RIELLO BURNERS

CE

TWO STAGE DUAL FUEL BURNERS

RLS SERIES

RLS 28	100/163 ÷	325 kW
RLS 38	116/232 ÷	442 kW
RLS 50	145/290 ÷	581 kW
RLS 70	232/465 ÷	814 kW
RLS 100	349/698 ÷	1163 kW
RLS 130	465/930 ÷	1395 kW

The RLS series of burners covers a firing range from 100 to 1395 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.

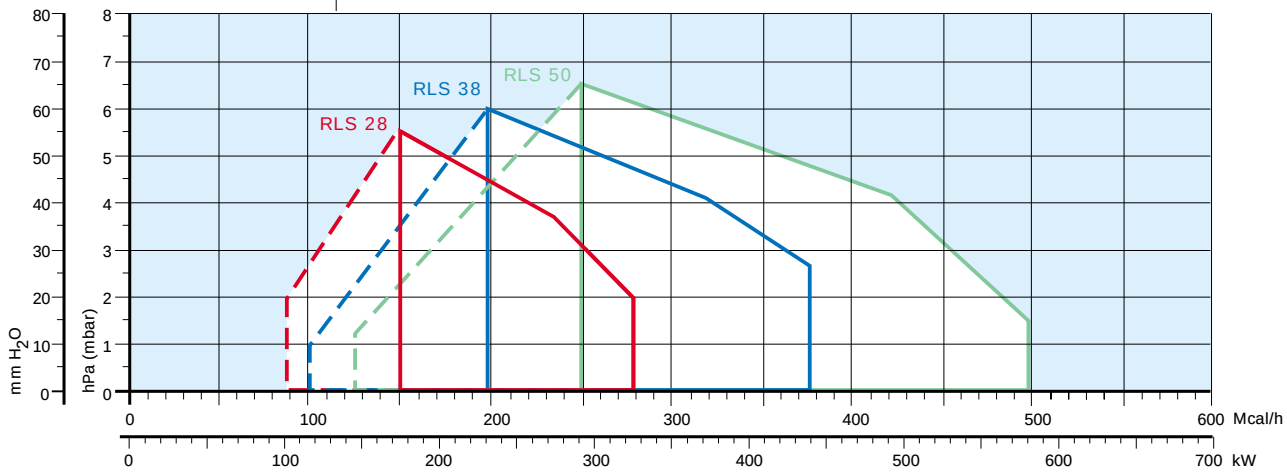
TECHNICAL DATA

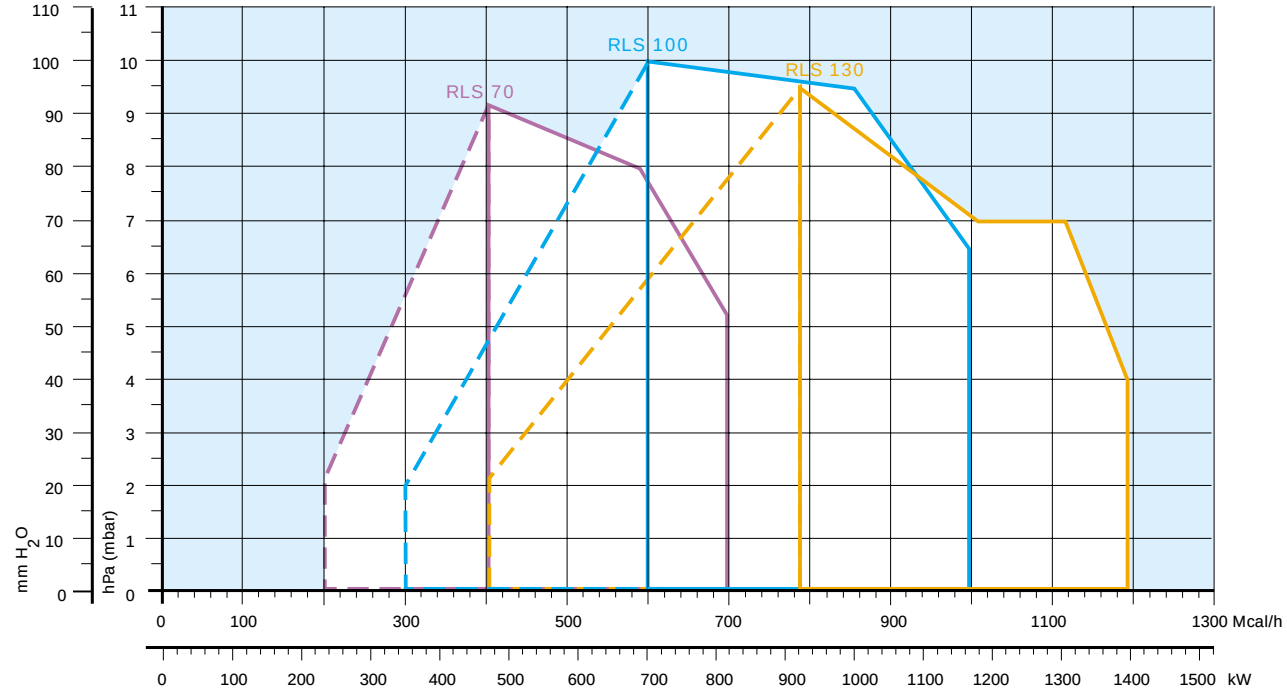
	Model			RLS 28	RLS 38	RLS 50	RLS 70	RLS 100	RLS 130
	Operation			Two stage					
	Modulating ratio at max. ouput			2:1					
	Servomotor	**type**		LKS 210 - 08			LKS 210 -10		
		run time	**s**	5					
	Heat output		**kW**	100/163-325	116/232-442	145/290-581	232/465-814	349/698-1163	465/930-1395
			Mcal/h	86/140-303	100/200-380	125/249-500	200/400-700	300/600-1000	400/800-1200
	Working temperature		**°C min/max**	0/40					
Fuel / air data	**Light oil**	**Net calorific value**	**kWh/kg**	11,8					
		Viscosity at 20°C	**mm^2/s (cSt)**	4-6					
		Delivery	**kg/h**	8/14-28	10/20-37	12/25-49	20/39-69	30/59-99	39/79-118
		Max temperature	**°C**	60					
	Pump	**type**		AL 65B			AJ 6CC		
		delivery	**kg/h**	63 (at 15 bar)			134 (at 20 bar)		
	Atomised pressure		**bar**	12					
	G20	**Net calorific value**	**kWh/Nm^3**	10					
		Density	**kg/Nm^3**	0,71					
		Delivery	**Nm^3/h**	10/16-32,5	12/23-44	14,5/29-58	23/46,5-81	35/70-116	46,5/93-139,5
	G25	**Net calorific value**	**kWh/Nm^3**	8,6					
		Density	**kg/Nm^3**	0,78					
		Delivery	**Nm^3/h**	12/19-38	13/27-51	17/33-68	27/54-95	41/81-135	54/108-162
	LPG	**Net calorific value**	**kWh/Nm^3**	25,8					
		Density	**kg/Nm^3**	2,02					
		Delivery	**Nm^3/h**	4/6-13	4/9-17	6/11-23	9/18-32	14/27-45	18/36-54
	Fan		**type**	Centrifugal - with reverse curve blades					
	Air temperature		**max °C**	60					
Electrical data	**Electrical supply**		**Ph / Hz / V**	1/50/230 (±10%)		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**	0,53	0,76	0,91	1,8	2,2	3
	Auxiliary electrical power		**kW**	0,19	0,25	0,17	0,33	0,33	0,43
	Protection level		**IP**	44					
	Fan electrical motor power		**kW**	0,25	0,42	0,65	1,1	1,5	2,2
	Rated fan motor current		**A**	2,1	2,9	3 -1,7	4,8 - 2,8	5,9 - 3,4	8,8 - 5,1
	Fan motor start current		**A**	4,8	11	13,8-8	22,6 -13,2	29,5 -17	52,8 - 30,6
	Fan motor protection level		**IP**	44			55	54	
	Pump electric motor power		**kW**	0,09			0,37		
	Rated pump motor current		**A**	0,8			2,4		
	Pump motor start current		**A**	-	-	-	-	-	-
	Pump motor protection level		**IP**	44					
	Ignition transformer		**V1- V2**	230 V - 2 x 5 kV					
			I1 - I2	1,9 A - 30 mA					
	Working			Intermittent (at least one stop every 24h)					
Emissions	**Sound pressure**		**dBA**	68	70	72	74	77,5	80
	Sound power		**W**	-	-	-	-	-	-
	Light oil	**CO emissions**	**mg/kWh**	< 20					
		Grade of smoke indicator	**N° Bacharach**	< 1					
		CxHy emissions	**mg/kWh**	< 10					
		NOx emissions	**mg/kWh**	< 190					
	G20	**CO emissions**	**mg/kWh**	< 15					
		NOx emissions	**mg/kWh**	< 80					
Approval	**Directive**			90/396 - 89/336 - 73/23 - 92/42 EEC					
	Conforming to			EN 267 - EN 676					
	Certifications			CE 0063 AR 4637			CE 0063 AS 4863 - DIN 5G 835/97 M		

Reference conditions:
Ambient temperature: 20°C
Pressure: 1000 mbar
Altitude: 100 m a.s.l.
Sound pressure level measured in manufacturers combustion laboratory, with burner operating on test boiler and at maximum rated output

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

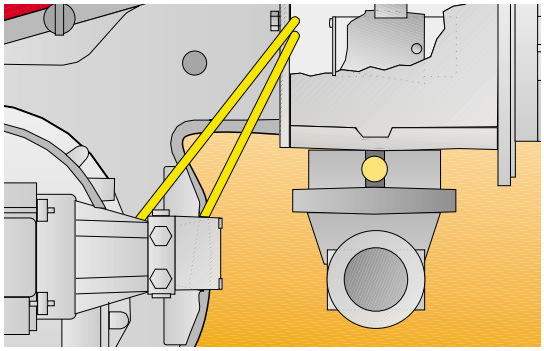
Modulating range

Test conditions conforming to EN 267 - EN 676:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.

FUEL SUPPLY

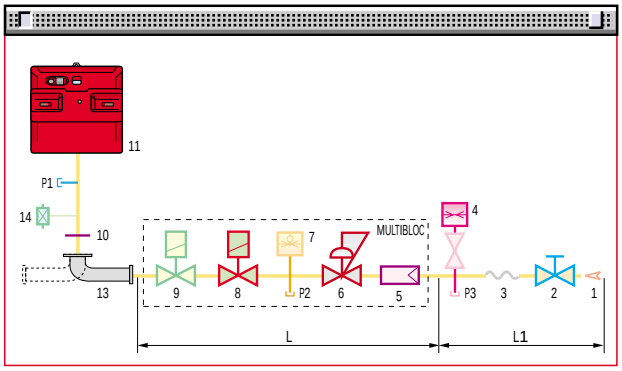
GAS TRAIN

The gas trains are fitted with a regulating valve to adjusts fuel delivery in relation to heat required. This valve is controlled by the two-stages device fitted on the burner.
Fuel can be supplied either from the right or left sides, on the basis of the application requirments.
A maximum gas pressure switch stops the burner in case of excess pressure in the supply line.
The gas train can be selected to best fit system requirments depending on the fuel output and pressure in the supply line.
The gas trains can be "Multibloc" type (containing the main components in a single unit) or "Composed" type (assembly of the single components).

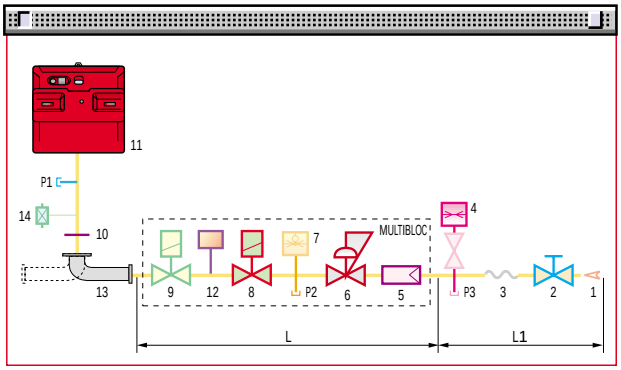


Example of gas inlet pipe burners for RLS 70-100-130

MULTIBLOC gas train without seal control

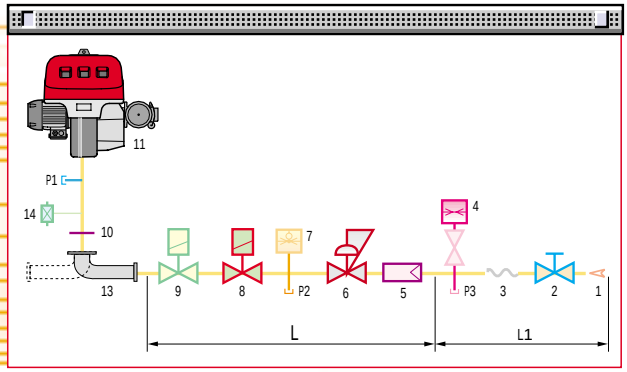


MULTIBLOC gas train with seal control

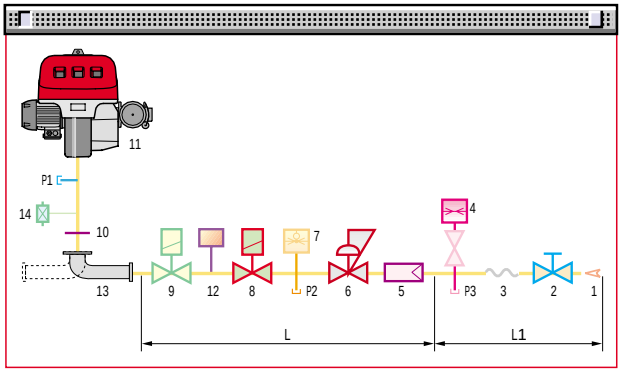


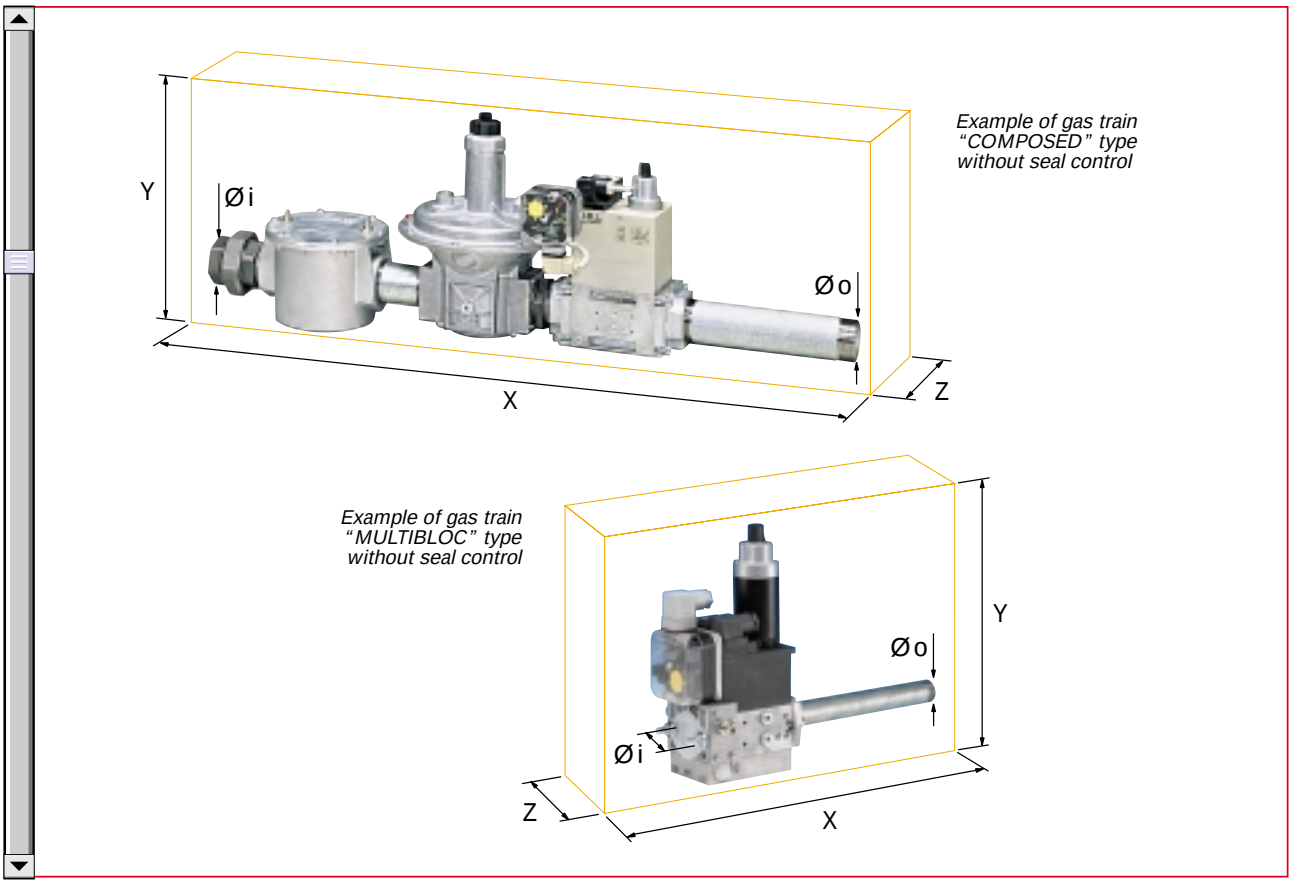
1	Gas input pipework
2	Manual valve
3	Anti-vibration joint
4	Pressure gauge with pushbutton cock
5	Filter
6	Pressure regulator (vertical)
7	Minimum gas pressure switch
8	VS safety solenoid (vertical)
9	VR regulation solenoid (vertical). Three adjustments: - ignition delivery (rapid opening) - 1st stage delivery (slow opening) - 2nd stage delivery ((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.
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

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 RLS 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.

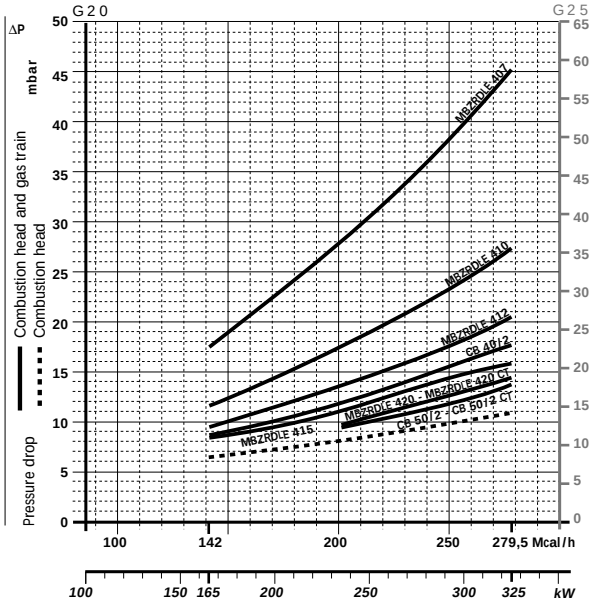
	Name	Code	Ø i	Ø o	X mm	Y mm	Z mm	Seal Control
MULTIBLOC GAS TRAINS	**MBZRDLE 407**	3970046	3/4”	3/4”	195	235	120	-
	MBZRDLE 410	3970079	1”	3/4”	195	235	145	-
	MBZRDLE 412	3970152	1”1/4	1”1/2	433	290	145	-
	MBZRDLE 415	3970183	1”1/2	121/2	523	346	100	-
	MBZRDLE 420	3970184	2”	2”	523	400	100	-
	MBZRDLE 420 CT	3970185	2”	2”	523	400	227	Incorporated
COMPOSED GAS TRAINS	**CB 40/2**	3970153	1”1/2	1”1/2	1013	346	195	-
	CB 50/2	3970154	2”	2”	1150	354	250	-
	CB 50/2 CT	3970166	2”	2”	1150	354	320	Incorporated
	CBF 65/2	3970155	DN 65	DN 65	1166	475	285	-
	CBF 65/2 CT	3970167	DN 65	DN 65	1166	475	285	Incorporated
	CBF 80/2	3970156	DN 80	DN 80	1246	425	285	-
	CBF 80/2 CT	3970168	DN 80	DN 80	1246	425	285	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

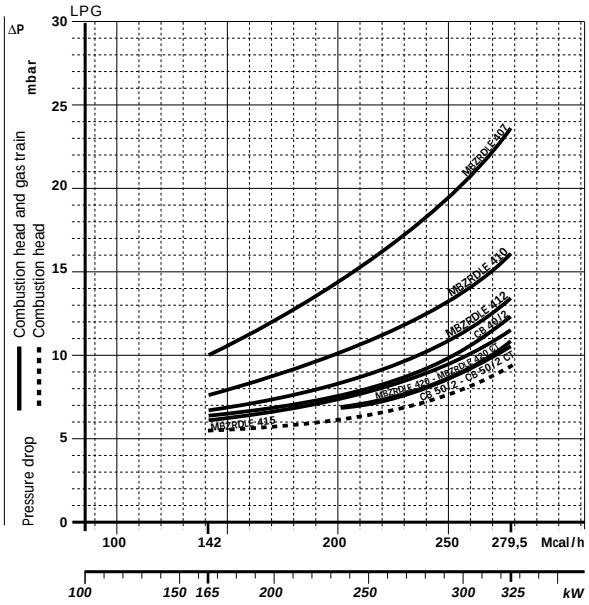
RLS 28



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

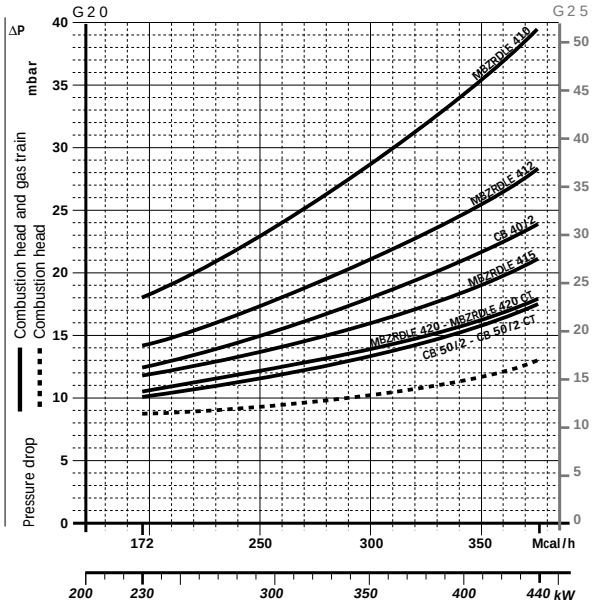
LPG

RLS 28



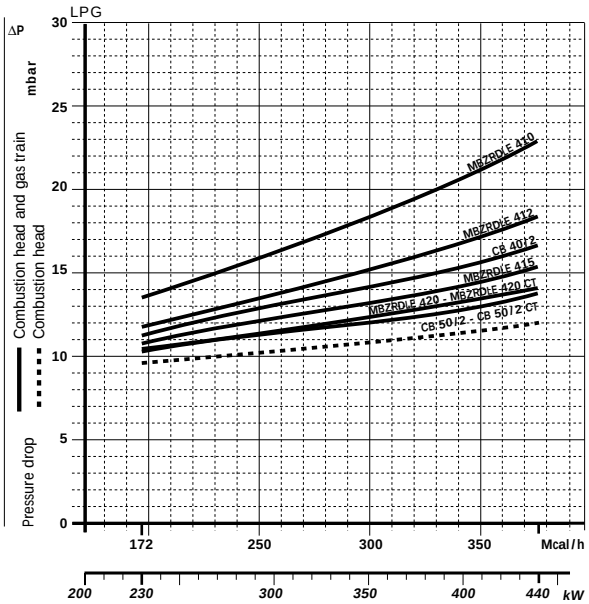
Gas train	Code	Adapter	Seal Control
MBZRDLE 420	3970184	3000822	Accessory
MBZRDLE 420 CT	3970185	3000822	Incorporated
CB 50/2	3970154	3000822	Accessory
CB 50/2 CT	3970166	3000822	Incorporated

RLS 38



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

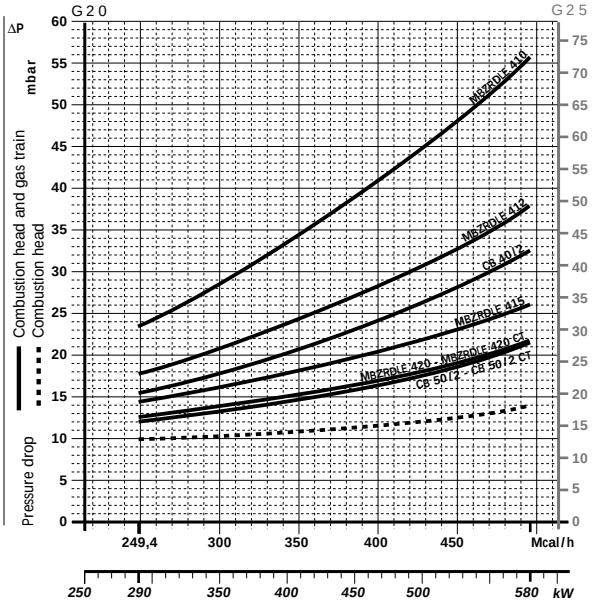
RLS 38



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

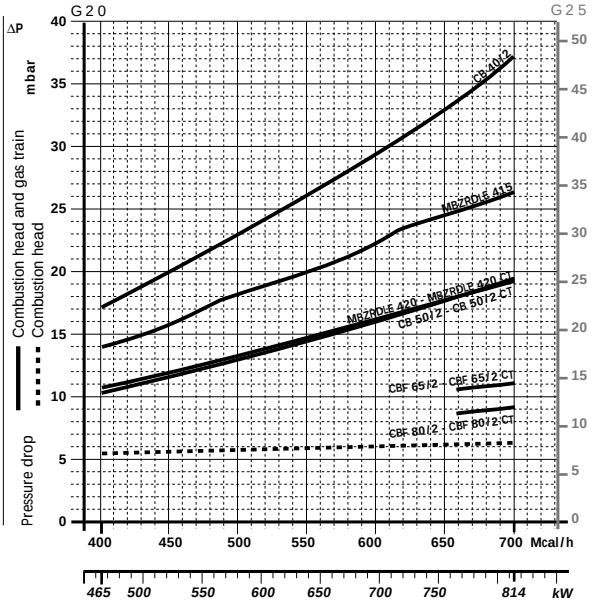
NATURAL GAS

RLS 50



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

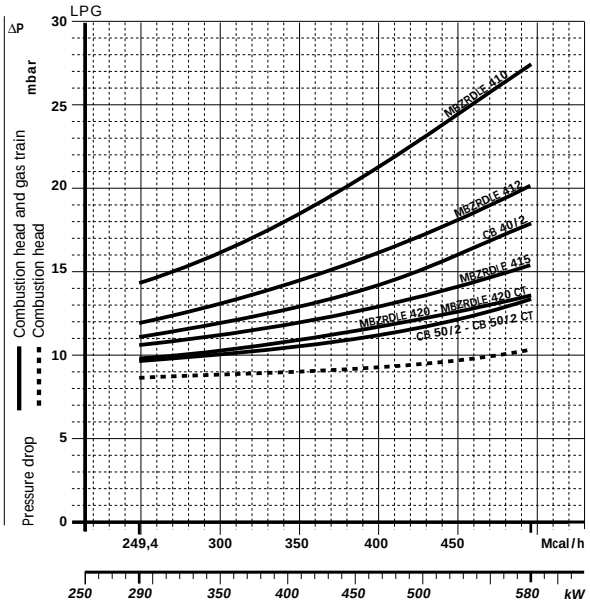
RLS 70



Gas train	Code	Adapter	Seal Control
MBZRDLE 415	3970183	3000843	Accessory
CB 40/2	3970153	3000843	Accessory
MBZRDLE 420	3970184	-	Accessory
MBZRDLE 420 CT	3970185	-	Incorporated
CB 50/2	3970154	-	Accessory

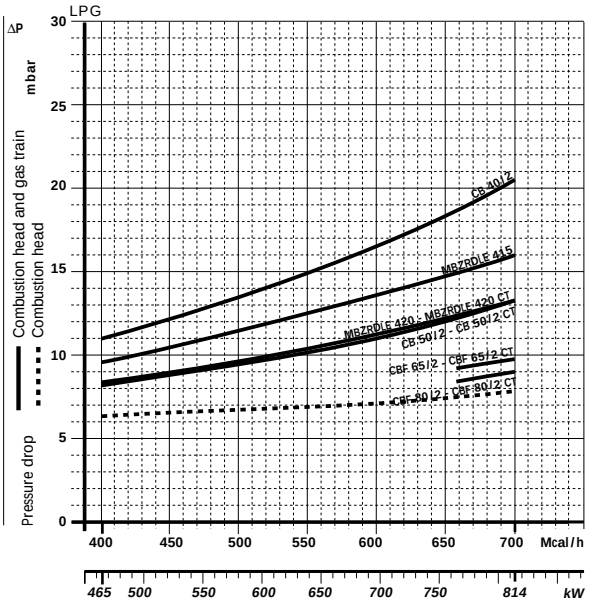
LPG

RLS 50



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

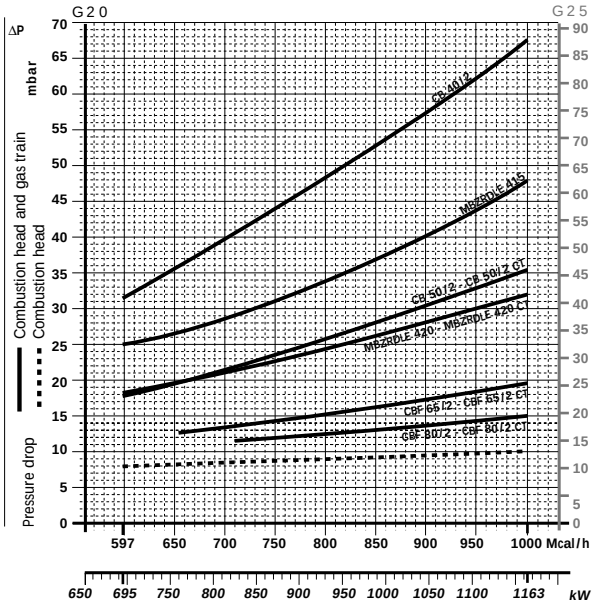
RLS 70



Gas train	Code	Adapter	Seal Control
CB 50/2 CT	3970166	-	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

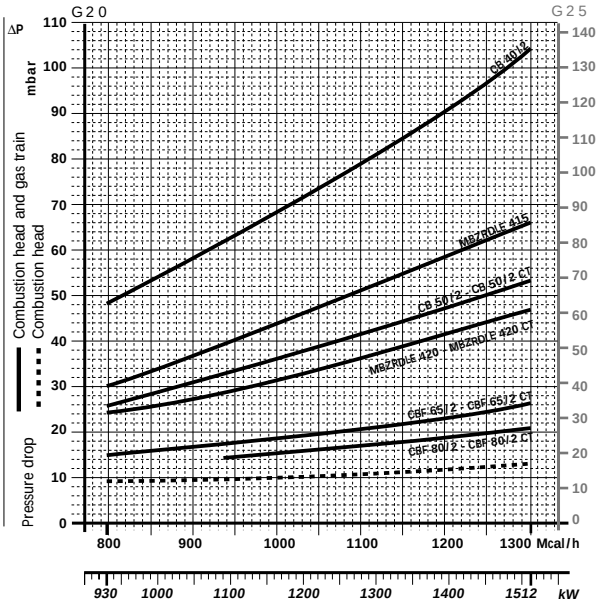
NATURAL GAS

RLS 100



Gas train	Code	Adapter	Seal Control
MBZRDLE 415	3970183	3000843	Accessory
CB 40/2	3970153	3000843	Accessory
MBZRDLE 420	3970184	-	Accessory
MBZRDLE 420 CT	3970185	-	Incorporated
CB 50/2	3970154	-	Accessory

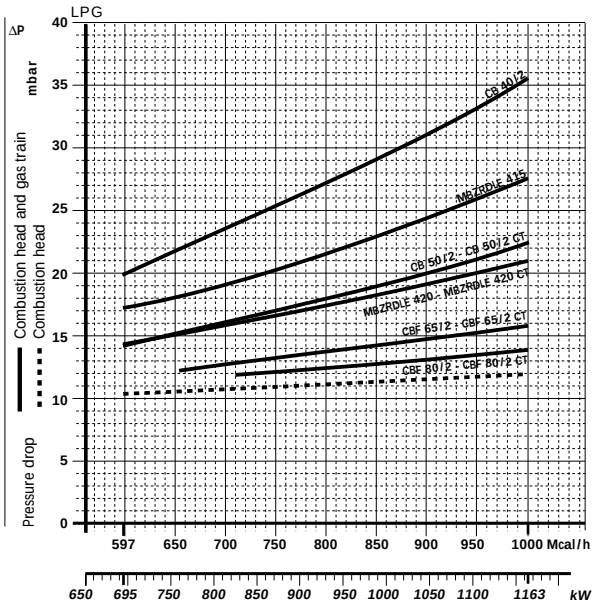
RLS 130



Gas train	Code	Adapter	Seal Control
MBZRDLE 415	3970183	3000843	Accessory
CB 40/2	3970153	3000843	Accessory
MBZRDLE 420	3970184	-	Accessory
MBZRDLE 420 CT	3970185	-	Incorporated
CB 50/2	3970154	-	Accessory

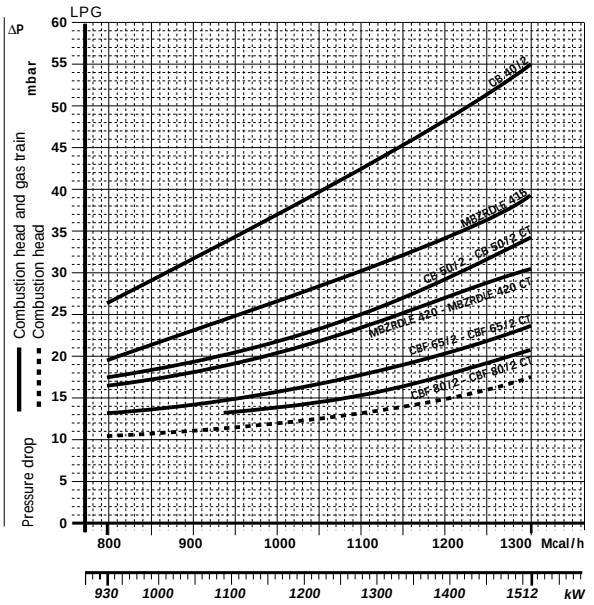
LPG

RLS 100



Gas train	Code	Adapter	Seal Control
CB 50/2 CT	3970166	-	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

RLS 130



Gas train	Code	Adapter	Seal Control
CB 50/2 CT	3970166	-	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.

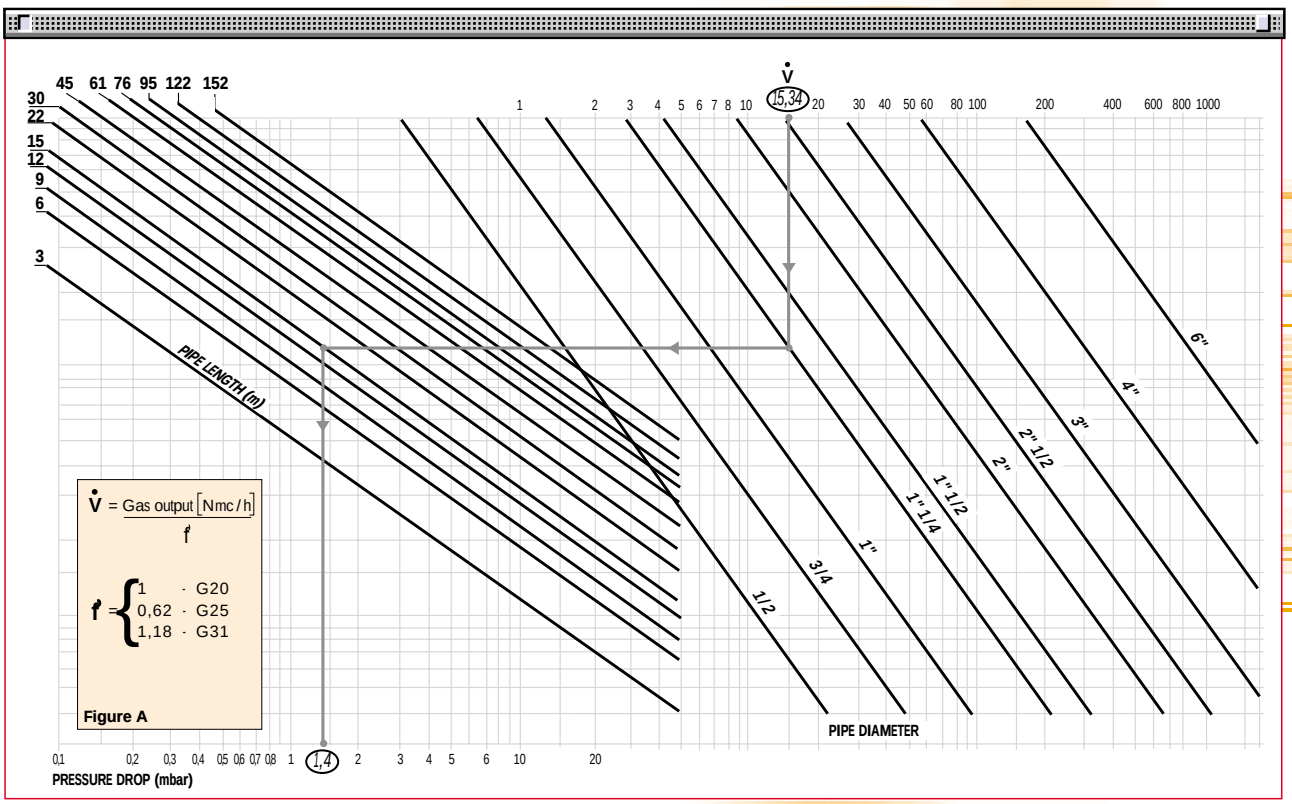
Example:

	- 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

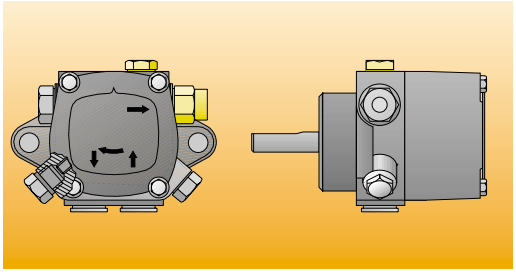
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the 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



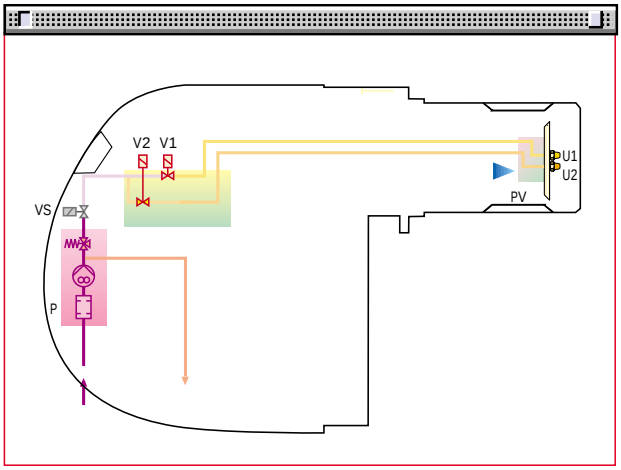
HYDRAULIC CIRCUIT

The burners are fitted with three valves (a safety valve and two oil delivery valves) along the oil line from the pump to the nozzle.
A thermostatic control device, on the basis of required output, regulates oil delivery valves opening, allowing light oil passage trough the valves and to the nozzle. Delivery valves open contemporary to the air damper opening, controlled by a servomotor.
The pumping group is fitted whit a pump, an oil filter and a regulating valve: through this it is possible to manaully adjusts atomised pressure, which in factory is preset at 12 bar.

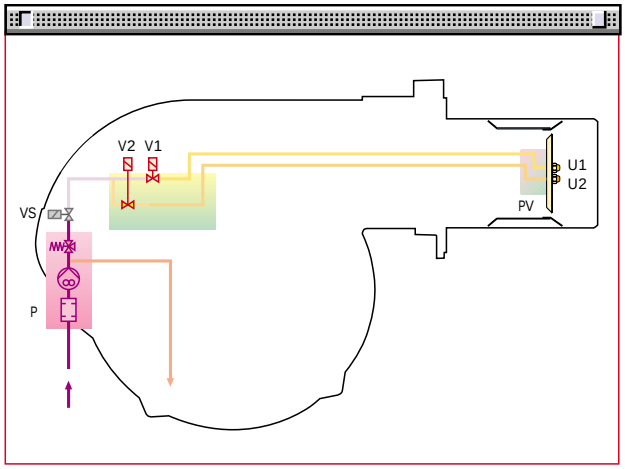


Example of light oil pump of RLS 70-100-130 burners

RLS 28-38-50



RLS 70-100-130



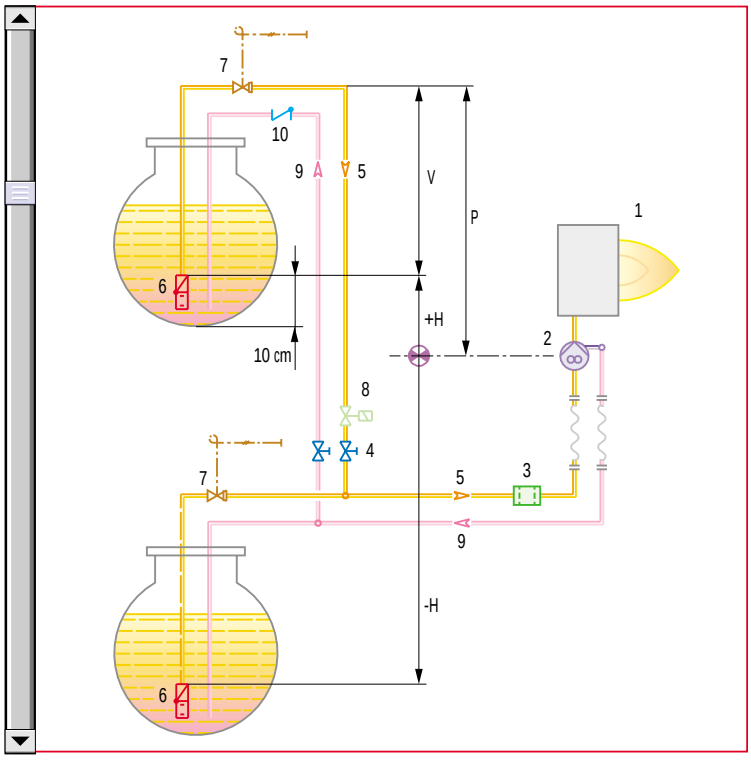
P	Pump with filter and pressure regulator on the output circuit
VS	Safety valve on the output circuit
V1	1st stage valve
V2	2nd stage valve
PV	Nozzle holder
U1	1st stage nozzle
U2	2nd stage nozzle

DIMENSIONING OF THE FUEL SUPPLY LINES

The fuel feed must be completed with the safety devices required by the local norms.

The table shows the choice of piping diameter for the various burners, depending on the difference in height between the burner and the tank and their distance.

