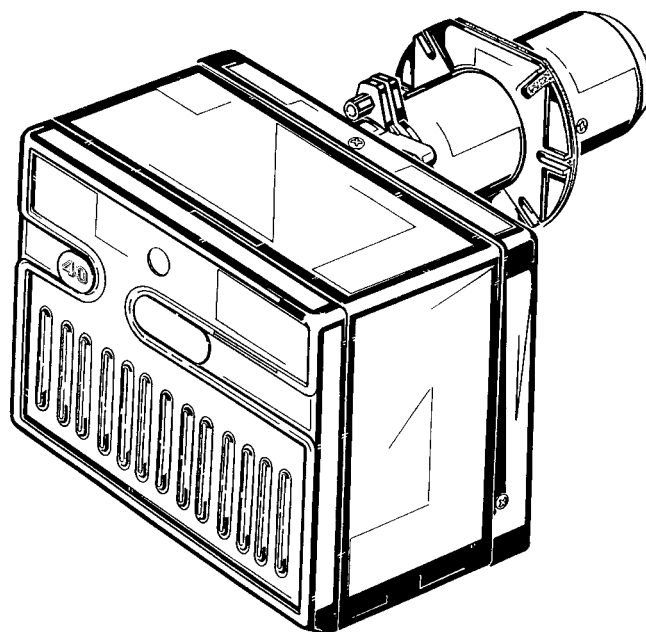


GB Forced draught gas burner

One stage operation



RIELLO 40

CODE	MODEL	TYPE
20039315	FS5 LME	564T31

TECHNICAL DATA

TYPE		564T31
Thermal power		18 – 58 kW – 15,500 ÷ 50,000 kcal/h
Natural gas (Family 2)	Pci	8 – 12 kWh/Nm ³ – 7.000 ÷ 10.340 kcal/Nm ³
	Pressure	min. 10 mbar – max. 40 mbar
Electrical supply		Single phase, 230 V ± 10% ~ 50Hz/60Hz
Motor		0.75 A run current - 2800 rpm. - 294 rad/s
Capacitor		2 µF
Ignition transformer		primary 230 V / 0.2 A – secondary 8 kV
Absorbed electrical power		0.15 kW

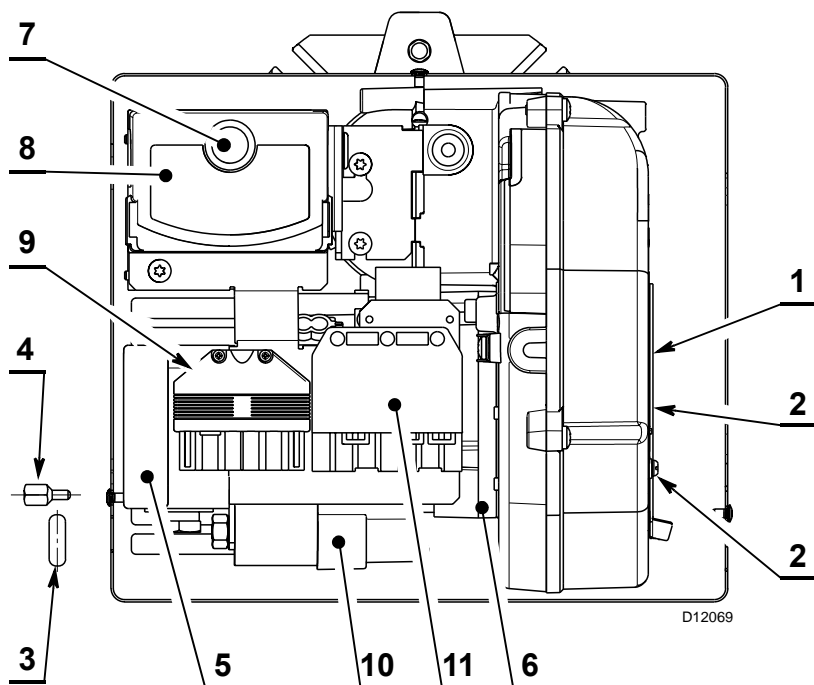
For gas family 3 (LPG) ask for separate kit.

COUNTRY	DE	DK - AT - GR - SE	GB - IE	LU - PL	NL
GAS CATEGORY	II2ELL3B/P	II2H3B/P	II2H3P	II2E3B/P	II2L3B/P

- The burner meets protection level of IP X0D (IP 40) as EN 60529.
- Burner in compliance with EC Directives: CEM 2004/108/EC, Low Voltage 2006/95/EC.
- Gas train according to EN 676.

Fig. 1

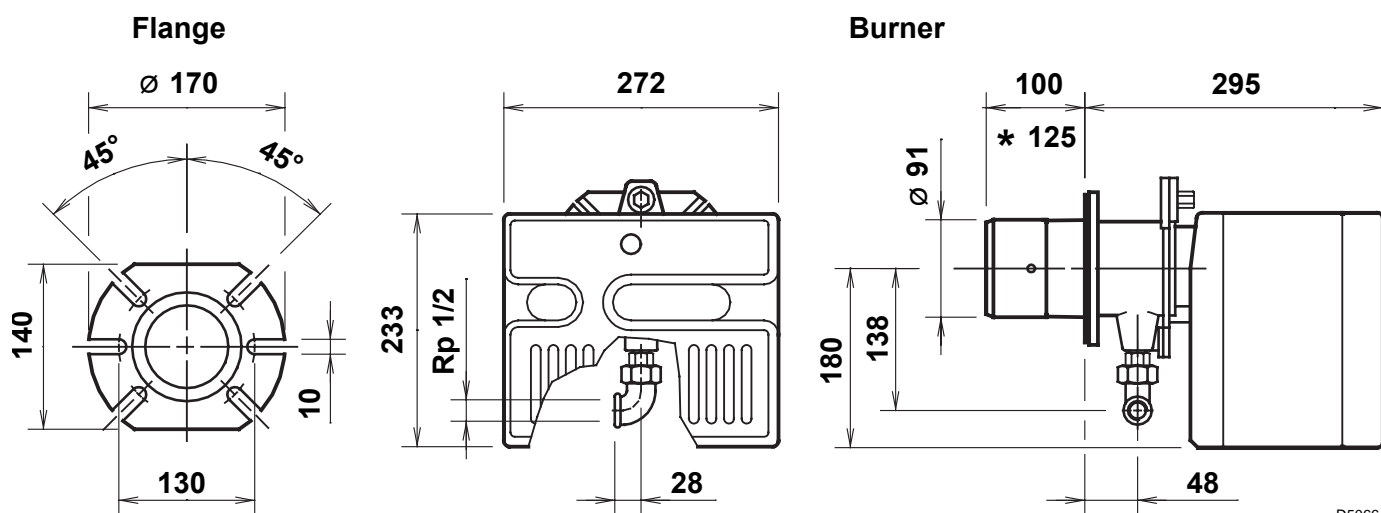
- 1 – Air dampers
- 2 – Damper fixing screws
- 3 – Grommet
- 4 – Hood fixing screw
- 5 – Air pressure switch
- 6 – Motor
- 7 – Lockout light with reset button
- 8 – Control box
- 9 – 6 pole socket for gas train
- 10 – Capacitor
- 11 – 7 pole socket



