



BURNERS  
BRULEURS  
BRENNER  
QUEMADORES  
BRUCIATORI

# MANUAL OF - INSTALLATION - OPERATING - MAINTENANCE

## GAS BURNERS TYPE:

# P60

# P72

M03956CE Rev.04 Ed.11/98

|           |              |      |    |
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## 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.**

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### 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 re-setting 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.

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### 3) GENERAL INSTRUCTIONS DEPENDING ON FUEL USED

#### 3A) ELECTRICAL CONNECTION

\* For safety reasons the unit must be efficiently earthed and installed as required by current safety regulations.

\* It is vital that all safety requirements are met. In case of any doubt, ask for an accurate inspection of electricians by qualified personnel, since the manufacturer cannot be held liable for damages that may be caused by failure to correctly earth the equipment.

\* Qualified personnel must inspect the system to make sure that it is adequate to take the maximum power used by the equipment shown on the equipment rating plate. In particular, make sure that the system cable cross section is adequate for the power absorbed by the unit.

\* No adaptors, multiple outlet sockets and/or extension cables are permitted to connect the unit to the electric mains.

An omnipolar switch shall be provided for connection to mains, as required by the current safety regulations.

The use of any power-operated component implies observance of a few basic rules, for example:

- do not touch the unit with wet or damp parts of the body and/or with bare feet;

- do not pull electric cables;

- do not leave the equipment exposed to weather (rain, sun, etc.) unless expressly required to do so;

- do not allow children or inexperienced persons to use equipment;

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

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

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

### 3B) FIRING WITH GAS, GASOIL OR OTHER FUELS

#### GENERAL

\* The burner shall be installed by qualified personnel and in compliance with regulations and provisions in force; wrong installation can cause injuries to people and animals, or damage to property, for which the manufacturer cannot be held liable.

\* Before installation, it is recommended that all the fuel supply system pipes be carefully cleaned inside, to remove foreign matter that might impair the burner operation.

\* Before the burner is commissioned, qualified personnel should inspect the following:

a) the fuel supply system, for proper sealing;

b) the fuel flow rate, to make sure that it has been set based on the firing rate required of the burner;

c) the burner firing system, to make sure that it is supplied for the designed fuel type;

d) the fuel supply pressure, to make sure that it is included in the range shown on the rating plate;

e) the fuel supply system, to make sure that the system dimensions are adequate to the burner firing rate, and that the system is equipped with all the safety and control devices required by the regulations in force.

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

#### SPECIAL INSTRUCTIONS FOR USING GAS

\* Have qualified personnel inspect the installation to ensure that:

a) the gas delivery line and train are in compliance with the regulations and provisions in force;

b) all gas connections are tight;

c) the boiler room ventilation openings are such that they ensure the air supply flow required by the current regulations, and in any case are sufficient for proper combustion.

\* Do not use gas pipes to earth electrical equipment.

\* Never leave the burner connected when not in use. Always shut the gas valve off.

\* In case of prolonged absence of the user, the main gas delivery valve to the burner should be shut off.

#### Precautions if you can smell gas

a) do not operate electric switches, the telephone, or any other item likely to generate sparks;

b) immediately open doors and windows to create an air flow to purge the room;

c) close the gas valves;

d) contact qualified personnel.

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

## PART 1: INSTALLATION MANUAL

### TECHNICAL DATA

| BURNERS                     | Type<br>Model       | P60              | P60              | P60              |
|-----------------------------|---------------------|------------------|------------------|------------------|
|                             |                     | M-xx.x.x.A.0.40  | M-xx.x.x.A.0.50  | M-xx.x.x.A.0.65  |
| Input                       | min. kW             | 160              | 160              | 160              |
|                             | max. kW             | 523              | 800              | 800              |
| Fuel                        |                     | Natural gas      | Natural gas      | Natural gas      |
| Category                    |                     | I <sub>2H</sub>  | I <sub>2H</sub>  | I <sub>2H</sub>  |
| Gas flow rate min - max     | Stm <sup>3</sup> /h | 17 - 56          | 17 - 84.7        | 17 - 84.7        |
| Electric supply - Frequency |                     | 230/400V - 50 Hz | 230/400V - 50 Hz | 230/400V - 50 Hz |
| Total electric consumption  | kW                  | 1.6              | 1.6              | 1.6              |
| Fan motor                   | kW                  | 1.1              | 1.1              | 1.1              |
| Protection                  |                     | IP40             | IP40             | IP40             |
| Weight                      | Kg                  | 58               | 58               | 65               |
| Operation                   |                     | AB - MD          | AB - MD          | AB - MD          |
| Destination                 |                     | *                | *                | *                |
| <b>Gas train</b>            |                     |                  |                  |                  |
| Size                        |                     | 1"1/2            | 2"               | 2"1/2            |
| Gas connection              |                     | Rp 11/2          | Rp 2             | DN 65            |
| Pressure min. - max.        | mbar                | 26 - 200         | 30 - 200         | 20 - 200         |

| BURNERS                     | Type<br>Model       | P72              | P72              | P72              |
|-----------------------------|---------------------|------------------|------------------|------------------|
|                             |                     | M-xx.x.x.A.0.50  | M-xx.x.x.A.0.65  | M-xx.x.x.A.0.80  |
| Input                       | min. kW             | 300              | 300              | 300              |
|                             | max. kW             | 1.200            | 1.200            | 1.200            |
| Fuel                        |                     | Natural gas      | Natural gas      | Natural gas      |
| Category                    |                     | I <sub>2H</sub>  | I <sub>2H</sub>  | I <sub>2H</sub>  |
| Gas flow rate min - max     | Stm <sup>3</sup> /h | 32 - 127         | 32 - 127         | 32 - 127         |
| Electric supply - Frequency |                     | 230/400V - 50 Hz | 230/400V - 50 Hz | 230/400V - 50 Hz |
| Total electric consumption  | kW                  | 2.7              | 2.7              | 2.7              |
| Fan motor                   | kW                  | 2.2              | 2.2              | 2.2              |
| Protection                  |                     | IP40             | IP40             | IP40             |
| Weight                      | Kg                  | 150              | 155              | 155              |
| Operation                   |                     | AB - PR - MD     | AB - PR - MD     | AB - PR - MD     |
| Destination                 |                     | *                | *                | *                |
| <b>Gas train</b>            |                     |                  |                  |                  |
| Size                        |                     | 2"               | 2"1/2            | 3"               |
| Gas connection              |                     | Rp 2             | DN65             | DN80             |
| Pressure min. - max.        | mbar                | 60 - 200         | 28 - 200         | 20 - 200         |

**Note:** all gas flow rates (Stm<sup>3</sup>/h) are referred to standard gas conditions: 1013 mbar pressure, 15° C temperature. Flow rates are referred to G20 natural gas (nett calorific value: 34.02 MJ/Stm<sup>3</sup>).

| BURNERS                     | Type<br>Model     | P72              | P72              | P72              |
|-----------------------------|-------------------|------------------|------------------|------------------|
|                             |                   | M-.xx.x.x.A.1.50 | M-.xx.x.x.A.1.65 | M-.xx.x.x.A.1.80 |
| Input                       | min. kW           | 300              | 300              | 300              |
|                             | max. kW           | 1.650            | 1.650            | 1.650            |
| Fuel                        |                   | Natural gas      | Natural gas      | Natural gas      |
| Category                    |                   | I <sub>2H</sub>  | I <sub>2H</sub>  | I <sub>2H</sub>  |
| Gas flow rate min - max     | Stm <sup>3h</sup> | 32 - 174.6       | 32 - 174.6       | 32 - 174.6       |
| Electric supply - Frequency |                   | 230/400V - 50 Hz | 230/400V - 50 Hz | 230/400V - 50 Hz |
| Total electric consumption  | kW                | 2.7              | 2.7              | 2.7              |
| Fan motor                   | kW                | 2.2              | 2.2              | 2.2              |
| Protection                  |                   | IP40             | IP40             | IP40             |
| Weight                      | Kg                | 150              | 155              | 155              |
| Operation                   |                   | AB - PR - MD     | AB - PR - MD     | AB - PR - MD     |
| Destination                 |                   | *                | *                | *                |
| <b>Gas train</b>            |                   |                  |                  |                  |
| Size                        |                   | 2"               | 2"1/2            | 3"               |
| Gas connection              |                   | Rp 2             | DN 65            | DN 80            |
| Pressure min. - max.        | mbar              | 90 - 200         | 40 - 200         | 25 - 200         |

### BURNER MODEL IDENTIFICATION

Burners are identified by burner type and model. Burner model identification is described here following.

|                         |  |  |
|-------------------------|--|--|
| Type: <b>P72</b><br>(1) | Model:   | <b>M-. AB. S. *. A. O. 40</b><br>(2) (3) (4) (5) (6) (7) (8)                 |
| (1) BURNER TYPE         |  |  |
| (2) FUEL                |  | M - Natural Gas  |
| (3) OPERATION           | available options:                             | AB - High low fire<br>PR - Progressive<br>MD - Fully modulating              |
| (4) BLAST TUBE LENGHT   | see dimensions at pag. 5<br>available options: | S - Standard<br>L - Long   |
| (5) DESTINATION COUNTRY |  | * see data plate   |
| (6) SPECIAL VERSION     |  | A - Standard   |
| (7) BURNER EQUIPMENT    | available options:                             | 0 - 2 Valves<br>1 - 2 Valves + Leak detection monitor (Optional on type P60) |
| (8) GAS TRAIN SIZE      | see Technical Data                             | 40 = Rp11/2<br>50 = Rp2<br>65 = DN65   |

OVERALL DIMENSIONS IN mm

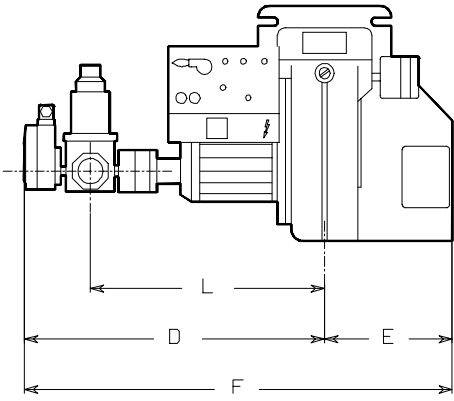
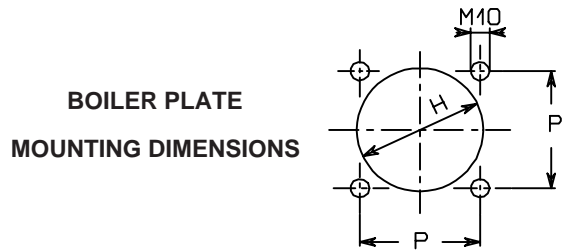
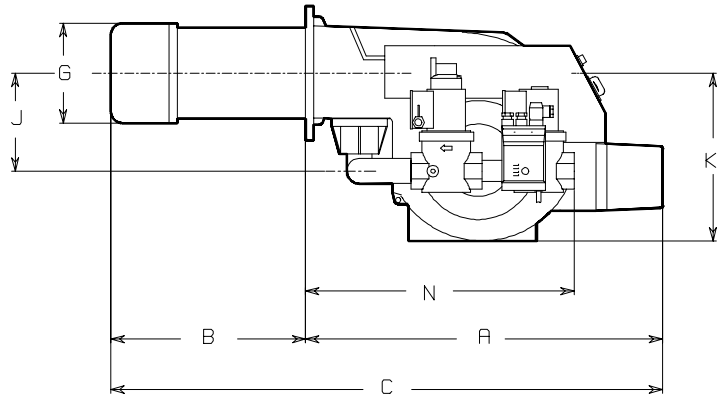


Fig. 1



| TYPE | A   | B   | BL  | C    | CL   | D   | E   | F    | G   | K   | J   | L   | N   | H   | P                  | M   |
|------|-----|-----|-----|------|------|-----|-----|------|-----|-----|-----|-----|-----|-----|--------------------|-----|
| P60  | 660 | 350 | 441 | 1010 | 1101 | 640 | 250 | 890  | 184 | 350 | 210 | 460 | 450 | 200 | 190                | M10 |
| P72  | 725 | 395 | 505 | 1120 | 1230 | 750 | 310 | 1060 | 235 | 375 | 230 | 450 | 450 | 250 | min.216<br>max.250 | M10 |
|      |     |     |     |      |      |     |     |      |     |     |     |     |     |     |                    |     |

B = Standard Blast Tube      BL = Long Blast Tube

**PERFORMANCE CURVES**

**Type P60**  
**Model M-.xx.x.xx.A.0.40**

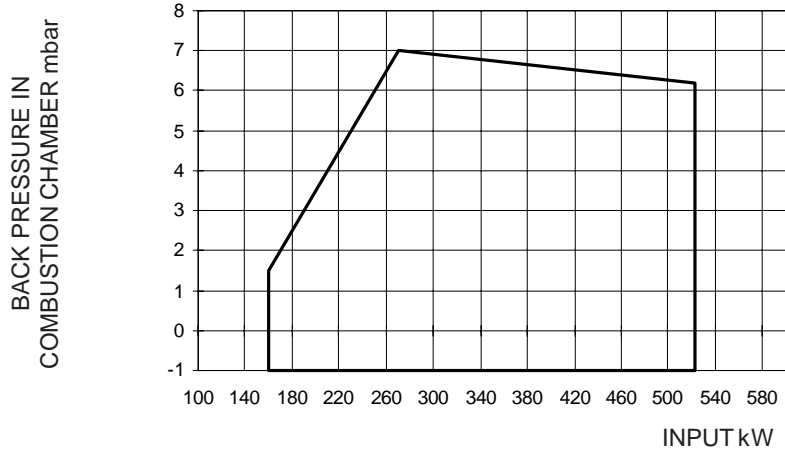


Fig. 2

**Type P60**  
**Model M-.xx.x.xx.A.0.50**  
**Model M-.xx.x.xx.A.0.65**

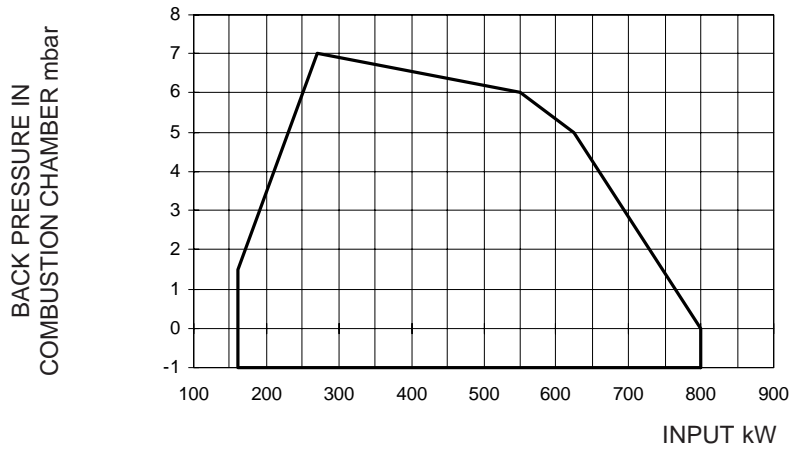


Fig. 2a

**Type P72**  
**Model M-.xx.x.xx.A.0.xx**

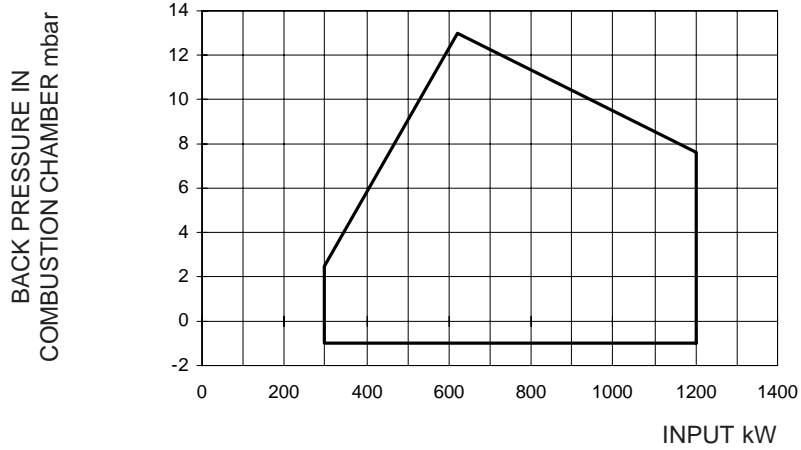


Fig. 3

**Type P72**  
**Model M-.xx.x.xx.A.1.xx**

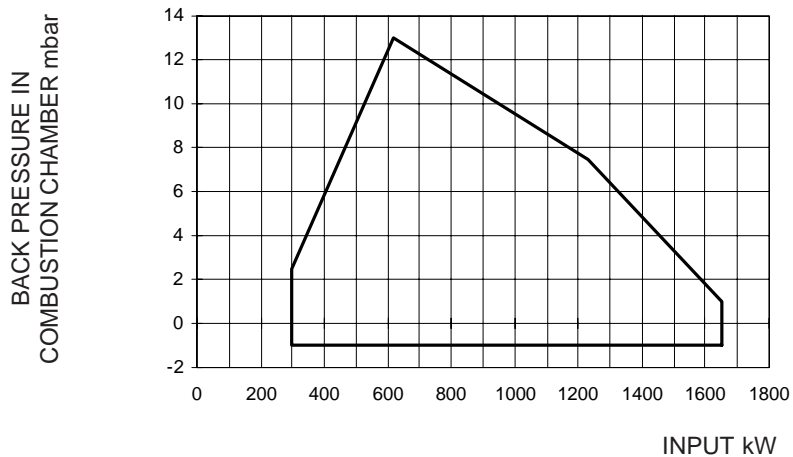


Fig. 3a

**NOTE:**  
**To calculate input in kcal/h multiply value in kW by 860.**

## MOUNTINGS AND CONNECTIONS

### Packing

The burners are despatched in cardboard packages of dimensions:

- P60 M-.xx.x.x.x.0.40: 1200 x 540 x 670 (W x H x D)
- P60 M-.xx.x.x.x.0.50: 1200 x 540 x 670 (W x H x D)
- P60 M-.xx.x.x.x.0.65: 1260 x 760 x 840 (W x H x D)
- P72 M-...: 1260 x 760 x 840 (W x H x D)

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

- 1 burner with gas train which is detached but already connected to the burner electrically;
- 1 gasket made of asbestos-free material to be inserted between the burner and the boiler;
- 1 set of the following documents: this manual and the test certificate.

