Библиотека СОК

CIB UNIGAS®

TECHNICAL INFORMATION

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LET'S LIGHT UP THE FUTURE.

CIB Unigas was founded in 1972 as a small company by Mr. Claudio Pancolini. The remarkable creative and design skills of its technical staff enabled the company to penetrate the market quickly and effectively. Over the past 50 years, with the goal of promoting eco-sustainable fuels and applications, **CIB Unigas has become one of the leading companies in the design, production and sale of burners for civil and industrial applications.**





Factors such as the progressive shift in demand abroad (over 85% of current turnover) and the willingness to develop a solid distribution network, have allowed the company to **open numerous branches, particularly in the United Kingdom, China, and the United States, in addition to more than 60 official dealers worldwide.** This strengthened and widespread sales network, combined with the complete range of burners offered and the constant participation in international conferences and trade fairs, has made CIB Unigas a leader in its sector.

In 1994, CIB Unigas obtained ISO 9001 quality certification and product certification (CE marking), issued by the most authoritative European certification body (TÜV). This certification is the most comprehensive available in this industrial sector, covering design, production, marketing, and after-sales services. As a result, the company currently meets all national and international requirements to sell, market, and install its products worldwide.

Today, the company is managed by the founder's heirs Mr. Filippo Pancolini and Mr. Riccardo Pancolini, who ensure the continuity not only of the business but also of CIB Unigas' vision: developing technologies with the aim of protect our world and our future.**With over 200 employees, the company produces all its products at its Italian plant facility in Campodarsego (Padua), where its main activities of design, assembly and innovation take place.**

Thanks to the strong flexibility of its production and organizational structure, CIB Unigas is able to meet any demand quickly and according to the specific requirements that arise from the market. This means, not only the ability to produce in series, but above all, the creative strength to satisfy market demands—values that are at the core of the shared efforts at CIB Unigas.

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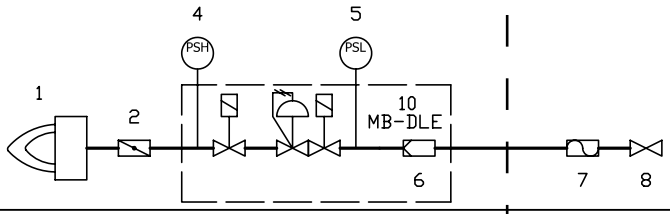
Matching low nox burner and heat generator with fgr 29

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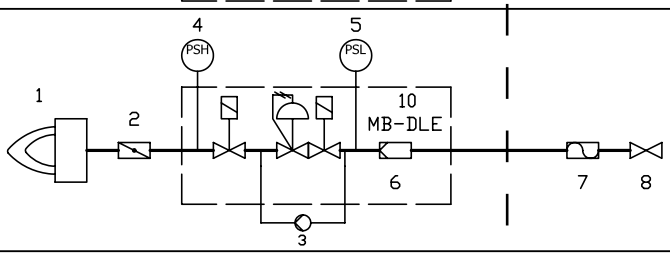
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MANUFACTURER | INSTALLER

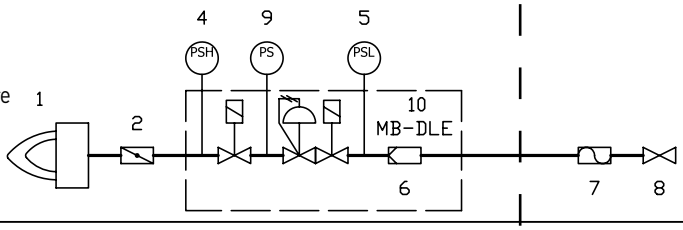
Gas train with valves group MB-DLE
(2 valves + gas filter + pressure governor).



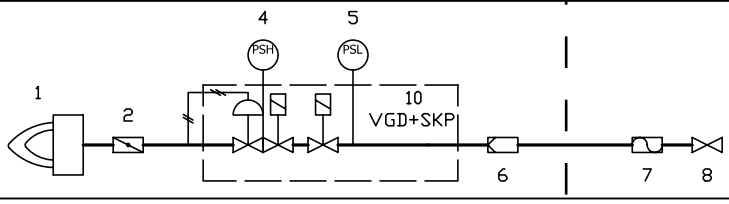
Gas train with valves group MB-DLE
(2 valves + gas filter + pressure governor) + leakage control VPS504.



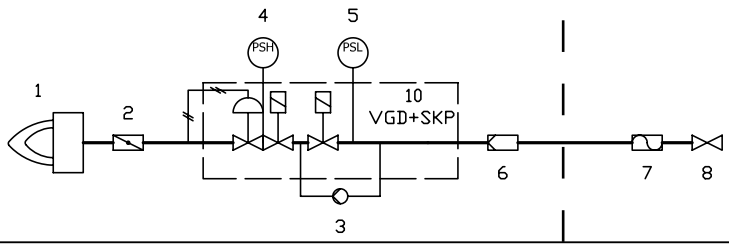
Gas train with valves group MB-DLE
(2 valves + gas filter + pressure governor) + leakage control pressure switch.



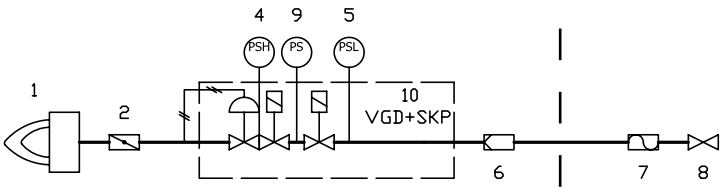
Gas train with valves group VGD
with built-in gas pressure governor.



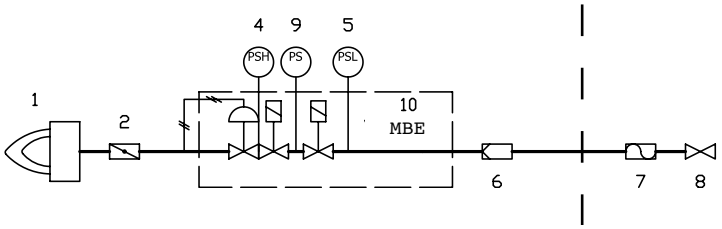
Gas train with valves group VGD
with built-in gas pressure governor + leakage control VPS504.



Gas train with valves group VGD
with built-in gas pressure governor + leakage control pressure switch



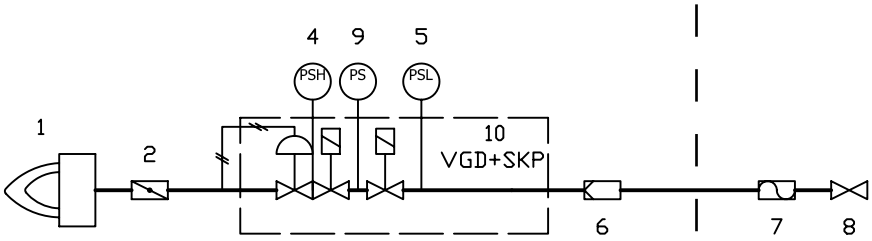
Gas train with valves group MBE
c/w built-in pressure governor+ leakage control pressure switch+ max pressure switch.



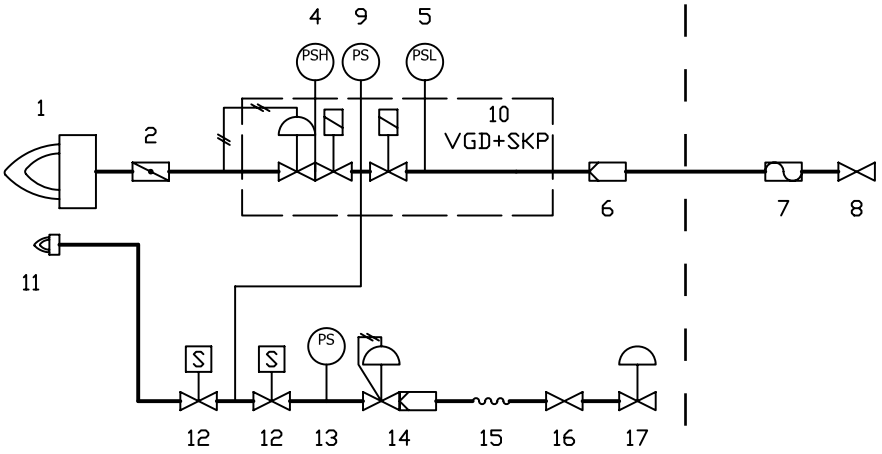
KEY
1 Burner
2 Butterfly valve
3 Leakage control device (optional if output < 1200 kW)
4 Maximum gas pressure switch (optional)
5 Minimum gas pressure switch
6 Gas filter
7 Anti-vibrating joint
8 Manual cut off valve
9 Leakage control pressure switch (optional if output < 1200 kW)
10 Valves group

MANUFACTURER | INSTALLER

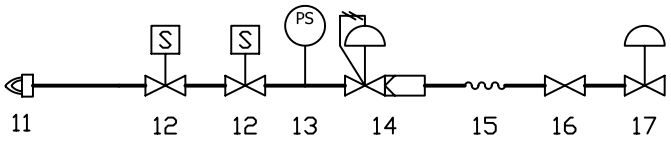
Gas train with valve group VGD
c/w built-in pressure governor
+ leakage control pressure switch.



Gas train with valve group VGD
c/w built-in pressure governor
+ leakage control pressure switch.
Pilot train with double valve and filter/governor.



Pilot train with double valve and pressure governor with filter.

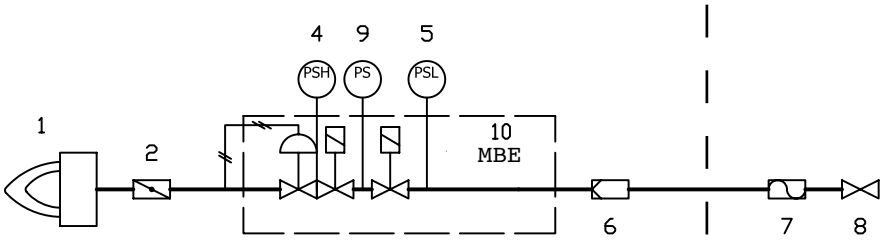


KEY

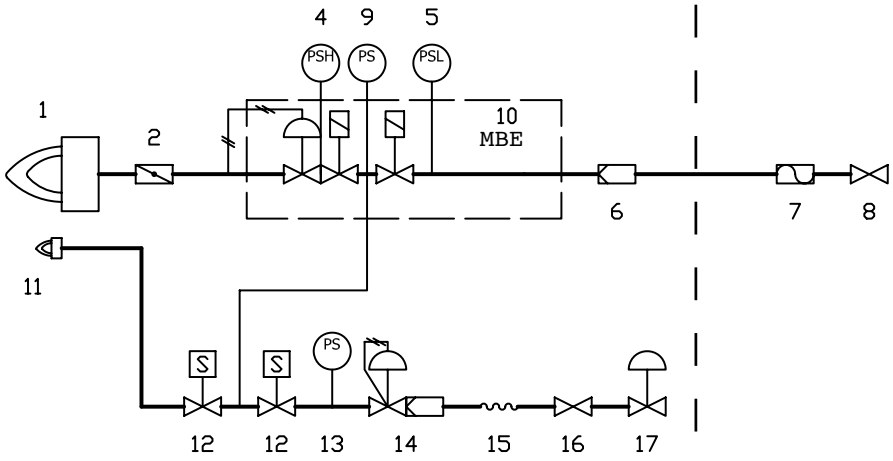
1 Burner
2 Butterfly valve
3 -
4 Maximum gas pressure switch (optional)
5 Minimum gas pressure switch
6 Gas filter
7 Anti-vibrating joint
8 Manual cut off valve
9 Leakage control pressure switch
10 Valves group VGD
11 Pilot burner
12 Pilot valve
13 Pilot minimum gas pressure switch
14 Pilot pressure governor
15 Pilot anti-vibrating joint (optional)
16 Pilot manual cut off valve (optional)
17 Pilot gas reducer (optional)

MANUFACTURER | INSTALLER

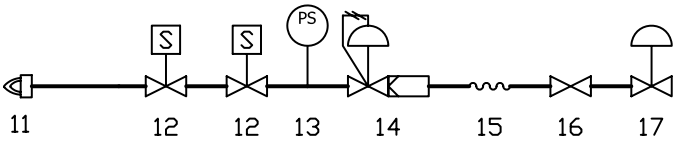
Gas train with valve group MBE
c/w built-in pressure governor
+ leakage control pressure switch
+ max pressure switch.



Gas train with valve group MBE
c/w built-in pressure governor
+ leakage control pressure switch
+ max pressure switch.
Pilot train with double valve and filter/governor.



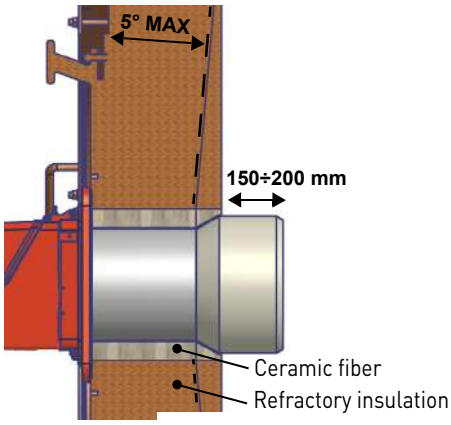
Pilot train with double valve and pressure governor with filter.

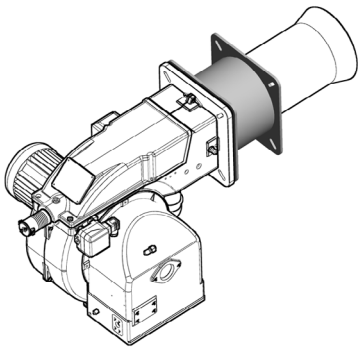


KEY
1 Burner
2 Butterfly valve
3 -
4 Maximum gas pressure switch
5 Minimum gas pressure switch
6 Gas filter
7 Anti-vibrating joint
8 Manual cut off valve
9 Leakage control pressure switch
10 Valves group MBE
11 Pilot burner
12 Pilot valve
13 Pilot minimum gas pressure switch
14 Pilot pressure governor
15 Pilot anti-vibrating joint (optional)
16 Pilot manual cut off valve (optional)
17 Pilot gas reducer (optional)

Matching the burner to the boiler (low NOx burners)

The burners described in this manual have been tested with combustion chambers that comply with EN676 regulation and whose dimensions are described in the diagram . In case the burner must be coupled with boilers with a combustion chamber smaller in diameter or shorter than those described in the diagram, please contact the supplier, to verify that a correct matching is possible, with respect of the application involved. To correctly match the burner to the boiler verify the type of the blast tube . Verify the necessary input and the pressure in combustion chamber are included in the burner performance curve; otherwise the choice of the burner must be revised consulting the burner manufacturer. To choose the blast tube lenght consider the following rule, even if it differs from the instructions of the boiler manufacturer: Cast-iron boilers, three pass flue boilers (with the first pass in the rear part): the blast tube must protrude at least 150÷200 mm into the combustion chamber.The length of the blast tubes does not always allow this requirement to be met, and thus it may be necessary to use a suitably-sized spacer to move the burner backwards.

