RIELLO BURNERS

CE

ONE STAGE GAS BURNERS

RIELLO 40 FS SERIES				
FS3	11	÷	35	kW
FS5	23	÷	58	kW
FS8	46	÷	93	kW
FS10	52	÷	116	kW
FS20	81	÷	218	kW

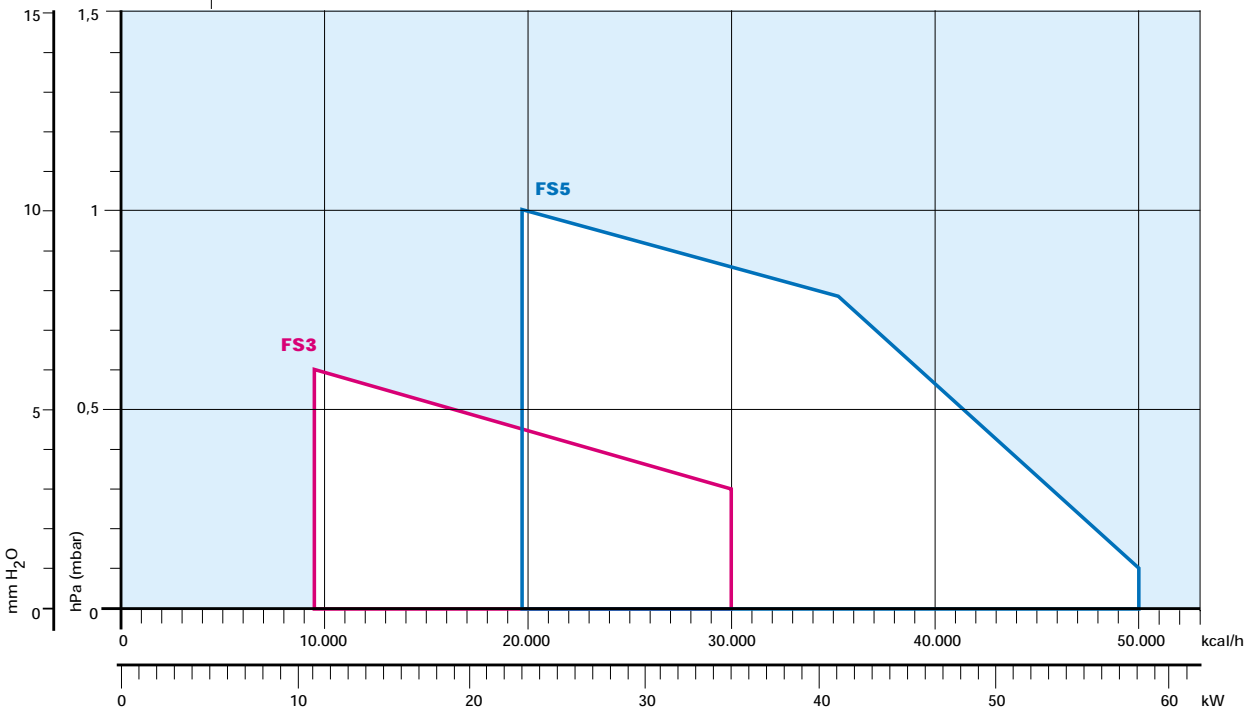
The Riello 40 FS series of one stage gas burners, is a complete range of products developed to respond to any request for light industrial application. The Riello 40 FS series is available in five different models, whit an output ranging from 11 to 218 kW, divided in four different structures.
All the 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.

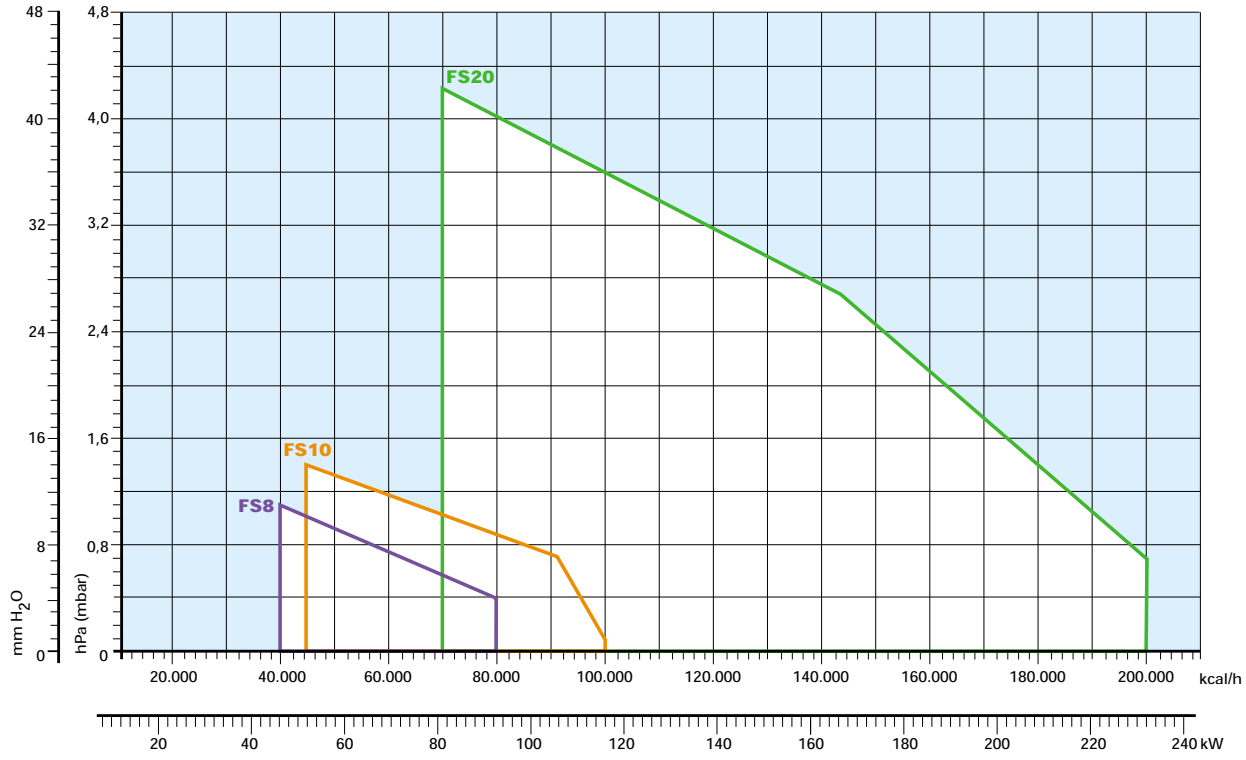
TECHNICAL DATA

	Model		FS3	FS5	FS8	FS10	FS20
	Setting		One stage				
	Servo-motor type		--				
	Servo-motor run time		--				
	Heat output	kW	11 - 35	23 - 58	46 - 93	52 - 116	81 - 218
		Mcal/h	9,5 - 30	20 - 50	40 - 80	45 - 100	69,7 - 187,5
	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 output	Nm³/h	1,1 - 3,5	2,3 - 5,8	4,6 - 9,3	5,2 - 11,6	8,1 - 21,8
	Net calorific value G25 gas	kWh/Nm³	8,6				
	G25 gas density	kg/Nm³	0,78				
	G25 gas output	Nm³/h	1,3 - 4	2,7 - 6,7	5,3 - 10,8	6 - 13,4	9,5 - 25,3
	Net calorific value LPG gas	kWh/Nm³	25,8				
	LPG gas density	kg/Nm³	2,02				
	LPG gas output	Nm³/h	0,4 - 1,4	0,9 - 2,2	1,8 - 3,6	2 - 4,4	3,1 - 8,4
	Fan	type	forward tilted blades				
	Air temperature	max. °C	40				
Electrical data	Electrical supply	Ph/Hz/V	1/50/230 ±10%				
	Aux. electrical supply	Ph/Hz/V	--				
	Control box	type	525 SE/5F	525 SE/3F	525 SE/3F	508 SE	508 SE
	Total electrical power	kW	0,1	0,11	0,13	0,13	0,25
	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 current	A	4	4	4	4	7,5
	Motor protection level	IP	20				
	Ignition transformer		incorporated in the control box			separated from the control box	
	Operation		intermittent (at least one halt every 24 h)				
Approval Emissions	Sound pressure	dB(A)	56	60	66	67	73
	CO Emissions	mg/kWh	< 40				
	NOx Emissions	mg/kWh	≤ 120				
	Directives		90/396/EEC, 89/336/EEC, 73/23/EEC, 98/37/EEC, 92/42/EEC				
	Conforming to		EN 676				
	Certifications		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.

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

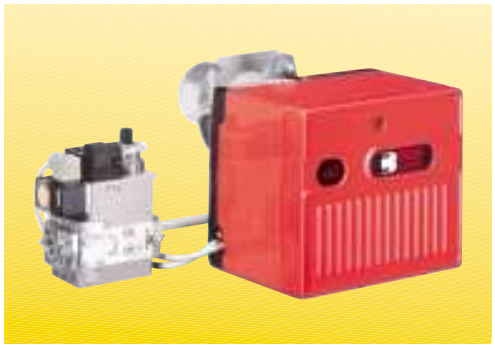
GAS TRAINS

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

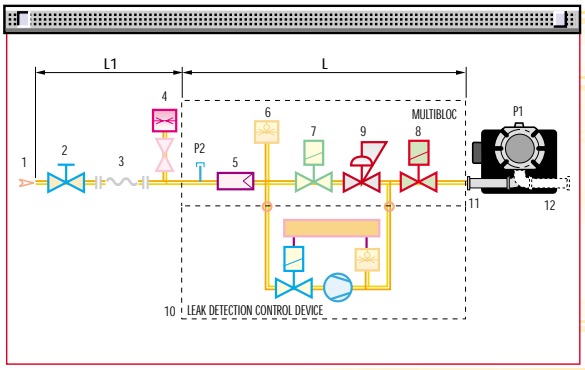
Depending on the gas output and the available pressure in the supply line, you should check the correct gas train to be adapted to the system requirements.

The gas train is Multibloc type, containing the main components in a single unit.
Except for the MBDLE 055 model, a valve seal control (as accessory) can be fitted to the Multibloc gas trains.

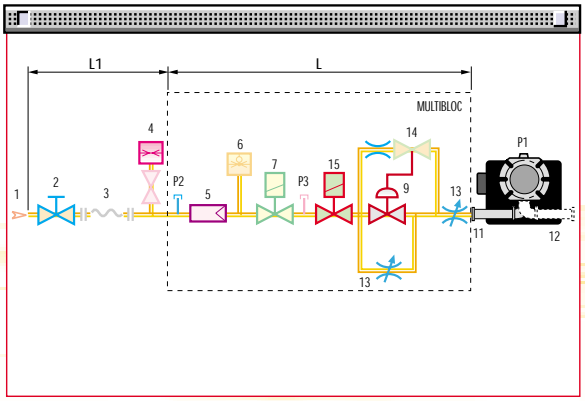
The MBDLE 055 Multibloc gas train can be fitted only to the left of the burner.



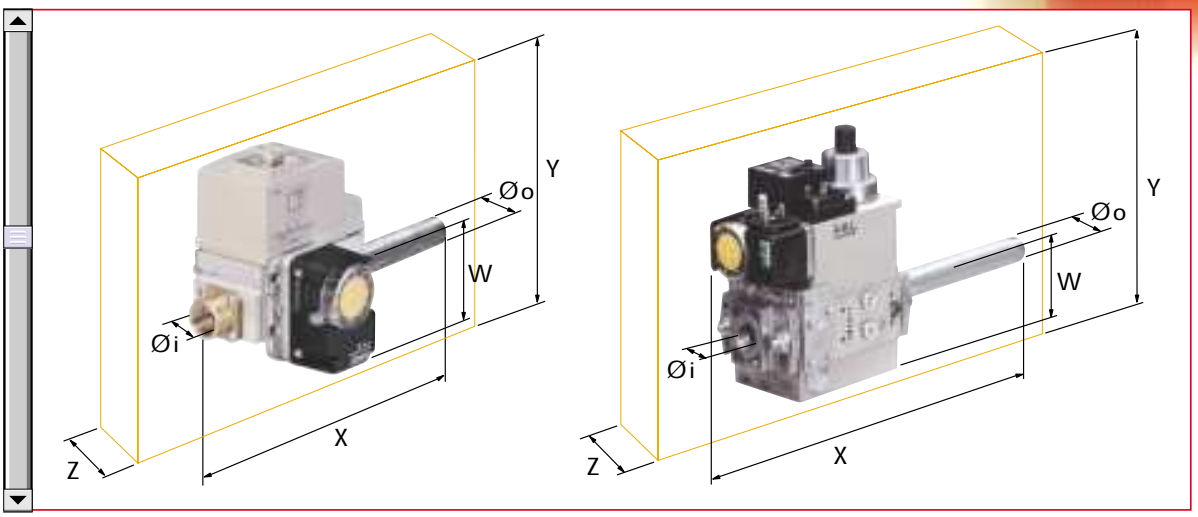
MBDLE 403 - 405 - 407 - 410



MBDLE 055



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 diameter and the coupling flange to the burner.

	Name	Code	Ø i	Ø o	X mm	Y mm	W mm	Z mm
MULTIBLOC	**MBDLE 055**	3970571	1/2"	1/2"	307	155	31	122
	MBDLE 055	3970569	1/2"	1/2"	307	155	31	122
	MBDLE 403	3970551	1/2"	1/2"	275	136	26	100
	MBDLE 403	3970533	1/2"	1/2"	275	136	26	100
	MBDLE 405	3970552	1/2"	1/2" (*)	321	186	46	120
	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 407	3970553	3/4"	3/4"	371	186	46	120
	MBDLE 410	3970532	1"	3/4"	405	221	55	145

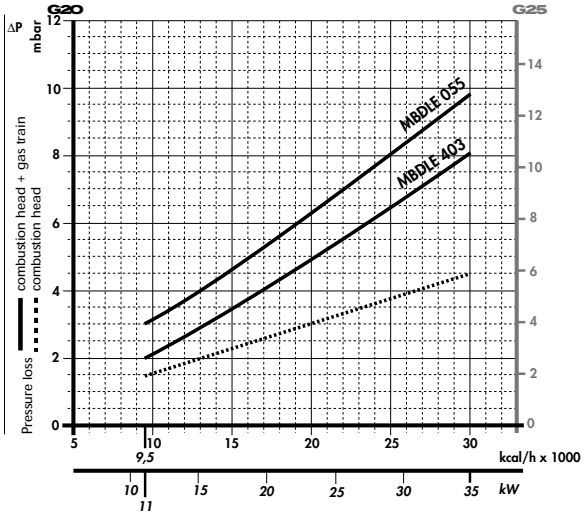
(*) With 1/2" - 3/4" reduction nipple supplied.

PRESSURE DROP DIAGRAMS

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.

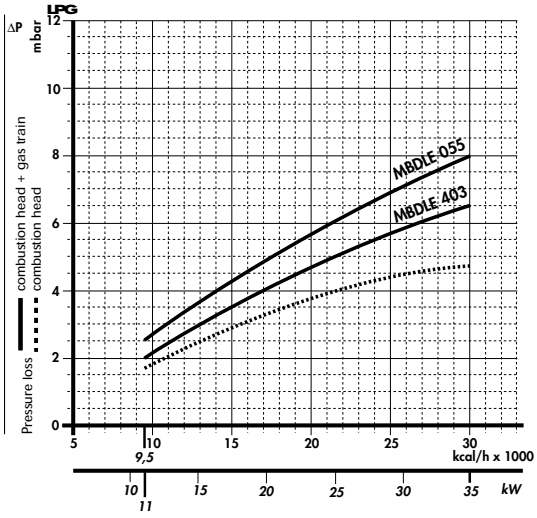
NATURAL GAS

FS3



LPG

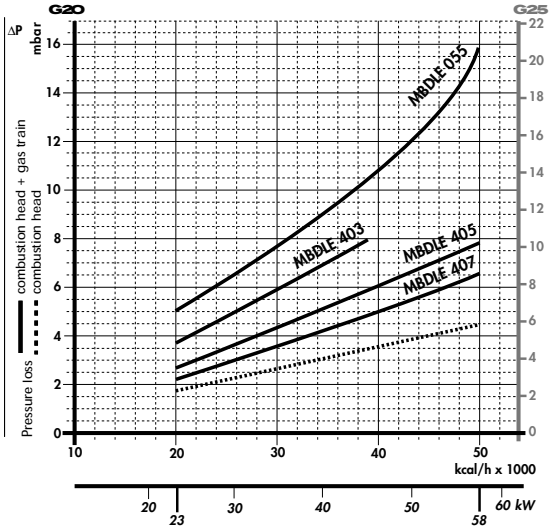
FS3



Gas train	Code	Terminal block	Plug and socket
MBDLE 055	3970571	•	
MBDLE 403	3970551	•	

NATURAL GAS

FS5

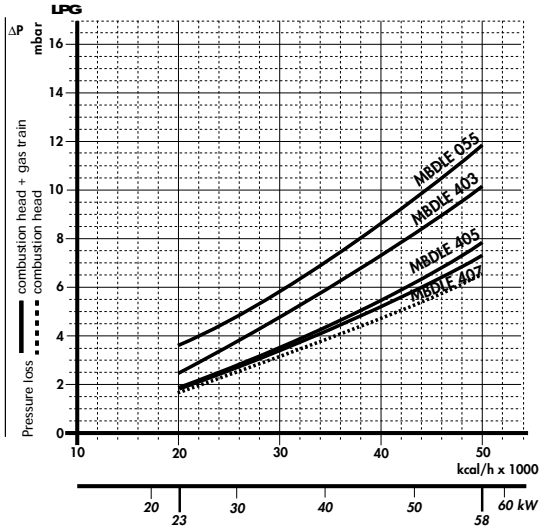


Gas train	Code	Output kW	Terminal block	Plug and socket
MBDLE 055	3970569	-		•
MBDLE 055	3970571	-	•	
MBDLE 403	3970533	≤ 45 (*)		•
MBDLE 403	3970551	≤ 45 (*)	•	

(*) With natural gas.

LPG

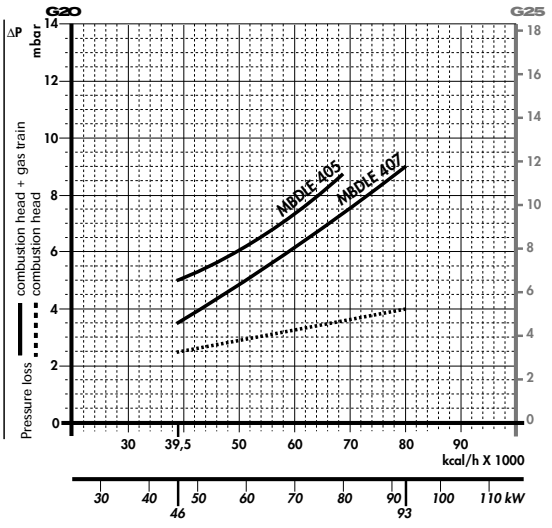
FS5



Gas train	Code	Terminal block	Plug and socket
MBDLE 405	3970530		•
MBDLE 405	3970552	•	
MBDLE 407	3970531		•

NATURAL GAS

FS8

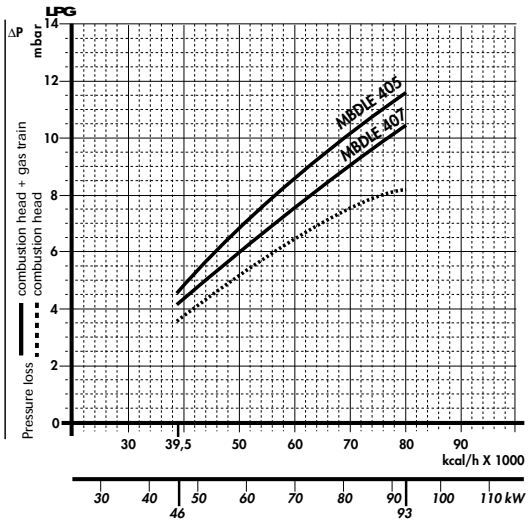


Gas train	Code	Output kW	Terminal block	Plug and socket
MBDLE 405	3970530	≤ 80 (*)		•
MBDLE 405	3970552	≤ 80 (*)	•	

(*) With natural gas.

LPG

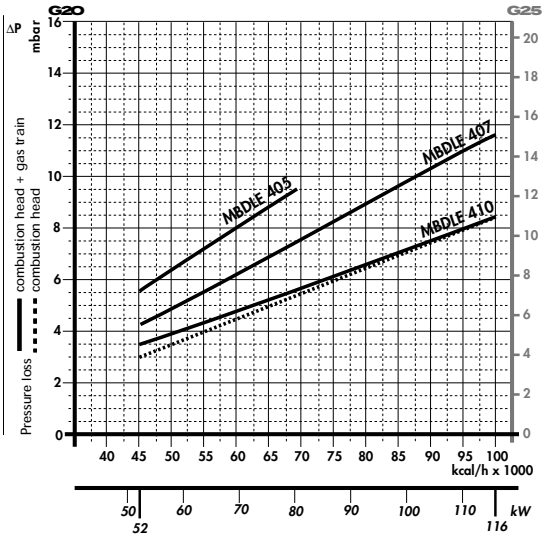
FS8



Gas train	Code	Terminal block	Plug and socket
MBDLE 407	3970531		•
MBDLE 407	3970553	•	

NATURAL GAS

FS10

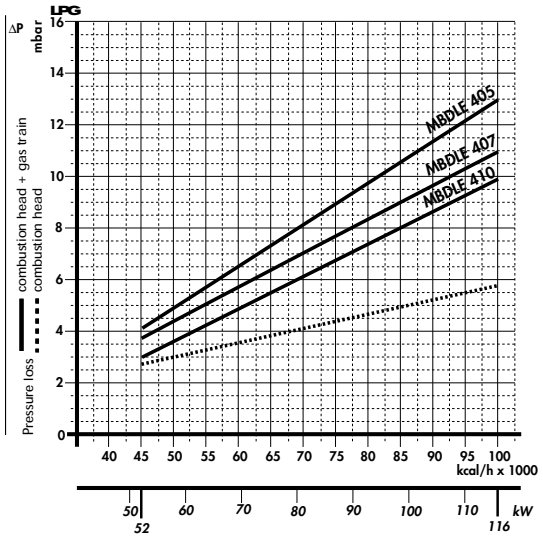


Gas train	Code	Output kW	Terminal block	Plug and socket
MBDLE 405	3970500	≤ 80 (*)		•
MBDLE 407	3970531	-		•
MBDLE 410	3970532	-		•

(*) With natural gas.

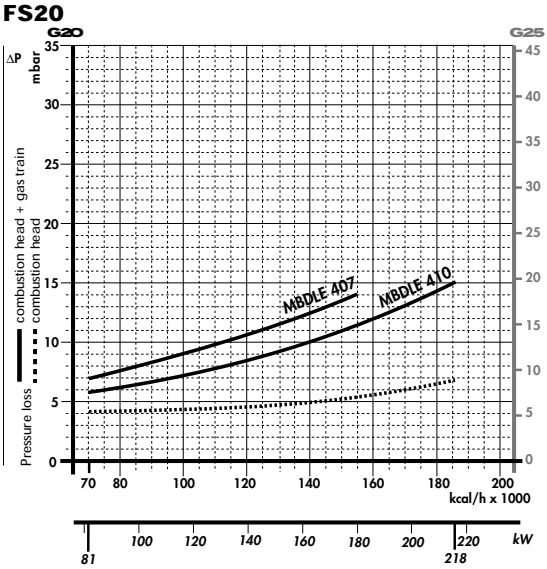
LPG

FS10



NATURAL GAS

FS20

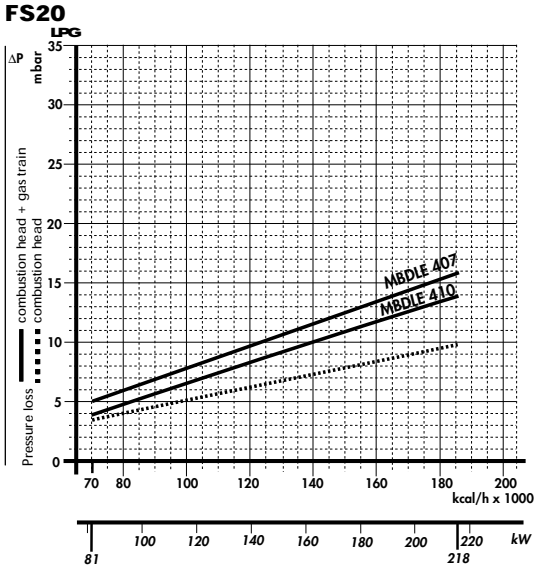


Gas train	Code	Output kW	Terminal block	Plug and socket
MBDLE 407	3970531	≤ 180 (*)		•
MBDLE 410	3970532	-		•

(*) With natural gas.

LPG

FS20



note *For pressure levels different from those indicated above, please contact Riello Burners Technical Office.*

DIMENSIONING OF THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

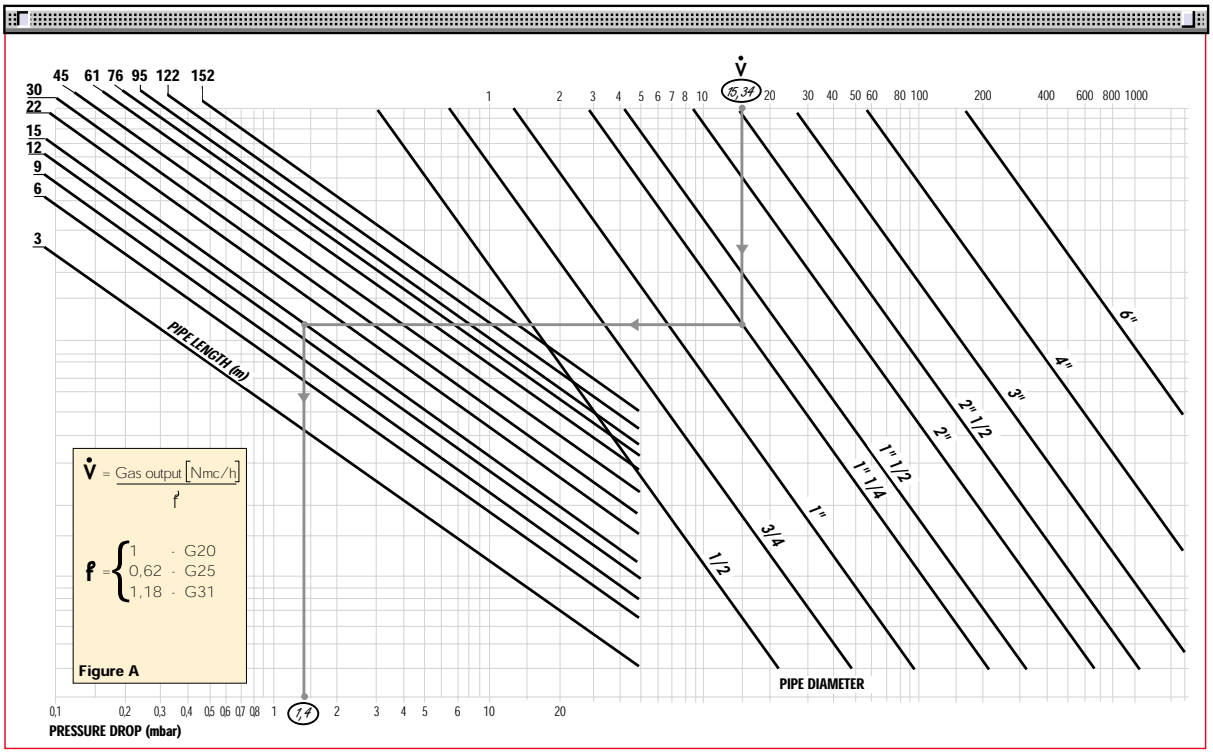
Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length.
Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop of on the botton scale below (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

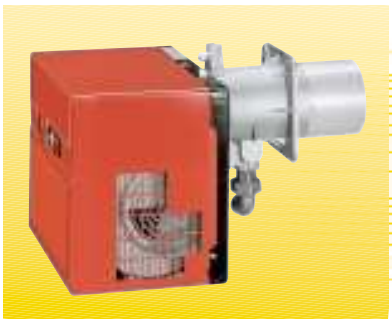
	- gas used	G25
	- gas output	9.51 mc/h
	- pressure at the gas meter	20 mbar
	- gas line length	15 m
	- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62} \right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;
- correct pressure = (20-1.4) = 18.6 mbar



VENTILATION

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

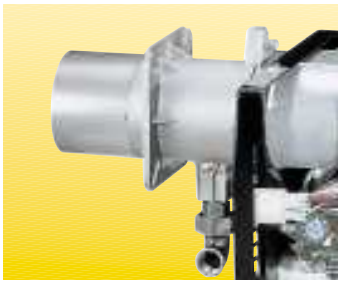


Air suction

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.

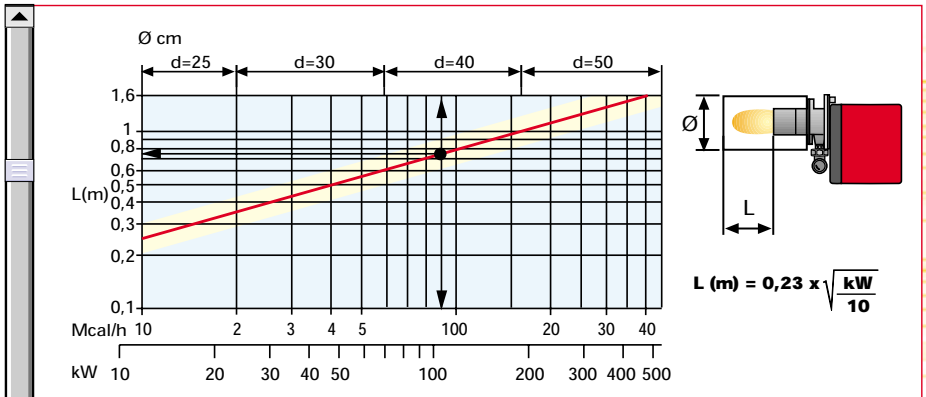
Combustion head



Flange

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

Combustion chamber dimensions used in the test laboratory



With simple adjustments, the burner can be adapted to combustion chambers that are slightly different from those used in the tests.

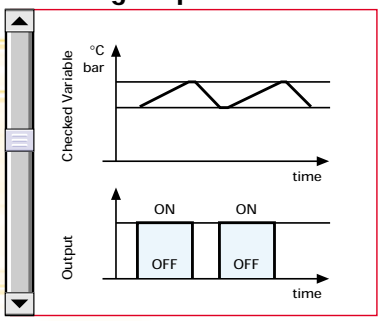
Example:
burnt thermal delivery = 105 kW;
L (m) = 0,23 x √10,5 = 0,74 (m);
Ø = 40 (cm)

ADJUSTMENT

BURNER OPERATION MODE

All these models are one stage operation.

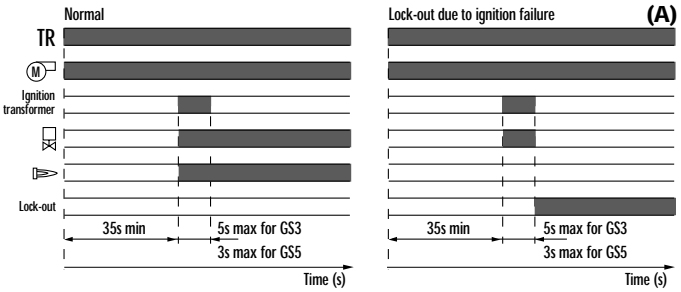
"One stage" operation



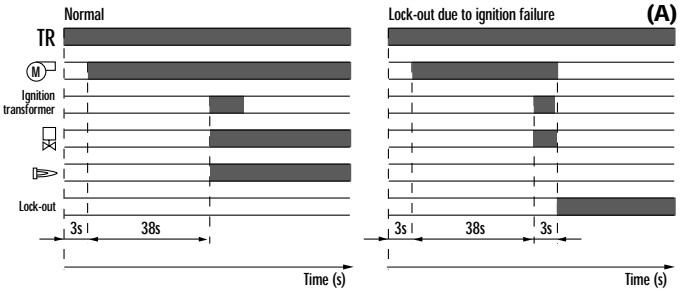
Air adjustment

IGNITION

FS3 - FS5 - FS8



FS10 - FS20



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

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-3s Safety time
3s-38s Pre-purge with the air damper open
41s Ignition

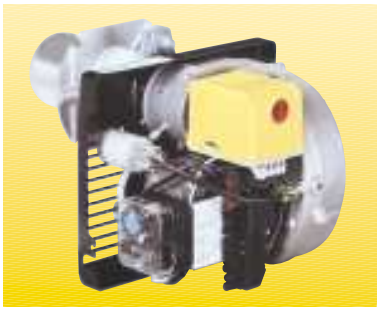
Lock-out due to ignition failure

If the flame does not light within the safety limit (3s) the burner locks-out.

ELECTRICAL CONNECTIONS
to be made by the installer

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

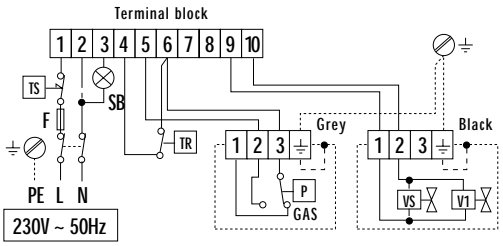


FS3 is fitted with terminal block: FS 10 and FS 20 are fitted with 7 and 6 pole sockets, FS5 and FS8 are available in both the configurations.

" ONE STAGE" OPERATION

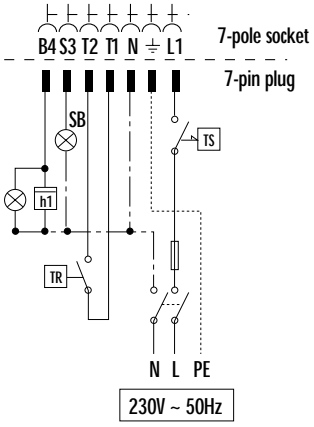
SB - Lock out led
TR - Regulating thermostat
TS - Safety thermostat (manual reset)
VS - Security valve
V1 - One stage valve
P - Gas pressure switch
F - Fuse

FS3 - FS5 - FS8

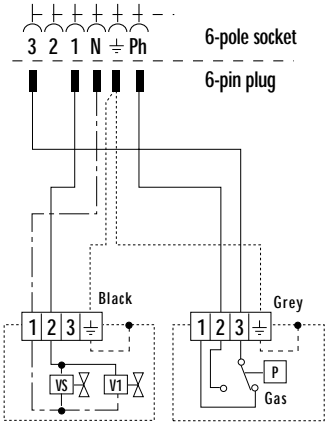


FS5 - FS8 - FS10 - FS20

Burner electrical wiring



Gas train electrical wiring



h1 - Single stage hour meter
SB - Lock out led
TR - Regulating thermostat
TS - Safety thermostat (manual reset)
VS - Security valve
V1 - One stage valve
P - Gas pressure switch
F - Fuse

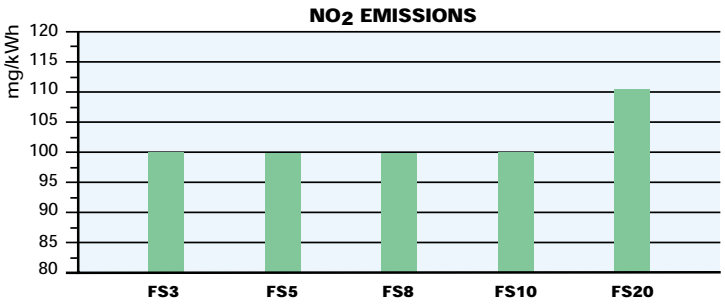
The following table shows the supply lead sections and types of fuse to be used.

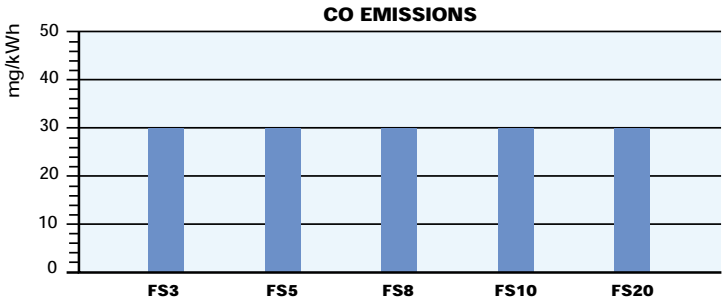
Model	FS3	FS5	FS8	FS10	FS20
	230V	230V	230V	230V	230V
F A	6	6	6	6	6A
L mm^2	1	1	1	1	1

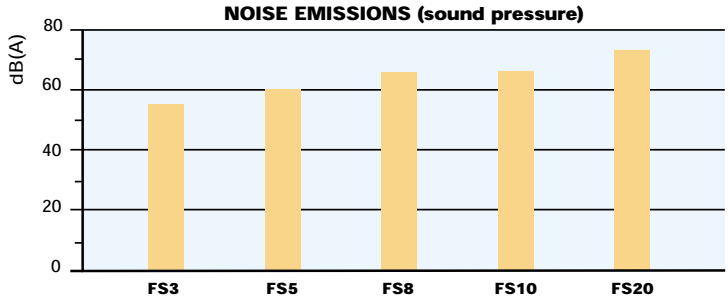
F = Fuse L = Lead section

EMISSIONS

The emission data have been measured in the various models at maximum output, in conformity with EN 676 standard.





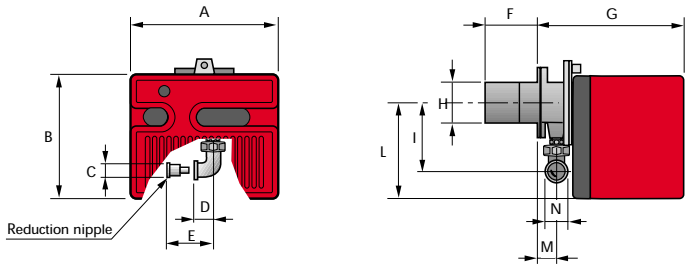


Special attention has been paid to noise reduction in the FS3 model. The model is fitted with sound-proofing material inside the cover.

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.

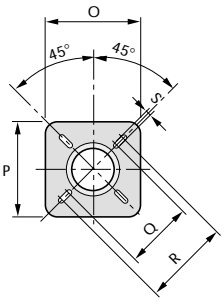
BURNERS



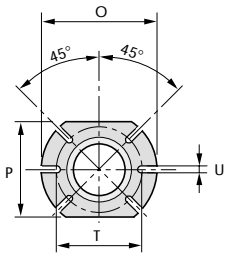
Model	A	B	C	D	E	F	G	H	I	L	M	N
FS3	252	215	Rp 1/2	25	55	100	230	91	132	165	37	Rp 3/8
FS5	272	233	Rp 1/2	28	-	100	295	91	138	180	48	-
FS8	305	262	Rp 3/4	33	-	110	347	105	142	204	61	-
FS10	305	262	Rp 3/4	33	-	110	347	105	142	204	61	-
FS20	350	298	Rp 3/4	33	-	120	389	125	152	230	67	-

BURNER-BOILER MOUNTING FLANGE

FS20

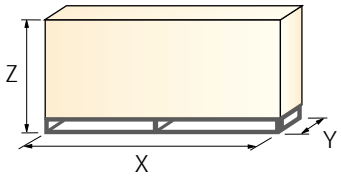


FS3 - FS5 - FS8 - FS10



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	9
FS5	435	345	315	10
FS8	473	413	320	16
FS10	473	413	320	16
FS20	525	453	365	16

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel.
The burner is set in factory on standard calibration (minimum output), if necessary adjustments can be made on the basis of the maximum output of the boiler.
All operations must be performed as described in the technical handbook supplied with the burner.

BURNER SETTINGS

- The air damper position can be easily adjusted removing the burner cover.

- Head setting is easy and aided by a graduated scale, a test point allows reading the air pressure in the combustion head.

- Riello 40 FS burners are fitted with an air pressure switch which, in accordance with EN 676 standards, can be adjusted by the installer using a graduated selector, on the basis of the effective working conditions.

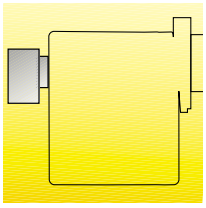
MAINTENANCE

- Maintenance is easily solved because the combustion head can be disassemblied without having to remove the burner from the boiler.

BURNER ACCESSORIES

Remote control release kit for the 525-508 control box

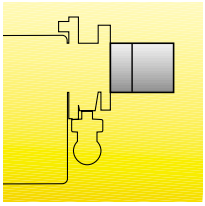
The 525-508 control box can be remotely released using an electric command kit.
This kit must be installed in conformity with current regulations in force.



Remote control release kit for the 525-508 control box	
Burner	**Kit code**
FS3 - FS5 - FS8 - FS10 - FS20	**3001030**

Extended head kit

"Standard head" burners can be transformed into "extended head" versions by using the special kit. Below the KITS available for the various burners are listed, showing the original and the extended lengths.



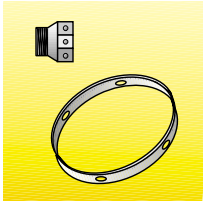
Combustion head extension kit			
Burner	**Standard head length (mm)**	**Extended head length (mm)**	**Kit code**
FS3 - FS5	100	125	**3000820**
FS8 - FS10	110	170	**3000864**
FS20	120	280	**3000873**

End cone with turbulator disk

End cone with turbulator disk		
Burner	**Projection**	**Kit code**
FS5	+15	**3000916**
FS8	+18	**3000917**
FS10	+18	**3000918**
FS20	+23	**3000919**

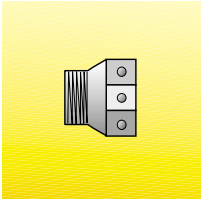
LPG kit

For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner, as shown in the following table:



LPG kit	
Burner	**Kit code**
FS3	**3000881**
FS5	**3000882**
FS8	**3000927**
FS10	**3000884**
FS20	**3000886**

Town gas kit



Town gas kit	
Burner	**Kit code**
FS3	**3000888**
FS5	**3000889**
FS8	**3000890**
FS10	**3000891**
FS20	**3000893**

Seal control kit

To test the valve seals on the gas train, (except for the model with Multibloc MBDLE 055) a special "seal control kit" is available.

Seal control kit	
Burner	**Kit code**
FS3 - FS5 - FS8 - FS10 - FS20	**3010123**

BALANCED FLUE VERSION

The R40 series balanced flue gas burner has been specifically designed to meet the increasing trend towards the use of balanced flue, otherwise known as room sealed appliances, which avoid the necessity of having a chimney to discharge the products of combustion.

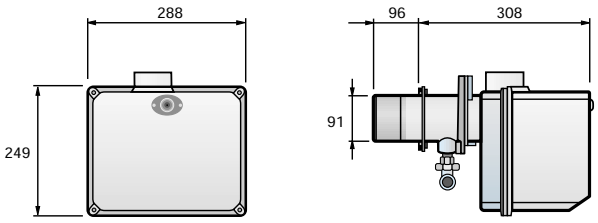
Balanced flue products are completely sealed from the environment in which they are installed, drawing air for combustion directly from the outside, thereby ensuring no unwelcome smells from the combustion.

As a result of the burner components being completely enclosed this provides an additional benefit of low sound levels.

This version is available for FS3 and FS5 only.

Riello 40 FS Balanced Flue version

Overall dimensions (mm)



SPECIFICATION

A special index guides your choice of boiler from the various models available in the FS series.
Below is a clear and detailed specification description of the product.

DESIGNATION OF SERIES

Series: F

Fuel : Natural gas

Size

F	S	3

AVAILABLE BURNER MODELS

FS3	11	÷	35	kW
FS5	23	÷	58	kW
FS8	46	÷	93	kW
FS10	52	÷	116	kW
FS20	81	÷	218	kW

SPECIFICATION DESCRIPTION

Burner

Monoblock, gas burners, completely automatic, with one stage settings fitted with:
- Fan with forward inclined blades
- Cover lined with sound-deadening material
- Metallic and fixed air damper with adjustment
- Single phase electric motor 230 V, 50 Hz
- Combustion head fitted with:
    - stainless steel head cone, resistant to high temperatures
    - ignition electrodes
    - ionisation probe
    - gas distributor
    - flame stability disk
- Adjustable air pressure switch, with graduated selector, to guarantee burner lock out in the case of insufficient combustible air
- Protection filter against radio interference
- IP 40 electric protection level.

Gas train

Fuel supply line in the Multibloc configuration, fitted with:
- Filter
- Pressure stabiliser
- Minimum gas pressure switch
- Safety valve
- Single stage working valve with ignition gas output regulator.

Burner and gas train assembled

Approval:
- EN 676 standard.

Conforming to:
- 90/396/EEC (gas)
- 73/23/EEC (low voltage)
- 89/336/EEC (electromagnetic compatibility)
- 92/42/EEC (performance)
- 98/37/EEC (machines).

Standard equipment:
- Flange insulation screen
- Screws and nuts for fixing the flange to the boiler
- 7-pole socket
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue
- Hinge
- Grommet.

Available accessories to be ordered separately:
- Remote release kit
- Extended head kit
- LPG kit
- Town gas kit
- Seal control kit
- Alternative combustion head kit
- Balanced flue version.

Lineagrafica

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Tel. ++39.0442630111 - Fax ++39.044221980
Internet: http://www.rielloburners.com - E-mail: rburners@rielloburners.com

RIELLO BURNERS

CE

ONE STAGE GAS BURNERS

RIELLO 40 GS SERIES				
GS3	11	÷	35	kW
GS5	18	÷	58	kW
GS10	42	÷	116	kW
GS20	81	÷	232	kW

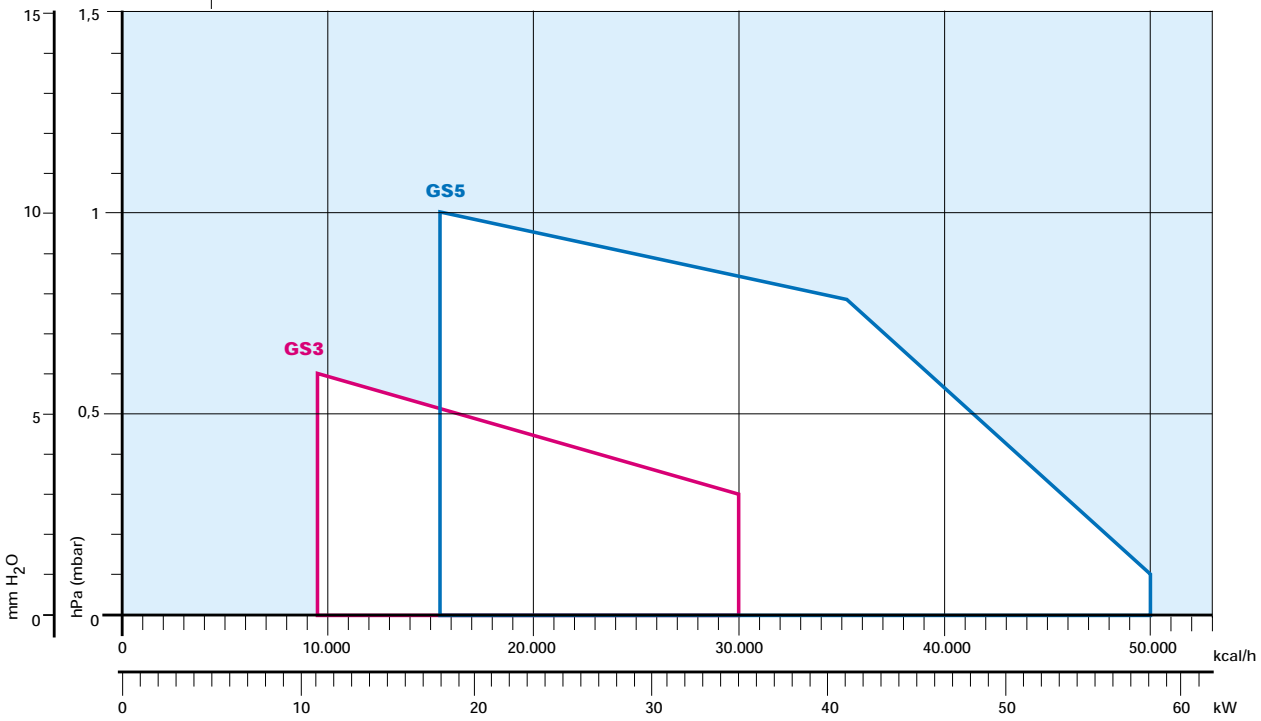
The Riello 40 GS series of one stage gas burners, is a complete range of products developed to respond to any request for home heating. The Riello 40 GS series is available in four different models, whit an output ranging from 11 to 232 kW, divided in four different structures.
All the models use the same components designed by Riello for the Riello 40 GS 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 GS burners are tested before leaving the factory.

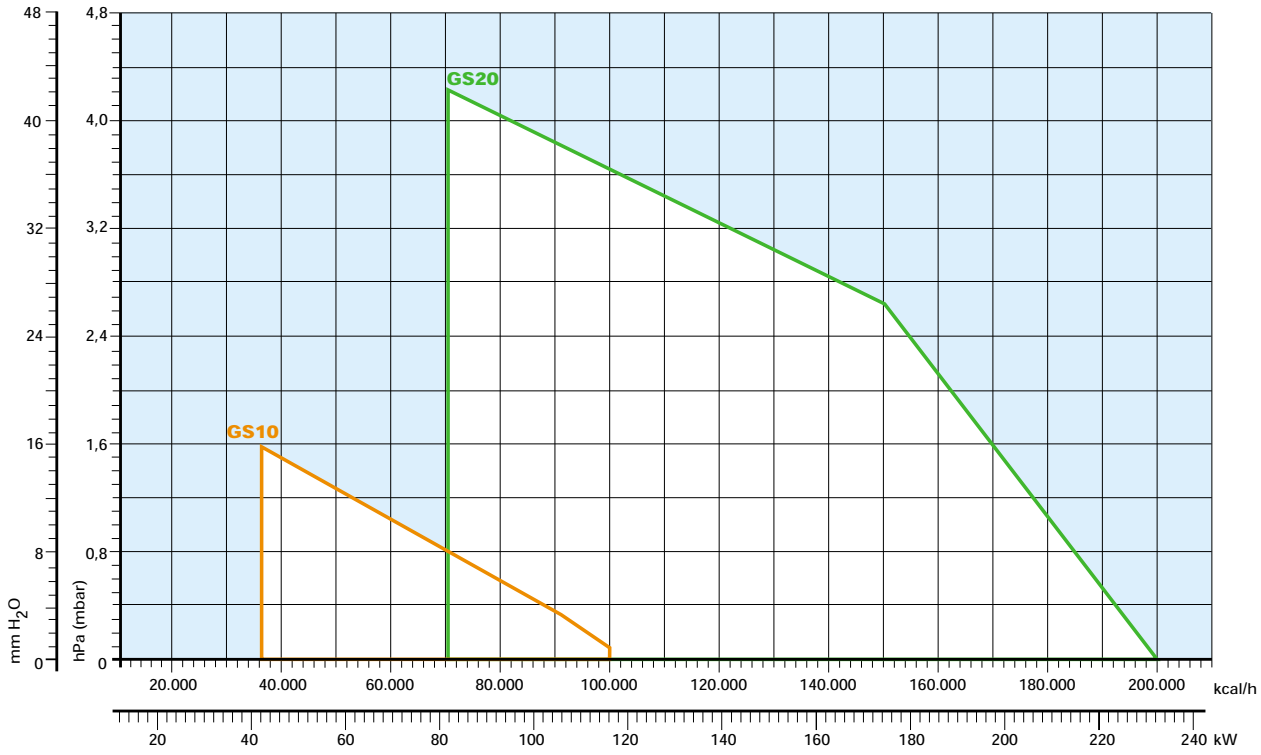
TECHNICAL DATA

	Model		GS3	GS5	GS10	GS20
	Setting		One stage			
	Servo-motor type		R.B.L.			
	Servo-motor run time		6 ÷ 28			
	Heat output	kW	11 - 35	18 - 58	42 - 116	81 - 232
		Mcal/h	9,5 - 30	15,5 - 50	36 - 100	70 - 200
	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 output	Nm³/h	1,1 - 3,5	1,8 - 5,8	4,2 - 11,6	8,1 - 23,2
	Net calorific value G25 gas	kWh/Nm³	8,6			
	G25 gas density	kg/Nm³	0,78			
	G25 gas output	Nm³/h	1,3 - 4	2,1 - 6,7	4,9 - 13,4	9,4 - 26,9
	Net calorific value LPG gas	kWh/Nm³	25,8			
	LPG gas density	kg/Nm³	2,02			
	LPG gas output	Nm³/h	0,4 - 1,4	0,7 - 2,2	1,6 - 4,4	3,1 - 8,9
	Fan	type	forward tilted blades			
	Air temperature	max. °C	40			
Electrical data	Electrical supply	Ph/Hz/V	1/50/230 ±10%			
	Aux. electrical supply	Ph/Hz/V	--			
	Control box	type	525 SE/5	525 SE/3	508 SE	508 SE
	Total electrical power	kW	0,1	0,11	0,13	0,25
	Protection level	IP	40			
	Motor electrical power	kW	0,09	0,09	0,09	0,15
	Rated motor current	A	0,6	0,65	0,7	1,4
	Motor start current	A	4	4	4	7,5
	Motor protection level	IP	20			
	Ignition transformer		incorporated in the control box		separated from the control box	
	Operation		intermittent (at least one halt every 24 h)			
Approval Emissions	Sound pressure	dB(A)	55	58	65	72
	CO Emissions	mg/kWh	< 40			
	NOx Emissions	mg/kWh	≤ 120			
	Directives		90/396/EEC, 89/336/EEC, 73/23/EEC, 98/37/EEC, 92/42/EEC			
	Conforming to		EN 676			
	Certifications		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.

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

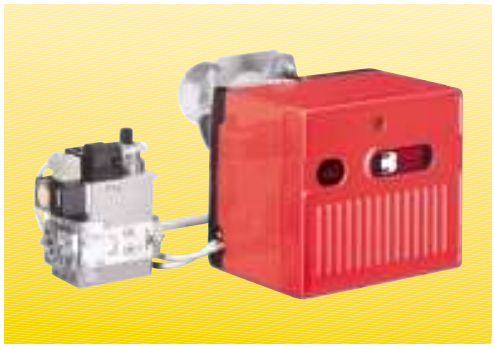
GAS TRAINS

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

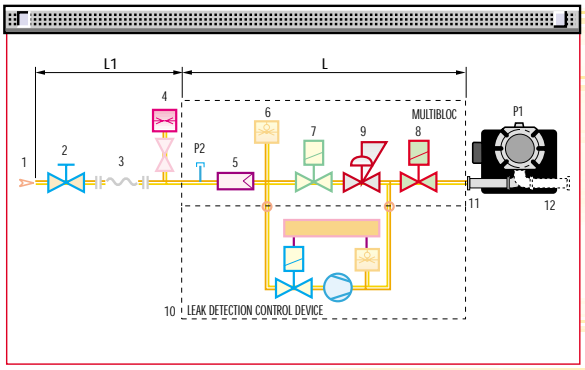
Depending on the fuel output and the available pressure in the supply line, you should check the correct gas train to be adapted to the system requirements.

The gas train is Multibloc type, containing the main components in a single unit.
Except for the MBDLE 055 model, a valve seal control (as accessory) can be fitted to the Multibloc gas trains.

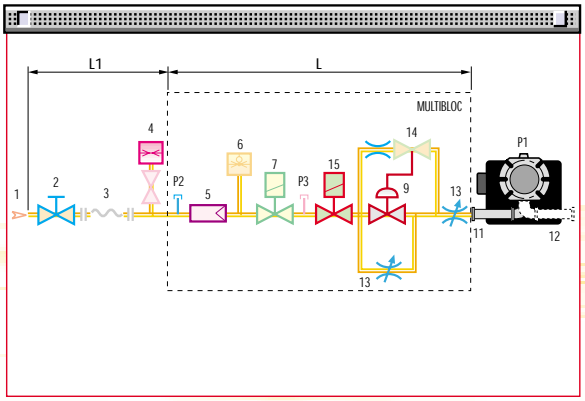
The MBDLE 055 Multibloc gas train can be fitted only to the left of the burner.



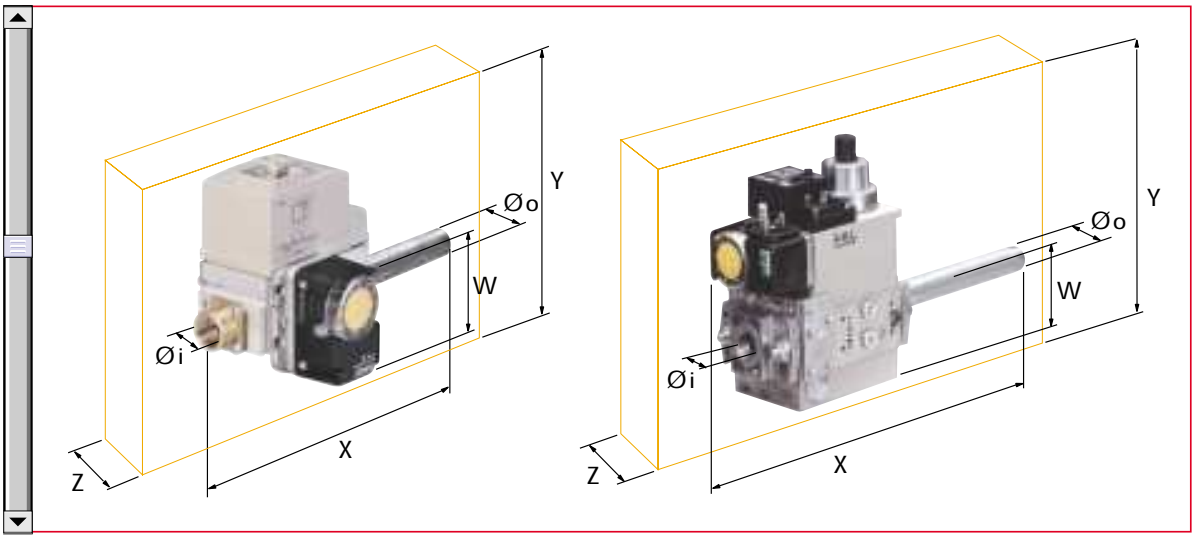
MBDLE 403 - 405 - 407 - 410



MBDLE 055



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 GS burners, intake diameter and the coupling flange to the burner.

	Name	Code	Ø i	Ø o	X mm	Y mm	W mm	Z mm
MULTIBLOC	**MBDLE 055**	3970569	1/2"	1/2"	307	155	31	122
	MBDLE 055	3970571	1/2"	1/2"	307	155	31	122
	MBDLE 403	3970533	1/2"	1/2"	275	136	26	100
	MBDLE 403	3970551	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
	MBDLE 410	3970554	1"	3/4"	405	221	55	145

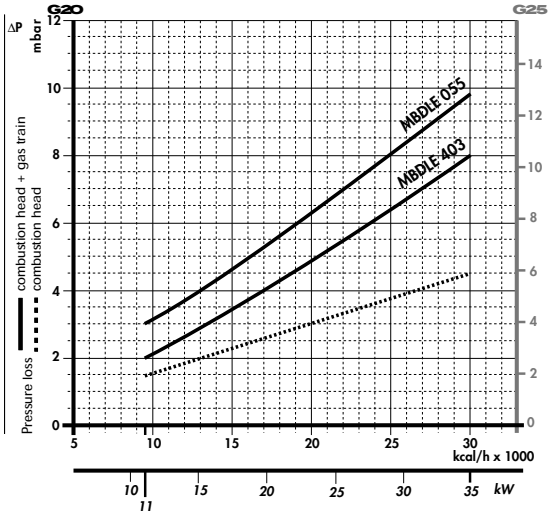
(*) With 1/2" - 3/4" reduction nipple supplied.

PRESSURE DROP DIAGRAMS

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

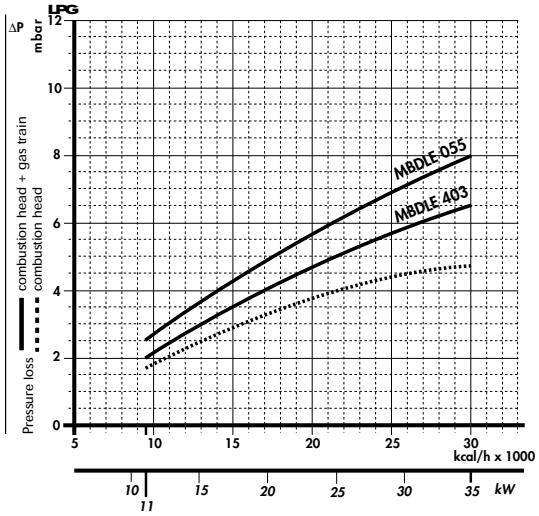
GS3



Gas train	Code	Terminal block	Plug and socket
MBDLE 055	3970569		•
MBDLE 055	3970571	•	

LPG

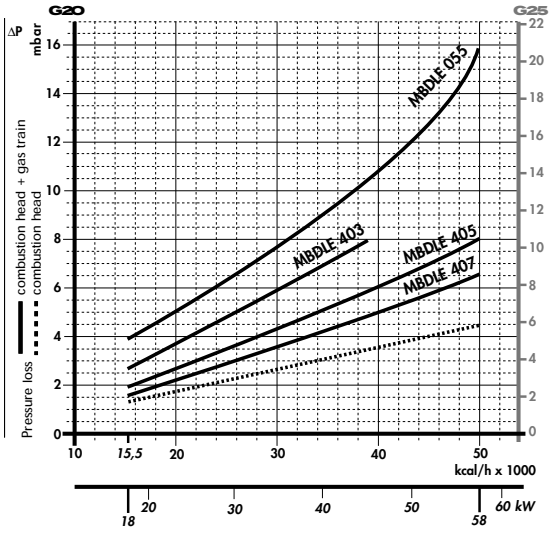
GS3



Gas train	Code	Terminal block	Plug and socket
MBDLE 403	3970533		•
MBDLE 403	3970551	•	

NATURAL GAS

GS5

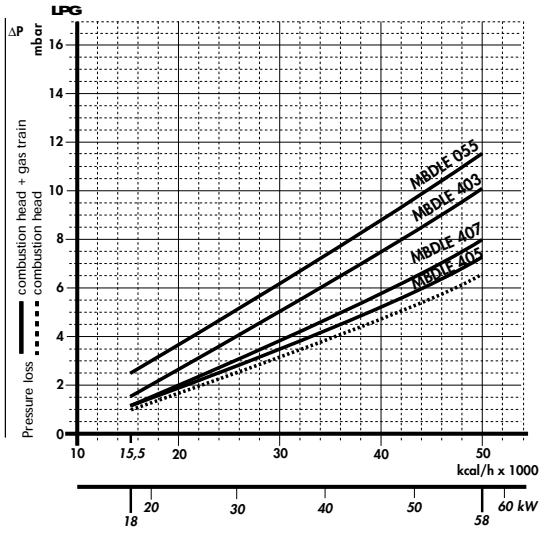


Gas train	Code	Output kW	Terminal block	Plug and socket
MBDLE 055	3970569	-		•
MBDLE 055	3970571	-	•	
MBDLE 403	3970533	≤ 45 (*)		•
MBDLE 403	3970551	≤ 45 (*)	•	

(*) With natural gas.

LPG

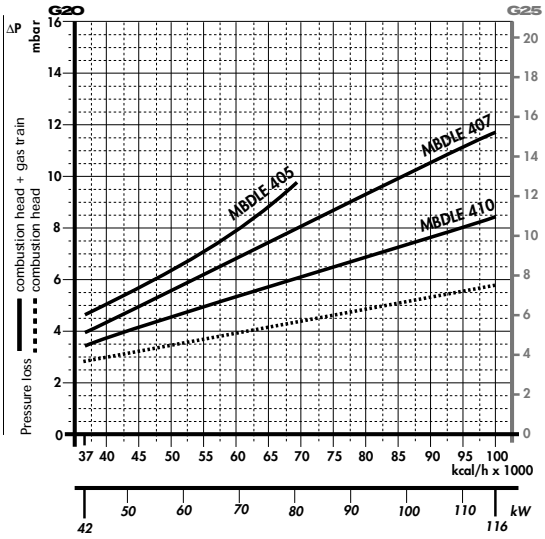
GS5



Gas train	Code	Terminal block	Plug and socket
MBDLE 405	3970530		•
MBDLE 405	3970552	•	
MBDLE 407	3970531		•

NATURAL GAS

GS10

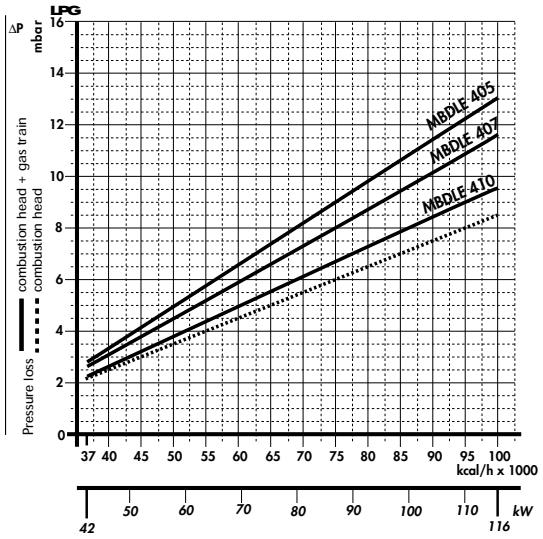


Gas train	Code	Output kW	Terminal block	Plug and socket
MBDLE 405	3970500	≤ 80 (*)		•
MBDLE 407	3970531	-		•
MBDLE 410	3970532	-		•

(*) With natural gas.

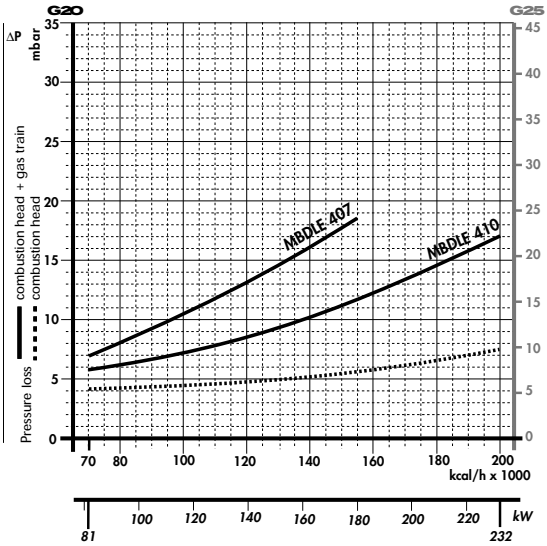
LPG

GS10



NATURAL GAS

GS20

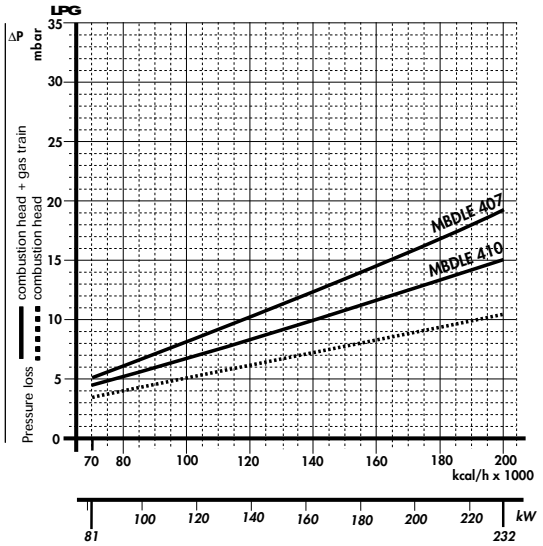


Gas train	Code	Output kW	Terminal block	Plug and socket
MBDLE 407	3970531	≤ 180 (*)		•
MBDLE 407	3970553	≤ 180 (*)	•	

(*) With natural gas.

LPG

GS20



Gas train	Code	Terminal block	Plug and socket
MBDLE 410	3970532		•
MBDLE 410	3970554	•	

note *For pressure levels different from those indicated above, please contact Riello Burners Technical Office.*

DIMENSIONING OF THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

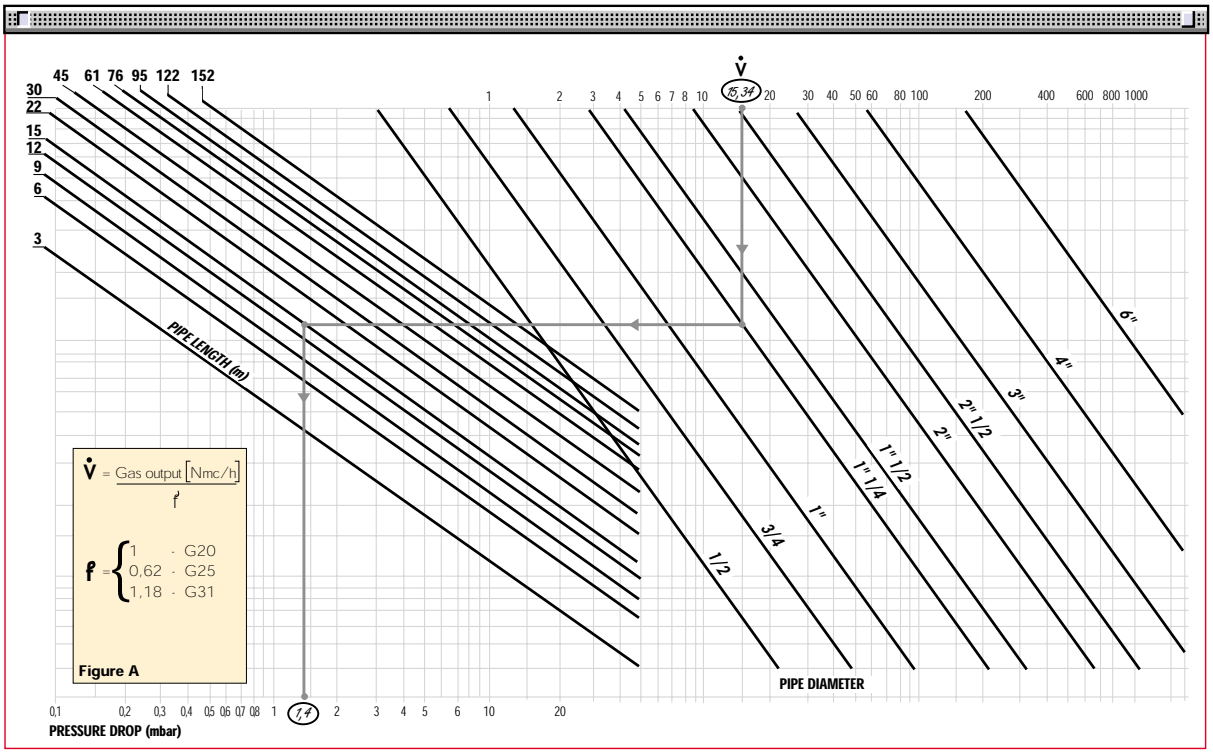
Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length.
Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop of on the botton scale below (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

	- gas used	G25
	- gas output	9.51 mc/h
	- pressure at the gas meter	20 mbar
	- gas line length	15 m
	- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62} \right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;

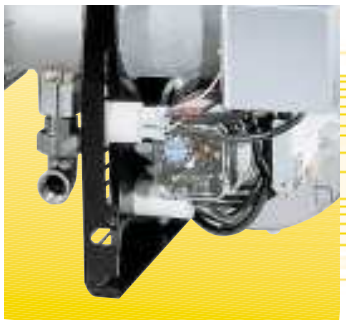
- correct pressure = (20-1.4) = 18.6 mbar



VENTILATION

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

Air suction

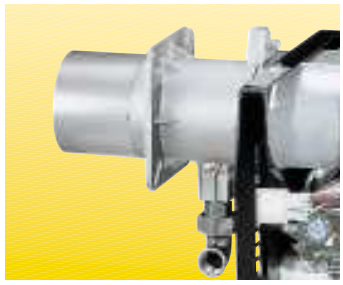


Air pressure switch

COMBUSTION HEAD

The combustion head in Riello 40 GS 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.

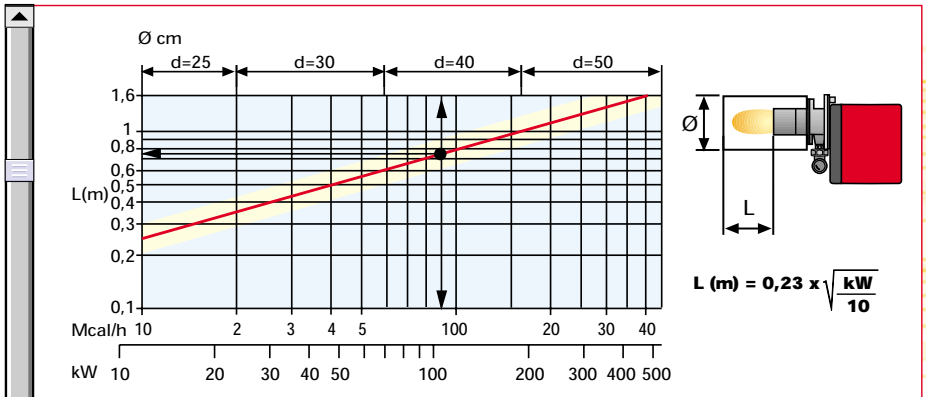
Combustion head



Flange

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

Combustion chamber dimensions used in the test laboratory



With simple adjustments, the burner can be adapted to combustion chambers that are slightly different from those used in the tests.

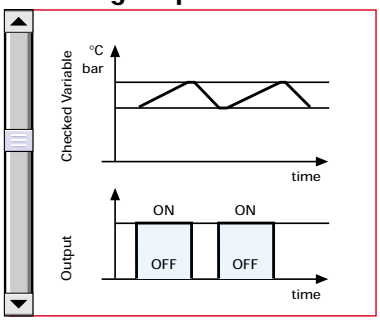
Example:
burnt thermal delivery = 105 kW;
L (m) = 0,23 x √10,5 = 0,74 (m);
Ø = 40 (cm)

ADJUSTMENT

BURNER OPERATION MODE

All these models are one stage operation.

"One stage" operation

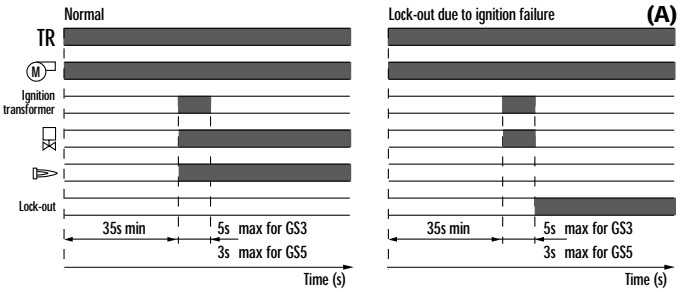


Air damper partially open

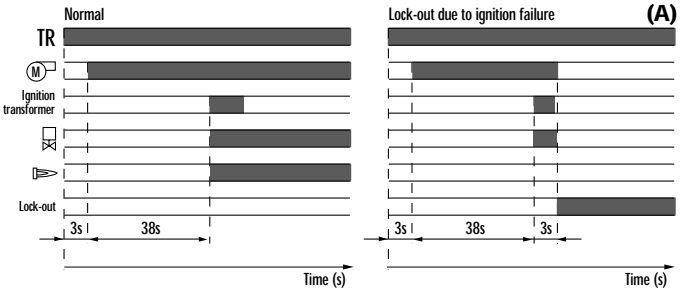
Air damper completely open

IGNITION

GS3 - GS5



GS10 - GS20



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

Correct operation for GS3 and GS5 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 GS3 model and 5s for GS5 model) the burner locks-out.

Correct operation for GS10 and GS20 models

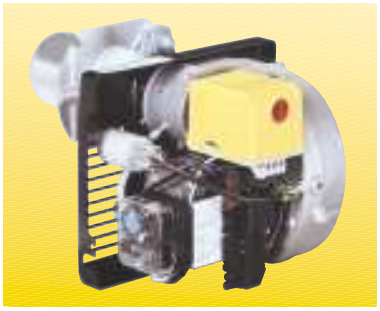
0s The burner begins the ignition cycle
0s-3s Safety time
3s-38s Pre-purge with the air damper open
41s Ignition

Lock-out due to ignition failure

If the flame does not light within the safety limit (3s) the burner locks-out.

ELECTRICAL CONNECTIONS
to be made by the installer

Electrical connections must be made by qualified and skilled personnel in conformity with the local regulations in force. All the models are fitted with 7 and 6 pole sockets.

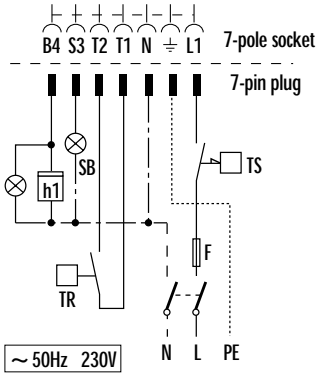


Control box fitted with an ignition transformer in GS3 and GS5 models

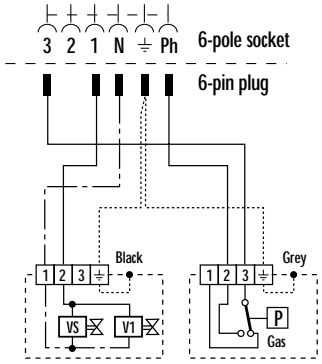
" ONE STAGE" OPERATION

GS3 - GS5 - GS10 - GS20

Burner electrical wiring

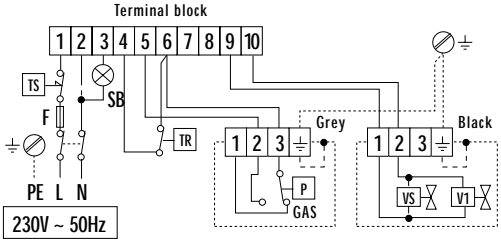


Gas train electrical wiring



h1 - Single stage hour meter
SB - Lock out led
TR - Regulating thermostat
TS - Safety thermostat (manual reset)
VS - Security valve
V1 - One stage valve
P - Gas pressure switch
F - Fuse

GS3 - GS5 - GS20



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

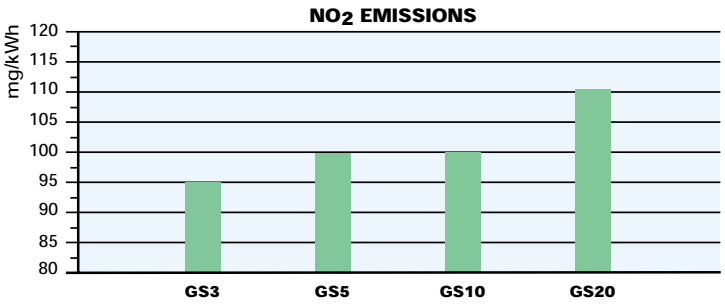
The following table shows the supply lead sections and types of fuse to be used.

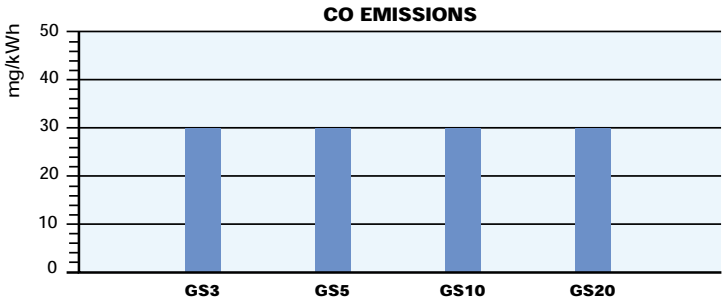
Model	GS3	GS5	GS10	GS20
	230V	230V	230V	230V
F A	6	6	6	6A
L mm^2	1	1	1	1

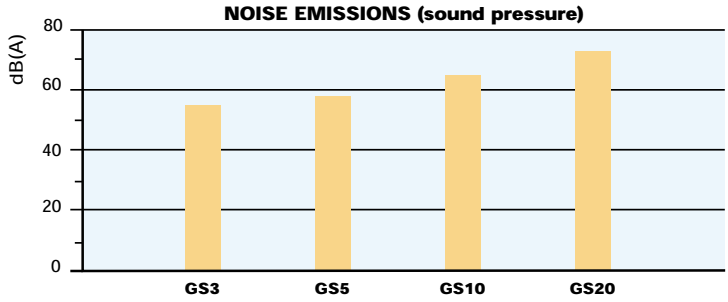
F = Fuse L = Lead section

EMISSIONS

The emission data have been measured in the various models at maximum output, in conformity with EN 676 standard.





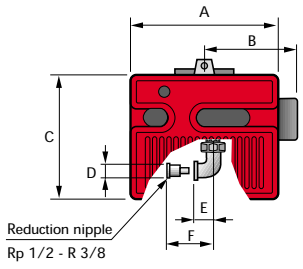


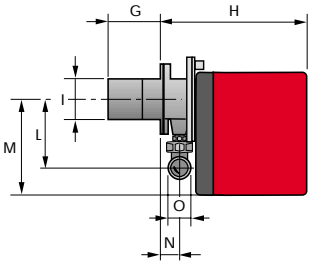
Special attention has been paid to noise reduction. All models are fitted with sound-proofing material inside the cover.

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.

BURNERS

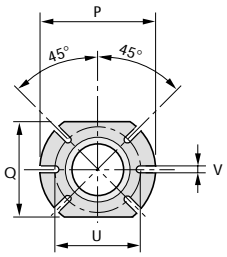




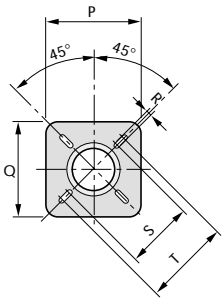
Model	A	B	C	D	E	F	G	H	I	L	M	N	O
GS3	252	166	215	Rp 1/2	25	55	100	230	91	132	165	37	Rp 3/8
GS5	272	170	233	Rp 1/2	28	-	100	295	91	138	180	48	-
GS10	305	188	262	Rp 3/4	33	-	110	347	105	142	204	61	-
GS20	350	212	298	Rp 3/4	33	-	120	389	125	152	230	67	-

BURNER-BOILER MOUNTING FLANGE

GS3 - GS5 - GS10

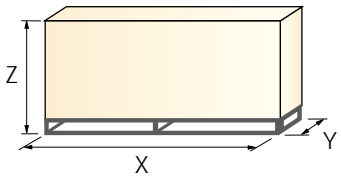


GS20



Model	P	Q	R	S	T	U	V
GS3	170	140	-	-	-	130	10
GS5	170	140	-	-	-	130	10
GS10	185	160	-	-	-	130	11
GS20	170	170	11	155	200	-	-

PACKAGING



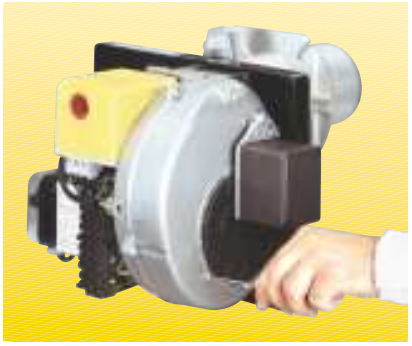
Model	X	Y	Z	kg
GS3	365	325	300	11
GS5	435	345	315	11
GS10	473	413	320	26
GS20	525	453	365	21

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel.
The burner is set in factory on standard calibration (minimum output), if necessary adjustments can be made on the basis of the maximum output of the boiler.
All operations must be performed as described in the technical handbook supplied with the burner.

BURNER SETTINGS

- The air damper position can be easily adjusted removing the burner cover.



- Head setting is easy and aided by a graduated scale, a test point allows reading the air pressure in the combustion head.

- Riello 40 GS burners are fitted with an air pressure switch which, in accordance with EN 676 standards, can be adjusted by the installer using a graduated selector, on the basis of the effective working conditions.

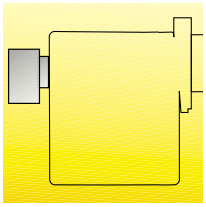
MAINTENANCE

- Maintenance is easily solved because the combustion head can be disassemblied without having to remove the burner from the boiler.

BURNER ACCESSORIES

Remote control release kit for the 525-508 control box

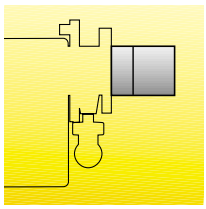
The 525-508 control box can be remotely released using an electric command kit.
This kit must be installed in conformity with current regulations in force.



Remote control release kit for the 525-508 control box	
Burner	**Kit code**
GS3 - GS5 - GS10 - GS20	**3001030**

Extended head kit

"Standard head" burners can be transformed into "extended head" versions by using the special kit. Below the KITS available for the various burners are listed, showing the original and the extended lengths.



Combustion head extension kit			
Burner	**Standard head length (mm)**	**Extended head length (mm)**	**Kit code**
GS3 - GS5	100	125	**3000820**
GS10	110	170	**3000864**
GS20	120	280	**3000873**

End cone with turbulator disk

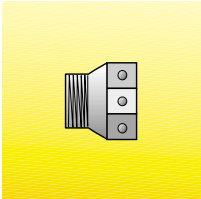
End cone with turbulator disk		
Burner	**Projection**	**Kit code**
GS5	+15	**3000916**
GS10	+18	**3000918**
GS20	+23	**3000919**

LPG kit

For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner, as shown in the following table:

LPG kit	
Burner	**Kit code**
GS3	**3000881**
GS5	**3000882**
GS10	**3000884**
GS20	**3000886**

Town gas kit



Town gas kit	
Burner	**Kit code**
GS3	**3000888**
GS5	**3000889**
GS10	**3000891**
GS20	**3000893**

Seal control kit

To test the valve seals on the gas train, (except for the model with Multibloc MBDLE 055) a special "seal control kit" is available.

Seal control kit	
Burner	**Kit code**
GS3 - GS5 - GS10 - GS20	**3010123**

BALANCED FLUE VERSION

The R40 series balanced flue gas burner has been specifically designed to meet the increasing trend towards the use of balanced flue, otherwise known as room sealed appliances, which avoid the necessity of having a chimney to discharge the products of combustion.

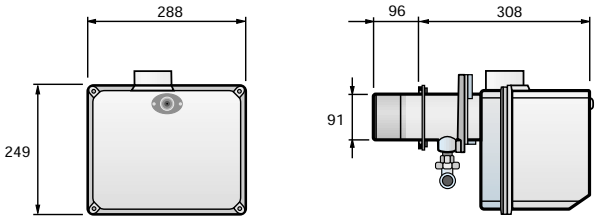
Balanced flue products are completely sealed from the environment in which they are installed, drawing air for combustion directly from the outside, thereby ensuring no unwelcome smells from the combustion.

As a result of the burner components being completely enclosed this provides an additional benefit of low sound levels.

This version is available for GS3 and GS5 only.

Riello 40 GS Balanced Flue version

Overall dimensions (mm)



SPECIFICATION

A special index guides your choice of boiler from the various models available in the GS series.
Below is a clear and detailed specification description of the product.

DESIGNATION OF SERIES

Series: G

Fuel : S Natural gas

Size

G	S	3

AVAILABLE BURNER MODELS

GS3	11	÷	35	kW
GS5	18	÷	58	kW
GS10	42	÷	116	kW
GS20	81	÷	232	kW

SPECIFICATION DESCRIPTION

Burner

Monoblock, gas burners, completely automatic, with one stage settings fitted with:
- Fan with forward inclined blades
- Cover lined with sound-deadening material
- Air damper, completely closed in stand by, with adjustment inside the cover
- Single phase electric motor 230 V, 50 Hz
- Combustion head fitted with:
    - stainless steel head cone, resistant to high temperatures
    - ignition electrodes
    - ionisation probe
    - gas distributor
    - flame stability disk
- Adjustable air pressure switch, with graduated selector, to guarantee burner lock out in the case of insufficient combustible air
- Protection filter against radio interference
- IP 40 electric protection level.

Gas train

Fuel supply line in the Multibloc configuration, fitted with:
- Filter
- Pressure stabiliser
- Minimum gas pressure switch
- Safety valve
- Single stage working valve with ignition gas output regulator.

Burner and gas train assembled

Approval:
- EN 676 standard.

Conforming to:
- 89/336/EEC (electromagnetic compatibility)
- 73/23/EEC (low voltage)
- 98/37/EEC (machines)
- 92/42/EEC (performance)
- 90/396/EEC (gas).

Standard equipment:
- Flange insulation screen
- Screws and nuts for fixing the flange to the boiler
- 7-pole socket
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue
- Hinge
- Grommet.

Available accessories to be ordered separately:
- Remote release kit
- Extended head kit
- LPG kit
- Seal control kit
- Town gas kit
- Alternative combustion head kit
- Balanced flue version.

Lineagrafica

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Tel. ++39.0442630111 - Fax ++39.044221980
Internet: http://www.rielloburners.com - E-mail: rburners@rielloburners.com

RIELLO BURNERS

CE

ONE-STAGE GAS BURNER

RDB S SERIES | **RDB1 S** 16 ÷ 47 kW

The Riello RDB1 S is a new model of one stage gas burners series, characterized for its small dimensions inspite of its high combustion performance. It is available in conventional flue and balanced flue versions. It has been developed to respond to any request for home heating, conforming to current regulations in force. This model uses the same components designed by Riello for the RDB series. The high quality level guarantees safe working. In developing this burner, special attention was paid to reducing noise, the ease of installation and adjustment, to obtaining the smallest size possible to fit into any sort of boiler available on the market.
This model is approved by the EN 676 European Standard and European Directives, Gas Appliance, EMC, Low Voltage, Boiler Efficiency.
The RDB1 S burner is tested before leaving the factory.

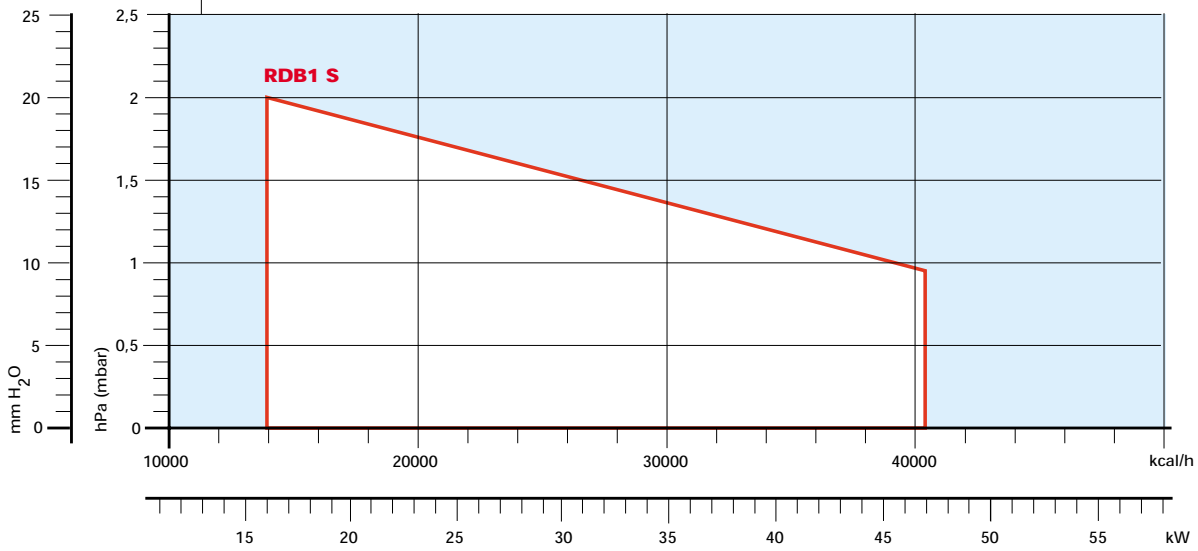
TECHNICAL DATA

	Model		RDB1 S
	Burner operation mode		One stage
	Modulation ratio at max. output		--
	Servomotor	type	--
		run time	s	--
	Heat output		kW	16÷47
			Mcal/h	13,8 - 40,4
	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	1,6 - 4,7
	Net calorific value G25 gas		kWh/Nm³	8,6
	G25 gas density		kg/Nm³	0,78
	G25 gas delivery		Nm³/h	1,9 - 5,46
	Net calorific value LPG gas		kWh/Nm³	25,8
	LPG gas density		kg/Nm³	2,02
	LPG gas delivery		Nm³/h	0,6 - 1,8
	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	LANDIS LMG25
	Total electrical power		kW	0,09
	Auxiliary electrical power		kW	--
	Protection level		IP	40
	Motor electrical power		kW	0,09
	Rated motor current		A	0,58
	Motor start up current		A	2,4
	Motor protection level		IP	20
	Ignition transformer		type	(BRAHMA) separated from the control box
			V1 - V2	(--) - 15 kV
			I1 - I2	(--) - 25 mA
	Operation			Intermittent (at least one stop every 24 h)
Emissions	Sound pressure		dB(A)	59,4
	Sound power		W	--
	CO emission		mg/kWh	25
	NOx emission		mg/kWh	110
Approval	Directive			89/336/EEC, 73/23/EEC, 98/37/EEC, 92/42/EEC
	Conforming to			EN 676
	Certification			CE-0085BM0490

Reference conditions:
Temperature: 20 °C
Pressure: 1013 mbar
Altitude: 0 m a.s.l.
Noise measured 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 RATE



Useful working field for choosing the burner

Test conditions conforming to EN 676:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 0 m a.s.l.

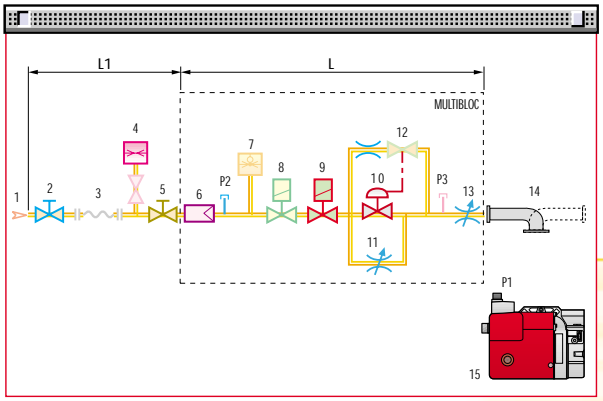
FUEL SUPPLY

GAS TRAINS

The burner is fitted with the gas train.
The gas train is Multibloc type, containing the main components in a single unit, and a valve seal control (as accessory) can be fitted.

Gas train fixed in the burner

MBDLE 055 D01



1	Gas delivery pipe
2	Manual valve
3	Vibration damping joint
4	Gas pressure gauge
5	Manual shutter (supplied)
6	Filter
7	Gas pressure switch
8	Safety solenoid
9	Regulation solenoid
10	Pressure regulator
11	Shutter with adjustment screws (brake regulator)
12	Pressure regulator setting device
13	Shutter with adjustment screws (solenoid regulator)
14	Gas train-burner adapter
15	Burner
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

Gas train

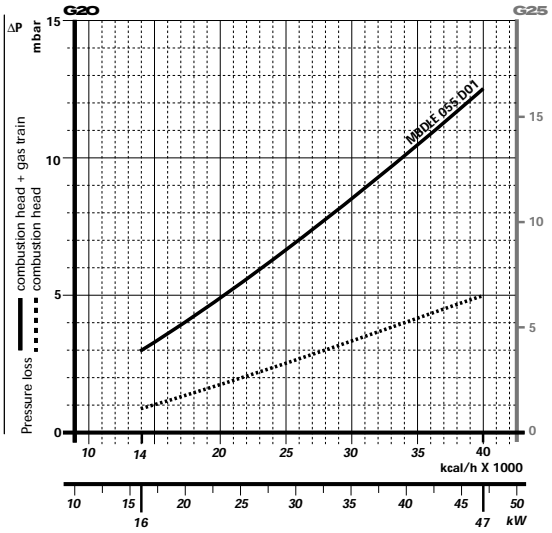
MULTIBLOC	Name
	MBDLE 055 D01

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 value thus calculated represents the minimum required input pressure to the gas train.

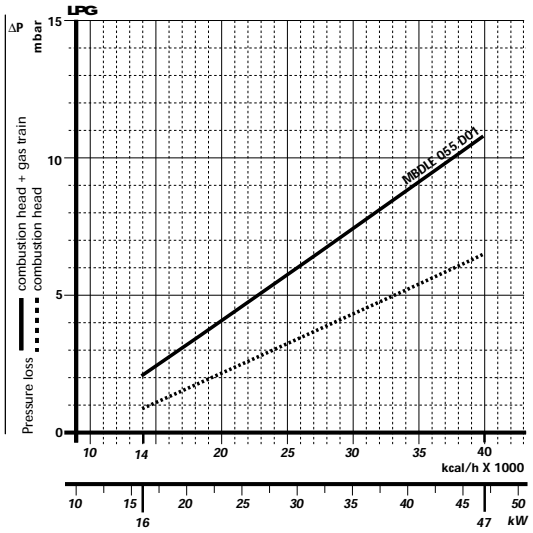
NATURAL GAS

RDB1 S



LPG

RDB1 S



Gas train
MBDLE 055 D01

note *For pressure levels different from those indicated above, please contact Riello Burners Technical Office.*

SELECTING THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

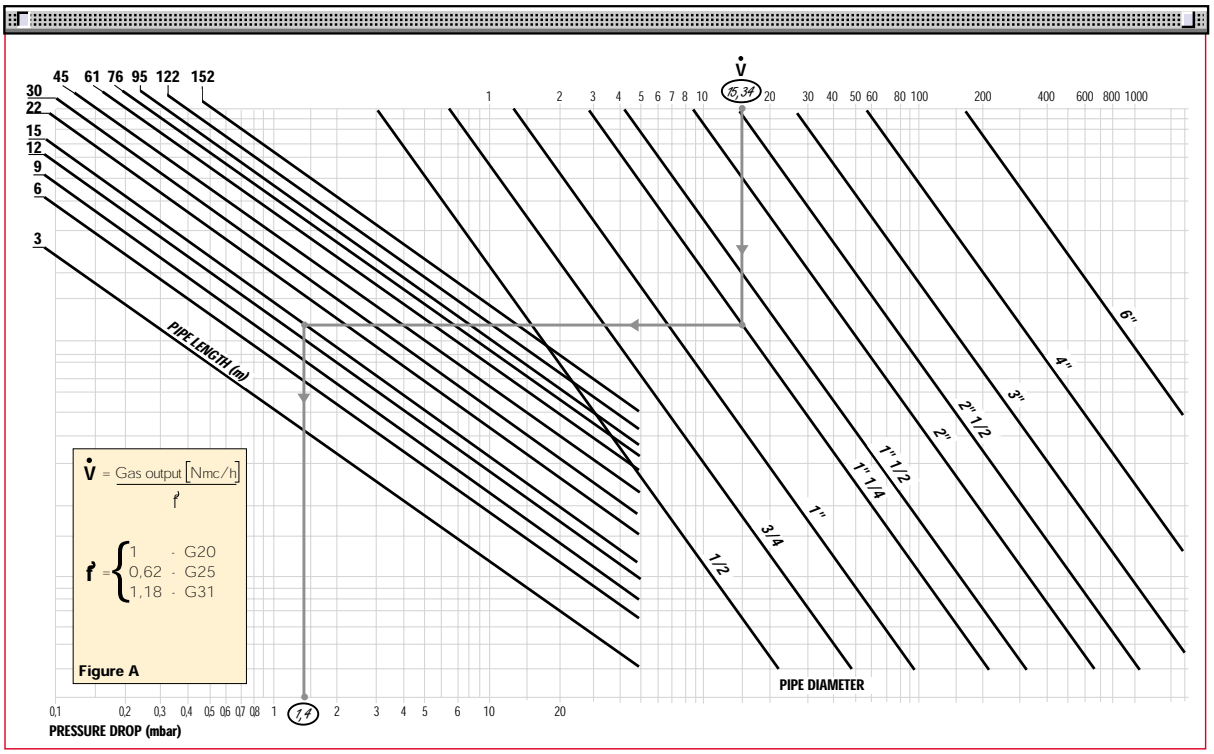
Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length.
Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop of on the botton scale below (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

- gas used	G25
- gas output	9.51 mc/h
- pressure at the gas meter	20 mbar
- gas line length	15 m
- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62}\right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;

- correct pressure = (20-1.4) = 18.6 mbar



VENTILATION

The ventilation circuit ensures low noise level with high performance of pressure and air delivery, inspite of their compact size.

The burner is fitted with an adjustable air pressure switch, conforming to EN 676 standards.

Air suction

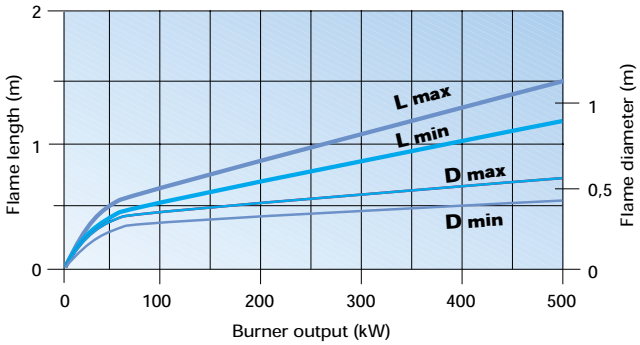
COMBUSTION HEAD

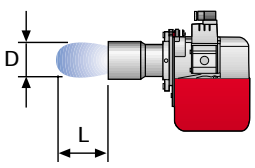
The combustion head in RDB1 S is the result of an innovative design, which allows combustion with low polluting emissions, while being easy to adapt to all various types of boilers and combustion chambers.

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

Combustion head

Dimensions of the flame





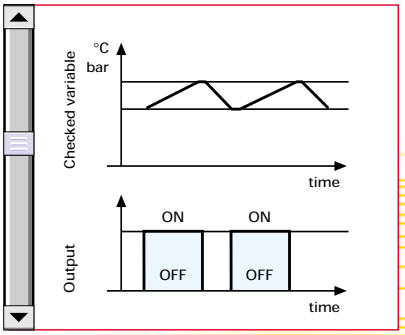
Example:
Burner thermal output = 350 kW;
L flame (m) = 1,2 m (medium value);
D flame (m) = 0,6 m (medium value)

ADJUSTMENT

BURNER OPERATION MODE

This model has one stage operation.

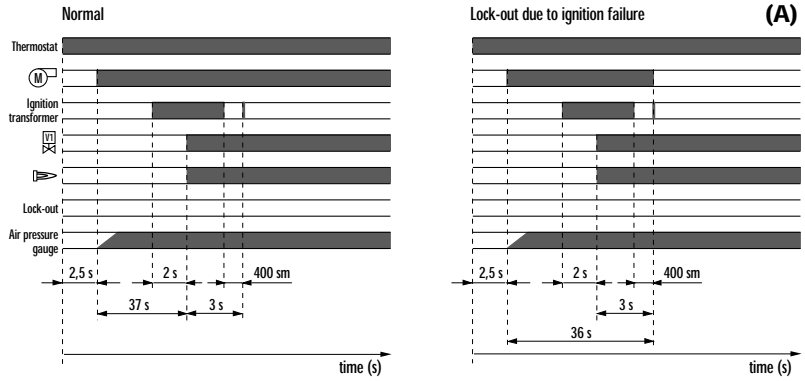
"One stage" operation



Air damper

Air damper adjustment

START UP CYCLE



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

Correct operation

0s	The burner begins the ignition cycle.
2,5s - 39,5s	Pre-purge with the air damper open.
39,5s - 42,5s	The ignition transformer starts.

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.

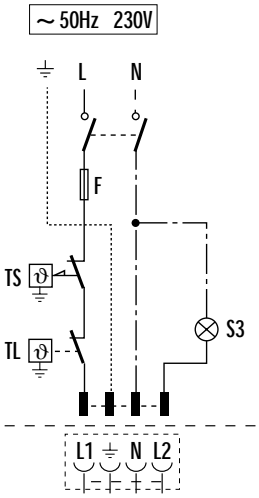
WIRING DIAGRAMS

Control box

Electrical connections must be made by qualified and skilled personnel, in conformity with the local regulations in force.
This model is fitted with 4-pole socket for electrical connection.

" ONE STAGE" OPERATION

Burner electrical wiring



S3 - Lock out led
TL - Regulation thermostat
TS - Safety thermostat (manual reset)
F - Fuse

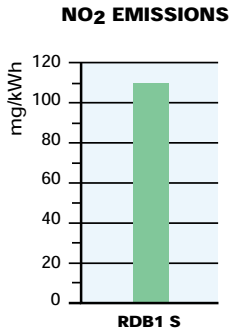
The following table shows the supply lead sections and types of fuse to be used.

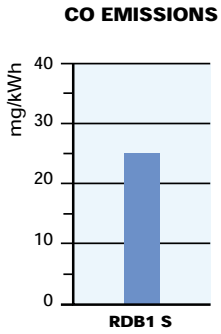
Model	RDB1 S
	230V
F A	T6
L mm^2	1

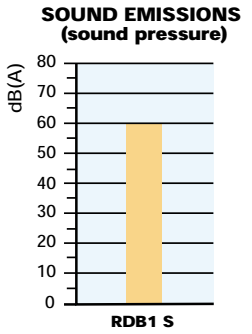
F = Fuse L = Lead section

EMISSIONS

The emission data have been measured in the RDB1 S at maximum output, in conformity with EN 676 standard.



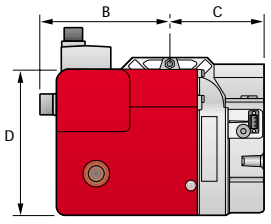


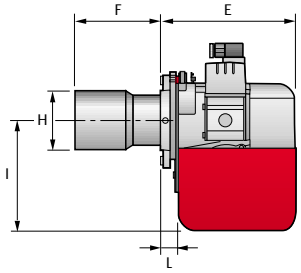


OVERALL DIMENSIONS (mm)

Thanks to certain construction features, this model can be fitted to any boiler on the market.

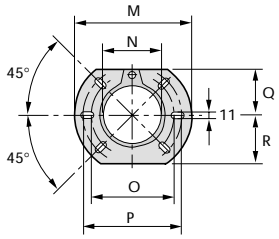
BURNER





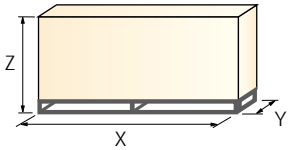
Model	D	B	C	F	E	I	H	L
RDB1 S	222	195	141	115	207	168	89	20

BURNER-BOILER MOUNTING FLANGE



Model	M	N	O	P	Q	R
RDB1 S	180	91	130	150	72	72

PACKAGING



Model	X	Y	Z	kg
RDB1 S	395	350	340	12

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel. The burner is set in the factory on standard calibration (minimum output), if necessary adjustments can be made on the basis of the maximum output of the boiler. All operations must be performed as described in the technical handbook supplied with the burner.

BURNER SETTINGS

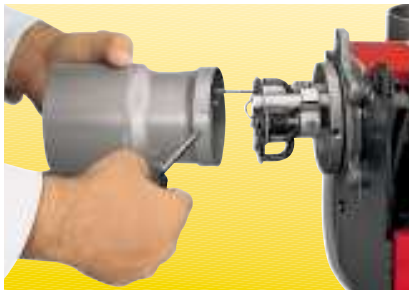
- The air damper position can be adjusted without removing the burner cover.

- Combustion head is fixed.
- RDB1 S burner is fitted with an air pressure switch which, in accordance with EN 676 standards, can be adjusted by the installer using a graduated selector, on the basis of the effective working conditions.

- The gas train is incorporated in the burner and can be easily adjusted without removing the burner cover.

MAINTENANCE AND ELECTRICAL CONNECTIONS

- Maintenance is easily solved disassemblying the combustion head.



- The 4-pole socket is fixed on the top of the burner.

BURNER ACCESSORIES

Balanced-conventional flue conversion kit

All the RDB series models are easily converted from conventional flue to balanced flue, by replacing the plastic screen on the air intake with the connector for the air supply pipe.
The reverse operation can be carried out on all the models from balanced flue to conventional flue burner, by replacing the connector on the air supply pipe with the plastic screen on the air intake.

Balanced-conventional flue conversion kit		
Burner	**Balanced flue kit code**	**Conventional flue kit code**
RDB1 S	**3062774**	**3062775**

LPG kit

For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner as shown in the following table.

LPG kit		
Burner	**Kit code for standard head**	**Kit code for extended head**
RDB1 S	**3001076**	**-**

SPECIFICATION

A special index guides your choice of boiler according to this model.
Below there is a clear and detailed specification description of the product.

DESIGNATION OF SERIES

Series : RDB

Size

Fuel : S Natural gas

Electrical supply to the system : 1/230/50 1/230V/50Hz

RDB	1	S	1/230/50

AVAILABLE BURNER MODEL

RDB1 S 1/230/50

PRODUCT SPECIFICATIONS

Burner

Monoblock, gas burner, completely automatic, with one stage settings fitted with:
- Fan with forward curve blades
- Cover lined with sound-deadening material
- Air damper, with external adjustment, with no need to remove the cover
- Single phase electric motor 230 V, 50 Hz
- Combustion head fitted with:
    - stainless steel head cone, resistant to high temperatures
    - ignition electrodes
    - ionisation probe
    - gas distributor
    - flame stability disk
- Adjustable air pressure switch, with graduated selector, to guarantee burner lock out in the case of insufficient combustible air
- Protection filter against radio interference
- IP 40 electric protection level.

Gas train

Fuel supply line in the Multibloc configuration, fitted with:
- Filter
- Pressure stabiliser
- Minimum gas pressure switch
- Safety valve
- Single stage working valve with ignition gas output regulator.

Approval:
- EN 676 standard.

Conforming to:
- Directive 98/37/EEC (machine)
- Directive 73/23/EEC (low voltage)
- Directive 89/336/EEC (electromagnetic compatibility)
- Directive 92/42/EEC (efficiency).

Standard equipment:
- Sliding flange
- Flange insulation screen
- Screws and nuts for fixing the flange to the boiler
- Instruction handbook for installation, use and maintenance
- Spare part catalogue.

Available accessories to be ordered separately:
- Balanced-conventional flue conversion kit
- LPG kit.

Lineagrafica

RIELLO S.p.A. - Via degli Alpini, 1 - 37045 LEGNAGO (VR) Italy
Tel. ++39.0442630111 - Fax ++39.044221980
Internet: http://www.rielloburners.com - E-mail: rburners@rielloburners.com

RIELLO BURNERS

CE

TWO STAGE GAS BURNERS

RIELLO 40 FSD SERIES			
FS5D	12/23 ÷ 58	kW
FS20D	58/81 ÷ 232	kW

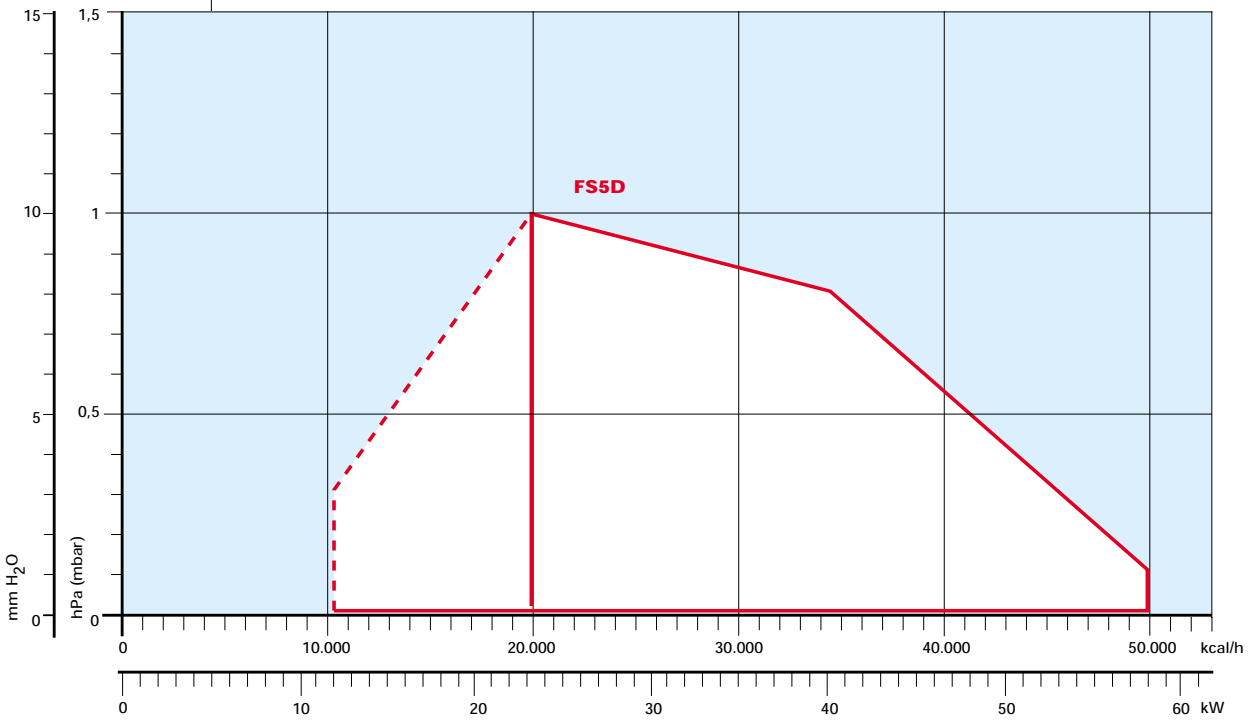
The Riello 40 FSD series of two stage gas burners, is a complete range of products developed to respond to any request for light industrial process. The Riello 40 FSD series is available in two different models, with an output ranging from 29 to 210 kW, divided in two different structures.
All the models use the same components designed by Riello for the Riello 40 FSD 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 FSD burners are tested before leaving the factory.

