

ONE STAGE GAS BURNERS

▶ **RS/1 SERIES**

▶ RS 28/1	163 ÷ 349 kW
▶ RS 38/1	232 ÷ 465 kW



The RS/1 series of burners covers a firing range from 163 to 465 kW, and they have been designed for use in hot or superheater water boilers, hot air or steam generators, diathermic oil boilers.

Operation is "one stage"; the burners are fitted with a microprocessor control panel which supplies indication of operation and diagnosis of fault cause. Optimisation of sound emissions is guaranteed by the use of fans with forward inclined blades and sound deadening material incorporated in the air suction circuit.

The elevated performance of the fans and combustion head, guarantee flexibility of use and excellent working at all firing rates.

The exclusive design ensures reduced dimensions, simple use and maintenance. A wide range of accessories guarantees elevated working flexibility.



TECHNICAL DATA

Model		▼ RS 28/1	▼ RS 38/1
Burner operation mode		One stage	
Modulation ratio at max. output		--	
Servomotor	type	--	
	run time	s	
Heat output	kW	163÷349	232÷465
	Mcal/h	140÷300	200÷400
Working temperature	°C min./max.	0/40	
Net calorific value G20 gas	kWh/Nm ³	10	
G20 density gas	kg/Nm ³	0,71	
G20 gas delivery	Nm ³ /h	16÷35	23÷46,5
Net calorific value G25 gas	kWh/Nm ³	8,6	
G25 density gas	kg/Nm ³	0,78	
G25 delivery gas	Nm ³ /h	19÷41	27÷54
Net calorific value LPG gas	kWh/Nm ³	25,8	
LPG gas density	kg/Nm ³	2,02	
LPG gas delivery	Nm ³ /h	6,5÷13,5	9÷18
Fan	type	Centrifugal with reverse curve blades	
Air temperature	Max. °C	60	
Electrical supply	Ph/Hz/V	1/50/230~(±10%)	
Auxiliary electrical supply	Ph/Hz/V	1/50/230 ~ (±10%)	
Control box	type	RMG	
Total electrical power	kW	0,37	0,60
Auxiliary electrical power	kW	0,12	0,12
Protection level	IP	44	
Motor electrical power	kW	0,25	0,42
Rated motor current	A	2,1	2,9
Motor start current	A	10	11
Motor protection level	IP	40	54
Ignition transformer	type		
	V1 - V2	230V - 1x8 kV	
	I1 - I2	1A - 20 mA	
Operation		Intermittent (at least one stop every 24 h)	
Sound pressure	dBA	68	70
Sound power	W	--	--
CO Emission	mg/kWh	< 40	
NOx Emission	mg/kWh	< 130	
Directive		90/396 - 89/336 - 73/23 - 92/42 EEC	
Conforming to		EN 676	
Certification		CE 63AP6680	

Reference conditions:

Temperature: 20°C

Pressure: 1000 mbar

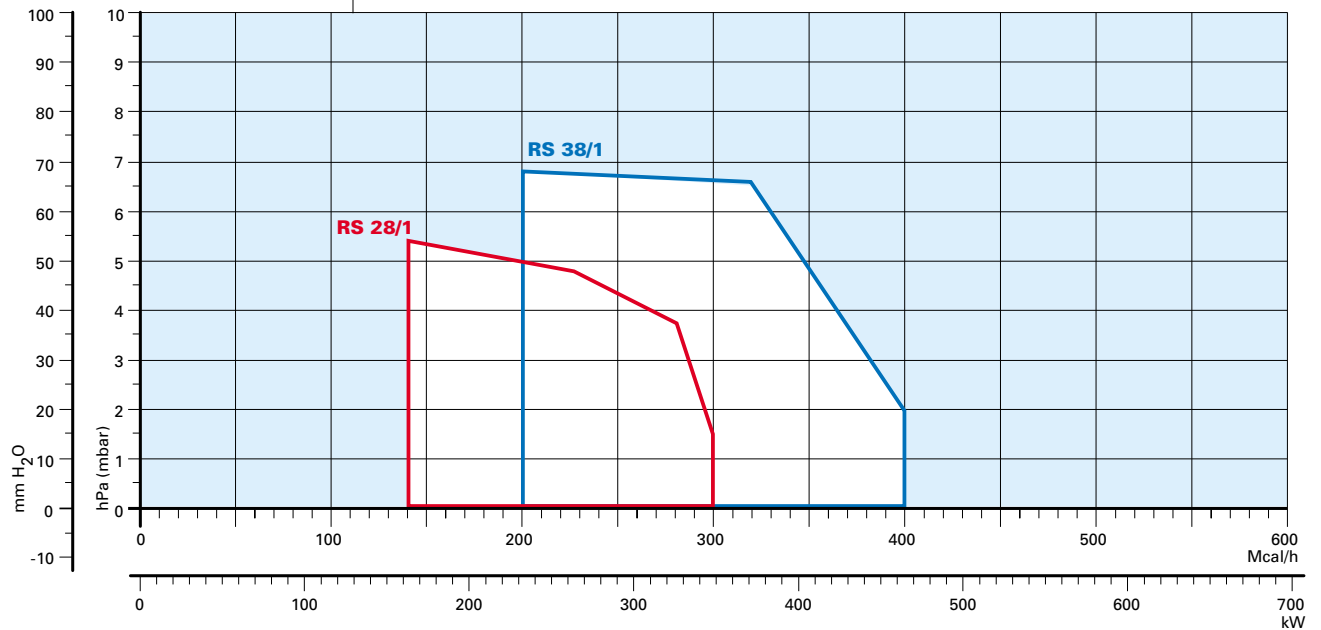
Altitude: 100 m a.s.l.


