

**Productinfo: Power Plant Probe**

## Plane filter in heated probe

Probe special for the use in power plants.

The probe can be used in power plants with high concentration of sulphuric acid droplets in the flue gas. The filter can be heated above the dew point of the sulphuric acid and avoid wrongness dust measurement. Because the collected sulphuric acid droplets on the filter can sham up to 10 mg/m<sup>3</sup> dust.



One exchangeable plane filter holder is in the front of a heated probe. Around of this plane filter holder and the conical entry is winding a second high performance heater cartridge. This avoids condensation at the filter (gas temperature above dew point).

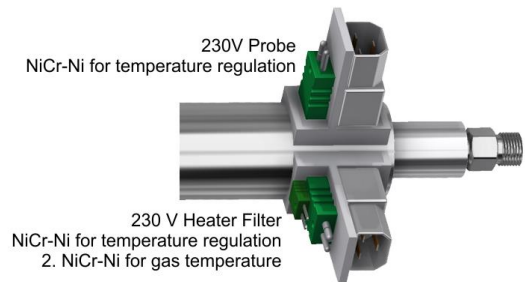
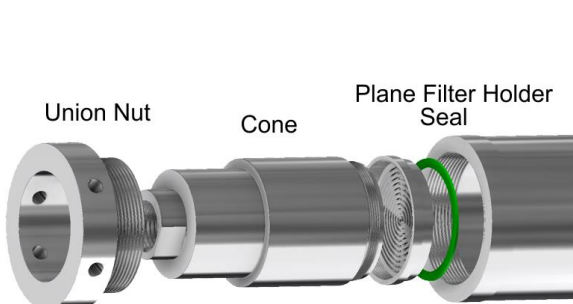
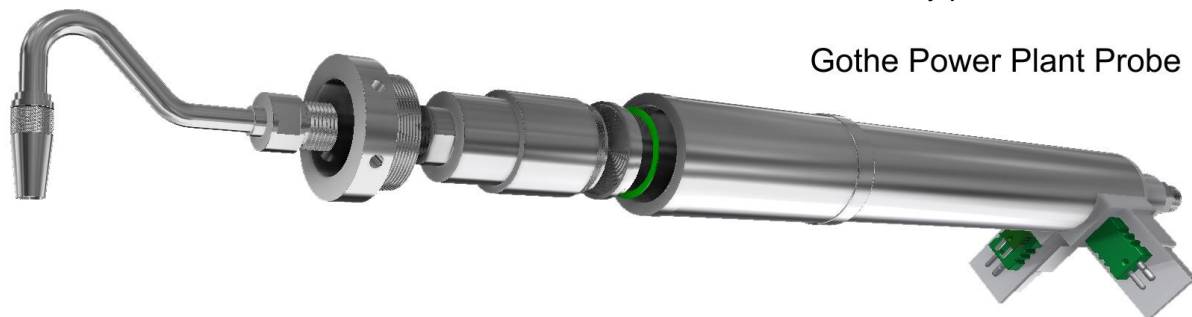
At the exit can screwed extensions

Three thermocouples for optimal controlling and monitoring:

1. Thermocouple for temperature controlling at heater cartridge filter
2. Thermocouple for temperature controlling at heater cartridge probe
3. Thermocouple directly behind plane filter device in gas flow. With this thermocouple can control the gas temperature to avoid condensation at the filter.

The development and validation take place in numerous tests at the power plant Herne . Germany-.

Available filter variation: Plane filter with Ø 45 mm or tubular filter with safety plane filter:



(c) Paul Gothe GmbH



## Measurement of dust concentration in flue gases with sulfuric acid aerosols

The preliminary tests in a fired with brown coal power plant with wet flue gas outlet and a broad range of coal-fired power plants with flue gas reheating shown that in the presence of sulfuric acid aerosols online registered light-optical operation instruments indicates significant higher dust concentration.

In the gravimetric calibration in addition to solid particles even sulfuric acid droplets are deposited on the filter surface, with chemical reactions. Furthermore, sulfuric acid remains in the filter pores, whereby high temperatures of up to 180°C are necessary for the equilibration of the filters to remove the free sulfuric acid almost quantitatively. Complete evaporation of sulfuric acid is not always guaranteed.

The definition according to DIN EN 13284-1 exclude clearly the measurement of sulfuric acid aerosols.

A calibration of the light scattering techniques can only be used when the operating dust measurement is not influenced by acid aerosols. The Gothe power plant probe includes a gravimetric measurement method for the determination of dust in flue gases behind REA (in front of chimney), in which the influence of sulfuric acid aerosols can be completely eliminated.