MAXIMUM EQUIVALENT LENGTH FOR THE PIPING L[m]						
Model	RLS 28 – 38 -50			RLS 70 –100 –130		
Piping diameter	8mm	10mm	12mm	12mm	14mm	16mm
+H, -H (m)	Lmax (m)	Lmax (m)	Lmax (m)	Lmax (m)	Lmax (m)	Lmax (m)
+4,0	35	90	152	71	138	150
+3,0	30	80	152	62	122	150
+2,0	26	69	152	53	106	150
+1,5	22	54	141	49	98	150
+1,0	21	59	130	44	90	150
+0,5	19	53	119	40	82	150
0	17	48	108	36	74	137
-0,5	15	43	97	32	66	123
-1,0	13	37	83	28	56	109
-1,5	11	32	74	24	49	95
-2,0	9	27	64	19	42	81
-3,0	4	16	42	10	26	53
-4,0	-	6	20	-	10	25

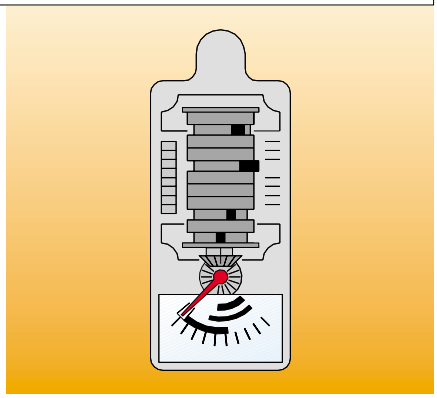


H	Difference in height pump-foot valve
Ø	Internal pipe diameter
P	Height ≤ 10 m
V	Height ≤ 4 m
1	Burner
2	Burner pump
3	Filter
4	Manual shut off valve
5	Suction pipework
6	Bottom valve
7	Remote controlled rapid manual shutoff valve (compulsory in Italy)
8	Type approved shut off solenoid (compulsory in Italy)
9	Return pipework
10	Check valve

note *With ring distribution oil systems, the feasible drawings and dimensioning are the responsibility of specialised engineering studios, who must check compatibility with the requirements and features of each single installation.*

VENTILATION

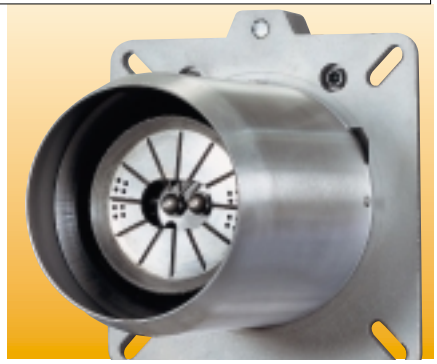
The ventilation circuit produces low noise levels with high performances in pressure and air delivery, in spite of compact dimensions. The use of reverse curve blades and sound proofing material keeps noise level very low.
The result is a powerful yet quiet burner with increased combustion performance.
A servomotor allows to have a right air flow in any operational state and the closure of the air damper when burner is in stand-by.



Example of the servomotor for air regulation on RLS 70-100-130 burners.

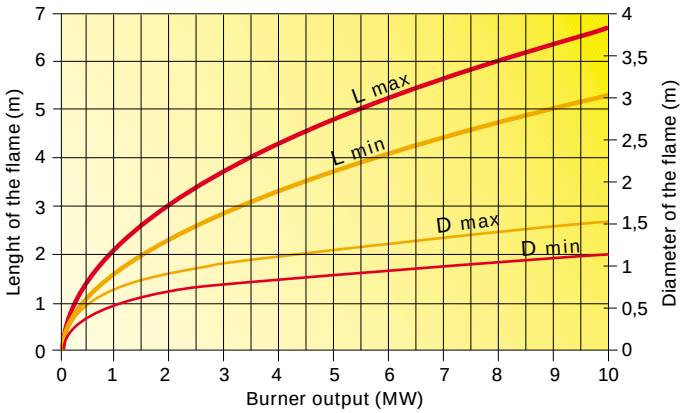
COMBUSTION HEAD

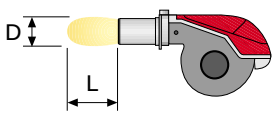
Different lenghts of the combustion head can be supplied (with application of a specific “extended head kit”) for the RLS series of burners.
The selection depends on the thickness of the front panel and on the type of boiler.
Depending on the type of generator, check that the penetration of the head into the combustion chamber is correct.
The internal position of the combustion head can easily be adjusted to the maximum defined output by regulating a screw fixed to the flange.



Example of RLS 130 burners combustion head.

Dimensions of the flame





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

BURNER OPERATION MODE

With two-stage operation, the RLS series of burners can follow the temperature load requested by the system. A modulation ratio of 2:1 is reached thanks to the nozzles when burner is supplied with light oil and to the two-stage gas train when burner is supplied from gas; the air is adapted to the servomotor rotations.

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

Two stage operation

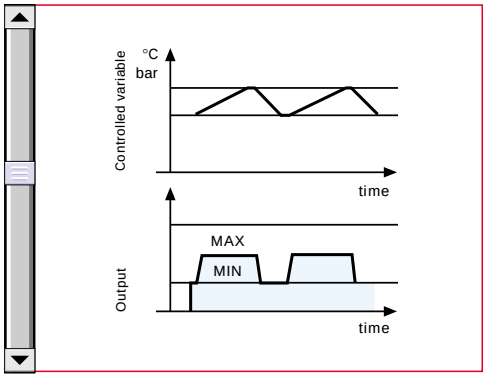
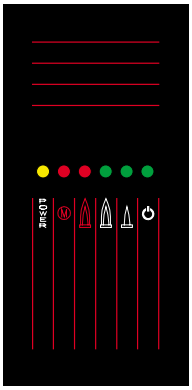


Figure **A**



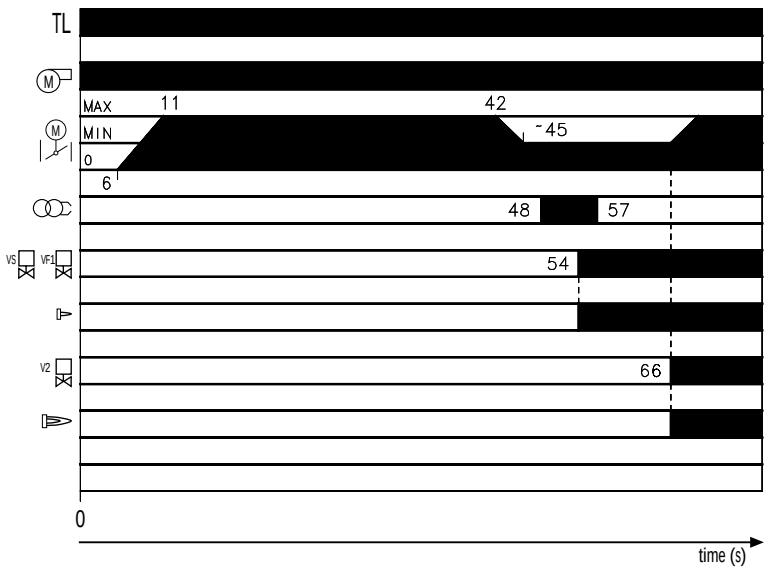
= Power on
= Fan motor blocked (red)
= Burner lock-out (red)
= 2nd stage operation
= 1st stage operation
= Burner operating

Figure **A:** *Layout of “Led Panel”*

The RLS burners are equipped with an exclusive electronic device “Led panel” that provides the six data items signalled by the leds lighting up of figure B.

FIRING

RLS 28 - 38 - 50 - 70 - 100 - 130



0”	Thermostat closes. The motor starts running.
6”-11”	The servomotor opens the air damper.
11”-42”	Pre-purge with air damper open.
42”-45”	The servomotor takes the air damper to the firing position.
48”	Pre-ignition
54”	Solenoid security valve VS and V1 1st stage valve open; 1st stage flame
57”	After 3” firing the ignition transformer switches off (if flame is detected, otherwise there is a lock-out)
66”	If heat request is not yet satisfied, 2nd stage solenoid valve V2 opens and at the same time servomotor open completely the air damper. The starting cycle comes to an end. 2nd stage flame.

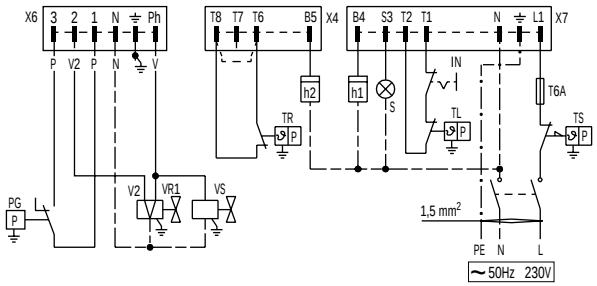
ELECTRICAL CONNECTIONS
To be made by the installer

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

Example of the terminal board for electrical connections for RLS 28-38 burner models

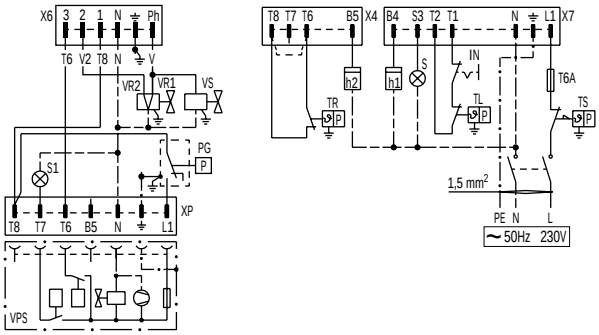
TWO STAGE OPERATION

RLS 28-38
Without seal control



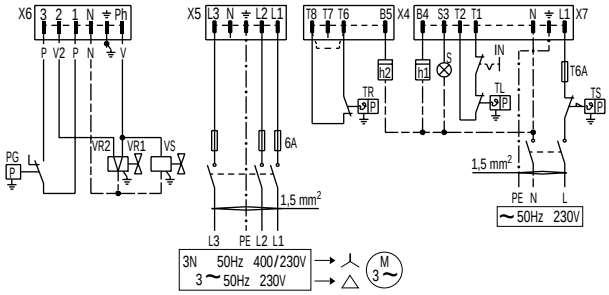
h1 - 1st stage hourcounter
h2 - 2nd stage hourcounter
IN - Burner manual stop switch
XP - Plug for seal control device
X4 - 4 pole plug
X6 - 6 pole plug
X7 - 7 pole plug
PG - Min gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TR - High-low mode load remote control system
TL - Load limit remote control system
TS - Safety load control system
VR1 - Regulating valve 1st stage
VR2 - Regulating valve 2nd stage
VS - Safety valve

RLS 28-38
With seal control



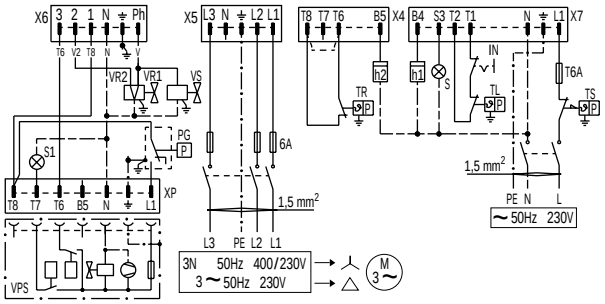
h1 - 1st stage hourcounter
h2 - 2nd stage hourcounter
IN - Burner manual stop switch
XP - Plug for seal control device
X4 - 4 pole plug
X6 - 6 pole plug
X7 - 7 pole plug
PG - Min gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TR - High-low mode load remote control system
TL - Load limit remote control system
TS - Safety load control system
VR1 - Regulating valve 1st stage
VR2 - Regulating valve 2nd stage
VS - Safety valve

RLS 50
Without seal control



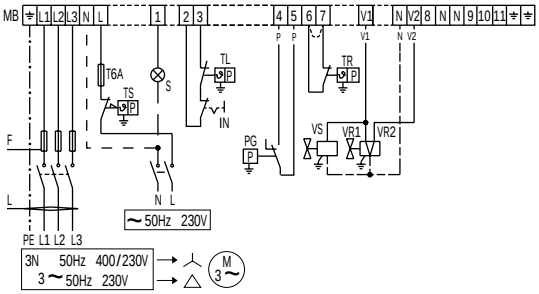
h1 - 1st stage hourcounter
h2 - 2nd stage hourcounter
IN - Burner manual stop switch
XP - Plug for seal control device
X4 - 4 pole plug
X5 - 5 pole plug
X6 - 6 pole plug
X7 - 7 pole plug
PG - Min gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TR - High-low mode load remote control system
TL - Load limit remote control system
TS - Safety load control system
VR1 - Regulating valve 1st stage
VR2 - Regulating valve 2nd stage
VS - Safety valve

RLS 50
With seal control



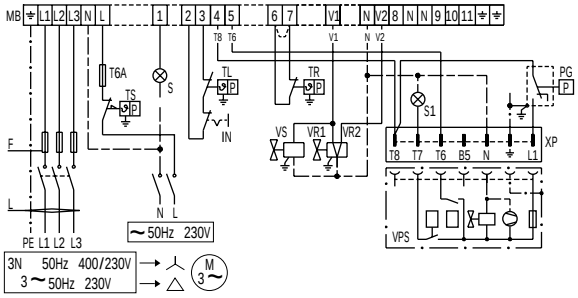
h1 - 1st stage hourcounter
h2 - 2nd stage hourcounter
IN - Burner manual stop switch
XP - Plug for seal control device
X4 - 4 pole plug
X5 - 5 pole plug
X6 - 6 pole plug
X7 - 7 pole plug
PG - Min gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TR - High-low mode load remote control system
TL - Load limit remote control system
TS - Safety load control system
VR1 - Regulating valve 1st stage
VR2 - Regulating valve 2nd stage
VS - Safety valve

RLS 70-100-130
Without seal control



IN - Burner manual stop switch
XP - Plug for seal control device
MB - Burner terminal board
PG - Min gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TR - High-low mode load remote control system
TL - Load limit remote control system
TS - Safety load control system
VR1 - Regulating valve 1st stage
VR2 - Regulating valve 2nd stage
VS - Safety valve

RLS 70-100-130
With seal control



IN - Burner manual stop switch
XP - Plug for seal control device
MB - Burner terminal board
PG - Min gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TR - High-low mode load remote control system
TL - Load limit remote control system
TS - Safety load control system
VR1 - Regulating valve 1st stage
VR2 - Regulating valve 2nd stage
VS - Safety valve

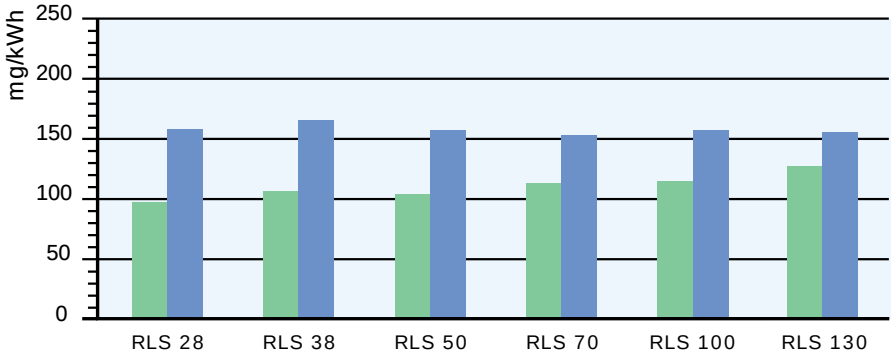
The following table shows the supply lead sections and the type of fuse to be used.

Model		▼ RLS 28	▼ RLS 38	▼ RLS 50		▼ RLS 70		▼ RLS 100		▼ RLS 130	
		230V	230V	230V	400V	230V	400V	230V	400V	230V	400V
F	A	T6	T6	T10	T6	T10	T6	T10	T6	T10	T6
L	mm²	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5

Table A

EMISSIONS

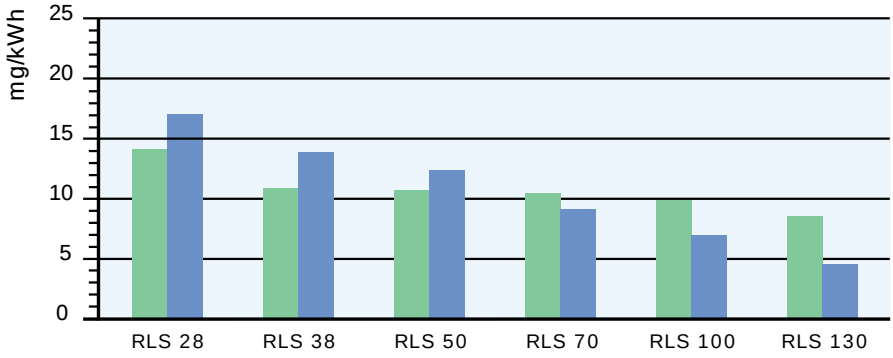
NO_X EMISSIONS



Gas working

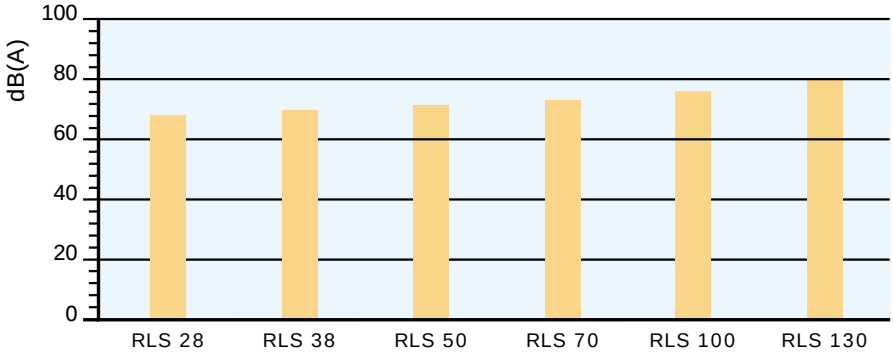
Light oil working

CO EMISSIONS



The emission data has been measured in the various models at maximum output, according to EN 676 and EN 267 standard.

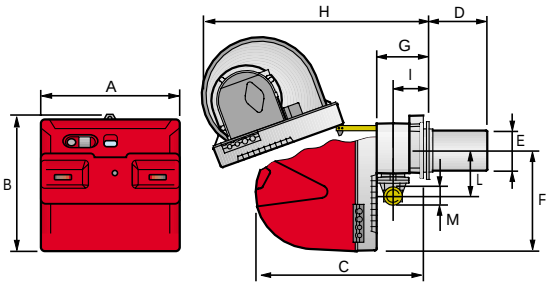
NOISE EMISSIONS



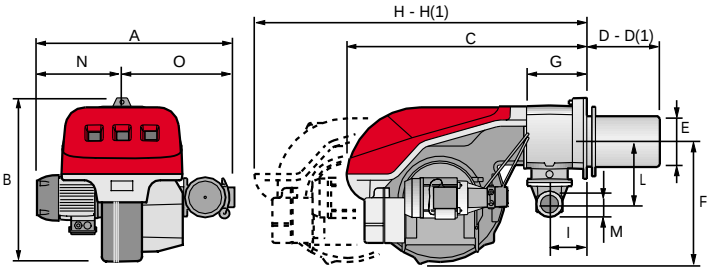
OVERALL DIMENSIONS (mm)

BURNERS

RLS 28 - 38 - 50



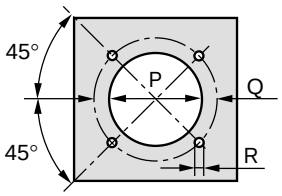
RLS 70 - 100 - 130



Model	A	B	C	D	D(1)	E	F	G	H	H(1)	I	L	M	N	O
RLS 28	476	474	580	191	326	140	352	164	810	810	108	168	1”1/2	-	-
RLS 38	476	474	580	201	336	152	352	164	810	810	108	168	1”1/2	-	-
RLS 50	476	474	580	216	351	152	352	164	810	810	108	168	1”1/2	-	-
RLS 70	691	555	840	250	385	179	430	214	1161	1361	134	221	2”	296	395
RLS 100	707	555	840	250	385	179	430	214	1161	1361	134	221	2”	312	395
RLS 130	733	555	840	250	385	189	430	214	1161	1361	134	221	2”	338	395

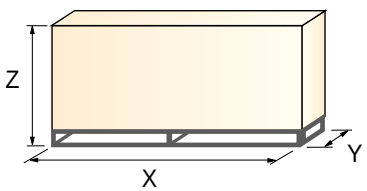
(1) Dimension with “extended head”.

BURNER - BOILER MOUNTING FLANGE



Model	P	Q	R
RLS 28	160	224	M8
RLS 38	160	224	M8
RLS 50	160	224	M8
RLS 70	185	275-325	M12
RLS 100	195	275-325	M12
RLS 130	195	275-325	M12

PACKAGING



Model	X	Y	Z	kg
RLS 28	872	540	550	43
RLS 38	872	540	550	45
RLS 50	872	540	550	46
RLS 70	1190	692	740	70
RLS 100	1190	692	740	73
RLS 130	1190	692	740	76

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 boiler output and following the diagrams included in the burner instruction handbook
- Refit the burner casing to the slide bars.
- Install the nozzle choosing this on the basis of the maximum boiler output and following the diagrams included in the burner instruction handbook.
- Check the position of the electrodes.
- Close the burner, sliding it up to the flange, keeping it slightly raised to avoid the flame stability disk rubbing against the blast tube.

ELECTRICAL AND HYDRAULIC CONNECTIONS AND START UP

- The burners are supplied for connection to two pipes fuel supply system.
- Connect the ends of the flexible pipes to the suction and return pipework using the supplied nipples.
- Make the electrical connections to the burner following the wiring diagrams included in the instruction handbook.
- Prime the pump by turning the motor (after checking rotation direction if it is a three phase motor).
- Adjust the gas train for first start
- On start up, check:
- Pressure pump and valve unit regulator (to max. and min.)
- Gas pressure at the combustion head (to max. and min. output)
- Combustion quality, in terms of unburned substances and excess air.

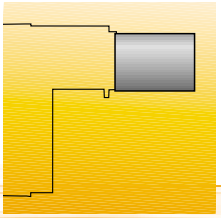
Nozzles type 60° B

The nozzles must be ordered separately. The following table shows the features and codes on the basis of the maximum required fuel output.

Nozzles type 60° B					
Burner	GPH	Rated output (kg/h) Nozzle			Code
		at 10 bar	at 12 bar	at 14 bar	
RLS 28	2,00	7,7	8,5	9,2	**3042126**
RLS 28-38	2,50	9,6	10,6	11,5	**3042140**
RLS 28-38-50	3,00	11,5	12,7	13,8	**3042158**
RLS 28-38-50	3,50	13,5	14,8	16,1	**3042162**
RLS 38-50	4,00	15,4	17	18,4	**3042172**
RLS 38-50	4,50	17,3	19,1	20,7	**3042182**
RLS 38-50-70	5,00	19,2	21,2	23	**3042192**
RLS 50-70	5,50	21,1	23,3	25,3	**3042202**
RLS 50-70	6,00	23,1	25,5	27,7	**3042212**
RLS 50-70	6,50	25	27,6	30	**3042222**
RLS 70-100	7,00	26,9	29,7	32,3	**3042232**
RLS 70-100	7,50	28,8	31,8	34,6	**3042242**
RLS 70-100	8,00	30,8	33,9	36,9	**3042252**
RLS 70-100	8,50	32,7	36,1	39,2	**3042262**
RLS 70-100-130	9,50	36,5	40,3	43,8	**3042282**
RLS 70-100-130	10,00	38,4	42,4	46,1	**3042292**
RLS 70-100-130	11,00	42,3	46,7	50,7	**3042312**
RLS 100-130	12,00	46,1	50,9	55,3	**3042322**
RLS 100-130	13,00	50	55,1	59,9	**3042332**
RLS 100-130	14,00	53,8	59,4	64,5	**3042352**
RLS 100-130	15,00	57,7	63,6	69,2	**3042362**
RLS 100-130	16,00	61,5	67,9	73,8	**3042382**
RLS 130	17,00	65,4	72,1	78,4	**3042392**

Extended heads

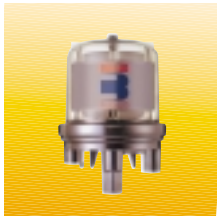
“Standard head” burners can be transformed into “extended head” versions, by using the special kit. The kits available for the various burners, giving the original and the extended lengths, are listed below.



Extended heads			
Burner	‘Standard’ head length (mm)	‘Extended’ head length (mm)	Kit code
RLS 28	191	326	**3010154**
RLS 38	201	336	**3010155**
RLS 50	216	351	**3010156**
RLS 70	250	385	**3010162**
RLS 100	250	385	**3010163**
RLS 130	250	385	**3010164**

Degasing unit

To solve problem of air in the oil sucked, two versions of degassing unit are available.



Degasing unit		
Burner	**Degasing unit with filter Code**	**Degasing unit without filter Code**
RLS	**3010055**	**3010054**

GAS TRAIN ACCESSORIES

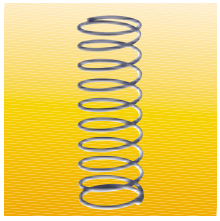
Seal control kit

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

Seal control kit		
Burner	**Gas train**	**Kit code**
RLS 28	MBZRDLE 407 - MBZRDLE 410 - MBZRDLE 412	**3010123**
	MBZRDLE 415 - MBZRDLE 420 - CB 40/2 - CB 50/2	**3010125**
RLS 38	MBZRDLE 410 - MBZRDLE 412	**3010123**
	MBZRDLE 415 - MBZRDLE 420 - CB 40/2 - CB 50/2	**3010125**
RLS 50	MBZRDLE 410 - MBZRDLE 412	**3010123**
	MBZRDLE 415 - MBZRDLE 420 - CB 40/2 - CB 50/2	**3010125**
RLS 70	MBZRDLE 415 - MBZRDLE 420 CB 40/2 - CB 50/2 - CBF 65/2 - CBF 80/2	**3010125**
RLS 100	MBZRDLE 415 - MBZRDLE 420 CB 40/2 - CB 50/2 - CBF 65/2 - CBF 80/2	**3010125**
RLS 130	MBZRDLE 415 - MBZRDLE 420 CB 40/2 - CB 50/2 - CBF 65/2 - CBF 80/2	**3010125**

Stabiliser spring

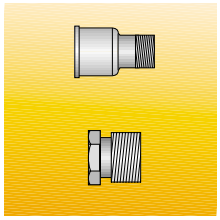
Accessory springs are available to vary the pressure range of the gas train stabilisers.

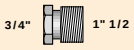
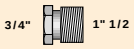
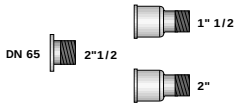
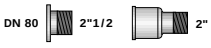
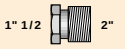
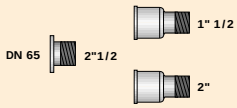
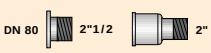
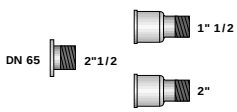
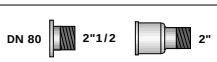


Stabiliser spring		
Gas train	**Spring**	**Code**
CBF 65/1 - CBF 80/1	Red from 25 to 55 mbar	**3010133**
CBF 65/1 - CBF 80/1	Black from 60 to 110 mbar	**3010135**
CBF 65/1 - CBF 80/1	Pink from 90 to 150 mbar	**3090456**

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.



Adapters			
Burner	**Gas train**	**Dimensions**	**Adapter code**
RLS 28	MBZRDLE 407 MBZRDLE 410		**3000824**
	CB 50/2 - CB 50/2 CT MBZRDLE 420 MBZRDLE 420 CT		**3000822**
RLS 38	MBZRDLE 410		**3000824**
	MBZRDLE 420 MBZRDLE 420 CT CB 50/2 - CB 50/2 CT		**3000822**
RLS 50	MBZRDLE 410		**3000824**
	MBZRDLE 420 MBZRDLE 420 CT CB 50/2 - CB 50/2 CT		**3000822**
RLS 70	MBZRDLE 415 - CB 40/2		**3000843**
	CBF 65/2 - CBF 65/2 CT		**3000825**
	CBF 80/2 - CBF 80/2 CT		**3000826**
RLS 100	MBZRDLE 415 - CB 40/2		**3000843**
	CBF 65/2 - CBF 65/2 CT		**3000825**
	CBF 80/2 - CBF 80/2 CT		**3000826**
RLS 130	MBZRDLE 415 - CB 40/2		**3000843**
	CBF 65/2 - CBF 65/2 CT		**3000825**
	CBF 80/2 - CBF 80/2 CT		**3000826**

SPECIFICATION

A specific index guides your choice of burner from the various models available in the RLS 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 Oil/Natural gas
- N Heavy oil

Size

Operation :
- /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
- 3/230-400/50 3/230V/50Hz - 3N/400V/50Hz

Auxiliary voltage :
- 230/50 230V/50Hz

ID : Differential switch

R	LS	28			TC		FS1	3/230-400/50	230/50	

BASIC DESIGNATION

EXTENDED DESIGNATION

LIST OF AVAILABLE MODELS

RLS	28	TC	LP	FS1	1/230/50	230/50
RLS	38	TC	LP	FS1	1/230/50	230/50
RLS	50	TC	LP	FS1	3/230-400/50	230/50
RLS	70	TC	LP	FS1	3/230-400/50	230/50
RLS	100	TC	LP	FS1	3/230-400/50	230/50
RLS	130	TC	LP	FS1	3/230-400/50	230/50

Other versions are available on request.

PRODUCT SPECIFICATION

Burner:
Monobloc forced draught dual fuel burner, two stage operation, made up of:
- Air suction circuit lined with sound-proofing material
- Fan with reverse curve blades
- Fan starting motor
- Air damper for air setting controlled by a servomotor
- Minimum air pressure switch
- Combustion head, that can be set on the basis of required output
- Gears pump for high pressure fuel supply
- Pump starting motor
- Oil safety valves
- Two oil valves (1st and 2nd stage)
- Flame control panel
- Electronic device to check all burners operational modes (Led Panel)
- UV photocell for flame detection
- Burner on/off switch
- Oil/Gas selector
- Manual 1st and 2nd stage switch
- Plugs for electrical connections (RLS 28-38-50)
- Flame inspection window
- Slide bars for easier installation and maintenance
- Protection filter against radio interference
- IP 44 electric protection level.

Conforming to:
- 89/336/EEC directive (electromagnetic compatibility)
- 73/23/EEC directive (low voltage)
- 92/42/EEC directive (performance)
- 98/37/EEC directive (machinery)
- EN 267 (liquid fuel burners)
- EN 676 (gas fuel 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
- 2 flexible pipes for connection to the oil supply network
- 2 nipples for connection to the pump with gaskets
- Kit for transformation to LPG
- Fairleads for electrical connections (for RLS 28-38-50 model)
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- Nozzles
- Head extension kit
- Degasing unit
- Adapters
- Stabiliser spring
- Seal control kit.

Lineagrafica

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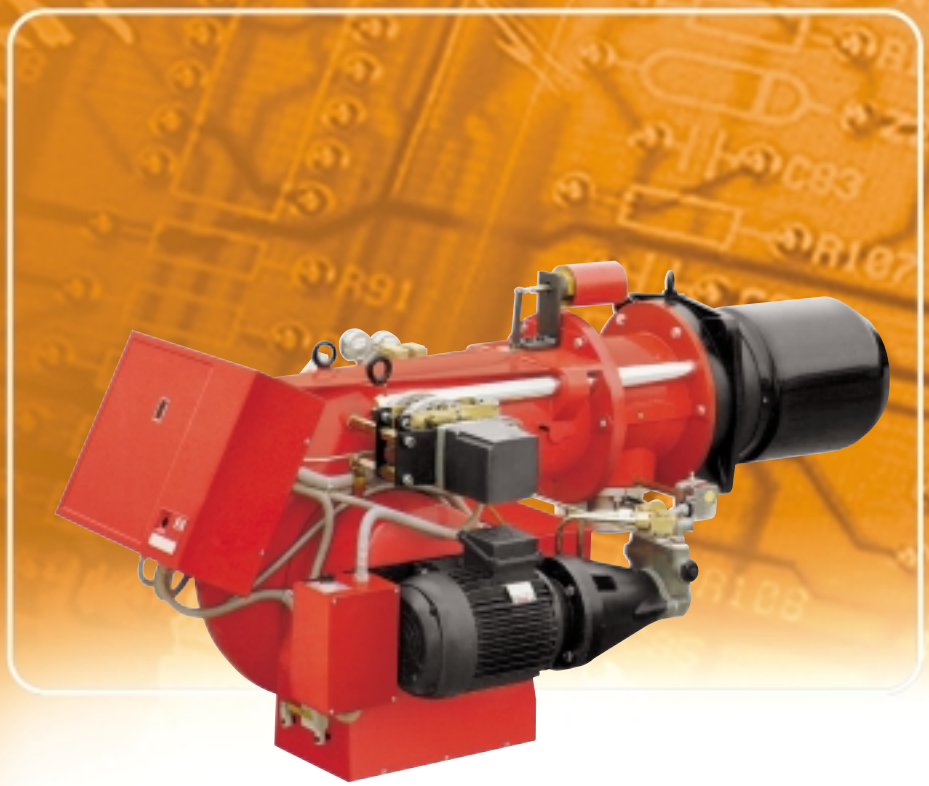
RIELLO BURNERS

CE

MODULATING DUAL FUEL BURNERS

ENNE/EMME SERIES

ENNE/EMME 1400	407/814÷1628 kW
ENNE/EMME 2000	581/1163÷2325 kW
ENNE/EMME 3000	872/1744÷3488 kW
ENNE/EMME 4500	1163/2325÷5000 kW



The ENNE/EMME 1400-4500 series of burners covers a firing range from 407 to 5000 kW. They have been designed for high output users and they are suitable for matching with every kind of boilers, with normal or pressurized combustion chamber. Operation can be “two stage progressive” or, alternatively, “modulating” with the installation of a PID logic regulator and respective probes. Two fuel options are available: only gas and only heavy oil, thus settable by a manual switch. Heavy oil circuit is fitted with his own electric motor: this permits pump stop during gas operation preventing danger of pumping seizure and avoiding oil circulation. A wide range of accessories and gas trains suitable to the burners guarantee an elevated working flexibility.

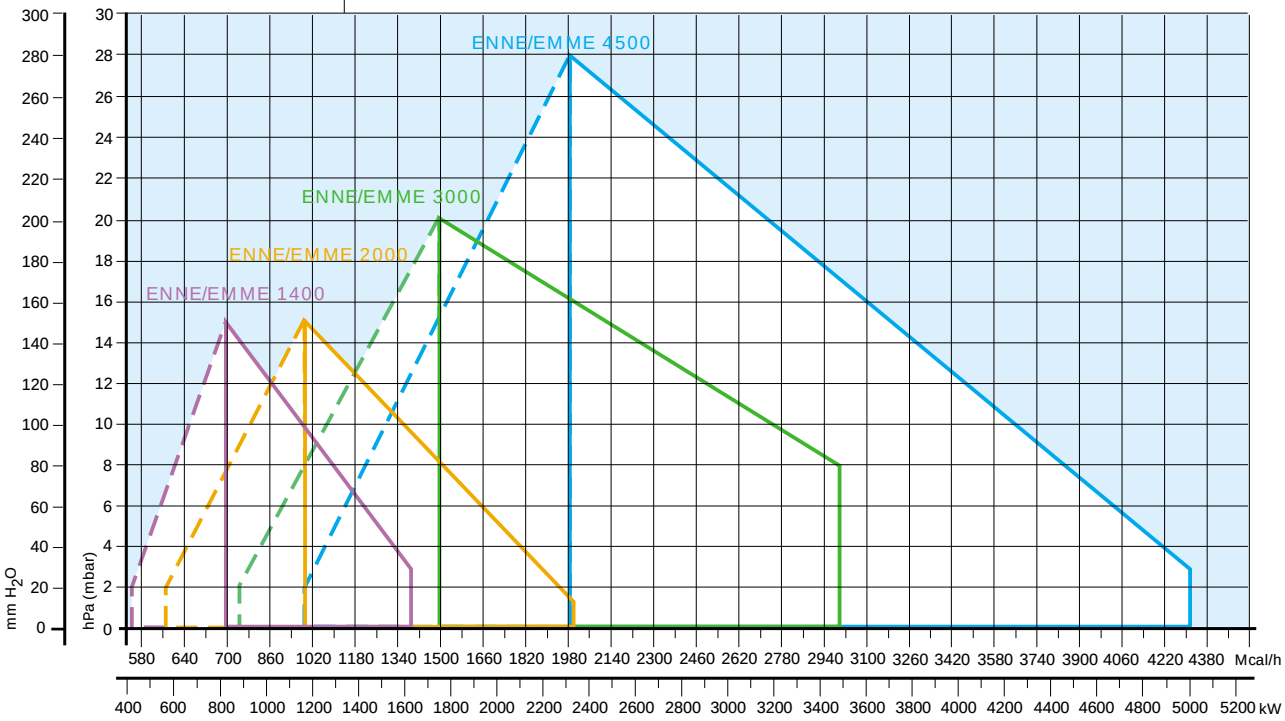
TECHNICAL DATA

	Model			ENNE/EMME 1400	ENNE/EMME 2000	ENNE/EMME 3000	ENNE/EMME 4500
	Burner operation mode			**Modulating (with regulator and probes accessories)**			
	Modulating ratio at max. ouput			**3:1**			
	Servomotor	**type**		**SQM 10.16502**			
		run time	**s**	**42**			
	Heat output		**kW**	**407/814-1628**	**581/1163-2325**	**872/1744-3488**	**1163/2325-5000**
			Mcal/h	**350/700-1400**	**500/1000-2000**	**750/1500-3000**	**1000/2000-4300**
	Working temperature		**°C min/max**	**0/40**			
Fuel / air data	**Oil**	**net calorific value**	**kWh/kg**	**11,16**			
		viscosity	**mm²/s (cSt)**	**max. 50 (at 50°C)**			
		delivery	**kg/h**	**36/73-114**	**52/104-208**	**78/156-312**	**104/208-448**
	Pump	**type**		**TA 3**	**TA 4**	**NVBHR PDC**	**NVBHR MDC**
		delivery	**kg/h**	**750 (at 25 bar)**	**850 (at 25 bar)**	**900 (at 25 bar)**	**1200 (at 25 bar)**
	Atomised pressure		**bar**	**25**			
	Fuel temperature		**max °C**	**50**			
	Fuel pre-heater			**YES**			
	G20	**net calorific value**	**kWh/Nm³**	**10**			
		density	**kg/Nm³**	**0,71**			
		gas delivery	**Nm³/h**	**41/81-127**	**58/116-232**	**87/174-349**	**116/232-500**
	G25	**net calorific value**	**kWh/Nm³**	**8,6**			
		density	**kg/Nm³**	**0,78**			
		gas delivery	**Nm³/h**	**47/95-147**	**68/135-270**	**101/203-406**	**135/270-581**
	LPG	**net calorific value**	**kWh/Nm³**	**25,8**			
		density	**kg/Nm³**	**2,02**			
		gas delivery	**Nm³/h**	**16/32-49**	**23/45-90**	**34/68-135**	**45/90-194**
	Fan		**type**	**Centrifugal with forward curve blades**			
	Air temperature		**max °C**	**60**			
Electrical data	**Electrical supply**		**Ph / Hz / V**	**3N/50/230-400 (±10%) ⅄ 3/50/230 (±10%) △**			
	Auxiliary electrical supply		**Ph / Hz / V**	**1/50/230 (±10%)**			
	Control box		**type**	**LFL 1.333**			
	Total electrical power		**kW**	**19**	**20**	**32**	**35**
	Auxiliary electrical power		**kW**	**0,9**	**0,9**	**1,2**	**1,2**
	Heaters electrical power		**kW**	**14**	**14**	**19,6**	**19,6**
	Protection level		**IP**	**40**			
	Pump motor electrical power		**kW**	**1,1**	**1,1**	**2,2**	**2,2**
	Rated pump motor current		**A**	**3 - 5,2**	**3 - 5,2**	**3,7 - 6,4**	**3,7 - 6,4**
	Pump motor start up current		**A**	**--**			
	Pump motor protection level		**IP**	**44**			
	Fan motor electrical power		**kW**	**3**	**4**	**9**	**12**
	Rated fan motor current		**A**	**6,1 - 10,6**	**8 - 13,8**	**17 - 29,4**	**26 - 45**
	Fan motor start up current		**A**	**44,5 - 77**	**64 - 111**	**124,1 - 215**	**151 - 261**
	Fan motor protection level		**IP**	**44**	**44**	**44**	**55**
	Ignition transformer		**type**	**--**			
			V1- V2	**230 V - 2 x 6 kV**			
			I1 - I2	**1,9 A - 35 mA**			
	Operation			**Intermittent (at least one stop every 24h)**			
Emissions	**Sound pressure**		**dB(A)**				
	Sound power		**W**				
	Oil	**CO emission**	**mg/kWh**	**< 170**			
		Grade of smoke indicator	**N° Bacharach**	**--**			
		CxHy emission	**mg/kWh**	**--**			
		NOx emission	**mg/kWh**	**< 1000**			
	G20	**CO emission**	**mg/kWh**	**< 100**			
		NOx emission	**mg/kWh**	**< 150**			
Approval	**Directive**			**90/396 - 89/336 - 73/23 EEC**			
	Conforming to			**EN 267 - EN 676**			
	Certification			**--**	**--**	**--**	**--**

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

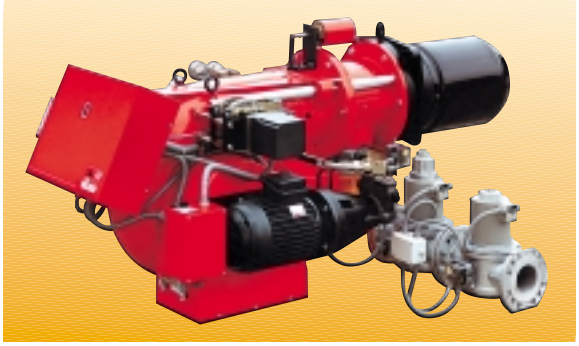
Test conditions conforming to EN 267 - EN 676:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.

FUEL SUPPLY

GAS TRAIN

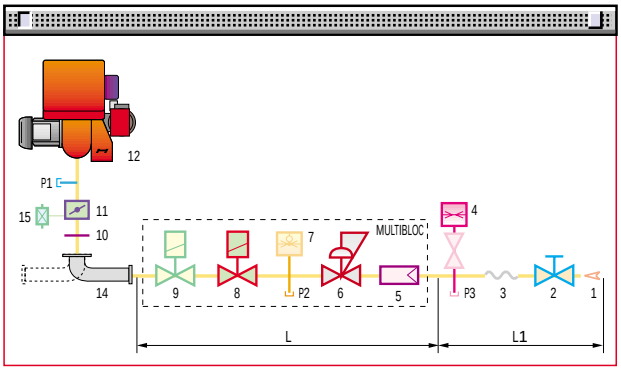
The burners are fitted with a butterfly valve to regulate the fuel, controlled by a variable profile cam servomotor.
Fuel can be supplied either from the right or left hand sides. A maximum gas pressure switch stops the burner in case of excess pressure in the fuel line.

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).