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.
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FIRING RATES



 Useful working field for choosing the burner

 Modulation range

Test conditions conforming to EN 676:

Temperature: 20°C
Pressure: 1000 mbar
Altitude: 100 m a.s.l.



FUEL SUPPLY

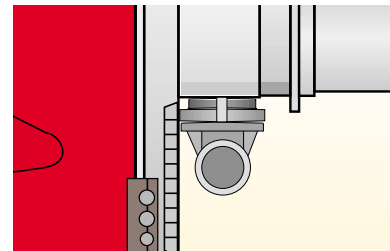
GAS TRAIN

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

The gas train can be selected to best fit system requirements depending on the fuel output and pressure in the supply line.

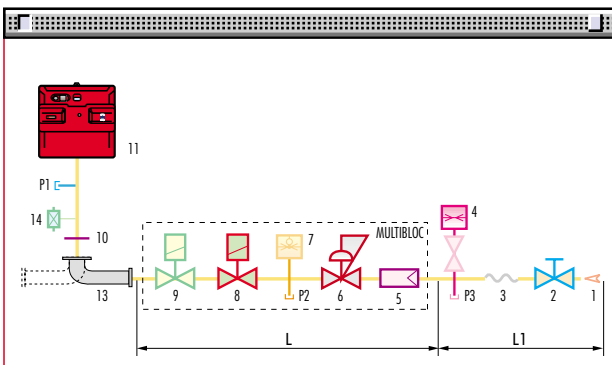
The gas train can be "Multibloc" type (containing the main components in a single unit) or "Composed" type (assembly of the single components).

The gas train can be, also, "One stage" or "Two stage" type. One stage gas train can be used on RS28/1 for all firing rates, and on RS38/1 up to a capacity of 350 kW.

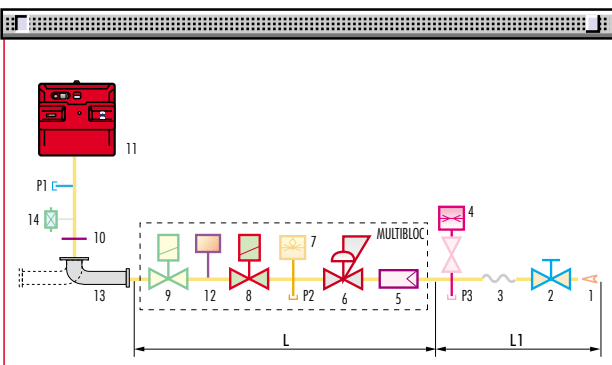


Example of the gas train connection flange of RS/1 burners.

