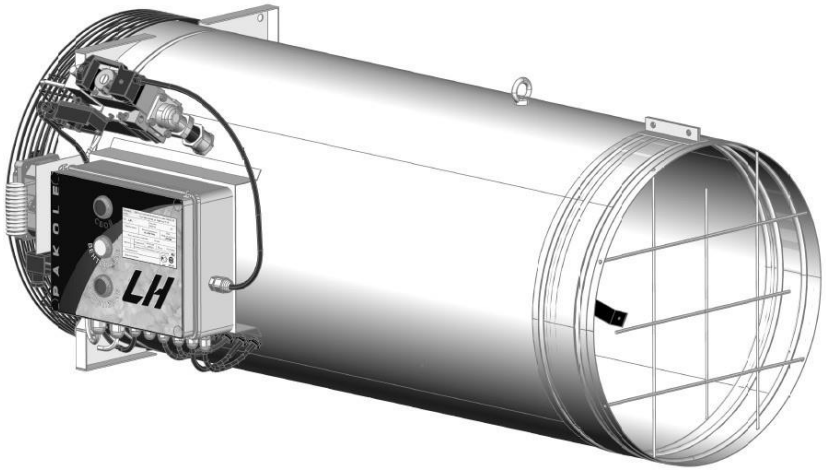
OPERATING MANUAL GAS HEAT GENERATOR

OPERATING ON NATURAL AND LIQUEFIED GAS

Industrial heating equipment

LH-30, LH-40, LH-50

LH-60, LH-70, LH-80



AE86 ОП019

IMPORTANT: Before putting into operation the device , carefully read this manual.
Failure by the consumer to comply with the rules of operation of the heating device set forth in this manual may lead to undesirable consequences. Keep this manual for answers to questions that arise during operation .

GENERAL SAFETY REQUIREMENTS

Neglect of the requirements set forth in this guide can lead to such consequences as: material damage and serious harm to human health, namely: fire, explosion, suffocation, carbon monoxide poisoning, electric shock, which can lead to death.
Operation and installation of the device is allowed only after careful reading of the operating manual and strict compliance with the requirements specified in it.

CONTENT

SAFETY INFORMATION

WARNING

WARNING: Explosive hazard. Strictly adhere to the requirements for placing the device in a heated room in relation to flammable materials (building structures, paper, cardboard). Never use the device in rooms gassed with vapors of gasoline, solvent or other chemical compounds, as well as in heavily dusty rooms.

ATTENTION : Operation of the device is prohibited in domestic premises.

The device is designed for air heating of industrial agricultural premises in accordance with the regulatory requirements Msz EN 525:2001. The device is designed for temporary or permanent heating of industrial and agricultural facilities. With proper operation, this device is safe and energy-saving. The combustion products formed during the combustion process, mixing with the flow of hot air, fall into the heated room.

Due to the fact that it is impossible to foresee all possible applications of the device, before installing it , it is necessary to coordinate the possibility of its use with the local fire safety department.

The gas connection must comply with the current requirements, regulations, in accordance with which work must be carried out on the supply of natural gas, and in the case of liquefied gas compliance with storage rules.

Carbon monoxide poisoning : The primary symptoms of poisoning are very similar to a cold, in addition, they can cause headache, dizziness, nausea. If you feel the above symptoms , you must immediately leave the room, go out into the fresh air.

Propane or P/B gas: Propane and P/B gas are odorless, aromatic substances are added to it for the timely detection of its leakage. However, even without feeling the characteristic smell, gas leakage and its presence in the surrounding air are possible.

Make sure that you have read and understood all the warnings, compliance with which will make it safe and optimal operation of the device:

- When installing and operating , adhere to the current requirements and rules in relation to gas-using equipment.
- The connection of the device to the power supply should be carried out in strict accordance with the Operating Manual .
- For your safety, check that the grounding is correct.
- When operating the device in a closed room, provide supply ventilation.
- Use the device only in well-ventilated areas. The amount of air required for combustion and ventilation is indicated in Appendix No. 1 to this manual.
- Protect the device from the following possible influences: wind, strong water jet, rain or dripping water.
- Do not use the device in an open space.
- It is strictly FORBIDDEN to use the device in rooms intended for sleeping or long-term stay of people.
- Comply with the requirements of safe distance for placing the device in relation to flammable materials, such as: fuel, gasoline, solvent, etc. flammable vapors, liquids.
- Do not use the device in heavily dusty rooms, as dust also ignites.
- When operating, take into account that the device is equipped with an individual thermostat and, in accordance with the specified parameters, can start starting at any time
- Before starting the device, always conduct a visual inspection, if any damage is detected, do not turn on the device.
- Do not place a device operating on liquefied gas in semi-basement and basement rooms, since the specific gravity of liquefied gas is heavier than air and in case of possible leakage tends to lower rooms.
- Use only manufacturer-recommended flexible hoses and gearboxes.
- Before each start-up, check the integrity of the gas connection, if you find damage, fractures on the flexible hose, replace it with a slag recommended by the manufacturer.
- Install or suspend the device only on such structures that, regardless of the heating of the device, remain stable.
- Do not allow children and animals to the working device.
- If you plan not to use the device for a long time, be sure to turn off the power supply and gas connection.
- Never block the air intake and blowout holes.
- Do not move or repair the device during operation, as well as the turned off device that is under voltage.

