GB Forced draught gas burners

F Brûleurs gaz à air soufflé

Progressive two-stage or modulating operation

Fonctionnement à deux allures progressif ou modulant

RS

CODE	MODEL - MODÈLE	TYPE
3781620 - 3781622	RS 50/M MZ	826T1
3781621 - 3781623	RS 50/M MZ	826T1
3781682	RS 50/M MZ	826T80
3781683	RS 50/M MZ	826T80

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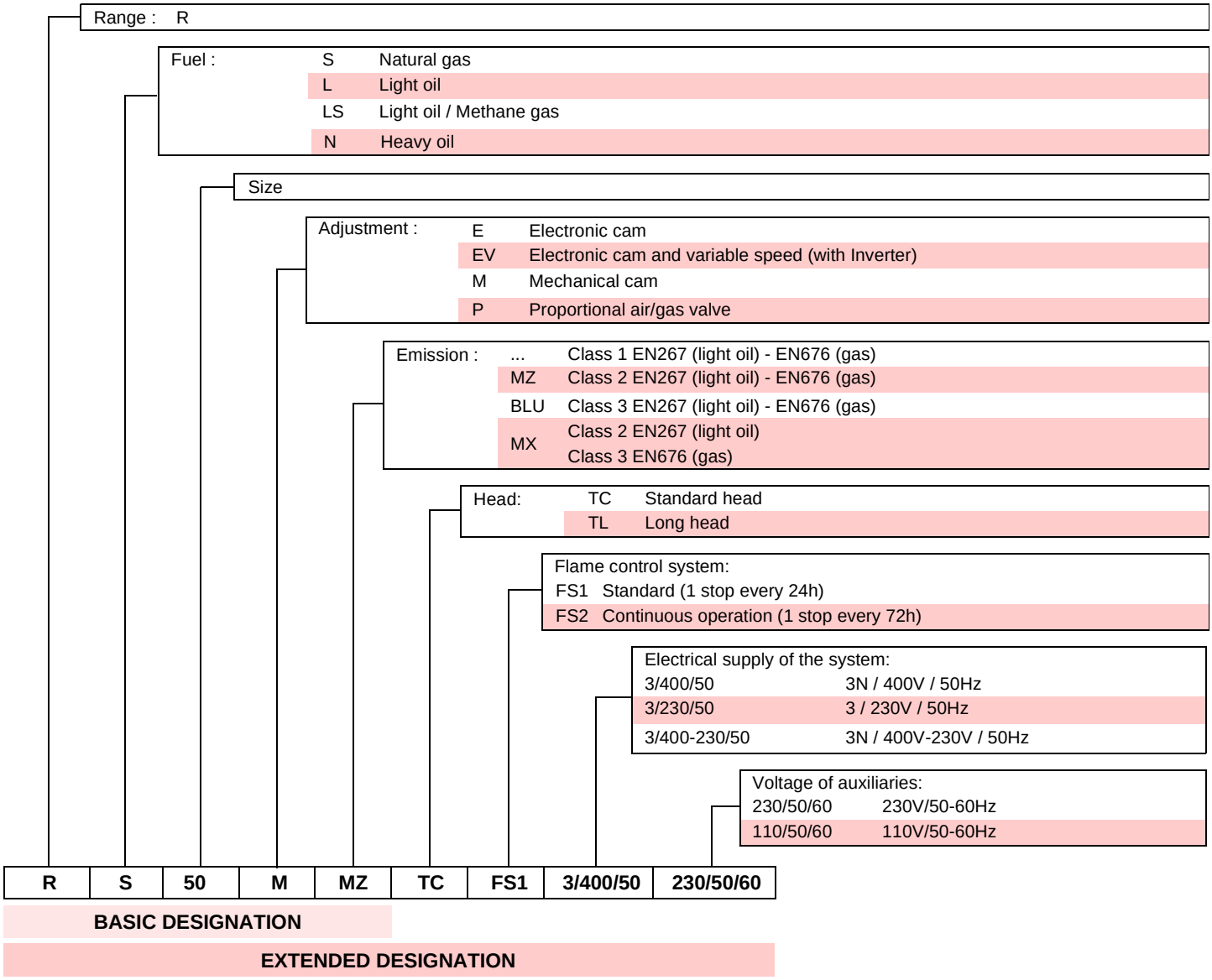
3 Technical description of the burner

3.1 Burner designation



3.2 Models available

Designation		Voltage	Code
RS 50/M MZ	TC	3 ~ 400/230V 50Hz	3781620 - 3781622
RS 50/M MZ	TL	3 ~ 400/230V 50Hz	3781621 - 3781623
RS 50/M MZ	TC	3 ~ 380/460/480V 60Hz	3781682
RS 50/M MZ	TL	3 ~ 380/460/480V 60Hz	3781683

3.3 Burner categories - Countries of destination

Country of destination	Gas category
AT - CH - CZ - DK - EE - ES - FI - GB - GR - HU - IE IS - IT - LT - LV - NO - PT - SE - SI - SK - TR	I2E
NL	I2L
FR	I2Er
DE	I2ELL
BE	I2E(R)B
LU - PL	I2E

3.4 Technical data

Model			RS 50/M MZ	
Type			826T1	826T80
Output (1)	maximum	kW Mcal/h	285 - 630 245 - 542	
	minimum	kW Mcal/h	80 69	
Fuel			Natural gas: G20 - G23 - G25	
Gas pressure at max. output (2) - Gas: G20/G25		mbar	8.5 - 11.3	
Operation			Intermittent (min. 1 stop in 24 hours)	
Standard applications			Boilers: water, steam, diathermic oil	
Ambient temperature		°C	0 - 40	
Combustion air temperature		°C max	60	
Main electrical supply Control circuit power supply			3 ~ 400/230V 50Hz 1N ~ 230V 50Hz	3 ~ 380/460/480V 60Hz 1N ~ 220V 60Hz
Fan motor (rating) Operating current Acceleration current		rpm V kW A A	2800 220/240 - 380/415 0.65 3 - 1.7 13.5 - 7.7	3400 208/230 - 380/460/480 0.56 3.6 (ʎʎ) - 1.8 (ʎ) 22 - 20.5
Ignition transformer		V1 - V2 I1 - I2	230 V - 1 x 8 kV 1 A - 20 mA	
Absorbed electrical power		kW max	0.75	0.66
Protection level			IP 44	
Noise levels (3)	Sound pressure Sound power	dB(A)	72 83	

(1) Reference conditions: Ambient temperature 20°C - Gas temperature 15°C - Barometric pressure 1013 mbar - Altitude 0 m above sea level.
(2) Gas pressure on the pipe coupling test point 8) (Fig. 5) with zero pressure in the combustion chamber and at maximum burner output.
(3) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum rated output. The sound power is measured with the “Free Field” method, as per EN 15036, and according to an “Accuracy: Category 3” measuring accuracy, as set out in EN ISO 3746.

3.5 Burner weight

The weight of the burner complete with its packaging is shown in table.

mm	kg
RS 50/M MZ	41

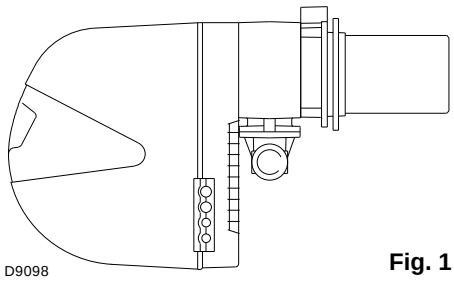


Fig. 1

3.6 Overall dimensions

The dimensions of the burner are shown in Fig. 2.
Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part drawn back on the guides.
The dimensions of the open burner are indicated by position H.

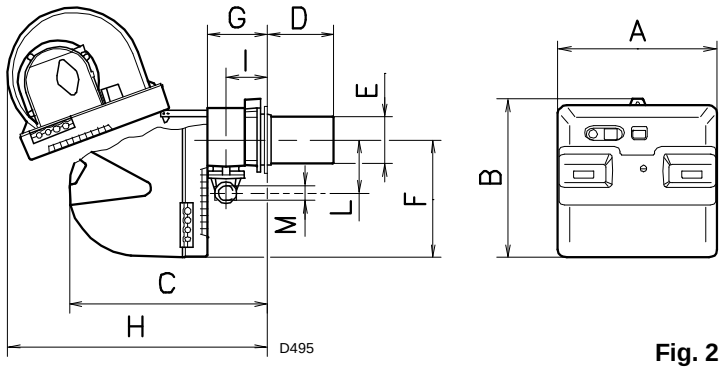


Fig. 2

mm	A	B	C	D(1)	E	F	G	H	I	L	M
RS 50/M MZ	476	474	580	216 - 351	152	352	164	810	108	168	1"1/2

(1) Blast tube: short-long

3.7 Firing rates

The **maximum output** is chosen within area A.

The **minimum output** must not be lower than the minimum limit of the diagram.

Important
The firing rate was obtained considering an ambient temperature of 20°C and an atmospheric pressure of 1013 mbar (approx. 0 m above sea level), with the combustion head adjusted as shown in Ch. 4.6.

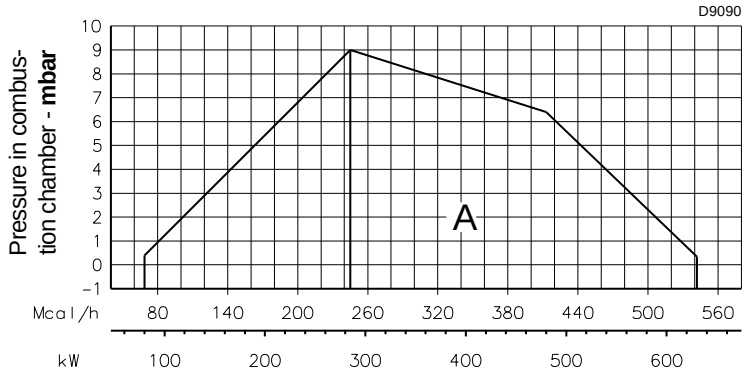


Fig. 3

The firing rates were obtained in special test boilers, according to EN 676 regulations.
Fig. 4 indicates the diameter and length of the test combustion chamber.

Example
Output 407 kW (350 Mcal/h):
diameter 60 cm,
length 1.5 m.

The coupling is ensured when the boiler is EC type-approved; for boilers or ovens with combustion chambers of very different dimensions compared to those shown in the diagram of Fig. 4, preliminary checks are recommended.

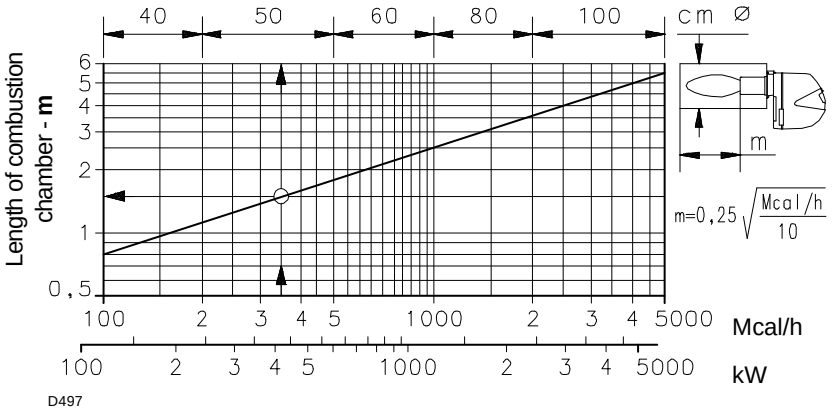


Fig. 4

3.8 Burner components

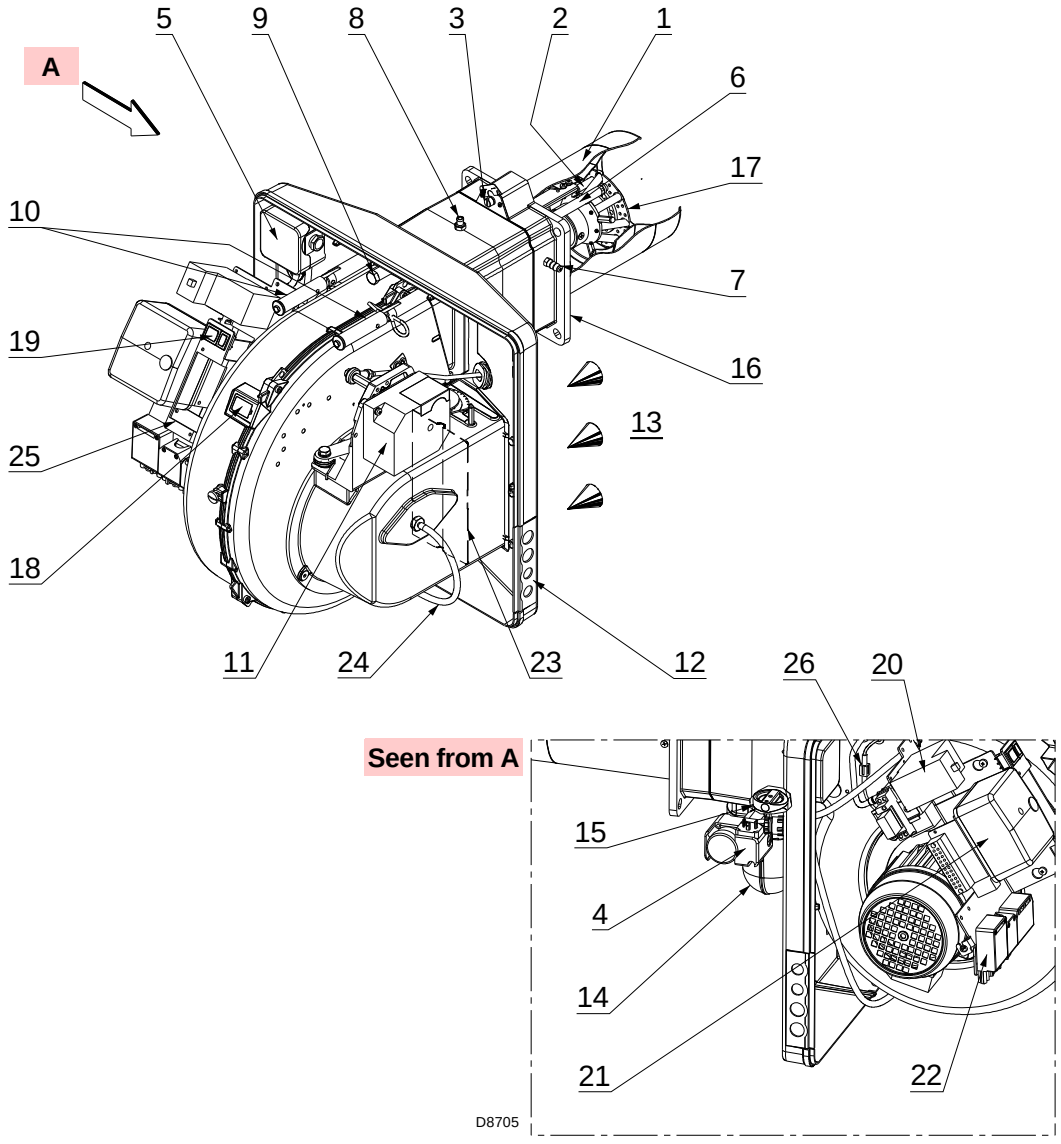


Fig. 5

1 Combustion head
2 Ignition electrode
3 Screw for combustion head adjustment
4 Maximum gas pressure switch
5 Air pressure switch (differential operating type)
6 Flame sensor probe
7 Air pressure socket
8 Gas pressure test point and head fixing screw
9 Screw securing fan to pipe coupling
10 Slide bars for opening the burner and inspecting the combustion head
11 Servomotor controlling the gas butterfly valve and the air damper valve (by means of an adjustable profile cam mechanism).
When the burner is not operating the air gate valve is fully closed in order to reduce heat dispersion from the boiler due to the flue draught which draws air from the fan suction inlet.
12 Plate with four hole knock-outs for electrical cable routing
13 Fan air inlet
14 Gas input pipe
15 Gas butterfly valve
16 Boiler fixing flange
17 Flame stability disc
18 Flame inspection window
19 Power switch for: automatic - manual - off
Button for: power increase - power reduction
20 Motor contact maker and thermal relay with reset button
21 Control box with lockout pilot light and lockout reset button
22 Terminal board for electrical wiring
23 Air damper
24 Tube connecting the fan suction line to the air pressure switch
25 Bracket for application of output power regulator RWF
26 Plug-socket on ionisation probe cable

