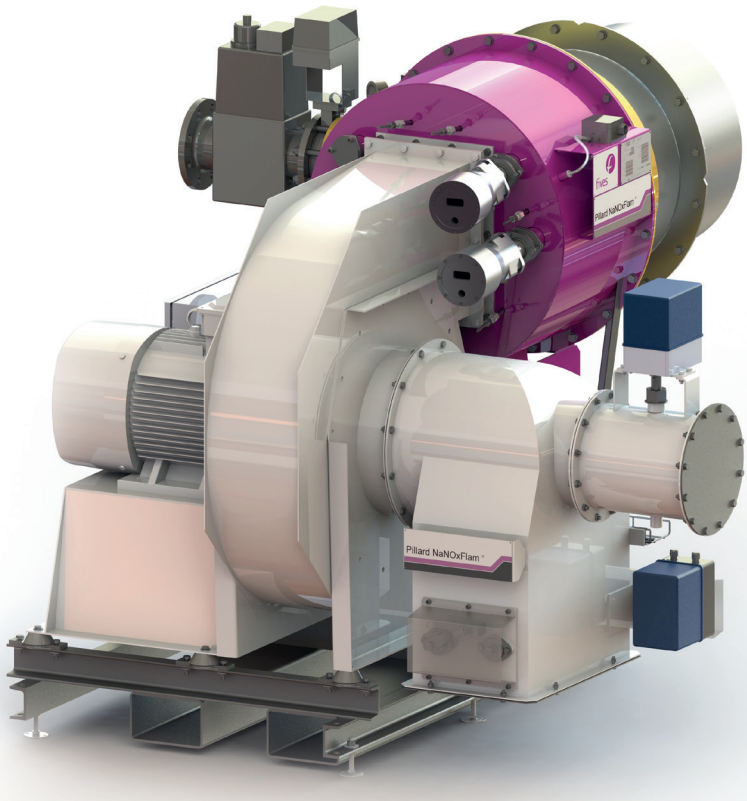
fives

PROCESS TECHNOLOGIES

ENERGY | COMBUSTION

# Pillard NANOxFLAM® Compact

## «All-in-One» ultra low NOx burner range




Ultimate NOx performance

**Under 9 ppm @3% $O_2$**

ENVIRONMENTALLY INSPIRED
IGNITING INNOVATION

## Best Available Technique that overcomes the limits of ultra low NOx combustion

- Outstanding ultra-low NOx Emissions and high thermal operation efficiency with monobloc burner
- Safe and reliable
- Flame dimensions designed to fit most combustion chambers
- "Plug & play" technology: Pre-wired and tested in our workshop
- Standard design to guarantee reduced commissioning time

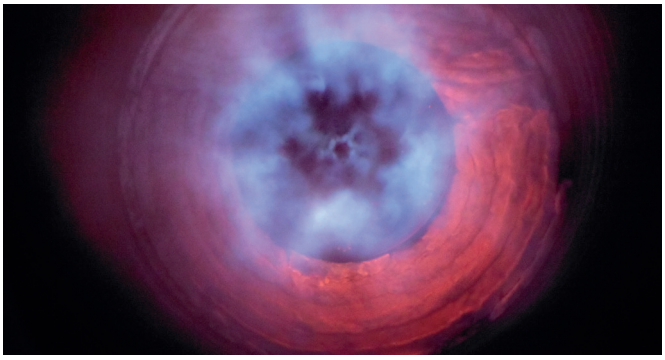
# Fives designs and supplies a complete portfolio of eco-friendly ultra low NOx burners

Fives and its advanced engineering team has developed the Pillard NANOxFLAM®, a pioneering new generation of ultra low NOx gas burner, based on the worldwide patented Pillard BLUEMix® technology consisting in a low and uniform flame temperature which also guarantees low CO values and high-combustion efficiency.

Until now, proposed as Duobloc version, the Pillard NANOxFLAM® burner is now available in a compact version to fit all industrial requirements on fire tube and water tube boilers, in 3 standardized sizes.

In addition to their excellent environmental performance, Pillard NANOxFLAM® Compact burners have been eco-designed in accordance with the Fives engineered sustainability® program. The burner's component materials are over 96% recyclable and is coated with water-soluble paints.

*Pillard NANOxFLAM® already implemented in more than 100 boilers (fire, tubes, water tubes)*



*Pillard BLUEMix® technology*

## THE BEST PERFORMANCE AT YOUR SERVICE

| PILLARD NANOXFLAM COMPACT BURNER MAIN FEATURES* | |
|---|---|
| NOx emissions (with FGR) | < 9 ppm@3%O2dry (18mg/Nm3@3%O2dry) |
| CO emissions (with FGR) | < 10 ppm@3%O2dry (15mg/Nm3@3%O2dry) |
| Excess Air | ≤ 15% |
| Turn Down | 1 to 8 |
| Combustion Air Operating Temperature | - 10 ≤ T (C°) + 60 |
| Max FGR temperature | 200°C |
| Max NG pressure (PS) | 500 mb |
| Installation | Indoor, not tropicalised, non ATEX |
| Ambient temperature | -10 ≤ T (C°) + 40 |

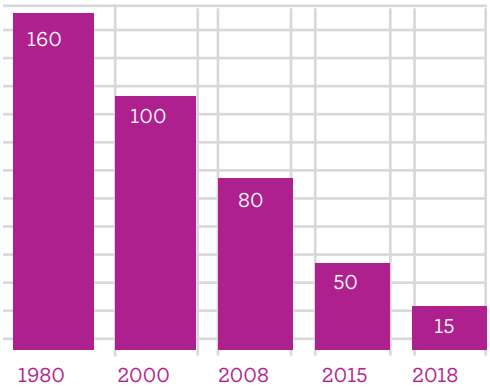
**to be confirmed and adapted to your project*

# Fives European Combustion Centre: Innovation and R&D at your service

Fives is leading ongoing research and continual progress in combustion technology, introducing new solutions to meet increasingly stringent emission standards and provide relevant and efficient equipment. To accelerate innovation for the combustion market, Fives opened a new facility to support the company's R&D activities. With this new combustion centre, Fives reinforces its commitment to provide more efficient combustion systems, eco-friendly and offering best performances on the market.