When unpacking the burner be careful do not disconnect the electric wires connecting the gas train and then fix the gas train to the burner.

When disposing of the burner packing and if the packing is scrapped follow the procedures laid down in the current legislation regarding the disposal of materials.

### Fitting the burner to the boiler

Attach the flange of the burner to the boiler with the reference as shown in fig. 4.

Once the burner has been fitted to the boiler, seal the space between the nozzle and the refractory lining with suitable insulating material (ceramic ROPE fibre or refractory cement).

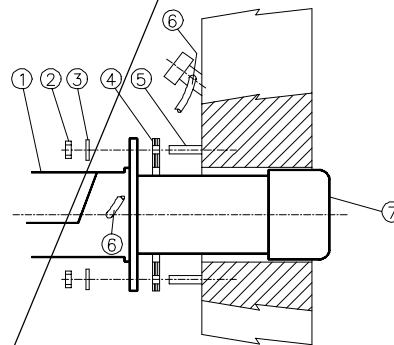


Fig. 4

### LEGEND

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

### Electrical connection diagram

- Remove the cover of the electrical panel beside the burner.
- Effect the electrical connections to the supply terminal board as per the scheme in fig. 5, check the direction of rotation of the fan motor (see note at end of page) and refit the panel cover.

**WARNING:** The burner is 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 terminal block be sure that ground wire should be longer than phase and neutral ones.

Legend: see page 21.

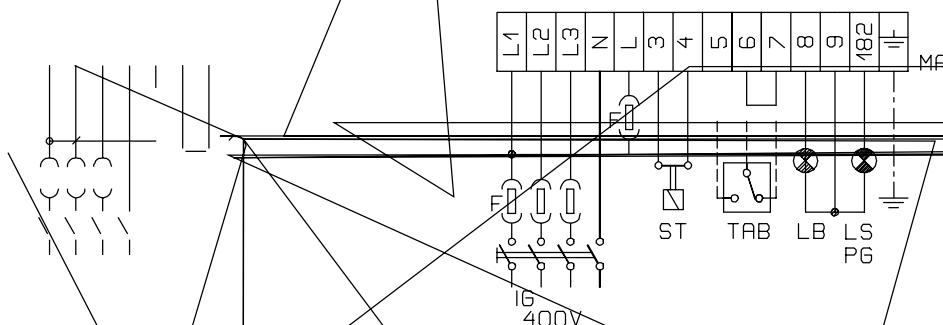


Fig. 5

**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.**

### Rotation of fan motor

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 of the motor. In the event of incorrect rotation reverse the three-phase supply and recheck 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 overload relay.



## Gas train installation diagrams

In fig. 6 are shown all the components of the gas train included in the supply and those which must be fitted by the installer. The scheme shown satisfies the current provisions of the law .

### LEGEND

- 1) Burner
- 2) Gas twin valve (including gas governor)
- 3) Gas valve
- 4) Minimum gas pressure switch
- 5) Filter
- 6) Manually operated shut off valve.
- Size: see technical data, Gas connection
- 7) Compact valves group
- 8) Leak detection monitor (for type P60 and P72 under 1200kW)

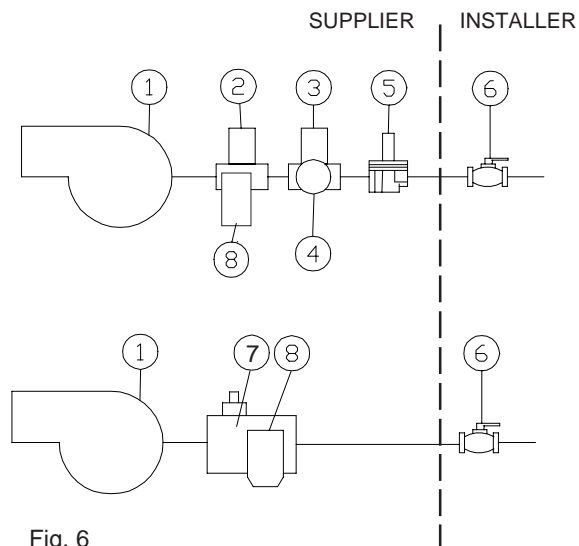


Fig. 6

## ADJUSTMENT

### Double valve Dungs DMV-DLE

It is a single body valve assembly including two class A electric gas valves. One of them is slow opening type.

The valve assembly can be coupled with leakage control Dungs mod. VPS504 or with a normally open valve.

To set gas flow rate use screw RP, under cover C. Clockwise rotation reduces flow rate, counter clock wise rotation increases it.

To set slow opening remove cover T, reverse upside down and use it as a tool to rotate screw WR. Clockwise rotation reduces start flow rate, counter clockwise rotation increases it.

### Dungs valve leakage monitor device VPS504 (optional)

The VPS504 checks the operation of the seal of the gas shut off valves constituting the DMV-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) In 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 lamp/button LB.

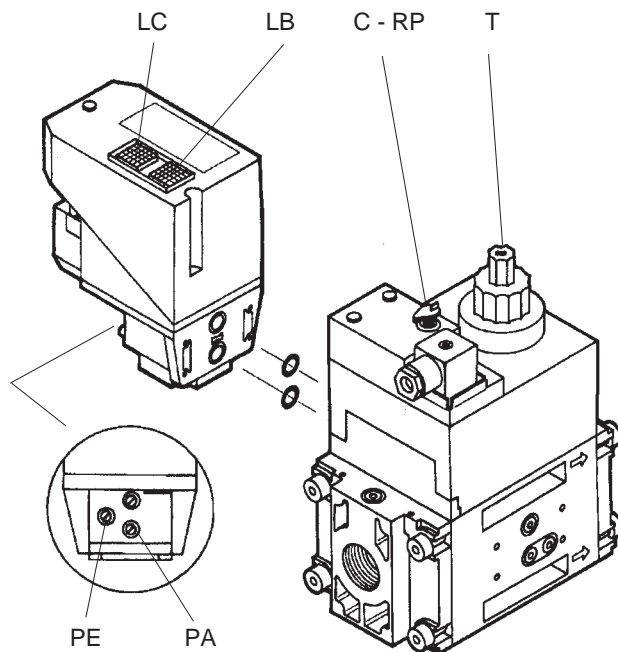


Fig. 7

### MV-DLE gas valve

To adjust the gas flow rate loosen the screw VB and rotate the regulator RP as necessary. Flow decreases with tightening and increases with unscrewing.

Tighten screw VB. For adjusting the speed of operation, remove the cap T, turn it over and fit on the pin VR with the appropriate spline placed on the upper part. By tightening it the starting flow rate decreases.

By slackening it the starting flow rate increases. N.B. The screw VSB must only be removed for replacement of the coil. Do not adjust the screw VR with a screwdriver.

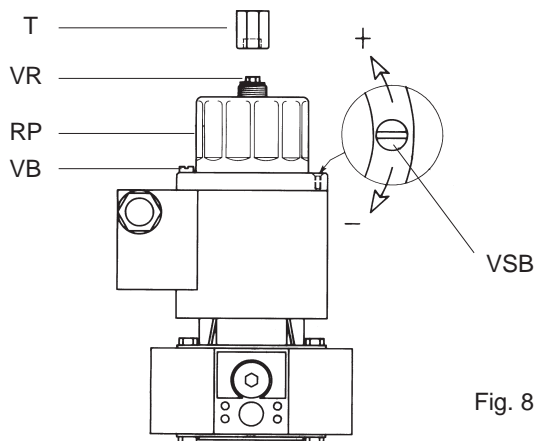


Fig. 8

### MVD gas valve

To adjust the gas flow unscrew the plug T, slacken the lock nut and apply a screwdriver to the adjusting screw VR. By turning in the clockwise direction the flow is increased and by turning in the anticlockwise direction it is decreased.

When this operation has been completed lock the lock 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.

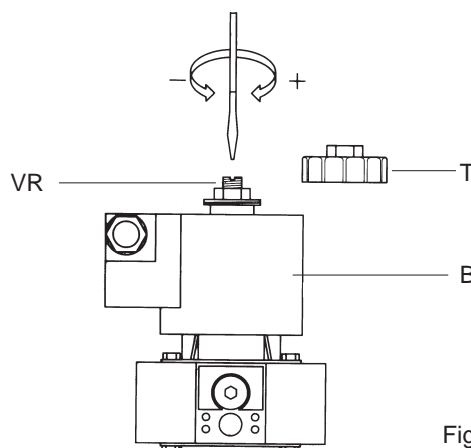


Fig. 9

### LANDIS gas valve

**Important:** Do not remove the cover as oil may leak out. Version with SKP20: (with built in pressure stabiliser).

To increase or decrease gas pressure, and therefore gas flow, remove the cap 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 Fig.10).

Leave the breather free (SA in Fig.10).

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

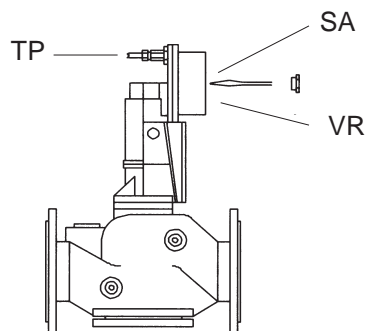


Fig. 10

### Multibloc MB-DLE

The multibloc is a compact device formed by 2 valves, gas pressure switch, pressure governor and gas filter. It can be coupled with leakage controls as Dungs VPS504.

The gas flow adjustment is carried out by means of a regulator, RP; unscrewing for a few turns the locking screw VB. Screwing out, the flow increases, screwing in the flow decreases.

The pressure governor is adjustable with the screw VS, located under the lid C. Screwing in pressure increases and screwing out pressure decreases.

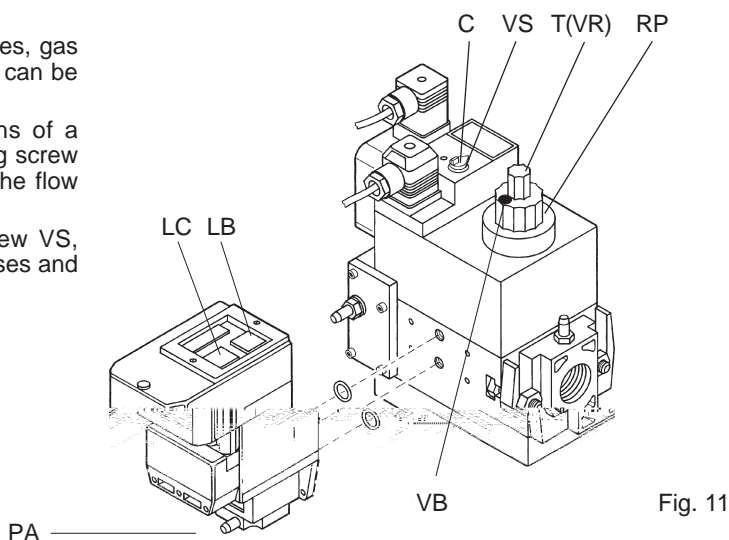


Fig. 11

## Pressure Governor

To increase the gas pressure on outlet, adjust with a screwdriver screw TR as indicated in figure 12.

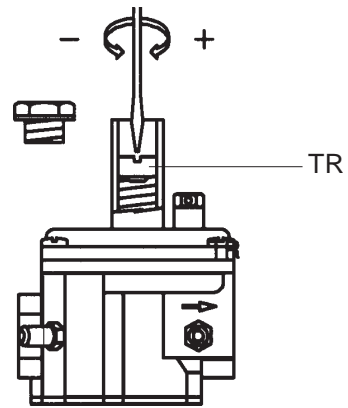


Fig. 12

## ADJUSTMENT OF GAS AND AIR FLOW RATE

**NOTE:** During commissioning operations, do not let the burner function 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.

### Burners with high-low operation (M-AB... models)

The angular movement of the servocontrol must always be 90° whatever the positions of high and low flame.

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

To alter the setting of the burner during commissioning of the plant adopt the following procedure:

- 1 Light the burner and bring it to high flame.
- 2 Adjust the gas flow rate to the required value by adjusting the pressure governor or the regulator valve (see instructions on page 9).

To adjust the air flow rate slacken the screw RA and rotate screw VRA (CW rotation increases air flow, while CCW rotation decreases it) until the desired flow rate is obtained. (fig. 15).

- 3 Bring the burner to low flame, in order to alter the gas flow rate slacken the nuts DB (fig. 13) and adjust the opening of the gas butterfly valve by rotating the rod TG (CW rotation increases gas flow, while CCW rotation decreases it). The slot on the butterfly valve shaft shows the degree of opening of the valve in relation to the horizontal axis (see fig.14).

- 4 If it is necessary to adjust the rating of the burner at low flame adjust the corresponding cam of the servo control ("STI" or "III"), after this adjustment, check the gas flow rate and repeat point 3.

N.B. On final adjustment, make sure the locking screws RA and DB are fully tightened.

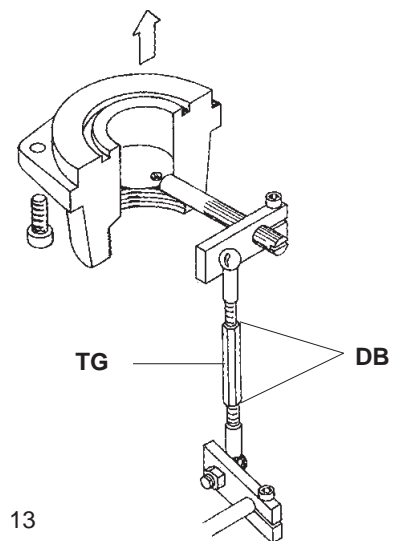


Fig. 13

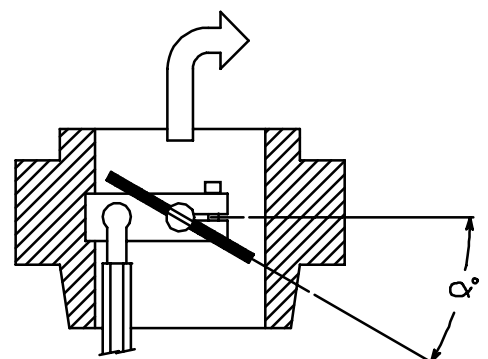


Fig. 14

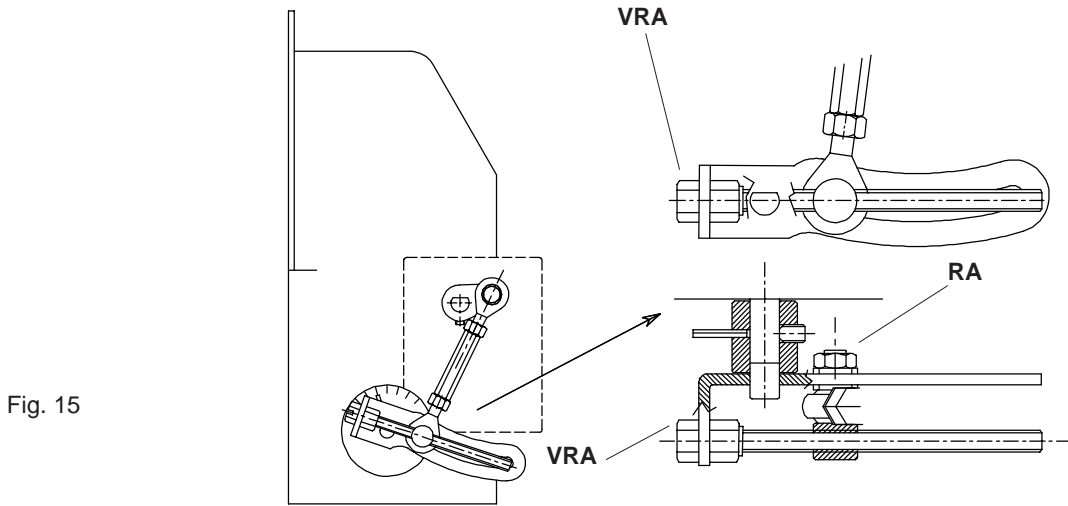


Fig. 15

**Adjustment of micro-switch cams**

The setting procedure is identical for Berger and Landis & Gyr servocontrols; refer to the following correspondence table for the functions of the cams.

| BERGER<br>STA6B3.41/6 | LANDIS & GYR<br>SQN30.151 |
|-----------------------|---------------------------|
| S2 1                  | I                         |
| ST 1                  | III                       |
| ST0                   | II                        |

- Micro-switch high flame (position at 90°)
- Micro-switch low flame and ignition
- Micro-switch dwell position (position at 0°)

**NOTES:** The cam MV on the BERGER and V on the LANDIS are not used.  
On the BERGER servocontrol the manual air damper control is not provided.

