CIB UNIGAS

IDEA RANGE
LIGHT OIL BURNERS

LO280

LO400

Compying with
EMC 79/336/CEE
LV 73/23/CEE

Documentazione Tecnica CIB UNIGAS spa - Campodarsego (Padova - Italy)

M039134CB Rev. 1 12-06

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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 repeated burner shut-downs, do not continue resetting the unit manually. Contact qualified personnel to take care of such defects.
- The unit shall be operated and serviced by qualified personnel only, in compliance with the regulations in force.

3) GENERAL INSTRUCTIONS DEPENDING ON FUEL USED

3a) ELECTRICAL CONNECTION

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

In case of damage to the cable, switch off the unit and contact qualified personnel to replace.
When the unit is out of use for some time the electric switch supplying all the power-driven components in the system (i.e. pumps, burner, etc.) should be switched off.

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

GENERAL

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

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

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

SPECIAL INSTRUCTIONS FOR USING GAS

Have qualified personnel inspect the installation to ensure that:

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

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

Precautions if you can smell gas

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

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

PART I: INSTALLATION

BURNERS CHARACTERISTICS

Burner model identification

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

Type **LO400** Model	**G-.**	**TN.**	**S.**	***.**	**A.**
(1)	(2)	(3)	(4)	(5)	(6)

(1)	BURNER TYPE	**LO280 - LO400**
(2)	FUEL	G - Light oil A - Biodiesell
(3)	OPERATION Available versions	TN - Single stage AB - Double stage
(4)	BLAST TUBE	M - Modular S - Standard L - Long
(5)	DESTINATION COUNTRY	* - destination country (see data plate)
(6)	BURNER VERSION	A - Standard Y - Special M -Hydraulic jack

Technical Specifications

BURNERS		**LO280 G-.TN.x.xx.A**	**LO280 G-.AB.x.xx.A**
Output	min. - max. kW	115 - 310	70 - 310
Light oil rate	min.- max. kg/h -	9.6 - 26	5.8 - 26
Fuel		Light oil	Light oil
Power supply		230V 50Hz	
Electric motor	kW	0.25	0.25
Total power consumption	W	0.55	0.55
Weight	kg	42	42
Operation		Single stage	éDouble stage
Operating temperature	°C	-10 ÷ +50	
Storage Temperature	°C	-20 ÷ +60	
Working service*		Intermittent	

BURNERS		**LO400 G-.TN.x.xx.A**	**LO400 G-.AB.x.xx.A**
Output	min.-max.kW	195 - 420	115 - 420
Light oil rate	min. - max. kg/h	16 - 35	10 - 35
Fuel		Light oil	Light oil
Power supply		230V 50Hz	
Electric motor	kW	0.37	0.37
Total power consumption	W	0.67	0.67
Weight	Kg	42	42
Operation		Single stage	éDouble stage
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 take place every 24 hours.**

⚠ WARNING: if fuel used is BIODIESEL, some components must be replaced. Please contact our Technical Department for further details.

OVERALL DIMENSIONS (mm)

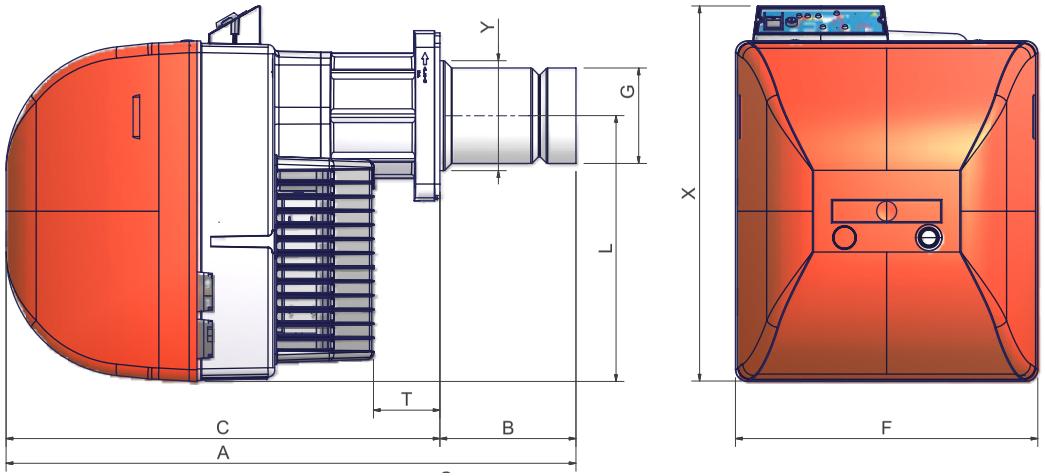


Fig. 4

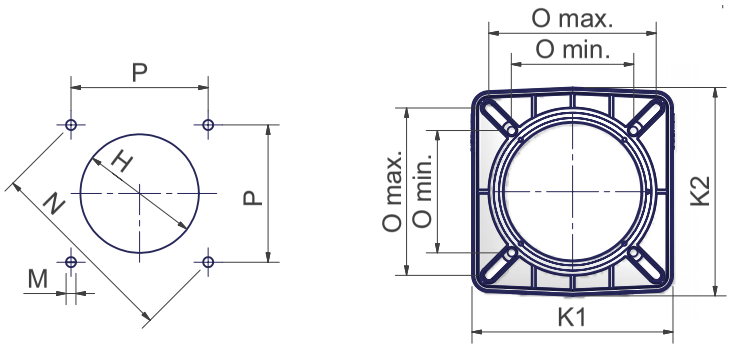


Fig. 5: Boiler's drilling plate and burner's flange

	AS*	AL*	BS*	BL*	C	F	G	H	K1	K2	L	M	N	Omin	Omax	P	X	Y
LO280	732.5	877.5	162.5	307.5	570	396	108	128	215	223	348	M10	219	131	179	155	492	108
LO400	748	877.5	178	307.5	570	396	125	164	215	223	348	M10	219	131	179	155	491	144

*S = standard blast tube
*L = long blast tube

.As far as modifying the blast tube for mod. LO400, see page 8.

Performance curves

LO280 Single stage

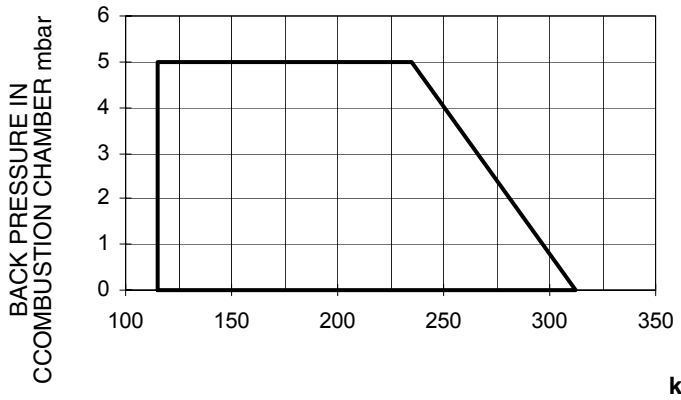


Fig. 6

LO280 High-Low flame

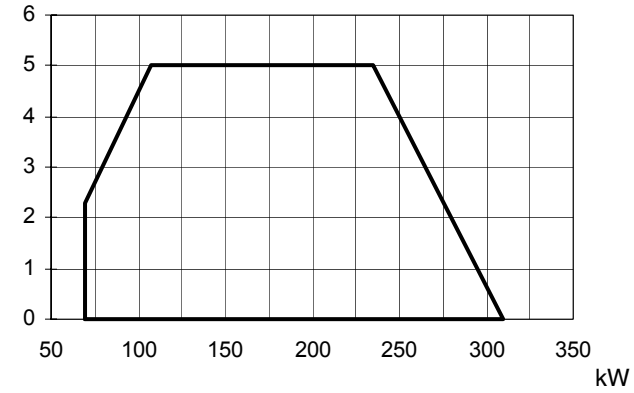


Fig. 7

LO400 Single stage

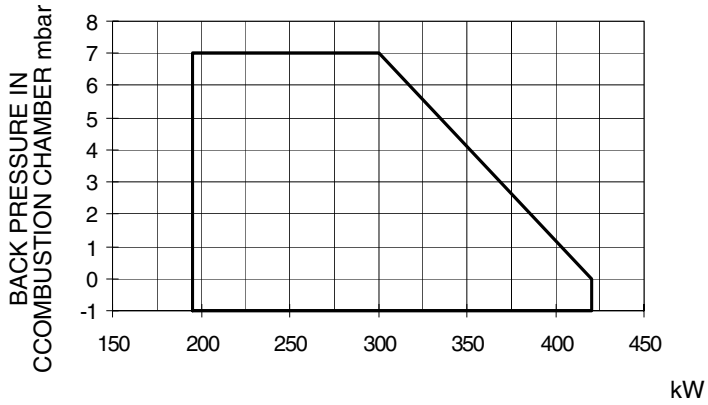


Fig. 8

LO400 High-Low flame

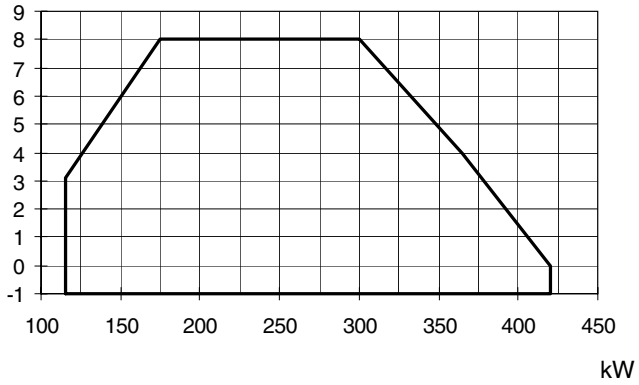


Fig. 9

How to modify blast tube length (mod. LO400)

To modify blast tube length please read the following instructions.

1 Remove combustion head (See “Removing the combustion head” - Part III of this user’s manual).

2 Remove the flanged piece T by removing the 4 socket head screws VTF (Fig. 10).

3 Remove the 4 screws which hold the blast tube to the flanged piece (Fig. 2).

4 Extract the blast tube from the flanged piece and assemble it in the other way round as shown in pictures Fig. 12 and Fig. 13. Now fasten the two pieces using the same screws (Fig. 14).

5 Assemble the whole piece to the burner by caring attention to the indication in picture Fig. 15.

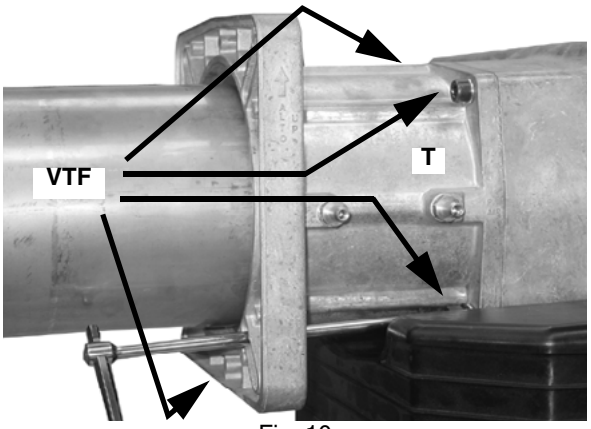


Fig. 10

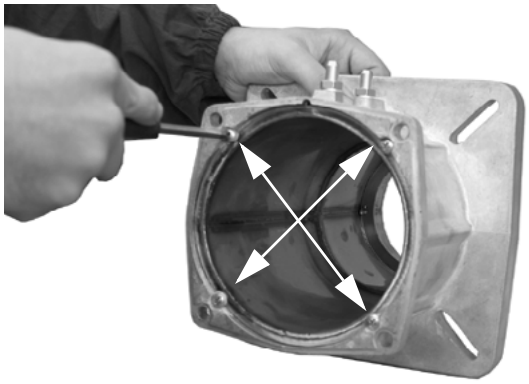


Fig. 11

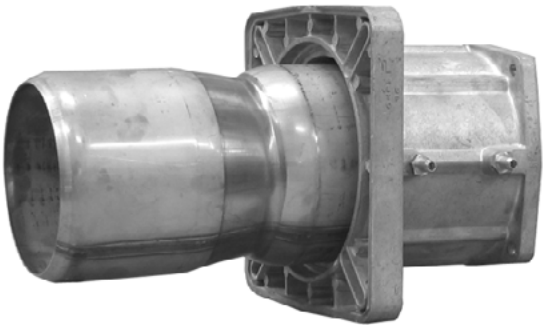


Fig. 12 - Short blast tube

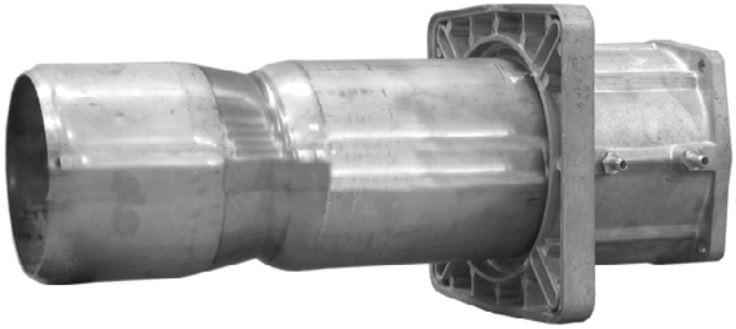


Fig. 13 - Long blast tube

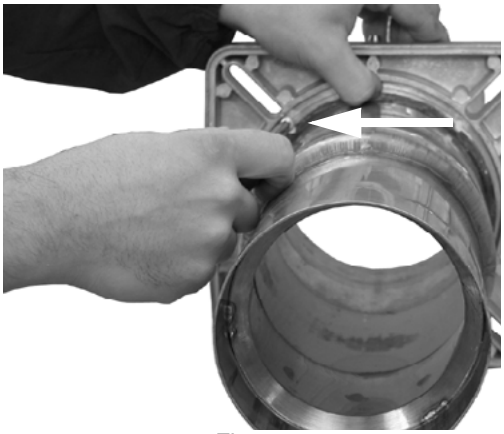


Fig. 14

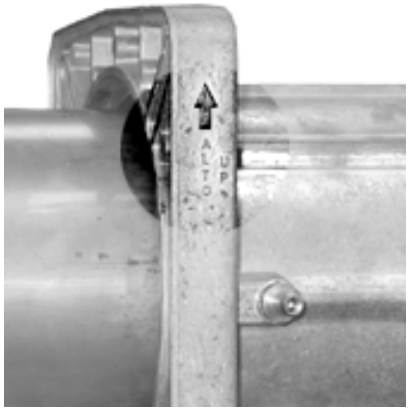


Fig. 15

If you modify the blast tube length you have to modify also the combustion head length by reading the following instructions:

1 Loosen the light oil feeding pipes connected to the nozzle-holder by using two spanners size 22 and 10 (Fig. 16).

2 Adjust cables length by pulling them very slightly as shown in Fig. 17.

3 Loosen the screw VA which tights the rod A (Fig. 18) and shift backward the flange as shown.

4 Tight the screw in the backward hole on the rod, see picture Fig. 19.

5 Fix the two extensions (supplied along with the burner inside the accessories carton box) on the light oil feeding pipes (Fig. 20) and tight them by using two spanners size 13 and 10 (Fig. 21). Fix the extensions to the nozzle holder by using two spanners size 22 and 10 (Fig. 16).

