RIELLO BURNERS

CE

ONE STAGE GAS BURNERS

RIELLO 40 FS SERIES

FS3	11	÷	35	kW
FS5	23	÷	58	kW
FS8	46	÷	93	kW
FS10	42	÷	116	kW
FS20	81	÷	220	kW

The Riello 40 FS series of one stage gas burners, is a complete range of products developed to respond to any request for light industrial application. The Riello 40 FS series is available in five different models, with an output ranging from 11 to 220 kW, divided in four different structures.
All the models use the same components designed by Riello for the Riello 40 FS series. The high quality level guarantees safe working.
In developing these burners, special attention was paid to reducing noise, to the ease of installation and adjustment, to obtaining the smallest size possible to fit into any sort of boiler available on the market.
All the models are approved by the EN 676 European Standard and conform to European Directives for EMC, Low Voltage, Machinery and Boiler Efficiency.
All the Riello 40 FS burners are tested before leaving the factory.

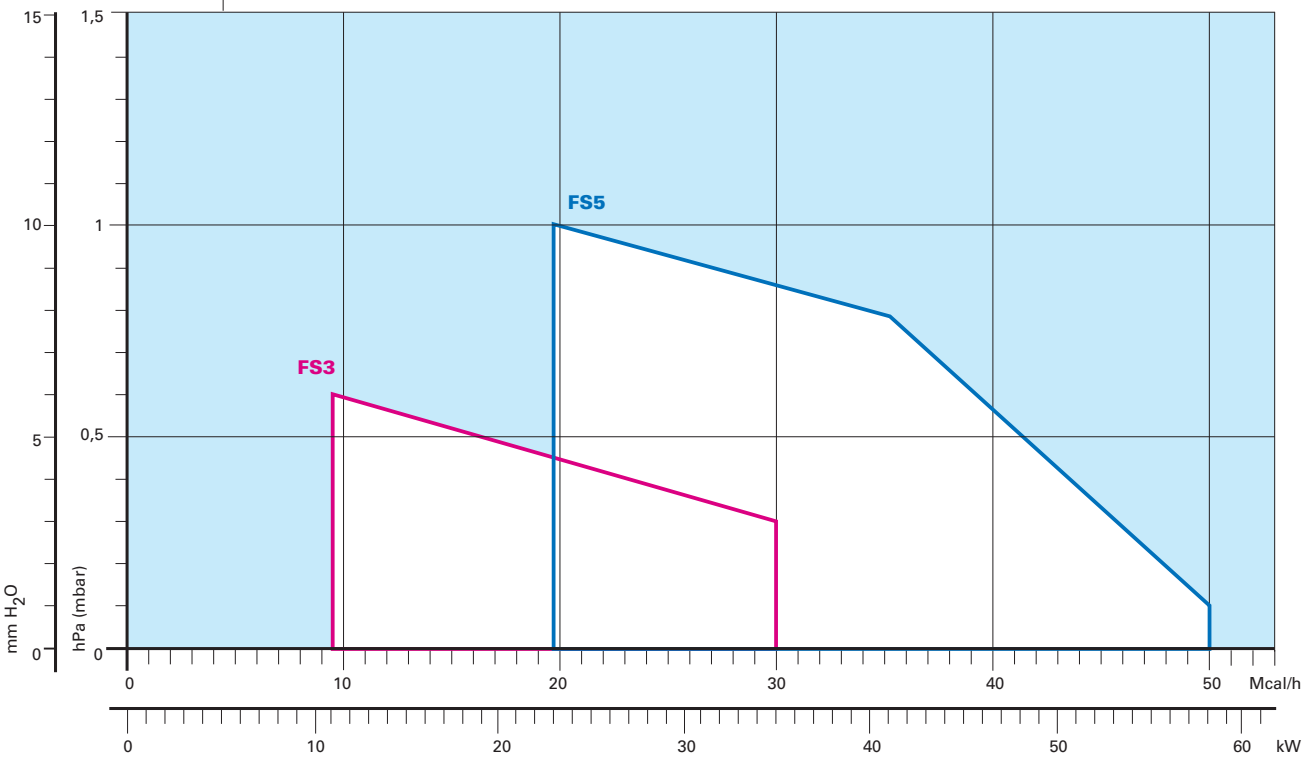
TECHNICAL DATA

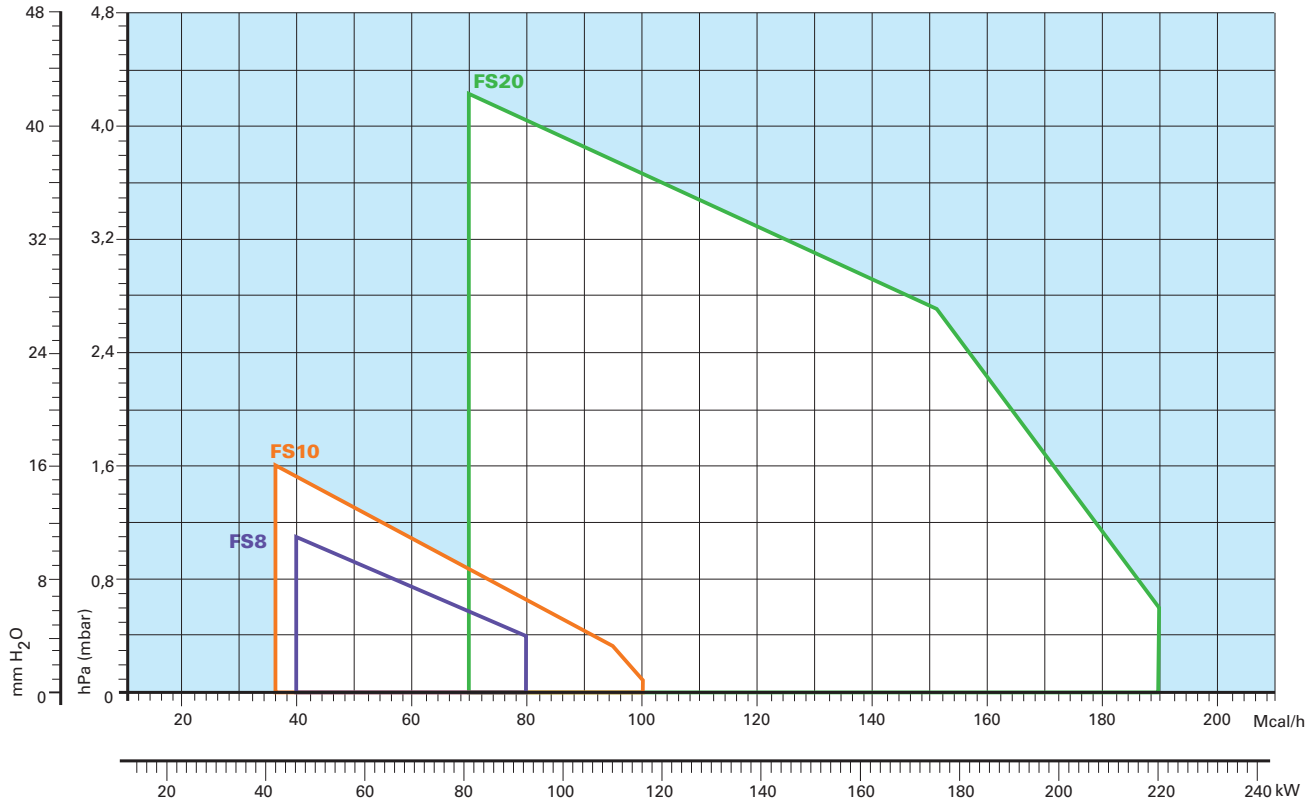
	Model		▼ FS3	▼ FS5	▼ FS8	▼ FS10	▼ FS20
	Burner operation mode		One stage				
	Modulation ratio at max. output		--				
	Servomotor	type	--				
		run time s	--				
	Heat output	kW	11 - 35	23 - 58	46 - 93	42 - 116	81 - 220
		Mcal/h	9,5 - 30	20 - 50	40 - 80	36 - 100	70 - 189
	Working temperature	°C min./max.	0/40				
Fuel / air data	Net calorific value G20 gas	kWh/Nm³	10				
	G20 gas density	kg/Nm³	0,71				
	G20 gas delivery	Nm³/h	1,1 - 3,5	2,3 - 5,8	4,6 - 9,3	4,2 - 11,6	8,1 - 22
	Net calorific value G25 gas	kWh/Nm³	8,6				
	G25 gas density	kg/Nm³	0,78				
	G25 gas delivery	Nm³/h	1,3 - 4	2,7 - 6,7	5,3 - 10,8	4,9 - 13,4	9,5 - 25,6
