

**HR91A - HR92A
HR93A
HR512A - HR515A
HR520A - HR525A**



***Progressive
and fully-modulating
gas - light oil burners***

MANUAL OF INSTALLATION - USE - MAINTENANCE

CIB UNIGAS

BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ

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APPENDIX

WARNINGS

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.

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, 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**.
- 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 safety 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;
- 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.

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;
- 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 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:

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Gas - Heavy oil burners

European directives:

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PART I: INSTALLATION

GENERAL FEATURES

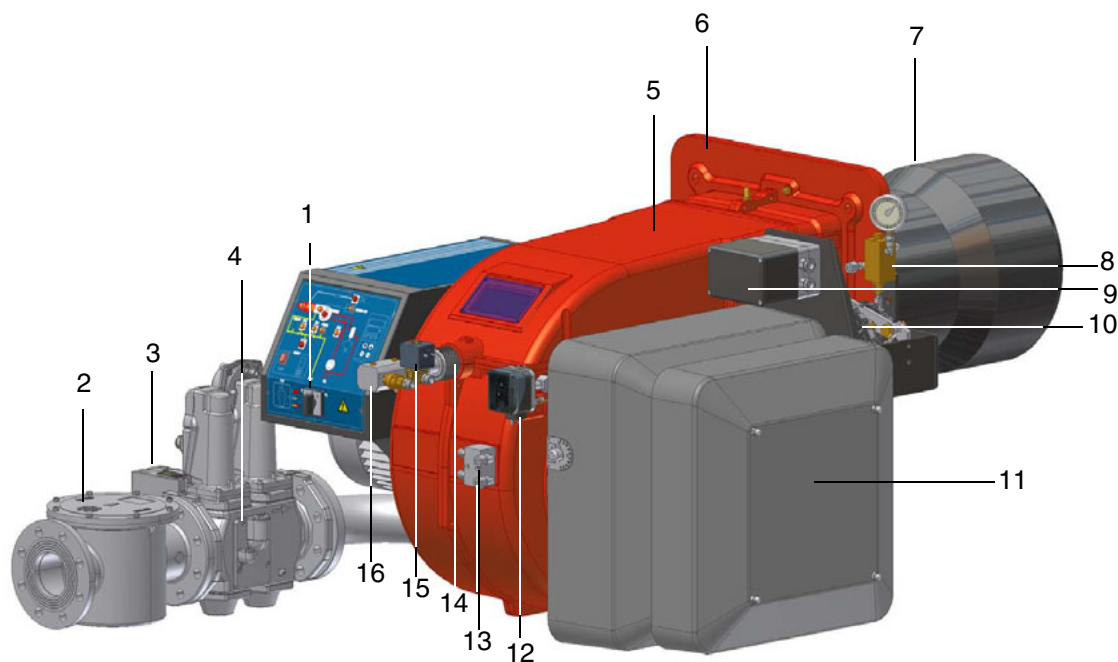


Fig. 1

- 1 Mimic panel with startup switch
- 2 Gas filter
- 3 Gas proving system
- 4 Gas valve group
- 5 Cover
- 6 Flange
- 7 Blast tube-Combustion head group
- 8 Oil pressure governor
- 9 Actuator
- 10 Adjusting cams
- 11 Air intake
- 12 Air pressure switch
- 13 Oil manifold
- 14 Head adjusting ring nut
- 15 Oil solenoid valve
- 16 Oil gun

Gas operation: the gas coming from the supply line, passes through the valves group provided with filter and stabiliser. This one forces the pressure in the utilisation limits. The actuator moves proportionally the air damper and the gas butterfly valve. It drives an adjusting cam with variable shape. This one allows the optimisation of the gas flue values, as to get an efficient combustion.

Light oil operation: the fuel coming from the supply line, is pushed by the pump to the nozzle and then into the combustion chamber, where the mixture between fuel and air takes place and consequently the flame.

In the burners, the mixture between fuel and air, to perform clean and efficient combustion, is activated by atomisation of oil into very small particles. This process is achieved making pressurised oil passing through the nozzle.

The pump main function is to transfer oil from the tank to the nozzle in the desired quantity and pressure. To adjust this pressure, pumps are provided with a pressure regulator (except for some models for which a separate regulating valve is provided). Other pumps are provided with two pressure regulators: one for the high and one for low pressure (in double-stage systems with one nozzle).

The adjustable combustion head can improve the burner performance. The combustion head determines the energetic quality and the geometry of the flame. Fuel and comburent are routed into separated ways as far as the zone of flame generation (combustion chamber).

The control panel, placed on the burner front side, shows each operating stage.

How to interpret 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 ($\text{kW} = \text{kcal/h} / 860$);
- backpressure (data are available on the boiler's ID plate or in the user's manual).

Example:

Furnace input: 600kW

Backpressure: 4mbar

In the "Performance curve" diagram (Fig. 2), 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.

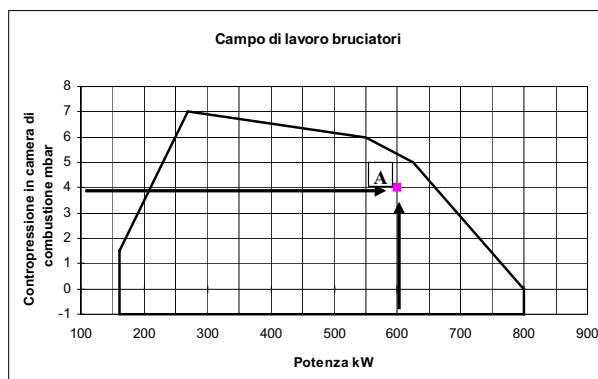


Fig. 2

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

Checking the proper gas train size

To check the proper gas train size, it is necessary to know the available gas pressure value upstream the burner's gas valve. Then subtract the backpressure. The result is called **p_{gas}**. Draw a vertical line matching the furnace input value (600kW, in the example), quoted on the x-axis, as far as intercepting 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 **p_{gas}** value, calculated before.

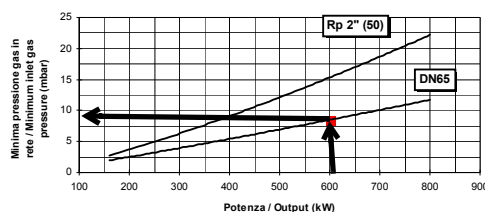


Fig. 3

Burner model identification

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

Type	HR512A	Model	MG.	PR.	S.	*.	A.	1.	80
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
(1) BURNER TYPE	HR91A - HR92A - HR93A - HR512A - HR515A - HR520A - HR525A								
(2) FUEL	M - Natural gas				G - Light oil				
(3) OPERATION	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		

Specifications

BURNER TYPE		HR91A	HR92A	HR93A
Output	min. - max. kW	480 - 2670	480 - 3050	550 - 4100
Fuel		Natural gas - Light oil		
Category		(see next paragraph)		
Gas rate	min.- max. (Stm ³ /h)	51 - 283	51 - 323	58 - 434
Gas pressure	mbar	(see Note 2)		
Light oil rate	min.-max. kg/h	40 - 225	40 - 257	46 - 345
Oil viscosity	cSt @ 40°C	2 - 7.4		
Oil density	kg/m ³	840		
Oil train pressure inlet	bar max	2		
Power supply		230V 3~ / 400V 3N ~ 50Hz		
Total power consumption	kW	5.6	7.1	9.1
Electric motor	kW	4	5.5	7.5
Pump motor	kW	1.1	1.1	1.1
Protection		IP40		
Operation		Progressive - Fully modulating		
Gas train 50	Valves size / Gas connection	50 / Rp 2		
Gas train 65	Valves size / Gas connection	65 / DN65		
Gas train 80	Valves size / Gas connection	80 / DN80		
Gas train 100	Valves size / Gas connection	100 / DN100		
Operating temperature	°C	-10 ÷ +50		
Storage Temperature	°C	-20 ÷ +60		
Working service*		Intermittent		

BURNER TYPE		HR512A	HR515A	HR520A	HR525A...50	HR525A...xx
Output	min. - max. kW	600 - 4500	770 - 5200	1000 - 6400	2000 - 6700	2000 - 8000
Fuel		Natural gas - Light oil				
Category		(see next paragraph)				
Gas rate	min.- max. (Stm ³ /h)	63 - 476	81 - 550	106 - 677	212 - 709	212 - 847
Pressure	mbar	(see Note 2)				
Light oil rate	min.-max. kg/h	50 - 379	65 - 438	84 - 539	168 - 564	168 - 674
Oil viscosity		2 - 7.4 cSt @ 40°C				
Oil density	kg/m ³	840				
Oil train pressure inlet	bar max	2				
Power supply		230V 3~ / 400V 3N ~ 50Hz				
Total power consumption	kW	10.8	13	17	22	22
Electric motor	kW	9.2	11	15	18.5	18.5
Pump motor	kW	1.1	1.5	1.5	3	3
Protection		IP40				
Operation		Progressive - Fully modulating				
Gas train 50	Valves size / Gas connection	50 / Rp2	50 / Rp2	50 / Rp2	50 / Rp2	
Gas train 65	Valves size / Gas connection	65 / DN65	65 / DN65	65 / DN65	-	65 / DN65
Gas train 80	Valves size / Gas connection	80 / DN80	80 / DN80	80 / DN80	-	80 / DN80
Gas train 100	Valves size / Gas connection	100 / DN100	100 / DN100	100 / DN100	-	100 / DN100
Operating temperature	°C	-10 ÷ +50				
Storage Temperature	°C	-20 ÷ +60				
Working service*		Intermittent				

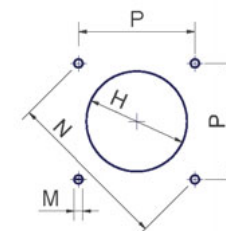
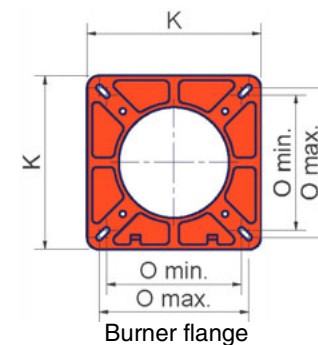
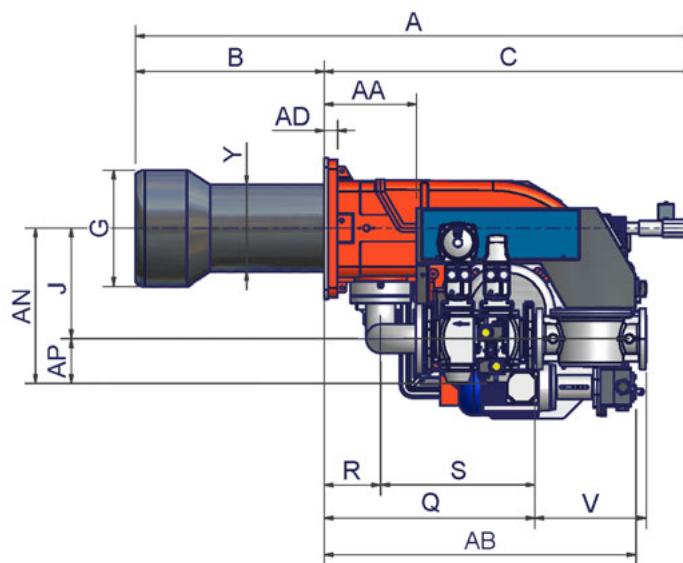
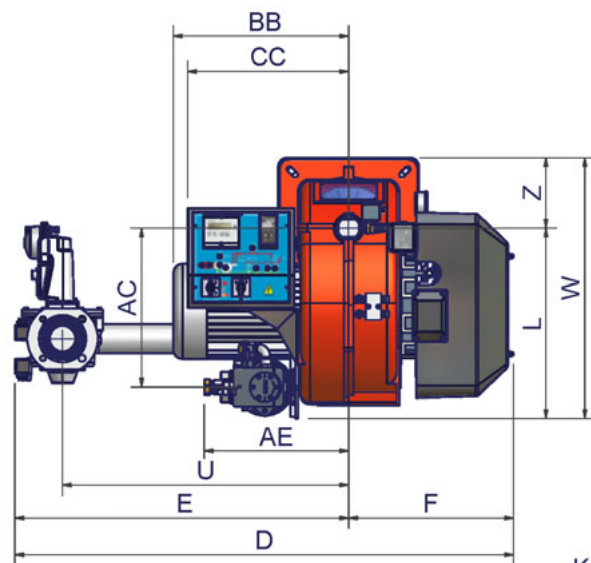
Note1:	all gas flow rates are referred to Stm ³ /h (1013 mbar absolute pressure, 15 °C temperature) and are valid for G20 natural gas (nett calorific value H _i = 34.02 MJ/Stm ³).
Note2:	Maximum gas pressure = 500mbar (with Siemens VGD.. / Dungs MBC..gas valves) Minimum gas pressure = see gas curves.

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

Country and usefulness gas categories

GAS CATEGORY	COUNTRY																									
	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 _{2H}																										
I _{2E}	LU	PL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
I _{2E(R) B}	BE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
I _{2L}	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
I _{2ELL}	DE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
I _{2Er}	FR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Overall dimensions (mm)

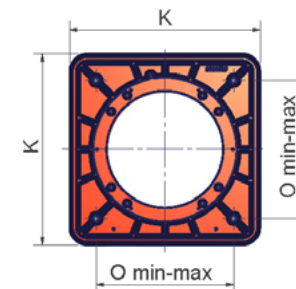
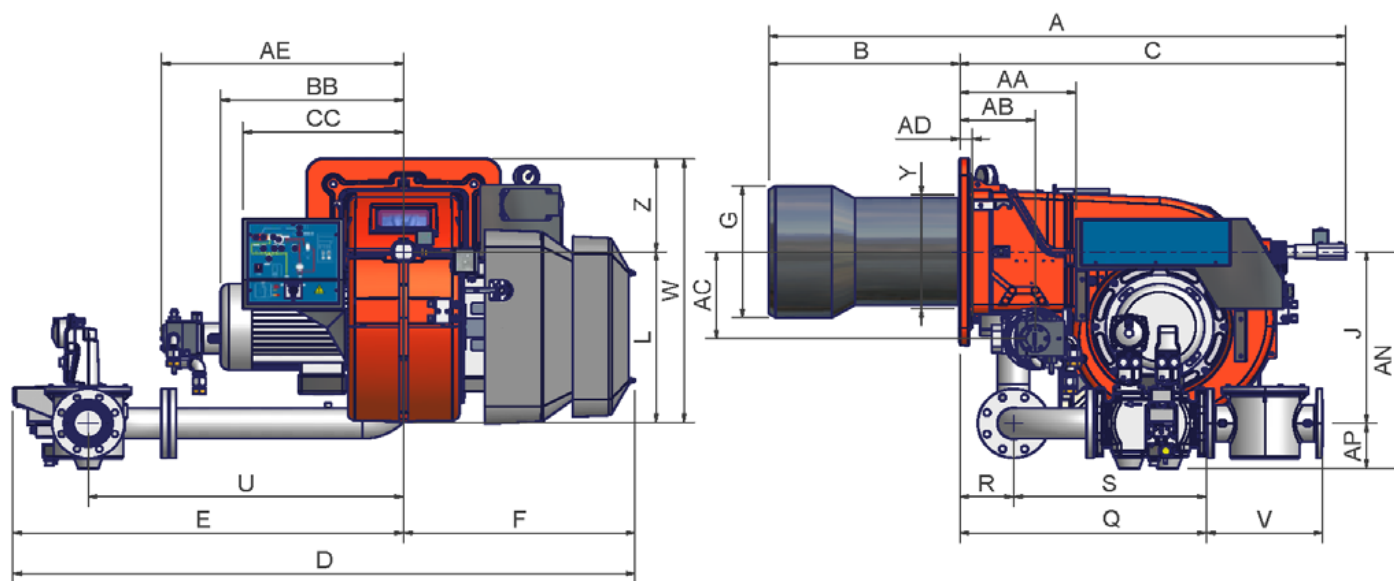


Boiler recommended drilling template

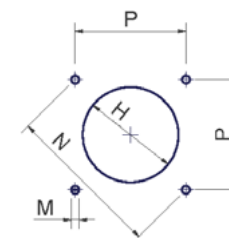
	DN	A	AA	AB	AC	AD	AE	AN	AP	B	BB	C	CC	D	E	F	G	H	J	K	L	M	N	Omin	Omax	P	Q	R	S	U	V	W	Y	Z
HR91A	50	1431	242	820	425	35	380	429	100	490	419	941	422	1159	725	434	265	295	329	360	505	M12	417	280	310	295	522	148	374	624	216	690	228	185
HR91A	65	1431	242	820	425	35	380	406	118	490	419	941	422	1309	875	434	265	295	288	360	505	M12	417	280	310	295	551	148	403	750	292	690	228	185
HR91A	80	1431	242	820	425	35	380	439	132	490	419	941	422	1311	877	434	265	295	307	360	505	M12	417	280	310	295	592	148	444	750	322	690	228	185
HR91A	100	1431	242	820	425	35	380	592	145	490	419	941	422	1401	967	434	265	295	447	360	505	M12	417	280	310	295	672	148	524	824	382	690	228	185
HR92A	50	1431	242	820	425	35	380	429	100	490	419	941	422	1159	725	434	269	299	329	360	505	M12	417	280	310	295	522	148	374	624	216	690	228	185
HR92A	65	1431	242	820	425	35	380	406	118	490	419	941	422	1309	875	434	269	299	288	360	505	M12	417	280	310	295	551	148	403	750	292	690	228	185
HR92A	80	1431	242	820	425	35	380	439	132	490	419	941	422	1311	877	434	269	299	307	360	505	M12	417	280	310	295	592	148	444	750	322	690	228	185
HR92A	100	1431	242	820	425	35	380	592	145	490	419	941	422	1401	967	434	269	299	447	360	505	M12	417	280	310	295	672	148	524	824	382	690	228	185
HR93A	50	1461	242	820	425	35	380	429	100	495	460	966	422	1159	725	434	304	344	329	360	505	M12	417	280	310	295	522	148	374	624	216	690	228	185
HR93A	65	1461	242	820	425	35	380	406	118	495	460	966	422	1309	875	434	304	344	288	360	505	M12	417	280	310	295	551	148	403	750	292	690	228	185
HR93A	80	1461	242	820	425	35	380	439	132	495	460	966	422	1311	877	434	304	344	307	360	505	M12	417	280	310	295	592	148	444	750	322	690	228	185
HR93A	100	1461	242	820	425	35	380	592	145	495	460	966	422	1401	967	434	304	344	447	360	505	M12	417	280	310	295	672	148	524	824	382	690	228	185