6 Assemble again the combustion head (See “Removing the combustion head” - Part III of this user’s manual).

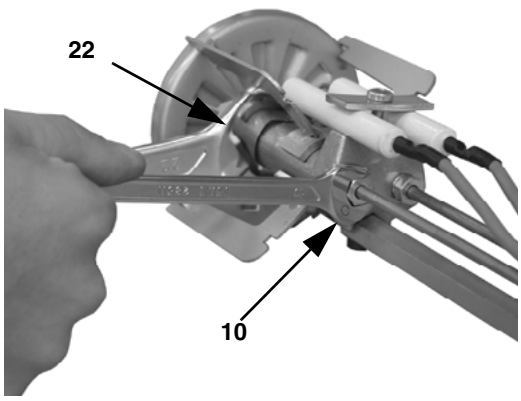


Fig. 16


Fig. 17

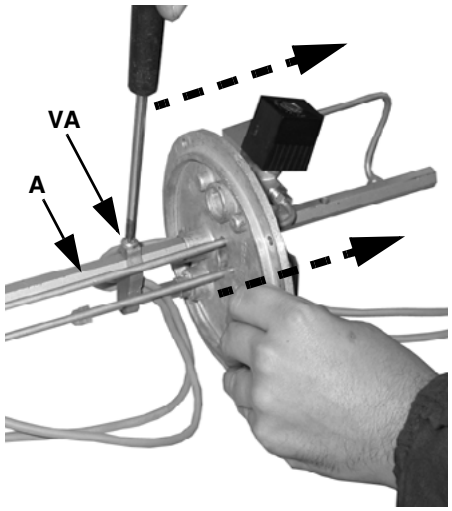


Fig. 18

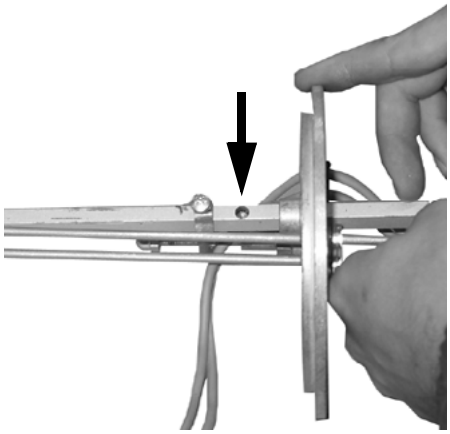


Fig. 19

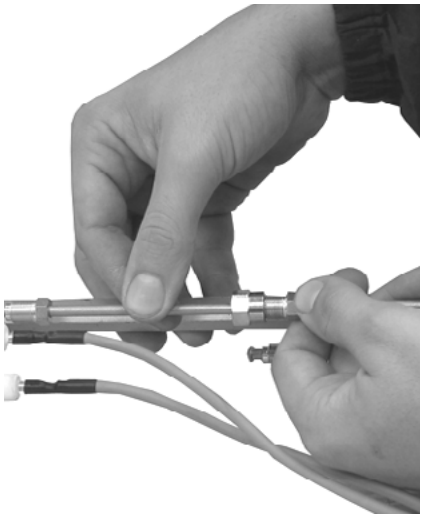


Fig. 20

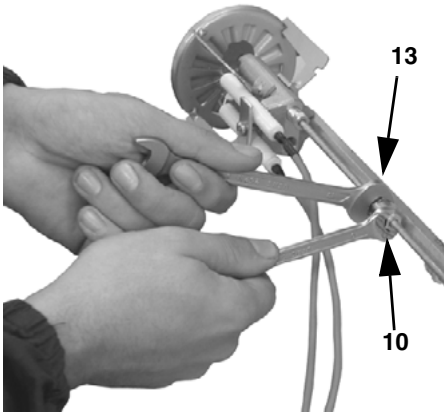


Fig. 21

MOUNTING AND CONNECTIONS

Packing

The burners are despatched in packages of dimensions 795 x 550 x 490 mm (W x H x D).

Packing cases of this kind are affected by humidity; the maximum number of cases to be stacked is indicated outside the packing .

The following are placed in each packing case:

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

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

ATTENZIONE: LEGGERE SCRUPOLOSAMENTE LE AVVERTENZE RIPORTATE ALL'INIZIO DEL MANUALE.

Fitting the burner to the boiler

To perform the installation, proceed as follows:

1 fix 4 holes on the boiler's door, according to the burner's drilling plate described on paragraph "Overall dimensions";
2 place the gasket on the burner's flange;
3 install the burner into the boiler;
4 fix the burner to the stud bolt, by means of the fixing nuts, according to Fig. 22.
5 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).

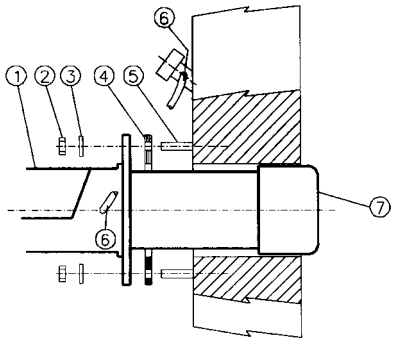


Fig. 22

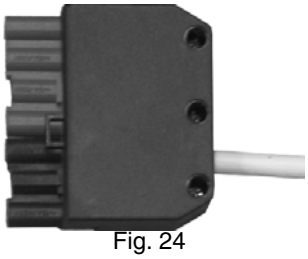
Key

1 Burner
2 Fixing nut
3 Washer
4 Sealing gasket
5 Stud bolt
7 Blast tube

ELECTRICAL WIRING

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

Identification of linking connectors

HIGH/LOW flame connector (CONN-TAB,) - mod. LO400	 Fig. 23
Burner power supply connector (CONN-LINEA, Fig. 24,)	 Fig. 24

IMPORTANT: before operating the burner, be sure all connectors are linked as indicated in the diagrams.

Make the electric connections following the diagrams below.

WARNING: the burner is fitted with a bridge between terminals T6 and T8 on CN2-TAB connector (external side link, male connector); remove this bridge before thermostat connection.

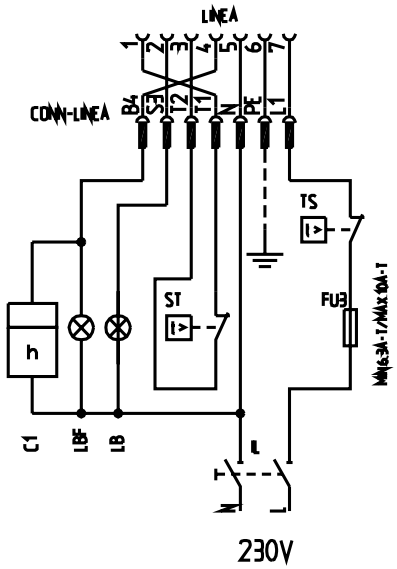


Fig. 25: Single stage burners

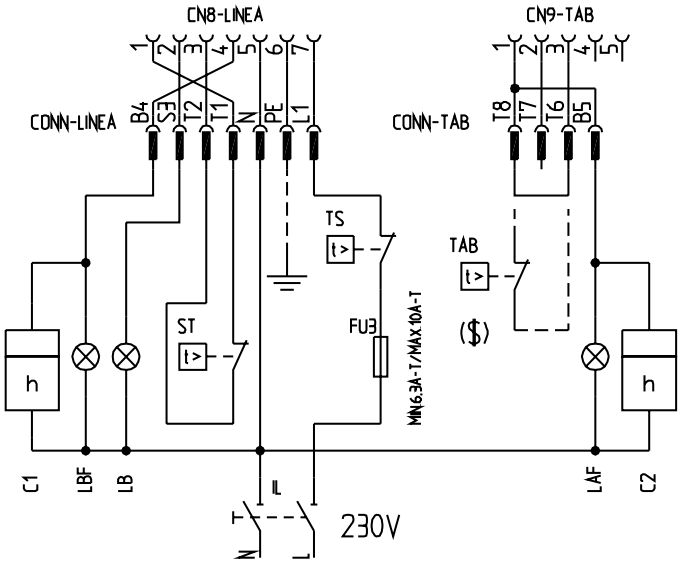


Fig. 26: High - Low flame burners

Key

C1-C2	Time counter	LAF	Burner in high flame signalling lamp (high-low flame and progressive versions only)
CONN-LINEA	Connectors on electrical board	LB	Burner lockout signalling lamp
CONN-TAB	Connectors on electrical board	LBF	Burner in low flame signalling lamp (high-low flame and progressive versions only)
F1-F3	Fuses	N	Neutral
IL	Line switch for burner's auxiliaries	ST	Thermostats or pressure switches group
IM	Fan motor line switch	TAB	High-Low flame thermostat
L	Phase	TS	Boiler safety thermostat

LIGHT OIL PIPING INSTALLATION DIAGRAM

PLEASE READ CAREFULLY THE "WARNINGS" CHAPTER AT THE BEGINNIGN OF THIS MANUAL

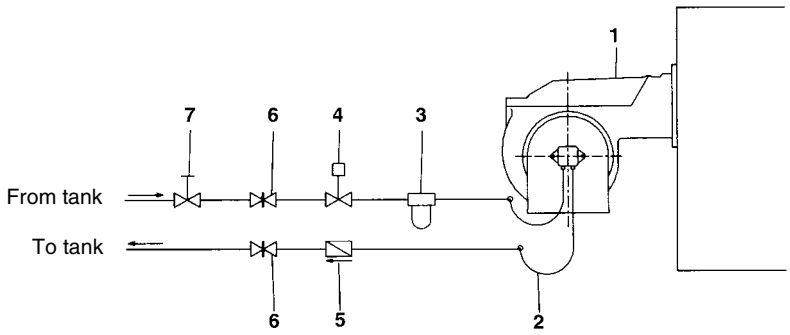


Fig. 27

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 (not in vicinity of tank or boiler)

(*) 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.

Pump operating principle

In the burners, the mixture bertween oil and air, to perform a clean and efficient combustion, is activated by atomization of oil into very small particles. This process is achieved making oil passing through the nozzle at a determined pressure

The pump's 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 si provided).

Other pumps are provided with two pressure regulators: one for the high and one for low pressure (in tow-stage systems with one nozzle).

These pumps 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 othe part goes back to the pump. In this system, the by-pass pulg, 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 pum'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 decribed before.

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.

As far as the pipes installation, refer to the following values, considering as well, the plant's needs.

Syphon twin pipe feed

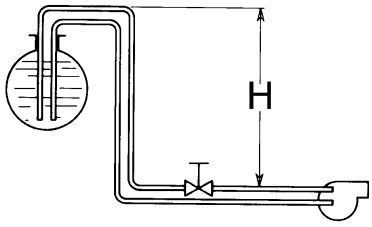


Fig. 28

Twin pipe suction feed

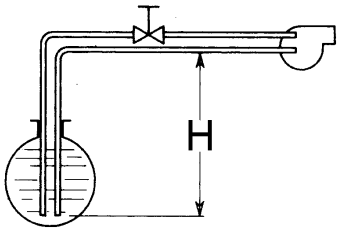


Fig. 29

SUNTEC AL65 - AS47 - AT2 45				
H (m)	L (m)			
	ø6	ø8	ø10	ø12
0	14	49	123	150
0,5	16	55	136	150
1	18	61	150	150
2	22	73	150	150
3	25	85	150	150
4	29	96	150	150

SUNTEC AL65 - AS47 - AT2 45				
H (m)	L (m)			
	ø6	ø8	ø10	ø12
0	14	49	123	150
0,5	12	44	110	150
1	10	38	96	150
2	7	26	66	140
3	3	13	13	75
4	0	1	1	15

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 sg 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.
- Filter must be thoroughly cleaned at least once in a season to ensure correct working of the fuel unit. To remove the filter, unscrew the four screws on the cover. When reassemble, make sure that the filter is mounted with the feet toward the pump body. If the gasket between cover and pump housing should be damaged, it must be replaced. An external filter should always be installed in the suction line upstream of the fuel unit.

Mounting of flexible light oil hoses

To connect the flexible hoses to the pump, proceed as follows.

1 Remove burner's cover.

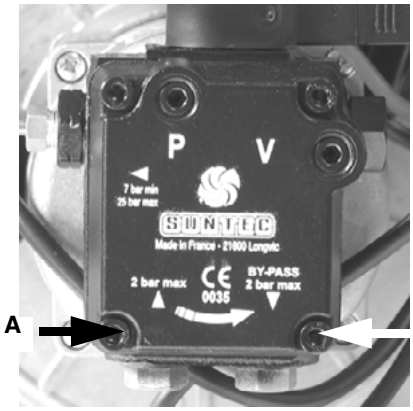


Fig. 30

mod. LO280

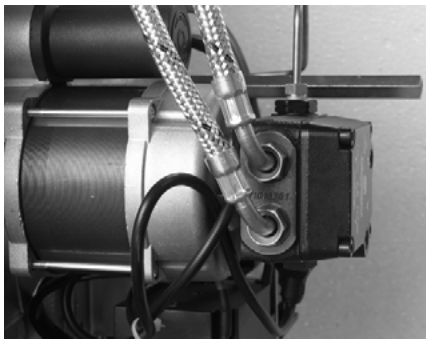


Fig. 31

mod. LO400

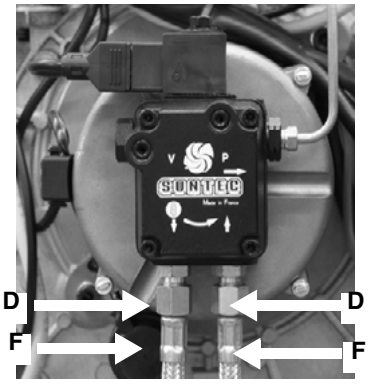


Fig. 32

2 Remove the light oil pump delivery and return line plugs.

3 Screw the rotating nut **D** of the two flexible hoses **F** on the pump being careful to avoid inverting the delivery and return lines.

4 Fix the flexible hoses as shoewed on Fig. 33

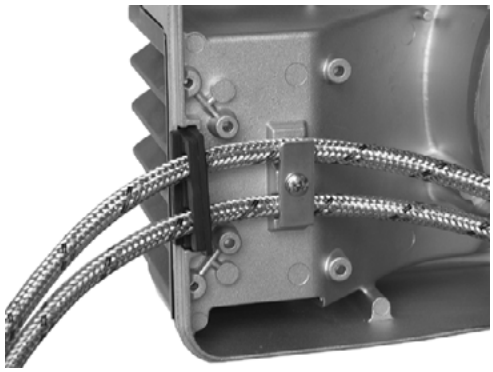


Fig. 33

5 Replace burner's cover.

⚠ **WARNING: if fuel used is BIODIESEL, some components must be replaced. Please contact our Technical Department for further details.**

SETTINGS LO280

Oil rate adjustment - Single stage burners

Priming the pump

Before carrying out the adjustment it is necessary to start up the fuel pump, proceeding as follows:

Prior to start up the burner, make sure that the return pipe to the tank is not obstructed. Any obstruction would cause the pump seal to break.

Start the burner, light up the photoresistor after the opening of the solenoid valve and escape the air from the pressure port.

The fuel flow rate is set choosing a properly dimensioned nozzle and setting the inlet pressure on the pump (see the hydraulic diagram in Fig. 34

To choose the correct nozzle refer to table Tab. 1; for setting of the pump pressure, see pag. 23.

Note: all pumps are set to 12 bar. The nozzle rate must be higher than the rate referred to the minimum burner output.

