

LOW NO_x ONE STAGE LIGHT OIL BURNERS

▶ **GULLIVER BGK SERIES**

▶ BGK0.1	22,5 ÷ 35,3	kW
▶ BGK1	17,8 ÷ 35,6	kW
▶ BGK2	32,0 ÷ 59,3	kW



The Riello Gulliver BGK series of one stage light oil burners is a complete range of Low NO_x products developed to respond to any request for home heating, conforming to the strictest standards regarding the reduction of polluting emissions.

The BGK series is available in three models with an output ranging from 17,8 to 59,3 kW, divided in two different structures.

All the models use the same components designed by Riello for the Gulliver series. The high quality level guarantees safe working. The Gulliver BGK1-2 burners are fitted with a microprocessor - based flame control panel, with diagnostic functions.

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

All the models are approved by the European EN 267 Standard and conform to European Directives for EMC, Low Voltage, Machinery and Boiler Efficiency.

All the Gulliver BGK series of burners are fired before leaving the factory.



TECHNICAL DATA

Model		▼ BGK0.1	▼ BGK1	▼ BGK2
Burner operation mode		One stage		
Modulation ratio at max. output		--		
Servomotor	run time	s		
	type	--		
Heat output	kW	22,5 - 35,3	17,8 - 35,6	32 - 59,3
	Mcal/h	19,4 - 30,4	15,3 - 30,6	27,5 - 51
	kg/h	1,9 - 2,95	1,5 - 3	2,7 - 5
Working temperature		°C min./max. 0/40		
Net calorific value		kWh/kg 11,8		
		kcal/kg 10200		
Viscosity		mm ² /s (cSt) 4 ÷ 6 (at 20°C)		
Pump	delivery	type R.B.L.		
		kg/h 30 (at 12 bar)		
Atomised pressure		bar 8 ÷ 15		
Fuel temperature		max. °C 50		
Fuel pre-heater		YES		
Fan		type centrifugal with forward curve blades		
Air temperature		max. °C 40		
Electrical supply		Ph/Hz/V 1/50/230 ±10%		
Auxiliary electrical supply		Ph/Hz/V --		
Control box		type R.B.L. 553 SE	MO 550	MO 550
Total electrical power		kW 0,220	0,250	0,270
Auxiliary electrical power		kW --		
Heaters electrical power		kW --		
Protection level		IP X0D (40)		
Pump motor electrical power		kW --		
Rated pump motor current		A --		
Pump motor start up current		A --		
Pump motor protection level		IP --		
Fan motor electrical power		kW 0,09		
Rated fan motor current		A 0,9		
Fan motor start up current		A 3,6		
Fan motor protection level		IP 20		
Ignition transformer		type incorporated in the control box		
		V1 - V2 (--) - 8 kV		
		I1 - I2 (--) - 16 mA		
Operation		intermittent (at least one stop every 24 h)		
Sound pressure		dB (A) 61	62	63
Sound power		W --		
CO emission		mg/kWh 1		
Grade of smoke indicator		N° Bacharach <1		
CxHy emission		mg/kWh <10 (after the first 20 s)		
NOx emission		mg/kWh 115	103	89
Directive		89/336/EEC, 73/23/EEC, 98/37/EEC, 92/42/EEC		
Conforming to		EN 267 - BlmSchV 1996		
Certification		CE - 0036 0329/02	CE - 0036 0232/98 BUWAL - Nr. 198014	CE - 0036 0232/98 BUWAL - Nr. 198014

Reference conditions:

Temperature: 20°C

Pressure: 1013 mbar

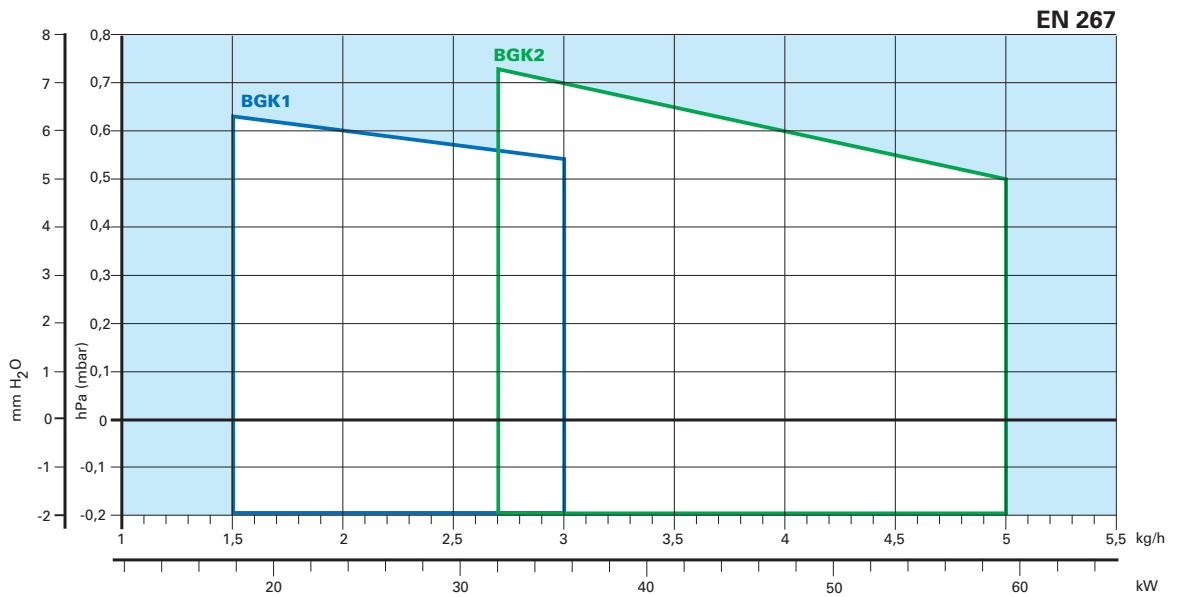
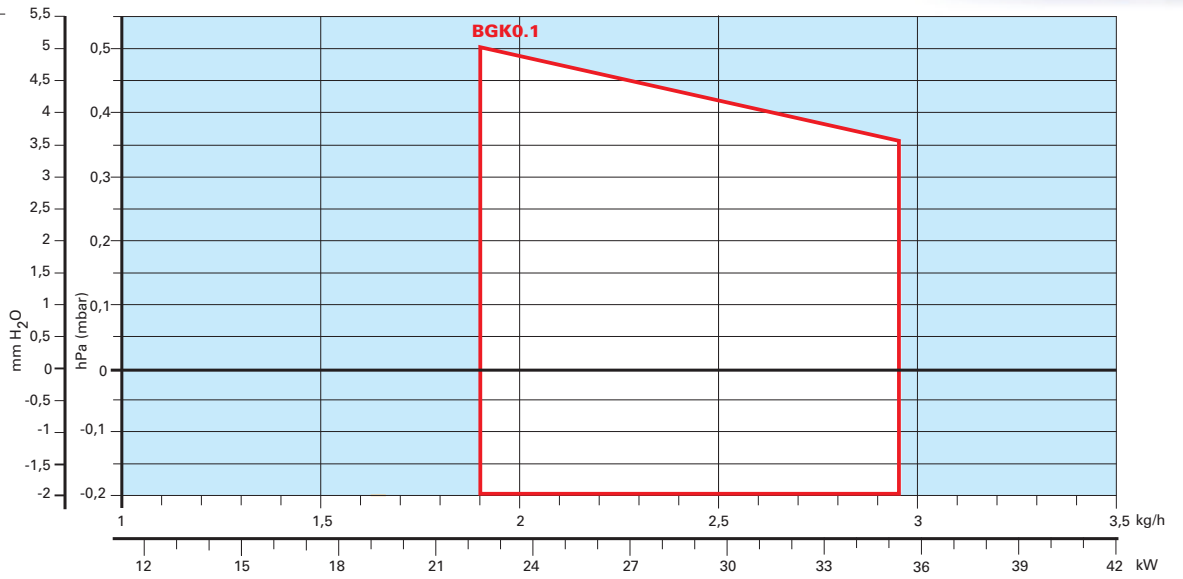
Altitude: 0 m a.s.l.

Noise measured at a distance of 1 meter.

Since the Company is constantly engaged in the production improvement, the aesthetic and dimensional features, the technical data, the equipment and the accessories can be changed.

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FIRING RATES



Useful working field for choosing the burner

Test conditions conforming to EN 267:

Temperature: 20°C
 Pressure: 1013 mbar
 Altitude: 0 m a.s.l.





FUEL SUPPLY

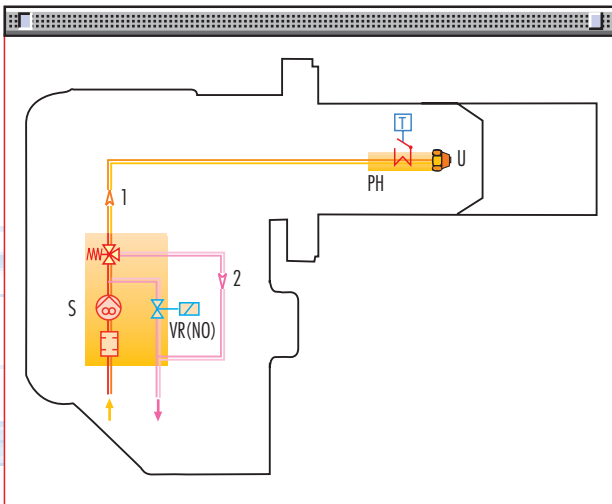
► HYDRAULIC CIRCUIT

All the burners are fitted with a Riello geared pump, with safety valve on the return circuit, and a PTC light oil pre-heater.

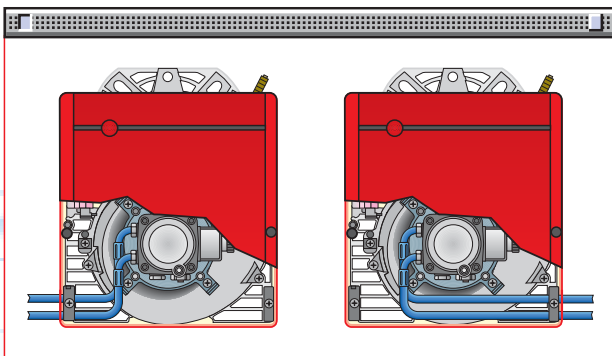


Fuel pump

BGK0.1 - BGK1 - BGK2



S	Pump with filter and pressure regulator on the delivery pipe
VR(NO)	Oil return valve normally open
1	Oil input pipe to the nozzle
2	Oil return pipe from the regulator
PH	Oil pre-heater with thermostat (where provided)
U	Nozzle (where provided)



Fuel feed to the burner can be from the right or the left side on all models.

