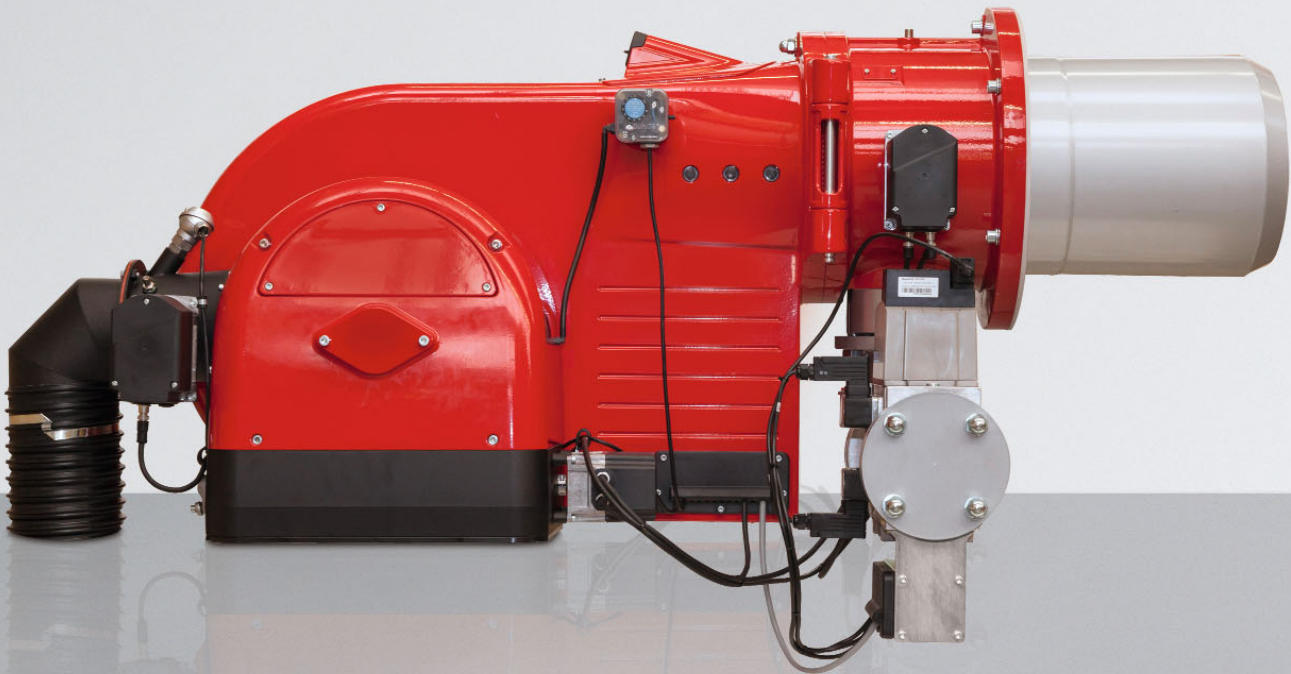


–weishaupt–

info

Information on Ultra Low NO_x gas burners



NO_x emissions < 15 ppm

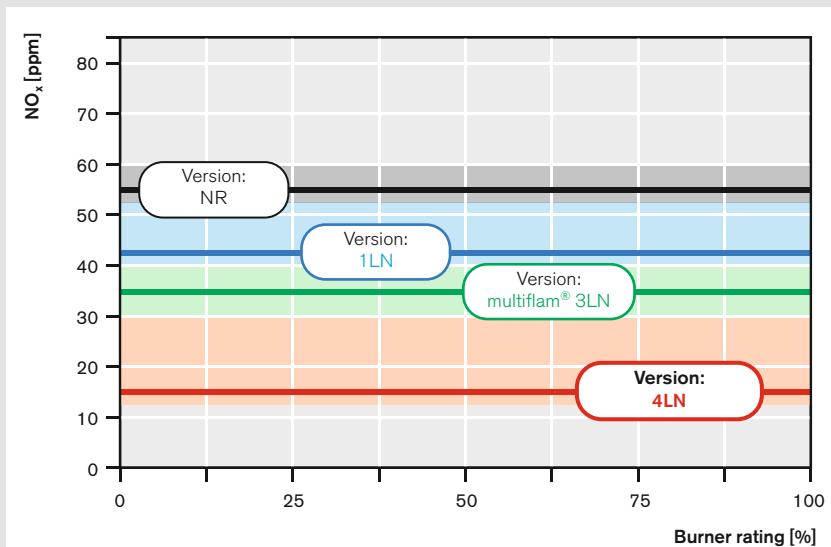
4LN version gas burners (with Flue Gas Recirculation)

NO_x emissions below 15 ppm: 4LN-version Weishaupt monarch[®] burners

For many decades, the Weishaupt monarch[®] brand has been known for their low emissions, robustness and reliable operation.