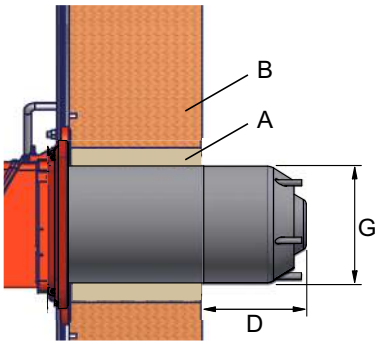




Matching the burner to the boiler (low NOx burners)

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The blast tube must penetrate the combustion chamber by 200 mm.



A: Ceramic fiber
B: Refractory insulation

$$D = \frac{G}{1{,}27} = 200 \text{ mm}$$

$$D = \frac{G}{0{,}05} = 7{,}87402 \text{ in}$$

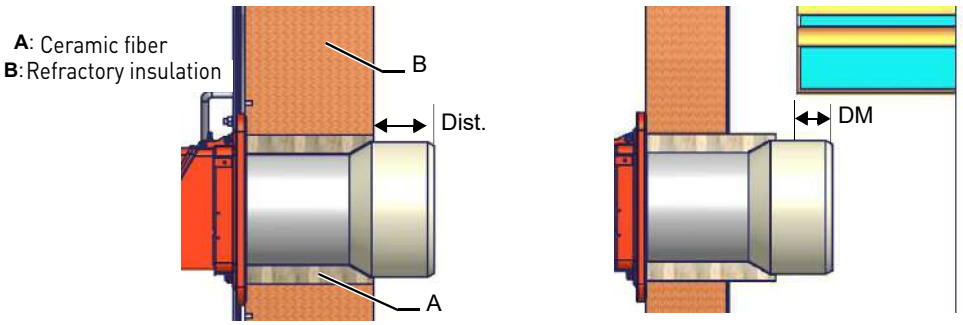
Matching the burner to the boiler

The burners described in this manual have been tested with combustion chambers that comply with EN676 regulation and whose dimensions are described in the diagram . In case the burner must be coupled with boilers with a combustion chamber smaller in diameter or shorter than those described in the diagram, please contact the supplier, to verify that a correct matching is possible, with respect of the application involved. To correctly match the burner to the boiler verify the type of the blast tube . Verify the necessary input and the pressure in combustion chamber are included in the burner performance curve; otherwise the choice of the burner must be revised consulting the burner manufacturer. To choose the blast tube lenght follow the instructions of the boiler manufacturer. In absence of these consider the following:

Cast-iron boilers, three pass flue boilers (with the first pass in the rear part):
the blast tube must protrude no more than Dist = 100 mm (39,37 in) into the combustion chamber. (please see the picture below)

Pressurised boilers with flame reversal:
in this case the blast tube must penetrate DM 50 ÷ 100 mm (1,97 ÷ 3,94 in) into combustion chamber in respect to the tube bundle plate (please see the picture below)

Dist. = 100 mm
DM = 50 ÷ 100 mm



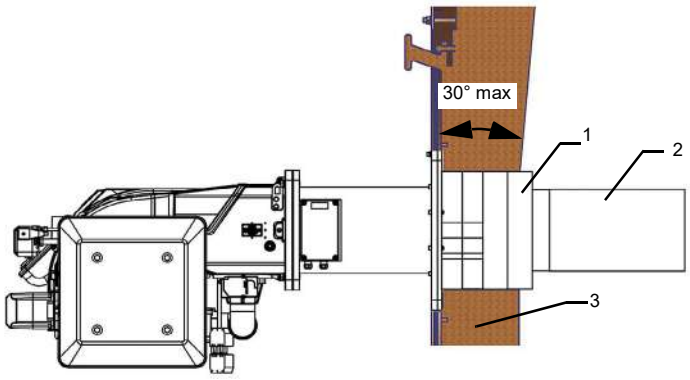
Matching the burner to the boiler (low NOx burners Serie N)

The burners described in this manual have been tested in combustion chambers complying with standard EN676. If the burner is to be matched to boilers with combustion chambers of a smaller diameter or shorter length than those indicated in the Standard, contact the Manufacturer to check that it is suitable for the application for which it is intended.

To correctly match the burner to the boiler:

- Check that the required power and the pressure in the combustion chamber are within the working range.
- Also check that the length of the combustion chamber is greater than the combustion head.
- Verify that the neutral section of the head exceeds the refractory. The application does not always meet this requirement, so it may be necessary to use a spacer of a suitable size, which serves to retract the burner to meet the above measurements.

The neutral section of the combustion head must be protected against high temperatures. A specially shaped panel for applications with operating temperatures up to 1200° C is supplied.
If the above requirements cannot be met, the choice of burner must be reviewed in consultation with the manufacturer.



1 - Burner insulation
2 - Burner head
3 - Boiler door

FLAME CONTROL UNITS, SIGNALS AND FUNCTIONS

Progressive burners can be controlled by a 3-point signal (high/low flame) through the appropriate terminals. However, depending on the type of application and automation of the boiler, other types of signals can also be used, both at the burner input (analog modulation) and at the output (feedback signal proportional to load percentage, corresponding to actual power). A typical configuration in many boiler rooms may be, for example, using a 4÷20 mA input signal, with feedback through a potentiometer on the burner servo drive. Another very common case is the use of serial communication between several electronic control units in the boiler room. In this case different protocols (for example, Modbus), as well as different standards for signal connection and control (for example, RS-485) may be used.

1	2	3	4	5	6	7	8	9	10	11	12	13
BURNERS		mechanical models	Electronic models (EA)			mod. el. (EB)	mod. el. (EC)	mod. el. (ED)	mod. el. (ES)	mod. el. (EI)	mod. el. (EO)	mod. el. (EK)
CONTROL UNITS		LME 73.000 + PME 73.831	LMV 20.100	LMV 27.100	LMV 37.400	LMV 37.400	LMV 26.300	LMV 26.300	LMV 51.100	LMV 51.300	LMV 52.400	LMV 52.400
FUELS	Single fuel	S	S	S	S	S	-	-	S	S	S	S
	Dual fuel	S	-	-	-	-	S	S	S	S	S	S
INPUT analog modulation	3-point modulation (high/low flame)	S	S	S	S	S	S	S	S L	S L	S L	S L
	Analog modulation [4÷20 mA]	P	-	-	S	S	S	S	S	S	S	S
	Analog modulation [0÷10 V]	P	-	-	P	P	P	P	S	S	S	S
OUTPUT proportional load feedback	Load signal [4÷20 mA]	P	-	P	P	-	P	-	S	S	S	S
	Load signal [0÷10 V]	P	-	P	P	-	P	-	P	P	P	P
	Load signal [0÷1000 Ω]	P	-	-	-	-	-	-	-	-	-	-
OTHER FUNCTIONS	INVERTER	-	-	-	-	S	-	S	-	S	-	S
	OPERATION 24h/24h non-stop (continuous operation)	-	-	-	P L	P L	-	-	S	S	S	S
	MODBUS via RS-485	-	-	P	P	P	P	P	S	S	S	S
	Oxygen control	-	-	-	-	-	-	-	-	-	S	S

S - function available on standard burner
P - function available upon request; extra price may be applied on custom products
L - configurations subject to usage limitations; for technical details, please contact the nearest branch reference branch office

Some functions are present on standard CIB Unigas burners, others may be requested during quotation phase and will require, as a result, modifications to standard products (such as adding a signal converter at the input or output terminals). The following table lists available configurations, depending on the burner model and the required functions.
Customers are advised to specify in detail all the required functions when applying for a commercial offer, which will allow us, in turn, to configure the correct burner model, including OEM parameters of electronic control units, where necessary.
If the desired signal combination is not included in this table, please contact our technical department in order to find a solution that suits your requirements.

Some configuration examples

1) Suppose the project specifications require a burner R515A with direct interface to boiler control unit.
Analog input signal to the burner: 4÷20 mA (input from external load controller)
Feedback signal to the boiler: potentiometer on servo drive, 0÷1000 Ω (output proportional to load percentage)
According to above table, first row, select a mechanical burner; in this case a simple progressive unit (PR) will suffice.

For example, **K590X model M-.PR.S.IT.Y.1.65**

Letter "**Y**" identifies burner customization.

2) Let's suppose a different case. Plant specs require a modulating gas burner, with signal 0÷10 V (output proportional to load percentage).
The burner has to work in continuous service mode (without stopping every 24 h).
I In this case the selected control unit is a **LMV37.400** (see table, 4th row) and the burner model is electronic, EA.
Thus, burner type K590X model M-.MD.S.IT.Y.1.65.EA.

3) Like in the previous example, suppose the designer require to add VSD (variable speed drive, or inverter) to the fan motor instead of 0÷10 V signal. The control unit is still a LMV37.400 but the burner model is now EB (see table, 4th row).
Burner type K590X model M-.MD.S.IT.Y.1.65.EB

4) Last example, similar to previous ones but suppose now that both functions are required (feedback signal and motor VSD), plus continuous service as before. The burner control unit must support all these functions at the same time, hence select an electronic cam LMV51.300 and a burner model EI (see table, 9th row).
The burner will then be an K590X model M-.MD.S.IT.A.1.65.EI

ADJUSTMENT OF THE BURNERS

When choosing the burner, the designer may select one among the following configurations.

TN (single-stage)

Burners with single-stage regulation operate in ON-OFF configuration: when an external switch (e.g. the boiler regulation thermostat) closes, the burner is switched on, and then operates at maximum power. When the generator set-point is reached, the contact opens, the flame is switched off and the burner is kept in stand-by.

AB (two-stage)

Burners with two-stage regulation operate in HIGH-LOW flame configuration: a signal from the boiler regulation thermostat brings the burner to high flame (maximum power); as soon as the high flame threshold is reached, the burner shifts quickly to low flame (minimum power). When the lower threshold is reached, the burner reverts to high flame.
Boiler temperature will thus oscillate around the desired setpoint. If the thermostat limit threshold is exceeded, the flame is switched off and the burner shifts into stand-by. The two-stage regulation allows higher yields (efficiency).

PR (progressive)

Conceptually, progressive burners operate like two-stage ones, i.e. with high-low flame type regulation. The difference is that transients between two stages follow a regulation control curve (combustion air-fuel ratio). AB burners are limited by the power difference between high flame and low flame stages; PR regulation, while retaining the same functional characteristics, does not pose such limits - the combustion is always well regulated, even at intermediate power output.
Additionally, liquid fuel PR burners are equipped with a single variable-flow nozzle instead of two nozzles (one for each stage); in case of variable load operation, load transients do not require large power jumps.

Note: if the boiler control unit requires burner control via an analog input signal (e.g. 4 ÷ 20 mA or 0 ÷ 10 V), please select a PR model burner. When requesting a quotation, specify the signal type given by the control unit, and the required feedback signal (e.g. 0 ÷ 1000 Ω via potentiometer on the actuator).
Attention, the burner configuration may vary according to the specific requests. See page 302 for a detailed explanation of I/O signal options.

MD (modulating)

Modulating burners are equivalent to PR ones, but supply includes by default a power regulator based on PID control system. The regulator synchronizes burner power and required load, via a feedback signal coming from a sensor installed on the boiler (also called modulation probe). Thermocouples can be used (for hot water and superheated water boilers, diathermic oil heaters, hot air generators, ovens and furnaces) or pressure transducers (for steam boilers). The air-fuel ratio is adjusted along a curve over the entire working range.

PR or MD burners with electronic cam

Electronic cam burners employ the same operating principle as the corresponding mechanically regulated burners: the air-fuel ratio curve is stored in the electronic unit memory, rather than being physically set by a variable cam connected to servo motors.
The electronic cam is extremely precise and offers several advantages, first of all overcoming limitations of mechanical linkages (e.g. wear, play between the moving parts, hysteresis). On the other hand, control units are more sensitive to electromagnetic interference, therefore quality of power supply is a fundamental factor in thermal plant design.

Note: to order a modulating burner, please select the desired probe separately.

Controlled variable	Temperature/pressure range
Temperature (*)	-15 ÷ 50 °C
Temperature	30 ÷ 130 °C
Temperature	0 ÷ 400 °C
Temperature	0 ÷ 1200 °C
Pressure	3 bar
Pressure	10 bar
Pressure	16 bar
Pressure	25 bar
Pressure	40 bar



(*) shot air probe
Other sensors and/or different scales available upon request.

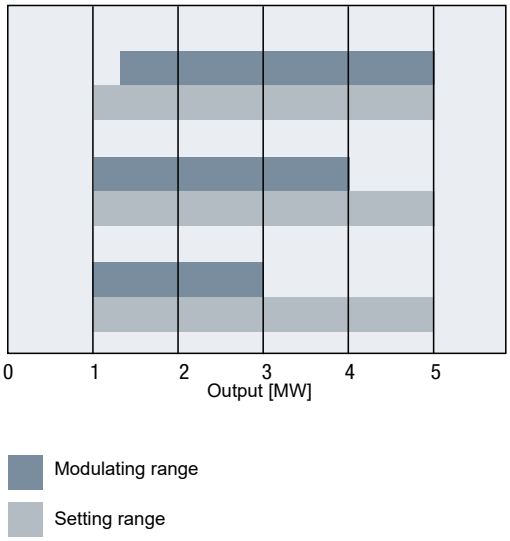
Control range and modulating ratio of a burner

Each burner, whether with an on-board or separate fan, is characterized by its performance curve defined by the minimum and maximum output within which it can operate. The modulating ratio is defined as the actual ratio between the minimum and maximum output of a specific thermal group burner-boiler (or burner-generator). The Performance curve is therefore quite different from the modulating range of the burner.

To better understand this concept let's make an example:
Consider a burner with a performance curve of 1.000 kW – 5.000 kW combined to a boiler that requires an output of 5 MW.
If we assume a modulating ratio of 1:4, the minimum achievable output is 5.000 kW: 4 = 1.250 kW.

The same burner, matched to a boiler which requires a max output of 4 MW, with exactly the same modulating ratio of 1:4, delivers a minimum output of 1.000 kW.

Let's consider the very same burner matched to a boiler which requires 3 MW only. Since the burner cannot work below its mechanical limits, it will operate with a reduced modulating ratio 1.000 kW: 3.000 kW = 1:3.



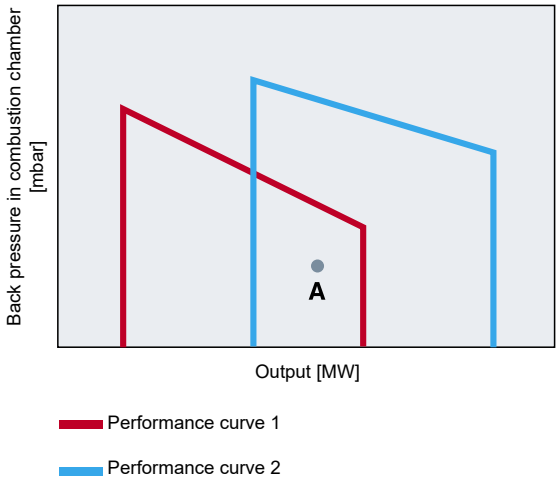
It's important to remember that the modulating ratio of any burner is strongly affected by the boiler on which it is installed.
To obtain the best performance, it is recommended to choose the burner with the widest possible modulating ratio, and the maximum output as close as possible to that required by the boiler.

