SUN BEAM Ltd.
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SUN-BEAM TUBES

INDOOR RADIANT HEATER RADIATING TUBE TYPE SBT 6U, 9U, 12U, 12I, 18I

INSTALLATION, USE AND MAINTENANCE

ATTENTION! Read the following manual carefully before proceeding with the installation.

The manufacturer reserves the right to make changes without notice.

TABLE OF CONTENTS

1. GENERAL INFORMATION

This manual is an integral and an vital part of this unit and it should be kept nearby in order to use it when required. Read all the instructions and warnings included in this manual because they provide essential information to do with safety, installation, use and maintenance.

Attention!
In case of loss, it is necessary to order a new copy of this manual from the supplier.

This unit was built to heat large working areas such as: manufacturing and craft's hangars, warehouses, workshops with huge air circulation, outside loading and unloading platforms, sports halls. Due to radiant heating it is possible to heat individual separate areas. It is possible to heat bigger areas by using additional number of heaters. This unit can be also used to heat the breeding places for all kinds of animals, greenhouses and in all industrial spheres (furnaces and drying chambers) where heating is required and where exhaust fumes cannot come into contact with the products.

Numerous devices, which are installed in the same place or in linked rooms, should be regarded as one unit with the same heating power equal to the sum of every power unit.

If there are people in heated areas, the exhaust fumes must be channeled by the conduit which goes through the outside wall (ceiling).

It is not allowed to heat areas where working process or materials constitute a risk of arising explosive formations, inflammable gas, steam or dust.

This unit should only be installed by qualified technicians complying with safety requirements at the same time. The manufacturer evades responsibility in case the unit is improperly installed or misused.

All package materials (nylon, wood, foamed polystyrene, stripes, etc.) can be dangerous and they must not be left around children without adult's attention.

The first lighting of the unit should be done by trained personnel.

In case the unit suddenly stops and/or is not running properly it should be shut down immediately. All repairs and/or component changes should only be done by qualified personnel using exclusively factory authorized parts. If these regulations are not observed, it will contravene people's safety.

To secure the proper working of the unit it is necessary to comply with the manufacturer's requirements. Maintenance should be carried out at least once a year by qualified personnel.

2. TECHNICAL DATA

2.1. Packing list

All modules (SBT 6U, SBT 9U, SBT 12U, SBT 12I, SBT 18I) are disassembled and some pieces must be assembled on the spot.

1) burner
2) “U” tube
3) radiant tube
4) reflector panel
5) hanger bracket
6) gasket
7) chimney tube
8) screw kit

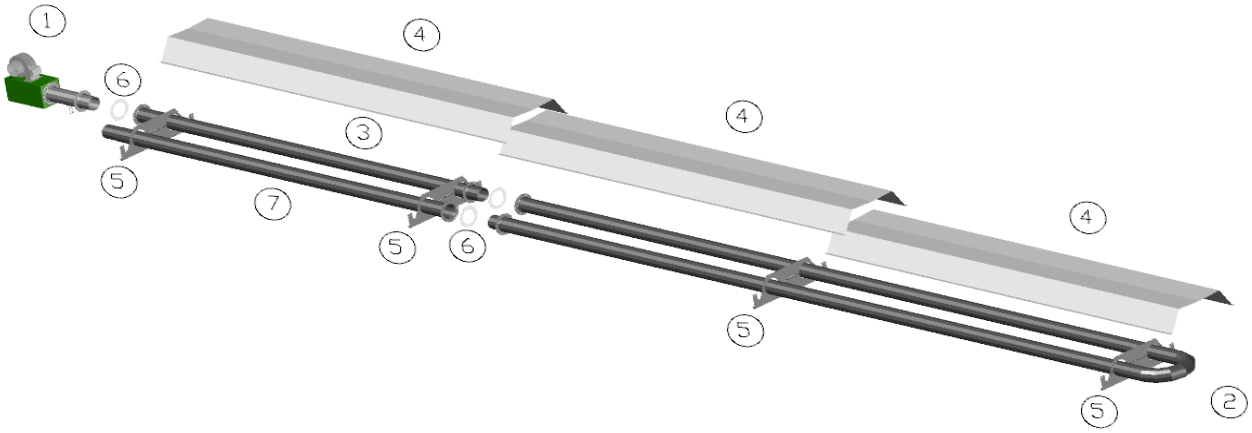

Fig. 1 SUN-BEAM tubes set, “U”/”I” type

The burner is delivered with all its pieces and is prepared to the gas type in accordance with the order. Delivery of the air and combustion flues, and the control set requires additional order. All elements are protected during transport and storing. The number of components fulfill the requirements in respect of the definite model.

No.	Component	SBT-6U	SBT-9U	SBT-12U	SBT-12I	SBT-18I
1	Burner	1	1	1	1	1
2	U bend	1	1	1	-	-
	I tube (central)	-	-	-	-	1 (6m)
3	Radiant tube (m)	-	1 (3m)	1 (6m)	1 (6m)	1 (6m)
4	Reflector panel	2	3	4	4	6
5	Hanger bracket	3	4	5	5	7
6	Gasket	1	3	3	2	3
7	Chimney pipe	-	1 (3m)	1 (6m)	1 (6m)	1 (6m)
8	Screw kit	1	1	1	1	1

2.2. Specifications

SUN-BEAM TUBES – INFRARED RADIANT GAS HEATER				
TECHNICAL DATA				
MODEL			SBT 6U/12I	SBT 9U/12U/18I
NOMINAL POWER		kW	30	45
ELECTRICAL SUPPLY		V/Hz	230/50	230/50
MAXIMUM ELECTRICITY POWER CONSUMPTION		W	83	83
GAS CONNECTION		INCHES	¾”	¾”
EXHAUST TUBE CONNECTION		mm	100	100
AIR TUBE CONNECTION		mm	100	100
WEIGHT OF STANDARD VERSION		KG	104/102	148/192/147
GAS CONSUMPTION	GZ-50 (2,0 kPa)	m^3/h	3,15	4,73
	PROPANE BUTANE MIXTURE (3,7 kPa)	kg/h	2,21	3,79
NOZZLE PRESSURE	GZ-50	kPa	1,7	1,7
	PROPANE BUTANE MIXTURE	kPa	MAXIMUM SETTING	MAXIMUM SETTING
NOZZLE DIAMETER	GZ-50	mm	4,2	4,8
	GZ-41,5	mm	-	-
	PROPANE BUTANE MIXTURE	mm	2,8	3,7
NOZZLE DIAMETER	GZ-50	mm	45	50
	GZ-41,5	mm	-	-
	PROPANE BUTANE MIXTURE	mm	45	50
INTERNATIONAL PROTECTION RATING			IP 40	

2.3. Main components

a) Electronic control unit: is the same in all models. It controls the solenoid valve, the burner ignition, and the work of ionization electrode. After getting the electric signal from the room thermostat the controller checks the normal work of the pressure switch. Next, the controller generate the signal to scavenge the combustion chamber (>30 seconds) and it releases a spark. This spark is indispensable to activate the burner. If the flame does not appear after 10 s, the unit blocks. In order to achieve normal conditions, the operator must use the "RESET" button on the control box.

