

# BURNERS OF THE NEW GENERATION E&M



## JBM-HP MONOBLOCK BURNER



- ALL TYPE OF LIQUID AND GASEOUS FUELS
- LOW POLLUTANT EMISSIONS
- LOW NOISE LEVEL
- ELECTRONIC REGULATION
- TOUCH SCREEN INCORPORATED

## E&M COMBUSTION IS INNOVATION

Since the foundation of the company, innovation has turned into one of the basic and fundamental goals of E & M Combustion. Our company tries to provide increasingly innovative equipment for the market based on three fundamental goals:

- Developing burners with more and more efficiency.
- Reducing emission of pollutants without losing energetic efficiency.
- Designing equipment in a way that they achieve qualities which are highly valued nowadays such as: decreasing the level of dB, easy access to burner elements, resistance, using new material, etc.

For achieving this goal, we think that there is no better way than the collaboration of our R+D+i department with technological centers of combustion in different countries. Thus, we work with the most efficient researchers, which allows us to exchange information and work on several investigations in such a way that the final result is achieving different options of improvement which is in other words, an extremely satisfactory and innovative product for the client.

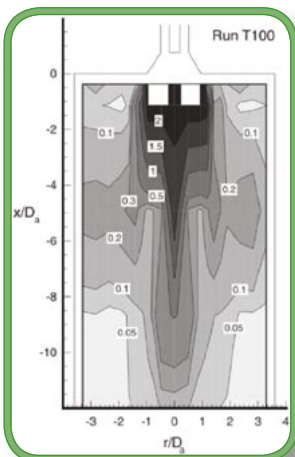
Our working implements are multiple. On the one hand, we use the most modern software for the simulation of fluids. On the other hand, our devices are fully tested in a complete group of installations such as: a semi-industrial combustor, laminated flow combustor, aerodynamic test bench, etc. Finally, our burners are tested in boilers and furnace plants in order to provide the market with a totally reliable and especially innovative product.