- Do not use air duct elements at the inlet or outlet of the device that are not recommended by the manufacturer.
- When replacing spare parts, use only original spare parts recommended by the manufacturer and do not use parts with similar parameters, this can lead to serious damage to the device.

⚠ **Always use only recommended and manufacturer-approved gearboxes, the minimum pressure of which can not be lower than 30 mbar and not higher than 60 mbar.**

UNPACKING THE DEVICE

Open it Box Device и Remove from Her parts Part then Remove Protective covering from the device (e.g. polystyrene or etc.)

- ⚠ **Remove the protective cap of the gas connection immediately before connecting the gas after the installation work is completed.**
- Check if the device is not affected during transportation.
- If you find any damage, report it to the vendor.

- ⚠ **After unpacking the instrument, remove the airflow regulator and fan locking rod.**
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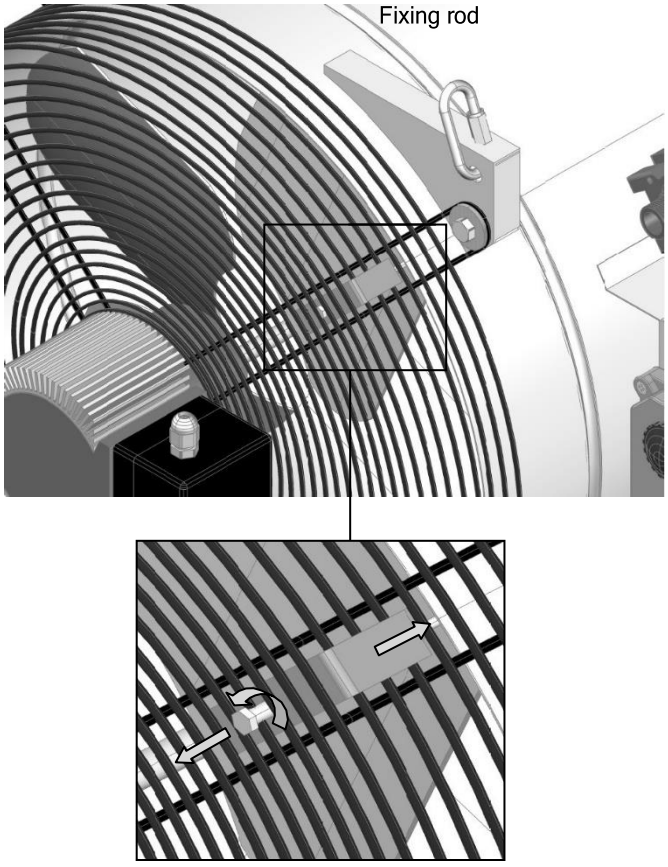
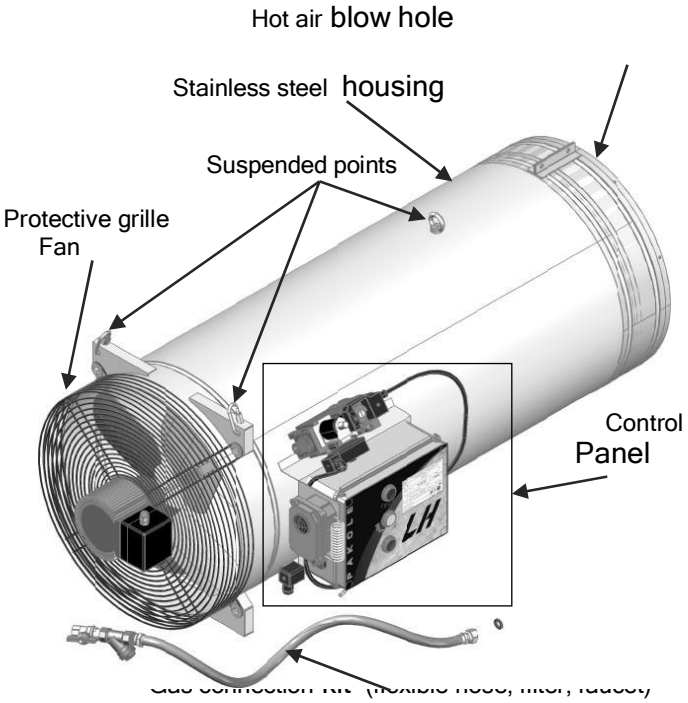
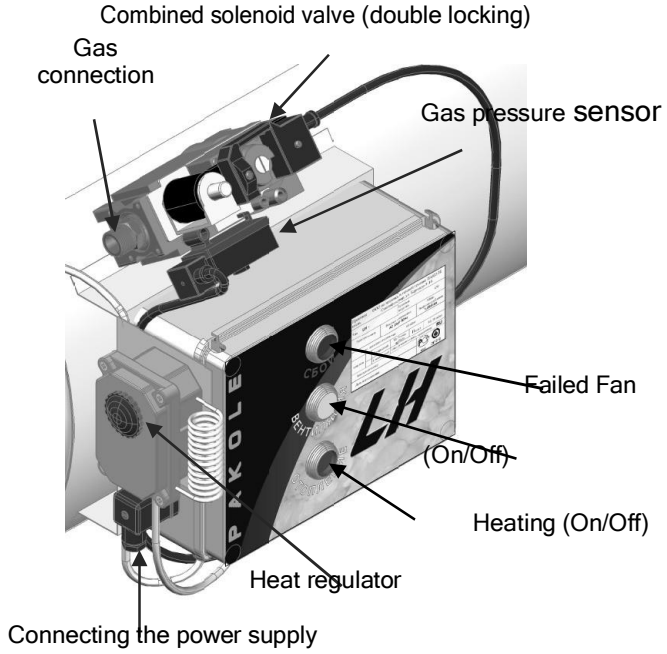


