Instruction for use

Gerkros NST Boiler

Technical Manual

Putting the boiler into operation:

ATTACK NST, NSK - WALL GAS BOILER

The boiler must be put into operation by a service worker trained by producer!

The boiler is set by the producer to natural gas G20, inlet gas pressure 2,0 kPa.

Before installation and putting the boiler into operation it is necessary to get acquainted with the instruction for use.

The NSK boiler is equipped with a waste-gas thermostat (B 11 Bs)

Before first putting into operation it is necessary to take following steps:

1.Check whether the heating system is filled with water and the boiler is deareated properly.
2.Make sure if all the valves are open.
3.Open the gas valve next to the boiler and test the sealing of the gas piping in the boiler

Procedure of the first boiler burning:

1.Plug the feeding flex into the 230V/50 Hz socket.
Test the socket with another appliance. The main switch of the boiler must be in the off position.
2.The button for setting the heating temperature and a room thermostat (if connected) set to maximum.
3.Put the mode switch to the position **winter**.
4.Check the proper operation of all the thermostats and control elements
5.Set the boiler output by the request of heated place.

ATTACK s.r.o.
Vrútky

Contents:

Technical manual

Introduction

Dear customer,

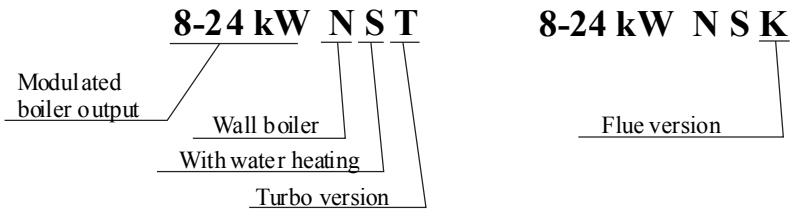
Thank you for confidence expressed by purchasing our product wall gas boiler ATTACK with smooth electronic output regulation. We wish you long and reliable operation, therefore you need to read this instruction for use carefully. The manual is written in the way to respect the right operation of the boiler in central heating.
The conditions of right operation of the boiler:
- choose the right type and output of the boiler
- impeccable putting into operation
- sensible operation
- regular technical maintenance
- reliable service

General description

The latest produced range of wall gas boilers is designed as an appliance with maximum effectivity and minimum emissions into atmosphere, saving environment considerably. The output is regulated smoothly, controlled by microprocessor in both the modes (hot water mode, heating mode) in all the output range of boilers and is modified to a building by heating loss and request for hot water. High technical level of boilers is supported by used top components from world producers.

NOTICE:
For the right working of the boiler it is necessary to keep a minimum water pressure of 1 bar (measured when the water is cold) in the heated system.

Description of ATTACK NST, NSK boilers brand:



Purpose of use:

The type range of ATTACK wall boilers (turbo and flue version) is produced with modulated output of 8-24 kW. They are used for heating or central heating of family houses, flats, shops and similar places where natural gas is used as fuel. The boiler is also equipped with a device for water heating.
As to installation, the boiler is built to operate with heating water to maximum hydrostatic pressure of 0,3 Mpa (3 bar) and operating temperature to 85°C with the connection to heating systems with forced flow of heating water in a closed system. The water in the heating system must suit to STN 07 7401 (it must not be sour in any case, which means that the pH-value must be higher than 7 and it must have minimum carbonate hardness, max. 3,5 m val/l). Filling pressure in cold system is of 1 1,5 bar. Filling must be done slowly to let air bubbles escape through proper deareating valves. For adjusting the water hardness in the heating system it is necessary to use recommended agents. **In the case of not following the rules above, there is no guarantee for damaged components.**

Installation conditions:

A gas boiler can be installed only by a company authorized to carry this works on the base of approved documentation of a projectant while respecting advice and notes in this manual. Before installation the installing company is obliged to check the right choice of the boiler type with regard to the functional attributes and required parametres. The boiler has a covering of electric parts IP 41 that is resistent against water dropping vertically. Therefore it can be installed in bathrooms in zone 3 (in the distance of 60 cm from the edge of the bath or shower corner). The room where the boiler is located must have the temperature in the range of +5 to +35°C with relative humidity to 80%.
It is not allowed to place things close to the boiler, in the distance of:
- 100 mm things from hard and medium inflammable materials
- 200 mm things from easy-inflammable materials

The first putting into operation and training of the boiler operators must be done by a contract service partner of the producer that makes regular maintenance as well as guarantee and post-guarantee service of the boiler. To the supply gas piping, a handy gas valve must be installed before the boiler which must be approachable but is not a part of the boiler accessories. Connecting the boiler to the heating system is through screw joints G 3/4“. Hot water as well as gas inlet is connected through screw joints G3/4“. Before installing the boiler it is necessary to make sure that the chosen place fits to requirements for waste gas escape and that minimum distances before mentioned are kept. As this boiler is fast-heating, equipped with its own pump, it is possible to connect it with gravity circulation as well as to a new system for forced water circualtion in the heating system. In the case of new distributions we recommend to use small-volume heating bodies and distributions in the smallest dimensions because of fast heating of the system to the temperature as well as big flexibility of the system. Connecting the boiler to the heating system and to the gas and hot water distribution is necessary to carry out so as not to strain connecting outlets of the boiler. Before connecting the boiler to the heating system it is necessary to flush it thoroughly to remove small impurities and mud.

The heating system must include a proper filter. To utilize the maximum output of the boiler it is necessary to ensure minimum pressure in the heating system of 1 bar for right functioning and long lifetime. A built in expansion tank enables connecting the boiler to closed heating system. **On hot-water inlet to the boiler it is necessary to install a magnetic or electromagnetic water treatment device.** The boiler is to operate on natural gas of 20 mbar nominal pressure in the distribution net. The boiler is located so as to ensure necessary operating conditions whether it is an appliance with open combustion chamber (flue) or with closed combustion chamber (turbo) and with regard to the ways of combustion air supply and waste gas exhaust.

Conditions of service:

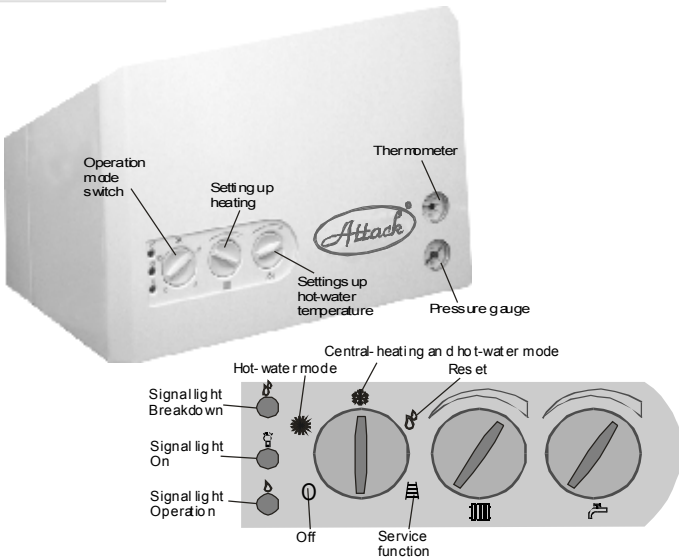
The service of the boiler must be carried out by the rules described in this manual. Except service works, the user must not carry out any repairs on the appliance nor adjustments or dismounting and cleaning the inside parts of the boiler. The boiler can be operated only by an adult. After leaving home in winter (on holiday...) a supervision by a trained person is needed. If there is a danger of approach of inflammable (combustible) gases or fumes to the boiler (e.g. when lying a PVC flooring), it must be put out of action early. The user is obliged to take care of proper use of the boiler according to this instruction which is also a condition to acknowledge guarantee. When putting the boiler to operation, the service worker must instruct the user about boiler operating. **The user with his or her signature in the letter of guarantee confirms having been instructed with the boiler operating.**