NOTE

The grommet (3) and the hood fixing screw (4), supplied as accessories, should be assembled on the same side as the gas train.

DIMENSIONS



* Long combustion head upon request

BURNER EQUIPMENT

Quantity	Description
4	Screws with nuts
1	Insulating gasket
3	Screws for fixing the fairing
1	Grommet
1	Hinge
1	7 pin plug

ACCESSORIES

SOFTWARE DIAGNOSTIC KIT

A special kit is available that, by an optical link to a PC, shows the burner life together with operating hours, type and number of lockout, serial number, etc...

Do the following to display the diagnostic:

- Connect the kit supplied separately to the appropriate socket on the control box.
The information is read after the software program in the kit is booted.

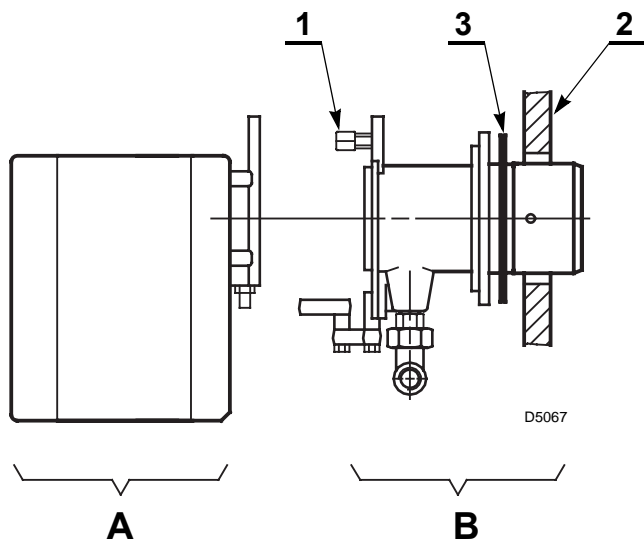
RESET KIT

The use of a connection available as an accessory is provided for remote resetting of the control box.

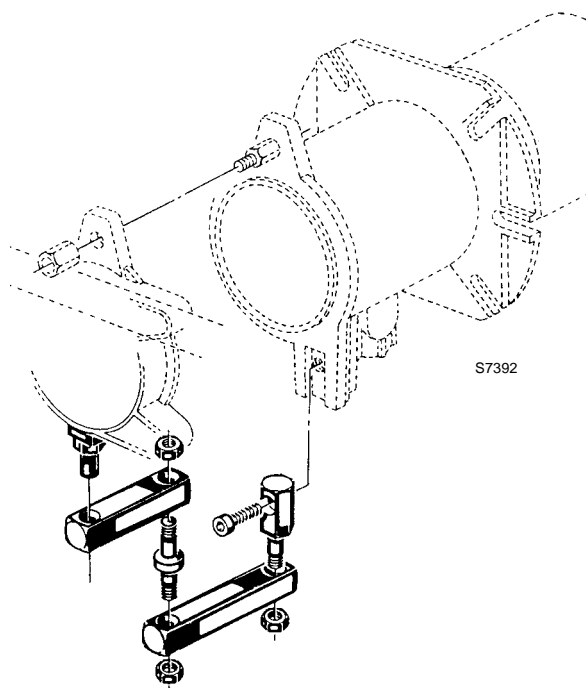
BOILER FIXING

Separate the combustion head from the burner body by removing the nut (1) and pulling back the group **(A)**.

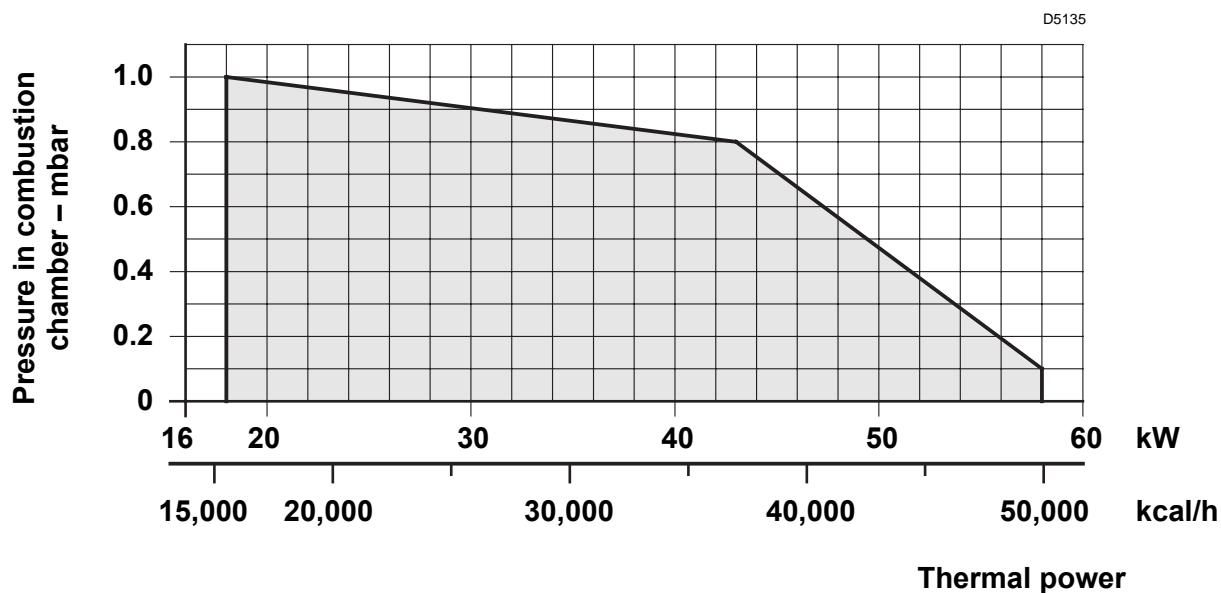
Fix the group **(B)** to the boiler plate (2), inserting the supplied insulating gasket (3).



