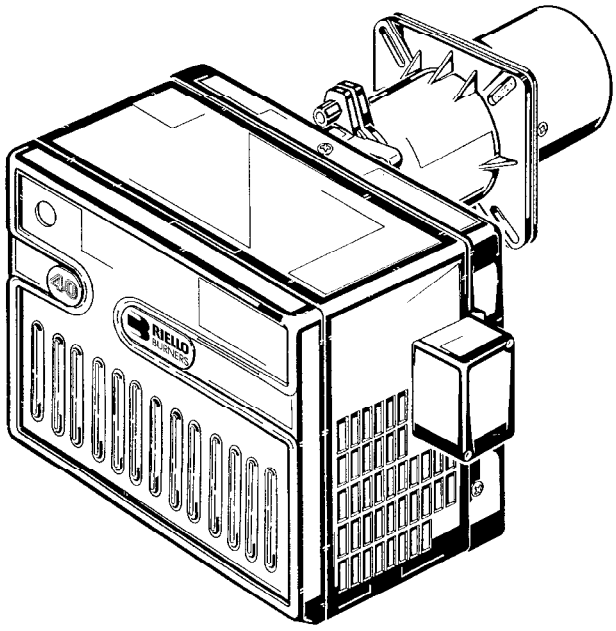
Montage und Bedienungsanleitung
Manuel d'entretien
Installation, use and maintenance instructions
Installatie-, gebruiks- en onderhoudsvoorschriften
Instrucciones para la instalación, uso y mantenimiento

RIELLO BURNERS

D Gas-Gebläsebrenner
F Brûleur gaz à air soufflé
GB Forced draught gas burner
NL Gasventilatorbrander
E Quemador de gas de aire soplado

Einstufiger Betrieb
Fonctionnement à 1 allure
One stage operation
Eentrapsbranders
Funcionamiento de una etapa

CE



RIELLO 40

CODE CÓDIGO	MODELL - MODELE MODEL - MODELO	TYP - TYPE TIPO
3755616	GS20	556T1

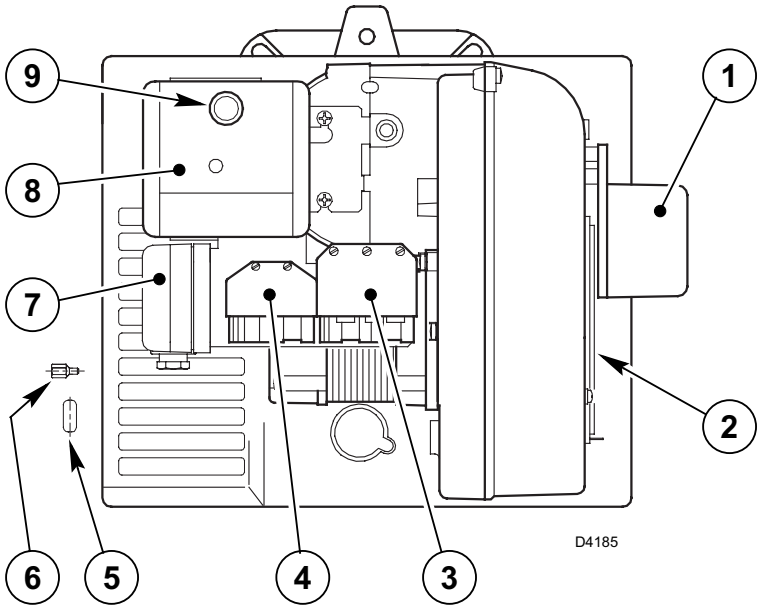
INDEX

1. BURNER DESCRIPTION

Gas burner with one stage working.

- CE marking according to Gas Appliance Directive 90/396/EEC; PIN **0063AP6680**.
  According to Directives: EMC 89/336/EEC, Low Voltage 73/23/EEC and Efficiency 92/42/EEC.
- The burner meets protection level of IP X0D (IP 40), EN 60529.
- Gas train according to EN 676.

Fig. 1



1 – Air damper actuator
2 – Air dampers
3 – 7 pole socket for electrical supply and control
4 – 6 pole socket for gas train
5 – Cable grommet
6 – Screw for fixing the cover
7 – Air pressure switch
8 – Control box
9 – Reset button with lock-out lamp

NOTE
The cable grommet (5) and the screw for fixing the cover (6) supplied with the burner, must be fitted to the same side of the gas train.