Technical description

Fast-heating wall boilers ATTACK NST, NSK are equipped with copper heat-exchangers protected on surface with silicone coating on the base of aluminium, resistent to 430°C. These are exchangers with separated systems to warm up hot water and heating water. A big adventage of this exchanger is place and weight saving. Maximum operation pressure for heating circle is 300 kPa (3 bar) by 85°C, for hot-water circle 600kPa (6 bar) by 60°C. Minimum operation pressure is 100 kPa (1 bar). The heat-exchanger is located in the upper part of combustion chamber and is fitted with an automatic deareating valve, which leads over closing chamber. For minimum loses during heat transmission it is necessary to keep the surface of heat-exchanger lamellas clean.
The source of heat is a gas burner of modern unit-built design made from stainless steel. It is located in the bottom part of combustion chamber. There are two electrodes in the burner. One of them is a spark ingition electrode, another is a inonization probe for burning control. Combustion chamber is made from aluminium-coated steel plate with inside thermal insulation. Over the combustion chamber (NST) is a waste-gas collector with a fan for waste-gas draw. With the help of silicone tubes is the fan connected to a switch of differential pressure (manostat). In the flue version (NSK) there is a draw breaker with a waste-gas thermostat. In the upper part of the exchanger there are thermal probes for heating and hot-water system. The inside water piping in the boiler is made from copper pipes. Closing chamber of the boiler (NST) is made from aluminium-coated steel plate. Openings in the closing chamber are sealed with silicone seal. On hot water inlet there is a water-passage sensor installed. Fast-heating wall boilers ATTACK NST and NSK are equipped with automatics and continuous regulation of output.

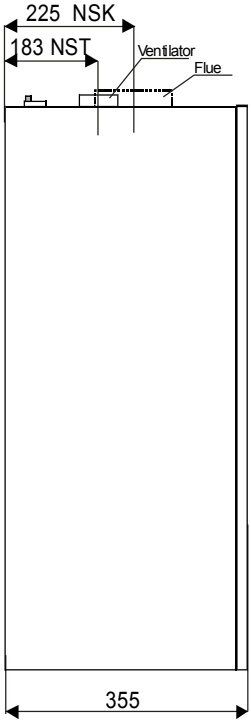
The control centre for controlling boiler operation is a modulation electronic board equipped with a microprocessor. Sensor state and value is scored by software which also gives orders to active elements gas valve, ignition electronics, circulation pump. On the inside distribution of heating water outlet there is an emergency thermostat, pressure switch and pressure gauge signalling the pressure in the heating piping.
In the case the temperature of outgoing heating water overcomes 95°C, the emergency thermostat puts the boiler in emergency condition following by putting it out of operation. In the case the pressure in the heating system falls under 1 bar, the pressure switch puts the boiler out of operation. In inside distribution of heating water inlet there is a 3-bar-safety valve and a circulation pump. In the bridging of hot water inlet and heating water inlet there is a ball valve serving for filling the heating system from the distribution net. In the rear part of the boiler there is an 8-liter expansion tank connected with the pump. Outside case is treated with dust paint with thermal endurance up to 180°C.

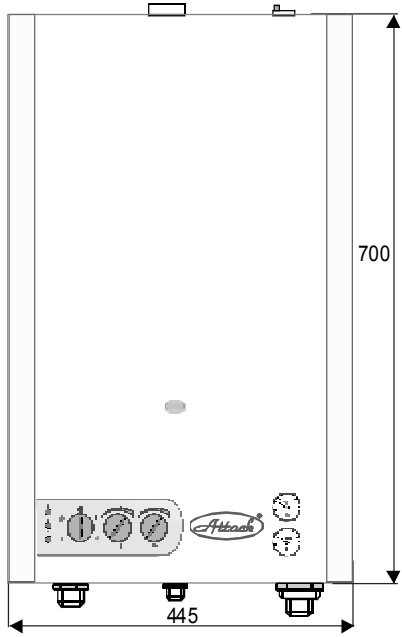
Control front board of the boiler

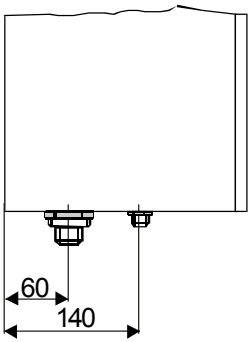


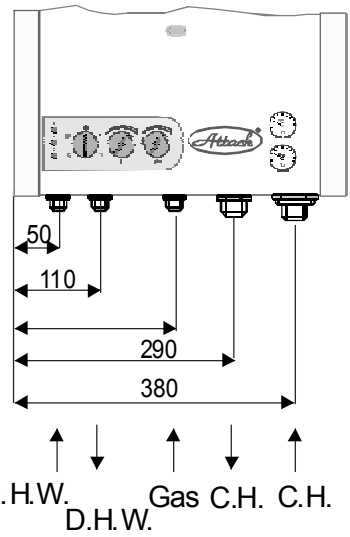
The thermometer and pressure gauge take the temperature and pressure in the heating system. With a button for setting the heating temperature, a user can set the temperature of water in the heating system in the range of 35 - 85°C. The recommended range is 55 - 85°C. With a control button for setting up hot-water temperature, a user can set requested outlet temperature of hot water in the range of 35 - 60°C. Signal light *Breakdown* signals a condition, when the electronics did not manage to burn the boiler (e.g. because of gas delivery failure). Return to operation condition can be made by brief turning the operation mode switch into the right extreme position (reset) when controlling the boiler operation. The signal light *Operation* signals burning of the boiler. The signal light *On* serves to signalling of starting the boiler mode. The operation mode switch has these positions:
– the boiler off
– summer operation (hot-water preparation on, heating off)
– winter operation (hot water and heating on)
– unblocking the boiler breakdown (reset)
– service testing function

Outside dimensions of the boiler :