Choosing oil nozzles

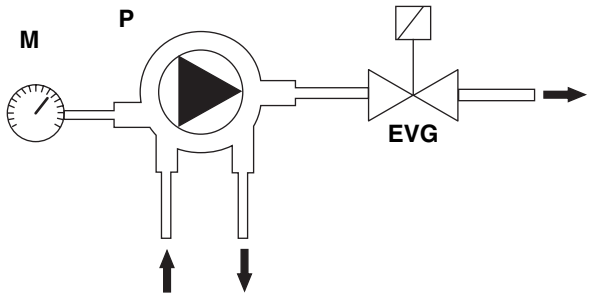
Key

EVG Light oil solenoid valve

M Manometer

P Pump (see chapter “LIGHT OIL PUMPS”)

Fig. 34



Tab. 1 - Choice of the oil nozzle - Single stage burners

NOZZLE	PUMP PRESSURE **(bar)**								
	6	7	8	9	10	11	12	13	14
G.P.H.	**kg/h**								
1,35	3,97	4,29	4,59	4,86	5,13	5,38	5,62	5,85	6,07
1,50	4,41	4,77	5,10	5,41	5,70	5,98	6,24	6,50	6,74
1,65	4,85	5,24	5,61	5,95	6,27	6,57	6,87	7,15	7,42
1,75	5,15	5,56	5,95	6,31	6,65	6,97	7,28	7,58	7,87
2,00	5,88	6,36	6,80	7,21	7,60	7,97	8,32	8,66	8,99
2,25	6,62	7,15	7,64	8,11	8,55	8,96	9,36	9,74	10,11
2,50	7,36	7,95	8,49	9,01	9,50	9,96	10,40	10,83	11,24
3,00	8,83	9,53	10,19	10,81	11,40	11,95	12,48	12,99	13,48
3,50	10,30	11,12	11,89	12,61	13,29	13,94	14,56	15,16	15,73
4,00	11,77	12,71	13,59	14,41	15,19	15,94	16,64	17,32	17,98
4,50	13,24	14,30	15,29	16,22	17,09	17,93	18,72	19,49	20,23
5,00	14,71	15,89	16,99	18,02	18,99	19,92	20,81	21,65	22,47
5,50	16,18	17,48	18,69	19,82	20,89	21,91	22,89	23,82	24,72
6,00	17,65	19,07	20,39	21,62	22,79	23,90	24,97	25,99	26,97
6,50	19,13	20,66	22,08	23,42	24,69	25,90	27,05	28,15	29,21

Oil rate adjustment - High-low flame burners
Priming the pump

Before carrying out the adjustment it is necessary to start up the fuel pump, proceeding as follows:

⚠ Prior to start up the burner, make sure that the return pipe to the tank is not obstructed. Any obstruction would cause the pump seal to break.

Start the burner, light up the photoresistor after the opening of the solenoid valve and escape the air from the pressure port.

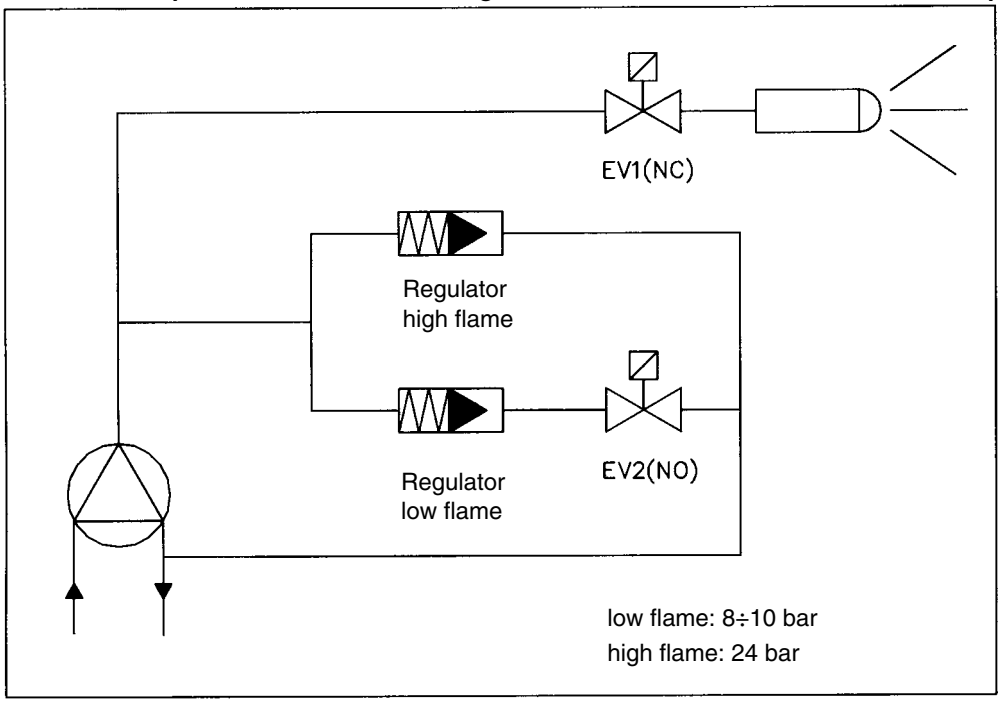
The light oil flow rate is adjusted choosing a nozzle of proper dimensions and setting the inlet pump pressure.

To choose the nozzle refer to the table below.

Setting the light oil pump

Adjust the ignition stage of the pump, to a pressure value of 8 - 10 bar. After 10", the safety device switch to the second stage. The pump setting must be fixed to 24 bar, by means of the adjusting screw (see chapter "LIGHT OIL PUMPS").

NOTE: The nozzle oil rate at a pressure of 8 bar, must be greather than the oil rate at the minimum output.



Tab. 2 - Choice of the oil nozzle - High-low flame burners

NOZZLE	PUMP PRESSURE (bar)																	
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
G.P.H.	kg/h																	
0,40	1,36	1,44	1,52	1,59	1,66	1,73	1,80	1,86	1,92	1,98	2,04	2,09	2,15	2,20	2,25	2,30	2,35	2,40
0,50	1,70	1,80	1,90	1,99	2,08	2,17	2,25	2,33	2,40	2,48	2,55	2,62	2,69	2,75	2,82	2,88	2,94	3,00
0,60	2,04	2,16	2,28	2,39	2,50	2,60	2,70	2,79	2,88	2,97	3,06	3,14	3,22	3,30	3,38	3,46	3,53	3,60
0,65	2,21	2,34	2,47	2,59	2,70	2,82	2,92	3,02	3,12	3,22	3,31	3,40	3,49	3,58	3,66	3,74	3,83	3,90
0,75	2,55	2,70	2,85	2,99	3,12	3,25	3,37	3,49	3,60	3,71	3,82	3,93	4,03	4,13	4,23	4,32	4,41	4,50
0,85	2,89	3,06	3,23	3,39	3,54	3,68	3,82	3,95	4,08	4,21	4,33	4,45	4,57	4,68	4,79	4,90	5,00	5,11
1,00	3,40	3,60	3,80	3,98	4,16	4,33	4,49	4,65	4,80	4,95	5,10	5,24	5,37	5,50	5,63	5,76	5,88	6,01
1,10	3,74	3,96	4,18	4,38	4,58	4,76	4,94	5,12	5,29	5,45	5,61	5,76	5,91	6,06	6,20	6,34	6,47	6,61
1,20	4,08	4,32	4,56	4,78	4,99	5,20	5,39	5,58	5,77	5,94	6,12	6,28	6,45	6,61	6,76	6,91	7,06	7,21
1,25	4,25	4,50	4,75	4,98	5,20	5,41	5,62	5,82	6,01	6,19	6,37	6,54	6,71	6,88	7,04	7,20	7,36	7,51
1,35	4,59	4,86	5,13	5,38	5,62	5,85	6,07	6,28	6,49	6,69	6,88	7,07	7,25	7,43	7,61	7,78	7,94	8,11
1,50	5,10	5,41	5,70	5,98	6,24	6,50	6,74	6,98	7,21	7,43	7,64	7,85	8,06	8,26	8,45	8,64	8,83	9,01
1,65	5,61	5,95	6,27	6,57	6,87	7,15	7,42	7,68	7,93	8,17	8,41	8,64	8,86	9,08	9,30	9,51	9,71	9,91
1,75	5,95	6,31	6,65	6,97	7,28	7,58	7,87	8,14	8,41	8,67	8,92	9,16	9,40	9,63	9,86	10,08	10,30	10,51
2,00	6,80	7,21	7,60	7,97	8,32	8,66	8,99	9,30	9,61	9,91	10,19	10,47	10,74	11,01	11,27	11,52	11,77	12,01
2,25	7,64	8,11	8,55	8,96	9,36	9,74	10,11	10,47	10,81	11,14	11,47	11,78	12,09	12,39	12,68	12,96	13,24	13,51
2,50	8,49	9,01	9,50	9,96	10,40	10,83	11,24	11,63	12,01	12,38	12,74	13,09	13,43	13,76	14,09	14,40	14,71	15,02
3,00	10,19	10,81	11,40	11,95	12,48	12,99	13,48	13,96	14,41	14,86	15,29	15,71	16,12	16,51	16,90	17,28	17,65	18,02
3,50	11,89	12,61	13,29	13,94	14,56	15,16	15,73	16,28	16,82	17,33	17,84	18,33	18,80	19,27	19,72	20,16	20,60	21,02
4,00	13,59	14,41	15,19	15,94	16,64	17,32	17,98	18,61	19,22	19,81	20,39	20,94	21,49	22,02	22,54	23,04	23,54	24,02
4,50	15,29	16,22	17,09	17,93	18,72	19,49	20,23	20,94	21,62	22,29	22,93	23,56	24,17	24,77	25,35	25,92	26,48	27,03

mod. LO280 Air rate setting

- **Single stage burners**
- loosen **VR** screw.
- move the **ID** index along the graduated slot towards + or -, in order to increase or decrease the air flow-rate, according to the required combustion values.
- asten the **VR** screw again.

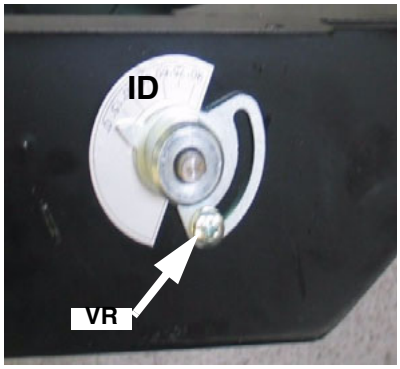


Fig. 35

- **Double stage burners**

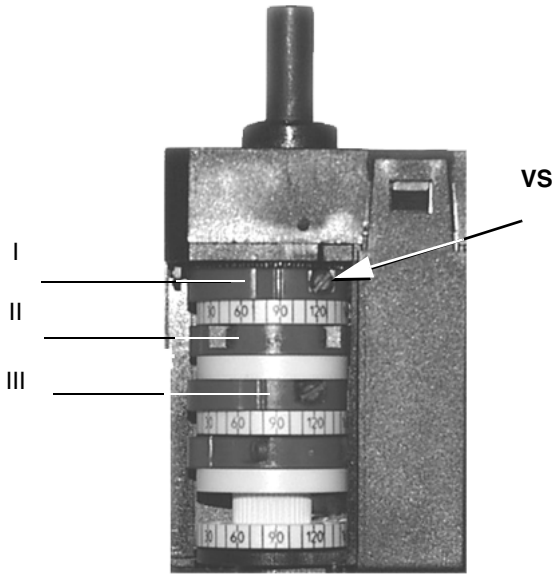
Servocontrol cams adjustement

.

.Air damper position is set by means of the servocontrol cams. As for the setting, refer to the next table

The STA4.5B0.37 is not provided with the manual contrl for the air damper. The cams adjustement must be performed by means of a screwdriver acting on the **VS** screw placed inside the cam. During the first setting, set the cam III between the cams I and II. Then, passing from the low to high flame stage, or viceversa, change the setting according to the flame composition: if cam III is too near to the low flame position (cam II), flue gas can take place, because there is more fuel than air; if cam III is too near to high flame (cam I), the flame could fade because of too much air.

Fig. 36 - Berger STA4.5B0.37/63N30L



BERGER STA4.5B0.37/6..	
I	High flame
II	Low flame - stand by - ignition
III	EVG2 opening (2nd nozzle)

MOD. LO400 SETTINGS

Priming the pump

Before carrying out the adjustment it is necessary to start up the fuel pump, proceeding as follows:

⚠ **Prior to start up the burner, make sure that the return pipe to the tank is not obstructed. Any obstruction would cause the pump seal to break.**

Start the burner, light up the photoresistor after the opening of the solenoid valve and escape the air from the pressure port.

Fuel rate adjustment

The fuel rate is setting choosing properly sized nozzles and adjusting the fuel pressure at the pump inlet (see the diagram Fig. 37 and Fig. 38). To choose the nozzles refer to Tab. 3b and Tab. 1b; for pump pressure regulation see on pag. 23. For further information on fuel pump see also the appendix.

⚠ **Note: all pumps are set to 12 bar. The nozzle rate must be higher than the rate referred to the minimum burner output.**

Key

EV Fuel solenoid valve
EVG1 Fuel solenoid valve - low flame
EVG2 Fuel solenoid valve - high flame (only hi-lo flame burners)
M Manometer
P Pump

Fig. 37 - **Single stage burners**

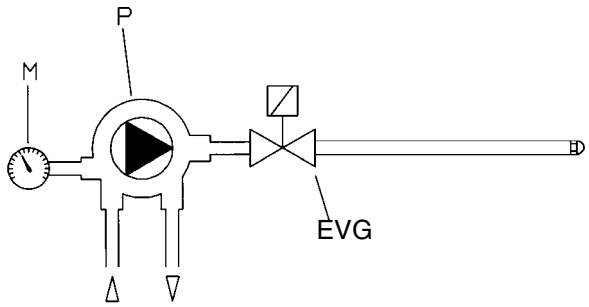
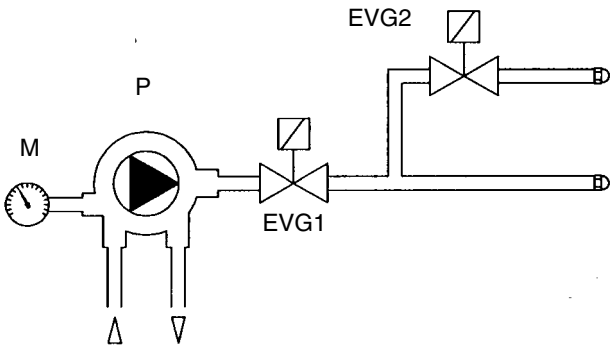


Fig. 38 - **Double stage burners**



Choosing the light oil nozzles

Tab. 3a - Single-stage LO400

	PUMP PRESSURE (bar)		
	10	12	14
NOZZLE (G.P.H.)	**FUEL RATE kg/h**		
4,00	15,19	16,64	17,98
4,50	17,09	18,72	20,23
5,00	18,99	20,81	22,47
5,50	20,89	22,89	24,72
6,00	22,79	24,97	26,97
6,50	24,69	27,05	29,21
7,00	26,59	29,13	31,46
7,50	28,49	31,21	33,71
8,30	31,53	34,54	37,30
9,50	36,09	39,53	42,70

Tab. 3b - Double-stage LO400

RATE		OUTPUT	PUMP PRESSURE		
kg	kcal/h	kW	10bar	12bar	14bar
30	306.300	356	3.50+4.50	3.00+4.00	3.00+3.50
35	357.350	416	4.00+5.00	3.50+5.00	3.50+4.00
40	408.400	475	4.50+6.00	4.00+5.50	4.00+5.00
45	459.450	534	5.00+6.50	4.50+6.00	4.00+6.00
50	510.500	594	5.50+7.50	5.00+7.00	4.50+6.50

Single stage burners

Set the air rate working on the screw **VBS** (Fig. 39); screw to decrease the air rate or unscrew to increase it.

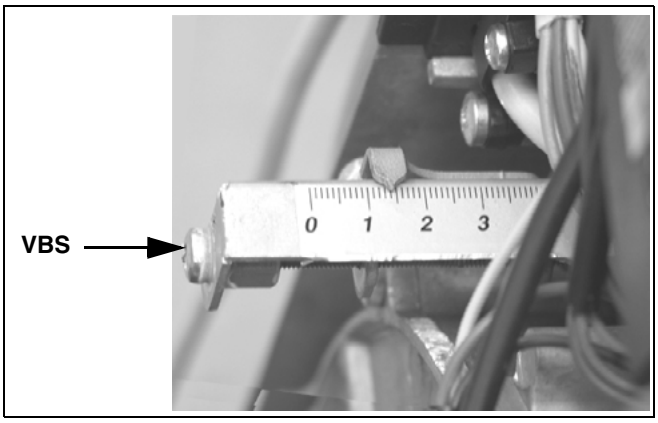


Fig. 39

Two-stage burners

- The air flow can be adjusted using the air damper servo-control cams as follows.
- Remove the burner's cover cover.
- Remove the servo-control's cover.
- Start the burner and let it burn at low flame (remove the bridge between Terminals **T6** and **T8**).
- Adjust the air flow in low flame by working on the appropriate cam (Fig. 42).
- Prime the second nozzle using the following procedure:

♦ Start the burner

♦ When the flame appears press the **P1** button (Fig. 40) for a few seconds to fill the second nozzle pipe;

- The cycle continues, and if the TAB thermostat is connected, the flame control apparatus brings the burner to high flame. If the **TAB** thermostat is not connected, bridge Terminals **T6** and **T8** on the connector (see “Identification of linking connectors” on page 11 and “Connectors layout on printed board” on page 41). Adjust the air flow at high flame by working on the appropriate cam.
- The cam that triggers the opening of the 2nd stage fuel valve (valve EVG2) must be set in an intermediate position between the other two cams.
- Replace the cover on the servo-control.
- Replace the burner's cover.