*DN = gas valves size

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



Burner flange



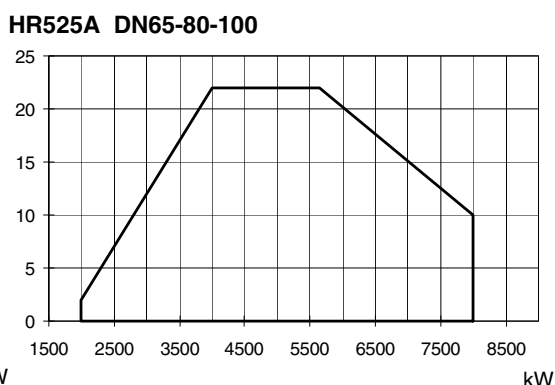
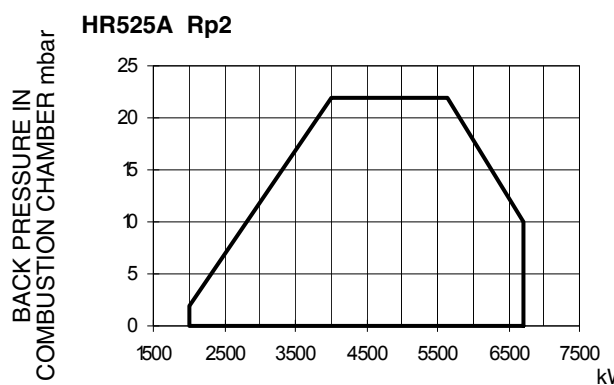
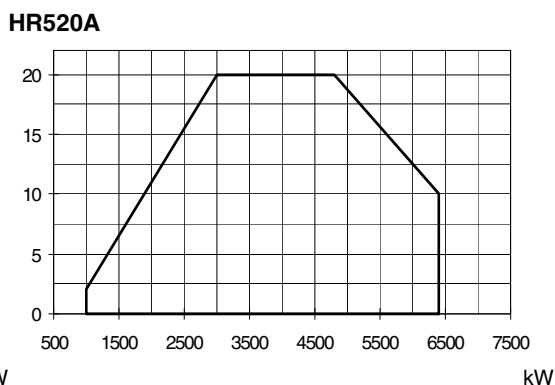
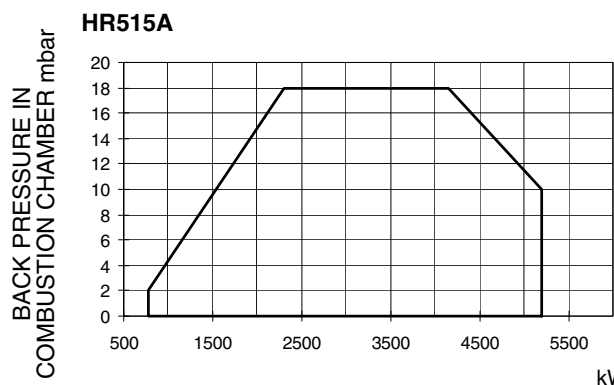
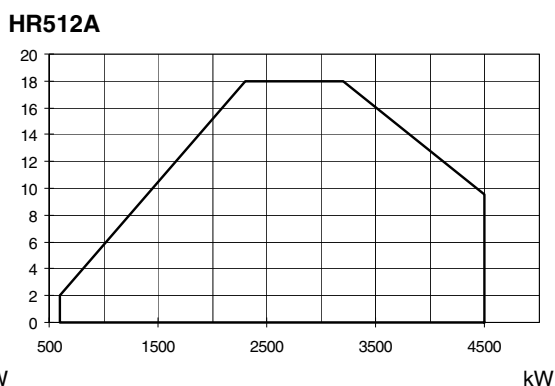
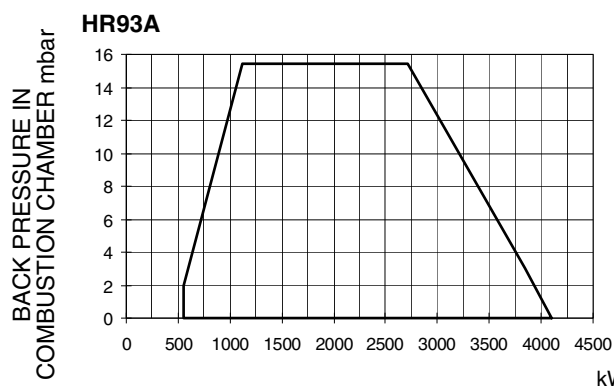
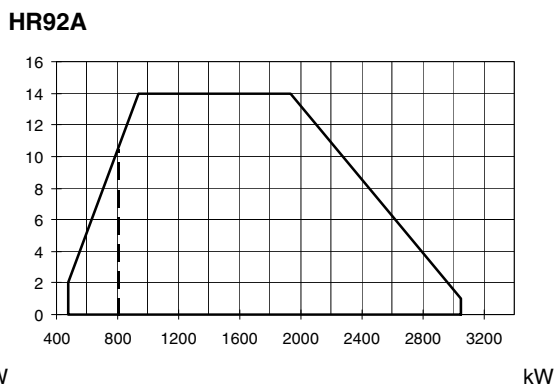
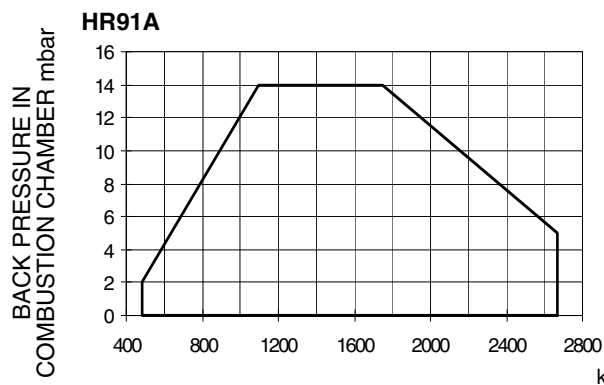
Boiler recommended drilling template

	DN	A	AA	AB	AC	AD	AE	AN	AP	B	BB	C	CC	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	U	UU	V	W	Y	Z
HR512A	50	1586	323	209	250	35	609	594	100	530	508	1056	446	1722	1079	643	340	380	494	540	492	M14	552	390	390	755	150	605	843	x	216	762	328	270
HR512A	65	1586	323	209	250	35	609	612	118	530	508	1056	446	1692	1049	643	340	380	494	540	492	M14	552	390	390	633	150	483	843	x	292	762	328	270
HR512A	80	1586	323	209	250	35	609	626	132	530	508	1056	446	1727	1084	643	340	380	494	540	492	M14	552	390	390	685	150	535	875	x	322	762	328	270
HR512A	100	1586	323	209	250	35	609	639	145	530	508	1056	446	1810	1167	643	340	380	494	540	492	M14	552	390	390	792	150	642	942	x	382	762	328	270
HR515A	50	1600	323	209	250	35	672	594	100	530	508	1070	446	1722	1079	643	380	420	494	540	492	M14	552	390	390	755	150	605	843	x	216	762	328	270
HR515A	65	1600	323	209	250	35	672	612	118	530	508	1070	446	1692	1049	643	380	420	494	540	492	M14	552	390	390	633	150	483	843	x	292	762	328	270
HR515A	80	1600	323	209	250	35	672	626	132	530	508	1070	446	1725	1084	643	380	420	494	540	492	M14	552	390	390	685	150	535	875	x	322	762	328	270
HR515A	100	1600	323	209	250	35	672	639	145	530	508	1070	446	1810	1167	643	380	420	494	540	492	M14	552	390	390	792	150	642	942	x	382	762	328	270
HR520A	50	1670	323	199	254	35	672	594	100	530	508	1140	446	1722	1079	643	400	450	494	540	492	M14	552	390	390	755	150	605	843	114	216	876	328	270
HR520A	65	1670	323	199	254	35	672	612	118	530	508	1140	446	1692	1049	643	400	450	494	540	492	M14	552	390	390	633	150	483	843	114	292	876	328	270
HR520A	80	1670	323	199	254	35	672	626	132	530	508	1140	446	1727	1084	643	400	450	494	540	492	M14	552	390	390	685	150	535	875	114	322	876	328	270
HR520A	100	1670	323	199	254	35	672	639	145	530	508	1140	446	1810	1167	643	400	450	494	540	492	M14	552	390	390	792	150	642	942	114	382	876	328	270
HR525A	50	1670	145	189	275	35	682	594	100	530	650	1140	598	1722	1079	643	434	484*	494	540	492	M14	552	390	390	755	150	605	843	172	216	934	328	270
HR525A	65	1670	145	189	275	35	682	612	118	530	650	1140	598	1692	1049	643	434	484*	494	540	492	M14	552	390	390	633	150	483	843	172	292	934	328	270
HR525A	80	1670	145	189	275	35	682	626	132	530	650	1140	598	1727	1084	643	434	484*	494	540	492	M14	552	390	390	685	150	535	875	172	322	934	328	270
HR525A	100	1670	145	189	275	35	682	639	145	530	650	1140	598	1810	1167	643	434	484*	494	540	492	M14	552	390	390	792	150	642	942	172	382	934	328	270

*DN = gas valves diameter

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

Performance Curves



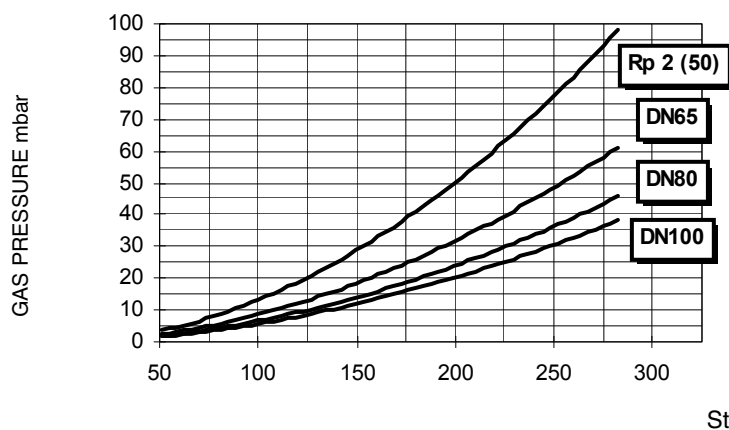
To get the input in kcal/h, multiply value in kW by 860.

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

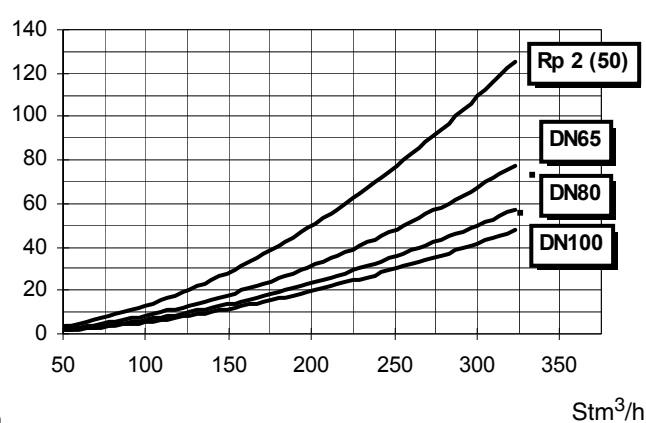
NOTE: The performance curve is a diagram that represents the burner performance in the type approval phase or in the laboratory tests, but does not represent the regulation range of the machine. On this diagram the maximum output point is usually reached by adjusting the combustion head to its "MAX" 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.

Pressure in the network - gas rate curves

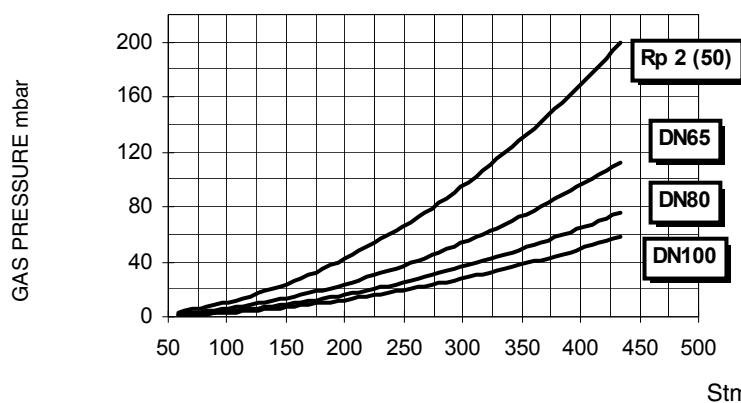
HR91A



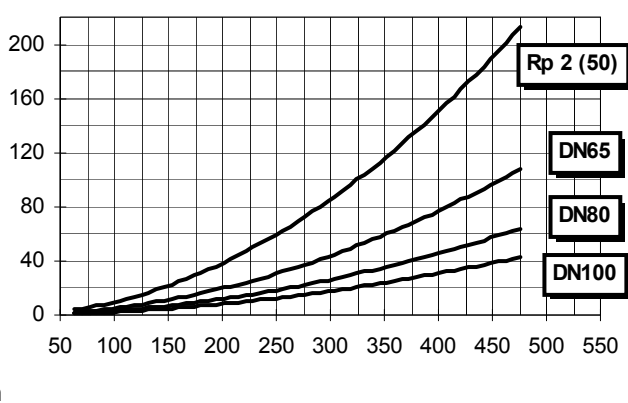
HR92A



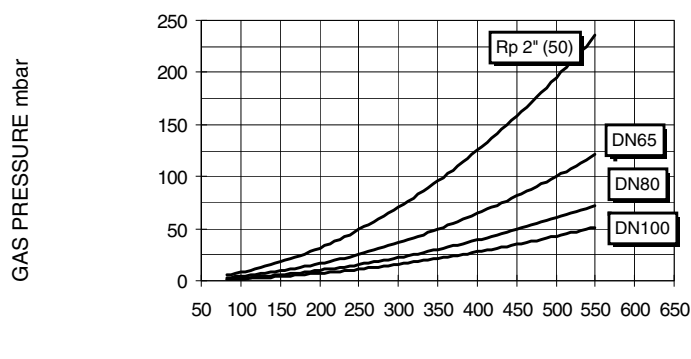
HR93A



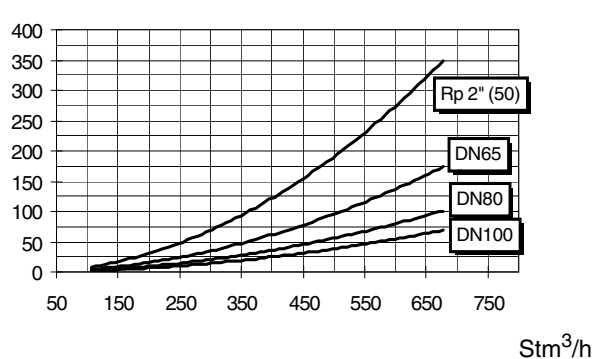
HR512A



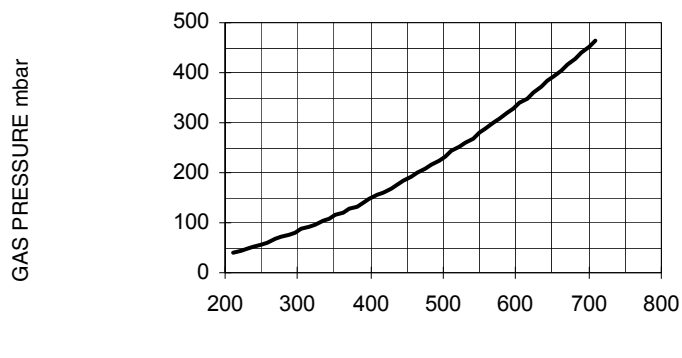
HR515A



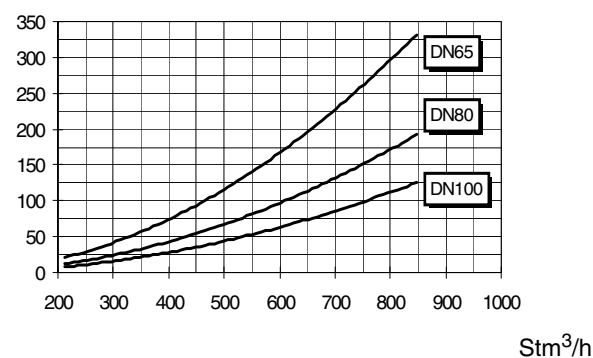
HR520A



HR525A Rp2



HR525A DN65-80-100



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.

MOUNTINGS AND CONNECTIONS

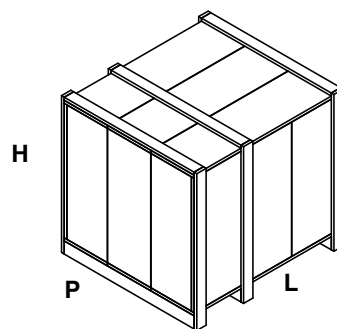
Packing

The burners are despatched wooden cages whose dimensions:

- **9xA series:** 1730mm x 1280mm x 1020mm (L x P x H)
- **5xxA series:** 1720mm x 1500mm x 1150mm (L x P x H)
- **525A series:** 1800mm x 1500mm x 1300mm (L x P x H)

Packing cases of this kind are affected by humidity and are not suitable for stacking. The following are placed in each packing case:

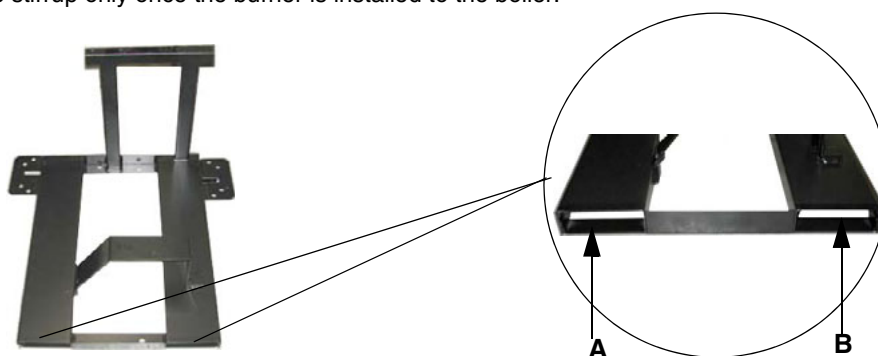
To get rid of the burner's packing, follow the procedures laid down by current laws on disposal of materials



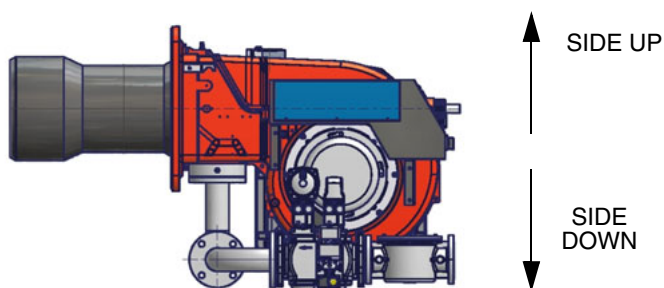
Handling the burner

	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 and B ways. Remove the stirrup only once the burner is installed to the boiler.



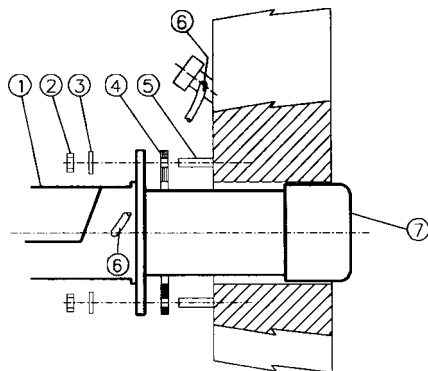
The burner is designed to work positioned according to the picture below. For different installations, please contact the Technical Department.



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

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 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 length 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 no more than 100 mm into the combustion chamber.
- Pressurised boilers with flame reversal: in this case the blast tube must penetrate at least 50 - 100 mm into combustion chamber in respect to the tube bundle plate.

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 or to design a blast tube that suits the utilisation (please, contact the manufacturer).

Key

- a) Heat output in kW
- b) Length of the flame tube in meters
- c) Flame tube firing intensity in MW/m³
- d) Combustion chamber diameter (m)

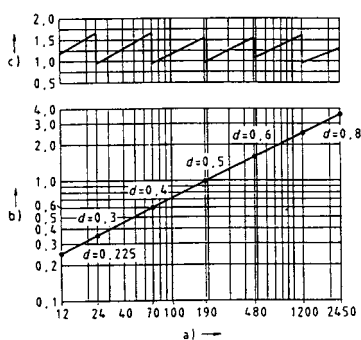


Fig. 4

Fig. 4 - Firing intensity, diameter and length of the test flame tube as a function of the heat input in kW.

Gas train connections

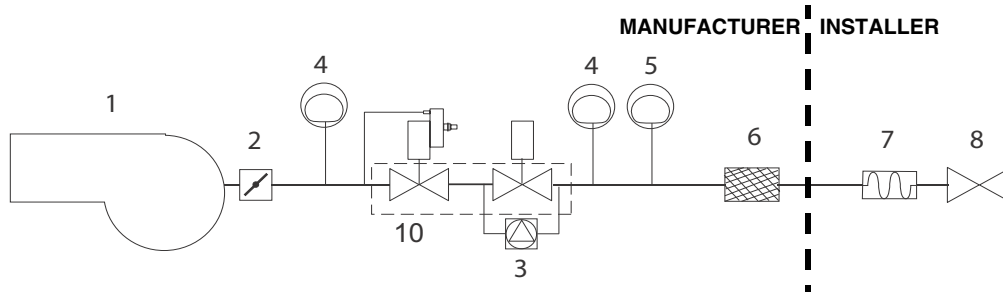
The diagrams show the components of the gas train included in the delivery and which must be fitted by the installer. The diagrams are in compliance with the current laws.