TECHNICAL DATA	
Manufacturer	BRAHMA
Model	CM31F
Power supply	220/240 V 50/60 Hz
Working temperature	-20° ÷ +60° C
Scavenge time	30 s
Burner ignition time	Max. 10s
Shutting down time	<1s

b) Gas valve: is the same in all models. Multifunctional, multi-gas and equipped with double solenoid valve class B (series connected), the pressure regulator, the unit of the burner soft power increase and the gas filter. Threaded input/output ½" joints with separate control pressure openings are placed in the aluminum body of the valve. Both valve adjustment and coils replacement must be done only by qualified personnel.

RATED DATA OF THE SOLENOID VALVE	
Manufacturer	HONEYWELL
Model	VR4605
Electrical supply	230V – 50Hz
Rated current	0,06+0,02 A

c) Differential pressure switch: serves to stop the unit work when there is not enough pressure in the gas system. The pressure switch, which is fixed inside the burner box, detects the pressure between inlet and outlet of the venturi tube. The difference between these two pressure values, while the burner works, gives the control signal for safe and proper burning.

RATED DATA OF THE PRESOSTATE	
Manufacturer	HONEYWELL
Model	C6065
Electrical connections	COM, NO, NC (230V)
Rated current	0,06+0,02 A

d) Blower motor

RATED DATA OF THE ELECTRIC MOTOR	
Manufacturer	EWMAR-NESS
Model	RV12
Electrical supply	230 V – 50 Hz
Power	70 W
Rated current	0,35 A
Rotational speed	2450

2.4. Dimensions

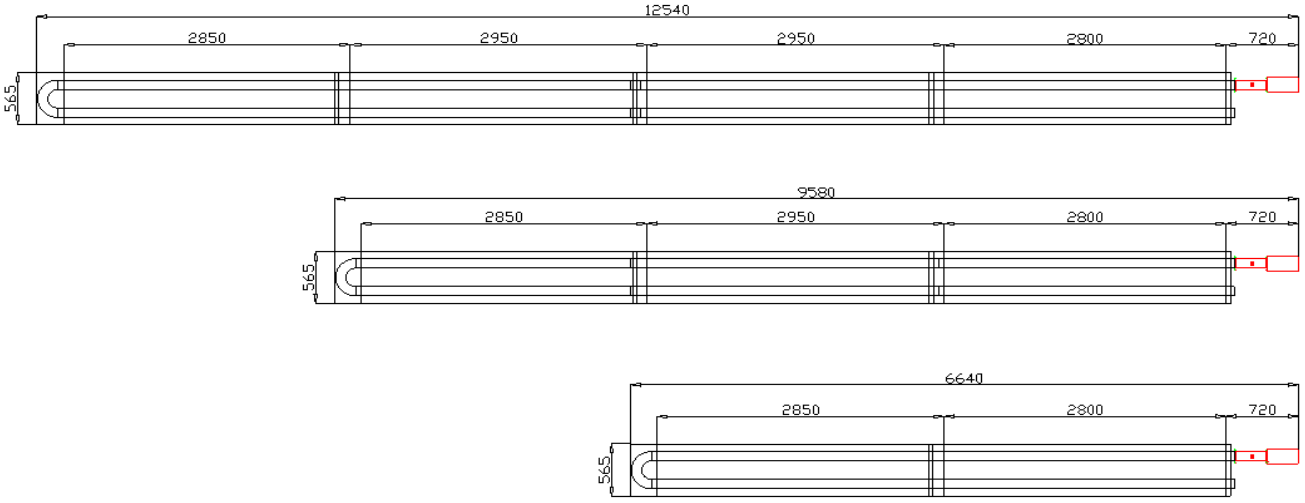

Fig. 2 Dimensions of the burner and SBT units – “U” type

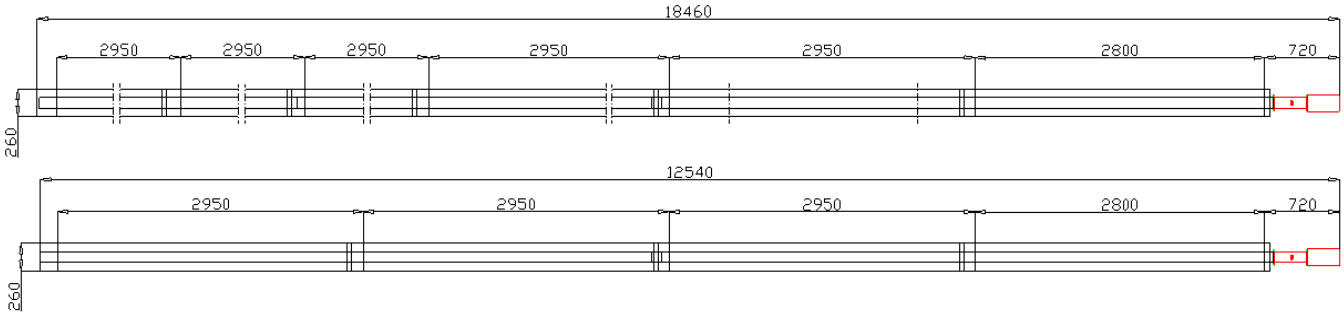

Fig. 3 Radiant heaters SBT 6; SBT 9; SBT 12 - “I” type

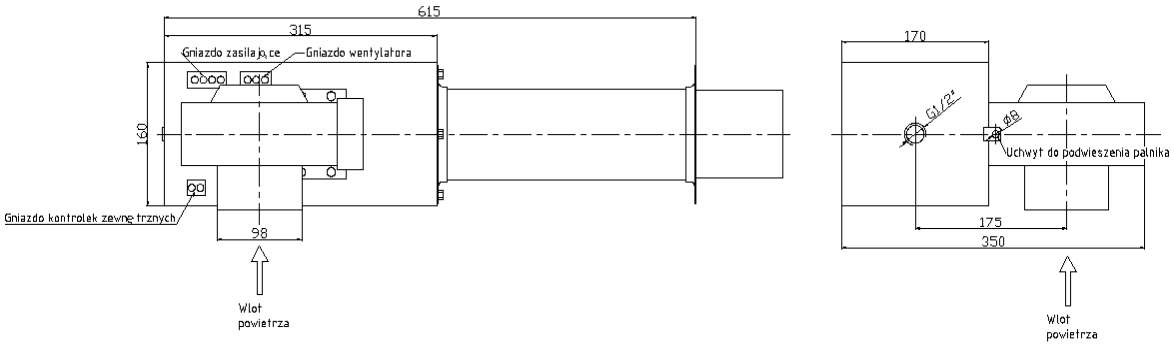

Fig. 4 Basic burner dimensions

1.Electrical power connector 2.Fan socket 3.Outside indicator lights socket 4.Air inlet 5.Handle to hold the burner 6.Air inlet

ATTENTION!

In view of the assembly analogy and the technical features there will be considered only “U” type radiant heaters in the further part of the manual.

