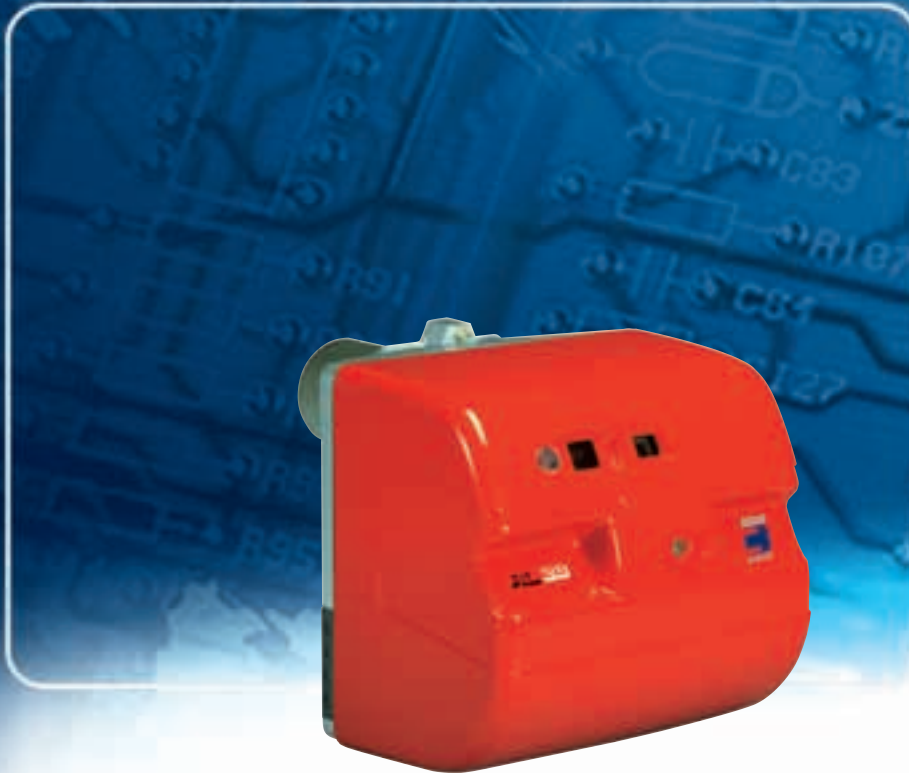


**ONE STAGE LIGHT OIL BURNERS**

▶ **RL/1 SERIES**

▶ **RL 28/1**

178 ÷ 332 kW



The RL/1 burners series covers a firing range from 178 to 332 kW, and it has been designed for use in hot or superheated water boilers, hot air or steam generators, diathermic oil boilers.

Optimisation of sound emissions is guaranteed by the use of fans with reverse curve blades and sound deadening material incorporated in the air suction circuit.

Special care has been paid to keeping overall dimensions compact and to easy servicing. The elevated fans and combustion head performance guarantees flexibility of use and excellent operation at all firing rates. A wide range of accessories guarantees elevated working flexibility.



# TECHNICAL DATA

Model		▼ RL 28/1
Bumer operation mode		One stage
Modulation ratio to max. output		--
Servo-motor	type	--
	run time	s
Heat output	kW	178 - 332
	Mcal/h	153 - 286
	Kg/h	15 - 28
Working temperature		°C min./max. 0/40
Net calorific value	kWh/kg	11,8
	kcal/kg	10.200
Viscosity at 20°C		mm <sup>2</sup> /s (cSt) 4 ÷ 6
Pump	type	AN 57 C
	output	kg/h at 12 bar 45
Atomised pressure		bar 12
Fuel temperature		Max. °C 50
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 RMO 88.53A2
Total electrical power		kW 0,37
Auxiliary electrical power		kW 0,12
Protection level		IP 44
Motor electrical power		kW 0,25
Rated motor current		A 2,1
Motor start current		A 4,8
Motor protection level		IP 54
Ignition transformer	V1 - V2	230V - 2x5 kV
	I1 - I2	1,9A - 30 mA
Working		intermittent (at least one stop every 24 h)
Sound pressure		dBA 70
Sound output		W --
CO emission		mg/kWh < 40
Grade of smoke indicator		N° Bach. < 1
CxHy emission		mg/kWh <10 (after the first 20 s.)
NOx emission		mg/kWh < 200
Directive		73/23 - 89/336 - 98/37 - 92/42 EEC
According to		EN 267
Certification		DIN 5G224/03