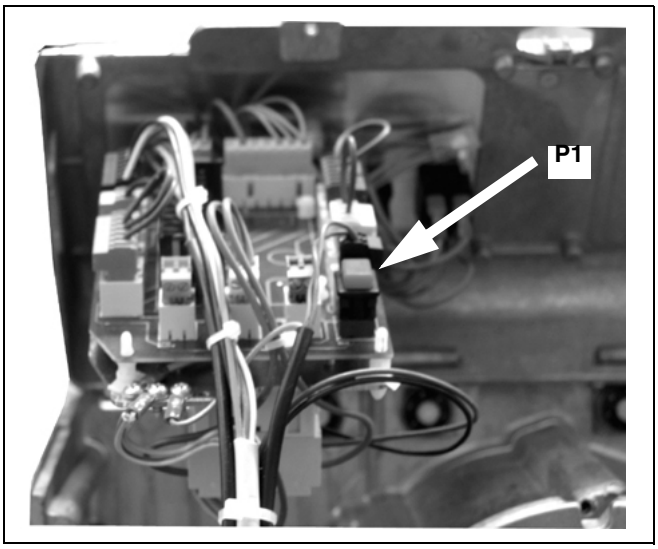


Fig. 40 - Second nozzle’s ignition pushbutton on double stage burners

Connections for pressure measurement

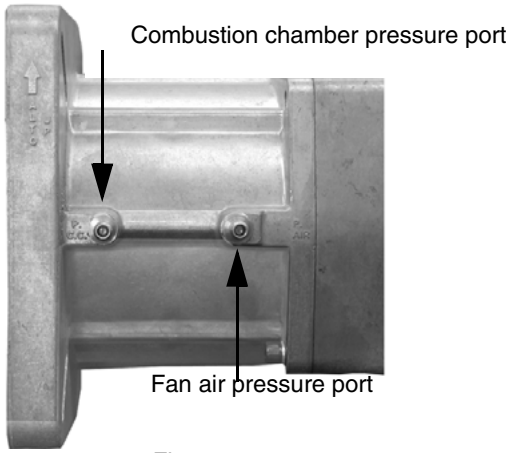


Fig. 41

SERVOCONTROL CAMS SETTING - Adjustment of cams microswitches

Refer to Tab. 4 for cams functions.

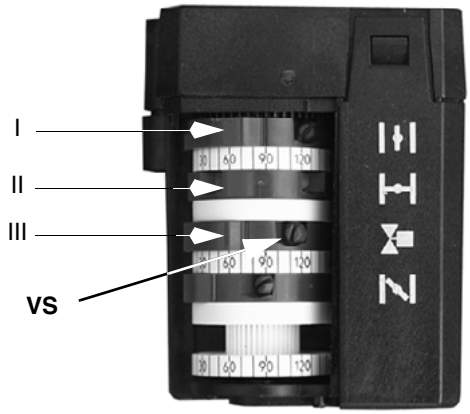


Fig. 42 - Berger STA4.5B037/4

Air damper position is set by means of the servocontrol cams. As for the setting, refer to the next table.

The STA4.5B0.37 is not provided with the manual control for the air damper. The cams adjustement must be performed by means of a screwdriver acting on the **VS** screw placed inside the cam. During the first setting, set the cam III inbetweens the cam I and II. Then, passing from the low to high flame stage, or viceversa, change the setting according to the flame composition: if cam III is too near to the low flame position (cam II), flue gas can take place, because there is more fuel than air; if cam III is too near to low flame (cam I), the flame could be turned off because of too much air.

Tab. 4

	BERGER STA4.5BO.37
Air adjustment in high flame cam	I
Air adjustment in low flame - Stand-by - Ignition cam	II
Auxiliary cam for the opening consent to the second fuel valve	III

LIGHT OIL PUMPS

mod. LO280 Pumps

Pump Suntec AS47 A

Viscosity	2 - 12 mm²/s (cSt)
Fuel temperature	0 - 60 °C into the pump
Maximum inlet pressure	14 bar max.
	- 0,45 barto avoid the separation between air and oil
Return pressure	2 bar max.
Rated speed	3600 rpm max.

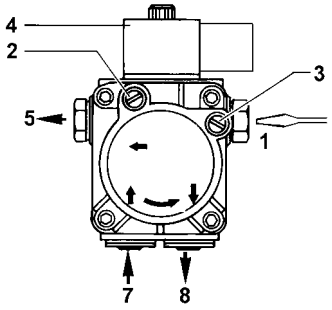


Fig. 43

Pump Suntec AT2 45A

Viscosity range	2 ÷ 12 (cSt) mm²/s
Oil temperature	60 °C max
Inlet pressure	2 bar max.
	- 0,35 barto avoid the separation between air and oil
Return pressure	2 bar max.
Rated speed	3600 rpm

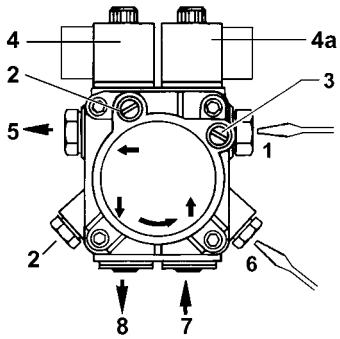


Fig. 44

Keys for Suntec AS47 A pump

1 Pressure governor
2 Manometer
3 Vacuum gauge
4 Solenoid valve
5 Nozzle
7 Suction
8 Return

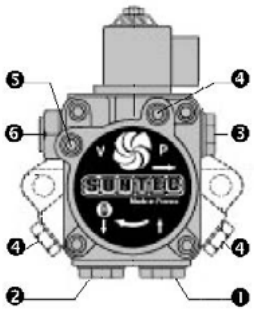
Keys for Suntec A T2 45A pump

1 Low pressure regulation (first stage)
2 Manometer
3 Vacuum gauge
4 Light oil solenoid valve
4a High-low pressure solenoid valve
5 To nozzle
6 High pressure regulation (second stage)
7 Suction
8 Return (with internal by-pass plug)

Pumps for mod. LO400

Pump Suntec AL65

Viscosity range	2 ÷ 12 (cSt) mm²/s
Oil temperature	0 - 60 °C in the pump
Inlet pressure	2 bar max.
Minimum inlet pressure	- 0,45 barto avoid the separation between air and oil
Return pressure	2 bar max.
Rated speed	3600 rpm



1 suction
2 return and internal by-pass plug
3 nozzle outlet
4 pressure gauge port
5 vacuum gauge port
6 pressure adjustement

Fig. 45

ADJUSTING THE COMBUSTION HEAD

The burner is set in the factory with the combustion head in the "MAX" position, corresponding to the maximum power (combustion head all-forward). To operate the burner at a lowest strenght, progressively shift back the combustion head, toward the "MIN" position, rotating the VRT screw clockwise (Fig. 47).

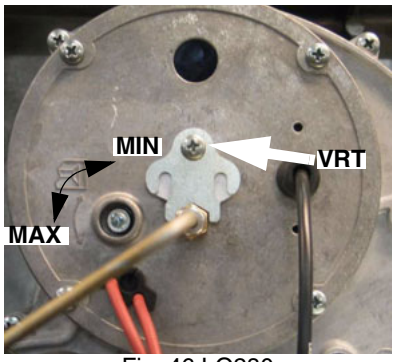


Fig. 46 LO280

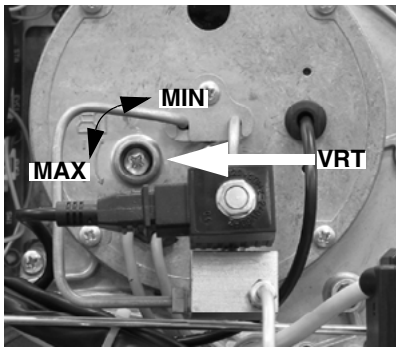


Fig. 47 LO400

PART II: OPERATION MANUAL

LIMITATIONS OF USE

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

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

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

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

NEVER OPEN OR DISMANTLE ANY COMPONENT OF THE MACHINE.

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 THE EVENT OF REPEATED LOCKOUTS, DO NOT PERSIST WITH THE RESET BUTTON AND CONTACT QUALIFIED PERSONNEL WHO WILL PROCEED TO ELIMINATE THE MALFUNCTION.

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.

FUNCIONAMIENTOOPERATION

Single-stage burners

- Turn on the burner using the switch **A** on the control panel (Fig. 48: the control panel of the single stage burner is only provided with the power switch and the fuse).
- Make sure that the apparatus is not in shutdown condition and if so, release by using the release button **S** on the burner cover (see Fig. 49).
- Make sure that the set of thermostats (or pressure-switches) triggers burner operation.
- The burner starting cycle begins and the apparatus starts the burner fan while the ignition transformer switches on at the same time.
- At the end of pre-ventilation, the fuel solenoid valve receives input and the burner switches on.
- The ignition transformer remains switched on for a few seconds after the ignition of the flame (post-ignition time) after which it is disconnected from the circuit.

Double-stage burners

- Turn on the burner using the switch **A** on the control panel (Fig. 48).
- Make sure that the apparatus is not in shutdown condition and if so, release by using the release button **S** on the burner cover (see Fig. 49).
- Make sure that the set of thermostats (or pressure-switches) triggers burner operation.
- The burner starting cycle begins and the apparatus starts the burner fan while the ignition transformer switches on at the same time; pre-ventilation lasts for 13 or 25 seconds depending on the apparatus provided with the burner.
- At the end of pre-ventilation, the fuel solenoid valve (1st stage, EVG1) receives input as signalled by the illumination of the signal light **H** on the control panel and the burner starts.
- The ignition transformer remains switched on for a few seconds after the ignition of the flame (post-ignition time), after which it is disconnected from the circuit and the corresponding signal light switches off.
- In this way, the burner is lit at low flame; after 5 or 15 seconds (depending on the apparatus installed) two-stage operation begins and the burner is either automatically brought to high flame (light **G** on) or remains burning at low flame (light H on) depending on the requests received from the system.

Burner's control panel

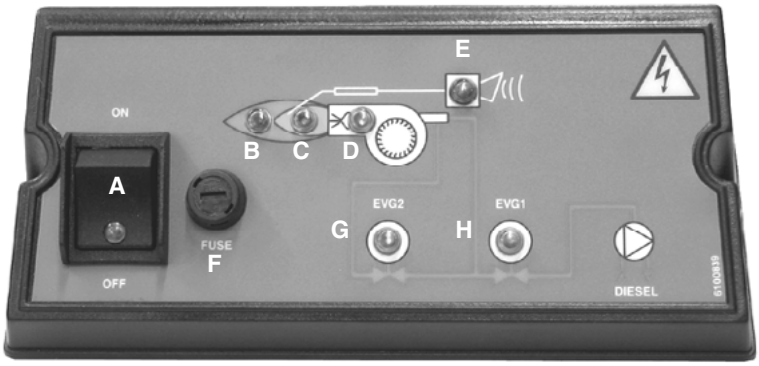


Fig. 48

Keys

A	Main switch
B	High flame lamp
C	Low flame lamp
D	Ignition transformer ligh
E	Lockout signalling lamp
F	Fuse
G	High flame solenoid valve operation light
H	Low flame solenoid valve operation light
S	Reset pushbutton (Fig. 49)

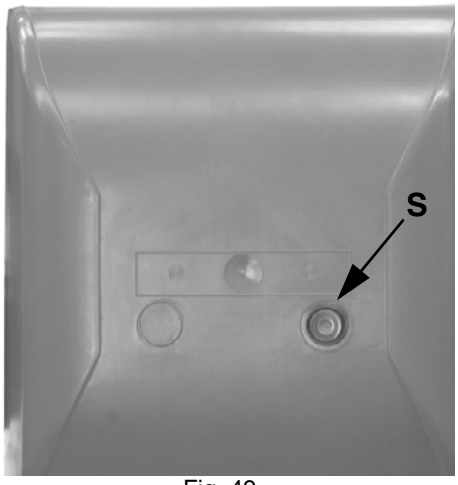


Fig. 49

PART III: MAINTENANCE MANUAL

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!

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

ROUTINE OPERATIONS

- Inspection and cleaning of the light oil filter cartdrige; replace it if necessary.
- Check the overall condition of the flexible light oil hoses and make sure there are no signs of leakage;
- Inspection and cleaning of the filter inside the light oil pump: filter must be thoroughly cleaned at least once in a season to ensure correct working of the fuel unit. To remove the filter, unscrew the four screws on the cover. When reassemble, make sure that the filter is mounted with the feet toward the pump body. If the gasket between cover and pump housing should be damaged, it must be replaced.
- Disassembly, inspection and cleaning of the combustion head. Respect the measurements listed on pag. 31 carefully during re-assembly.
- Inspection and cleaning of ignition electrodes (pag. 29) and respective ceramic insulators: clean, adjust, and replace if necessary.
- Disassemble and clean the light oil nozzles (pag. 29).

IMPORTANT: cleaning must be performed using solvent, not metal tools!

At the end of maintenance operations after first reassembling the burner, light the flame and check its shape, replacing the nozzle whenever a questionable flame shape appears. Whenever the burner is used intensely, we recommend preventively replacing the nozzle at the start of each heating season;

- Inspect and thoroughly clean the flame detection photoresistor and replace if necessary. In case of doubt, check the detection current after first starting the burner by following the procedure illustrated in Fig. 69.
- Clean and grease levers and rotating parts.

Removing the combustion head

- Remove the burner's cover by unscrewing the fixing screws.
- Slacken the light oil pipes **T1** and **T2** from the pump (Fig. 50).
- Disconnect the ignition cables **CA1** and **CA2** from the transformer **TA** (Fig. 51).
- Remove the 4 screws **V1** - **V4** shown in Fig. 53.
- Disconnect the connector **CE** fron the solenoid valve **EV2**

ATTENTION: the screw V1 is longer than the other and must be replaced in the same position!

- Withdraw the photoelectric cell **FR** from its housing (Fig. 54).

ATTENTION: avoid to withdraw the photoelectric cell drawing its cable!

- Remove the combustion head from its housing as shown in Fig. 55.
- Clean the combustion head by a compressed air blow or, in case of scale, scrape it off by a scratchbrush.
- Replace the combustion head.
- Replace the burner's cover.

