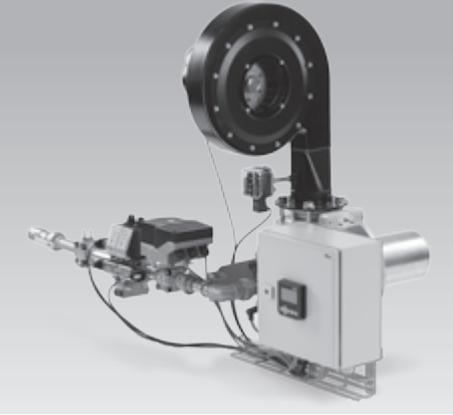


## Operating instructions Forced draught burners PBG..EE



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## Safety

### Please read and keep in a safe place



Please read through these instructions carefully before installing or operating. Following the installation, pass the instructions on to the operator. This unit must be installed and commissioned in accordance with the regulations and standards in force. These instructions can also be found at www.docuthek.com.

### Explanation of symbols

■, **1**, **2**, **3**... = Action  
> = Instruction

### Liability

We will not be held liable for damage resulting from non-observance of the instructions and non-compliant use.

### Safety instructions

Information that is relevant for safety is indicated in the instructions as follows:

#### **⚠ DANGER**

Indicates potentially fatal situations.

#### **⚠ WARNING**

Indicates possible danger to life and limb.

#### **! CAUTION**

Indicates possible material damage.

All interventions may only be carried out by qualified gas technicians. Electrical interventions may only be carried out by qualified electricians.

### Conversion, spare parts

All technical changes are prohibited. Only use OEM spare parts.

## Changes to edition 04.12

– Fully revised version

## Checking the usage

### Intended use

#### Forced draught burners PBG..EE

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.

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

The authorized gas type depends on the system.

This function is only guaranteed when used within the specified limits – see page 15 (Technical data). Any other use is considered as non-compliant.

### Type code

Code	Description
<b>PBG</b>	Forced draught burner for gas
<b>300-5000</b>	Burner size
<b>C</b>	
<b>D</b>	Burner construction stage
<b>E</b>	
<b>-EE-</b>	European market
<b>V</b>	Pneumatic air/gas ratio control
<b>F</b>	Gas train with linear flow control
	Gas type:
<b>B</b>	natural gas
<b>G</b>	propane, propane/butane, butane
<b>-A</b>	System construction stage*

\* PBG 3000/5000 old version

### Type label

Permissible maximum/minimum temperature, maximum allowable pressure, material number, designation, production order, date of production (week/year) and QR code: see type label.

D-49018 Osnabrück  
Germany

krom/  
schöder

**PBG**

**TS**

**PS**

## Materials required

### BCSoft

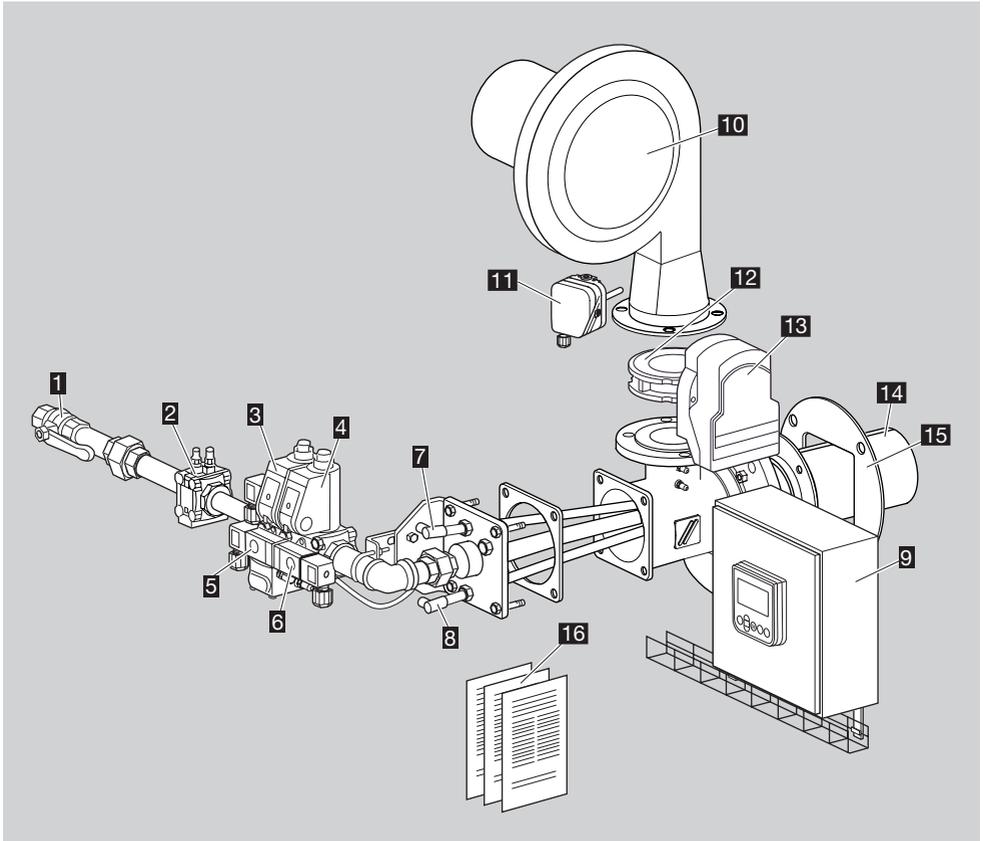
The current software can be downloaded from our Internet site at <http://www.docuthek.com>. To do so, you need to register in the DOCUTHEK.

### Opto-adapter PCO 200

Including BCSoft CD-ROM,  
Order No.: 74960625.

