Forced draught burner PBG..EE

Technical Information · GB
7 Edition 11.14

- Robust burner design for applications in industry
- Easy to install thanks to compact design, complete pre-assembly and pre-wiring
- Electronic actuator permits easy integration into existing control systems
- Large temperature range thanks to excess air operation
- Direct ignition and monitoring
- Large capacity range up to 1100 kW
- Pre-set for safe ignition
- Combustion chamber reverse flow pressure up to 7 mbar

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1 Application

PBG..EE with modulating air/gas ratio control

PBG..EE with modulating gas control

Completely pre-assembled and pre-wired burner unit with mounted fan, gas safety system, gas control system and burner control unit for applications in industry. Typical applications include drying systems, hot air generation or process gas heating.

Thanks to its compact design, both conversion of existing systems and initial installation can be implemented within a very short time.

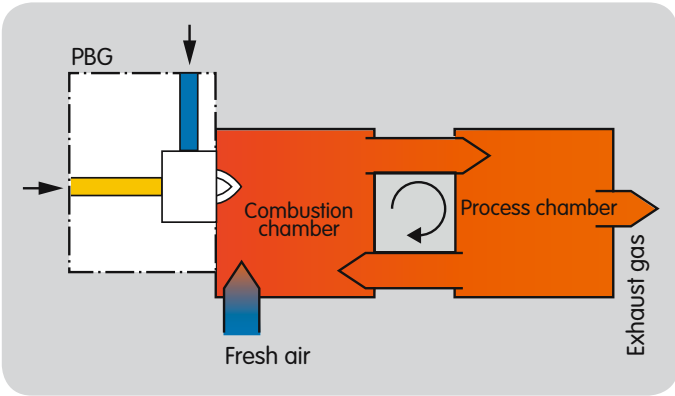
Control is carried out in a pneumatic ratio control system (modulating air/gas ratio control) or using the linear flow control with actuator in the gas circuit with a constant air volume.

PBG..EE with modulating air/gas ratio control

The air/gas ratio control VAG regulates the ratio of gas pressure to air pressure. The burner capacity is controlled in modulating mode by adjusting the air butterfly valve.

PBG..EE with modulating gas control

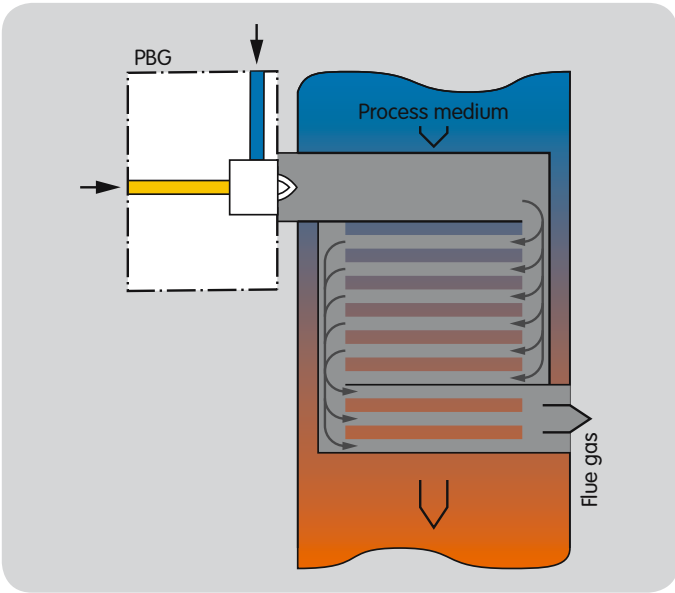
The gas flow rate can be adjusted in modulating mode using the linear flow control with actuator. The air flow rate remains constant.



1.1 Examples of application

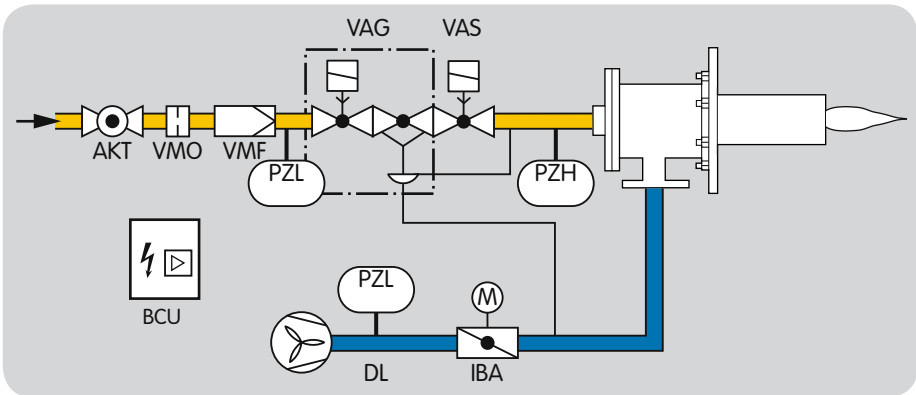
1.1.1 Direct heating

The forced draught burner PBG fires into a combustion chamber which is directly connected to the process chamber. Thanks to this direct firing system, optimal utilization of the heat generated is possible, e.g. in directly heated drying systems.