3.9 Burner equipment

The burner is supplied complete with:
➤ Gas train flange
➤ Flange gasket
➤ 4 screws to fix the M8x25 flange:
➤ 4 screws to fix the M8x25 burner flange to the boiler
➤ Thermal insulation screen
➤ N° 6 cable grommets for electrical wiring
➤ Instruction manual
➤ Spare parts list

3.10 Control box for the air/fuel ratio

Introduction
The RMG/M 88.62... control box included in burners of **RS** range is designed to control and start up forced draught gas burners with intermittent operation.
In compliance with:
- Technical Standard EN676 (gas burners)
- Technical Standard EN298 (gas appliances)

Fig. 6

DANGER

All the installation, maintenance and disassembly operations must be carried out with the electricity supply disconnected.
To avoid damaging things or injuring people, do not open or alter the control box.

WARNING

The installation of the burner must be carried out by qualified personnel, in compliance with the standards and regulations of the laws in force.

Technical Data

Electrical supply	AC 220.....240V +10% / -15%
Frequency	50.....60 Hz +/- 6%
Internal fuse	T6,3H250V
Operation below the nominal value of electrical supply	
Minimum operation value on reduction of electrical supply below nominal value	approx. AC 160V
Minimum operation value on increase in electrical supply towards nominal value	approx. AC 175V
Maximum load of the contacts:	
Alarm exit Nominal power supply Maximum current	 AC 230V, 50/60 Hz 0.5 A
Allowed cable length Thermostat Air pressure switch CPI Gas pressure switch Flame detector Remote reset	 max. 20 m at 100 pF/m max. 1 m at 100 pF/m max. 1 m at 100 pF/m max. 20 m at 100 pF/m max. 1 m max. 20 m at 100 pF/m
M4 screws tightening torque	max. 0.8 Nm

3.11 Servomotor

The servomotor provides simultaneous adjustment for the air damper, by means of the adjustable profile cam and the gas butterfly valve.
The angle of rotation of the servomotor is equal to the angle on the graduated sector controlling the gas butterfly valve.
The servomotor rotates by 90° in 24 seconds.

WARNING

Do not alter the factory setting for the 4 cams; simply check that they are set as indicated below:

Cam I: 90°
Limits rotation toward maximum position.
When the burner is at MAX output, the gas butterfly valve must be fully open: 90°.

Cam II: 0°
Limits rotation toward minimum position.
When the burner is shut down, the air damper and gas butterfly valve must be closed: 0°.

Cam III: 15°
Adjusts the ignition position and the MIN output.

Cam IV: integrated to cam III.

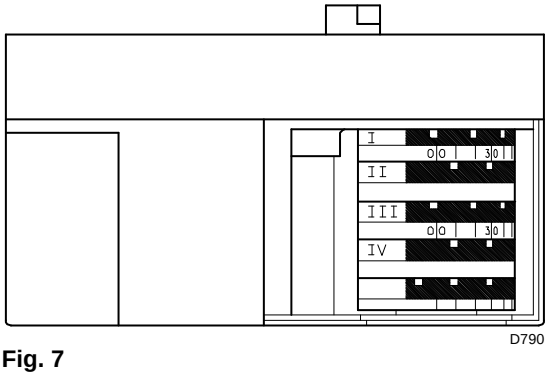


Fig. 7

4 Installation

4.1 Notes on safety for the installation

After carefully cleaning all around the area where the burner will be installed, and arranging the correct lighting of the environment, proceed with the installation operations.

DANGER

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

WARNING

The installation of the burner must be carried out by qualified personnel, as indicated in this manual and in compliance with the standards and regulations of the laws in force.

4.2 Handling

The packaging of the burner includes a wooden platform, so it is possible to move the burner (still packaged) with a transpallet truck or fork lift truck.

WARNING

The handling operations for the burner can be highly dangerous if not carried out with the greatest attention: keep any unauthorised people at a distance; check the integrity and suitableness of the available means of handling.
Check also that the area in which you are working is empty and that there is an adequate escape area (i.e. a free, safe area to which you can quickly move if the burner should fall).
During the handling, keep the load at not more than 20-25 cm from the ground.

CAUTION

After positioning the burner near the installation point, correctly dispose of all residual packaging, separating the various types of material.
Before proceeding with the installation operations, carefully clean all around the area where the burner will be installed.

4.3 Preliminary checks

Checking the consignment

CAUTION

After removing all the packaging, check the integrity of the contents. In the event of doubt, do not use the burner; contact the supplier.

The packaging elements (wooden cage or cardboard box, nails, clips, plastic bags, etc.) must not be abandoned as they are potential sources of danger and pollution; they should be collected and disposed of in the appropriate places.

Checking the characteristics of the burner

Check the identification label of the burner, showing:

- ➤ the model (see **A** in Fig. 8) and type of burner (**B**);
- ➤ the year of manufacture, in cryptographic form (**C**);
- ➤ the serial number (**D**);
- ➤ the data for electrical supply and the protection level (**E**);
- ➤ the electrical input power (**F**);
- ➤ the types of gas used and the relative supply pressures (**G**);
- ➤ the data of the burner's minimum and maximum output possibilities (**H**) (see Firing rate)
  Warning. The output of the burner must be within the boiler's firing rate;
- ➤ the category of the appliance/countries of destination (**I**).

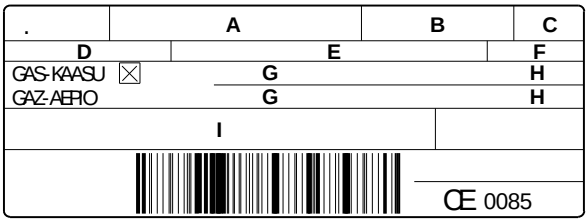


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Fig. 8

WARNING

A burner label that has been tampered with, removed or is missing, along with anything else that prevents the definite identification of the burner and makes any installation or maintenance work difficult.

4.4 Operating position

The burner is designed to work only in the positions **1**, **2**, **3 and 4**.
Installation **1** is preferable, as it is the only one that allows the maintenance operations as described in this manual. Installations **2**, **3 and 4** permit operation but make maintenance and inspection of the combustion head more difficult.

Any other position could compromise the correct operation of the appliance. Installation **5** is prohibited for safety reasons.

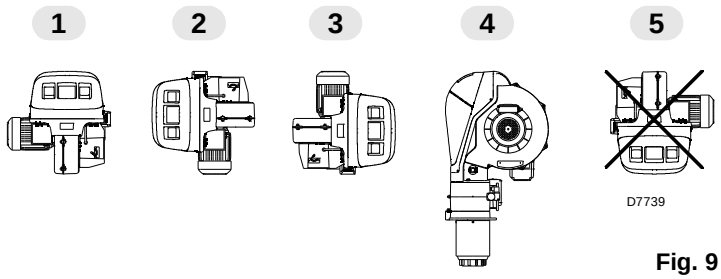


Fig. 9

4.5 Securing the burner to the boiler

Preparing the boiler

Boring the boiler plate
Make holes in the plate shutting off the combustion chamber, as illustrated in Fig. 10.
The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

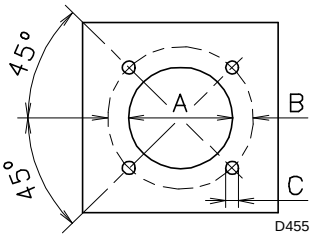


Fig. 10

mm	A	B	C
RS 50/M MZ	160	224	M8

Length of the blast tube
The length of the blast tube must be selected according to the indications provided by the manufacturer of the boiler, and in any case it must be greater than the thickness of the boiler door complete with its refractory.
The available lengths L are those indicated in the table below.

Blast tube	short	long
RS 50/M MZ	216 mm	351 mm

For boilers with front flue passes 13) or flame inversion chamber, a protection in refractory material 11) must be inserted between the boiler fettling 12) and the blast tube 10).
This protection must not compromise the extraction of the blast tube. See Fig. 11.
For boilers with a water-cooled frontal, a refractory lining is not necessary 11)-12) unless expressly requested by the boiler manufacturer.

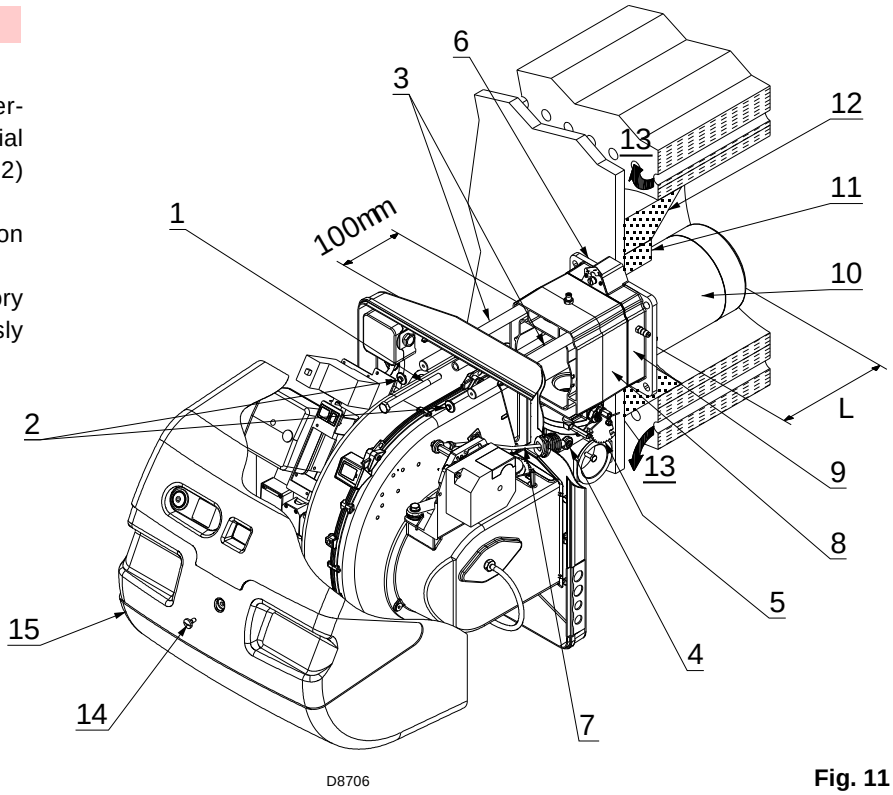


Fig. 11

Securing the burner to the boiler

Before fixing the burner to the boiler, check from the opening of the blast tube that the probe and the electrode are correctly positioned, as in Fig. 12.

If, in the previous check, the position of the probe or electrode was not correct, remove the screw 1)(Fig. 13), extract the inner part 2)(Fig. 13) of the head, and calibrate them.

Do not rotate the probe: leave it as in Fig. 12 since if it is located too close to the ignition electrode, the control box amplifier may be damaged.

Separate the combustion head from the rest of the burner, Fig. 11.

To do this, proceed as follows:
- remove screw 14) and withdraw the cover 15);
- disengage the articulated coupling 4) from the graduated sector 5);
- remove screws 2) from the two slide bars 3);
- remove screw 1) and pull the burner back on slide bars 3) by about 100 mm;
- disconnect the wires from the probe and the electrode and then pull the burner completely off the slide bars, after removing the split pin from the slide bar 3).

Once this operation has been carried out, fix the flange 9)(Fig. 11) to the boiler plate, interposing the insulating gasket 6)(Fig. 11) supplied.
Use the 4 screws supplied, with a tightening torque of 35 ÷ 40 Nm, after protecting their thread with anti-seize products.
The seal between burner and boiler must be airtight. After the start-up (see Ch. 5.3), check there is no leakage of flue gases into the external environment.

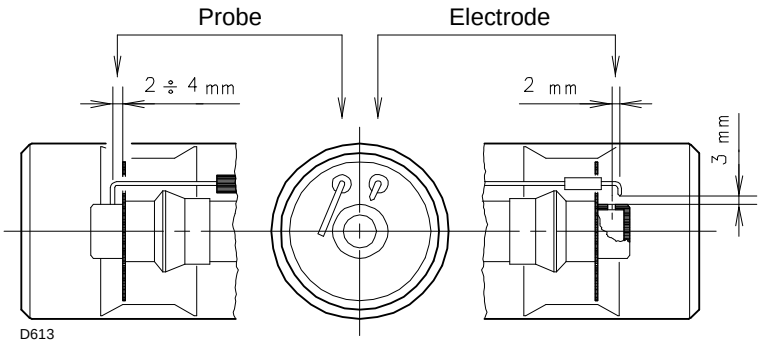


Fig. 12

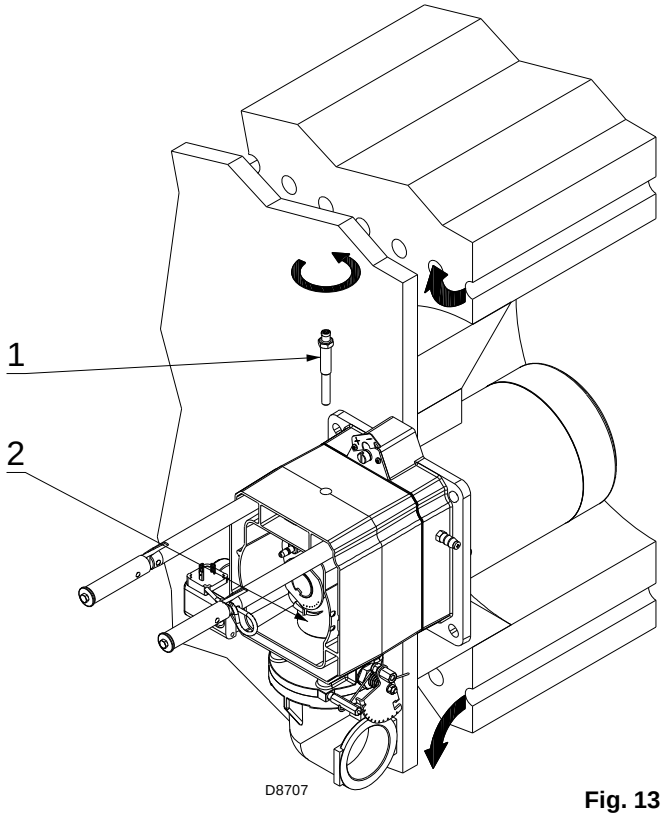


Fig. 13

4.6 Combustion head adjustment

At this stage of installation, the blast tube and the pipe coupling are secured to the boiler as shown in Fig. 15.
Therefore it is particulary easy to carry out the combustion head adjustments: air and gas.