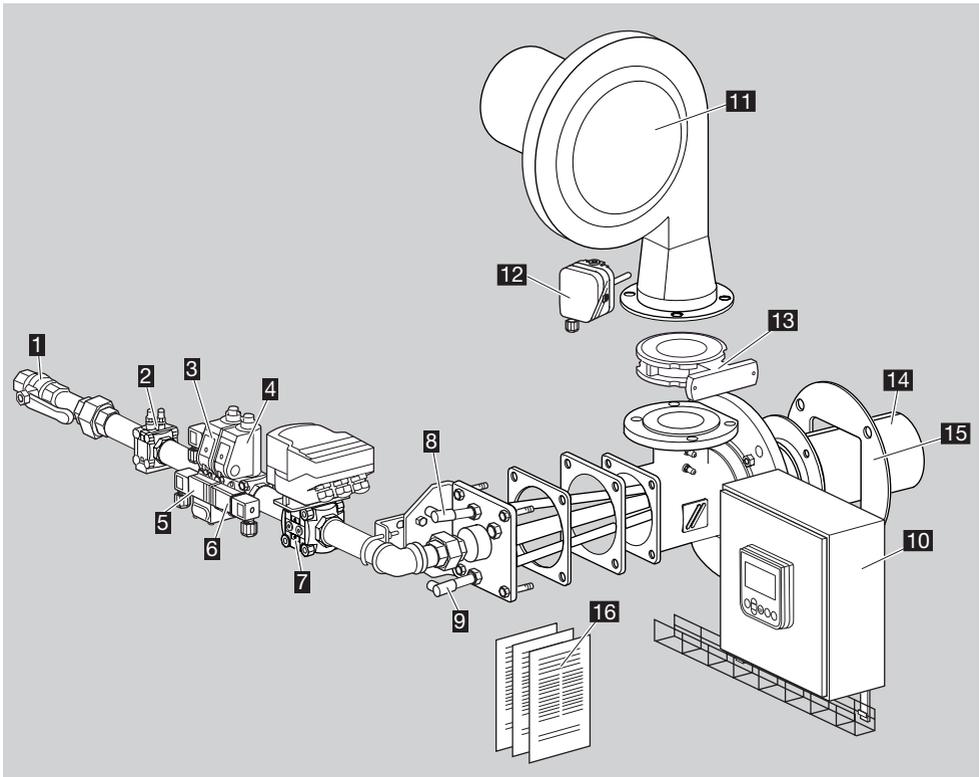
## Part designations

### PBG..V with modulating air/gas ratio control



- 1** Manual valve
- 2** Measuring orifice VMO
- 3** Pressure regulator with solenoid valve VAD
- 4** Solenoid valve for gas VAS
- 5** Min. gas pressure switch
- 6** Max. gas pressure switch
- 7** Ignition electrode
- 8** Ionization electrode
- 9** Switch box with operator-control unit OCU
- 10** Fan
- 11** Air pressure switch
- 12** Air butterfly valve
- 13** Actuator (IC 20)
- 14** Burner tube
- 15** Mounting gasket
- 16** Enclosed documentation  
(PBG operating instructions, BCU operating instructions, VAS operating instructions, VAG operating instructions, IC 20 operating instructions, circuit diagram, diagrams)

## PBG..F with modulating gas control



- 1** Manual valve
- 2** Measuring orifice VMO
- 3** Air/gas ratio control with solenoid valve VAG
- 4** Solenoid valve for gas VAS
- 5** Min. gas pressure switch
- 6** Max. gas pressure switch
- 7** Linear flow control with actuator IFC
- 8** Ignition electrode
- 9** Ionization electrode
- 10** Switch box with operator-control unit OCU
- 11** Fan
- 12** Air pressure switch
- 13** Air butterfly valve
- 14** Burner tube
- 15** Mounting gasket
- 16** Enclosed documentation

(PBG operating instructions, BCU operating instructions, VAS operating instructions, VAG operating instructions, IC 20 operating instructions, circuit diagram, diagrams)

## Installation

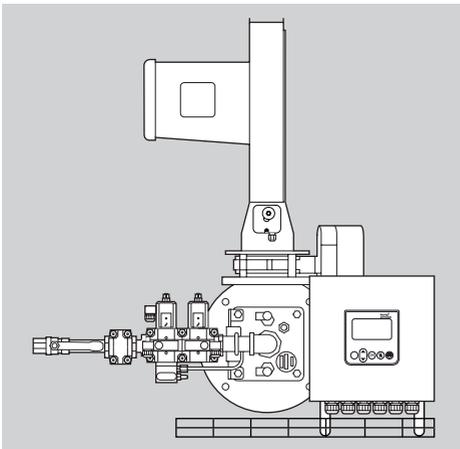
### ! CAUTION

Please observe the following to ensure that the forced draught burner PBG is not damaged during installation and during subsequent operation:

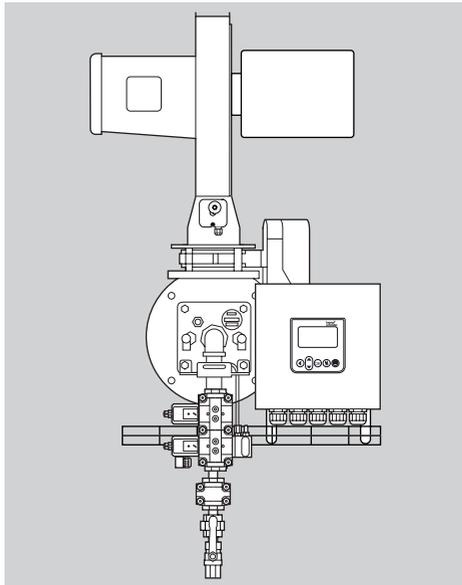
- The burner can be installed in side walls, ceilings or in the floor of furnaces, dryers or combustion chambers. Note the installation instructions for individual controls.
  - Note the weight of the burner and the associated components when designing the furnace wall.
  - For walls which are thicker than the length of the burner tube or if used in cross flow, a straight or angled flame tube may be required, see page 15 (Accessories).
  - To prevent injuries caused by crushing or impacts, secure the burner to stop it from falling or swinging during installation.
- ▷ When installing the burner in the open air, ensure there is appropriate weather protection.
- ▷ When operating the burner inside buildings, ensure there is a sufficient supply of fresh air.

### Installation positions

#### PBG..V in the standard installation position

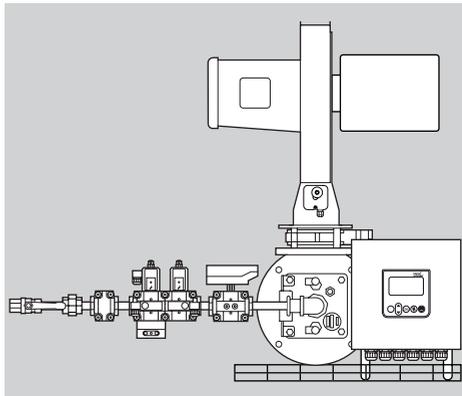


#### PBG..V in the vertical position

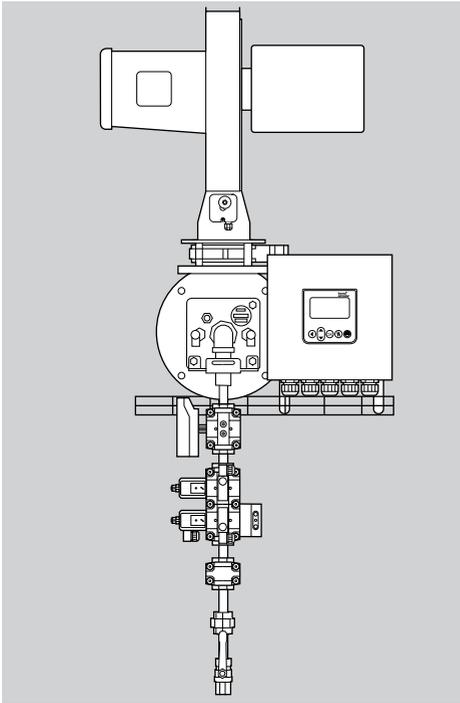


- ▷ Turn the burner insert incl. retaining fixture for the gas train 90° anti-clockwise.
- ▷ Installation with air/gas ratio control VAG in the vertical position: minimum inlet pressure  $p_{U\min} = 80$  mbar.