1.1 BURNER EQUIPMENT

Insulating gasket . . . . . No. 1
Cable grommet . . . . . No. 1
Hinge . . . . . No. 1
Screws and nuts for flange to be fixed to boiler . . . No. 4
Screw for fixing the cover. . . . . No. 1
7 pin plug. . . . . No. 1

2. TECHNICAL DATA

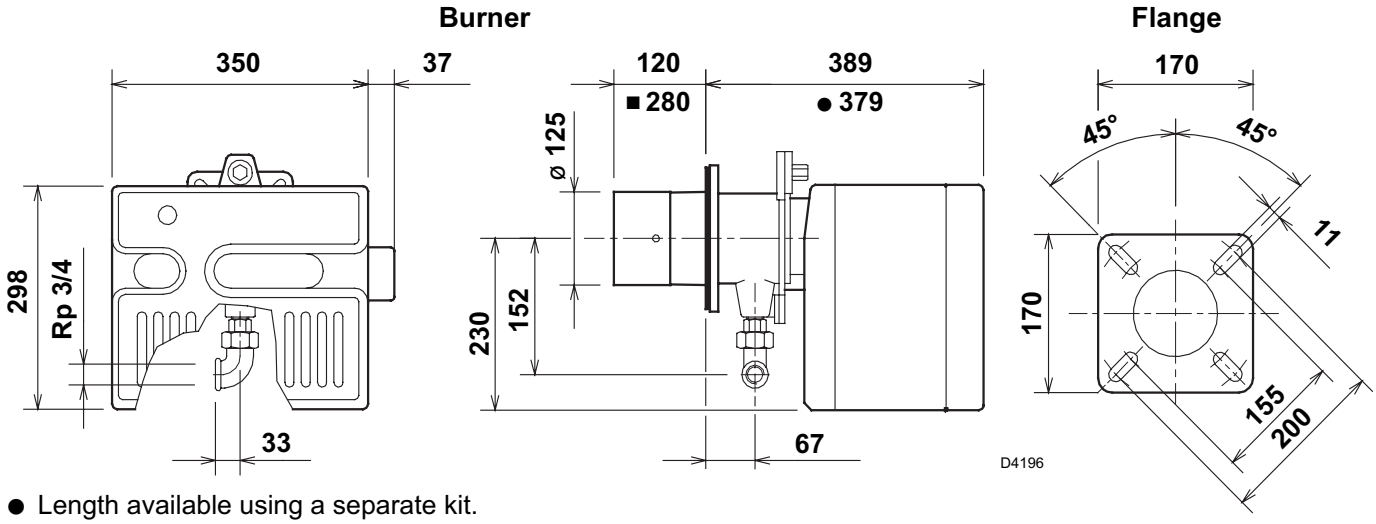
2.1 TECHNICAL DATA

Thermal power **(1)**	81 – 220 kW - 70,000 – 189,000 kcal/h
Natural gas **(Family 2)**	Net heat value: 8 – 12 kWh/Nm^3 - 7,000 – 10,340 kcal/Nm^3
	Pressure: min. 20 mbar - max. 100 mbar
Electrical supply	Single phase, 230V ± 10% ~ 50Hz
Motor	230V / 1.4A
Capacitor	5 µF
Ignition transformer	Primary 230V / 1.8A - Secondary 8 kV / 30 mA
Absorbed electrical power	0.25 kW
(1) Reference conditions: Temp. 20°C - Barometric pressure 1013 mbar – Altitude 0 m above sea level.	

