

ABB MEASUREMENT & ANALYTICS | DATA SHEET

System components for sample gas sampling



Measurement made easy

System components for sample gas sampling

Sample gas sampling best suited to the application ensures perfect measurement results in the gas analyzer

- In most cases, the sample gas taken from the process cannot be processed by the gas analyzer without further treatment. Excessive dust content, temperature and dew point as well as excessively high or low pressure and, last but not least, interfering components in the sample gas can impair the operability of the gas analyzer and falsify the measurement result.
- System components such as the sampling probes, filter units and sample gas lines ensure that regardless of the process and local conditions, the gas inlet conditions of the connected sample gas coolers, pumps and gas analyzers are met and perfect measurement results are obtained.

System components for sample gas sampling

- FE2 Filter unit
- Heating sleeve
- PFE2 Filter unit
- PFE3 Filter unit
- Type 40, Type 40 W Probe tubes
- Type 42 Probe tube (heated)
- Type 60 S Probe tube (cement flue gas probe)
- Probe H (cement flue gas probe)
- Probe 2
- Probe 11
- Ceramic filter
- Process pressure reducers
- Electronic temperature controller and switching relay
- CGWB 13, TBL 01-C Heated sample gas lines

Modular sample gas probe system

- Easily adaptable to different sampling conditions thanks to modular construction
- Components:
 - FE2, PFE2, PFE3 filter units
 - Heating sleeve
 - Probe tube types 40, 42, 60 S
- Probe tubes and filter unit heatable
- Connections for test gas and back purging
- Filter with high retention rate and long service life
- Easy filter replacement
- Usable in emission measuring systems conforming to European Directive 2010/75/EU (IED)



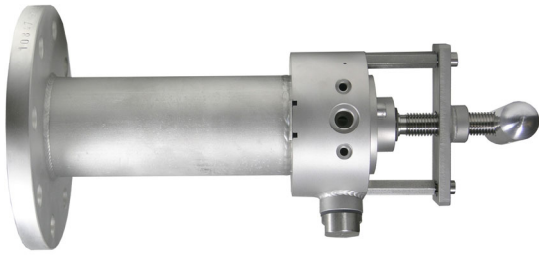
Sales



Service



FE2 Filter unit



Use

The FE2 filter unit is a component of the modular gas sampling probe system. It is used for filtering gases containing dust. It can be heated with the regulated heating sleeve (see page 5).

Process gas sampling conditions

Pressure

$p_{abs} = 50$ to 600 kPa

Temperature

Max. 200 °C (coated max. 180 °C)

Flow rate

30 to 500 l/h, relative to 100 kPa and 0 °C

Pressure drop

Approx. 0.6 hPa at 100 l/h

Dust content

Max. 3 g/m³ (application recommendation); max. 40 g/m³ with probe tube type 40 (see page 19) with purge-back device; max. 2000 g/m³ with probe tube type 60 S (see page 21)

Filter characteristics

Filter element

Surface filter, ceramic

Filter fineness

0.3 µm

Retention rate

99.98 %

Seal integrity

10^{-4} hPa l/s

Dead volume

280 ml

Materials of gas-conducting parts

Casing and connections

Stainless steel 1.4571 (AISI 316Ti)

Flange

Stainless steel 1.4541 (AISI 321)

Filter

Aluminum oxide surface filter

Coating

Thermoset plastic, resistant up to 180 °C

Installation

Flange

DN 65, PN 6, facing type A to DIN EN 1092-1; positioning of holes: 45°, 90°, 135°, 180°, 225°, 270°, 315°, 360°

Mounting

Flange connect or bolt to the probe tube

Weight

Approx. 8.0 kg

Connection ports

Sample gas, test gas

G¹/₄ internal thread

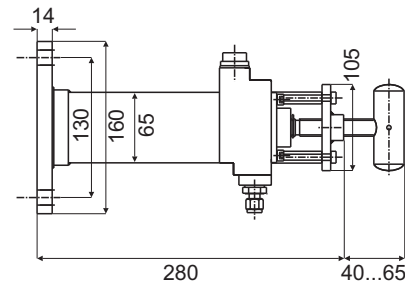
Compressed air for back-purging (2 ports, optional, see page 6)

G¹/₂ internal thread

Probe tube

G³/₄ internal thread

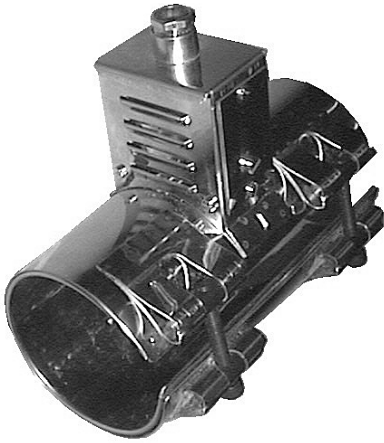
Dimensions (in mm)



Ordering information

	Catalog No.
Housing and flange SS, filter 0.3 µm ceramic, gaskets standard, without purge connectors	23042-4-0730743
Housing and flange SS, filter 0.3 µm ceramic, gaskets standard, with purge connectors	23042-4-0730745
Housing and flange SS, coated, filter 0.3 µm ceramic, gaskets standard, with purge connectors	23042-5-0730746
Housing and flange SS, filter 0.3 µm ceramic, gaskets for high corrosive gases, without purge connectors	23042-4-0730747
Housing and flange SS, filter 0.3 µm ceramic, gaskets for high corrosive gases, with purge connectors	23042-4-0730749

Heating sleeve



Regulated heating sleeve for FE2 filter unit

Heater

Micanite

Holding temperature

Max. 350 °C

Temperature control

Max. 200 °C (Pt 100)

Power supply

120 V AC or 230 V AC

Power consumption

250 VA

Connection

Terminal box with M16 cable gland, degree of protection IP54

Supply cable

3 x 1 mm² with silicone sheath, length 1 m

Ambient temperature

-20 to +45 °C

Relative humidity

≤ 75 % yearly mean; infrequent slight condensation permissible

Weight

Approx. 1 kg

Essential accessories

Insulating mat (see ordering information)

Temperature controller (see page 27)

Ordering information

	Catalog No.
Heating sleeve, 230 V, 50/60 Hz, 250 VA	23043-5-8018410
Heating sleeve, 120 V, 50/60 Hz, 250 VA	23043-5-8018411
Insulating mat	23043-5-8018412

PFE2 Filter unit



Use and design

The PFE2 filter unit consists of the FE2 filter unit (see page 4) with a regulated heating sleeve (see page 5, installed in a stainless-steel protective case. It is used to filter dust-containing gases and is a component of the modular gas sampling probe system.