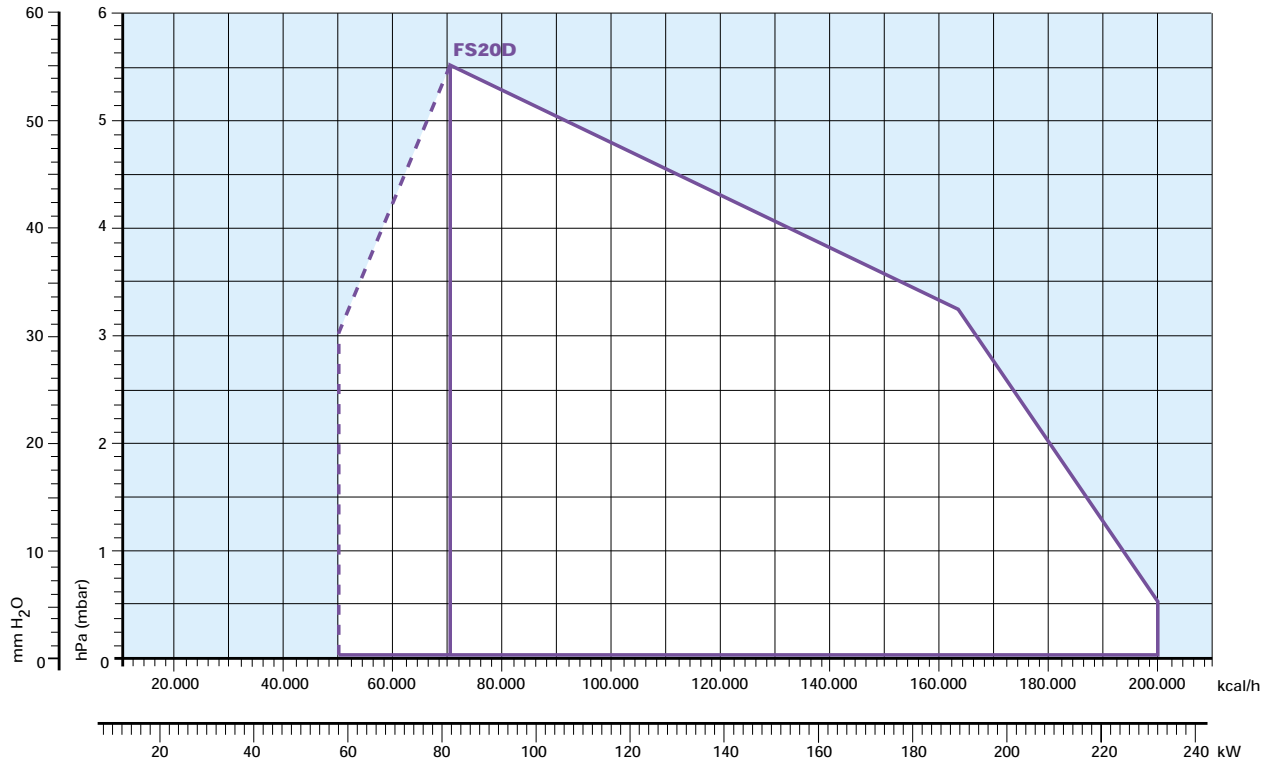
TECHNICAL DATA

Model			FS5D	FS20D
Setting			Two stage	
Servo-motor	type		BERGER	
	run time		13	
Heat		kW	12/23 - 58	58/81 - 232
output		Mcal/h	10/20 - 50	50/70 - 200
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 output	Nm³/h	1,2/2,3 - 5,8	5,8/8,1 - 23,2
	Net calorific value G25 gas	kWh/Nm³	8,6	
	G25 gas density	kg/Nm³	0,78	
	G25 gas output	Nm³/h	1,4/2,7 - 6,7	6,7-9,4 - 26,9
	Net calorific value LPG gas	kWh/Nm³	25,8	
	LPG gas density	kg/Nm³	2,02	
	LPG gas output	Nm³/h	0,4/0,8 - 2,2	2,2/3,1 - 9
	Fan	type	forward tilted blades	
	Air temperature	max. °C	40	
Electrical data	Electrical supply	Ph/Hz/V	1/50/230 ±10%	
	Aux. electrical supply	Ph/Hz/V	--	
	Control box	type	525 SE/3F	509 SE
	Total electrical power	kW	0,11	0,25
	Protection level	IP	40	
	Motor electrical power	kW	0,09	0,15
	Rated motor current	A	0,65	1,4
	Motor start current	A	4	7,5
	Motor protection level	IP	20	
	Ignition transformer		incorporated in the control box	separated from the control box
	Operation		intermittent (at least one halt every 24 h)	
Approval Emissions	Sound pressure	dB(A)	60	73
	CO Emissions	mg/kWh	<40	
	NOx Emissions	mg/kWh	≤120	
	Directives		90/396/EEC, 89/336/EEC, 73/23/EEC, 98/37/EEC, 92/42/EEC	
	Conforming to		EN 676	
	Certifications		CE-0063AP6680	

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.

FIRING RATES





Useful working field for choosing the burner

1st stage operating rate

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

FUEL SUPPLY

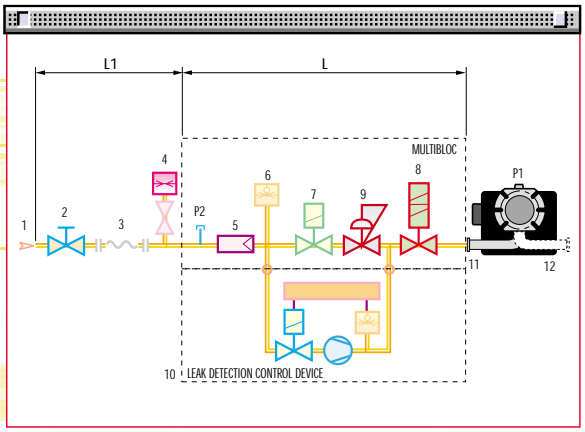
GAS TRAINS

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

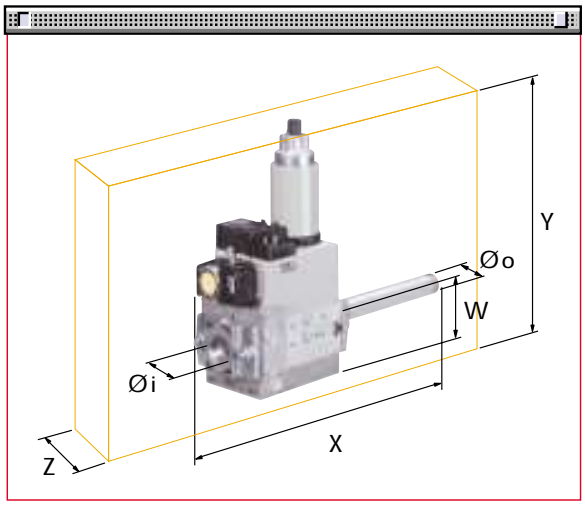
Depending on the gas output and the available pressure in the supply line, you should check the correct gas train to be adapted to the system requirements.

The gas train is Multibloc type, containing the main components in a single unit and it can be fitted with the valves seal control (as accessory).

MBZRDLE 405 - 407 - 410



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 1st and 2nd stage: 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
P1	Combustion head pressure
P2	Upstream pressure from the filter
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 FSD burners, intake diameter and the coupling flange to the burner.

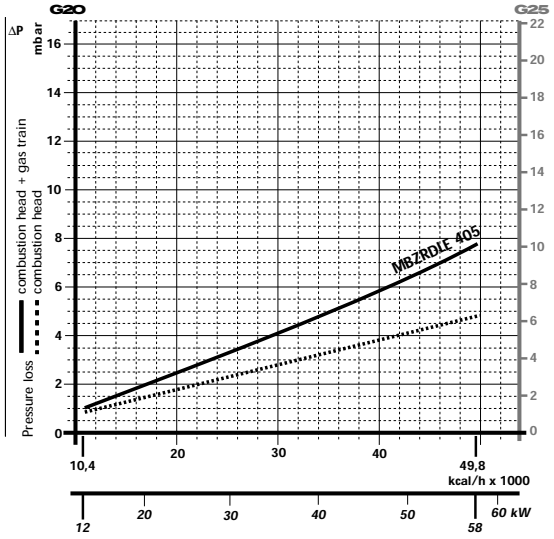
	Name	Code	Ø i	Øo	X mm	Y mm	W mm	Z mm
MULTIBLOC	**MBZRDLE 405**	3970555	Rp 1/2"	Rp 1/2"	321	256	46	120
	MBZRDLE 407	3970556	Rp 3/4"	Rp 3/4"	371	256	46	120
	MBZRDLE 410	3970557	Rp 3/4"	Rp 3/4"	405	315	55	145

PRESSURE DROP DIAGRAMS

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

NATURAL GAS

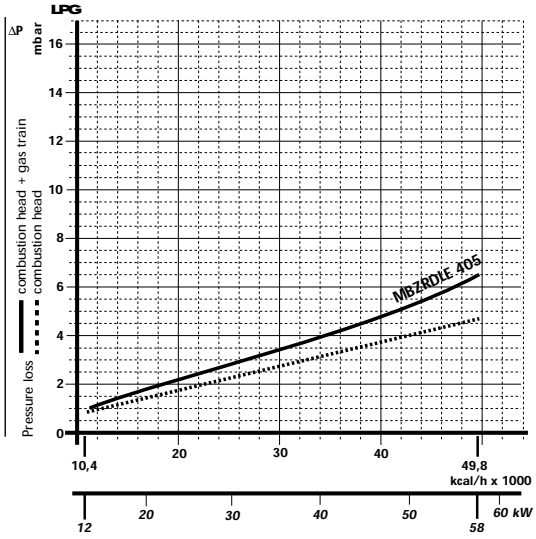
FS5D



Gas train	Code	Terminal block	Plug and socket
MBZRDLE 405	3970555	•	

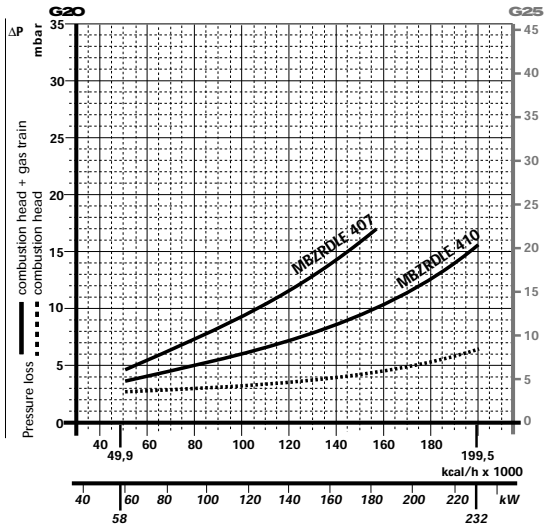
LPG

FS5D



NATURAL GAS

FS20D

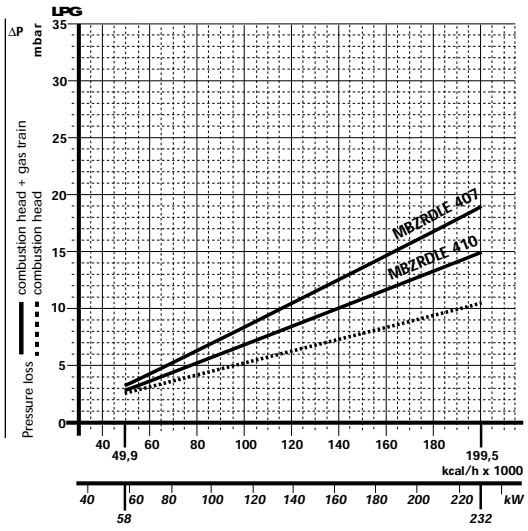


Gas train	Code	Output kW	Terminal block	Plug and socket
MBZRDLE 407	3970556	≤ 180 (*)	•	
MBZRDLE 410	3970557	-	•	

(*) With natural gas.

LPG

FS20D



note *For pressure levels different from those indicated above, please contact Riello Burners Technical Office.*

DIMENSIONING OF THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

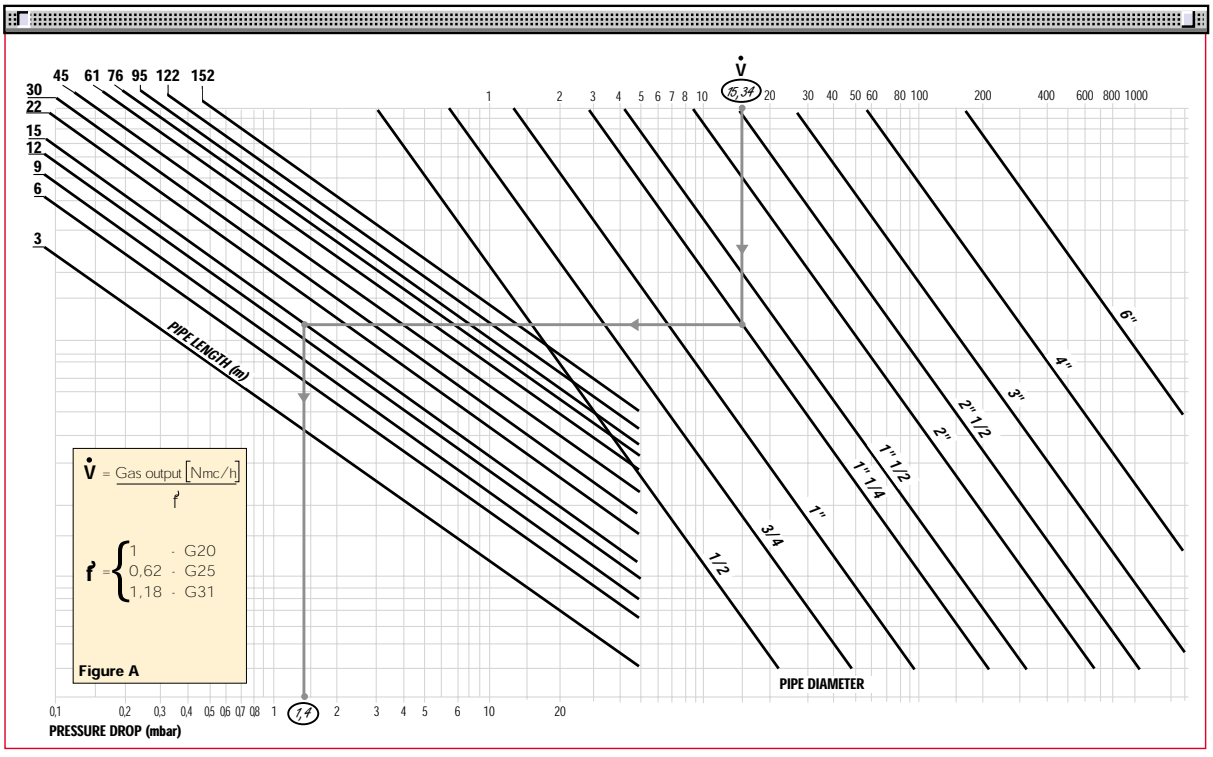
Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length.
Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop of on the botton scale below (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

	- gas used	G25
	- gas output	9.51 mc/h
	- pressure at the gas meter	20 mbar
	- gas line length	15 m
	- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62} \right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;

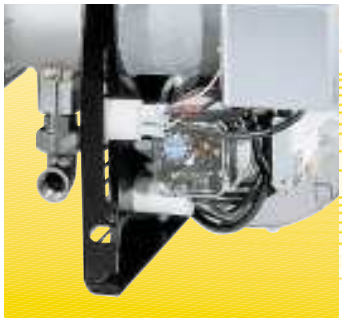
- correct pressure = (20-1.4) = 18.6 mbar



VENTILATION

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

Air suction

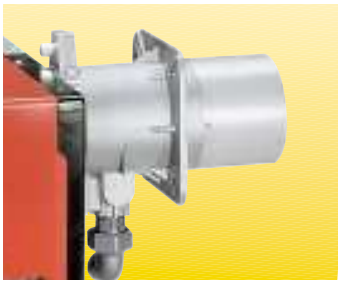


Air pressure switch

COMBUSTION HEAD

The combustion head in Riello 40 FSD 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.

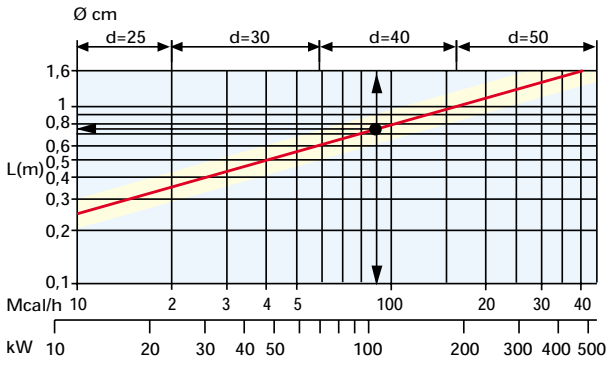
Combustion head

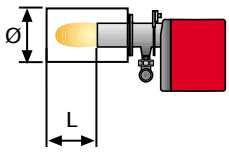


Flange

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

Combustion chamber dimensions used in the test laboratory





$$L\ (m) = 0{,}23 \times \sqrt{\frac{kW}{10}}$$

With simple adjustments, the burner can be adapted to combustion chambers that are slightly different from those used in the tests.

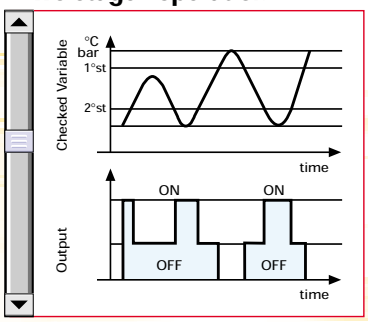
Example:
burnt thermal delivery = 105 kW;
L (m) = 0,23 x $\sqrt{10{,}5}$ = 0,74 (m);
Ø = 40 (cm)

ADJUSTMENT

BURNER OPERATION MODE

All these models are two stage operation.

"Two stage" operation



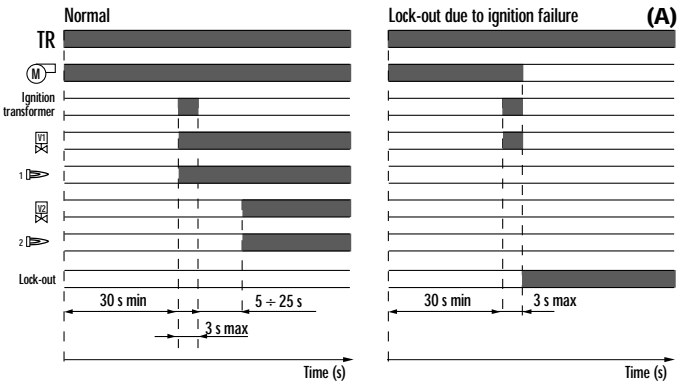
Air damper adjustment

Air damper partially open

Air damper completely open

IGNITION

FS5D



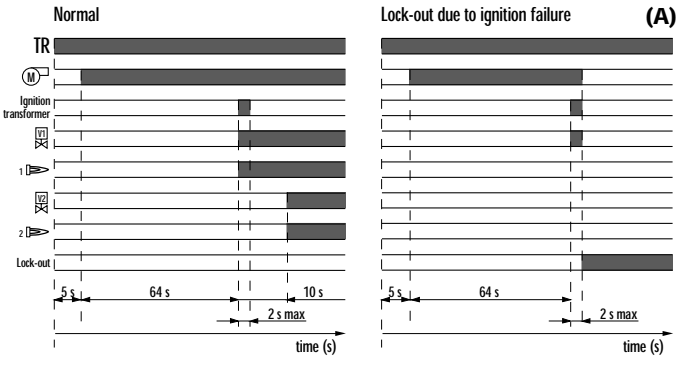
(A) Lock-out is shown by a led on the appliance.

Correct operation for FS5D model

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 (5s) the burner locks-out.

FS20D



Correct operation for FS20D model

0s	The burner begins the ignition cycle
0s-5s	Safety time
5s-69s	Pre-purge with the air damper open
69s-71s	Ignition 1st stage
79s	Ignition 2nd stage.

Lock-out due to ignition failure
If the flame does not light within the safety limit (~2s) the burner locks-out.

ELECTRICAL CONNECTIONS
to be made by the installer

Electrical connections must be made by qualified and skilled personnel in conformity with the local regulations in force. The models are fitted with terminal block for all the electrical connections.

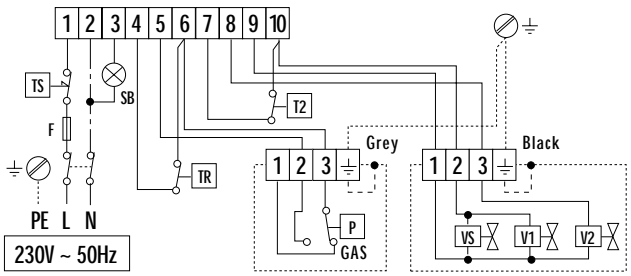
FS20D control box and separated ignition transformer

FS5D control box with integrated ignition transformer

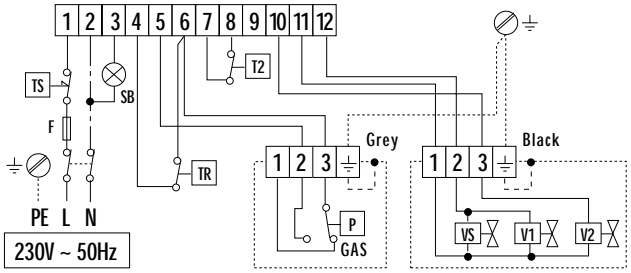
" TWO STAGE" OPERATION

SB - Lock out led
TR - Regulating thermostat
TS - Safety thermostat (manual reset)
T2 - Two stage thermostat
VS - Security valve
V1 - One stage valve
V2 - Two stage valve
P - Gas pressure switch
F - Fuse

FS5D



FS20D



SB - Lock out led
TR - Regulating thermostat
TS - Safety thermostat (manual reset)
T2 - Two stage thermostat
VS - Security valve
V1 - One stage valve
V2 - Two stage valve
P - Gas pressure switch
F - Fuse

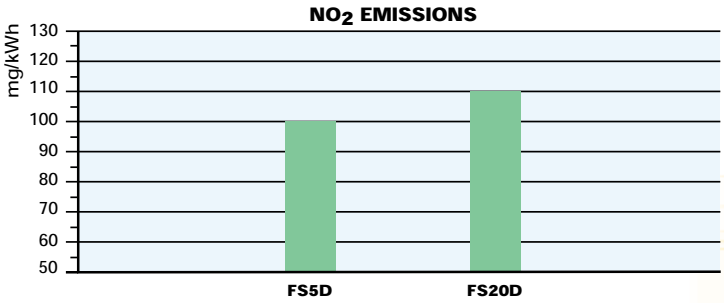
The following table shows the supply lead sections and types of fuse to be used.

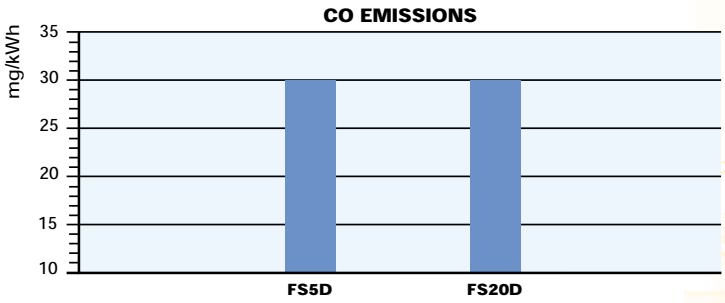
Model	▼ FS5D	▼ FS20D
	230V	230V
F A	6	6A
L mm²	1	1

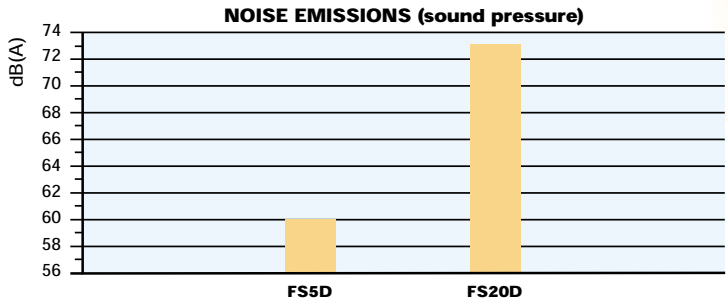
F = Fuse L = Lead section

EMISSIONS

The emission data have been measured in the various models at maximum output, in conformity with EN 676 standard.



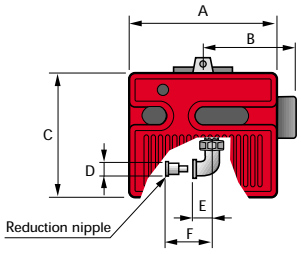


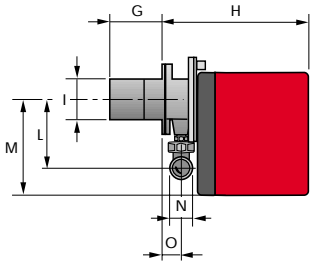


OVERALL DIMENSIONS (mm)

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.

BURNERS

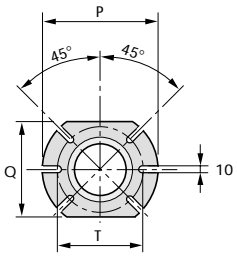




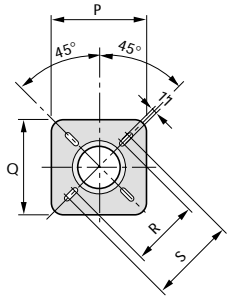
Model	A	B	C	D	E	F	G	H	I	L	M	N	O
FS5D	272	170	233	Rp 3/4	28	65	100	295	91	138	180	Rp 1/2	48
FS20D	350	238	298	Rp 3/4	33	-	120	389	125	152	230	-	67

BURNER-BOILER MOUNTING FLANGE

FS5D

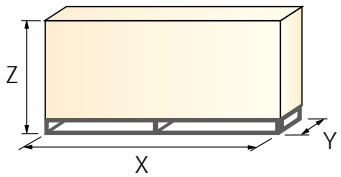


FS20D



Model	P	Q	R	S	T
FS5D	170	140	-	-	130
FS20D	170	170	155	200	-

PACKAGING



Model	X	Y	Z	kg
FS5D	435	345	315	10
FS20D	525	525	365	20

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel.
All operations must be performed as described in the technical handbook supplied with the burner.
The burner is set in the factory on standard calibration (minimum output). If necessary adjustments can be made on the basis of the maximum output of the boiler.

BURNER SETTINGS

- The air damper position is easy to set.

- Head setting is easy and aided by a graduated scale; a test point allows reading the air pressure in the combustion head.

- Riello 40 FSD burners are fitted with an air pressure switch which, in accordance with EN 676 standards, can be adjusted by the installer using a graduated selector, on the basis of the effective working conditions.

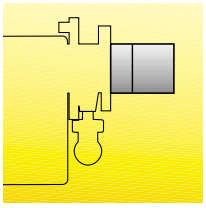
MAINTENANCE

- The maintenance position is easily carried out by hinge that joins the body of burner to the flange.

BURNER ACCESSORIES

Extended head kit

"Standard head" burners can be transformed into "extended head" versions by using the special kit.
Below the KITS available for the various burners are listed, showing the original and the extended lengths.

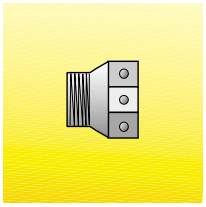


Combustion head extension kit			
Burner	**Standard head length (mm)**	**Extended head length (mm)**	**Kit code**
FS5D	100	125	**3000820**
FS20D	120	280	**3000873**

End cone with turbulator disk

End cone with turbulator disk		
Burner	**Projection**	**Kit code**
FS5D	+15	**3000916**
FS20D	+23	**3000919**

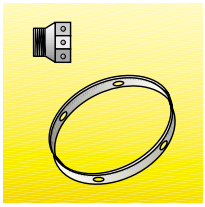
Town gas kit



Town gas kit	
Burner	**Kit code**
FS5D	**3000889**
FS20D	**3000893**

LPG kit

For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner, as shown in the following table:



LPG kit	
Burner	**Kit code**
FS5D	**3000882**
FS20D	**3000886**

Seal control kit

To test the valve seals on the gas train a special "seal control kit" is available.

Seal control kit	
Burner	**Kit code**
FS5D - FS20D	**3010123**

SPECIFICATION

A special index guides your choice of boiler from the various models available in the Riello 40 FSD series. Below is a clear and detailed specification description of the product.

DESIGNATION OF SERIES

Series: F

Fuel : Natural gas

Size

Optional variations: D Two-stage output adjustment

F	S	5	D

AVAILABLE BURNER MODELS

FS5D	12/23 ÷ 58	kW
FS20D	58/81 ÷ 232	kW

SPECIFICATION DESCRIPTION

Burner

Monoblock, gas burners, completely automatic, with two stage settings fitted with:
- Fan with forward inclined blades
- Metallic cover
- Air damper, completely closed in stand by, driven by an electric servomotor
- Air damper with 1st and 2nd stage adjustement
- Single phase electric motor 230 V, 50 Hz
- Combustion head fitted with:
    - stainless steel head cone, resistant to high temperatures
    - ignition electrodes
    - ionisation probe
    - gas distributor
    - flame stability disk
- Adjustable air pressure switch, with graduated selector, to guarantee burner lock out in the case of insufficient combustible air
- Protection filter against radio interference
- IP 40 electric protection level.

Gas train

Fuel supply line in the Multibloc configuration, fitted with:
- Filter
- Pressure stabiliser
- Minimum gas pressure switch
- Safety valve
- Two stage working valve with ignition gas output regulator.

Burner and gas train assembled

Approval:
- EN 676 standard.

Conforming to:
- 90/396/EEC (gas)
- 73/23/EEC (low voltage)
- 89/336/EEC (electromagnetic compatibility)
- 92/42/EEC (performance)
- 98/37/EEC (machines).

Standard equipment:
- Flange insulation screen
- Screws and nuts for fixing the flange to the boiler
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue
- Hinge
- Grommet.

Available accessories to be ordered separately:
- Remote release kit
- Extended head kit
- LPG kit
- Seal control kit
- Alternative combustion head kit
- Town gas kit.

Lineagrafica

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Tel. ++39.0442630111 - Fax ++39.044221980
Internet: http://www.rielloburners.com - E-mail: rburners@rielloburners.com

RIELLO BURNERS

CE

TWO STAGE GAS BURNERS

RIELLO 40 GSD SERIES		
	GS10D	29/41 ÷ 106 kW
	GS20D	58/81 ÷ 210 kW

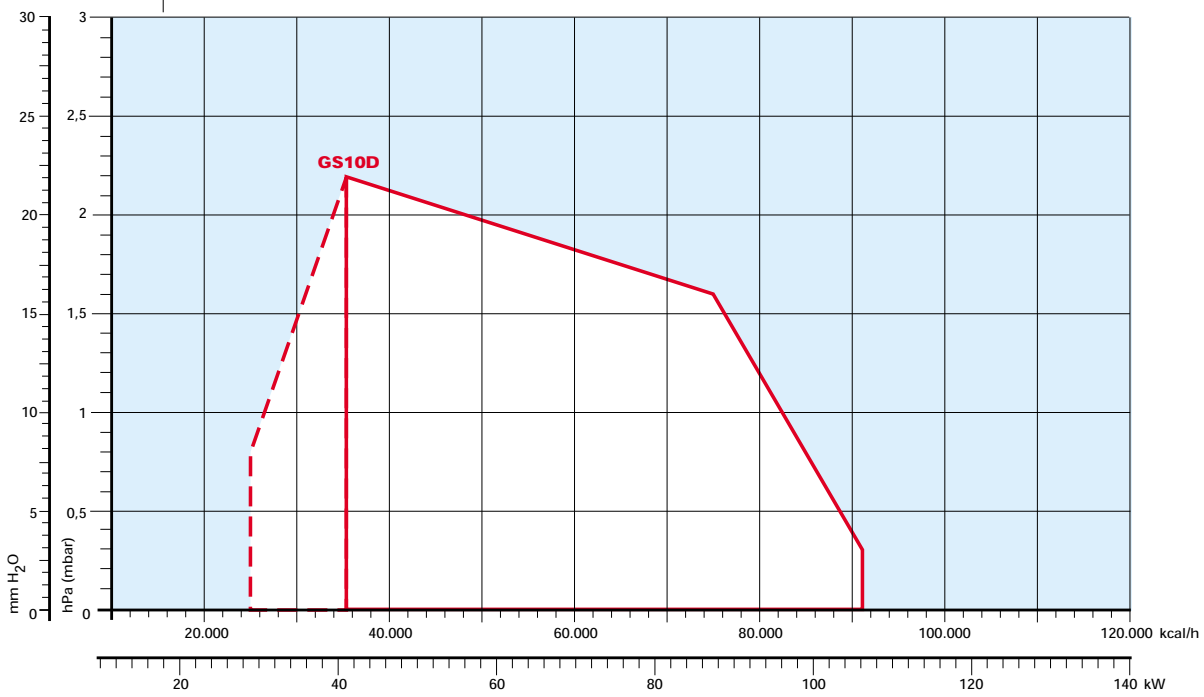
The Riello 40 GSD series of two stage gas burners, is a complete range of products developed to respond to any request for home heating. The Riello 40 GSD series is available in two different models, whit an output ranging from 29 to 210 kW, divided in two different structures.
All the models use the same components designed by Riello for the Riello 40 GSD 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 GSD burners are tested before leaving the factory.

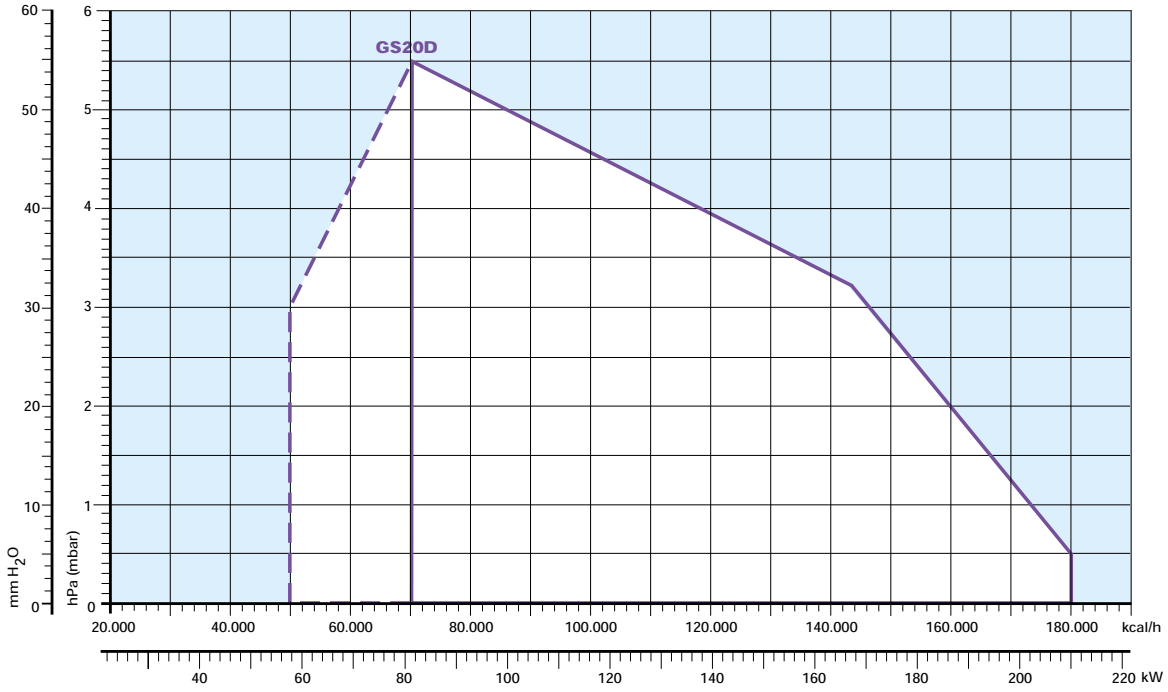
TECHNICAL DATA

	Model		GS10D	GS20D
	Setting		Two stage	
	Servo-motor type		BERGER	
	Servo-motor run time		13	
	Heat output	kW	29/41 - 106	58/81 - 210
		Mcal/h	25/35 - 91	50/70 - 180,6
	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 output	Nm³/h	2,9/4,1 - 10,6	5,8/8,1 - 21
	Net calorific value G25 gas	kWh/Nm³	8,6	
	G25 gas density	kg/Nm³	0,78	
	G25 gas output	Nm³/h	3,4/4,8 - 12,3	6,7-9,4 - 24,4
	Net calorific value LPG gas	kWh/Nm³	25,8	
	LPG gas density	kg/Nm³	2,02	
	LPG gas output	Nm³/h	1,1/1,6 - 4,1	2,2/3,1 - 8,1
	Fan	type	forward tilted blades	
	Air temperature	max. °C	40	
Electrical data	Electrical supply	Ph/Hz/V	1/50/230 ±10%	
	Aux. electrical supply	Ph/Hz/V	--	
	Control box	type	509 SE	
	Total electrical power	kW	0,13	0,25
	Protection level	IP	40	
	Motor electrical power	kW	0,09	0,15
	Rated motor current	A	0,7	1,4
	Motor start current	A	4	7,5
	Motor protection level	IP	20	
	Ignition transformer		separated from the control box	
	Operation		intermittent (at least one halt every 24 h)	
Approval Emissions	Sound pressure	dB(A)	65	72
	CO Emissions	mg/kWh	<40	
	NOx Emissions	mg/kWh	≤120	
	Directives		90/396/EEC, 89/336/EEC, 73/23/EEC, 98/37/EEC	
	Conforming to		EN 676	
	Certifications		CE-0063AP6680	

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.

FIRING RATES





Useful working field for choosing the burner

1st stage operating rate

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

FUEL SUPPLY

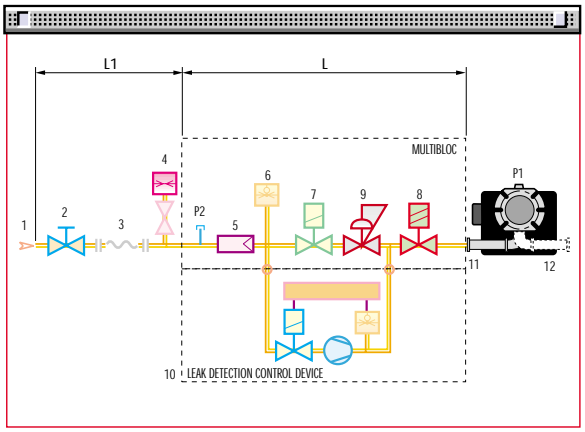
GAS TRAINS

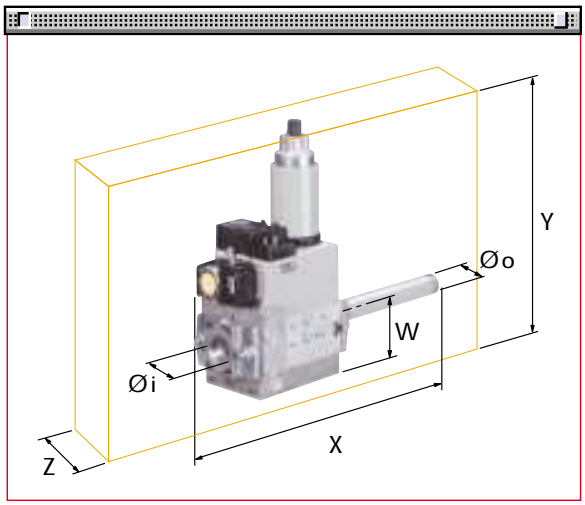
The burners are set for fuel supply from either the right or left hand sides.

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 and it can be fitted with the valves seal control (as accessory).

MBZRDLE 405 - 407 - 410





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 1st and 2nd stage: 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
P1	Combustion head pressure
P2	Upstream pressure from the filter
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 GSD burners, intake diameter and the coupling flange to the burner.

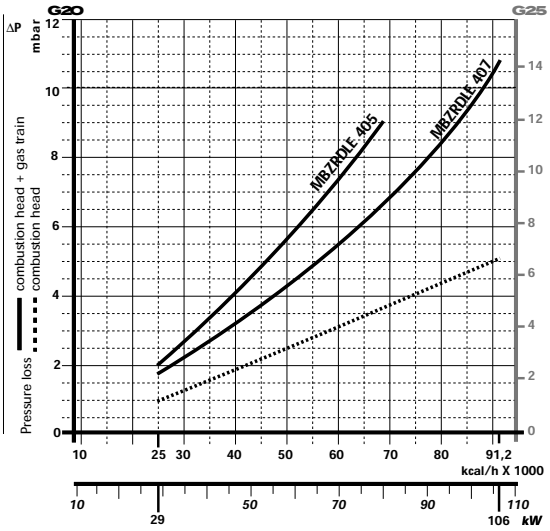
	Name	Code	Ø i	Øo	X mm	Y mm	W mm	Z mm
MULTIBLOC	**MBZRDLE 405**	3970084	Rp 1/2"	Rp 1/2"	321	256	46	120
	MBZRDLE 407	3970537	Rp 3/4"	Rp 3/4"	371	256	46	120
	MBZRDLE 407	3970556	Rp 3/4"	Rp 3/4"	371	256	46	120
	MBZRDLE 410	3970534	Rp 3/4"	Rp 3/4"	405	315	55	145
	MBZRDLE 410	3970557	Rp 3/4"	Rp 3/4"	405	315	55	145

PRESSURE DROP DIAGRAMS

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

NATURAL GAS

GS10D

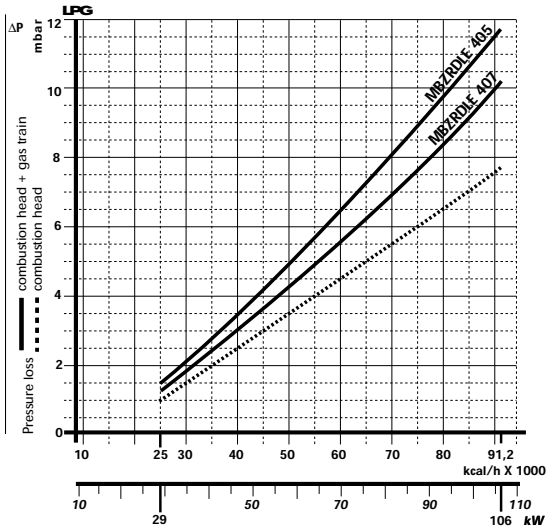


Gas train	Code	Output kW	Plug and socket
MBZRDLE 405	3970084	≤ 80 (*)	•
MBZRDLE 407	3970537	-	•

(*) With natural gas.

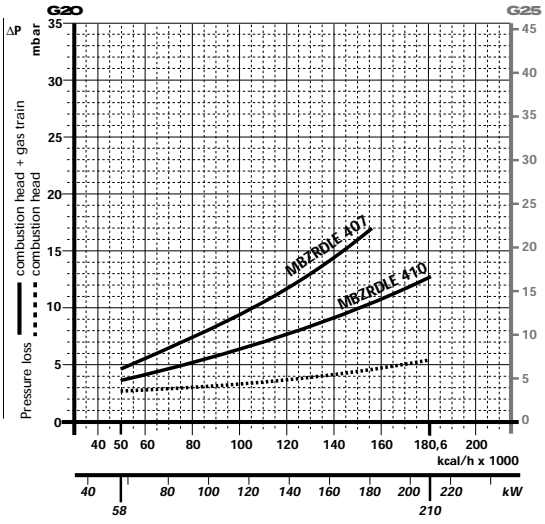
LPG

GS10D



NATURAL GAS

GS20D

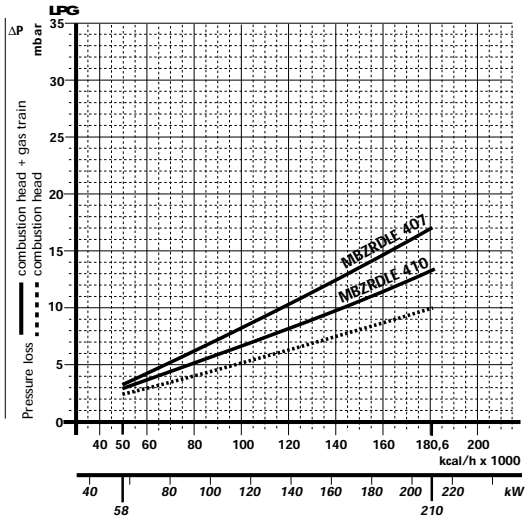


Gas train	Code	Output kW	Plug and socket
MBZRDLE 407	3970537	≤ 180 (*)	•
MBZRDLE 410	3970534		•

(*) With natural gas.

LPG

GS20D



note *For pressure levels different from those indicated above, please contact Riello Burners Technical Office.*

DIMENSIONING OF THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

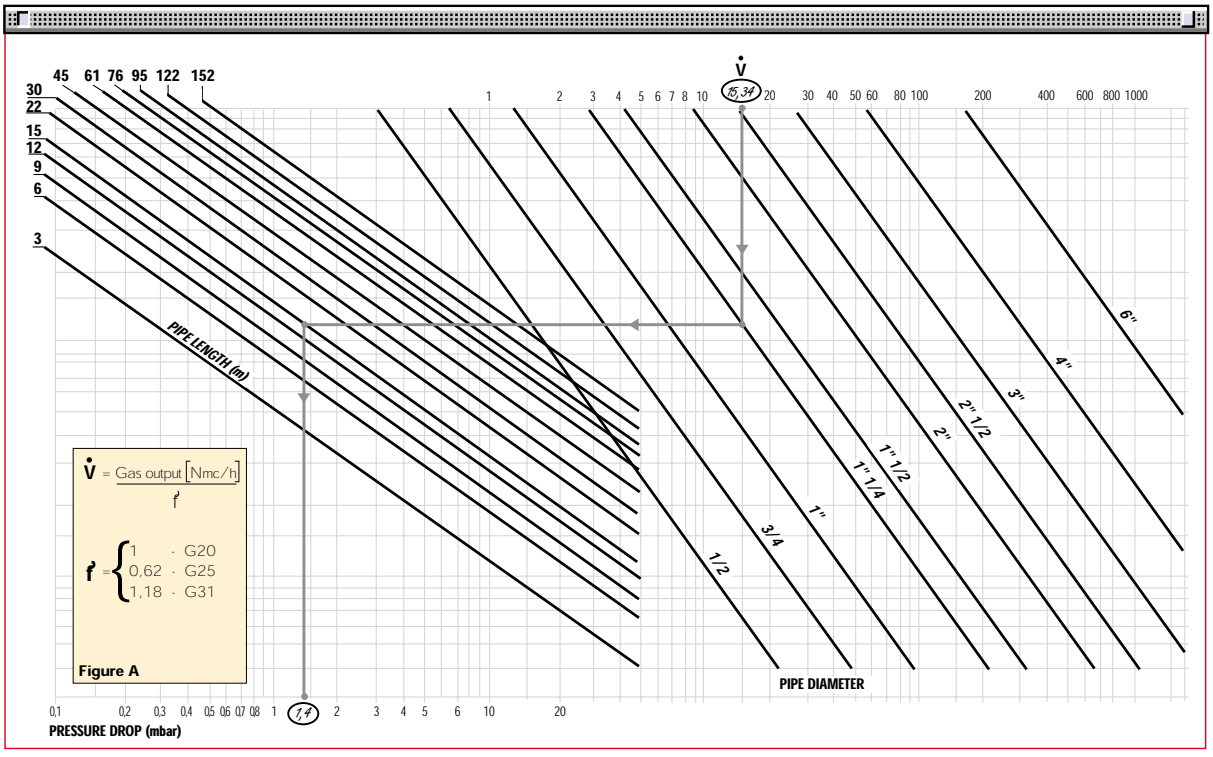
Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length.
Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop of on the botton scale below (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

	- gas used	G25
	- gas output	9.51 mc/h
	- pressure at the gas meter	20 mbar
	- gas line length	15 m
	- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62} \right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;

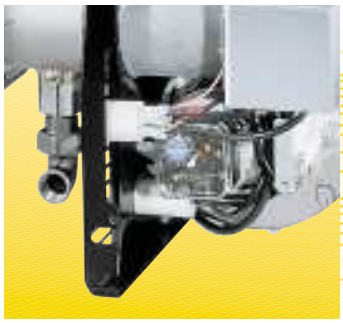
- correct pressure = (20-1.4) = 18.6 mbar



VENTILATION

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

Air suction

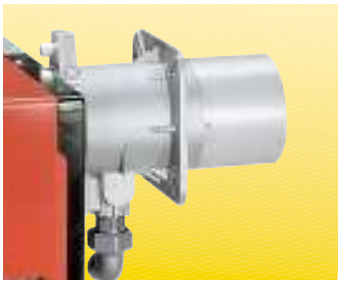


Air pressure switch

COMBUSTION HEAD

The combustion head in Riello 40 GSD 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.

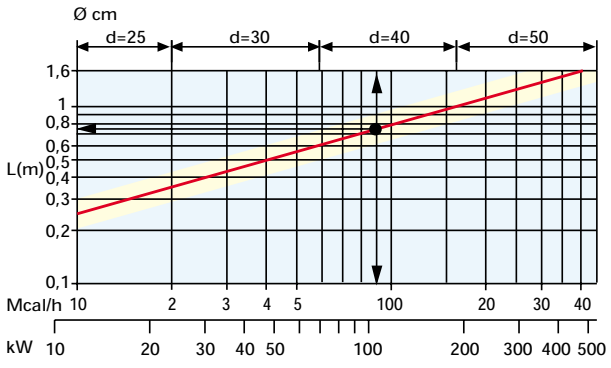
Combustion head

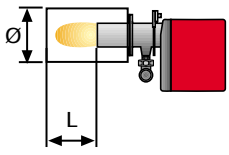


Flange

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

Combustion chamber dimensions used in the test laboratory





$$L\ (m) = 0{,}23 \times \sqrt{\frac{kW}{10}}$$

With simple adjustments, the burner can be adapted to combustion chambers that are slightly different from those used in the tests.

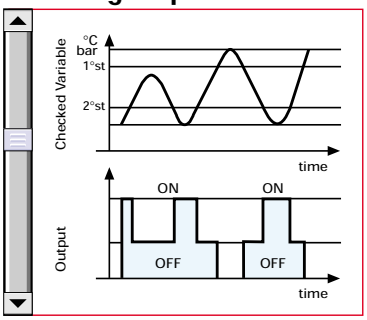
Example:
burnt thermal delivery = 105 kW;
$L\ (m) = 0{,}23 \times \sqrt{10{,}5} = 0{,}74$ (m);
Ø = 40 (cm)

ADJUSTMENT

BURNER OPERATION MODE

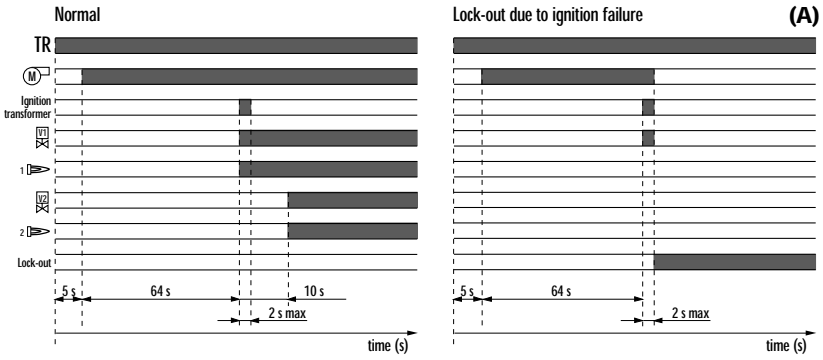
All these models are two stage operation. The Riello 40 GSD series of two stage burners allows operating at both full and reduced output, with consequent reduction in turning the burner on and off, their giving better performance to the boiler.
During stand-by, the air damper is completely closed (controlled by an electric servomotor) and prevents heat loss due to the flue draught.

"Two stage" operation



Air damper adjustment

IGNITION



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

Correct operation

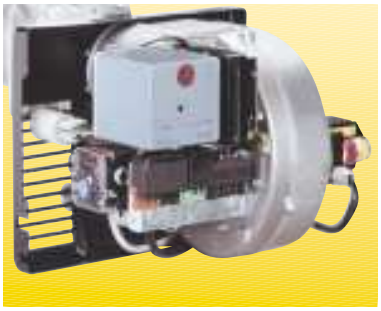
0s The burner begins the ignition cycle
0s-5s Safety time
5s-69s Pre-purge with the air damper open
69s-71s Ignition 1st stage
79s Ignition 2nd stage.

Lock-out due to ignition failure

If the 1st stage flame does not light within the safety limit (~2s) the burner locks-out.

ELECTRICAL CONNECTIONS
to be made by the installer

Electrical connections must be made by qualified and skilled personnel in conformity with the local regulations in force. The 7-pole socket, the 4-pole socket (for connecting the 2nd stage thermostat and the hour meter) and the 6-pole socket (for connection to the gas train) are connected to the equipement and fixed into the burner.
The 7 and 4-pin plugs are supplied for connection to the boiler.

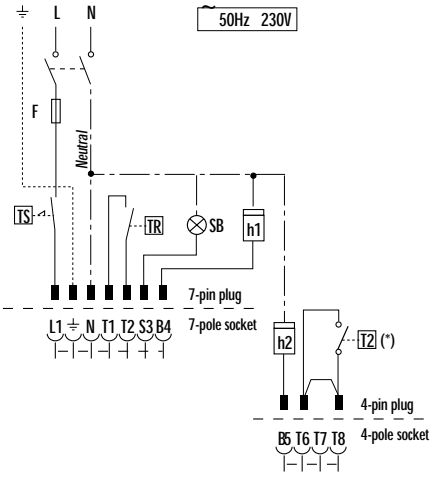


Appliance fitted with 7-pole, 6-pole and 4-pole sockets

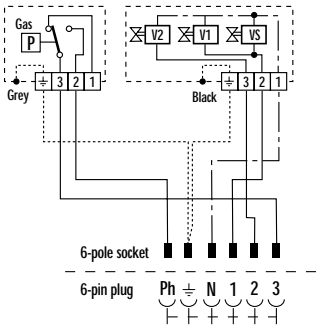
" TWO STAGE" OPERATION

GS10D - GS20D

Burner electrical wiring



Gas train electrical wiring



h1 - One stage counter hours (230V 0,1A max.)
h2 - Two stage counter hours (230V 0,1A max.)
SB - Remote lock out signal (230V 0,1A max.)
TR - Regulating thermostat
TS - Safety thermostat (manual reset)
T2 - Two stage thermostat
VS - Safety valve
V1 - One stage valve
V2 - Two stage valve
P - Gas pressure switch
F - Fuse

(*) Connect 2nd stage thermostat between clamps T6 and T8 removing the bridge.

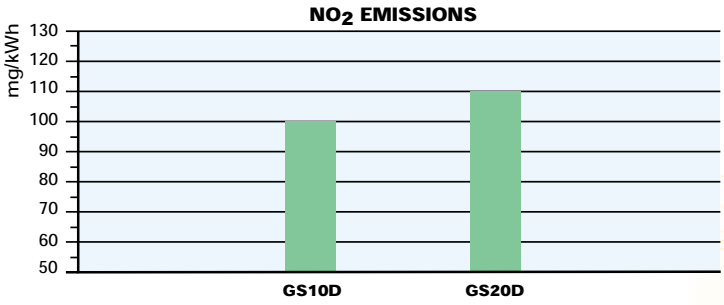
The following table shows the supply lead sections and types of fuse to be used.

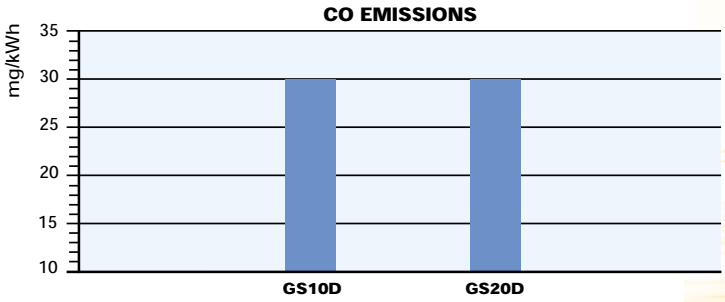
Model	GS10D	GS20D
	230V	230V
F A	6	T6
L mm²	1	1

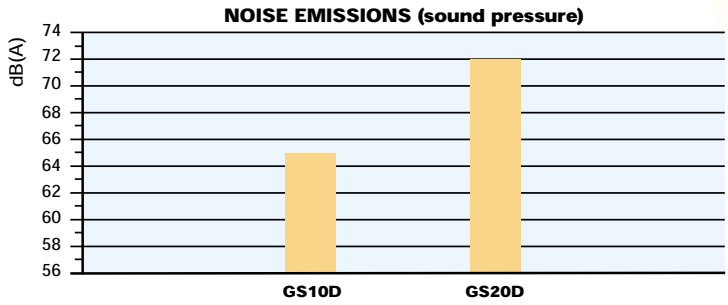
F = Fuse L = Lead section

EMISSIONS

The emission data have been measured in the various models at maximum output, in conformity with EN 676 standard.





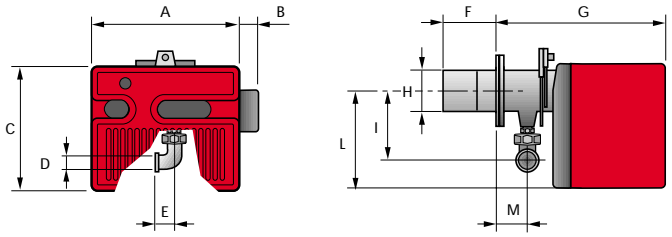


Special attention has been paid to noise reduction.
All models are fitted with sound-proofing material inside the cover.

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.

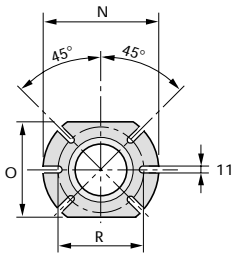
BURNERS



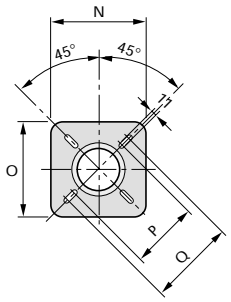
Model	A	B	C	D	E	F	G	H	I	L	M
GS10D	305	95	262	Rp 3/4"	33	110	347	105	142	204	61
GS20D	350	95	298	Rp 3/4"	33	120	389	125	152	230	67

BURNER-BOILER MOUNTING FLANGE

GS10D

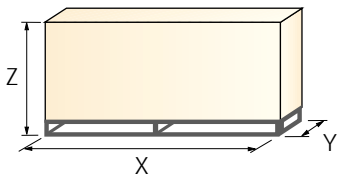


GS20D



Model	N	O	P	Q	R
GS10D	185	160	-	-	130
GS20D	170	170	155	200	-

PACKAGING



Model	X	Y	Z	kg
GS10D	485	473	320	16
GS20D	525	525	365	21

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel.
All operations must be performed as described in the technical handbook supplied with the burner. The burner is set in the factory on standard calibration (minimum output). If necessary adjustments can be made on the basis of the maximum output of the boiler.

BURNER SETTINGS

- The air damper position can be adjusted without removing the burner cover.

- Head setting is easy and aided by a graduated scale; a test point allows reading the air pressure in the combustion head.

- Riello 40 GSD burners are fitted with an air pressure switch which, in accordance with EN 676 standards, can be adjusted by the installer using a graduated selector, on the basis of the effective working conditions.

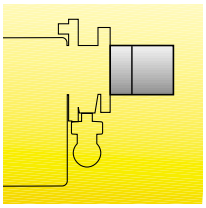
MAINTENANCE

- The maintenance position is easily carried out by hinge that joins the body of burner to the flange.

BURNER ACCESSORIES

Extended head kit

"Standard head" burners can be transformed into "extended head" versions by using the special kit.
Below the KITS available for the various burners are listed, showing the original and the extended lengths.

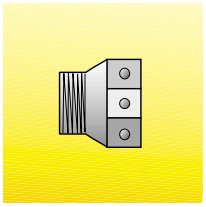


Combustion head extension kit			
Burner	**Standard head length (mm)**	**Extended head length (mm)**	**Kit code**
GS10D	110	170	**3000864**
GS20D	120	280	**3000873**

End cone with turbulator disk

End cone with turbulator disk		
Burner	**Projection**	**Code**
GS10D	+18	**3000918**
GS20D	+23	**3000919**

Town gas kit



Town gas transformation kit	
Burner	**Kit code**
GS10D	**3000891**
GS20D	**3000893**

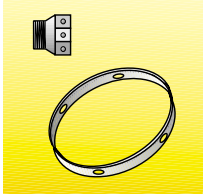
Seal control kit

To test the valve seals on the gas train, a special "seal control kit" is available.

Seal control kit	
Burner	**Kit code**
GS10D - GS20D	**3010123**

LPG kit

For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner, as shown in the following table:



LPG kit	
Burner	**Kit code**
GS10D	**3000884**
GS20D	**3000886**

SPECIFICATION

A special index guides your choice of boiler from the various models available in the Riello 40 GSD series. Below is a clear and detailed specification description of the product.

DESIGNATION OF SERIES

G	S	10	D

- G — Series: G
- S — Fuel : S Natural gas
- 10 — Size
- D — Optional variation: D Two stage output adjustment

AVAILABLE BURNER MODELS

GS10D	29/41 ÷ 106 kW
GS20D	58/81 ÷ 210 kW

SPECIFICATION DESCRIPTION

Burner

Monoblock, gas burners, completely automatic, with two stage settings fitted with:
- Fan with forward inclined blades
- Cover lined with sound-deadening material
- Air damper, completely closed in stand by, driven by an electric servomotor
- Air damper with 1st and 2nd stage adjustement
- Single phase electric motor 230 V, 50 Hz
- Combustion head fitted with:
    - stainless steel head cone, resistant to high temperatures
    - ignition electrodes
    - ionisation probe
    - gas distributor
    - flame stability disk
- Adjustable air pressure switch, with graduated selector, to guarantee burner lock out in the case of insufficient combustible air
- Protection filter against radio interference
- IP 40 electric protection level.

Gas train

Fuel supply line in the Multibloc configuration, fitted with:
- Filter
- Pressure stabiliser
- Minimum gas pressure switch
- Safety valve
- Two stage working valve with ignition gas output regulator.

Burner and gas train assembled

Approval:
- EN 676 standard.

Conforming to:
- 90/396/EEC (gas)
- 73/23/EEC (low voltage)
- 89/336/EEC (electromagnetic compatibility)
- 92/42/EEC (performance)
- 98/37/EEC (machines).

Standard equipment:
- Flange insulation screen
- Screws and nuts for fixing the flange to the boiler
- 7-pole socket
- 4-pole socket
- Hinge
- Grommet
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- Extended head kit
- LPG kit
- Seal control kit
- Alternative combustion head kit
- Town gas kit.

Lineagrafica

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Tel. ++39.0442630111 - Fax ++39.044221980
Internet: http://www.rielloburners.com - E-mail: rburners@rielloburners.com

RIELLO BURNERS

CE

TWO-STAGE PROGRESSIVE AND MODULATING GAS BURNERS

RIELLO 40 GS/M SERIES

- **GS 10/M** 22/42 ÷ 106,0 kW
- **GS 20/M** 43/82 ÷ 192,4 kW

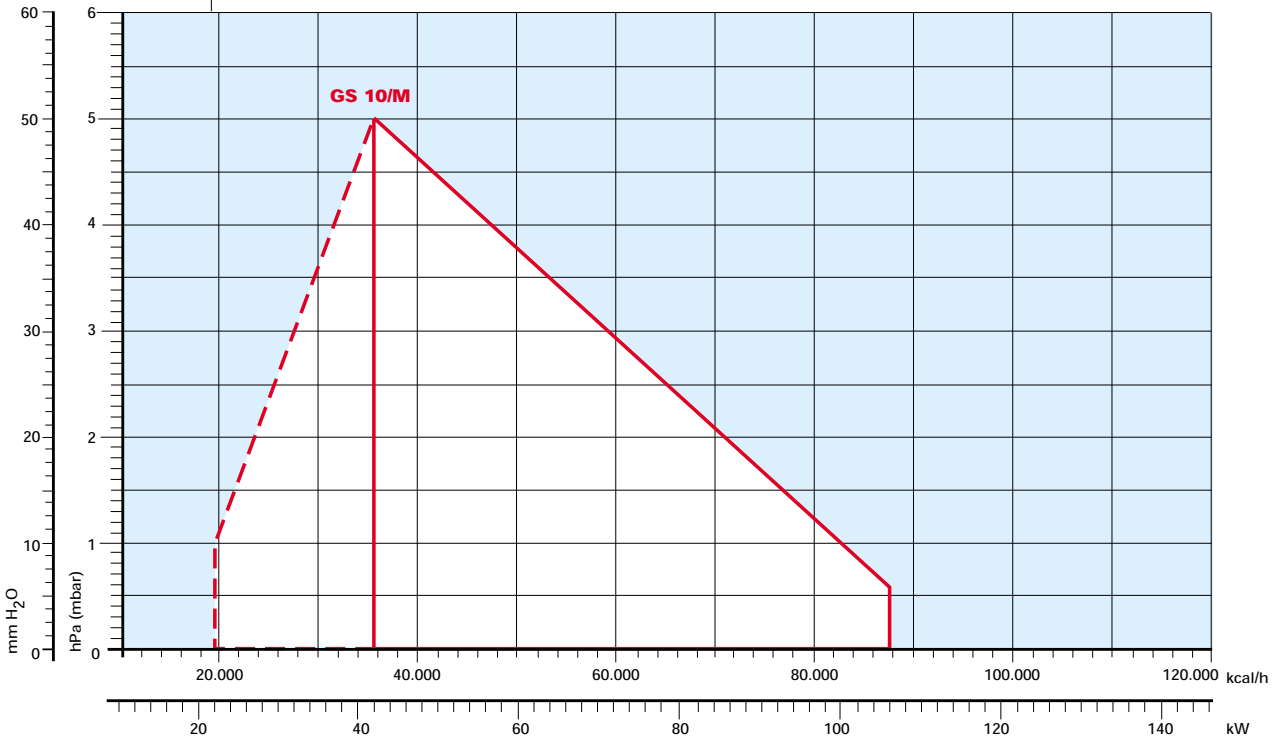
The Riello 40 GS/M series of two stage progressive or modulating gas burners, is a complete range of products developed to respond to any request of gas burners for hot air generator according to PrEN 1020. These new models complete the Riello 40 gas series which prides itself on many years of experience in all the world in the field of residential heating and soft industrial applications.
This series of burners is available in two different models with an output ranging from 22 to 192,4 kW, divided in two different structures.
Basic version of these models has two stage progressive operation. A simple modification, adding a component, permits obtaining modulating operation with a rate 1 : 4. The burners are supplied air fuel ratio control gas trains.
This more advanced version can better satisfy market needs for applications where modulation is requested to obtain highest plant efficiency.
In developing these burners, special attention was paid to the ease of installation and adjustment, to maintaining the smallest size possible and obtaining high performance for modulating operation to fit into any sort of application available on the market.
All the models are approved by the EN 676 European Standard and they conform to European Directives: Gas Appliances, EMC, Low Voltage, Machinery and Boiler Efficiency.

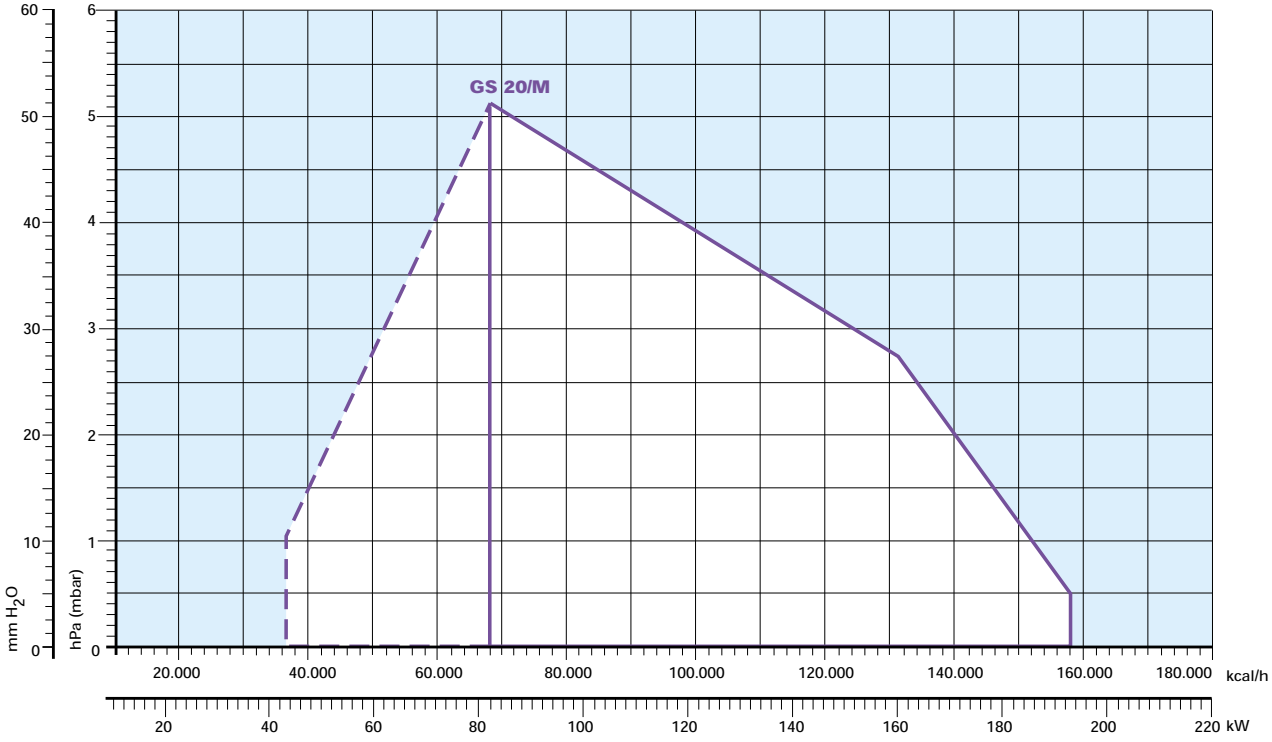
TECHNICAL DATA

	Model			GS 10/M	GS 20/M
	Setting			Modulating (with regulator and probes accessories)	
	Servo-motor	type		SQN 70	
		run time		30 s	
	Heat output		kW	22/42÷106	43/82÷192,4
			Mcal/h	18,9/36,1÷91,16	37/70,5÷165,5
	Working temperature		°C min./max.	0 - 40	
Fuel / air data	Net calorific value G20 gas		kWh/Nm³	10	
			kcal/Nm³	8.600	
	G20 gas density		kg/Nm³	0,71	
	G20 gas delivery		Nm³/h	2,2/4,2÷10,6	4,3/8,2÷19,24
	Net calorific value LPG gas		kWh/Nm³	25,8	
			kcal/Nm³	10	
	LPG gas density		kg/Nm³	2,019	
	LPG gas delivery		Nm³/h	0,85/1,63÷4,11	1,67/3,18÷7,46
	Fan		type	Forward blades	
	Air temperature		max °C	60	
Electrical data	Electrical supply		Ph/Hz/V	1/230/50 (±10%)	
	Aux. electrical supply		Ph/Hz/V	1/230/50	
	Control box		type	LMG 22	
	Total electrical power		kW	0,130	0,25
	Rated total current		A	0,8	1
	Protection level		IP	40	
	Motor supply		Nfasi/V/Hz	1/230/50 (±10%)	
	Motor electrical power		kW	0,09	0,15
	Rated motor current		A	0,75	0,95
	Motor start current		A	2,25	2,85
	Motor protection level		IP	20	
	Aux. electrical power		kW	0,04	
	Auxiliary rated current		A	0,5	
	Ignition transformer			230V - 1x15 kV	
				0.2A - 25mA	
	Operation			Intermittent	
Emissions	Sound pressure		dB(A)	65	72
	Sound output		W	--	--
	CO emissions		mg/kWh	15	
	NOx emissions		mg/kWh		
Approval	Directives			90/396/EEC, 89/336/EEC, 73/23/EEC, 92/42/EEC	
	Conforming to:			EN 676	
	Certifications			CE-0085AU2367	

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.

FIRING RATES





Useful working field for choosing the burner

Modulation range

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

FUEL SUPPLY

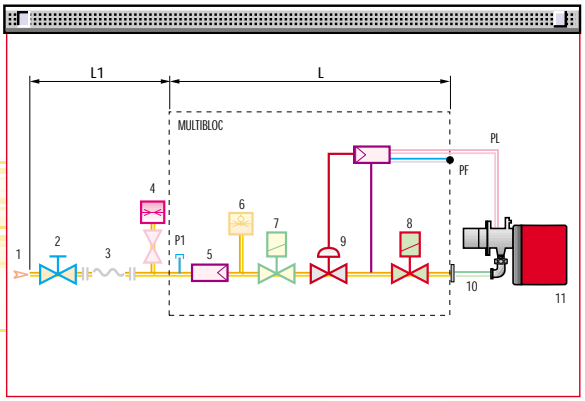
GAS TRAINS

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

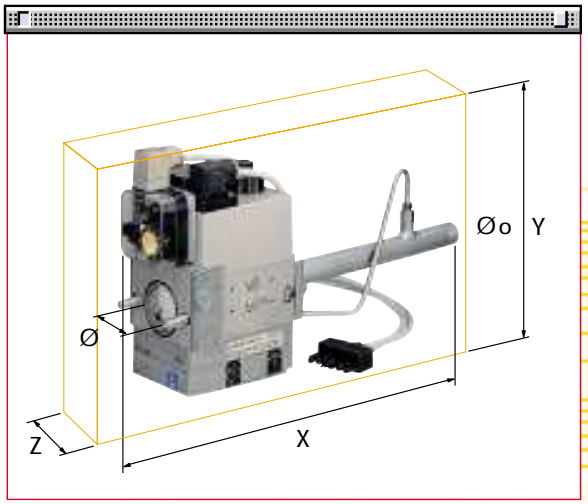
Depending on the fuel output and the available pressure in the supply line, you should check the correct gas train to be adapted to the system requirements.

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

MB-VEF 407-412



1	Gas inlet
2	Manual tip
3	Antivibrating joint
4	Gas pressure gauge
5	Gas filter
6	Min gas pressure switch
7	Safety gas valve
8	Gas valve
9	Gas regulator
10	Adapter
11	Burner
PF	Impulse line combustion chamber
PL	Impulse line combustion head
P1	Gas pressure gauge
L	Gas train to be ordered separately
L1	Supplied by the installer



The following table shows the dimensions of the gas trains which can be fitted to Riello 40 GS/M burners, intake diameter and the coupling flange to the burner.

MULTIBLOC

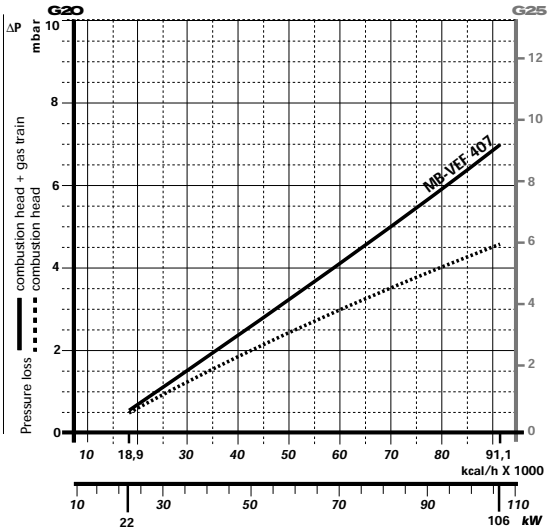
Name	Code	Ø i	Øo	X mm	Y mm	Z mm
MB-VEF 407	3970535	Rp 3/4"	Rp 3/4"	430	230	120
MB-VEF 412	3970536	Rp 1"	Rp 3/4"	465	255	145

PRESSURE DROP DIAGRAMS

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

NATURAL GAS

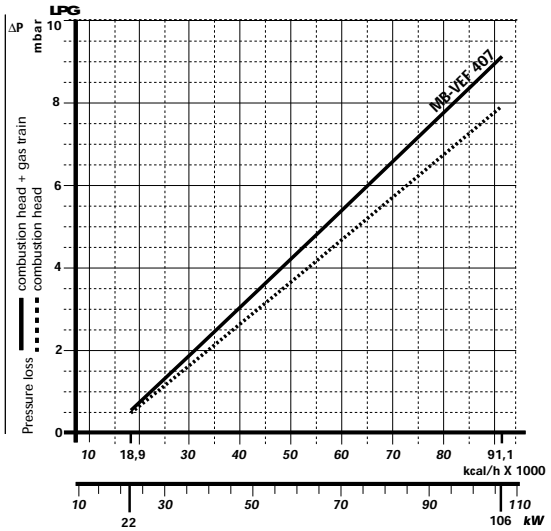
GS 10/M



Gas train	Code
MB-VEF 407	3970535

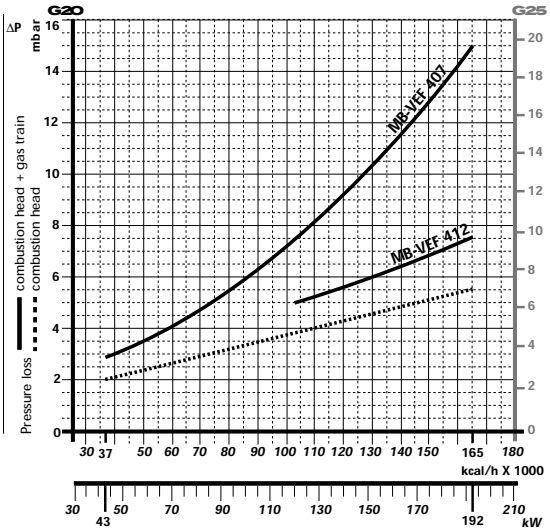
LPG

GS 10/M



NATURAL GAS

GS 20/M

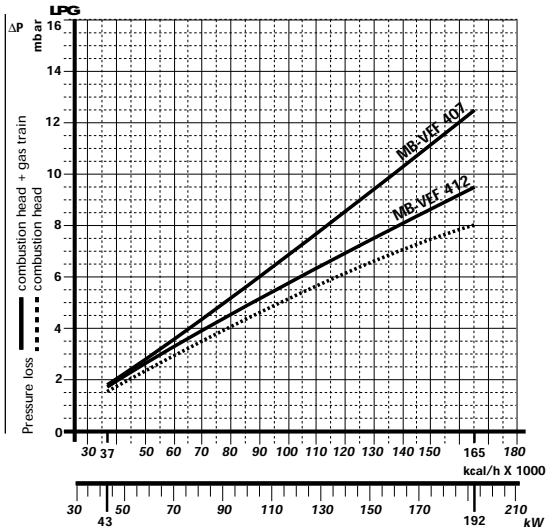


Gas train	Code	Output
MB-VEF 407	3970535	-
MB-VEF 412	3970536	≥ 120 kW*

* With natural gas.

LPG

GS 20/M



note *For pressure levels different from those indicated above, please contact Riello Burners Technical Office.*

DIMENSIONING OF THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

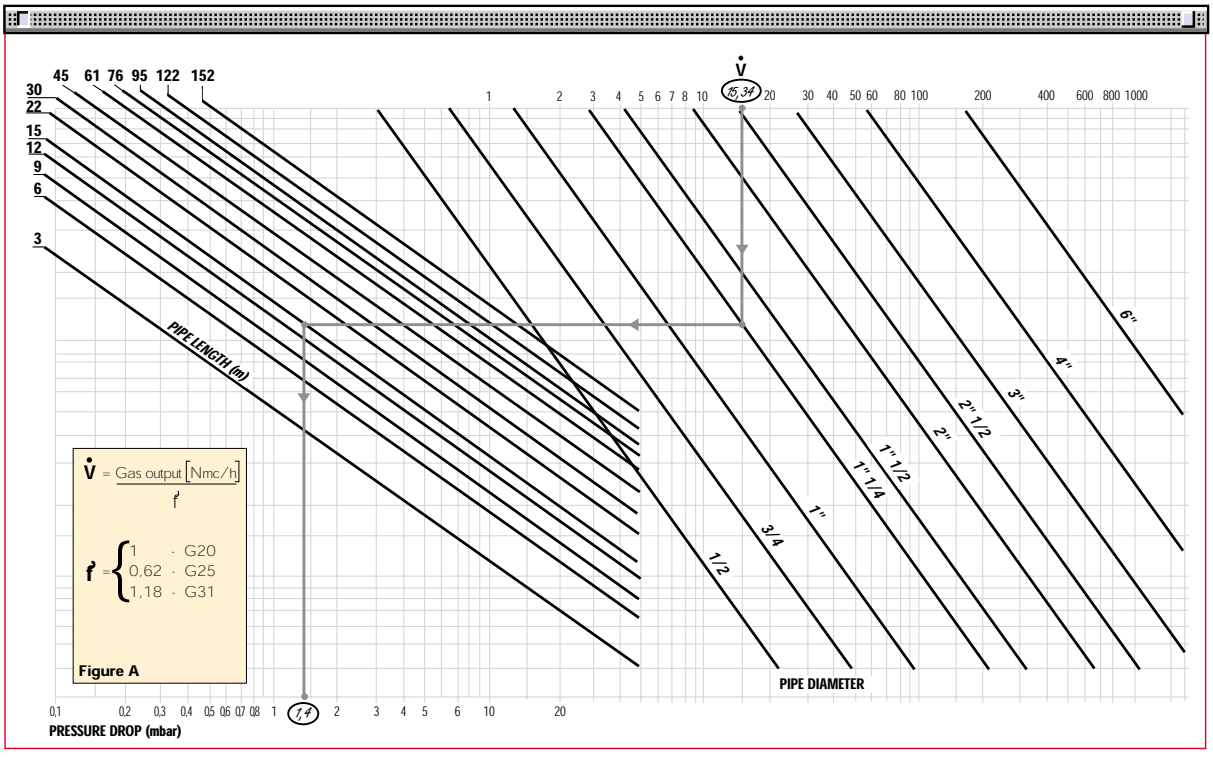
Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length.
Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop of on the botton scale below (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

	- gas used	G25
	- gas output	9.51 mc/h
	- pressure at the gas meter	20 mbar
	- gas line length	15 m
	- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62} \right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;

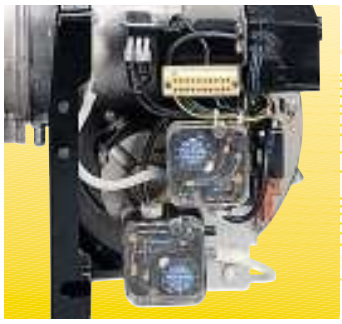
- correct pressure = (20-1.4) = 18.6 mbar



VENTILATION

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

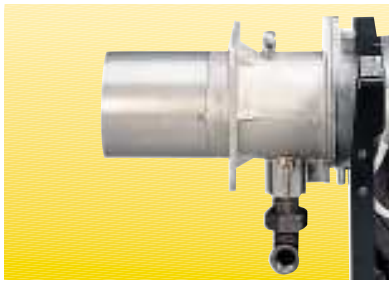
Air suction



Min and Max air pressure switches

COMBUSTION HEAD

The combustion head in Riello 40 GS/M Heater 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.

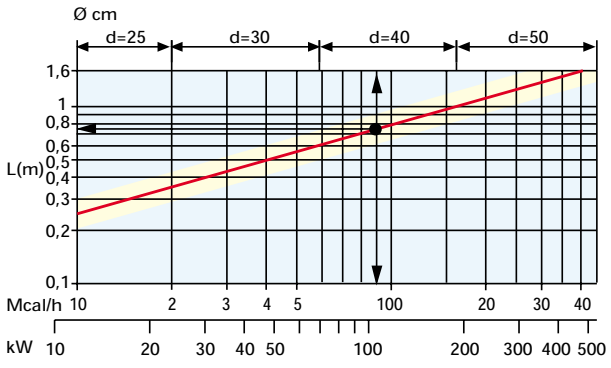


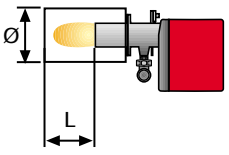
Combustion head

Flange

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

Combustion chamber dimensions used in the test laboratory





$$L\ (m) = 0{,}23 \times \sqrt{\frac{kW}{10}}$$

With simple adjustments, the burner can be adapted to combustion chambers that are slightly different from those used in the tests.

Example:
burnt thermal delivery = 105 kW;
L (m) = 0,23 x $\sqrt{10{,}5}$ = 0,74 (m);
Ø = 40 (cm)

ADJUSTMENT

BURNER OPERATION MODE

All these models in standard version are two-stage progressive operation.
Adding the output regulator device they are modulating operation.

Air damper adjustment

On "two-stage progressive" operation, the burner gradually adapts the output to the requested level, by varying between two pre-set levels (see figure A).
On "modulating" operation, normally required in steam generators, in superheater boilers or diathermic oil burners, a specific regulator and probes are required. These are supplied as accessories that must be ordered separately. The burner can work for long periods at intermediate output levels (see figure B).

"Two-stage progressive" operation

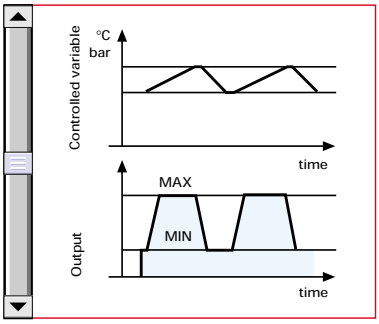


Figure A

"Modulating" operation

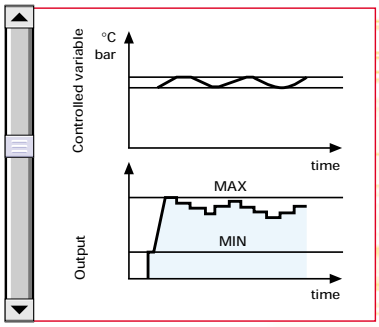
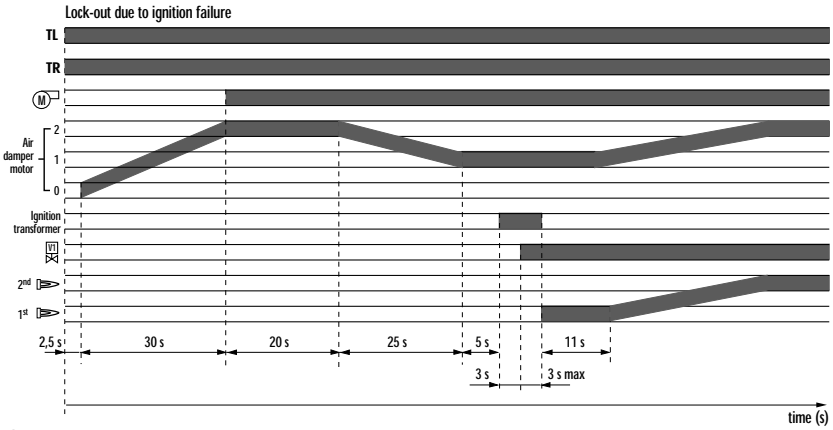


Figure B

IGNITION



Correct operation

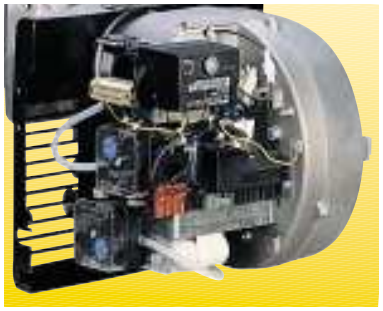
0s	The burner begins the ignition cycle.
0s-2,5s	Safety time.
2,5s-32,5s	Progressive open of the air damper until the 2nd stage position.
32,5s-52,5s	Pre-purge at the 2nd stage.
52,5s-77,5s	The air damper closes until 1st stage position.
77,5s-82,5s	Pre-purge at the 1st stage.
82,5s-88,5s	The ignition transformer starts.
85,5s	The solenoid opens.
88,5s-99,5s	Ignition 1st stage.
99,5s	Ignition 2nd stage.

If the flame does not light within the safety limit (~3s) the burner locks-out.
Lock-out is shown by a led on the appliance.

ELECTRICAL CONNECTIONS
to be made by the installer

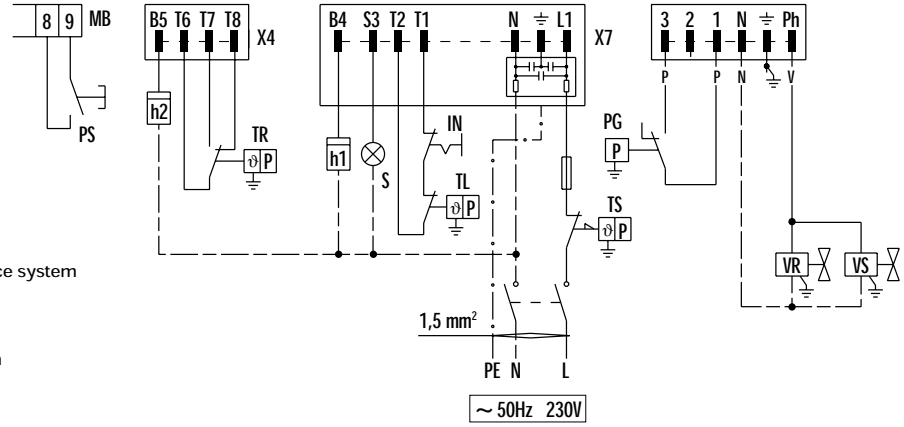
Electrical connections must be made by qualified and skilled personnel in conformity with the local regulations in force.

The 7-pole socket is incorporated inside the burner, the 4-pole socket (for connecting the 2nd stage thermostat to the hour meter) and the 6-pole (for connection to the gas train) are already connected to the equipment and fixed to the inside of the burner.
The 7 and 4-pin plugs are also supplied for connection to the boiler.



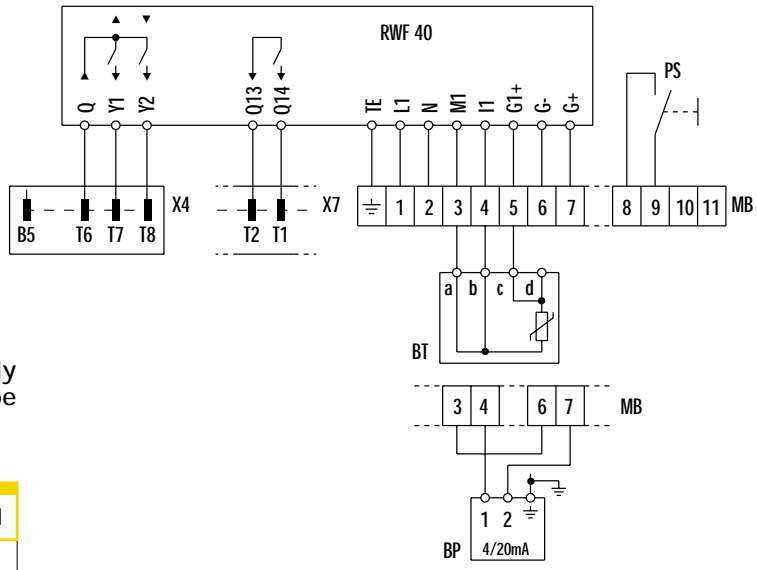
Appliance fitted with 7-pole, 6-pole and 4-pole sockets

" TWO STAGE PROGRESSIVE" OPERATION



PS - Remote manual reset
MB - Terminal strip
X7 - 7 pole plug
X4 - 4 pole plug
X6 - 6 pole plug
h2 - 2nd stage hourcounter
TR - High-low mode control device system
h1 - 1st stage hourcounter
S - Remote lock-out signal
IN - Manual burner stop switch
TL - Limit control device system
TS - Safety control device system
PG - Min. gas pressure switch
VR - Adjustment valve
VS - Safety valve

" MODULATING OPERATION"



PS - Remote manual reset
MB - Terminal strip
X7 - 7 pole plug
X4 - 4 pole plug
BT - Temperature probe
BP - Pressure probe

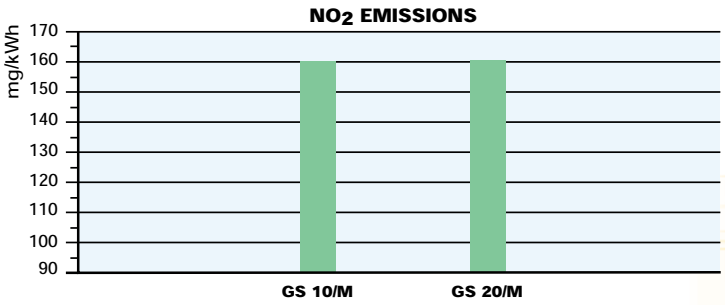
The following table shows the supply lead sections and types of fuse to be used.

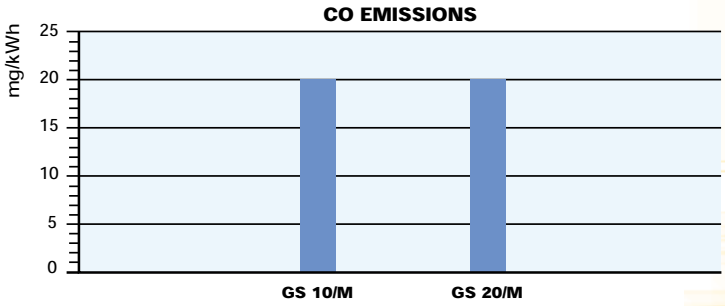
Model	▼ GS 10/M	▼ GS 20/M
	230V	230V
F A	T6	T6
L mm²	1	1

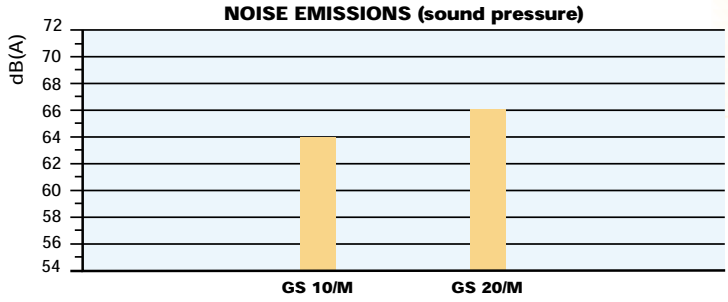
F = Fuse L = Lead section

EMISSIONS

The emission data have been measured in the various models at maximum output, in conformity with EN 676 standard.





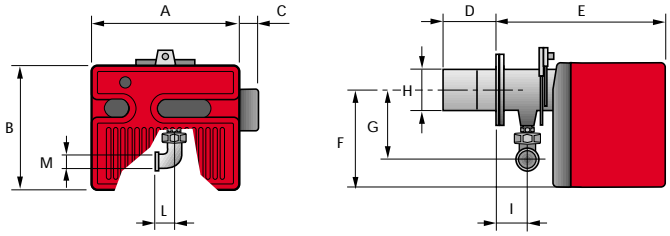


Special attention has been paid to noise reduction. All models are fitted with sound-deadening material inside the cover.

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.

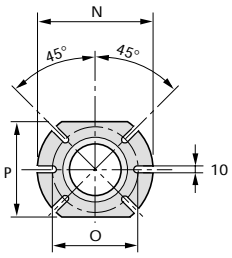
BURNER



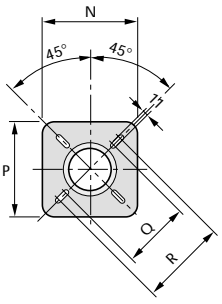
Model	A	B	C	D	E	F	G	H	I	L	M
GS 10/M	305	262	120	128	347	204	142	105	61	33	Rp 3/4"
GS 20/M	350	298	37	120	389	230	170	125	67	33	Rp 3/4"

BURNER-BOILER MOUNTING FLANGE

GS 10/M

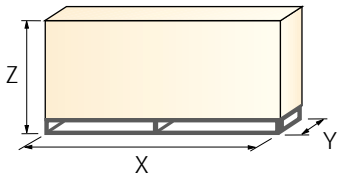


GS 20/M



Model	N	O	P	Q	R
GS 10/M	185	130	160	-	-
GS 20/M	170	-	170	155	200

PACKAGING



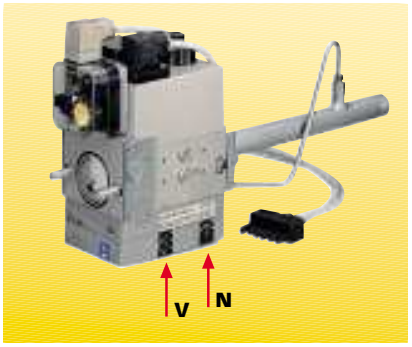
Model	X	Y	Z	kg
GS 10/M	495	480	320	16
GS 20/M	550	525	365	17

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel.
All operations must be performed as described in the technical handbook supplied with the burner.
The burner is set in the factory on standard calibration (minimum output). If necessary adjustments can be made on the basis of the maximum output of the boiler.

BURNER SETTINGS

- The gas flow rate for both high and low capacity must be done by using the screws **V** and **N** on the gas valve group. The air flow must be adjusted at maximum output by the air damper.



- If necessary it is possible to increase the minimum output by moving a cam of the air servomotor.

- In according to EN 676 and Pr EN 1020, the GS 10/M and GS 20/M are provided by two air pressure switches to be adjusted at the end of commissioning procedure.

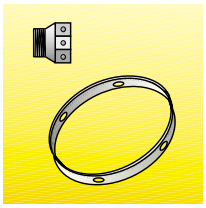
MAINTENANCE

- Particular care is given to the design of the burner to ensure ease of maintenance. The burner body is hinged to permit quick and easy access to the combustion head for maintenance and setting.
To make friendly all the operations on the burner, the internal and external components are connected by plugs and sockets.

BURNER ACCESSORIES

LPG transformation kit

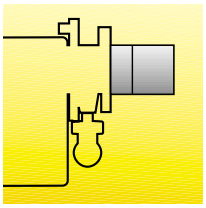
For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner, as shown in the following table:



LPG transformation kit	
Burner	**Kit code**
GS 10/M	**3000884**
GS 20/M	**3000886**

Extended heads

Standard head" burners can be transformed into "extended head" versions by using the special kit. Below the KITS available for the various burners are listed, showing the original and the extended lengths.



Combustion head extension kit			
Burner	**Standard head length (mm)**	**Extended head length (mm)**	**Kit code**
GS10/M	128	188	**3000864**
GS20/M	120	280	**3000873**

Accessories for modulating setting

To obtain modulating setting, the R40/M series of burners requires a regulator with three point outlet controls. The relative temperature or pressure probes fitted to the regulator, must be chosen on the basis of the application.
The following table lists the accessories for modulating setting with their application range.

REGULATOR		PROBE		
Type	**Code**	**Type**	**Range (°C) (bar)**	**Code**
RWF 40	**3001074**	Temperature PT 100	-100 ÷ 500°C	**3010110**
		Pressure 4 ÷ 20 mA	0 ÷ 2,5 bar	**3010213**
		Pressure 4 ÷ 20 mA	0 ÷ 16 bar	**3010214**

SPECIFICATION

A special index guides your choice of boiler from the various models available in the R 40/M series. Below is a clear and detailed specification description of the product.

DESIGNATION OF SERIES

Series: Riello 40

Fuel : GS gas

Size

Operation mode: /M two-stage progressive of fully modulating

R40	GS	10	/M

LIST OF AVAILABLE MODELS

GS 10/M Heater	22/42 ÷ 106,0	kW	
GS 20/M Heater	43/82 ÷ 192,4	kW	
GS 10/M	22/44 ÷ 102,0	kW (in progress)	
GS 20/M	40/84 ÷ 195,0	kW (in progress)	

SPECIFICATION DESCRIPTION

Burner

Monoblock, gas burners, completely automatic, high/low progressive operation mode or fully modulating by using a regulator:
- Ratio air/fuel controlled by checking both the air and the gas flows
- Two pressure switches on the burner, to make sure the burner operation, detecting both the fan and the chimney fonctions
- Remote reset available
- Servomotor to drive the air damper to fully closed position at stand-by, low and high fire position
- Turn down fire 1:4
- Fan with forward inclined blades
- Metallic cover
- Single phase electric motor 230 V, 50 Hz
- Combustion head fitted with:
    - stainless steel head cone, resistant to high temperatures
    - ignition electrodes
    - ionisation probe
    - gas distributor
    - flame stability disk
    - additional device, to keep short the flame shape
- Protection filter against radio interference
- IP 40 electric protection level.

Gas train

Fuel supply line in the Multibloc configuration, fitted with:
- Filter
- Pressure stabiliser
- Minimum gas pressure switch
- Safety valve
- Single stage working valve
- Self-adapting regulator, to adjust the gas flow following the air flow.

Burner and gas train assembled

Approval:
- EN 676 standard
- In accordance to PrEN 1020 (Heaters).

Conforming to European Directives:
- 90/396/EEC (gas)
- 73/23/EEC (low voltage)
- 89/336/EEC (electromagnetic compatibility)
- 92/42/EEC (efficiency).

Standard equipment:
- Hinge to turn the burner left-side or right-side for the maintenance position
- Flange insulation screen
- Screws and nuts for fixing the flange to the boiler
- 7-pin plug with capacitor for EMC
- 4-pin plug to connect the high-low thermostat
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- LPG transformation kit
- RWF 40 for modulating operation
- Temperature and pressure probe.

Lineagrafica

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Tel. ++39.0442630111 - Fax ++39.044221980
Internet: http://www.rielloburners.com - E-mail: rburners@rielloburners.com

RIELLO BURNERS

CE

SINGLE-STAGE GAS BURNER

GULLIVER RS SERIES | **RS5** 160 ÷ 330 kW

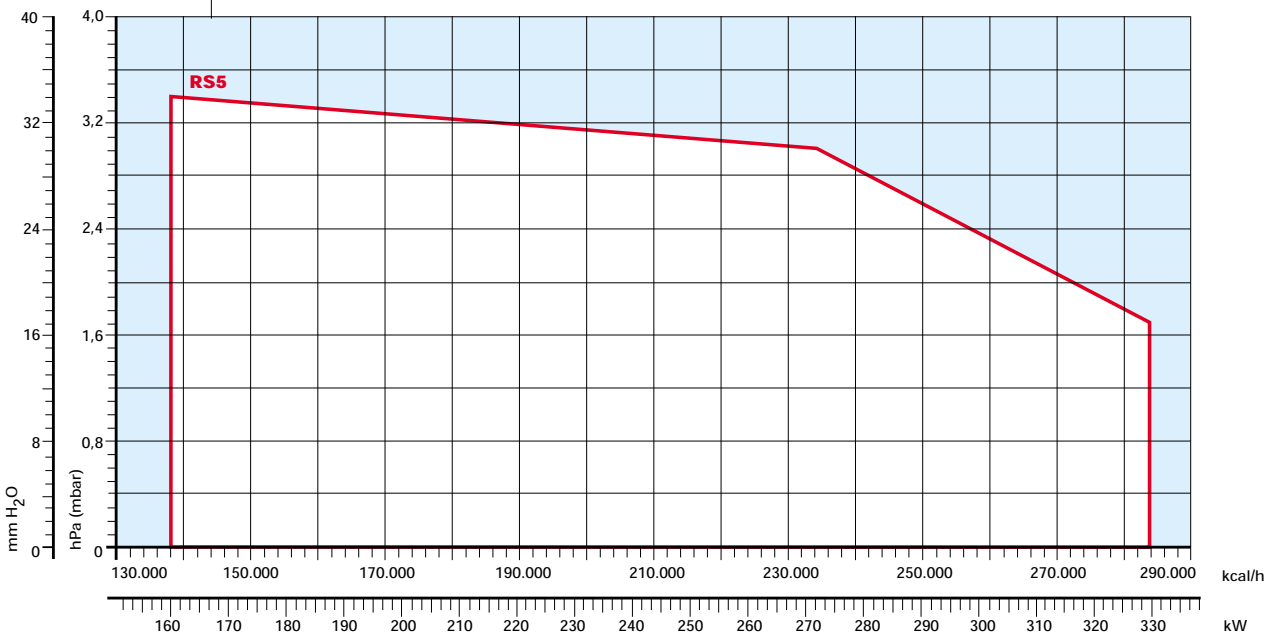
The Riello Gulliver RS5 is a new model of the series of single stage gas burners, characterized for its small dimensions inspite of its high combustion performance. It has been developed to respond to any request for home heating, conforming to current regulations in force. This model uses the same components designed by Riello for the Gulliver series. The high quality level guarantees safe working.
In developing this burner, special attention was paid to reducing noise, the ease of installation and adjustment, to obtaining the smallest size possible to fit into any sort of boiler available on the market.
This model is approved by the EN 676 European Standard and European Directives, Gas Appliance, EMC, Low Voltage, Boiler Efficiency.
The Gulliver RS5 burner is tested before leaving the factory.

TECHNICAL DATA

	Model			RS5
	Setting			Single-stage
	Servo-motor	type		R.B.L.
		run time		6÷28
	Heat		kW	160 - 330
	output		Mcal/h	137,6 - 283,8
	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	16 - 33
	PCI gas G25		kWh/Nm³	8,6
	G25 gas density		kg/Nm³	0,78
	G25 gas delivery		Nm³/h	18,6 - 38,4
	Net calorific value LPG gas		kWh/Nm³	25,8
	LPG gas density		kg/Nm³	2,02
	LPG gas delivery		Nm³/h	6,2 - 12,8
	Fan		type	forward tilted 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. 568
	Total electrical output		kW	0,43
	Protection level		IP	40
	Electric motor output		kW	0,43
	Rated motor current		A	2
	Motor take-off current		A	8,5
	Motor protection level		IP	20
	Ignition transformer			incorporated in the control box
	Operation			intermittent (at least one halt every 24 h)
Approval Emissions	Sound pressure		dB(A)	70
	CO emissions		mg/kWh	< 40
	NOx emissions		mg/kWh	≤ 120
	Directives			90/396/CEE, 89/336/CEE, 73/23/CEE, 92/42/CEE
	Conforming to			EN 676
	Certifications			CE - 0085 AQ0409

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.

FIRING RATE



Useful range 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 TRAINS

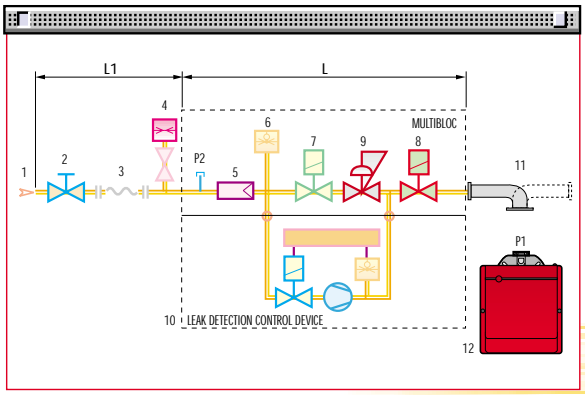
The burner is set for fuel supply from either the right or left hand sides.

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

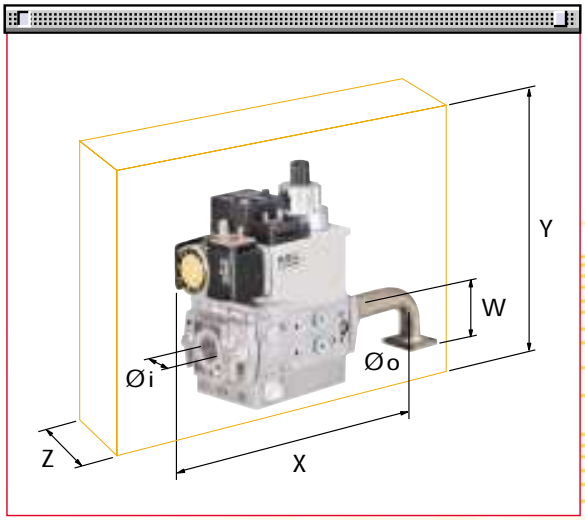
The gas train is Multibloc type, containing the main components in a single unit, and a valve seal control (as accessory) can be fitted.

Gas train installed on the burner

MBDLE 410 - 412 - 415



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
P1	Combustion head pressure
P2	Upstream pressure from the filter
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 maximum dimensions of the gas trains that can be fitted to Gulliver RS5 burner, intake diameter and the coupling flange to the burner.

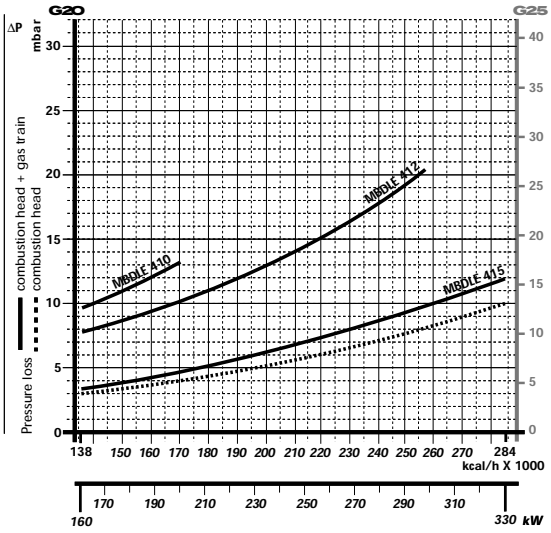
	Name	Code	Ø i	Øo	X mm	Y mm	W mm	Z mm
MULTIBLOC	**MBDLE 410**	3970549	1" 1/4	FLANGE 3	259	215	47	145
	MBDLE 412	3970550	1" 1/4	FLANGE 3	259	215	47	145
	MBDLE 415	3970558	1" 1/2	FLANGE 3	330	250	47	100

PRESSURE DROP DIAGRAMS

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

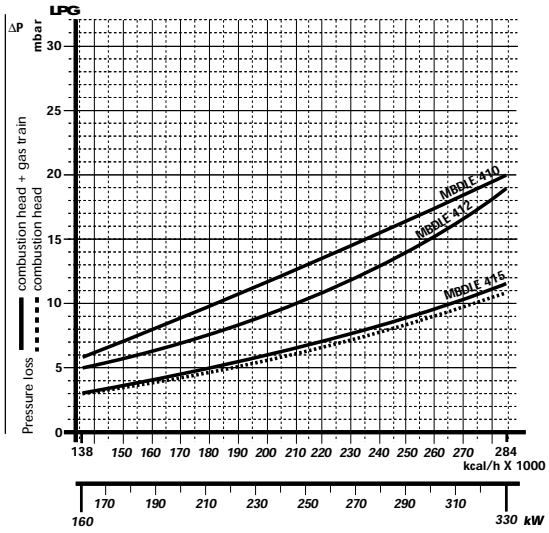
NATURAL GAS

RS5



LPG

RS5



Gas train	Code	Output
MBDLE 410	3970549	≤ 200 kW*
MBDLE 412	3970550	≤ 300 kW*
MBDLE 415	3970558	-

* With natural gas.

note *For pressure levels different from those indicated above, please contact Riello Burners Technical Office.*

SELECTING THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

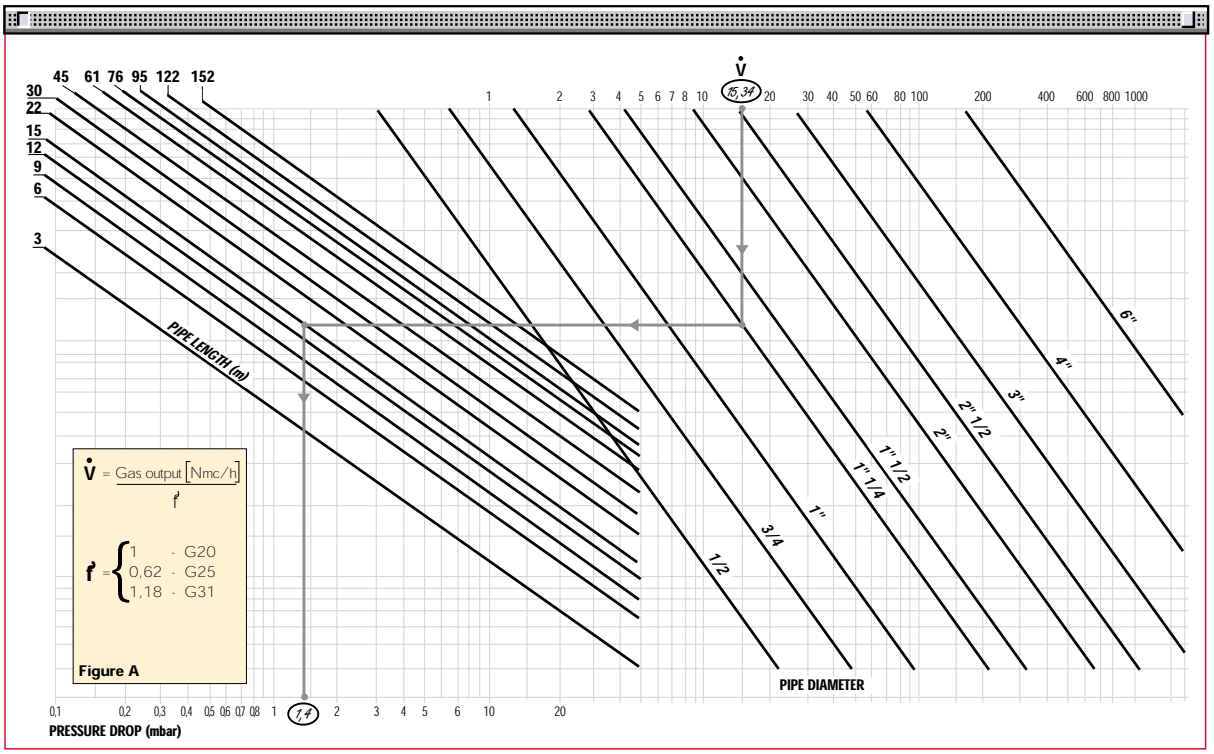
Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length.
Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop of on the botton scale below (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

	- gas used	G25
	- gas output	9.51 mc/h
	- pressure at the gas meter	20 mbar
	- gas line length	15 m
	- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62}\right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;

- correct pressure = (20-1.4) = 18.6 mbar



VENTILATION

The ventilation circuit ensures low noise level with high performance of pressure and air delivery, inspite of their compact size.

The burner is fitted with an adjustable air pressure switch, conforming to EN 676 standards.

Air suction

Air pressure switch

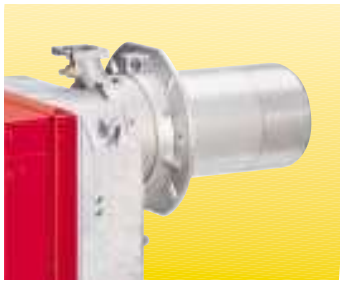
COMBUSTION HEAD

The combustion head in Gulliver RS5 burner is the result of an innovative design, which allows combustion with low polluting emissions, while being easy to adapt to all various types of boilers and combustion chambers.

Thanks to the use of a mobile coupling flange, the penetration of the head into the combustion chamber can be adjusted.

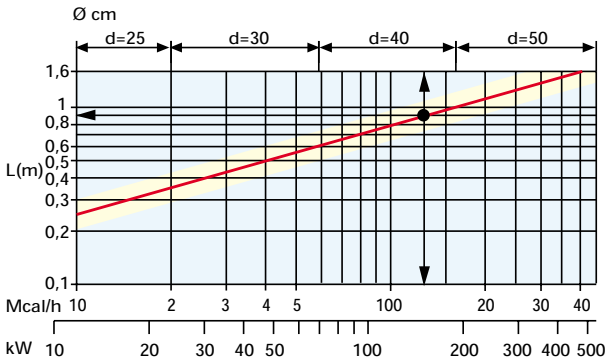
Simple adjustment allows the internal geometry of the combustion head to be adapted to the burner output.

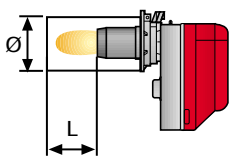
Combustion head



Mobile coupling flange

Combustion chamber dimensions used in the test laboratory





$$L\ (m) = 0{,}23 \times \sqrt{\frac{kW}{10}}$$

With simple adjustments, the burner can be adapted to combustion chambers that are slightly different from those used in the tests.