The **4LN-version** of the current WM 20 to WM 50 range of Weishaupt monarch[®] burners can comply with the most stringent environmental standards in force worldwide. A 4LN-version burner is equipped with a flue gas recirculation system (FGR) whose control components integrated with the burner.

Specially designed mixing head assembly and digital combustion management ensure that the key characteristics of Weishaupt burners – reliable ignition, a high degree of flame stability and safe operation – remain very much to the fore.



The values are based on burner versions on three-pass combustion chambers with medium temperatures ≤ 230F (110 °C).

NO_x emissions achievable when firing natural gas

Burner versions

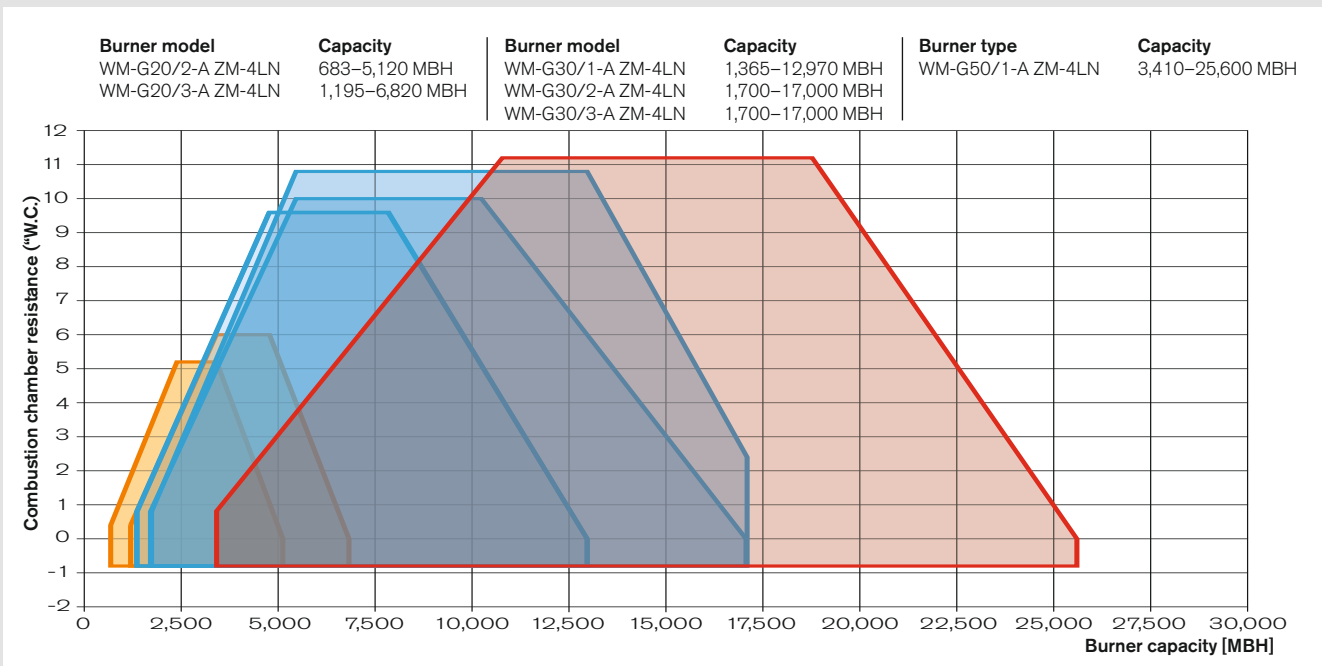
Version	Fuels		
	Gas	Oil	Dual-fuel
ZM-NR	●	●	●
ZM-LN	●	–	–
ZM-3LN	●	●	●
ZM-4LN	●	–	–

Version	Flue gas recirculation (FGR)	
	Gas	Oil
ZM-NR	○	–
ZM-LN	○	–
ZM-3LN	○	–
ZM-4LN	●	–

