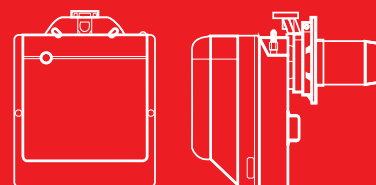




## Gulliver RS Series

One Stage Gas Burner

RS5	160	÷	330	kW
RS5 TL	160	÷	330	kW





The Riello Gulliver RS5 is a new model of the series of one stage gas burners, characterized for its small dimensions in spite of its high combustion performance. It has been developed to respond to any request for home heating, conforming to current regulations in force.

This model uses the same components designed by Riello for the Gulliver series. The high quality level guarantees safe working. The burners are fitted with a microprocessor-based burner safety control box which supplies indication of operation and diagnosis of fault cause.

In developing this burner, special attention was paid to reducing noise, the ease of installation and adjustment, to obtaining the smallest size possible to fit into any sort of boiler available on the market.

This model is approved by the EN 676 European Standard and European Directives, Gas Appliance, EMC, Low Voltage, Boiler Efficiency.

The Gulliver RS5 burner is tested before leaving the factory.

## Technical Data

<b>MODEL</b>			<b>RS5</b>
Burner operation mode			One stage
Modulation ratio at max. output			--
Servomotor	type		R.B.L.
	run time s		8 ÷ 27
Heat output	kW		160 ÷ 330
	Mcal/h		137.6 ÷ 283.8
Working temperature	°C min./max.		0/40
<b>FUEL/AIR DATA</b>			
G20 gas	net calorific value	kWh/Nm <sup>3</sup>	10
	gas density	kg/Nm <sup>3</sup>	0.71
	gas delivery	Nm <sup>3</sup> /h	16 ÷ 33
G25 gas	net calorific value	kWh/Nm <sup>3</sup>	8.6
	gas density	kg/Nm <sup>3</sup>	0.78
	gas delivery	Nm <sup>3</sup> /h	18.6 ÷ 38.4
LPG gas	net calorific value	kWh/Nm <sup>3</sup>	25.8
	gas density	kg/Nm <sup>3</sup>	2.02
	gas delivery	Nm <sup>3</sup> /h	6.2 ÷ 12.8
Fan	type		Centrifugal with forward curve blades
Air temperature	max °C		40
<b>ELECTRICAL DATA</b>			
Electrical supply	Ph/Hz/V		1/50/230 (±10%)
Auxiliary electrical supply	Ph/Hz/V		--
Control box	type		MG569
Total electrical power	kW		0.430
Auxiliary electrical power	kW		--
Protection level	IP		X0D
Fan motor	electrical power	kW	0.25
	rated current	A	2
	start up current	A	7.8
	protection level	IP	20
Ignition transformer	type		Incorporated in the control box
	V1 - V2		230V - 8 kV
	I1 - I2		0.2 A - 12 mA
Operation			Intermittent (at least one stop every 24 h)
<b>EMISSIONS</b>			
Noise levels	sound pressure	dB (A)	70
	sound power	W	-
Gas G20	CO emission	mg/kWh	< 40
	NOx emission	mg/kWh	< 120
<b>APPROVAL</b>			
Directive			2006/42 - 2009/142 - 2004/108 - 2006/95 EC
Conforming to			EN 676 - EN 12100
Certification			CE-0085BM0114

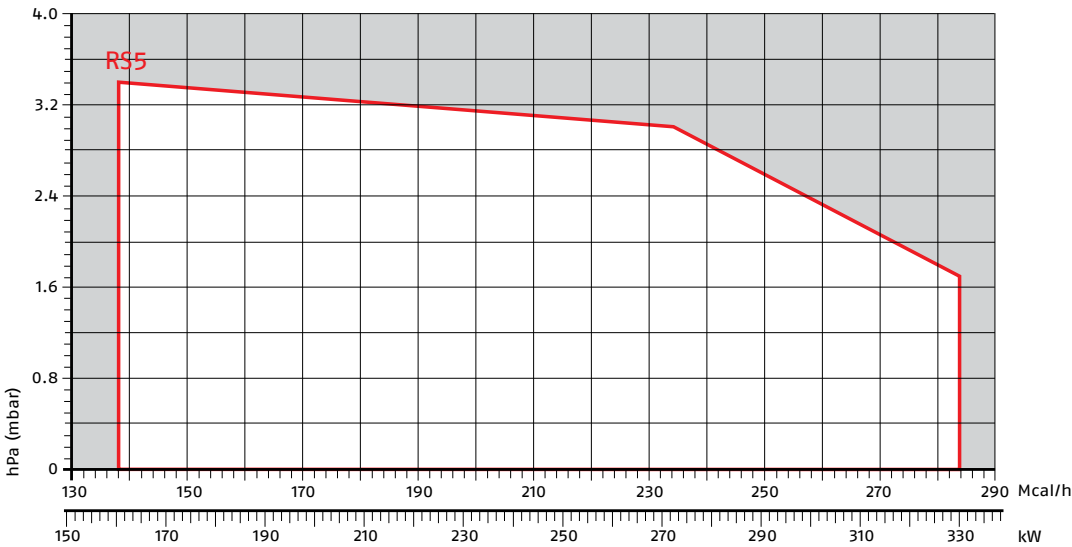
Reference conditions:

Temperature: 20°C - Pressure: 1013,5 mbar - Altitude: 0 m a.s.l. - Noise measured at a distance of 1 meter.