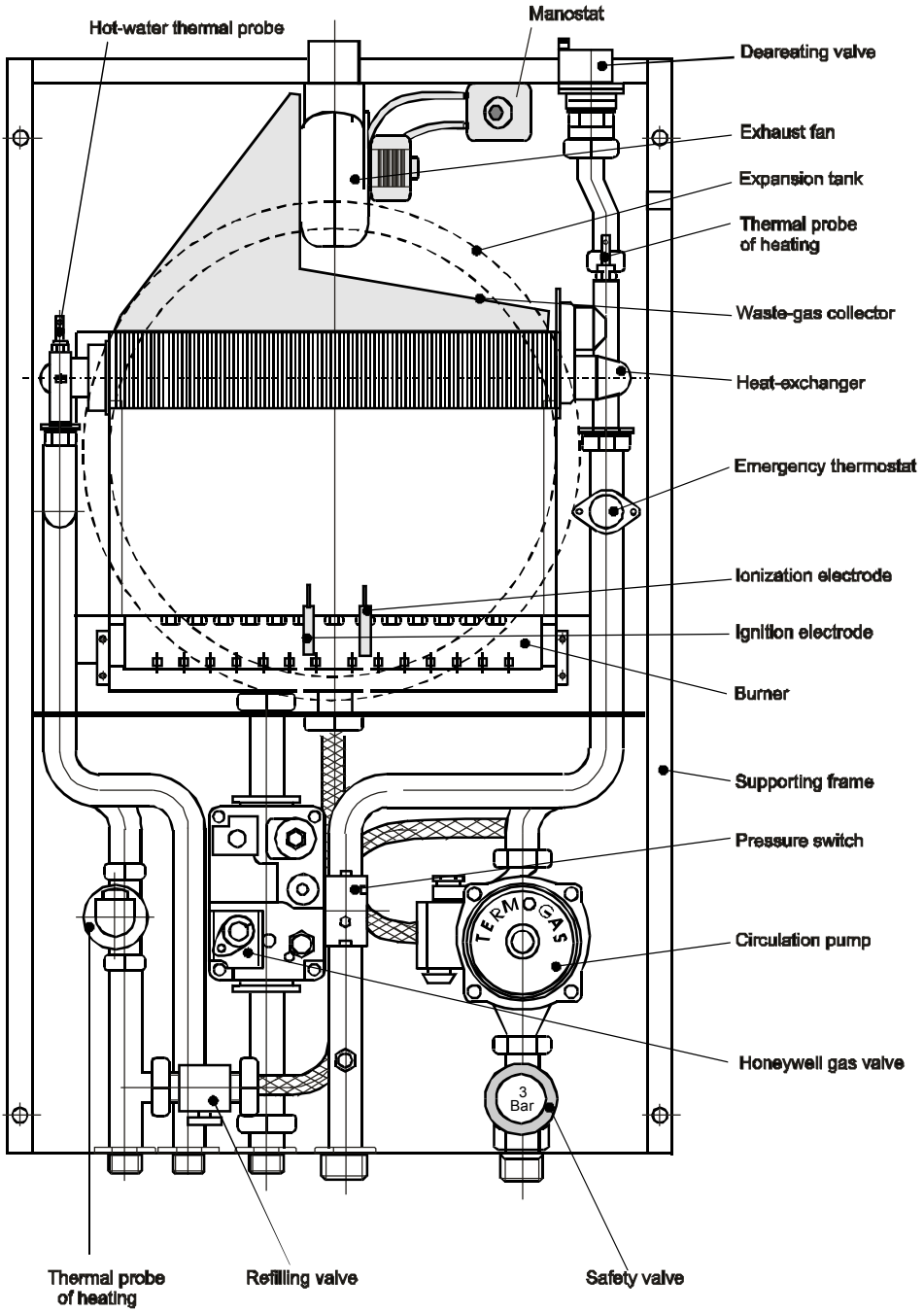




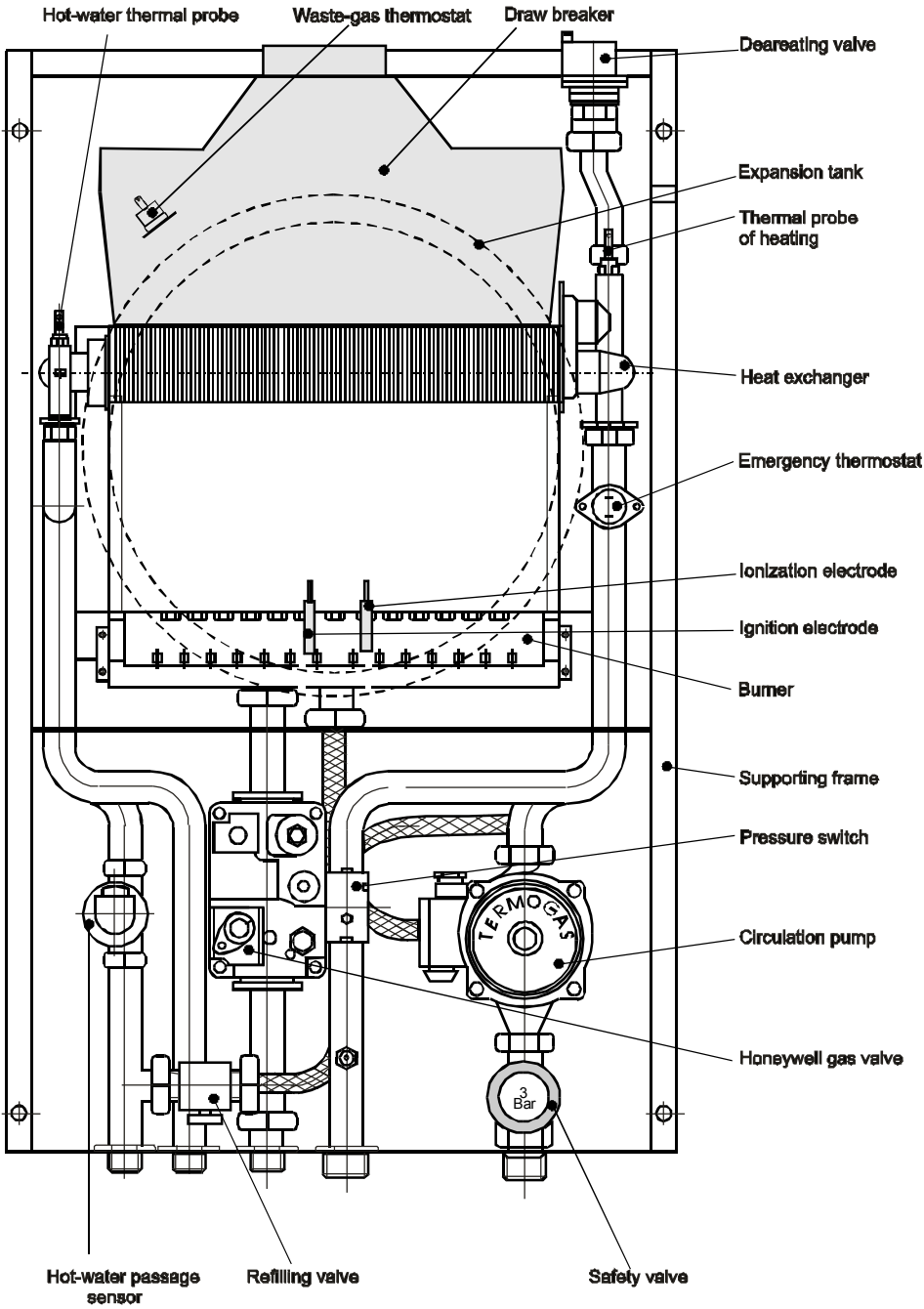




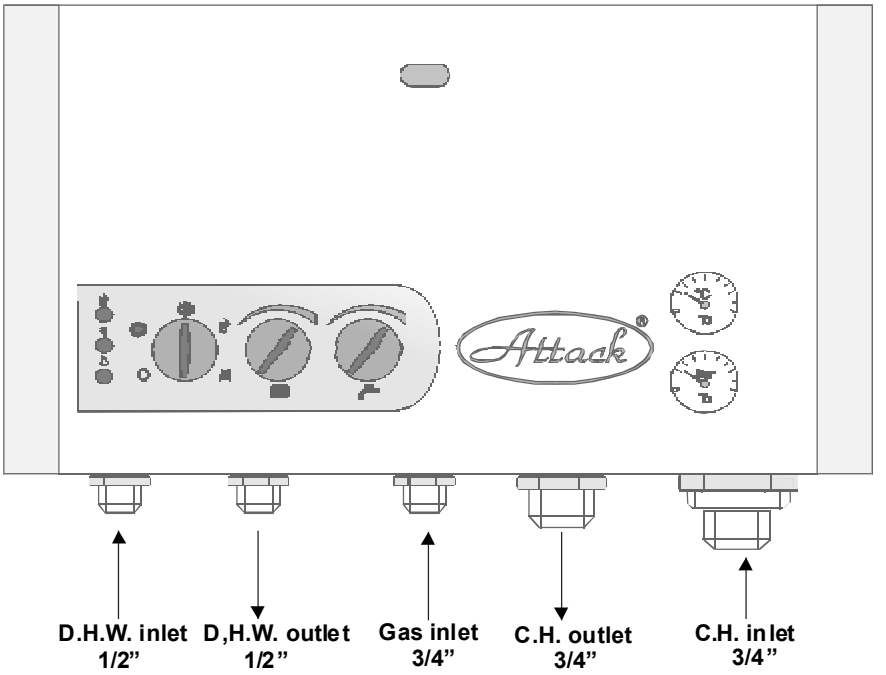
Main parts of the NST boiler :



Main parts of the NSK boiler



Connecting the boiler to water and gas:



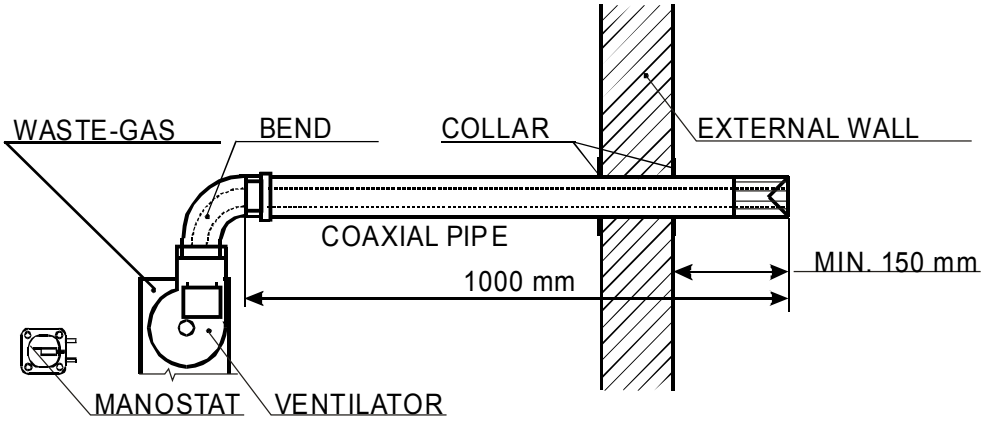
Connecting the boiler to electric net

The boiler is plugged into the electric net socket with a supply lead with a plug. The socket must suit to appropriate standards , various multiplugs and lenghtening cables are not allowed to use. Installation of the socket, connecting the space thermostat and service of electric parts of the boiler can be only performed by a person with special electric qualification by the Public Notice No. 718/2002 Z.z. Electric installation is ready for additional connection of room thermostat.