## Reference conditions:

Temperature: 20°C

Pressure: 1013.5 mbar

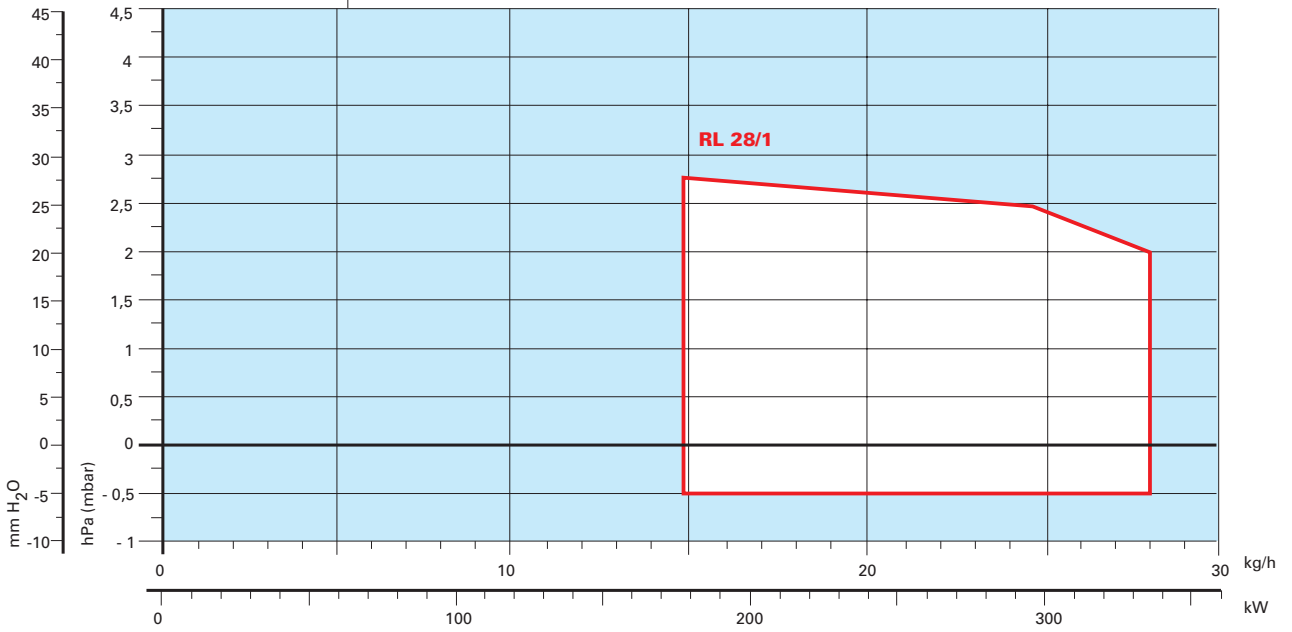
Altitude: 100 m a.s.l.

Noise measured at a distance of 1 meter.

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



Useful working field for choosing the burner

**Test conditions conforming to EN 267:**

Temperature: 20°C  
Pressure: 1013.5 mbar  
Altitude: 100 m a.s.l.



