BURNERS
BRULEURS
BRENNER
QUEMADORES
BRUCIATORI

MANUAL OF
- INSTALLATION
- OPERATION
- MAINTENANCE

LPG BURNERS

P20
P30
P45
P65

M03989CD Rev. 03 11/04

NOTICES

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.

TECHNICAL DATA
SINGLE STAGE BURNERS

BURNERS TYPE/MODEL		P20 L-....25	P20 L-....40	P30 L-....40
Input	min. kW	80	80	150
	max. kW	230	280	350
	min. kcal/h	68.800	68.800	129.000
	max. kcal/h	197.800	240.800	301.000
Fuel		LPG	LPG	LPG
Category		I_{3+}	I_{3+}	I_{3+}
Gas flow rate min.- max.	(Stm^3/h)	3 - 8.9	3 - 10.8	5.8 - 13.5
Gas pressure min.* - max.	mbar	30 - 200	30 - 200	30 - 200
Power supply		230V - 50Hz	230V - 50Hz	230V - 50Hz
Power consumption	W	650	650	650
Electric motor (2800 rpm)	W	370	370	370
Protection		IP40	IP40	IP40
Weight	Kg	30	30	30
Gas train size		1”	$1”_{1/2}$	$1”_{1/2}$
Gas connections		Rp 1	Rp $1_{1/4}$	Rp $1_{1/4}$
Operation		single stage	single stage	single stage
Destination country		*	*	*

DOUBLE STAGE, PROGRESSIVE AND FULLY MODULATING BURNERS

BURNERS TYPE/MODEL		P20 L-....25	P20 L-....40	P30 L-....40	P45 L-....40
Input	min. low flame kW	85	85	65	145
	min. high flame kW	120	120	100	220
	max. kW	230	280	350	520
	min. low flame kcal/h	73.100	73.100	55.900	124.700
	min. high flame kcal/h	103.200	103.200	86.000	189.200
	max. kcal/h	197.800	240.800	301.000	447.200
Fuel		LPG	LPG	LPG	LPG
Category		I_{3+}	I_{3+}	I_{3+}	I_{3+}
Gas flow rate min.- max.	(Stm^3/h)	3.3 - 8.9	3.3 - 10.8	2.5 - 13.5	5.6 - 20
Gas pressure min.* - max.	mbar	30 - 200	30 - 200	30 - 200	30 - 200
Power supply		230V - 50Hz	230V - 50Hz	230V - 50Hz	230V - 50Hz
Power consumption	W	650	650	650	900
Electric motor (2800 rpm)	W	370	370	370	620
Protection		IP40	IP40	IP40	IP40
Weight	Kg	30	30	30	58
Gas train size		1”	$1”_{1/2}$	$1”_{1/2}$	$1”_{1/2}$
Gas connections		Rp 1	Rp $1_{1/4}$	Rp $1_{1/4}$	Rp $1_{1/2}$
Operation		double stage progressive fully modulating	double stage progressive fully modulating	double stage progressive fully modulating	double stage progressive fully modulating
Destination country		*	*	*	*

BURNERS TYPE/MODEL		P45 L-....50	P65 L-....50	P65 L-....65
Input	min. low flame kW	145	270	270
	min. high flame kW	220	480	480
	max. kW	520	970	970
	min. low flame kcal/h	124.700	232.200	232.200
	min. high flame kcal/h	189.200	412.800	412.800
	max. kcal/h	447.200	834.200	834.200
Fuel		LPG	LPG	LPG
Category		I_{3+}	I_{3+}	I_{3+}
Gas flow rate min.- max.	(Stm^3/h)	5.6 - 20	10.4 - 37.3	10.4 - 37.3
Gas pressure min.* - max.	mbar	30 - 200	50 - 200	30 - 200
Power supply		230/400V - 50Hz	230V - 50Hz	230V - 50Hz
Power consumption	W	900	2000	2000
Electric motor (2800 rpm)	W	620	1500	1500
Protection		IP40	IP40	IP40
Weight	Kg	58	150	155
Gas train size		2”	2”	$2”_{1/2}$
Gas connections		Rp 2	Rp 2	DN 65
Operation		double stage progressive fully modulating	double stage progressive fully modulating	double stage progressive fully modulating
Destination country		*	*	*

* Minimum pressure required to get the maximum rate with any back-pressure in combustion chamber (referring to the performance curves). The burner operates correctly also with lowest pressure only if these are enough to guarantee the necessary gas rate.

BURNER MODEL IDENTIFICATION

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

Type: **P20**	Model:	**L-.**	**AB.**	**S.**	***.**	**A.**	**0.**	**40**
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)

(1)	BURNER TYPE		
(2)	FUEL		L - LPG
(3)	OPERATION	Available versions	TN - Single stage
			AB - Double stage
			PR - Progressive
			MD - Fully modulating
(4)	BLAST TUBE LENGHT	(see overall dimensions)	
		Available versions	S - Standard
			L - Long
(5)	DESTINATION COUNTRY		* - see data plate
(6)	SPECIAL VERSION		A - Standard
(7)	BURNER EQUIPMENT	Available versions	0 - 2 Valves
			1 - 2 Valves + leakage control (optional if burner input < 1200 kW)
(8)	GAS TRAIN SIZE	(See Technical data)	
		25= Rp1	40 = Rp1 1/2
		50 = Rp2	65 = DN65

OVERALL DIMENSIONS IN mm

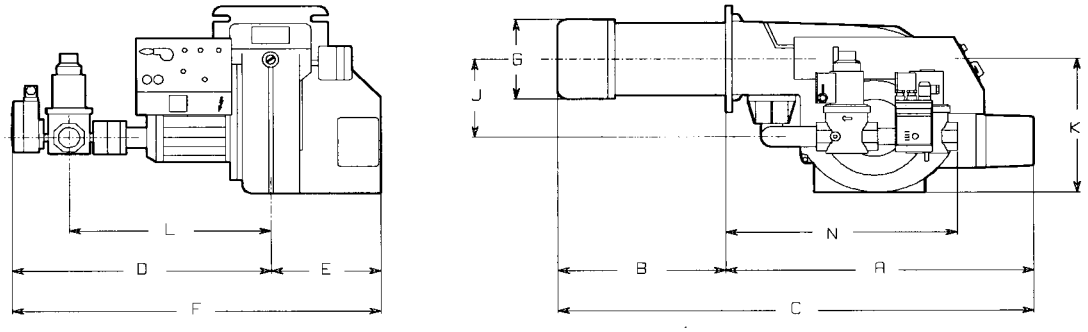
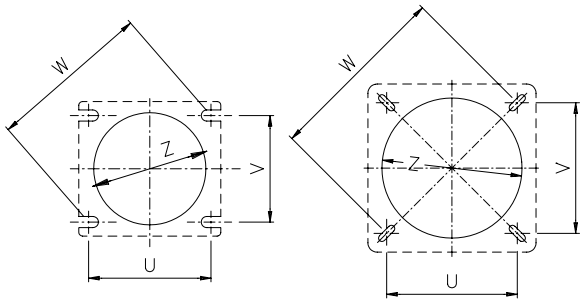


Fig. 4a



	U	V	W	Z
P20	155	155	220	160
P30	155	155	220	160
P45	215	190	287	200
P65	233	233	330	250

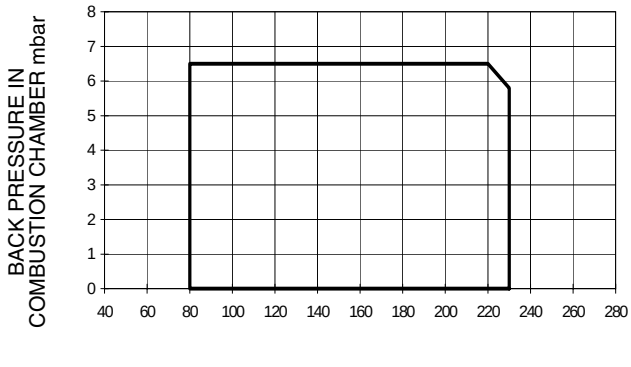
Fig. 4b - Boiler plate drilling template - Make 4 M10 threaded holes

	A	B	BL	C	CL	D	E	F	G	K	J	L	N
P20	555	210	295	765	850	510	200	710	126	290	178	360	370
P30	555	230	330	785	885	510	200	710	148	290	178	360	370
P45	660	255	355	915	1015	640	250	890	148	350	210	460	450
P65	825	325	415	1150	1240	750	350	1060	184	375	230	460	450

BL - Long blast tube

PERFORMANCE CURVES

P20 L-.TN...25

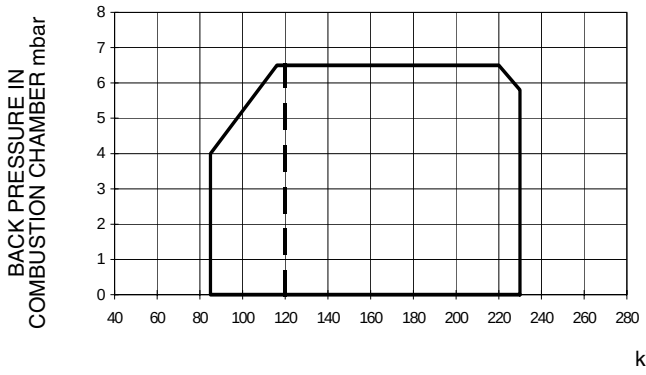


P30 L-.TN..40



Fig. 5

P20 L-.AB...25 - L-.PR...25 - L-.MD...25



P30 L-.AB...40 - L-.MD...40 - L-.PR...40

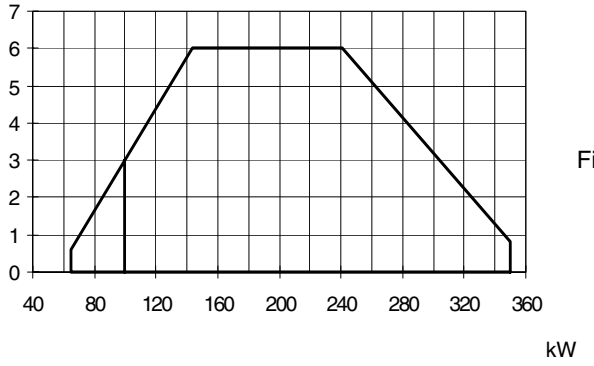
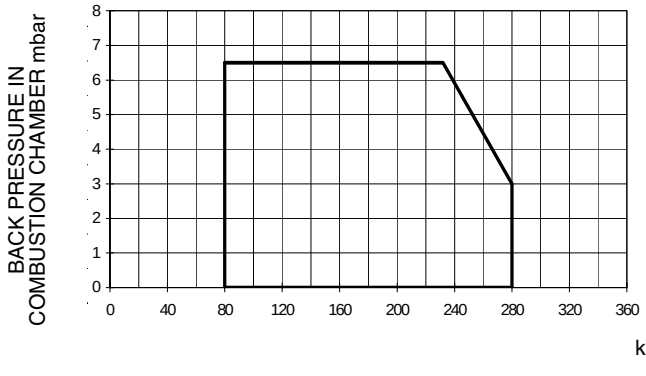


Fig. 6

P20 L-.TN...40



P45 L-.TN...xx

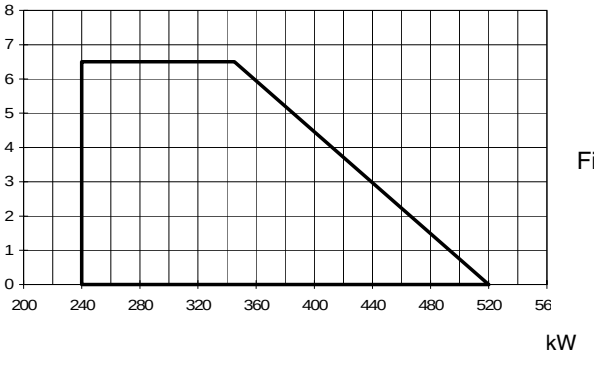
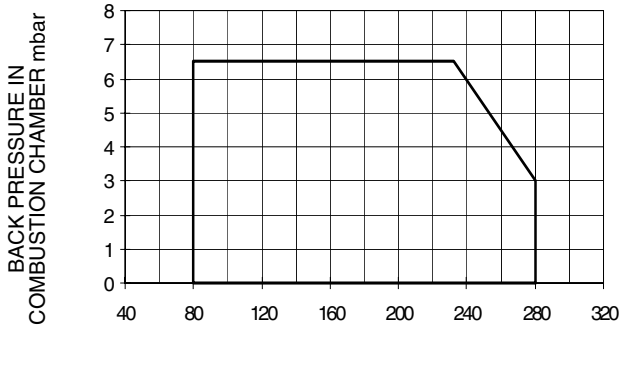


Fig. 7

P20 L-.AB...40 - L-.PR...40 - L-.MD...40



P45 L-.AB...xx - L-.PR...xx - L-.MD...xx



Fig. 8

------ Minimum high flame

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

P65 L-.AB...xx - L-.PR...xx - L-.MD...xx

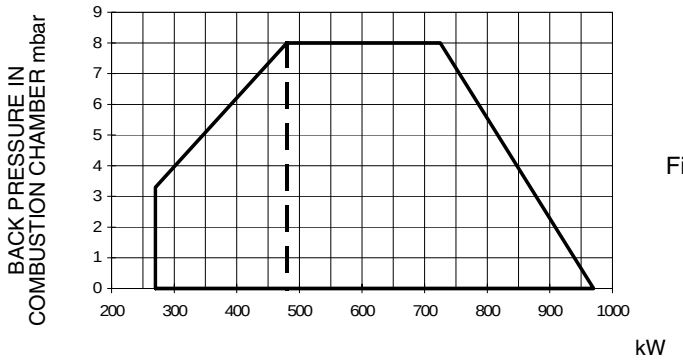


Fig. 9

------ Minimum high flame

MOUNTINGS AND CONNECTIONS

Packing

The burners are dispatched in cardboard pakages with dimensions:

P20 - P30	98 x 55 x 46	(W x H x D)
P45	118 x 67 x 57	(W x H x D)
P65	127 x 84 x 76	(W x H x D)

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

1 burner with detached gas train (but electrically connected to the burner in DN65 models);

1 gasket to be inserted between the burner and the boiler;

1 envelope containing this manual .

Unpacking the burner take care of not to damage the electrical connection between the burner and the gas train (only on DN65 models).

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.

Fitting the burner to the boiler

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

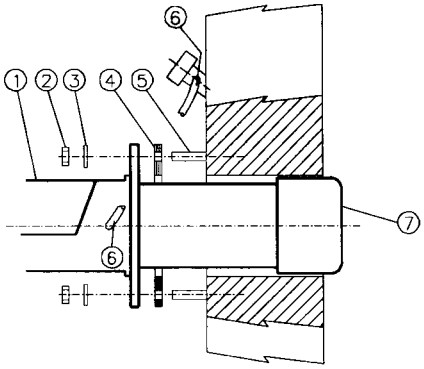


Fig. 10

Key

1 Burner
2 Fixing nut
3 Washer
4 Seal
5 Stud bolt
6 Sightglass cleaning tube
7 Blast tube

Matching the burner to the boiler

The burners described in this manual have been tested with combustion chambers that comply with EN676 regulation and whose dimensions are described in the diagram in Fig. 11. In case the burner must be coupled with boilers with a combustion chamber smaller in diameter or shorter than those described in the diagram, please contact the supplier, to verify that a correct matching is possible, with respect of the application involved.

To correctly match the burner to the boiler verify the necessary input and the pressure in combustion chamber are included in the burner performance curve; otherwise the choice of the burner must be revised consulting the burner manufacturer.

To choose the blast tube lenght follow the instructions of the boiler manufacturer. In absence of these consider the following:

- Cast-iron boilers, three pass flue boilers (with the first pass in the rear part): the blast tube must protrude no more than 100 mm into the combustion chamber.

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

- Pressurised boilers with flame reversal: in this case the blast tube must penetrate at least 50 - 100 mm into combustion chamber in respect to the tube bundle plate.

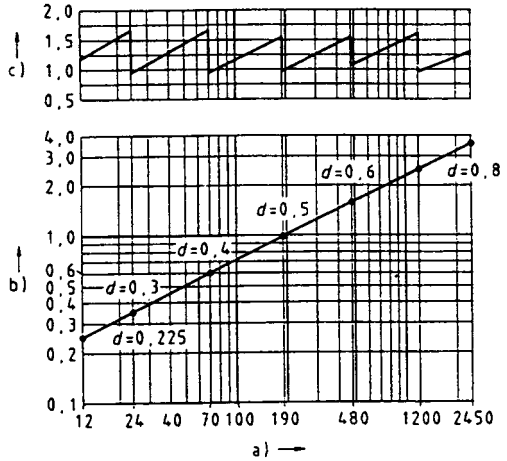


Fig. 11

Firing intensity, diameter and lenght of the test flame tube as a function of the heat input Q.

Key

a) Heat input Q in kW

b) Lenght of the flame tube in metres

c) Flame tube firing intensity in kW/m^3

d) Diameter of combustion chamber (m)

ELECTRICAL CONNECTIONS

- Remove the front panel of the electrical board on the burner.
- Carry out the connections in the power supply electrical board as shown in the following diagrams, verify the fan motor direction (only in three-phase burners) and refit the electrical board front panel.

WARNING: The burners with high-low flame operation are fitted with an electrical bridge between terminals 6 and 7; in the event of connecting the high/low flame thermostat remove this bridge before connecting the thermostat.

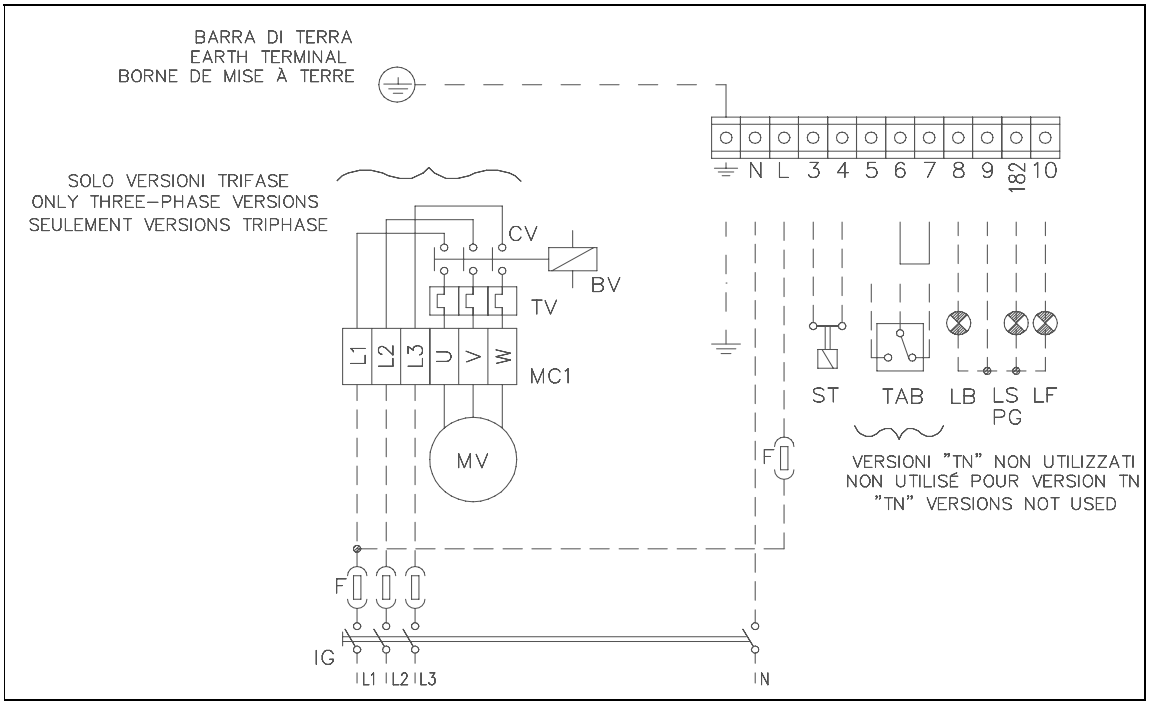
IMPORTANT: In connecting electric supply wires to burner teminal block be sure that ground wire should be longer than phase and neutral ones.

For a complete key, see on page 29 and page 37.

Diagrams for burners WITH printed circuit

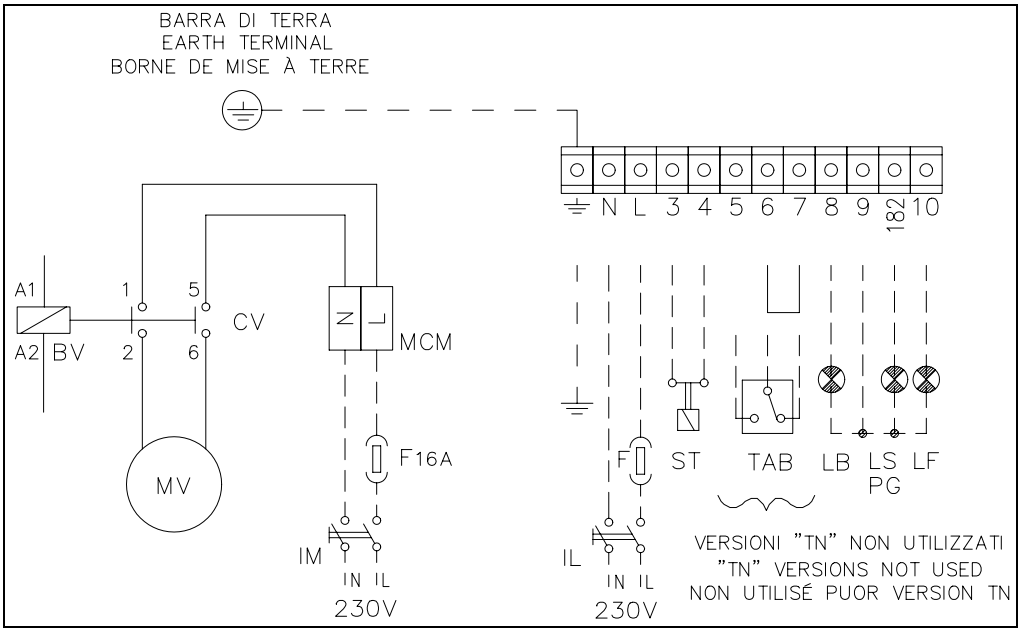
Burners type P20 - P30 - P65 single stage, double stage and progressive

Fig. 12a



Burners type P45 single stage, double stage and progressive

Fig. 12b



Power supply terminal board (three-phase burners)



Fig. 13a

Power supply terminal board for mono-phase burners type P45

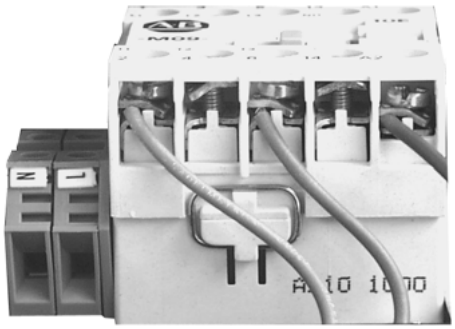


Fig. 13b

Terminal block for connections on printed circuit

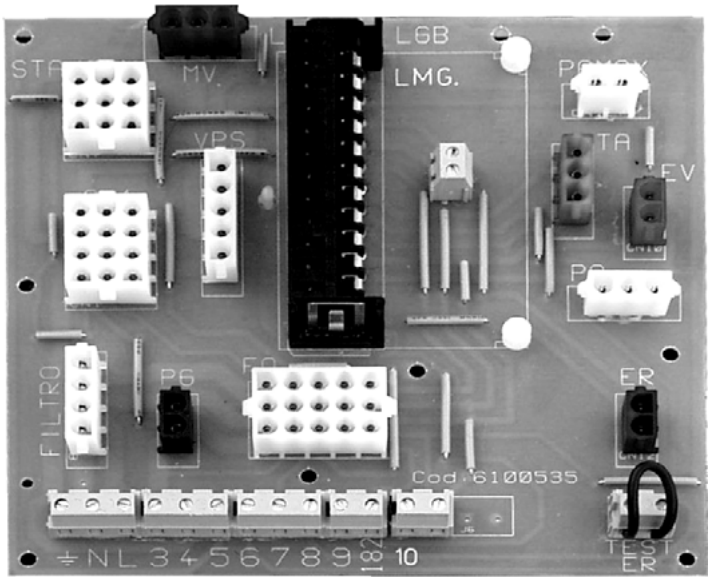
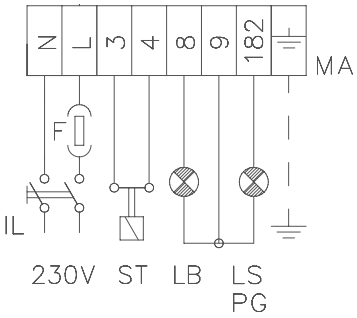


Fig. 14

Diagrams for burners WITHOUT printed circuit

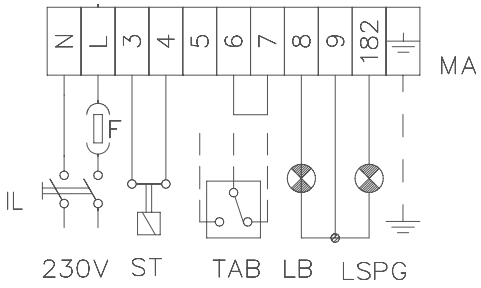
Type P20 - P30 L-.TN...