Operation control

During the operation the boiler is secured against dangerous operation conditions. However, the breakdowns the cause of which is not included in the boiler mechanism, cannot be protected to arise. Therefore it is necessary after putting the boiler to operation to examine the boiler once in three days and check:
– whether the system is filled with water and there is no discharge
– whether waste gases or gas cannot be smelled
Found breakdowns must be reported to the service worker who put the boiler to operation. If there is a gas discharge, the gas supply must be closed. Found breakdowns must be removed immediately.

Waste-gas exhaust



Waste-gas exhaust and combustion air come through double piping (turbo version) delivered by the boiler producer which can be ordered in required amount by the project (horizontal or vertical exhaust) including sealing collars, roof reducing piece and so on.

Conditions of waste-gas exhaust outlet through the external wall:

– the outlet must protrude 150 mm minimally from the external wall of a building
– minimum height over the ground to a space publicly inapproachable is 1 m
– minimum height over the ground to a space publicly approachable is 2 m
– the outlet must not lead to an explosive and inflammable space
– if in the up direction there are some inflammable materials on the building, it is necessary to keep vertical distance of 1,5 m from the outlet

Maximum length of double waste-gas exhaust permitted by the producer:

– horizontal piping of 3 m measured from the bend on the boiler to the outlet on the facade
– vertical piping of 2,7 m measured from the boiler to the bottom edge of a roof reducing piece
– each 90° bend inserted shortens the length in 0.75 m and a 45° bend shortens it in 0.5 m

Spare parts

The producer keeps single parts of boilers as spare parts which are provided for guarantee and postguarantee service only to contract partners on the base of order or reclamation.

Guarantee, reclamation

The exact reading of guarantee and guarantee conditions and hints for reclamation are included in the letter of guarantee. Repairs in the guarantee time are performed only by contract services.

Attention!

To respect the conditions of guarantee, the producer does not permit performing any repairs by a company other than a contractor service in the guarantee time.

Service

After each year of the operation during the guarantee time it is necessary to get the boiler examined and adjusted by a contract company. Until this is not performed, the guarantee will not be admitted. Even after finishing the guarantee time the producer recommends any interventions aiming to repairs to be made only by a contract service partner. The activities of the boiler user in the post guarantee time are determined in the part „Maintenance".

Maintenance

Regular maintenance is important for reliable working of the boiler, long lifetime and combustion effectivity of the boiler. The user is recommended to contact a contract service organization nearby and ensure regular annual examinations (see conditions for guarantee). A service worker checks control and safety elements of the boiler, gas and water distribution sealing or cleans the burner and exchanger from burnt dust particles. For faultless operation of heating system it is necessary to check regularly the pressure of water in heating system (min. 1 bar, measured when the water is cold). In the case of lower pressure it is necessary to refill water into cold heating system. The outside coat of the boiler can be cleaned with a rag soaked in soapy water and then dried with a dry one.

Wrapping, transport, storing

Boilers are transported in vertical position. To prevent possible damage, they are protected by a carton wrapping. The wrapping is secured by an adhesive tape. The boiler must be stored in non-aggressive space with the temperature of +5 up to +50°C in maximum relative humidity of air of 75%, without presence of organic steams, gases and dust.

Boiler accessories and documentation

ATTACK NST, NSK boilers are delivered completely assemblied and tested functionally. The delivery includes following documentation:
– instruction for use with a document on boiler testing on the back side of the instruction
– letter of guarantee, list of contract partners

Technical parameters

Table

Max. min. output of heating	kW	24-8
Max. min. output of hot water	kW	24-8
Gas consumption - natural gas	m^3/hod	0,9-2,7
Effectivity	%	90 92
Electrical supply	V/Hz	230/50
Control of room thermostat	V	24
Min. max. pressure in heating	bar	0,8-3
Min. max. pressure of hot water	bar	1-6
Expansion tank volume	l	8
Weight	kg	40
Passage of hot water heated in 25 °C	l/min	13
Passage of hot water heated in 35 °C	l/min	9
Outlet heating temperature regulation	°C	30-85
Outlet hot-water temperature regulation	°C	30-60
Waste-gas exhausting diameter ⌀	mm	130
Forced waste-gas exhausting diameter⌀	mm	100/60
Electric input	W	130
Connecting gas pressure	mbar	20
Electric standard	-	IP 41
Number of nozzles	pcs	13
Nozzle diameter NST ⌀	mm	1,15
Nozzle diameter NSK ⌀	mm	1,25
Nox	ppm	20-50
CO	ppm	7-14
Fuel	-	Natural gas

TECHNICAL MANUAL FOR ASSEMBLY AND SERVICE COMPANIES

Installation of boilers

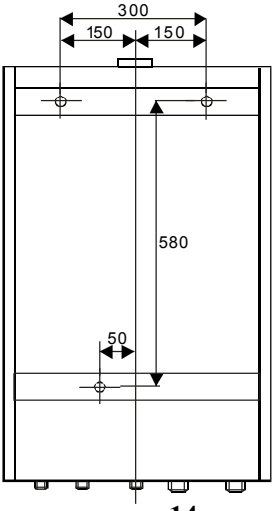
A boiler can be installed only by a company with an appropriate certificate for assembly of gas appliances. Connecting of the boiler must also suit to valid standards, rules and instruction for use. ***The producer is not responsible for damages caused by wrong connecting.***

Localization of boilers

Localization of boilers must suit to project documentation. Boilers are to be situated in the way to ensure all the operation conditions needed for an appliance with open combustion chamber (flue) as well as for closed combustion chamber (turbo) with regard to the way of combustion air supply and waste gas exhaust. From the sides of boilers there must be free access of at least 0.2 m and in front of boilers of 1 m for assembly and service. Boilers must be installed at least 0.1 m over the floor. The flue version has an open combustion chamber so it takes air for combustion directly from the room where the boiler is placed. The room can be ventilated through ventilating openings into surrounding atmosphere or indirectly through neighbouring rooms. The neighbouring room, where the air is sucked from, must not be a bedroom or a part of the house where there is danger of fire e.g. store of inflammable materials or a garage.

Hanging boilers on the wall

Mounting boilers on the wall must be performed on the base of qualified assessment of the wall bearing capacity (by a project worker or assembly company) so as to guarantee safe and reliable hanging of boilers. Boilers are necessary to mount to the wall with a suitable connecting material (e.g. screws and dowels) regarding the quality of the wall.



Connecting boilers to heating system

ATTACK boilers serve for heating systems with forced circulation. Rate of water flow can be set by the switch on the pump. Before filling the heating system with water, it is necessary to clean the system properly. Heaters and distribution must be washed several times. For thorough washing and cleaning the heating system we recommend to use cleaning agents. On the inlet from heating system and hot water to boilers, filters must be mounted. We recommend brass filters with side cleaning. The filters must be cleaned once a year minimally. Maintenance of the boiler is easier when on the inlet as well as on the outlet of heating there is a valve. In the hot-water circuit, the valve is recommended to mount in the inlet to the boiler before the filter. Filters and ball valves are not delivered as boiler accessories. Clogged filters can cause higher noisiness of boilers. Outlet from safety valve is necessary to connect to discharge piping. ***Guarantee does not apply to the cases of clogging the exchanger or pump by impurities from the system.***
The hardness of water in the heating system is not recommended higher than 3.5m val/l. In boilers there is an 8-litre pressure expansion tank enabling connecting to a closed heating system. If it is required by the size of the heating system, it is necessary to mount another pressure expansion tank. The recommended temperature difference between outcoming and incoming heating water from a boiler is 15 - 20°C. For reconstruction of heating or a new system we recommend small-volume heaters and distributions in the smallest dimensions regarding to fast rise of the system to the temperature and quite a big flexibility of the system. Process of water filling: when filling with water, boiler must be disconnected from electricity, deareating valves on the boiler and heating system must be open. Set the system to the pressure of 1 bar, then deareate and set to the pressure again (1.5 bar when it is cold).