ATTENTION: BEFORE EXECUTING THE CONNECTIONS TO THE GAS PIPE NETWORK, BE SURE THAT THE MANUAL CUTOFF VALVES ARE CLOSED. READ CAREFULLY THE "WARNINGS" CHAPTER AT THE BEGINNING OF THIS MANUAL.

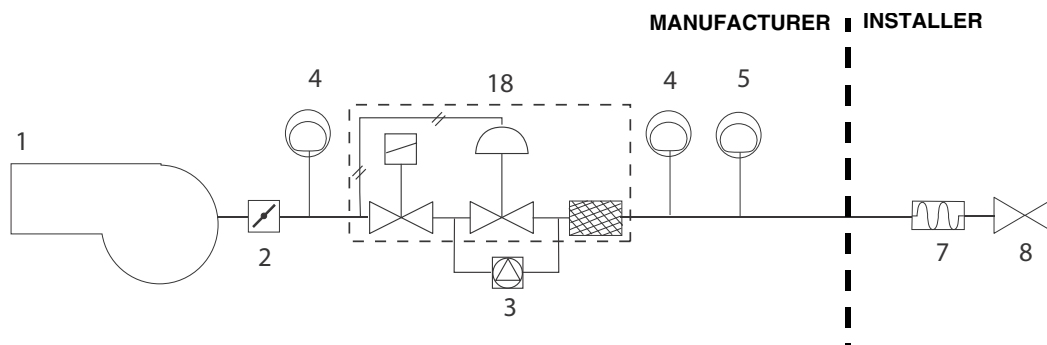
Gas train - 1

Gas train with valves group VGD 20/40.. with built-in gas pressure governor + VPS504 gas proving system



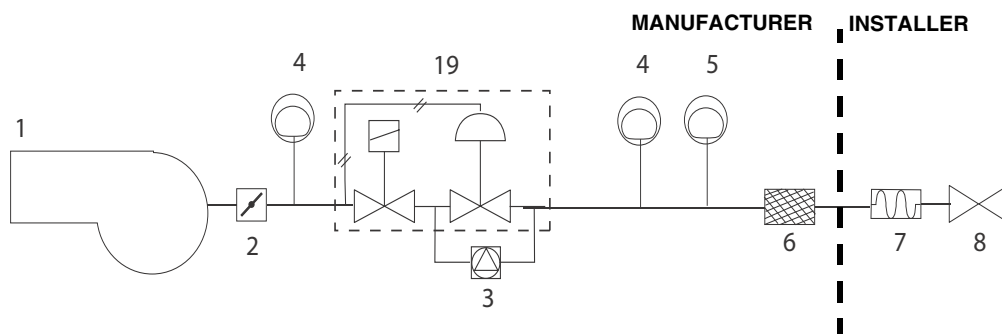
Gas train - 2 (Rp2)

Gas train with valves group MBC 1200SE (2 valves + gas filter + pressure governor) + VPS504 gas proving system



Gas train - 3 (DN65/80/100)

Gas train with valves group MBC 1900/3100/5000SE (2 valves + gas filter + pressure governor) + VPS504 gas proving system



Key

- | | | | |
|---|---|----|--|
| 1 | Burner | 8 | Manual cutoff valve |
| 2 | Butterfly valve | 10 | VGD Valves group |
| 3 | Gas proving system | 18 | MBC Valves group (2" with filter provided) |
| 4 | Maximum gas pressure switch (optional*) | 19 | MBC Valves group (DN65/80/100) |
| 5 | Minimum gas pressure switch | | |
| 6 | Gas filter | | |
| 7 | Bellows unit | | |

* Note: the high 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).

Assembling the gas grain

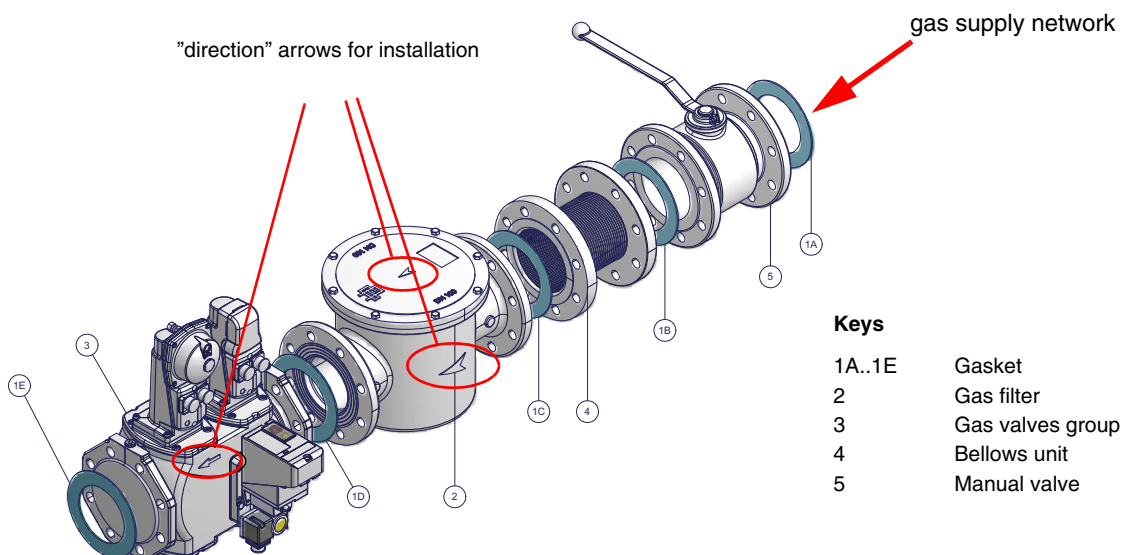


Fig. 5 - Example of gas train

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 - Fig. 5) between the elements.

NOTE: the bellow joint, the manual cock and the gaskets are not part of the standard supply.



ATTENTION: once the gas train is mounted according to the diagram on Fig. 5, the gas proving test must be performed, according to the procedure set by the laws in force.

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

- threaded gas trains with Multibloc Dungs MBC..SE 1200 or Siemens VGD20..
- flanged gas trains with Multibloc Dungs MBC..SE 1900-3100-5000 or Siemens VGD40..



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).

MULTIBLOC DUNGS MBC300-700-1200SE (Threaded valves group)

Mounting

1. Mount flange onto tube lines. Use appropriate sealing agent (see Fig. 6)
2. Insert MBC...SE. Note position of O rings (see Fig. 7).
3. Tighten screws A – H
4. After installation, perform leakage and functional test.
5. Disassembly in reverse order

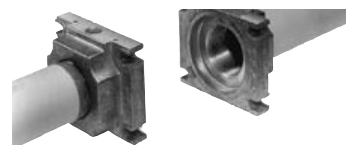
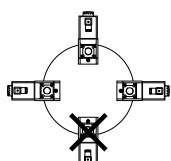


Fig. 6

MOUNTING

POSITIONS



OPTION

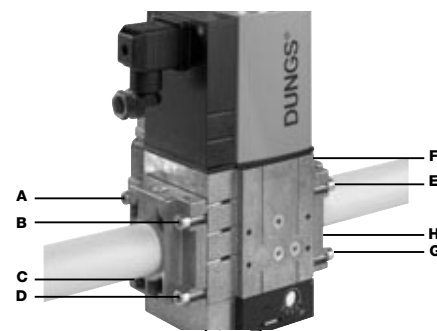
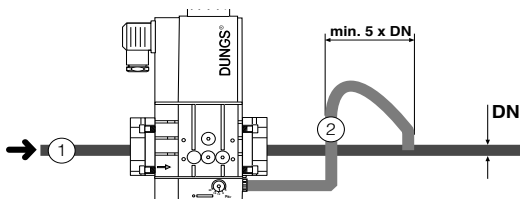


Fig. 7

MULTIBLOCDUNGS MBC1900-3100-5000SE (Flanged valves group)**Mounting**

1. Insert setscrews A
 2. Insert seals
 3. Insert setscrews B
 4. Tighten setscrews A + B.
- Ensure correct seating of the seal!
6. After installation, perform leakage and functional test.
 7. Disassembly in reverse order.

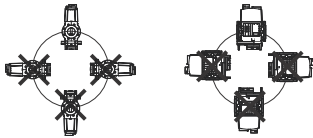
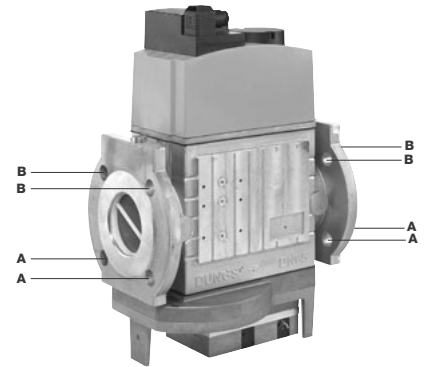
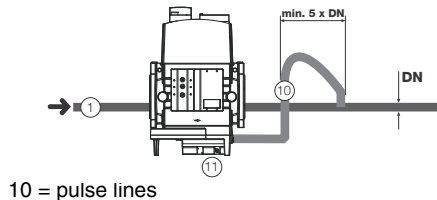
Mounting positions**OPTION**

Fig. 8

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. 11).

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

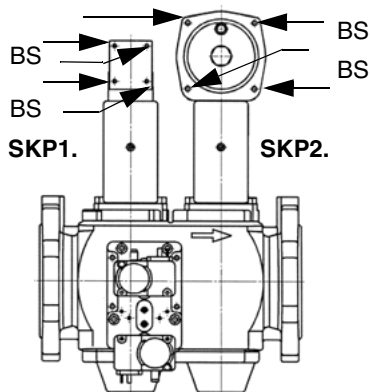


Fig. 9

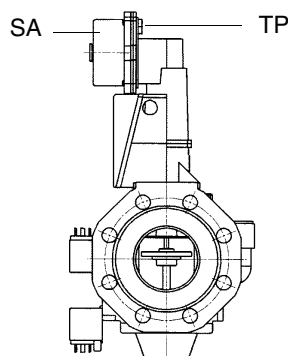


Fig. 10

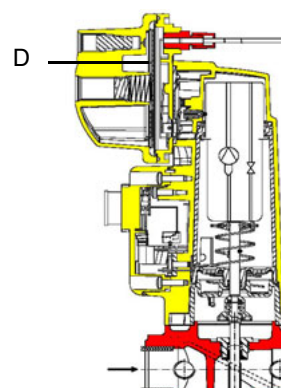


Fig. 11

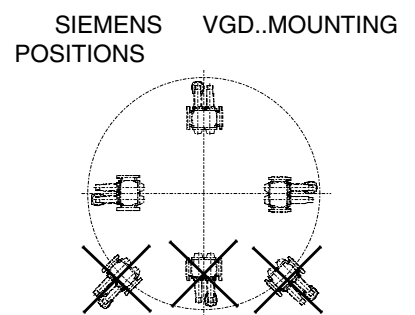


Fig. 12

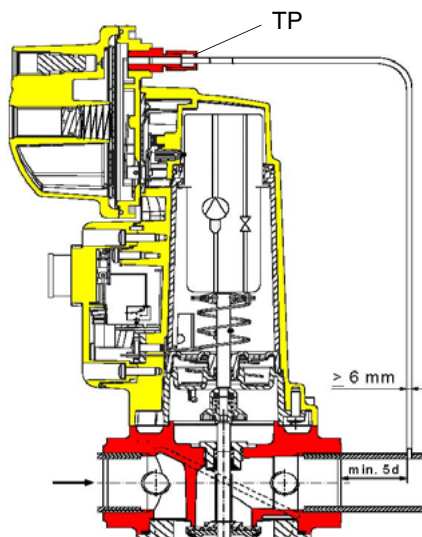
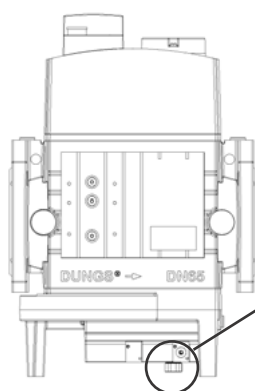


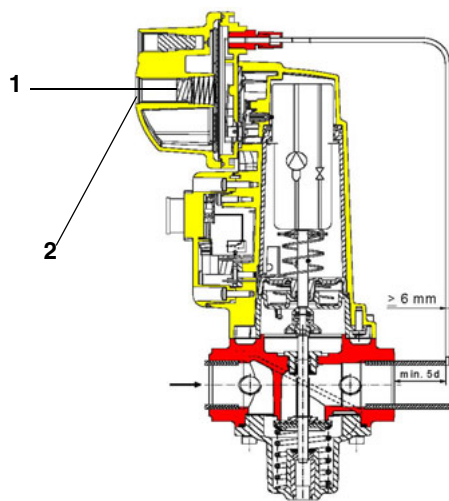
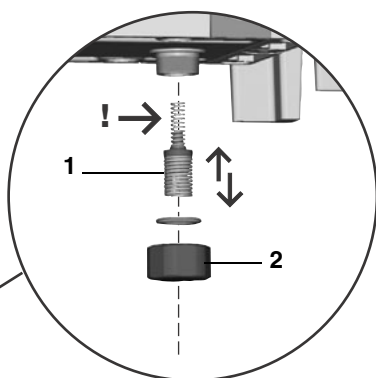
Fig. 13

Pressure adjusting range

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



DUNGS MBC..SE



Siemens SKP actuator

Keys

- 1 spring
- 2 cap

DUNGS MBC valves:

Performance range (mbar)	4 - 20	20 - 40	40 - 80	80 - 150
Spring colour	-	red	black	green

Siemens VGD valves with SKP actuator :

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

Once the train is installed, electrically connect all its elements: gas valves group, pressure switches, gas proving system.



ATTENTION: once the gas train is mounted according to the diagram on Fig. 5, the gas proving test must be performed, according to the procedure set by the laws in force.

[illegible]

- 1 Manual valve
- 2 Light oil filter
- 3 Light oil feeding pump
- 4 One way valve
- 5 Flexible hoses
- 6 Relief valve

19

Installation diagram of light oil pipes



PLEASE READ CAREFULLY THE "WARNINGS" CHAPTER AT THE BEGINNING OF THIS MANUAL.

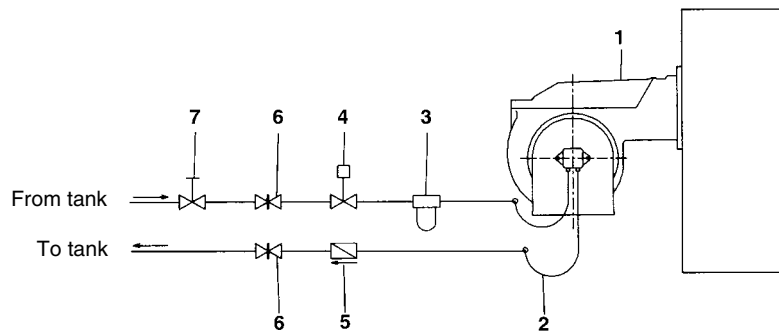


Fig. 17 - Double-pipe system

The burner is supplied with filter and flexible hoses, all the parts upstream the filter and downstream the return flexible hose, must be installed by the customer. As far as the hoses connection, see the related paragraph.

Key

- 1 Burner
- 2 Flexible hoses (fitted)
- 3 Light oil filter (fitted)
- 4 Automatic interceptor (*)
- 5 One-way valve (*)
- 6 Gate valve
- 7 Quick-closing gate-valve (outside the tank or boiler rooms)

(*) Only for installations with gravity, siphon or forced circulation feed systems. If the device installed is a solenoid valve, a timer must be installed to delay the valve closing.

The direct connection of the device without a timer may cause pump breaks.

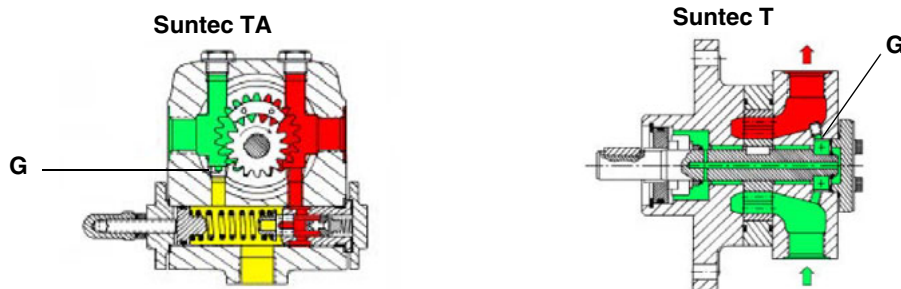
The pumps that are used can be installed both into single-pipe and double-pipe systems.

Single-pipe system: a single pipe drives the oil from the tank to the pump's inlet. Then, from the pump, the pressurised oil is driven to the nozzle: a part comes out from the nozzle while the other part goes back to the pump. In this system, the by-pass plug, if provided, must be removed and the optional return port, on the pump's body, must be sealed by steel plug and washer.

Double-pipe system: as for the single pipe system, a pipe that connects the tank to the pump's inlet is used besides another pipe that connects the pump's return port to the tank, as well. The excess of oil goes back to the tank: this installation can be considered self-bleeding. If provided, the inside by-pass plug must be installed to avoid air and fuel passing through the pump.

Burners come out from the factory provided for double-pipe systems. They can be suited for single-pipe system (recommended in the case of gravity feed) as described before. To change from a 1-pipe system to a 2-pipe-system, insert the by-pass plug **G** (as for ccw-rotation- referring to the pump shaft).

Caution: Changing the direction of rotation, all connections on top and side are reversed.



Bleed

Bleeding in two-pipe operation is automatic: it is assured by a bleed flat on the piston. In one-pipe operation, the plug of a pressure gauge port must be loosened until the air is evacuated from the system.

About the use of fuel pumps

- Make sure that the by-pass plug is not used in a single pipe installation, because the fuel unit will not function properly and damage to the pump and burner motor could result.
- Do not use fuel with additives to avoid the possible formation over time of compounds which may deposit between the gear teeth, thus obstructing them.
- After filling the tank, wait before starting the burner. This will give any suspended impurities time to deposit on the bottom of the tank, thus avoiding the possibility that they might be sucked into the pump.
- On initial commissioning a "dry" operation is foreseen for a considerable length of time (for example, when there is a long suction

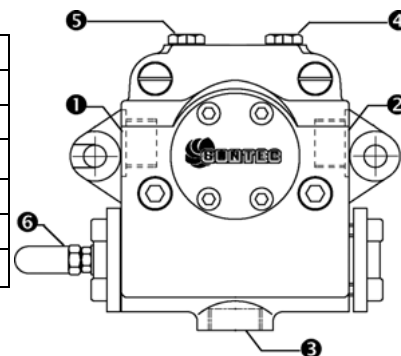
line to bleed). To avoid damages inject some lubrication oil into the vacuum inlet.

- Care must be taken when installing the pump not to force the pump shaft along its axis or laterally to avoid excessive wear on the joint, noise and overloading the gears.
- Pipes should not contain air pockets. Rapid attachment joint should therefore be avoided and threaded or mechanical seal junctions preferred. Junction threads, elbow joints and couplings should be sealed with removable seal component. The number of junctions should be kept to a minimum as they are a possible source of leakage.
- Do not use PTFE tape on the suction and return line pipes to avoid the possibility that particles enter circulation. These could deposit on the pump filter or the nozzle, reducing efficiency. Always use O-Rings or mechanical seal (copper or aluminium gaskets) junctions if possible.
- An external filter should always be installed in the suction line upstream of the fuel unit.

Light oil pumps

Suntec TA..	
Oil viscosity	3 ÷ 75 cSt
Oil temperature	0 ÷ 150°C
Min. suction pressure	- 0.45 bar to avoid gasing
Max. suction pressure	5 bar
Max. return pressure	5 bar
Rotation speed	3600 rpm max.