Since the Company is constantly engaged in the production improvement, the aesthetic and dimensional features, the technical data, the equipment and the accessories can be changed. This document contains confidential and proprietary information of RIELLO S.p.A. Unless authorised, this information shall not be divulged, nor duplicated in whole or in part.



# Firing Rate



Useful working field  
for choosing the  
burner

Test conditions  
conforming to EN676  
Temperature: 20°C  
Pressure: 1013,5 mbar  
Altitude: 0 m a.s.l.

# Gas train

## GAS TRAIN DESIGNATION

Series: MB							
Size: 410 412 415							
Operation: /1 stage mode opening							
Leak detection control: - 0							
Joint type: R threaded joint							
F1 square flange BS1							
F2 square flange BS2							
F3 square flange BS3 – BS4							
Electrical connection: SD Domestic plug							
Standard output pressure range: - without pressure governor							
0 with governor and air/gas proportional pressure							
2 with governor and output pressure up to 20 mbar							
3 with governor and output pressure up to 30 mbar							
4 with governor and output pressure up to 40 mbar							
5 with governor and output pressure up to 50 mbar							
Valve control: 0 shared							

MB	410	/1		F3	SD	2	0
BASIC DESIGNATION							
EXTENDED DESIGNATION							

## GAS TRAINS

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

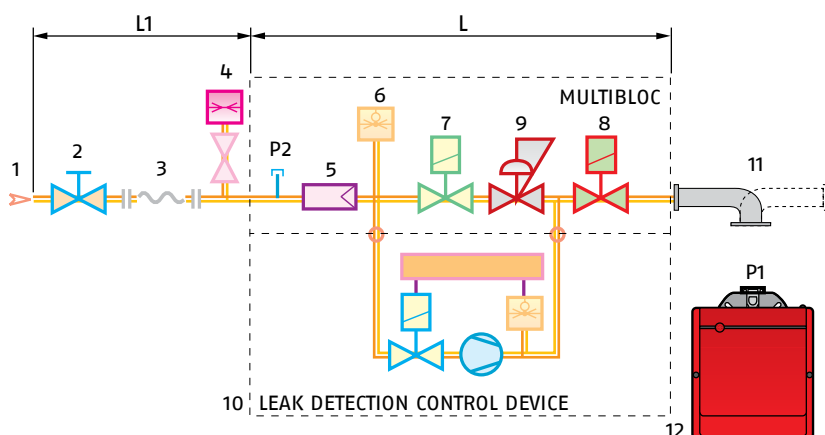
Depending on the fuel output and the available pressure in the supply line, you should check the correct gas train to be adapted to the system requirements.

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

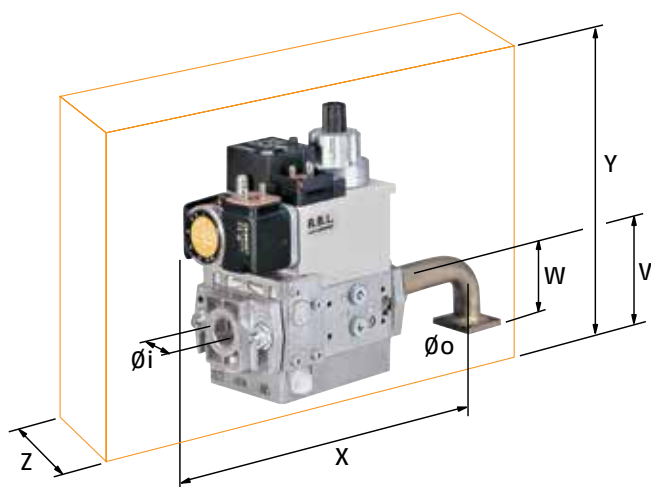


Gas train installed on the burner

### MB 410/1 - 412/1 - 415/1



1	Gas input pipework
2	Manual valve
3	Anti-vibration joint
4	Gas pressure gauge
5	Filter
6	Gas pressure switch
7	Safety valve
8	Adjustment solenoid: firing delivery adjustment (rapid opening) maximum delivery adjustment (slow opening)
9	Pressure adjuster
10	Leak detection device for valves 7 and 8 (accessory)
11	Gas train-burner adapter
12	Burner
P1	Combustion head pressure
P2	Upstream pressure from the filter
L	Gas train supplied separately
L1	Installer's responsibility



The dimensions of the gas trains vary depending on their construction features.

