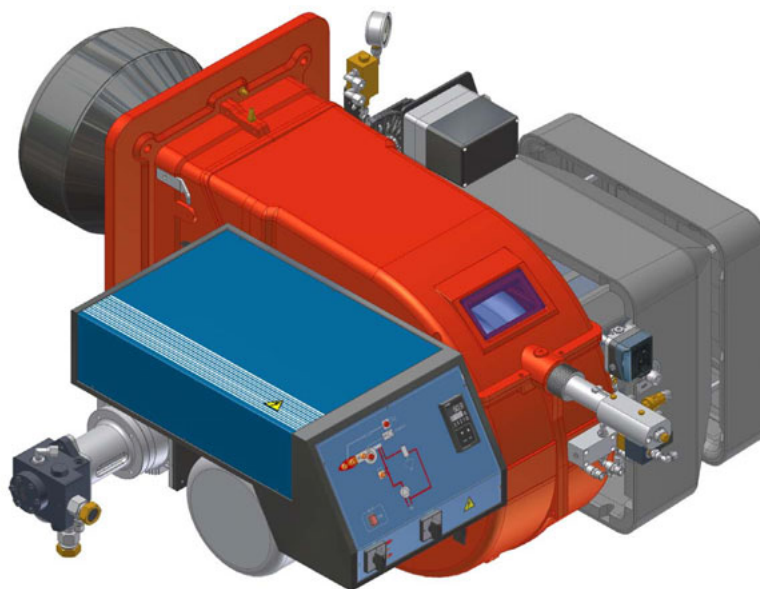


RG91 - RG92 - RG93

RG510 - RG515

RG520 - RG525



Progressive - Fully modulating 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 electricians 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:

- 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.

National standards :

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

Gas - Heavy oil burners

European directives:

- Directive 2009/142/EC - Gas Appliances;
- Directive 2006/95/EC on low voltage;
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- 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

GENERAL FEATURES

The burners of this series represent monoblock burners made in die-cast aluminium housing with relative flange to work on heating generators. The maximum output range is from 2100kW to 8000kW (according to the model). They can be provided in progressive or fully-modulating version.

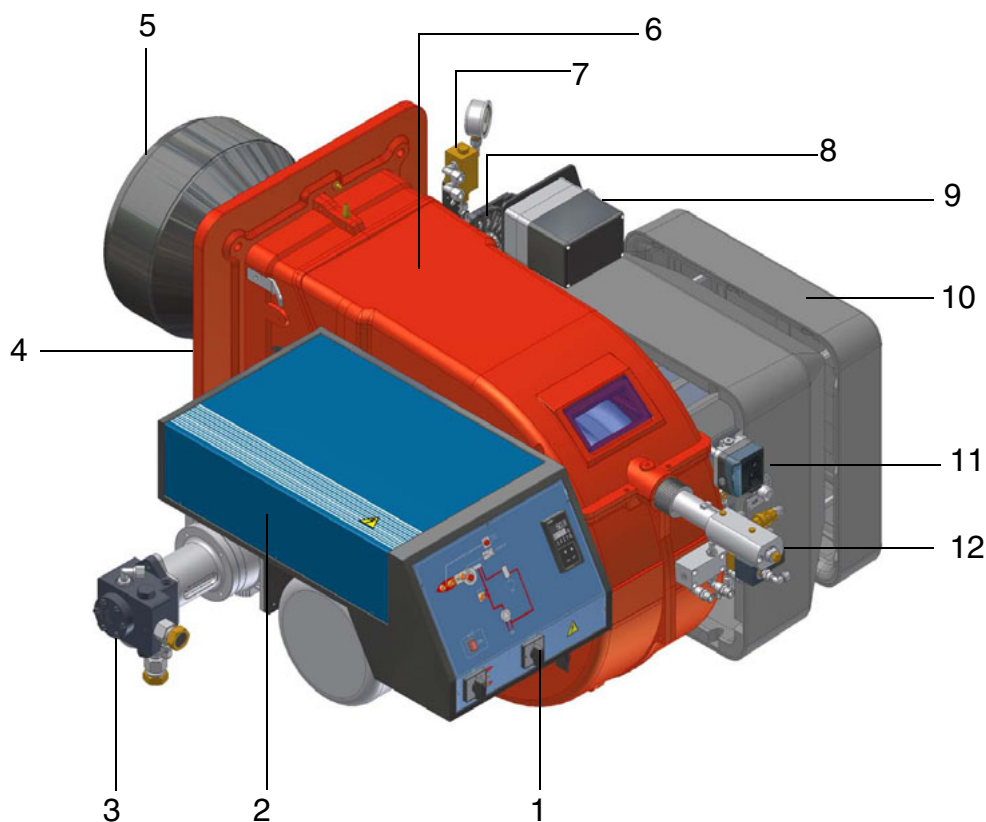


Fig. 1

- 1 Control panel
- 2 Electrical panel
- 3 Pump
- 4 Burner flange
- 5 Blast tube-combustion head
- 6 Burner cover
- 7 Oil pressure governor
- 8 Adjusting cam
- 9 Actuator
- 10 Air inlet
- 11 Air pressure switch
- 12 Gun and head adjusting ring nut

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).

In the double-stage burners, the electric actuator, that moves the air damper, allows the optimisation of the gas flue values, as to get an efficient combustion. The position of the combustion head determines the burner output. The air (comburent) and fuel (light oil) are forced into the combustion chamber, as to let the flame light up.

How to interpret the burner's "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.

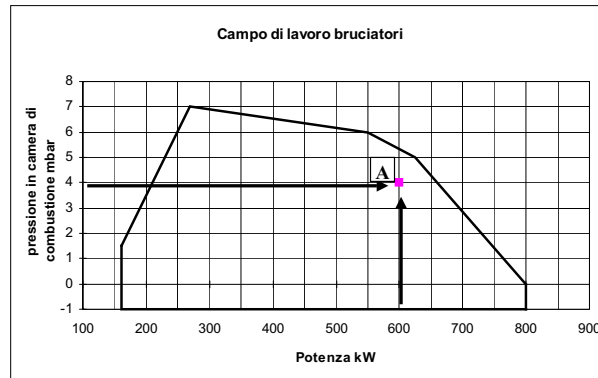


Fig. 2

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

Burner model identification

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

Type RG520	Model	G-	PR.	S.	**.	A.
(1)	(2)	(3)	(4)	(5)	(6)	(6)
(1) BURNER TYPE	RG91 - RG92 - RG93 - RG510 - RG515 - RG520 - RG525					
(2) FUEL	G - Light oil					
(3) OPERATION (Available versions)	PR - Progressive			MD - Fully modulating		
(4) BLAST TUBE	S - standard			L - extended		
(5) DESTINATION COUNTRY	* - see data plate*					
(6) BURNER VERSION	A - Standard					

Technical specifications

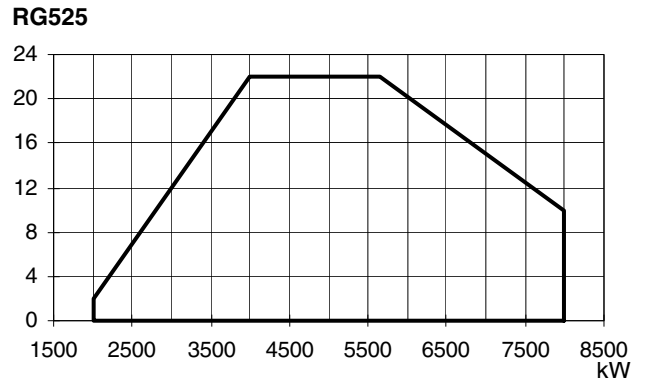
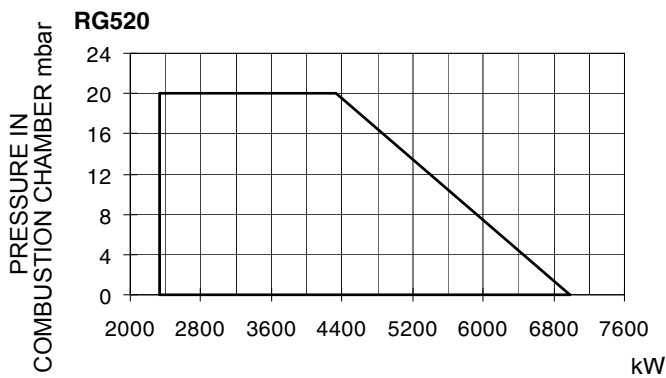
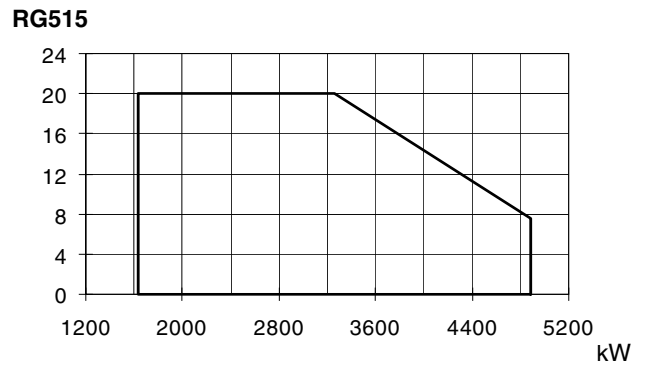
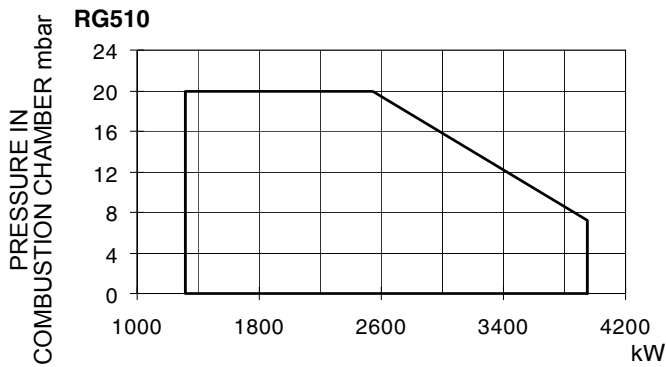
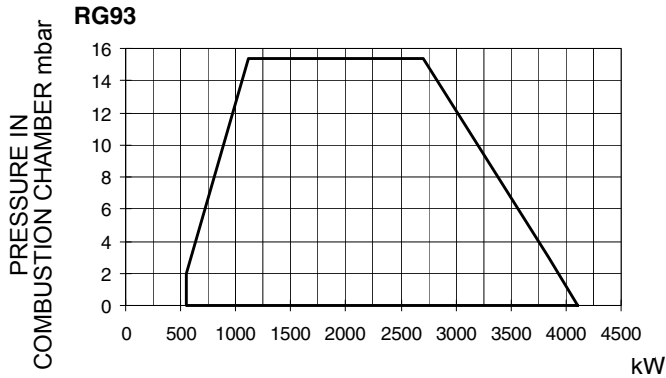
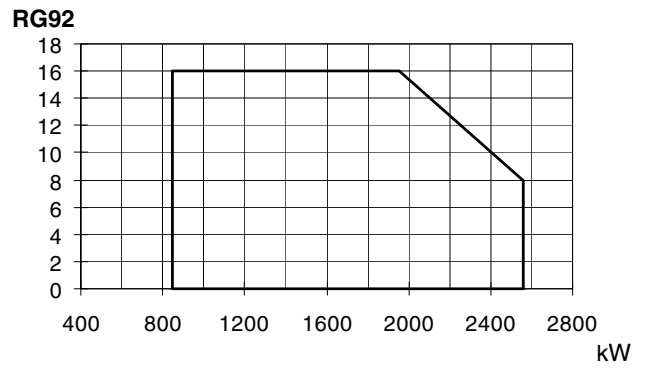
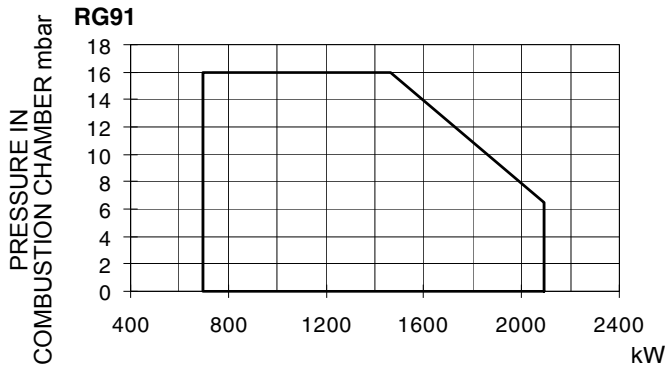
BURNERS		RG91	RG92	RG93
Output	min. -max. kW	698 - 2093	849 - 2558	550 - 4100
Light oil rate	min. -max. kg/h	59 - 176	72 - 215	46 - 345
Fuel		Light oil		
Viscosity	cSt @ 40 °C	2 - 7.4		
Density	kg/m ³	840		
Oil train pressure inlet	bar max	4		
Power supply		400V 3N ~ 50Hz		
Fan motor	kW	4	5.5	7.5
Pump motor	kW	1.1	1.1	1.1
Total power consumption	kW	5.6	7.0	9.0
Index of protection		IP40		
Approx. weight	kg	220	220	230
Operation		Progressive - Fully modulating		
Operating temperature	°C	-10 ÷ +50		
Storage temperature	°C	-20 ÷ +60		
Working service *		Intermittent		

BURNERS		RG510	RG515	RG520	RG525
Output	min. -max. kW	1314 - 3953	1628 - 4884	2326 - 6977	2000 - 8000
Fuel		Light oil			
Light oil rate	min. -max. kg/h	111 - 333	137 - 411	196 - 588	169 - 674
Viscosity	cSt @ 40 °C	2 - 7.4			
Density	kg/m ³	840			
Oil train pressure inlet	bar max	4			
Power supply		400V 3N ~ 50Hz			
Electric motor	kW	7.5	11	15	18.5
Pump motor	kW	1.1	1.5	1.5	3
Total power consumption	kW	9.1	13	17	22
Operation		Progressive - Fully modulating			
Index of protection		IP40			
Operating temperature	°C	-10 ÷ +50			
Storage temperature	°C	-20 ÷ +60			
Working service *		Intermittent			

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

NOTE: Choosing the nozzle for light oil, consider Hi equal to 42.8MJ/kg.

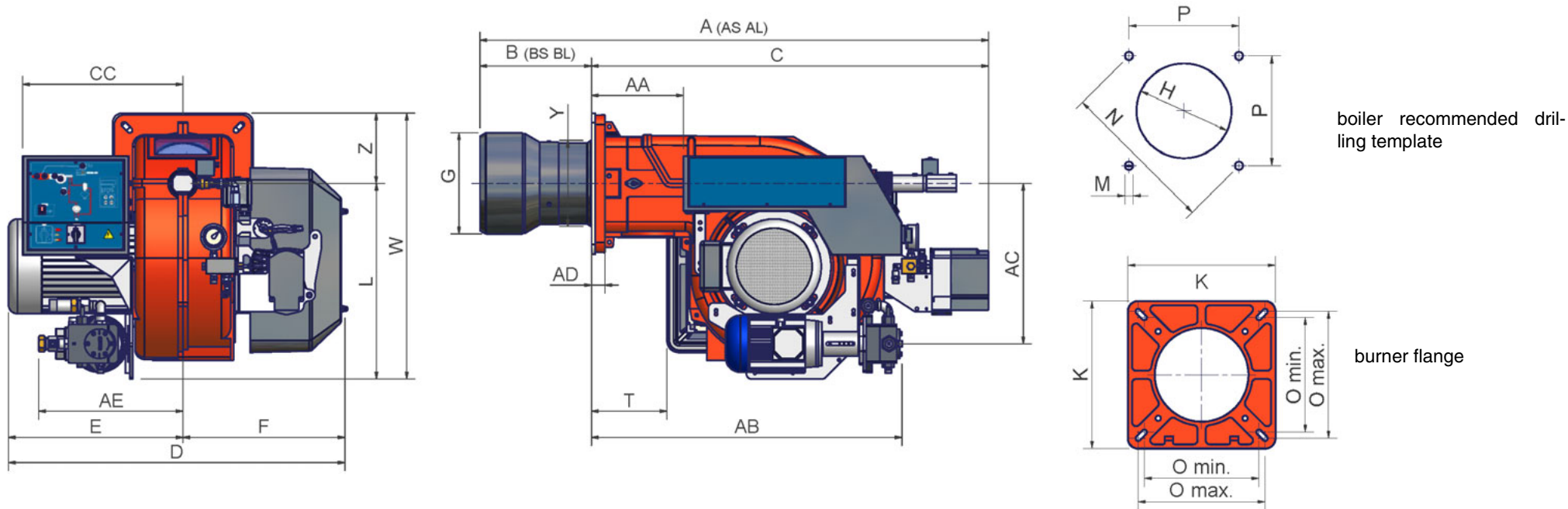
Performance curves



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.