When used for gases with high dust content, the PFE2 can optionally be fitted with valves for automatic cleaning of the filter element in the FE2 filter unit. Depending on the dust load, in addition to 1-stage or 2-stage back-purging the type of back-purging can be selected. For this purpose, a pneumatically controlled valve circuitry with diaphragm back-purging valves and a direct acting version with coaxial sliding valves are available. The coaxial sliding valves are particularly suitable for frequent back-purging cycles.

Protective case

Dimensions

Standard version: 450 x 450 x 400 mm (H x W x D)

Basic version: 270 x 203 x 330 mm (H x W x D)

Material

Stainless steel 1.4301 (AISI 304)

Degree of protection of housing

IP54

Weight

Standard version: approx. 25 kg incl. FE2 filter unit;

Basic version: approx. 17 kg incl. FE2 filter unit

Ambient temperature

-20 to +45 °C

Option

Heating sleeve (see page 5)

Back purging

Compressed air quality

Instrument air, free of dust, water and oil

Pneumatic valves

Type

2/2-way straight-way diaphragm valve

Operating pressure/control pressure

600 kPa (6 bar)

Nominal diameter

DN 12

Connections

G $\frac{1}{2}$ internal thread, control air: G $\frac{1}{8}$ internal thread

Material

Brass

Mode of operation

Closed in normal position

Ambient temperature

0 to +100 °C

Control valves

Type

3/2-way solenoid valve

Pressure range

600 kPa (6 bar)