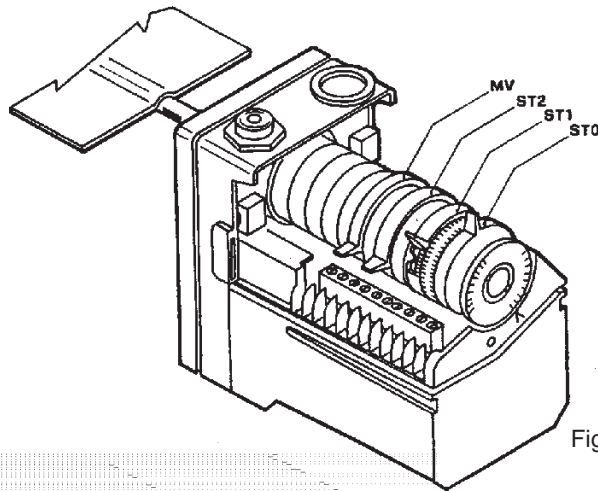


Fig. 16

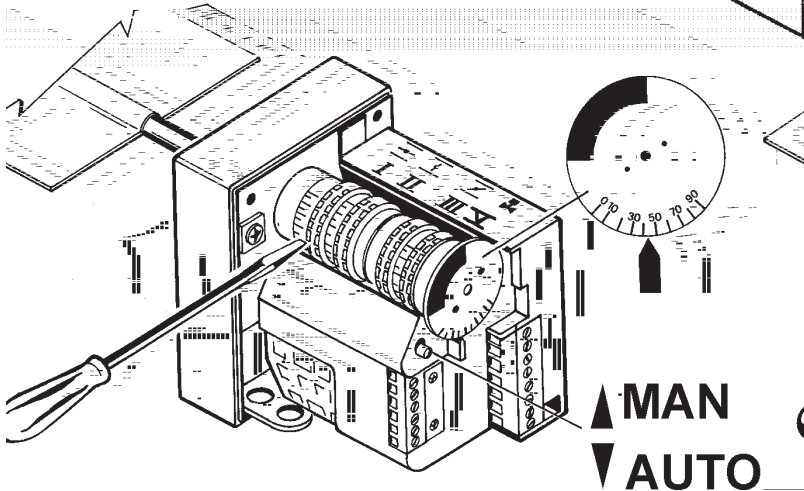


Fig. 17

### Burners with progressive operation (M-PR... & M-MD... models)

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

To recalibrate the burner at the time of on-site testing, employ the following procedure.

- 1 Light the burner and keep the servo-control in the ignition position by using the AUTO-MAN on the servo-control switch (ignition position = 0°).
- 2 To regulate the ignition air flow move the servo-control cam AB (see fig.18) (to increase air flow increase servo-control position angle).

For a correct position of the cam AB, proceed as follows.

- Remove the plastic lock B;
- push completely the green lever;
- manually move the air damper in the desired position and release the lever.

To regulate the ignition gas flow turn the adjustable screws V (see fig. 20) to change the opening of the throttle (see fig. 19). Turn clockwise to increase the gas flow and anti-clockwise to reduce it.

- 3 Switch off the burner, put the AUTO-MAN servo-control switch in AUTO position and start the burner again. If the setting is correct proceed to point 4, else correct it again.

- 4 With the servo-control switch in MAN position turn the servocontrol up to high flame (servo-control position = 90°).

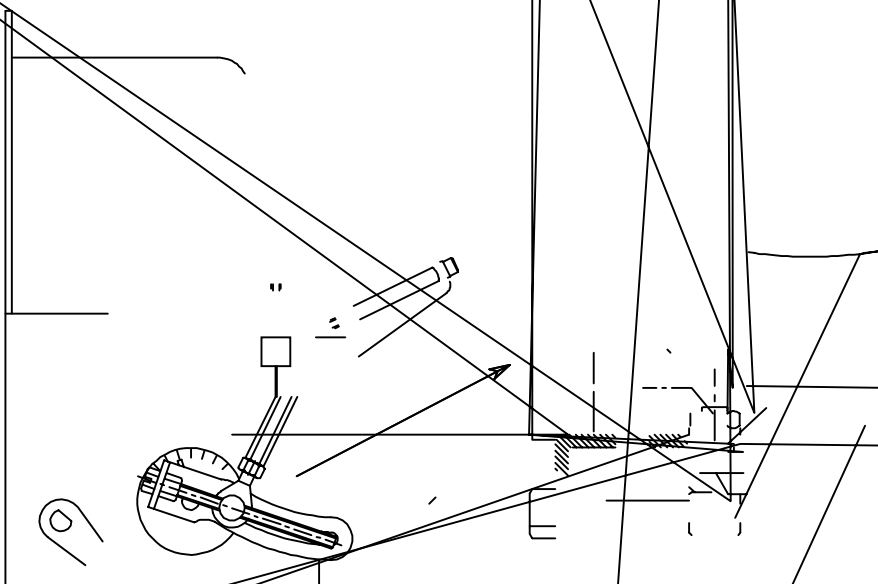
**IMPORTANT NOTICE:** move the servocontrol by hand slowly, taking care to combustion values in order to be sure not to let the burner function with insufficient air flow.

Regulate the gas flow to the required figure by adjusting the pressure stabilizer or the regulator valve (see page 10).

To adjust the air flow rate slacken the screw RA and rotate the screw VRA (clockwise rotation increases air flow, while anticlockwise rotation decreases it) until the desired flow rate is obtained. (fig. 20).

- 5 Turn the burner down to low flame, to regulate the gas flow act on the adjustable screws V as described at point 2.
- 6 Should it be necessary to adjust burner capacity at low flame move the servocontrol cam BF accordingly (see fig. 18). The low-flame position should never coincide with the ignition position, so for this reason the cam has been calibrated at least 5° off the ignition position.
- 7 Put the AUTO-MAN servo-control switch in AUTO position and check burner starting again.  
If gas or air flow need further adjustment proceed as described at point 2.

N.B. On final adjustment, make sure the locking screw RA is fully tightened.



---

### Calibration of air pressure switch

Calibration is carried out as follows:

Remove the transparent plastic cap.

After air and gas setting has been completed, start the burner and, while prepurge 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 cover on the pressure switch.

### Calibration of minimum gas pressure switch

Calibrations are carried out as follows:

Remove the transparent plastic cover.

With the burner in operation measure the pressure on the pressure port on gas filter and close the shut off valve (n° 4 in installation diagram) slowly until the detected pressure is reduced by 50%.

Verify CO emissions of the burner, if the measured value is smaller than 80 ppm screw down the adjusting ring nut until the burner is turned off.

If CO emissions are greater than 80 ppm slightly open the shut off valve until the CO value is reduced below 80 ppm, then screw down the adjusting ring nut until the burner is turned off.

Fully open the valve n° 4.

Refit the cover on the pressure switch.

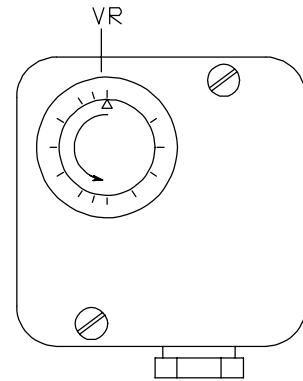


Fig. 21

### Calibrating the high gas pressure switch

The high gas pressure switch is fitted on the burner close to the throttle and is connected by copper tube.

For calibration proceed as follows:

Remove the transparent plastic cover.

Bring the burner to maximum output.

Rotate 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 again

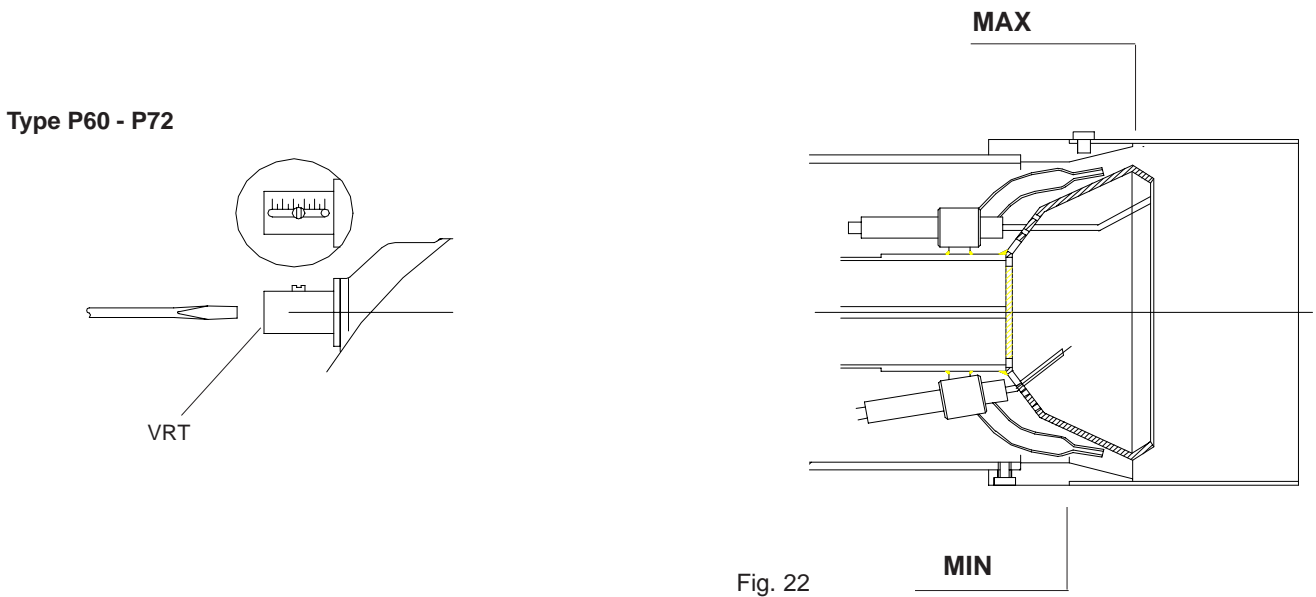
In the event of stoppage rotate the adjustment ring nut slightly further back.

Refit the cover.

### Adjustment of combustion head

The burner is adjusted in the factory with the head in the position "MAX", corresponding to maximum output. When operating at reduced power progressively move the combustion head to the positions indicated in the table following

**Note:** On burner type P72 loosen the screw VB before adjusting and tighten it up again afterwards.



| COMBUSTION HEAD POSITION | BURNER INPUT (kW) |     |      |      |
|--------------------------|-------------------|-----|------|------|
|                          | P60               |     | P72  |      |
|                          | From              | To  | From | To   |
| 3                        | 450               | 800 | 850  | 1650 |
| 2                        | 400               | 450 | 750  | 850  |
| 1                        | 350               | 400 | 700  | 750  |
| 0                        | <                 | 350 | <    | 700  |

Fig. 23

---

## SECTION II: OPERATIONS MANUAL

### LIMITATIONS ON THE USE OF THE EQUIPMENT

THE BURNER HAS BEEN DESIGNED TO OPERATE ONLY AFTER IT HAS BEEN CORRECTLY CONNECTED TO A HEAT GENERATING UNIT (E.G. BOILERS, WARM AIR HEATERS, FURNACES ETC.) AND ALL OTHER USES MUST BE CONSIDERED IMPROPER AND THEREFORE DANGEROUS.

THE USERS MUST GUARANTEE THE CORRECT ASSEMBLY OF THE EQUIPMENT AND HAVE IT INSTALLED BY QUALIFIED PERSONNEL. THEY MUST HAVE THE FIRST COMMISSIONING OF THE EQUIPMENT CARRIED OUT BY A SERVICE CENTRE AUTHORIZED BY THE MANUFACTURERS OF THE BURNERS. FOR THIS PURPOSE THE ELECTRICAL CONNECTIONS TO THE REGULATING AND SAFETY EQUIPMENT OF THE GENERATOR (OPERATING THERMOSTATS, SAFETY DEVICES ETC.) WHICH ENSURE THE PROPER AND SAFE FUNCTIONING OF THE BURNER ARE OF GREAT IMPORTANCE.

ANY OPERATION ON THE EQUIPMENT WHICH MAKES NO ALLOWANCE FOR THE INSTALLATION OPERATIONS OR WHICH OCCURS AFTER THE COMPLETE OR PARTIAL INCORRECT HANDLING OF THESE OPERATIONS (E.G. DISCONNECTION EVEN IF ONLY PARTIAL OF THE ELECTRICAL CONDUCTORS, OPENING OF THE DOOR OF THE GENERATOR, DISMANTLING OF PARTS OF THE BURNER), MUST BE OMITTED.

NEVER OPEN OR DISMANTLE ANY COMPONENT OF THE MACHINE.

ONLY OPERATE THE CONTROL SWITCH OF THE BOILER AND, WHERE APPLICABLE, THE RESET PUSH BUTTON.

IF THE EQUIPMENT BECOMES LOCKED OUT AGAIN DO NOT CONTINUE TO USE THE RE-SET PUSH BUTTON AND CONSULT QUALIFIED PERSONNEL WHO WILL BE ABLE TO ELIMINATE THE OPERATING FAULT.

**WARNING:** DURING NORMAL OPERATION THE PARTS OF THE BURNER NEAREST THE HEAT GENERATOR (COUPLING FLANGE) ARE SUBJECTED TO HEATING. DO NOT TOUCH THEM SO AS TO AVOID SUFFERING BURNS.



## FUNCTIONING BURNERS WITH HIGH-LOW OPERATION (M-AB... MODELS)

- Rotate into position 1 the switch A on the burner's control panel.
- Check that the appliance is not on lockout (warning light B lit), if necessary reset by operating button C (reset).
- Verify that the control thermostats (or pressure switches) are made to allow the burner to operate.
- Check that the gas supply pressure is sufficient (signalled by lighting up of indicator light E).
- Only for burners with leakage control: the check cycle of the gas valve closure monitor device begins; completion of the check is signalled by the lighting up of the appropriate indicator light on the leak monitor.
- When the checking of gas valves is finished initiate the burner's start-up cycle. In the event of leakage the seal monitor device goes into lockout and the light E comes on. To reset, press the reset button on the leak monitor device.
- At the beginning of the start-up cycle the servo control operates the air damper to maximum opening and the fan motor starts and the pre-purge phase begins.

During the pre-purge phase the complete opening of the air damper is signalled by the lighting of the indicator light F on the front panel.

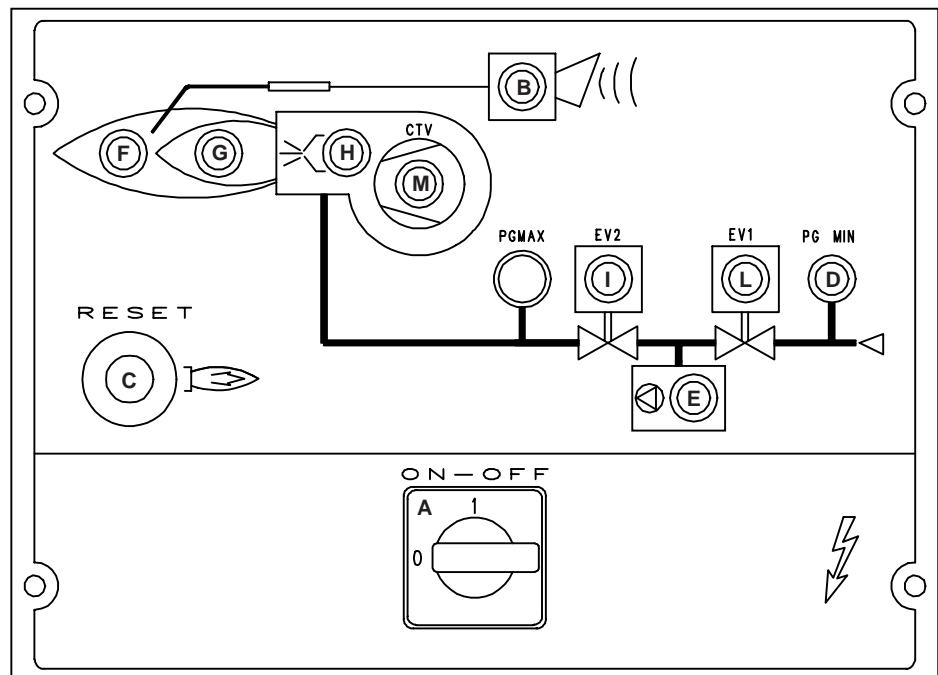
- At the end of the pre-purge the air damper is brought to the ignition position, the ignition transformer is energised (signalled by indicator light H on the panel) and, after 3 sec., the two gas valves EV1 and EV2 are energised (indicator lights I and L on the mimic panel).

3 seconds after the opening of the gas valves the ignition transformer is de-energised and the light H is extinguished.

- The burner is firing in low flame (indicator light G lit up); after 8 sec. 2-stage operation initiates and the burner is brought automatically into high flame, or remains in low flame according to the requirements of the plant. Operation in high or low flame is signalled by the lighting up/extinguishing of the indicator light F on the mimic panel.

Front panel

Fig. 24



### Legend

- A** Main switch on-off
- B** Lockout indicator light
- C** Reset button for burner control device
- D** Gas pressure switch indicator light
- E** Lockout indicator light for gas valve leak detection device (only burners equipped with leakage control)
- F** Indicator light for high flame operation (or damper open, in pre-purge phase)
- G** Indicator light for low flame operation (burners with on/off operation, indicator lights F and G light up at the same time, on the start-up of the burner)
- H** Indicator light for functioning of ignition transformer
- I** Indicator light for valve EV2 open
- L** Indicator light for valve EV1 open
- M** Indicator light for motor overload tripped



## PART III: MAINTENANCE MANUAL

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

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

### PERIODIC OPERATIONS

- Cleaning and examining the gas filter cartridge, if necessary replace it;
- removal, examination and cleaning of the combustion head (see fig. 26 - 27);
- examination of ignition electrodes, cleaning, possible adjustment and, if necessary, replacement (see fig. 28);
- examination of detection electrode, cleaning, possible adjustment or, if necessary, replacement (see fig. 28);
- in the event of doubt check the detection circuit after putting the burner back into operation, as shown in fig. 29;
- cleaning and greasing of sliding and rotating parts

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

### Removing the burner head

#### Type P60

Remove the lid C.