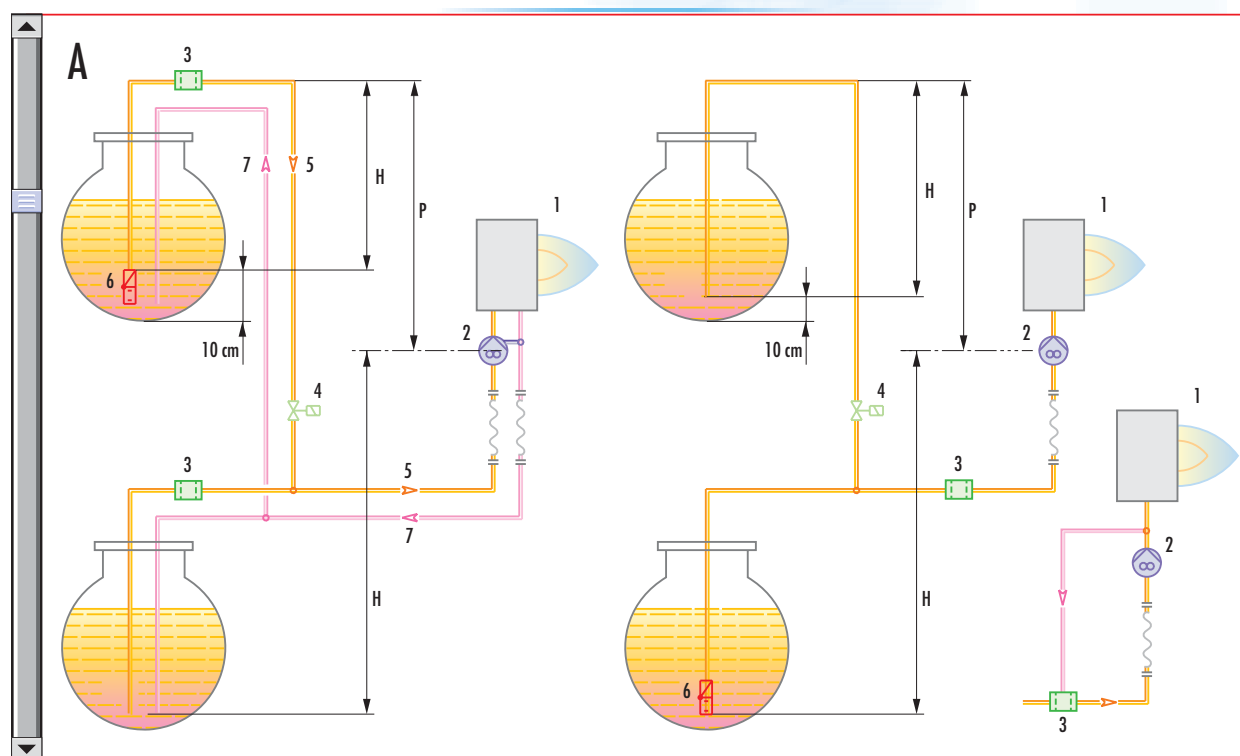


▶ SELECTING THE FUEL SUPPLY LINES

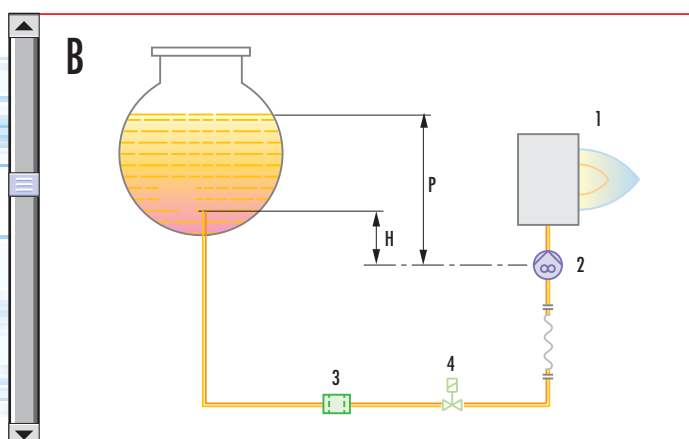
The fuel feed must be completed with the safety devices required by the local regulations in force.

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

MAXIMUM EQUIVALENT LENGTH OF THE PIPEWORK L[m]				
Pipe size	▼ Type A system		▼ Type B system	
	Ø8mm	Ø10mm	Ø8mm	Ø10mm
H(m)	L _{max} (m)	L _{max} (m)	L _{max} (m)	L _{max} (m)
0	35	100	-	-
0,5	30	100	10	20
1,0	25	100	20	40
1,5	20	90	40	80
2,0	15	70	60	100
3,0	8	30	-	-
3,5	6	20	-	-

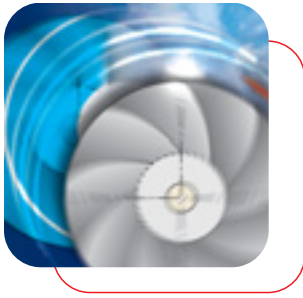


Type of system that can be installed



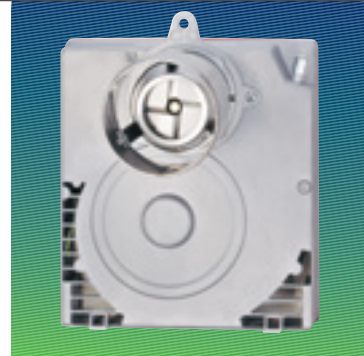
H	Difference in height
Ø	Internal pipe diameter
P	Difference in height ≤ 4 m
1	Burner
2	Pump
3	Filter
4	Shut-off solenoid valve
5	Suction pipework
6	Bottom valve
7	Return pipework



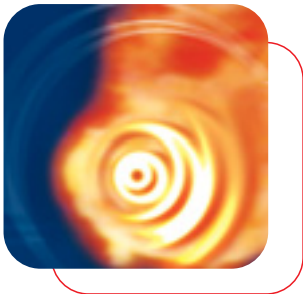


VENTILATION

The ventilation circuits always ensure low noise levels with high performance of pressure and air delivery, inspite of their compact size.