	Net calorific value LPG gas	kWh/Nm³	25,8				
	LPG gas density	kg/Nm³	2,02				
	LPG gas delivery	Nm³/h	0,4 - 1,4	0,9 - 2,2	1,8 - 3,6	1,6 - 4,4	3,1 - 8,5
	Fan	type	Centrifugal with forward curve blades				
	Air temperature	Max. °C	40				
Electrical data	Electrical supply	Ph/Hz/V	1/50/230 ±10%				
	Auxiliary electrical supply	Ph/Hz/V	--				
	Control box	type	R.B.L. 525 SE/5F	R.B.L. 525 SE/5F	R.B.L. 525 SE/5F	RMG 88.620A2	
	Total electrical power	kW	0,100	0,110	0,130	0,130	0,250
	Auxiliary electrical power	kW	--				
	Protection level	IP	40				
	Motor electrical power	kW	0,09	0,09	0,09	0,09	0,15
	Rated motor current	A	0,6	0,65	0,7	0,7	1,4
	Motor start up current	A	2,4	2,6	2,8	2,8	5,6
	Motor protection level	IP	20				
	Ignition transformer	type	Incorporated in the control box			Separated from the control box	
		V1 - V2	(-) - 8 kV			230 V - 8 kV	
		I1 - I2	(-) - 12 mA			1,8 A - 30 mA	
	Operation		Intermittent (at least one stop every 24 h)				
Emissions	Sound pressure	dB(A)	56	60	66	67	73
	Sound power	W	--				
	CO emission	mg/kWh	< 40				
	NOx emission	mg/kWh	≤ 120				
Approval	Directive		90/396/EEC, 89/336/EEC, 73/23/EEC, 98/37/EEC, 92/42/EEC				
	Conforming to		EN 676				
	Certification		CE - 0063 AP6680				

Reference conditions:
Temperature: 20 °C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.
Noise was measured in the boiler room behind the burner at a distance of 1 meter.

Since the Company is constantly engaged in the production improvement, the aesthetic and dimensional features, the technical data, the equipment and the accessories can be changed.

FIRING RATES





Useful working field for choosing the burner

Test conditions conforming to EN 676:
Temperature: 20 °C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.