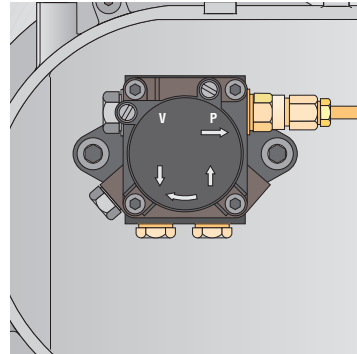
## FUEL SUPPLY



### HYDRAULIC CIRCUITS

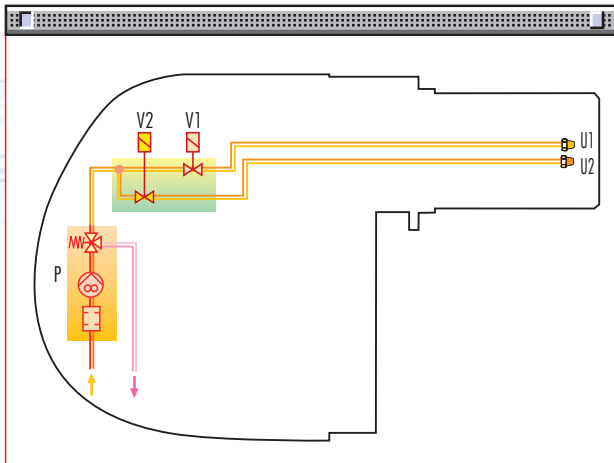
The burner is fitted with a self-priming pump and two delivery valves along the oil line from the pump to the nozzles. The pump does not need calibrating, as it is set in the factory at 12 bar; however, pressure level can be changed if necessary, by adjusting the regulator fitted on the pump. The delivery valves control the passage from start-up to operating phase.

At the start, after pre-purging phase, the first delivery valve opens and the fuel is sprayed out through the first nozzle, igniting when it comes into contact with the spark; then the second delivery valve opens and the fuel is sprayed out through both nozzles.



Example of self-priming pump of RL 28/1 burners

### Hydraulic layout of RL 28/1 burner



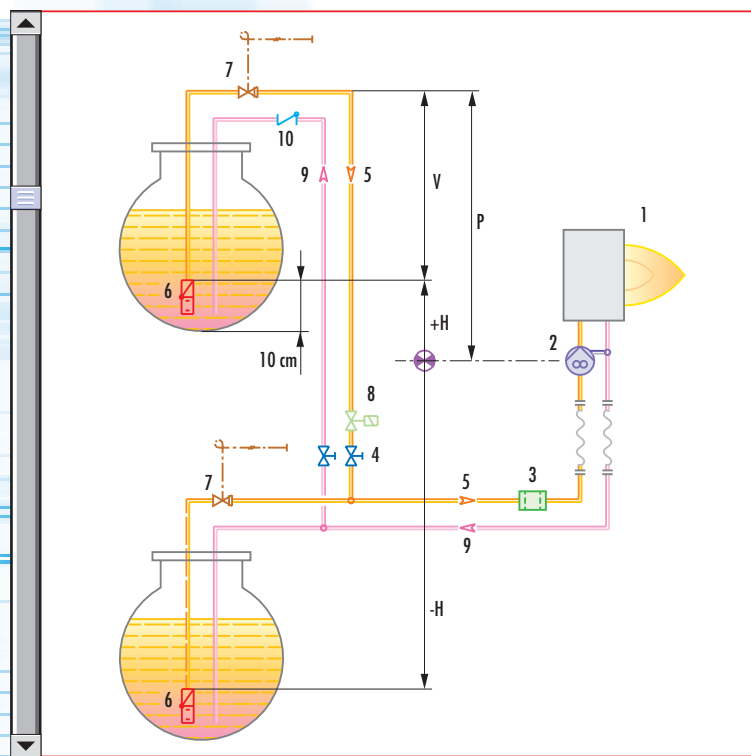
P	Pump with filter and pressure regulator
V1	1 <sup>st</sup> delivery valve
V2	2 <sup>nd</sup> delivery valve
U1	1 <sup>st</sup> nozzle
U2	2 <sup>nd</sup> nozzle

## ▶ DIMENSIONING OF THE FUEL SUPPLY LINES

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

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

MAXIMUM EQUIVALENT LENGTH FOR THE PIPING L[m]			
Model	▼ RL28/1		
Diameter piping	Ø10mm	Ø12mm	Ø14mm
+H, -H (m)	L <sub>max</sub> (m)	L <sub>max</sub> (m)	L <sub>max</sub> (m)
+4,0	63	144	150
+3,0	55	127	150
+2,0	48	111	150
+1,5	44	102	150
+1,0	40	94	150
+0,5	37	86	150
0	33	78	150
-0,5	29	70	133
-1,0	25	82	118
-1,5	21	63	103
-2,0	17	45	88
-3,0	10	29	58
-4,0	4	12	28



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

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



## VENTILATION

In spite of the compact dimensions the ventilation circuit guarantees low noise levels with high performance pressure and air delivery.