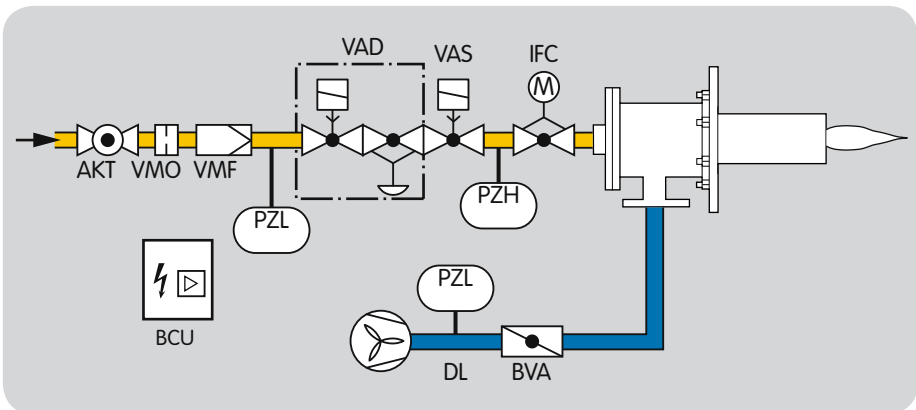
1.1.2 Indirect heating

The forced draught burner PBG fires into a combustion chamber which heats the process medium indirectly via a heat exchanger. For applications in which combustion gases must be kept separate from the product, e.g. for hot air generation or process gas heating.



1.1.3 Modulating air/gas ratio control

The burner capacity is controlled in modulating mode by adjusting the air butterfly valve. The air/gas ratio control regulates the ratio of gas to air.



1.1.4 Modulating gas control with constant air volume

The burner capacity is controlled in modulating mode by adjusting the linear flow control with actuator in the gas circuit with a constant air volume.

2 Certification

Eurasian Customs Union

The product PBG meets the technical specifications of the Eurasian Customs Union (the Russian Federation, Belarus, Kazakhstan).

Declaration of Incorporation pursuant to the Machinery Directive

The forced draught burner PBG..EE complies with the requirements of EN 746-2 and the Machinery Directive 2006/142/EC. This is confirmed by the manufacturer's Declaration of Incorporation.

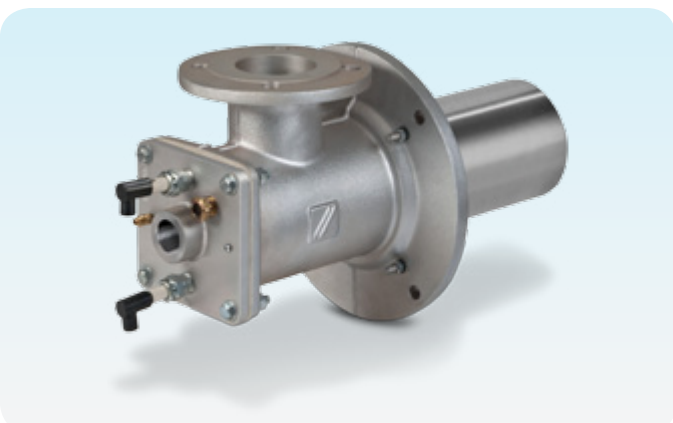
3 Mechanical construction

The forced draught burner PBG..EE is a completely pre-assembled and pre-wired burner unit. With its mounted fan, gas safety system, gas control system and burner control unit, the burner constitutes a coordinated system.

Thanks to its compact design, both conversion of existing systems and initial installation can be implemented within a very short time.

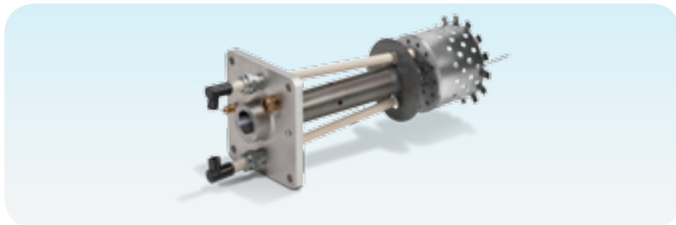
3.1 Burner

The burner is composed of 3 modules: burner housing, burner insert and burner tube.



The entire PBG system is fastened to the furnace using the burner housing. The burner housing accommodates the burner insert and the burner tube, and routes the combustion air.

Burner insert

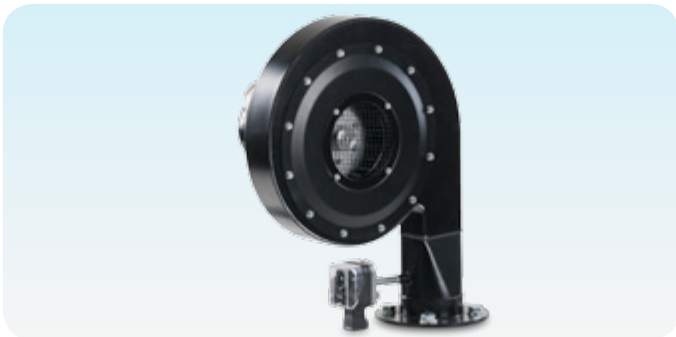


The combustion gas is supplied to the burner head via the gas connection and the gas pipe.