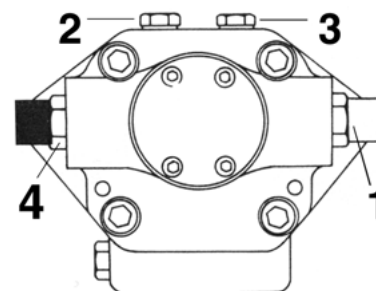
- 1 Inlet G1/2
- 2 To the nozzle G1/2
- 3 Return G1/2
- 4 Pressure gauge port G1/4
- 5 Vacuum gauge port G1/4
- 6 Pressure governor



Suntec T..	
Viscosity	3 - 75 cSt
Oil temperature	0 - 150 °C
Minimum suction pressure	- 0.45 bar to prevent gasing
Maximum suction pressure	5 bar
Rated speed	3600 rpm max.

Key

- 1 Inlet G3/4
- 2 Pressure gauge port G1/4
- 3 Vacuum gauge port to measure the inlet vacuum G1/4
- 4 To pressure adjusting valve G3/4



"Note: pump with "C" rotation.

Pressure regulator valve Suntec TV

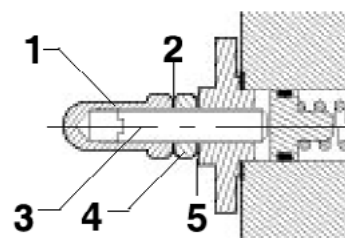
Pressure regulation

Remove cap-nut 1 and the gasket 2, unscrew the lock nut 4. To increase pressure, turn adjusting screw 3 clockwise.

To decrease the pressure, turn screw anticlockwise. Tight the lock nut 4, refit the gasket 2 and the cap nut 1.

Key

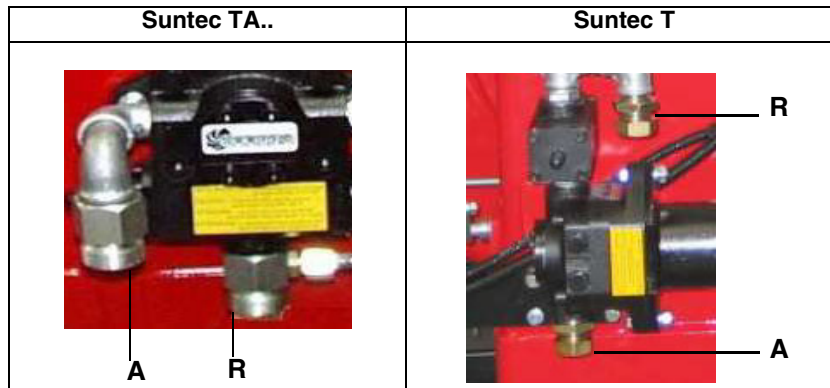
- 1 Cap nut
- 2 Gasket
- 3 Adjusting screw
- 4 Lock nut
- 5 Gasket



Assembling the light oil flexible hoses

To connect the flexible light oil hoses to the pump, proceed as follows, according to the pump provided:

- 1 remove the closing nuts **A** and **R** on the inlet and return connections;
- 2 screw the rotating nut of the two flexible hoses on the pump **being careful to avoid exchanging the inlet and return lines**: see the arrows marked on the pump that show the inlet and the return (see previous paragraph).



Electrical connections

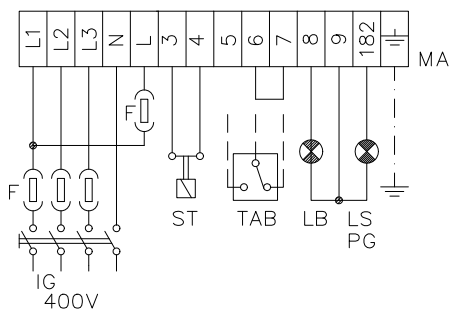
	Respect the basic safety rules. make sure of the connection to the earthing system. do not reverse the phase and neutral connections. fit a differential thermal magnet switch adequate for connection to the mains.
	ATTENTION: before executing the electrical connections, pay attention to turn the plant's 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.

- Remove the cover of the electrical board mounted on the burner.
- Execute the electrical connections to the power supply terminal board as shown here following, check the direction of rotation of the fan motor (see next paragraph) and refit the electrical board cover.

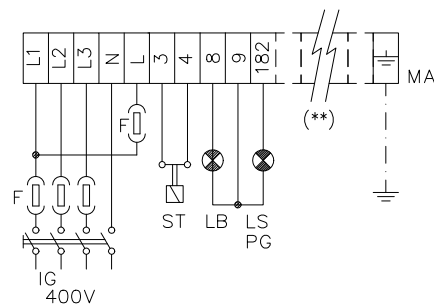
	WARNING: The burner is provided with a jumper between terminals 6 and 7; in the event of connecting the high/low flame thermostat remove this jumper before connecting the thermostat.
	IMPORTANT: while connecting electric supply wires to burner's terminal block be sure that ground wire should be longer than phase and neutral ones.

Connecting burners not fitted with printed circuit

High-low flame burners

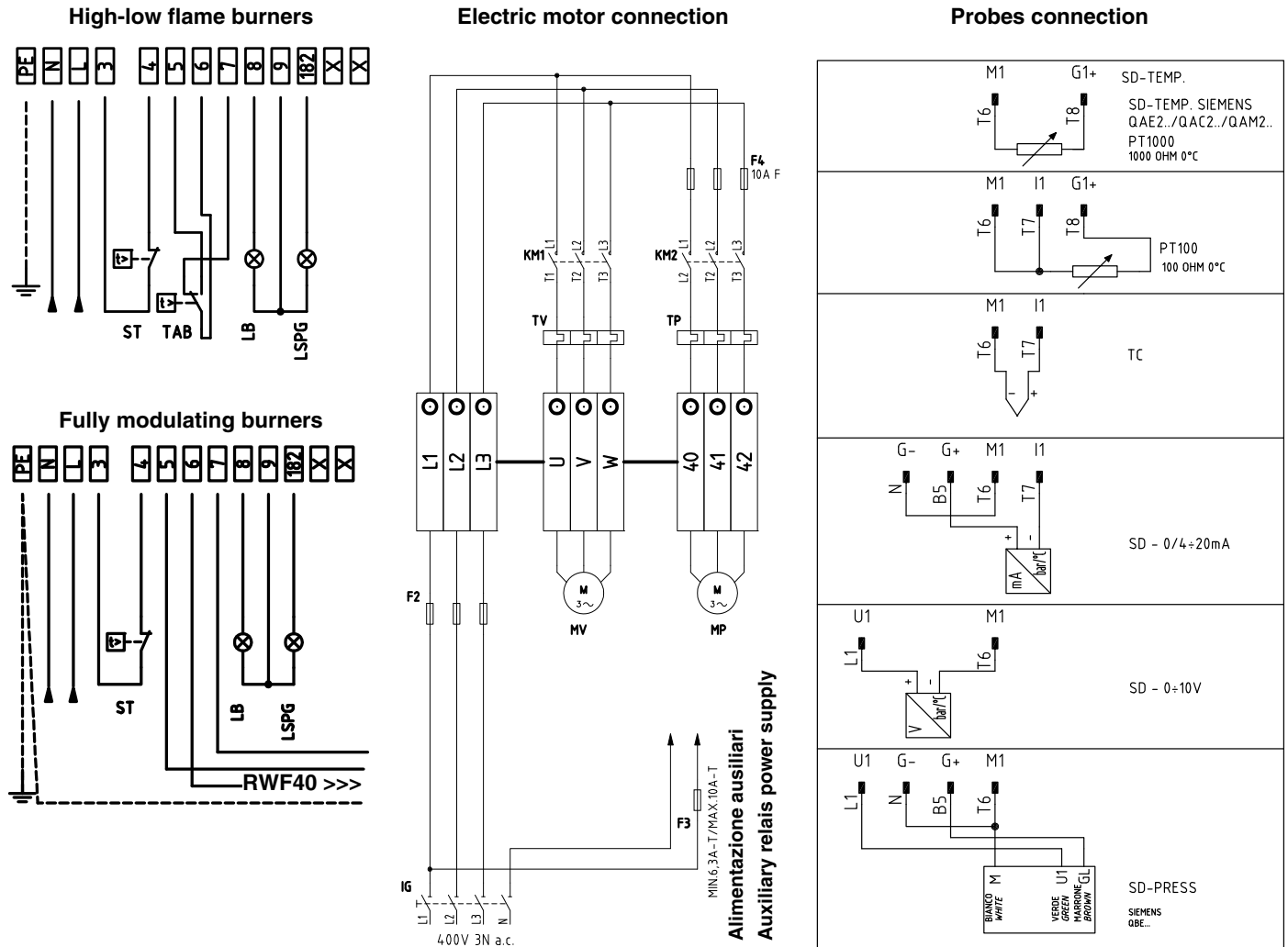


Fully modulating burners



For probes connection see Wiring diagrams

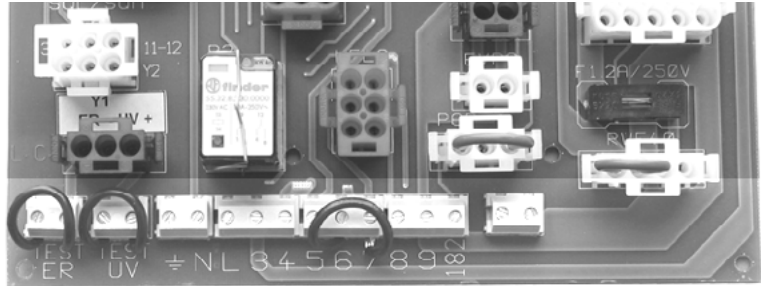
Electrical Wiring Diagram for Burners Fitted with Printed Circuit



Power supply terminal board



Terminal board for connections on printed circuit



Rotation of fan motor and pump motor

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

NOTE (motors for “star/delta” start-up excluded): burners are supplied for three-phase 400V supply, and in the case of three-phase 230V supply it is necessary to modify the electrical connections into the terminal box of the electric motor and replace the overload tripped relay.



CAUTION: adjust the thermal cut-out according to the motor rated current value.

ADJUSTMENTS

Combustion head gas pressure curves depending on the flow rate

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

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 Fig. 18, 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.

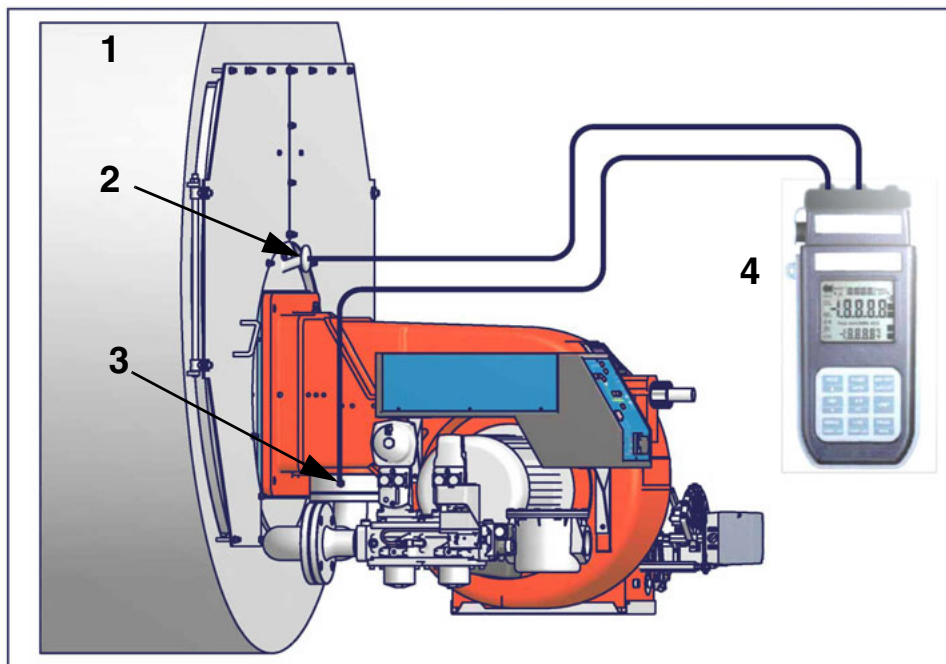


Fig. 18

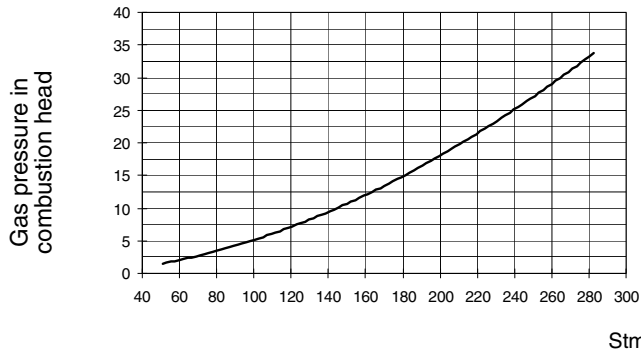
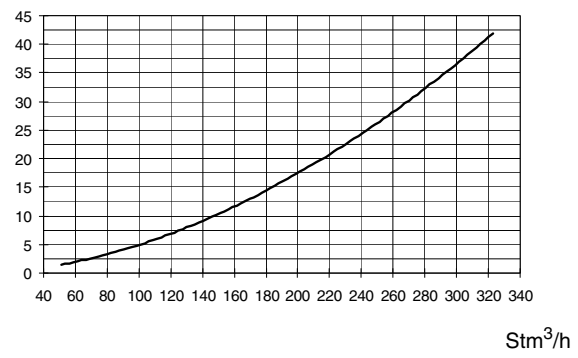
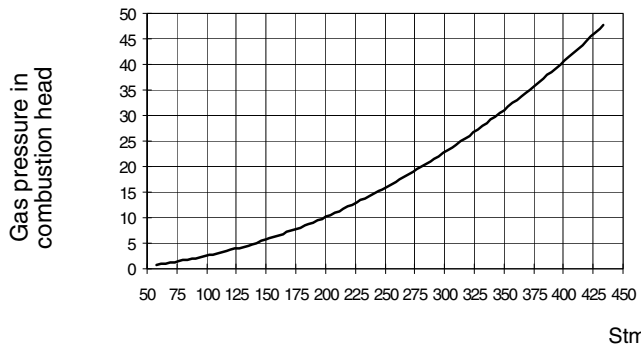
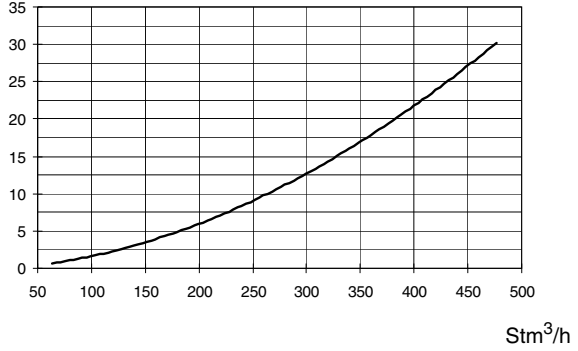
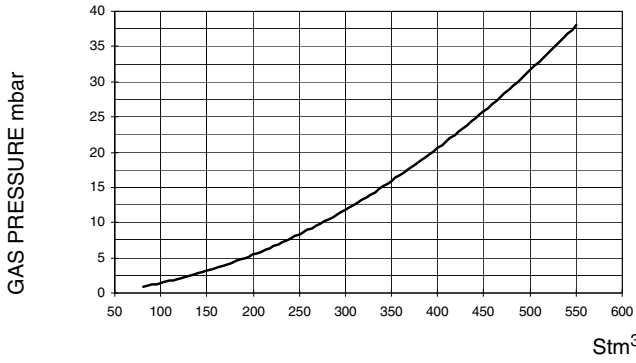
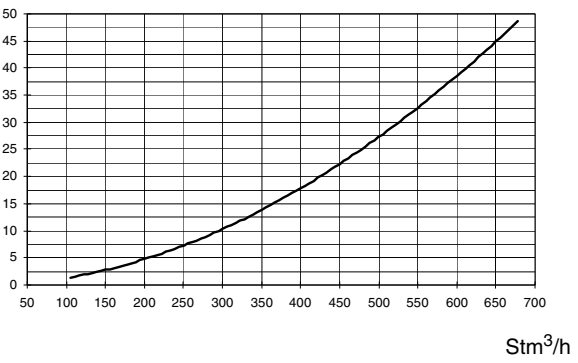
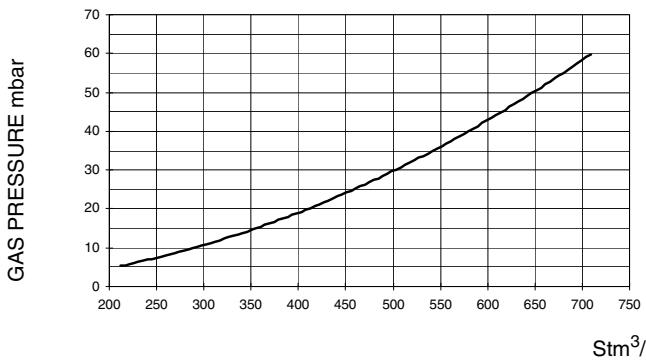
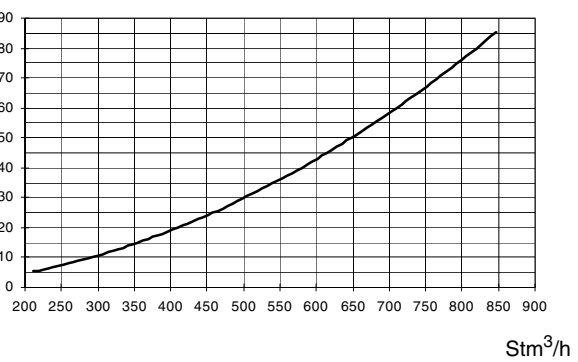
Key

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

Measuring the gas pressure in the combustion head

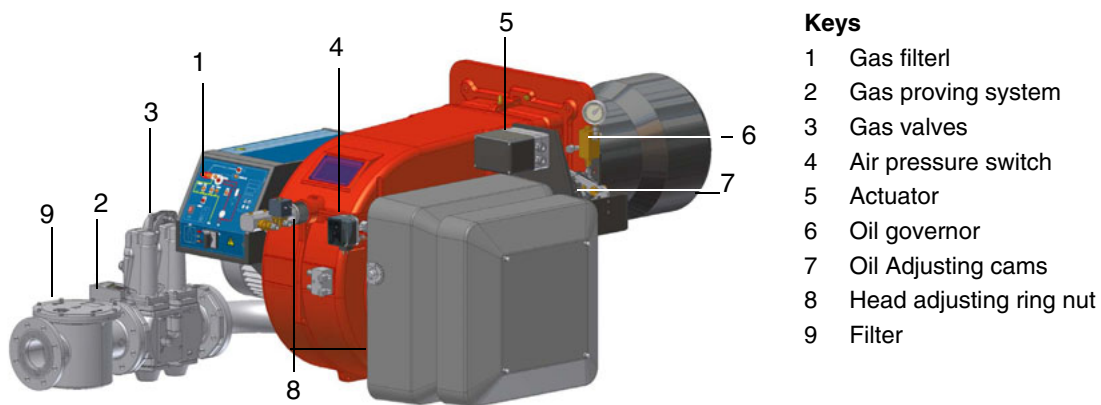
In order to measure the pressure in the combustion head, insert the pressure gauge probes: one into the combustion chamber's pressure outlet (Fig. 18-2) to get the pressure in the combustion chamber and the other one into the butterfly valve's pressure outlet of the burner (Fig. 18-3). On the basis of 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.

NOTE: THE PRESSURE-RATE CURVES ARE GIVEN AS INFORMATION ONLY; FOR A PROPER SETTING OF THE GAS RATE, PLEASE REFER TO THE GAS METER READING.