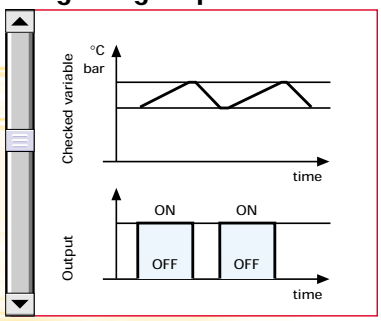
Example:
burnt thermal delivery = 160 kW;
L (m) = 0,23 x $\sqrt{16}$ = 0,92 (m);
Ø = 40 (cm)

ADJUSTMENT

BURNER OPERATION MODE

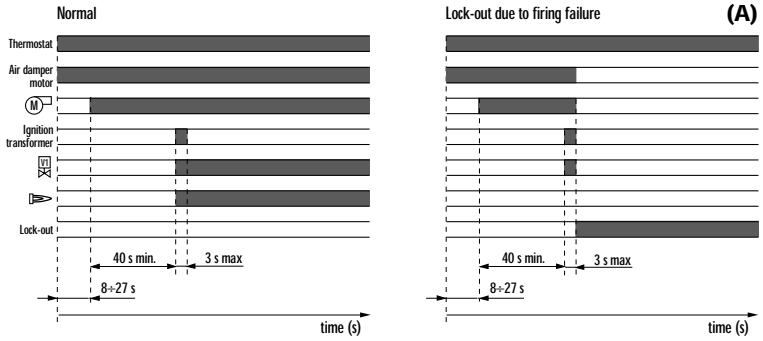
This model has single-stage output regulation.

"Single-stage" operation



Air damper adjustment

FIRING



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

Correct operations

0s	The burner begins the firing cycle.
0s-8/27s	The motor opens the air damper.
8/27s-48/67s	Pre-purge with the air damper open.
48/67s	Ignition.

Lock-out due to firing 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.

ELECTRICAL CONNECTIONS
to be made by the installer

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

The 7-pole socket is incorporated in the control box, the 6-pole socket for connection to the gas train is already connected to the equipment and fixed to the outside of the burner.
The 7-pin plug is also supplied for connection to the boiler.

Appliance fitted with an ignition transformer

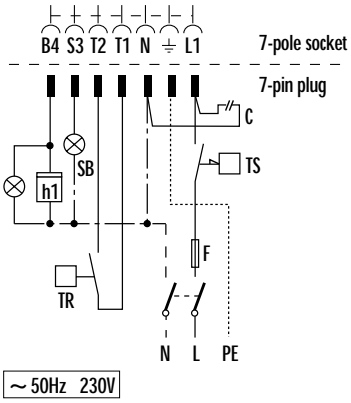
6-pole socket

7-pole socket incorporated in the control box

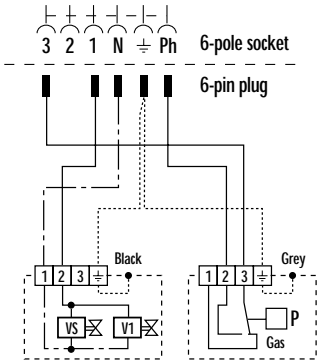
" SINGLE-STAGE" OPERATIONS

h1 - Single stage hour meter
SB - Lock out led
TR - Regulation thermostat
TS - Safety thermostat (manual reset)
VS - Security valve
V1 - 1st stage valve
P - Gas pressure switch
C - Capacitor
F - Fuse

Burner electrical wiring



Gas train electrical wiring

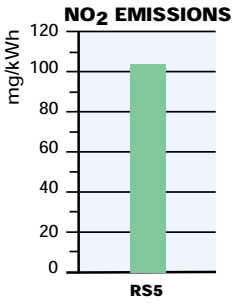


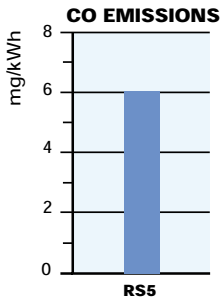
The following table shows the supply lead sections and types of fuse to be used.

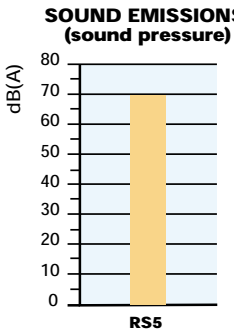
Model	▼ RS5
	230V
F A	T6
L mm²	1

F = Fuse L = Lead section

EMISSIONS







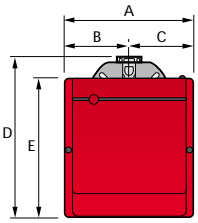
The emission data have been measured in the RS5 at maximum output, in conformity with EN 676 standard.

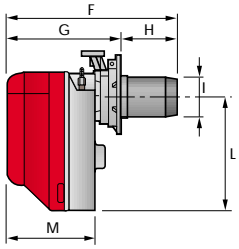
Special attention has been paid to noise reduction. This model is fitted with sound-deadening material inside the cover.

OVERALL DIMENSIONS (mm)

Thanks to certain construction features, this model can be fitted to any boiler on the market.

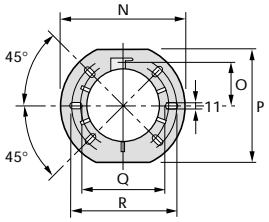
BURNER





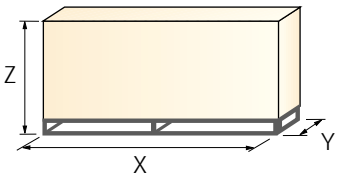
Model	A	B	C	D	E	F	G	H	I	L	M
RS5	300	150	150	392	345	501	278÷301	223÷200	137	286	216

BURNER-BOILER MOUNTING FLANGE



Model	N	O	P	Q	R
RS5	218	80,5	203	170	200

PACKAGING

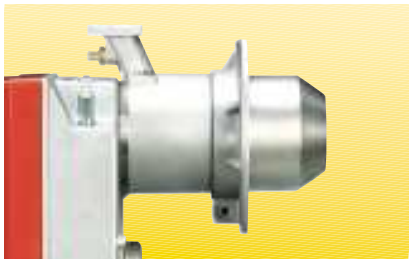


Model	X	Y	Z	kg
RS5	590	335	420	18

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel.
The burner is set in the factory on standard calibration (minimum output), if necessary adjustments can be made on the basis of the maximum output of the boiler.
All operations must be performed as described in the technical handbook supplied with the burner.

- The mobile flange allows adapting the length of the combustion head to the combustion chamber (flame inversion or 3 smoke cycles) and to the thickness of the boiler panel.



BURNER SETTINGS

- The air damper position can be adjusted without removing the burner cover.

- Head setting is easy and aided by a graduated scale, a test point allows reading the air pressure in the combustion head.

- Gulliver RS5 burner is fitted with an air pressure switch which, in accordance with EN 676 standards, can be adjusted by the installer using a graduated selector, on the basis of the effective working conditions.

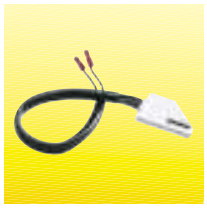
MAINTENANCE

- Maintenance is easily solved because the combustion head can be disassemblied without having to remove the burner and gas train from the boiler.

ACCESSORIES

Remote control release kit for the 568 control box

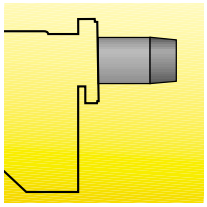
The 568 control box can be remotely released using an electric command kit.
This kit must be installed in conformity with current regulations in force.



Remote control release kit for the 568 control box	
Burner	**Code**
RS5	**3001031**

Extended head

Standard head" burners can be transformed into "extended head" versions by using the special kit.



Combustion head extension kit			
Burner	**Standard head length (mm)**	**Extended head length (mm)**	**Extended head kit code**
RS5	200 ÷ 223	365 ÷ 382	**3001016**

LPG transformation kit

For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner as shown in the following table.

LPG trasformation kit	
Burner	**LPG kit code**
RS5	**3001011**

Seal control kit

To test the valve seals on the gas train, a special "seal control kit" is available.

Seal control kit	
Burner	**Kit code**
RS5	**3010123**

SPECIFICATION

A special index guides your choice of boiler according to this model.
Below there is a clear and detailed specification description of the product.

DESIGNATION OF SERIES

Series:	R	Standard emission burners
	B	Low NOx burners
Fuel :	S	Natural gas
	G	Light-oil
Size		
Possible variations:	R	Light-oil pre-heater
	K	Cone shaped head
	S	Reduced output ignition
	D	Two stage output setting
	E	Flame monitor

R	S	5	

AVAILABLE MODEL

RS5	160	÷	330	kW

SPECIFICATION DESCRIPTION

Burner

Monoblock, gas burner, completely automatic, with single stage settings fitted with:
- Fan with forward inclined blades
- Cover lined with sound-deadening material
- Air damper, completely closed in stand by, with external adjustment, with no need to remove the cover
- Single phase electric motor 230 V, 50 Hz
- Combustion head fitted with:
    - stainless steel head cone, resistant to high temperatures
    - ignition electrodes
    - ionisation probe
    - gas distributor
    - flame stability disk
- Flame inspection window
- Adjustable air pressure switch, with graduated selector, to guarantee burner lock out in the case of insufficient combustible air
- Protection filter against radio interference
- IP 40 electric protection level.

Gas train

Fuel supply line in the Multibloc configuration, fitted with:
- Filter
- Pressure stabiliser
- Minimum gas pressure switch
- Safety valve
- Single stage working valve with ignition gas output regulator.

Burner and gas train assembled

Approval:
- EN 676 standard.

Conforming to:
- Directive 90/396/CEE (gas)
- Directive 73/23/CEE (low voltage)
- Directive 89/336/CEE (electromagnetic compatibility)
- Directive 92/42/CEE (efficiency).

Supplied material:
- Sliding flange
- Flange insulation screen
- Screws and nuts for fixing the flange to the boiler
- 7-pin plug with capacitor for EMC
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- Remote release kit
- Head extension kit
- LPG transformation kit
- Seal control kit.

Lineagrafica

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RIELLO BURNERS

CE

TWO STAGE GAS BURNERS

GAS/2 SERIES		
	GAS 3/2	80/130 ÷ 350 kW
	GAS 4/2	120/180 ÷ 470 kW
	GAS 5/2	155/320 ÷ 660 kW
	GAS 6/2	300/520 ÷ 1050 kW
	GAS 7/2	400/800 ÷ 1760 kW

The GAS/2 series of burners covers a firing range from 80 to 1760 kW and they have been designed for use in civil installations of average dimensions, like building areas and large apartment groups or for use in industrial applications, like small or medium plants. Operation is two stage; the combustion head, that can be set on the basis of required output, allows optimal performance ensuring good combustion and reducing fuel consumption.
The main feature of these burners is their reliability due to a simple and strong construction, which permits operation without particular maintenance intervention.
Simplified maintenance is achieved by the slide bar system, which allows easy access to all of the essential components of the combustion head. All electrical components are easily accessible only by dismounting a protection panel, thus guaranteeing a quick and simple intervention on components.

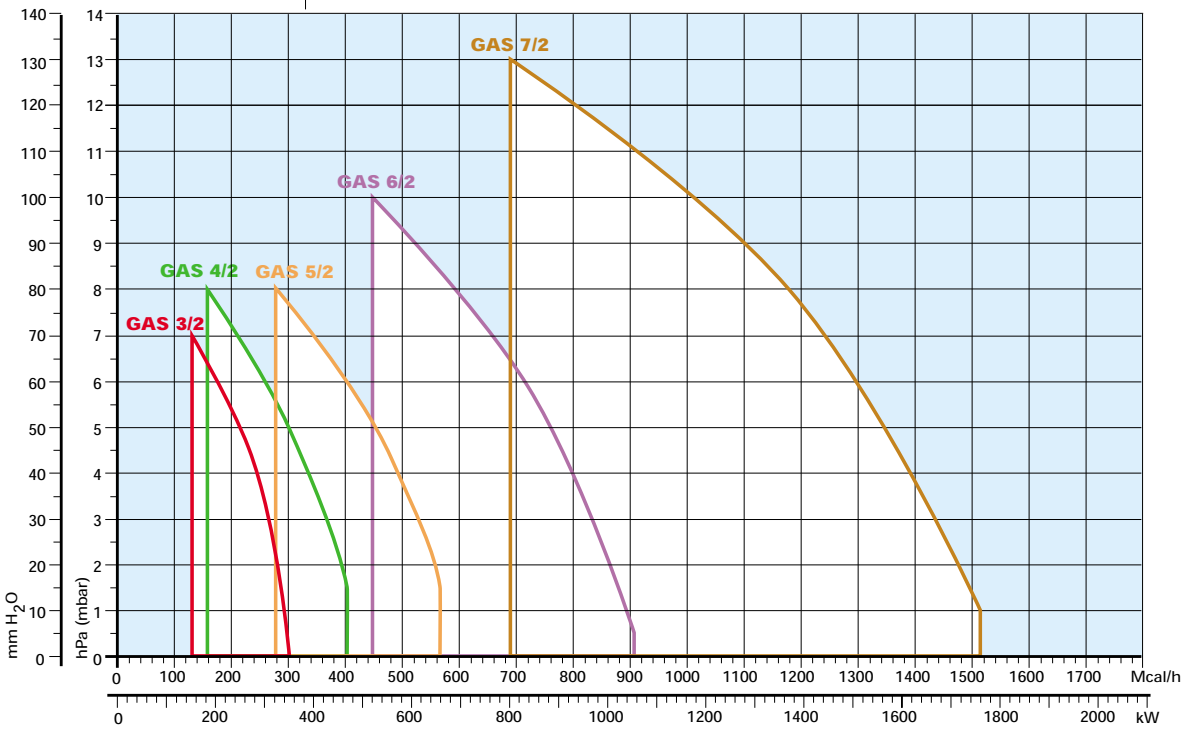
TECHNICAL DATA

	Model		GAS 3/2	GAS 4/2	GAS 5/2	GAS 6/2	GAS 7/2
	Burner operation mode		Two stage				
	Modulation ratio at max. output		2 ÷ 1				
	Servomotor type		LKS 210				
	Servomotor run time	s	5				
	Heat output	kW	80/130÷350	120/180÷470	155/320÷660	300/520÷1050	400/800÷1760
		Mcal/h	69/112÷301	104/155÷404	133/275÷568	258/447÷903	344/668÷1514
	Working temperature	°C min./max.	0/40				
Fuel / air data	Net calorific value gas G20	kWh/Nm³	10				
	Density gas G20	kg/Nm³	0,71				
	Output gas G20	Nm³/h	8/13÷35	12/18÷47	15,5/32÷66	30/52÷105	40/80÷176
	Net calorific value gas G25	kWh/Nm³	8,6				
	Density gas G25	kg/Nm³	0,78				
	Output gas G25	Nm³/h	9/15÷41	14/21÷55	18/37÷77	35/60,5÷122	46,5/93÷205
	Net calorific value LPG gas	kWh/Nm³	25,8				
	Density LPG gas	kg/Nm³	2,02				
	Output LPG gas	Nm³/h	3/5÷13,5	5/7÷18	6/12÷25,5	11,5/20÷41	15,5/31÷68
	Fan	Type	Centrifugal with forward curve blades				
	Air temperature	Max. °C	60				
Electrical data	Electrical supply	Ph/Hz/V	1/50/230~(±10%)		3N/50/230-400~(±10%) ⅄	3/50/230~(±10%) △	
	Auxiliary electrical supply	Ph/Hz/V	1/50/230 ~ (±10%)				
	Control box	Type	RMG				
	Total electrical power	kW	0,4	0,54	0,85	1,7	3,4
	Auxiliary electrical power	kW	0,15	0,17	0,1	0,2	0,4
	Protection level	IP	40				
	Motor electrical power	kW	0,25	0,37	0,75	1,5	3
	Rated motor current	A	1,8	2,9	2,85-1,65	5,9-3,4	10,9-6,3
	Motor start up current	A	4,8	9,5	10-6	22,5-13	55-32
	Motor protection level	IP	54				
	Ignition transformer	V1 - V2	230V - 1x8 kV				
		I1 - I2	1,8 A - 20 mA				
	Operation		Intermittent (at least one stop every 24 h)				
Emissions	Sound pressure	dBA	75	78	83	84	87
	Sound power	W	--				
	CO Emission	mg/kWh	< 100				
	NOx Emission	mg/kWh	< 170				
Approval	Directive		73/23 - 89/336 - 90/396 - 92/42 EEC				
	Conforming to		EN 676				
	Certification		CE 0085AQ0707				

Reference conditions:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.
Noise measured 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

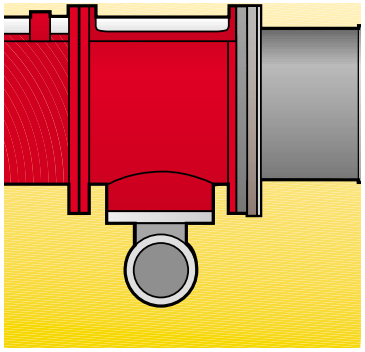
Test conditions conforming to EN 676:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.

FUEL SUPPLY

GAS TRAINS

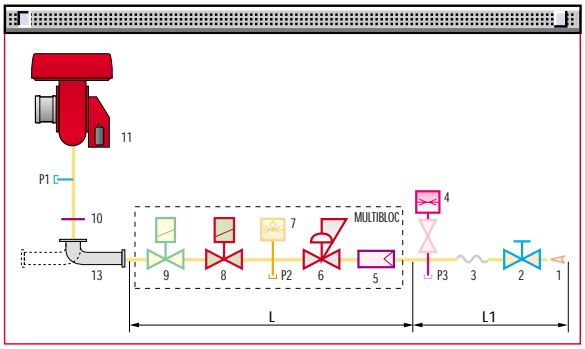
Fuel can be supplied either from the right or left hand sides.

The gas train can be selected to best fit system requirements depending on the fuel output and pressure in the supply line. The gas train can be "Multibloc " type (containing the main components in a single unit) or "Composed" type (assembly of the single components).

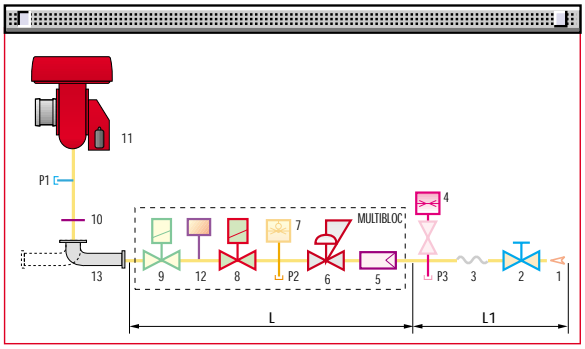


Example of the gas train connection flange of GAS/2 burners.

MULTIBLOC gas train without seal control

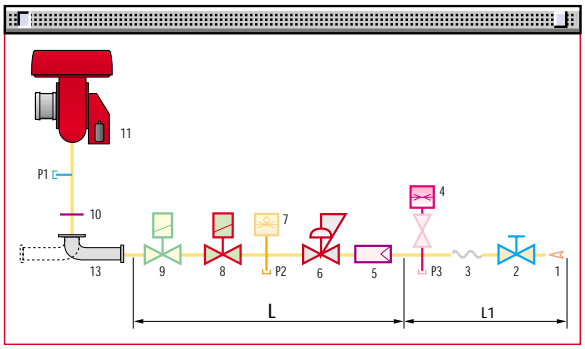


MULTIBLOC gas train with seal control

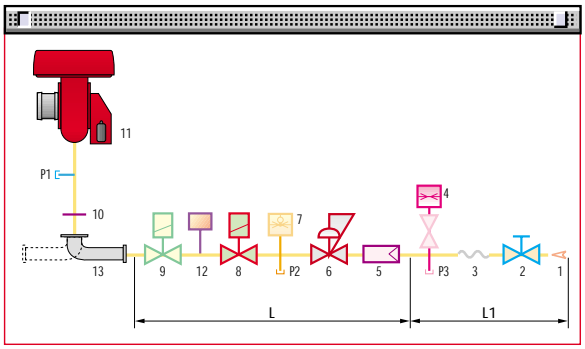


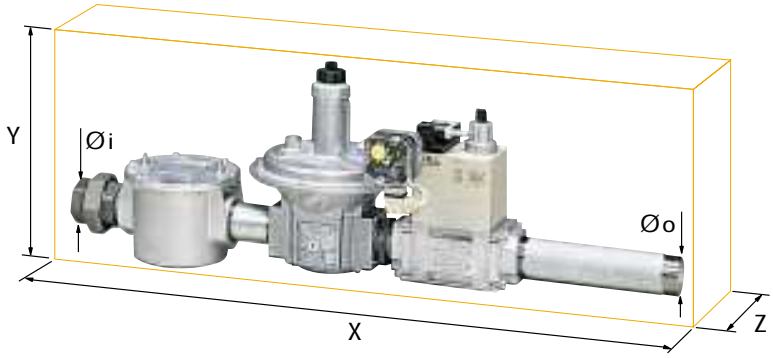
1	Gas input pipework
2	Manual valve
3	Anti-vibration joint
4	Pressure gauge with pushbutton cock
5	Filter
6	Pressure regulator (vertical)
7	Minimum gas pressure switch
8	VS safety solenoid (vertical)
9	VR regulation solenoid (vertical) Two settings: - firing output (rapid opening) - maximum output (slow opening)
10	Gasket and flange supplied with the burner
11	Burner
12	Seal control mechanism for valves 8-9. According to standard EN 676, the seal control is compulsory for burners with maximum output above 1200 kW.
13	Gas train-burner adapter
P1	Combustion head pressure
P2	Pressure downstream from the regulator
P3	Pressure upstream from the filter
L	Gas train supplied separately, with the code given in the table
L1	Installer's responsibility

COMPOSED gas train without seal control



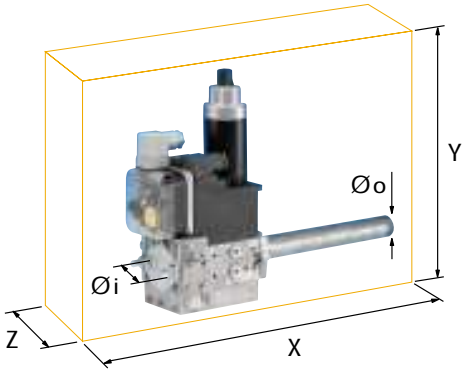
COMPOSED gas train with seal control





Example of gas train "COMPOSED" type without seal control

Example of gas train "MULTIBLOC" type without seal control



Gas trains are approved by standard EN 676 together with the burner.

The overall dimensions of the gas train depends on how they are constructed. The following table shows the maximum dimensions of the gas trains that can be fitted to GAS/2 burners, intake and outlet diameters and seal control if fitted.
Please note that the seal control can be installed as an accessory, if not already installed on the gas train.
The maximum gas pressure of gas train "Multibloc" type is 300 mbar, and that one of gas train "Composed" type is 500 mbar.

	Name	Code	Ø i	Ø o	X mm	Y mm	Z mm	Seal Control
MULTIBLOC GAS TRAINS	**MBZRDLE 407**	3970046	3/4"	3/4"	371	256	120	-
	MBZRDLE 410	3970079	1"	3/4"	405	315	145	-
	MBZRDLE 412	3970152	1"1/4	1"1/2	433	315	145	-
	MBZRDLE 415	3970183	1"1/2	1"1/2	523	350	100	-
	MBZRDLE 420	3970184	2"	2"	523	410	100	-
	MBZRDLE 420 CT	3970185	2"	2"	523	410	227	Incorporated
COMPOSED GAS TRAINS	**CB 40/2**	3970153	1"1/2	1"1/2	1013	345	195	-
	CB 50/2	3970154	2"	2"	1150	350	250	-
	CB 50/2 CT	3970166	2"	2"	1150	350	320	Incorporated
	CBF 65/2	3970155	DN 65	DN 65	1166	472	285	-
	CBF 65/2 CT	3970167	DN 65	DN 65	1166	472	390	Incorporated
	CBF 80/2	3970156	DN 80	DN 80	1246	470	285	-
	CBF 80/2 CT	3970168	DN 80	DN 80	1246	470	387	Incorporated

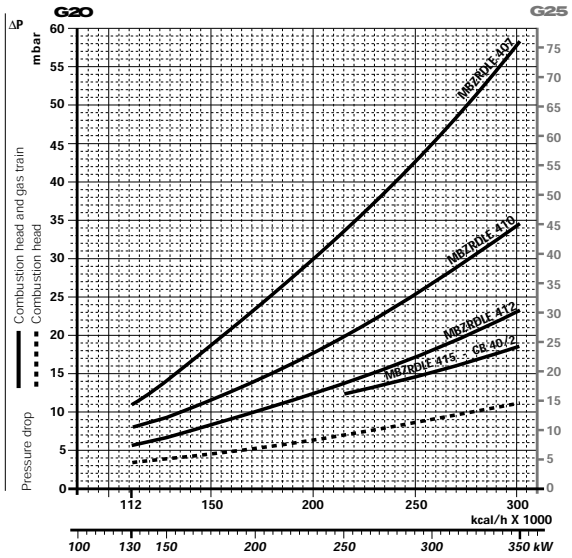
PRESSURE DROP DIAGRAMS

The diagrams indicate the minimum pressure drop of the burners with the various gas trains that can be matched with them; at the value of these pressure drop add the combustion chamber pressure.
The value thus calculated represents the minimum required input pressure to the gas train.

NATURAL GAS

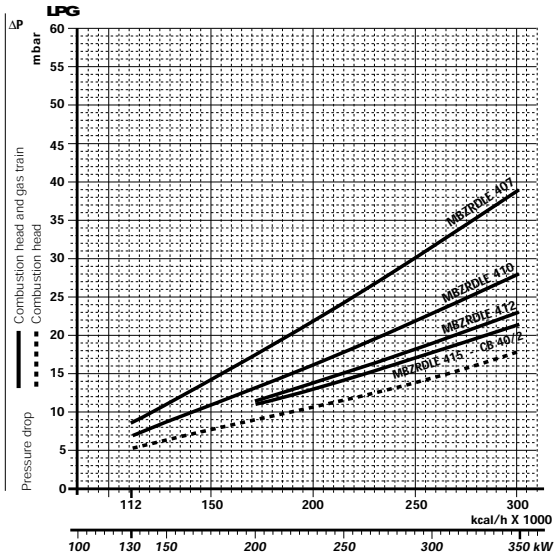
LPG

GAS 3/2

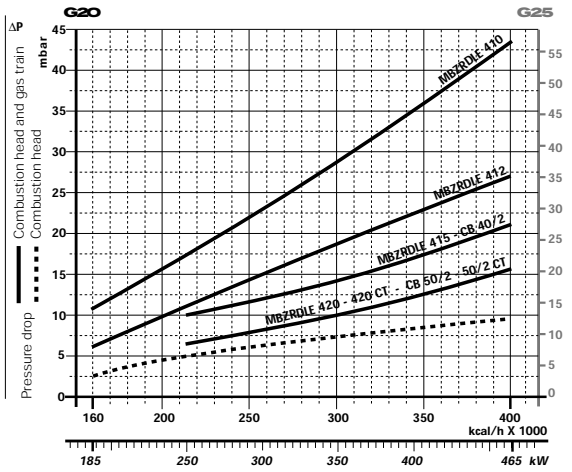


Gas train	Code	Adapter	Seal Control
MBZRDLE 407	3970046	3000824	Accessory
MBZRDLE 410	3970079	3000824	Accessory
MBZRDLE 412	3970152	-	Accessory
MBZRDLE 415	3970183	-	Accessory
CB 40/2	3970153	-	Accessory

GAS 3/2

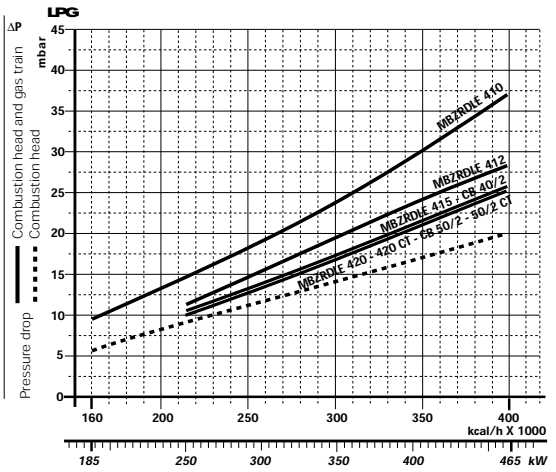


GAS 4/2



Gas train	Code	Adapter	Seal Control
MBZRDLE 410	3970079	3000824	Accessory
MBZRDLE 412	3970152	-	Accessory
CB 40/2	3970153	-	Accessory
MBZRDLE 415	3970183	-	Accessory

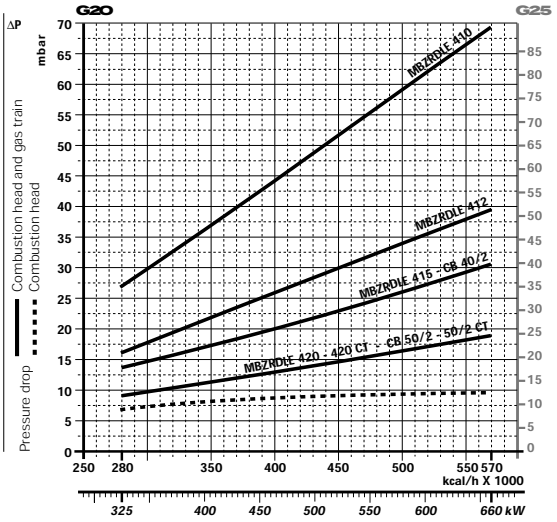
GAS 4/2



Gas train	Code	Adapter	Seal Control
CB 50/2	3970154	3000822	Accessory
CB 50/2 CT	3970166	3000822	Incorporated
MBZRDLE 420	3970184	3000822	Accessory
MBZRDLE 420 CT	3970185	3000822	Incorporated

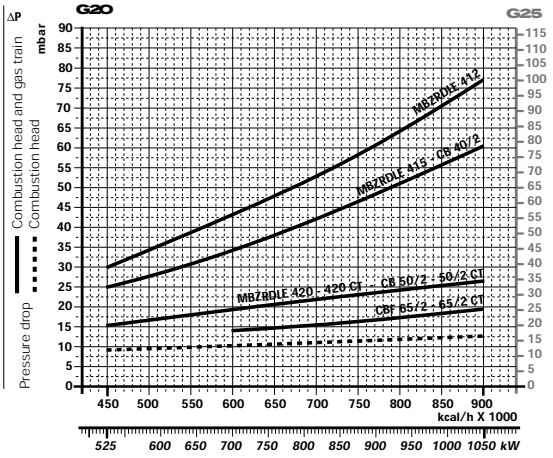
NATURAL GAS

GAS 5/2



Gas train	Code	Adapter	Seal Control
MBZRDLE 410	3970079	3000824	Accessory
MBZRDLE 412	3970152	-	Accessory
CB 40/2	3970153	-	Accessory
MBZRDLE 415	3970183	-	Accessory

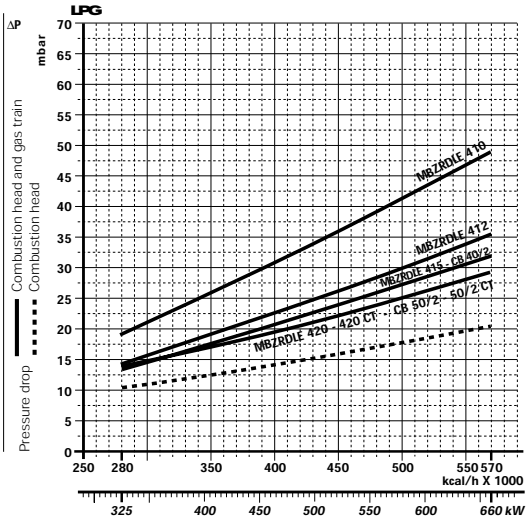
GAS 6/2



Gas train	Code	Adapter	Seal Control
MBZRDLE 410	3970079	3000824 3000843	Accessory
MBZRDLE 412	3970152	3000843	Accessory
CB 40/2	3970153	3000843	Accessory
MBZRDLE 415	3970183	-	Accessory
CB 50/2	3970154	-	Accessory

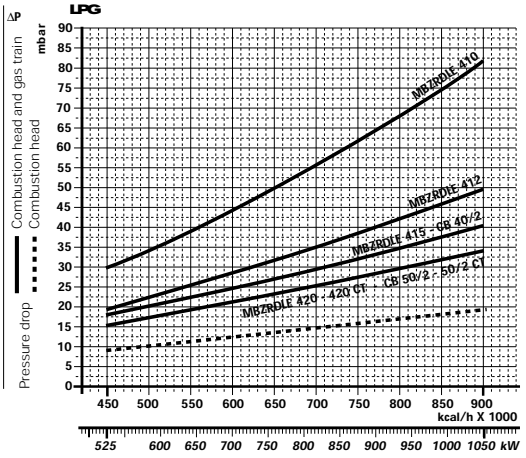
LPG

GAS 5/2



Gas train	Code	Adapter	Seal Control
CB 50/2	3970154	3000822	Accessory
CB 50/2 CT	3970166	3000822	Incorporated
MBZRDLE 420	3970184	3000822	Accessory
MBZRDLE 420 CT	3970185	3000822	Incorporated

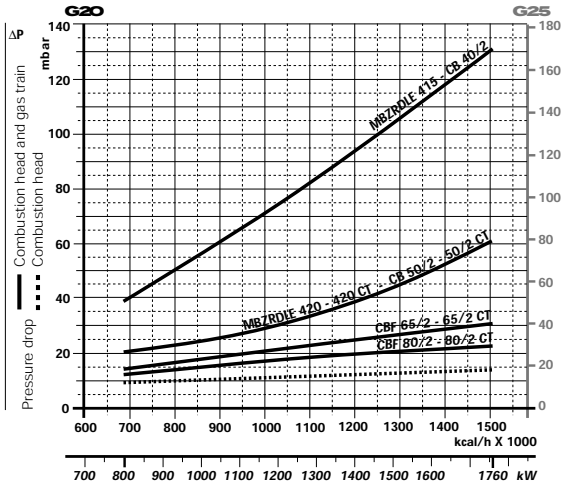
GAS 6/2



Gas train	Code	Adapter	Seal Control
CB 50/2 CT	3970166	-	Incorporated
MBZRDLE 420	3970184	3000822	Accessory
MBZRDLE 420 CT	3970185	3000822	Incorporated
CBF 65/2	3970155	3000825	Accessory
CBF 65/2 CT	3970167	3000825	Incorporated

NATURAL GAS

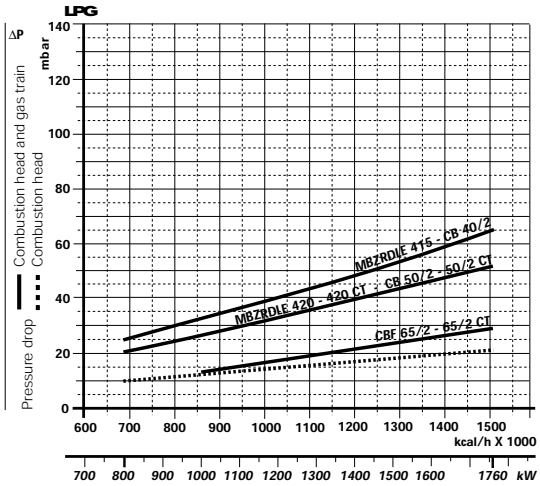
GAS 7/2



Gas train	Code	Adapter	Seal Control
CB 40/2	3970153	--	Accessory
MBZRDLE 415	3970183	--	Accessory
CB 50/2	3970154	3000822	Accessory
CB 50/2 CT	3970166	3000822	Incorporated
MBZRDLE 420	3970184	3000822	Accessory

LPG

GAS 7/2



Gas train	Code	Adapter	Seal Control
MBZRDLE 420 CT	3970185	3000822	Incorporated
CBF 65/2	3970155	3000825	Accessory
CBF 65/2 CT	3970167	3000825	Incorporated
CBF 80/2	3970156	3000826	Accessory
CBF 80/2 CT	3970168	3000826	Incorporated

note *Please contact the Riello Burner Technical Office for different pressure levels from those above indicated.*

SELECTING THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length. Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop of on the botton scale below (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

	- gas used	G25
	- gas output	9.51 mc/h
	- pressure at the gas meter	20 mbar
	- gas line length	15 m
	- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62} \right] = 15.34$ mc/h

- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;

- correct pressure = (20-1.4) = 18.6 mbar

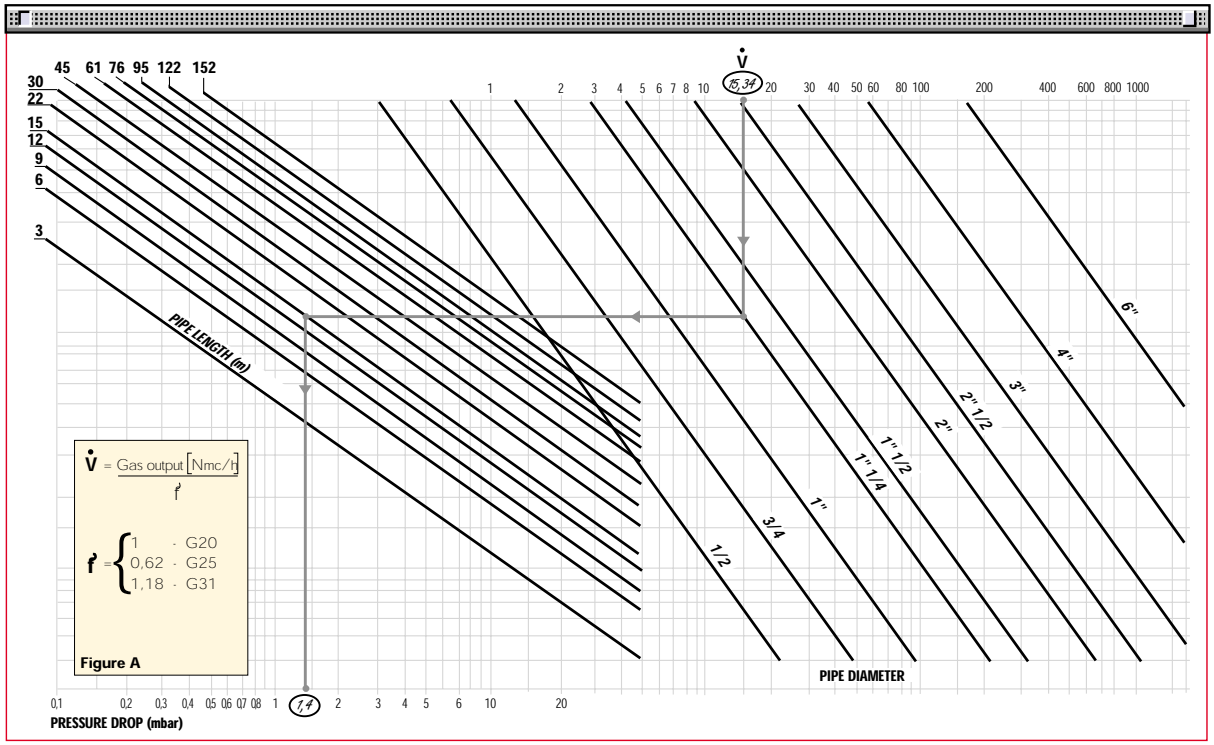


Figure A

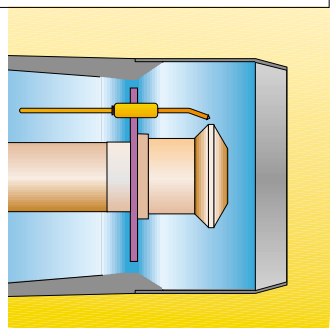
VENTILATION

The ventilation circuit of GAS/2 burners is inserted in a extremely compact structure and it is provided with a forward blades centrifugal fan, which guarantees high pressure levels at the required air deliveries and permits installation flexibility.
A servomotor adjust the air damper in relation to the fuel burnt.
When the burner is not operating the servomotor closes completely the air damper to reduce heat dispersion from the boiler.
A minimum air pressure switch stops the burner when there is an insufficient quantity of air at the combustion head.

Example of servomotor for air damper adjusting on GAS/2 series of burners

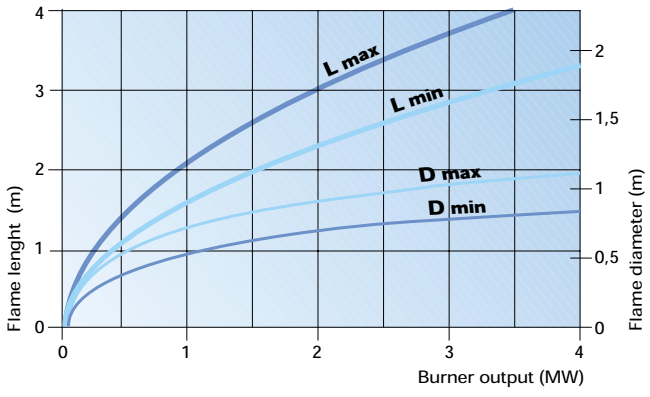
COMBUSTION HEAD

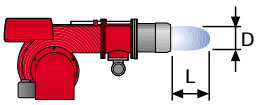
Different combustion head length can be selected for the various models of GAS/2 series of burners.
The choice depends on the thickness of the front panel and type of boiler. Correct head penetration into the combustion chamber depends on the type of heat generator.
These burners are equipped with adjustable combustion head.
This enables optimum combustion performance throughout the working field, ensuring peak combustion efficiency thus saving on fuel consumption.
The following diagram shows the flame dimensions in relation to the burner output. The lengths and diameter shown in the diagram below should be employed for a preliminary check: if combustion chamber dimensions are different from the values in the diagram, further tests need to be done.



Example of a GAS/2 burner combustion head

Flame dimensions





Example:
Burner thermal output = 2000 kW;
L flame (m) = 2,7 m (medium value);
D flame (m) = 0,8 m (medium value)

ADJUSTMENT

BURNER OPERATION MODE

On "two stage" operation, the burner gradually adapts the output to the requested level, by varying between two pre-set levels (see figure A).

Two stage operation

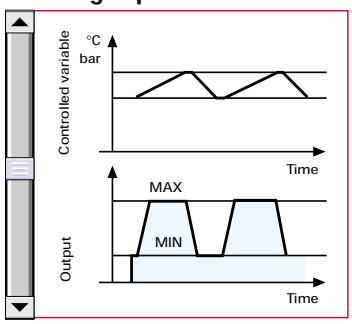


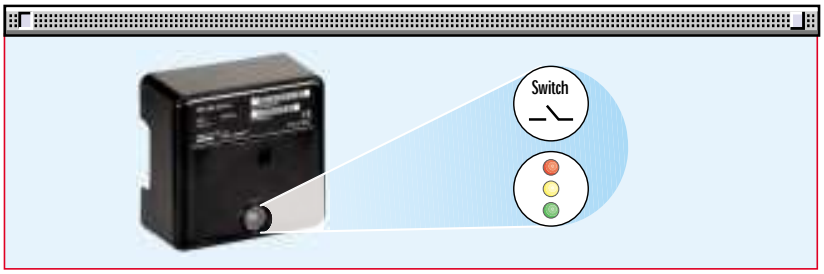
Figure A

All GAS/2 series burners are fitted with a new microprocessor control panel for the supervision during intermittent operation.
For helping the commissioning and maintenance work, there are two main elements:

The lock-out reset button is the central **operating element** for resetting the burner control and for activating / deactivating the diagnostic functions.

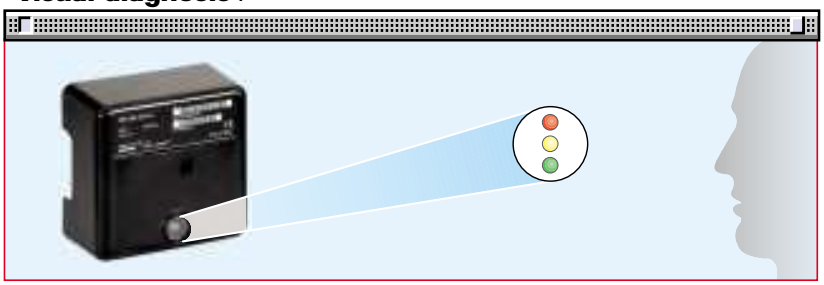
The multi-color LED is the central **indication element** for visual diagnosis and interface diagnosis.

Both elements are located under the transparent cover of lock-out reset button, as showed below.

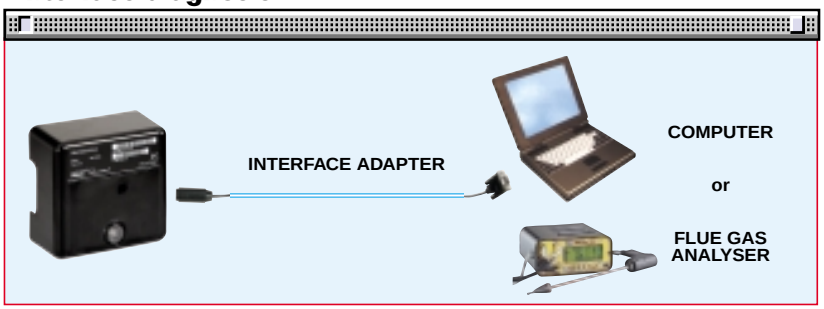


There are two diagnostic choices, for indication of operation and diagnosis of fault cause:

- **visual diagnosis** :



- **interface diagnosis** :



by the interface adapter and a PC with dedicated software or by a predisposed flue gas analyzer (see paragraph accessories).

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**

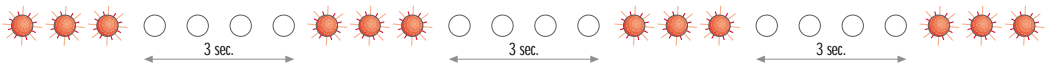
Diagnosis of fault causes :

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**

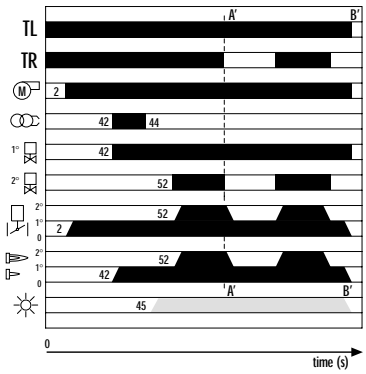


Error code table

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	● ● ●
Extraneous light or 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

GAS 3/2 - 4/2 - 5/2 - 6/2 - 7/2



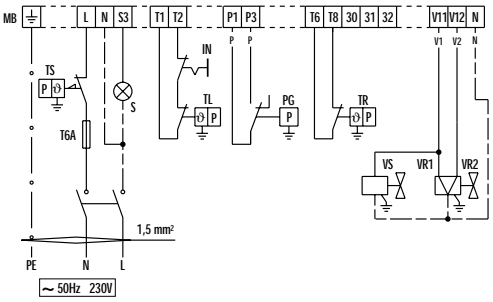
0 s The burner begins the firing cycle.
2 s The motor starts: pre-purge phase.
42 s Ignition electrode sparks; safety valve VS and the 1st stage VR1 of the adjustment valve VR open.
45 s Lock out signal is activated if flame is not revealed by the flame detector.
52 s Output can be increased by second stage valve VR2 and air damper opening; the start up cycle is concluded.

WIRING DIAGRAMS

Electrical connections must be made by qualified and skilled personnel, according to the local regulations.

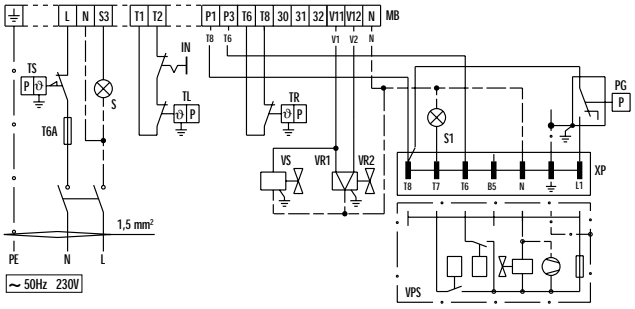
TWO STAGE OPERATION - Single-phase power supply

GAS 3/2 - 4/2 - without seal control



MB - Burner terminal board
TS - Safety thermostat
TL - Threshold thermostat
TR - High/low flame setting thermostat
PG - Minimum gas pressure switch
S - External lock-out signal
IN - Manual switch
T6A - 6A fuse
VR1 - 1st adjustment valve
VR2 - 2nd adjustment valve
VS - Safety valve

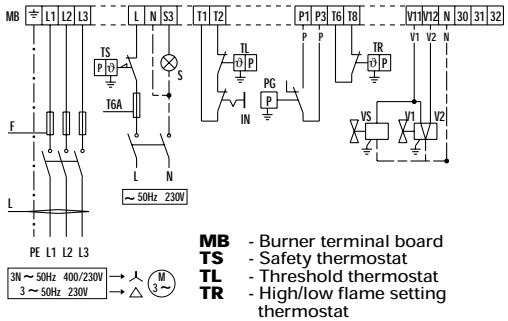
GAS 3/2 - 4/2 - with seal control



MB - Burner terminal board
TS - Safety thermostat
TL - Threshold thermostat
TR - High/low flame setting thermostat
PG - Minimum gas pressure switch
S - External lock-out signal
S1 - External lock-out signal on the seal control
IN - Manual switch
T6A - 6A fuse
VR1 - 1st adjustment valve
VR2 - 2nd adjustment valve
VS - Safety valve
VPS - Seal control
XP - Seal control plug

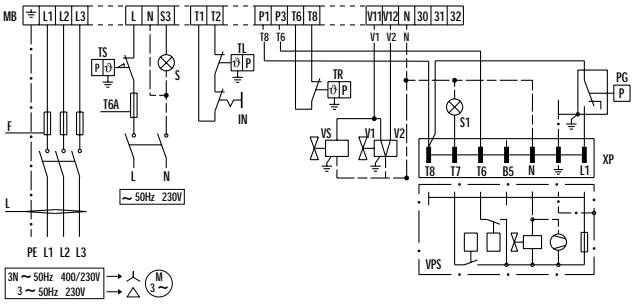
TWO STAGE OPERATION - Triple-phase power supply

GAS 5/2 - 6/2 - 7/2 - without seal control



MB - Burner terminal board
TS - Safety thermostat
TL - Threshold thermostat
TR - High/low flame setting thermostat
PG - Minimum gas pressure switch
S - External lock-out signal
IN - Manual switch
T6A - 6A fuse
F - Fuse (see table A)
L - Lead section (see table A)
VR1 - 1st adjustment valve
VR2 - 2nd adjustment valve
VS - Safety valve

GAS 5/2 - 6/2 - 7/2 - with seal control



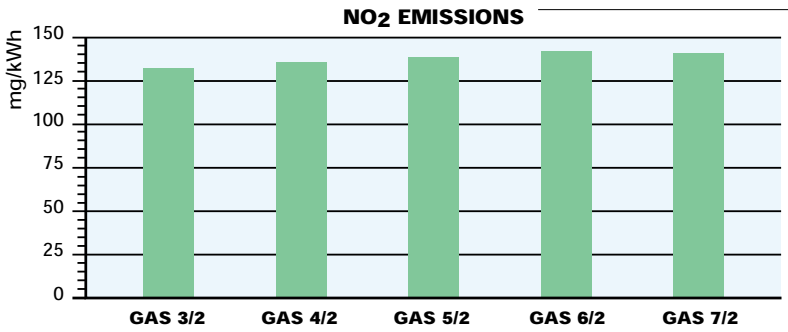
MB - Burner terminal board
TS - Safety thermostat
TL - Threshold thermostat
TR - High/low flame setting thermostat
PG - Minimum gas pressure switch
S - External lock-out signal
S1 - External lock-out signal on the seal control
IN - Manual switch
T6A - 6A fuse
F - Fuse (see table A)
L - Lead section (see table A)
VR1 - 1st adjustment valve
VR2 - 2nd adjustment valve
VS - Safety valve
VPS - Seal control
XP - Seal control plug

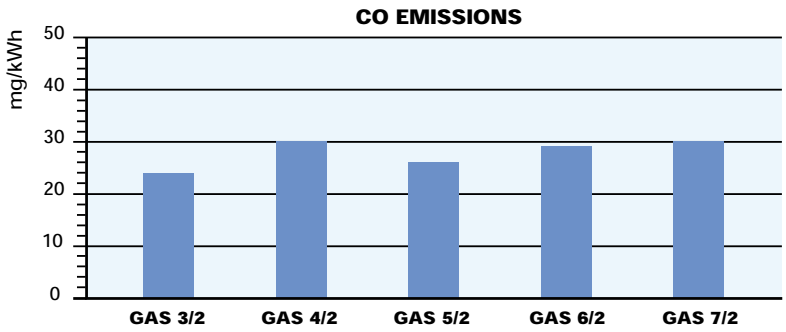
The following table shows the supply lead sections and the type of fuse to be used.

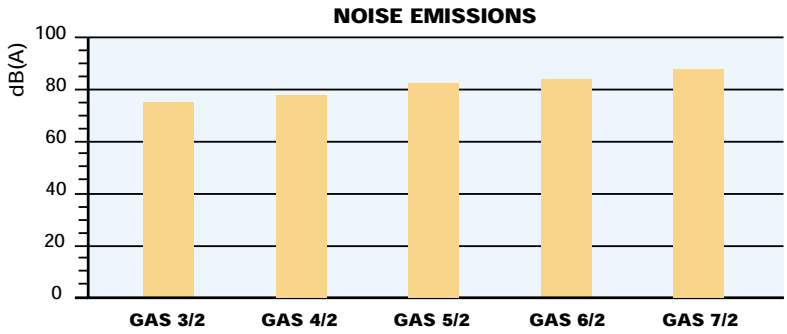
Model	GAS 3/2	GAS 4/2	GAS 5/2		GAS 6/2		GAS 7/2	
	230V	230V	230V	400V	230V	400V	230V	400V
F A	T6	T6	T6	T6	T16	T10	T25	T16
L mm²	1,5	1,5	1,5	1,5	1,5	1,5	2,5	1,5

Table A

EMISSIONS



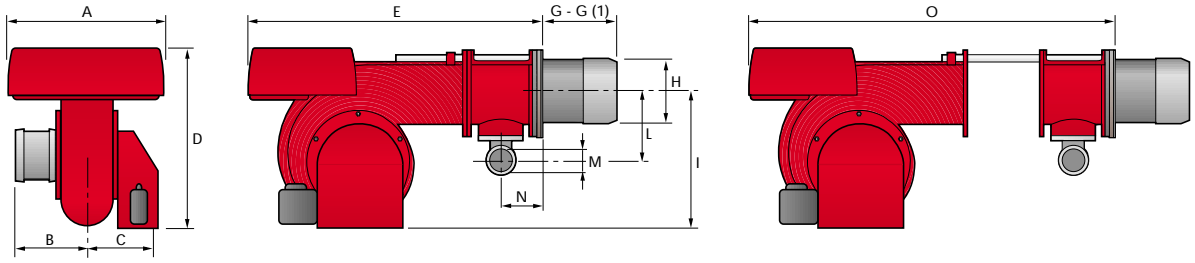




The emission data has been measured in the various models at maximum output, according to EN 676 standard.

OVERALL DIMENSIONS (mm)

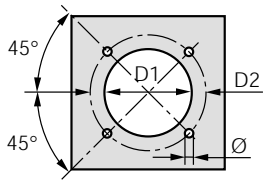
BURNERS



Model	A	B	C	D	E	G - G (1)	H	I	L	M	N	O
GAS 3/2	410	205	205	397	610	185 - 320	140	292	165	1"1/2	97	775
GAS 4/2	410	205	205	397	610	187 - 320	150	292	165	1"1/2	97	775
GAS 5/2	431	226	205	437	645	207 - 365	155	332	165	1"1/2	97	810
GAS 6/2	463	258	205	485	770	227 - 360	175	370	195	2"	131	966
GAS 7/2	606	358	248	590	920	240 - 400	220	445	245	2"	140	1142

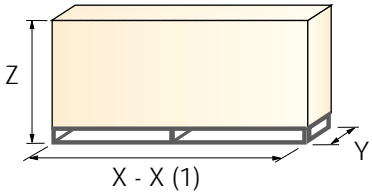
(1) Length with extended combustion head

BURNER - BOILER MOUNTING FLANGE



Model	D1	D2	Ø
GAS 3/2	155	226	M10
GAS 4/2	165	226	M10
GAS 5/2	165	226	M10
GAS 6/2	185	276	M12
GAS 7/2	230	325	M12

PACKAGING



Model	X - X (1)	Y	Z	kg
GAS 3/2	850	545	473	34
GAS 4/2	850	545	473	40
GAS 5/2	895	543	520	43
GAS 6/2	1045	543	555	60
GAS 7/2	1245	727	665	98

(1) Length with extended combustion head

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel.
All operations must be performed in accordance with the technical handbook supplied with the burner.

BURNER SETTING

- All the burners have slide bars, for easier installation and maintenance.
- After drilling the boilerplate, using the supplied gasket as a template, dismantle the blast tube from the burner and fix it to the boiler.
- Adjust the combustion head.
- Fit the gas train, choosing this on the basis of the maximum output of the boiler and considering the enclosed diagrams.
- Refit the burner casing to the slide bars.
- Close the burner, sliding it up to the flange.

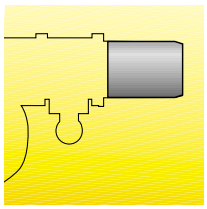
ELECTRICAL CONNECTIONS AND START UP

- Make the electrical connections to the boiler following the wiring diagrams included in the instruction handbook.
- Turn the motor to check rotation direction (if it is a three-phase motor).
- Perform a first ignition calibration on the gas train.
- On start up, check:
  - Gas pressure at the combustion head (to max. and min. output)
  - Combustion quality, in terms of unburned substances and excess air.

BURNER ACCESSORIES

Extended head kit

"Standard head" burners can be transformed into "extended head" versions, by using the special kit. The KITS available for the various burners, giving the original and the extended lengths, are listed below.



Extended head kit			
Burner	**Standard head length (mm)**	**Extended head length (mm)**	**Kit code**
GAS 3/2	185	320	**3000605**
GAS 4/2	187	320	**3000606**
GAS 5/2	207	365	**3000607**
GAS 6/2	227	360	**3000608**
GAS 7/2	240	400	**3000678**

Spacer kit

If burner head penetration into the combustion chamber needs reducing, varying thickness spacers are available, as given in the following table:

Spacer kit		
Burner	**Spacer thickness S (mm)**	**Kit code**
GAS 3/2 - 4/2 - 5/2 - 6/2	142	**3000755**
GAS 7/2	102	**3000722**

Continuous ventilation kit

If the burner requires continuous ventilation in the stages without flame, a special kit is available as given in the following table:

Continuous ventilation kit	
Burner	**Kit code**
GAS 3/2 - 4/2 - 5/2 - 6/2 - 7/2	**3010030**

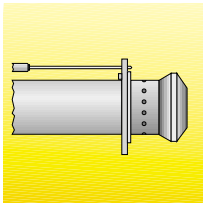
Sound proofing box

If noise emission needs reducing even further, sound-proofing boxes are available, as given in the following table:

Sound proofing box		
Burner	**Box type**	**Box code**
GAS 3/2 - 4/2 - 5/2	C2	**3000777**
GAS 6/2	C3	**3000778**
GAS 7/2	C4	**3000779**

LPG kit

For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner, as given in the following table:



LPG kit		
Burner	**Kit code for standard head**	**Kit code for extended head**
GAS 3/2	**3000657**	**3000807**
GAS 4/2	**3000658**	**3000808**
GAS 5/2	**3000659**	**3000809**
GAS 6/2	**3000753**	**3000810**
GAS 7/2	**3000806**	**3000811**

Interface adapter kit

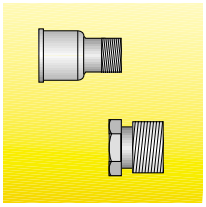
To connect the flame control panel to a personal computer for the transmission of operation, fault signals and detailed service information, an interface adapter with PC software are available.

Interface adapter	
Burner	**Kit code**
GAS 3/2 - 4/2 - 5/2 - 6/2 - 7/2	**in progress**

GAS TRAIN ACCESSORIES

Adapters

When the diameter of the gas train is different from the set diameter of the burners, an adapter must be fitted between the gas train and the burner. The following table lists the adapters for various burners.



Adapters			
Burner	**Gas train**	**Dimensions**	**Adapter code**
GAS 3/2	MBZRDLE 407 - 410	3/4" 1" 1/2	**3000824**
GAS 4/2	MBZRDLE 410	3/4" 1" 1/2	**3000824**
	MBZRDLE 420 - CB 50/2	2" 1" 1/2	**3000822**
GAS 5/2	MBZRDLE 410	3/4" 1" 1/2	**3000824**
	MBZRDLE 420 - CB 50/2	2" 1" 1/2	**3000822**
GAS 6/2	MBZRDLE 410	3/4" 1" 1/2 1" 1/2 2"	**3000824** **3000843**
	MBZRDLE 412 - 415 - CB 40/2	1" 1/2 2"	**3000843**
	CBF 65/2	DN 65 2"1/2 1" 1/2 2"	**3000825**
GAS 7/2	MBZRDLE 415 - CB 40/2	1" 1/2 2"	**3000843**
	CBF 65/2	DN 65 2"1/2 1" 1/2 2"	**3000825**
	CBF 80/2	DN 80 2"1/2 2"	**3000826**

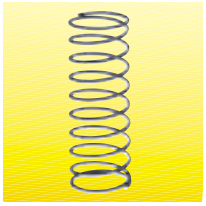
Seal control kit

To test the valve seals on the gas train, a special "seal control kit" is available. The valve seal control device is compulsory (EN 676) on gas trains to burners with a maximum output over 1200 kW. The sealing control is type VPS 504.

Seal control kit		
Burner	**Gas train**	**Kit code**
GAS 3/2	MBZRDLE 407 - 410 - 412	**3010123**
	MBZRDLE 415 - CB 40/2	**3010125**
GAS 4/2	MBZRDLE 410 - 412	**3010123**
	MBZRDLE 415 - 420 - CB 40/2 - 50/2	**3010125**
GAS 5/2	MBZRDLE 410 - 412	**3010123**
	MBZRDLE 415 - 420 - CB 40/2 - 50/2	**3010125**
GAS 6/2	MBZRDLE 410 - 412	**3010123**
	MBZRDLE 415 - 420 - CB 40/2 - 50/2 - CBF 65/2	**3010125**
GAS 7/2	MBZRDLE 415 - 420 CB 40/2 - 50/2 - CBF 65/2 - 80/2	**3010125**

Stabiliser spring

Accessory springs are available to vary the pressure range of the gas train stabilisers. The following table shows these accessories with their application range



Stabiliser springs		
Gas train	**Spring**	**Code**
CBF 65/2 - CBF 80/2	Red from 25 to 55 mbar	**3010133**
CBF 65/2 - CBF 80/2	Black from 60 to 110 mbar	**3010135**
CBF 65/2 - CBF 80/2	Pink from 90 to 150 mbar	**3090456**

Please refer to the technical manual for the correct choice of spring.

SPECIFICATION

A specific index guides your choice of burner from the various models available in the RS series.
Below is a clear and detailed specification description of the product.

DESIGNATION OF SERIES

Series : GAS

Size

Operation :
- ... One stage
- /2 Two stage
- P/M Modulating

Emission : ... Class 1 EN267 - EN676

Head :
- TC Standard head
- TL Extended head

Flame control system:
- FS1 Standard (1 stop every 24 h)
- FS2 Continuous working (1 stop every 72 h)

Electrical supply to the system :

1/230/50	1/230V/50Hz
1/210/60	1/210V/60Hz
1/220/60	1/220V/60Hz
3/230-400/50	3/230V/50Hz - 3N/400V/50Hz
3/210/60	3/210V/60
3/220-380/60	3/220V/60Hz - 3N/380V/60Hz

Auxiliary voltage :

230/50	230V/50Hz
220/60	220V/60Hz
120/50-60	120V/50-60Hz

GAS	7	/2		TC	FS1	3/230-400/50	230/50
BASIC DESIGNATION							
EXTENDED DESIGNATION							

AVAILABLE BURNER MODELS

GAS 3/2	TC	FS1	1/210/60	120/50-60
GAS 3/2	TC	FS1	1/220/60	220/60
GAS 3/2	TC	FS1	1/230/50	230/50
GAS 4/2	TC	FS1	1/230/50	230/50
GAS 4/2	TC	FS1	1/210/60	120/50-60
GAS 4/2	TC	FS1	3/220-380/60	220/60
GAS 5/2	TC	FS1	3/210/60	120/50-60
GAS 5/2	TC	FS1	3/220-380/60	220/60
GAS 5/2	TC	FS1	3/230-400/50	230/50
GAS 6/2	TC	FS1	3/210/60	120/50-60
GAS 6/2	TC	FS1	3/220-380/60	220/60
GAS 6/2	TC	FS1	3/230-400/50	230/50
GAS 7/2	TC	FS1	3/210/60	120/50-60
GAS 7/2	TC	FS1	3/220-380/60	220/60
GAS 7/2	TC	FS1	3/230-400/50	230/50

Other versions are available on request.

PRODUCT SPECIFICATION

Burner:

Monoblock forced draught gas burner with two stage operation, fully automatic, made up of:
- Air suction circuit
- Fan with forward curve blades high performance concerning pressure and air delivery
- Air damper for air setting controlled by servomotor
- Fan pressure test point
- Starting motor at 2800 rpm
- Combustion head, that can be set on the basis of required output, fitted with:
    - stainless steel end cone, resistant to corrosion and high temperatures
    - ignition electrodes
    - ionisation probe
    - gas distributor
    - flame stability disk
- Minimum air pressure switch stops the burner in case of insufficient air quantity at the combustion head
- Microprocessor-based flame control panel with diagnostic functions
- Terminal strip for electrical connections
- Slide bars for easier installation and maintenance
- Protection filter against radio interference
- IP 44 electric protection level.

Gas train
Fuel supply line, in the MULTIBLOC configuration (from a diameter of 3/4″ until a diameter 2″) or COMPOSED configuration (from a diameter of DN 40 until a diameter of DN 80), fitted with:
- Filter
- Stabiliser
- Minimum gas pressure switch
- Safety valve
- Two stage working valve with ignition gas output regulator.

Conforming to:
- 89/336/EEC directive (electromagnetic compatibility)
- 73/23/EEC directive (low voltage)
- 92/42/EEC directive (performance)
- 90/396/EEC directive (gas)
- EN 676 (gas burners).

Standard equipment:
- 1 gas train gasket
- 1 flange gasket
- 4 screws for fixing the flange
- 1 thermal screen
- 4 screws for fixing the burner flange to the boiler
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- Extended head kit
- Spacer kit
- Continuous ventilation kit
- Sound-proofing box
- LPG kit
- Gas train adapter
- Seal control kit
- Stabiliser spring
- Interface adapter kit.

Lineagrafica

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Internet: http://www.riellobumers.com - E-mail: rburners@riellobumers.com

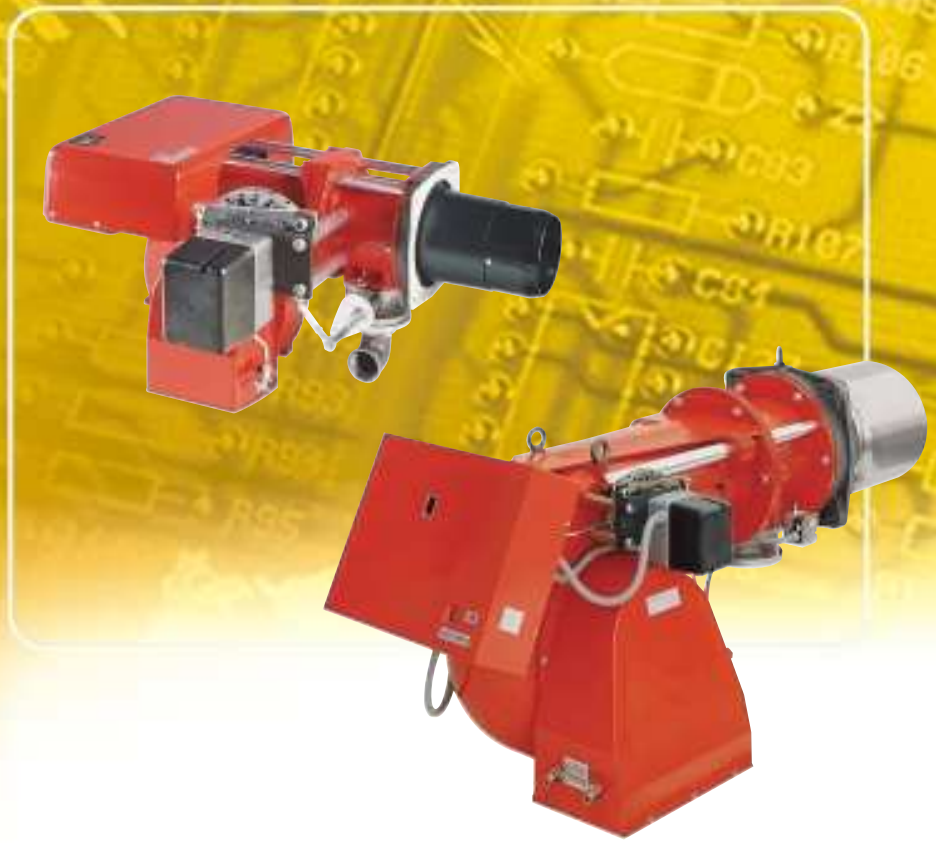
ISO 9001 Cert. n. 0061

RIELLO BURNERS

CE

MODULATING GAS BURNERS

GAS P/M SERIES		
GAS 3 P/M	80/130 ÷	350 kW
GAS 4 P/M	120/180 ÷	470 kW
GAS 5 P/M	155/320 ÷	660 kW
GAS 6 P/M	300/520 ÷	1050 kW
GAS 7 P/M	400/800 ÷	1760 kW
GAS 8 P/M	640/1162 ÷	2210 kW
GAS 9 P/M	870/1744 ÷	3488 kW
GAS 10 P/M	1140/2441 ÷	4885 kW



The GAS P/M series cover a firing range from 80 to 4885 kW.
Operation is featured by progressive two stage operation or full modulation, with an advanced modulating control system and probes.
The burners of GAS P/M series are well suited for applications requiring versatility of control (process, steam, refrigerating absorption) where a variable output is needed.
Due to their metal sheet structures, they are specifically suitable for process applications where plastic materials could be easily damaged or deformed.
Simplified maintenance is achieved by sliding bars which permit the access to the combustion head without need of removing the burner from the boiler.

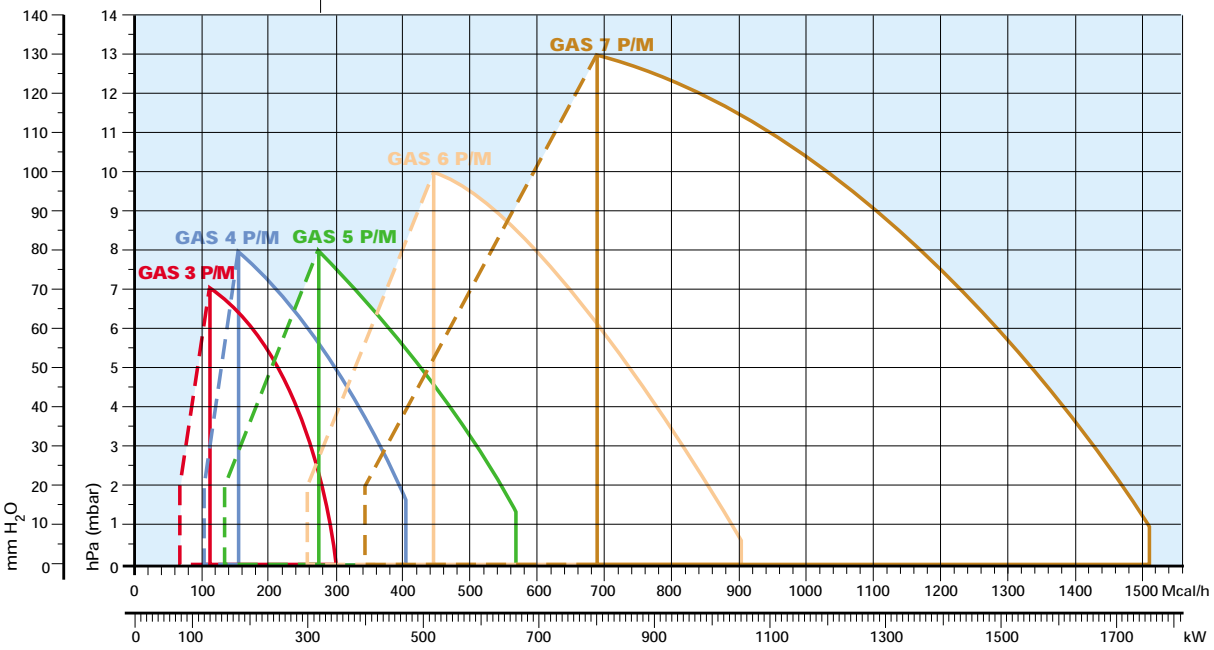
TECHNICAL DATA

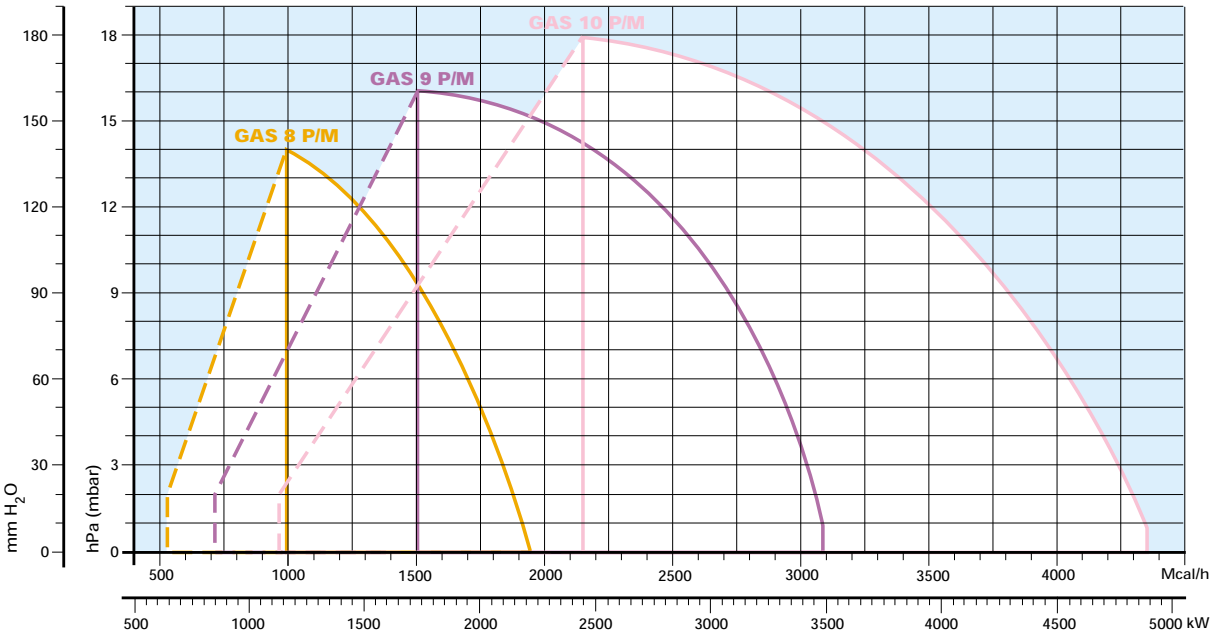
	Model		GAS 3 P/M	GAS 4 P/M	GAS 5 P/M	GAS 6 P/M	GAS 7 P/M	GAS 8 P/M	GAS 9 P/M	GAS 10 P/M
	Burner operation mode		Modulating (with regulator and probes accessories) or Two stage progressive							
	Modulation ratio at max. output		4 ÷ 1							
	Servo-motor Type		SQM 10							
	Servo-motor Run time	s	42							
	Heat output	kW	80/130÷350	120/180÷470	155/320÷660	300/520÷1050	400/800÷1760	640/1162÷2210	870/1744÷3488	1140/2441÷4885
		Mcal/h	69/112÷301	104/155÷404	133/275÷568	258/447÷903	344/688÷1514	550/1000÷1900	750/1500÷3000	980/2100÷4200
	Working temperature	°C min./max.	0/40							
Fuel / air data	Net calorific value G20 gas	kWh/Nm³	10							
Fuel / air data	G20 gas density	kg/Nm³	0,71							
Fuel / air data	G20 gas delivery	Nm³/h	8/13÷35	12/18÷47	15,5/32÷66	30/52÷105	40/80÷176	64/116,3÷221	87/174,4÷348,8	114/244,1÷488,5
Fuel / air data	Net calorific value G25 gas	kWh/Nm³	8,6							
Fuel / air data	G25 gas density	kg/Nm³	0,78							
Fuel / air data	G25 gas delivery	Nm³/h	9,3/15,1÷40,7	13,9/20,9÷54,6	18/37,2÷76,7	34,8/60,4÷122	46,5/92,9÷204,4	74,3/135÷256,7	101,1/202,6÷405,1	132,4/283,5÷567,4
Fuel / air data	Net calorific value LPG gas	kWh/Nm³	29,2							
Fuel / air data	LPG gas density	kg/Nm³	2,16							
Fuel / air data	LPG gas delivery	Nm³/h	2,7/4,5÷12	4,1/6,2÷16,1	5,3/11÷22,6	10,3/17,8÷36	13,7/27,4÷60,3	21,9/39,9÷75,8	29,8/59,8÷119,6	39,1/83,7÷167,5
Fuel / air data	Fan	type	Centrifugal with forward curve blades							
Fuel / air data	Air temperature	max. °C	60							
Electrical data	Electrical supply	Ph/Hz/V	1/50/230 (±10%)		3N/50/400-230 (±10%)					
Electrical data	Auxiliary electrical supply	Ph/Hz/V	1/50/230 (±10%)							
Electrical data	Control box	type	LANDIS LFL 1.333							
Electrical data	Total electrical power	kW	0,4	0,54	0,85	1,7	3,4	5	9	14
Electrical data	Auxiliary electrical power	kW	0,15	0,17	0,1	0,2	0,4	1	1,5	2
Electrical data	Protection level	IP	40							
Electrical data	Motor electrical power	kW	0,25	0,37	0,75	1,5	3	4	7,5	12
Electrical data	Rated motor current	A	1,8	2,9	2,85 - 1,65	5,9 - 3,4	8 - 13,5	9,5 - 16,4	17,5 - 30	26 - 45
Electrical data	Motor start up current	A	4,8	9,5	10 - 6	22,5 - 13	51 - 86	48 - 83	113 - 195	151 - 261
Electrical data	Motor protection level	IP	44				55			
Electrical data	Ignition transformer	type	--							
Electrical data		V1 - V2	230V - 1x8 kV							
Electrical data		I1 - I2	1,8A - 30 mA							
Electrical data	Operation		Intermittent (at least one stop every 24 h) - Continuous (at least one stop every 72 h)							
Emissions	Sound pressure	dB(A)	74,6	78	83,8	83,7	84,8	85,9	89,4	90
Emissions	Sound output	W	--							
Emissions	CO emission	mg/kWh	< 60							
Emissions	NOx emission	mg/kWh	< 120							
Approval	Directive		90/396 - 89/336 - 73/23 - 92/42 EEC							
Approval	Conforming to		EN 676							
Approval	Certification		CE 0085AQ0710					CE 0085AP0941	CE 0085AP0942	CE 0085AP0943

Reference conditions:
Temperature: 20°C
Pressure: 1013,5 mbar
Altitude: 100 m a.s.l.
Noise measured 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

Modulation range

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

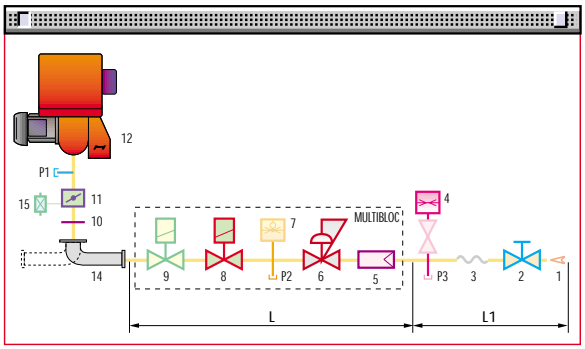
FUEL SUPPLY

GAS TRAIN

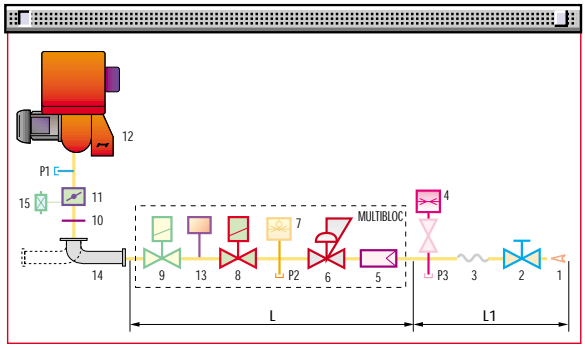
The burners are fitted with a butterfly valve to regulate the fuel, controlled by a variable profile cam servomotor. Fuel can be supplied either from the right or left hand sides, on the basis of the application requirments. A maximum gas pressure switch stops the burner in case of an excess of pressure in fuel line.
The gas train can be selected to best fit system requirements depending on the fuel output and pressure in the supply line. The gas train can be "Multibloc" type (containing the main components in a single unit) or "Composed" type (assembly of the single components).

Example of the variable profile cam on GAS 3-4-5-6-7 P/M burners.

MULTIBLOC gas train without seal control

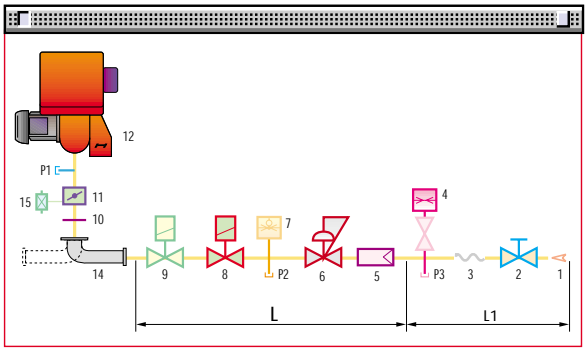


MULTIBLOC gas train with seal control

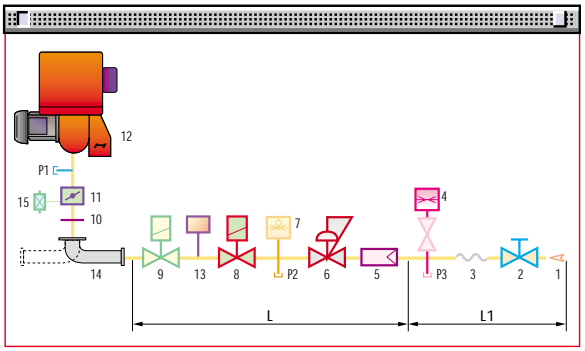


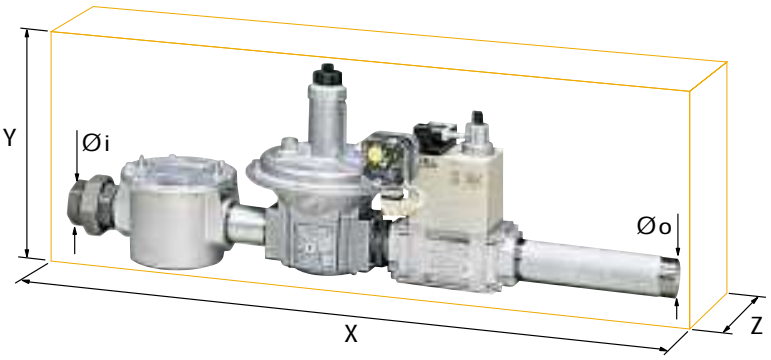
1	Gas input pipework
2	Manual valve
3	Anti-vibration joint
4	Pressure gauge with pushbutton cock.
5	Filter
6	Pressure regulator (vertical)
7	Minimum gas pressure switch
8	VS safety solenoid (vertical)
9	VR regulation solenoid (vertical) Two settings: - firing output (rapid opening) - maximum output (slow opening)
10	Gasket and flange supplied with the burner
11	Gas adjustment butterfly valve
12	Burner
13	Seal control mechanism for valves 8-9. According to standard EN 676, the seal control is compulsory for burners with maximum output above 1200 kW.
14	Gas train-burner adapter.
15	Maximum gas pressure switch
P1	Combustion head pressure
P2	Pressure downstream from the regulator
P3	Pressure upstream from the filter
L	Gas train supplied separately, with the code given in the table
L1	Installer' s responsibility

COMPOSED gas train without seal control



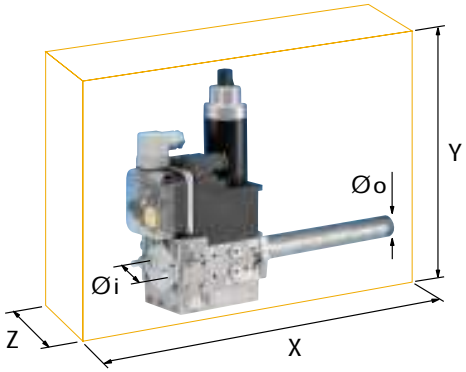
COMPOSED gas train with seal control





Example of gas train "COMPOSED" type without seal control

Example of gas train "MULTIBLOC" type without seal control



Gas trains are approved by standard EN 676 together with the burner.

The overall dimensions of the gas train depends on how they are constructed. The following table shows the maximum dimensions of the gas trains that can be fitted to GAS P/M burners, intake and outlet diameters and seal control if fitted.
Please note that the seal control can be installed as an accessory, if not already installed on the gas train.
The maximum gas pressure of gas train "Multibloc" type is 300 mbar, and that one of gas train "Composed" type is 500 mbar.

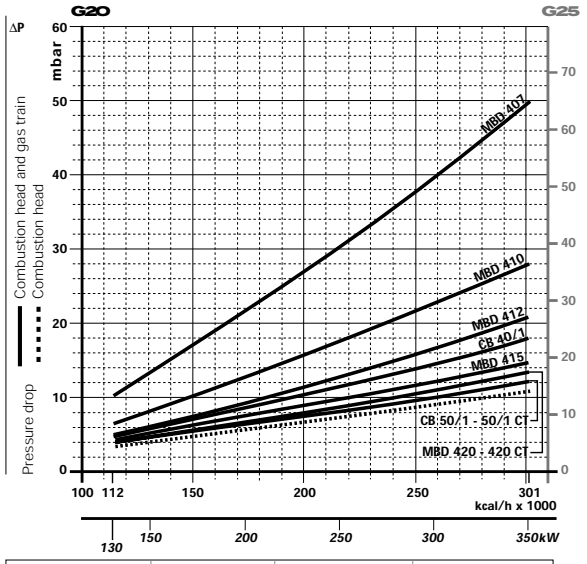
	Name	Code	Ø i	Ø o	X mm	Y mm	Z mm	Seal Control
MULTIBLOC GAS TRAINS	**MBD 407**	3970076	3/4"	3/4"	371	196	120	-
	MBD 410	3970077	1"	3/4"	405	217	145	-
	MBD 412	3970144	1"1/4	1"1/2	433	217	145	-
	MBD 415	3970180	1"1/2	1"1/2	523	250	100	-
	MBD 420	3970181	2"	2"	523	300	100	-
	MBD 420 CT	3970182	2"	2"	523	300	227	Incorporated
COMPOSED GAS TRAINS	**CB 40/1**	3970145	1"1/2	1"1/2	891	261	195	-
	CB 50/1	3970146	2"	2"	986	328	250	-
	CB 50/1 CT	3970160	2"	2"	986	328	320	Incorporated
	CBF 65/1	3970147	DN 65	DN 65	874	356	285	-
	CBF 65/1 CT	3970161	DN 65	DN 65	874	356	285	Incorporated
	CBF 80/1	3970148	DN 80	DN 80	934	416	285	-
	CBF 80/1 CT	3970162	DN 80	DN 80	934	416	285	Incorporated
	CBF 100/1	3970149	DN 100	DN 100	1054	501	350	-
	CBF 100/1 CT	3970163	DN 100	DN 100	1054	501	350	Incorporated

PRESSURE DROP DIAGRAM

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

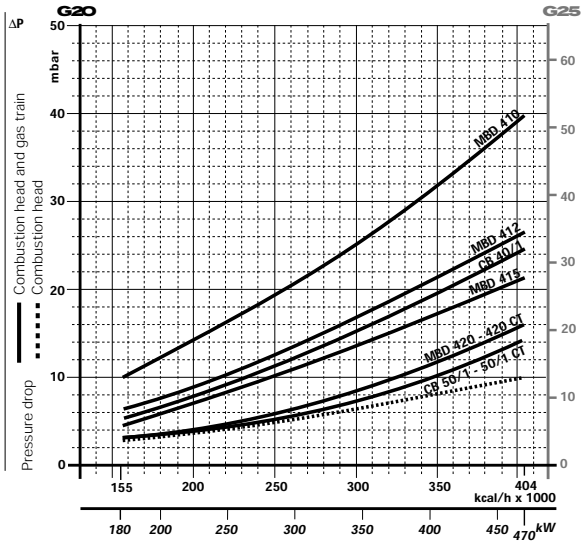
NATURAL GAS

GAS 3 P/M



Gas train	Code	Adapter	Seal Control
MBD 407	3970076	3000824	Accessory
MBD 410	3970077	3000824	Accessory
MBD 412	3970144	-	Accessory
MBD 415	3970180	-	Accessory
MBD 420	3970181	3000822	Accessory

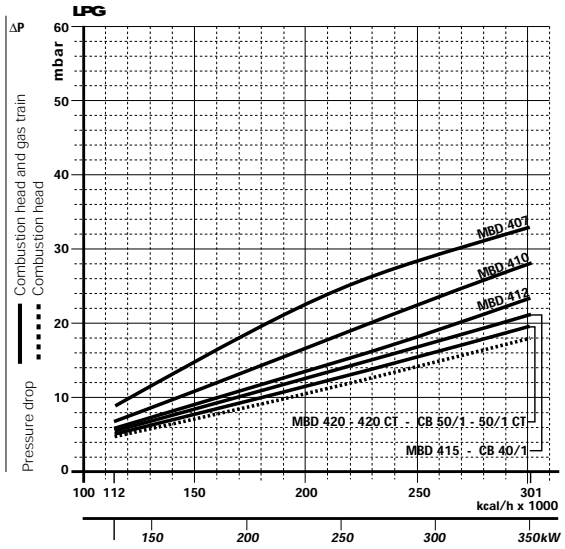
GAS 4 P/M



Gas train	Code	Adapter	Seal Control
MBD 410	3970077	3000824	Accessory
MBD 412	3970144	-	Accessory
MBD 415	3970180	-	Accessory
MBD 420	3970181	3000822	Accessory

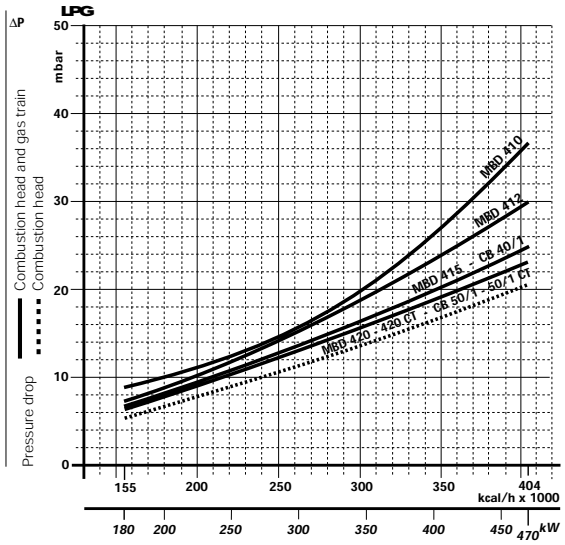
LPG

GAS 3 P/M



Gas train	Code	Adapter	Seal Control
MBD 420 CT	3970182	3000822	Incorporated
CB 40/1	3970145	-	Accessory
CB 50/1	3970146	3000822	Accessory
CB 50/1 CT	3970160	3000822	Incorporated

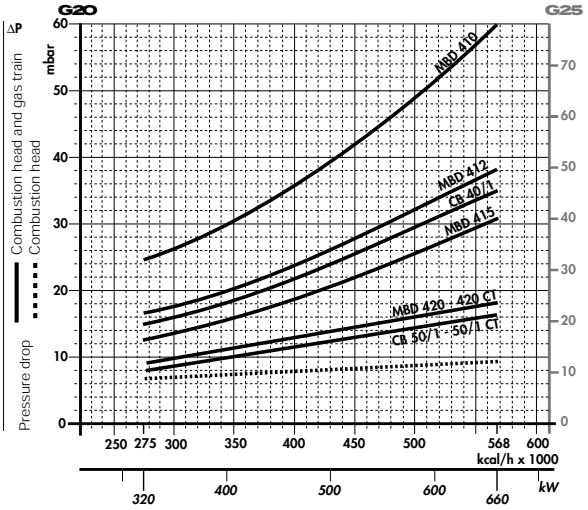
GAS 4 P/M



Gas train	Code	Adapter	Seal Control
MBD 420 CT	3970182	3000822	Incorporated
CB 40/1	3970145	-	Accessory
CB 50/1	3970146	3000822	Accessory
CB 50/1 CT	3970160	3000822	Incorporated

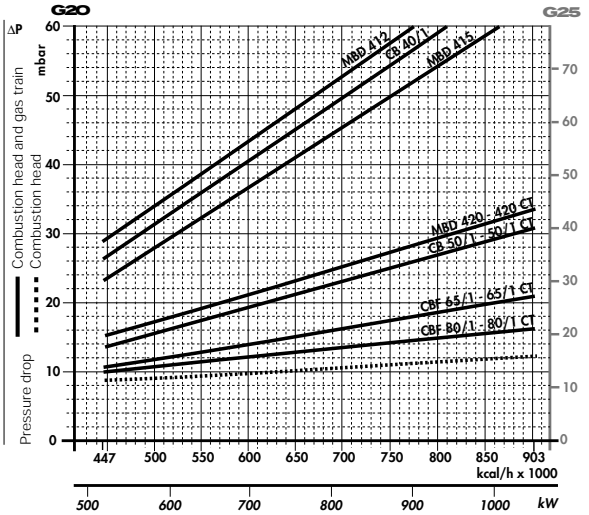
NATURAL GAS

GAS 5 P/M



Gas train	Code	Adapter	Seal Control
MBD 410	3970077	3000824	Accessory
MBD 412	3970144	-	Accessory
MBD 415	3970180	-	Accessory
MBD 420	3970181	3000822	Accessory

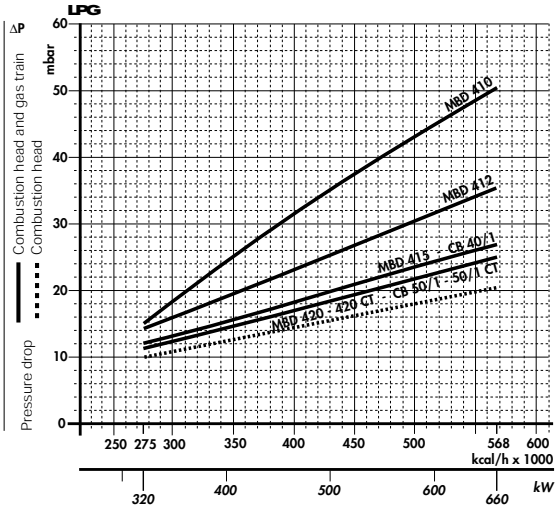
GAS 6 P/M



Gas train	Code	Adapter	Seal Control
MBD 412	3970144	3010126	Accessory
MBD 415	3970180	3000843	Accessory
MBD 420	3970181	-	Accessory
MBD 420 CT	3970182	-	Incorporated
CB 40/1	3970145	3000843	Accessory
CB 50/1	3970146	-	Accessory

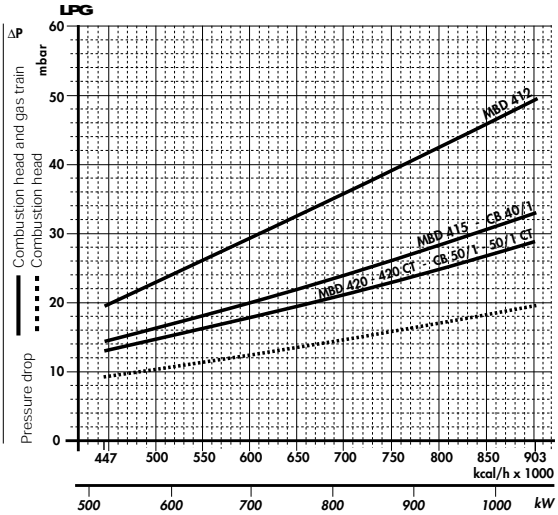
LPG

GAS 5 P/M



Gas train	Code	Adapter	Seal Control
MBD 420 CT	3970182	3000822	Incorporated
CB 40/1	3970145	-	Accessory
CB 50/1	3970146	3000822	Accessory
CB 50/1 CT	3970160	3000822	Incorporated

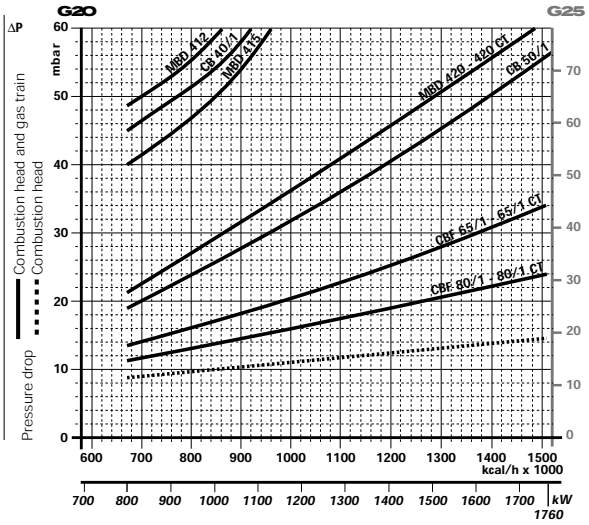
GAS 6 P/M



Gas train	Code	Adapter	Seal Control
CB 50/1 CT	3970160	-	Incorporated
CBF 65/1	3970147	3000825	Accessory
CBF 65/1 CT	3970161	3000825	Incorporated
CBF 80/1	3970148	3000826	Accessory
CBF 80/1 CT	3971062	3000826	Incorporated

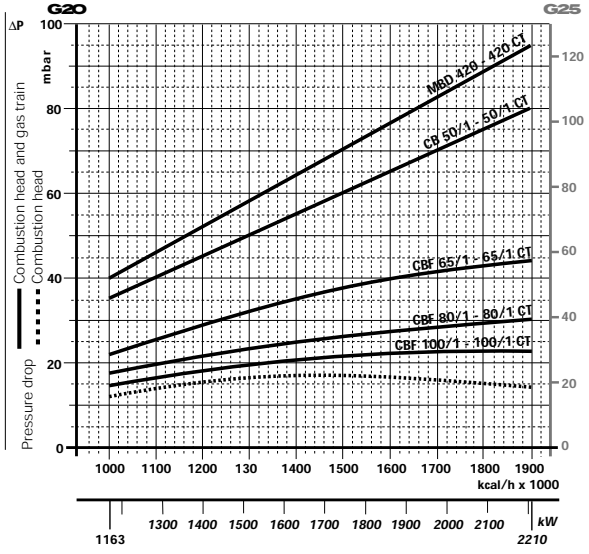
NATURAL GAS

GAS 7 P/M



Gas train	Code	Adapter	Seal Control
MBD 412	3970144	3010126	Accessory
MBD 415	3970180	3000843	Accessory
MBD 420	3970181	-	Accessory
MBD 420 CT	3970182	-	Incorporated
CB 40/1	3970145	3000843	Accessory
CB 50/1	3970146	-	Accessory

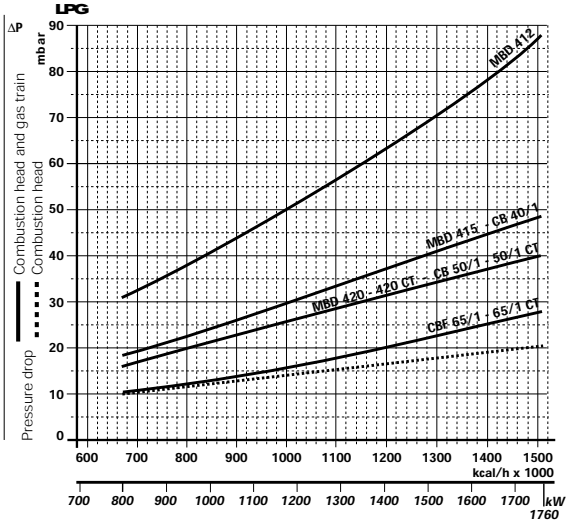
GAS 8 P/M



Gas train	Code	Adapter	Seal Control
MBD 420	3970181	3010128	Accessory
MBD 420 CT	3970182	3010128	Incorporated
CB 50/1	3970146	3010128	Accessory
CB 50/1 CT	3970160	3010128	Incorporated
CBF 65/1	3970147	3000831	Accessory

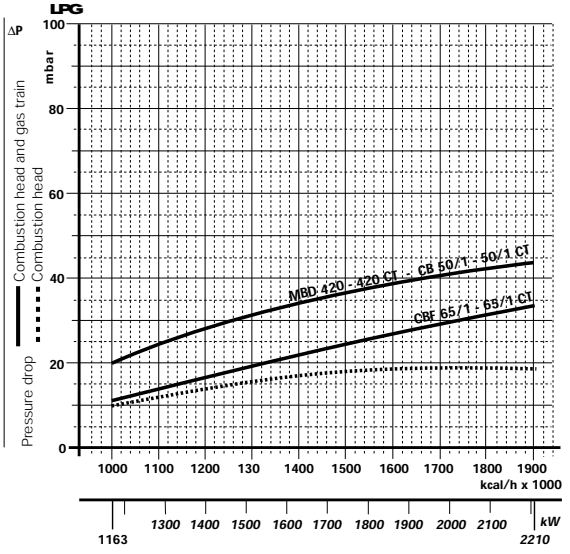
LPG

GAS 7 P/M



Gas train	Code	Adapter	Seal Control
CB 50/1 CT	3970160	-	Incorporated
CBF 65/1	3970147	3000825	Accessory
CBF 65/1 CT	3970161	3000825	Incorporated
CBF 80/1	3970148	3000826	Accessory
CBF 80/1 CT	3971062	3000826	Incorporated

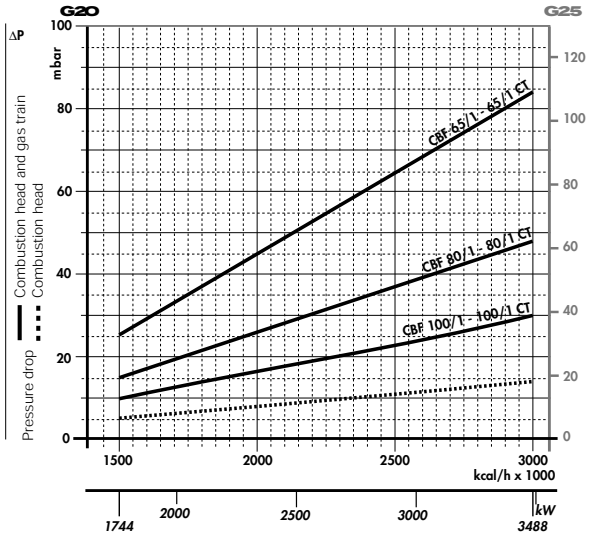
GAS 8 P/M



Gas train	Code	Adapter	Seal Control
CBF 65/1 CT	3970161	3000831	Incorporated
CBF 80/1	3970148	3000832	Accessory
CBF 80/1 CT	3971062	3000832	Incorporated
CBF 100/1	3970149	3010127	Accessory
CBF 100/1 CT	3970163	3010127	Incorporated

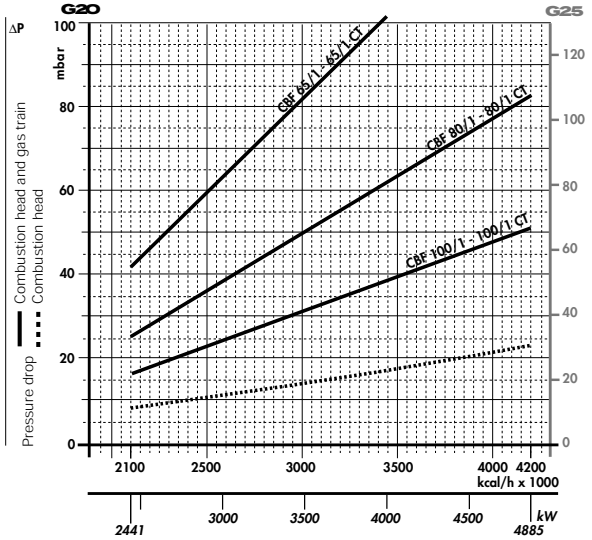
NATURAL GAS

GAS 9 P/M



Gas train	Code	Adapter	Seal Control
CBF 65/1	3970147	3000831	Accessory
CBF 65/1 CT	3970161	3000831	Incorporated
CBF 80/1	3970148	3000832	Accessory

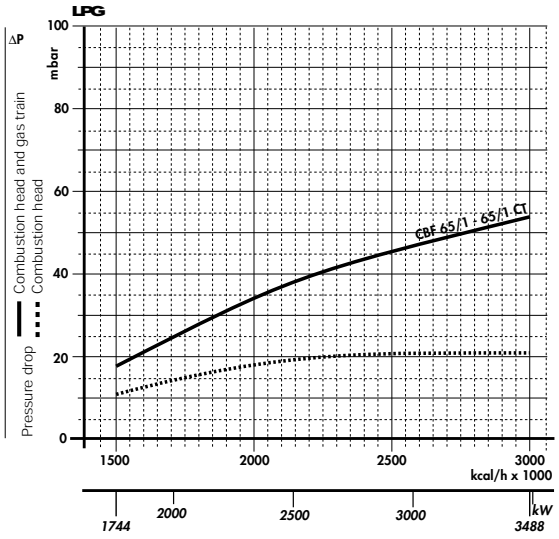
GAS 10 P/M



Gas train	Code	Adapter	Seal Control
CBF 65/1	3970147	3000831	Accessory
CBF 65/1 CT	3970161	3000831	Incorporated
CBF 80/1	3970148	3000832	Accessory

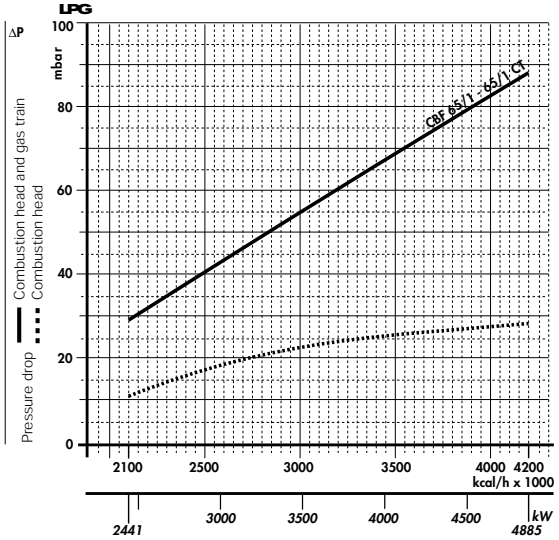
LPG

GAS 9 P/M



Gas train	Code	Adapter	Seal Control
CBF 80/1 CT	3971062	3000832	Incorporated
CBF 100/1	3970149	3010127	Accessory
CBF 100/1 CT	3970163	3010127	Incorporated

GAS 10 P/M



Gas train	Code	Adapter	Seal Control
CBF 80/1 CT	3971062	3000832	Incorporated
CBF 100/1	3970149	3010127	Accessory
CBF 100/1 CT	3970163	3010127	Incorporated

note *Please contact the Riello Burner Technical Office for different pressure levels from those above indicated.*

SELECTING THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

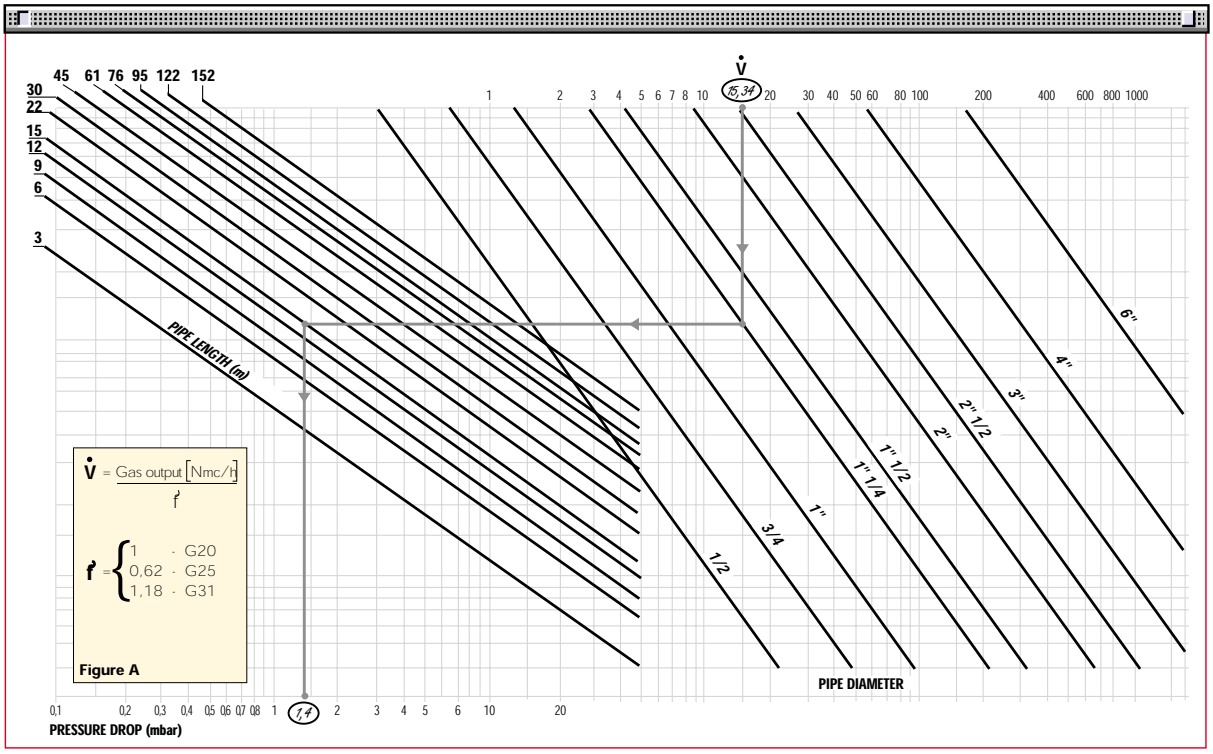
Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length. Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop of on the botton scale below (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

- gas used		G25
- gas output		9.51 mc/h
- pressure at the gas meter		20 mbar
- gas line length		15 m
- conversion coefficient		0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62}\right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;

- correct pressure = (20-1.4) = 18.6 mbar



VENTILATION

The ventilation circuit comes with a forward blades centrifugal fan, which gaurantees high pressure levels at the required air deliveries and permits installation flexibility.

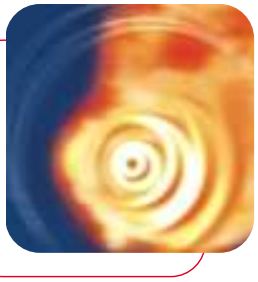
Example of servomotor and air damper of GAS 3 P/M

In spite of the remarkable output power and of the very high pressure performances, GAS P/M models are extremely compact.

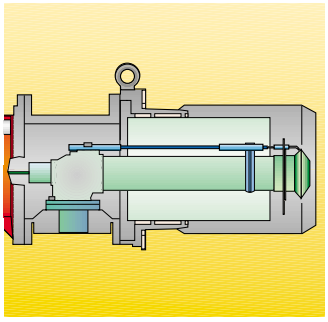
A minimum air pressure switch stops the burner when there is an insufficient quantity of air at the combustion head.

A variable profile cam connects fuel and air setting, ensuring fuel efficiency at all firing rates.

COMBUSTION HEAD



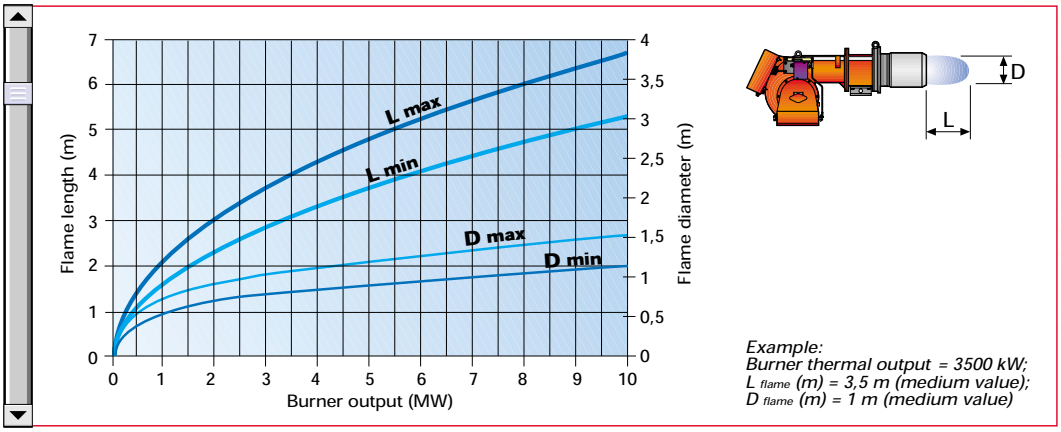
Two different combustion head length can be selected for the various models of GAS P/M series of burners.



Example of GAS 8 P/M combustion head

The choice depends on the thickness of the front panel and type of boiler. Correct head penetration into the combustion chamber depends on the type of heat generator.
These burners are equipped with a variable geometry combustion head. This enables optimum combustion performance throughout the working field, ensuring peak combustion efficiency thus saving on fuel consumption.
The following diagram shows the flame dimensions in relation to the burner output. The lengths and diameter shown in the diagram below should be employed for for a preliminary check: if combustion chamber dimensions are different from the values in the diagram, further tests need to be done.

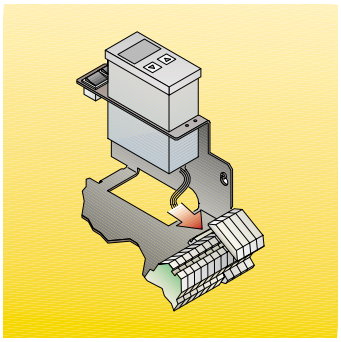
Flame dimensions



Example:
Burner thermal output = 3500 kW;
L flame (m) = 3,5 m (medium value);
D flame (m) = 1 m (medium value)

ADJUSTMENT

BURNER OPERATION MODE



Example of RWF 40 regulator

The GAS P/M series of burners can be "two stage progressive" or "modulating" operation.

During "two stage progressive" operation, the burner gradually adapts the output to the requested level, by varying between two pre-set levels (see figure A).

"Two stage progressive" operation

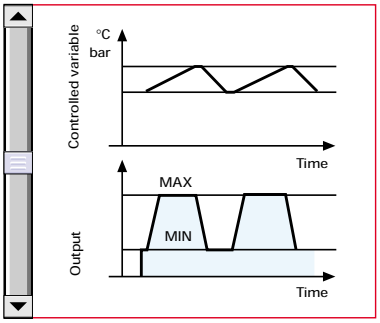


Figure A

During "modulating" operation, normally required in steam generators, in superheated boilers or thermal oil burners, a specific regulator and probes are required. These are supplied as accessories that must be ordered separately. The burner can work for long periods at intermediate output levels (see figure B).

