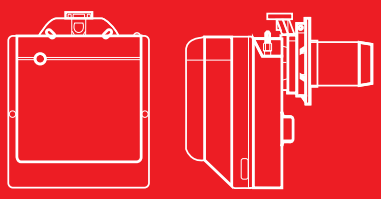
TECHNICAL DATA LEAFLET

GAS

Gulliver RSF Series

One Stage Gas Burner

RS5F	160	÷	330	kW



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Energy For Life

The Riello Gulliver RS5F, is a new model of the series of one stage gas burners, developed to respond to any request for light industrial processes like bakery ovens, spray painting ovens, small steam or thermal boilers and all applications which require a reliable, user-friendly industrial product with enhanced performance and specific functions.
The Gulliver RS5F series has an output ranging from 160 to 330 kW, uses the same components designed by Riello for the Gulliver series and have the same ventilation system and overall dimensions as the previous one stage gas model.
The burners are fitted with a microprocessor-based burner safety control box which supplies indication of operation and diagnosis of fault cause.
This new burner can operate on 50 or 60 Hz and a Voltage 220 - 230 Volt (dual frequency) and it is conform to the EN 676 Standard (Forced draught gas burners) and to European Directives for EMC, Low Voltage and Machinery.
For depressurised working field see EN 746-2 Standard.
All the Gulliver RS5F burners are fired before leaving the factory.

Technical Data

MODEL			RS5F
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
FUEL/AIR DATA			
G20 gas	net calorific value	kWh/Nm³	10
	gas density	kg/Nm³	0.71
	gas delivery	Nm³/h	16 ÷ 33
G25 gas	net calorific value	kWh/Nm³	8.6
	gas density	kg/Nm³	0.78
	gas delivery	Nm³/h	18.6 ÷ 38.4
LPG gas	net calorific value	kWh/Nm³	25.8
	gas density	kg/Nm³	2.02
	gas delivery	Nm³/h	6.2 ÷ 12.8
Fan		type	Centrifugal with forward curve blades
Air temperature		max °C	40
ELECTRICAL DATA			
Electrical supply		Ph/Hz/V	1/50-60/220-230 (±10%)
Auxiliary electrical supply		Ph/Hz/V	--
Control box		type	MG569
Total electrical power		kW	0.430 (50Hz) - 0.600 (60Hz)
Auxiliary electrical power		kW	--
Protection level		IP	X0D
Fan motor	electrical power	kW	0.25
	rated current	A	2.0 (50Hz) - 2.7 (60Hz)
	start up current	A	7.8 (50Hz) - 10.8 (60Hz)
	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)
EMISSIONS			
Noise levels	sound pressure	dB (A)	70
	sound power	W	-
Gas G20	CO emission	mg/kWh	6
	NOx emission	mg/kWh	103
APPROVAL			
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.