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

COUNTRY	AT	DE	ES - GB - IE	LU	NL
GAS CATEGORY	$II_{2H3B/P}$	$II_{2ELL3B/P}$	II_{2H3P}	$II_{2E3B/P}$	II2L3B/P

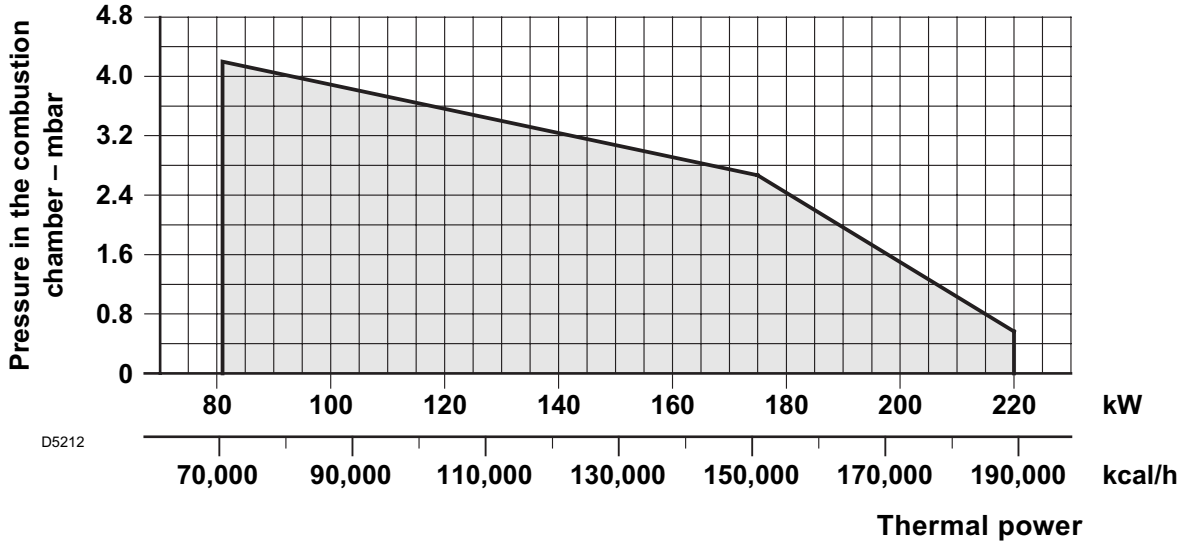
2.2 OVERALL DIMENSIONS



● Length available using a separate kit.

■ Combustion head extension, supplied separately.

2.3 WORKING FIELD (as EN 676)



TEST BOILER

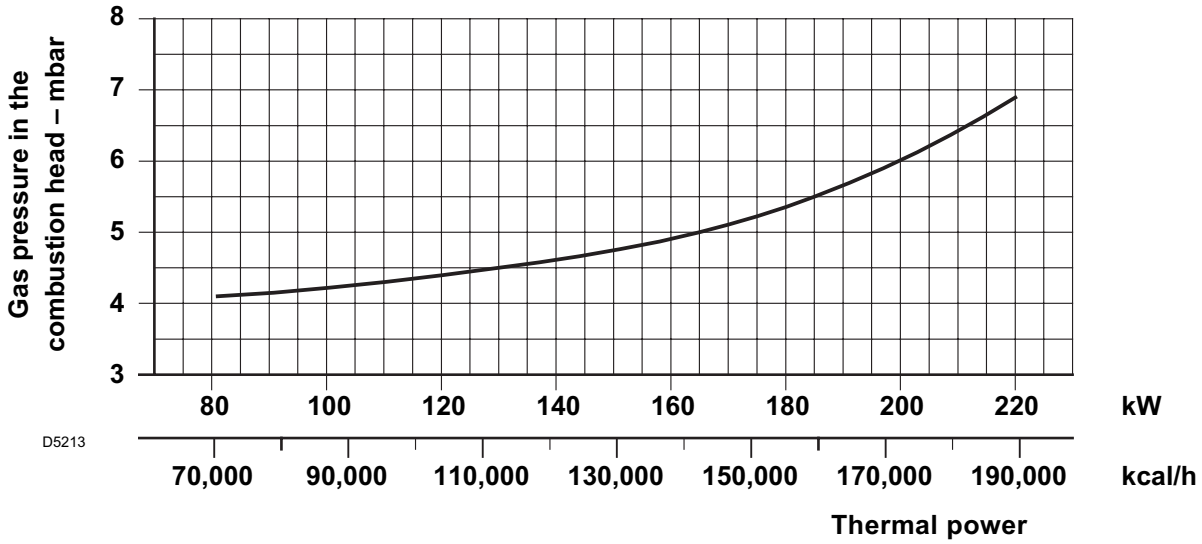
The working field has been defined according to EN 676 standard.

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, a gas head pressure of 6.9 mbar is measured (**M2**, see chapter 3.3, page 4) with the combustion chamber at 0 mbar using gas G20 with a net heat value of 10 kWh/Nm3 (8,570 kcal/Nm3).



3. INSTALLATION

THE BURNER MUST BE INSTALLED IN CONFORMITY WITH LEGISLATION AND LOCAL STANDARDS.