Unscrew the screw at the end of the locking rod, then remove the rod and the locking plate.

GENERAL CHARACTERISTICS OF THE DEVICE



Rice. 1 External type of device



Rice. Appearance of the control panel

DESIGN AND PRINCIPLE WORK DEVICE

Gas supply system : For the safe operation of the device, the network gas pressure must be at least 30 mbar, but not exceed 60 mbar.

After connecting the gas connection kit to the network and the device, open the gas tap, after which the gas will begin to be supplied through the gas filter, solenoid valve, nozzles into the combustion chamber.

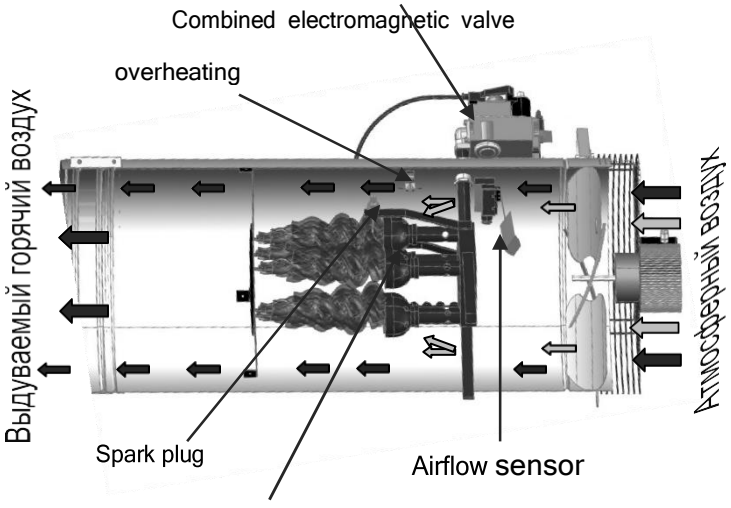
Air supply system : The motor will turn the fan blades, which in turn will supply the necessary air flow inside the device. The air flow created in this way, dragging with it the heat created during the combustion of the gas-air mixture and the combustion products formed during this process, is fed into the heated zone.

Ignition system : The control electronics in accordance with the specified temperature parameters give a high-voltage electrical signal to the spark plug, which under this influence begins to spark thereby igniting the gas-air mixture.

Safety and control system: For your safety, the device is equipped with three sensors

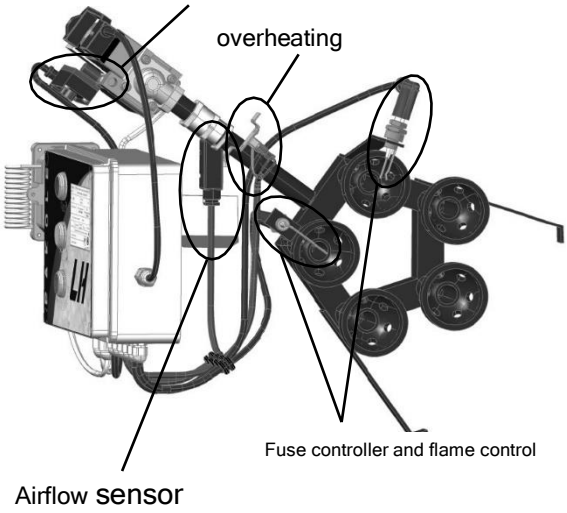
- ionization flame control
- Airflow sensor
- overheating sensor

In some countries, such as Ukraine, Russia, etc., according to the requirements, it is necessary to install a fourth sensor – a minimum gas pressure sensor.



combustion air, heating air

Rice. 2 The device in the section + the principle of operation



Rice. 3 Burner + safety elements.

In connection with the constant work on improving the device, increasing its reliability and quality, changes may be made to the design of the device that are not reflected in this documentation.

INSTALLATION OF THE DEVICE

Gas supply system

ATTENTION: Heat generators type LH-... can work only with the gas specified in the instruction manual.
When operating the device on natural gas, the pressure of the network gas is 30 mbar.
When operating the device on liquefied gas, the gas pressure is 50 mbar.
The maximum gas pressure is 60 mbar.