Unscrew the 2 screws S which hold in position the washer and then unscrew 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.

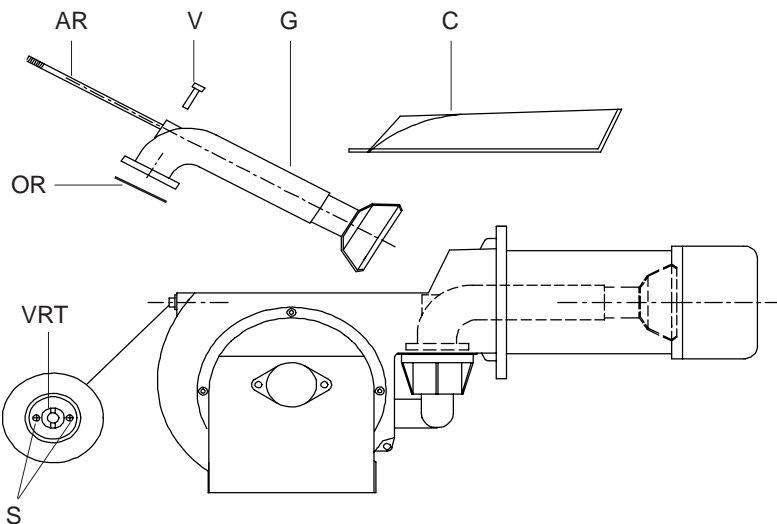


Fig. 26

#### Type P72

Remove the lid C.

Unscrew the screws V which locks 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.

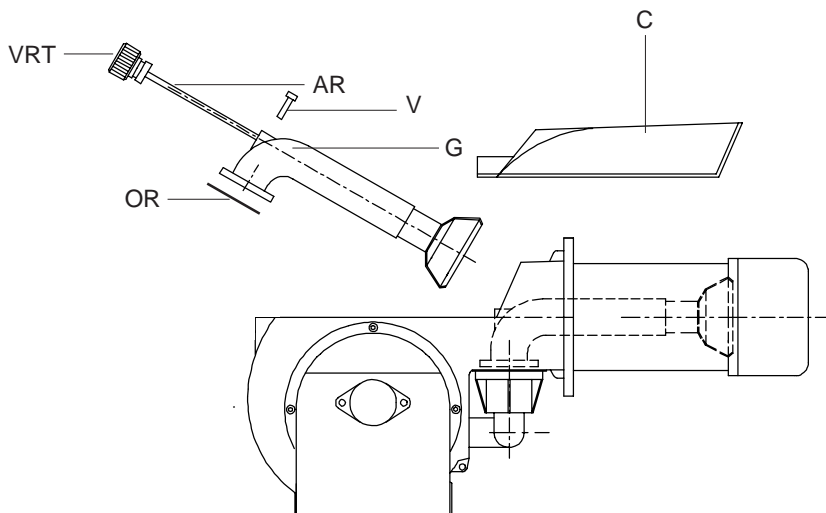


Fig. 27

**Correct electrodes position**

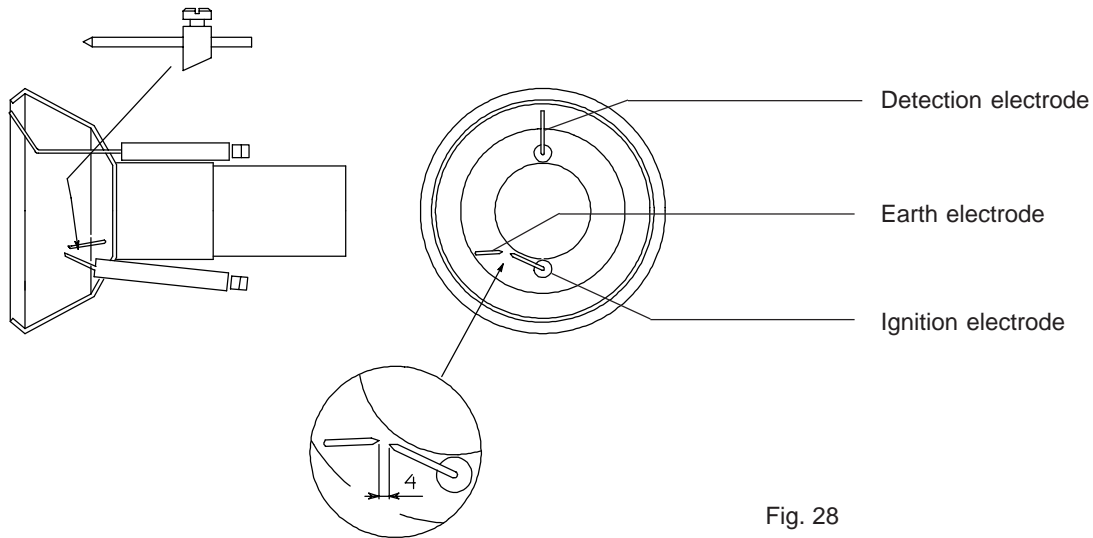


Fig. 28

**TERMINAL BOARD**

Check of ionisation current

To measure the detection signals follow the scheme in fig. 30.

If the signal is less than the value shown, check the position of the FLAME detection electrode, the electrical contacts and if necessary replace the detection electrode.

| Model.   | Minimum signal |
|----------|----------------|
| App.     | of detection   |
| LGB22    | 3 $\mu$ A      |
| LFL1.322 | 6 $\mu$ A      |

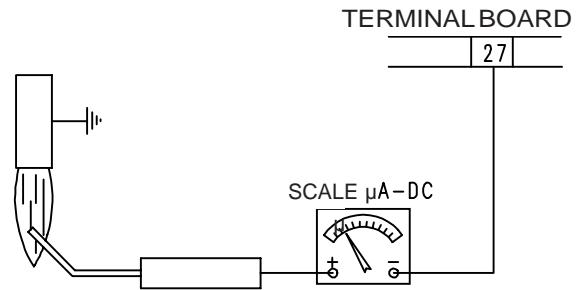
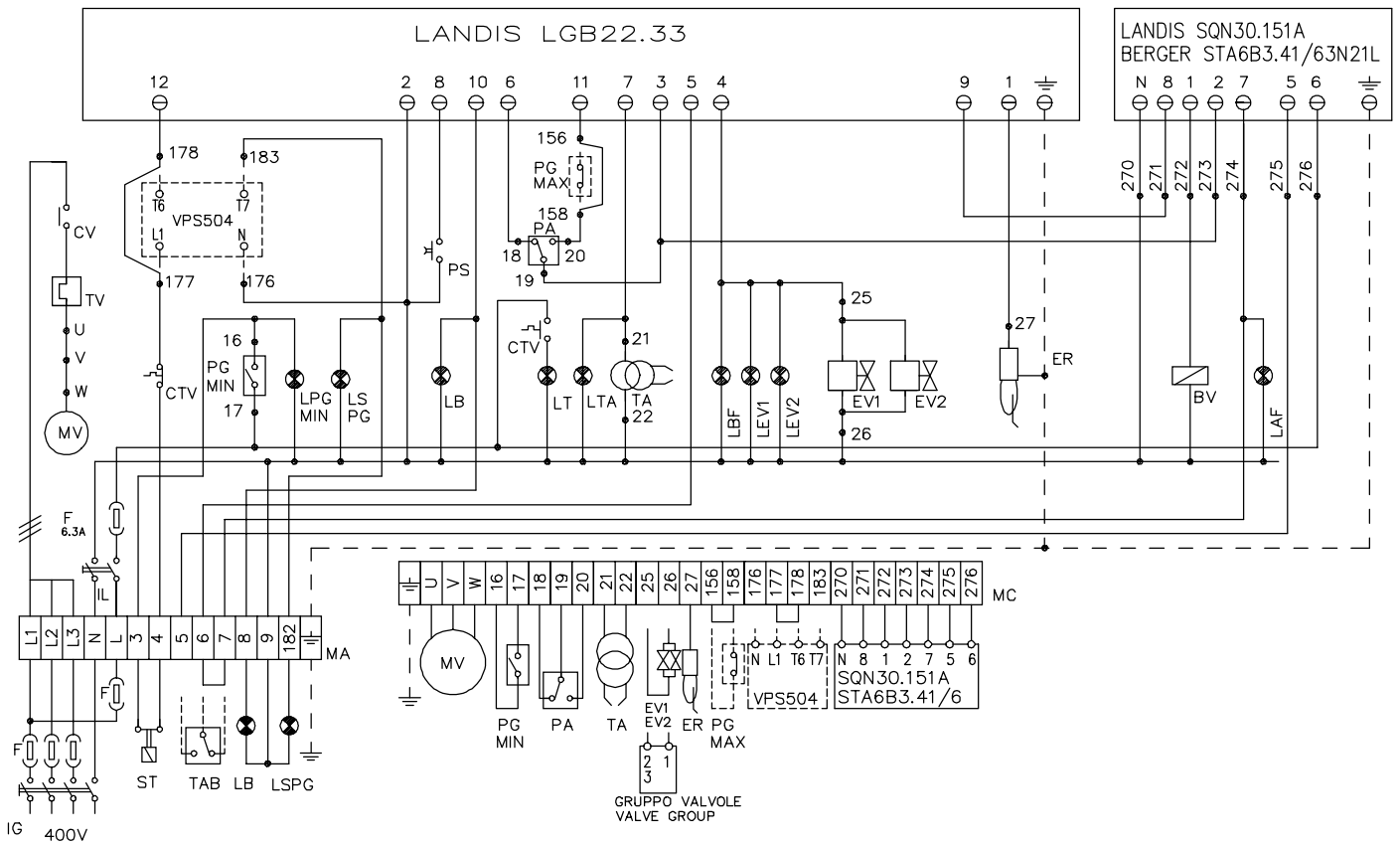


Fig. 29

**FAULT FINDING TABLE**

| CAUSE                                    | FAULT                |                    |                                  |  |                                |                               |                                 |  |
|--|----------------------|--------------------|----------------------------------|--|--------------------------------|-------------------------------|---------------------------------|--|
|  | BURNER DOESN'T START | CONTINUE PRE-PURGE | BURNER DOESN'T START AND LOCKOUT | BURNER DOESN'T START AND REPEATS CYCLE | BURNER START AND REPEATS CYCLE | BURNER DOESN'T GO TO HI FLAME | BURNER LOCKOUT DURING OPERATION | BURNER SWITCH OFF AND REPEATS CYCLE DURING OPERATION |
| MAIN SWITCH OPEN                         | ■                    |                    |                                  |  |                                |                               |                                 |  |
| PROTECTION FUSES INTERRUPTED             | ■                    |                    |                                  |  |                                |                               |                                 |  |
| THERE'S NO GAS                           | ■                    |                    |                                  |  |                                |                               |                                 |  |
| DEFECTIVE GAS PRESSURE SWITCH            | ■                    |                    |                                  |  |                                |                               |                                 |  |
| DEFECTIVE THERMOSTAT                     | ■                    |                    |                                  |  |                                |                               |                                 |  |
| FAN THERMIC RELAY OPEN                   | ■                    |                    |                                  |  |                                |                               |                                 |  |
| AUXILIARY FUSE INTERRUPTED               | ■                    |                    |                                  |  |                                |                               |                                 |  |
| DEFECTIVE AIR PRESSURE SWITCH            | ■                    |                    | ■                                |  |                                |                               | ■                               |  |
| DEFECTIVE CONTROL BOX                    | ■                    | ■                  | ■                                |  |                                |                               | ■                               |  |
| DEFECTIVE SERVOCONTROL                   |                      | ■                  |                                  |  |                                |                               |                                 |  |
| AIR PRESSURE SWITCH FAULT OR BAD SETTING |                      |                    |                                  |  |                                |                               | ■                               |  |
| GAS PRESSURE SWITCH BAD SETTING          |                      |                    | ■                                | ■                                      | ■                              |                               |                                 | ■  |
| DEFECTIVE IGNITION TRANSFORMER           |                      |                    | ■                                |  |                                |                               |                                 |  |
| ELECTRODES BAD POSITION                  |                      |                    | ■                                |  |                                |                               |                                 |  |
| GAS THROTTLE BAD SETTING                 |                      |                    | ■                                |  |                                |                               |                                 |  |
| DEFECTIVE GAS GOVERNOR                   |                      |                    |                                  | ■                                      | ■                              |                               |                                 | ■  |
| HI-LOW FLAME THERMOSTAT FAULT            |                      |                    |                                  |  |                                | ■                             |                                 |  |
| SERVOCONTROL CAM WRONG SETTING           |                      |                    |                                  |  |                                | ■                             |                                 |  |
| DETECTION ELECTRODE BAD POSITION         |                      |                    |                                  |  |                                |                               | ■                               |  |

**ELECTRICAL DIAGRAM TYPE P60 MOD. M-AB.... (Code 05-509/2)**



**LEGEND**

- BV Fan motor remote contactor coil
- CR1 Auxiliary relay contacts
- CTV Fan motor overload contacts
- CV Fan motor contactor
- CMF Manual operation selector
- 0 - stand by 1 - high flame
- 2 - low flame 3 - automatic
- ER Flame detection electrode
- EV1 Gas electro-valve upstream DUNGS group
- EV2 Gas electro-valve downstream DUNGS group
- F Fuses
- FC\* UV flame detection
- IG Main switch
- IL Auxiliary line switch
- L Phase
- LAF Burner in high flame indicator light
- LB Burner lockout indicator light
- LBF Burner in low flame indicator light
- LEV1 Indicator light for opening of electro-valve EV1
- LEV2 Indicator light for opening of electro-valve EV2
- LFL1.322 LANDIS flame monitor device
- LGB22.33 LANDIS flame monitor device
- LPGMIN Indicator light for presence of gas in the network
- LS Indicator light for burner in stand-by (STAND-BY)
- LSPG Indicator light for leakage control
- LT Indicator light for fan overload tripped
- LTA Ignition transformer indicator light
- MA Supply terminal block
- MC Terminal block for connection of burner components
- MV Fan motor
- N Neutral
- PA Combustion air pressure switch
- PGMAX High gas pressure switch
- PGMIN Low gas pressure switch
- PS Leakage control device reset button

- SD-PRESS 3 wires pressure probe (Landis QBE61.1)
- SD-TEMP 2 wires temperature probe (Pt1000, Landis QAE2..., QAC2..)
- R1 Auxiliary relay
- SQL33 LANDIS servocontrol for air damper
- SQN30.151 LANDIS servocontrol for air damper
- ST Series of thermostat or pressure switches
- STA6B3.41/6 BERGER servocontrol for air damper
- TA Ignition transformer
- TAB High/low thermostat (where supplied, remove the bridge between terminals 6 and 7 in terminal block MA)
- TV Fan motor thermal
- VPS504 Dungs valve leakage monitor device
- \* In the version with photoelectric cell use ER in place of FC in context

QUADRO MODULAZIONE Modulation box.  
 \*Link between terminal "G" in the RWF32 modulator and terminal "G" (terminal 13 in terminal block MA) in the pressure probe, applies only if the pressure probe is used. The modulator includes a limit switch (terminals Q13 and Q14); it stops the burner if the work parameters overcome set differential.

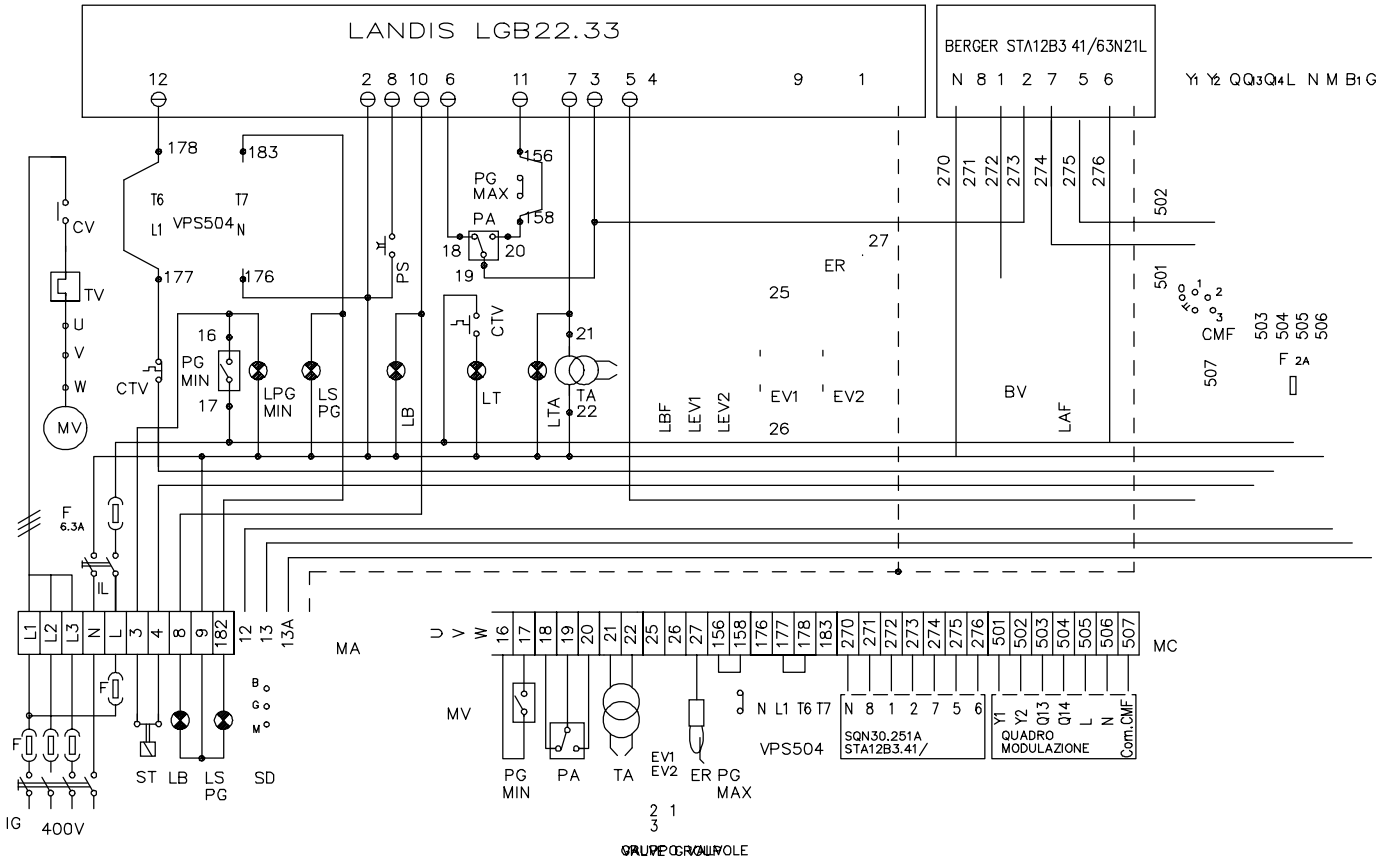
**SERVO CONTROL CAMS**

| LANDIS | SQN30   | SQL33 |            |
|--------|---------|-------|------------|
|        | I       | Y1    | high flame |
|        | II      | Y2    | stand by   |
|        | III     | 3     | low flame  |
|        | V       |       | not used   |
| BERGER | STA6B.. |       |            |
|        | ST2     |       | high flame |
|        | ST0     |       | stand by   |
|        | ST1     |       | low flame  |
|        | MV      |       | not used   |