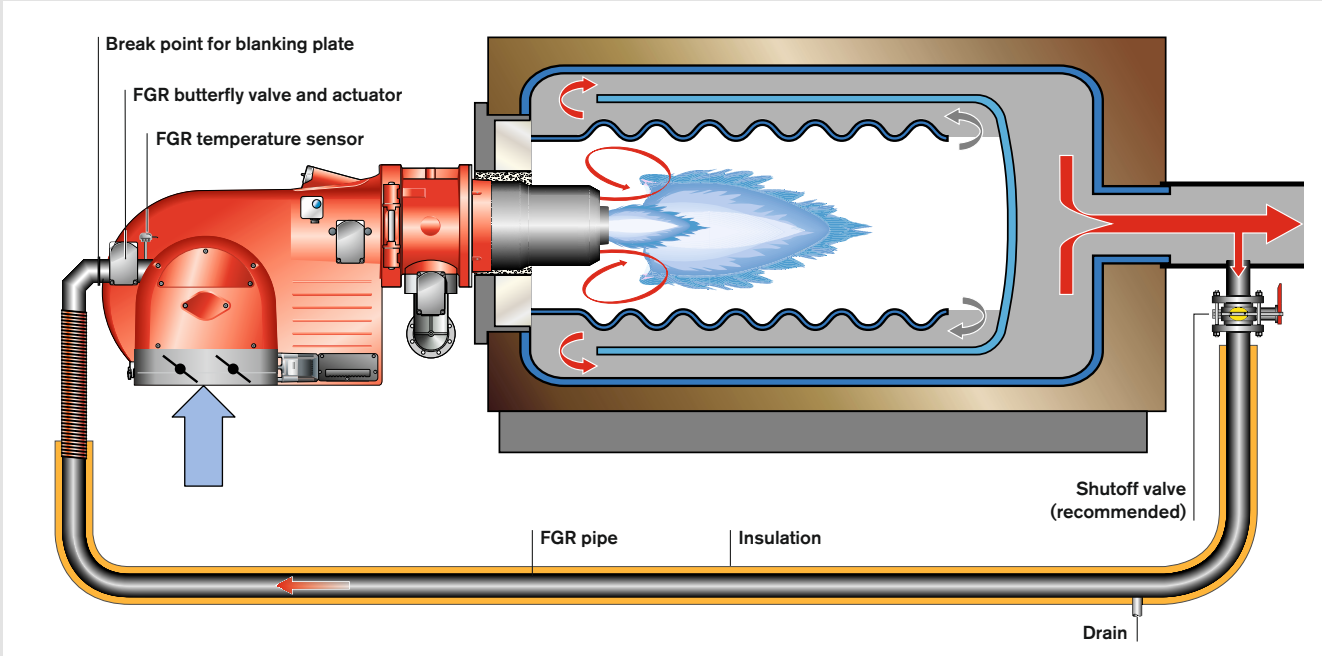
● Standard ○ Optional – Not available



Air inlet housing with factory-preassembled flue gas recirculation components

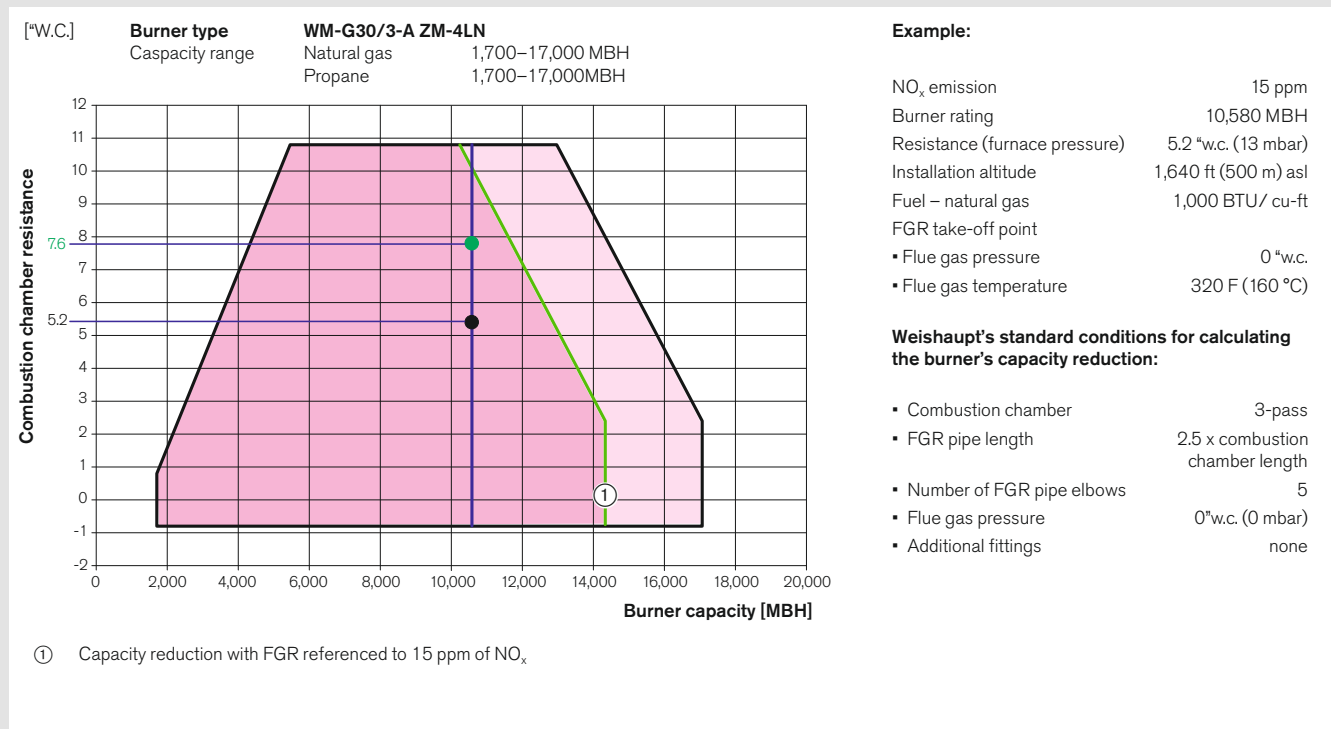


Capacity graph showing maximum burner capacity at a recirculation rate of 0% – refer to page 4 for examples of capacity reductions with x% recirculation



General arrangement of a flue gas recirculation system with a WM-series burner

Capacity reduction with flue gas recirculation



Example:

NO_x emission 15 ppm
 Burner rating 10,580 MBH
 Resistance (furnace pressure) 5.2 °w.c. (13 mbar)
 Installation altitude 1,640 ft (500 m) asl
 Fuel – natural gas 1,000 BTU/ cu-ft
 FGR take-off point
 • Flue gas pressure 0 °w.c.
 • Flue gas temperature 320 F (160 °C)

Weishaupt's standard conditions for calculating the burner's capacity reduction:

- Combustion chamber 3-pass
- FGR pipe length 2.5 x combustion chamber length
- Number of FGR pipe elbows 5
- Flue gas pressure 0°w.c. (0 mbar)
- Additional fittings none

Stated ratings are based on an air temperature of 68 F (20 °C) and an installation at sea level. For installations at higher altitudes, a reduction in capacity of 1 % per 328 ft (100 m) above sea level should be taken into account.

Why does burner capacity reduce?
 Equipping a burner with flue gas recirculation reduces its capacity. The extent of the reduction has to be calculated individually for each individual installation.

The burner fan was designed to supply combustion air. If a burner is equipped with flue gas recirculation, however, then the fan has to draw both air and flue gas and mix the two together. As a consequence, while the overall volume supplied by the fan remains the same, the addition of the flue gas reduces the total oxygen concentration. With less oxygen in the combustion air, the burner's capacity is reduced.

What does flue gas recirculation do?

- Reduce oxygen concentration per unit volume (cu-ft, m³) of air
- Increase the air flow speed
- Shorten dwell times for combustion gases in the hot reaction zone
- Lower flame temperatures
- **Reduce NO_x emissions**