Connecting to water piping

Maximum permitted overpressure of water from piping is 6 bar. Users of boilers are reminded to pay high attention to the quality of water used to heating system and water heating. On the inlet of hot water to a boiler there must be a magnetic or electromagnetic water treatment device installed.
Guarantee does not apply to the cases of incrustation of the heat exchanger or pump.

Connecting boilers to gas pipeline

Before connecting a boiler to the gas pipeline, the pipeline must be tested and adjusted. After connecting to a boiler, all the gas connectors must be tested, including piping and fittings in the boiler. Bolted connections of the gas pipeline as well as those of the water piping and heating water piping must not be stressed by any additional force.

Connecting a spatial thermostat (regulator)

A spatial thermostat is not a part of boiler accessories but it can be connected into a boiler by the request of a customer. Voltage for switch contacts of the spatial thermostat is 24 V. Connecting of the spatial thermostat into the boiler is illustrated on the connection chart. Connecting terminals for the thermostat are
interconnected by a jumper. After connecting the spatial thermostat to the terminals the jumper is to be removed.

Connecting to a flue. NSK version

ATTACK NSK boilers in the flue version are connected to a flue with an exhaust branch of 130 mm diameter. Connection to the flue must be done by the appropriate rules.

Connecting of coaxial pipe. NST version

Air inlet for combustion and flue gas exhaust is carried out by pipe in pipe elbow 90° and pipe in pipe 1m long. Additional accessories 90° and 45° albows or pipes 0,5 and 1m long is possible to purchase on request. The maximum lenght, admitted by the producer, of coaxial waste gas exhaust is 3 m horizontally and 2,7 vertically, measured from the boiler to the outlet on the facade or to the bottom edge of the roof reducing piece. Each 90°bend shortens the lenght in 0.75 m and a 45°bend in 0.5 m. The whole pressure loss of the piping must not be bigger than 80 Pa. Coaxial piping must have a slope of 3° from the boiler out.

Putting the boiler into operation

Putting into operation, checking and setting minimum and maximum output of the boiler as well as the repairs can be carried out only by firms authorized to this and trained by the producer (list of the contract service partners is in the supplement).

Duties of a service worker when putting the boiler into operation:

– check whether the installation of the boiler and accessories suits to the project and boiler inspection.
– check the deaeration of the boiler and heating system (the bolt on the automatic deaerator must be released)
– check the water pressure in the heating system (minimum of 1 1.5 bar in the cold system)
– check if the safety valve is working
– check the connecting to the gas pipeline as well as control and safety elements and test the sealing of the gas pipeline from the main pipe seal up to the burner in the boiler
– check electric socket connecting and electroinstallation inspection
– check the waste gas exhaust
– check the flue inspection
– check the minimum and maximum output by measuring the pressure on burner nozzles
– set the output of the boiler by a thermal loss of the heated place
– test the regulation of heating

– check the operation of summer and winter mode, regulation of hot-water heating
– set appropriate pump speed and pressure in the heating system
– test function of ball valves before the boiler
– get a user acquainted with the boiler attendance which is confirmed by the user´s signature in the letter of guarantee
– write down putting the boiler into operation to the letter of guarantee and instructions for use

Integrated control system of boiler of type AM 56 IMS 02 code 16 562

Description:
Control automatics of the AM 56 IMS 02 type for hanging gas boilers with instantaneous water heating, double heat exchanger and automatic ignition.

Control functions of automatics include ignition of flame, its control and smooth modulation. Automatics has two functional units:
– burner control unit (ACCF)
– flame control and modulation unit (CMF)

General properties:

– signalling of working and breakdowns with the help of LED lights on the board
– elimination of disturbing caused by ignition and contact switching
– control of a circulation pump with a run-out function after the request for heating
– control of a ventilator and air flow with a run-out function
– earthing connector on the board
– 2A fuse on the board
– connecting the phase, neutral conductor and earthing on the entry with the help of connector on the board
– connecting the spatial thermostat with the help of connector on the board
– connecting the emergency thermostat
– option of operation mode and reset by a switch on the board
– stopping the burner in the case of primary thermal sensor failure (breakdown or short)
– manual reset

Section of flame modulation

– setting the boiler mode by P1 switch on the board
– setting starting output with the help of P5 trimer
– setting central heating and hot water temperature with potentiometers on the board
– control of hot water temperature with a thermal sensor on the outlet
– control of heating temperature with a thermal sensor on the outlet
– anti-fast cycling function in the heating mode which can be set to 180 seconds or cancelled (by inserting a jumper) with JP3 on the board
– setting the burner output in the heating mode with P4 trimer on the board

Operation

Hot-water mode

Hot-water mode is switched on by an information from the water passage sensor when the passage is bigger than 3 l/min. After opening hot water, the circulation pump of the heating circuit stops. Starting output (set up by resistance trimer P5) is kept after burning the boiler in the time of two seconds. Then the boiler output is controlled by PID regulation by the passage and temperature of hot water to reach the set temperature as soon as possible. When the water passage drops under 2.5 l/min, the operation phase of hot water mode finishes. If the set up temperature in the heating mode is over 55°C by the passage of hot water of 3 l/min, this temperature will be limited to 50°C to prevent incrustation in the heat exchanger. If the outlet temperature of hot water reaches 70°C, the burner is off. After finishing the request for hot water the pump starts working to limit incrustation. Run-out time of the pump changes from 0.4 to 2 seconds depending on the temperature in the heating circuit in the time of request for hot water. In the case of parallel requests the hot water mode is preferred to heating mode. If the J5 jumper is positioned in the ON position, the run-out of the pump at the end of the request for hot water is always 2 seconds.

Heating mode

Operation phase in the heating mode starts when a spatial thermostat puts a request for heat and the operation switch (P1 potentiometer on the board) is in the ***winter*** position. The pump and ventilator are activated and after verifying air flow, the burner control unit is activated. Starting output is kept in the time of two seconds after burning the boiler. Then the boiler output is controlled by PID regulation until the set temperature for central heating is reached. In the case the water overcomes the set value in 5°C, the burner is off. The burner is reignited by the temperature 5°C lower than set value until the anti-fast cycling time is over. The anti-fast cycling function is over until the contacts of the room thermostat are broken and switched. When the JP4 jumper is set to ON position, the range of temperatures is lowered to values suitable for floor heating.
Note: Always must be used an appliance limiting high temperature (to protect floor heating)

Pump control and circulation

The pump starts in the moment of the request for heating or hot water. At the end of each request for heating the pump keeps working for 180 s more. If after working time the boiler signals a failure in heating mode, the pump works on all the time as a run-out in the heating mode.

Anti-blocking-pump function

After 24 hours of not working the pump is activated to 150 s. After breaking electrical supply, the first cycle of anti-blocking-pump function starts after 3 hours of not working.

Anti-freezing function

If a thermal sensor of the heating circulation finds a decrease of temperature of under 6°C, the pump is activated and burner starts with minimum output. This lasts until the 25°C temperature is reached and then the anti-freezing function stops working. This function is active even when the operation switch is in SUMMER position and in emergency mode (stand-by). If there is a failure in the boiler, only pump is activated.

Control of ventilator, air flow and waste gas (NST version)

If there is a request for ignition, burning automatics at first tests the condition of manostat. If it is in a still position, burning automatics switches the waste gas exhaust ventilator. If the ventilator is operating and the exhaust is clear, the manostat switches into working position and the boiler is burned. Difference pressure must be over 80 Pa.
After each blowing out the ventilator keeps working 20 seconds more.