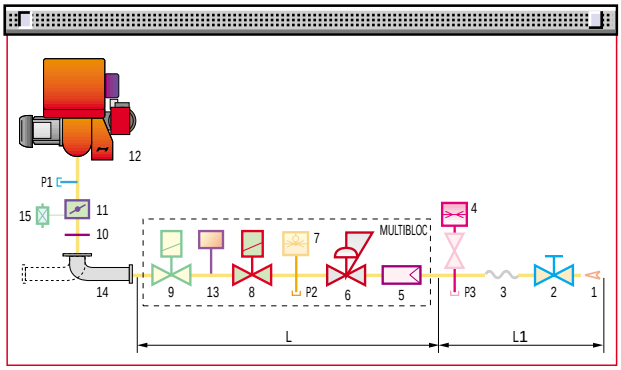


Example of burner of ENNE/EMME series with connected gas train

MULTIBLOC gas train without seal control

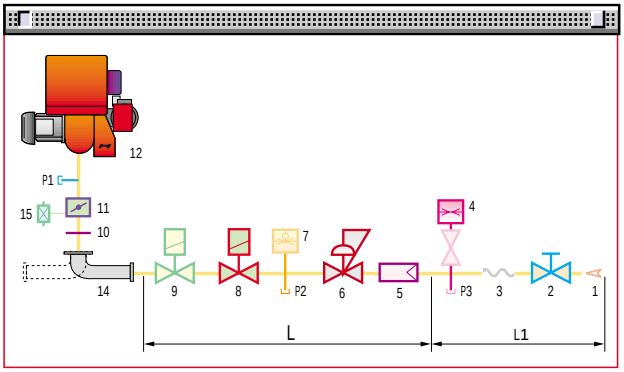


MULTIBLOC gas train with seal control

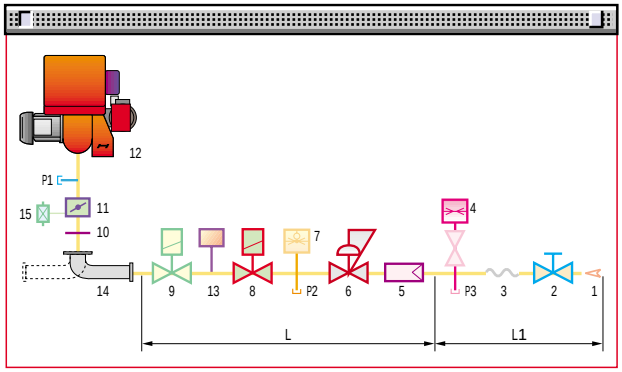


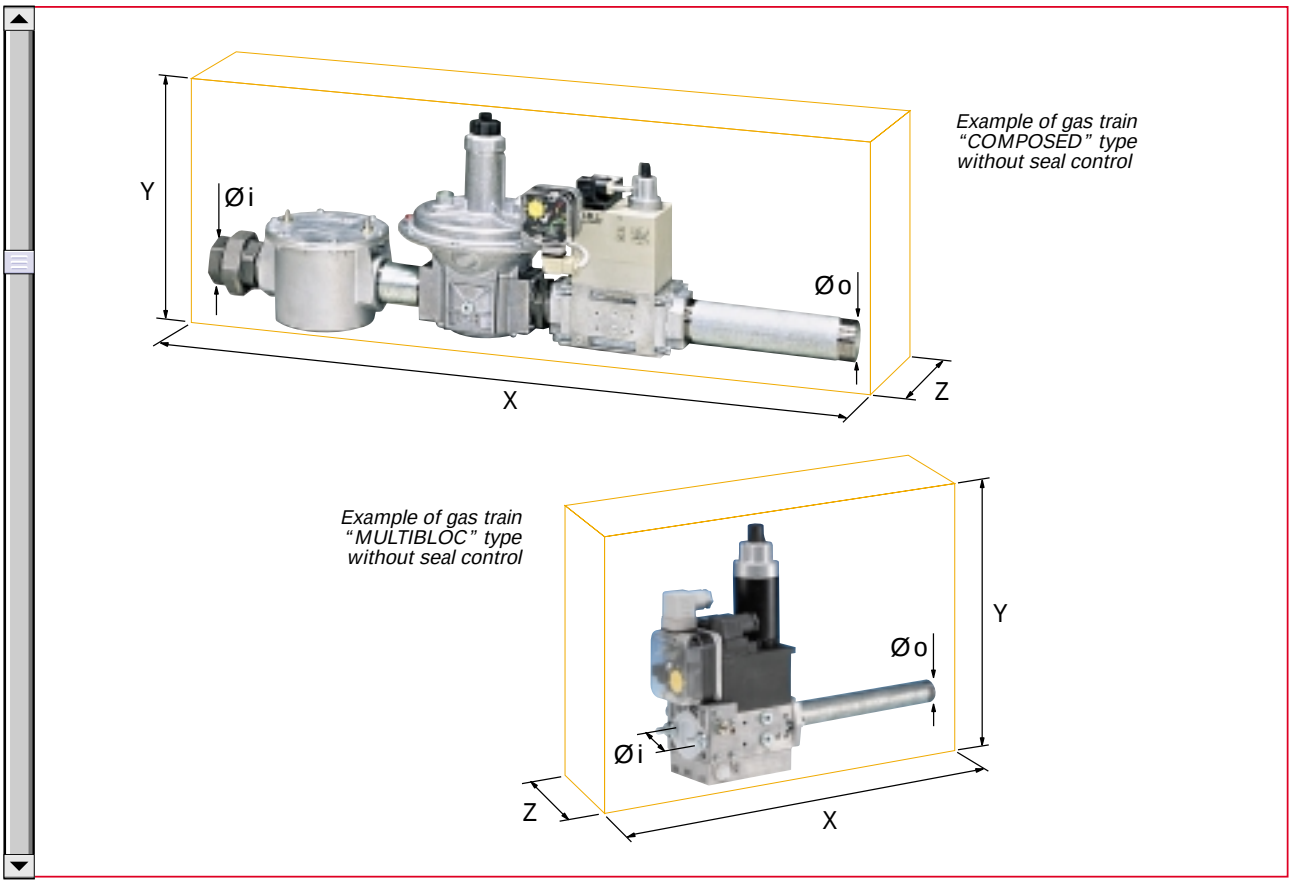
1	Gas input pipework
2	Manual valve
3	Anti-vibration joint
4	Pressure gauge with pushbutton cock
5	Filter
6	Pressure regulator (vertical)
7	Minimum gas pressure switch
8	VS safety solenoid (vertical)
9	VR regulation solenoid (vertical) Two settings: - firing output (rapid opening) - maximum output (slow 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 ENNE/EMME burners, inlet 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 the one of the gas train “Composed” type is 500 mbar.

	Name	Code	Ø i	Ø o	X mm	Y mm	Z mm	SC
MULTIBLOC GAS TRAINS	**MBD 420**	3970181	2”	2”	523	300	100	-
	MBD 420 CT	3970182	2”	2”	523	300	227	Incorporated
COMPOSED GAS TRAINS	**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

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 “Accessories” section.

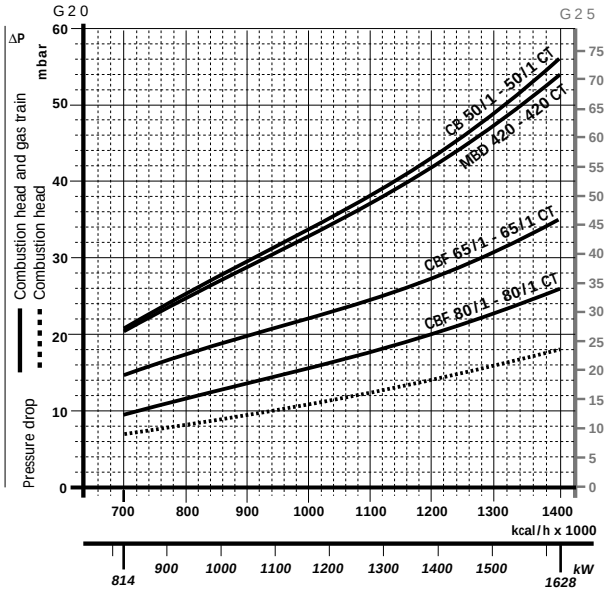
PRESSURE DROP DIAGRAM

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

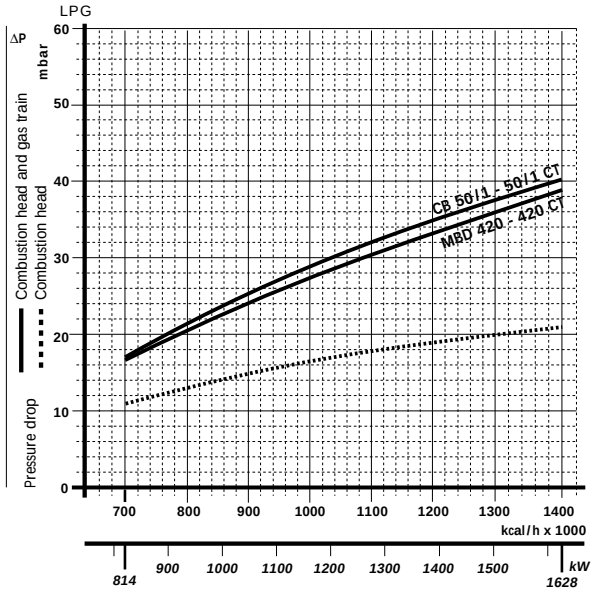
LPG

ENNE/EMME 1400



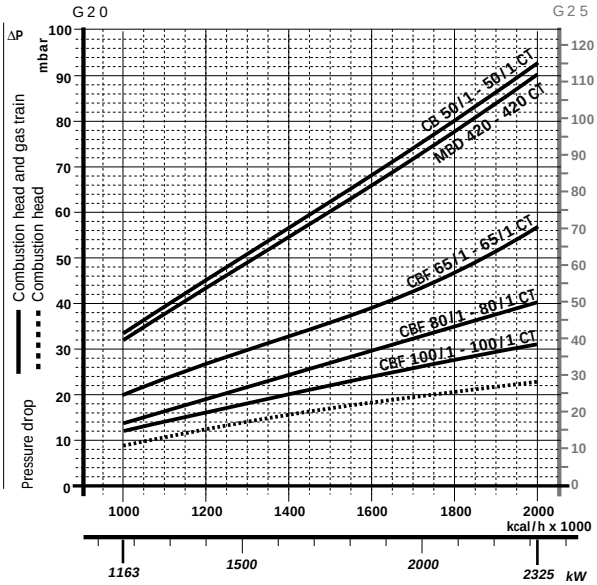
Gas train	Code	Adapter	Seal Control
MBD 420	3970181	-	Accessory
MBD 420 CT	3970182	-	Incorporated
CB 50/1	3970146	-	Accessory
CB 50/1 CT	3970160	-	Incorporated

ENNE/EMME 1400



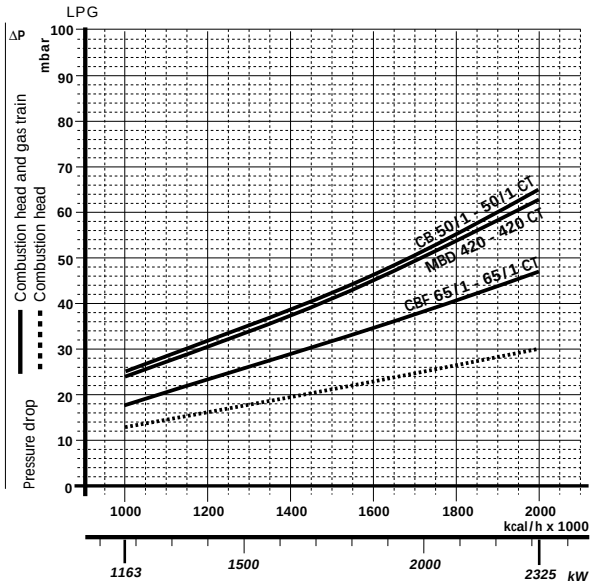
Gas train	Code	Adapter	Seal Control
CBF 65/1	3970147	3000825	Accessory
CBF 65/1 CT	3970161	3000825	Incorporated
CBF 80/1	3970148	3000826	Accessory
CBF 80/1 CT	3970162	3000826	Incorporated

ENNE/EMME 2000



Gas train	Code	Adapter	Seal Control
MBD 420	3970181	-	Accessory
MBD 420 CT	3970182	-	Incorporated
CB 50/1	3970146	-	Accessory
CB 50/1 CT	3970160	-	Incorporated
CBF 65/1	3970147	3000825	Accessory

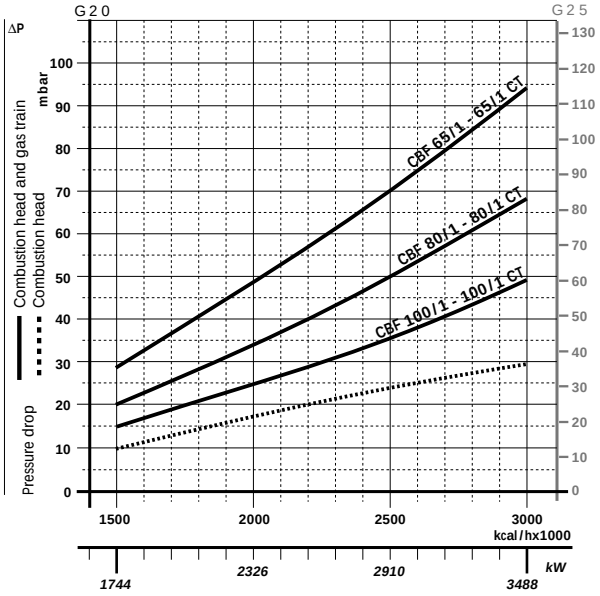
ENNE/EMME 2000



Gas train	Code	Adapter	Seal Control
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

NATURAL GAS

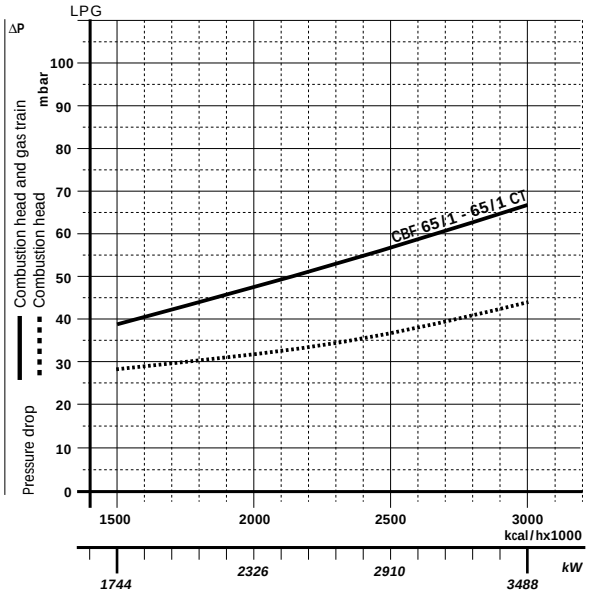
ENNE/EMME 3000



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

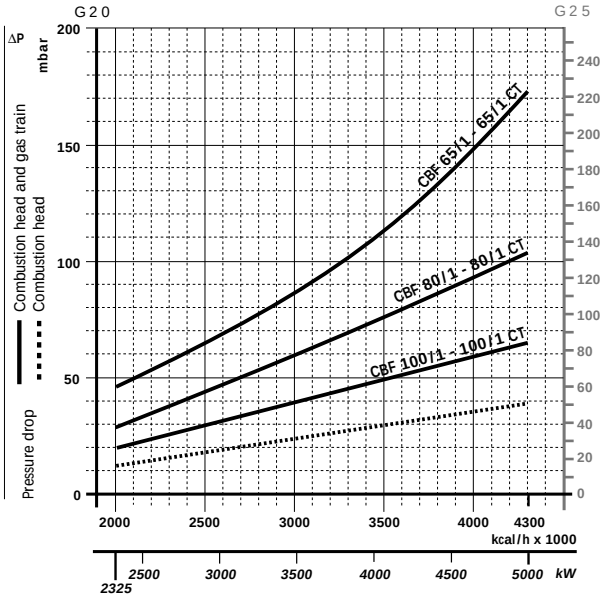
LPG

ENNE/EMME 3000



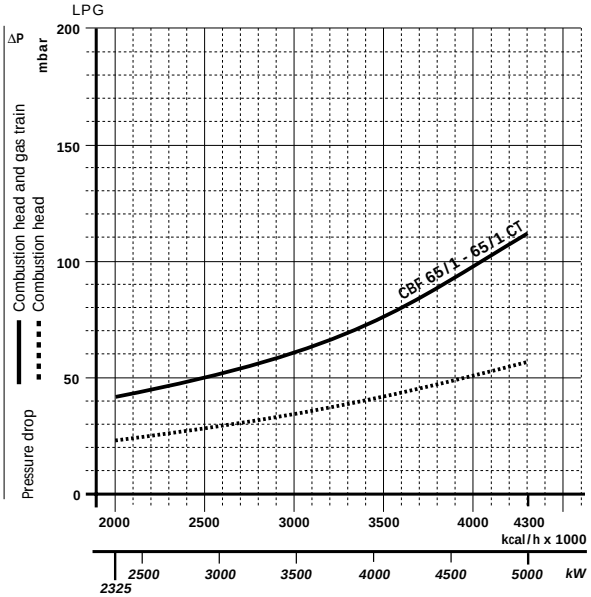
Gas train	Code	Adapter	Seal Control
CBF 80/1 CT	3970162	3000832	Incorporated
CBF 100/1	3970149	3010127	Accessory
CBF 100/1 CT	3970163	3010127	Incorporated

ENNE/EMME 4500



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

ENNE/EMME 4500



Gas train	Code	Adapter	Seal Control
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.

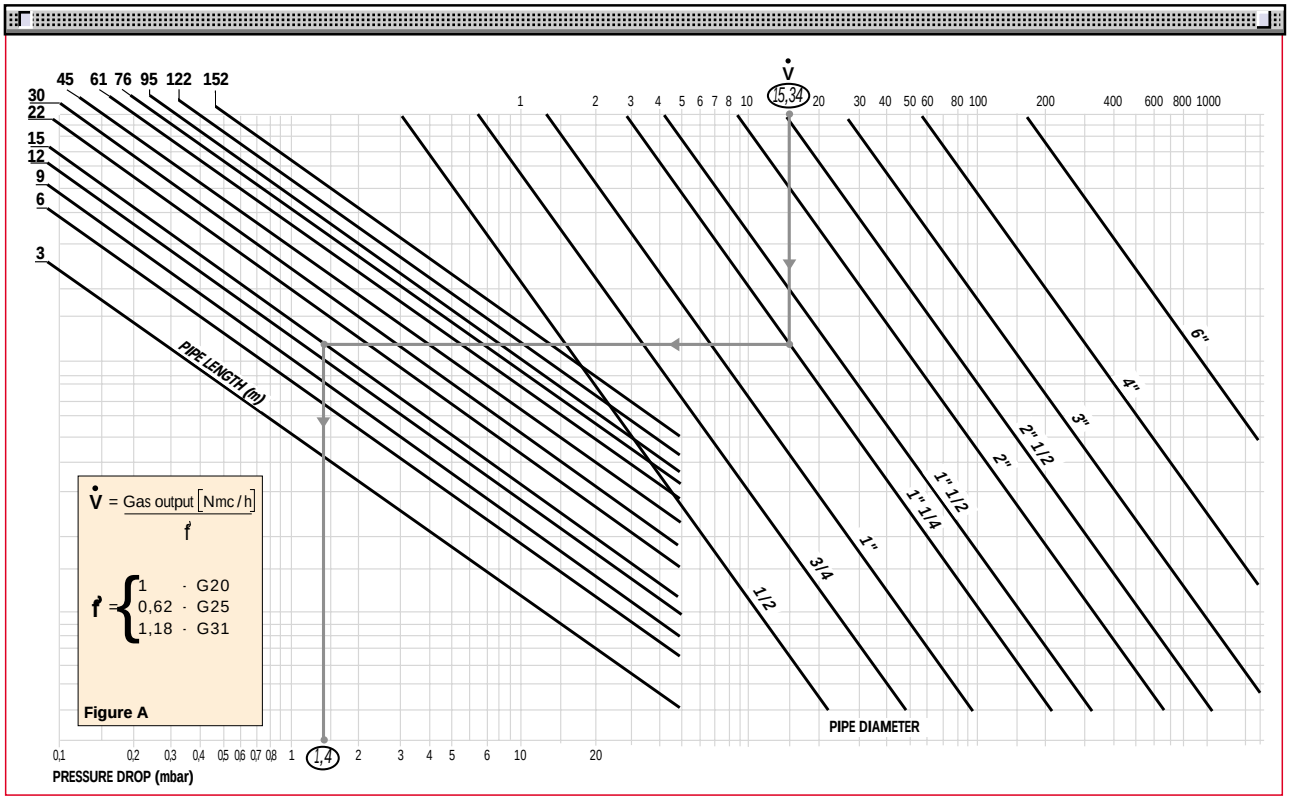
Example:

	- 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

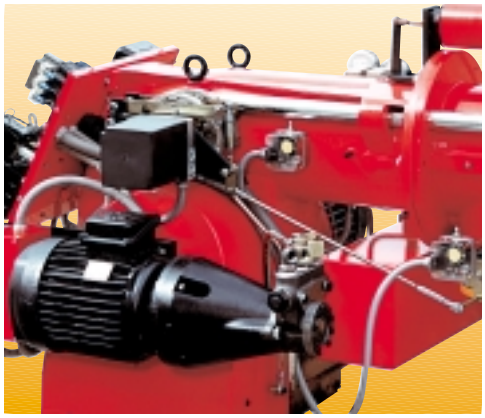
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the 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



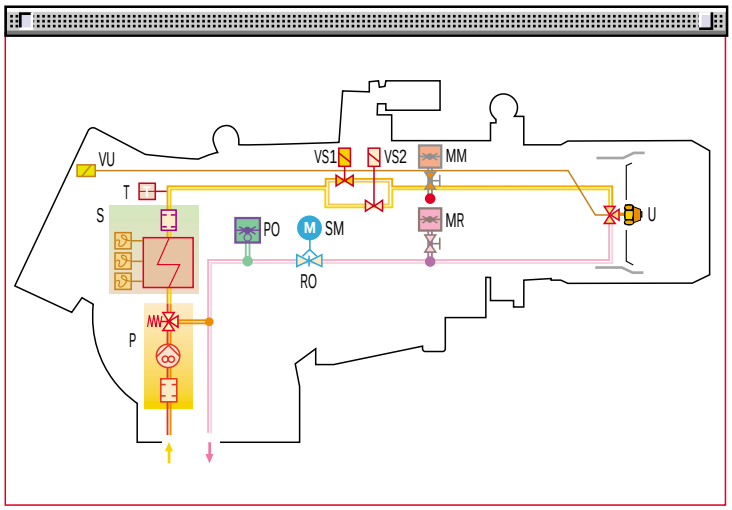
HYDRAULIC CIRCUIT

The burners are fitted with two valves and an oil preheater with thermostats along the oil line from the pump to the nozzle, which opening is regulated from a needle valve. A pressure regulator on the return circuit from the nozzle allows to vary the quantity of fuel burnt.
For heavy oil preheating, a special kit with three electrical heaters at the pump, at the regulator and at the nozzle could be used.
The models are fitted with a maximum pressure switch on the oil return circuit.



Example of oil circuit in ENNE/EMME series of burners

prEN 267 > 100 Kg/h



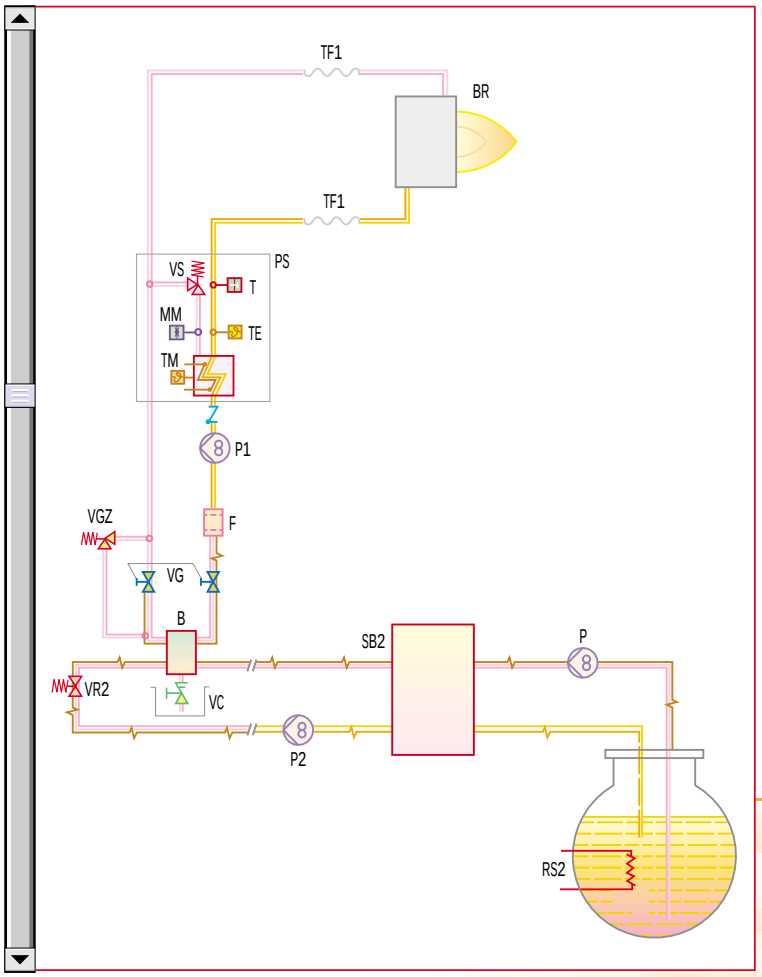
P	Pump with filter, heater and pressure regulator on the output circuit
S	Oil preheater with maximum, minimum and regulation thermostat
T	Thermometer
MM	Oil delivery gauge
SM	Servomotor
RO	Pressure regulator on the return circuit
PO	Oil pressure switch on the return circuit
U	Nozzle
MR	Pressure gauge on the return circuit
VU	Nozzle needle valve
VSn	Delivery oil valves

SELECTING THE FUEL SUPPLY LINES

The fuel feed must be completed with the safety devices required by the local norms.

IMPORTANT NOTES

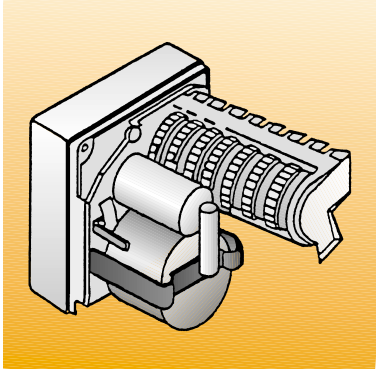
- The oil could easily flow through the pipes if those are properly sized, protected and heated (by electricity, steam or hot water)
- In order to limit gas or steam production the oil pressure into the gas separator shall be set in function of the supply temperature, see instructions manual.
- The forwarding pump should have at least a double capacity than that one of the burner. For several burners supplied through the same ring supply line, the forwarding pump should have a capacity of approximatively 30% more than the sum of the single burners outputs.



RS2	Tank heater
P	Double pumping unit with filter and heater on transfer ring
SB2	Service tank
P2	Double pumping unit with filter and heater on main ring
VR2	Oil valve – main ring
B	Gas separator bottle
VGZ	Safety valve – burner circuit
P1	Pump with heater – burner circuit
PS	Electrical preheater
VS	Preheater safety valve
BR	Burner
TF1	Flexible oil line
T	Thermometer
TM	Max oil temperature switch
TE	Temperature switch regulation
MM	Oil delivery gauge
VC	Vent valve
F	Oil filter

VENTILATION

The ventilation circuit comes with a forward blades centrifugal fan, which guarantees high pressure levels at the required air deliveries and permits installation flexibility.
In spite of the remarkable output power and of the very high pressure performance, ENNE/EMME models are extremely compact.
Sound proofing boxes help to reduce the noise level.
A variable profile cam connects fuel and air setting, ensuring fuel efficiency at all firing rates.



Example of servomotor mounted on ENNE/EMME series of burner

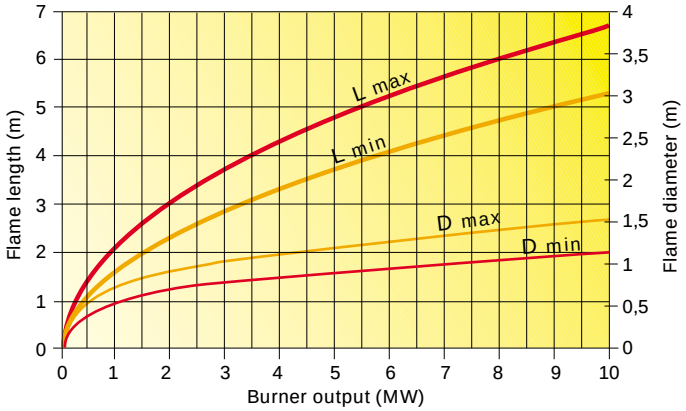
COMBUSTION HEAD

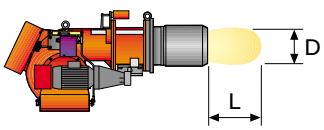
Two different combustion head length can be selected for the various models of ENNE/EMME series of burners.
The choice depends on the thickness of the front panel and type of boiler. Correct head penetration into the combustion chamber depends on the type of heat generator.
These burners are equipped with a variable geometry combustion head. This enables optimum combustion performance throughout the working field, ensuring peak combustion efficiency thus saving on fuel consumption.

Example of ENNE/EMME combustion head

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 the combustion chamber dimensions are different from the values in the diagram, further tests need to be done.

Flame dimensions



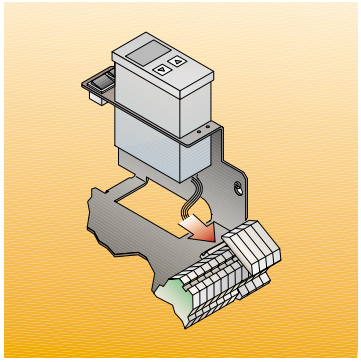


Example:
Burner thermal output = 3500 kW;
L_{flame} (m) = 3,5 m (medium value);
D_{flame} (m) = 1 m (medium value)

ADJUSTMENT

BURNER OPERATION MODE

The ENNE/EMME series of burners can be “two stage progressive” or “modulating”.
During “two stage progressive” operation, the burner gradually adapts the output to the required level, by varying between two pre-set levels (see figure A).
During “modulating” operation, normally required in steam generators, in superheated water boilers or thermal oil boilers, 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).



Example of a regulator

“Two stage progressive” operation

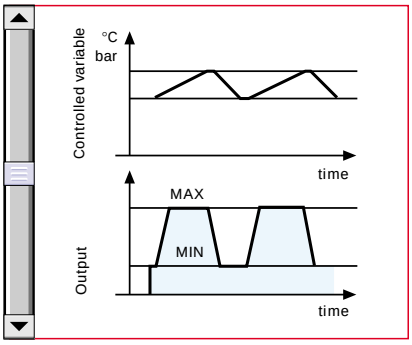


Figure A

“Modulating” operation

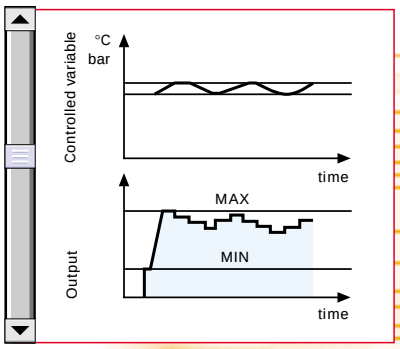
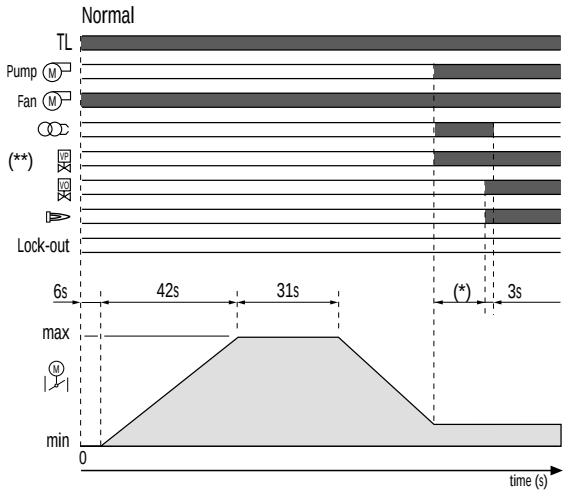


Figure B

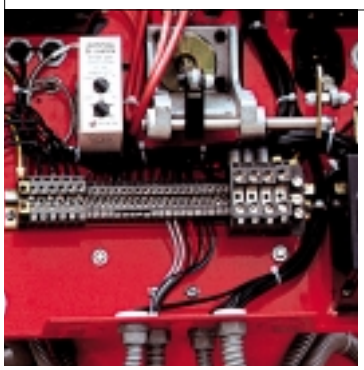
START UP CYCLE



0”	The burner begins start-up cycle: fan motor starts turning.
6”- 48”	The servomotor opens the air damper at the maximum position.
48”- 79”	Chamber pre-purge phase with air damper open.
79”	The servomotor takes the air damper to
the	firing position.
n”	Ignition transformer turns on. Pre-purge valve opens and oil circuit pre-purge phase takes place.
n”+ m”(*)	Ignition valve opens and flame rilevation with photocell is activated.
n”+ m”+ 3”	After a safety time of m”+ 3” the ignition transformer turns off if there is the flame otherwise lock-out happens.

(*) *Time adjustable with timer (6” for gas working)*
(**) Only for heavy oil working.

WIRING DIAGRAMS

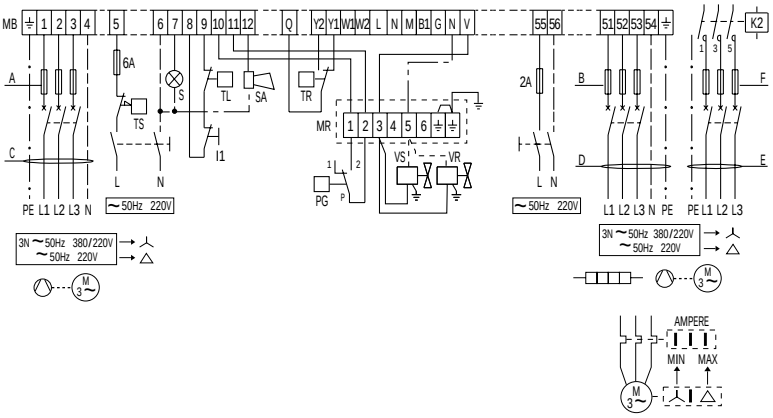


Electrical connections must be made by qualified and skilled personnel, according to the local norms.

Example of the terminal board for the electrical connections for ENNE/EMME burner models

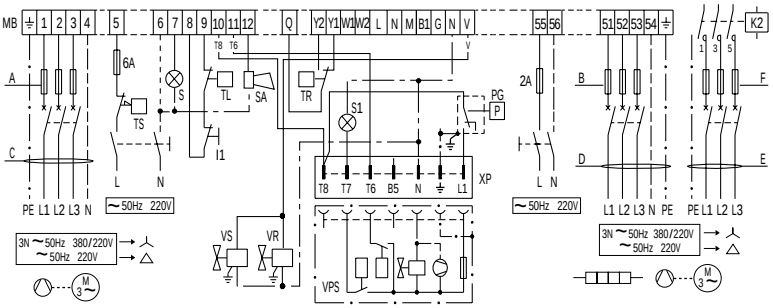
"TWO STAGE PROGRESSIVE" OPERATION

ENNE/EMME 1400 - 2000 - 3000 (direct start-up) - Without seal control



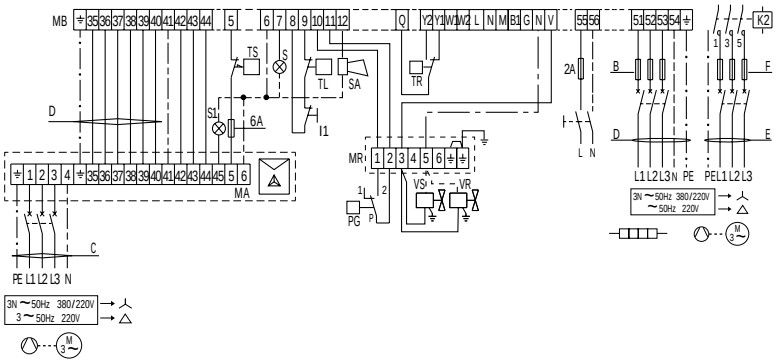
I1 - Burner manual stop switch (optional)
PG - Min. gas pressure switch
S - Remote lock-out signal
TR - High-low mode load remote control system
TL - Load limit remote control system
TS - Safety load control system
VR - Regulating gas valve
VS - Safety gas valve
MB - Burner terminal board
T6A - 6A Fuse
F,B - Fuse
L,H,D - Lead section
SA - Oil high temperature alarm
MR - Gas train terminal board
K2 - Pump motor contactor

ENNE/EMME 1400 - 2000 - 3000 (direct start-up) - With seal control



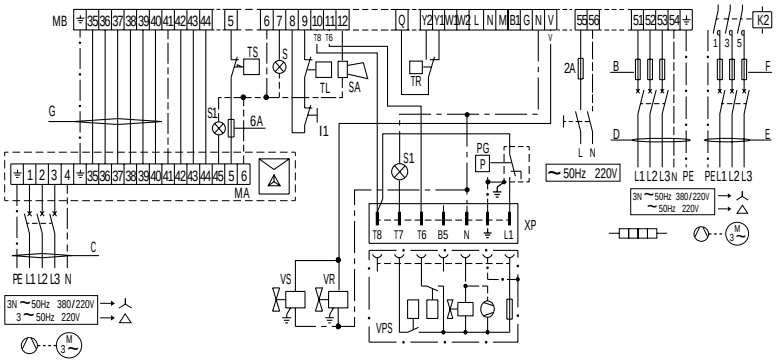
I1 - Burner manual stop switch (optional)
XP - Plug for seal control device
PG - Min. gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TR - High-low mode load remote control system
TL - Load limit remote control system
TS - Safety load control system
VR - Regulating gas valve
VS - Safety gas valve
MB - Burner terminal board
VPS - Seal control device
T6A - 6A Fuse
F,B - Fuse
L,H,D - Lead section
SA - Oil high temperature alarm
K2 - Pump motor contactor

ENNE/EMME 4500 (star delta start-up) - Without seal control



I1 - Burner manual stop switch (optional)
PG - Min. gas pressure switch
S - Remote lock-out signal
TR - High-low mode load remote control system
TL - Load limit remote control system
TS - Safety load control system
VR - Regulating gas valve
VS - Safety gas valve
MB - Burner terminal board
MA - Star delta starter terminal board
S2 - Fan lock-out signal
T6A - 6A Fuse
F,B - Fuse
L,H,D - Lead section
SA - Oil high temperature alarm
MR - Gas train terminal board
K2 - Pump motor contactor

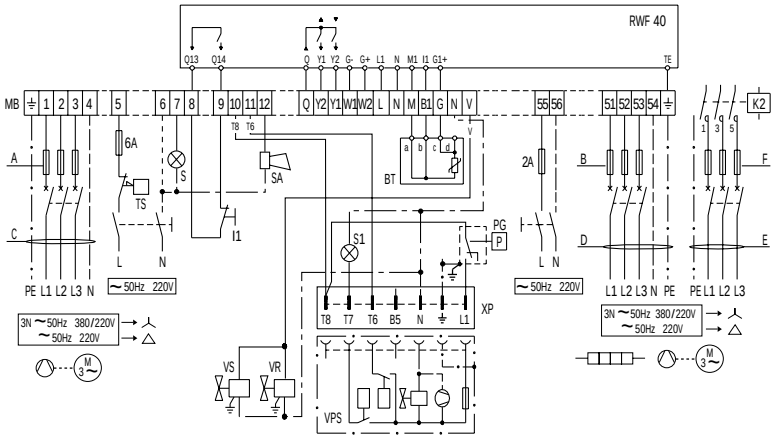
ENNE/EMME 4500 (star delta start-up) - With seal control



I1 - Burner manual stop switch (optional)
XP - Plug for seal control device
PG - Min. gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TR - High-low mode load remote control system
TL - Load limit remote control system
TS - Safety load control system
VR - Regulating gas valve
VS - Safety gas valve
MB - Burner terminal board
VPS - Seal control device
MA - Star delta starter terminal board
S2 - Fan lock-out signal
T6A - 6A Fuse
F,B - Fuse
L,H,D - Lead section
SA - Oil high temperature alarm
K2 - Pump motor contactor

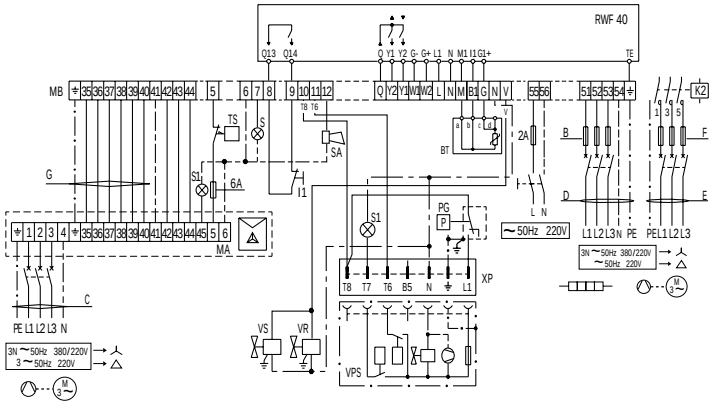
"MODULATING" OPERATION - temperature probe

ENNE/EMME 1400 - 2000 - 3000 (direct start-up)



I1 - Burner manual stop switch (optional)
XP - Plug for seal control device
PG - Min. gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TS - Safety load control system
VR - Regulating gas valve
VS - Safety gas valve
MB - Burner terminal board
VPS - Seal control device
RWF 40 - Regulator (fitted to the burner)
BT - Temperature probe
T6A - 6A Fuse
F,B - Fuse
L,H,D - Lead section
SA - Oil high temperature alarm
K2 - Pump motor contactor

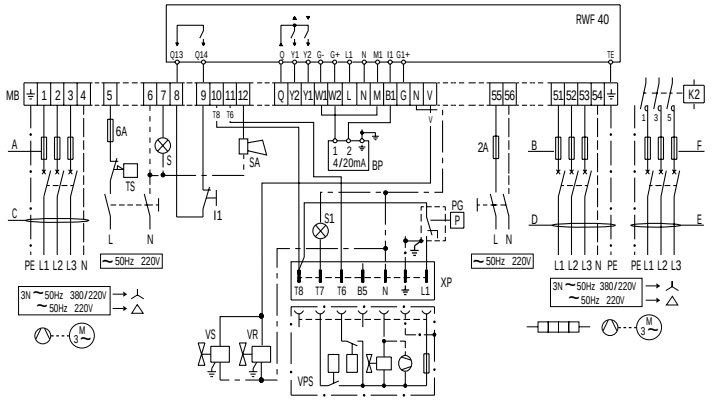
ENNE/EMME 4500 (star delta start-up)



I1	- Burner manual stop switch (optional)
XP	- Plug for seal control device
PG	- Min. gas pressure switch
S	- Remote lock-out signal
S1	- Remote lock-out signal of seal control device
TS	- Safety load control system
VR	- Regulating gas valve
VS	- Safety gas valve
MB	- Burner terminal board
VPS	- Seal control device
MA	- Star delta starter terminal board
S2	- Fan lock-out signal
RWF 40	- Regulator (fitted to the burner)
BT	- Temperature probe
T6A	- 6A Fuse
F,B	- Fuse
L,H,D	- Lead section
SA	- Oil high temperature alarm
K2	- Pump motor contactor

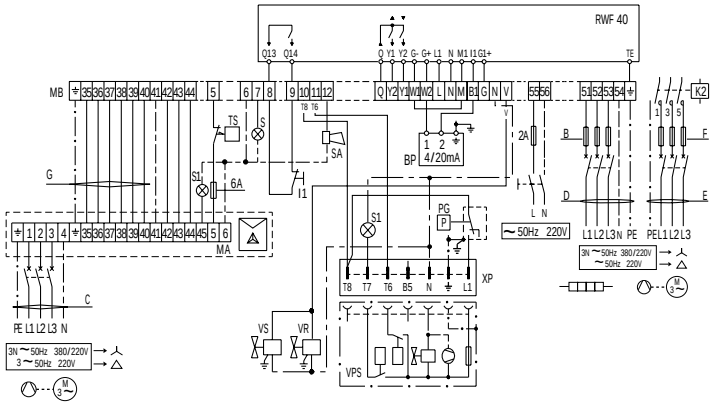
"MODULATING" OPERATION - pressure probe

ENNE/EMME 1400 - 2000 - 3000 (direct start-up)



I1	- Burner manual stop switch (optional)
XP	- Plug for seal control device
PG	- Min. gas pressure switch
S	- Remote lock-out signal
S1	- Remote lock-out signal of seal control device
TS	- Safety load control system
VR	- Regulating gas valve
VS	- Safety gas valve
MB	- Burner terminal board
VPS	- Seal control device
RWF 40	- Regulator (fitted to the burner)
BP	- Pressure probe
T6A	- 6A Fuse
F,B	- Fuse
L,H,D	- Lead section
SA	- Oil high temperature alarm
K2	- Pump motor contactor

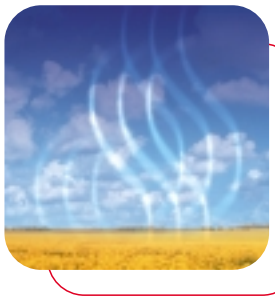
ENNE/EMME 4500 (star delta start-up)



I1	- Burner manual stop switch (optional)
XP	- Plug for seal control device
PG	- Min. gas pressure switch
S	- Remote lock-out signal
S1	- Remote lock-out signal of seal control device
TS	- Safety load control system
VR	- Regulating gas valve
VS	- Safety gas valve
MB	- Burner terminal board
VPS	- Seal control device
MA	- Star delta starter terminal board
S2	- Fan lock-out signal
RWF 40	- Regulator (fitted to the burner)
BP	- Pressure probe
T6A	- 6A Fuse
F,B	- Fuse
L,H,D	- Lead section
SA	- Oil high temperature alarm
K2	- Pump motor contactor

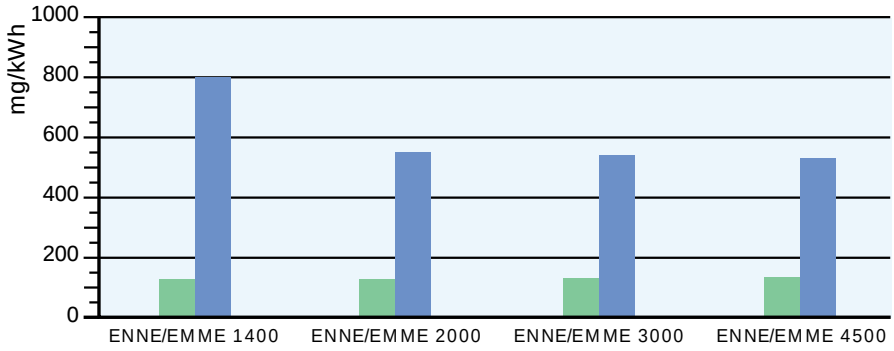
The following table shows the supply lead sections and the type of fuse to be used.

