RX90 - RX91
RX510 - RX515
RX520

Gas burners

Low NOx series

MANUAL OF INSTALLATION - USE - MAINTENANCE

CIB UNIGAS

BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ

M039218CE Rel. 4.1 01/2015

DANGERS, WARNINGS AND NOTES OF CAUTION

THIS MANUAL IS SUPPLIED AS AN INTEGRAL AND ESSENTIAL PART OF THE PRODUCT AND MUST BE DELIVERED TO THE USER.

INFORMATION INCLUDED IN THIS SECTION ARE DEDICATED BOTH TO THE USER AND TO PERSONNEL FOLLOWING PRODUCT INSTALLATION AND MAINTENANCE.

THE USER WILL FIND FURTHER INFORMATION ABOUT OPERATING AND USE RESTRICTIONS, IN THE SECOND SECTION OF THIS MANUAL. WE HIGHLY RECOMMEND TO READ IT.

CAREFULLY KEEP THIS MANUAL FOR FUTURE REFERENCE.

1) GENERAL INTRODUCTION

- The equipment must be installed in compliance with the regulations in force, following the manufacturer's instructions, by qualified personnel.
- Qualified personnel means those having technical knowledge in the field of components for civil or industrial heating systems, sanitary hot water generation and particularly service centres authorised by the manufacturer.
- Improper installation may cause injury to people and animals, or damage to property, for which the manufacturer cannot be held liable.
- Remove all packaging material and inspect the equipment for integrity.

In case of any doubt, do not use the unit - contact the supplier.

The packaging materials (wooden crate, nails, fastening devices, plastic bags, foamed polystyrene, etc), should not be left within the reach of children, as they may prove harmful.

- Before any cleaning or servicing operation, disconnect the unit from the mains by turning the master switch OFF, and/or through the cut-out devices that are provided.
- Make sure that inlet or exhaust grilles are unobstructed.
- In case of breakdown and/or defective unit operation, disconnect the unit. Make no attempt to repair the unit or take any direct action.

Contact qualified personnel only.

Units shall be repaired exclusively by a servicing centre, duly authorised by the manufacturer, with original spare parts.

Failure to comply with the above instructions is likely to impair the unit's safety.

To ensure equipment efficiency and proper operation, it is essential that maintenance operations are performed by qualified personnel at regular intervals, following the manufacturer's instructions.

- When a decision is made to discontinue the use of the equipment, those parts likely to constitute sources of danger shall be made harmless.
- In case the equipment is to be sold or transferred to another user, or in case the original user should move and leave the unit behind, make sure that these instructions accompany the equipment at all times so that they can be consulted by the new owner and/or the installer.
- For all the units that have been modified or have options fitted then original accessory equipment only shall be used.
- This unit shall be employed exclusively for the use for which it is meant. Any other use shall be considered as improper and, therefore, dangerous.

The manufacturer shall not be held liable, by agreement or otherwise, for damages resulting from improper installation, use and failure to comply with the instructions supplied by the manufacturer.The occurrence of any of the following circustances may cause explosions, polluting unburnt gases (example: carbon monoxide CO), burns, serious harm to people, animals and things:

- Failure to comply with one of the WARNINGS in this chapter
- Incorrect handling, installation, adjustment or maintenance of the burner
- Incorrect use of the burner or incorrect use of its parts or optional supply

2) SPECIAL INSTRUCTIONS FOR BURNERS

- The burner should be installed in a suitable room, with ventilation openings complying with the requirements of the regulations in force, and sufficient for good combustion.
- Only burners designed according to the regulations in force should be used.
- This burner should be employed exclusively for the use for which it was designed.
- Before connecting the burner, make sure that the unit rating is the same as delivery mains (electricity, gas oil, or other fuel).
- Observe caution with hot burner components. These are, usually, near to the flame and the fuel pre-heating system, they become hot during the unit operation and will remain hot for some time after the burner has stopped.

When the decision is made to discontinue the use of the burner, the user shall have qualified personnel carry out the following operations:

a Remove the power supply by disconnecting the power cord from the mains.

b) Disconnect the fuel supply by means of the hand-operated shut-off valve and remove the control handwheels from their spindles.

Special warnings

- Make sure that the burner has, on installation, been firmly secured to the appliance, so that the flame is generated inside the appliance firebox.
- Before the burner is started and, thereafter, at least once a year, have qualified personnel perform the following operations:

a set the burner fuel flow rate depending on the heat input of the appliance;

b set the flow rate of the combustion-supporting air to obtain a combustion efficiency level at least equal to the lower level required by the regulations in force;

c check the unit operation for proper combustion, to avoid any harmful or polluting unburnt gases in excess of the limits permitted by the regulations in force;

d make sure that control and safety devices are operating properly;

e make sure that exhaust ducts intended to discharge the products of combustion are operating properly;

f on completion of setting and adjustment operations, make sure that all mechanical locking devices of controls have been duly tightened;

g make sure that a copy of the burner use and maintenance instructions is available in the boiler room.

- In case of a burner shut-down, reser the control box by means of the RESET pushbutton. If a second shut-down takes place, call the Technical Service, **without trying to RESET further**.
- The unit shall be operated and serviced by qualified personnel only, in compliance with the regulations in force.

3) GENERAL INSTRUCTIONS DEPENDING ON FUEL USED

3a) ELECTRICAL CONNECTION

- For safety reasons the unit must be efficiently earthed and installed as required by current safety regulations.
- It is vital that all saftey requirements are met. In case of any doubt, ask for an accurate inspection of electrics by qualified personnel, since the manufacturer cannot be held liable for damages that may be caused by failure to correctly earth the equipment.
- Qualified personnel must inspect the system to make sure that it is adequate to take the maximum power used by the equipment shown on the equipment rating plate. In particular, make sure that the system cable cross section is adequate for the power absorbed by the unit.
- No adaptors, multiple outlet sockets and/or extension cables are permitted to connect the unit to the electric mains.
- An omnipolar switch shall be provided for connection to mains, as required by the current safety regulations.
- The use of any power-operated component implies observance of a few basic rules, for example:
  - do not touch the unit with wet or damp parts of the body and/or with bare feet;
  - do not pull electric cables;

- do not leave the equipment exposed to weather (rain, sun, etc.) unless expressly required to do so;
- do not allow children or inexperienced persons to use equipment;

- The unit input cable shall not be replaced by the user.

In case of damage to the cable, switch off the unit and contact qualified personnel to replace.

When the unit is out of use for some time the electric switch supplying all the power-driven components in the system (i.e. pumps, burner, etc.) should be switched off.

3b) FIRING WITH GAS, LIGHT OIL OR OTHER FUELS

GENERAL

- The burner shall be installed by qualified personnel and in compliance with regulations and provisions in force; wrong installation can cause injuries to people and animals, or damage to property, for which the manufacturer cannot be held liable.
- Before installation, it is recommended that all the fuel supply system pipes be carefully cleaned inside, to remove foreign matter that might impair the burner operation.
- Before the burner is commissioned, qualified personnel should inspect the following:

a the fuel supply system, for proper sealing;
b the fuel flow rate, to make sure that it has been set based on the firing rate required of the burner;
c the burner firing system, to make sure that it is supplied for the designed fuel type;
d the fuel supply pressure, to make sure that it is included in the range shown on the rating plate;
e the fuel supply system, to make sure that the system dimensions are adequate to the burner firing rate, and that the system is equipped with all the safety and control devices required by the regulations in force.

- When the burner is to remain idle for some time, the fuel supply tap or taps should be closed.

SPECIAL INSTRUCTIONS FOR USING GAS

Have qualified personnel inspect the installation to ensure that:

a the gas delivery line and train are in compliance with the regulations and provisions in force;
b all gas connections are tight;
c the boiler room ventilation openings are such that they ensure the air supply flow required by the current regulations, and in any case are sufficient for proper combustion.

- Do not use gas pipes to earth electrical equipment.
- Never leave the burner connected when not in use. Always shut the gas valve off.
- In case of prolonged absence of the user, the main gas delivery valve to the burner should be shut off.

Precautions if you can smell gas

a do not operate electric switches, the telephone, or any other item likely to generate sparks;
b immediately open doors and windows to create an air flow to purge the room;
c close the gas valves;
d contact qualified personnel.

- Do not obstruct the ventilation openings of the room where gas appliances are installed, to avoid dangerous conditions such as the development of toxic or explosive mixtures.

DIRECTIVES AND STANDARDS

Gas burners

European directives:

- Directive 2009/142/EC - Gas Appliances;
- Directive 2006/95/EC on low voltage;
- Directive 2004/108/EC on electromagnetic compatibility

Harmonised standards :

-UNI EN 676 (Gas Burners;-EN 55014-1Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus.

-CEI EN 60335-1(Household and similar electrical appliances - Safety. Part 1: General requirements;

-EN 50165 (Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

-EN 60335-2-102 (Household and similar electrical appliances. Safety. Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections)

Light oil burners

European directives:

- Directive 2006/95/EC on low voltage;
- Directive 2004/108/EC on electromagnetic compatibility

Harmonised standards :

-CEI EN 60335-1(Household and similar electrical appliances - Safety. Part 1: General requirements;

-UNI 267 Automatic forced draught burners for liquid fuels

-EN 55014-1Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus.

-EN 50165 (Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

National standards :

-UNI 7824: Monobloc nebulizer burners for liquid fuels. Characteristics and test methods

Heavy oil burners

European directives:

- Directive 2006/95/EC on low voltage;
- Directive 2004/108/EC on electromagnetic compatibility

Harmonised standards :

-CEI EN 60335-1 Household and similar electrical appliances - SafetyPart 1: General requirements;

-EN 55014-1Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus.

- EN 50165 Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

National standards :

-UNI 7824: Monobloc nebulizer burners for liquid fuels. Characteristics and test methods

Gas - Light oil burners

European directives:

- Directive 2009/142/EC - Gas Appliances;
- Directive 2006/95/EC on low voltage;
- Directive 2004/108/EC on electromagnetic compatibility

Harmonised standards :

-UNI EN 676 Gas Burners

-EN 55014-1Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus.

-UNI 267 Automatic forced draught burners for liquid fuels

-CEI EN 60335-1(Household and similar electrical appliances - Safety. Part 1: General requirements;

- EN 50165 Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

National standards :

-UNI 7824: Monobloc nebulizer burners for liquid fuels. Characteristics and test methods

Gas - Heavy oil burners

European directives:

- Directive 2009/142/EC - Gas Appliances;
- Directive 2006/95/EC on low voltage;
- Directive 2004/108/EC on electromagnetic compatibility

Harmonised standards :

-EN 55014-1Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus.

-UNI EN 676 (Gas Burners;

-CEI EN 60335-1(Household and similar electrical appliances - Safety. Part 1: General requirements;

- EN 50165 Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

National standards :

-UNI 7824: Monobloc nebulizer burners for liquid fuels. Characteristics and test methods

Industrial burners

European directives:

- Directive 2009/142/EC - Gas Appliances;
- Directive 2006/95/EC on low voltage;
- Directive 2004/108/EC on electromagnetic compatibility

Harmonised standards :

-EN 55014-1Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus.

-EN 50165 Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

-UNI EN 746-2: Industrial thermoprocessing equipment

Burner data plate

For the following information, please refer to the data plate:

- burner type and burner model: must be reported in any communication with the supplier
- burner ID (serial number): must be reported in any communication with the supplier
- date of production (year and month)
- information about fuel type and network pressure

Type	--
Model	--
Year	--
S.Number	--
Output	--
Oil Flow	--
Fuel	--
Category	--
Gas Pressure	--
Viscosity	--
El.Supply	--
El.Consump.	--
Fan Motor	--
Protection	--
Drwaing n°	--
P.I.N.	--

SYMBOLS USED

WARNING!

Failure to observe the warning may result in irreparable damage to the unit or damage to the environment

DANGER!

Failure to observe the warning may result in serious injuries or death.

WARNING!

Failure to observe the warning may result in electric shock with lethal consequences

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PART I: SPECIFICATIONS

1.0 GENERAL FEATURES

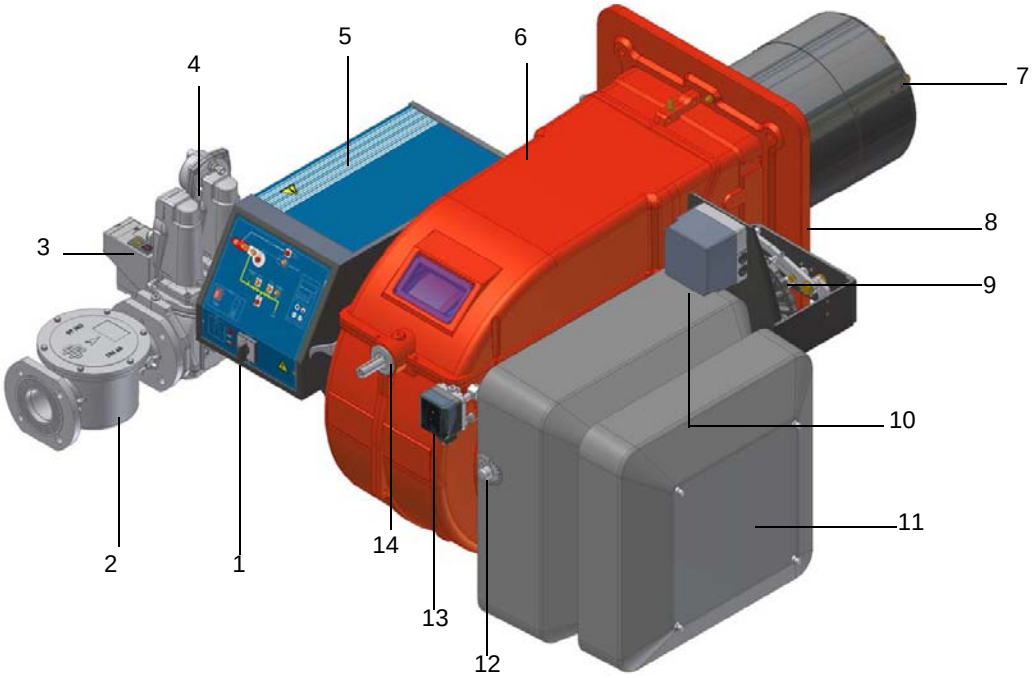


Fig. 1

Note: the figure is indicative only

1 Control panel with startup switch
2 Gas filter
3 Gas proving system
4 Gas valves group
5 Electrical panel
6 Cover
7 Blast tube + Combustion head
8 Flange
9 Adjusting cam
10 Actuator
11 Silencer
12 Air damper index
13 Air pressure switch
14 Combustion head adjusting ring nut

The gas coming from the supply line, passes through the valves group provided with filter and governor. This one forces the pressure in the utilisation limits. The electric actuator, that moves proportionally the air damper and the gas butterfly valve, uses an adjusting cam (9) with variable shape. This one allows the optimisation of the gas flue values, as to get an efficient combustion. The combustion head positioning determines the burner's output. Fuel and comburent are routed into separated ways as far as the zone of flame generation (combustion chamber). The air (comburent) and fuel (gas) are forced into the combustion chamber. The control panel (1), placed on the burner's front side, shows each operating stage.

2.0 BURNERS FEATURES

2.1 Burner model identification

Burners are identified by burner type and model. Burner model identification is described as follows.

Type	**RX510**	Model	**M-.**	**PR.**	**S.**	***.**	**A.**	**1.**	**80.**
	(1)		**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**

(1) BURNER TYPE	**RX90 - RX91 - RX510 - RX515 - RX520**
(2) FUEL	M - Natural gas
(3) OPERATION (Available versions)	PR - Progressive MD - Fully modulating
(4) BLAST TUBE	S - Standard L - Extended
(5) DESTINATION COUNTRY	* - see data plate
(6) BURNER VERSION	A - Standard
(7) EQUIPMENT	1 = 2 valves + gas proving system 8 = 2 valves + gas proving system + maximum gas pressure switch
(8) GAS CONNECTION	50 = Rp2 65 = DN65 80 = DN80 100 = DN100

2.2 Technical Specifications

BURNER TYPE		**RX90**	**RX91**
Output	min - max kW	288 - 1480	674 - 2008
Fuel		Natural gas	
Category		(see next paragraph)	
Gas rate	min.-max. (Stm^3/h)	30.5 - 157	71 - 213
Gas pressure		(see Note 2)	
Power supply		400V 3N~ 50Hz	
Total power consumption	kW	3.5	4.5
Electric motor	kW	3	4
Approximate weight	kg	250	
Protection		IP40	
Operation		Progressive - Fully modulating	
Gas train 50 Connection	Ø Valves / Connections	50 / Rp 2	
Gas train 65	Ø Valves / Connections	65 / DN65	
Gas train 80	Ø Valves / Connections	80 / DN80	
Gas train 100	Ø Valves / Connections	100 / DN100	
Operating temperature	°C	-10 ÷ +50	
Storage Temperature	°C	-20 ÷ +60	
Working service*		Intermittent	
NOx emissions		≤ 80 mg/kWh (Class 3 - EN676)	

Note1:	**All gas flow rates are referred to Stm^3/h (1013 mbar absolute pressure, 15 °C temperature) and are valid for G20 gas (net calorific value H_i = 34.02 MJ/Stm^3);**
Note2:	**Maximum gas pressure = 360mbar (with Dungs MBDLE)** **Maximum gas pressure = 500mbar (with Siemens VGD)** **Minimum gas pressure = see gas curves.**

*** NOTE ON THE BURNER WORKING SERVICE:** for safety reasons, one controlled shutdown must be performed every 24 hours of continuous operation.