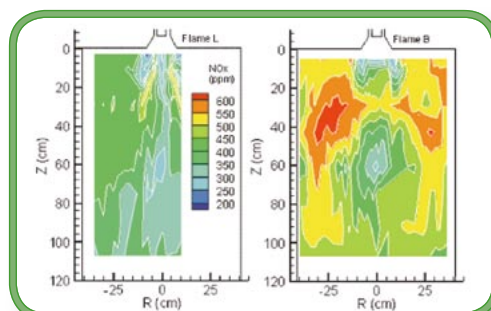
*Gas flame.*



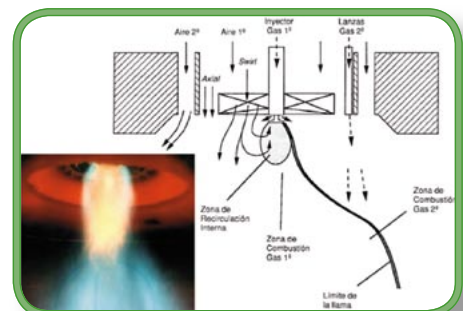
*Industrial combustor.*



*Software simulation.*

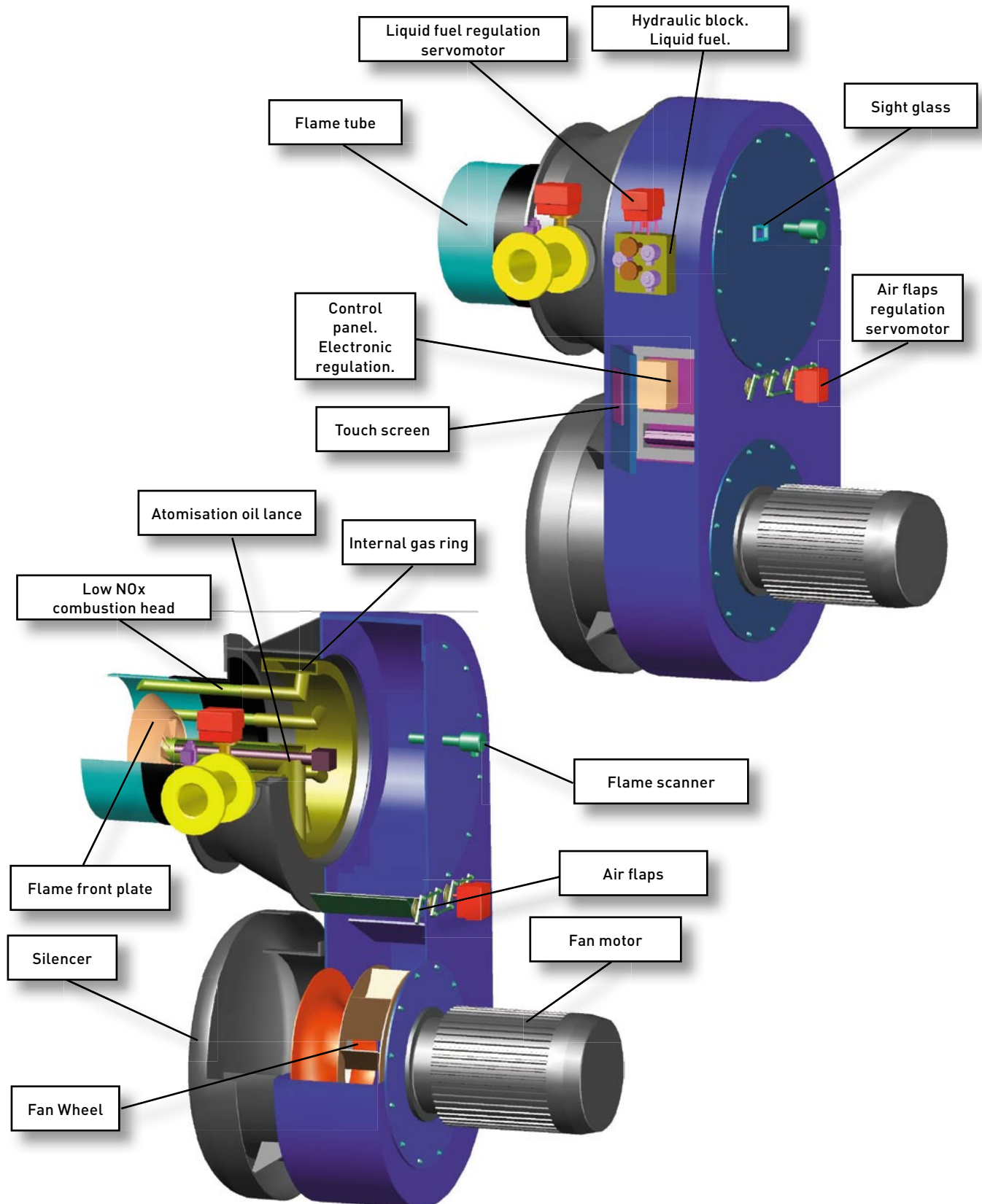


*Flame simulation.*



*Low NO<sub>x</sub> flame.*

## DESCRIPTION OF THE BURNER COMPONENTS







# INNOVATIVE COMBU

## E&M TECHNOLOGY

E&M Combustión, by means of its R+D+i department and by the collaboration of technological centers specialized in combustion technology of different countries, has developed a new range of burners of the new generation whose principal qualities are: high energetic efficiency, low emission of pollutants and a reduced level of dB.

The design, development and manufacture are based on the European regulations EN 676-EN 267, and have been produced according to very strict parameters of quality.

## INNOVATION IN DESIGN

The innovative design that our products present, plays a fundamental role in its own way, other than the appearance of the product, it also allows us to achieve qualities which have remarkably improved till now which have been obtained by conventional designs of burners.

## FAN INCORPORATED

### REDUCED NOISE EMISSION

The fan is incorporated into the burner thereby avoiding the installation of connecting pipes between the fan and the burner. This makes it easier to install the equipment.

The burner features a silencer to reduce dB (A). The silencer is pre-installed on the suction fan and allows us to achieve noise levels below the current rules. This silencer is fitted as standard and greatly simplifies the problem of noise reduction that can occur in traditional great power duobloc burners, and which requires a conventional fan installed with a silencer, making the installation expensive as a whole.

## MONOBLOCK BURNER

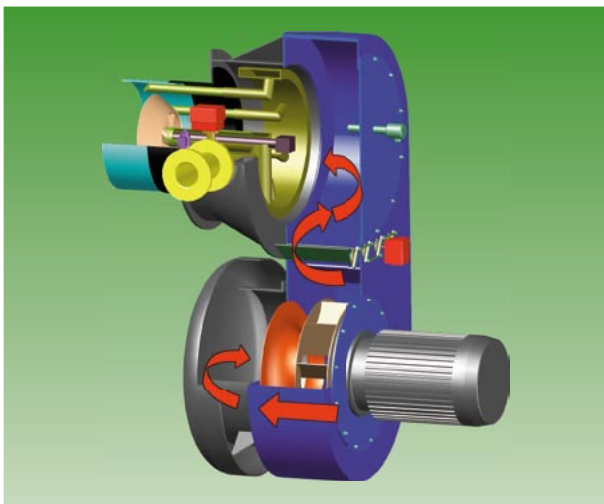
### EASY ACCESS

The burner has a monoblock design that incorporates the fan and the control panel. These burners present the following advantages in operation:

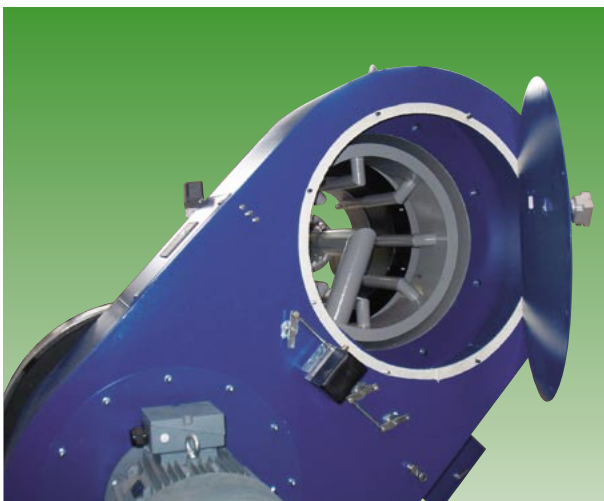
- The control panel is incorporated in the side part of the burner which includes a touchscreen (optional) to control the burner as well.
- Backdoor for an easy and convenient access to the interior of the burner, so you can easily access both to the combustion head as the air regulation flaps and fan. This will facilitate maintenance tasks to have easy access to all components.



*Innovative design of burner.*



*Noise reduction system.*



*Easy access to the different components.*

- Easy disassembly of the gas burner head, pulling out in an easy way the front plate and ignition electrodes and the oil lance in liquid fuel burners.
- Easy access to the fan wheel by disassembling 8 screws placed on the air flaps plate.
- Easy disassembly of the flame tube without needing to disassemble the burner.

## CONTROL PANEL

### ELECTRONIC REGULATION

The burner incorporates the control panel, which includes a switchboard that controls the independent actuators in order to control the air flaps, butterfly valves for gas flow and the liquid fuel's regulation valve. The operation of the burner is totally controlled by this switchboard through the incorporated touch screen (see page 11) or a display.

This electronic switchboard has a number of digital and analogue input /outputs freely configurable and programmable, which allows us to control the burner, much of the elements of a boiler room.