	Direct start-up						Star delta start-up	
Model	ENNE/EMME 1400		ENNE/EMME 2000		ENNE/EMME 3000		ENNE/EMME 4500	
	230 V	400 V	230 V	400 V	230 V	400 V	230 V	400 V
A A	25	25	35	25	63	50	-	-
B A	50	35	50	35	63	50	63	50
F A	6	4	6	4	16	10	20	16
C mm²	2,5	2,5	4	2,5	6	4	10	6
D mm²	10	6	10	6	10	6	10	6
E mm²	2,5	1,5	2,5	1,5	4	2,5	4	2,5
G mm²	-	-	-	-	-	-	6	4



EMISSIONS

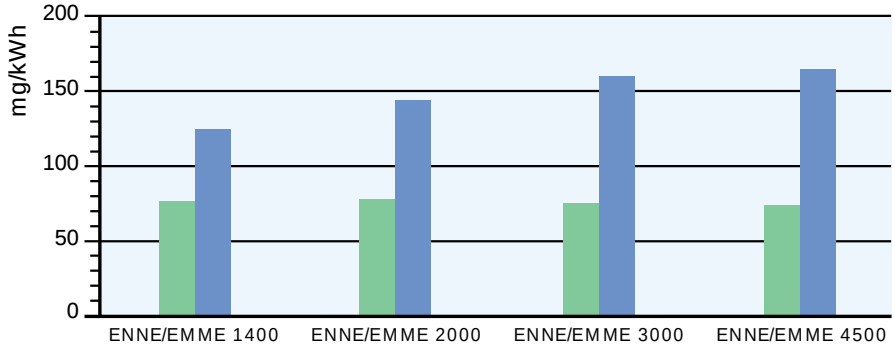
NO_X EMISSIONS



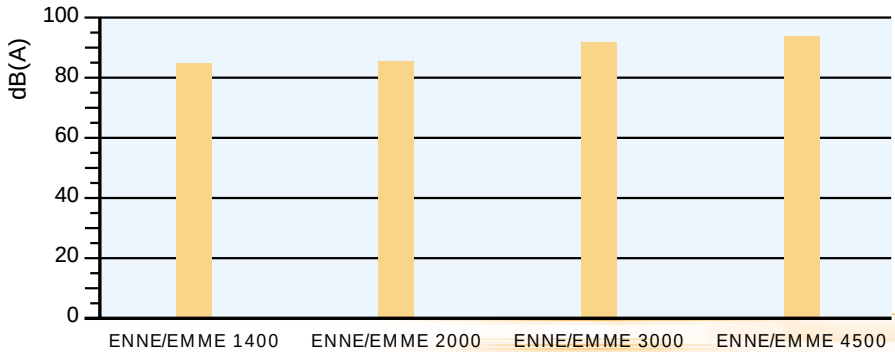
Gas working

Heavy oil working

CO EMISSIONS



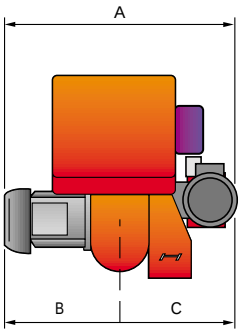
NOISE EMISSIONS

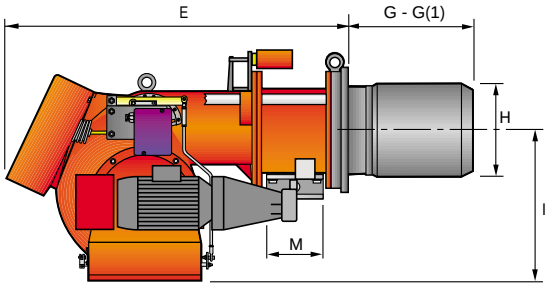


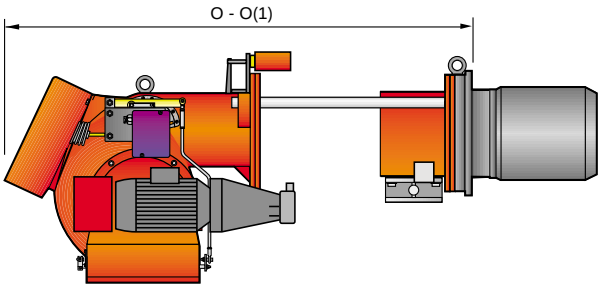
The emission data has been measured in the various models at maximum output, according to EN 676 and EN 267 standard.

OVERALL DIMENSIONS (mm)

BURNER



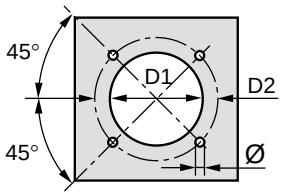




Model	A	B	C	E	G - G(1)	H	I	M	O - O(1)
ENNE/EMME 1400	892	376	516	1090	385 - 495	250	467	2”	1475 - 1585
ENNE/EMME 2000	912	396	516	1090	385 - 495	260	467	DN80	1475 - 1585
ENNE/EMME 3000	1000	447	553	1320	476 - 606	336	525	DN80	1796 - 1926
ENNE/EMME 4500	1061	508	553	1320	476 - 606	336	525	DN80	1796 - 1926

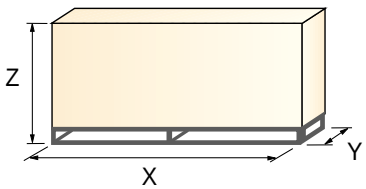
(1) model “extended head”

BURNER - BOILER MOUNTING FLANGE



Model	D1	D2	Ø
ENNE/EMME 1400	255	260	M16
ENNE/EMME 2000	265	260	M16
ENNE/EMME 3000	340	310	M20
ENNE/EMME 4500	340	310	M20

PACKAGING



Model	X - X(1)	Y	Z	Kg
ENNE/EMME 1400	1670 - 1670	1010	780	265
ENNE/EMME 2000	1670 - 1670	1010	780	265
ENNE/EMME 3000	2000 - 2000	1160	870	280
ENNE/EMME 4500	2000 - 2000	1160	870	290

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 boiler output and following the diagrams included in the burner instruction handbook
- Refit the burner casing to the slide bars.
- Install the nozzle choosing this on the basis of the maximum boiler output and following the diagrams included in the burner instruction handbook.
- Check the position of the electrodes.
- Close the burner, sliding it up to the flange, keeping it slightly raised to avoid the flame stability disk rubbing against the blast tube.

ELECTRICAL AND HYDRAULIC CONNECTIONS AND START UP

- The burners are supplied for connection to two pipes fuel supply system.
- Connect the ends of the flexible pipes to the suction and return pipework using the supplied nipples.
- Make the electrical connections to the burner following the wiring diagrams included in the instruction handbook.
- Prime the pump by turning the motor (after checking rotation direction if it is a three phase motor).
- Adjust the gas train for start-up
  On start-up, check:
  Pressure pump and valve unit regulator (to max. and min.)
  Gas pressure at the combustion head (to max. and min. output)
  Combustion quality, in terms of unburned substances and excess air.

BURNER ACCESSORIES

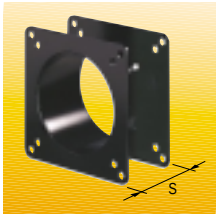
Nozzles

The nozzles must be ordered separately. The following table shows the features and codes on the basis of the maximum required fuel output.

Nozzles type B3 - AA 45°		
Burner	**Rated output (kg/h)**	**Nozzle code**
ENNE/EMME 1400	70	**3009613**
ENNE/EMME 1400	80	**3009615**
ENNE/EMME 1400	90	**3009617**
ENNE/EMME 1400 - 2000	100	**3009620**
ENNE/EMME 1400 - 2000	125	**3009623**
ENNE/EMME 1400 - 2000 - 3000	150	**3009626**
ENNE/EMME 2000 - 3000	175	**3009629**
ENNE/EMME 2000 - 3000 - 4500	200	**3009632**
ENNE/EMME 3000 - 4500	225	**3009635**
ENNE/EMME 3000 - 4500	250	**3009638**
ENNE/EMME 3000 - 4500	275	**3009641**
ENNE/EMME 3000 - 4500	300	**3009644**
ENNE/EMME 4500	325	**3009647**
ENNE/EMME 4500	350	**3009650**
ENNE/EMME 4500	375	**3009653**
ENNE/EMME 4500	400	**3009656**
ENNE/EMME 4500	425	**3009659**
ENNE/EMME 4500	450	**3009661**

Spacer kit

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



Spacer kit		
Burner	**Spacer thickness S (mm)**	**Kit code**
ENNE/EMME 1400 - 2000	110	**3000722**
ENNE/EMME 3000 - 4500	130	**3000751**

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**
ENNE/EMME 1400 - 2000	C7	**3010048**
ENNE/EMME 3000 - 4500	C8	**3010049**

Accessories for modulating operation

To obtain modulating setting, the ENNE/EMME 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.

Burner	Regulator type	Code
ENNE/EMME 1400 - 2000 - 3000 - 4500	RWF 40	**3010211**

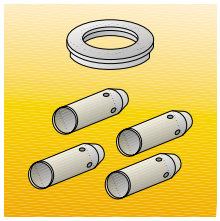
Probe type	Range (°C) (bar)	Probe code
Temperature PT 100	-100 ÷ 500°C	**3010110**
Pressure 4 ÷ 20 mA	0 ÷ 2,5 bar	**3010213**
Pressure 4 ÷ 20 mA	0 ÷ 16 bar	**3010214**

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	Potentiometer kit code
ENNE/EMME 1400 - 2000 - 3000 - 4500	**3010021**

LPG kit

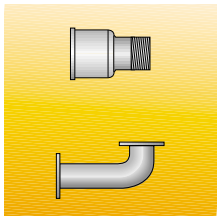
For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner, as given in the following table:



LPG kit		
Burner	**Kit code for standard head**	**Kit code for extended head**
ENNE/EMME 1400 - 2000	**3010063**	**3010063**

Adapters

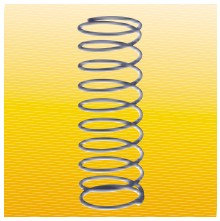
When the diameter of the gas train is different from the set diameter of the burners, an adapter must be fitted between the gas train and the burner. The following table lists the adapters for various burners.



Adapters			
Burner	**Gas train**	**Dimensions**	**Adapter code**
ENNE/EMME 1400	CBF 65	DN 65 2"1/2 — 1" 1/2 — 2"	**3000825**
	CBF 80	DN 80 2"1/2 — 2"	**3000826**
ENNE/EMME 2000	MBD 420 CB 50/1	DN 80 — DN 65 — 2"1/2 — 2"	**3010128**
	CBF 65	DN 65 — DN 80	**3000831**
	CBF 80	DN 80 — DN 80	**3000832**
	CBF 100	DN 100 — DN 80	**3010127**
ENNE/EMME 3000	CBF 65	DN 65 — DN 80	**3000831**
	CBF 80	DN 80 — DN 80	**3000832**
	CBF 100	DN 100 — DN 80	**3010127**
ENNE/EMME 4500	CBF 65	DN 65 — DN 80	**3000831**
	CBF 80	DN 80 — DN 80	**3000832**
	CBF 100	DN 100 — DN 80	**3010127**

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**

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**
ENNE/EMME 1400	MBD 420 - CB 50/1 - CBF 65/1 - CBF 80/1	**3010125**
ENNE/EMME 2000	MBD 420 - CB 50/1 - CBF 65/1 - CBF 80/1- CBF 100/1	**3010125**
ENNE/EMME 3000	CBF 65/1 - CBF 80/1- CBF 100/1	**3010125**
ENNE/EMME 4500	CBF 65/1 - CBF 80/1	**3010125**

SPECIFICATION

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

DESIGNATION OF SERIES

Series : ENNE / EMME

Size: 1400 ... 4500

Emission : ... Class 1 EN267

Head : TC Standard head
TL Extended head

Flame control system :
FS1 Standard (1 stop every 24 h)

Electrical supply to the system :
3/22/50 3/220V/50Hz
3/380/50 3N/380V/50Hz
3/220-380/50 3/220/50Hz-3N/380V/50Hz

Auxiliary voltage :
220/50 220V/50Hz

ENNE/EMME	1400			TC		FS1	3/220-380/50	220/50	

BASIC DESIGNATION

EXTENDED DESIGNATION

AVAILABLE BURNER MODELS

ENNE/EMME 1400	TC	FS1	3/220-380/50	220/50
ENNE/EMME 1400	TL	FS1	3/220-380/50	220/50
ENNE/EMME 2000	TC	FS1	3/220-380/50	220/50
ENNE/EMME 2000	TL	FS1	3/220-380/50	220/50
ENNE/EMME 3000	TC	FS1	3/220-380/50	220/50
ENNE/EMME 3000	TL	FS1	3/220-380/50	220/50
ENNE/EMME 4500	TC	FS1	3/220/50	220/50
ENNE/EMME 4500	TL	FS1	3/220/50	220/50
ENNE/EMME 4500	TC	FS1	3/380/50	220/50
ENNE/EMME 4500	TL	FS1	3/380/50	220/50

Other versions are available on request.

PRODUCT SPECIFICATION

Burner

Monoblock forced draught dual fuel burner, two stage progressive or modulating operation with a kit, made up of:
- Air suction circuit
- Fan with forward curved blades
- Air damper for setting and butterfly valve for regulating fuel output controlled by a servomotor
- Combustion head, that can be set on the basis of required output
- Maximum gas pressure switch
- Minimum air pressure switch
- Fan electrical motor
- Pump electrical motor
- Gears pump for high pressure fuel supply, fitted with:
  - -filter
  - -pressure regulator
  - -connections for installing a pressure gauge and a a vacuometer
  - -internal by-pass for sinlge pipe installation
- Preheater unit
- Valve unit with a double oil safety valve on the output circuit and safety valve on the return circuit
- 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:
- 90/396/EEC directive (gas)
- 89/336/EEC directive (electromagnetic compatibility)
- 73/23/EEC directive (low voltage)
- EN 267 (liquid fuel burners)
- EN 676 (gas fuel burners).

Standard equipment:
- 1 gas train gasket
- 12 screws for fixing the burner flange to the boiler
- 1 insulating screen
- 2 flexible hoses for connection to the oil supply circuit
- 2 nipples for connection to the pump
- 4 wiring looms fittings for electrical connections
- 2 pin extensions
- 8 washers
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- Return nozzles
- Head length reduction kit
- Sound proofing box
- RWF 40 output regulator
- Pressure probe 0-2,5 bar
- Pressure probe 0-16 bar
- Temperature probe -100-500°C
- Potentiometer kit for the servomotor
- Kit for transformation to LPG
- Gas train adapter
- Stabiliser spring
- Seal control kit.

Lineagrafica

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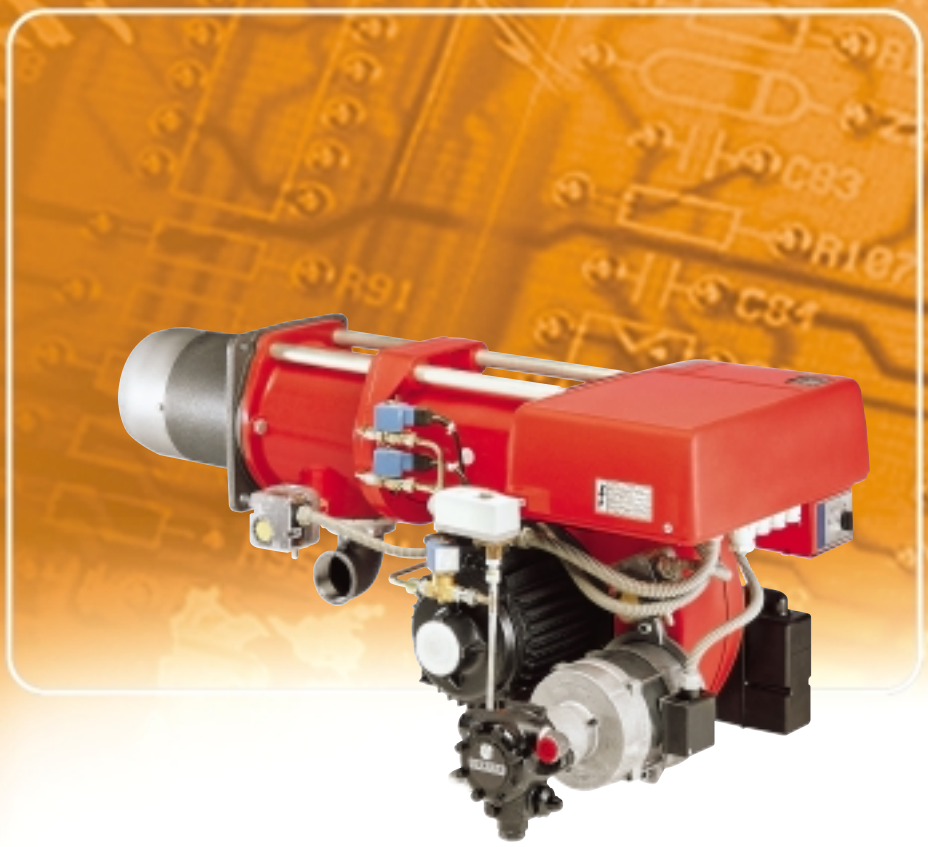
RIELLO BURNERS

CE

TWO STAGE DUAL FUEL BURNERS

GI/EMME SERIES

- **GI/EMME 300** 107/175÷ 332 kW
- **GI/EMME 400** 116/232÷ 465 kW
- **GI/EMME 600** 174/348÷ 665 kW
- **GI/EMME 900** 250/525÷ 922 kW



The GI/EMME 300-900 series of burners covers a firing range from 107 to 922 kW. They have been designed for middle and high output users and they are suitable for matching with boilers that have pressurized combustion chambers.
Their use allows to have an high safety during operation thank to continuos working, guaranteed from the double fuel supply: this is necessary when gas distribution line isn't able to give continuosly the maximum required output.
Two operating options, gas or light oil, are available thank to a selector and a terminal board. The light oil circuit comes with its own electric motor: so the pump is stopped during gas operation to prevent pump seizure and to avoid oil in circulation.
A wide range of accessories and gas trains guarantee maximum working flexibility.

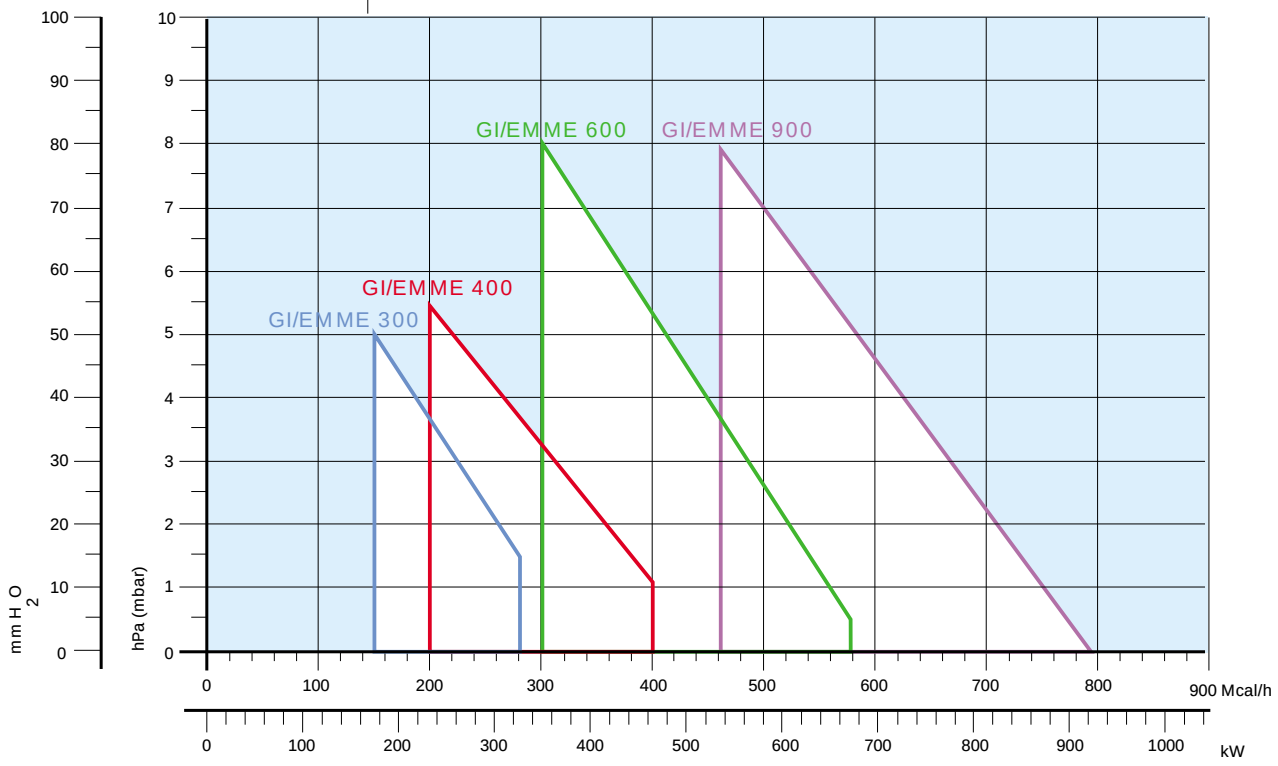
TECHNICAL DATA

	Model			GI/EMME 300	GI/EMME 400	GI/EMME 600	GI/EMME 900
	Burner operation mode			Two stage			
	Modulating ratio at max. ouput			2:1			
	Servomotor	type		LKS 210			
		run time	s	5			
	Heat output		kW	107/175 - 332	116/232 - 465	174/348 - 665	250/525 - 922
			Mcal/h	92/150 - 286	100/200 - 400	150/299 - 572	215/452 - 793
	Working temperature		°C min/max	0/40			
Fuel / air data	Oil	Net calorific value	kWh/kg	11,8			
		Viscosity	mm^2/s (cSt)	4-6 at 20°C			
		Delivery	kg/h	9/15 - 28	10/20 - 39	15/29 - 56	21/44 - 78
	Pump	type		AN 67	AN 67	AN 77	AN 97
		delivery	kg/h	75 at 12 bar	75 at 12 bar	100 at 12 bar	120 at 12 bar
	Atomised pressure		bar	12			
	Fuel temperature		max °C	60			
	Fuel preheater			NO			
	G20	Net calorific value	kWh/Nm^3	10			
		Density	kg/Nm^3	0,71			
		Gas delivery	Nm^3/h	10,7/17,5 - 33,2	11,6/23,2 - 46,5	17,4/34,8 - 66,5	25/52,5 - 92,2
	G25	Net calorific value	kWh/Nm^3	8,6			
		Density	kg/Nm^3	0,78			
		Gas delivery	Nm^3/h	12,4/20,3 - 38,6	13,5/27 - 54	20,2/40,4 - 77,3	29/61 - 107,2
	LPG	Net calorific value	kWh/Nm^3	25,8			
		Density	kg/Nm^3	2,02			
		Gas delivery	Nm^3/h	4,1/6,8 - 12,9	4,5/9 - 18	6,7/13,5 - 25,8	9,7/20,3 - 35,7
	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%)	
	Auxiliary electrical supply		Ph/Hz/V	1/50/230 (±10%)			
	Control box		type	LFL 1.333			
	Total electrical power		kW	0,5	0,62	1,1	2
	Auxiliary electrical power		kW	0,1	0,1	0,2	0,35
	Heaters electrical power		kW	--			
	Protection level			44P			
	Pump motor electrical power		kW	0,15			
	Rated pump motor current		A	1,4			2,85
	Pump motor start up current		A	3,2			6,5
	Pump motor protection level		IP	44			
	Fan motor electrical power		kW	0,25	0,37	0,75	1,5
	Rated fan motor current		A	1,85	2,9	2,85/1,65	6,55/3,15
	Fan motor start up current		A	4,2	6,6	6,5/3,8	32,75/15,75
	Fan motor protection level		IP	44			
	Ignition transformer		type	--			
			V1- V2	230 V - 1x8 kV			
			I1 - I2	1,8 A - 30 mA			
	Operation			Intermittent (at least one stop every 24h)			
Emissions	Sound pressure		dB(A)	69	74	82	84
	Sound power		W	--			
	Oil	CO emission	mg/kWh	< 30			
		Grade of smoke indicator	N° Bacharach	--			
		CxHy emission	mg/kWh	--			
		NOx emission	mg/kWh	< 200			
	G20	CO emission	mg/kWh	< 60			
		NOx emission	mg/kWh	< 120			
Approval	Directive			89/336 - 73/23 EEC			
	Conforming to			EN 267 - EN 676			
	Certification			--			

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



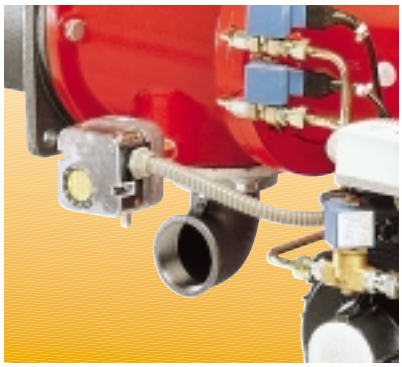
Useful working field for choosing the burner

Test conditions conforming to EN 267 - EN 676:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.

FUEL SUPPLY

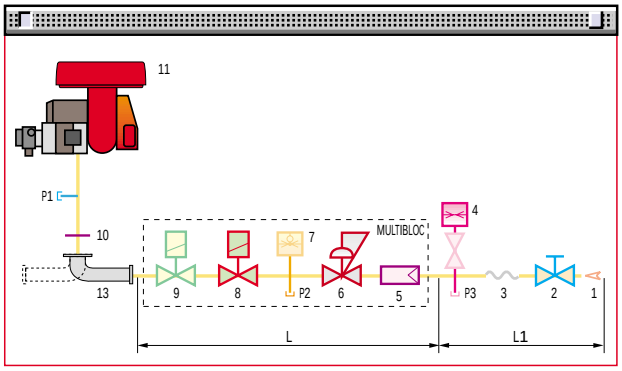
GAS TRAIN

The gas trains are fitted with a regulating valve to adjusts fuel delivery in relation to heat required. This valve is controlled by the two-stages device fitted on the burner.
Fuel can be supplied either from the right or left sides, on the basis of the application requirments.
The gas train can be selected to best fit system requirments depending on the fuel output and pressure in the supply line.
The gas trains can be “Multibloc” type (containing the main components in a single unit) or “Composed” type (assembly of the single components).

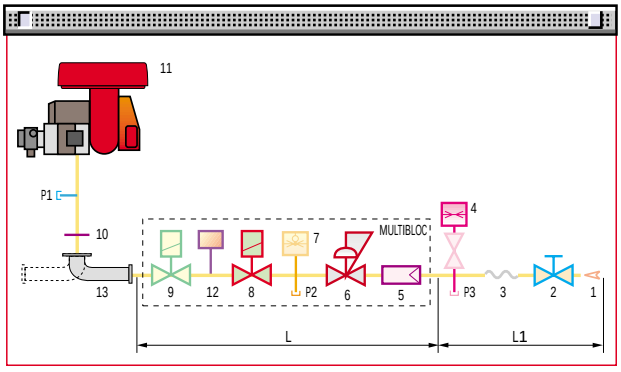


Example of gas inlet pipe burners for GI/EMME

MULTIBLOC gas train without seal control

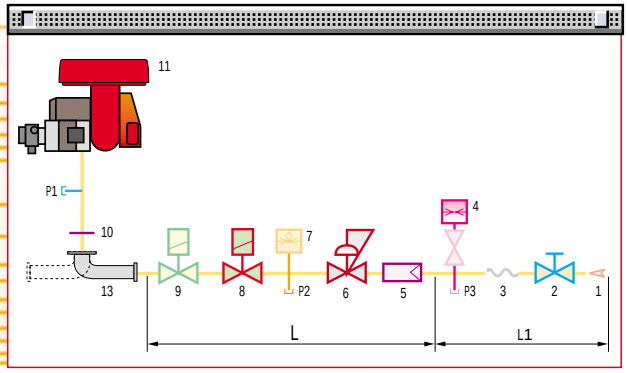


MULTIBLOC gas train with seal control

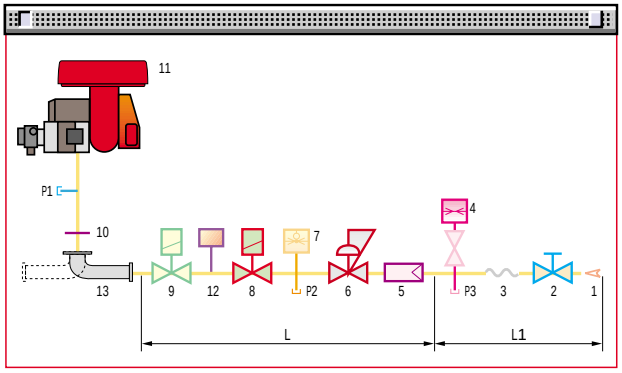


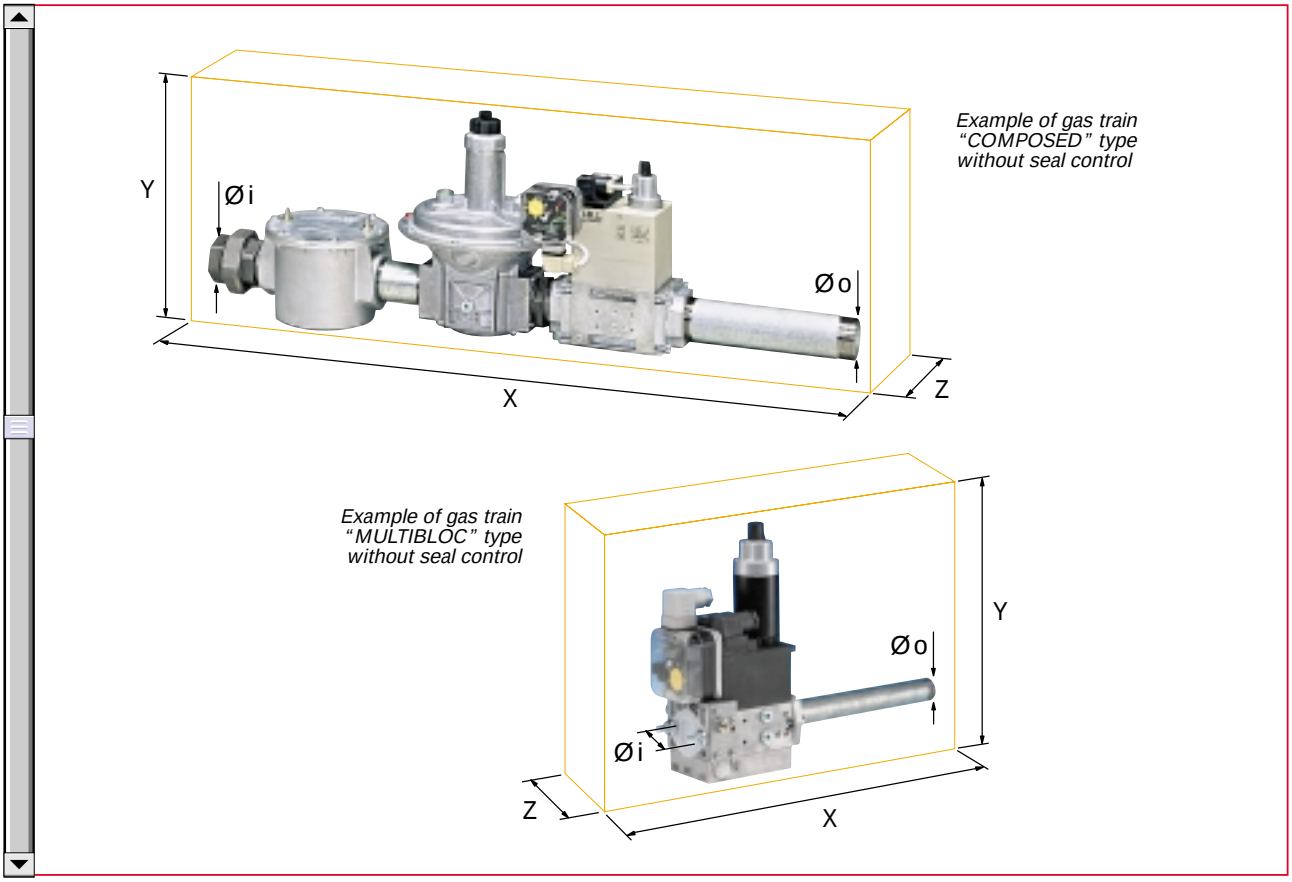
1	Gas input pipework
2	Manual valve
3	Anti-vibration joint
4	Pressure gauge with pushbutton cock
5	Filter
6	Pressure regulator (vertical)
7	Minimum gas pressure switch
8	VS safety solenoid (vertical)
9	VR regulation solenoid (vertical). Three adjustments: - ignition delivery (rapid opening) - 1st stage delivery (slow opening) - 2nd stage delivery ((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 RLS 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.

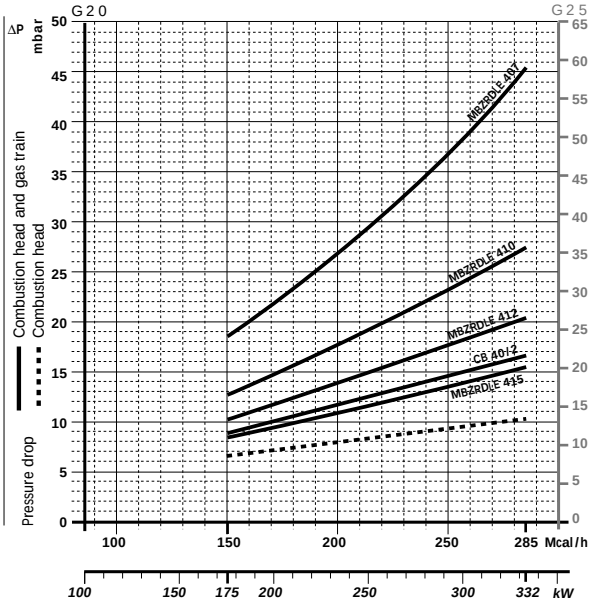
	Name	Code	Ø i	Ø o	X mm	Y mm	Z mm	Seal Control
MULTIBLOC GAS TRAINS	**MBZRDLE 407**	3970150	3/4”	3/4”	195	235	120	-
	MBZRDLE 410	3970151	1”	3/4”	195	235	145	-
	MBZRDLE 412	3970152	1”1/4	1”1/2	433	290	145	-
	MBZRDLE 415	3970183	1”1/2	121/2	523	346	100	-
	MBZRDLE 420	3970184	2”	2”	523	400	100	-
	MBZRDLE 420 CT	3970185	2”	2”	523	400	227	Incorporated
COMPOSED GAS TRAINS	**CB 40/2**	3970153	1”1/2	1”1/2	1013	346	195	-
	CB 50/2	3970154	2”	2”	1150	354	250	-
	CB 50/2 CT	3970166	2”	2”	1150	354	320	Incorporated
	CBF 65/2	3970155	DN 65	DN 65	1166	475	285	-
	CBF 65/2 CT	3970167	DN 65	DN 65	1166	475	285	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.

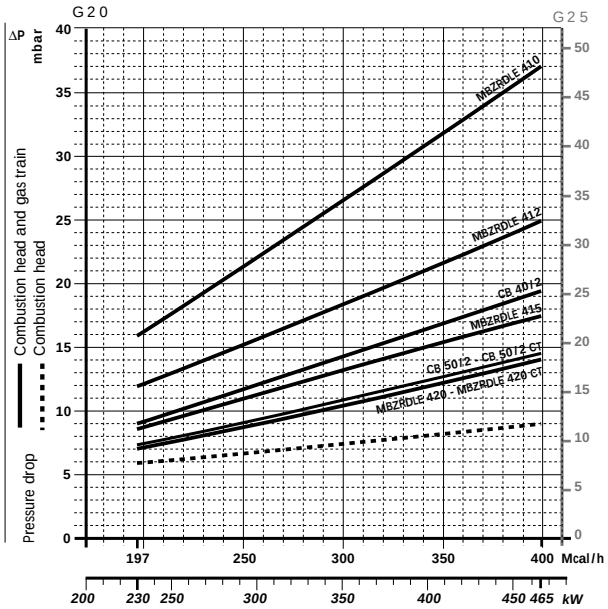
NATURAL GAS

GI/EMME 300



Gas train	Code	Adapter	Seal Control
MBZRDLE 407	3970150	3000824	Accessory
MBZRDLE 410	3970151	3000824	Accessory
MBZRDLE 412	3970152	3010124	Accessory

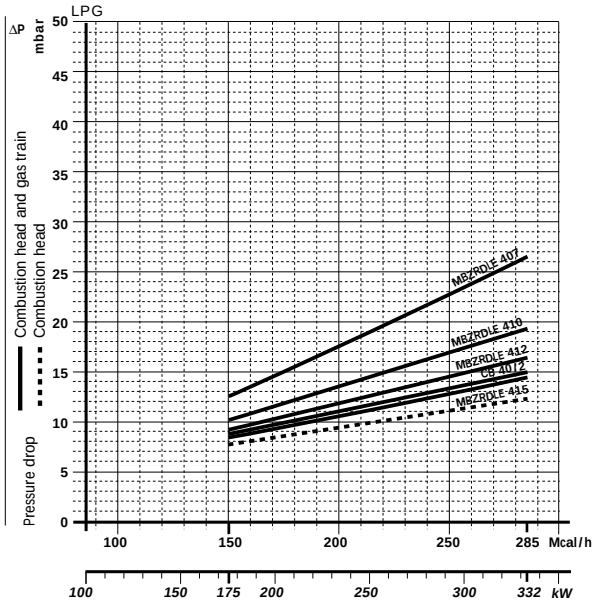
GI/EMME 400



Gas train	Code	Adapter	Seal Control
MBZRDLE 410	3970151	3000824	Accessory
MBZRDLE 412	3970152	3010124	Accessory
MBZRDLE 415	3970183	-	Accessory
CB 40/2	3970153	-	Accessory

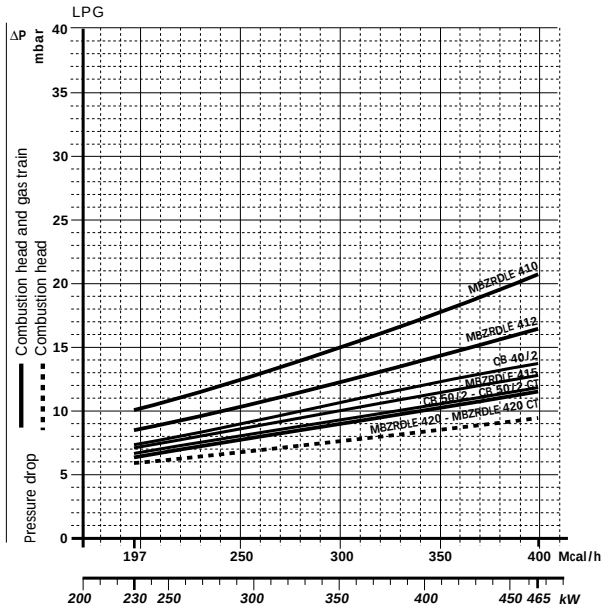
LPG

GI/EMME 300



Gas train	Code	Adapter	Seal Control
MBZRDLE 415	3970183	-	Accessory
CB 40/2	3970153	-	Accessory

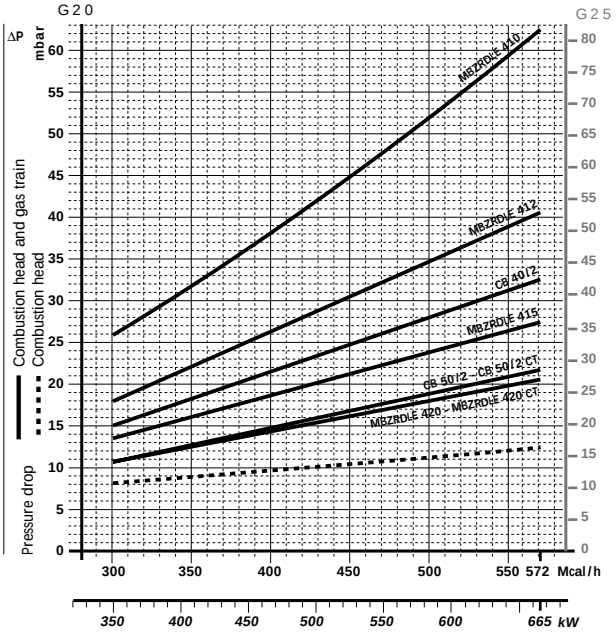
GI/EMME 400



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

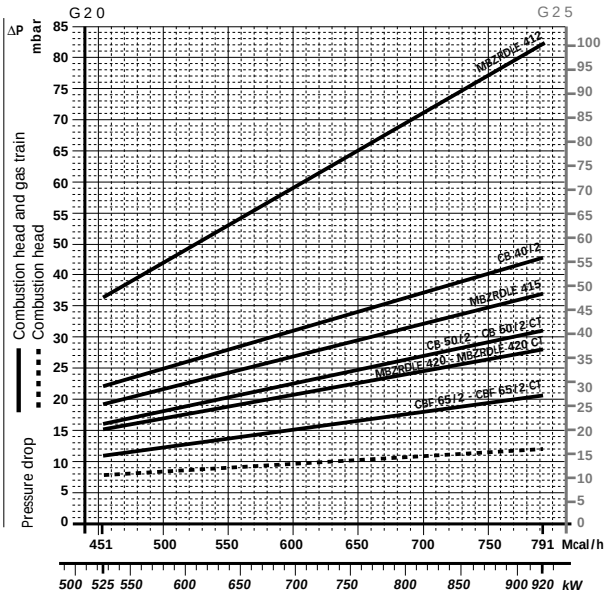
NATURAL GAS

GI/EMME 600



Gas train	Code	Adapter	Seal Control
MBZRDLE 410	3970151	3000824	Accessory
MBZRDLE 412	3970152	3010124	Accessory
MBZRDLE 415	3970183	-	Accessory
CB 40/2	3970153	-	Accessory

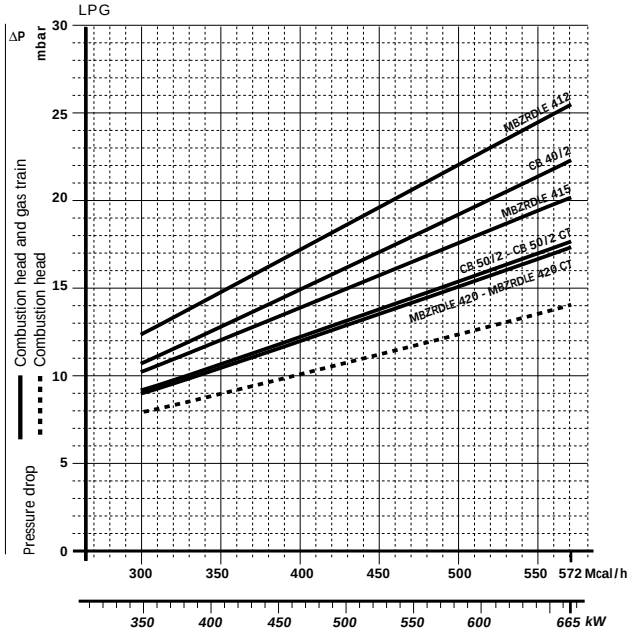
GI/EMME 900



Gas train	Code	Adapter	Seal Control
MBZRDLE 412	3970152	3010126	Accessory
CB 40/2	3970153	3000843	Accessory
MBZRDLE 415	3970183	3000843	Accessory
MBZRDLE 420	3970184	-	Accessory
MBZRDLE 420 CT	3970185	-	Incorporated

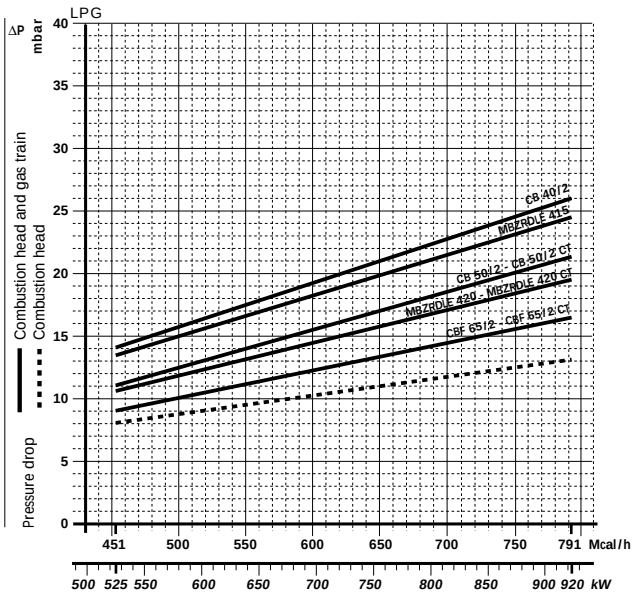
LPG

GI/EMME 600



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

GI/EMME 900



Gas train	Code	Adapter	Seal Control
CB 50/2	3970154	-	Accessory
CB 50/2 CT	3970166	-	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.