2.5. Types of brackets to indoor radiant heater SBT

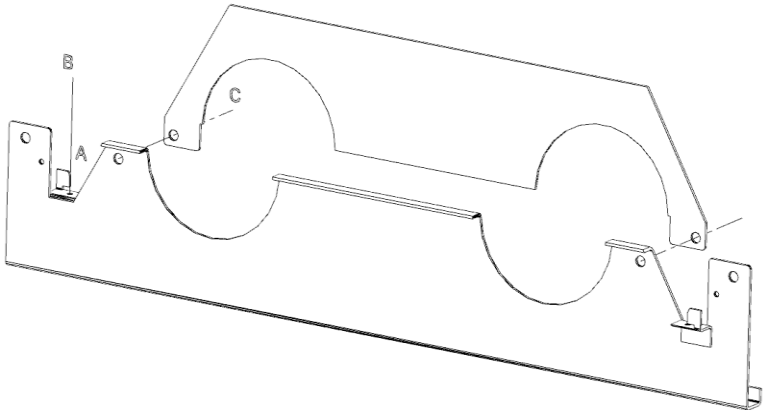

Fig. 5 Bracket to the radiant heater SBT - “U” type

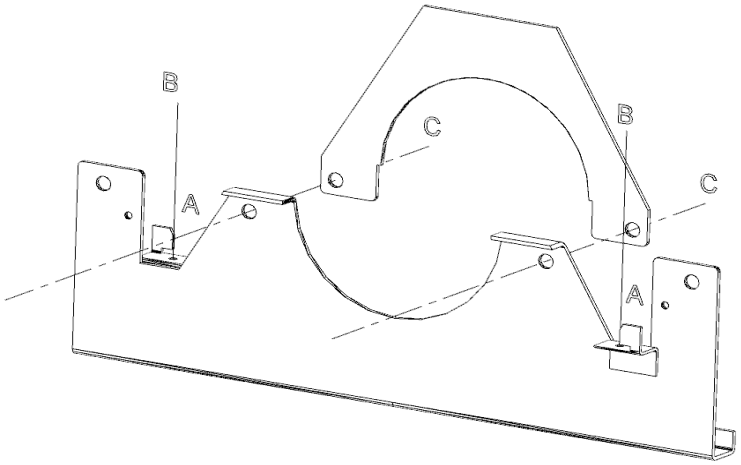

Fig. 6 Bracket to the radiant heater SBT - “I” type

“U” and “I” tube brackets are composed of two parts which are screwed together in holes “C” (fig. 5 and 6) with M8 screws from the screw kit.

Reflector panels, which are on the brackets, are assembled in catches “A” (fig. 5 and 6). They make reflector panels impossible to raise. However, these catches ensure the movement along the reflector panels. The reflector panel, which is on the second bracket from the burner, can be blocked with a cotter pin or a screw Ø4 after previously drilled holes in the reflector panel. The rest of the bracket holes are not used. Reflector panels are put together thanks to the self-drilling screws.

2.6. Types of indoor radiant heaters SBT 6, 9, 12 with the component list

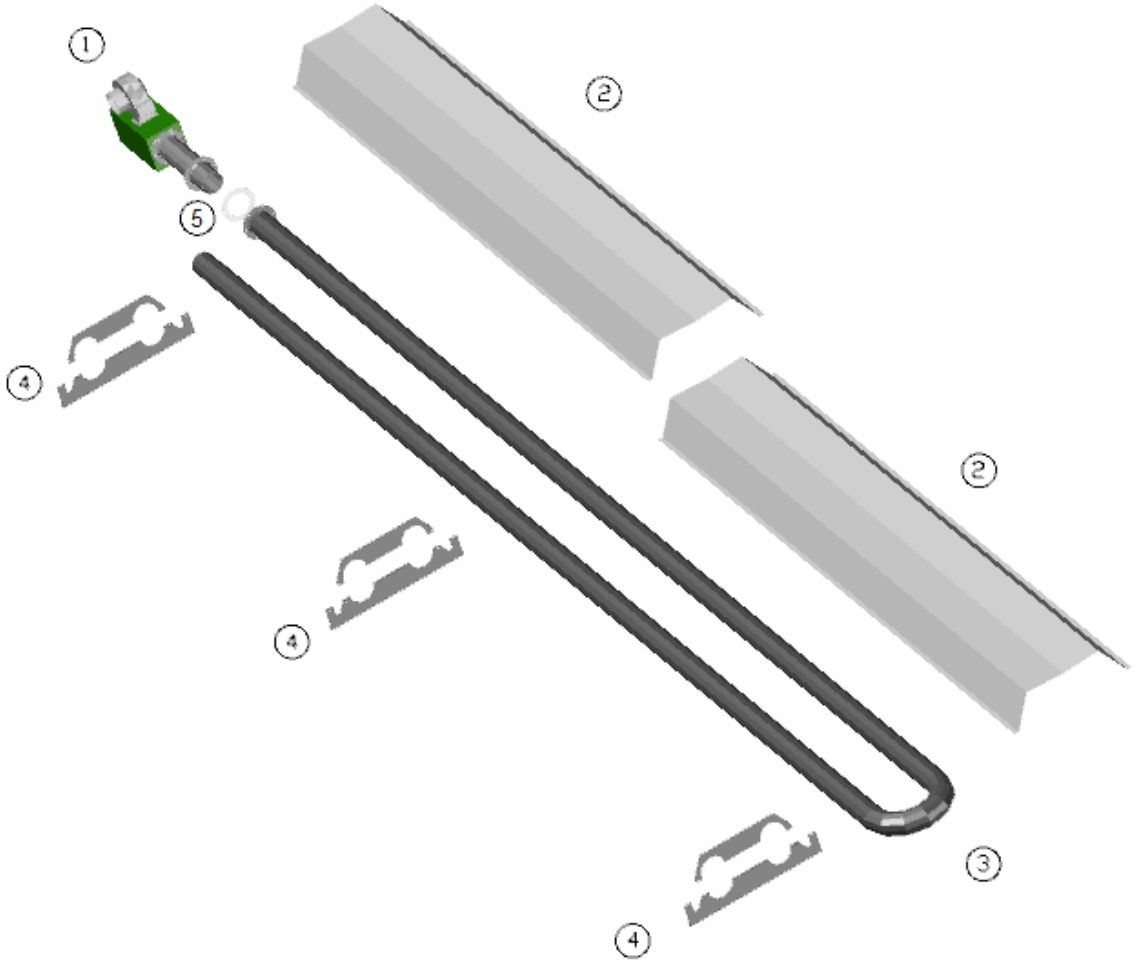

Fig. 7 Radiant heater SBT 6U

No.	Description	Qty.
1	Burner	1
2	Reflector panel	2
3	U bend	1
4	Bracket	3
5	Gasket	2