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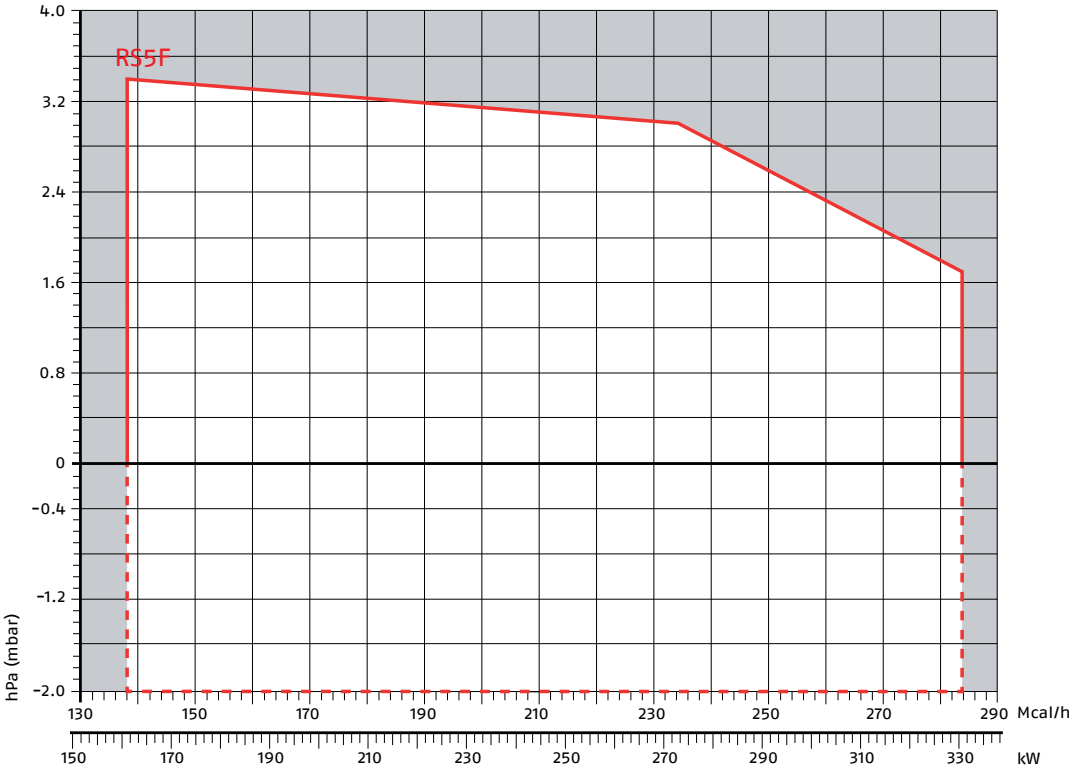
Firing Rate



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

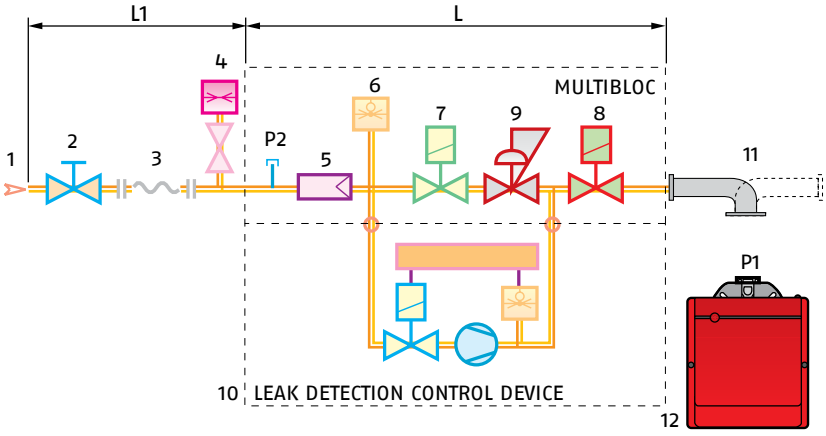
EXTENDED DESIGNATION

GAS TRAINS

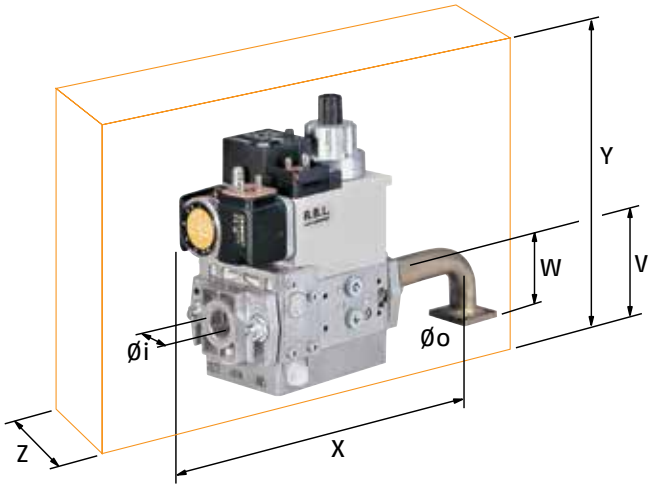
The burners are set for fuel supply from either the right or left hand sides.
Depending on the fuel output and the available pressure in the supply line, you should check the correct gas train to be adapted to the system requirements.
The gas train is Multibloc type, containing the main components in 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 responsability



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.