By safe and controlled increase in the temperature of the sampling filter up to 180°C above the dew point of sulfuric acid, the sulfuric acid condensation can be prevented on the sampling filter.

Experiments in power plant Lippendorf and Scholven, Block B confirm that with the Gothe power plant probe no deposits of sulfuric acid aerosols take place on the filter material.

### In summary, the following statements can be made:

- A reliable calibration of flue gas measurement devices is only possible by the use of Gothe power plant probe with a heated filter of 180°C.
- Because of the possibility of condensate return flow, especially in a flue gas sample from the top, is generally the heating from the probe necessary.

### Additional literature:

1. Gefahrstoffe-Reinhaltung der Luft, 64 (2007) Nr. 4
2. Merkblatt Powertech VGB-M 301 (2008)

# Kraftwerk-Sonde - Version 2009

Absaugrohr Ø 64 mm l: 100 mm,  
anschließend 60 mm

Suction tube Ø 64 mm l: 100mm,  
following 60 mm

NiCr-Ni Thermoelement Nr. 3  
zur Erfassung der Gastemperatur

NiCr-Ni thermocouple No: 3  
for determination of the gas temperature

Dichtung hinter Planfilterhalter (Di-13)  
Seal behind plane filter holder (Di-13)

Planfilterhalter Ø 45 mm  
Plane filter Ø 45 mm

PTFE-Dichtung vor Planfilter (Di-30)  
PTFE-Seal in front of plane filter (Di-30)

Verschraubung

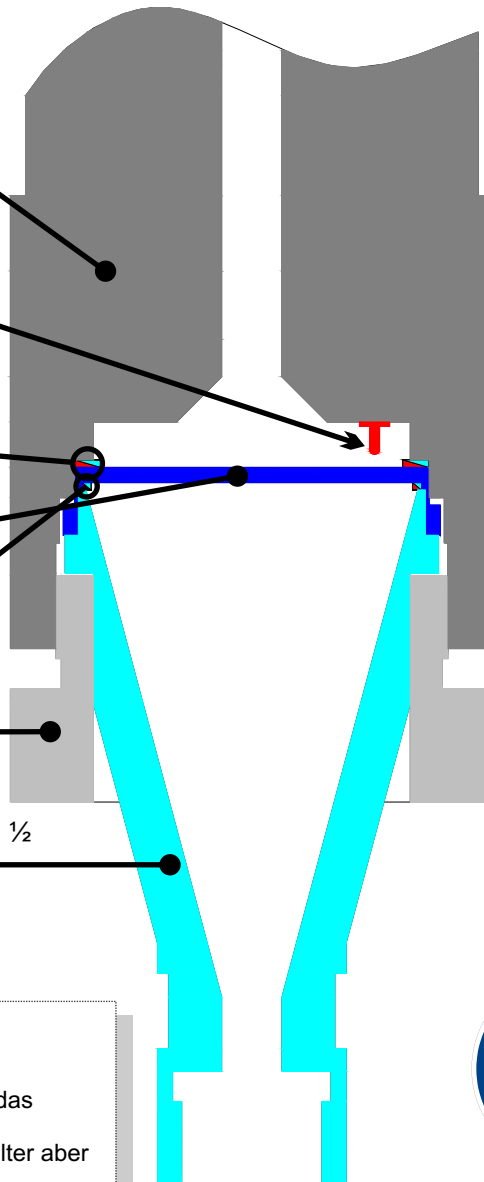
Thread

Konus mit Innengewinde G ½ / Cone with thread G ½

für Krümmer oder Schwanenhalsdüse  
for bent or gooseneck nozzle

Hintere Heizung [400 W/m]  
(Hochleistungswendelrohrpatrone)  
mit NiCr-Ni Nr.: 2  
rear heater  
(high performance coil heater)  
with NiCr-Ni No: 2

Vordere Heizung [400 W]  
(Hochleistungswendelrohrpatrone)  
mit NiCr-Ni Nr.: 1  
forehols heater  
(high performance coil heater)  
with NiCr-Ni No: 1



Für die Regelung der hinteren Heizung (Absaugrohr) das  
Thermoelement Nr.: 2 verwenden.

Für die Regelung der vorderen Heizung für den Filterkopf das  
Thermoelement Nr.: 1 verwenden.  
Das Thermoelement 1 ist an der Heizwendel für den Planfilter aber  
erfasst nicht die Gastemperatur.