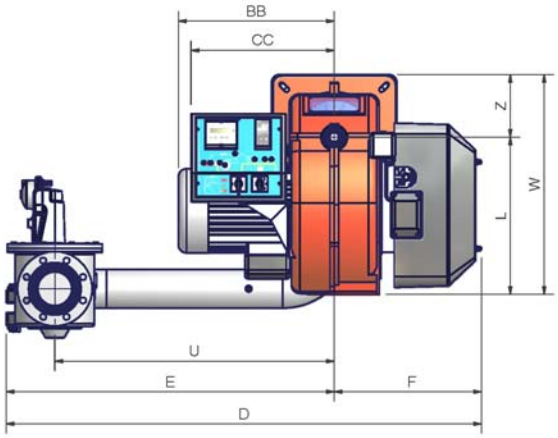
BURNER TYPE		**RX510**	**RX515**	**RX520**
Output	min - max kW	800 - 3250	770 - 4400	1000 - 5800
Fuel		Natural gas		
Category		(see next paragraph)		
Gas rate	min.-max. (Stm^3/h)	85 - 344	81.50 - 466	106 - 614
Gas pressure	min - max mbar	(see Note 2)		
Power supply		400V 3N~ 50Hz		
Total power consumption	kW	8	11.50	15.50
Electric motor	kW	7.50	11	15
Approximate weight	kg	350		
Protection		IP40		
Operation		Progressive - Fully modulating		
Gas train 50	ØValves / Connections	50 / Rp 2		
Gas train 65	ØValves / Connections	65 / DN65		
Gas train 80	ØValves / Connections	80 / DN80		
Gas train 100	ØValves / Connections	100 / DN100		
Operating temperature	°C	-10 ÷ +50		
Storage Temperature	°C	-20 ÷ +60		
Working service		Intermittent		
NOx emissions		≤ 80 mg/kWh(Class 3 - EN676)		

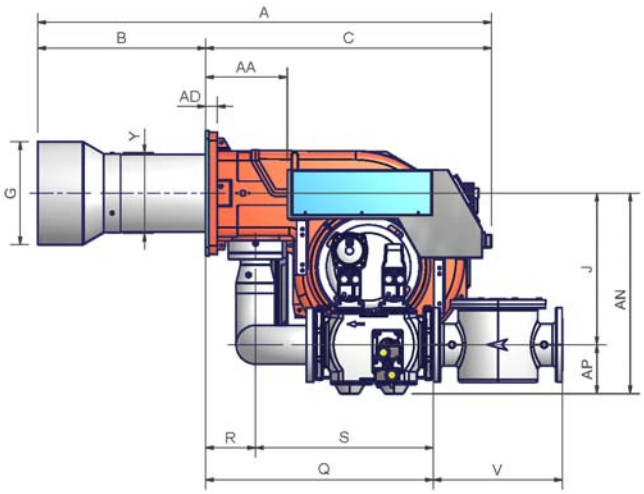
Note1:	**All gas flow rates are referred to Stm^3/h (1013 mbar absolute pressure, 15 °C temperature) and are valid for G20 gas (net calorific value H_i = 34.02 MJ/Stm^3);**
Note2:	**Maximum gas pressure = 360mbar (with Dungs MBDLE)** **Maximum gas pressure = 500mbar (with Siemens VGD)** **Minimum gas pressure = see gas curves.**

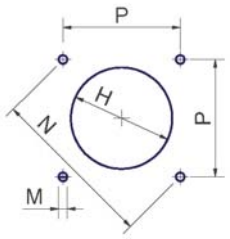
2.3 Country and usefulness gas categories

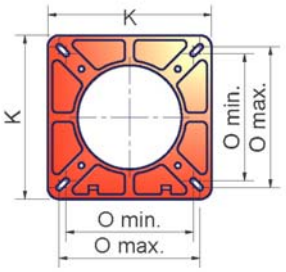
GAS CATEGORY	**COUNTRY**																								
I_{2H}	AT	ES	GR	SE	FI	IE	HU	IS	NO	CZ	DK	GB	IT	PT	CY	EE	LV	SI	MT	SK	BG	LT	RO	TR	CH
I_{2E}	LU	PL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$I_{2E(R)B}$	BE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I_{2L}	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I_{2ELL}	DE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I_{2Er}	FR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

2.4 Overall dimensions (mm)







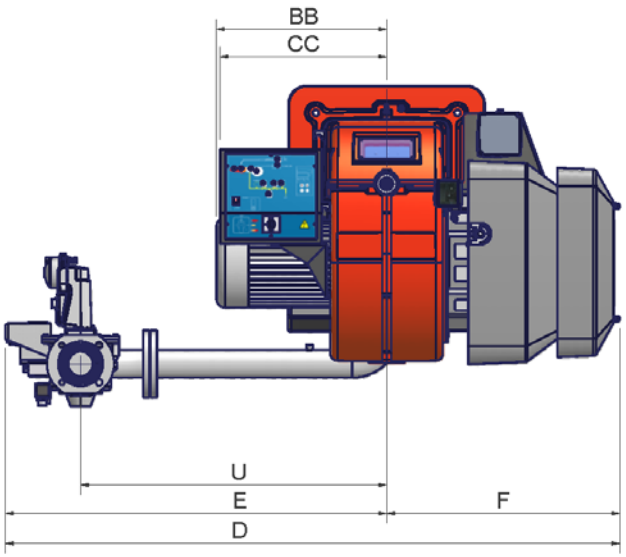


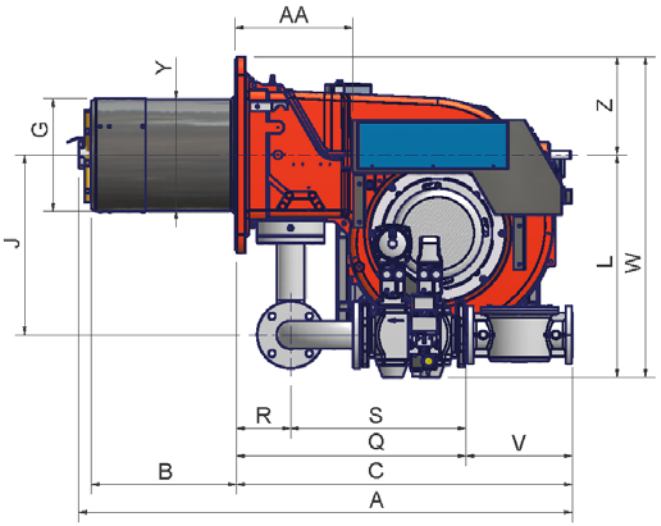
boiler recommended drilling template and burner flange

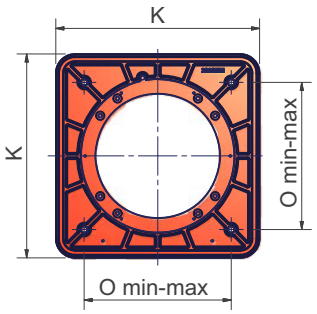
	DN	A	AA	AD	AN	AP	B	BB	C	CC	D	E	F	G	H	J	K	L	M	N	Omin	Omax	P	Q	R	S	U	V	W	Y	Z
RX90	50	1168	242	35	429	100	290	419	843	422	1159	725	434	228	258	329	360	464	M12	417	280	310	295	522	148	374	624	216	649	228	185
RX90	65	1168	242	35	406	118	290	419	843	422	1309	875	434	228	258	288	360	464	M12	417	280	310	295	551	148	403	750	292	649	228	185
RX90	80	1168	242	35	439	132	290	419	843	422	1311	877	434	228	258	307	360	464	M12	417	280	310	295	592	148	444	750	322	649	228	185
RX90	100	1168	242	35	592	145	290	419	843	422	1401	967	434	228	258	447	360	464	M12	417	280	310	295	672	148	524	824	382	649	228	185
RX91	50	1330	246	35	550	100	290	441	1005	425	1160	725	435	228	258	450	360	464	M12	424	280	310	300	532	148	384	624	190	649	228	185
RX91	65	1330	246	35	564	117	290	441	1005	425	1406	971	435	228	258	447	360	464	M12	424	280	310	300	632	148	484	846	292	649	228	185
RX91	80	1330	246	35	579	132	290	441	1005	425	1437	1002	435	228	258	447	360	464	M12	424	280	310	300	683	148	535	875	313	649	228	185
RX91	100	1330	246	35	592	145	290	441	1005	425	1520	1085	435	228	258	447	360	464	M12	424	280	310	300	790	148	642	942	353	649	228	185

*DN = gas valves size

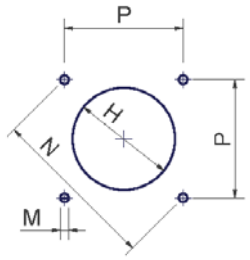
NOTE: the overall dimensions are referred to burners provided with Siemens VGD valves.







Burner flange



Boiler recommended drilling template

	DN*	A	AA	AD	B	BB	C	CC	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	U	V	W	Y	Z
RX510	50	1359	323	35	400	468	924	446	1713	1071	642	318	350	494	540	597	M14	552	390	390	755	150	605	843	216	867	328	270
RX510	65	1359	323	35	400	468	924	446	1691	1049	642	318	350	494	540	612	M14	552	390	390	633	150	483	843	292	882	328	270
RX510	80	1359	323	35	400	468	924	446	1726	1084	642	318	350	494	540	626	M14	552	390	390	685	150	535	875	322	896	328	270
RX510	100	1359	323	35	400	468	924	446	1809	1167	642	318	350	494	540	641	M14	552	390	390	792	150	642	942	382	911	328	270
RX515	50	1514	323	35	530	508	924	446	1713	1071	642	305	345	494	540	597	M14	552	390	390	755	150	605	843	216	867	328	270
RX515	65	1514	323	35	530	508	924	446	1691	1049	642	305	345	494	540	612	M14	552	390	390	633	150	483	843	292	882	328	270
RX515	80	1514	323	35	530	508	924	446	1726	1084	642	305	345	494	540	626	M14	552	390	390	685	150	535	875	322	896	328	270
RX515	100	1514	323	35	530	508	924	446	1809	1167	642	305	345	494	540	641	M14	552	390	390	792	150	642	942	382	772	328	270
RX520	50	1514	323	35	530	508	924	446	1713	1071	642	340	372	494	540	597	M14	552	390	390	755	150	605	843	216	867	328	270
RX520	65	1514	323	35	530	508	924	446	1691	1049	642	340	372	494	540	612	M14	552	390	390	633	150	483	843	292	882	328	270
RX520	80	1514	323	35	530	508	924	446	1726	1084	642	340	372	494	540	626	M14	552	390	390	685	150	535	875	322	896	328	270
RX520	100	1514	323	35	530	508	924	446	1809	1167	642	340	372	494	540	641	M14	552	390	390	792	150	642	942	382	772	328	270

*DN = gas valves size

NOTE: the overall dimensions are referred to burners provided with Siemens VGD valves.

2.5 How to read the burner “Performance curve”

To check if the burner is suitable for the boiler to which it must be installed, the following parameters are needed:

- furnace input, in kW or kcal/h (kW = kcal/h / 860);
- backpressure (data are available on the boiler ID plate or in the user’s manual).

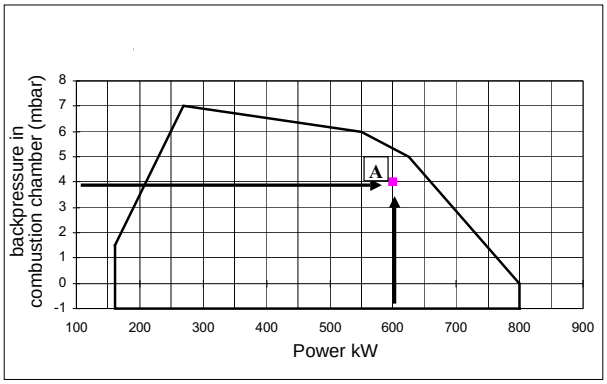
Example:

Furnace input: 600kW

Backpressure: 4mbar

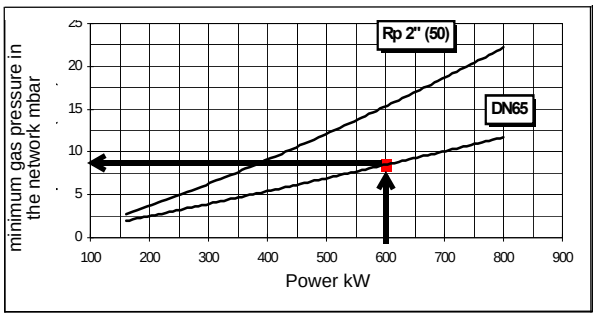
In the “Performance curve” diagram, draw a vertical line matching the furnace input value and an horizontal line matching the backpressure value. The burner is suitable if the intersection point A is inside the performance curve.

Data are referred to standard conditions: atmospheric pressure at 1013mbar, ambient temperature at 15°C.



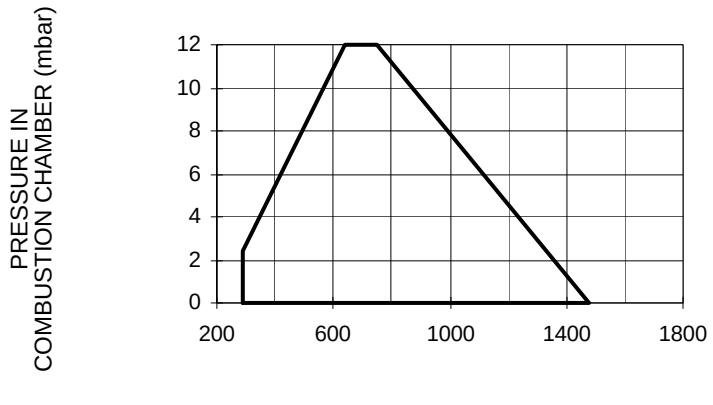
2.6 Checking the proper gas train size

To check the proper gas train size, it is necessary to the available gas pressure value upstream the burner’s gas valve. Then subtract the backpressure. The result is called **pgas.** Draw a vertical line matching the furnace input value (600kW, in the example), quoted on the x-axis, as far as intercepitng the network pressure curve, according to the installed gas train (DN65, in the example). From the interception point, draw an horizontal line as far as matching, on the y-axis, the value of pressure necessary to get the requested furnace input. This value must be lower or equal to the **pgas** value, calculated before.

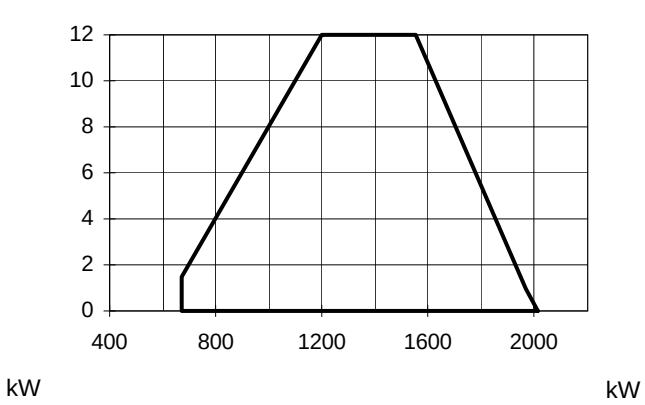


2.7 Performance Curves

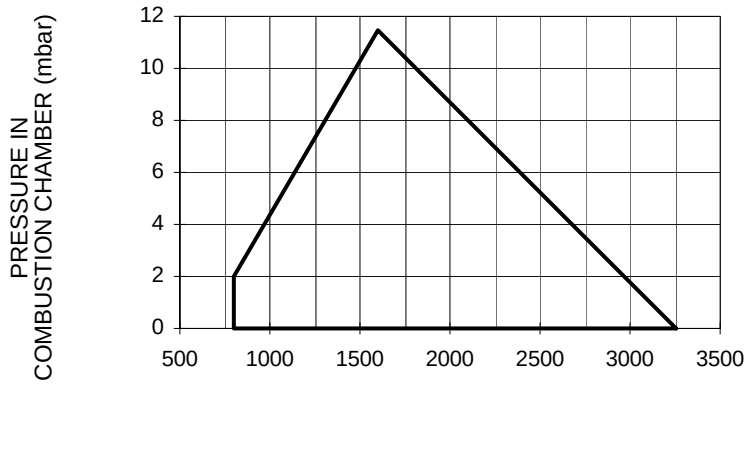
RX90



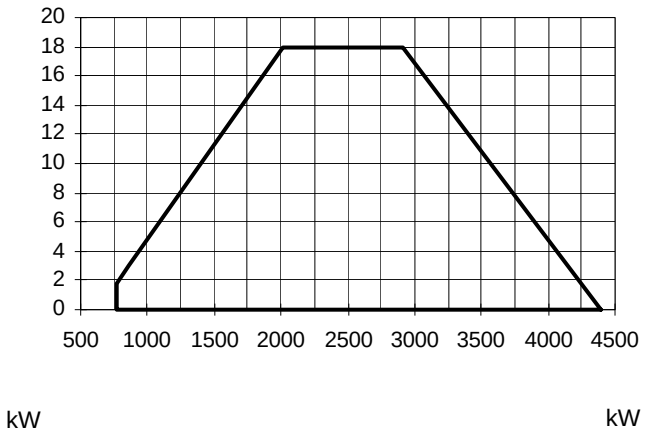
RX91



RX510



RX515



RX520

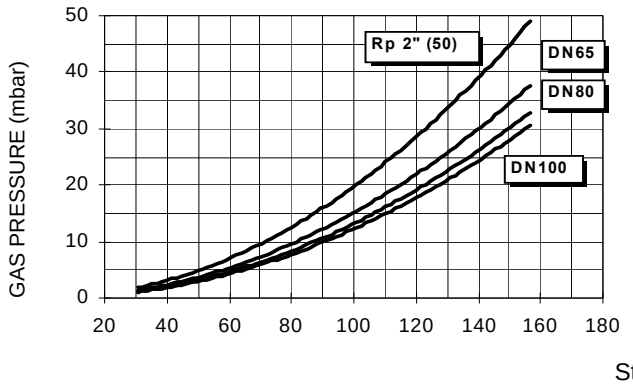
To get the input in kcal/h, multiply value in kW by 860.