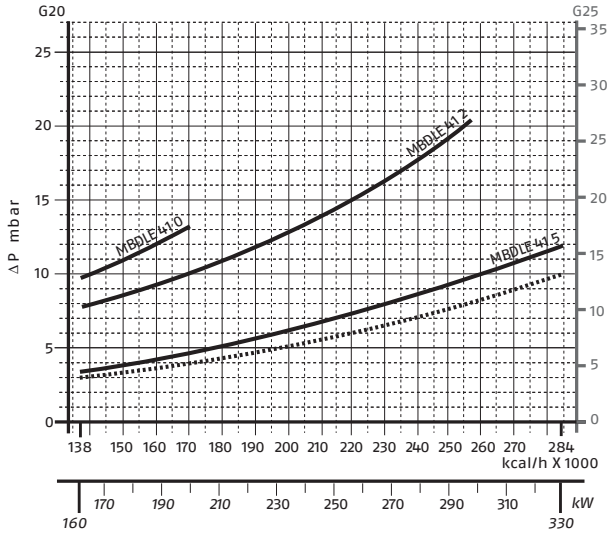
GAS TRAIN									
MODEL	CODE	Ø in	Ø out	X mm	Y mm	W mm	Z mm	V mm	mbar max*
MB 410/1	3970549	1" 1/4	FLANGE 3	259	215	47	145	55	300
MB 412/1	3970550	1" 1/4	FLANGE 3	259	215	47	145	55	300
MB 415/1	3970558	1" 1/4	FLANGE 3	330	250	47	100	80	300

* max inlet gas pressure (mbar)

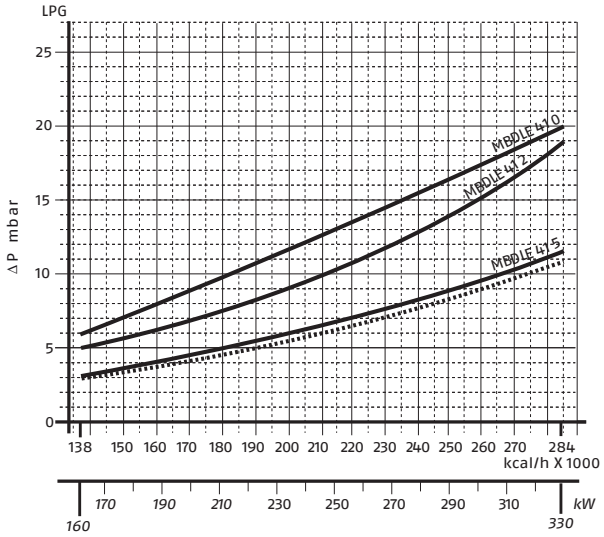
Pressure Drop Diagram

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.

RS5F (NATURAL GAS)



RS5F (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 botton scale below (mbar).

