

Self-recuperative gas burners



General information:

Recuperative gas burners of the B202 HR and HSR series, sizes 1-4, are available with various design options. The standard or basic type comes with heat exchanger, burner mounting flange, body with gas and air connections, burner insert and ignition insert.

Output range for direct firing:	B202 HR 1-4 for 30 to 1000 kW
Output range for indirect firing:	B202 HSR 1-4 for 30 to 540 kW
Fuels:	natural gas and LPG gases
Control range:	1 : 4, infinitely variable or two stages
Flame outlet velocity:	up to approx. 150 m/sec.
Recuperator inlet temperature:	up to approx. 1000 °C for B202 HR 1-3
Recuperator inlet temperature:	up to approx. 1000 °C for B202 HSR 1-4
Recuperator inlet temperature:	up to max. 750 °C for B202 HR 4

The heat exchanger is built into the burner which makes our recuperative burners very easy to handle. This integrated heat exchanger is available as a shell-and-tube recuperator (firing efficiency up to $\eta_f = 94\%$) and for lower heating powers as plain recuperator on request.

Recuperative gas burners of the B202 HR series, sizes 1-4 with standard CO protection tube are custom-designed for direct firing applications (without radiant tube) and those of the B202 HSR series, sizes 1-4, are meant for indirect firing with P-shaped, double-P shaped or jacketed radiant tubes.

All recuperative gas burners of the B202 HR and HSR series, sizes 1-4, come with direct electric ignition and monitoring as part of the standard package. Flame monitoring is effected by built-in ionization electrode. Accordingly, these burners are intrinsically safe due to flame monitoring by an ionization probe. This feature is also referred to as "IO" below.

A regards maximum start-up output and equipment specifications, the applicable safety requirements laid down in EN 746-2 shall be observed.

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From size B202 HR 4 and HSR 4 upwards each unit may be optionally equipped with a pilot burner. The choice is between an ionization-monitored pilot burner plus additional ionization monitoring of the main flame or, alternatively, a UV-monitored pilot burner. In the latter configuration the main burner flame is sensed through the de-activated UV pilot burner.

All series B202 HR, Size 1-4, recuperative gas burners are also available with optional exhaust gas ducting. Depending on the installation situation and flow conditions around the unit, these burners can also be provided with additional and adapted CO flame protection tubes.

Series B202 HSR, Size 1-4, recuperative gas burners are generally supplied without exhaust gas ducting since the latter always forms part of the respective radiant tubes.

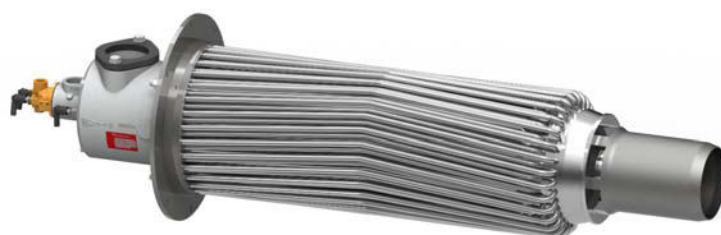
Important Note: Radiant tubes, regardless of which description, are not included in WIEDEMANN's scope of supply. They are typically rated, designed and built by the furnace manufacturer or equipment installer, or sourced from an external contractor.

In the following sections the various models are described by way of example or to explain a principle, with illustrations for clarity. These descriptions do not claim to be correct or complete.

Recuperative gas burner, Series B202 HR 1-4-R, with shell-and-tube heat exchanger and standard CO protection tube for direct heating (no radiant tube).

Shown with IO pilot burner.

Applicable data sheet TB 003520



Connecting unit

Shell-and-tube type heat exchanger

CO protection tube

Recuperative gas burner, Series B202 HR 1-4-R, with shell-and-tube heat exchanger, standard CO protection tube (not visible) and optional CO flame protection tube for direct heating (no radiant tube).

Shown with IO pilot burner.

Applicable data sheet TB 003520



Optional CO flame protection tube

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Recuperative gas burner, Series B202 HR 1-4-R, with shell-and-tube heat exchanger, standard CO protection tube and optional exhaust gas ducting for direct heatings (no radiant tube).

Shown with IO pilot burner.