Data are referred to standard conditions: atmospheric pressure at 1013mbar, ambient temperature at 15°C

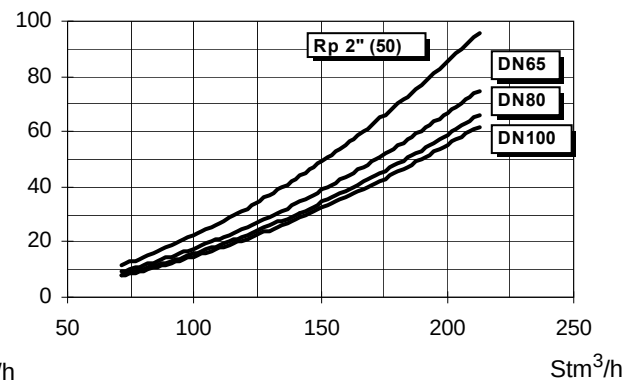
NOTE: The performance curve is a diagram that represents the burner performance in the type approval phase or in the laboratory tests, but does not represent the regulation range of the machine. On this diagram the maximum output point is usually reached by adjsuting the combustion head to its “MAX” position (see paragraph “Adjusting the combustion head”); the minimum output point is reached setting the combustion head to its “MIN” position. During the first ignition, the combustion head is set in order to find a compromise between the burner output and the generator specifications, that is why the minimum output may be different from the Performance curve minimum.

2.8 Pressure in the Network / gas flow rate curves

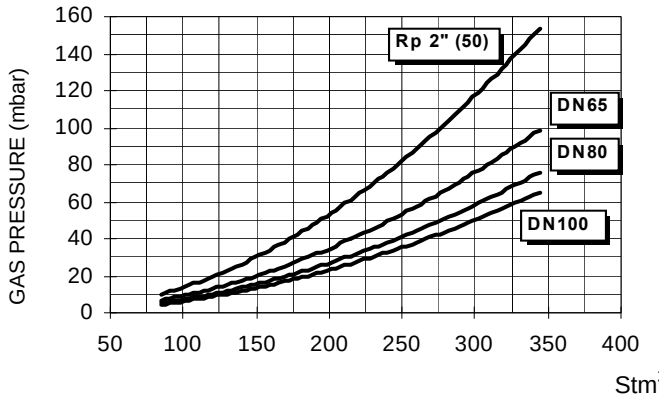
RX90



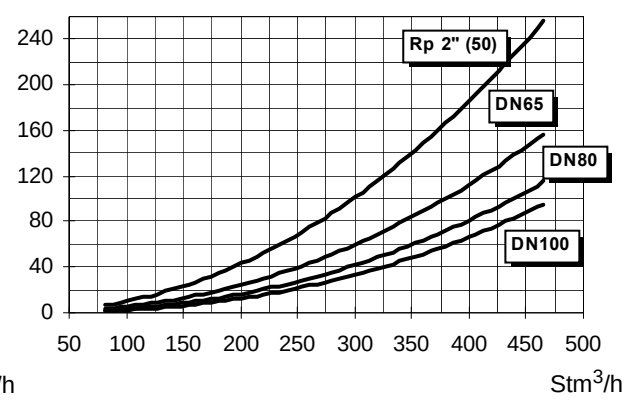
RX91



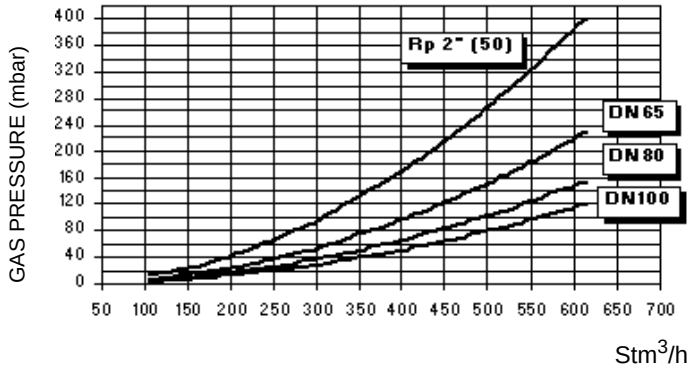
RX510



RX515



RX520



Caution: the gas rate value is quoted on the x-axis, the related network pressure is quoted on the y-axis (pressure value in the combustion chamber is not included). To know the minimum pressure at the gas train inlet, necessary to get the requested gas rate, add the pressure value in the combustion chamber to the value read on the y-axis.

2.9 Combustion head gas pressure curves depending on the flow rate

The curves referred to the gas pressure in the combustion head, depending on the gas flow rate, are referred to the burner properly adjusted (percentage of residual O_2 in the flues as shown in the "Recommended combustion values" table and CO in the standard limits). During this stage, the combustion head, the gas butterfly valve and the actuator are at the maximum opening. Refer to , showing the correct way to measure the gas pressure, considering the values of pressure in combustion chamber, surveyed by means of the pressure gauge or taken from the boiler's Technical specifications.

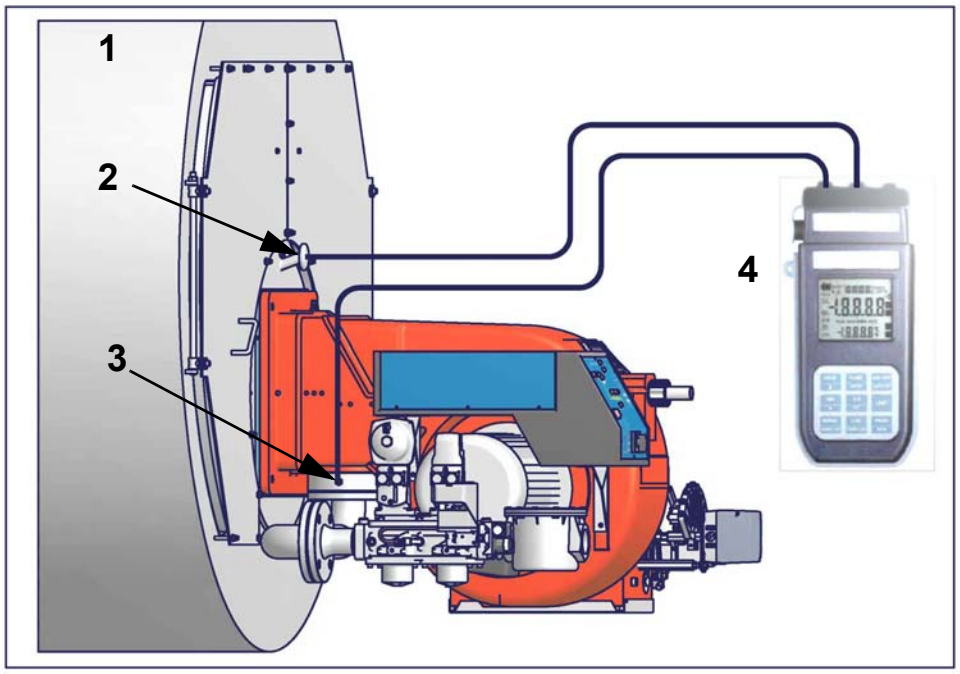


Fig. 2

Note: the figure is indicative only.

Key

1 Generator
2 Pressure outlet on the combustion chamber
3 Gas pressure outlet on the butterfly valve
4 Differential pressure gauge

2.10 Measuring the gas pressure in the combustion head

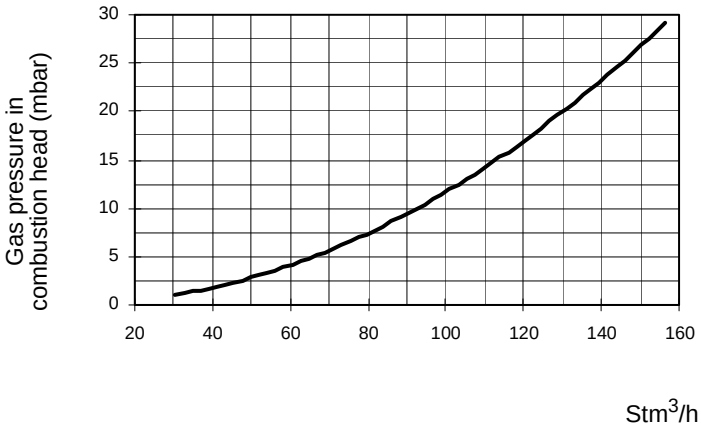
In order to measure the pressure in the combustion head, insert the pressure gauge probes: one into the combustion chamber's pressure outlet to get the pressure in the combustion chamber and the other one into the butterfly valve's pressure outlet of the burner. On the basis of the measured differential pressure, it is possible to get the maximum flow rate: in the pressure - rate curves (showed on the next paragraph), it is easy to find out the burner's output in Stm^3/h (quoted on the x axis) from the pressure measured in the combustion head (quoted on the y axis). The data obtained must be considered when adjusting the gas flow rate.

ATTENTION: THE BURNED GAS RATE MUST BE READ AT THE GAS FLOW METER. WHEN IT IS NOT POSSIBLE, THE USER CAN REFERS TO THE PRESSURE-RATE CURVES AS GENERAL INFORMATION ONLY.

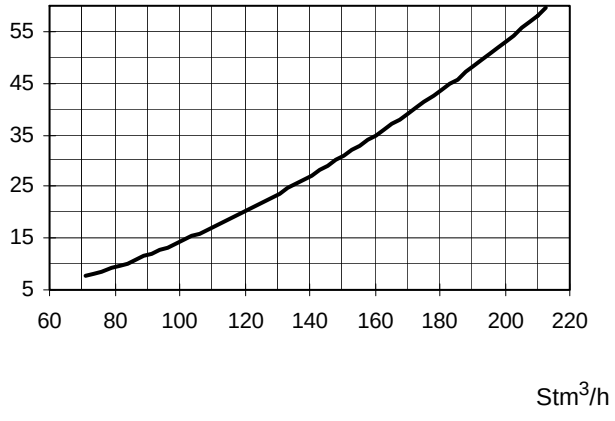
2.11 Pressure - rate in combustion head curves

Curves are referred to pressure = 0mbar in the combustion chamber!

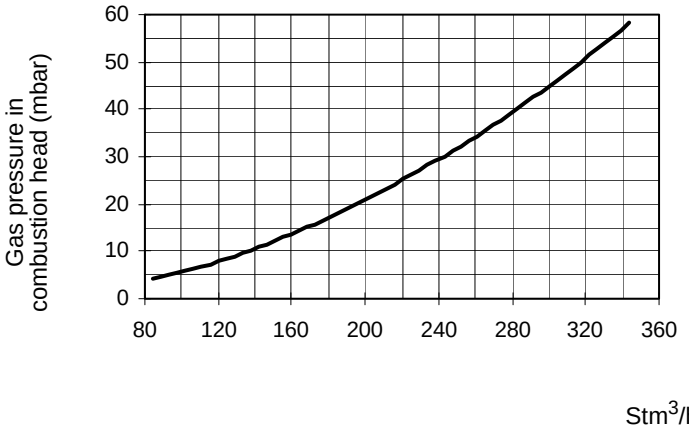
RX90



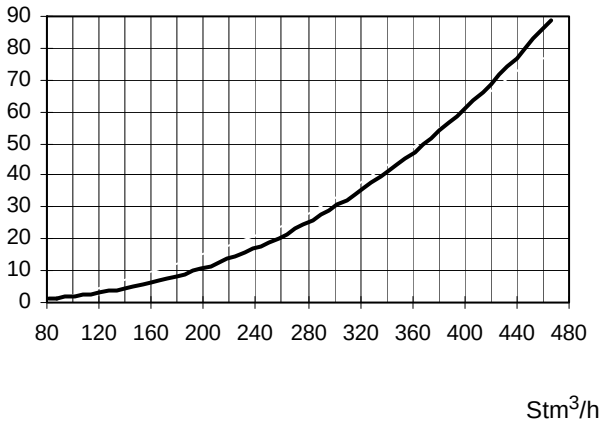
RX91



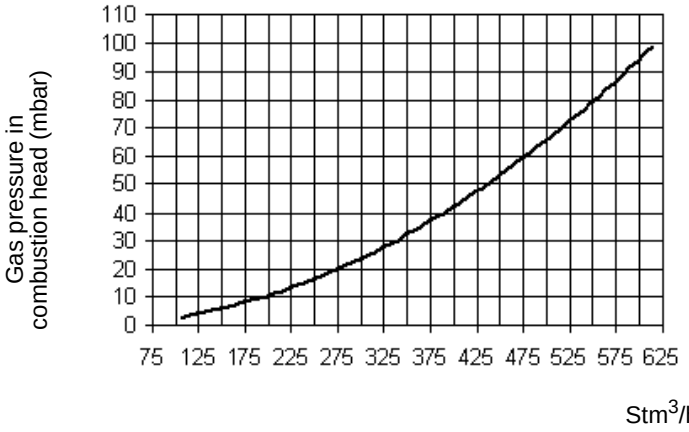
RX510



RX515



RX520



PART II: INSTALLATION

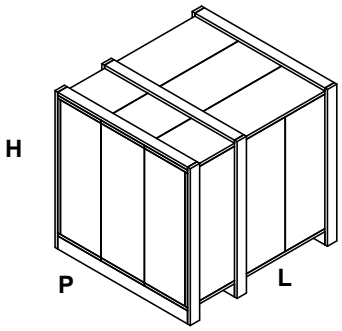
3.0 MOUNTING AND CONNECTING THE BURNER

3.1 Packing

The burners are despatched in wooden crates whose dimensions are:

series 9x: 1672mm x 1072mm x 1016mm (L x P x H)

series 5xx : 1986mm x 1456mm x 1120mm (L x P x H)



Packing cases of this type are affected by humidity and are not suitable for stacking.

The following are placed in each packing case:

- burner with gas train;
- ceramic fibre plait to be inserted between the burner and the boiler;
- envelope containing this manual.

To get rid of the burner's packing, follow the procedures laid down by current laws on disposal of materials.

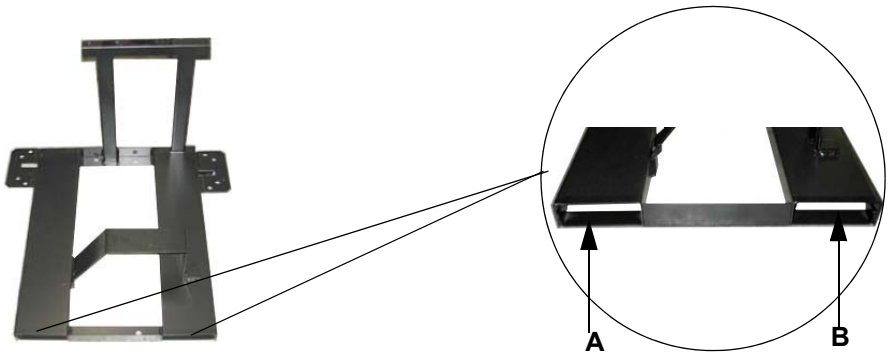
3.2 Handling the burner

ATTENTION! The handling operations must be carried out by specialised and trained personnel. If these operations are not carried out correctly, the residual risk for the burner to overturn and fall down still persists.

To move the burner, use means suitable to support its weight (see paragraph "Technical specifications").

The unpacked burner must be lifted and moved only by means of a fork lift truck.

The burner is mounted on a stirrup provided for handling the burner by means of a fork lift truck: the forks must be inserted into the A anb B ways. Remove the stirrup only once the burner is installed to the boiler.



3.3 Fitting the burner to the boiler

To install the burner into the boiler, proceed as follows:

1 make a hole on the closing door of the combustion chamber as described on paragraph "Overall dimensions")

2 place the burner to the boiler: lift it up and handle it according to the procedure described on paragraph "Handling the burner";

3 place the 4 stud bolts (5), according to the burner's drilling plate described on paragraph "Overall dimensions";

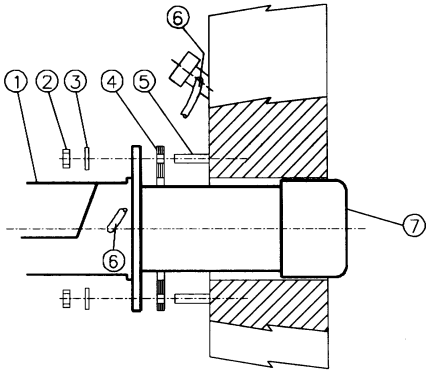
4 fasten the 4 stud bolts;

5 place the ceramic fibre plait on the burner flange;

6 install the burner into the boiler;

7 fix the burner to the stud bolts, by means of the fixing nuts, according to the next picture.

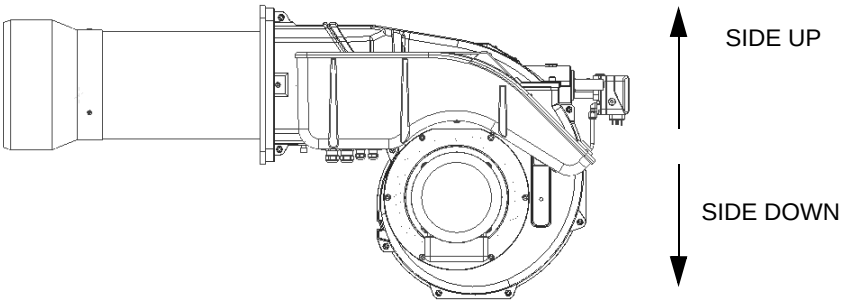
8 After fitting the burner to the boiler, ensure that the gap between the blast tube and the refractory lining is sealed with appropriate insulating material (ceramic fibre cord or refractory cement).



Keys

1 Burner
2 Fixing nut
3 Washer
4 Ceramic fibre plait
5 Stud bolt
7 Blast tube

The burner is designed to work positioned according to the picture below. For different installations, please contact the Technical Department.