Das Thermoelement Nr.: 3 ist im Gasstrom hinter dem  
Planfilter und erfasst die Gastemperatur. Nicht für die  
Heizungssteuerung benutzen. Nur zur Kontrolle einsetzen.



To regulate the rear heater (suction tube), use thermocouple No: 2.

To regulate the front heater (for the plane filter), use thermocouple  
No: 1. This thermocouple is at the heater for the plane filter but  
measure not the gas temperature.

The thermocouple No: 3 is located in the gas stream directly  
behind the plane filter and measure the gas temperature.  
Use it only for controlling, not to adjust the temperature.



Für Ihre Sicherheit:  
Achtung bei der verlängerbaren Version:  
Die Verlängerungen mit dem Stromkabel  
nicht in Temperaturen über 160°C verwenden!

For your safety:  
Attention, if use the extensible version:  
Don't use the extension tubes with the  
power main cable in temperatures over 160°C!



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Zeichnungs-Nr.:

KW-Sonde (beheizter Planfilter in beheizter Sonde)  
(heated table filter in heated probe)

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Be/Rd



**Zum Ausrichten des Krümmers (C):**

Krümmers (C) und Teile A + B lose zusammenschrauben.

Erst Krümmers (C) mit Teil B fest anschrauben.

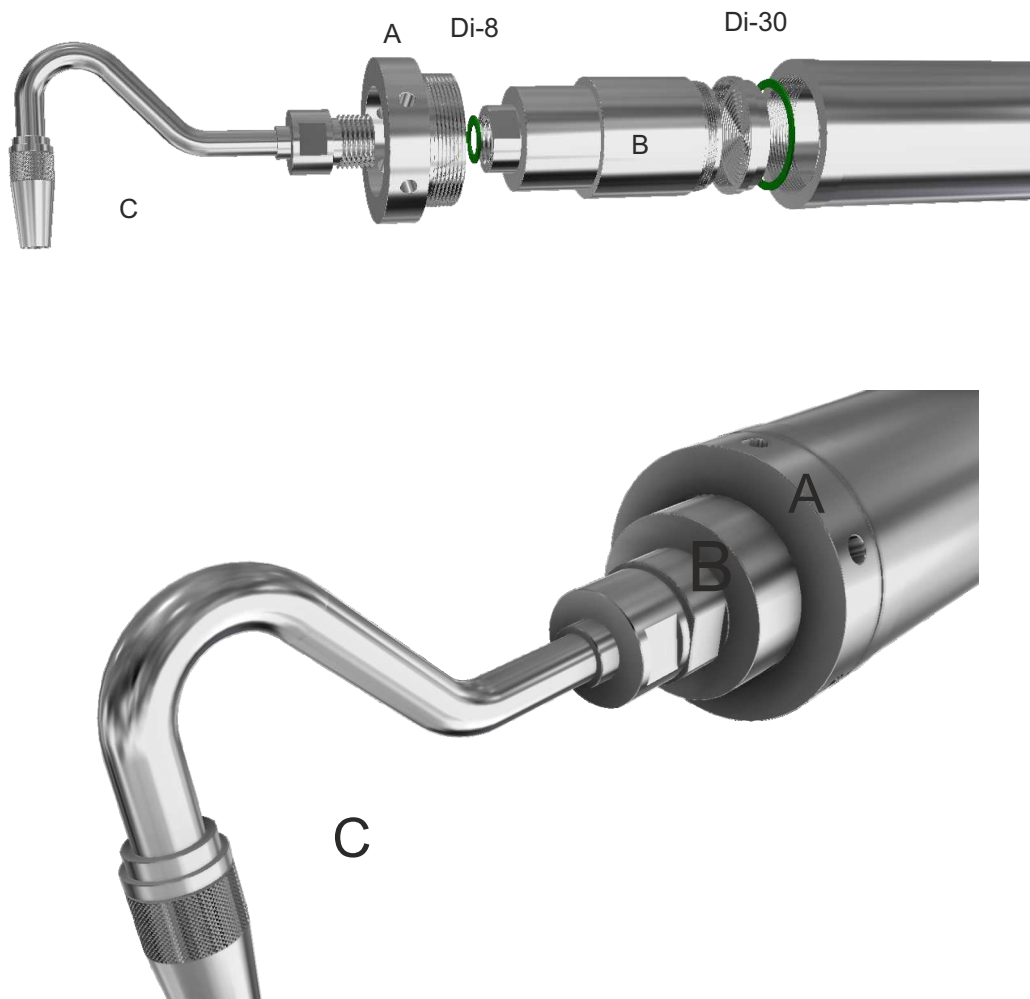
Überwurfmutter (A) nach dem Ausrichten von C mit den Hakenschlüsseln fest anziehen.