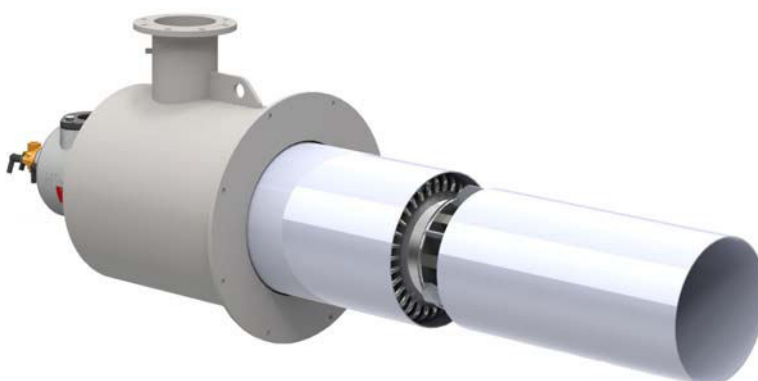


optional exhaust gas ducting, complete

CO protection tube

Recuperative gas burner, Series B202 HR 1-4-R, with shell-and-tube heat exchanger, standard CO protection tube (not visible), optional exhaust gas ducting and optional CO flame protection tube for direct heatings (no radiant tube).

Shown with IO pilot burner.



optional exhaust gas ducting, complete

Optional CO flame protection tube

Recuperative gas burner, Series B202 HSR 1-4-R, with shell-and-tube heat exchanger for indirect heatings in combination with diverse radiant tubes, as outlined above.

Shown with ignition insert.



Applicable data sheet TB 003510

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Recuperative gas burner, Series B202 HSR 1-2-F, with plate-type heat exchanger for indirect heatings in combination with diverse radiant tubes, as outlined above.

Shown with ignition insert.



Only for <160 kW, only on request

Recuperative gas burner, Series B202 HSR 1-2-F, with plate-type / shell-and-tube heat exchanger for indirect heatings in combination with P-shaped radiant tubes, double-P-shaped radiant tubes as well as jacketed radiant tubes for special applications.

Shown with P-type radiant tube.



In aluminium industry applications these systems are commonly employed for process temperatures up to approx. 650 °C.

Note regarding radiant tubes (all types):

The data sheet TB 003510 contains information on the typical gross radiant tube surface watt density, e.g., 35 kW / m², in conjunction with the nominal radiant tube diameter. The necessary radiant tube size can thus be calculated.

Example: Thus, a B202 HSR 3-R recuperative gas burner delivering 170-210 kW needs a radiant tube surface area of approx. $210 \text{ kW} / 35 \text{ kW} / \text{m}^2 = 6 \text{ m}^2$. With a nominal diameter of 235 mm, the radiant tube must have a developed length of approx. $8.1 \text{ m} = 6 \text{ m}^2 / (0.235 \times 3.141592654)$ to provide this surface area.

The efficiency of a burner used in combination with radiant tubes, regardless of which type, depends on the process temperature, the surface watt density and the actual heat transfer to the process air. It follows that, on principle, the figures stated in the above-mentioned data sheets can be indicative only.

The radiant tube surface watt density must decrease with increasing process temperature and vice versa. In other words, the higher the temperature, the larger must be the radiant tube and hence, its surface area.

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Standard ignition inserts for all the above burner systems are shown here in their normal and short configuration.

Depending on the burner type, total lengths of up to approx. 1800 mm are possible and intermediate insulators and electrode supports may be used.