"Modulating" operation

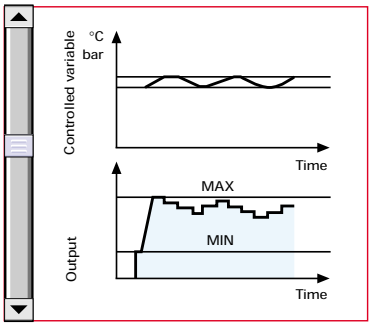
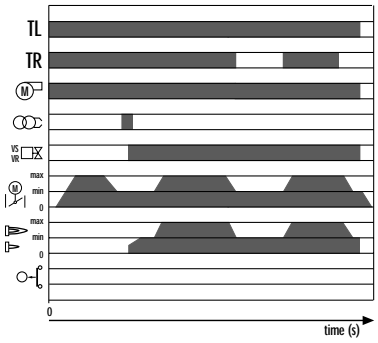


Figure B

START UP CYCLE

GAS 3 P/M - 4 P/M - 5 P/M - 6 P/M - 7 P/M - 8 P/M - 9 P/M - 10 P/M



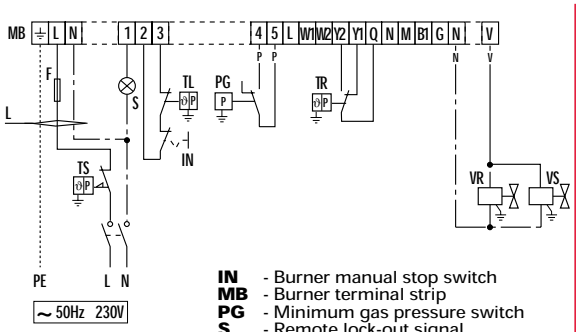
0"	The burner begins the firing cycle. Load control TL closes and motor starts running.
6" - 51"	The servomotor opens the air damper at the maximum output.
51"- 82"	Pre-purge phase with air delivery at maximum output.
82" - 117"	The servomotor sets the air damper and the butterfly valve at the minimum output.
117" - 120"	Pre-ignition.
126"	Firing : all the solenoid gas valves are supplied.
126" - 129"	After ignition.
150"	Output can be increased.

WIRING DIAGRAMS

Electrical connections must be made by qualified and skilled personnel, according to the local regulations.

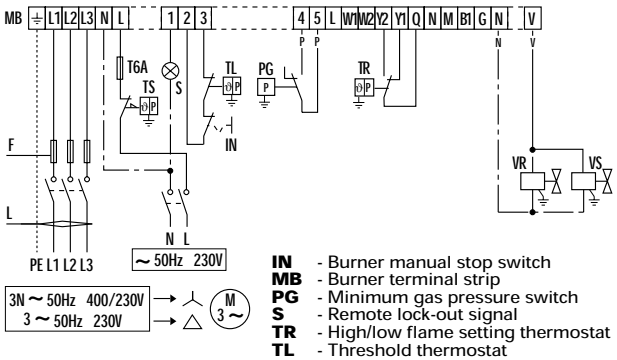
" TWO STAGE PROGRESSIVE" OPERATION

GAS 3 P/M - 4 P/M
Without seal control



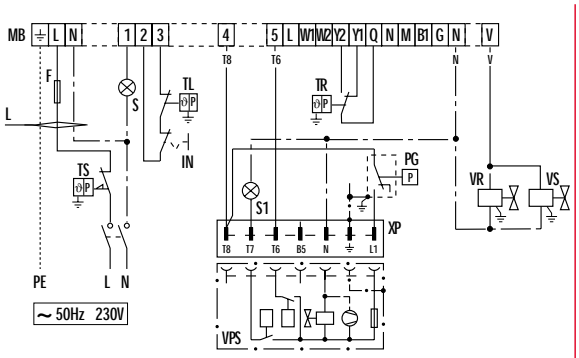
IN - Burner manual stop switch
MB - Burner terminal strip
PG - Minimum gas pressure switch
S - Remote lock-out signal
TR - High/low flame setting thermostat
TL - Threshold thermostat
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
F - Fuse (see table A)
L - Lead section (see table A)

GAS 5 P/M - 6 P/M - 7 P/M
Without seal control



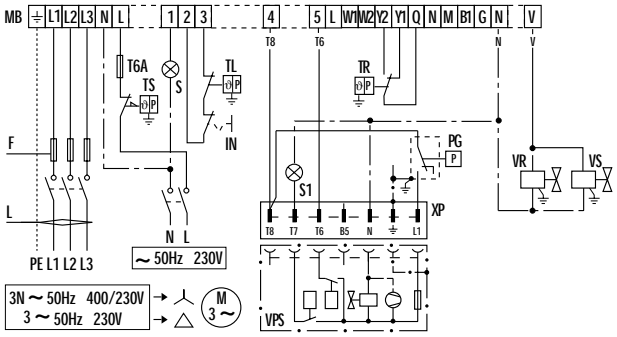
IN - Burner manual stop switch
MB - Burner terminal strip
PG - Minimum gas pressure switch
S - Remote lock-out signal
TR - High/low flame setting thermostat
TL - Threshold thermostat
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
F - Fuse (see table A)
L - Lead section (see table A)

GAS 3 P/M - 4 P/M
With seal control



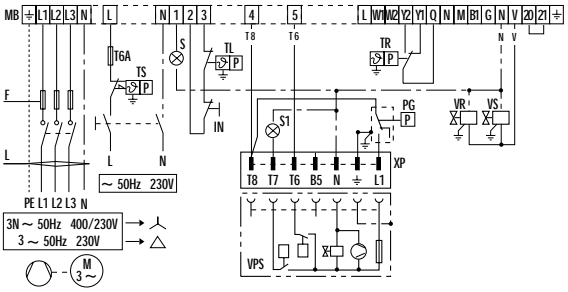
XP - Plug for seal control device
S1 - Remote lock-out signal for seal control device
IN - Burner manual stop switch
MB - Burner terminal strip
PG - Minimum gas pressure switch
S - Remote lock-out signal
TR - High/low flame setting thermostat
TL - Threshold thermostat
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
VPS - Seal control device
F - Fuse (see table A)
L - Lead section (see table A)

GAS 5 P/M - 6 P/M - 7 P/M
With seal control



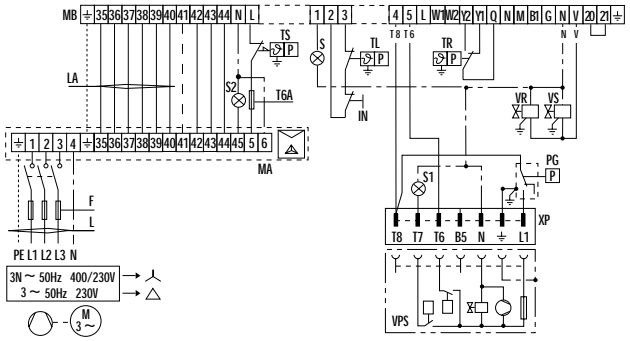
XP - Plug for seal control device
S1 - Remote lock-out signal for seal control device
IN - Burner manual stop switch
MB - Burner terminal strip
PG - Minimum gas pressure switch
S - Remote lock-out signal
TR - High/low flame setting thermostat
TL - Threshold thermostat
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
VPS - Seal control device
F - Fuse (see table A)
L - Lead section (see table A)

GAS 8 P/M - 9 P/M
With seal control - Direct start-up version



XP - Plug for seal control device
S1 - Remote lock-out signal for seal control device
IN - Burner manual stop switch
MB - Burner terminal strip
PG - Minimum gas pressure switch
S - Remote lock-out signal
TR - High/low flame setting thermostat
TL - Threshold thermostat
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
VPS - Seal control device
F - Fuse (see table B)
L - Lead section (see table B)

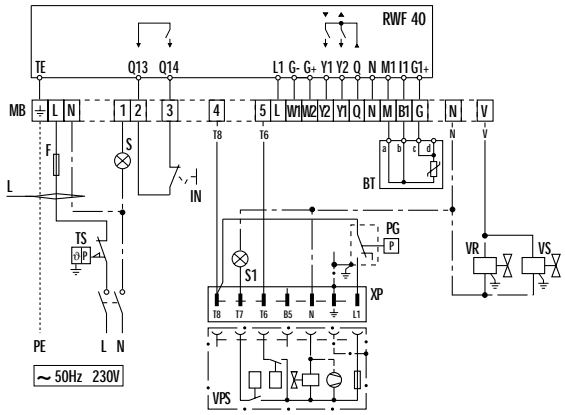
GAS 9 P/M - 10 P/M
With seal control - Star-delta start-up version



XP - Plug for seal control device
S1 - Remote lock-out signal for seal control device
IN - Burner manual stop switch
MB - Burner terminal strip
PG - Minimum gas pressure switch
S - Remote lock-out signal
TR - High/low flame setting thermostat
TL - Threshold thermostat
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
VPS - Seal control device
MA - Star-delta starter terminal strip
S2 - Motor strip remote signal
F - Fuse (see table B)
L - Lead section (see table B)

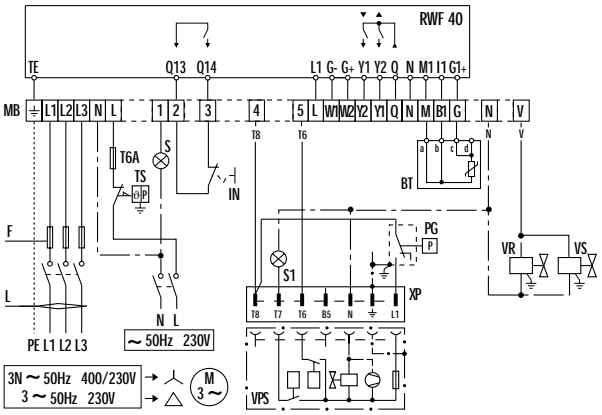
" MODULATING" OPERATION - temperature probe

GAS 3 P/M - 4 P/M



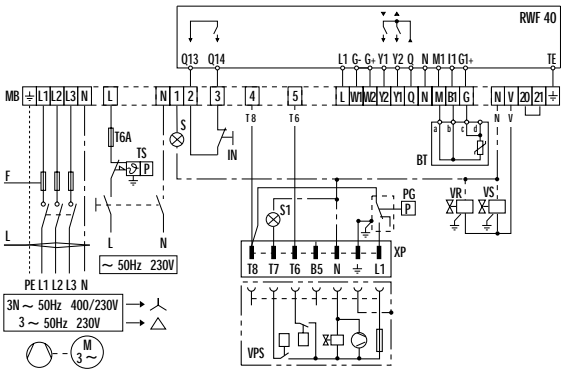
XP - Plug for seal control device
S1 - Remote lock-out signal for seal control device
IN - Burner manual stop switch
MB - Burner terminal strip
PG - Minimum gas pressure switch
S - Remote lock-out signal
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
VPS - Seal control device
F - Fuse (see table A)
L - Lead section (see table A)
BT - Temperature probe
RWF40 - Regulator (installed on the burner)

GAS 5 P/M - 6 P/M - 7 P/M



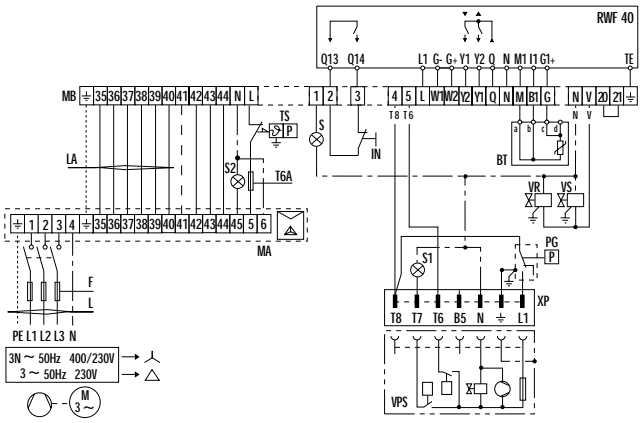
XP - Plug for seal control device
S1 - Remote lock-out signal for seal control device
IN - Burner manual stop switch
MB - Burner terminal strip
PG - Minimum gas pressure switch
S - Remote lock-out signal
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
VPS - Seal control device
F - Fuse (see table A)
L - Lead section (see table A)
BT - Temperature probe
RWF40 - Regulator (installed on the burner)

GAS 8 P/M - 9 P/M
Direct start-up version



XP - Plug for seal control device
S1 - Remote lock-out signal for seal control device
IN - Burner manual stop switch
MB - Burner terminal strip
PG - Minimum gas pressure switch
S - Remote lock-out signal
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
VPS - Seal control device
F - Fuse (see table B)
L - Lead section (see table B)
BT - Temperature probe
RWF40 - Regulator (installed on the burner)

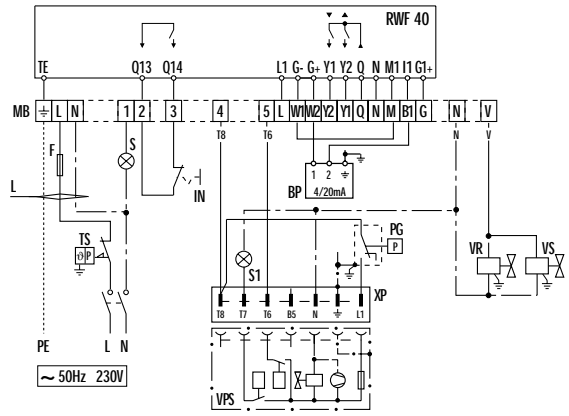
GAS 9 P/M 10 P/M
Star-delta start-up version



XP - Plug for seal control device
S1 - Remote lock-out signal for seal control device
IN - Burner manual stop switch
MB - Burner terminal strip
PG - Minimum gas pressure switch
S - Remote lock-out signal
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
VPS - Seal control device
MA - Star-delta starter terminal strip
S2 - Motor strip remote signal
F - Fuse (see table B)
L - Lead section (see table B)
BT - Temperature probe
RWF40 - Regulator (installed on the burner)

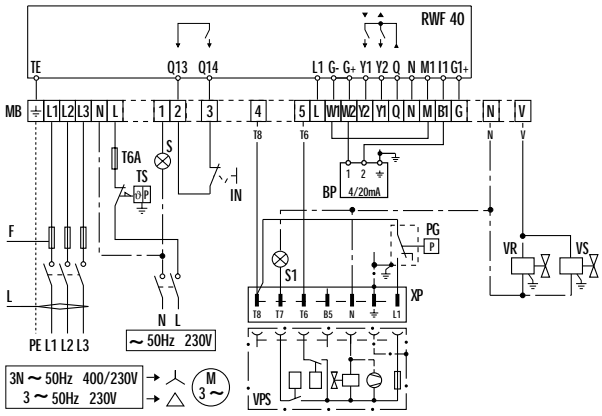
"MODULATING" OPERATION - pressure probe

GAS 3 P/M - 4 P/M



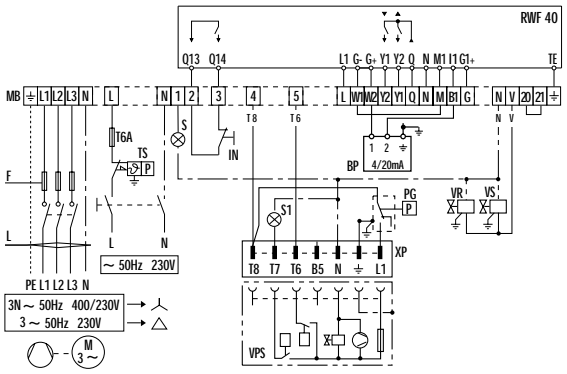
XP - Plug for seal control device
S1 - Remote lock-out signal for seal control device
IN - Burner manual stop switch
MB - Burner terminal strip
PG - Minimum gas pressure switch
S - Remote lock-out signal
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
VPS - Seal control device
F - Fuse (see table A)
L - Lead section (see table A)
BP - Pressure probe
RWF40 - Regulator (installed on the burner)

GAS 5 P/M - 6 P/M - 7 P/M



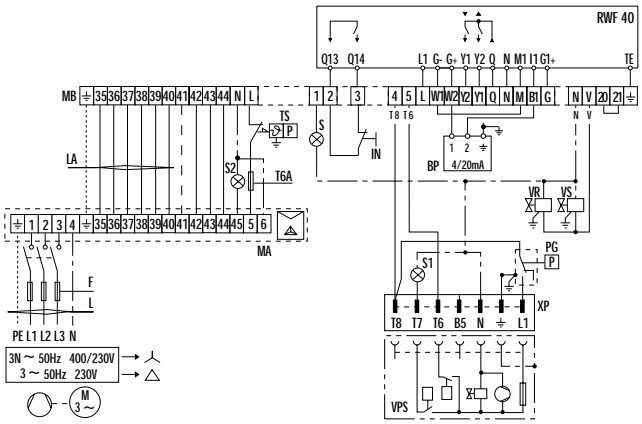
XP - Plug for seal control device
S1 - Remote lock-out signal for seal control device
IN - Burner manual stop switch
MB - Burner terminal strip
PG - Minimum gas pressure switch
S - Remote lock-out signal
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
VPS - Seal control device
F - Fuse (see table A)
L - Lead section (see table A)
BP - Pressure probe
RWF40 - Regulator (installed on the burner)

GAS 8 P/M - 9 P/M
Direct start-up version



XP - Plug for seal control device
S1 - Remote lock-out signal for seal control device
IN - Burner manual stop switch
MB - Burner terminal strip
PG - Minimum gas pressure switch
S - Remote lock-out signal
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
VPS - Seal control device
F - Fuse (see table B)
L - Lead section (see table B)
BP - Pressure probe
RWF40 - Regulator (installed on the burner)

GAS 9 P/M 10 P/M
Star-delta start-up version



XP - Plug for seal control device
S1 - Remote lock-out signal for seal control device
IN - Burner manual stop switch
MB - Burner terminal strip
PG - Minimum gas pressure switch
S - Remote lock-out signal
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
VPS - Seal control device
MA - Star-delta starter terminal strip
S2 - Motor strip remote signal
F - Fuse (see table B)
L - Lead section (see table B)
BP - Pressure probe
RWF40 - Regulator (installed on the burner)

The following table shows the supply lead sections and the type of fuse to be used.

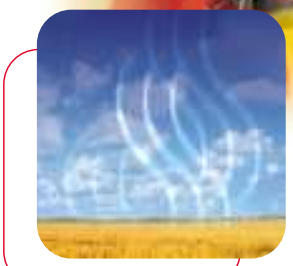
		Single phase		Three phase - Direct start-up					
Model		**GAS 3 P/M**	**GAS 4 P/M**	**GAS 5 P/M**		**GAS 6 P/M**		**GAS 7 P/M**	
				230V	400V	230V	400V	230V	400V
F	A	T5	T6	T6	T6	T16	T10	T25	T16
L	mm²	1,5	1,5	1,5	1,5	1,5	1,5	2,5	1,5

Table A

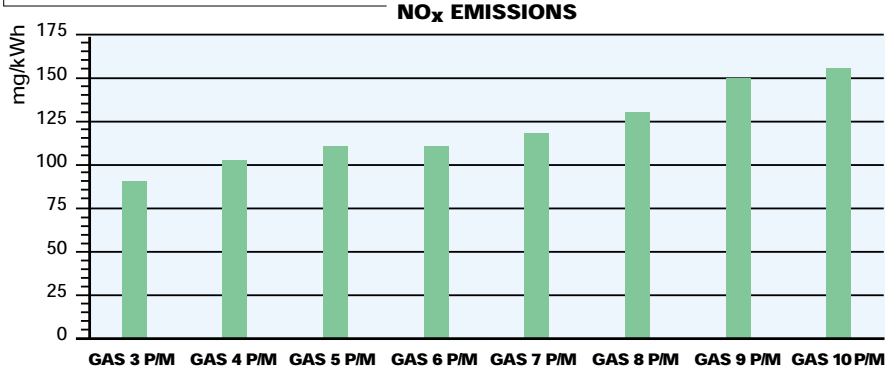
		Three phase - Direct start-up				Three phase - Star-delta start-up			
Model		**GAS 8 P/M**		**GAS 9 P/M**		**GAS 9 P/M**		**GAS 10 P/M**	
		230V	400V	230V	400V	230V	400V	230V	400V
F	A	T35	T25	T50	T35	T35	T25	T63	T35
L	mm²	4	2,5	6	4	4	2,5	6	4

Table B

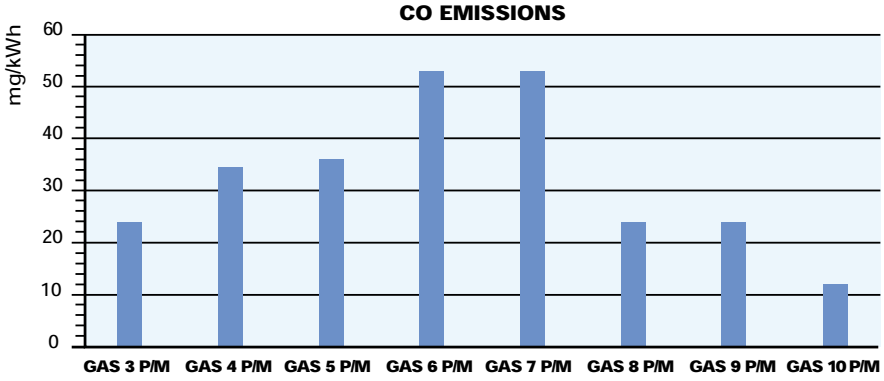
EMISSIONS



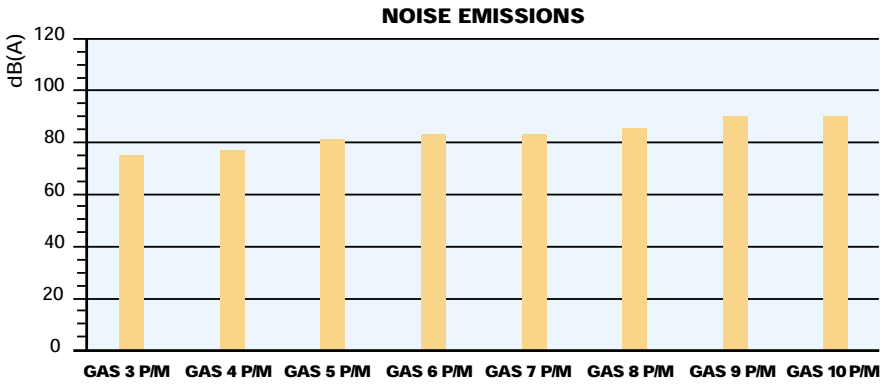
NO_x EMISSIONS



CO EMISSIONS



NOISE EMISSIONS

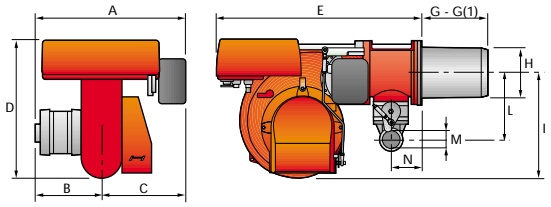


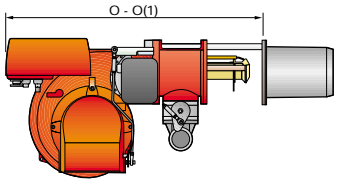
The emission data has been measured in the various models at maximum output, according to EN 676 standard.

OVERALL DIMENSIONS (mm)

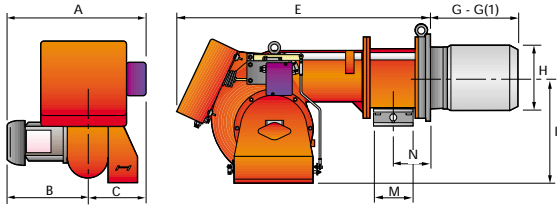
BURNERS

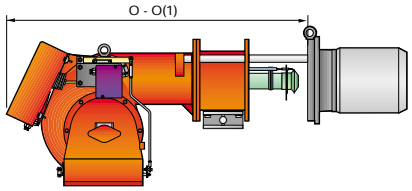
GAS 3 P/M - 4 P/M - 5 P/M - 6 P/M - 7 P/M





GAS 8 P/M - 9 P/M - 10 P/M

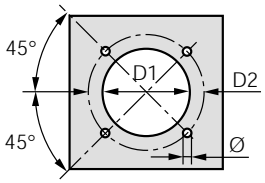




Model	A	B	C	D	E	G - G(1)	H	I	L	M	N	O - O(1)
GAS 3 P/M	585	205	380	397	610	185 - 320	140	292	225	1"1/2	97	775
GAS 4 P/M	585	205	380	397	610	187 - 320	150	292	225	1"1/2	97	775
GAS 5 P/M	581	226	355	437	645	207 - 365	155	332	225	1"1/2	97	810
GAS 6 P/M	628	258	370	485	770	227 - 360	175	370	250	2"	131	966
GAS 7 P/M	758	358	400	590	920	240 - 400	220	445	305	2"	140	1142
GAS 8 P/M	755	396	359	-	1090	391 - 501	260	467	-	DN 80	158	1541 - 1644
GAS 9 P/M	817	447	370	-	1200	444 - 574	295	496	-	DN 80	168	1627 - 1757
GAS 10 P/M	917	508	409	-	1320	476 - 606	336	525	-	DN 80	203	1730 - 1860

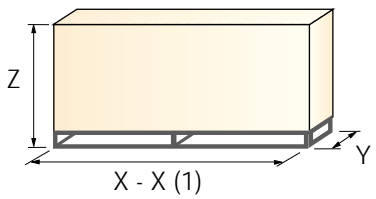
(1) Length with extended combustion head

BURNER - BOILER MOUNTING FLANGE



Model	D1	D2	Ø
GAS 3 P/M	155	226	M10
GAS 4 P/M	165	226	M10
GAS 5 P/M	165	226	M10
GAS 6 P/M	185	276	M12
GAS 7 P/M	230	325	M12
GAS 8 P/M	265	368	M16
GAS 9 P/M	300	368	M18
GAS 10 P/M	350	438	M20

PACKAGING



Model	X - X (1)	Y	Z	kg
GAS 3 P/M	930 - -	705	555	37
GAS 4 P/M	930 - -	705	555	43
GAS 5 P/M	930 - -	705	555	46
GAS 6 P/M	1045 - -	705	555	63
GAS 7 P/M	1203 - -	865	665	101
GAS 8 P/M	1690	820	880	195
GAS 9 P/M	1870	920	910	240
GAS 10 P/M	2040	1101	930	290

(1) dimension with extended head

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel.
All operations must be performed in accordance with the technical handbook supplied with the burner.

BURNER SETTING

- All the burners have slide bars, for easier installation and maintenance.
- After drilling the boilerplate, using the supplied gasket as a template, dismantle the blast tube from the burner and fix it to the boiler.
- Adjust the combustion head.
- Fit the gas train, choosing this on the basis of the maximum output of the boiler and considering the enclosed diagrams.
- Refit the burner casing to the slide bars.
- Close the burner, sliding it up to the flange.

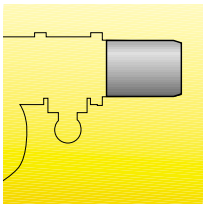
ELECTRICAL CONNECTIONS AND START UP

- Make the electrical connections to the boiler following the wiring diagrams included in the instruction handbook.
- Turn the motor to check rotation direction (if it is a three-phase motor).
- Perform a first ignition calibration on the gas train.
- On start up, check:
  - Gas pressure at the combustion head (to max. and min. output)
  - Combustion quality, in terms of unburned substances and excess air.

BURNER ACCESSORIES

Extended head kit

"Standard head" burners can be transformed into "extended head" versions, by using the special kit. The KITS available for the various burners, giving the original and the extended lengths, are listed below.



Extended head kit			
Burner	**Standard head length (mm)**	**Extended head length (mm)**	**Kit code**
GAS 3 P/M	185	320	**3000605**
GAS 4 P/M	187	320	**3000606**
GAS 5 P/M	207	365	**3000607**
GAS 6 P/M	227	360	**3000608**
GAS 7 P/M	240	400	**3000609**

Spacer kit

If burner head penetration into the combustion chamber needs reducing, varying thickness spacers are available, as given in the following table:

Spacer kit		
Burner	**Spacer thickness S (mm)**	**Kit code**
GAS 3 - 4 - 5 - 6 P/M	142	**3000755**
GAS 7 - 8 P/M	102	**3000722**
GAS 9 P/M	130	**3000723**
GAS 10 P/M	130	**3000751**

Continuous ventilation kit

If the burner requires continuous ventilation in the stages without flame, a special kit is available as given in the following table:

Continuous ventilation kit	
Burner	**Kit code**
GAS 3 - 4 - 5 - 6 - 7 P/M	**3010030**

Sound proofing box

If noise emission needs reducing even further, sound-proofing boxes are available, as given in the following table:

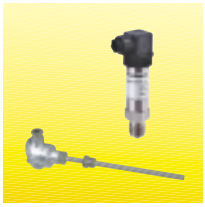
Sound proofing box		
Burner	**Box type**	**Box code**
GAS 3 - 4 - 5 P/M	C2	**3000777**
GAS 6 P/M	C3	**3000778**
GAS 7 P/M	C4	**3000779**
GAS 8 P/M	C5	**3000780**
GAS 9 - 10 P/M	C6	**3000781**

Accessories for modulating operation

To obtain modulating operation, the GAS P/M series of burners requires a regulator with three point outlet controls. The following table lists the accessories for modulating operation with their application range.

Burner	Regulator type	Regulator code
GAS 3 - 4 - 5 - 6 - 7 P/M	RWF 40	**3010210**
GAS 8 - 9 - 10 P/M	RWF 40	**3010211**

The relative temperature or pressure probes fitted to the regulator must be chosen on the basis of the application.



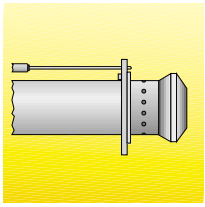
Probe type	Range (°C) (bar)	Probe code
Temperature PT 100	-100 ÷ 500°C	**3010110**
Pressure 4 ÷ 20 mA	0 ÷ 2,5 bar	**3010213**
Pressure 4 ÷ 20 mA	0 ÷ 16 bar	**3010214**

Depending on the servomotor fitted to the burner, a three-pole potentiometer (1000 Ω) can be installed to check the position of the servomotor. The KITS available for the various burners are listed below.

Burner	Kit code
GAS 3 - 4 - 5 - 6 - 7 - 8 - 9 -10 P/M	**3010021**

LPG kit

For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner, as given in the following table:

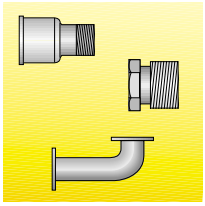


LPG kit		
Burner	Kit code for standard head	Kit code for extended head
GAS 3 P/M	**3000657**	**3000807**
GAS 4 P/M	**3000658**	**3000808**
GAS 5 P/M	**3000659**	**3000809**
GAS 6 P/M	**3000753**	**3000810**
GAS 7 P/M	**3000806**	**3000811**
GAS 8 P/M	**3000875**	**3010029**
GAS 9 P/M	**3000876**	**3010028**
GAS 10 P/M	**3010152**	**3010153**

GAS TRAIN ACCESSORIES

Adapters

When the diameter of the gas train is different from the set diameter of the burners, an adapter must be fitted between the gas train and the burner. The following table lists the adapters for various burners.



Adapters

Burner	Gas train	Dimensions	Adapter code
GAS 3 P/M	MBD 407 - 410	3/4" 1" 1/2	**3000824**
	MBD 420 - CB 50/1	2" 1" 1/2	**3000822**
GAS 4 - 5 P/M	MBD 410	3/4" 1" 1/2	**3000824**
	MBD 420 - CB 50/1	2" 1" 1/2	**3000822**
GAS 6 - 7 P/M	MBD 412 - 415 - CB 40/1	1" 1/2 2"	**3000843**
	CB 65	DN 65 2"1/2 1" 1/2 2"	**3000825**
	CB 80	DN 80 2"1/2 2"	**3000826**
GAS 8 P/M	MBD 420 - CB 50/1	DN 80 DN 65 2"1/2 2"	**3010128**
	CB 65	DN 80 DN 65	**3000831**
	CB 80	DN 80 DN 80	**3000832**
	CB 100	DN 80 DN 100	**3010127**
GAS 9 -10 P/M	CB 65	DN 80 DN 65	**3000831**
	CB 80	DN 80 DN 80	**3000832**
	CB 100	DN 80 DN 100	**3010127**

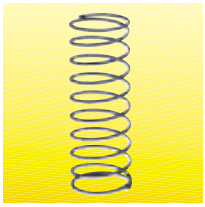
Seal control kit

To test the valve seals on the gas train, a special "seal control kit" is available. The valve seal control device is compulsory (EN 676) on gas trains to burners with a maximum output over 1200 kW. The sealing control is type VPS 504.

Seal control kit		
Burner	**Gas train**	**Kit code**
GAS 3 P/M	MBD 407 - 410 - 412	**3010123**
	MBD 415 - 420 - CB 40/1 - 50/1	**3010125**
GAS 4 P/M	MBD 410 - 412	**3010123**
	MBD 415 - 420 - CB 40/1 - 50/1	**3010125**
GAS 5 P/M	MBD 410 - 412	**3010123**
	MBD 415 - 420 - CB 40/1 - 50/1	**3010125**
GAS 6 P/M	MBD 412	**3010123**
	MBD 415 - 420 - CB 40/1 - 50/1 - CBF 65/1 - 80/1	**3010125**
GAS 7 P/M	MBD 412	**3010123**
	MBD 415 - 420 - CB 40/1 - 50/1 - CBF 65/1 - 80/1	**3010125**
GAS 8 P/M	MBD 420 - CB 50/1 - CBF 65/1 - 80/1 - 100/1	**3010125**
GAS 9 P/M	CBF 65/1 - 80/1 - 100/1	**3010125**
GAS 10 P/M	CBF 65/1 - 80/1 - 100/1	**3010125**

Stabiliser spring

Accessory springs are available to vary the pressure range of the gas train stabilisers. The following table shows these accessories with their application range



Stabiliser spring		
Gas train	**Spring**	**Spring code**
CBF 65/1 - CBF 80/1	Red from 25 to 55 mbar	**3010133**
CBF 100/1	Red from 25 to 55 mbar	**3010134**
CBF 65/1 - CBF 80/1	Black from 60 to 110 mbar	**3010135**
CBF 100/1	Black from 60 to 110 mbar	**3010136**
CBF 65/1 - CBF 80/1	Pink from 90 to 150 mbar	**3090456**
CBF 100/1	Pink from 90 to 150 mbar	**3090489**

Please refer to the technical manual for the correct choice of spring.

SPECIFICATION

A specific index guides your choice of burner from the various models available in the GAS P/M series. Below is a clear and detailed specification description of the product.

DESIGNATION OF SERIES

Series : GAS

Size

Operation :

...	One stage
/2	Two stage
P/M	Modulating

Emission : ... Class 1 EN267 - EN676

Head :

TC	Standard head
TL	Extended head

Flame control system:

FS1	Standard (1 stop every 24 h)
FS2	Continuous working (1 stop every 72 h)

Electrical supply to the system :

1/230/50	1/230V/50Hz
1/210/60	1/210V/60Hz
3/230/50	3/230V/50Hz
3/400/50	3N/400V/50Hz
3/230-400/50	3/230V/50Hz - 3N/400V/50Hz
3/210/60	3/210V/60Hz
3/220/60	3/220V/60Hz
3/380/60	3/380V/60Hz
3/220-380/60	3/220V/60Hz - 3N/380V/60Hz

Auxiliary voltage :

230/50	230V/50Hz
220/60	220V/60Hz
120/50-60	120V/50-60Hz
230/50-60	230V/50-60Hz

GAS	9	P/M		TC	FS1	3/230-400/50	230/50-60
BASIC DESIGNATION							
EXTENDED DESIGNATION							

AVAILABLE BURNER MODELS

GAS 3 P/M	TC	FS1	1/210/60	120/50-60
GAS 3 P/M	TC	FS1	1/230/50	230/50-60
GAS 4 P/M	TC	FS1	1/230/50	230/50-60
GAS 4 P/M	TC	FS1	3/210/60	120/50-60
GAS 4 P/M	TC	FS1	3/220-380/60	220/60
GAS 5 P/M	TC	FS1	3/210/60	120/50-60
GAS 5 P/M	TC	FS1	3/220-380/60	220/60
GAS 5 P/M	TC	FS1	3/230-400/50	230/50-60
GAS 6 P/M	TC	FS1	3/210/60	120/50-60
GAS 6 P/M	TC	FS1	3/220-380/60	220/60
GAS 6 P/M	TC	FS1	3/230-400/50	230/50-60
GAS 7 P/M	TC	FS1	3/210/60	120/50-60
GAS 7 P/M	TC	FS1	3/220-380/60	220/60
GAS 7 P/M	TC	FS1	3/230-400/50	230/50-60
GAS 8 P/M	TC	FS1	3/220-380/60	220/60
GAS 8 P/M	TC	FS1	3/230-400/50	230/50
GAS 8 P/M	TC	FS1	3/230-400/50	230/50-60
GAS 8 P/M	TL	FS1	3/220-380/60	220/60
GAS 8 P/M	TL	FS1	3/230-400/50	230/50
GAS 8 P/M	TL	FS1	3/230-400/50	230/50-60
GAS 9 P/M	TC	FS1	3/220-380/60	220/60
GAS 9 P/M	TC	FS1	3/230/50	230/50
GAS 9 P/M	TC	FS1	3/230/50	230/50-60
GAS 9 P/M	TC	FS1	3/230-400/50	230/50
GAS 9 P/M	TC	FS1	3/230-400/50	230/50-60
GAS 9 P/M	TC	FS1	3/400/50	230/50
GAS 9 P/M	TC	FS1	3/400/50	230/50-60
GAS 9 P/M	TL	FS1	3/220-380/60	220/60
GAS 9 P/M	TL	FS1	3/230/50	230/50
GAS 9 P/M	TL	FS1	3/230/50	230/50-60
GAS 9 P/M	TL	FS1	3/230-400/50	230/50
GAS 9 P/M	TL	FS1	3/230-400/50	230/50-60
GAS 9 P/M	TL	FS1	3/400/50	230/50
GAS 9 P/M	TL	FS1	3/400/50	230/50-60
GAS 10 P/M	TC	FS1	3/220/60	220/60
GAS 10 P/M	TC	FS1	3/230/50	230/50
GAS 10 P/M	TC	FS1	3/230/50	230/50-60
GAS 10 P/M	TC	FS1	3/380/60	220/60
GAS 10 P/M	TC	FS1	3/400/50	230/50
GAS 10 P/M	TC	FS1	3/400/50	230/50-60
GAS 10 P/M	TL	FS1	3/220/60	220/60
GAS 10 P/M	TL	FS1	3/230/50	230/50
GAS 10 P/M	TL	FS1	3/230/50	230/50-60
GAS 10 P/M	TL	FS1	3/380/60	220/60
GAS 10 P/M	TL	FS1	3/400/50	230/50
GAS 10 P/M	TL	FS1	3/400/50	230/50-60

Other versions are available on request

PRODUCT SPECIFICATION

Burner:

Monoblock forced draught gas burner, two stage progressive operation or modulating with a kit, made up of:
- Air suction circuit
- Fan with forward curved blades
- Air damper for air setting controlled by a servomotor;
- Combustion head, that can be set on the basis of required output, fitted with:
    - stainless steel end cone, resistant to corrosion and high temperatures
    - ignition electrodes
    - flame stability disk
- Servomotor for air and gas delivery regulation
- Maximum gas pressure switch
- Minimum air pressure switch
- Single phase or three phases electrical motor
- UV photocell for flame detection
- Flame inspection window
- Slide bars for easier installation and maintenance
- Protection filter against radio interference
- IP 40 protection level.

Gas train
Fuel supply line, in the MULTIBLOC configuration (from a diameter of 3/4" until a diameter 2") or COMPOSED configuration (from a diameter of DN 65 until a diameter of DN 100), fitted with:
- Filter
- Stabiliser
- Minimum gas pressure switch
- Safety valve
- Valve seal control (for output > 1200 kW)
- One stage working valve with ignition gas output regulator.

Conforming to:
- 89/336/EEC directive (electromagnetic compatibility)
- 73/23/EEC directive (low voltage)
- 92/42/EEC directive (performance)
- 90/396/EEC directive (gas)
- EN 676 (gas burners).

Standard equipment:
- 1 gas train gasket
- 1 flange gasket
- 1 insulating screen
- 8 screws for fixing the burner flange to the boiler (12 for GAS 8 P/M - GAS 9 P/M and GAS 10 P/M)
- 4 wiring looms for electrical connections
- 1 star delta starter (for GAS 8 P/M - GAS 9 P/M and GAS 10 P/M)
- 2 wiring looms for electrical connections to the star delta starter (for GAS 8 P/M - GAS 9 P/M and GAS 10 P/M)
- 8 washers (for GAS 8 P/M - GAS 9 P/M and GAS 10 P/M)
- 2 bar extensions (only for long head versions of GAS 8 P/M - GAS 9 P/M and GAS 10 P/M)
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- Head extension kit
- Head length reduction kit
- Continuous ventilation kit
- Sound-proofing box
- RWF 40 output regulator
- Pressure probe 0 – 2.4 bar
- Pressure probe 0 – 16 bar
- Temperature probe -100 – 500°C
- Potentiometer kit for the servomotor
- LPG kit
- Gas train adapter
- Seal control kit
- Stabiliser spring.

Lineagrafica

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RIELLO BURNERS

CE

ONE STAGE GAS BURNERS

GAS SERIES				
	GAS 3	130	÷	350 kW
	GAS 4	185	÷	465 kW
	GAS 5	325	÷	660 kW
	GAS 6	525	÷	1050 kW

The GAS series of burners cover a firing range from 130 to 1050 kW.
Operation is "one stage"; the combustion head, that can be set on the basis of required output, allows optimal performance ensuring good combustion and reducing fuel consumption.
The GAS series are extremely reliable burners, featured by a simple use and an operation without particular maintenance intervention.
Simplified maintenance is achieved by the slide bar system, which allows easy access to all of the essential components of the combustion head. All electrical components are easily accessible only by dismounting a protection panel, thus guaranteeing a quick and simple intervention on components.

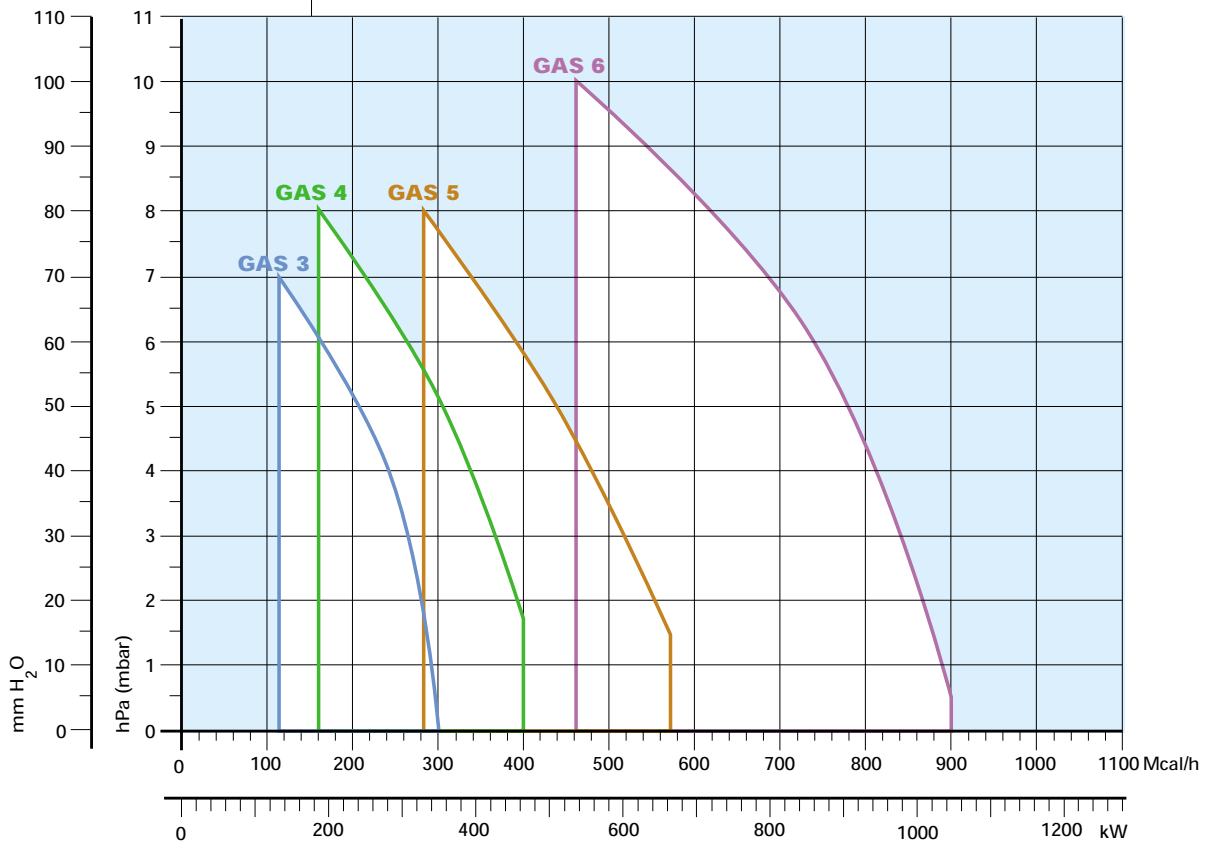
TECHNICAL DATA

	Model			GAS 3	GAS 4	GAS 5	GAS 6
	Burner operation mode			One stage			
	Modulation ratio at max. output			--			
	Servomotor	type		--			
		run time	s	--			
	Heat output		kW	130÷350	185÷465	325÷660	525÷1050
			Mcal/h	112÷301	160÷400	280÷570	450÷900
	Working temperature		°C min./max.	0/40			
Fuel / air data	Net calorific value gas G20		kWh/Nm³	10			
	Density gas G20		kg/Nm³	0,71			
	Output gas G20		Nm³/h	13÷35	18,5÷46,5	32,5÷66	52,5÷105
	Net calorific value gas G25		kWh/Nm³	8,6			
	Density gas G25		kg/Nm³	0,78			
	Output gas G25		Nm³/h	15÷41	22÷54	38÷77	61÷122
	Net calorific value LPG gas		kWh/Nm³	25,8			
	Density LPG gas		kg/Nm³	2,02			
	Output LPG gas		Nm³/h	5,8÷14	7÷18	13÷26	20÷41
	Fan		Type	Centrifugal with forward curve blades			
	Air temperature		Max. °C	60			
Electrical data	Electrical supply		Ph/Hz/V	1/50/230~(±10%)		3N/50/400~(±10%) ⅄	3/50/230~(±10%) △
	Auxiliary electrical supply		Ph/Hz/V	1/50/230 ~ (±10%)			
	Control box		Type	RMG			
	Total electrical power		kW	0,4	0,54	0,85	1,7
	Auxiliary electrical power		kW	0,15	0,17	0,1	0,2
	Protection level		IP	40			
	Motor electrical power		kW	0,25	0,37	0,75	1,5
	Rated motor current		A	1,8	2,9	2,85÷1,65	5,9÷3,4
	Motor start up current		A	4,8	9,5	10÷6	22,5÷13
	Motor protection level		IP	54			
	Ignition transformer		V1 - V2	230 V - 1x8 kV			
			I1 - I2	1,8 A - 30 mA			
	Operation			Intermittent (at least one stop every 24 h)			
Emissions	Sound pressure		dBA	75	78	83	84
	Sound power		W	--			
	CO Emission		mg/kWh	< 100			
	NOx Emission		mg/kWh	< 170			
Approval	Directive			73/23 - 89/336 - 90/396 - 92/42 EEC			
	Conforming to			EN 676			
	Certification			CE 0085AQ0707	--		

Reference conditions:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.
Noise measured 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

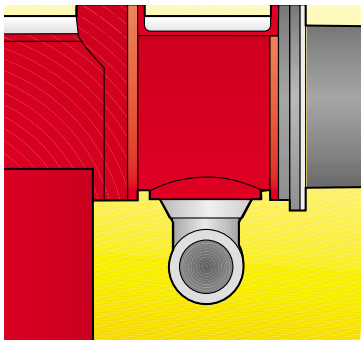
Test conditions conforming to EN 676:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.

FUEL SUPPLY

GAS TRAINS

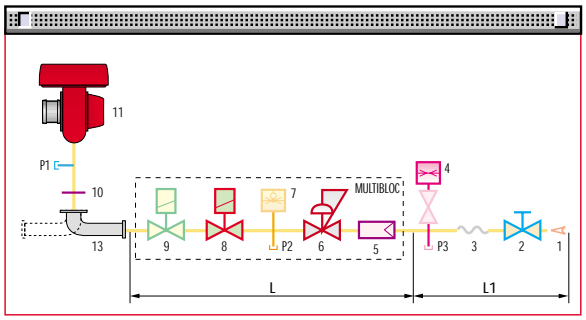
Fuel can be supplied either from the right or left hand sides.

The gas train can be selected to best fit system requirements depending on the fuel output and pressure in the supply line. The gas train can be "Multibloc " type (containing the main components in a single unit) or "Composed" type (assembly of the single components).

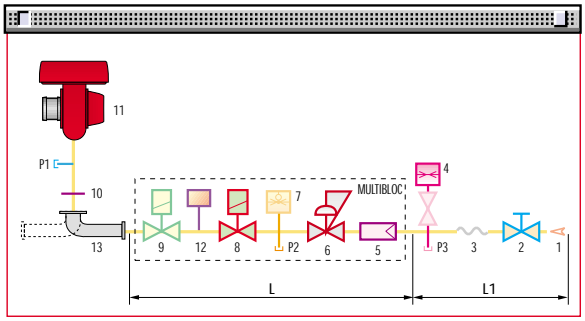


Example of the gas train connection flange of GAS burners.

MULTIBLOC gas train without seal control

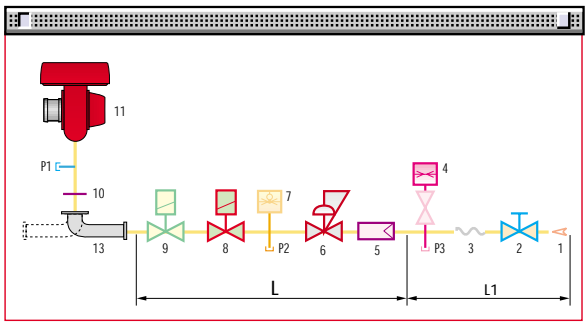


MULTIBLOC gas train with seal control

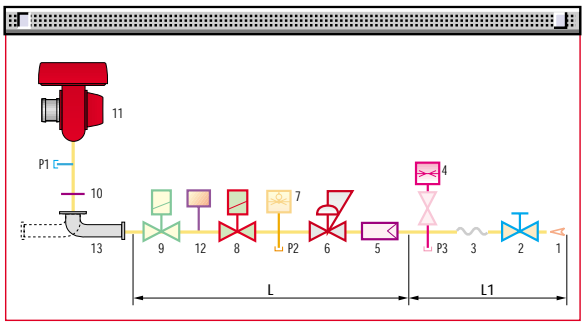


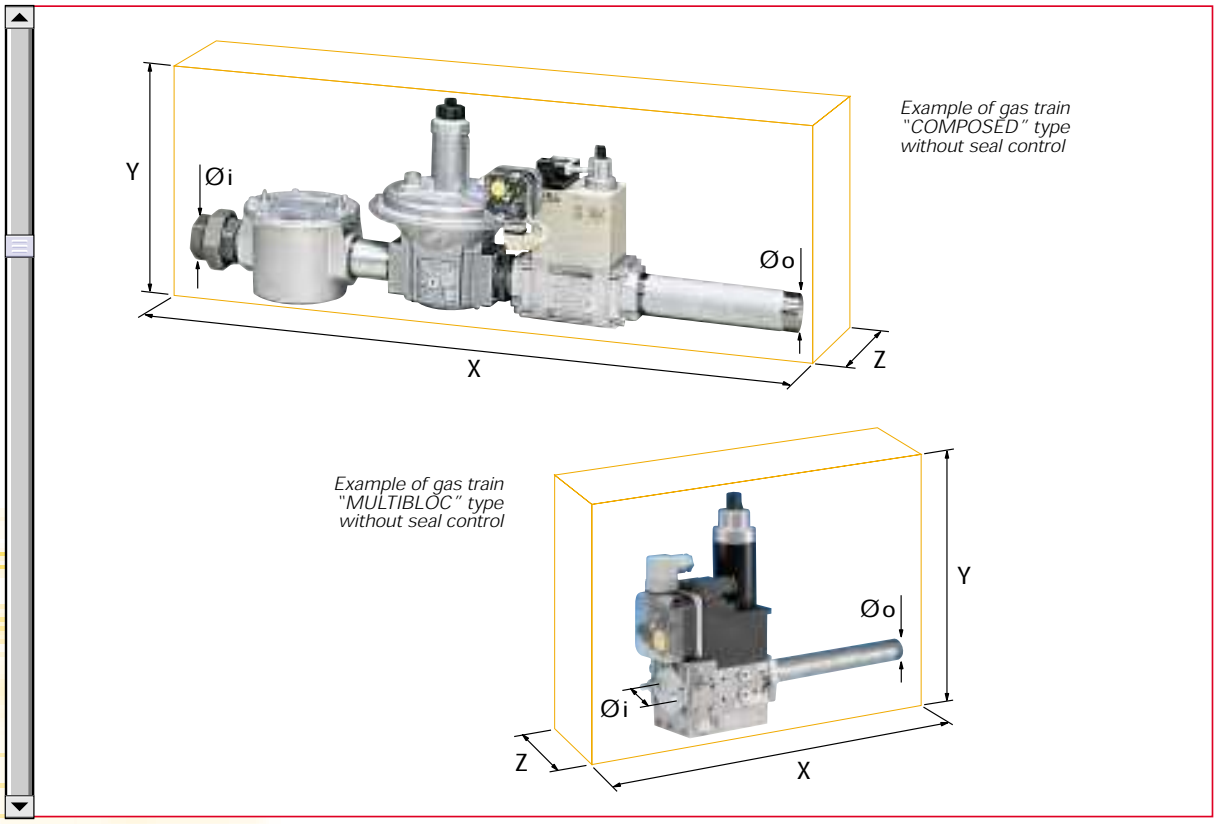
1	Gas input pipework
2	Manual valve
3	Anti-vibration joint
4	Pressure gauge with pushbutton cock
5	Filter
6	Pressure regulator (vertical)
7	Minimum gas pressure switch
8	VS safety solenoid (vertical)
9	VR regulation solenoid (vertical) Two settings: - firing output (rapid opening) - maximum output (slow opening)
10	Gasket and flange supplied with the burner
11	Burner
12	Seal control mechanism for valves 8-9. According to standard EN 676, the seal control is compulsory for burners with maximum output above 1200 kW
13	Gas train-burner adapter
P1	Combustion head pressure
P2	Pressure downstream from the regulator
P3	Pressure upstream from the filter
L	Gas train supplied separately, with the code given in the table
L1	Installer's responsibility

COMPOSED gas train without seal control



COMPOSED gas train with seal control





Gas trains are approved by standard EN 676 together with the burner.

The overall dimensions of the gas train depends on how they are constructed. The following table shows the maximum dimensions of the gas trains that can be fitted to the burners of GAS series, intake and outlet diameters and seal control if fitted.
Please note that the seal control can be installed as an accessory, if not already installed on the gas train.
The maximum gas pressure of gas train "Multibloc" type is 300 mbar, and that one of gas train "Composed" type is 500 mbar.

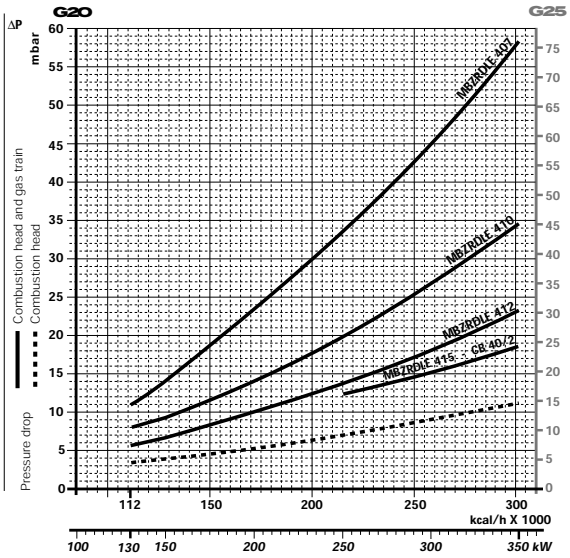
	Name	Code	Ø i	Ø o	X mm	Y mm	Z mm	Seal Control
MULTIBLOC GAS TRAINS	**MBZRDLE 407**	3970046	3/4"	3/4"	371	256	120	-
	MBZRDLE 410	3970079	1"	3/4"	405	315	145	-
	MBZRDLE 412	3970152	1"1/4	1"1/2	433	315	145	-
	MBZRDLE 415	3970183	1"1/2	1"1/2	523	350	100	-
	MBZRDLE 420	3970184	2"	2"	523	410	100	-
	MBZRDLE 420 CT	3970185	2"	2"	523	410	227	Incorporated
COMPOSED GAS TRAINS	**CB 40/2**	3970153	1"1/2	1"1/2	1013	345	195	-
	CB 50/2	3970154	2"	2"	1150	350	250	-
	CB 50/2 CT	3970166	2"	2"	1150	350	320	Incorporated
	CBF 65/2	3970155	DN 65	DN 65	1166	472	285	-
	CBF 65/2 CT	3970167	DN 65	DN 65	1166	472	390	Incorporated

PRESSURE DROP DIAGRAMS

The diagrams indicate the minimum pressure drop of the burners with the various gas trains that can be matched with them; at the value of these pressure drop add the combustion chamber pressure.
The value thus calculated represents the minimum required input pressure to the gas train.

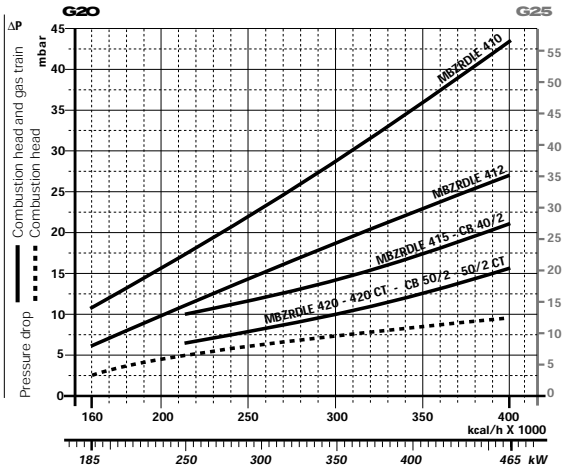
NATURAL GAS

GAS 3



Gas train	Code	Adapter	Seal Control
MBZRDLE 407	3970046	3000824	Accessory
MBZRDLE 410	3970079	3000824	Accessory
MBZRDLE 412	3970152	-	Accessory
MBZRDLE 415	3970183	-	Accessory
CB 40/2	3970153	-	Accessory

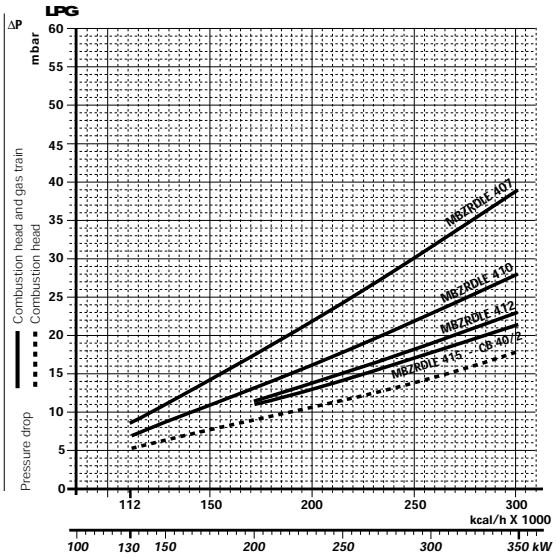
GAS 4



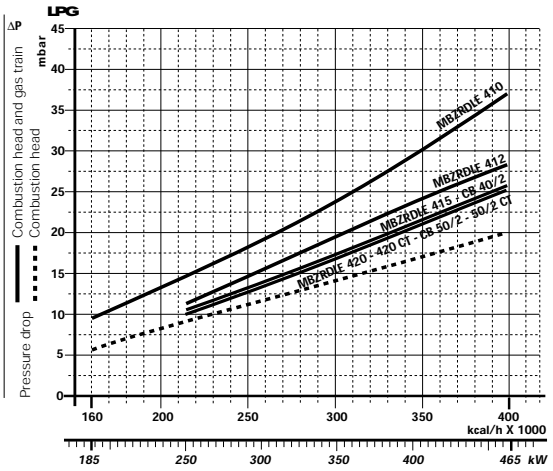
Gas train	Code	Adapter	Seal Control
MBZRDLE 410	3970079	3000824	Accessory
MBZRDLE 412	3970152	-	Accessory
CB 40/2	3970153	-	Accessory
MBZRDLE 415	3970183	-	Accessory

LPG

GAS 3



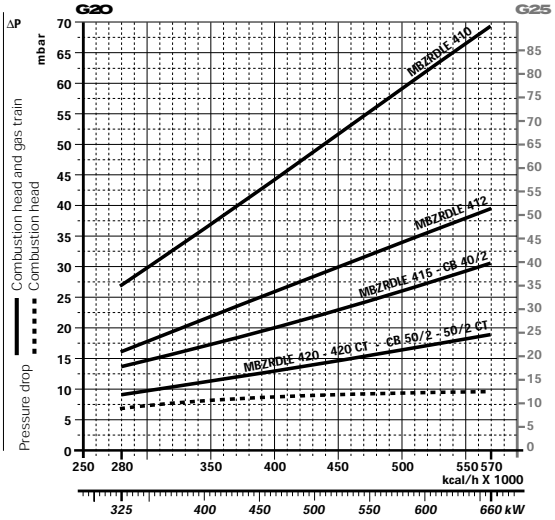
GAS 4



Gas train	Code	Adapter	Seal Control
CB 50/2	3970154	3000822	Accessory
CB 50/2 CT	3970166	3000822	Incorporated
MBZRDLE 420	3970184	3000822	Accessory
MBZRDLE 420 CT	3970185	3000822	Incorporated

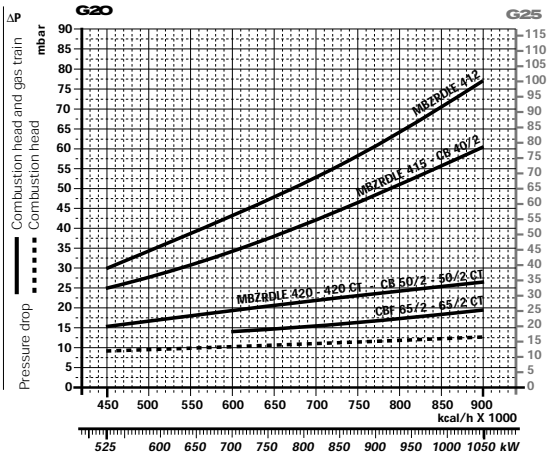
NATURAL GAS

GAS 5



Gas train	Code	Adapter	Seal Control
MBZRDLE 410	3970079	3000824	Accessory
MBZRDLE 412	3970152	-	Accessory
CB 40/2	3970153	-	Accessory
MBZRDLE 415	3970183	-	Accessory

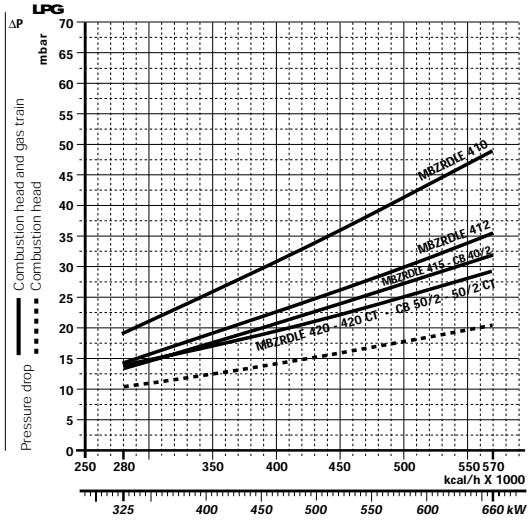
GAS 6



Gas train	Code	Adapter	Seal Control
MBZRDLE 410	3970079	3000824 3000843	Accessory
MBZRDLE 412	3970152	3000843	Accessory
CB 40/2	3970153	3000843	Accessory
MBZRDLE 415	3970183	-	Accessory
CB 50/2	3970154	-	Accessory

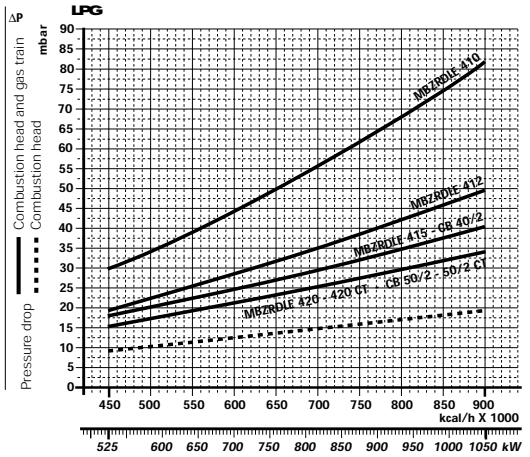
LPG

GAS 5



Gas train	Code	Adapter	Seal Control
CB 50/2	3970154	3000822	Accessory
CB 50/2 CT	3970166	3000822	Incorporated
MBZRDLE 420	3970184	3000822	Accessory
MBZRDLE 420 CT	3970185	3000822	Incorporated

GAS 6



Gas train	Code	Adapter	Seal Control
CB 50/2 CT	3970166	-	Incorporated
MBZRDLE 420	3970184	3000822	Accessory
MBZRDLE 420 CT	3970185	3000822	Incorporated
CBF 65/2	3970155	3000825	Accessory
CBF 65/2 CT	3970167	3000825	Incorporated

note *Please contact the Riello Burner Technical Office for different pressure levels from those above indicated.*

SELECTING THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

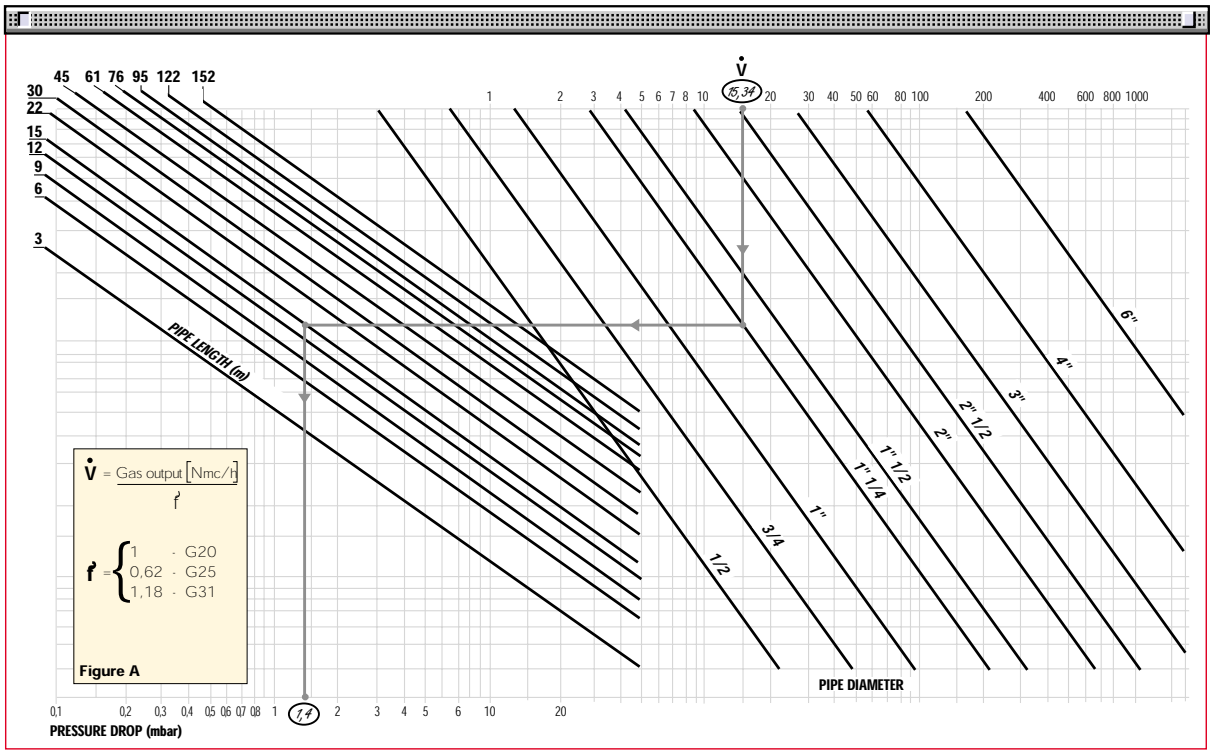
Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length. Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop of on the botton scale below (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

	- gas used	G25
	- gas output	9.51 mc/h
	- pressure at the gas meter	20 mbar
	- gas line length	15 m
	- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62}\right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;
- correct pressure = (20-1.4) = 18.6 mbar



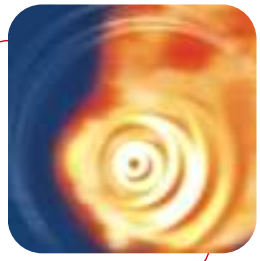
VENTILATION

The ventilation circuit produces low noise levels with high performance pressure and air output, in spite of the compact dimensions.

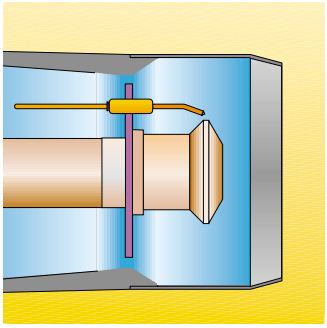
The air damper is easy to set; when fitted, it makes no difference to air delivery.

Example of fan air gate valve indexed selector of GAS burner

COMBUSTION HEAD

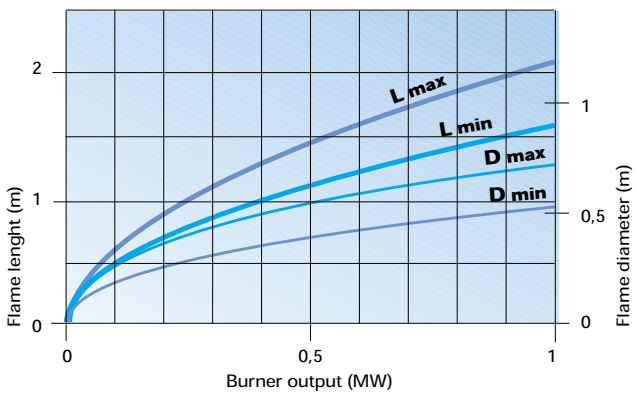


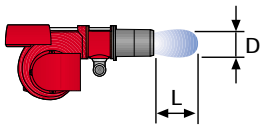
Different combustion head length can be selected for the various models of GAS series of burners.
The choice depends on the thickness of the front panel and type of boiler. Correct head penetration into the combustion chamber depends on the type of heat generator.
These burners are equipped with adjustable combustion head.
This enables optimum combustion performance throughout the working field, ensuring peak combustion efficiency thus saving on fuel consumption.
The following diagram shows the flame dimensions in relation to the burner output. The lengths and diameter shown in the diagram below should be employed for a preliminary check: if combustion chamber dimensions are different from the values in the diagram, further tests need to be done.



Example of a GAS burner combustion head

Flame dimensions





Example:
Burner thermal output = 500 kW;
L flame (m) = 1,3 m (medium value);
D flame (m) = 0,45 m (medium value)

ADJUSTMENT

BURNER OPERATION MODE

The burner of GAS series is one stage working.
On "one stage" operation, the burner adjusts output to the requested level, by varying between on-off phases (see figure A).

One stage operation

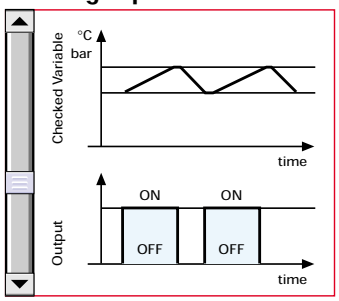


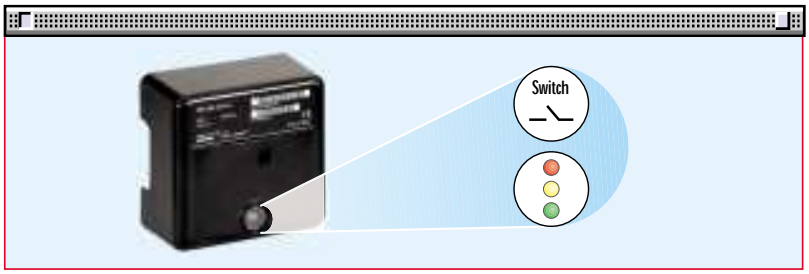
Figure A

All GAS series burners are fitted with a new microprocessor control panel for the supervision during intermittent operation.
For helping the commissioning and maintenance work, there are two main elements:

The lock-out reset button is the central **operating element** for resetting the burner control and for activating / deactivating the diagnostic functions.

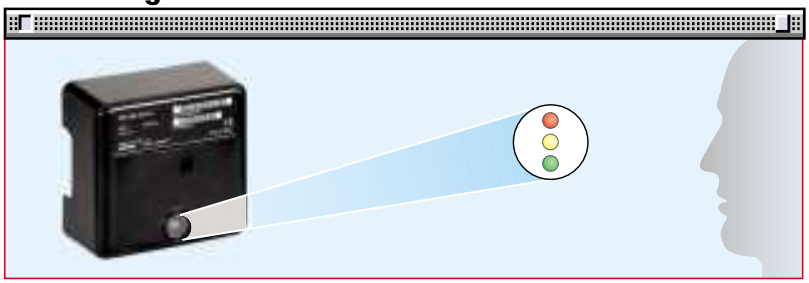
The multi-color LED is the central **indication element** for visual diagnosis and interface diagnosis.

Both elements are located under the transparent cover of lock-out reset button, as showed below.

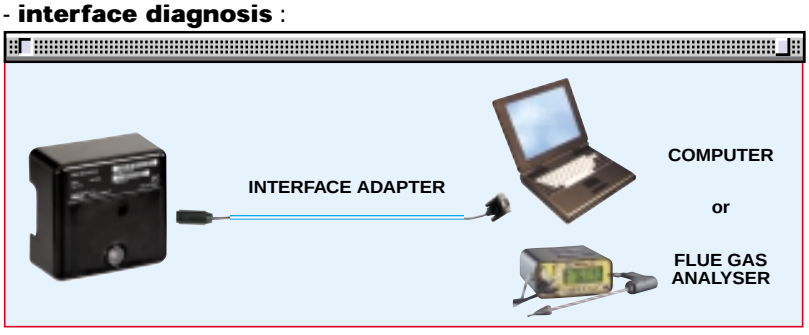


There are two diagnostic choices, for indication of operation and diagnosis of fault cause:

- **visual diagnosis** :



- **interface diagnosis** :



by the interface adapter and a PC with dedicated software or by a predisposed flue gas analyzer (see paragraph accessories).

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**

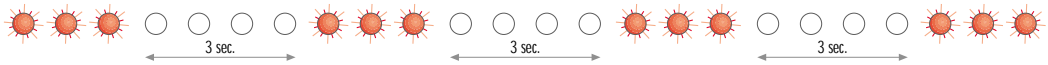
Diagnosis of fault causes :

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)

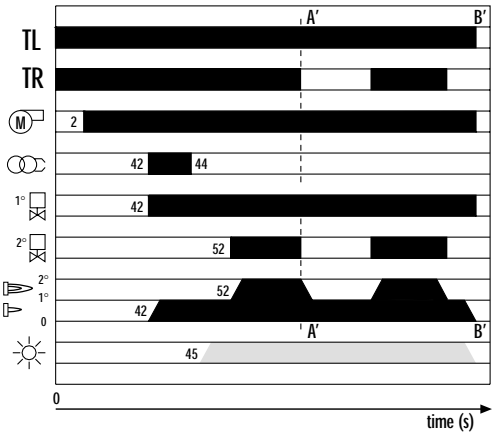
○ **LED off**



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	✹ ✹ ✹
Extraneous light or 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

GAS 3 - 4 - 5 - 6



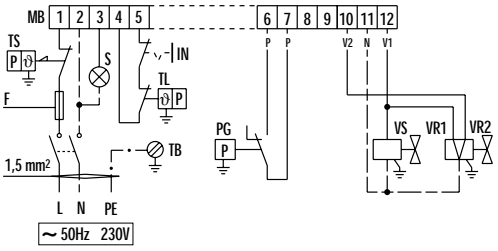
0 s The burner begins the firing cycle.
2 s The motor starts: pre-purge phase.
42 s Ignition electrode sparks; the safety valve and the firing delivery valve opens.
45 s Lock out signal is activated if flame is not revealed by the flame detector.
52 s The working valve opens; the start up cycle is concluded.

WIRING DIAGRAMS

Electrical connections must be made by qualified and skilled personnel, according to the local norms.

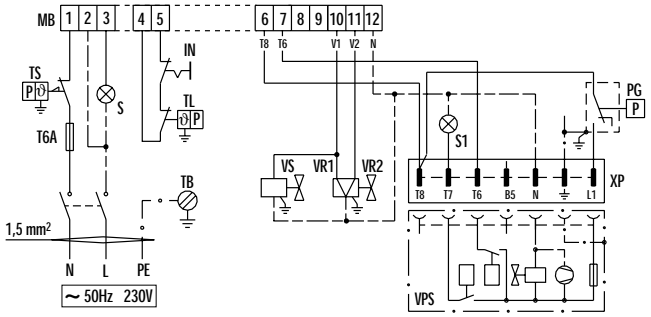
ONE STAGE OPERATION - Single-phase power supply

GAS 3 - 4
Without seal control



MB - Burner terminal board
TS - Safety thermostat
TL - Threshold thermostat
PG - Minimum gas pressure switch
S - External lock-out signal
TB - Burner ground (earth) connection
IN - Manual switch
F - Fuse (see table A)
VR1 - 1st adjustment valve
VR2 - 2nd adjustment valve
VS - Safety valve

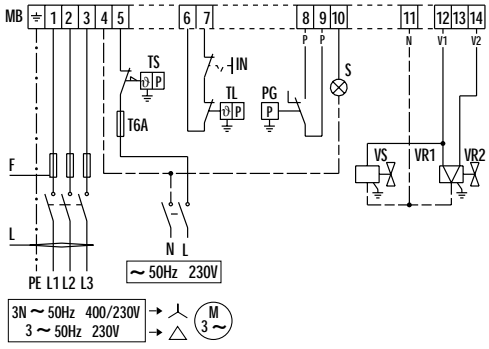
GAS 3 - 4
With seal control



MB - Burner terminal board
TS - Safety thermostat
TL - Threshold thermostat
PG - Minimum gas pressure switch
S - External lock-out signal
S1 - External lock-out signal on the seal control
TB - Burner ground (earth) connection
IN - Manual switch
T6A - 6A fuse
VR1 - 1st adjustment valve
VR2 - 2nd adjustment valve
VS - Safety valve
VPS - Seal control
XP - Seal control plug

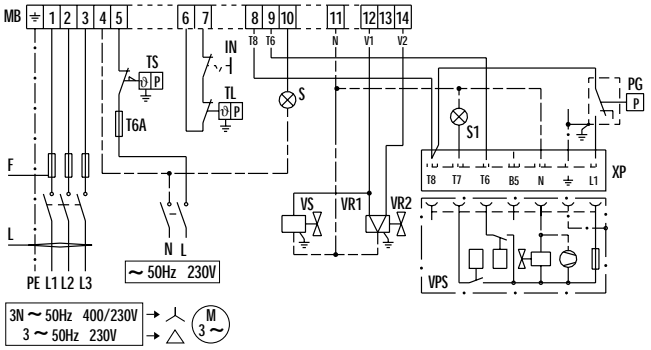
ONE STAGE OPERATION - Triple-phase power supply

GAS 5 - 6
Without seal control



MB - Burner terminal board
TS - Safety thermostat
TL - Threshold thermostat
PG - Minimum gas pressure switch
S - External lock-out signal
IN - Manual switch
T6A - 6A fuse
F - Fuse (see table A)
L - Lead section (see table A)
VR1 - 1st adjustment valve
VR2 - 2nd adjustment valve
VS - Safety valve

GAS 5 - 6
With seal control

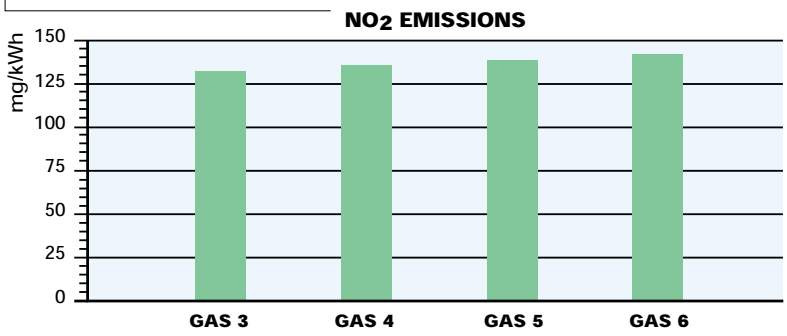


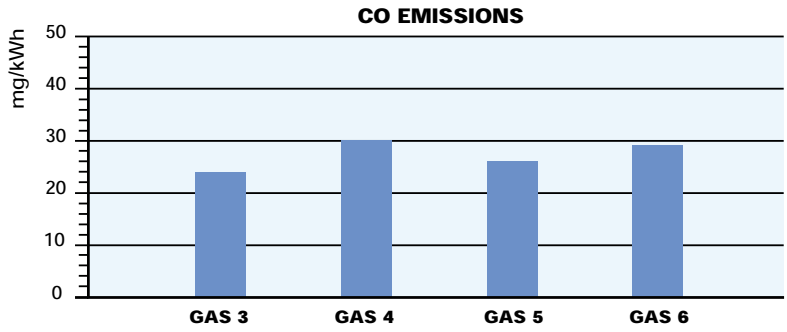
MB - Burner terminal board
TS - Safety thermostat
TL - Threshold thermostat
PG - Minimum gas pressure switch
S - External lock-out signal
S1 - External lock-out signal on the seal control
IN - Manual switch
T6A - 6A fuse
F - Fuse (see table A)
L - Lead section (see table A)
VR1 - 1st adjustment valve
VR2 - 2nd adjustment valve
VS - Safety valve
VPS - Seal control
XP - Seal control plug

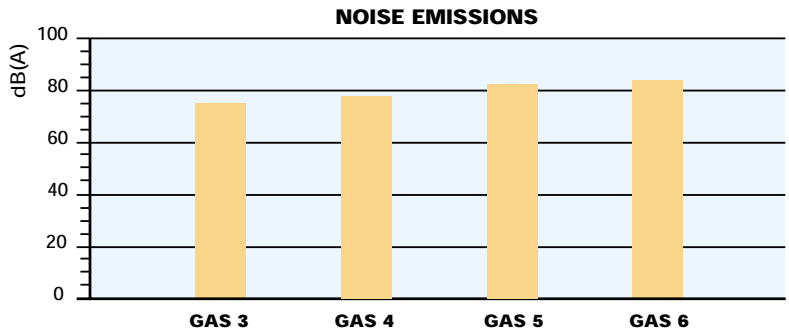
The following table shows the supply lead sections and the type of fuse to be used.

Model		GAS 3	GAS 4	GAS 5		GAS 6	
		230V	230V	230V	400V	230V	400V
F	A	T5	T6	T6	T6	T16	T10
L	mm²	1,5	1,5	1,5	1,5	1,5	1,5

EMISSIONS





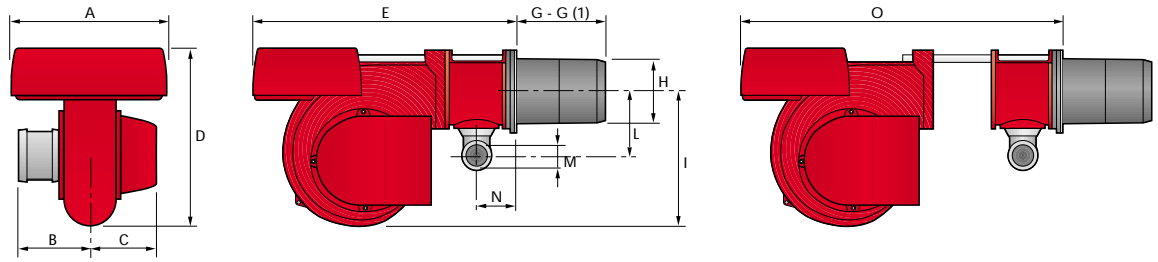


The emission data has been measured in the various models at maximum output, according to EN 676 standard.

OVERALL DIMENSIONS (mm)

BURNERS

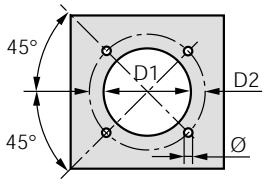
GAS 3 - 4 - 5 - 6



Model	A	B	C	D	E	G - G (1)	H	I	L	M	N	O
GAS 3	410	205	205	397	610	185 - 320	140	292	165	1"1/2	97	775
GAS 4	410	205	205	397	610	187 - 320	150	292	165	1"1/2	97	775
GAS 5	431	226	205	437	645	207 - 365	155	332	165	1"1/2	97	810
GAS 6	463	258	205	485	770	227 - 360	175	370	195	2"	131	966

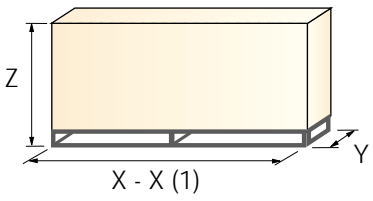
(1) Length with extended combustion head

BURNER - BOILER MOUNTING FLANGE



Model	D1	D2	Ø
GAS 3	155	226	M10
GAS 4	165	226	M10
GAS 5	165	226	M10
GAS 6	185	276	M12

PACKAGING



Model	X - X (1)	Y	Z	kg
GAS 3	850	545	473	32
GAS 4	850	545	473	38
GAS 5	895	543	520	41
GAS 6	1045	543	555	58

(1) Length with extended combustion head

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel.
All operations must be performed in accordance with the technical handbook supplied with the burner.

BURNER SETTING

- All the burners have slide bars, for easier installation and maintenance.
- After drilling the boilerplate, using the supplied gasket as a template, dismantle the blast tube from the burner and fix it to the boiler.
- Adjust the combustion head.
- Fit the gas train, choosing this on the basis of the maximum output of the boiler and considering the enclosed diagrams.
- Refit the burner casing to the slide bars.
- Close the burner, sliding it up to the flange.

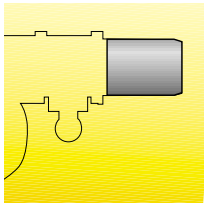
ELECTRICAL CONNECTIONS AND START UP

- Make the electrical connections to the boiler following the wiring diagrams included in the instruction handbook.
- Perform a first ignition calibration on the gas train.
- On start up, check:
  - Gas pressure at the combustion head (to max. and min. output)
  - Combustion quality, in terms of unburned substances and excess air.

BURNER ACCESSORIES

Extended head kit

"Standard head" burners can be transformed into "extended head" versions, by using the special kit. The KITS available for the various burners, giving the original and the extended lengths, are listed below.



Extended head kit			
Burner	**Standard head length (mm)**	**Extended head length (mm)**	**Kit code**
GAS 3	185	320	**3000605**
GAS 4	187	320	**3000606**
GAS 5	207	365	**3000607**
GAS 6	227	360	**3000608**

Spacer kit

If burner head penetration into the combustion chamber needs reducing, varying thickness spacers are available, as given in the following table:

Spacer kit		
Burner	**Spacer thickness S (mm)**	**Kit code**
GAS 3 - 4 - 5 - 6	142	**3000755**

Continuous ventilation kit

If the burner requires continuous ventilation in the stages without flame, a special kit is available as given in the following table:

Continuous ventilation kit	
Burner	**Kit code**
GAS 3 - 4 - 5 - 6	**3010030**

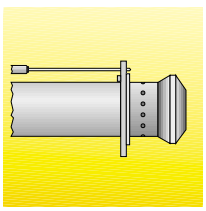
Sound proofing box

If noise emission needs reducing even further, sound-proofing boxes are available, as given in the following table:

Sound proofing box		
Burner	**Box type**	**Box code**
GAS 3 - 4 - 5	C2	**3000777**
GAS 6	C3	**3000778**

LPG kit

For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner, as given in the following table:



LPG kit		
Burner	**Kit code for standard head**	**Kit code for extended head**
GAS 3	**3000657**	**3000807**
GAS 4	**3000658**	**3000808**
GAS 5	**3000659**	**3000809**
GAS 6	**3000753**	**3000810**

Interface adapter kit

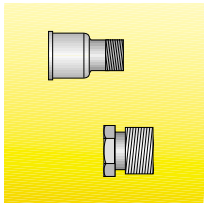
To connect the flame control panel to a personal computer for the transmission of operation, fault signals and detailed service information, an interface adapter with PC software are available.

Interface adapter	
Burner	**Kit code**
GAS 3 - 4 - 5 - 6	**in progress**

GAS TRAIN ACCESSORIES

Adapters

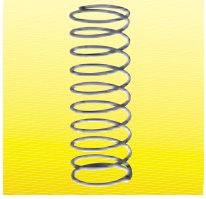
When the diameter of the gas train is different from the set diameter of the burners, an adapter must be fitted between the gas train and the burner. The following table lists the adapters for various burners.



Adapters			
Burner	**Gas train**	**Dimensions**	**Adapter code**
GAS 3	MBZRDLE 407 - 410	3/4" 1" 1/2	**3000824**
GAS 4	MBZRDLE 410	3/4" 1" 1/2	**3000824**
	MBZRDLE 420 - CB 50/2	2" 1" 1/2	**3000822**
GAS 5	MBZRDLE 410	3/4" 1" 1/2	**3000824**
	MBZRDLE 420 - CB 50/2	2" 1" 1/2	**3000822**
GAS 6	MBZRDLE 410	3/4" 1" 1/2 1" 1/2 2"	**3000824** **3000843**
	MBZRDLE 412 - 415 - CB 40/2	1" 1/2 2"	**3000843**
	CBF 65/2	DN 65 2"1/2 1" 1/2 2"	**3000825**

Stabiliser spring

Accessory springs are available to vary the pressure range of the gas train stabilisers. The following table shows these accessories with their application range.



Stabiliser springs		
Gas train	**Spring**	**Code**
CBF 65/2	Red from 25 to 55 mbar	**3010133**
CBF 65/2	Black from 60 to 110 mbar	**3010135**
CBF 65/2	Pink from 90 to 150 mbar	**3090456**

Please refer to the technical manual for the correct choice of spring.

Seal control kit
To test the valve seals on the gas train, a special "seal control kit" is available. The valve seal control device is compulsory (EN 676) on gas trains to burners with a maximum output over 1200 kW. The sealing control is type VPS 504.

Seal control kit		
Burner	**Gas train**	**Kit code**
GAS 3	MBZRDLE 407 - 410 - 412	**3010123**
	MBZRDLE 415 - CB 40/2	**3010125**
GAS 4	MBZRDLE 410 - 412	**3010123**
	MBZRDLE 415 - 420 - CB 40/2 - 50/2	**3010125**
GAS 5	MBZRDLE 410 - 412	**3010123**
	MBZRDLE 415 - 420 - CB 40/2 - 50/2	**3010125**
GAS 6	MBZRDLE 410 - 412	**3010123**
	MBZRDLE 415 - 420 - CB 40/2 - 50/2 - 65/2	**3010125**

SPECIFICATION

A specific index guides your choice of burner from the various models available in the GAS series.
Below is a clear and detailed specification description of the product.

DESIGNATION OF SERIES

Series : GAS

Size

Operation :
- ... One stage
- /2 Two stage
- P/M Modulating

Emission : ... Class 1 - EN676

Head :
- TC Standard head
- TL Extended head

Flame control system:
- FS1 Standard (1 stop every 24 h)
- FS2 Continuous working (1 stop every 72 h)

Electrical supply to the system :

1/230/50	1/230V/50Hz
1/240/50	1/240V/50Hz
1/220/60	1/220V/60Hz
1/200/50-60	1/200V/50-60Hz
3/230-400/50	3/230V/50Hz - 3N/400V/50Hz
3/220-380/60	3/220V/60Hz - 3N/380V/60Hz
3/200/50-60	3/200V/50-60Hz

Auxiliary voltage :

230/50	230V/50Hz
240/50	240V/50Hz
220/60	220V/60Hz
200/50-60	200V/50-60Hz

GAS	6			TC	FS1	3/230-400/50	230/50

BASIC DESIGNATION

EXTENDED DESIGNATION

AVAILABLE BURNER MODELS

GAS 3	TC	FS1	1/200/50-60	200/50-60
GAS 3	TC	FS1	1/220/60	220/60
GAS 3	TC	FS1	1/230/50	230/50
GAS 3	TC	FS1	1/240/50	240/50
GAS 3	TL	FS1	1/240/50	240/50
GAS 4	TC	FS1	1/230/50	230/50
GAS 4	TC	FS1	3/200/50-60	200/50-60
GAS 4	TC	FS1	3/220-380/60	220/60
GAS 5	TC	FS1	3/200/50-60	200/50-60
GAS 5	TC	FS1	3/220-380/60	220/60
GAS 5	TC	FS1	3/230-400/50	230/50
GAS 6	TC	FS1	3/200/50-60	200/50-60
GAS 6	TC	FS1	3/220-380/60	220/60
GAS 6	TC	FS1	3/230-400/50	230/50

Other versions are available on request.

PRODUCT SPECIFICATION

Burner:
Monoblock forced draught gas burner with one stage operation, fully automatic, made up of:
- Air suction circuit
- Fan with forward curve blades high performance concerning pressure and air delivery
- Air damper for air setting
- Starting motor at 2800 rpm
- Combustion head, that can be set on the basis of required output, fitted with:
    - stainless steel end cone, resistant to corrosion and high temperatures
    - ignition electrodes
    - ionisation probe
    - gas distributor
    - flame stability disk
- Minimum air pressure switch stops the burner in case of insufficient air quantity at the combustion head
- Microprocessor-based flame control panel with diagnostic functions
- Terminal strip for electrical connections
- Slide bars for easier installation and maintenance
- Protection filter against radio interference
- IP 44 electric protection level.

Gas train
Fuel supply line, in the MULTIBLOC configuration (from a diameter of 3/4" until a diameter 2") or COMPOSED configuration (from a diameter of DN 40 until a diameter of DN 65), fitted with:
- Filter
- Stabiliser
- Minimum gas pressure switch
- Safety valve
- One stage or two stage working valve with ignition gas output regulator.

Conforming to:
- 89/336/EEC directive (electromagnetic compatibility)
- 73/23/EEC directive (low voltage)
- 92/42/EEC directive (performance)
- 90/396/EEC directive (gas)
- EN 676 (gas burners).

Standard equipment:
- 1 gas train gasket
- 1 flange gasket
- 4 screws for fixing the flange
- 1 thermal screen
- 4 screws for fixing the burner flange to the boiler
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- Extended head kit
- Spacer kit
- Continuous ventilation kit
- Sound-proofing box
- LPG kit
- Interface adapter kit
- Gas train adapter
- Stabiliser spring
- Seal control kit.

Lineagrafica

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RIELLO BURNERS

CE

ONE STAGE GAS BURNERS

RS/1 SERIES			
▸ **RS 28/1**	163 ÷	349 kW
▸ **RS 38/1**	232 ÷	465 kW

The RS/1 series of burners covers a firing range from 163 to 465 kW, and they have been designed for use in hot or superheater water boilers, hot air or steam generators, diathermic oil boilers.
Setting is "one stage"; optimisation of sound emissions is guaranteed by the use of fans with forward inclined blades and sound deadening material incorporated in the air suction circuit.
The elevated performance of the fans and combustion head, guarantee flexibility of use and excellent working at all firing rates.
The exclusive design ensures reduced dimensions, simple use and maintenance. A wide range of accessories guarantees elevated working flexibility.

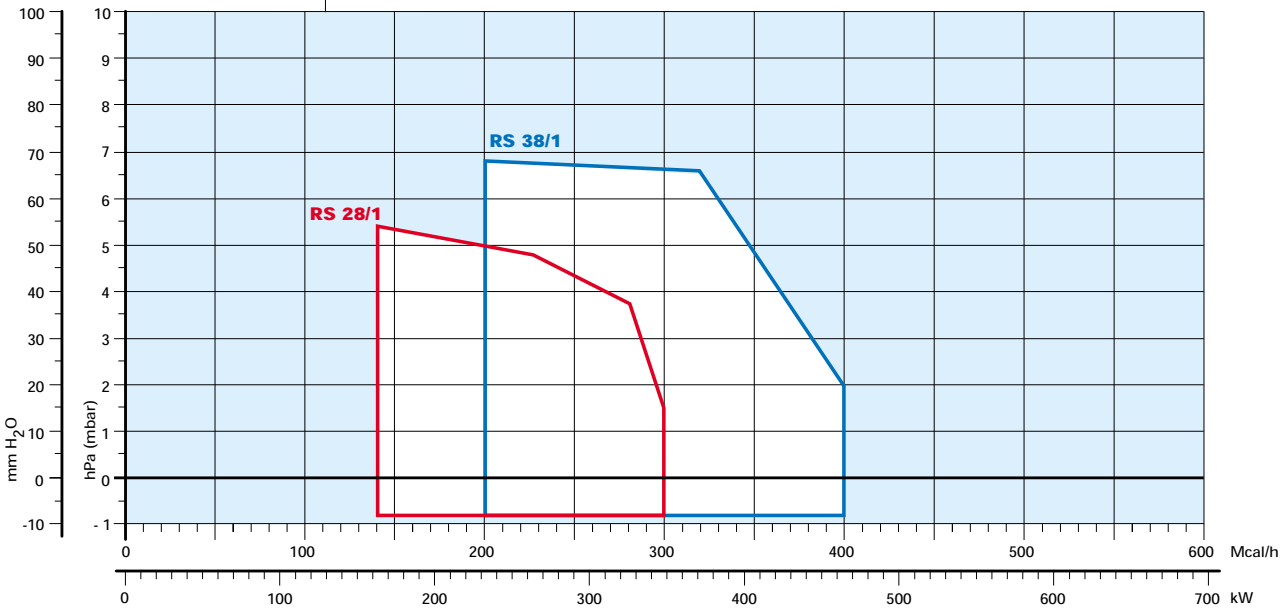
TECHNICAL DATA

				RS 28/1	RS 38/1
	Burner operation mode			One stage	
	Modulation ratio at max. output			--	
	Servo-motor	Type		--	
		Run time	s	--	
	Heat output		kW	163÷349	232÷465
			Mcal/h	140÷300	200÷400
	Working temperature		°C min./max.	0/40	
Fuel / air data	Net calorific value gas G20		kWh/Nmc	10	
	Density gas G20		kg/Nmc	0,71	
	Output gas G20		Nmc/h	16÷35	23÷46,5
	Net calorific value gas G25		kWh/Nmc	8,6	
	Density gas G25		kg/Nmc	0,78	
	Output gas G25		Nmc/h	19÷41	27÷54
	Net calorific value LPG gas		kWh/Nmc	25,8	
	Density LPG gas		kg/Nmc	2,02	
	Output LPG gas		Nmc/h	6,5÷13,5	9÷18
	Fan		Type	centrifugal with reverse curve blades	
	Air temperature		Max. °C	60	
Electrical data	Electrical supply		Ph/Hz/V	1/50/230~(±10%)	
	Auxiliary electrical supply		Ph/Hz/V	1/50/230 ~ (±10%)	
	Control box		Type	MMI 813	
	Total electrical power		kW	0,37	0,60
	Auxiliary electrical power		kW	0,12	0,12
	Protection level		IP	44	
	Motor electrical power		kW	0,25	0,42
	Rated motor current		A	2,1	2,9
	Motor start current		A	4,8	11
	Motor protection level		IP	54	
	Ignition transformer		V1 - V2	230V - 1x8 kV	
			I1 - I2	1A - 20 mA	
	Working			Intermittent (at least one stop every 24 h)	
Emissions	Sound pressure		dBA	68	70
	Sound output		W	--	--
	CO Emission		mg/kWh	< 40	
	NOx Emission		mg/kWh	< 130	
Approval	Directive			90/396 - 89/336 - 73/23 - 92/42 EEC	
	Conforming to			EN 676	
	Certification			CE 63AP6680	

Reference conditions:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.
Noise measured 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

Modulation range

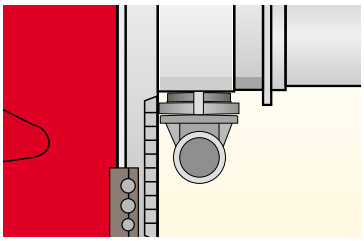
Test conditions conforming to EN 676:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.

FUEL SUPPLY

GAS TRAINS

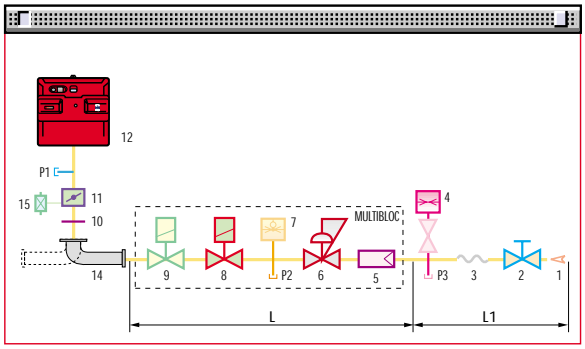
Fuel can be supplied either from the right or left hand sides.

The gas train can be selected to best fit system requirements depending on the fuel output and pressure in the supply line.
The gas train can be "Multibloc " type (containing the main components in a single unit) or "Composed" type (assembly of the single components).
The gas train can be, also, "One stage" or "Two stage" type. One stage gas train can be used on RS28/1 for all firing rates, and on RS38/1 up to a capacity of 350 kW.

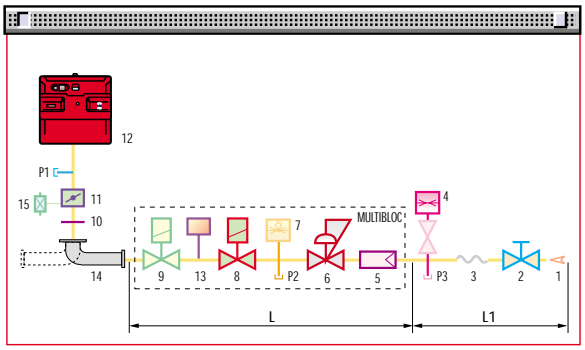


Example of the gas train connection flange of RS/1 burners.

MULTIBLOC gas train without seal control

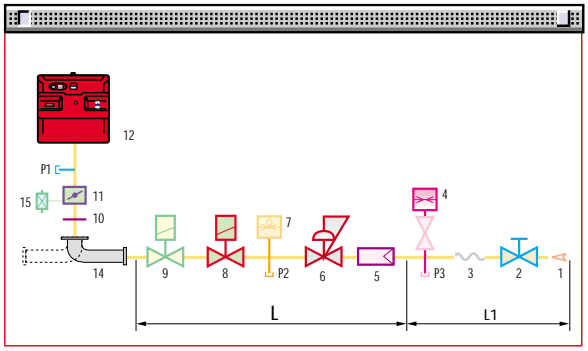


MULTIBLOC gas train with seal control

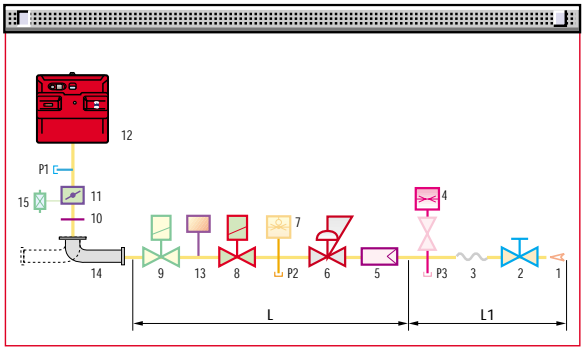


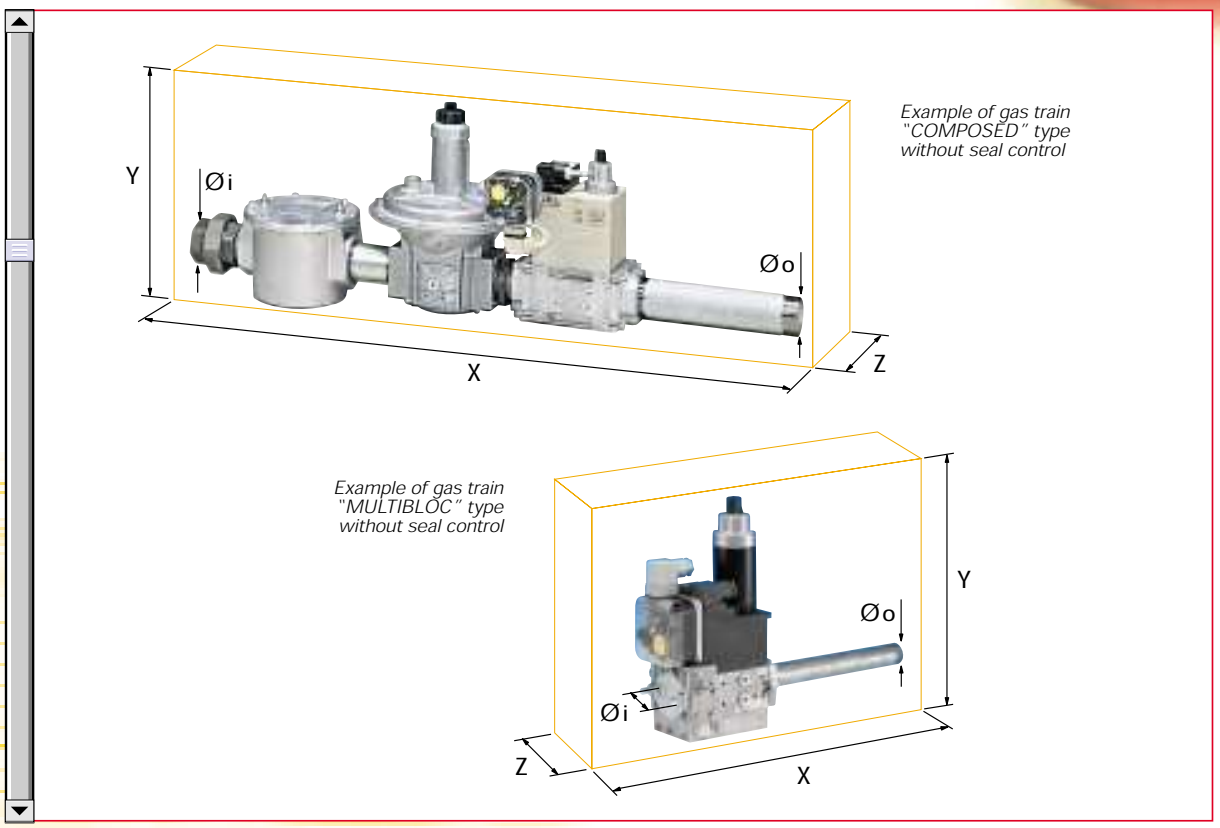
1	Gas input pipework
2	Manual valve
3	Anti-vibration joint
4	Pressure gauge with pushbutton cock.
5	Filter
6	Pressure regulator (vertical)
7	Minimum gas pressure switch
8	VS safety solenoid (vertical)
9	VR regulation solenoid (vertical) Two settings: - firing output (rapid opening) - maximum output (slow opening)
10	Gasket and flange supplied with the burner
11	Gas adjustment butterfly valve
12	Burner
13	Seal control mechanism for valves 8-9. According to standard EN 676, the seal control is compulsory for burners with maximum output above 1200 kW.
14	Gas train-burner adapter.
15	Maximum gas pressure switch
P1	Combustion head pressure
P2	Pressure downstream from the regulator
P3	Pressure upstream from the filter
L	Gas train supplied separately, with the code given in the table
L1	Installer' s responsibility

COMPOSED gas train without seal control



COMPOSED gas train with seal control





Gas trains are approved by standard EN 676 together with the burner.

The overall dimensions of the gas train depends on how they are constructed. The following table shows the maximum dimensions of the gas trains that can be fitted to RS/1 burners, intake and outlet diameters and seal control if fitted.
Please note that the seal control can be installed as an accessory, if not already installed on the gas train.
The maximum gas pressure of gas train "Multibloc" type is 300 mbar, and that one of gas train "Composed" type is 500 mbar.

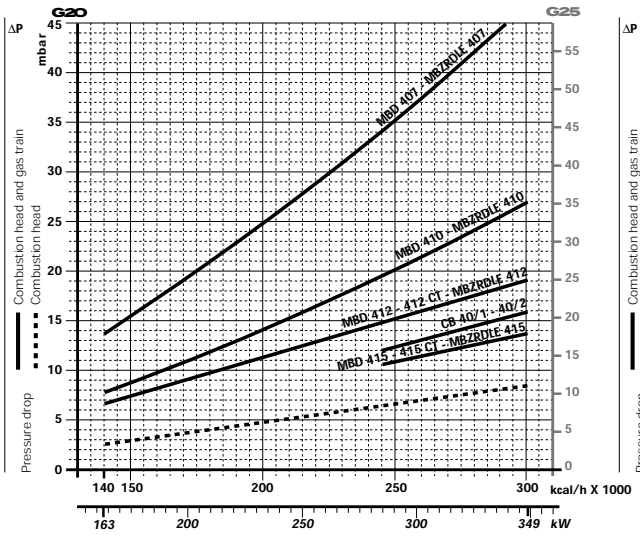
		Name	Code	Ø i	Ø o	X mm	Y mm	Z mm	Seal Control
ONE STAGE GAS TRAINS	MULTIBLOC GAS TRAINS	**MBD 407**	3970076	3/4"	3/4"	371	196	120	-
		MBD 410	3970077	1"	3/4"	405	217	145	-
		MBD 412	3970144	1"1/4	1"1/2	433	217	145	-
		MBD 412 CT	3970197	1"1/4	1"1/2	433	217	262	Incorporated
		MBD 415	3970180	1"1/2	1"1/2	523	250	100	-
		MBD 415 CT	3970198	1"1/2	1"1/2	523	250	227	Incorporated
		MBD 420	3970181	2"	2"	523	300	100	-
		MBD 420 CT	3970182	2"	2"	523	300	227	Incorporated
	COMPOSED GAS TRAINS	**CB 40/1**	3970145	1"1/2	1"1/2	891	261	195	-
		CB 50/1	3970146	2"	2"	986	328	250	-
		CB 50/1 CT	3970160	2"	2"	986	328	320	Incorporated
TWO STAGE GAS TRAINS	MULTIBLOC GAS TRAINS	**MBZRDLE 407**	3970046	3/4"	3/4"	371	256	120	-
		MBZRDLE 410	3970079	1"	3/4"	405	315	145	-
		MBZRDLE 412	3970152	1"1/4	1"1/2	433	315	145	-
		MBZRDLE 415	3970183	1"1/2	1"1/2	523	350	100	-
		MBZRDLE 420	3970184	2"	2"	523	410	100	-
		MBZRDLE 420 CT	3970185	2"	2"	523	410	227	Incorporated
	COMPOSED GAS TRAINS	**CB 40/2**	3970153	1"1/2	1"1/2	1013	345	195	-
		CB 50/2	3970154	2"	2"	1150	350	250	-
		CB 50/2 CT	3970166	2"	2"	1150	350	320	Incorporated

PRESSURE DROP DIAGRAMS

The diagrams indicate the minimum pressure drop of the burners with the various gas trains that can be matched with them; at the value of these pressure drop add the combustion chamber pressure.
The value thus calculated represents the minimum required input pressure to the gas train.