The ignition and ionization electrodes are screwed into the connection flange and can be replaced without removing the burner insert.

The gas and air are only mixed once they are in the burner head and are then ignited. This prevents explosive gases from being generated in the pipelines.

3.2 Fan



On the PBG..EE, the fan is flange-mounted directly onto the burner housing air connection. No other complex pipework is required. A pressure switch fitted to the fan housing acts as the low air pressure protection device in accordance with the requirements of EN 746-2.

An fan filter is available separately, see page 17 (Accessories).

3.3 Gas safety system, gas control system

The PBG..EE is available with two different types of gas train: an air/gas ratio control line with capacity control via the combustion air or a control line with modulating gas control at constant air volume.

Both gas trains include a high gas pressure protection device (PZH), a low gas pressure protection device (PZL) and a double shut-off valve, in accordance with the requirements of EN 746-2.

3.4 Burner control unit

The PBG switch box contains the burner control unit BCU 570 and the operator-control unit OCU. The burner control unit BCU 570 controls, ignites and monitors the forced draught burner.

You can find further information on burner control units at: www.docuthek.com ➔ Kromschröder ➔ Products ➔ 06 Electric flame monitoring and control units ➔ Burner control unit BCU 570.

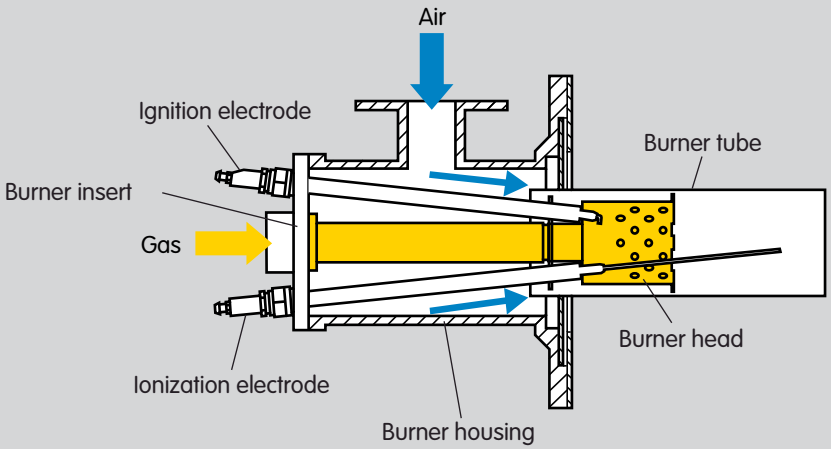
3.5 Actuator

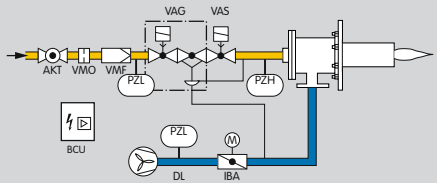
Actuator IC 20..E for precise, controlled rotary movement between 0° and 90° is mounted on the air butterfly valve or on the linear flow control depending on the type of control selected. The actuator can be controlled by a 4–20 mA, 0–20 mA or 0–10 V signal as desired. On delivery, the IC 20..E is controlled by a 4–20 mA signal. For control via a 0–20 mA or 0–10 V signal, the DIP switches must be set correspondingly in the IC 20..E.

The BCU must be rewired for three-point step control. More information about rewiring the BCU is available in the PBG operating instructions at: www.docuthek.com ➔ Kromschröder ➔ Products ➔ 07 Burners and pilot burners ➔ Forced draught burners PBG Europe.

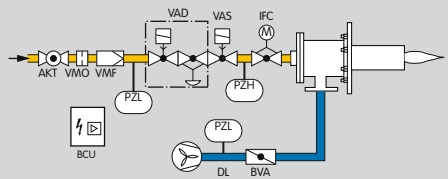
You can find further information on actuators at: www.docuthek.com ➔ Kromschröder ➔ Products ➔ 03 Valves and butterfly valves ➔ Actuators IC 20, IC 40.

4 Function





PBG..EE with modulating air/gas ratio control



PBG..EE with modulating gas control

4.1 PBG..EE with modulating air/gas ratio control

The burner control unit BCU 570 actuates the fan and pre-purge is carried out in the combustion chamber. After pre-purge, the air butterfly valve moves back to the ignition position. The gas is released and the safety valves open. The gas flows through the burner insert and the air flows through the burner housing as far as the burner head. The combustible gas/air mixture is produced downstream of the burner head and is electrically ignited directly by an ignition electrode. The resulting flame is controlled by the ionization electrode. After pre-purge and burner start, the controller enable signal is issued to an external controller which positions the air butterfly valve in accordance with the capacity demand. The air/gas ratio control regulates the gas volume on the basis of the air volume.