**Note**

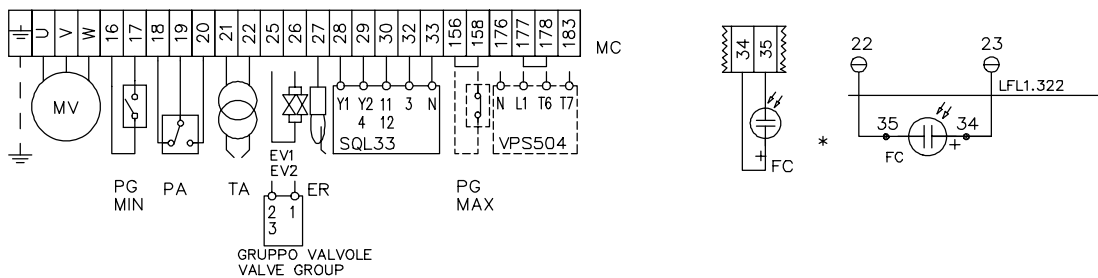
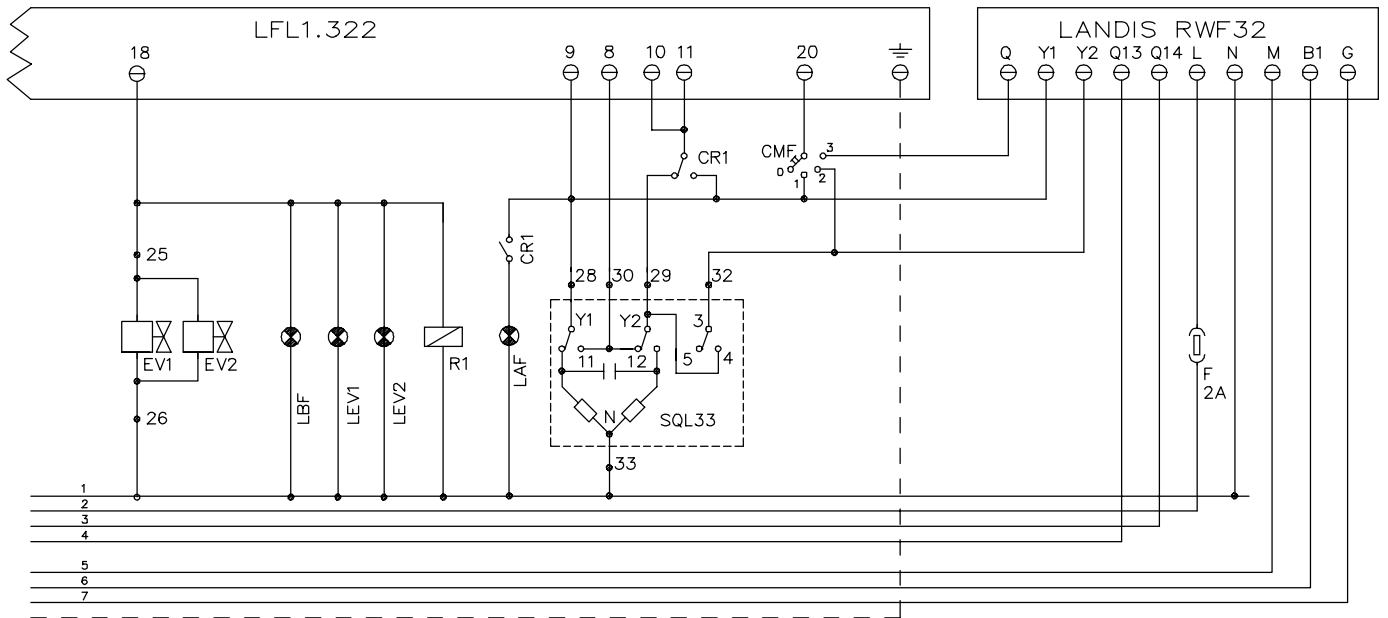
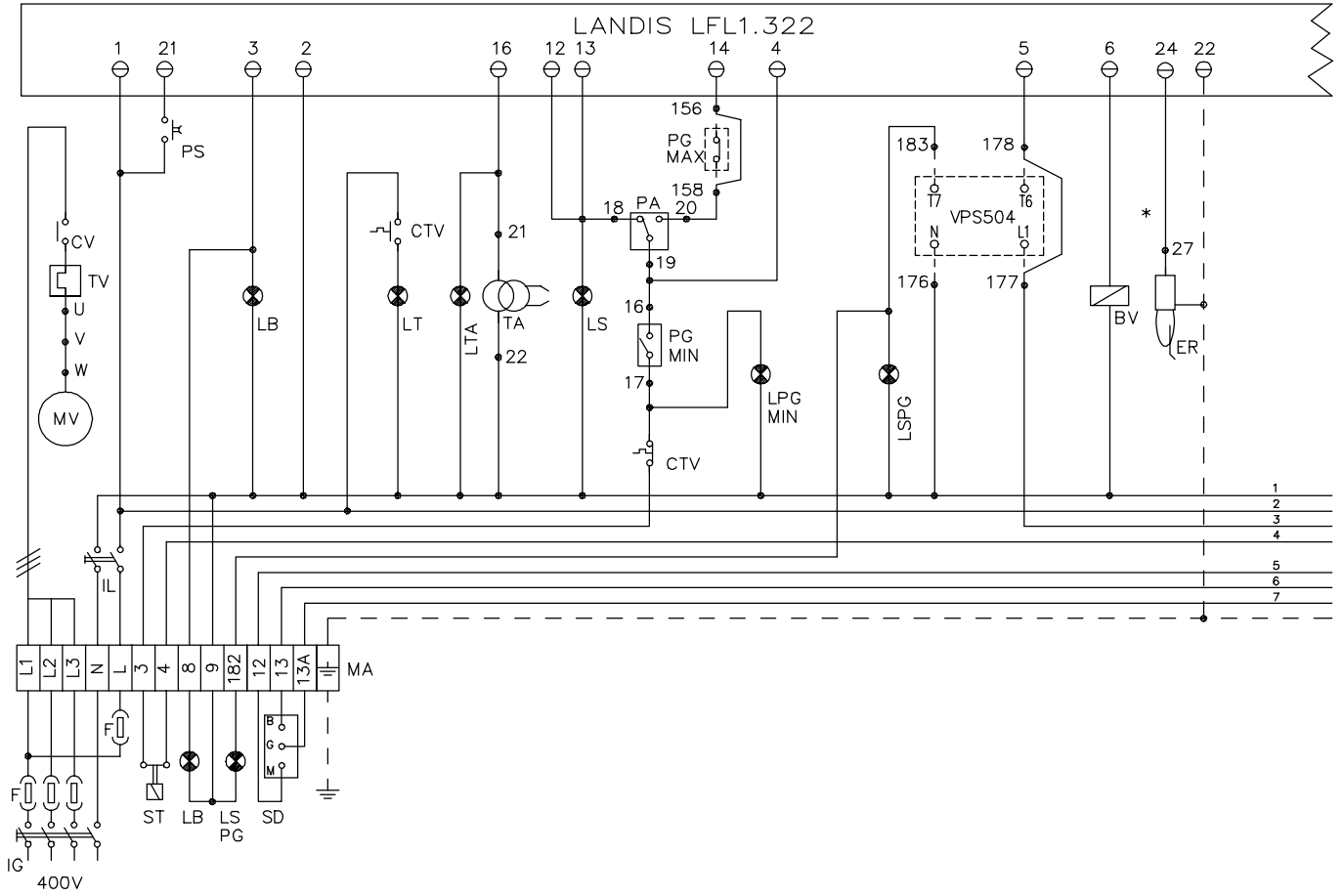
- 1 - Power supply 400V 50Hz 3N a.c.
- 2 - Do not reverse phase with neutral
- 3 - Ensure burner is properly earthed

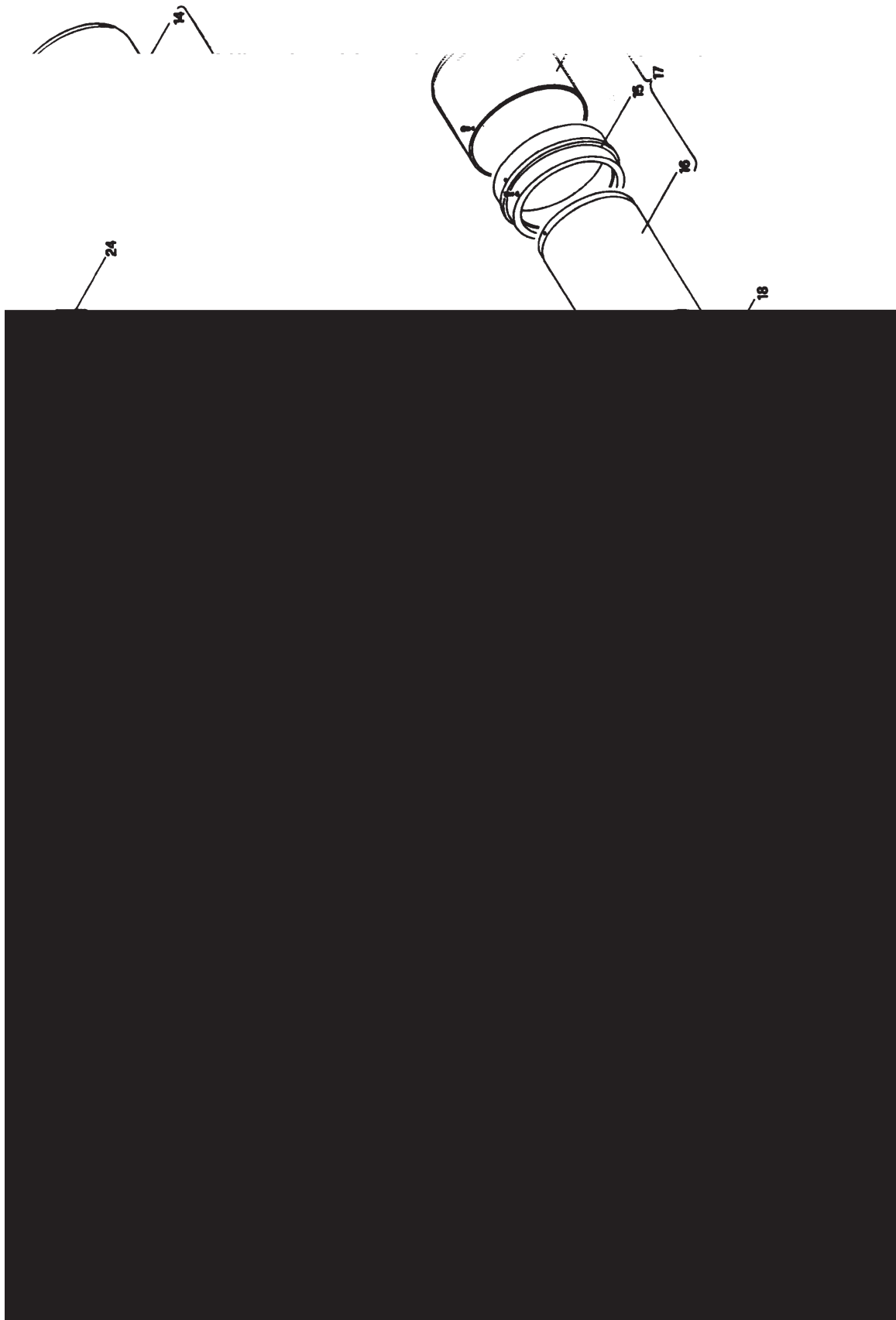
**ELECTRICAL DIAGRAM TYPE P60 MOD. M-MD... (Cod. 05-510/2)**



**ELECTRICAL DIAGRAM TYPE P72 MOD. M-PR... (Cod. 07-324/2)**

ELECTRICAL DIAGRAM TYPE P72 MOD. M-MD... (Cod. 07-325/2)