Pressure in combustion head - gas rate curves**HR91A****HR92A****HR93A****HR512A****HR515A****HR520A****HR525A Rp2****HR525A DN65-80-100**

Adjustments

	ATTENTION: before starting the burner up, be sure that the manual cutoff valves are open and check that the pressure upstream the gas train complies the value quoted on paragraph "Technical specifications". Be sure that the mains switch is closed.
	ATTENTION: 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: NEVER LOOSE THE SEALED SCREWS! OTHERWISE, THE DEVICE WARRANTY WILL BE INVALIDATE!



Keys

- 1 Gas filter
- 2 Gas proving system
- 3 Gas valves
- 4 Air pressure switch
- 5 Actuator
- 6 Oil governor
- 7 Oil Adjusting cams
- 8 Head adjusting ring nut
- 9 Filter

Fig. 19

Gas Filter

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

VPS504 Gas proving system

The VPS504 check the operation of the seal of the gas shut off valves. This check is carried out as soon as the boiler thermostat gives a start signal to the burner, creating, by means of the diaphragm pump inside it, a pressure in the test space of 20 mbar higher than the supply pressure.

When wishing to monitor the test, install a pressure gauge ranged to that of the pressure supply point PA.

If the test cycle is satisfactory, after a few seconds the consent light LC (yellow) comes on. In the opposite case the lockout light LB (red) comes on.

To restart it is necessary to reset the appliance by pressing the illuminated pushbutton LB.

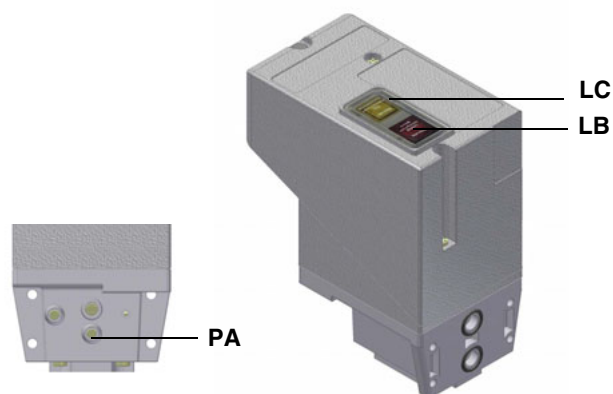


Fig. 20

Actuator

The actuator provided can be either Berger STM30../Siemens SQM40.. (see pag. 28) or Siemens SQL33.. (see pag. 29).

	IMPORTANT! the combustion air excess must be adjusted according to the in the following chart:
---	---

Recommended combustion parameters		
Fuel	Recommended (%) CO ₂	Recommended (%) O ₂
Natural gas	9 ÷ 10	3 ÷ 4.8
Light oil	11.5 ÷ 13	2.9 ÷ 4.9

Adjustments - brief description

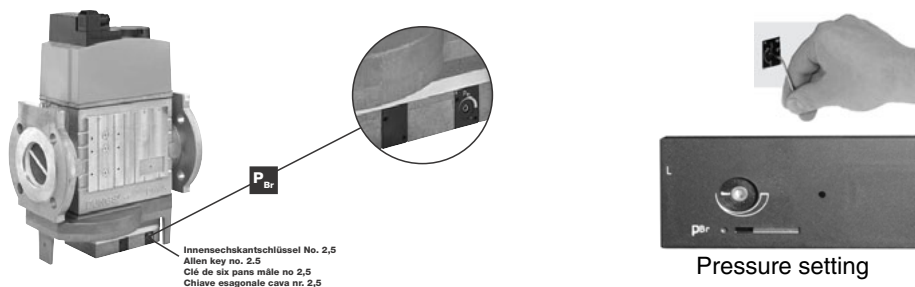
Adjust the air and gas flow rates at the maximum output ("high flame") first, by means of the air damper and the adjusting cam respectively.

- 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, as described on par. see "Measuring the gas pressure in the combustion head" on page 24.
- 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.

Adjustment procedure

To change the burner setting during the testing in the plant, follow the next procedure.

On the DUNGS MBC..SE gas valves group, set the pressure regulator to 1/3 of its stroke, using a 2.5 allen key.

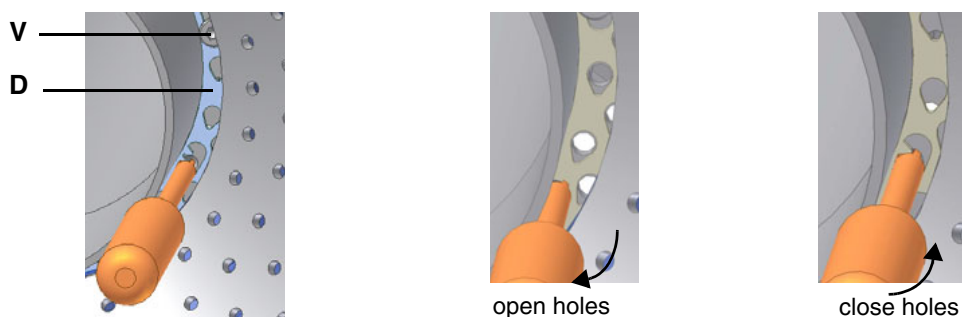


CAUTION: perform these adjustments once the burner is turned off and cooled.

The burner is factory-set with the adjusting plate holes fully open, and the combustion head at its MAX position, so it is fit to work at the maximum output.

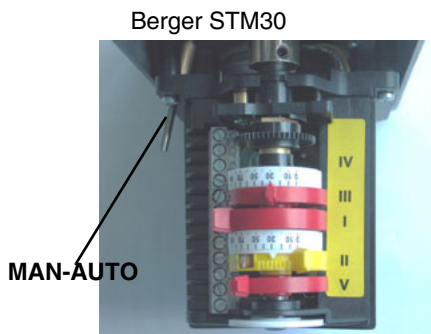
To adjust the gas flow, partially close the holes, as follows:

- 1 loosen the three **V** screws that fix the adjusting plate **D**;
- 2 insert a screwdriver on the adjusting plate notches and let it move CW/CCW as to open/close the holes;
- 3 once the adjustment is performed, fasten the **V** screws.



Now, adjust the burner according to the actuator model provided.

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



Siemens SQM40



Actuator cams

I	High flame
II	Stand-by and Ignition
III	Low flame - gas
IV	Low flame - oil (SQM40..)
V	Low flame - oil (STM30..)

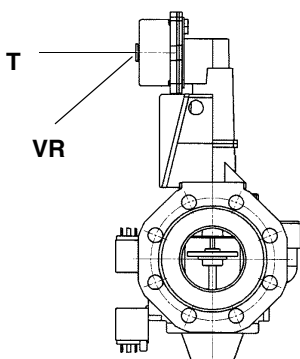
MAN-AUTO



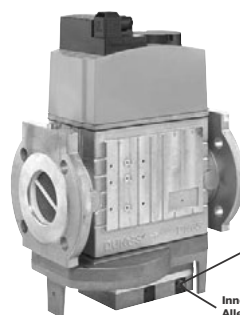
- 1 set GAS fuel by means of the burner **CM** switch (it is placed on the burner control panel - see Fig. 31)
- 2 check the fan motor rotation (see page 23).
- 3 Before starting the burner up, drive the high flame actuator microswitch matching the low flame one (in order to let the burner operates at the lowest output) to safely achieve the high flame stage.
- 4 Start the burner up by means of the thermostat series and wait until the pre-purge time comes to an end and that the burner starts up;
- 5 drive the burner to high flame stage, by means of 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 governor.
- 7 go on adjusting air and gas flow rates: check, continuously, the flue gas analysis, 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; screwing **VR** the rate increases, unscrewing it decreases (see next figure).

- **Dungs MBC..SE valves group:** act on its pressure governor to increase or decrease the pressure and consequently the gas rate.

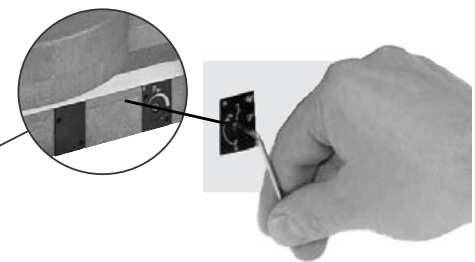


Siemens VGD..



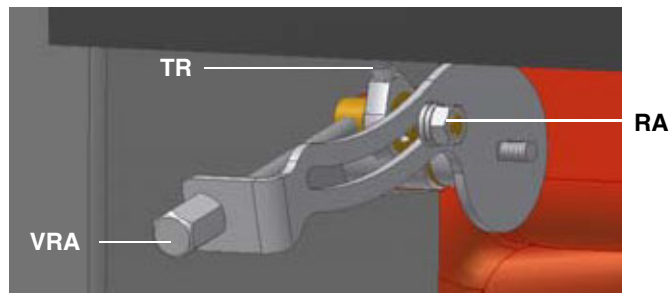
Innensechskantschlüssel No. 2,5
Allen key no. 2,5
Clé de six pans mâle no 2,5
Chiave esagonale cava nr. 2,5

Dungs MBC..SE

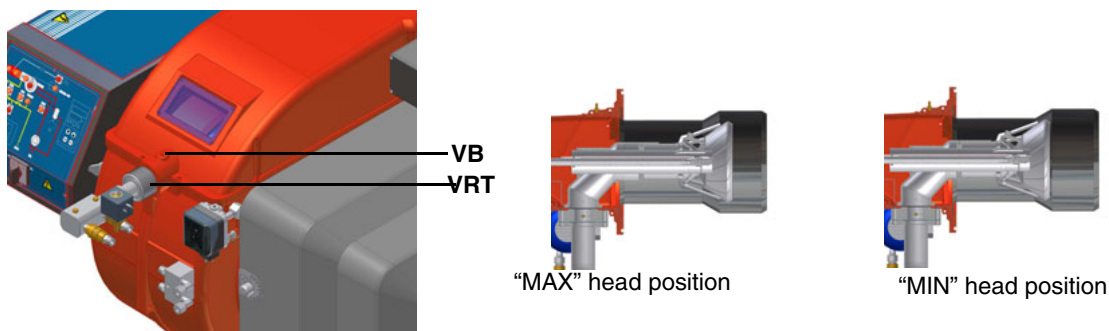


- 9 To adjust the **air flow rate in the high flame stage**, loose the **RA** nut and screw **VRA** as to get the desired air flow rate: moving the rod **TR** towards the air damper shaft, the air damper opens and consequently the air flow rate increases, moving it far from the shaft the air damper closes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

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

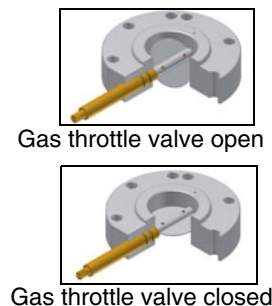
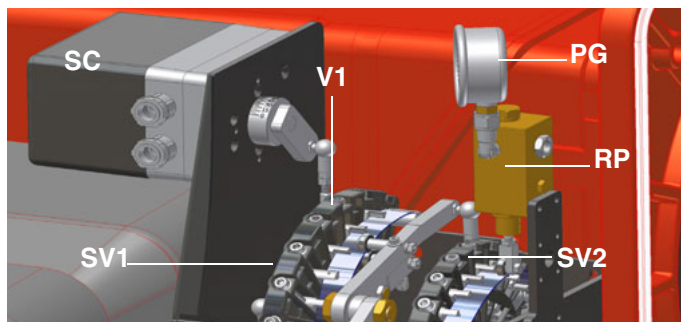


- 10 Only if necessary, change the combustion head position: to let the burner operate at a lower output, loose the **VB** screw and move progressively back the combustion head towards the MIN position, by turning clockwise the **VRT** ring nut. Fasten **VB** screw when the adjustment is accomplished.



Attention! if it is necessary to change the head position, repeat the air and gas adjustments described above.

- 11 the air and gas rate are now adjusted at the maximum power stage, go on with the point to point adjustment on the **SV1** (gas side) adjusting cam as to reach the minimum output point.

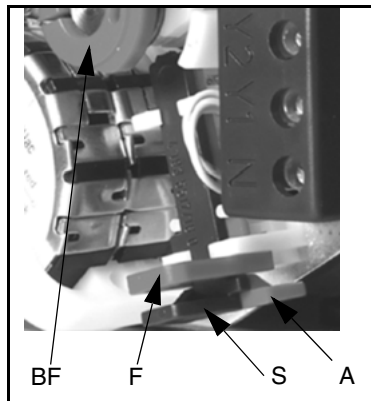
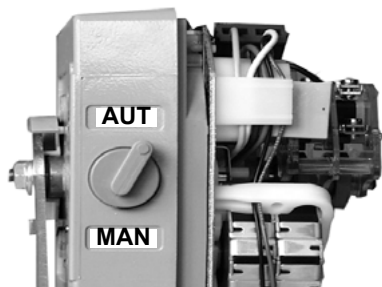


- 12 as for the point-to-point regulation, move the gas low flame microswitch a little lower than the maximum position (90°);
- 13 set the **TAB** thermostat to the minimum (as far as fully-modulating burners, see related paragraph) in order that the actuator moves progressively towards the low flame 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 next par.).

Adjustment by the Siemens SQL33.. actuator

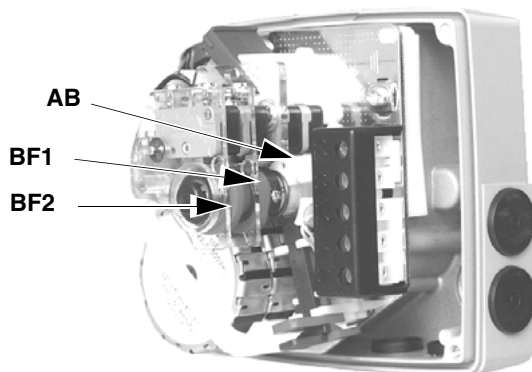
- 1 turn the burner on by setting GAS fuel by means of the burner **CM** switch (it is placed on the burner control panel - see page 38)
- 2 check the fan motor rotation (see page 23).
- 3 Start the burner up by means of the thermostat series and wait until the pre-purge time comes to an end;
- 4 the burner starts up with the actuator on the ignition position, set it to the **MAN** (manual mode), by the **MAN/AUTO** selector (ignition position= read on the air damper index **ID**);
- 5 disconnect the **TAB** thermostat removing the wire from the terminal no. 6 or by setting MAN on the RWF40 modulatore or by setting 0 by means of the **CMF** switch (only for fully-modulating burners);
- 6 set the actuator on the manual mode (MAN) by means of the MAN/AUTO switch (see next pictures).
- 7 manually drive the adjusting cam **SV1** to the high flame position and set the actuator to the AUTO mode (by the related switch - see

picture) to lock the adjusting cam.



SQL33.. actuator cams

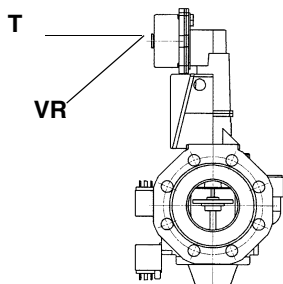
A = (red) cam locking lever for "high flame"
 S = (green) cam locking lever for "stand-by and ignition"
 BF1 = Low flame (GAS)
 BF2 = Low flame (OIL)
 F = plastic cam



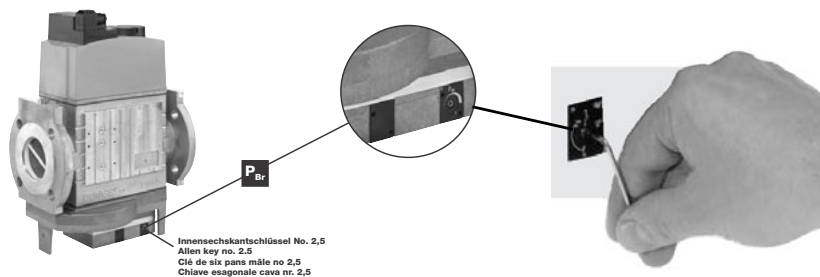
- 8 go on adjusting air and gas flow rates: check, continuously, the flue gas analysis, as to avoid combustion with little air; dose the air according to the gas flow rate change following the steps below;
- 9 acting on the pressure stabiliser of the valves group, adjust the **gas flow rate in the high 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; screwing **VR** the rate increases, unscrewing it decreases (see next figure).

- **Dungs MBC..SE valves group:** act on its pressure governor to increase or decrease the pressure and consequently the gas rate.



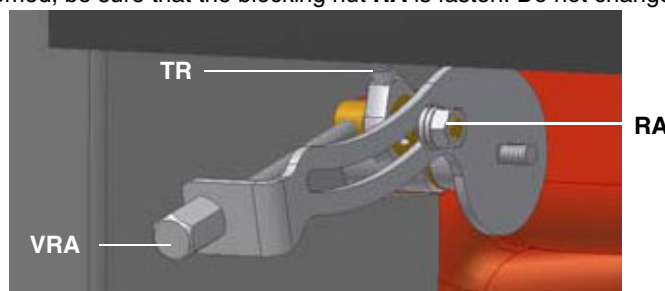
Siemens VGD..



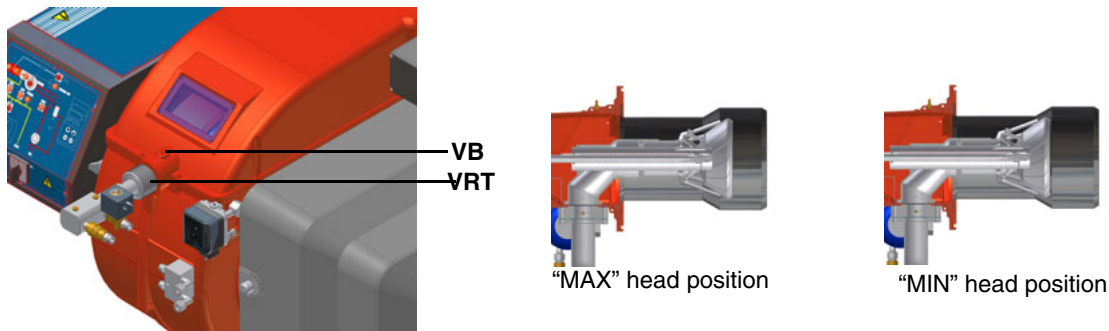
Dungs MBC..SE

- 10 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 performed, be sure that the blocking nut **RA** is fasten. Do not change the position of the air damper rods.

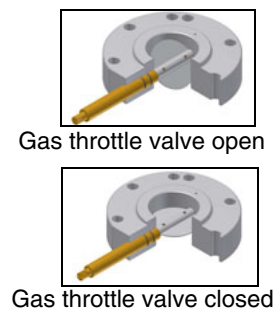
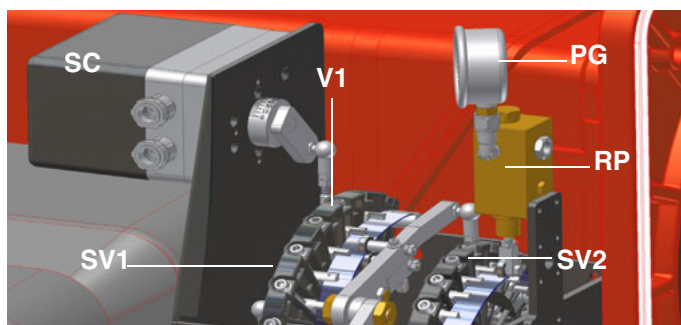


- 11 If necessary, change the combustion head position: to let the burner operate at a lower output, loose the **VB** screw and move progressively back the combustion head towards the MIN position, by turning clockwise the **VRT** ring nut. Fasten **VB** screw when the adjustment is accomplished.



Attention! if it is necessary to change the head position, repeat the air and gas adjustments described above.