HINGE ASSEMBLY



FIRING RATE



TEST BOILER

The firing rate has been defined according to EN 676 standard.

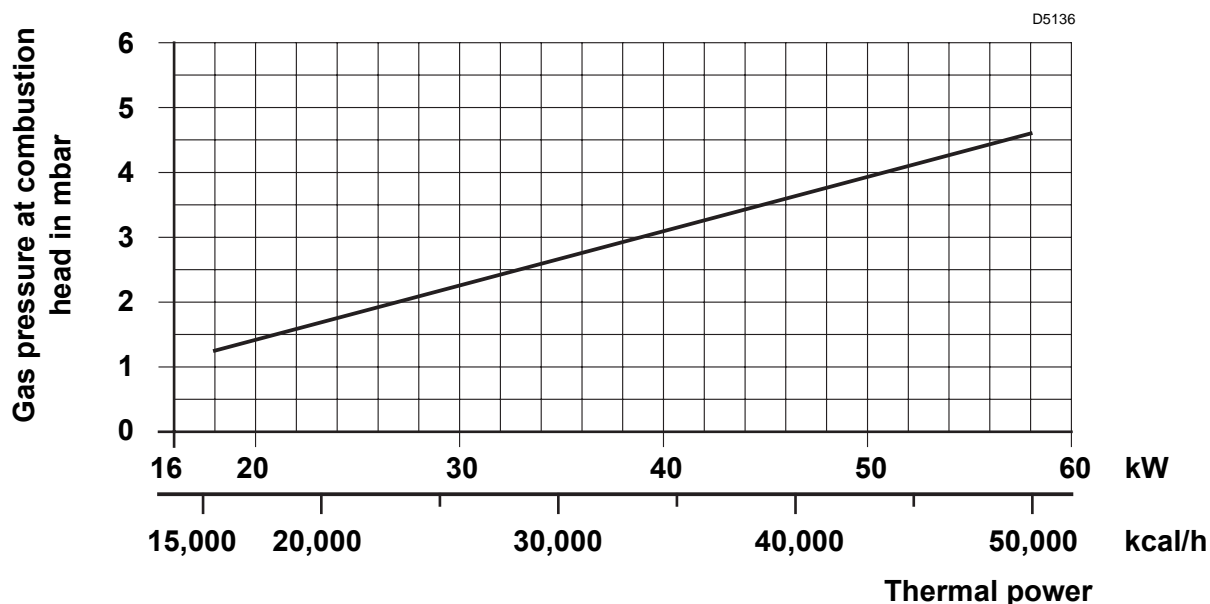
COMMERCIAL BOILERS

The burner-boiler matching is assured if the boiler conforms to EN 303 and the combustion chamber dimensions are similar to those shown in the diagram EN 676.

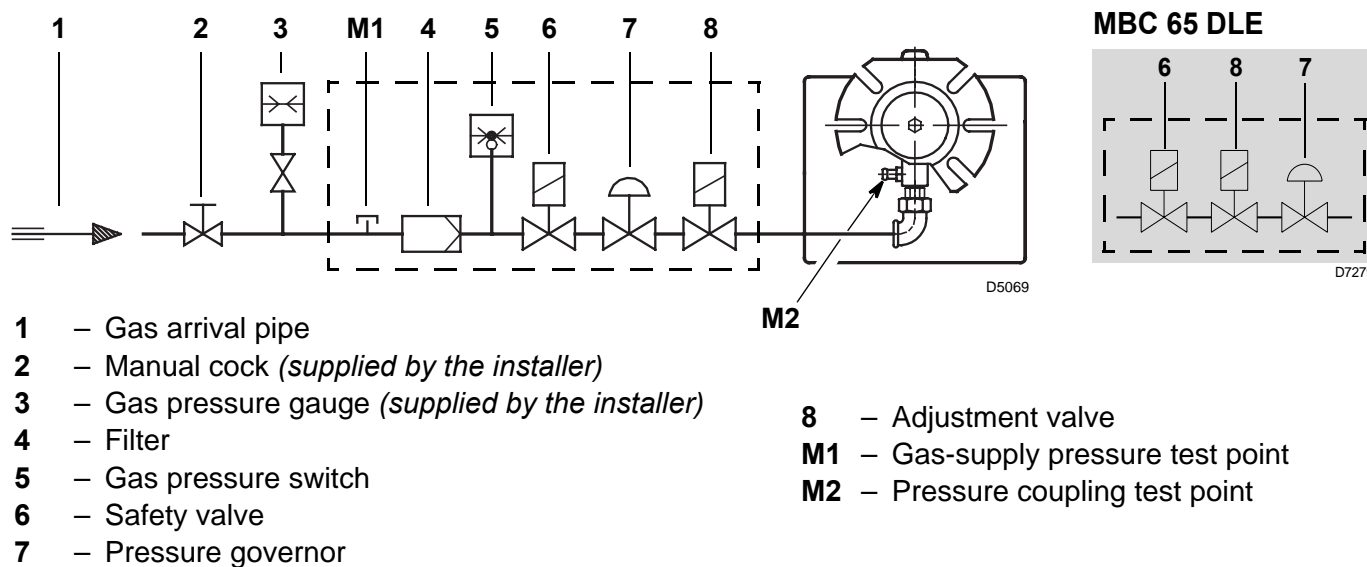
For applications where the boiler does not conform to EN 303, or where the combustion chamber is much smaller than the dimensions given in EN 676, please consult the manufacturers.

CORRELATION BETWEEN GAS PRESSURE AND BURNER OUTPUT

To obtain the maximum output, it is necessary to have 4.6 mbar measured on the pipe coupling, with the combustion chamber at 0 mbar and gas G20 - Pci = 10 kWh/Nm³ (8,570 kcal/Nm³).



GAS FEEDING LINE



GAS TRAIN ACCORDING TO EN 676

MULTIBLOC	CODICE	CONNECTIONS		USE
		TRAIN	BURNER	
MBC 65 DLE	3970569	Rp 1/2	Rp 1/2	Natural gas and LPG
MBDLE 405 B01	3970530	Rp 1/2	Rp 1/2	Natural gas and LPG

The gas train is supplied separately, for its adjustment see the enclosed instructions.