— 3,000 m²
— 30 MW installed test power
— Liquid fuel spray room for flame characterization
— Flame video-monitoring by a highly sensitive UV camera
— Commercial presentation Area
— Remote monitoring system to enable the test campaigns to be followed live from the Marseilles Head Office
— Mixing skid for fuel gas preparation, adapted for $CH_4$, $H_2$, $C_3H_8$ and $CO_2$

**Fives European Combustion Centre**




Pillard Burners NOx emissions improvement since 1980 in mg/Nm3 3%O2dry in gas firing

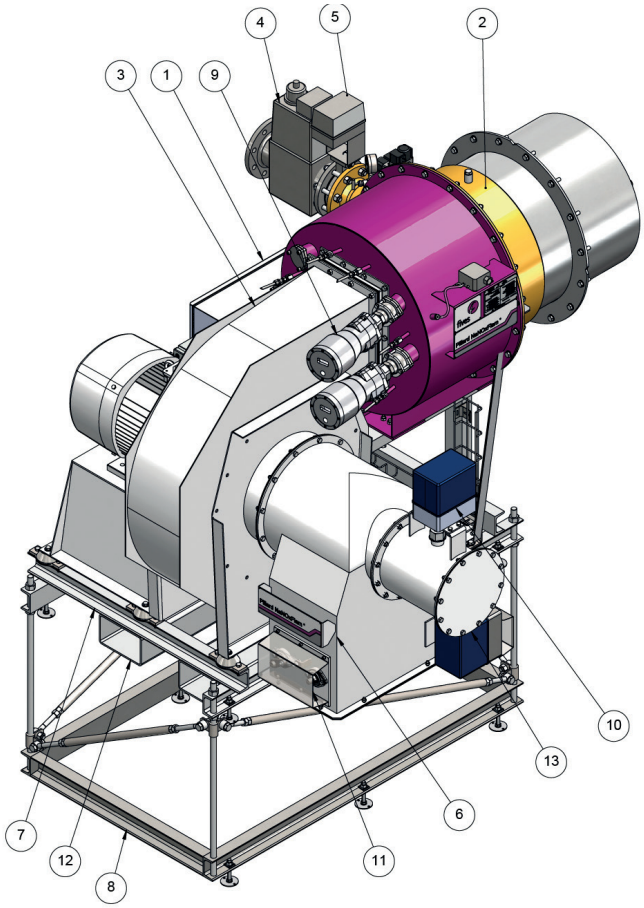
— Over 100 patents, with most of them as "Best Available Techniques"
— Over 20 years of improvement of burners NOx emissions

# Pillard NANOxFLAM® Compact overview

The Pillard NANOxFLAM® Compact burner is a "Plug & Play" (integrated BMS, FAN, gas skid, etc.), fully packaged, safe and reliable, ultra low NOx burner for the global energy industry.

## AT-A-GLANCE BY MAIN APPLICATIONS AND INDUSTRIES

— Small and Medium Firetube Boilers
— Small and Medium Water-tube Boilers
— Ultra low NOx Hot Gas Generator
— Urban Heating
— Process Heating
— Mirror design to fit double fire tube boilers



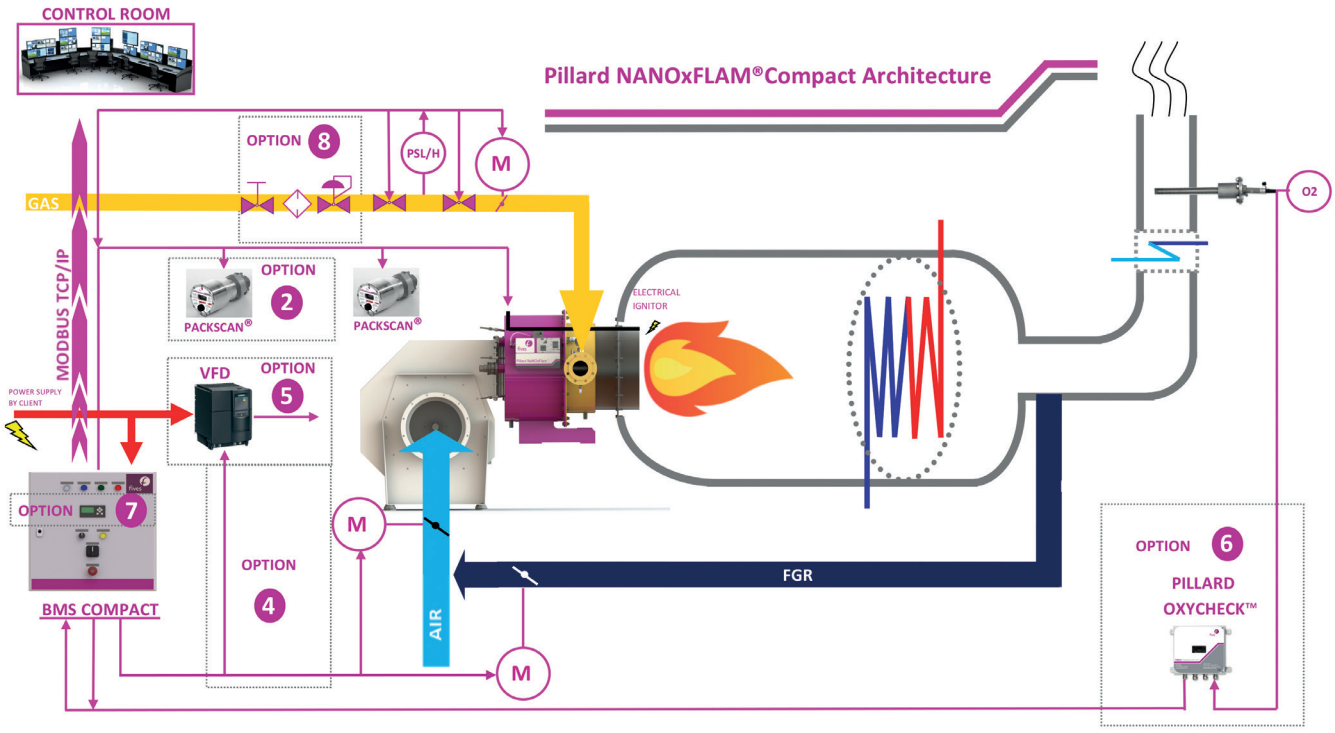

| Mark | Description | Status |
|---|---|---|
| 1 | BMS Cabinet | Standard |
| 2 | Pillard NANOxFLAM® | Standard |
| 3 | Air & FGR FAN | Standard |
| 4 | Double Shut-Off Valves | Standard |
| 5 | Gas flow control Valve | Standard |
| 6 | Air & FGR Mixing Box | Standard |
| 7 | Upper Frame | Standard |
| 8 | Adjustable Lower Frame | Optional |
| 9 | Pillard Flame Check RUBY | Standard |
| 10 | FGR Control Damper | Standard |
| 11 | Air Control Damper | Standard |
| 12 | Forkliftable System | Standard |