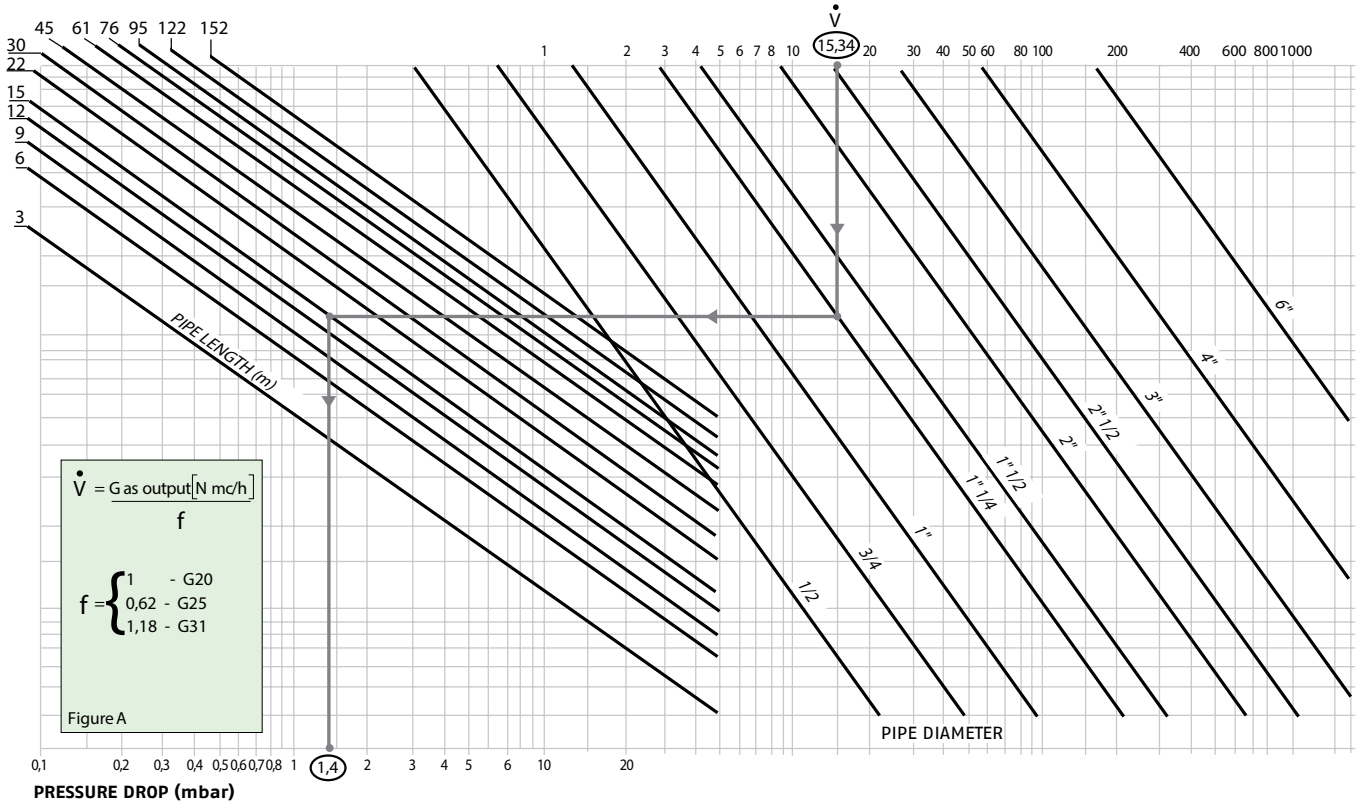
By subtracting this value from the pressure measured on the gas meter, the correct pressure value will be found for the choice of gas train.

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

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

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

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



Ventilation

The ventilation circuit ensures low noise level with high performance of pressure and air delivery, inspite of their compact size.
The burner is fitted with an adjustable air pressure switch, conforming to EN 676 standards.

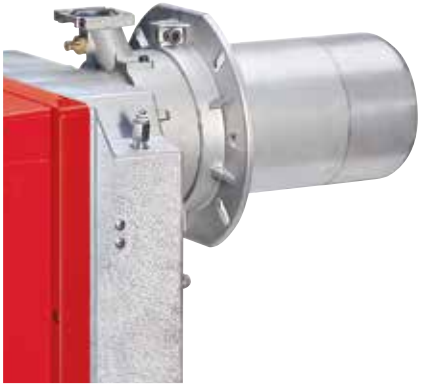
Air suction

Air pressure switch

Combustion Head

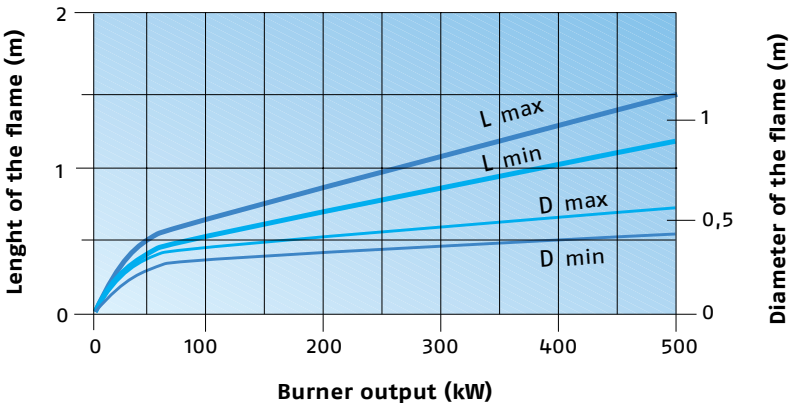
The combustion head in Gulliver RS burners is the result of an innovative design, which allows combustion with low polluting emissions, while being easy to adapt to all the various types of boilers and combustion chambers.
Thanks to the use of a mobile coupling flange, the penetration of the head into the combustion chamber can be adjusted.
Simple adjustment allows the internal geometry of the combustion head to be adapted to the burner output.