4.2 PBG..EE with modulating gas control

The burner control unit BCU 570 actuates the fan and pre-purge is carried out in the combustion chamber. After pre-purge, the linear flow control moves to the ignition position. The gas is released and the safety solenoid valves open. The gas flows through the burner insert and the air flows through the burner housing as far as the burner head. The combustible gas/air mixture is produced downstream of the burner head and is electrically ignited directly by an ignition electrode. The resulting flame is controlled by the ionization electrode. After pre-purge and burner start, the linear flow control is positioned in accordance with the capacity demand. The air flow rate remains constant.

5 Selection

The choice of forced draught burner depends on the capacity and process conditions. The desired operating mode determines whether modulating air/gas ratio control or modulating gas control is most suitable.

5.1 Burner size

The tables show capacities at various reverse flow pressures.

5.1.1 Modulating air/gas ratio control

Control range ≥ 1/20 up to 2 mbar reverse flow pressure

	Rated capacity [kW]			
Furnace pressure p	0 mbar	2 mbar	5 mbar	7 mbar
PBG 300	85	80	65	55
PBG 500	140	130	110	100
PBG 750	200	190	170	155
PBG 1000	270	255	220	200
PBG 2000	550	505	440	390

PBG 3000 (660 kW) and PBG 5000 (1100 kW) available on request.

5.1.2 Modulating gas control with constant air volume

Control range 1/10 up to 5 mbar reverse flow pressure

Burner	Rated capacity [kW]	
Furnace pressure p	0 to 5 mbar	7 mbar
PBG 300	85	75
PBG 500	140	125
PBG 750	200	185
PBG 1000	270	245
PBG 2000	550	500

PBG 3000 (660 kW) and PBG 5000 (1100 kW) available on request.

5.2 Burner control

Burner	Size	Gas train	Air butterfly valve
PBG..EE-V	300–5000	Modulating air/ gas ratio control	With actuator
PBG..EE-F	300–5000	Modulating gas control	Manual valve

5.3 Gas types

Gas type	Code letter	Calorific value range [kWh/m3(n)]	Density ρ [kg/m3]
Natural gas L and H quality	B	8–12	0.7–0.9
Propane, propane/butane, butane	G	25–35	2.0–2.7

5.4 Selection table

	-EE-	V	F	B	G	-A
PBG 300D	●	●	●	●	○	●
PBG 500D	●	●	●	●	○	●
PBG 750D	●	●	●	●	○	●
PBG 1000E	●	●	●	●	○	●
PBG 2000C	●	●	●	●	○	●
PBG 3000C*	●	●	●	●	○	
PBG 5000C*	●	●	●	●	○	

● = *standard*, ○ = *available*

** Version of previous construction stage*

Order example

PBG 1000E-EE-VB-A

5.5 Type code

Code	Description
PBG	Forced draught burner for gas
300–5000	Burner size
C, D, E	Burner construction stage
-EE-	European market
V F	Pneumatic air/gas ratio control Gas train with linear flow control
B G	Gas type: natural gas LPG
-A	System construction stage
F	Flame control with ionization electrode

6 Project planning information

6.1 Combustion chamber conditions

PBG..EE can be used in a wide temperature range – the maximum combustion chamber temperature is 1000°C. In low temperature applications, higher CO values are to be expected which can be reduced by secondary measures such as using the optionally available flame tube FPT, see page 17 (Flame tube FPT).

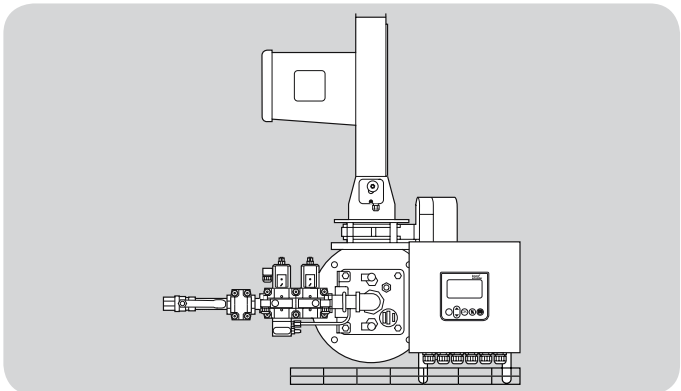
The PBG..EE can be operated in combustion chamber pressures of between -3 mbar and +7 mbar. Higher reverse flow pressures lead to reduced performance and should be checked on an individual basis.