Order numbers/ availability

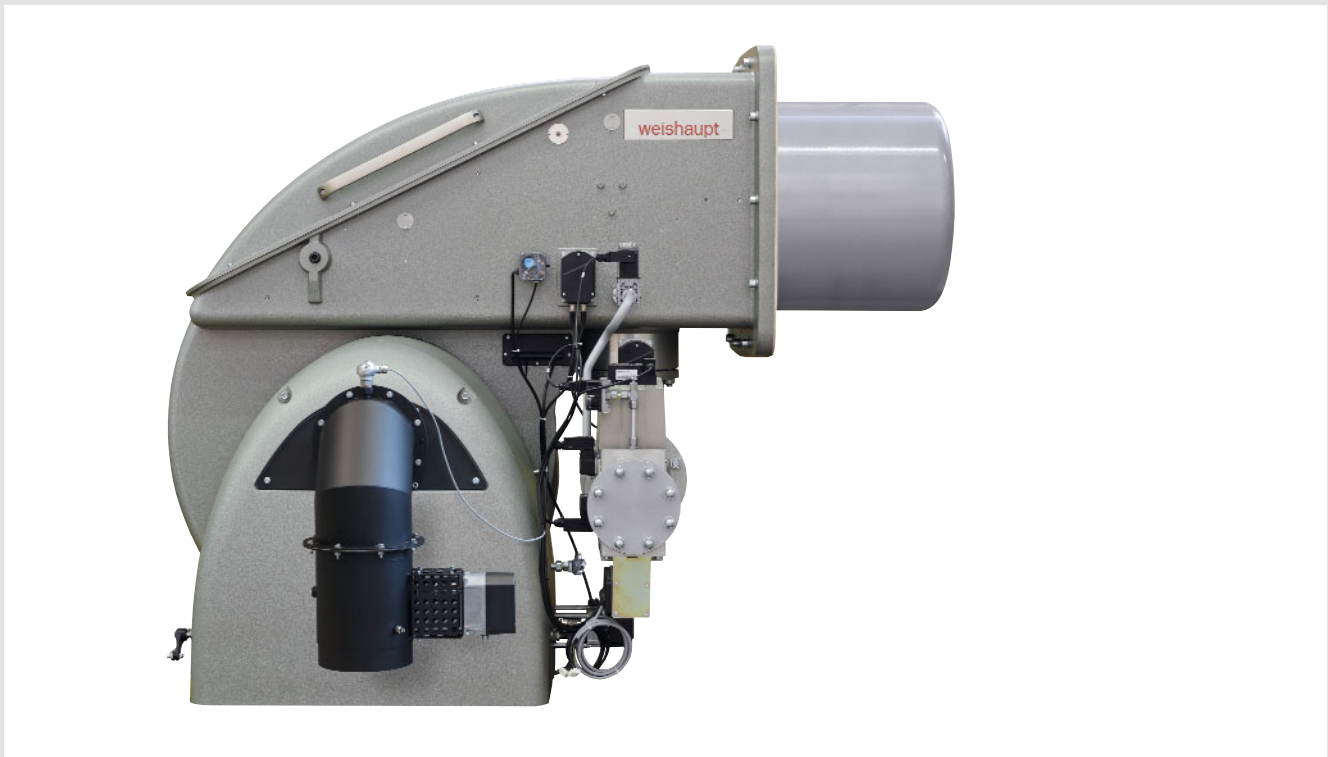
Gas burners

Burner model	Version	Order No.
WM-G20/2-A	ZM-4LN	217 218 11
WM-G20/3-A	ZM-4LN	217 219 11
WM-G30/1-A	ZM-4LN	217 322 12
WM-G30/2-A	ZM-4LN	217 323 12
WM-G30/3-A	ZM-4LN	217 324 12
WM-G50/1-A	ZM-4LN	217 523 13

Availability

Burner type	Version	Availability
WM-G20/2-A	ZM-4LN	Now
WM-G20/3-A	ZM-4LN	Now
WM-G30/1-A	ZM-4LN	Now
WM-G30/2-A	ZM-4LN	Now
WM-G30/3-A	ZM-4LN	Now
WM-G50/1-A	ZM-4LN	Now
WM-G50/2-A	ZM-4LN	2018

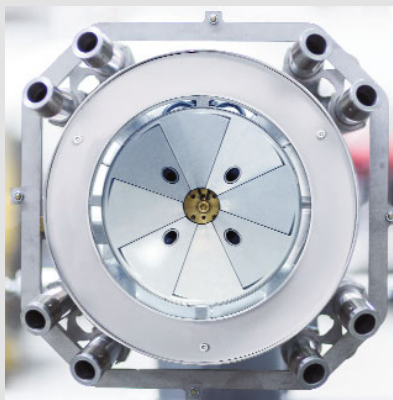
Low NO_x emissions for large burner capacity: The WKmono 80 in 4LN version