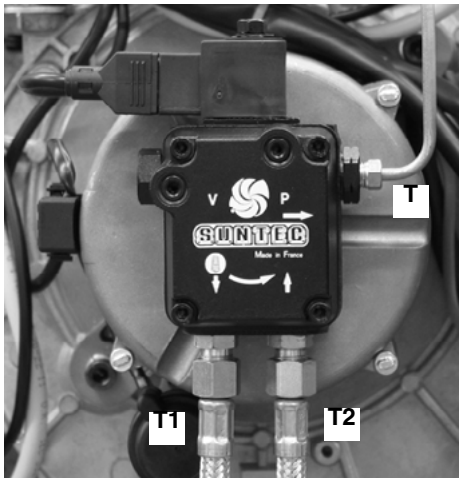


Fig. 50

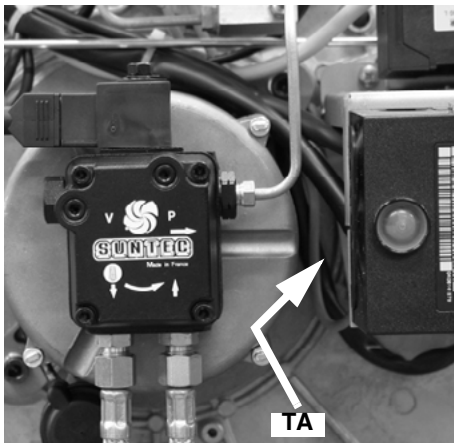


Fig. 51

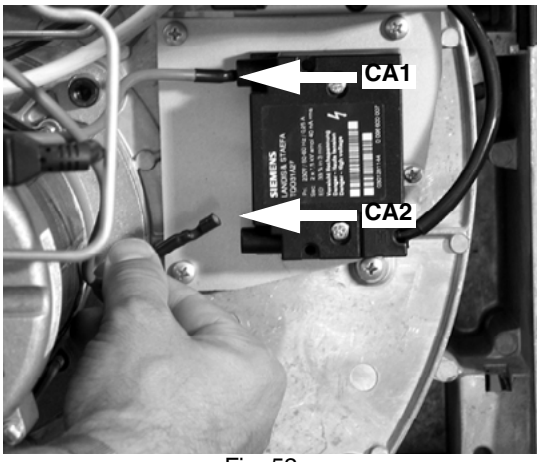


Fig. 52

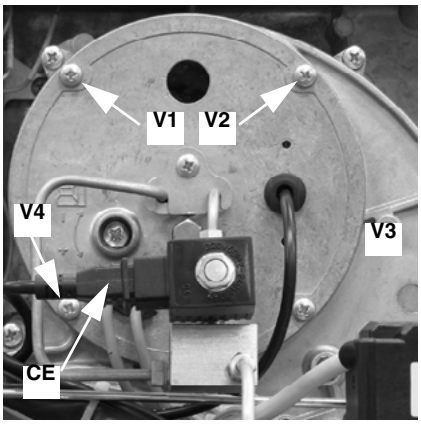


Fig. 53

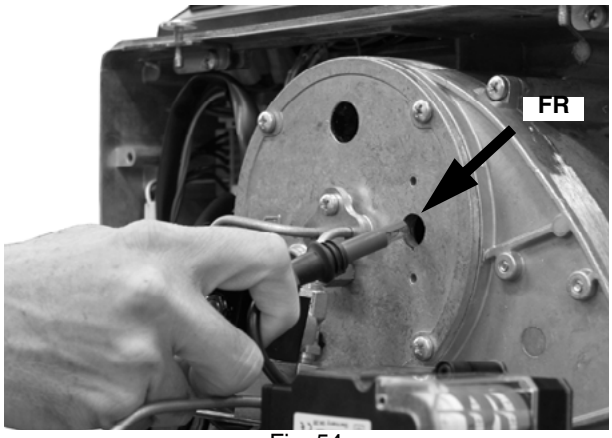


Fig. 54

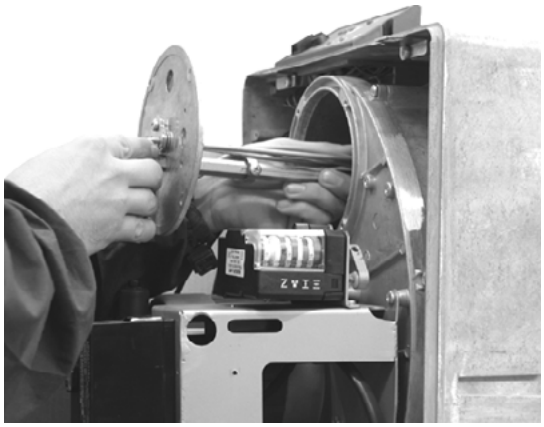


Fig. 55

Removing burner components plate

- Remove the combustion head (see “Removing the combustion head” a pagina 26).
- Remove the 7 screws **V5** - **V11** which fasten the components plate (Fig. 56).
- Remove the rod **T** from its housing as shown in Fig. 57.
- Hook the burner components plate as shown in Fig. 58.

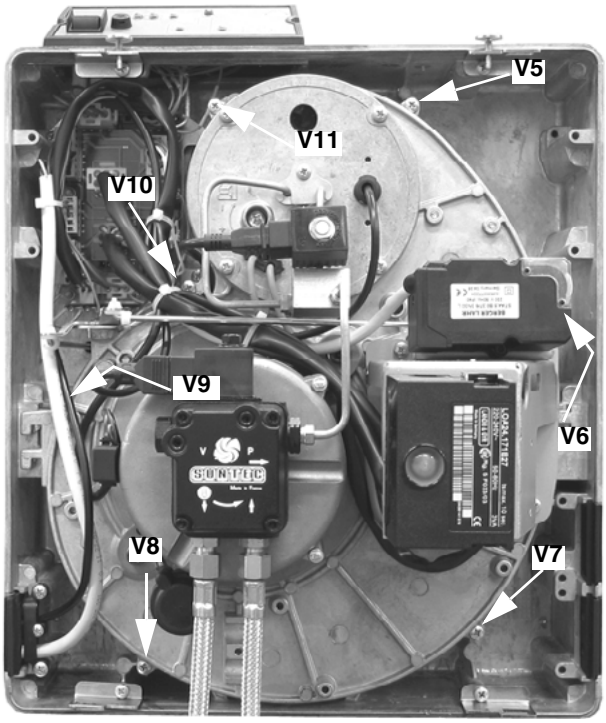


Fig. 56

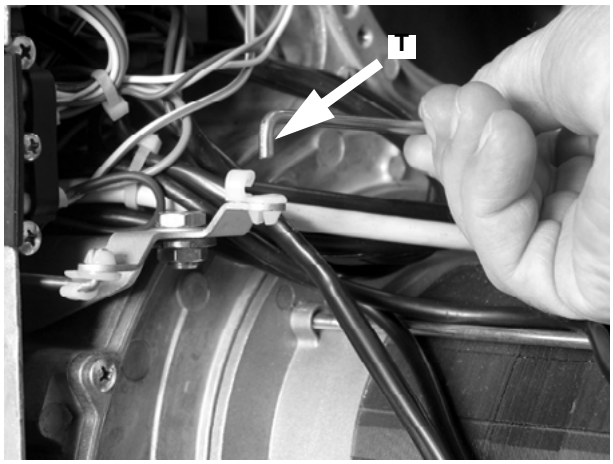


Fig. 57

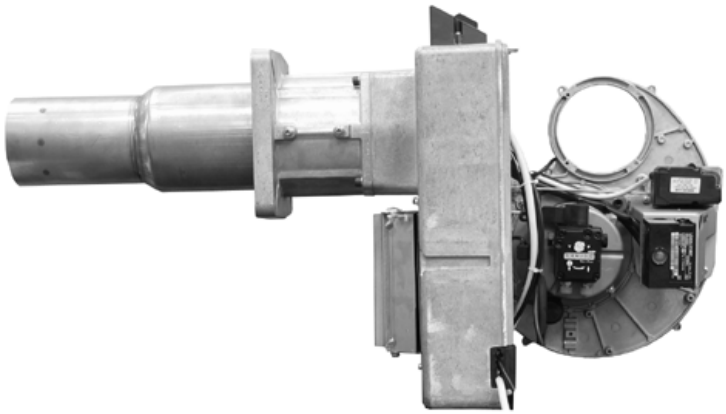


Fig. 58

Assembling burner components plate

- Reassemble burner components plate and tighten the 6 screws **V5** - **V11** (Fig. 56).
- Refit the rod **T** (Fig. 57).
- Reassemble the combustion head and tighten the 4 screws **V1** - **V4** (Fig. 53).

Removing the electrodes

- Remove the combustion head (see “Removing the combustion head” on page 26).
- Withdraw the screw **VE** and remove the electrodes from the support (Fig. 59 - Fig. 60).

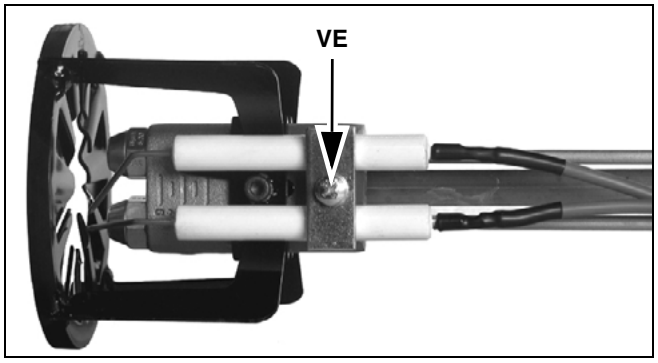


Fig. 59

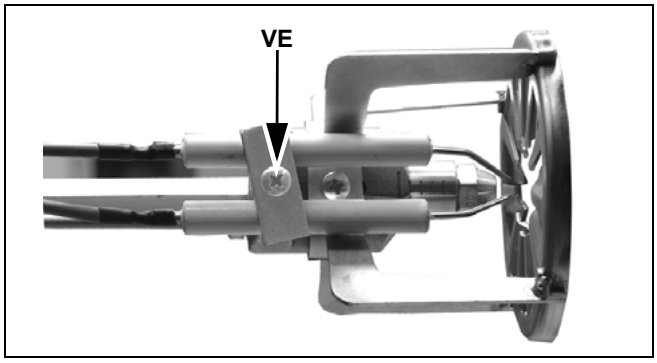


Fig. 60

DISASSEMBLY OF THE NOZZLE *mod. LO280*

Before disassembly the nozzle, measure the real position “A” (see Fig. 61) and make a note in the panel below.

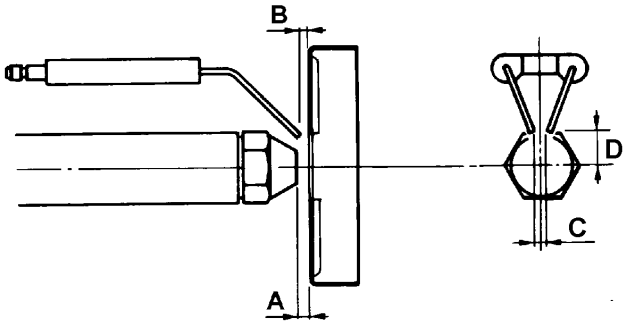


Fig. 61

	NOZZLE	A
Position “A” set in the factory mm:	60°	8
	45°	10
Measurement of real “A” position, mm:	60°	.....
	45°	.....

- Unscrew the **V** screw that fastens the combustion head and remove the head from the nozzle-holder (Fig. 62 - Fig. 63).

In order to remove the nozzle, it is important to use two wrenches as shown in Fig. 63, to avoid damaging the burner component plate!

- Reassemble the combustion head by respecting the position "A" measured previously, making sure to fasten the V screw (Fig. 62).

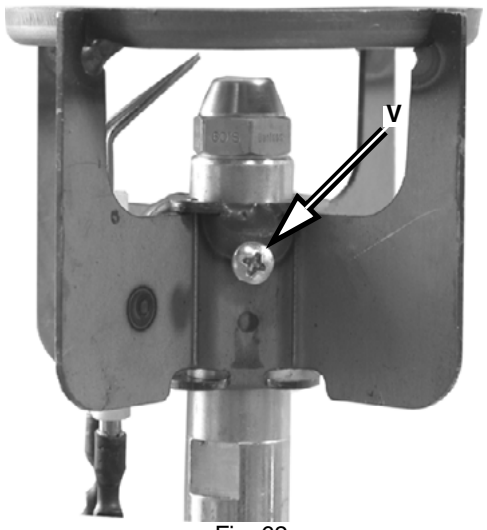


Fig. 62

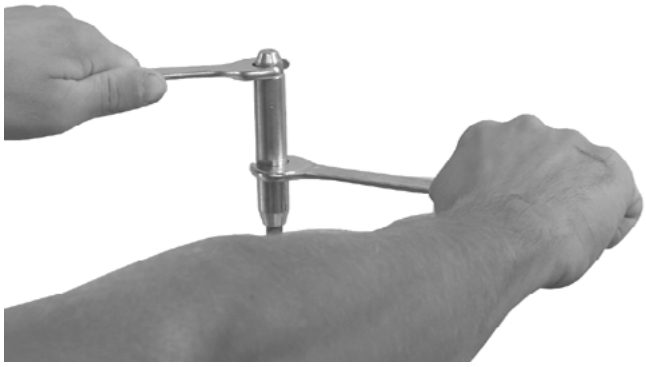


Fig. 63

Removing the nozzles LO400

- Unscrew the Allen screw **VT** and remove the combustion head **TC**.
- Unscrew the nozzles using two wrenches (16 and 24 mm), as shown in Fig. 66.

Double stage burners

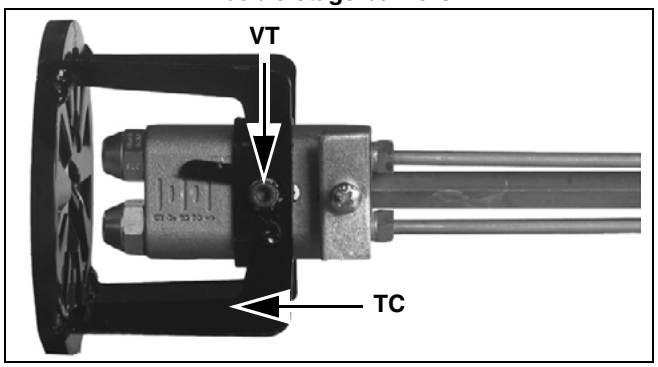


Fig. 64

Single stage burners

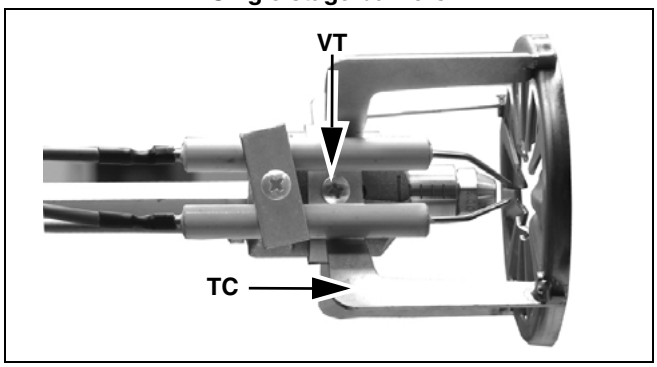


Fig. 65

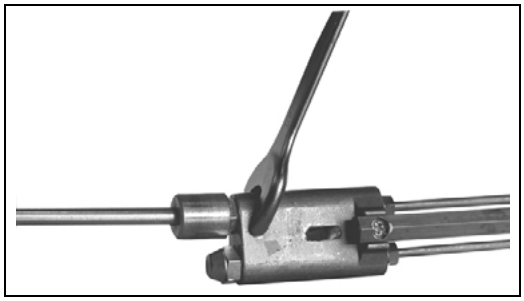


Fig. 66

Correct position of electrodes and combustion head

To ensure a good ignition, respect the measures in Fig. 67 - Fig. 68.