FUEL SUPPLY

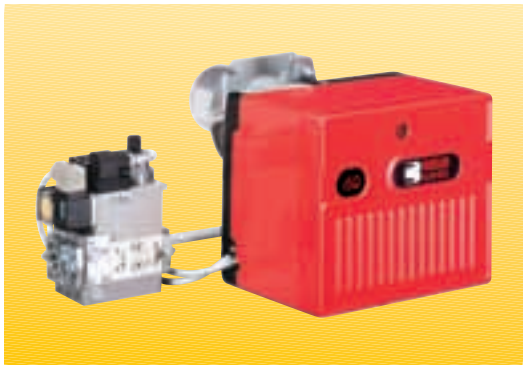
GAS TRAIN

The burners are set for fuel supply from either the right or left hand sides.

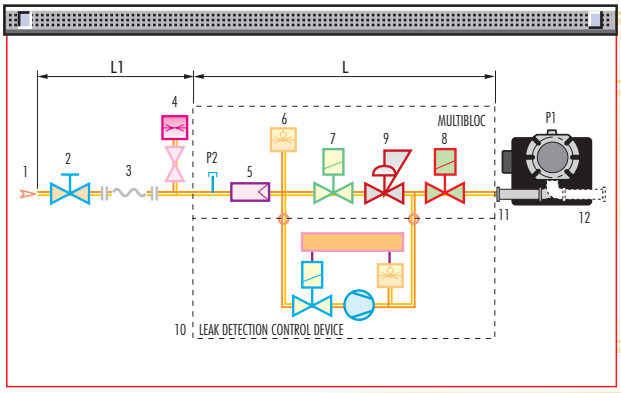
Depending on the gas output and the available pressure in the supply line, you should check the correct gas train to be adapted to the system requirements.

The gas train is Multibloc type, containing the main components in a single unit.
Except for the MBC 65 DLE model, a valve seal control (as accessory) can be fitted to the Multibloc gas trains.

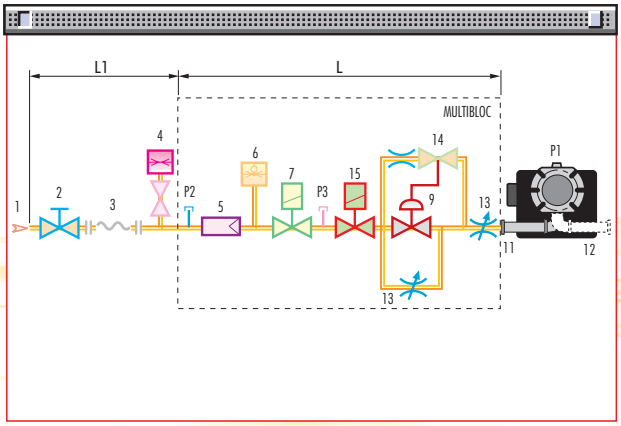
The MBC 65 DLE Multibloc gas train can be fitted only to the left of the burner.



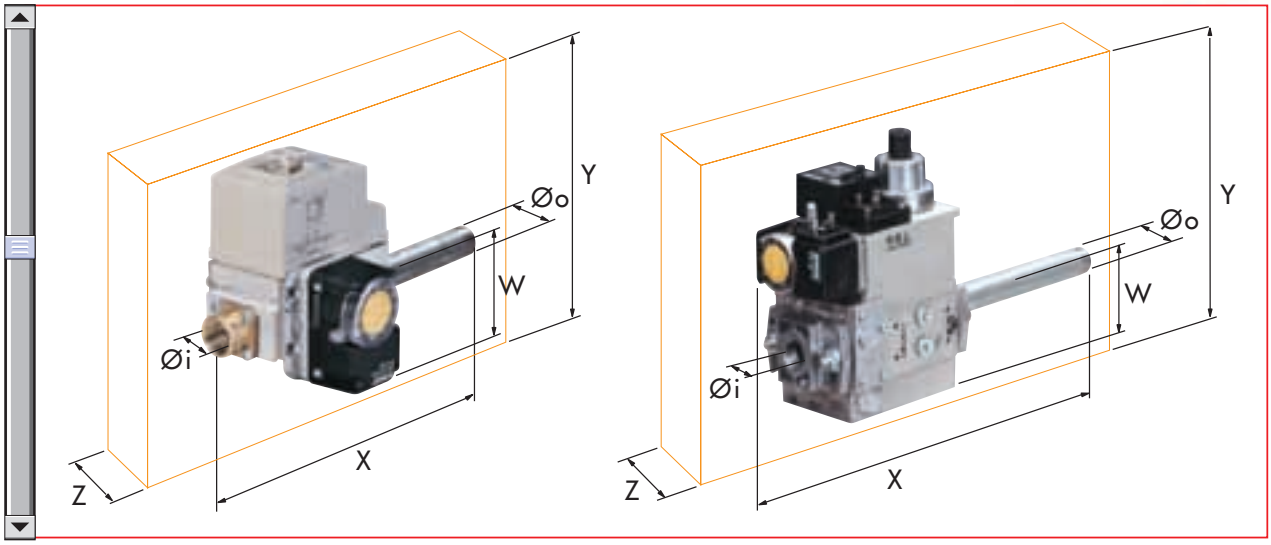
MBDLE 403 - 405 - 407 - 410



MBC 65 DLE



1	Gas delivery pipe
2	Manual valve
3	Vibration damping joint
4	Gas pressure gauge
5	Filter
6	Gas pressure switch
7	Safety solenoid
8	Adjustment solenoid: firing delivery adjustment (rapid opening) maximum delivery adjustment (slow opening)
9	Pressure regulator
10	Leak detection control device for valves 7 and 8 (accessory)
11	Gas train-burner adapter
12	Burner
13	Shutter with adjustment screws
14	Pressure regulator setting device
15	Regulation solenoid
P1	Combustion head pressure
P2	Upstream pressure from the filter
P3	Upstream pressure from the control valve
L	Gas train supplied separately
L1	To be performed by the installer



The dimensions of the gas trains vary depending on their construction features.
The following table shows the dimensions of the gas trains that can be fitted to Riello 40 FS burners, intake and outlet diameters.