*Control panel incorporated.*

## TOUCH SCREEN FOR HANDLING THE ELECTRONIC REGULATION

### ONE STEP FORWARD

The burner on the electric panel incorporates a touch screen for operation of the burner (optional). Some of the advantages we bring this screen are:

- Very intuitive system for burner operation.
- Graphic representation of all elements and parameters of the burner.
- Possibility of remote control via Ethernet (normal data network).
- Possibility to control and register other elements of the boiler room (boiler levels, water pumps, metering signals, purges, etc.).
- Signs and fault memories.

The location of the touch screen in the side part of the burner allows us, at first sight, to know the status of the burner and the fault memories and when these faults have been produced. This greatly reduces the time spent on repair of failures or breakdowns.



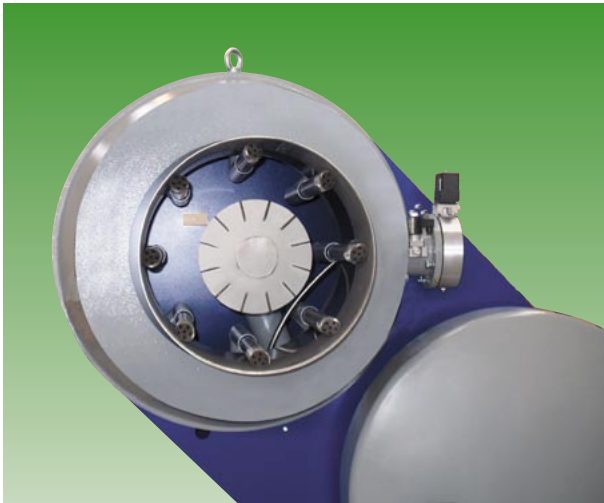
*Easy access to the different components.*

## BURNER HEAD

### REGARDING THE ENVIROMENT

The Low NOx combustion heads are designed to reduce pollutant emissions as much as possible, which is in favour of the environment and it achieves a high level of thermal efficiency. (From 91 to 94 % of the N.C.V.).

Measurements of NOx emission which are obtained by natural gas range between 80 and 100 mg/kW depending on the type of boiler.



*Low NOx gas combustion head.*

## GAS COMBUSTION HEAD

### CIS IGNITION SYSTEM

The gas combustion head is constituted by an internal gas ring which leads different lances to the outer part and in the inside, a central pipe of gas where the internal lances and the ignition system are situated.

Distribution of gas is 20% in the internal lances and 80% in the external ones, which produces the combustion in two different steps, and causes a remarkable reduction of NOx and a well -balanced flame.

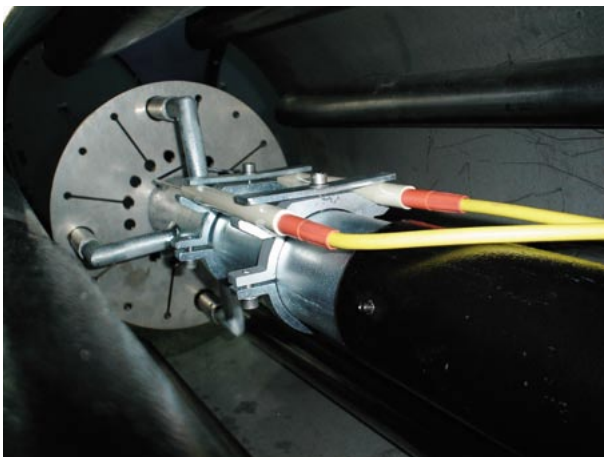
This combustion head gives access to the external lances of gas by means of the opening of the burner.

These lances are movable, allowing us to orientate them in different positions, so that we can achieve different flame dimensions. In addition to this factor, the possibility of using swirlers, also gives the burner a variety of dimensions of flames and allows it to adapt to any type of combustion chamber.

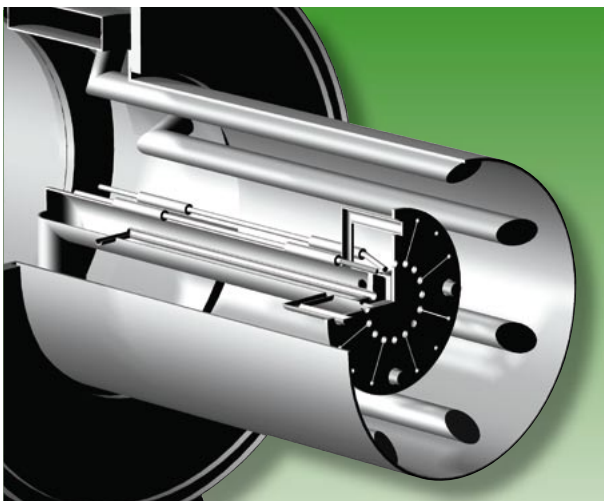
The start up or ignition in burners is performed by an innovative system called C.I.S (crown ignition system). The pilot flame is produced right behind the front plate creating a crown shape and in a way uniformed around it. This system presents the following advantages in regards of conventionals:

- Reduction in different pressure variations.
- Reduction in fluctuations of flames.
- Softness and stability in the start up.

All components of the head are made of best quality refractory steel which hereby guarantees its lifetime.



*C.I.S. ignition system.*



*Low NOx gas combustion head.*



## HYDRAULIC BLOCK

### SIMPLICITY

Up to 14.500 model, a hydraulic block is used for the control and regulation of the combustible liquid. This equipment, designed by E&M Combustion engineers, allows the whole combustible regulation system to be used in an aluminium block. The advantages of traditional regulation systems are as follows:

- Reducing space in regulation and control system.
- Eliminating possible leakage produced when the combustible liquid runs through the pipe connectors.
- Immediate visualisation of regulation parameters (pressure of inlet and outlet, position of the regulation actuator of the combustible liquid's flow,...).
- Ability of changing magnetic valves easily (they are threaded to the block)
- Connected to the pump by two flexible pipes.



*Hydraulic block.*

## COMBUSTION HEAD

### ATOMISATION SYSTEMS

The JBM-HP burners are suitable for the combustion of any type of liquid fuel. This can be performed by high-pressure mechanical atomisation or instead, by means of steam atomisation.