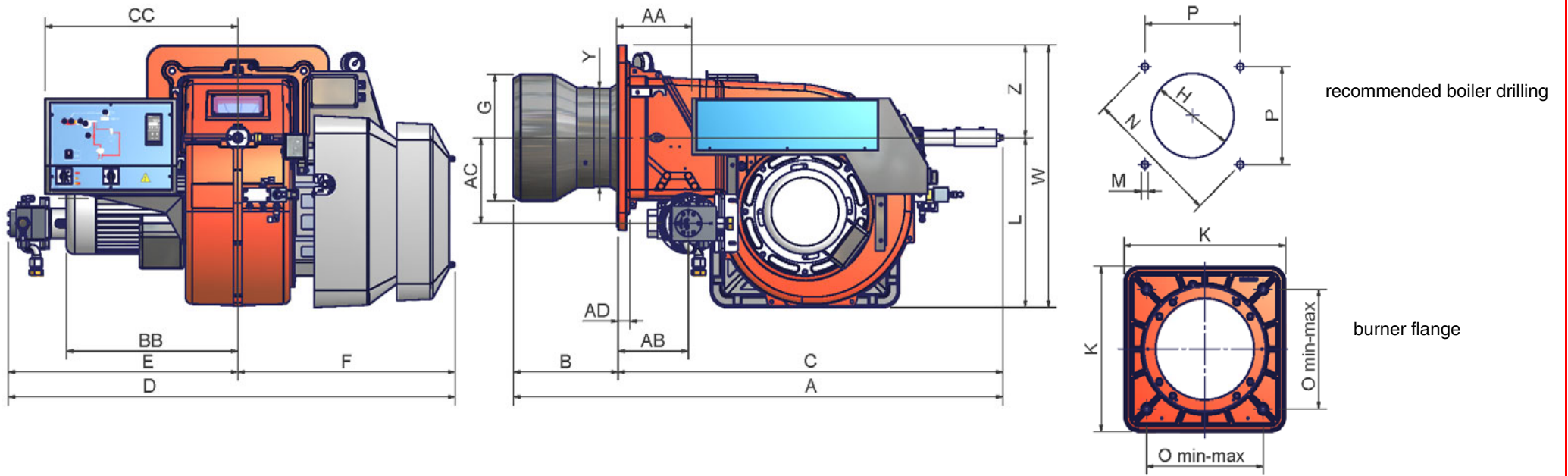
Overall dimensions (mm)



	A (AS)	A (AL)	AA	AB	AC	AD	AE	B (BS)	B (BL)	BB	C	CC	E	F	G	H	K	L	M	N	Omin	Omax	P	W	Y	Z
RG91	1345	1518	242	820	421	35	380	300	473	419	1045	422	419	434	238	268	360	513	M12	417	280	310	295	698	228	185
RG92	1339	1512	242	820	421	35	380	294	467	419	1045	422	419	434	266	296	360	513	M12	417	280	310	295	698	228	185
RG93	1339	1512	242	820	421	35	380	294	467	460	1045	422	460	434	266	296	360	513	M12	417	280	310	295	698	228	185

*AS/BS: measure referred to burner with standard blast tube provided

*AL/BL: measure referred to burner with extended blast tube provided



	A (AS)	A (AL)	AA	AB	AC	AD	B (BS)	B (BL)	BB	C	CC	D	E	F	G	H	K	L	M	N	O	P	UU	W	Y	Z
RG510	1451	1671	219	217	246	35	310	530	468	1141	571	1313	671	642	329	369	540	496	M14	552	390	390	x	766	328	270
RG515	1451	1671	219	217	246	35	310	530	508	1141	571	1323	681	642	350	390	540	496	M14	552	390	390	x	766	328	270
RG520	1451	1671	219	207	250	35	310	530	508	1141	571	1323	681	642	370	410	540	496	M14	552	390	390	114	880	328	270
RG525	1511	1691	219	197	275	35	350	530	650	1161	571	1341	698	642	434	484	540	496	M14	552	390	390	172	938	434	270

*AS/BS: measure referred to burner with standard blast tube provided

*AL/BL: measure referred to burner with extended blast tube provided

MOUNTINGS AND CONNECTIONS

Packing

The burners are dispatched in wooden packages whose dimensions are:

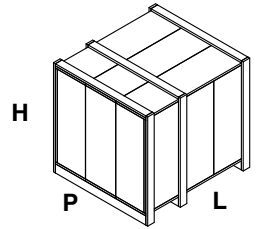
series 9x: 1720 mm x 1270 mm x 1020 mm (L x P x H)

series 5xx: 1800 mm x 1500 mm x 1300 mm (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.

- burner;
- light oil flexible hoses;
- light oil filter;
- gasket to be inserted between the burner and the boiler;
- envelope containing this manual.

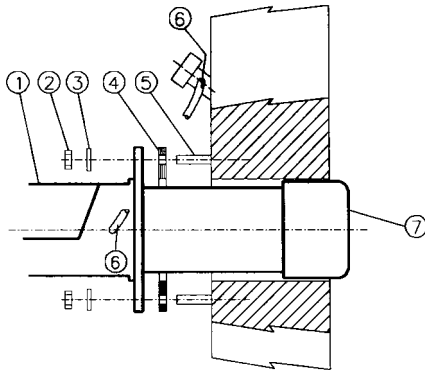
To get rid of the burner's packing, follow the procedures laid down by current laws on disposal of materials.



Fitting the burner to the boiler

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

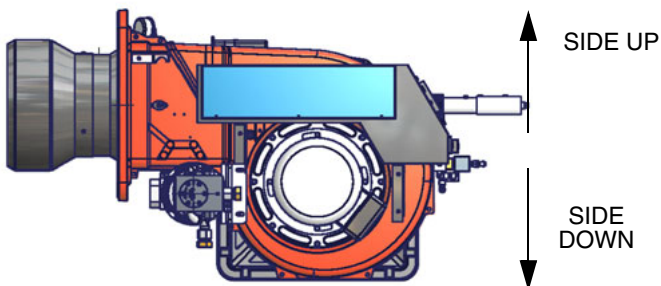
- 1 make a hole on the closing door of the combustion chamber as described on paragraph "Overall dimensions"
- 2 place the burner to the boiler: lift it up and handle it according to the procedure described on paragraph "Handling the burner";
- 3 place the 4 stud bolts (5), according to the burner's drilling plate described on paragraph "Overall dimensions";
- 4 fasten the 4 stud bolts;
- 5 place the ceramic fibre plait on the burner flange;
- 6 install the burner into the boiler;
- 7 fix the burner to the stud bolts, by means of the fixing nuts, according to the next picture.
- 8 After fitting the burner to the boiler, ensure that the gap between the blast tube and the refractory lining is sealed with appropriate insulating material (ceramic fibre cord or refractory cement).




Keys

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

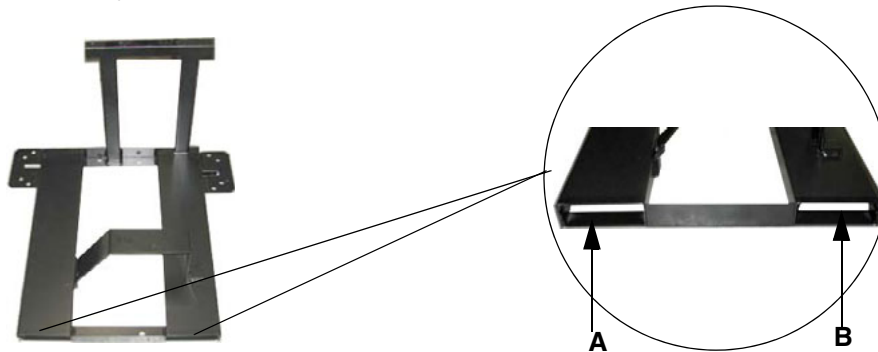
The burner is designed to work positioned according to the picture below. For different installations, please contact the Technical Department.



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.



Hydraulic diagrams for light oil supplying circuits

Fig. 3 - Gravity circuit

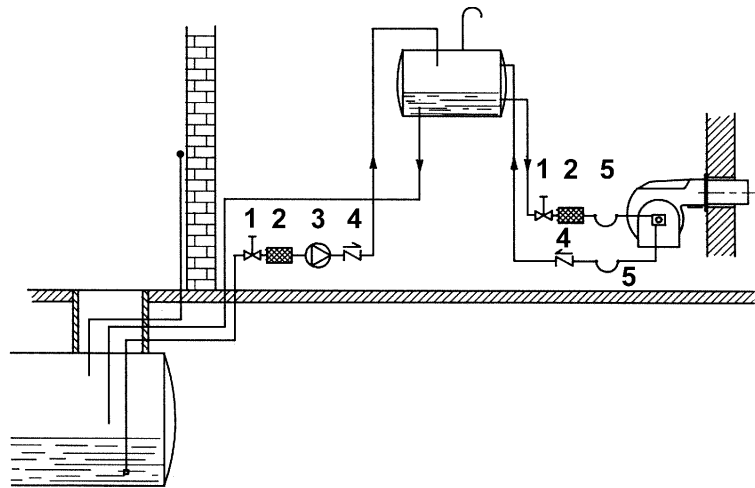


Fig. 4 - Ring circuit

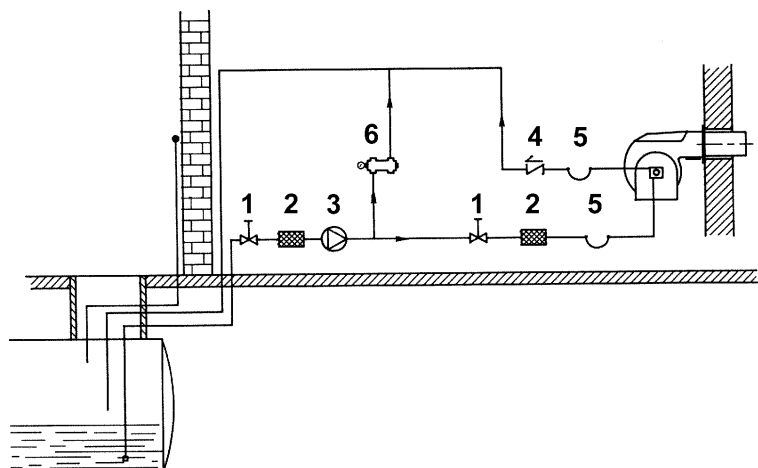
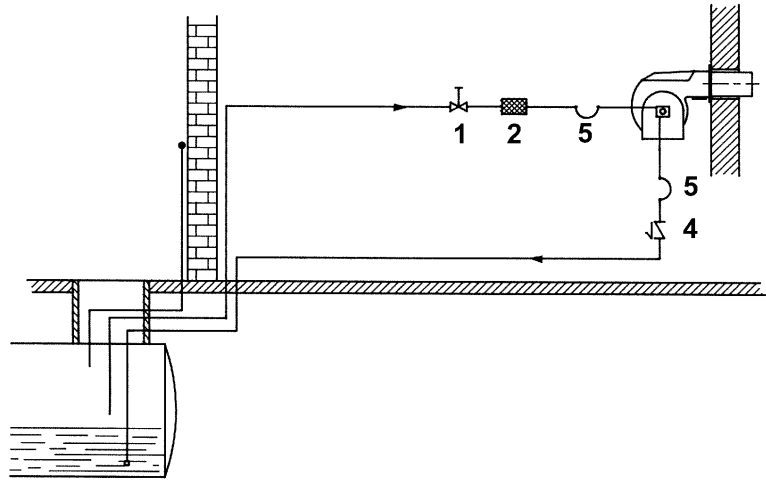


Fig. 5 - Suction circuit

Key

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



NOTE: in plants where gravity or ring feed systems are provided, install an automatic interception device (see n. 4 - Fig. 6).

Installation diagram of light oil pipes

⚠ PLEASE READ CAREFULLY THE “WARNINGS” CHAPTER AT THE BEGINNING OF THIS MANUAL.

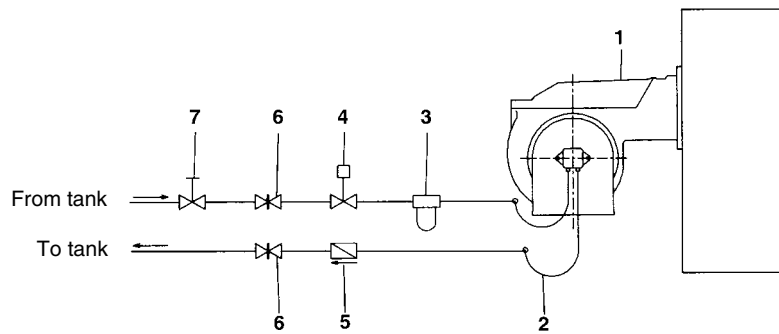


Fig. 6 - Double-pipe system

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.

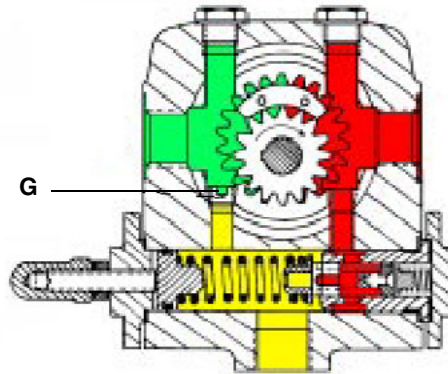
Double-pipe system: as for the single pipe system, a pipe that connects the tank to the pump's inlet is used besides another pipe that connects the pump's return port to the tank, as well. The excess of oil goes back to the tank: this installation can be considered self-bleeding. If provided, the inside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

Burners come out from the factory provided for double-stage systems. They can be suited for single-pipe system (recommended in the case of gravity feed) as described before.

- **Suntec TA Pumps**

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).

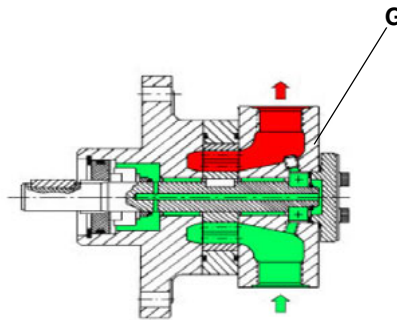
Caution: Changing the direction of rotation, all connections on top and side are reversed.



- **Suntec T Pump**

The bypass plug inserted between the pressure-side and shaft seal is only intended to change the pump rotation, check the presence of this plug by means of a 4 mm Allen key in the pressure outlet of the pump.

Caution: changing the direction of pump rotation involves changing of all pump connections.



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 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.

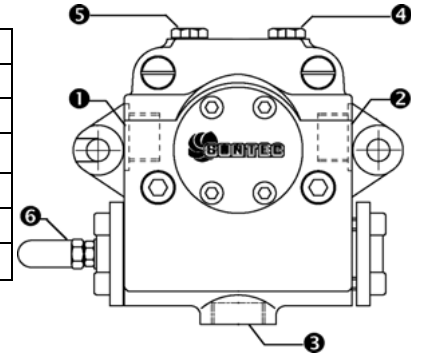
Light oil pumps

The pumps provided with these burners are Suntec TA (except mod. RG525).