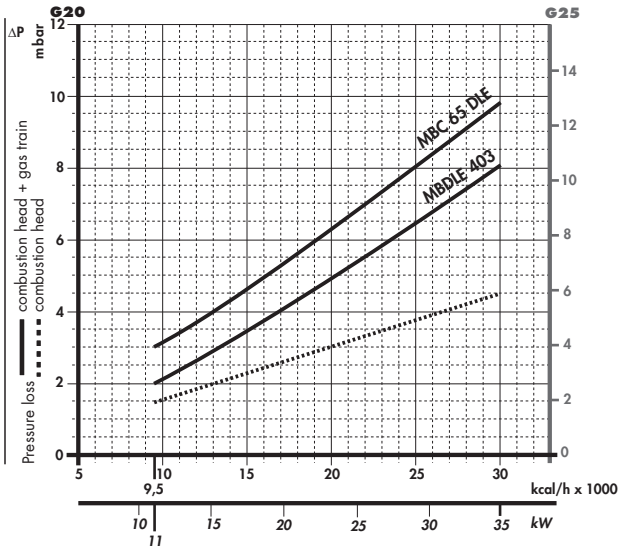
	Name	Code	Ø i	Ø o	X mm	Y mm	W mm	Z mm
MULTIBLOC	**MBC 65 DLE**	3970569	1/2"	1/2"	307	155	31	122
	MBDLE 403	3970533	1/2"	1/2"	275	136	26	100
	MBDLE 405	3970530	1/2"	1/2"	321	186	46	120
	MBDLE 405	3970500	3/4"	3/4"	371	186	46	120
	MBDLE 407	3970531	3/4"	3/4"	371	186	46	120
	MBDLE 410	3970532	1"	3/4"	405	221	55	145

PRESSURE DROP DIAGRAM

The diagrams indicate the minimum pressure drop of the burners with the various gas trains that can be combined with them; the values thus calculated represents the minimum required input pressure to the gas train.

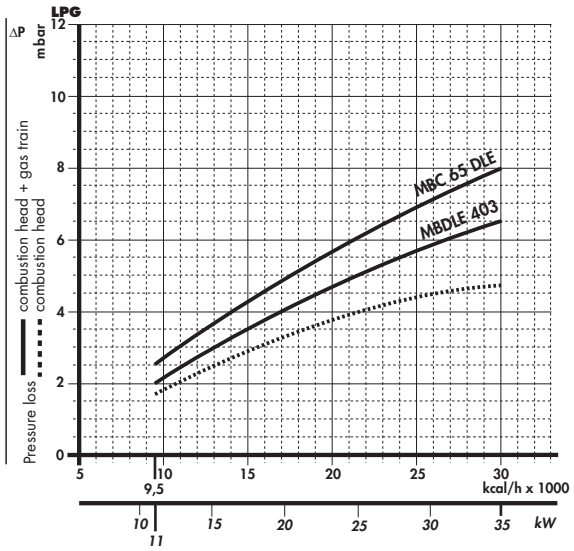
NATURAL GAS

FS3



LPG

FS3

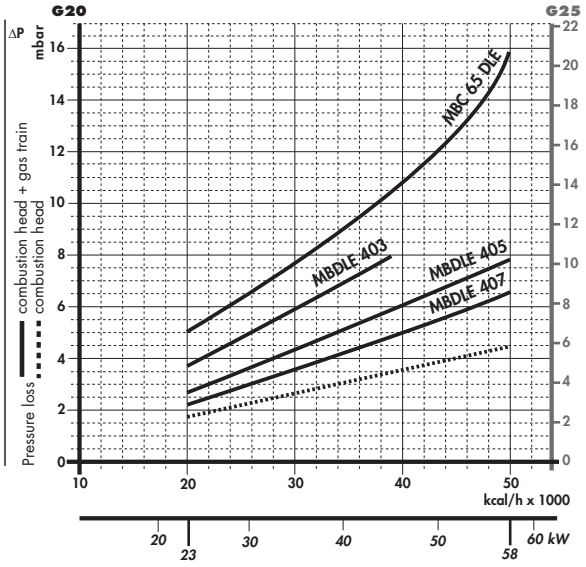


Gas train	Code	Terminal strip	Plug and socket
MBC 65 DLE	3970569		•
MBDLE 403	3970533		•

With installed plug (if the plug is not necessary, remove it in accordance with gas train instruction manual indication).