#### PBG..F in the standard installation position



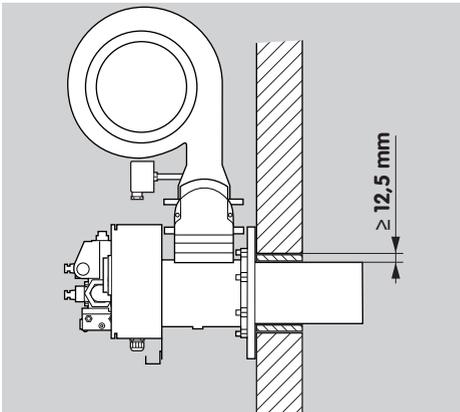
## PBG..F in the vertical position



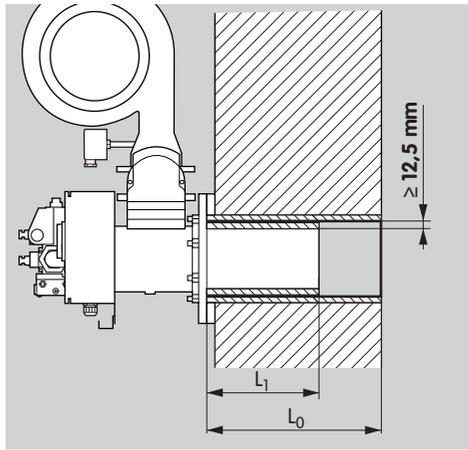
- ▷ Turn the burner insert incl. retaining fixture for the gas train 90° anti-clockwise.

### Installation in systems

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



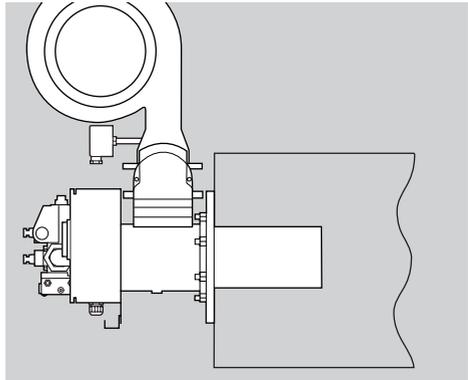
- ▷ If the furnace wall thickness is less than or equal to the burner tube length, no flame tube FPT is required to enhance insulation.



- ▷  $L1 \geq L0$ : no flame tube FPT required.
- ▷  $L1 < L0$ : flame tube FPT required.

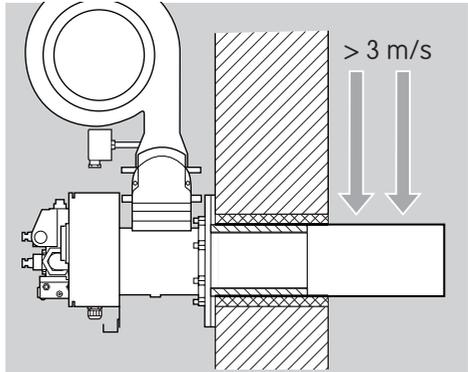
### Installation in heat exchangers

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



### Installation with flame tubes

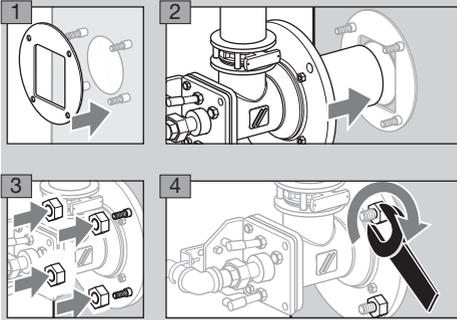
- ▷ For flow velocities of  $> 3$  m/s, we recommend using a flame tube to protect the flame from being cooled, see page 15 (Accessories).



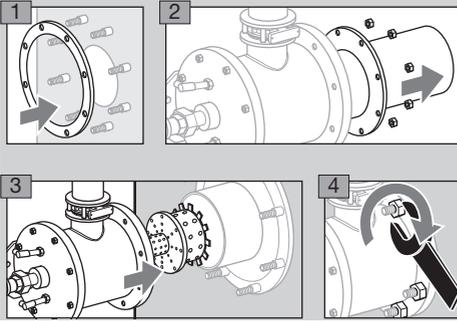
## Installation on the furnace

### PBG 300 – 1000

- ▷ When installing, always ensure that when the burner is mounted, it is sealed tightly on the furnace wall.



### PBG 2000 – 5000



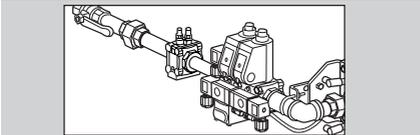
### Gas connection (GA)

#### **⚠ DANGER**

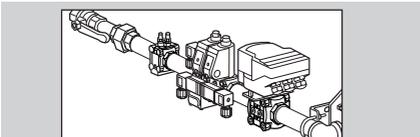
Risk of explosion! Ensure the connection is gas-tight.

- ▷ The PBG is designed for a gas pressure at the gas train inlet of 50 – 100 mbar.
- ▷ Installation of air/gas ratio control VAG in vertical pipelines: min. inlet pressure = 80 mbar.

### PBG..V



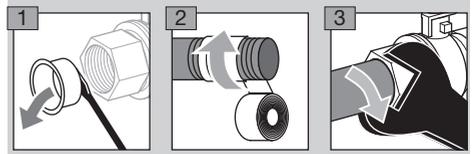
### PBG..F



- ▷ Threaded connection pursuant to DIN EN 10226-1:

Burner	Gas connection
PBG 300	DN 15, Rp 1/2"
PBG 500	DN 15, Rp 1/2"
PBG 750	DN 20, Rp 3/4"
PBG 1000	DN 25, Rp 1"
PBG 2000	DN 40, Rp 1 1/2"
PBG 3000	DN 40, Rp 1 1/2"
PBG 5000	DN 40, Rp 1 1/2"

- ▷ Install flexible tubes or bellows units to prevent mechanical stress or transmission of vibration.
- ▷ Use approved sealing material only.
- ▷ Sealing material and dirt, e.g. thread cuttings, must not be allowed to get into the pipework.



### Air connection

- ▷ The air supply is provided by the attached fan.

### PBG..V

- ▷ When using an air butterfly valve with an actuator, note the separate operating instructions for actuator IC 20.

### PBG..F

- ▷ When using a butterfly valve without an actuator, control is carried out in the gas circuit with constant air pressure – note the separate operating instructions for linear flow control VFC and actuator IC 20.

## Wiring

#### **⚠ WARNING**

Electric shocks can be fatal! Before working on possible live components, ensure the unit is disconnected from the 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.
- ▷ Please refer to the circuit diagram for the correct voltage supply of the switch box and for further information regarding the cable cross-sections and safeguarding of the power supply.
- ▷ Testing of the electrical safety measures is to be carried out when testing the entire control system.