RG525: Suntec T pump and Suntec TV pressure governor are provided.

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.

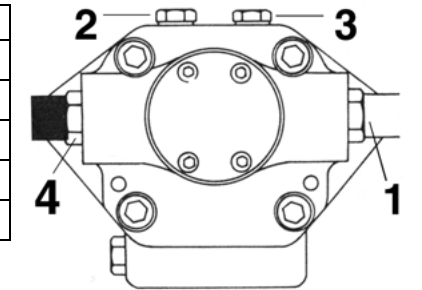
- 1 Inlet G1/2
- 2 To the nozzle G1/2
- 3 Return G1/2
- 4 Pressure gauge port G1/4
- 5 Vacuum gauge port G1/4
- 6 Pressure governor



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.

Suntec TV Pressure governor

Pressure adjustment

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

To decrease the pressure, twist screw counterclockwise. 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

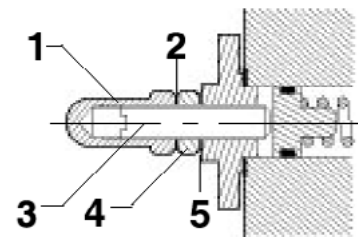
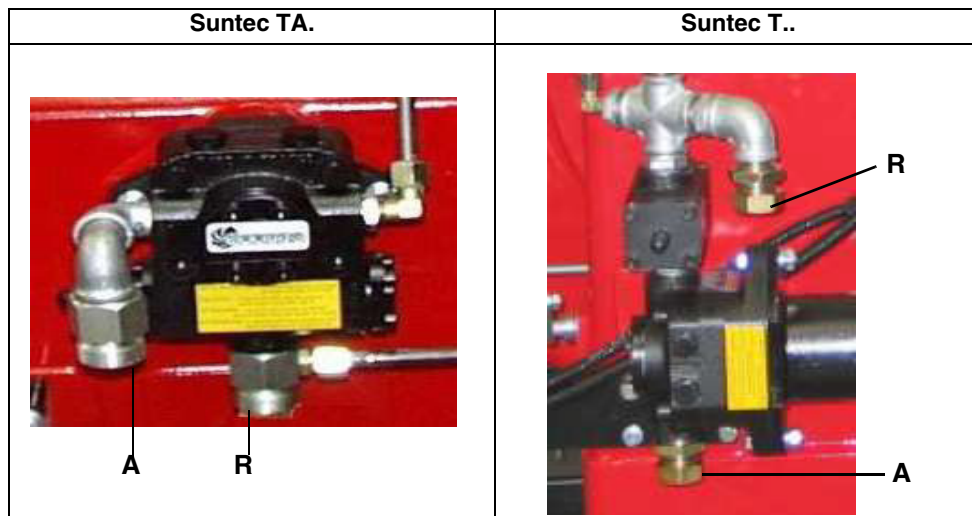


Fig. 7

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 of the pump;
- 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).



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 feded 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 prevoius paragraph).

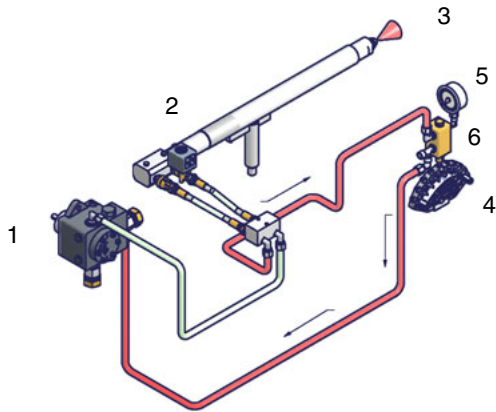


Fig. 8 - Stand-by

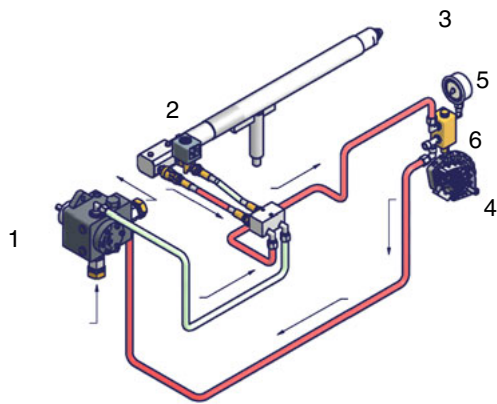


Fig. 9 - Pre-purge

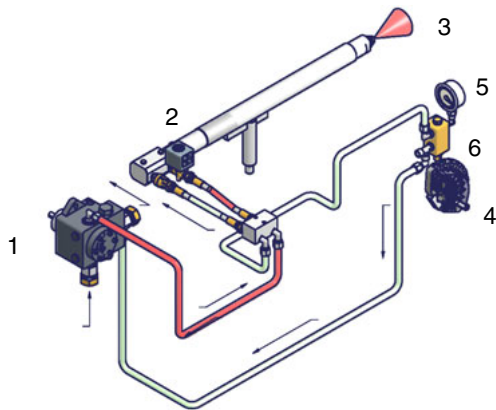


Fig. 10 - Low flame

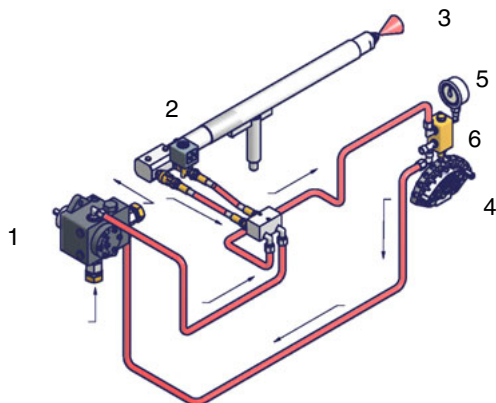


Fig. 11 - High flame

Key

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

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).

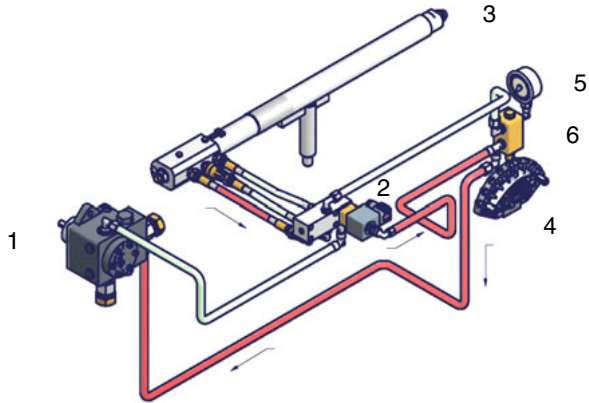


Fig. 12 - Stand-by

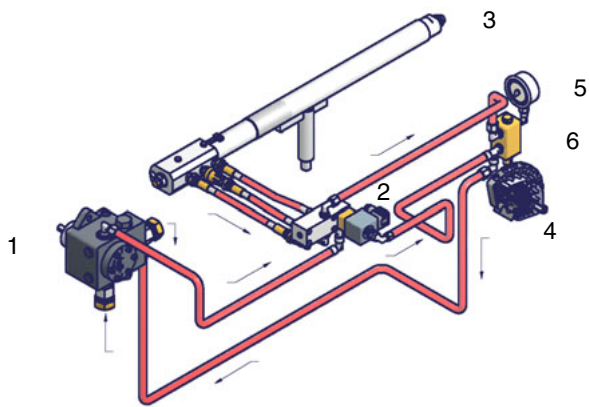


Fig. 13 - Pre-purge

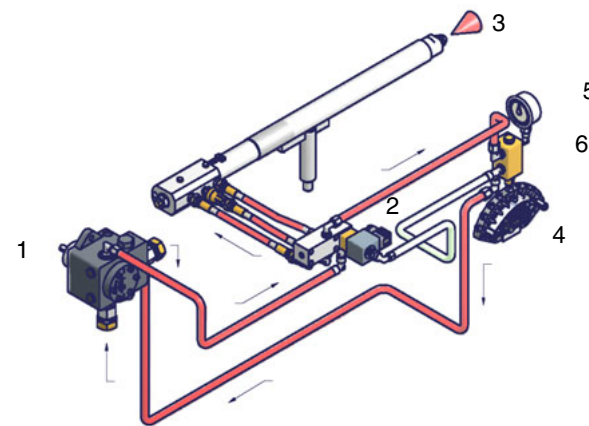


Fig. 14 - Low flame

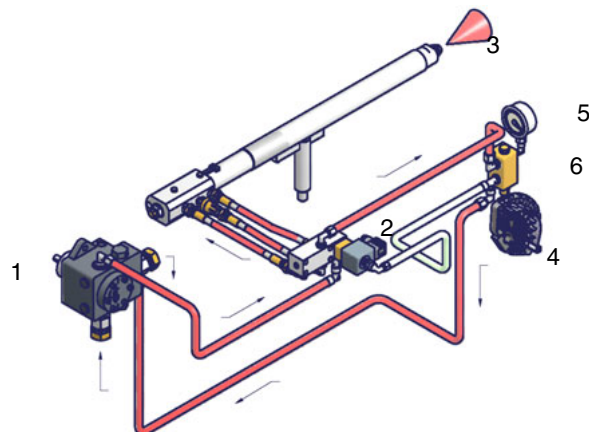


Fig. 15 - High flame

Key

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

Electrical connections diagram



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. STRICTLY OBSERVE THE DATA PLATE.

- 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 the fan motor and the pump motor - see note at the end of page and refit the cover of the electrical board.



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.

Progressive burners

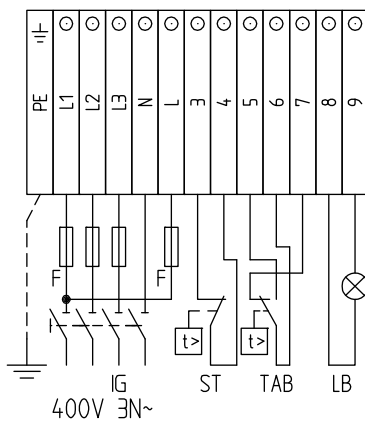


Fig. 16

Fully-modulating burners

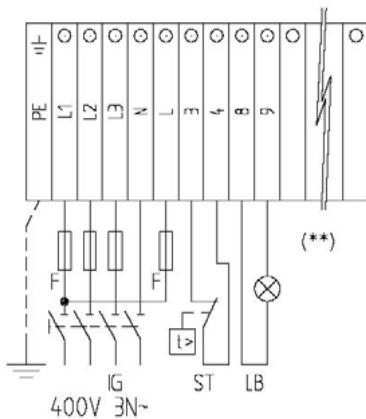


Fig. 18

Probes connection

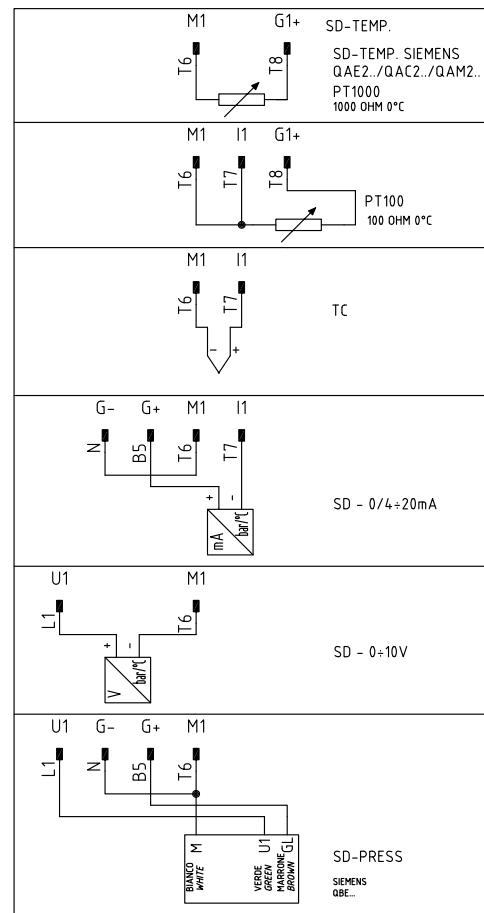


Fig. 17

Probes connection by means of the 7-pins plug (Fig. 19) - see **Fan motor and pump motor rotation**

Fig. 17 and the ELECTRIC WIRING DIAGRAMS for connections.

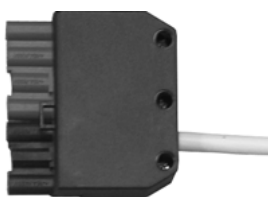


Fig. 19

Once the electrical connection of the burner is executed, remember to check the rotation of the motor. The motor should rotate according to the direction shown by the "Arrow" attached to the body. In the event of wrong rotation, reverse the three-phase supply and check again the rotation of the motor.

NOTE (except for motors with "star-delta" start up): Burners are provided for three-phase 400 V supply, and in the case of three-phase 230 V supply it is necessary to modify the electrical connections inside the terminal box of the electric motor and replace the thermal cutout relay.

ADJUSTING AIR AND LIGHT OIL FLOW RATE

Light oil nozzles

The light oil flow rate can be adjusted choosing a 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. 20 (as far as reading the pressure values, see next paragraphs).

NOZZLE	NOZZLE SUPPLY PRESSURE (bar)	HIGH FLAME RETURN PRESSURE (bar)	LOW FLAME RETURN PRESSURE (bar)
BERGONZO A3	20	11 - 13	5 (recommended)
FLUIDICS WR2/UNIGAS M3	25	19 - 20	7 (recommended)

Example: as far as over 100kg/h nozzle the 80% of the nozzle rated flow rate is achieved with 18bar return pressure (see Fig. 20).