## ECC COMPLIANCE / CERTIFICATES

— Best available technique as per BREF 2017
— 2006/42/EC (Machines)
— PED 2014/68/EC (Pressure)
— EN 676
— EN 298
— EN 746-2
— AQUAP 2007/01 (72h)
— C2E Marking

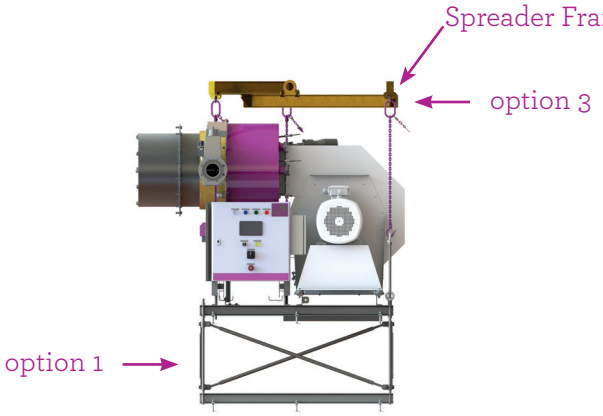
# Pillard NANOxFLAM® Compact overview

## MAIN SCOPE AND OPTIONS




| Mark | Description | Status |
|---|---|---|
| Option 1 | Adjustable Frame | To adapt the burner to any combustion chamber axis |
| Option 2 | 2nd flame scanner | For a higher availability |
| Option 3 | Spreader frame | To move the burner without a forklift |
| Option 4 | VFD Compatible | BMS implemented for a VFD |
| Option 5 | VFD | IP31 delivered loose |
| Option 6 | $O_2$ probe + transmitter | Pillard Oxychech™ type |
| Option 7 | Touchscreen HMI | 7" touchscreen |
| Option 8 | Gas Pressure reducer | Compact gas skid with manual isolating valve, gas filter and gas pressure reducer |

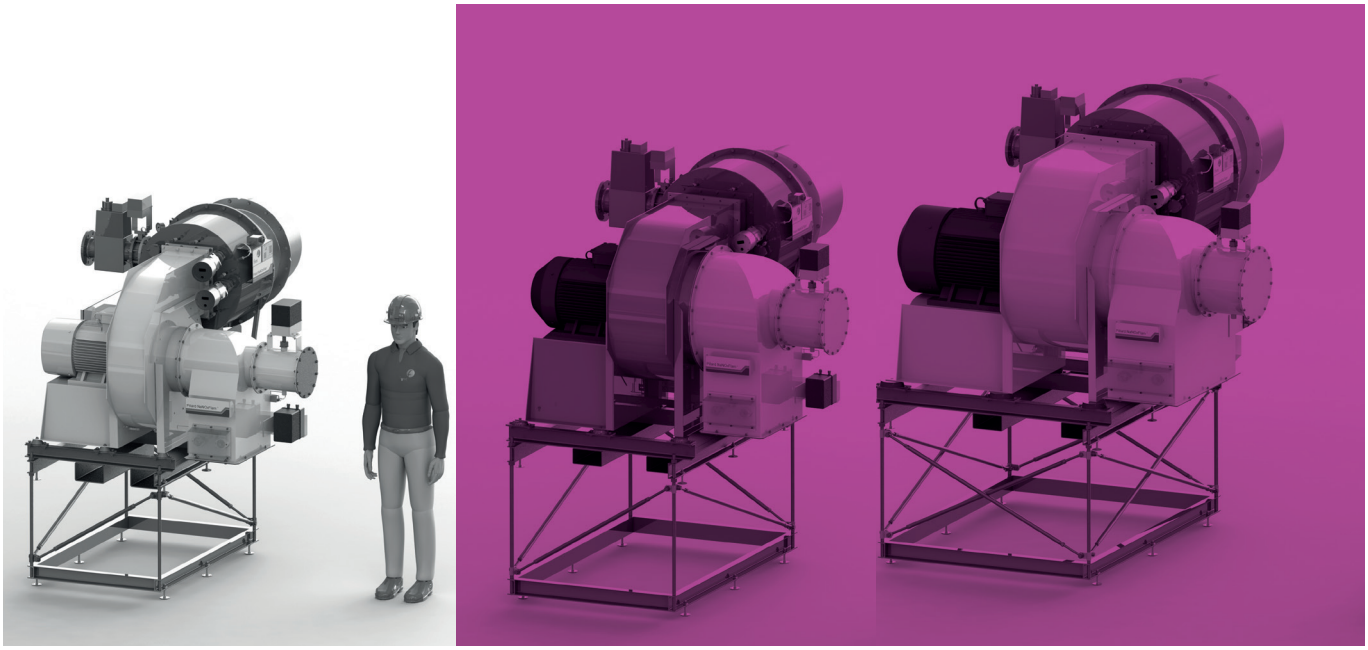
## LIFTING PRINCIPLES




without forklift

with forklift

# Pillard NANOxFLAM® Compact N°1



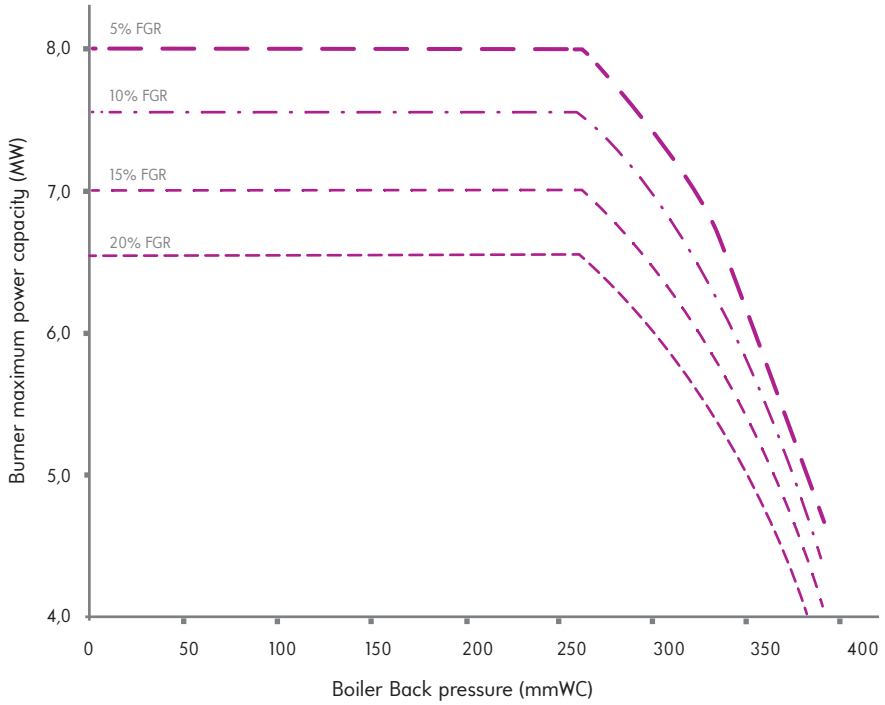
| Key Features | |
|---|---|
| Nominal heat output | from 6 to 8,4 MW[1] |
| Max. Turn Down ratio | 1 : 8 |
| Total Weight | 980 kg |
| FAN motor | 22kW[2] |
| Gas Inlet (PN16) | 4“ |