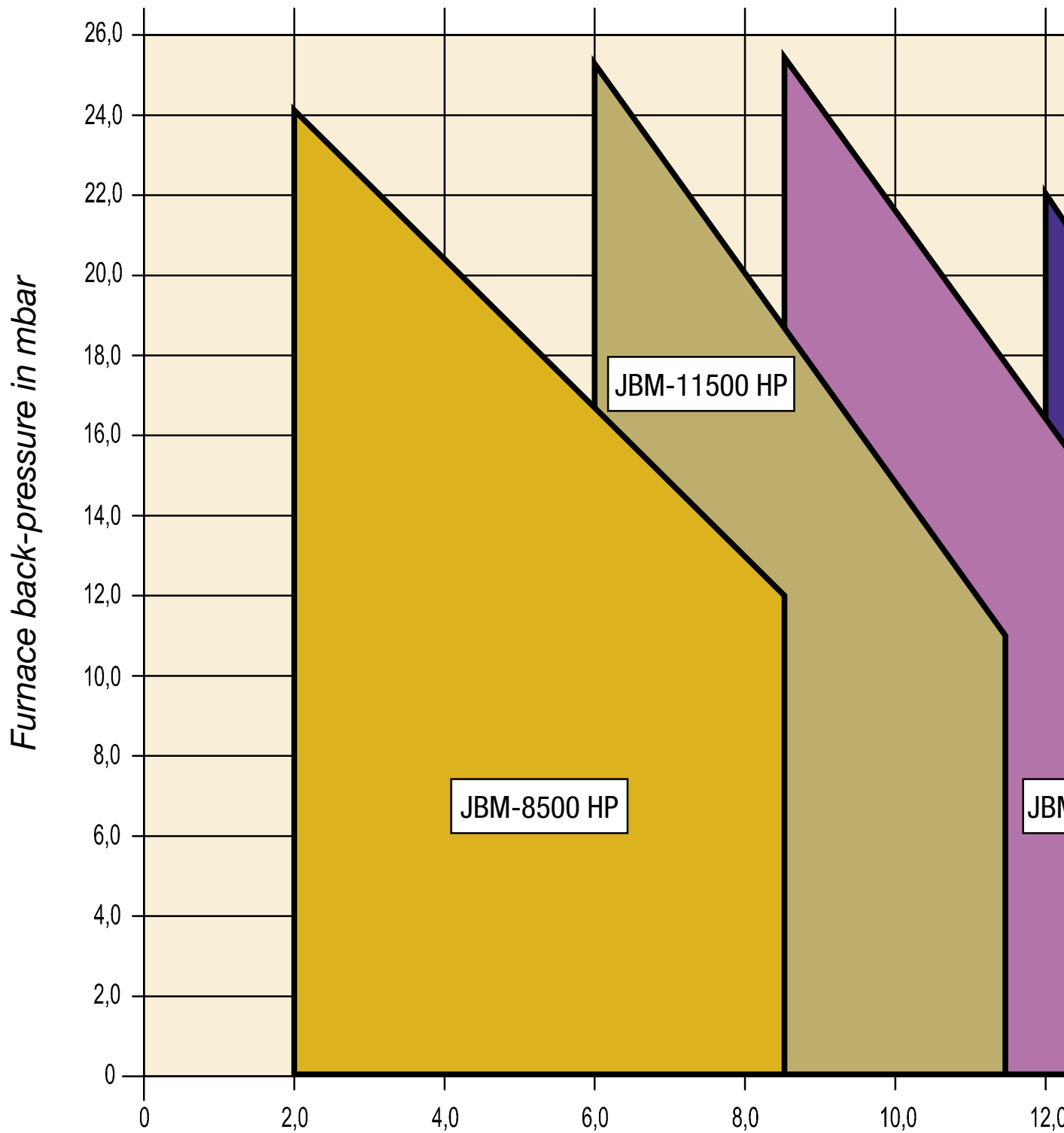
This last system is highly recommendable for large consumptions and for fuels with high viscosity levels, given that it offers the following advantages.

- Discharge of any possible waste that is deposited in the oil lances thanks to the steam action, therefore reducing maintenance work.
- Wide modulation range up to 1÷10.
- Easy control of the shapes and sizes of the flame.
- Much cleaner combustion, increasing the average lifetime of the boiler.