The type with open combustion chamber. (NSK version)

In this version, if there is a request for heat, the burner control unit is activated after activating the pump and verifying the water passage. In the case of failure (rising temperature because of wrong waste gas exhaust) the waste gas thermostat breaks contacts, the burner blows out and a failure is signalled. Reignition is not possible for 30 minutes. This time period can be cleared (reset) with the operation switch.

Service testing functions

If this function is chosen, the boiler starts working in the heating mode to the maximum output of the burner and maximum temperature of the heating water (80°C). The burner is off after reaching the maximum switch-off temperature (85°C). If there is a request for hot water, this function is interrupted and the request is postponed. This function can last 15 minutes maximally and then it is necessary to switch the operation switch to some of other functions and then back to this function.

Signalling

	Red LED	Green LED 1	Green LED 2
Boiler off	X	OFF	X
Boiler in emergency mode	OFF	ON	OFF
Breakdown - ignition mode Breakdown - overheating	ON	ON	OFF
Parasitic flame, error in ACCF unit	ON L	ON	ON L
No water pressure Lack of air -	ON	ON	OFF
Waste gas thermostat open	ON LA	ON	ON LA
Sensor damaged	OFF	ON	ON L
Flame presence	OFF	ON	ON

ON = lighting
ON L = flickering
ON LA = flickering alternately
OFF = no lighting

X = all the error signallings possible

Functions of the BERTELLI automatics in MAXIMUS RZT, RZK boilers

If the spatial thermostat is not connected, the pump keeps working even if the boiler is off.

If the spatial thermostat is connected, the pump is in operation after switching off the boiler during 180 seconds.

	Broken	Switched
JP1	natural gas	LPG
JP3	anti-cycling function - waiting for 180 s between switching off and on	switched on immediately after dropping the heating water temperature under set up level
JP4	heating water by set up	floor heatig - watching the temperature of of heating water - 40°C maximally
JP5	Run-out of the pump for 0,4-2s by the temperature of heating water	run-out of the pump after hot-water heating is always for 2 s

Anti-cycling function

Time of anti-cycling begins when the tempearute of heating water overcomes the temperature set up by the boiler or spatial thermostat in 2 - 3°C. Before that, the ouput has been modified to minimum by microprocessor and then gas inlet was stopped. During this time the boiler is off and must not be switched on despite the heating water having been cooled. Anti-cycling time in the range of 0 to 180 seconds is set up by JP3 jumper. Normal burning begins when the anti-cycling time is over. This function prevents the boiler working in a small circuit (e.g. closed heating valves) to burn and turn out. If there is a request for hot water during this time, the immediate burning on starts. Short-circuiting of JP3 jumper causes disabling of this function. The boiler then reacts without stopping, burns on immediately after dropping the temperature of heating water (if the spatial thermostat is on).

Run-out of the pump

The run-out time starts in the moment of switching off the boiler by the thermostat. At the end of each request for heating, the pump stays in operation for 180 seconds more. The run-out of the pump has 2 important functions:

– it cools heat-exchanger to prevent overheating
– in the run-out time, the temperature differences on heating bodies are equalized

The run-out of the pump by the request for hot water is set up by JP5 jumper. When the jumper is in OFF position, the run-out is 0.4 - 2 seconds, in ON position the run-out is always 2 seconds.

Technical parameters

Supply

Supply voltage	230 V +10%-15%
Inner fuse	2AF 250VAC
Ground resistance	10 mΩ

Contact loading

Outlet to main valve	230 V 0,1A MAX cos 0,4
Outlet to pump	230 V 0,4A MAX cos 0,4
Outlet to ventilator	230 V 0,35A MAX cos 0,4

Functional paramaters

Operation temperature range	-20 °C/+60 °C
Range of set up of hot-water temperature	+35/+60 °C
Starting temperature for function of limiting hot-water heating	70 °C
Range of heating temperature set up	+30 °C/+80 °C
Range of floor-heating temperature set up	+20 °C/+40 °C
Switching-off heating temperautre	+35 °C/+85 °C
Switching-on heating temperature	+25 °C/+75 °C
Operation thermostat temperature	10 K
Timing function against repeated starting	0 alebo 180 sek
Switch-on temperature of anti-freezing function	6 °C
Switch-off temperature of anti-freezing function	25 °C
Slow-ignition timing	2 sek
Supply to a modulator natural gas	45-220 mA +-7,5%
Supply to a modulator LPG	65-310 mA +-7,5%
Power regulation range for slow ignition	0-80% I max
Power regulation range for maximum heating output	0-100% I max

Thermal probes

Electric parameters

Resistance by 25°C	10 k +-1%
B (25 80°C)	3435 +-1%
Insulation resistance	10 mΩ A 500 VDC

$$R_T = R_{TO} \times e^{B \times (\frac{1}{T} - \frac{1}{T_{10}})}$$

RT - resistance by requested temperature
RTO - resistance by 25°C
T, TO - temperature in K

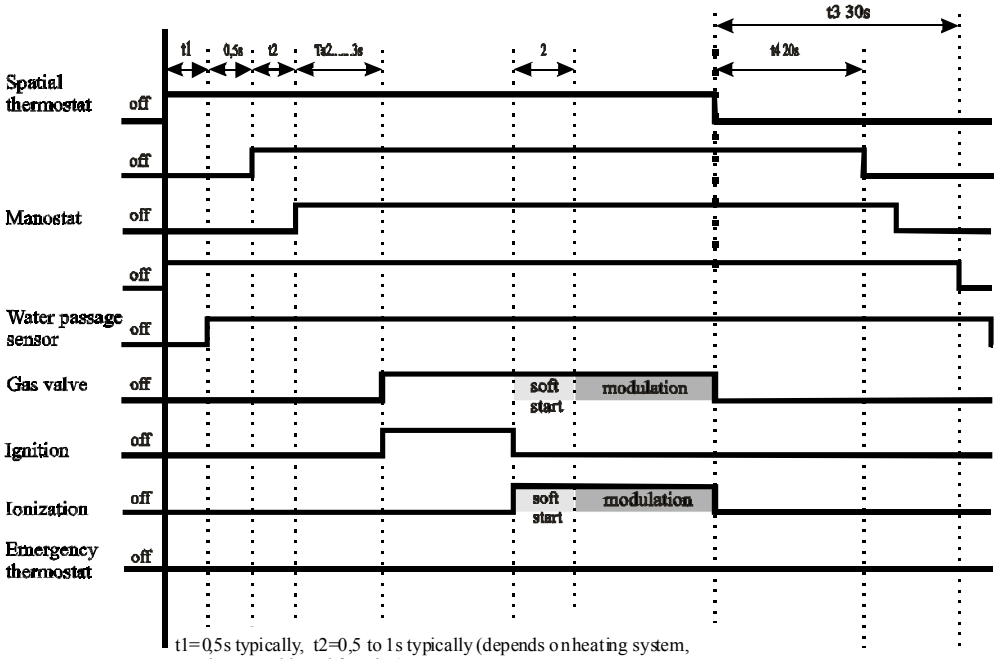
Table of relation between resistance and temperature

Temperature °C	Resistance k Ω	Temperature °C	Resistance k Ω	Temperature °C	Resistance k Ω
-30	111,3	16	14,17	62	2,83
-29	105,7	17	13,62	63	2,74
-28	100,5	18	13,09	64	2,66
-27	95,52	19	12,59	65	2,58
-26	90,84	20	12,11	66	2,50
-25	86,43	21	11,65	67	2,43
-24	82,26	22	11,21	68	2,35
-23	78,33	23	10,79	69	2,29
-22	74,61	24	10,39	70	2,22
-21	71,10	25	10,00	71	2,15
-20	87,77	26	9,63	72	2,09
-19	64,51	27	9,27	73	2,03
-18	61,64	28	8,93	74	1,97
-17	58,68	29	8,61	75	1,92
-16	55,97	30	8,30	76	1,86
-15	53,41	31	8,00	77	1,81
-14	50,98	32	7,71	78	1,76
-13	48,68	33	7,44	79	1,71
-12	46,50	34	7,18	80	1,66
-11	44,43	35	6,92	81	1,62
-10	42,47	36	6,68	82	1,57
-9	40,57	37	6,45	83	1,53
-8	38,77	38	6,23	84	1,49
-7	37,06	39	6,01	85	1,45
-6	35,44	40	5,81	86	1,41
-5	34,48	41	5,61	87	1,37
-4	32,96	42	5,42	88	1,33
-3	31,52	43	5,24	89	1,30
-2	30,16	44	5,06	90	1,26
-1	28,85	45	4,89	91	1,23
0	27,62	46	4,73	92	1,20
1	26,44	47	4,57	93	1,17
2	25,32	48	4,42	94	1,14
3	24,25	49	4,28	95	1,11
4	23,23	50	4,14	96	1,08
5	22,27	51	4,01	97	1,05
6	21,34	52	3,88	98	1,02
7	20,46	53	3,75	99	1,00
8	19,63	54	3,64	100	0,97
9	18,83	55	3,52		
10	18,07	56	3,41		
11	17,34	57	3,30		
12	16,65	58	3,20		
13	15,98	59	3,10		
14	15,35	60	3,01		
15	14,75	61	2,91		