> **WARNING**
> **MINIMUM OUTPUT MODULATIONS:**
> when the MIN output is between 80 - 129 kW, the ring nut 2) value must be adjusted to 0.

There are two possible cases:

The MINIMUM burner output is over 130 kW.

In the diagram of Fig. 16, find the notch at which both air and gas can be adjusted according to the MAX output, then:

Air adjustment

Rotate the screw 4) until the notch you have found corresponds with the front surface 5) of the flange.

Central gas adjustment

Loosen the screw 1) and turn ring nut 2) until the notch identified is aligned with index 3).
Tighten the screw 1) fully down.

Example:
the burner varies output between MIN = 130 and MAX = 460 kW.
The gas and air adjustments for this output are carried out on notch 3, like in Fig. 15.
The loss of pressure in the combustion head is shown in column 1 on page 35.

NOTE
The dicagram shows the ideal settings for the ring nut 2).
If ring nut 2) is only partially opened, the ring nut can be further opened 1-2 notch if pressure in the gas feeding network is very low and pressure indicated on page 35 in MAX gas cannot be reached.

To continue the preceding example, on page 35, it can be seen that 5.4 mbar of pressure in socket 6) are needed for a burner with 460 kW of power. If this pressure is not available, open 4-5 notch ring nut 2).
Check that the combustion is satisfactory and without pulsations.

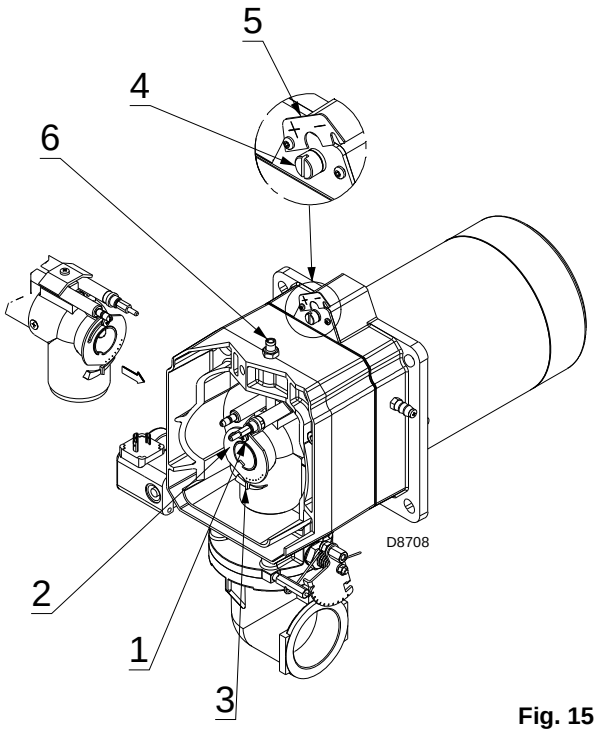


Fig. 15

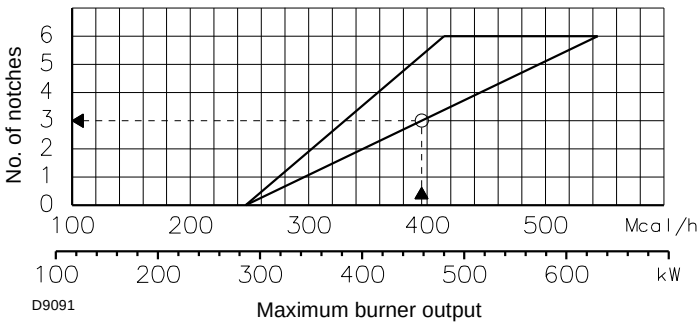


Fig 16

The MINIMUM burner output is lower than 130 kW.

Air adjustment

The same as the previous case: follow the diagram.

Central gas adjustment

The ring nut 2) is always adjusted to position 0, irrespective of the MAX burner output.

Once the combustion head adjustment is completed:

- ➤ reassemble the burner 4) on the slide bars 3) at about 100 mm from the pipe coupling 5) - burner in the position shown in Fig. 11;
- ➤ insert the probe and electrode cables, then slide the burner as far as the pipe coupling - burner in the position shown in Fig. 17;
- ➤ refit the screws 2) on the slide bars 3);
- ➤ fix the burner to the pipe coupling with the screw 1).
- ➤ refit the split pin into one of two slide bars 3).
- ➤ re-couple the articulated coupling 6) to the graduated sector 7).

CAUTION

When fitting the burner on the two guides, it is advisable to gently draw out the high voltage cable and flame detection probe cable until they are slightly taut.

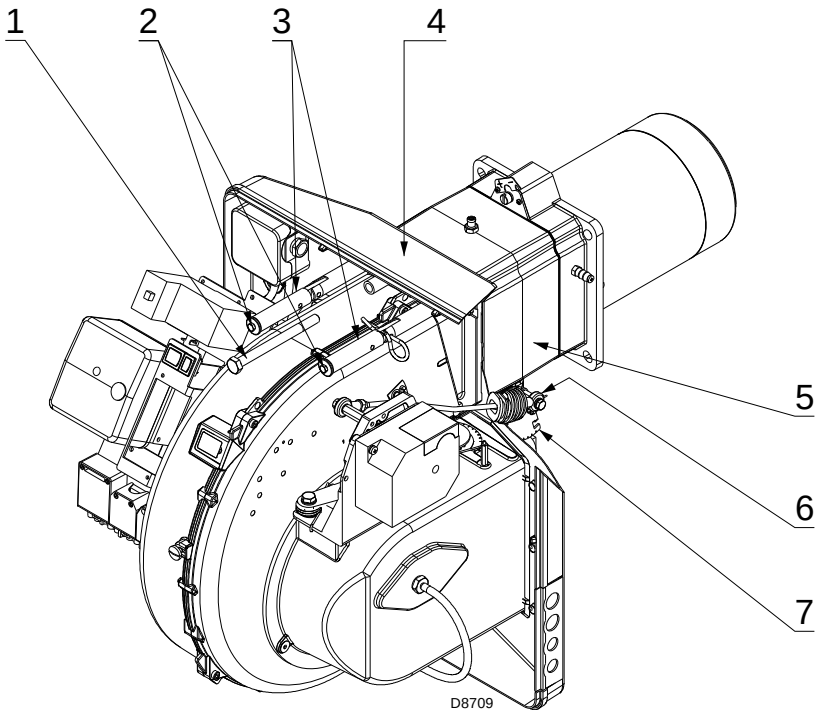


Fig. 17

4.7 Assembly of the gas train

➤ The gas train is type-approved according to standard EN 676 and is supplied separately from the burner, with the code indicated in Appendix B.

➤ The gas train can enter the burner from the right or left side, depending on which is the most convenient, see Fig. 18.

➤ The gas train must be connected to the gas attachment 1)(Fig. 18) with the flange 2), the gasket 3) and the screws 4) supplied with the burner.

➤ The gas solenoids must be as close as possible to the burner, to ensure that the gas reaches the combustion head within the safety time of 3s.

➤ Ensure that the maximum pressure necessary for the burner is included in the calibration field of the pressure adjuster (colour of the spring).

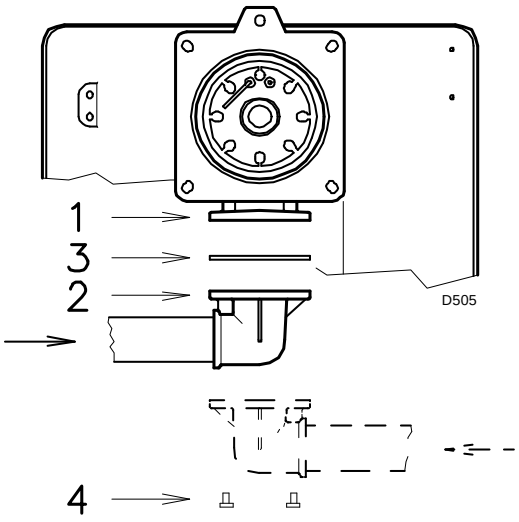


Fig. 18

WARNING

See the accompanying instructions for the adjustment of the gas train.

1 - Gas input pipe
2 - Manual valve
3 - Vibration damping joint
4 - Pressure gauge with pushbutton cock
5 - Filter
6 - Pressure adjuster (vertical)
7 - Minimum gas pressure switch
8 - Safety solenoid VS (vertical)
9 - Adjustment solenoid VR (vertical)
10 - Two adjustments:
  • ignition delivery (rapid opening)
  • maximum delivery (slow opening)
11 - Standard issue burner gasket with flange
12 - Gas adjustment butterfly valve
13 - Burner
14 - Valve 8)-9) leak detection control device.
15 - In compliance with the EN 676 standard, gas valve leak detection control devices are compulsory for burners with maximum outputs over 1200 kW.
16 - Gas train/burner adaptor
17 - Maximum gas pressure switch
18 - P1-Pressure at combustion head
19 - P2-Pressure down-line from the pressure adjuster
20 - P3-Pressure upline the filter
L - Gas train supplied separately with the code indicated in Appendix B
L1 - The responsibility of the installer

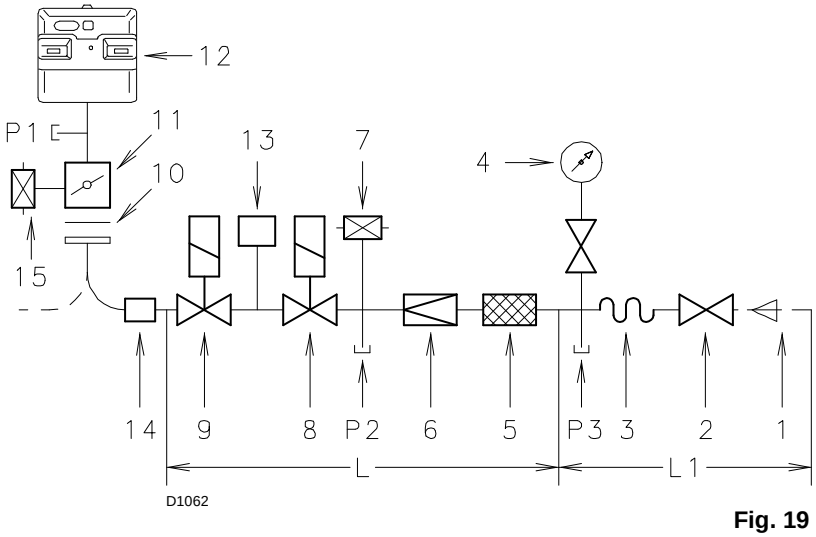


Fig. 19

The losses of load along the gas supply line are indicated in Appendix C.

4.8 Electrical wiring

Notes on safety for the electrical wiring

- ➤ The electrical wiring must be carried out with the electrical supply disconnected.
- ➤ Electrical wiring must be carried out by qualified personnel and in compliance with the regulations currently in force in the country of destination. Refer to the electrical layouts given in Appendix A.
- ➤ RIELLO declines all responsibility for modifications or connections different from those shown in the electrical layouts.
- ➤ Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual. See Fig. 8.
- ➤ Do not invert the neutral with the phase in the electrical supply line.Any inversion would cause a lockout due to ignition failure.
- ➤ RS50/M MZ burners have been approved for intermittent operation. This means they should compulsorily be stopped at least once every 24 hours to enable the control box to perform checks of its own start-up efficiency. Normally, burner stopping is guaranteed by the boiler's thermostat/pressure switch.
  If this is not the case, a time switch should be fitted in series to IN to provide for burner shutdown at least once every 24 hours. Refer to the electrical layouts given in Appendix A.

DANGER

- ➤ The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards. It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel. Do not use the gas tubes as an earthing system for electrical appliances.
- ➤ The electrical system must be suitable for the maximum input power of the device,as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for the input power of the appliance.
- ➤ For the main power supply of the device from the electricity mains:
  - do not use adapters, multiple sockets or extensions;
  - use an omnipolar switch with an opening of at least 3 mm between the contacts, as indicated by the current safety standards.
- ➤ Do not touch the device with wet or damp body parts and/or in bare feet.
- ➤ Do not pull the electric cables.

If the hood is still present, remove it and proceed with the electrical wiring according to the layouts shown in Appendix A.

Use flexible cables in compliance with the EN 60 335-1 standard.

All cables to be connected to the plugs 7 (Fig. 20) of the burner are passed through supplied cable grommets that must be inserted into the holes of the left-hand and right-hand plate, after having unscrewed screws 8), opened the plate in part 9) and 10) and removed the thin diaphragm that blocks the holes.
The fairleads and hole press-outs can be in various ways; by way of example we indicate the following mode:

1-Pg 11 Three-phase power supply
2-Pg 11 Single-phase power supply
3-Pg 9 Remote control TL
4-Pg 9 Remote control TR or probe (RWF)
5-Pg 11 Gas valves (when RG1/CT or LDU 11 leak detection control device is not fitted)
6-Pg 11 Gas pressure switch or valve leak detection control device

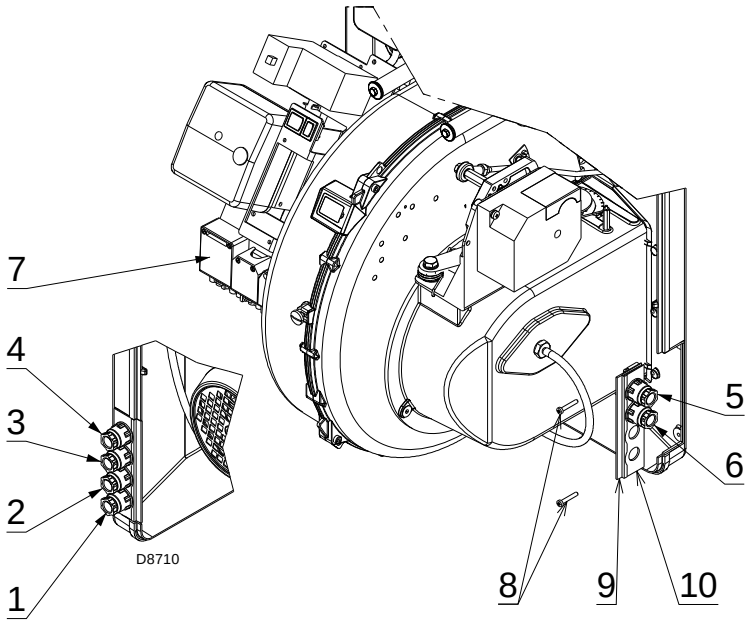


Fig. 20

4.9 Calibration of the thermal relay

The thermal relay serves to avoid damage to the motor due to an excessive absorption increase or if a phase is missing.