Nominal diameter

DN 2.0

Connections

G $\frac{1}{8}$ internal thread

Material

Brass

Mode of operation

Closed in normal position

Ambient temperature

0 to +100 °C

Electrical connections

Standard connector

Power supply

120 V AC or 230 V AC, 50 to 60 Hz

Power consumption

8 VA

Coaxial valves

Type

2/2-way direct acting valve

Operating pressure

0 to 64 bar

Nominal diameter

DN 10

Connections

10/12 x 1 mm

Material

Body: brass, valve seat: synthetic resin on metal, seal: NBR

Mode of operation

Closed in normal position

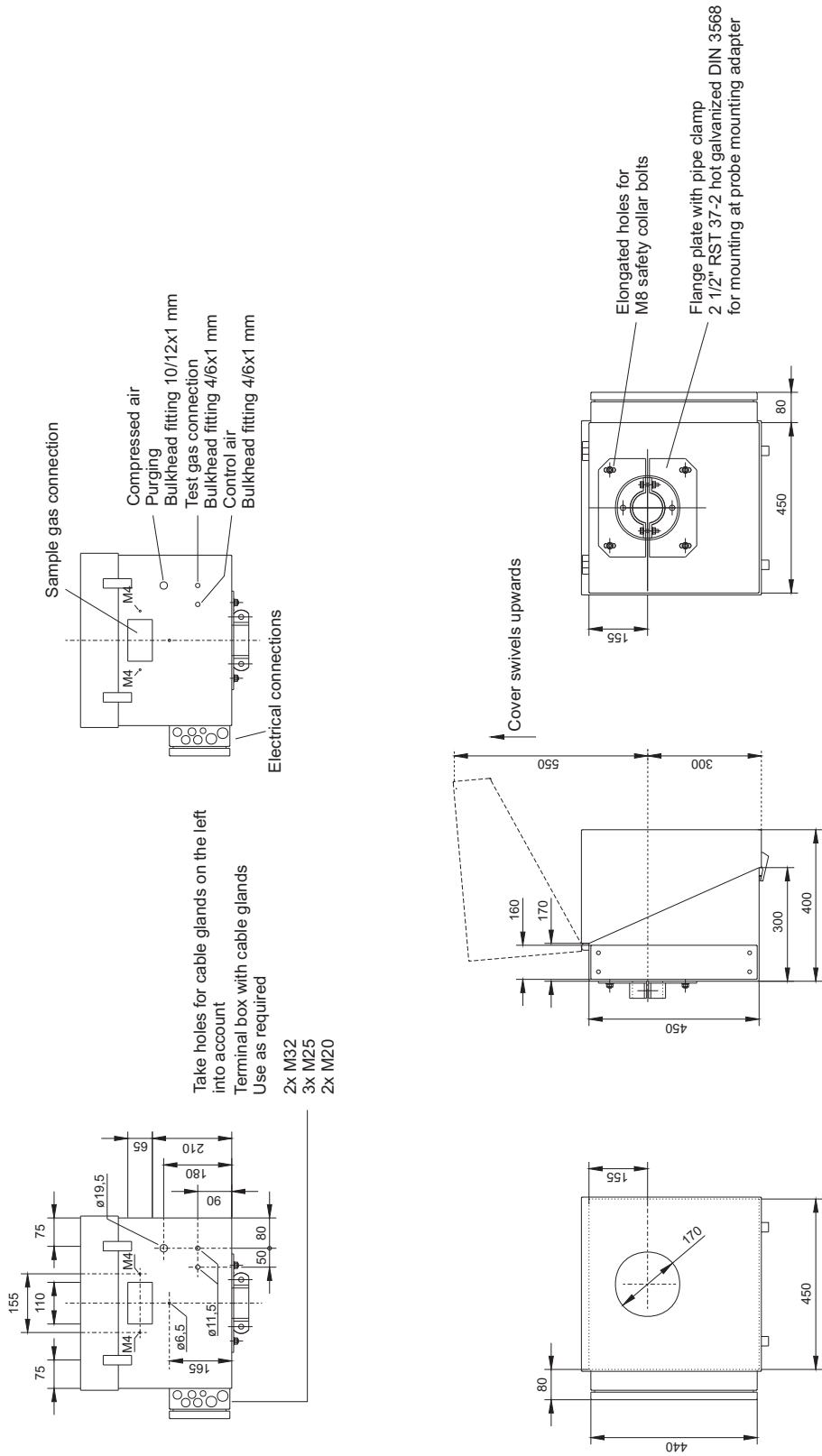
Ambient temperature

-10 to +80 °C

Power supply, current consumption

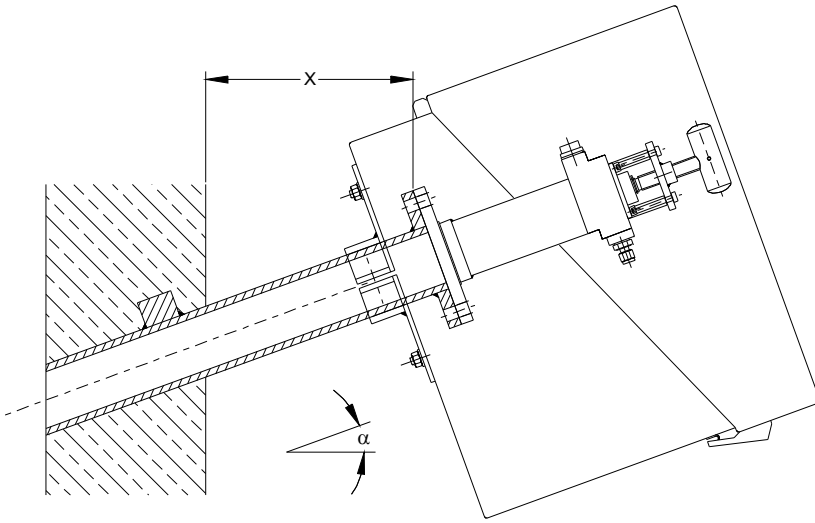
230 V AC, 50 to 60 Hz, 0.13 A

Probe protective case, standard version: Dimensions (in mm)



... PFE2 Filter unit

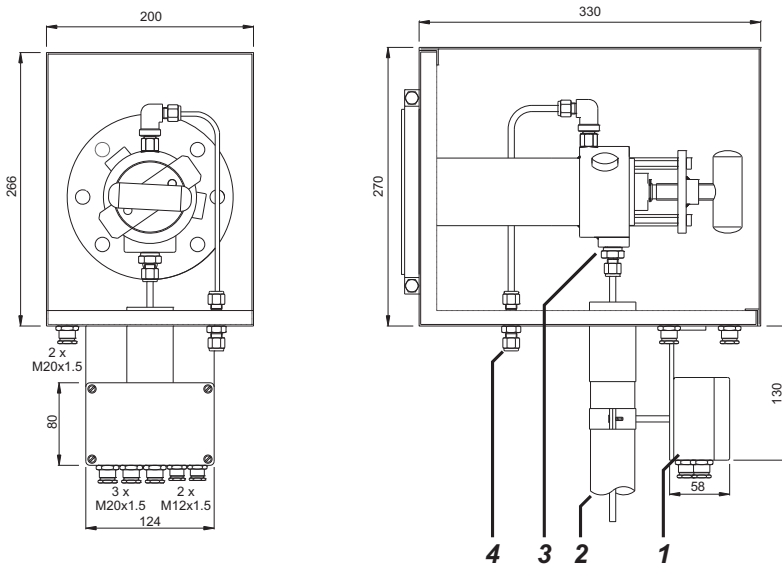
Probe protective case, standard version: Mounting



Minimum distance x_{\min} of the mounting flange from the wall depending on mounting angle α :

α	10°	15°	20°	25°	30°	35°
x_{\min} /mm	229	248	268	287	307	324

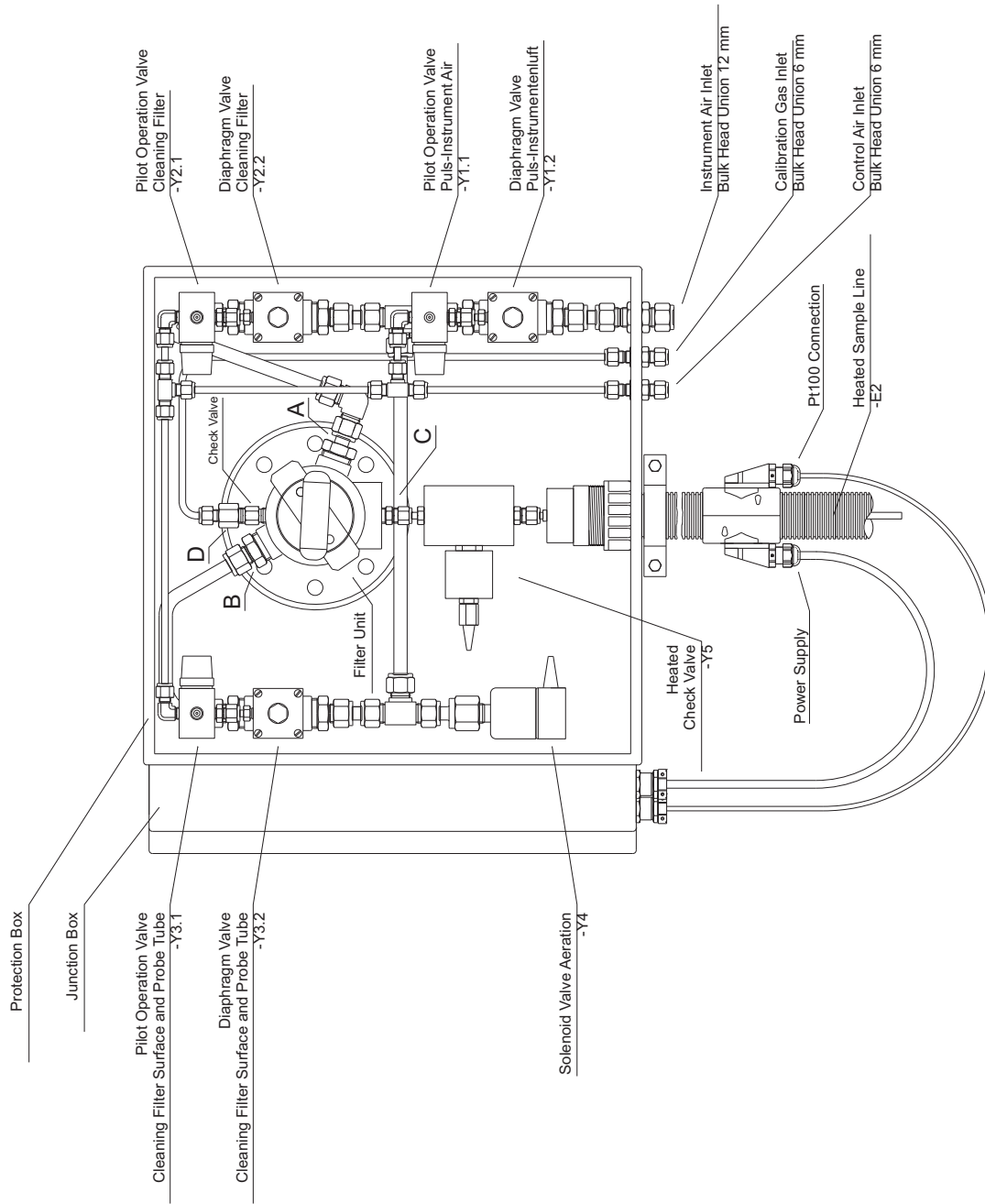
Probe protective case, basic version: Dimensions (in mm)