### Rewiring capacity control to change from analogue to digital control

- ▷ Actuator IC 20 is set to be controlled by a 4 – 20 mA signal on delivery. Details on the control options are given in the burner control unit BCU and actuator IC 20 documentation and in the circuit diagram.

- ▷ For rewiring in order to change from analogue capacity control (4 – 20 mA / 0 – 20 mA / 0 – 10 V) to digital capacity control using a 3-point step controller, the controller enable signal of the BCU 570 [terminal 56] must be connected to the 3-point step controller. Actuation signals for the OPEN/CLOSE cams (terminals 53/54) are connected to the inputs of the actuator [1/2], together with the control signals.

## Preparing commissioning

### **⚠ DANGER**

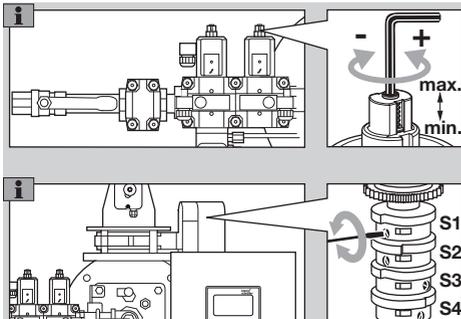
The burner must only be commissioned by authorized trained personnel.

Risk of explosion! Please observe the appropriate precautions when igniting the burner.

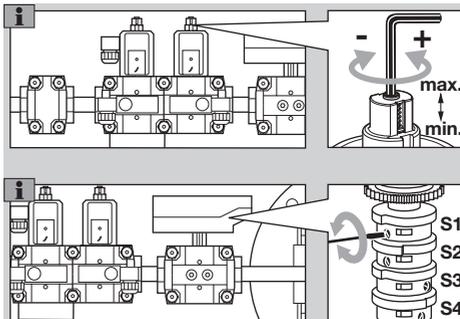
Risk of poisoning! Open the gas and air supply so that the burner is always operated with excess air – otherwise CO will form in the furnace chamber. CO is odourless and poisonous! A flue gas analysis is to be conducted.

- ▷ Agree settings and commissioning of the burner with the system operator or manufacturer.
- ▷ Check the entire system, upstream devices and electrical wiring.
- ▷ Note the operating instructions for individual controls.
- ▷ Pre-purge the furnace chamber with air (5 x furnace chamber volume) before every ignition attempt.
- ▷ The PBG is pre-set to  $\lambda > 1$ , thus ensuring safe ignition. Pre-set values for both systems can be found in the enclosed tables.
- ▷ The maximum gas flow rate is limited using the integrated restrictor on the second safety valve.
- ▷ The pilot rate is pre-set manually using cam S1 on the actuator.

### PBG..V



### PBG..F



### **⚠ DANGER**

Risk of explosion! Fill the gas line to the burner carefully and correctly with gas and vent it safely into the open air – do not discharge the test volume into the furnace chamber.

### Determining the flow rates

$$Q_{\text{gas}} = P_{\text{B}}/H_{\text{U}}$$

$$Q_{\text{air}} = Q_{\text{gas}} \cdot \lambda \cdot L_{\text{min}}$$

- ▷  $Q_{\text{gas}}$ : Gas flow rate in m<sup>3</sup>/h (ft<sup>3</sup>/h)
- ▷  $P_{\text{B}}$ : Burner capacity in kW (BTU/h)
- ▷  $H_{\text{U}}$ : Gas calorific value in kWh/m<sup>3</sup> (BTU/ft<sup>3</sup>)
- ▷  $Q_{\text{air}}$ : Air flow rate in m<sup>3</sup>(n)/h (SCFH)
- ▷  $\lambda$ : Lambda, air index
- ▷  $L_{\text{min}}$ : Minimum air requirement in m<sup>3</sup>(n)/m<sup>3</sup>(n) (SCF/SCF)

- Use the lower calorific value  $H_{\text{L}}$ .
- ▷ Information on the gas quality supplied can be obtained from the competent gas supply company.

### Common gas qualities

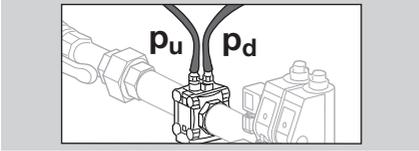
Gas type	$H_{\text{U}}^*$ kWh/m <sup>3</sup> (BTU/SCF)	$L_{\text{min}}$ m <sup>3</sup> (n)/m <sup>3</sup> (n) (SCF/SCF)
Natural gas H	11 (1114)	10.6
Natural gas L	8.9 (901)	8.6
Propane	25.9 (2568)	24.4
Butane	34.4 (3406)	32.3

\* Data in kWh/m<sup>3</sup>(n) refer to the lower calorific value  $H_{\text{L}}$  and data in BTU/SCF refer to the upper calorific value  $H_{\text{U}}$ .

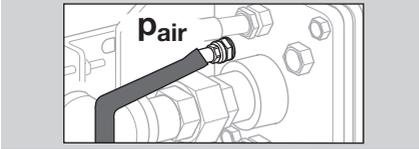
- ▷ For safety reasons, the air excess should be min. 10% (lambda = 1.10).
- ▷ A flue gas analysis or process gas analysis is to be conducted.

## Measuring the gas and air pressures

- ▷ Connect the pressure gauges before commissioning.
- ▷ Measure the differential gas pressure at the measuring orifice VMO.



- ▷ Measure the air pressure on the burner.



## Commissioning

### **⚠ DANGER**

Avoid CO formation – always operate the burner with excess air when starting up.  
 Ensure adequate ventilation of the furnace chamber before each burner start!  
 Ensure that no materials can be sucked into the fan air intake. Install a fan filter if necessary.

- ▷ The pre-purge time is set to  $t = 6000$  s on delivery.
- ▷ Pre-purge the combustion chamber with air (5 x chamber volume) before every ignition attempt.
- ▷ The usual program sequence of the BCU 570 provides for pre-purge each time the device is switched on or after each restart.
- ▷ Adjust the pre-purge time, see page 12 (Setting pre-purge).

### Igniting the burner (as pre-set on delivery)

- 1 Open the gas supply.
- 2 Switch on the system by pressing the ON/OFF key on the OCU.



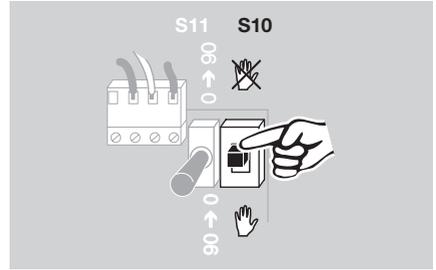
- 3 The program sequence of the BCU is started.
- 4 The burner ignites at the pre-set pilot rate ( $\lambda > 1$ ).
- 5 Once the program sequence has ended and the burner is in operation, the display of the OCU shows "Operation" and 08.