Fig. 14a



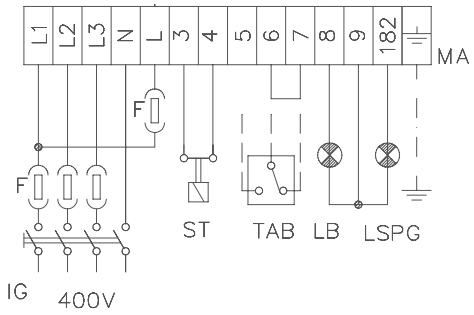
Type P20 - P30 L-.AB...

Fig. 14b



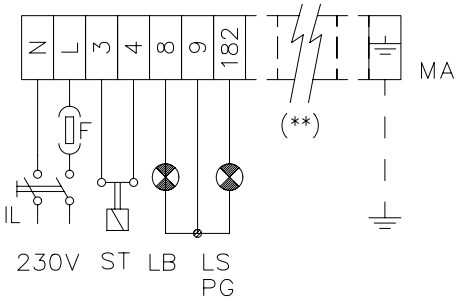
Type P65 L-.AB...

Fig. 14c



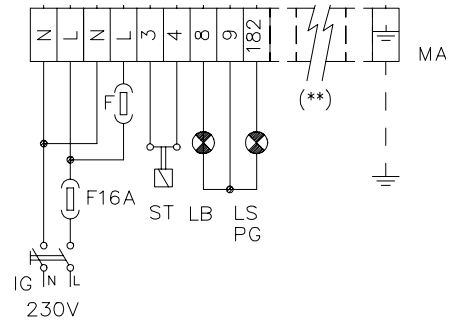
Type P20 - P30 L-.MD...

Fig. 15a



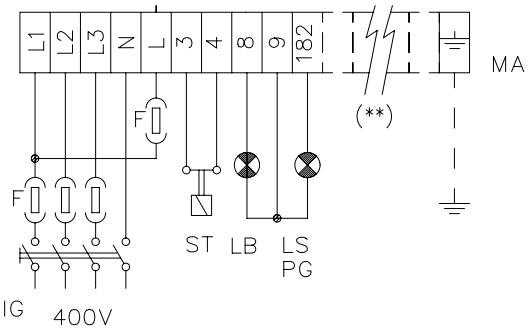
Type P45 L-.MD

Fig. 15b



Type P65 L-.MD

Fig. 15c



PROBE CONNECTION ON FULLY MODULATING BURNERS

(**)

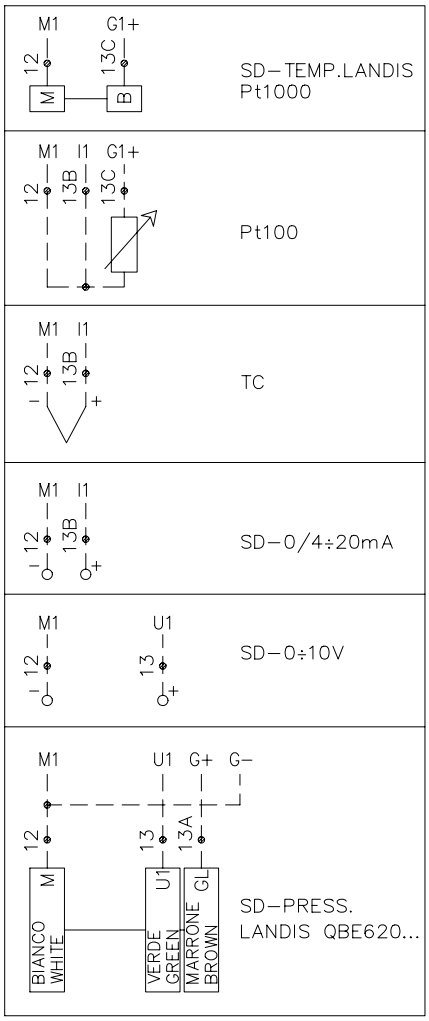


Fig. 16

(**) Probe connection, see Fig. 16

Fan motor direction

After completing the electrical connection of the burner, remember to check the rotation of the fan motor. The motor should rotate in an anti-clockwise direction looking at cooling fan. In the event of incorrect rotation reverse the three-phase supply and check again the rotation of the motor.

NOTE: the burners are supplied 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.

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.

GAS TRAIN INSTALLATION DIAGRAMS

The figures shown the diagrams with the gas train components wich are included in the delivery and those wich must be fitted by the customer. The diagrams complies with regulations in force.

Fig. 17a
Gas train with valves group MB-DLE (2 valves + gas filter + pressure governor + pressure switch) + leakage control VPS504

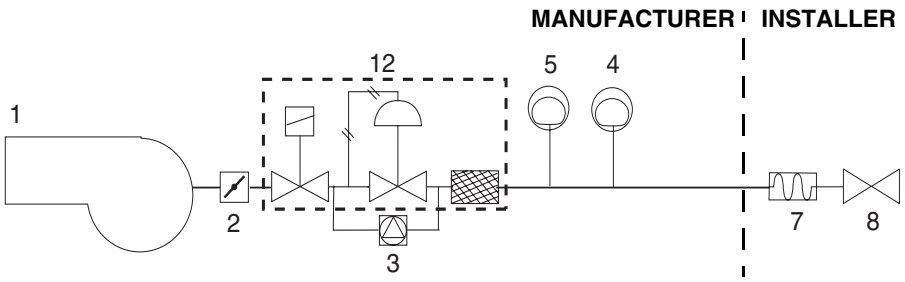


Fig. 17b
Gas train with safety valve + gas valve with built in pressure governor + leakage control VPS504

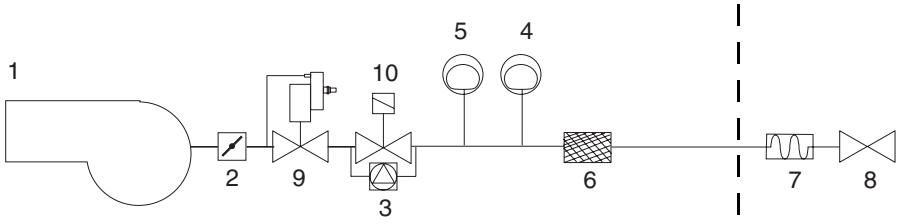
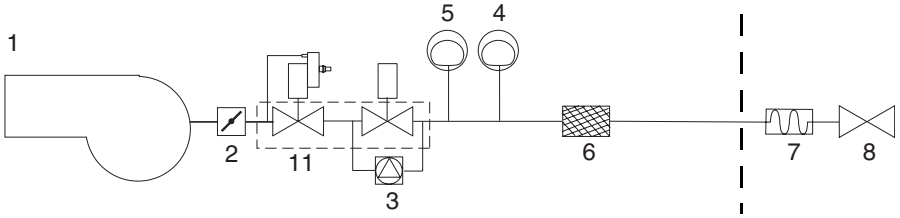


Fig. 17c
Gas train with valves group VGD with built-in gas pressure governor + leakage control VPS504



Key

1 Burner
2 Butterfly valve
3 Leakage control device (optional if output < 1200 kW)
4 Maximum gas pressure switch (optional)
5 Minimum gas pressure switch
6 Gas filter
7 Bellow joint
8 Manual cock
9 Gas valve with pressure governor
10 Safety gas valve
11 Valves group VGD
12 Valves group MB-DLE
13 Valves group DMV-DLE
14 Pressure governor with filter
15 Leakage control pressure switch
16 Gas pressure governor

Fig. 17d
Gas train with valves group VGD with built-in gas pressure governor + leakage control LDU11

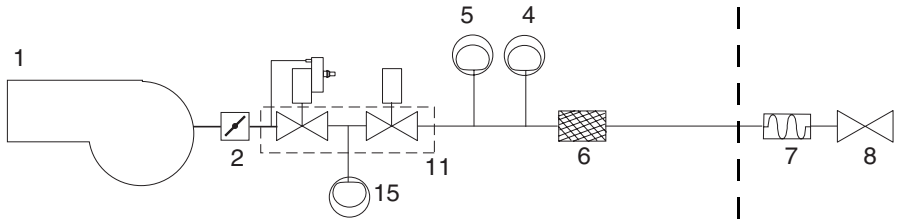


Fig. 17e
Gas train with valves group DMV-DLE + leakage control VPS504

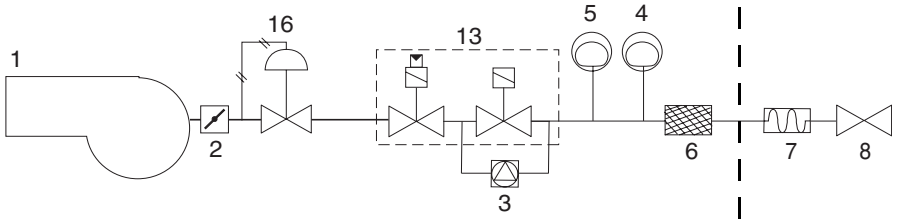
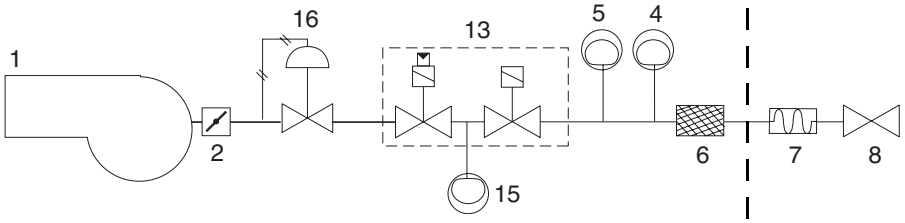


Fig. 17f
Gas train with valves group DMV-DLE + leakage control LDU11



Key

1 Burner
2 Butterfly valve
3 Leakage control device (optional if output < 1200 kW)
4 Maximum gas pressure switch (optional)
5 Minimum gas pressure switch
6 Gas filter
7 Bellow joint
8 Manual cock
9 Gas valve with pressure governor
10 Safety gas valve
11 Valves group VGD
12 Valves group MB-DLE
13 Valves group DMV-DLE
14 Pressure governor with filter
15 Leakage control pressure switch
16 Gas pressure governor

SETTINGS

WARNING!

THE SEALED SCREWS MUST NOT BE UNLOOSED!
IN A SUCH CASE THE DEVICE WARRANTY IS IMMEDIATELY INVALIDATE!

Fig. 18 - Multibloc MB-DLE - VPS504

The multibloc unit is a compact unit consisting of two valves, gas pressure switch, pressure stabilizer and gas filter. It can be paired jointly to the Dungs VPS504 sealing controls.

The valve is adjusted by means of the RP regulator after slackening the locking screw VB by a number of turns. By unscrewing the regulator RP the valve opens, screwing the valve closes.

To set the fast opening remove cover T, reverse it upside down and use it as a tool to rotate screw VR. Clockwise rotation reduces start flow rate, anticlockwise rotation increases it.

Do not use a screwdriver on the screw VR!

The pressure stabilizer is adjusted by operating the screw VS located under the cover C. By screwing down the pressure is increased and by unscrewing it is reduced.

Note: the screw VSB must be removed only in case of replacemente of the coil.

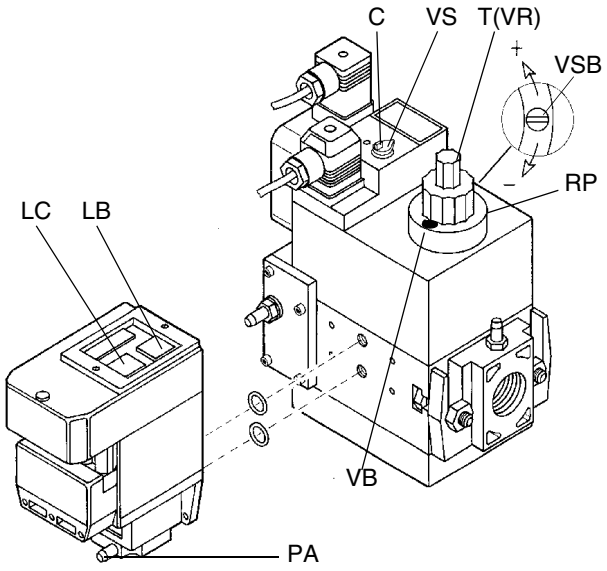


Fig. 18

Leakage control device VPS504 (Optional)

The VPS504 check the operation of the seal of the gas shut off valves costituting the MB-DLE. This check, carried out as soon as the boiler thermostat gives a start signal to the burner, creates, by means of the diaphragm pump inside it, a pressure in the test space of 20 mbar higher than the supply pressure. When wishing to monitor the test, install a pressure gauge ranged to that of the pressure supply point PA. If the test cycle is satisfactory, after a few seconds the consent light LC (yellow) comes on. In the opposite case the lockout light LB (red) comes on.

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

Gas valve Dungs MV-DLE

- To adjust the gas flow rate loosen the screw VB and rotate the regulator RP as necessary. Unscrew to close the valve, screw to open.
- Tighten the screw VB.
- To set the fast opening remove cover T, reverse it upside down and use it as a tool to rotate the screw VR. Clockwise rotation reduces the ignition flow rate, anticlockwise rotation increase it.

Note: the screw VSB must be removed only in case of replacemente of the coil.

Do not use a screwdriver on the screw VR!

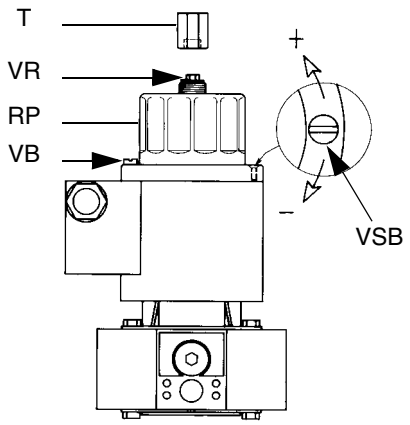


Fig. 19

Gas valve Dungs MVD

- To adjust the gas flow rate unscrew the plug T, slacken the locking nut and apply a screwdriver to the adjusting screw VR. Turn clockwise to close the valve or counterclockwise to open.
- When this operation has been completed lock the nut and screw down the plug T.
- To replace the coil remove the plug T, withdraw the coil B and after replacing the coil refit the plug T.

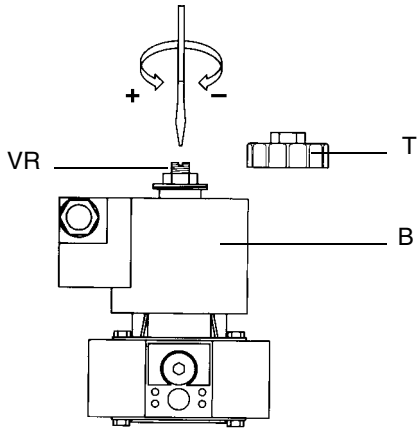


Fig. 20

Landis gas valves

Version with SKP20 (with incorporated pressure governor).

- To increase or decrease gas pressure, and therefore gas flow rate, remove the cap T and use a screwdriver to adjust the regulator screw VR. Turn clockwise to increase the flow, anti-clockwise to reduce it.
- Connect up the gas tubing to the gas pressure nipple (TP in figure).

Leave the blowhole free (SA in figure).

Should the spring fitted not permit satisfactory regulation, ask one of our service centres for a suitable replacement.

(For further informations see also the appendix)

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

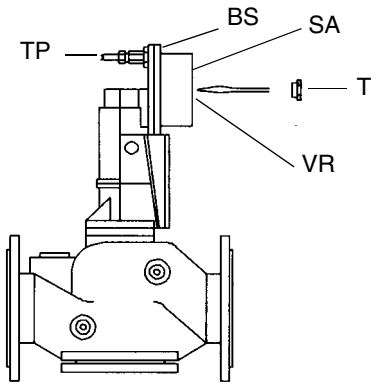


Fig. 21

Landis gas valves VGD

Version with SKP20 (with incorporated pressure governor).

- To increase or decrease gas pressure, and therefore gas flow rate, remove the cap T and use a screwdriver to adjust the regulator screw VR. Turn clockwise to increase the flow, anti-clockwise to reduce it.
- Connect up the gas tubing to the gas pressure nipple (TP in figure).

Leave the blowhole free (SA in figure).

Should the spring fitted not permit satisfactory regulation, ask one of our service centres for a suitable replacement.

(For further informations see also the appendix)

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

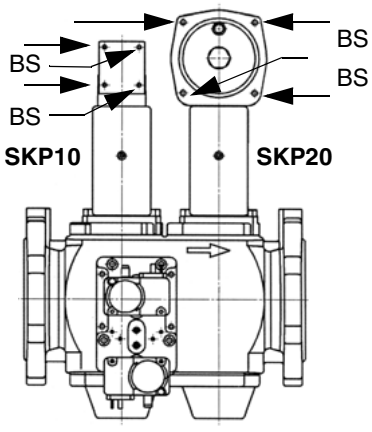


Fig. 22a

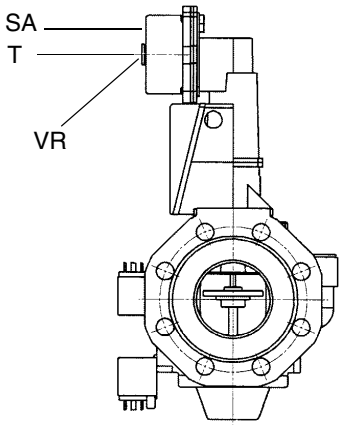


Fig. 22b

Dungs Valves

SV (without regulation)
SV-D Quick opening valve with regulation
SV-DLE Slow opening valve with regulation

SV-D...

- To adjust the valve slacken the screw VR and turn the knob G.
- Rotate clockwise to open the valve
- Rotate counterclockwise to close the valve
- Tight the screw VR at the end of setting

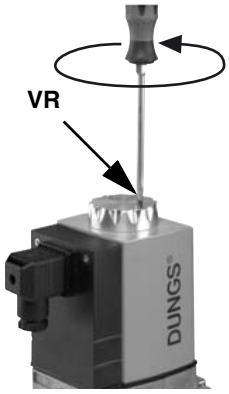


Fig. 23a

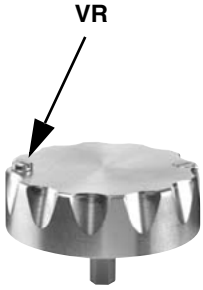


Fig. 23b

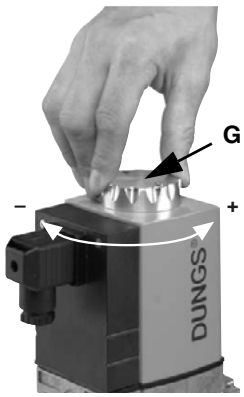


Fig. 23c

SV-DLE...

- To adjust the valve slacken the screw VR and turn the knob G.
- Rotate clockwise to open the valve
- Rotate counterclockwise to close the valve
- Tight the screw VR at the end of setting

Rapid stroke adjustment

- Unscrew the cap E from the hydraulic brake unit

Turn the adjustment cap E upside down and use it as a tool, tucking it in the regulation spindle

- Turn clockwise to increase the rapid stroke

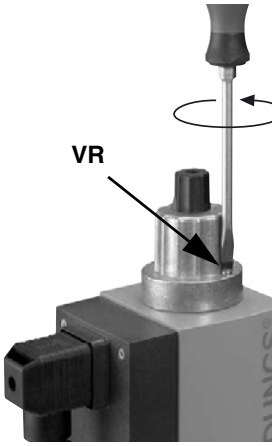


Fig. 24a

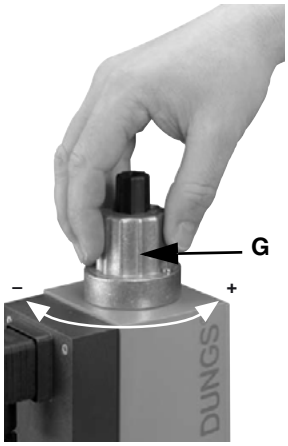


Fig. 24b

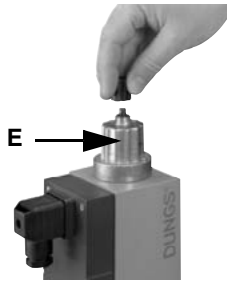


Fig. 24c

ValvesDungs DMV-DLE

Setting is carried out working on the screw V1. Turning clockwise the valve closes, turning counterclockwise the valve opens.

Fast stroke setting

- Unscrew the setting cap E.
- Turn the cap upside down and use it as a tool tucking it in the regulation spindle.

Rotate counterclockwise to increase rapid stroke.

Warning: the knob F doesn't make any setting!

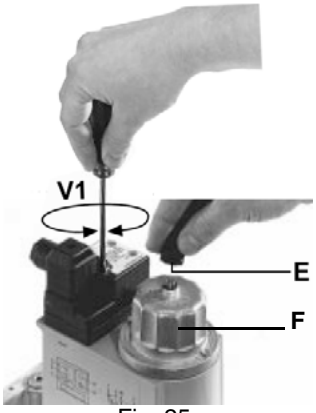


Fig. 25

Pressure regulator Dungs FRS

Adjustment

- Unscrew the protection cap A
- Rotate the regulation screw B clockwise to increase the pressure or counterclockwise to decrease it
- Check the pressure at the end of settings
- Replace the protection cap A

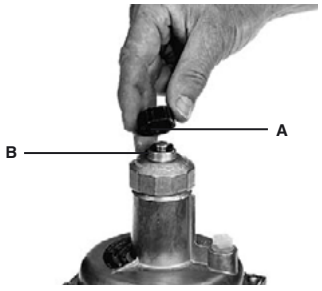


Fig. 26a

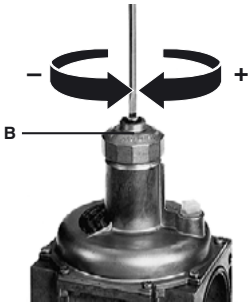


Fig. 26b

GAS FILTER

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

GAS FILTER MAINTENANCE

Flanged fittings - Fig. 27a

After having ensured that there is no pressurised gas inside the filter, remove the cover (1) by unscrewing the fastening screws (8). Remove the filter cartridge (3), wash it in soap and water, blow it with compressed air (or replace if necessary) and put it back in its initial position, checking that it fits between the positioning guides (6) on the bottom (5) and that it does not stop the cover (1) from being put back in place. Finally, put the cover (1) back in place, making sure that the O-Ring (2) is in its seat and that the filter cartridge (3) fits neatly between the guides (6) on the cover (1), the same as those on the bottom (5).

Threaded fittings - Fig. 27b and Fig. 27c

After having ensured that there is no pressurised gas inside the filter, remove the cover (5) by unscrewing the fastening screws (1). Remove the filter cartridge (3), wash it in soap and water, blow it with compressed air (or replace if necessary) and put it back in its initial position, checking that it fits between the positioning guides (7) and that it does not stop the cover (5) from being put back in place. Finally, put the cover (5) back in place, making sure that the O-Ring (4, Fig. 27b) is in its seat.

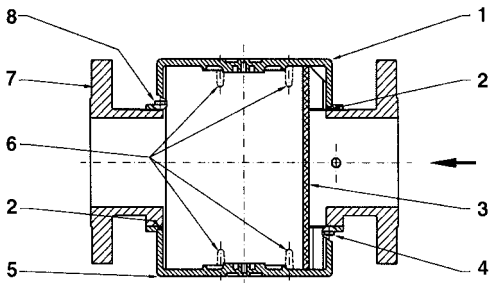


Fig. 27a

Key (Fig. 27a)

1 Cover
2 O-Ring
3 Filter cartridge
4 Screws M5 x 12
5 Bottom
6 Positioning guides
7 Body
8 Screws M5 x 14

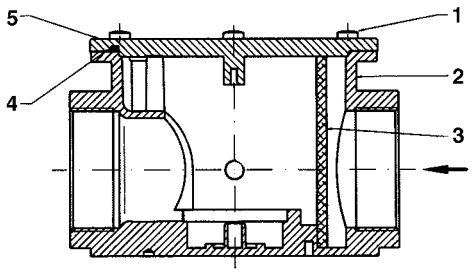


Fig. 27b

Key (Fig. 27b - Fig. 27c)

1 Fastening screws
2 Body
3 Filter cartridge
4 O-Ring
5 Cover
6 Pressure port
7 Positioning guides

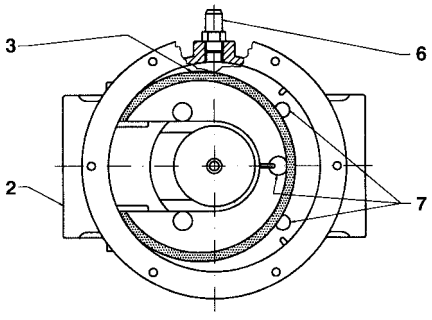


Fig. 27c - Top view, without cover

ADJUSTMENT OF GAS AND AIR FLOW RATE

WARNING: During commissioning operations, do not let the burner operate with insufficient air flow (danger of formation of carbon monoxide); if this should happen, shut down the burner, increase the opening of the air damper and start up the burner again to ensure the purging of the carbon monoxide from the combustion chamber.