## SELECTION CURVES

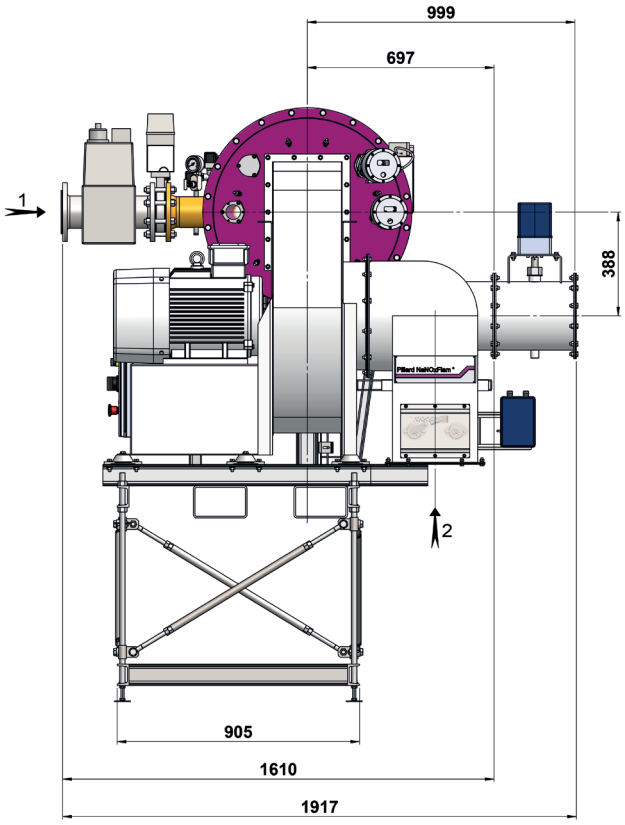
Curves given for 20°C combustion air and 150°C FGR temperature.

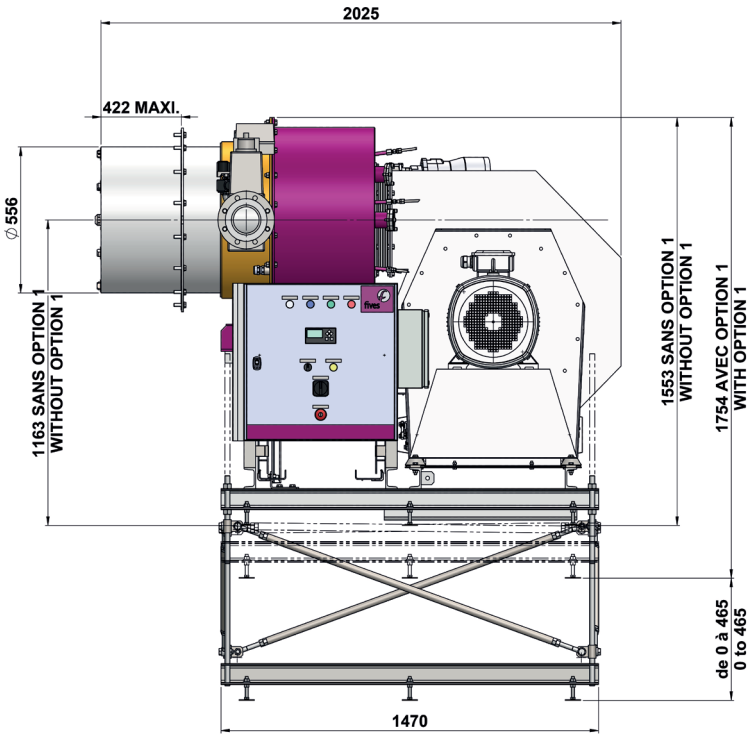
[1] Select nominal burner load vs boiler back pressure and % FGR.

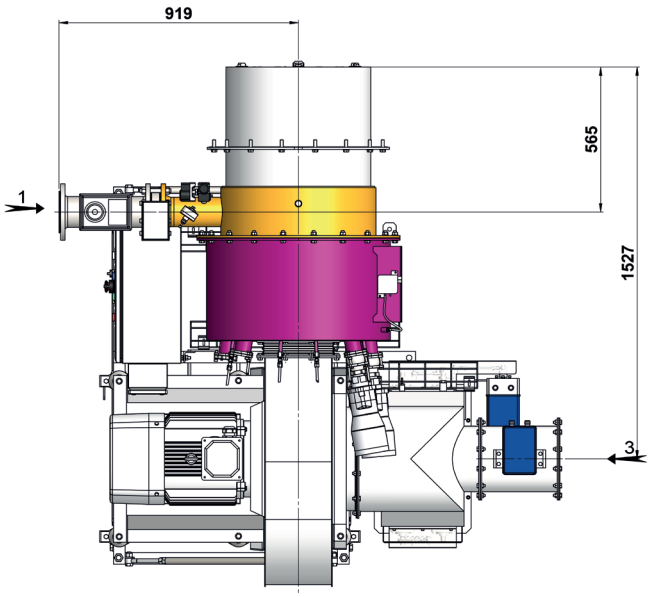
[2] 30 kW (optional) to maintain nominal burner load over 250 mmWC boiler back pressure.