ELECTRICAL WIRING



All the installation, maintenance and disassembly operations must be carried out with the electricity supply disconnected.



The burner requires periodic maintenance carried out by a qualified and authorised technician in conformity with legislation and local standards.

ATTENTION:

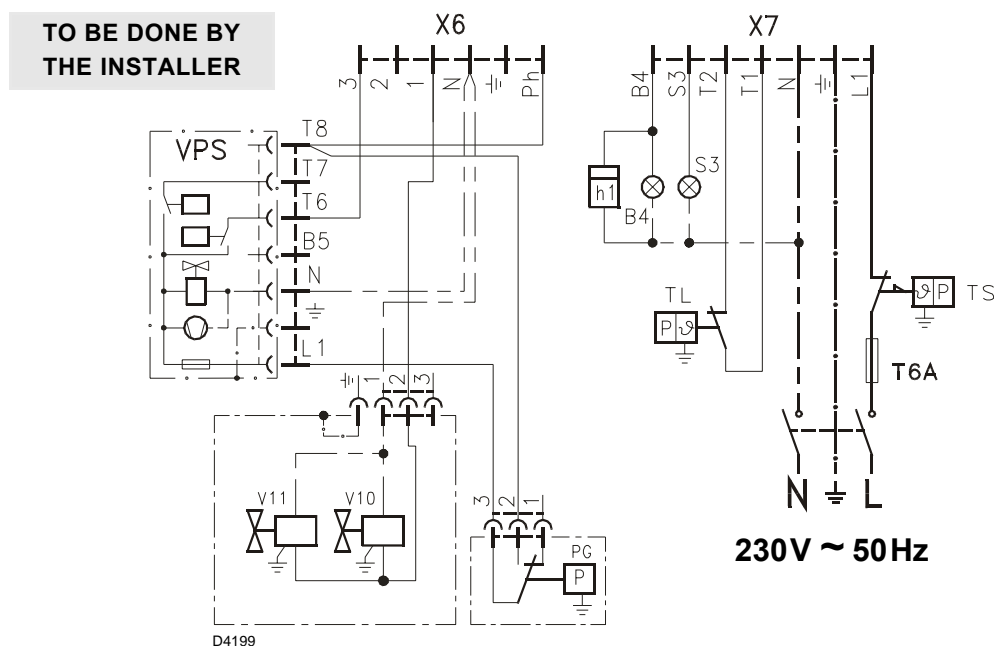
- **Do not swap neutral and phase over, follow the diagram shown carefully and carry out a good earth connection.**
- The section of the conductors must be at least 1 mm² . *(Unless requested otherwise by local standards and legislation).*
- The electrical wiring carried out by the installer must be in compliance with the rules in force in the country.
- Verify that the burner stops by operating the boiler control thermostats and that the burner locks out by separating the red ionisation probe lead connector.

NOTES

The burners have been type-approved for intermittent operation. This means they must stop at least once every 24 hours in order to allow the electrical control box to check its efficiency on start-up. The boiler limit thermostat (TL) normally ensures the burner halts. If this does not happen a time switch (IN) halting the burner at least once every 24 hours must be applied in series to limit thermostat (TL).

STANDARD ELECTRICAL WIRING (see page 13).

ELECTRICAL WIRING WITH GAS LEAK CONTROL DEVICE (DUNGS VPS 504)



KEY TO LAY-OUT

- | | |
|---|-------------------------------|
| X6 - 6 pin plug | T6A - Fuse |
| X7 - 7 pin plug | TL - Limit thermostat |
| B4 - Working signal | TS - Safety thermostat |
| h1 - Hour counter | V10 - Safety valve |
| PG - Minimum gas pressure switch | V11 - Adjustment valve |
| S3 - Remote lock-out signal
(230V - 0.5 A max.) | |

COMBUSTION HEAD ADJUSTMENT

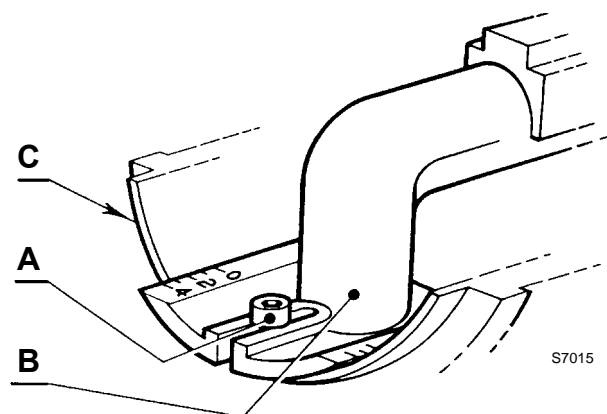
Loosen the screw (A), move the elbow (B) so that the rear plate of the coupling (C) coincides with the set point.

Tighten the screw (A).

Example:

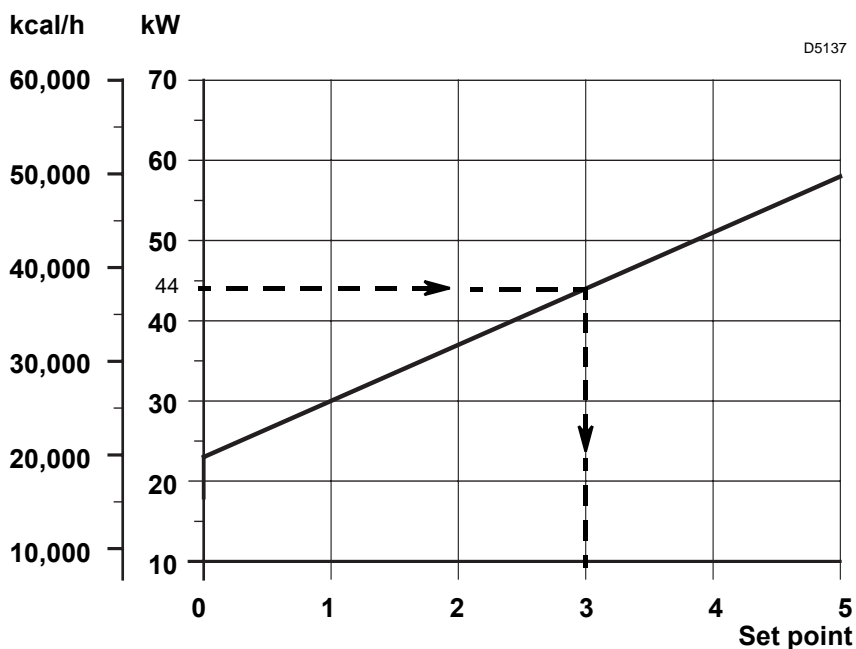
The burner is installed in a 40 kW boiler.