The following table shows the dimensions of the gas trains that can be fitted to Gulliver RS5 burners, intake diameter and the coupling flange to the burner.

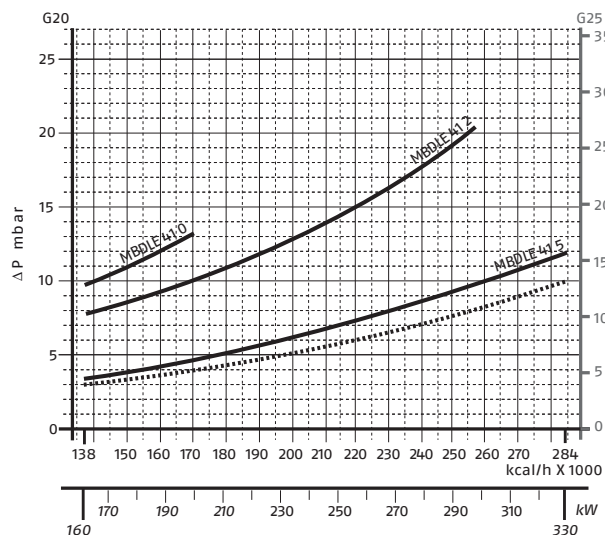
GAS TRAIN									
MODEL	CODE	Ø in	Ø out	X mm	Y mm	W mm	Z mm	V mm	mbar max*
MB 410/1	3970549	1" 1/4	FLANGE 3	259	215	47	145	55	300
MB 412/1	3970550	1" 1/4	FLANGE 3	259	215	47	145	55	300
MB 415/1	3970558	1" 1/4	FLANGE 3	330	250	47	100	80	300

\* max inlet gas pressure (mbar)

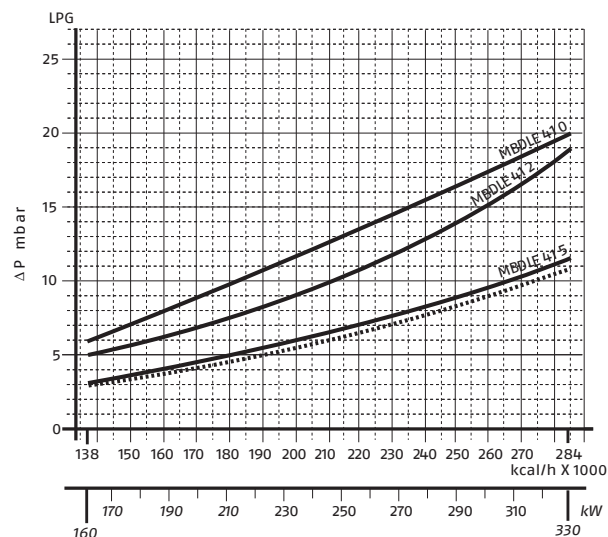
## Pressure Drop Diagram

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.

### RS5 (NATURAL GAS)



### RS5 (LPG)



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

In LPG plants, Multibloc gas trains do not operate below 0°C.

They are only suitable for gaseous LPG (liquid hydrocarbons destroy the seal materials).

— Combustion head + gas train  
 - - - Combustion head

#### GAS TRAIN

CODE	MODEL	BURNER MODEL	OUTPUT	PLUG AND SOCKET
3970549	MB 410/1 - F3SD 20	RS5	≤ 200 kW*	●
3970550	MB 412/1 - F3SD 20	RS5	≤ 300 kW*	●
3970558	MB 415/1 - F32D 20	RS5	-	●