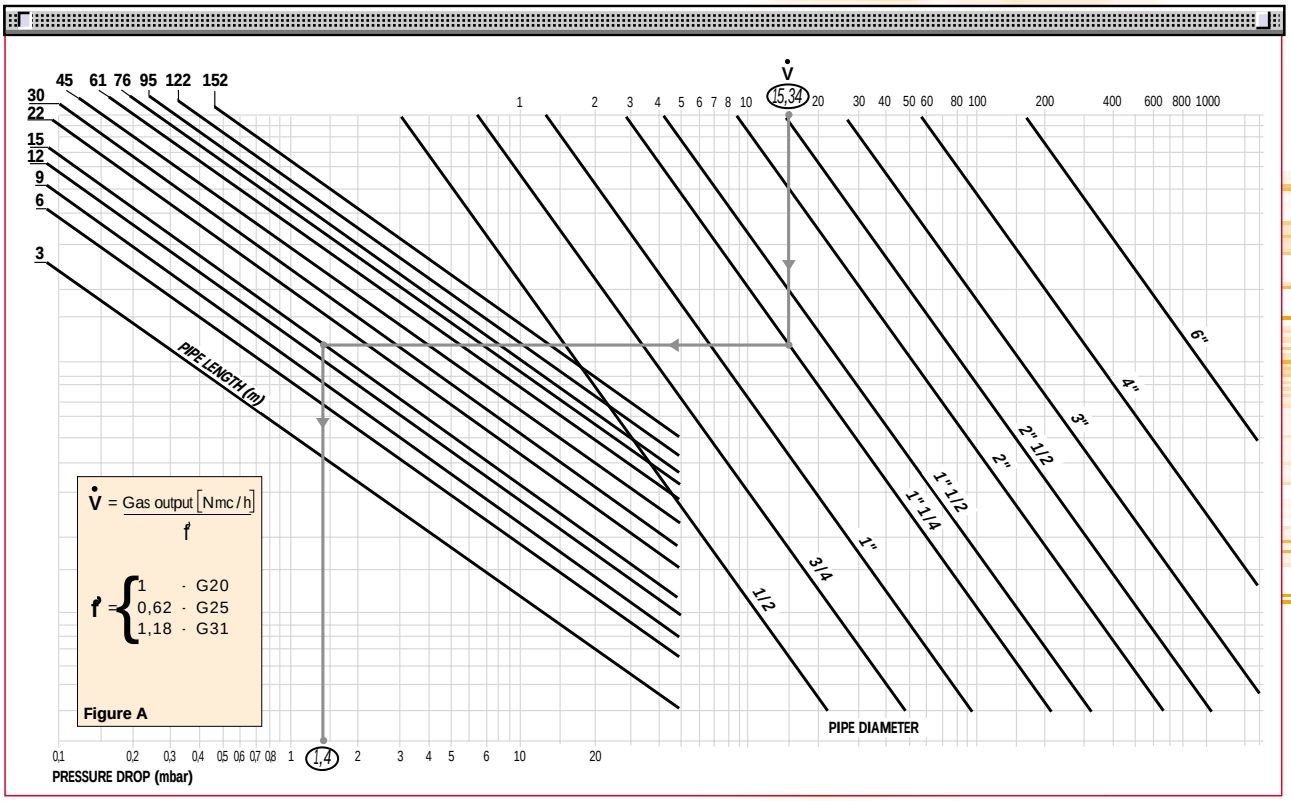
Example:

- 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

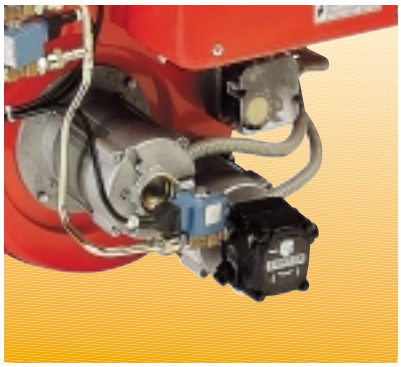
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the 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



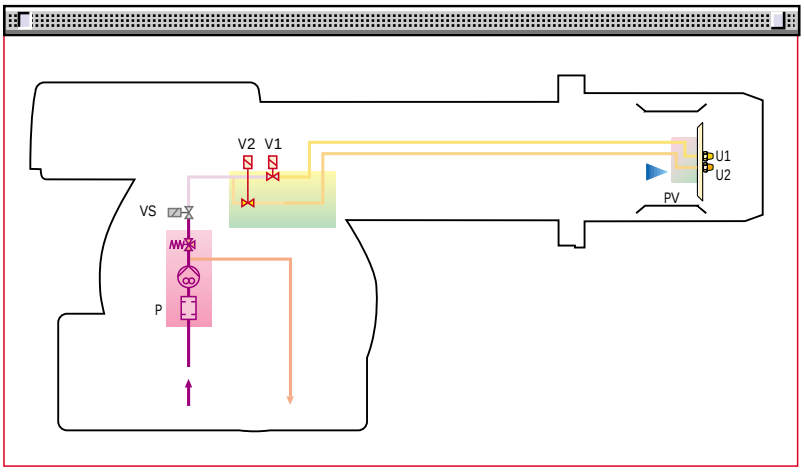
HYDRAULIC CIRCUIT

The burners are fitted with three valves (a safety valve and two oil delivery valves) along the oil line from the pump to the nozzle. A thermostatic control device, on the basis of required output, regulates oil delivery valves opening, allowing light oil passage trough the valves and to the nozzle.
Delivery valves open contemporary to the air damper opening, controlled by a servomotor.
The pumping group is fitted whit a pump, an oil filter and a regulating valve: through this it is possible to manaully adjusts atomised pressure, which in factory is preset at 12 bar.



Example of light oil pump of GI/EMME burners

GI/EMME 300 - 400 - 600 - 900



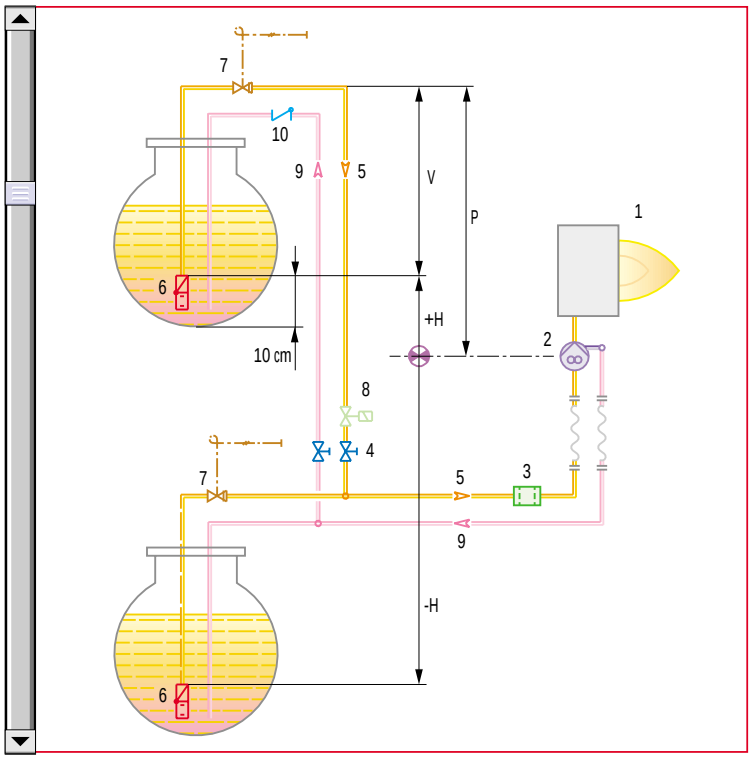
P	Pump with filter and pressure regulator on the output circuit
VS	Safety valve on the output circuit
V1	1st stage valve
V2	2nd stage valve
PV	Nozzle holder
U1	1st stage nozzle
U2	2nd stage nozzle

SELECTING THE FUEL SUPPLY LINES

The fuel feed must be completed with the safety devices required by the local norms.

The table shows the choice of piping diameter for the various burners, depending on the difference in height between the burner and the tank and their distance.

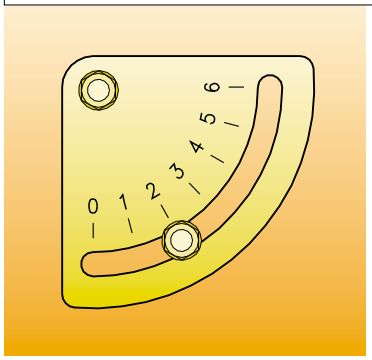
MAXIMUM EQUIVALENT LENGTH FOR THE PIPING L[m]								
Model	GI/EMME 300		GI/EMME 400		GI/EMME 600		GI/EMME 900	
Piping diameter	8 mm	10 mm	8 mm	10 mm	10 mm	12 mm	12 mm	14 mm
+H, -H (m)	Lmax (m)	Lmax (m)	Lmax (m)	Lmax (m)	Lmax (m)	Lmax (m)	Lmax (m)	Lmax (m)
+4	33	83	20	51	51	112	71	138
+3	22	55	18	46	46	99	62	122
+4	19	48	16	39	39	86	58	106
+1,5	18	44	14	35	35	79	51	98
+1	16	40	13	32	32	73	44	90
+0,5	15	37	12	29	29	65	40	82
0	13	33	10	26	26	60	36	74
-0,5	12	29	9	23	23	54	32	66
-1	10	25	8	20	20	47	28	56
-1,5	8	21	6	16	16	40	23	49
-2	7	17	5	13	13	34	19	42
-3	4	10	3	7	7	21	190	26
-4	2	4	1	2	2	8	3	10



H	Difference in height pump-foot valve
Ø	Internal pipe diameter
P	Height ≤ 10 m
V	Height ≤ 4 m
1	Burner
2	Burner pump
3	Filter
4	Manual shut off valve
5	Suction pipework
6	Bottom valve
7	Remote controlled rapid manual shutoff valve (compulsory in Italy)
8	Type approved shut off solenoid (compulsory in Italy)
9	Return pipework
10	Check valve

note *With ring distribution oil systems, the feasible drawings and dimensioning are the responsibility of specialised engineering studios, who must check compatibility with the requirements and features of each single installation.*

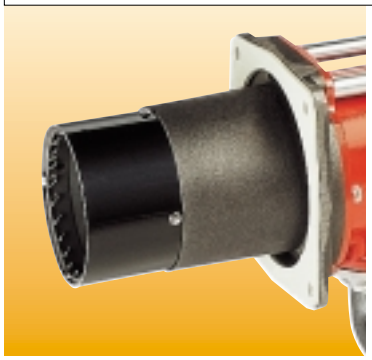
VENTILATION



Example of air damper of GI/EMME burners

The ventilation circuit comes with a forward blades centrifugal fan, which guarantees high pressure levels at the required air deliveries and permits installation flexibility.
In spite of the remarkable output power and of the very high pressure performance, GI/EMME 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 servomotor allows to have a right air flow in any operational state and the closure of air damper when burner is in stand-by.

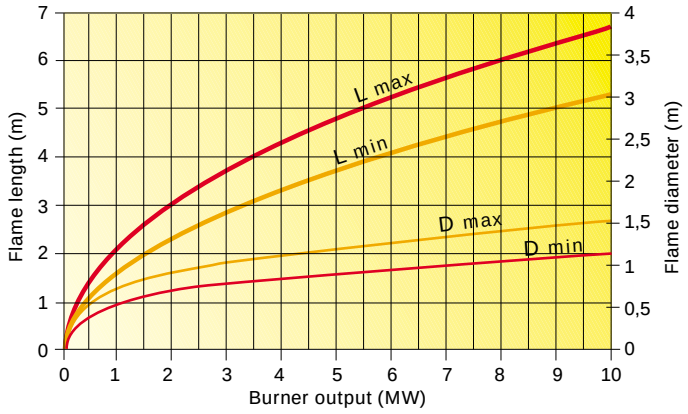
COMBUSTION HEAD

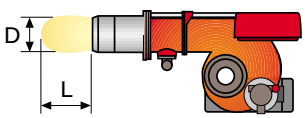


Example of GI/EMME burners combustion head

Different lengths of the combustion head can be supplied (with application of a specific “extended head kit”) for the GI/EMME 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.
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 the 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

With two stage operation, the GI/EMME series of burners can follow the temperature load requested by the system. A modulation ratio of 2:1 is reached thanks to the nozzles when burner is supplied with light oil and to the two-stage gas train when burner is supplied from gas; the air is adapted to the servomotor rotations.
On “two stage” operation, the burner gradually adjusts output to the requested level, by varying between two pre-set levels (see figure A).

Two stage operation

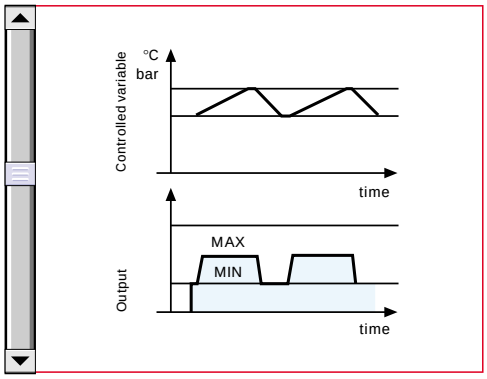
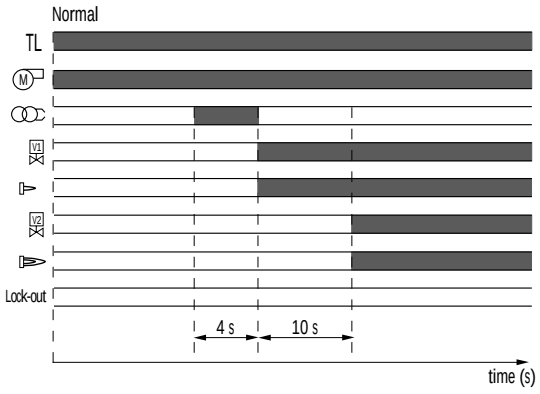


Figure **A**

START UP CYCLE



0”	Thermostat closes. The motor starts running.
36”	Pre-ignition (*)
40”	1st stage valve opens; 1st stage flame (**).
50”	If heat request is not yet satisfied, 2nd stage solenoid valve opens. The start up cycle comes to an end. 2nd stage flame (***).

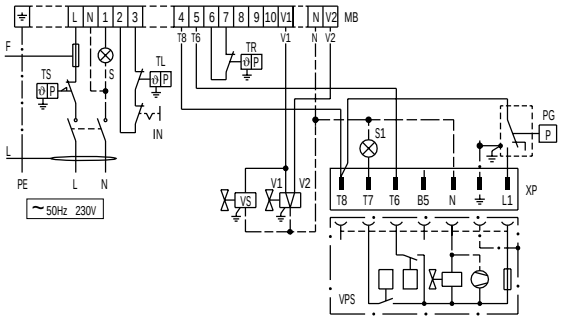
(*) 49” for GI/EMME 300.
(**) 55” for GI/EMME 300.
(***) 67” for GI/EMME 300.

WIRING DIAGRAMS

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

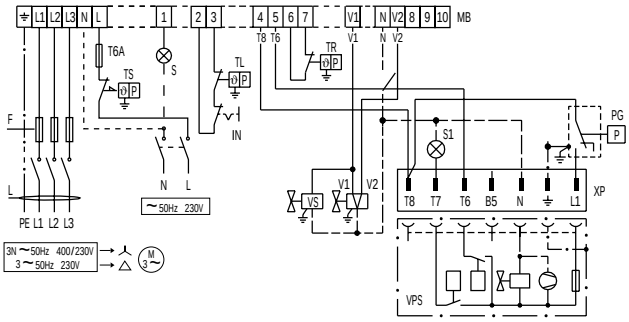
TWO STAGE OPERATION

GI/EMME 300-400 Without seal control



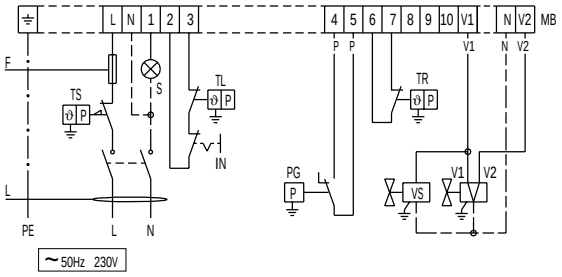
MB - Burner terminal board
IN - Burner manual stop switch
PG - Min. gas pressure switch
S - Remote lock-out signal
TL - Load limit remote control system
TR - High-Low mode remote control system
TS - Safety load control system
V1 - Regulating valve 1st stage
V2 - Regulating valve 2nd stage
VS - Safety valve

GI/EMME 600-900 Without seal control



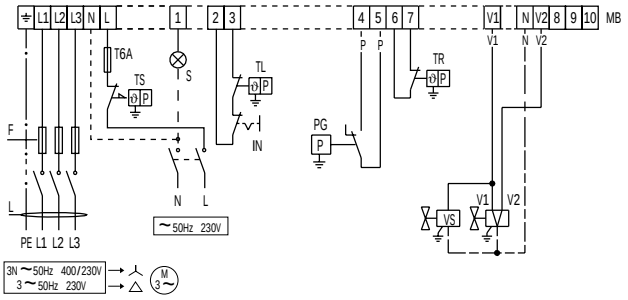
MB - Burner terminal board
IN - Burner manual stop switch
PG - Min. gas pressure switch
S - Remote lock-out signal
TL - Load limit remote control system
TR - High-Low mode remote control system
TS - Safety load control system
V1 - Regulating valve 1st stage
V2 - Regulating valve 2nd stage
VS - Safety valve

GI/EMME 300-400 With seal control



MB - Burner terminal board
IN - Burner manual stop switch
PG - Min. gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TL - Load limit remote control system
TR - High-Low mode remote control system
TS - Safety load control system
VPS - Seal control device
V1 - Regulating valve 1st stage
V2 - Regulating valve 2nd stage
VS - Safety valve
XP - Plug for seal control device

GI/EMME 600-900 With seal control

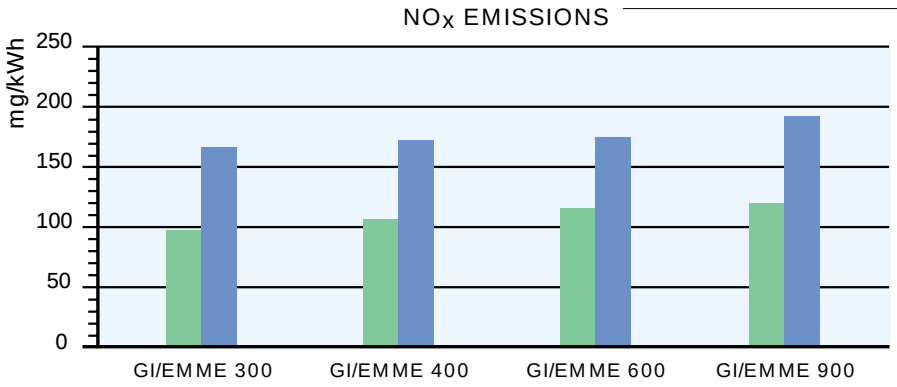


MB - Burner terminal board
IN - Burner manual stop switch
PG - Min. gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TL - Load limit remote control system
TR - High-Low mode remote control system
TS - Safety load control system
VPS - Seal control device
V1 - Regulating valve 1st stage
V2 - Regulating valve 2nd stage
VS - Safety valve
XP - Plug for seal control device

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

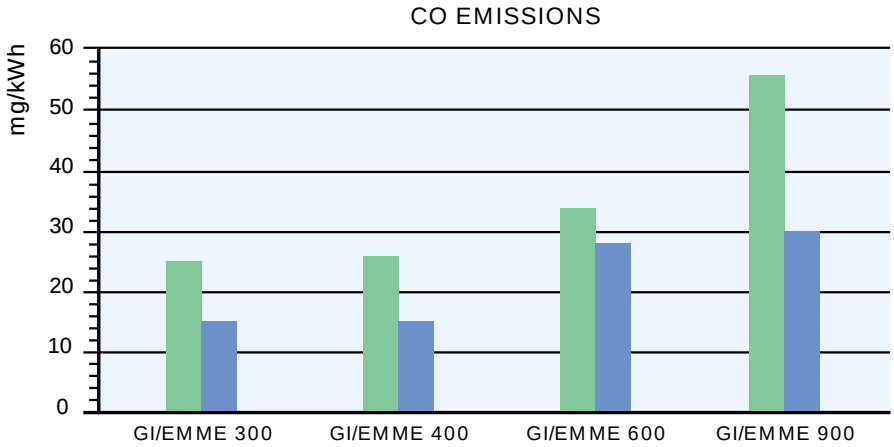
Model	GI/EMME 300	GI/EMME 400	GI/EMME 600		GI/EMME 900	
	230V	230V	230V	400V	230V	400V
F A	T6	T6	T6	T6	T16	T10
L mm^2	1,5	1,5	1,5	1,5	1,5	1,5

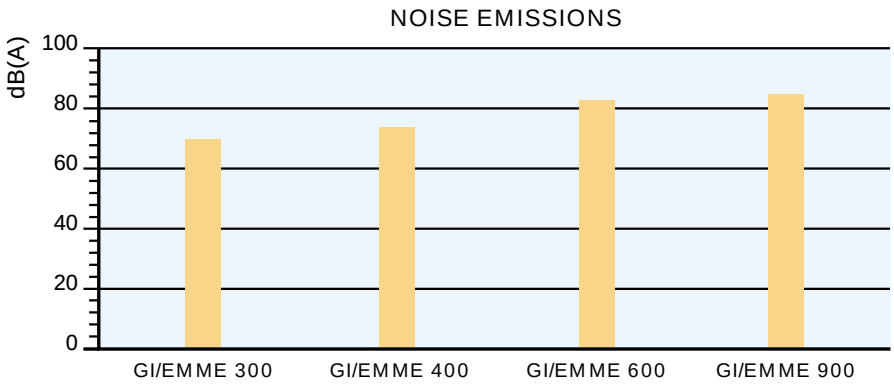
EMISSIONS



Gas working

Light oil working

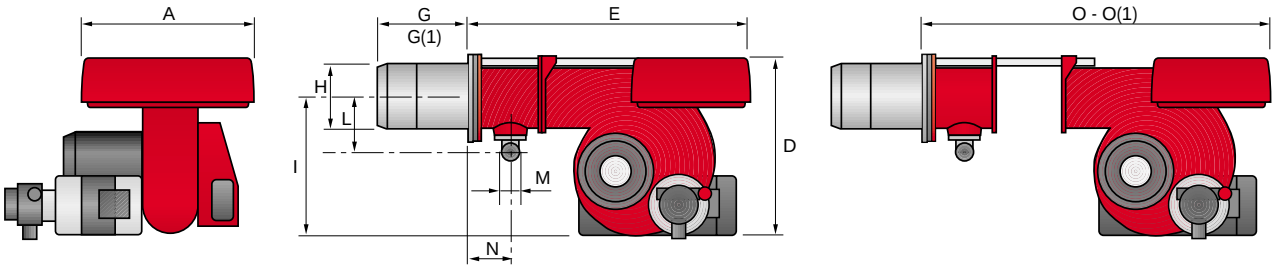




The emission data has been measured in the various models at maximum output, according to EN 676 and EN 267 standard.

OVERALL DIMENSIONS (mm)

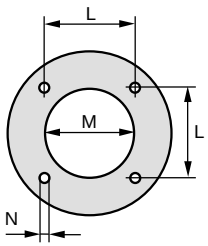
BURNERS



Model	A	E	G	G(1)	D	H	L	M	I	N	O	O(1)
GI/EMME 300	410	610	185	320	397	140	165	1”1/2	292	97	978	978
GI/EMME 400	410	610	187	320	397	150	165	1”1/2	292	97	1018	1018
GI/EMME 600	410	645	187	320	437	155	165	1”1/2	332	97	1063	1063
GI/EMME 900	410	770	227	360	485	175	195	2”	370	131	1260	1260

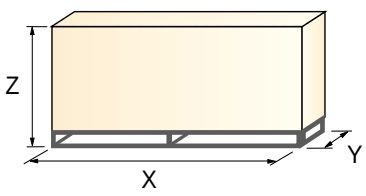
(1) Dimension with “extended head”.

BURNER - BOILER MOUNTING FLANGE



Model	L	M	N
GI/EMME 300	160	155	M 10
GI/EMME 400	160	165	M 10
GI/EMME 600	160	165	M 10
GI/EMME 900	195	185	M 12

PACKAGING



Model	X	Y	Z	kg
GI/EMME 300	835	530	453	42
GI/EMME 400	835	530	453	49
GI/EMME 600	880	530	500	64
GI/EMME 900	103	530	435	88

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 boiler output and following the diagrams included in the burner instruction handbook
- Refit the burner casing to the slide bars.
- Install the nozzle choosing this on the basis of the maximum boiler output and following the diagrams included in the burner instruction handbook.
- Check the position of the electrodes.
- Close the burner, sliding it up to the flange, keeping it slightly raised to avoid the flame stability disk rubbing against the blast tube.

ELECTRICAL AND HYDRAULIC CONNECTIONS AND START UP

- The burners are supplied for connection to two pipes fuel supply system.
- Connect the ends of the flexible pipes to the suction and return pipework using the supplied nipples.
- Make the electrical connections to the burner following the wiring diagrams included in the instruction handbook.
- Prime the pump by turning the motor (after checking rotation direction if it is a three phase motor).
- Adjust the gas train for start-up
  On start-up, check:
  Pressure pump and valve unit regulator (to max. and min.)
  Gas pressure at the combustion head (to max. and min. output)
  Combustion quality, in terms of unburned substances and excess air.

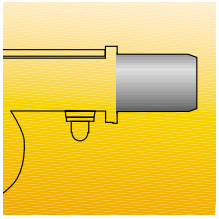
Nozzles

The nozzles must be ordered separately. The following table shows the features and codes on the basis of the maximum required fuel delivery.

Nozzles type 60° B			
Burner	**GPH**	**Rated delivery (kg/h) at 12 bar**	**Nozzle code**
GI/EMME 300	1,75	6,8	**3042114**
GI/EMME 300	2,00	7,8	**3042126**
GI/EMME 300	2,25	8,7	**3042132**
GI/EMME 300 - 400	2,50	9,7	**3042140**
GI/EMME 300 - 400	3,00	11,6	**3042158**
GI/EMME 300 - 400	3,50	13,6	**3042162**
GI/EMME 300 - 400 - 600	4,00	15,6	**3042172**
GI/EMME 400 - 600	4,50	17,5	**3042182**
GI/EMME 400 - 600	5,00	19,4	**3042192**
GI/EMME 400 - 600	5,50	21,3	**3042202**
GI/EMME 600 - 900	6,00	23,3	**3042212**
GI/EMME 600 - 900	7,00	27,1	**3042232**
GI/EMME 600 - 900	7,50	29,1	**3042242**
GI/EMME 900	8,50	33	**3042262**
GI/EMME 900	9,50	36,8	**3042282**
GI/EMME 900	10	38,8	**3042292**
GI/EMME 900	11	42,3	**3042312**
GI/EMME 900	12,00	46,5	**3042322**

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**
GI/EMME 300	185	320	**3000836**
GI/EMME 400	187	320	**3010001**
GI/EMME 600	187	320	**3010002**
GI/EMME 900	227	360	**3010003**

Sound proofing box

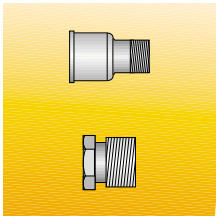
If noise emission needs reducing, sound-proofing boxes are available, as given in the following table:

Sound proofing box		
Burner	**Box type**	**Box code**
GI/EMME 600	C2	**3000777**
GI/EMME 900	C3	**3000778**

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.



Adapters			
Burner	**Gas train**	**Dimensions**	**Adapter code**
GI/EMME 300	MBZRDLE 407-410	3/4" 1" 1/2	**3000824**
	MBZRDLE 412	1"1/4 1" 1/2	**3010124**
GI/EMME 400	MBZRDLE 410	3/4" 1" 1/2	**3000824**
	MBZRDLE 412	1"1/4 1" 1/2	**3010124**
	MBZRDLE 420 - CB 50/1	2" 1" 1/2	**3000822**
GI/EMME 600	MBZRDLE 410	3/4" 1" 1/2	**3000824**
	MBZRDLE 412	1"1/4 1" 1/2	**3010124**
	MBZRDLE 420 - CB 50/1	2" 1" 1/2	**3000822**
GI/EMME 900	MBZRDLE 412	1"1/4 2"	**3010126**
	MBZRDLE 415 - CB 40/1	1" 1/2 2"	**3000843**
	CBF 65	DN 65 2"1/2 1" 1/2 2"	**3000825**

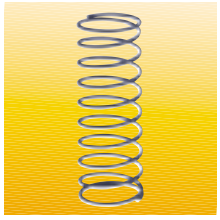
Seal control kit

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

Seal control kit		
Burner	**Gas train**	**Kit code**
GI/EMME 300	MBZRDLE 407 - MBZRDLE 410 - MBZRDLE 412	**3010123**
	MBZRDLE 415 - CB 40/2 -	**3010125**
GI/EMME 400	MBZRDLE 410 - MBZRDLE 412	**3010123**
	MBZRDLE 415 - MBZRDLE 420 CB 40/2 - CB 50/2	**3010125**
GI/EMME 600	MBZRDLE 410 - MBZRDLE 412	**3010123**
	MBZRDLE 415 - MBZRDLE 420 CB 40/2 - CB 50/2	**3010125**
GI/EMME 900	MBZRDLE 412	**3010123**
	MBZRDLE 415 - MBZRDLE 420 CB 40/2 - CB 50/2 - CBF 65/2	**3010125**

Stabiliser spring

Accessory springs are available to vary the pressure range of the gas train stabilisers.



Stabiliser spring		
Gas train	**Spring**	**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**

SPECIFICATION

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

DESIGNATION OF SERIES

Series : GI/EMME

Size

Emission: Class 1 EN 267

Head :
- TC Standard head
- TL Extended head

Flame control system :
- FS1 Standard (1 stop every 24 h)

Electrical supply to the system :

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

Auxiliary voltage :

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

GI/EMME	900		TC	FS1	3/230-400/50	230/50
BASIC DESIGNATION						
EXTENDED DESIGNATION						

LIST OF AVAILABLE MODELS

GI/EMME 300	TC	FS1	1/220/60	220/60
GI/EMME 300	TC	FS1	1/230/50	230/50
GI/EMME 400	TC	FS1	1/210/60	120/60
GI/EMME 400	TC	FS1	1/230/50	230/50
GI/EMME 400	TC	FS1	3/220-380/60	220/60
GI/EMME 600	TC	FS1	3/210/60	120/60
GI/EMME 600	TC	FS1	3/220-380/60	220/60
GI/EMME 600	TC	FS1	3/230-400/50	230/50
GI/EMME 900	TC	FS1	3/210/60	120/60
GI/EMME 900	TC	FS1	3/220-380/60	220/60
GI/EMME 900	TC	FS1	3/230-400/50	230/50

Other versions are available on request.

PRODUCT SPECIFICATION

Burner:

Monoblock forced draught dual fuel burner, with two-stage operation, made up of:
- Air suction circuit
- Fan with forward curved blades
- Air damper for setting controlled by a servomotor
- Combustion head, that can be set on the basis of required output
- Maximum gas pressure switch
- Minimum air pressure switch
- Fan electrical motor
- Pump electrical motor
- Gears pump for high pressure fuel supply, fitted with:
    - filter
    - pressure regulator
    - connections for installing a pressure gauge and a a vacuometer
    - internal by-pass for single pipe installation
- Valve unit with a double oil safety valve on the output circuit
- 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)
- EN 267 (liquid fuel burners)
- EN 676 (gas fuel burners).

Standard equipment:
- 1 gas train gasket
- 1 flange gasket
- 1 insulating screen
- 2 flexible hoses for connection to the oil supply circuit
- 2 nipples for connection to the pump
- 3 wiring looms fittings for electrical connections
- 8 screws for fixing the burner flange to the boiler
- 1 LPG kit
- 2 nozzles for light oil
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- Nozzles
- Head extension kit
- Sound proofing box
- Adapters
- Stabiliser spring
- Seal control kit.

Lineagrafica

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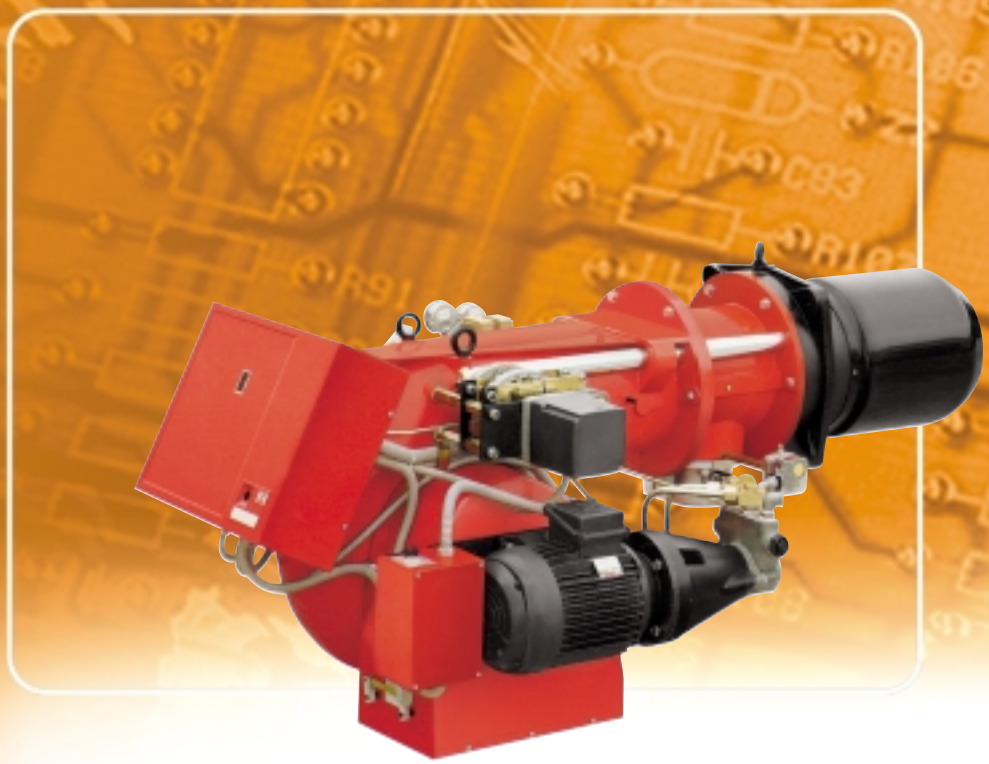
RIELLO BURNERS

CE

MODULATING DUAL FUEL BURNERS

GI/EMME SERIES

GI/EMME 1400	407/820 ÷ 1540 kW
GI/EMME 2000	581/1163 ÷ 2325 kW
GI/EMME 3000	872/1744 ÷ 3488 kW
GI/EMME 4500	1163/2350 ÷ 4650 kW



The GI/EMME 1400-4500 series of burners covers a firing range from 407 to 4650 kW. They have been designed for high output users and they are suitable for matching with all kinds of boilers, with normal or pressurized combustion chamber.
Operation can be “two stage progressive” or, alternatively, “modulating” with the installation of a PID logic regulator and probes. Two operating options, gas or light oil, are available at the touch of a switch. The light oil circuit comes with its own electric motor: so the pump is stopped during gas operation to prevent pump seizure and to avoid oil in circulation. A wide range of accessories and gas trains guarantee maximum working flexibility.

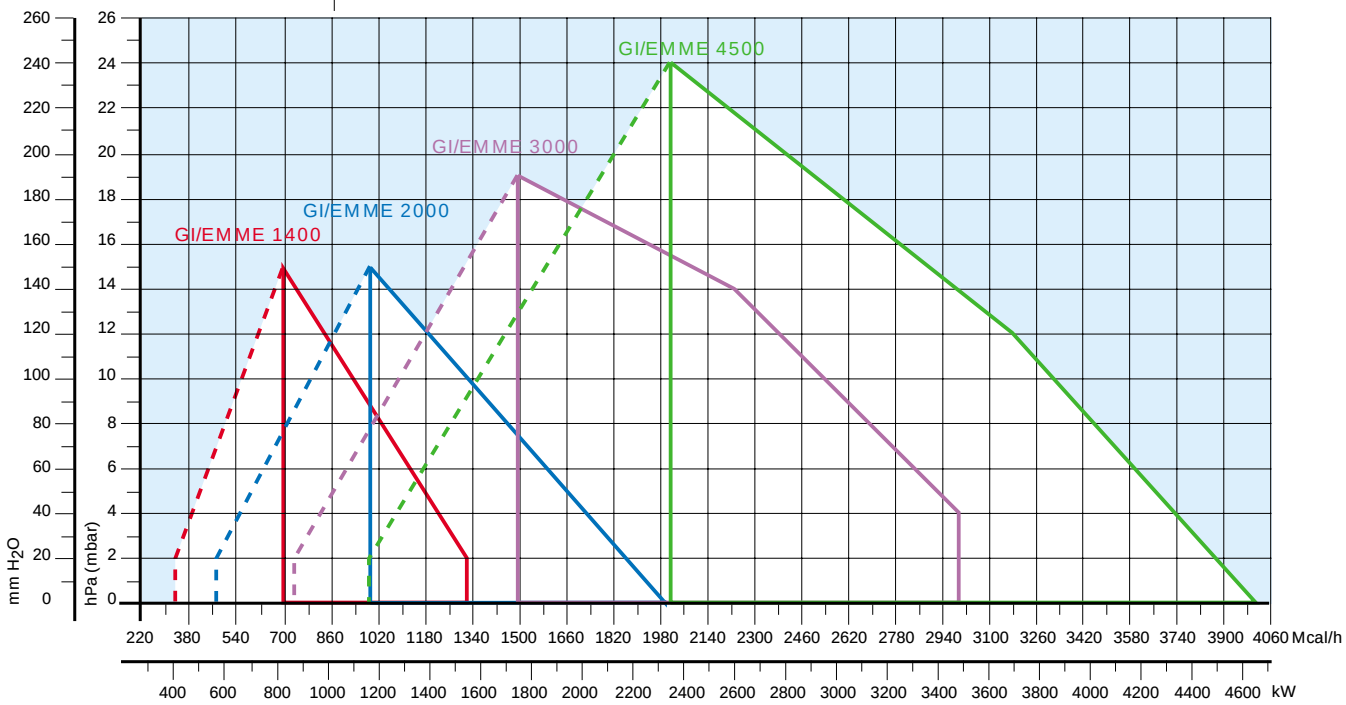
TECHNICAL DATA

	Model			GI/EMME 1400	GI/EMME 2000	GI/EMME 3000	GI/EMME 4500
	Burner operation mode			Modulating (with regulator and probes accessories) or two stage progressive			
	Modulating ratio at max. ouput			3:1			
	Servomotor	type		SQM 10.16502			
		run time	s	42			
	Heat output		kW	407/820-1540	581/1163-2325	872/1744-3488	1163/2350-4650
			Mcal/h	350/705-1324	500/1000-2000	750/1500-3000	1000/2021-4000
	Working temperature		°C min/max	0/40			
Fuel / air data	Oil	Net calorific value	kWh/kg	11,8			
		Viscosity	mm^2/s (cSt)	4-6 (at 20°C)			
		Delivery	kg/h	34/69-130	49/99-197	74/148-296	99/199-394
	Pump	type		TA2	TA3	TA4	TA5
		delivery	kg/h	336 (at 25 bar)	546 (at 25 bar)	706 (at 25 bar)	1008 (at 25 bar)
	Atomised pressure		bar	25			
	Fuel temperature		max °C	60			
	Fuel preheater			NO			
	G20	Net calorific value	kWh/Nm^3	10			
		Density	kg/Nm^3	0,71			
		Gas delivery	Nm^3/h	41/82-154	58/116-232,5	87/174-349	116/235-465
	G25	Net calorific value	kWh/Nm^3	8,6			
		Density	kg/Nm^3	0,78			
		Gas delivery	Nm^3/h	47/95-179	68/135-270	101/203-406	135/273-541
	LPG	Net calorific value	kWh/Nm^3	25,8			
		Density	kg/Nm^3	2,02			
		Gas delivery	Nm^3/h	16/32-60	23/45-90	34/68-135	45/91-180
	Fan		type	Centrifugal with 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	5,1	6,1	12	15,5
	Auxiliary electrical power		kW	1	1	1,5	2
	Heaters electrical power		kW	--			
	Protection level		IP	44			
	Pump motor electrical power		kW	1,1	1,1	1,5	1,5
	Rated pump motor current		A	3	3	3,7	3,7
	Pump motor start up current		A	--			
	Pump motor protection level		IP	44			
	Fan motor electrical power		kW	3	4	9	12
	Rated fan motor current		A	6,1	8	17	23
	Fan motor start up current		A	44,5	64	124,1	158,7
	Fan motor protection level		IP	44	44	44	55
	Ignition transformer		type	--			
			V1- V2	230 V - 2 x 6 kV			
			I1 - I2	1,9 A - 35 mA			
	Operation			Intermittent (at least one stop every 24h)			
Emissions	Sound pressure		dB(A)	85,4	88	92	93,1
	Sound power		W	--			
	Oil	CO emission	mg/kWh	< 50			
		Grade of smoke indicator	N° Bacharach	< 1			
		CxHy emission	mg/kWh	--			
		NOx emission	mg/kWh	< 250			
	G20	CO emission	mg/kWh	< 100			
		NOx emission	mg/kWh	< 150			
Approval	Directive			90/396 - 89/336 - 73/23 EEC			
	Conforming to			EN 267 - EN 676			
	Certification			CE 0085AQ0712	CE 0085AQ0712	CE 0085AQ0712	CE 0085AQ0712
				DIN 5G830/97 M	DIN 5G831/97 M	DIN 5G832/97 M	DIN 5G833/97 M

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

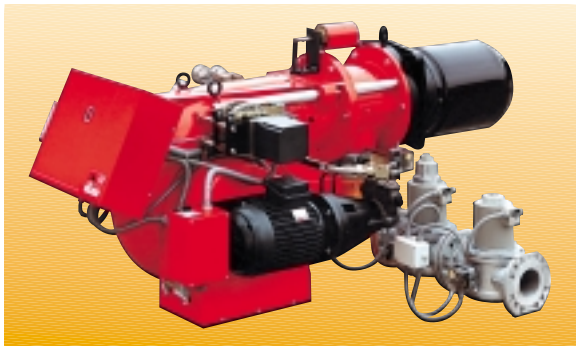
Modulation range

Test conditions conforming to EN 267 - EN 676:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 m a.s.l.