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

Tab. 1

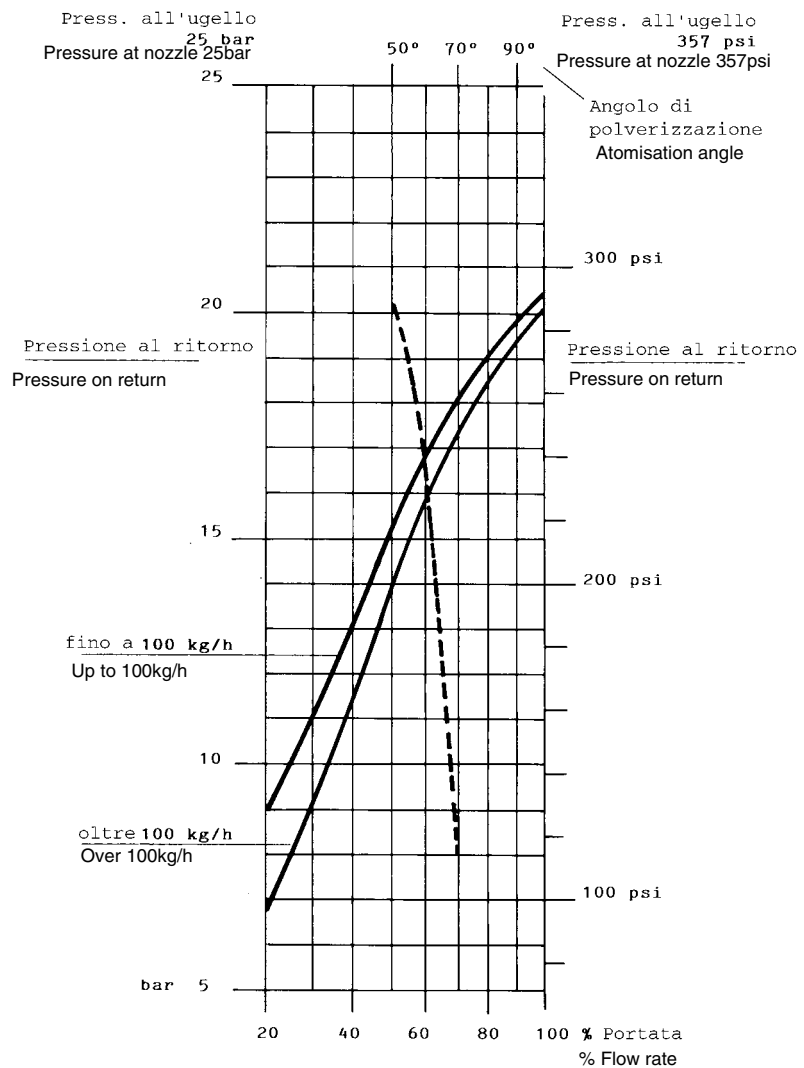


Fig. 20

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

Charles Bergonzo S.A. Moutier (suisse)

Gicleur à débits variables 9/16" | Pression initiale ... 20 atm

TYPE A3 60°

Rücklaufdüsen 9/16"

vorlaufdruck konstant ... 20 atü

Référence

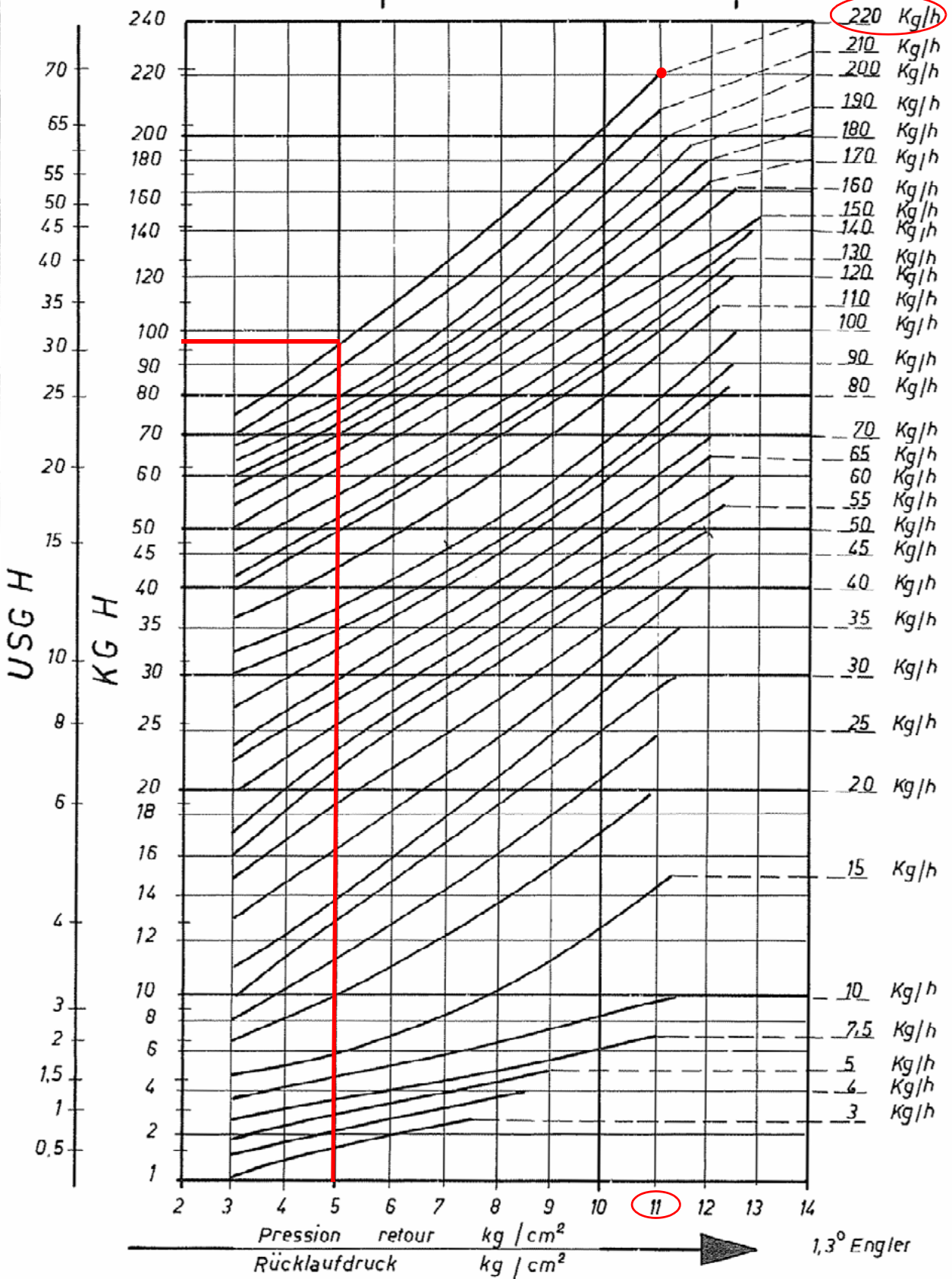




Fig. 21

	ATTENTION: before starting the burner up, be sure that the manual cutoff valves are open. Be sure that the mains switch is closed.
	Before starting up the burner, make sure that the return pipe to the tank is not obstructed. Any obstruction would cause the pump seal to break.
	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.

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

Recommended combustion parameters		
<i>Fuel</i>	<i>Recommended (%) CO₂</i>	<i>Recommended (%) O₂</i>
Light oil	11.5 ÷ 13	2.9 ÷ 4.9

Adjustments - brief description

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

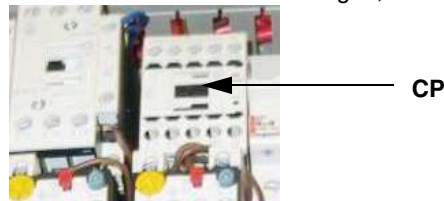
- Check that the combustion parameters are in the suggested limits.
- Check the nozzle flow rate.
- Then, adjust the combustion values corresponding to the points between maximum and minimum: set the shape of the adjusting cam foil. The adjusting cam sets the air/fuel ratio in those points, regulating the opening-closing of the fuel governor.
- 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, according to the actuator model provided (mod. Siemens SQM40.., Berger STM30.. or mod. Siemens SQL..).

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

- 1 Check the fan motor rotation (see page 19).
- 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.

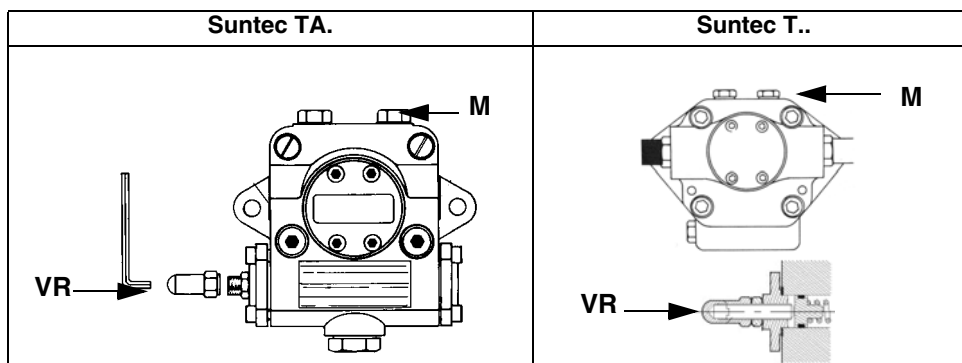
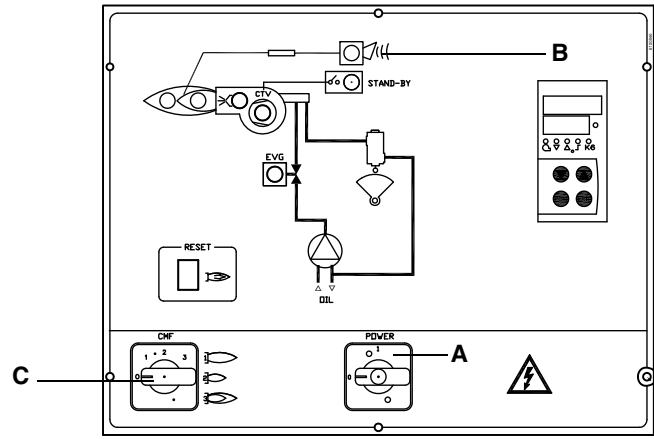
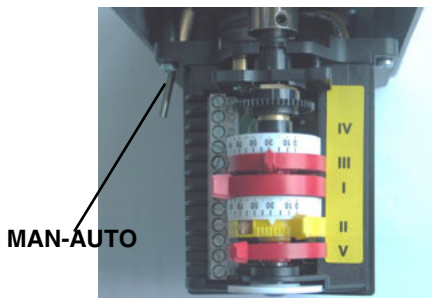


Fig. 22

- 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 Turn the burner on by means of its main switch **A**: if the burner locks (LED **B** on in the control panel) press the RESET button (**C**) on the control panel (see next picture) - see chapter “OPERATION” on page 30.



- 6 ;start the burner up by means of the thermostat series and wait until the pre-purge time comes to an end;
- 7 drive the burner to high flame stage, by means fo the thermostat **TAB** (as far as fully-modulating burners, see the 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).



Berger STM30



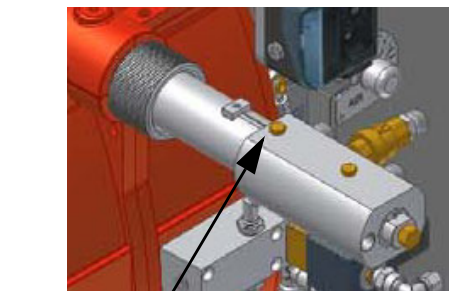
MAN-AUTO

Siemens SQM40

Actuator cams

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

- 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. 23 and act on on the pump adjusting screw **VR** (see Fig. 22) as to get the nozzle pressure at 25bar (Fluidics nozzles - see diagram on page 20).



Pressure gauge port

Fig. 23

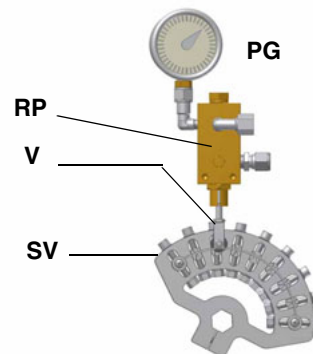
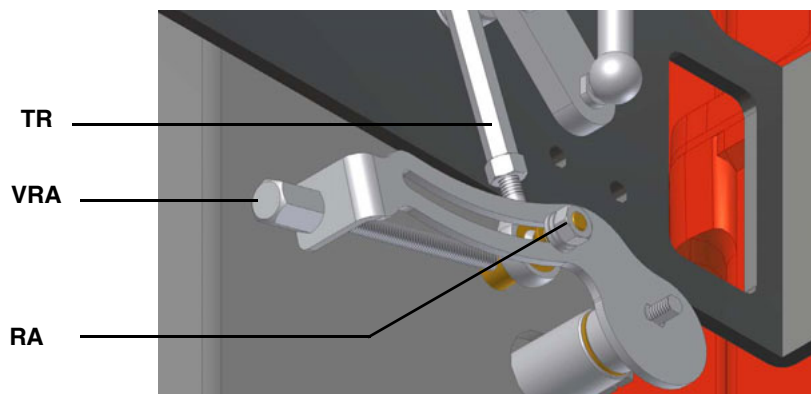


Fig. 24

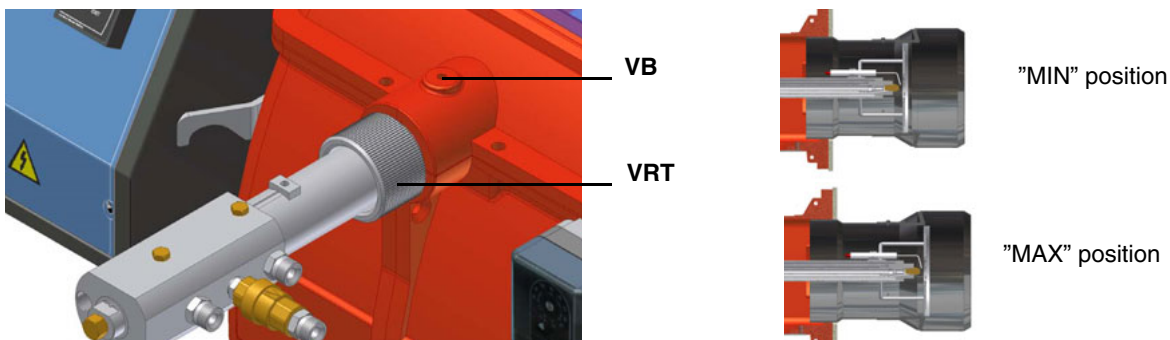
- 10 in order to get the maximum oil flow rate, adjust the pressure (reading its value on the **PG** pressure gauge) without changing the air flow rate set during the gas operation adjustments (see previous paragraph): checking always the combustion parameters, the adjustment is to be performed by means of the **SV** adjusting cam screw (see picture) when the cam has reached the high flame position.
- 11 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.

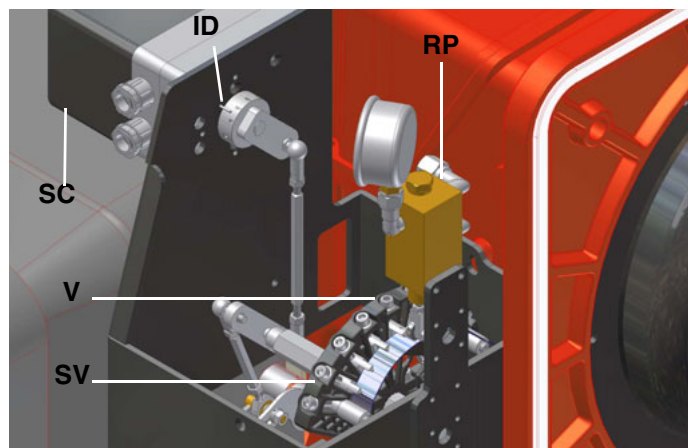


- 12 Only if necessary, change the combustion head position: to let the burner operate at a lower output, loose the **VB** screw and move progressively back the combustion head towards the MIN position, by turning clockwise the **VRT** ring nut. Fasten **VB** screw when the adjustment is accomplished.



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

- 13 the air and oil rate are now adjusted at the maximum power stage, go on with the point to point ajustement on the **SV** adjusting cam as to reach the minimum output point.

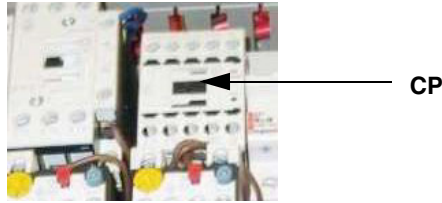


- 14 as for the point-to-point regulation in order to set the cam foil shape, move the low flame microswitch (cam III) a little lower than the maximum position (90°);
- 15 set the **TAB** thermostat to the minimum in order that the actuator moves progressively towards the low flame position;
- 16 move cam III (low flame) 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 **V** to increase the rate, unscrew to decrease, in order to get the pressure as shown on diagram in Fig. 20, according to the requested rate.
- 17 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.
- 18 The low flame position must never match the ignition position that is why cam III 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 Check the fan motor rotation (see page 19).
- 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. 25) by loosening the cap without removing it, then release the contactor.