ATTENTION: If the pressure in the gas network exceeds 60 mbar. - the use of a pressure **reducer** is mandatory .

The gearbox is installed separately in front of each device or one common gearbox on the central gas supply pipe. A filter must be installed before each device to prevent blockage of the solenoid valve due to possible contamination from gas pipelines (despite the fact that the solenoid valve is blocked) to purge them). Connection to the main gas pipeline is carried out top or side, as the connection at the bottom will be serve Collection Pollution A what Can influence on Normal Work Device.

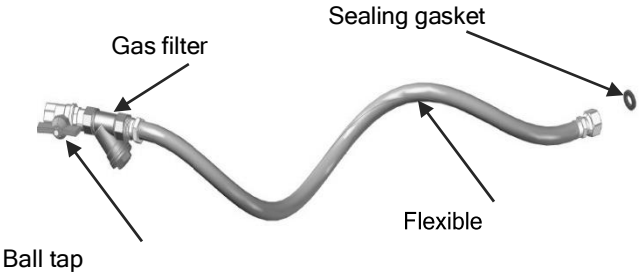
Rice. 4 Correct/incorrect connection to the gas pipeline

It is necessary to take into account the thermal expansion of the device, so the connection of the device to the gas pipeline is carried out with a flexible hose. Flexible hose

is installed so as to provide an extension of at least 100 mm.

⚠ The flexible hose must be connected without kinks!

Pakole recommends using the gas connection kit they supplied, which includes a flexible hose, a filter, a ball valve. If you want to install a gearbox in front of each device, it should be installed between the filter and the flexible hose.



Rice. 5 Set of gas connection

you must do the following

- Before connecting the devices to the gas network

carry out thorough cleaning and blowing Gas pipeline.
- Check the tightness of the connections. This procedure must be repeated after each disconnection / connection to the gas pipeline.

PROVISION FEED AIR

⚠ Always adhere to the **requirements for a minimum supply of fresh/ventilation air. If the inflow of fresh/ventilation air is insufficient,** there **may be danger of carbon monoxide poisoning. Before starting the device, ventilate the room.**

Determination of the required amount of fresh/ventilation air

In accordance with the existing standards, the calculation of the required amount of fresh / ventilation air is carried out:

$$(L \cdot Q \cdot \cdot T \cdot 10^{-3}) \cdot \frac{110}{100} \cdot \frac{103}{100} \cdot N \cdot Q \cdot 10^{-3}$$ i.e.

C_v

Where is $$Q \cdot \frac{1130 \cdot L}{(N \cdot 1{,}13 \cdot C_v \cdot T)}$$

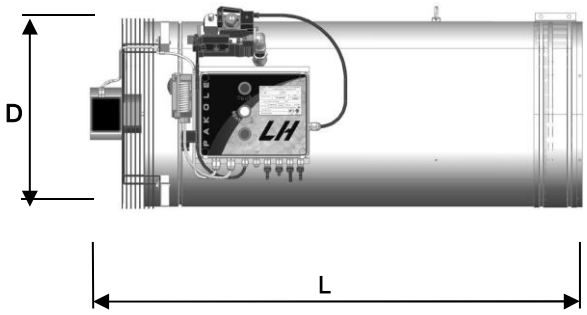
L – room heat loss
Q – (= AV) air exchange m³/h
N – maximum permitted heat output is 86 kJ/m³
Cv - specific calorific value of air is 1.207 86 kJ /m³K
T – temperature difference in Kelvin
110/100 – the value gives a 10% premium for fast warm-up
103/100 – the value gives a 3% surcharge on the heat loss of the device body

For an example of the calculation, see the following articles: See Annex No. 1.

INSTALLATION OF THE DEVICE

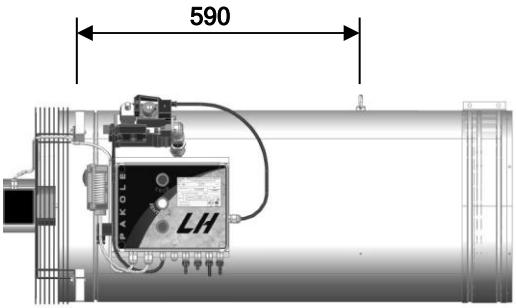
⚠

Installation must comply with the current requirements, rules, in accordance with which work on the installation of the device must be carried out. Therefore, the specialist installing the device must comply with all the rules for the installation of gas equipment.
The specialist installing the device should check the tightness of the gas connection.
Before installing the device, it is necessary to check the compliance of local conditions, gas type and pressure with the factory setting of the device.