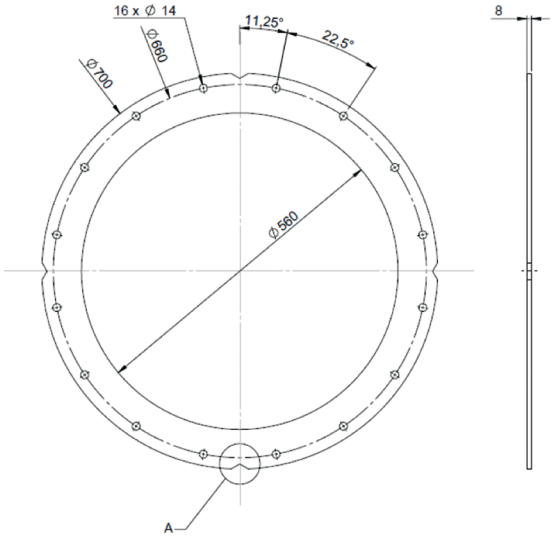


# Overall Dimensions



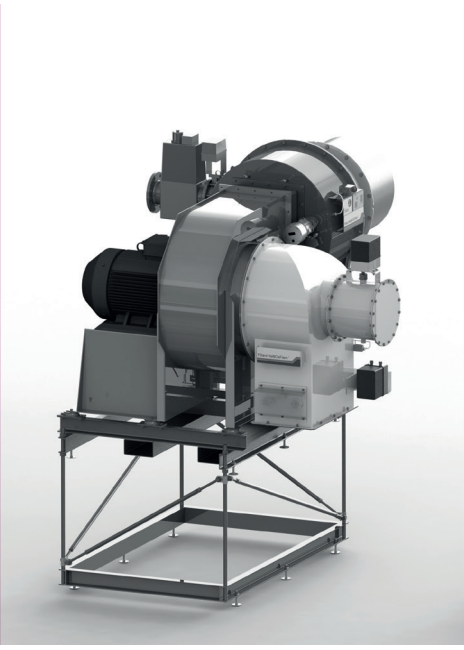



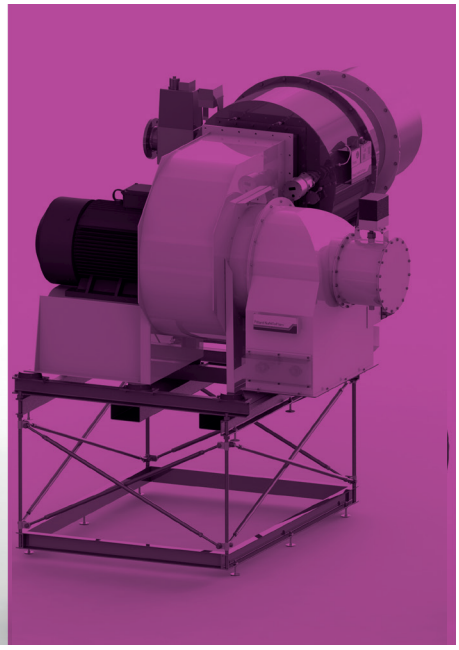




| PIPING CONNECTIONS BOARD | | | |
|---|---|---|---|
| **N°** | **FLUID** | **FLOW DIRECTION** | **DIMENSION N°1** |
| **1** | NATURAL GAS | INLET | DN 100 |
| **2** | COMBUSTION AIR | INLET | 520 x 312 |
| **3** | FGR | INLET | ID 250 |

# Pillard NANOxFLAM® Compact N°2



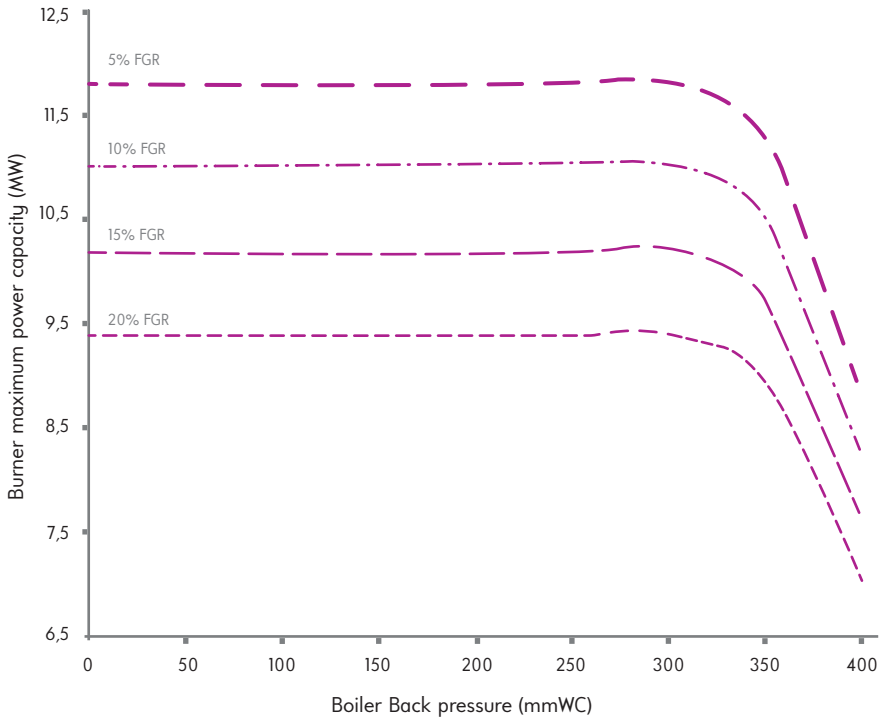


| Key Features | |
|---|---|
| Nominal heat output | from 8,4 to 12,7 MW [1] |
| Max. Turn Down ratio | 1 : 8 |
| Total Weight | 1173 kg |
| FAN motor | 45kW |
| Gas Inlet (PN16) | 5“ |