The use of reverse curve blades and sound-proofing material contribute in keeping sound emissions very low.



Example of fan air gate valve indexed selector of RL 28/1 burner



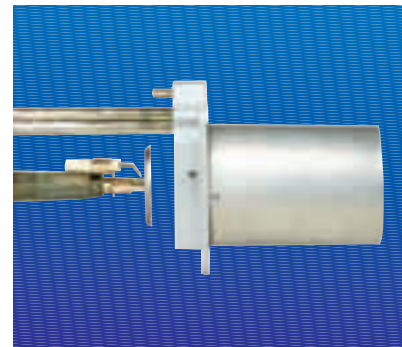
## COMBUSTION HEAD

RL/1 burners series has available different lengths of the combustion head.

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

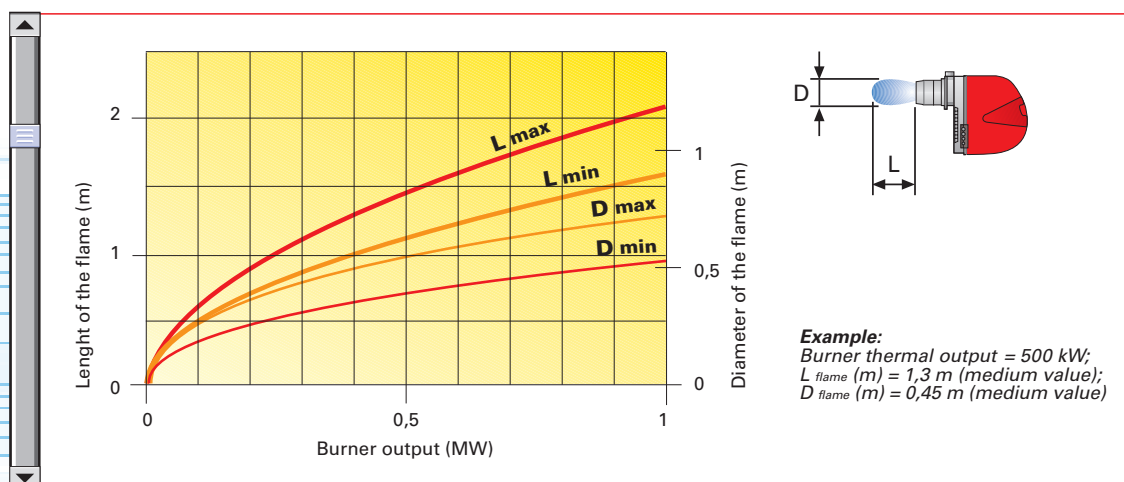
Depending on the type of generator, check that the penetration of the head into the combustion chamber is correct.

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



Example of a RL 28/1 burner combustion head

### Dimensions of the flame



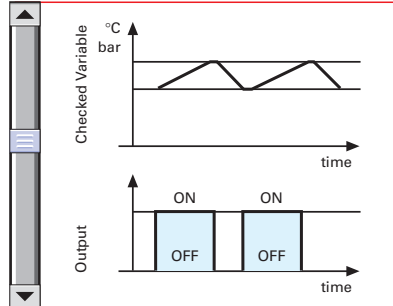
# ADJUSTMENT

## BURNER OPERATION MODE

RL/1 burner is one stage working.

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

### One stage operation



Picture A



All RL/1 burners series 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:

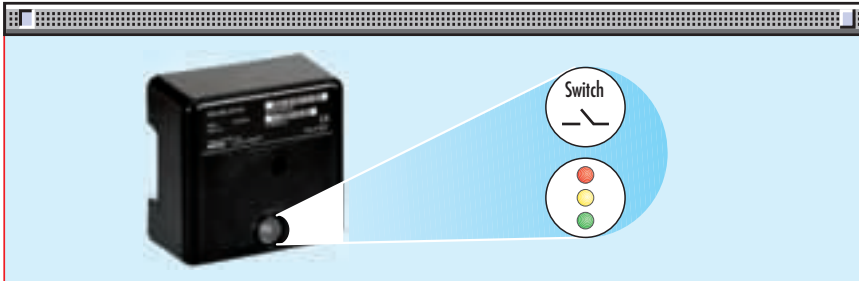


The lock-out reset button is the central **operating element** for resetting the burner control and for activating / deactivating the diagnostic functions.