Single stage burners (mod. LO280-LO400) and Double stage burners (mod. LO280)

A 8 ÷ 10 mm
B 4,5 ÷ 6 mm
C 10 mm
D 6.5 mm

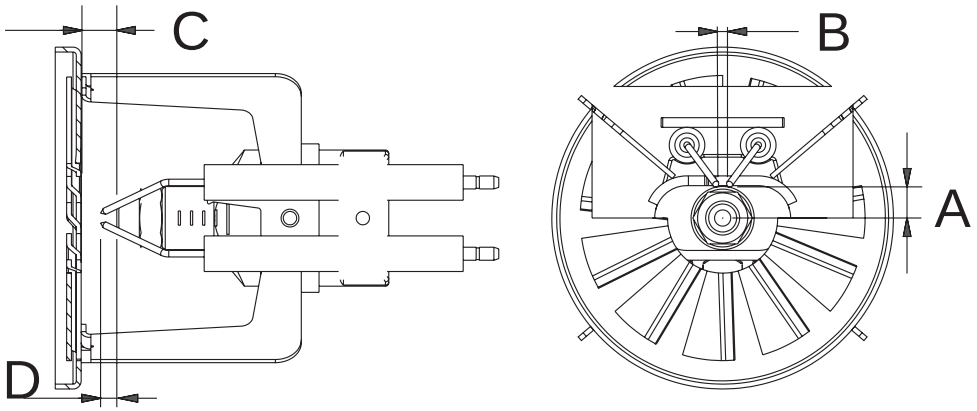


Fig. 67

Double-stage burners (mod. LO400)

A 8 ÷ 10 mm
B 4,5 ÷ 6 mm
C 8 mm
D 5 mm

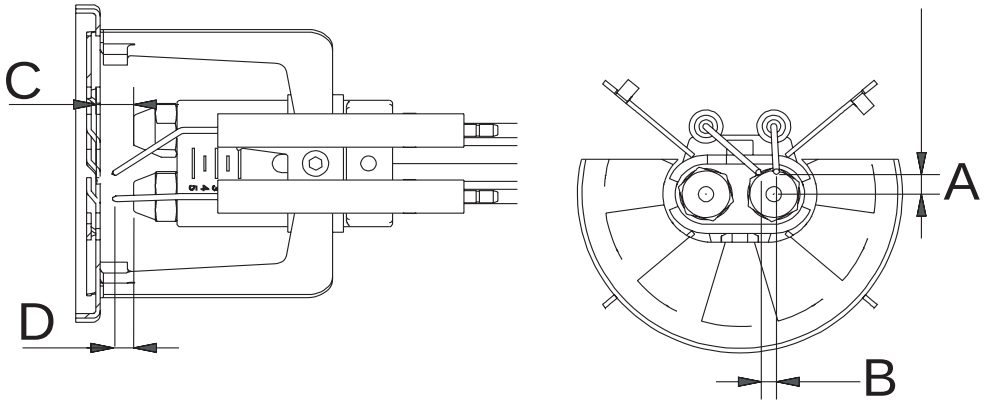


Fig. 68

Check the detection current

See the diagram in Fig. 69 to measure the detection current. If the signal doesn't suit the suggested value, verify the electric terminal, the cleaning of the combustion head and the position of the photoelectric cell; replace it if necessary..

Minimum current intensity with flame	45 µA
Maximum current intensity without flame	5 µA
Maximum possible current intensity with flame	45 µA (LOA..) 100 µA (LMO..)

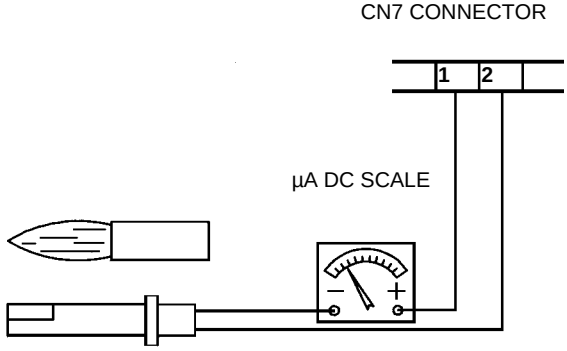
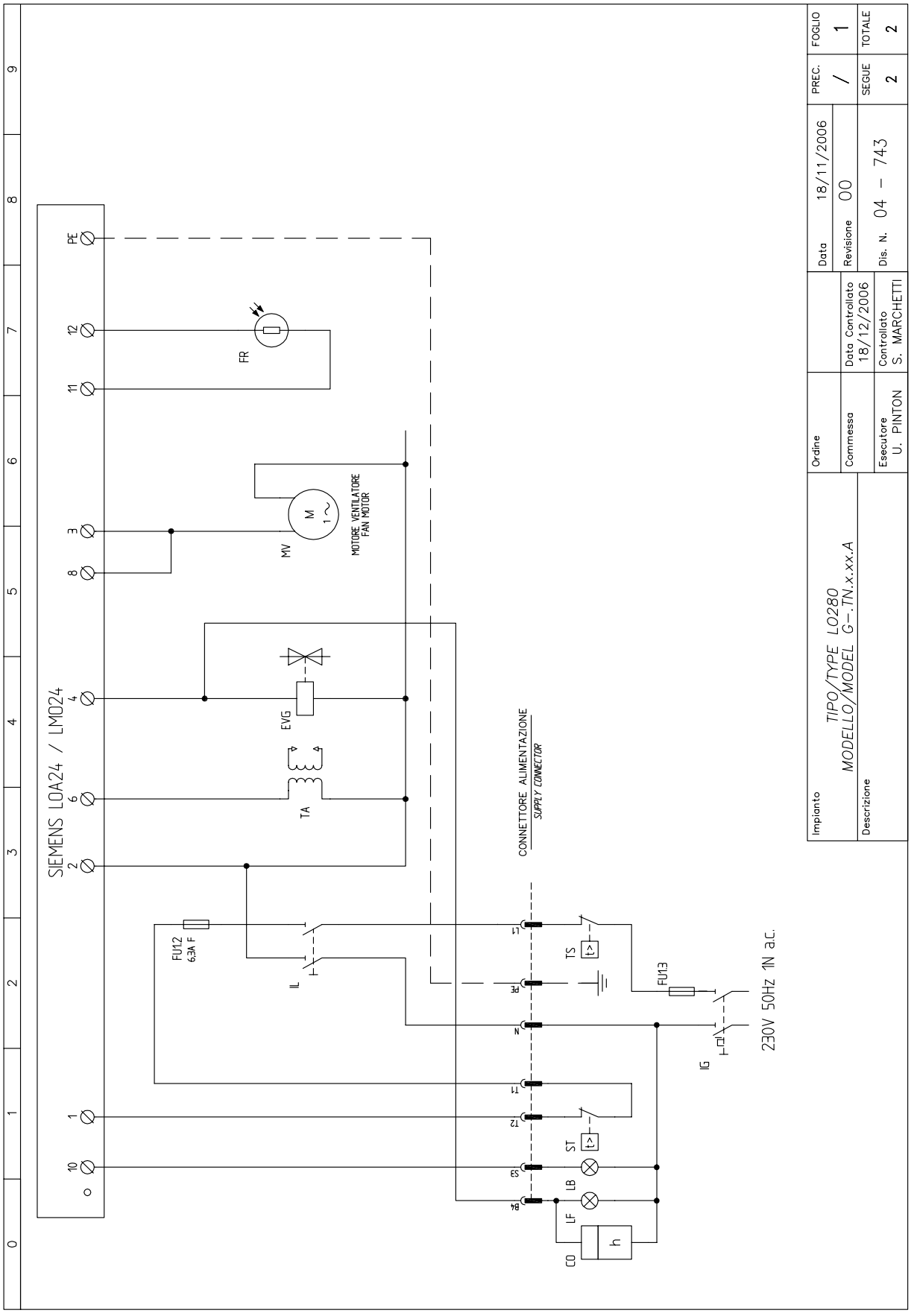


Fig. 69

	BURNER DOESN'T START	REPETITION OF PRE-PURGE	NOISY FUEL PUMP	BURNER DOESN'T START AND LOCKS	BURNER STARTS AND LOCKS	BURNER DOESN'T SWITCH TO HIGH FLAME	BURNER LOCK DURING OPERATION	BURNER LOCKS AND REPEATS CYCLE DURING OPERATION
MAINS SWITCH OPEN	●							
FUSES INTERVENTION	●							
MAXIMUM PRESSURE SWITCH FAULT	●							●
INTERVENTION OF THE FAN MOTOR THERMAL CUTOUT	●							
AUXILIARIES RELAY FUSES INTERVENTION	●							
FLAME CONTROL DEVICE FAULT	●	●		●	●		●	
SERVOCONTROL FAULT						●		
SMOKY FLAME					●		●	
IGNITION TRANSFORMER FAULT				●				
IGNITION ELECTRODE DIRTY OR BAD POSITION				●				
DIRTY NOZZLE				●				
FUEL SOLENOID VALVE DEFECTIVE				●			●	
PHORESISTANCE DIRTY OR DEFECTIVE					●		●	
HIGH - LOW FLAME THERMOSTAT DEFECTIVE						●		
BAD POSITION OF SERVOCONTROL CAMS						●		
FUEL LOW PRESSURE				●				
FUEL FILTERS DIRTY			●	●			●	

WIRING DIAGRAMS

Wiring diagram 04-743 - LO280 Single stage burners

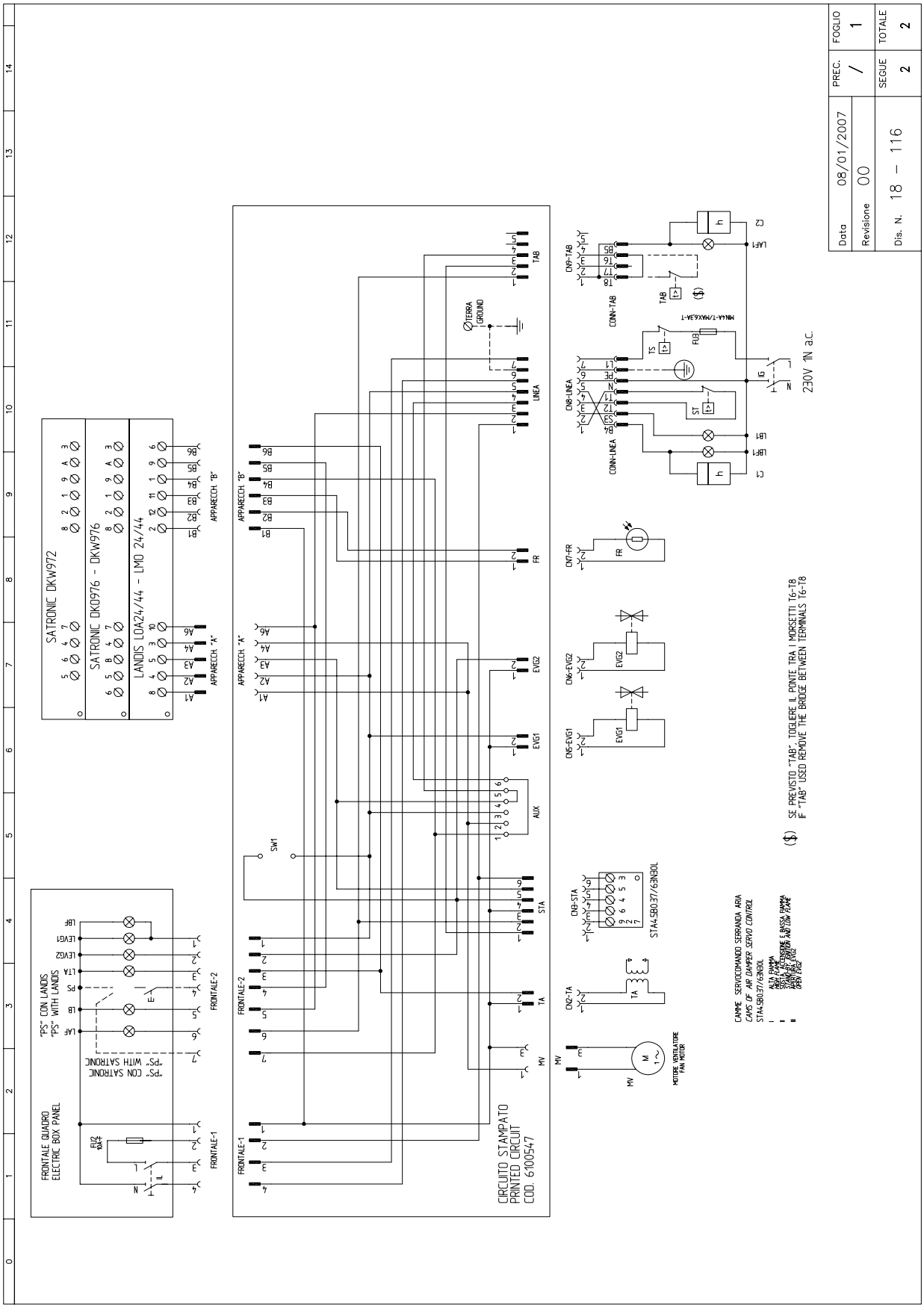


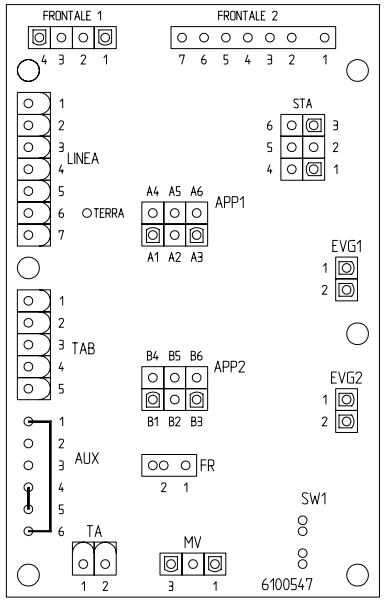
0	1	2	3	4	5	6	7	8	9

SIGLA/ITEM	FOGLIO/SHEET	FUNZIONE	FUNCTION
CO	1	CONTAORE DI FUNZIONAMENTO (OPTIONAL)	OPERATION TIME METER (OPTIONAL)
EVG	1	ELETTROVALVOLA GASOLIO	LIGHT OIL ELECTRO-VALVE
FR	1	FOTORESISTENZA RILEVAZIONE FIAMMA	PHOTORESISTOR FLAME DETECTOR
FU1.2	1	FUSIBILE DI LINEA	LINE FUSE
FU1.3	1	FUSIBILE DI LINEA	LINE FUSE
IG	1	INTERRUTTORE GENERALE	MAIN DISCONNECTOR
IL	1	INTERRUTTORE LINEA BRUCIATORE	BURNER LINE SWITCH
LB	1	LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE	INDICATOR LIGHT FOR BURNER LOCK-OUT
LF	1	LAMPADA SEGNALAZIONE FUNZIONAMENTO BRUCIATORE	INDICATOR LIGHT BURNER OPERATION
MV	1	MOTORE VENTILATORE	FAN MOTOR
SIEMENS LOA24 / LMO24	1	APPARECCHIATURA CONTROLLO FIAMMA	FLAME MONITOR DEVICE
ST	1	SERIE TERMOSTATI/PRESSOSTATI	SERIES OF THERMOSTATS OR PRESSURE SWITCHES
TA	1	TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER
TS	1	TERMOSTATO/PRESSOSTATO DI SICUREZZA	SAFETY THERMOSTAT OR PRESSURE SWITCH

Data 18/11/2006		PREC.	FOGLIO
Revisione 00		1	2
Dis. N. 04 – 743		SEGUE	TOTALE
		/	2