- 1 Terminal box -X1 IP66
- 2 Sample gas line
- 3 Sample gas connection 6 mm
- 4 Test gas connection bulkhead fitting 6 mm

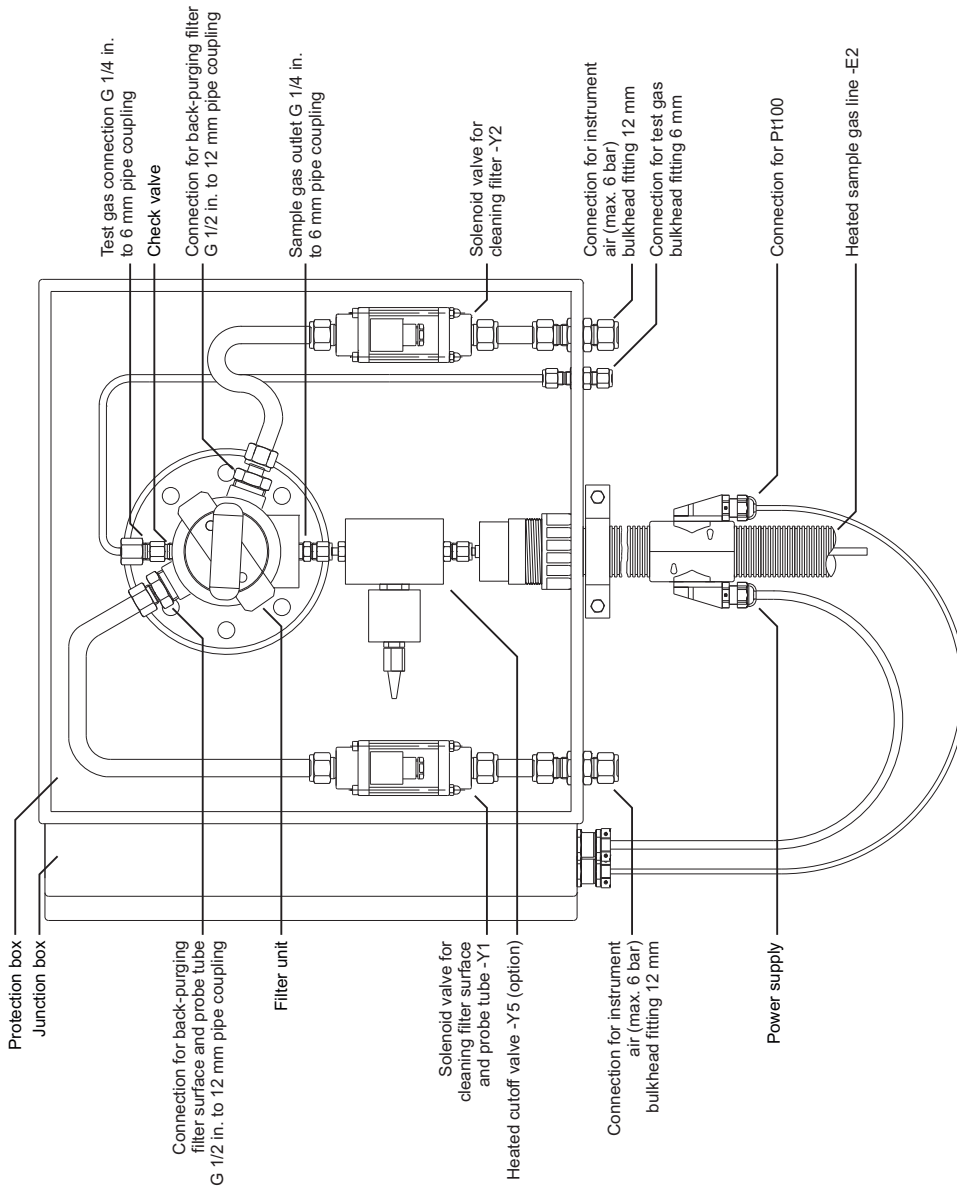
Pneumatic connections for 2-stage back-purging, standard version

- A:** Back Pressure Purging Filter Inlet
G 1/2" -> 12 mm Tube Fitting
- B:** Back Pressure Purging Filter Surface and Probe Tube Inlet
G 1/2" -> 12 mm Tube Fitting
- C:** Sample Outlet
G 1/4" -> 6 mm or 8 mm Tube Fitting
- D:** Calibration Gas Inlet
G 1/4" -> 6 mm Tube Fitting