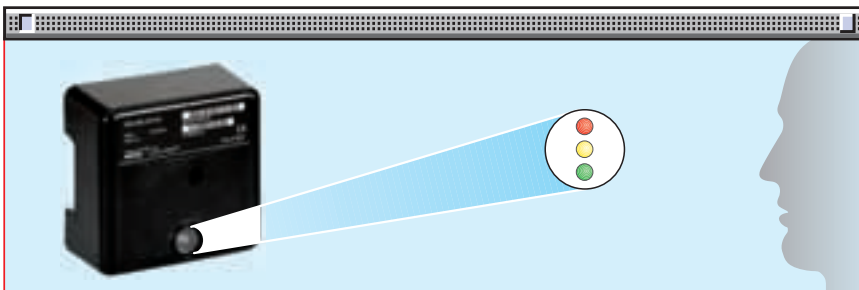
The multi-color LED is the central **indication element** for visual diagnosis and interface diagnosis.

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).





### Indication of operation :

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

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

Color code table	
Operation statuses	Color code table
Stand-by	○ ○ ○ ○ ○ ○ ○ ○
Pre-purging	☀ ☀ ☀ ☀ ☀ ☀ ☀ ☀
Ignition phase	☀ ○ ○ ○ ☀ ○ ○ ○
Flame OK	☀ ☀ ☀ ☀ ☀ ☀ ☀ ☀
Poor flame	☀ ○ ○ ☀ ○ ○ ☀ ○ ○
Undervoltage, built-in fuse	☀ ☀ ☀ ☀ ☀ ☀ ☀ ☀
Fault, alarm	☀ ☀ ☀ ☀ ☀ ☀ ☀ ☀
Extraneous light	☀ ☀ ☀ ☀ ☀ ☀ ☀ ☀

○ LED off

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

The blinkers of red LED are a signal with this sequence :

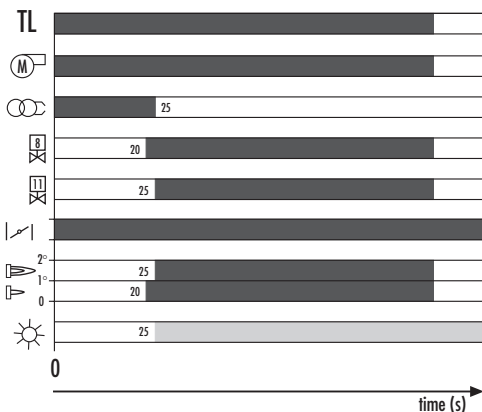
(e.g. signal with n° 3 blinks – faulty air pressure monitor)



Error code table	
Possible cause of fault	Blink code
No establishment of 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 equipment	☀ ☀
Faulty air pressure monitor	☀ ☀ ☀
Extraneous light or simulation of flame on burner start up	☀ ☀ ☀ ☀
Loss of flame during operation : - faulty or soiled fuel valves - faulty or soiled flame detector - poor adjustment of burner	☀ ☀ ☀ ☀ ☀ ☀ ☀ ☀
Wiring error or internal fault	☀ ☀ ☀ ☀ ☀ ☀ ☀ ☀ ☀ ☀

## ▶ START UP CYCLE

### RL 28/1



0"

The burner begins the firing cycle: the motor and transformer are supplied.

Pre-purging begins with the max air delivery.

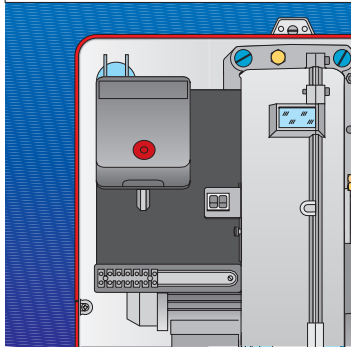
20÷28"

The 1<sup>st</sup> delivery valve opens and the fuel is ignited.

5" after firing

The ignition transformer switches off. The 2<sup>nd</sup> delivery valve opens. This is the operating flame.