For example, if the working point of the boiler (point A in the picture) can suit many burners, it is recommended to pick up the model whose maximum output is closer to that required (curve 1). This is the best choice, both economically (smaller burner size), and technically, because it provides the widest modulating ratio.

A burner similar to curve 2 in the example, could only operate at an output which is already close to its min limit, and this would not allow any modulating ratio, meaning a completely negative situation.

Finally, let us remember two further factors that can affect the modulating ratio:

- the boiler or heat generator manufacturer, as a rule, writes the maximum recommended modulating ratio to prevent the temperature of the flue gases at the minimum output to fall below the condensation limit.
- liquid fuel burners are bounded to the modulating ratio of the nozzles (typically 1:3 - 1:4, except special applications).



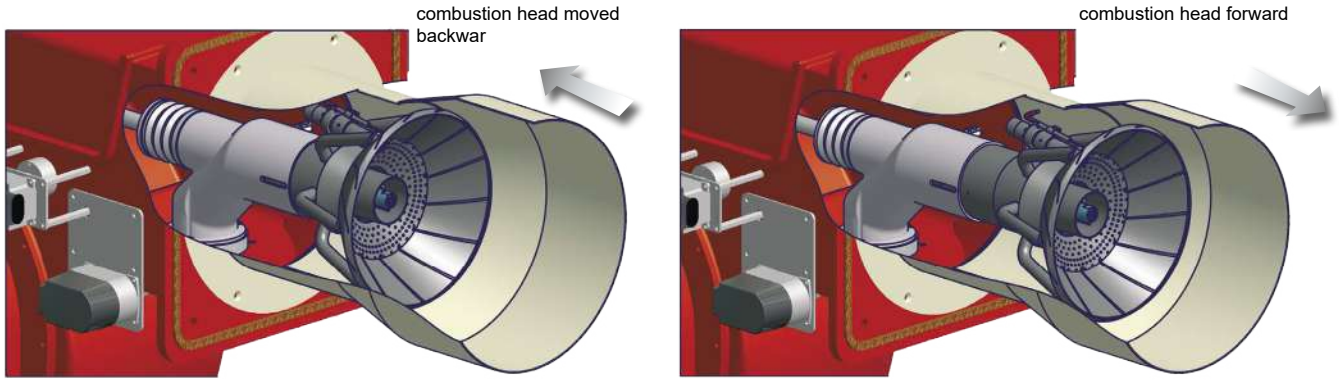
Burners with high modulation ratio

A special high modulation ratio customization is available on Class 2 gas and dual fuel burners with electronic control (variants with LMV51/52 units). This configuration can guarantee a ratio 1:6 between minimum and maximum power (1:10 with inverter).
This excellent performance is achieved by precisely dosing air flow at low power, while maintaining required flame stability.
High modulation ratio is recommended when project specifications call for an extremely low minimum load, and it is not possible to achieve this with other means (e.g. several smaller burners in cascade control).

Typical examples include burners for condensing boilers, applications such as processing plants or furnaces (e.g. food cooking ovens).

However, it is not recommended to use such configuration when there is risk of acidic condensate formation at the chimney (exhaust gases temperature too low), on ordinary steam boilers for example.

The use of burners with a high modulation ratio should always be agreed upon with the boiler or furnace manufacturer.



How to choose a monobloc burner in altitude

Per garantire una combustione completa e sicura occorre fornire al bruciatore la portata corretta di ossigeno in aspirazione. La quantità di ossigeno disponibile è proporzionale alla densità dell'aria comburente, e la densità dipende a sua volta dalle condizioni ambientali.
Per questa ragione, i campi di lavoro dei bruciatori sono definiti in condizioni ambientali standard secondo le normative tecniche. In particolare, sono definiti a livello del mare in atmosfera standard: temperatura 15 °C e pressione 101,3 kPa.
Naturalmente nelle condizioni reali di funzionamento di un impianto la temperatura e la pressione dell'aria cambiano costantemente. Se la densità dell'aria diminuisce (ad esempio quando le temperature estive sono molto elevate) anche l'ossigeno disponibile in un metro cubo d'aria è ridotto e viceversa: pertanto occorre tener conto di questa differenza.
Le piccole variazioni giornaliere rientrano solitamente nelle tolleranze definite dalla normativa, perciò sono trascurabili.
D'altro canto le variazioni stagionali devono essere compensate, perciò è opportuno regolare periodicamente la combustione durante l'anno. In questo modo si evita la formazione di monossido di carbonio (CO) poiché la combustione avviene sempre in eccesso di aria: tipicamente l'ossigeno residuo è fissato al 3%. Bisogna inoltre ricordare che la pressione atmosferica e la densità dell'aria diminuiscono al crescere dell'altitudine sul livello del mare. Fino a 300 metri questa variazione è di entità trascurabile. Tuttavia se il bruciatore che il cliente intende acquistare sarà installato in regioni montuose, come le Alpi, occorre ricalcolare i parametri dell'impianto.

In order to avoid mistakes in calculations always remember to provide also the altitude of the thermal output plant at the moment of the offer!

The table on the right gives the correction factors to be applied to the calculations. Below is an example of how to choose a monobloc burner in altitude.

Suppose you have to select a burner intended for the city in altitude. This city is surrounded by mountains, and the thermal output plant will be built at approximately 1.000 meters above sea level.

The data of the boiler to be matched are:
- nominal output Pn 4.000 kW
- efficiency h 91 %
- back pressure in combustion chamber Cp 12 mbar
- fuel natural gas

The first step is to calculate the output (Pb) required to the burner:

$$P_b = \frac{P_n}{\eta} = \frac{4.000}{0,91} = 4.400 \text{ kW}$$

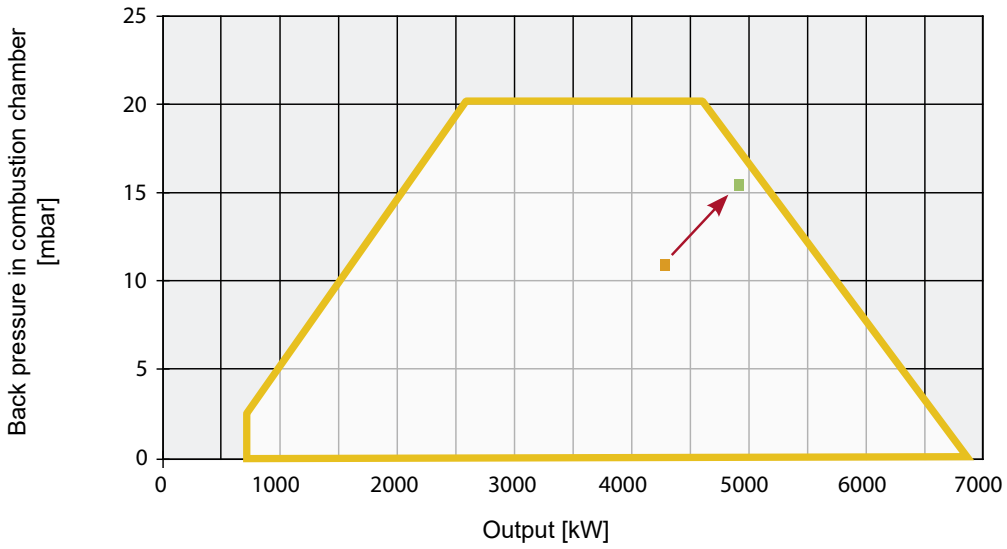
Note the altitude of the plant above sea level (1.000 meters) and obtain the correction coefficients K1 and K2 from the table.
In this case:
K1 = 1,128
K2 = 1,272

Correct the output and back pressure by applying K1 and K2 respectively:
Pb (corrected) = Pb x K1 = 4.400 x 1,128 = 4.960 kW
Cp (corrected) = Cp x K2 = 12 x 1,272 = 15,3 mbar

Installation height above sea level	Correction factors	
	K1 (Power)	K2 (Back-pressure in the combustion chamber)
300	1,036	1,074
400	1,049	1,100
500	1,061	1,127
600	1,074	1,154
700	1,087	1,182
800	1,100	1,211
900	1,114	1,241
1.000	1,128	1,272
1.200	1,155	1,334
1.400	1,184	1,402
1.600	1,213	1,472
1.800	1,243	1,546
2.000	1,276	1,628
2.400	1,342	1,801
2.800	1,410	1,988
3.200	1,483	2,199
3.600	1,561	2,437
4.000	1,644	2,703

Finally, it is possible to pick up the right gas burner for the customer's plant, in this case it is H685A.

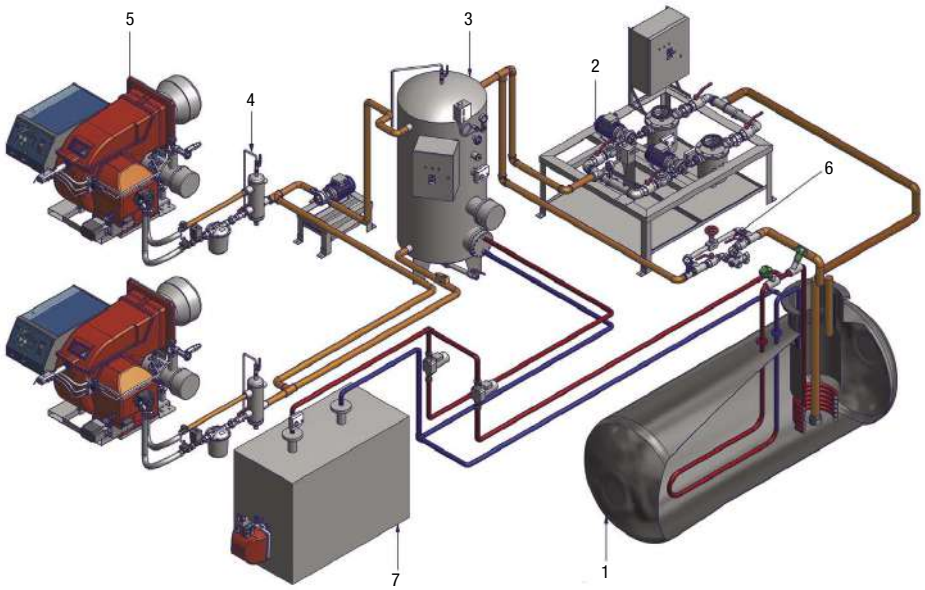
Performance curve of the H685A burner



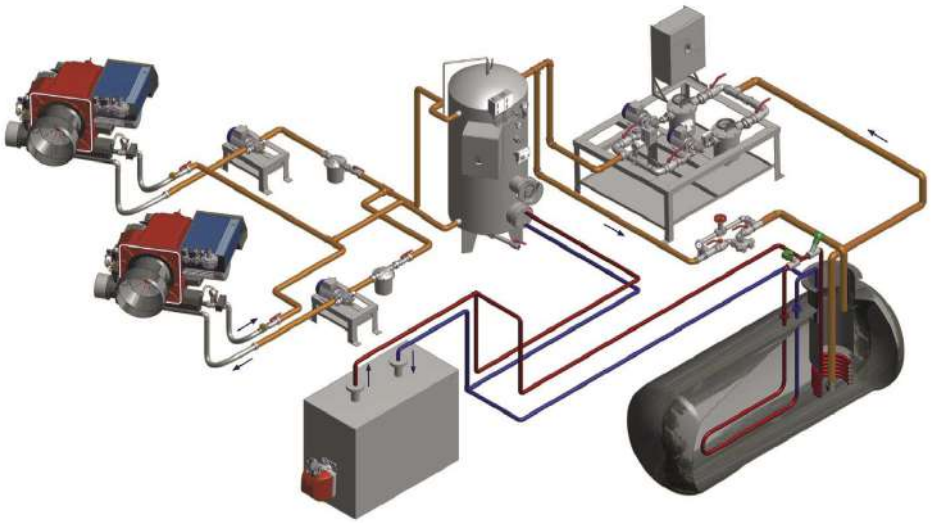
Attention! The correction applied does not change the actual output that the burner must develop. The boiler is always 4.000 kW, and the burner always develops 4.400 kW, then why was a 4.960 kW burner selected?
What has changed is the performance of the fan, which must deliver a sufficient oxygen flow to the fuel combustion.
The choice of burner is therefore made in the following way: the performance curve of the burner is maintained as if the system was located at sea level, but we pretend that the boiler requires a higher performance according to the K1 and K2 coefficients.
This operation is equivalent to maintain the real working point, and reducing the performance curve of the burner. The result is the same but the calculation is simpler and faster.

Very often, for a correct light and heavy oil burners operation, it is necessary to prepare an additional fuel supply line.
In this case, rather than suck the fuel from the tank along separate lines suitable to each individual burner, a low-pressure supply circuit (normally 1 ÷ 2 bar) must be created.
Two of the most common fuel oil configurations are simplified in the following diagrams:

Ref. 01 - Example of a ring circuit for heavy fuel oil burners with mechanical atomization.



Ref. 02 - Example of a ring circuit for pneumatically atomized heavy fuel oil burners.



Below is a description, as an example, of some available solutions for oil preheating fuel supply to the burner.
The daily storage service tank (no. 1 in the figure) is heated by a service boiler (no. 7) with a steam or hot water boiler; its target is to keep the heavy fuel oil liquid enough to keep the necessary pressure inside the ring circuit.
The capacity of the service tank (no. 3) provides, if necessary, an additional temperature difference before supplying the oil to the burner (no. 5).
The burners themselves are supplied through degassing tanks (no. 4), which allow to separate the gas which forms in the heated fuel oil.
On the back, below item no. 6, there's a pressure regulator.

CIB UNGAS can supply, upon request, pumping units for diesel and heavy fuel oil, pressure regulators and degassing tanks.

VARIABLE SPEED DRIVE FOR ELECTRONICALLY CONTROLLED BURNERS

The burner fan motors can be driven directly, or indirectly through a frequency converter (Variable Speed Drive, VSD).
In order to equip a burner with a frequency converter, first select an electronically controlled model (EB, ED, EI, EK, EG, ER, LG, LR); then select a VSD based on the power of the burner fan (see table below on this page).

For example: burner model N880X is equipped with an 18,5 kW fan motor, thus select an 18,5 kW VSD + braking chopper.

SUPPLY LIMITS AND CONDITIONS

Frequency converter loose supplied
- Inverter equipped with metal backplate suitable for wall mounting; IP54/IP55 protection class.
- Braking resistors (b. chopper) are loose supplied (IP54).
- Electromagnetic filter (EMC) class A2 or A1/B (suitable for shielded cable up to 20 m).