Startup input

The start-up heat input shall not exceed 120 kW (single stage burners) or 1/3 of nominal input (2 stages or fully modulating burners). In order to comply with these requirements, single stage burners are dispatched from the factory with appropriate setting of the hydraulic brake of gas valve.

On 2 stages or modulating burners, take care to set the minimum gas flow rate lower than 1/3 of nominal input.

Burners with single stage operation

- Slacken the screw VBS shown in Fig. 28 by means of a screwdriver; set the desired air flow rate by adjusting directly the damper.
- On final adjustment tight the screw VBS.

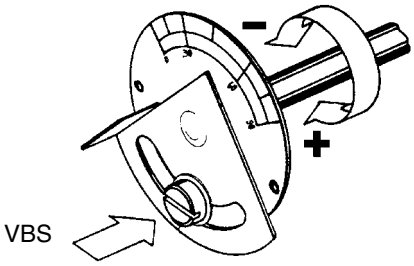


Fig. 28

Burners with hi-lo flame operation

- The rotation of the servocontrol must always be 90°, whatever the positions of high and low flame.

During testing in the factory the throttle valve, air damper and low flame are set to average values using cams of the servocontrol.

To change the settings of the burner during testing in the plant proceed as follow:

1 Turn on the burner and drive it to high flame.

2 Adjust the gas flow rate to the required value by means of the pressure governor or the valve regulator.

To adjust the air flow rate slacken the nut RA and rotate the screw VRA (clockwise rotation increases air flow, anticlockwise rotation decreases it) until the desired flow rate is obtained. (Fig. 31).

3 Drive the burner to low flame. In order to alter the gas flow rate slacken the nuts DB (Fig. 29) and adjust the opening angle of the gas throttle valve by rotating the rod TG (clockwise rotation increases gas flow, anticlockwise rotation decreases it). The slot on the throttle valve shaft shows the opening degree of the valve with respect of the horizontal axis (Fig. 30).

4 If it should be necessary to adjust the rating of the burner at low flame, adjust the corresponding cam of the servo control. After this adjustment, check the gas flow rate and repeat point 3.

N.B. At the end of settings, make sure the fastening screws RA and DB are fully tightened.

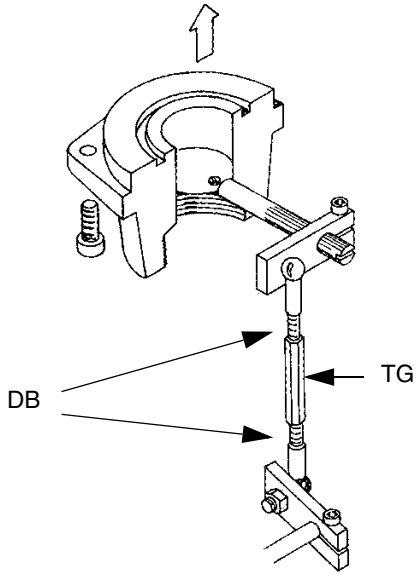


Fig. 29

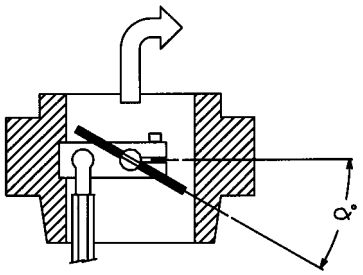
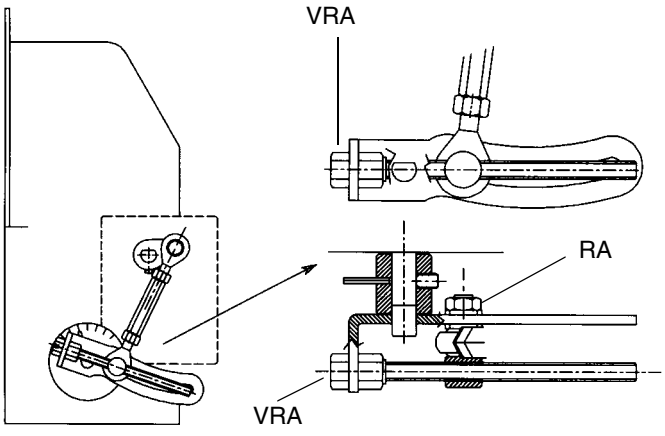


Fig. 30

Fig. 31



Burners with fully modulating or progressive operation

During the test in the factory, the gas throttle valve, air damper in low flame operation and the servocontrol are set to average values.

To recalibrate the burner on site, proceed as follows.

1 Switch on the burner and drive it to high-flame (servocontrol position = 90°).

Adjust the gas flow rate to the required figure by adjusting the pressure governor or the valve regulator. To adjust the air flow rate (Fig. 33) slacken the screw RA and rotate the screw VRA (clockwise rotation increases air flow, anticlockwise rotation decreases it) until the desired flow rate is obtained.

N.B.: at the end of settings remember to tight the screw RA.

2 Drive the burner to low flame. If it should be necessary to adjust burner capacity at low flame move the servocontrol cam accordingly (page 22).

3 Adjust the gas flow rate in the low-flame position (same position as the ingition) by means of the adjustable screws V (Fig. 33), to change the opening angle of the throttle valve (Fig. 32); rotate clockwise to increase the flow rate or anticlockwise to decrease it.

4 Turn off the burner and turn it on again. If the gas flow rate needs further regulations, repeat operations at step 3.

Fully modulating burners

To set the gas flow rate in low flame and in the intermediate points, proceed as follows.

5 Push the button EXIT on the modulator device (Fig. 37) for a time of 5 seconds; when the led with the hand simbol lights, use the arrow keys to drive the servocontrol to the maximum opening position and, stopping the movement at each screw V, use the one corresponding to the bearing to set the gas flow rate.

6 Push the EXIT button to exit the manual operation mode.

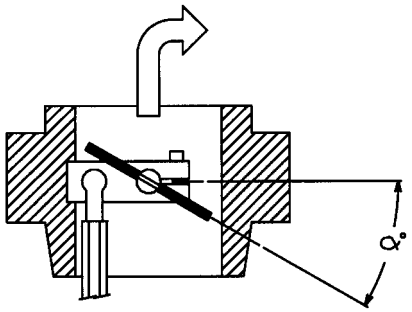


Fig. 32

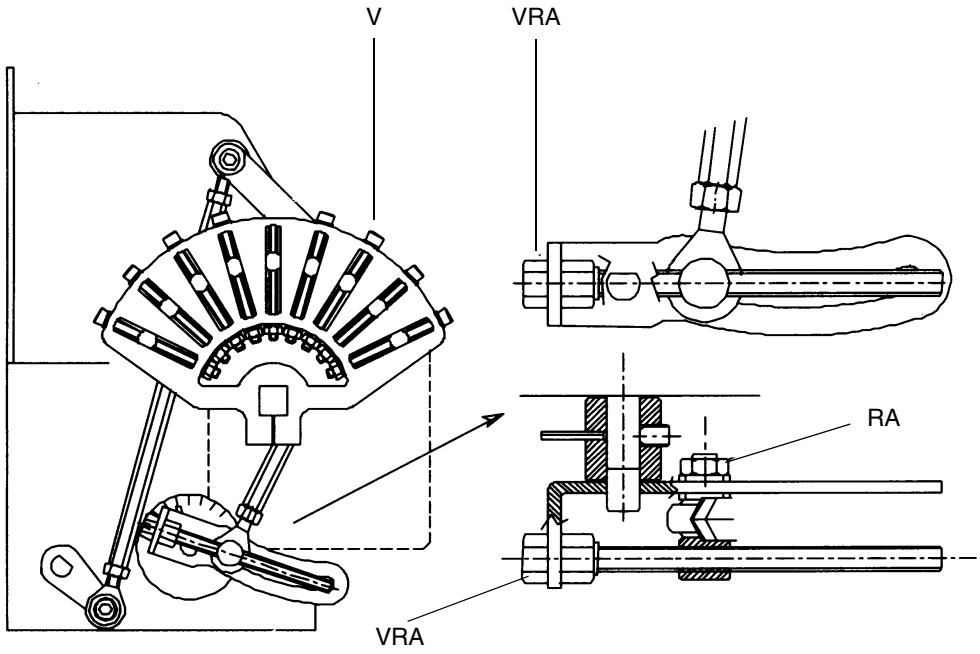
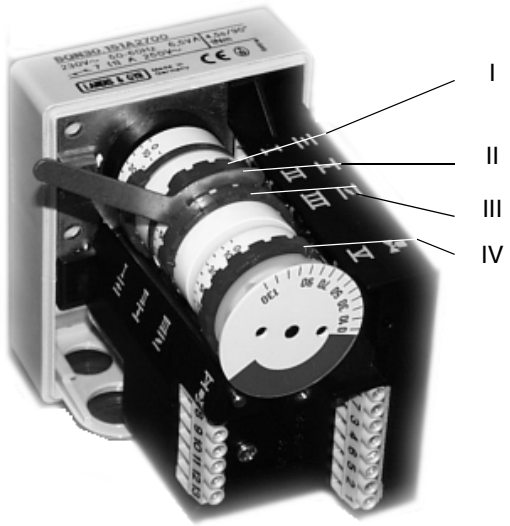


Fig. 33

SERVOCONTROL CAMS SETTING

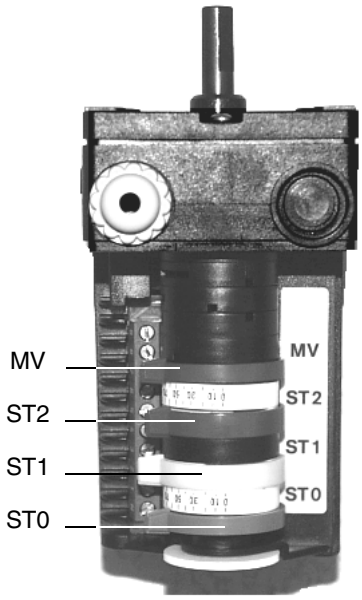
Landis SQN30.151 (hi-lo flame burners)
Landis SQN30.251 (progressive and fully modulating burners)

Fig. 34a



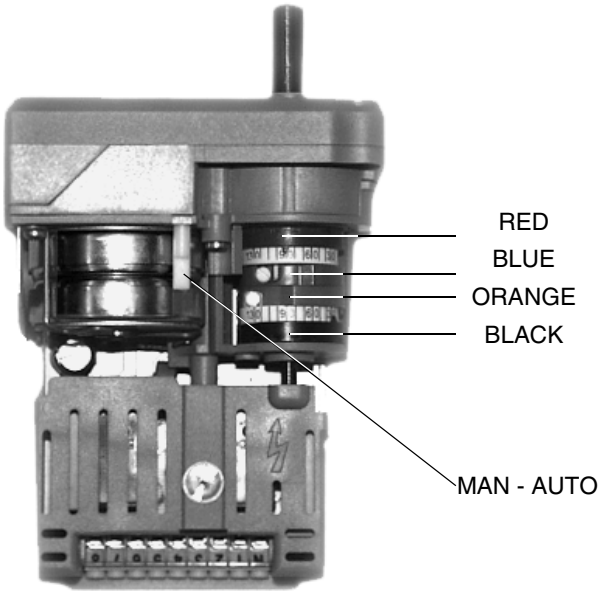
Berger STA6 B 3.41 (hi-lo flame burners)
Berger STA12B3.41 (progressive and fully modulating burners)
Berger STA15B3.41 (progressive and fully modulating burners)

Fig. 34b



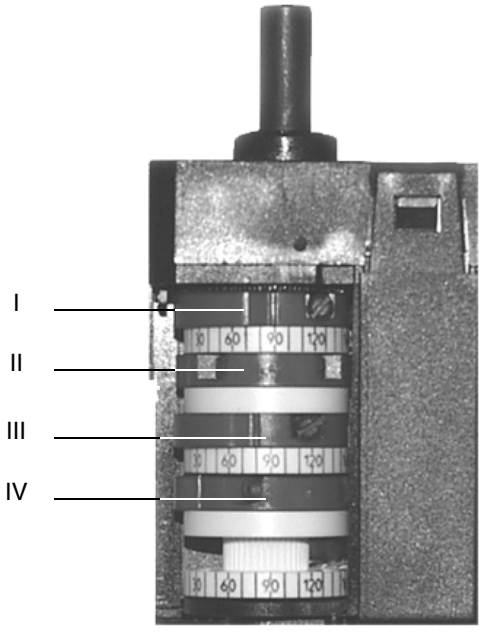
Landis SQN70.224A20 (hi-lo flame burners)
Landis SQN70.424A20 (progr. and fully modulating burners)

Fig. 34c



Berger STA4.5BO.37/6

Fig. 34d



Servocontrol cams setting

The setting procedure is the same for Berger and Landis servocontrols. Refer to the table below for the correct correspondence of cams.

	BERGER	BERGER	LANDIS	LANDIS
High flame position (set to 90°)	ST2	I	I	RED
Low flame and ignition position	ST1	IV	III	ORANGE
Stand-by position (set to 0°)	ST0	II	II	BLUE
Not used	MV	III	V	BLACK

In the servocontrols BERGER STA6B3.41 e STA4.5, the manual air damper control is not provided. The regulations are carried out by means of the appropriate tool fitted with the servocontrol (with SQN30) or by means of a screwdriver, affecting on the screw into the cam (all other servocontrols).

Calibration of air pressure switch (single stage burners)

Calibration is carried out as follows.:

- Remove the transparent plastic cap.
- With the burner in operation, after air and gas setting have been completed, slowly turn the adjusting ring nut VR in the clockwise direction until the burner lockout; read the value on the pressure switch scale and reduce it by 0.5 mbar.
- Repeat the start up cycle of the burner and check it runs properly.
- Refit the transparent plastic cover on the pressure switch.

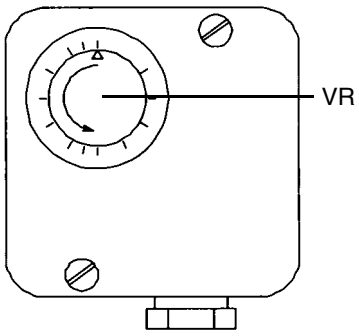


Fig. 35

Calibration of air pressure switch
(High-low flame and fully modulating burners)

Calibration is carried out as follows:

- Remove the transparent plastic cap.
- After air and gas setting have been completed, start the burner and, while pre-purge phase is running, slowly turn the adjusting ring nut VR in the clockwise direction until the burner lockout .
- Read the value on the pressure switch scale and reduce it by 15%.
- Repeat the ignition cycle of the burner and check it runs properly.
- Refit the transparent plastic cover on the pressure switch.

Calibration of minimum gas pressure switch

Calibration is carried out as follows:

- Remove the transparent plastic cap.
- With the burner in operation test the pressure on the pressure port at the input of the gas filter; slowly close the manual shut-off valve (See “Gas train installation”) until the detected pressure is reduced by 50%.
- Fully open the manual shut-off valve **(WARNING: carry out this operation ONLY with the burner turned off!).**
- Refit the transparent plastic cover on the pressure switch.

Calibrating the maximum gas pressure switch (optional)

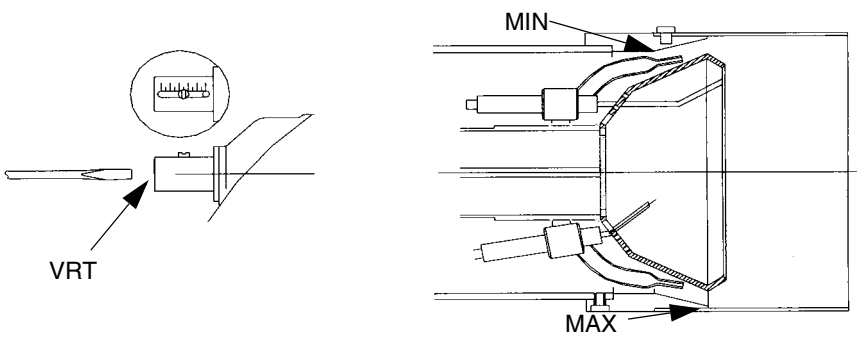
The high gas pressure switch is mounted on the burner near to the throttle valve and is connected to it by a copper tube. Calibration is carried out as follows:

- Remove the transparent plastic cap.
- Drive the burner to maximum output.
- Rotate slowly the adjustment ring nut VR clockwise, until the burner stops.
- Rotate the adjustment ring nut slightly back (increase the value indicated on the scale nut after rotation, by 30%).
- Turn on the burner and verify it operates correctly; if it shuts-off, turn back the setting knob again.
- Refit the transparent plastic cover on the pressure switch.

Adjusting the combustion head

The burner is adjusted in the factory with the combustion head in the "MAX" position, corresponding to the maximum power. To operate the burner at a lowest strenght, progressively shift back the combustion head, toward the "MIN" position, rotating the screw VRT clockwise.

Fig. 36



PART II: OPERATION

LIMITATIONS OF USE

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

THE USER MUST GUARANTEE THE CORRECT FITTING OF THE APPLIANCE, ENTRUSTING THE INSTALLATION OF IT TO QUALIFIED PERSONNEL AND HAVING THE FIRST COMMISSIONING OF IT CARRIED OUT BY A SERVICE CENTRE 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 ("ON-OFF"), 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.

OPERATION

- Bring to the ON position the mains switch A on the burner electrical board front panel.
- Check the flame control device is not in the lockout position (light B on), if necessary reset it by means of the pushbutton C (reset);
- Verify that the control thermostats or pressure switches give the consent to the burner to operate.
- Check the gas supply pressure is sufficient (light D on).

Only burners equipped with leakage control device: the check cycle of the leakage control device starts; the completion of this check is signalled by the light of the lamp on the device. When the valves check is finished, the start up cycle of the burner begins. In the case of a leak in a valve, the leakage control device locks and the lamp E lights.

To reset the device operate on the device pushbutton.

- When the startup cycle begins, the servocontrol drives the air damper to the maximum opening position, the fan motor starts and the pre-purgue phase begins.

During the pre-purgue phase, the complete opening of the air damper is signalled by the lamp F on the frontal panel of the electrical board.

- At the end of the pre-purgue phase, the air damper goes to the ignition position, the ignition transformer comes on (signalled by the lamp H) and 3 seconds later the solenoid valves EV1 and EV2 are energized (lights L and I on the front panel).
- 3 seconds after the opening of the valves, the ignition transformer comes off and the lamp H turns off; subsequently:

Single stage burners: the burner is on at the maximum power; the lights F and G are on;

High-low flame burners: the burner is on in low flame (light G is on); 8 seconds later the high flame operation begins and the burner switches automatically to high flame (light F is on) or remains in low flame operation, depending on the plant needs.

Fully modulating burners: after the posted time the modulating operation begins and the burner is driven by the modulator (P), depending on the needs of the plant; the light F is on until the modulator drives the burner to a rise of power.

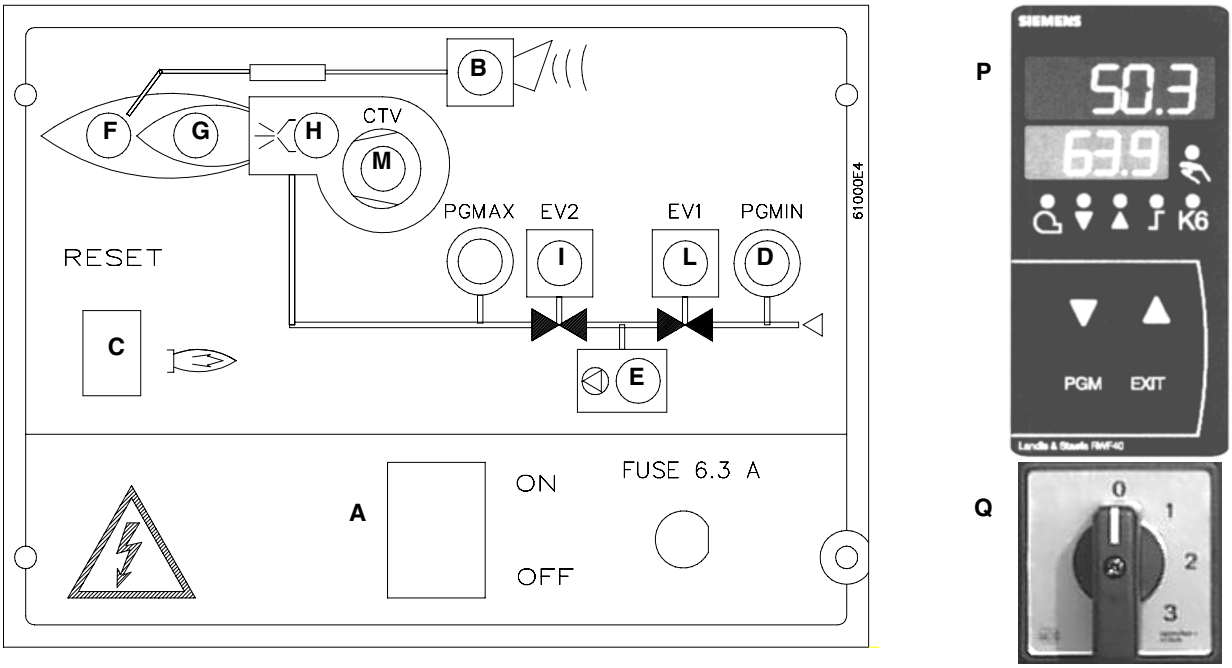


Fig. 37 - Electrical board front panel

Key

A main switch on-off
B lockout indicator light
C reset pushbutton for flame control device
D gas pressure switch consent indicator light
E leakage control device lockout indicator light (only on burners with leakage control device)
F high flame operation indicator light (or air damper open during pre-purgue phase)
G low flame operation indicator light
H ignition transformer operation indicator light
I valve in operation indicator light for EV2
L valve in operation indicator light for EV1
M indicator light for fan motor overload tripped (only three-phase burners); to reset the overload tripped, open the electrical board.
P modulator (fitted only on fully modulating burners)
Q operation manual selector: 0) stop - 1) high flame - 2) low flame - 3) automatic

PART II: OPERATION

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.

N.B. All operations on the burner must be carried out with the power disconnected

PERIODICAL OPERATIONS

- Cleaning and examining the gas filter cartridge, if necessary replace it; (see on page 19);
- Removal, examination and cleaning of the combustion head (see Fig. 38 - Fig. 39);
- Check of ignition electrode, cleaning, adjustment and, if necessary, replacement (see Fig. 40 - Fig. 41);
- Check of detection electrode, cleaning, adjustment and, if necessary, replacement (see Fig. 40 - Fig. 41); if in doubt check the detection circuit as shown in Fig. 42 - Fig. 43, with the burner in operation;
- Cleaning and greasing sliding and rotating parts.

NOTE: The check on the ignition and detection electrodes is carried out after removing the combustion head.

Removal of the combustion head

Fig. 38 - Burners P20 - P30 - P45

- Remove the lid C.
- Unscrew the 2 screws S which hold in position the washer, unscrew then the screw VRT, to free the threaded rod AR.
- Unscrew the screws V which lock the gas manifold G and extract the complete unit as shown in the figure.

Note: for subsequent assembly carry out the above described operations in the reverse order, having care to keep the OR ring in the correct position.

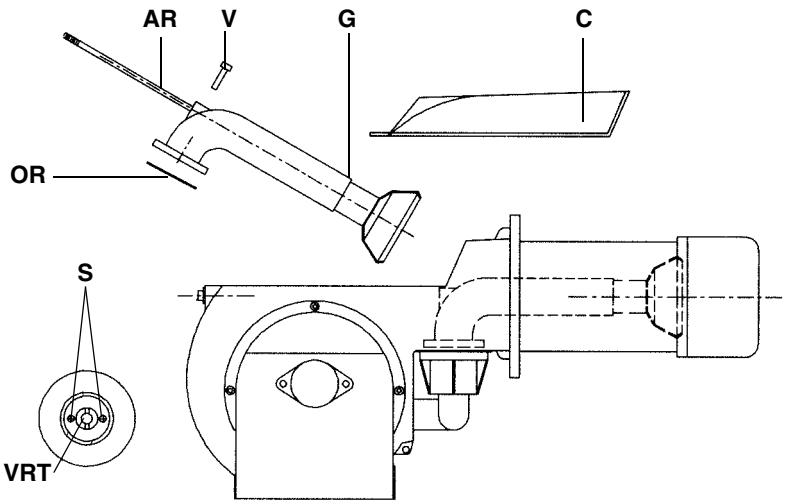


Fig. 38

Fig. 39 - Burners P65

- Remove the lid C.
- Unscrew the 2 screws V which hold in position the washer G and remove the complete set as shown in figure.