WKmono-G80 with flue gas recirculation



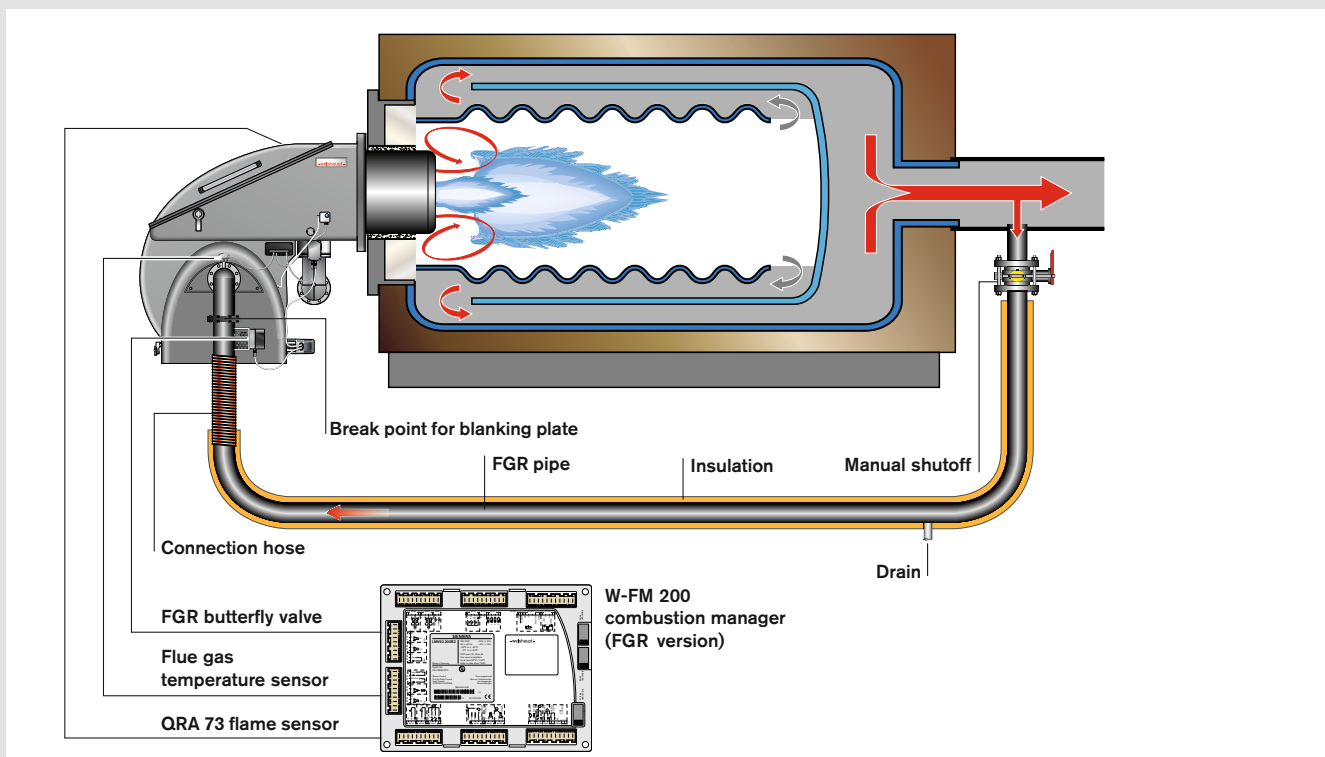
FGR connecting elbow with actuator and temperature sensor



multiflam® mixing assembly

Flexibility with flue gas recirculation

Where the most stringent emission limits for nitrogen oxides are in force, Weishaupt's multiflam® technology for gas-fired burners can be combined with flue gas recirculation. Weishaupt takes advantage of the special properties of the flame geometry, and with it the adaption to the combustion chamber, to reduce NO_x levels.



General arrangement of a flue gas recirculation system with a WKmono-series burner

The multiflam® technology developed and patented by Weishaupt is a way to reduce nitrogen oxide emissions to a minimum.

At the heart of Weishaupt's multiflam® technology is a special mixing assembly design, which distributes the fuel among primary and secondary nozzles. This results in extremely efficient combustion thanks to recirculation of the flue gases directly at the mixing assembly.

If a specific market demands ultra-low NO_x emissions, Weishaupt combines multiflam® technology with external flue gas recirculation. This system, which is designed for gaseous fuels, reduces NO_x emissions to levels that will meet the most stringent requirements of NO_x emissions worldwide.

The compact FGR dosing unit is worth highlighting. The connecting elbow incorporates the FGR butterfly valve and the associated temperature sensor. This packaged assembly allows the

system to be fully tested at the factory and avoids additional installation work on site.

The FGR system is controlled by the W-FM 200 combustion manager. An additional software module ensures proper dosing of temperature-compensated volume of flue gas at all operating stages, reliable cold start behaviour and the highest degree of operational availability.

Low NO_x emissions for large burner capacity: WK-series burners with flue gas recirculation

Flue gas recirculation is also available for Weishaupt's WK-series industrial burners. The special modular design of the WK-series burners separates burner body from combustion air fan, thus facilitating innovative and customer-oriented solutions.