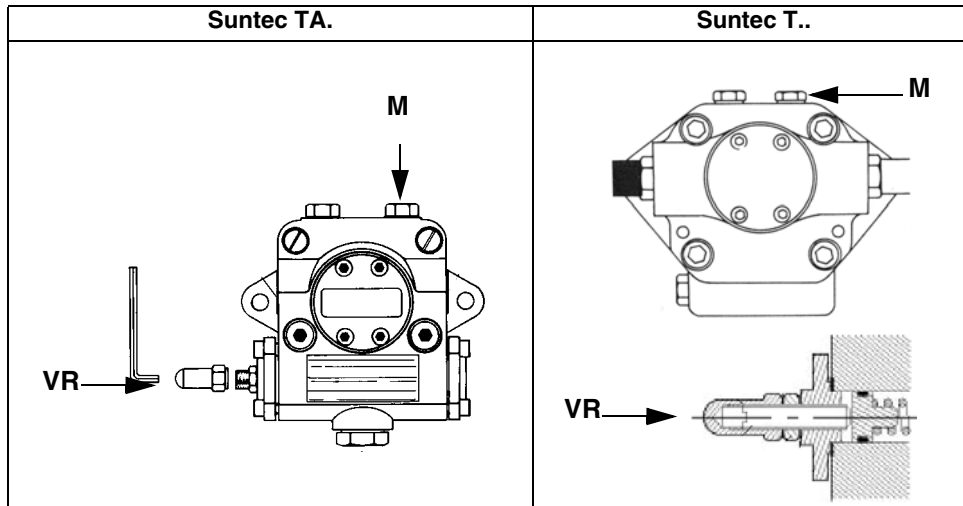
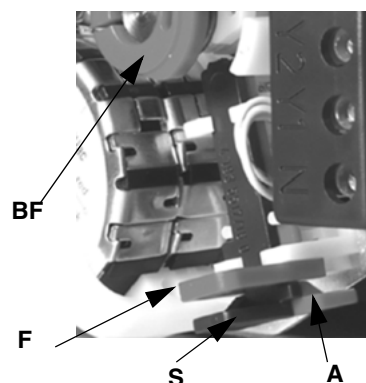
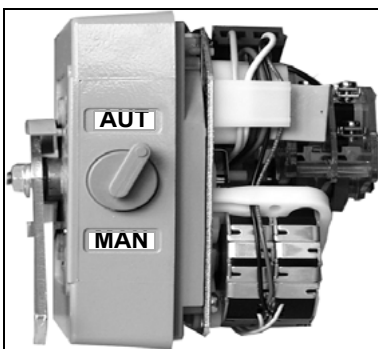
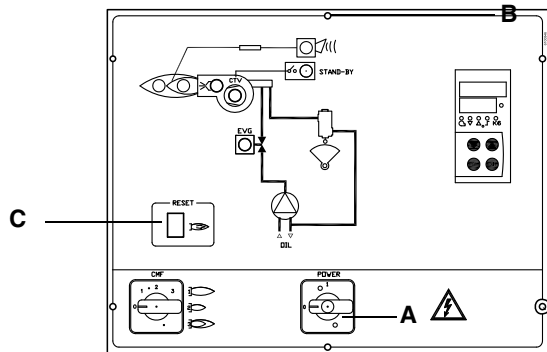


Fig. 25

- 4 Turn the burner on by means of its main switch **A**: if the burner locks (LED **B** on in the control panel) press the RESET button (**C**) on the control panel (see next picture) - see chapter "OPERATION" on page 30.



SQL330.. actuator cams

- F = plastic clamp
- A = cam locking lever
- S = cam locking lever
- BF = Low flame cam

- 5 Start the burner up by means of the thermostat series and wait until the pre-purge phase comes to end;
- 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** - see picture on page 24);
- 7 disconnect the **TAB** thermostat removing the wire from the terminal no. 6 or by setting MAN on the RWF40 modulator or by setting 0 by means of the **CMF** switch (only for fully-modulating burners);
- 8 set the actuator on the manual mode (MAN) by means of the MAN/AUTO switch (see next pictures).

- 9 manually drive the adjusting cam **SV** to the high flame position and set the actuator to the AUTO mode (by the related switch - see picture) to lock the adjusting cam.
- 10 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. 21 and act on the pump adjusting screw **VR** (see Fig. 25) as to get the nozzle pressure at 25bar (Fluidics nozzles - see diagram on page 20).

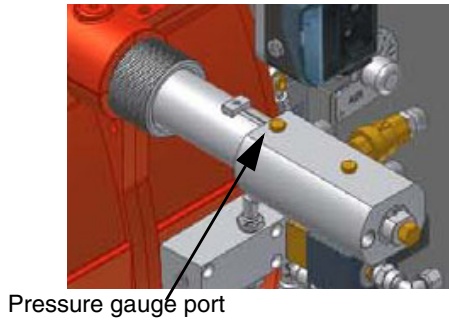


Fig. 26

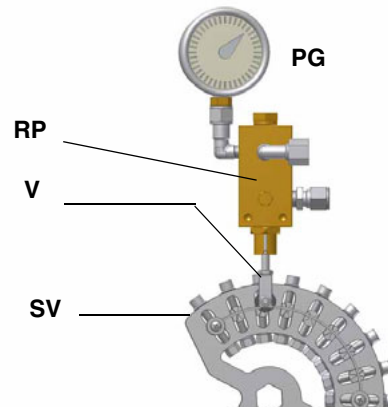
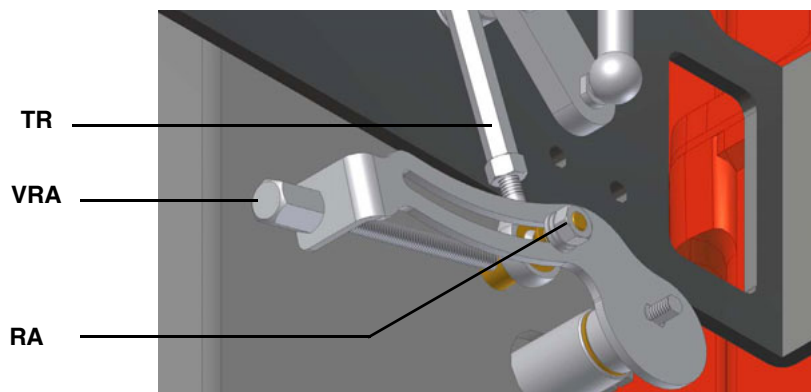


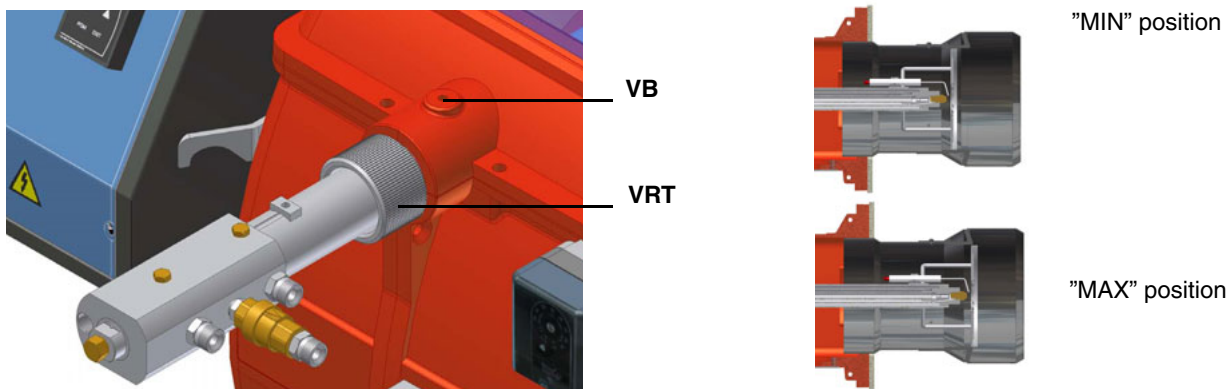
Fig. 27

- 11 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 **SV** adjusting cam screw (see picture) when the cam has reached the high flame position.
- 12 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.



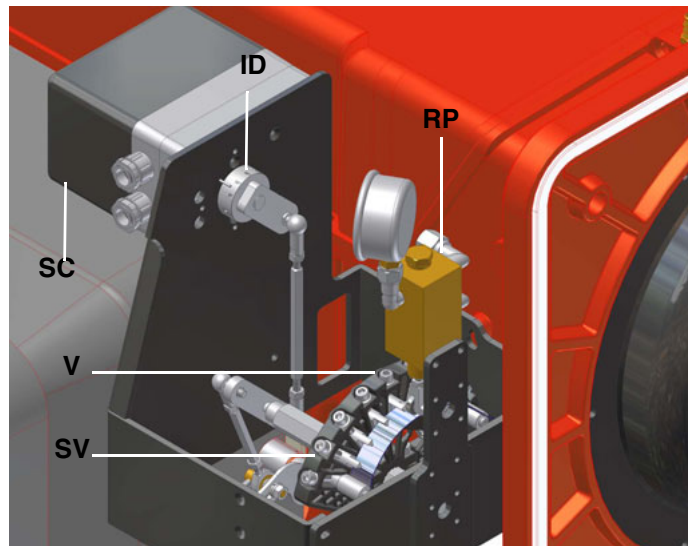
- 13 Only if necessary, change the combustion head position: to let the burner operate at a lower output, loose the **VB** screw and move progressively back the combustion head towards the MIN position, by turning clockwise the **VRT** ring nut. Fasten **VB** screw when the adjustment is accomplished.



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

- 14 once the air and oil flow rate have been adjusted at the maximum output, go on with the point to point adjustment on the **SV** adju-

sting cam as to reach the minimum output point: gradually move the adjusting cam in order to adjust each of the **V** screws as to describe the cam foil shape.



- 15 to change the **SV** position set the actuator on the manual mode (**MAN**), turn the adjusting cam **SV** and set again the actuator to the **AUTO** mode to lock the adjusting cam;
- 16 act on the **V** screw that matches the bearings referring to the adjusting cam position;
- 17 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.
- 18 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).
- 19 Turn the burner off then start it up again.
- 20 Once the pre-purge time comes to end, drive the burner to the high flame stage by the **TAB** thermostat: check the combustion values;
- 21 drive the burner to low flame, if necessary adjust the low flame size (output) by inserting a screwdriver on the slot **FA** to move the **BF** cam.



- 22 The low flame position must never match the ignition position that is why cam **BF** must be set 20°- 30° more than the ignition position.

NOTE: to change the low flame position, act exclusively on the actuator cam.

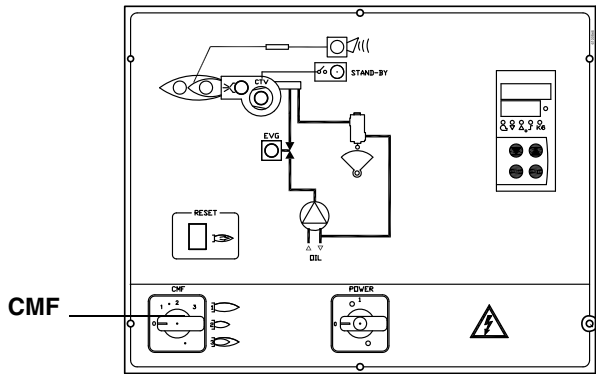
Now adjust the pressure switch (see page 28).

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 and then CMF=0. For further information about the regulating modulator, see the attached manual.

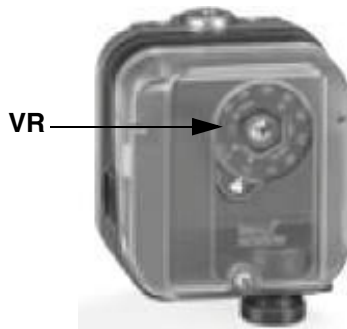


- CMF = 0 stop at current position
- CMF = 1 high flame operation
- CMF = 2 low flame operation
- CMF = 3 automatic operation

Calibration of air pressure switch (when provided)

To calibrate the air pressure switch, proceed as follows:

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



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. Be sure that the mains switch is closed.

- 1 Set to the ON position the switch A on the control panel of the burner.
- 2 Check the control box is not in the lockout position (light B must be off); in such a case reset it by the reset pushbutton C.
- 3 Check that the series of thermostats (or pressure switches) enables the burner to operate.
- 4 The startup sequence begins: the control box ignites the fan motor and energises the ignition transformer as well (signalled by the light H on the burner control panel).
- 5 At the end of the pre-purge stage, the light oil solenoid valve EVG1 is energised (signalled by the lamp G on the control panel) and the burner is on.
- 6 The ignition transformer is energized for few seconds after the ignition of the flame (post-ignition time) and at the end of this time is de-energised (light H off).
- 7 After the ignition the actuator moves to the high flame position for some seconds, then the operation begins and the burner switches to high flame or to low flame, according to the plant demand.
- 8 The high/low flame operation is shown by the F LED turning on/off.

Burner control panel

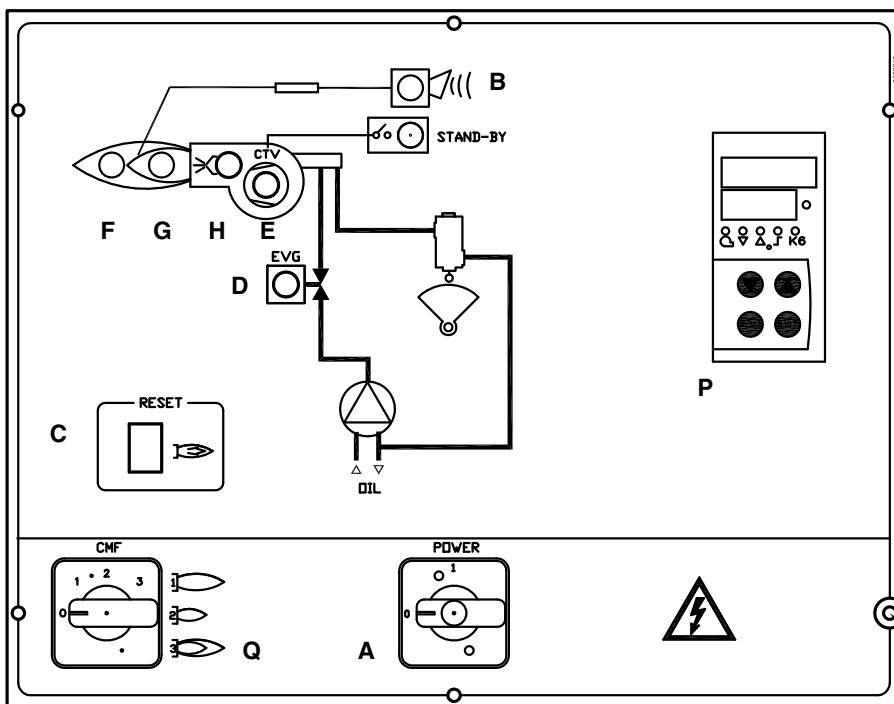


Fig. 28

Keys

- A ON-OFF main switch
- B Lockout signalling lamp
- C Conreol box release pushbutton
- D Signalling lamp for light oil solenoid valve opening
- E Thermal cutout intervention signalling lamp
- F High flame operation signalling lamp
- G Low flame operation signalling lamp
- H Ignition transformer operation signalling lamp
- P Siemens modulator
- Q Manual operation mode switch

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 BEGINNING OF THIS MANUAL..

ROUTINE MAINTENANCE

- Check and clean the cartridge of the fuel filter, replace it if necessary (see next paragraph);
- carefully check the fuel flexible hoses for leaks;
- check and clean the filter on the fuel 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;
- remove, check and clean the combustion head (page 32); when reassembling, carefully observe the measures on page 33;
- check the ignition electrodes and their ceramic insulators, clean, adjust and replace if necessary page 33;
- remove and clean the oil nozzles (IMPORTANT: do not clean the nozzles using metallic or sharp utensils, use only solvents or steam); at the end of maintenance operations, refit the burner, turn it on and check the combustion. If in doubt, replace the defective nozzle/s. In case of intensive use of the burner, the nozzles must be replaced at the end of the working season;
- check and carefully clean the flame detection photoresistor, if necessary replace it and, if in doubt, check the detection current following the scheme in Fig. 30;
- clean and grease levers and rotating parts.