- 12 the air and gas rate are now adjusted at the maximum output, go on with the point to point adjustment on the **SV1** adjusting cam as to reach the minimum output point: gradually move the adjusting cam in order to adjust each of the **V1** screws as to set the cam foil shape as described on the next steps:
- 13 to change the **SV1** position set the actuator on the manual mode (MAN), turn the adjusting cam **SV1** and set again the actuator to the AUTO mode to lock the adjusting cam;
- 14 act on the **V1** screw that matches the bearings referring to the adjusting cam position;
- 15 to adjust the next screw, set again the actuator mode to MAN, turn the adjusting cam and set the actuator to AUTO mode to lock the adjusting cam on the next screw; adjust it and go on this way to adjust all the screws in order to set the cam foil shape, according to the combustion values read.
- 16 Once the cam foil shape is defined, reconnect the **TAB** thermostat reconnecting the wire to the terminal no.6 or setting the RWF40 burner modulator to AUTO or the CMF switch to 3 (only for fully-modulating burner).



- 17 Turn the burner off, then start it up again.
- 18 Once the pre-purge time comes to end, drive the burner to the high flame stage by the **TAB** thermostat and check the combustion values;
- 19 drive the burner to low flame, if necessary adjust the low flame size (output) by inserting a screwdriver on the slot **F** to move the **BF1** cam.



- 20 The low flame position must never match the ignition position that is why cam **BF1** must be set 20°- 30° more than the ignition position (see **ID1** index on previous pictures).

Now adjust the pressure switches (see next paragraph).

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



To calibrate the air pressure switch, proceed as follows:

- ### ***Calibration of low gas pressure switch***

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

- ### ***Adjusting the high gas pressure switch (when provided)***

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

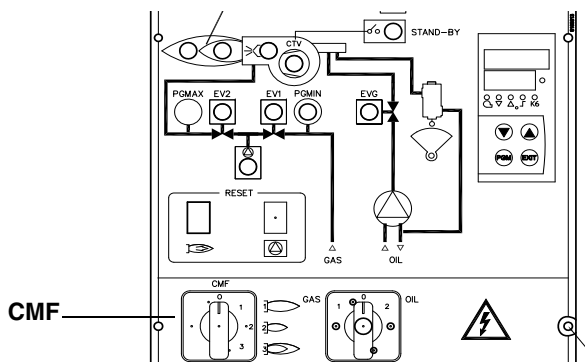
- 1 remove the pressure switch plastic cover;
- 2 if the maximum pressure switch is mounted upstream the gas valves: measure the gas pressure in the network, when flame is off; by means of the adjusting ring nut **VR**, set the value read, increased by the 30%.
- 3 if the maximum pressure switch is mounted downstream the “gas governor-gas valves” group and upstream the butterfly valve: light the burner, adjust it according to the procedure in the previous paragraph. 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.

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 instead of **TAB**.

The **CMF** position sets the operating 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.



- 32

Adjusting light oil flow rate

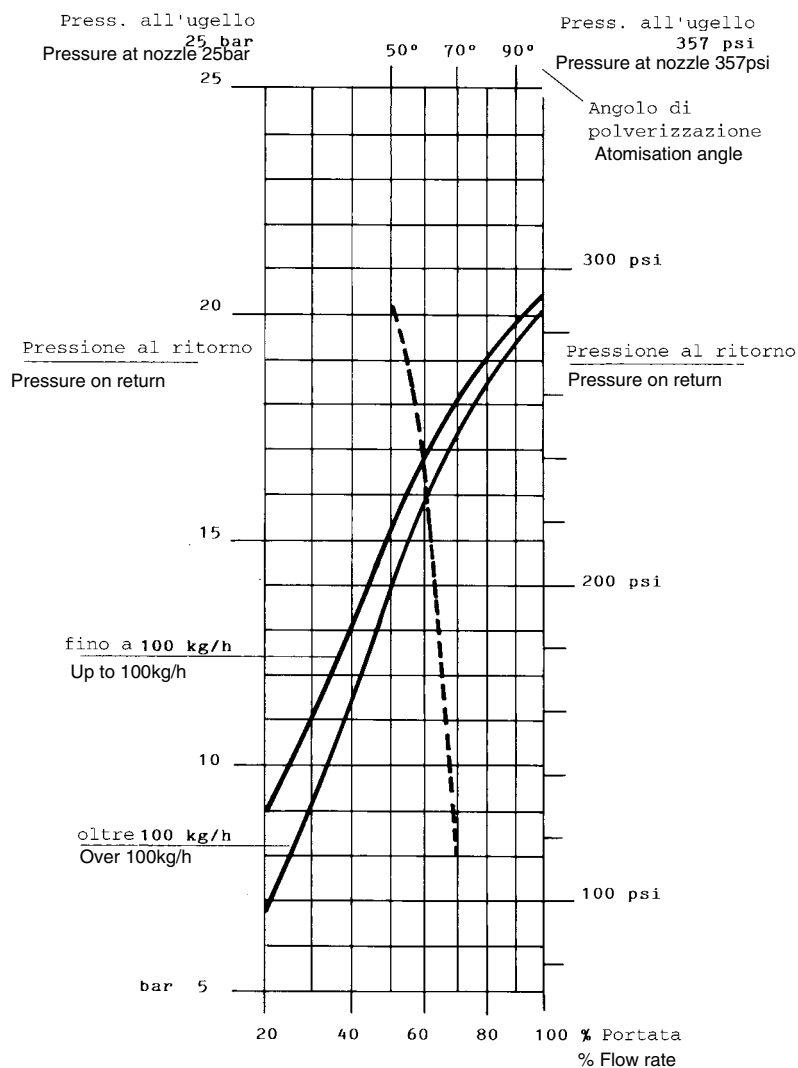
The light oil flow rate can be adjusted choosing a by-pass nozzle that suits the boiler/utilisation output and setting the delivery and return pressure values according to the ones quoted on the chart below and the diagram on Fig. 21 (as far as reading the pressure values, see next paragraphs).

NOZZLE	DELIVERY PRESSURE bar	RETURN PRESSURE MAX. bar	RETURN PRESSURE MIN. bar
FLUIDICS WR2	25	19-20	7 (recommended)

Tab. 1

DIMENSIONS	FLOW RATE kg/h	
	Min	Max
40	13	40
50	16	50
60	20	60
70	23	70
80	26	80
90	30	90
100	33	100
115	38	115
130	43	130
145	48	145
160	53	160
180	59	180
200	66	200
225	74	225
250	82	250
275	91	275
300	99	300
330	109	330
360	119	360
400	132	400
450	148	450
500	165	500
550	181	550
600	198	600
650	214	650
700	231	700
750	250	750
800	267	800

Fig. 21



-----Atomisation angle according to the return pressure
 _____ % Flow rate

Example (Fluidics): as for over 100kg/h nozzles, the 80% of the nozzle flow rate can be obtained with a return pressure at about 18bar (see Fig. 21 diagram).

Oil Flow Rate Settings by means of Berger STM30../Siemens SQM40.. actuator

- 1 Once the air and gas flow rates are adjusted, turn the burner off, switch it on again by turning the **CM** switch to the oil operation (OIL, on the burner control panel (see page 38).
- 2 with the electrical panel open, prime the oil pump acting directly on the related **CP** contactor (see next picture): check the pump motor rotation and keep pressing for some seconds until the oil circuit is charged;



- 3 bleed the air from the **M** pressure gauge port (Fig. 22) by loosening the cap without removing it, then release the contactor.

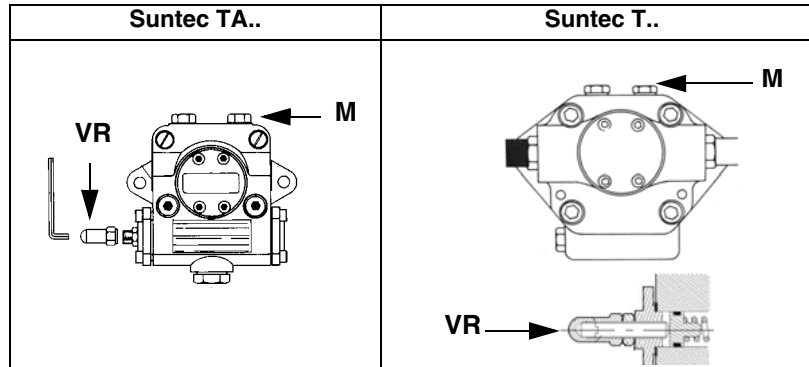


Fig. 22

- 4 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 achieve safely the high flame stage .
- 5 record the high flame value set during the gas operation adjustments (see previous paragraphs);
- 6 start the burner up by means of the thermostat series and wait until the pre-purge time comes to an end and that the burner starts up;
- 7 drive the burner to high flame stage, by means of the thermostat **TAB** (high/low flame thermostat - see Wiring diagrams), as far as fully-modulating burners, see related paragraph.
- 8 Then move progressively the microswitch to higher values until it reaches the high flame position; always check the combustion values and eventually adjusting the oil pressure (see next step).

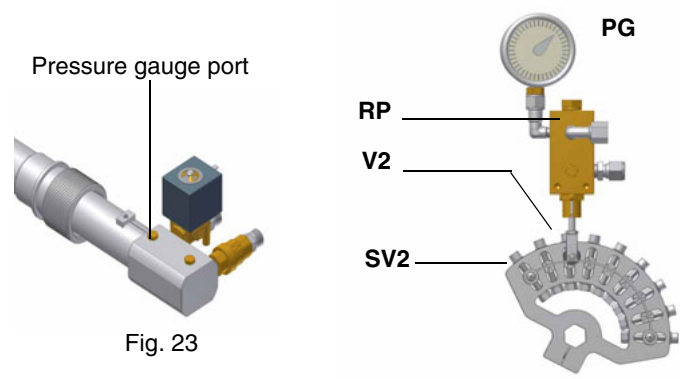
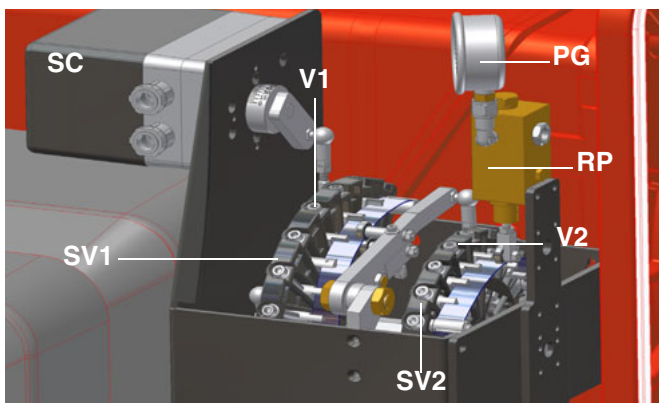


Fig. 23

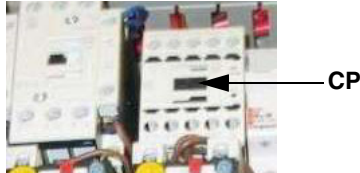
- 9 the nozzle supply pressure is already factory-set and must not be changed. Only if necessary, adjust the supply pressure as follows (see related paragraph); insert a pressure gauge into the port shown on Fig. 22 and act on the pump adjusting screw **VR** (see Fig. 22 and page 22) as to get the nozzle pressure at 25bar (Fluidics nozzles - see page 33).
- 10 in order to get the maximum oil flow rate, adjust the pressure (reading its value on the **PG** pressure gauge) without changing the air flow rate set during the gas operation adjustments (see previous paragraph): checking always the combustion parameters, the adjustment is to be performed by means of the **SV2** adjusting cam screw (see picture) when the cam has reached the high flame position.
- 11 as for the point-to-point regulation in order to set the cam foil shape, move the oil low flame microswitch a little lower than the maximum position (90°);
- 12 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;
- 13 move the low flame cam towards the minimum to move the actuator towards the low flame until the two bearings find the adjusting screw that refers to a lower position: screw **V2** to increase the rate, unscrew to decrease, in order to get the pressure as showed on chart/diagram on "Adjusting light oil flow rate" on page 33, according to the requested rate.

- 14 Move again the low flame cam 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.
- 15 The low flame position must never match the ignition position that is why this cam must be set 20° - 30° more than the ignition position.

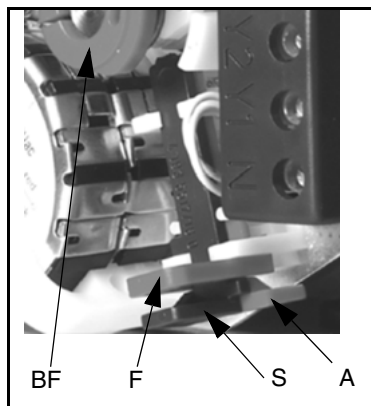
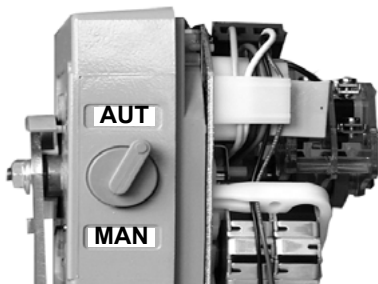
Turn the burner off; then start it up again. If the adjustment is not correct, repeat the previous steps.

Adjustment by the Siemens SQL33.. actuator

- 1 Once the air and gas flow rates are adjusted, turn the burner off, switch the **CM** switch to the heavy oil operation (OIL, on the burner control panel (see page 38).
- 2 with the electrical panel open, prime the oil pump acting directly on the related **CP** contactor (see next picture): check the pump motor rotation and keep pressing for some seconds until the oil circuit is charged;

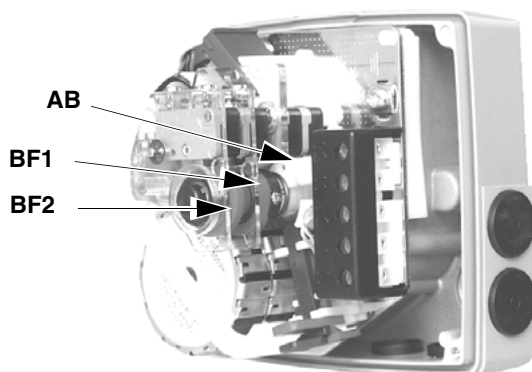


- 3 bleed the air from the **M** pressure gauge port (Fig. 22) by loosening the cap without removing it, then release the contactor.
- 4 record the high flame value set during the gas operation adjustments (see previous paragraphs);
- 5 Start the burner up by means of the thermostat series and wait until the pre-purge phase comes to end and that burner starts up;
- 6 the burner starts up with the actuator on the ignition position, set it to the **MAN** (manual mode), by the **MAN/AUTO** selector (ignition position= read on the air damper index **ID1**);
- 7 disconnect the **TAB** thermostat removing the wire from the terminal no. 6 or by setting MAN on the RWF40 modulatore or by setting 0 by means of the **CMF** switch (only for fully-modulating burners);
- 8 manually drive the adjusting cam **SV2** to the high flame position and set the actuator to the AUTO mode (by the related switch - see picture) to lock the adjusting cam.



SQL33.. actuator cams

- A = (red) cam locking lever for "high flame"
- S = (green) cam locking lever for "stand-by and ignition"
- BF1 = Low flame (GAS)
- BF2 = Low flame (OIL)
- F = plastic cam



The nozzle supply pressure is already factory-set and must not be changed. Only if necessary, adjust the supply pressure as follows (see related paragraph); insert a pressure gauge into the port shown on Fig. 24 and act on the pump adjusting screw **VR** (see Fig. 22 and page 22) as to get the nozzle pressure at 25bar (Fluidics nozzles - see page 33).

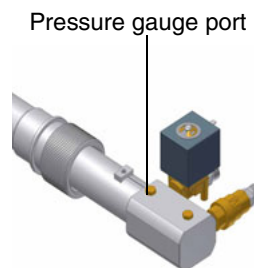
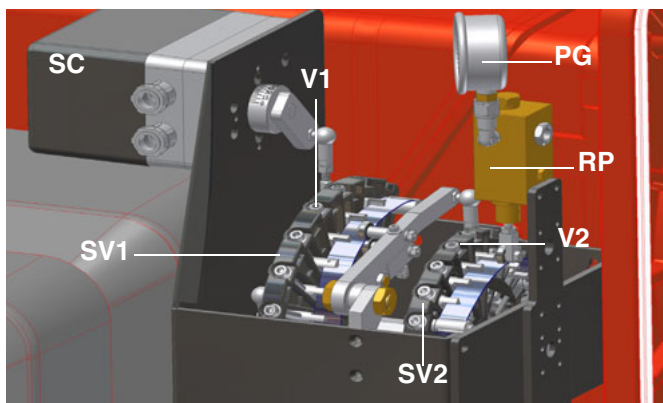


Fig. 25

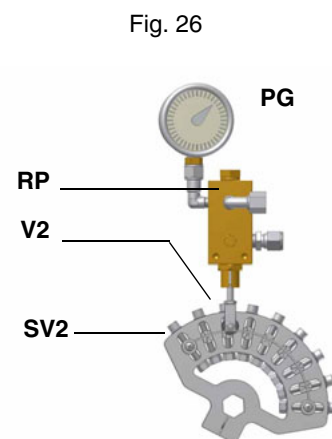


Fig. 26

- 9 in order to get the maximum oil flow rate, adjust the pressure (reading its value on the **PG** pressure gauge) without changing the air flow rate set during the gas operation adjustments (see previous paragraph): checking always the combustion parameters, the adjustment is to be performed by means of the **SV2** adjusting cam screw (see picture) when the cam has reached the high flame position.
- 10 once the air and oil flow rate have been adjusted at the maximum output, go on with the point to point adjustment on the **SV2** adjusting cam as to reach the minimum output point: gradually move the adjusting cam in order to adjust each of the **V2** screws as to describe the cam foil shape.
- 11 to change the **SV2** position set the actuator on the manual mode (MAN), turn the adjusting cam **SV2** and set again the actuator to the AUTO mode to lock the adjusting cam;
- 12 act on the **V2** screw that matches the bearings referring to the adjusting cam position;
- 13 to adjust the next screw, set again the actuator mode to MAN, turn the adjusting cam and set the actuator to AUTO mode to lock the adjusting cam on the next screw; adjust it and go on this way to adjust all the screws in order to set the cam foil shape, according to the combustion values read.
- 14 Once the cam foil shape is defined, reconnect the **TAB** thermostat reconnecting the wire to the terminal no.6 or setting the RWF40 burner modulator to AUTO or the CMF switch to 3 (only for fully-modulating burner).
- 15 Turn the burner off then start it up again.
- 16 Once the pre-purge time comes to end, drive the burner to the high flame stage by the **TAB** thermostat: check the combustion values;
- 17 drive the burner to low flame, if necessary adjust the low flame size (output) by inserting a screwdriver on the slot **F** to move the **BF2** cam.



- 18 The low flame position must never match the ignition position that is why cam **BF2** must be set 20°- 30° more than the ignition position.
- 19 Turn the burner off; then start it up again. If the adjustment is not correct, repeat the previous steps.

Oil circuit

The fuel is pushed into the pump 1 to the nozzle 3 at the delivery pressure set by the pressure governor. The solenoid valve 2 stops the fuel immission into the combustion chamber. The fuel flow rate that is not burnt goes back to the tank through the return circuit. The spill-back nozzle is feeded at constant pressure, while the return line pressure is adjusted by means of the pressure governor controlled by an actuator coupled to an adjusting cam. The fuel amount to be burnt is adjusted by means of the burner actuator according to the adjustments set (see previous paragraph).