Note: the figure is indicative only.

3.4 Matching the burner to the boiler

The burners described in this manual have been tested with combustion chambers that comply with EN676 regulation and whose dimensions are described in the diagram . In case the burner must be coupled with boilers with a combustion chamber smaller in diameter or shorter than those described in the diagram, please contact the supplier, to verify that a correct matching is possible, with respect of the application involved. To correctly match the burner to the boiler verify the type of the blast tube . Verify the necessary input and the pressure in combustion chamber are included in the burner performance curve; otherwise the choice of the burner must be revised consulting the burner manufacturer. To choose the blast tube lenght follow the instructions of the boiler manufacturer. In absence of these consider the following:

- Cast-iron boilers, three pass flue boilers (with the first pass in the rear part): the blast tube must protrude about 200 mm into the combustion chamber (Fig. 1).

The length of the blast tubes does not always allow this requirement to be met, and thus it may be necessary to use a suitably-sized spacer to move the burner backwards (Fig. 3).

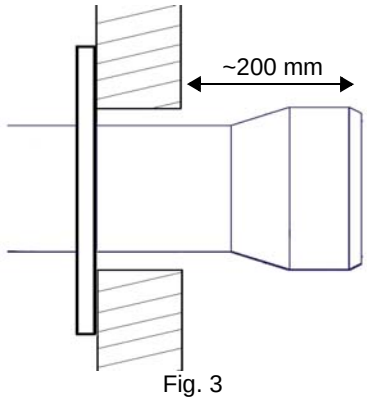


Fig. 3

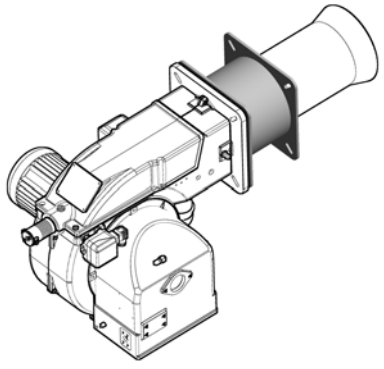


Fig. 4

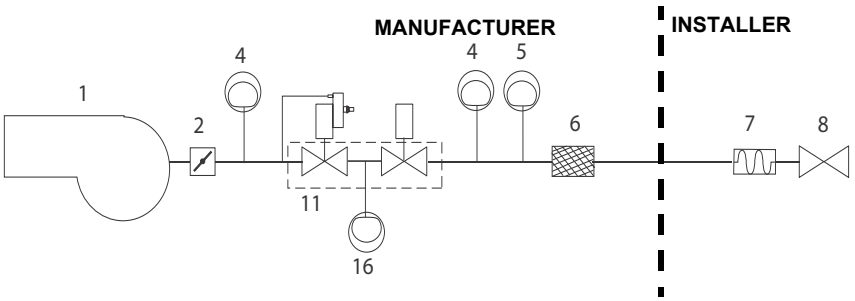
4.0 GAS TRAIN CONNECTIONS

The diagrams show the components of the gas trai included in the delivery and which must be fitted by the installer.The diagrams are in compliance with the current laws.

ATTENTION: BEFORE EXECUTING THE CONNECTIONS TO THE GAS PIPE NETWORK, BE SURE THAT THE MANUAL CUTOFF VALVES ARE CLOSED.

- **Burners: RX90-RX91-RX510**

Gas train with valves group VGD 20/40.. with built-in gas pressure governor + PGCP gas leakage pressure switch



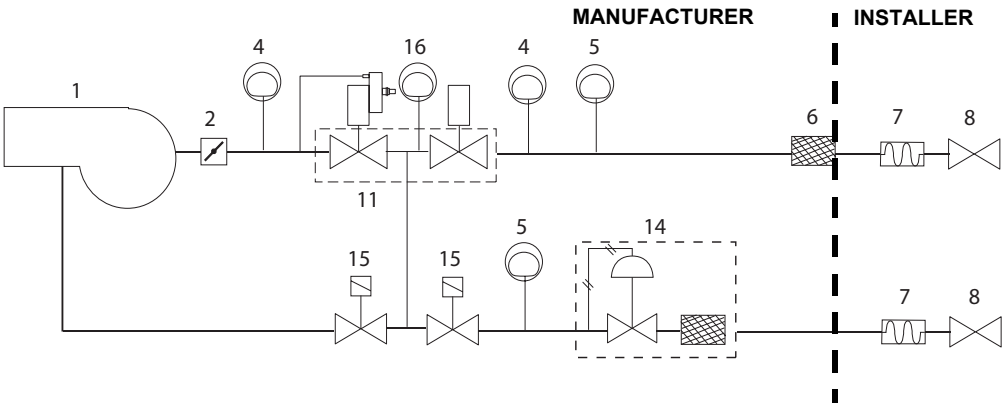
Key

1	Burner	7	Bellows unit
2	Butterfly valve	8	Manual cutoff valve
4	Maximum gas pressure switch (option*)	11	VGD Valves group
5	Minimum gas pressure switch	16	PGCP gas leakage pressure switch
6	Gas filter		

* Note: the maximum gas pressure switch can be mounted either upstream or downstream the gas valve but upstream the butterfly gas valve (see item no.4 in the scheme above).

- **Burners: RX515-RX520**

Gas train : Gas train with valves group VGD 20/40 with built-in gas pressure governor + PGCP



Key

1	Burner	8	Manual cutoff valve
2	Butterfly valve	11	VGD Valves group
4	Maximum gas pressure switch (option*)	14	Pressure governor with filter
5	Minimum gas pressure switch	15	Pilot gas valve
6	Gas filter	16	PGCP (leakage control pressure switch)
7	Bellows unit		

* Note: the maximum gas pressure switch can be mounted either upstream or downstream the gas valve but upstream the butterfly gas valve (see item no.4 in the scheme above).

4.1 Pilot gas train (only for RX515/RX520)

The pilot gas train is already installed to the burner, the following connections must be executed:

- connection from the filter with stabiliser to the gas supply network

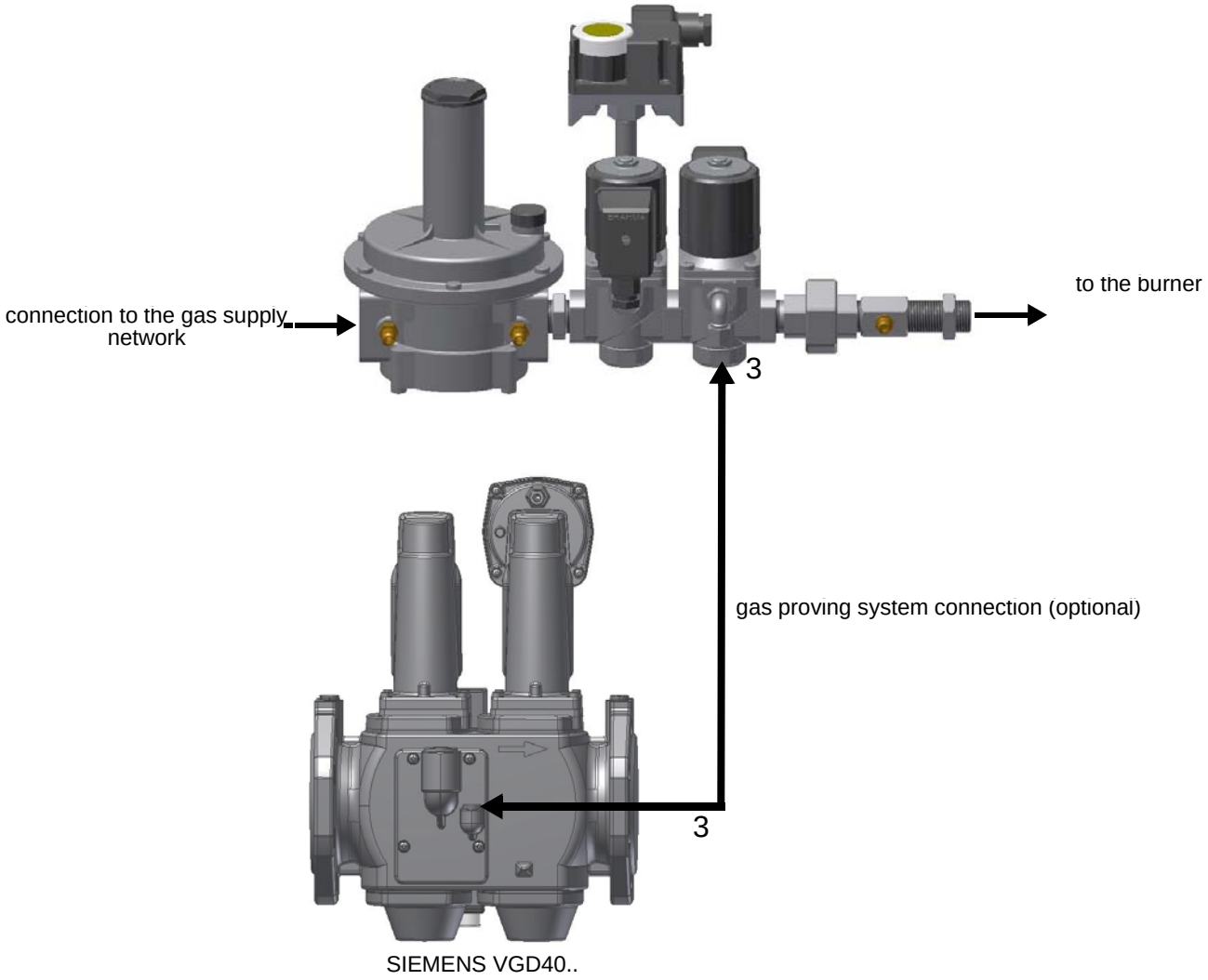


Fig. 5 - pipe port (3) for connecting the pilot gas train to the valves group of the main gas train

4.2 Assembling the gas grain

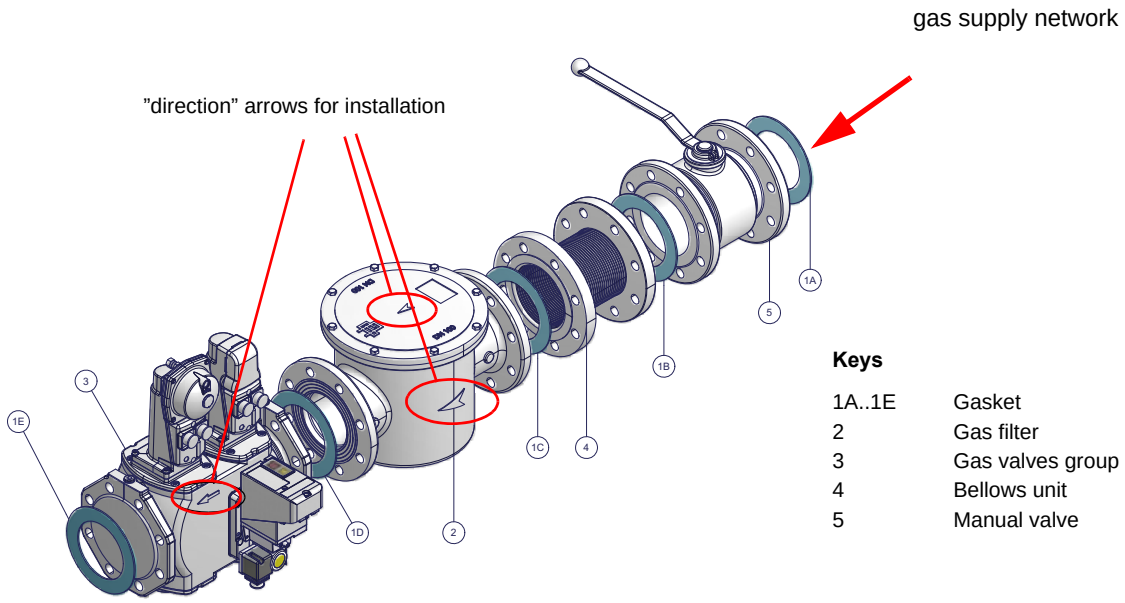


Fig. 6 - Example of gas train

To mount the gas train, proceed as follows:

1-a) in case of threaded joints: use proper seals according to the gas used;

1-b) in case of flanged joints: place a gasket (no. 1A..1E -) between the elements

2) fasten all the items by means of screws, according to the diagrams showed, observing the mounting direction for each item;

NOTE: the bellows unit, the manual cutoff valve and the gaskets are not part of the standard supply.

ATTENTION: once the gas train is mounted according to the diagram on Fig. 1, the gas proving test mus be performed, according to the procedure set by the laws in force.

ATTENTION: it is recommended to mount filter and gas valves to avoid that extraneous material drops inside the valves, during maintenance and cleaning operation of the filters (both the filters outside the valves group and the ones built-in the gas valves).

The procedures of installation fo the gas valves are showed in the next paragraphs, according to the gas train used:

- threaded gas trains with Siemens VGD20..
- flanged gas trains with Siemens VGD40..

4.3 Siemens VGD20.. and VGD40.. gas valves - with SKP2.. (pressure governor)

Mounting

- When mounting the VGD.. double gas valve, two flanges are required (as for VGD20.. model, the flanges are threaded); to prevent cuttings from falling inside the valve, first fit the flanges to the piping and then clean the associated parts;
- install the valve;
- the direction of gas flow must be in accordance with the direction of the arrow on the valve body;
- ensure that the bolts on the flanges are properly tightened;
- ensure that the connections with all components are tight;
- make certain that the O-rings and gaskets between the flanges and the double gas valve are fitted.
- Connect the reference gas pipe (**TP** in figure; 8mm-external size pipe supplied loose), to the gas pressure nipples placed on the gas pipe, downstream the gas valves: gas pressure must be measured at a distance that must be at least 5 times the pipe size.

Leave the blowhole free (**SA** in figure). Should the spring fitted not permit satisfactory regulation, ask one of our service centres for a suitable replacement.

Caution: the SKP2 diaphragm D must be vertical (see Fig. 7).

WARNING: removing the four screws BS causes the device to be unserviceable!

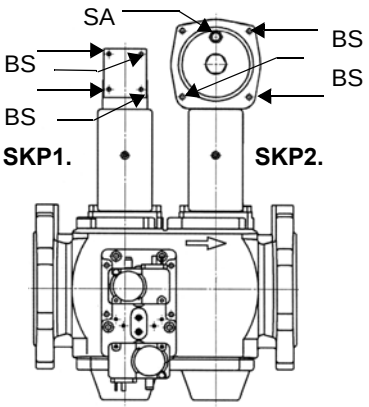


Fig. 7

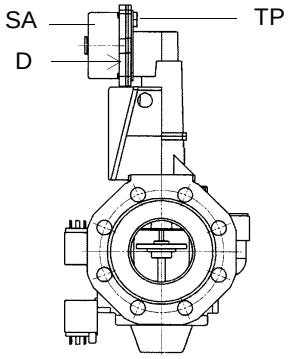
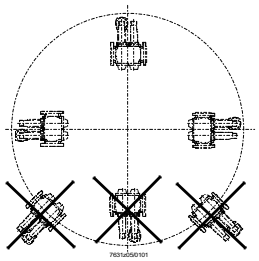


Fig. 8



SIEMENS VGD..MOUNTING POSITIONS

Fig. 9

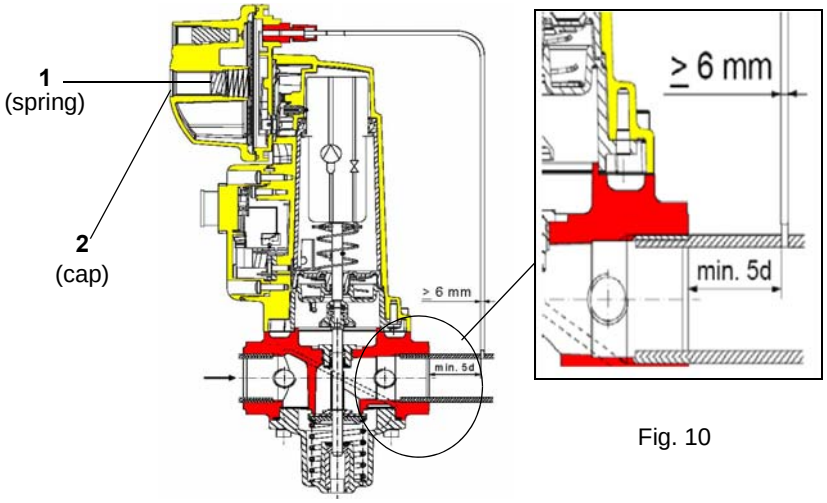


Fig. 10

Siemens VGD valves with SKP actuator :

The pressure adjusting range, upstream the gas valves group, changes according to the spring provided with the valve group.

Performance range (mbar)	0 - 22	15 - 120	100 - 250
Spring colour	neutral	yellow	red

Once the gas train in installed, execute the electrical connections for all its items (gas valves group, gas proving system, pressure switches).

4.4 Gas Filter (if provided)

The gas filters remove the dust particles that are present in the gas, and prevent the elements at risk (e.g.: burner valves, counters and regulators) from becoming rapidly blocked. The filter is normally installed upstream from all the control and on-off devices.

ATTENTION: it is reccomended to install the filter with gas flow parallel to the floor in order to prevent dust fall on the safety valve during maintenance operation.

5.0 ELECTRICAL CONNECTIONS

WARNING! Respect the basic safety rules. make sure of the connection to the earthing system. do not reverse the phase and neutral connections. fit a differential thermal magnet switch adequate for connection to the mains.

WARNING! before executing the electrical connections, pay attention to turn the plant's switch to OFF and be sure that the burner's main switch is in 0 position (OFF) too. Read carefully the chapter "WARNINGS", and the "Electrical connections" section.

ATTENTION: Connecting electrical supply wires to the burner teminal block MA, be sure that the ground wire is longer than phase and neutral ones.