Light oil filter maintenance

For correct and proper servicing, proceed as follows:

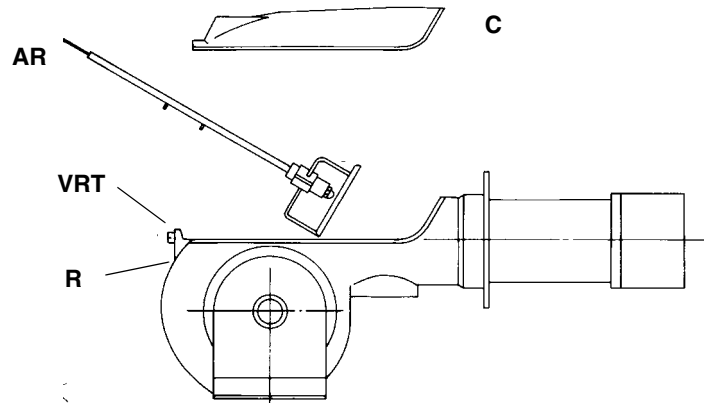
- 1 shut off fuel in the line section being serviced;
- 2 unscrew the tray;
- 3 remove the filter cartridge from its support and wash it with petrol or replace if necessary; check seal O-Ring, replace if necessary;
- 4 reassemble the tray and restore fuel flow.



Removing the combustion head

- 1 Remove the top cover **C**;
- 2 remove the photoresistor from its seat;
- 3 unscrew the revolving connectors (**E** in figure) on the fuel pipes (use 2 spanners to avoid loosening the connections attached to the distributor block);
- 4 loosen **VRT** screw to free the threaded rod **AR**, then screw out the 2 screws **V** holding the washer **R** and the screw **VRT** again;
- 5 remove the whole assembly as shown in figure;
- 6 clean the combustion head by means of a vacuum cleaner; to scrape off the scale use a metallic brush.

Note: to replace the combustion head reverse the procedure described above.

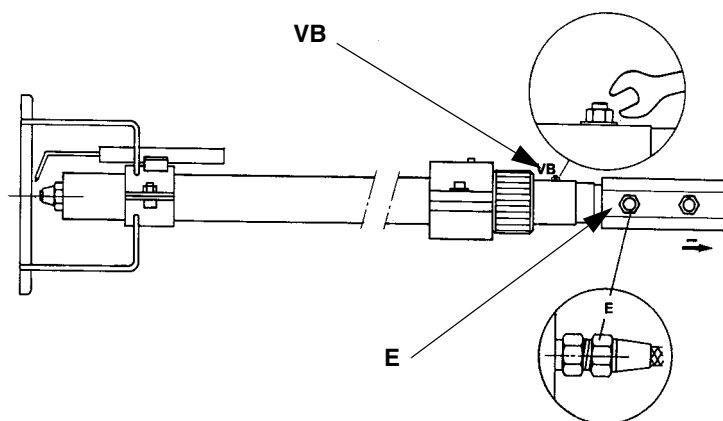


Removing the oil gun

Once the combustion head is removed, as described before, remove the oil gun as follows:

- 1 unscrew the connectors from the oil pipes (**E** in figure) using 2 spanners to avoid loosening the connections attached to the distributor block);
- 2 loosen the screw **VB**
- 3 remove the gun with the light oil nozzle holder.
- 4 clean the oil gun by means of a vacuum cleaner; to scrape off the scale use a metallic brush
- 5 replace the oil gun, if necessary.

Note: To re-assemble, follow the procedure above in reversed order.



Correct position of electrodes and combustion head



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

To guarantee a good ignition the measures (in mm) shown on the next pictures must be observed. Be sure to tight the screw on the electrodes group before reassembling the combustion head.

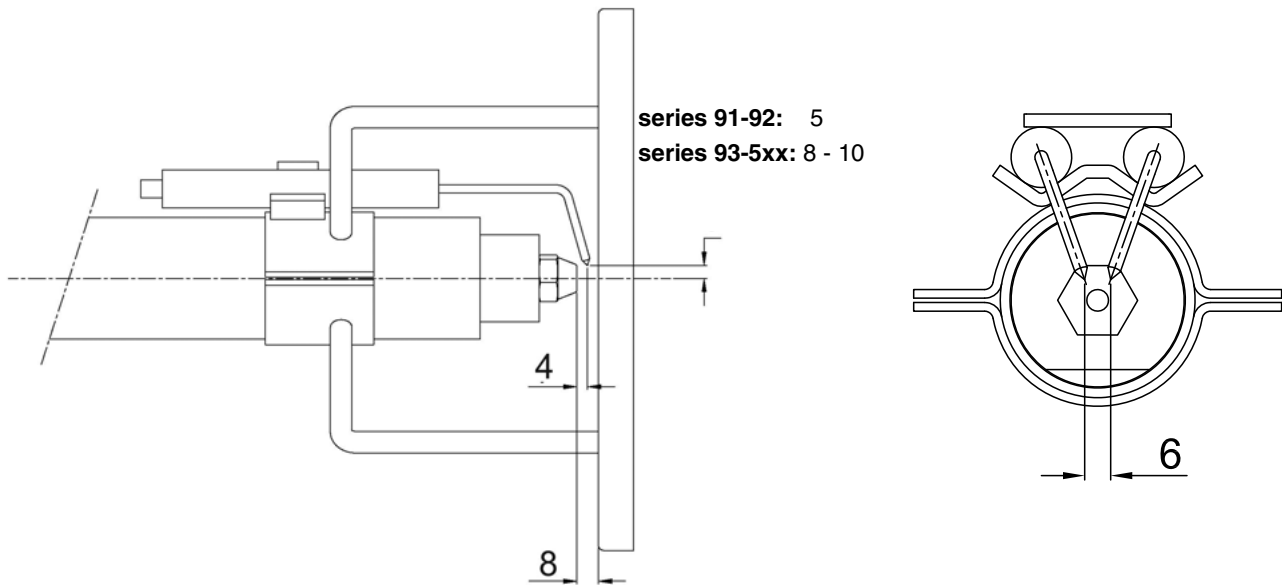


Fig. 29

Replacing the ignition electrodes



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

To replace the ignition electrodes, proceed as follows:

- 1 remove the burner cover;
- 2 disconnect the electrodes cables;
- 3 remove the combustion head (see par. "Removing the combustion head");
- 4 loose screw (B) that fasten the ignition electrodes;
- 5 remove the electrodes and replace them, referring to the values quoted on Fig. 29.

Cleaning and replacing the detection photoresistor

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

Checking the detection current

To measure the detection signal follow the diagram in Fig. 30. If the signal is not in the advised range, check the electrical contacts, the cleaning of the combustion head, the position of the photoresistor and if necessary replace it.

series 9x: LMO

series 5xx: LAL25

Minimum current intensity with flame

LMO: $45\mu\text{A}$

LAL25: $8\mu\text{A}$

Maximum current intensity without flame:

LMO: $5.5\mu\text{A}$

LAL25: $0.8\mu\text{A}$

Maximum possible current intensity with flame:

LMO: $100\mu\text{A}$

LAL25: $30\mu\text{A}$

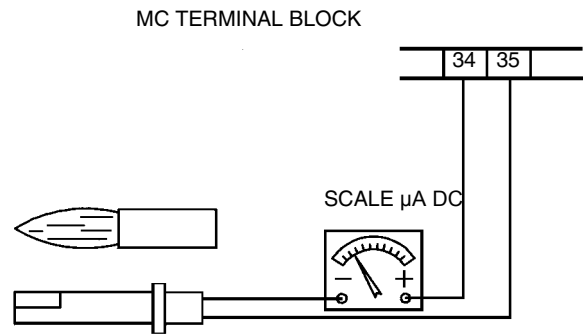


Fig. 30

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

	THE BURNER DOESN'T START	THE BURNER REPEATS PRE-PURGE	NOISY FUEL PUMP	THE BURNER DOESN'T START AND STOPS	THE BURNER STARTS AND STOPS	THE BURNER DOESN'T SWITCH TO HIGH FLAME	THE BURNER STOPS DURING OPERATION	THE BURNER STOPS AND REPEATS THE CYCLE DURING OPERATION
MAIN SWITCH OPEN	●							
LINE FUSE INTERVENTION	●							
MAX. PRESSURE SWITCH FAULT	●							●
FAN THERMAL CUTOUT INTERVENTION	●							
AUXILIARY RELAIS FUSES INTERVENTION	●							
CONTROL BOX FAULT	●	●		●	●		●	
SERVOCONTROL FAULT						●		
SMOKEY FLAME					●		●	
IGNITION TRANSFORMER FAULT				●				
IGNITION ELECTRODE DIRTY OR WRONG POSITIONED				●				
DIRTY NOZZLE				●			●	
FUEL SOLENOID VALVE DEFECTIVE				●			●	
PHOTORESISTOR DIRTY OR DEFECTIVE					●		●	
HI-LO FLAME THERMOSTAT DEFECTIVE						●		
WRONG POSITION OF SERVOCONTROL CAMS						●		
FUEL PRESSURE TOO LOW				●				
DIRTY FUEL FILTERS			●	●			●	

SPARE PARTS

Description	Code		
	RG91	RG92	RG93
CONTROL BOX	2020455	2020455	2020455
IGNITION ELECTRODES	2080206	2080206	2080206
FUEL FILTER	2090018	2090018	2090018
GASKET	2110048	2110048	2110048
FAN WHEEL	2150031	2150033	2150032
AIR PRESSURE SWITCH	2160065	2160065	2160065
IGNITION TRANSFORMER	2170302	2170302	2170302
FAN MOTOR	2180276	2180277	2180206
PUMP MOTOR	2180202	2180202	2180202
SOLENOID VALVE	2190403	2190403	2190403
FLEXIBLE HOSE L = 1500 1"MX	2340004	2340004	2340004
FLEXIBLE HOSES L = 335 3/8"	2340087	2340087	2340087
FLEXIBLE HOSES L = 385 3/8"	2340088	2340088	2340088
ADJUSTING CAM FOIL	2440013	2440013	2440013
ACTUATOR mod. SIEMENS SQL..	2480040	2480040	2480007
ACTUATOR mod. BERGER STM30..	2480090	2480090	2480090
ACTUATOR mod. SIEMENS SQM40..	24800A5	24800A5	24800A5
PHOTORESISTOR mod. SIEMENS QRB..	2510003	2510003	2510003
COUPLING	2540019	2540019	2540019
PRESSURE GOVERNOR	2570054	2570054	2570077
BURNER MODULATOR	2570112	2570112	2570112
PUMP mod. SUNTEC	2590118	2590119	2590120
NOZZLE mod. BERGONZO A3	2610202	2610202	-
NOZZLE mod. FLUIDICS WR2 50°	-	-	2610203
NOZZLE mod. UNIGAS M3 45°	-	-	2610230
OIL GUN (standard)	2700217	2700217	27002xx
OIL GUN (extended)	2700223	2700223	27002xx
COMBUSTION HEAD	3060160	3060161	3060161
BLAST TUBE (standard)	30910C5	30910C6	30910C6
BLAST TUBE (extended)	3091082	3091084	3091084
IGNITION CABLES	6050129	6050129	6050129

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

Description	Code			
	RG510	RG515	RG520	RG525
CONTROL BOX	2020420	2020420	2020420	2020420
IGNITION ELECTRODES	2080206	2080206	2080206	2080291
FUEL FILTER	2090018	2090018	2090018	2090018
FAN WHEEL	2150010	2150030	2150029	2150029
AIR PRESSURE SWITCH	2160065	2160065	2160065	2160065
IGNITION TRANSFORMER	2170302	2170302	2170302	2170302
PUMP MOTOR	2180202	2180223	2180223	2180219
FAN MOTOR	2180206	2180209	2180278	2180289
SOLENOID VALVE	2190403	2190403	2190437	2190437
FLEXIBLE HOSES L = 1500 1"	2340004	2340004	2340004	2340004
FLEXIBLE HOSES L = 335 3/8"	2340087	2340087	2340087	2340087
FLEXIBLE HOSES L = 385 3/8"	2340088	2340088	2340088	2340088
FLEXIBLE HOSES L = 435 3/8"	-	-	2340089	2340089
ADJUSTING CAM FOIL (with BG PRO governor)	2440013	2440013	2440013	2440013
ADJUSTING CAM FOIL (with BGH PRO governor)	-	-	-	2440054
ACTUATOR mod. SIEMENS SQL..	2480007	2480007	2480007	2480007
ACTUATORL mod. BERGER STM30..	2480090	2480090	2480090	2480090
ACTUATORL mod. SIEMENS SQM40..	24800A5	24800A5	24800A5	24800A5
PHOTORESISTOR mod. SIEMENS QRB..	2510003	2510003	2510003	2510003
MOTOR-PUMP COUPLING	2540019	2540126	2540126	2540133
PRESSURE GOVERNOR	25700B9	25700C0	25700C0	2570008 (BG PRO) 25700A7 (BGH PRO)
PUMP mod. SUNTEC	2590120	2590121	2590121	2590124
NOZZLE mod. FLUIDICS WR2	2610203	2610203	2610203	2610203
NOZZLE mod. UNIGAS M3 45°	2610230	2610230	2610230	2610230
OIL GUN (standard)	2700225	2700225	2700253	2700253
OIL GUN (long)	2700224	2700224	2700254	2700255
COMBUSTION HEAD	3060163	3060164	3060165	30601D2
BLAST TUBE (standard)	30910R8	30910R9	30910S0	30910T2
BLAST TUBE (extended)	30910S1	30910S2	30910S3	30910T1
IGNITION CABLES	6050144	6050144	6050129	6050112

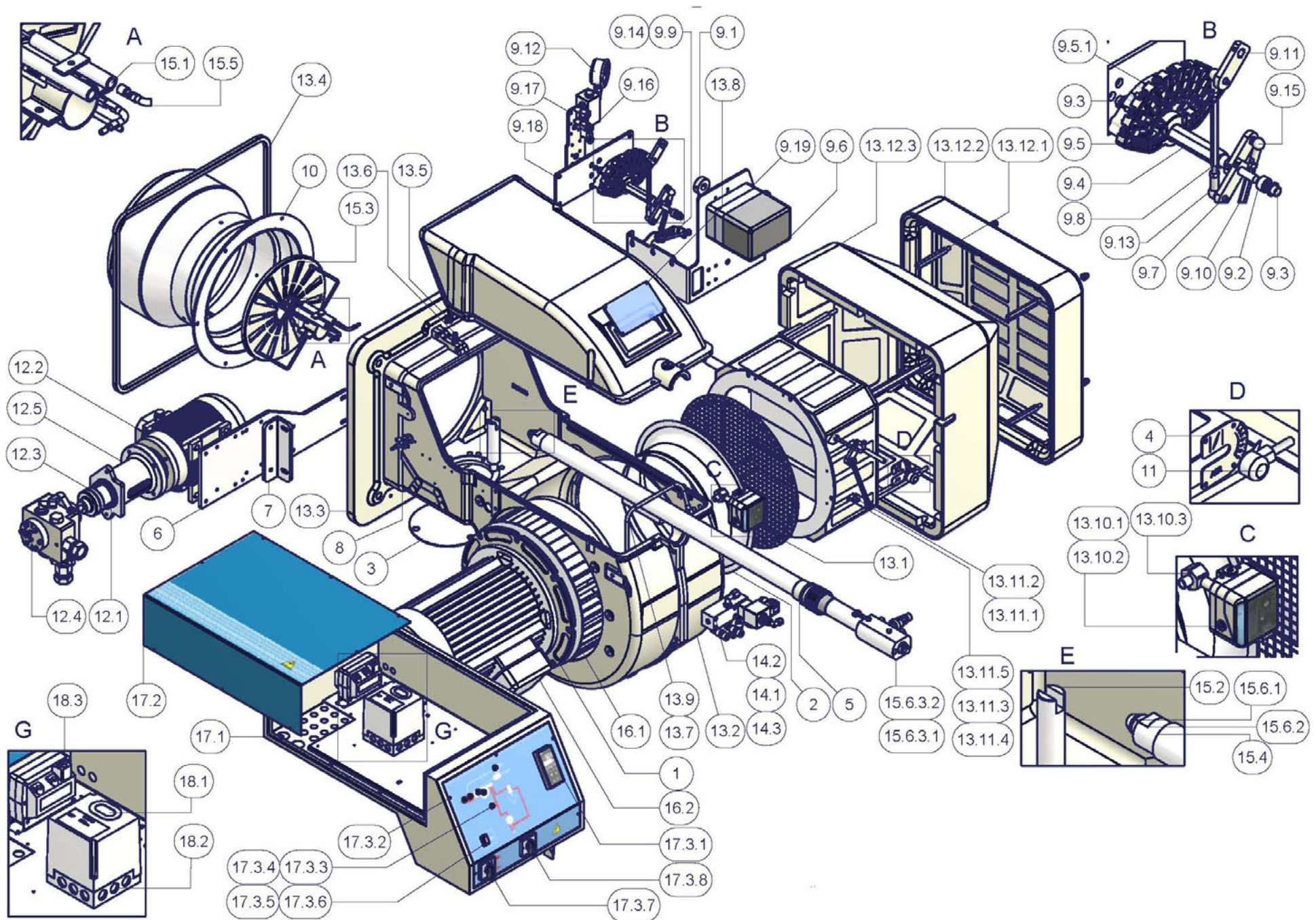
NOTE: it is recommended to mention the burner ID number on the spare parts request form.