Frequency converter with electrical cabinet
- Frequency converter (IP20 protection class), built-in inside the burner electrical cabinet (IP55 protection class).
- Braking resistors (b. chopper): IP54 protection class.
- Electromagnetic filter (EMC) class A1/B (suitable for shielded cable up to 20 m).
- Select a burner equipped with cabinet-type control panel; see cabinets specifications, next page.

INVERTER CONVERTER TABLE					
Burner type	Fan motor power kW	Inverter power kW	Braking resistors (opzion)	VSD protection class	Braking resistors protection class
91	4,0	4,0	-	IP20 / IP54	-
91	4,0	4,0	-	IP20 / IP54	-
92	5,5	5,5	-	IP20 / IP54	-
93/RX92R/RX92.1/ HRX92R/HRX92.1	7,5	7,5	-	IP20 / IP54	-
512	9,2	11,0	-	IP20 / IP54	-
515	11,0	11,0	-	IP20 / IP54	-
520	15,0	15,0	-	IP20 / IP54	-
525	18,5	18,5	-	IP20 / IP54	-
G258A	4	4	-	IP20 / IP54	-
G335A/G225X/G270X	5,5	5,5	-	IP20 / IP54	-
G380A/G400A/G325X/ H365X	7,5	7,5	-	IP20 / IP54	-
H440X/H500X/H630A/ H685A	9,2	11,0	-	IP20 / IP54	-
K590X/K660X/K750X/ K750A/K880A/K990A	15,0	15,0	-	IP20 / IP54	-
1025 / N880X	18,5	18,5	• (included)	IP20 / IP55	IP54
1030 / N925X / N1060A	22,0	22,0	• (included)	IP20 / IP55	IP54
1040 / N1060X / N1300A	30,0	30,0	• (included)	IP20 / IP55	IP54
2050R / 2050	37,0	37,0	• (included)	IP20 / IP55	IP54
2060	45,0	45,0	• (included)	IP20 / IP55	IP54
2080	55,0	55,0	• (included)	IP20 / IP55	IP54

Note: packaging included (wooden crate suitable for road transport).
Standard UE power supply: 400 V AC 3ph. 50 Hz; other options available, please make an inquiry if interested.
Shielded cable between burner motor and VSD: not included. If design specifications require a cable longer than 20 m, please make request for a higher-class EMC filter.
Inverters for smaller burners (not included in the table): available on request, please contact nearest CIB Unigas branch office.

Attention: burners in EB, ED, EI, EK, EG, EP, ER, LG or LR configuration can work exclusively through a VSD coupled to the fan motor.
It is also possible to provide a modified burner, configured for inverter, but additionally equipped with a delta-star starter.
The customer may then decide whether or not to use the inverter according to project requirements.
This option must be requested during quotation phase, before order.

Separate electrical panels for burners

Standard burners are provided with integrated electrical panels which include all electronic automation and all necessary components for a correct and reliable operation.
Alternative solutions to the integrated control panel are available upon request:
- Wall mounted control panel according to customers' specifications.
- Floor standing electrical panel; it has its base, and it is provided with a tilting panel.
- Large electrical panel with base plate (Closet type); this type of panel allows to mount an inverter or other necessary electronical equipment.

All electrical panels are provided with a door lock.



Floor standing

Maximum dimensions			
Electrical panel type	width [mm]	depth [mm]	height [mm]
Floor standing	600 - 1000	500	1000
Closet type	600	400	2000
Wall mounted	400 - 600	200 - 300	600 - 700



Closet type

Protection degree of self-supporting switchboards: IP55 (or higher upon request)

The dimensions indicated are valid for the configurations widely used in boiler rooms.
Based on the specifications of the heating system, it is possible to realize electrical panels of different sizes, or prepare one common electrical panel to several burners.

Note: If you select the option "control cabinet type", you need to specify the cable entry position (cable entry from the bottom or top of the electrical panel housing).

Note: Some combinations have restrictions on the passage of signals from and to the outside to electronical equipment. To order a special electrical cabinet, the length of the electrical connections between the panel and the burner must be worked out in advance.

For burners with a special configuration, please ask our Technical Department.



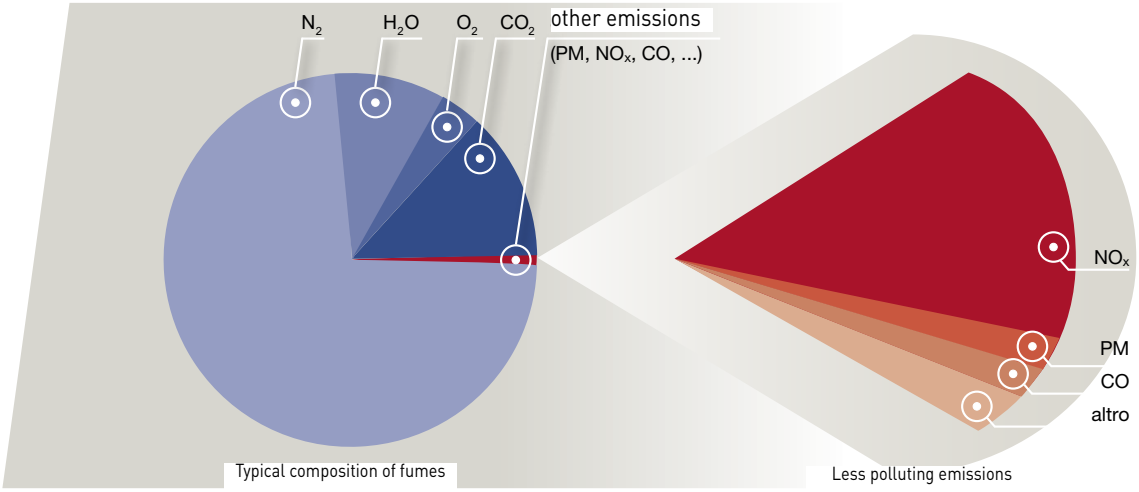
Wall mounted

EMISSIONS

The subject of emissions is very wide and complex. The scientific literature in this field is under continuous update and there's no way to describe it briefly.
The boiler room is a source of pollution caused by the combustion of hydrocarbons. Combustion products consist mainly of nitrogen, carbon dioxide and steam delivered into the atmosphere through the chimney. The products of secondary combustion include a long list of chemicals, such as (CO), nitrogen oxides (NOx), fine particulate matter (PM) and others. The normatives in force provide their max limits.

The level of emissions depends on many factors, including:
- fuel composition;
- shape of the combustion chamber and characteristics of the boiler;
- type of burner head.

For example, liquid fuels usually contain sulphur and other impurities.
These substances do not burn, therefore, if there is a need to reduce emissions, it is necessary to use a highperformance burner or to use complex systems for the treatment of fumes.
The emissions of nitrogen oxide also depend on the characteristics of the combustion chamber and the combustion head.
Due to the fact that the limit values required by the technical standards for the environmental protection are more and more restricted it is necessary to pay particular attention to propose a correct choice of burner and boiler.
CIB UNIGAS Technical Management keeps always an eye on new technologies to reduce emissions. For these reasons CIB UNIGAS has been investing in the development of low environmental impact burners.



All CIB UNIGAS burners are certified for both gaseous and liquid fuels in accordance with European standards and meet the requirements for polluting emissions.
Measurements of CO and NOx emissions are carried out on standard size boilers, on all test conditions.

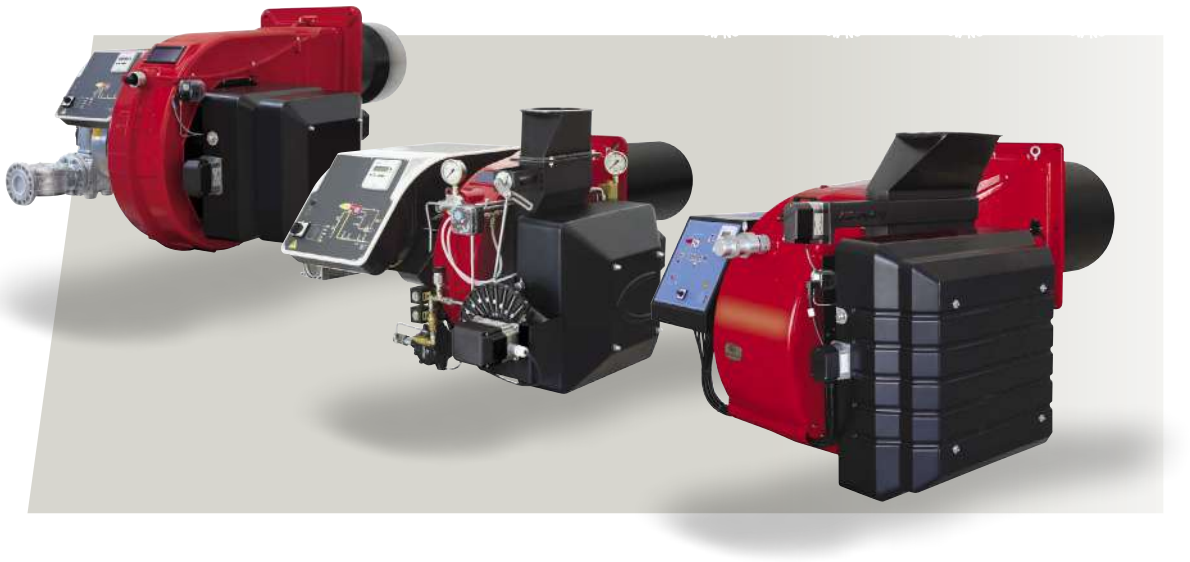
Type of fuel	Burner class	Unit of measurement	*CO*	*NO_x*	Regulations
gas naturale	Class 1	mg/kWh	100	170	UNI EN 676
gas naturale	Class 2	mg/kWh	100	>80 <120	UNI EN 676
gas naturale	Class 3	mg/kWh	100	>60 <80	UNI EN 676
gas naturale	Class 4	mg/kWh	100	<60	UNI EN 676
gas GPL	Class 1	mg/kWh	100	230	UNI EN 676
gas GPL	Class 2	mg/kWh	100	180	UNI EN 676
gas GPL	Class 3	mg/kWh	100	140	UNI EN 676
gas GPL	Class 4	mg/kWh	100	110	UNI EN 676
gasolio	Class 1	mg/kWh	110	250	UNI EN 267
gasolio	Class 2	mg/kWh	110	185	UNI EN 267
gasolio	Class 3	mg/kWh	60	120	UNI EN 267

TABLE: LIMIT VALUES FOR EMISSIONS OF NITROGEN OXIDES AND CARBON MONOXIDE ACCORDING TO THE EUROPEAN STANDARD

CIB UNIGAS burners, NOx emissions:
- Low NOx gas burners correspond to Class 2, Ultra Low NOx burners without FGR correspond to Class 3.
- LPG burners correspond to Class 1, Low NOx LPG burners correspond to Class 3;
- Oil burners have a maximum NOx emission of 250 mg/kWh (Class 1);
- Heavy fuel oil burners (non-standard fuel oil) can, in the worst case, reach a maximum NOx emission of 700 mg/kWh.

CIB Unigas also offers Low NOx solutions for complex systems and revamping of existing plants.
As far as carbon monoxide (CO) is concerned, a properly set CIB UNIGAS burner delivers a very small CO level.

If necessary, CIB UNIGAS offers FGR (Flue Gas Recirculation) solutions – these are burners with flue gas recirculation system which deliver emissions of less than 50 or 30 mg/kWh. Burners with FGR are designed for installations with Low NOx emissions requirements, such as greenhouses or boilers in large residential areas where low levels of contaminants are a priority. Our FGR solutions meet environmental impact requirements.



Often non-EU countries follow different normatives and measurement conditions. To ensure that the levels of pollutant emissions are always correct, it is necessary to know exactly the conditions in which tests were carried out, i.e. measurement of the gas, the error, type of fuel, boiler size, atmospheric conditions, etc.
In addition, standards can use different units of measurement*. Therefore for the comparison, it is necessary to translate the limit values expressed as follows in mg/kWh (milligrams per kilowatt hour), using the correct formula, depending on the selected fuel and residual oxygen in the exhaust gases.
* For example: ppm (parts per million), mg/Nm3 (milligrams per normal cubic meter), etc.

SULFUR OXIDES EMISSIONS

The polluting emissions of sulfur oxides (SOx) mainly include sulfur dioxide (SO2) and trioxide (SO3). These chemicals are particularly aggressive and dangerous, both for the environment and human health.
However, sulfur oxides represent a separate case from CO and NOx since their production d uring hydrocarbons combustion does not depend on the burner, nor on the boiler, but only on the quantity of sulfur already present in the fuel upstream of the process.
On the one hand, higher quality, gaseous fuels (methane, LPG) include insignificant amounts of sulfur, and the use of these fuels minimizes hazardous emissions. On the other, the problem is evident in liquid fuels (especially crude oil and heavy fuel oil), whose composition always includes a certain amount of sulfur - it will inevitably be oxidized in the combustion chamber and emitted as SOx pollutant.

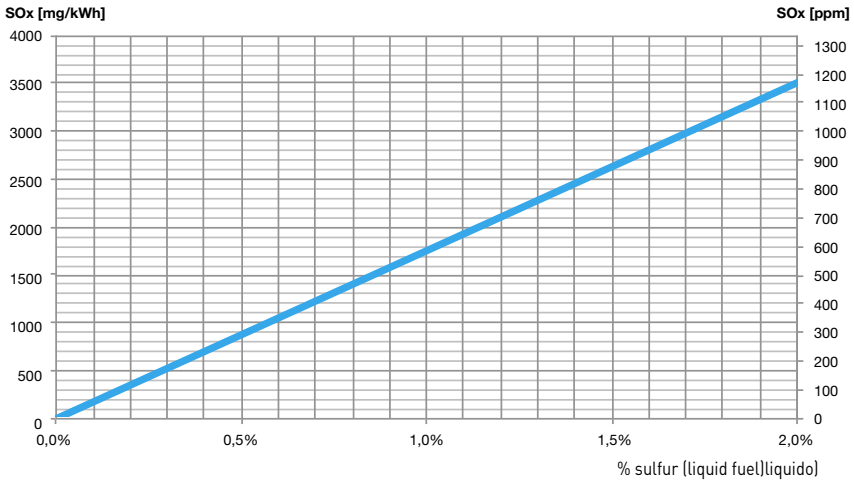
It is possible to estimate the quantity of SOx produced with the diagram on this page, or with the following procedure.
Given the quantity of sulfur present in the fuel (expressed as a percentage by mass), just multiply this value by a numerical factor, 1.750.
The resulting number represents the emissions of SOx at the chimney, expressed in mg/kWh.

Example
Given a fuel that contains 0,5 % sulfur, SOx emissions will be equal to
0,5 x 1.750 = 875 mg/kWh.

Conversely, once the SOx emission limit is known for a given thermal plant, it is possible to calculate the maximum admissible sulfur concentration in the fuel, dividing by the same coefficient above.

Example
Let's assume that emission limit required by project specifications is 300 mg/kWh SOx.
The maximum percentage of sulfur in the fuel can be 300 : 1.750 = 0,17
The numerical result represents directly the percentage in mass: 0,17 %.