The protection is in any case ensured even if the minimum value of the thermal relay scale is over the rating absorption of the motor.
This occurs when the motor power supply is 400V.
To reset, in case of an intervention of the thermal relay, press button 1) of Fig. 21.

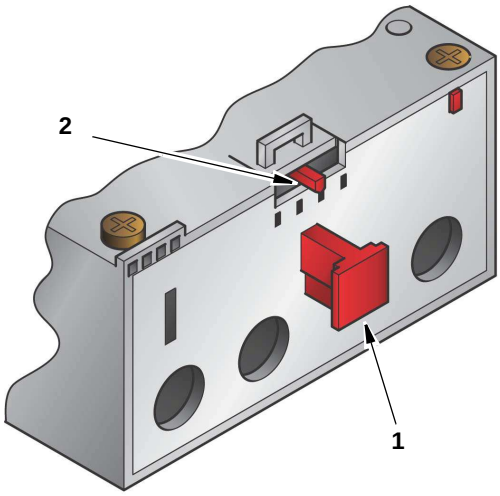


Fig. 21

Voltage 3 ~ 400/230V - 50Hz

• If the motor is star-driven, **400V**, the cursor must be positioned on "MIN".
• If it is delta-driven, **230V**, the cursor is positioned on "MAX".
Even if the scale of the thermal relay does not include rated motor absorption at 400V, protection is still ensured in any case.

NOTE
The RS 50/M MZ models leave the factory preset for **400V** power supply.
If **230V** power supply is used, change the motor connection from star to delta and change the calibration of the thermal relay as well.

Voltage 3 ~ 380/460/480V - 60Hz

• If the motor is star-driven, **380/460/480V**, the cursor must be positioned on "MIN".
• Even if the scale of the thermal relay does not include rated motor absorption at **380/460/480V**, protection is still ensured in any case.

NOTE
The burners leave the factory preset for **380/460/480V** power supply.

5.1 Notes on safety for the first start-up

WARNING

The first start-up of the burner must be carried out by qualified personnel, as indicated in this manual and in compliance with the standards and regulations of the laws in force.

WARNING

Check the correct working of the adjustment, command and safety devices.

5.2 Operations before start-up

- ➤ Ensure that the gas supply company has carried out the supply line vent operations, eliminating air or inert gases from the piping.
- ➤ Slowly open the manual valves situated upstream of the gas train.
- ➤ Adjust the minimum gas pressure switch (Fig. 22) to the start of the scale.
- ➤ Adjust the maximum gas pressure switch (Fig. 23) to the end of the scale.
- ➤ Adjust the air pressure switch (Fig. 24) to the start of the scale.

Minimum gas pressure switch

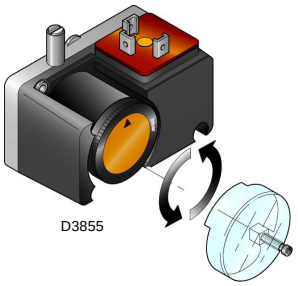


Fig. 22

Maximum gas pressure switch

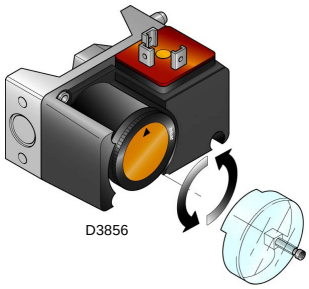


Fig. 23

Air pressure switch

Fig. 24

- ➤ Check the gas supply pressure by connecting a pressure gauge to the pressure test point 1)(Fig. 25) of the minimum gas pressure switch: it must be lower than the maximum allowed pressure of the gas train, as shown on the characteristics label.

DANGER

An excessive gas pressure can damage the components of the gas train and lead to a risk of explosion.

- ➤ Bleed the air from the piping of the gas train, connecting a plastic tube to the pressure test point 1)(Fig. 25) of the minimum gas pressure switch.
  Take the vent tube outside the building so you can notice the smell of gas.
- ➤ Connect two lamps or testers to the two gas line solenoids to check the exact moment at which voltage is supplied.
  This operation is unnecessary if each of the two solenoids is equipped with an indicator light that signals voltage passing through.

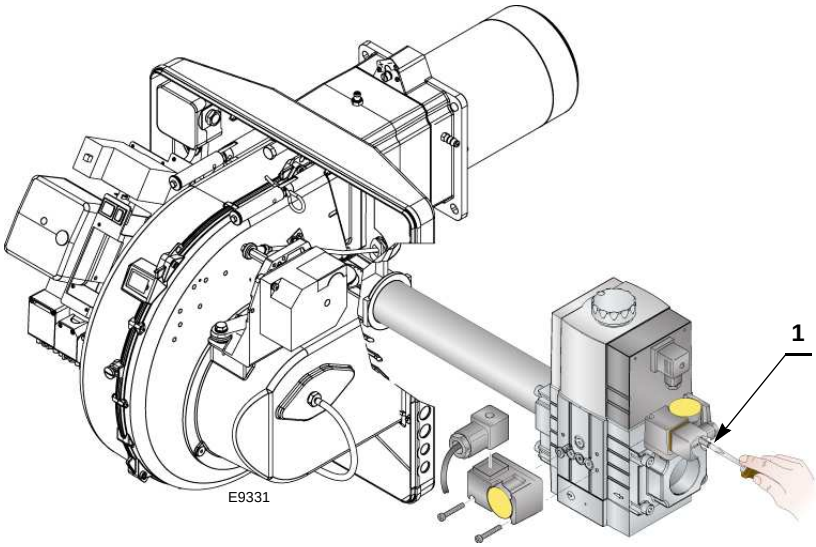


Fig. 25

WARNING

Before starting up the burner, it is good practice to adjust the gas train so that ignition takes place in conditions of maximum safety, i.e. with gas delivery at the minimum.

5.3 Burner start-up

Feed electricity to the burner via the disconnecting switch on the boiler panel.
Close the thermostats/pressure switches and turn the switch of Fig. 27 to position **"MAN"**.

DANGER

Make sure that the lights or testers connected to the solenoids, or the pilot lights on the solenoids themselves, indicate that no voltage is present.
If voltage is present, stop the burner **immediately** and check the electrical wiring.

As soon as the burner starts, check the direction of rotation of the fan blade, looking through the flame inspection window.

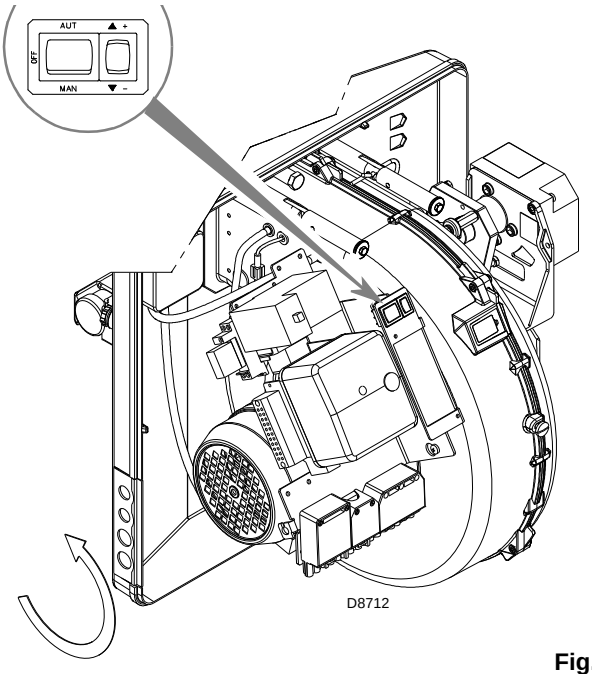


Fig. 26

5.4 Burner ignition

Having completed the checks indicated in the previous heading, ignition of the burner should be achieved. If the motor starts but the flame does not appear and the control box goes into lockout, reset and wait for a new ignition attempt.
If ignition is still not achieved, it may be that gas is not reaching the combustion head within the safety time period of 3 seconds. In this case increase gas ignition delivery.
The arrival of gas to the pipe coupling is shown by the pressure gauge.
Once the burner has ignited, proceed with the global adjustment of the burner.

5.5 Burner adjustment

The optimum adjustment of the burner requires an analysis of flue gases at the boiler outlet.
Adjust in sequence:
- ➤ Output upon ignition
- ➤ Maximum output
- ➤ Minimum output
- ➤ Intermediate outputs between Min. and Max.
- ➤ Air pressure switch
- ➤ Maximum gas pressure switch
- ➤ Minimum gas pressure switch

Output upon ignition

According to EN 676 standard.
Burners with MAX output up to 120 kW
Ignition can occur at the maximum operation output level. Example:
- ➤ max. operation output: 120 kW
- ➤ max. output upon ignition: 120 kW

Burners with MAX output above 120 kW
Ignition must occur at a lower output than the max. operation output.
If ignition output does not exceed 120 kW, no calculations are required. If ignition output exceeds 120 kW, the regulatory standard sets that the value be defined according to the control box safety time "ts":
for ts = 3s, ignition output must be equal to or less than 1/3 of the max. operation output.

Example
MAX operation output of 450 kW.
The ignition output must be equal to or less than 150 kW with ts = 3s.

In order to measure the ignition output:
- ➤ disconnect the plug-socket 26)(Fig. 5) on the ionisation probe cable (the burner will fire and then go into lockout after the safety time has elapsed);
- ➤ perform 10 ignitions with consecutive lockouts;
- ➤ on the meter, read the quantity of gas burned:
  this quantity must be equal to, or lower than, the quantity given by the formula, for ts = 3s:

$$Vg = \frac{\textbf{Qa} \text{ (max. burner delivery) } \textbf{x n x ts}}{\textbf{3600}}$$

Vg: volume supplied in ignitions carried out (Sm^3)
Qa: ignition delivery (Sm^3/h)
n: number of ignitions (10)
ts: safety time (sec)

Example for gas G 20 (9.45 kWh/Sm^3):
ignition output 150 kW
corresponding to 15.87 Sm^3/h.
After 10 ignitions with their lockouts, the delivery indicated on the meter must be equal to or less than:

$$Vg = \frac{\textbf{15.87 x 10 x 3}}{\textbf{3600}} = \textbf{0.132 Sm}^3$$

Maximum output

Max. output of the burner must be set within the firing rate range shown on page 7. In the above description, we left the burner switched on, working at MIN output.
Now press the button 2)(Fig. 27) "output increase", and keep it pressed until the servomotor has opened the air damper and the gas butterfly valve at 90°.

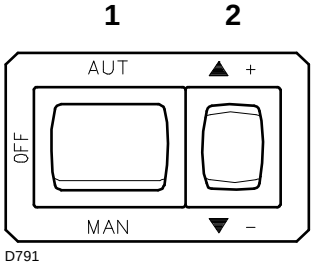


Fig. 27

Adjustment of gas delivery

Measure the gas delivery on the meter.

As a general rule, it can be seen from the table on page 35: just read gas pressure on the pressure gauge, see Fig. 36, and follow the indications given on page 35.

- If delivery needs to be reduced, diminish outlet gas pressure; if it is already very low, slightly close the VR adjustment valve.
- If delivery needs to be increased, increase the adjuster outlet gas pressure.

Adjusting air delivery

Progressively adjust the end profile of cam 4)(Fig. 28) by turning the cam adjustment screws as they are visible through the access opening 6 (Fig. 28).

- Turn the screws clockwise to increase air delivery.
- Turn the screws anti-clockwise to reduce air delivery.

Minimum output

MIN output must be selected within the firing rate range shown on page 7.

Press the button 2 (Fig. 27) "output reduction", and keep it pressed until the servomotor has closed the air damper and the gas butterfly valve at 15° (adjustment made in the factory).

Adjustment of gas delivery

Measure the gas delivery on the meter.

- If it is necessary to reduce it, reduce slightly the angle of cam III (Fig. 29) with small, regular movements, i.e. bring it from an angle of 15° to 13° - 11°....
- If it is necessary to increase it, press slightly the button "output increase" 2)(Fig. 27) (open by 10-15° the gas butterfly valve), increase the cam III angle (Fig. 29) with small, regular movements, i.e. bring it from an angle of 15° a 17° - 19°....
  Then press the button "output reduction" until the servomotor is in the position of minimum opening, and measure the gas output.

NOTE

The servomotor follows the adjustment of cam III only when the angle of the cam is reduced. If it is necessary to increase the angle of the cam, you must first increase the angle of the servomotor by means of the "output increase" key, then increase the angle of cam III, and finally bring the servomotor to the position of MIN output, with the "output reduction" key.

If it is necessary to adjust cam III, remove the cover 1)(Fig. 29), inserted with a trigger catch, as indicated in Fig. 29, extract the special key 2)(Fig. 29) from inside, and insert it in the notch of cam III.

Adjusting air delivery

Progressively adjust the end profile of cam 4)(Fig. 28) by turning the cam adjustment screws as they are visible through the access opening 6(Fig. 28).

It is preferable not to turn the first screw since this is used to set the air damper to its fully closed position.

Intermediate outputs

Adjustment of gas delivery

No adjustment of gas delivery is required.

Adjusting air delivery

Press the key 2)(Fig. 27) "output increase" a little so that a new screw 5)(Fig. 28) appears in the opening 6)(Fig. 28), adjust it until optimal combustion is obtained. Proceed in the same way with the other screws.

Take care that the cam profile variation is progressive.

Switch the burner off with switch 1)(Fig. 27), OFF position. Release the adjustable profile cam by setting the servomotor slot 2)(Fig. 28) in a vertical position and check several times that by rotating the cam forwards and backwards by hand, the movement is soft and smooth, without sticking.

As far as is possible, try not to move those screws at the ends of the cam that were previously adjusted for the opening of the air damper to MAX and MIN output.

NOTE

Once you have finished adjusting outputs MAX - MIN - INTERMEDIATE, check ignition once again: noise emission at this stage must be identical to the following stage of operation. If you notice any sign of pulsations, reduce the ignition stage delivery.