BURNER EXPLODED VIEWД

ITEM	DESCRIPTION
1	FLANGE
2	AIR INLET CONE
3	CLOSING PLATE
4	INDEX LABEL
5	RING NUT
6	PLATE
7	PLATE
8	PHOTORESISTOR
9.1	INDEX LABEL
9.2	BUSH
9.3	BUSH
9.4	ADJUSTING CAM SHAFT
9.5	ADJUSTING CAM
9.5.1	ADJUSTING CAM FOIL
9.6	ACTUATOR
9.7	LEVERAGE
9.8	ROD
9.9	CAM
9.10	ROD
9.11	LEVERAGE
9.12	PRESSURE GAUGE
9.13	JOINT
9.14	JOINT
9.15	JOINT
9.16	PRESSURE GOVERNOR
9.17	BRACKET
9.18	BRACKET
9.19	BRACKET

ITEM	DESCRIPTION
10	STANDARD BLAST TUBE
11	AIR DAMPER INDEX
12.1	NET
12.2	MOTOR
12.3	COUPLING
12.4	PUMP
12.5	BRACKET
13.1	NET
13.2	BURNER HOUSING
13.3	FLANGE
13.4	CERAMIC FIBRE PLAIT
13.5	PRESSURE PLUG
13.6	INLET
13.7	SCREW
13.8	INSPECTION GLASS
13.9	AIR PRESSURE SWITCH PIPE
13.10.1	THREADED GAS PIPE
13.10.2	AIR PRESSURE SWITCH
13.10.3	PRESSURE SWITCH BRACKET
13.11.1	AIR DAMPER SILENCER
13.11.2	AIR INTAKE DAMPER
13.11.3	ROD
13.11.4	JOINT
13.11.5	JOINT
13.12.1	SPACER
13.12.2	SILENCER
13.12.3	SILENCER
14.1	OIL SOLENOID VALVE

ITEM	DESCRIPTION
14.2	OIL MANIFOLD
14.3	CONNECTOR
15.1	LONG IGNITION ELECTRODE
15.2	OIL GUN HOLDER
15.3	COMBUSTION HEAD
15.4	COMBUSTION HEAD ADJUSTING PIPE
15.5	IGNITION CABLE
15.6.1	NOZZLE
15.6.2	NOZZLE HOLDER
15.6.3.1	ONE-WAY VALVE
15.6.3.2	OIL MANIFOLD
16.1	FAN WHEEL
16.2	MOTOR
17.1	BOARD
17.2	COVER
17.3.1	POWER CONTROLLER
17.3.2	FRONT CONTROL PANEL
17.3.3	LIGHT
17.3.4	LIGHT
17.3.5	LOCK-OUT RESET BUTTON
17.3.6	PROTECTION
17.3.7	SWITCH
17.3.8	SWITCH
18.1	CONTROL BOX
18.2	CONTROL BOX SOCKET
18.3	IGNITION TRANSFORMER



ELECTRICAL WIRING DIAGRAMS

WIRING DIAGRAMS - Complete key

CMF	Operation manual switch
CO	0) stop - 1) high flame - 2) low flame - 3) automatic
CO	Time counter (optional)
EVG	Light oil solenoid valve
EVG1/2	Light oil solenoid valves
FR	Photoresistor
FU	Fuses
FU1.0	Burner line fuse
FU1.1	Oil pump line fuses
FU1.2	Auxiliary fuse
IG	Main switch
IL	Auxiliary line switch
KA2.2	Auxiliary relay
KA3.2	Auxiliary relay
KM1.8	Fan motor contactor
KM1.9	Oil pump motor contactor
KM2.6	Fan motor contactor (line)
KM2.6D	Fan motor contactor (delta)
KM2.7S	Fan motor contactor (star)
KM2.8	Pump motor contactor
KT2.7	Star/delta delayed relay
LAF	Burner in high flame signalling lamp
LB	Flame lockout signalling lamp
LBF	Burner in low flame signalling lamp
LEVG	EVG opening signalling lamp
LS	Burner stand-by signalling lamp
LT	Thermal cutout intervention signalling lamp
LTA	Ignition transformer signalling lamp
MP	Pump motor
MV	Fan motor
PA	Air pressure switch
PS	Control box reset pushbutton
Pt100	Pt100 temperature probe
SD-0/4÷20mA	Probe connection with signal 0÷20mA / 4÷20mA
SD-0÷10V	Probe connection with signal 0÷10V
SD-PRESS.	Pressure probe
SD-TEMP.	Temperature probe
SIEMENS LAL2.25	SIEMENS control box
SIEMENS RWF40 **	SIEMENS modulator
SQM/STM/SQL	Air damper actuator
ST	Thermostats or pressure switches serie
TA	Ignition transformer
TAB	High-low flame thermostat (if fitted remove the connection between terminals 6 and 7 on terminal block MA)
TC	Thermocoupling connection
TP	Pump motor thermal cutout
TV	Fan motor thermal cutout

* The modulator includes a limit switch (terminals Q13 and Q14), it stops the burner if the work parameter overcomes set differential.

ATTENTION:

- 1 - Electric supply 230/400V 50Hz 3N a.c.
- 2 - Don't reverse phase and neutral
- 3 - Make sure that the burner is properly heated

Wiring diagram 07-475 - Burners progressive - RG91 - RG92 - RG93

Wiring diagram 07-479 - Burners fully modulating - RG91 - RG92 - RG93

Wiring diagram 11-272 - Burners progressive - RG510 - RG515 - RG520

Wiring diagram 11-293 - Burners fully modulating - RG510 - RG515 - RG520

Wiring diagram 11- 344 - Burners progressive - RG525

Wiring diagram 11- 356 - Burners fully modulating - RG525

APPENDIX

SIEMENS OIL BURNERS AUTOMATIC CONTROLLER SIEMENS LMO14 - LMO24 - LMO44

The LMO... burner controls are designed for the start-up and supervision of single- or 2-stage forced draught oil burners in intermittent operation. Yellow-burning flames are supervised with photoresistive detectors QRB..., blue-burning flames with blue-flame detectors QRC...

In terms of housing dimensions, electrical connections and flame detectors, the LMO... are identical to the LOA... oil burner controls.

Preconditions for startup

- Burner control is reset
- All contacts in the line are closed
- No undervoltage
- Flame detector is darkened, no extraneous light

Undervoltage

- Safety shut-down in the operating position takes place should the mains voltage drop below about AC 165 V
- Restart is initiated when the mains voltage exceeds about AC 175 V

Time supervision oil pre-heater

If the oil pre-heater's release contact does not close within 10 minutes, the burner control will initiate lock-out.

Controlled intermittent operation

After no more than 24 hours of continuous operation, the burner control will initiate an automatic safety shut-down followed by a restart.

Control sequence in the event of fault

If lock-out occurs, the outputs for the fuel valves and the ignition will immediately be deactivated (< 1 second).

Cause	Response
After a mains failure	Restart
After voltage has fallen below the undervoltage threshold	Restart
In the event of a premature, faulty flame signal during «t1»	Lock-out at the end of «t1»
In the event of a premature, faulty flame signal during «tw»	Prevention of start-up, lock-out after no more than 40 seconds
If the burner does not ignite during «TSA»	Lock-out at the end of TSA
In the event the flame is lost during operation	Max. 3 repetitions, followed by lock-out
Oil pre-heater's release contact does not close within 10 min.	Lock-out

Lock-out

In the event of lock-out, the LMO... remains locked (lock-out cannot be changed), and the red signal lamp will light up. This status is also maintained in the case of a mains failure.

Resetting the burner

Whenever lock-out occurs, the burner control can immediately be reset. To do this, keep control the lock-out reset button depressed for about 1 second (< 3 seconds).

Ignition program with LMO24.113A2

If the flame is lost during «TSA», the burner will be reignited, but not later than at the end of «TSAmax.». This means that several ignition attempts can be made during TSA (refer to «Program sequence»).

Limitation of repetitions

If the flame is lost during operation, a maximum of 3 repetitions can be made. If the flame is lost for the 4th time during operation, the burner will initiate lock-out. The repetition count is restarted each time controlled switching on by «R-W-SB» takes place.

Operation

Lock-out reset button «EK...» is the key operating element for resetting the burner control and for activating / deactivating the diagnostic functions.



The multicolour «LED» is the key indicating element for both visual diagnosis and interface diagnosis.

- s Red
- l Yellow
- o Green

Colour code table		
Status	Colour code	Colour
Oil pre-heater heats, waiting time «tw»	llllllllll	Yellow
Ignition phase, ignition controlled	lmlmlmlml	Yellow-off
Operation, flame o.k.	oooooooooooo	Green
Operation, flame not o.k.	omomomomomo	Green-off
Undervoltage	lslslslsls	Yellow-red
Fault, alarm	ssssssssss	Red
Output of fault code (refer to Fault code table)	smsmsmsmsm	Red-off
Extraneous light prior to burner start-up	osososososo	Green-red
Interface diagnosis	ssssssssssss	Red flicker light

Key

- m Off
- l Yellow
- o Green
- s Red

Diagnosis of cause of fault

After lock-out, the red fault signal lamp remains steady on.

In that condition, the visual diagnosis of the cause of fault according to the error code table can be activated by pressing the lock-out reset button for more than 3 seconds.

Error code table	
Blink code	Possible cause
2 blinks **	No establishment of flame at the end of TSA <ul style="list-style-type: none"> ● Faulty or soiled fuel valves ● Faulty or soiled flame detector ● Poor adjustment of burner, no fuel ● Faulty ignition
3 blinks ***	Free
4 blinks ****	Extraneous light on burner startup
5 blinks *****	Free
6 blinks *****	Free
7 blinks *****	Too many losses of flame during operation (limitation of the number of repetitions) <ul style="list-style-type: none"> ● Faulty or soiled fuel valves ● Faulty or soiled flame detector ● Poor adjustment of burner
8 blinks *****	Time supervision oil pre-heater
9 blinks *****	Free
10 blinks *****	Wiring error or internal error, output contacts

During the time the cause of fault is diagnosed, the control outputs are deactivated.

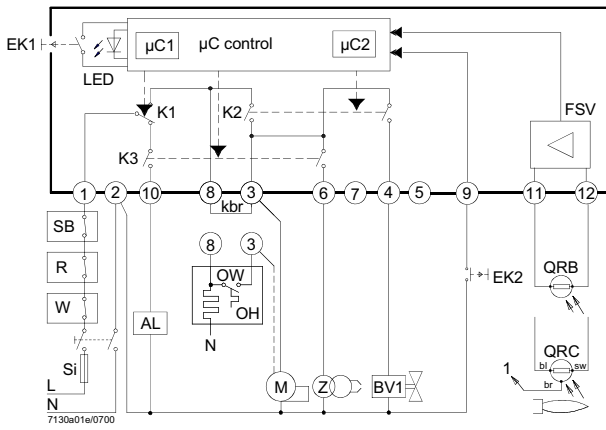
- Burner remains shut down
- Fault status signal «AL» at terminal 10 is activated

The diagnosis of the cause of fault is quit and the burner switched on again by resetting the burner control.

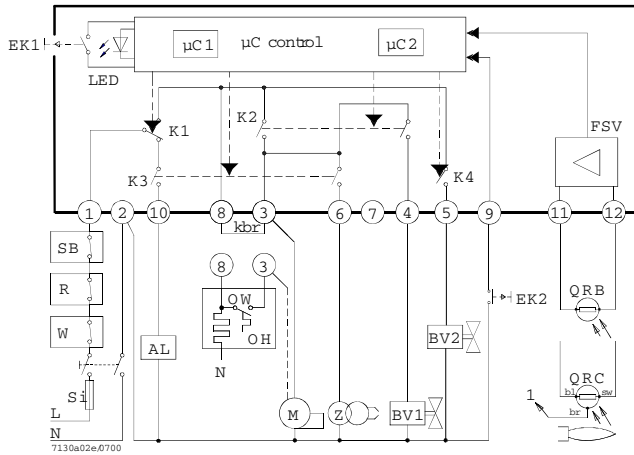
Press lock-out reset button for about 1 second (< 3 seconds).

Connection diagram and internal diagram

LMO14

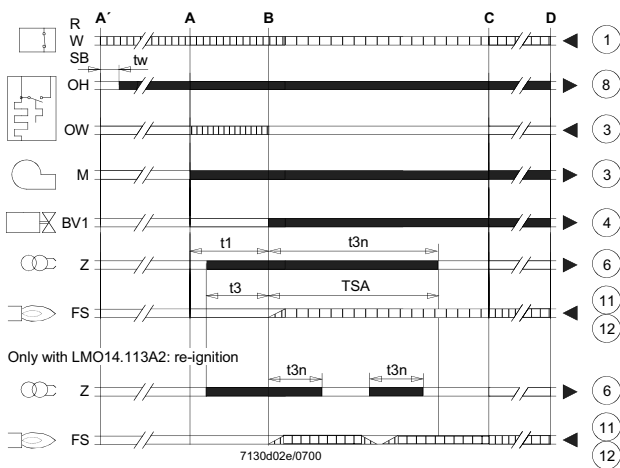


LMO24 - LMO44

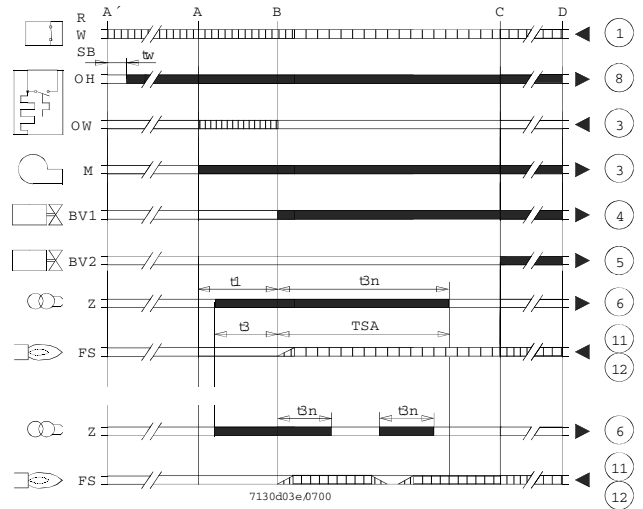


Control sequence

LMO14



LMO24 - LMO44



Key

- AL Alarm device
- kbr... Cable link (required only when no oil pre-heater is used)
- BV... Fuel valve
- EK1 Lock-out reset button
- EK2 Remote lock-out reset button
- FS Flame signal
- FSV Flame signal amplifier
- K... Contacts of control relay
- LED 3-colour signal lamps
- M Burner motor
- OW Release contact of oil pre-heater
- t1 Pre-purge time
- t3 Pre-ignition time
- t3n Post-ignition time
- A' Beginning of start-up sequence with burners using an oil pre-heater
- A Beginning of start-up sequence with burners using no oil pre-heater
- Controller output signals
- Required input signals
- OH Oil pre-heater
- QRB Photoresistive detector
- QRC Blue-flame detector
- bl = blue
- br = brown
- sw = black
- R Control thermostat or pressurestat
- SB Safety limit thermostat
- Si External primary fuse
- W Limit thermostat or pressure switch
- Z Ignition transformer
- t4 Interval from flame signal to release «BV2»
- TSA Ignition safety time
- tw Waiting time for oil pre-heating
- B Time of flame establishment
- C Operating position
- D Controlled shut-down by «R»
- μC1 Microcontroller 1
- μC2 Microcontroller 2