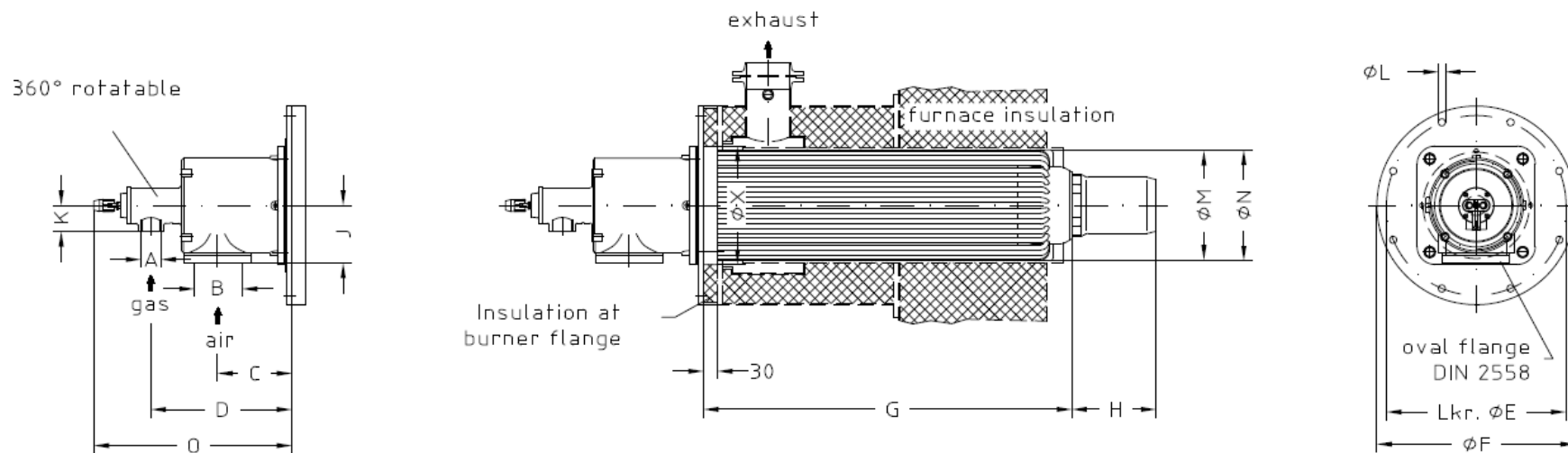


B051 series gas pilot burners, size 1 and 2, are optionally available for indirect ignition of all above burner systems in custom lengths of approx. 1800 mm maximum.

The standard version comes with flame ionization monitoring.

Special versions with UV-monitoring can be supplied. Custom adapters provide the ability to utilize UV sensors from a variety of manufacturers.