## WIRING DIAGRAMS

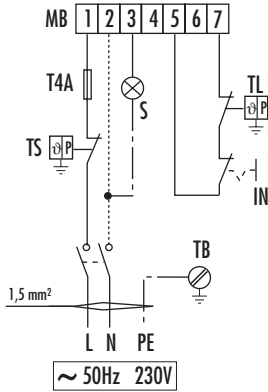


Electrical connections must be made by qualified and skilled personnel, according to the local norms.

Example of the terminal board for electrical connections and control panel on RL 28 /1



### “ONE STAGE” OPERATION

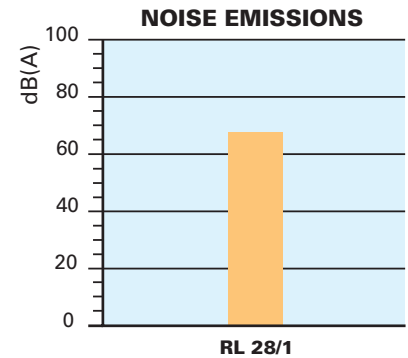
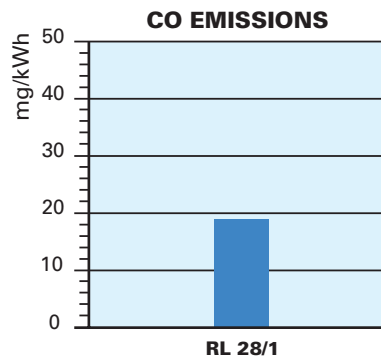
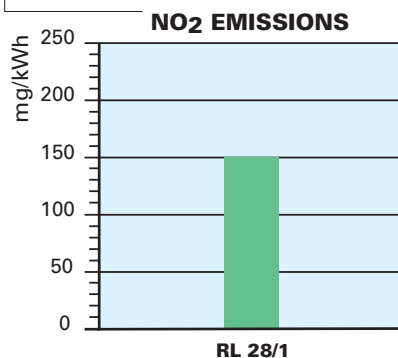


- MB** - Burner terminal board
- TS** - Safety thermostat
- S** - External lock-out signal
- IN** - Manual switch
- TL** - Threshold thermostat
- T4A** - 4A fuse
- TB** - Burner ground (earth) connection

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

Model		▼ RL 28/1
F	A	230V T4
L	mm <sup>2</sup>	1,5

## EMISSIONS



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

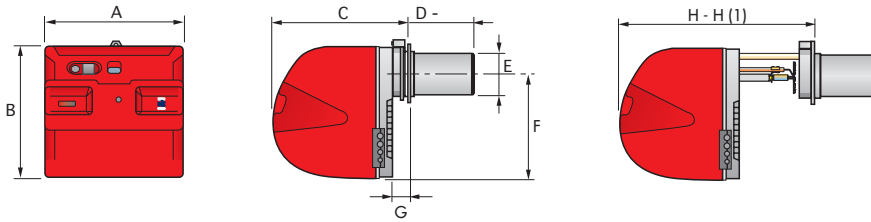




## OVERALL DIMENSIONS (mm)

### BURNERS

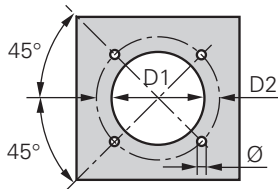
RL 28/1



Model	A	B	C	D - D (1)	E	F	G	H - H (1)
▶ RL 28/1	476	474	468	216 - 351	140	352	52	672 - 807

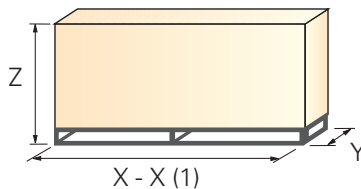
(1) dimension with extended head.

### BURNER - BOILER MOUNTING FLANGE



Model	D1	D2	Ø
▶ RL 28/1	160	224	M8

### PACKAGING



Model	X - X (1)	Y	Z	kg
▶ RL 28/1	760 - 895	540	550	35

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



### HYDRAULIC AND ELECTRICAL CONNECTIONS AND START UP

- ▶ The burners are supplied for connection to two pipes fuel supply system.
- ▶ Connect the ends of the flexible pipes to the suction and return pipework using the supplied nipples.
- ▶ Make the electrical connections to the burner following the wiring diagrams included in the instruction handbook.
- ▶ Prime the pump by turning the motor.
- ▶ On start up, check:
  - Pressure pump
  - Combustion quality, in terms of unburned substances and excess air.