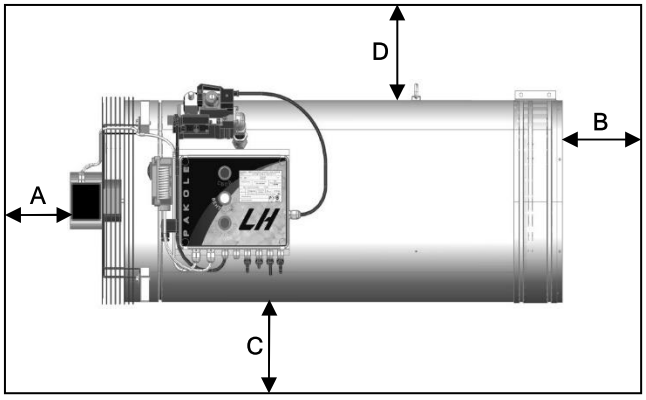
Rice. 6 Overall dimensions of the device

Power [kW]	Overall dimensions (mm)	
	D	L
30 kW	435	1130
40 kW	435	1130
50 kW	435	1130
60 kW	435	1130
70 kW	435	1130
80 kW	435	1130



Rice. Fig. 7: Distance between suspension mounts

Requirements for distances, safety and fire protection: The distance depends on the power of the device

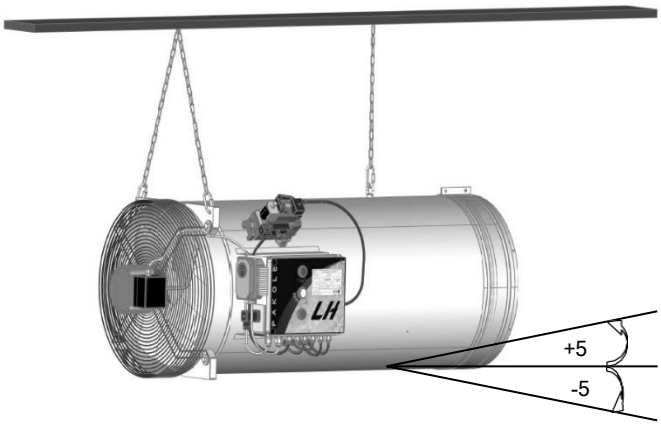


Rice. 8 Minimum safety and fire protection distances.

Power [kW]	Protective distances, mm			
	A	B	C	D
30 kW	300	1200	500	500
40 kW	300	1350	500	500
50 kW	450	1500	500	500
60 kW	450	1650	500	500
70 kW	450	1800	500	500
80 kW	450	1950	500	500

DEVICE PENDANT

For Warning Deformation in consequence of Heat Extensions length Suspension (e.g.chain) must be at least 400 mm. Attach suspension under Roof or Ceiling on Reference beams or supports, between pillars or against the wall. Suspension of the device is performed with the help of ears, Located on his Housing.

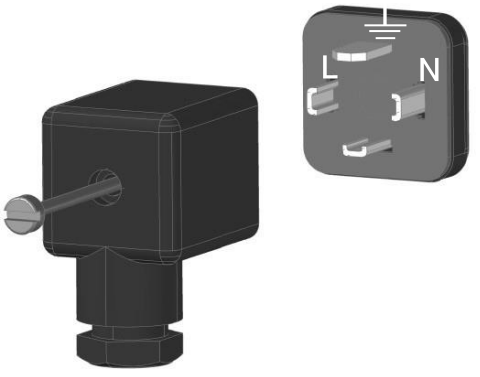


Rice. 8 Device suspension

When suspending, the device is installed horizontally, the maximum permissible deviation is +5 / -5 º.

POWER CONNECTION

⚠The device is connected to the mains through a safe connector in the control unit (box).
- How to connect to the network:
By means of a grounded plug or a fixed connection taking into account the correct phase,
- max. electric consumption of the device 1,5 A
- Mains power wire: 3x0.75 MT cable
- The device is sensitive to phase, so the connection must be made as indicated in the figure.



L – Phase
N – Zero
⏚ Earth

An electrical diagram of the power supply with Brahma automation is given in Appendix No. 2.

INSTRUMENT CONTROL

The heat generator type LH is equipped with an individual thermostat, it is located on the side wall of the control panel on the side of the discharge fan. Temperature scale of the thermostat: from 0 to 40 º C. The automatic mode of operation of the device occurs by turning on / off the device, which, depending on the air temperature in the room in relation to the temperature set on the device, turns on or off.
An external thermostat can also be connected to the device. For a diagram of the connection of the external thermostat, see. Appendix No2.
The device can operate in three operating positions :

- VENTILATION
- VENTILATION + HEATING
- HEATING

VENTILATION:

Turning on the power supply of the device, press the white button on the control panel with the inscription fan, the device will start the fan, and will work in ventilation mode, in which the light signal of the white button is constantly lit. To turn off the ventilation mode, you must press the white button again.

VENTILATION + HEATING:

Having turned on the power supply of the device, press the green, then the white button on the control panel, in this case the ventilation mode is constantly working, and the heating mode is turned on periodically depending on the air temperature in the room in relation to the set on temperature device.
In this position, the light signal should be lit on both buttons. When you press the white button again , the ventilation mode is turned off, and the device will operate in automatic heating mode.
It is possible that when you press the white button again, the light signal will not go out, this is due to the fact that the shutdown was made at the time when the fan was started in heating mode.