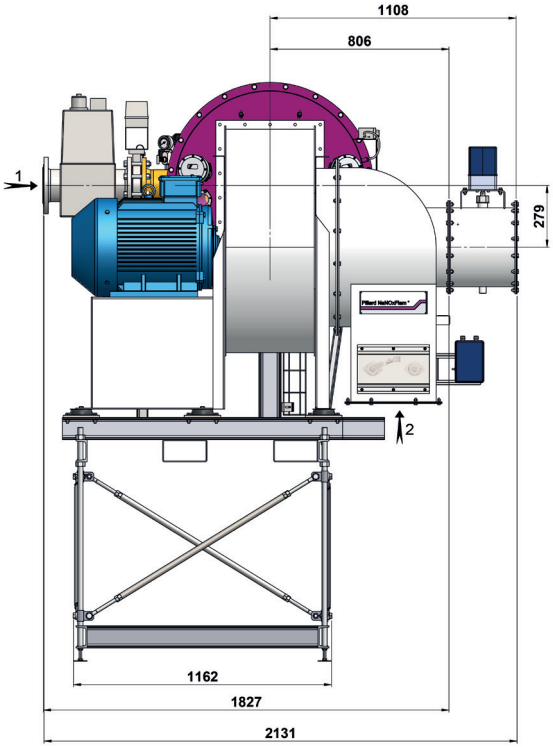
## SELECTION CURVES

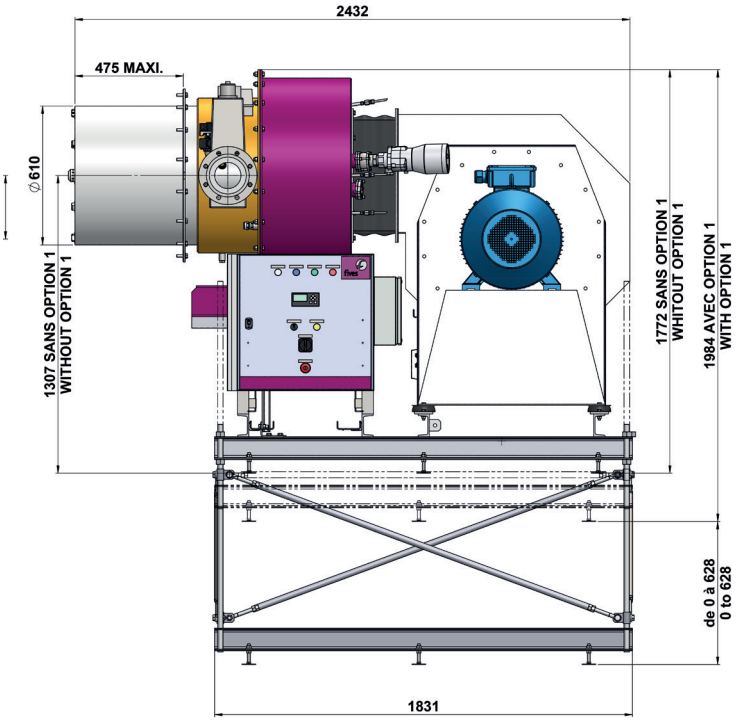
Curves given for 20°C combustion air and 150°C FGR temperature.

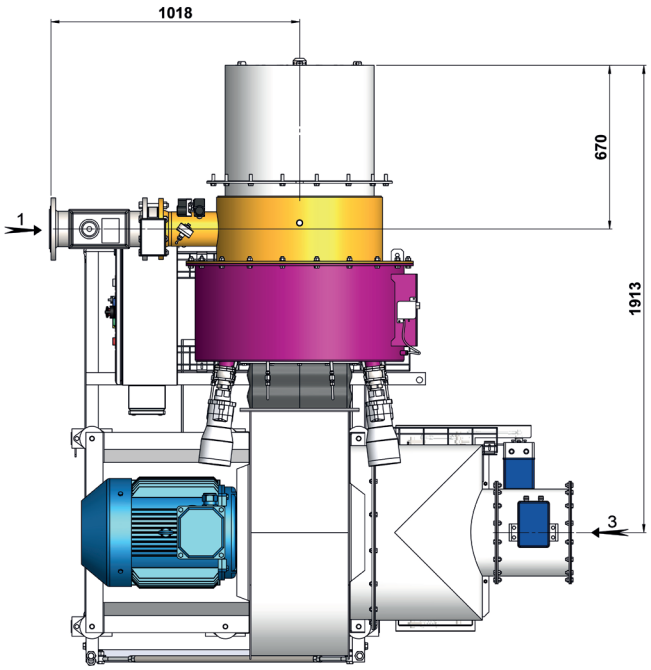
[1] Select nominal burner load vs boiler back pressure and % FGR.