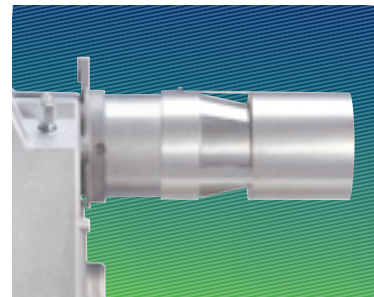
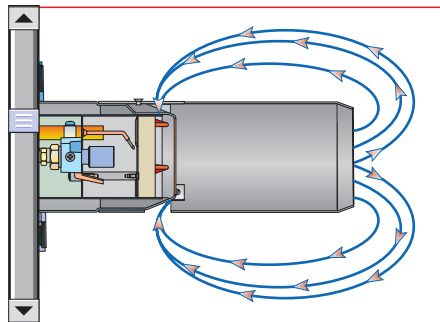
Air suction



COMBUSTION HEAD

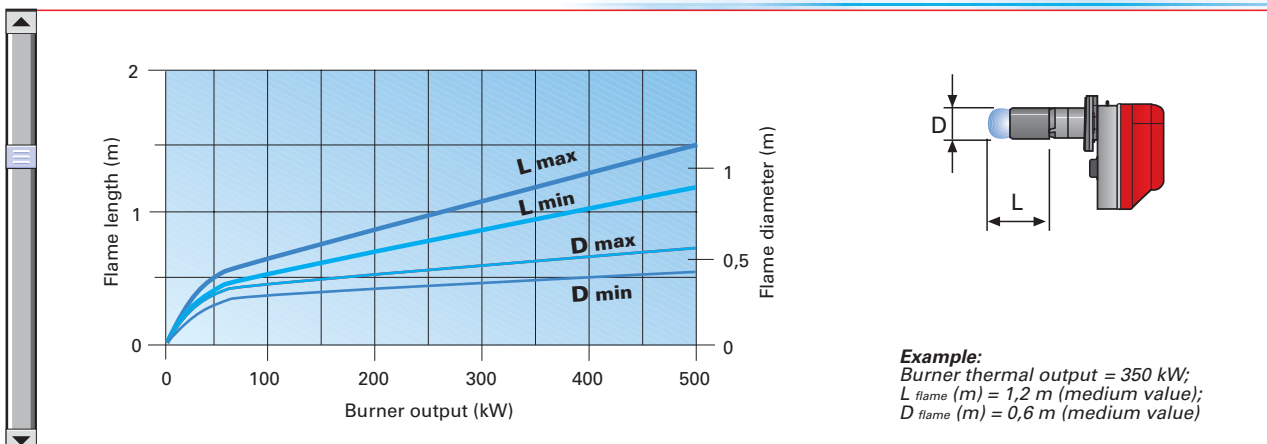
REDUCING FLAME TEMPERATURE

The configuration of the combustion head provokes internal re-circulation of the combustion substances. This re-circulation reduces the flame temperature and therefore the NOx emissions. Furthermore, re-circulation of the combustion substances speeds up evaporation of combustible droplets creating gassy type combustion, similar to gas burner blue flame.



Combustion head BGK0.1, BGK1, BGK2

Dimensions of the flame

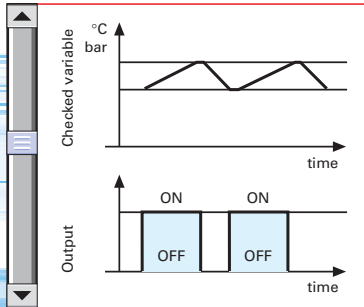


ADJUSTMENT

BURNER OPERATION MODE

All these models are one stage operation.

"One stage" operation



Air damper adjustment

The BGK 0.1 Gulliver model is fitted with the Riello model 553 SE control box and a simple photocell is used for flame detection; on request the MO 550 control box can be supplied.

The BGK1 and BGK2 Gulliver models are fitted with the new microprocessor based Riello MO 550 control box for the supervision during intermittent operation. This control box has the following features:

- Digital technology
- Visual or PC interface diagnostic functions through multi-color LED device
- Post-ignition of 3 seconds after safety time
- Adjustable post-purge
- Remote lock-out reset
- Post-combustion lock-out
- Recycling for 3 attempts if there is failure flame during operation
- Integrated ignition transformer with a 8 seconds ignition time (equal to control box safety time)
- Integrated 7-pole socket.

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

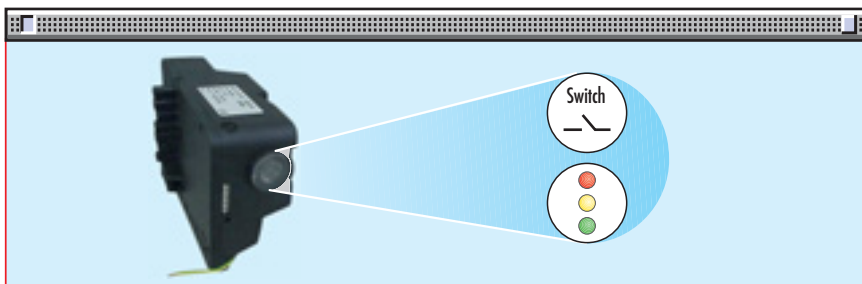


The lock-out reset button is the central **operating element** for resetting the burner control and for activating / deactivating the diagnostic functions.