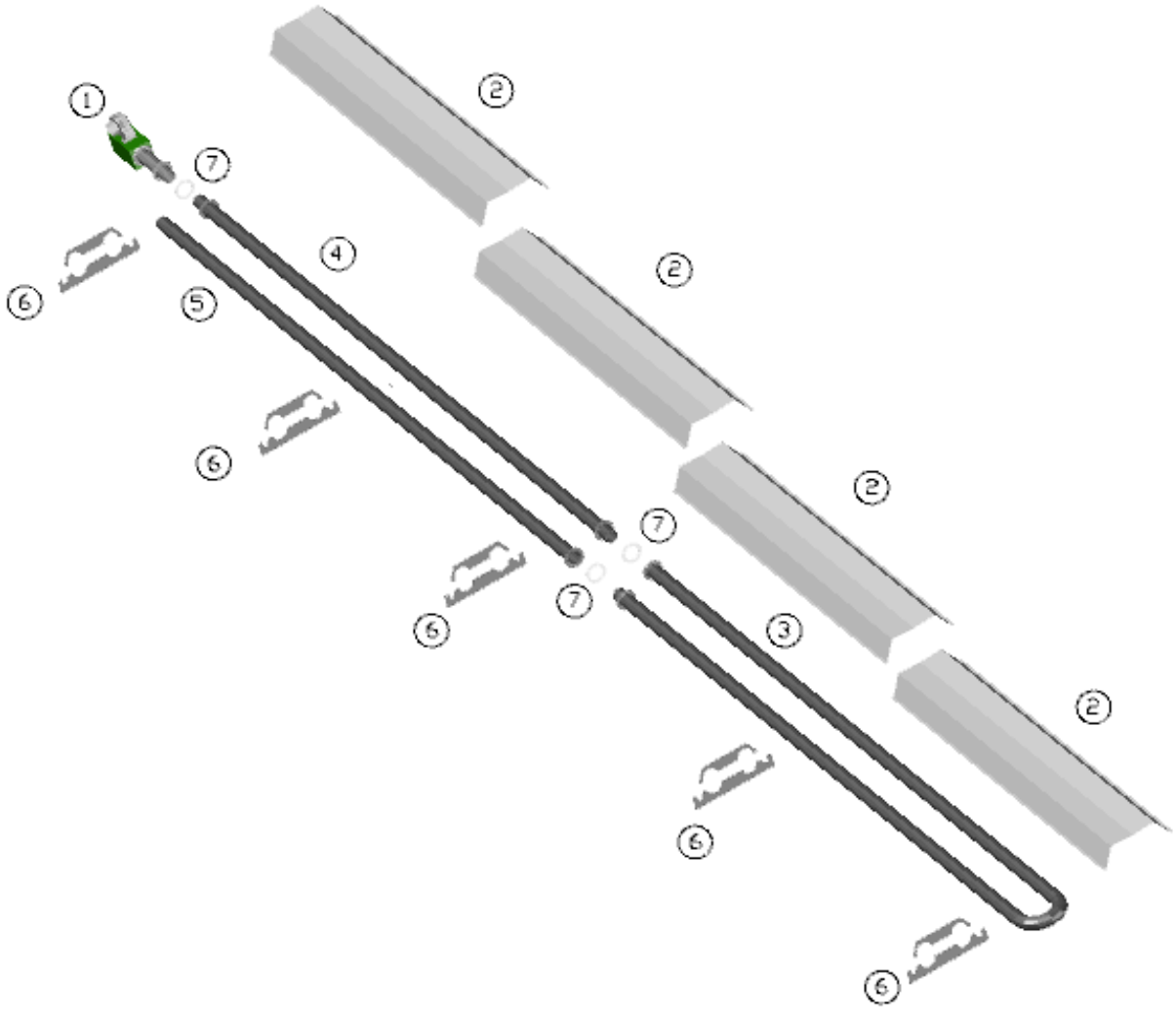

Fig. 8 Radiant heater SBT 9

No.	Description	Qty.
1	Burner	1
2	Reflector panel	3
3	U bend	1
4	Tube by the burner 3m	1
5	Chimney pipe 3m	1
6	Bracket	4

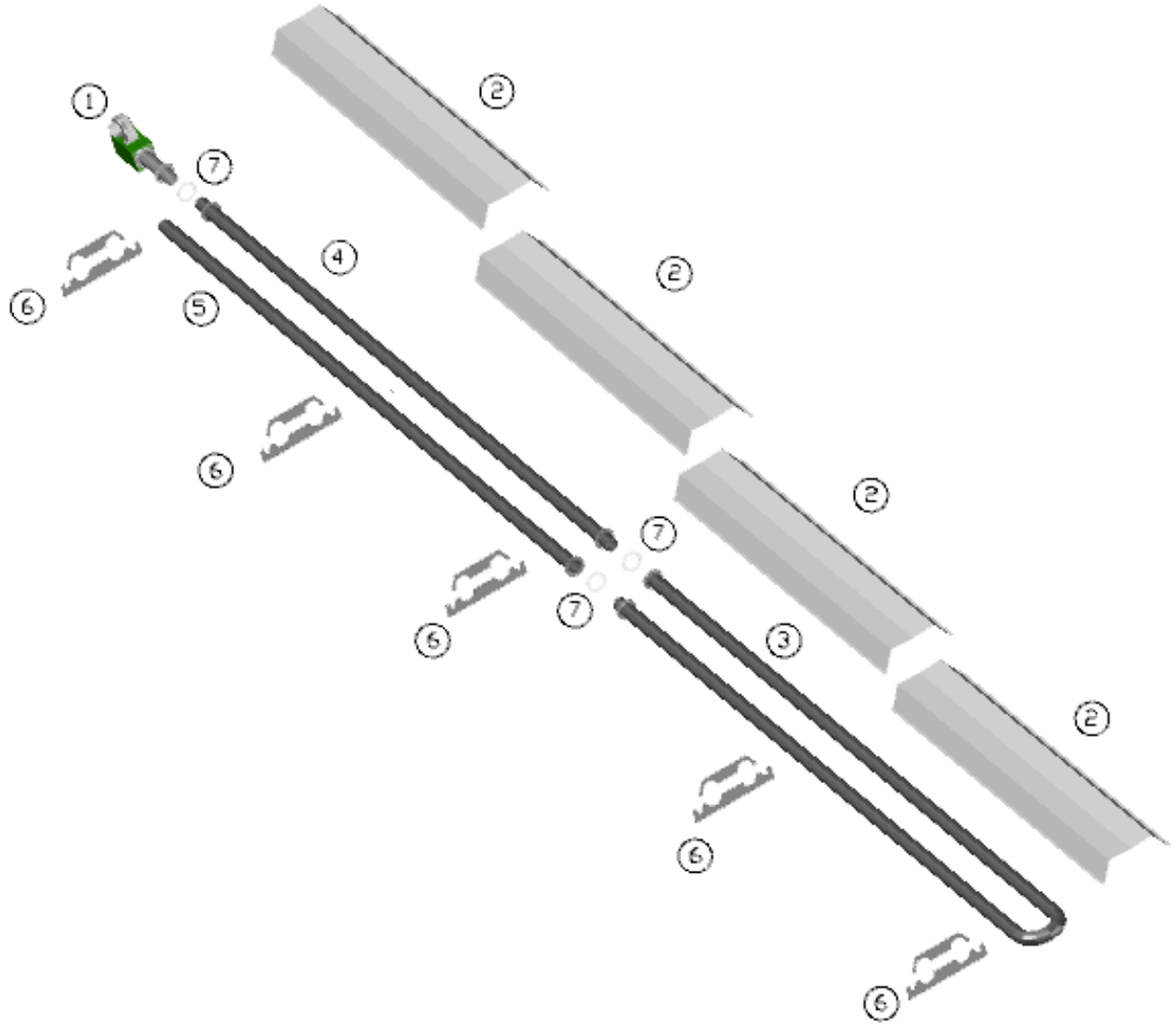

Fig. 9 Radiant heater SBT 12

No.	Description	Qty.
1	Burner	1
2	Reflector panel	4
3	U bend	1
4	Tube by the burner 6m	1
5	Chimney pipe 6m	1
6	Bracket	4