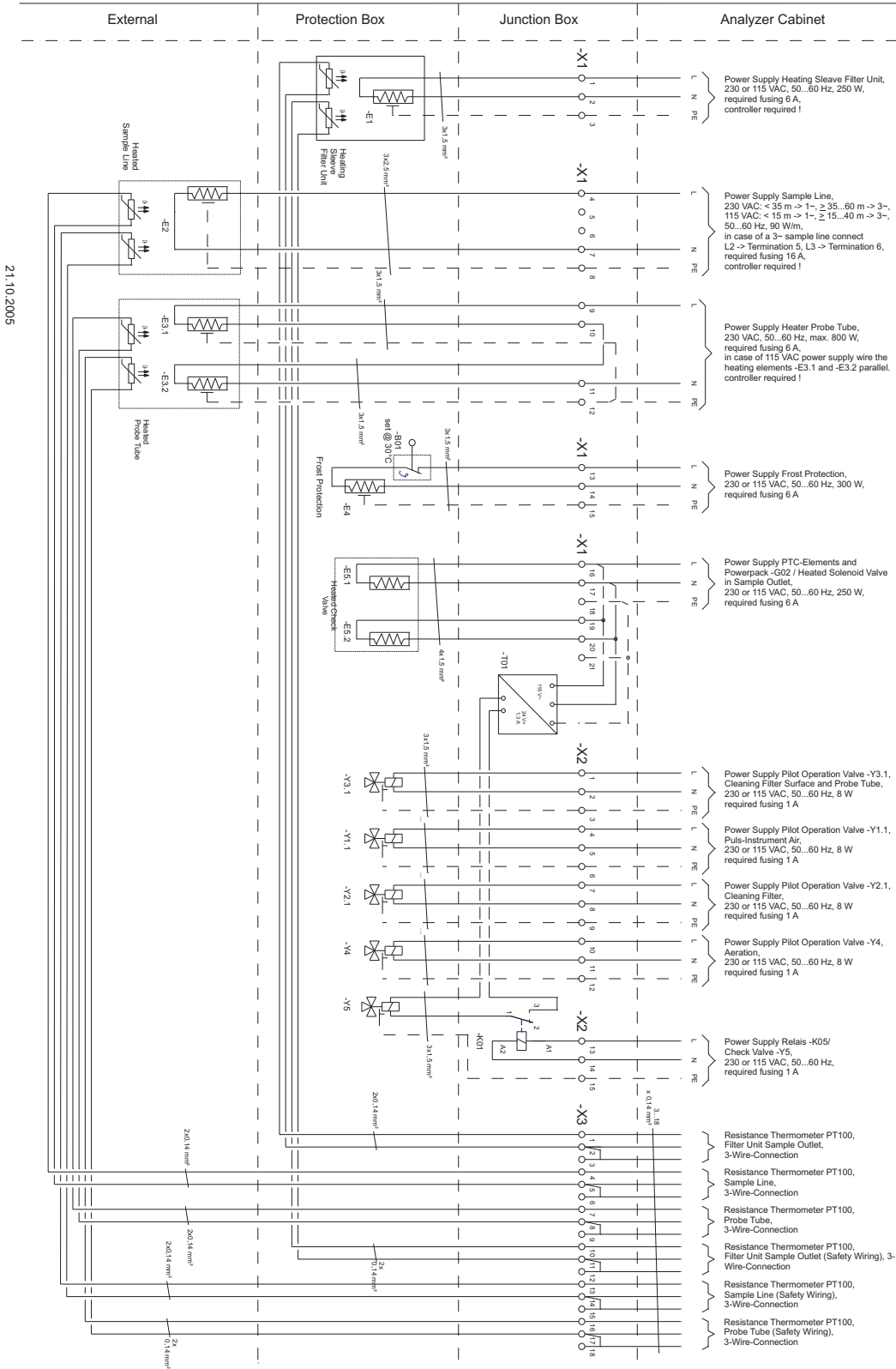


... PFE2 Filter unit

Pneumatic connections for 2-stage back-purging, standard version with coaxial valves