Considering efficiency of 90% the burner must supply around 44 kW.



The diagram shows that for this output the adjustment must be made on notch **3**.

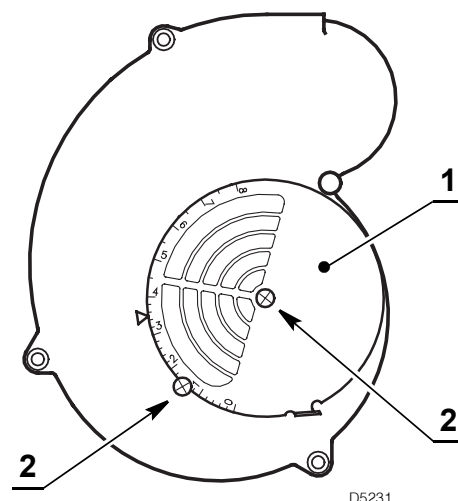
The diagram is to be used only for initial settings, to improve air pressure switch operation or improve combustion, it may be necessary to reduce this setting (*set point toward position 0*).



AIR DAMPER ADJUSTMENT

The regulation of the air-rate is made by adjusting the air damper (1), after loosening the screws (2).

When the optimal regulation is reached, **screw tight the screws (2)**.



COMBUSTION ADJUSTMENT

In conformity with Efficiency Directive 92/42/EEC, the application of the burner on the boiler, adjustment and testing must be carried out by observing the instruction manual of the boiler, including verification of the CO and CO₂ concentration in the flue gases, their temperatures and the average temperature of the water in the boiler. It is advisable to set the burner according to the type of gas used and following the indications of the table:

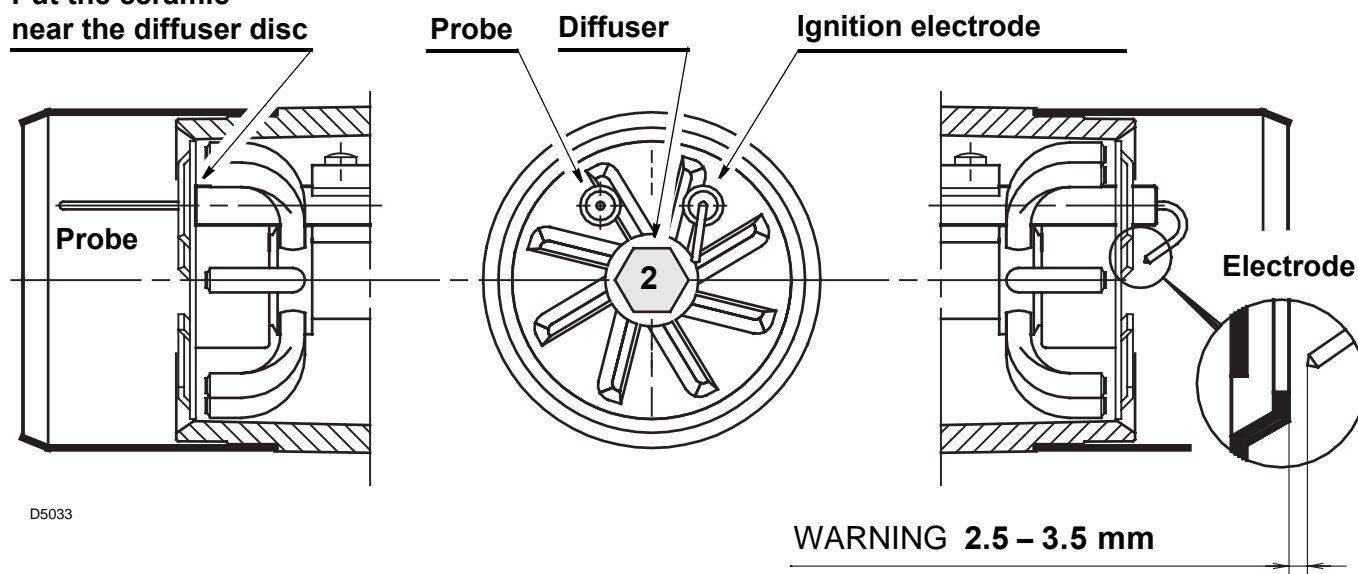
EN 676		AIR EXCESS: max. output $\lambda \leq 1.2$ – min. output $\lambda \leq 1.3$			
GAS	Theoretical max. CO ₂ 0 % O ₂	Setting CO ₂ %		CO mg/kWh	NO _x mg/kWh
		$\lambda = 1.2$	$\lambda = 1.3$		
G 20	11.7	9.7	9.0	≤ 100	≤ 170
G 25	11.5	9.5	8.8	≤ 100	≤ 170
G 30	14.0	11.6	10.7	≤ 100	≤ 230
G 31	13.7	11.4	10.5	≤ 100	≤ 230

PROBE - ELECTRODE POSITIONING

IMPORTANT

Do not turn the starting electrode but leave it as shown in the drawing; if the starting electrode is put near the ionization probe, the amplifier of the control box might be damaged.

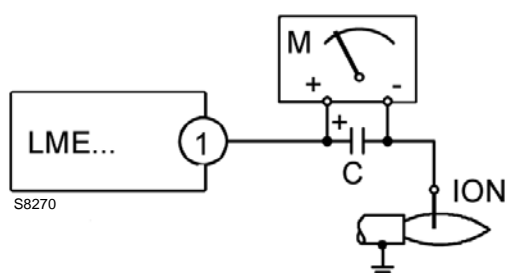
Put the ceramic
near the diffuser disc



IONIZATION CURRENT

The minimum current necessary for the control box operation is 3 μ A.

The burner normally supplies a higher current value, so that no check is needed. However, if you want to measure the ionization current, you must open the connector fitted to the red wire and insert a microammeter.