Note: for subsequent assembly carry out the above described operations in the reverse order, having care to keep the OR ring in the correct position.

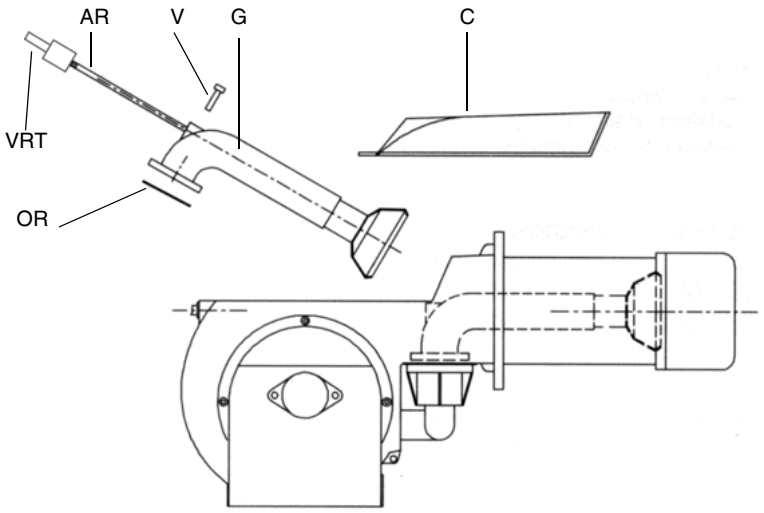


Fig. 39

Fig. 40 - Electrodes position setting P20 - P30 - P45

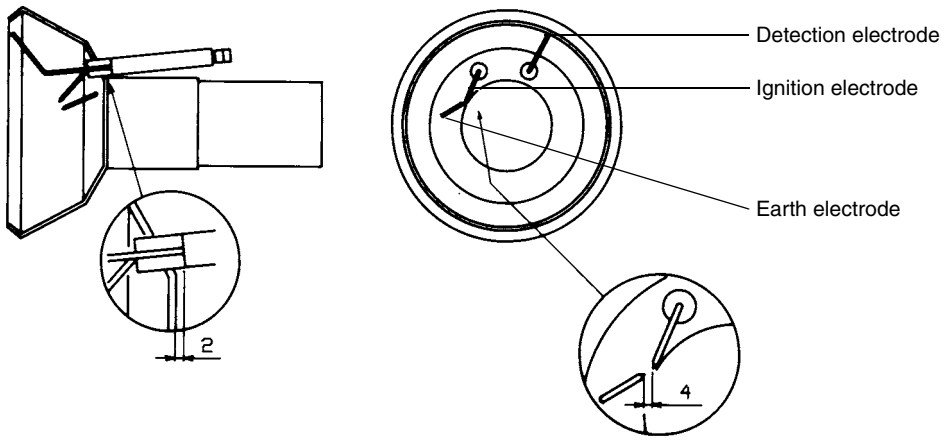
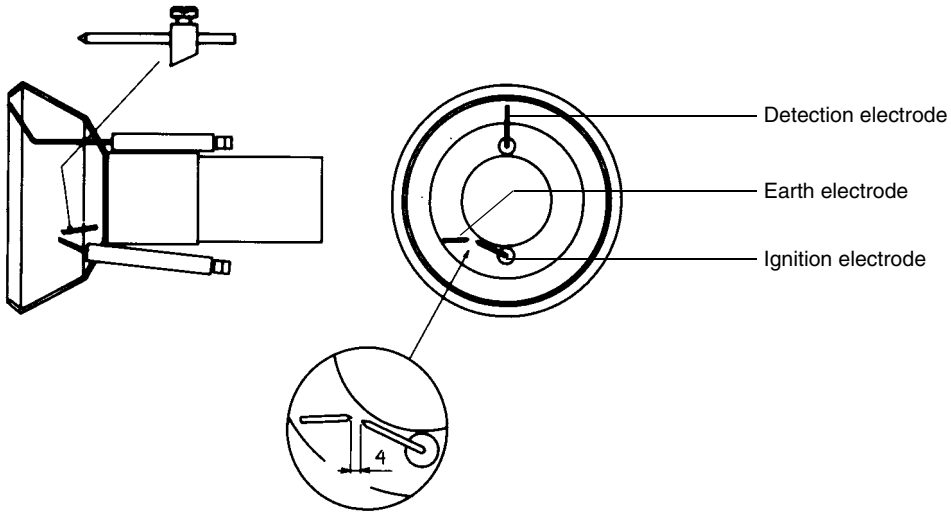


Fig. 41 - Electrodes position setting P65



Check of ionisation current

To measure the detection signals refer to the diagrams in Fig. 42 - Fig. 43. If the signal is less than the value shown, check the position of the detection electrode, the electrical contacts and if necessary replace the detection electrode.

Fig. 42

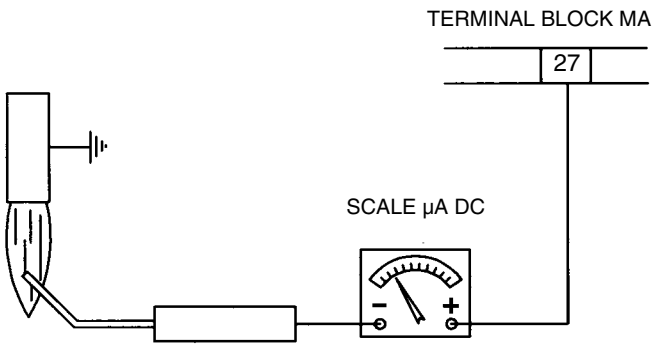
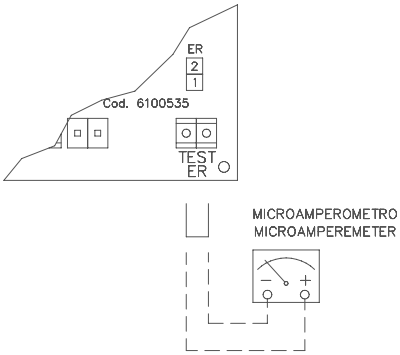


Fig. 43



Flame control device	Minimum detection signal
Landis LGB21-22	3 µA
Landis LMG21-22	3 µA

If the power supply to the burner is 230V three-phase or 230V phase-phase (without a neutral), with the Landis LGB2... o LMG2... flame control device, between the terminal 2 on the board and the earth terminal, an RC Landis RC466890660 filter must be inserted

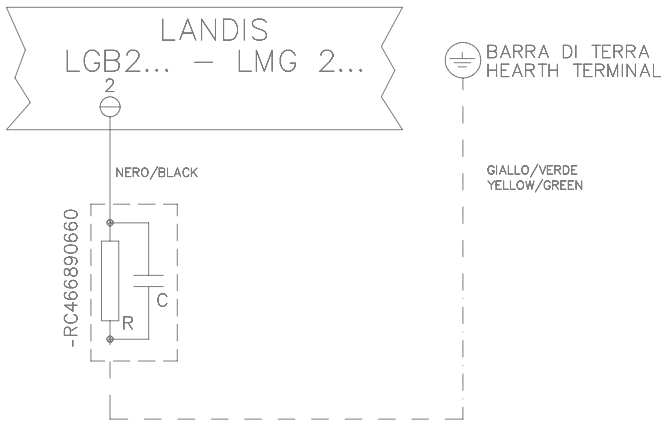


Fig. 44

Key
C - Capacitor (22nF/250V)
LGB - LMG - Landis flame control device
R - Resistor (1Mohm)
RC466890660 - RC Landis filter

TROUBLESHOOTING

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

* In this case insert an RC filter (see Fig. 44)

ELECTRICAL DIAGRAMS

Electrical diagrams code 18-009 Rev.1 and 18-020 - complete key

BV	Fan motor remote contactor coil
CTV	Contacts of fan motor overload tripped
CN1	Connector for three-phase versions
CV	Fan motor contactor contacts
ER	Flame detection electrode
EV	Valves connector
EV1	Network side solenoid gas valve (or valves group)
EV2	Burner side solenoid gas valve (or valves group)
F-FU	Fuses (FU =6,3A three-phase versions - FU =10A monophase version)
FILTRO	Filter (when necessary)
FQ	Electrical board frontal connector
IG	Main switch
IL	Line switch for auxiliaries
IM	Line switch for fan motor
L(1,2,3)	Phase
LAF	High flame operation light (only progressive and double stage burners)
LB	Burner lockout signaling light
LBF	Low flame operation light (only progressive and double stage burners)
LEV1	Signaling light for EV1 opening
LEV2	Signaling light for EV2 opening
LF	Burner in operation light (only single stage burners)
LGB/LMG21.33 (**)	Landis flame control device (single stage burners)
LGB/LMG22.33	Landis flame control device (hi-low flame and progressive burners)
LPG	Gas in the network signaling light
LSPG	Valves leakage signaling light
LT	Intervention of fan motor overload tripped signaling light (only three phase burners)
LTA	Ignition transformer in operation signaling light
MC1	Terminal block for three-phase power supply connection and three-phase motor connection
MCM	Terminal block for fan motor supply connection
MV	Fan motor
N	Neutral
PA	Air pressure switch
PE	Earth connection
PGMAX	Maximum gas pressure switch (optional, if fitted remove the bridge in the connector)
PG	Minimum gas pressure switch
PS	Reset pushbutton for flame control device
SQN30.151	Landis servocontrol for air damper (hi-lo flame burners)
SQN30.251	Landis servocontrol for air damper (progressive burners)
SQN70.224A20	Landis servocontrol for air damper (hi-lo flame burners)
SQN70.424A20	Landis servocontrol for air damper (progressive burners)
ST	Thermostats or pressure switches group
STA4.5B0.37/63N21L	Berger servocontrol for air damper (hi-lo flame burners)
STA12B3.41/63N21L	Berger servocontrol for air damper (progressive burners)
STA15B3.41/83N21L	Berger servocontrol for air damper (progressive burners)
STA6B3.41/63N21L	Berger servocontrol for air damper (hi-lo flame burners)
TA	Ignition transformer
TAB	Pressure switch for high-low flame operation (where fitted, remove the bridge between terminals 6 and 7 on terminal board MA)
TV	Fan motor overload tripped
VPS504	Dungs valves leakage control device (otional, if fitted remove the bridge on the connector)

(*) Version with separate valves and gas train connector; A - with leakage control, B - without leakage control

(**) With LGB21.33, a bridge between terminals 7 and 9 must be fitted

SERVOCONTROL CAMS

LANDIS SQN30.251	BERGER STA1xB3.41/x	LANDIS SQN70.424A20	
I	ST2	RED	High flame
II	ST0	BLUE	Stand-by
III	ST1	ORANGE	Low flame
V	MV	BLACK	Not used

ATTENTION:

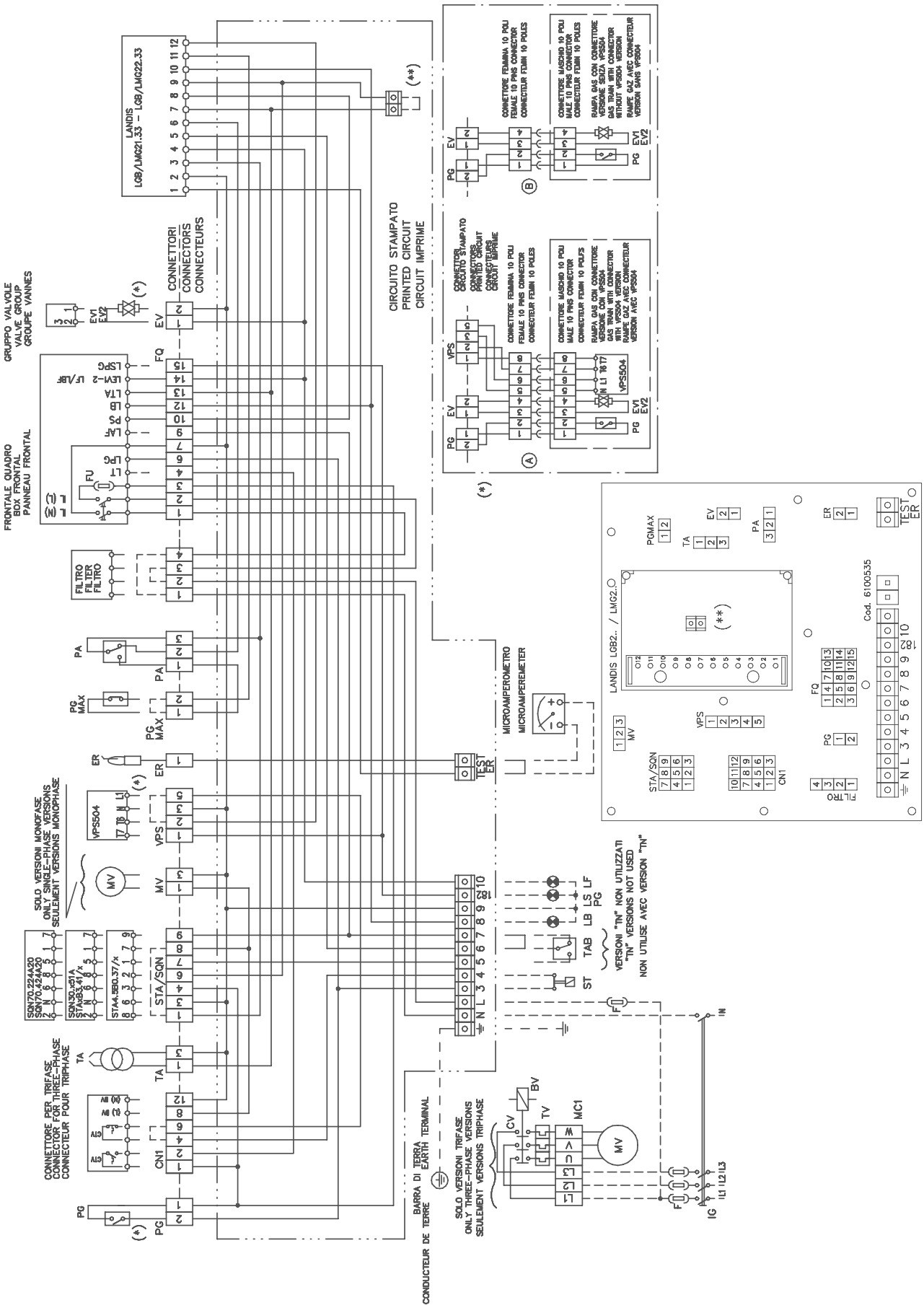
1 - Power supply: 400V 50Hz 3N a.c.three-phase and 230V 50Hz 2N a.c. monophase

2 - Don’t reverse phase and neutral

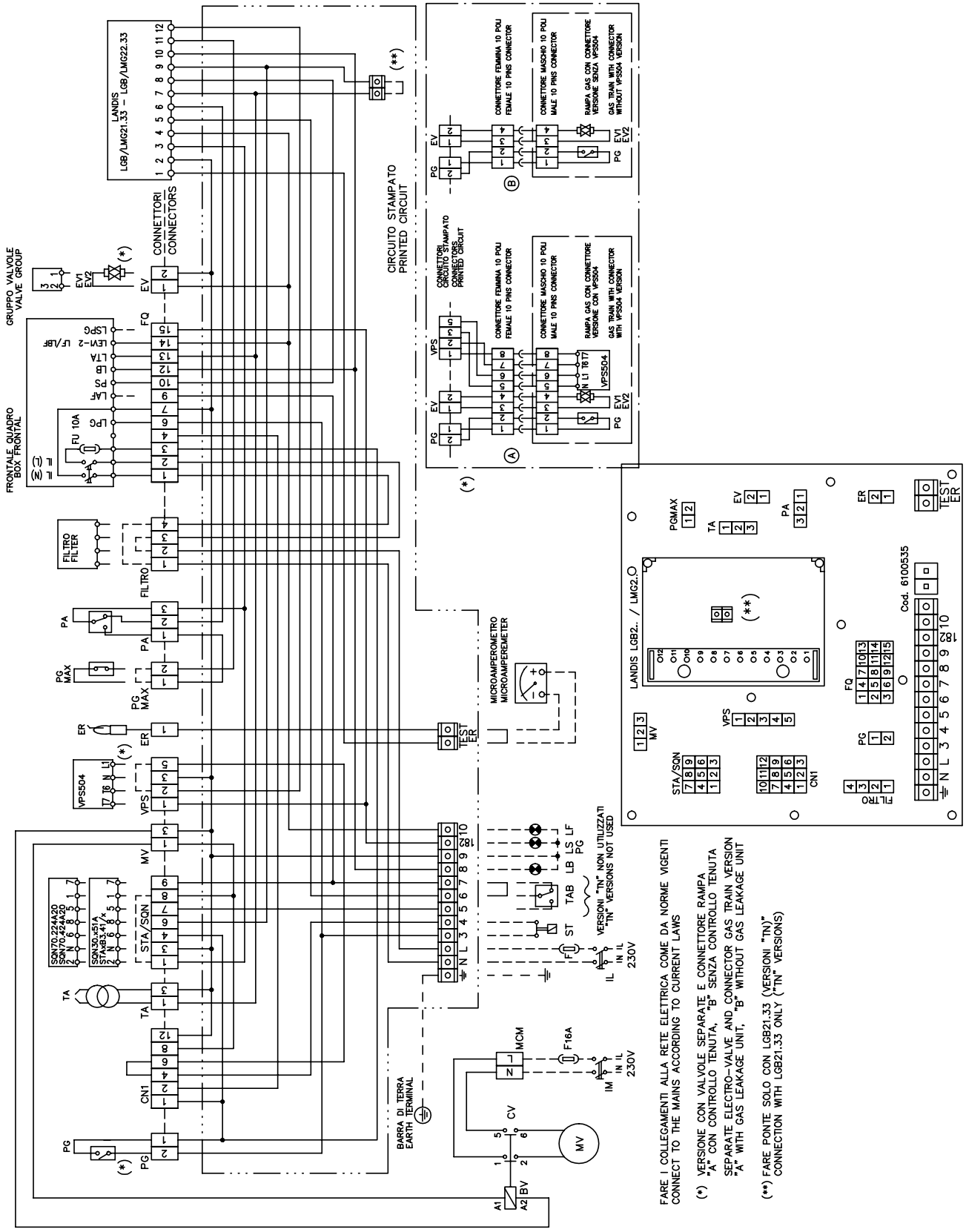
3 - Ensure the burner is properly earthed

ELECTRICAL DIAGRAMS

Electrical diagram code 18-009 Rev. 1 - Burners P20 - P30 L-.TN.., L-.AB.., L-.PR.., P65 L-. AB



Electrical diagram code 18-020 - Burners P45 L-.AB.., L-.PR..



Electrical diagrams code 04-520 Rev. 4, 04-521 Rev. 4, 04-671, 04-672, 05-581- 05-509 Rev. 4, complete key
Burners WITHOUT printed circuit

BV	Fan motor contactor coil
CTV	Fan motor overload tripped contacts
CV	Fan motor contactor contacts
ER	Flame detection electrode
EV1	Gas network side solenoid valve (or valves group)
EV2	Burner side solenoid valve (or valves group)
F	Fuse
IG	Main switch
IL	Line switch
L	Phase
LAF	Burner in high flame operation light
LB	Flame lockout light
LBF	Burner low flame operation light
LEV1	Signaling light for EV1 solenoid valve opening
LEV2	Signaling light for EV2 solenoid valve opening
LF	Burner in operation signaling light
LGB2..* / LMG2..	LANDIS flame control device
LGB2..	LANDIS flame control device
LGB22.33/LMG22.33	LANDIS flame control device
LPG	Signaling light for gas presence in the network
LPGMIN	Signaling light for low pressure in the network
LSPG	Valves leakage signaling light
LT	Motor overload tripped signaling light
LTA	Ignition transformer operation light
MA	Burner supply terminal board
MC	Burner components connection terminal board
MV	Fan motor
N	Neutral
PA	Air pressure switch
PG	Minimum gas pressure switch
PGMAX	Maximum gas pressure switch (optional, if fitted remove the bridge between terminals 156 and 158 on terminal board MC)
PGMIN	Minimum gas pressure switch
PS	Reset pushbutton for flame control device
SQN30.151	LANDIS servocontrol for air damper (hi-lo operation burners)
SQN30.251	LANDIS servocontrol for air damper (progressive operation burners)
SQN70.224A20	LANDIS servocontrol for air damper (hi-lo operation burners)
SQN70.424A20	LANDIS servocontrol for air damper (progressive operation burners)
ST	Group of thermostats or pressure switches
STA12B3.41/63N21L	BERGER servocontrol for air damper (progressive operation burners)
STA15B3.41/83N21L	BERGER servocontrol for air damper (progressive operation burners)
STA4.5B0.37/63N23L	BERGER servocontrol for air damper (hi-lo operation burners)
STA6B3.41/63N21L	BERGER servocontrol for air damper (hi-lo operation burners)
TA	Ignition transformer
TAB	High-low flame pressure switch (if fitted remove the bridge between terminals 177 and 178 on terminal board MA)
TV	Fan motor overload tripped
VPS504	Dungs valves leakage control (optional, if fitted remove the bridge between terminals 6 and 7 on terminal board MC)

* Place a bridge between terminals 7 and 9 on the LGB board, only with LGB21.33

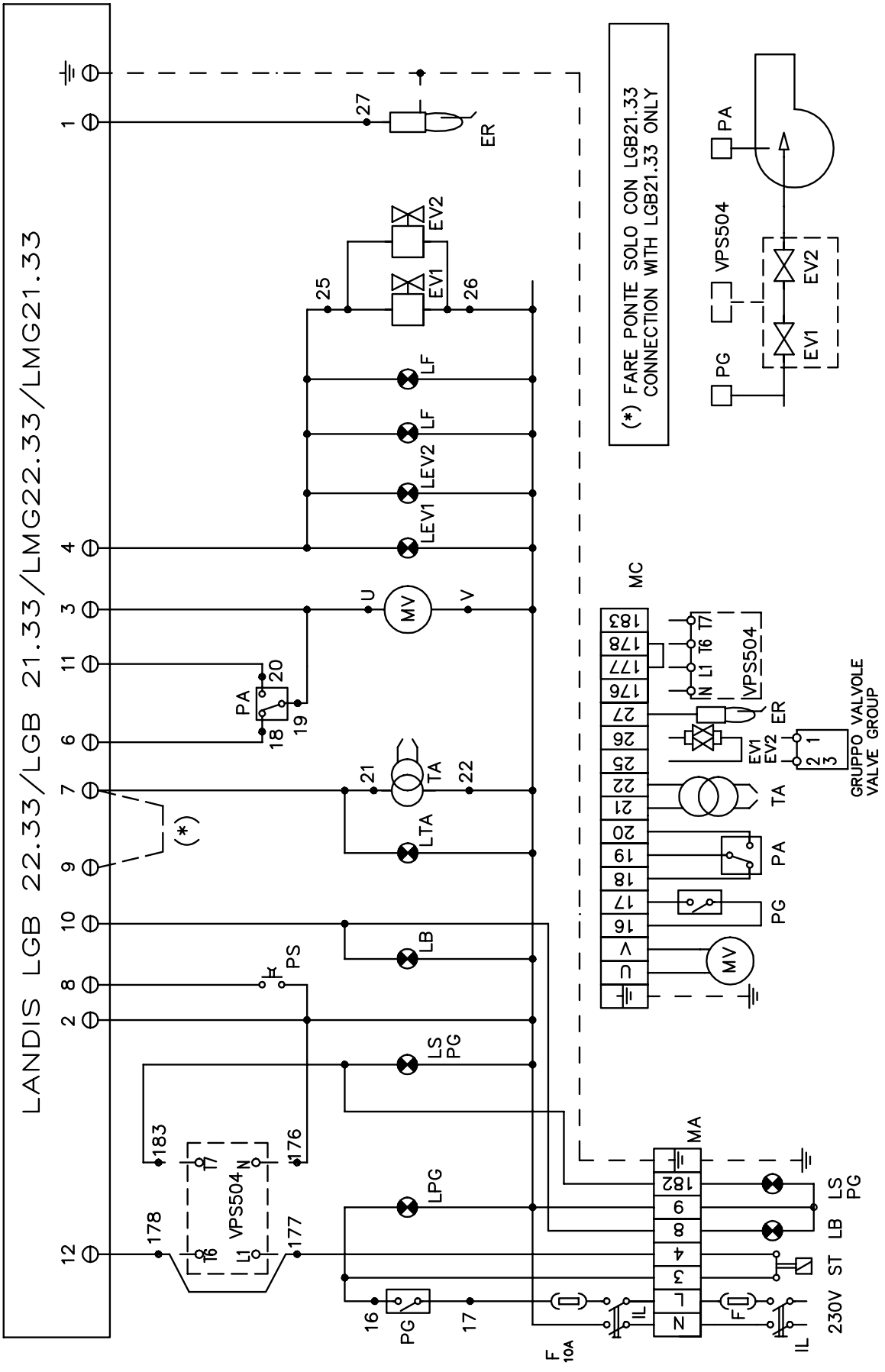
SERVOCONTROL CAMS

LANDIS SQN30.x51	BERGER STAxB3.41	BERGER STA4.5B0.37/	LANDIS SQN70.x24A20	
I	ST2	I	ROSSA	high flame
II	ST0	II	BLU	stand-by
III	ST1	IV	ARANCIO	low flame
V	MV	III	NERA	not used