General unit data

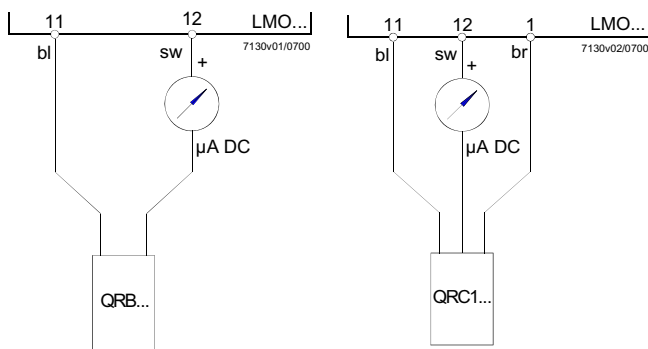
Mains voltage	AC 230 V +10 % / -15 % AC 120 V +10 % / -15 %
Mains frequency	50...60 Hz ±6 %
External primary fuse (Si)	6.3A (slow)
Power consumption	12 VA
Mounting orientation	optional
Weight	approx. 200 g
Degree of protection	IP40 (to be ensured through mounting)
Perm. cable lengths	max. 3m at line capacitance of 100 pF/m
Detector cable laid separately	10 m
Remote reset laid separately	20m

	LMO14	LMO24	LMO44
Terminal 1	5 A	5 A	5 A
Terminals 3 and 8	3 A	5 A	5 A
Terminals 4, 5 and 10	1 A	1 A	1 A
Terminals 6	1 A	1 A	2 A

Flame supervision with QRB and QRC

	QRB	QRC
Min. detector current required (with flame)	45 µA	70 µA
Min detector current permitted (without flame)	5.5 µA	5.5 µA
Max. possible with flame (typically)	100 µA	100 µA

Measurement circuit for detector current



Key

µA DC	DC microammeter with an internal resistance of 5 kΩ max.
bl	Blue
sw	Black
br	Brown

LAL.. CONTROL BOX FOR OIL BURNERS

Use

- Control and supervision of oil atomization burners
- For burners of medium to high capacity
- For intermittent operation (at least one controlled shutdown every 24 hours)
- Universally applicable for multistage or modulating burners

Housing and plug-in base

- Made of impact-proof and heat-resistance black plastic
- Lockout reset button with viewing window; located behind it:
- Lockout warning lamp
- Lockout indicator coupled to the spindle of the sequence switch and visible in the transparent lockout reset button
- uses easy-to-remember symbols to indicate the type of fault and the point in time lockout occurred

Base and plug-in section of the LAL... are designed such that only burner controls of the LAL... family can be plugged in.

- 24 connection terminals
- Auxiliary terminals «31» and «32»
- 3 earth terminals terminating in a lug for earthing the burner
- 3 neutral conductor terminals prewired to terminal 2
- 14 knockout holes for cable entry by means of cable glands
- 8 at the side

- 6 in the bottom of the base
- 6 lateral threaded knockout holes for cable entry glands Pg11 or M20

Operation

Flame detector and flame simulation test are made automatically during burner off times and the prepurge time «t1». If loss of flame occurs during operation, the burner control will initiate lockout. If automatic repetition of the startup sequence is required, the clearly marked wire link on the plug-in section of the LAL... must be cut away.

Pre-conditions for burner startup

- Burner control is not in the lockout position
- Sequence switch is in its start position (with LAL2 voltage is present at terminals 11 and 12.
- Air damper is closed; end switch «Z» for the CLOSED position must feed power from terminal 11 to terminal 8.
- Contact of the limit thermostat or pressure switch «W» and the contacts of any other switching devices in the control loop between terminals 4 and 5 must be closed e.g. a control contact for the oil preheater's temperature
- Normally closed contact of the air pressure switch must be closed.

Startup sequence

Start command by «R»:

«R» closes the start control loop between terminals 4 and 5

- The sequence switch starts to run
- Only prepurging, fan motor at terminal 6 receives power
- Pre- and postpurging, fan motor or flue gas fan at terminal 7 receives power on completion of «t7»
- On completion of «t16», the control command for opening the air damper is delivered via terminal 9
- Terminal 8 receives no power during the positioning time
- The sequence switch continues to run only after the air damper has fully closed.

t1 Prepurge time with air damper fully open:

- The correct functioning of the flame supervision circuit is checked during «t1»
- The burner control will initiate lockout if correct functioning is not ensured.

With LAL2:

Shortly after the beginning of «t1», the air pressure switch must change over from terminal 13 to terminal 14 otherwise, the burner control will initiate lockout start of the air pressure check.

t3 Short preignition time:

«Z» must be connected to terminal 16, release of fuel via terminal 18.

t3' Long preignition time: «Z» connected to terminal 15.

t3n Postignition time:

- «Z» must be connected to terminal 15

- With short preignition, «Z» remains on until «TSA» has elapsed connection to terminal 16.

t4 Interval «BV1 – BV2» or «BV1 - LR»: On completion of «t4», voltage is present at terminal 19. The voltage is required to power «BV2» connected to auxiliary switch «v» in the actuator.

t5 Interval: On completion of «t5», terminal 20 receives power. At the same time, control outputs 9 to 11 and input 8 are galvanically separated from the LAL...’s control section.

LAL... is now protected against reverse voltages from the load control circuit. With the release of «LR» at terminal 20, the startup sequence of the LAL... ends. After a few idle steps (steps with no contact position changes), the sequence switch switches itself off.

B Operating position of the burner

B-C Burner operation: during burner operation, «LR» drives the air damper to the nominal load or low-fire position, depending on heat demand; the release of the nominal load takes place via auxiliary switch «v» in the actuator and in the event of loss of flame during operation, the LAL... will initiate lockout. For automatic start repetition, the clearly marked wire link «B» on the plugin section of the LAL... must be cut away.

C Controlled shutdown: in the case of controlled shutdown, «BV...» will immediately be closed. At the same time, the sequence switch is started to program «t6»

C-D Sequence switch travels to start position «A»

t6 Postpurge time: fan «M2» connected to terminal 7. Shortly after the start of «t6», terminal 10 receives power and the air damper is driven to the MIN position. Full closing of the air damper starts only shortly before «t6» has elapsed initiated by the control signal at terminal 11. During the following burner off time, terminal 11 is live.

t13 Permissible afterburn time: during «t13», the flame signal input may still receive a flame signal.

D-A End of control program: start position

As soon as the sequence switch has reached the start position – having thereby switched itself off – the flame detector and flame simulation test will start again.

During burner off times, the flame supervision circuit is live.

Lockout and indication of the stop position

Whenever a fault occurs, the sequence switch stops and with it the lockout indicator. The symbol appearing above the reading mark indicates the type of fault:

◀ No start. One of the contacts is not closed (also refer to «Preconditions for burner startup»):

Extraneous light:

Lockout during or after completion of the control program

Examples: nonextinguished flame, leaking fuel valves faulty flame supervision circuit.

▲ Interruption of startup. No OPEN signal at terminal 8 from the changeover end switch «a». Terminals 6, 7 and 15 are live until fault has been corrected

P Lockout. No air pressure indication at the beginning of the air pressure check. Air pressure failure after the air pressure check.

■ Defect in the flame supervision circuit.

▼ Interruption of the startup sequence. No positioning signal at terminal 8 from the auxiliary switch «m» for the low-fire position. Terminals 6, 7 and 15 are live until fault has been corrected.

1 Lockout. No flame signal at the end of the safety time.

I Flame signal has been lost during operation.

A Consenso all'avviamento (ad esempio tramite il termostato o il pressostato R dell'impianto

B Operating position of the burner

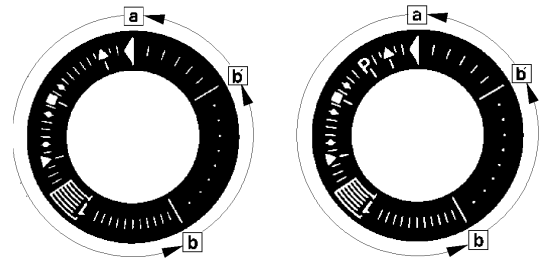
B-C Burner operation: during burner operation, «LR» drives the air damper to the nominal load or low-fire position, depending on heat demand; the release of the nominal load takes place via auxiliary switch «v» in the actuator and in the event of loss of flame during operation, the LAL... will initiate lockout. For automatic start repetition, the clearly marked wire link «B» on the plugin section of the LAL... must be cut away.

C Controlled shutdown: in the case of controlled shutdown, «BV...» will immediately be closed. At the same time, the sequence switch is started to program «t6»

C-D Sequence switch travels to start position «A».

During burner off times, the flame supervision circuit is live.

Lockout indication



a-b Startup sequence

b-b' Idle step (with no contact confirmation)

b(b')-a Postpurge program

Burner control can immediately be reset after lockout:

Do not press the lockout reset button for more than 10 seconds

The sequence switch always travels to the start position first

After resetting

After rectification of a fault that led to shutdown

After each power failure

During this period of time, power is only fed to terminals 7 and 9...11.

Then, the LAL... will program a new burner startup sequence

Specifications

Power supply AC 230 V -15 / +10 %

for LAL2... on request AC 100 V -15 %...AC 110 V +10 %

Frequency 50 Hz -6 %...60 Hz +6 %

Absorption AC 3.5 VA

Mounting position optional

Protection IP 40

Perm. input current at terminal 1

AC 5 A max., 20 A peak

Perm. current rating of control terminals 3, 6, 7, 9...11, 15...20

4 A max., 20 A peak

Internal fuse

T6,3H250V according to IEC 127

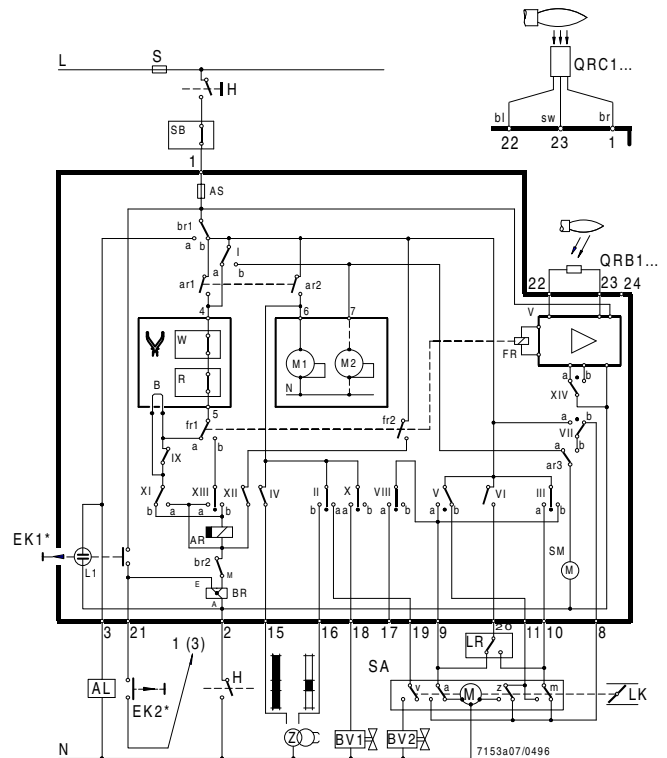
External fuse

max. 10 A

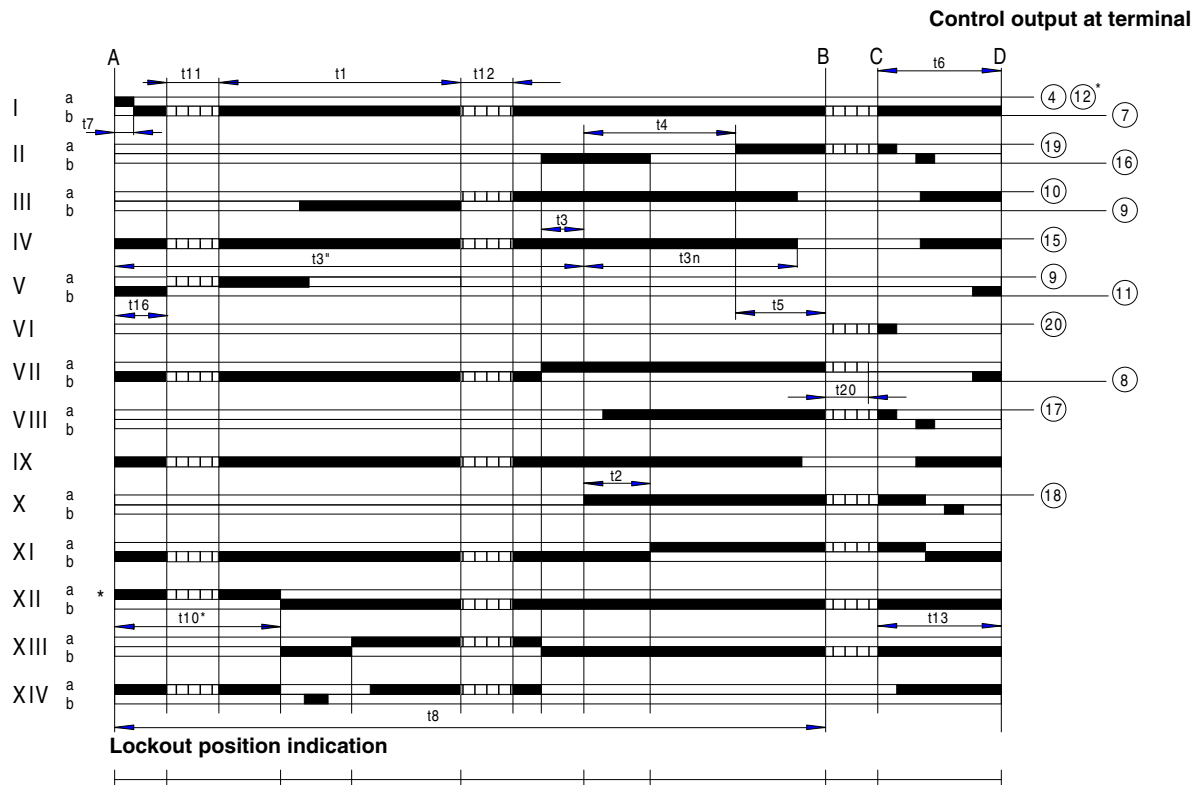
Weight

Device 1000 g

Plug-in base 165 g



Sequence diagram



Key

- t1 Purpurge time with air damper fully open
- t2 Safety time
- t3 Preignition time, short («Z» connected to terminal 16)
- T3' Preignition time, long («Z» connected to terminal 15)
- t3n Postignition time («Z» connected to terminal 15)
- t4 Interval between voltage at terminals 18 and 19 («BV1-BV2»)
- t5 Interval between voltage at terminals 19 and 20 («BV2» load controller)
- t6 Postpurge time (with «M2»)
- t7 Interval between start command and voltage at terminal 7 (start delay time for «M2»)
- t8 Duration of startup sequence (excluding «t11» and «t12»)
- t10 Interval from startup to the beginning of the air pressure check
- t11 Air damper running time to the OPEN position
- t12 Air damper running time to the low-fire position (MIN)
- t13 Permissible afterburn time
- t16 Interval to the OPEN command for the air damper
- t20 For self-shutdown of the sequence switch





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Note: Specifications and and data subject to change. Errors and omissions excepted.