HEATING:

After turning on the power supply of the device, press the green button on the control panel, in this case the heating mode is constantly running. If only the light signal of the green button on the thermostat is lit , this means that the air temperature is in a room higher than the specified one. This is will last until the air temperature in the room drops below the temperature set on the thermostat and the thermostat starts the heating mode, in which the light signal of the white button should light up. After reaching the set temperature in the room, the thermostat turns off the heating mode, stops the fan and the light signal of the white button goes out.

COMMISSIONING

Starting the device

If you have selected the above mode of operation of the device, then press the button or buttons you need and the device in accordance with this will launch the program of your choice .
The ignition process starts from 30 seconds. Purge. during this purge the airflow controller analyzes the correct operation of the fan and its ability to create the necessary airflow . if the airflow sensor detects the correct operation of the fan then after the expiration
30 sec. the electronics will start the spark, at the same time as the solenoid valve opens, opening the gas access to the combustion chamber, where the gas-air mixture is ignited by means of sparking. If the ignition was successfully performed, the ionization controller the flame detects the correct pattern of combustion, the device begins to work and perform its heating functions.

In those countries where the installation of a minimum gas pressure sensor is mandatory , the start of the device will occur only if the pressure of the network gas exceeds the specified minimum. If during the operation of the device, there is a pressure drop in the network, the minimum gas pressure sensor will turn it off.

Malfunctions (RESET)

During the operation of the device , malfunctions may occur, controlled by the safety system of the device. The basic model of the device is equipped with three controllers:

- ionization flame controller
- Airflow sensor
- overheating sensor

In some countries, such as Ukraine, Russia, etc. a fourth sensor is required – a minimum gas pressure sensor. The instruments supplied to these countries are equipped with four sensors.

These sensors independently monitor the correct flow of the worker

The process of the device and, having detected any malfunction, give a signal to the electronics, which immediately stops the operation of the device.

Airflow sensor Airflow sensor analyzes the correct operation of the fan and its ability to create the necessary airflow, as well as the operating state of the motor,

no barrier of atmospheric air intake to the fan. If the airflow sensor will not switch to position, the control automation stops the start-up process and the light signal of the red button (FAILURE) lights up on the control panel. The failure signal is removed by pressing the red button, after it is extinguished, the start attempt is automatically repeated.

Flame ionization control

The ionization control of the flame is responsible for the ignition process, i.e. the ignition process. there was a stick of sparks during the operation of the appliance

controls the presence of flames. If for any reason the flame is extinguished, the controller immediately sends a signal to the automatic control, which in turn turns off the device and the light signal lights up on the control panel. Red button (FAILURE). The fault signal is removed by pressing the red button. After that, the attempt is automatically repeated. If the device does not turn on when you try to start again, contact the service department.

Overheating sensor

The overheating sensor is located under the casing of the device and its function is to constantly monitor the temperature of the casing. If the temperature of the casing reaches 134ºC, the controller immediately sends a signal to the automatic

control, which in turn turns off the device and the light signal of the red button (FAILURE) lights up on the control panel. The failure signal is removed by pressing the red button and after it is extinguished, the start attempt is automatically repeated .

Disabling the device

Disconnect the device in the following sequence:

- Make sure that all buttons on the control panel are in a depressed state and that no lights are on.
- Close the gas tap in front of the appliance.
- Turn off the power supply to the appliance.

POSSIBLE MALFUNCTIONS AND METHODS OF THEIR ELIMINATION

The axial fan does not turn on Possible causes:

- No power is supplied to the motor
- The fuse has failed Troubleshooting options :

- Check the power supply
- Replace the fuse. If the fuse fails, find the cause of the overvoltage.

No spark between ignition electrodes Possible causes:

- No voltage between the ignition unit and the control electronics
- Too large spark gap with ignition electrodes
- Damaged control automation

Troubleshooting capabilities:

- Clean the ignition electrodes
- Check the electrical connection between the ignition unit and the control electronics
- Check the spark gap between the ignition electrodes

- Replace control automation

The device does not work after the first ignition cycle

Possible causes:

- Gas tap closed
- Gas pipeline is aired
- Inappropriate nozzle pressure

Troubleshooting options :

- Open the gas tap
- Blow the gas pipeline

- Check the gas inlet and outlet pressure on the solenoid valve measuring nozzles

The device does not work after repeatedly trying to start the ignition cycle

Possible causes:

- Damaged solenoid valve
- The electrical connection between the igniter and the control electronics was interrupted
- Inappropriate pressure on the injector
- Improperly performed grounding

Troubleshooting options :

- Replace the solenoid valve
- Check the electrical connection between the igniter and the control electronics
- Check the gas inlet and outlet pressure on the solenoid valve measuring nozzles

The gas burner starts, but after a while the flame goes out

Possible causes:

- Confused zero and phase wire
- Inappropriate pressure on the injector
- Airflow controller returns to its original position

Troubleshooting options :

- Verify that the phase is correct
- Check the gas inlet and outlet pressure on the solenoid valve measuring nozzles
- Check the position of the airflow controller , if it is in its original position, check if there is any stickiness, if necessary, clean it.

STORAGE

⚠ ATTENTION: If you plan not to use the device for a long time, be sure to turn off the power supply and gas connection.