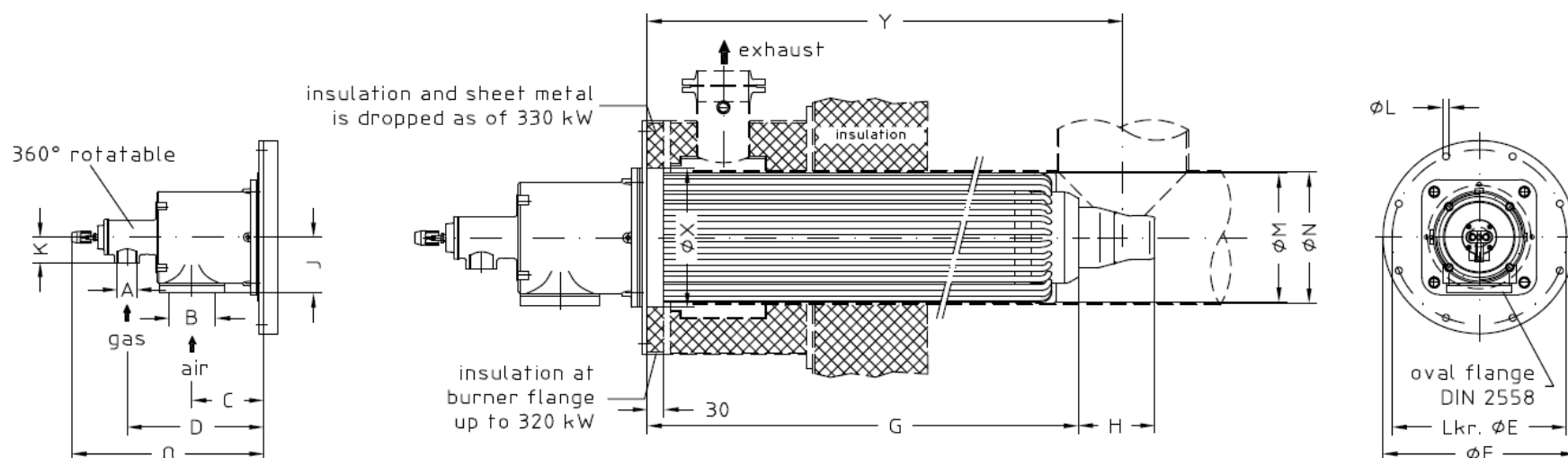


burner type	gross power [kW]	process temperature approx. [°C]	exhaust temperature before recu. approx. [°C]	exhaust temperature after recu. approx. [°C]	efficiency η_r approx. [%]	theoretical air preheat approx. [°C]	A-gas press. [mbar]	conn.	B-air press. [mbar]	conn.	C [mm]	D [mm]	J [mm]	K [mm]	ϕ L [mm]	approx. [mm]	ϕ E [mm]	ϕ F [mm]	G [mm]	H [mm]	ϕ M [mm]	ϕ N [mm]	ϕ X [mm]	weight approx. [kg]	flame length approx. [m]	possible pilot burner
B202 HR 2-R	80-160	600	600	340	86	300	40	G 1"	45	G 2"	119	230	104	50	8x ϕ 15	350	320	360	1100	200	233	235 ⁺² ₋₀	250	75	0,4	--
B202 HR 3-R	160-300	600	600	350	86	300	40	G 1 1/4"	45	G 2 1/2"	156	297	120	55	8x ϕ 15	430	380	420	1100	225	278	280 ⁺² ₋₀	290	105	0,6	--
B202 HR 3-R	270-340	600	600	340	86	300	40	G 1 1/4"	45	G 2 1/2"	156	297	120	55	8x ϕ 15	430	480	520	1100	225	378	380 ⁺² ₋₀	400	120	0,7	--
B202 HR 4-R	340-450	600	600	340	86	300	45	G 1 1/2"	50	DN 100	168	310	154	55	8x ϕ 15	460	480	520	1100	270	378	380 ⁺² ₋₀	400	145	0,8	B051-2 / 12 kW
B202 HR 4-R	450-540	600	600	360	85	280	45	G 1 1/2"	50	DN 100	168	310	154	55	8x ϕ 15	460	480	520	1100	270	378	380 ⁺² ₋₀	400	160	0,9	B051-2 / 12 kW
B202 HR 4-R	540-740	600	600	350	85	300	50	G 1 1/2"	55	DN 100	168	310	154	55	8x ϕ 15	460	570	620	1300	300	468	470 ⁺² ₋₀	490	230	1,1	B051-2 / 12 kW
B202 HR 4-R	740-1000	600	600	340	86	300	50	G 1 1/2"	55	DN 100	168	310	154	55	8x ϕ 15	460	620	670	1500	330	528	530 ⁺² ₋₀	550	340	1,3	B051-2 / 12 kW

Process temperature: max. 700 °C • Regulating range: 1:3 (up to 1:5) • pressure loss of exhaust: approx. 3 mbar • Direct electrical ignition and ionization control

Datas of emission: reference to 3 % O₂, nominal power, nominal temperature, operation with natural gas as well as measuring in wet exhaust gas

CO = 80 ppm (100 mg/Nm³) - NO_x = 98 ppm (200 mg/Nm³)



burner type	gross power [kW]	process temperature approx [°C]	exhaust temperature before recu approx [°C]	exhaust temperature after recu approx [°C]	efficiency η_f approx [%]	theoretical air preheat approx [°C]	A-gas press. [mbar]	A-gas conn.	B-air press. [mbar]	B-air conn.	C [mm]	D [mm]	Ø E [mm]	Ø F [mm]	J [mm]	K [mm]	Ø L [mm]	D approx [mm]	G [mm]	H [mm]	Ø M [mm]	Ø N [mm]	Ø X [mm]	Y [mm]	weight approx [kg]
B202 HSR 1-R	40-80	700	850	390	84	525	4.0	G ¾"	4.5	G 1 ½"	106	210	320	360	90	50	8xØ15	305	1100	50	198	200 ⁺² ₋₀	210	1110	65
B202 HSR 1-R	40-80	700	850	360	86	560	4.0	G ¾"	4.5	G 1 ½"	106	210	320	360	90	50	8xØ15	305	1390	50	198	200 ⁺² ₋₀	210	1400	70
B202 HSR 2-R	80-160	700	850	430	83	480	4.0	G 1"	4.5	G 2"	119	230	380	420	104	50	8xØ15	350	1170	82	233	235 ⁺² ₋₀	250	1200	86
B202 HSR 3-R	170-210	700	850	450	82	460	4.0	G 1 ¼"	4.5	G 2 ½"	156	297	380	420	120	55	8xØ15	430	1250	138	233	235 ⁺² ₋₀	250	1300	110
B202 HSR 3-R	220-260	700	850	450	82	460	4.0	G 1 ¼"	4.5	G 2 ½"	156	297	380	420	120	55	8xØ15	430	1300	215	278	280 ⁺² ₋₀	300	1400	125
B202 HSR 4-R	270-320	700	850	450	82	460	4.0	G 1 ½"	4.5	DN 100	168	310	440	480	154	55	8xØ15	460	1300	230	298	300 ⁺² ₋₀	325	1400	150
B202 HSR 4-R	330-440	700	850	450	82	460	4.0	G 1 ½"	4.5	DN 100	168	310	480	520	154	55	8xØ15	460	1670	230	395	400 ⁺² ₋₀	410	1750	170
B202 HSR 4-R	450-540	700	850	450	82	460	4.0	G 1 ½"	4.5	DN 100	168	310	480	520	154	55	8xØ15	460	1670	230	395	400 ⁺² ₋₀	410	1750	190

Process temperature: max. 750 °C • Regulating range: 1:3 (up to 1:5) • pressure loss of exhaust: approx. 3 mbar • Direct electrical ignition and ionization control

Datas of emission: reference to 3 % O₂, nominal power, nominal temperature, operation with natural gas as well as measuring in wet exhaust gas

CO = 80 ppm (100 mg/Nm³) - NO_x = 122 ppm (250 mg/Nm³) - Above values obtained on a net area load of the radiant tube of approx. 35 kW / m²