Key to layout

\* with natural gas

## 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 bottom scale (mbar).

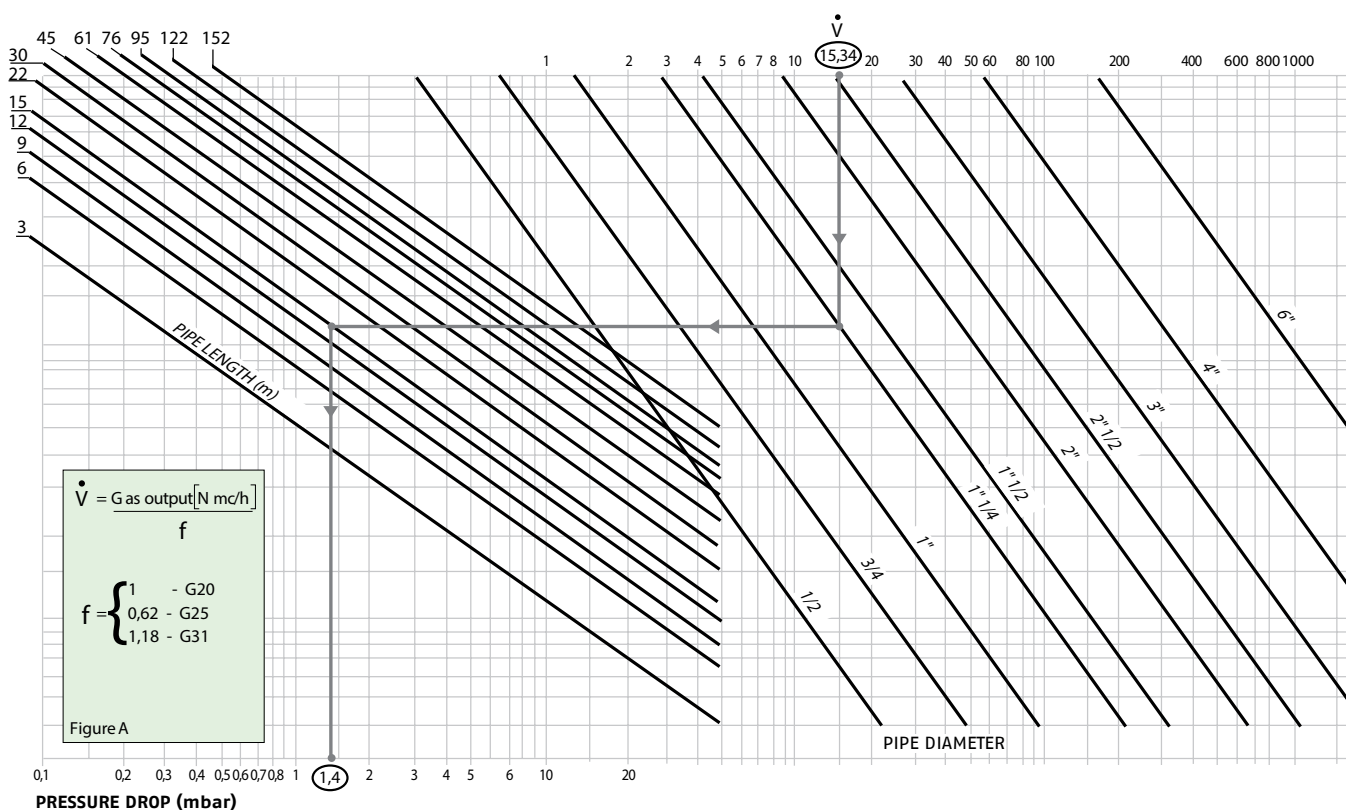
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

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

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

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

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



Air suction



Air pressure switch

## Combustion Head

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

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

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

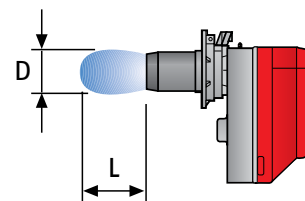
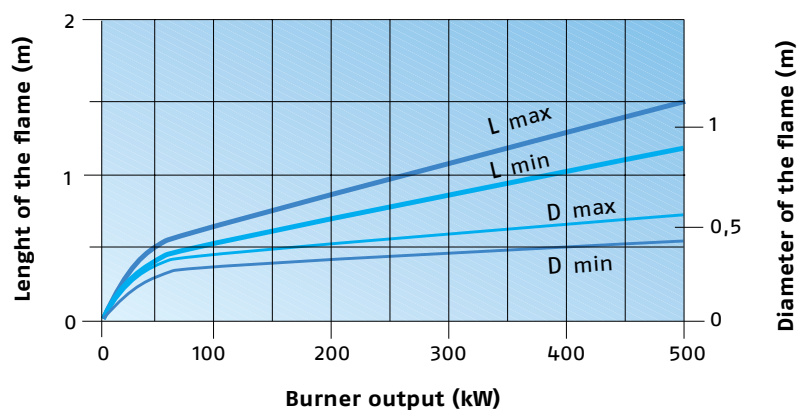


Combustion head



Mobile flange

## DIMENSIONS OF THE FLAME

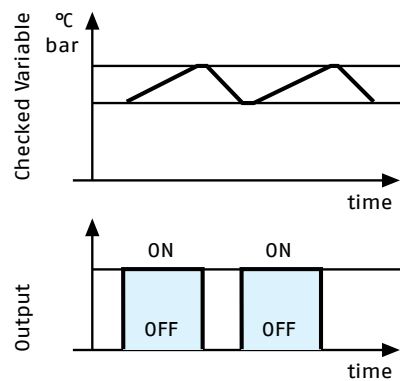


Example:  
 Burner thermal output = 350 kW;  
 L flame (m) = 1.2 m (medium value);  
 D flame (m) = 0.6 m (medium value)

# Operation

## BURNER OPERATION MODE

All these models are one stage operation.