FUEL SUPPLY

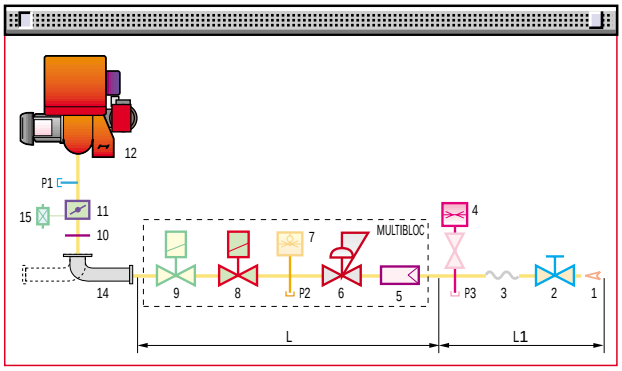
GAS TRAIN

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 requirements.
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).

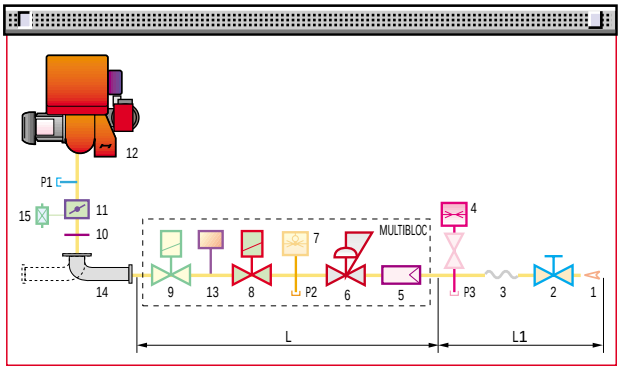


Example of burner of GI/EMME series with connected gas train

MULTIBLOC gas train without seal control

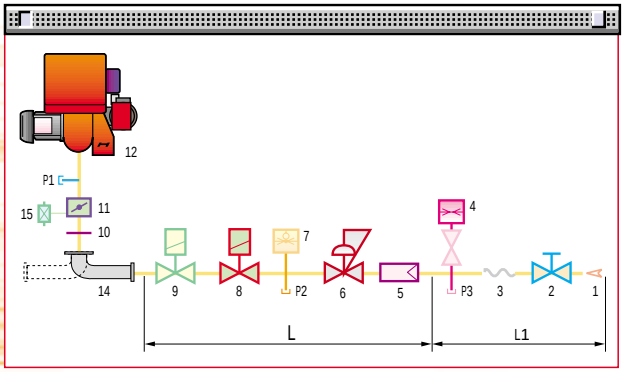


MULTIBLOC gas train with seal control

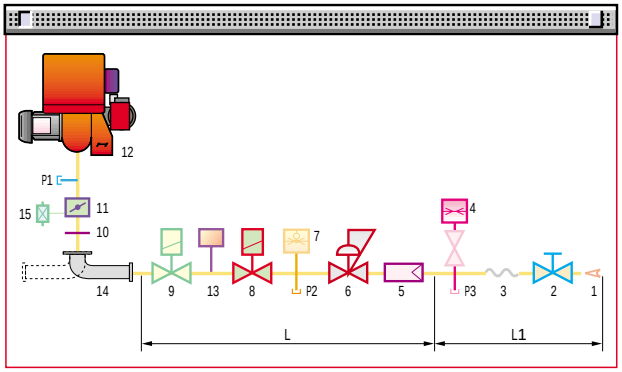


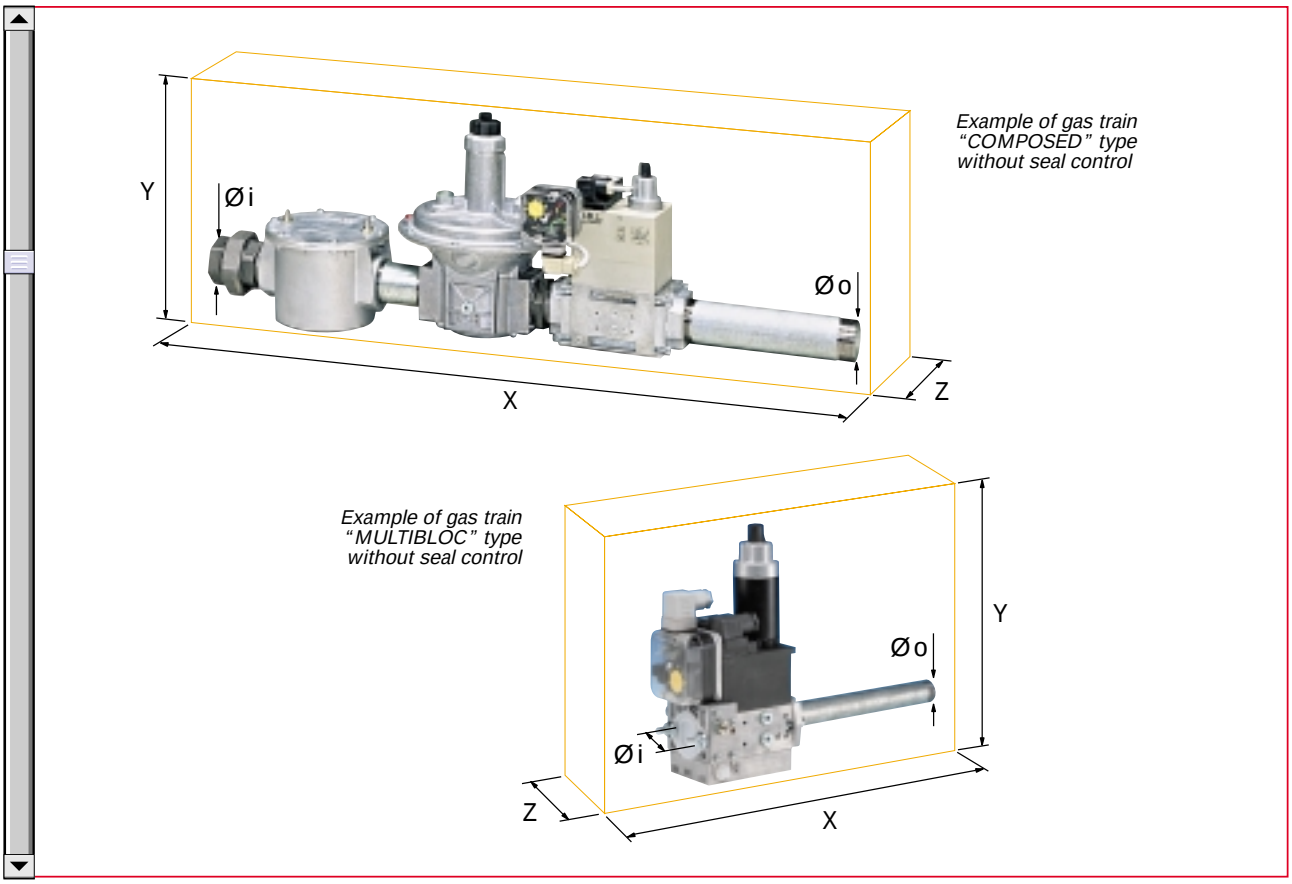
1	Gas input pipework
2	Manual valve
3	Anti-vibration joint
4	Pressure gauge with pushbutton cock
5	Filter
6	Pressure regulator (vertical)
7	Minimum gas pressure switch
8	VS safety solenoid (vertical)
9	VR regulation solenoid (vertical) Two settings: - firing output (rapid opening) - maximum output (slow 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 GI/EMME burners, inlet 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 the one of the gas train “Composed” type is 500 mbar.

	Name	Code	Ø i	Ø o	X mm	Y mm	Z mm	SC
MULTIBLOC GAS TRAINS	**MBD 420**	3970181	2”	2”	523	300	100	-
	MBD 420 CT	3970182	2”	2”	523	300	227	Incorporated
COMPOSED GAS TRAINS	**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

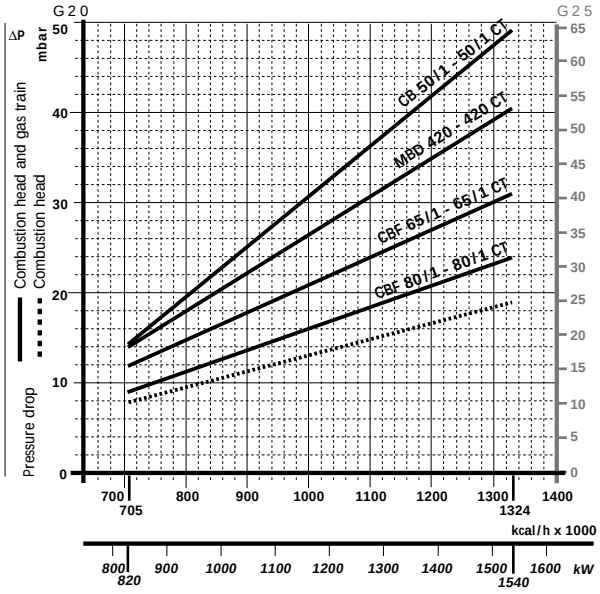
When the diameter of the gas train is different from the set diameter of the burners, an adapter must be fitted between the gas train and the burner.
For further information see “Accessories” section.

PRESSURE DROP DIAGRAM

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

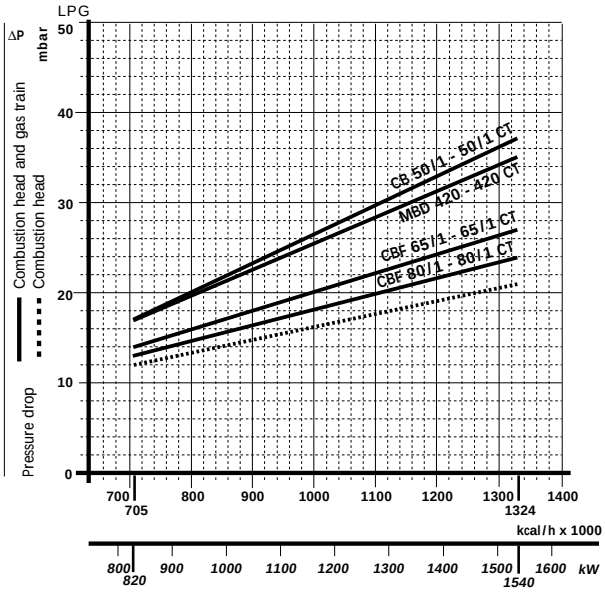
GI/EMME 1400



Gas train	Code	Adapter	Seal Control
MBD 420	3970181	-	Accessory
MBD 420 CT	3970182	-	Incorporated
CB 50/1	3970146	-	Accessory
CB 50/1 CT	3970160	-	Incorporated

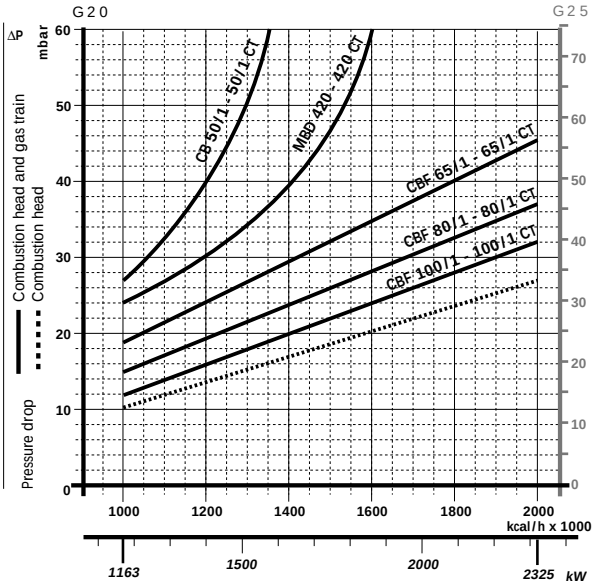
LPG

GI/EMME 1400



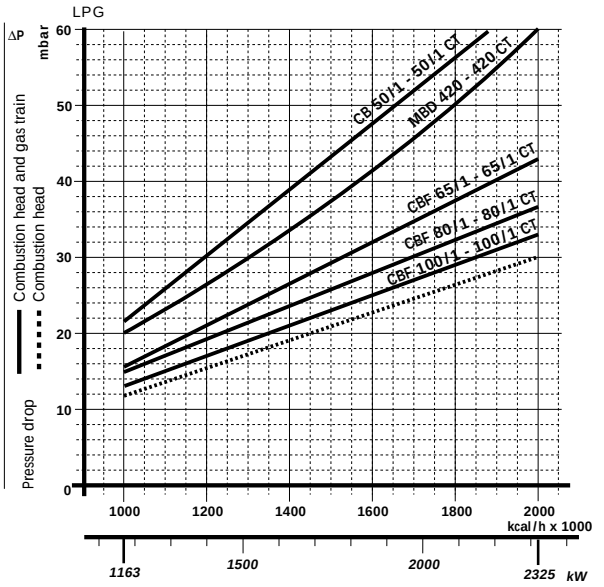
Gas train	Code	Adapter	Seal Control
CBF 65/1	3970147	3000825	Accessory
CBF 65/1 CT	3970161	3000825	Incorporated
CBF 80/1	3970148	3000826	Accessory
CBF 80/1 CT	3970162	3000826	Incorporated

GI/EMME 2000



Gas train	Code	Adapter	Seal Control
MBD 420	3970181	-	Accessory
MBD 420 CT	3970182	-	Incorporated
CB 50/1	3970146	-	Accessory
CB 50/1 CT	3970160	-	Incorporated
CBF 65/1	3970147	3000825	Accessory

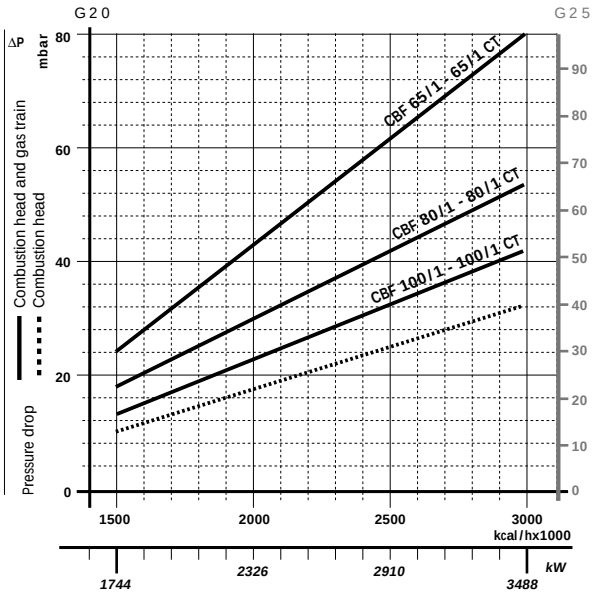
GI/EMME 2000



Gas train	Code	Adapter	Seal Control
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

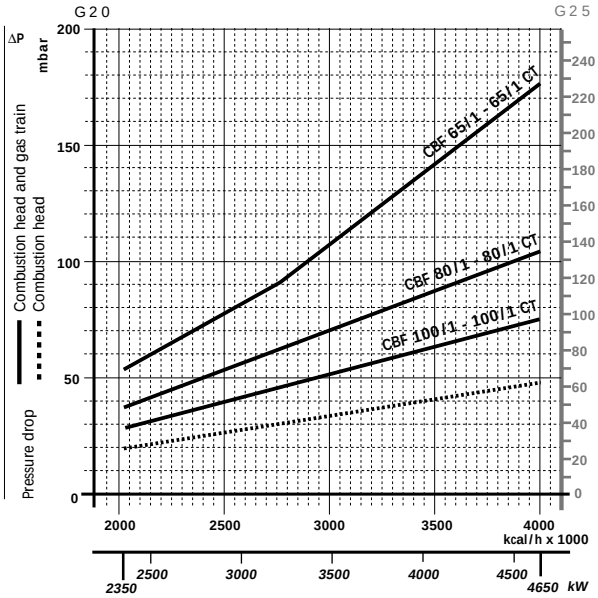
NATURAL GAS

GI/EMME 3000



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

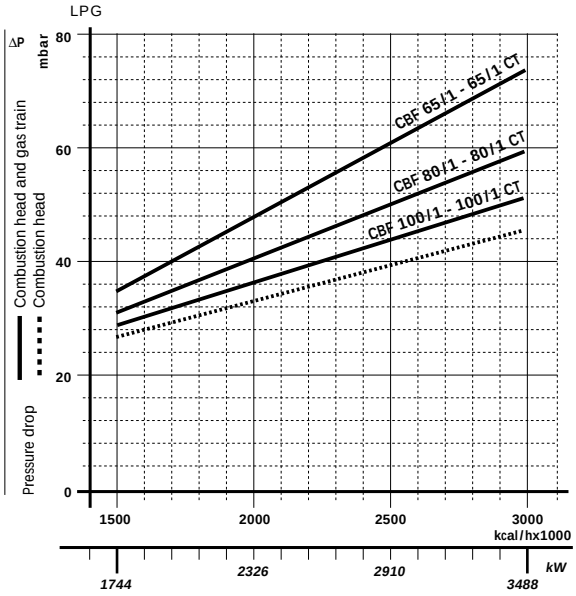
GI/EMME 4500



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

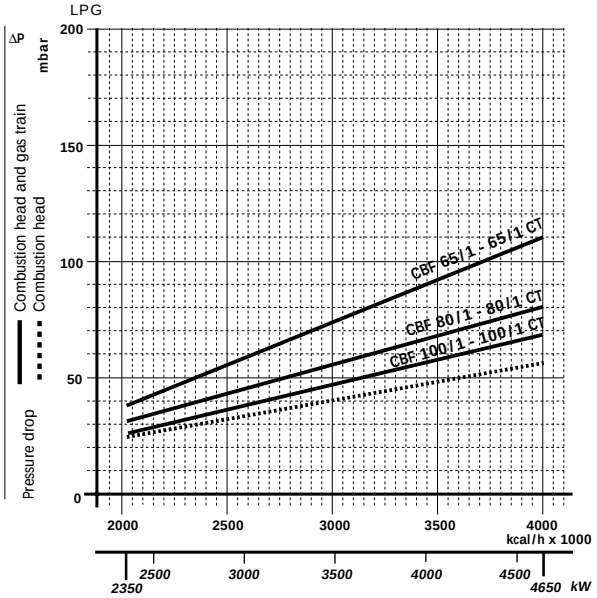
LPG

GI/EMME 3000



Gas train	Code	Adapter	Seal Control
CBF 80/1 CT	3970162	3000832	Incorporated
CBF 100/1	3970149	3010127	Accessory
CBF 100/1 CT	3970163	3010127	Incorporated

GI/EMME 4500



Gas train	Code	Adapter	Seal Control
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.

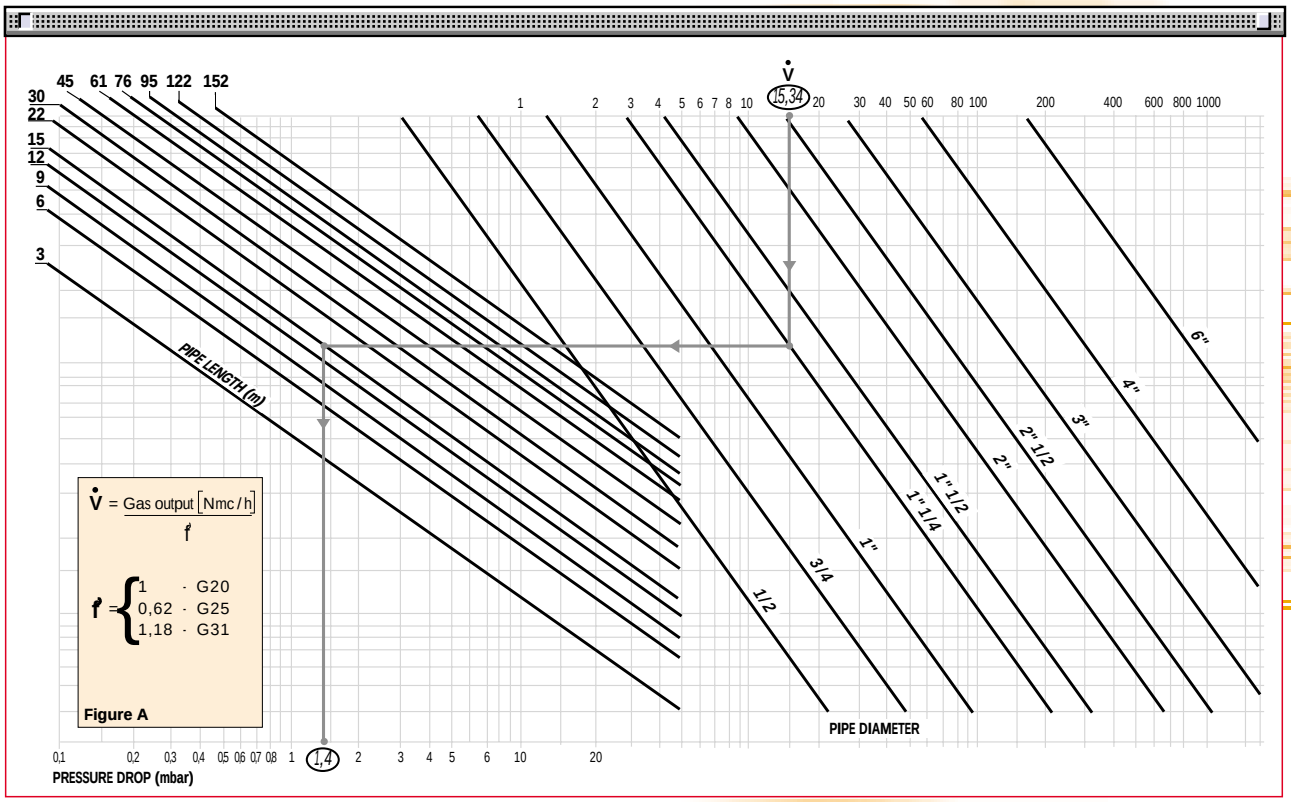
Example:

	- 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

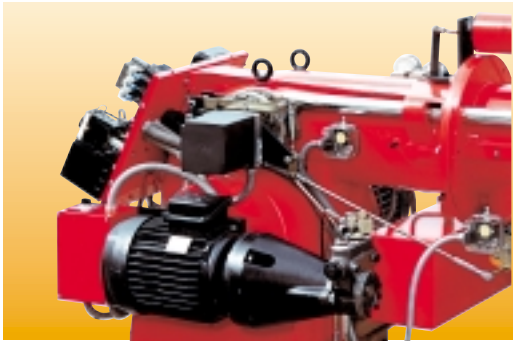
- once the value of 15.34 has been identified on the output scale ($\dot{V}$), moving vertically downwards you cross the line that represents 1" 1/4 (the chosen diameter for the piping);
- from this point, move horizontally to the left until you meet the line that represents the length of 15 m of the 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



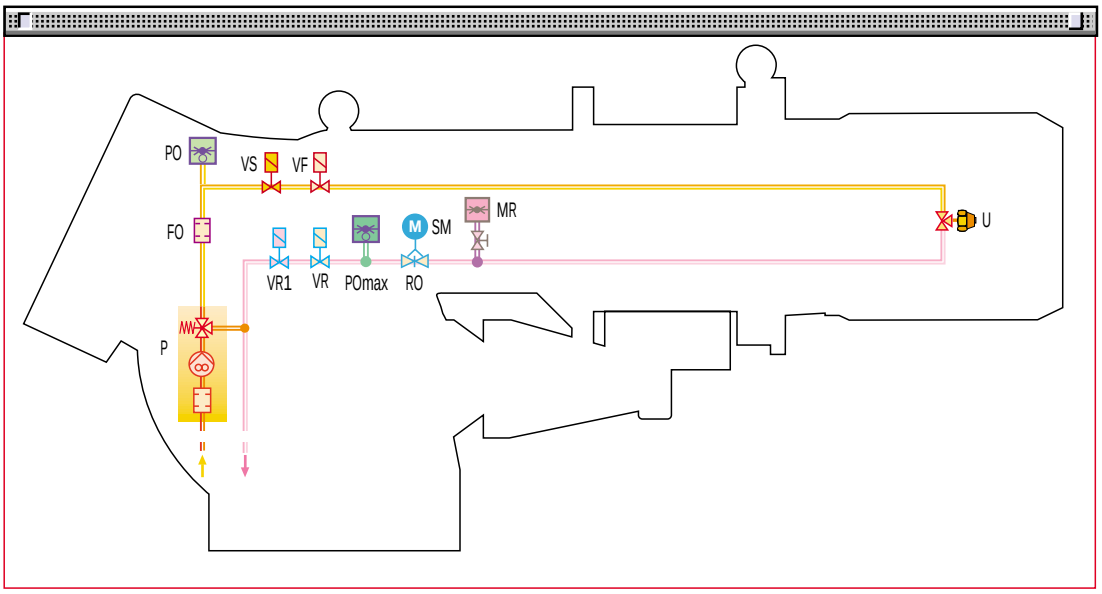
HYDRAULIC CIRCUIT

The hydraulic circuit of the GI/EMME series of burners is characterised by a fuel pump with an independent motor.
The burners are fitted with two valves (a safety valve and an operation valve) and an oil filter along the oil line from the pump to the nozzle.
A pressure regulator on the return circuit from the nozzle enables the quantity of fuel burnt to be varied.
Two safety valves on the return circuit avoid oil leakage from the nozzle when the burner is in stand-by and pre-purge phase.
The models are fitted with a maximum pressure switch on the oil return circuit, and a minimum oil pressure switch on the oil line from the pump to the nozzle.



Example of oil circuit in GI/EMME series of burners

EN 267 > 100 kg/h



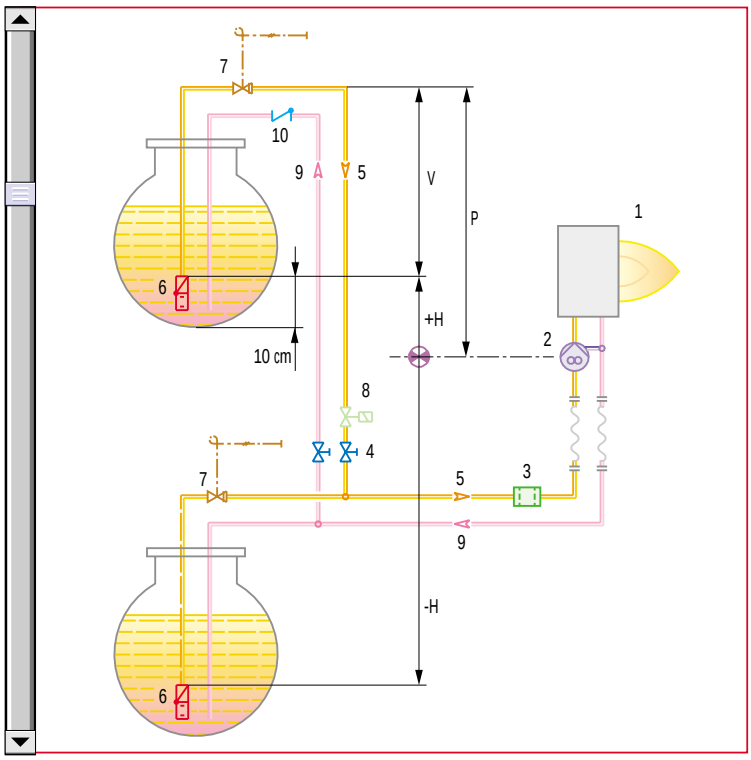
P	Pump with filter and pressure regulator on the output circuit
FO	Oil filter
VS	Safety valve on the output circuit
VF	Working valve on the output circuit
U	Nozzle
MR	Pressure gauge on the return circuit
SM	Servomotor
RO	Pressure regulator on the return circuit
PO max	Max. oil pressure switch on the return circuit
VR	1st safety valve on the return circuit
VR1	2nd safety valve on the return circuit
PO	Min. oil pressure switch on the output circuit

SELECTING THE FUEL SUPPLY LINES

The fuel feed must be completed with the safety devices required by the local norms.

The table shows the choice of piping diameter for the various burners, depending on the difference in height between the burner and the tank and their distance.

MAXIMUM EQUIVALENT LENGTH FOR THE PIPING L[m]								
Model	**GI/EMME 1400**		**GI/EMME 2000**		**GI/EMME 3000**		**GI/EMME 4500**	
Piping diameter	**14mm**	**16mm**	**16mm**	**18mm**	**G 1/2"**	**G 3/4"**	**G 3/4"**	**G 1"**
+H, -H (m)	**Lmax (m)**	**Lmax (m)**	**Lmax (m)**	**Lmax (m)**	**Lmax (m)**	**Lmax (m)**	**Lmax (m)**	**Lmax (m)**
+2,0	55	70	40	60	25	85	55	130
+1,5	45	65	35	55	23	80	50	120
+1,0	40	60	30	50	20	70	45	110
+0,5	35	50	25	45	18	65	40	100
0	30	45	20	40	15	60	35	90
-0,5	25	40	18	35	12	50	30	80
-1,0	20	35	15	30	10	45	25	70
-1,5	15	30	13	25	8	35	20	60
-2,0	10	25	10	20	5	30	15	45
-3,0	5	15	5	10	3	15	10	25

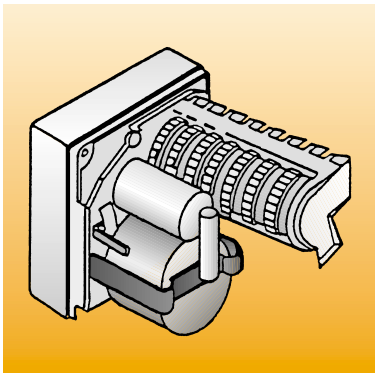


H	Difference in height pump-foot valve
Ø	Internal pipe diameter
P	Max. height 10 m
V	Height 4 m
1	Burner
2	Burner pump
3	Filter
4	Manual shut off valve
5	Suction pipework
6	Bottom valve
7	Remote controlled rapid manual shut off valve (compulsory in Italy)
8	Type approved shut off solenoid valve (compulsory in Italy)
9	Return pipework
10	Check valve

note *With ring distribution oil systems, the feasible drawings and dimensioning are the responsibility of specialised engineering studios, who must check compatibility with the requirements and features of each single installation.*

VENTILATION

The ventilation circuit comes with a forward blades centrifugal fan, which guarantees high pressure levels at the required air deliveries and permits installation flexibility.
In spite of the remarkable output power and of the very high pressure performance, GI/EMME models are extremely compact.
Sound proofing boxes help to reduce the noise level.
A variable profile cam connects fuel and air setting, ensuring fuel efficiency at all firing rates.



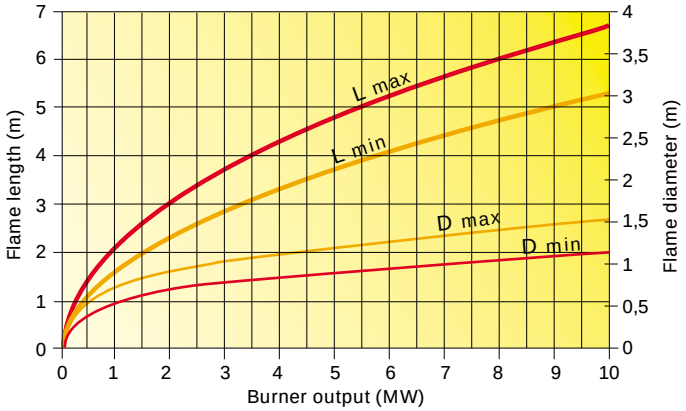
Example of servomotor mounted on GI/EMME series of burner

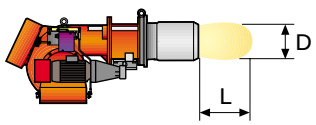
COMBUSTION HEAD

Two different combustion head length can be selected for the various models of GI/EMME 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 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 a preliminary check: if the combustion chamber dimensions are different from the values in the diagram, further tests need to be done.

Example of GI/EMME combustion head

Flame dimensions





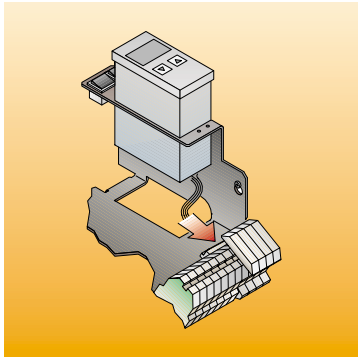
Example:
Burner thermal output = 3500 kW;
L_{flame} (m) = 3,5 m (medium value);
D_{flame} (m) = 1 m (medium value)

ADJUSTMENT

BURNER OPERATION MODE

The GI/EMME series of burners can be “two stage progressive” or “modulating”.

During “two stage progressive” operation, the burner gradually adapts the output to the required level, by varying between two pre-set levels (see figure A).
During “modulating” operation, normally required in steam generators, in superheated water boilers or thermal oil boilers, 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).



Example of a regulator

“Two stage progressive” operation

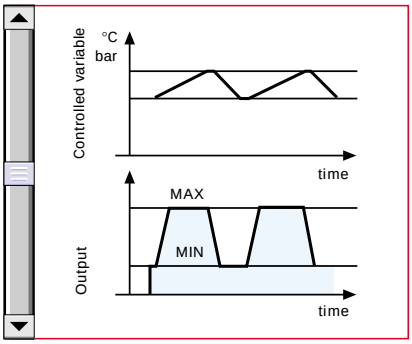


Figure A

“Modulating” operation

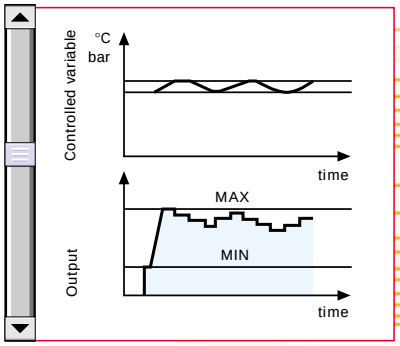
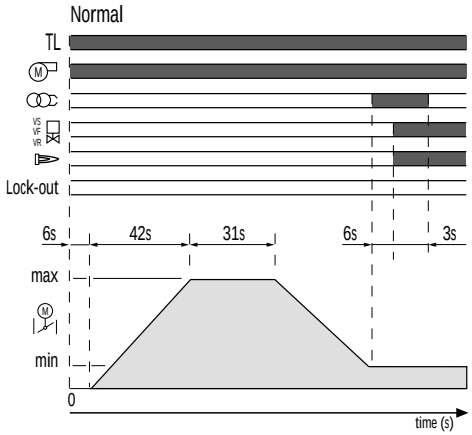


Figure B

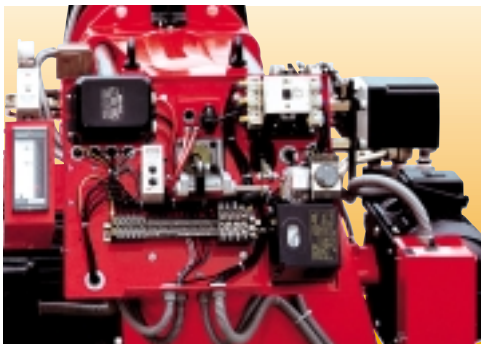
START UP CYCLE



0”	The burner begins the start-up cycle: the motor starts turning.
6”-48”	The servomotor opens the air damper at the maximum position.
48”-79”	Pre-purge phase with air damper open.
79”-n”	The servomotor takes the air damper to the ignition position.
n”	Ignition transformer turns on.
6” after	Oil solenoid valves open and flame detection with P.E. cell is activated.
3”	After a safety time, the ignition transformer turns off if there is the flame, otherwise lock-out happens.

WIRING DIAGRAMS

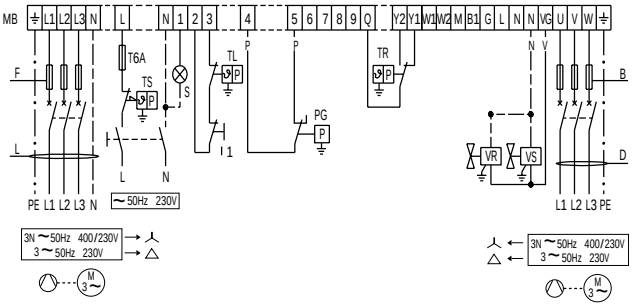
Electrical connections must be made by qualified and skilled personnel, according to the local norms.



Example of the terminal board for the electrical connections for GI/EMME burner models

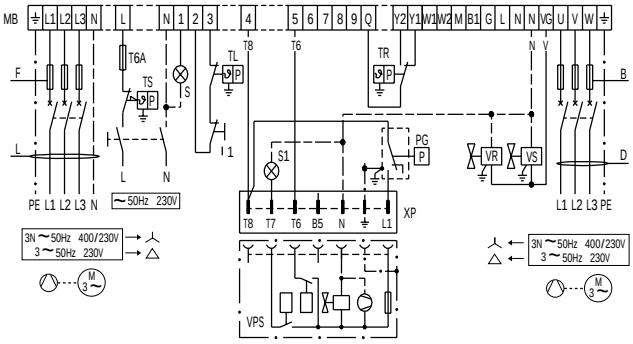
"TWO STAGE PROGRESSIVE" OPERATION

GI/EMME 1400 - 2000 - 3000 (direct start-up) Without seal control



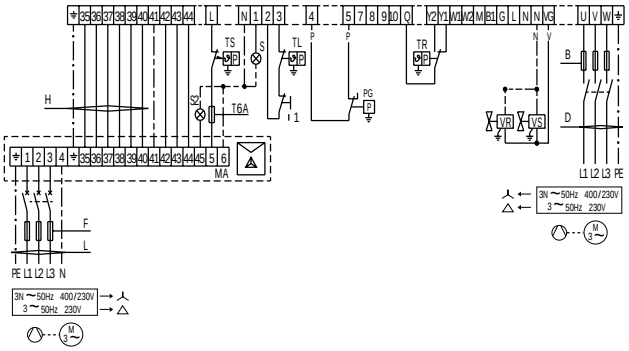
I1 - Burner manual stop switch (optional)
PG - Min. gas pressure switch
S - Remote lock-out signal
TR - High-low mode load remote control system
TL - Load limit remote control system
TS - Safety load control system
VR - Regulating gas valve
VS - Safety gas valve
MB - Burner terminal board
T6A - 6A Fuse
F,B - Fuse
L,H,D - Lead section

GI/EMME 2000 - 3000 - 4500 (direct start-up) With seal control



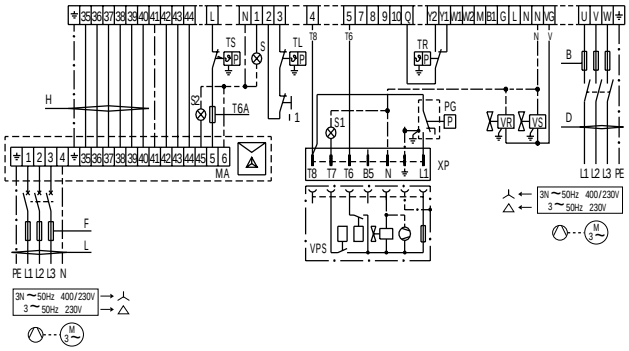
I1 - Burner manual stop switch (optional)
XP - Plug for seal control device
PG - Min gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TR - High-low mode load remote control system
TL - Load limit remote control system
TS - Safety load control system
VR - Regulating gas valve
VS - Safety gas valve
MB - Burner terminal board
VPS - Seal control device
T6A - 6A Fuse
F,B - Fuse
L,H,D - Lead section

GI/EMME 1400 - 2000 - 3000 (star delta start-up) Without seal control



I1 - Burner manual stop switch (optional)
PG - Min gas pressure switch
S - Remote lock-out signal
TR - High-low mode load remote control system
TL - Load limit remote control system
TS - Safety load control system
VR - Regulating gas valve
VS - Safety gas valve
MB - Burner terminal board
MA - Star delta starter terminal board
S2 - Fan lock-out signal
T6A - 6A Fuse
F,B - Fuse
L,H,D - Lead section

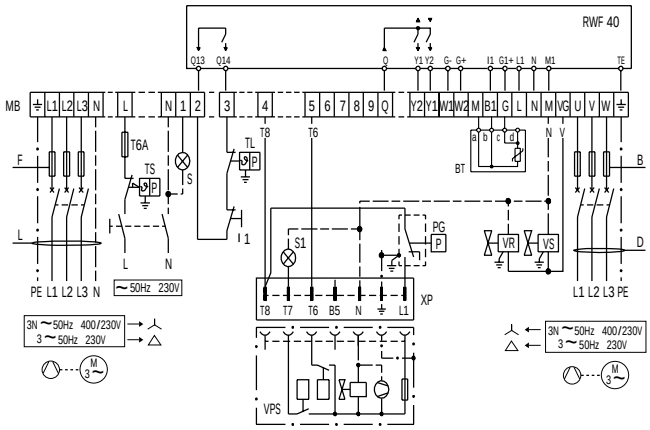
GI/EMME 2000 - 3000 - 4500 (star delta start-up) With seal control



I1 - Burner manual stop switch (optional)
XP - Plug for seal control device
PG - Min gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TR - High-low mode load remote control system
TL - Load limit remote control system
TS - Safety load control system
VR - Regulating gas valve
VS - Safety gas valve
MB - Burner terminal board
VPS - Seal control device
MA - Star delta starter terminal board
S2 - Fan lock-out signal
T6A - 6A Fuse
F,B - Fuse
L,H,D - Lead section

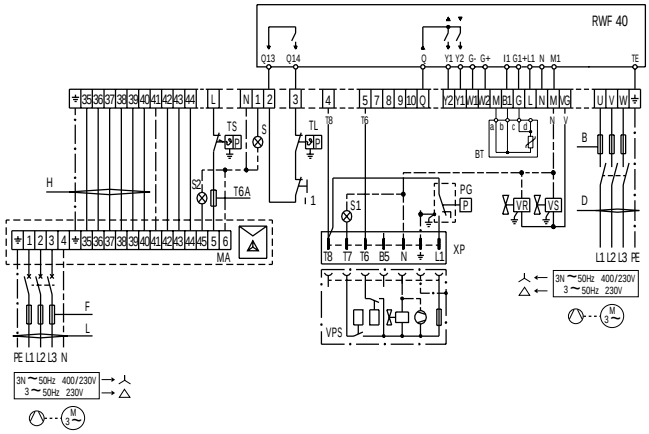
"MODULATING" OPERATION - TEMPERATURE PROBE

GI/EMME 1400 - 2000 - 3000 (direct start-up)



I1 - Burner manual stop switch (optional)
XP - Plug for seal control device
PG - Min gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TL - Load limit remote control system
TS - Safety load control system
VR - Regulating gas valve
VS - Safety gas valve
MB - Burner terminal board
VPS - Seal control device
RWF40 - Regulator (fitted to the burner)
BT - Temperature probe
T6A - 6A Fuse
F,B - Fuse
L,H,D - Lead section

GI/EMME 2000 - 3000 - 4500 (star delta start-up)

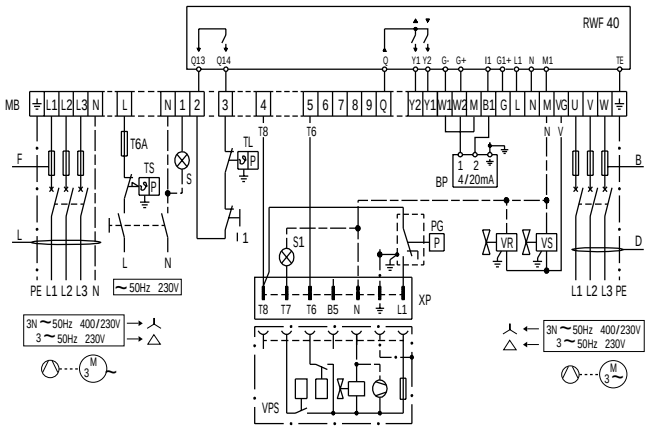


I1 - Burner manual stop switch (optional)
XP - Plug for seal control device
PG - Min gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TL - Load limit remote control system
TS - Safety load control system
VR - Regulating gas valve
VS - Safety gas valve
MB - Burner terminal board
VPS - Seal control device
MA - Star delta starter terminal board
S2 - Fan lock-out signal
RWF40 - Regulator (fitted to the burner)
BT - Temperature probe
T6A - 6A Fuse
F,B - Fuse
L,H,D - Lead section

"MODULATING" OPERATION - PRESSURE PROBE

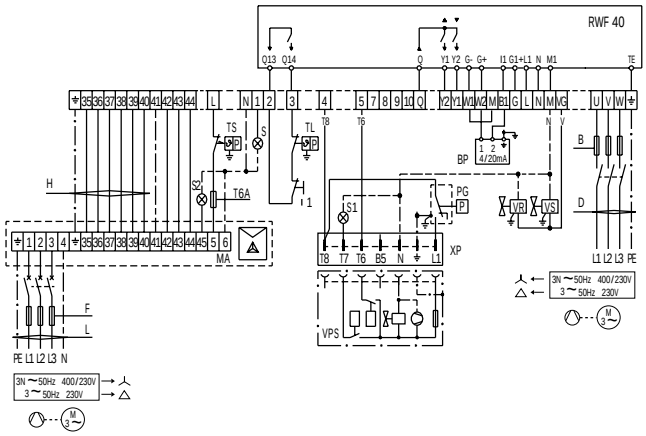
GI/EMME 1400 - 2000 - 3000 (direct start-up)

I1 - Burner manual stop switch (optional)
XP - Plug for seal control device
PG - Min gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TL - Load limit remote control system
TS - Safety load control system
VR - Regulating gas valve
VS - Safety gas valve
MB - Burner terminal board
VPS - Seal control device
RWF40 - Regulator (fitted to the burner)
BT - Pressure probe
T6A - 6A Fuse
F,B - Fuse
L,H,D - Lead section



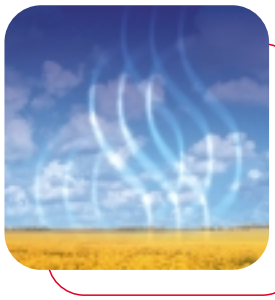
GI/EMME 2000 - 3000 - 4500 (star delta start-up)

I1 - Burner manual stop switch (optional)
XP - Plug for seal control device
PG - Min gas pressure switch
S - Remote lock-out signal
S1 - Remote lock-out signal of seal control device
TL - Load limit remote control system
TS - Safety load control system
VR - Regulating gas valve
VS - Safety gas valve
MB - Burner terminal board
VPS - Seal control device
RWF40 - Regulator (fitted to the burner)
BT - Pressure probe
MA - Star delta starter terminal board
S2 - Fan lock-out signal
T6A - 6A Fuse
F,B - Fuse
L,H,D - Lead section



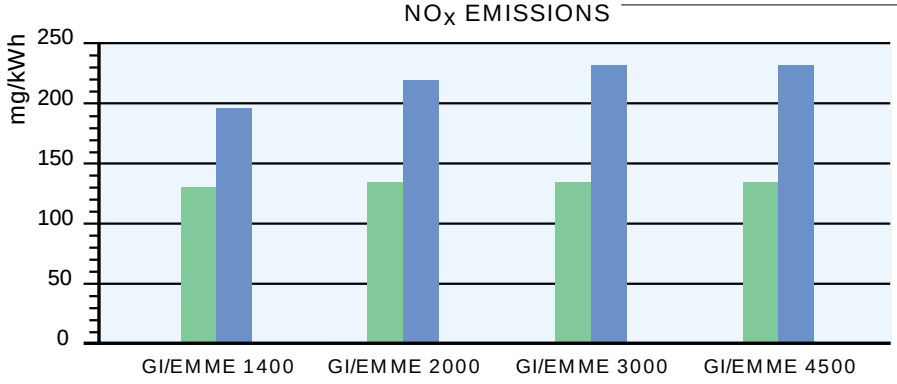
The following table shows the supply lead sections and the type of fuse to be used.