MULTIBLOC gas train without seal control

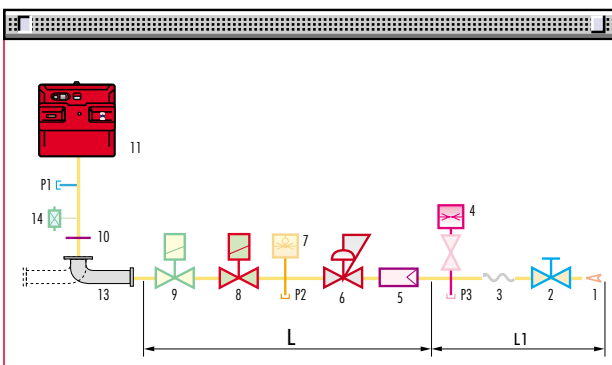


MULTIBLOC gas train with seal control

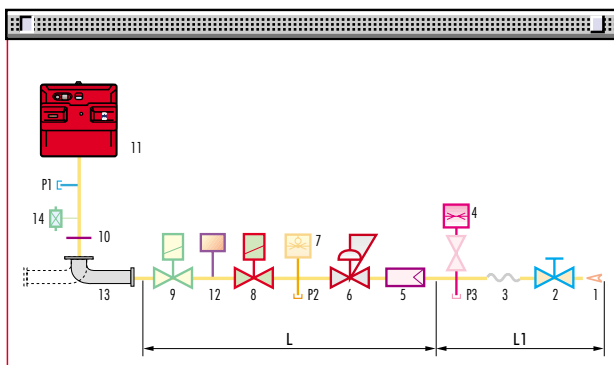


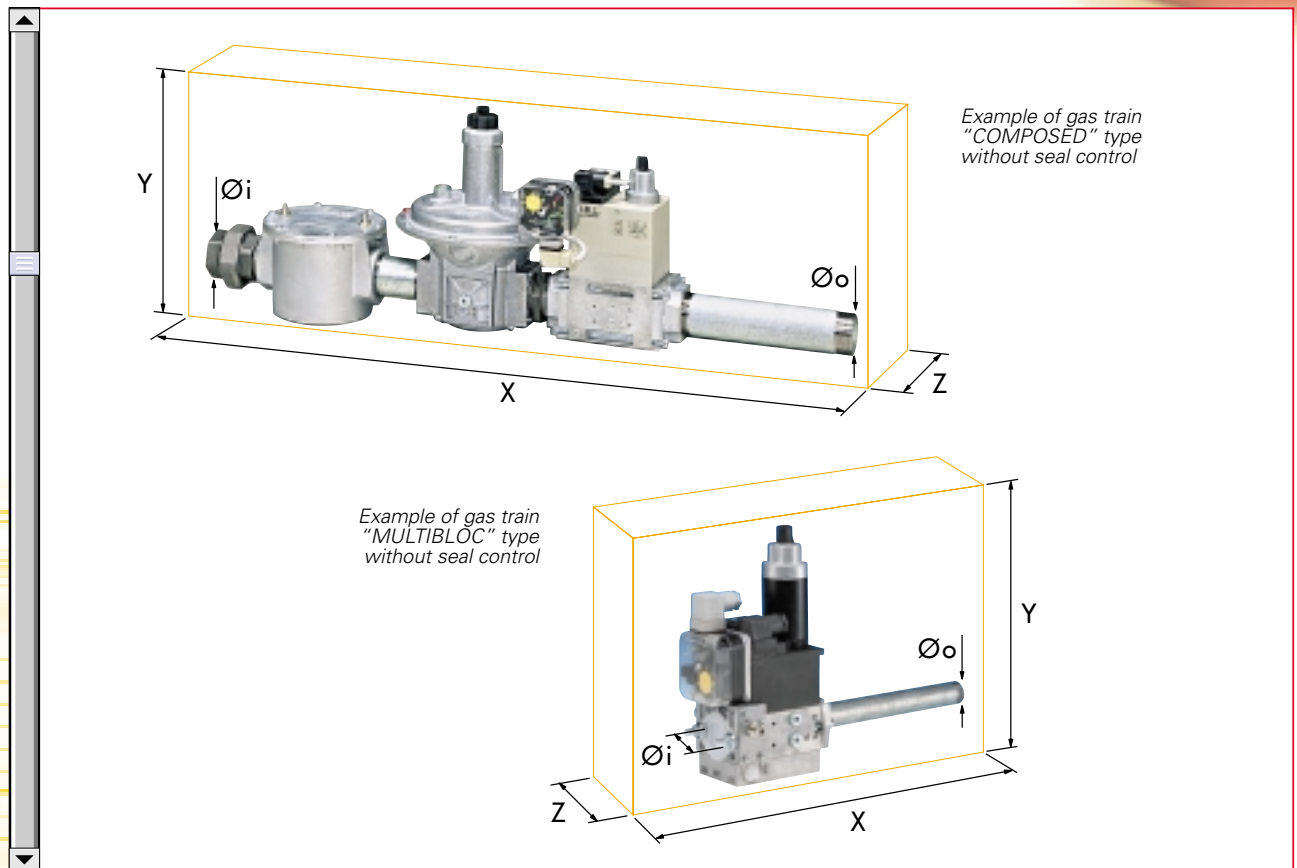
1	Gas input pipework
2	Manual valve
3	Anti-vibration joint
4	Pressure gauge with pushbutton cock.
5	Filter
6	Pressure regulator (vertical)
7	Minimum gas pressure switch
8	VS safety solenoid (vertical)
9	VR regulation solenoid (vertical) Two settings: - firing output (rapid opening) - maximum output (slow opening)
10	Gasket and flange supplied with the burner
11	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 RS/1 burners, intake and outlet diameters and seal control if fitted.

Please note that the seal control can be installed as an accessory, if not already installed on the gas train.

The maximum gas pressure of gas train "Multibloc" type is 300 mbar, and that one of gas train "Composed" type is 500 mbar.

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





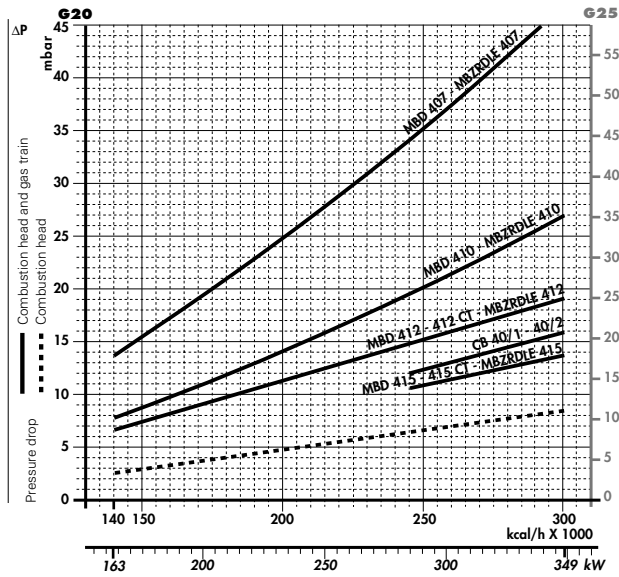
► PRESSURE DROP DIAGRAM

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.