NATURAL GAS

FS5

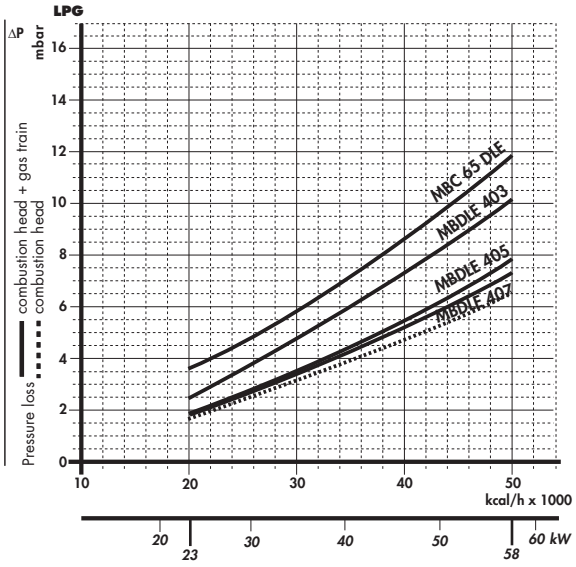


Gas train	Code	Output kW	Terminal strip	Plug and socket
MBC 65 DLE	3970569	-		•
MBDLE 403	3970533	≤ 45 (*)	•	•
MBDLE 405	3970530	-		•
MBDLE 407	3970531	-		•

(*) With natural gas.
With installed plug (if the plug is not necessary, remove it in accordance with gas train instruction manual indication).

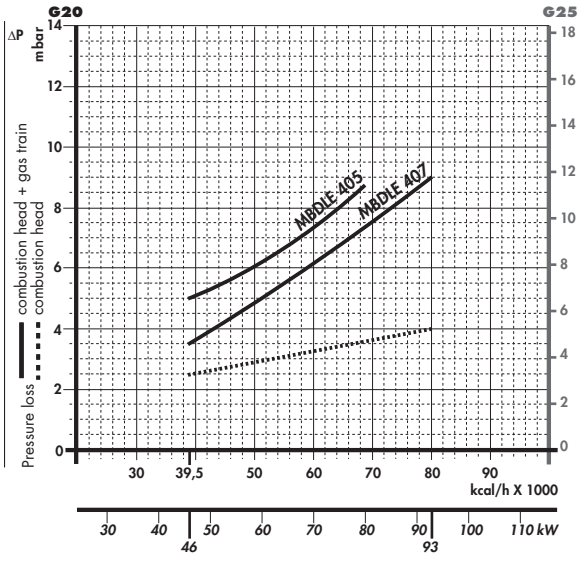
LPG

FS5



NATURAL GAS

FS8

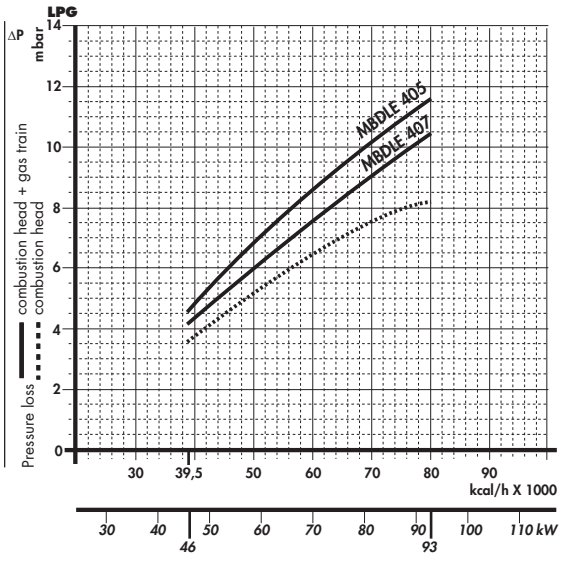


Gas train	Code	Output kW	Terminal strip	Plug and socket
MBDLE 405	3970530	≤ 80 (*)		•
MBDLE 407	3970531	-		•

(*) With natural gas.
With installed plug (if the plug is not necessary, remove it in accordance with gas train instruction manual indication).

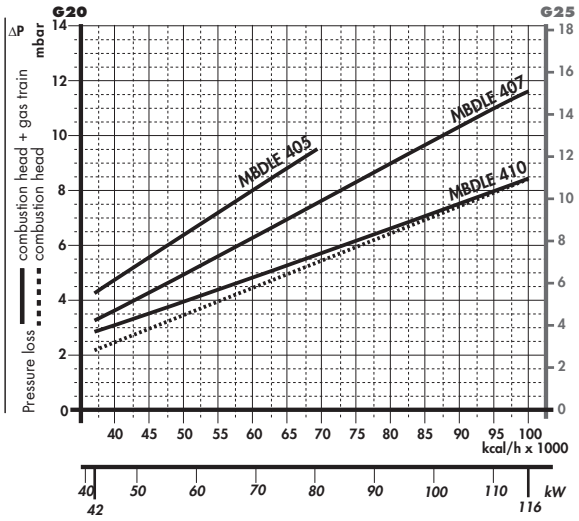
LPG

FS8



NATURAL GAS

FS10

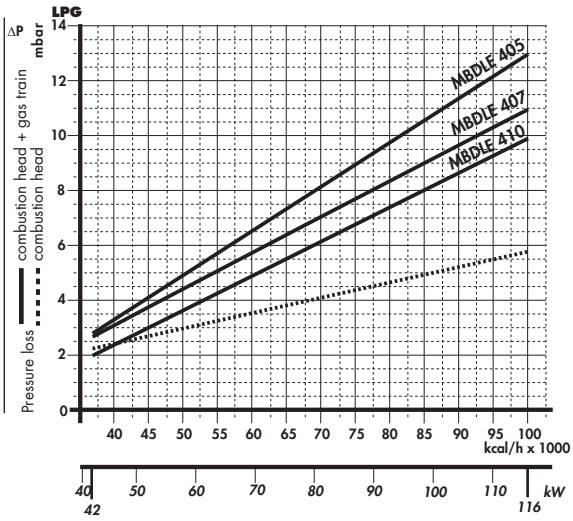


Gas train	Code	Output kW	Terminal strip	Plug and socket
MBDLE 405	3970500	≤ 80 (*)		•
MBDLE 407	3970531	-		•
MBDLE 410	3970532	-		•

(*) With natural gas.
With installed plug (if the plug is not necessary, remove it in accordance with gas train instruction manual indication).