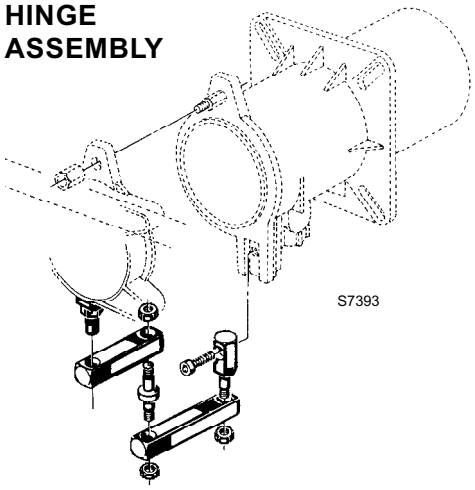
3.1 BOILER FIXING

IMPORTANT

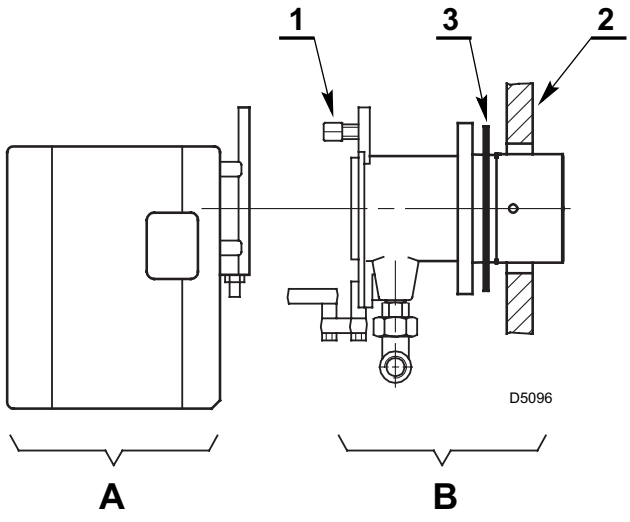
Boiler door must have a max. thickness of **100 mm**, refractory lining included.

If thickness is greater **(max. 260 mm)**, a combustion head extension must be fitted, which is supplied separately.

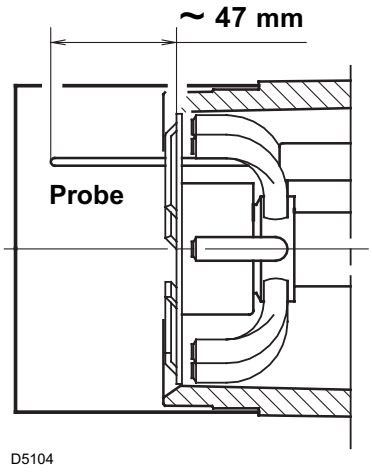
HINGE ASSEMBLY

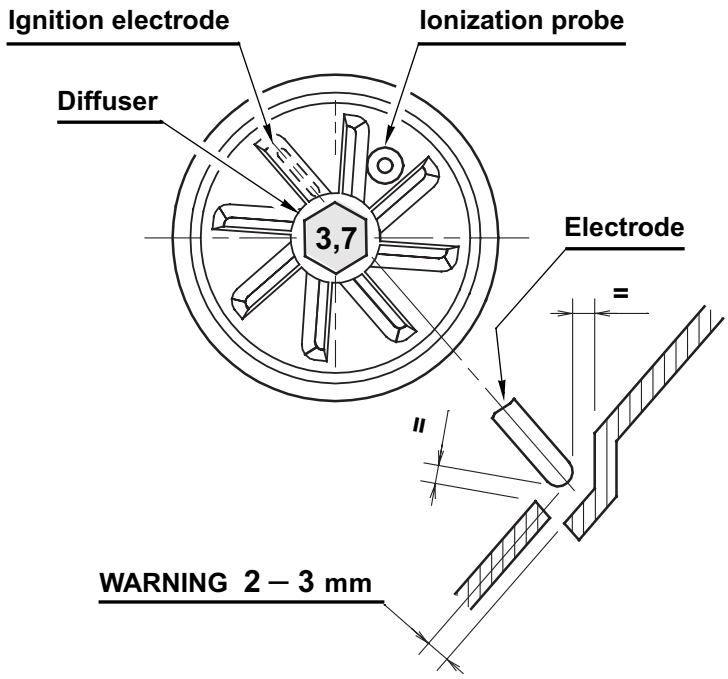


- Separate the combustion-head assembly from the burner body by removing nut (1) and removing group **(A)**.
- Fix the head assembly group **(B)** to the boiler (2) insert the supplied insulating gasket (3).