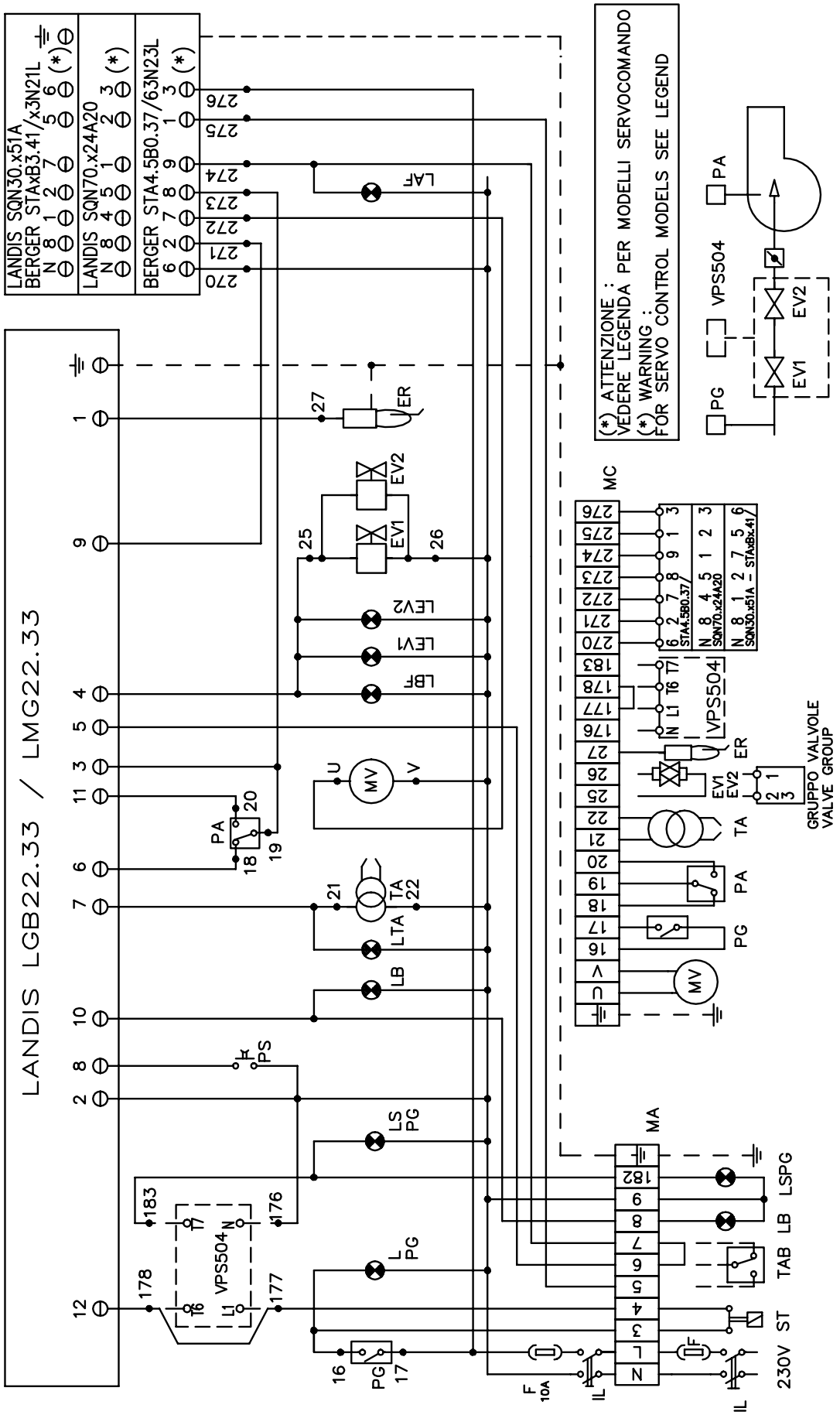
ATTENTION:

1 - Power supply: 400V 50Hz 3N a.c.three-phase and 230V 50Hz 2N a.c. monophase
2 - Don’t reverse phase and neutral
3 - Ensure the burner is properly earthed

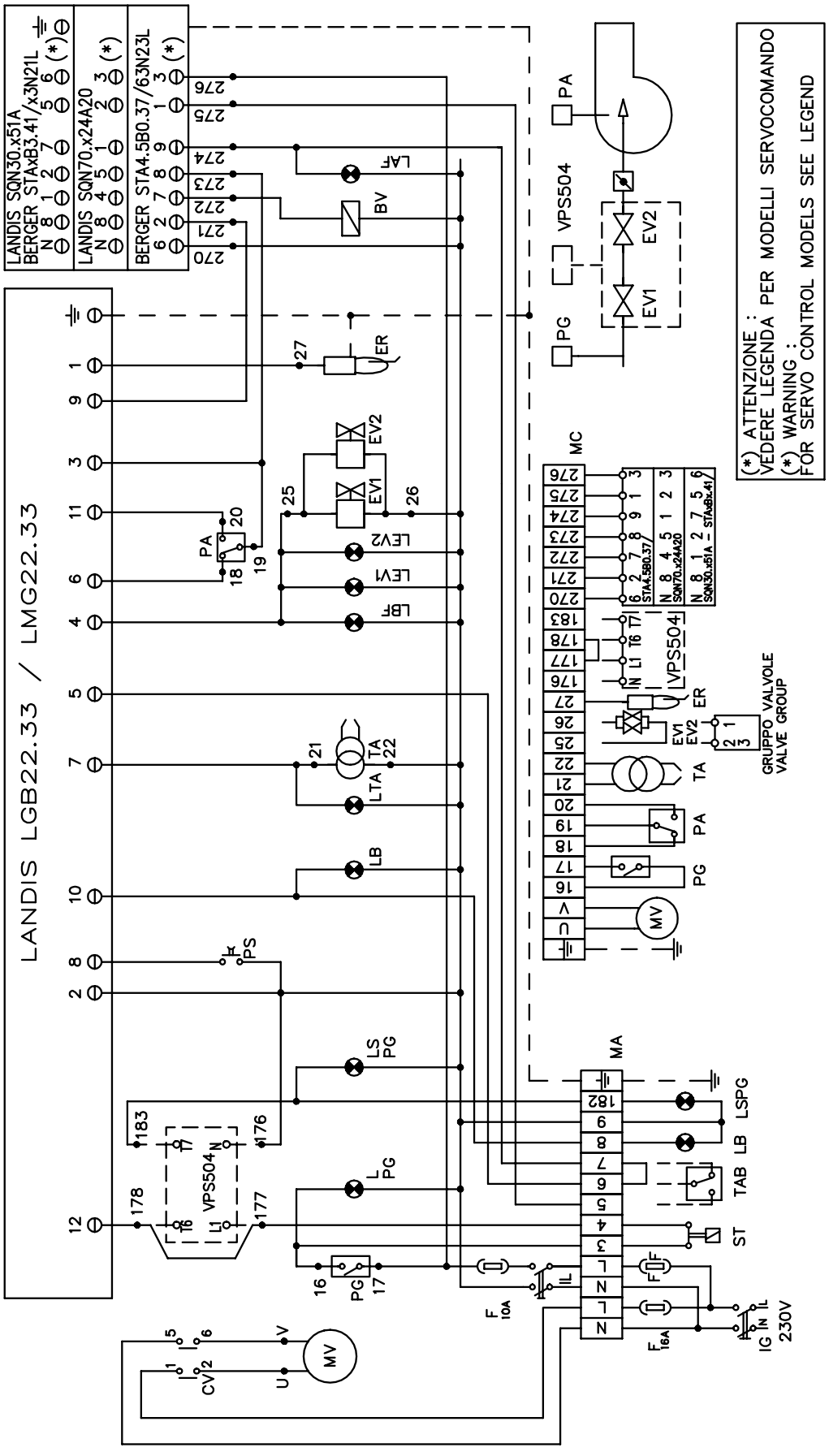
Electrical diagram 04-520 Rev. 4 - Burners P20 - P30 M-.TN..



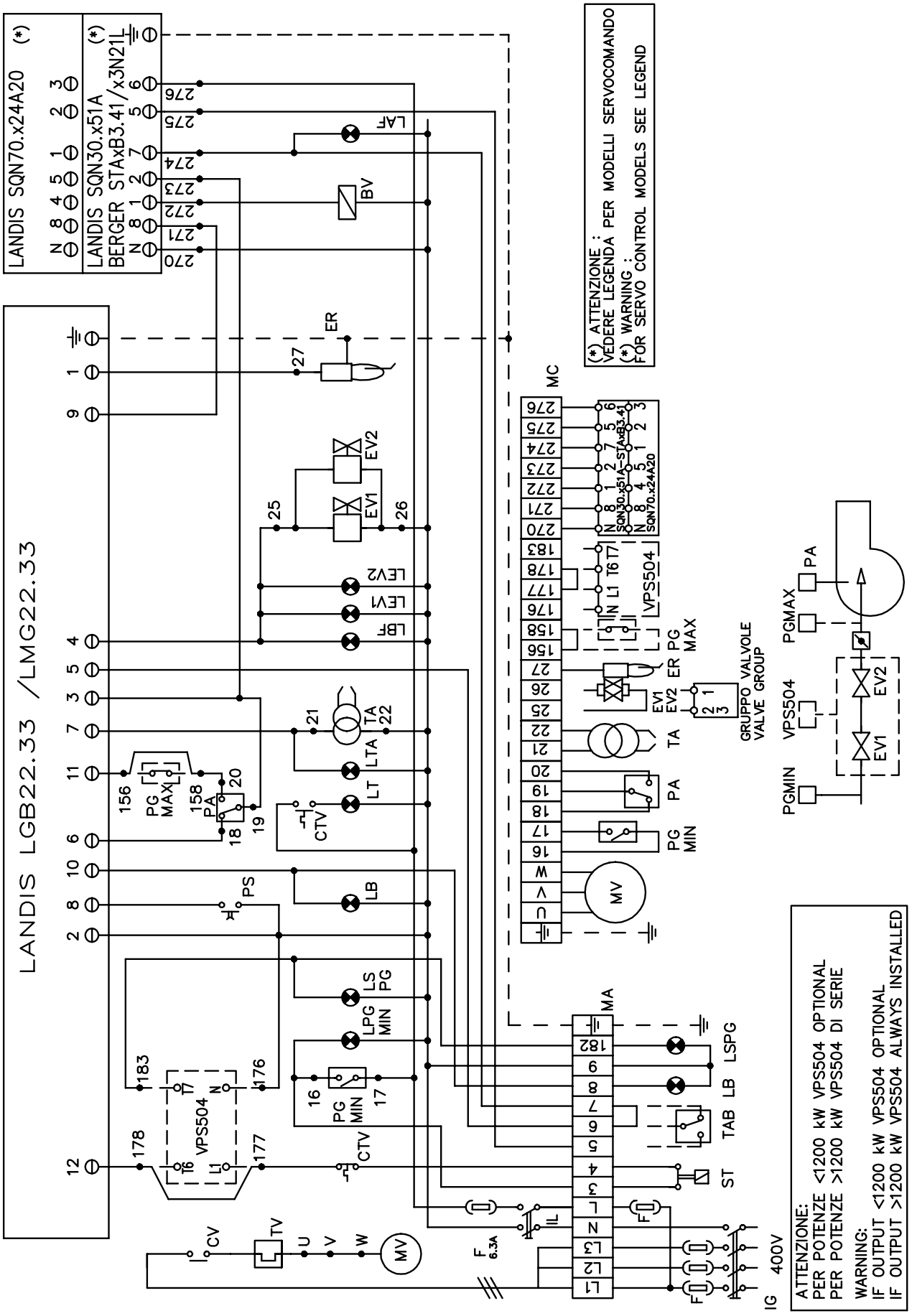
Electrical diagram 04-521 Rev. 4 - Burners P20 - P30 M-.AB



Electrical diagram 04-672 - Burners P45 M-.AB.., M-.PR..



Electrical diagram 05-509 Rev. 4 - Burners P65 M-.AB.., M-.PR..



Electrical diagrams 04-622 Rev. 1 - 04-642 Rev. 1 - 05-615 Rev. 1 - complete key

BV	Fan motor remote contactor coil
CMF	Operation manual selector: 0) stop - 1) high flame - 2) low flame - 3) automatic
CTV	Contacts of fan motor overload tripped
CV	Fan motor contactor contacts
ER	Flame detection electrode
EV1	Network side solenoid gas valve (or valves group)
EV2	Burner side solenoid gas valve (or valves group)
F÷F2	Fuses
IG	Main switch
IL	Line switch
L	Phase
LAF	Burner high flame operation signaling light (2nd stage)
LB	Burner lockout signaling light
LBF	Burner low flame operation signalization light (1st stage)
LEV1	Signalization light for EV1 opening
LEV2	Signalization light for EV2 opening
LGB22.33/LMG22.33	LANDIS flame control device
LPG	Gas in the network signaling light
LPG MIN	Low pressure in the network signaling light
LS	Burner in stand-by signaling light
LSPG	Valves leakage signaling light
LT	Intervention of fan motor overload tripped signaling light
LTA	Ignition transformer in operation signaling light
MA	Burner power supply terminal block
MC	Terminal block for burner components connection
MV	Fan motor
N	Neutral
PA	Air pressure switch
PG	Minimum gas pressure switch
PGMAX	Maximum gas pressure switch (optional, if fitted remove the bridge between terminals 156 and 158 on terminal block MC)
PGMIN	Minimum gas pressure switch
PS	Flame reset pushbutton
Pt100	Connection for thermoresistor Pt 100
RWF40.000*	Landis modulator
SD-0/4÷20mA	Probe connection with signal 0÷20mA / 4÷20mA
SD-0÷10V	Probe connection with signal 0÷10V
SD-PRESS.	3 terminals pressure probe connection (LANDIS QBE620…)
SD-TEMP	2 terminals themperature probe connection (Pt1000 o LANDIS QAE2..-QAC2..)
SQN30.251	Landis servocontrol for air damper (alternate)
SQN70.424A20	Landis servocontrol for air damper (alternate)
ST	Thermostats or pressure switches group
STA12B3.41/63N21L	Berger servocontrol for air damper
STA15B3.41/83N21L	Berger servocontrol for air damper (alternate)
TA	Ignition transformer
TC	Themperature probe connection
TV	Fan motor overload tripped
VPS504	Dungs valves leakage control device (otional, if fitted remove the bridge between terminals 177 and 178 on terminal board MC)

Link the terminal G on the RWF40 modulator with the teminal G on the probe (terminal 13 on terminal board MA) only if a probe is connected.

SERVOCONTROL CAMS

LANDIS SQN30.251	BERGER STA1xB3.41/x	LANDIS SQN70.424A20	
I	ST2	RED	High flame
II	ST0	BLUE	Stand by
III	ST1	ORANGE	Low flame
V	MV	BLACK	Not used

*The modulator includes a limit switch (trminals Q 13 and Q14 on RWF40); it stops the burner if the working parameter overcomes the set differential.

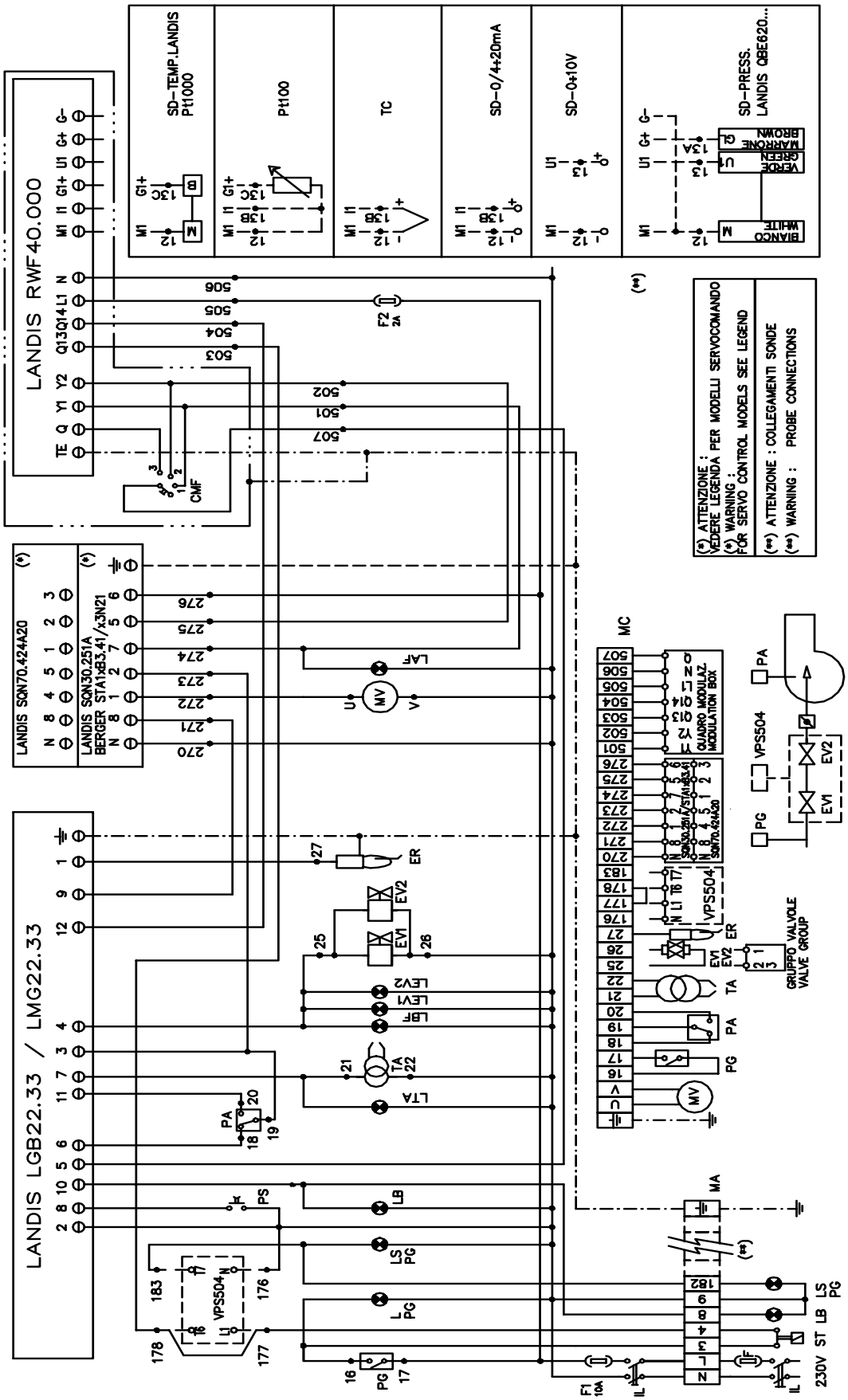
ATTENTION:

1 - Power supply: 400V 50Hz 3N a.c.three-phase and 230V 50Hz 2N a.c. monophase

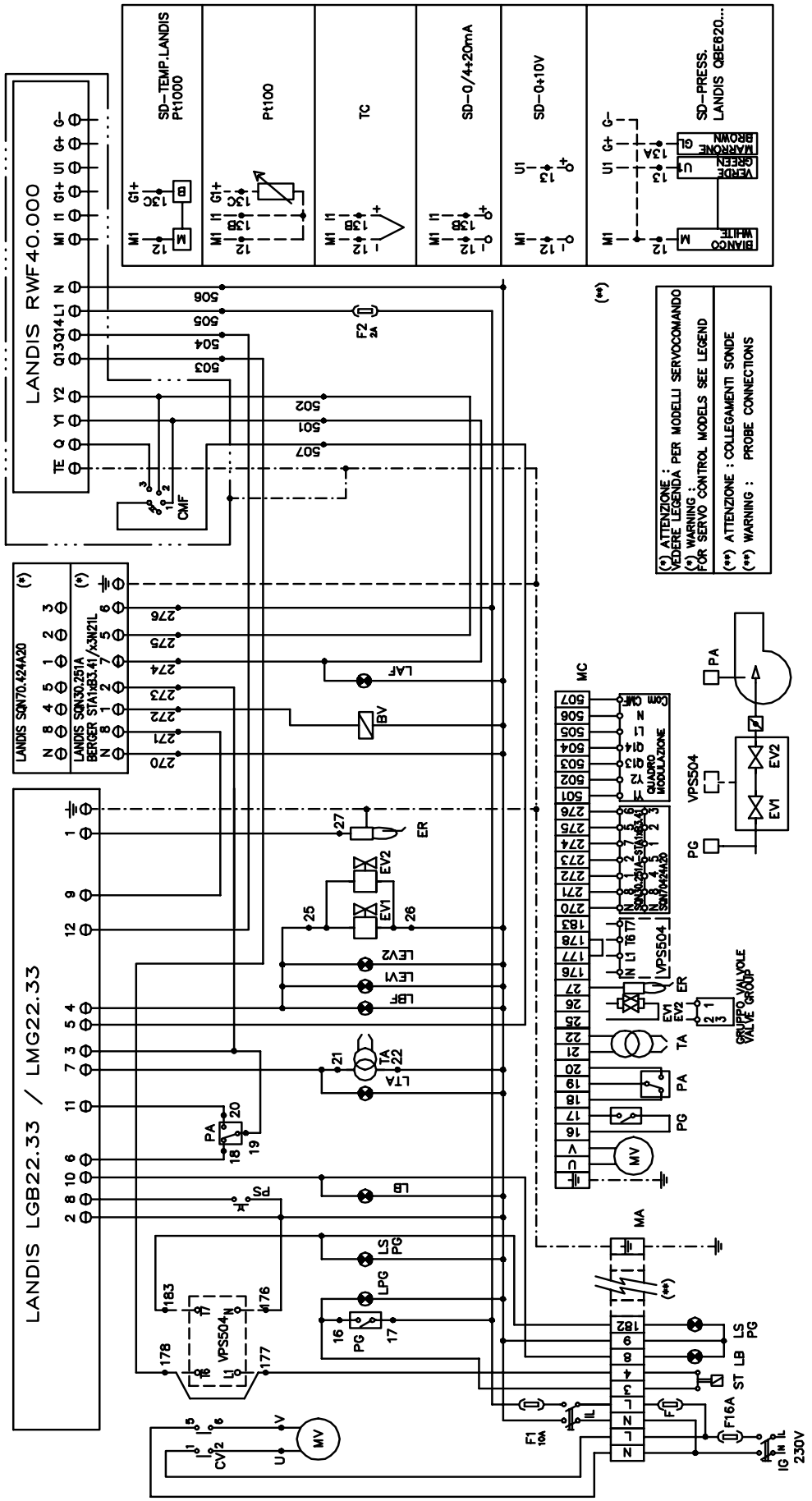
2 - Don’t reverse phase and neutral

3 - Ensure the burner is properly earthed

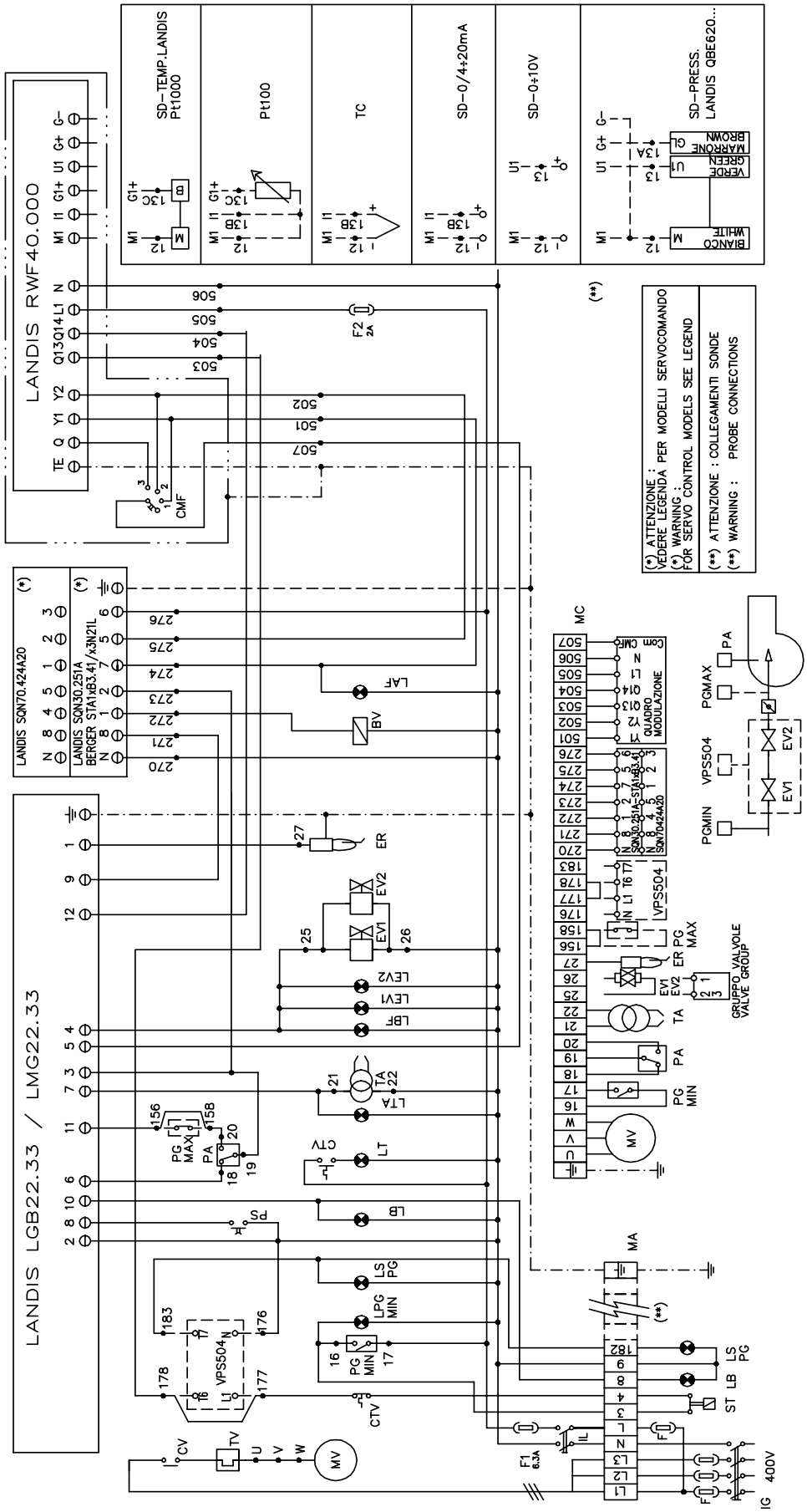
Electrical diagram code 04-622 Rev. 1 - Burners P20 - P30 M-.MD