To execute the electrical connections, proceed as follows:

1 remove the cover from the electrical board, unscrewing the fixing screws;
2 execute the electrical connections to the supply terminal board as shown in the attached wiring diagrams;
3 check the direction of the fan motor (see next paragraph);
4 refit the panel cover.

WARNING: (only for double stage and progressive burners) The burner is provided with an electrical bridge between terminals 6 and 7; when connecting the high/low flame thermostat, remove this bridge before connecting the thermostat.

5.1 Rotation of electric motor

Once the electrical connection of the burner is executed, remember to check the rotation of the electric motor. The motor should rotate according to the "arrow" symbol on the body. In the event of wrong rotation, reverse the three-phase supply and check again the rotation of the motor.

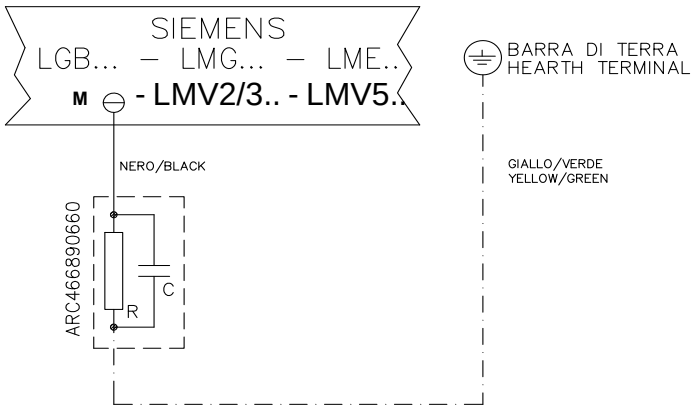
CAUTION: check the motor thermal cut-out adjustment

NOTE: the burners are supplied for three-phase 380 V or 400 V supply, and in the case of three-phase 220 V or 230 V supply it is necessary to modify the electrical connections into the terminal box of the electric motor and replace the overload tripped relay.

5.2 Note on elecrtical supply

If the power supply to the burner is 230V three-phase or 230V phase-phase (without a neutral), with the Siemens control box, between the terminal 2 (terminal X3-04-4 in case of LMV2x, LMV3x, LMV5x, LME7x) on the board and the earth terminal, an RC Siemens RC466890660 filter must be inserted.

Key
C - Capacitor (22nF/250V)
LME / LMV - Siemens control box
R - Resistor (1Mohm)
M - Terminal 2 (LGB,LMC,LME), terminal X3-04-4 (LMV2x, LMV3x, LMV5, LME7x)
RC466890660 - RC Siemens filter



For LMV5 control box, please refer to the clabeling recommendations avaible on the Siemens CD attached to the burner

PART III: OPERATION

LIMITATIONS OF USE

THE BURNER IS AN APPLIANCE DESIGNED AND CONSTRUCTED TO OPERATE ONLY AFTER BEING CORRECTLY CONNECTED TO A HEAT GENERATOR (E.G. BOILER, HOT AIR GENERATOR, FURNACE, ETC.), ANY OTHER USE IS TO BE CONSIDERED IMPROPER AND THEREFORE DANGEROUS.

THE USER MUST GUARANTEE THE CORRECT FITTING OF THE APPLIANCE, ENTRUSTING THE INSTALLATION OF IT TO QUALIFIED PERSONNEL AND HAVING THE FIRST COMMISSIONING OF IT CARRIED OUT BY A SERVICE CENTRE AUTHORISED BY THE COMPANY MANUFACTURING THE BURNER.

A FUNDAMENTAL FACTOR IN THIS RESPECT IS THE ELECTRICAL CONNECTION TO THE GENERATOR'S CONTROL AND SAFETY UNITS (CONTROL THERMOSTAT, SAFETY, ETC.) WHICH GUARANTEES CORRECT AND SAFE FUNCTIONING OF THE BURNER.

THEREFORE, ANY OPERATION OF THE APPLIANCE MUST BE PREVENTED WHICH DEPARTS FROM THE INSTALLATION OPERATIONS OR WHICH HAPPENS AFTER TOTAL OR PARTIAL TAMPERING WITH THESE (E.G. DISCONNECTION, EVEN PARTIAL, OF THE ELECTRICAL LEADS, OPENING THE GENERATOR DOOR, DISMANTLING OF PART OF THE BURNER).

NEVER OPEN OR DISMANTLE ANY COMPONENT OF THE MACHINE EXCEPT FOR ITS MAINTENANCE.

TO SECURE THE MACHINE, ACT ON THE ISOLATOR SWITCH. IN CASE OF ANOMALIES THAT REQUIRED A SHUT DOWN OF THE BURNER, IT'S POSSIBLE TO ACT ON THE AUXILIARY LINE SWITCH, LOCATED ON THE BURNER FRONT PANEL.

IN CASE OF A BURNER SHUT-DOWN, RESET THE CONTROL BOX BY MEANS OF THE RESET PUSHBUTTON. IF A SECOND SHUT-DOWN TAKES PLACE, CALL THE TECHNICAL SERVICE, WITHOUT TRYING TO RESET FURTHER.

WARNING: DURING NORMAL OPERATION THE PARTS OF THE BURNER NEAREST TO THE GENERATOR (COUPLING FLANGE) CAN BECOME VERY HOT, AVOID TOUCHING THEM SO AS NOT TO GET BURNT.

1 Turn to the “ON” position the main switch **A**, on the burner’s control panel (see Fig. 15).

2 Check the control box is not locked (LED **B**, on) and eventually release it by means of the pushbutton **C** (reset - for more information about the device, please refer to the manual’s Appendix).

3 Check the series of thermostats or pressure switches gives the burner the start signal for operating (closed contact).

4 Check that the gas pressure in the gas network is sufficient (if the pressure is normal, the LED **E** lights up).

5 The gas proving system checking cycle starts

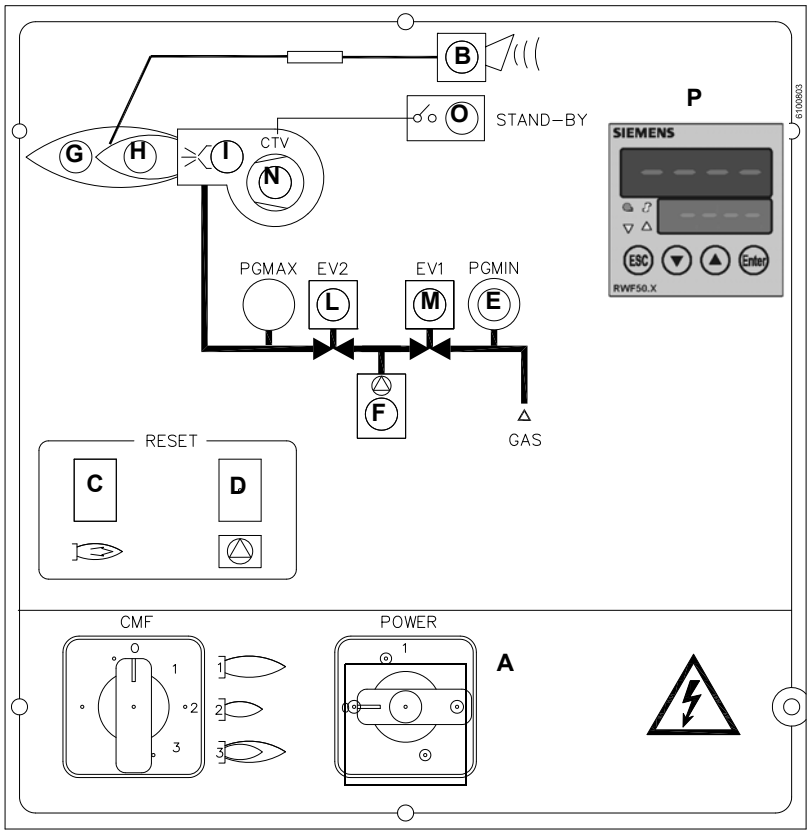
6 The fan motor starts, the actuator drives the air damper to the maximum opening position (LED **G** on); the pre-purge time countdown starts now.

7 At the end of the pre-purgue time, the air damper moves to the ignition position (about 5°), the ignition transformer is energised (LED **I** on), the solenoid gas valves **EV1** and **EV2** are energised (LEDs **L** and **M** on). As far as burners with pilot gas train, the pilot gas valves open.

8 The flame must lights up within few seconds after the gas valves opening, otherwise the control box locks out. Few seconds after the gas valves opening, the transformer is de-energised and the LED **I** turns off.The burner is now operating and at the same time the servocontrol moves to the hi-flame position (90°).

9 Some seconds after the gas valves opening, the burner starts the automatic operation: it automatically switches to low or high flame stage (progressive PR- burners) or to the operation requested by the burner modulator (Fully modulating - MD buners) according to the requirements of the plant. As far as the modulator is concerned, refere to the related manual.

Fig. 11 - Burner front panel



Key

- **A** Main switch
- **B** Lock-out LED
- **C** Reset pushbutton for control box
- **D** Reset pushbutton for gas proving system (only for burners provided with Siemens LDU11)
- **E** “Gas pressure switch signal ” LED
- **F** “Lock-out” LED for gas proving system
- **G** Hi-flame operation LED
- **H** Lo-flame operation LED
- **I** “Ignition transformer operation” LED
- **L** “EV2 opening” LED
- **M** “EV1 opening” LED
- **N** “Fan motor overload tripped” LED
- **O** “Burner in stand-by” LED
- **P** Burner Modulator (only on fully modulating burners)

6.0 ADJUSTING AIR AND GAS FLOW RATES

WARNING! During commissioning operations, do not let the burner operate with insufficient air flow (danger of formation of carbon monoxide); if this should happen, make the fuel decrease slowly until the normal combustion values are achieved.

WARNING! the combustion air excess must be adjusted according to the values in the following chart.

Recommended combustion parameters		
Fuel	Recommended (%) CO_2	Recommended (%) O_2
Natural gas	9 ÷ 10	3 ÷ 4.8

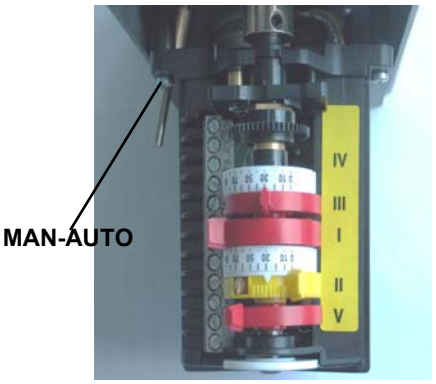
6.1 Adjustments - brief description

Adjust the air and gas flow rates at the maximum output (“high flame”) first, by means of the air damper and the adjusting cam respectively.

- Check that the combustion parameters are in the suggested limits.
- .Check the flow rate measuring it on the counter or, if it was not possible, verifying the combustion head pressure by means of a differential pressure gauge.
- Then, adjust the combustion values corresponding to the points between maximum and minimum: set the shape of the adjusting cam foil. The adjusting cam sets the air/gas ratio in those points, regulating the opening-closing of the throttle gas valve.
- Set, now, the low flame output, acting on the low flame microswitch of the actuator in order to avoid the low flame output increasing too much or that the flues temperature gets too low to cause condensation in the chimney.

6.2 Air and Gas Flow Rate Settings by means of Siemens SQM40../Berger STM30.. actuator

Berger STM30



Siemens SQM40

Actuator cams (SQM40)

I	High flame
II	Stand-by
III	Low flame - gas
VI	Ignition - gas

Actuator cams (STM30)

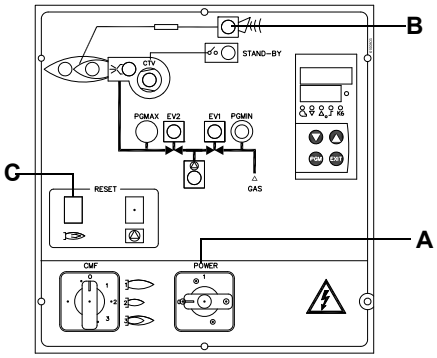
I	High flame
II	Stand-by and Ignition
III	Low flame - gas

1 check the fan motor rotation.

2 Before starting the burner up, drive the high flame actuator microswitch matching the low flame one (in order to let the burner operates at the lowest output) to safely achieve the high flame stage.

3 Turn the burner on by means of its main switch **A** (see next picture): if the burner locks (LED **B** on in the control panel) press the RESET button (**C**) on the control panel - see chapter “OPERATION”.

4 Start the burner up by means of the thermostat series and wait until the pre-purge time comes to an end and the burner starts up;



5 drive the burner to high flame stage, by means fo the thermostat **TAB** (high/low flame thermostat - see Wiring diagrams), as far as fully-modulating burners, see related paragraph.

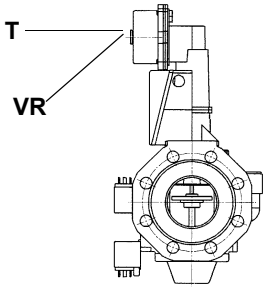
6 Then move progressively the microswitch to higher values until it reaches the high flame position; always check the combustion values and eventually adjusting the gas by means of the valves group stabiliser.

7 go on adjusting air and gas flow rates: check, continuosly, the flue gas analisys, as to avoid combustion with little air; dose the air according to the gas flow rate change following the steps quoted below;

8 acting on the pressure stabiliser of the valves group, adjust the **gas flow rate in the high flame stage** as to meet the values requested by the boiler/utilisation:

- Siemens VGD valves group: remove cap **T** and act on the **VR** adjusting screw to increase or decrease the pressure and consequently the gas rate; screwind **VR** the rate increases, unscrewing it decreases (see next figure).

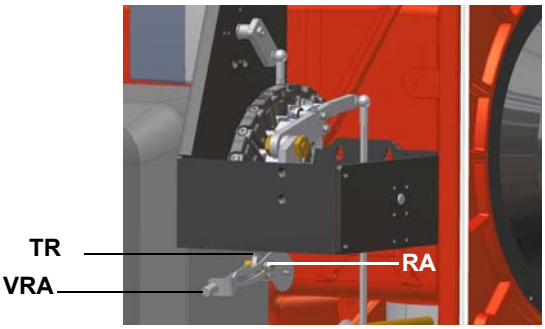
:



Siemens VGD..

9 To adjust the **air flow rate in the high flame stage**, loose the **RA** nut and screw **VRA** as to get the desired air flow rate: moving the rod **TR** towards the air damper shaft, the air damper opens and consequently the air flow rate increases, moving it far from the shaft the air damper closes and the air flow rate decreases.

Note: once the procedure is perfomed, be sure that the blocking nut **RA** is fasten. Do not change the position of the air damper rods.



10 Only if necessary, change the combusiton head position: see paragraph “Adjusting the combustion head”.

11 the air and gas rate are now adjusted at the maximum power stage, go on with the point to point adjustement on the **SV** adjusting cam as to reach the minimum output point.

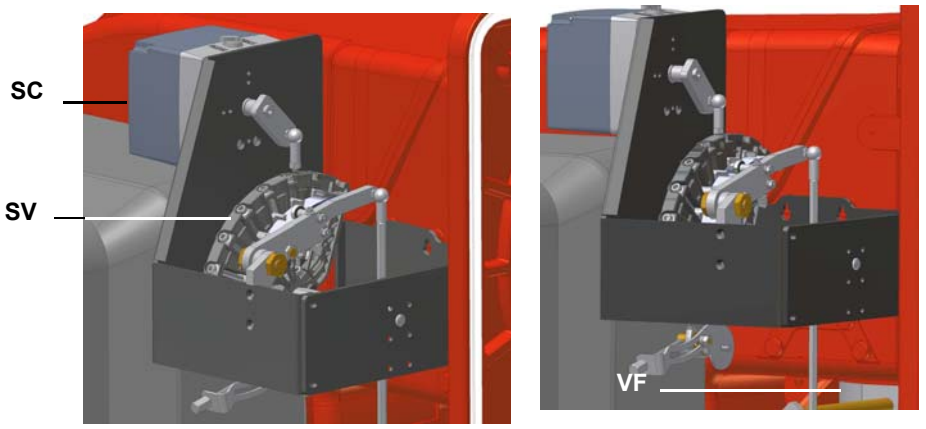
12 as for the point-to-point regulation, move the gas low flame microswitch (cam III) a little lower than the maximum position (90°);

13 set the **TAB** thermostat to the minimum (as far as fully-modulating burners, see related paragraph) in order that the actuator moves progressively towards the low flame position;

14 move cam III to the minimum to move the actuator towards the low flame until the two bearings find the adjusting screw that refers to the lower position: screw **V1** to increase the rate, unscrew to decrease.

15 Move again cam III towards the minimum to meet the next screw on the adjusting cam and repeat the previous step; go on this way as to reach the desired low flame point.

16 Now adjust the pressure switches (see related par.).



Gas butterfly valve closed

Gas butterfly valve open

17 If it is necessary to change the burner output in the low flame stage, move cam III: the low flame position must never match the ignition position, that is why cam III must be set 20°- 30° more than cam II.

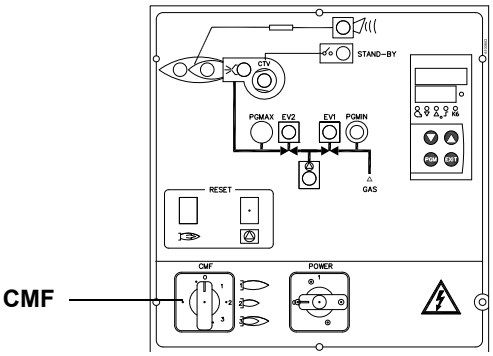
18 Turn the burner off; then start the burner up again. If the adjustment is not correct, repeat the previous steps.