Legend

- C - Capacitor 100...470 μ F; DC 10...25V
- ION - Ionization probe
- M - Microammeter, Ri max. 5000 Ω

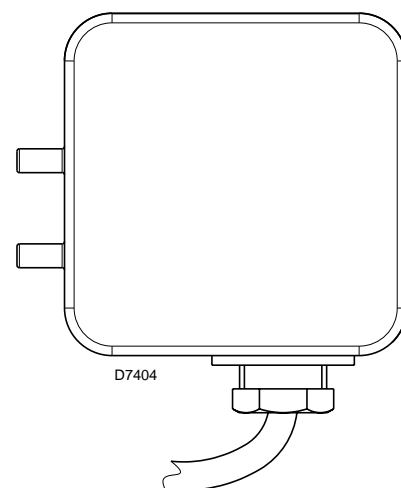
AIR PRESSURE SWITCH

The air pressure switch is set after all other adjustments have been made. Begin with the switch at the lowest setting. With the burner function at the required power, turn the knob slowly in a clockwise direction until burner lockout.

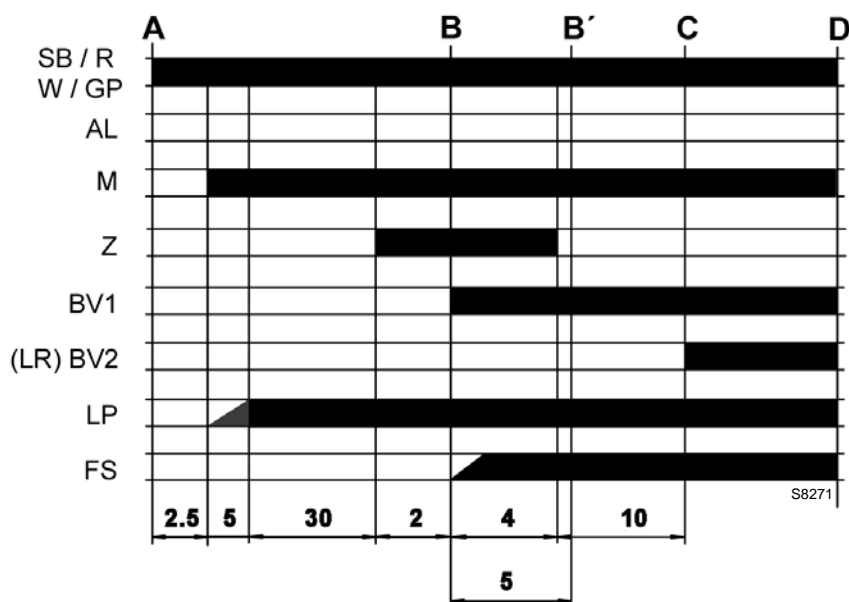
Then turn the knob anticlockwise to an extent that is around 20% of the adjusted value and then check that the burner starts up properly. If the burner locks out again turn the knob slightly in an anticlockwise direction.

Attention:

In conformity with the standard, the air pressure switch must prevent the air pressure falling below 80% of the adjusted value and the CO in the flue gases exceeding 1% (10,000 ppm). To check this, insert a combustion analyser in the flue, slowly reduce the burner air setting (for example with a piece of cardboard) and verify that the burner locks out before the CO value in the flue gases exceeds 1%.



BURNER START-UP CYCLE



- AL** - Error message (alarm)
- BV** - Fuel valve
- FS** - Flame signal
- GP** - Gas pressure switch
- LP** - Air pressure switch
- LR** - Load controller
- M** - Fan motor
- R** - Control thermostat / pressurestat
- SB** - Safety limiter
- W** - Limit thermostat / pressure switch
- Z** - Ignition transformer

- A** Start command (switching on by «R»)
- B-B'** Interval for establishment of flame
- C** Operating position of burner reached
- C-D** Burner operation (generation of heat)
- D** Controlled shutdown by «R»
 - Burner will immediately be shut down
 - Burner control will immediately be ready for new startup

When flame-failure occurs during working, shut down takes place within one second.

START-UP CYCLE DIAGNOSTICS

During start-up, indication is according to the following table:

COLOUR CODE TABLE	
Sequences	Colour code
Pre-purging	● ● ● ● ● ● ● ● ● ● ● ●
Ignition phase	● ○ ● ○ ● ○ ● ○ ● ○ ● ○ ●
Operation, flame ok	□ □ □ □ □ □ □ □ □ □ □ □
Operating with weak flame signal.	□ ○ □ ○ □ ○ □ ○ □ ○ □ ○
Electrical supply lower than ~ 170V	● ▲ ● ▲ ● ▲ ● ▲ ● ▲ ● ▲ ●
Lock-out	▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲
Extraneous light	▲ □ ▲ □ ▲ □ ▲ □ ▲ □ ▲ □ ▲ □
Index: ○ Off ● Yellow □ Green ▲ Red	

RESETTING THE CONTROL BOX AND USING DIAGNOSTICS

The control box features a diagnostics function through which any causes of malfunctioning are easily identified (indicator: **RED LED**).

To use this function, you must wait at least 10 seconds once it has entered the safety condition (**lock-out**), and then press the reset button.

The control box generates a sequence of pulses (1 second apart), which is repeated at constant 3-second intervals.

Once you have seen how many times the light pulses and identified the possible cause, the system must be reset by holding the button down for between 1 and 3 seconds.

RED LED on wait at least 10s	Lock-out	Press reset for > 3s	Pulses	Interval 3s	Pulses
■	■	■	● ● ● ● ● ●	■	● ● ● ● ● ●

The methods that can be used to reset the control box and use diagnostics are given below.

RESETTING THE CONTROL BOX

To reset the control box, proceed as follows:

- Hold the button down for between 1 and 3 seconds.
The burner restarts after a 2-second pause once the button is released.
If the burner does not restart, you must make sure the limit thermostat is closed.

VISUAL DIAGNOSTICS

Indicates the type of burner malfunction causing lock-out.

To view diagnostics, proceed as follows:

- Hold the button down for more than 3 seconds once the red LED (burner lock-out) remains steadily lit.
A yellow light pulses to tell you the operation is done.
Release the button once the light pulses. The number of times it pulses tells you the cause of the malfunction, indicated in the table below.

SOFTWARE DIAGNOSTICS

Reports the life of the burner by means of an optical link with the PC, indicating hours of operation, number and type of lock-outs, serial number of control box etc ...

(WITH KIT INTERFACE ADAPTER LME TO PC Code 3002719).

To view diagnostics, proceed as follows:

- Hold the button down for more than 3 seconds once the red LED (burner lock-out) remains steadily lit.
A yellow light pulses to tell you the operation is done.