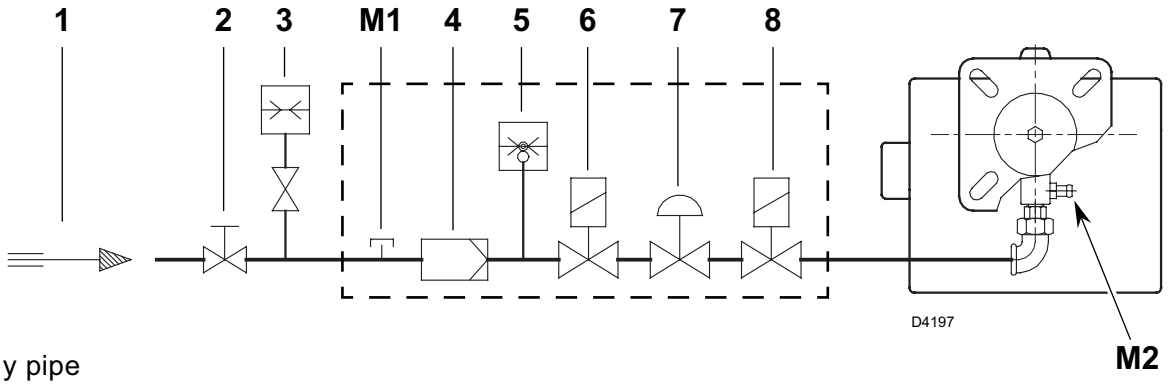


3.2 PROBE - ELECTRODE POSITIONING





3.3 GAS FEEDING LINE



1 – Gas supply pipe
2 – Manual cock *(supplied by the installer)*
3 – Gas pressure gauge *(supplied by the installer)*
4 – Filter
5 – Gas pressure switch
6 – Safety valve
7 – Pressure governor
8 – Adjustment valve