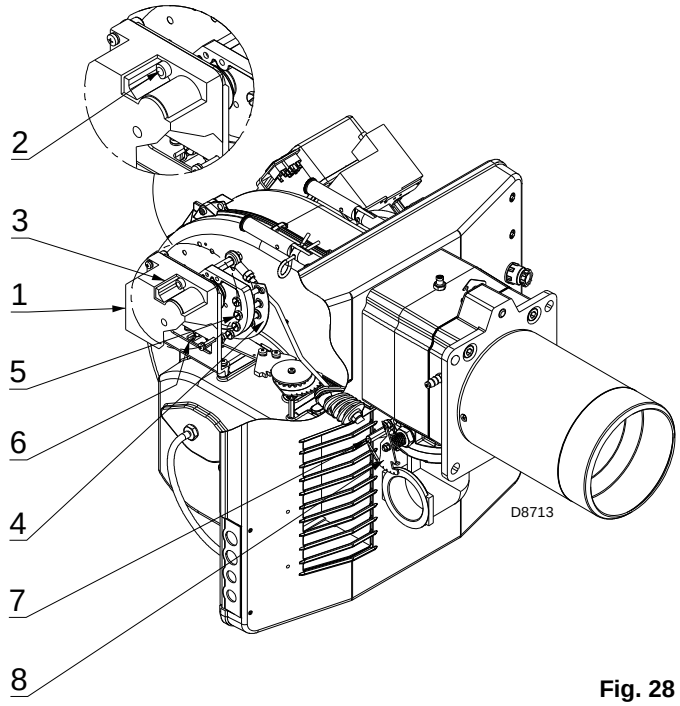


Fig. 28

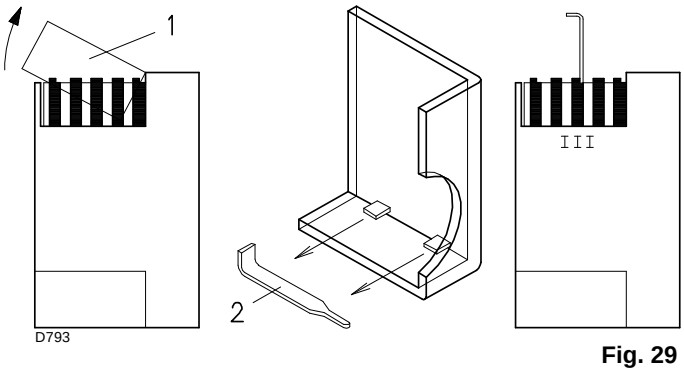


Fig. 29

1 Servomotor
2 ⊖ Cam 4 engaged/ ◍ disengaged
3 Cam cover
4 Adjustable profile cam
5 Screws for adjusting the adjustable profile
6 Opening for access to screws 5
7 Index for graduated sector 8
8 Graduated sector for gas butterfly valve

Air pressure switch

The air pressure switch can be connected in differential mode, see B)(Fig. 30), i.e. it is under pressure either by the depression or pressure generated by the fan. In this way the burner can operate even in combustion chambers in depression and with high modulation ratios: MIN / MAX outputs of up to 1/6.
In this case the air pressure switch needs no adjustment and its function is limited to controlling fan operation.

Warning: The use of the air pressure switch with differential operation is allowed only in industrial applications and where rules enable the air pressure switch to control only fan operation without any reference to CO limit.
In civil applications the pipe from the fan air inlet should be removed, see A)(Fig. 30), and adjust the pressure switch as follows.

Air pressure switch connected as in A)(Fig. 30):
The air pressure switch is set after all other adjustments have been made. Begin with the switch at the start of the scale.
With the burner operating at MIN output, increase adjustment pressure by slowly turning the relative knob clockwise until the burner locks out.
Then turn the knob anticlockwise by about 20% of the set point and repeat burner start-up to ensure it is correct.
If the burner locks out again, turn the knob anticlockwise a little bit more.

Warning: as a rule, the air pressure switch must limit the CO in the fumes to less than 1% (10,000 ppm). To check this, insert a combustion analyser into the chimney, slowly close the fan suction inlet (for example with cardboard) and check that the burner locks out, before the CO in the fumes exceeds 1%.

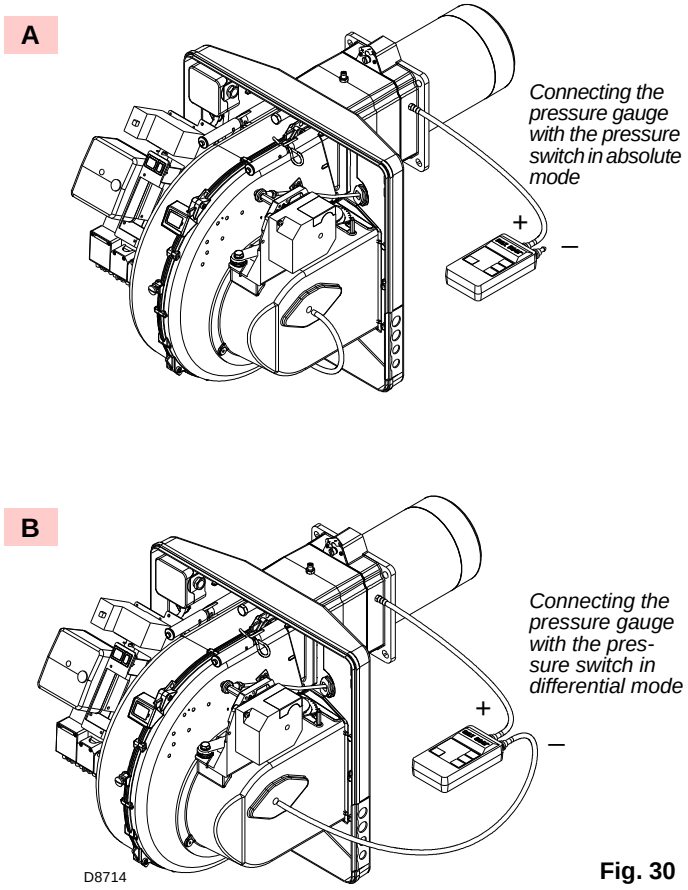


Fig. 30

Maximum gas pressure switch

Adjust the maximum gas pressure switch after having performed all other burner adjustments with the maximum gas pressure switch set to the end of the scale (Fig. 31).
With the burner operating at maximum output, lower adjustment pressure by slowly turning the relative knob anti-clockwise until the burner locks out.
Turn the knob clockwise by 2 mbar and repeat the start-up of the burner.
If the burner locks out again, turn the knob clockwise again by 1 mbar.

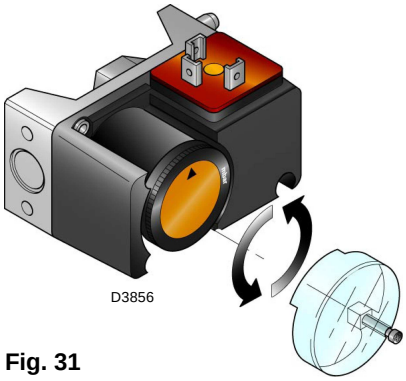


Fig. 31

Minimum gas pressure switch

Adjust the minimum gas pressure switch after having performed all other burner adjustments with the pressure switch set to the start of the scale (Fig. 32).
With the burner operating at maximum output, increase adjustment pressure by slowly turning the relative knob clockwise until the burner locks out.
Then turn the knob anticlockwise by 2 mbar and repeat burner start-up to ensure it is uniform.
If the burner locks out again, turn the knob anticlockwise again by 1 mbar.

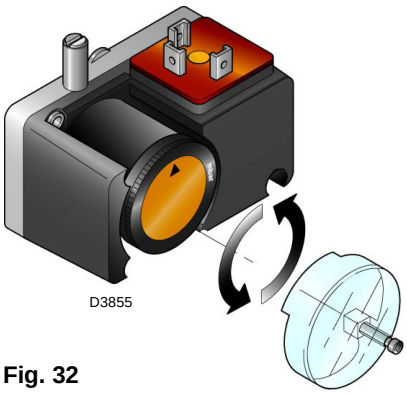


Fig. 32

5.6 Operation sequence of the burner

Burner start-up

- 0s: TL closed.
- 0s: TL thermostat/pressure switch closes.
- 2s: The control box starting cycle begins. Servomotor starts: rotate to the left by 90°, i.e. until the contact intervenes with cam I (Fig. 7).
- 26s: The air damper arrives to the MAX. output position.
  The fan motor starts up.
  Start of the pre-purging phase.
- 57s: the servomotor rotates towards the right, as far as the angle set on cam III (Fig. 7) for the MIN output.
- 77s: The air damper and the gas butterfly valve adopt the MIN output position (with cam III) (Fig. 7) at 65°.
- 92s: Ignition electrode strikes a spark.
  The safety valve VS opens, along with the adjustment valve VR, quick opening. The flame is ignited at a low output level, point A.
  Delivery is then progressively increased, with the valve VR opening slowly up to MIN. output, point B.
- 94s: The spark goes out.
- 118s: The starting cycle comes to an end.

STANDARD IGNITION

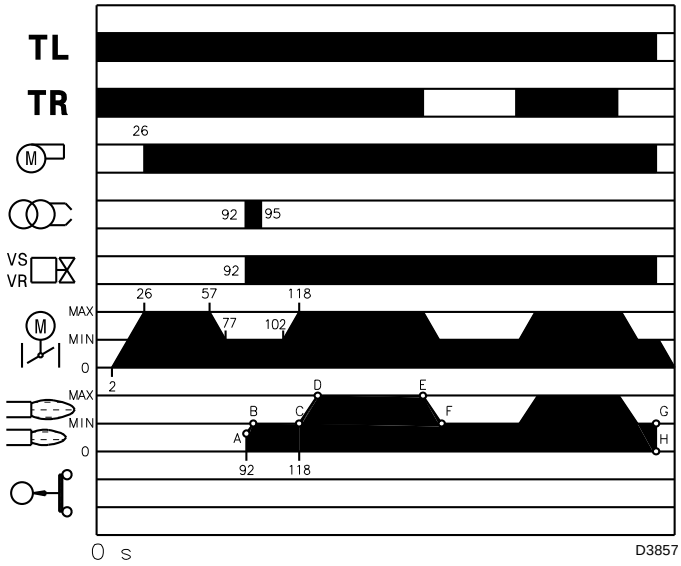


Fig. 33

Steady state operation

Burner without themodulating operation kit
Once the start-up cycle is completed, the servomotor command moves on to the TR thermostat/pressure switch that controls the pressure or the temperature in the boiler, point C.
(The electrical control box still continues to check the presence of the flame and the correct position of the air and gas maximum pressure switches).

- If the temperature or the pressure is low so the thermostat/ pressure switch TR is closed, the burner progressively increases the output up to the MAX value (section C-D).
- If subsequently the temperature or pressure increases until TR opens, the burner progressively decreases its output to the MIN. value (section E-F). The sequence repeats endlessly.
- The burner locks out when the heat request is less than the heat supplied by the burner at MIN. output, (section G-H). The TL thermostat/pressure switch opens, and the servomotor returns to angle 0°.
  The air damper closes completely to reduce heat losses to a minimum.

Burner with modulating operation kit
See manual enclosed with the adjuster.

Ignition failure

If the burner does not switch on, there is a lockout within 3s of the electrical supply reaching the gas valve.
It may be that the gas does not arrive at the combustion head within the safety time of 3s.
In this case increase gas ignition delivery.
The arrival of the gas at the pipe coupling is shown on the pressure gauge of Fig. 36.

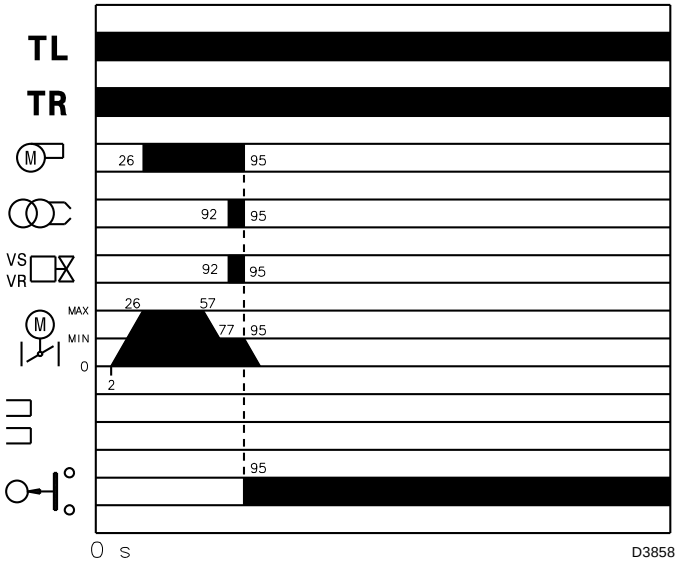


Fig. 34

5.7 Burner flame goes out during operation

If the flame should accidentally go out during operation, the burner will lock out within 1s.

5.8 Stopping of the burner

The burner can be stopped by:

➤ intervening on the disconnecting switch of the electrical supply line, located on the boiler panel;
➤ removing the hood and working on the "AUT/MAN" switch of Fig. 27.

5.9 Measuring the ionisation current

The burner is fitted with an ionisation system to check that a flame is present. The minimum current for control box operation is 6 µA.
The burner provides a much higher current, so controls are not normally required.
However, if it is necessary to measure the ionisation current, disconnect the plug-socket (2)(Fig. 35) on the ionisation probe cable and insert a direct current microammeter (1)(Fig. 35) with a base scale of 100 µA.
Carefully check the polarities!

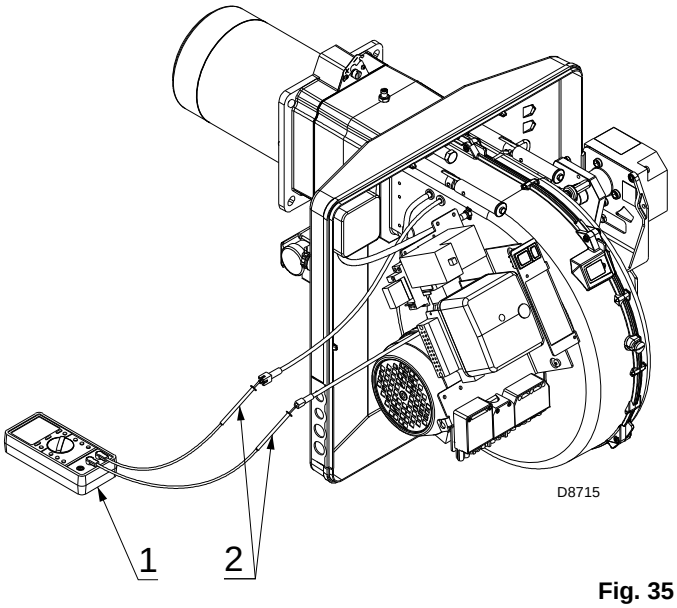


Fig. 35

5.10 Checking the air and gas pressure on the combustion head

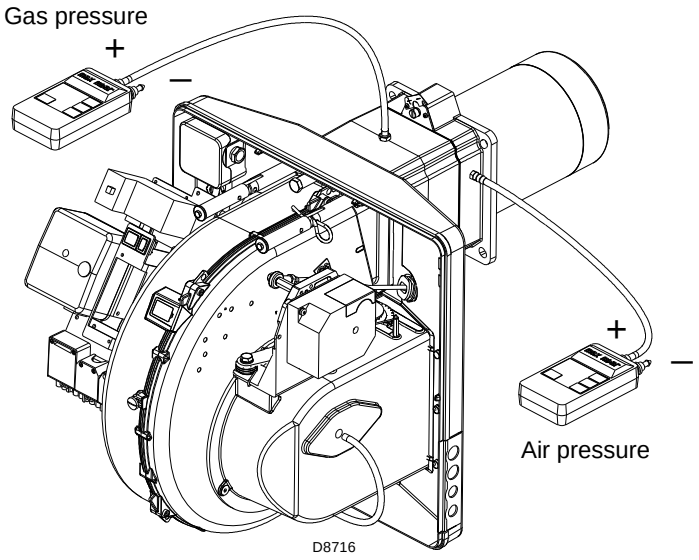


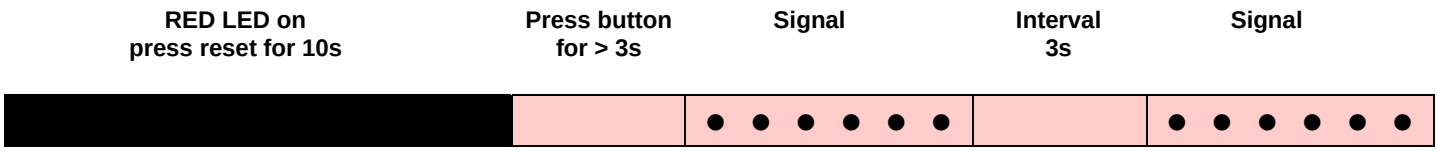
Fig. 36

5.11 Final checks (with burner operating)

➤ Open the thermostat/pressure switch TL:
➤ Open the thermostat/pressure switch TS:
the burner must stop
➤ Rotate the maximum gas pressure switch knob to the minimum end-of-scale position.
➤ Rotate the air pressure switch knob to the maximum end-of-scale position.
the burner must stop in lockout
➤ Switch off the burner and disconnect the voltage.
➤ Disconnect the minimum gas pressure switch connector.
the burner must not start
➤ Disconnect the ionisation probe wire.
the burner must stop in lockout due to ignition failure
➤ Make sure that the mechanical locking systems on the different adjustment devices are fully tightened.