Wiring diagram 18-116 - LO280 Double stage burners





SIGLA/ITEM	FUNZIONE	FUNCTION
C1	CONTAORE BASSA FIAMMA	LOW FLAME TIME METER
C2	CONTAORE ALTA FIAMMA	HIGH FLAME TIME METER
EVG1	ELETTROVALVOLA GASOLIO BASSA FIAMMA	LOW FLAME LIGHT OIL ELECTRO-VALVE
EVG2	ELETTROVALVOLA GASOLIO ALTA FIAMMA	HIGH FLAME LIGHT OIL ELECTRO-VALVE
FR	FOTORESISTENZA RILEVAZIONE FIAMMA	PHOTORESISTOR FLAME DETECTOR
FU2	FUSIBILE DI LINEA	LINE FUSE
FU3	FUSIBILE LINEA BRUCIATORE	BURNER LINE FUSE
IG	INTERRUTTORE GENERALE	MAIN DISCONNECTOR
IL	INTERRUTTORE LINEA AUSILIARI	AUXILIARY LINE SWITCH
LAF	LAMPADA SEGNALAZIONE ALTA FIAMMA BRUCIATORE	BURNER IN HIGH FLAME INDICATOR LIGHT
LAF1	LAMPADA SEGNALAZIONE ALTA FIAMMA BRUCIATORE	BURNER IN HIGH FLAME INDICATOR LIGHT
LANDIS LOA24/44 - LMO 24/44	APPARECCHIATURA CONTROLLO FIAMMA	FLAME MONITOR DEVICE
LB	LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE	INDICATOR LIGHT FOR BURNER LOCK-OUT
LB1	LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE	INDICATOR LIGHT FOR BURNER LOCK-OUT
LBF	LAMPADA SEGNALAZIONE BASSA FIAMMA BRUCIATORE	BURNER IN LOW FLAME INDICATOR LIGHT
LBF1	LAMPADA SEGNALAZIONE BASSA FIAMMA BRUCIATORE	BURNER IN LOW FLAME INDICATOR LIGHT
LEVG1	LAMPADA SEGNALAZIONE APERTURA (EVG1)	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE (EVG1)
LEVG2	LAMPADA SEGNALAZIONE APERTURA (EVG2)	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE (EVG2)
LTA	LAMPADA SEGNALAZIONE TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER INDICATOR LIGHT
MV	MOTORE VENTILATORE	FAN MOTOR
PS	PULSANTE SBLOCCO FIAMMA (SOLO CON LOA44 E LMO..)	LOCK-OUT RESET BUTTON (WITH LOA44 AND LMO.. ONLY)
SATRONIC DKO976 - DKW976	APPARECCHIATURA CONTROLLO FIAMMA	FLAME MONITOR DEVICE
SATRONIC DKW972	APPARECCHIATURA CONTROLLO FIAMMA	FLAME MONITOR DEVICE
ST	SERIE TERMOSTATI/PRESSOSTATI	SERIES OF THERMOSTATS OR PRESSURE SWITCHES
STA4.5B0.37/63N30L	SERVOCOMANDO SERRANDA ARIA	AIR DAMPER SERVO CONTROL
TA	TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER
TAB	TERMOSTATO/PRESSOSTATO ALTA-BASSA FIAMMA	HIGH-LOW THERMOSTAT/PRESSURE SWITCHES
TS	TERMOSTATO/PRESSOSTATO DI SICUREZZA	SAFETY THERMOSTAT OR PRESSURE SWITCH

SIGLA/ITEM	DESCRIZIONE	DESCRIPTION
($)	SE PREVISTO "TAB", TOGLIERE IL PONTE TRA I MORSETTI T6-T8	IF "TAB" USED REMOVE THE BRIDGE BETWEEN TERMINALS T6-T8
	CAMME SERVOCOMANDO	SERVO CONTROL CAMS
I	ALTA FIAMMA	HIGH FLAME
II	SOSTA, ACCENSIONE E BASSA FIAMMA	STAND-BY, IGNITION AND LOW FLAME
III	APERTURA EVG2	OPEN EVG2

Data 08/01/2007		PREC. 1	FOGLIO 2
Revisione 00			
Dis. N. 18 – 116		SEGUE /	TOTALE 2

WIRING DIAGRAMS - Complete key - mod. LO400

C1	LOW FLAME TIME METER
C2	HIGH FLAME TIME METER
EVG	LIGHT OIL ELECTRO-VALVE
FR	PHOTORESISTOR FLAME DETECTOR
FU1	FAN MOTOR LINE FUSE
FU2	LINE FUSE
FU3	BURNER LINE FUSE
IL	BURNER LINE SWITCH
IM	FAN MOTOR LINE SWITCH
KA2.3	AUXILIARY RELAY
KA2.4	AUXILIARY RELAY
KM1.1	FAN MOTOR CONTACTOR
KT2.4	DELAYED RELAY
LAF	BURNER IN HIGH FLAME INDICATOR LIGHT
LANDIS LOA24/44 - LMO 24/44	FLAME MONITOR DEVICE
LB	INDICATOR LIGHT FOR BURNER LOCK-OUT
LBF	BURNER IN LOW FLAME INDICATOR LIGHT
LEVG1	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVG1]
LTA	IGNITION TRANSFORMER INDICATOR LIGHT
MV	FAN MOTOR
PS	LOCK-OUT RESET BUTTON (WITH LOA44 AND LMO.. ONLY)
SATRONIC DKO976 - DKW976	FLAME MONITOR DEVICE
SATRONIC DKW972	FLAME MONITOR DEVICE
SATRONIC TF976	FLAME MONITOR DEVICE
ST	SERIES OF THERMOSTATS OR PRESSURE SWITCHES
SW1	II° STAGE BURNER START BUTTON
TA	IGNITION TRANSFORMER
TAB	HIGH-LOW THERMOSTAT/PRESSURE SWITCHES
TS	SAFETY THERMOSTAT OR PRESSURE SWITCH

($) IF "TAB" USED REMOVE THE BRIDGE BETWEEN TERMINALS T6-T8

SERVOCONTROL CAMS

I	HIGH FLAME
II	STAND-BY, IGNITION, LOW FLAME
III	EVG2 OPENING

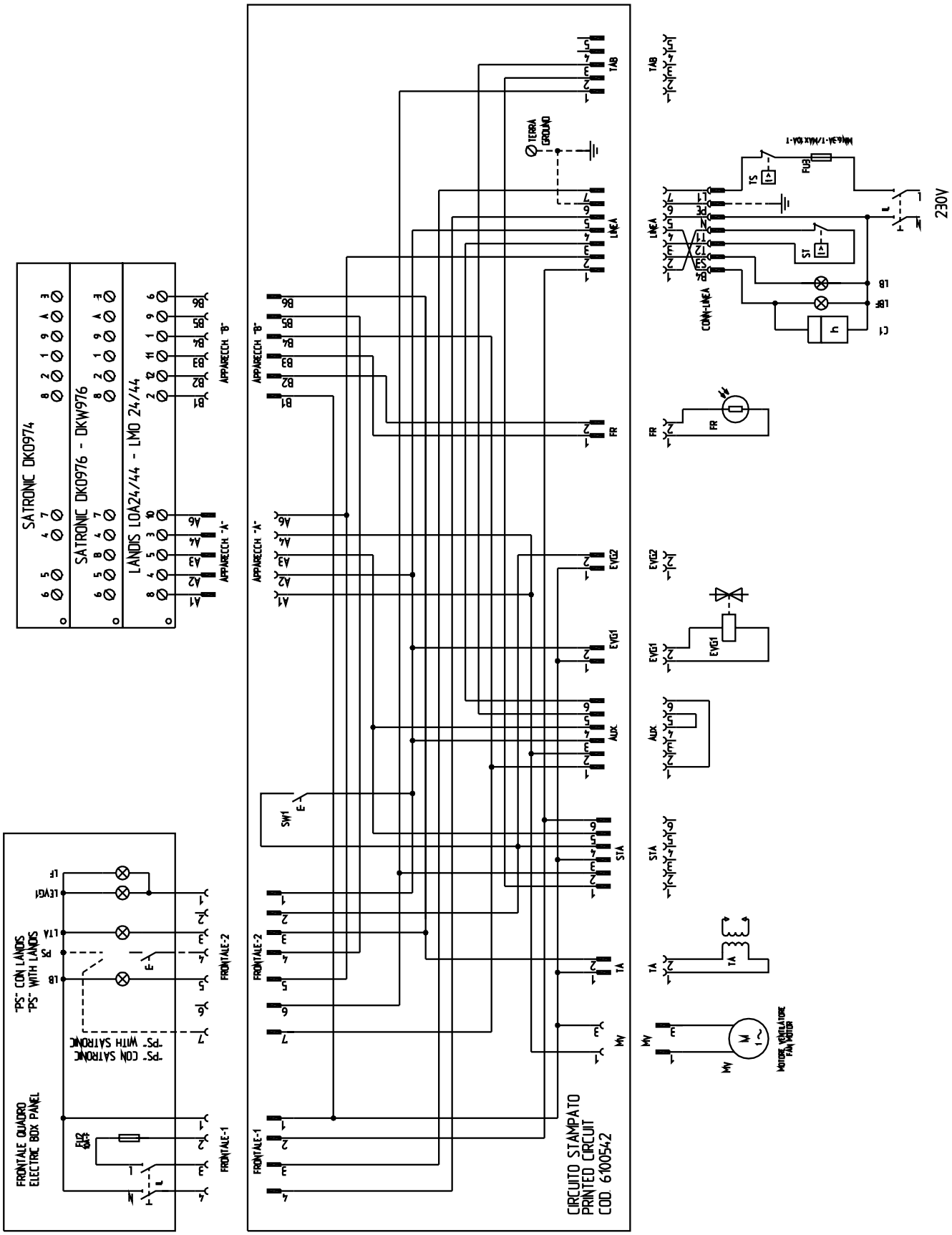
WARNING

1 - Electrical supply 230V 50/60Hz 2N a.c.

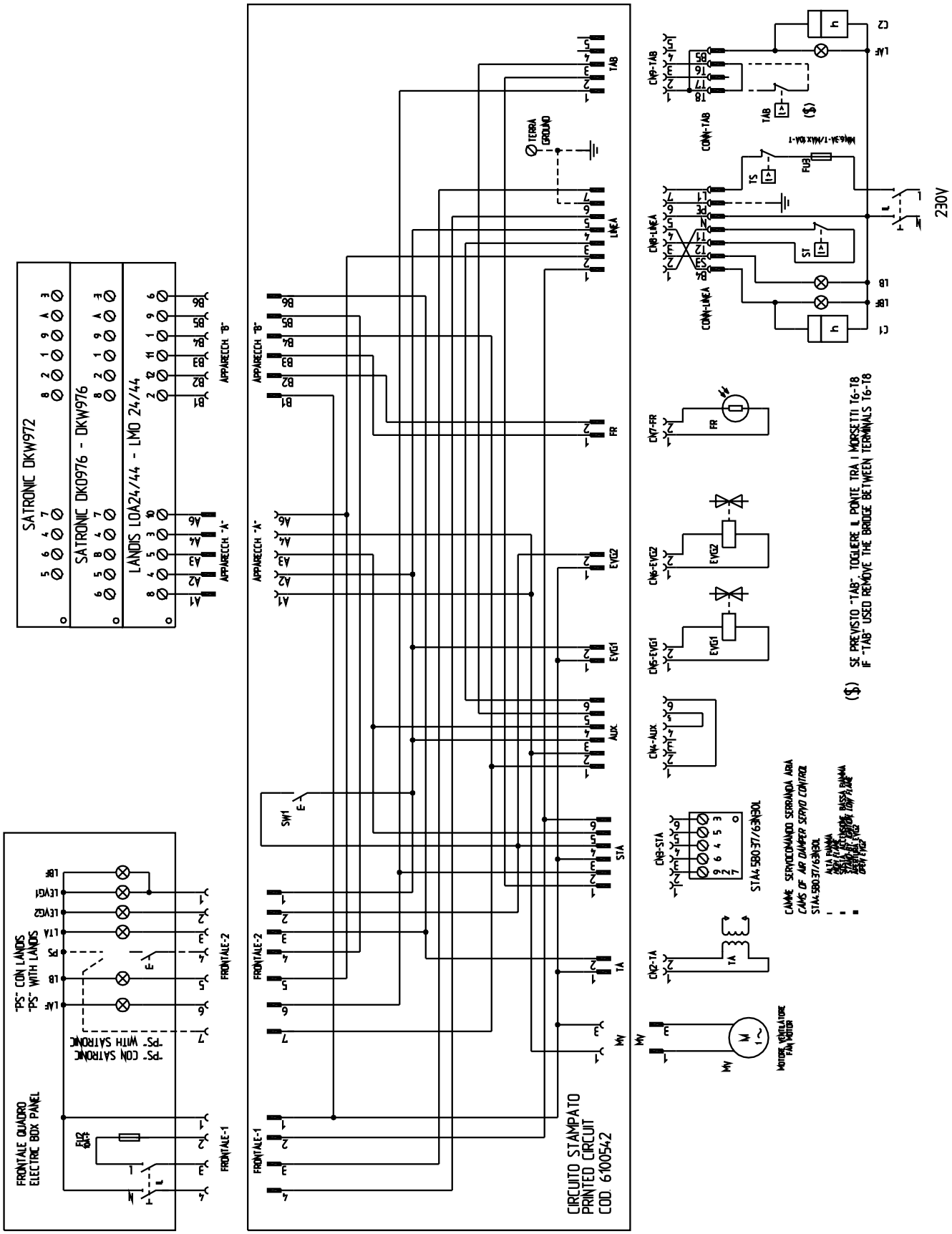
2 - Do not reverse phase with neutral

3 - Ensure burner is properly earthed

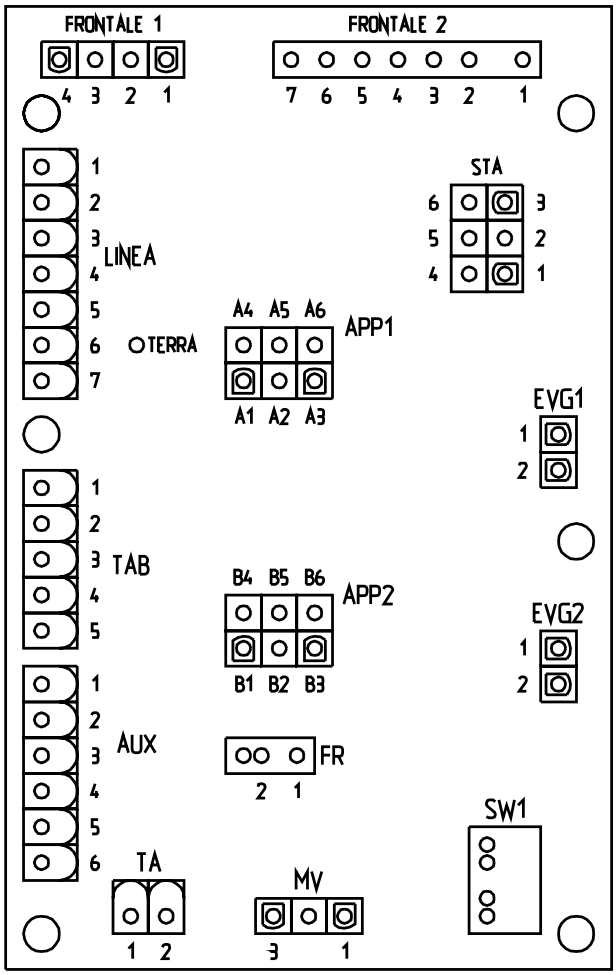
Wiring diagram 18-049 - LO400 Single stage burners



Single stage burners 18-049 - LO400 Double-stage burners



Connectors layout on printed board



SPARE PARTS

DESCRIPTION	CODE			
	LO280 Single stage	LO280 Doulbe stage	LO400 Single stage	LO400 Doulbe stage
LOA24 CONTROL BOX	2020445	2020445	2020445	2020445
ELECTRIC MOTOR	2180717	2180717	2180714	2180714
IGNITION TRANSFORMER	2170231	2170231	2170231	2170231
PUMP	2590130	2590152	2590170	2590170
IGNITION CABLES	6050153	6050153	6050153	6050153
IGNITION ELECTRODES	2080283	2080283	2080259	2080259+2080260
COMBUSTION HEAD	30601C5	30601C5	30601A1	30601A0
FUEL FILTER	2090027	2090027	2090025	2090025
SERVOCONTROL	-	2480057	-	2480057
FAN	2150071	2150071	2150060	2150060
BLAST TUBE	Standard: 30900L3 Long: 30900L4	Standard: 30900L3 Long: 30900L4	30900G2	30900G2
NOZZLE HOLDER	Standard: 30200F1 Long: 30200F2	Standard30200F1 Long: 30200F2	2850090	2850089
PHOTORESISTOR	2510034	2510033	2510033	2510033
NOZZLES	261...	261...	261...	261...
Flexible hoses	234Fx22	234Fx22	2340001	2340001
GASKET	2110059	2110059	2110059	2110059
BOARDPRINTED CIRCUIT	-	6100547	6100542	6100542
EVG2 ELECTRO-VALVE	-	-	-	2190638
MOTOR-PUMP COUPLING	2540055	2540055	2540055	2540055
EVG1 COIL	2580402	2580402	2580402	2580402
EVG2 COIL	-	2580402	-	-

APPENDIX - COMPONENTS SPECIFICATIONS

LANDIS OIL BURNERS AUTOMATIC CONTROLLER LOA24

Use

LOA... safety devices are intended for use solely with QRB... photoresistors, for lighting and controlling low capacity forced air light oil burners with max. capacity 30 kg/h in accordance with standard DIN 4787.