One stage operation



Air damper adjustment

All Gulliver RS5 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:

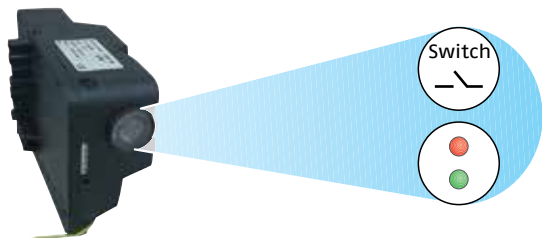


The lock-out reset button is the central operating element for resetting the burner control and for activating / deactivating the diagnostic functions.



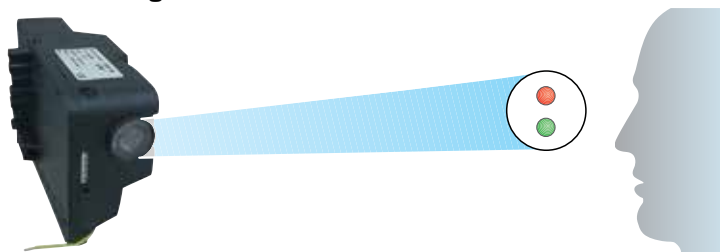
The multi-color LED is the central indication element for visual diagnosis and interface diagnosis.

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

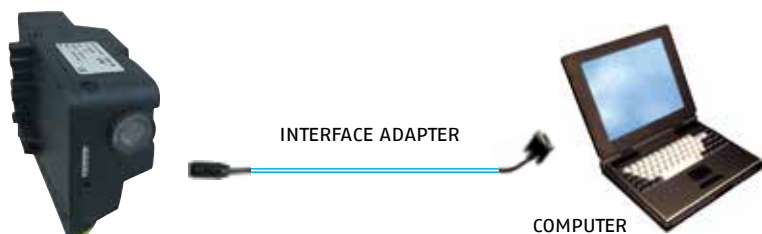


There are two diagnostic choices, for indication of operation and diagnosis of fault cause:

### - visual diagnosis:



### - interface diagnosis:



By the interface adapter and a PC with dedicated software.

### Indication of operation

In normal operation, the various statuses are indicated in the form of colour codes according to the table below.

### Diagnosis of fault causes

After lock-out has occurred, the red signal lamp is steady on.

In this status, the visual fault diagnosis according to the error code table can be activated by pressing the lock-out reset button for > 3 seconds.

The control box sends a sequence of pulses that are repeated at 2 second intervals.

The interface diagnosis (with adapter) can be activated by pressing again the lock-out button for > 3 seconds.

**Color code table**

Operation statuses	Color code
Stand-by	○ Led off
Pre-purging	● Green
Ignition phase	● Green
Flame OK	● Green
Post purge	● Green
Undervoltage, built-in fuse	○ Led off
Fault, alarm	● Red

Example of blinks sequence:



**Error code table**

Blink code	Possible cause of fault
2 blinks ● ●	No flame at the end of safety time: - faulty or soiled gas valves - faulty ionisation probe - poor adjustment of burner, no gas - faulty ignition - neutral / phase exchange
3 blinks ● ● ●	Air pressure switch does not close or is already closed before heat demand: - faulty air pressure switch - air pressure switch incorrectly regulated
4 blinks ● ● ● ●	Presence of flame: - in stand-by position - with thermostat of heat demand in idle or working position - during pre-purge - during post-purge
6 blinks ● ● ● ● ● ●	Loss of air pressure: - during pre-purge - during or after safety time
7 blinks ● ● ● ● ● ● ●	Loss of flame during operations after n°3 attempts of re-cycle: - faulty or soiled gas valves - faulty ionisation probe - short circuit between ionisation probe and earth of the burner - poor adjustment of burner, no fuel

The MG569 digital control box gives some other advantages:

#### Post ignition (during safety time)

The spark ignition is present during all safety time.

#### Adjustable post purge

The Post-purge is a function that maintains air ventilation even after the burner is switched off.

Post-purge time can be set to a maximum of 6 minutes.

This function can be activated and set in a very easy way by pressing repeatedly the reset button; after 5 seconds the control box automatically shows the minutes set by the red LED flashing (1 pulse = post-ventilation for 1 minute).

If during post-purge there is a new request for heat, it is halted and a new operating cycle starts.