M1 – Gas-supply pressure test point
M2 – Pressure coupling test point

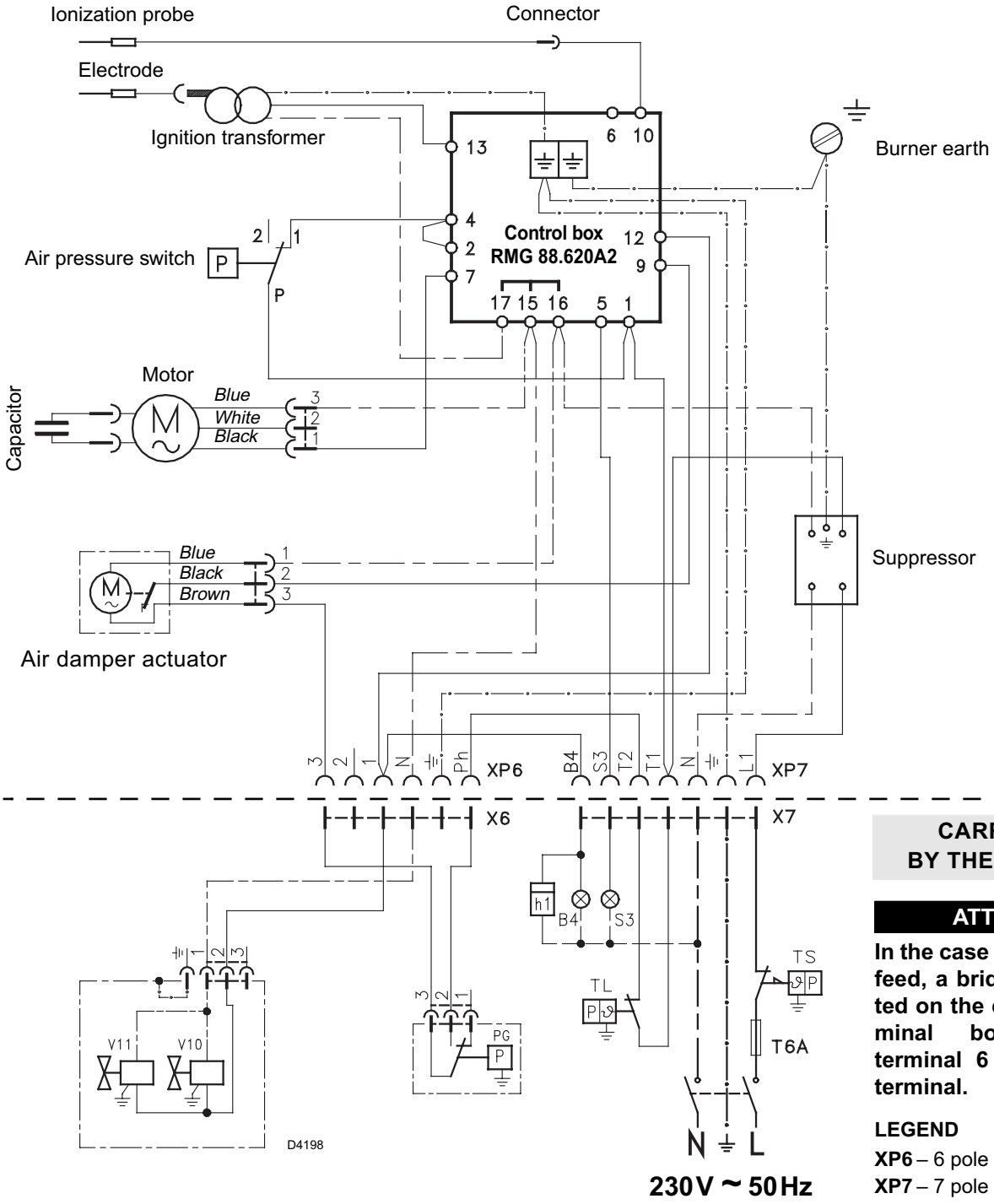
GAS TRAIN ACCORDING TO EN 676

GAS TRAIN		CONNECTIONS		USE
TYPE	CODE	INLET	OUTLET	
MBDLE 407 B01	**3970531**	Rp 3/4	Rp 3/4	Natural gas ≤ 180 kW and LPG
MBDLE 410 B01	**3970532**	Rp 1	Rp 3/4	Natural gas and LPG

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

3.4 ELECTRICAL WIRING

3.4.1 STANDARD ELECTRICAL WIRING



CARRIED-OUT BY THE INSTALLER

ATTENTION

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.

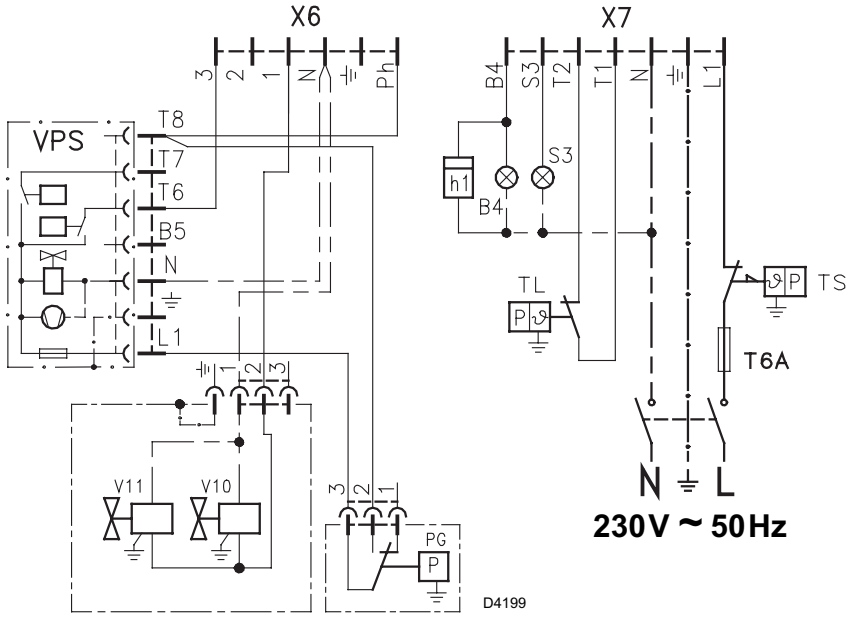
LEGEND

XP6 – 6 pole socket
XP7 – 7 pole socket
X6 – 6 pin plug
X7 – 7 pin plug
B4 – Working signal
h1 – Hour counter
PG – Minimum gas pressure switch
S3 – Remote lock-out signal (230V - 0.5 A max.)
T6A – Fuse
TL – Limit thermostat
TS – Safety thermostat
V10 – Safety valve
V11 – Adjustment valve

NOTES:

- **Do not exchange the neutral with the phase and connect exactly the above wiring.**
- Wires of min. 1 mm^2 section. *(Unless requested otherwise by local standards and legislation).*
- Carry out a safe earth connection.
- 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.
- The electric wiring carried out by the installer must be in compliance with regulations in force in the Country.

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



CARRIED-OUT BY THE INSTALLER

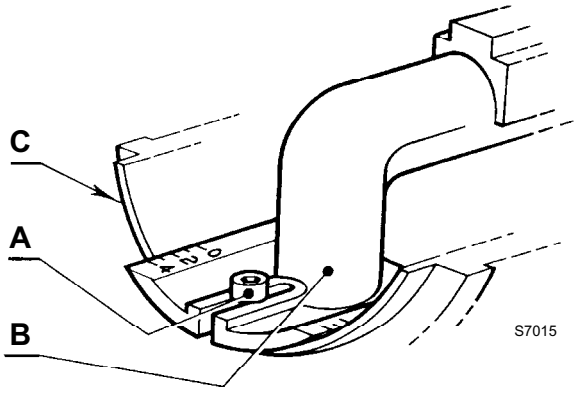
LEGEND

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

4. WORKING

4.1 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 observing the instruction manual of the boiler, including verification of the CO and CO_2 concentration in the flue gases, their temperatures and the average temperature of the water in the boiler.
To suit the required appliance output, choose the proper setting of the combustion head, and the air damper opening.