Release the button for 1 second and then press again for over 3 seconds until the yellow light pulses again.

Once the button is released, the red LED will flash intermittently with a higher frequency: only now can the optical link be activated.

Once the operations are done, the control box's initial state must be restored using the resetting procedure described above.

BUTTON PRESSED FOR	CONTROL BOX STATUS
Between 1 and 3 seconds	Control box reset without viewing visual diagnostics.
More than 3 seconds	Visual diagnostics of lock-out condition: (LED pulses at 1-second intervals).
More than 3 seconds starting from the visual diagnostics condition	Software diagnostics by means of optical interface and PC (hours of operation, malfunctions etc. can be viewed)

The sequence of pulses issued by the control box identifies the possible types of malfunction, which are listed in the table below.

SIGNAL	PROBABLE CAUSE
2 pulses ● ●	The flame does not stabilise at the end of the safety time: – faulty ionisation probe; – faulty or soiled gas valves; – neutral/phase exchange; – faulty ignition transformer – poor burner regulation (insufficient gas).
3 pulses ● ● ●	Minimum air pressure switch does not close: – make sure VPS trips to produce lockout; – air pressure switch faulty; – air pressure switch incorrectly regulated; – fan motor does not run; – maximum air pressure switch operating.
4 pulses ● ● ● ●	Min. air pressure switch does not open or light in the chamber before firing: – air pressure switch faulty; – air pressure switch incorrectly regulated.
5 pulses ● ● ● ● ●	Time out "LP": – "LP" is welded working position.
7 pulses ● ● ● ● ● ● ●	Loss of flame during operations: – poor burner regulation (insufficient gas); – faulty or soiled gas valves; – short circuit between ionisation probe and earth.
10 pulses ● ● ● ● ● ● ● ● ● ●	– Wiring error or internal fault.

WARNINGS TO AVOID BURNOUT OR BAD COMBUSTION OF THE BURNER

- 1 – When the burner is stopped, the smoke pipe must be opened and effect a natural draught in the combustion chamber. If the smoke pipe is closed, the burner must be drawn back till the extraction of blast tube from the furnace. Before operating in this way take the voltage off.
- 2 – The place, where the burner works, must have same openings suitable for the passage of air necessary for combustion. To be sure about this, you have to control CO₂ and CO in the exhaust gases with all the windows and doors closed.
- 3 – If in the place, where the burner works, there are air-breathings, check the existence of air-input openings with dimensions suitable for the necessary air-exchange. In any case check that, when the burner is stopped, the air-breathings do not draw warm smokes from pipes through the burner.

MAINTENANCE

The burner requires periodic maintenance carried out by a qualified and authorised technician **in conformity with legislation and local standards.**

Maintenance is essential for the reliability of the burner, avoiding the excessive consumption of fuel and consequent pollution.

Before carrying out any cleaning or control always first switch off the electrical supply to the burner acting on the main switch of the system.

THE BASIC CHECKS ARE:

Leave the burner working without interruption for 10 min., checking the right settings of all the components stated in this manual. Then carry out a combustion check verifying:

- CO₂ (%) content ● Smoke temperature at the chimney ● CO content (ppm).

FAULTS / SOLUTIONS

Here below you can find some causes and the possible solutions for some problems that could cause a failure to start or a bad working of the burner. A fault usually makes the lock-out lamp light which is situated inside the reset button of the control box (9, fig. 1, page 1).

When lock out lamp lights the burner will attempt to light only after pushing the reset button. After this if the burner functions correctly, the lock-out can be attributed to a temporary fault.

If however the lock out continues the cause must be determined and the solution found.

BURNER STARTING DIFFICULTIES

Signal	Problem	Possible cause	Recommended remedy
2 blinks ● ●	Once the pre-purging phase and safety time have passed, the burner goes into lock-out without the appearance of the flame	1 - The operation solenoid lets little gas through 2 - One of the two solenoid valves does . . . not open. 3 - Gas pressure too low. 4 - Ignition electrode incorrectly adjusted . . . 5 - Electrode grounded due to broken insulation 6 - High voltage cable defective 7 - High voltage cable deformed by high . . . temperature 8 - Ignition transformer defective 9 - Incorrect valve or transformer electrical wiring 10 - Defective control box 11 - A closed valve upline the gas train 12 - Air in pipework 13 - Gas valves unconnected or with interrupted coil	Increase Replace Increase pressure at governor Adjust, see page 4 Replace Replace Replace and protect Replace Check Replace Open Bleed air Check connections or replace coil
3 blinks ● ● ●	The burner does not switch on, and the lockout appears	14 - Air pressure switch in operating position .	Adjust or replace
	The burner switches on, but then stops in lockout	- Air pressure switch inoperative due to insufficient air pressure: 15 - Air pressure switch incorrectly adjusted. . 16 - Pressure switch pressure test point pipe blocked 17 - Poorly adjusted head. 18 - High pressure in the furnace	Adjust or replace Clean Adjust Connect air pressure switch to fan suction line
	Lockout during pre-purging phase	19 - Defective motor control contactor (only three-phase version) 20 - Defective electrical motor 21 - Motor lockout (defective electrical motor)	Replace Replace Replace
4 pulses ● ● ● ●	The burner switches on, but then stops in lockout	22 - Flame simulation	Replace the control box
	Lockout when burner stops	23 - Permanent flame in the combustion head or flame simulation	Eliminate persistence of flame or replace control box
7 blinks ● ● ● ● ● ● ●	The burner goes into lockout immediately following the appearance of the flame	24 - The operation solenoid lets little gas through 25 - Ionisation probe incorrectly adjusted 26 - Insufficient ionisation (less than 5 A) 27 - Earth probe 28 - Burner poorly grounded. 29 - Phase and neutral connections inverted . 30 - Defective flame detection circuit	Increase Adjust, see page 4 Check probe position Withdraw or replace cable Check grounding Invert them Replace the control box
	Burner goes into lock-out during operation	31 - Probe or ionisation cable grounded.	Replace worn parts