**To align the bent (C):**

Screw bent (C) and parts A + B not tight together.

Screw only bent (C) and part B tight together.

Tighten firmly union nut (A) after alignment of the bent (C) with the hook wrench.



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Zeichnungs-Nr.:

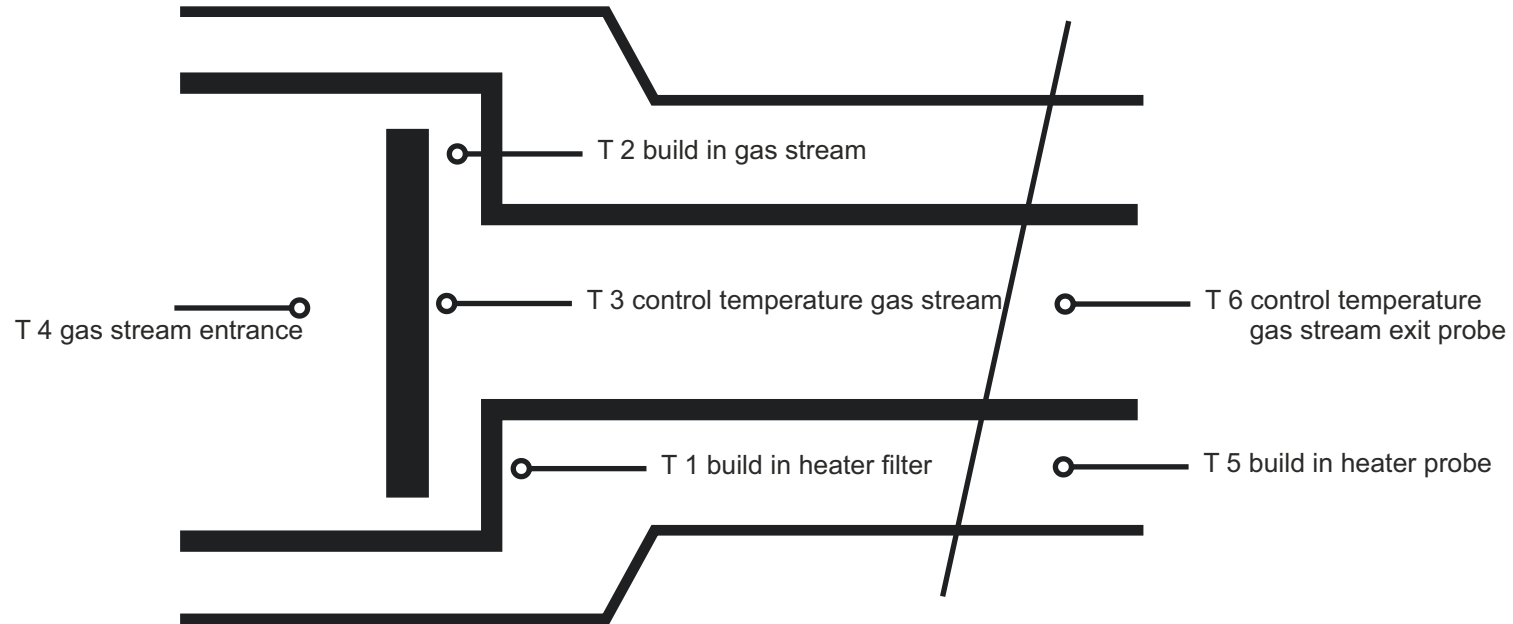
Kraftwerkssonde Ausrichtung Krümmers  
Alignment Bent Power Plant Probe

Be/Rd



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# experimental setup power plant probe (24.10.2008)