If the fuel oil contains a higher fraction of sulfur, the required limit will be exceeded, regardless of burner or boiler selection!



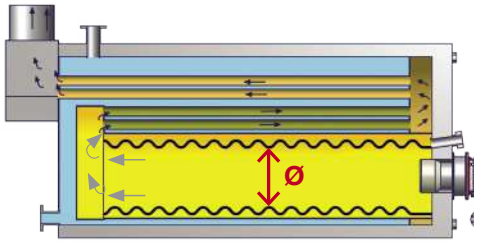
Reference conditions
Heavy fuel oil with net heating value Hi = 9.800 kcal/kg
Residual oxygen at the chimney O2 = 3 % (λ = 1,15)

WHY DIFFERENT THERMAL GROUPS RELEASE DIFFERENT LEVELS OF NITROGEN OXIDES AT THE SAME OUTPUT?

The CO, NOx and other pollutants are strongly influenced by a number of factors, not always burner related. There are factors independent from the thermal plant, such as environmental conditions (altitude, humidity, fuel composition, etc...) and factors related in particular to the design of the generator. The most important factors are summarized below.
It becomes evident that burner and boiler must be evaluated as a single thermal group, in order to comply to the rule on emission levels, or to the specific requirements of designers. The correct match between burner and boiler is discussed in greater detail on the following pages.

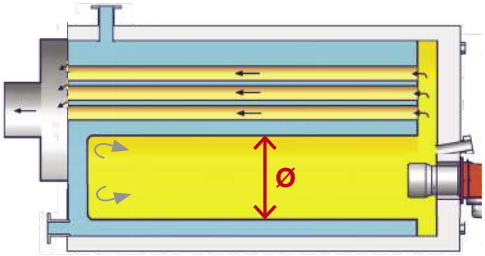
BOILER TYPE

- type of generator (reverse flame, or 3 smoke-pass)
- dwell time of the flame within the combustion chamber
- heat exchange surface
- temperature and type of heat transfer fluid



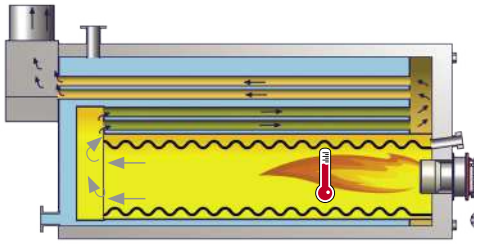
DIMENSIONS OF THE COMBUSTION CHAMBER

- combustion chamber internal gas circulation
- dwell time of the flame within the combustion chamber
- thermal load of the chamber



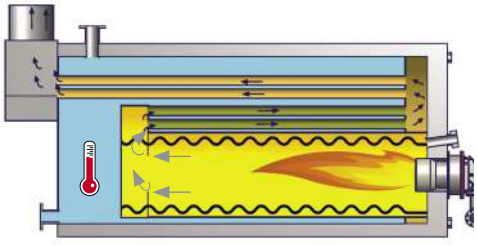
THERMAL LOAD OF THE COMBUSTION CHAMBER

- flame temperature
- speed at which the NOx is formed



BOILER TEMPERATURE

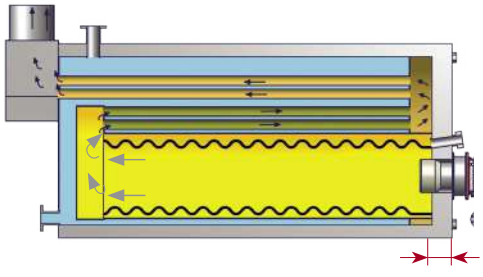
- flame temperature
- speed at which the NOx is formed



THICKNESS OF THE REFRACTORY OR BOILER DOOR

- length of the combustion head
- internal combustion gas circulation

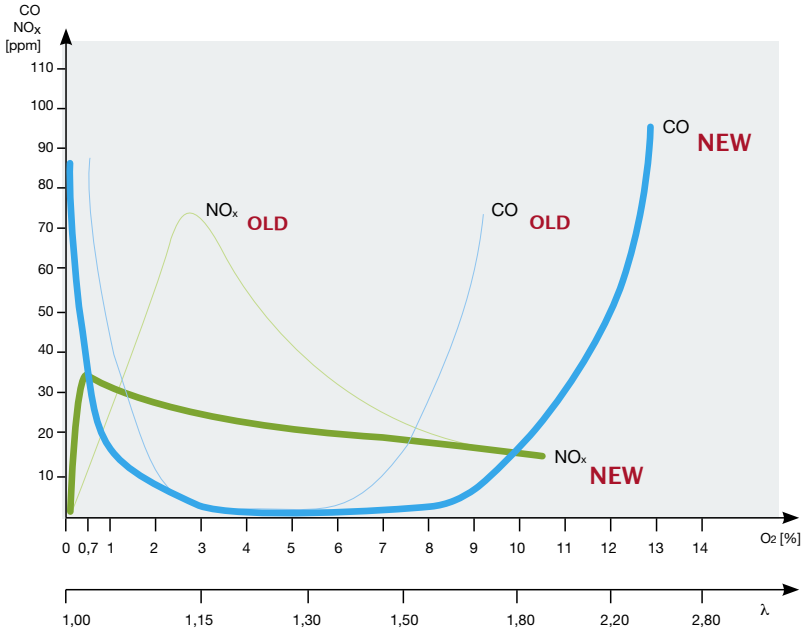
Reverse flame boilers: contact our Technical Department.



Relation between NOx emissions and CO

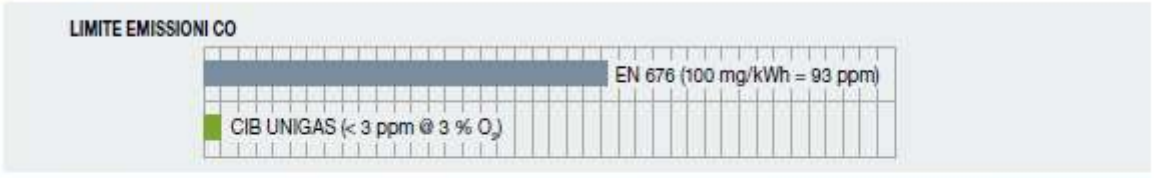
Emissions of nitrogen oxides and carbon monoxide are strongly cor related as both depend on the stoichiometry of the combustion. Excess of air af fects both emissions and the efficiency of the generator. In a logic of compromise, reducing fuel consumption requires a reduction of excess air.
The limit is given by the emission of CO.
In the burners of the previous generation this choice had priority on NOx emissions.

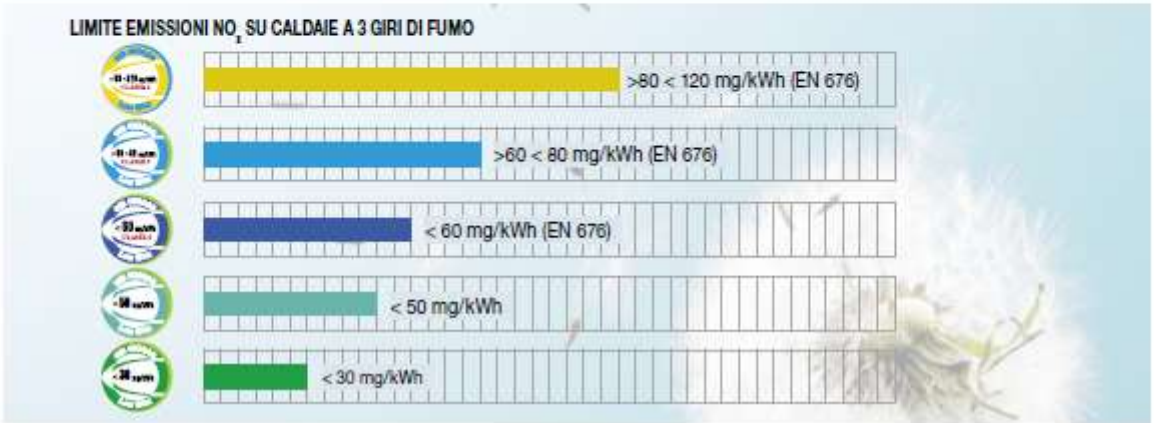
THE "ECOLOGIC" BURNER SERIES HAS REACHED A GREAT GOAL: WIDE RANGE OF COMBUSTION FLEXIBILITY



The development of low burners emissions represent a real revolution in the way NOx and CO interact when changing the excess of air.
The new series of Low NOx burners from the CIB UNIGAS ensures zero CO values in a very wide range of operation, with residual oxygen between 0,5 % and 8 %, while maintaining low NOx emissions almost constant.
The advantage is obvious: the careful choice of the the generator makes possible, for example, to set the oxygen at 1,5 % without formation of CO; increasing the efficiency of the thermal group without deteriorate the NOx emissions.
Economical and ecological.

ECOLOGIC





Reverse flame boilers: contact our Technical Department.

The procedure to match a burner and evaluate the emissions attainable by a thermal unit can be divided in a few simple steps. The first one is to check the operating point of the generator and select a suitable burner size. The next step is to calculate the thermal load of the combustion chamber and use this data to estimate NOx emissions.
In the case of standard boilers, proceed in the following way.

Introduction

To choose the proper burner, the following data are necessarily required:
- Boiler type
- Burner input
- Backpressure in the combustion chamber
- Dimensions of the combustion chamber included the reverse smoke chamber
- NOx emissions requested, 80, 50, 30 mg/kWh.

The counting procedure is divided into three steps:
- choosing the burner;
- choosing the depowenty burner output to obtain the correct emissions;
- choosing the combustion head length.

BURNER SELECTION FOR NOx < 80 mg/kWh

Reference conditions
- Measurement tolerances according to EN 676 standard
- Temperature: 20 °C
- Dried flue gases
- Barometric pressure: 1013 millibars

- Relative humidity: 70 % (equivalent to 10 g H2O/kg of air)
- Boiler temperature: 110 °C
- Fuel: G20 (natural gas, 100 % CH4)
- Three-smoke pass boiler

CHOOSING THE BURNER

To clearly explain the procedure about choosing a suitable burner, please follow the example:

Boiler type	3 pass
Furnace input	950 kW
Backpressure in the combustion chamber	6 mbar
Dimensions of the combustion chamber	Length L = 1.750 mm (1,75 m)
Smoke reverse chamber	Length L = 250 mm (0,25 m)
Total length of the calculation	Length TL = 2.000 mm (2,0 m)
Diameter	Diameter D = 680 mm (0,68 m)
Calculation combustion chamber volume	D x D x 0,78 x TL
	0,68 m x 0,68 m x 0,78 x 2,0m = 0,72 m³
Calculation thermal load	950 kW /0,72 m³ / 1.000 = 1,31 MW/m³
Gas type	Natural gas

Procedure
First, identify the burners whose requested output is included with in their performance curves.

BURNER PERFORMANCE CURVE

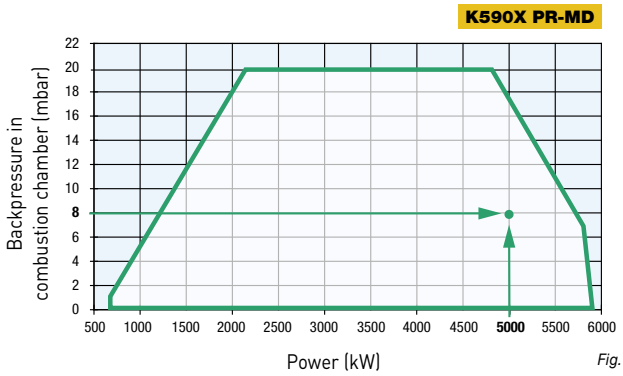


Fig. 1

The required operating point is inside of Low NOx burner model E115X (Fig.1).

NOx DIAGRAM IN RELATION TO THE THERMAL LOAD OF THE BOILER

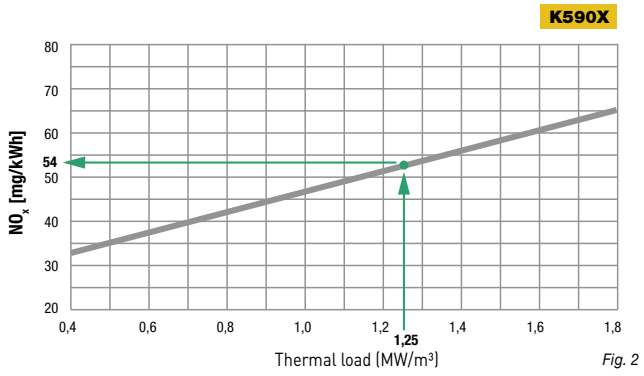


Fig. 2

In the thermal load - NOx diagram (Fig. 2) of the selected burner, find the calculated thermal load, draw a vertical line to meet the the NOx curve and read the value on the ordinate.

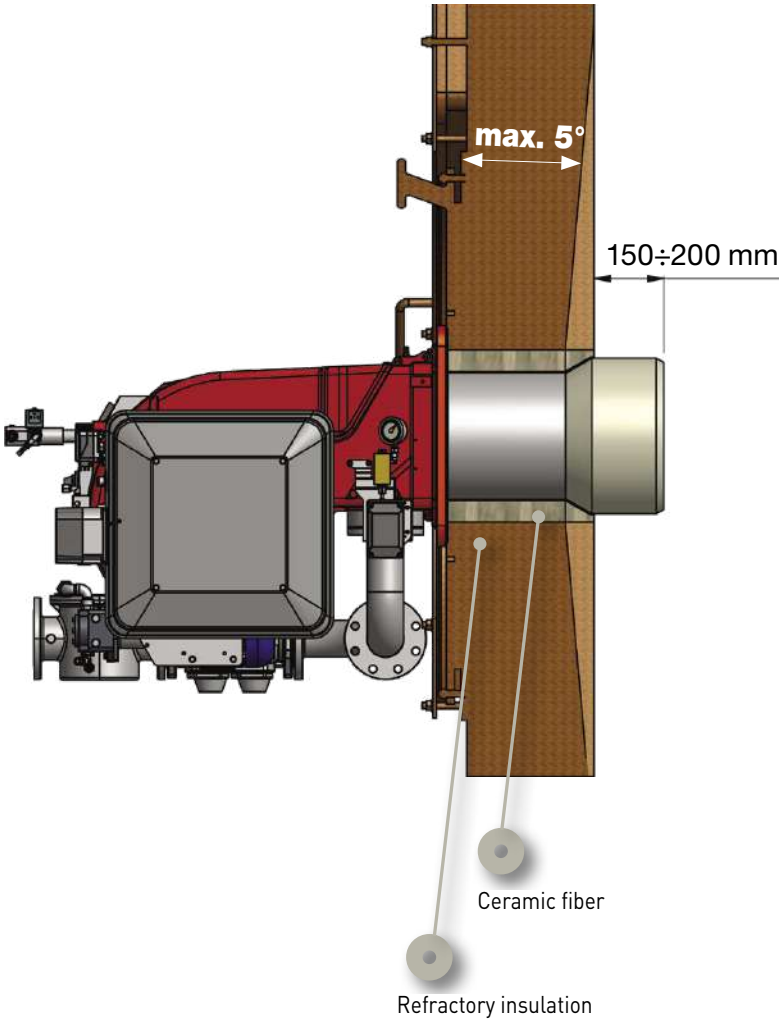
In the example, it is possible to estimate an emission of approximately 62 mg/kWh at 3% O2 of NOx.
Diagrams of the various models are given on the following pages.