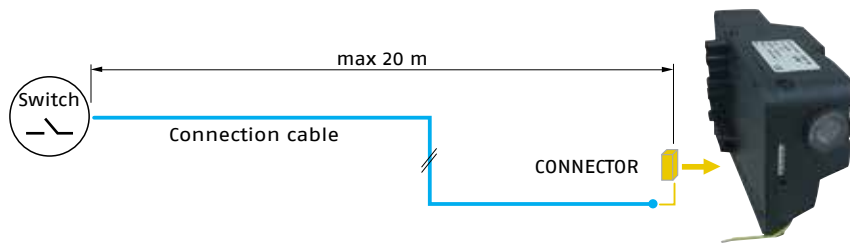
The control box leaves the factory with the setting 0 minutes (no post-ventilation).

#### Remote lock-out reset

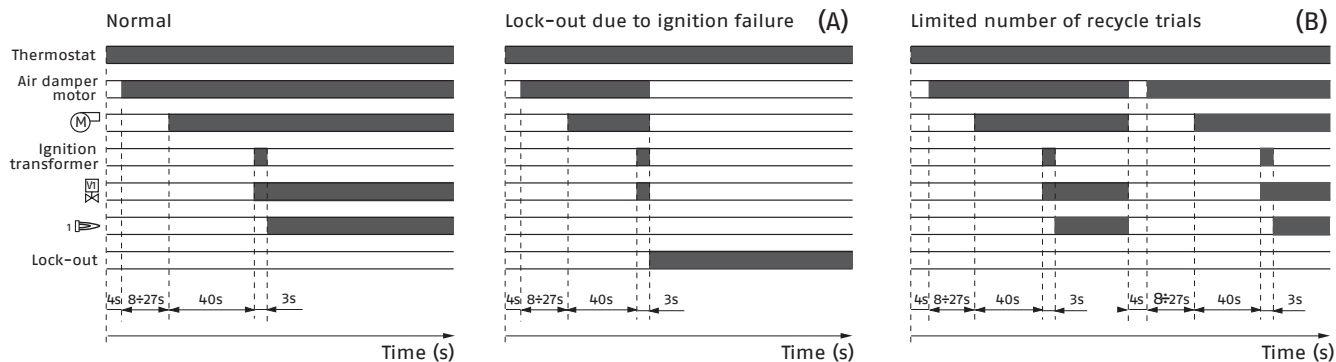
The "Remote lock-out reset" is a function that allows to reset the control-box operation from a remote position.

In the burner packages will be included a particular connector to remote the reset signal.

The maximum length of connection must be 20 m.



### START UP CYCLE



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

(B) Total number of recycle trials is 3

#### Correct operation

0s	Start of heat demand the burner begins the ignition cycle
0s-4s	The burner is in stand-by
4s-12/31s	The motor opens the air damper
12/31s-52/71s	Pre-purge with the air damper open
52/71s	Ignition

#### Lock-out due to ignition failure

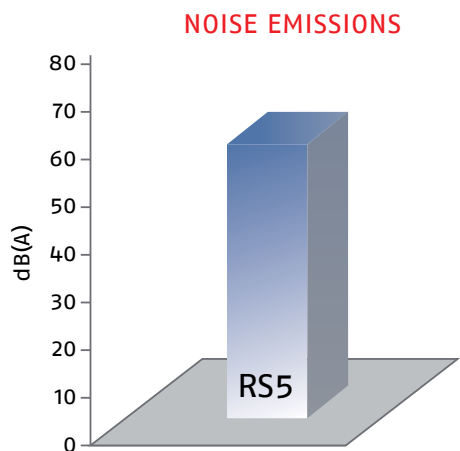
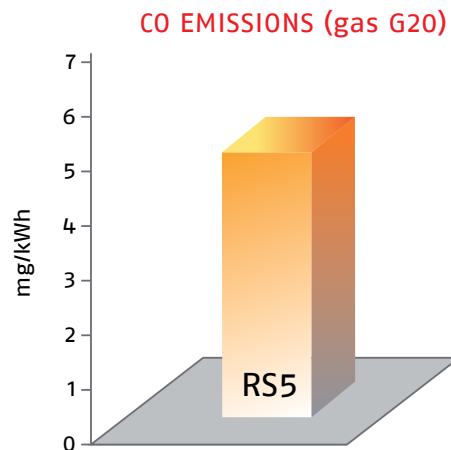
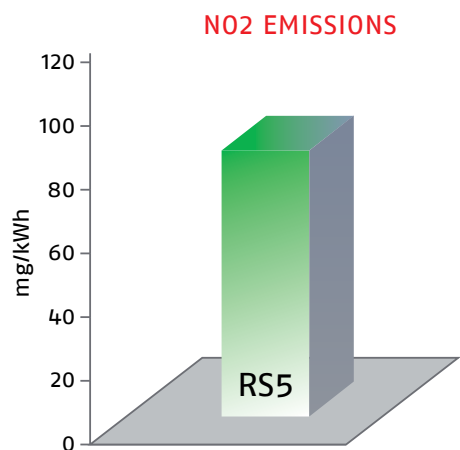
If the flame does not light within the safety limit (~ 3s) the burner locks-out.