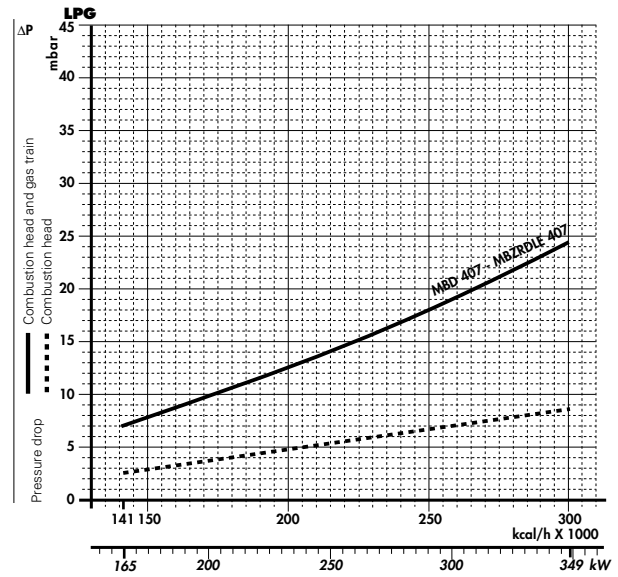
NATURAL GAS

RS 28/1



LPG

RS 28/1



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

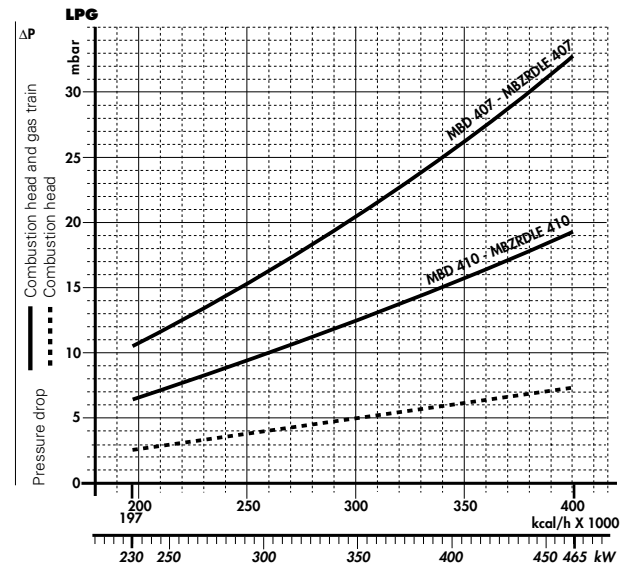
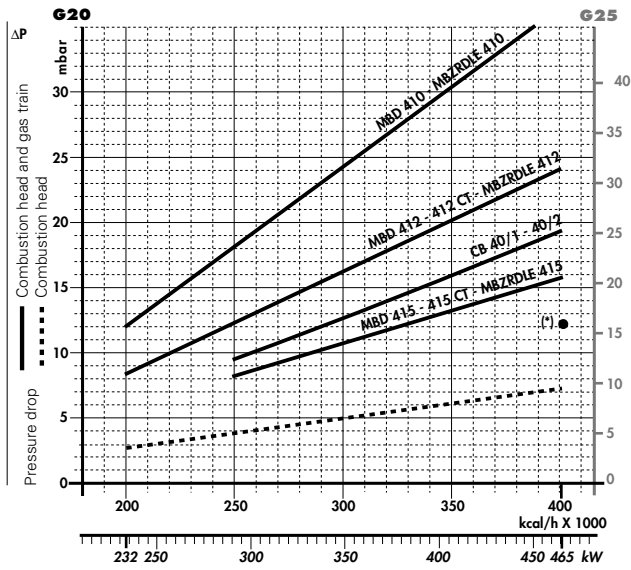


NATURAL GAS

LPG

RS 38/1

RS 38/1



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

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

► note

Please contact the Riello Burner Technical Office for different pressure levels from those above indicated and refer to the technical manual for the correct choice of the spring.



SELECTING THE FUEL SUPPLY LINES

The following diagram enables pressure drop in a pre-existing gas line to be calculated and to select the correct gas train.

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

Control of the pressure drop in an existing gas line or selecting a new gas supply line.

The methane output equivalent is determined by the formula fig. A on the diagram and the conversion coefficient.

Once the equivalent output has been determined on the delivery scale (\dot{V}), shown at the top of the diagram, move vertically downwards until you cross the line that represents the pipe diameter; at this point, move horizontally to the left until you meet the line that represents the pipe length. Once this point is established you can verify, by moving vertically downwards, the pipe pressure drop on the bottom scale below (mbar).

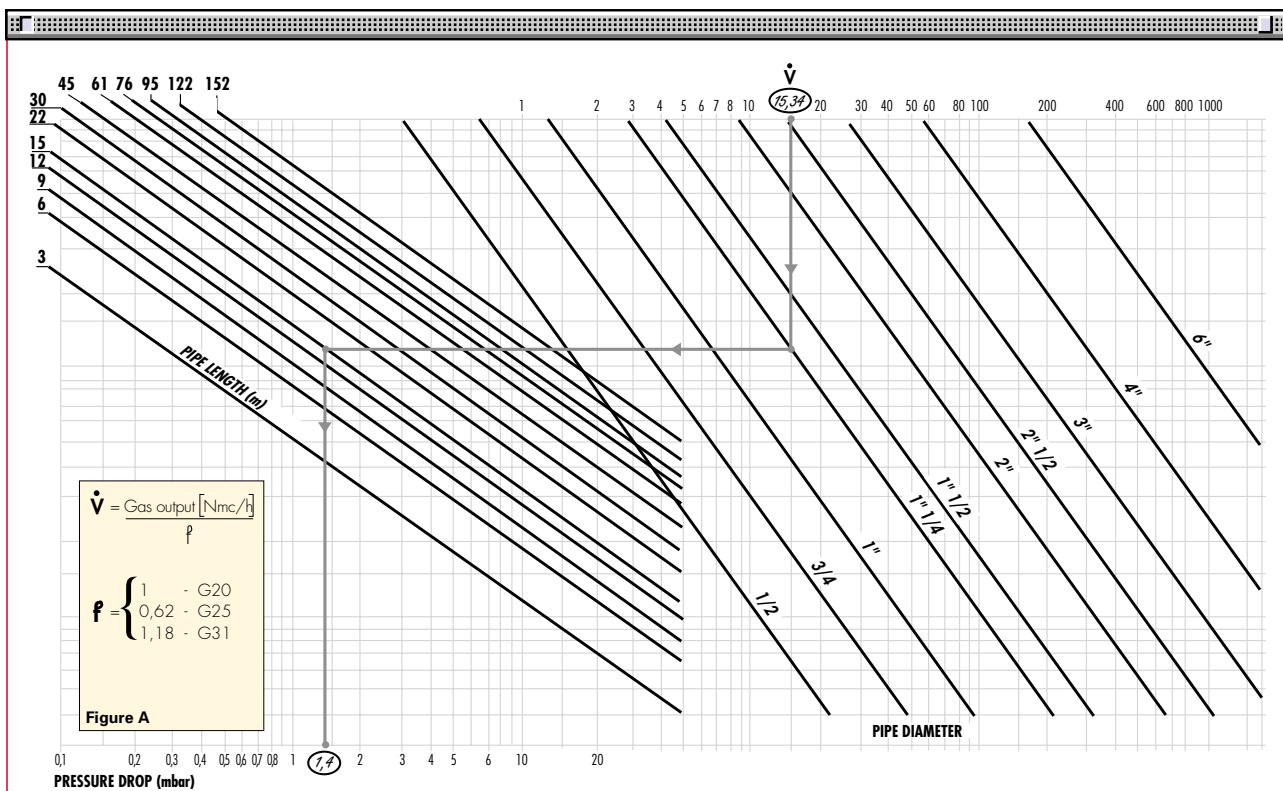
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