Ignition and ionization unit (ACCF)

Definition
Electronical appliance for control of flame by the ES 298, for direct ignition of the burner by discharge spark and monitoring presence of flame with ionization electrode.

Heating, time schedule



t1=0,5s typically, t2=0,5 to 1s typically (depends on heating system, not the control board function)
t3=run-out of the pump, t4=run-out of the ventilator

Technical parameters

Flame detection

Minimum ionization current	>1.2 uA
Maximum length of ionization cable	1 m
Maximum parasitic capacity	1 nF
Minimum resistance of ionization electrode and cable to ground	50 mΩ
Short-circuit current	>200 uA

The circuit measuring amplifier sensitivity

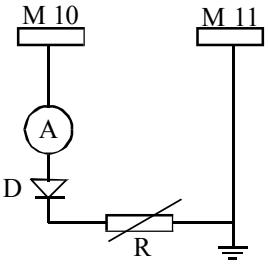


Table of values (230V~50 Hz):

	Štart ON	Prevádzka ON	Prevádzka OFF
Ionizačný prúd I(uA´)	<0.6+-10%	>1.2+-10%	>0.9+-10%
Odpor plameňa R (mΩ.)	>140+-10%	<70+-10%	<95+-10%

Ignition

Ignition voltage	16 kV cca (záťaž 40 pF)
Distance of ignition electrode	4 mm (max)
Frequency of sparkle repeating	10 Hz
Maximum lenght of ignition cable	1 m
Ignition transformer	typ b&p

Working programm and times

Autotest time	2,2s +15% / -10%	A 230 V ~25°C
Safety time		10 s
Manufacturing tolerance of safety time	8s +10% / -15%	A 230 V ~25°C
Reaction time of switch-off		< 1 s

Basic functional characteristics

– detection, polarity
– interrupted run (interruption every 24 hours at least)
automatic reset

Working in the case of failure

- If there is flame simulation, ignition is stopped
Note: If CMF unit finds flame simulation, it reports anomaly and if this situation lasts longer than 15 seconds, the request for heat is stopped (it is switched off by a relay). A new try for ignition can occur only after resetting the system with the operation mode switch.

– Repeated cycling in the case of flame failure during operation

– The failure that can be remedied by switching off and on the main supply of power if the flame is not present

Note: The CMF unit can resolve the breakdown caused by ignition failure because of switching off, when the highest temperature was overcome. The unit induces appropriate anomaly and switchess off the relay requests for heating. A new attempt for ignition can start after resetting the system by the operation mode switch.

Functional failure: Overheating

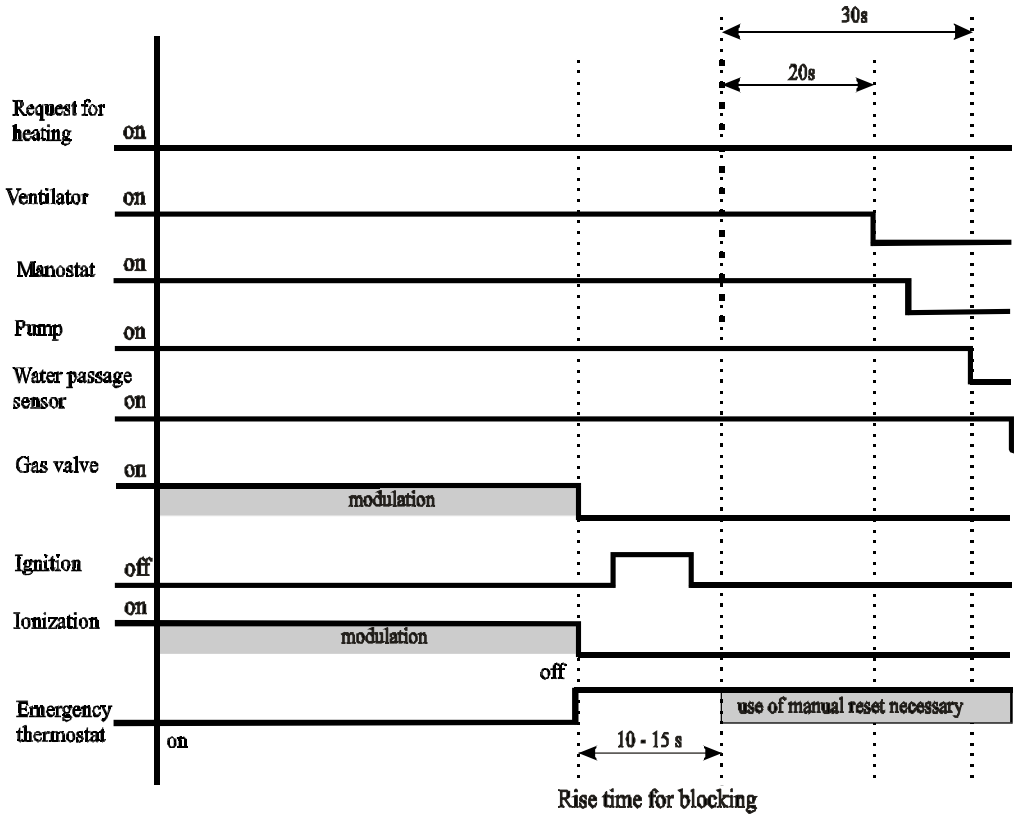
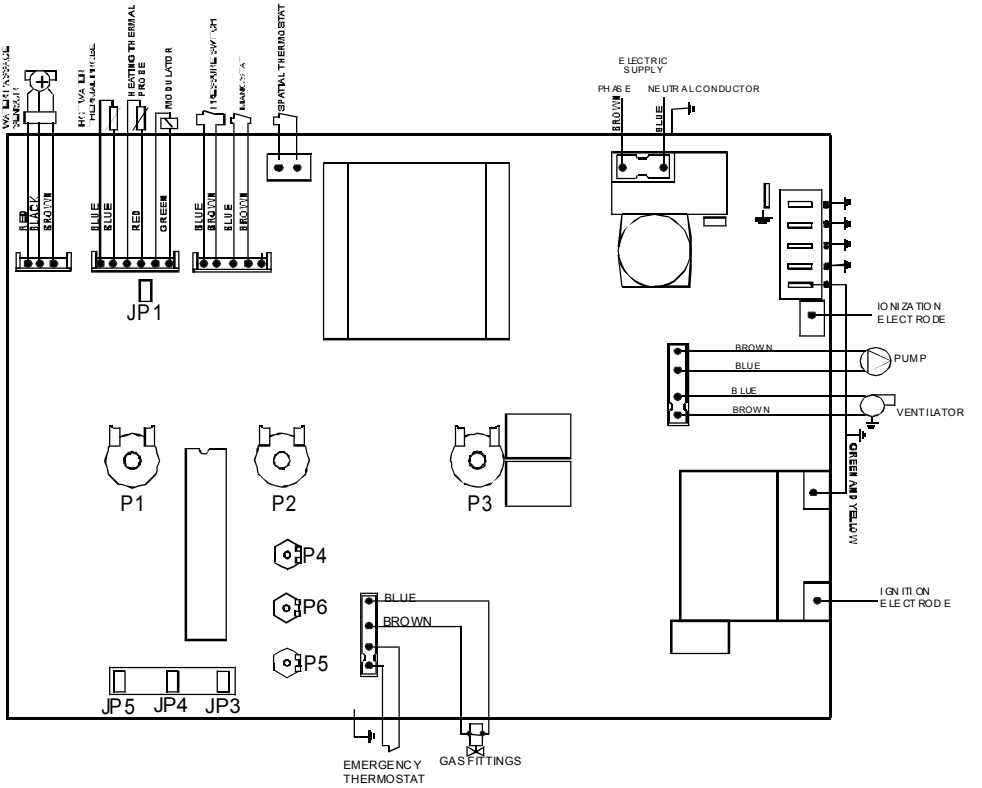
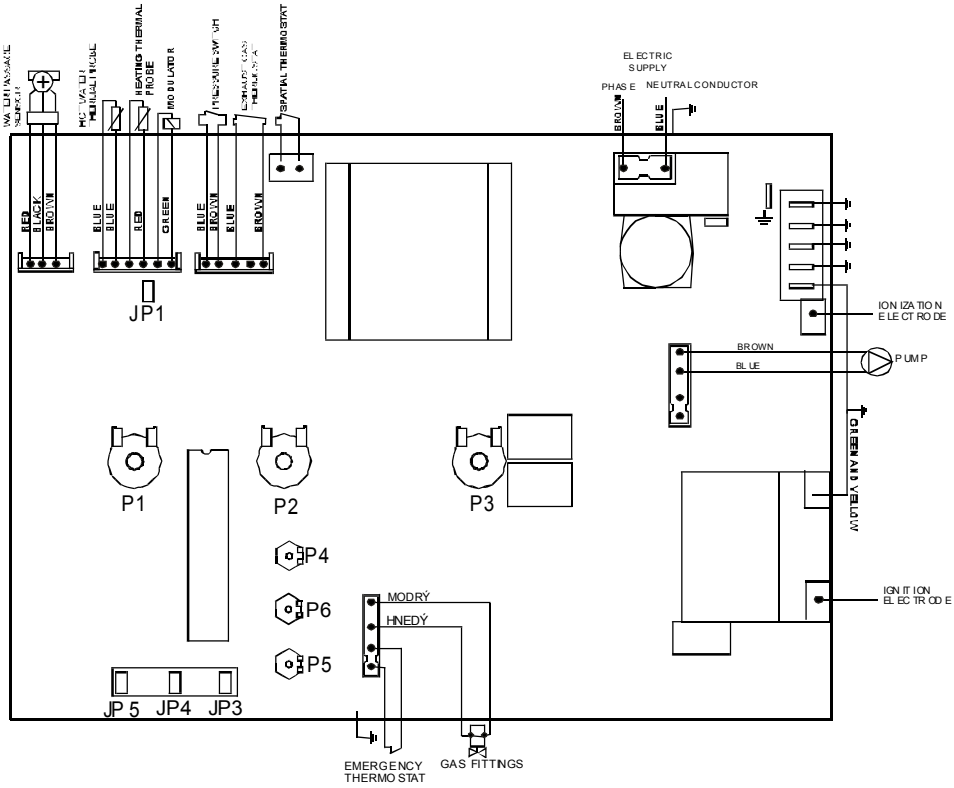