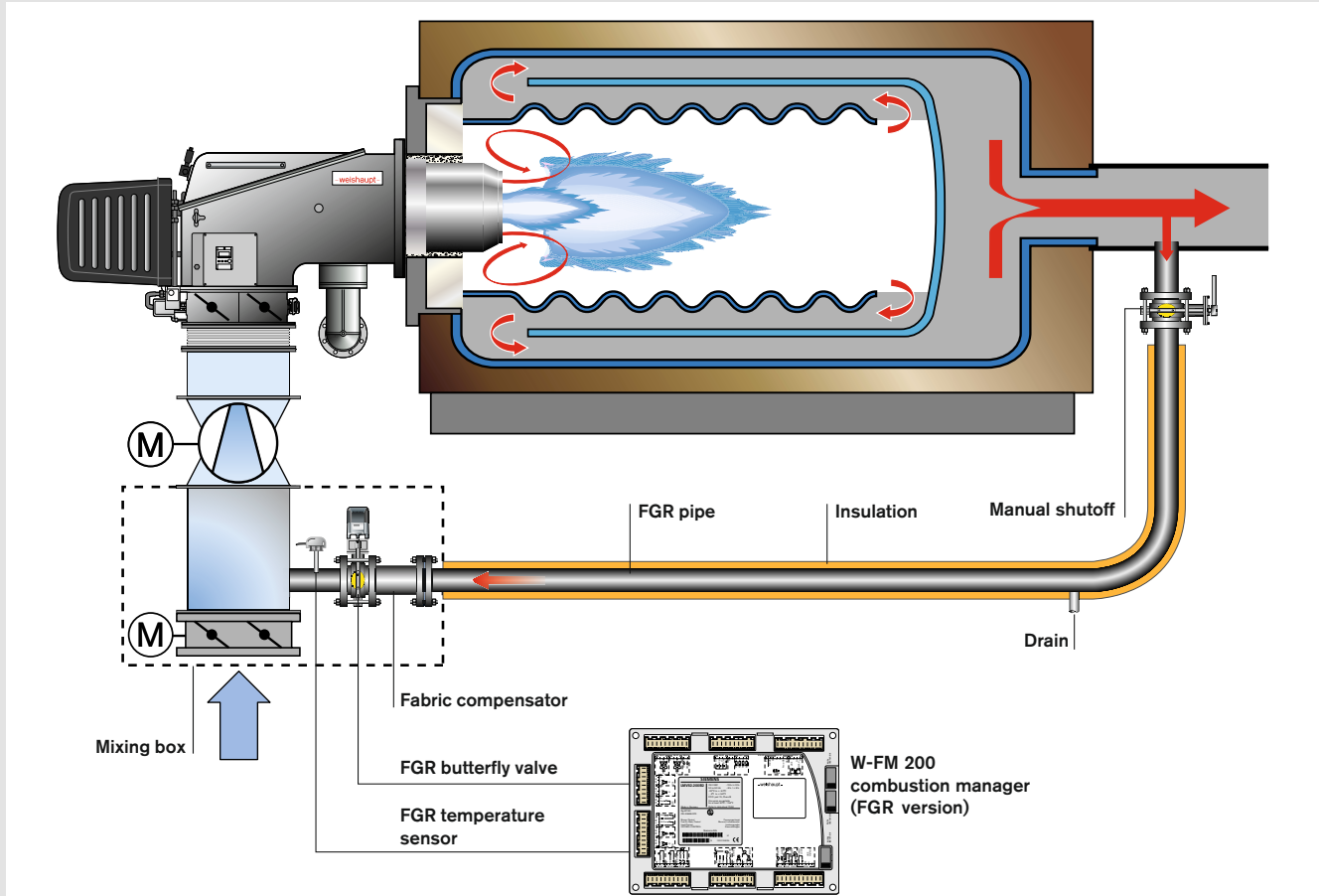
The mixing box

The mixing box is developed in a collaboration with our combustion air fan manufacturer. It is fitted directly to the combustion air fan and forms a compact assembly with fixed dimensions. The mixing box consists of a housing with an integrated air damper register for suction control, a flanged connection for easy installation of the FGR butterfly valve and a sleeve with inbuilt temperature sensor.

Advantages

To the customer, the mixing box presents many advantages. Precise site plans can be drawn up, if required, fully encapsulating sound absorbers can be fabricated without the need for on-site measurements, installation times are reduced and – the crucial factor for functionality – everything is in the right place.

All in all, a convincing, complete packaged solution.