6 Faults - Probable causes - Solutions

The control box has a self-diagnostic system, which easily allows identifying the operating faults (signal: **RED LED**).
To use this function, wait at least ten seconds from the safety lock out, and then press the reset button for a minimum of 3 seconds.
After releasing the button, the RED LED starts flashing as shown in the diagram below.



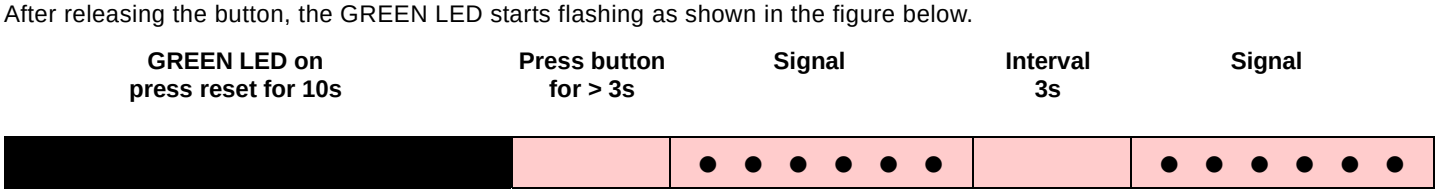
The pulses of the LED constitute a signal spaced by approximately 3 seconds.
The number of pulses will provide the information on the possible faults, according to the table below.

SIGNAL	FAULT	PROBABLE CAUSE	SUGGESTED 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 up-line from the gas train 12 - Air in pipework 13 - Gas trains not connected or with coil blocked	Increase Replace Increase pressure at regulator Adjust, see Fig. 12 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 - Head incorrectly adjusted 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 (only three-phase version)	Replace Replace Replace
4 blinks ● ● ● ●	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 simulation of flame	Eliminate permanency of flame or flame simulation and replace control box
6 blinks ● ● ● ● ● ●	The burner switches on, but then stops in lockout	24 - Defective or incorrectly adjusted servomotor	Replace or adjust
7 blinks ● ● ● ● ● ● ●	The burner goes into lockout immediately following the appearance of the flame	25 - The operation solenoid lets little gas through 26 - Ionisation probe incorrectly adjusted 27 - Insufficient ionisation (less than 5 µA) 28 - Probe earthed 29 - Burner poorly grounded 30 - Phase and neutral connections inverted 31 - Defective flame detection circuit	Increases Adjust it, see Fig. 12 Check probe position Withdraw or replace cable Check grounding Invert them Replace control box
	Burner locks out when shifting from minimum to maximum output and vice versa	32 - Too much air or too little gas	Adjust air and gas
	Burner goes into lockout during operation	33 - Probe or ionisation cable earthed	Replace worn parts

SIGNAL	FAULT	PROBABLE CAUSE	SUGGESTED REMEDY
10 blinks ● ● ● ● ● ● ● ● ● ●	The burner does not switch on, and the lockout appears	34 - Incorrect electrical wiring	Check connections
	The burner goes into lockout	35 - Defective control box 36 - Presence of electromagnetic disturbances in the thermostat lines 37 - Presence of electromagnetic disturbance	Replace Filter or eliminate Use the radio disturbance protection kit
No blink	The burner does not start	38 - No electrical power supply 39 - A limiter or safety control device is open 40 - Line fuse blocked 41 - Defective control box 42 - No gas supply 43 - Mains gas pressure insufficient 44 - Minimum gas pressure switch fails to close 45 - Servomotor fails to move to min. ignition position	Close all switches - Check connections Adjust or replace Replace Replace Open the manual valves between contactor and train Contact your GAS COMPANY Adjust or replace Replace
	The burner continues to repeat the start-up cycle, without lockout	46 - The gas pressure in the network is near the value on which the min. gas pressure switch gas is adjusted.The sudden drop in pressure when the valve is opened causes the 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 and the ignition cycle is repeated. And so on.	Reduce the cut in pressure of the min. gas pressure switch Replace the gas filter cartridge
	Ignition with pulsations	47 - Head poorly adjusted 48 - Ignition electrode incorrectly adjusted 49 - Incorrectly adjusted fan air damper: too much air 50 - Output during ignition phase is too high	Adjust, see Fig. 15 Adjust it, see Fig. 12 Adjust Reduce
	Burner does not reach maximum output	51 - Control device TR does not close 52 - Defective control box 53 - Defective servomotor	Adjust or replace Replace Replace
	Burner stops with air damper open	54 - Servomotor defective	Replace

6.1 Normal operation / flame detection time

The control box has a further function to guarantee the correct burner operation (indicator: **GREEN LED** permanently on).
To use this function, wait at least ten seconds from the burner ignition and then press the control box button for a minimum of 3 seconds.
After releasing the button, the GREEN LED starts flashing as shown in the figure below.



The pulses of the LED constitute a signal spaced by approximately 3 seconds.
The number of pulses will measure the probe DETECTION TIME since the opening of gas valves, according to the following table:

SIGNAL	FLAME DETECTION TIME
1 blink ●	0.4 s
2 blinks ● ●	0.8 s
6 blinks ● ● ● ● ● ●	2.8 s

This is updated in every burner start-up.
Once read, the burner repeats the start-up cycle by briefly pressing the control box button.

WARNING
If the result is > 2 s, ignition will be retarded.
Check the adjustment of the hydraulic brake of the gas valve, the air damper and the combustion head adjustment.

7 Maintenance

7.1 Notes on safety for the maintenance

The periodic maintenance is essential for the good operation, safety, yield and duration of the burner.
It allows you to reduce consumption and polluting emissions and to keep the product in a reliable state over time.

DANGER

The maintenance interventions and the calibration of the burner must only be carried out by qualified, authorised personnel, in accordance with the contents of this manual and in compliance with the standards and regulations of current laws.

Before carrying out any maintenance, cleaning or checking operations:

DANGER

disconnect the electricity supply from the burner by means of the main switch of the system;

DANGER

close the fuel interception tap;

7.2 Maintenance programme

Maintenance frequency

The gas combustion system should be checked **at least once a year** by a representative of the manufacturer or another specialised technician.

Checking and cleaning

Combustion
Carry out an analysis of the flue gases.
Significant differences with respect to the previous measurements indicate the points where more care should be exercised during maintenance.

Gas leaks
Make sure that there are no gas leaks on the pipes between the gas meter and the burner.

Gas filter
Replace the gas filter when it is dirty.

Flame inspection window
Clean the glass of the flame inspection window.

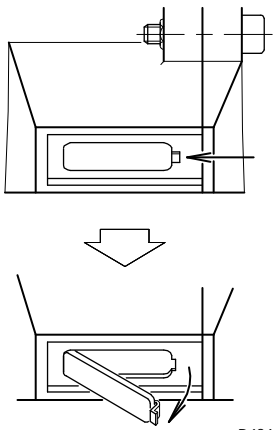


Fig. 37 D484

Combustion head
Open the burner and make sure that all the components of the combustion head are:
- undamaged;
- not deformed due to high temperature;
- free of ambient dirt or dust;
- free of rusted materials;
- adequately positioned.

Make sure that the gas outlet holes for the start-up, on the combustion head distributor, are free of dirt or rust deposits.
If in doubt, disassemble the elbow 7)(Fig. 38).

Servomotor
Release cam 4)(Fig. 28) from the servomotor, rotating notch 2)(Fig. 28) by 90° and manually check that it rotates smoothly backwards and forwards.
Constrain cam 4)(Fig. 28) again.

Burner
Check for excess wear or loose screws in the mechanisms controlling the air damper and the gas butterfly valve. Also make sure that the screws securing the electrical leads in the burner connections are fully tightened.
Clean the outside of the burner, taking special care with the articulated couplings and cam 4)(Fig. 28).

Combustion
Adjust the burner if the combustion values found at the beginning of the operation do not comply with the regulations in force or, at any rate, do not produce good combustion.
Use the appropriate card to record the new combustion values; they will be useful for subsequent controls.

7.3 Opening the burner

➤ **Disconnect the electrical supply from the burner**.
➤ Remove screw 1) and take out hood 2).
➤ Disengage the articulated coupling 3) from the graduated sector 4).
➤ Remove screw 5), the split pin 9) and pull the burner back by about 100 mm on the slide bars 6. Disconnect the probe and electrode leads and then pull the burner fully back.
➤ Turn it as indicated in the diagram, and insert the split pin 9) into the hole of one of the two guides so that the burner remains in that position.

Now extract the gas distributor 7) after having removed the screw 8).

7.4 Closing the burner

➤ Push the burner up to approximately 100 mm from the pipe coupling.
➤ Remove the split pin 9) and push the burner until it is approx. 100 mm from the pipe coupling.
➤ Reinsert the cables and slide the burner as far as the stop.
➤ Replace the screws 5) and split pin 9) and carefully pull the probe and electrode cables outwards until they are slightly taut.
➤ Re-couple the articulated coupling 3) to the graduated sector 4).

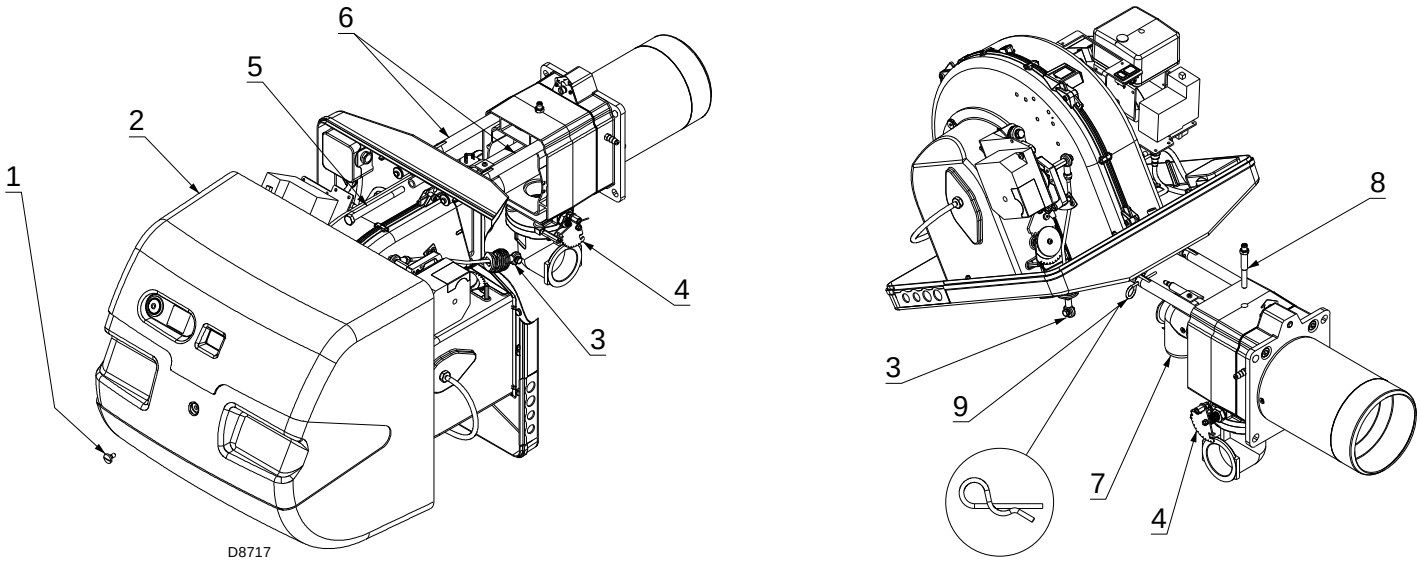
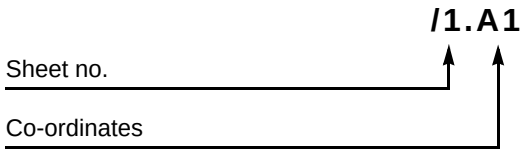