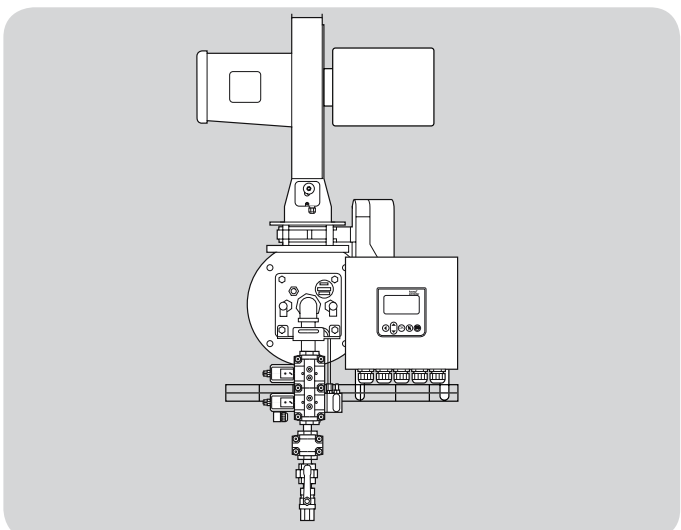
6.2 Installation positions

The entire burner unit is secured using the burner housing. The burner flange seal is included in the delivery.

In a vertical installation position, the burner insert must be turned clockwise through 90°. The retaining plates on the switch box and the gas train are not turned.

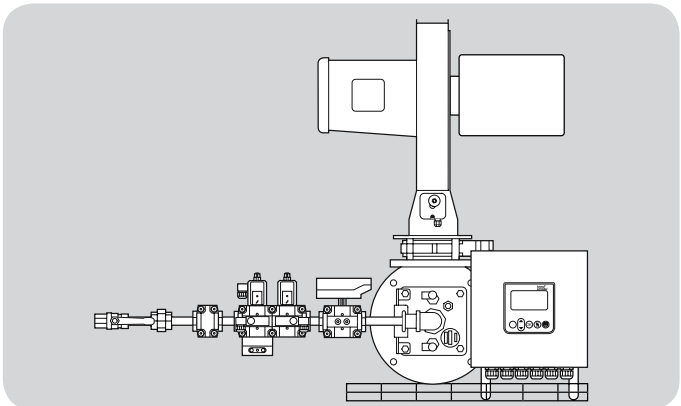
6.2.1 PBG..EE with modulating air/gas ratio control

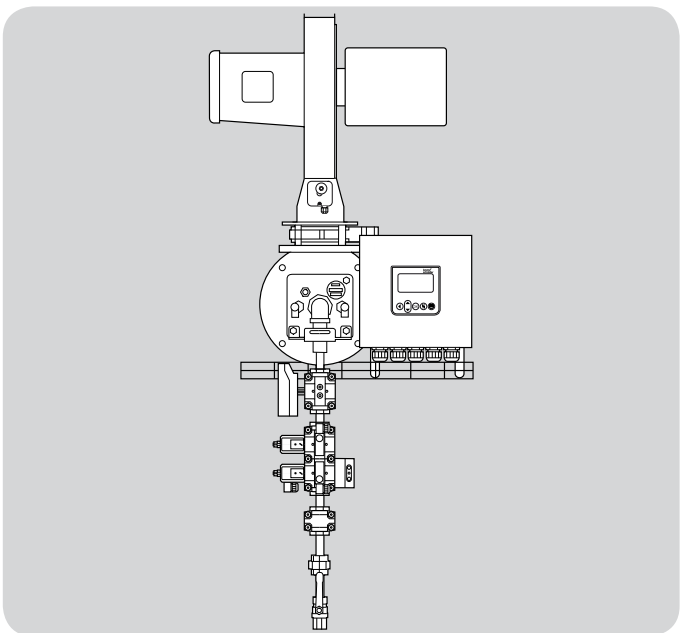




Installation with air/gas ratio control VAG in the vertical position: min. inlet pressure $p_{u\ min.}$ = 80 mbar.

6.2.2 PBG..EE with modulating gas control



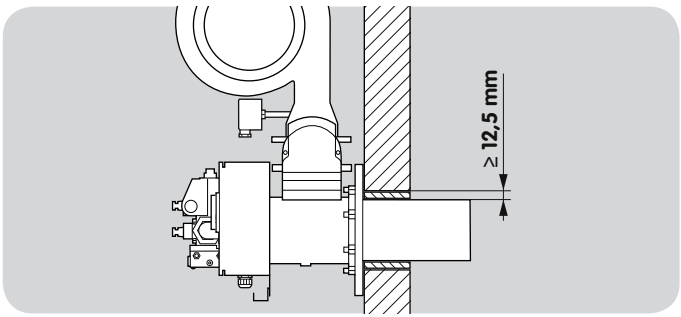


6.3 Installation options

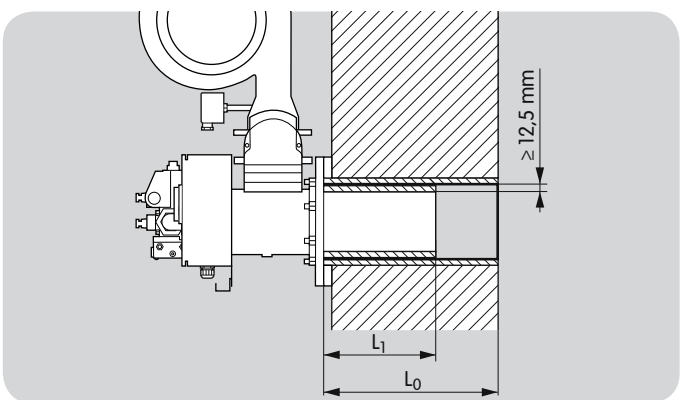
The PBG is suitable for installation in walls, ceilings and floors.