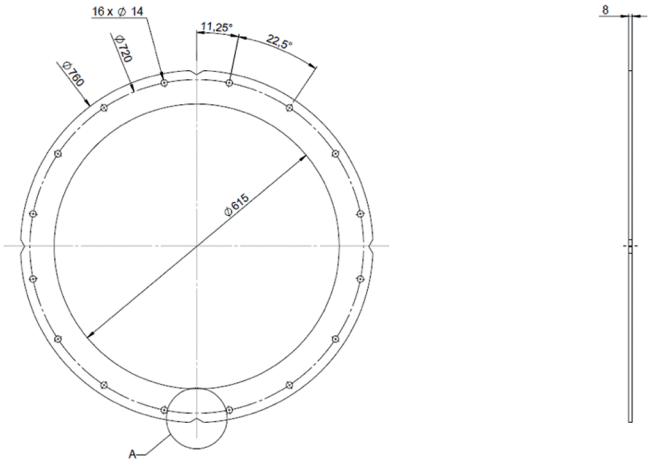


# Overall Dimensions



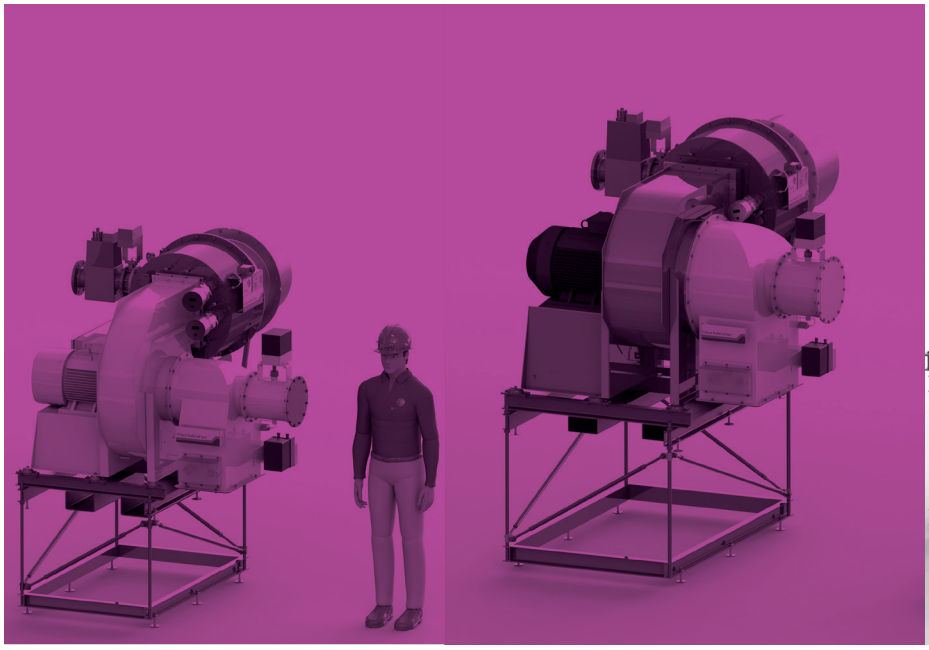



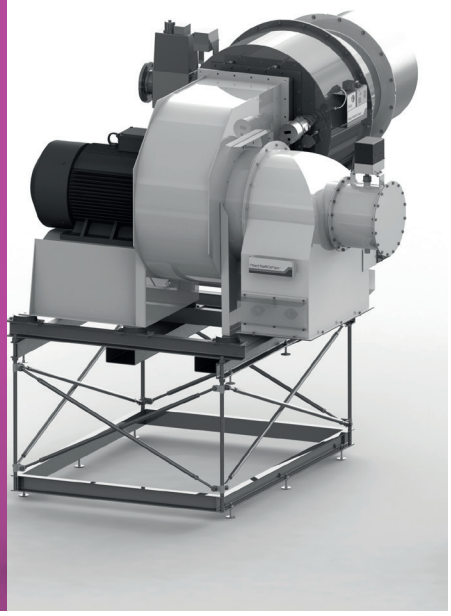




| PIPING CONNECTIONS BOARD | | | |
|---|---|---|---|
| N° | FLUID | FLOW DIRECTION | DIMENSION N°2 |
| 1 | NATURAL GAS | INLET | DN 125 |
| 2 | COMBUSTION AIR | INLET | 630 X 378 |
| 3 | FGR | INLET | ID 350 |

# Pillard NANOxFLAM® Compact N°3





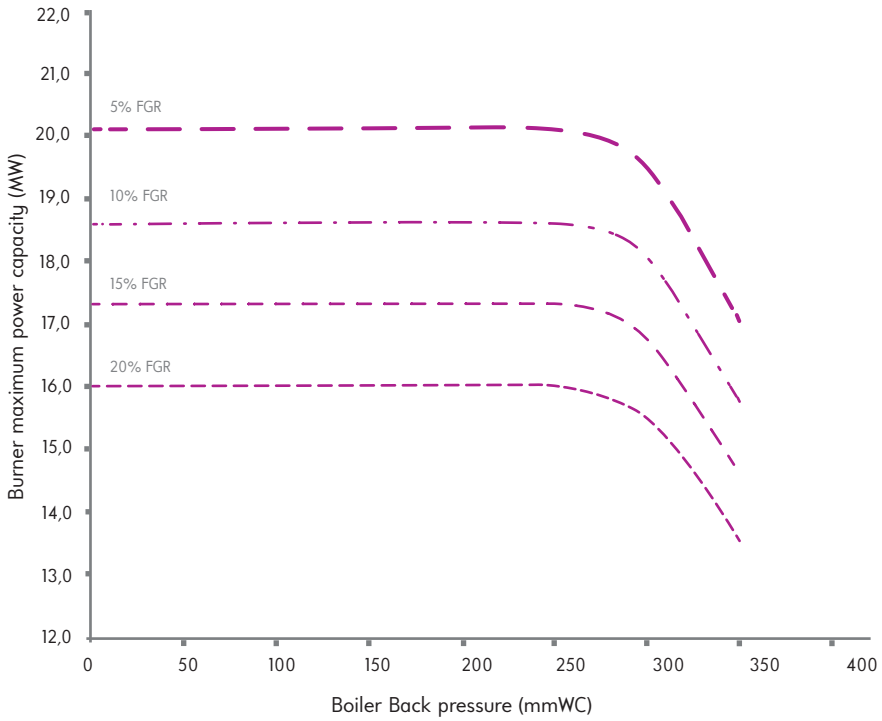
| Key Features | |
|---|---|
| Nominal heat output | from 14,8 to 21,6 MW [1] |
| Max. Turn Down ratio | 1 : 8 |
| Total Weight | 1680 kg |
| FAN motor | 75kW |
| Gas Inlet (PN16) | 5“ |

## SELECTION CURVES

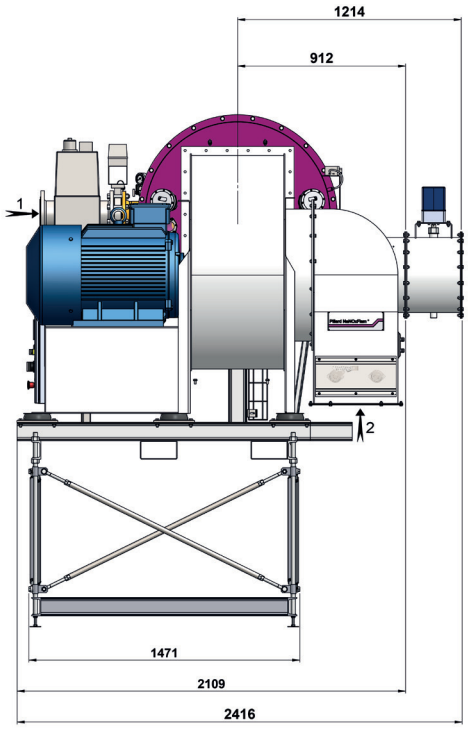
Curves given for 20°C combustion air and 150°C FGR temperature.