Put on the plastic protective caps of the gas connection removed when unpacking the device.

⚠ After each disconnection from the gas network, change the gasket on the flexible gas hose.

Store the device in a covered, dry room, protecting it from mechanical damage.

SERVICE AND PREVENTIVE MAINTENANCE

Preventive maintenance

⚠ NOTICE: Never perform preventive maintenance on a running or energized appliance.

Heat generators of the LH type , in addition to inspection and cleaning, do not require special care (see preventive maintenance performed by the user). However, in order to ensure the safety of operation and a long service life, it is recommended to conduct an annual inspection by an authorized service specialist .

User-defined preventive maintenance

(a) Inspection and cleaning of the housing of the appliance. Remove dust from the surface of the casing with a brush or air and make sure there are no stains or burned parts.
b) Check visually through the blowhole the condition of the flame retardant disc. Burnout or disc discoloration is clearly visible in visual inspection.
c) Check the suspensions, make sure that the load in the suspension areas is evenly distributed. This can be done by moving each suspension separately.
d) Clean and check the fan: Check the rotation of the fan shaft, whether the fan blades turn freely, if the blades are dirty, clean them.
e) Manually control the airflow controller , manually switch the microswitch several times. Check for the presence of the spring. If necessary, air purify the controller.

If the operating conditions (contamination in the environment, e.g. dust, fumes) require this, inspection and cleaning should be carried out more often! The main reason for this is that the layer of dust that is deposited on the fan worsens the efficiency of the device and significantly increases its weight, which is an important factor in terms of suspension safety.
The device is suitable for heating greenhouses, in animal husbandry (poultry houses, pigsties).
Attention: If the device is used in agriculture (e.g. animal husbandry) or in such

areas where volatile combustible materials are formed during care, cleaning, the drill during this procedure must be turned off!
When using the device in animal husbandry, after each movement , it must be cleaned!

After-sales service

⚠TICE: Never perform maintenance on an energized or operating appliance. This can lead to burns or electric shock.

Preventive work Performed Specialized Service Service (works related to Disassembling device)

(a) Check Pressure on Nozzle (on SecondaryOutput solenoid valve)
b) Checking the gearbox before the device c) Cleaning the gas filter.
d) Checking the state of differential pressostats.
e) Checking the presence of protective grounding e) Checking the electrical connection
g) Axial fan test. Check
Fan shaft rotation , remove dirt from the blades.

TECHNICAL CHARACTERISTICS

..... FuelNaural gas, Propane or P/B
Gas pressure in front of the solenoid valve: Minimum.... 30 mbar
Maximum ..... 60 mbar
Fan .....Motor 150W
Operating ..... voltage230V/50Hz/2.
Electrical ..... requireme
..... Weight23.1 k

Usable power						
Type	LH-30	LH-40	LH-50	LH-60	LH-70	LH-80
Usable power	31kW	39 kW	51 kW	59 kW	68 kW	79 kW

Fuel consumption						
Type	LH-30	LH-40	LH-50	LH-60	LH-70	LH-80
Natural gas m³/h	3.00	4.00	5.00	6.12	7.14	8.20
Propane, P/W kg/h	2,38	3,17	4,04	4,85	5,66	6.46

Quantity of air supplied						
Type	LH-30	LH-40	LH-50	LH-60	LH-70	LH-80
Air capacity ventilation m³/h	2.800 - 3.000		4.500 - 5.000			

Nozzle pressure / diameter/ quantity						
Type	LH-30	LH-40	LH-50	LH-60	LH-70	LH-80
Quantity of nozzles, pcs.	5	5	5	5	5	5
Natural Gas						
Nozzle pressure, mbar	10	10	10	10	10	10
Nozzle diameter, mm	2,3	2,6	3,0	3,3	3,6	3,9
Propane/Bhutan (40/60)						
Nozzle pressure, mbar	20	20	22,5	20	22,5	22,5

⚠ **If you need to change the type of gas , please contact the authorized service department.**

APPLICATION

Annex No. 1

Heated room:

(a) 15 m x 30 m x 4 m = 1800 m3
b) Design losses L = 264 MJ/h c) calculated for minimum outside temperature - 1·C 20·C and internal temperature 20·C T = 21·C
In this case , the volume of air exchange:

$$Q \cdot \frac{1130 \square 264}{86 \cdot \cdot 1{,}13 \cdot 1{,}207 \cdot 20 \cdot} \cdot 5201 \; i \; \left| \div \grave{a} \tilde{n} \right.$$

$$(\cdot 1) \cdot$$

Based on a room with a volume of 1800 m3, air exchange in 1 hour

$$\frac{5201}{1800} \square 3{,}0$$

The heat consumption for incoming air "H" is calculated as follows:
$H = A.V.C_v . T \times 10^{-3}$
Where is
A - number of air exchanges per hour V - volume of the room
C_v - specific heat of air = 1.207 kJ ^{m3K}