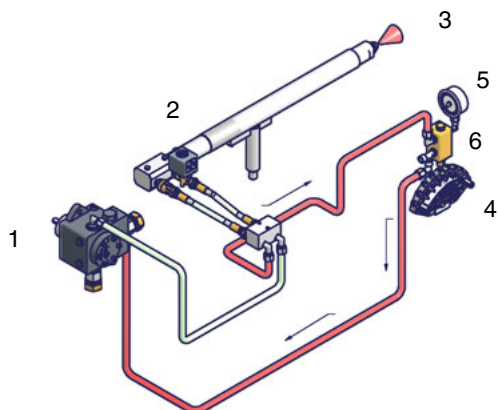


Fig. 27 - Stand-by

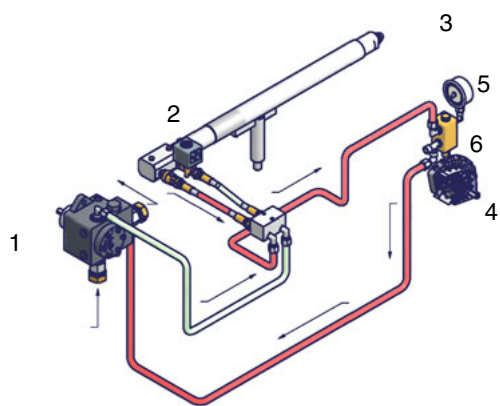


Fig. 28 - Pre-purge

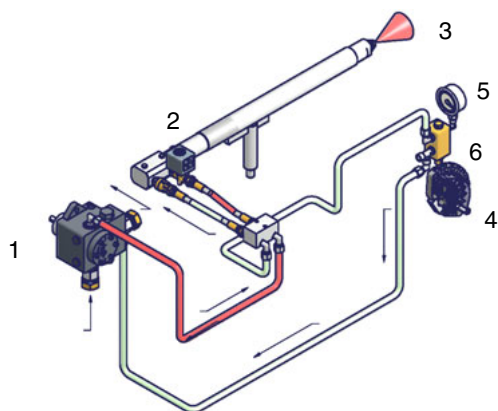


Fig. 29 - Low flame

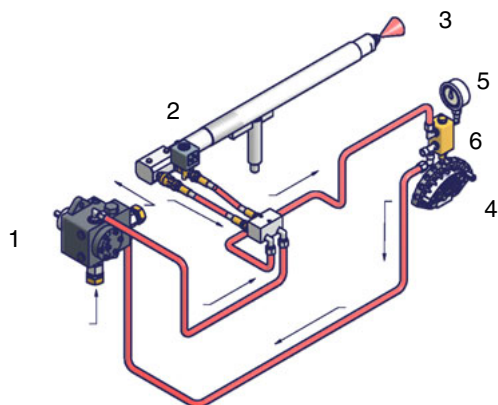


Fig. 30 - High flame

Key

- 1 Light oil pump
- 2 Light oil solenoid valve
- 3 Nozzle
- 4 Adjusting cam
- 5 Pressure gauge
- 6 Pressure governor

PART II: 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 AUTHORIZED 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.

OPERATE ONLY THE MAIN SWITCH, WHICH THROUGH ITS EASY ACCESSIBILITY AND RAPIDITY OF OPERATION ALSO FUNCTIONS AS AN EMERGENCY SWITCH, AND ON THE RESET BUTTON.

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.

OPERATION

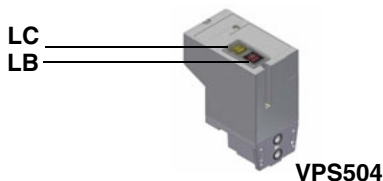


ATTENTION: before starting the burner up, be sure that the manual cutoff valves are open and check that the pressure upstream the gas train complies the value quoted on paragraph "Technical specifications". Read carefully the "WARNINGS" chapter in this manual.

- Choose the typer of fuel by turning the **A** switch, on the burner control panel.
CAUTION: if the fuel chosen is light oil, be sure the cutoff valves on the feed and return pipes are open.
- Check the control box is not locked (signalling light **O**, on); if so, reset it by means of the pushbutton **C**.
- Check the series of thermostats and pressure switches turn the burner to on.

Gas operation

- Check the gas feeding pressure is sufficient (signalling lamp **G** on).
- the gas proving system test begins; when the test is performed the proving system LED turns on. At the end of the test, the burner starting cycle begins: in case of leakage in a valve, the gas proving system stops the burner and the lamp **E** turns on. Reset it, by means of the reset pushbutton on the device, in burners with VPS504 (pushbutton **LB** in picture), or by the **D** pushbutton on the burner panel if this one is fitted with LDU11 proving system.



NOTE: if the burner is fitted with Dungs VPS504, the pre-purge phase starts once the gas proving system is successfully performed. Since the pre-purge phase must be carried out with the maximum air rate, the control box drives the actuator opening and when the maximum opening position is achieved, the pre-purge time counting starts.

- At the end of the pre-purge time, the actuator drives the complete closing (ignition with gas position) and, as this is achieved the ignition transformer is energised (LED **L** is on); the gas valves open.
- Few seconds after the valves opening, the transformer is de-energised and lamp **L** turns off.

- The burner is now operating, meanwhile the actuator goes to the high flame position and, after some seconds, the two-stage operation begins; the burner is driven automatically to high flame or low flame, according to the plant requirements.

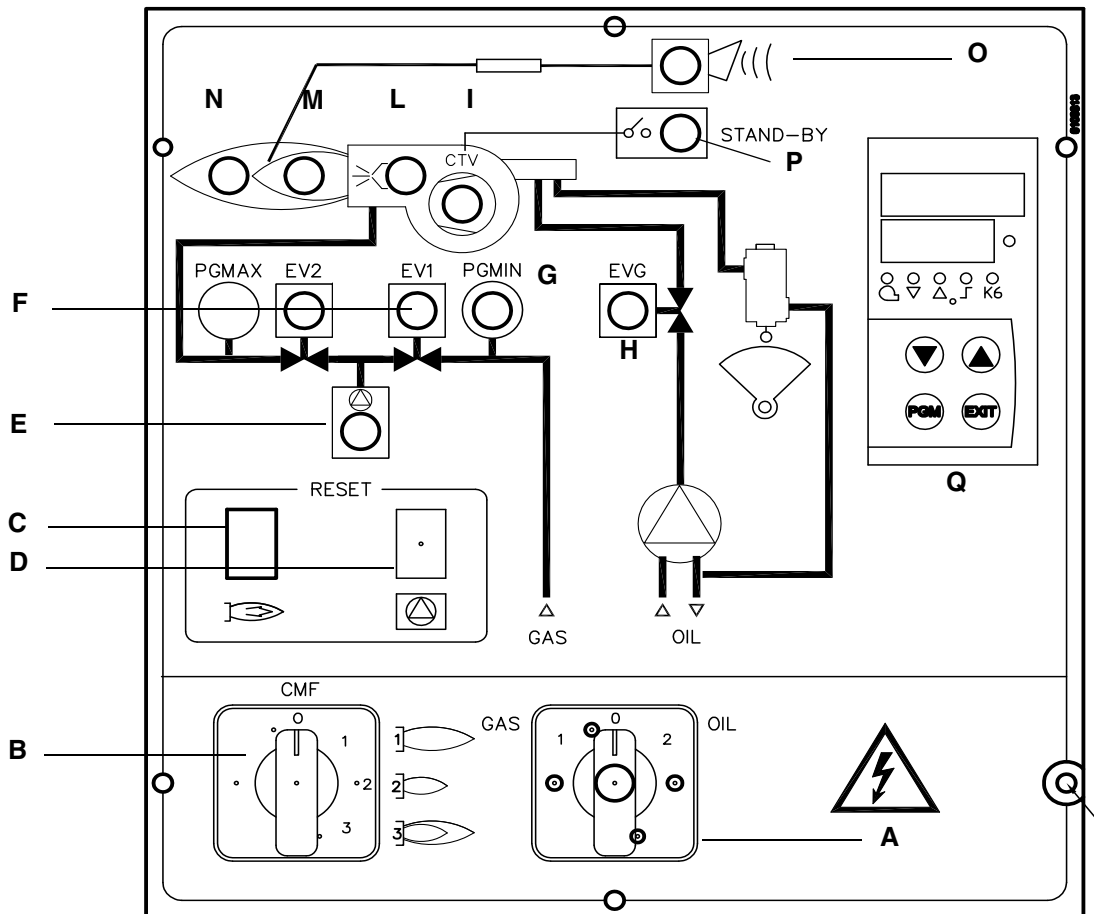
Operation in high or low flame is signalled by lamp **N** on the frontal panel.

Light oil operation

- The fan motor starts and the pre-purge phase as well. Since the pre-purge phase must be carried out at the maximum air rate, the control box drives the actuator opening and when the maximum opening position is reached, the pre-purge time counting starts.
- At the end of the pre-purge time, the actuator is in the light oil ignition position: the ignition transformer is energised (lamp **L** on); the light oil valves open. Few seconds after the valves opening, the transformer is de-energised and lamp **L** turns off.
- The burner is now operating, meanwhile the actuator goes to the high flame position; after some seconds, the two-stage operation begins; the burner is driven automatically to high flame or low flame, according to the plant requirements.

Operation in high or low flame is signalled by LED **N** on the burner control panel.

Fig. 31 - - Burner control panel



Keys

- A Main switch (0=Off, 1=GAS, 2=OIL)
- B CMF switch (0=stop, 1=low flame, 2=high flame, 3=automatic) - fully modulating burners only
- C Control box reset pushbutton
- D Gas proving system reset pushbutton (only for burners with Siemens LDU11 provided)
- E Gas proving system lockout signalling lamp
- F Gas valves EV1/EV2 operation signalling lamp
- G Gas pressure switch signal lamp
- H Oil valve EVG operation signalling lamp
- I Thermal cutout intervention signalling light CTV
- L Ignition transformer operation signalling lamp
- M Low flame operation signalling lamp
- N High flame operation signalling lamp
- O Burner lockout signalling lamp
- P Stand-by signalling lamp
- Q Siemens RWF40 Modulator (fully modulating burners only - see related attached manual)

PART III: 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 MANUAL CUTOFF VALVES CLOSED!
	ATTENTION: READ CAREFULLY THE “WARNINGS” CHAPTER AT THE BEGINNIG OF THIS MANUAL..

ROUTINE MAINTENANCE

- Check and clean the gas filter cartridge, if necessary replace it (see next paragraphs);
- Check and clean the fuel filter cartridge, replace if necessary.
- Check and clean the filter inside the light oil pump: filter must be thoroughly cleaned at least once in a season to ensure correct working of the fuel unit. To remove the filter, unscrew the four screws on the cover. When reassemble, make sure that the filter is mounted with the feet toward the pump body. If the gasket between cover and pump housing should be damaged, it must be replaced. An external filter should always be installed in the suction line upstream of the fuel unit.
- Check the fuel hoses for possible leaks.
- Remove, check and clean the combustion head (see page 41);
- Check ignition electrodes, clean, adjust and, if necessary, replace them (see page 42);
- Check and carefully clean the **UV** detector, replace it if necessary; if in doubt, check the detection current, once the burner starts up (see on page 42).
- Remove and clean the fuel nozzle  (**Important: cleaning must be performed using solvent, not metal tools!**). At the end of maintenance operations after the burner reassembly, light the flame and check its shape, replacing the nozzle whenever a questionable flame shape appears. Whenever the burner is used intensely, we recommend preventively replacing the nozzle at the start of each heating season.
- Clean and grease sliding 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.
---	--

Light oil filter maintenance

For correct and proper servicing, proceed as follows:

- 1 cutoff the required pipe section;
- 2 unscrew the filter cup;
- 3 remove the filtering cartridge, wash it with gasoline; if necessary, replace it; check the tightening O-rings and replace them if necessary;
- 4 replace the cup and restore the pipe line.

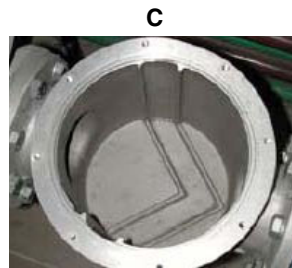
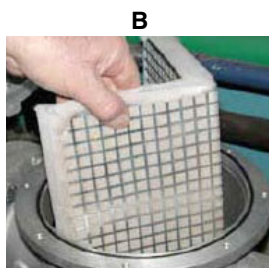
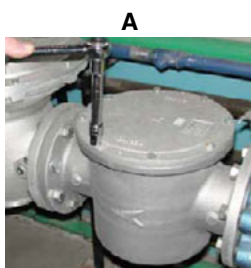


Gas filter maintenance

	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 Or ring into its place (C) and replace the cover fastening by the proper screws (A).



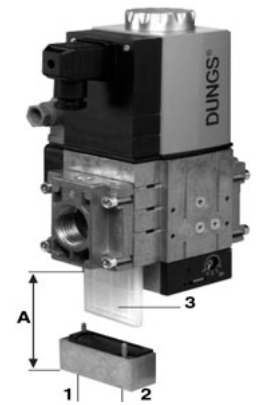
Inspection and replacement of the MULTIBLOC DUNGS MBC..SE filter (Threaded valves group)

Inspect the filter at least once a year.

- Change the filter, if pressure value between pressure connections 1 and 2 is greater than 10 mbar.
- Change the filter, if pressure value between pressure connections 1 and 2 is twice as high compared to the last inspection.

1. Interrupt gas supply: close ball valve
 2. Remove screws 1-2
 3. Replace the filter insert 3
 4. Screw in screws 1-2 without use force to fasten.
 5. Perform leakage and function test.
 6. Pay attention that dirt does not fall inside the valve.
- Space requirements for fitting filter, A: from 150 to 230 mm.

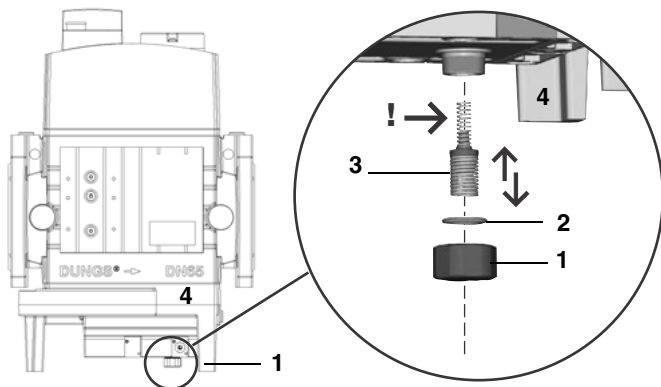
Fig.32



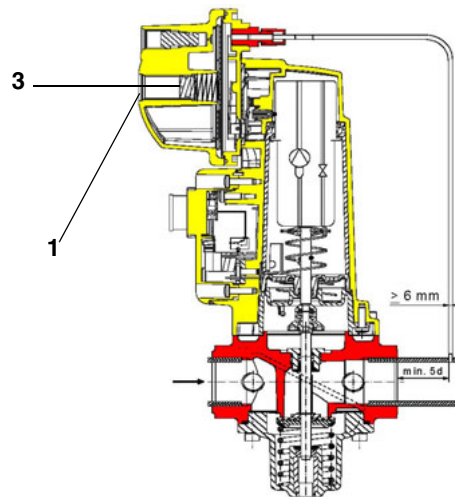
Replacing the spring in the gas valve group

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.



DUNGS MBC..SE

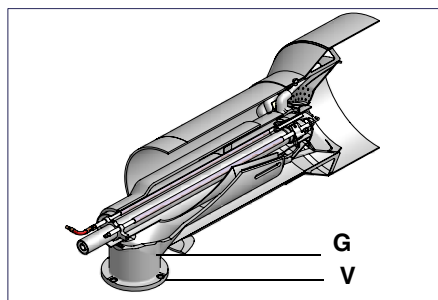
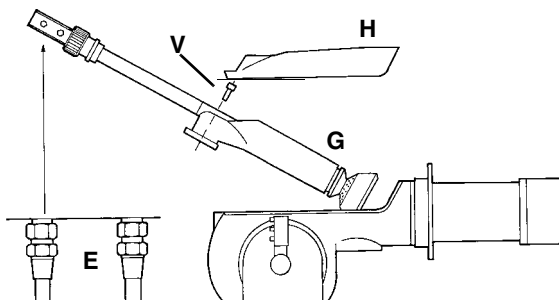


SKP Siemens actuator

Removing the combustion head

- 1 Remove the top H.
- 2 Remove the UV detector out of its housing: disconnect electrode cables and the light oil flexible hoses.
- 3 Loosen the screws V holding the gas manifold G, loosen the two connectors E and remove the assembly as shown.
- 4 Clean the combustion head by means of a vacuum cleaner; scrape off the scale by means of a metallic brush.

Note: to replace the combustion head, reverse the operations described above.



Removing the oil gun, replacing the nozzle and the electrodes

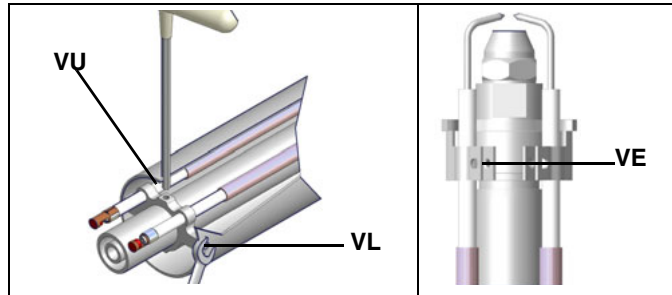


ATTENTION: avoid the electrodes to get in touch with metallic parts (blast tube, head, etc.), otherwise the boiler operation would be compromised. Check the electrodes position after any intervention on the combustion head.

To remove the oil gun, proceed as follows:

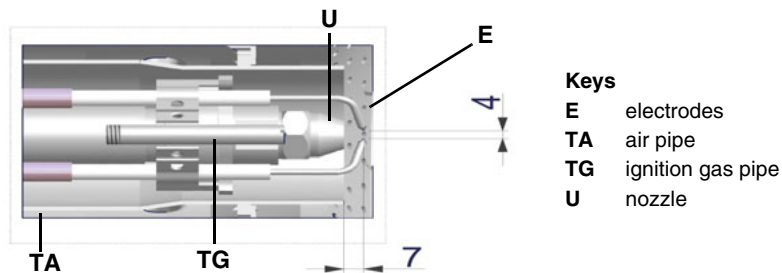
- 1 remove the combustion head as described on the previous paragraph;
- 2 loosen the **VL** screw and remove the oil gun and the electrodes: check the oil gun, replace it if necessary;
- 3 after removing the oil gun, unscrew the nozzle and replace it if necessary;
- 4 in order to replace the electrodes, unscrew the **VE** fixing screws and remove them: place the new electrodes being careful to observe the measures showed on pag.: reassemble following the reversed procedure.

Caution: adjust the nozzle position according to the air pipe, by means of the **VU** screw, once the **VL** screw is fastened.



Adjusting the electrodes position

Adjust the electrodes position, according to the quotes shown on the next picture



Keys

- E** electrodes
- TA** air pipe
- TG** ignition gas pipe
- U** nozzle

Fig. 33

Cleaning and replacing the detection photocell

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

- 1 Disconnect the system from the electrical power supply.
- 2 Shut off the fuel 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.



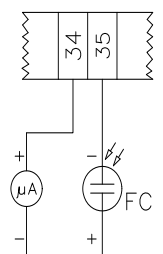
Checking the detection current

To check the detection current follow the diagram on Fig. 34. If the signal is lower 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 LFL1.3..	70µA (with UV detector)

Fig. 34 Detection with detector QRA...