2.7. Burner set with the component list

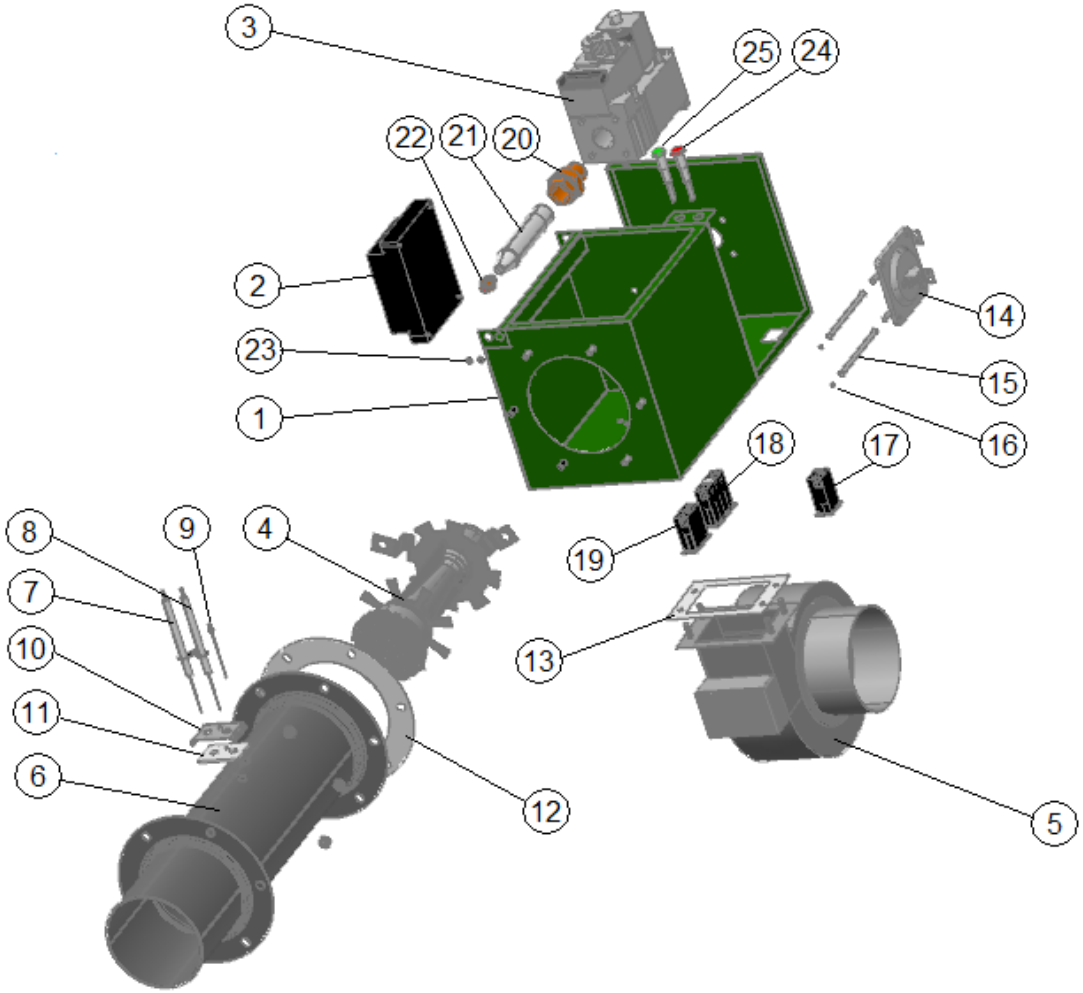

Fig. 10 Burner SBT components

No	Description	No	Description
1	Burner box	14	Pressure control HONEYWELL C6065
2	Control unit BRAHMA CE 31 F	15	Pressure control silicone pipe
3	Solenoid valve HONEYWELL VR4605	16	Rubber grommet Ø6
4	Venturi tube	17	Failure/work signal connection
5	Fan	18	Electrical power connection
6	Radiant tube	19	Fan power connection
7	Ignition spark electrode	20	Pipe union ½”
8	Ionizing electrode	21	Nozzle pipe
9	Mass electrode	22	Nozzle
10	Electrodes support	23	Rubber grommet Ø9
11	Electrodes gasket	24	Red indicator light – “failure”
12	Burner tube gasket	25	Green indicator light – “work”
13	Fan gasket		

3. Installation instructions

3.1. Installation places and safe distances

Flammable materials can be stored minimum 1,5 m away from the heat tube in order to keep safe temperature - below 85°C. In some specific circumstances if these distances cannot be kept (motors placed on overhead travelling cranes, conductors, bulbs, cabins) it is necessary to provide the proper shield to all materials which can be damaged by radiant heater. In all of the above mentioned situations there must be made an isolation.