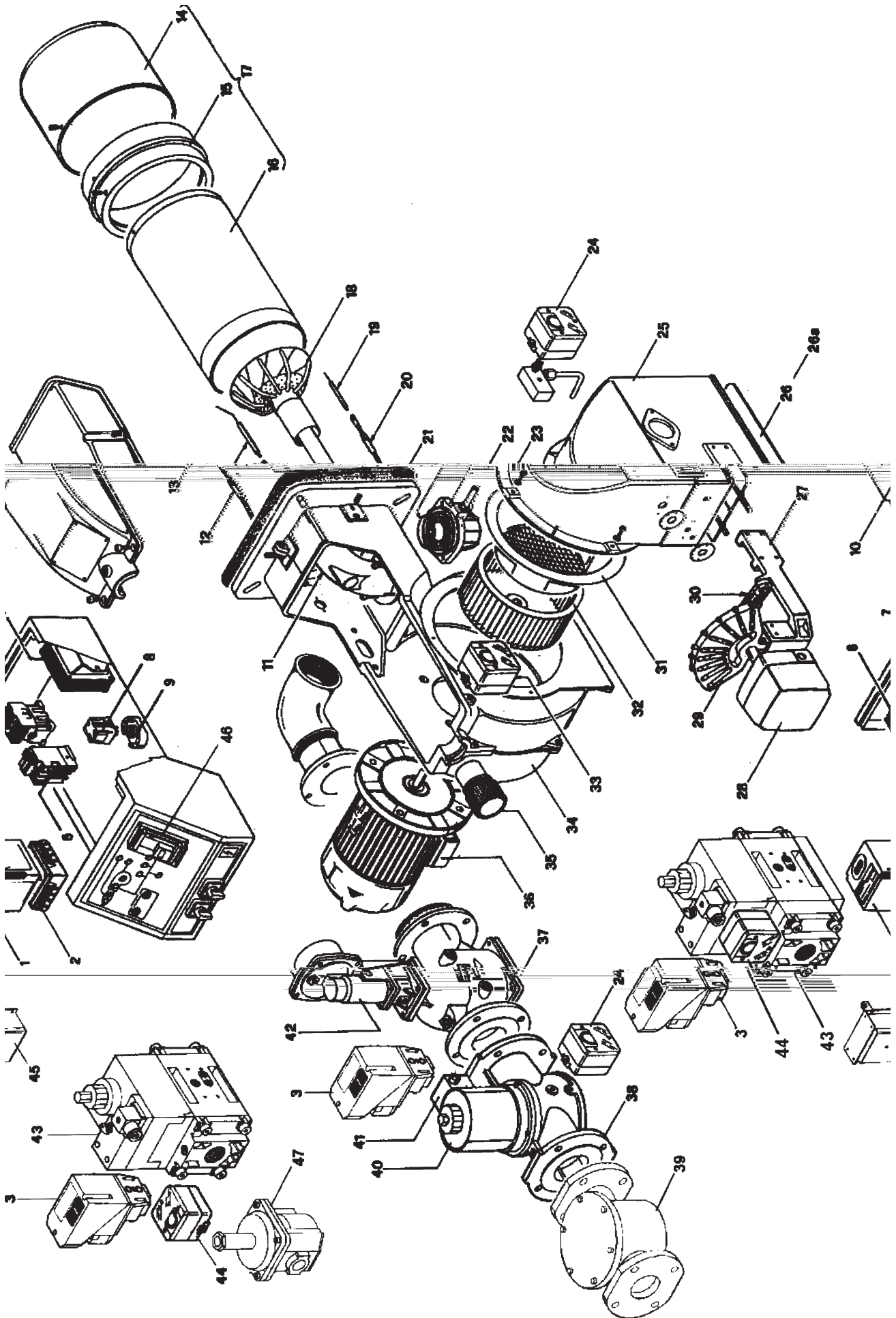






| POS. | DESCRIPTION                  | P60        |            |            |            |            |            |
|------|------------------------------|------------|------------|------------|------------|------------|------------|
|      |                              | M-ABS...40 | M-ABL...40 | M-ABS...50 | M-ABL...50 | M-ABS...65 | M-ABL...65 |
| 1    | CONTROL BOX SOCKET           | 203.04.15  | 203.04.15  | 203.04.15  | 203.04.15  | 203.04.15  | 203.04.15  |
| 2    | CONTROL BOX                  | 202.04.30  | 202.04.30  | 202.04.30  | 202.04.30  | 202.04.30  | 202.04.30  |
| 3    | THERMAL RELAIS               | 614.00.02  | 614.00.02  | 614.00.02  | 614.00.02  | 614.00.02  | 614.00.02  |
| 4    | CONTACTOR                    | 613.00.01  | 613.00.01  | 613.00.01  | 613.00.01  | 613.00.01  | 613.00.01  |
| 5    | IGNITION TRANSFORMER         | 217.01.02  | 217.01.02  | 217.01.02  | 217.01.02  | 217.01.02  | 217.01.02  |
| 6    | RELAIS                       | ---        | ---        | ---        | ---        | ---        | ---        |
| 7    | RELAIS SOCKET                | ---        | ---        | ---        | ---        | ---        | ---        |
| 9    | GAS PRESSURE SWITCH          | 216.00.52  | 216.00.52  | 216.00.52  | 216.00.52  | ---        | ---        |
| 10   | TOP COVER                    | 221.01.09  | 221.01.09  | 221.01.09  | 221.01.09  | 221.01.09  | 221.01.09  |
| 11   | MANIFOLD                     | 274.00.03  | 274.00.03  | 274.00.03  | 274.00.03  | 274.00.03  | 274.00.03  |
| 12   | DETECTION CABLE              | 605.02.05  | 605.02.05  | 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  | 208.01.02  | 208.01.02  |
| 14   | BLAST TUBE EXTENSION         | 220.00.55  | 220.00.56  | 220.00.55  | 220.00.56  | 220.00.55  | 220.00.56  |
| 15   | BLAST TUBE RING              | 247.00.37  | 247.00.37  | 247.00.37  | 247.00.37  | 247.00.37  | 247.00.37  |
| 16   | BLAST TUBE                   | 230.00.35  | 230.00.35  | 230.00.35  | 230.00.35  | 230.00.35  | 230.00.35  |
| 17   | COMPLETE BLAST TUBE          | 309.10.60  | 309.10.61  | 309.10.60  | 309.10.61  | 309.10.60  | 309.10.61  |
| 18   | COMBUSTION HEAD              | 306.00.78  | 306.00.78  | 306.00.78  | 306.00.78  | 306.00.78  | 306.00.78  |
| 19   | IGNITION ELECTRODE           | 208.02.02  | 208.02.02  | 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  | 605.01.08  | 605.01.08  |
| 21   | GASKET                       | 211.00.13  | 211.00.13  | 211.00.13  | 211.00.13  | 211.00.13  | 211.00.13  |
| 22   | THROTTLE "O" RING            | 225.00.03  | 225.00.03  | 225.00.03  | 225.00.03  | 225.00.03  | 225.00.03  |
| 23   | THROTTLE                     | 246.02.22  | 246.02.22  | 246.02.22  | 246.02.22  | 246.02.24  | 246.02.24  |
| 24   | GAS PRESSURE SWITCH          | 216.00.26  | 216.00.26  | 216.00.26  | 216.00.26  | 216.00.26  | 216.00.26  |
| 25   | AIR INLET                    | 238.01.10  | 238.01.10  | 238.01.10  | 238.01.10  | 238.01.10  | 238.01.10  |
| 26   | INTERNAL AIR DAMPER          | 214.00.07  | 214.00.07  | 214.00.07  | 214.00.07  | 214.00.07  | 214.00.07  |
| 27   | EXTERNAL AIR DAMPER          | ---        | ---        | ---        | ---        | ---        | ---        |
| 28   | SERVOCONTROL MOUNTING BRAKET | 305.00.09  | 305.00.09  | 305.00.09  | 305.00.09  | 305.00.09  | 305.00.09  |
| 29   | SERVOCONTROL                 | 248.00.42  | 248.00.42  | 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  | 219.16.04  | 219.16.04  |
| 31   | INLET CONE                   | 204.00.17  | 204.00.17  | 204.00.17  | 204.00.17  | 204.00.17  | 204.00.17  |
| 32   | FAN                          | 215.00.21  | 215.00.21  | 215.00.21  | 215.00.21  | 215.00.21  | 215.00.21  |
| 33   | AIR PRESSURE SWITCH          | 216.00.58  | 216.00.58  | 216.00.58  | 216.00.58  | 216.00.58  | 216.00.58  |
| 34   | BURNER CASING                | 205.01.21  | 205.01.21  | 205.01.21  | 205.01.21  | 205.01.21  | 205.01.21  |
| 35   | HEAD ADJUSTMENT              | 232.05.02  | 232.05.02  | 232.05.02  | 232.05.02  | 232.05.02  | 232.05.02  |
| 36   | MOTOR                        | 218.00.20  | 218.00.20  | 218.00.20  | 218.00.20  | 218.00.20  | 218.00.20  |
| 37   | GAS VALVE EV2                | ---        | ---        | ---        | ---        | 219.01.51  | 219.01.51  |
| 38   | GAS VALVE EV1                | ---        | ---        | ---        | ---        | 219.03.21  | 219.03.21  |
| 39   | GAS FILTER                   | ---        | ---        | ---        | ---        | 209.01.11  | 209.01.11  |
| 40   | EV1 COIL                     | ---        | ---        | ---        | ---        | 258.00.05  | 258.00.05  |
| 41   | EV1 BOARD                    | ---        | ---        | ---        | ---        | 253.01.05  | 253.01.05  |
| 42   | ACTIVATOR                    | ---        | ---        | ---        | ---        | 219.01.20  | 219.01.20  |
| 43   | MULTIBLOC VALVE GROUP        | 219.03.E4  | 219.03.E4  | 219.03.E5  | 219.03.E5  | ---        | ---        |

| POS. | DESCRIPTION                  | P72        |            |            |            |            |            |
|------|------------------------------|------------|------------|------------|------------|------------|------------|
|      |                              | M-ABS...50 | M-ABL...50 | M-ABS...65 | M-ABL...65 | M-ABS...80 | M-ABL...80 |
| 1    | CONTROL BOX SOCKET           | 203.04.15  | 203.04.15  | 203.04.15  | 203.04.15  | 203.04.15  | 203.04.15  |
| 2    | CONTROL BOX                  | 202.04.30  | 202.04.30  | 202.04.30  | 202.04.30  | 202.04.30  | 202.04.30  |
| 3    | THERMAL RELAIS               | 614.00.08  | 614.00.08  | 614.00.08  | 614.00.08  | 614.00.08  | 614.00.08  |
| 4    | CONTACTOR                    | 613.00.01  | 613.00.01  | 613.00.01  | 613.00.01  | 613.00.01  | 613.00.01  |
| 5    | IGNITION TRANSFORMER         | 217.01.02  | 217.01.02  | 217.01.02  | 217.01.02  | 217.01.02  | 217.01.02  |
| 6    | RELAIS                       | ---        | ---        | ---        | ---        | ---        | ---        |
| 7    | RELAIS SOCKET                | ---        | ---        | ---        | ---        | ---        | ---        |
| 9    | GAS PRESSURE SWITCH          | 216.00.52  | 216.00.52  | ---        | ---        | ---        | ---        |
| 10   | TOP COVER                    | 221.01.24  | 221.01.24  | 221.01.24  | 221.01.24  | 221.01.24  | 221.01.24  |
| 11   | MANIFOLD                     | 274.00.19  | 274.00.19  | 274.00.19  | 274.00.19  | 274.00.19  | 274.00.19  |
| 12   | DETECTION CABLE              | 605.02.06  | 605.02.06  | 605.02.06  | 605.02.06  | 605.02.06  | 605.02.06  |
| 13   | DETECTION ELECTRODE          | 208.01.07  | 208.01.07  | 208.01.07  | 208.01.07  | 208.01.07  | 208.01.07  |
| 14   | BLAST TUBE EXTENSION         | 220.00.34  | 220.00.34  | 220.00.34  | 220.00.34  | 220.00.34  | 220.00.34  |
| 15   | BLAST TUBE RING              | 247.00.31  | 247.00.31  | 247.00.31  | 247.00.31  | 247.00.31  | 247.00.31  |
| 16   | BLAST TUBE                   | 230.00.54  | 230.00.25  | 230.00.54  | 230.00.25  | 230.00.54  | 230.00.25  |
| 17   | COMPLETE BLAST TUBE          | 309.10.C3  | 309.10.92  | 309.10.C3  | 309.10.92  | 309.10.C3  | 309.10.92  |
| 18   | COMBUSTION HEAD              | 306.00.80  | 306.00.A8  | 306.00.80  | 306.00.A8  | 306.00.80  | 306.00.A8  |
| 19   | IGNITION ELECTRODE           | 208.02.07  | 208.02.07  | 208.02.07  | 208.02.07  | 208.02.07  | 208.02.07  |
| 20   | IGNITION CABLE               | 605.01.12  | 605.01.12  | 605.01.12  | 605.01.12  | 605.01.12  | 605.01.12  |
| 21   | GASKET                       | 211.00.33  | 211.00.33  | 211.00.33  | 211.00.33  | 211.00.33  | 211.00.33  |
| 22   | THROTTLE "O" RING            | 225.00.03  | 225.00.03  | 225.00.03  | 225.00.03  | 225.00.03  | 225.00.03  |
| 23   | THROTTLE                     | 246.02.22  | 246.02.22  | 246.01.23  | 246.01.23  | 246.01.23  | 246.01.23  |
| 24   | GAS PRESSURE SWITCH          | 216.00.26  | 216.00.26  | 216.00.26  | 216.00.26  | 216.00.26  | 216.00.26  |
| 25   | AIR INLET                    | 238.01.15  | 238.01.15  | 238.01.15  | 238.01.15  | 238.01.15  | 238.01.15  |
| 26   | INTERNAL AIR DAMPER          | 214.00.22  | 214.00.22  | 214.00.22  | 214.00.22  | 214.00.22  | 214.00.22  |
| 27   | EXTERNAL AIR DAMPER          | 214.00.23  | 214.00.23  | 214.00.23  | 214.00.23  | 214.00.23  | 214.00.23  |
| 28   | SERVOCONTROL MOUNTING BRAKET | 305.00.10  | 305.00.10  | 305.00.10  | 305.00.10  | 305.00.10  | 305.00.10  |
| 29   | SERVOCONTROL                 | 248.00.42  | 248.00.42  | 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  | 219.16.04  | 219.16.04  |
| 31   | INLET CONE                   | 204.00.11  | 204.00.11  | 204.00.11  | 204.00.11  | 204.00.11  | 204.00.11  |
| 32   | FAN                          | 215.00.18  | 215.00.18  | 215.00.18  | 215.00.18  | 215.00.18  | 215.00.18  |
| 33   | AIR PRESSURE SWITCH          | 216.00.58  | 216.00.58  | 216.00.58  | 216.00.58  | 216.00.58  | 216.00.58  |
| 34   | BURNER CASING                | 205.01.61  | 205.01.61  | 205.01.61  | 205.01.61  | 205.01.61  | 205.01.61  |
| 35   | HEAD ADJUSTMENT              | 232.05.03  | 232.05.03  | 232.05.03  | 232.05.03  | 232.05.03  | 232.05.03  |
| 36   | MOTOR                        | 218.00.58  | 218.00.58  | 218.00.58  | 218.00.58  | 218.00.58  | 218.00.58  |
| 37   | GAS VALVE EV2                | ---        | ---        | 219.01.51  | 219.01.51  | 219.01.52  | 219.01.51  |
| 38   | GAS VALVE EV1                | ---        | ---        | 219.03.21  | 219.03.21  | 219.03.22  | 219.03.21  |
| 39   | GAS FILTER                   | ---        | ---        | 209.01.11  | 209.01.11  | 209.01.12  | 209.01.11  |
| 40   | EV1 COIL                     | ---        | ---        | 258.00.05  | 258.00.05  | 258.00.06  | 258.00.05  |
| 41   | EV1 BOARD                    | ---        | ---        | 253.01.05  | 253.01.05  | 253.01.06  | 253.01.05  |
| 42   | ACTIVATOR                    | ---        | ---        | 219.01.20  | 219.01.20  | 219.01.20  | 219.01.20  |
| 43   | MULTIBLOC VALVE GROUP        | 219.03.E5  | 219.03.E5  | ---        | ---        | ---        | ---        |



| POS. | DESCRIPTION                   | P72         |               |              |              |              |              |
|------|-------------------------------|-------------|---------------|--------------|--------------|--------------|--------------|
|      |                               | M-.MDS...50 | M-.MDB.L...50 | M-.MDS...65  | M-.MDL...65  | M-.MDS...80  | M-.MDL...80  |
|      |                               |             |               | M-.PR.S...65 | M-.PR.L...65 | M-.PR.S...80 | M-.PR.L...80 |
| 1    | CONTROL BOX SOCKET            | 203.04.07   | 203.04.07     | 203.04.07    | 203.04.07    | 203.04.07    | 203.04.07    |
| 2    | CONTROL BOX                   | 202.04.04   | 202.04.04     | 202.04.04    | 202.04.04    | 202.04.04    | 202.04.04    |
| 3    | LEAKAGE CONTROL (optional)    | 219.16.04   | 219.16.04     | 219.16.04    | 219.16.04    | 219.16.04    | 219.16.04    |
| 5    | THERMAL RELAIS                | 614.00.08   | 614.00.08     | 614.00.08    | 614.00.08    | 614.00.08    | 614.00.08    |
| 6    | CONTACTOR                     | 613.00.01   | 613.00.01     | 613.00.01    | 613.00.01    | 613.00.01    | 613.00.01    |
| 7    | IGNITION TRANSFORMER          | 217.00.04   | 217.00.04     | 217.00.04    | 217.00.04    | 217.00.04    | 217.00.04    |
| 8    | RELAIS                        | 607.00.04   | 607.00.04     | 607.00.04    | 607.00.04    | 607.00.04    | 607.00.04    |
| 9    | RELAIS SOCKET                 | 608.00.03   | 608.00.03     | 608.00.03    | 608.00.03    | 608.00.03    | 608.00.03    |
| 10   | TOP COVER                     | 221.01.24   | 221.01.24     | 221.01.24    | 221.01.24    | 221.01.24    | 221.01.24    |
| 11   | MANIFOLD                      | 274.00.19   | 274.00.19     | 274.00.19    | 274.00.19    | 274.00.19    | 274.00.19    |
| 12   | DETECTION CABLE               | 605.02.06   | 605.02.06     | 605.02.06    | 605.02.06    | 605.02.06    | 605.02.06    |
| 13   | DETECTION ELECTRODE           | 208.01.07   | 208.01.07     | 208.01.07    | 208.01.07    | 208.01.07    | 208.01.07    |
| 14   | BLAST TUBE EXTENSION          | 220.00.34   | 220.00.34     | 220.00.34    | 220.00.34    | 220.00.34    | 220.00.34    |
| 15   | BLAST TUBE RING               | 247.00.31   | 247.00.31     | 247.00.31    | 247.00.31    | 247.00.31    | 247.00.31    |
| 16   | BLAST TUBE                    | 230.00.54   | 230.00.25     | 230.00.54    | 230.00.25    | 230.00.54    | 230.00.25    |
| 17   | COMPLETE BLAST TUBE           | 309.10.C3   | 309.10.92     | 309.10.C3    | 309.10.92    | 309.10.C3    | 309.10.92    |
| 18   | COMBUSTION HEAD               | 306.00.80   | 306.00.A8     | 306.00.80    | 306.00.A8    | 306.00.80    | 306.00.A8    |
| 19   | IGNITION ELECTRODE            | 208.02.07   | 208.02.07     | 208.02.07    | 208.02.07    | 208.02.07    | 208.02.07    |
| 20   | IGNITION CABLE                | 605.01.42   | 605.01.42     | 605.01.42    | 605.01.42    | 605.01.42    | 605.01.42    |
| 21   | GASKET                        | 211.00.33   | 211.00.33     | 211.00.33    | 211.00.33    | 211.00.33    | 211.00.33    |
| 22   | THROTTLE "O" RING             | 225.00.03   | 225.00.03     | 225.00.03    | 225.00.03    | 225.00.03    | 225.00.03    |
| 23   | THROTTLE                      | 246.00.22   | 246.00.22     | 246.01.23    | 246.01.23    | 246.01.23    | 246.01.23    |
| 24   | GAS PRESSURE SWITCH           | 216.00.26   | 216.00.26     | 216.00.26    | 216.00.26    | 216.00.26    | 216.00.26    |
| 25   | AIR INLET                     | 238.01.15   | 238.01.15     | 238.01.15    | 238.01.15    | 238.01.15    | 238.01.15    |
| 26   | INTERNAL AIR DAMPER           | 214.00.22   | 214.00.22     | 214.00.22    | 214.00.22    | 214.00.22    | 214.00.22    |
| 24A  | EXTERNAL AIR DAMPER           | 214.00.23   | 214.00.23     | 214.00.23    | 214.00.23    | 214.00.23    | 214.00.23    |
| 27   | SERVOCONTROL MOUNTING BRACKET | 305.00.11   | 305.00.11     | 305.00.12    | 305.00.12    | 305.00.12    | 305.00.12    |
| 28   | SERVOCONTROL                  | 248.00.07   | 248.00.07     | 248.00.07    | 248.00.07    | 248.00.07    | 248.00.07    |
| 29   | ADJUSTABLE CAM                | 244.00.29   | 244.00.29     | 244.00.29    | 244.00.29    | 244.00.29    | 244.00.29    |
| 30   | COMPLETE LEVER SYSTEM         | 244.00.15   | 244.00.15     | 244.00.15    | 244.00.15    | 244.00.15    | 244.00.15    |
| 31   | INLET CONE                    | 204.00.11   | 204.00.11     | 204.00.11    | 204.00.11    | 204.00.11    | 204.00.11    |
| 32   | FAN                           | 215.00.18   | 215.00.18     | 215.00.18    | 215.00.18    | 215.00.18    | 215.00.18    |
| 33   | AIR PRESSURE SWITCH           | 216.00.58   | 216.00.58     | 216.00.58    | 216.00.58    | 216.00.58    | 216.00.58    |
| 34   | BURNER CASING                 | 205.01.61   | 205.01.61     | 205.01.61    | 205.01.61    | 205.01.61    | 205.01.61    |
| 35   | HEAD ADJUSTMENT               | 232.05.03   | 232.05.03     | 232.05.03    | 232.05.03    | 232.05.03    | 232.05.03    |
| 36   | MOTOR                         | 218.00.58   | 218.00.58     | 218.00.58    | 218.00.58    | 218.00.58    | 218.00.58    |
| 37   | GAS VALVE EV2                 | ---         | ---           | 219.01.51    | 219.01.51    | 219.01.52    | 219.01.52    |
| 38   | GAS VALVE EV1                 | ---         | ---           | 219.03.21    | 219.03.21    | 219.03.22    | 219.03.22    |
| 39   | GAS FILTER                    | ---         | ---           | 209.01.11    | 209.01.11    | 209.01.12    | 209.01.12    |
| 40   | EV1 COIL                      | ---         | ---           | 258.00.05    | 258.00.05    | 258.00.06    | 258.00.06    |
| 41   | EV1 BOARD                     | ---         | ---           | 253.01.05    | 253.01.05    | 253.01.06    | 253.01.06    |
| 42   | ACTIVATOR WITH GOVERNOR       | ---         | ---           | 219.01.20    | 219.01.20    | 219.01.20    | 219.01.20    |
| 43   | MULTIBLOC VALVES GROUP        | 219.03.E5   | 219.03.E5     | ---          | ---          | ---          | ---          |
| 44   | GAS PRESSURE SWITCH           | 216.00.52   | 216.00.52     | ---          | ---          | ---          | ---          |
| 45   | MODULATOR PROBE               | 256.01...   | 256.01...     | 256.01...    | 256.01...    | 256.01...    | 256.01...    |
| 45A  | FELD ADAPTOR                  | 256.01...   | 256.01...     | 256.01...    | 256.01...    | 256.01...    | 256.01...    |
| 46   | MODULATOR                     | 257.00.34   | 257.00.34     | 257.00.34    | 257.00.34    | 257.00.34    | 257.00.34    |