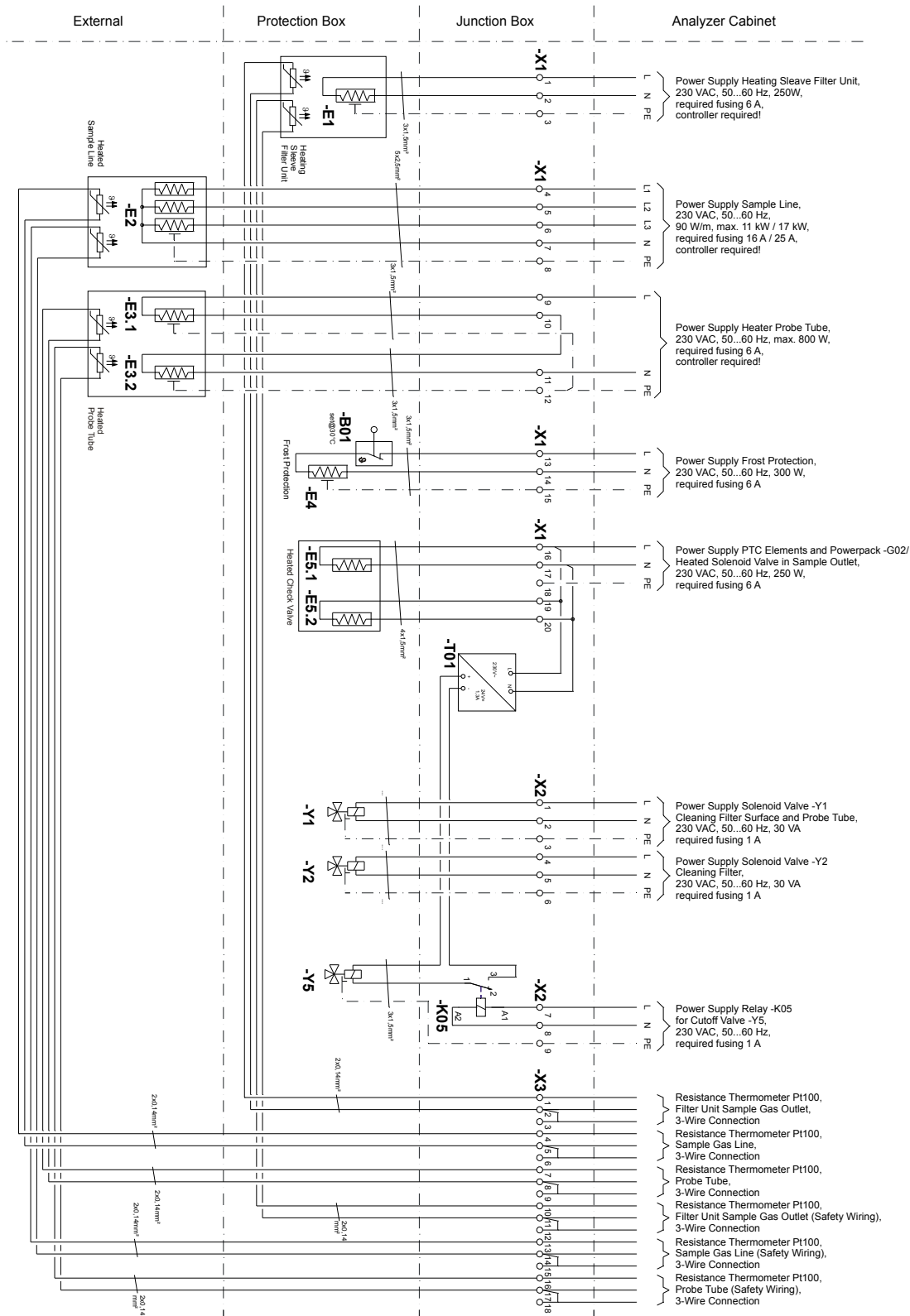


Probe protective case, standard version: Circuit and terminal diagram



... PFE2 Filter unit

Probe protective case, standard version with coaxial valves: Circuit and terminal diagram



Ordering information

		Catalog No. 23028-0-								0 0
Design										
with protection box, Standard, IP 54 (450 x 450 x 400 mm)	2									
with protection box, Standard, IP 54, anti-freeze heating	3									
with protection box, Standard, IP 54, ambient temp. max. 65 °C	4									
with protection box, Basic, IP 54 (270 x 203 x 330 mm)	5									
Filter housing and flange (equal FE2)										
Material SS, filter ceramic 0.3 µm, w/o connectors for back purging	A									
Material SS, coated, filter ceramic 0.3 µm, w/o connectors for back purging	B									
Material SS, filter stainless steel 1.0 µm, w/o connectors for back purging	C									
Heating										
with heating sleeve and insulation (max. 190 °C, Pt 100 required)	2									
Controlling and monitoring										
without	1									
with 1 x Pt 100	2									
with 2 x Pt 100	3									
Back purging unit with test/emergency purge valve (w/o compressed air unit)										
without							0			
with back purging, 1-stage and SS connection adapter							1			
with back purging, 2-stage and SS connection adapter							2			
without back purging, with test/emergency purge valve, unheated, without SS connection adapter							3			
with back purging, 1-stage, with test/emergency purge valve, heated shut-off valve, SS connection adapter							5			
with back purging, 2-stage, with test/emergency purge valve, heated shut-off valve, SS connection adapter							6			
with back purging, 2-stage, heated shut-off valve, SS connection adapter							7			
with back purging, 1-stage via Coax valve, SS connection adapter							A			
with back purging, 2-stage via Coax valves, SS connection adapter							B			
with back purging, 1-stage via Coax valve, with test/emerg. purge valve, heated shut-off-valve, SS connection ad.							D			
with back purging, 2-stage via Coax valves, with test/emerg. purge valve, heated shut-off valve, SS connection ad.							E			
with back purging, 2-stage via Coax valves, heated shut-off valve, SS connection adapter							F			
Power supply										
230 V, 50 to 60 Hz							1			
120 V, 50 to 60 Hz							2			
120 V, 50 to 60 Hz CSA, with AWG wiring							3			
Approvals										
without								0		
GOST								1		
Gaskets										
Standard								1		
for high corrosive gases								2		
Connectors for back-purging at the filter housing (FE2)										
without									0	
with									1	
Bulkhead unions (at the protection box)										
metric									1	
imperial (sample gas outlet in metric only)									2	

PFE3 Filter unit



Design

The PFE3 filter unit consists of a modified FE2 filter unit with a self-regulating heater. It is installed in a stainless steel protective case.

Process gas sampling conditions

Pressure

$p_{\text{abs}} = 50$ to 600 kPa

Temperature

Max. 200 °C

Flow rate

30 to 500 l/h, relative to 100 kPa and 0 °C

Pressure drop

Approx. 0.6 hPa at 100 l/h

Dust content

Max. 3 g/m³ (application recommendation)

Filter characteristics

Filter element

Surface filter

Filter fineness

0.3 µm

Seal integrity

10⁻⁴ hPa l/s

Dead volume

280 ml

Dimensions

50/20 x 135 mm

Heater

Type

Self-regulating heater (400 W)

Temperature

180 °C (ambient temperature 20 °C)

Temperature alarm

Approx. 150 °C

Power supply

120 V AC or 230 V AC, 50 to 60 Hz

Options

Heating sleeve (see page 5)

Materials of gas-conducting parts

Casing, flange and connections

Stainless steel 1.4571 (AISI 316Ti)

Seals

FPM

Installation

Flange

DN 65, PN 6, facing type A to DIN EN 1092-1; positioning of holes: 45°, 135°, 225°, 315°

Mounting

Flange connect or bolt to the probe tube

Connection ports

Sample gas

Pipe fitting 6 mm

Test gas

Bulkhead fitting 6 mm (option)

Purge gas

Bulkhead fittings 18 mm (option)

Probe tube

G³/₄ internal thread

Protective case

Dimensions

270 x 203 x 330 mm (H x W x D)

Material

Stainless steel 1.4301 (AISI 304)