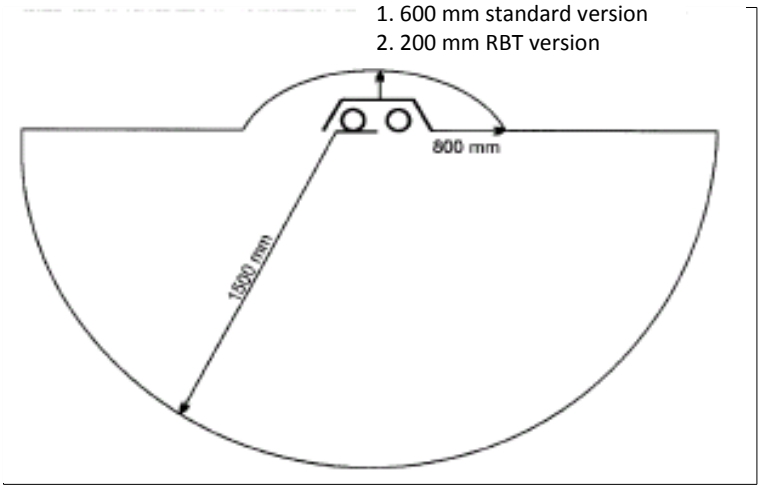

Fig. 11 Distance from flammable materials

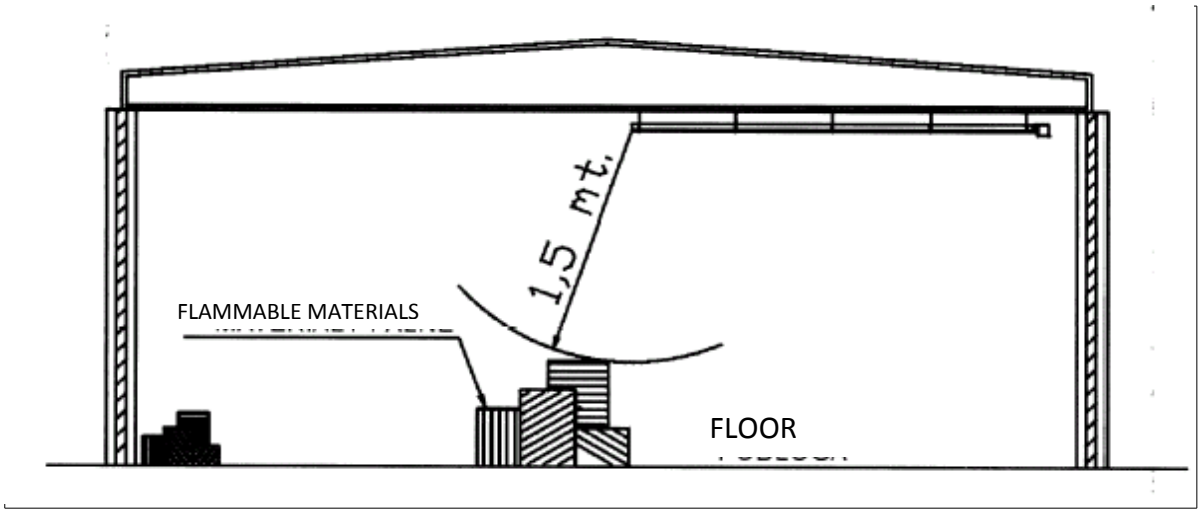

Fig. 12 Distance from flammable materials

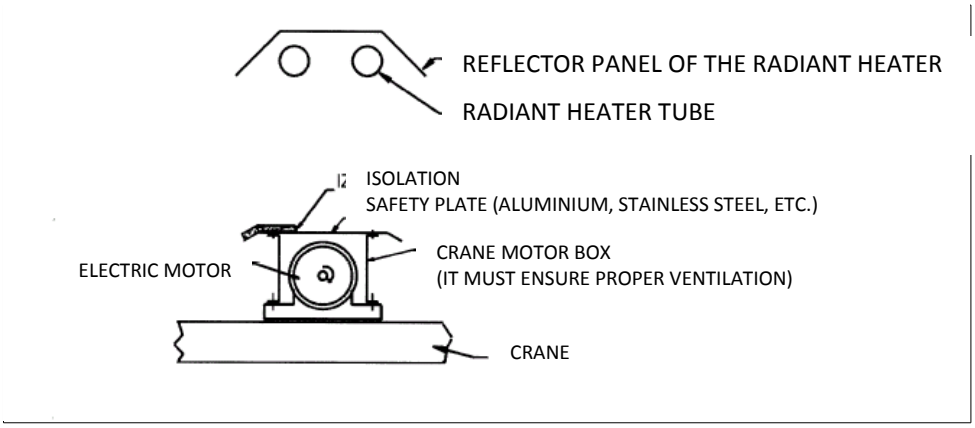

Fig. 13 Exemplary solution to isolate the crane motor

3.2. Heater assembly overview

It is recommended to assemble the unit on the floor first, and then hang it on the previously prepared chains (according to picture 10).

Assembly order

There is presented an exemplary assembly order of the radiant heater SBT.

1. If the radiant heater SBT 9, 12 or 18 is assembled, bolt its tubes with M6 screw kit. It is necessary to put gaskets between the flanges.

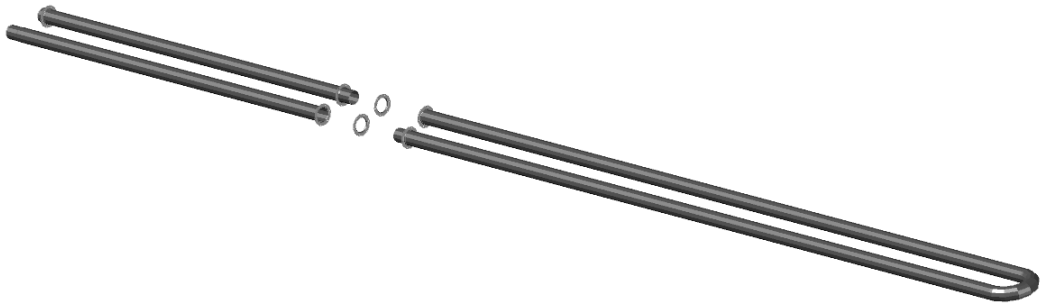

Fig. 14 Tubes assembly

2. Set the brackets.

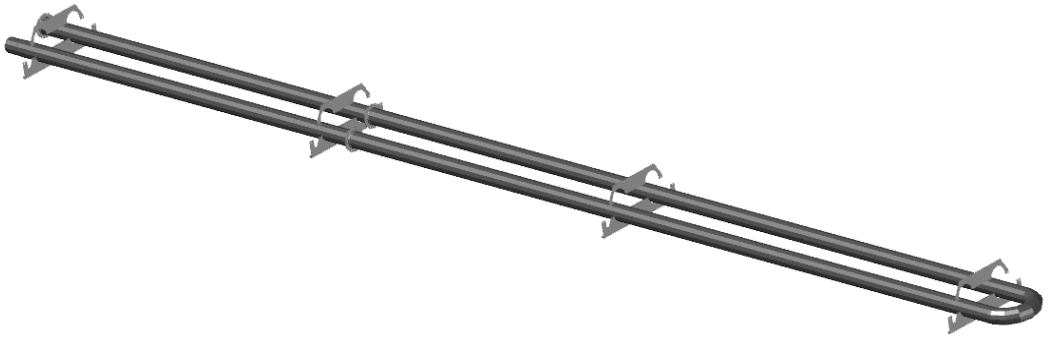

Fig. 15 Brackets assembly

3. Put the reflector panels (shields) on the brackets.

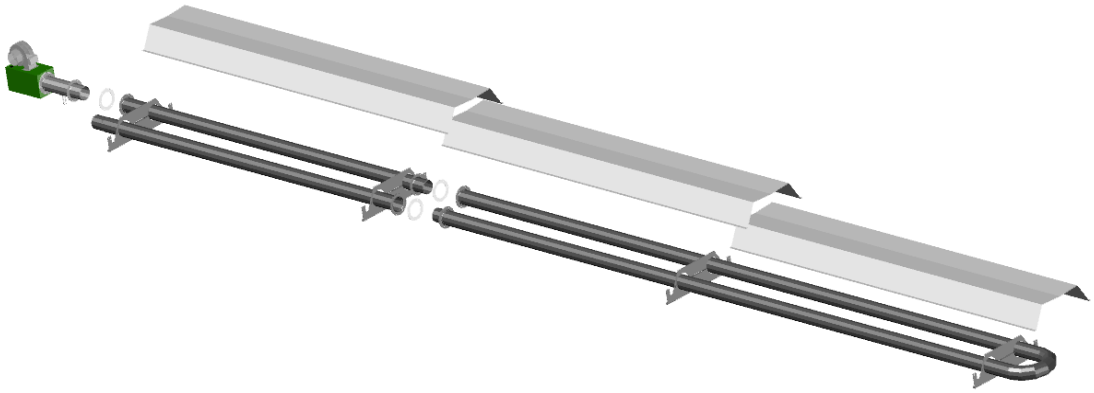

Fig. 16 Radiant heater reflector panels assembly

Bolt the reflector panels with the supplied screws and protect the shield on the bracket with a cotter pin (the second from the burner). The rest of the brackets attach the reflector panels on the catches. These catches protect from raising the reflector panels.

Minimum thickness of the hooks “S” - 5mm. After assembling.