The One or two flamess are lit through electrical connections with or without post-ignition.

To replace LAI... AND LAB.. WITH LOA...

LOA... models can be used as replacement for LAI... and LAB.. controllers by means of the adapter KF8819 and without the need to change the electrical wiring. Because the LOA is smaller in dimensions, when it is used with the adapter the external dimensions are almost identical, which means that there is no need to move the reset button.

Performance

The controllers just need plugging in, so they can be mounted in almost any position: on the burner, on the electrical panel or on the control panel. The casing is made of robust heat-resistant plastic and contains:

- the thermic programmer operating a multiple switch control system with ambient temperature compensator
- flame signal amplifier with flame relay
- warning light indicating lockout and associated sealed reset button.

The plug-in socket, also made of robust heat-resistant plastic, contains the 12 terminals and also:

- 3 neutral terminals, ready wired up to terminal 2
- 4 earth terminals for earthing the burner
- 2 supplementary terminals numbered “31” and “32”.

The socket has two openings at the bottom for the leads; 5 others with threaded connection for cable holders PG11 or 3/4UNP for non-metallic sleeves are located on a mobile stuffing box, one on either side and 3 on the front.

There are two flexible metal tongues on the sides of the socket for mounting.

To dismantle it only requires gentle pressure with a screw driver in the slot of the mounting guide. The base dimensions of the socket are exaclty the same as for types LAB/LAI and there is no difference in the diameter of the reset button, the two mounting screws and the flange of the burner earth.

Safety at low voltage levels

Safety devices against any reduction in the mains voltage operate on a special electronic circuit which, in the event of the power supply falling below 165V~, stops the burner switching on without releasing the fuel and locks out the apparatus.

Wiring diagram of the programme

To ensure correct wiring it is essential to observe local standards and follow the instructions of the burner manufacturer with regard to assembly and start-up.

Program's legend:

Controller output signals

Required input signals

A’	Burner start up with light oil pre-heater OH
A	Burner start-up without light oil pre-heater
B	Flame lit
C	Normal operation
D	Normal stop through R
tw	Oil pre-heating time until operational all clear given through contact OW
tl	Pre-purge time
t3	Pre-ignition time
t2	Safety time
t3n	Post-ignition time
t4	Interval between the flame lighting and energising of solenoid 2a at terminal 5

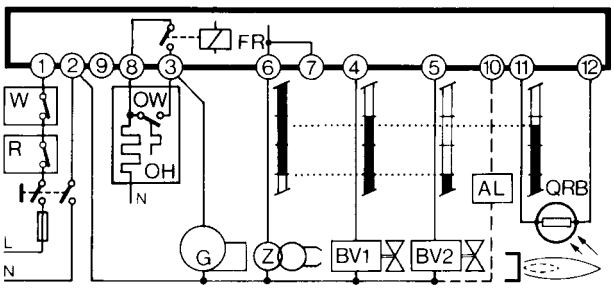
Internal layout

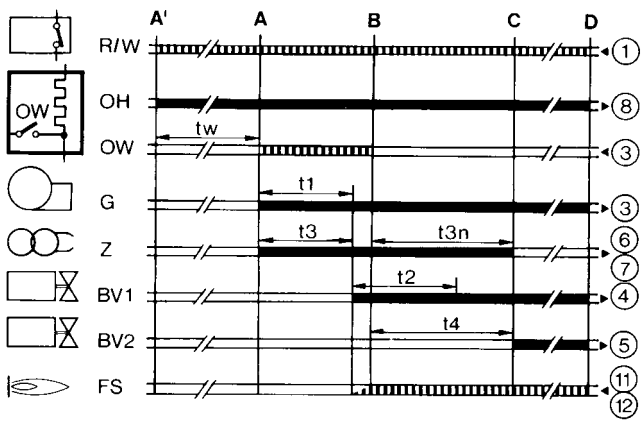
AL	Optical alarm
BV.	Fuel valve
EK	Reset button
FR	Flame relay
fr	Flame relay contacts
FS	Flame alight signal
G	Burner motor
K	Flame relay anchor to delay the tzl command in the event of a premature flame signal or endorse it where the signal is correct.
OH	light oil pre-heater
OW	Operational all-clear contact
QRB	Photo-resistant cell (flame detector)
R	Thermostat or pressure switch
TZ	Thermo-electric programmer (bimetal system)
tz..	TZ contacts
V	Flame signal amplifier
W	Safety thermostat or pressure switch
Z	Ignition transformer

The above are safety devices!

To tamper with them in any way may have unforeseeable consequences!

Do not open them!





Technical characteristics

Voltage	220V -15%..240V+10% or 100V -15%...110V+10%
Frequency	50...60Hz +/- 6%
External fuse	max.10A slow action
Contact flow:	
- terminal 1	5A
- terminal 3	5A (incl.capacity absorbed by motor and pre-heater)
Terminal flow:	
terminals 4, 5 &10	1A
terminals 6&7	2A
terminal 8	5A
Absorbed cap	3VA
Protection	IP40
Premitted temp:	
operational	-20...+60°C
transport & storage	-50...+60°C
Emplacement	any
Mass (weight)	controller 180g, socket 50g, AGK accessories 12 g.

Commands in the event of operational interference

Stray light/premature ignition

During pre-purge and/or pre-ignition there should be no flamesignal. If there is a flame signal, eg from premature ignition due to a faulty solenoid, external light, short circuit in the photoresisto or wiring, malfunction in the flame signal amplifier, etc., at the end of pre-purge and safety time the controller locks out the burner and stops the fuel flow even during safety time.

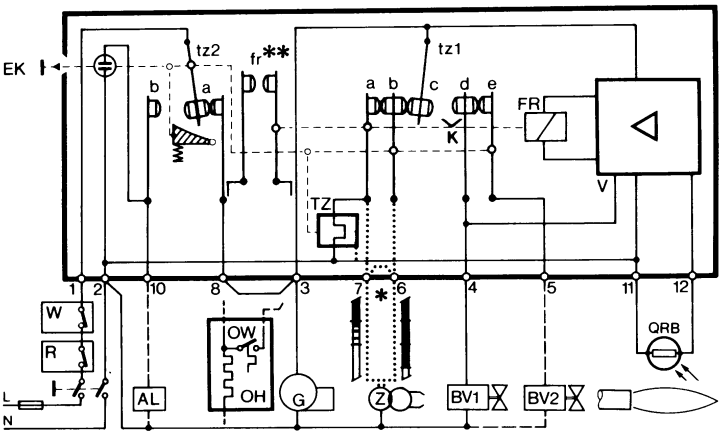
Absence of flame

If there is no flame at the end of safety time the controller locks out immediately.

Absence of flame during operation

If there is no flame during operation the controller cuts off the supply of fuel and automatically initiates a fresh start-up programme: at the end of t4 the start-up programme ends.

Whenever there is a safety stop, terminals 3-8 and 11 are de-energised in less than 1 second; at the same time a remote lockout signal is transmitted through terminal 10. The controller can be reset after c. 50 seconds.



LANDIS OIL BURNERS AUTOMATIC CONTROLLER LOA44
OPERATION

Burners without fuel pre-heater

Start-up, thermostat and pressure switches R, burner motor G and ignition transformer Z are all controlled at the same time.

After about 25 seconds the solenoid is energised (in this period the flame amplifier is at maximum sensitivity). The command to the first solenoid BV1 marks the start of the safety time during which, either there is no flame in the burner and the controller locks it out, or after 5 seconds the stage 2 solenoid BV2 is energised and this ends the burner start-up programme.

Burners with fuel pre-heater

(Operational all-clear from contact OW which short circuits terminals 3 and 8). The burner start-up programme is exactly the same as above except that it is initiated by the closing of the OW contact of the preheater OH.

When the flame lights the flame relay contact (fr2) is short circuited and should the contact OW open that does not cause a lockout but a repetition of the cycle.

Commands in the event of operational interference

Premature ignition / **Flame present during pre-purge:** Lockout and termination of pre-purge

Defective components in controller or electronic programmer: Lockout

No flame signal at the end of safety time: Lockout

No flame during post-ignition: Lockout

No flame during normal operation: Repetition of start-up programme

Power cut during start-up programme or operation: Automatic repetition of programme when power restored.

Lack of sufficient power (~160V): Solenoid BV1 de-energised, solenoid BV2 de-energised when flame goes out

Lockout which occurs within less than 1 second, cuts off power to terminals 3-8 and 12; terminal 10 still remains live in order to activate the optical lockout indicator. The controller can be reset 2 seconds after a lockout.

Important: when external wiring is replaced ensure that it is switched on at the same phase of terminal 2 (so that terminal 9 is connected up to neutral).

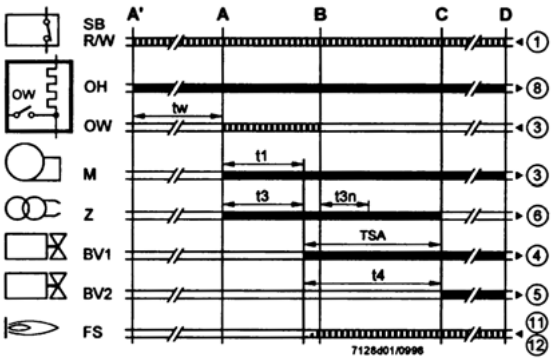
Electrical connections and programmer's layout

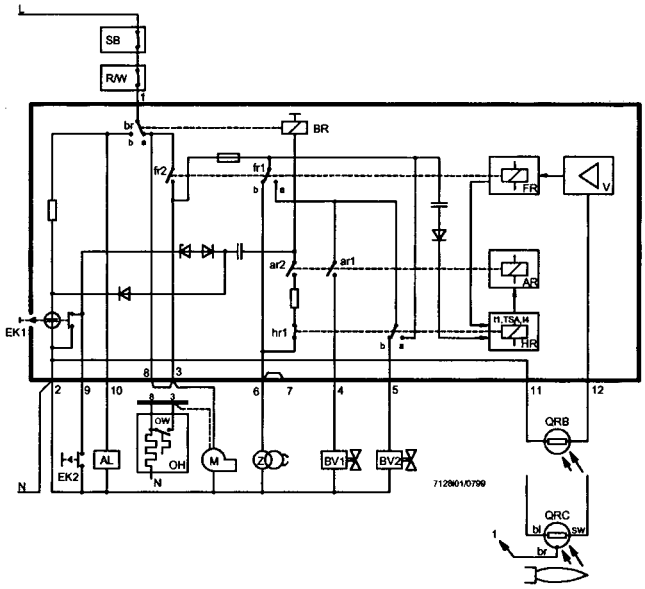
A' burner start-up
B Flame signal with oil pre-heater present
C End of programme-start of normal operation
A burner start-up
C-D normal operation without oil pre- heater
D normal stop

Programme or command cycle

tw fuel pre-heating time acc. to system
tl pre-purge time, ~25secs.
t3 pre-ignition time, ~25secs.
t2 safety time max.5 secs.
t3n post-ignition time, ~2 secs.
t4 interval between BV1 and BV2 commands, ~5 secs* - lockout from absence of flame, <1 sec.

* In relation to the moment when the flame occurs.





Key - Internal diagram

AL alarm device
AR main relay with contacts
BV.. fuel valve
BR lockout relay
EK.. lockout reset button
FS flame signal
M burner motor
HR auxiliary relay with contacts hr
OH oil pre-heater
OW release contact of oil pre-heater
QRB photoresistive detector
R control pressostat or pressure switch
V flame signal amplifer
W limit thermostat or pressure switch
Z ignition transformer

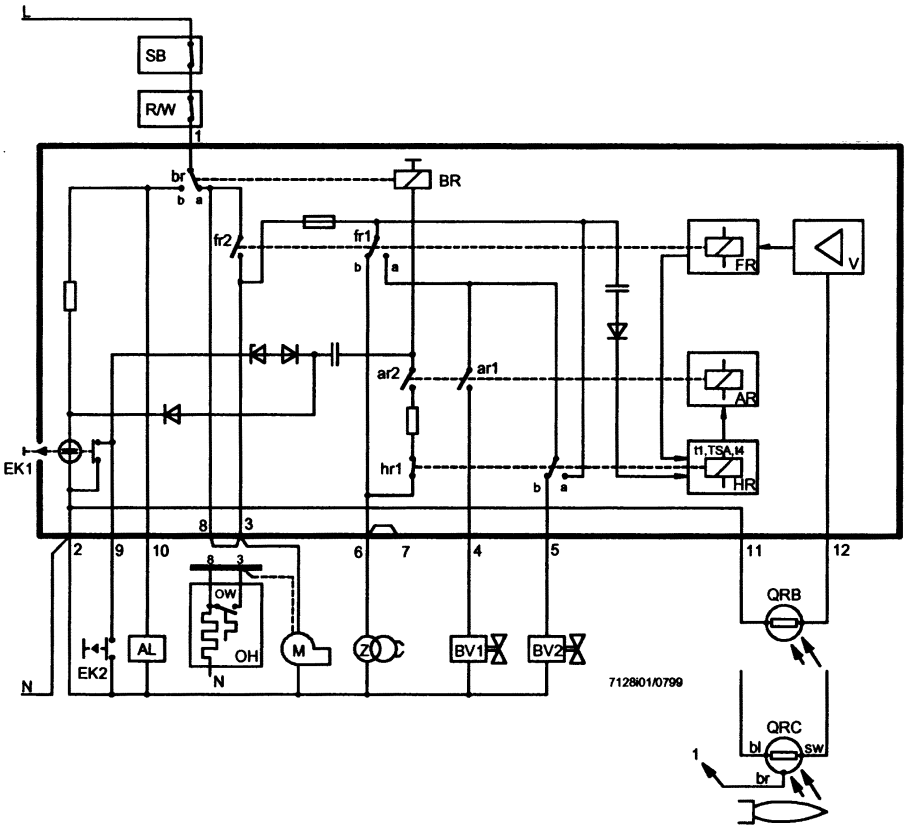
Technical characteristics

Voltage	220V-15%..240V+10% or 100V-15%..110V+10%
Frequency	50...60Hz _6%
External fuse	max.10 A, slow action
Contact flow:	
terminal 1	max. 5A
terminal 3	5A (incl. consumed cap. of motor and pre-heater)
terminals 4,5& 6	max.2A
terminal 8	max. 5A
terminal 10	max.1A
Permitted temperature	
operation	-20...+60°C
storage and transport	-50...+40°C
Protection	IP40
Mass (weight) controller/socket	140g/80g,
AGK accessories	~12g

Key to internal diagram

AL	Remote optical lockout indicator
AR	Main relay with contacts ar...
BV..	Fuel solenoid
BR	Lockout relay with contacts br..
EK	Reset button
FR	Flame relay with contacts fr...
FS	Flame present signal
G	Burner motor
HR	Auxiliary relay with contacts hr..
L	Lockout LED incorporated in the reset button
OH	Fuel pre-heater
OW	All-clear contact for pre-heater
QRB	Photo resistor (flame detector)
R	Normal thermostat or pressure switch
V	Flame signal amplifier
W	Safety thermostat or pressure switch
Z	Safety transformer

Internal diagram



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