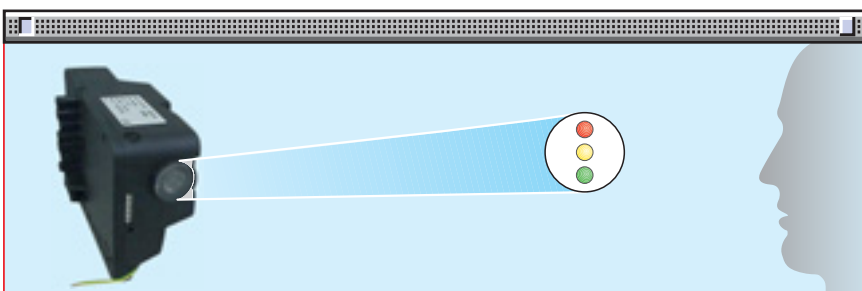
The multi-color LED is the central **indication element** for visual diagnosis and interface diagnosis.

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



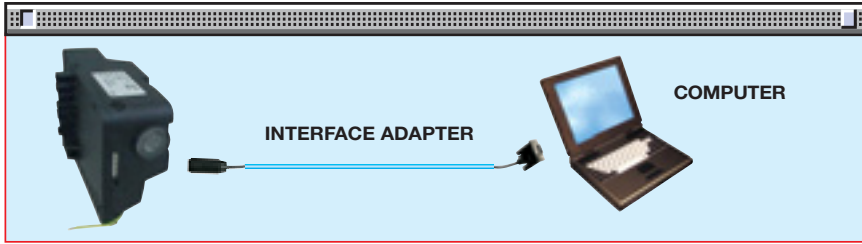
There are two diagnostic choices, for indication of operation and diagnosis of fault cause:

- visual diagnosis :





- interface diagnosis :



by the interface adapter and a PC with dedicated software.

Indication of operation:

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

Color code table		
Operation status	Color code	Flash type
Stand-by	○ Led off	
Pre-heating	● Yellow continue	
Pre-purging	● Green continue	
Ignition	● ● Green continue + Yellow flashing	Fast
Flame OK	● ● Green continue + Yellow flashing	Slow
Post-purge	● ● Green continue + Yellow continue	
Re-cycle	● ● Green continue + Yellow flashing	Medium
Lock out	● Red continue	Fast
Flame during pre-heating or stand-by	● ● Yellow flashing	Fast
Flame during post-purge	● ● Green continue + Yellow flashing	Fast
Flame during lock out	● ● Red continue + Yellow flashing	

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.

Example of flashes sequence:



Error code table	
Flash code	Possible cause of fault
2 flashes ● ●	No flame at the end of safety time : - faulty or soiled fuel valves - faulty or soiled flame detector - poor adjustment of burner, no fuel - faulty ignition
4 flashes ● ● ● ●	Extraneous light or presence of flame : - in stand-by position - with thermostat of heat demand in idle or working position - during oil-preheater - during pre-purge - during post-purge
7 flashes ● ● ● ● ● ● ●	Flame failure during running position after n° 3 attempts of re-cycle : - faulty or soiled fuel valves - faulty or soiled flame detector - soiled ignition electrodes - poor adjustment of burner, no fuel
8 flashes ● ● ● ● ● ● ● ●	Monitoring of oil-preheater : - faulty heater or oil-thermostat

The MO 550 digital control box gives some other advantages:

Post ignition

The spark ignition is present during all safety time and for supplementary time of 3 seconds.

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.

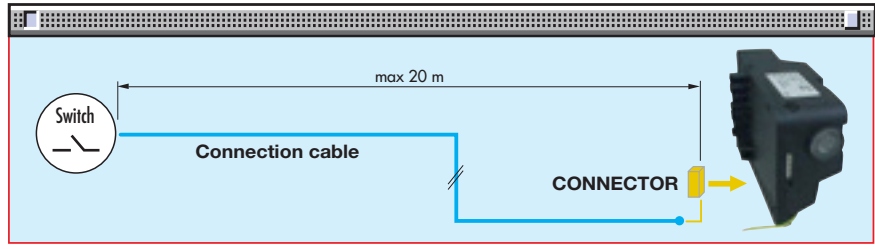
This function can be activated and set in a very easy way by pressing repeatedly the reset button; after 5 seconds the control box automatically shows the minutes set by the red LED flashing (1 pulse = post-ventilation for 1 minute).

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).