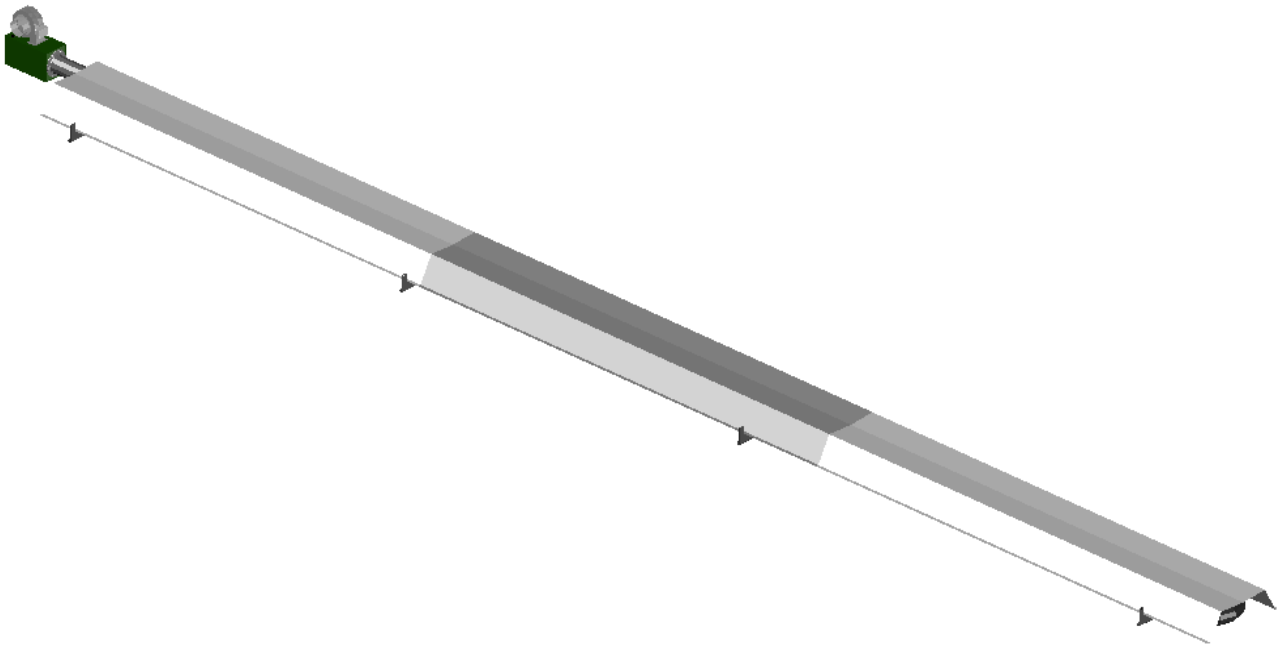

Fig. 17 Assembled unit

Hang the unit on the chains which are fixed to the ceiling.
The chains, which diameter is minimum 5mm and strength 7,75 kN, are sufficient to hang the radiant heater SBT.

3.3. Air and combustion conduits

According to the valid regulations exhaust tubes of natural or forced draught were made of metal which is resistant to mechanical and thermal stress, influence of combustion products and their condensates in the course of time.

There can be also used inflexible stainless steel tubes or inflexible aluminum tubes (the latter which is 1,5mm tight).

In order to avoid the problems connected to the relative movement of the exhaust elbow tube (4) and the ceiling firm there are used flexible stainless steel tubes. Another type of metal tubes can be used to inlet tubes which provide air to the burner. While connecting the tube (4) it is necessary to pay particular attention to link tube (3) and (5) to ensure tightness of the whole combustion system.

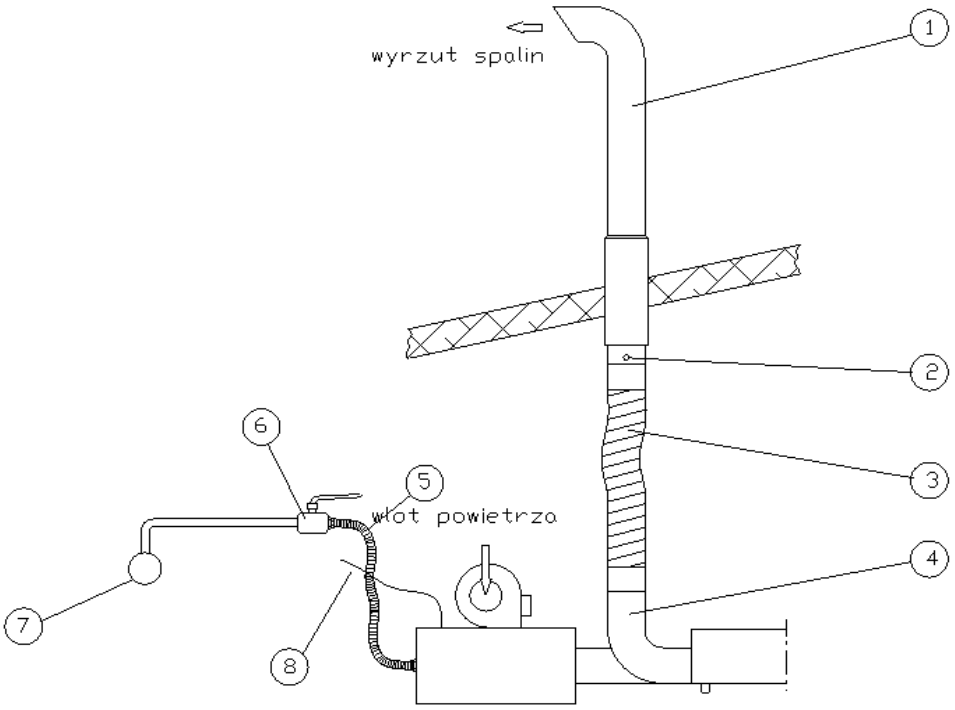

Fig. 18 Connections chart

1 - flue
2 - an opening to analyze exhaust gases (after taking measurements the opening must be closed)
3 - combustion tube Ø 100
4 - elbow tube of the exhaust fumes outlet
5 - flexible gas pipe ½" (3/4") minimum 30 cm long
6 - cut-off ball valve
7 - feed gas pipeline
8 - electric power cord 4x1 mm^2

4. ELECTRICAL SYSTEM

4.1. Electrical connections

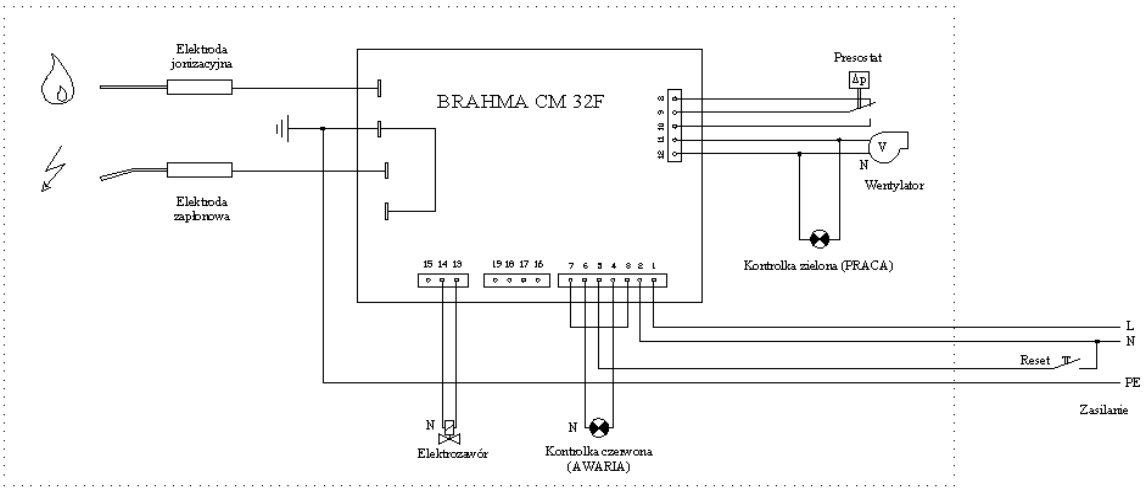

Fig. 24 Circuit diagram of the radiant heater SBT

1. Ionization electrode
2. Ignition spark electrode
3. Solenoid valve
4. Red indicator light (FAILURE)
5. Green indicator light (WORK)
6. Fan
7. Pressure control
8. Power supply