#### Re-cycle

The burner permits maximum three repetitions of complete ignition cycle if there is flame failure during operation. The burner goes in safety shut-down within one second.

The final action at the last trial following at last flame failure is a lock-out.

The burners in the Gulliver RS5 series guarantee controlled combustion, reducing emissions of both CO and NO<sub>x</sub>, this combustion control is due to the recirculation of the combustion products in the chamber (thanks to different combustible air flow speeds) and to the fuel staging technique (thanks to the special geometry of the gas nozzles).

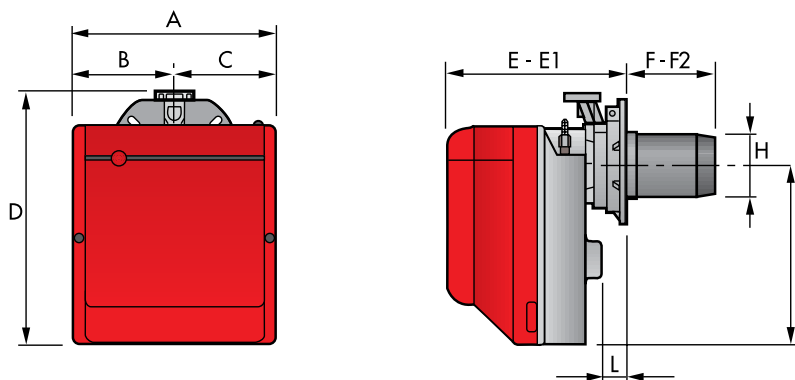


The emission data have been measured in the various models at maximum output, in conformity with EN 676 standard.

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

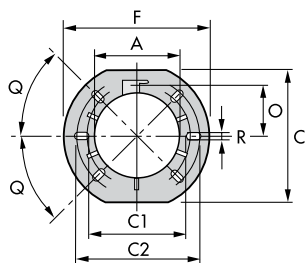
## Overall Dimensions (mm)

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



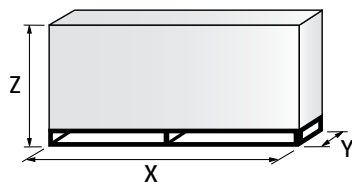
MODEL	A	B	C	D	E	E1	F	F2	H	I	L
RS5	300	150	150	392	278	300	225	203	137	286	45
RS5 TL	300	150	150	392	278	300	382	360	137	286	45

### BURNER - BOILER MOUNTING FLANGE



MODEL	A	C	C1	C2	F	O	Q	R
RS5	137	203	170	200	218	80.5	45°	11
RS5 TL	137	203	170	200	218	80.5	45°	11

### PACKAGING

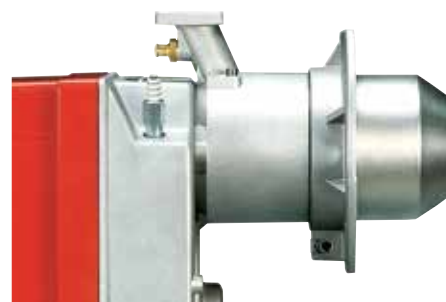


MODEL	X	Y	Z	kg
RS5	600	345	440	18
RS5 TL	703	335	435	20

## Installation Description

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

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



### BURNER SETTING

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



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



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



## MAINTENANCE AND ELECTRICAL CONNECTIONS

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



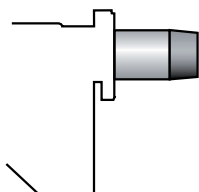
The 7-pole socket is incorporated in the control box, the 6-pole socket for connection to the gas train is already connected to the equipment and fixed to the outside of the burner.

The 7-pin plug is also supplied for connection to the boiler.



## Burner accessories

### EXTENDED HEAD KIT



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

BURNER	STANDARD HEAD LENGTH (mm)	EXTENDED HEAD LENGTH (mm)	CODE
RS5	203 ÷ 225	357 ÷ 372	3001016

### LPG KIT



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

BURNER	STANDARD HEAD CODE	EXTENDED HEAD CODE	CODE (*)
RS5	3001011	3001011	3002737

(\*) CE certification in progress

### GROUND FAULT INTERRUPTER KIT



A "Ground fault interrupter kit" is available as a safety device in case of electrical system fault. It is supplied with burners with pin plug.

BURNER	CODE
RS5	3001180

### PC INTERFACE KIT



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

BURNER	CODE
RS5	3002731

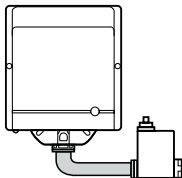
### 7-PIN PLUG KIT

If necessary a 7-pin plug kit is available (in packaging of n. 5 pieces).