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 bottom scale;
- subtract the determined pressure drop from the meter pressure, the correct pressure level will be found for the choice of gas train;
- correct pressure = (20-1.4) = 18.6 mbar



VENTILATION



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

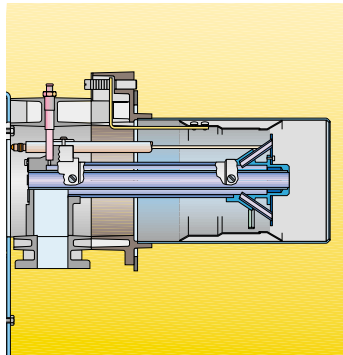
The use of reverse curve blades and sound-proofing material keeps noise level very low.

Example of the air damper on RS 28/1 burner

COMBUSTION HEAD



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



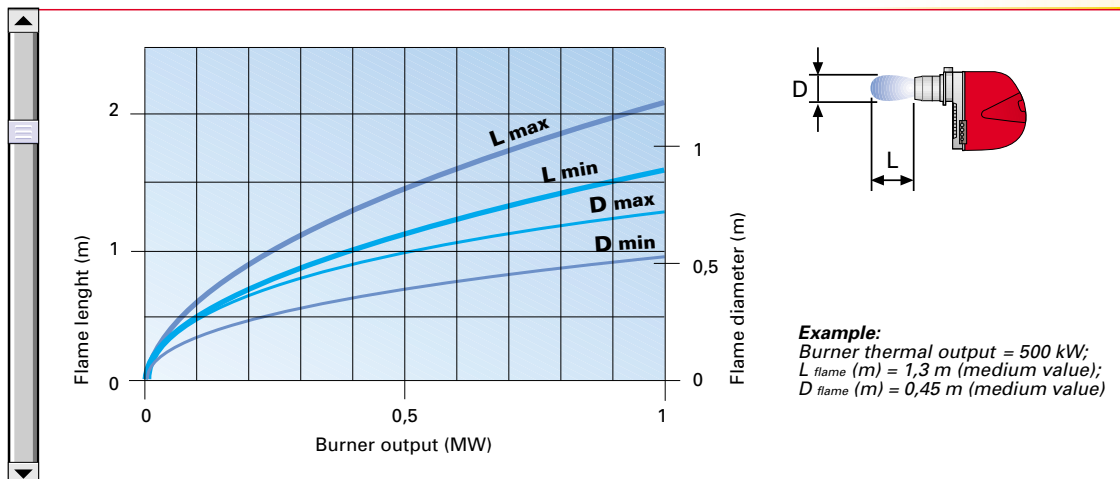
The choice depends on the thickness of the front panel and the type of boiler.

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

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

Example of a RS/1 burner combustion head

Flame dimensions





ADJUSTMENT

BURNER OPERATION MODE

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

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

One stage operation

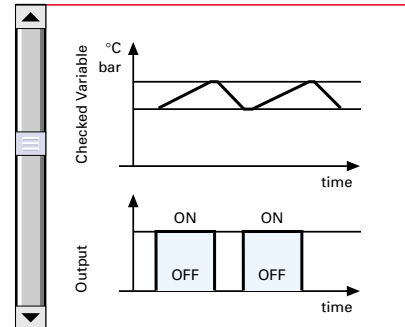


Figure A

All RS/1 series burners are fitted with a new microprocessor control panel for the supervision during intermittent operation.

For helping the commissioning and maintenance work, there are two main elements:

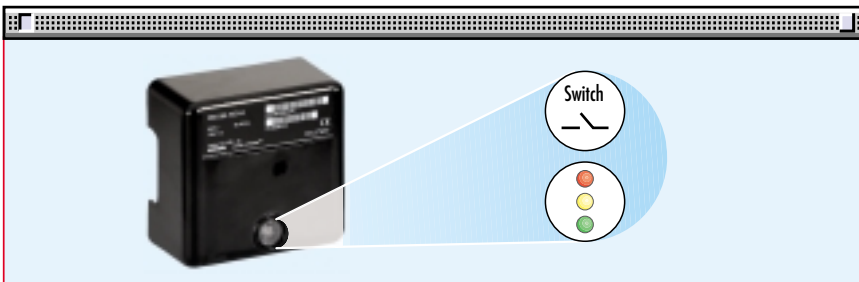


The lock-out reset button is the central **operating element** for resetting the burner control and for activating / deactivating the diagnostic functions.