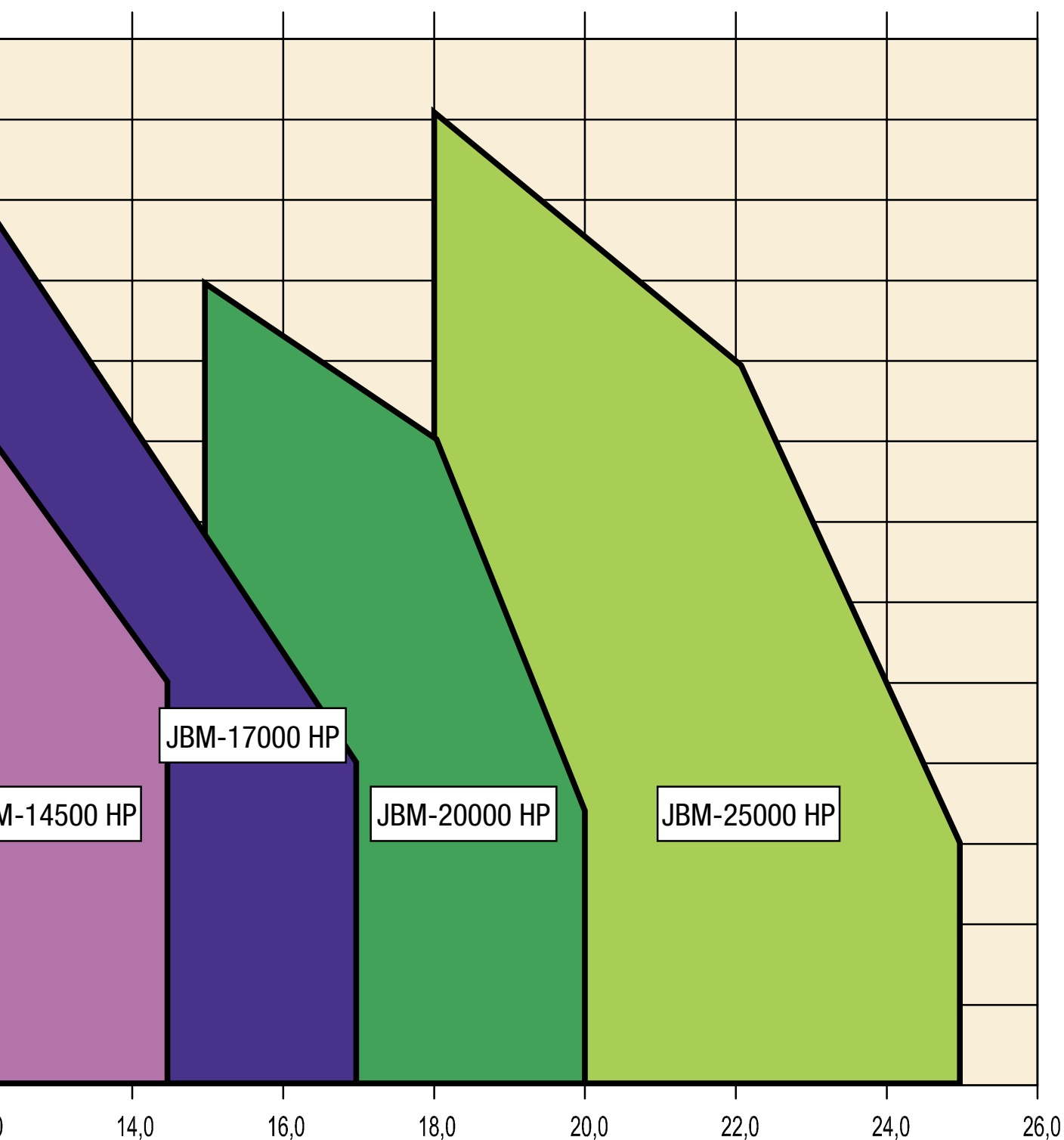
*Steam oil lance.*

## BURNER POWER CURVES





# COMBUSTION SOLUTIONS



*Burner capacity in MW*

## ELECTRONIC REGULATION

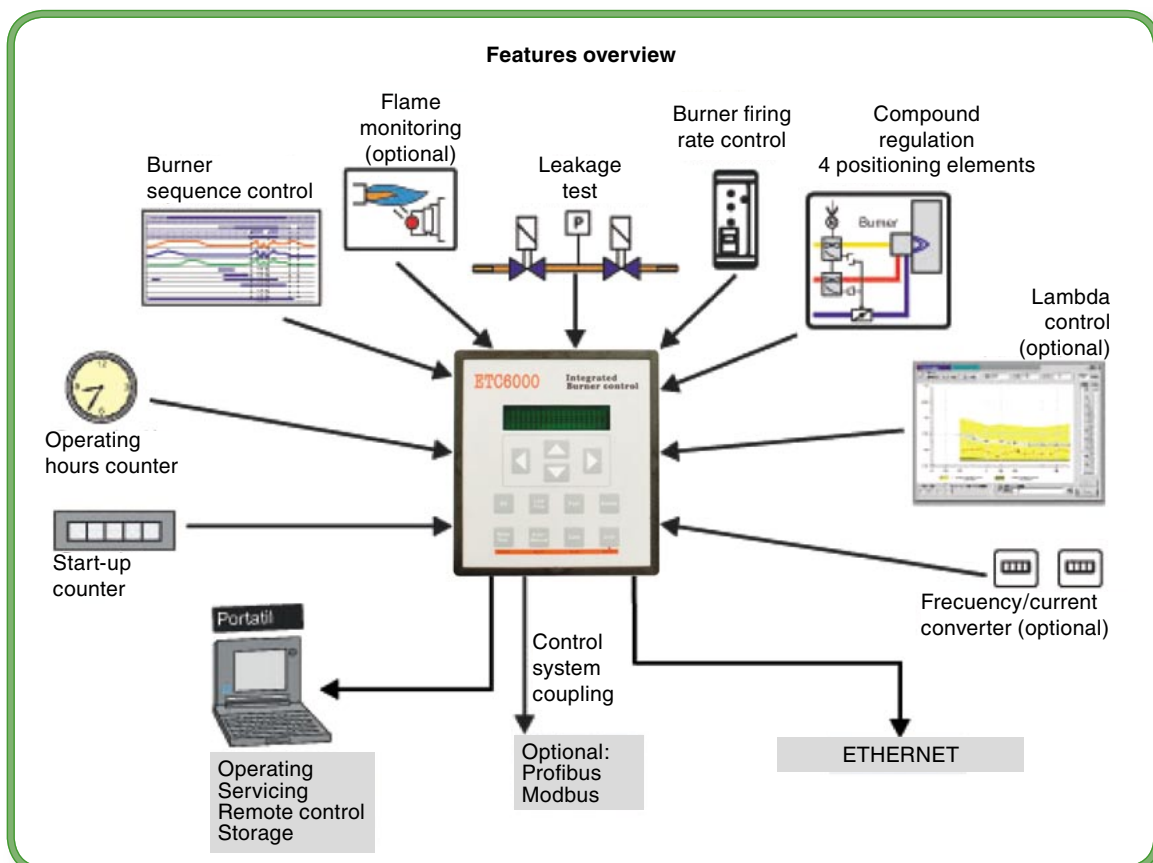
### ADVANTAGES IN ACCESSIBILITY

Burners manufactured by E&M combustion incorporate electronic regulation switchboards in order to have precise control on the fuel- air ratio. This electronic regulation system presents advantages in traditional regulation systems based on mechanical systems, such as:

- All control and regulation functions of the burner are integrated in one single device, including sequences of ignition, security controls, P.I.D. regulation, leakage test and flame detection system.
- It remarkably increases the precision of the regulation ,avoiding mechanical hysteresis produced in rods and cams of the traditional regulation .This is operated by the transmission of electrical pulses to individual actuators.
- They can control up to 10 channels.
- It incorporates a visualisation display of information or a touchscreen that can quickly show the state of the burner as well as fault memories and hours of operation.
- Presents an external connection to P.C. or to P.L.C. bus system.
- Reduces time of commissioning due to pre-regulations in the factory.