COMBUSTION HEAD LENGTH SELECTION

The final step is to check combustion head dimensions, in relation to combustion chamber, because they are a critical parameter to obtain the expected emissions.
Two conditions should be met:
1) It is recommended that the diameter of the chamber is 2,5 to 3 times larger than the diameter of the burner combustion head.
2) The low NOx combustion head must penetrate 150÷200 mm into the combustion chamber.

In the cited example, the boiler chamber diameter was 680 mm, so the optimal combustion head diameter lies in the range between 215 mm and 270 mm.
The dimensional table on page 95 or 100 shows that E115X combustion head diameter is equal to 219 mm, thus the first condition is met.
Regarding the combustion head length, suppose the boiler door is 219 mm thick, refractory included. The combustion head must penetrate at least 150 mm as said above, thus the long combustion head variant is selected (390 mm). The short combustion head (305 mm) is insufficient as it only penetrates by 85 mm into the combustion chamber.
In this case we have 170 mm.
To properly install the burner, please refer to Fig. 3 to the side.
Of course, it is possible to carry out the reverse procedure as well: given an emission limit that cannot be exceeded by design, the NOx diagram provides the admissible thermal load for a given heat generator. This way, designer can select a suitable boiler based on project specifications and required power. In any case, burner combustion head dimensions must be checked to complete the matching procedure.

Reverse flame boilers: contact our Technical Department.

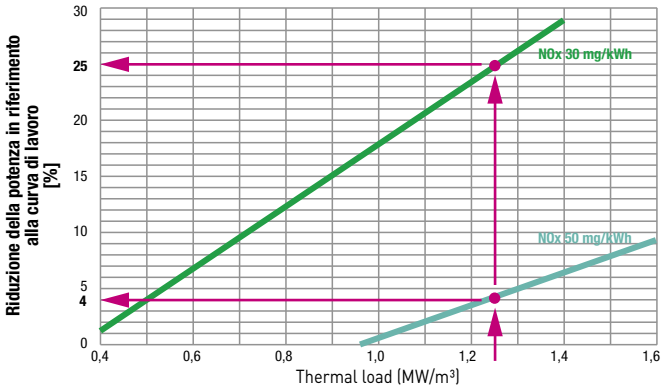


BURNER SELECTION FOR NOx < 50 mg/kWh e < 30 mg/kWh

With NOx < 50 mg/kWh and < 30 mg/kWh we need to have a smoke recirculation (FGR).
The smoke recirculation decreases a percentage of the performance curves and increases the backpressure in the combustion chamber. This percentage depend also of the thermal load of the combustion chamber.
In order to select the correct burner we can calculate the depowering percentage needed.

SELEZIONE 1: K590X...FRG

OUTPUT REDUCTION IN REFERENCE TO THE BURNER PERFORMANCE CURVE

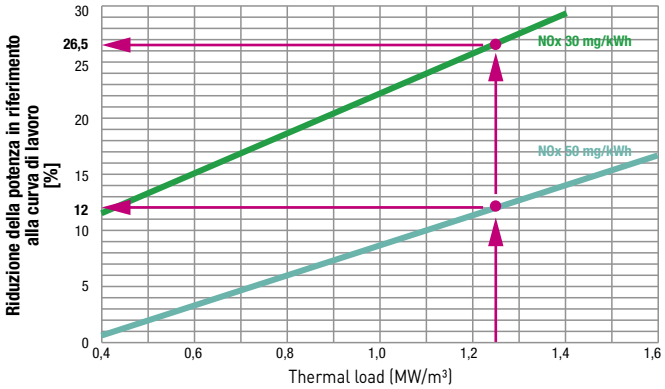


< 50 mg/kWh
In the selection 1 with the thermal load 1,31 MW/m³, the percentage of the depowering of the burner is 9 %.

< 30 mg/kWh
In the selection 1 with the thermal load 1,31 MW/m³, the percentage of the depowering of the burner is 21 %.

SELEZIONE 2: K750X...FGR

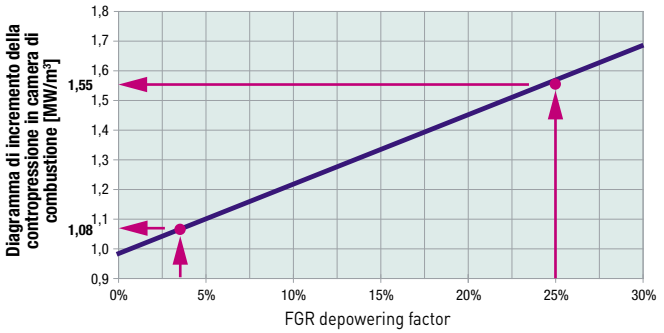
OUTPUT REDUCTION IN REFERENCE TO THE BURNER PERFORMANCE CURVE



< 50 mg/kWh
In the selection 2 with the thermal load 1,31 MW/m³, the percentage of the depowering of the burner is 0,2 %.

< 30 mg/kWh
In the selection 2 with the thermal load 1,31 MW/m³, the percentage of the depowering of the burner is 18 %.

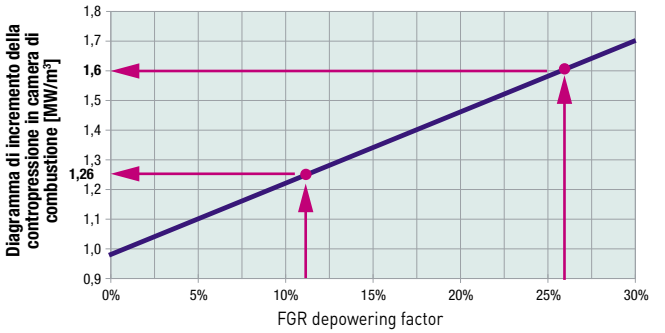
BACKPRESSURE IN THE COMBUSTION CHAMBER INCREASING FACTOR CHART (CALCULATE)



< 50 mg/kWh
In the selection 1 with the thermal load 1,31 MW/m³ the percentage of the depowering of the burner is 9 %, and the backpressure in the combustion chamber increases
6 mbar x 1,2 = 7,2 mbar.

< 30 mg/kWh
In the selection 1 with the thermal load 1,31 MW/m³, the percentage of the depowering of the burner is 21 %, and the backpressure in the combustion chamber increases
6 mbar x 1,48 = 8,9 mbar.

BACKPRESSURE IN THE COMBUSTION CHAMBER INCREASING FACTOR CHART (CALCULATE)

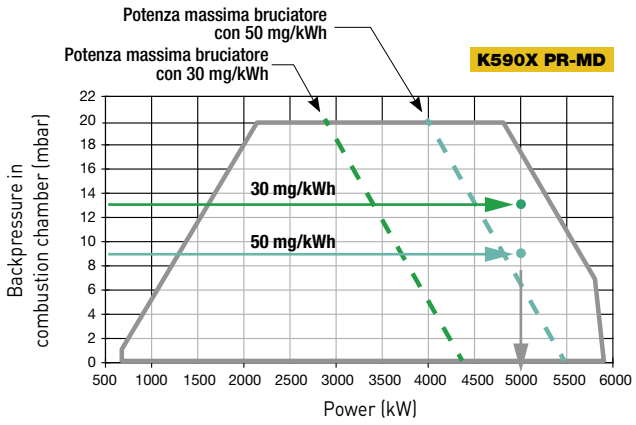


< 50 mg/kWh
In the selection 2 with the thermal load 1,31 MW/m³ the percentage of the depowering of the burner is 0,2 %, and the backpressure in the combustion chamber increases
6 mbar x 1,01 = 6,06 mbar.

< 30 mg/kWh
In the selection 2 with the thermal load 1,31 MW/m³, the percentage of the depowering of the burner is 18 %, and the backpressure in the combustion chamber increases
6 mbar x 1,43 = 8,58 mbar.

SELEZIONE 1: K590X...FGR

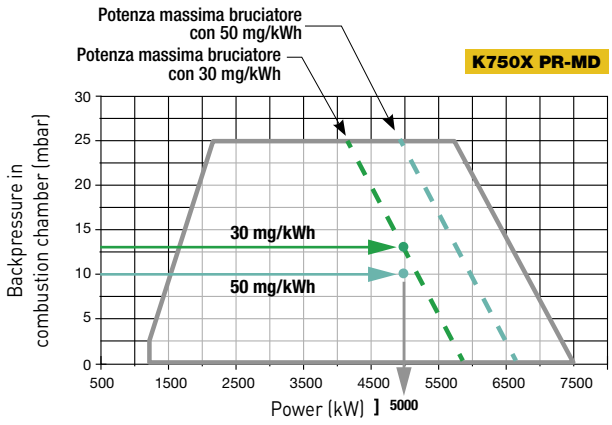
POWER REDUCTION IN RELATION TO THE BURNER WORKING CURVE



The burner E115X in the selection 1 is outside of the performance curve, for this reason we can not choose this burner.

SELEZIONE 2: K750X...FGR

POWER REDUCTION IN RELATION TO THE BURNER WORKING CURVE

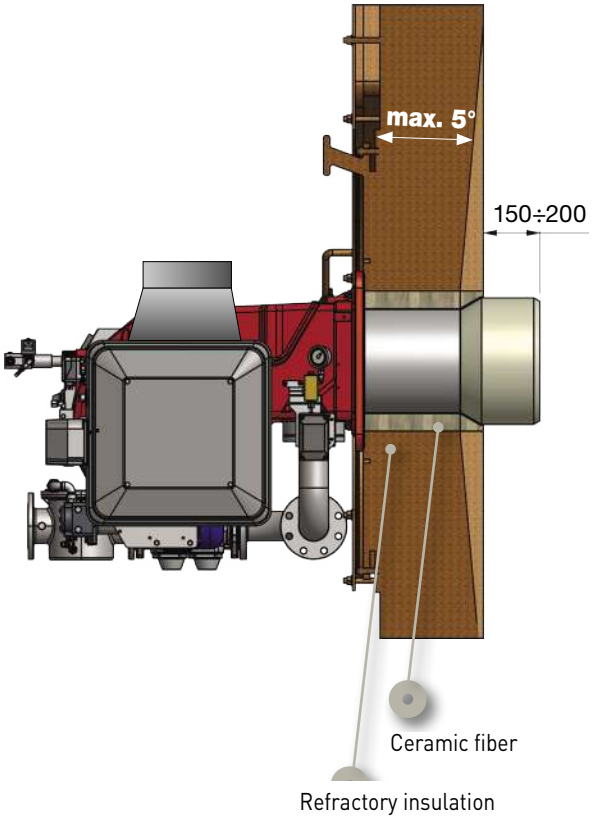


The burner E150X in the selection 2 is correct because is inside of the performance curve with emissions 50 and 30 mg/kWh.

COMBUSTION HEAD LENGTH SELECTION

In the cited example, the boiler chamber diameter was 680 mm, so the optimal combustion head diameter lies in the range between 215 mm and 270 mm.
The dimensional table on page 95 or 100 shows that E150X combustion head diameter is equal to 259 mm, thus the first condition is met.
Regarding the combustion head length, suppose the boiler door is 220 mm thick, refractory included. The combustion head must penetrate at least 150 mm as said above, thus the short combustion head variant is selected (400 mm).
The long combustion head (500 mm) penetrate too much (280 mm) into in the combustion chamber.
In this case with short combustion head we have 180 mm.
To properly install the burner, please refer to Fig. 4 to the side.
Of course, it is possible to carry out the reverse procedure as well: given an emission limit that cannot be exceeded by design, the NOx diagram provides the admissible thermal load for a given heat generator. This way, designer can select a suitable boiler based on project specifications and required power. In any case, burner combustion head dimensions must be checked to complete the matching procedure.

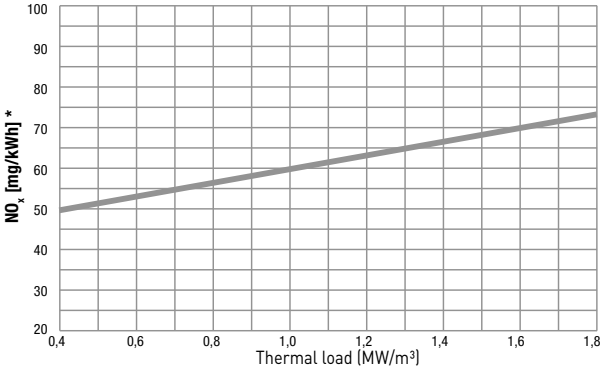
Reverse flame boilers: contact our Technical Department.