## PBG.V

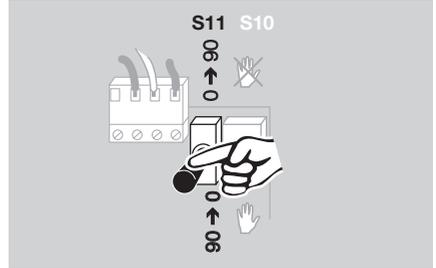
### Setting the low-fire rate/offset

- ▷ Set the valve to the air pressure  $p_{air}$  of the lower lambda value specified (see enclosed diagram "Adjustment").

- 6 Set switch S10 of the IC 20 to Manual mode.



- 7 Press the toggle switch S11 downwards.

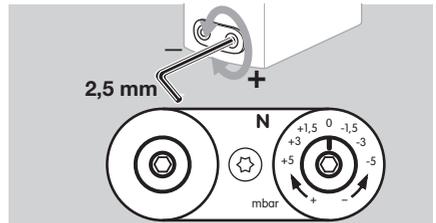


- ▷ The valve closes.

- 8 Read off the low-fire rate corresponding to the set air pressure  $p_{air}$  and calculate the appropriate gas flow rate  $Q_{gas}$ .

$$Q_{gas} = P_B / H_u$$

- 9 Determine the differential gas pressure  $\Delta p_{gas}$  corresponding to the gas flow rate  $Q_{gas}$  calculated (see enclosed diagram "Gas Flow Rate").
- 10 Adjust the offset on the VAG until  $\Delta p_{gas}$  is reached on the measuring orifice VMO.



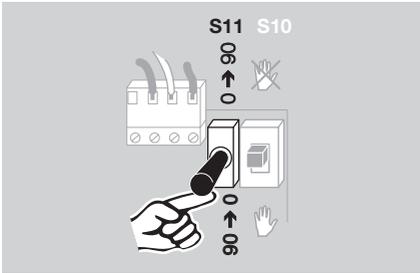
- ▷ The offset is set.

- 11 Set the air valve to the required low-fire rate and adjust the switching cams on the IC 20, see page 11 (Adjusting the switching cams and calibrating the IC 20).
- ▷ The low-fire rate is set.

## Setting the high-fire rate

- ▷ Set the valve to the air pressure  $p_{\text{air}}$  for the high-fire rate to be adjusted (see enclosed diagram "Adjustment").

- 12 Press the toggle switch S11 upwards.

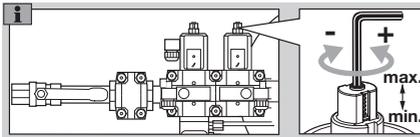


- ▷ The valve opens.

- 13 Calculate the gas flow rate  $Q_{\text{gas}}$ .

$$Q_{\text{gas}} = P_B / H_u$$

- 14 Determine the differential gas pressure  $\Delta p_{\text{gas}}$  corresponding to the gas flow rate  $Q_{\text{gas}}$  calculated (see enclosed diagram "Gas Flow Rate").
- 15 Adjust the internal restrictor on the VAS until  $\Delta p_{\text{gas}}$  is reached on the measuring orifice VMO.



- 16 Adjust the high-fire cam on the IC 20, see page 11 (Adjusting the switching cams and calibrating the IC 20).

- ▷ The high-fire rate is set.

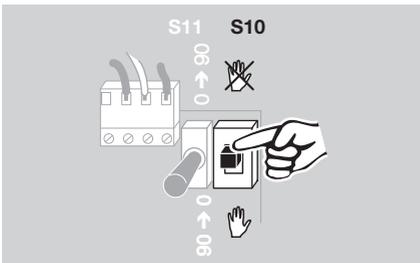
- 17 Adjust the pre-purge time, see page 12 (Setting pre-purge).

## PBG..F

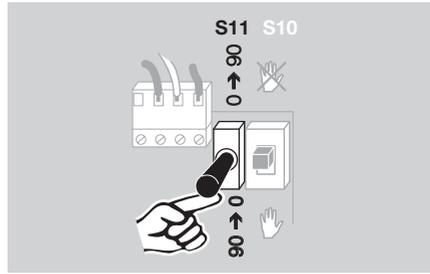
### Setting the high-fire rate

- ▷ On PBG..F, the high-fire rate must be set first.

- 6 Set switch S10 of the IC 20 to Manual mode.



- 7 Press the toggle switch S11 upwards.



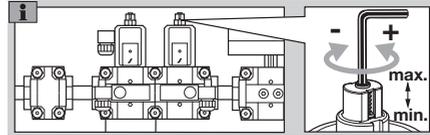
- 8 Open the valve as far as it will go (90°).

- 9 Calculate the appropriate gas flow rate  $Q_{\text{gas}}$  for the high-fire rate.

$$Q_{\text{gas}} = P_B / H_u$$

- 10 Determine the differential gas pressure  $\Delta p_{\text{gas}}$  corresponding to the gas flow rate  $Q_{\text{gas}}$  calculated (see enclosed diagram "Gas Flow Rate").

- 11 Adjust the internal restrictor on the VAS until  $\Delta p_{\text{gas}}$  is reached on the measuring orifice VMO.

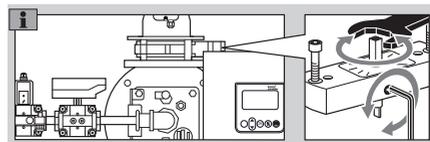


- 12 Calculate the appropriate air flow rate  $Q_{\text{air}}$  for the high-fire rate.

$$Q_{\text{air}} = Q_{\text{gas}} \cdot L_{\text{min}} \cdot 1,1$$

- 13 Determine the appropriate air pressure  $p_{\text{air}}$  for the air flow rate  $Q_{\text{air}}$  calculated (see enclosed diagram "Butterfly Valve Air Setting").

- 14 Adjust the air butterfly valve until the air pressure  $p_{\text{air}}$  read off has been reached. Then make sure that the valve position cannot be changed.



- ▷ The high-fire rate is set.

### Setting the low-fire rate

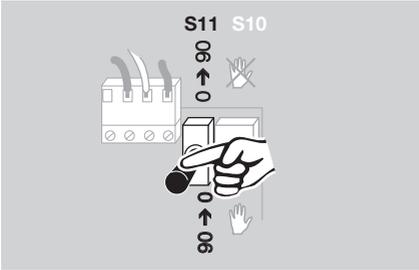
- ▷ The high-fire rate must be set before the low-fire rate of the PBG..F can be set.

- 15 Calculate the appropriate gas flow rate  $Q_{\text{gas}}$  for the low-fire rate.

$$Q_{\text{gas}} = P_B / H_u$$

- 16 Determine the differential gas pressure  $\Delta p_{\text{gas}}$  corresponding to the gas flow rate  $Q_{\text{gas}}$  calculated (see enclosed diagram "Gas Flow Rate").

- 17** Press the toggle switch S11 downwards until  $\Delta p_{\text{gas}}$  is reached on the measuring orifice VMO.



- 18** Adjust the low-fire cam on the IC 20, see page 11 (Adjusting the switching cams and calibrating the IC 20).

▷ The low-fire rate is set.

- 19** Adjust the pre-purge time, see page 12 (Setting pre-purge).