		Direct start-up						Star delta start-up					
Model		▼ GI/EMME 1400		▼ GI/EMME 2000		▼ GI/EMME 3000		▼ GI/EMME 2000		▼ GI/EMME 3000		▼ GI/EMME 4500	
		230 V	400 V	230 V	400 V	230 V	400 V	230 V	400 V	230 V	400 V	230 V	400 V
F	A	20	16	25	20	40	32	25	20	40	32	63	40
B	A	6	4	6	4	10	6	6	4	10	6	10	6
L	mm^2	2,5	2,5	2,5	2,5	6	4	2,5	2,5	2,5	2,5	6	4
D	mm^2	1,5	1,5	1,5	1,5	2,5	1,5	1,5	1,5	1,5	1,5	2,5	1,5
H	mm^2	-	-	-	-	-	-	1,5	1,5	2,5	2,5	4	2,5



EMISSIONS

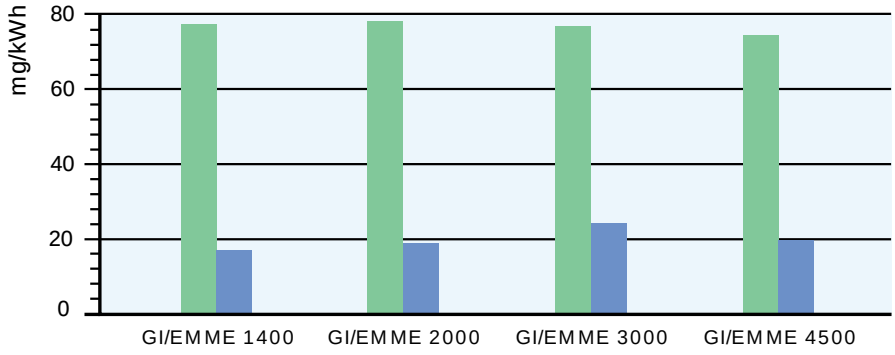
NO_X EMISSIONS



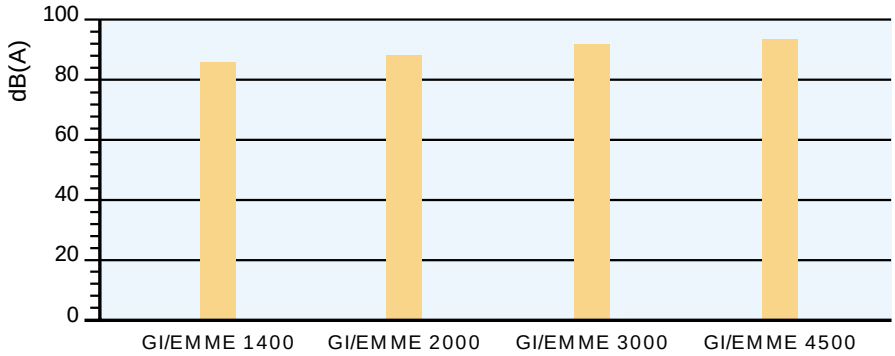
Gas working

Light oil working

CO EMISSIONS



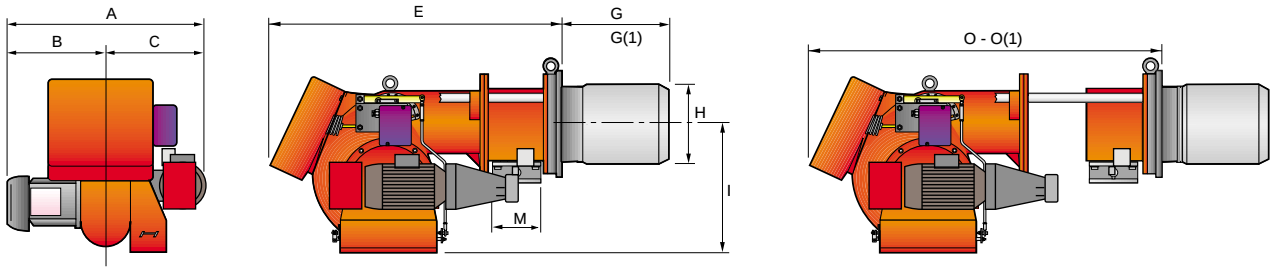
NOISE EMISSIONS



The emission data has been measured in the various models at maximum output, according to EN 676 and EN 267 standard.

OVERALL DIMENSIONS (mm)

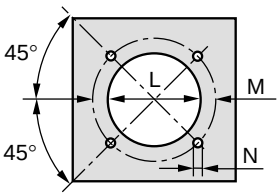
BURNER



Model	A	B	C	E	G	G(1)	H	M	I	O	O(1)
GI/EMME 1400	858	376	482	1090	385	495	250	2”	467	1407	1585
GI/EMME 2000	878	396	482	1090	385	495	260	DN 80	467	1407	1585
GI/EMME 3000	985	447	538	1320	476	606	336	DN 80	525	1796	2000
GI/EMME 4500	1046	508	538	1320	476	606	336	DN 80	525	1796	1926

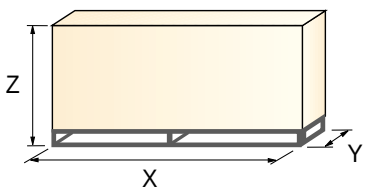
(1) Length with extended combustion head.

BURNER - BOILER MOUNTING FLANGE



Model	L	M	N
GI/EMME 1400	255	260	M 16
GI/EMME 2000	265	260	M 16
GI/EMME 3000	340	310	M 20
GI/EMME 4500	340	310	M 20

PACKAGING



Model	X	Y	Z	kg
GI/EMME 1400	1670	1010	780	190
GI/EMME 2000	1670	1010	780	200
GI/EMME 3000	2000	1160	870	280
GI/EMME 4500	2000	1160	870	280

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 boiler output and following the diagrams included in the burner instruction handbook
- Refit the burner casing to the slide bars.
- Install the nozzle choosing this on the basis of the maximum boiler output and following the diagrams included in the burner instruction handbook.
- Check the position of the electrodes.
- Close the burner, sliding it up to the flange, keeping it slightly raised to avoid the flame stability disk rubbing against the blast tube.

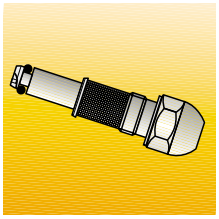
ELECTRICAL AND HYDRAULIC CONNECTIONS AND START UP

- The burners are supplied for connection to two pipes fuel supply system.
- Connect the ends of the flexible pipes to the suction and return pipework using the supplied nipples.
- Make the electrical connections to the burner following the wiring diagrams included in the instruction handbook.
- Prime the pump by turning the motor (after checking rotation direction if it is a three phase motor).
- Adjust the gas train for first start
- On start up, check:
- Pressure pump and valve unit regulator (to max. and min.)
- Gas pressure at the combustion head (to max. and min. output)
- Combustion quality, in terms of unburned substances and excess air.

BURNER ACCESSORIES

Nozzles

The nozzles must be ordered separately. The following table shows the features and codes on the basis of the maximum required fuel output.

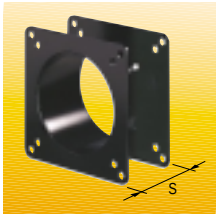


Nozzles type B3 - SA 45°		
Burner	Rated delivery (*) (kg/h)	Nozzle code
GI/EMME 1400	70	**3009713**
GI/EMME 1400	80	**3009715**
GI/EMME 1400	90	**3009717**
GI/EMME 1400 - 2000	100	**3009720**
GI/EMME 1400 - 2000	125	**3009723**
GI/EMME 2000 - 3000	150	**3009726**
GI/EMME 2000 - 3000	175	**3009729**
GI/EMME 2000 - 3000 - 4500	200	**3009732**
GI/EMME 3000 - 4500	225	**3009735**
GI/EMME 3000 - 4500	250	**3009738**
GI/EMME 3000 - 4500	275	**3009741**
GI/EMME 3000 - 4500	300	**3009744**
GI/EMME 4500	325	**3009747**
GI/EMME 4500	350	**3009750**
GI/EMME 4500	375	**3009753**
GI/EMME 4500	400	**3009756**

(*) Nozzle rated delivery is referred to atomised pressure.

Spacer kit

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



Spacer kit		
Burner	**Spacer thickness S (mm)**	**Kit code**
GI/EMME 1400 - 2000	110	**3000722**
GI/EMME 3000 - 4500	130	**3000751**

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**
GI/EMME 1400 - 2000	C7	**3010048**
GI/EMME 3000 - 4500	C8	**3010049**

Accessories for modulating operation

To obtain modulating setting, the GI/EMME 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.

Burner	Regulator type	Code
GI/EMME 1400 - 2000 - 3000 - 4500	RWF 40	**3010211**

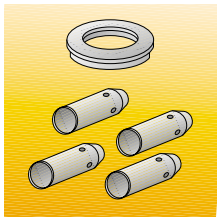
Probe type	Range (°C) (bar)	Probe code
Temperature PT 100	-100 ÷ 500°C	**3010110**
Pressure 4 ÷ 20 mA	0 ÷ 2,5 bar	**3010213**
Pressure 4 ÷ 20 mA	0 ÷ 16 bar	**3010214**

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	Potentiometer kit code
GI/EMME 1400 - 2000 - 3000 - 4500	**3010021**

LPG kit

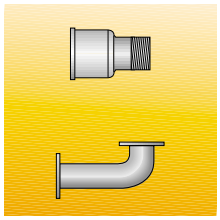
For burning LPG gas, a special kit is available to be fitted to the combustion head on the burner, as given in the following table:



LPG kit		
Burner	**Kit code for standard head**	**Kit code for extended head**
GI/EMME 1400 - 2000	**3010063**	**3010063**

Adapters

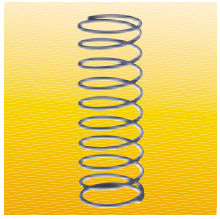
When the diameter of the gas train is different from the set diameter of the burners, an adapter must be fitted between the gas train and the burner. The following table lists the adapters for various burners.



Adapters			
Burner	**Gas train**	**Dimensions**	**Adapter code**
GI/EMME 1400	CBF 65/1	DN 65 2"1/2 — 1" 1/2 — 2"	**3000825**
	CBF 80/1	DN 80 2"1/2 — 2"	**3000826**
GI/EMME 2000	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**
GI/EMME 3000	CBF 65/1	DN 65 — DN 80	**3000831**
	CBF 80/1	DN 80 — DN 80	**3000832**
	CBF 100/1	DN 100 — DN 80	**3010127**
GI/EMME 4500	CBF 65/1	DN 65 — DN 80	**3000831**
	CBF 80/1	DN 80 — DN 80	**3000832**
	CBF 100/1	DN 100 — DN 80	**3010127**

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**

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**
GI/EMME 1400	MBD 420 - CB 50/1 - CBF 65/1 - CBF 80/1	**3010125**
GI/EMME 2000	MBD 420 - CB 50/1 - CBF 65/1 - CBF 80/1- CBF 100/1	**3010125**
GI/EMME 3000	CBF 65/1 - CBF 80/1- CBF 100/1	**3010125**
GI/EMME 4500	CBF 65/1 - CBF 80/1- CBF 100/1	**3010125**

SPECIFICATION

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

DESIGNATION OF SERIES

Series : GI/EMME

Size

Emission: Class 1 EN 267

Head :
- TC Standard head
- TL Extended head

Flame control system :
- FS1 Standard (1 stop every 24 h)

Electrical supply to the system :

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

Auxiliary voltage :

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

GI/EMME	1400		TC	FS1	3/230-400/50	230/50
BASIC DESIGNATION						
EXTENDED DESIGNATION						

AVAILABLE BURNER MODELS

GI/EMME	1400	TC	FS1	3/220-380/60	220/60
GI/EMME	1400	TC	FS1	3/230-400/50	230/50
GI/EMME	1400	TL	FS1	3/220-380/60	220/60
GI/EMME	1400	TL	FS1	3/230-400/50	230/50
GI/EMME	2000	TC	FS1	3/220-380/60	220/60
GI/EMME	2000	TC	FS1	3/230-400/50	230/50
GI/EMME	2000	TC	FS1	3/400/50	230/50
GI/EMME	2000	TL	FS1	3/220-380/60	220/60
GI/EMME	2000	TL	FS1	3/230-400/50	230/50
GI/EMME	2000	TL	FS1	3/400/50	230/50
GI/EMME	3000	TC	FS1	3/220-380/60	220/60
GI/EMME	3000	TC	FS1	3/230-400/50	230/50
GI/EMME	3000	TC	FS1	3/400/50	230/50
GI/EMME	3000	TL	FS1	3/220-380/60	220/60
GI/EMME	3000	TL	FS1	3/230-400/50	230/50
GI/EMME	3000	TL	FS1	3/400/50	230/50
GI/EMME	4500	TC	FS1	3/220/60	220/60
GI/EMME	4500	TC	FS1	3/230/50	230/50
GI/EMME	4500	TC	FS1	3/380/60	220/60
GI/EMME	4500	TC	FS1	3/400/50	230/50
GI/EMME	4500	TL	FS1	3/220/60	220/60
GI/EMME	4500	TL	FS1	3/230/50	230/50
GI/EMME	4500	TL	FS1	3/380/60	220/60
GI/EMME	4500	TL	FS1	3/400/50	230/50

Other versions are available on request.

PRODUCT SPECIFICATION

Burner

Monoblock forced draught dual fuel burner, two stage progressive or modulating operation with a kit, made up of:
- Air suction circuit
- Fan with forward curved blades
- Air damper for setting and butterfly valve for regulating fuel output controlled by a servomotor
- Combustion head, that can be set on the basis of required output
- Maximum gas pressure switch
- Minimum air pressure switch
- Fan electrical motor
- Pump electrical motor
- Gears pump for high pressure fuel supply, fitted with:
  - filter
  - pressure regulator
  - connections for installing a pressure gauge and a a vacuometer
  - internal by-pass for sinlge pipe installation
- Valve unit with a double oil safety valve on the output circuit and safety valve on the return circuit
- 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:
- 90/396/EEC directive (gas)
- 89/336/EEC directive (electromagnetic compatibility)
- 73/23/EEC directive (low voltage)
- EN 267 (liquid fuel burners)
- EN 676 (gas fuel burners).

Standard equipment:
- 1 flange (for GI/EMME 1400)
- 1 gas train gasket
- 8 screws for fixing the burner flange to the boiler (for GI/EMME 1400)
- 12 screws for fixing the burner flange to the boiler
- 1 insulating screen
- 2 flexible hoses for connection to the oil supply circuit
- 2 nipples for connection to the pump
- 4 wiring looms fittings for electrical connections
- 2 pin extensions
- 8 washers (for GI/EMME 1400)
- 12 washers
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

Available accessories to be ordered separately:
- Return nozzles
- Head length reduction kit
- Sound proofing box
- RWF 40 output regulator
- Pressure probe 0-2,5 bar
- Pressure probe 0-16 bar
- Temperature probe -100-500°C
- Potentiometer kit for the servomotor
- Kit for transformation to LPG
- Gas train adapter
- Stabiliser spring
- Seal control kit.

Lineagrafica

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RIELLO BURNERS

CE

MODULATING DUAL FUEL BURNERS

MODUBLOC MB LSE SERIES

MB 4 LSE	1070 ÷ 4070 kW
MB 6 LSE	1186 ÷ 6000 kW
MB 8 LSE	1500 ÷ 8000 kW
MB 10 LSE	2000 ÷ 10000 kW

The MODUBLOC MB LSE 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.

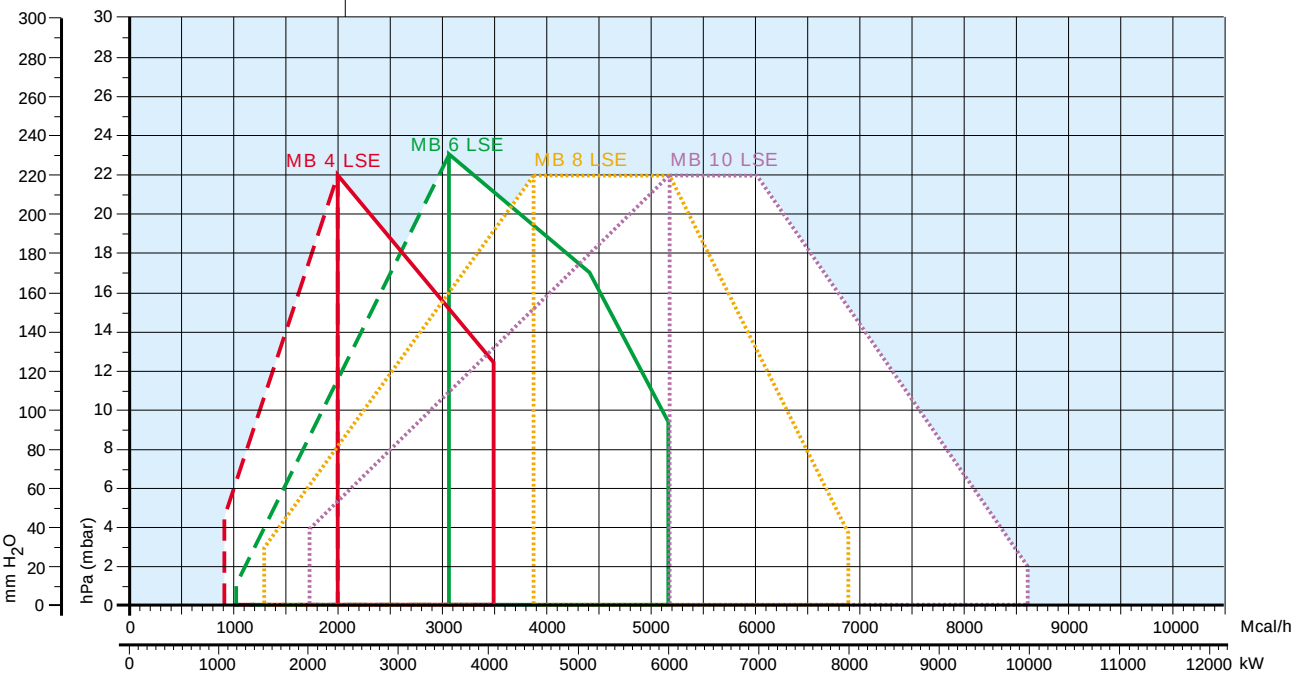
TECHNICAL DATA

	Model			MB 4 LSE	MB 6 LSE	MB 8 LSE	MB 10 LSE
	Setting type			modulating			
	Modulating ratio at max. output			5 ÷ 1			
	Servomotor	type		MM 10004			
		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	Light oil	Net calorific value	kWh/kg	11,8			
		Viscosity at 20°C	mm^2/s (cSt)	4 ÷ 6			
		Capacity	kg/h	90/196÷343	100/300÷506	126/379÷675	169/506÷843
		Max temperature	°C	50			
	Pump	Type		TA5 C		VBHR G	
		Capacity	kg/h	1000 (25 bar)		1390 (30 bar)	
	Atomised pressure		bar	25			
	G20	Net calorific value	kWh/Nm^3	10			
		Density	kg/Nm^3	0,71			
		Gas output	Nm^3/h	107/233÷407	119/356÷600	150/450÷800	200/600÷1000
	G25	Net calorific value	kWh/Nm^3	8,6			
		Density	kg/Nm^3	0,78			
		Gas output	Nm^3/h	124/270÷473	138/414÷698	174/523÷930	233/698÷1163
	LPG	Net calorific value	kWh/Nm^3	25,8			
		Density	kg/Nm^3	2,02			
		Gas output	Nm^3/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			
	Control box		type	LFL 1.333			
	Total electrical power		kW	15	17	27,4	
	Auxiliary electrical power		kW	0,55			
	Protection level		IP	40			
	Fan electric motor power		kW	11	13	22	
	Rated fan motor current		A	38 - 22	46,7 - 27	67,5 - 39	
	Fan motor start current		A	7,3 x I nom	7,6 x I nom	7,9 x I nom	
	Fan motor protection level		IP	55			
	Pump electric motor power		kW	1,5		3	
	Rated pump motor current		A	6,4 - 3,7		11,4 - 6,6	
	Pump motor start current		A	5 x I nom		7 x I nom	
	Pump motor protection level		IP	55			
	Ignition transformer		V1 - V2	230V - 2x6 kV			
			I1 - I2	2,3A - 35mA			
	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	--	--	--	--
	Light oil	CO emissions	mg/kWh	< 15			
		Grade of smoke indicator	N° Bach.	< 1			
		CxHy emission	mg/kWh	< 10 (after first 20s)			
		NOx emissions	mg/kWh	< 230			
	G20	CO emissions	mg/kWh	< 15			
		NOx emissions	mg/kWh	< 150			
Approval	Directive			73/23 - 89/336 - 98/37 - 90/396 EEC			
	According to			EN 267 - EN 676			
	Certifications			CE 0085AU2360 - DIN 5G033/99 M		in progress (CE ... - DIN n° ...)	

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 267 - EN 676:
Temperature: 20°C
Pressure: 1013.5 mbar
Altitude: 100 meters a.s.l.

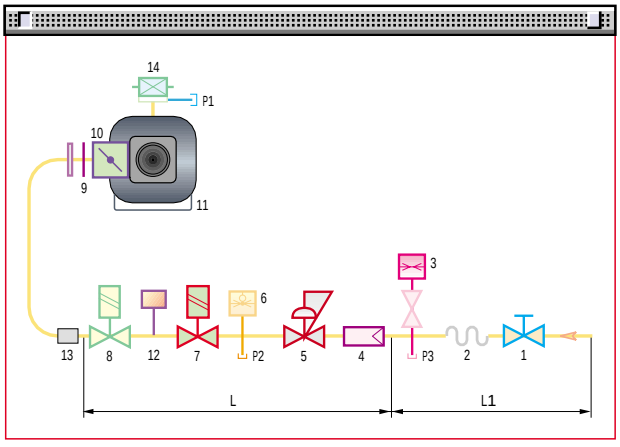
FUEL SUPPLY

GAS TRAIN

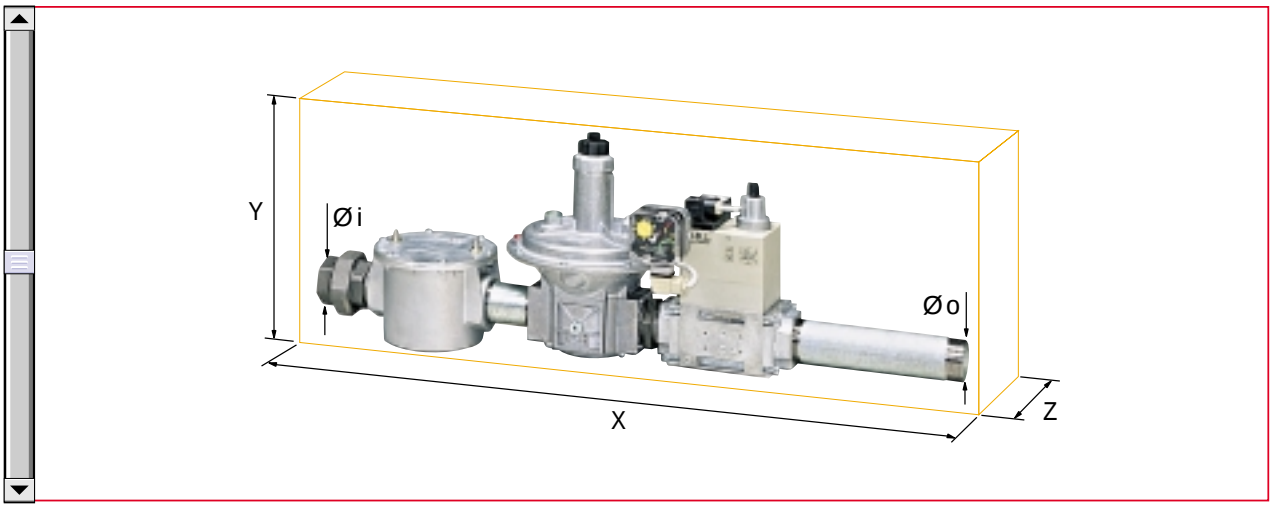
The burners are fitted with a butterfly valve to regulate the fuel, controlled by the main management module of burner through a high precision servomotor.
Fuel can be supplied either from the right or left sides, on the basis of the application requirements.
A maximum gas pressure switch stops the burner 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 LSE fuel supply circuit

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

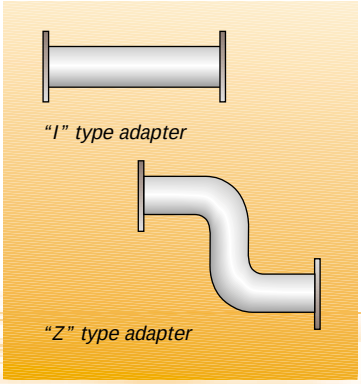


Example of gas train "COMPOSED" type without seal control

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 LSE 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



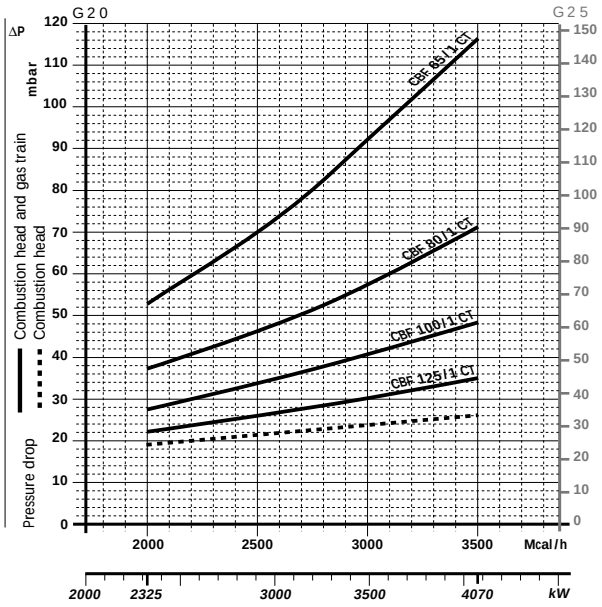
When the diameter of the gas train is different from the set diameter of the burners, an adapter must be fitted between the gas train and the burner.
For further information see paragraph "Accessories".

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.

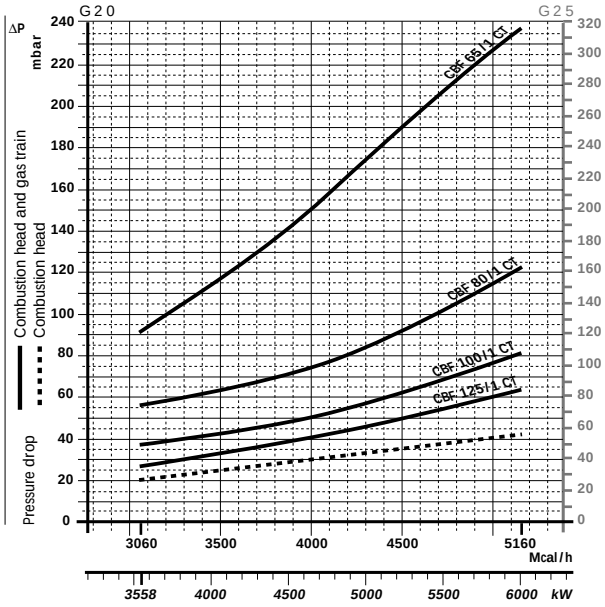
NATURAL GAS

MB 4 LSE



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

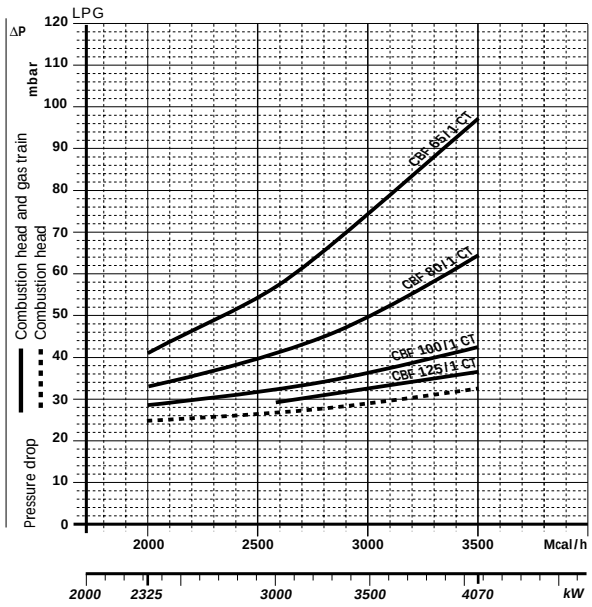
MB 6 LSE



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

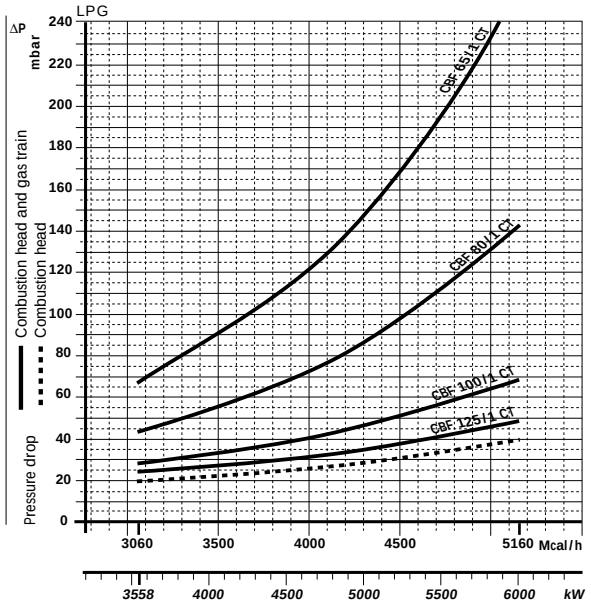
LPG

MB 4 LSE



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

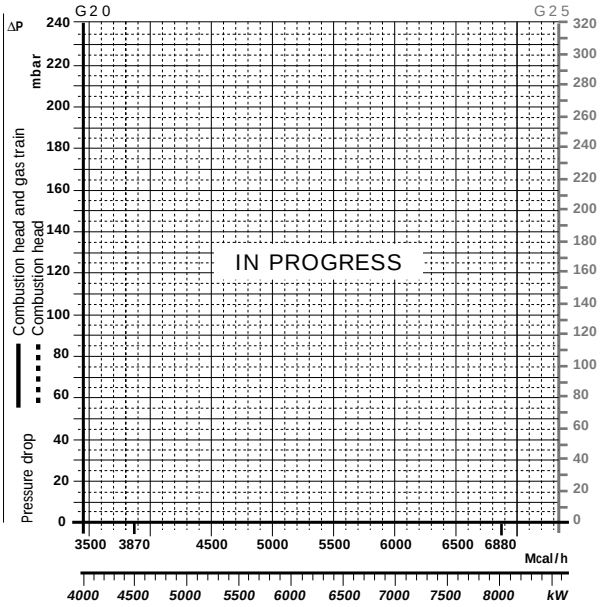
MB 6 LSE



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

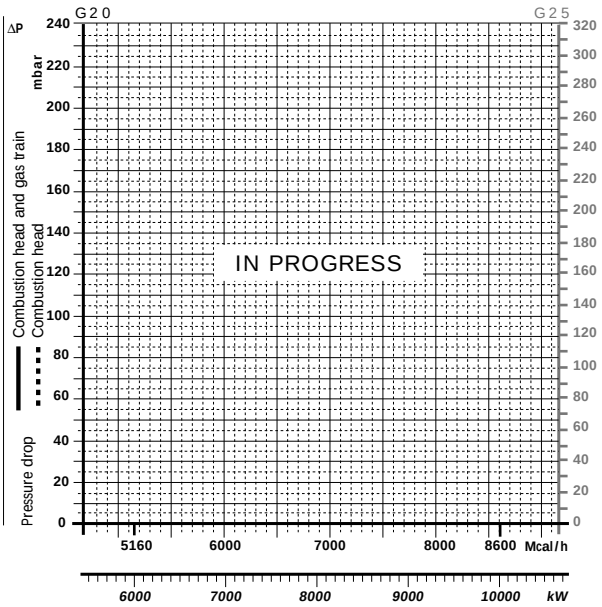
NATURAL GAS

MB 8 LSE



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

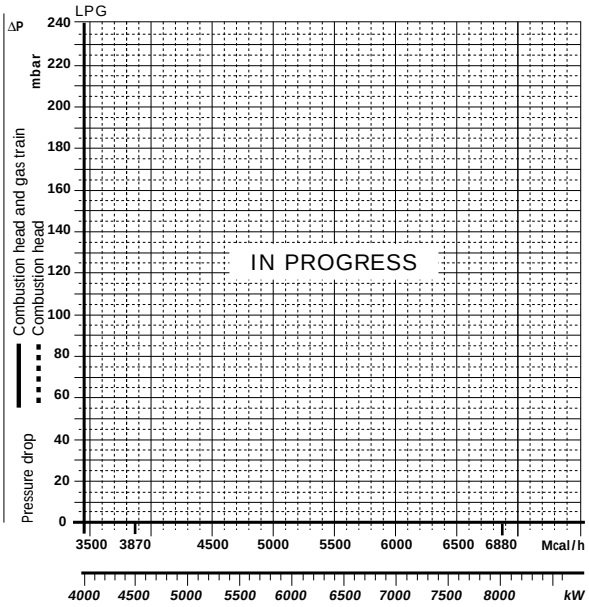
MB 10 LSE



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

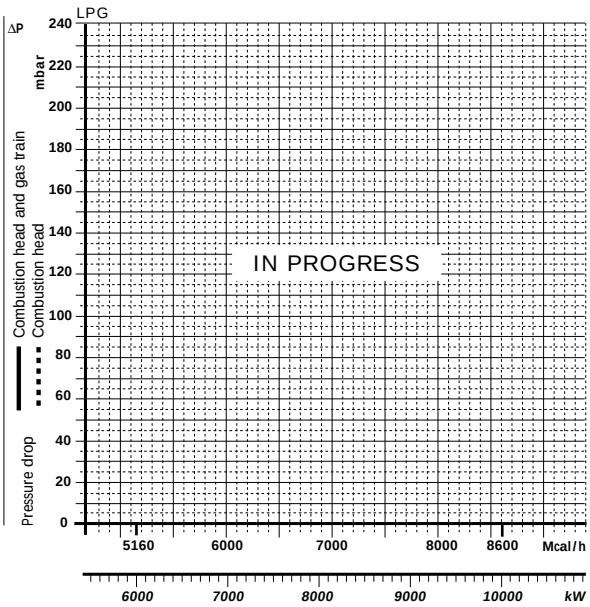
LPG

MB 8 LSE



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 LSE



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.

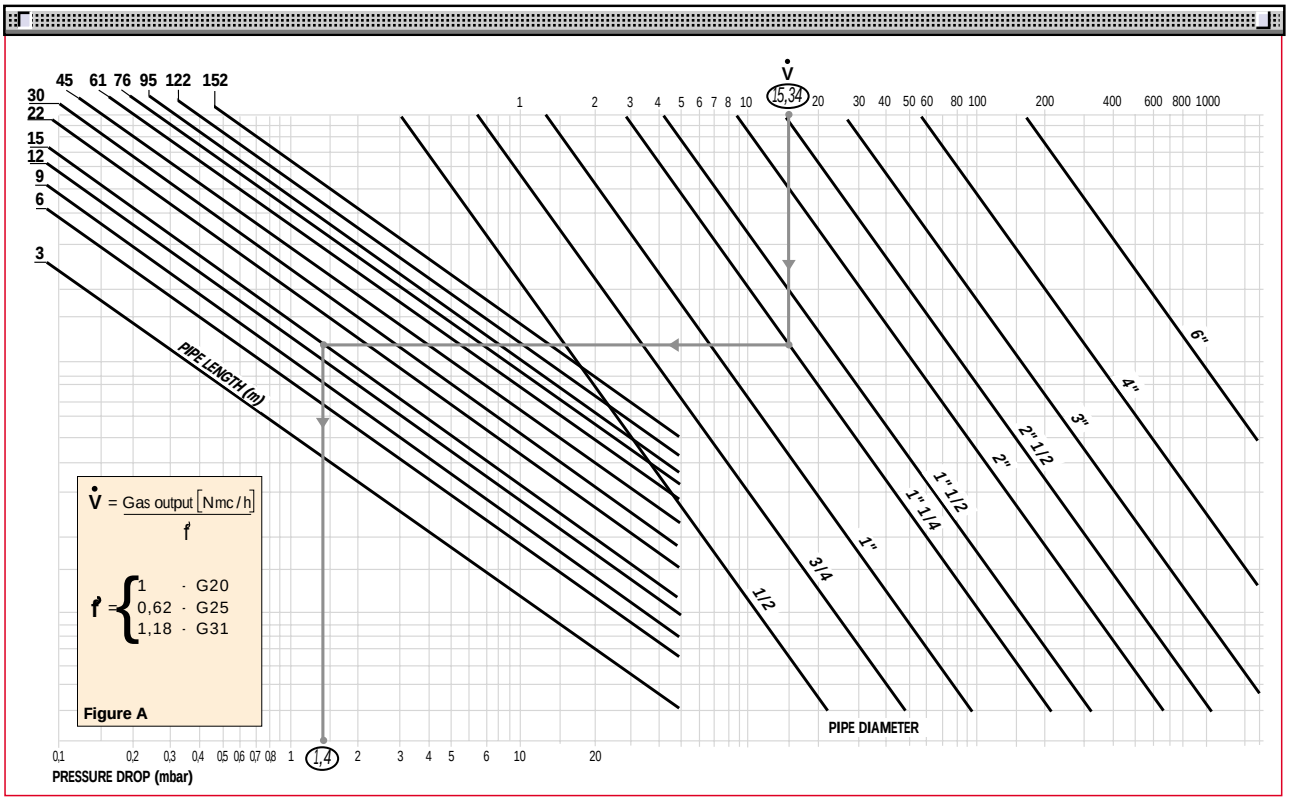
Example:

	- 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;

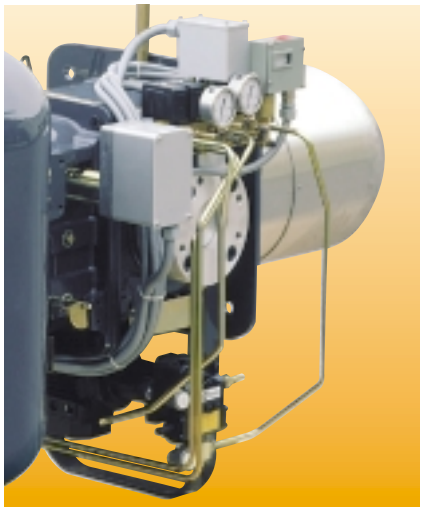
- correct pressure = (20-1.4) = 18.6 mbar



HYDRAULIC CIRCUIT

The hydraulic circuit of the MB series of burners is characterised by a fuel pump with an independent motor.