Electrical diagram 04-642 Rev. 1 - Burners P45 M-.MD

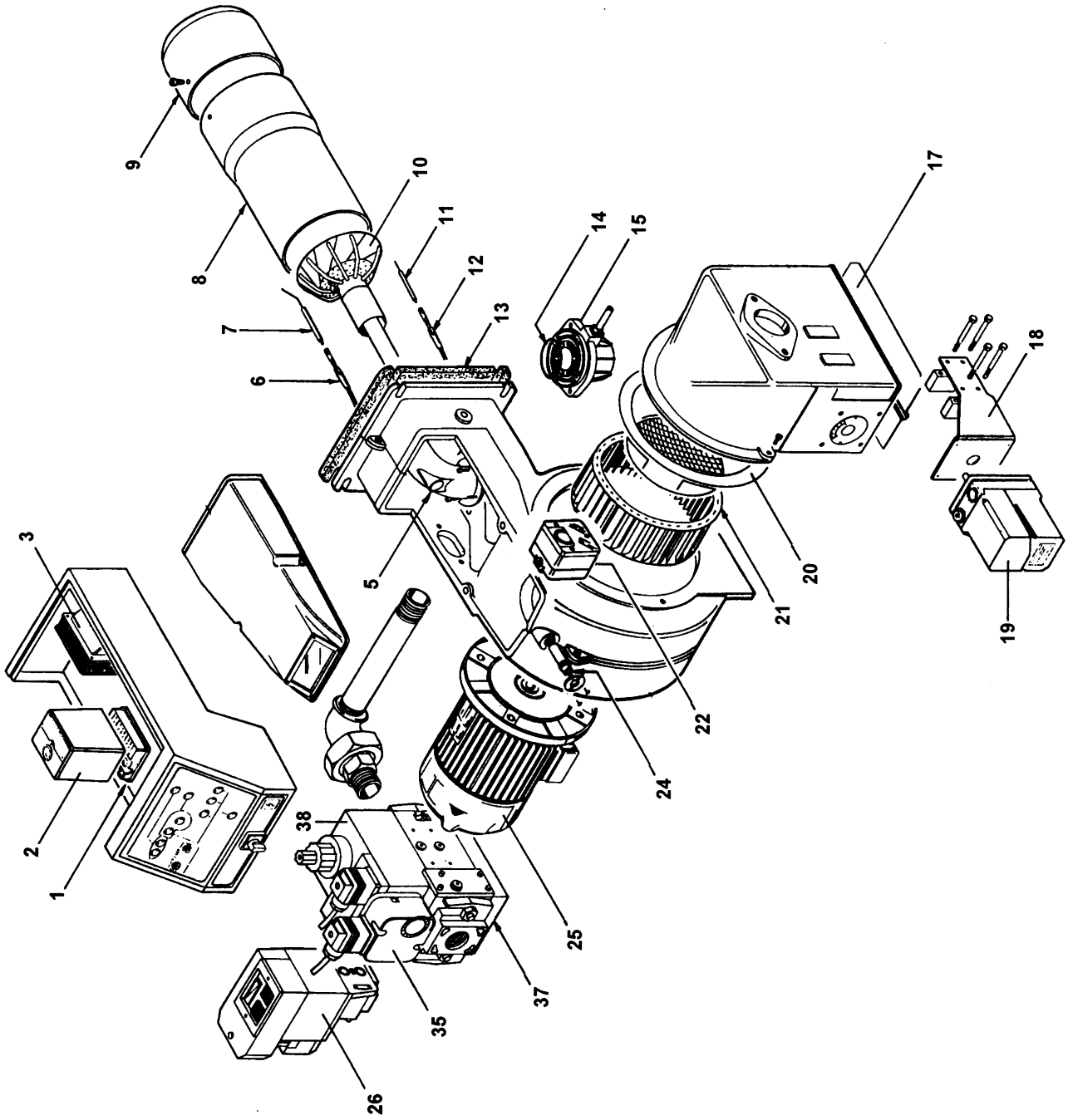


Electrical diagram code 05-615 Rev. 1 - Burner P65 M-.MD

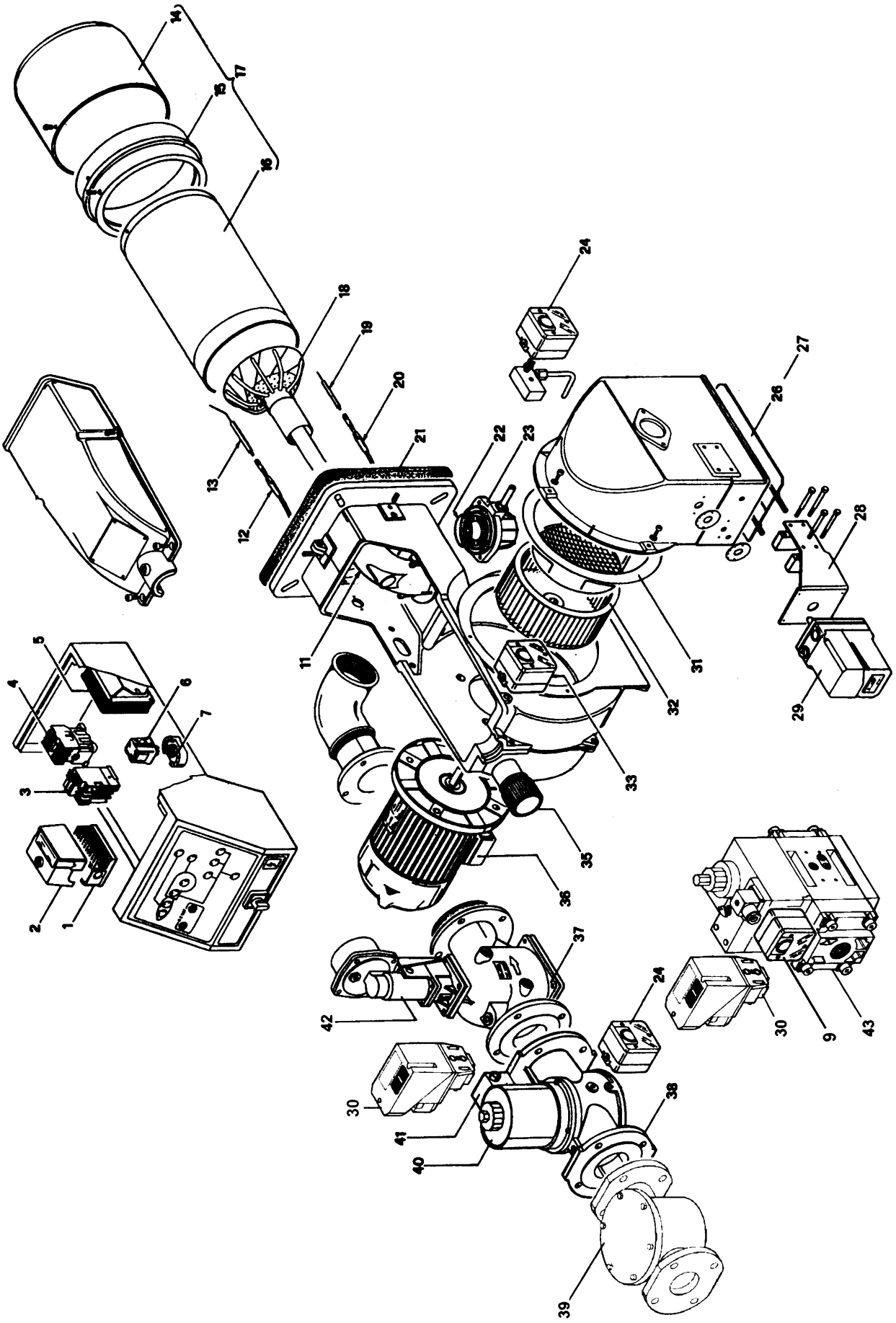


SPARE PARTS

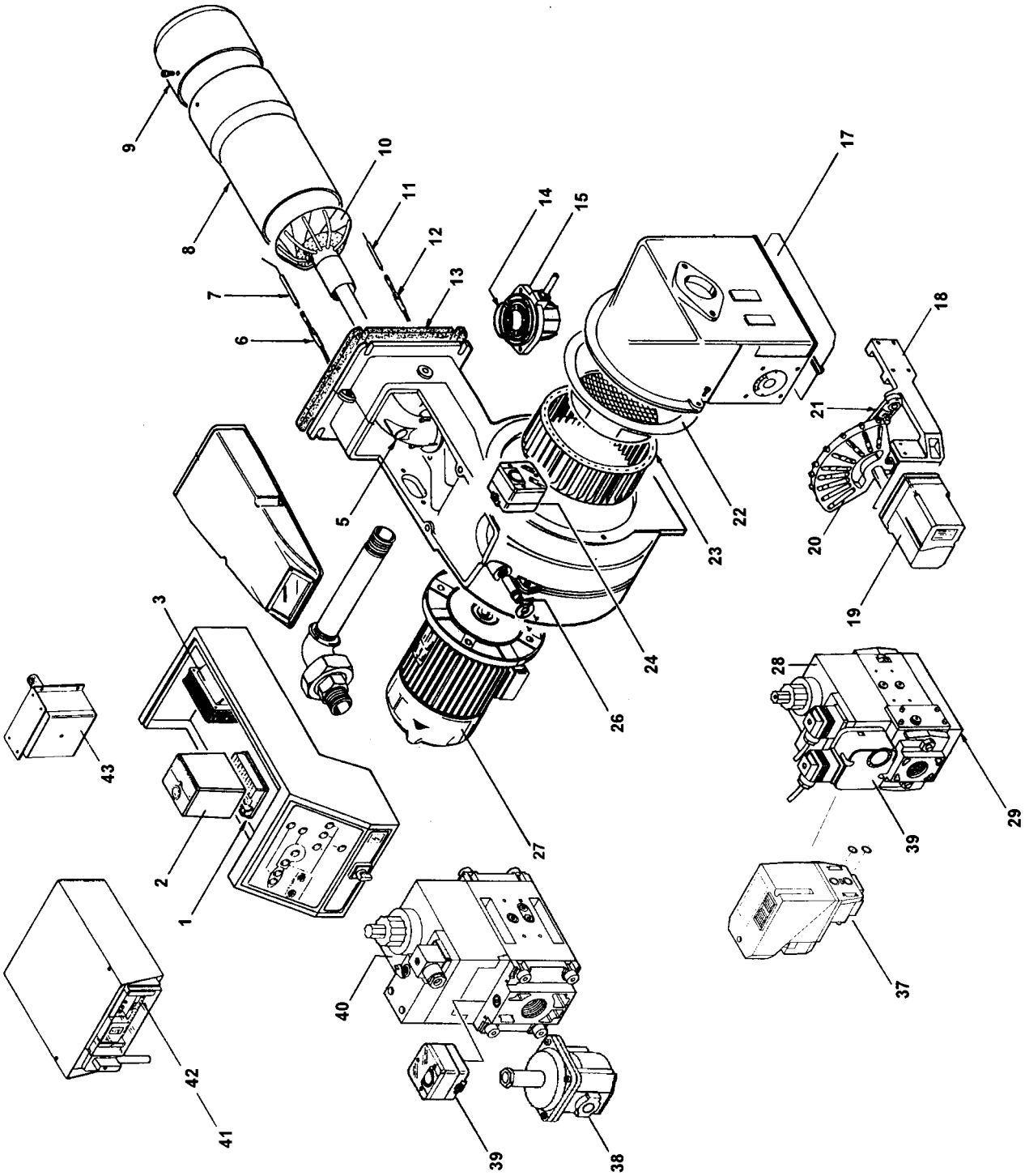
SPARE PARTS - Burners P20 - P30 L-.TN, L-.AB



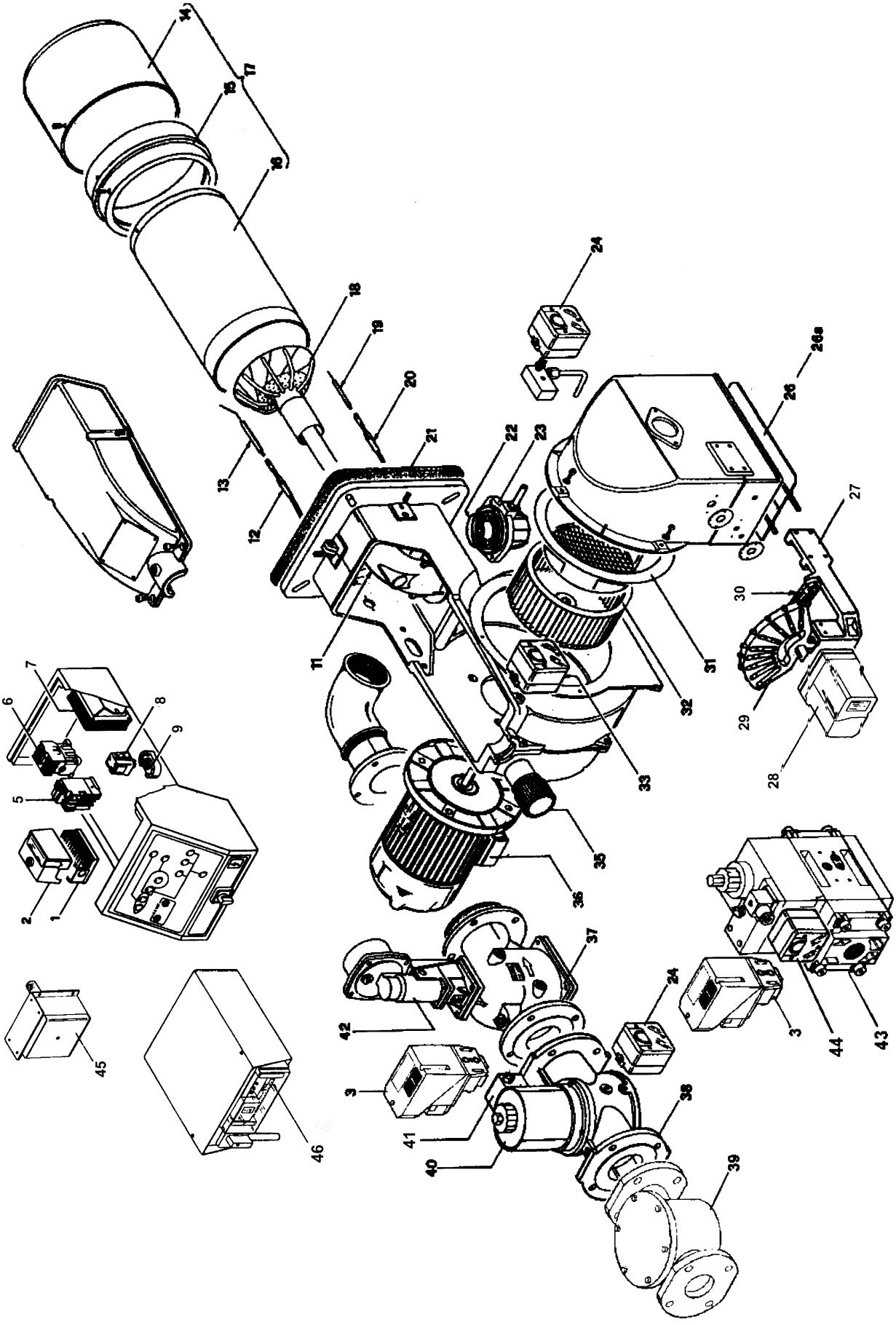
POS.	DESCRIPTION	P20 L-.XX.S.*.A.0.25	P20 L-.XX.L.*.A.0.25	P20 L-.XX.S.*.A.0.40	P20 L-.XX.L.*.A.0.40	P30 L-.XX.S.*.A.0.40	P30 L-.XX.L.*.A.0.40
1	SOCKET FOR FLAME CONTROL DEVICE	2030415	2030415	2030415	2030415	2030415	2030415
2	FLAME CONTROL DEVICE LGB21 (SINGLE STAGE)	2020443	2020443	2020443	2020443	2020443	2020443
2	FLAME CONTROL DEVICE LGB22 (HI-LO FLAME)	2020430	2020430	2020430	2020430	2020430	2020430
2	FLAME CONTROL DEVICE LMG21 (SINGLE STAGE)	2020449	2020449	2020449	2020449	2020449	2020449
2	FLAME CONTROL DEVICE LMG22 (HI-LO FLAME)	2020450	2020450	2020450	2020450	2020450	2020450
3	TANSFORMER	2170128	2170128	2170128	2170128	2170128	2170128
5	MANIFOLD	2740002	2740002	2740002	2740002	2740002	2740002
6	DETECTION CABLE	6050205	6050205	6050205	6050205	6050205	6050205
7	DETECTION ELECTRODE	2080106	2080106	2080106	2080106	2080102	2080102
8	COMPLETE BLAST TUBE	3090096	3090086	3090096	3090086	3090019	3091005
9	BLAST TUBE EXTENSION	---	---	---	---	---	2200046
10	COMBUSTION HEAD	3060073	3060072	3060073	3060072	3060005	3060005
11	IGNITION ELECTRODE	2080209	2080209	2080209	2080209	2080202	2080202
12	IGNITION CABLE	6050108	6050108	6050108	6050108	6050108	6050108
13	GASKET	2110004	2110004	2110004	2110004	2110004	2110004
14	"O" RING	2250001	2250001	2250001	2250001	2250001	2250001
15	THROTTLE VALVE (HI-LO FLAME)	2460221	2460221	2460221	2460221	2460221	2460221
15A	THROTTLE VALVE (SINGLE STAGE)	2460201	2460201	2460201	2460201	2460201	2460201
17	AIR DAMPER	2140005	2140005	2140005	2140005	2140005	2140005
18	SERVOC. SUPPORT BRACKET (HI-LO FLAME)	3050009	3050009	3050009	3050009	3050009	3050009
19	SERVOCONTROL (BERGER, VERS. HI-LO FLAME)	2480057	2480057	2480057	2480057	2480057	2480057
20	INLET CONE	2040016	2040016	2040016	2040016	2040016	2040016
21	FAN	2150006	2150006	2150006	2150006	2150006	2150006
22	AIR PRESSURE SWITCH	2140065	2140065	2140065	2140065	2140065	2140065
24	HEAD ADJUSTING SCREW	2320501	2320501	2320501	2320501	2320501	2320501
25	MOTOR	2180704	2180704	2180704	2180704	2180704	2180704
26	LEAKAGE CONTROL (OPTIONAL)	2191604	2191604	2191604	2191604	2191604	2191604
35	MINIMUM GAS PRESSURE SWITCH	2160052	2160052	2160052	2160052	2160052	2160052
37	MULTIBLOC VALVES GROUP	2190341	2190341	2190342	2190342	2190342	2190342
	PRINTED CIRCUIT	6100535	6100535	6100535	6100535	6100535	6100535
38	MULTIBLOC COIL	2580017	2580017	2580017	2580017	2580017	2580017


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POS.	DESCRIPTION	P45 L-.AB..S.. .40 L-.AB..L.. .40	P45 L-.AB..S.. .50 L-.AB..L.. .50	P65 L-.AB..S.. .50 L-.AB..L.. .50	P65 L-.AB..S.. .65 L-.AB..L.. .65
1	SOCKET FOR FLAME CONTROL DEVICE	203.04.15	203.04.15	203.04.15	203.04.15
2	CONTROL DEVICE LGB21 (SINGLE STAGE)				
2	CONTROL DEVICE LGB22 (HI-LO FLAME)	202.04.30	202.04.30	202.04.30	202.04.30
2	CONTROL DEVICE LMG21 (SINGLE STAGE)				
2	CONTROL DEVICE LMG22 (HI-LO FLAME))	202.04.50	202.04.50	202.04.50	202.04.50
3	OVERLOAD RELAY	---	---	614.00.32	614.00.32
4	CONTACTOR	---	---	613.00.16	613.00.16
5	IGNITION TRANSFORMER	217.01.28	217.01.28	217.01.28	217.01.28
6	RELAY	---	---	---	---
7	RELAY SOCKET	---	---	---	---
9	GAS PRESSURE SWITCH	216.00.76	216.00.76	216.00.76	---
11	MANIFOLD	274.00.02	274.00.02	274.00.03	274.00.03
12	DETECTION CABLE	605.02.05	605.02.05	605.02.05	605.02.05
13	DETECTION ELECTRODE	208.01.02	208.01.02	208.01.02	208.01.02
14	STANDARD BLAST TUBE EXTENSION	---	---	220.00.55	220.00.55
14	LONG BLAST TUBE EXTENSION	220.00.46	220.00.46	220.00.56	220.00.56
15	BLAST TUBE RING	---	---	247.00.37	247.00.37
16	BLAST TUBE BODY	---	---	230.00.55	230.00.55
17	STANDARD BLAST TUBE - COMPLETE	309.00.39	309.00.39	309.10.E9	309.10.E9
17	LONG BLAST TUBE - COMPLETE	309.10.F1	309.10.F1	309.10.E0	309.10.E0
18	COMBUSTION HEAD	306.00.C1	306.00.C1	306.00.C2	306.00.C2
19	IGNITION ELECTRODE	208.02.02	208.02.02	208.02.02	208.02.02
20	IGNITION CABLE	605.01.08	605.01.08	605.01.08	605.01.08
21	GASKET	211.00.13	211.00.13	211.00.33	211.00.33
22	RING "OR" FOR THROTTLE VALVE	225.00.03	225.00.03	225.00.03	225.00.03
23	THROTTLE VALVE	246.02.22	246.02.22	246.02.22	246.02.24
24	GAS PRESSURE SWITCH	216.00.10	216.00.10	218.02.03.01	218.02.03.01
26	INTERNAL AIR DAMPER	214.00.07	214.00.07	214.00.22	214.00.22
27	ESTERNAL AIR DAMPER	---	---	214.00.23	214.00.23
28	SERVOCONTROL SUPPORT BRACKET	305.00.09	305.00.09	305.00.10	305.00.10
29	SERVOCONTROL	248.00.42	248.00.42	248.00.42	248.00.42
30	LEAKAGE CONTROL	219.16.04	219.16.04	219.16.04	219.16.04
31	AIR INLET	204.00.17	204.00.17	204.00.11	204.00.11
32	FAN	215.00.21	215.00.21	215.00.18	215.00.18
33	AIR PRESSURE SWITCH	216.00.65	216.00.65	216.00.65	216.00.65
35	HEAD ADJUSTING KNOB	232.05.02	232.05.02	232.05.03	232.05.03
36	ELECTRIC MOTOR	218.00.91	218.00.91	218.02.03	218.02.03
37	GAS SOLENOID VALVE EV2	---	---	---	219.01.51
38	GAS SOLENOID VALVE EV1	---	---	---	219.03.21
39	GAS FILTER	---	---	---	209.01.17
40	COIL FOR EV1	---	---	---	258.00.05
41	PRINTED CIRCUIT FOR EV1	---	---	---	253.01.05
42	ACTUATOR WITH STABILIZER	---	---	---	219.01.20
43	MULTIBLOC VALVES GROUP	219.03.E9	219.03.E0	219.03.E0	---
	PRINTED CIRCUIT FOR ELECTRIC BOARD	610.05.35	610.05.35	610.05.35	610.05.35