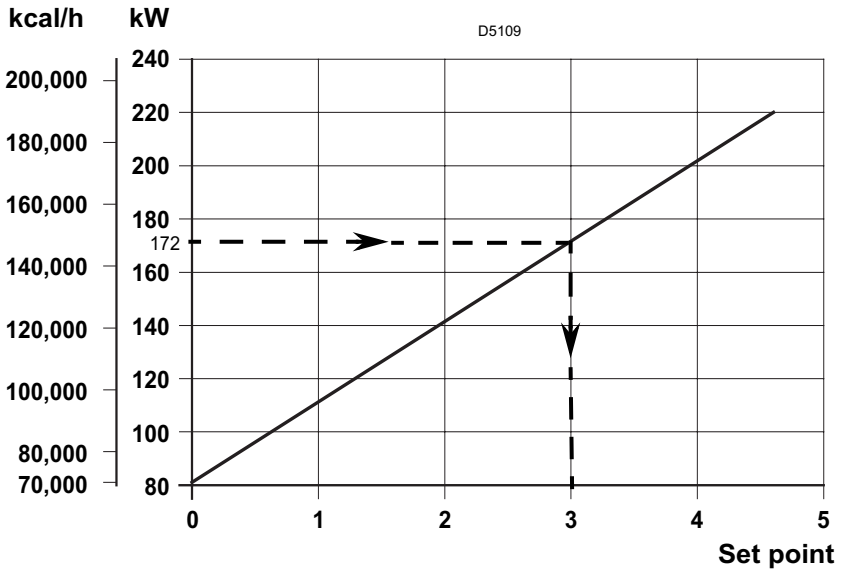
4.2 COMBUSTION HEAD SETTING

Loose 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 on a 155 kW boiler with an efficiency of 90%, the burner input is about 172 kW using the diagram, the combustion set point is **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**).*

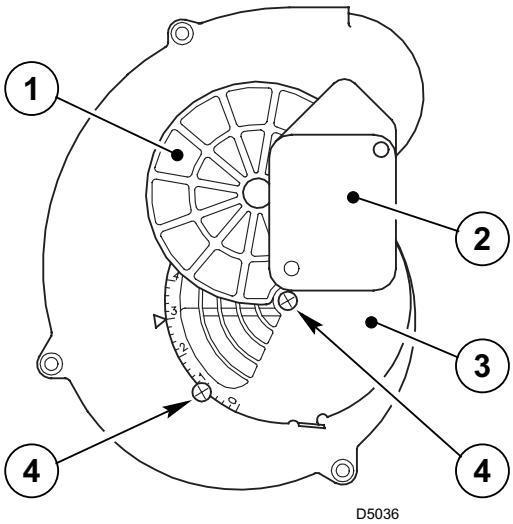


4.3 AIR DAMPER SETTING

The air damper (1) is operated by the actuator (2) and assures that the air damper is fully open before the burner start cycle begins .

The regulation of the air-rate is made by adjusting the fixed air damper **(3)**, after loosing the screws **(4)**.

When the optimal regulation is reached, **screw tight the screws (4)** to assure a free movement of the mobile air damper **(1)**.



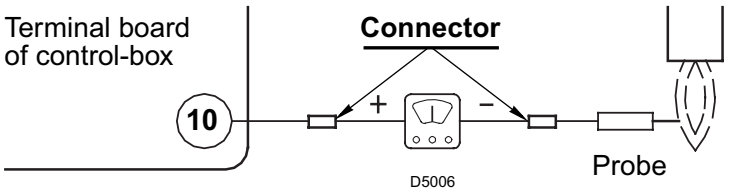
4.4 COMBUSTION CHECK

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 % $\lambda = 1.2$	$\lambda = 1.3$	CO mg/kWh	NO_x mg/kWh
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