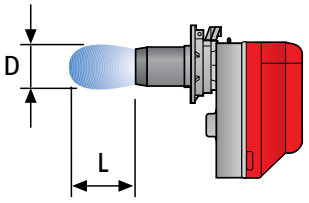
Combustion head



Mobile flange

DIMENSIONS OF THE FLAME



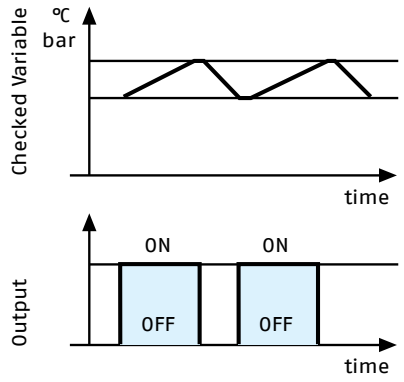


Example:
Burner thermal output = 350 kW;
L flame (m) = 1.2 m (medium value);
D flame (m) = 0.6 m (medium value)

Operation

BURNER OPERATION MODE

All these models are one stage operation.



One stage operation

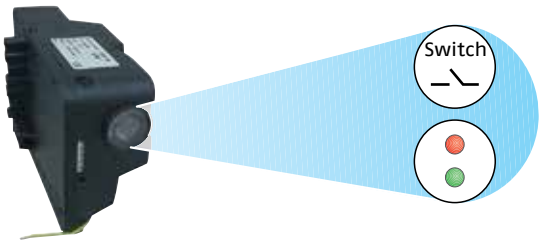
Air damper adjustment

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.

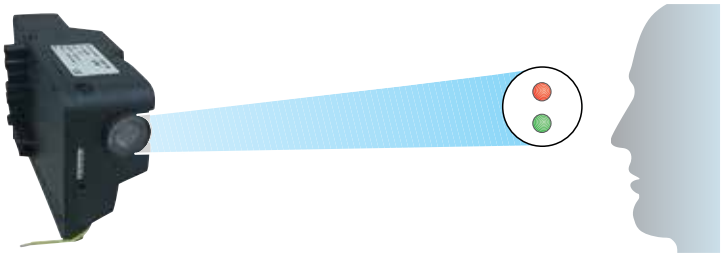
The multi-color LED is the central indication element for visual diagnosis and interface diagnosis.

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

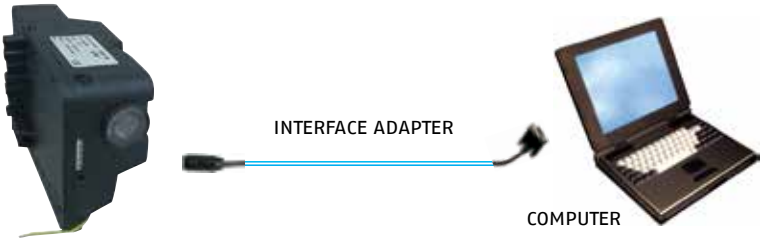


There are two diagnostic choices, for indication of operation and diagnosis of fault cause:

- visual diagnosis:



- interface diagnosis:



By the interface adapter and a PC with dedicated software.

Indication of operation
In normal operation, the various statues 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 statues	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

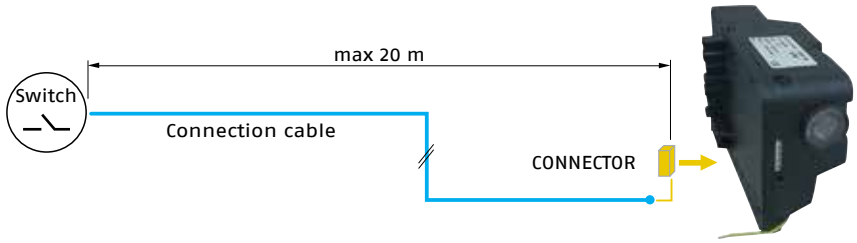
Blink code	Possible cause of fault
2 blinks	No flame at the end of safety time: - faulty or soiled gas valves - faulty ionisation probe - poor adjustment of burner, no gas - faulty ignition - neutral / phase exchange
3 blinks	Air pressure switch does not close or is already closed before heat demand: - 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:

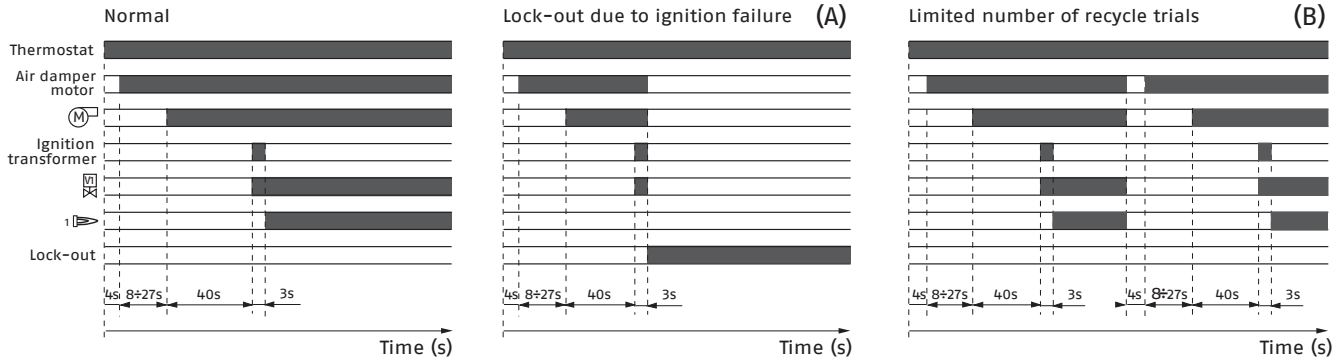
Post ignition (during safety time)
The spark ignition is present during all safety time.

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

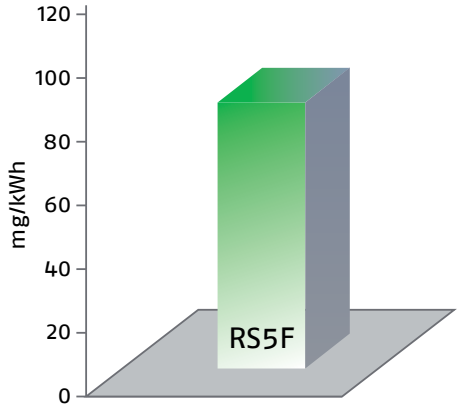
0s	Start of heat demand the burner begins the ignition cycle
0s-4s	The burner is in stand-by
4s-12/31s	The motor opens the air damper
12/31s-52/71s	Pre-purge with the air damper open
52/71s	Ignition

Lock-out due to ignition failure
If the flame does not light within the safety limit (~ 3s) the burner locks-out.

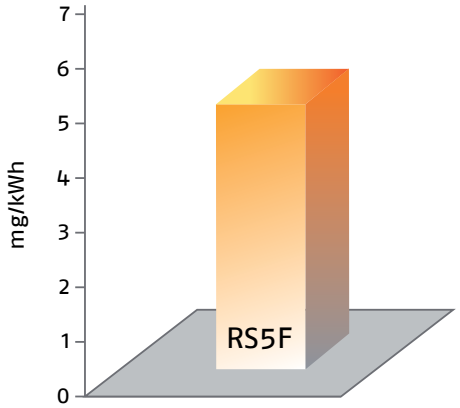
Re-cycle
The burner permits maximum three repetitions of complete ignition cycle if there is flame failure during operation.
The burner goes in safety shut-down within one second.
The final action at the last trial following at last flame failure is a lock-out.

The burners in the Gulliver RS5F series guarantee controlled combustion, reducing emissions of both CO and NOx, this combustion control is due to the recirculation of the combustion products in the chamber (thanks to different combustible air flow speeds) and to the fuel staging technique (thanks to the special geometry of the gas nozzles).