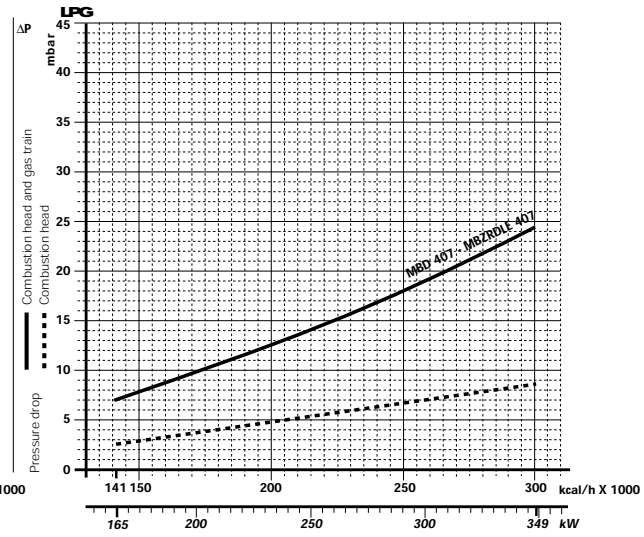
NATURAL GAS

RS 28/1



LPG

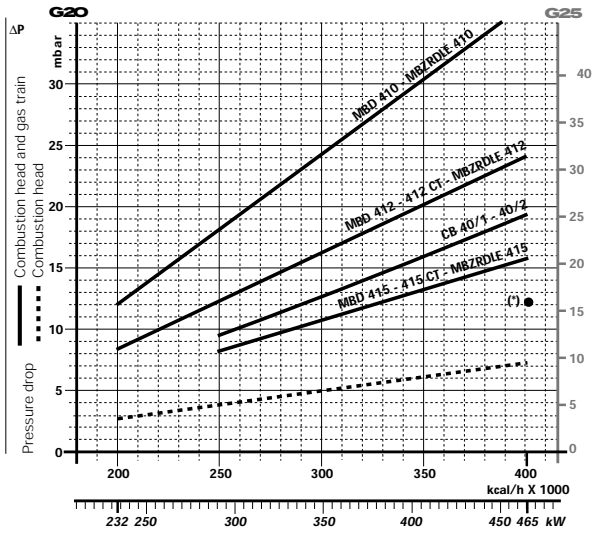
RS 28/1



Gas train	Code	Adapter	Seal Control
MBD 407	3970076	3000824	Accessory
MBZRDLE 407	3970046	3000824	Accessory
MBD 410	3970077	3000824	Accessory
MBZRDLE 410	3970079	3000824	Accessory
MBD 412	3970144	-	Accessory
MBD 412 CT	3970197	-	Incorporated
MBZRDLE 412	3970152	-	Accessory
MBD 415	3970180	-	Accessory
MBD 415 CT	3970198	-	Incorporated
MBZRDLE 415	3970183	-	Accessory
CB 40/1	3970145	-	Accessory
CB 40/2	3970153	-	Accessory

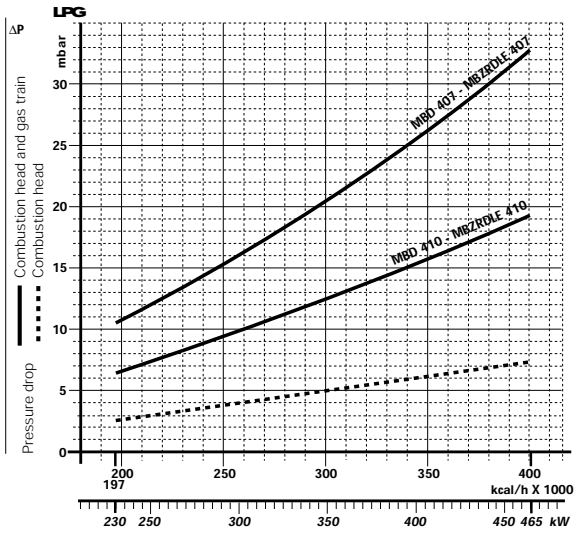
NATURAL GAS

RS 38/1



LPG

RS 38/1



(*) MBD 420 - MBD 420 CT - MBZRDLE 420 - MBZRDLE 420 CT - CB 50/1 - CB 50/1 CT - CB 50/2 - CB 50/2 CT

Gas train	Code	Adapter	Seal Control
MBD 407	3970076	3000824	Accessory
MBZRDLE 407	3970046	3000824	Accessory
MBD 410	3970077	3000824	Accessory
MBZRDLE 410	3970079	3000824	Accessory
MBD 412	3970144	-	Accessory
MBD 412 CT	3970197	-	Incorporated
MBZRDLE 412	3970152	-	Accessory
CB 40/1	3970145	-	Accessory
CB 40/2	3970153	-	Accessory
MBD 415	3970180	-	Accessory
MBD 415 CT	3970198	-	Incorporated
MBZRDLE 415	3970183	-	Accessory
CB 50/1	3970146	3000822	Accessory
CB 50/1 CT	3970160	3000822	Incorporated
CB 50/2	3970154	3000822	Accessory
CB 50/2 CT	3970166	3000822	Incorporated
MBD 420	3970181	3000822	Accessory
MBD 420 CT	3970182	3000822	Incorporated
MBZRDLE 420	3970184	3000822	Accessory
MBZRDLE 420 CT	3970185	3000822	Incorporated

note *Please contact the Riello Burner Technical Office for different pressure levels from those above indicated.*

SELECTING THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

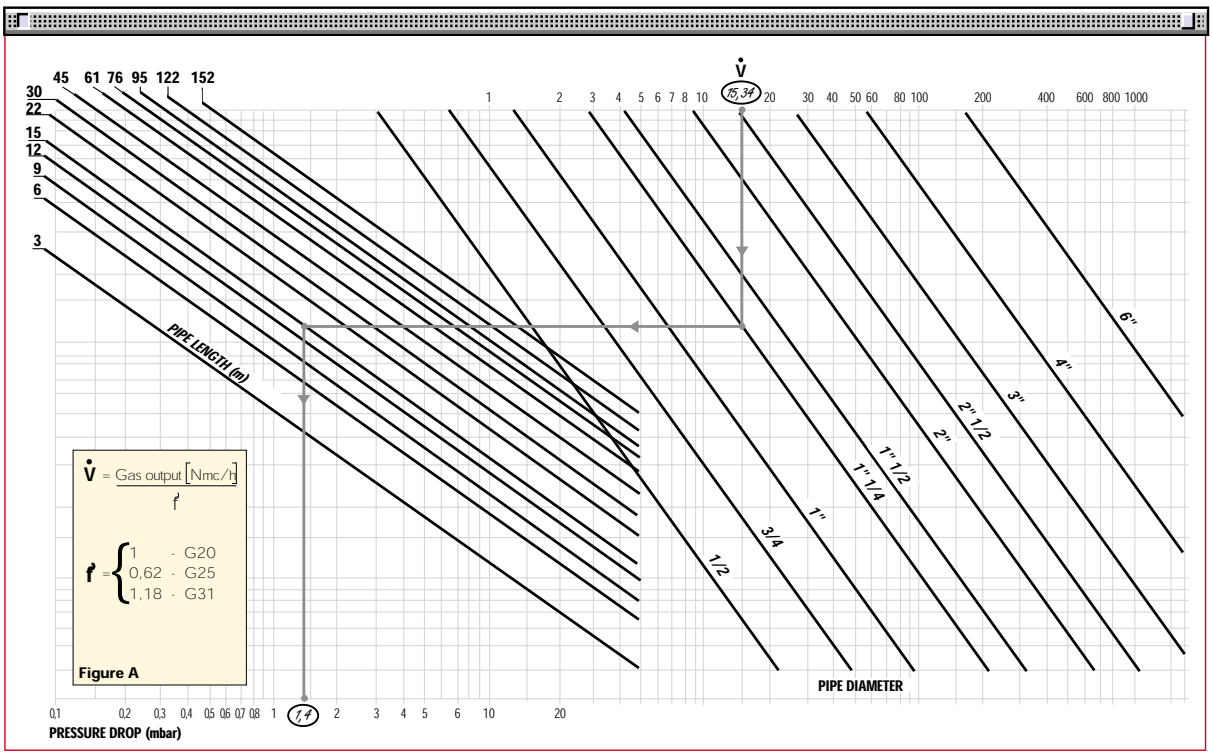
Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length. Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop of on the botton scale below (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

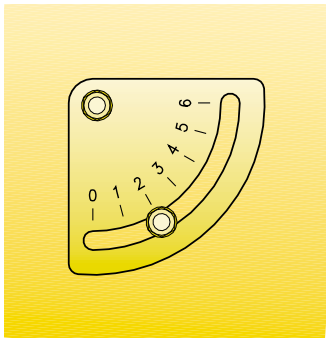
Example:

	- gas used	G25
	- gas output	9.51 mc/h
	- pressure at the gas meter	20 mbar
	- gas line length	15 m
	- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62} \right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;
- correct pressure = (20-1.4) = 18.6 mbar



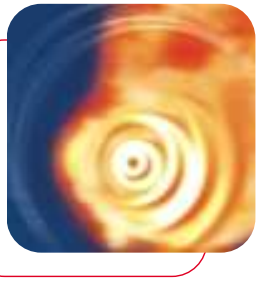
VENTILATION



The ventilation circuit produces low noise levels with high performance pressure and air output, in spite of the compact dimensions.

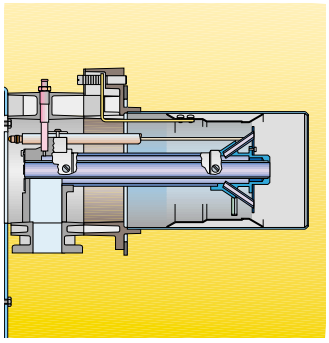
The use of reverse curve blades and sound-proofing material keeps noise level very low.

Example of fan air gate valve indexed selector of RS 28/1 burner



COMBUSTION HEAD

Different lengths of the combustion head can be chosen for the RS/1 series of burners.



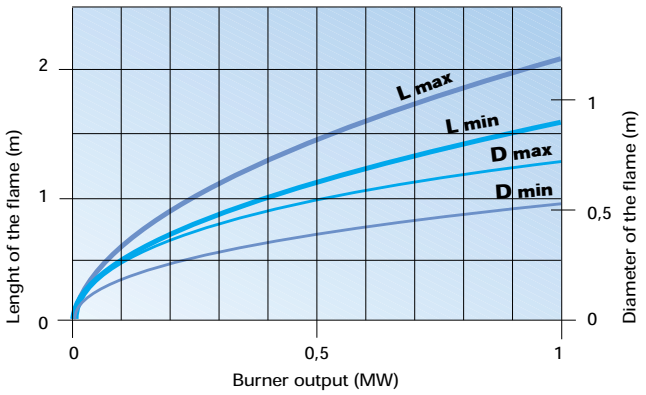
The choice depends on the thickness of the front panel and the type of boiler.

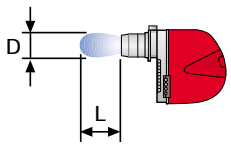
Depending on the type of generator, check that the penetration of the head into the combustion chamber is correct.

The internal positioning of the combustion head can easily be adjusted to the maximum defined output by adjusting a screw fixed to the flange.

Example of a RS/1 burner combustion head

Dimensions of the flame





Example:
Burner thermal output = 500 kW;
L_{flame} (m) = 1,3 m (medium value);
D_{flame} (m) = 0,45 m (medium value)

ADJUSTMENT

BURNER OPERATION MODE

The burner of RS/1 series is one stage working.

On "one stage" operation, the burner adjusts output to the requested level, by varying between on-off phases (see figure A).

One stage operation

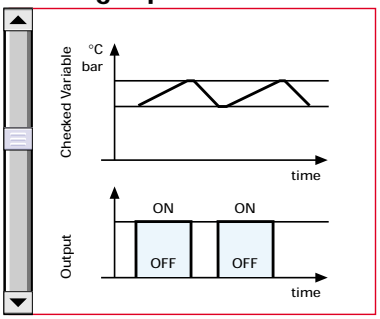
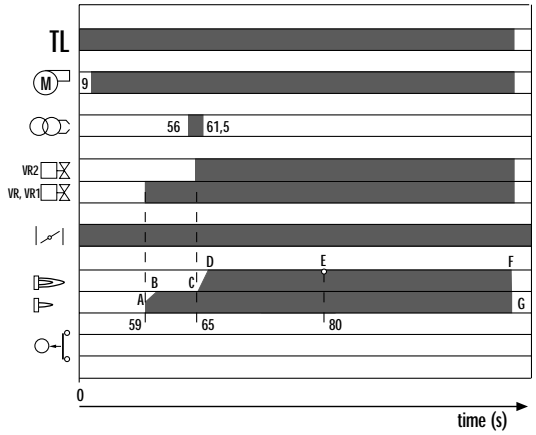


Figure A

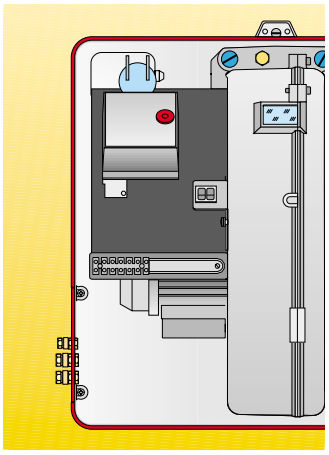
FIRING

RS 28/1 - 38/1



0″	The burner begins the firing cycle
9″	The motor starts: pre-purge phase. The air damper is set on maximum output
56″	Pre-ignition
59″	Safety valve VS and the 1st stage VR1 of the adjustment valve VR open
61,5″	After-ignition
65″	The second stage VR2 of valve VR opens
80″	The control panel starting cycle ends.

ELECTRICAL CONNECTIONS
To be made by the installer

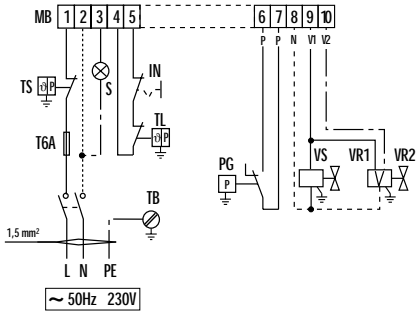


Electrical connections must be made by qualified and skilled personnel, according to the local norms.

Example of the terminal board for electrical connections and control panel on RS 28 /1

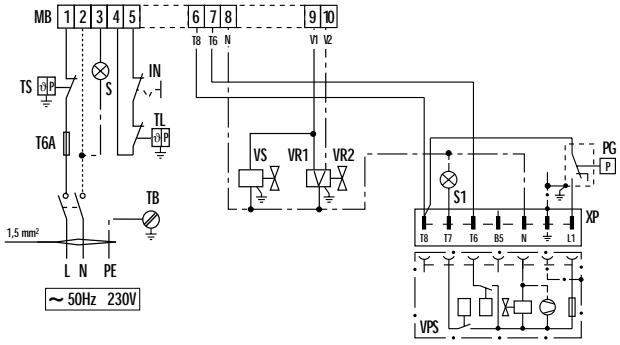
" ONE STAGE" OPERATION

RS 28/1 - 38/1 Without seal control



MB - Burner terminal board
TS - Safety thermostat
S - External lock-out signal
IN - Manual switch
TL - Threshold thermostat
TB - Burner ground
T6A - 6A fuse
PG - Minimum gas pressure switch
VR1 - 1st adjustment valve
VR2 - 2nd adjustment valve
VS - Safety valve

RS 28/1 - 38/1 With seal control

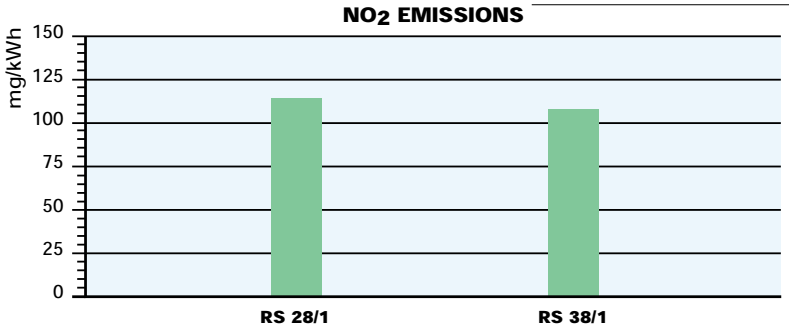


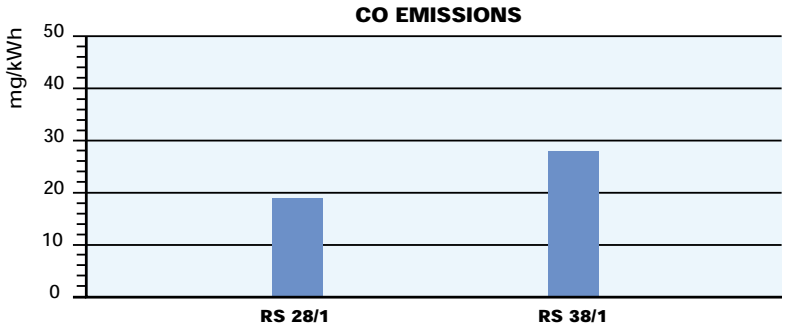
MB - Burner terminal board
TS - Safety thermostat
S - External lock-out signal
S1 - External lock-out signal on the seal control
IN - Manual switch
TL - Threshold thermostat
TB - Burner ground
T6A - 6A fuse
PG - Minimum gas pressure switch
VR1 - 1st adjustment valve
VR2 - 2nd adjustment valve
VS - Safety valve
VPS - Seal control
XP - Seal control plug

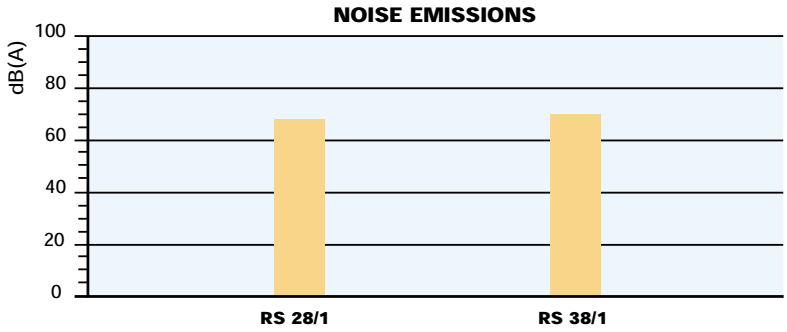
The following table shows the supply lead sections and the type of fuse to be used.

Model	RS 28/1	RS 38/1
	230V	230V
F A	T6	T6
L mm²	1,5	1,5

EMISSIONS





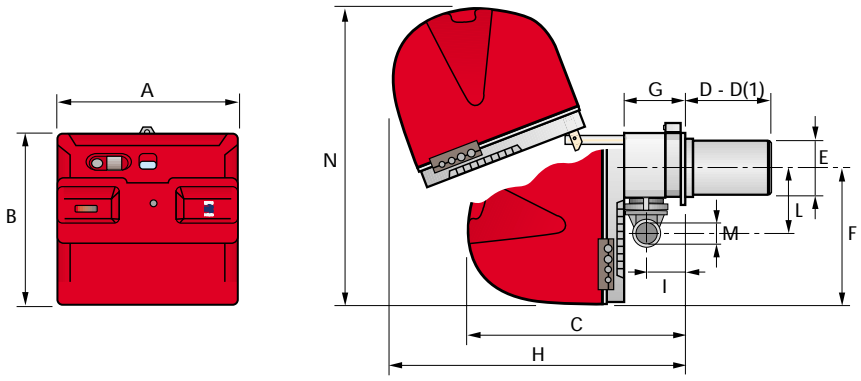


The emission data has been measured in the various models at maximum output, according to EN 676 standard.

OVERALL DIMENSIONS (mm)

BURNERS

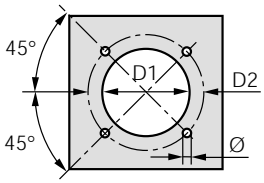
RS 28/1 - 38/1



Model	A	B	C	D - D(1)	E	F	G	H	I	L	M	N
▸ **RS 28/1**	476	474	580	216 - 351	140	352	164	810	108	168	1"1/2	719
▸ **RS 38/1**	476	474	580	216 - 351	140	352	164	810	108	168	1"1/2	719

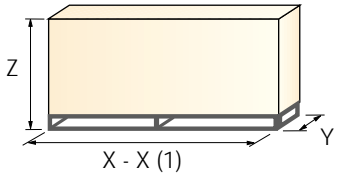
(1) Dimension with "extended head".

BURNER - BOILER MOUNTING FLANGE



Model	D1	D2	Ø
▸ **RS 28/1**	160	224	M8
▸ **RS 38/1**	160	224	M8

PACKAGING



Model	X - X (1)	Y	Z	kg
▸ **RS 28/1**	872 - 1007	540	550	37
▸ **RS 38/1**	872 - 1007	540	550	39

(1) dimension with extended head.

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel.
All operations must be performed in accordance with the technical handbook supplied with the burner.

BURNER SETTING

- All the burners have slide bars, for easier installation and maintenance.
- After drilling the boilerplate, using the supplied gasket as a template, dismantle the blast tube from the burner and fix it to the boiler.
- Adjust the combustion head.
- Fit the gas train, choosing this on the basis of the maximum output of the boiler and considering the enclosed diagrams.
- Refit the burner casing to the slide bars.
- Close the burner, sliding it up to the flange.

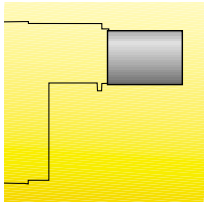
ELECTRICAL CONNECTIONS AND START UP

- Make the electrical connections to the boiler following the wiring diagrams included in the instruction handbook.
- Perform a first ignition calibration on the gas train.
- On start up, check:
  - Gas pressure at the combustion head (to max. and min. output)
  - Combustion quality, in terms of unburned substances and excess air.

BURNER ACCESSORIES

Extended heads

"Standard head" burners can be transformed into "extended head" versions, by using the special kit. The KITS available for the various burners, giving the original and the extended lengths, are listed below.



Combustion head extension kits			
Burner	**'Standard' head length (mm)**	**'Extended' head length (mm)**	**Kit code**
RS 28/1	216	351	**3010091**
RS 38/1	216	351	**3010092**

Spacer kit

If burner head penetration into the combustion chamber needs reducing, varying thickness spacers are available, as given in the following table:

Head length reduction kit		
Burner	**Spacer thickness S (mm)**	**Kit code**
RS 28/1 - 38/1	90	**3010095**

Continuous ventilation kit

If the burner requires continuous ventilation in the stages without flame, a special kit is available as given in the following table:

Continuous ventilation kit	
Burner	**Kit code**
RS 28/1 - 38/1	**3010094**

Sound proofing box

If noise emission needs reducing even further, sound-proofing boxes are available, as given in the following table:

Sound proofing box		
Burner	**Box type**	**Box code**
RS 28/1 - 38/1	C2	**3000777**

LPG kit

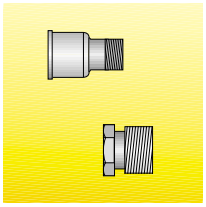
For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner, as given in the following table:

LPG kit	
Burner	**Kit code**
RS 28/1	**3010089**
RS 38/1	**3010090**

GAS TRAIN ACCESSORIES

Adapters

When the diameter of the gas train is different from the set diameter of the burners, an adapter must be fitted between the gas train and the burner. The following table lists the adapters for various burners.



Adapters			
Burner	**Gas train**	**Dimensions**	**Adapter code**
RS 28/1	MBD 407	3/4" 1" 1/2	**3000824**
	MBZRDLE 407	3/4" 1" 1/2	**3000824**
	MBD 410	3/4" 1" 1/2	**3000824**
	MBZRDLE 410	3/4" 1" 1/2	**3000824**
RS 38/1	MBD 407 - 410	3/4" 1" 1/2	**3000824**
	MBZRDLE 407 - 410	3/4" 1" 1/2	**3000824**
	MBD 420 - CB 50/1	2" 1" 1/2	**3000822**
	MBD 420 CT - CB 50/1 CT	2" 1" 1/2	**3000822**
	MBZRDLE 420 - CB 50/2	2" 1" 1/2	**3000822**
	MBZRDLE 420 CT - CB 50/2 CT	2" 1" 1/2	**3000822**

Seal control kit

To test the valve seals on the gas train, a special "seal control kit" is available. The valve seal control device is compulsory (EN 676) on gas trains to burners with a maximum output over 1200 kW. The sealing control is type VPS 504.

Seal control kit		
Burner	**Gas train**	**Kit code**
RS 28/1	MBD 407 - MBZRDLE 407	**3010123**
	MBD 410 - MBZRDLE 410	**3010123**
	MBD 412 - MBZRDLE 412	**3010123**
	MBD 415 - CB 40/1	**3010123**
	MBZRDLE 415 - CB 40/2	**3010125**
RS 38/1	MBD 407 - MBZRDLE 407	**3010123**
	MBD 410 - MBZRDLE 410	**3010123**
	MBD 412 - MBZRDLE 412	**3010123**
	MBD 415 - MBD 420	**3010123**
	CB 40/1 - CB 50/1	**3010123**
	MBZRDLE 415 - CB 40/2	**3010125**
	MBZRDLE 420 - CB 50/2	**3010125**

SPECIFICATION

A specific index guides your choice of burner from the various models available in the RS/1 series.
Below is a clear and detailed specification description of the product.

DESIGNATION OF SERIES

Series : R

Fuel :
- S Natural Gas
- L Light oil
- LS Light oil/Methane
- N Heavy oil

Size

Setting :
- /1 Single stage
- ... Two stage
- /M Modulating

Emission :
- ... Class 1 EN267 - EN676
- MZ Class 2 EN267 - EN676
- BLU Class 3 EN267 - EN676
- MX Class 1 EN267 Class 3 EN676

Head :
- TC Standard head
- TL Extended head

Diagnostic :
- LP Led panel
- ST Status panel

Flame control system :
- FS1 Standard (1 stop every 24 h)
- FS2 Continuous working (1 stop every 72 h)

Electrical supply to the system :

1/230/50	1/230V/50Hz
3/230/50	3/230V/50Hz
3/400/50	3N/400V/50Hz
3/230-400/50	3/230V/50Hz - 3N/400V/50Hz
3/220/60	3/220V/60Hz
3/380/60	3N/380V/60Hz
3/220-380/60	3/220/60Hz - 3N/380V/60Hz

Auxiliary voltage :

230/50-60	230V/50-60Hz
110/50-60	110V/50-60Hz

ID: Differential switch

R	S	28	/1		TC		FS1	1/230/50	230/50-60	

BASIC DESIGNATION

EXTENDED DESIGNATION

LIST OF AVAILABLE MODELS

RS 28/1 TC FS1 1/230/50 230/50-60
RS 28/1 TL FS1 1/230/50 230/50-60

RS 38/1 TC FS1 1/230/50 230/50-60
RS 38/1 TL FS1 1/230/50 230/50-60

Other versions are available on request

PRODUCT SPECIFICATION

Burner:

Monoblock forced draught gas burner with one stage operation, fully automatic, made up of:
- Air suction circuit lined with sound-proofing material
- Fan with reverse curve blades high performance with low sound emissions
- Air damper for air flow setting
- Starting motor at 2800 rpm, (single-phase, 230V, 50Hz)
- Combustion head, that can be set on the basis of required output, fitted with:
    - stainless steel end cone, resistant to corrosion and high temperatures
    - ignition electrodes
    - ionisation probe
    - gas distributor
    - flame stability disk
- Minimum air pressure switch stops the burner in case of insufficient air quantity at the combustion head
- Flame control panel
- Terminal strip for electrical connections
- Flame inspection window
- Slide bars for easier installation and maintenance
- Protection filter against radio interference
- IP 44 electric protection level.

Gas train
Fuel supply line, in the MULTIBLOC configuration (from a diameter of 3/4" until a diameter 2") or COMPOSED configuration (from a diameter of DN 40 until a diameter of DN 50), fitted with:
- Filter
- Stabiliser
- Minimum gas pressure switch
- Safety valve
- One stage or two stage working valve with ignition gas output regulator.

Conforming to:
- 89/336/EEC directive (electromagnetic compatibility)
- 73/23/EEC directive (low voltage)
- 92/42/EEC directive (performance)
- 90/396/EEC directive (gas)
- EN 676 (gas burners).

Standard equipment:
- 1 gas train gasket
- 1 flange gasket
- 4 screws for fixing the flange
- 1 thermal screen
- 4 screws for fixing the burner flange to the boiler
- 4 fairleads for electrical connection
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- Head extension kit
- Head length reduction kit
- Continuous ventilation kit
- Sound-proofing box
- LPG kit
- Gas train adapter
- Seal control kit.

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Internet: http://www.riellobumers.com - E-mail: rburners@riellobumers.com

RIELLO BURNERS

CE

TWO STAGE GAS BURNERS

RS SERIES		
RS 28	81/163 ÷	325 kW
RS 38	105/232 ÷	440 kW
RS 50	116/290 ÷	580 kW
RS 70	192/465 ÷	814 kW
RS 100	232/698 ÷	1163 kW
RS 130	372/930 ÷	1512 kW
RS 190	470/1279 ÷	2290 kW

The RS series of burners covers a firing range from 81 to 2290 kW, and they have been designed for use in hot or superheater water boilers, hot air or steam generators, diathermic oil boilers.
Operation is "two stage"; the burners are fitted with an electronic device STATUS PANEL, which supplies complete diagnostic: hour meter, ignition meter, identification of trouble shooting.
Optimisation of sound emissions is guaranteed by the use of fans with forward inclined blades and sound deadening material incorporated in the air suction circuit.
The elevated performance of the fans and combustion head, guarantee flexibility of use and excellent working at all firing rates.
The exclusive design ensures reduced dimensions, simple use and maintenance. A wide range of accessories guarantees elevated working flexibility.

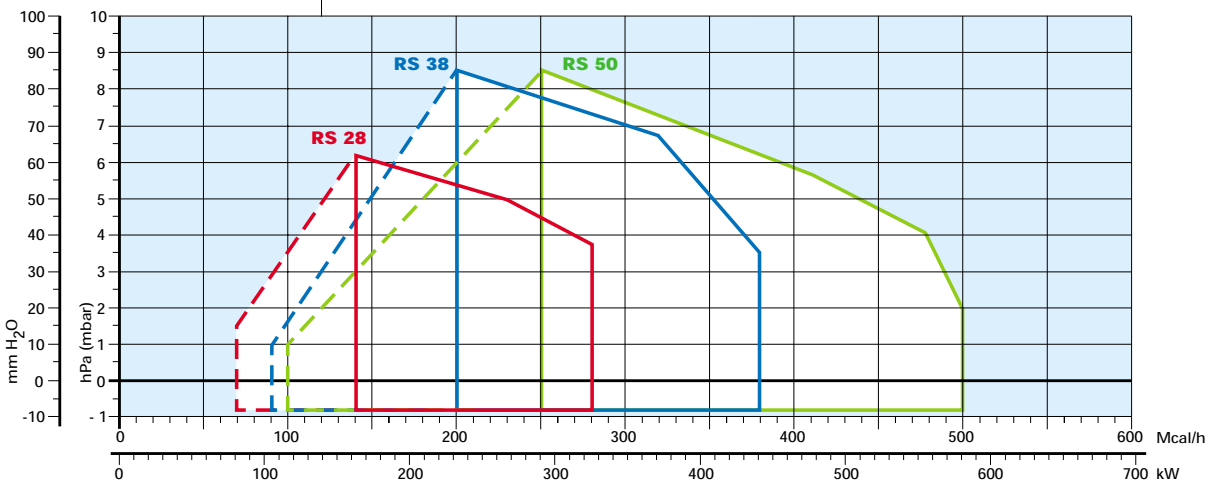
TECHNICAL DATA

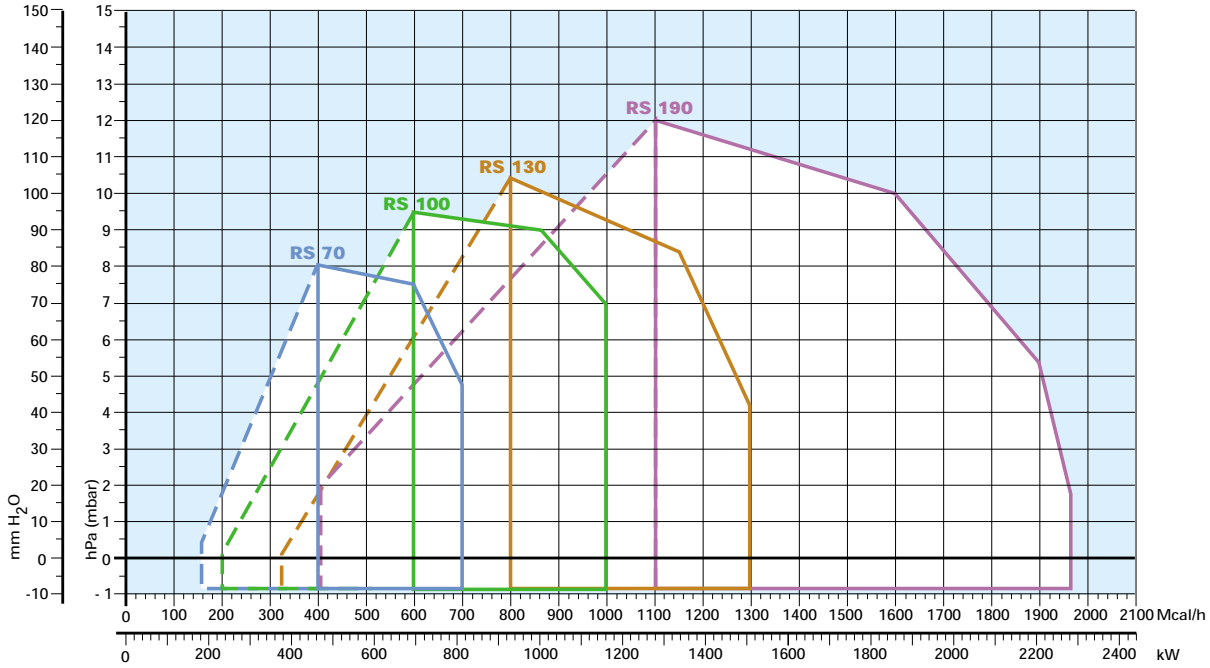
Model			RS 28	RS 38	RS 38	RS 50	RS 70	RS 100	RS 130	RS 190
Burner operation mode			Two stage							
Modulation ratio to max. output			2 ÷ 1							
Servo-motor	Type		SQN90				LKS210			SQN31
	Run time	s	12				15			15
Heat output		kW	81/163÷325	105/232÷440	105/232÷440	116/290÷581	192/465÷814	232/698÷1163	372/930÷1512	470/1279÷2290
		Mcal/h	70/140÷280	90/200÷378	90/200÷378	100/249÷500	165/400÷700	200/600÷1000	320/800÷1300	405/1100÷1970
Working temperature		°C min./max.	0/40							
Fuel / air data	Net calorific value gas G20	kWh/Nmc	10							
	Density gas G20	kg/Nmc	0,71							
	Output gas G20	Nmc/h	8/16÷32	10,5/23÷44	10,5/23÷44	11,6/29÷58	19/46,5÷81,4	23/70÷116	37/93÷151	47/128÷229
	Net calorific value gas G25	kWh/Nmc	8,6							
	Density gas G25	kg/Nmc	0,78							
	Output gas G25	Nmc/h	9,4/19÷38	12/27÷51	12/27÷51	13,5/34÷68	22/54÷95	27/81÷135	43/108÷176	55/149÷266
	Net calorific value LPG gas	kWh/Nmc	25,8							
	Density LPG gas	kg/Nmc	2,02							
	Output LPG gas	Nmc/h	3/6,5÷12,5	4/9÷17	4/9÷17	4,5/11÷23	7,4/18÷32	9/27÷45	14,4/36÷59	18/50÷89
	Fan	Type	Centrifugal with reverse curve blades							Straight blades
	Air temperature	Max. °C	60							
Electrical data	Electrical supply	Ph/Hz/V	1/50/230~(±10%)		3N/50/230-400~(±10%)人 3/50/230~(±10%) △					
	Auxiliary electrical supply	Ph/Hz/V	1/50/230 ~ (±10%)							
	Control box	Type	MMI 813							
	Total electrical power	kW	0,37	0,6	0,56	0,75	1,4	1,8	2,6	5,5
	Auxiliary electrical power	kW	0,12	0,12	0,12	0,12	0,3	0,3	0,4	1
	Protection level	IP	44							
	Motor electrical power	kW	0,25	0,42	0,45	0,65	1,1	1,5	2,2	4,5
	Rated motor current	A	2,1	2,9	2 - 1,2	3 - 1,7	4,8 - 2,8	5,9 - 3,4	8,8 - 5,1	15,8 - 9,1
	Motor start current	A	4,8	11	9,5 - 5,5	13,8 - 8	25 - 14,6	27,7 - 16	57,2 - 33,2	126 - 73
	Motor protection level	IP	54							
	Ignition transformer	V1 - V2	230V - 1x8 kV							
		I1 - I2	1A - 20 mA							
	Operation		Intermittent (at least one stop every 24 h)							
Emissions	Sound pressure	dBA	68	70	70	72	75	77	78,5	83
	Sound output	W	--	--	--	--	--	--	--	--
	CO Emission	mg/kWh	< 40							
	NOx Emission	mg/kWh	< 130							
Approval	Directive		90/396 - 89/336 - 73/23 - 92/42 EEC							
	Conforming to		EN 676							
	Certification		CE 0085AP0733	CE 0085AP0734		CE 0085AP0735	CE 0085AP0944	CE 0085AP0945	CE 0085AP0946	CE 0085AT0042

Reference conditions:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.
Noise measured 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

1st stage operating range

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

FUEL SUPPLY

GAS TRAINS

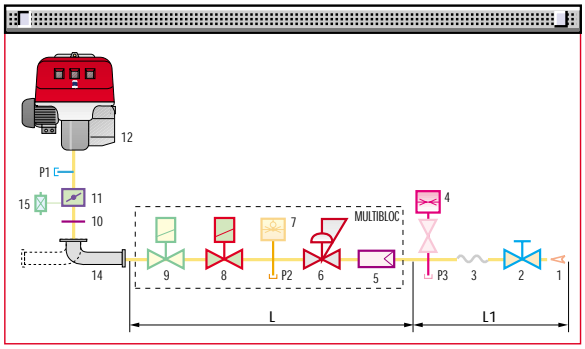
The burners are fitted with a butterfly valve to regulate the fuel delivery on 1st and 2nd stage, controlled by a variable profile cam servomotor.

Fuel can be supplied either from the right or left hand sides.

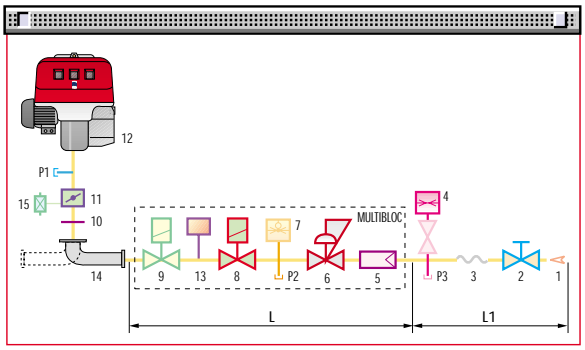
The gas train can be selected to best fit system requirements depending on the fuel output and pressure in the supply line.
The gas train can be "Multibloc" type (containing the main components in a single unit) or "Composed" type (assembly of the single components).

Example of the variable profile cam on RS 70-100-130 burners.

MULTIBLOC gas train without seal control

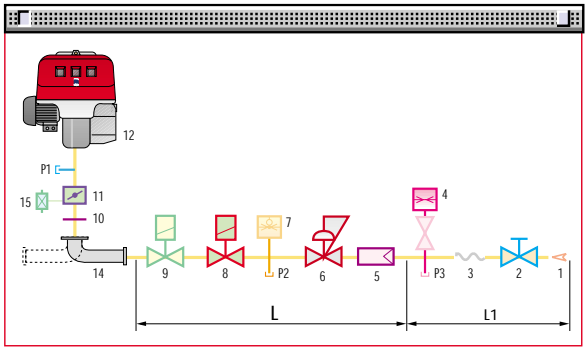


MULTIBLOC gas train with seal control

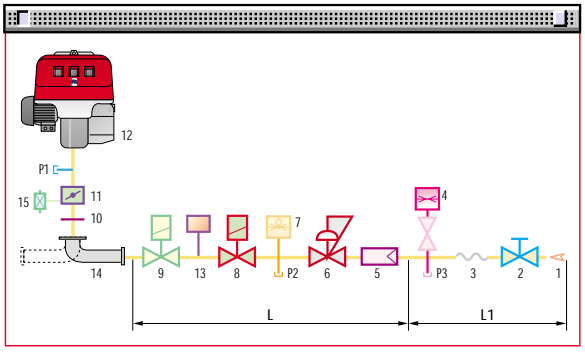


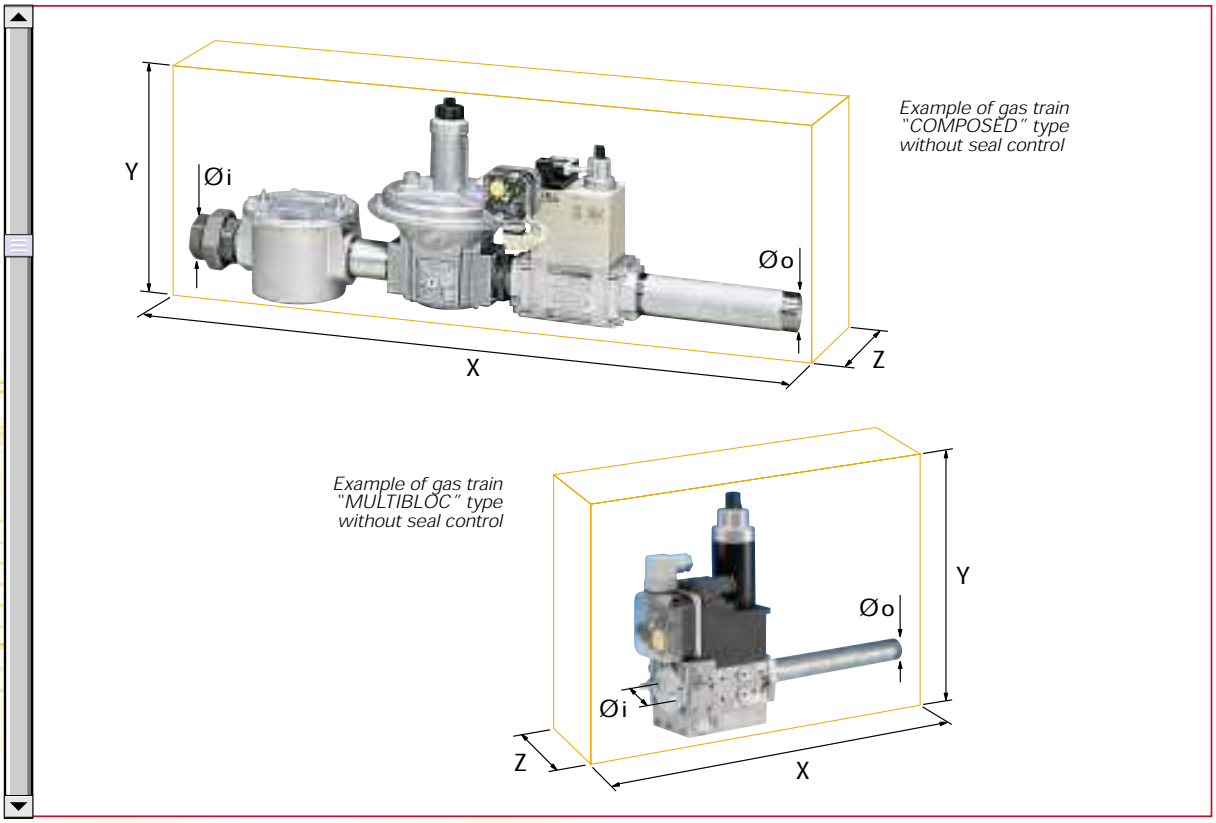
1	Gas input pipework
2	Manual valve
3	Anti-vibration joint
4	Pressure gauge with pushbutton cock.
5	Filter
6	Pressure regulator (vertical)
7	Minimum gas pressure switch
8	VS safety solenoid (vertical)
9	VR regulation solenoid (vertical) Two settings: - firing output (rapid opening) - maximum output (slow opening)
10	Gasket and flange supplied with the burner
11	Gas adjustment butterfly valve
12	Burner
13	Seal control mechanism for valves 8-9. According to standard EN 676, the seal control is compulsory for burners with maximum output above 1200 kW.
14	Gas train-burner adapter.
15	Maximum gas pressure switch
P1	Combustion head pressure
P2	Pressure downstream from the regulator
P3	Pressure upstream from the filter
L	Gas train supplied separately, with the code given in the table
L1	Installer' s responsibility

COMPOSED gas train without seal control



COMPOSED gas train with seal control





Gas trains are approved by standard EN 676 together with the burner.

The overall dimensions of the gas train depends on how they are constructed. The following table shows the maximum dimensions of the gas trains that can be fitted to RS burners, intake and outlet diameters and seal control if fitted.
Please note that the seal control can be installed as an accessory, if not already installed on the gas train.
The maximum gas pressure of gas train "Multibloc" type is 300 mbar, and that one of gas train "Composed" type is 500 mbar.

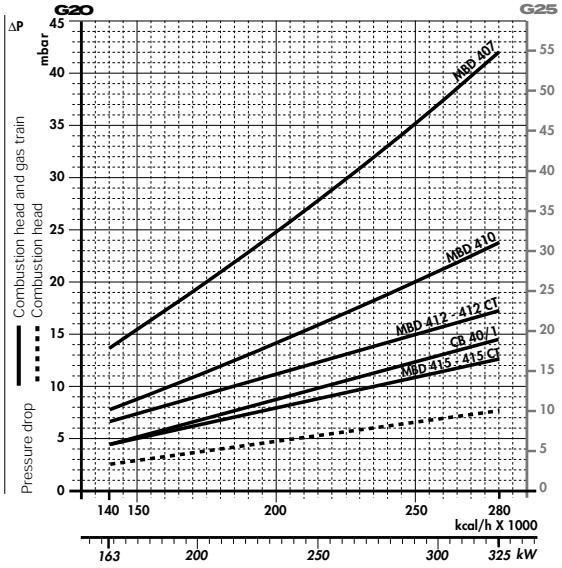
	Name	Code	Ø i	Ø o	X mm	Y mm	Z mm	Seal Control
MULTIBLOC GAS TRAINS	**MBD 407**	3970076	3/4"	3/4"	371	196	120	-
	MBD 410	3970077	1"	3/4"	405	217	145	-
	MBD 412	3970144	1"1/4	1"1/2	433	217	145	-
	MBD 412 CT	3970197	1"1/4	1"1/2	433	217	262	Incorporated
	MBD 415	3970180	1"1/2	1"1/2	523	250	100	-
	MBD 415 CT	3970198	1"1/2	1"1/2	523	250	227	Incorporated
	MBD 420	3970181	2"	2"	523	300	100	-
	MBD 420 CT	3970182	2"	2"	523	300	227	Incorporated
COMPOSED GAS TRAINS	**CB 40/1**	3970145	1"1/2	1"1/2	891	261	195	-
	CB 50/1	3970146	2"	2"	986	328	250	-
	CB 50/1 CT	3970160	2"	2"	986	328	320	Incorporated
	CBF 65/1	3970147	DN 65	DN 65	874	356	285	-
	CBF 65/1 CT	3970161	DN 65	DN 65	874	356	285	Incorporated
	CBF 80/1	3970148	DN 80	DN 80	934	416	285	-
	CBF 80/1 CT	3970162	DN 80	DN 80	934	416	285	Incorporated
	CBF 100/1	3970149	DN 100	DN 100	1054	501	350	-
	CBF 100/1 CT	3970163	DN 100	DN 100	1054	501	350	Incorporated

PRESSURE DROP DIAGRAMS

The diagrams indicate the minimum pressure drop of the burners with the various gas trains that can be matched with them; at the value of these pressure drop add the combustion chamber pressure.
The value thus calculated represents the minimum required input pressure to the gas train.

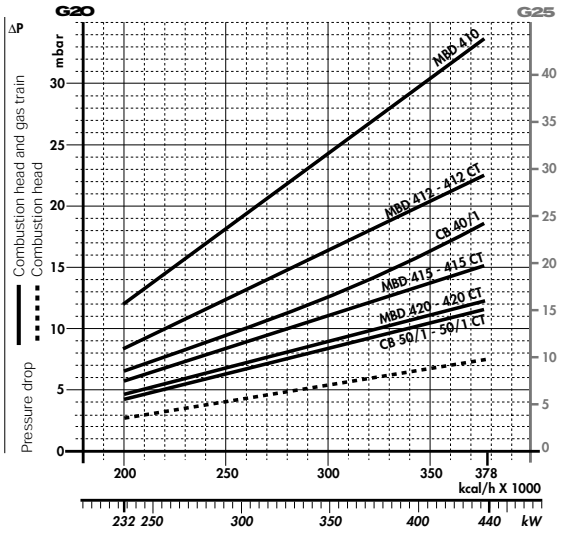
NATURAL GAS

RS 28



Gas train	Code	Adapter	Seal Control
MBD 407	3970076	3000824	Accessory
MBD 410	3970077	3000824	Accessory
MBD 412	3970144	-	Accessory
MBD 412 CT	3970197	-	Incorporated

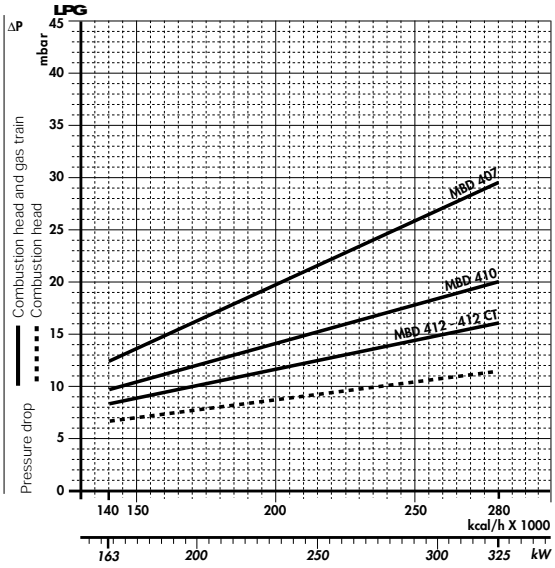
RS 38



Gas train	Code	Adapter	Seal Control
MBD 407	3970076	3000824	Accessory
MBD 410	3970077	3000824	Accessory
MBD 412	3970144	-	Accessory
MBD 412 CT	3970197	-	Incorporated
CB 40/1	3970145	-	Accessory
MBD 415	3970180	-	Accessory

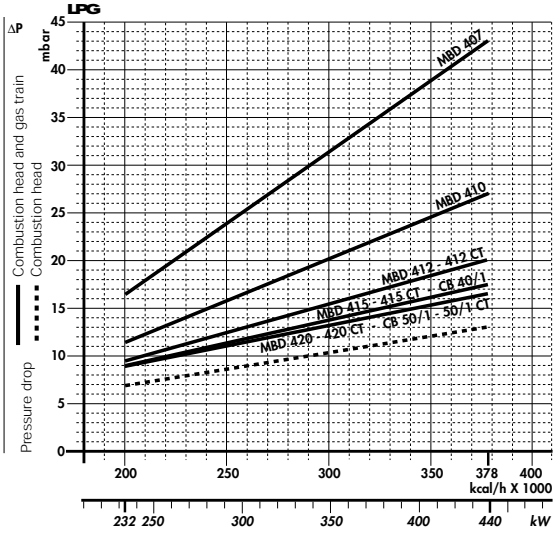
LPG

RS 28



Gas train	Code	Adapter	Seal Control
CB 40/1	3970145	-	Accessory
MBD 415	3970180	-	Accessory
MBD 415 CT	3970198	-	Incorporated

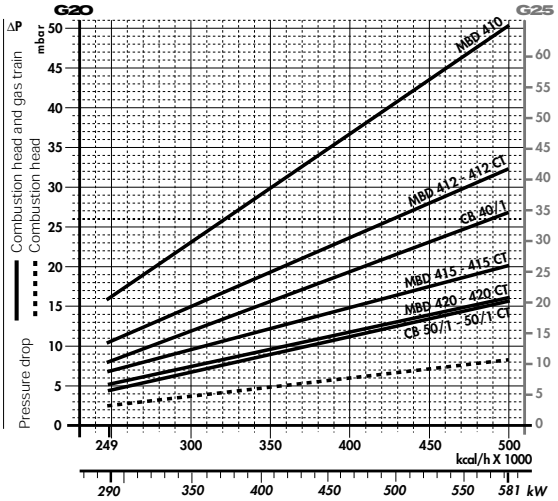
RS 38



Gas train	Code	Adapter	Seal Control
MBD 415 CT	3970198	-	Incorporated
CB 50/1	3970146	3000822	Accessory
CB 50/1 CT	3970160	3000822	Incorporated
MBD 420	3970181	3000822	Accessory
MBD 420 CT	3970182	3000822	Incorporated

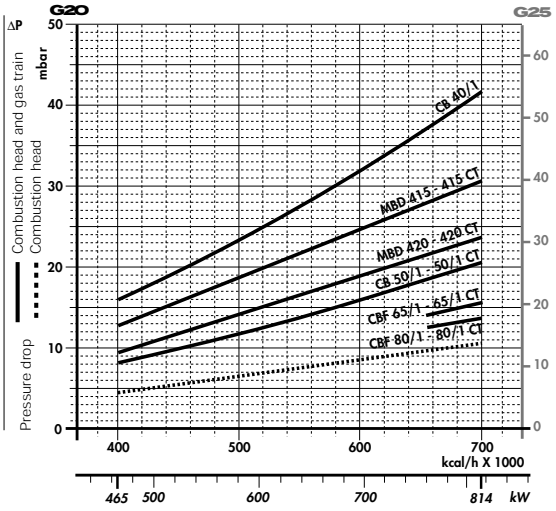
NATURAL GAS

RS 50



Gas train	Code	Adapter	Seal Control
MBD 407	3970076	3000824	Accessory
MBD 410	3970077	3000824	Accessory
MBD 412	3970144	-	Accessory
MBD 412 CT	3970197	-	Incorporated
CB 40/1	3970145	-	Accessory
MBD 415	3970180	-	Accessory

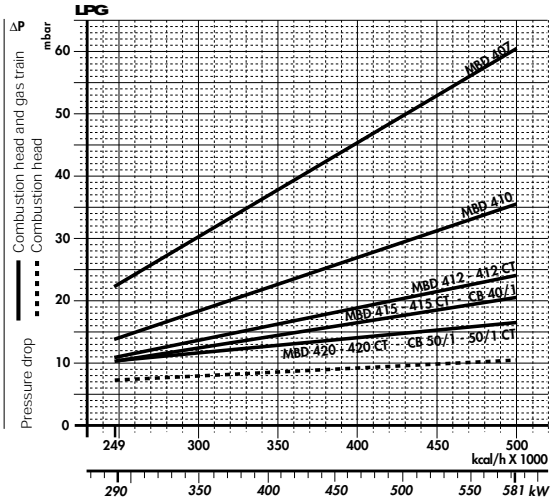
RS 70



Gas train	Code	Adapter	Seal Control
CB 40/1	3970145	3000843	Accessory
MBD 415	3970180	3000843	Accessory
MBD 415 CT	3970198	3000843	Incorporated
CB 50/1	3970146	-	Accessory
CB 50/1 CT	3970160	-	Incorporated
MBD 420	3970181	-	Accessory

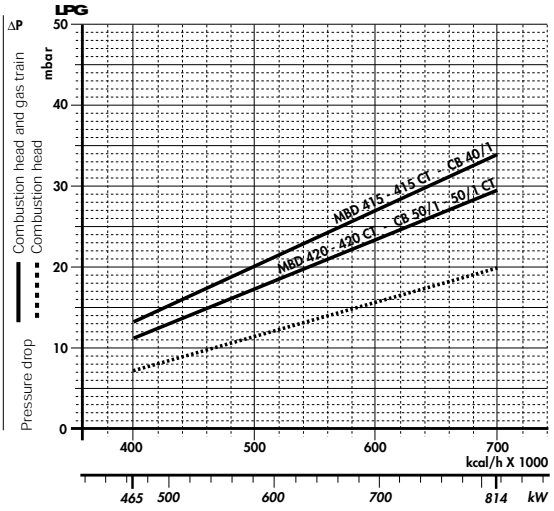
LPG

RS 50



Gas train	Code	Adapter	Seal Control
MBD 415 CT	3970198	-	Incorporated
CB 50/1	3970146	3000822	Accessory
CB 50/1 CT	3970160	3000822	Incorporated
MBD 420	3970181	3000822	Accessory
MBD 420 CT	3970182	3000822	Incorporated

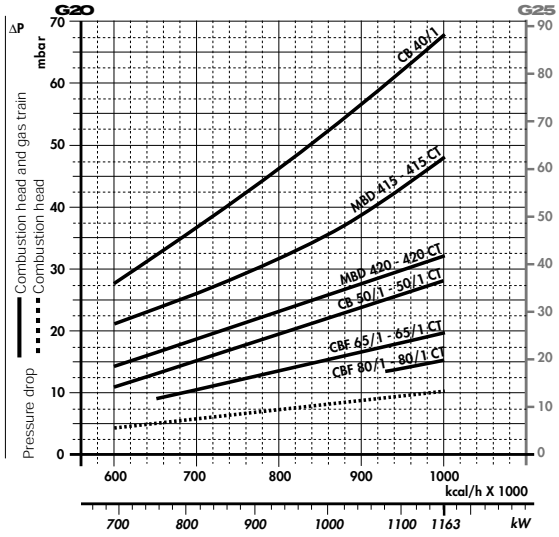
RS 70



Gas train	Code	Adapter	Seal Control
MBD 420 CT	3970182	-	Incorporated
CBF 65/1	3970147	3000825	Accessory
CBF 65/1 CT	3970161	3000825	Incorporated
CBF 80/1	3970148	3000826	Accessory
CBF 80/1 CT	3970162	3000826	Incorporated

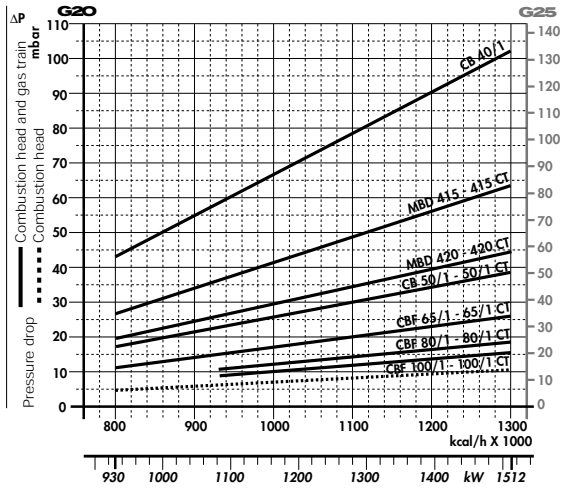
NATURAL GAS

RS 100



Gas train	Code	Adapter	Seal Control
CB 40/1	3970145	3000843	Accessory
MBD 415	3970180	3000843	Accessory
MBD 415 CT	3970198	3000843	Incorporated
CB 50/1	3970146	-	Accessory
CB 50/1 CT	3970160	-	Incorporated
MBD 420	3970181	-	Accessory

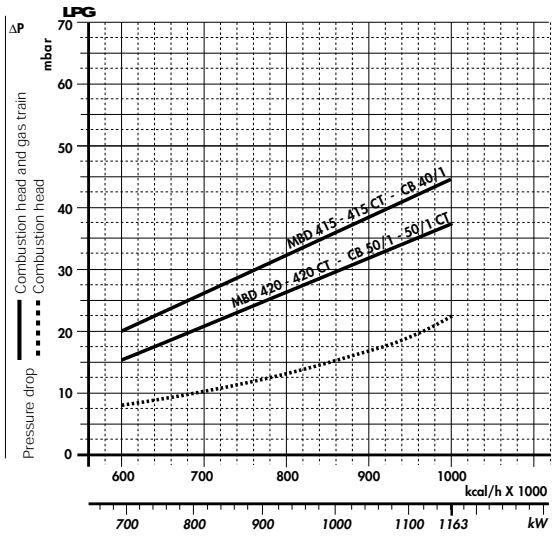
RS 130



Gas train	Code	Adapter	Seal Control
CB 40/1	3970145	3000843	Accessory
MBD 415	3970180	3000843	Accessory
MBD 415 CT	3970198	3000843	Incorporated
CB 50/1	3970146	-	Accessory
CB 50/1 CT	3970160	-	Incorporated
MBD 420	3970181	-	Accessory
MBD 420 CT	3970182	-	Incorporated

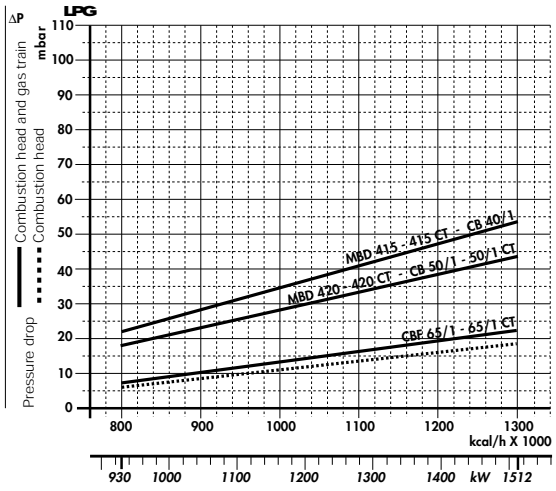
LPG

RS 100



Gas train	Code	Adapter	Seal Control
MBD 420 CT	3970182	-	Incorporated
CBF 65/1	3970147	3000825	Accessory
CBF 65/1 CT	3970161	3000825	Incorporated
CBF 80/1	3970148	3000826	Accessory
CBF 80/1 CT	3970162	3000826	Incorporated

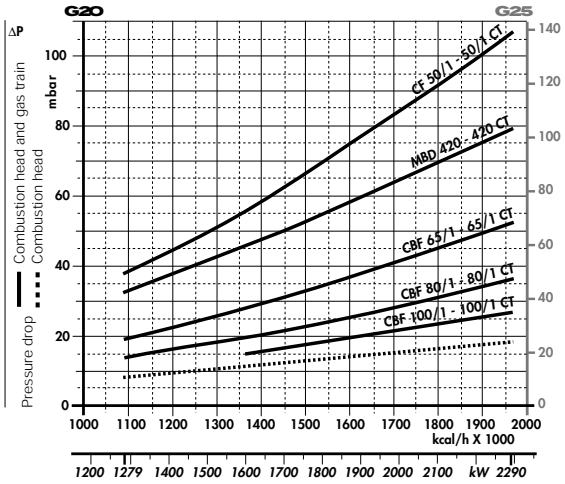
RS 130



Gas train	Code	Adapter	Seal Control
CBF 65/1	3970147	3000825	Accessory
CBF 65/1 CT	3970161	3000825	Incorporated
CBF 80/1	3970148	3000826	Accessory
CBF 80/1 CT	3970162	3000826	Incorporated
CBF 100/1	3970149	3010223 3000826	Accessory
CBF 100/1 CT	3970163	3010223 3000826	Incorporated

NATURAL GAS

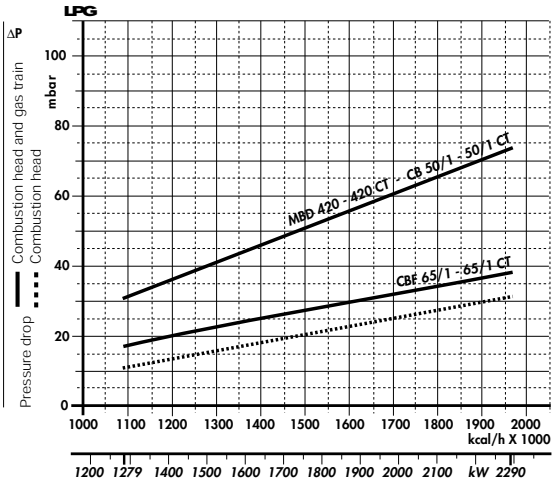
RS 190



Gas train	Code	Adapter	Seal Control
CB 50/1	3970146	3010128	Accessory
CB 50/1 CT	3970160	3010128	Incorporated
MBD 420	3970181	3010128	Accessory
MBD 420 CT	3970182	3010128	Incorporated
CBF 65/1	3970147	3000831	Accessory

LPG

RS 190



Gas train	Code	Adapter	Seal Control
CBF 65/1 CT	3970161	3000831	Incorporated
CBF 80/1	3970148	3000832	Accessory
CBF 80/1 CT	3970162	3000832	Incorporated
CBF 100/1	3970149	3010127	Accessory
CBF 100/1 CT	3970163	3010127	Incorporated

note *Please contact the Riello Burner Technical Office for different pressure levels from those above indicated.*

SELECTING THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

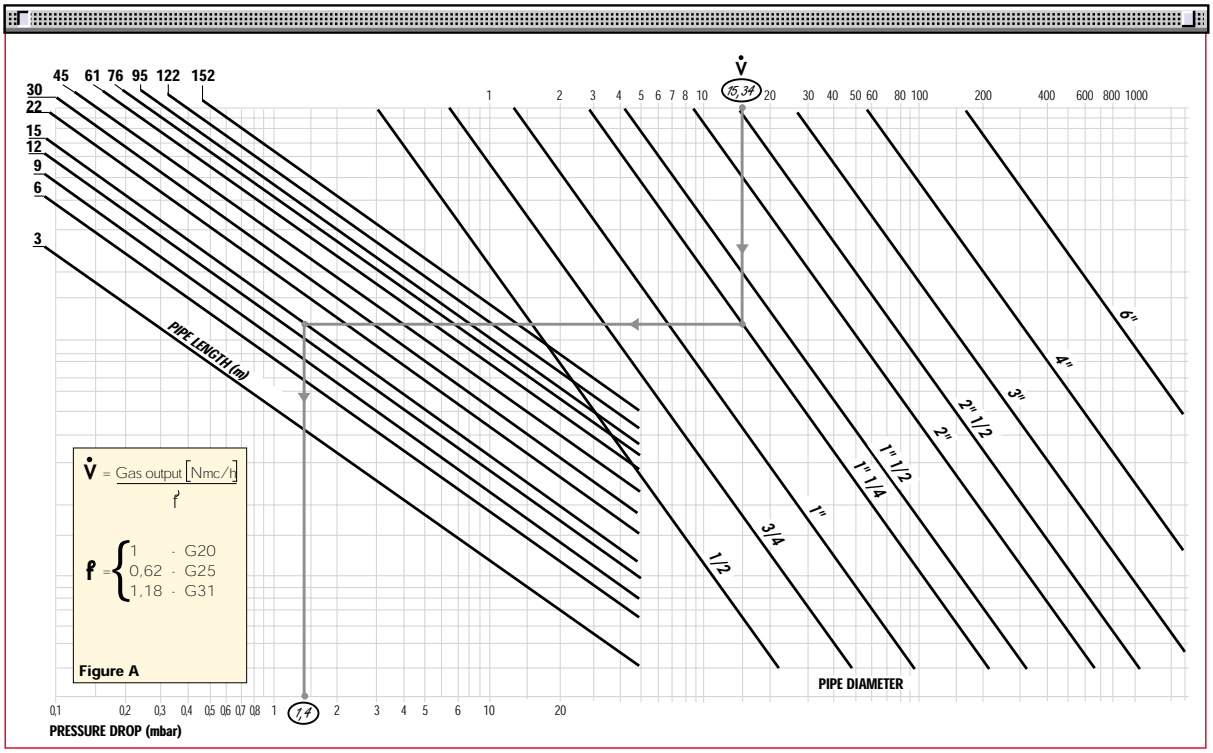
Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length. Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop of on the botton scale below (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

	- gas used	G25
	- gas output	9.51 mc/h
	- pressure at the gas meter	20 mbar
	- gas line length	15 m
	- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62}\right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;
- correct pressure = (20-1.4) = 18.6 mbar



VENTILATION

The ventilation circuit produces low noise levels with high performance pressure and air output, inspite of the compact dimensions.

Example of the air damper on RS 28 - 38 - 50 burners

Except for the RS 190 model, the use of reverse curve blades and sound-proofing material keeps noise level very low. In the RS 190 model, noise has been reduced by the special design of the air suction circuit.

A variable profile cam connects the fuel and air regulations, to obtain a perfect control of combustion during the change of stage. When the burner is not operating the servomotor closes completely the air damper to reduce heat dispersion from the boiler.
A minimum air pressure switch stops the burner when there is an insufficient quantity of air at the combustion head.

COMBUSTION HEAD

Different lengths of the combustion head can be chosen for the RS series of burners.

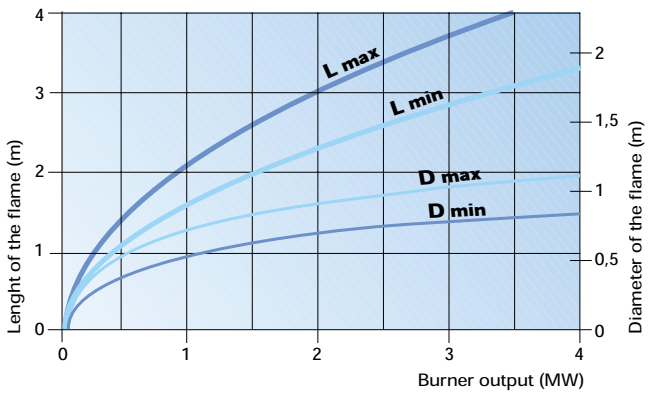
Example of a RS burner combustion head

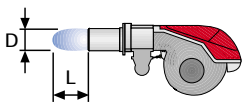
The choice depends on the thickness of the front panel and the type of boiler.

Depending on the type of generator, check that the penetration of the head into the combustion chamber is correct.

The internal positioning of the combustion head can easily be adjusted to the maximum defined output by adjusting a screw fixed to the flange.

Dimensions of the flame





Example:
Burner thermal output = 2000 kW;
L_{flame} (m) = 2,7 m (medium value);
D_{flame} (m) = 0,8 m (medium value)

ADJUSTMENT

BURNER OPERATION MODE

On "two stage" operation, the burner gradually adapts the output to the requested level, by varying between two pre-set levels (see figure A).

"Two stage " operation

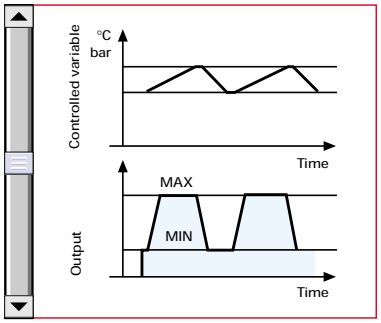


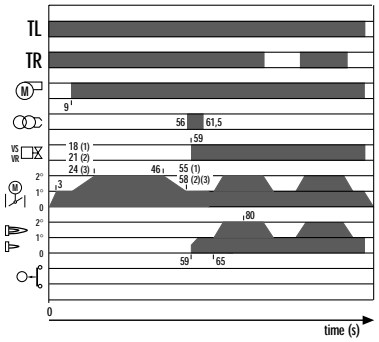
Figure A

Example of "STATUS PANEL"

The RS burners are equipped of an exclusive electronic device "STATUS PANEL" or "LED PANEL" that, in every moments, shows all burners operational modes and finds eventual anomalies during the operational cycle.

FIRING

RS 28-38-50-70-100-130-190



(1) RS 28-38-50
(2) RS 70-100-130
(3) RS 190

•	The TL remote control closes; servomotor starts after about 3".
0"	The control box starting cycle begins.
9"	Fan motor starts. The air damper is positioned to 2nd stage.
18/21/24"	Pre-ventilation stage.
46"	Servomotor rotates.
55"	The air damper and the gas butterfly valve are positioned to 1st stage output (for RS 28-38-50).
56"	Ignition electrode sparks.
58"	The air damper and the gas butterfly valve are positioned to 1st stage output (for RS 70-100-130-190).
59"	Firing; the VS safety valve and the VR adjustment valve open.
65"	Output can be increased.
80"	The control box starting cycle ends.

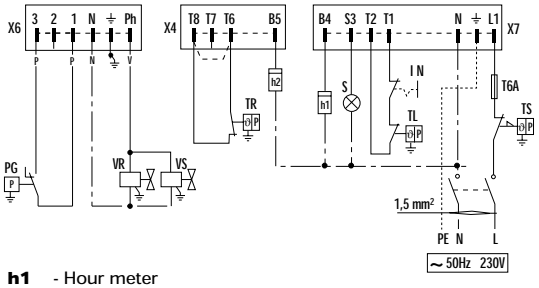
ELECTRICAL CONNECTIONS
To be made by the installer

Electrical connections must be made by qualified and skilled personnel, according to the local regulations.

Example of the terminal board for electrical connections for the RS 70-100-130-190 models

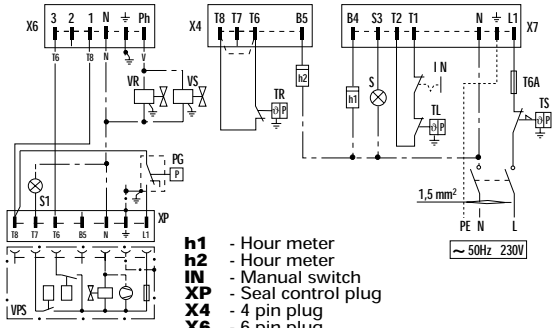
" TWO STAGE" OPERATION - Single-phase power supply

RS 28-38 - without seal control



h1 - Hour meter
h2 - Hour meter
IN - Manual switch
MB - Burner auxiliary terminal board
X4 - 4 pin plug
X6 - 6 pin plug
X7 - 7 pin plug
PG - Minimum gas pressure switch
S - External lock-out signal
TR - High/low flame setting thermostat
TL - Threshold thermostat
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
T6A - 6A fuse

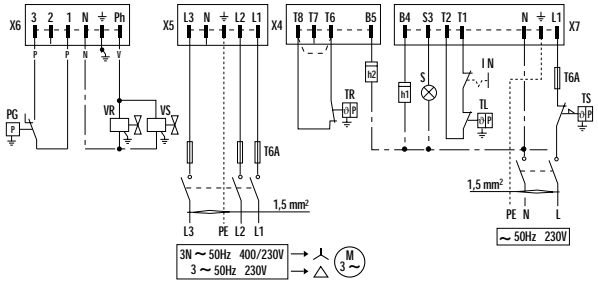
RS 28-38 - with seal control



h1 - Hour meter
h2 - Hour meter
IN - Manual switch
XP - Seal control plug
X4 - 4 pin plug
X6 - 6 pin plug
X7 - 7 pin plug
PG - Minimum gas pressure switch
S - External lock-out signal
S1 - External lock-out signal on the seal control
TR - High/low flame setting thermostat
TL - Threshold thermostat
TS - Safety thermostat
VPS - Seal control
VR - Adjustment valve
VS - Safety valve
T6A - 6A fuse

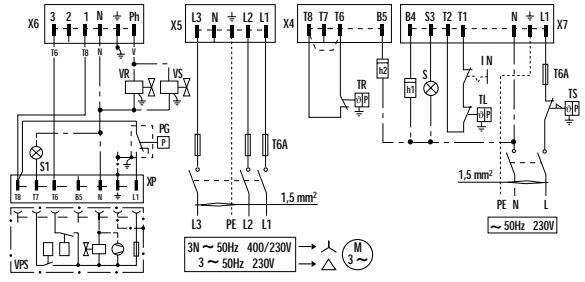
" TWO STAGE" OPERATION - Triple-phase power supply

RS 38-50 - without seal control



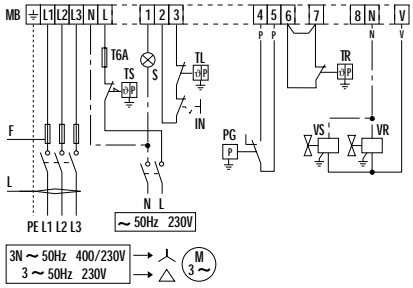
h1 - Hour meter
h2 - Hour meter
IN - Manual switch
MB - Burner auxiliary terminal board
X4 - 4 pin plug
X5 - 5 pin plug
X6 - 6 pin plug
X7 - 7 pin plug
PG - Minimum gas pressure switch
S - External lock-out signal
TR - High/low flame setting thermostat
TL - Threshold thermostat
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
T6A - 6A fuse

RS 38-50 - with seal control



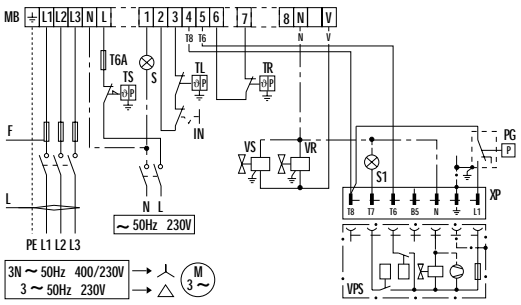
h1 - Hour meter
h2 - Hour meter
IN - Manual switch
XP - Seal control plug
X4 - 4 pin plug
X5 - 5 pin plug
X6 - 6 pin plug
X7 - 7 pin plug
PG - Minimum gas pressure switch
S - External lock-out signal
S1 - External lock-out signal on the seal control
TR - High/low flame setting thermostat
TL - Threshold thermostat
TS - Safety thermostat
VPS - Seal control
VR - Adjustment valve
VS - Safety valve
T6A - 6A fuse

RS 70-100-130-190 - without seal control



MB - Burner terminal board
IN - Manual switch
PG - Minimum gas pressure switch
S - External lock-out signal
TR - High/low flame setting thermostat
TL - Threshold thermostat
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
T6A - 6A fuse
F - Fuse (see table A)
L - Lead section (see table A)

RS 70-100-130-190 - with seal control



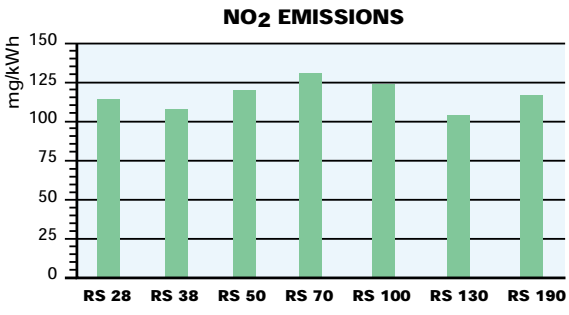
MB - Burner terminal board
IN - Manual switch
XP - Seal control plug
PG - Minimum gas pressure switch
S - External lock-out signal
S1 - External lock-out signal on the seal control
TR - High/low flame setting thermostat
TL - Threshold thermostat
TS - Safety thermostat
VPS - Seal control
VR - Adjustment valve
VS - Safety valve
T6A - 6A fuse
F - Fuse (see table A)
L - Lead section (see table A)

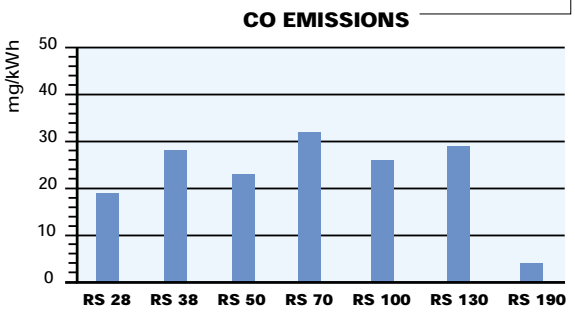
The following table shows the supply lead sections and the type of fuse to be used.

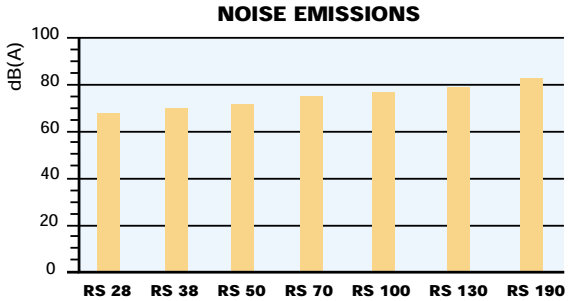
Model	RS 28	RS 38	RS 38		RS 50		RS 70		RS 100		RS 130		RS 190	
	230V	230V	230V	400V	230V	400V	230V	400V	230V	400V	230V	400V	230V	400V
F A	T6	T6	T6	T6	T6	T6	T10	T6	T16	T10	T16	T10	T25	T20
L mm²	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	2,5	2,5

Table A

EMISSIONS





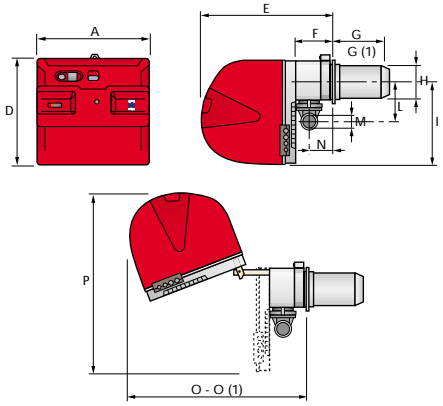


The emission data has been measured in the various models at maximum output, according to EN 676 standard.

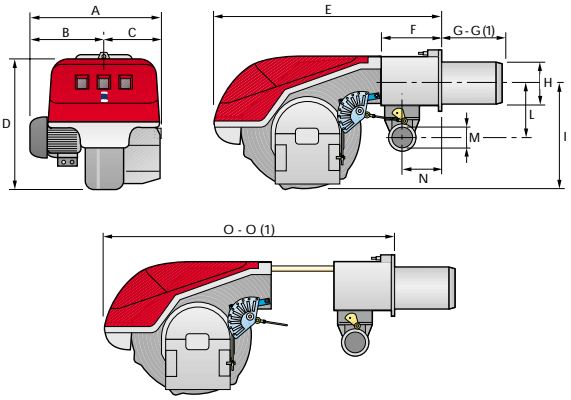
OVERALL DIMENSIONS (mm)

BURNERS

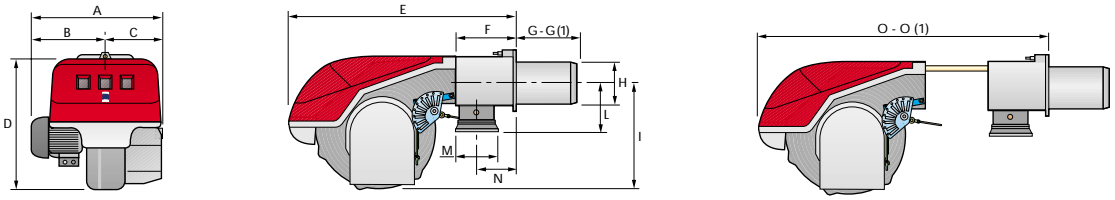
RS 28 - 38 - 50



RS 70 - 100 - 130



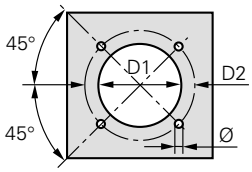
RS 190



Model	A	B	C	D	E	F	G - G (1)	H	I	L	M	N	O - O (1)	P
RS 28	476	-	-	474	580	164	216 - 351	140	352	168	1"1/2	108	810	719
RS 38	476	-	-	474	580	164	216 - 351	140	352	168	1"1/2	108	810	719
RS 50	476	-	-	474	580	164	216 - 351	152	352	168	1"1/2	108	810	719
RS 70	511	296	215	555	840	214	250 - 385	179	430	221	2"	134	1161 - 1296	-
RS 100	527	312	215	555	840	214	250 - 385	179	430	221	2"	134	1161 - 1296	-
RS 130	553	338	215	555	840	214	280 - 415	189	430	221	2"	134	1161 - 1296	-
RS 190	681	366	315	555	856	230	372	222	430	186	DN80	150	1312	-

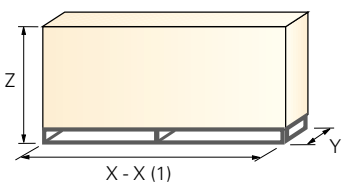
(1) "Extended" head model

BURNER - BOILER MOUNTING FLANGE



Model	D1	D2	Ø
RS 28	160	224	M8
RS 38	160	224	M8
RS 50	160	224	M8
RS 70	185	275 - 325	M12
RS 100	185	275 - 325	M12
RS 130	195	275 - 325	M12
RS 190	230	325 - 368	M16

PACKAGING



Model	X - X (1)	Y	Z	kg
RS 28	872 - 1007	540	550	38
RS 38	872 - 1007	540	550	40
RS 50	872 - 1007	540	550	41
RS 70	1190 - 1325	692	740	70
RS 100	1190 - 1325	692	740	73
RS 130	1190 - 1325	692	740	76
RS 190	1250	785	725	82

(1) "Extended" head model

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel.
All operations must be performed in accordance with the technical handbook supplied with the burner.

BURNER SETTING

- All the burners have slide bars, for easier installation and maintenance.
- After drilling the boilerplate, using the supplied gasket as a template, dismantle the blast tube from the burner and fix it to the boiler.
- Adjust the combustion head.
- Fit the gas train, choosing this on the basis of the maximum output of the boiler and considering the enclosed diagrams.
- Refit the burner casing to the slide bars.
- Close the burner, sliding it up to the flange.

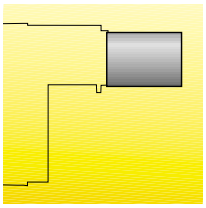
ELECTRICAL CONNECTIONS AND START UP

- Make the electrical connections to the boiler following the wiring diagrams included in the instruction handbook.
- Turn the motor to check rotation direction (if it is a three-phase motor).
- Perform a first ignition calibration on the gas train.
- On start up, check:
  - Gas pressure at the combustion head (to max. and min. output)
  - Combustion quality, in terms of unburned substances and excess air.

ACCESSORIES

Extended heads

"Standard head" burners can be transformed into "extended head" versions, by using the special kit. The KITS available for the various burners, giving the original and the extended lengths, are listed below.



Combustion head extension kits			
Burner	**'Standard head' length (mm)**	**'Extended head' length (mm)**	**Kit code**
RS 28	216	351	**3010076**
RS 38	216	351	**3010077**
RS 50	216	351	**3010078**
RS 70	250	385	**3010117**
RS 100	250	385	**3010118**
RS 130	280	415	**3010119**
RS 190	372	530	**3010196**

Spacer kit

If burner head penetration into the combustion chamber needs reducing, varying thickness spacers are available, as given in the following table:

Head length reduction kit		
Burner	**Spacer thickness S (mm)**	**Kit code**
RS 28 - 38 - 50	90	**3010095**
RS 70 - 100 - 130	135	**3010129**
RS 190	110	**3000722**

Continuous ventilation kit

If the burner requires continuous ventilation in the stages without flame, a special kit is available as given in the following table:

Continuous ventilation kit	
Burner	**Kit code**
RS 28 - 38 - 50	**3010094**
RS 70 - 100 - 130 - 190	**3010094**

Sound proofing box

If noise emission needs reducing even further, sound-proofing boxes are available, as given in the following table:

Sound proofing box		
Burner	**Box type**	**Box code**
RS 28 - 38 - 50	C2	**3000777**
RS 70 - 100 - 130 - 190	C3	**3000778**

LPG kit

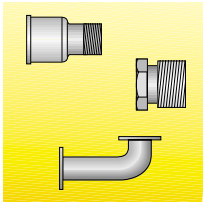
For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner, as given in the following table:

LPG kit		
Burner	**Kit code for 'standard head'**	**Kit code for 'extended head'**
RS 28	**3010079**	**3010080**
RS 38	**3010081**	**3010082**
RS 50	**3010083**	**3010084**
RS 70	**3010097**	**3010098**
RS 100	**3010099**	**3010100**
RS 130	**3010101**	**3010102**
RS 190	**3010166**	**-**

GAS TRAIN ACCESSORIES

Adapters

When the diameter of the gas train is different from the set diameter of the burners, an adapter must be fitted between the gas train and the burner. The following table lists the adapters for various burners.



Adapters			
Burner	**Gas train**	**Dimensions**	**Adapter code**
RS 28	MBD 407 - 410	3/4" 1" 1/2	**3000824**
RS 38	MBD 407 - 410	3/4" 1" 1/2	**3000824**
	MBD 420 - CB 50/1	2" 1" 1/2	**3000822**
RS 50	MBD 407 - 410	3/4" 1" 1/2	**3000824**
	MBD 420 - CB 50/1	2" 1" 1/2	**3000822**
RS 70	MBD 415 - CB 40/1	1" 1/2 2"	**3000843**
	CBF 65/1	DN 65 2"1/2 1" 1/2 2"	**3000825**
	CBF 80/1	DN 80 2"1/2 2"	**3000826**
RS 100	MBD 415 - CB 40/1	1" 1/2 2"	**3000843**
	CBF 65/1	DN 65 2"1/2 1" 1/2 2"	**3000825**
	CBF 80/1	DN 80 2"1/2 2"	**3000826**
RS 130	MBD 415 - CB 40/1	1" 1/2 2"	**3000843**
	CBF 65/1	DN 65 2"1/2 1" 1/2 2"	**3000825**
	CBF 80/1	DN 80 2"1/2 2"	**3000826**
	CBF 100/1	DN 100 DN 80 DN 80 2"1/2 2"	**3010223** **3000826**
RS 190	MBD 420 - CB 50/1	DN 80 DN 65 2"1/2 2"	**3010128**
	CBF 65/1	DN 65 DN 80	**3000831**
	CBF 80/1	DN 80 DN 80	**3000832**
	CBF 100/1	DN 100 DN 80	**3010127**

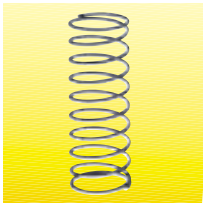
Seal control kit

To test the valve seals on the gas train, a special "seal control kit" is available. The valve seal control device is compulsory (EN 676) on gas trains to burners with a maximum output over 1200 kW. The sealing control is type VPS 504.

Seal control kit		
Burner	**Gas train**	**Kit code**
RS 28	MBD 407 - 410 - 412 - 415 - CB 40/1	**3010123**
RS 38	MBD 407 - 410 - 412 - 415 - 420 - CB 40/1 - 50/1	**3010123**
RS 50	MBD 407 - 410 - 412 - 415 - 420 - CB 40/1 - 50/1	**3010123**
RS 70	MBD 415 - 420 - CB 40/1 - 50/1 - CBF 65/1 - 80/1	**3010123**
RS 100	MBD 415 - 420 - CB 40/1 - 50/1 - CBF 65/1 - 80/1	**3010123**
RS 130	MBD 415 - 420 - CB 40/1 - 50/1 - CBF 65/1 - 80/1 - 100/1	**3010123**
RS 190	MBD 420 - CB 50/1 - CBF 65/1 - 80/1 - 100/1	**3010123**

Stabiliser spring

Accessory springs are available to vary the pressure range of the gas train stabilisers. The following table shows these accessories with their application range



Stabiliser springs		
Gas train	**Spring**	**Code**
CBF 65/1 - CBF 80/1	Red da 25 a 55 mbar	**3010133**
CBF 100/1	Red da 25 a 55 mbar	**3010134**
CBF 65/1 - CBF 80/1	Black da 60 a 110 mbar	**3010135**
CBF 100/1	Black da 60 a 110 mbar	**3010136**
CBF 65/1 - CBF 80/1	Pink da 90 a 150 mbar	**3090456**
CBF 100/1	Pink da 90 a 150 mbar	**3090489**

Please refer to the technical manual for the correct choice of spring.

SPECIFICATION

A specific index guides your choice of burner from the various models available in the RS series.
Below is a clear and detailed specification description of the product.

DESIGNATION OF SERIES R BURNERS

Series : R

Fuel :
- S Natural Gas
- L Light oil
- LS Light oil/Methane
- N Heavy oil

Size

Setting :
- /1 Single stage
- ... Two stage
- /M Modulating

Emission :
- ... Class 1 EN267 - EN676
- MZ Class 2 EN267 - EN676
- BLU Class 3 EN267 - EN676
- MX Class 1 EN267 Class 3 EN676

Head :
- TC Standard head
- TL Extended head

Diagnostic :
- LP Led panel
- ST Status panel

Flame control system:
- FS1 Standard (1 stop every 24 h)
- FS2 Continuous working (1 stop every 72 h)

Electrical supply to the system :

1/230/50	1/230V/50Hz
3/230/50	3/230V/50Hz
3/400/50	3N/400V/50Hz
3/230-400/50	3/230V/50Hz - 3N/400V/50Hz
3/220/60	3/220V/60Hz
3/380/60	3N/380V/60Hz
3/220-380/60	3/220/60Hz - 3N/380V/60Hz

Auxiliary voltage :

230/50-60	230V/50-60Hz
110/50-60	110V/50-60Hz

ID: Differential switch

R	S	130			TC		FS1	3/230-400/50	230/50-60	

BASIC DESIGNATION

EXTENDED DESIGNATION

LIST OF AVAILABLE MODELS

RS 28	TC	LP	FS1	1/230/50	230/50-60	
RS 28	TC	LP	FS1	1/230/50	230/50-60	ID
RS 28	TC	ST	FS1	1/230/50	230/50-60	
RS 28	TC	ST	FS1	1/230/50	230/50-60	ID
RS 28	TL	LP	FS1	1/230/50	230/50-60	
RS 28	TL	LP	FS1	1/230/50	230/50-60	ID
RS 28	TL	ST	FS1	1/230/50	230/50-60	
RS 28	TL	ST	FS1	1/230/50	230/50-60	ID
RS 38	TC	LP	FS1	1/230/50	230/50-60	
RS 38	TC	LP	FS1	1/230/50	230/50-60	ID
RS 38	TC	LP	FS1	3/230-400/50	230/50-60	
RS 38	TC	LP	FS1	3/230-400/50	230/50-60	ID
RS 38	TC	ST	FS1	1/230/50	230/50-60	
RS 38	TC	ST	FS1	1/230/50	230/50-60	ID
RS 38	TC	ST	FS1	3/230-400/50	230/50-60	
RS 38	TC	ST	FS1	3/230-400/50	230/50-60	ID
RS 38	TL	LP	FS1	1/230/50	230/50-60	
RS 38	TL	LP	FS1	1/230/50	230/50-60	ID
RS 38	TL	LP	FS1	3/230-400/50	230/50-60	
RS 38	TL	LP	FS1	3/230-400/50	230/50-60	ID
RS 38	TL	ST	FS1	1/230/50	230/50-60	
RS 38	TL	ST	FS1	1/230/50	230/50-60	ID
RS 38	TL	ST	FS1	3/230-400/50	230/50-60	
RS 38	TL	ST	FS1	3/230-400/50	230/50-60	ID
RS 50	TC	LP	FS1	3/230-400/50	230/50-60	
RS 50	TC	LP	FS1	3/230-400/50	230/50-60	ID
RS 50	TC	ST	FS1	3/230-400/50	230/50-60	
RS 50	TC	ST	FS1	3/230-400/50	230/50-60	ID
RS 50	TL	LP	FS1	3/230-400/50	230/50-60	
RS 50	TL	LP	FS1	3/230-400/50	230/50-60	ID
RS 50	TL	ST	FS1	3/230-400/50	230/50-60	
RS 50	TL	ST	FS1	3/230-400/50	230/50-60	ID

RS 70	TC	LP	FS1	3/230-400/50	230/50-60	
RS 70	TC	LP	FS1	3/230-400/50	230/50-60	ID
RS 70	TC	ST	FS1	3/230-400/50	230/50-60	
RS 70	TC	ST	FS1	3/230-400/50	230/50-60	ID
RS 70	TL	LP	FS1	3/230-400/50	230/50-60	
RS 70	TL	LP	FS1	3/230-400/50	230/50-60	ID
RS 70	TL	ST	FS1	3/230-400/50	230/50-60	
RS 70	TL	ST	FS1	3/230-400/50	230/50-60	ID
RS 100	TC	LP	FS1	3/230-400/50	230/50-60	
RS 100	TC	LP	FS1	3/230-400/50	230/50-60	ID
RS 100	TC	ST	FS1	3/230-400/50	230/50-60	
RS 100	TC	ST	FS1	3/230-400/50	230/50-60	ID
RS 100	TL	LP	FS1	3/230-400/50	230/50-60	
RS 100	TL	LP	FS1	3/230-400/50	230/50-60	ID
RS 100	TL	ST	FS1	3/230-400/50	230/50-60	
RS 100	TL	ST	FS1	3/230-400/50	230/50-60	ID
RS 130	TC	LP	FS1	3/230-400/50	230/50-60	
RS 130	TC	LP	FS1	3/230-400/50	230/50-60	ID
RS 130	TC	ST	FS1	3/230-400/50	230/50-60	
RS 130	TC	ST	FS1	3/230-400/50	230/50-60	ID
RS 130	TL	LP	FS1	3/230-400/50	230/50-60	
RS 130	TL	LP	FS1	3/230-400/50	230/50-60	ID
RS 130	TL	ST	FS1	3/230-400/50	230/50-60	
RS 130	TL	ST	FS1	3/230-400/50	230/50-60	ID
RS 190	TC	ST	FS1	3/230-400/50	230/50-60	
RS 190	TC	ST	FS1	3/230-400/50	230/50-60	ID

Other versions are available on request

PRODUCT SPECIFICATION

Burner:

Monoblock forced draught gas burner with two stage operation, fully automatic, made up of:
- Air suction circuit lined with sound-proofing material
- Fan with reverse curve blades (straight blades on the 190 model) high performance with low sound emissions
- Air damper for air flow setting and butterfly valve for regulating fuel output on 1st and 2nd stage controlled by a servomotor with variable cam
- Starting motor at 2800 rpm, three-phase 400V with neutral, 50Hz (available also single-phase, 230V, 50Hz for the RS 28 and 38 models)
- Combustion head, that can be set on the basis of required output, fitted with:
    - stainless steel end cone, resistant to corrosion and high temperatures
    - ignition electrodes
    - ionisation probe
    - gas distributor
    - flame stability disk
- Minimum air pressure switch stops the burner in case of insufficient air quantity at the combustion head
- Flame control panel, with lock-out pilot light and lock-out reset button
- Electronic control device: STATUS PANEL or LED PANEL
- Burner on/off selection switch
- 1st - 2nd stage manual switch
- Flame inspection window
- Slide bars for easier installation and maintenance
- Protection filter against radio interference
- IP 44 electric protection level.

Gas train
Fuel supply line, in the MULTIBLOC configuration (from a diameter of 3/4" until a diameter 2") or COMPOSED configuration (from a diameter of DN 65 until a diameter of DN 100), fitted with:
- Filter
- Stabiliser
- Minimum gas pressure switch
- Safety valve
- Valve seal control (for output > 1200 kW)
- One stage working valve with ignition gas output regulator.

Conforming to:
- 89/336/EEC directive (electromagnetic compatibility)
- 73/23/EEC directive (low voltage)
- 92/42/EEC directive (performance)
- 90/396/EEC directive (gas)
- EN 676 (gas burners).

Standard equipment:
- 1 gas train gasket
- 1 flange gasket
- 4 screws for fixing the flange
- 1 thermal screen
- 4 screws for fixing the burner flange to the boiler
- Wiring loom fittings for the electrical connection (RS 28 - 38 - 50)
- 2 slide bar extensions (for extended head models and RS 190 model)
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- Head extension kit
- Head length reduction kit
- Continuous ventilation kit
- Sound-proofing box
- LPG kit
- Gas train adapter
- Seal control kit
- Stabiliser spring.

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RIELLO BURNERS

CE

MODULATING GAS BURNERS

RS/M SERIES		
	RS 28/M	52/163÷ 325 kW
	RS 38/M	70/232÷ 440 kW
	RS 50/M	85/290÷ 580 kW
	RS 70/M	135/465÷ 814 kW
	RS100/M	150/698÷1163 kW
	RS 130/M	160/930÷1512 kW
	RS 190/M	470/1279÷2290 kW

The RS/M series of burners covers a firing range from 52 to 2290 kW, and they have been designed for use in hot water boilers or superheaters, hot air or steam generators, diathermic oil boilers.
Operation can be "two stage progressive" or, alternatively, "modulating" with the installation of a PID logic regulator and respective probes.
RS/M series burners guarantees high efficiency levels in all the various applications, thus reducing fuel consumption and running costs.
Optimisation of sound emissions is guaranteed by the use of fans with forward inclined blades and sound deadening material incorporated in the air suction circuit.
The exclusive design ensures reduced dimensions, simple use and maintenance.
A wide range of accessories guarantees elevated working flexibility.

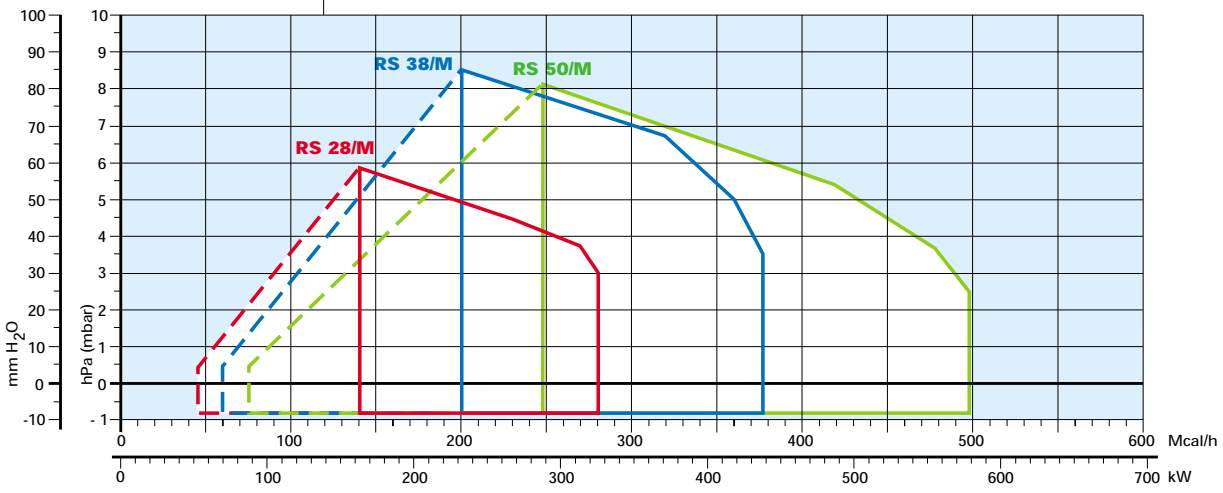
TECHNICAL DATA

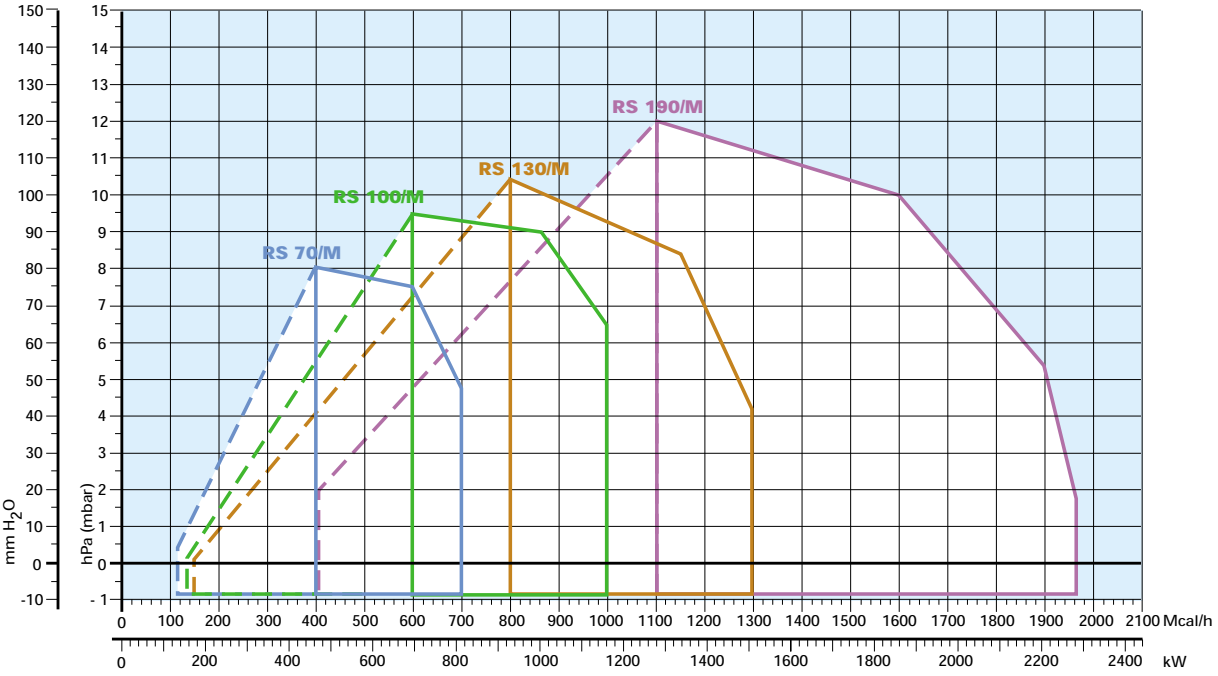
	Model		RS28/M	RS38/M	RS50/M	RS70/M	RS100/M	RS130/M	RS190/M
	Burner operation mode		Modulating (with regulator and probes accessories)						
	Modulation ratio at max. output		6 ÷ 1						
	Servo-motor Type		SQN90			SQN31			
	Servo-motor Run time	s	24			42			
	Heat output	kW	52/163÷325	70/232÷440	85/290÷580	135/465÷814	150/698÷1163	160/930÷1512	470/1279÷2290
		Mcal/h	45/140÷280	60/200÷378	73/249÷499	116/400÷700	129/600÷1000	138/800÷1300	405/1100÷1970
	Working temperature	°C min./max.	0/40						
Fuel / air data	Net calorific value gas G20	kWh/Nmc	10						
Fuel / air data	Density gas G20	kg/Nmc	0,71						
Fuel / air data	Output gas G20	Nmc/h	5/16÷32	7/23÷44	8,5/29÷58	13,5/46,5÷81,4	15/70÷116	16/93÷151	47/128÷229
Fuel / air data	Net calorific value gas G25	kWh/Nmc	8,6						
Fuel / air data	Density gas G25	kg/Nmc	0,78						
Fuel / air data	Output gas G25	Nmc/h	6/19÷38	8/27÷51	10/34÷68	16/54÷95	17/81÷135	19/108÷176	55/149÷266
Fuel / air data	Net calorific value LPG gas	kWh/Nmc	25,8						
Fuel / air data	Density LPG gas	kg/Nmc	2,02						
Fuel / air data	Output LPG gas	Nmc/h	2/6,5÷12,5	3/9÷17	4/11÷23	5/18÷32	6/27÷45	6/36÷59	18/50÷89
Fuel / air data	Fan	Type	Centrifugal with reverse curve blades						Straight blades
Fuel / air data	Air temperature	Max. °C	60						
Electrical data	Electrical supply	Ph/Hz/V	1/50/230~(±10%)	3N/50/230-400~(±10%) ⅄ 3/50/230~(±10%) △					
Electrical data	Auxiliary electrical supply	Ph/Hz/V	1/50/230 ~ (±10%)						
Electrical data	Control box	Type	LFL 1.333 (Intermittent working)						
Electrical data	Total electrical power	kW	0,37	0,56	0,75	1,4	1,8	2,6	5,5
Electrical data	Auxiliary electrical power	kW	0,12	0,12	0,12	0,3	0,3	0,4	1
Electrical data	Protection level	IP	44						
Electrical data	Motor electrical power	kW	0,25	0,45	0,65	1,1	1,5	2,2	4,5
Electrical data	Rated motor current	A	2,1	2 - 1,2	3 - 1,7	4,8 - 2,8	5,9 - 3,4	8,8 - 5,1	15,8 - 9,1
Electrical data	Motor start current	A	4,8	9,5 - 5,5	13,8 - 8	25 - 14,6	27,7 - 16	57,2 - 33,2	126 - 73
Electrical data	Motor protection level	IP	54						
Electrical data	Ignition transformer	V1 - V2	230V - 1x8 kV						
Electrical data		I1 - I2	1A - 20 mA						
Electrical data	Operation		Intermittent (at least one stop every 24 h) - Continuous as optional (at least one stop every 72 h)						
Emissions	Sound pressure	dBA	68	70	72	75	77	78,5	83
Emissions	Sound output	W	--	--	--	--	--	--	--
Emissions	CO Emission	mg/kWh	< 40						
Emissions	NOx Emission	mg/kWh	< 130						
Approval	Directive		90/396 - 89/336 - 73/23 - 92/42 EEC						
Approval	Conforming to		EN 676						
Approval	Certification		CE 0085AQ0709			CE 0085AQ0708			CE 0085AT0042

Reference conditions:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.
Noise measured 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

Modulation range

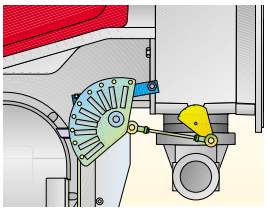
Test conditions conforming to EN 676:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.

FUEL SUPPLY

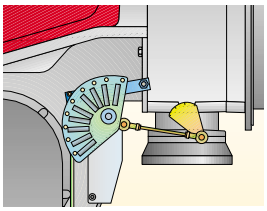
GAS TRAINS

The burners are fitted with a butterfly valve to regulate the fuel, controlled by a variable profile cam servomotor. Fuel can be supplied either from the right or left hand sides. A maximum gas pressure switch stops the burner in case of excess pressure in the fuel line.

The gas train can be selected to best fit system requirements depending on the fuel output and pressure in the supply line.
The gas train can be "Multibloc " type (containing the main components in a single unit) or "Composed" type (assembly of the single components).

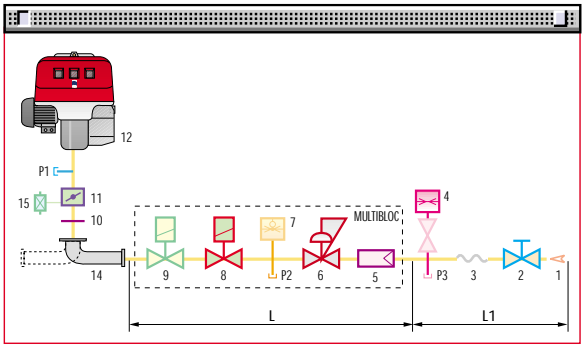


Example of the variable profile cam on RS 70-100-130/M burners.

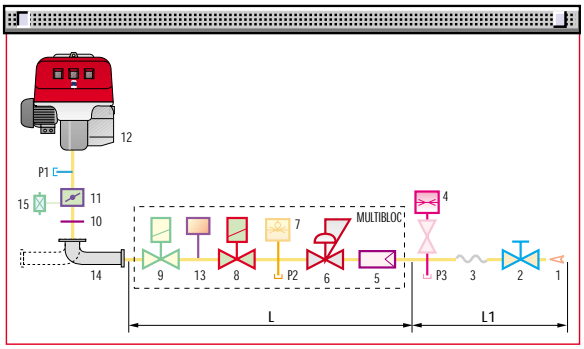


Example of the variable profile cam on RS 190/M burners.

MULTIBLOC gas train without seal control

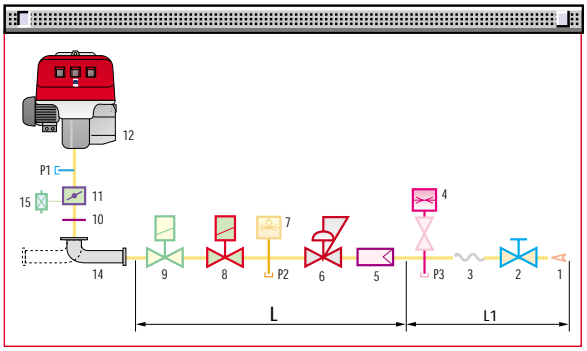


MULTIBLOC gas train with seal control

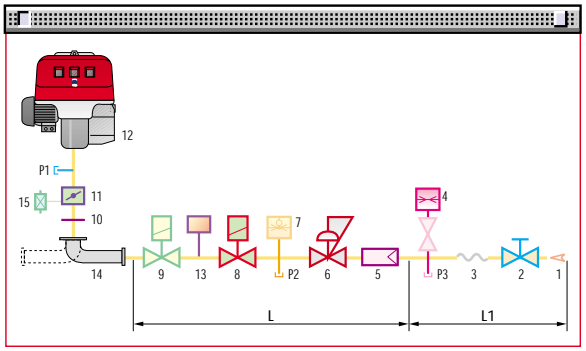


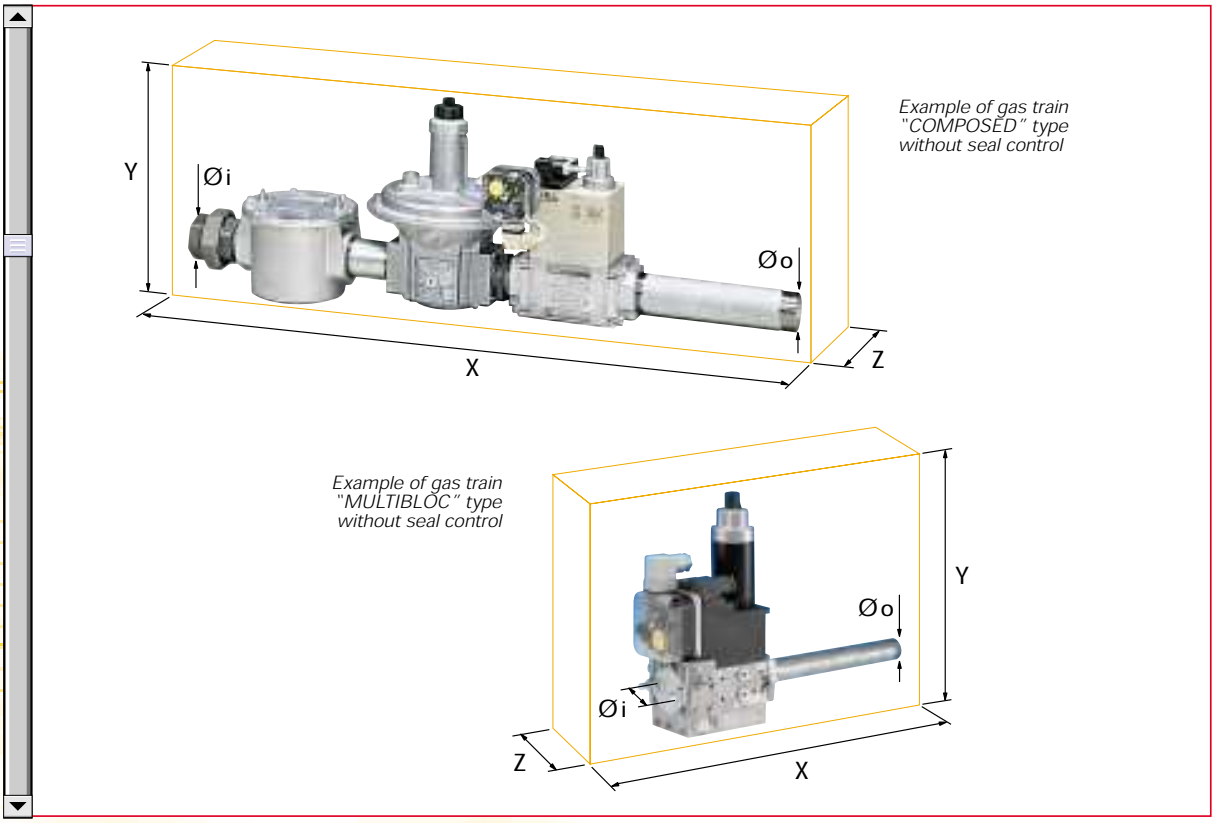
1	Gas input pipework
2	Manual valve
3	Anti-vibration joint
4	Pressure gauge with pushbutton cock.
5	Filter
6	Pressure regulator (vertical)
7	Minimum gas pressure switch
8	VS safety solenoid (vertical)
9	VR regulation solenoid (vertical) Two settings: - firing output (rapid opening) - maximum output (slow opening)
10	Gasket and flange supplied with the burner
11	Gas adjustment butterfly valve
12	Burner
13	Seal control mechanism for valves 8-9. According to standard EN 676, the seal control is compulsory for burners with maximum output above 1200 kW.
14	Gas train-burner adapter.
15	Maximum gas pressure switch
P1	Combustion head pressure
P2	Pressure downstream from the regulator
P3	Pressure upstream from the filter
L	Gas train supplied separately, with the code given in the table
L1	Installer' s responsibility

COMPOSED gas train without seal control



COMPOSED gas train with seal control





Gas trains are approved by standard EN 676 together with the burner.

The overall dimensions of the gas train depends on how they are constructed. The following table shows the maximum dimensions of the gas trains that can be fitted to RS/M burners, intake and outlet diameters and seal control if fitted.
Please note that the seal control can be installed as an accessory, if not already installed on the gas train.
The maximum gas pressure of gas train "Multibloc" type is 300 mbar, and that one of gas train "Composed" type is 500 mbar.