### ADVANTAGES FOR SAVING ENERGY

One of the great advantages of electronic switchboards is the possibility of using frequency converters and oxygen probes as elements that save energy. These connections are optional, but reduce energy expenses, as for the ones related to the consumption of the motor as well as ones for combustion efficiency.



## TOUCH SCREEN

### ONE STEP FORWARD IN THE REGULATION

The burner incorporates a 10.4" touch screen in the electric control panel for the control of the equipment. This touch screen controls the electronic switchboard and, therefore, the burner, but it also presents some advantages.

- It is an intuitive control system, unlike traditional control consoles.
- Allows graphical representation of the different elements of the burner and generator and the visualization of the different parameters of regulation and control of both.
- Allows remote control from a P.C. via Ethernet. You can connect remotely from the computer by using the Explorer via an IP address.
- Incorporates a slot for an MMC card which allows local software downloads and data logging.
- Real-time data logging with graphical representation.
- Four changeover relays for interfacing to third-party systems.
- Ability to control up to 10 servos through CANbus.
- 10 configurable digital inputs.
- 6 ÷ 8 configurable digital outputs.
- 4 ÷ 6 configurable 4 ÷ 20 mA analogue inputs.
- 3 configurable 4 ÷ 20 mA analogue outputs.
- It can be performed with the incorporated software various programming and control loops to control other devices in the plant from the generator, fuel lines or other elements. It allows traditional P.L.C. functions.



## DENOMINATION OF THE BURNER

**JBM-HP**

Burner's system:  
industrial monoblock  
burner

**20.000**

Burner's power

**G**

Fuel:  
G-Natural Gas  
LO-light-oil  
FO-heavy-oil  
GLO-N.G./light-oil  
GFO-N.G./heavy-oil

**LT ##**

Length of flame tube



## O<sub>2</sub>-CONTINUOUS MEASUREMENT

### A CHALLENGE FOR SAVING

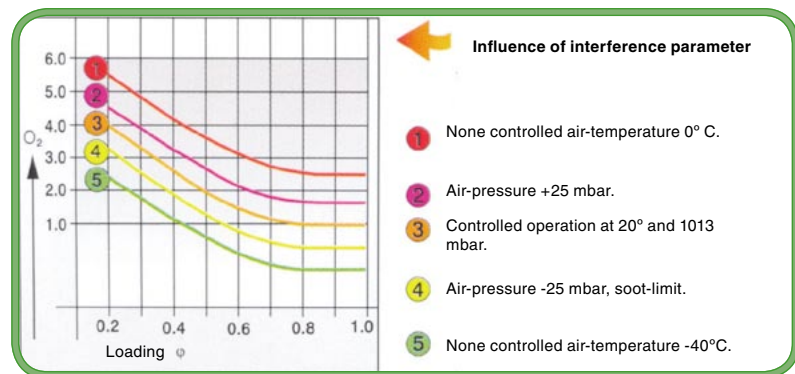
Today, mainly O<sub>2</sub> regulations based on zirconium dioxide oxygen probes, known as Lambda probes, are used for monitoring and optimisation of furnace plants. They offer the following advantages.

- Direct measurement in most exhaust gas without gas preparation.
- Rapid reaction and adjustment time.
- Permanent measuring value coverage.
- No gas sample extraction.
- Low maintenance.

With O<sub>2</sub> regulation the fluctuations affecting combustion should be generally compensated for. In addition to this, O<sub>2</sub> regulation also monitors the fuel-air ratio of the combustion. If this oversteps the permissible values, the alarm is set off.

Fluctuations of the following have a general disruptive effect on combustion.

Air:	Temperature
	Pressure
	Humidity
Fuel:	Heat value
	Temperature
	Viscosity
	Density
	Fluctuation in gas pressure
Pollution:	Burner
	Boiler
Mechanics:	Mechanical hysteresis (rod play)



All these measurements demand more combustion air for safety reasons, than would be necessary for ideal combustion.

These excessive air volumes are heated unnecessarily and transport the heat as a loss via the chimney.

This excess air can be offset though the use of O<sub>2</sub> control systems in a continuous way, producing an average improvement in the operation as follows:

	NATURAL GAS	HEATING OIL	
	H	EI	S
1. Heat value deviations.	1.5%	—	0.3%
2. Alteration of burner burden due to oil/gas pressure, derivations, viscosity and temperature changes.	0.5%	0.4%	1.7%
3. Air-temperature.	0.4%	0.4%	0.4%
4. Air-pressure changes.	0.3%	0.3%	0.3%
<b>TOTAL</b>	<b>2.7%</b>	<b>1.1%</b>	<b>2.7%</b>
As extreme values were assumed for these alteration, only half of this sum can be reckoned with on average in the course of a year, ie;	1.35%	0.55%	1.2%
Supposing that by O <sub>2</sub> -regulation as a result of compensating for the fluctuation the burner adjustments can be set on average at approx. 1 vol.% O <sub>2</sub> closer to optimum resulting in an improvement of	0.60%	0.70%	0.75%
<b>Average per year</b>	<b>1.95%</b>	<b>1.25%</b>	<b>1.95%</b>

## ENERGETIC EFFICIENCY

### A GREAT DEAL FOR SAVING

One of the greatest advantages that E&M burners of the new generation presents is its high energetic efficiency thanks to these three fundamental factors:

- 1) The combustion heads have been designed for achieving excellent combustion with minimum excess of oxygen obtained, and as a result, a remarkable efficiency in combustion.
- 2) The fans are designed to achieve an excellent efficiency. They also allow us to use a frequency converter for the regulation of the air flow.
- 3) It is possible to use optimizing O<sub>2</sub> systems for improving combustion efficiency.