6.3 Fully modulating burners

.To adjust the fully-modulating burners, use the **CMF** switch on the burner control panel (see next picture), instead of the **TAB** thermostat as described on the previous paragraphs about the progressive burners. Go on adjusting the burner as described before, paying attention to use the CMF switch intead of **TAB**.

The **CMF** position sets the oprating stages: to drive the burner to the high-flame stage, set CMF=1; to drive it to the low-flame stage, set CMF=2.

To move the adjusting cam set CMF=1 or 2 and then CMF=0.



CMF = 0 stop at the current position
CMF = 1 high flame operation
CMF = 2 low flame operation
CMF = 3 automatic operation

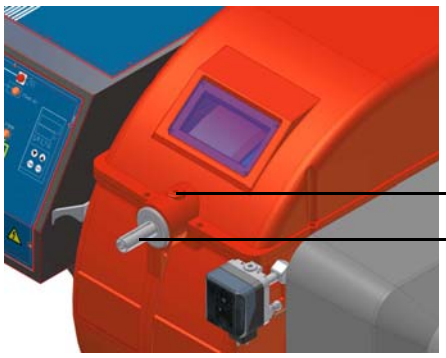
6.4 Adjusting the combustion head

Burner is factory-set according to its combustion head model.

Attention! If it is necessary to change the head position, repeat the air and gas adjustments described at staps 1-9 in paragraph related to air/fuel ratio adjustments according to the actuator model.

Attention (RX515-520):before adjusting the combustion head, turn the burner off and wait until it gets cold. When changing the nozzles position, pay attention that the smallest holes are always directed inwards, otherwise rotate the nozzle as to adjust them. Remeber to fasten V1 and V2 srews.

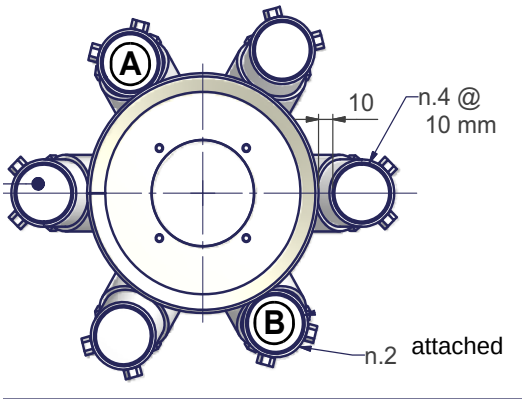
- **RX90-RX91-RX510:** The burner is factory-set with the head in its "all-ahead" position, as for the minimum output. To operate at a higher power, loosen the **VB** screw and slightly move the combustion head backwards, by screwing the **VRT** screw. Fasten **VB** screw when the adjustment is accomplished.



"all-ahead" position

"all-backwards" head position

- **RX515-RX520:** the combustion head is factory-set according to the values mentioned below.

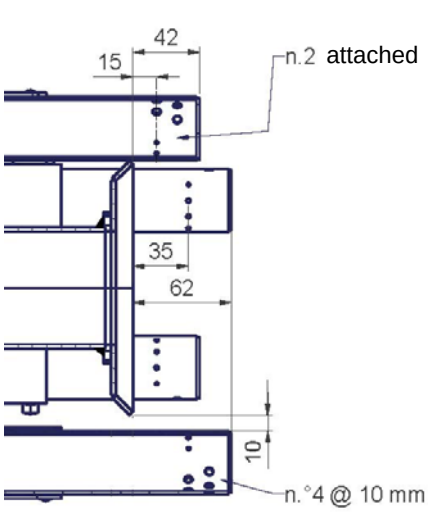


There are six nozzles: two are in touch with the diffuser and are diametrically opposite, four are placed at 10mm from the diffuser edge (see picture above).

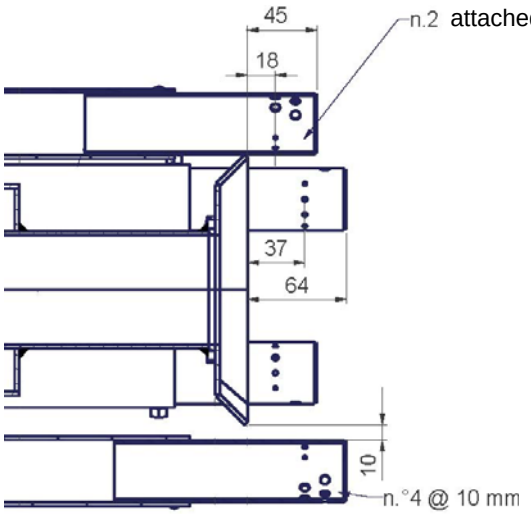
Nozzles are factory set in order that:

RX515: the two attached to the diffuser lean out 42mm from the diffuser edge, the other four lean out 62mm.

RX520: the two attached to the diffuser lean out 45mm from the diffuser edge, the other four lean out 64mm.

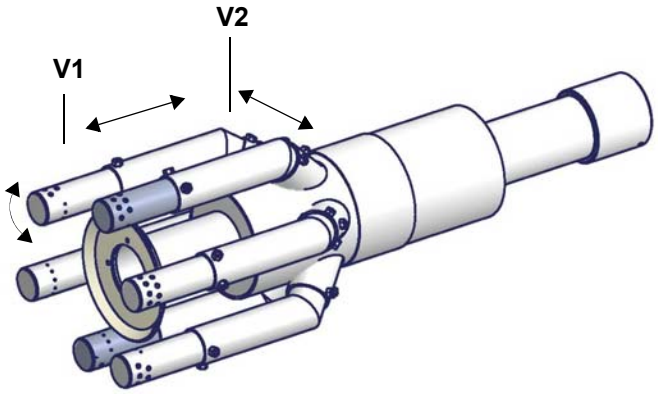


RX515



RX520

The smallest holes (pilot holes) are directed towards the flame axis while the biggest ones (main holes) are directed outwards. As for a finest adjustment in the plant, please contact the Technical service.



The nozzles can be adjusted as follows:

- back and forth adjustment, by means of **V1** screws
- up and down adjustment, by means of **V2** screws

6.5 Adjusting the pilot gas flow rate (RX515-RX520)

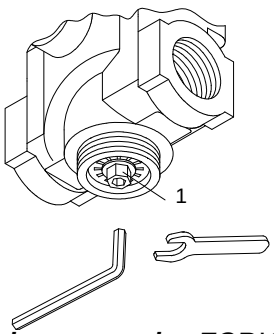
To change the pilot gas valve flow rate, proceed as follows:

1 remove the protection on the bottom of the valve, moving it counterclockwise (see next picture);

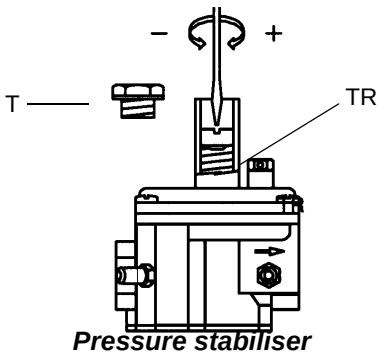
2 rotate clockwise the nut 1 as shown to close the valve or counterclockwise to open.

To perform a finest adjustment, act directly on the pressure stabiliser as follows (see next picture):

3 remove the cap **T**: to increase the gas pressure at the outlet use a screwdriver on the screw **TR** as shown below. Screw to increase the pressure, unscrew to decrease; once the regulation is performed, replace cap **T**.

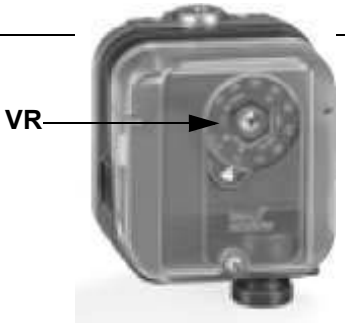


Brahma gas valve EGR*12



Pressure stabiliser

6.6 Setting air and gas pressure switches



The **air pressure switch** locks the control box if the air pressure is not the one requested. If it happens, unlock the burner by means of the control box unlock pushbutton, placed on the burner control panel.

The **gas pressure switches** check the pressure to avoid the burner operate when the pressure value is not in the requested pressure range.

6.7 PGCP Gas leakage pressure switch (witn Siemens LDU/LME7x burner control/Siemens LMV Burner Management System)

- remove the pressure switch plastic cover;
- adjust the PGCP pressure switch to the same value set for the minimum gas pressure switch;
- replace the plastic cover.

6.8 Adjusting the maximum gas pressure switch (when provided)

To calibrate the maximum pressure switch, proceed as follows according to its mounting position:

1 remove the pressure switch plastic cover;

2 if the maximum pressure switch is mounted upstreaam the gas valves: measure the gas pressure in the network, when flame is off; by means of the adjusting ring nut **VR**, set the value read, increased by the 30%.

3 if the maximum pressure switch is mounted downstream the “gas governor-gas valves” group and upstream the butterfly valve: light the burner, adjust it according to the procedure in the previous paragrph. Then, measure the gas pressure at the operating flow rate, downstream the “gas governor-gas valves” group and upstream the butterfly valve; by means of the adjusting ring nut **VR**, set the value read on step 2, increased by the 30%;

4 replace the plastic cover.

6.9 Calibration of low gas pressure switch

As for the gas pressure switch calibration, proceed as follows:

- Be sure that the filter is clean.
- Remove the transparent plastic cap.
- While the burner is operating at the maximum output, test the gas pressure on the pressure port of the minimum gas pressure switch.
- Slowly close the manual cutoff valve (placed upstream the pressure switch, see gas train installation diagram), until the detected pressure is reduced by 50%. Pay attention that the CO value in the flue gas does not increase: if the CO values are higher than the limits laid down by law, slowly open the cutoff valve as to get values lower than these limits.
- Check that the burner is operating correctly.
- Clockwise turn the pressure switch adjusting ring nut (as to increase the pressure value) until the burner stops.
- Slowly fully open the manual cutoff valve.
- Refit the transparent plastic cover on the pressure switch.

6.10 Calibration of air pressure switch

To calibrate the air pressure switch, proceed as follows:

- Remove the transparent plastic cap.
- Once air and fuel setting have been accomplished, startup the burner.
- During the pre-purge phase o the operation, turn slowly the adjusting ring nut **VR** in the clockwise direction (to increase the adjusting pressure) until the burner lockout, then read the value on the pressure switch scale and set it to a value reduced by 15%.
- Repeat the ignition cycle of the burner and check it runs properly.
- Refit the transparent plastic cover on the pressure switch.

PART IV: MAINTENANCE

At least once a year carry out the maintenance operations listed below. In the case of seasonal servicing, it is recommended to carry out the maintenance at the end of each heating season; in the case of continuous operation the maintenance is carried out every 6 months.

WARNING: ALL OPERATIONS ON THE BURNER MUST BE CARRIED OUT WITH THE MAINS DISCONNECTED AND THE FUEL MANAUL CUTOFF VALVES CLOSED!

ATTENTION: READ CAREFULLY THE "WARNINGS" CHAPTER AT THE BEGINNIG OF THIS MANUAL.

7.0 ROUTINE MAINTENANCE

- Clean and examine the gas filter cartridge and replace it if necesssary;
- Remove and clean the combustion head;
- Examine and clean the ignition electrodes, adjust and replace them if necessary;
- Examine and clean the detection electrode/photoelement (according to the burner models), replace it if necessary, in case of doubt, check the detection circuit, after the burner start-up;
- Clean and grease leverages and rotating parts.

ATTENTION: when servicing, if it was necessary to disassemble the gas train parts, remember to execute the gas proving test, once the gas train is reassembled, according to the procedure imposed by the law in force.

7.1 Gas filter maintenance

ATTENTION: Before opening the filter, close the manual cutoff valve downstream the filter and bleed the gas; check that inside the filter there is no pressurised gas.

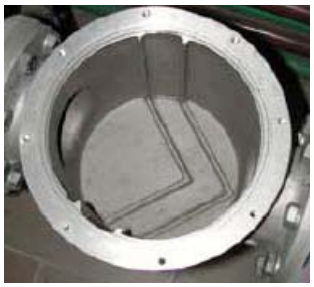
To clean or remove the filter, proceed as follows:

1 remove the cap unscrewing the fixing screws (A);
2 remove the filtering cartridge (B), clean it using water and soap, blow it with compressed air(or replace it, if necessary)
3 replace the cartridge in its proper position taking care to place it inbetween the guides as not to hamper the cap replacement;
4 be sure to replace the "O" ring into its place (C) and replace the cover fastening by the proper screws (A).

A

B

C



7.3 Removing the combustion head

Attention: before adjusting the combustion head, turn the burner off and wait until it gets cold.

- Remove the cover **C**.
- remove the electrodes cables;
- unscrew the 3 screws **V** which hold in position the gas manifold **G** and pull out the complete group as shown in the picture below.
- Clean the combustion head by a compressed air blow or, in case of scale, scrape it off by a scratchbrush.

Note: to replace the combustion head reverse the procedure described above having care to place correctly the O ring (**OR**) between burner and gas manifold.

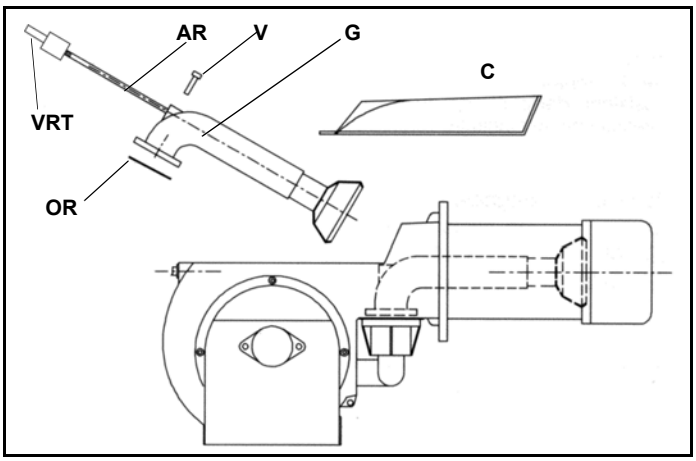
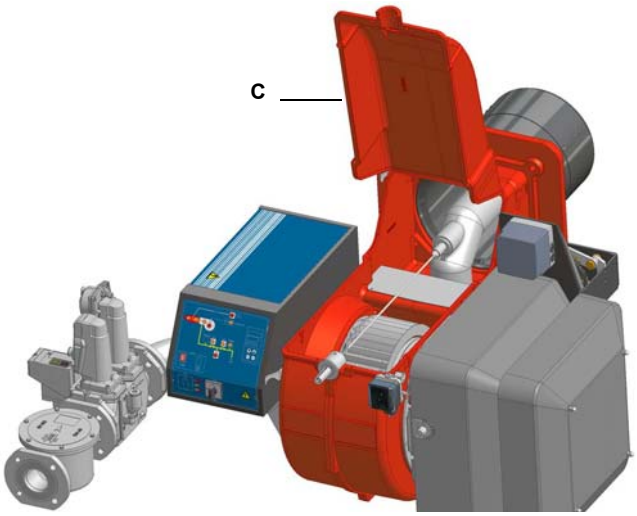
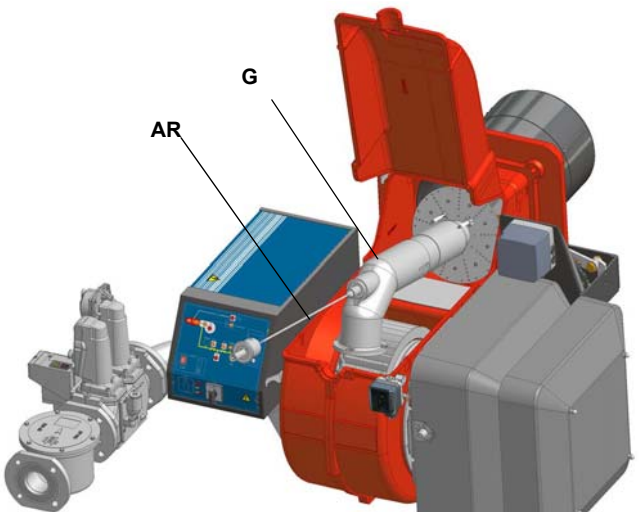


Fig. 12

Key

VRT	Head adjusting screw
AR	Threaded rod
V	Fixing screw
G	Gas manifold
OR	”O” ring
C	Cover





CAUTION (RX515-520): set the nozzles as described on paragraph “Adjusting the combustion head”.

7.4 Electrodes Adjustment

Important Note: Check the ignition and detection electrodes after removing/adjusting the combustion head.

ATTENTION: avoid the ignition and detection electrodes to contact metallic parts (blast tube, head, etc.), otherwise the boiler's operation would be compromised. Check the electrodes position after any intervention on the combustion head.

- **RX510:** the gap between ignition electrode **E** and grounded electrode **M** must be **4mm**.
- **RX515-RX520:** the electrode must be placed in the middle of the slot (see picture).