| POS. | DESCRIPTION                   | P60         |               |               |             |             |               |
|------|-------------------------------|-------------|---------------|---------------|-------------|-------------|---------------|
|      |                               | M-.MDS...40 | M-.MDB.L...40 | M-.MDB.S...50 | M-.MDL...50 | M-.MDS...65 | M-.MDB.L...65 |
|      |                               |             |               |               |             |             |               |
| 1    | CONTROL BOX SOCKET            | 203.04.15   | 203.04.15     | 203.04.15     | 203.04.15   | 203.04.15   | 203.04.15     |
| 2    | CONTROL BOX                   | 202.04.30   | 202.04.30     | 202.04.30     | 202.04.30   | 202.04.30   | 202.04.30     |
| 3    | LEAKAGE CONTROL (optional)    | 219.16.04   | 219.16.04     | 219.16.04     | 219.16.04   | 219.16.04   | 219.16.04     |
| 5    | THERMAL RELAIS                | 614.00.02   | 614.00.02     | 614.00.02     | 614.00.02   | 614.00.02   | 614.00.02     |
| 6    | CONTACTOR                     | 613.00.01   | 613.00.01     | 613.00.01     | 613.00.01   | 613.00.01   | 613.00.01     |
| 7    | IGNITION TRANSFORMER          | 217.01.02   | 217.01.02     | 217.01.02     | 217.01.02   | 217.01.02   | 217.01.02     |
| 8    | RELAIS                        | ---         | ---           | ---           | ---         | ---         | ---           |
| 9    | RELAIS SOCKET                 | ---         | ---           | ---           | ---         | ---         | ---           |
| 10   | TOP COVER                     | 221.01.09   | 221.01.09     | 221.01.09     | 221.01.09   | 221.01.09   | 221.01.09     |
| 11   | MANIFOLD                      | 274.00.03   | 274.00.03     | 274.00.03     | 274.00.03   | 274.00.03   | 274.00.03     |
| 12   | DETECTION CABLE               | 605.02.05   | 605.02.05     | 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   | 208.01.02   | 208.01.02     |
| 14   | BLAST TUBE EXTENSION          | 220.00.55   | 220.00.56     | 220.00.55     | 220.00.56   | 220.00.55   | 220.00.56     |
| 15   | BLAST TUBE RING               | 247.00.37   | 247.00.37     | 247.00.37     | 247.00.37   | 247.00.37   | 247.00.37     |
| 16   | BLAST TUBE                    | 230.00.35   | 230.00.35     | 230.00.35     | 230.00.35   | 230.00.35   | 230.00.35     |
| 17   | COMPLETE BLAST TUBE           | 309.10.60   | 309.10.61     | 309.10.60     | 309.10.61   | 309.10.60   | 309.10.61     |
| 18   | COMBUSTION HEAD               | 306.00.78   | 306.00.78     | 306.00.78     | 306.00.78   | 306.00.78   | 306.00.78     |
| 19   | IGNITION ELECTRODE            | 208.02.02   | 208.02.02     | 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   | 605.01.08   | 605.01.08     |
| 21   | GASKET                        | 211.00.13   | 211.00.13     | 211.00.13     | 211.00.13   | 211.00.13   | 211.00.13     |
| 22   | THROTTLE "O" RING             | 225.00.03   | 225.00.03     | 225.00.03     | 225.00.03   | 225.00.03   | 225.00.03     |
| 23   | THROTTLE                      | 246.02.22   | 246.02.22     | 246.02.22     | 246.02.22   | 246.02.24   | 246.02.24     |
| 24   | GAS PRESSURE SWITCH           | 216.00.26   | 216.00.26     | 216.00.26     | 216.00.26   | 216.00.26   | 216.00.26     |
| 25   | AIR INLET                     | 238.01.10   | 238.01.10     | 238.01.10     | 238.01.10   | 238.01.10   | 238.01.10     |
| 26   | INTERNAL AIR DAMPER           | 214.00.07   | 214.00.07     | 214.00.07     | 214.00.07   | 214.00.07   | 214.00.07     |
| 24A  | EXTERNAL AIR DAMPER           | ---         | ---           | ---           | ---         | ---         | ---           |
| 27   | SERVOCONTROL MOUNTING BRACKET | 305.00.11   | 305.00.11     | 305.00.11     | 305.00.11   | 305.00.11   | 305.00.11     |
| 28   | SERVOCONTROL                  | 248.00.53   | 248.00.53     | 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   | 244.00.29   | 244.00.29     |
| 30   | COMPLETE LEVER SYSTEM         | 244.00.15   | 244.00.15     | 244.00.15     | 244.00.15   | 244.00.15   | 244.00.15     |
| 31   | INLET CONE                    | 204.00.17   | 204.00.17     | 204.00.17     | 204.00.17   | 204.00.17   | 204.00.17     |
| 32   | FAN                           | 215.00.21   | 215.00.21     | 215.00.21     | 215.00.21   | 215.00.21   | 215.00.21     |
| 33   | AIR PRESSURE SWITCH           | 216.00.58   | 216.00.58     | 216.00.58     | 216.00.58   | 216.00.58   | 216.00.58     |
| 34   | BURNER CASING                 | 205.01.21   | 205.01.21     | 205.01.21     | 205.01.21   | 205.01.21   | 205.01.21     |
| 35   | HEAD ADJUSTMENT               | 232.05.02   | 232.05.02     | 232.05.02     | 232.05.02   | 232.05.02   | 232.05.02     |
| 36   | MOTOR                         | 218.00.20   | 218.00.20     | 218.00.20     | 218.00.20   | 218.00.20   | 218.00.20     |
| 37   | GAS VALVE EV2                 | ---         | ---           | ---           | ---         | 219.01.51   | 219.01.51     |
| 38   | GAS VALVE EV1                 | ---         | ---           | ---           | ---         | 219.03.21   | 219.03.21     |
| 39   | GAS FILTER                    | ---         | ---           | ---           | ---         | 209.01.11   | 209.01.11     |
| 40   | EV1 COIL                      | ---         | ---           | ---           | ---         | 258.00.05   | 258.00.05     |
| 41   | EV1 BOARD                     | ---         | ---           | ---           | ---         | 253.01.05   | 253.01.05     |
| 42   | ACTIVATOR WITH GOVERNOR       | ---         | ---           | ---           | ---         | 219.01.20   | 219.01.20     |
| 43   | MULTIBLOC VALVES GROUP        | 219.03.E4   | 219.03.E4     | 219.03.E5     | 219.03.E5   | ---         | ---           |
| 44   | GAS PRESSURE SWITCH           | 216.00.52   | 216.00.52     | 216.00.52     | 216.00.52   | ---         | ---           |
| 45   | MODULATOR PROBE               | 256.01...   | 256.01...     | 256.01...     | 256.01...   | 256.01...   | 256.01...     |
| 45A  | FELD ADAPTOR                  | 256.01...   | 256.01...     | 256.01...     | 256.01...   | 256.01...   | 256.01...     |
| 46   | MODULATOR                     | 257.00.34   | 257.00.34     | 257.00.34     | 257.00.34   | 257.00.34   | 257.00.34     |

## APPENDIX: COMPONENTS CHARACTERISTICS

|   |         |
|---|---------|
| Landis&Gyr LGB21/22 flame monitor         | Page 28 |
| Landis&Gyr LFL1.322 flame monitor         | Page 30 |
| Combined Multibloc valves unit            | Page 33 |
| Landys & Gyr gas valves                   | Page 34 |
| Gas valves Dungs MV/5, MVD/5, MVDLE/5     | Page 34 |
| Dungs electromagnetic twin valves DMV-DLE | Page 35 |
| Dungs VPS504 leakage control              | Page 35 |

### LANDYS & GYR LGB 21/22.. FLAME CONTROLLER

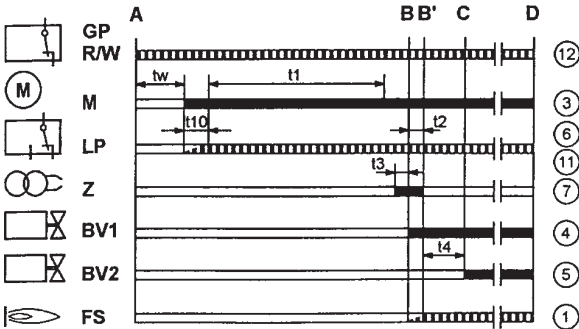
#### Function

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.

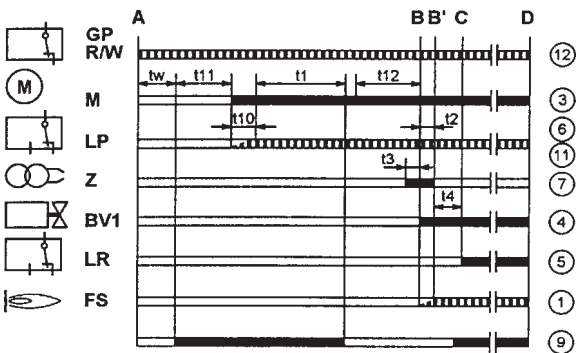
The LGB types are fitted with under voltage protection, i.e. the load relay AR is de-energized when the supply voltage falls below 140 V. The burner control automatically attempts a new start-up when the supply voltage again exceeds 140 V

- 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



#### Legend for operation diagram

- A Start-up (control start-up by "R")
- B-B' Interval for flame establishment
- C Operating position of the burner or release of the 2nd stage via load controller LR
- D Controlled shut-down by "R"
- tw Waiting time, 8 sec. for LGB21; 9 sec. for LGB22
- t1 Controlled pre-purge time, 30 sec.
- t2 First safety time, 3 sec.
- t3 Pre-ignition time, 2 sec. for LGB21; 3 sec. for LGB22
- t4 Interval BV1- BV2 = Interval BV1- LR, 8 sec.
- t10 Specified time for the air pressure signal, 5 sec. for LGB21; 3 sec for LGB22
- t11 Programmed time to open the damper SA, max 12 sec.

- t12 Programmed running time for air damper from OPEN to LOW FLAME position, max 11 sec.
- 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
- ZV1 Main flame ignition gas valve or BV1 for burners with main flame supervision
- 1...12 Terminals of the burner flame controls on the baseplate AGK11
- 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-up command (controlled start-up)**  
The regulator "R" supplies (due to terminal 12) the mechanism; the fan starts up for pre-purge. The actuator SA moves the air damper to the maximum load position (when till has elapsed).
- tw **Waiting time**  
During this time the air pressure switch check for correct operation.
- t11 **Running time for complete damper opening (OPEN) (only for LGB22)**  
The fan motor is started only after the air damper has reached the full load position.
- t10 **Specified time for the air pressure signal**  
When this time has elapsed, the set value of air pressure must have built up, or a lock-out is initiated.
- t1 **Pre-purge time**  
For LGB21.. purging of the combustion chamber with the nominal air load; for LGB22.. purging of the combustion chamber with the maximum air load.  
Under "Summary of Types", "Function Diagrams" and "Time Diagrams of Programming Mechanism", the so-called controlled **pre-purge time t1** is shown, during which LP (Air Pressure Switch) must prove the air pressure required.  
The effective pre-purge time comprises the interval "end of tw/ beginning of t3".
- t12 **Programmed time to close the damper SA (MINIMUM)**  
During the time t12, the air damper moves to the low flame position.
- t3 **Pre-ignition time**  
During this time, and until to the end of the safety time t2, the flame relay is forced to close. When time t3 has elapsed, the fuel release is initiated at terminal 4.
- t2 **Safety time**  
At the end of safety time there must be a flame signal at the input 1 of the flame signal amplifier, which must continues uninterruptedly until controlled shut-down occurs, or the flame relay will deenergize, and remains blocked in the fault position.
- t4 **Interval**  
When time t4 has elapsed, the controller starts.
- 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.

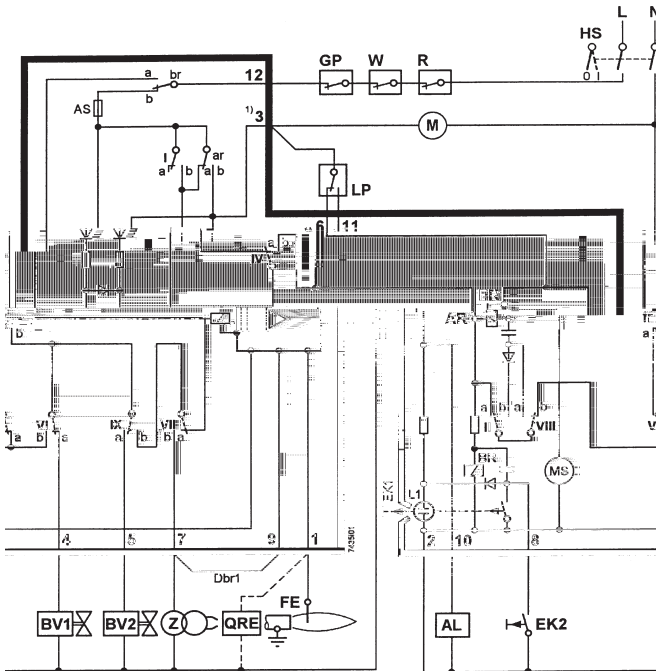
**D Controlled by "R" shutdown**

The burner stops, waiting for the next ignition.

**Programme of command in the event of a defect**

In the event of a defect the inflow of fuel is interrupted. When the block occurs in the preventionation 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 preventionation 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 t2
- **Absence of confirmation of air pressure:** safety stop(block) after t10
- **Failure to start up the burner:** safety stop after safety time t2
- **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**

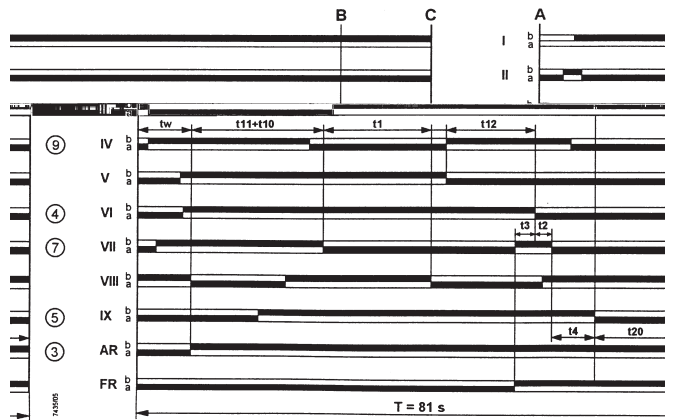
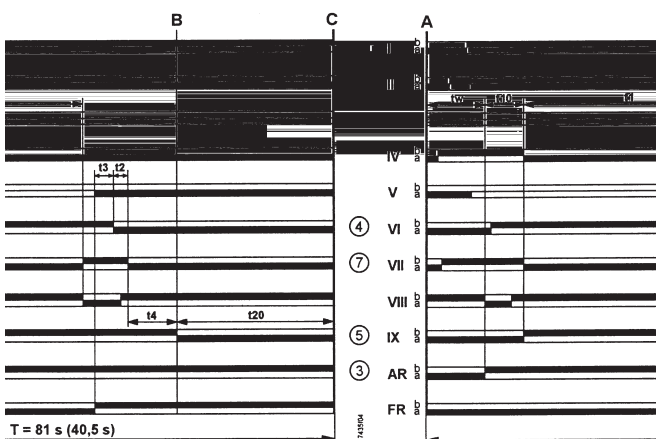
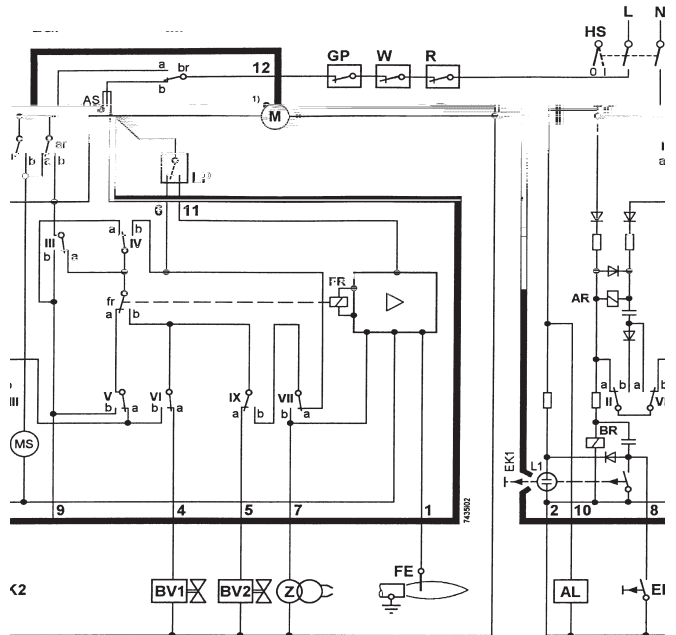
Unblocking of the appliance can be effected immediately after the safety stop without causing modification of the programme.