CHART OF "ATTACKNST" CONNECTING



P1	Operation mode switch	JP1	Fuel setting
P2	Heating temperature setting	JP2	
P3	Water temperature setting	JP3	Anti-fast cycling timer
P4	Max.output to heating system	JP4	Setting to floor heating
P5	Starting output	JP5	Pump run-out setting
P6	Not used	JP6	

CHART OF " ATTACK NSK" CONNECTING



PUMP CHARACTERISTICS

Wilo RS 15/6-3P PN 10

Condenser µF	MOTOR levels	revolutions rev/min	P1 W	Current A	Threat	Weight kg	Pitch mm
	1	1450	46	0,2			
2,6	2	1900	67	0,3	3/4"	2,00	130
	3	2200	93	0,4			

Setting minimum and maximum boiler output into heating

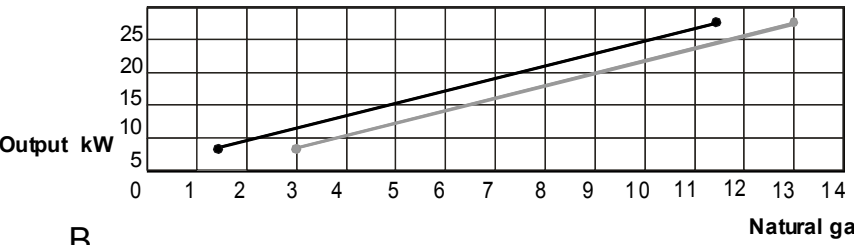
Modulation regulator on the gas fittings is set from production to minimum and maximum pressure on nozzles that suits to minimum (8kW) and maximum (24kW) boiler output. When putting boiler to operation, it is necessary to check minimum and maximum gas pressure on the nozzles.

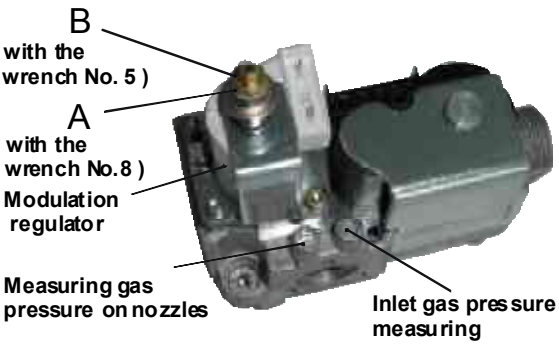
Instruction for checking and setting up

– release the bolt in the probe for measuring inlet gas pressure, connect manometer and read the measured value (2mbar). Screw in the bolt in the probe for measuring inlet gas pressure.
– release the bolt in the probe for measuring gas pressure on burner nozzles, connect manometer and read the measured value by the chart of pressure setting.
– in the case of setting minimum and maximum pressure on nozzles, following actions are to be done:

a) remove the cover of modulation regulator
b) set the mode switch on the control board to the heating and hot-water mode and the P4 trimer located on the electric board set to the right extreme position (minimum output to heating) and with the help of manometer take outlet pressure on nozzles
c) if necessary, set minimum pressure on nozzles with **B** nut on the modulation regulator
d) turn the P4 trimer towards the left extreme position whereby raise the boiler output to heating, read the measured value of outlet pressure on nozzles and compare the value with the chart of relationship between the boiler output and gas pressure on nozzles
e) maximum output of 24 kW can be set by turning the **A** nut on the modulation regulator
f) disconnect the manometer and close the probe by screwing the bolt
g) attach back the cover of modulation coil
h) check right operation of the boiler

Chart of setting pressure on nozzles





- Setting MIN and MAX output on the "NST" boiler, ⌀ 1,15nozzle
- Setting MIN and MAX output on the "NSK" boiler, ⌀ 1,25 nozzle

Notes :

RECORD ON PUTTING THE BOILER TO OPERATION

Boiler type: ……

Boiler output: ……

Production No. ……

Date of putting to operation: ……

Service company: ……

Stamp, signature

Obligatory service examination after the 1st year of operation

Date: ……

Stamp, signature

Obligatory service examination after the 2nd year of operation

Date: ……

Stamp, signature

Obligatory service examination after the 3rd year of operation

Date: ……

Stamp, signature

DOCUMENT on testing and completness of ATTACK gas boiler

NST **NSK**

Boiler output : 8-24 kW

Boiler production No.: **N**

The product delivered with this certificate suits to technical standards and technical conditions.
The product was manufactured by its drawing design in requested quality and is approved by TECHNICAL TESTING FACILITY SKTC104 in Piešťany under the No. of certificate 00846/104/2/2002, 00847/104/2/2002

Technical inspection

Vrútky, date: .....

Stamp and signature of the final inspection: .....

Producer:
TERMOGAS
Dielenská Kružná 5
038 61 Vrútky
SLOVAKIA

Exporter:
ATTACK s.r.o.
Dielenská Kružná 5
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