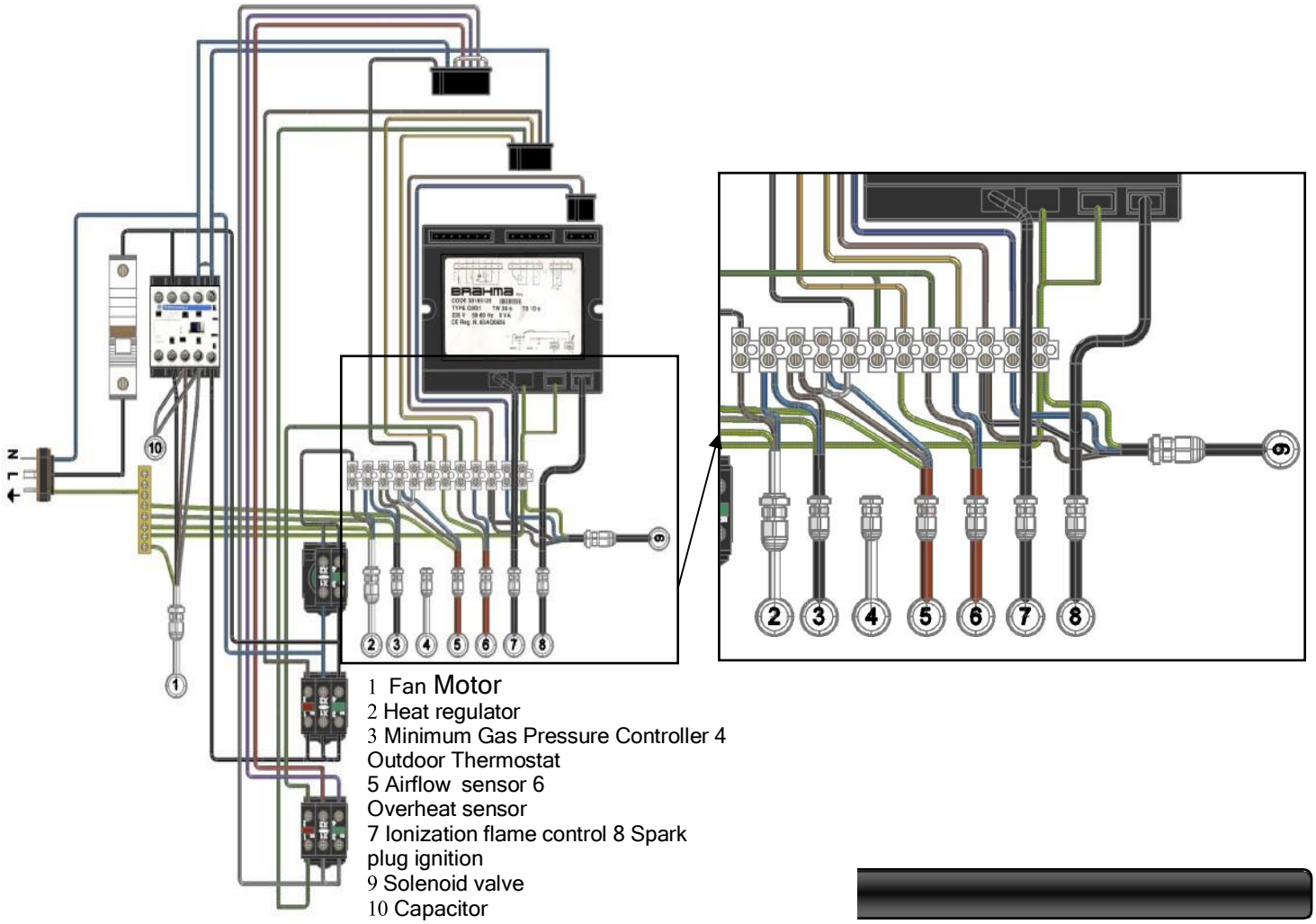
T - Temperature difference in Kelvin
H = 3.1800.1,207.21 x 10-3 10-3 = 137 MJ/h

Therefore , the total heat consumption of the building is 137 + 264 = 401 MJ/h = 112 kW
By this method of calculation, the co2 concentration is not

exceeds the allowed value of 0.28% (V/V).

Annex No. 2

Power supply circuit



1 Fan Motor
2 Heat regulator
3 Minimum Gas Pressure Controller 4 Outdoor Thermostat
5 Airflow sensor 6 Overheat sensor
7 Ionization flame control 8 Spark plug ignition
9 Solenoid valve
10 Capacitor

Warranty

Gas heat generators of the LH type are guaranteed for 24 months from the date of sale, provided that the consumer complies with the rules of transportation, storage and operation set forth in the Passport and Operating Manual.
During the warranty period, if the consumer discovers defects, the manufacturer replaces the failed components and parts of the heater free of charge: for this purpose, a defective unit must be sent to the manufacturer with an act drawn up by a representative of the gas management together with the owner of the heater. The act indicates the factory number, date of manufacture, date of installation at the consumer and a description of the defect indicating causes of its occurrence. In the absence of a defective unit or act, the manufacturer does not accept claims.

The warranty is terminated:
- When using the device for other purposes
- If the installation of the device into operation was performed by an unauthorized service department.