## BURNER ACCESSORIES

### Return nozzles

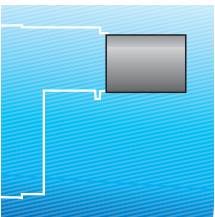
The nozzles must be ordered separately. The following table shows the features and codes on the basis of the maximum required fuel output.



Nozzles type 60°B		
GPH	Rated output [kg/h] at 12 [bar]	Nozzle code
1,5	6,3	3042107
1,75	7,3	3042110
2,0	8,4	3042126
2,5	10,5	3042140
3,0	12,6	3042158
3,5	14,7	3042162
4,0	16,7	3042172

### Extended heads

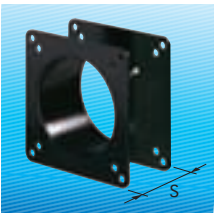
“Standard head” burners can be transformed into “extended head” versions, by using the special kit. The kit available, giving the original and the extended lengths, is listed below.



Combustion head extension kits			
Burner	'Standard' head length (mm)	'Extended' head length (mm)	Kit code
RL 28/1	216	351	3010073

### 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	Thickness S (mm)	Kit code
RL 28/1	90	3010095

### Sound proofing box

If noise emission needs reducing even further, sound-proofing box is available, as given in the following table:



Sound proofing box		
Burner	Box type	Box code
RL 28/1	C1	3000776



### Degasing unit

With single pipe systems, you can find air in the oil sucked by the pump that comes from the oil itself due to negative pressure or to a faulty seal.

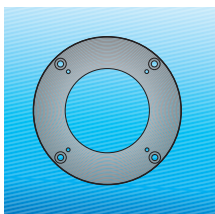
To solve this problem, we recommend fitting a degasing unit near the burner. Two versions are available with or without filter:



Degasing unit		
Burner	Filter	Kit code
RL 28/1	With filter	3010055
RL 28/1	Without filter	3010054

### Connection flange kit

A kit is available for use where the burner opening on the boiler is of excessive diameter.