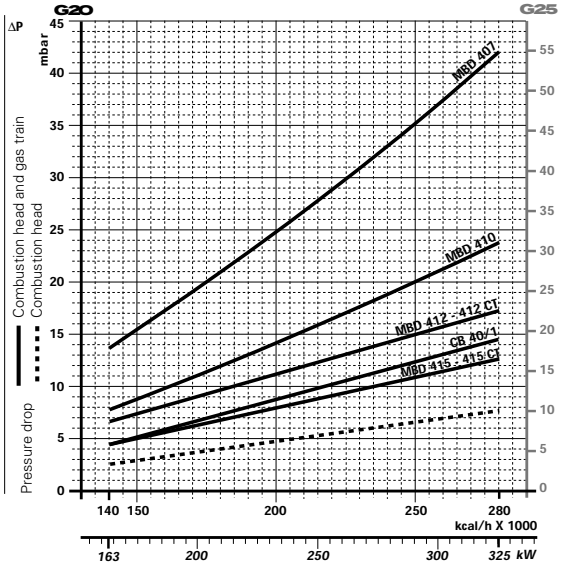
	Name	Code	Ø i	Ø o	X mm	Y mm	Z mm	Seal Control
MULTIBLOC GAS TRAINS	**MBD 407**	3970076	3/4"	3/4"	371	196	120	-
	MBD 410	3970077	1"	3/4"	405	217	145	-
	MBD 412	3970144	1"1/4	1"1/2	433	217	145	-
	MBD 412 CT	3970197	1"1/4	1"1/2	433	217	262	Incorporated
	MBD 415	3970180	1"1/2	1"1/2	523	250	100	-
	MBD 415 CT	3970198	1"1/2	1"1/2	523	250	227	Incorporated
	MBD 420	3970181	2"	2"	523	300	100	-
	MBD 420 CT	3970182	2"	2"	523	300	227	Incorporated
COMPOSED GAS TRAINS	**CB 40/1**	3970145	1"1/2	1"1/2	891	261	195	-
	CB 50/1	3970146	2"	2"	986	328	250	-
	CB 50/1 CT	3970160	2"	2"	986	328	320	Incorporated
	CBF 65/1	3970147	DN 65	DN 65	874	356	285	-
	CBF 65/1 CT	3970161	DN 65	DN 65	874	356	285	Incorporated
	CBF 80/1	3970148	DN 80	DN 80	934	416	285	-
	CBF 80/1 CT	3970162	DN 80	DN 80	934	416	285	Incorporated
	CBF 100/1	3970149	DN 100	DN 100	1054	501	350	-
	CBF 100/1 CT	3970163	DN 100	DN 100	1054	501	350	Incorporated

PRESSURE DROP DIAGRAMS

The diagrams indicate the minimum pressure drop of the burners with the various gas trains that can be matched with them; at the value of these pressure drop add the combustion chamber pressure.
The value thus calculated represents the minimum required input pressure to the gas train.

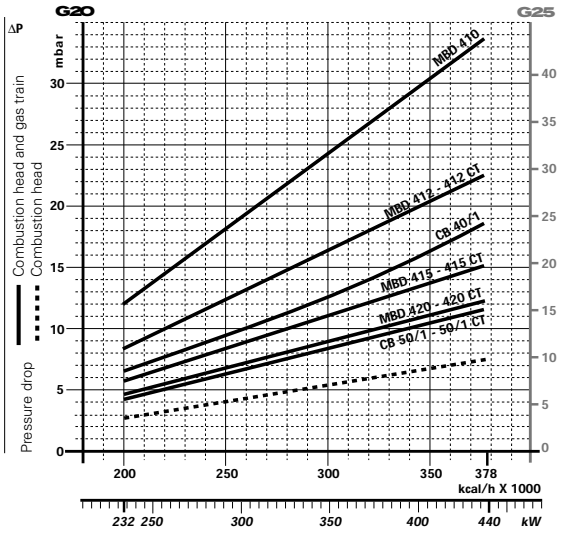
NATURAL GAS

RS 28/M



Gas train	Code	Adapter	Seal Control
MBD 407	3970076	3000824	Accessory
MBD 410	3970077	3000824	Accessory
MBD 412	3970144	-	Accessory
MBD 412 CT	3970197	-	Incorporated

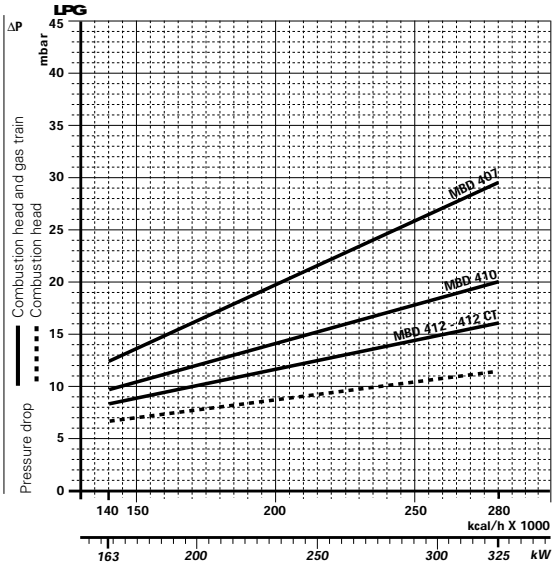
RS 38/M



Gas train	Code	Adapter	Seal Control
MBD 407	3970076	3000824	Accessory
MBD 410	3970077	3000824	Accessory
MBD 412	3970144	-	Accessory
MBD 412 CT	3970197	-	Incorporated
CB 40/1	3970145	-	Accessory
MBD 415	3970180	-	Accessory

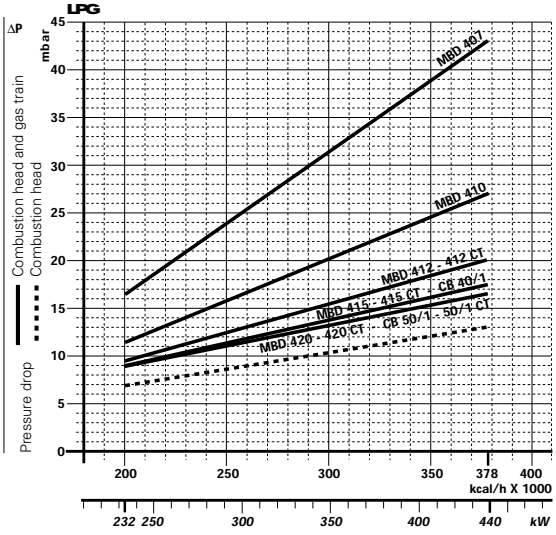
LPG

RS 28/M



Gas train	Code	Adapter	Seal Control
CB 40/1	3970145	-	Accessory
MBD 415	3970180	-	Accessory
MBD 415 CT	3970198	-	Incorporated

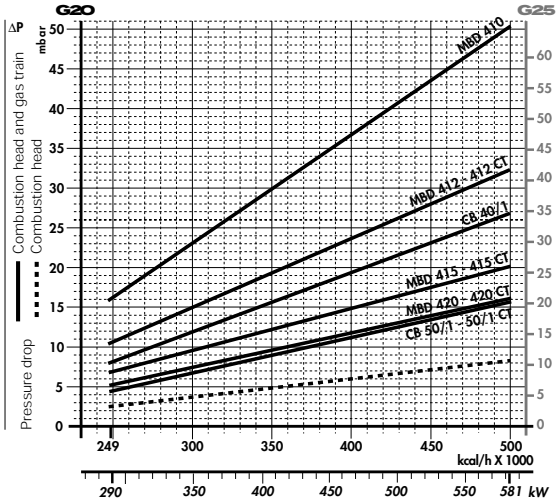
RS 38/M



Gas train	Code	Adapter	Seal Control
MBD 415 CT	3970198	-	Incorporated
CB 50/1	3970146	3000822	Accessory
CB 50/1 CT	3970160	3000822	Incorporated
MBD 420	3970181	3000822	Accessory
MBD 420 CT	3970182	3000822	Incorporated

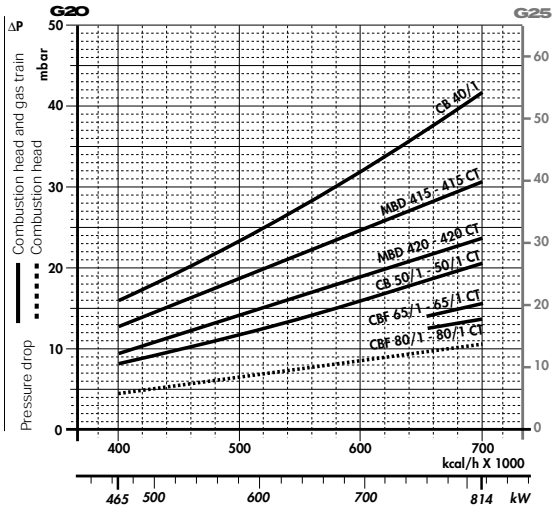
NATURAL GAS

RS 50/M



Gas train	Code	Adapter	Seal Control
MBD 407	3970076	3000824	Accessory
MBD 410	3970077	3000824	Accessory
MBD 412	3970144	-	Accessory
MBD 412 CT	3970197	-	Incorporated
CB 40/1	3970145	-	Accessory
MBD 415	3970180	-	Accessory

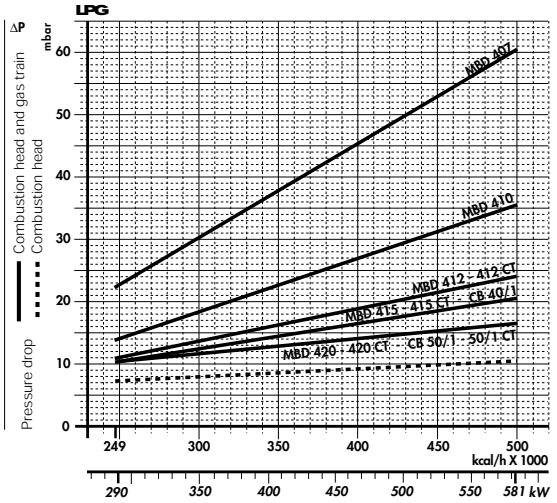
RS 70/M



Gas train	Code	Adapter	Seal Control
CB 40/1	3970145	3000843	Accessory
MBD 415	3970180	3000843	Accessory
MBD 415 CT	3970198	3000843	Incorporated
CB 50/1	3970146	-	Accessory
CB 50/1 CT	3970160	-	Incorporated
MBD 420	3970181	-	Accessory

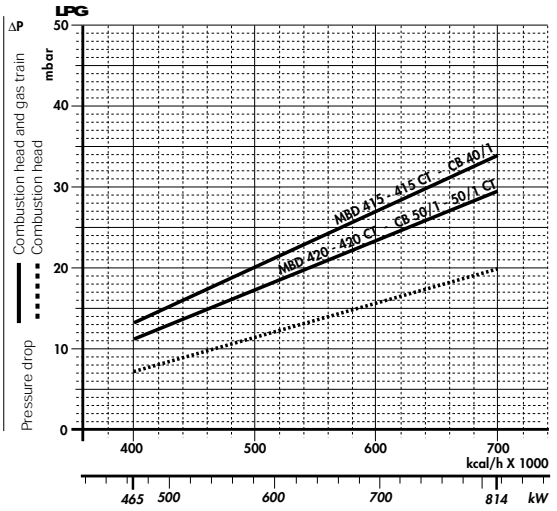
LPG

RS 50/M



Gas train	Code	Adapter	Seal Control
MBD 415 CT	3970198	-	Incorporated
CB 50/1	3970146	3000822	Accessory
CB 50/1 CT	3970160	3000822	Incorporated
MBD 420	3970181	3000822	Accessory
MBD 420 CT	3970182	3000822	Incorporated

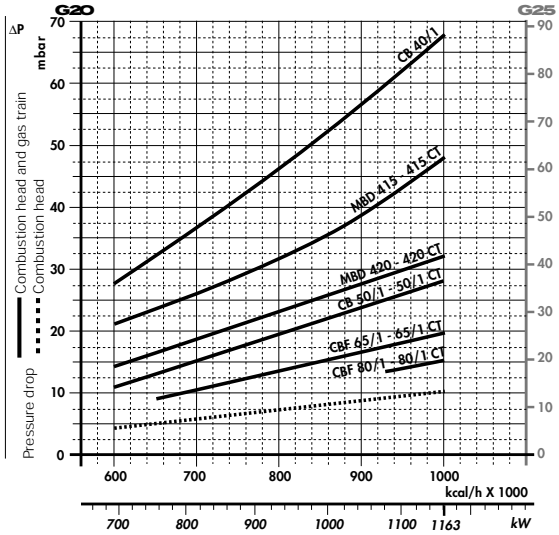
RS 70/M



Gas train	Code	Adapter	Seal Control
MBD 420 CT	3970182	-	Incorporated
CBF 65/1	3970147	3000825	Accessory
CBF 65/1 CT	3970161	3000825	Incorporated
CBF 80/1	3970148	3000826	Accessory
CBF 80/1 CT	3970162	3000826	Incorporated

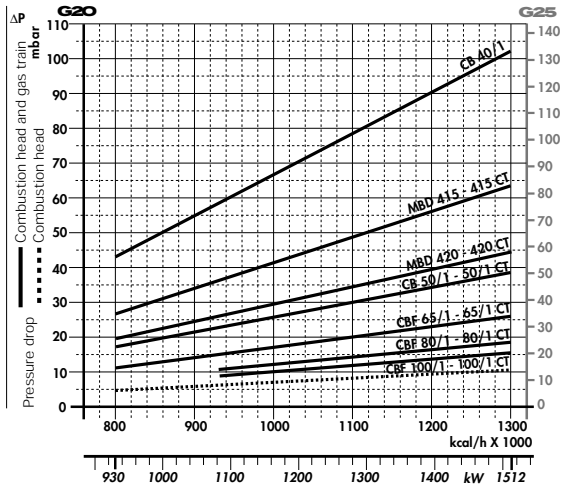
NATURAL GAS

RS 100/M



Gas train	Code	Adapter	Seal Control
CB 40/1	3970145	3000843	Accessory
MBD 415	3970180	3000843	Accessory
MBD 415 CT	3970198	3000843	Incorporated
CB 50/1	3970146	-	Accessory
CB 50/1 CT	3970160	-	Incorporated
MBD 420	3970181	-	Accessory

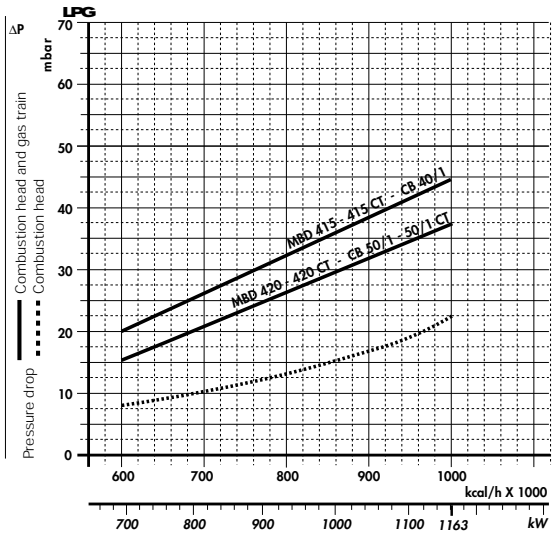
RS 130/M



Gas train	Code	Adapter	Seal Control
CB 40/1	3970145	3000843	Accessory
MBD 415	3970180	3000843	Accessory
MBD 415 CT	3970198	3000843	Incorporated
CB 50/1	3970146	-	Accessory
CB 50/1 CT	3970160	-	Incorporated
MBD 420	3970181	-	Accessory
MBD 420 CT	3970182	-	Incorporated

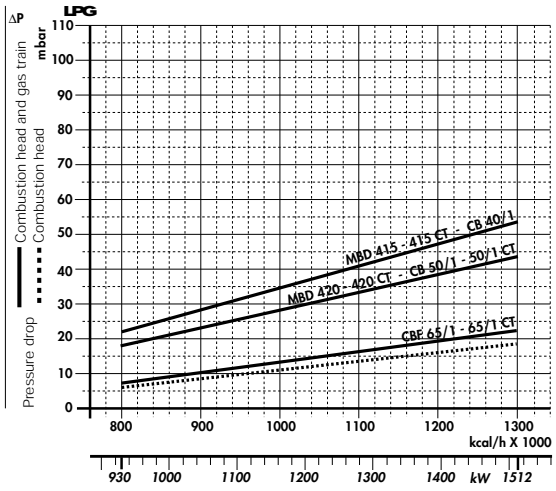
LPG

RS 100/M



Gas train	Code	Adapter	Seal Control
MBD 420 CT	3970182	-	Incorporated
CBF 65/1	3970147	3000825	Accessory
CBF 65/1 CT	3970161	3000825	Incorporated
CBF 80/1	3970148	3000826	Accessory
CBF 80/1 CT	3970162	3000826	Incorporated

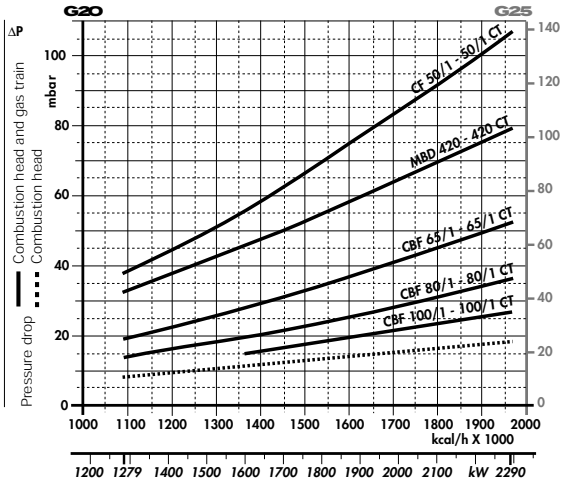
RS 130/M



Gas train	Code	Adapter	Seal Control
CBF 65/1	3970147	3000825	Accessory
CBF 65/1 CT	3970161	3000825	Incorporated
CBF 80/1	3970148	3000826	Accessory
CBF 80/1 CT	3970162	3000826	Incorporated
CBF 100/1	3970149	3010223 3000826	Accessory
CBF 100/1 CT	3970163	3010223 3000826	Incorporated

NATURAL GAS

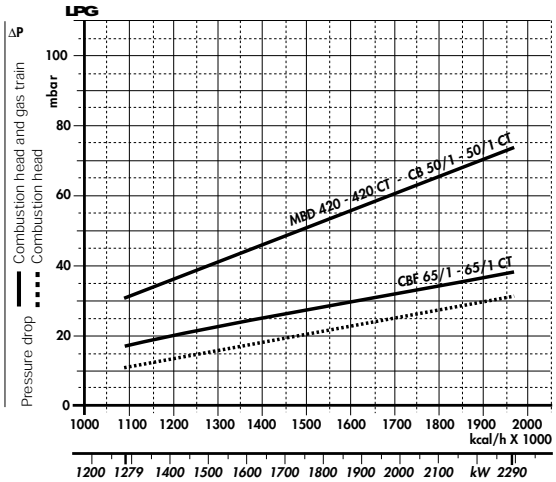
RS 190/M



Gas train	Code	Adapter	Seal Control
CB 50/1	3970146	3010128	Accessory
CB 50/1 CT	3970160	3010128	Incorporated
MBD 420	3970181	3010128	Accessory
MBD 420 CT	3970182	3010128	Incorporated
CBF 65/1	3970147	3000831	Accessory

LPG

RS 190/M



Gas train	Code	Adapter	Seal Control
CBF 65/1 CT	3970161	3000831	Incorporated
CBF 80/1	3970148	3000832	Accessory
CBF 80/1 CT	3970162	3000832	Incorporated
CBF 100/1	3970149	3010127	Accessory
CBF 100/1 CT	3970163	3010127	Incorporated

note *Please contact the Riello Burner Technical Office for different pressure levels from those above indicated.*

SELECTING THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

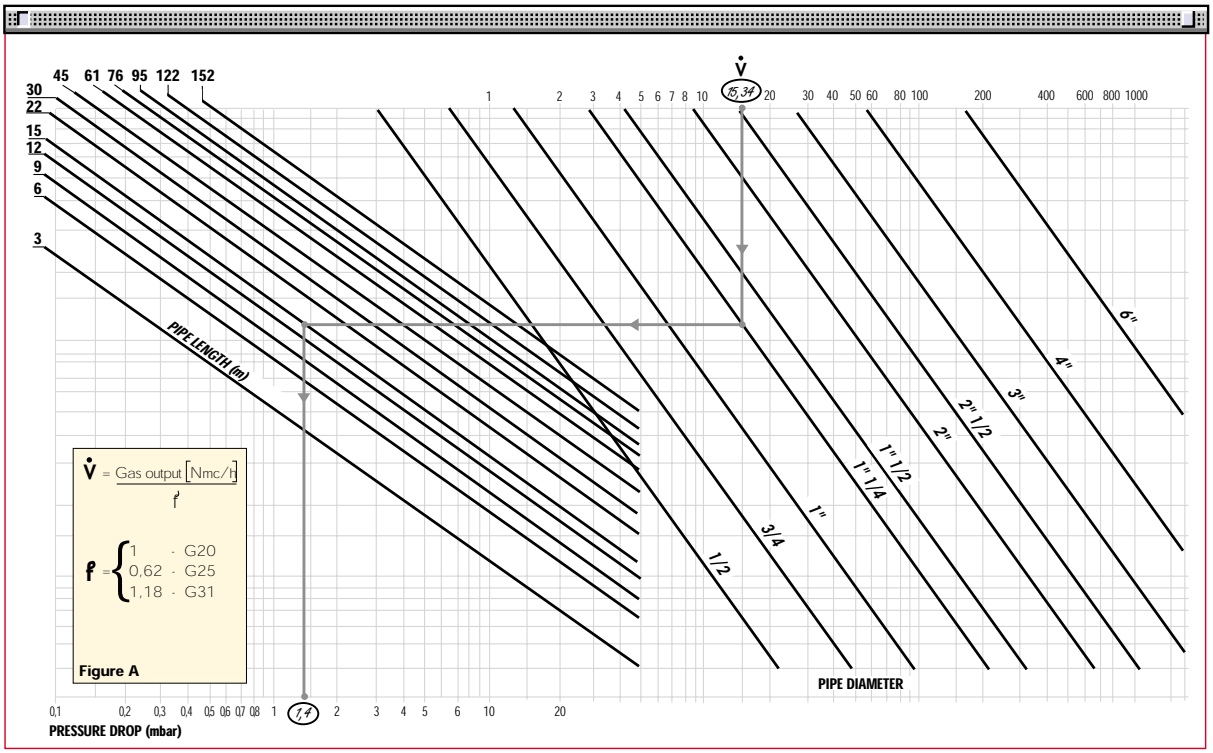
Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length. Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop of on the botton scale below (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

	- gas used	G25
	- gas output	9.51 mc/h
	- pressure at the gas meter	20 mbar
	- gas line length	15 m
	- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62} \right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;
- correct pressure = (20-1.4) = 18.6 mbar



VENTILATION

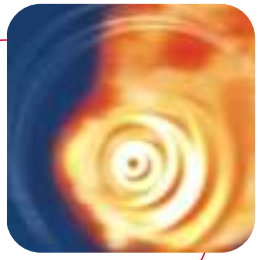
The ventilation circuit produces low noise levels with high performance pressure and air output, inspite of the compact dimensions.

Example of the servomotor for gas setting

Except for the RS 190/M model, the use of reverse curve blades and sound-proofing material keeps extremely lnoise level very low. In the RS 190/M model, noise has been reduced by the special design of the air suction circuit.

A variable profile cam connects the fuel and air regulations, ensuring high fuel efficiency at all firing ranges.
A minimum air pressure switch stops the burner when there is an insufficient quantity of air at the combustion head.

COMBUSTION HEAD



Different lengths of the combustion head can be chosen for the RS/M series of burners.

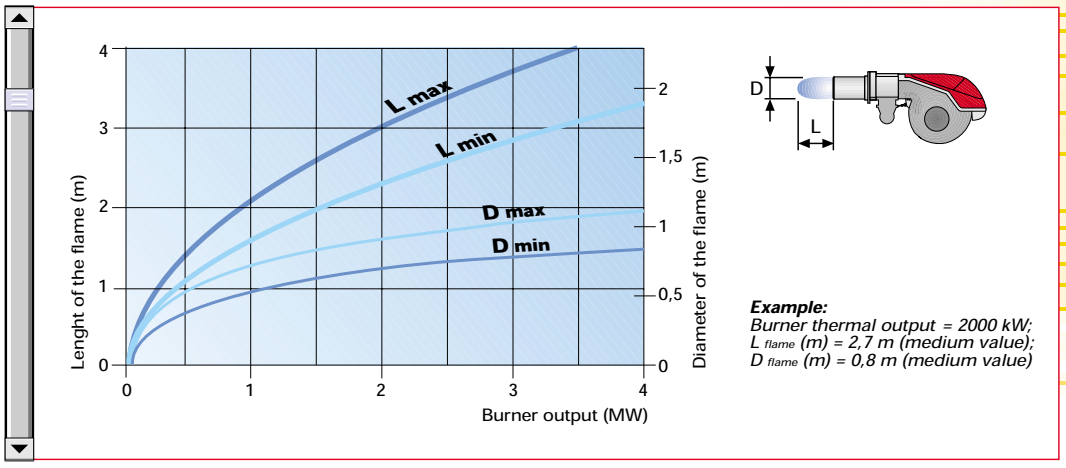
Example of a RS/M burner combustion head

The choice depends on the thickness of the front panel and the type of boiler.

Depending on the type of generator, check that the penetration of the head into the combustion chamber is correct.

The internal positioning of the combustion head can easily be adjusted to the maximum defined output by adjusting a screw fixed to the flange.

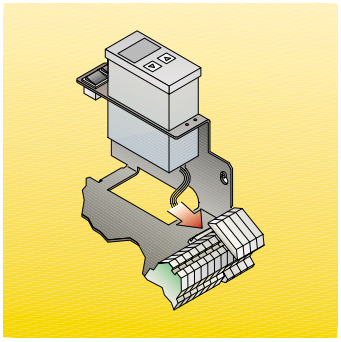
Dimensions of the flame



Example:
Burner thermal output = 2000 kW;
L flame (m) = 2,7 m (medium value);
D flame (m) = 0,8 m (medium value)

ADJUSTMENT

BURNER OPERATION MODE



Example of a regulator

The RS/M series of burners can have "two stage progressive" or "modulating" operation.

On "two stage progressive" operation, the burner gradually adapts the output to the requested level, by varying between two pre-set levels (see figure A).

"Two stage progressive" operation

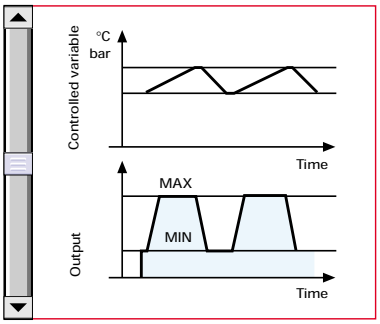


Figure A

In "modulating" operation, normally required in steam generators, in superheater boilers or diathermic oil burners, a specific regulator and probes are required. These are supplied as accessories that must be ordered separately. The burner can work for long periods at intermediate output levels (see figure B).

"Modulating" operation

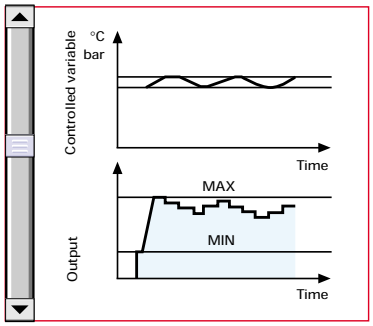
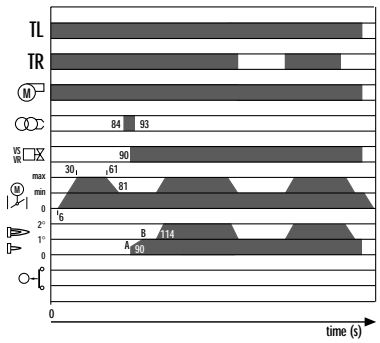


Figure B

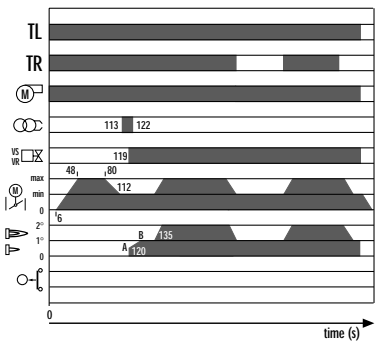
FIRING

RS 28/M - 38/M - 50/M



0"	The TL remote control closes. The fan motor starts turning.
6" - 30"	The servomotor opens the air-damper.
30"- 61"	Pre-ventilation with air delivery at MAX output.
61" - 81"	The air damper and the gas butterfly valve are positioned on MIN output
84"	The ignition electrode sparks.
90"	Firing : the VS safety valve and the VR adjustment valve open.
114"	The start up cycle of the control box is concluded.

RS 70/M - 100/M - 130/M - 190/M



0"	The TL remote control closes. The fan motor starts turning.
6" - 48"	The servomotor opens the air-damper.
48"- 80"	Pre-ventilation with air delivery at MAX output.
80" - 112"	The air damper and the gas butterfly valve are positioned on MIN output
113"	The ignition electrode sparks.
119"	Firing : the VS safety valve and the VR adjustment valve open.
135"	The start up cycle of the control box is concluded.

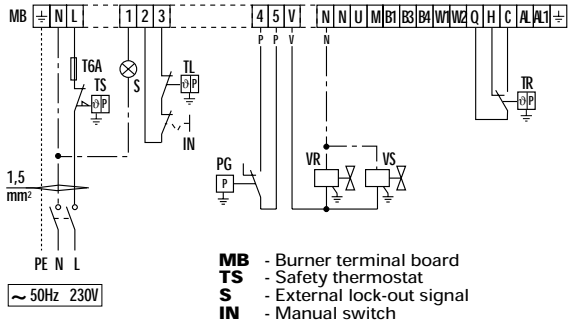
ELECTRICAL CONNECTIONS
To be made by the installer

Electrical connections must be made by qualified and skilled personnel, according to the local regulations.

Example of the terminal board for electrical connections for the RS 70-100-130-190/M models

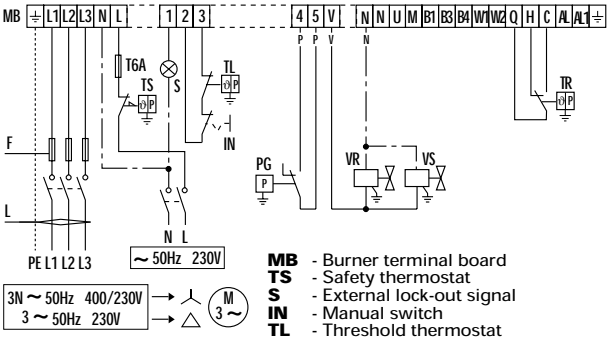
" TWO STAGE PROGRESSIVE" OPERATION

RS 28/M
Without seal control



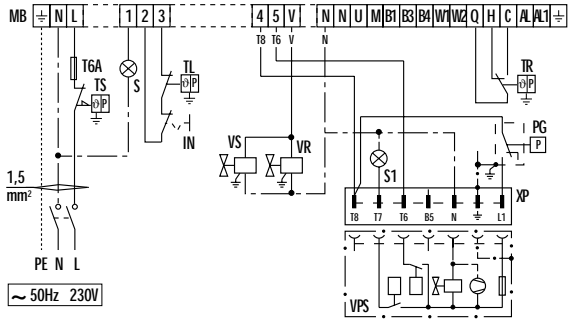
MB - Burner terminal board
TS - Safety thermostat
S - External lock-out signal
IN - Manual switch
TL - Threshold thermostat
TR - High/low flame setting thermostat
T6A - 6A fuse
PG - Minimum gas pressure switch
VR - Adjustment valve
VS - Safety valve

RS 38/M - 50/M - 70/M - 100/M - 130/M - 190/M
Without seal control



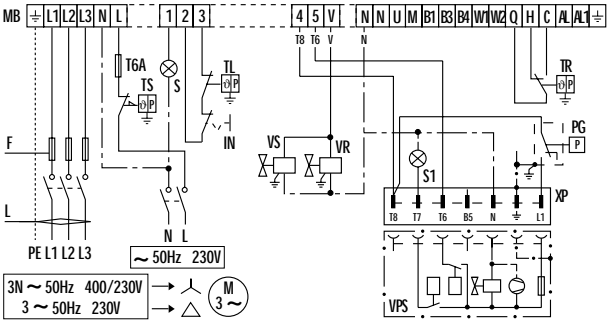
MB - Burner terminal board
TS - Safety thermostat
S - External lock-out signal
IN - Manual switch
TL - Threshold thermostat
TR - High/low flame setting thermostat
T6A - 6A fuse
F - Fuse (see table A)
L - Lead section (see table A)
PG - Minimum gas pressure switch
VR - Adjustment valve
VS - Safety valve

RS 28/M
With seal control



MB - Burner terminal board
TS - Safety thermostat
S - External lock-out signal
S1 - External lock-out signal on the seal control
IN - Manual switch
TL - Threshold thermostat
TR - High/low flame setting thermostat
T6A - 6A fuse
PG - Minimum gas pressure switch
VR - Adjustment valve
VS - Safety valve
VPS - Seal control
XP - Plug for VPS

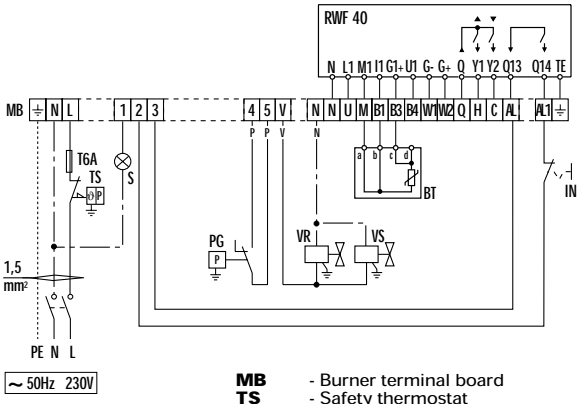
RS 38/M - 50/M - 70/M - 100/M - 130/M - 190/M
With seal control



MB - Burner terminal board
TS - Safety thermostat
S - External lock-out signal
S1 - External lock-out signal on the seal control
IN - Manual switch
TL - Threshold thermostat
TR - High/low flame setting thermostat
T6A - 6A fuse
F - Fuse (see table A)
L - Lead section (see table A)
PG - Minimum gas pressure switch
VR - Adjustment valve
VS - Safety valve
VPS - Seal control
XP - Plug for VPS

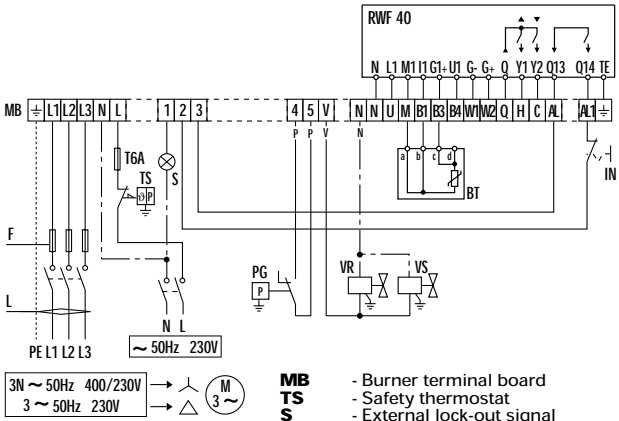
" MODULATING" OPERATION - temperature probe

RS 28/M



MB - Burner terminal board
TS - Safety thermostat
S - External lock-out signal
IN - Manual switch
BT - Temperature probe
T6A - 6A fuse
RWF40 - Regulator (fitted to the burner)
PG - Minimum gas pressure switch
VR - Adjustment valve
VS - Safety valve

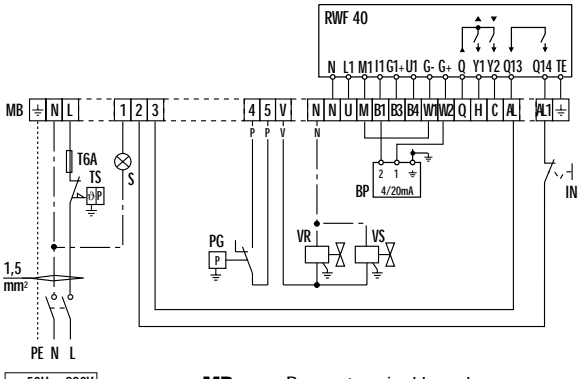
RS 38/M - 50/M - 70/M - 100/M - 130/M -190/M



MB - Burner terminal board
TS - Safety thermostat
S - External lock-out signal
IN - Manual switch
BT - Temperature probe
T6A - 6A fuse
F - Fuse (see table A)
L - Lead section (see table A)
RWF40 - Regulator (fitted to the burner)
PG - Minimum gas pressure switch
VR - Adjustment valve
VS - Safety valve

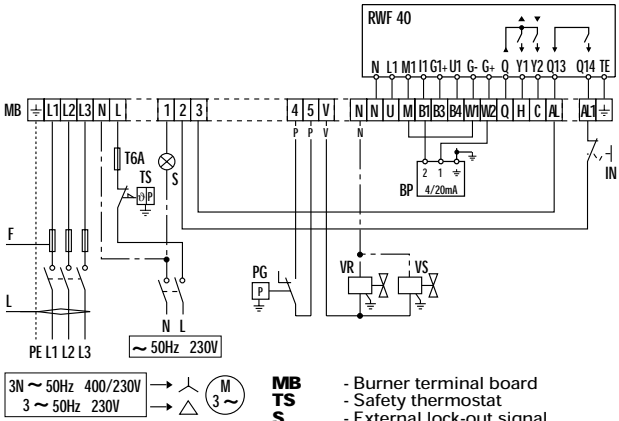
"MODULATING" OPERATION - pressure probe

RS 28/M



MB - Burner terminal board
TS - Safety thermostat
S - External lock-out signal
IN - Manual switch
BP - Pressure probe
T6A - 6A fuse
RWF40 - Regulator (installed on the burner)
PG - Minimum gas pressure switch
VR - Adjustment valve
VS - Safety valve

RS 38/M - 50/M - 70/M - 100/M - 130/M -190/M



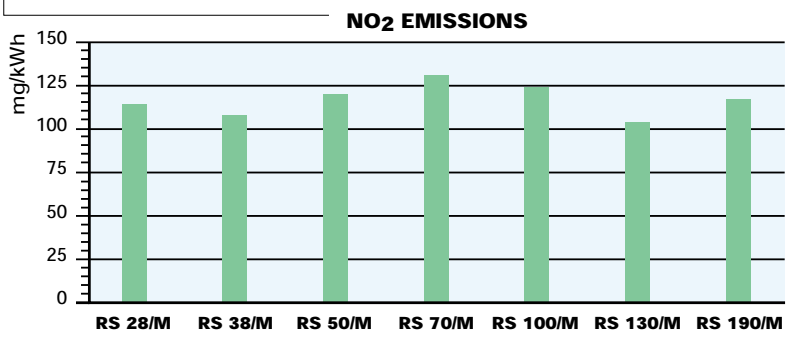
MB - Burner terminal board
TS - Safety thermostat
S - External lock-out signal
IN - Manual switch
BP - Pressure probe
T6A - 6A fuse
F - Fuse (see table A)
L - Lead section (see table A)
RWF40 - Regulator (fitted on the burner)
PG - Minimum gas pressure switch
VR - Adjustment valve
VS - Safety valve

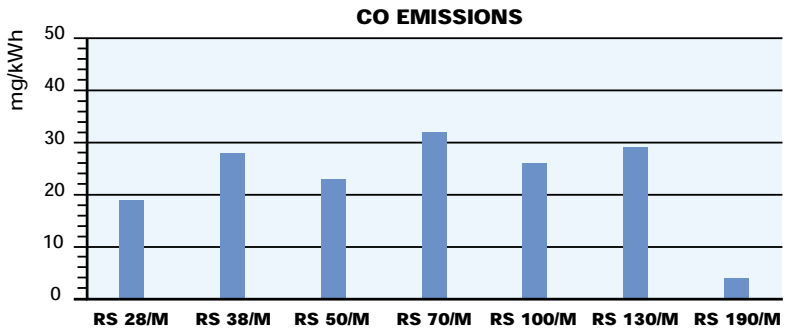
The following table shows the supply lead sections and the type of fuse to be used.

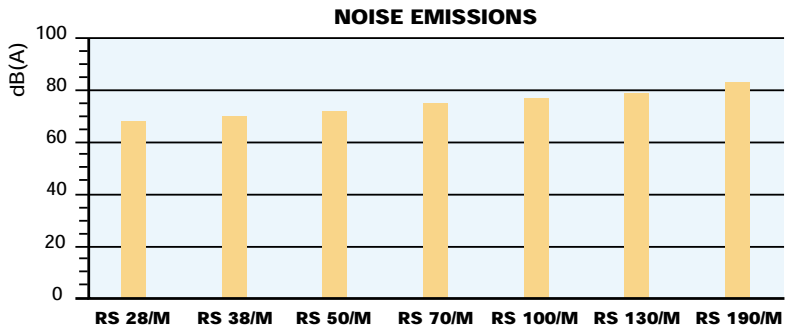
Model	RS 28/M	RS 38/M		RS 50/M		RS 70/M		RS 100/M		RS 130/M		RS 190/M	
	230V	230V	400V	230V	400V	230V	400V	230V	400V	230V	400V	230V	400V
F A	T6	T6	T6	T6	T6	T10	T6	T16	T10	T16	T10	T25	T25
L mm²	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	2,5	2,5

Table A

EMISSIONS





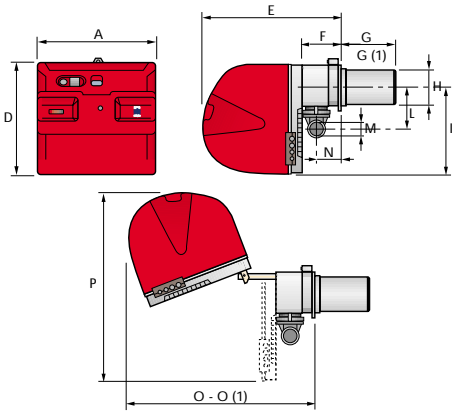


The emission data has been measured in the various models at maximum output, according to EN 676 standard.

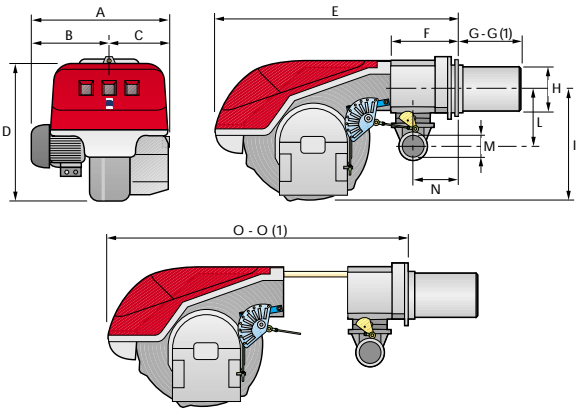
OVERALL DIMENSIONS (mm)

BURNERS

RS 28/M - 38/M - 50/M



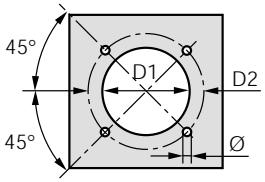
RS 70/M - 100/M - 130/M - 190/M



Model	A	B	C	D	E	F	G - G (1)	H	I	L	M	N	O - O(1)	P
RS 28/M	476	-	-	474	580	164	216 - 351	140	352	168	1"1/2	108	810 - -	719
RS 38/M	476	-	-	474	580	164	216 - 351	140	352	168	1"1/2	108	810 - -	719
RS 50/M	476	-	-	474	580	164	216 - 351	152	352	168	1"1/2	108	810 - -	719
RS 70/M	511	296	215	555	840	214	250 - 385	179	430	221	2"	134	1161 - 1296	-
RS 100/M	527	312	215	555	840	214	250 - 385	179	430	221	2"	134	1161 - 1296	-
RS 130/M	553	338	215	555	840	214	280 - 415	189	430	221	2"	134	1161 - 1296	-
RS 190/M	681	366	315	555	856	230	372 - 530	222	430	186	DN 80	150	1312 - -	-

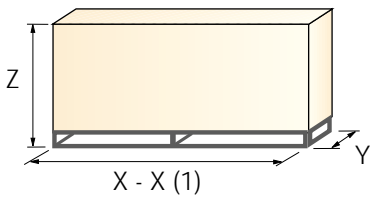
(1) dimension with extended head

BURNER - BOILER MOUNTING FLANGE



Model	D1	D2	Ø
RS 28/M	160	224	M8
RS 38/M	160	224	M8
RS 50/M	160	224	M8
RS 70/M	185	275-325	M12
RS 100/M	185	275-325	M12
RS 130/M	195	275-325	M12
RS 190/M	230	325-368	M16

PACKAGING



Model	X - X (1)	Y	Z	kg
RS 28/M	872 - 1007	540	550	38
RS 38/M	872 - 1007	540	550	40
RS 50/M	872 - 1007	540	550	41
RS 70/M	1190 - 1325	692	740	70
RS 100/M	1190 - 1325	692	740	73
RS 130/M	1190 - 1325	692	740	76
RS 190/M	1250	785	725	82

(1) dimension with extended head

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel. All operations must be performed in accordance with the technical handbook supplied with the burner.

BURNER SETTING

- All the burners have slide bars, for easier installation and maintenance.
- After drilling the boilerplate, using the supplied gasket as a template, dismantle the blast tube from the burner and fix it to the boiler.
- Adjust the combustion head.
- Fit the gas train, choosing this on the basis of the maximum output of the boiler and considering the enclosed diagrams.
- Refit the burner casing to the slide bars.
- Close the burner, sliding it up to the flange.

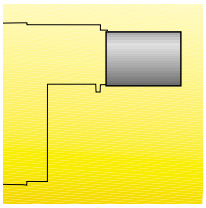
ELECTRICAL CONNECTIONS AND START UP

- Make the electrical connections to the boiler following the wiring diagrams included in the instruction handbook.
- Turn the motor to check rotation direction (if it is a three-phase motor).
- Perform a first ignition calibration on the gas train.
- On start up, check:
  - Gas pressure at the combustion head (to max. and min. output)
  - Combustion quality, in terms of unburned substances and excess air.

ACCESSORIES

Extended heads

"Standard head" burners can be transformed into "extended head" versions, by using the special kit. The KITS available for the various burners, giving the original and the extended lengths, are listed below.



Combustion head extension kits			
Burner	**'Standard head' length (mm)**	**'Extended head' length (mm)**	**Kit code**
RS 28/M	216	351	**3010076**
RS 38/M	216	351	**3010077**
RS 50/M	216	351	**3010078**
RS 70/M	250	385	**3010117**
RS 100/M	250	385	**3010118**
RS 130/M	280	415	**3010119**
RS 190/M	372	530	**3010196**

Spacer kit

If burner head penetration into the combustion chamber needs reducing, varying thickness spacers are available, as given in the following table:

Head length reduction kit		
Burner	**Spacer thickness S (mm)**	**Kit code**
RS 28/M - 38/M - 50/M	90	**3010095**
RS 70/M - 100/M - 130/M	135	**3010129**
RS 190/M	110	**3000722**

Continuous ventilation kit

If the burner requires continuous ventilation in the stages without flame, a special kit is available as given in the following table:

Continuous ventilation kit	
Burner	**Kit code**
RS 28/M - 38/M - 50/M	**3010094**
RS 70/M - 100/M - 130/M - 190/M	**3010094**

Sound proofing box

If noise emission needs reducing even further, sound-proofing boxes are available, as given in the following table:

Sound proofing box		
Burner	**box type**	**box code**
RS 28/M - 38/M - 50/M	C2	**3000777**
RS 70/M - 100/M - 130/M - 190/M	C3	**3000778**

Accessories for modulating operation

To obtain modulating operation, the RS/M series of burners requires a regulator with three point outlet controls. The relative temperature or pressure probes fitted to the regulator must be chosen on the basis of the application.
The following table lists the accessories for modulating operation with their application range.

REGULATOR		PROBE		
Type	**Code**	**Type**	**Range (°C) (bar)**	**Code**
RWF 40	**3010212**	Temperature PT 100	-100 ÷ 500°C	**3010110**
		Pressure 4 ÷ 20 mA	0 ÷ 2,5 bar	**3010213**
		Pressure 4 ÷ 20 mA	0 ÷ 16 bar	**3010214**

Depending on the servomotor fitted to the burner, a three-pole potentiometer (1000 Ω) can be installed to check the position of the servomotor. The KITS available for the various burners are listed below.

Potentiometer kit	
Burner	**Kit code**
RS 28/M - 38/M - 50/M	**3010109**
RS 70/M - 100/M - 130/M - 190/M	**3010021**

LPG kit

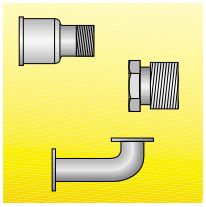
For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner, as given in the following table:

LPG kit		
Burner	**Kit code for 'standard head'**	**Kit code for 'extended head'**
RS 28/M	**3010079**	**3010080**
RS 38/M	**3010081**	**3010082**
RS 50/M	**3010083**	**3010084**
RS 70/M	**3010097**	**3010098**
RS 100/M	**3010099**	**3010100**
RS 130/M	**3010101**	**3010102**
RS 190/M	**3010166**	**-**

GAS TRAIN ACCESSORIES

Adapters

When the diameter of the gas train is different from the set diameter of the burners, an adapter must be fitted between the gas train and the burner. The following table lists the adapters for various burners.



Adapters			
Burner	**Gas train**	**Dimensions**	**Adapter code**
RS 28/M	MBD 407 - 410	3/4" 1" 1/2	**3000824**
RS 38/M	MBD 407 - 410	3/4" 1" 1/2	**3000824**
	MBD 420 - CB 50/1	2" 1" 1/2	**3000822**
RS 50/M	MBD 407 - 410	3/4" 1" 1/2	**3000824**
	MBD 420 - CB 50/1	2" 1" 1/2	**3000822**
RS 70/M	MBD 415 - CB 40/1	1" 1/2 2"	**3000843**
	CBF 65/1	DN 65 2"1/2 1" 1/2 2"	**3000825**
	CBF 80/1	DN 80 2"1/2 2"	**3000826**
RS 100/M	MBD 415 - CB 40/1	1" 1/2 2"	**3000843**
	CBF 65/1	DN 65 2"1/2 1" 1/2 2"	**3000825**
	CBF 80/1	DN 80 2"1/2 2"	**3000826**
RS 130/M	MBD 415 - CB 40/1	1" 1/2 2"	**3000843**
	CBF 65/1	DN 65 2"1/2 1" 1/2 2"	**3000825**
	CBF 80/1	DN 80 2"1/2 2"	**3000826**
	CBF 100/1	DN 100 DN 80	**3010223**
		DN 80 2"1/2 2"	**3000826**
RS 190/M	MBD 420 - CB 50/1	DN 80 DN 65 2"1/2 2"	**3010128**
	CBF 65/1	DN 80 DN 65	**3000831**
	CBF 80/1	DN 80 DN 80	**3000832**
	CBF 100/1	DN 80 DN 100	**3010127**

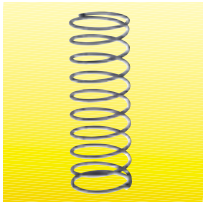
Seal control kit

To test the valve seals on the gas train, a special "seal control kit" is available. The valve seal control device is compulsory (EN 676) on gas trains to burners with a maximum output over 1200 kW. The sealing control is type VPS 504.

Seal control kit		
Burner	**Gas train**	**kit code**
RS 28/M	MBD 407 - 410 - 412 - 415 - CB 40/1	**3010123**
RS 38/M	MBD 410 - 412 - 415 - 420 - CB 40/1 - 50/1	**3010123**
RS 50/M	MBD 410 - 412 - 415 - 420 - CB 40/1 - 50/1	**3010123**
RS 70/M	MBD 415 - 420 - CB 40/1 - 50/1 - CBF 65/1	**3010123**
RS 100/M	MBD 415 - 420 - CB 40/1 - 50/1 - CBF 65/1 - 80/1	**3010123**
RS 130/M	MBD 415 - 420 - CB 40/1 - 50/1 - CBF 65/1 - 80/1	**3010123**
RS 190/M	MBD 420 - CB 50/1 - CBF 65/1 - 80/1 - 100/1	**3010123**

Stabiliser spring

Accessory springs are available to vary the pressure range of the gas train stabilisers. The following table shows these accessories with their application range



Stabiliser springs		
Gas train	**Spring**	**Code**
CBF 65/1 - CBF 80/1	Red da 25 a 55 mbar	**3010133**
CBF 100/1	Red da 25 a 55 mbar	**3010134**
CBF 65/1 - CBF 80/1	Black da 60 a 110 mbar	**3010135**
CBF 100/1	Black da 60 a 110 mbar	**3010136**
CBF 65/1 - CBF 80/1	Pink da 90 a 150 mbar	**3090456**
CBF 100/1	Pink da 90 a 150 mbar	**3090489**

Please refer to the technical manual for the correct choice of spring.

SPECIFICATION

A specific index guides your choice of burner from the various models available in the RS/M series. Below is a clear and detailed specification description of the product.

DESIGNATION OF SERIES R BURNERS

Series : R

Fuel :
- S Natural Gas
- L Light oil
- LS Light oil/Methane
- N Heavy oil

Size

Setting :
- /1 Single stage
- ... Two stage
- /M Modulating

Emission :
- ... Class 1 EN267 - EN676
- MZ Class 2 EN267 - EN676
- BLU Class 3 EN267 - EN676
- MX Class 1 EN267 Class 3 EN676

Head :
- TC Standard head
- TL Extended head

Diagnostic :
- LP Led panel
- ST Status panel

Flame control system:
- FS1 Standard (1 stop every 24 h)
- FS2 Continuous working (1 stop every 72 h)

Electrical supply to the system :

1/230/50	1/230V/50Hz
3/230/50	3/230V/50Hz
3/400/50	3N/400V/50Hz
3/230-400/50	3/230V/50Hz - 3N/400V/50Hz
3/220/60	3/220V/60Hz
3/380/60	3N/380V/60Hz
3/220-380/60	3/220/60Hz - 3N/380V/60Hz

Auxiliary voltage :

230/50-60	230V/50-60Hz
110/50-60	110V/50-60Hz

ID: Differential switch

R	S	50	/M		TC		FS1	3/230-400/50	230/50-60	

BASIC DESIGNATION

EXTENDED DESIGNATION

LIST OF AVAILABLE MODELS

RS	28/M	TC	FS1	1/230/50	230/50-60	
RS	28/M	TL	FS1	1/230/50	230/50-60	
RS	28/M	TC	FS1	1/230/50	230/50-60	ID
RS	28/M	TL	FS1	1/230/50	230/50-60	ID
RS	38/M	TC	FS1	3/230-400/50	230/50-60	
RS	38/M	TL	FS1	3/230-400/50	230/50-60	
RS	38/M	TC	FS1	3/230-400/50	230/50-60	ID
RS	38/M	TL	FS1	3/230-400/50	230/50-60	ID
RS	50/M	TC	FS1	3/230-400/50	230/50-60	
RS	50/M	TL	FS1	3/230-400/50	230/50-60	
RS	50/M	TC	FS1	3/230-400/50	230/50-60	ID
RS	50/M	TL	FS1	3/230-400/50	230/50-60	ID
RS	70/M	TC	FS1	3/230-400/50	230/50-60	
RS	70/M	TL	FS1	3/230-400/50	230/50-60	
RS	70/M	TC	FS1	3/230-400/50	230/50-60	ID
RS	70/M	TL	FS1	3/230-400/50	230/50-60	ID
RS	100/M	TC	FS1	3/230-400/50	230/50-60	
RS	100/M	TL	FS1	3/230-400/50	230/50-60	
RS	100/M	TC	FS1	3/230-400/50	230/50-60	ID
RS	100/M	TL	FS1	3/230-400/50	230/50-60	ID
RS	130/M	TC	FS1	3/230-400/50	230/50-60	
RS	130/M	TL	FS1	3/230-400/50	230/50-60	
RS	130/M	TC	FS1	3/230-400/50	230/50-60	ID
RS	130/M	TL	FS1	3/230-400/50	230/50-60	ID
RS	190/M	TC	FS1	3/230-400/50	230/50-60	
RS	190/M	TC	FS1	3/230-400/50	230/50-60	ID

Other versions are available on request

PRODUCT SPECIFICATION

Burner:

Monoblock forced draught gas burner with two stage progressive or modulating operation, with a specific kit, fully automatic, made up of:
- Air suction circuit lined with sound-proofing material
- Fan with reverse curve blades (straight blades on the 190/M model) high performance with low sound emissions
- Air damper for air flow setting and butterfly valve for regulating fuel output controlled by a servomotor with variable cam
- Starting motor at 2800 rpm, three-phase 400V with neutral, 50Hz (single-phase, 230V and 50Hz for the 28/M model)
- Combustion head, that can be set on the basis of required output, fitted with:
    - stainless steel end cone, resistant to corrosion and high temperatures
    - ignition electrodes
    - ionisation probe
    - gas distributor
    - flame stability disk
- Maximum gas pressure switch to stop the burner in the case of excess pressure on the fuel supply line
- Minimum air pressure switch stops the burner in case of insufficient air quantity at the combustion head
- Flame control panel, fitted with control function for the correct positioning of the servomotor and possibility of post-purge by just changing the electric wiring
- Burner on/off selection switch
- Manual or automatic output increase/decrease selection switch
- Flame inspection window
- Slide bars for easier installation and maintenance
- Protection filter against radio interference
- IP 44 electric protection level.

Gas train
Fuel supply line, in the MULTIBLOC configuration (from a diameter of 3/4" until a diameter 2") or COMPOSED configuration (from a diameter of DN 65 until a diameter of DN 100), fitted with:
- Filter
- Stabiliser
- Minimum gas pressure switch
- Safety valve
- Valve seal control (for output > 1200 kW)
- One stage working valve with ignition gas output regulator.

Conforming to:
- 89/336/EEC directive (electromagnetic compatibility)
- 73/23/EEC directive (low voltage)
- 92/42/EEC directive (performance)
- 90/396/EEC directive (gas)
- EN 676 (gas burners).

Standard equipment:
- 1 gas train gasket
- 1 flange gasket
- 4 screws for fixing the flange
- 1 thermal screen
- 4 screws for fixing the burner flange to the boiler
- Wiring loom fittings for the electrical connection (RS 28/M - 38/M - 50/M)
- 2 slide bar extensions (for extended head models and RS 190/M model)
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- Head extension kit
- Head length reduction kit
- Continuous ventilation kit
- Sound-proofing box
- RWF 40 output regulator
- Pressure probe 0 – 2.4 bar
- Pressure probe 0 – 16 bar
- Temperature probe -100 – 500°C
- Potentiometer kit for the servomotor
- LPG kit
- Gas train adapter
- Seal control kit
- Stabiliser spring.

Lineagrafica

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ISO 9001 Cert. n. 0061

RIELLO BURNERS

CE

MODULATING GAS BURNERS

MODUBLOC MB SE SERIES

MB 4 SE	1070 ÷	4070 kW
MB 6 SE	1186 ÷	6000 kW
MB 8 SE	1500 ÷	8000 kW
MB 10 SE	2000 ÷	10000 kW

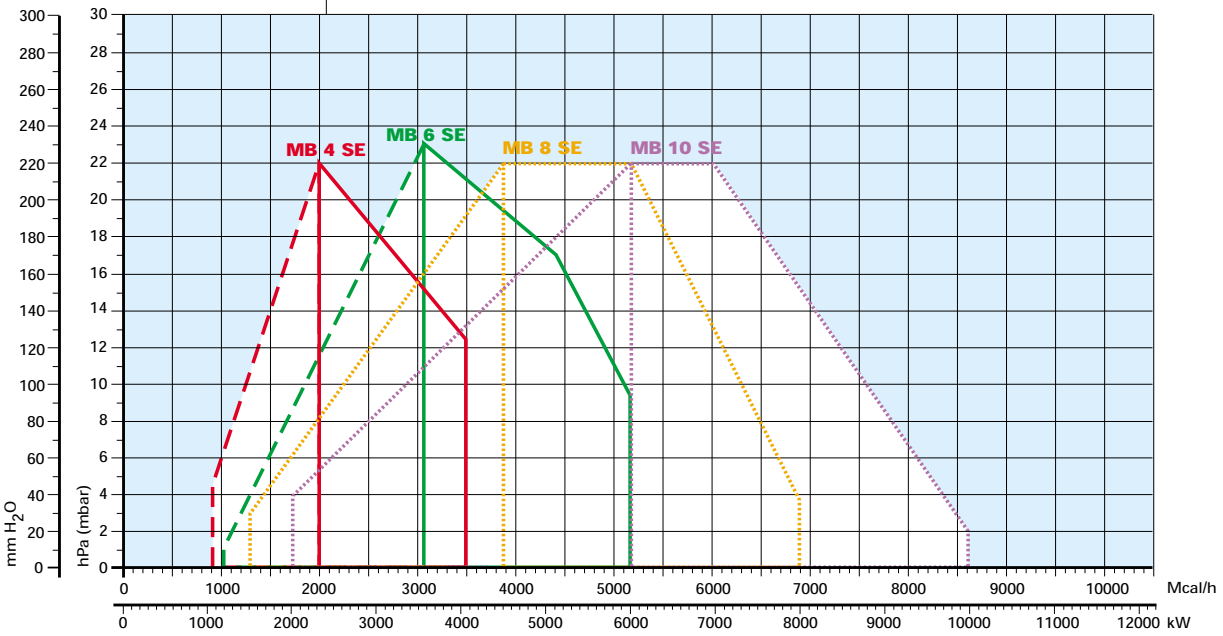
The MODUBLOC MB SE series of burners are characterised by a monoblock structure that means all necessary components can be combined in a single unit, making installation easier and faster. The series covers a firing range from 1070 to 10000 kW, and they have been designed for use in hot water boilers or industrial steam generators.
Adjustment is modulating, through an innovative electronic module, which gives control of the air/fuel ratio and PID control of the generator temperature or pressure.
The mechanisms of regulation allow to catch up a high modulation ratio on all firing rates range.
The burner can, therefore, supply with precision the demanded power, guaranteeing a high efficiency system level and the stability setting, obtaining fuel consumption and operating costs reduction.
An exclusive design, with fan unit fitted on line with the combustion head, guarantees low sound emissions, reduced dimensions, easy use and maintenance.

TECHNICAL DATA

	Model		MB 4 SE	MB 6 SE	MB 8 SE	MB 10 SE
	Setting type		modulating			
	Modulating ratio at max. output		5 ÷ 1			
	Servo-motor type		MM 10004 (air) - MM 10005 (gas)			
	Servo-motor run time	s	--		--	
	Heat output	kW	1070/2325÷4070	1186/3558÷6000	1500/4500÷8000	2000/6000÷10000
		Mcal/h	920/2000÷3500	1020/3060÷5160	1290/3870÷6880	1720/5160÷8600
	Working temperature	°C min./max.	0/40			
Fuel / air data	Net calorific value gas G20	kWh/Nm³	10			
	Density gas G20	kg/Nm³	0,71			
	Output gas G20	Nm³/h	107/233÷407	119/356÷600	150/450÷800	200/600÷1000
	Net calorific value gas G25	kWh/Nm³	8,6			
	Density gas G25	kg/Nm³	0,78			
	Output gas G25	Nm³/h	124/270÷473	138/414÷698	174/523÷930	233/698÷1163
	Net calorific value gas LPG	kWh/Nm³	25,8			
	Density gas LPG	kg/Nm³	2,02			
	Output gas LPG	Nm³/h	41,5/90÷158	46/138÷233	58/174÷310	78/233÷388
	Fan	type	reverse curve blades			
	Air temperature	max °C	60			
Electrical data	Electrical supply	Ph/Hz/V	3N/50/230-400~(±10%)			
	Auxiliary electrical supply	Ph/Hz/V	1/50/230 ~ (±10%)			
	Control box	type	LFL 1.333			
	Total electrical power	kW	13	15	26	
	Auxiliary electrical power	kW	2	2	0,55	
	Protection level	IP	40			
	Electric motor power	kW	11	13	22	
	Rated motor current	A	38 - 22	46,7 - 27	67,5 - 39	
	Motor start current	A	7,3 x I nom	7,6 x I nom	7,9 x I nom	
	Motor protection level	IP	55			
	Ignition transformer	V1 - V2	230V - 2x5 kV		230V - 2x6 kV	
		I1 - I2	1,9A - 30mA		1,9A - 30mA	
	Operation		Intermittent (at least one stop every 24 h) or Continuous as optional (at least one stop every 72 h)			
Emissions	Sound pressure	dBA	82	85	88	
	Sound output	W	--	--	--	--
	CO emissions	mg/kWh	< 15			
	NOx emissions	mg/kWh	< 150			
Approval	Directive		90/396 - 89/336 - 73/23 EEC			
	According to		EN 676			
	Certifications		CE 0085AU2367		in progress (CE ...)	

Reference conditions:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 meters a.s.l.
Noise measured at a distance of 1 meter.

FIRING RATES



Useful rate for the choice of the burner

Modulating rate

Firing rates in progress

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

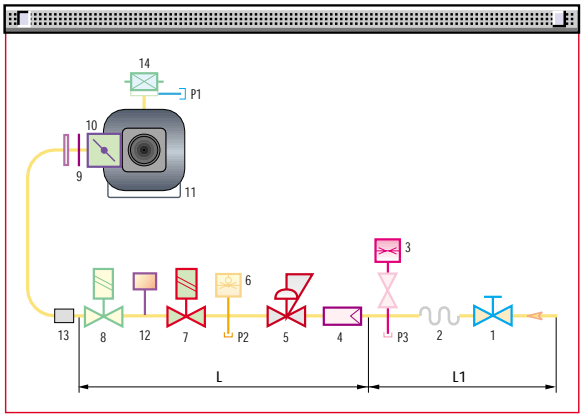
FUEL SUPPLY

GAS TRAIN

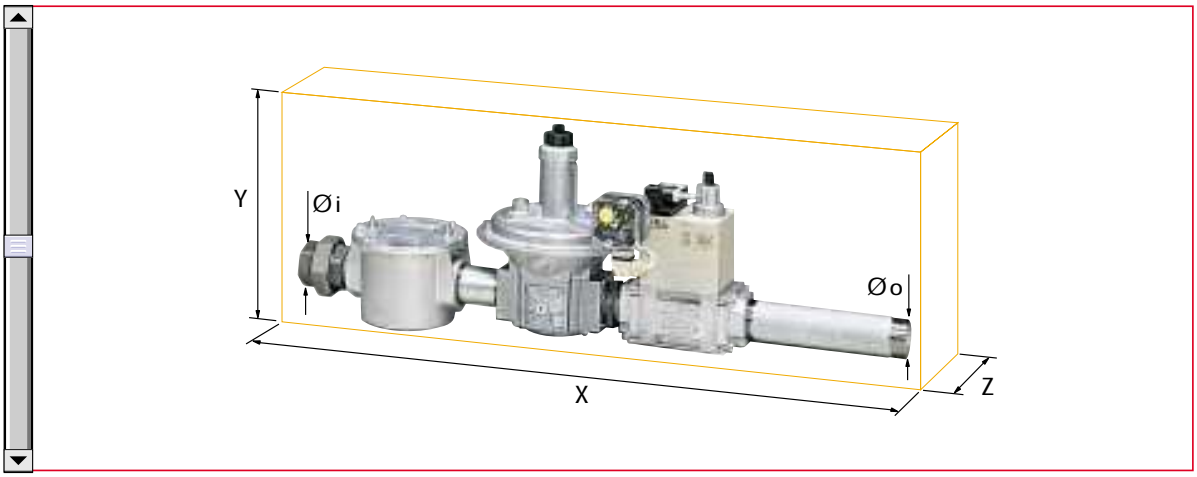
The burners are fitted with a butterfly valve to regulate the fuel, controlled by the main management module of burner through a high precision servomotor.
Fuel can be supplied either from the right or left sides, on the basis of the application requirements.
A maximum gas pressure switch stops the burner in case of excess pressure in the fuel line.
The gas train can be selected to best fit system requirements depending on the fuel output and pressure in the supply line.
The gas trains are "Composed" type (assembly of the single components).

Example of the MB 4 SE gas adjustment butterfly valve

COMPOSED gas train with seal control



1	Manual valve
2	Anti-vibration joint
3	Pressure gauge with pushbutton cock
4	Filter
5	Pressure regulator (vertical)
6	Minimum gas pressure switch
7	VS safety solenoid (vertical)
8	VR regulation solenoid (vertical) Two settings: - firing output (rapid opening) - maximum output (slow opening)
9	Gasket and flange supplied with the burner
10	Gas adjustment butterfly valve
11	Burner
12	Seal control mechanism for valves 8-9. According to standard EN 676, the seal control is compulsory for burners with maximum output above 1200 kW
13	Gas train-burner adapter
14	Maximum gas pressure switch
P1	Combustion head pressure
P2	Pressure downstream from the regulator
P3	Pressure upstream from the filter
L	Gas train supplied separately, with the code given in the table
L1	Installer's responsibility



Example of gas train "COMPOSED" type without seal control

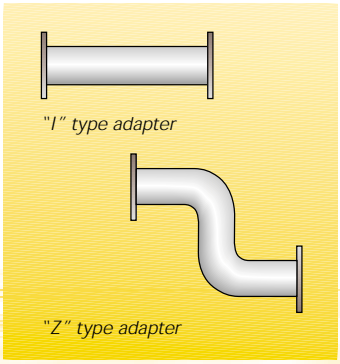
Gas trains are approved by standard EN 676 together with the burner.

The overall dimensions of the gas train depends on how they are constructed. The following table shows the maximum dimensions of the gas trains that can be fitted to MB SE burners, intake and outlet diameters and seal control if fitted.
Please note that the seal control can be installed as an accessory, if not already installed on the gas train.

The maximum gas pressure of gas train "Composed" type is 500 mbar.

COMPOSED GAS TRAINS

Name	Code	Ø i	Ø o	X mm	Y mm	Z mm	CT
CBF 65/1 CT	3970161	DN 65	DN 65	874	356	285	incorporated
CBF 80/1 CT	3970162	DN 80	DN 80	934	416	285	incorporated
CBF 100/1 CT	3970163	DN 100	DN 100	1054	501	350	incorporated
CBF 125/1 CT	3970196	DN 125	DN 125	1166	686	400	incorporated



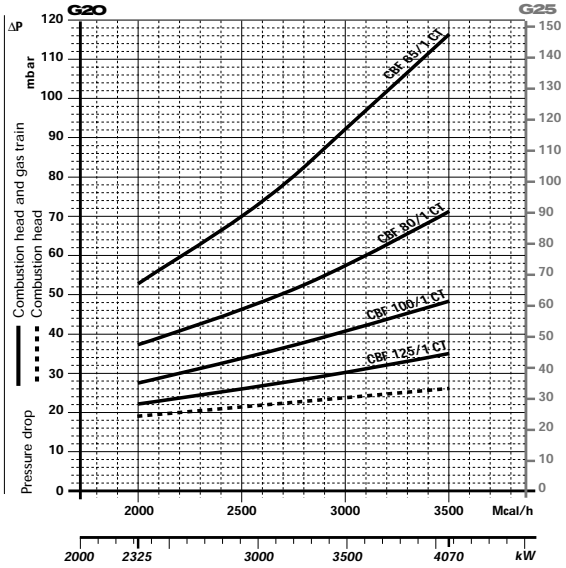
When the diameter of the gas train is different from the set diameter of the burners, an adapter must be fitted between the gas train and the burner.
For further information see paragraph "Accessories".

PRESSURE DROP DIAGRAMS

The diagrams indicate the minimum pressure drop of the burners with the various gas trains that can be matched with them; at the value of these pressure drop add the combustion chamber pressure.
The value thus calculated represents the minimum required input pressure to the gas train.

NATURAL GAS

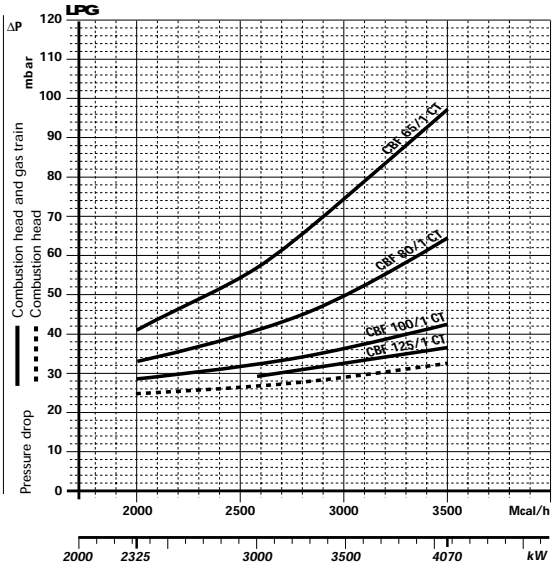
MB 4 SE



Gas train	Code	Adapter	SC
CBF 65/1 CT	3970161	3010221 (I) 3010225 (Z)	incorporated
CBF 80/1 CT	3970162	3010222 (I) 3010226 (Z)	incorporated

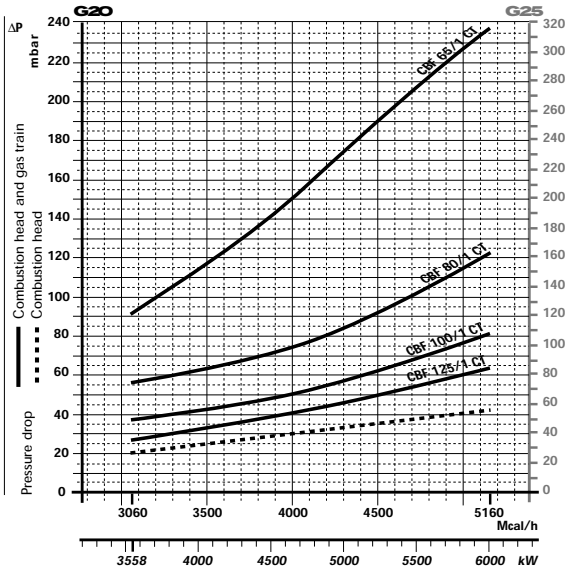
LPG

MB 4 SE



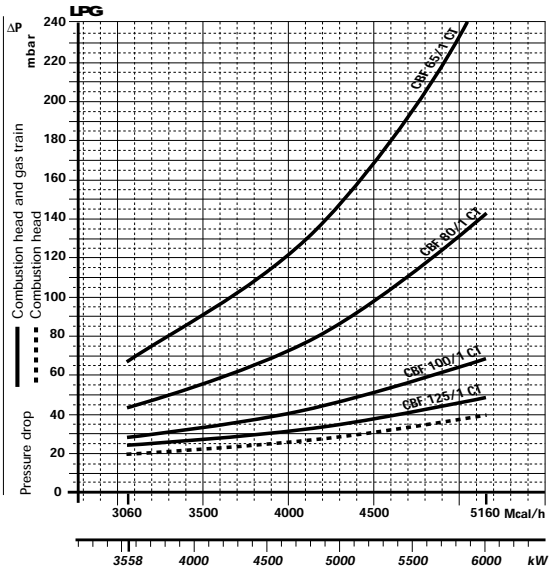
Gas train	Code	Adapter	SC
CBF 100/1 CT	3970163	3010223 (I) 3010227 (Z)	incorporated
CBF 125/1 CT	3970196	3010224 (I) 3010228 (Z)	incorporated

MB 6 SE



Gas train	Code	Adapter	SC
CBF 65/1 CT	3970161	3010221 (I) 3010225 (Z)	incorporated
CBF 80/1 CT	3970162	3010222 (I) 3010226 (Z)	incorporated

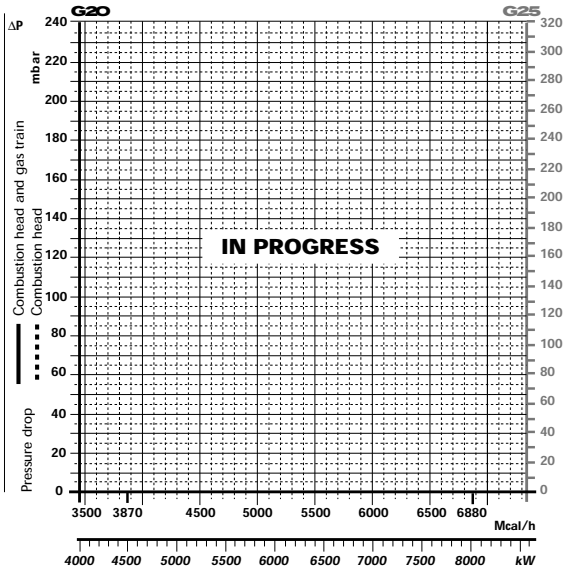
MB 6 SE



Gas train	Code	Adapter	SC
CBF 100/1 CT	3970163	3010223 (I) 3010227 (Z)	incorporated
CBF 125/1 CT	3970196	3010224 (I) 3010228 (Z)	incorporated

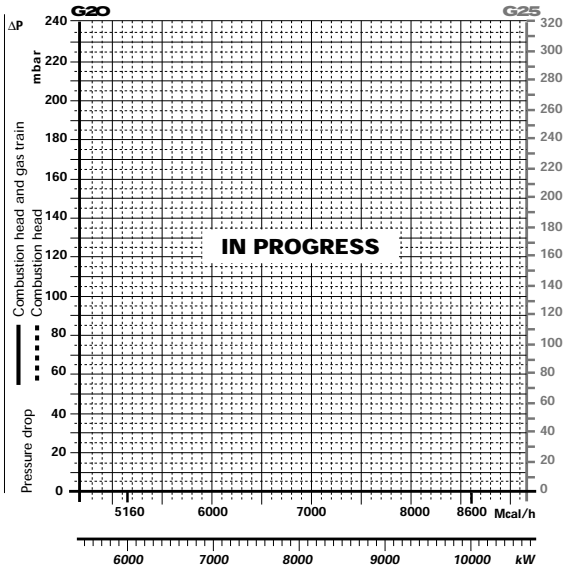
NATURAL GAS

MB 8 SE



Gas train	Code	Adapter	SC
CBF 65/1 CT	3970161	3010221 (I) 3010225 (Z)	incorporated
CBF 80/1 CT	3970162	3010222 (I) 3010226 (Z)	incorporated

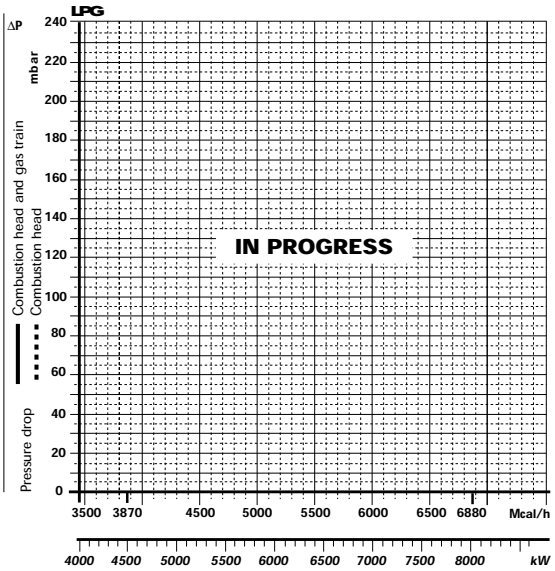
MB 10 SE



Gas train	Code	Adapter	SC
CBF 65/1 CT	3970161	3010221 (I) 3010225 (Z)	incorporated
CBF 80/1 CT	3970162	3010222 (I) 3010226 (Z)	incorporated

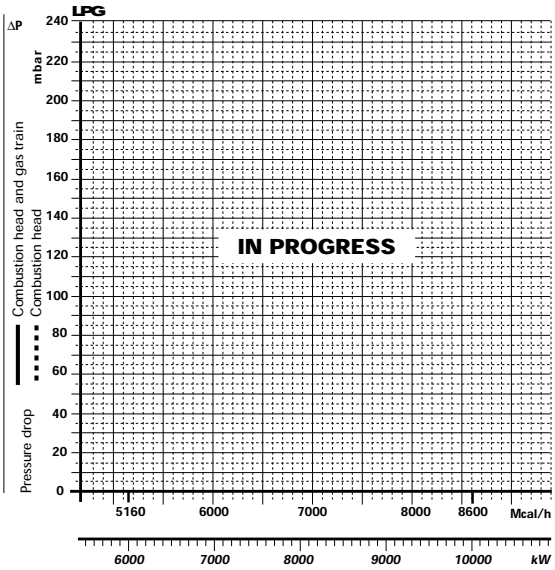
LPG

MB 8 SE



Gas train	Code	Adapter	SC
CBF 100/1 CT	3970163	3010223 (I) 3010227 (Z)	incorporated
CBF 125/1 CT	3970196	3010224 (I) 3010228 (Z)	incorporated

MB 10 SE



Gas train	Code	Adapter	SC
CBF 100/1 CT	3970163	3010223 (I) 3010227 (Z)	incorporated
CBF 125/1 CT	3970196	3010224 (I) 3010228 (Z)	incorporated

note *Please contact the Riello Burner Technical Office for different pressure levels from those above indicated.*

SELECTING THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

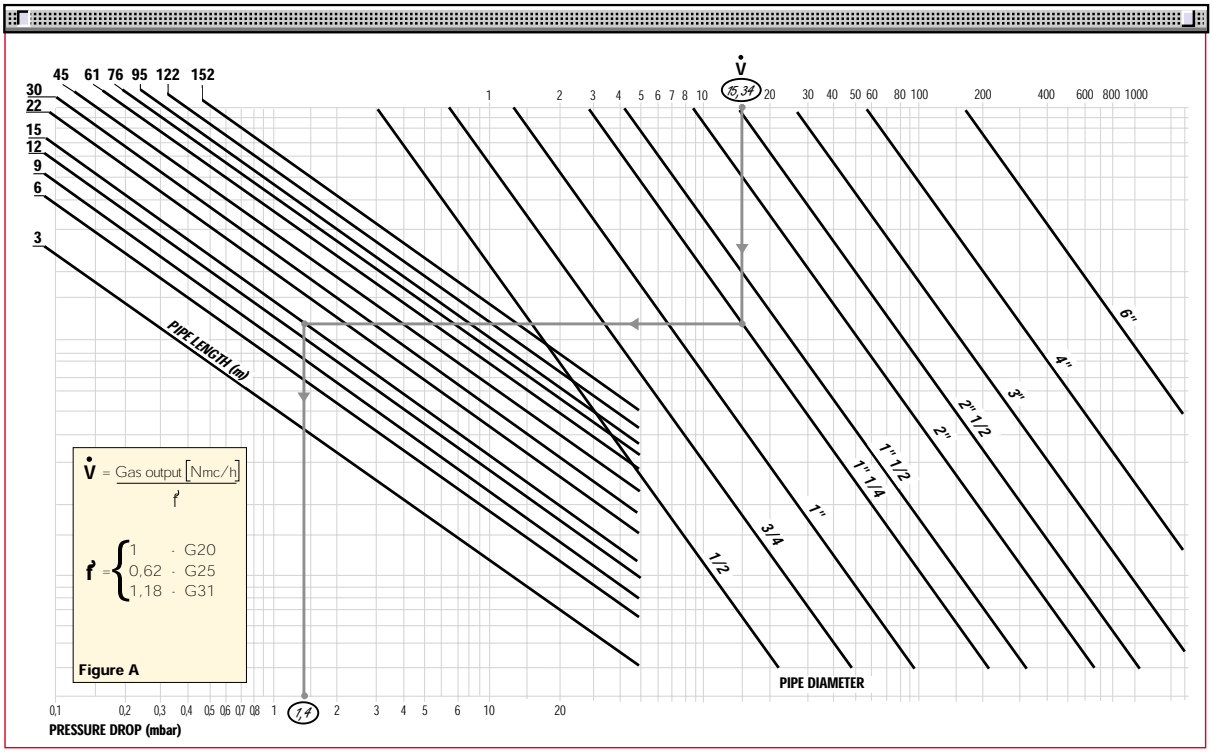
Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length.
Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop of on the botton scale below (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

	- gas used	G25
	- gas output	9.51 mc/h
	- pressure at the gas meter	20 mbar
	- gas line length	15 m
	- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62}\right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;

- correct pressure = (20-1.4) = 18.6 mbar



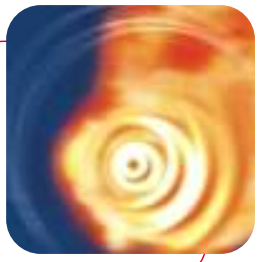
VENTILATION

Example of the servomotor and dampers for air setting

All the burners in the MB series are fitted with fans with reverse curve blades, which give excellent performance and are fitted in line with the combustion head. The air flow and sound-deadening materials that are used in the construction are designed to reduce sound emissions to the minimum and guarantee high levels of performance in terms of output and air pressure.
A high precision servomotor through the main management module installed on each burner of MB series, controls the air dampers position constantly, guaranteeing an optimal fuel-air mix. On request, the Modubloc burners can be supplied with the "inverter" configuration, which means they are fitted with a device for varying the amount of combustion air through a variable speed action of the fan motor. The addition of the interface inverter module means the burner can work at reduced speed, with further benefits in terms of sound emissions, especially during the night when the perception threshold is lower.

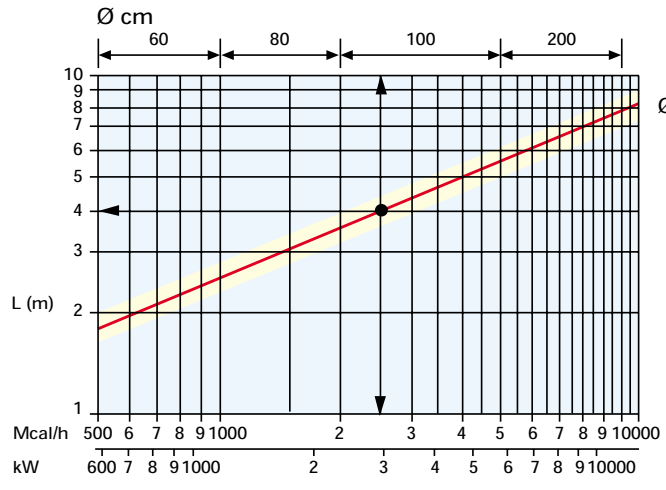
COMBUSTION HEAD

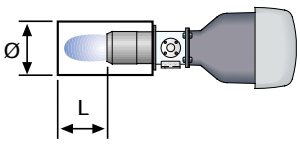
Example of a MODUBLOC MB SE burner combustion head



Simple adjustment of the combustion head allows to adapt internal geometry of the head to the output of the burner. The same adjustment servomotor for the air damper also varies, depending on the required output, the setting of the combustion head, through a simple lever.
This system guarantees excellent mix on all firing rates range.

Dimensions of the combustion chambers used in the testing laboratory





$$L\ (m) = 0{,}23 \times \sqrt{\frac{kW}{10}}$$

Example:
Burnt thermal output = 3020 kW;
L (m) = 0,23 x √302 = 4 (m);
Ø = 100 (cm)

For more detailed evaluations regarding the combinations, consult the Riello Technical manual.

SETTING

OUTPUT SETTING

Main management module

Each MB series burner has a main electronic microprocessor management panel, which controls both the fuel flow servomotor (with a pressure regulator) and air flow servomotor (with air dampers).

Hysteresis is prevented by the precise control of the two servomotors and the software link. The high precision regulation is due to the absence of mechanical clearance normally found in mechanical regulation cams on traditional modulating burners.

Inside each MB series burner main electronic microprocessor management panel, there is a PID regulator to control the boiler temperature or pressure . Variables can be controlled by specific accessory probes (see paragraph "Accessories).

The burner can run for a long time on intermediate output settings (see fig. A)

The main electronic management panel shows all operational parameters in real time, so as to keep a constant check on the burner:
- servomotor angle
- required set-point and actual set-point
- fuel consumption (measured indirectly)
- smoke and environmental temperature (with EGA module)
- CO_2, CO, O_2, NO e SO_2 value (with EGA module)
- burner stage

"modulating" setting

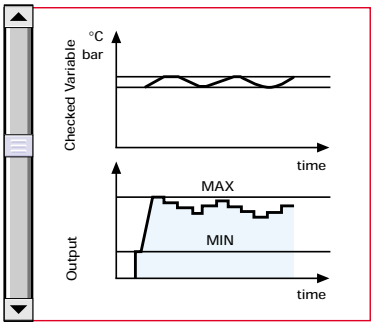


Figure A

The main electronic management panel operations can be increased by installing accessory modules as illustrated below. For available module codes see "Accessories".

Special software can be loaded into a portable PC to input and download data through an interface cable to an infrared device on the front panel of the MB series burner.
This is useful both during burner start-up and commissioning phases, and maintenance.

D.T.I. Module

D.T.I. module (Data Transfer interface)

This electronic module can transfer multiple signals from different local modules to a BMS supervisor software system (Building Management System).

Examples of local modules:
- main management module on each MB series burner which sends and receives signals to indicate or modify the burner working stage

- modules which send and receive signals from the various devices in the boiler room and system.
  e.g. - analog modules I/O
  - digital modules /O
  - EGA modules
  (For further information see relative paragraph)

Up to ten MB series burners, with or without the EGA module, ten analog modules I/O and ten digital modules I/O can be linked up.
The DTI module uses MODUBUS interface protocol as a standard protocol to external supervisory systems (a type of field bus widely used in industrial communication systems).
This type of protocol is used when sample signal rates which need checking are low e.g. for temperature, pressure or pump and fan systems.
With special electronic interface boards other communication protocols (e.g. PROFIBUS) can be used.

DTI module information is transferred directly or by modem to supervisory systems by RS 232 or RS 422 (in the case of long distance up to 1 km) connections.

The supervisory system can also manage a series of MB burners installed in the same system; each main electronic management panel comes with the software needed to manage such a series of burners.

Digital I/O Module

Digital I/O Module

Digital modules I/O transfer in-coming and out-going information such as working stages and alarms, from the boiler room or from the system in general where one or more MB series burners are installed to a remote supervisor system.

Digital modules I/O manage both input and output signals, e.g.:
- n. 16 input signals (free contacts – max. current 1 A)
- n. 8 output signals (free contacts – max. current 1 A)

The out-going signals can control any device in the boiler room, e.g. pumps, fans, etc…

The in-coming signals can check any device in the boiler room, e.g. pumps, fans, etc… and receive warning signals such as over heating, excess pressure.

Up to ten I/0 digital modules can be linked together. Fig. C shows an example of sequencing I/O digital modules linked to a remote supervisor system by a DTI interface.

Analogic I/O Module

Analog I/O module

I/O Analog modules transfer in-coming and out-going information about burner working stages and other devices in the boiler room or in the system in general where one or more MB series burners are installed to a remote supervisor system.
I/O Analog modules manage both input and output signals, such as 4-20 mA or 0-10 Volt, e.g.:
- n. 6 input signals
- n. 6 output signals

These modules can be connected to the remote supervisor system in two different ways:

- **" LOW LEVEL" connection**
  each I/O analog module transmits information from a single burner to a remote supervisor system using 4-20 mA or 0-10 Volt signals, e.g.
  boiler temperature/pressure, output level, boiler set-point, servomotor angle position, etc.
  The system becomes operational when each single I/O analog module is programmed by a portable PC and appropriate software.
  The set point can be modified by a single in-coming 4–20 mA or 0-10 Volt signal from the supervisor system.

Here is an example of a "LOW LEVEL" connection between I/O analogue modules and remote supervisor system. (figure B)

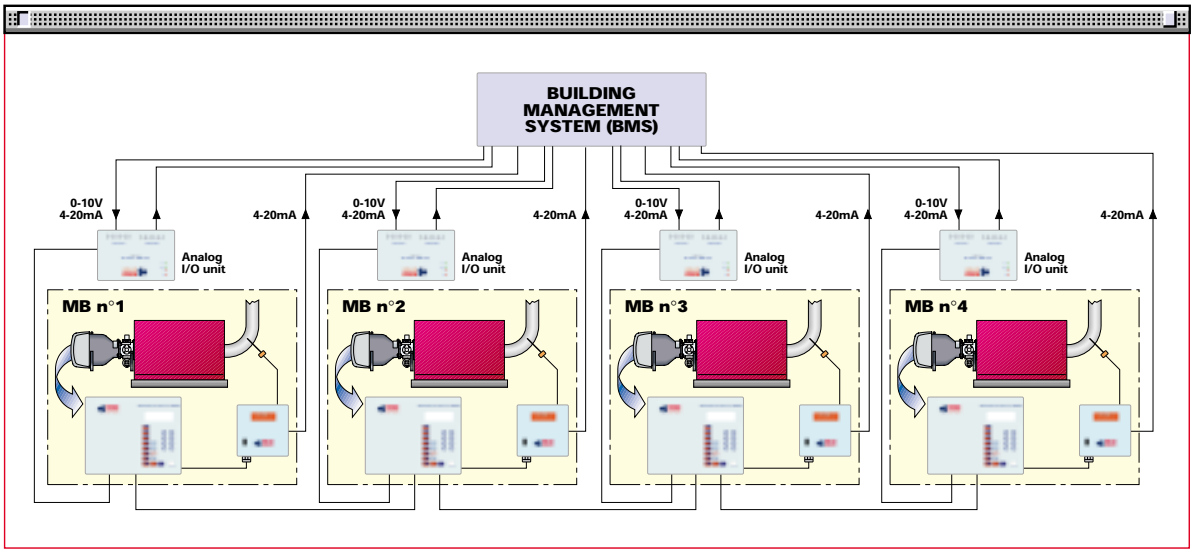


Figura B - "LOW LEVEL" connection

- **" HIGH LEVEL" connection**
  each I/O analog module transmits in-coming and out-going information about boiler room temperature/pressure, pump rpm, set point, to a remote supervisor system using 4-20 mA or 0-10 Volt signals, through DTI interface.
  Up to ten I/0 digital modules can be linked together.

Here is an example of an "HIGH LEVEL" connection between I/O analogue modules and remote supervisor system. (figure C)

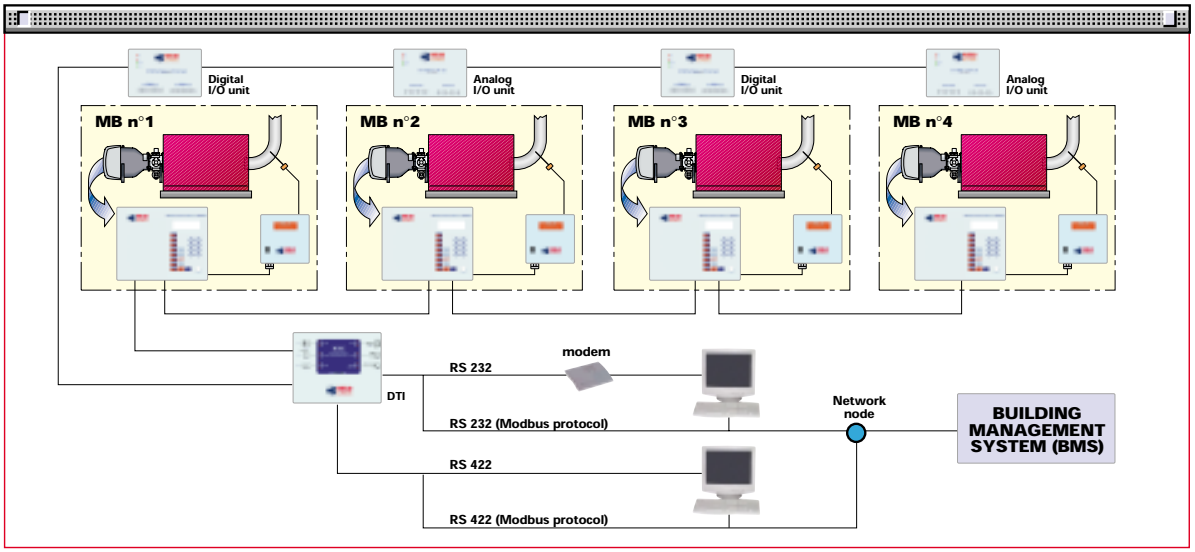


Figura C - "HIGH LEVEL" connection

E.G.A. Module

E.G.A. module (Exhaust Gas Analyser)

EGA modules measure some of the exhaust gas substances. These modules come with an exhaust gas sampler probe and exhaust gas temperature probe (0-400 °C).
Four different EGA modules are available depending on the type of substance to be checked. (For further information see "accessories" paragraph).
Thanks to EGA module connected to the main electronic microprocessor management panel on each MB series burner, the burner can adjust its working parameters on the basis of continuous combustion gas analysis.
The EGA module creates a closed control link which increases efficiency by up to max 5%.

The following functions are also available:
- smoke and environmental temperature measurement
- viewing of measured parameters on main management display panel
- burner lock-out when some parameters exceed permitted levels (settable)
- combustion optimisation with automatic air damper setting (adjustment O2 level)
- automatic re-adjustment at each firing

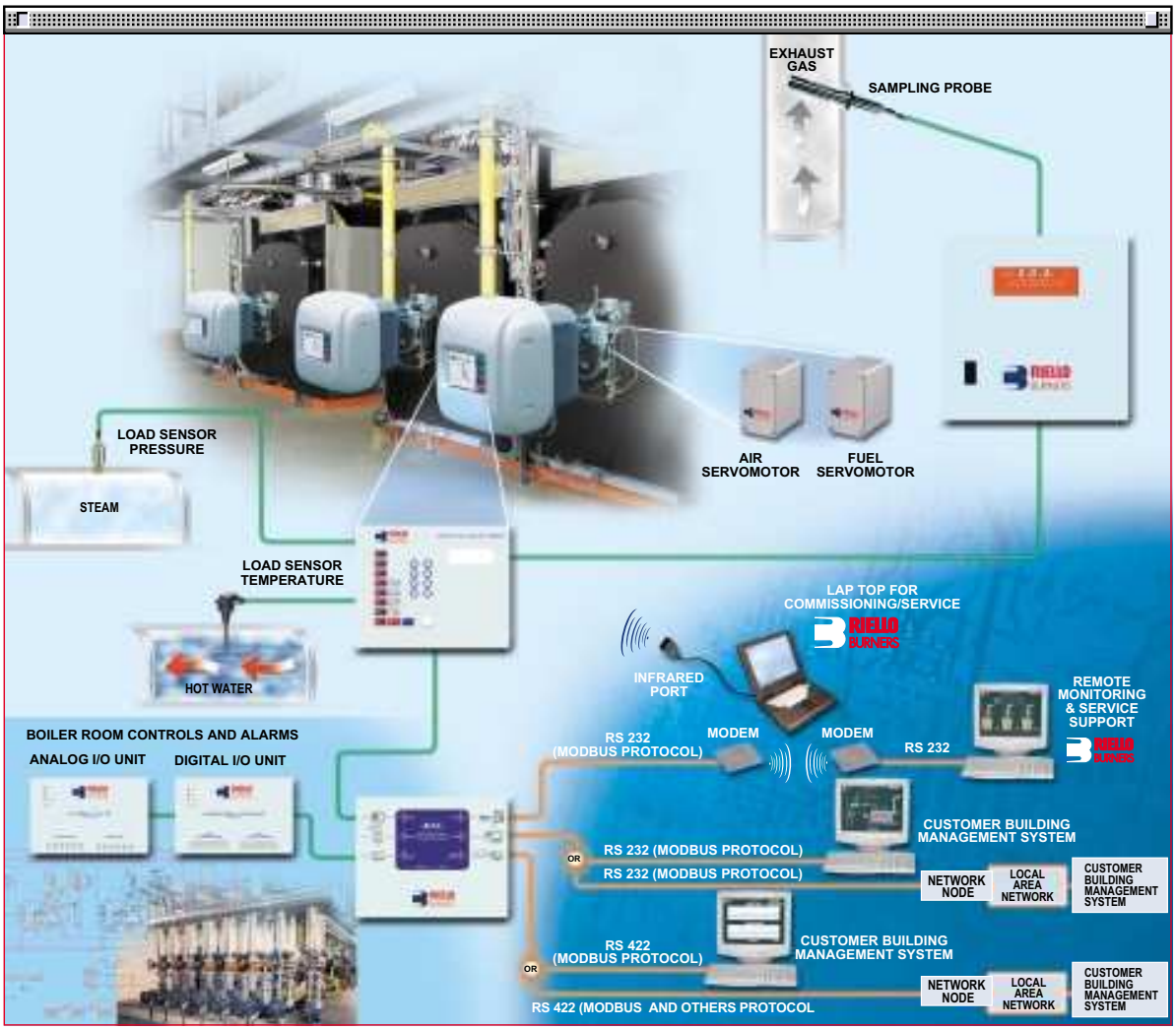
The information from EGA modules can be sent to a remote supervisor system in two ways:
- through six signals (4-20mA) on a terminal board (see layout fig. B)
  To activate this operation each single EGA module must be programmed using a PC with appropriate software.
- through the DTI interface module (see layout fig. C)

Connections between Modules

A data cable type BELDEN 9501 or similar, which can be ordered as an accessory (see accessories paragraph), must be used to connect the above modules.

note *To develop the various layouts or for further information about single modules please contact the Riello Burners Technical Office.*

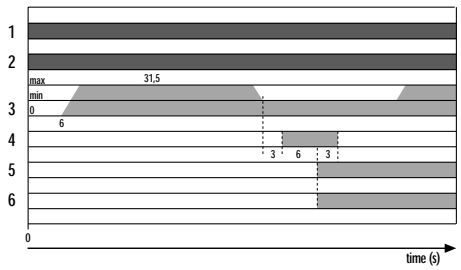
The following diagram summarises how MB series burners and modules can be used for the supervision of boiler rooms or systems in general.



Example of boiler room management system

IGNITION

MB 4-6-8-10 SE



1 - Closing thermostat
2 - Fan motor working
3 - Air damper
4 - Ignition transformer
5 - Valves open
6 - Flame presence

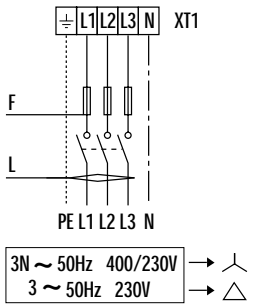
ELECTRICAL CONNECTIONS
To be made by the installer

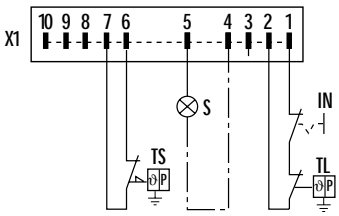
Example of the terminal board for electrical connections

Electrical connections must be made by qualified and skilled personnel, according to the local norms.

THREE PHASE SUPPLY TO THE POWER CIRCUIT AND CONNECTING THE AUXILIARY CONTROLS

MB 4-6-8-10 SE

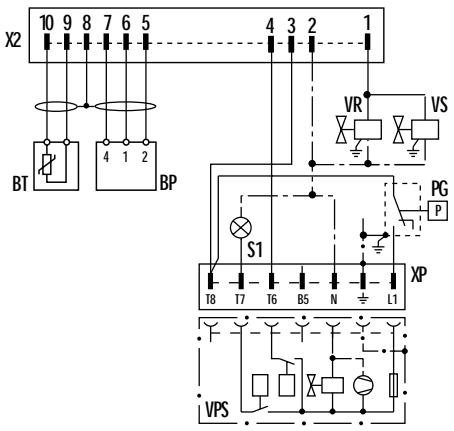


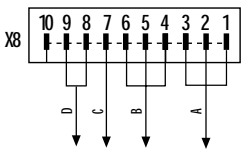


XT1 - General supply terminal board
X1 - 10 pin plug
TS - Safety thermostat
TL - Threshold thermostat
IN - Manual switch
S - External lock-out signal
F - Fuse (refer to table A)
L - Lead section (refer to table A)

CONNECTION OF THE PROBES FOR THE CONTROLLED PARAMETER AND DATA CONNECTION FOR THE VARIOUS MODULES (Accessories)

MB 4-6-8-10 SE

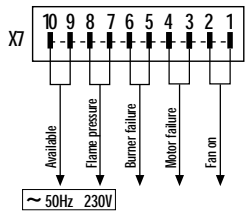


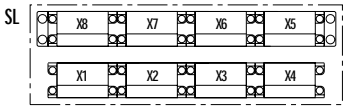


X2 - 10 pin plug
X8 - 10 pin plug for connecting accessories
BT - Temperature probe
BP - Pressure probe
PG - Minimum gas pressure switch
S1 - Emergency push-button
VPS - Seal control
VR - Adjustment valve
VS - Safety valve
XP - Seal control plug
A - E.G.A. module connections
B - Main, D.T.I., I/O modules connections
C - 230 V/50 Hz output for butterfly valve of sequence boilers
D - Free contacts for lead boiler choice of sequence

SIGNALS FOR WORKING STATUS OF THE MAIN COMPONENTS

MB 4-6-8-10 SE





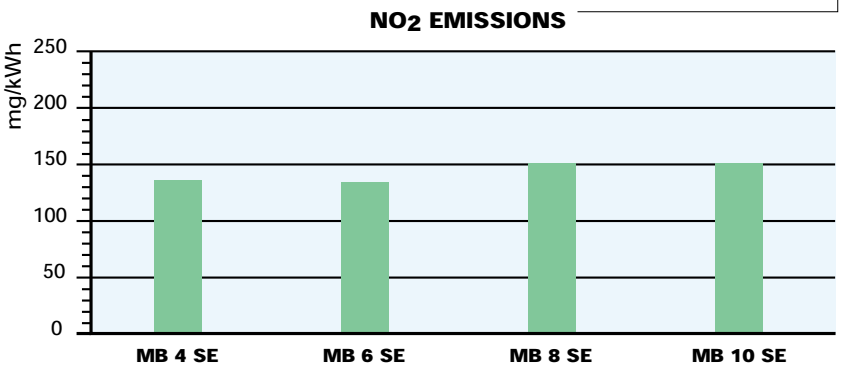
X7 - 10 pin output plug, free contacts
SL - Layout plug diagram
X3,4,5,6 - Plugs for electrical factory-set connections

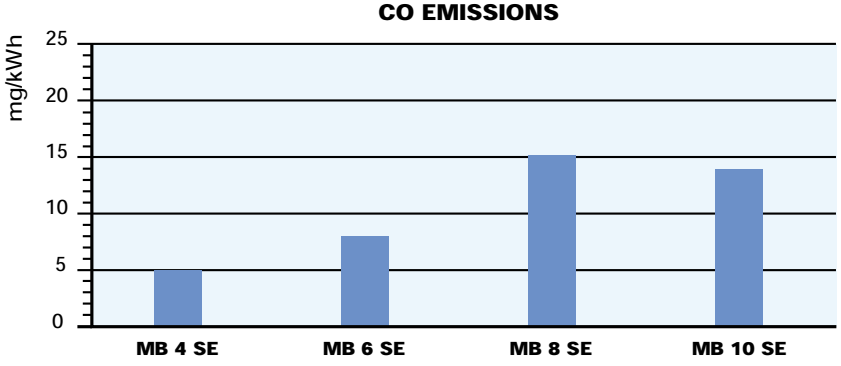
The following table shows the supply lead sections and the type of fuse to be used.

Model		MB 4 SE		MB 6 SE		MB 8 SE		MB 10 SE	
		230V	400V	230V	400V	230V	400V	230V	400V
F	A	63 gG	50 gG	63 gG	50 gG	80 gG	63 gG	80 gG	63 gG
L	mm^2	6	4	6	4	10	10	10	10

Table A

EMISSIONS

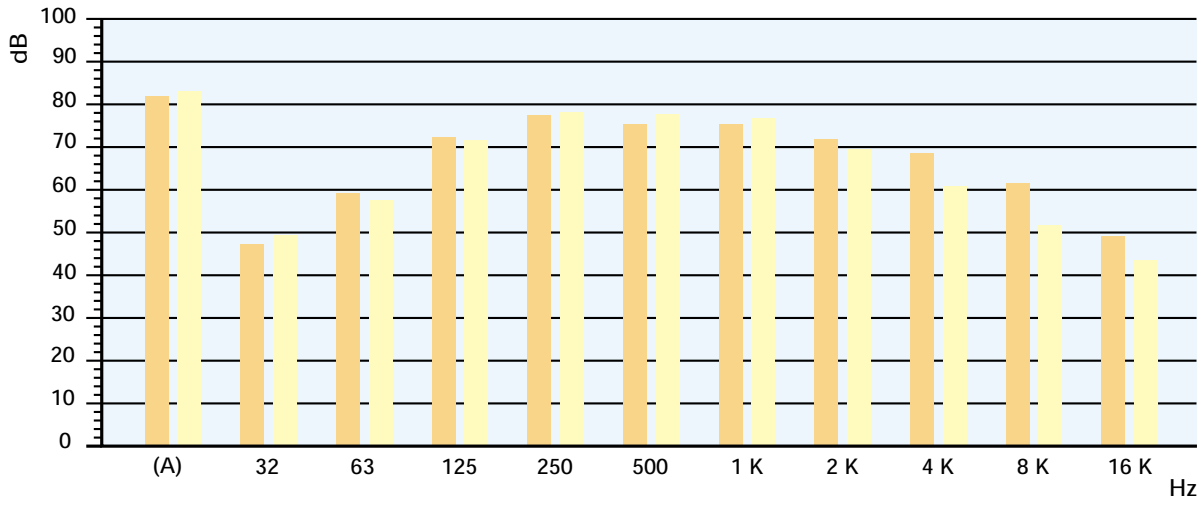




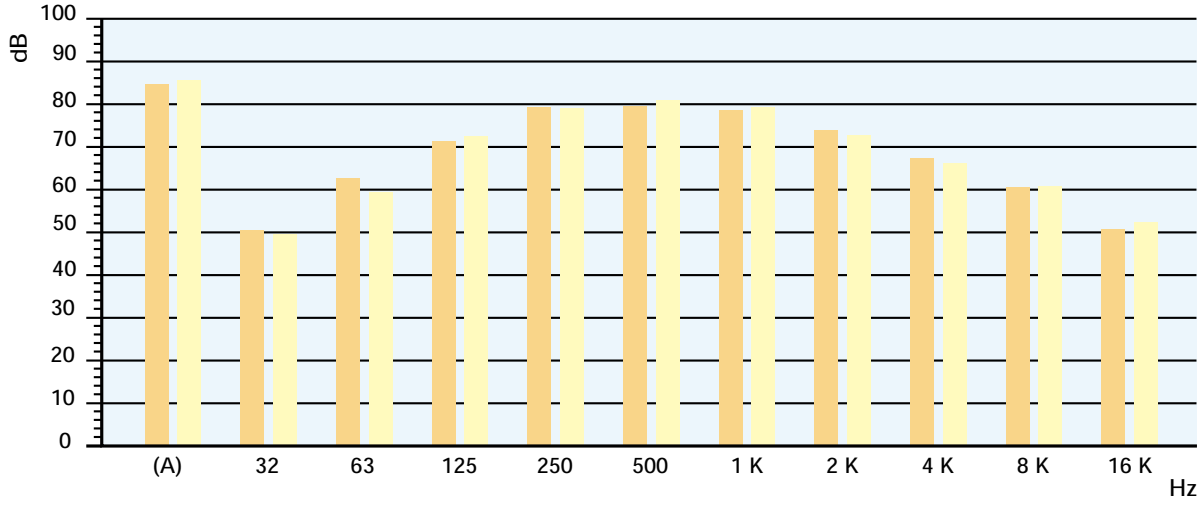
The emission data has been measured in the various models at maximum output, according to EN 676 standard.

SOUND EMISSIONS

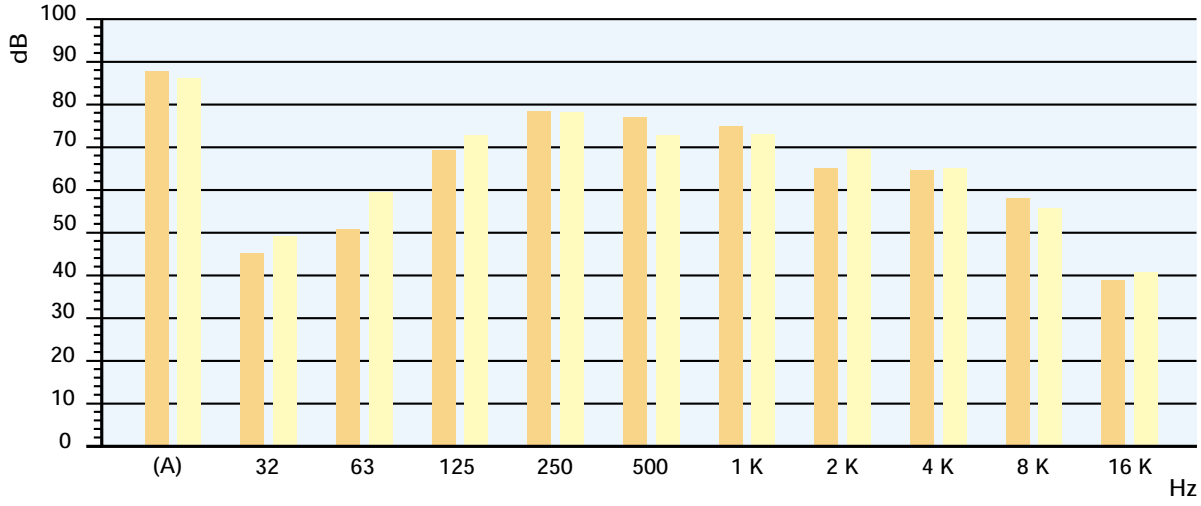
MB 4 SE



MB 6 SE



MB 8 -10 SE



(A) Value obtained in dB(A)

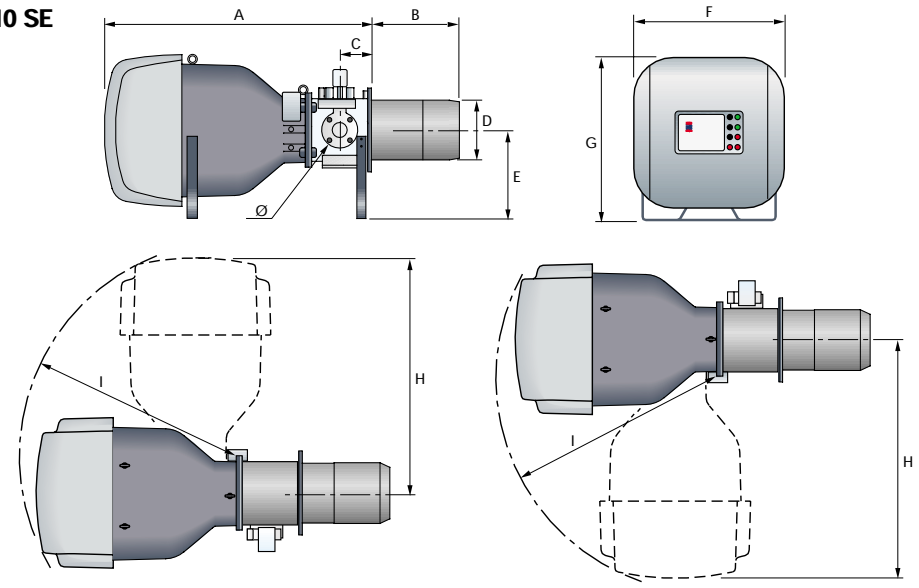
Maximum modulation

Minimal modulation

OVERALL DIMENSIONS (mm)

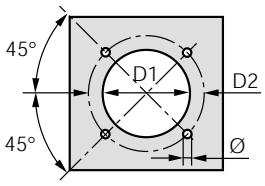
BURNERS

MB 4-6-8-10 SE



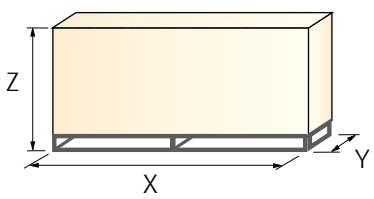
Model	A	B	C	D	E	F	G	H	I	Ø
MB 4 SE	1470	511	183	336	490	840	910	1330	1205	DN80
MB 6 SE	1470	511	183	336	490	840	910	1330	1205	DN80
MB 8 SE	1900	530	208	413	575	1007	1079	1740	1570	DN80
MB 10 SE	1900	530	208	413	575	1007	1079	1740	1570	DN80

BURNER - BOILER MOUNTING FLANGE



Model	D1	D2	Ø
MB 4 SE	350	496	M20
MB 6 SE	350	496	M20
MB 8 SE	418	608	M20
MB 10 SE	418	608	M20

PACKAGING



Model	X	Y	Z	kg
MB 4 SE	2120	1005	1175	300
MB 6 SE	2120	1005	1175	300
MB 8 SE	2590	1170	1350	450
MB 10 SE	2590	1170	1350	450

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel.
All operations must be performed in accordance with the technical handbook supplied with the burner.