Fig. 38

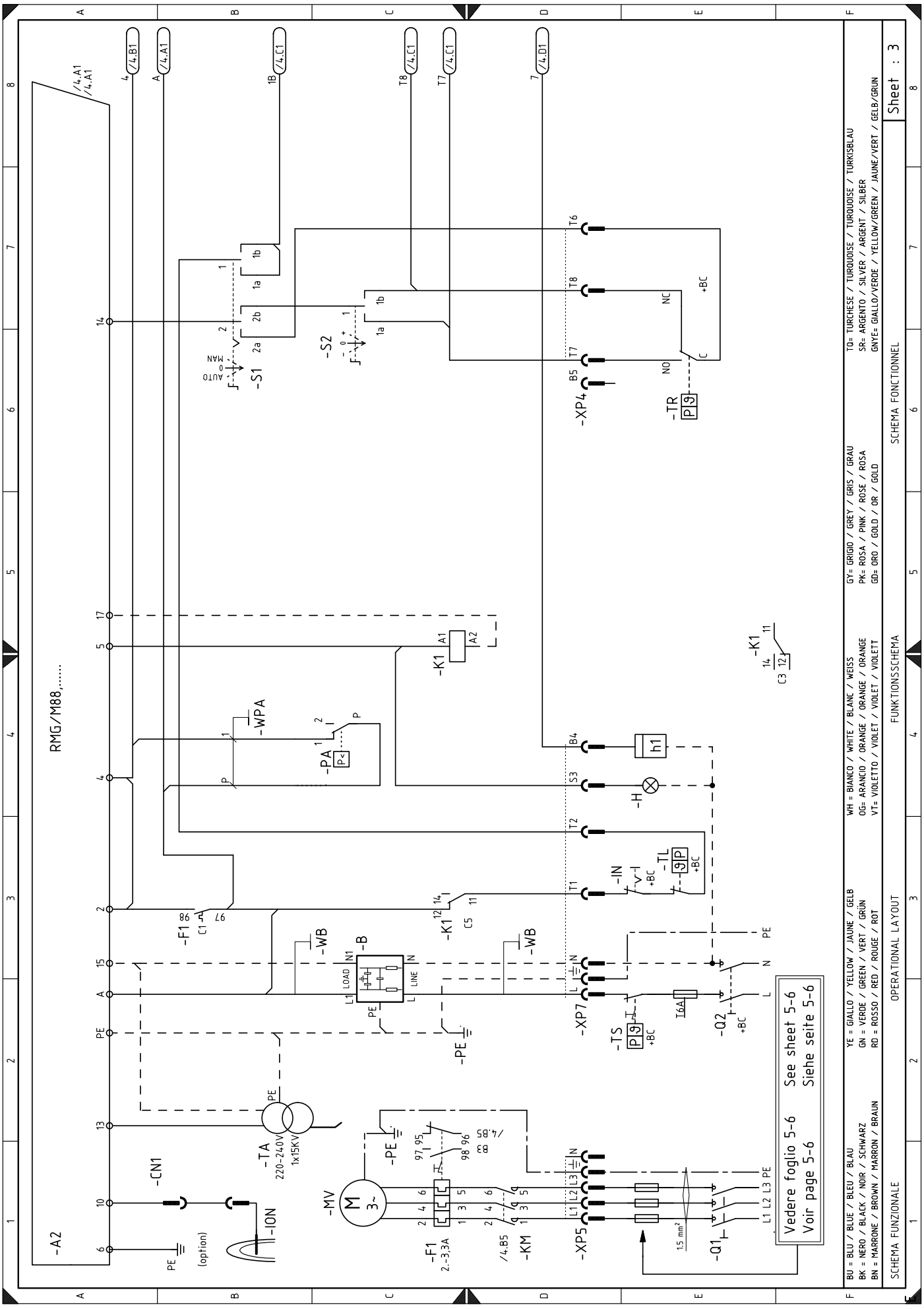
1	**Index of layouts**
2	Indication of references
3	Functional layout
4	Functional layout
5	Electrical wiring that the installer is responsible for
6	Functional layout RWF50...

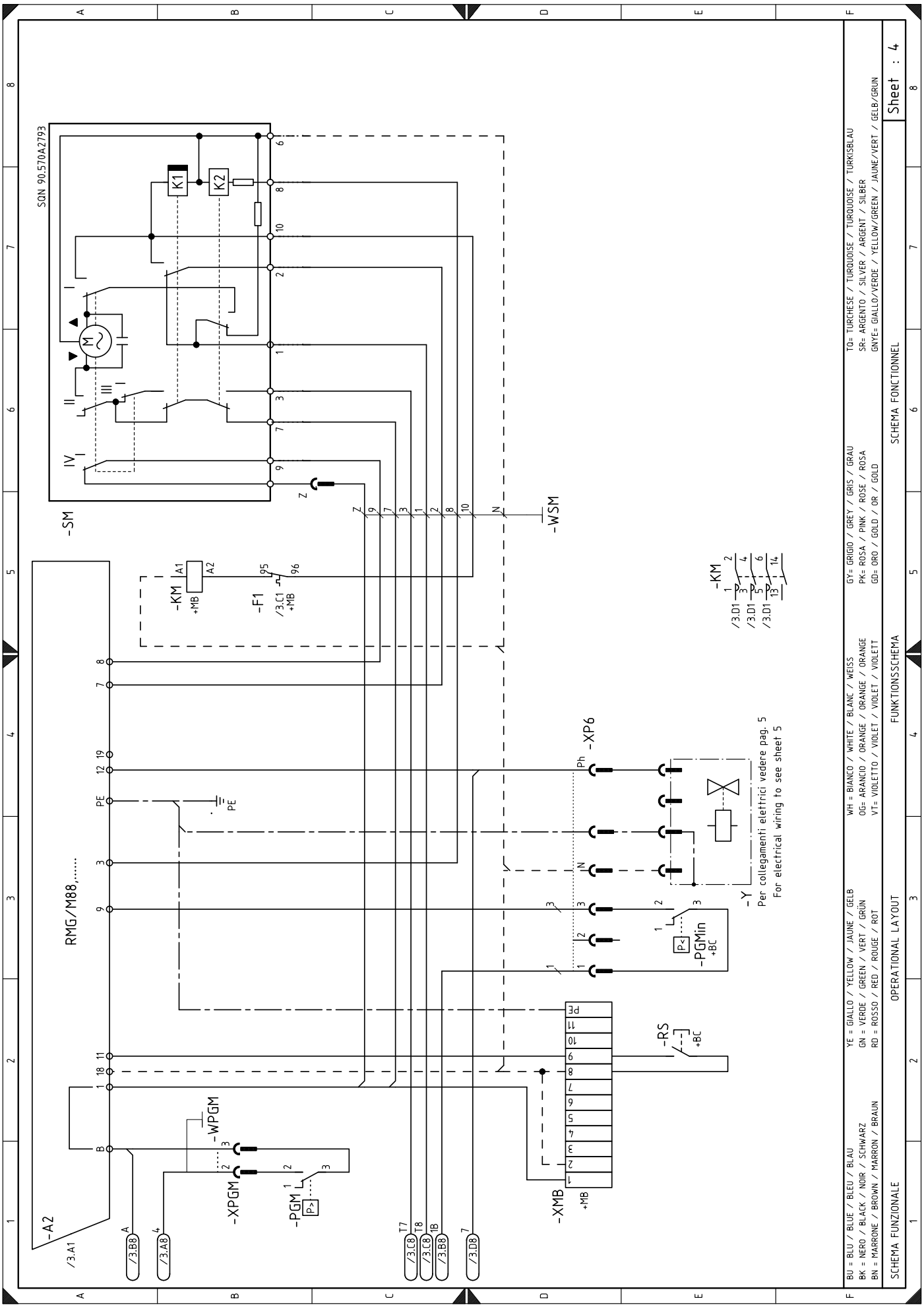
2 Indication of references



Wiring layout key

A - Electrical control box
B - Filter to protect against radio disturbance
B1 - Output regulator RWF
BA - Input in current DC 4...20 mA
BA1 - Input in current DC 4...20 mA to modify remote set-point
BP - Pressure probe
BP1 - Pressure probe
BR - Remote setpoint potentiometer
BTEXT - External probe for climatic compensation of the set-point
BT1 - Thermocouple probe
BT2 - Probe Pt100, 2 wires
BT3 - Probe Pt100, 3 wires
BT4 - Probe Pt100, 3 wires
BV - Input in voltage DC 0...10V
BV1 - Input in voltage DC 0...10V to modify remote setpoint
+BB - Burners components
+BC - Boiler components
CN1 - Ionisation probe connector
F1 - Fan motor thermal relay
H - Remote lockout signalling
H1 - Lockout YVPS
IN - Burner manual stop switch
ION - Ionisation probe
h1 - Hour counter
K1 - Relay
KM - Motor contact maker
MV - Fan motor
PA - Air pressure switch
PE - Burner earth
PGM - Maximum gas pressure switch
PGMin - Minimum gas pressure switch
Q1 - Three-phase disconnecting switch
Q2 - Single phase disconnecting switch
RS - Remote burner reset button
S1 - Off / automatic / manual selector
S2 - Power increase - power reduction selector
SM - Servomotor
TA - Ignition transformer
TL - Limit thermostat/pressure switch
TR - Adjustment thermostat/pressure switch
TS - Safety thermostat/pressure switch
Y - Gas adjustment valve + gas safety valve
YVPS - Valve leak detection device
XMB - Terminal board
XPGM - Maximum gas pressure switch connector
XP4 - 4 pole socket
XP5 - 5 pole socket
XP6 - 6 pole socket
XP7 - 7 pole socket
X4 - 4 pin plug
X5 - 5 pin plug
X6 - 6 pin plug
X7 - 7 pin plug
XRWF - Terminal board RWF


RMG/M88,.....
-A2
-CN1
-ION
-TA
220-240V
1x15KV
-MV
-F1
2.-3,3A
-KM
-XP5
-XP7
-XP4
-S1
-S2
-WPA
-PA
-K1
-F1
-WB
-B
-IN
-TL
-TS
-Q2
-Q1
-TR
-H
h1
I6A
1.5 mm²
Vedere foglio 5-6
Voir page 5-6
See sheet 5-6
Siehe seite 5-6
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
FUNKTIONSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 3


SQN 90.570A2793
-SM
-WSM
-KM
-F1
-XP6
-PGMin
-Y
-RS
-XMB
-WPGM
-XPGM
-PGM
-A2
RMG/M88,.....
Per collegamenti elettrici vedere pag. 5
For electrical wiring to see sheet 5
BU = BLU / BLUE / BLEU / BLAU
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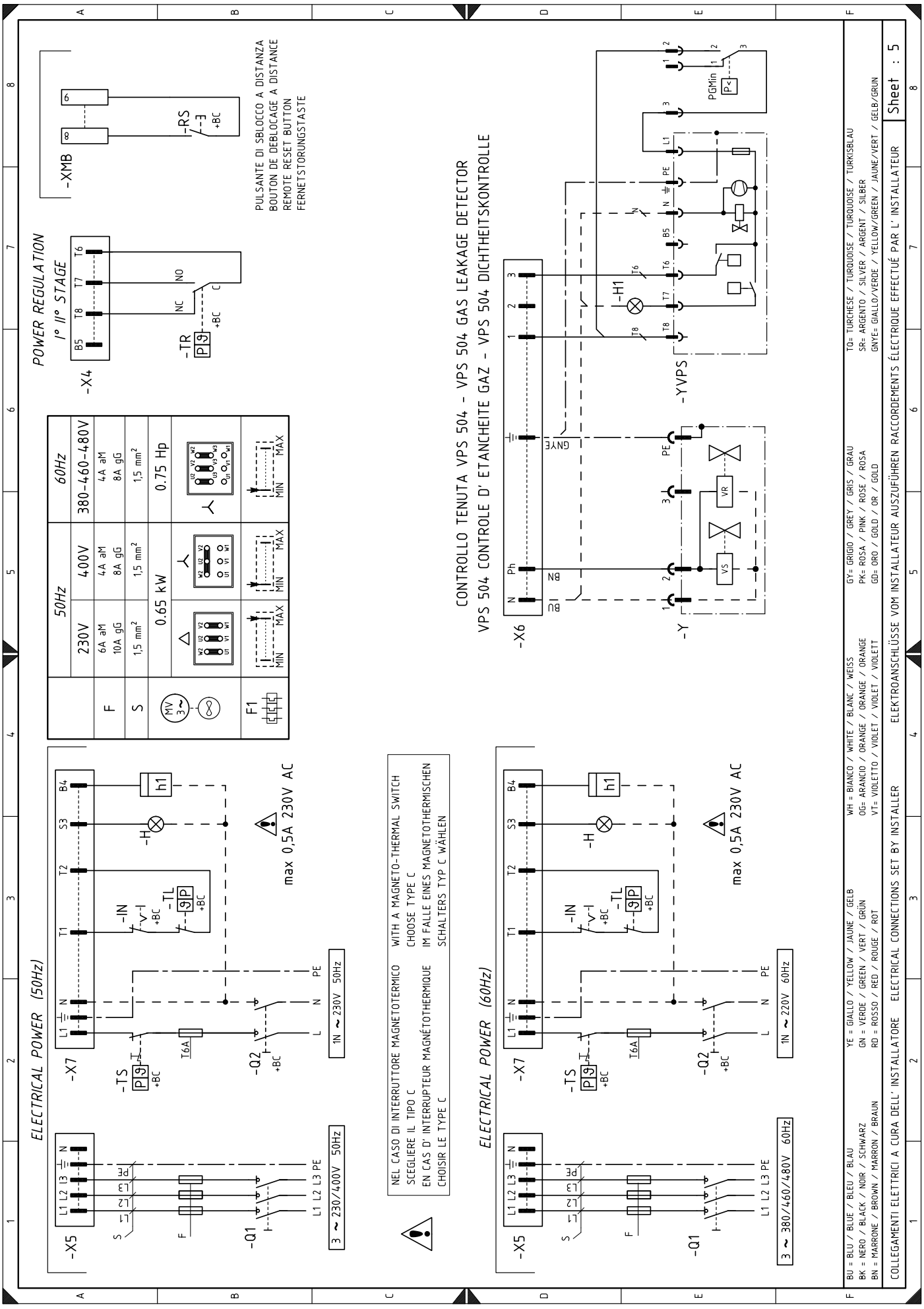
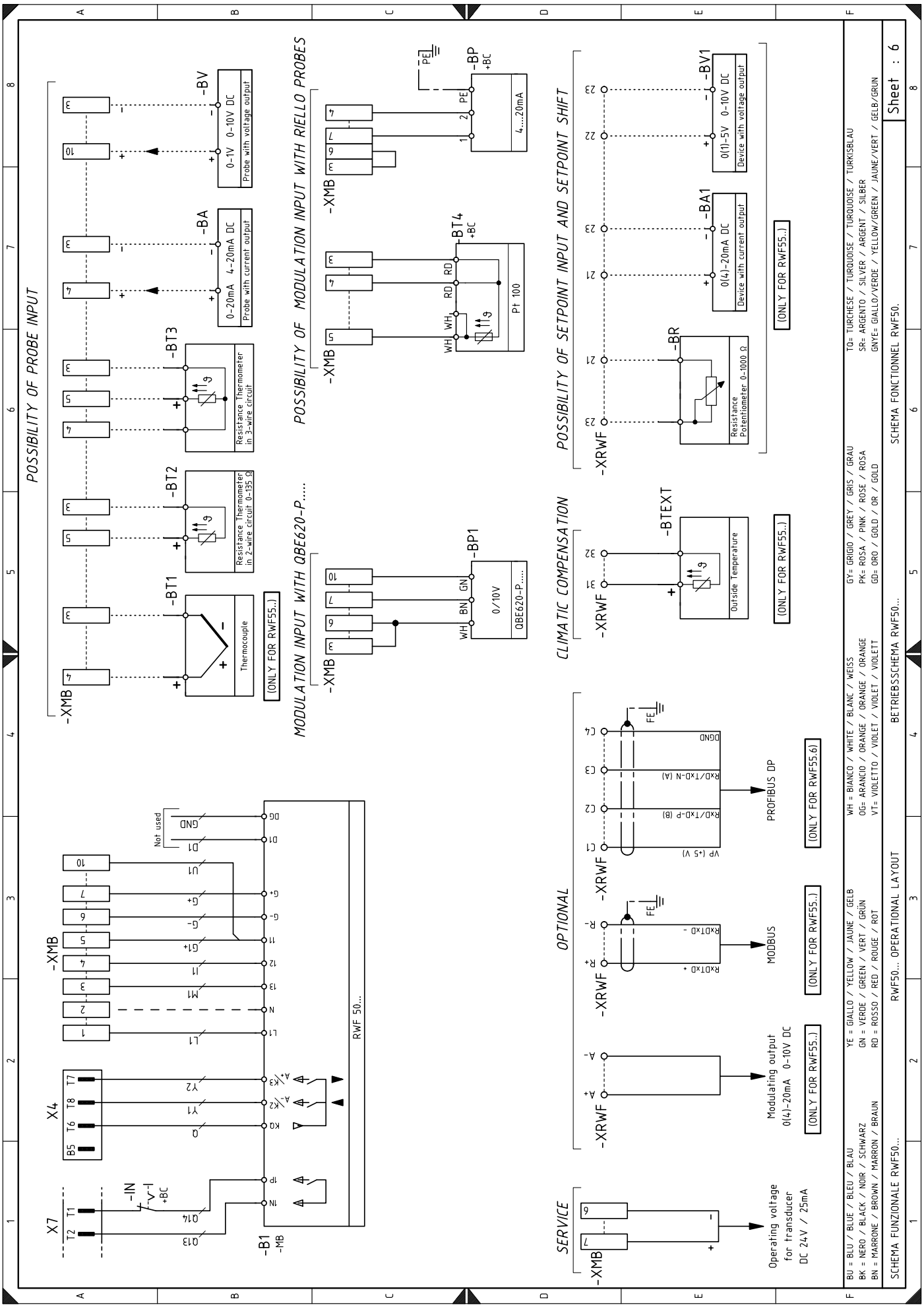
SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
FUNKTIONSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 4