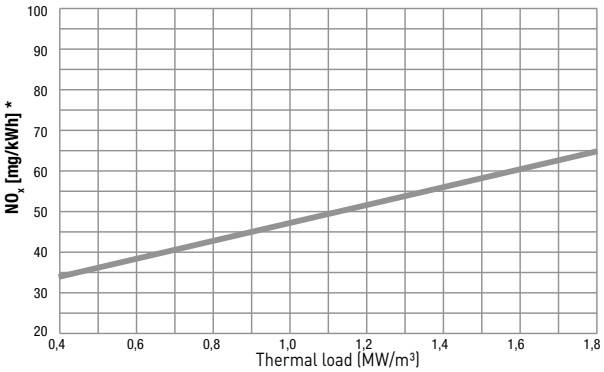
MATCHING LOW NOx BURNER AND HEAT GENERATOR

NOx DIAGRAM IN RELATION TO THE THERMAL LOAD OF THE BOILER

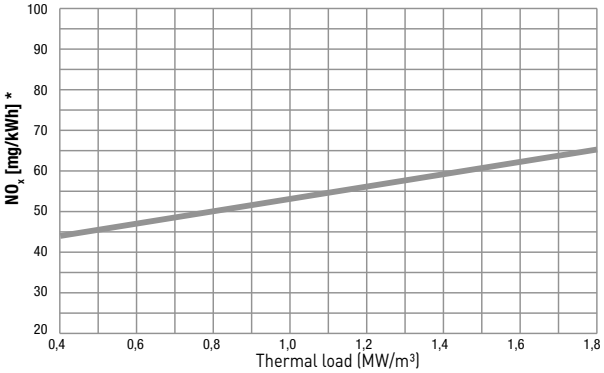
RX92R **HRX92R...MG**



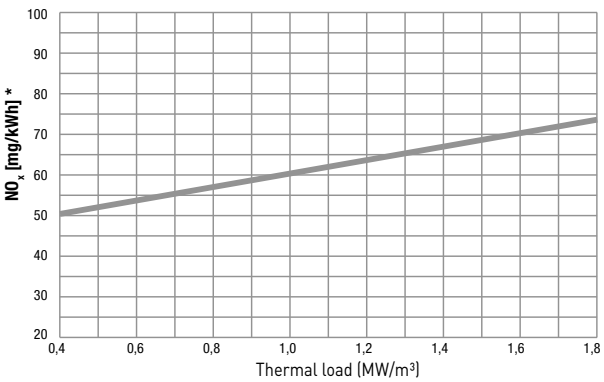
RX92.1 **HRX92.1...MG**



G225X **G225X...MG**

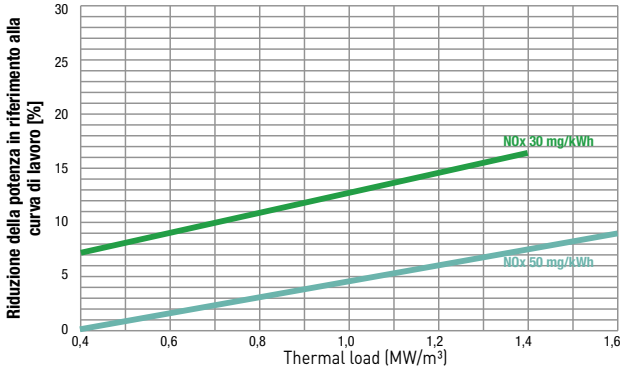


G270X **G270X...MG**

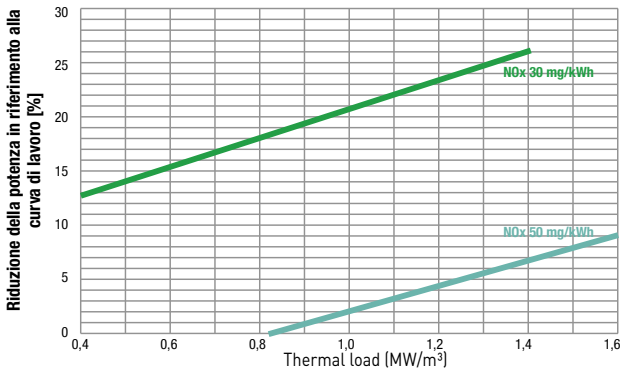


POWER REDUCTION IN RELATION TO THE BURNER WORKING CURVE

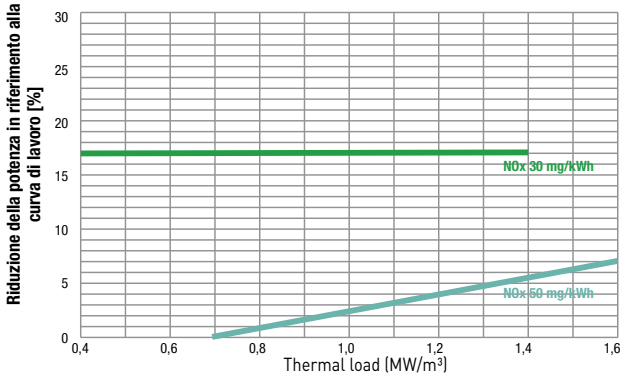
RX92R...FGR **HRX92R...MG...FGR**



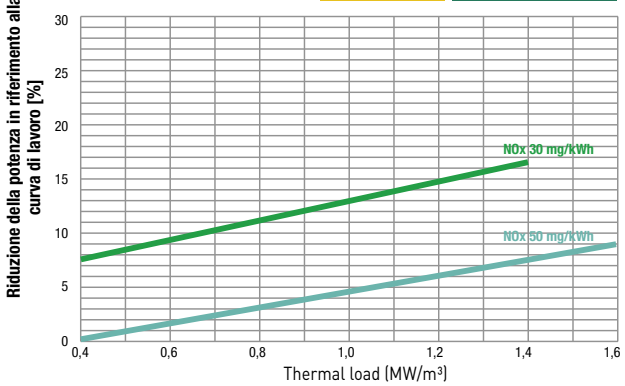
RX92.1...FGR **HRX92.1...MG...FGR**



G225X...FGR **G225X...MG...FGR**



G270X...FGR **G270X...MG...FGR**

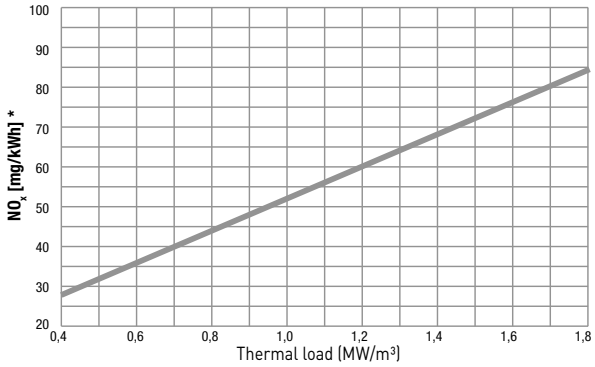


According to UNI EN 676 correction method; p amb 1013 mbar; t amb 20 °C; h 10 g/kg.

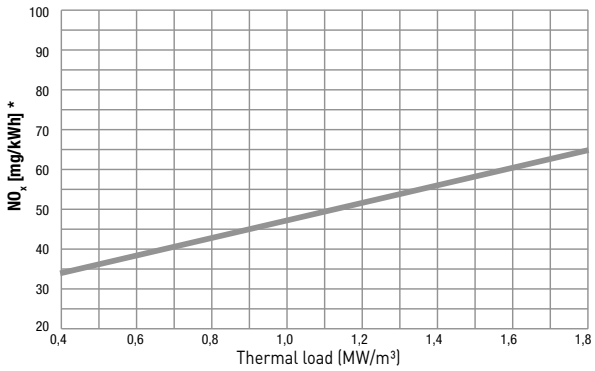
ABBINAMENTO BRUCIATORE LOW NOX - GENERATORE DI CALORE

NOx DIAGRAM IN RELATION TO THE THERMAL LOAD OF THE BOILER

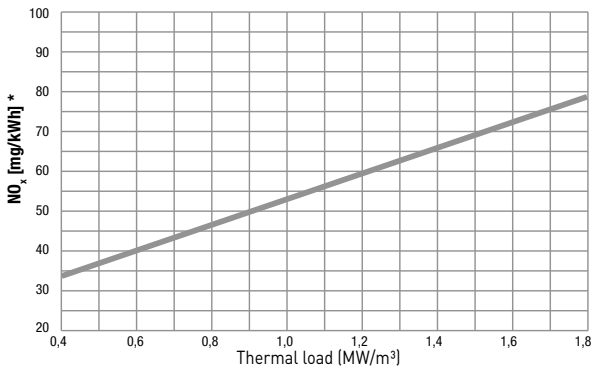
G325X **G325X...MG**



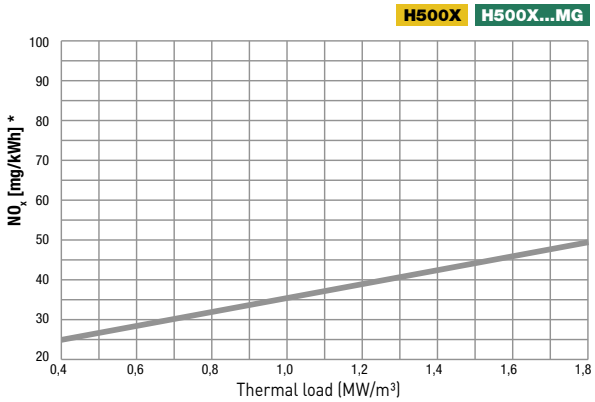
H365X **H365X...MG**



H440X **H440X...MG**

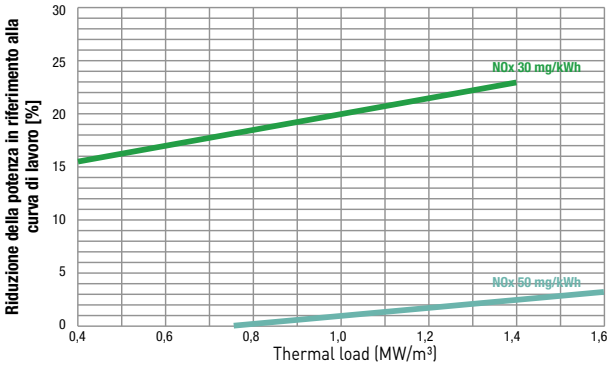


H500X **H500X...MG**

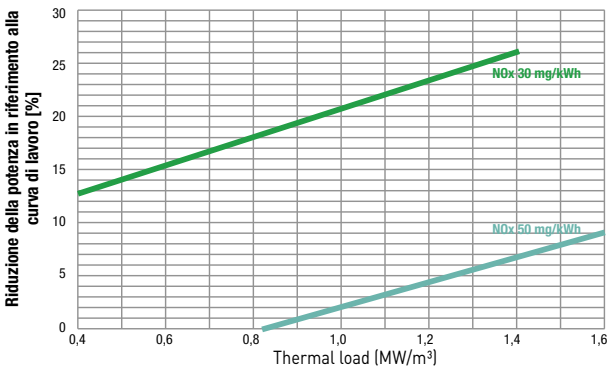


POWER REDUCTION IN RELATION TO THE BURNER WORKING CURVE

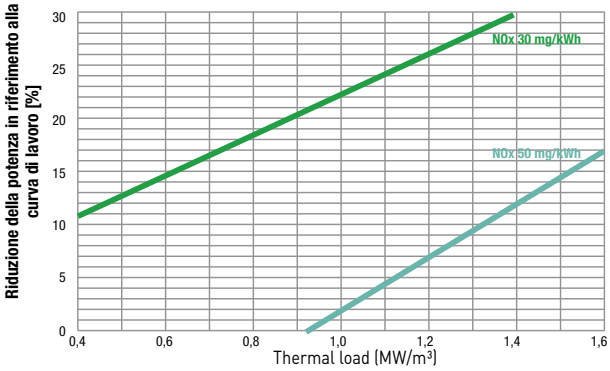
G325X...FGR **G325X...MG...FGR**



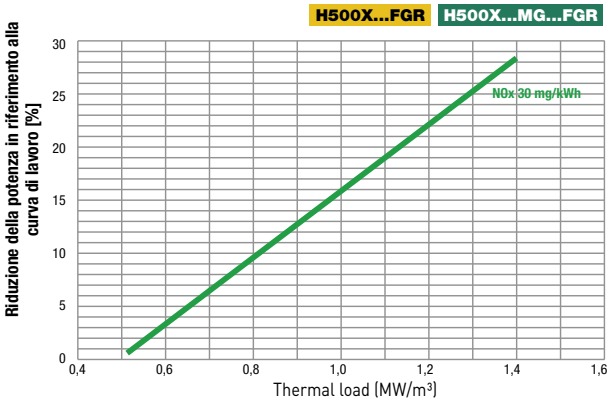
H365X...FGR **H365X...MG...FGR**



H440X...FGR **H440X...MG...FGR**



H500X...FGR **H500X...MG...FGR**

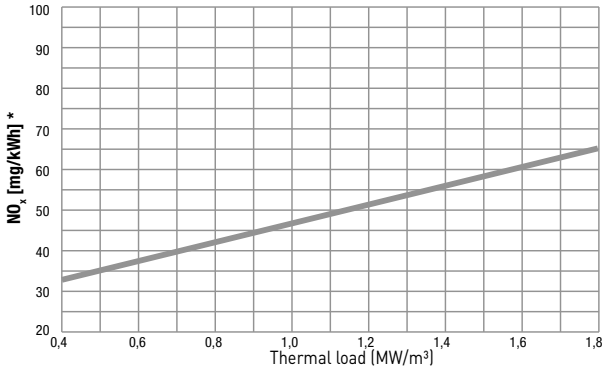


According to UNI EN 676 correction method; p amb 1013 mbar; t amb 20 °C; h 10 g/kg.