BURNER	CODE
RS5	3000945



MULTIBLOC ROTATION KIT



There is a special kit available that can be used to install the burner turned 180°. This kit is designed to ensure the gas train valve properly.

BURNER	CODE
RS5	3001178

Gas train accessories

SEAL CONTROL KIT



To test the valve seals on the gas train, (except for the model with Multibloc MBC 65/1) a special “seal control kit” is available.

GAS TRAIN	CODE for 50Hz operation	CODE for 60Hz operation
MB/1 type	3010123	20050030

# Specification

## DESIGNATION OF SERIES

A specific index guides your choice of burner from the various models available in the RS/M C13 series. Below is a clear and detailed specification description of the product.

Series:	R	Standard emission burner
	B	Low NOx burners
Fuel:	S	Natural Gas
	SP	LPG
	G	Light oil
Size:		
Optional variations:	R	Light oil pre-heater
	K	Cone shaped head
	S	Reduced output ignition
	D	Two stage output operation
Head length:	...	standard head
	TL	extended head
Electrical supply to the system: 1/230/50 1/230V/50Hz		

R	S	5			1/230/50
BASIC DESIGNATION					
EXTENDED DESIGNATION					

## AVAILABLE BURNER MODELS

BURNER MODELS	ELECTRICAL SUPPLY	HEAT OUTPUT		TOTAL ELECTRICAL POWER (kW)	CERTIFICATION	NOTE
		(kW)	NATURAL GAS (Nm <sup>3</sup> /h)			
RS5	1/230/50	160 – 330	16 – 33	0.43	CE-0085BM0114	(1)
RS5 TL	1/230/50	160 – 330	16 – 33	0.43	CE-0085BM0114	(1)

Net calorific value G20: 10 kWh/Nm<sup>3</sup> – Density: 0,71 kg/Nm<sup>3</sup>.

The burners of BS series are in according to EN 676.

(1) With plug and socket.

## SPECIFICATION

### STATE OF SUPPLY

Monoblock, gas burners, completely automatic, one stage operation, made up of:

- Fan with forward curve blades
- Cover lined with sound-proofing material
- Air damper, completely closed in stand by, with external adjustment, with no need to remove the cover
- Single phase electric motor 230V, 50Hz
- Combustion head fitted with:
  - stainless steel head cone, resistant to high temperatures
  - ignition electrodes
  - ionisation probe
  - gas distributor
  - flame stability disk
- Flame inspection window
- Adjustable air pressure switch, with graduated selector, to guarantee burner lock out in the case of insufficient combustible air
- Microprocessor-based burner safety control box, with diagnostic and remote reset functions
- Protection filter against radio interference (included into burner safety control box)
- IP X0D (IP 40) electric protection level.

### Standard equipment:

- Sliding flange
- Flange insulation screen
- Screws and nuts for fixing the flange to the boiler
- 7-pin plug
- Remote control release kit
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue

### Conforming to:

- 2004/108 EC Directive (electromagnetic compatibility)
- 2006/95 EC Directive (low voltage)
- 2009/142 EC Directive (gas)
- 2006/42 EC Directive (machine)
- EN 676 (gas burners)

### Available accessories to be ordered separately:

- Extended head kit
- LPG kit
- Ground fault interrupter kit
- Multibloc rotation kit
- 7-pin plug kit
- PC interface kit
- Seal control kit



# Riello Burners a world of experience in every burner we sell.

06/2014

T50006UK03



[ 1 ]



[ 2 ]

[ 1 ] BURNERS PRODUCTION PLANT  
S. PIETRO, LEGNAGO (VERONA) - ITALIA

[ 2 ] HEADQUARTER BURNERS DIVISION  
S. PIETRO, LEGNAGO (VERONA) - ITALIA

Across the world, Riello sets the standard in reliable and high efficiency burner technology.

With burner capacity from 5 kW to 48 MW, Riello gas, oil, dual fuel and Low Nox burners deliver unbeatable performance across the full range of residential and commercial heating applications, as well as in industrial processes.

With headquarter in Legnago, Italy, Riello has been manufacturing premium quality burners for over 90 year. The manufacturing plant is equipped with the most innovative systems of assembling lines and modern manufacturing cells for a quick and flexible response to the market.

Besides, the Riello Combustion Research Centre, located in Angiari, Italy, represents one of the most modern facility in Europe and one of the most advanced in the world for the development of the combustion technology.

Today, the company's presence on worldwide markets is distinguished by a well-constructed and efficient sales network, alongside many important Training Centres located in various countries to meet its customers' needs. Riello has 13 operational branches abroad (in Europe, America and Asia), with customers in over 60 countries.

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