Appendix - Electrical panel layout




POSSIBILITY OF PROBE INPUT
-XMB
-BT1
Thermocouple
(ONLY FOR RWF55..)
-BT2
Resistance Thermometer in 2-wire circuit 0-135 Ω
-BT3
Resistance Thermometer in 3-wire circuit
-BA
0-20mA 4-20mA DC
Probe with current output
-BV
0-1V 0-10V DC
Probe with voltage output
POSSIBILITY OF MODULATION INPUT WITH RIELLO PROBES
-XMB
-BT4
+BC
Pt 100
-BP
+BC
4....20mA
PE
MODULATION INPUT WITH QBE620-P.....
-XMB
-BP1
0/10V
QBE620-P.....
CLIMATIC COMPENSATION
-XRWF
-BTEXT
Outside Temperature
POSSIBILITY OF SETPOINT INPUT AND SETPOINT SHIFT
-XRWF
-BR
Resistance Potentiometer 0-1000 Ω
-BA1
0(4)-20mA DC
Device with current output
-BV1
0(1)-5V 0-10V DC
Device with voltage output
OPTIONAL
-XRWF
Modulating output
0(4)-20mA 0-10V DC
MODBUS
PROFIBUS DP
SERVICE
-XMB
Operating voltage for transducer DC 24V / 25mA
X7
X4
-IN
-B1
-MB
RWF 50...
Not used
(ONLY FOR RWF55..)
(ONLY FOR RWF55.6)
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
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SCHEMA FUNZIONALE RWF50...
RWF50... OPERATIONAL LAYOUT
BETRIEBSSCHEMA RWF50...
SCHEMA FONCTIONNEL RWF50.
Sheet : 6

Output power regulator kit for modulating operation

With the modulating operation, the burner continually adapts the power to the request for heat, ensuring great stability for the parameter controlled: temperature or pressure.
Two components should be ordered:
• the output power regulator to install on the burner;
• the probe to install on the heat generator.

Parameter to be checked		Probe		Output regulator	
	Adjustment field	Type	Code	Type	Code
Temperature	- 100...+ 500°C	PT 100	3010110	RWF50...	20082208
Pressure	0...2.5 bar 0...16 bar	Output probe 4...20mA	3010213 3010214	RWF55...	20099657

Potentiometer kit for the indication of load position

Burner	Kit code
RS 50/M MZ	3010109

RMG to PC interface adapter kit

Burner	Kit code
RS 50/M MZ	3002719

Clean contacts kit

Burner	Kit code
RS 50/M MZ	3010419

Gas trains in compliance with standard EN 676 (complete with valves, pressure adjuster and filter)
Gas train - burner adapters

Gas train			Gas train - burner adapter
Code	Model	Ø	Code
3970554	MB-DLE 410	1”1/4	3000824
3970144	MB-DLE 412	1”1/4	-
3970197	MB-DLE 412 CT	1”1/4	-
3970180	MB-DLE 415	1”1/2	-
3970198	MB-DLE 415 CT	1”1/2	-
3970181	MB-DLE 420	2”	3000822
3970182	MB-DLE 420 CT	2”	3000822
3970221	MBC-1200-SE-50	2”	3000822
3970225	MBC-1200-SE-50 CT	2”	3000822

Kit for LPG operation

Burner	Combustion head	Kit code	Obtainable output with the kit
RS 50/M MZ	TC - TL	20008173	125/285 ÷ 630 kW

Kit for TOWN GAS operation - not EC type-approved

Burner	Combustion head	Kit code
RS 50/M MZ	TC	3010285
RS 50/M MZ	TL	

Long head kit

Burner	Kit code	Standard head length	Head length obtained with the kit
RS 50/M MZ	3010078	216 mm	351 mm

Spacer kit

Burner	Kit code	Thickness
RS 50/M MZ	3010095	90 mm

Continuous purging kit

Burner	Kit Code
RS 50/M MZ	3010094

Soundproofing chamber

Burner	Kit code	Type	Reduction of noise average
RS 50/M MZ	3010403	C1/3	10 [dB(A)]

Vibration reduction kit (for flame inversion boilers)

Burner	Kit code
RS 50/M MZ	3010200

Radio disturbanceprotection kit

If the burner is installed in places particularly subject to radio disturbance (emission of signals exceeding 10 V/m) owing to the presence of an INVERTER, or in applications where the length of the thermostat connections exceeds 20 metres, a protection kit is available as an interface between the control box and the burner.

Burner	Kit code
RS 50/M MZ	3010386

Appendix - Gas supply pressure

The table show minimum load losses along the gas supply line depending on the maximum burner output operation.

kW	1 Δp (mbar)		2 Δp (mbar)		3 Δp (mbar)									
					MB-DLE 410 (Rp 1" 1/4)		MB-DLE 412 (Rp 1" 1/4)		MB-DLE 415 (Rp 1" 1/2)		MB-DLE 420 (Rp 2")		MBC-1200-SE (Rp 2")	
	G 20	G 25	G 20	G 25	G 20	G 25	G 20	G 25	G 20	G 25	G 20	G 25	G 20	G 25
285	2.5	3.7	0.4	0.5	16.5	22.7	8.0	11.1	4.0	5.3	3.2	3.4	3.4	3.6
330	3.3	4.5	0.5	0.6	21.0	28.4	10.1	14.2	4.9	6.6	3.2	4.2	3.5	3.8
380	4.1	5.3	0.7	0.8	26.0	35.3	13.0	17.7	6.0	8.0	3.8	5.1	3.7	4.0
430	4.9	6.1	0.8	1.0	31.4	42.6	15.7	21.4	7.2	9.6	4.6	6.2	3.9	4.3
480	5.8	7.0	1.0	1.3	37.1		18.6	25.6	8.5	11.2	5.4	7.3	4.1	4.6
530	6.7	8.4	1.3	1.6	43.2		21.8	30.1	9.7	12.9	6.2	8.6	4.3	4.9
580	7.6	9.9	1.5	1.9			25.2	34.5	11.0	14.6	7.2	9.8	4.5	5.2
630	8.5	11.3	1.8	2.2			28.8	39.1	12.4	16.4	8.2	11.1	4.8	5.5

The values shown in the tables refer to:
- Natural gas G 20 PCI 9.45 kWh/Sm^3 (8.2 Mcal/Sm^3)
- Natural gas G 25 PCI 8.13 kWh/Sm^3 (7.0 Mcal/Sm^3)

Column 1
Load loss at combustion head.
Gas pressure measured at the test point 1)(Fig. 39), with:
- Combustion chamber at 0 mbar;
- Burner working at maximum output;
- Combustion head adjusted according to the diagram of Fig. 16.

Column 2
Load loss at gas butterfly valve 2)(Fig. 39) with maximum opening: 90°.

Column 3
Load loss at train 3)(Fig. 39) including:
- adjustment valve (VR)
- safety valve (VS) (both fully open)
- pressure adjuster (R)
- filter (F)

NOTE
To know the approximate output at which the burner is operating at its maximum:
- Subtract the combustion chamber pressure from the gas pressure measured at test point 1)(Fig. 39).
- Find, in the table relating to the burner concerned, column 1, the pressure value closest to the result you want.
- Read off the corresponding output on the left.

Example with natural gas G 20
- Maximum output operation
- Ring nut 2)(Fig. 15) adjusted as in the diagram of (Fig. 16)
- Gas pressure at test point 1)(Fig. 39) = 8 mbar
- Pressure in combustion chamber = 2.2 mbar

8 - 2.2 = 5.8 mbar

A pressure of 5.8 mbar, column 1, corresponds in the table to an output of 480 kW.
This value serves as a rough guide; the effective output must be measured at the gas meter.

NOTE
To know the required gas pressure at test point 1)(Fig. 39), set the MAX output required from the burner operation:
- Find the nearest output value in the table for the burner in question.
- Read, on the right column (1) the socket pressure 1)(Fig. 39).
- Add this value to the estimated pressure in the combustion chamber.

Example with natural gas G 20
- Required burner maximum output operation: 480 kW
- Ring nut 2)(Fig. 15) adjusted as in the diagram of (Fig. 16)
- Gas pressure at output of 480 kW = 5.8 mbar
- Pressure in combustion chamber = 2.2 mbar

5.8 + 2.2 = 8 mbar

pressure required at test point 1)(Fig. 39).

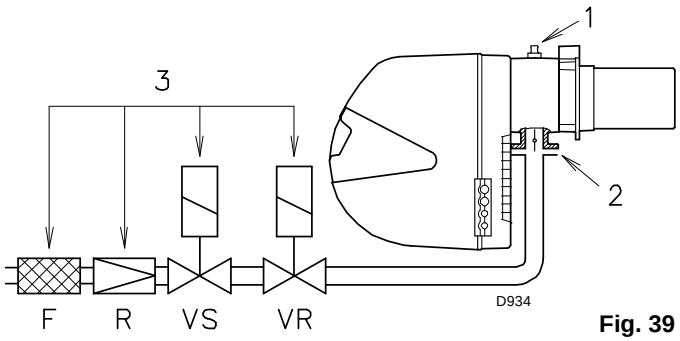

Fig. 39

Appendix - Firing rate on basis of air density

The firing rate of the burner shown in the manual is valid for an ambient temperature of 20°C and an altitude of 0 m above sea level (barometric pressure around 1013 mbar).

It may be that a burner has to operate with combustion air at a higher temperature and/or higher altitudes.

The heating of the air and the increase in altitude produce the same effect: the expansion of the air volume (i.e. the reduction of its density).

The delivery of the burner fan remains essentially the same, but the oxygen per m^3 of air, and the thrust (discharge head) of the fan are reduced.

It is therefore important to know if the maximum output requested from the burner at a determinate combustion chamber pressure remains within the firing rate of the burner even with the changed temperature and altitude conditions.
To check it, proceed as follows:

1 -Find the corrective factor F (relating to the air temperature and altitude of the system) in the table alongside.
2 -Divide the output Q required from the burner by F to obtain the equivalent output Qe:

Qe = Q : F (kW)

3 -In the firing rate of the burner, mark the work point identified by:
Qe = equivalent output
H1 = pressure in combustion chamber
point A that must remain within the firing rate (Fig. 40).
4 -Trace a vertical line from point A, Fig. 40, and find the maximum pressure H2 of the firing rate.
5 -Multiply H2 by F to obtain the maximum lowered pressure H3 of the firing rate

H3 = H2 x F (mbar)

If H3 is greater than H1, as in Fig. 40, the burner can produce the delivery requested.
If H3 is less than H1, it is necessary to reduce the output of the burner. The reduction in output is accompanied by a reduction in the combustion chamber pressure:
Qr = reduced output
H1r = reduced pressure

$$H1r = H1 \times \left(\frac{Qr}{Q}\right)^2$$

Example, 5% reduction in output:

$Qr = Q \times 0.95$

$H1r = H1 \times (0.95)^2$

With the new values - Qr and H1r - repeat steps 2 - 5.

Warning:
the combustion head should be adjusted in relation to the equivalent output Qe.

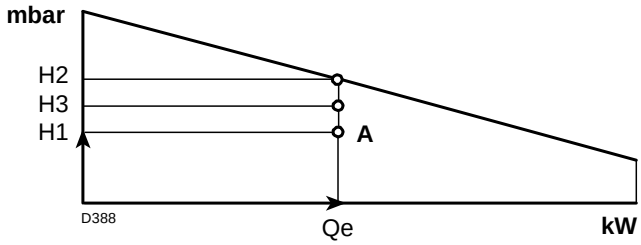

Fig. 40

Altitude	Average barometric pressure	F							
		Air temperature °C							
m. above sea level	mbar	0	5	10	15	20	25	30	40
0	1013	1.087	1.068	1.049	1.031	1.013	0.996	0.980	0.948
100	1000	1.073	1.054	1.035	1.017	1.000	0.983	0.967	0.936
200	989	1.061	1.042	1.024	1.006	0.989	0.972	0.956	0.926
300	978	1.050	1.031	1.013	0.995	0.978	0.962	0.946	0.916
400	966	1.037	1.018	1.000	0.983	0.966	0.950	0.934	0.904
500	955	1.025	1.007	0.989	0.972	0.955	0.939	0.923	0.894
600	944	1.013	0.995	0.977	0.960	0.944	0.928	0.913	0.884
700	932	1.000	0.982	0.965	0.948	0.932	0.916	0.901	0.872
800	921	0.988	0.971	0.954	0.937	0.921	0.906	0.891	0.862
900	910	0.977	0.959	0.942	0.926	0.910	0.895	0.880	0.852
1000	898	0.964	0.946	0.930	0.914	0.898	0.883	0.868	0.841
1200	878	0.942	0.925	0.909	0.893	0.878	0.863	0.849	0.822
1400	856	0.919	0.902	0.886	0.871	0.856	0.842	0.828	0.801
1600	836	0.897	0.881	0.866	0.851	0.836	0.822	0.808	0.783
1800	815	0.875	0.859	0.844	0.829	0.815	0.801	0.788	0.763
2000	794	0.852	0.837	0.822	0.808	0.794	0.781	0.768	0.743
2400	755	0.810	0.796	0.782	0.768	0.755	0.742	0.730	0.707
2800	714	0.766	0.753	0.739	0.726	0.714	0.702	0.690	0.668
3200	675	0.724	0.711	0.699	0.687	0.675	0.664	0.653	0.632
3600	635	0.682	0.669	0.657	0.646	0.635	0.624	0.614	0.594
4000	616	0.661	0.649	0.638	0.627	0.616	0.606	0.596	0.577


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