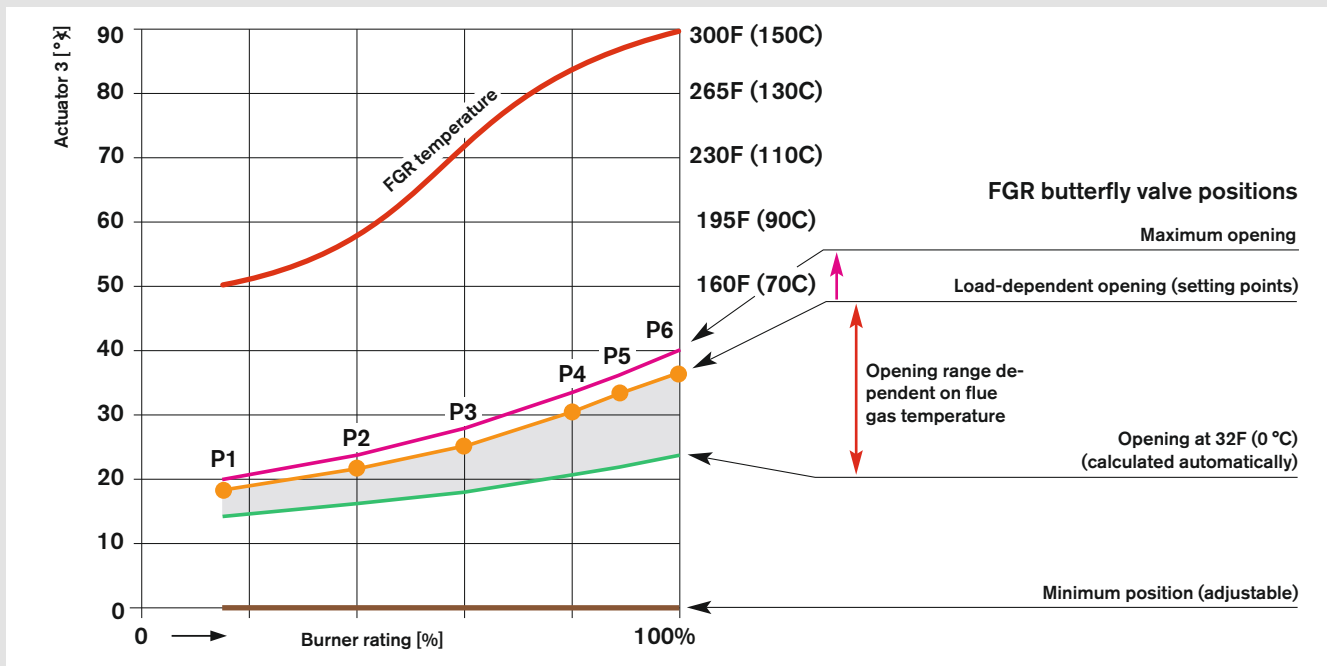


General arrangement of a flue gas recirculation system with WK-series burner and mixing box



Mixing box for flue gas recirculation at the combustion air fan

Functional and safe: Temperature-compensated flue gas dosing



Flue gas recirculation

Burner's air intake is connected to the boiler's stack and with help of burner's fan the flue gas is drawn off and fed back into the flame mixed with the combustion air. The result: extremely low NO_x emissions.

However, the critical factor is the precise dosing of the recirculated flue gas. The W-FM 200 combustion manager is best equipped to control this process. With just two additional components – a flue gas temperature sensor and a butterfly valve – and some additional software, the W-FM 200 can control the flow of flue gas so that the correct amount will be fed into the combustion air under all operating conditions, providing reliable startup and operational behaviour – just as you would expect.

Simple commissioning

The W-FM 200's fuel - air ratio controller provides up to 15 setting points which can be positioned as required throughout the burner's operating range. This allows the volume of recirculated flue gas to be matched precisely to the combustion conditions.

Flue gas temperature is also crucial in determining the volume of flue gas to be recirculated. The temperature of the flue gas affects its density and thus the mass flow rate.

The flue gas temperature is measured continuously to ensure stable burner operating behaviour and consistently low NO_x levels. Variations in temperature are compensated automatically by adjustments to the FGR butterfly valve.

System-specific adaptations

Beside controlling the FGR butterfly valve, the W-FM 200 combustion manager's software has parameters at hand that allow additional adjustments to suit site conditions, such as defining minimum and maximum FGR butterfly valve positions and make adjustments via correction factors.



Burners with FGR on long-term test at Weishaupt factory's boiler room

– weishaupt –

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Regular maintenance reduces heating costs and environmental pollution. Only a properly adjusted burner can save energy and be environmentally friendly. Behind each Weishaupt burner stands the whole Weishaupt customer service organization. The outstanding efforts made in maintenance and service justify the enormous trust placed in Weishaupt's burners, for at Weishaupt, product and customer service belong together.

Weishaupt customer service is there for you all year round. Whenever you need help, be it the supply of spare parts, technical advice or a site visit. We are there when you need us.