### ADVANTAGES OF USING A FREQUENCY CONVERTER

#### Saving energy consumed by motor

It is possible to estimate that the figure on the right shows a notable energy saving by using a frequency converter.

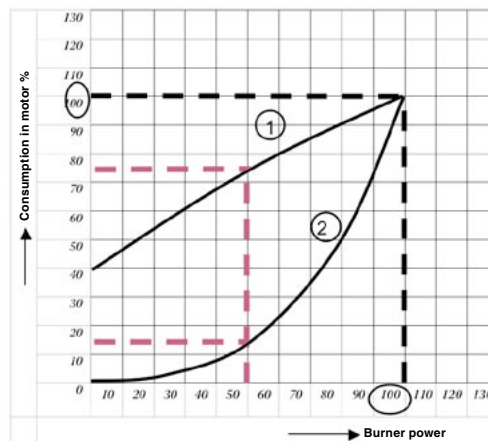
In curve 1 the % of the consumption of the motor using a regulation for traditional air flaps is described.

In curve 2 we have the % of electrical consumption used in a speed converter. Both curves depend on the load of the burner. As we can see, between 20-80% of the load of the burner, saving becomes very important. This varies between 30-50% depending on the burner's power in every moment.

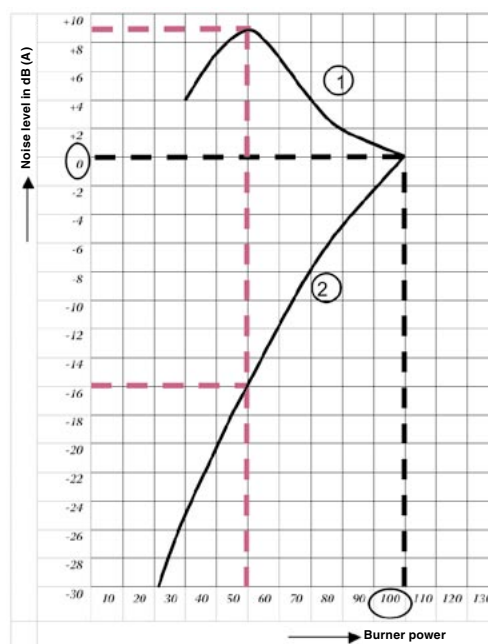
#### Reduction of the level of noise of the motor

One of the other important advantages of using a frequency converter is reducing the level of dB that is produced by the motor. In the graph of fig.2, we can observe the two curves that indicate the level of noise of the device with and without a speed converter.

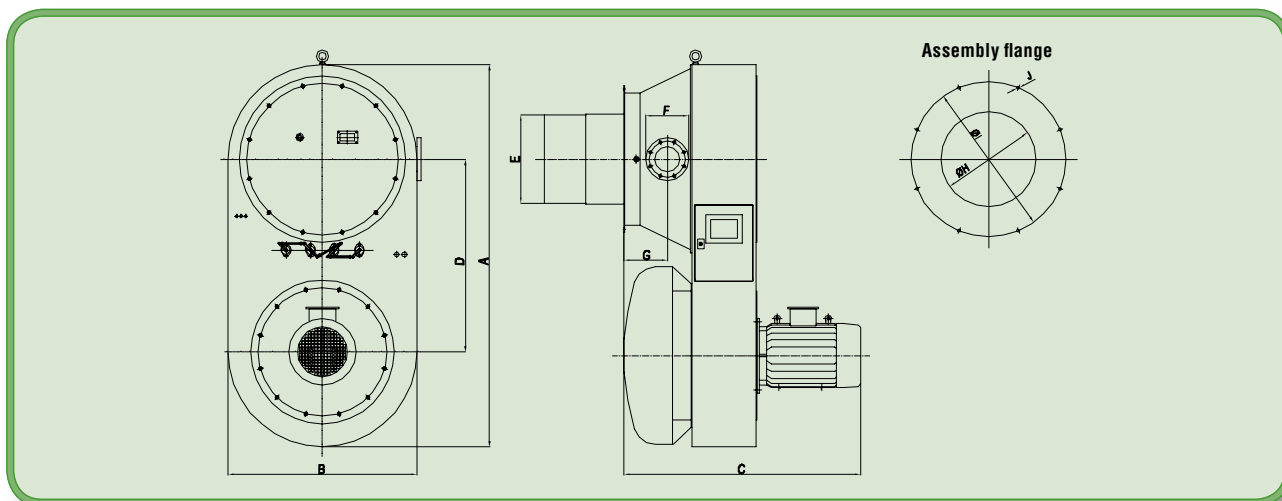
As we can see at some points the difference is really important. In addition to this improvement, the design of the burner itself makes E&M burners one of the quietest in the market.