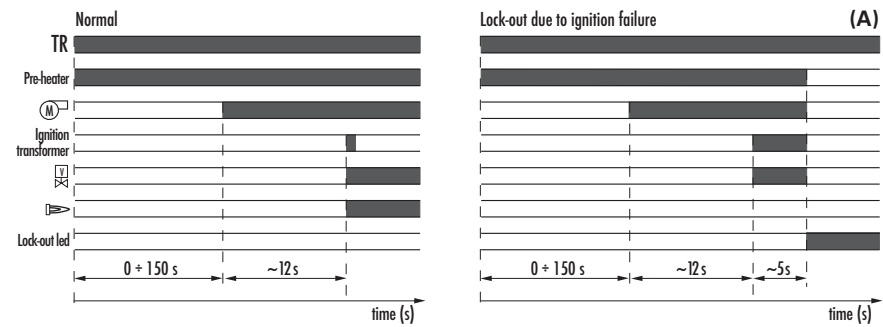
Remote lock-out reset

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

Control box RBL 553 SE



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

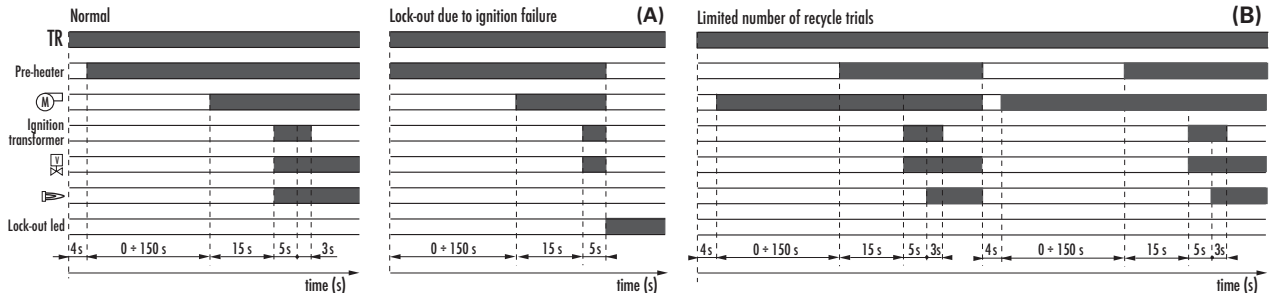
Correct operation

- 0s The burner begins the ignition cycle.
- 0s-150s Delay before pre-purge: this delay period can reach 150s, depending on the room and fuel temperatures.
- 150s-162s Pre-purge with air damper open.
- 162s Firing.

Lock-out due to ignition failure

If the flame does not light within the safety limit (~5s) the burner locks-out.

Control box MO 550



(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-154s Delay before pre-purge: this delay period can reach 150s, depending on the room and fuel temperatures
- 154s-169s Pre-purge with air damper open
- 169s-174s Ignition transformer is on during all safety time
- 174s-177s Post-ignition: ignition transformer is on for supplementary time.

Lock-out due to ignition failure

If the flame does not light within the safety limit (~5s) 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.

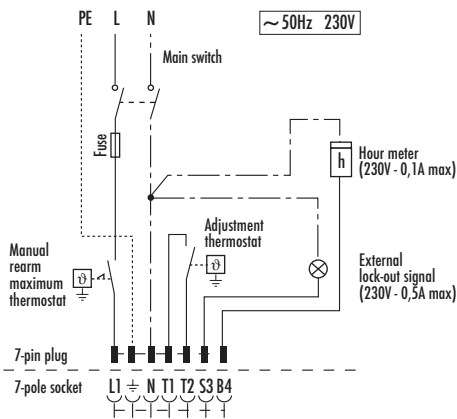


WIRING DIAGRAMS

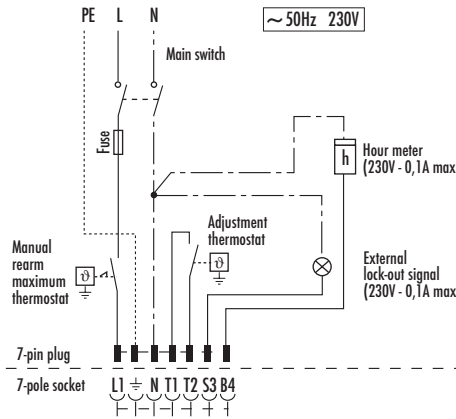
Electrical connections must be made by qualified and skilled personnel in conformity with the local regulations in force.

"ONE STAGE" OPERATION

Control box RBL 553 SE



Control box MO 550



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

Model	▼ BGK0.1 - 1 - 2
	230V
F A	6
L mm ²	1

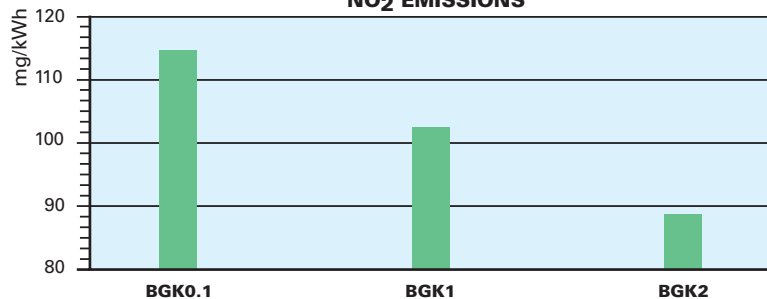
F = Fuse L = Lead section

EMISSIONS

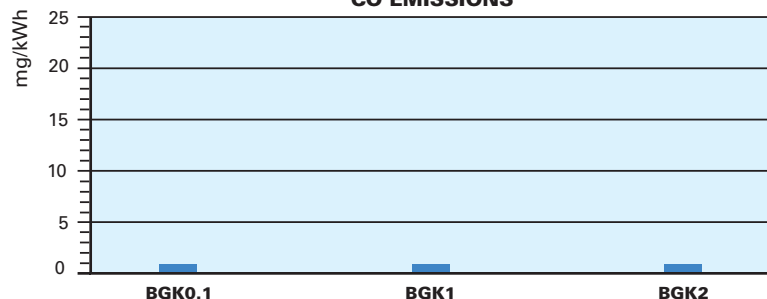
The emission data have been measured in the various models at maximum output, in conformity with EN 267 standard.