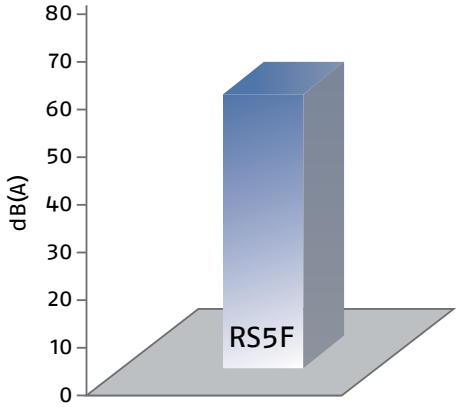
NO2 EMISSIONS



CO EMISSIONS (gas G20)



NOISE EMISSIONS

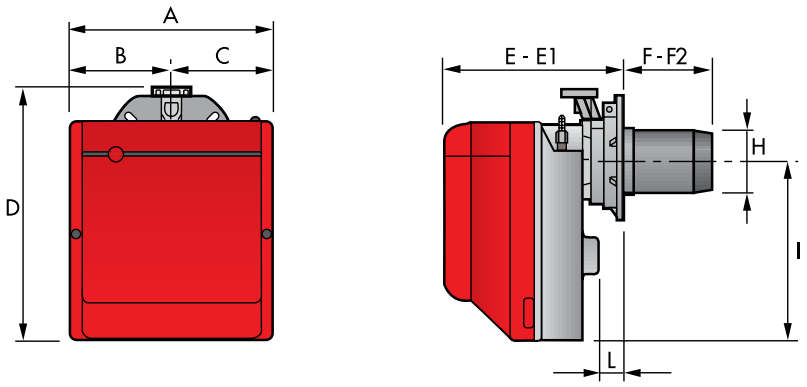


The emission data have been measured in the various models at maximum output, in conformity with EN 676 standard.

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

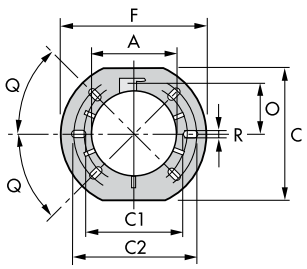
Overall Dimensions (mm)

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



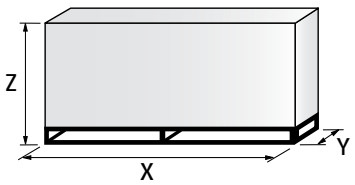
MODEL	A	B	C	D	E	E1	F	F2	H	I	L
RS5F	300	150	150	392	278	300	225	203	137	286	45

BURNER – BOILER MOUNTING FLANGE



MODEL	A	C	C1	C2	F	O	Q	R
RS5F	137	203	170	200	218	80.5	45°	11

PACKAGING

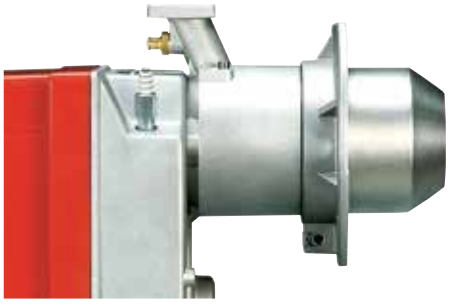


MODEL	X	Y	Z	kg
RS5F	600	345	430	18

Installation Description

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

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



BURNER SETTING

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

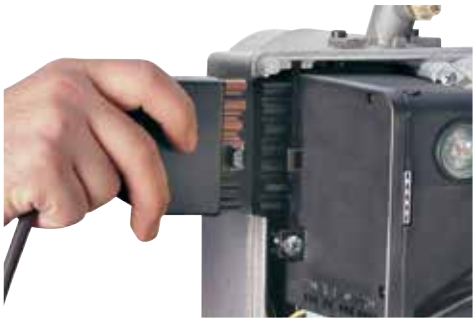
Head setting is easy and aided by a graduated scale; a test point allows reading the air pressure in the combustion head.