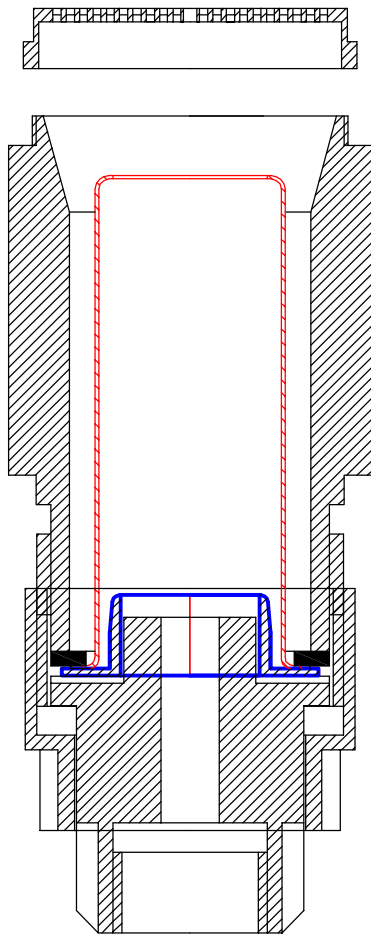
suction rate m <sup>3</sup> /h	T1 Heater	T2 build in gas	T3 control	T4 gas temp.	T5 heater probe	T6 control
0 m <sup>3</sup> /h	247°C	246°C	248°C	80°C	180°C	176°C
1,5 m <sup>3</sup> /h i.N.	247°C	235°C	222°C	87°C	180°C	178°C
2 m <sup>3</sup> /h i.N.	247°C	234°C	220°C	87°C	180°C	178°C
3 m <sup>3</sup> /h i.N.	247°C	226°C	206°C	87°C	180°C	176°C

Be/Rd

Zeichnungs-Nr.:

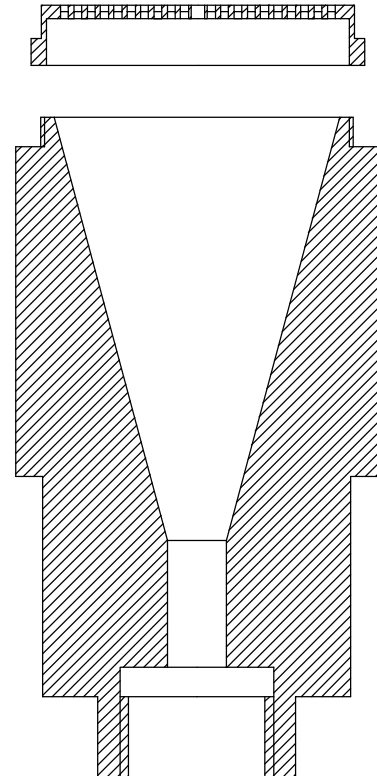
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Hülsen-Planfilter-Einsatz  
Inlet cone for bush and plane filter

Art.-Nr: KW-E-FP-T



Planfilter-Einsatz  
Inlet cone for plane filter

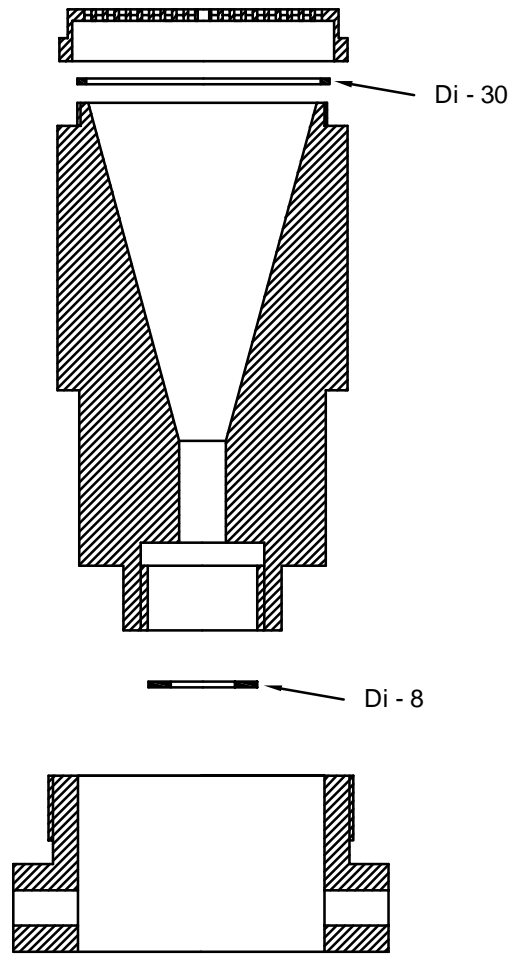
Art.-Nr: KW-P

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Bearb.	Name	Material:	Maßstab: ohne
	Datum		
geändert	Name	Zeichnungs Nr.: 19072011	
	Datum		
	Name		
	Datum		



Planfilterhalter für Planfilter

Di - 30

Einlaufkonus

Di - 8