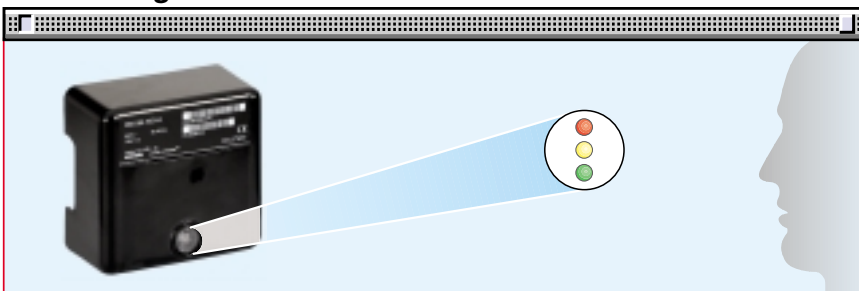
The multi-color LED is the central **indication element** for visual diagnosis and interface diagnosis.

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



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

- visual diagnosis :



- interface diagnosis :

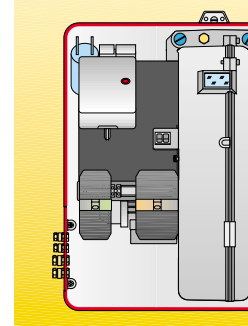


by the interface adapter and a PC with dedicated software or by a predisposed flue gas analyzer (see paragraph accessories).



WIRING DIAGRAMS

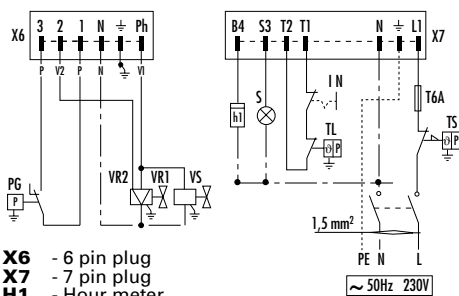
Electrical connections must be made by qualified and skilled personnel, according to the local norms.



Example of plugs and sockets for electrical connections and control panel on RS 28/1

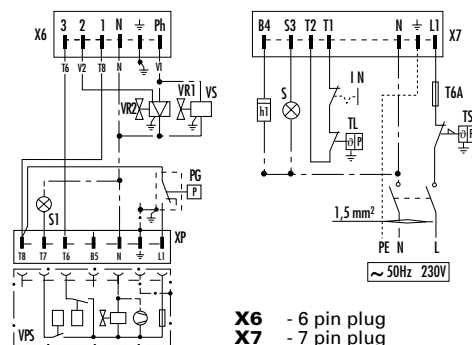
“ONE STAGE” OPERATION

RS 28/1 - 38/1 - Without seal control



- X6** - 6 pin plug
- X7** - 7 pin plug
- H1** - Hour meter
- TS** - Safety thermostat
- S** - External lock-out signal
- IN** - Manual switch
- TL** - Threshold thermostat
- T6A** - 6A fuse
- PG** - Minimum gas pressure switch
- VR1** - 1st adjustment valve
- VR2** - 2nd adjustment valve
- VS** - Safety valve

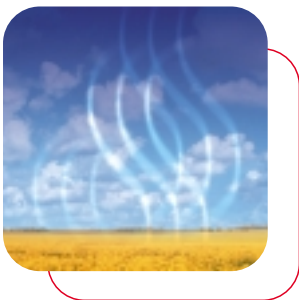
RS 28/1 - 38/1 - With seal control



- X6** - 6 pin plug
- X7** - 7 pin plug
- H1** - Hour meter
- TS** - Safety thermostat
- S** - External lock-out signal
- S1** - External lock-out signal on the seal control
- IN** - Manual switch
- TL** - Threshold thermostat
- T6A** - 6A fuse
- PG** - Minimum gas pressure switch
- VR1** - 1st adjustment valve
- VR2** - 2nd adjustment valve
- VS** - Safety valve
- VPS** - Seal control
- XP** - Seal control plug

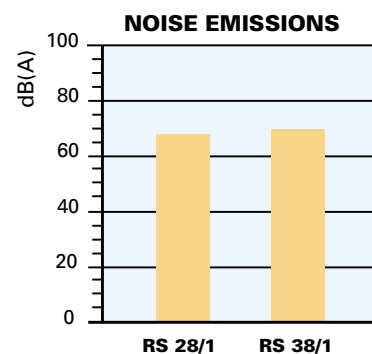
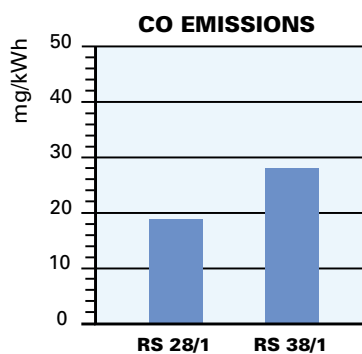
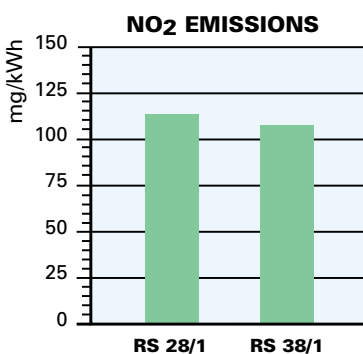
Model	▼ RS 28/1	▼ RS 38/1
F A	T6	T6
L mm ²	1,5	1,5