1 = Control by air flaps (traditional burners)  
2 = Control by frequency converter



1 = Control by air flaps (traditional burners)  
2 = Control by frequency converter



## DIMENSIONS OF BURNER

Model	A	B	C	D	E	F	G	H	I	J
JBM-8.500 HP	1.975	965	1.345	1.045	415	DN-80	265	Ø445	Ø760	M14
JBM-11.500 HP	1.975	965	1.375	1.045	450	DN-80	265	Ø480	Ø760	M14
JBM-14.000 HP	1.975	965	1.475	1.045	505	DN-80	265	Ø535	Ø760	M14
JBM-17.000 HP	2.525	1.250	1.540	1.275	549	DN-125	305	Ø575	Ø925	M16
JBM-20.000 HP	2.525	1.250	1.570	1.275	585	DN-125	305	Ø610	Ø925	M16
JBM-25.000 HP	2.525	1.250	1.650	1.275	632	DN-125	305	Ø660	Ø925	M16

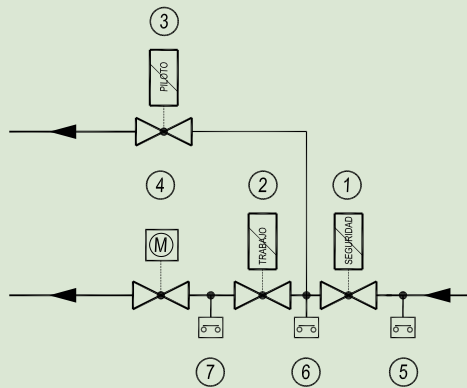
Note: The illustrations and information demonstrated are orientative. E&M Combustion S.L keeps the right to make all necessary modifications for the improvement of our products.

## BURNER COMPONENTS DESCRIPTION

Description	G	LO	FO	GLO	GFO
Body of burner, assembly flange, motor of burner, fan wheel, air flaps for air regulation, combustion head, ignition trafo., ignition cable, ignition electrodes, flame tube.	•	•	•	•	•
Electronic switchboard	•	•	•	•	•
Incorporated electric control panel	•	•	•	•	•
Visualisation display / Touch screen	•	•	•	•	•
Double magnetic valves for gas	•			•	•
Gas magnetic valve for pilot flame ignition	•			•	•
Butterfly valve for gas	•			•	•
Air pressure switch	•	•	•	•	•
Self-checking flame detector	•	•	•	•	•
Gas pressure switch	•			•	•
Actuating motor for air flaps	•	•	•	•	•
Actuating motor for gas butterfly valve	•			•	•
Actuating motor for regulation of combustible flow		•	•	•	•
Motorpump outlet for combustible liquid (external)		•	•	•	•
Hydraulic block (up to model 14.500)		•	•	•	•
Hydraulic circuit (from model 14.500)		•	•	•	•
Preheater (external)			•		•
Connecting pipes for combustible liquid		•	•	•	•
Oil lance + nozzle		•	•	•	•
Silencer	•	•	•	•	•



## GAS TRAIN DRAWING

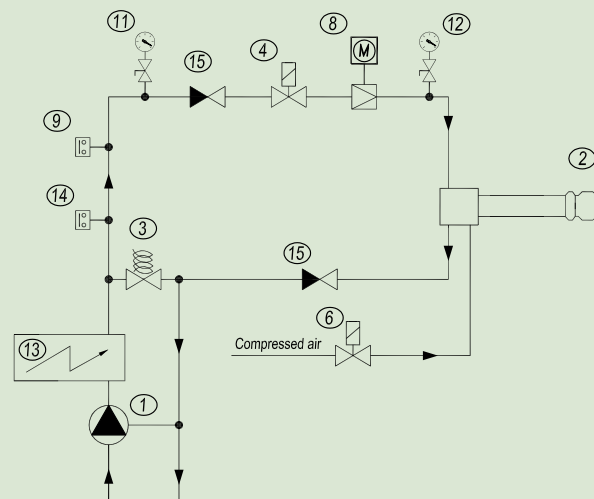
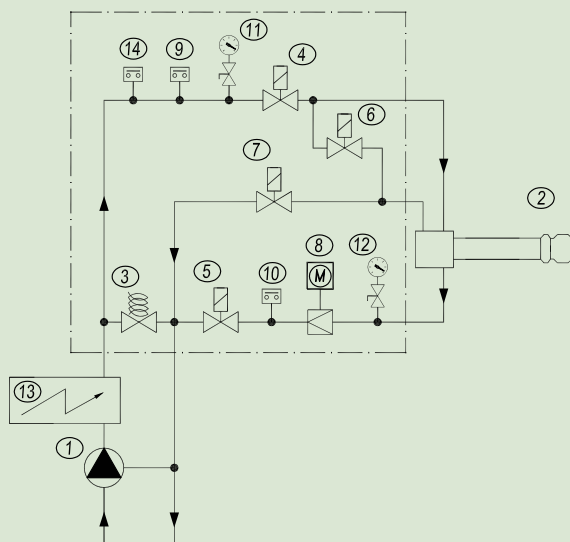


1. Safety solenoid gas valve.
2. Regulation solenoid gas valve.
3. Pilot flame solenoid gas valve.
4. Gas flow regulation servo valve.
5. Min. gas pressure switch.
6. Min. gas pressure switch.
7. Max. gas pressure switch.

## HYDRAULIC BLOCK DRAWING

### HIGH PRESSURE MECHANICAL ATOMISATION

### STEAM ATOMISATION



1. Atomisation motor pump
2. Oil lance
3. Pressure regulating valve
4. Fuel inlet NC magnetic valve
5. Fuel return NC magnetic valve
6. Atomizing oil lance opening NC magnetic valve

7. Atomizing oil lance closing NO magnetic valve
8. Flow regulating servo valve
9. Min. Pump pressure switch
10. Max. Pump return pressure switch
11. Pump pressure manometer
12. Return pressure manometer

13. Electric preheater (heavy-oil)
14. Cold fuel thermostat
15. Anti - return valve



## TECHNICAL SERVICE AND COLLABORATION WITH THE CLIENT

One of the big advantages of our company is the continuous communication and cooperation with our clients. Our success in this business is based in a close collaboration and relationship with our customers by showing them how to handle our equipments and with a technical personal assistance. We are a very flexible company in this material, giving a fast answer and a good service to all problems that can happen in our installations, with an easy accessibility to our engineers.

We really take care very much this aspect of business based in the close communication and friendship with our customer.

[www.emcombustion.es](http://www.emcombustion.es)