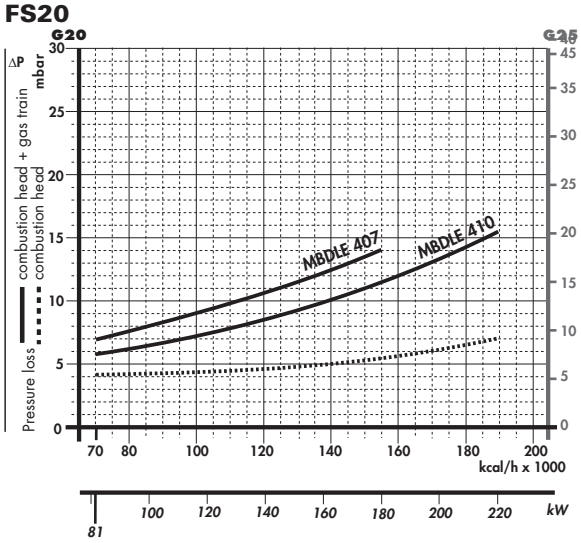
LPG

FS10



NATURAL GAS

FS20

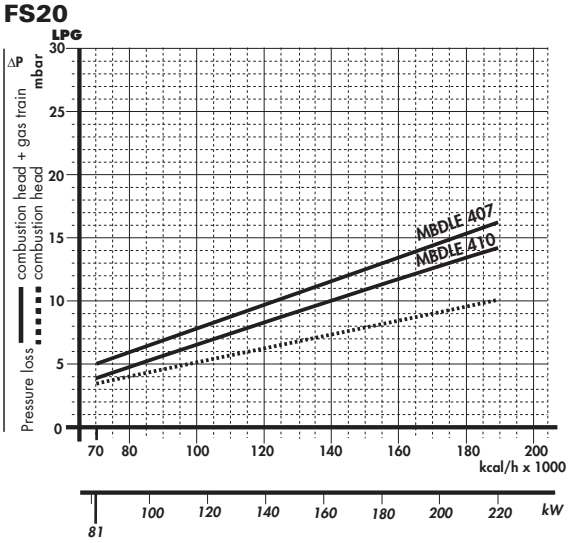


Gas train	Code	Output kW	Terminal strip	Plug and socket
MBDLE 407	3970531	≤ 180 (*)		•
MBDLE 410	3970532	-		•

(*) With natural gas.
With installed plug (if the plug is not necessary, remove it in accordance with gas train instruction manual indication).

LPG

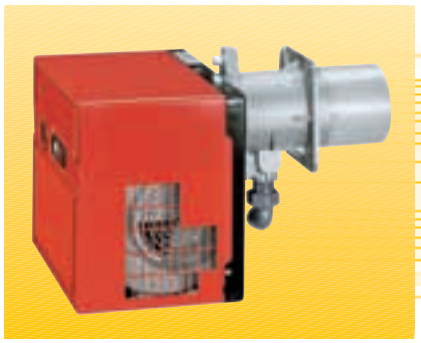
FS20



note *For pressure levels different from those indicated above, please contact Riello Burners Technical Office.*
In LPG plants, Multibloc gas trains do not operate below 0°C.
They are only suitable for gaseous LPG (liquid hydrocarbons destroy the seal materials).

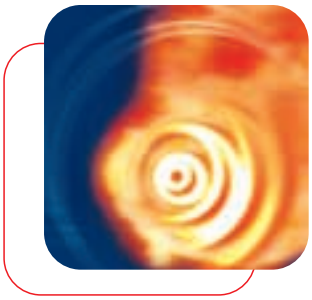
VENTILATION

The different ventilation circuits always ensure low noise levels with high performance of pressure and air delivery, in spite of their compact size.
The burners are fitted with an adjustable air pressure switch, conforming to EN 676 standards.



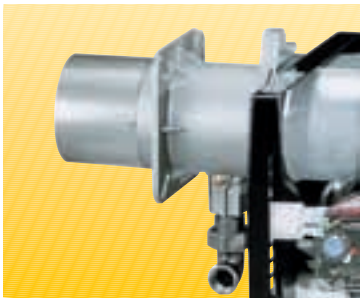
Air suction

COMBUSTION HEAD



The combustion head in Riello 40 FS burners is the result of an innovative design, which allows combustion with low polluting emissions, while being easy to adapt to all the various types of boilers and combustion chambers.

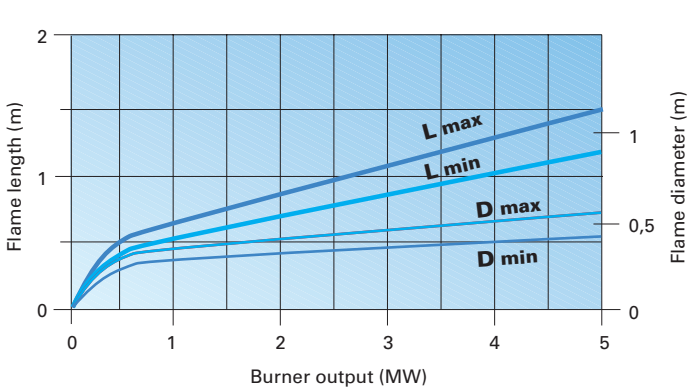
Combustion head

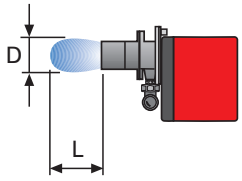


Flange

Simple adjustment allows the internal geometry of the combustion head to be adapted to the burner output.