**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
- |||| 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 for (LGB22) the air lock 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)



### Legend for 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            |

### Legend for the programmer's diagram

|     |   |
|-----|---|
| A   | start-up (command from regulator "R")         |
| AR  | main relay                                    |
| B   | burner operation                              |
| C   | program start position (start up)             |
| FR  | flame relay                                   |
| tw  | waiting time                                  |
| t1  | pre-ventilation time                          |
| t2  | 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.X | contacts of programmer's cams                 |

### Technical data

|   |                               |
|---|-------------------------------|
| 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                   |
| Current at input to terminal 12                   | max 5 A <sup>1</sup>          |
| Protection  | IP40                          |
| Permissible ambient temperature                   |                               |
| - operating                                       | -20...+ 60°C                  |
| - transport and storage                           | -40...+ 70°C                  |
| Mount. pos. permitted                             | any                           |
| Mass (weight) without/with base                   | c. 230/310 g                  |
| Mass (weight) AGK66                               | c. 12 kg                      |
| 1) At permissible voltage and that is 187...264 V |                               |

### LANDIS & GYR LFL 1.322

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

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

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

- ◀ **No start-up** (for example fault in the CLOSED signal for the limit contact "Z" at terminal 8 or some other contact between the terminals 12 and 4 or 4 and 5 is not closed).
- ▲ **Start-up suspended** because of a fault in the OPEN signal for the limit contact "A" at terminal 8.
- P **Block due** to absence of air pressure signal.

**From this moment onwards any absence of air pressure will cause a block.**

- **Block due** to malfunction of the flame detector circuit.
- ▼ **Start-up interrupted** because there is a fault in the MINIMUM signal for the auxiliary contact of the damper servo motor at terminal 8.

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

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

- 2 **Block due** to absence of flame signal at the end of the 2nd safety period (flame signal of main burner).

| **Block due** to absence of flame signal or air pressure during operation.

- ◀ **Block at the end of the start-up** programme due to parasitic light or faulty flame signal (eg. UV detector is exhausted). Where a block stoppage occurs at any moment between switch on and pre-ignition without registering any symbol, the cause is normally an unscheduled flame signal.

a-b Start-up programme

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

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

. Safety time duration for mono-tube burners

.. Safety time duration for twin-tube burners

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

### Operation

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

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

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

A-B start-up programme

B-C normal burner operation

C regulation stop caused by "R"

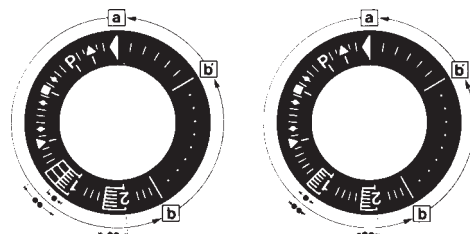
C-D programmer returns to start-up position A.

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

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

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

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



## Start-up programme

### A Start-up

(R closes the start-up control ring between terminals 4 and 5)  
The programmer starts up. At the same time the ventilator motor is fed through terminal 6 (only for pre-ventilation) and, after t7, the ventilator motor or the combustion gas exhaust fan is fed through terminal 7 (pre-ventilation and post-ventilation).

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

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

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

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

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

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

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

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

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

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

### Mono-tube burner

#### t3 Pre-ignition time

waiting the response from the fuel valve at terminal 18.

#### t2 Safety time

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

#### t4 Interval;

at the end of t4, terminal 19 is live.

It is normally used to feed a fuel valve at auxiliary contact "V" of the damper servomotor.

#### t5 Interval

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

### Twin-tube burners (\*\*)

#### t3 Preignition time

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

#### t2 First safety time

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

#### t4 Interval

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

#### t9 2nd safety time;

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

#### t5 Interval;

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

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

## B Operational position of the burner

### B-C Burner operation (production of heat)

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

### C Regulation stop for operation of "R"

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

#### t6 Post-ventilation time

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

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

#### t13 Admissible post-ignition time

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

### D-A End of automatic programme

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

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

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

## Technical data

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

### Ionisation monitor

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

### UV monitor

Voltage in UV detector

|                                 |           |
|---------------------------------|-----------|
| normal working                  | 330V ±10% |
| test                            | 380V ±10% |
| Detector current, min. request* | 70µA      |

|                       |         |
|-----------------------|---------|
| Max. detector current | 630 µA  |
| normal working        | 630 µA  |
| test                  | 1300 µA |

|  |      |
|--|------|
| Max.length of connecting cable                           |      |
| normal cable (laid separately**)                         | 100m |
| armoured cable (high frequency) protected at terminal 22 | 200m |

Weight

|       |        |
|-------|--------|
| QRA2  | 60 g   |
| QRA10 | 450 g. |

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

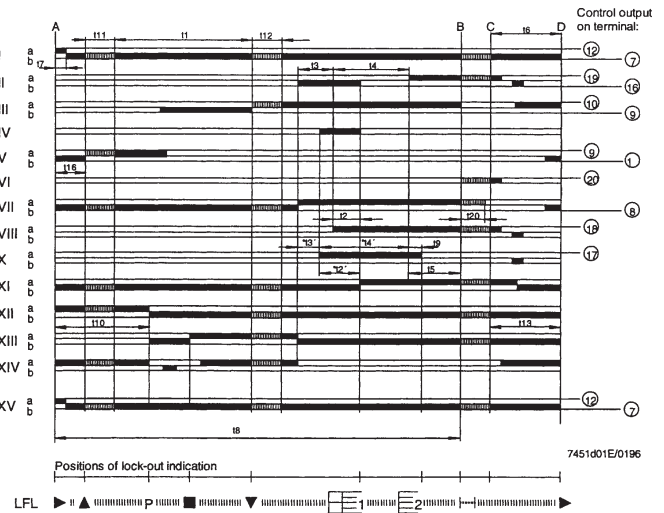
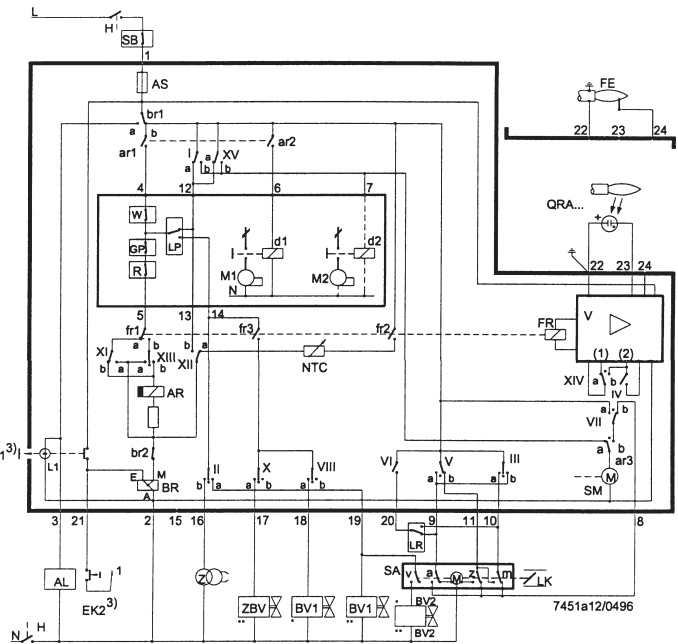
\*\* The wire connecting up the detector electrode should not be in the  $E_{EK1}^{3)}$  same sleeve as the other conductor wires.

### Ignition spark monitor with QRE1 series 02 detector

|                          |      |
|--------------------------|------|
| Minimum detector current | 30µA |
|--------------------------|------|

### Operating times

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





## Legend

|     |  |
|-----|--|
| A   | limit contact switch for damper OPEN position  |
| AI  | block remote signal  |
| AR  | main relay (working network) with contacts "ar"  |
| AS  | Monitor fuse   |
| BR  | block relay with "br" contacts   |
| BV  | fuel valve   |
| EK  | reset button   |
| FE  | detector electrode of ionisation circuit   |
| FR  | flame relay with "fr" contacts   |
| G   | ventilator motor or burner motor   |
| GP  | gas pressure switch  |
| H   | main interruptor switch  |
| L   | block stoppage LED   |
| LK  | air damper   |
| LP  | air pressostat   |
| LR  | safety regulator   |
| M   | auxiliary contact switch for damper "MIN" position   |
| QRA | UV detector  |
| QRE | ignition spark detector  |
| R   | thermostat or pressostat   |
| S   | fuse   |
| SA  | damper servo-motor   |
| SM  | synchronous programmer motor   |
| V   | flame signal amplifier   |
| V   | in case of servo-motor: auxiliary contact for response to fuel valve with regard of damper position                      |
| W   | safety pressostat or thermostat  |
| Z   | ignition transformer   |
| Z   | in case of servomotor: end of limit contact switch for damper CLOSED position  |
| ZBV | pilot burner fuel valve  |
| °   | for mono-tube burners  |
| °°  | for twin-tube burners  |
| (1) | input for raising QRA detector voltage to test level   |
| (2) | input for excitation of flame relay during flame detector test circuit (contact XIV) and during safety time (contact IV) |
| (3) | Do not press EK for more than 10 seconds   |

## Programmer diagram

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

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

## COMBINED MULTIBLOC GAS UNIT FOR ADJUSTMENT/SAFETY IN SINGLE-STAGE OPERATION

### Technical data

|   |   |
|---|---|
| Nominal diameters   | MB 415 B01, MB 420 B02  |
| Flanges with threaded pipes                                     | Rp1, 1 1/4, 1 1/2, 2 according to DIN 2999 and their combinations   |
| Max. operating pressure   | 360 mbar (36kPa)  |
| Outlet pressure range   | 4.0 up to 20 mbar   |
| Pressure stage  | PN 1  |
| Fluids  | gases of families 1, 2, 3 and other gaseous media   |
| Ambient temperature   | -15° C up to +70° C (don't operate MB-DLE below 0° C in liquid gas systems)   |
| Dirt trap   | sieve with 0,8 mm mesh width, filter made of random laid nonwoven fabric, microfilter, two layer.   |
| It is possible to change the filter without dismantle the frame |   |
| 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. |
| Solenoid valve 1  | Valve to DIN EN 161, Class A, Group 2 fast closing, fast opening  |
| Solenoid valve 2  | Valve to DIN EN 161, Class A, Group 2 fast closing, fast opening  |
| Measuring - ignition gas connection                             | G 1/8 as per DIN ISO 228  |
| Burner pressure monitor P <sub>Br</sub>                         | Connection downstream of valve V2, pressure switch mountable on adapter laterally   |
| Voltage - frequency   | 50-60Hz 220-230 V AC -15 % +10 %  |
| Other preferred voltages:                                       | 240 V AC, 110-120 V AC, 48 V DC, 24-28 V DC   |
| Electrical connection   | plug connection as per DIN 43650, IEC 335, IEC 730, (VDE 0700, VDE 0722) for valves and pressure switches   |
| Rating - power consumption                                      | On request  |
| Switch-on duration:   | 100% ED   |
| Degree of protection  | IP54 as per IEC 529 (EN60529)   |
| Radio interference  | interference degree N   |
| 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   |
| Closed position signal contact                                  | closed position signal contact, type K01/1 (DIN tested), mountable on V2  |

## Landys & Gyr valves

### Operations

#### 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 return 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 spring 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 reservoir. 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 reservoir. 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 return 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. In spite 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.

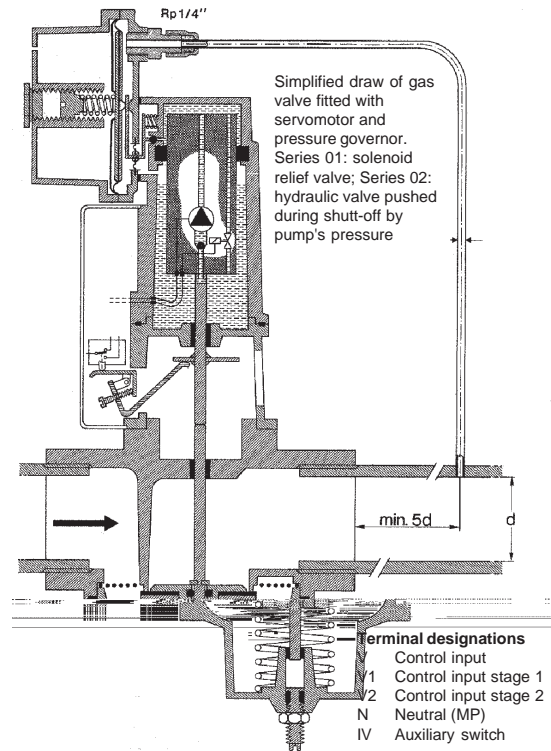
#### Gas pressure governor

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 maximum permissible vacuum is 200 mbar.

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



### SAFETY SOLENOID VALVES TYPE MV/5, MVD/5, MVDLE/5 SINGLE STAGE

#### Technical data

|                                   |   |
|-----------------------------------|---|
| Nominal diameters                 | 10 15 20 25 40 50 65 80 100 125 150<br>200  |
| Pipe thread as per ISO 7/1Rp      | 3/8 1/2 3/4 1 1 1/2 2 2 1/2   |
| FlangeConnection                  | 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 - refer to type overview                     |
| 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              | IP 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          |

## Installation and operation instructions

During installation of pipes, be careful to the flow direction marked by the arrow in the valve's body.

Keep to the prescribed mounting positions.

Connecting the pipe to the valve body, be careful not to use the magnet as a lever but operate with a proper tool.

At the end of these operations, check for leakages and correct operations.

## Double solenoid valve DMV-DLE/11

### Specifications

|   |   |
|---|---|
| Nominal diameters                         | DN 40 50 65 80 100 125  |
| Flange                                    | Connection flange as per DIN 2501 Part 1, to fit preweld flanges as per DIN 2633 (PN 16) DN 40 to DN 125, ISO 7005 - 1 (PN 16), ISO 7005 - 2 (PN 16) Construction length as per DIN 3202 Part 1, row F1 for DN 65 to DN 125 |
| Max. operating pressure                   | 500 mbar (50 kPa)   |
| Pressure stage                            | PN 1  |
| Solenoid valve V1                         | Automatic shut-off valve as per EN 161: Class A, Group 2  |
| Solenoid valve V2                         | Automatic shut-off valve as per EN 161: Class A, Group 2  |
| Closing time                              | < 1 s   |
| Opening time                              | DMV-D.../11: < 1 s<br>DMV-DLE.../11: approx. 20 s at room temperature +20°C and without fast stroke   |
| Fast stroke                               | Adjustable up to approx. 70% of total stroke  |
| 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/I   |
| 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   |
| Measuring gas connection                  | G 1/4 DIN ISO 228 centrally upstream of V1 and downstream of V2   |
| Ignition gas connection                   | G 1/8 DIN ISO 228 on both sides upstream of V1, between V1 and V2, downstream of V2<br>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  |
| Other preferred voltages:                 | 110 V - 120 V AC, 48 V DC, 24 V, 28 V DC.   |
| Rating - power consumption                | on request  |
| Degree of protection / switch-on duration | IP 54 / 100 %   |
| Electrical connection                     | PG* 11 cable gland, plug connection as per DIN 43 650 on request (* = heavy-gauge conduit thread)   |
| Radio interference                        | degree of interference N  |
| Closed position signal contact            | Type K01/1 (DIN tested), can be mounted on V1 and V2  |

## Valve proving system for single valves, and Dungs double - and combination valves VPS 504

### Technical data

|  |   |
|--|---|
| Operating pressure                           | max. 500 mbar (50 kPa)  |
| Test volume                                  | 4.0 l   |
| Pressure increase by motor pump              | >20 mbar  |
| Nominal voltage                              | 230 V AC -15% to -240 V +10   |
| Rating requirement                           | During pumping time approx. 6 VA, in operation 17 VA  |
| Prefuse (provided by customer)               | 10 A quick-acting fuse or 6.3 A slow-blow fuse  |
| Fuse installed in housing cover, replaceable | Microfuse 6.3 slow-blow L 250 V; IEC-127-2/III (DIN 41 662)   |
| Switching current                            | Operating output VPS 504 Series 01, 02, 03, 04, 05:   |
| Degree of protection                         | Interference output VPS 504 Series 02, 04, 05<br>VPS 504 Series 01, 02, 03: IP 40<br>VPS 504 Series 04, 05: IP 54 |
| Ambient temperature                          | 50 Hz 230 VAC -15°C to +70°C<br>others: -15°C to +60°C  |
| Release time                                 | Approx. 10 - 26 s, depending on test volume <b>and</b> 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   |

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