Gulliver RS5F 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

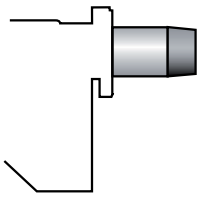
Maintenance is easily solved because the combustion head can be disassemblyed without having to remove the burner and gas train from the boiler.

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
RS5F	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
RS5F	3001011	3001011

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
RS5F	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.

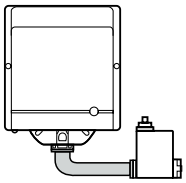
BURNER	CODE
RS5F	3002731

7-PIN PLUG KIT

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

BURNER	CODE
RS5F	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
RS5F	3001178

Gas train accessories

SEAL CONTROL KIT

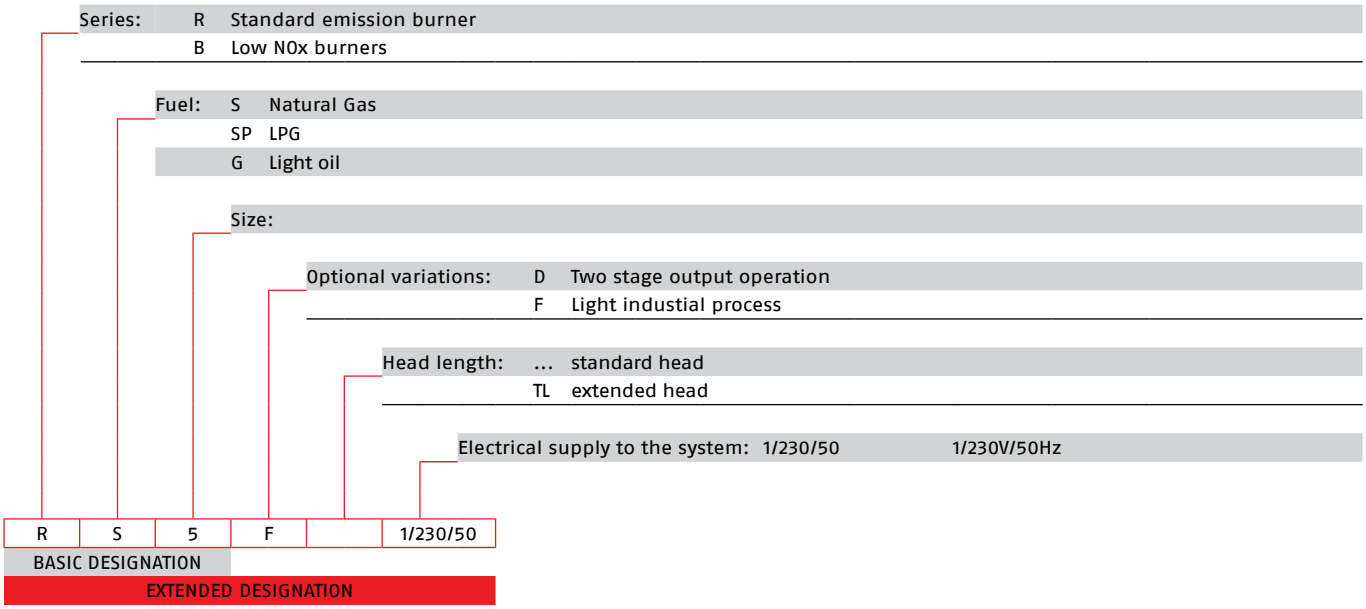
To test the valve seals on the gas train, (except for the model with Multibloc MBC 65/1) a special "seal control kit" is available.

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.



AVAILABLE BURNER MODELS

BURNER MODELS	ELECTRICAL SUPPLY	HEAT OUTPUT (kW)	HEAT OUTPUT NATURAL GAS (Nm^3/h)	TOTAL ELECTRICAL POWER (kW)	CERTIFICATION	NOTE
RS5F	1/220-230/50-60	160 - 330	16 - 33	0.43 (50 Hz) 0.60 (60 Hz)	CE-0085BM0114	(1)

Net calorific value G20: 10 kWh/Nm^3 - Density: 0,71 kg/Nm^3.
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 220-230V, 50-60Hz
- 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)
- EN 746-2 Standard (for the part of the working field that is depressurised)

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
TS0060UK02

[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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