5. CONVERSION INSTRUCTIONS

This modification must be made only by qualified technicians complying with all safety regulations. The manufacturer evades responsibility in case the unit is improperly modified or misused.

5.1. Converting from natural gas installations to LPG

① Close the gas supply and unplug power supply.
② Disconnect the feeding nozzle from the solenoid valve by the pipe union.
③ Unscrew the nozzle.
④ Substitute the natural gas nozzle with LPG nozzle (see: table with technical data).
⑤ Connect the pipe to the solenoid valve.
⑥ Disconnect the solenoid valve reducer (screw clockwise the control pressure screw until it stops moving- fig. 25, position 1).
⑦ Turn on the unit and check if the gas pressure which flows into the burner- at the control opening by the solenoid valve inlet - amounts to 37 mbar (*).
⑧ Check the gas gasket at the screw joints.
⑨ Note down the modification on the rating plate (gas type).

(*) For LPG (Propane- Butane) 1st grade reducer must be installed close to the tank to reduce the pressure to 1 bar, 2nd grade reducer must be installed on the main outside gas supply pipe at the lower part of the building in order to reduce the pressure to 37 mbar.

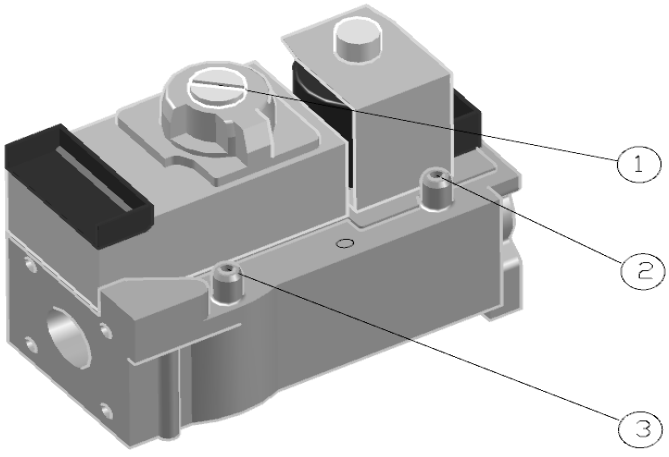

Fig. 25 Gas valve adjustment

1. Flow calibration.
2. Analysis opening of the output pressure.
3. Analysis opening of the input pressure.
4. Slow starting calibration.

5.2. Converting from LPG installations to natural gas

① Close the LPG gas supply and unplug power supply.
② Disconnect the pipe which feeds the nozzle from the solenoid valve by the pipe union.
③ Unscrew the nozzle.
④ Substitute the LPG gas nozzle with the natural gas nozzle (see: table with technical data).
⑤ Connect the burner to the solenoid valve and screw it.
⑥ Pressure reducer of the solenoid valve must be turned on by rotating the screw (3).
⑦ Turn on the unit and adjust the gas pressure, which flows into the burner – at the control opening (2) to the solenoid valve it amounts to 17 mbar.
⑧ Check the gas gasket at the screw joints.
⑨ Note down the modification on the rating plate (gas type).

6. HEATER ACTIVATION

① While burners are working check if there is gas in the pipes and measure the pressure on every burner with a measuring instrument.
② Adjust the room thermostat to minimum for a particular area.
③ While the gas valves are opened turn on the supply voltage for a particular area that is controlled by one thermostat.
④ Adjust the thermostat for required temperature in a particular area; the burners should start working.
⑤ Repeat foregoing actions in order to activate the modules in another areas.

Control lamps on the control panel:

Green indicator lights	Power supply is on
Red indicator lights	Failure. In order to cancel the warning signal use the “RESET” button on the control panel

7. TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Burner does not react to turning on the power supply.	a) inversely linked phase and zero wire	a) rearrange the links
	b) inadequate grounding	b) check the grounding
Burner turns on and after several seconds it blocks.	a) the electric plug or the measurement electrode is incorrectly placed	a) place the electrode 4mm from the plate
	b) faulty work of the control accessories	b) replace the appliance with factory authorized substitutes
	c) air in the gas pipe system	c) eliminate the air
	d) wrong gas pressure	d) check the pressure with the value on the rating plate
Fan motor turns on and after a while the electronic control unit tries to activate but the combustion process does not start.	a) gas absence in the burner	a) check the gas feeding pipe
	b) faulty work of the solenoid valve coil	b) do a test using a screw driver: the screw driver should be pulled up to the coil while turning on
	c) natural gas pressure is too high in the nozzle	c) supply as much pressure as the value on the rating plate
Fan does not turn on.	a) no power supply	a) check the switch off button adjustment on the electric control panel and at the main board
	b) faulty work of the motor	b) check only if the fan is working and, if it is necessary, replace it with a new original fan
	c) faulty work of the capacitor	c) substitute the capacitor with similar one
Fan motor turns on, the electronic control unit tries to activate, the solenoid valve opens, but there is no ignition.	a) make sure if the gas is supplied to the burner	a) remove the air from the gas pipe system if it is new
	b) ignition spark electrode is improperly placed	b) place the electrode 3-5 mm from the venturi tube ending
	c) too high pressure	c) set the pressure according to the rated plate
Fan motor turns on but the electronic control unit gives no signal to the burner and to the solenoid valve	a) the contact of the differential pressure cut-off switch was permanently shorted in closed position	a) exchange the pressure control for a new one; choose factory authorized substitutes which have the same parameters
	b) faulty work of the electronic control unit	b) exchange the electronic control unit for a new original one

8. USER INSTRUCTIONS

8.1. Lighting instructions

Do as follows at the zone control panel:
① Set the room thermostat at the required temperature (recommended 12-15°C).
② Turn on the power supply button for the whole panel.
③ Press the power supply button for the heat module.
④ The unit is working when the green indicator lights.
The room thermostat check can be made while the first thermostat setting is at the minimum (the burner should switch off), and next, set the temperature again (the burner should turn on again).

8.2. Shut down instructions

Do as follows at the zone control panel:
① Set the room thermostat at the minimum.
② Switch off the power supply of the respective heat modules.
③ Switch off the main power supply switch.
If all units must be switched off for a long time it is also recommended to unplug the power supply from the control panels (or from the main board) and do as follows: close the cut off valves on the conduits, which supply gas to individual units. Close the main cut off valve on the gas pipe placed outside the building.