6.3.1 Installation in systems

Fill the annular gap between the burner tube and furnace wall with temperature-resistant insulation material.



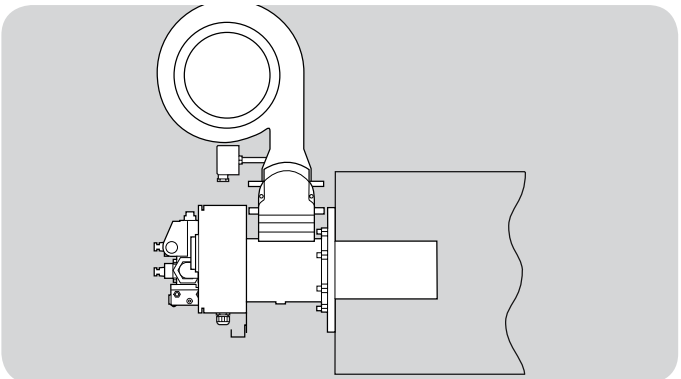
If the furnace wall thickness is less than or equal to the burner tube length, no flame tube FPT is required to enhance insulation.



L1 ≥ L0: no flame tube FPT required.
L1 < L0: flame tube FPT required.

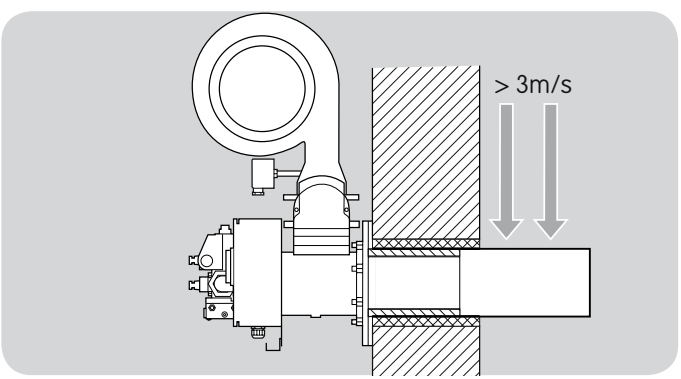
Installation in heat exchangers

When used in heat exchangers in the low temperature range, the burner can be installed directly in the combustion chamber without refractory lining.



6.3.2 Installation with flame tubes

For flow velocities of > 3 m/s, we recommend using a flame tube to protect the flame from being cooled, see page 17 (Flame tube FPT).



6.4 Gas connection

A gas pressure of between 50 and 100 mbar is required at the gas connection of the PBG..EE.

Installation of the air/gas ratio control VAG in vertical pipelines requires an inlet pressure of > 80 mbar. For documentation on the installation position of the controls used, see www.docuthek.com.

Install flexible tubes or bellows units to prevent mechanical stress or transmission of vibration.

A flow rate measuring system is required in the gas circuit for burner adjustment. A measuring orifice VMO is installed in the gas train for this purpose.

6.5 Power supply

The various controls are actuated centrally by the PBG switch box. The switch box is in turn actuated and supplied with energy by the higher-level plant control system.

Burner size	Voltage	Frequency	Phases
PBG 300–2000	230 V	50 Hz	1
PBG 3000–5000	400 V	50 Hz	3

6.6 Condition on delivery/Pre-setting

The forced draught burner PBG is supplied with all pre-settings made. Safe ignition ($\lambda > 1$) is guaranteed. A low-fire rate and rated capacity is precalibrated on the IC 20, the ignition position is defined by a cam.

The gas flow rate is limited by the internal restrictor on the gas solenoid valve VAS.

The low-fire rate and rated capacity are adjusted on site using the supplied setting diagrams. Further information is provided in the appropriate operating instructions (see www.docuthek.com).

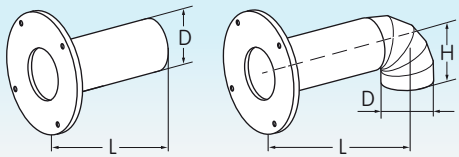
6.7 Purging/cooling air

While the burner is switched off, there must be a certain air flow in order to ensure safe ignition and monitoring of the burner, and for cooling the burner components. For this, leave the air fan switched on until the furnace has cooled down completely (< 400 °C).

The cooling/purging air volume is defined by the calibrated minimum position of the air butterfly valve. This is adequate up to the maximum furnace temperature (1000°C).

7 Accessories

7.1 Flame tube FPT



Straight or angled flame tube FPT to protect the flame from cross flows or as an installation tool. The flame tube is installed between the burner flange and the furnace wall.