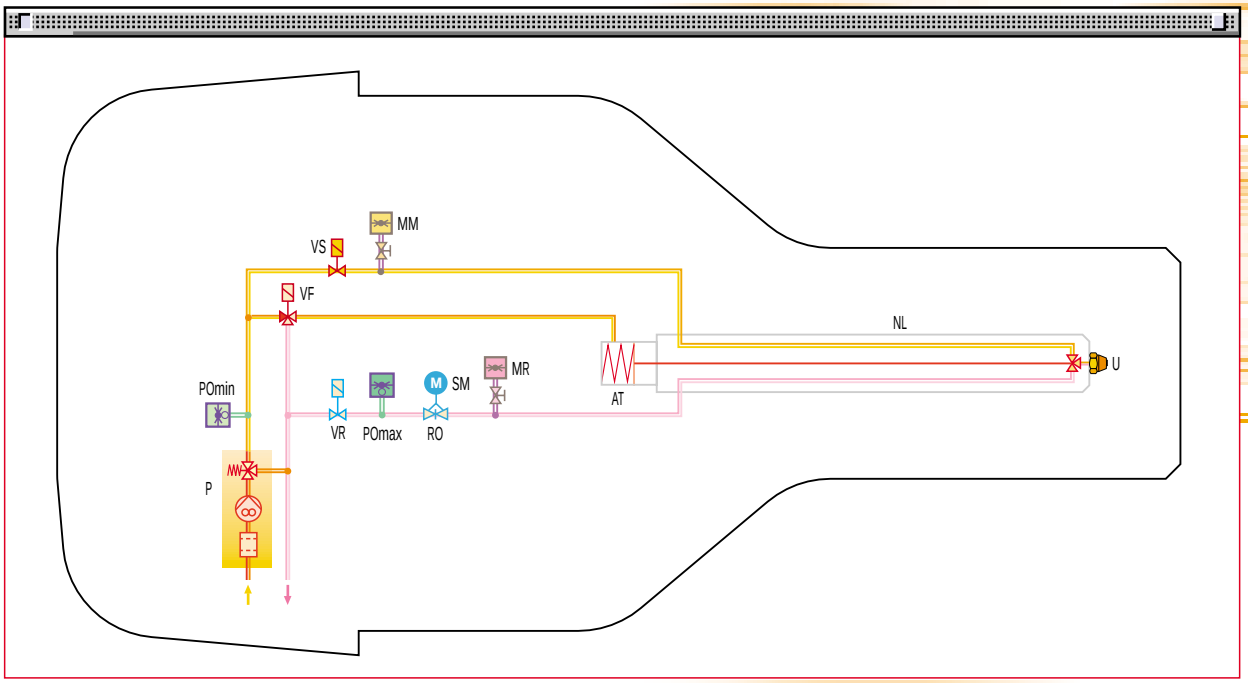
The burners have two safety valves for the light oil, one on the delivery circuit and one on the return circuit; the use of a nozzle with shut-off needle gives even further safety.
A three way valve is associated to the actuator for opening and closing the nozzle needle, and a servo-driven pressure variator on the return circuit gives utmost precision to the amount of fuel burnt.
A minimum pressure switch on the oil delivery line means that the burners are suitable, from a hydraulic point of view, for use in steam generators that correspond to TRD 604 (Germany), NBN (Belgium) standards.
For further information on MB burners series versions with “continuous operation” contact Riello Burners Technical Office.



Example of the MB LSE fuel supply circuit

P	Pump with filter and pressure regulator
PO min	Min. oil pressure switch on the delivery circuit
VF	3 way operating valve
VS	Safety valve on the delivery circuit
MM	Pressure gauge on the delivery circuit
NL	Nozzle pipe
U	Nozzle
AT	Actuator for opening and closing the nozzle needle
MR	Pressure gauge on the return circuit
SM	Servomotor
RO	Pressure regulator on the return circuit
PO max	Max. oil pressure switch on the return circuit
VR	Safety valve on the return circuit

EN 267 > 100 Kg/h (TRD 604, NBN)

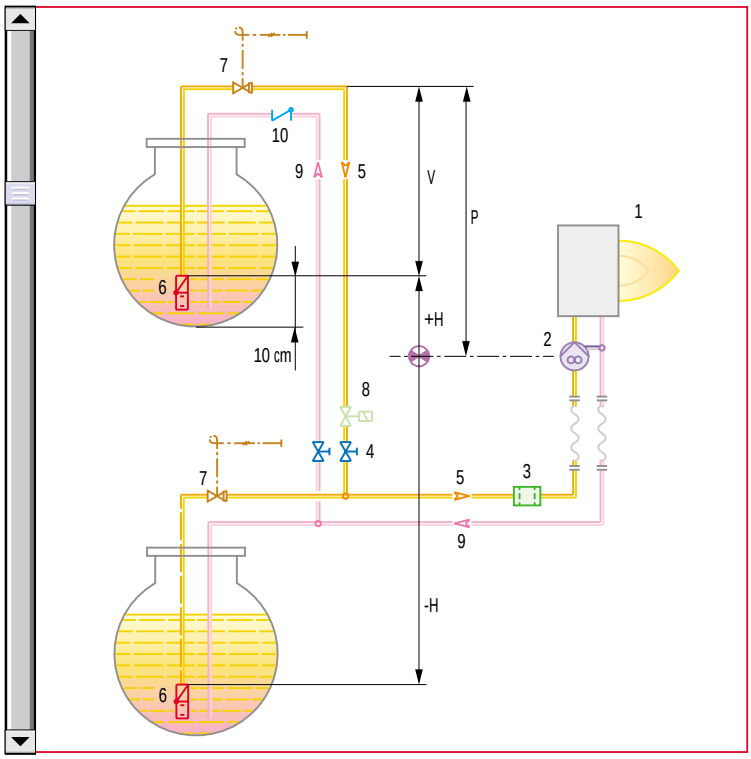


DIMENSIONING OF THE FUEL SUPPLY LINES

The fuel feed must be completed with the safety devices required by the local norms.

The table shows the choice of piping diameter for the various burners, depending on the difference in height between the burner and the tank and their distance.

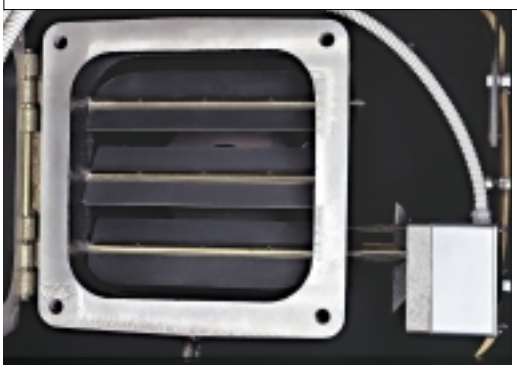
MAXIMUM EQUIVALENT LENGTH FOR THE PIPING L[m]						
Model	**MB 4 LSE**		**MB 6 LSE**		**MB 8 LSE**	**MB 10 LSE**
Piping diameter	**G 3/4"**	**G1"**	**G 3/4"**	**G1"**		
+H, -H (m)	**Lmax (m)**	**Lmax (m)**	**Lmax (m)**	**Lmax (m)**		
+4,0	-	-	-	-	-	-
+3,0	-	-	-	-	-	-
+2,0	55	130	55	130	-	-
+1,5	50	120	50	120	-	-
+1,0	45	110	45	110	-	-
+0,5	40	100	40	100	-	-
0	35	90	35	90	-	-
-0,5	30	80	30	80	-	-
-1,0	25	70	25	70	-	-
-1,5	20	60	20	60	-	-
-2,0	15	45	15	45	-	-
-3,0	10	25	10	25	-	-
-4,0	-	-	-	-	-	-



H	Difference in height pump-foot valve
Ø	Internal pipe diameter
P	Height ≤ 10 m
V	Height ≤ 4 m
1	Burner
2	Burner pump
3	Filter
4	Manual shut off valve
5	Suction pipework
6	Bottom valve
7	Remote controlled rapid manual shutoff valve (compulsory in Italy)
8	Type approved shut off solenoid (compulsory in Italy)
9	Return pipework
10	Check valve

note *With ring distribution oil systems, the feasible drawings and dimensioning are the responsibility of specialised engineering studios, who must check compatibility with the requirements and features of each single installation.*

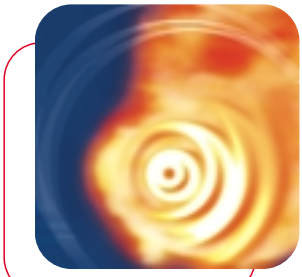
VENTILATION

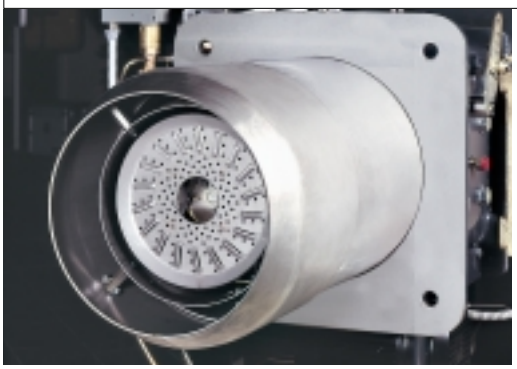


Example of the servomotor and dampers for air setting

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



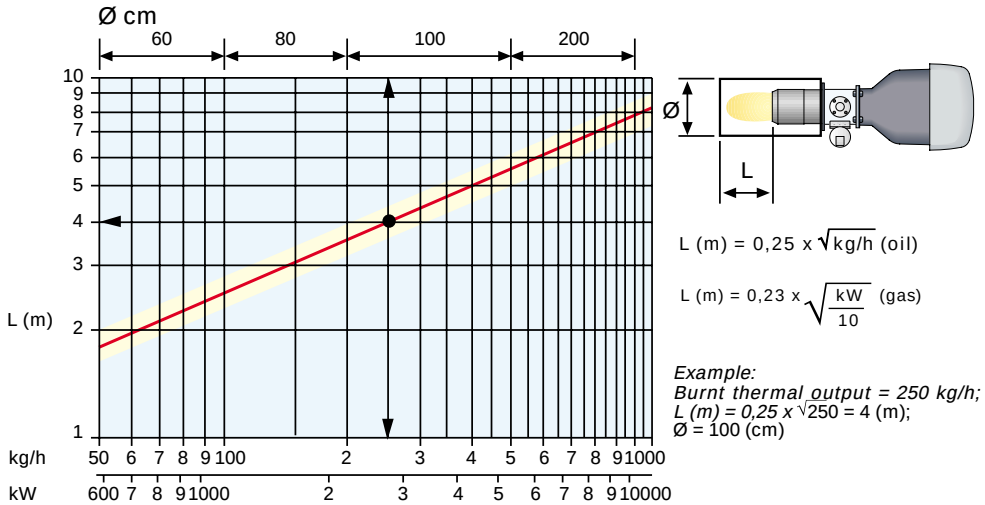


Example of a MODUBLOC MB LSE burner combustion head

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



For more detailed evaluations regarding the combinations, consult the Riello Technical manual.

SETTING

OUTPUT SETTING

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).

Main management module

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

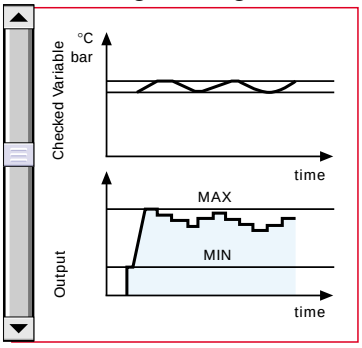


Figure A

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)

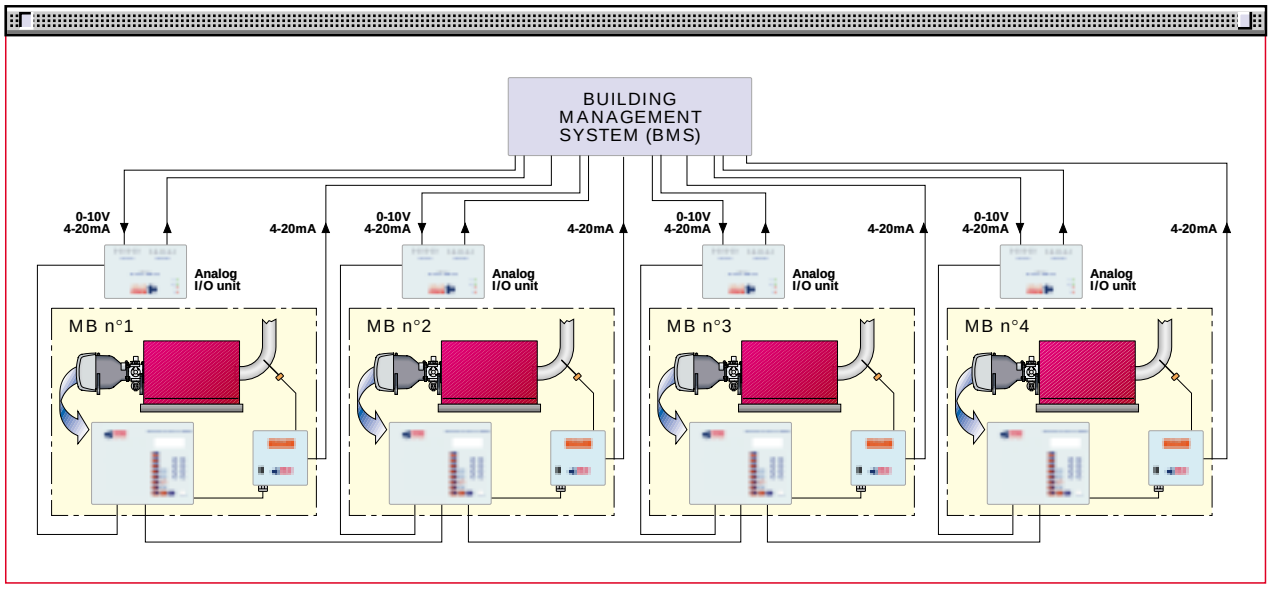


Figure B - "LOW LEVEL" connection

- “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)

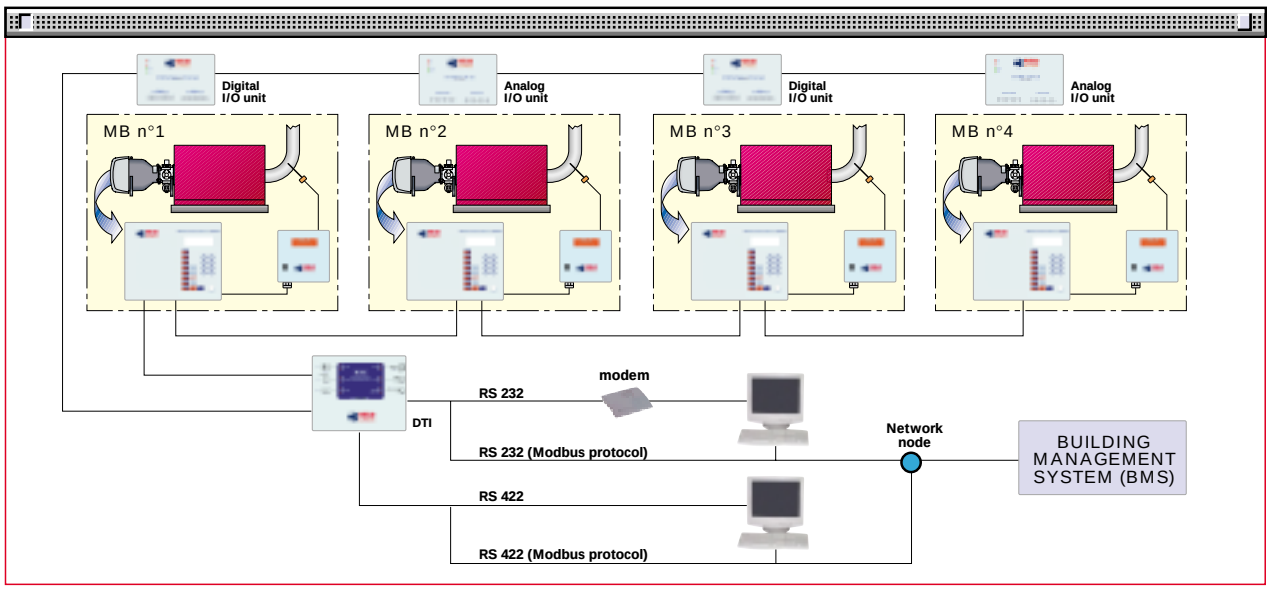


Figure C - “HIGH LEVEL” connection

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 O_2 level)
- automatic re-adjustment at each firing

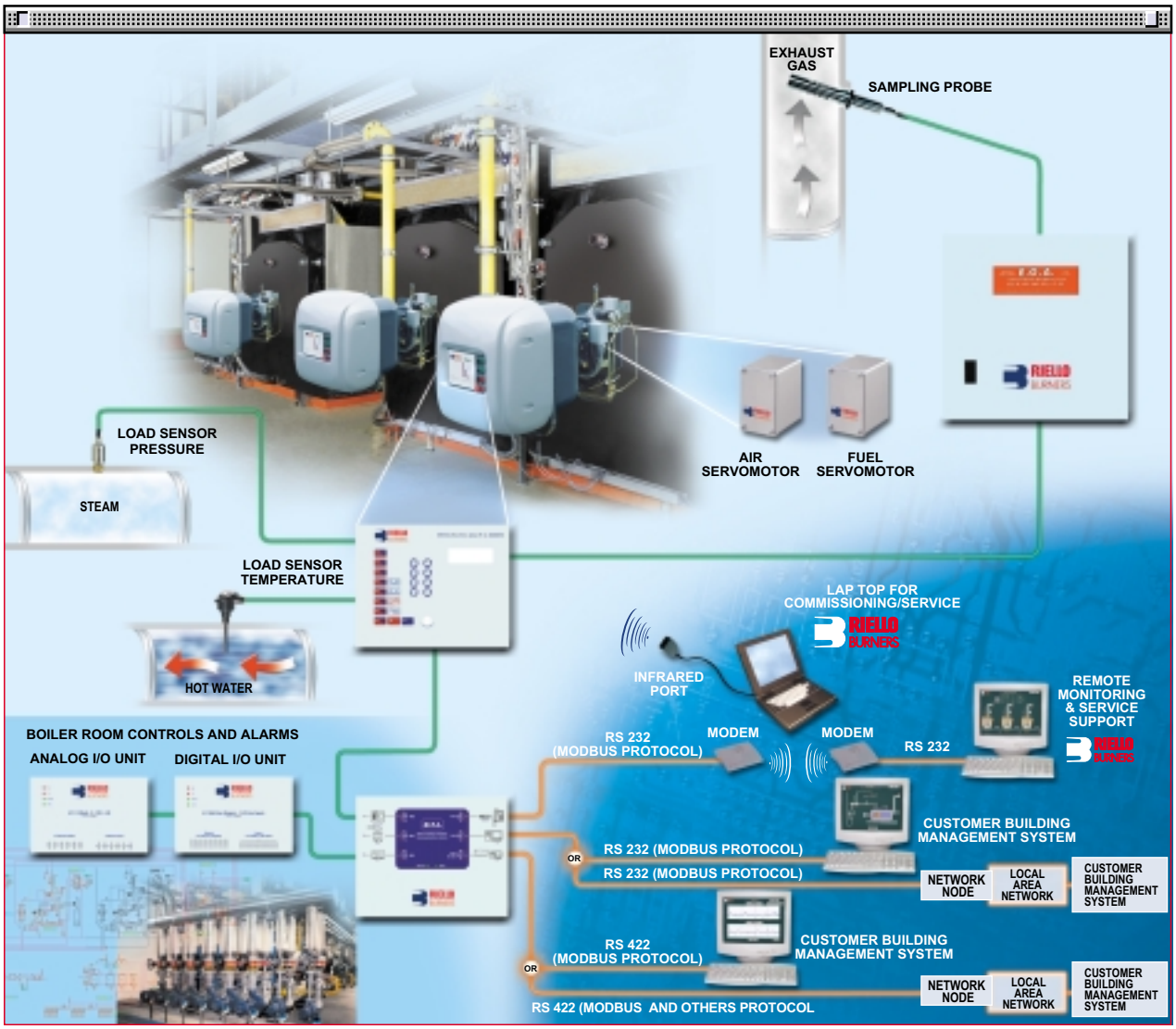
The information from EGA modules can be sent to a remote supervisor system in two ways:
- through six signals (4-20mA) on a terminal board (see layout fig. B)
  To activate this operation each single EGA module must be programmed using a PC with appropriate software.
- through the DTI interface module (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.*

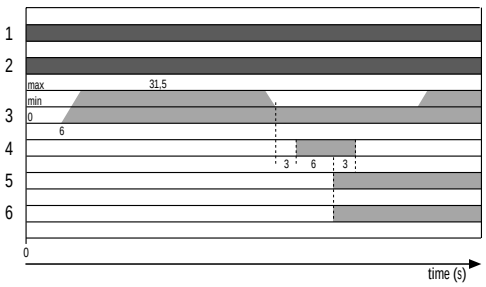
The following diagram summarises how MB series burners and modules can be used for the supervision of boiler rooms or systems in general.



Example of boiler room management system

IGNITION

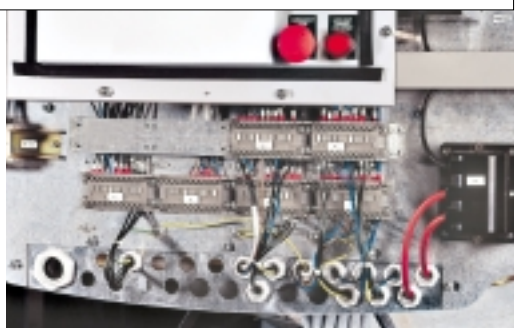
MB 4-6-8-10 LSE



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

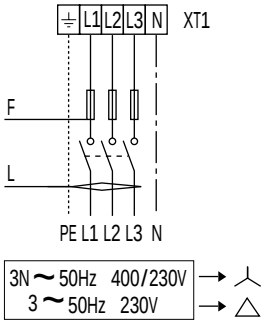
Electrical connections must be made by qualified and skilled personnel, according to the local norms.

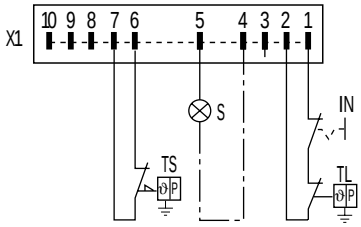


Example of the terminal board for electrical connections

THREE PHASE SUPPLY TO THE POWER CIRCUIT AND CONNECTING THE AUXILIARY CONTROLS

MB 4-6-8-10 LSE

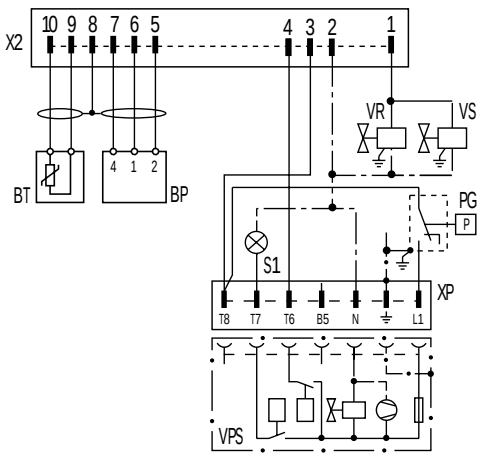


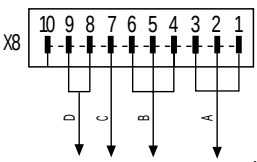


XT1 - General supply terminal board
X1 - 10 pin plug
TS - Safety thermostat
TL - Threshold thermostat
IN - Manual switch
S - External lock-out signal
F - Fuse (refer to table A)
L - Lead section (refer to table A)

CONNECTION OF THE PROBES FOR THE CONTROLLED PARAMETER AND DATA CONNECTION FOR THE VARIOUS MODULES (Accessories)

MB 4-6-8-10 LSE

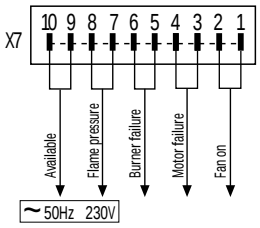


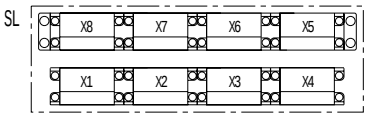


X2 - 10 pin plug
X8 - 10 pin plug for connecting accessories
BT - Temperature probe
BP - Pressure probe
PG - Minimum gas pressure switch
S1 - Emergency push-button
VPS - Seal control
VR - Adjustment valve
VS - Safety valve
XP - Seal control plug
A - E.G.A. module connections
B - Main, D.T.I., I/O modules 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 LSE





X7 - 10 pin output plug, free contacts
SL - Layout plug diagram
X3,4,5,6 - Plugs for electrical factory-set connections

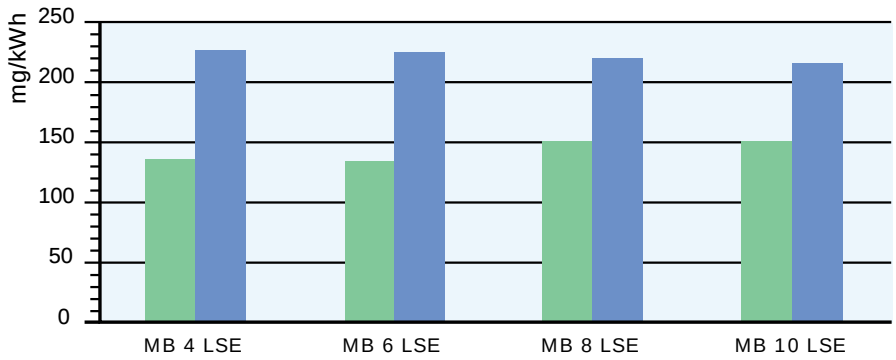
The following table shows the supply lead sections and the type of fuse to be used.

Model		MB 4 LSE		MB 6 LSE		MB 8 LSE		MB 10 LSE	
		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

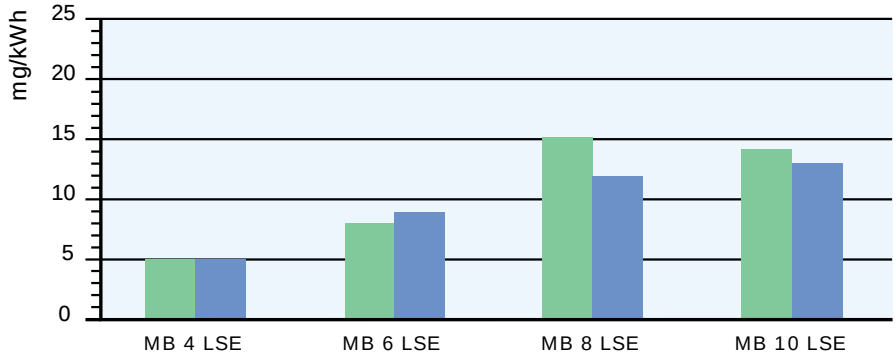
Table A

EMISSIONS

NO_2 EMISSIONS



CO EMISSIONS



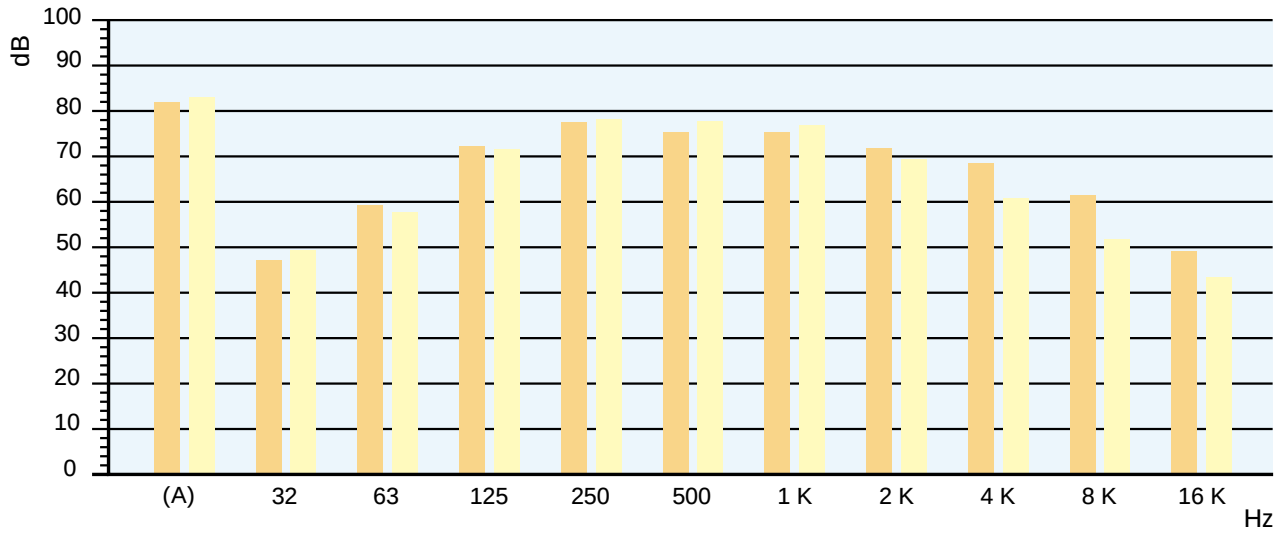
Gas working

Light oil working

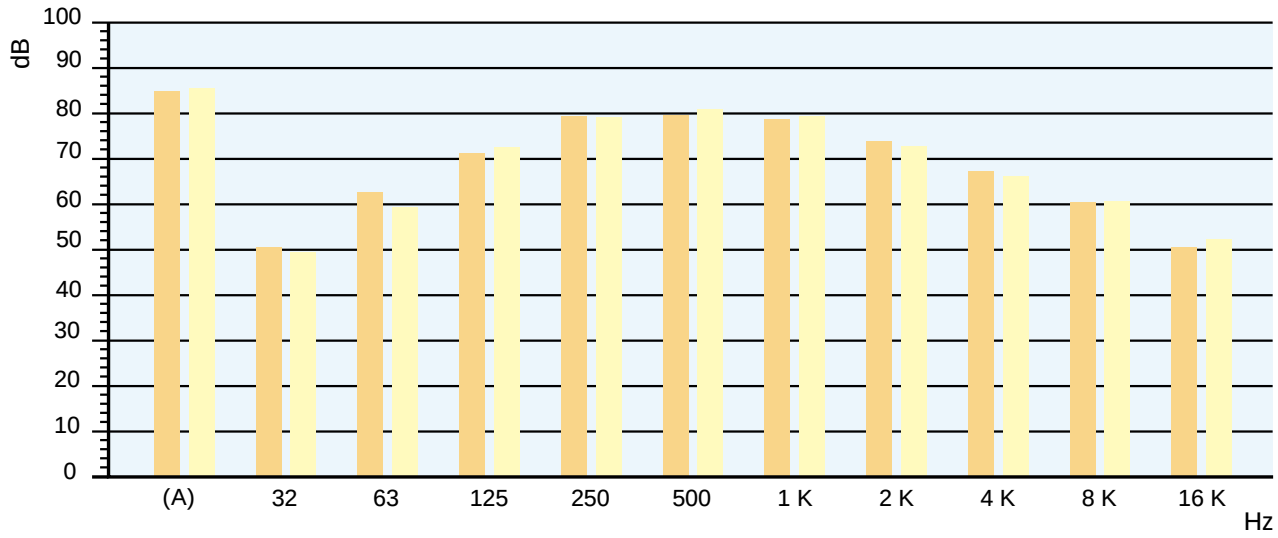
The emission data has been measured in the various models at maximum output, according to EN 676 and EN 267 standard.

SOUND EMISSIONS

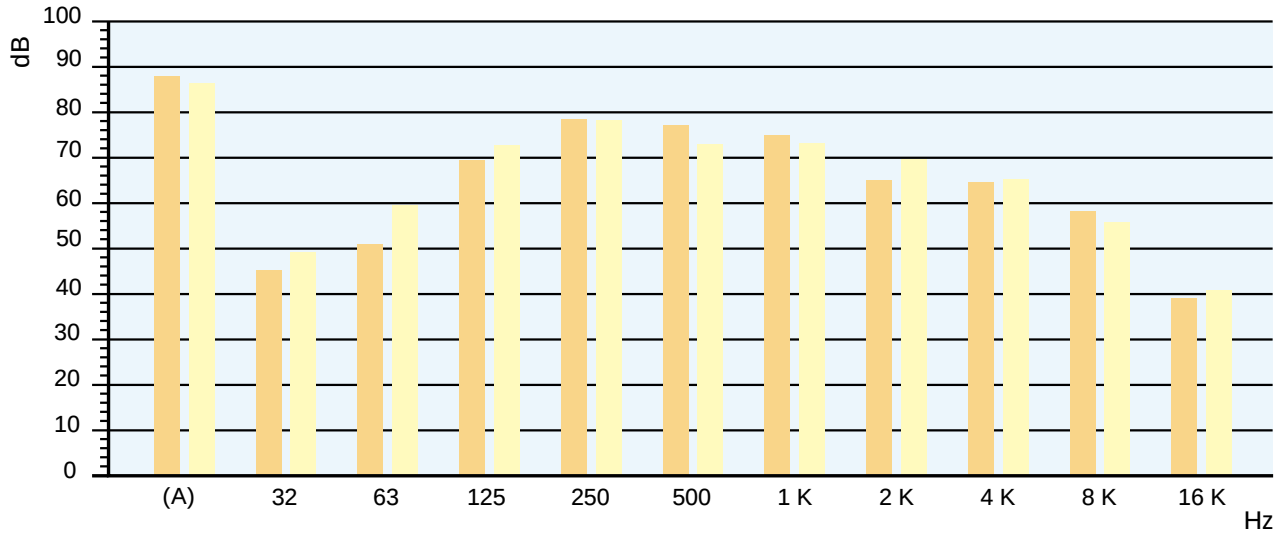
MB 4 LSE



MB 6 LSE



MB 8 -10 LSE



(A) Value obtained in dB(A)

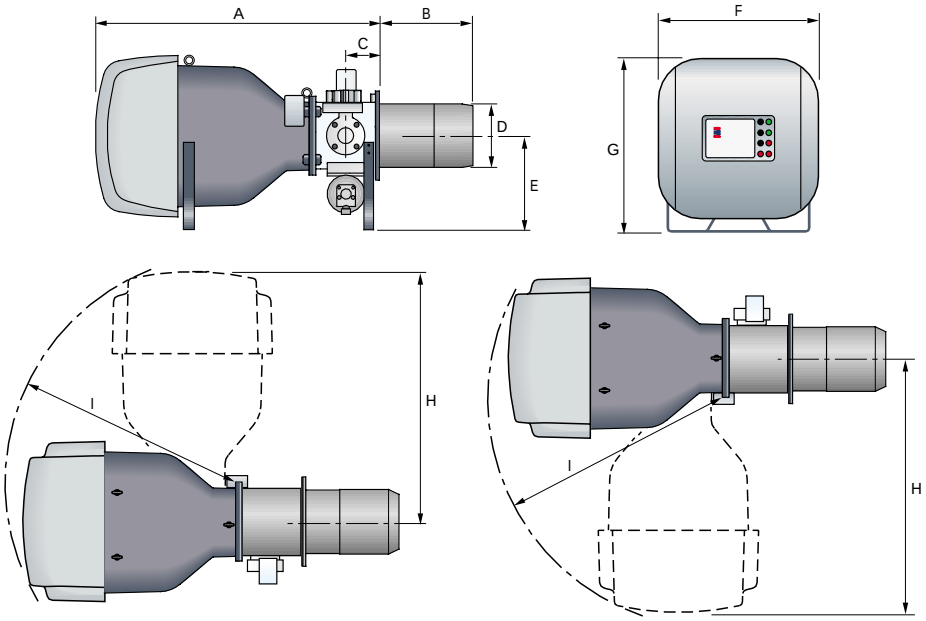
Maximum modulation

Minimal modulation

OVERALL DIMENSIONS (mm)

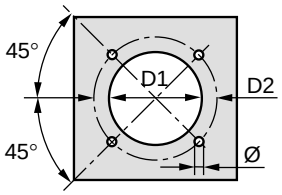
BURNERS

MB 4-6-8-10 LSE



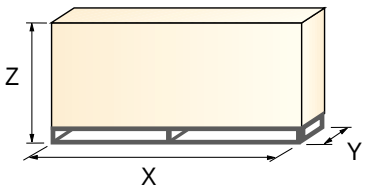
Model	A	B	C	D	E	F	G	H	I
MB 4 LSE	1470	511	183	336	490	840	910	1330	1205
MB 6 LSE	1470	511	183	336	490	840	910	1330	1205
MB 8 LSE	1900	530	208	413	575	1007	1079	1740	1570
MB 10 LSE	1900	530	208	413	575	1007	1079	1740	1570

BURNER - BOILER MOUNTING FLANGE



Model	D1	D2	Ø
MB 4 LSE	350	496	M20
MB 6 LSE	350	496	M20
MB 8 LSE	418	608	M20
MB 10 LSE	418	608	M20

PACKAGING

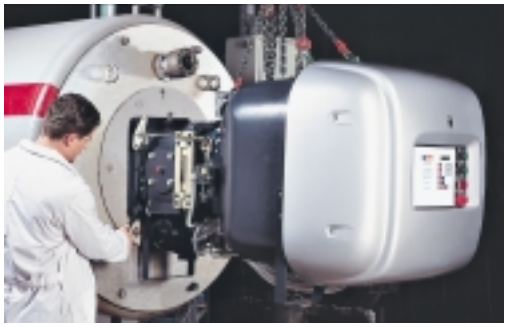


Model	X	Y	Z	kg
MB 4 LSE	2120	1005	1175	300
MB 6 LSE	2120	1005	1175	300
MB 8 LSE	2590	1170	1350	450
MB 10 LSE	2590	1170	1350	450

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 nozzle and 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 AND HYDRAULIC CONNECTIONS AND START UP

- The burner are supplied for connection to two pipes fuel supply system.
- Connect the ends of the flexible pipes to the suction and return pipework using the supplied nipples.
- Make the electrical connections to the burner following the wiring diagrams included in the instruction handbook.
- Prime the pump, by turning the motor (check rotation direction corresponds with the arrow printed on the pump motor cover and that the led signalling correct rotation direction, at left of the plugs group, is on).
- Adjust the gas train for first start.
- On start up, check:
  - Pressure at the pump, the regulator and the valve unit (to max. and min.)
  - 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 LSE	**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 LSE	**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 LSE	**3010232**

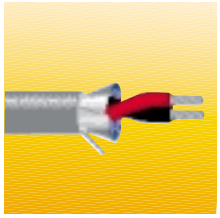
EGA module (Exhaust Gas analyser)

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 LSE	CO, CO_2, O_2	**3010235**
MB 4 - 6 - 8 - 10 LSE	CO, CO_2, O_2, NO	**3010236**
MB 4 - 6 - 8 - 10 LSE	CO, CO_2, O_2, SO_2	**3010237**
MB 4 - 6 - 8 - 10 LSE	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 LSE	**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 LSE	Temperature	0 ÷ 400°C	**3010187**
MB 4 - 6 - 8 - 10 LSE	Pressure	0 ÷ 3 bar	**3010246**
MB 4 - 6 - 8 - 10 LSE	Pressure	0 ÷ 18 bar	**3010186**
MB 4 - 6 - 8 - 10 LSE	Pressure	0 ÷ 30 bar	**3010188**

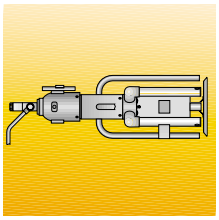
Return nozzles with needle cut-off

The nozzles must be ordered separately. The following table shows the features and codes, on the basis of maximum fuel output that is required.

Nozzles B5 45°					
Burner	**Rated output kg/h**	**Nozzle code**	**Burner**	**Rated output kg/h**	**Nozzle code**
MB 4 LSE	200	**3009800**	MB 8 LSE	525	**3009813**
	225	**3009801**		550	**3009814**
	250	**3009802**		575	**3009815**
	275	**3009803**		600	**3009816**
	300	**3009804**		650	**3009817**
	325	**3009805**		700	**3009818**
MB 6 LSE	350	**3009806**	MB 10 LSE	400	**3009808**
	375	**3009807**		425	**3009809**
	400	**3009808**		450	**3009810**
	425	**3009809**		475	**3009811**
	450	**3009810**		500	**3009812**
	475	**3009811**		525	**3009813**
	500	**3009812**		550	**3009814**
MB 8 LSE	300	**3009804**		575	**3009815**
	325	**3009805**		600	**3009816**
	350	**3009806**		650	**3009817**
	375	**3009807**		700	**3009818**
	400	**3009808**		750	**3009819**
	425	**3009809**		800	**3009820**
	450	**3009810**		850	**3009821**
	475	**3009811**		900	**3009822**
	500	**3009812**			

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 LSE	**3010189**
MB 6 LSE	**3010190**
MB 8 LSE	**In progress**
MB 10 LSE	**In progress**

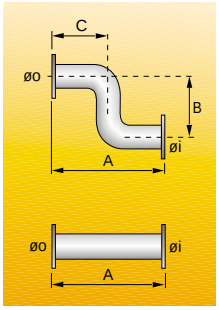
Burner support

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 LSE	**In progress**
MB 8 - 10 LSE	**In progress**

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:

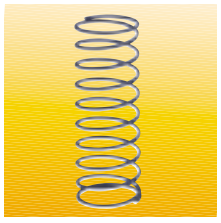


Adapters

Burner	Gas train	Adapter type	Dimensions					Adapter code
			Øi DN	Øo DN	A mm	B mm	C mm	
MB 4-6-8-10 LSE	CBF 65/1 CT	I	65	80	320	--	--	**3010221**
MB 4-6-8-10 LSE	CBF 80/1 CT	I	80	80	320	--	--	**3010222**
MB 4-6-8-10 LSE	CBF 100/1 CT	I	100	80	320	--	--	**3010223**
MB 4-6-8-10 LSE	CBF 125/1 CT	I	125	80	320	--	--	**3010224**
MB 4-6-8-10 LSE	CBF 65/1 CT	Z	65	80	400	480	225	**3010225**
MB 4-6-8-10 LSE	CBF 80/1 CT	Z	80	80	400	480	225	**3010226**
MB 4-6-8-10 LSE	CBF 100/1 CT	Z	100	80	400	480	225	**3010227**
MB 4-6-8-10 LSE	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	**being prepared**
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	**being prepared**
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	**being prepared**

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	LS	E		TC	FR	FS1	3/400/50	230/50-60

BASIC DESIGNATION

EXTENDED DESIGNATION

LIST OF AVAILABLE MODELS

MB4LSE	TC	FR	FS1	3/400/50	230/50-60
MB4LSE	TC	FR	FS1	3/230/50	230/50-60
MB4LSE	TC	FL	FS1	3/400/50	230/50-60
MB4LSE	TC	FL	FS1	3/230/50	230/50-60
MB6LSE	TC	FR	FS1	3/400/50	230/50-60
MB6LSE	TC	FR	FS1	3/230/50	230/50-60
MB6LSE	TC	FL	FS1	3/400/50	230/50-60
MB6LSE	TC	FL	FS1	3/230/50	230/50-60

MB8LSE	TC	FR	FS1	3/400/50	230/50-60
MB8LSE	TC	FR	FS1	3/230/50	230/50-60
MB8LSE	TC	FL	FS1	3/400/50	230/50-60
MB8LSE	TC	FL	FS1	3/230/50	230/50-60
MB10LSE	TC	FR	FS1	3/400/50	230/50-60
MB10LSE	TC	FR	FS1	3/230/50	230/50-60
MB10LSE	TC	FL	FS1	3/400/50	230/50-60
MB10LSE	TC	FL	FS1	3/230/50	230/50-60

Other versions are available on request.

PRODUCT SPECIFICATION

Burner:

Monoblock forced draught oil and 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
- pump starting motor at 2900 rpm, three phase 230/400 V 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
- gears pump for high pressure fuel supply, fitted with:
    - filter
    - pressure regulator
    - connections for installing a pressure gauge and vacuum meter
    - internal by pass for single pipe installation
- valve unit containing:
    - oil safety valve on the delivery circuit
    - oil safety valve on the return circuit
    - three way valve for the actuator
- actuator for opening and closing the nozzle needle
- automatic setting for light oil delivery, controlled by a high precision servomotor
- safety oil pressure switch for stop the burner in the case of problems in the return circuit
- pressure gauge for delivery pressure
- pressure gauge for return pressure
- minimum oil pressure switch on the delivery circuit (TRD 604, NBN standards)
- automatic setting 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
- pump motor starter
- 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 and pump motor
- emergency button
- coded connection plugs-sockets
- burner opening hinge
- lifting rings
- IP 40 electric protection level.

According to:
- 89/336/CEE directive (electromagnetic compatibility)
- 73/23/CEE directive (low voltage)
- 98/37/EEC directive (machinery)
- 90/396/EEC directive (gas)
- EN 267 (liquid fuel burners).
- EN 676 (gas burners).

Standard equipment:
- 2 flexible pipes for connection to the oil supply network
- 2 gaskets for the flexible pipes
- 2 nipples for connection to the pump
- 1 flange gasket
- 8 screws for fixing the flange
- 4 screws for fixing the burner flange to the boiler
- 1 thermal screen
- 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, 0_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
- Return nozzles with needle cut-off
- Kit for transformation to LPG
- Burner support
- Adapters
- Stabiliser spring.

Lineagrafica

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