T

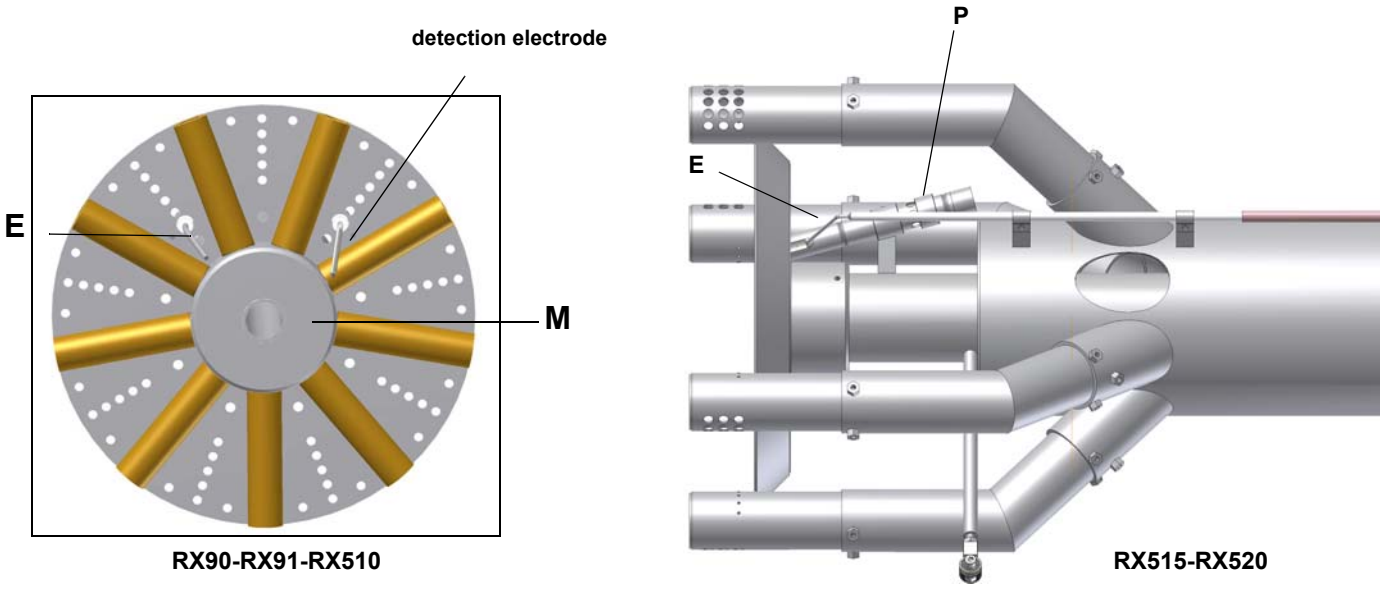


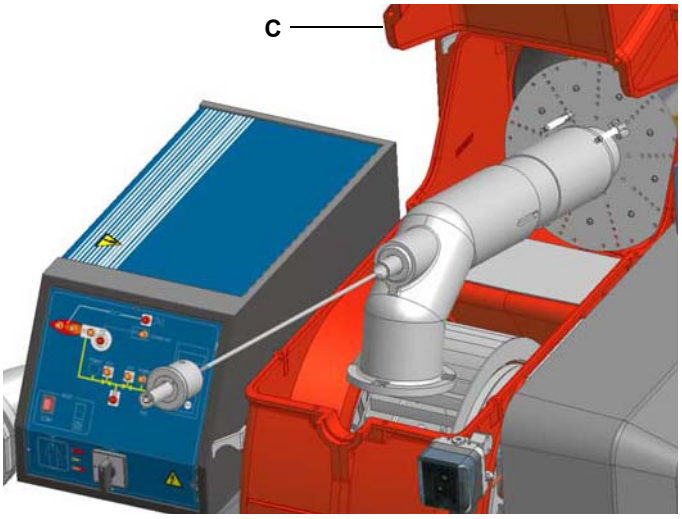
Fig. 13

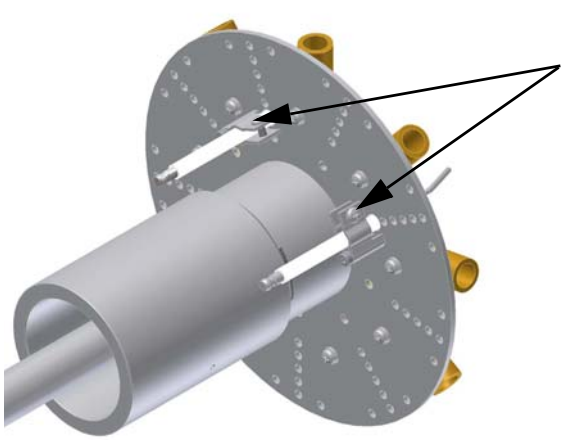
7.5 Replacing the electrodes

ATTENTION: avoid the ignition and detection electrodes to contact metallic parts (blast tube, head, etc.), otherwise the boiler's operation would be compromised. Check the electrodes position after any intervention on the combustion head.

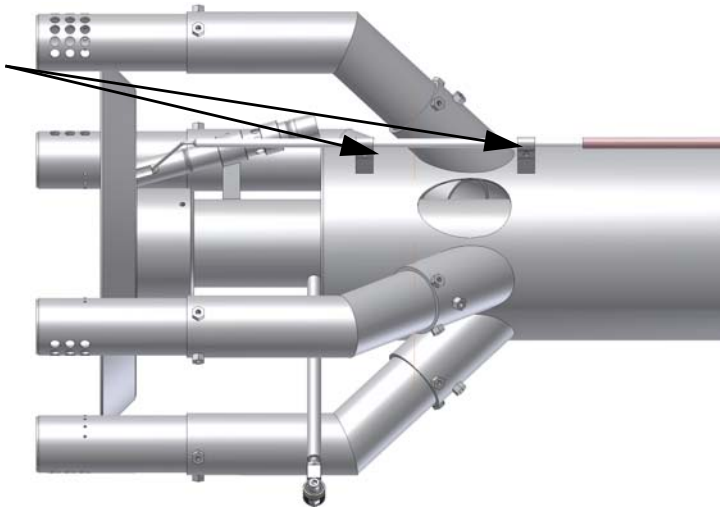
To replace the electrodes, proceed as follows:

1 remove the burner cover **C;**r
2 disconnect the electrodes cables;
3 emove the combustion head referring to paragraph "Removing the combustion head";
4 unscrew **VE** screws that fasten the electrodes (see next pictures)
5 remove the electrodes and replace them referring to the measures indicated in the previous paragraph;
6 reconnect the electrodes cables;
7 replace the combustion head;
8 replace the burner cover.





RX90-RX91-RX510



RX515-RX520

7.6 Cleaning and replacing the detection photocell (RX515-RX520)

To clean/replace the detection photocell, proceed as follows:

1 Disconnect the system from the electrical power supply.
2 Shut off the gas supply
3 remove the photocell from its slot (see next figure);
4 clean the bulbe if dirty, taking care not to touch it with bare hands;
5 if necessary, replace the bulb;
6 replace the photocell into its slot.

When cleaning the photoresistive detector, always use a clean cloth. If necessary, remove it from its slot to replace it.

7.7 Checking the detection current

To check the detection signal follow the scheme in Fig. 1 or Fig. 3. If the signal is less than the value indicated, check the position of the detection electrode or detector, the electrical contacts and, if necessary, replace the electrode or the detector.

Control box	Minimum detection signal
Siemens LME7..	2µA (with electrode)(
Siemens LME7...	70µA with UV detector)

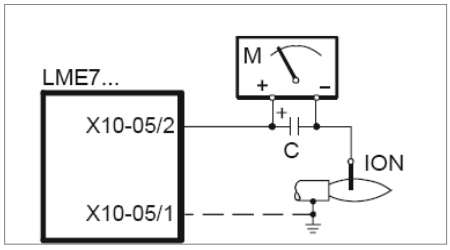


Fig. 14: Detection by electrode

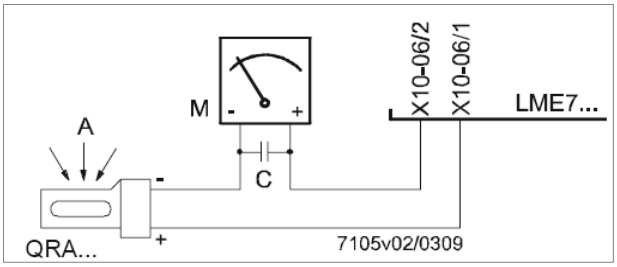
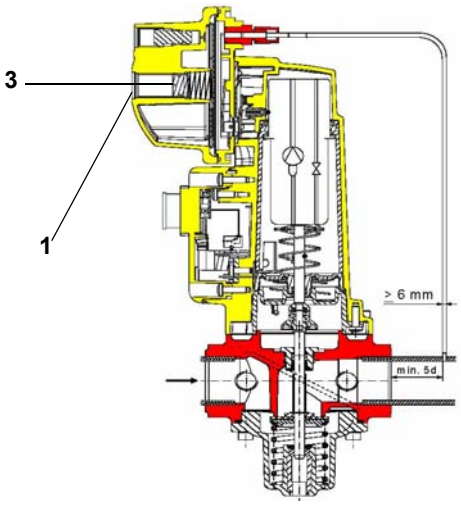


Fig. 15: Detection by photocell QRA..

7.8 Replacing the spring in the gas valve group

To replace the spring in the gas valve group,proceed as follows:

1 Carefully twist the protection cap 1 and the O-ring 2.
2 remove the “set value” spring 3 from housing 4.
3 Replace spring 3.
4 Carefully insert the new “set value” spring. Pay attention to mount properly. First insert the spring part with smaller diameter in the housing.
5 Place O-ring 2 in protective cap 1. Screw in the protective cap with the O-ring in it.
6 Stick the adhesive label for spring identification on the type plate.



SKP Siemens actuator

7.9 Seasonal stop

To stop the burner in the seasonal stop, proceed as follows:

1 turn the burner main switch to 0 (Off position)
2 disconnect the power mains
3 close the fuel valve of the supply line

7.10 Burner disposal

In case of disposal, follow the instructions according to the laws in force in your country about the “Disposal of materials”.

8.0 TROUBLESHOOTING

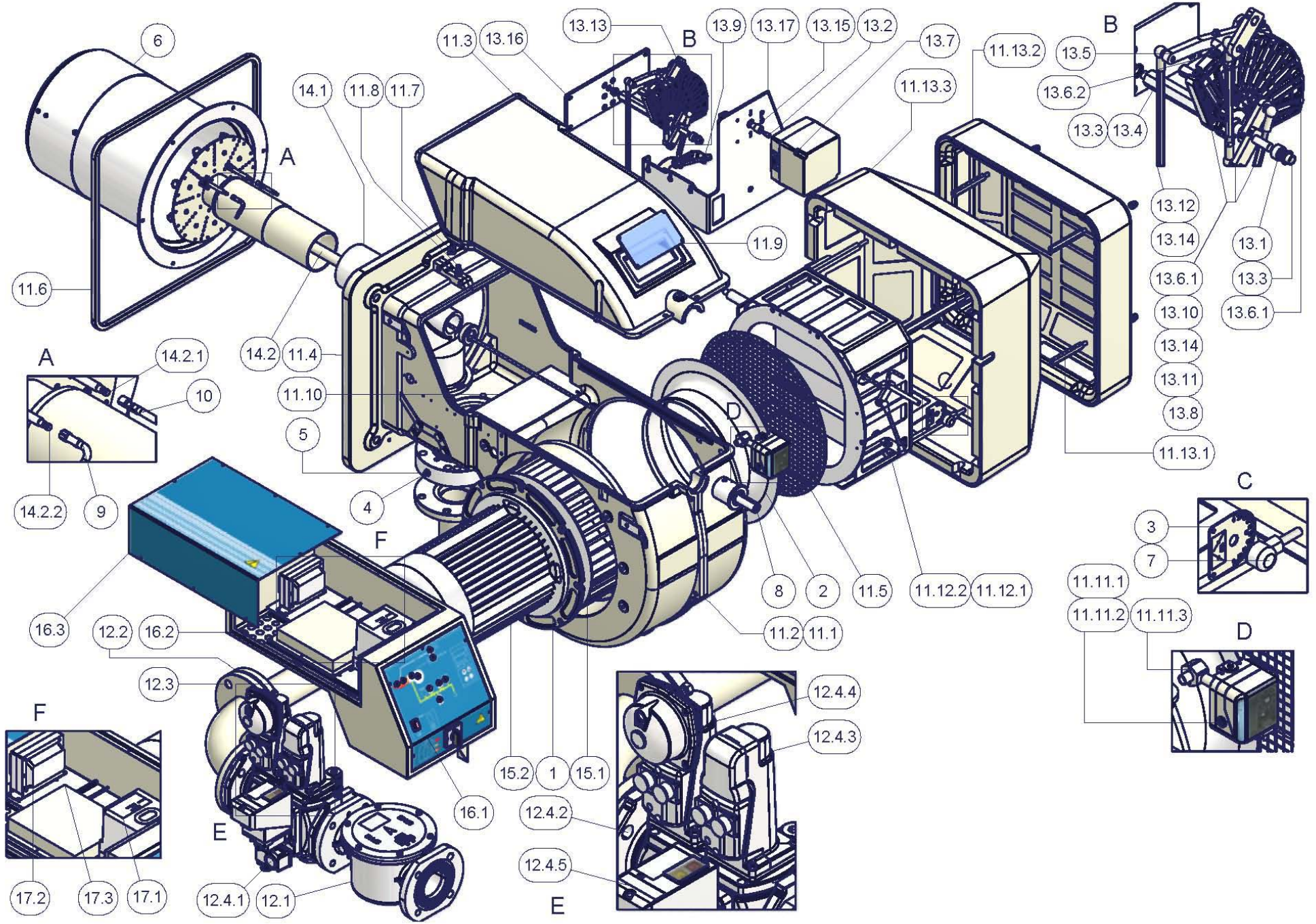
CAUSE	TROUBLE										
	THE BURNER DOESN'TSTART	CONTINUE WITH PRE-PURGE	DOESN'T START AND LOCK-OUT	DOESN'T START AND REPEATS THE CYCLE	STARTS AND REPEATS THE CYCLE	STARTS AND LOCK-OUT	THE FLAME MONITOR DEVICE DOESN'T GIVECONSENT TO START	DOESEN'T SWITCH TO HIGH FLAME	DOESEN'T RETURN IN LOW FLAME	LOCK-OUT DURING OPERATION	TTURNS OF AND REPEATS CYCLE DURING OPERATION
MAIN SWITCH OPEN	●										
LACK OF GAS	●			●							
MAXIMUM GAS PRESSURE SWITCH DEFECTIVE	●		●								
THERMOSTATS/PRESSURE SWITCHES DEFECTIVES	●			●							●
OVERLOAD TRIPPED INTERVENTION	●										
AUXILIARIES FUSE INTERRUPTED	●										
DEFECTIVE CONTROL BOX	●	●	●			●				●	
DEFECTIVE ACTUATOR	●	●	●								
AIR PRESSURE SWITCH FAULT OR BAD SETTING	●					●	●			●	
MINIMUM GAS PRESSURE SWITCH DEFECTIVE OR GAS FILTER DIRTY	●			●	●		●				●
IGNITION TRANSFORMER FAULT			●								
IGNITION ELECTRODES BAD POSITION			●								
BUTTERFLY VALVE BAD SETTING			●			●					
DEFECTIVE GAS GOVERNOR			●	●	●						●
GAS VALVE DEFECTIVE			●								
BAD CONNECTION OR DEFECTIVE HIGH/LOW FLAME THERMOSTAT OR PRESSURE SWITCH								●	●		
ACTUATOR CAM WRONG SETTING							●	●	●		
UV PROBE DIRTY OR DEFECTIVE			●			●				●	

9.0 BURNER EXPLODED VIEW

ITEM	DESCRIPTION
1	FLANGE
2	AIR INLET CONE
3	INDEX LABEL
4	PRESSURE PLUG
5	BUTTERFLY GAS VALVE
6	BLAST TUBE
7	AIR DAMPER INDEX
8	HEAD ADJUSTING RING NUT
9	IGNITION CABLE
10	DETECTION CABLE
11.1	BURNER HOUSING
11.2	BURNER HOUSING
11.3	COVER
11.4	FLANGE
11.5	NET
11.6	CERAMIC FIBRE PLAIT
11.7	PRESSURE PLUG
11.8	INLET
11.9	INSPECTION GLASS
11.10	BRACKET
11.11.1	THREADED GAS PIPE
11.11.2	AIR PRESSURE SWITCH
11.11.3	PRESSURE SWITCH BRACKET
11.12.1	AIR DAMPER SILENCER

ITEM	DESCRIPTION
11.12.2	AIR INTAKE DAMPER
11.13.1	SPACER
11.13.2	SILENCER
11.13.3	SILENCER
12.1	GAS FILTER
12.2	REVERSIBLE PIPE
12.3	FLANGED REVERSIBLE CURVE
12.4.1	GAS PRESSURE
12.4.2	GAS VALVE HOUSING
12.4.3	"SKP" ACTUATOR
12.4.4	"SKP" ACTUATOR
12.4.5	GAS PROVING SYSTEM
13.1	BUSH
13.2	BUSH
13.3	BUSH
13.4	ADJUSTING CAM SHAFT
13.5	LEVERAGE
13.6.1	ADJUSTING CAM
13.6.2	ADJUSTING CAM FOIL
13.7	ACTUATOR
13.8	LEVERAGE
13.9	CAM
13.10	ROD
13.11	ROD

ITEM	DESCRIPTION
13.12	ROD
13.13	LEVERAGE
13.14	JOINT
13.15	ACTUATOR SHAFT
13.16	BRACKET
13.17	BRACKET
14.1	GAS MANIFOLD
14.2	STANDARD COMBUSTION HEAD
14.2.1	DETECTION ELECTRODE
14.2.2	IGNITION ELECTRODE
15.1	FAN WHEEL
15.2	MOTOR
16.1	FRONT CONTROL PANEL
16.2	BOARD
16.3	COVER
17.1	CONTROL BOX
17.2	IGNITION TRANSFORMER
17.3	PRINTED CIRCUIT BOARD


6
11.3
13.16
13.13
B
13.9
13.17
13.15
13.2
13.7
11.13.2
B
13.5
13.6.2
13.3
13.4
14.1
11.8
11.7
A
11.13.3
13.12
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13.14
13.11
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11.13.1
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A
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14.2.2
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D
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11.5
11.12.2
11.12.1
11.2
11.1
C
3
7
11.11.1
11.11.2
11.11.3
D
16.3
12.2
16.2
12.3
F
12.4.4
12.4.3
15.2
1
15.1
16.1
12.4.2
12.4.5
E
E
17.2
17.3
17.1
12.4.1
12.1

10.0 WIRING DIAGRAMS

Refer to the attached wiring diagrams.