Straight flame tube

Burner	L [mm]	D
PBG 300 – 1000	254 – 762	168
PBG 2000	457 – 914	241
PBG 3000	457 – 914	273
PBG 5000	457 – 914	307

** The length L is available in 25.4 mm increments.*

Angled flame tube

Burner	L [mm]	D	H
PBG 300 – 1000	406 – 762	168	152
PBG 2000	685 – 914	241	229
PBG 3000	685 – 914	273	228
PBG 5000	685 – 914	307	229

** The length L is available in 25.4 mm increments.*

The flame tube seal is included in the delivery. Flame tube FPT available on request.

7.2 Air filter

The air filter is installed on the fan housing with a pipe clamp.

Order No.	Fan filter	Dimensions [mm]	Filter class	Filter pads
03352654	PBG 300–2000	Ø 252 x 322	G4	03352657

7.3 UV sensor UVS 10

For monitoring gas burners in conjunction with flame detectors or automatic burner control units.

The UVS installation set for PBG (Order No. 74927601) is required for installation on the PBG.

UVS 10: with heat guard made of quartz glass,
delivery of UV sensor and installation set on request.

8 Technical data

Gas inlet pressure p_u: 50–100 mbar.

Gas types: natural gas, LPG.

Mains voltage:
PBG 300–2000: 230 V AC, ±10%, 50 Hz,
PBG 3000–5000: 400 V AC, ±10%, 50 Hz.

Electrical power consumption:

PBG	300	500 – 2000	3000	5000
kW	0.65	0.85	1.2	2.3

Control type: modulating.

Control: three-point step, 0–10 V, 0(4)–20 mA.
Systems are supplied with 4–20 mA control.

Control range (without combustion chamber reverse flow pressure):

	PBG 300 – 2000	PBG 3000 – 5000
Modulating air/gas ratio control	> 1:20	1:10
Modulating gas control	1:10	1:10

Flame control: with ionization electrode (UV sensor as an option).

Ignition: direct spark ignition.

Combustion chamber reverse flow pressure:

	PBG 300 – 2000	PBG 3000 – 5000
Combustion chamber reverse flow pressure	-3 to +7 mbar	-3 to +2 mbar

Maximum combustion chamber temperature: 1000°C.

8.1 Burner size

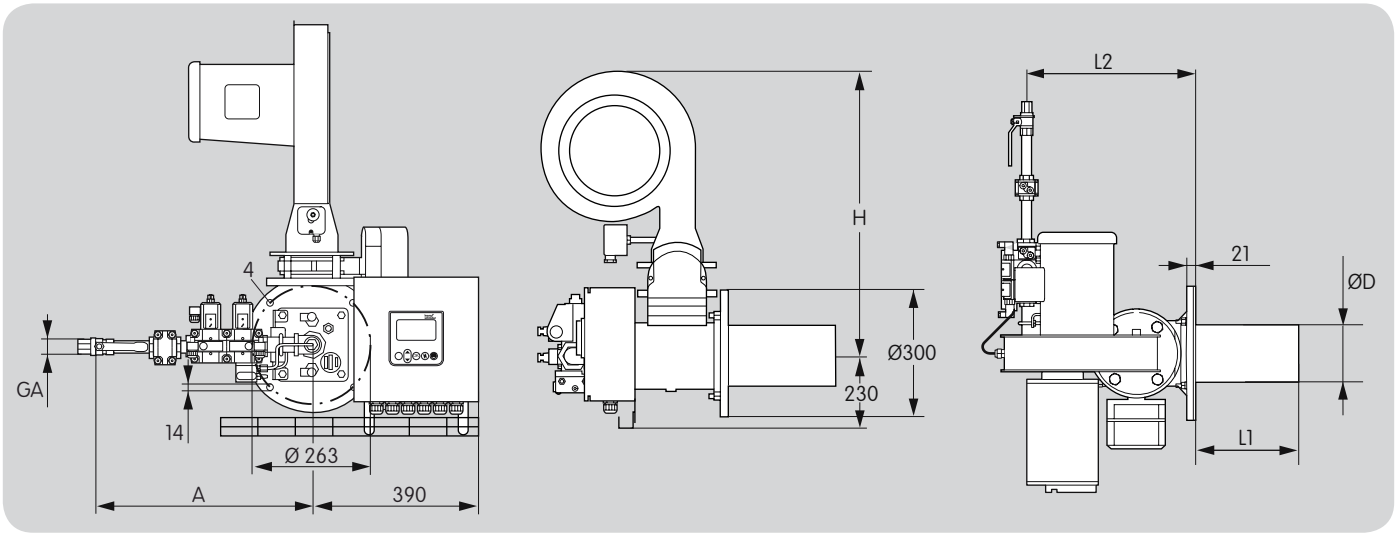
Burner	Capacity [kW]*	Weight [kg]	Flame length [mm]**
PBG 300	85	70	550
PBG 500	140	75	720
PBG 750	200	75	850
PBG 1000	270	75	1100
PBG 2000	550	90	1300
PBG 3000	660	115	1600
PBG 5000	1100	140	1900

* The specified capacity applies to a maximum reverse flow pressure of 0 mbar.