IONIZATION CURRENT

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

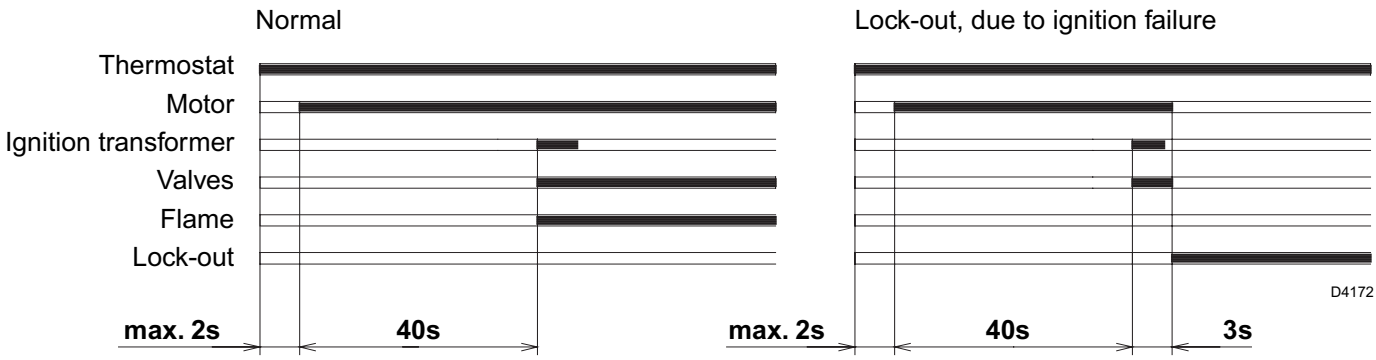


4.5 AIR PRESSURE SWITCH

The air pressure switch is set after all other adjustments have been made. Begin with the switch at the lowest setting. With the burner working at the minimum output, adjust the dial clockwise, increasing its value until the burner shuts down. Now reduce the value by one set point, turning the dial anti-clockwise.
Check for reliable burner operation, if the burner shuts down, reduce the value by a half set point.

Attention:
To comply with the EN 676 standard, the air pressure switch must operate when the CO value exceeds 1% (10,000 ppm).
To check this, insert a combustion analyser in the flue, slowly reduce the burner air setting and verify that the burner shuts down by the action of the air pressure switch before the CO value exceeds 1%.

4.6 BURNER START-UP CYCLE



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

4.7 START-UP CYCLE DIAGNOSTICS

During start-up, indication is according to the followin 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	

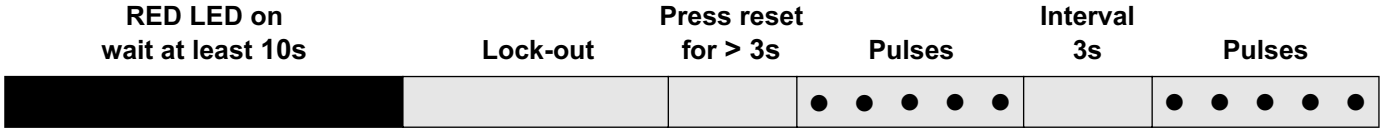
4.8 RESETTING THE CONTROL BOX AND USING DIAGNOSTICS

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.



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 ...

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 ● ● ●	Min. air pressure switch does not close: – air pressure switch faulty; – air pressure switch incorrectly regulated; – max. air pressure switch triggered (if installed).
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.
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.

5. 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:

● CO_2 (%) content ● Smoke temperature at the chimney ● CO content (ppm).

6. 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

FAULTS	SOLUTIONS
The burner does not start at the limit thermostat closing.	Gas is not supplied.
	The actuator is faulty. Replace.
	The gas pressure switch does not close its contact due to incorrect setting or a faulty switch.
	The air pressure switch has changed over to the operational position.
The burner does not pass through the pre-purge and locks out.	The air pressure switch does not change over: it has failed or the air pressure is too low *(combustion head incorrectly set).*
	Flame simulation exists *(or the flame really lights).*
The burner locks out, after the pre-purge period, because the flame does not ignite.	The gas valve pass too little gas *(low pressure in the gas pipework).*
	The valves are faulty.
	The ignition arc is irregular or not present.
	The air has not been purged from the pipe.
The burner goes through the normal pre-purge, the flame ignites but the burner locks out within 3 seconds after ignition.	The ionization probe is earthed or not in contact with the flame, or its wiring to the control box is broken, or there is a fault on its insulation to earth.
	The ionization current is weak *(lower than 3 μA).* (See chapter 4.7).
	The gas pressure switch is set too close to its working-pressure.
The burner continues to repeat the starting cycle without locking out.	This concerns a very particular irregularity, caused by the fact that the pressure in the gas mains is very close to the value to which the gas pressure switch has been set. Consequently, the sudden falling off in pressure at the opening of the valves causes the pressure switch to open, the valves immediately close and the motor stops. The pressure then increases, the pressure switch closes and the starting cycle can be repeated, and so on. This can be remedied by lowering the setting of the pressure switch.

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.