WARNING

1 - Electrical supply 230V 50Hz 1 a.c./400V 50Hz 3N a.c.

2 - Do not reverse phase with neutral

3 - Ensure burner is properly earthed

APPENDIX

SIEMENS LFL 1.3.. CONTROL BOX

Automatic programme in the event of interruption and indication of position when interrupted

By default, in the event of any kind of interruption, the flow of fuel is immediately interrupted. At the same time the programmer stops and this indicates the position at the time of the interruption.

A symbol on the indicator disc shows each time the type of stoppage:

◄ No start-up (for example fault in the CLOSED signal for the limit contact "Z" at terminal 8 or some other contact between the terminals 12 and 4 or 4 and 5 is not closed).

◄ Start-up suspended because of a fault in the OPEN signal for the limit contact "A" at terminal 8.

P Block due to absence of air pressure signal. From this moment onwards any absence of air pressure will cause a block.

■ Block due to malfunction of the flame detector circuit.

▼ Start-up interrupted because there is a fault in the MINIMUM signal for the auxiliary contact of the damper servo motor at terminal 8.

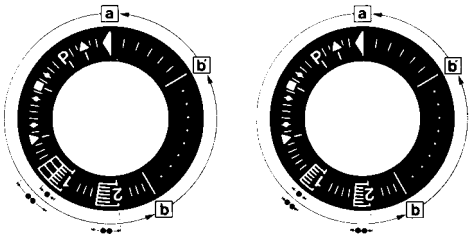
1 Block due to absence of flame signal at the end of the 1st safety period.

From this moment onwards any absence of a flame signal will cause a block.

2 Blockdue to absence of flame signal at the end of the 2nd safety period (flame signal of main burner).

▌ Blockdue to absence of flame signal or air pressure during operation.

Where a block stoppage occurs at any moment between switch on and pre-ignition without registering any symbol, the cause is normally an unscheduled flame signal.



a-b Start-up programme

b-b' For time variants:move the programmer on to the automatic stop after the burner starts up (b' = position of the programmer during normal burner operation).

b(b')-aPost-ventilation programme after a regulation stop.At the start-up position "a" the programmer stops automatically.

. Safety time duration for mono-tube burners

.. Safety time duration for twin-tube burners

The apparatus can be reset immediately after a block. After resetting (and after the elimination of any problem causing the stoppage or after a power failure) the programmer returns to its start-up position. In this event only the terminals 7, 9, 10 and 11 are live in accordance with the monitoring programme. Only after this the device programs a new startup.

Operation

The wiring system and also the control system of the programmer "P" have already been given in this manual. The response signals required for the active parts and the flame monitor circuit are shown by a hatching.

In the absence of these response signals the mechanism interrupts the start-up programme; the exact time of the interruption can be identified from the visual indicator and will cause a block if the safety code requires it.

A consent to start-up by means of the thermostat or pressostat "R"

A-B start-up program

B-C normal burner operation

C regulation stop caused by "R"

C-D programmer returns to start-up position A.

During the regulation stop only terminals 11 and 12 are live and the damper, through the limit contact "Z" of its servo-motor is in the CLOSED position.The flame detector circuit F is activated (terminals 22 and 23 or 23/4) for the detector test and the paracitic light test.

Where the burners do not have dampers (or have an independent 00 damper control mechanism) there must be a bridge between terminals 6 and 8, otherwise the mechanism will not start up the burner.

For a burner to start up the following conditions must be met:

- Mechanism not blocked/reset.
- Damper closed.Limit contact switchZ must be in the CLOSED position and allow current to flow between terminals 11 and 8.
- Any contacts checking that the fuel valve (bv...) is closed, or other contacts with similar functions, must be closed between terminal 12 and the air pressostat LP.
- The contact for the air pressostat LP must be in the off position (LP test) so as to feed terminal 4.
- The gas pressostat contacts GP and the safety thermostat and pressostat contacts W must also be closed.

Start-up program

A Start-up

(R closes the start-up control ring between terminals 4 and 5)

The programmer starts up.At the same time the ventilator motor is fed through terminal 6 (only for pre-ventilation) and, after t7, the ventilator motor or the combustion gas exhaust fan is fed through terminal 7 (pre-ventilation and post-ventilation).

At the end of t16, the command opening the damper passes through terminal 9; during the damper opening time the programmer does not move since terminal 8, through which the programmer is fed, is dead.

Only once the damper is fully open and the limit contact switch A has switched on, feeding terminal 8, does the programme proceed.

t1 Pre-ventilation time with damper fully open (nominal air flow).

Shortly after the beginning of the pre-ventilation time, the air pressostat should switch off the current between terminals 4 and 13;otherwisethe apparatus would block (air pressure monitor).

At the same time the terminal 14 should be live since current feeding the ignition transformer and the fuel valves passes through this circuit.

During pre-ventilation time the flame detector circuit is checked and in the event of an operational defect the monitor brings about a block.

At the end of the pre-ventilation time the monitor automatically moves the damper servo-motor, through terminal 10, to the flame ignition position which is governed by the auxiliary contact "M".

During this period the programmer stops until terminal 8, is again activatedthrough contact "M".

After a few seconds the little programmer motor is directly fed by the active part of the apparatus.

After this point terminal 8 plays no further part in the burner ignition process.

Mono-tube burner

t3 Pre-ignition time waiting the response from the fuel valve at terminal 18.

t2 Safety time (start up flame strenght); at the end of the safety time a flame signal should appear at terminal 22 of the amplifier and it should stay on until a regulation stop; if this does not happen the mechanism will block.

t4 Interval; at the end of t4, terminal 19 is live.

t5 Interval At the end of t5 terminal 20 is live.At the same time the monitor outlets from 9 and 11 and terminal 8 into the active part of the apparatus are kept galvanically separatedso as to protect the monitor itself from recovery voltage through the capacity regulator circuit.

Twin-tube burners (**)

t3 Preignition time until the all clear to the pilot burner valve at terminal 17.

t2 First safety time (pilot flame strenght); at the end of the safety time a flame signal should appear at terminal 22 of the amplifier and it should stay on, until a regulation stop; if it does not, the apparatus will block.

t4 Interval until the consent to the fuel valve at terminal 19, for the first flame of the main burner.

t9 2nd safety time; at the end of the second safety time the main burner should be lit by means of the pilot. At the end of this period, terminal 17 is dead and therefore the pilot burner will be out.

t5 Interval; at the end of t5 terminal 20 is live. At the same time the monitor outlets from 9 to 11 and the terminal 8at the input of the active part of the apparatus are galvanically separated so as to protect the apparatus itself from recovery voltage through the strenght regulator circuit.

When the strenght regulator LR at terminal 20 gives the consent, the start-up programme for the apparatus comes to an end. Depending on time variants, the programmer stops either immediately or at the end of a set time, without effecting the position of the contacts.

B Operational position of the burner

B-C Burner operation (production of heat)

While the burner is working the strnght regulator controls the damper, according to the demand for heat, by means of the positioning at nominal load of the auxiliary contact "V" of the damper servocontrol.

C Regulation stop for operation of "R"

When there is a regulation stop the fuel valves immediately close. At the same time the programmer starts to programme:

t6 Post-ventilation time (post-ventilation with the ventilator "G" at terminal 7).Shortly after beginning of the post-ventilation time terminal 10 becomes live and moves the damper to the "MIN" position. The full closure of the damper only happens towards the end of the post-ventilation time and is prompted by an automatic signal from terminal 11

t13 Admissible post-ignition time

During this time the flame monitor circuit may still receive a flame signal without the apparatus blocking.

D-A End of automatic programme

At the end of t6, at the point where the programmer and the automatic contacts have reverted to the starter position, the detection probe test restarts.

During an operational stop even an unscheduled flame signal lasting a few seconds can cause a block because during this period an NTC in the circuit acts as retarder.This means that brief unscheduled influences cannot cause a block.

(**) Times t3, t2 and t4 only apply only to safety devices in the series 01.

Specifications

Mains voltage	220V -15%...240V +10%
Frequency	50Hz -6%...60Hz +6%
Absorbed capacity	3.5 VA
Built-in fuse	T6.3/250E slow action DIN41571 No. 451915070
External fuse	max. 16A
Interference	N-VDE0875
Flow permitted at terminal 1	5A (DIN 0660 AC3)
Flow permitted at control terminals	4A (DIN 0660 AC3)
Flow at monitor contacts:	
input at terminals 4 & 5	1A, 250V
input at terminals 4 & 11	1A, 250V
input at terminals 4 & 14	function of the load at terminals 16 and 19, min.1A, 250V
Emplacement	Any
Protection	IP40
Permitted ambient temp	-20...+60° C
Min.temperature (trans/storage)	-50° C
Weight:	
apparatus	approx. 1,000g.
base	approx. 165g.

Ionisation monitor

voltage in detector electrode	
normal working	330V ±10%
test	380V ±10%
short circuit current	max. 0,5 mA
Ionisation current, min.request	6 µA
max. permitted length for connecting cables	
normal cable (laid separately**)	80m
armoured cable(high frequency)	protection at terminal 22 140m

UV monitor	
Voltage in UV detector	
normal working	330V ±10%
test	380V ±10%
Detector current, min. request*	70µA
Max. detector current	
normal working	630 µA
test	1300 µA
Max.length of connecting cable	
normal cable (laid separately**)	100m
armoured cable (high frequency)	protected at terminal 22 200m
Weight	
QRA2	60 g
QRA10	450 g.

*Connect up in parallel to the measuring device a condenser 100µF, 10...25V.

** The wire connecting up the detector electrode should not be in the same sleeve as the other conductor wires.

Ignition spark monitor with QRE1 series 02 detector

Minimum detector current	30µA

Operating times

t7 initial delay for ventilator G2	2	
t16 initial delay of air damper OPEN consent		4
t11 opening time for damper	any	
t10 initial delay for air pressure monitor	8	
t1 pre-ventilation time with damper open	36	
t12 travel time for air damper to MIN position	any	
t3 t3' pre-ignition time	t3	4
	t3	'-
t2 t2' safety time (1st safety time for burners with intermittent pilot lighter	t2	2
	t2	'-
t4 t4' interval between start of t2 and response to valve at terminal 19	t4	10
	t4	'-
t9 2nd safety time for burners with intermittent pilot lighter	2	
t5 interval between end of t4 and response at terminal 20	10	
t20 interval before programmer cuts out after start-up-		
duration of start-up		60
t6 post-ventilation time (G2 only)		12
t13 permitted post-ignition time		12

t16 initial delay from opening consent of the air damper

t20 interval until the automatic shut-off of the programming mechanism after the burner start

Key

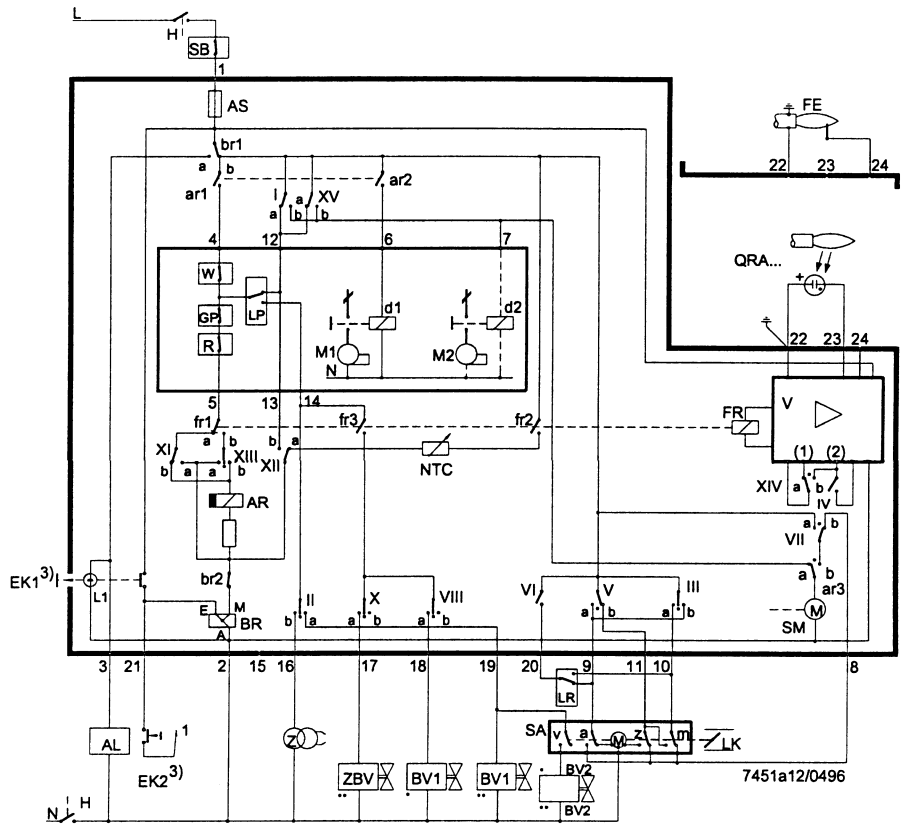
A	limit contact switch for damper OPEN position
AI	block remote signal
AR	main relay (working network) with contacts "ar"
AS	Monitor fuse
BR	block relay with "br" contacts
BV	fuel valve
EK	reset button
FE	detector electrode of ionisation circuit
FR	flame relay with "fr" contacts
G	ventilator motor or burner motor
GP	gas pressure switch
H	main interruptor switch
L	block stoppage LED
LK	air damper
LP	air pressostat
LR	safety regulator
M	auxiliary contact switch for damper "MIN" position
QRA	UV detector
QRE	ignition spark detector
R	thermostat or pressostat
S	fuse
SA	damper servo-motor
SM	synchronous programmer motor
V	flame signal amplifier
V	in case of servo-motor: auxiliary contact for response to fuel valve with regard of damper position
W	safety pressostat or thermostat
Z	ignition transformer
Z	in case of servomotor: end of limit contact switch for damper CLOSED position
ZBV	pilot burner fuel valve
°	for mono-tube burners
°°	for twin-tube burners

(1)	input for raising QRA detector voltage to test level
(2)	input for excitation of flame relay during flame detector test circuit (contact XIV) and during safety time (contact IV)
(3)	Do not press EK for more than 10 seconds

Programmer diagram

t1	pre-ventilation time
t2	safety time
*t2	'1st safety time
t3	pre-ignition time
*t3	'pre-ignition time
t4	interval for creating current between terminals 18 and 19
*t4	'interval for creating current between terminals 17 and 19
t5	interval for creating current between terminals 19 and 20
t6	post-ventilation time
t7	interval between startup consent and current created at terminal 7
t8	duration of start-up
*t9	2nd safety time
t10	interval before air pressure monitoring begins
t11	damper opening travel time
t12	damper closure travel time
t13	permissible post-combustion time
t16	initial delay of damper OPEN response
t20	interval before programmer automatically stops

* These times are valid with the use of a series 01 safety device for monitoring burners with intermittent pilot lighter.


L
H
SB
1
AS
br1
ar1
ar2
XV
4
12
6
7
W
GP
LP
R
d1
d2
M1
M2
N
FE
22
23
24
QRA...
5
13
14
fr1
fr3
fr2
FR
V
(1) (2)
XI
XIII
XII
NTC
AR
XIV
IV
VII
EK1 3)
L1
br2
E
M
BR
A
II
X
VIII
VI
V
III
ar3
SM
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15
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19
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LR
SA
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AL
EK2 3)
ZBV
BV1
BV2
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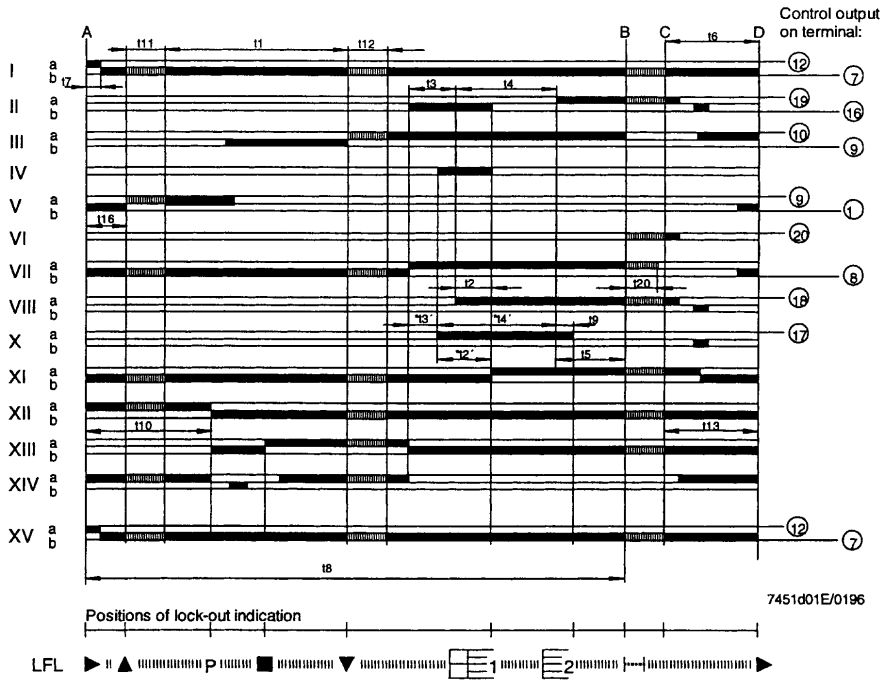
H
7451a12/0496


Control output on terminal:
A
B
C
D
t11
t1
t12
t6
t7
t3
t4
t16
t2
t20
t13
t14
t9
t12
t5
t10
t13
t8
I
II
III
IV
V
VI
VII
VIII
X
XI
XII
XIII
XIV
XV
12
7
10
9
1
20
8
18
17
7451d01E/0196
Positions of lock-out indication
LFL
P
1
2

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