** Measured in the open air (natural gas).

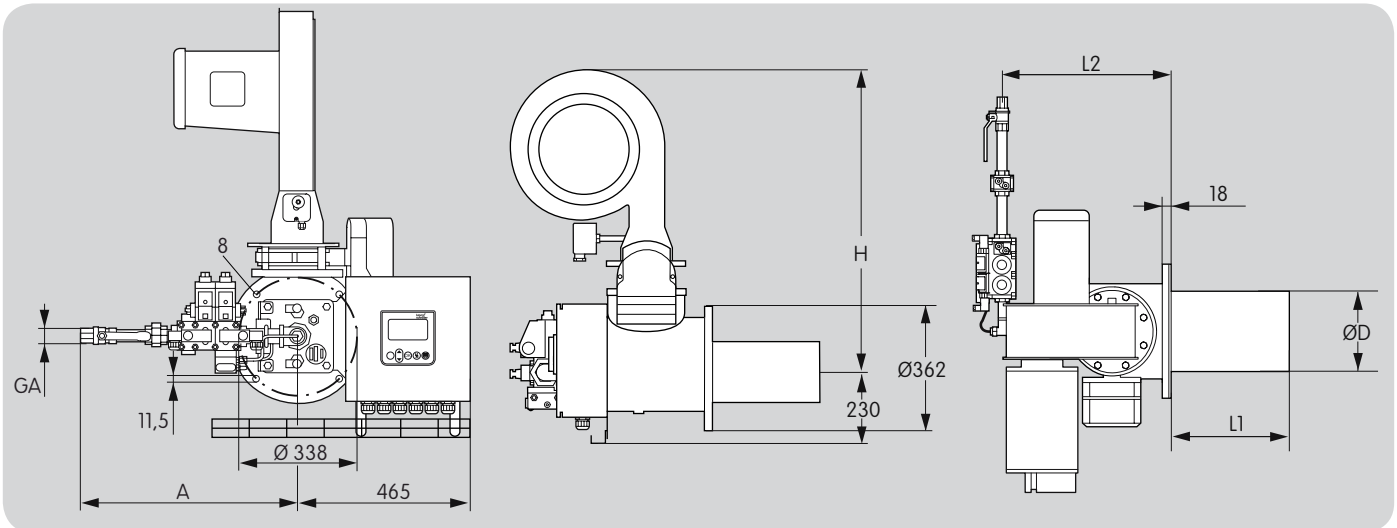
8.2 Dimensions

8.2.1 PBG 300 – 1000 [mm]



Type	Connection	Dimensions [mm]				
	GA	A	H	∅ D1	L1	L2
PBG 300D-EE-VB-A	Rp ½"	700	815	95	232	405
PBG 300D-EE-FB-A	Rp ½"	815	815	95	232	405
PBG 500D-EE-VB-A	Rp ½"	700	770	95	232	405
PBG 500D-EE-FB-A	Rp ½"	815	770	95	232	405
PBG 750D-EE-VB-A	Rp ¾"	700	775	121	232	410
PBG 750D-EE-FB-A	Rp ¾"	825	775	121	232	410
PBG 1000E-EE-VB-A	Rp 1"	755	775	138	241	410
PBG 1000E-EE-FB-A	Rp 1"	880	775	138	241	410

8.2.2 PBG 2000 – 5000 [mm]



Type	Connection	Dimensions [mm]				
	GA	A	H	∅ D1	L1	L2
PBG 2000C-EE-VB-A	Rp 1½"	1100	850	190	438	480
PBG 2000C-EE-FB-A	Rp 1½"	1300	850	190	438	480

PBG 3000 and PBG 5000 on request.
Dimensions of PBG systems for LPG on request.

9 Maintenance

Twice per year, but if the media are highly contaminated, this interval should be reduced.

10 Legend

	Manual valve
	Measuring orifice
	Filter module
	Pressure switch for maximum pressure
	Pressure switch for minimum pressure
	Air butterfly valve with actuator
	Linear flow control with actuator
	Air butterfly valve with manual adjustment
	Gas solenoid valve
	Air/gas ratio control with solenoid valve
	Burner control unit
	Fan
	Burner

Feedback

Finally, we are offering you the opportunity to assess this "Technical Information (TI)" and to give us your opinion, so that we can improve our documents further and suit them to your needs.

Clarity

- ○ Found information quickly
- ○ Searched for a long time
- ○ Didn't find information
  What is missing?
- ○ No answer

Comprehension

- ○ Coherent
- ○ Too complicated
- ○ No answer

Scope

- ○ Too little
- ○ Sufficient
- ○ Too wide
- ○ No answer

Use

- ☐ To get to know the product
- ☐ To choose a product
- ☐ Planning
- ☐ To look for information

Navigation

- ○ I can find my way around
- ○ I got "lost"
- ○ No answer

My scope of functions

- ○ Technical department
- ○ Sales
- ○ No answer

Remarks

(Adobe Reader 7 or higher required)
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