### Adjusting the switching cams and calibrating the IC 20

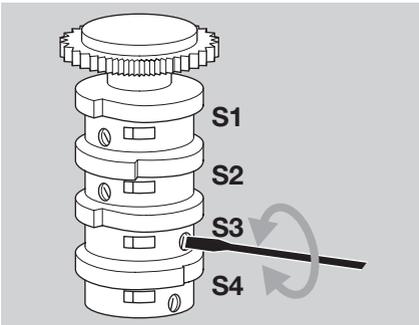
#### ! CAUTION

Please observe the following to ensure that the actuator is not damaged:

Important! Remove the screwdriver before attempting to actuate the cams.

- Only adjust the low-fire rate, switching cam S4, between 0° and 30°.
- Only adjust the high-fire rate, switching cam S3, between 40° and 90°.

- 1** To adjust the switching cams, insert a screwdriver into the slotted screw for the appropriate cam and turn it.



### Adjusting switching cam S3/high-fire rate

- ▷ Switching cam S3 switches off the actuator in the maximum opening angle.
  - ▷ The adjusting screw for S3 is positioned to the rear.
  - ▷ S3 can only be accessed when the valve is in an open position.
- 2** Move the actuator to its maximum opening angle and adjust switching cam S3.
- 3** Adjust the trip point of cam S3 using the screwdriver.

- ▷ Anti-clockwise = smaller opening angle.
- ▷ Clockwise = greater opening angle.

### Adjusting switching cam S4/low-fire rate

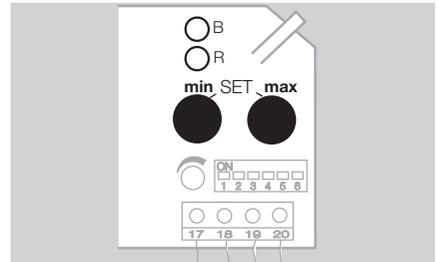
- ▷ Switching cam S4 switches off the actuator in the minimum opening angle when it is closed.
- 4** Move the actuator to its minimum opening angle and adjust switching cam S4.
- 5** Adjust the trip point of cam S4 using the screwdriver.
- ▷ Anti-clockwise = smaller opening angle.
  - ▷ Clockwise = greater opening angle.

### Adjusting switching cams S1 and S2

- ▷ Default S1 = ignition.
  - ▷ Default S2 = none.
- 6** Adjust the trip point of the cams using the screwdriver.
- ▷ Anti-clockwise = smaller opening angle.
  - ▷ Clockwise = greater opening angle.
  - ▷ Cams S1 and S2 can be adjusted over the full angle of rotation (0 – 90°) of the actuator.

### Calibrating the IC 20

- ▷ Once switching cams S3 and S4 have been adjusted, calibrate the IC 20.
  - ▷ The IC 20 is in Manual mode and the blue LED is lit.
- 7** Press the min and max buttons simultaneously (approx. 3 seconds) until the blue (B) and red (R) LEDs flash.

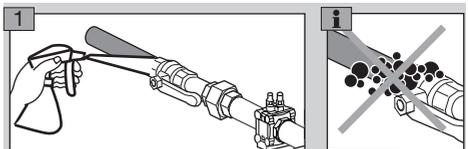


- ▷ The IC 20 moves to the cam positions.
  - ▷ Calibration is completed when the red and blue LEDs go out.
- 8** Set switch S10 to Automatic mode.
- ▷ The IC 20 is set.

### Tightness test

#### ⚠ DANGER

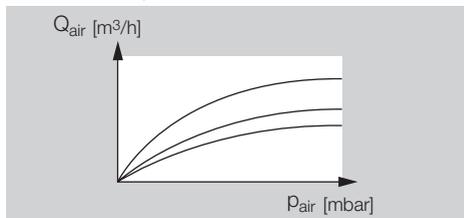
Risk of explosion! To ensure that there is no danger resulting from a leak, check the gas connections for leaks immediately after the burner has been put into operation.



- 2** Check all valves of the furnace system for leaks.

## Setting pre-purge

- ▷ The pre-purge time is  $t = 6000$  s on delivery, the air flow rate during pre-purge is at its maximum – see Pre-purge + Purging air and cooling air diagram.
  - ▷ Before pre-purge, the actuator moves to the MAX cam.
  - ▷ The pre-purge time must be adjusted after commissioning. To do so, measure the air pressure  $p_{\text{air}}$  during pre-purge (burner start-up/OCU display: P1).
- 1** Read off the flow rate corresponding to the air pressure  $p_{\text{air}}$  in the enclosed diagram.



- 2** Ask the operator to provide the volume of the combustion chamber.
- 3** Calculate the pre-purge time using the formula

$$t = \frac{V_{\text{BK}} \cdot 18000}{Q_{\text{air}}}$$

- ▷ **t**: Pre-purge time in seconds
  - ▷ **V<sub>BK</sub>**: Combustion chamber volume in m<sup>3</sup> (SCF)
  - ▷ **Q<sub>air</sub>**: Air flow rate in m<sup>3</sup>(m)/h (SCFH)
- 4** Adjust parameter P34 of the BCU 570 again using BCSofT.

## 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).
- ▷ If the controlled air flow input (BCU 570, terminal 2) is actuated in standby, the BCU will start the fan. The volume of air flowing is controlled depending on the function defined using parameter 32.

Parameter	Name Values
32	2 = Off, external butterfly valve controller enable

- ▷ The controller enable signal (terminal 56) is issued. The position of the actuator can be changed using an external temperature controller (controlled cooling). Monitoring of the low air pressure protection device (PZL) is not active, see [www.docuthek.com](http://www.docuthek.com) → Elster Kromschröder → Kromschröder, LBE → Products → 06 Electric flame monitoring and control units → Burner control unit BCU 570 → Burner control unit BCU 570 operating instructions.

- ▷ There is enough air to purge/cool the burner, even when the air valve is closed (leakage rate).
- ▷ As soon as a start-up signal  $\vartheta$  (temperature demand) is received, the controlled air flow function is stopped and a burner start is initiated.

## Blocking and recording the settings

- 1** Produce a measurement report.
- 2** Set the burner to low fire and check the settings.
- 3** Set the burner to low and high fire several times while monitoring the inlet pressures, flue gas values and flame patterns.
- 4** Remove the measuring devices and close off the test nipples – tighten the grub screws.
- 5** Block and seal the adjusting elements.
- 6** Induce a flame failure, e.g. by pulling the plug off the ionization electrode. The flame detector must close the gas safety valve and signal a fault.
- 7** Switch the system on and off several times while monitoring the burner control unit.
- 8** Produce an acceptance report.

## DANGER

Risk of explosion! An incorrect change of the burner settings may change the gas/air ratio and lead to unsafe operating conditions.

Risk of poisoning in case of CO being formed in the furnace chamber! CO is odourless and poisonous!

## Maintenance

In order to ensure smooth operation, we recommend a function check every six months.