Connection flange kit	
Burner	Kit code
RL 28/1	3010138

### Status Panel kit

The RL 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
RL 28/1	3010322

### 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.



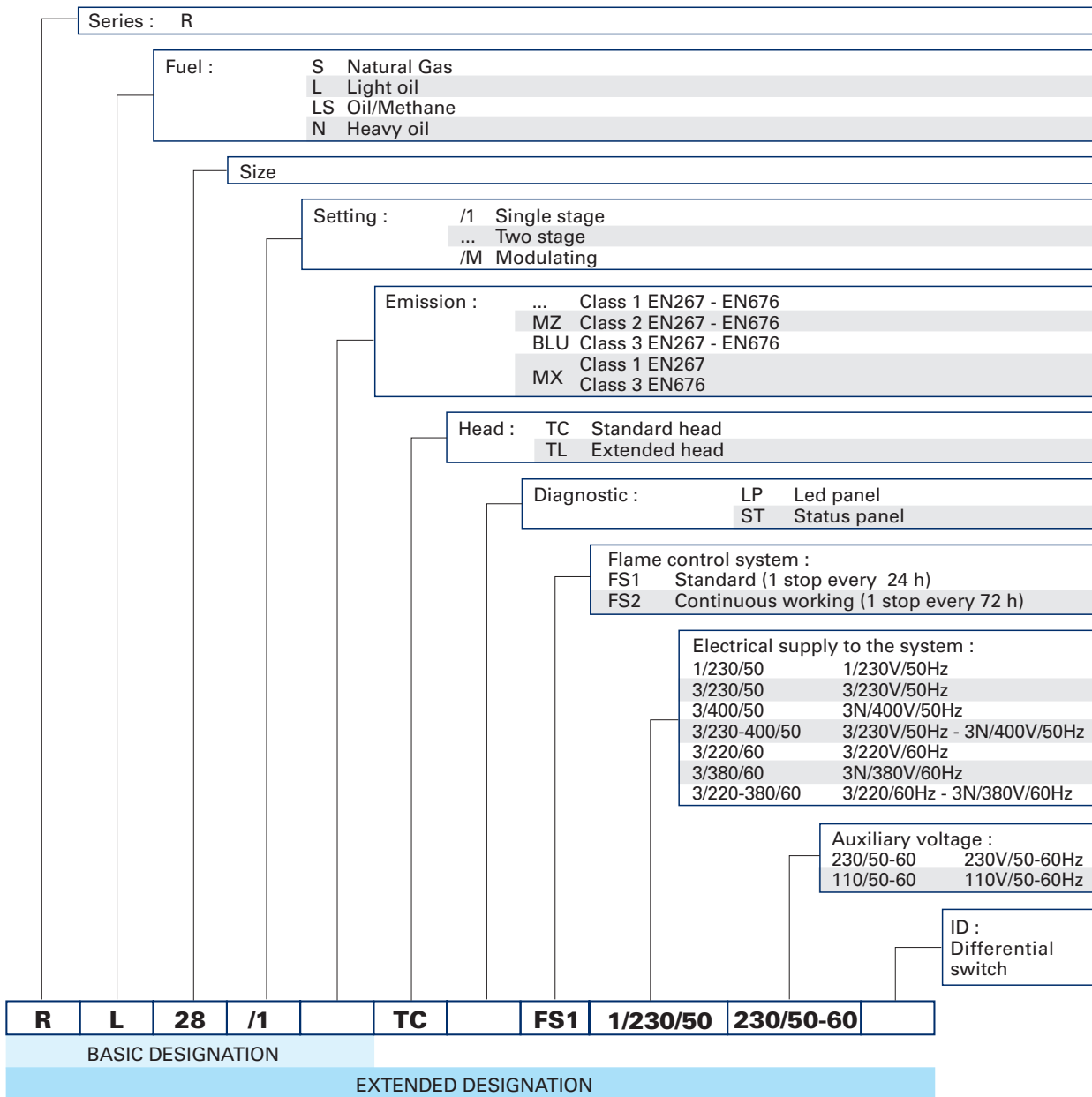
Interface adapter kit	
Burner	Kit code
RL 28/1	in progress



## SPECIFICATION

A specific index guides your choice of burner. Below is a clear and detailed specification description of the product.

### DESIGNATION OF SERIES



### LIST OF AVAILABLE MODELS

RL	28/1	TC	FS1	1/230/50	230/50-60	RL	28/1	TC	FS1	1/220-230/60	220/60
RL	28/1	TL	FS1	1/230/50	230/50-60	RL	28/1	TL	FS1	1/220-230/60	220/60

Other versions are available on request.



## ▶ PRODUCT SPECIFICATION

### **Burner:**

Monoblock forced draught oil 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 setting
- Starting motor at 2800 rpm, single-phase, 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
  - flame stability disk
- Fan pressure test point
- Gears pump for high pressure fuel supply, fitted with:
  - filter
  - pressure regulator
  - connections for installing a pressure gauge and vacuumeter
  - internal by-pass for single pipe installation
- Valve unit with a double oil delivery valve on the output circuit
- Photocell for flame detection
- Flame control panel, with lock-out pilot light and lock-out reset button
- Terminal strip for electrical connections
- Flame inspection window
- Slide bars for easier installation and maintenance
- Protection filter against radio interference
- IP 44 electric protection level.

### **According to:**

- 89/336/EEC directive (electromagnetic compatibility)
- 73/23/EEC directive (low voltage)
- 92/42/EEC directive (performance)
- 98/37/EEC directive (machinery)
- EN 267 (liquid fuel burners).

### **Standard equipment:**

- 2 flexible pipes for connection to the oil supply network
- 2 gaskets for the flexible pipes
- 2 nipples for connection to the pump
- 1 thermal screen
- 2 slide bar extensions (for model with long blast tube)
- 4 screws for fixing the burner flange to the boiler
- 2 fairleads for electrical connections
- Instruction handbook for installation, use and maintenance
- Spare parts catalogue.

### **Available accessories to be ordered separately:**

- Nozzles
- Head extension kit
- Spacer kit
- Sound-proofing box
- Degasing unit
- Interface adapter kit
- Status panel.



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