Degree of protection of case

IP54

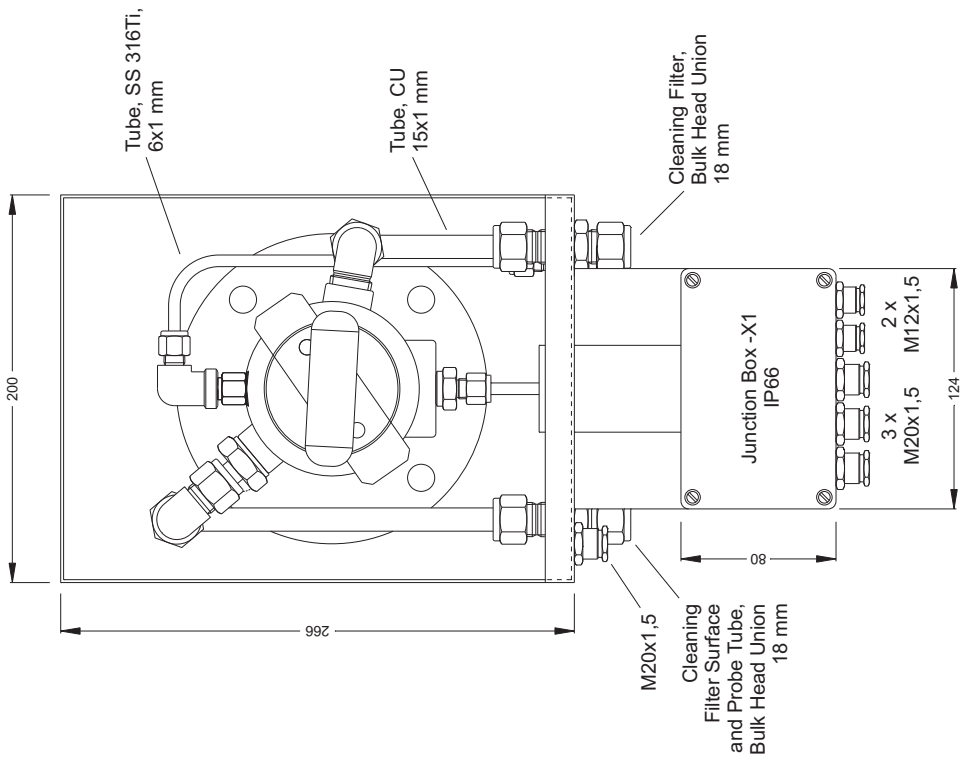
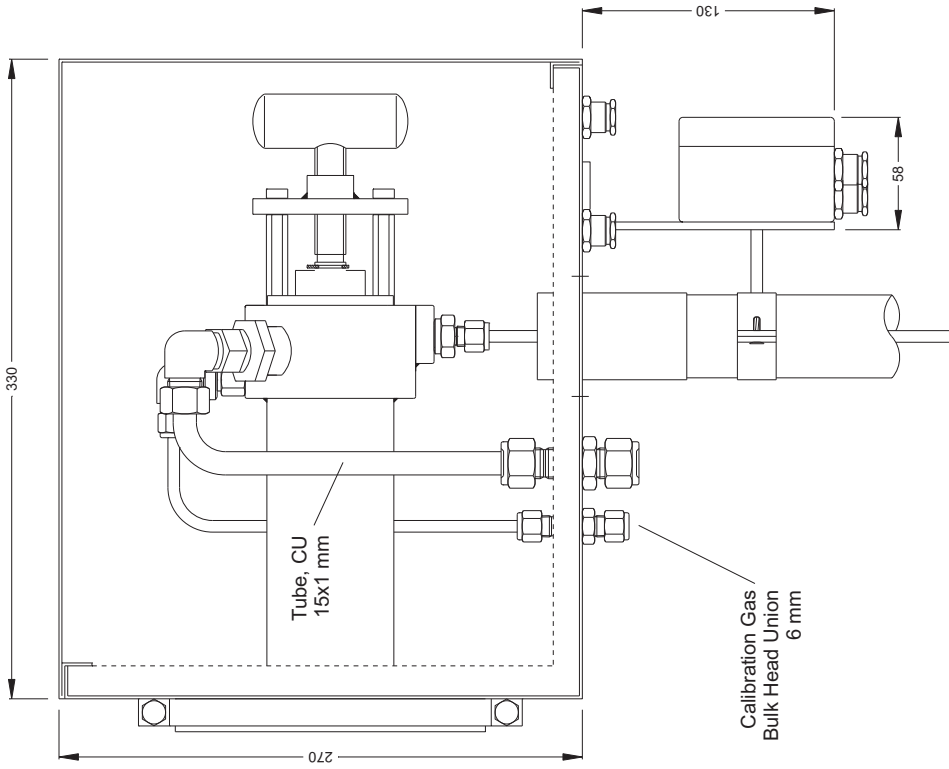
Weight