Access to the internal components is very simple, as the back of the burner is hinged which means it can be completely opened.
The burners can be supplied with the opening on the right or left, depending on personal requirements.

FIXING THE BURNER TO THE BOILER AND INITIAL SETTINGS

- All the burners have lifting rings, for easier installation and maintenance.
- After drilling the boilerplate, using the supplied gasket as template, prepare a suitable lifting system and, after hooking onto the rings, fix burner to the boiler.
- Install the gas train, choosing it on the basis of the maximum boiler output and on the basis of the diagrams enclosed with the burner instructions.
- Adjust the combustion head run, using the mechanism lever.

ELECTRICAL CONNECTIONS AND START UP

- Make the electrical connections to the burner following the wiring diagrams included in the instruction handbook.
- Turning the motor check the led signalling correct rotation direction, at left of the plugs group, is on.
- Perform a first ignition calibration on the gas train.
- On start up, check:
  - gas pressure at the combustion head (to max. and min. output)
  - combustion quality, in terms of unburned substances and excess air.

ACCESSORIES

DTI Module (Data Transfer Interface)

This electronic module can transfer multiple signals from different local modules to a BMS supervisor software system (Building Management System).

DTI module	
Burner	**module code**
MB 4 - 6 - 8 - 10 SE	**3010234**

I/O digital module

Digital modules I/O transfer in-coming and out-going information such as working stages and alarms, from the boiler room or from the system in general where one or more MB series burners are installed to a remote supervisor system.

I/O digital module	
Burner	**module code**
MB 4 - 6 - 8 - 10 SE	**3010233**

I/O analogic module

I/O Analog modules transfer in-coming and out-going information about burner working stages and other devices in the boiler room or in the system in general where one or more MB series burners are installed to a remote supervisor system.
I/O Analog modules manage both input and output signals, such as 4-20 mA or 0-10 Volt.

I/O analogic module	
Burner	**module code**
MB 4 - 6 - 8 - 10 SE	**3010232**

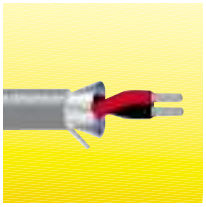
EGA module (Exhaust Gas analyser)

EGA modules measure some of the exhaust gas substances. These modules come with an exhaust gas sampler probe and exhaust gas temperature probe (0-400 °C).
Four different EGA modules are available depending on the type of substance to be checked, as given in the following table:

EGA module		
Burner	**Analysed gas**	**module code**
MB 4 - 6 - 8 - 10 SE	CO, CO_2, O_2	**3010235**
MB 4 - 6 - 8 - 10 SE	CO, CO_2, O_2, NO	**3010236**
MB 4 - 6 - 8 - 10 SE	CO, CO_2, O_2, SO_2	**3010237**
MB 4 - 6 - 8 - 10 SE	CO, CO_2, O_2, NO, SO_2	**3010238**

Belden 9501 type leads

All the connections for the above modules must be done using a BELDEN 9501 type lead, which is available as an accessory in coils of 50 m.



Belden 9501 lead	
Burner	**lead code**
MB 4 - 6 - 8 - 10 SE	**3010239**

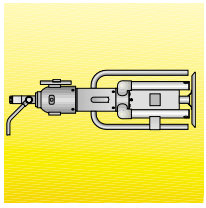
Accessories for modulating setting

Main management module allows a modulating setting with use of probes chosen on the basis of the application.
The following table lists the accessories for modulating setting, with the application field.

PROBE			
Burner	**Type**	**Range (°C) (bar)**	**Code**
MB 4 - 6 - 8 - 10 SE	Temperature	0 ÷ 400°C	**3010187**
MB 4 - 6 - 8 - 10 SE	Pressure	0 ÷ 3 bar	**3010246**
MB 4 - 6 - 8 - 10 SE	Pressure	0 ÷ 18 bar	**3010186**
MB 4 - 6 - 8 - 10 SE	Pressure	0 ÷ 30 bar	**3010188**

Kit for transformation to LPG

For burning LPG gas, a special kit is available to be fitted to the combustion head of the burner, as given in the following table:



LPG transformation kit	
Burner	**Kit code**
MB 4 SE	**3010189**
MB 6 SE	**3010190**
MB 8 SE	**in progress**
MB 10 SE	**in progress**

Burner support

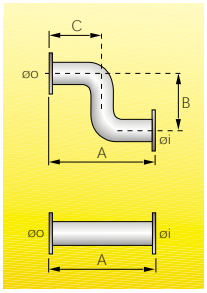
For easier maintenance, a mobile burner support has been designed, which means the burner can be dismantled without the need for forklift trucks.

Support	
Burner	**Support code**
MB 4 - 6 SE	**in progress**
MB 8 - 10 SE	**in progress**

GAS TRAIN ACCESSORIES

Adapters

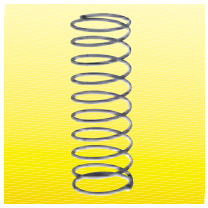
In certain cases, an adapter must be fitted between the gas train and the burner, when the diameter of the gas train is different from the set diameter of the burner.
Below are given the adapters than can be fitted on the various burners:



Adapters								
Burner	Gas train	Adapter type	Dimensions					Adapter code
			Øi DN	Øo DN	A mm	B mm	C mm	
MB 4-6-8-10 SE	CBF 65/1 CT	I	65	80	320	--	--	**3010221**
MB 4-6-8-10 SE	CBF 80/1 CT	I	80	80	320	--	--	**3010222**
MB 4-6-8-10 SE	CBF 100/1 CT	I	100	80	320	--	--	**3010223**
MB 4-6-8-10 SE	CBF 125/1 CT	I	125	80	320	--	--	**3010224**
MB 4-6-8-10 SE	CBF 65/1 CT	Z	65	80	400	480	225	**3010225**
MB 4-6-8-10 SE	CBF 80/1 CT	Z	80	80	400	480	225	**3010226**
MB 4-6-8-10 SE	CBF 100/1 CT	Z	100	80	400	480	225	**3010227**
MB 4-6-8-10 SE	CBF 125/1 CT	Z	125	80	500	480	300	**3010228**

Stabiliser spring

To vary the pressure range of the gas train stabilisers, accessory springs are available. The following table shows these accessories with their application range:



Stabiliser spring		
Gas train	Spring	Code
CBF 65/1 CT - 80/1 CT	Red from 25 to 55 mbar	**3010133**
CBF 100/1 CT	Red from 25 to 55 mbar	**3010134**
CBF 125/1 CT	Red from 25 to 55 mbar	**in progress**
CBF 65/1 CT - 80/1 CT	Black from 60 to 110 mbar	**3010135**
CBF 100/1 CT	Black from 60 to 110 mbar	**3010136**
CBF 125/1 CT	Black from 60 to 110 mbar	**in progress**
CBF 65/1 CT - 80/1 CT	Pink from 90 to 150 mbar	**3090456**
CBF 100/1 CT	Pink from 90 to 150 mbar	**3090489**
CBF 125/1 CT	Pink from 90 to 150 mbar	**in progress**

Please refer to the technical manual for the correct choice of spring.

SPECIFICATION

A specific index guides your choice of burner from the various models available in the MODUBLOC MB series. Below is a clear and detailed specification description of the product.

DESIGNATION OF SERIES MODUBLOC MB BURNERS

Series : MB

Size

Fuel :
- S Natural Gas
- L Light oil
- LS Light oil/Methane

Setting :
- E Electronic cam
- V Electronic cam and variable speed (with Inverter)

Emission :
- ... Class 1 EN267 - EN676
- MZ Class 2 EN267 - EN676
- BLU Class 3 EN267 - EN676
- MX Class 1 EN267 Class 3 EN676

Head :
- TC Standard head
- TL Extended head

Fuel supply :
- FR from the right
- FL from the left

Flame control system :
- FS1 Standard (1 stop every 24 h)
- FS2 Continuous working (1 stop every 72 h)

Electrical supply to the system :
- 3/400/50 3N/400V/50Hz
- 3/230/50 3/230V/50Hz

Auxiliary voltage :
- 230/50-60 230V/50-60Hz
- 110/50-60 110V/50-60Hz

MB	4	S	E		TC	FR	FS1	3/400/50	230/50-60
BASIC DESIGNATION					EXTENDED DESIGNATION				

LIST OF AVAILABLE MODELS

MB4SE	TC	FR	FS1	3/400/50	230/50-60	MB8SE	TC	FR	FS1	3/400/50	230/50-60
MB4SE	TC	FR	FS1	3/230/50	230/50-60	MB8SE	TC	FR	FS1	3/230/50	230/50-60
MB4SE	TC	FL	FS1	3/400/50	230/50-60	MB8SE	TC	FL	FS1	3/400/50	230/50-60
MB4SE	TC	FL	FS1	3/230/50	230/50-60	MB8SE	TC	FL	FS1	3/230/50	230/50-60
MB6SE	TC	FR	FS1	3/400/50	230/50-60	MB10SE	TC	FR	FS1	3/400/50	230/50-60
MB6SE	TC	FR	FS1	3/230/50	230/50-60	MB10SE	TC	FR	FS1	3/230/50	230/50-60
MB6SE	TC	FL	FS1	3/400/50	230/50-60	MB10SE	TC	FL	FS1	3/400/50	230/50-60
MB6SE	TC	FL	FS1	3/230/50	230/50-60	MB10SE	TC	FL	FS1	3/230/50	230/50-60

Other versions are available on request.

PRODUCT SPECIFICATION

Burner

Monoblock forced draught gas burner with modulating setting, fully automatic, made up of:
- Fan with reverse curve blades high performance with low sound emissions
- Air suction circuit lined with sound-proofing material
- Air damper for air setting controlled by a high precision servomotor
- Air pressure switch
- Fan starting motor at 2900 rpm, three-phase 230/400 - 400/690 V with neutral, 50Hz
- Mobile combustion head, that can be set on the basis of required output, fitted with:
    - stainless steel end cone, resistant to corrosion and high temperatures
    - ignition electrodes
    - flame stability disk
- Automatic regulator for gas delivery, controlled by a high precision servomotor
- Maximum gas pressure switch, with pressure test point, for halting the burner in the case of over pressure on the fuel supply line
- Module for air/fuel setting and output modulation with incorporated PID control of temperature or pressure of the heat generator
- Flame control panel for controlling the system safety
- Photocell for flame detection
- Star/triangle starter for the fan motor
- Burner on/off switch
- Auxiliary voltage led signal
- Manual or automatic output increase/decrease switch
- Burner working led signal
- Contacts motor and thermal relay with release button
- Motor failure led signal
- Burner failure led signal and lighted release button
- Led signal for correct rotation direction of fan motor
- Emergency button
- Coded connection plugs-sockets
- Burner opening hinge
- Lifting rings
- IP 40 electric protection level.

According to:
- 89/336/EEC directive (electromagnetic compatibility)
- 73/23/EEC directive (low voltage)
- 90/396/EEC directive (gas)
- EN 676 (gas burners).

Standard equipment:
- 1 flange gasket
- 8 screws for fixing the flange
- 1 thermal screen
- 4 screws for fixing the burner flange to the boiler
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- DTI module (Data Transfer Interface)
- I/O digital module
- I/O analogic module
- EGA module (Exhaust Gas Analyser) in the following versions:
    - EGA - CO, CO_2, O_2
    - EGA - CO, CO_2, O_2, NO
    - EGA - CO, CO_2, O_2, SO_2
    - EGA - CO, CO_2, O_2, NO, SO_2
- BELDEN 9501 type lead
- Pressure probe 0 - 3 bar
- Pressure probe 0 - 18 bar
- Pressure probe 0 - 30 bar
- Temperature probe 0 - 400°C
- Kit for transformation to LPG
- Burner support
- Adapters
- Stabiliser spring.

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RIELLO BURNERS

CE

LOW NOx SINGLE-STAGE GAS BURNERS

GULLIVER BS SERIES					
BS1	16	÷	52	kW
BS2	35	÷	91	kW
BS3	65	÷	189	kW
BS4	110	÷	246	kW

The Riello Gulliver BS series of single-stage gas burners, is a complete range of Low NOx emission products, developed to respond to any request for home heating, conforming to the most severe standards regarding the reduction of polluting emissions. This series of burners is available in four different models with an output ranging from 16 to 246 kW, divided in four different structures.
All the models use the same components designed by Riello for the Gulliver series. The high quality level guarantees safe working.
In developing these burners, special attention was paid to reducing noise, 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 LRV-92 Swiss standards, and conform to BImSchV 1996 and European Directives, Gas Appliance, EMC, Low Voltage, Boiler Efficiency.
All the Gulliver BS burners are tested before leaving the factory.

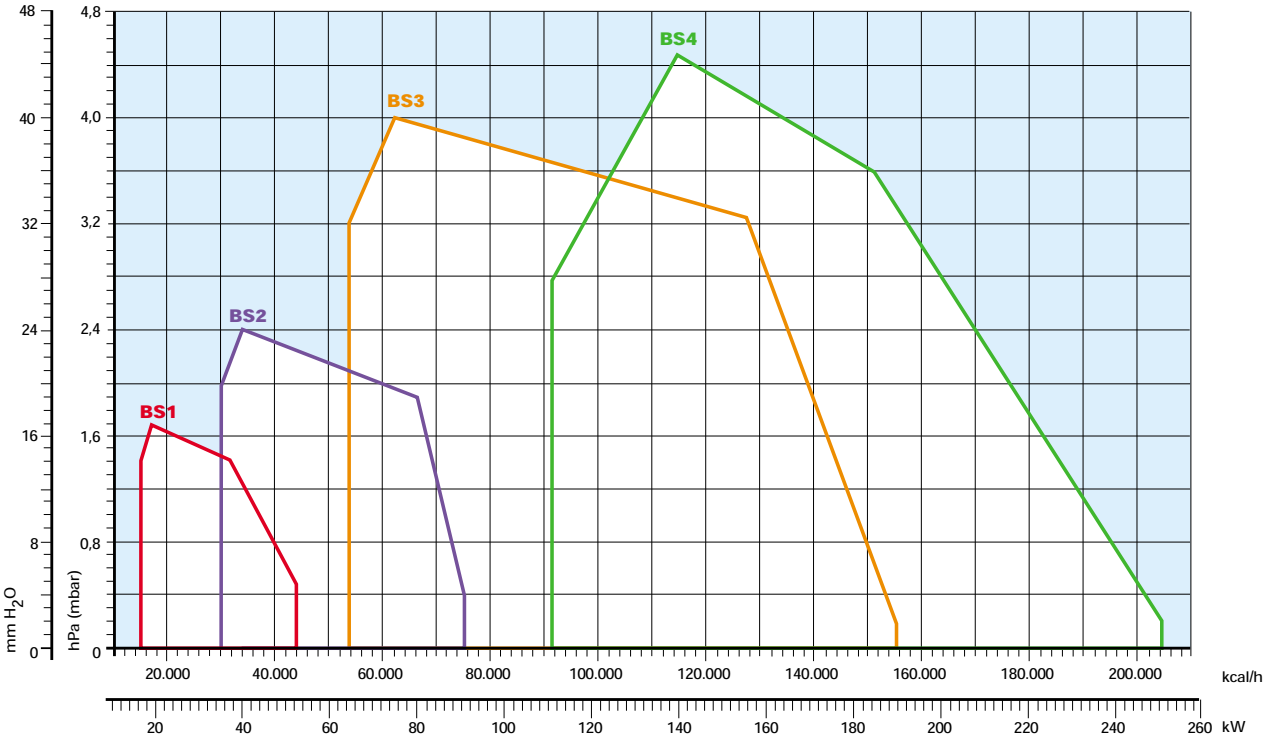
TECHNICAL DATA

	Model		BS1	BS2	BS3	BS4
	Setting		Single-stage			
	Servo-motor type		--			
	Servo-motor run time		--			
	Heat output	kW	16 - 52	35 - 91	65 - 189	110 - 246
	Heat output	Mcal/h	13,8 - 44,7	30,1 - 78,2	55,9 - 162,5	94,6 - 211,6
	Working temperature	°C min./max.	0/40			
Fuel / air data	Net calorific value G20 gas	kWh/Nm³	10			
Fuel / air data	G20 gas density	kg/Nm³	0,71			
Fuel / air data	G20 gas delivery	Nm³/h	1,6 - 5,2	3,5 - 9	6,5 - 19	11 - 24,6
Fuel / air data	Net calorific value G25 gas	kWh/Nm³	8,6			
Fuel / air data	G25 gas density	kg/Nm³	0,78			
Fuel / air data	G25 gas delivery	Nm³/h	1,9 - 6	4 - 10,5	7,5 - 22	13 - 28,5
Fuel / air data	Net calorific value LPG gas	kWh/Nm³	25,8			
Fuel / air data	LPG gas density	kg/Nm³	2,02			
Fuel / air data	LPG gas delivery	Nm³/h	0,6 - 2	1,3 - 3,5	2,5 - 7,3	4,2 - 9,5
Fuel / air data	Fan	type	forward tilted blades			
Fuel / air data	Air temperature	max. °C	40			
Electrical data	Electrical supply	Ph/Hz/V	1/50/230 ±10%			
Electrical data	Aux. electrical supply	Ph/Hz/V	--			
Electrical data	Control box	type	R.B.L. 568			
Electrical data	Total electrical output	kW	0,15	0,18	0,35	0,43
Electrical data	Protection level	IP	40			
Electrical data	Electric motor output	kW	0,15	0,18	0,35	0,43
Electrical data	Rated motor current	A	0,64	0,67	1,4	2
Electrical data	Motor take-off current	A	3	3	3	8,5
Electrical data	Motor protection level	IP	20			
Electrical data	Ignition transformer		incorporated in the control box			
Electrical data	Operation		intermittent (at least one halt every 24 h)			
Emissions	Sound pressure	dB(A)	61	62	66	71
Emissions	CO Emissions	mg/kWh	< 40			
Emissions	NOx Emissions	mg/kWh	< 80			
Approval	Directives		90/396/CEE, 89/336/CEE, 73/23/CEE, 92/42/CEE			
Approval	Conforming to:		EN 676 - LRV 92 - BImSchV 1996			
Approval	Certifications		CE - 0085 AQ0409			
Approval	Certifications		BUWAL - Nr.100010	BUWAL - Nr.197011	BUWAL - Nr.100010	BUWAL - Nr.100010

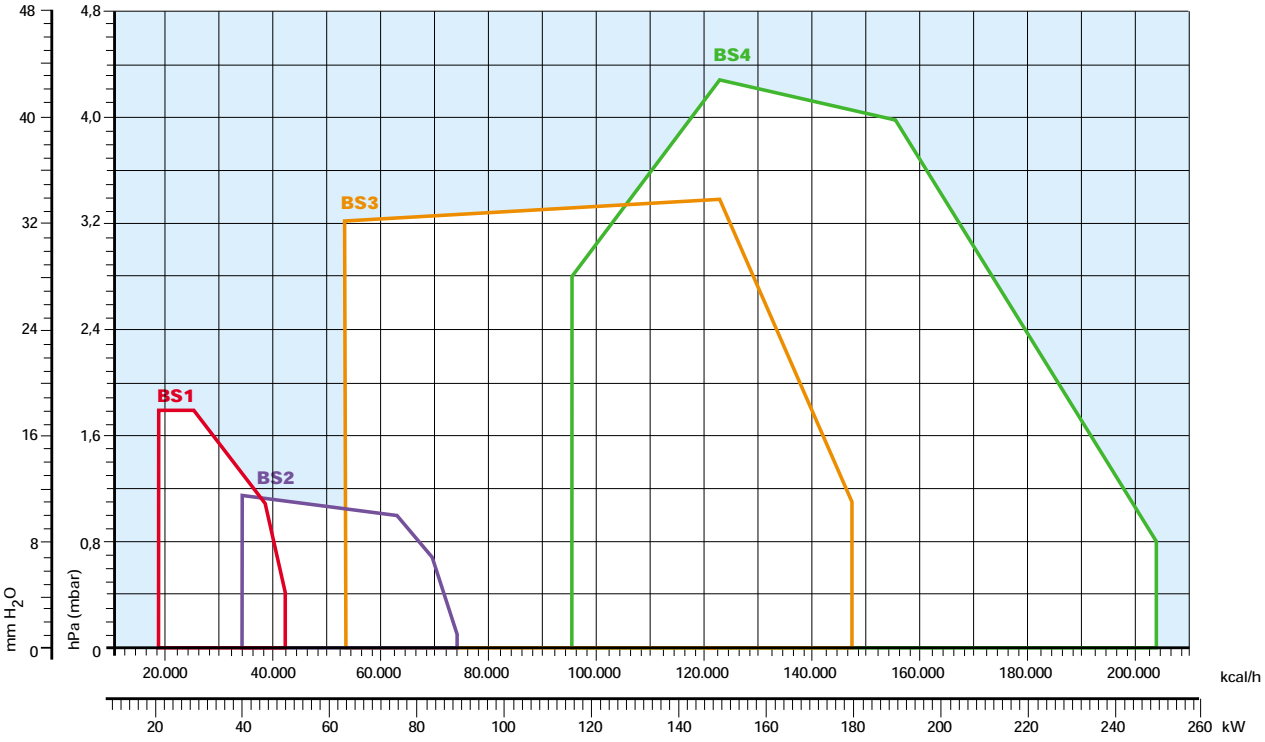
Reference conditions:
Temperature: 20°C
Pressure: 1013.5 Mbar
Altitude: 100 meters a.s.l.
Noise measured at a distance of 1 meter.

FIRING RATES

EN 676



LRV 92



Useful working field for choosing the burner

Test conditions conforming to EN 676 and LRV 92:
Temperature: 20 °C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.

FUEL SUPPLY

GAS TRAINS

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

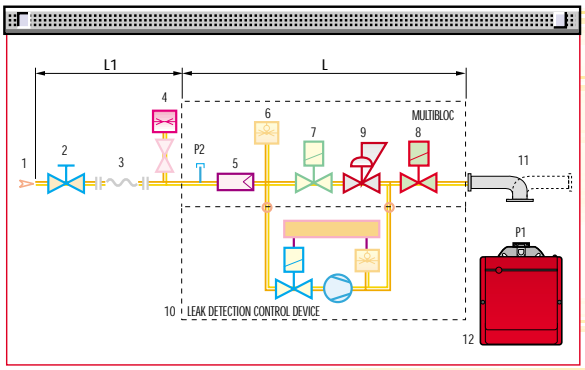
Depending on the fuel output and the available pressure in the supply line, you should check the correct gas train to be adapted to the system requirements.

The gas train is Multibloc type, containing the main components in a single unit.
Except for the MBDLE 055 model, a valve seal control (as accessory) can be fitted to the Multibloc gas trains.

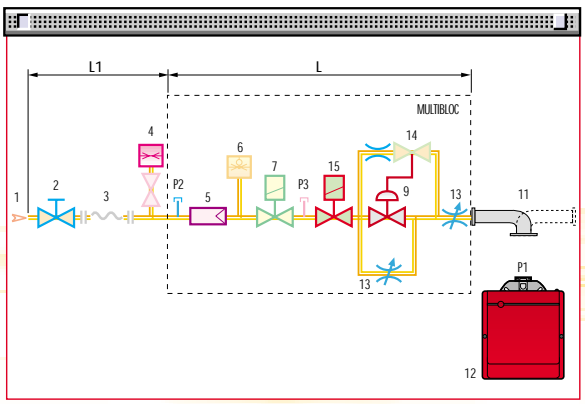
The MBDLE 055 Multibloc gas train can be fitted only to the left of the burner.

Gas train installed on the burner

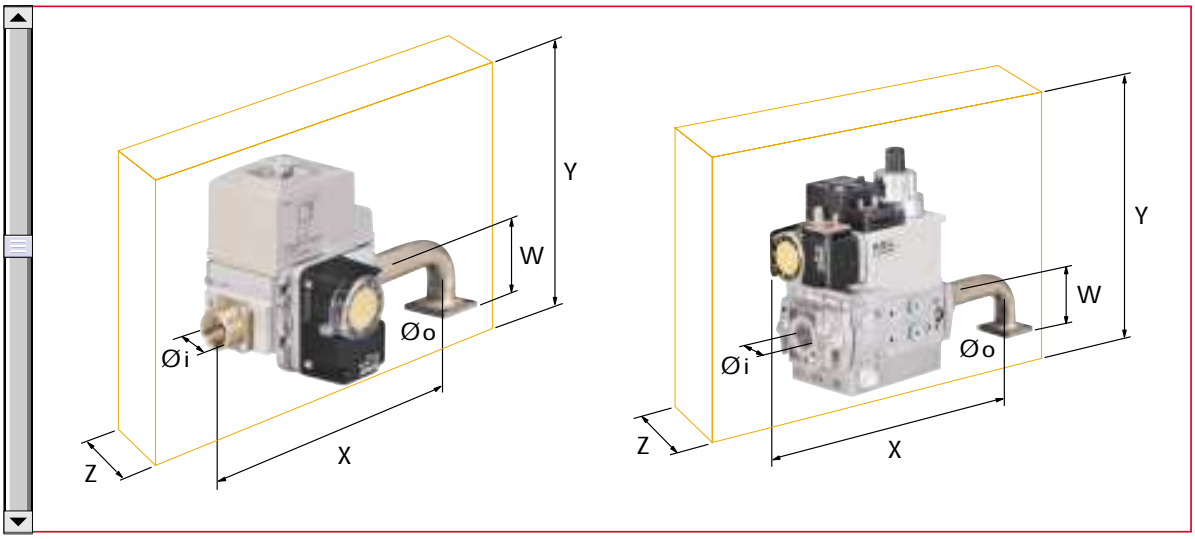
MBDLE 403 - 405 - 407 - 410 - 412



MBDLE 055



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 Gulliver BS burners, intake diameter and the coupling flange to the burner.

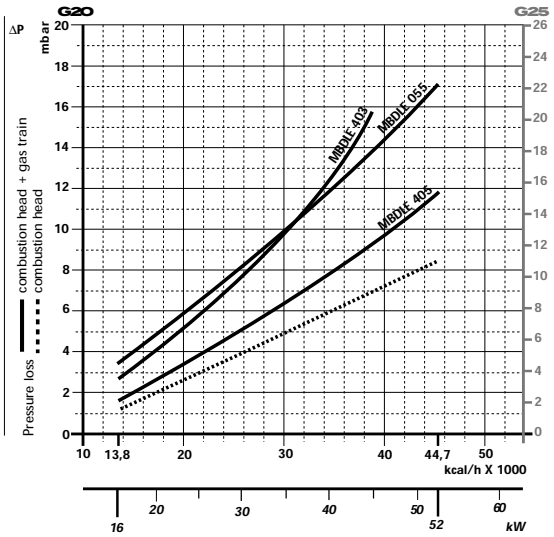
	Name	Code	Ø i	Ø o	X mm	Y mm	W mm	Z mm
MULTIBLOC	**MBDLE 055**	3970570	1/2"	FLANGE 1	232	126	45	122
	MBDLE 403	3970545	1/2"	FLANGE 1	200	137	45	100
	MBDLE 405	3970546	1/2"	FLANGE 1	246	186	45	120
	MBDLE 405	3970547	3/4"	FLANGE 2	236	186	47	120
	MBDLE 407	3970544	3/4"	FLANGE 2	236	186	47	120
	MBDLE 407	3970548	3/4"	FLANGE 3	236	186	47	120
	MBDLE 410	3970549	1" 1/4	FLANGE 3	259	215	47	145
	MBDLE 412	3970550	1" 1/4	FLANGE 3	259	215	47	145

PRESSURE DROP DIAGRAMS

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

NATURAL GAS

BS1

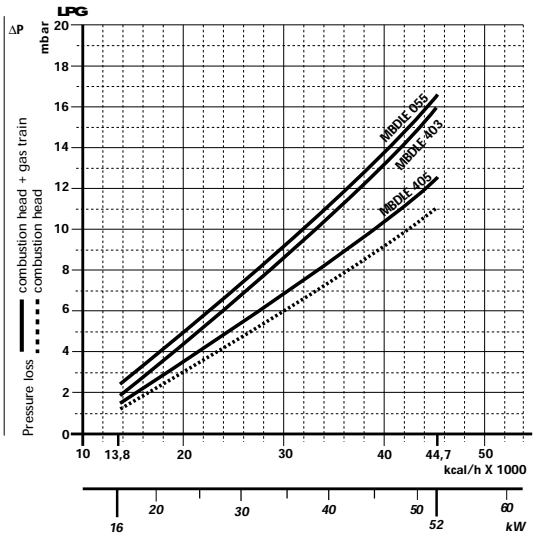


Gas Train	Code	Output
MBDLE 403	3970545	≤ 45 kW *
MBDLE 405	3970546	-
MBDLE 055	3970570	-

* with natural gas.

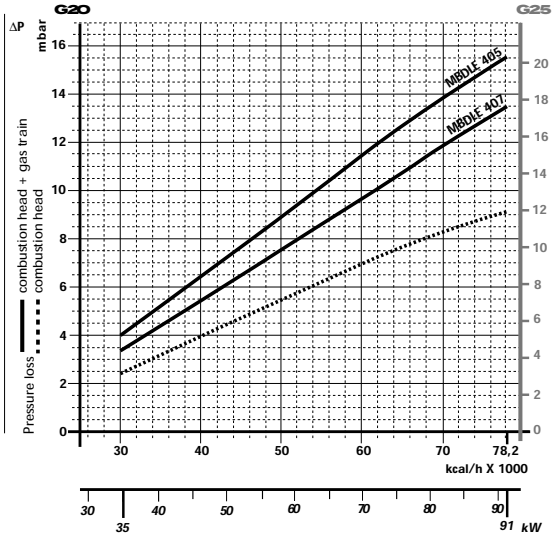
LPG

BS1



NATURAL GAS

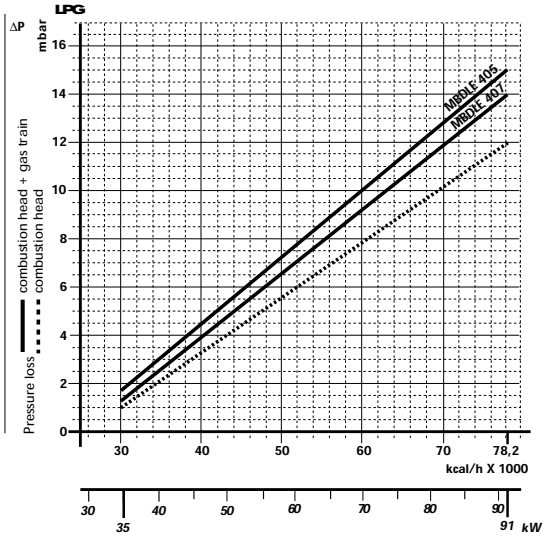
BS2



Gas Train	Code
MBDLE 405	3970547
MBDLE 407	3970544

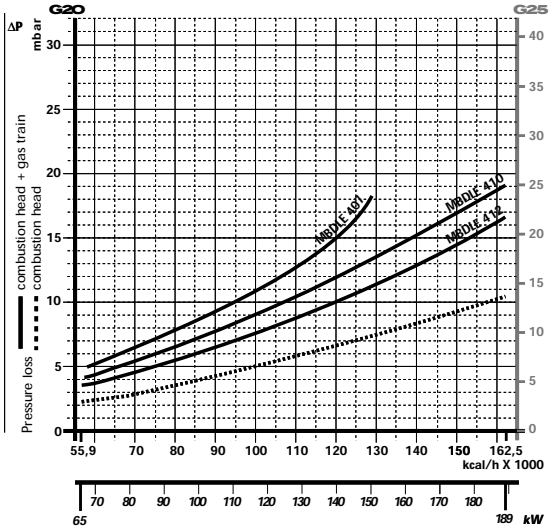
LPG

BS2



NATURAL GAS

BS3

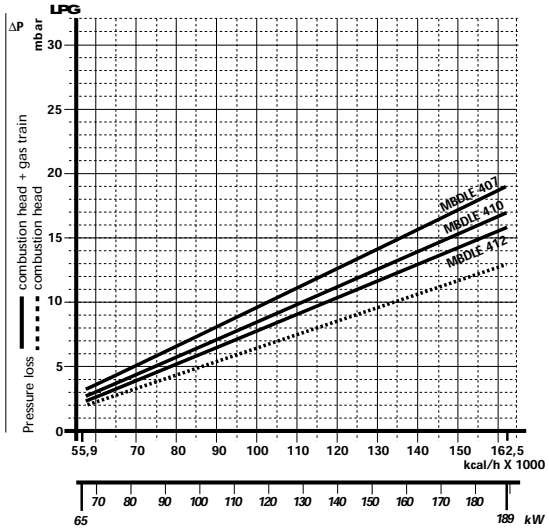


Gas Train	Code	Output
MBDLE 407	3970548	≤ 150 kW *
MBDLE 410	3970549	-
MBDLE 412	3970550	-

* with natural gas.

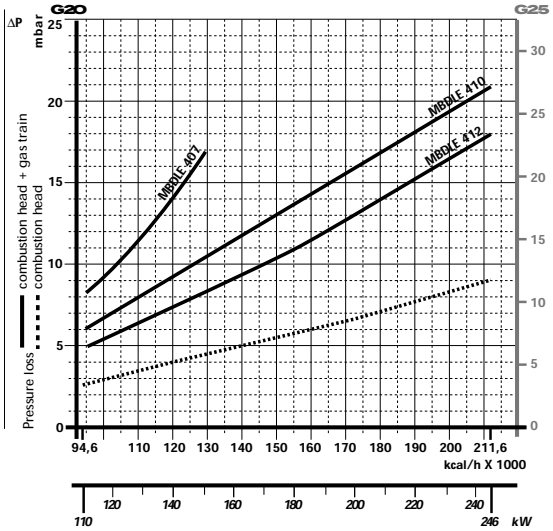
LPG

BS3



NATURAL GAS

BS4

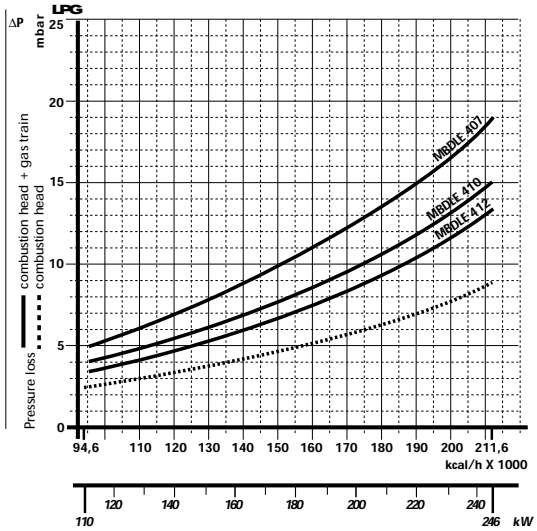


Gas Train	Code	Output
MBDLE 407	3970548	≤ 150 kW *
MBDLE 410	3970549	-
MBDLE 412	3970550	-

* with natural gas.

LPG

BS4



note *For pressure levels different from those indicated above, please contact Riello Burners Technical Office.*

DIMENSIONING OF THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

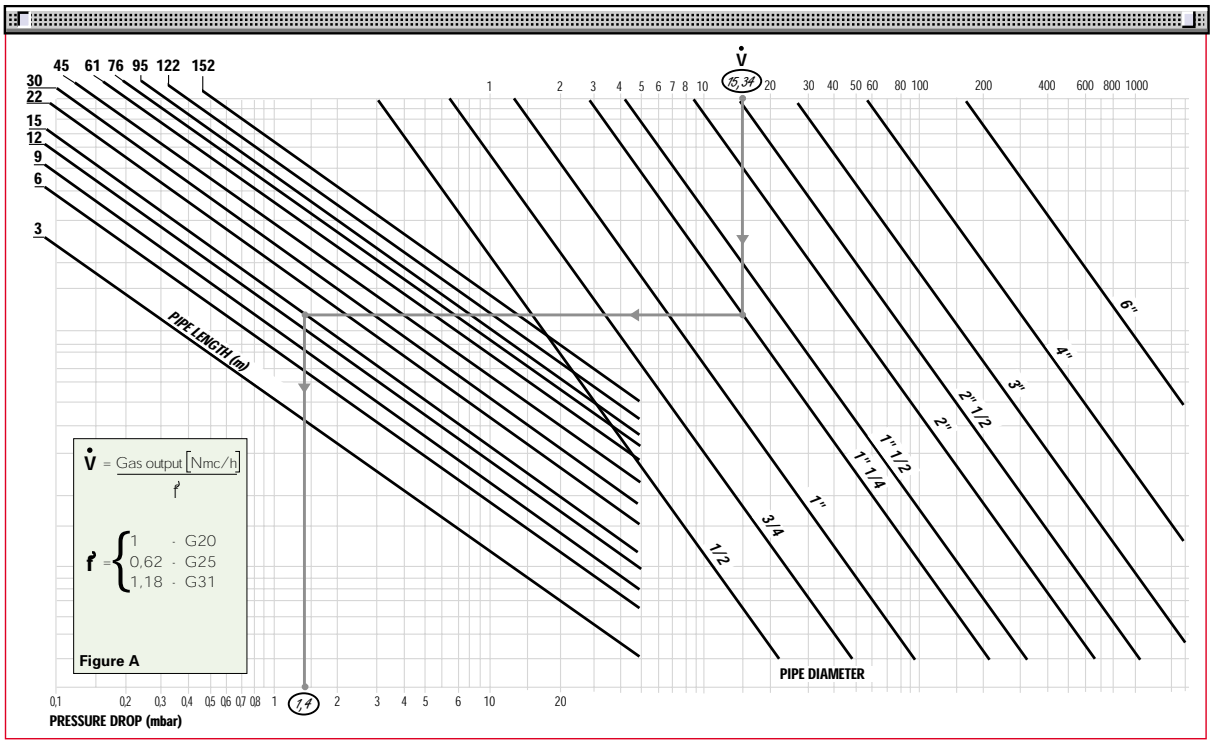
Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length. Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop on the botton scale (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

- gas used	G25
- gas output	9.51 mc/h
- pressure at the gas meter	20 mbar
- gas line length	15 m
- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62}\right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;

- correct pressure = (20-1.4) = 18.6 mbar



VENTILATION

The different ventilation circuits always ensure low noise levels with high performance of pressure and air delivery, inspite of their compact size.

Air suction

The burners are fitted with an adjustable air pressure switch, conforming to EN 676 standards.

Air pressure switch

COMBUSTION HEAD

The combustion head in Gulliver BS 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.

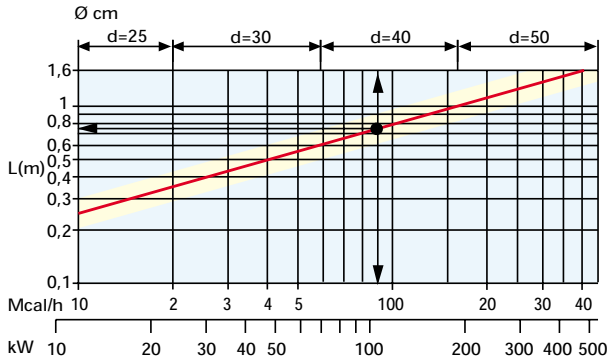
Thanks to the use of a mobile coupling flange, the penetration of the head into the combustion chamber can be adjusted.

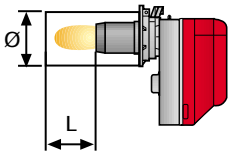
Simple adjustment allows the internal geometry of the combustion head to be adapted to the burner output.

Combustion head

Mobile flange

Combustion chamber dimensions used in the test laboratory





$$L\ (m) = 0{,}23 \times \sqrt{\frac{kW}{10}}$$

With simple adjustments, the burner can be adapted to combustion chambers that are slightly different from those used in the tests.

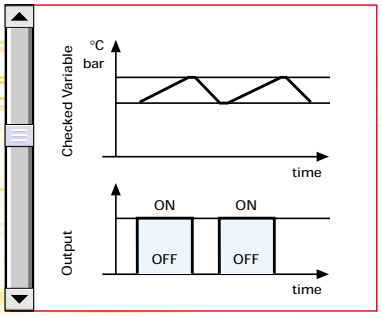
Example:
burnt thermal delivery = 105 kW;
L (m) = 0,23 x $\sqrt{10{,}5}$ = 0,74 (m);
Ø = 40 (cm)

ADJUSTMENT

BURNER OPERATION MODE

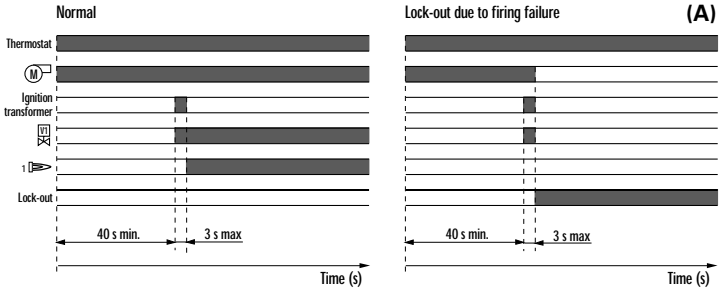
All these models are single-stage working.

Single-stage" operation



Air damper adjustment

FIRING



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

Correct operations

0s	The burner begins the firing cycle
0s-40s	Pre-purge with the air damper open
40s	Ignition.

Lock-out due to firing failure

If the flame does not light within the safety limit (~ 3s) the burner locks-out.

ELECTRICAL CONNECTIONS
to be made by the installer

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

The 7-pole socket is incorporated in the control box, the 6-pole socket for connection to the gas train is already connected to the equipment and fixed to the outside of the burner.
The 7-pin plug is also supplied for connection to the boiler.

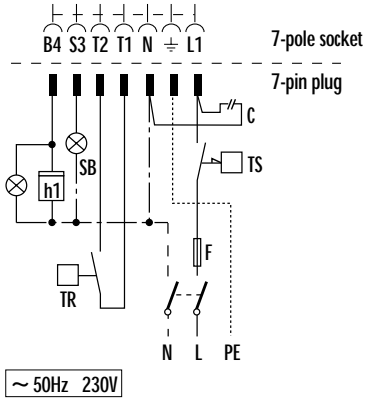
Appliance fitted with an ignition transformer

6-pole socket

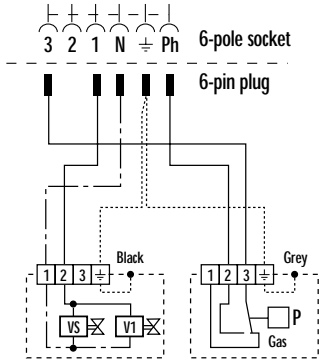
7-pole socket incorporated in the control box

" SINGLE-STAGE" OPERATIONS

Burner electrical wiring



Gas train electrical wiring

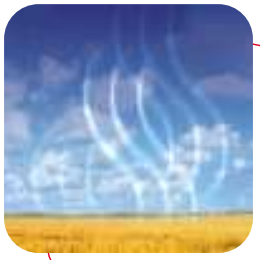


h1 - Single stage hour meter
SB - Lock out led
TR - Regulating thermostat
TS - Safety thermostat (manual reset)
VS - Security valve
V1 - One stage valve
P - Gas pressure switch
C - Capacitor
F - Fuse

The following table shows the supply lead sections and types of fuse to be used.

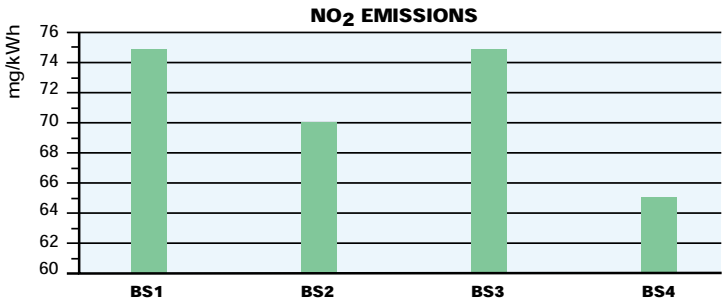
Model	BS1	BS2	BS3	BS4
	230V	230V	230V	230V
F A	6	6	6	T6
L mm^2	1	1	1	1

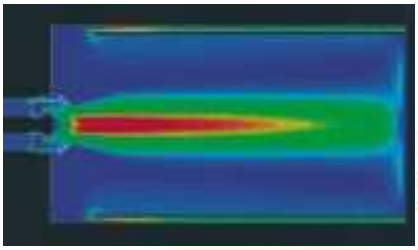
F = Fuse L = Lead section

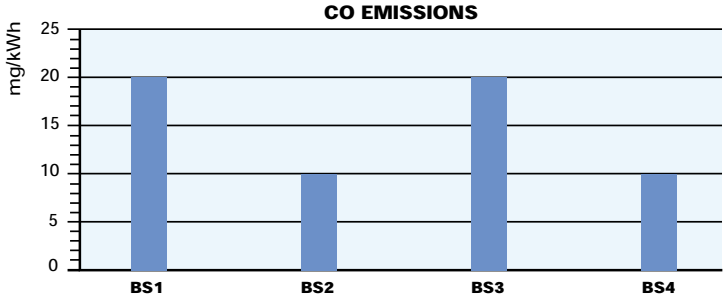


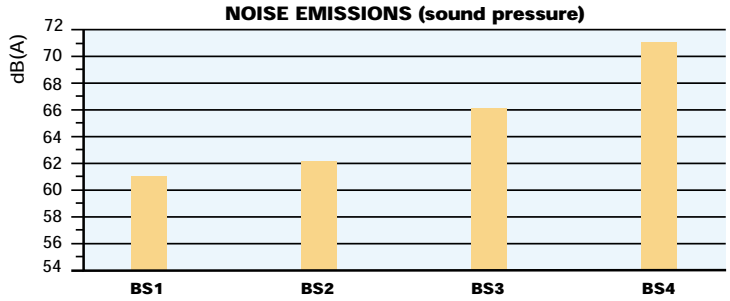
EMISSIONS

The burners in the Gulliver BS series guarantee controlled combustion, reducing emissions of both CO and NOx, this combustion control is due to the recirculation of the combustion products in the chamber (thanks to different combustible air flow speeds) and to the fuel staging technique (thanks to the special geometry of the gas nozzles).









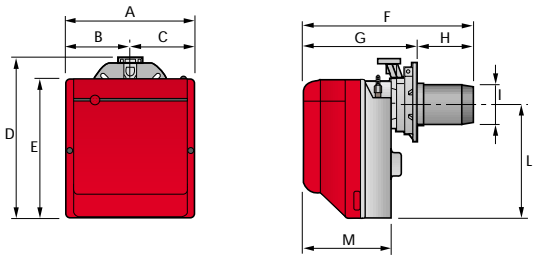
The emission data have been measured in the various models at maximum output, in conformity with EN 676 standard.

Special attention has been paid to noise reduction. All models are fitted with sound-proofing material inside the cover.

OVERALL DIMENSIONS (mm)

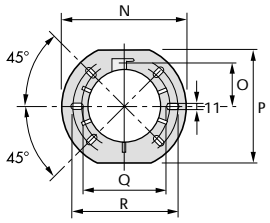
These models are distinguished by their reduced size, in relation to the outputs achieved, which means they can be fitted to any boiler on the market.

BURNER



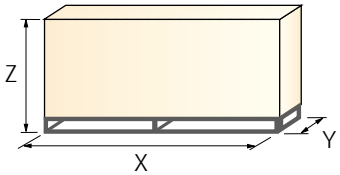
Model	A	B	C	D	E	F	G	H	I	L	M
BS1	234	122,0	112,0	295	254	346	230÷276	116÷70	83	210	174
BS2	255	125,5	125,5	325	280	352	238÷252	114÷100	101	230	174
BS3	300	150,0	150,0	391	345	390	262÷280	128÷110	123	285	196
BS4	300	150,0	150,0	392	345	446	278÷301	168÷145	131,5	286	216

BURNER-BOILER MOUNTING FLANGE



Model	N	O	P	Q	R
BS1	192	66	167	140	170
BS2	192	66	167	140	170
BS3	216	76,5	201	160	190
BS4	218	80,5	203	170	200

PACKAGING



Model	X	Y	Z	kg
BS1	385	268	340	10
BS2	395	288	365	11
BS3	440	335	430	15
BS4	500	335	430	16,5

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel
The burner is set in the factory on standard calibration (minimum output). If necessary adjustments can be made on the basis of the maximum output of the boiler.
All operations must be performed as described in the technical handbook supplied with the burner.

- The mobile flange allows adapting the length of the combustion head to the combustion chamber (flame inversion or 3 smoke cycles) and to the thickness of the boiler panel.

SETTING

- The air damper position can be adjusted without removing the burner cover.

- Head setting is easy and aided by a graduated scale; a test point allows reading the air pressure in the combustion head.

- Gulliver BS burners are fitted with an air pressure switch which, in accordance with EN 676 standards, can be adjusted by the installer using a graduated selector, on the basis of the effective working conditions.

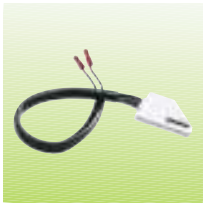
MAINTENANCE

- Maintenance is easily solved because the combustion head can be disassemblyed without having to remove the burner and gas train from the boiler.

ACCESSORIES

Remote control release kit for the 568 control box

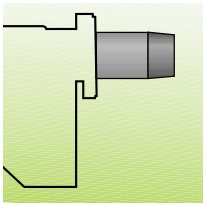
The 568 control box can be remotely released using an electric command kit.
This kit must be installed in conformity with current regulations in force.



Remote control release kit for the 568 control box	
Burner	**Kit code**
BS1 - BS2 - BS3 - BS4	**3001031**

Extended heads

Standard head" burners can be transformed into "extended head" versions by using the special kit. Below the KITS available for the various burners are listed, showing the original and the extended lengths.



Combustion head extension kit			
Burner	**Standard head length (mm)**	**Extended head length (mm)**	**Kit code**
BS1	70 ÷ 116	175 ÷ 185	**3001007**
BS2	100 ÷ 114	275 ÷ 285	**3001008**
BS3	110 ÷ 128	270 ÷ 285	**3001009**
BS4	145 ÷ 168	325 ÷ 340	**3001016**

LPG transformation kit

For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner, as shown in the following table:

LPG transformation kit	
Burner	**Kit code**
BS1	**3001003**
BS2	**3001004**
BS3	**3001005**
BS4	**3001011**

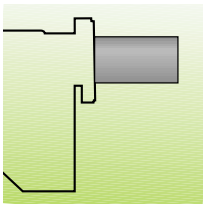
Seal control kit

To test the valve seals on the gas train, (except for the model with Multibloc MBDLE 055) a special "seal control kit" is available.

Seal control kit	
Burner	**Kit code**
BS1 - BS2 - BS3 - BS4	**3010123**

Kit for alternative combustion heads

To extend the adaptability of Gulliver BS burners to any sort of application, alternative combustion heads have been developed, for example, to overcome situations of combustion instability which could arise with certain heat generators.
These heads cause a very limited increase in NOx emissions, due to the slower air flow.



Kit for alternative combustion heads	
Burner	**Kit code**
BS1	**3001059**
BS2	**3001064**
BS3	**3001060**
BS4	**3001070**

SPECIFICATION

A special index guides your choice of boiler from the various models available in the BS series. Below there is a clear and detailed specification description of the product.

DESIGNATION OF SERIES

Series:	R	Standard emission burner
	B	Low NOx burners
Fuel :	S	Natural gas
	G	Light oil
Size		
Optional variations:	R	Light oil pre-heater
	K	Cone shaped head
	S	Reduced output ignition
	D	Two stage output adjustment
	E	Flame monitor

B	S	3	

LIST OF AVAILABLE MODELS

BS1	16	÷	52	kW
BS2	35	÷	91	kW
BS3	65	÷	189	kW
BS4	110	÷	246	kW

SPECIFICATION DESCRIPTION

Burner:

Monoblock, gas burners, completely automatic, with single stage settings fitted with:
- Fan with forward inclined blades
- Cover lined with sound-deadening material
- Air damper, completely closed in stand by, with external adjustment, with no need to remove the cover
- Single phase electric motor 230 V, 50 Hz
- Combustion head fitted with:
    - stainless steel head cone, resistant to high temperatures
    - ignition electrodes
    - ionisation probe
    - gas distributor
    - flame stability disk
- Flame inspection window
- Adjustable air pressure switch, with graduated selector, to guarantee burner lock out in the case of insufficient combustible air
- Protection filter against radio interference
- IP 40 electric protection level.

Gas train:

Fuel supply line in the Multibloc configuration, fitted with:
- Filter
- Pressure stabiliser
- Minimum gas pressure switch
- Safety valve
- Single stage working valve with ignition gas output regulator.

Burner and gas train assembled:

Approval:
- EN 676 standard
- LRV 92 standard.

Conforming to European Directives:
- 90/396/CEE (gas)
- 73/23/CEE (low voltage)
- 89/336/CEE (electromagnetic compatibility)
- 92/42/CEE (efficiency).

Conforming to:
- BImSchV 1996.

Supplied material:
- Sliding flange
- Flange insulation screen
- Screws and nuts for fixing the flange to the boiler
- 7-pin plug with capacitor for EMC
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- Remote release kit
- Head extension kit
- LPG transformation kit
- Seal control kit
- Alternative combustion head kit.

Lineagrafica

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RIELLO BURNERS

CE

LOW NOx TWO-STAGE GAS BURNERS

GULLIVER BSD SERIES

BS1D	16/19	÷	52	kW
BS2D	35/40	÷	91	kW
BS3D	65/75	÷	189	kW
BS4D	110/140	÷	246	kW

The Riello Gulliver BSD series of two-stage gas burners, is a complete range of Low NOx emission products, developed to respond to any request for home heating, conforming to the most severe standards regarding the reduction of polluting emissions. This series of burners is available in four different models with an output ranging from 16 to 246 kW, divided in four different structures.
All the models use the same components designed by Riello for the Gulliver series. The high quality level guarantees safe working.
In developing these burners, special attention was paid to reducing noise, the ease of installation and adjustment, to obtaining the smallest size possible to fit into any sort of boiler available on the market.
Two stage working guarantees high level performance from the thermal unit. All the models are approved by the EN 676 European Standard and LRV 92 Swiss standards, and conform to BImSchV 1996 and European Directives, Gas Appliance, EMC, Low Voltage, Boiler Efficiency.
All the Gulliver BSD burners are tested before leaving the factory.

TECHNICAL DATA

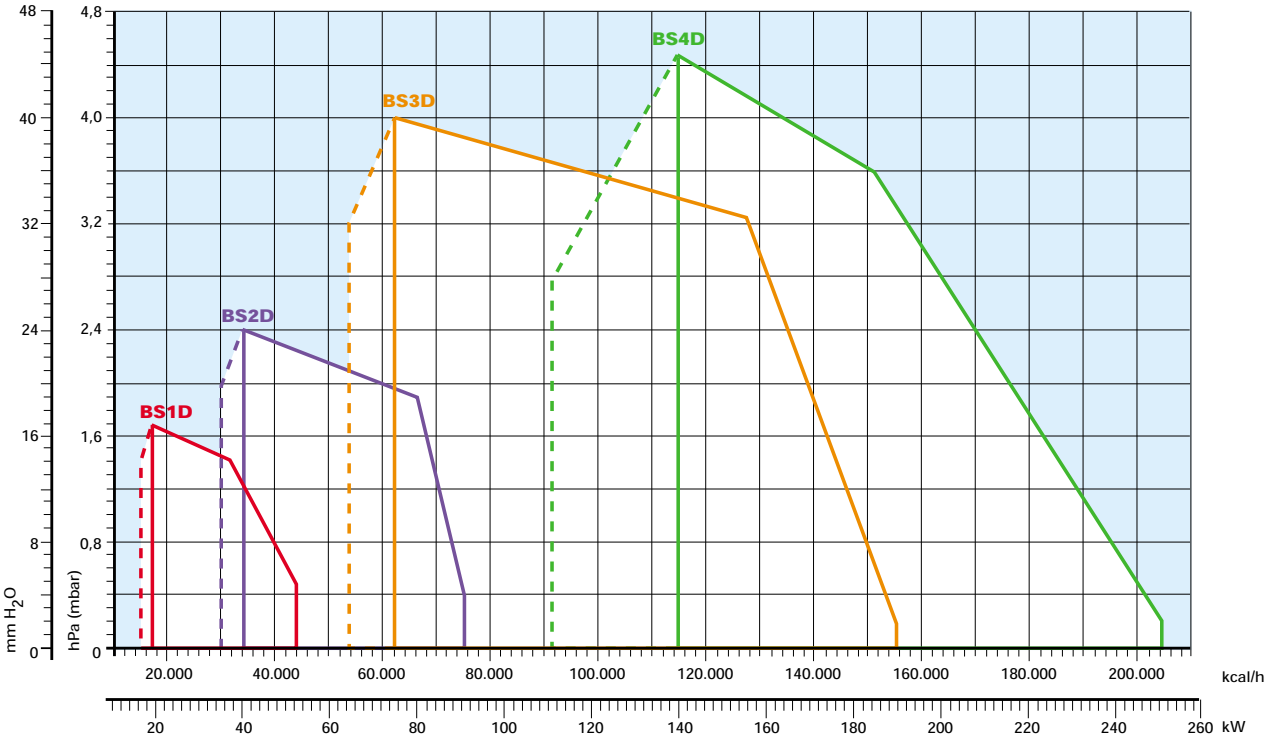
	Model		BS1D	BS2D	BS3D	BS4D
	Setting		Two stage			
	Servo-motor type		R.B.L.			
	Servo-motor run time		6 ÷ 28			
	Heat output	kW	16/19 - 52	35/40 - 91	65/75 - 189	110/140 - 246
	Heat output	Mcal/h	13,8 - 44,7	30,1 - 78,2	55,9 - 162,5	94,6 - 211,6
	Working temperature	°C min./max.	0/40			
Fuel / air data	Net calorific value G20 gas	kWh/Nm³	10			
Fuel / air data	G20 gas density	kg/Nm³	0,71			
Fuel / air data	G20 gas delivery	Nm³/h	1,6 - 5,2	3,5 - 9	6,5 - 19	11 - 24,6
Fuel / air data	Net calorific value G25 gas	kWh/Nm³	8,6			
Fuel / air data	G25 gas density	kg/Nm³	0,78			
Fuel / air data	G25 gas delivery	Nm³/h	1,9 - 6	4 - 10,5	7,5 - 22	13 - 28,5
Fuel / air data	Net calorific value LPG gas	kWh/Nm³	25,8			
Fuel / air data	LPG gas density	kg/Nm³	2,02			
Fuel / air data	LPG gas delivery	Nm³/h	0,6 - 2	1,3 - 3,5	2,5 - 7,3	4,2 - 9,5
Fuel / air data	Fan	type	forward tilted blades			
Fuel / air data	Air temperature	°C max	40			
Electrical data	Electrical supply	Ph/Hz/V	1/50/230 ±10%			
Electrical data	Aux. electrical supply	Ph/Hz/V	--			
Electrical data	Control box	type	R.B.L. 568			
Electrical data	Total electrical output	kW	0,15	0,18	0,35	0,43
Electrical data	Protection level	IP	40			
Electrical data	Electric motor output	kW	0,15	0,18	0,35	0,43
Electrical data	Rated motor current	A	0,64	0,67	1,4	2
Electrical data	Motor take-off current	A	3	3	3	8,5
Electrical data	Motor protection level	IP	20			
Electrical data	Ignition transformer		incorporated in the control box			
Electrical data	Operation		intermittent (at least one halt every 24 h)			
Emissions	Sound pressure	dB(A)	61	62	66	71
Emissions	CO Emissions	mg/kWh	< 40			
Emissions	NOx Emissions	mg/kWh	< 80			
Approval	Directives		90/396/CEE, 89/336/CEE, 73/23/CEE, 92/42/CEE			
Approval	Conforming to:		EN 676 - LRV 92 - BImSchV 1996			
Approval	Certifications		CE - 0085 AQ0409 BUWAL - Nr.100010			

Reference conditions:
Temperature: 20°C
Pressure: 1013.5 Mbar
Altitude: 100 meters a.s.l.
Noise measured at a distance of 1 meter.

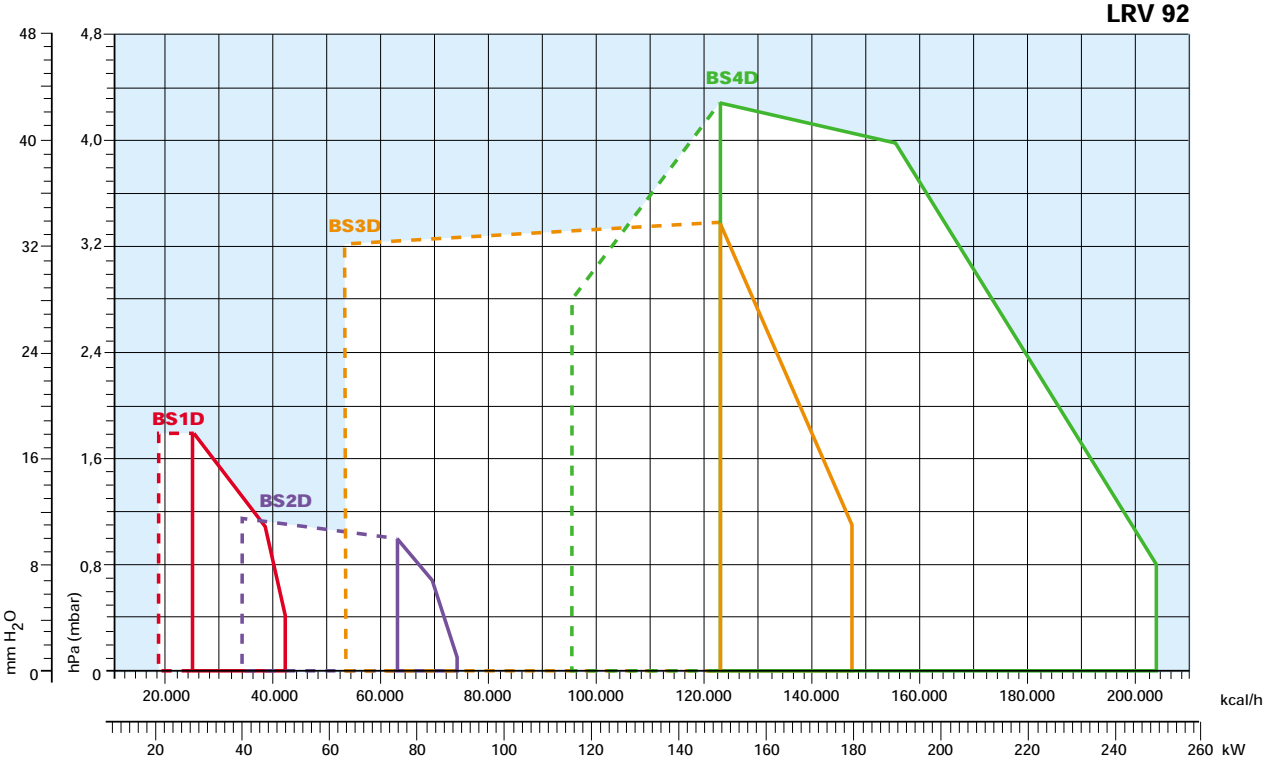
Since the Company is constantly engaged in the production improvement, the aesthetic and dimensional features, the technical data, the equipment and the accessories can be changed.

FIRING RATES

EN 676



LRV 92



Useful working field for choosing the burner

Modulation range

Test conditions conforming to EN 676 and LRV 92:
Temperature: 20 °C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.

FUEL SUPPLY

GAS TRAINS

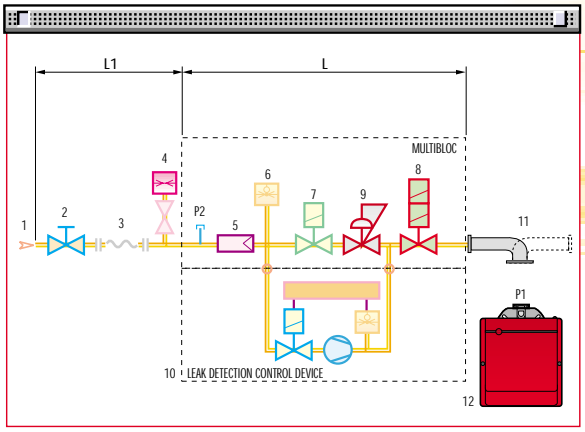
The burners are set for fuel supply from either the right or left hand sides.

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

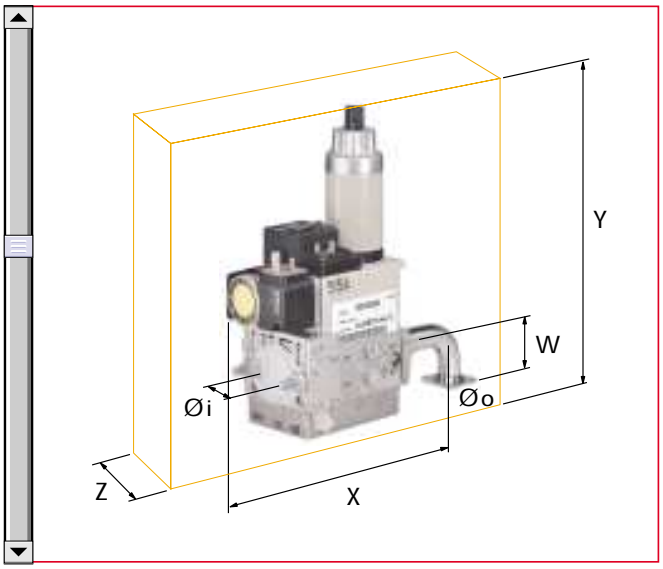
The gas train is Multibloc type, containing the main components in a single unit and it can be fitted with the valve seal control (as an accessory).

Gas train installed on the burner

MBZRDLE 405 - 407 - 410 - 412



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 1st and 2nd stage: 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
P1	Combustion head pressure
P2	Upstream pressure from the filter
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 Gulliver BSD burners, intake diameter and the coupling flange to the burner.

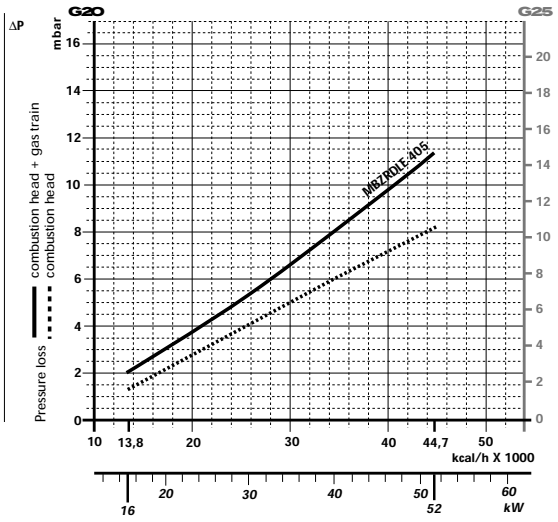
	Name	Code	Ø i	Ø o	X mm	Y mm	W mm	Z mm
MULTIBLOC	**MBZRDLE 405**	3970539	1/2"	FLANGE 1	246	256	45	120
	MBZRDLE 405	3970540	3/4"	FLANGE 2	236	256	47	120
	MBZRDLE 407	3970538	3/4"	FLANGE 2	236	256	47	120
	MBZRDLE 407	3970541	3/4"	FLANGE 3	236	256	47	120
	MBZRDLE 410	3970542	1" 1/4	FLANGE 3	259	315	47	145
	MBZRDLE 412	3970543	1" 1/4	FLANGE 3	259	315	47	145

PRESSURE DROP DIAGRAMS

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

NATURAL GAS

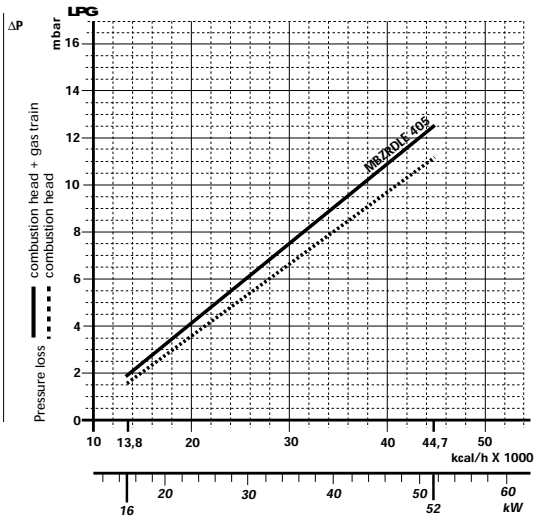
BS1D



Gas Train	Code
MBZRDLE 405	3970539

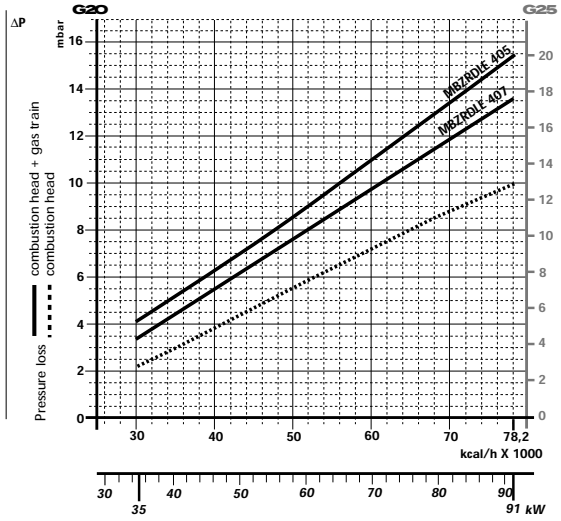
LPG

BS1D



NATURAL GAS

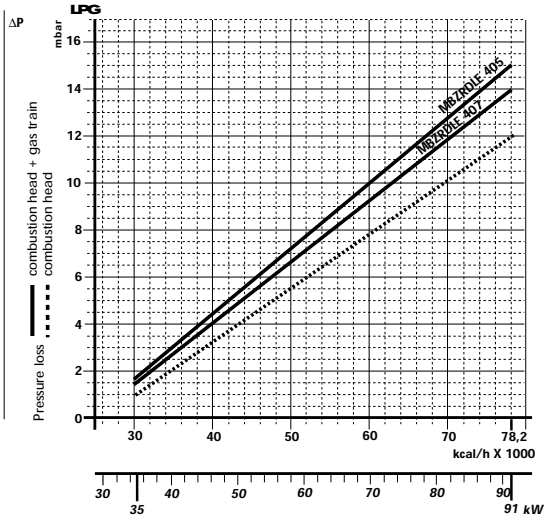
BS2D



Gas Train	Code
MBZRDLE 405	3970540
MBZRDLE 407	3970538

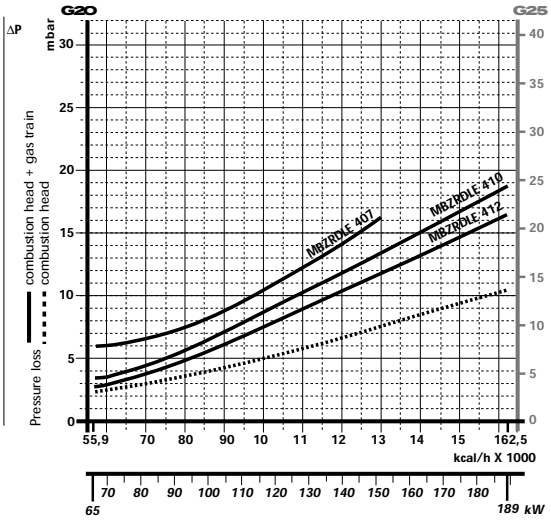
LPG

BS2D



NATURAL GAS

BS3D

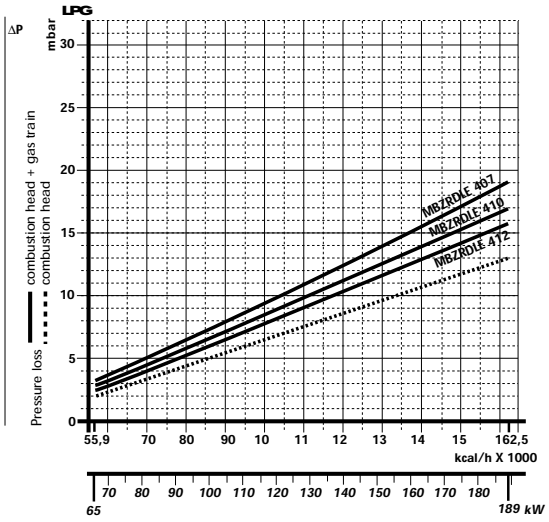


Gas Train	Code	Output
MBZRDLE 407	3970541	≤ 150 kW *
MBZRDLE 410	3970542	-
MBZRDLE 412	3970543	-

* with natural gas.

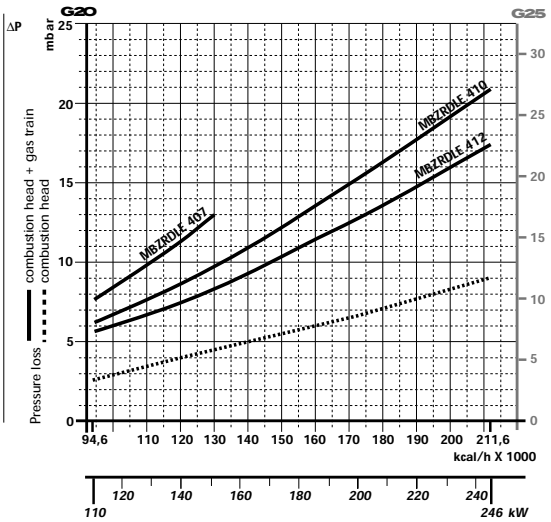
LPG

BS3D



NATURAL GAS

BS4D

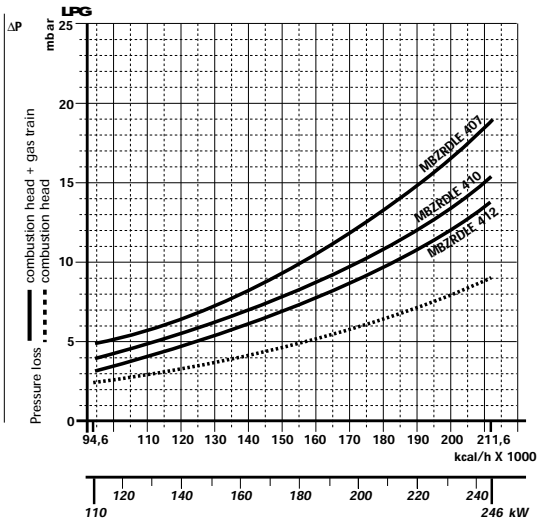


Gas Train	Code	Output
MBZRDLE 407	3970541	≤ 150 kW *
MBZRDLE 410	3970542	-
MBZRDLE 412	3970543	-

* with natural gas.

LPG

BS4D



note *For pressure levels different from those indicated above, please contact Riello Burners Technical Office.*

DIMENSIONING OF THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

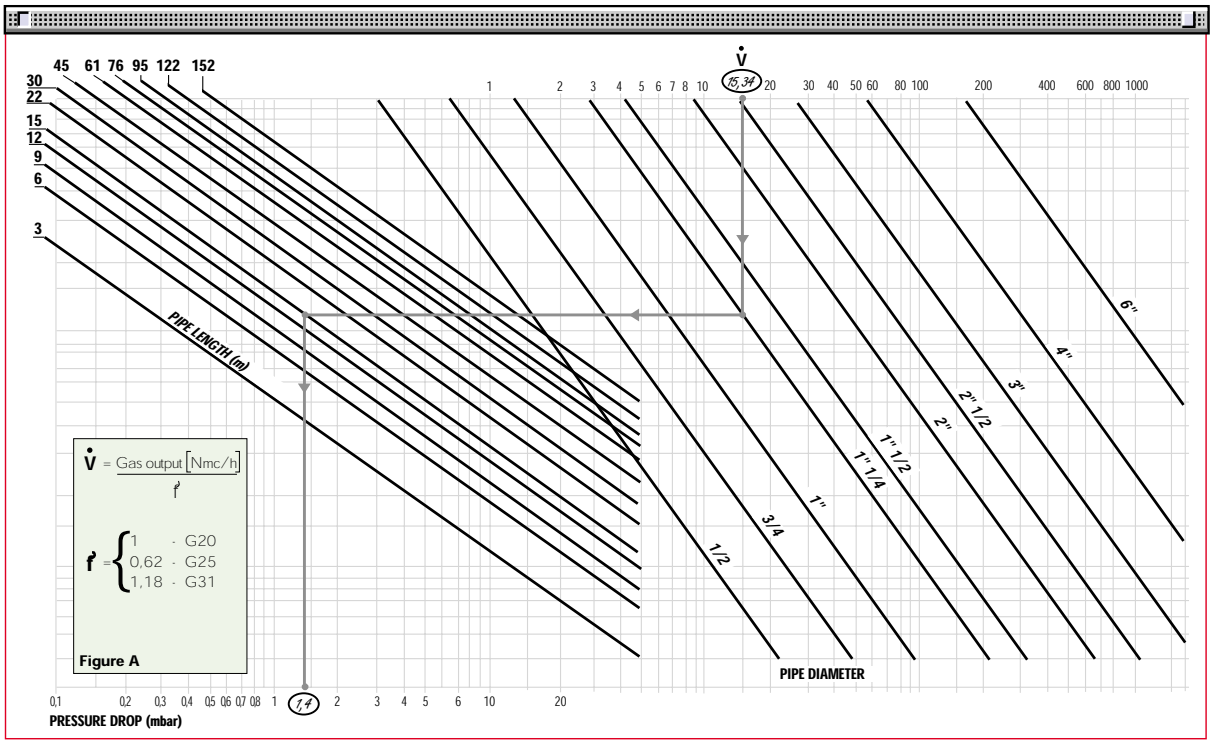
Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length. Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop on the botton scale (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

- gas used	G25
- gas output	9.51 mc/h
- pressure at the gas meter	20 mbar
- gas line length	15 m
- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62}\right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;
- correct pressure = (20-1.4) = 18.6 mbar



VENTILATION

The different ventilation circuits always ensure low noise levels with high performance of pressure and air delivery, inspite of their compact size.

Air suction

The burners are fitted with an adjustable air pressure switch, conforming to EN 676 standards.

Air pressure switch

COMBUSTION HEAD

The combustion head in Gulliver BSD 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.

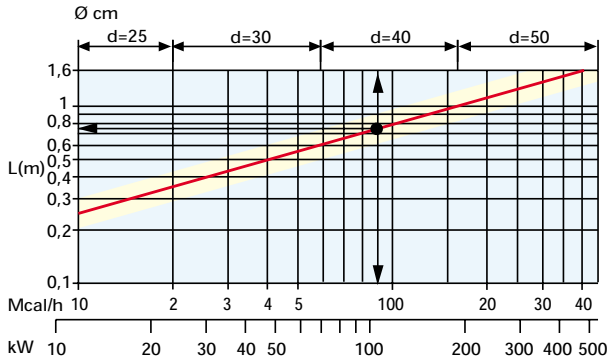
Thanks to the use of a mobile coupling flange, the penetration of the head into the combustion chamber can be adjusted.

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

Combustion head

Mobile flange

Combustion chamber dimensions used in the test laboratory



With simple adjustments, the burner can be adapted to combustion chambers that are slightly different from those used in the tests.

Example:
burnt thermal delivery = *105 kW;*
L (m) = 0,23 x $\sqrt{10,5}$ = 0,74 (m);
Ø = 40 (cm)

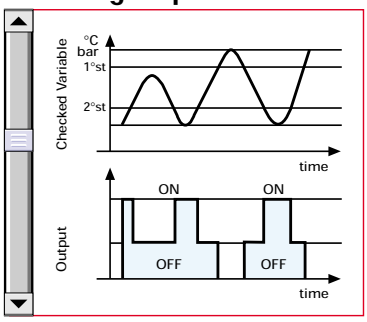
ADJUSTMENT

BURNER OPERATION MODE

All these models are two-stage working.
The Gulliver BSD series of two stage burners allows operating at both full and reduced output, with consequent reduction in turning the burner on and off, their giving better performance to the boiler.

During stand-by, the air damper is completely closed (controlled by an electric servomotor) and prevents heat loss due to the flue draught.

"Two-stage" operation

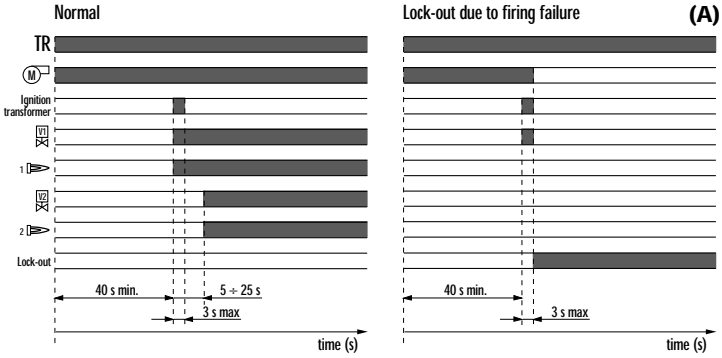


Air damper adjustment

Air-damper opening mechanism

Air-damper opening mechanism

FIRING



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

Correct operations

0s	The burner begins the firing cycle.
0s-40s	Pre-purge with the air damper open.
40s	Ignition 1st stage.
45÷65s	Ignition 2nd stage.

Lock-out due to firing failure

If the flame does not light within the safety limit (~ 3s) the burner locks-out.

ELECTRICAL CONNECTIONS
to be made by the installer

Electrical connections must be made by qualified and skilled personnel, in conformity with the local regulations in force.
The 7-pole socket is incorporated in the control box, the 4-pole socket (for connecting the 2nd stage thermostat to the hour meter) and the 6-pole socket (for connection to the gas train) are already connected to the equipment and fixed into the burner.
The 7 and 4-pin plugs are also supplied for connection to the boiler.

7-pole socket incorporated in the control box

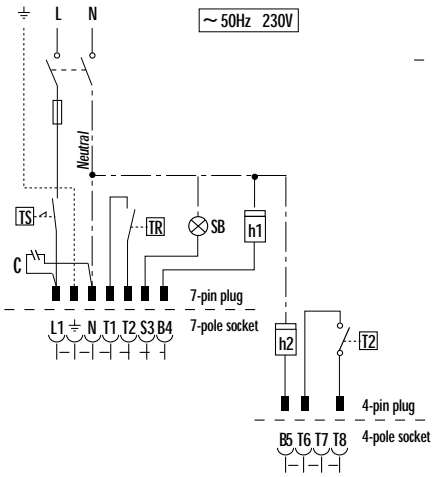
6-pole socket

4-pole socket

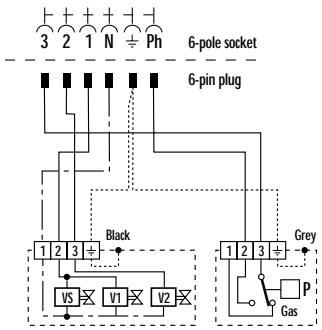
" TWO-STAGE" OPERATIONS

h1 - One stage counter hours (230V 0,1A max.)
h2 - Two stage counter hours (230V 0,1A max.)
SB - Remote lock out signal (230V 0,1A max.)
TR - Regulating thermostat
TS - Safety thermostat (manual reset)
T2 - Two stage thermostat
VS - Safety valve
V1 - One stage valve
P - Gas pressure switch
C - Capacitor
F - Fuse

Burner electrical wiring



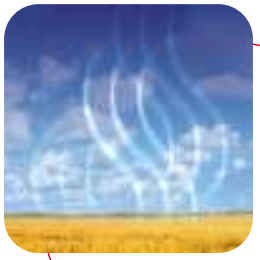
Gas train electrical wiring



The following table shows the supply lead sections and types of fuse to be used.

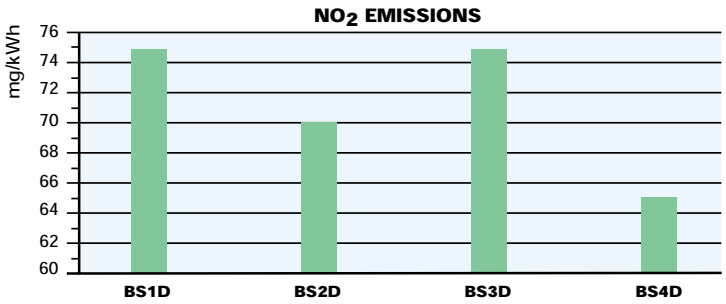
Model	BS1D	BS2D	BS3D	BS4D
	230V	230V	230V	230V
F A	6	6	6	T6
L mm²	1	1	1	1

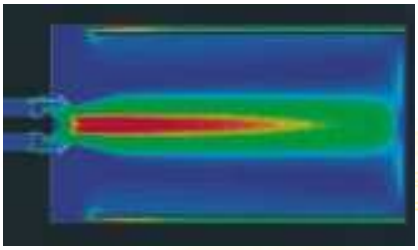
F = Fuse L = Lead section

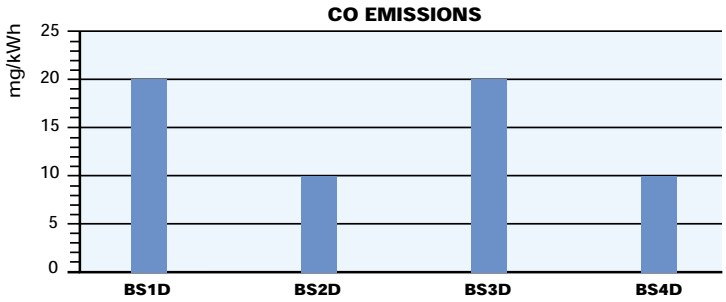


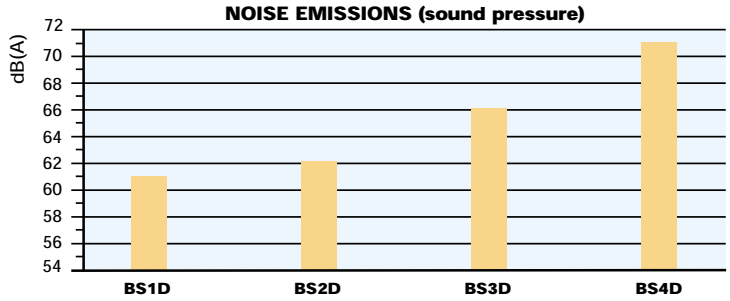
EMISSIONS

The burners in the Gulliver BSD series guarantee controlled combustion, reducing emissions of both CO and NOx, this combustion control is due to the recirculation of the combustion products in the chamber (thanks to different combustible air flow speeds) and to the *fuel staging* technique (thanks to the special geometry of the gas nozzles).









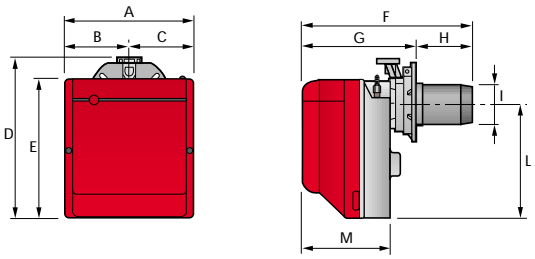
The emission data have been measured in the various models at maximum output, in conformity with EN 676 standard.

Special attention has been paid to noise reduction. All models are fitted with sound-proofing material inside the cover.

OVERALL DIMENSIONS (mm)

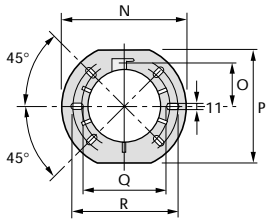
These models are distinguished by their reduced size, in relation to their output, which means they can be fitted to any boiler on the market.

BURNER



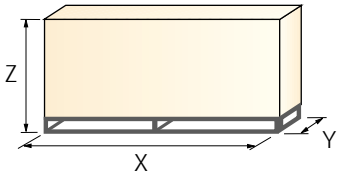
Model	A	B	C	D	E	F	G	H	I	L	M
BS1D	234	122,0	112,0	295	254	346	230÷276	116÷70	83	210	174
BS2D	255	125,5	125,5	325	280	352	238÷252	114÷100	101	230	174
BS3D	300	150,0	150,0	391	345	390	262÷280	128÷110	123	285	196
BS4D	300	150,0	150,0	392	345	446	278÷301	168÷145	131,5	286	216

BURNER-BOILER MOUNTING FLANGE



Model	N	O	P	Q	R
BS1D	192	66	167	140	170
BS2D	192	66	167	140	170
BS3D	216	76,5	201	160	190
BS4D	218	80,5	203	170	200

PACKAGING



Model	X	Y	Z	kg
BS1D	385	268	340	11
BS2D	395	288	365	12
BS3D	440	335	430	16
BS4D	500	335	430	18

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel
The burner is set in the factory on standard calibration (minimum output). If necessary adjustments can be made on the basis of the maximum output of the boiler.
All operations must be performed as described in the technical handbook supplied with the burner.

- The mobile flange allows adapting the length of the combustion head to the combustion chamber (flame inversion or 3 smoke cycles) and to the thickness of the boiler panel.

BURNER SETTINGS

- The adjustment of the 1st stage air damper position can be easily carried out by setting the air damper motor and following the manual instruction.

- The second stage position of the air damper can be adjusted without removing the burner cover.

- Head setting is easy and aided by a graduated scale; a test point allows reading the air pressure in the combustion head.

- Gulliver BSD burners are fitted with an air pressure switch which, in accordance with EN 676 standards, can be adjusted by the installer using a graduated selector, on the basis of the effective working conditions.

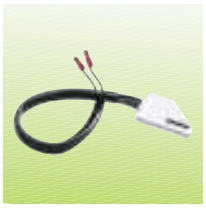
MAINTENANCE

- Maintenance is easily solved because the combustion head can be disassemblyed without having to remove the burner and gas train from the boiler.

ACCESSORIES

Remote control release kit for the 568 control box.

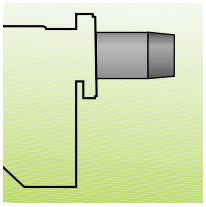
The 568 control box can be remotely released using an electric command kit.
This kit must be installed in conformity with current regulations in force.



Remote control release kit for the 568 control box.	
Burner	**Kit Code**
BS1D - BS2D - BS3D - BS4D	**3001031**

Extended heads

Standard head" burners can be transformed into "extended head" versions by using the special kit. Below the KITS available for the various burners are listed, showing the original and the extended lengths.



Combustion head extension kit			
Burner	**Standard head length (mm)**	**Extended head length (mm)**	**Kit Code**
BS1D	70 ÷ 116	175 ÷ 185	**3001007**
BS2D	100 ÷ 114	275 ÷ 285	**3001008**
BS3D	110 ÷ 128	270 ÷ 285	**3001009**
BS4D	145 ÷ 168	325 ÷ 340	**3001016**

LPG transformation kit

For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner, as shown in the following table:

LPG transformation kit	
Burner	**Kit Code**
BS1D	**3001003**
BS2D	**3001004**
BS3D	**3001005**
BS4D	**3001011**

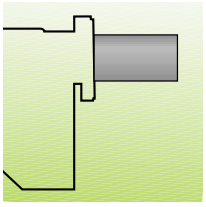
Seal control kit

To test the valve seals on the gas train a special "seal control kit" is available.

Seal control kit	
Burner	**Kit Code**
BS1D - BS2D - BS3D - BS4D	**3010123**

Kit for alternative combustion heads

To extend the adaptability of Gulliver BSD burners to any sort of application, alternative combustion heads have been developed, for example, to overcome situations of combustion instability which could arise with certain heat generators.
These heads cause a very limited increase in NOx emissions, due to the slower air flow.



Kit for alternative combustion heads	
Burner	**Kit Code**
BS1D	**3001059**
BS2D	**3001064**
BS3D	**3001060**
BS4D	**3001070**

SPECIFICATION

A special index guides your choice of boiler from the various models available in the BSD series. Below there is a clear and detailed specification description of the product.

DESIGNATION OF SERIES

Series:	R	Standard emission burner
	B	Low NOx burners
Fuel :	S	Natural gas
	G	Light oil
Size		
Optional variations:	R	Light oil pre-heater
	K	Cone shaped head
	S	Reduced output ignition
	D	Two stage output adjustment
	E	Flame monitor

B	S	3	D

LIST OF AVAILABLE MODELS

BS1D	16/19	÷	52	kW
BS2D	35/40	÷	91	kW
BS3D	65/75	÷	189	kW
BS4D	110/140	÷	246	kW

SPECIFICATION DESCRIPTION

Burner:

Monoblock, gas burners, completely automatic, with two stage settings fitted with:
- Fan with forward inclined blades
- Cover lined with sound-deadening material
- Air damper, completely closed in stand by, driven by an electric servomotor
- Air damper with 1st and 2nd stage adjustment (2nd stage external adjustment, with no need to remove the cover)
- Single phase electric motor 230 V, 50 Hz
- Combustion head fitted with:
    - stainless steel head cone, resistant to high temperatures
    - ignition electrodes
    - ionisation probe
    - gas distributor
    - flame stability disk
- Flame inspection window
- Adjustable air pressure switch, with graduated selector, to guarantee burner lock out in the case of insufficient combustible air
- Protection filter against radio interference
- IP 40 electric protection level.

Gas train:

Fuel supply line in the Multibloc configuration, fitted with:
- Filter
- Pressure stabiliser
- Minimum gas pressure switch
- Safety valve
- Two stage working valve with ignition gas output regulator.

Burner and gas train assembled:

Approval:
- EN 676 standard
- LRV 92 standard.

Conforming to European Directives:
- 90/396/CEE (gas)
- 73/23/CEE (low voltage)
- 89/336/CEE (electromagnetic compatibility)
- 92/42/CEE (efficiency)

Conforming to:
- BImSchV 1996

Supplied material
- Sliding flange
- Flange insulation screen
- Screws and nuts for fixing the flange to the boiler
- 7-pin plug with capacitor for EMC
- 4-pin plug
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- Remote release kit
- Head extension kit
- LPG transformation kit
- Seal control kit
- Alternative combustion head kit.

Lineagrafica

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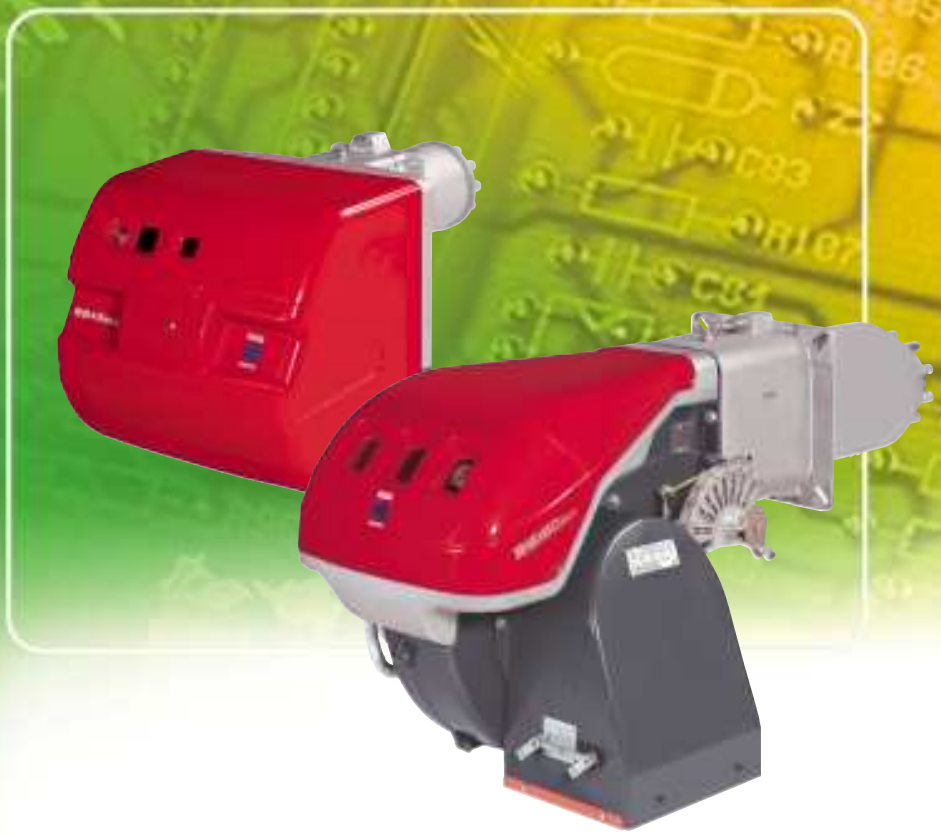
RIELLO BURNERS

CE

MODULATING LOW NOx GAS BURNERS

RS/M BLU SERIES		
	RS 45/M BLU	90 ÷ 550 kW
	RS 68/M BLU	150 ÷ 860 kW
	RS 120/M BLU	300 ÷ 1300 kW
	RS 160/M BLU	300 ÷ 1860 kW



The RS/M BLU series of burners covers a firing range from 90 to 1860 kW, and they have been designed for use in hot or superheated water boilers, hot air or steam generators, diathermic oil boilers.
Setting Adjustment can be "two stage progressive" or, alternatively, "modulating" with the installation of a PID logic regulator and respective probes.
RS/M BLU series burners guarantees high efficiency levels in all the various applications, thus reducing fuel consumption and running costs.
Optimisation of sound emissions is guaranteed by the use of fans with forward inclined blades and sound deadening material incorporated in the air suction circuit.
The exclusive design ensures reduced dimensions, simple use and maintenance. A wide range of accessories guarantees elevated working flexibility.

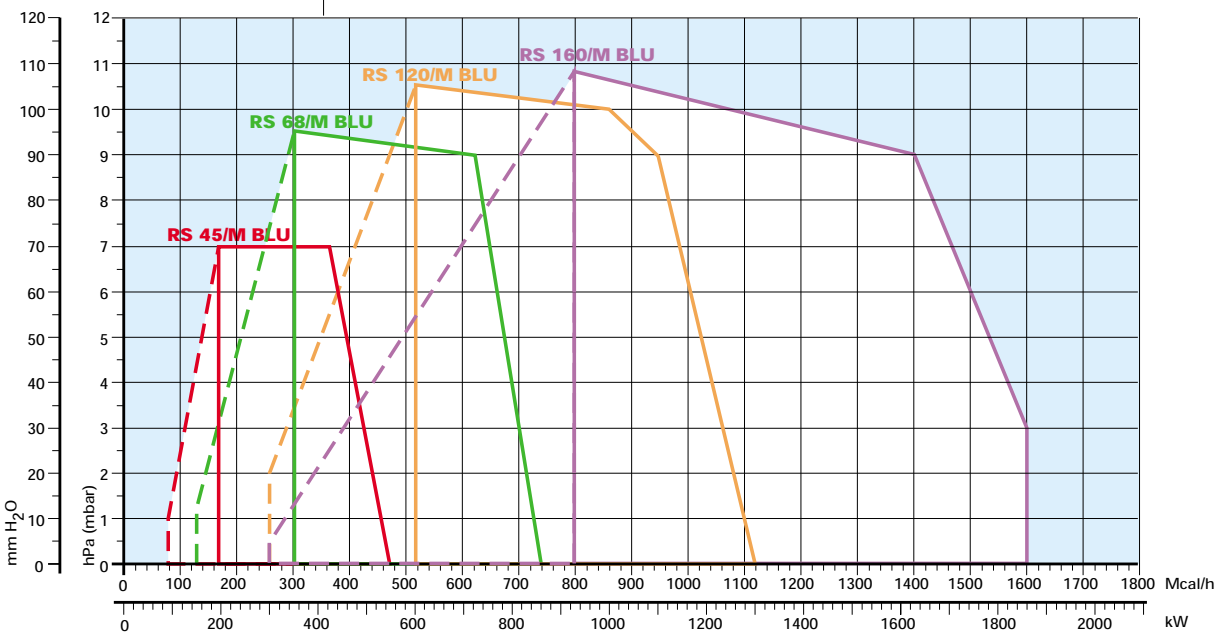
TECHNICAL DATA

	Model			RS45/M BLU	RS68/M BLU	RS120/M BLU	RS160/M BLU
	Setting type			Modulating (with regulator and probes accessories)			
	Modulation ratio at max. output			3 ÷ 1			4 ÷ 1
	Servo-motor	Type		SQN90	SQN31		
		Run time	s	24	42		
	Heat output		kW	90/190÷550	150/350÷860	300/600÷1300	300/930÷1860
			Mcal/h	77/164÷473	129/301÷740	258/516÷1118	258/800÷1600
	Working temperature		°C min./max.	0/40			
Fuel / air data	Net calorific value gas G20		kWh/Nmc	10			
	Density gas G20		kg/Nmc	0,71			
	Output gas G20		Nmc/h	9/19÷55	15/35÷86	30/60÷130	30/93÷180
	Net calorific value gas G25		kWh/Nmc	8,6			
	Density gas G25		kg/Nmc	0,78			
	Output gas G25		Nmc/h	10,5/22÷64	17,5/41÷100	35/70÷151	35/108÷216
	Net calorific value LPG gas		kWh/Nmc	25,8			
	Density LPG gas		kg/Nmc	2,02			
	Output LPG gas		Nmc/h	--	--	--	--
	Fan		type	Centrifugal with reverse curve blades			
	Air temperature		°C max	60			
Electrical data	Electrical supply		Ph/Hz/V	1/50/230~(±10%)	3N/50/230-400~(±10%) 人 3/50/230~(±10%) △		
	Auxiliary electrical supply		Ph/Hz/V	1/50/230 ~ (±10%)			
	Control box		type	LMG22 (intermittent operation) - LGK16 (continuous operation)			
	Total electrical power		kW	0,6	2,1	2,6	4,8
	Auxiliary electrical power		kW	0,18	0,3	0,3	0,3
	Protection level		IP	44			
	Motor electric power		kW	0,42	1,5	2,2	4,5
	Rated motor current		A	2,9	5,9 - 3,4	8,8 - 5,1	15,8 - 9,1
	Motor start current		A	9,2	32,8 - 19	55,4 - 32	126 - 72,8
	Motor protection level		IP	54			
	Ignition transformer		V1 - V2	230/240V - 1x15 kV	230V - 1x8 kV		
			I1 - I2	45vA - 25 mA	1A - 20 mA		
	Operation			Intermittent (at least one stop every 24 h) - Continuous (at least one stop every 72 h)			
Emissions	Sound pressure		dBA	74	77	78,5	80,5
	Sound output		W	--	--	--	--
	CO Emission		mg/kWh	< 20			
	NOx Emission		mg/kWh	< 80			
Approval	Directive			90/396 - 89/336 - 73/23 - 92/42 EEC		90/396 - 89/336 - 73/23 EEC	
	According to			EN 676 - LRV 92	EN 676		
	Certification			in progress (CE ... BUWAL n°...)	in progress (CE ...)		

Reference conditions:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 meters a.s.l.
Noise measured 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 rate for the choice of the burner

Modulating rate

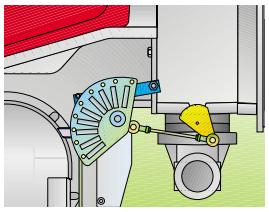
Test conditions conforming to EN 676:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 meters a.s.l.

FUEL SUPPLY

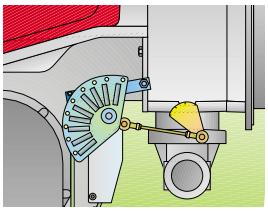
GAS TRAIN

The burners are fitted with a butterfly valve to regulate the fuel, controlled by a variable profile cam servomotor. Fuel can be supplied either from the right or left hand sides. A maximum gas pressure switch stops the burner in case of excess pressure in the fuel line.

The gas train can be selected to best fit system requirements depending on the fuel output and pressure in the supply line.
The gas train can be "Multibloc" type (containing the main components in a single unit) or "Composed" type (assembly of the single components).

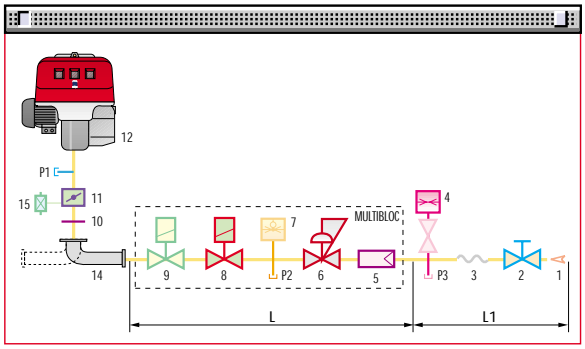


Example of the variable profile cam on RS 68-120/M BLU burners.

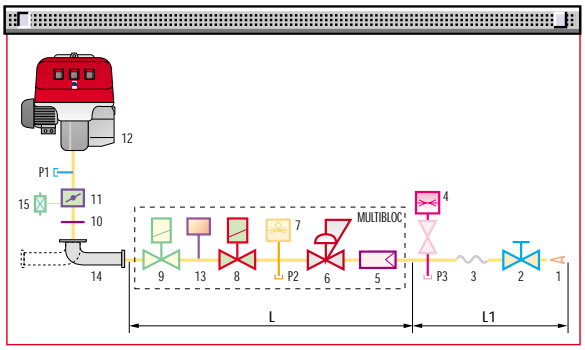


Example of the variable profile cam on RS 160/M BLU burners.

MULTIBLOC gas train without seal control

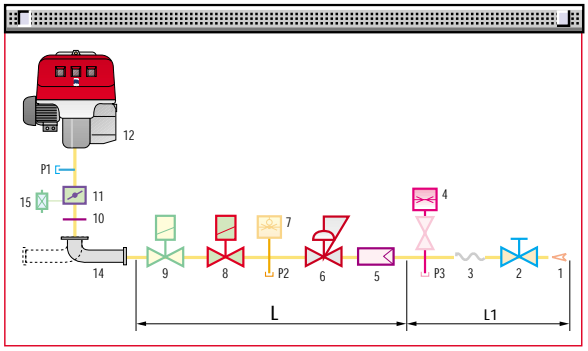


MULTIBLOC gas train with seal control

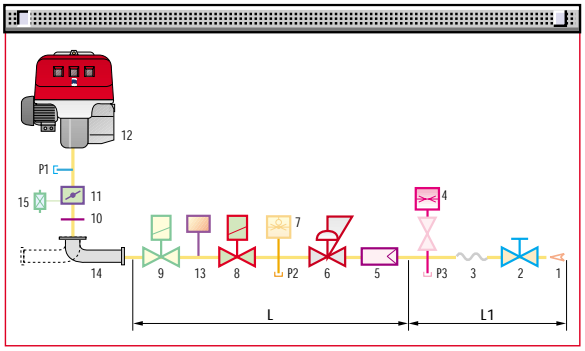


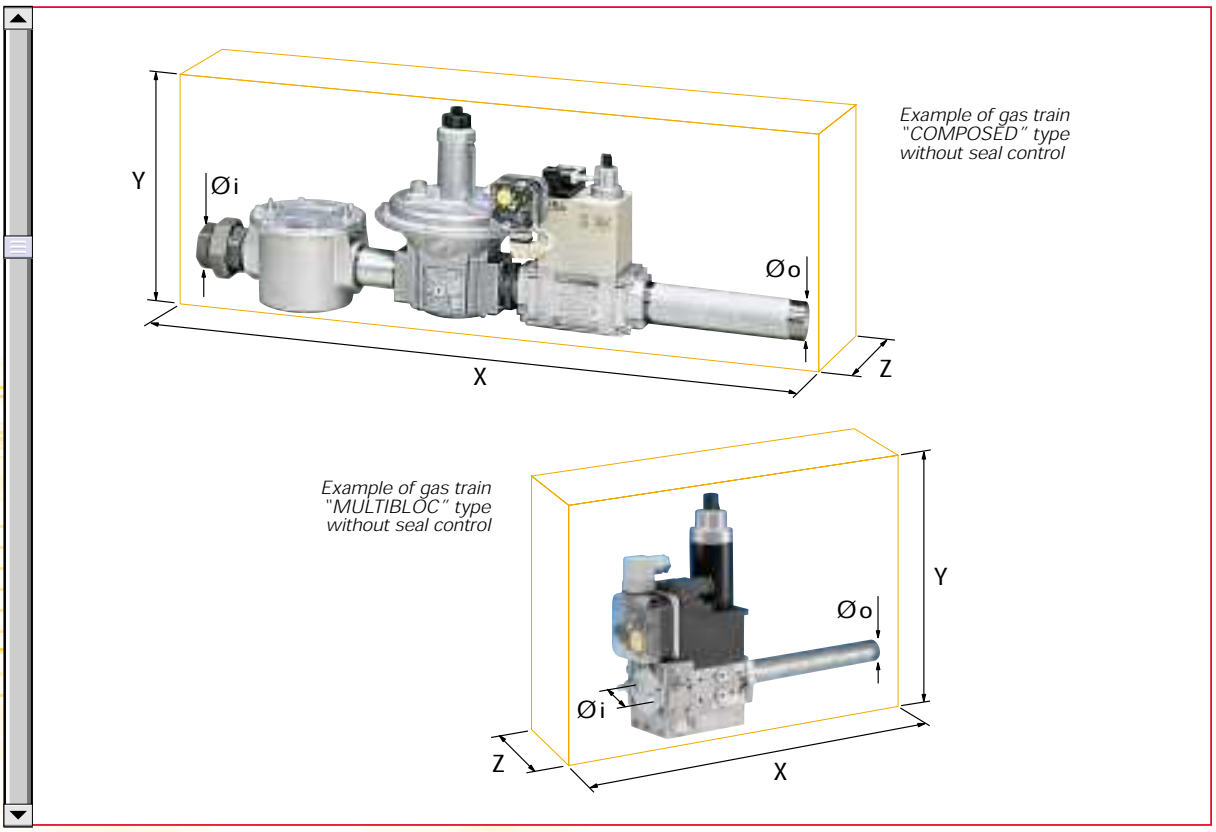
1	Gas input pipework
2	Manual valve
3	Anti-vibration joint
4	Pressure gauge with pushbutton cock
5	Filter
6	Pressure regulator (vertical)
7	Minimum gas pressure switch
8	VS safety solenoid (vertical)
9	VR regulation solenoid (vertical) Two settings: - firing output (rapid opening) - maximum output (slow opening)
10	Gasket and flange supplied with the burner
11	Gas adjustment butterfly valve
12	Burner
13	Seal control mechanism for valves 8-9. According to standard EN 676, the seal control is compulsory for burners with maximum output above 1200 kW
14	Gas train-burner adapter.
15	Maximum gas pressure switch
P1	Combustion head pressure
P2	Pressure downstream from the regulator
P3	Pressure upstream from the filter
L	Gas train supplied separately, with the code given in the table
L1	Installer's responsibility

COMPOSED gas train without seal control



COMPOSED gas train with seal control





Gas trains are approved by standard EN 676 together with the burner.

The overall dimensions of the gas train depends on how they are constructed. The following table shows the maximum dimensions of the gas trains that can be fitted to RS/M BLU burners, intake and outlet diameters and seal control if fitted.
Please note that the seal control can be installed as an accessory, if not already installed on the gas train.
The maximum gas pressure of gas train "Multibloc" type is 300 mbar, and that one of gas train "Composed" type is 500 mbar.

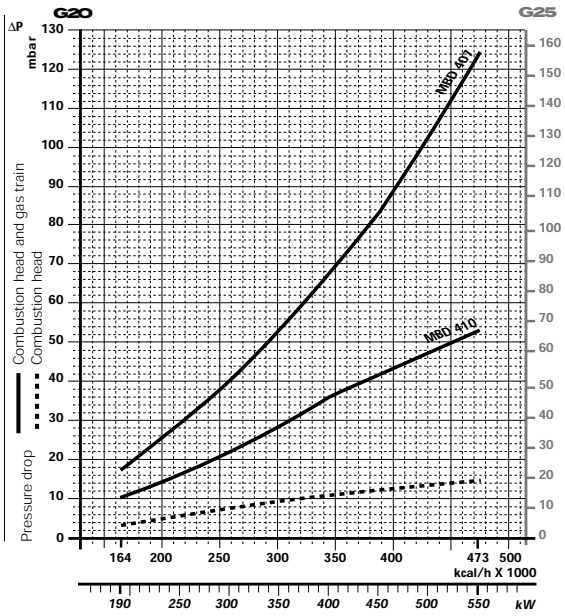
	Name	Code	Ø i	Ø o	X mm	Y mm	Z mm	SC
MULTIBLOC GAS TRAINS	**MBD 407**	3970076	3/4"	3/4"	371	196	120	-
	MBD 410	3970077	1"	3/4"	405	217	145	-
	MBD 412	3970144	1"1/4	1"1/2	433	217	145	-
	MBD 412 CT	3970197	1"1/4	1"1/2	433	217	262	Incorporated
	MBD 415	3970180	1"1/2	1"1/2	523	250	100	-
	MBD 415 CT	3970198	1"1/2	1"1/2	523	250	227	Incorporated
	MBD 420	3970181	2"	2"	523	300	100	-
	MBD 420 CT	3970182	2"	2"	523	300	227	Incorporated
COMPOSED GAS TRAINS	**CB 40/1**	3970145	1"1/2	1"1/2	891	261	195	-
	CB 50/1	3970146	2"	2"	986	328	250	-
	CB 50/1 CT	3970160	2"	2"	986	328	250	Incorporated
	CBF 65/1	3970147	DN 65	DN 65	874	356	285	-
	CBF 65/1 CT	3970161	DN 65	DN 65	874	356	285	Incorporated
	CBF 80/1	3970148	DN 80	DN 80	934	416	285	-
	CBF 80/1 CT	3970162	DN 80	DN 80	934	416	285	Incorporated
	CBF 100/1	3970149	DN 100	DN 100	1054	501	350	-
	CBF 100/1 CT	3970163	DN 100	DN 100	1054	501	350	Incorporated

PRESSURE DROP DIAGRAMS

The diagrams indicate the minimum pressure drop of the burners with the various gas trains that can be matched with them; at the value of these pressure drop add the combustion chamber pressure.
The value thus calculated represents the minimum required input pressure to the gas train.