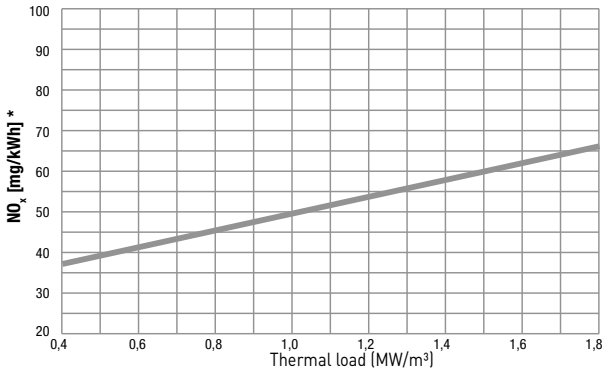
ABBINAMENTO BRUCIATORE LOW NOX - GENERATORE DI CALORE

NOx DIAGRAM IN RELATION TO THE THERMAL LOAD OF THE BOILER

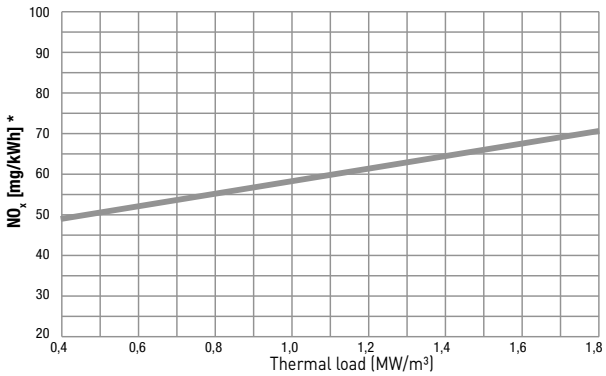
K590X **K590X...MG**



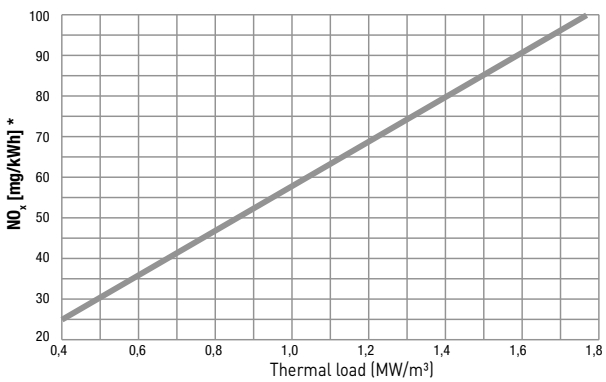
K660X **K660X...MG**



K750X **K750X...MG**

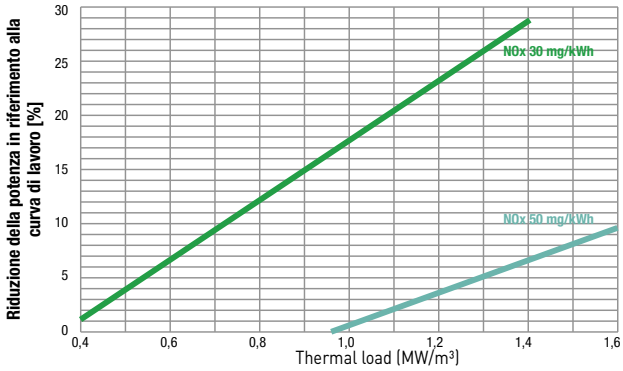


N880X **N880X...MG**

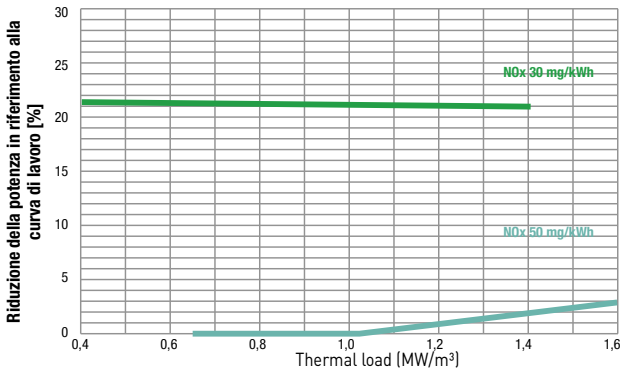


POWER REDUCTION IN RELATION TO THE BURNER WORKING CURVE

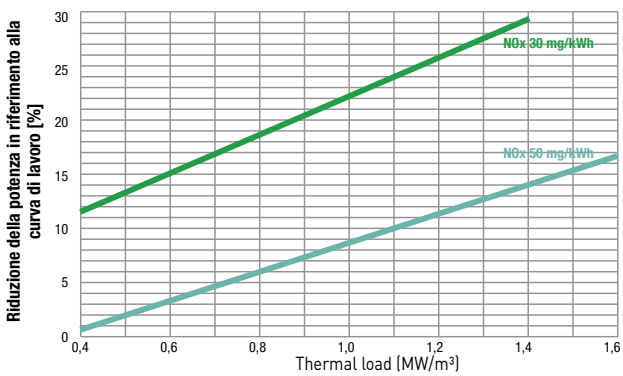
K590X...FGR **K590X...MG...FGR**



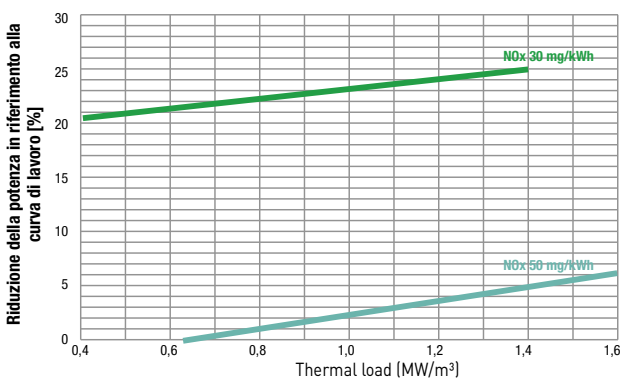
K660X...FGR **K660X...MG...FGR**



K750X...FGR **K750X...MG...FGR**



N880X...FGR **N880X...MG...FGR**

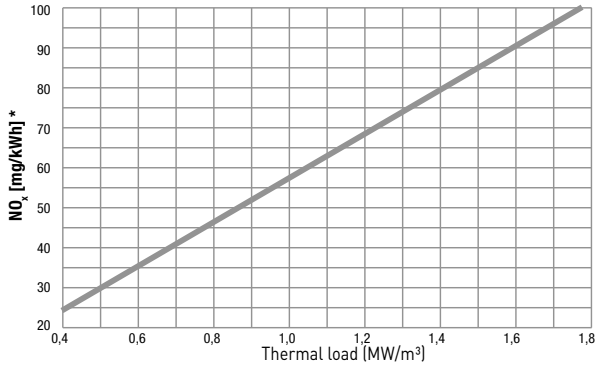


According to UNI EN 676 correction method; p amb 1013 mbar; t amb 20 °C; h 10 g/kg.

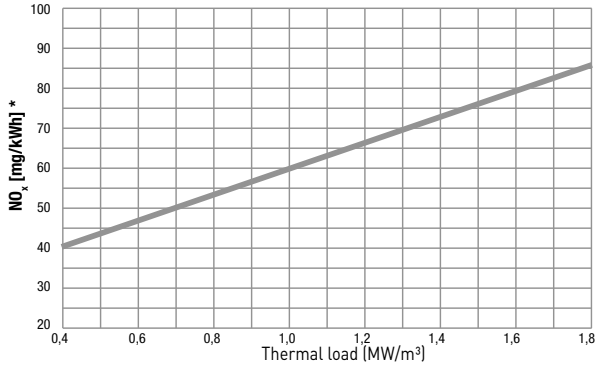
ABBINAMENTO BRUCIATORE LOW NOX - GENERATORE DI CALORE

NOx DIAGRAM IN RELATION TO THE THERMAL LOAD OF THE BOILER

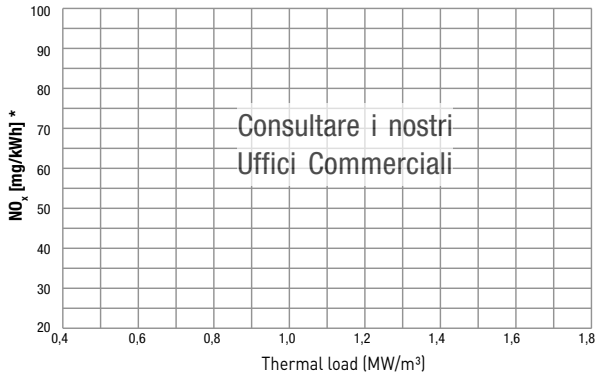
N925X **N925X...MG**



N1060X **N1060X...MG**

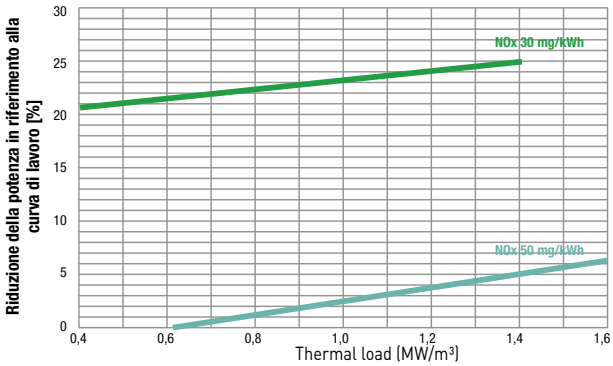


RX2050 - RX2060 - RX2080
HR2050 - HR2060 - HR2080...MG

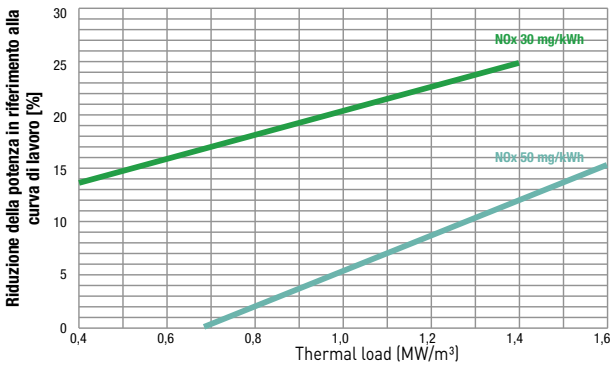


POWER REDUCTION IN RELATION TO THE BURNER WORKING CURVE

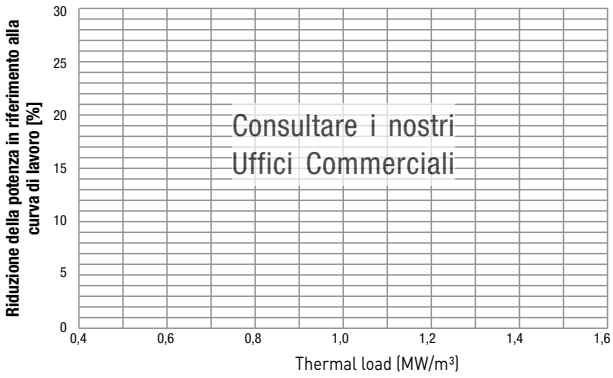
N925X...FGR **N925X...MG...FGR**



N1060X...FGR **N1060X...MG...FGR**

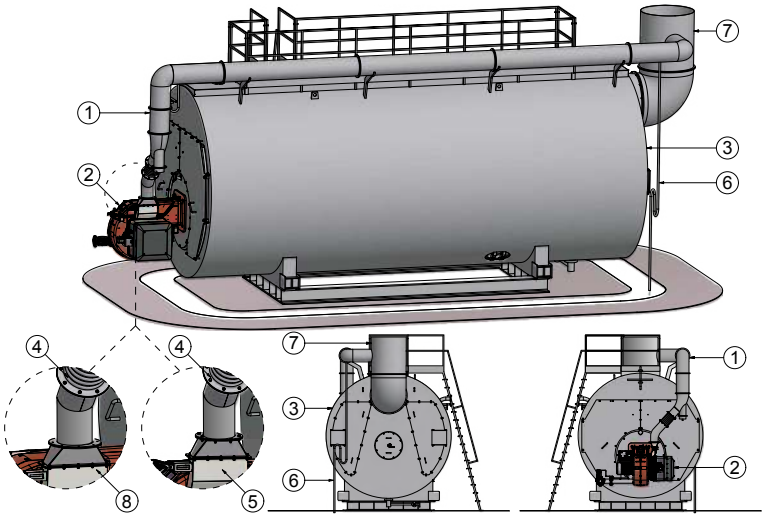


RX2050-RX2060-RX2080...FGR
HR2050-HR2060-HR2080...MG...FGR



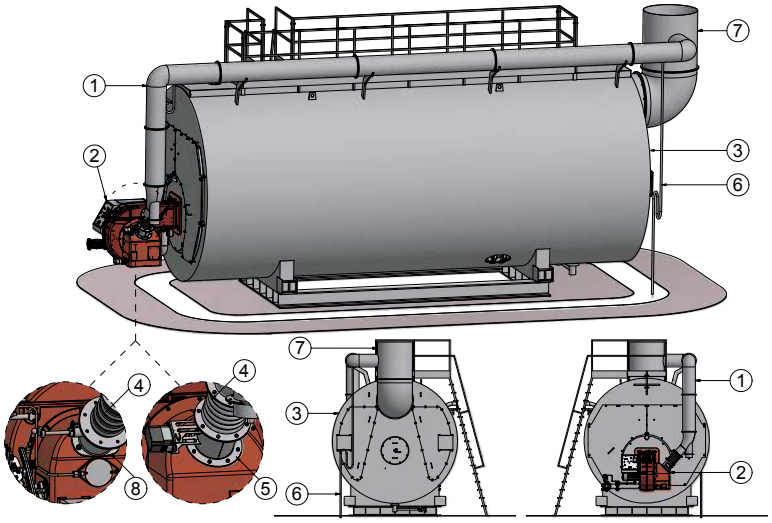
According to UNI EN 676 correction method; p amb 1013 mbar; t amb 20 °C; h 10 g/kg.

BURNER WITH AIR INLET SILENCER



Legend
1 - FGR pipe
2 - Burner with air inlet silencer
3 - Boiler
4 - Antivibrating joint
5 - FGR system 30 mg/kWh
6 - Condensate drain
7 - Chimney
8 - FGR system 50 mg/kWh

BURNER WITHOUT AIR INLET SILENCER



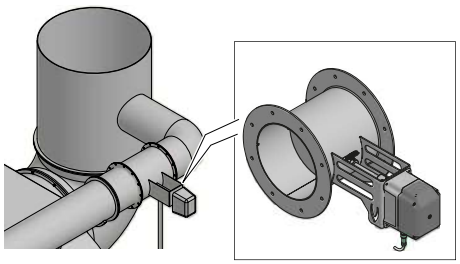
Legend
1 - FGR pipe
2 - Burner without air inlet silencer
3 - Boiler
4 - Antivibrating joint
5 - FGR system 30 mg/kWh
6 - Condensate drain
7 - Chimney
8 - FGR system 50 mg/kWh

BURNER LIGHT-OIL: ADDITIONAL DAMPER FOR EXCLUSION FGR

For burner Natural gas / light oil operation it is recommended to use an additional damper to close the flow of recirculation gas FGR.

Option 1: Damper with actuator
Connect the actuator to the electrical predisposition inside the electrical panel

Option 2: Damper manual
Damper manual with Opening / Closing signaling microswitches to be connected to the electrical predisposition inside the burner electrical panel.



Additional damper with actuator on chimney (option 1)

For the use of the FGR during light oil operation, please consult our sales offices.

ACOUSTIC HOODS BOX ASSEMBLED ON WHEELED FRAME

All burners in this catalogue have lower noise levels than the standard values.
If a further reduction of the burner noise is required, the customer has at disposal a series of acoustic hoods box that can be integrated in the system.
The noise reduction range varies from 5 to 15 dB(A), depending on the design specification. For more important reductions, please consult our technical department.





INPUT DATA FOR QUOTATION

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E-mail of the order department: ordini@cibunigas.it

COMPANY			
ADDRESS	CITY		CITY CODE
TEL. /		FAX /	

BOILER:

MANUFACTURER:	MODEL:	
BOILER TYPE:	SMOKE TUBES ☐	WATER TUBES ☐
BOILER OUTPUT: (kW)	STEAM PRODUCTION: (kg/h)	
BURNER OUTPUT: (kW)		
COMBUSTION CHAMBER PRESSURE: (mbar)		
COMBUSTION AIR TEMPERATURE (°C):		
COMBUSTION CHAMBER SIZE - LENGHT:	WIDTH (or dia):	HEIGHT:

THERMAL MEDIUM: ☐ STEAM ☐ WATER ☐ OIL ☐ HOT AIR

STEAM PRESSURE	bar
FEEDING MEDIUM TEMPERATURE:	°C
OUTLET MEDIUM TEMPERATURE (water, air, oil)	°C
FUEL DATA	

FUEL:	LOWER CALORIFIC VALUE (kcal/kg):	
DENSITY (kg/m^3):	VISCOSITY:	°E (a .....°C)
FUEL TEMPERATURE: (°C)		
PRESSURE AT GAS TRAIN INLET:	mbar	
OTHER:		

GENERAL:

POWER SUPPLY	VOLT	Hz
COMBUSTION CONTROL:	☐ ON-OFF	☐ HIGH-LOW FLAME
	☐ PROGRESSIVE	☐ MODULATING
REQUIRED TURN-DOWN 1		
PROBE:	☐ TEMPERATURE °C	☐ PRESSURE (bar) ☐ OTHER

REQUIRED COMPONENTS: ☐ BURNER ☐ CONTROL PANEL

☐ GAS TRAIN ☐ DRAUGHT AIR FAN

OIL HANDLING UNIT

☐ BACK OIL PUMP ☐ BACK UP OIL FILTER ☐ STEAM HEATER ☐ ELECTRIC HEATER

DRAUGHT FAN SPECIFICATION (when existing fan is used):

FLOW RATE (m^3/h)	AT	mbar OUTPUT PRESSURE
ELECTRIC MOTOR POWER (kW)	BLOWER MODEL	

NOTE:	
EDIT BY:	DATE:

Mod. 721-00 - Rev. 00

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Note: specifications and data subject to change.
Errors and omissions excepted.