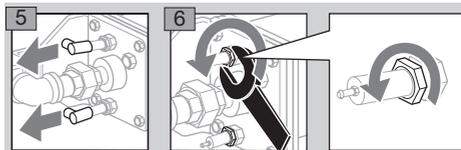
## DANGER

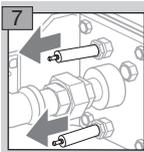
Risk of burning! Outflowing flue gases and burner components are hot.

- 1** Check the ionization and ignition cables.
- 2** Measure the ionization current.
  - ▷ The ionization current must be at least 2  $\mu$ A.
  - ▷ The ionization current must not vary too much.
  - ▷ The flame signal in mA can be read off the OCU.
- 3** Disconnect the system from the electrical power supply.
- 4** Shut off the gas supply – do not change the restrictor settings.

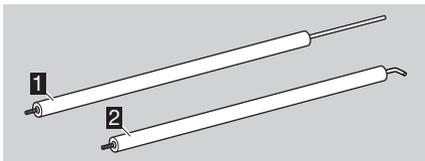
## Checking the ionization and ignition electrodes

- ▷ Disconnect the plug and dismantle the electrode.





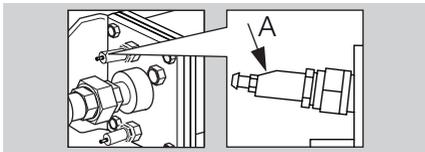
- 8** Remove dirt from the ionization electrode **1** and ignition electrode **2**.



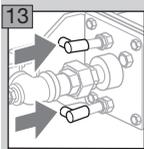
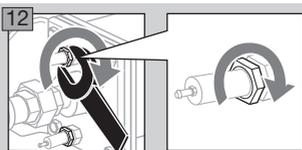
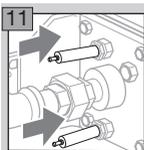
- 9** If the ends of the electrodes or the insulators are damaged, replace the electrodes.

- 10** Install the electrodes.

- ▷ When the burner is installed in the standard installation position, the ignition electrode is correctly positioned with the slanted edge **A** facing upwards.

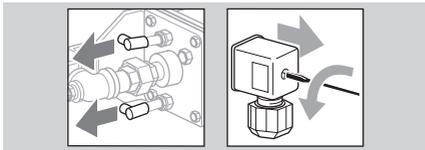


- ▷ Turning the electrode makes it easier to feed the electrode into the burner insert.
- ▷ Slide in the electrode as far as it will go.

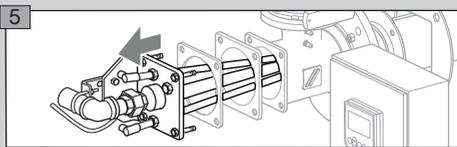
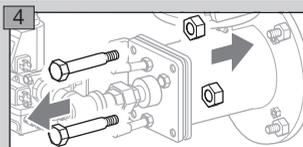
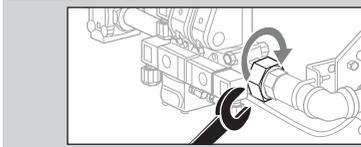


### Checking the burner

- 1** Disconnect all electrical plug connectors and cables coming from the burner control unit.



- 2** Disconnect the gas pipe.



- ▷ If the burner is dismantled, the gas housing gasket will have to be renewed.

- 6** Place the burner insert in a safe place.

- ▷ Depending on the amount of dirt or wear: replace the ionization and ignition electrodes during servicing – see page 12 (Checking the ionization and ignition electrodes).

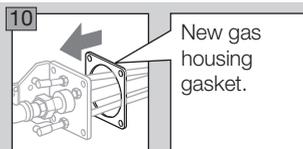
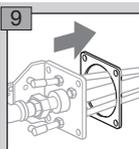
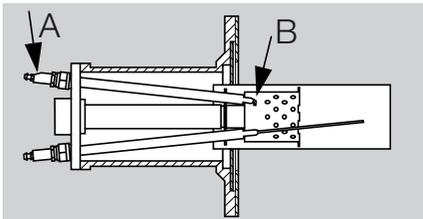
- 7** Check burner head for dirt and thermal cracks.

### ⚠ WARNING

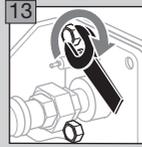
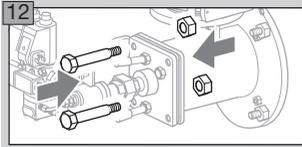
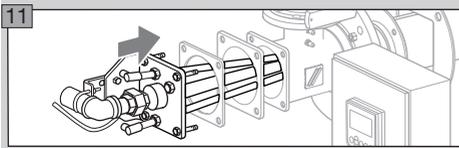
Risk of injury! Burner heads have sharp edges.

- 8** Check the electrode positions.

- ▷ When the burner is installed in the standard installation position, the ignition electrode is correctly positioned with the slanted edge **A** facing upwards. Wire tip **B** thus points to the centre of the burner head.

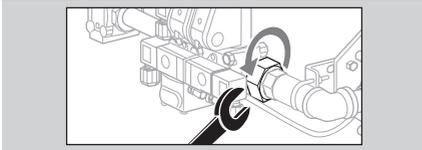


New gas housing gasket.

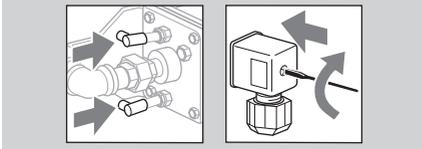


**14** Tighten the burner insert: the maximum tightening torque is 50 Nm.

**15** Connect the gas pipe.



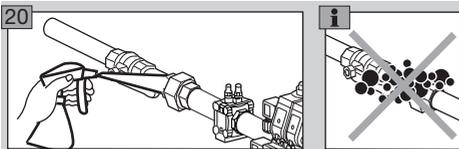
**16** Reconnect all electrical plug connectors and cables.



**17** Switch on the power supply.

**18** Open the gas and air supply.

**19** Set the burner to low-fire rate and high-fire rate. Compare the pressure settings to those stated in the acceptance report.



**21** Set the burner to low and high fire several times while monitoring the pressure settings, flue gas values and flame patterns.

## **⚠ DANGER**

Risk of explosion! An incorrect change of the burner settings may change the gas/air ratio and lead to unsafe operating conditions.

Risk of poisoning in case of CO being formed in the furnace chamber! CO is odourless and poisonous!

**22** Produce a maintenance report.

## Assistance in the event of malfunction

### **⚠ DANGER**

Electric shocks can be fatal! Before working on possible live components, ensure the unit is disconnected from the power supply.

Risk of injury! Burner heads have sharp edges.

Fault-clearance must only be undertaken by authorized trained personnel.