TERMINAL BOARD MC



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

Burner disposal

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

TROUBLESHOOTING

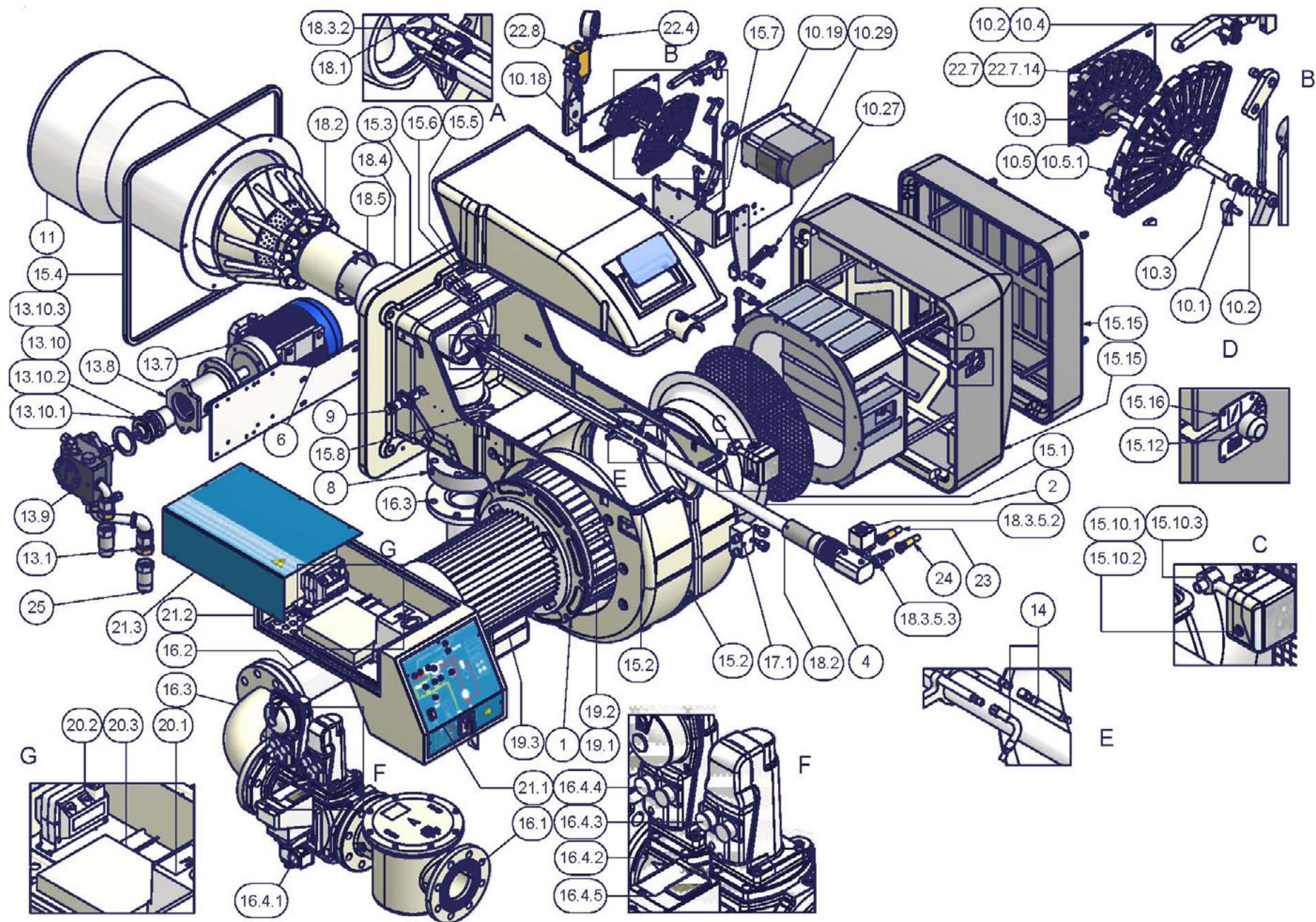
CAUSE / FAULT	BURNER DOESN'T START	CONTINUE PRE-PURGUE	BURNER DOESN'T START AND LOCKS	BURNER DOESN'T START AND REPEATS THE CYCLE	BURNER STARTS AND REPEATS THE CYCLE	BURNER DOESN'T SWITCH TO HIGH FLAME	BURNER'S LOCKOUT DURING OPERATION	BURNER STOPS AND REPEATS CYCLEDURING OPERATION	BURNER'S LOCKOUT AFTER START	THE FLAME CONTROL DEV. REPEATS THE CYCLE WITHOUT GIVE CONSENT
MAIN SWITCH OPEN	●									
ABSENCE OF GAS	●									
MINIMUM GAS PRESSURE SWITCH FAULT OR BAD SETTING	●			●	●			●		
BOILER THERMOSTATS OPEN	●									
OVERLOAD TRIPPED INTERVENTION	●									
FUSES INTERVENTION	●									
AIR PRESSURE SWITCH FAULT OR BAD SETTING	●		●				●			●
DEFECTIVE CONTROL BOX	●	●	●				●			
DEFECTIVE AIR DAMPER ACTUATOR		●								
DEFECTIVE IGNITION TRANSFORMER			●							
IGNITION ELECTRODE WRONG POSITION			●							
THROTTLE VALVE BAD SETTING			●							
DEFECTIVE GAS GOVERNOR				●	●			●		
DEFECTIVE HI-LO FLAME THERMOSTAT						●				
ACTUATOR CAM BAD SETTING						●				
DETECTION ELECTRODE BAD POSITION OR DEFECTIVE DETECTION CIRCUIT							●		●	
REVERSED PHASE AND NEUTRAL CONNECTION									●	

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ITEM	DESCRIPTION
1	FLANGE
2	AIR INLET CONE
4	RING NUT
6	PLATE
8	BUTTERFLY GAS VALVE
9	PHOTOCELL
10.1	BUSH
10.2	BUSH
10.3	ADJUSTING CAM SHAFT
10.4	LEVERAGE
10.5	ADJUSTING CAM
10.5.1	ADJUSTING CAM FOIL
10.18	
10.19	BRACKET
10.27	AIR ADJUSTING CAM REGULATING NUT
10.29	ACTUATOR
11	STANDARD BLAST TUBE
13.1	
13.7	MOTOR
13.8	BRACKET
13.9	PUMP
13.10	COUPLING
13.10.1	HALF-COUPLING
13.10.2	ELASTIC RING
13.10.3	HALF-COUPLING
14	IGNITION CABLE
15.1	NET
15.2	BURNER HOUSING
15.3	FLANGE
15.4	CERAMIC FIBRE PLAIT
15.5	PRESSURE PLUG
15.6	INLET
15.7	INSPECTION GLASS
15.8	BRACKET

ITEM	DESCRIPTION
15.10	AIR PRESSURE SWITCH
15.10.1	THREADED GAS PIPE
15.10.2	AIR PRESSURE SWITCH
15.10.3	PRESSURE SWITCH BRACKET
15.12	AIR DAMPER INDEX
15.15	
15.16	INDEX LABEL
16.1	GAS FILTER
16.3	GASKET
16.2	REVERSIBLE PIPE
16.3	
16.4.1	GAS PRESSURE
16.4.2	GAS VALVE HOUSING
16.4.3	"SKP" ACTUATOR
16.4.4	"SKP" ACTUATOR
16.4.5	GAS PROVING SYSTEM
17.1	OIL MANIFOLD
18.1	IGNITION ELECTRODE
18.2	ADJUSTING BUSH
18.4	PIN
18.3	STANDARD COMPLETE OIL GUN
18.3.2	NOZZLE
18.3.5.2	OIL SOLENOID VALVE
18.3.5.3	ONE-WAY VALVE
18.4	GAS MANIFOLD
18.5	STANDARD COMBUSTION HEAD
19.1	SPACER
19.2	FAN WHEEL
19.3	MOTOR
20.1	CONTROL BOX
20.2	IGNITION TRANSFORMER
20.3	PRINTED CIRCUIT BOARD
21.1	FRONT CONTROL PANEL
21.2	BOARD

[illegible]



SPARE PARTS

Description	Code		
	HR91A	HR92A	HR93A
CONTROL BOX	2020448	2020448	2020448
IGNITION ELECTRODE	2080292	2080292	2080292
OIL FILTER	2090018	2090018	2090018
GAS FILTER - Rp 2	2090119	2090119	2090119
GAS FILTER - DN65	2090117	2090117	2090117
GAS FILTER - DN80	2090112	2090112	2090112
GAS FILTER - DN100	2090113	2090113	2090113
GASKET	2110048	2110048	2110048
FAN WHEEL	2150009	2150028	2150010
AIR PRESSURE SWITCH	2160065	2160065	2160065
GAS PRESSURE SWITCH- GW500 A6	2160087	2160087	2160087
GAS PRESSURE SWITCH- GW150 A5	2160077	2160077	2160077
GAS PRESSURE SWITCH- GW500 A5	2160089	2160089	2160089
GAS PRESSURE SWITCH- GW50 A5	2160076	2160076	2160076
IGNITION TRANSFORMER	2170302	2170302	2170302
PUMP MOTOR	2180202	2180202	2180202
FAN MOTOR	2180276	2180277	2180206
GAS VALVE GROUP - Rp2 - Siemens VGD20..	2190171	2190171	2190171
GAS VALVE GROUP - DN65 - Siemens VGD40..	2190172	2190172	2190172
GAS VALVE GROUP - DN80 - Siemens VGD40..	2190169	2190169	2190169
GAS VALVE GROUP - DN100 - Siemens VGD40..	2190174	2190174	2190174
GAS VALVE ACTUATOR SKP15	2190181	2190181	2190181
GAS VALVE ACTUATOR SKP25	2190183	2190183	2190183
GAS VALVE GROUP - Rp2 - Dungs MBC1200SE	21903M5	21903M5	21903M5
GAS VALVE GROUP - DN65 - Dungs MBC1900SE	21903M6	21903M6	21903M6
GAS VALVE GROUP - DN80 - Dungs MBC3100SE	21903M7	21903M7	21903M7
GAS VALVE GROUP - DN100 - Dungs MBC5000SE	21903M8	21903M8	21903M8
GAS PROVING SYSTEM	2190403	2190403	2190403
GAS PROVING SYSTEM	2191604	2191604	2191604
FLEXIBLE HOSE L=1500	2340004	2340004	2340004
FLEXIBLE HOSE L=335	2340087	2340087	2340087
FLEXIBLE HOSE L=385	2340088	2340088	2340088
SMALL ADJUSTING CAM FOIL	2440013	2440013	2440013
BIG ADJUSTING CAM FOIL	2440014	2440014	2440014
ACTUATOR SIEMENS SQL33.03	2480040	2480040	2480040
ACTUATOR BERGER STM30/24	2480090	2480090	2480090
ACTUATOR SIEMENS SQM40	24800A5	24800A5	24800A5
UV PROBE	2510001	2510001	2510001
MOTOR-PUMP COUPLING	2540019	2540019	2540019
LIGHT OIL GOVERNOR	2570054	2570054	2570077
BURNER MODULATOR (only for fully-modulating burners)	2570112	2570112	2570112
PUMP SUNTEC	2590119	2590119	2590120
PUMP DANFOSS	2590311	2590311	2590312
NOZZLE	2610202	2610202	2610203
OIL GUN	2700231	2700231	2700236
COMBUSTION HEAD	30600R3	30600R3	30600R3
BLAST TUBE	30900M3	30900M4	30910M6
IGNITION CABLE	6050108	6050108	6050108
PRINTED CIRCUIT BOARD	6100533	6100533	6100533

NOTE: it is recommended to mention the burner ID number on the spare parts request form.

Description	Code			
	HR512A	HR515A	HR520A	HR525A
CONTROL BOX	2020448	2020448	2020448	2020448
IGNITION ELECTRODE	2080292	2080292	2080292	2080292
OIL FILTER	2090018	2090018	2090018	2090018
GAS FILTER - Rp 2	2090119	2090119	2090119	2090119
GAS FILTER - DN65	2090117	2090117	2090117	2090117
GAS FILTER - DN80	2090112	2090112	2090112	2090112
GAS FILTER - DN100	2090113	2090113	2090113	2090113
FAN WHEEL	2150010	2150030	2150029	2150029
AIR PRESSURE SWITCH	2160065	2160065	2160065	2160065
GAS PRESSURE SWITCH- DUNGS GW50 A5	2160076	2160076	2160076	2160076
GAS PRESSURE SWITCH- DUNGS GW150 A5	2160077	2160077	2160077	2160077
GAS PRESSURE SWITCH- DUNGS GW500 A6	2160087	2160087	2160087	2160087
GAS PRESSURE SWITCH- DUNGS GW500 A5	2160089	2160089	2160089	2160089
IGNITION TRANSFORMER	2170302	2170302	2170302	2170302
PUMP MOTOR	2180202	2180223	2180223	2180219
FAN MOTOR	2180298	2180209	2180278	2180289
GAS VALVE GROUP - Rp2 - Siemens VGD20..	2190171	2190171	2190171	2190171
GAS VALVE GROUP - DN65 - Siemens VGD40..	2190172	2190172	2190172	2190172
GAS VALVE GROUP - DN80 - Siemens VGD40..	2190169	2190169	2190169	2190169
GAS VALVE GROUP - DN100 - Siemens VGD40..	2190174	2190174	2190174	2190174
GAS VALVE ACTUATOR SKP15	2190181	2190181	2190181	2190181
GAS VALVE ACTUATOR SKP25	2190183	2190183	2190183	2190183
GAS VALVE GROUP - Rp2 - Dungs MBC1200SE	21903M5	21903M5	21903M5	21903M5
GAS VALVE GROUP - DN65 - Dungs MBC1900SE	21903M6	21903M6	21903M6	21903M6
GAS VALVE GROUP - DN80 - Dungs MBC3100SE	21903M7	21903M7	21903M7	21903M7
GAS VALVE GROUP - DN100 - Dungs MBC5000SE	21903M8	21903M8	21903M8	21903M8
OIL SOLENOID VALVE	2190403	2190403	2190437	2190437
GAS PROVING SYSTEM	2191604	2191604	2191604	2191604
FLEXIBLE HOSE L=1500	2340004	2340004	2340004	2340004
FLEXIBLE HOSE L=335	2340087	2340087	2340087	2340087
FLEXIBLE HOSE L=385	2340088	2340088	2340088	2340088
SMALL ADJUSTING CAM FOIL	2440013	2440013	2440013	2440013
BIG ADJUSTING CAM FOIL	2440014	2440014	2440014	2440014
ACTUATOR SIEMENS SQL33.03	2480040	2480040	2480040	2480040
ACTUATOR BERGER STM30/24	2480090	2480090	2480090	2480090
ACTUATOR SIEMENS SQM40	24800A5	24800A5	24800A5	24800A5
UV PROBE	2510001	2510001	2510001	2510001
MOTOR-PUMP COUPLING	2540019	2540126	2540126	2540133
LIGHT OIL GOVERNOR	2570077	25700B2	25700B2	25700A7
SUNTEC TV LIGHT OIL GOVERNOR	-	-	-	2570036
BURNER MODULATOR (only for fully-modulating burners)	2570112	2570112	2570112	2570112
PUMP PUMP SUNTEC	2590120	2590121	2590121	2590124
PUMP PUMP DANFOSS	2590312	2590313	2590313	-
NOZZLE	2610203	2610203	2610203	2610203
OIL GUN	2700232	2700232	2700232	2700232
COMBUSTION HEAD	30600R4	30600R5	30600R6	30600R6
BLAST TUBE	30910R1	30910R2	30910R3	30910R4
IGNITION CABLE	6050108	6050108	6050108	6050108
PRINTED CIRCUIT BOARD	6100533	6100533	6100533	-

NOTE: it is recommended to mention the burner ID number on the spare parts request form.

WIRING DIAGRAMS

ATTENTION:

- 1 - Electrical supply 400V 50Hz 3N a.c.
- 2 - Don't reverse phase with neutral
- 3 - Ensure to the burner a proper hearthing

Please, see the attached wiring diagram.

Burners not fitted with printed circuit

WIRING DIAGRAM SE05-680 - **Progressive burners**

WIRING DIAGRAM SE05-681 - **Fully modulating burners**

WIRING DIAGRAM - HR525A MG.PR.. - SE11-336

WIRING DIAGRAM HR525A MG.MD.. SE11-339

Burners fitted with printed circuit

WIRING DIAGRAM SE05-680

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.

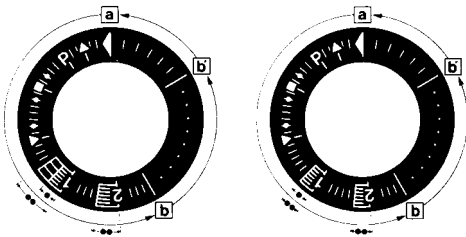
A symbol on the indicator disc shows each time the type of stoppage:

- ◀ 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** Block due to absence of flame signal at the end of the 2nd safety period (flame signal of main burner).
- Block due 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')-a Post-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 switch Z 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; otherwise the 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 activated through 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 separated so 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 8 at the input of the active part of the apparatus are galvanically separated so as to protect the apparatus itself from recovery voltage through the strength regulator circuit.

When the strength 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 strength 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 monitor8	
t1 pre-ventilation time with damper open36	
t12 travel time for air damper to MIN positionany	
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

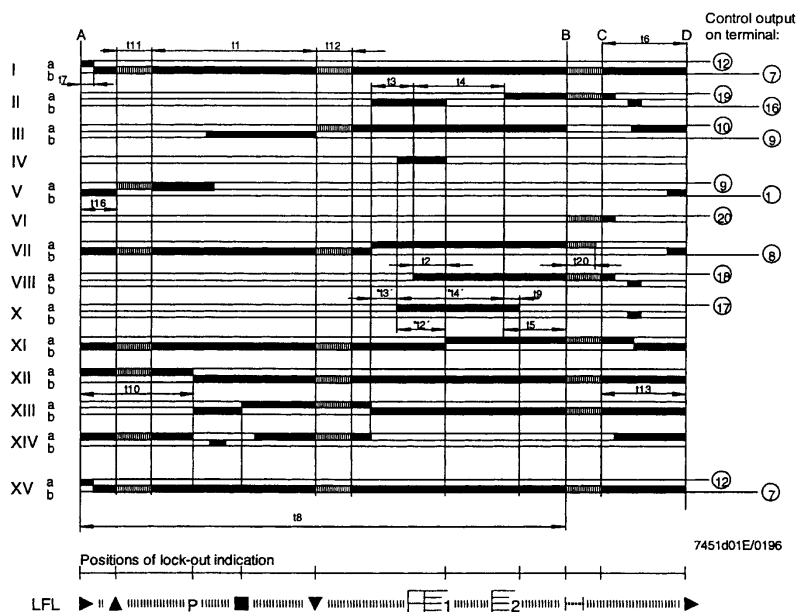
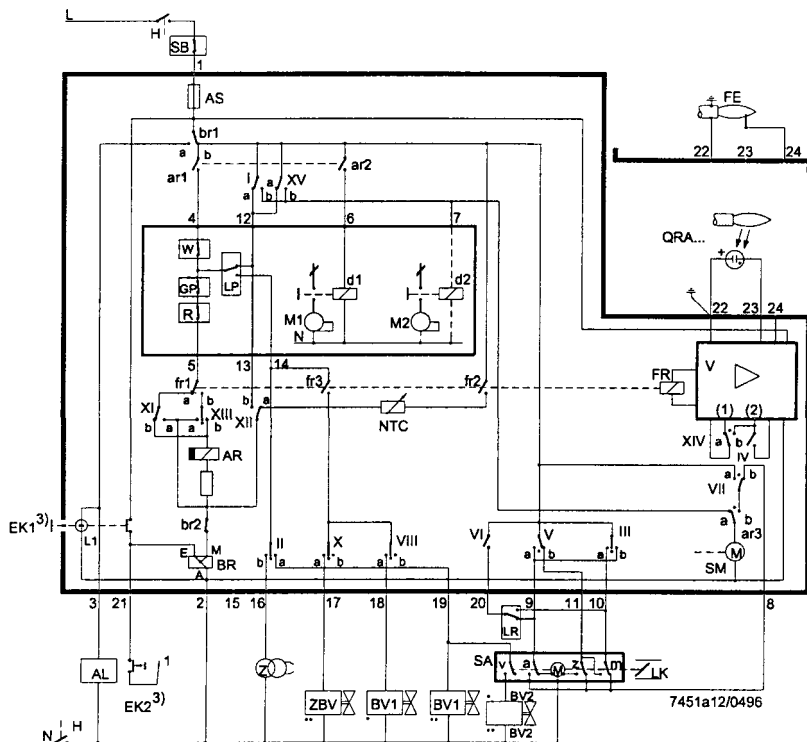
- (1) input for raising QRA detector voltage to test level
- (2) input for excitation of flame relay during flame detector test circuit (contact XIV) and during safety time (contact IV)
- (3) Do not press EK for more than 10 seconds

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 O1 safety device for monitoring burners with intermittent pilot lighter.





C.I.B. UNIGAS S.p.A.
Via L.Galvani, 9 - 35011 Campodarsego (PD) - ITALY
Tel. +39 049 9200944 - Fax +39 049 9200945/9201269
web site: www.cibunigas.it - e-mail: cibunigas@cibunigas.it

Note: specifications and data subject to change. Errors and omissions exceptd.