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



EMISSIONS

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

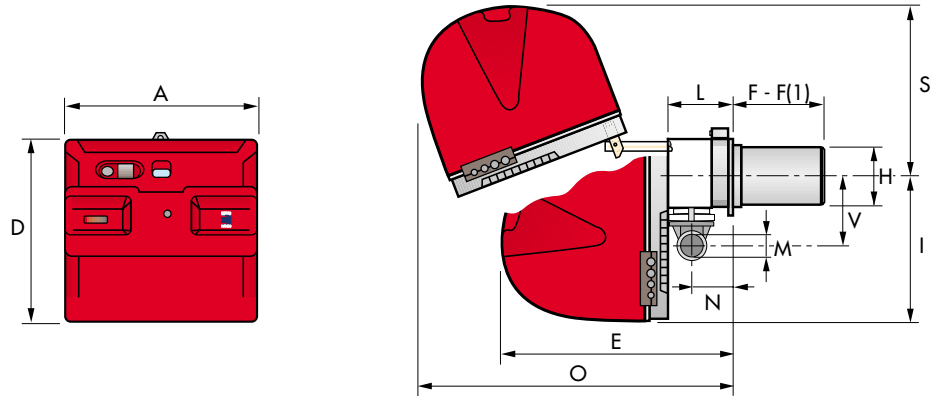


OVERALL DIMENSIONS (mm)



BURNER

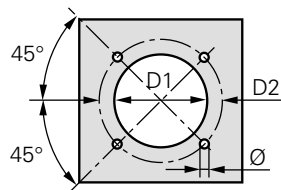
RS 28/1 - 38/1



Model	A	D	E	F - F(1)	H	I	L	M	N	O	S	V
▶ RS 28/1	476	474	580	216 - 351	140	352	164	1"1/2	108	810	367	168
▶ RS 38/1	476	474	580	216 - 351	140	352	164	1"1/2	108	810	367	168

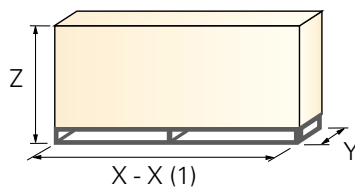
(1) Length with extended combustion head

BURNER - BOILER MOUNTING FLANGE



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

PACKAGING



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

(1) Length with extended combustion head



INSTALLATION DESCRIPTION

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

BURNER SETTING

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

ELECTRICAL CONNECTIONS AND START UP

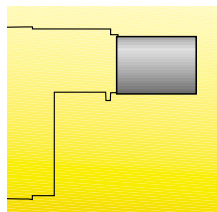
- ▶ Make the electrical connections to the boiler following the wiring diagrams included in the instruction handbook.
- ▶ Perform a first ignition calibration on the gas train.
- ▶ On start up, check:
 - Gas pressure at the combustion head (to max. and min. output)
 - Combustion quality, in terms of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

BURNER ACCESSORIES



Extended head kit

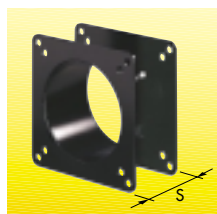
"Standard head" burners can be transformed into "extended head" versions, by using the special kit. The KITS available for the various burners, giving the original and the extended lengths, are listed below.



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

Spacer kit

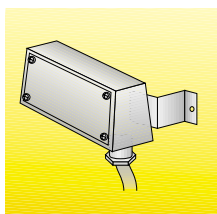
If burner head penetration into the combustion chamber needs reducing, varying thickness spacers are available, as given in the following table:



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

Post-ventilation kit

To prolong ventilation for approximately 5 seconds after opening of thermostats chain, a special kit is available.



Post-ventilation kit	
Burner	Kit code
RS 28/1 - 38/1	3010004

Continuous ventilation kit

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



Continuous ventilation kit	
Burner	Kit code
RS 28/1 - 38/1	in progress

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	Average noise reduction [dB(A)]	Box code
RS 28/1 - 38/1	C2	11	3000777



LPG kit

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



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

Town gas kit

For burning Town gas, a special kit is available:



Town gas kit		
Burner	Kit code for standard head (*)	Kit code for extended head (*)
RS 28/1	3010283	3010283
RS 38/1	3010284	3010284

(*) Without CE certification

Status Panel kit

The RS burners can be equipped with an exclusive electronic device "Status Panel" which continuously monitors and displays all the burner operational modes and picks up any anomalies during the operational cycle.



Status Panel kit	
Burner	Kit code
RS 28/1 - 38/1	3010322

Ground fault interrupter kit

A "Ground fault interrupter kit" is available as a safety device for electrical system fault.