#### **? Faults**

#### **! Cause**

#### **• Remedy**

#### **? Burner does not function?**

**!** Burner control unit will not switch on.

**•** Check the voltage supply and wiring.

**!** Valves do not open.

**•** Check the voltage supply and wiring.

**!** Control valves do not move to low-fire position.

**•** Check the actuator and air butterfly valve (PBG..V).

**•** Check the actuator and linear flow control (PBG..F).

**!** Gas inlet pressure is too low.

**•** Check the gas pressure control system.

**!** Gas and air pressures on the burner are too low.

**•** Check the restrictors.

**!** Burner control unit signals a fault.

**•** Check the ionization cable and ionization current.

**•** Check whether the burner is adequately grounded.

**•** Note the burner control unit operating instructions.

**!** No ignition spark is created.

**•** Check the ignition cable.

**•** Check whether the burner is adequately grounded.

**•** Check the voltage supply and wiring.

**•** Check the electrodes, see page 12 (Checking the ionization and ignition electrodes).

**? Burner performs a fault lock-out after burning faultlessly in normal operation?**

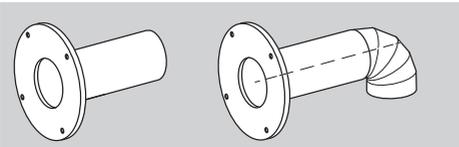
- ! Incorrect gas and air flow rate settings.
- Check the gas and air pressures.

- ! Burner control unit signals a fault.
- Check the ionization cable.
- Measure the ionization current.

- ! Burner head dirty.
- Clean gas and air bore holes and air slots.
- Remove deposits on the burner head.

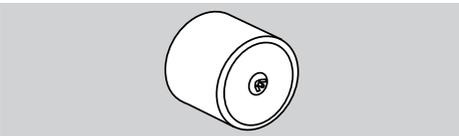
## Accessories

### Flame tube FPT



Straight or angled flame tube to protect the flame from cross flows ( $v > 3$  m/s) in direct heating systems. The flame tube is installed between the combustion chamber flange and the furnace wall. Available on request.

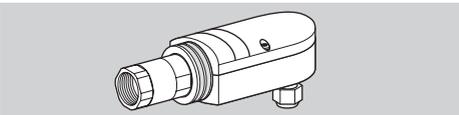
### Air filter



The air filter is secured to the fan housing using a mounting bracket and a butterfly nut. Available on request.

Order No.	Fan filter
03352654	PBG 300 – 2000

### 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.

## Technical data

Gas inlet pressure  $p_{i1}$ : 50 – 100 mbar.

Gas types: natural gas, LPG.

Mains voltage:

PBG 300 – 2000: 230 V AC,  $\pm 10\%$ , 50 Hz,

PBG 3000 – 5000: 400 V AC,  $\pm 10\%$ , 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.

## Logistics

### Transport

Protect the unit from external forces (blows, shocks, vibration). On receipt of the product, check that the delivery is complete, see page 3 (Part designations). Report any transport damage immediately.

### Storage

Store the product in a dry and clean place.

Storage temperature: see page 15 (Technical data). Storage time: 6 months before using for the first time. If stored for longer than this, the overall service life will be reduced by the corresponding amount of extra storage time.

### Packaging

The packaging material is to be disposed of in accordance with local regulations.

### Disposal

Components are to be disposed of separately in accordance with local regulations.

## Declaration of Incorporation



according to 2006/42/EC, Annex II, No. 1B  
The product "Forced draught burner for gas PBG... EE" is a partly completed machine pursuant to Article 2g and is designed exclusively for installation in or assembly with another machine or other equipment. The following essential health and safety requirements in accordance with Annex I of this Directive are applicable and have been fulfilled:  
Annex I, Articles 1.1.3, 1.1.5, 1.2.1, 1.3.2, 1.3.4, 1.5.2, 1.5.9

The relevant technical documentation has been compiled in accordance with part B of Annex VII and will be sent to the relevant national authorities on request as a digital file.

The following (harmonized) standards have been applied:

- EN 746-2: 2010 – Industrial thermoprocessing equipment; Safety requirements for combustion and fuel handling systems
- EN ISO 12100:2010 – Safety of machinery – General principles for design – Risk assessment and risk reduction (ISO 12100:2010)

The partly completed machine may only be commissioned once it has been established that the machine into which the product mentioned above is to be incorporated complies with the provisions of the Machinery Directive 2006/42/EC.

Elster GmbH

### Einbauerklärung

nach 2006/42/EG, Anhang II, Nr. 1B

### / Declaration of Incorporation

/ according to 2006/42/EC, Annex II, No. 1B

Folgendes Produkt / The following product

Bezeichnung:  
Description  
Typenbezeichnung / Type:

Gabelbrenner für Gas  
Forced draught burner for gas  
PBG...EE

ist eine unvollständige Maschine nach Artikel 2g und ausschließlich zum Einbau in oder zum Zusammenbau mit einer anderen Maschine oder Auslösung vorgesehen.  
is a partly completed machine pursuant to Article 2g and is designed exclusively for installation in or assembly with another machine or other equipment.

Folgende grundlegende Sicherheits- und Gesundheitsschutzanforderungen gemäß Anhang I dieser Richtlinie kommen zur Anwendung und wurden eingehalten.  
The following essential health and safety requirements in accordance with Annex I of this Directive are applicable and have been fulfilled.

Anhang I, Artikel / Annex I, Article  
1.1.3, 1.1.5, 1.2.1, 1.3.2, 1.3.4, 1.5.2, 1.5.9

Die speziellen technischen Unterlagen gemäß Anhang VII B wurden erstellt und werden der zuständigen nationalen Behörde auf Verlangen in elektronischer Form übermittelt.  
The relevant technical documentation has been compiled in accordance with part B of Annex VII and will be sent to the relevant national authorities on request as a digital file.

Folgende (harmonisierte) Normen wurden angewandt: / The following (harmonized) standards have been applied

EN 746-2:2010 – Industrielle Thermoprocessinganlagen; Sicherheitsanforderungen an Feuerungen und Brennstoffführungssysteme  
– Industrial thermoprocessing equipment; Safety requirements for combustion and fuel handling systems  
EN ISO 12100:2010 – Sicherheit von Maschinen – Allgemeine Gestaltungsgrundsätze – Risikobewertung  
und Risikoreduzierung (ISO 12100:2010)  
– Safety of machinery – General principles for design – Risk assessment and risk reduction (ISO 12100:2010)

Die unvollständige Maschine darf erst dann in Betrieb genommen werden, wenn festgestellt wurde, dass die Maschine, in der sie oben beschriebene Produkt eingebaut werden soll, den Bestimmungen der Richtlinie für Maschinen (2006/42/EG) entspricht.

The partly completed machine may only be commissioned once it has been established that the machine into which the product mentioned above is to be incorporated complies with the provisions of the Machinery Directive 2006/42/EC.

Lotte (Büro)

27.11.2014  
Datum / Date

Sandra Runde, Matthias Rieken  
Konstrukteure / Designers

Sandra Runde, Matthias Rieken sind befähigt, die speziellen technischen Unterlagen gemäß Anhang VII B zusammenzustellen.  
Sandra Runde, Matthias Rieken are authorized to compile the relevant technical documentation according to Annex VII B.

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## Contact

If you have any technical questions, please contact your local branch office/agent. The addresses are available on the Internet or from Elster GmbH.

We reserve the right to make technical modifications in the interests of progress.

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