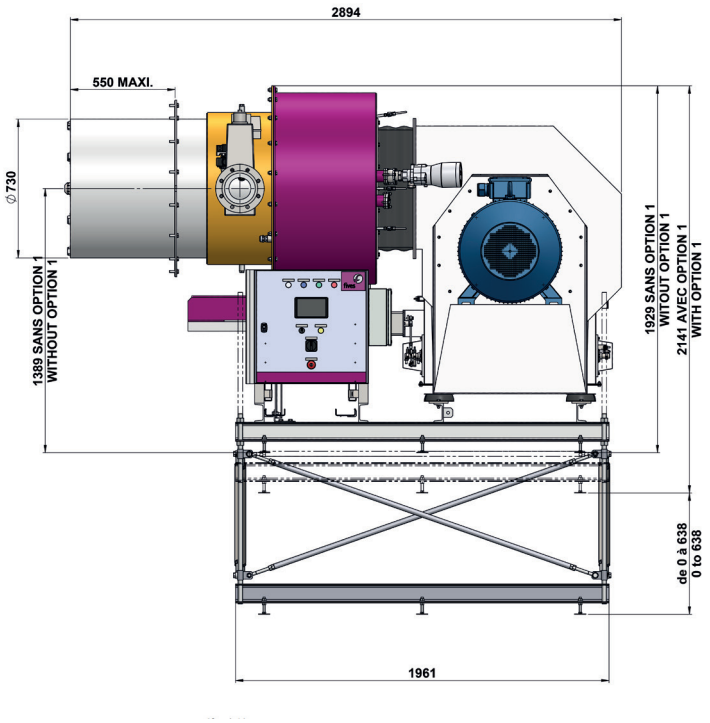
[1] Select nominal burner load vs boiler back pressure and % FGR.

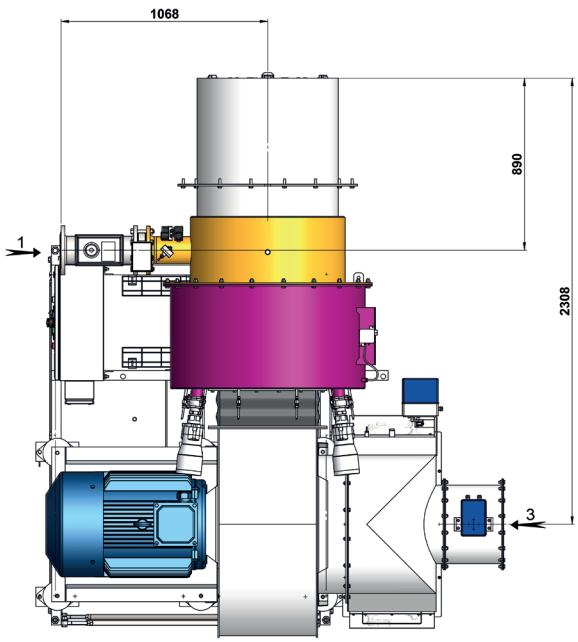
[2] 90 kW (optional) to maintain nominal burner load over 250 mmWC boiler back pressure.

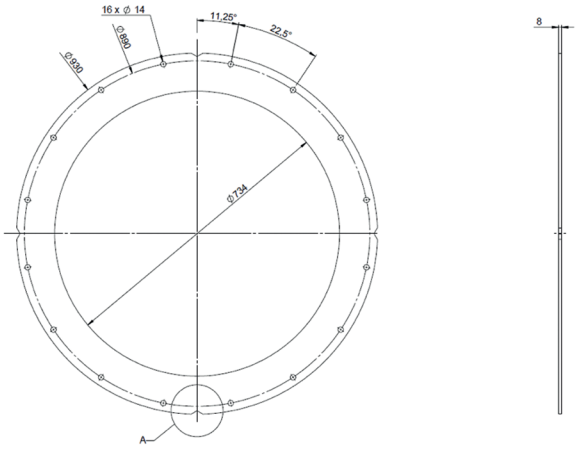


# Overall Dimensions

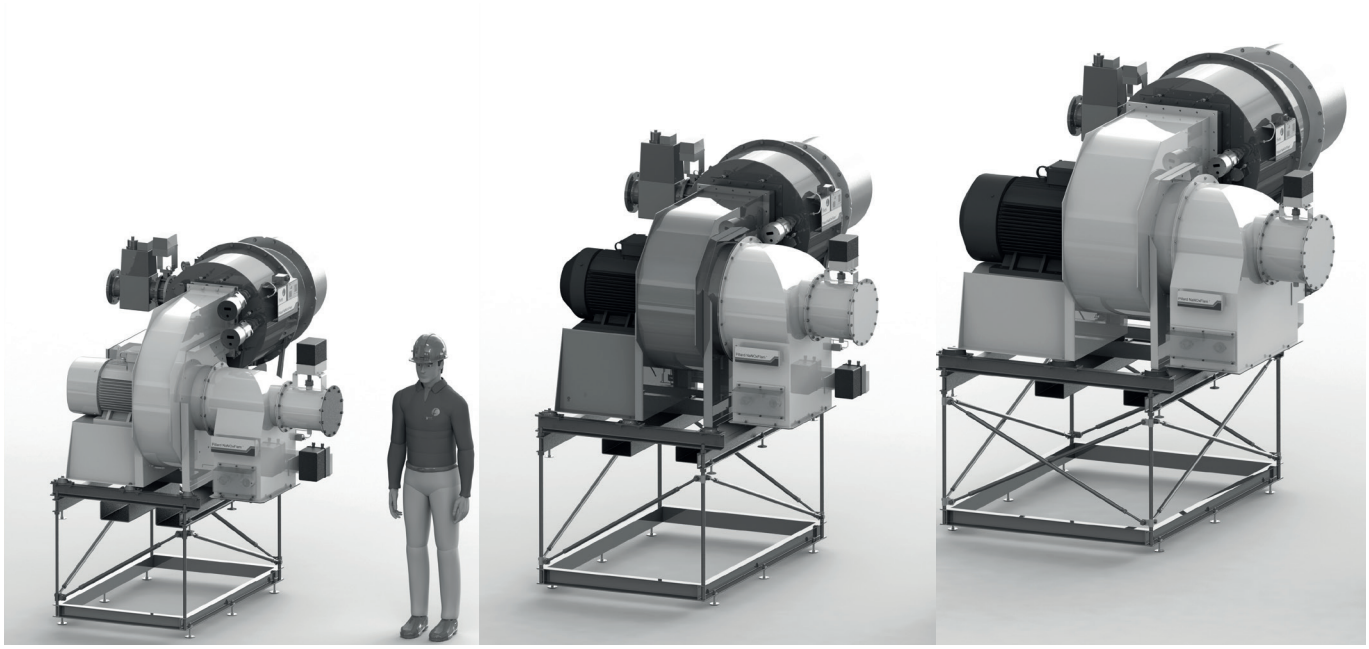



| PIPING CONNECTIONS BOARD | | | |
|---|---|---|---|
| **N°** | **FLUID** | **FLOW DIRECTION** | **DIMENSION N°3** |
| **1** | NATURAL GAS | INLET | DN 125 |
| **2** | COMBUSTION AIR | INLET | 820 X 492 |
| **3** | FGR | INLET | ID 400 |



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