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

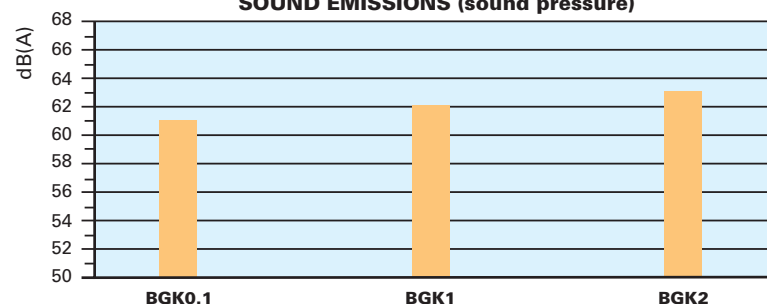
NO₂ EMISSIONS



CO EMISSIONS



SOUND EMISSIONS (sound pressure)



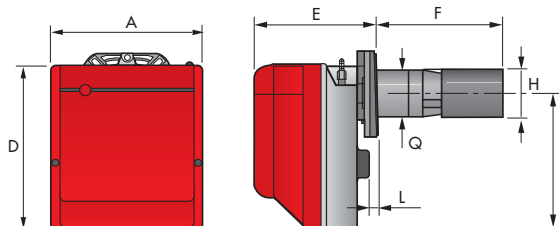
OVERALL DIMENSIONS (mm)

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

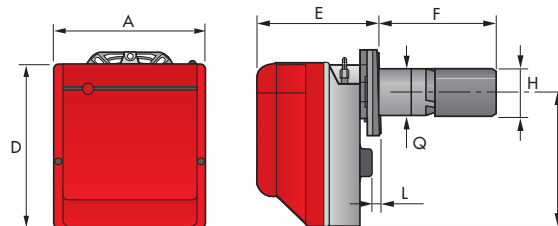


BURNER

BGK0.1



BGK1 - BGK2

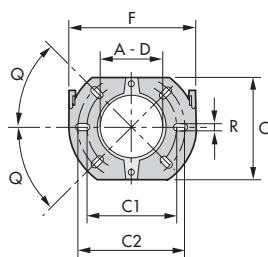


Model	A	D	E	F	H	I	L	Q
▶ BGK0.1	234	254	196	191	87	210	4	84
▶ BGK1	255	280	202	192	87	230	10	89
▶ BGK2	255	280	202	197	87	230	10	89

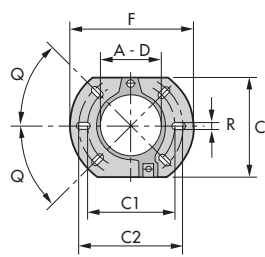
IMPORTANT: Boiler door must have a max. thickness of 70 mm for BGK0.1, 80 mm for BGK1 and 90 mm for BGK2, refractory lining included.

BURNER - BOILER MOUNTING FLANGE

BGK0.1

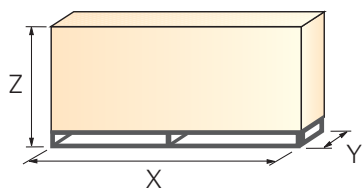


BGK1 - BGK2



Model	A	C	C1	C2	D	F	Q	R
▶ BGK0.1	91	144	130	150	91	180	45	11
▶ BGK1	106	168	140	166	106	189	45	11
▶ BGK2	106	168	140	166	106	189	45	11

PACKAGING



Model	X	Y	Z	kg
▶ BGK0.1	343	268	310	13
▶ BGK1	533	288	340	13
▶ BGK2	533	288	340	13



INSTALLATION DESCRIPTION

Skilled and qualified personnel must perform installation, start up and maintenance.

A nozzle is fitted to the burner and used for fire tests in the factory. If necessary, change the nozzle on the basis of the maximum output of the boiler.

All operations must be carried out as described in the technical handbook supplied with the burner.

▶ **BURNER SETTING**

- ▶ The air damper can be opened without removing the burner cover.
- ▶ Head setting area is easily accessible and the operation is simple thanks to a graduated scale.



▶ **MAINTENANCE AND ELECTRICAL CONNECTIONS**

- ▶ The nozzle holder can be serviced through the rear cover without detaching the burner from the boiler.
- ▶ The 7-pole socket is incorporated in the control box. The 7-pin plug is also supplied for connection to the boiler.



BURNER ACCESSORIES



Tester

The tester controls the correct working of the burner components in the Gulliver series. It can be fitted to all the light oil models, with or without pre-heater.

It is made up of two parts: a control instrument and a "control box" which replaces and simulates the one on the burner.












This tester is very simple to use: just replace the burner control box with the tester to check correct working of the motor, valve, pre-heater and flame probe (only photo-resistance).

This device has a display showing the levels that have been measured, a selection switch for selecting the component to be tested and four switches to be used in the various working stages of the burner.



Tester	
Burner	Kit code
BGK0.1 - BGK1 - BGK2	3087211



Direct testing	Measurements
 MOTOR The switch feeds the motor.	 L1-N Main voltage (230 V)
 VALVE The switch feeds electromagnetic winding of the coil. A red led signals excitation stage, and a green led signals retainer stage.	  Pre-heater current consumption
 PRE-HEATER The switch feeds the light oil pre-heater; a green led signals the thermostat cut-in.	  Secondary voltage (low voltage)
 TRANSFORMER The switch feeds the firing transformer inside the control box and excites the oil valve.	  Photo-resistance current consumption

7-pin plug kit

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

7-pin plug kit	
Burner	Kit code
All models	3000945

PC interface 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.