Dimensions of the flame





Example:
Burner thermal output = 350 kW;
L flame (m) = 1,2 m (medium value);
D flame (m) = 0,6 m (medium value)

Indication of operation:

In normal operation, the various statues are indicated in the form of colour codes according to the table below.
The interface diagnosis (with adapter) can be activated by pressing the lock-out button for > 3 seconds.

Color code table

Operation statues	Color code table
Stand-by	○ ○ ○ ○ ○ ○ ○ ○
Pre-purging	☀ ☀ ☀ ☀ ☀ ☀ ☀ ☀
Ignition phase	☀ ○ ☀ ○ ☀ ○ ☀ ○
Flame OK	● ● ● ● ● ● ● ●
Poor flame	● ○ ● ○ ● ○ ● ○
Undervoltage, built-in fuse	☀ ✹ ☀ ✹ ☀ ✹ ☀ ✹
Fault, alarm	✹ ✹ ✹ ✹ ✹ ✹ ✹ ✹
Extraneous light	✹ ● ✹ ● ✹ ● ✹ ●

○ **LED off**

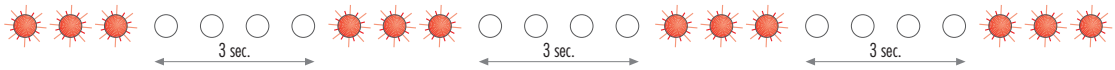
Diagnosis of fault causes:

After lock-out has occurred, the red signal lamp is steady on. In this status, the visual fault diagnosis according to the error code table can be activated by pressing the lock-out reset button for > 3 seconds. The interface diagnosis (with adapter) can be activated by pressing again the lock-out button for > 3 seconds.

The blinkers of red LED are a signal with this sequence:

(e.g. signal with n° 3 blinks – faulty air pressure monitor)

○ **LED off**

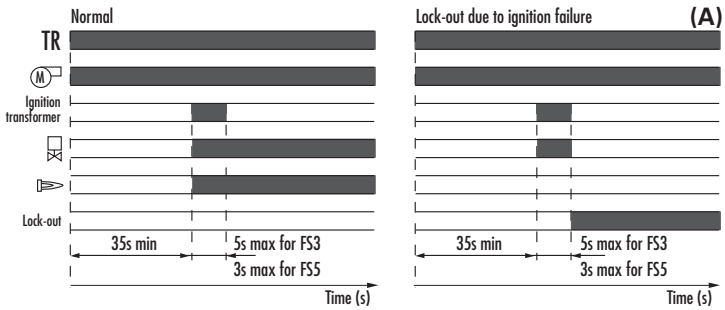


Error code table

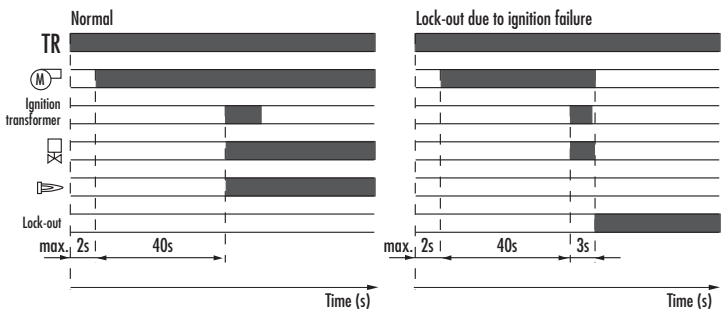
Possible cause of fault		Blink code
No establishment of flame at the end of safety time:	- faulty or soiled fuel valves - faulty or soiled flame detector - poor adjustment of burner, no fuel - faulty ignition equipment	✹ ✹
Faulty air pressure monitor		✹ ✹ ✹
Simulation of flame on burner start up		✹ ✹ ✹ ✹
Loss of flame during operation:	- faulty or soiled fuel valves - faulty or soiled flame detector - poor adjustment of burner	✹ ✹ ✹ ✹ ✹ ✹ ✹
Wiring error or internal fault		✹ ✹ ✹ ✹ ✹ ✹ ✹ ✹ ✹ ✹

START UP CYCLE

FS3 - FS5 - FS8



FS10 - FS20



Correct operation for FS3, FS5 and FS8 models

0s	The burner begins the ignition cycle
0s-35s	Pre-purge with the air damper open
35s	Ignition

Lock-out due to ignition failure

If the flame does not light within the safety limit (3s for FS3 model and 5s for FS5 and FS8 models) the burner locks-out.

Correct operation for FS10 and FS20 models

0s	The burner begins the ignition cycle
0s-2s	Safety time
2s-40s	Pre-purge with the air damper open
40s	Ignition

Lock-out due to ignition failure

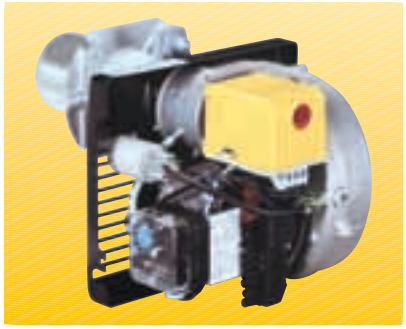
If the flame does not light within the safety limit (3s) the burner locks-out. When the flame-failure occurs during working, shut down takes place within one second.