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POS.	DESCRIPTION	P20 L-.MD.S.*.A.0.25	P20 L-.MD.L.*.A.0.25	P20 L-.MD.S.*.A.0.40	P20 L-.MD.L.*.A.0.40	P30 L-.MD.S.*.A.0.40	P30 L-.MD.L.*.A.0.40
1	SOCKET FOR FLAME CONTROL DEVICE	203.04.15	203.04.15	203.04.15	203.04.15	203.04.15	203.04.15
2	FLAME CONTROL DEVICE LANDIS LGB22	202.04.30	202.04.30	202.04.30	202.04.30	202.04.30	202.04.30
2	FLAME CONTROL DEVICE LANDIS LMG22	202.04.50	202.04.50	202.04.50	202.04.50	202.04.50	202.04.50
3	TRANSFORMER	217.01.02	217.01.02	217.01.02	217.01.02	217.01.02	217.01.02
5	MANIFOLD	274.00.02	274.00.02	274.00.02	274.00.02	274.00.02	274.00.02
6	DETECTION CABLE	605.02.05	605.02.05	605.02.05	605.02.05	605.02.05	605.02.05
7	DETECTION ELECTRODE	208.01.06	208.01.06	208.01.06	208.01.06	208.01.02	208.01.02
8	COMPLETE BLAST TUBE	309.00.96	309.00.86	309.00.96	309.00.86	309.00.19	309.10.05
9	BLAST TUBE EXTENSION	---	---	---	---	---	220.00.46
10	COMBUSTION HEAD	306.00.73	306.00.72	306.00.73	306.00.72	306.00.05	306.00.05
11	IGNITION ELECTRODE	208.02.09	208.02.09	208.02.09	208.02.09	208.02.02	208.02.02
12	IGNITION CABLE	60.01.08	605.01.08	605.01.08	605.01.08	605.01.08	605.01.08
13	GASKET	211.00.04	211.00.04	211.00.04	211.00.04	211.00.04	211.00.04
14	"O" RING	225.00.01	225.00.01	225.00.01	225.00.01	225.00.01	225.00.01
15	THROTTLE VALVE	246.02.21	246.02.21	246.02.21	246.02.21	246.02.21	246.02.21
17	AIR DAMPER	214.00.05	214.00.05	214.00.05	214.00.05	214.00.05	214.00.05
18	SERVOCONTROL SUPPORT BRACKET	305.00.11	305.00.11	305.00.11	305.00.11	305.00.11	305.00.11
19	SERVOCONTROL (BERGER)	248.00.53	248.00.53	248.00.53	248.00.53	248.00.53	248.00.53
20	ADJUSTABLE CAM	244.00.29	244.00.29	244.00.29	244.00.29	244.00.29	244.00.29
21	LEVER	244.00.15	244.00.15	244.00.15	244.00.15	244.00.15	244.00.15
22	INLET CONE	204.00.16	204.00.16	204.00.16	204.00.16	204.00.16	204.00.16
23	FAN	215.00.06	215.00.06	215.00.06	215.00.06	215.00.06	215.00.06
24	AIR PRESSURE SWITCH	216.00.65	216.00.65	216.00.65	216.00.65	216.00.65	216.00.65
26	HEAD ADJUSTING SCREW	232.05.01	232.05.01	232.05.01	232.05.01	232.05.01	232.05.01
27	MOTOR	218.07.04	218.07.04	218.07.04	218.07.04	218.07.04	218.07.04
28	MULTIBLOC COIL	258.00.17	258.00.17	258.00.17	258.00.17	258.00.17	258.00.17
29	MULTIBLOC VALVES GROUP	219.03.41	219.03.41	219.03.42	219.03.42	219.03.42	219.03.42
37	LEAKAGE CONTROL VPS504 (OPTIONAL)	219.16.04	219.16.04	219.16.04	219.16.04	219.16.04	219.16.04
39	MINIMUM GAS PRESSURE SWITCH	216.00.52	216.00.52	216.00.52	216.00.52	216.00.52	216.00.52
41	MODULATOR	257.00.34	257.00.34	257.00.34	257.00.34	257.00.34	257.00.34
42	FIELD ADAPTER	256.01..	256.01..	256.01..	256.01..	256.01..	256.01..
43	MODULATION PROBE	256.01..	256.01..	256.01..	256.01..	256.01..	256.01..


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POS.	DESCRIPTION	P45 L-.MD..S...40 L-.MD..L...40	P45 L-.MD..S...50 L-.MD..L...50	P65 L-.MD..S...50 L-.MD..L...50	P65 L-.MD..S...65 L-.MD..L...65
1	FLAME CONTROL DEVICE SOCKET	203.04.15	203.04.15	203.04.15	203.04.15
2	FLAME CONTROL DEVICE LANDIS LGB22	202.04.30	202.04.30	202.04.30	202.04.30
2	FLAME CONTROL DEVICE LANDIS LMG22	202.04.50	202.04.50	202.04.50	202.04.50
3	LEAKAGE CONTROL	219.16.04	219.16.04	219.16.04	219.16.04
5	OVERLOAD RELAY	---	---	614.00.32	614.00.32
6	CONTACTOR	---	---	613.00.16	613.00.16
7	IGNITION TRANSFORMER	217.01.02	217.01.02	217.01.02	217.01.02
8	RELAY	---	---	---	---
9	RELAY SOCKET	---	---	---	---
11	MANIFOLD	274.00.02	274.00.02	274.00.03	274.00.03
12	DETECTION CABLE	605.02.05	605.02.05	605.02.05	605.02.05
13	DETECTION ELECTRODE	208.01.02	208.01.02	208.01.02	208.01.02
14	STANDARD BLAST TUBE EXTENSION	---	---	220.00.55	220.00.55
14	LONG BLAST TUBE EXTENSION	220.00.46	220.00.46	220.00.56	220.00.56
15	BLAST TUBE RING	---	---	247.00.37	247.00.37
16	BLAST TUBE BODY	---	---	230.00.55	230.00.55
17	COMPLETE BLAST TUBE - STANDARD	309.00.39	309.00.39	309.10.E9	309.10.E9
17	COMPLETE BLAST TUBE - LONG	309.10.F1	309.10.F1	309.10.E0	309.10.E0
18	COMBUSTION HEAD	306.00.C1	306.00.C1	306.00.C2	306.00.C2
19	IGNITION ELECTRODE	208.02.02	208.02.02	208.02.02	208.02.02
20	IGNITION CABLE	605.01.08	605.01.08	605.01.08	605.01.08
21	GASKET	211.00.13	211.00.13	211.00.33	211.00.33
22	OR RING FOR THROTTLE VALVE	225.00.03	225.00.03	225.00.03	225.00.03
23	THROTTLE VALVE	246.02.22	246.02.22	246.02.22	246.02.24
24	GAS PRESSURE SWITCH	216.00.10	216.00.10	216.00.10	216.00.10
26	INTERNAL AIR DAMPER	214.00.07	214.00.07	214.00.22	214.00.22
26A	EXTERNAL AIR DAMPER	---	---	214.00.23	214.00.23
27	SERVOCONTROL SUPPORT BRACKET	305.00.11	305.00.11	305.00.12	305.00.12
28	SERVOCONTROL	248.00.53	248.00.53	248.00.53	248.00.53
29	ADJUSTABLE CAM	244.00.29	244.00.29	244.00.29	244.00.29
30	COMPLETE LEVER	244.00.15	244.00.15	244.00.15	244.00.15
31	INLET CONE	204.00.17	204.00.17	204.00.11	204.00.11
32	FAN	215.00.21	215.00.21	215.00.18	215.00.18
33	AIR PRESSURE SWITCH	216.00.65	216.00.65	216.00.65	216.00.65
35	HEAD ADJUSTING KNOB	232.05.02	232.05.02	232.05.03	232.05.03
36	ELECTRIC MOTOR	218.02.03.01	218.02.03.01	218.02.03.01	218.02.03.01
37	GAS SOLENOID VALVE EV2	---	---	---	219.01.51
38	GAS SOLENOID VALVE EV1	---	---	---	219.03.21
39	GAS FILTER	---	---	---	209.01.17
40	COIL FOR EV1	---	---	---	258.00.05
41	PRINTED CIRCUIT FOR EV1	---	---	---	253.01.05
42	ACTIVATOR WITH STABILIZER	---	---	---	219.01.20
43	MULTIBLOC VALVES GROUP	219.03.E9	219.03.E0	219.03.E0	---
44	GAS PRESSURE SWITCH	216.00.76	216.00.76	216.00.76	---
45	MODULATOR PROBE	256.01..	256.01..	256.01..	256.01..
46	MODULATOR RWF40	257.00.34	257.00.34	257.00.34	257.00.34
46	FIELD ADAPTER	257.01.12	257.01.12	257.01.12	257.01.12
46A	FLAME CONTROL DEVICE SOCKET	256.01..	256.01..	256.01..	256.01..

APPENDIX: COMPONENTS CHARACTERISTICS

LANDIS LGB 21/22.. FLAME CONTROLLER 51

LANDIS LMG21/22/25 FLAME CONTROLLER 54

GAS MULTIBLOC REGULATOR DUNGS MB-DLE 405-407-410-412-415-420 57

VALVE PROVING SYSTEM DUNGS VPS504 57

DOUBLE GAS VALVES VGD20 - VGD40 57

SAFETY SOLENOID VALVES DUNGS MV/5, MVD/5, MVDLE/5 SINGLE STAGE 57

LANDIS VALVES 58

SAFETY SOLENOID VALVE DUNGS SV/SV-D/SV-DLE 59

DOUBLE SOLENOID VALVE DUNGS DMV-DLE 59

PRESSURE REGULATOR DUNGS FRS 60

LANDIS LGB 21/22.. FLAME CONTROLLER

Function

The programme run is shown in the diagrams. The required and permissible input signals for the control part and flame supervision part are pictured as a hatching correspondingly in the function diagrams. If these input signals are missing, the controller interrupts the start-up programme and initiates a lock-out at the place where the safety regulations demand it.

The LGB types are fitted with under voltage protection, i.e. the load relay AR is de-energized when the supply voltage falls below 160 V. The burner control automatically attempts a new start-up when the supply voltage again exceeds 160 V

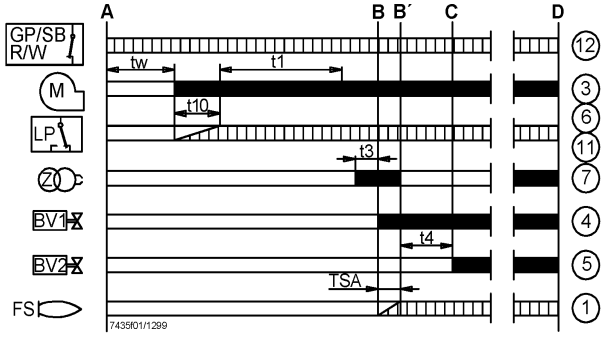
A Start-up command from the temperature or pressure controller “R”

A-C Start-up programme

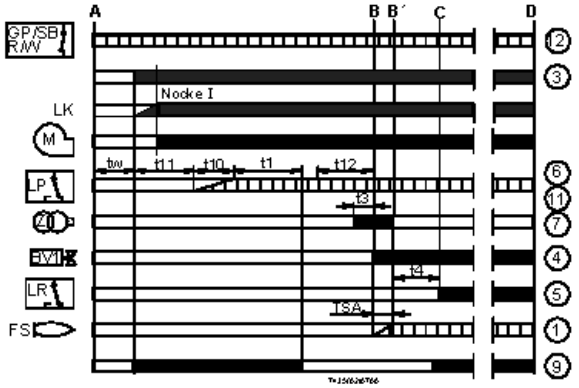
C-D Burner operation (heat production corresponding to the control commands)

D Controlled shut-down by “R”

LGB21



LGB22



Key for operation diagram

A - C Startup sequence

tw Waiting time, 8s for LGB21, 9s for LGB22

t1 Prepurge time 30s

TSA Ignition safety time 3s

t3 Preignition time, 2s for LGB21, 3s for LGB22

t4 Interval «BV1-BV2» or «BV1-LR», 8s

t10 Specified time for air pressure signal, 5s for LGB21, 3s for LGB22

t11 Programmed opening time for actuator «SA», max. 12s

t12 Programmed closing time for actuator «SA», max. 11s

BV Fuel valves

FS Flame presence signal

GP Gas pressure switch

LP Air pressure switch

LR Load controller

M Fan motor

R Temperature or pressure controller

W Safety thermostat or pressure switch

Z Ignition transformer

1...12 Terminals of the burner flame controls on AGK11's socket

Command signal from flame control

Input signals

Conditions for starting up the burner:

- The burner control must not be locked out.
- The contacts of the gas pressure switch ”GP", the temperature or pressure switch “W" and the controller “R", must be closed.

Start-up programme

A Start command (switching on)

This command is triggered by control thermostat / pressure controller «R». Terminal 12 receives voltage and the programming mechanism starts running. On completion of waiting time «tw» with the LGB21..., or after air damper «SA» has reached the nominal load position (on completion of «t11») with the LGB22..., fan motor «M» will be started.

tw Waiting time

During the waiting time, air pressure monitor «LP» and flame relay «FR» are tested for correct contact positions.

t11 Programmed opening time for actuator «SA»

(Only with LGB22...) The air damper opens until the nominal load position is reached. Only then will fan motor «M» be switched on.

t10 Specified time for air pressure signal

On completion of this period of time, the set air pressure must have built up, or else lockout will occur.

t1 Prepurge time

Purging the combustion chamber and the secondary heating surfaces: required with low-fire air volumes when using the LGB21... and with nominal load air volumes when using the LGB22.... The diagrams show the so-called prepurge time «t1» during which air pressure monitor «LP» must indicate that the required air pressure is available. The effective prepurge time «t1» comprises interval end «tw» through «t3».

t12 Programmed closing time for actuator «SA»

(Only with LGB22...)During «t12», the air damper travels to the low-fire position.

t3 Preignition time

During «t3» and up to the end of «TSA», flame relay «FR» is forced to close. On completion of «t3», the release of fuel is triggered at terminal 4.

TSA Ignition safety time

On completion of «TSA», a flame signal must be present at terminal 1. That flame signal must be continuously available until shutdown occurs, or else flame relay «FR» will be deenergized, resulting in lockout.

t4 Interval

LGB21...: time to the release of the second fuel valve «BV2»

LGB22...: on completion of «t4», the heat source is controlled depending on the load (release of load controller «LR»)

B - B' Interval for flame establishment

C Burner operation position

C - D Burner operation (heat production)
Operation of the burner at the maximum strenght or, with a flame controller for the load.

D Controlled by "R" shutdown
The burner stops, waiting for the next ignition.

Command program in the event of a defect

In the event of a defect the inflow of fuel is interrupted. When the block occurs in the preventilation time (not indicated by the symbol) the causes may be the air pressostat LP or a premature signal of flame presence.

- With voltage failure: repetition of the start-up with complete programme
- Premature presence of flame at the start of preventilation time: safety stop (block)
- Contact of air pressostat LP stuck during time tw: start-up cannot take place.
- Air pressure failure after t10: safety stop after safety time TSA
- Absence of confirmation of air pressure: safety stop(block) after t10
- Failure to start up the burner: safety stop after safety time TSA
- Absence of flame during functioning: immediate safety stop.
- Checking the ignition spark with QRE: with absence of spark there is no consent to the fuel, safety stop (block) after time t2.

Unblocking the appliance

Unblocking of the appliance can be effected immediately after the safety stop without causing modification of the programme.

Indicator of the command programme of the defective item

On the front part of the safety appliance is located a plexiglass lunette under which there is the indicator disc of programme's progress.

In the event of safety stop, the programmer stops. The disc shows, as follows, the position of the programme at which the interruption occurred:

►	no start-up, the command ring is open
IIII	interval tw or t10 on LGB21; tw or t11 on LGB22
▲	air damper open (LGB22)
P	safety stop (block) through absence of the air pressure signal (LGB21) or because (LGB22) the air damper is not open
➔➔➔	interval t1, t3 (t12)
▼	fuel consent (LGB22)
1	safety stop (block) through absence of the flame signal at the end of the 1st safety time
2	consent of the 2nd fuel valve (LGB 21) or consent at the power regulator (LGB22)
°°°°	functioning of the burner at partial or maximum power (or return to the service position)

Specifications

Supply voltage	220 V AC -15%...240 VAC +10%
Frequency	50 Hz -6%...60 Hz +6%
Consumption	3 VA
Flow rate of the contacts at terminals	
- terminal 3	max. 3 A (15 A max. for 0.5s)
- terminals 4, 5, 7	max. 2 A
- terminal 10	max. 1 A
- terminal 12 (for Umax 264 V)	max. 5 A*
Fuse max.	10 A, with slow blow-out
Radio disturbance	N - VDE0875
Protection	IP40
Permissible ambient temperature	
- operating	-20....+ 60°C
- transport and storage	-40....+ 70°C
Mounting pos. permitted	any
Mass (weight) without/with base	c. 230/310 g
Mass (weight) AGK66	c. 12 kg

*) At permissible voltage and that is 187...264 V

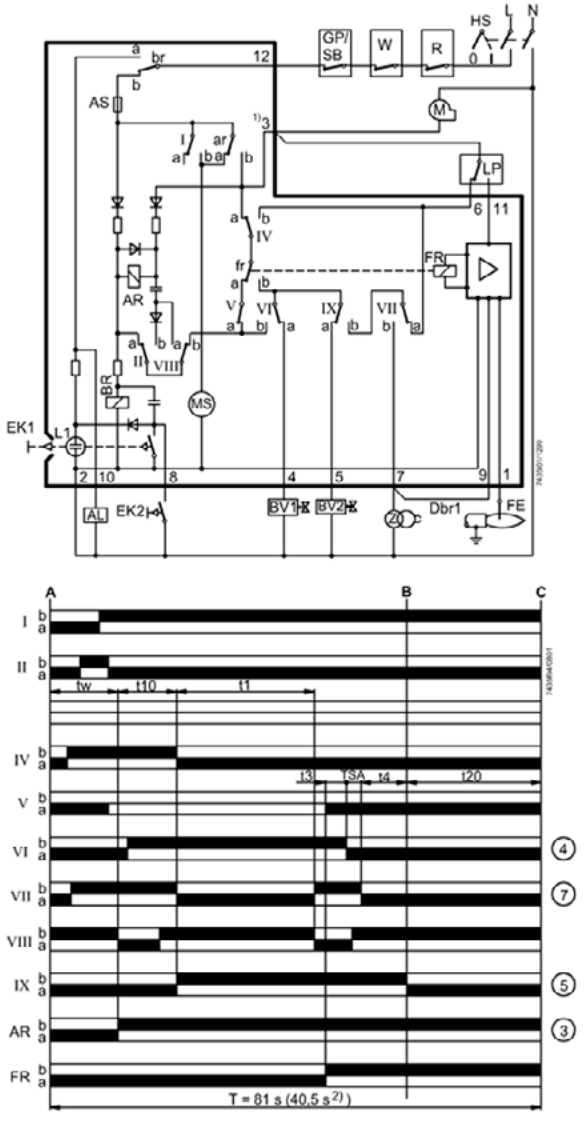
Key - internal diagram

AL	Block signal
AR	Main relay with "ar" contacts
BR	Block relay with "br" contacts
BV	Fuel valve
Dbr1	U bolt
EK	Unblocking button
FE	Detection electrode
FR	Flame relay with "fr" contacts
GP	Gas pressostat
HS	Main selector
L	Phase conductor
L1	Block light (blinking)
LP	Air pressostat
M	Fan motor
MS	Synchronous motor
N	Neutral conductor
R	Thermostat or pressostat
W	Safety thermostat or pressostat
Z	Ignition transformer

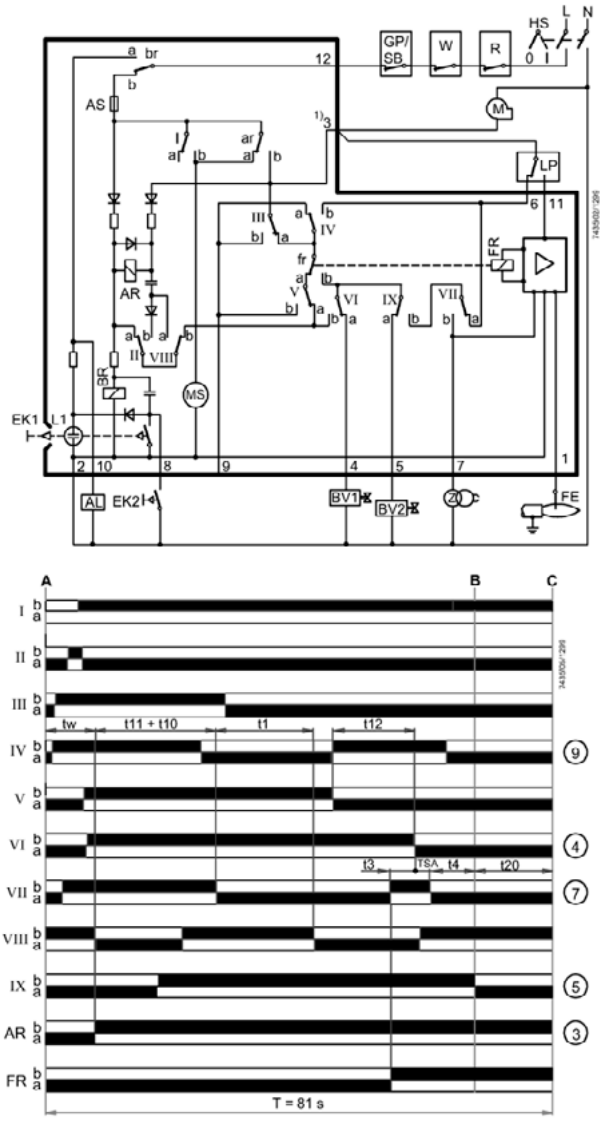
Key - programmer's diagram

A	start-up (command from regulator “R”)
B	burner operation
C	program start position (start up)
tw	waiting time
t1	preventilation time
TSA	safety time
t3	pre-ignition time
t4	interval of time BV1-BV2 or BV1-LR
t10	waiting time for confirmation of air pressure
t11	air damper movement time to open position
t12	air damper movement time to close position
t20	travel time for auto-return of the programmer
T	programmer's total time
I.IX	contacts of programmer's cams

LGB21



LGB22



LANDIS LMG21/22/25 FLAME CONTROLLER

FEATURES

The series of equipment LMG.. is interchangeable with the series LGB.., all diagrams and accessories are interchangeable, the main features are:

- Indications of error codes by a signalling red light in the release button;
- Programmer times fix for the digital management of signals.
  In case of lack of the flame during working the model LMG 25.33 doesn't stop but repeat the starting cycle
  maximum 3 times), if the problem persists, after the fourth starting the equipment stops .

Comparative table

Old series LGB	New series LMG
---	LMG 25.33
LGB 21.33	LMG 21.33
LGB 22.33	LMG 22.33

Conditions for startup

- Burner control is reset
- All contacts in the line are closed
- Fan motor "M" or AGK25 is connected
- Air pressure monitor "LP" is in idle position
- No undervoltage

Undervoltage

- Safety shutdown in the event the mains voltage is lower than typically AC 160V;
- a restart is made when the mains voltage exceeds AC 195V

Reversed polarity protection

If the connections of line (terminal 12) and neutral (terminal 2) have been exchanged, the burner control will initiatelockout at the end of "TSA"

Startup program

A Start-up, controlled by LR

Fan command after the waiting time tw for LMG21/25, or after the period t11 for LMG22.

tw Waiting time.

During this time the air pressure switch and the flame relay are tested for correct contact position.

t11 Programmed time for the opening of the servocontrol SA,

only with LMG22. The servocontrol SA moves to the low flame position.

t10 Specified time for the air pressure signal.

When this time has elapsed, the set value of air pressure must have built up, else a lock-out is initiated.

t1 Pre-purgue time.

Purguing of the combustion chamber and the secondary heating surfaces with low-load combustion head for LMG21/25, or with fully load combustion air for LMG22. The affective pre-purgue time comprises the interval between the end of tw and the start of t3.

t12 Programmed time to close the damper SA (MINIMUM)

(LMG22): During the time t12, the air damper moves to the low flame position.

t3n Postignition time

Ignition time during «TSA». Just before reaching the end of «TSA», ignition transformer «Z» will be switched off. This means that «t3n» is somewhat shorter than «TSA». This is necessary in order to give the forcedly closed flame relay «FR» sufficient time to drop out if there is no flame.

t3 Pre-ignition time.