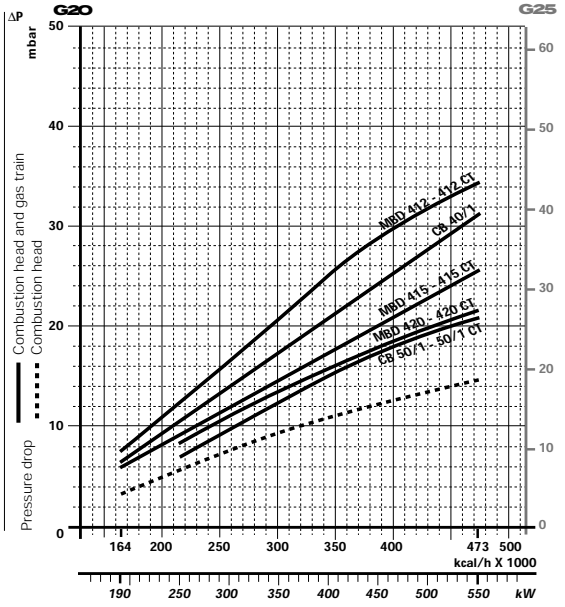
NATURAL GAS

RS 45/M BLU



Gas train	Code	Adapter	SC
MBD 407	3970076	3000824	Accessory
MBD 410	3970077	3000824	Accessory

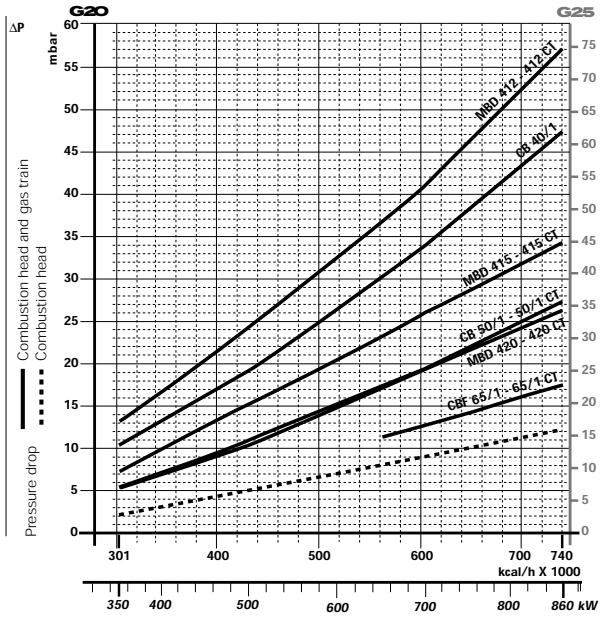
RS 45/M BLU



Gas train	Code	Adapter	SC
MBD 412	3970144	-	Accessory
MBD 412 CT	3970197	-	Incorporated
CB 40/1	3970145	-	Accessory
MBD 415	3970180	-	Accessory
MBD 415 CT	3970198	-	Incorporated
CB 50/1	3970146	3000822	Accessory
CB 50/1 CT	3970160	3000822	Incorporated
MBD 420	3970181	3000822	Accessory
MBD 420 CT	3970182	3000822	Incorporated

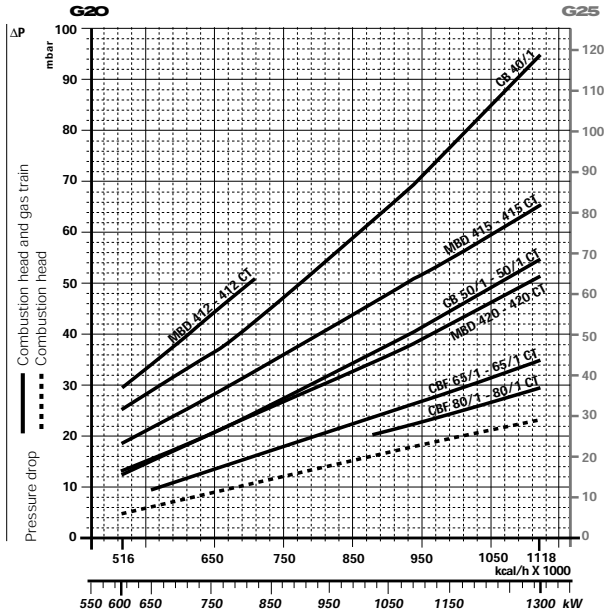
NATURAL GAS

RS 68/M BLU



Gas train	Code	Adapter	SC
MBD 412	3970144	3000843	Accessory
MBD 412 CT	3970197	3000843	Incorporated
CB 40/1	3970145	3000843	Accessory
MBD 415	3970180	3000843	Accessory
MBD 415 CT	3970198	3000843	Incorporated
CB 50/1	3970146	-	Accessory
CB 50/1 CT	3970160	-	Incorporated
MBD 420	3970181	-	Accessory
MBD 420 CT	3970182	-	Incorporated
CBF 65/1	3970147	3000825	Accessory
CBF 65/1 CT	3970161	3000825	Incorporated

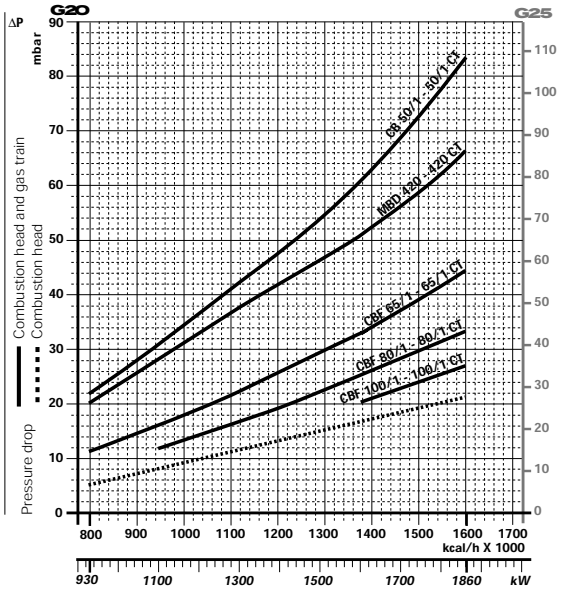
RS 120/M BLU



Gas train	Code	Adapter	SC
MBD 412	3970144	3000843	Accessory
MBD 412 CT	3970197	3000843	Incorporated
CB 40/1	3970145	3000843	Accessory
MBD 415	3970180	3000843	Accessory
MBD 415 CT	3970198	3000843	Incorporated
CB 50/1	3970146	-	Accessory
CB 50/1 CT	3970160	-	Incorporated
MBD 420	3970181	-	Accessory
MBD 420 CT	3970182	-	Incorporated
CBF 65/1	3970147	3000825	Accessory
CBF 65/1 CT	3970161	3000825	Incorporated
CBF 80/1	3970148	3000826	Accessory
CBF 80/1 CT	3970162	3000826	Incorporated

NATURAL GAS

RS 160/M BLU



Gas train	Code	Adapter	SC
CB 50/1	3970146	-	Accessory
CB 50/1 CT	3970160	-	Incorporated
MBD 420	3970181	-	Accessory
MBD 420 CT	3970182	-	Incorporated
CBF 65/1	3970147	3000825	Accessory
CBF 65/1 CT	3970161	3000825	Incorporated
CBF 80/1	3970148	3000826	Accessory
CBF 80/1 CT	3970162	3000826	Incorporated
CBF 100/1	3970149	3010127	Accessory
CBF 100/1 CT	3970163	3010127	Incorporated

note *Please contact the Riello Burner Technical Office for different pressure levels from those above indicated.*

SELECTING THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length. Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop on the botton scale (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

- gas used	G25
- gas output	9.51 mc/h
- pressure at the gas meter	20 mbar
- gas line length	15 m
- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62}\right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;
- correct pressure = (20-1.4) = 18.6 mbar

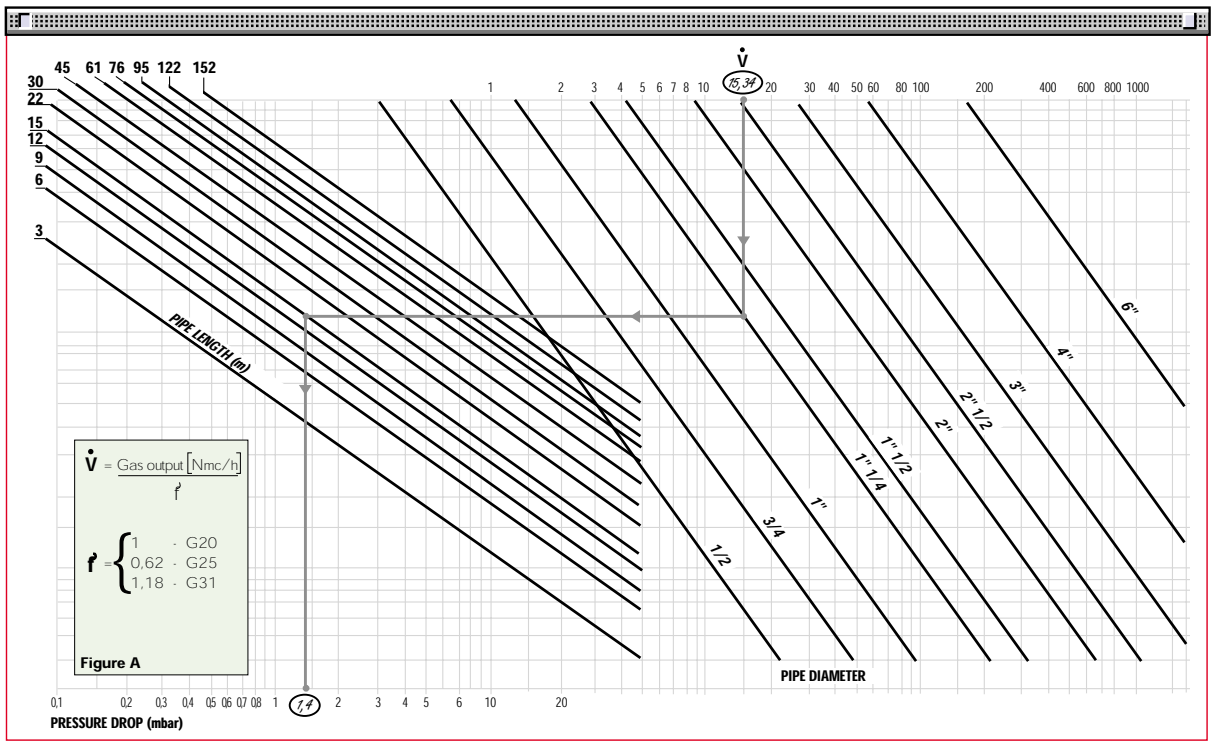
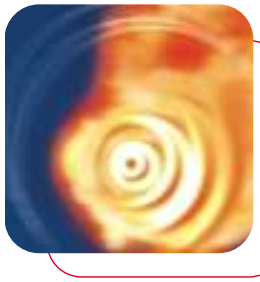


Figure A

VENTILATION

The ventilation circuit produces low noise levels with high performance pressure and air output, in despite of the compact dimensions. Except for the RS 160/M BLU model, the use of reverse curve blades and sound-proofing material keeps noise level very low. In the RS 160/M model, noise has been reduced by the special design of the air suction circuit.
A variable profile cam connects the fuel and air regulations, ensuring high fuel efficiency at all firing ranges.
A minimum air pressure switch stops the burner when there is an insufficient quantity of air at the combustion head.
Models with a special control panel and servomotor are suitable for steam generators which conform to TRD 604 (Germany) and NBN (Belgium).

Example of the servomotor for air/gas setting



COMBUSTION HEAD

Different lengths of the combustion head can be chosen for the RS/M series of burners.

The choice depends on the thickness of the front panel and the type of boiler.

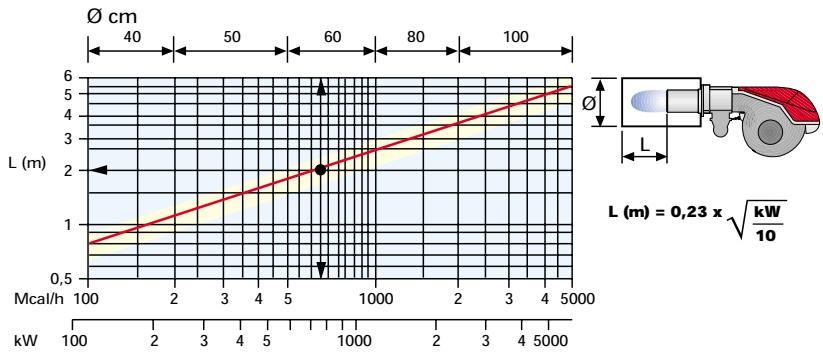
Depending on the type of generator, check that the penetration of the head into the combustion chamber is correct.

The internal positioning of the combustion head can easily be adjusted to the maximum defined output by adjusting a screw fixed to the flange.

Example of a RS 45/M BLU burner combustion head

Example of a RS 68-120-160/M BLU burner combustion head

Dimensions of the combustion chambers used in the testing laboratory



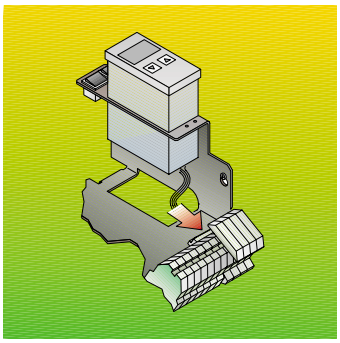
With simple setting operations, the burners can be also adapted to combustion chambers that are slightly different with respect to the ones used in the tests.

Example:
Burnt thermal output = 756 kW;
L (m) = 0,23 x √75,6 = 2 (m);
Ø = 60 (cm)

SETTING

OUTPUT SETTING

The RS/M BLU series of burners can have "two-stage progressive" or "modulating" setting.



Example of a regulator

On "two-stage progressive" setting, the burner gradually adapts the output to the requested level, by varying between two pre-set levels (see figure A).

"Two-stage progressive" setting

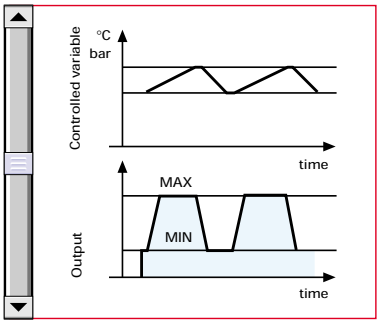


Figure A

On "modulating" setting, normally required in steam generators, in superheater boilers or diathermic oil burners, a specific regulator and probes are required. These are supplied as accessories that must be ordered separately. The burner can work for long periods at intermediate output levels (see figure B).

"Modulating" setting

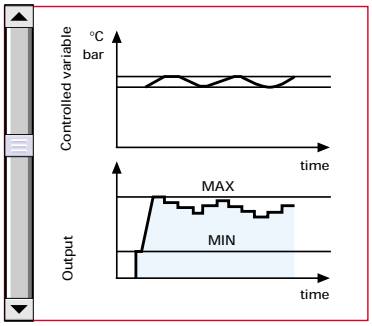
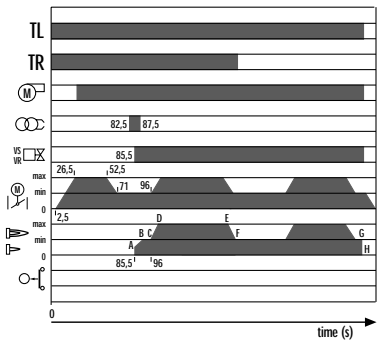


Figure B

FIRING

RS 45/M - 68/M - 120/M - 160/M BLU



0"	The burner begins the firing cycle
2,5"-26,5"	The servomotor opens the air damper at the maximum output
26,5"-52,5"	The motor starts : pre-purge phase
52,5"-71"	The servomotor sets the air damper and the butterfly valve at minimum output
82,5"-85,5"	Pre-ignition
85,5"	Firing : all the solenoid gas valves are supplied
85,5"-87,5"	After-ignition
96"	Output can be increased

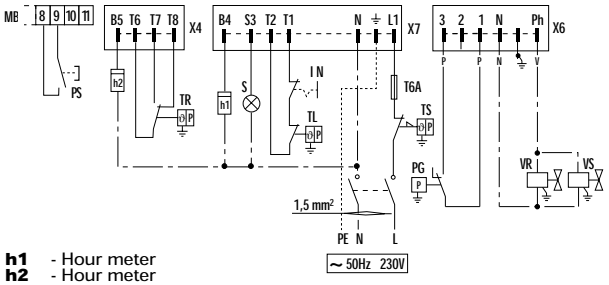
ELECTRICAL CONNECTIONS
To be made by the installer

Electrical connections must be made by qualified and skilled personnel, according to the local regulations.

Example of the terminal board for electrical connections for the RS 68-120-160/M BLU models

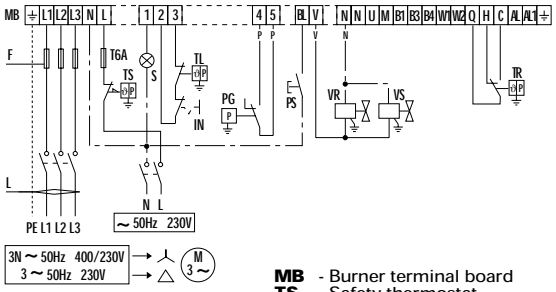
" TWO-STAGE PROGRESSIVE" SETTING

RS 45/M BLU
Without seal control



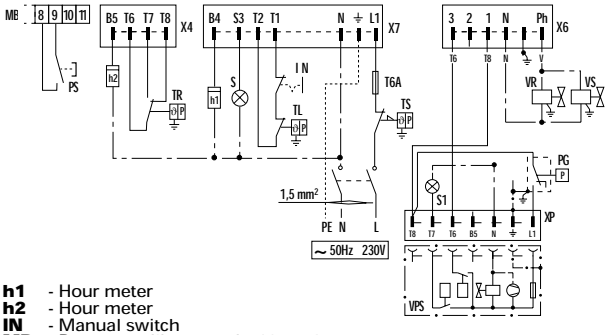
h1 - Hour meter
h2 - Hour meter
IN - Manual switch
MB - Burner auxiliary terminal board
X4 - 4 pin plug
X6 - 6 pin plug
X7 - 7 pin plug
PG - Minimum gas pressure switch
PS - Lock-out reset button
S - External lock-out signal
TR - High/low flame setting thermostat
TL - Threshold thermostat
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve
T6A - 6A fuse

RS 68/M - 120/M - 160/M BLU
Without seal control



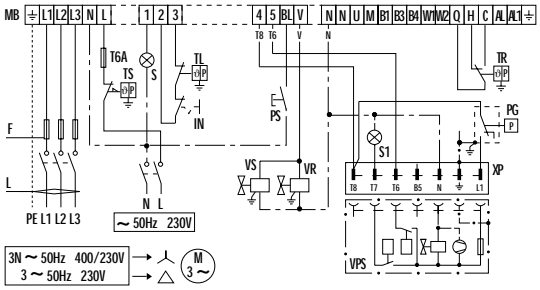
MB - Burner terminal board
TS - Safety thermostat
S - External lock-out signal
IN - Manual switch
TL - Threshold thermostat
TR - High/low flame setting thermostat
T6A - 6A fuse
F - Fuse (see table A)
L - Lead section (see table A)
PG - Minimum gas pressure switch
PS - Lock-out reset button
VR - Adjustment valve
VS - Safety valve

RS 45/M BLU
With seal control



h1 - Hour meter
h2 - Hour meter
IN - Manual switch
MB - Burner auxiliary terminal board
XP - Seal control plug
X4 - 4 pin plug
X6 - 6 pin plug
X7 - 7 pin plug
PG - Minimum gas pressure switch
PS - Lock-out reset button
S - External lock-out signal
S1 - External lock-out signal on the seal control
TR - High/low flame setting thermostat
TL - Threshold thermostat
TS - Safety thermostat
VPS - Seal control
VR - Adjustment valve
VS - Safety valve
T6A - 6A fuse

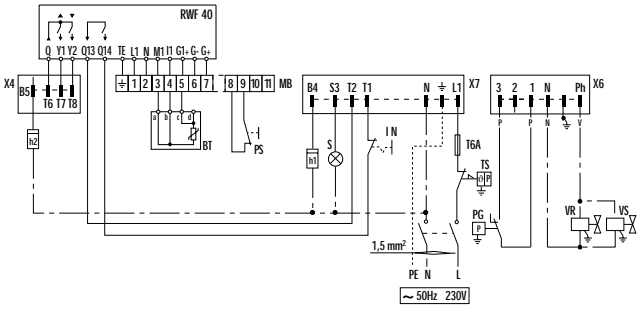
RS 68/M - 120/M - 160/M BLU
With seal control



MB - Burner terminal board
TS - Safety thermostat
S - External lock-out signal
S1 - External lock-out signal on the seal control
IN - Manual switch
TL - Threshold thermostat
TR - High/low flame setting thermostat
T6A - 6A fuse
F - Fuse (see table A)
L - Lead section (see table A)
PG - Minimum gas pressure switch
PS - Lock-out reset button
VR - Adjustment valve
VS - Safety valve
VPS - Seal control
XP - Seal control plug

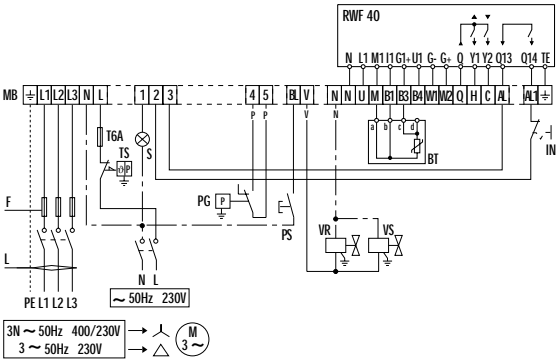
" MODULATING" SETTING - temperature probe

RS 45/M BLU



BT - Temperature probe
h1 - Hour meter
h2 - Hour meter
IN - Manual switch
MB - Burner auxiliary terminal board
X4 - 4 pin plug
X6 - 6 pin plug
X7 - 7 pin plug
PG - Minimum gas pressure switch
PS - Lock-out reset button
RWF40 - Regulator (installed on the burner)
S - External lock-out signal
T6A - 6A fuse
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve

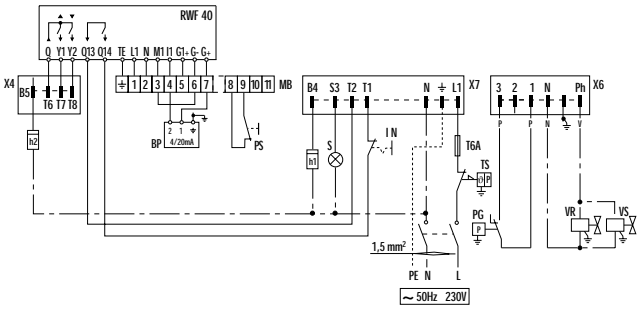
RS 68/M - 120/M - 160/M BLU



MB - Burner auxiliary terminal board
TS - Safety thermostat
S - External lock-out signal
IN - Manual switch
BT - Temperature probe
T6A - 6A fuse
F - Fuse (see table A)
L - Lead section (see table A)
RWF40 - Regulator (installed on the burner)
PG - Minimum gas pressure switch
PS - Lock-out reset button
VR - Adjustment valve
VS - Safety valve

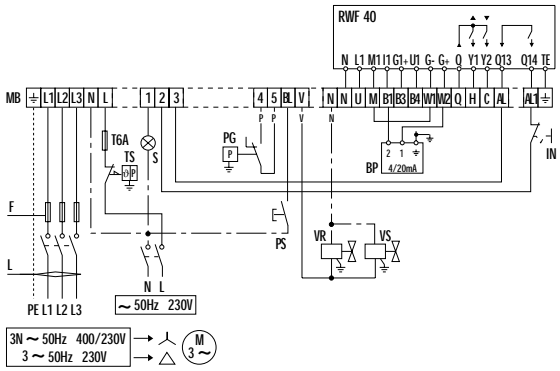
"MODULATING" SETTING - pressure probe

RS 45/M BLU



BP - Pressure probe
h1 - Hour meter
h2 - Hour meter
IN - Manual switch
MB - Burner auxiliary terminal board
X4 - 4 pin plug
X6 - 6 pin plug
X7 - 7 pin plug
PG - Minimum gas pressure switch
PS - Lock-out reset button
RWF40 - Regulator (installed on the burner)
S - External lock-out signal
T6A - 6A fuse
TS - Safety thermostat
VR - Adjustment valve
VS - Safety valve

RS 68/M - 120/M - 160/M BLU



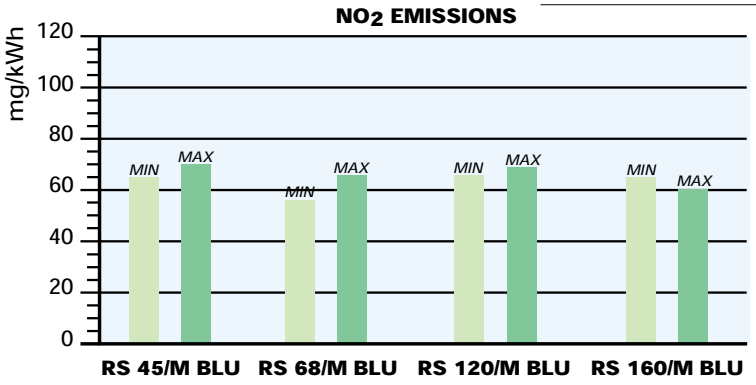
MB - Burner auxiliary terminal board
TS - Safety thermostat
S - External lock-out signal
IN - Manual switch
BP - Pressure probe
T6A - 6A fuse
F - Fuse (see table A)
L - Lead section (see table A)
RWF40 - Regulator (installed on the burner)
PG - Minimum gas pressure switch
PS - Lock-out reset button
VR - Adjustment valve
VS - Safety valve

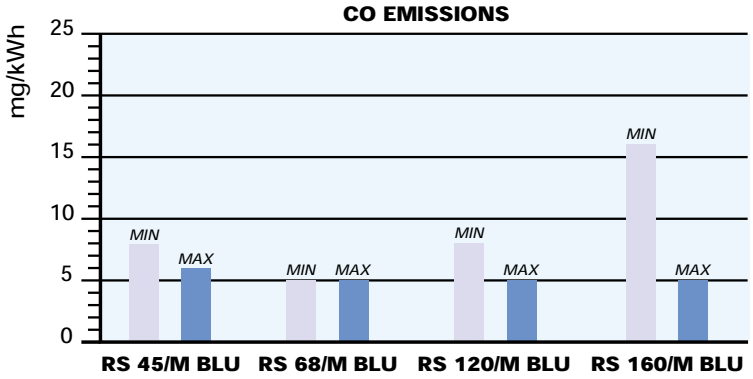
The following table shows the supply lead sections and the type of fuse to be used.

Model	RS 45/M BLU	RS 68/M BLU		RS 120/M BLU		RS 160/M BLU	
	230V	230V	400V	230V	400V	230V	400V
F A	T6	T16	T10	T16	T10	T25	T20
L mm²	1,5	1,5	1,5	1,5	1,5	2,5	2,5

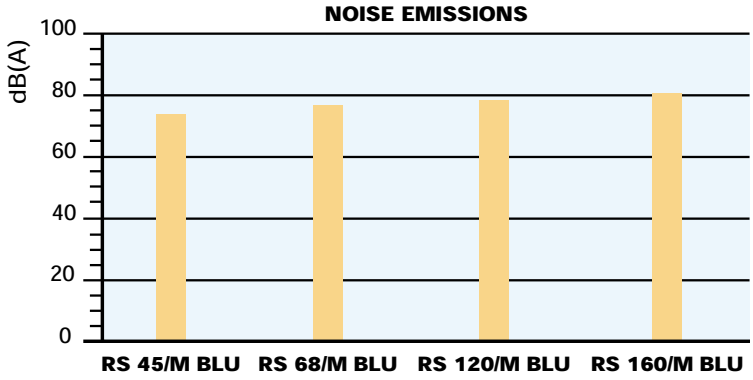
Table A

EMISSIONS





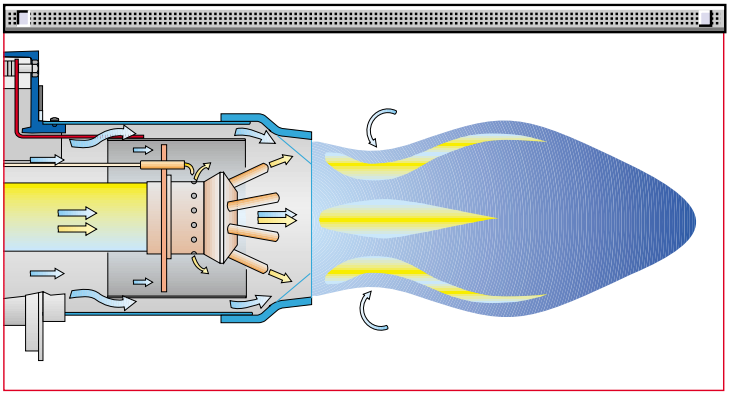
The NO_2 and CO emissions have been measured in various models at minimum and maximum output, according to EN 676 standard.



The noise emission have been measured at maximum output.

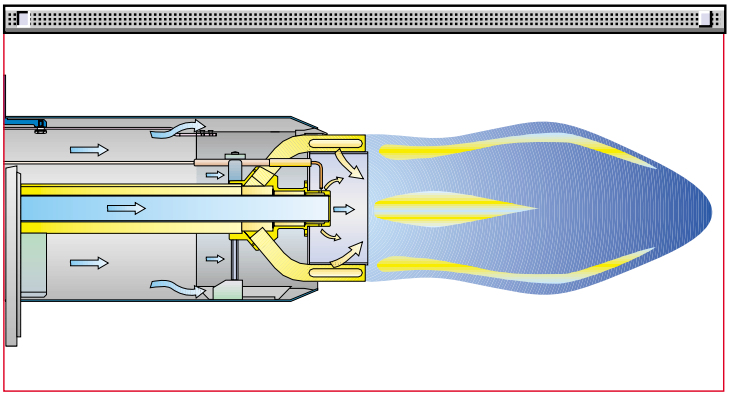
The RS/M BLU series combustion heads reduce polluting emissions thanks to their special design which optimises the air fuel mix.

Combustion head operating diagram of RS 45/M BLU model



The RS 45/M BLU model has an oblique radial pipe distributor through which gas is injected directly into the passing air flow for a perfect distribution.
This prevents no homogeneous concentrations in the flame with areas of high oxidation; part of the premixed gas/air is injected into the centre of the flame.
These methods produce a very stable flame with gradual and progressive combustion as the flame develops, thus giving polluting emission values below even the most restrictive norm values.

Combustion head operating diagram of RS 68/M - 120/M - 160/M BLU models

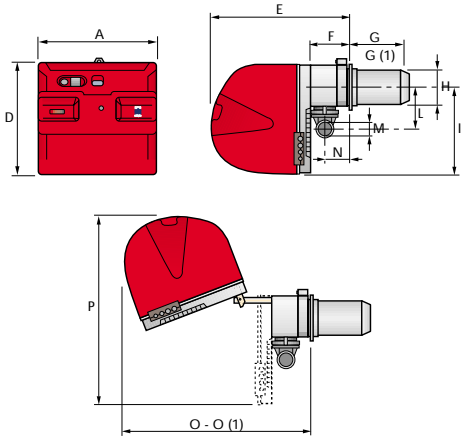


In RS 68/M – 120/M – 160/M BLU models part of the gas is distributed through outlets which are perpendicular to the air flow, while the remaining gas is injected directly into the centre of the flame.
This prevents no homogeneous concentrations in the flame with areas of high oxidation,
producing very stable flame with gradual and progressive combustion as the flame develops, thus giving polluting emission values below even the most restrictive norm values.

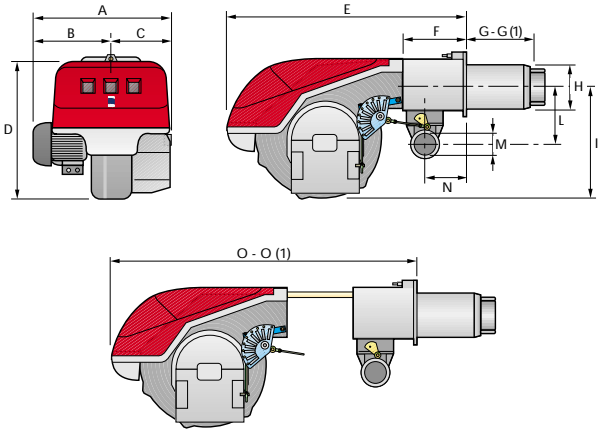
OVERALL DIMENSIONS (mm)

BURNERS

RS 45/M BLU



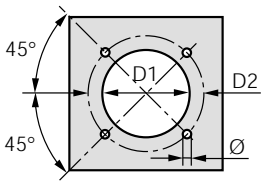
RS 68/M - 120/M - 160/M BLU



Model	A	B	C	D	E	F	G - G (1)	H	I	L	M	N	O - O(1)	P
RS 45/M BLU	476	-	-	474	580	164	229 - 354	160	352	168	1"1/2	108	810 - 810	719
RS 68/M BLU	511	296	215	555	840	214	255 - 390	189	430	221	2"	134	1161 - 1296	-
RS 120/M BLU	553	338	215	555	840	214	255 - 390	189	430	221	2"	134	1161 - 1296	-
RS 160/M BLU	681	366	315	555	847	221	373 - 503	221	430	186	2"	141	1395 - 1535	-

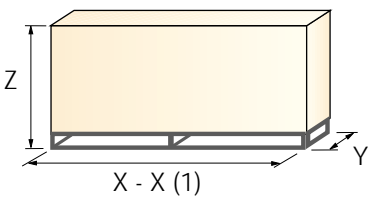
(1) dimension with extended head

BURNER - BOILER MOUNTING FLANGE



Model	D1	D2	Ø
RS 45/M BLU	165	224	M8
RS 68/M BLU	195	275-325	M12
RS 120/M BLU	195	275-325	M12
RS 160/M BLU	230	325-368	M16

PACKAGING



Model	X - X (1)	Y	Z	kg
RS 45/M BLU	1015 - 1015	500	630	41
RS 68/M BLU	1190 - 1340	692	740	70
RS 120/M BLU	1190 - 1340	692	740	76
RS 160/M BLU	1250 - 1400	785	725	89

(1) dimension with extended head

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel.
All operations must be performed in accordance with the technical handbook supplied with the burner.

FIXING THE BURNER TO THE BOILER AND INITIAL SETTINGS

- All the burners have slide bars, for easier installation and maintenance.
- After drilling the boilerplate, using the supplied gasket as a template, dismantle the blast tube from the burner and fix it to the boiler.
- Adjust the combustion head.
- Fit the gas train, choosing this on the basis of the maximum output of the boiler and considering the enclosed diagrams.
- Refit the burner casing to the slide bars.
- Close the burner, sliding it up to the flange.

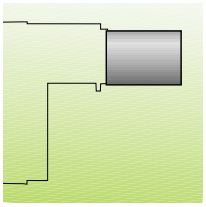
ELECTRICAL CONNECTIONS AND START UP

- Make the electrical connections to the boiler following the wiring diagrams included in the instruction handbook.
- Turn the motor to check rotation direction (if it is a three-phase motor).
- Perform a first ignition calibration on the gas train.
- On start up, check:
  - Gas pressure at the combustion head (to max. and min. output)
  - Combustion quality, in terms of unburned substances and excess air.

ACCESSORIES

Extended heads

"Standard head" burners can be transformed into "extended head" versions, by using the special kit. The KITS available for the various burners, giving the original and the extended lengths, are listed below.



Combustion head extension kits			
Burner	**'Standard head' length (mm)**	**'Extended head' length (mm)**	**Kit code**
RS 45/M BLU	229	354	**3010240**
RS 68/M BLU	255	390	**3010177**
RS 120/M BLU	255	390	**3010177**
RS 160/M BLU	373	503	**3010193**

Spacer kit

If burner head penetration into the combustion chamber needs reducing, varying thickness spacers are available, as given in the following table:

Head length reduction kit		
Burner	**Spacer thickness S (mm)**	**Kit code**
RS 45/M BLU	90	**3010095**
RS 68/M - 120/M BLU	135	**3010129**
RS 160/M BLU	110	**3000722**

Continuous ventilation kit

If the burner requires continuous ventilation in the stages without flame, a special kit is available as given in the following table:

Continuous ventilation kit	
Burner	**Kit code**
RS 45/M BLU	**3010094**
RS 68/M - 120/M - 160/M BLU	**3010094**

Sound proofing box

If noise emission needs reducing even further, sound-proofing boxes are available, as given in the following table:

Sound proofing box		
Burner	**Box type**	**Box code**
RS 45/M BLU	C2	**3000777**
RS 68/M - 120/M - 160/M BLU	C3	**3000778**

Head kit for " reverse flame chamber"

In certain cases, the use of the burner on reverse flame boilers can be improved by using an additional Pipes Kit.

Head kit for "reverse flame chamber"	
Burner	**Kit code**
RS 68/M BLU	**3010247**
RS 120/M BLU	**3010248**
RS 160/M BLU	**3010249**

Accessories for modulating setting

To obtain modulating setting, the RS/M BLU series of burners requires a regulator with three point outlet controls. The relative temperature or pressure probes fitted to the regulator must be chosen on the basis of the application.
The following table lists the accessories for modulating setting with their application range.

REGULATOR		PROBE		
Type	**Code**	**Type**	**Range (°C) (bar)**	**Code**
RWF 40	**3010212**	Temperature PT 100	-100 ÷ 500°C	**3010110**
		Pressure 4 ÷ 20 mA	0 ÷ 2,5 bar	**3010213**
		Pressure 4 ÷ 20 mA	0 ÷ 16 bar	**3010214**

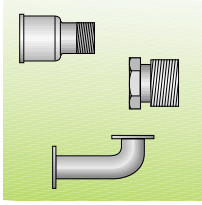
Depending on the servomotor fitted to the burner, a three-pole potentiometer (1000 Ω) can be installed to check the position of the servomotor. The KITS available for the various burners are listed below.

Potentiometer kit	
Burner	**Kit code**
RS 45/M BLU	**3010109**
RS 68/M - 120/M - 160/M BLU	**3010021**

GAS TRAIN ACCESSORIES

Adapters

When the diameter of the gas train is different from the set diameter of the burners, an adapter must be fitted between the gas train and the burner. The following table lists the adapters for various burners.



Adapters			
Burner	**Gas train**	**Dimensions**	**Adapter code**
RS 45/M BLU	MBD 407 - MBD 410	3/4" 1" 1/2	**3000824**
	MBD 420 - CB 50/1	2" 1" 1/2	**3000822**
RS 68/M BLU	MBD 412 - MBD 415 - CB 40/1	1" 1/2 2"	**3000843**
	CBF 65/1	DN 65 2"1/2 1" 1/2 2"	**3000825**
RS 120/M BLU	MBD 415 - CB 40/1	1" 1/2 2"	**3000843**
	CBF 65/1	DN 65 2"1/2 1" 1/2 2"	**3000825**
	CBF 80/1	DN 80 2"1/2 2"	**3000826**
RS 160/M BLU	CBF 65/1	DN 65 2"1/2 1" 1/2 2"	**3000825**
	CBF 80/1	DN 80 2"1/2 2"	**3000826**
	CBF 100/1	DN 100 DN 80	**3010127**

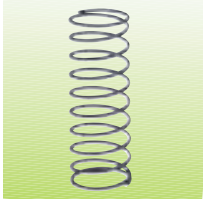
Seal control kit

To test the valve seals on the gas train, a special "seal control kit" is available. The valve seal control device is compulsory (EN 676) on gas trains to burners with a maximum output over 1200 kW. The seal control is type VPS 504.

Seal control kit		
Burner	**Gas train**	**Kit code**
RS 45/M BLU	CB 40/1 - CB 50/1 - MBD 407 - 410 - 412 - 415 - 420	**3010123**
RS 68/M BLU	CB 40/1 - CB 50/1 - MBD 412 - 415 - 420 - CBF 65/1	**3010123**
RS 120/M BLU	CB 40/1 - CB 50/1 - MBD 415 - 420 - CBF 65/1 - CBF 80/1	**3010123**
RS 160/M BLU	CB 50/1 - MBD 420 - CBF 65/1 - CBF 80/1	**3010123**

Stabiliser spring

Accessory springs are available to vary the pressure range of the gas train stabilisers. The following table shows these accessories with their application range



Stabiliser springs		
Gas train	**Spring**	**Code**
CBF 65/1 - CBF 80/1	Red from 25 to 55 mbar	**3010133**
CBF 100/1	Red from 25 to 55 mbar	**3010134**
CBF 65/1 - CBF 80/1	Black from 60 to 110 mbar	**3010135**
CBF 100/1	Black from 60 to 110 mbar	**3010136**
CBF 65/1 - CBF 80/1	Pink from 90 to 150 mbar	**3090456**
CBF 100/1	Pink from 90 to 150 mbar	**3090489**

Please refer to the technical manual for the correct choice of spring.

SPECIFICATION

A specific index guides your choice of burner from the various models available in the RS/M BLU series. Below is a clear and detailed specification description of the product.

DESIGNATION OF SERIES R BURNERS

Series : R

Fuel :
- S Natural Gas
- L Light oil
- LS Light oil/Methane
- N Heavy oil

Size

Setting :
- /1 Single stage
- ... Two stage
- /M Modulating

Emission :
- ... Class 1 EN267 - EN676
- MZ Class 2 EN267 - EN676
- BLU Class 3 EN267 - EN676
- MX Class 1 EN267 Class 3 EN676

Head :
- TC Standard head
- TL Extended head

Diagnostic :
- LP Led panel
- ST Status panel

Flame control system :
- FS1 Standard (1 stop every 24 h)
- FS2 Continuous working (1 stop every 72 h)

Electrical supply to the system :

1/230/50	1/230V/50Hz
3/230/50	3/230V/50Hz
3/400/50	3N/400V/50Hz
3/230-400/50	3/230V/50Hz - 3N/400V/50Hz
3/220/60	3/220V/60Hz
3/380/60	3N/380V/60Hz
3/220-380/60	3/220/60Hz - 3N/380V/60Hz

Auxiliary voltage :

230/50-60	230V/50-60Hz
110/50-60	110V/50-60Hz

ID: Differential switch

R	S	120	/M	BLU	TC		FS1	3/230-400/50	230/50-60	

BASIC DESIGNATION

EXTENDED DESIGNATION

LIST OF AVAILABLE MODELS

RS 45/M BLU TC FS1 1/230/50 230/50-60
RS 45/M BLU TL FS1 1/230/50 230/50-60
RS 45/M BLU TC FS2 1/230/50 230/50-60
RS 45/M BLU TL FS2 1/230/50 230/50-60

RS 45/M BLU TC FS1 1/230/50 230/50-60 ID
RS 45/M BLU TL FS1 1/230/50 230/50-60 ID
RS 45/M BLU TC FS2 1/230/50 230/50-60 ID
RS 45/M BLU TL FS2 1/230/50 230/50-60 ID

RS 68/M BLU TC FS1 3/230-400/50 230/50-60
RS 68/M BLU TL FS1 3/230-400/50 230/50-60
RS 68/M BLU TC FS2 3/230-400/50 230/50-60
RS 68/M BLU TL FS2 3/230-400/50 230/50-60

RS 120/M BLU TC FS1 3/230-400/50 230/50-60
RS 120/M BLU TL FS1 3/230-400/50 230/50-60
RS 120/M BLU TC FS2 3/230-400/50 230/50-60
RS 120/M BLU TL FS2 3/230-400/50 230/50-60

RS 160/M BLU TC FS1 3/230-400/50 230/50-60
RS 160/M BLU TL FS1 3/230-400/50 230/50-60
RS 160/M BLU TC FS2 3/230-400/50 230/50-60
RS 160/M BLU TL FS2 3/230-400/50 230/50-60

Other versions are available on request

PRODUCT SPECIFICATIONS

Burner:
Monoblock forced draught LOW NOx gas burner with two stage progressive or modulating setting, with a specific kit, fully automatic, made up of:
- air suction circuit lined with sound-proofing material
- fan with reverse curve blades (straight blades on the 160/M BLU model) high performance with low sound emissions
- air damper for air flow setting and butterfly valve for regulating fuel output controlled by a servomotor with variable cam
- starting motor at 2800 rpm, three-phase 400V with neutral, 50Hz (single-phase, 230V and 50Hz for the 45/M BLU model)
- low emission combustion head, that can be set on the basis of required output, fitted with:
    - stainless steel end cone, resistant to corrosion and high temperatures
    - ignition electrodes
    - ionisation probe
    - gas distributor
    - flame stability disk
- maximum gas pressure switch to stop the burner in the case of excess pressure on the fuel supply line
- minimum air pressure switch stops the burner in case of insufficient air quantity at the combustion head
- flame control panel, fitted with control functions for the correct positioning of the servomotor
- burner on/off selection switch
- manual or automatic output increase/decrease selection switch
- flame inspection window
- slide bars for easier installation and maintenance
- protection filter against radio interference
- IP 44 electric protection level.

Gas train:
Fuel supply line, in the MULTIBLOC configuration (from a diameter of 3/4" until a diameter of 2") or COMPOSED configuration (from a diameter of DN 65 until a diameter of DN 100), fitted with:
- filter
- stabiliser
- minimum gas pressure switch
- safety valve
- valve seal control (for output > 1200 kW)
- one stage working valve with ignition gas output regulator.

According to:
- 89/336/EEC directive (electromagnetic compatibility)
- 73/23/EEC directive (low voltage)
- 92/42/EEC directive (performance)
- 90/396/EEC directive (gas)
- EN 676 (gas burners).

Standard equipment:
- 1 gas train gasket
- 1 flange gasket
- 4 screws for fixing the flange
- 1 thermal screen
- 4 screws for fixing the burner flange to the boiler
- wiring loom fittings for the electrical connection (for RS 45/M BLU model)
- 2 slide bar extensions (for extended head models and RS 160/M BLU)
- instruction handbook for installation, use and maintenance
- spare parts catalogue.

Available accessories to be ordered separately:
- Head extension kit
- Head length reduction kit
- Continuous ventilation kit
- Sound-proofing box
- RWF 40 output regulator
- Pressure probe 0 ÷ 2.4 bar
- Pressure probe 0 ÷ 16 bar
- Temperature probe -100 ÷ 500°C
- Potentiometer kit for the servomotor
- Gas train adapter
- Seal control kit
- Stabiliser spring.

Lineagrafica

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RIELLO BURNERS

CE

MODULATING LOW NOx GAS BURNERS

MODUBLOC MB SE BLU SERIES

MB 4 SE BLU	1000 ÷ 4600 kW
MB 6 SE BLU	1100 ÷ 5900 kW
MB 8 SE BLU	1500 ÷ 7500 kW
MB 10 SE BLU	2000 ÷ 8500 kW

The MODUBLOC MB SE BLU series of burners are characterised by a monoblock structure that means all necessary components can be combined in a single unit, making installation easier and faster.
The series covers a firing range from 1000 to 8500 kW, and they have been designed for use in hot water boilers or industrial steam generators.
Adjustment is modulating, through an innovative electronic module, which gives control of the air/fuel ratio and PID control of the generator temperature or pressure.
The mechanisms of regulation allow to catch up a high modulation ratio on all firing rates range.
The burner can, therefore, supply with precision the demanded power, guaranteeing a high efficiency system level and the stability setting, obtaining fuel consumption and operating costs reduction.
The combustion head, studied with advances simulation devices, guarantees reduced polluting emissions.
An exclusive design, with fan unit fitted on line with the combustion head, guarantees low sound emissions, reduced dimensions, easy use and maintenance.

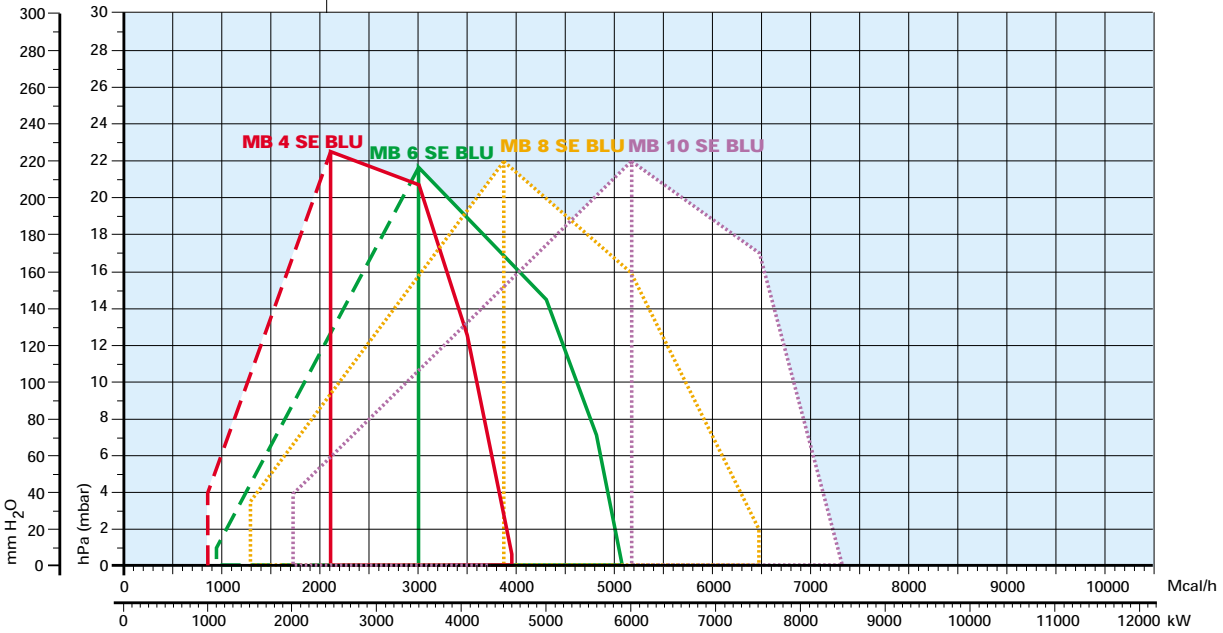
TECHNICAL DATA

	Model		MB 4 SE BLU	MB 6 SE BLU	MB 8 SE BLU	MB 10 SE BLU
	Setting type		modulating			
	Modulating ratio at max. output		5 ÷ 1			
	Servo-motor type		MM 10004 (air) - MM 10005 (gas)			
	Servo-motor run time	s	--		--	
	Heat output	kW	1000/2450÷4600	1100/3600÷5900	1500/4500÷7500	2000/6000÷8500
		Mcal/h	860/2107÷3956	946/3096÷5074	1290/3870÷6450	1720/5160÷7310
	Working temperature	°C min./max.	0/40			
Fuel / air data	Net calorific value gas G20	kWh/Nmc	10			
	Density gas G20	kg/Nmc	0,71			
	Output gas G20	Nmc/h	100/245÷460	110/360÷590	150/450÷750	200/600÷850
	Net calorific value gas G25	kWh/Nmc	8,6			
	Density gas G25	kg/Nmc	0,78			
	Output gas G25	Nmc/h	116/285÷535	128/419÷686	174/523÷872	233/698÷988
	Net calorific value gas LPG	kWh/Nmc	25,8			
	Density gas LPG	kg/Nmc	2,02			
	Output gas LPG	Nmc/h	--	--	--	--
	Fan	type	reverse curve blades			
	Air temperature	°C max	60			
Electrical data	Electrical supply	Ph/Hz/V	3N/50/230-400~(±10%)			
	Auxiliary electrical supply	Ph/Hz/V	1/50/230 ~ (±10%)			
	Control box	type	LFL 1.333			
	Total electrical power	kW	13	15	26	
	Auxiliary electrical power	kW	2	2	0,55	
	Protection level	IP	40			
	Electric motor power	kW	11	13	22	
	Rated motor current	A	38 - 22	46,7 - 27	67,5 - 39	
	Motor start current	A	7,3 x I nom	7,6 x I nom	7,9 x I nom	
	Motor protection level	IP	55			
	Ignition transformer	V1 - V2	230V - 2x5 kV		230V - 2x6 kV	
		I1 - I2	1,9A - 30mA		1,9A - 30mA	
	Operation		Intermittent (at least one stop every 24 h) or Continuous as optional (at least one stop every 72 h)			
Emissions	Sound pressure	dBA	82	85	88	
	Sound output	W	--	--	--	--
	CO emissions	mg/kWh	< 10			
	NOx emissions	mg/kWh	< 80			
Approval	Directive		90/396 - 89/336 - 73/23 EEC			
	According to		EN 676			
	Certifications		in progress (CE ...)			

Reference conditions:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 meters a.s.l.
Noise measured 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 rate for the choice of the burner

Modulating rate

Firing rates IN PROGRESS

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

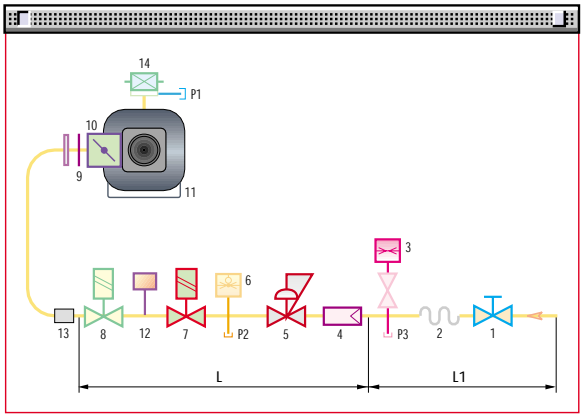
FUEL SUPPLY

GAS TRAIN

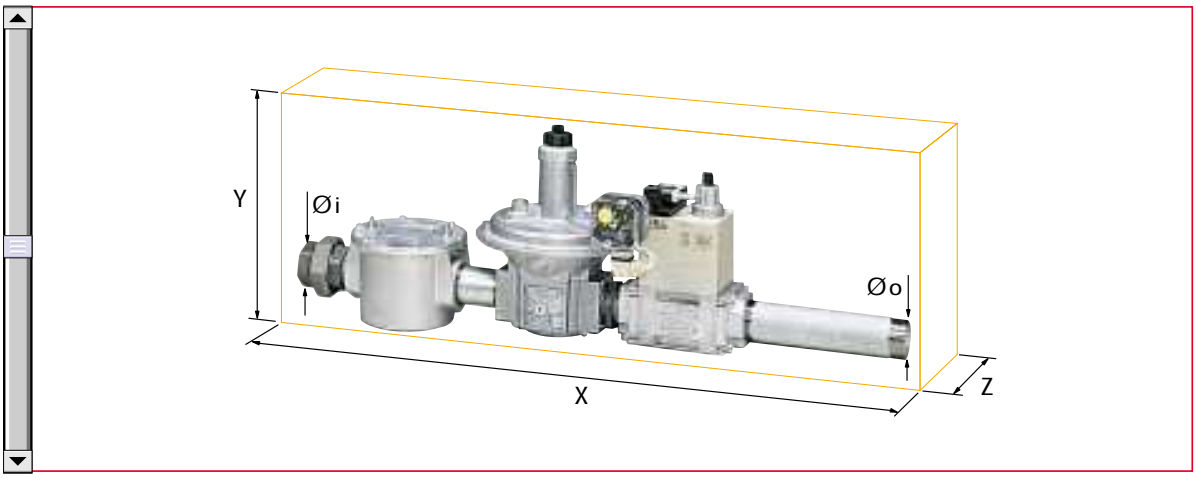
The burners are fitted with a butterfly valve to regulate the fuel, controlled by the main management module of burner through a high precision servomotor.
Fuel can be supplied either from the right or left sides, on the basis of the application requirements.
A maximum gas pressure switch stops the burner in case of excess pressure in the fuel line.
The gas train can be selected to best fit system requirements depending on the fuel output and pressure in the supply line.
The gas trains are "Composed" type (assembly of the single components).

Example of the MB 4 SE BLU gas adjustment butterfly valve

COMPOSED gas train with seal control



1	Manual valve
2	Anti-vibration joint
3	Pressure gauge with pushbutton cock
4	Filter
5	Pressure regulator (vertical)
6	Minimum gas pressure switch
7	VS safety solenoid (vertical)
8	VR regulation solenoid (vertical) Two settings: - firing output (rapid opening) - maximum output (slow opening)
9	Gasket and flange supplied with the burner
10	Gas adjustment butterfly valve
11	Burner
12	Seal control mechanism for valves 8-9. According to standard EN 676, the seal control is compulsory for burners with maximum output above 1200 kW
13	Gas train-burner adapter
14	Maximum gas pressure switch
P1	Combustion head pressure
P2	Pressure downstream from the regulator
P3	Pressure upstream from the filter
L	Gas train supplied separately, with the code given in the table
L1	Installer's responsibility



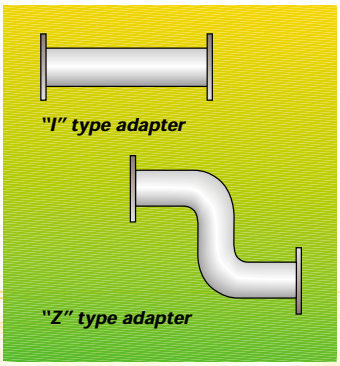
Example of gas train "COMPOSED" type without seal control

Gas trains are approved by standard EN 676 together with the burner.

The overall dimensions of the gas train depends on how they are constructed. The following table shows the maximum dimensions of the gas trains that can be fitted to MB SE BLU burners, intake and outlet diameters and seal control if fitted.
Please note that the seal control can be installed as an accessory, if not already installed on the gas train.

The maximum gas pressure of gas train "Composed" type is 500 mbar.

	Name	Code	Ø i	Ø o	X mm	Y mm	Z mm	SC
COMPOSED GAS TRAINS	**CBF 65/1 CT**	3970161	DN 65	DN 65	874	356	285	incorporated
	CBF 80/1 CT	3970162	DN 80	DN 80	934	416	285	incorporated
	CBF 100/1 CT	3970163	DN 100	DN 100	1054	501	350	incorporated
	CBF 125/1 CT	3970196	DN 125	DN 125	1166	686	400	incorporated



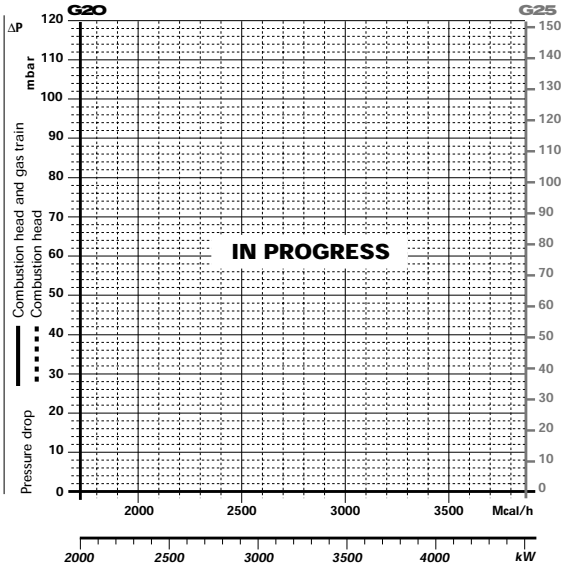
When the diameter of the gas train is different from the set diameter of the burners, an adapter must be fitted between the gas train and the burner.
For further information see paragraph "Accessories".

PRESSURE DROP DIAGRAMS

The diagrams indicate the minimum pressure drop of the burners with the various gas trains that can be matched with them; at the value of these pressure drop add the combustion chamber pressure.
The value thus calculated represents the minimum required input pressure to the gas train.

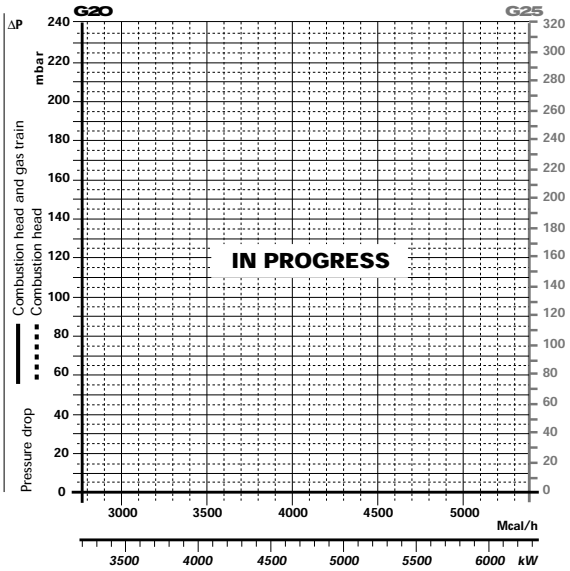
NATURAL GAS

MB 4 SE BLU



Gas train	Code	Adapter	SC
CBF 65/1 CT	3970161	3010221 (I) 3010225 (Z)	incorporated
CBF 80/1 CT	3970162	3010222 (I) 3010226 (Z)	incorporated
CBF 100/1 CT	3970163	3010223 (I) 3010227 (Z)	incorporated
CBF 125/1 CT	3970196	3010224 (I) 3010228 (Z)	incorporated

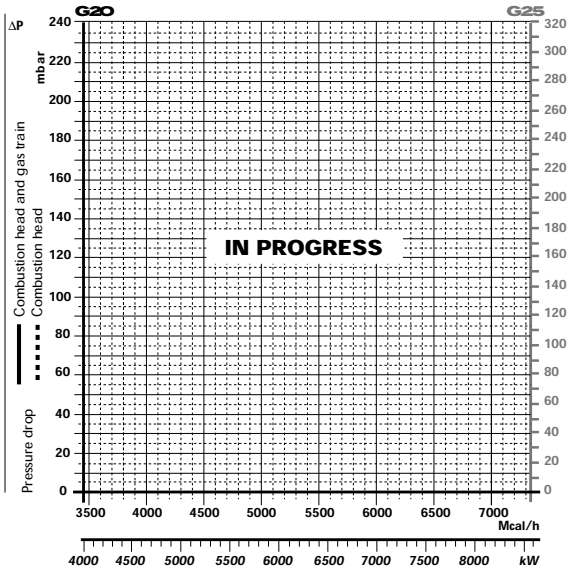
MB 6 SE BLU



Gas train	Code	Adapter	SC
CBF 65/1 CT	3970161	3010221 (I) 3010225 (Z)	incorporated
CBF 80/1 CT	3970162	3010222 (I) 3010226 (Z)	incorporated
CBF 100/1 CT	3970163	3010223 (I) 3010227 (Z)	incorporated
CBF 125/1 CT	3970196	3010224 (I) 3010228 (Z)	incorporated

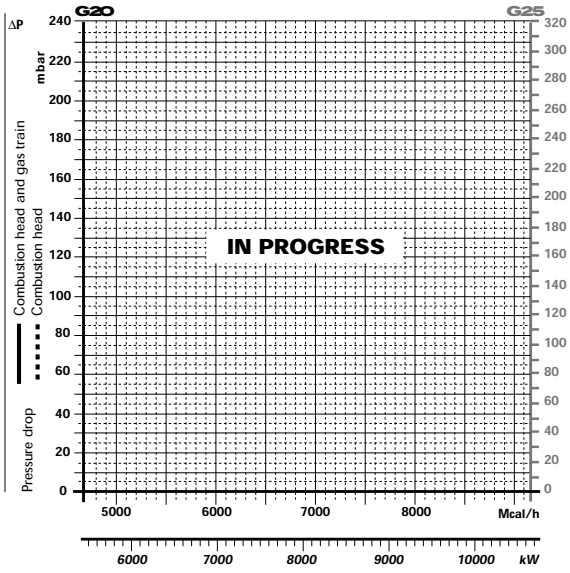
NATURAL GAS

MB 8 SE BLU



Gas train	Code	Adapter	SC
CBF 65/1 CT	3970161	3010221 (I) 3010225 (Z)	incorporated
CBF 80/1 CT	3970162	3010222 (I) 3010226 (Z)	incorporated
CBF 100/1 CT	3970163	3010223 (I) 3010227 (Z)	incorporated
CBF 125/1 CT	3970196	3010224 (I) 3010228 (Z)	incorporated

MB 10 SE BLU



Gas train	Code	Adapter	SC
CBF 65/1 CT	3970161	3010221 (I) 3010225 (Z)	incorporated
CBF 80/1 CT	3970162	3010222 (I) 3010226 (Z)	incorporated
CBF 100/1 CT	3970163	3010223 (I) 3010227 (Z)	incorporated
CBF 125/1 CT	3970196	3010224 (I) 3010228 (Z)	incorporated

note *Please contact the Riello Burner Technical Office for different pressure levels from those above indicated.*

SELECTING THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.
The diagram can also be used to select a new gas line when fuel output and pipe length are known. The pipe diameter is selected on the basis of the desired pressure drop. The diagram uses methane gas as reference; if another gas is used, conversion coefficient and a simple formula (on the diagram) transform the gas output to a methane equivalent (refer to figure A). Please note that the gas train dimensions must take into account the back pressure of the combustion chamber during operations.

Control of the pressure drop in an existing gas line or selecting a new gas supply line.
The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

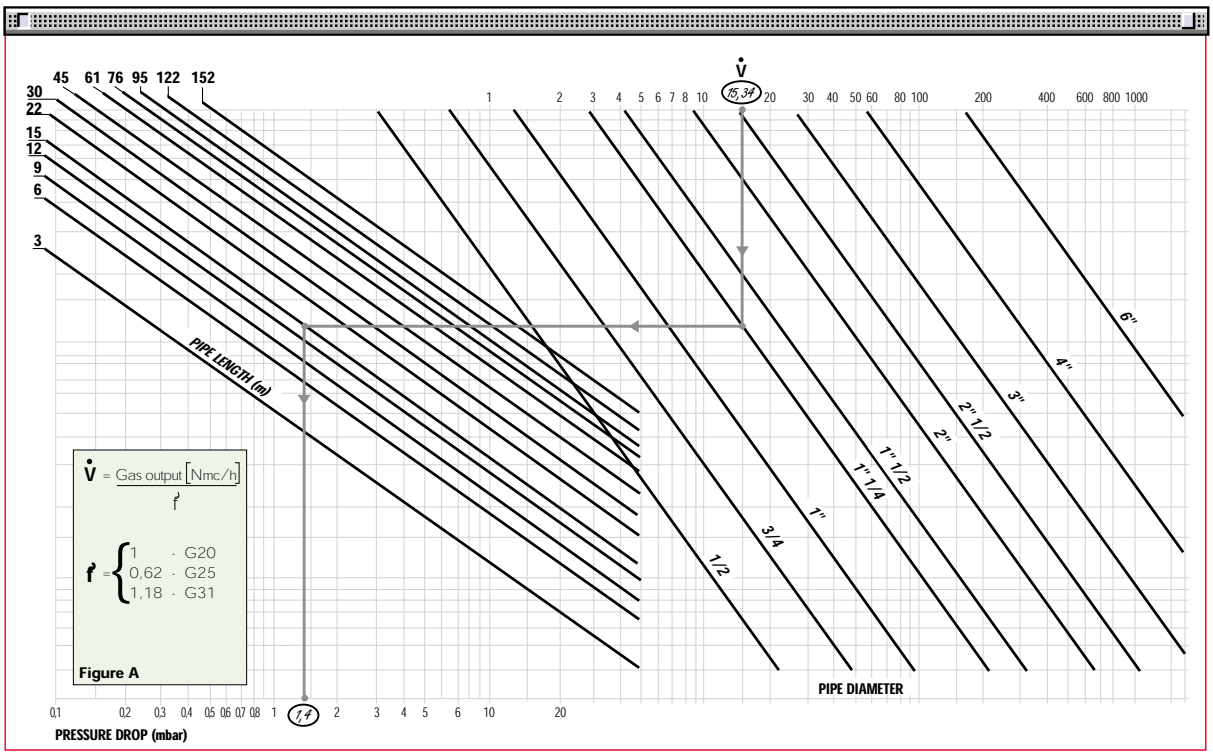
Once the equivalent output has been determined on the delivery scale ($\dot{V}$), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length.
Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop of on the botton scale below (mbar).
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

Example:

	- gas used	G25
	- gas output	9.51 mc/h
	- pressure at the gas meter	20 mbar
	- gas line length	15 m
	- conversion coefficient	0.62 (see figure A)

- equivalent methane output $\dot{V} = \left[\frac{9.51}{0.62} \right] = 15.34$ mc/h
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the piping;
- move vertically downwards to determine a value of 1.4 mbar in the pressure drop botton scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;

- correct pressure = (20-1.4) = 18.6 mbar

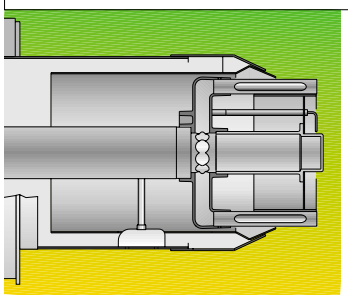


VENTILATION

Example of the servomotor and dampers for air setting

All the burners in the MB series are fitted with fans with reverse curve blades, which give excellent performance and are fitted in line with the combustion head. The air flow and sound-deadening materials that are used in the construction are designed to reduce sound emissions to the minimum and guarantee high levels of performance in terms of output and air pressure.
A high precision servomotor through the main management module installed on each burner of MB series, controls the air dampers position constantly, guaranteeing an optimal fuel-air mix. On request, the Modubloc burners can be supplied with the "inverter" configuration, which means they are fitted with a device for varying the amount of combustion air through a variable speed action of the fan motor. The addition of the interface inverter module means the burner can work at reduced speed, with further benefits in terms of sound emissions, especially during the night when the perception threshold is lower.

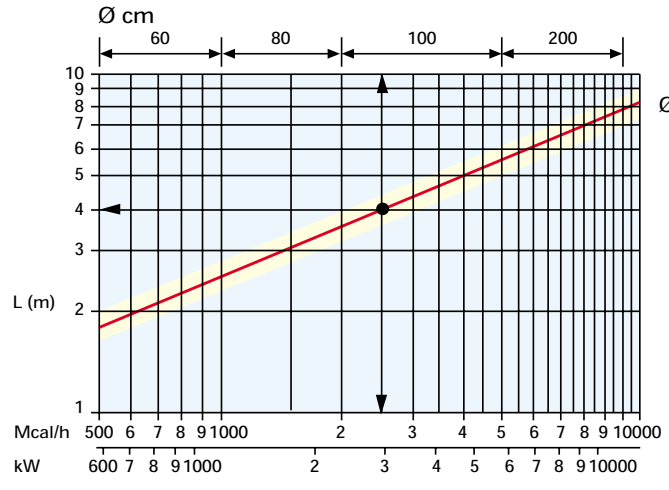
COMBUSTION HEAD

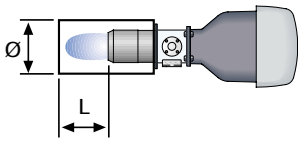


Example of a MODUBLOC MB SE BLU burner combustion head

Simple adjustment of the combustion head allows to adapt internal geometry of the head to the output of the burner. The same adjustment servomotor for the air damper also varies, depending on the required output, the setting of the combustion head, through a simple lever.
This system guarantees excellent mix on all firing rates range.

Dimensions of the combustion chambers used in the testing laboratory





$$L\,(m) = 0{,}23 \times \sqrt{\frac{kW}{10}}$$

Example:
Burnt thermal output = 3020 kW;
L (m) = 0,23 x $\sqrt{302}$ = 4 (m);
Ø = 100 (cm)

For more detailed evaluations regarding the combinations, consult the Riello Technical manual.

SETTING

OUTPUT SETTING

Main management module

Each MB series burner has a main electronic microprocessor management panel, which controls both the fuel flow servomotor (with a pressure regulator) and air flow servomotor (with air dampers).

Hysteresis is prevented by the precise control of the two servomotors and the software link.
The high precision regulation is due to the absence of mechanical clearance normally found in mechanical regulation cams on traditional modulating burners.

Inside each MB series burner main electronic microprocessor management panel, there is a PID regulator to control the boiler temperature or pressure . Variables can be controlled by specific accessory probes (see paragraph "Accessories).

The burner can run for a long time on intermediate output settings (see fig. A)

"modulating" setting

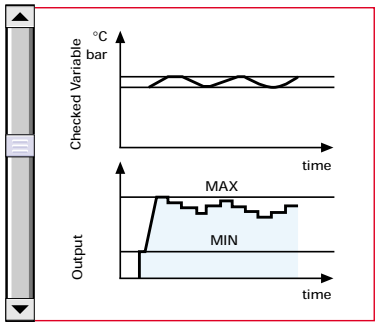


Figure A

The main electronic management panel shows all operational parameters in real time, so as to keep a constant check on the burner:
- servomotor angle
- required set-point and actual set-point
- fuel consumption (measured indirectly)
- smoke and environmental temperature (with EGA module)
- CO_2, CO, O_2, NO e SO_2 value (with EGA module)
- burner stage

The main electronic management panel operations can be increased by installing accessory modules as illustrated below. For available module codes see "Accessories".

Special software can be loaded into a portable PC to input and download data through an interface cable to an infrared device on the front panel of the MB series burner.
This is useful both during burner start-up and commissioning phases, and maintenance.

D.T.I. Module

D.T.I. module (Data Transfer interface)

This electronic module can transfer multiple signals from different local modules to a BMS supervisor software system (Building Management System).

Examples of local modules:
- main management module on each MB series burner which sends and receives signals to indicate or modify the burner working stage

- modules which send and receive signals from the various devices in the boiler room and system.
  e.g. - analog modules I/O
  - digital modules /O
  - EGA modules
  (For further information see relative paragraph)

Up to ten MB series burners, with or without the EGA module, ten analog modules I/O and ten digital modules I/O can be linked up.
The DTI module uses MODUBUS interface protocol as a standard protocol to external supervisory systems (a type of field bus widely used in industrial communication systems).
This type of protocol is used when sample signal rates which need checking are low e.g. for temperature, pressure or pump and fan systems.
With special electronic interface boards other communication protocols (e.g. PROFIBUS) can be used.

DTI module information is transferred directly or by modem to supervisory systems by RS 232 or RS 422 (in the case of long distance up to 1 km) connections.

The supervisory system can also manage a series of MB burners installed in the same system; each main electronic management panel comes with the software needed to manage such a series of burners.

Digital I/O Module

Digital I/O Module

Digital modules I/O transfer in-coming and out-going information such as working stages and alarms, from the boiler room or from the system in general where one or more MB series burners are installed to a remote supervisor system.

Digital modules I/O manage both input and output signals, e.g.:
- n. 16 input signals (free contacts – max. current 1 A)
- n. 8 output signals (free contacts – max. current 1 A)

The out-going signals can control any device in the boiler room, e.g. pumps, fans, etc…

The in-coming signals can check any device in the boiler room, e.g. pumps, fans, etc… and receive warning signals such as over heating, excess pressure.

Up to ten I/0 digital modules can be linked together. Fig. C shows an example of sequencing I/O digital modules linked to a remote supervisor system by a DTI interface.

Analogic I/O Module

Analog I/O module

I/O Analog modules transfer in-coming and out-going information about burner working stages and other devices in the boiler room or in the system in general where one or more MB series burners are installed to a remote supervisor system.
I/O Analog modules manage both input and output signals, such as 4-20 mA or 0-10 Volt, e.g.:
- n. 6 input signals
- n. 6 output signals

These modules can be connected to the remote supervisor system in two different ways:

- **" LOW LEVEL" connection**
  each I/O analog module transmits information from a single burner to a remote supervisor system using 4-20 mA or 0-10 Volt signals, e.g.
  boiler temperature/pressure, output level, boiler set-point, servomotor angle position, etc.
  The system becomes operational when each single I/O analog module is programmed by a portable PC and appropriate software.
  The set point can be modified by a single in-coming 4–20 mA or 0-10 Volt signal from the supervisor system.

Here is an example of a "LOW LEVEL" connection between I/O analogue modules and remote supervisor system. (figure B)

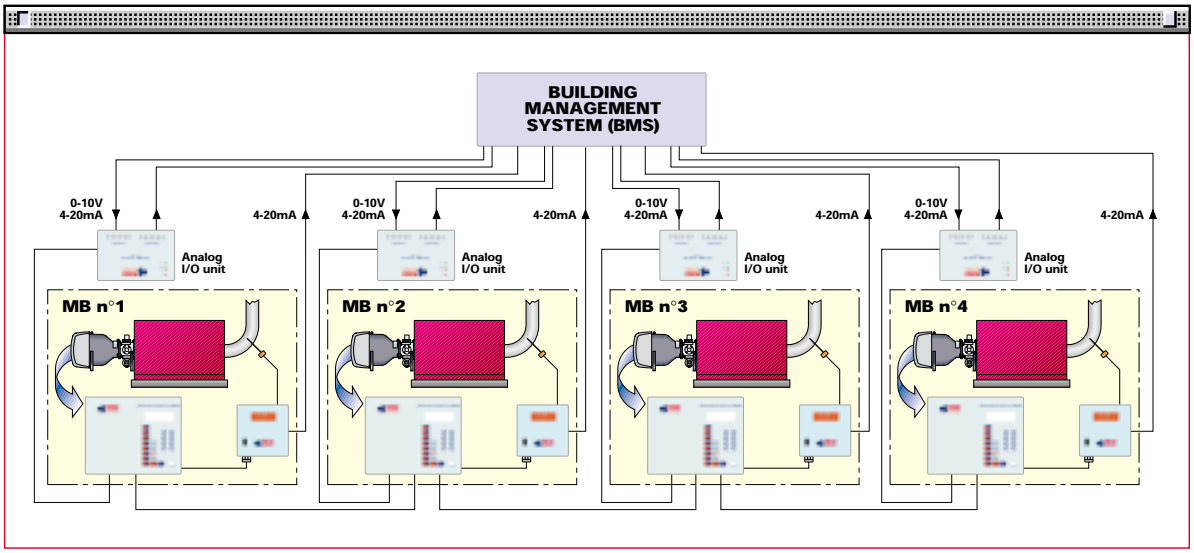


Figura B - "LOW LEVEL" connection

- **" HIGH LEVEL" connection**
  each I/O analog module transmits in-coming and out-going information about boiler room temperature/pressure, pump rpm, set point, to a remote supervisor system using 4-20 mA or 0-10 Volt signals, through DTI interface.
  Up to ten I/0 digital modules can be linked together.

Here is an example of an "HIGH LEVEL" connection between I/O analogue modules and remote supervisor system. (figure C)

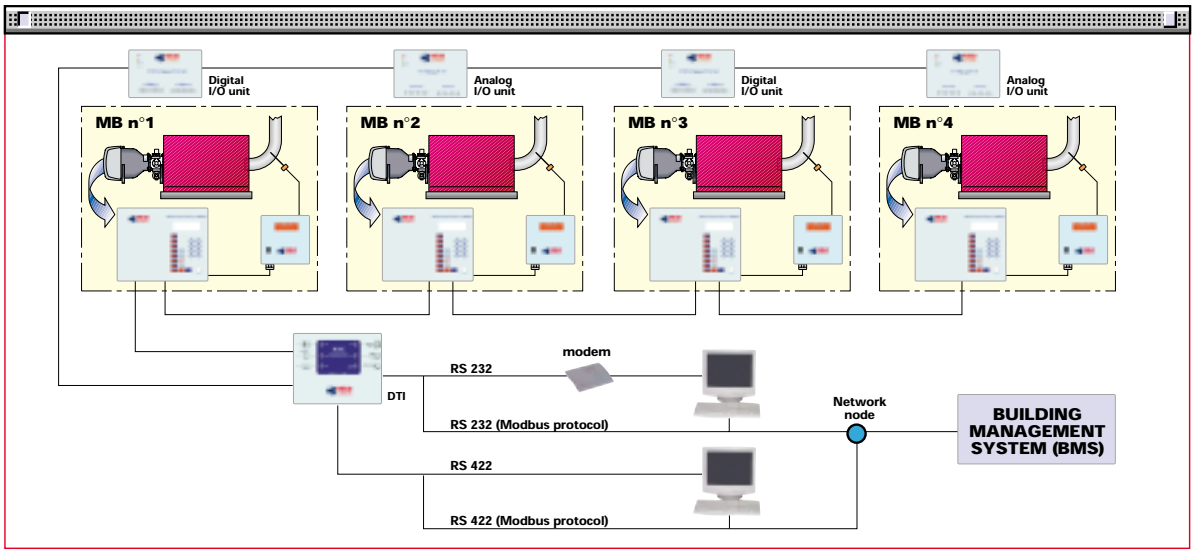


Figure C - "HIGH LEVEL" connection

E.G.A. Module

E.G.A. module (Exhaust Gas Analyser)

EGA modules measure some of the exhaust gas substances. These modules come with an exhaust gas sampler probe and exhaust gas temperature probe (0-400 °C).
Four different EGA modules are available depending on the type of substance to be checked. (For further information see "accessories" paragraph).
Thanks to EGA module connected to the main electronic microprocessor management panel on each MB series burner, the burner can adjust its working parameters on the basis of continuous combustion gas analysis.
The EGA module creates a closed control link which increases efficiency by up to max 5%.

The following functions are also available:
- smoke and environmental temperature measurement
- viewing of measured parameters on main management display panel
- burner lock-out when some parameters exceed permitted levels (settable)
- combustion optimisation with automatic air damper setting (adjustment O2 level)
- automatic re-adjustment at each firing

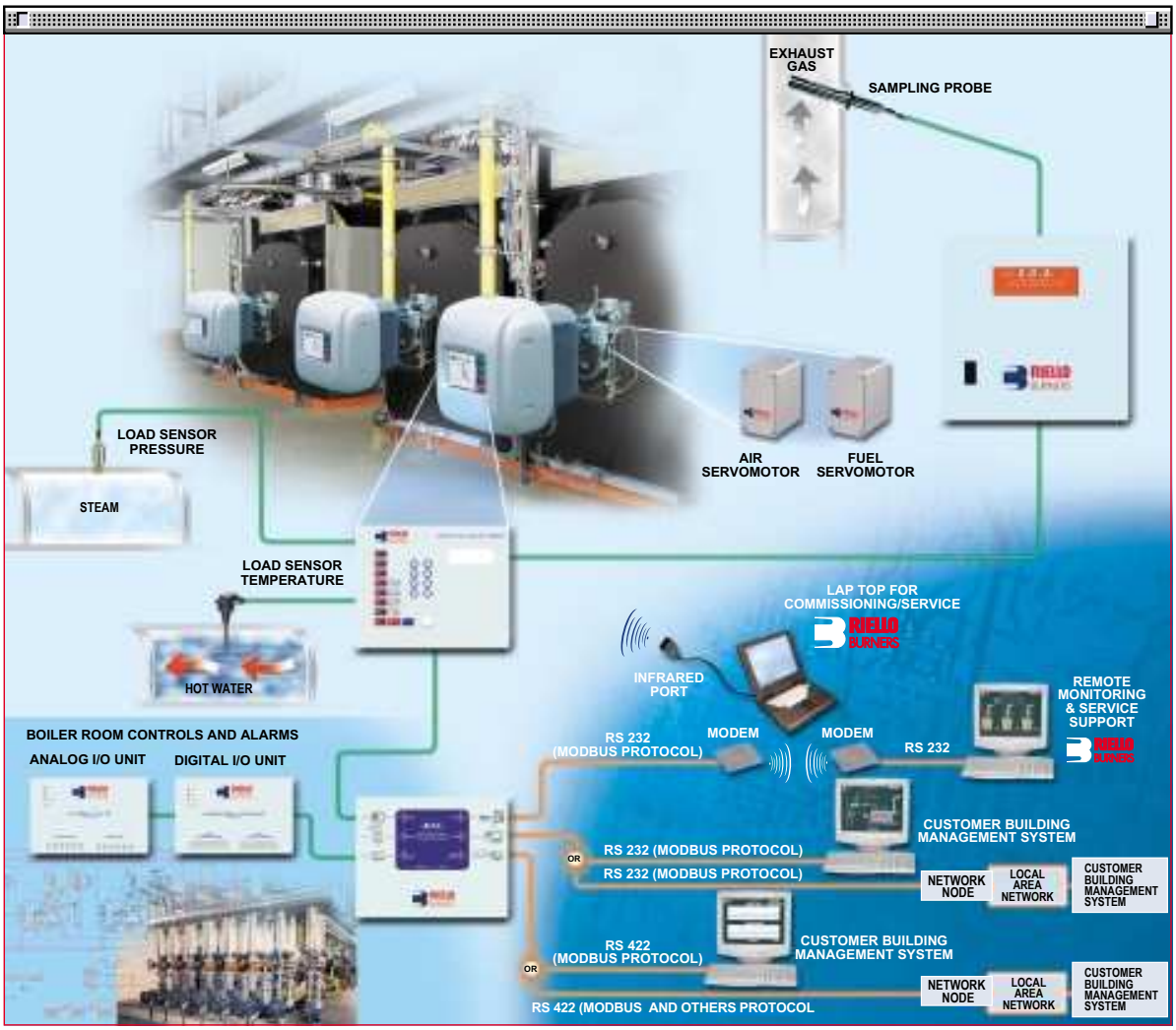
The information from EGA modules can be sent to a remote supervisor system in two ways:
- through six signals (4-20mA) on a terminal board (see layout fig. B)
  To activate this operation each single EGA module must be programmed using a PC with appropriate software.
- through the DTI interface module (see layout fig. C)

Connections between Modules

A data cable type BELDEN 9501 or similar, which can be ordered as an accessory (see accessories paragraph), must be used to connect the above modules.

note *To develop the various layouts or for further information about single modules please contact the Riello Burners Technical Office.*

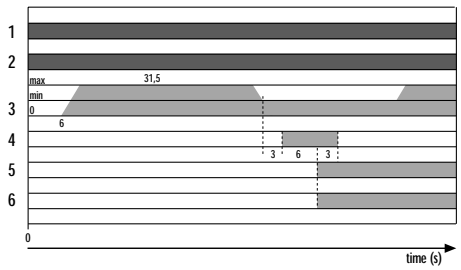
The following diagram summarises how MB series burners and modules can be used for the supervision of boiler rooms or systems in general.



Example of boiler room management system

IGNITION

MB 4-6-8-10 SE BLU



1 - Closing thermostat
2 - Fan motor working
3 - Air damper
4 - Ignition transformer
5 - Valves open
6 - Flame presence

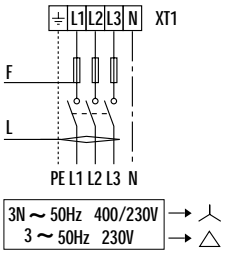
ELECTRICAL CONNECTIONS
To be made by the installer

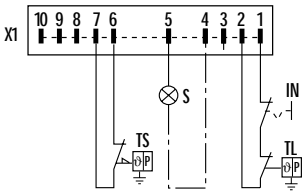
Electrical connections must be made by qualified and skilled personnel, according to the local norms.

Example of the terminal board for electrical connections

THREE PHASE SUPPLY TO THE POWER CIRCUIT AND CONNECTING THE AUXILIARY CONTROLS

MB 4-6-8-10 SE BLU

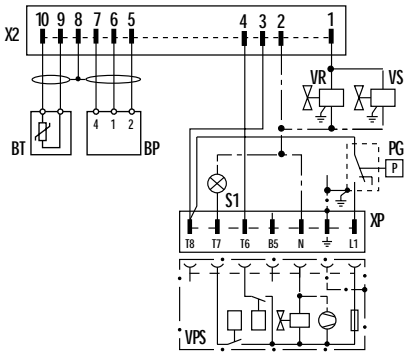


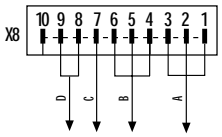


XT1 - General supply terminal board
X1 - 10 pin plug
TS - Safety thermostat
TL - Threshold thermostat
IN - Manual switch
S - External lock-out signal
F - Fuse (refer to table A)
L - Lead section (refer to table A)

CONNECTION OF THE PROBES FOR THE CONTROLLED PARAMETER AND DATA CONNECTION FOR THE VARIOUS MODULES (Accessories)

MB 4-6-8-10 SE BLU

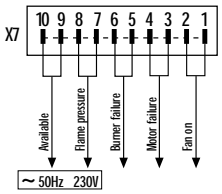


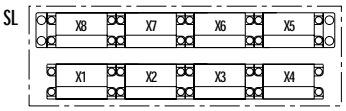


X2 - 10 pin plug
X8 - 10 pin plug for connecting accessories
BT - Temperature probe
BP - Pressure probe
PG - Minimum gas pressure switch
S1 - Emergency push-button
VPS - Seal control
VR - Adjustment valve
VS - Safety valve
XP - Seal control plug
A - E.G.A. module connections
B - Main, D.T.I., I/O modules connections
C - 230 V/50 Hz output for butterfly valve of sequence boilers
D - Free contacts for lead boiler choice of sequence

SIGNALS FOR WORKING STATUS OF THE MAIN COMPONENTS

MB 4-6-8-10 SE BLU





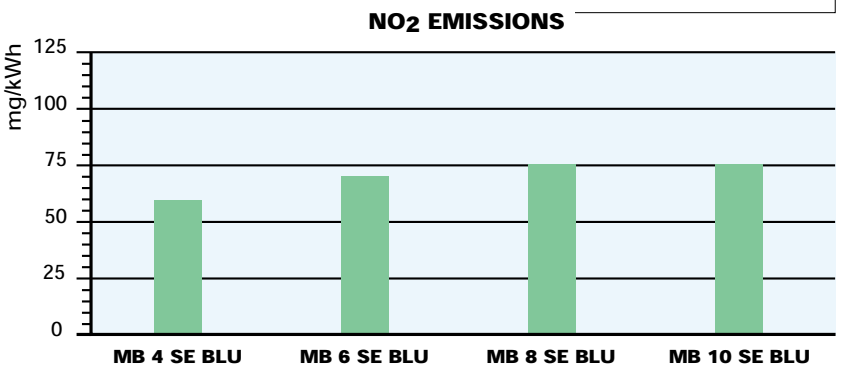
X7 - 10 pin output plug, free contacts
SL - Layout plug diagram
X3,4,5,6 - Plugs for electrical factory-set connections

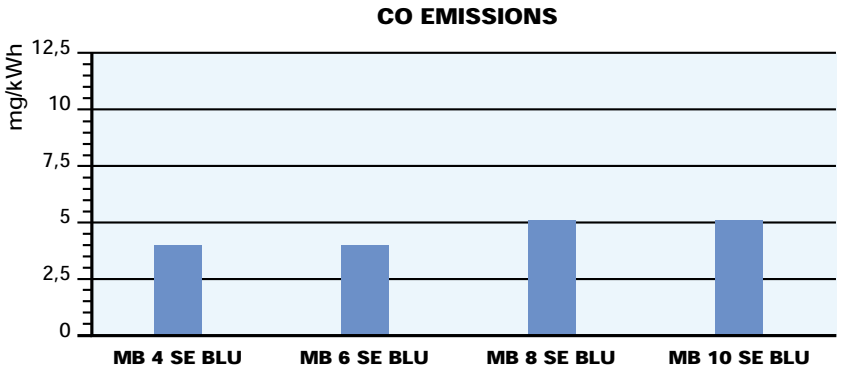
The following table shows the supply lead sections and the type of fuse to be used.

Model		MB 4 SE BLU		MB 6 SE BLU		MB 8 SE BLU		MB 10 SE BLU	
		230V	400V	230V	400V	230V	400V	230V	400V
F	A	63 gG	50 gG	63 gG	50 gG	80 gG	63 gG	80 gG	63 gG
L	mm²	6	4	6	4	10	10	10	10

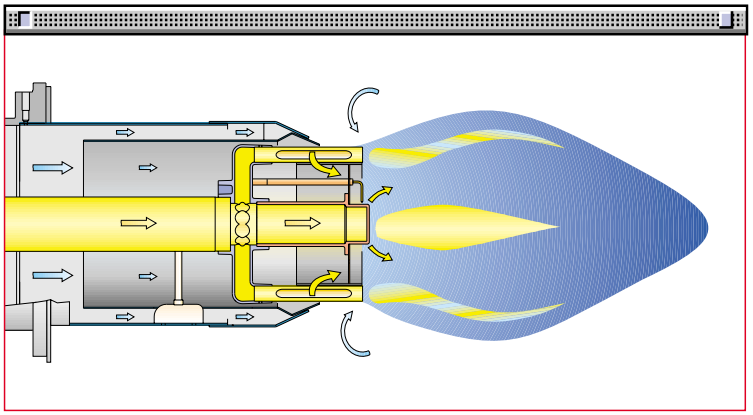
Table A

EMISSIONS





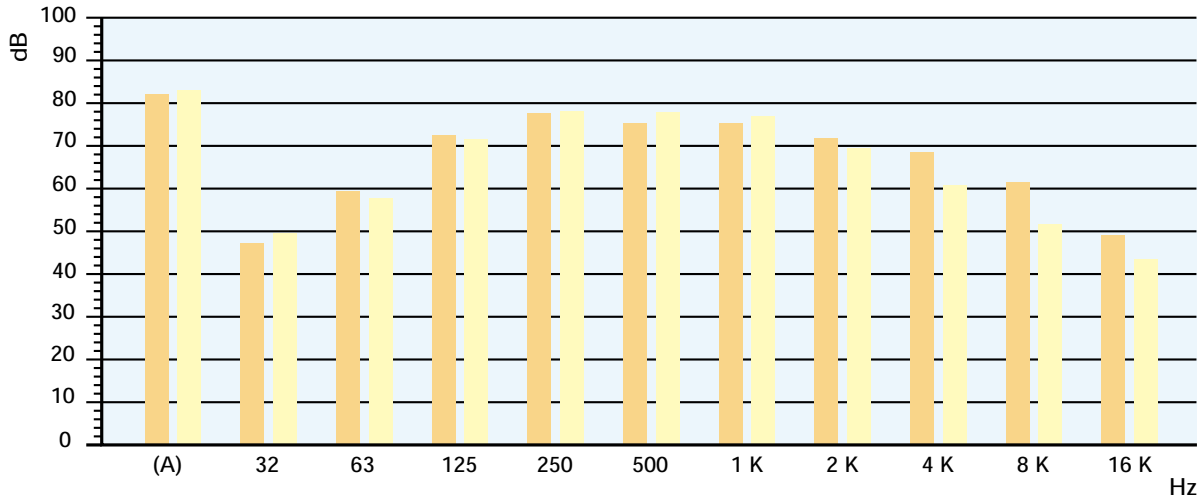
The emissions have been obtained, for the various models, on the basis of EN 676 standard.



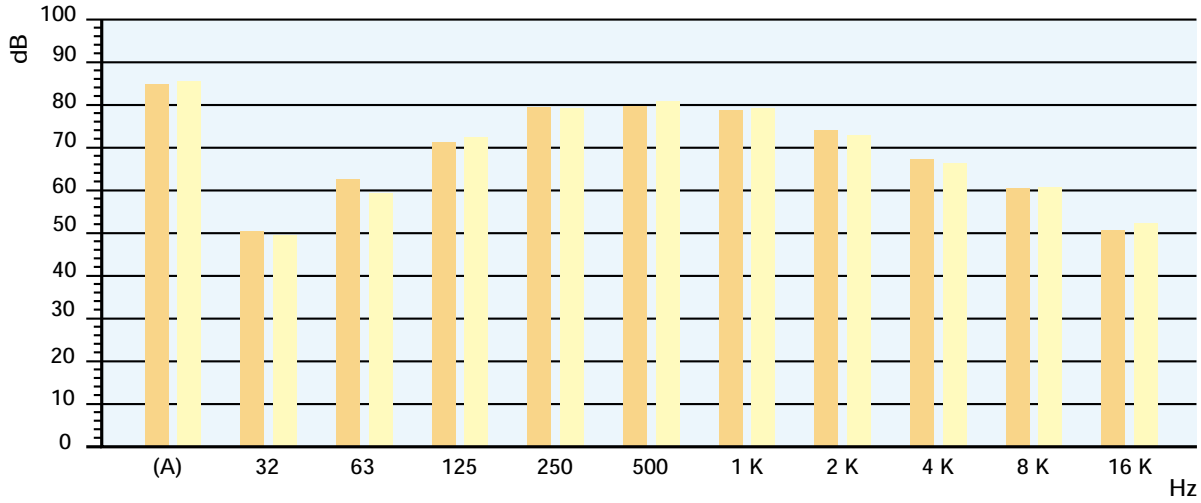
The MB SE BLU series reduce polluting emissions with its exclusive design which optimises air/fuel mixture. The gas in the combustion heads is distributed through openings which are perpendicular to the air flow; part of the fuel is injected directly into the centre of the flame.
This results in low flame temperature combustion to prevent the formation of NO. Gradual and progressive combustion throughout the flame prevents areas of high oxidation inside the flame.
Emissions are further reduced by the re-circulation of combustion gases due to the high velocity of air leaving the combustion head.
Pollution levels are below even the most severe requirement standards.

SOUND EMISSIONS

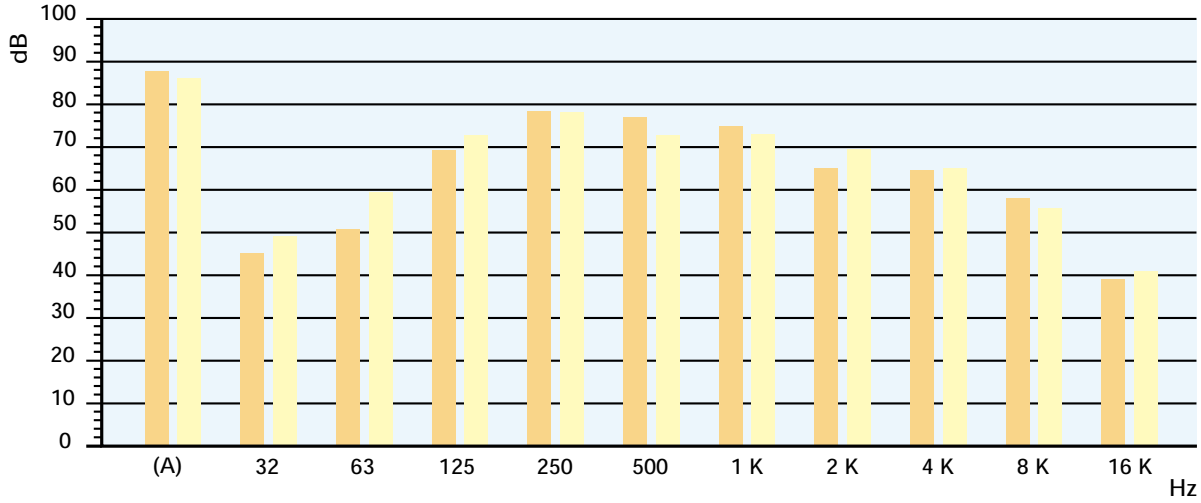
MB 4 SE BLU



MB 6 SE BLU



MB 8 -10 SE BLU



(A) Value obtained in dB(A)

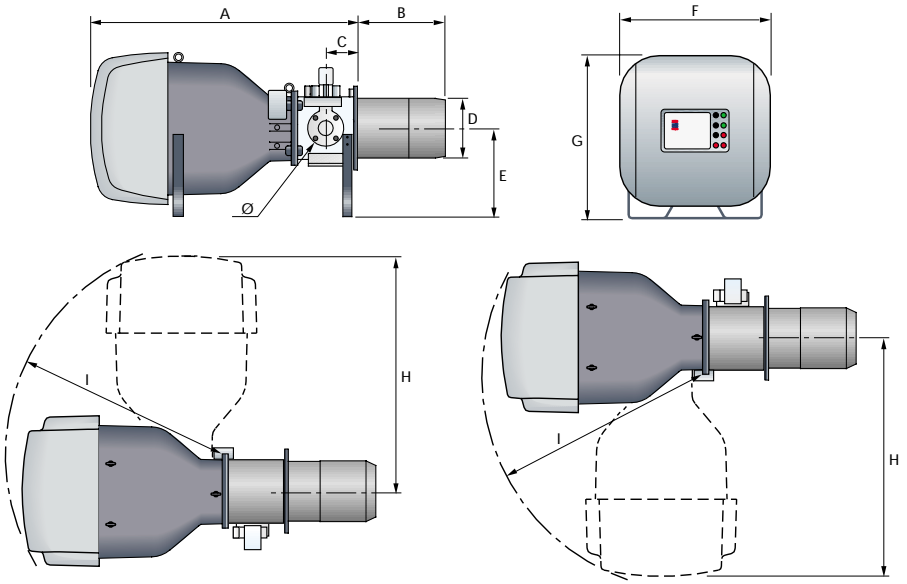
Maximum modulation

Minimal modulation

OVERALL DIMENSIONS (mm)

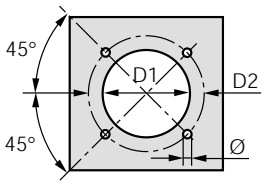
BURNERS

MB 4-6-8-10 SE BLU



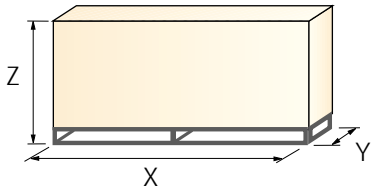
Model	A	B	C	D	E	F	G	H	I	Ø
MB 4 SE BLU	1470	511	183	336	490	840	910	1330	1205	DN80
MB 6 SE BLU	1470	511	183	336	490	840	910	1330	1205	DN80
MB 8 SE BLU	1900	530	208	413	575	1007	1079	1740	1570	DN80
MB 10 SE BLU	1900	530	208	413	575	1007	1079	1740	1570	DN80

BURNER - BOILER MOUNTING FLANGE



Model	D1	D2	Ø
MB 4 SE BLU	350	496	M20
MB 6 SE BLU	350	496	M20
MB 8 SE BLU	418	608	M20
MB 10 SE BLU	418	608	M20

PACKAGING



Model	X	Y	Z	kg
MB 4 SE BLU	2120	1005	1175	300
MB 6 SE BLU	2120	1005	1175	300
MB 8 SE BLU	2590	1170	1350	450
MB 10 SE BLU	2590	1170	1350	450

INSTALLATION DESCRIPTION

Installation, start up and maintenance must be carried out by qualified and skilled personnel.
All operations must be performed in accordance with the technical handbook supplied with the burner.

Access to the internal components is very simple, as the back of the burner is hinged which means it can be completely opened.
The burners can be supplied with the opening on the right or left, depending on personal requirements.

FIXING THE BURNER TO THE BOILER AND INITIAL SETTINGS

- All the burners have lifting rings, for easier installation and maintenance.
- After drilling the boilerplate, using the supplied gasket as template, prepare a suitable lifting system and, after hooking onto the rings, fix burner to the boiler.
- Install the gas train, choosing it on the basis of the maximum boiler output and on the basis of the diagrams enclosed with the burner instructions.
- Adjust the combustion head run, using the mechanism lever.

ELECTRICAL CONNECTIONS AND START UP

- Make the electrical connections to the burner following the wiring diagrams included in the instruction handbook.
- Turning the motor check the led signalling correct rotation direction, at left of the plugs group, is on.
- Perform a first ignition calibration on the gas train.
- On start up, check:
  - gas pressure at the combustion head (to max. and min. output)
  - combustion quality, in terms of unburned substances and excess air.

ACCESSORIES

DTI Module (Data Transfer Interface)

This electronic module can transfer multiple signals from different local modules to a BMS supervisor software system (Building Management System).

DTI module	
Burner	**Module code**
MB 4 - 6 - 8 - 10 SE BLU	**3010234**

I/O digital module

Digital modules I/O transfer in-coming and out-going information such as working stages and alarms, from the boiler room or from the system in general where one or more MB series burners are installed to a remote supervisor system.

I/O digital module	
Burner	**Module code**
MB 4 - 6 - 8 - 10 SE BLU	**3010233**

I/O analogic module

I/O Analog modules transfer in-coming and out-going information about burner working stages and other devices in the boiler room or in the system in general where one or more MB series burners are installed to a remote supervisor system.
I/O Analog modules manage both input and output signals, such as 4-20 mA or 0-10 Volt.

I/O analogic module	
Burner	**Module code**
MB 4 - 6 - 8 - 10 SE BLU	**3010232**

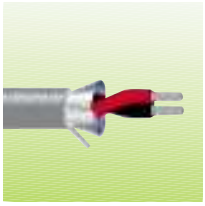
EGA module (Exhaust Gas analyser)

EGA modules measure some of the exhaust gas substances. These modules come with an exhaust gas sampler probe and exhaust gas temperature probe (0-400 °C).
Four different EGA modules are available depending on the type of substance to be checked, as given in the following table:

EGA module		
Burner	**Analysed gas**	**Module code**
MB 4 - 6 - 8 - 10 SE BLU	CO, CO_2, O_2	**3010235**
MB 4 - 6 - 8 - 10 SE BLU	CO, CO_2, O_2, NO	**3010236**
MB 4 - 6 - 8 - 10 SE BLU	CO, CO_2, O_2, SO_2	**3010237**
MB 4 - 6 - 8 - 10 SE BLU	CO, CO_2, O_2, NO, SO_2	**3010238**

Belden 9501 type leads

All the connections for the above modules must be done using a BELDEN 9501 type lead, which is available as an accessory in coils of 50 m.



Belden 9501 lead	
Burner	**Lead code**
MB 4 - 6 - 8 - 10 SE BLU	**3010239**

Accessories for modulating setting

Main management module allows a modulating setting with use of probes chosen on the basis of the application.
The following table lists the accessories for modulating setting, with the application field.

Probe			
Burner	**Type**	**Range (°C) (bar)**	**Code**
MB 4 - 6 - 8 - 10 SE BLU	Temperature	0 ÷ 400°C	**3010187**
MB 4 - 6 - 8 - 10 SE BLU	Pressure	0 ÷ 3 bar	**3010246**
MB 4 - 6 - 8 - 10 SE BLU	Pressure	0 ÷ 18 bar	**3010186**
MB 4 - 6 - 8 - 10 SE BLU	Pressure	0 ÷ 30 bar	**3010188**

Burner support

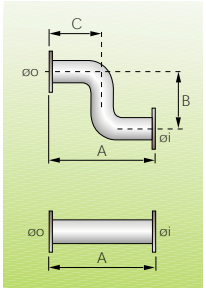
For easier maintenance, a mobile burner support has been designed, which means the burner can be dismantled without the need for forklift trucks.

Support	
Burner	**Support code**
MB 4 - 6 SE BLU	**in progress**
MB 8 - 10 SE BLU	**in progress**

GAS TRAIN ACCESSORIES

Adapters

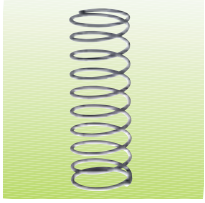
In certain cases, an adapter must be fitted between the gas train and the burner, when the diameter of the gas train is different from the set diameter of the burner.
Below are given the adapters than can be fitted on the various burners:



Adapters								
Burner	Gas train	Adapter type	Dimensions					Adapter code
			Øi DN	Øo DN	A mm	B mm	C mm	
MB 4-6-8-10 SE BLU	CBF 65/1 CT	I	65	80	320	--	--	**3010221**
MB 4-6-8-10 SE BLU	CBF 80/1 CT	I	80	80	320	--	--	**3010222**
MB 4-6-8-10 SE BLU	CBF 100/1 CT	I	100	80	320	--	--	**3010223**
MB 4-6-8-10 SE BLU	CBF 125/1 CT	I	125	80	320	--	--	**3010224**
MB 4-6-8-10 SE BLU	CBF 65/1 CT	Z	65	80	400	480	225	**3010225**
MB 4-6-8-10 SE BLU	CBF 80/1 CT	Z	80	80	400	480	225	**3010226**
MB 4-6-8-10 SE BLU	CBF 100/1 CT	Z	100	80	400	480	225	**3010227**
MB 4-6-8-10 SE BLU	CBF 125/1 CT	Z	125	80	500	480	300	**3010228**

Stabiliser spring

To vary the pressure range of the gas train stabilisers, accessory springs are available. The following table shows these accessories with their application range:



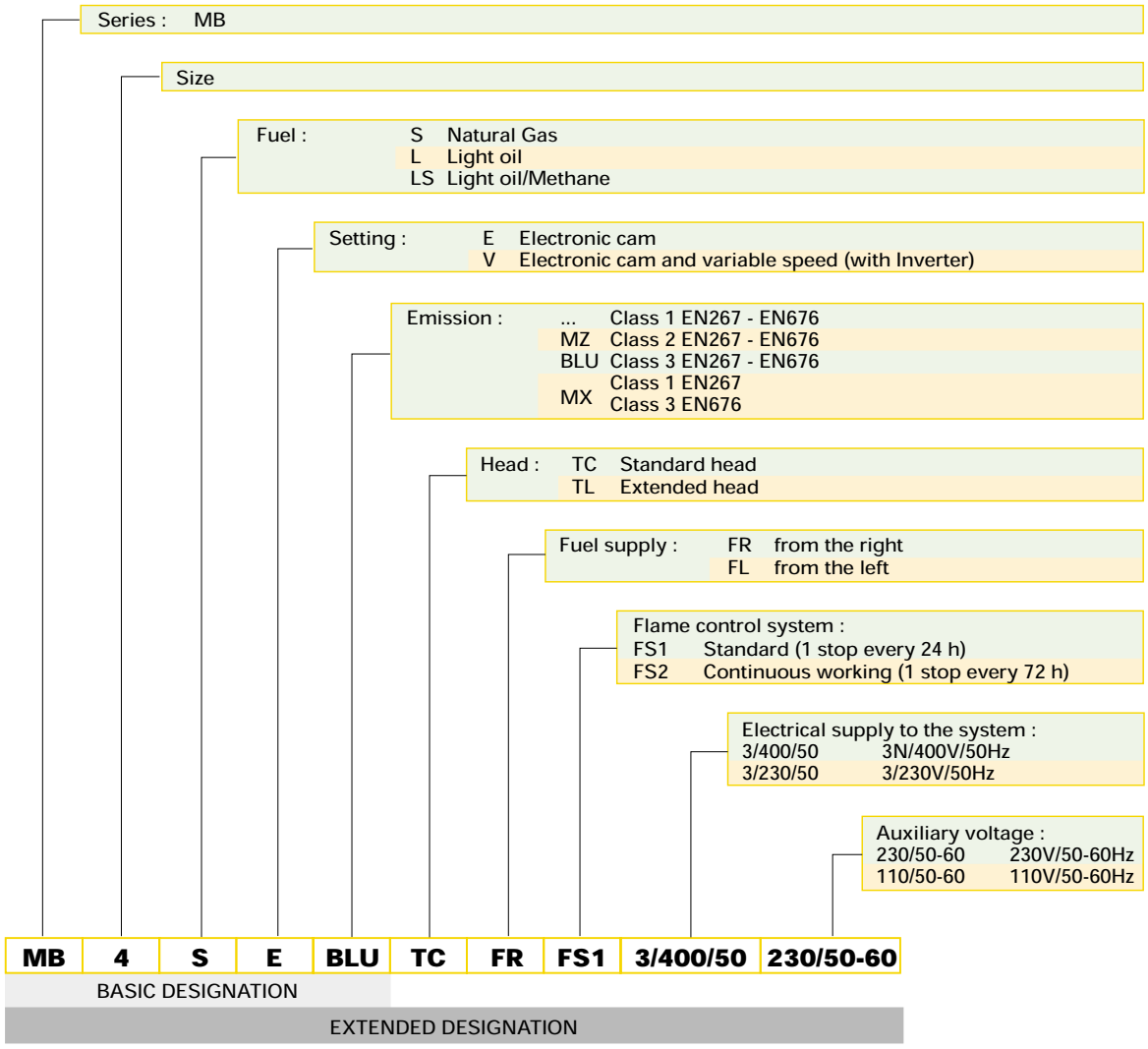
Stabiliser spring		
Gas train	Spring	Code
CBF 65/1 CT - 80/1 CT	Red from 25 to 55 mbar	**3010133**
CBF 100/1 CT	Red from 25 to 55 mbar	**3010134**
CBF 125/1 CT	Red from 25 to 55 mbar	**in progress**
CBF 65/1 CT - 80/1 CT	Black from 60 to 110 mbar	**3010135**
CBF 100/1 CT	Black from 60 to 110 mbar	**3010136**
CBF 125/1 CT	Black from 60 to 110 mbar	**in progress**
CBF 65/1 CT - 80/1 CT	Pink from 90 to 150 mbar	**3090456**
CBF 100/1 CT	Pink from 90 to 150 mbar	**3090489**
CBF 125/1 CT	Pink from 90 to 150 mbar	**in progress**

Please refer to the technical manual for the correct choice of spring.

SPECIFICATION

A specific index guides your choice of burner from the various models available in the MODUBLOC MB series. Below is a clear and detailed specification description of the product.

DESIGNATION OF SERIES MODUBLOC MB BURNERS



LIST OF AVAILABLE MODELS

MB4SE	BLU	TC	FR	FS1	3/400/50	230/50-60
MB4SE	BLU	TC	FR	FS1	3/230/50	230/50-60
MB4SE	BLU	TC	FL	FS1	3/400/50	230/50-60
MB4SE	BLU	TC	FL	FS1	3/230/50	230/50-60
MB6SE	BLU	TC	FR	FS1	3/400/50	230/50-60
MB6SE	BLU	TC	FR	FS1	3/230/50	230/50-60
MB6SE	BLU	TC	FL	FS1	3/400/50	230/50-60
MB6SE	BLU	TC	FL	FS1	3/230/50	230/50-60
MB8SE	BLU	TC	FR	FS1	3/400/50	230/50-60
MB8SE	BLU	TC	FR	FS1	3/230/50	230/50-60
MB8SE	BLU	TC	FL	FS1	3/400/50	230/50-60
MB8SE	BLU	TC	FL	FS1	3/230/50	230/50-60
MB10SE	BLU	TC	FR	FS1	3/400/50	230/50-60
MB10SE	BLU	TC	FR	FS1	3/230/50	230/50-60
MB10SE	BLU	TC	FL	FS1	3/400/50	230/50-60
MB10SE	BLU	TC	FL	FS1	3/230/50	230/50-60

Other versions are available on request.

PRODUCT SPECIFICATION

Burner

Monoblock forced draught gas burner with modulating setting, fully automatic, made up of:
- Fan with reverse curve blades high performance with low sound emissions
- Air suction circuit lined with sound-proofing material
- Air damper for air setting controlled by a high precision servomotor
- Air pressure switch
- Fan starting motor at 2900 rpm, three-phase 230/400 - 400/690 V with neutral, 50Hz
- Low emission mobile combustion head, that can be set on the basis of required output, fitted with:
    - stainless steel end cone, resistant to corrosion and high temperatures
    - ignition electrodes
    - flame stability disk
- Automatic regulator for gas delivery, controlled by a high precision servomotor
- Maximum gas pressure switch, with pressure test point, for halting the burner in the case of over pressure on the fuel supply line
- Module for air/fuel setting and output modulation with incorporated PID control of temperature or pressure of the heat generator
- Flame control panel for controlling the system safety
- Photocell for flame detection
- Star/triangle starter for the fan motor
- Burner on/off switch
- Auxiliary voltage led signal
- Manual or automatic output increase/decrease switch
- Burner working led signal
- Contacts motor and thermal relay with release button
- Motor failure led signal
- Burner failure led signal and lighted release button
- Led signal for correct rotation direction of fan motor
- Emergency button
- Coded connection plugs-sockets
- Burner opening hinge
- Lifting rings
- IP 40 electric protection level.

According to:
- 89/336/EEC directive (electromagnetic compatibility)
- 73/23/EEC directive (low voltage)
- 90/396/EEC directive (gas)
- EN 676 (gas burners).

Standard equipment:
- 1 flange gasket
- 8 screws for fixing the flange
- 1 thermal screen
- 4 screws for fixing the burner flange to the boiler
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- DTI module (Data Transfer Interface)
- I/O digital module
- I/O analogic module
- EGA module (Exhaust Gas Analyser) in the following versions:
    - EGA - CO, CO_2, O_2
    - EGA - CO, CO_2, O_2, NO
    - EGA - CO, CO_2, O_2, SO_2
    - EGA - CO, CO_2, O_2, NO, SO_2
- BELDEN 9501 type lead
- Pressure probe 0 - 3 bar
- Pressure probe 0 - 18 bar
- Pressure probe 0 - 30 bar
- Temperature probe 0 - 400°C
- Burner support
- Adapters
- Stabiliser spring.

Lineagrafica

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