(A) Lock-out is shown by a led on the appliance.

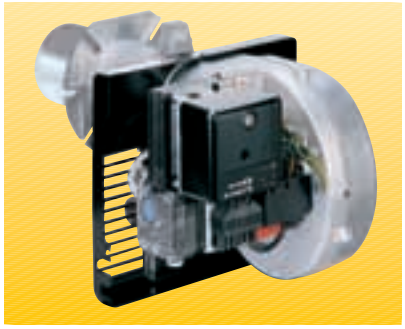
WIRING DIAGRAMS

Electrical connections must be made by qualified and skilled personnel in conformity with the local regulations in force.

Control box fitted with an ignition transformer in FS3, FS5 and FS8 models



FS3 is fitted with terminal strip: FS 5, FS 10 and FS 20 are fitted with 7 and 6 pole sockets, FS8 is available in both the configurations

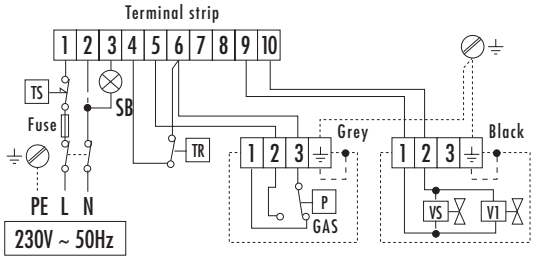


In FS 10 and FS 20 models the control box is separated from the ignition transformer

ONE STAGE OPERATION

FS3 - FS8

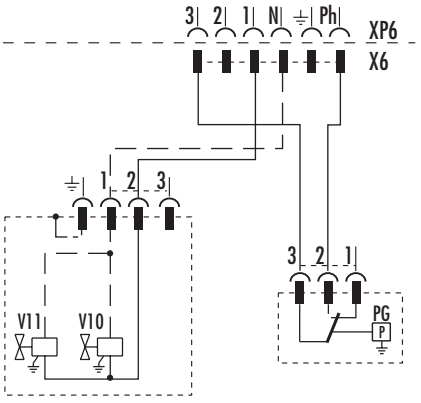
SB - Lock out led
TR - Regulating thermostat
TS - Safety thermostat (manual reset)
VS - Security valve
V1 - One stage valve
P - Gas pressure switch



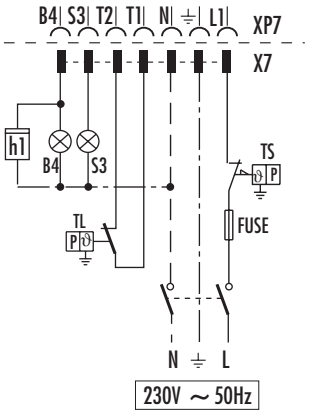
FS5 - FS8 - FS10 - FS20

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 - 0,5A max.)
TL - Limit thermostat
TS - Safety thermostat
V10 - Safety valve
V11 - Adjustment valve

Gas train electrical wiring



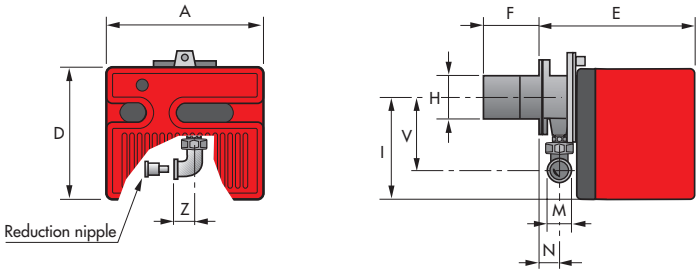
Burner electrical wiring



OVERALL DIMENSIONS (mm)

These models are distinguished by their reduced size, in relation to the outputs achieved, which means they can be fitted to any boiler actually on the market.

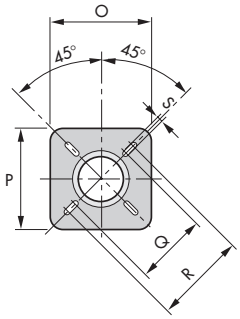
BURNER



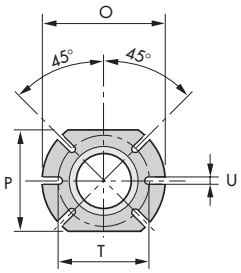
Model	A	D	E	F	H	I	M	N	V	Z
FS3	252	215	230	100	91	165	Rp 3/8	37	132	25
FS5	272	233	295	100	91	180	-	48	138	28
FS8	305	262	347	110	105	204	-	61	142	33
FS10	305	262	346	110	105	204	-	61	142	33
FS20	350	298	389	120	125	230	-	67	152	33

BURNER-BOILER MOUNTING FLANGE

FS20

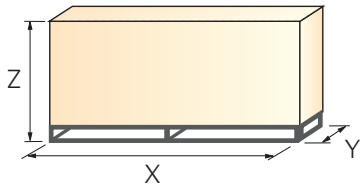


FS3 - FS5 - FS8 - FS10



Model	O	P	Q	R	S	T	U
FS3	170	140	-	-	-	130	10
FS5	170	140	-	-	-	130	10
FS8	185	160	-	-	-	130	11
FS10	185	160	-	-	-	130	11
FS20	170	170	155	200	11	-	-

PACKAGING



Model	X	Y	Z	kg
FS3	365	325	300	5
FS5	435	345	315	11
FS8	473	413	320	13,6
FS10	473	413	320	17
FS20	525	453	365	17