Ignition time until the opening of BV1.

TSA Ignition safety time.

Opening of fuel valve BV1; the flame signal must be present at the terminal 1 up tho the end of TSA.

t4 Interval BV-BV2 or BV1-LR.

Interval between the end of TSA and the consent to the second fuel valve BV2 or to the load regulator LR.

B-B' Interval for the flame establishment.

C Operating position of the burner.

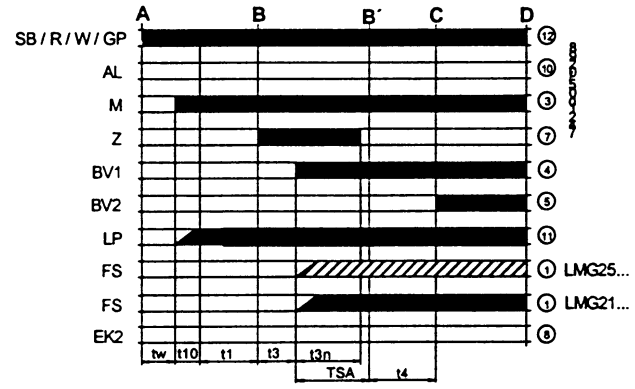
C-D Burner operation (heat production)

D Controlled shut-down by LR.

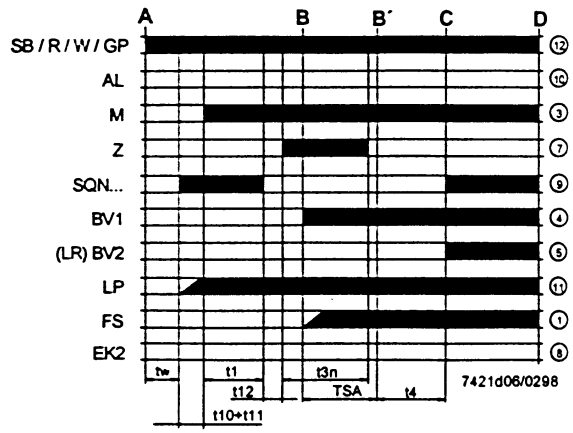
The burner is shut-off immediately and the flame control device is ready for a new start.

FUNCTIONS

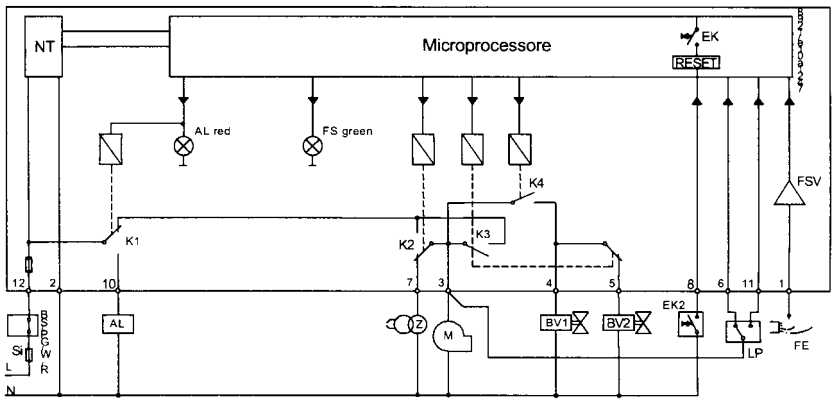
LMG21.../LMG25...



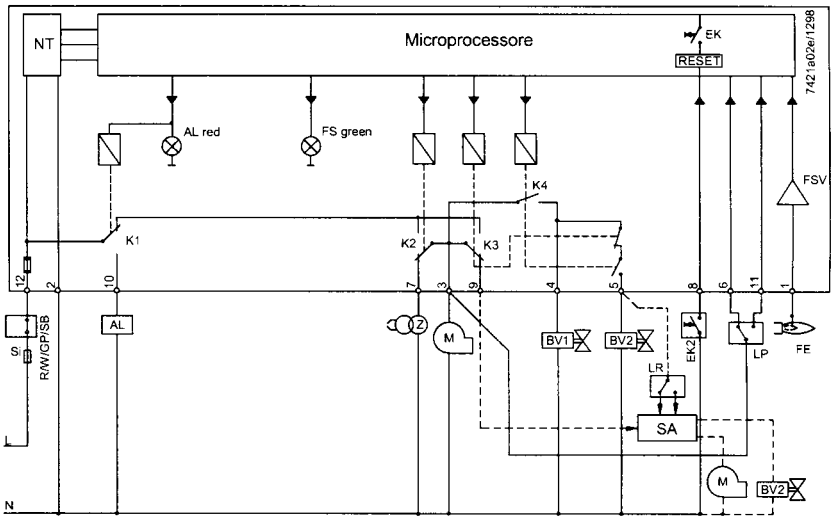
LMG22...



Internal diagram LMG21/25



Internal diagram LMG22



Operations key

AL Alarm
BV Fuel valve
EK2 Remote reset button
FS Flame presence signal
GP Gas detection pressure switch
LP Air pressure switch
LR Burner's output regulation
M Fan motor
R Safety thermostat or pressure switch
SB Safety limit
W Regulation thermostat or pressure switch
Z Ignition transformer
tw Waiting time
t1 Pre-ventilation time
TSA Ignition safety time
t3 Pre-ignition time
t3n Ignition time during “TSA”
t4 Interval BV-BV2 or BV1-LR
t10 Specified time for air pressure signal
t11 Programmed opening time for actuator SA
t12 Programmed closing time for actuator SA

Control program in the event of fault

- If a fault occurs, all outputs will immediately be deactivated (in less than 1s).
- On restoration of power, a restart will be made with the full progra sequence.
- If the operating voltage drops below the undervoltage thresold.
- If there is a premature faulty flame signal during t1, a lockout occurs.
- If the contact of air pressure monitor LP has welded in the working position, prevention of startup and, after 8.5s: lockout.
- If the contact of the air pressure monitor LP has welded in the idle position: lockout at the end of t10.
- If the burner doesn't ignite by the end of TSA: lockout
- If flame is lost during operation: lockout

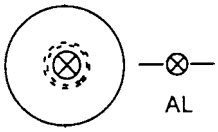
IMPORTANT:

- **The release of the equipment can be carried out after each stop pressing the release button for 0.5- 3 seconds. Then the equipment pulses to signal the happened release.**

- **To control the stop cause it is necessary to wait for 10 seconds, then press the release button for more than 3 seconds and count pulses (the equipment repeats pulses at regular intervals).**

Flame control device stopped

- Stop red lamp switched on.



Release of the flame control device

- Press the release button for 0.5 ÷ 3 seconds.

Diagnosis of troubles

- Wait at least 10s.
- Press the release button for >3s.
- - Count the number of flashing of the green lamp and compare with the “Diagnosis Table”

Diagnosis table

Number of flashing

- Possible causes

2 flashing **

No flame at the end of the "Safety time":

- Detection electrode dirty
- Fuel valve faulty
- Gas doesn't reach the burner

3 flashing ***

The air pressure switch doesn't commute or is at rest:

- Pressure switch faulty
- The fan motor doesn't work
- Air lock servocontrol (where arranged) faulty

4 flashing ****

The air pressure switch is not commuted at rest as well as on air, or it remains commuted on air:

- Pressure switch faulty
- The calibration of air pressure switch is too sensible

5 flashing *****

Foreign light

7 flashing *******

Lack of flame during working:

- Calibration of the burner not optimum
- Trouble or gag of the fuel valve

8 ÷ 17 flashing * ÷ ******

Not used

18 flashing ******************

During pre-ventilation the oressure switch commutes and then comes back to the rest:

- Air pressure switch faulty or calibration too high

19 flashing *******************

Trouble of contacts outlet:

- Errors of electric connection
- Anomalous voltage to outlet terminals

20 flashing ********************

Internal error of the flame control equipment

GAS MULTIBLOC REGULATOR DUNGS MB-DLE 405-407-410-412-415-420

Specifications

Nominal diameters - Flange with pipe threads as per ISO 7/1 (DIN 2999)
MB 405-407: Rp1/2, 3/4 and their conbinations
MB 410-412: Rp3/4, Rp1, $Rp1_{1/4}$ and their combinations
MB 415 B01: Rp1, $Rp1_{1/4}$, $Rp1_{1/2}$, Rp2 and their combinations
MB420 B01: Rp1, $Rp1_{1/4}$, $Rp1_{1/2}$, Rp2 and their combinations

Max. operating pressure	360 mbar
Output pressure range	4 mbar to 20 mbar
Pressure stage	PN1

Media gas of families 1, 2, 3 and other neutral gaseous media

Ambient temperature	-15 °C to +70 °C

Dirt trap Sieve with 0.8 mm mesh width, filter made of random laid nonwoven fabric microfilter, two-layer, changing the filter is possible without removing the valve.

Pressure switches	Types GW A5, GW A2, NB A2, ÜB A2 mountable as per DIN EN 1854.
Pressure regulator	Pressure regulator compensated for

residual pressure, leakproof seal when switched off by means of valve V1 as per DIN EN 88 Class A. Setpoint spring permanently installed (no spring exchange possible). A vent line above roof is not required. Internal pulse tap provided.

Solenooid valve 1	Valve as per DIN EN 161, Class A, Group 2, fast closing, fast opening
Solenoid valve 2	valve as per DIN EN 161, Class A, Group 2, fast closing, slow opening

Measuring/ignition gas connection
For G 1/8 as per DIN ISO 228
Burner pressure monitor pBr
Connection downstream of valve V2, pressure switch A2 mountable on adapter laterally

Closed position signal contact	Closed position signal contact type K01/1 (DIN tested), mountable on V2
Voltage/frequency	~(AC) 50-60Hz 230 V -15% +10%
Preferred voltages	240VAC, 110-120VAc, 24-28VDC, 48VDC
Electrical connection	Plug connection as per DIN 43 650, IEC 335, IEC 730 (VDE 0700, VDE 0722) for valves and pressure switches
Rating power/consumption	upon request
Switch on duration	100% ED
Degree of protection	IP54 as per IEC 529 (EN 60529)
Radio interference	Interference degreeN
Material of gas-conveying parts	
housing:	aluminium die casting;
diaphragms, seals:	NBR basis, Silopren (silicone rubber)
solenoid drive:	steel, brass, aluminium.
Installation position	
Solenoid	vertically upright or lying horizontally as well as its intermediate positions

DOUBLE GAS VALVES VGD20 - VGD40

Double gas valves for use on gas trains, consisting of 2 class «A» safety shut-off valves.

In combination with the SKP… actuators, the gas valve also serves as a shut-off valve (in connection with the SKP10) or control valve with shut-off function (in connection with the SKP20, SKP70).

The double gas valves VGD20... are of the normally closed type. The high closing force of the return spring is supported by the prevailing gas pressure (class «A» to EN 161). A strainer on the inlet side protects the valve and downstream controls against dirt.

Technical data

Class	A (EN 161)
Group	2 (EN 161)
Types of gases	Gas families I, II, III (to G260 of DVGW), air

Maximum gas pressure admissible
VGD20.503: 600 mbar - VGD40.065, 0.80, 100: 700 mbar

Built-in strainer, mesh size	0.9 mm

Permanent medium temperature-15...+60 °C

Mounting	spring housing horizontal or vertical, pointing downward

Operation

Climatic conditions	class 3K6
Mechanical conditions	class 3M2
Temperature range	-10...+60 °C
Humidity	<95%

SAFETY SOLENOID VALVES DUNGS MV/5, MVD/5, MVDLE/5 SINGLE STAGE

Specifications

Flange Connection	flange as per DIN 2501 Part1
Max. operating pressure	up to 200 mbar (20 kPa), 360 mbar (36kPa) or up to 500 (50 kPa) mbar
Solenoid valve	Valve as per EN 161, Class A, Group 2, single-stage mode
Pressure stage	PN 1
Closing time	< 1 s
Opening time	< 1 s for MVDLE approx. 20 s at room temperature 20°C and without fast stroke
Fast stroke	Adjustable
Main volume adjustment	Manually adjustable on MVD and MVDLE
Materials of gas-conveying parts	
Housing	aluminium, steel, brass
Seals	NBR basis
Voltage/frequency	230 V AC (+10 % -15 %); 50-60 Hz - other voltages on request
Rating / power consumption	Refer to type overview
Switch-on duration	100 %
Degree of protection	P 54, IP 65 on request
Electrical connection	At screw terminals via PG* 11 cable gland (* = heavy-gauge conduit thread)
Plug connection	as per DIN 43650 can be retrofitted
Switching rate	
MVD…/5	max. 1000/h MVD 2200,
MVDLE…/5	max. 100/h MV 5100/5 S, MV 2125/5 S
MV 2150/5 S	max. 20/h
Measuring/ignition gas connection	G 1/4 ISO 118, on both sides in inlet section, additionally G 3/4 on input side, form size DN 40 (flange) upwards
Dirt trap	Sieve installed, mesh width 1 mm
Ambient temperature	-15 ° C to + 60 ° C
Installation position	Solenoid from vertically upright to horizontally lying
Closed position signal contact	Type K01/1, DIN-tested, mountable on DN 10 - DN 150
Valve proving system	Type VDK 200 A S02, mountable via G1/4 test connection, Type VPS 504, mountable with adapter up to DN 80

VALVE PROVING SYSTEM DUNGS VPS504

Specifications

Operating pressure	max.500 mbar (50 kPa)
Test volume	4.0 l
Pressure increase by motor pump	20 mbar
Nominal voltage	~(AC) 230V -15%...240V +10% DC 24V
Frequency	50 Hz
Rating requirement during pumping time	approx, 60 VA, in operation 17 VA
Prefuse (provided by the customer)	10 A quick-acting fuse or 6.3 slow-blow fuse
Fuse	installed in housing cover, replaceable microfuse 6.3 A slow-blow L 250 V; IEC-127-2/III (DIN 41 662)
Degree of protection	IP40 (IP54 series 04, 05)
Ambient temperature	50 Hz 230 VAC -15°C to +70°C, others: -15°C to +60°C
Release time	Approx. 10 - 26s, depending on test volume and input pressure
Sensitivity limit	max. 50 l/h
Switch on duration of control	100%
Max. number of test cycles	20/h
Installation position	upright, horizontal, not inverted

LANDIS VALVES

Operation

Single stage valves

When the command to open the valve is given, the pump is switched on and the relief valve is simultaneously closed. From the nearly filled reservoir below the piston, the oil is now pumped into the chamber above the piston, causing the piston to move downward and thus opening the valve - against the force of the retum spring.

The pump remains energized until the command is given to close the valve.

When the valve closes (or when the electrical supply is interrupted), the pump stops and the relief valve opens the bypass thus allowing the return spríng with the aid of the pressure of the gas to push the piston upward again.

The flow characteristic of the relief valve is such that the valve fully closes in less than 0.8 second.

Actuators with gas pressure governors

With these actuators the outlet pressure represents the actual value which acts on a diaphragm. The diaphragm is supported by a spring the force of which is adjustable, representing the setpoint.

The movements of the diaphragm are transferred to a lever system which opens and closes a ball valve situated in the bypass between the pressure side and the reservoìr. If the actual value is smaller than the setpoint, the bypass is closed so that the actuator can open the valve.

If the actual value exceeds the setpoint, the bypass is opened to some extent so that some oil can return from the pressure side to the reservoír. The piston travels upward and the valve is slightly closed. This movement of the piston comes to a stand still as soon as actual value and setpoint are identical.

In this position the opening of the bypass is such that the retum flow through the bypass corresponds to the current oil output of the pump.

The control characteristic is that of a P-controller with a very small proportional band. Inspite of this the control stability is good since the piston velocities are small.

Design Features

Servocontrol

The electro-hydraulic actuator consists of a cylinder filled with oil and an electric oscillating pump with piston and relief valve.

A solenoid valve is mounted between the suction chamber and the pump chamber as a seal.

A disc, with the aid of a lever system, also actuates the auxiliary switch to signal the "close" position or other positions, as well as the limit changeover switches for the positioning of the low-fire and high-fire stroke with high-low valves. The switching positions of these switches are adjustable over the entire stroke.

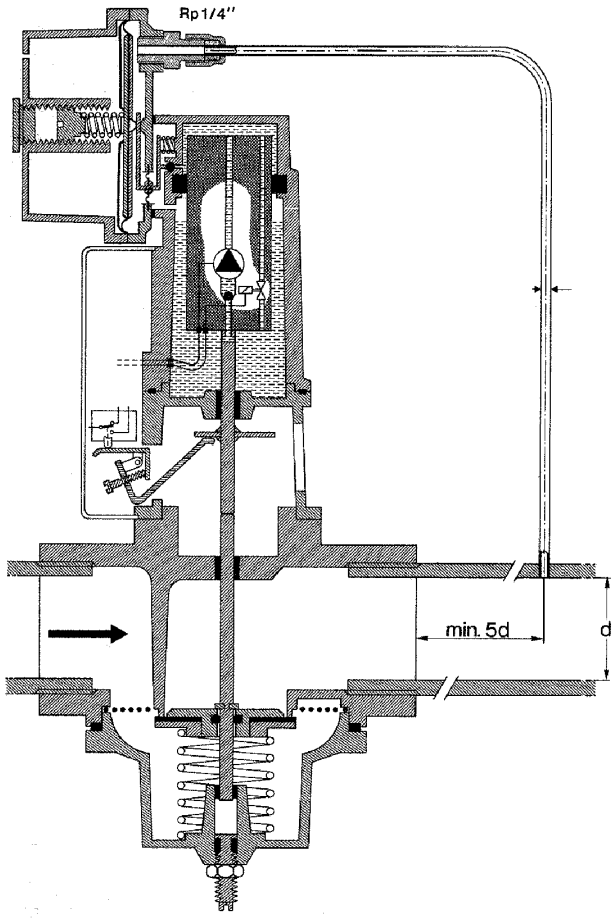
Gas pressure governor

The governor has a working diaphragm, a safety diaphragm, a set-point spring and a lever system which actuates a ball valve in the bypass between the pressure side and the reservoir of the hydraulic system (also refer to "Functions"). Setting range: 0 to 22 mbar or, replacing the spring, up to 250 mbar.

Connection of 1/4" pressure port

Due to the use of a safety diaphragm a vent pipe is not required with inlet pressures of up to 100 mbar. If employed in connection with valve proving system, the massimum permissible vacuum is 200mbar.

The housing of actuator and governor are made of die-cast aluminium.



Simplified draw of gas valve fitted with servomotor and pressure governor.

Series 01: solenoid relief valve;

Series 02: hydraulic valve pushed during shutt-off by pump's pressure

Terminal designations

V	Control input
V1	Control input stage 1
V2	Control input stage 2
N	Neutral (MP)
IV	Auxiliary switch

SAFETY SOLENOID VALVE DUNGS SV/SV-D/SV-DLE

Technical Description

The Dungs safety solenoid valve SV is a single-stage automatic shut-off valve to EN 161 for gas burners and gas burning appliances:

- Double-disc valves
- Max. operating pressure up to 0.5 bar
- Standard IP 65
- Zero current shutoff
- SV, SV-D: fast-open
- SV-DLE: slow-open with adjustable fast stroke for starting gas flow
- DC solenoid

Application

The solenoid valve is used for securing, limiting, shutting off and releasing the gas supply to gas burners and gas burning appliances. The DUNGS SV-… safety solenoid valve is suitable for gases of gas families 1, 2, 3 and other inert gaseous media.

Technical Data

Max. operating pressure	500 mbar (50 kPa)
Pressure stage	PN 1
Solenoid valve	auto shut-off valve complying with EN 161: class A, group 2
Closing time	< 1 s
Opening time	SV…, SV-D… : < 1 s
SV-DLE… :	approx. 20 s at room temperature + 20 °C and without fast stroke
Fast stroke	adjustable on SV-DLE…
Flow restrictor	adjustable on SV-D… and SV-DLE…
Materials of gas-conveying parts	
housing	aluminium, steel, free of non-ferrous metals
seals in valve seat	NBR based, suitable for gases as per G260/l
Ambient temperature	-15 °C up to +60 °C
Installation position	Solenoid arranged vertically to horizontally
Dirt trap	Integrated strainer. To protect the entire gas train, we recommend installing an upstream gas filter. Measuring gas connection G 1/8 DIN ISO 228: SV-… at valve inlet, in the centre; at output flange for SV-… 510 - 520; on both sides in front of and behind the valve seat, at the valve outlet in the centre. Pressure switch retrofittable: to the side, at the inlet and outlet flanges. Fitting a pressure switch can exclude measuring gas/ ignition gas connection.
Voltage / frequency	~(AC) 50 - 60 Hz 230 V -15 % + 10 %, other voltages on request. Standard voltages: ~(AC) 24 V, 110 V, 120 V, =(DC) 48 V, =(DC) 24 V - 28 V
Rating / power consumption	at ~(AC) 230 V, + 20 °C: see type summary
Protection	IP 65
Switch-on duration	100 % ED
Electrical connection	Plug-in connection to DIN EN 175301-803
Radio interference suppression	Interference level N
Valve proving system	Type VPS 504 S... retrofittable, on SV-… 510 - 520

DOUBLE SOLENOID VALVE DUNGS DMV-DLE

Technical description

The DUNGS double solenoid valve DMV integrates two solenoid valves in one compact fitting.

Application

Double solenoid valves are used where two single valves were mounted previously. In connection with DUNGS gas regulators and additional components, a wide variety of regulating tasks can be performed. Suitable for gases of families 1, 2, 3 and other neutral gaseous media.

Specifications

Max. operating pressure	500 mbar (50 kPa)
Pressure stage	PN 1
Solenoid valve 1	Automatic shut-off valve as per EN 161: Class A, Group 2
Solenoid valve 2	Automatic shut-off valve as per EN 161: Class A, Group 2
Closing time	< 1 s
Opening time	DMV-D…/11: < 1 s DMV-DLE…/11: approx. 20 s at room temperature +20°C and without fast stroke
Fast stroke	regolabile (Rp2) Adjustable up to approx. 70% of total stroke (DN65-80-100)
Main valve restrictor	Adjustable
Materials of gas conveying parts	
Housing:	aluminium, steel, no non-ferrous metals
Seals at valve seat:	NBR basis, suitable for gases as per G260/l
Ambient temperature	-15 °C to +60 °C
Installation position	Solenoid vertically upright to lying horizontally
Dirt trap	Sieve installed. To protect the complete gas train we recommend you to install an upstream gas filter (refer to Datasheet 2.03)
Measuring gas connection	
Rp2	G 1/8 DIN ISO 228 on both sides upstream of V1, between V1 and V2, downstream of V2 at input and output flanges. Pressure switch can be mounted to input and output flanges. By mounting a pressure switch, measuring/ignition gas connection can be partly excluded.
DN65-80-100	G 1/4 DIN ISO 228 centrally upstream of V1 and downstream of V2 G 1/8 DIN ISO 228 on both sides upstream of V1, between V1 and V2, downstream of V2
Ignition gas connection	Rp2: G 1/2 ignition gas flange as per ISO 228, possible on both sides between V1 and V2 DN65-80-100: G 3/4 ignition gas flange as per ISO 228, possible on both sides between V1 and V2
Voltage/frequency	50 - 60 Hz, 220 V - 240 V AC, -15% +10%, further voltages on request
Degree of protection	IP 54
Switch-on duration	100 % ED
Electrical connection	Rp2: Plug connection as per DIN EN 175301-803, PG* 11 cable gland on request (* = heavy-gauge conduit thread) DN65-80-100: PG* 11 cable gland, plug connection as per DIN EN 175301-803 on request (* = heavy-gauge conduit thread)
Radio interference	Degree of interference N

PRESSURE REGULATOR DUNGS FRS

Technical description

The DUNGS pressure regulator, type FRS, has an adjustable setpoint spring. The pressure regulator complies with EN 88 and DIN 3380

Application

Gas pressure regulator for gas burners and gas equipment. It does not contain any non-ferrous metals, suitable for gases of up to max. 0.1 vol.% H2S, dry. Suitable for gases of families 1, 2, 3 and other neutral gaseous media.

Specifications

Max. operating pressure	up to 500 mbar (50 kPa)
Pressure regulator	Pressure regulator as per EN 88, Class A, Group 2, DIN 3380, RG 10
Input pressure range	+ 5 mbar or p2 +2.5 mbar up to 500 mbar
Pressure stage	PN 1
Output pressure range	2.5 mbar to 150 mbar as a factor of adjustable setpoint spring
Materials of gas-conveying parts	Housing: aluminium, steel Seals and diaphragms: NBR
Ambient temperature	-15 °C to + 70 °C
Installation position	Regulator dome from vertically upright to lying horizontally
Measuring/ignition gas connections	G 1/4 ISO 228 on both sides in inlet section



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