Signal	Problem	Possible cause	Recommended remedy
10 blinks ● ● ● ● ● ● ● ● ● ●	The burner does not switch on, and the lockout appears	32 - Incorrect electrical wiring	Check
	The burner goes into lockout	33 - Defective control box 34 - Presence of electromagnetic disturbances in the thermostat lines	Replace Filter or eliminate
No blink	The burner does not start	35 - No electrical power supply	Close all switches - Check connections
		36 - A limiter or safety control device is open .	Adjust or replace
		37 - Line fuse blocked.	Replace
		38 - Defective control box	Replace
		39 - No gas supply	Open the manual valves between contactor and train
		40 - Mains gas pressure insufficient	Contact your GAS COMPANY
		41 - Minimum gas pressure switch fails to . . . close	Adjust or replace
	The burner continues to repeat the start-up cycle, without lockout	42 - The gas pressure in the gas mains lies very close to the value to which the minimum gas pressure switch has been set. The sudden drop in pressure after valve opening causes temporary opening of the pressure switch itself, the valve immediately closes and the burner comes to a halt. Pressure increases again, the pressure switch closes again and the ignition cycle is repeated. And so on	Reduce the minimum gas pressure switch intervention pressure. Replace the gas filter cartridge.
	Ignition with pulsations	43 - Poorly adjusted head	Adjust. See page 6
		44 - Ignition electrode incorrectly adjusted . . .	Adjust, see page 4
		45 - Incorrectly adjusted fan air damper: too much air	Adjust
		46 - Output during ignition phase is too high .	Reduce

N.B.: If problems still occur after all of the above checks have been made, check the electrical connections on the plug and sockets, the damper and burner motor, gas control wiring ignition transformer and external interlocks, if the burner still fails to function, replace the control box.

STANDARD ELECTRICAL WIRING

1	INDEX
2	Indication of references
3	Functional layout

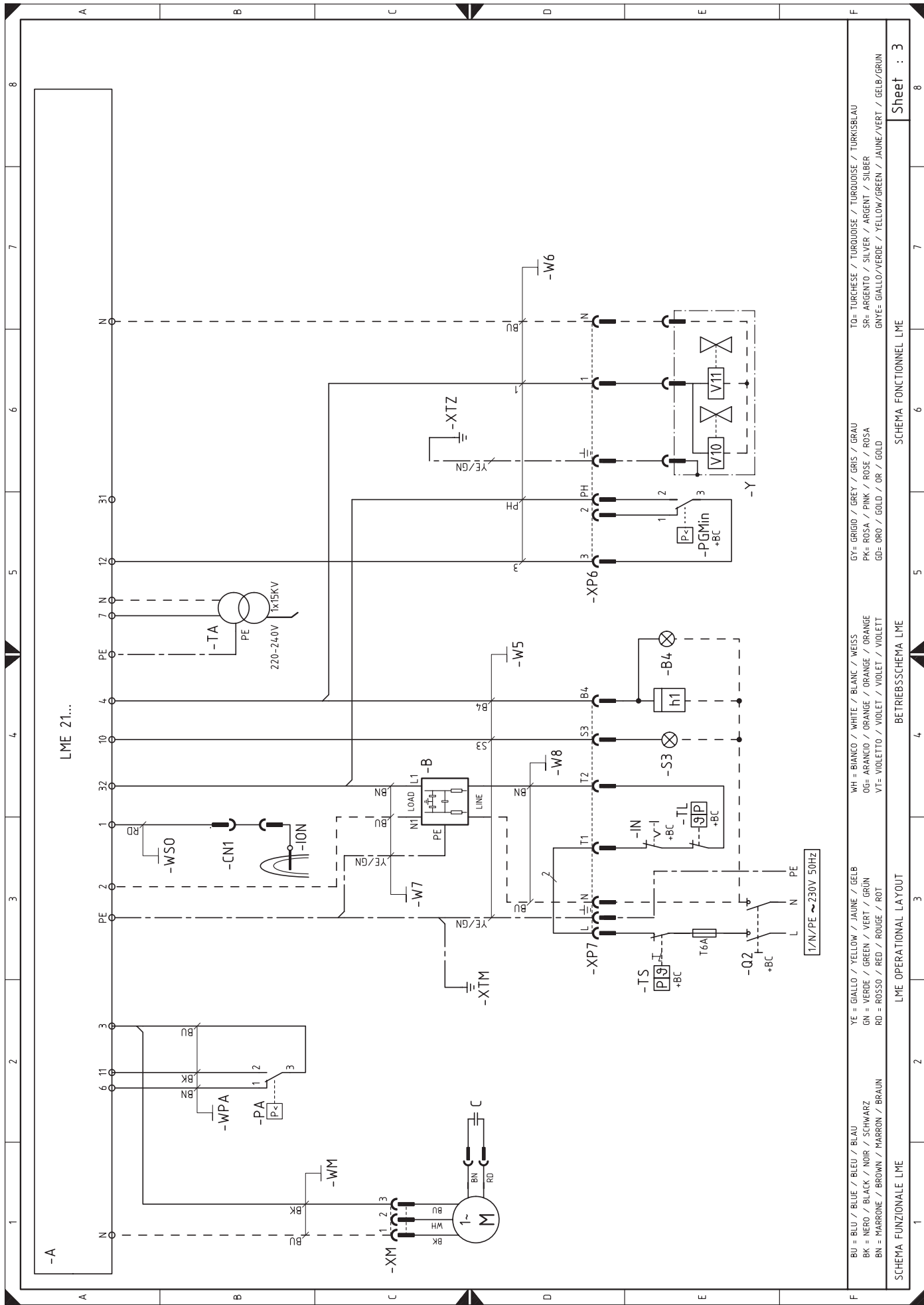
2

Indication of references

Sheet no

Co-ordinates

/1.A1



KEY TO ELECTRICAL LAYOUT

- A** – Control box
- B** – Suppresor
- B4** – Working signal
- C** – Capacitor
- CN1**– Connector
- h1** – Hour counter
- IN** – Switch
- ION**– Ionisation probe
- Y** – Valve assembly
- PA** – Air pressure switch
- PGMin**– Minimum gas pressure switch
- Q2** – Main disconnecting swich
- S3** – Remote lock-out signal (230V - 0.5 A max.)
- T6A**– Fuse
- TA** – Ignition transformer
- TL** – Limit thermostat
- TS** – Safety thermostat
- V10** – Safety valve
- V11** – Adjustment valve
- XM** – Motor connector
- XP6**– 6 pole socket
- XP7**– 7 pole socket
- XTM**– Burner ground (earth) connection
- XTZ**– Burner shelf



WARNING

In the case of phase-phase feed, a bridge must be fitted on the control box terminal board between terminal 6 and the earth terminal.

The logo consists of the word "RIELLO" in a bold, red, sans-serif typeface.

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