Ground fault interrupter kit	
Burner	Kit code
RS 28/1 - 38/1	3010321

Interface adapter kit

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



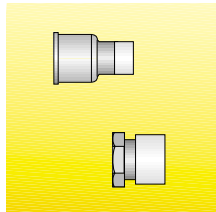
Interface adapter kit	
Burner	Kit code
RS 28/1 - 38/1	in progress











GAS TRAIN ACCESSORIES



Adapters

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



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

Seal control kit

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



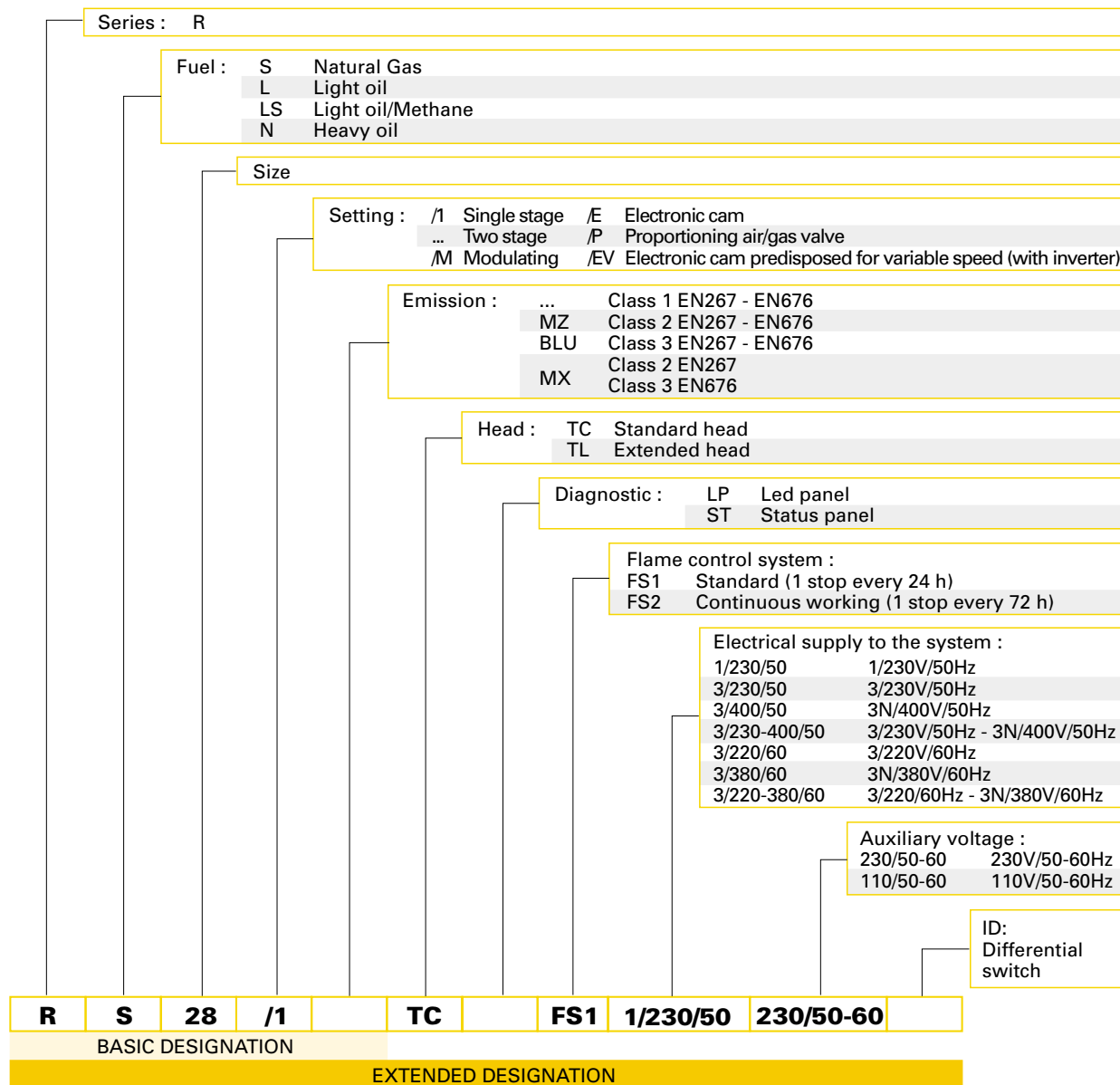
Seal control kit		
Burner	Gas train	Kit code
RS 28/1	MBD 407 - MBZRDLE 407	3010123
	MBD 410 - MBZRDLE 410	3010123
	MBD 412 - MBZRDLE 412	3010123
	MBD 415 - CB 40/1	3010123
	MBZRDLE 415 - CB 40/2	3010125
RS 38/1	MBD 407 - MBZRDLE 407	3010123
	MBD 410 - MBZRDLE 410	3010123
	MBD 412 - MBZRDLE 412	3010123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



SPECIFICATION

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

DESIGNATION OF SERIES



AVAILABLE BURNER MODELS

RS 28/1 TC FS1 1/230/50 230/50-60
 RS 28/1 TL FS1 1/230/50 230/50-60
 RS 38/1 TC FS1 1/230/50 230/50-60
 RS 38/1 TL FS1 1/230/50 230/50-60

Other versions are available on request



▶ PRODUCT SPECIFICATION

Burner:

Monoblock forced draught gas burner with one stage operation, fully automatic, made up of:

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

Gas train

Fuel supply line, in the MULTIBLOC configuration (from a diameter of 3/4" until a diameter 2") or COMPOSED configuration (from a diameter of DN 40 until a diameter of DN 50), fitted with:

- Filter
- Stabiliser
- Minimum gas pressure switch
- Safety valve
- One stage or two stage working valve with ignition gas output regulator.

Conforming to:

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

Standard equipment:

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

Available accessories to be ordered separately:

- Extended head kit
- Spacer kit
- Post-ventilation kit
- Continuous ventilation kit
- Sound-proofing box
- LPG kit
- Town gas kit
- Status panel kit
- Ground fault interrupter kit
- Interface adapter kit
- Gas train adapter
- Seal control kit.



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