PC interface kit	
Burner	Kit code
BGK1 - BGK2	3002731

Light oil filter

For cleaning light oil from dirty particles and impurities filters with the following features are available:



Light oil filter		
Burner	Filtering degree (µm)	Code
All models	60	3006561

Filter made up of aluminium body and stainless steel filtering cartridge; available singularly.

Light oil filter		
Burner	Filtering degree (µm)	Code
All models	60	3075011

Filter made up of aluminium cover, plastic tank and nylon filtering cartridge; available in packaging of 50 pieces.

Light oil filter/degassing unit

To solve problems of air or water in the oil circuit a special filter/degassing unit is available, made up of aluminium cover, plastic tank, stainless steel filtering cartridge, air release cap and water purge valve. It is available singularly.



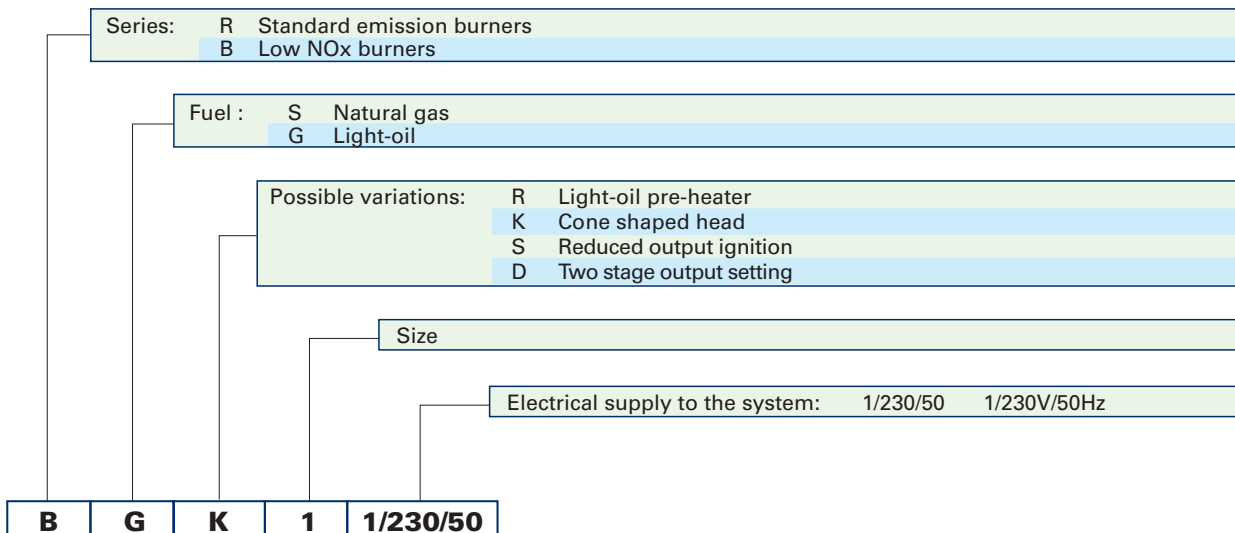
Light oil filter/degassing unit		
Burner	Filtering degree (µm)	Code
All models	100	3000926



SPECIFICATION

A special index will help you choose the right burner from the BGK models available. There is also a clear and detailed product specification and description.

DESIGNATION OF SERIES





▶ AVAILABLE BURNER MODELS

BGK0.1	1/230/50
BGK1	1/230/50
BGK2	1/230/50

▶ PRODUCT SPECIFICATION

Burner

Completely automatic monobloc light oil burners, with one stage operation fitted with:

- Fan with forward inclined blades
- Sound deadening cover
- Air damper with external adjustment, with no need to remove the cover
- Single phase electric motor 230 V, 50 Hz
- Combustion head, fitted with:
 - stainless steel end cone resistant to high temperatures
 - ignition electrodes
 - flame stability disk
- Geared pump for fuel supply, fitted with:
 - filter
 - pressure regulator
 - connectors for installing a pressure gauge and vacuumeter
 - internal by-pass for preparing for single pipe installation
- Post-ignition of 3 seconds after safety time
- Fuel feed solenoid incorporated in the pump
- Photocell for flame detection with optical fibre
- Microprocessor-based flame control panel MO 550, with diagnostic and remote control release functions
- Protection filter against radio interference (included into flame control panel)
- Light oil nozzle
- IP X0D (IP 40) electric protection level
- PTC fuel heater.

Approval to standards:

- EN 267.

Conforming to European Directives:

- 89/336/EEC (electromagnetic compatibility)
- 73/23/EEC (low voltage)
- 98/37/EEC (machinery)
- 92/42/EEC (efficiency).

Conforming to:

- BImSchV 1996.

Standard equipment:

- Flange with insulating gasket
- Screws and nuts for flange
- Recirculating pipe (for BGK0.1)
- Four screws and nuts for flange to be fixed to boiler
- Remote control release kit
- Two flexible oil pipes with nipples
- 7-pin plug kit
- Technical instructions
- Spare parts catalogue.

Available accessories to be ordered separately:

- Tester for checking the various components
- 7-pin plug kit
- PC interface kit
- Light oil filter
- Light oil filter/degassing unit.





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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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