Approx. 17 kg incl. FE2 filter unit

Ambient temperature

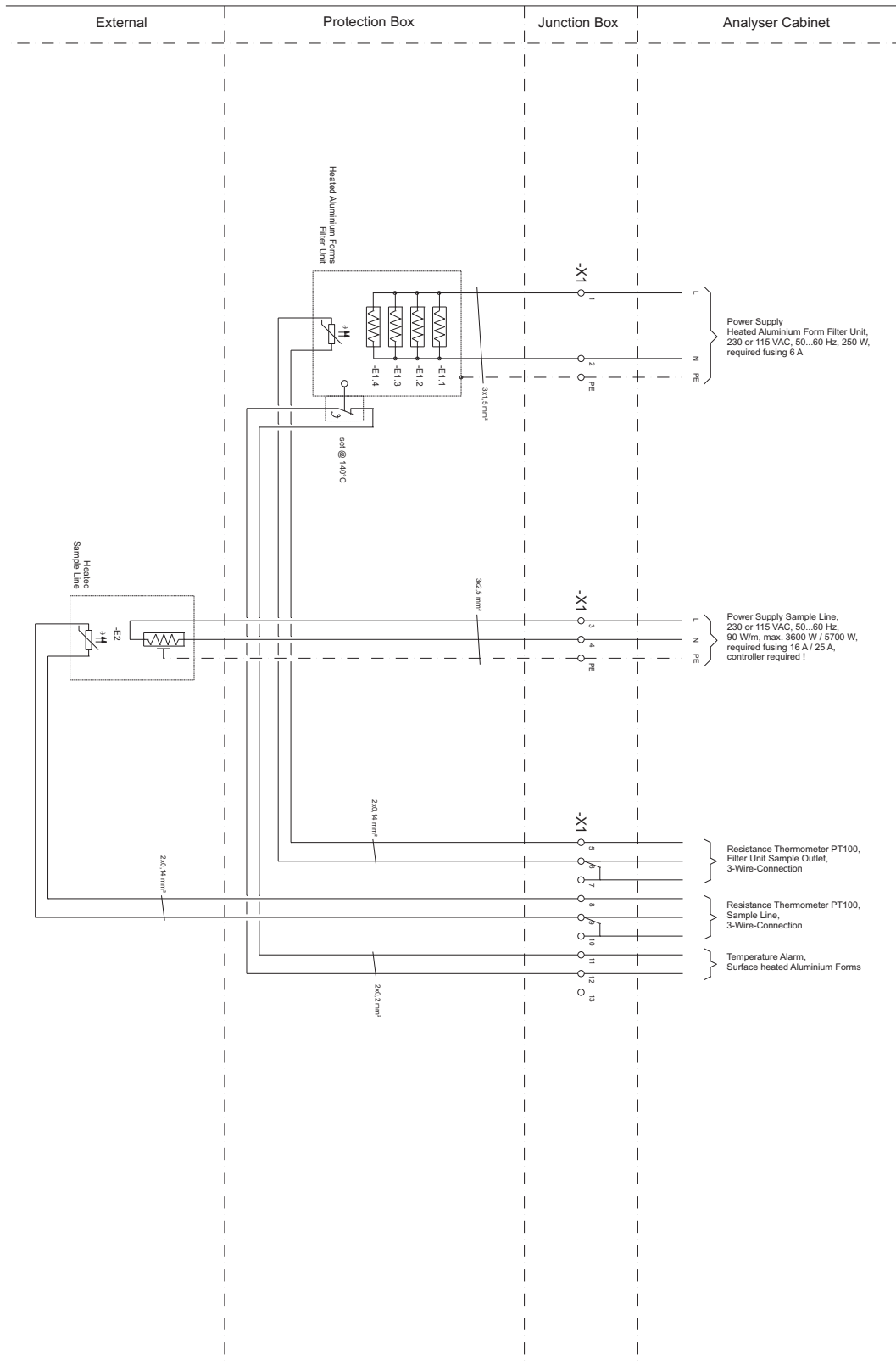
-20 to +45 °C

Dimensions, gas connections (dimensions in mm)



... PFE3 Filter unit

Circuit and terminal diagram



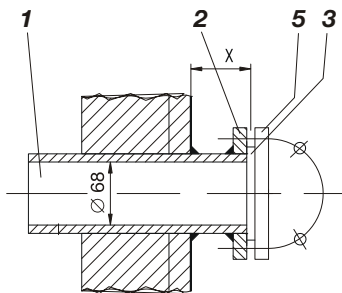
Selection table for probe tube types and probes

		Probe tube type 40 SS 1.4571 (AISI 316Ti)	Probe tube type 40 W SS 1.4571 (AISI 316Ti)	Probe tube type 40 SS 1.4571 (AISI 316Ti) coated	Probe tube type 40 SS 1.4893	Probe tube type 40 silicon carbide	Probe tube type 42 SS heated	Probe tube type 60 S water cooled ³⁾	Probe H water cooled ³⁾	Probe 2 partly heated	Probe 2 heated
Temperature	< 130 °C										X
	< 180 °C			X			X ²⁾				
	< 300 °C		X								
	180 to 450 °C	X								X	
	180 to 900 °C				X						
	< 1300 °C					X		X	X		
	< 1400 °C							X	X		
Dust content	< 50 mg/m ³	X	X	X	X	X	X				
	< 1000 mg/m ³	X	X	X	X	X	X				
	< 3 g/m ³	X	X	X	X	X	X			X	X
	> 3 g/m ³	X ¹⁾	X ¹⁾		X ¹⁾	X ¹⁾	X ¹⁾			X	X
	40 to 100 g/m ³							X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾
	< 2000 g/m ³							X ¹⁾	X ¹⁾		
Water vapor dew point	< 65 °C	X		X	X	X		X	X	X	
	> 65 °C		X		X	X		X	X		X
Acidic aerosols (acid dew point 130 °C)							X	X	X		X
Pressure	< 2 bar						X	X	X		
	< 5 bar	X	X	X	X	X					
Technical data see ...		Page 19	Page 19	Page 19	Page 19	Page 19	Page 20	Page 21	Page 22	Page 23	Page 23

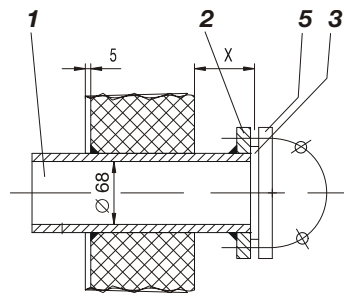
- 1) Back purging required
- 2) With regulated heating sleeve (see page 5)
- 3) See data sheet 'SCK Sampling system for dry gas sampling'

Lead-through tube installation

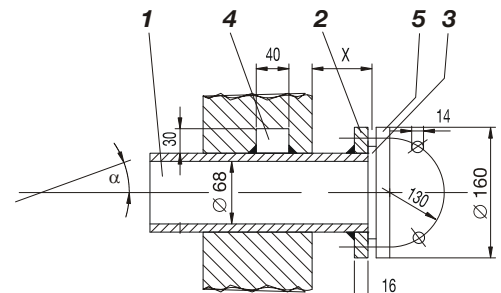
Brickwork with metal sheeting



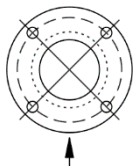
Isolated sheet-metal channel



Brickwork



Flow direction of process gas



- 1 Lead-through tube
- 2 Mounting flange DN 65, PN 6, facing type A to DIN EN 1092-1
- 3 Gasket
- 4 Welded-on rectangular block
- 5 Sampling probe flange

Dimensions in mm

Minimum distance x_{min} of the mounting flange from the wall depending on mounting angle α :

α	10°	15°	20°	25°	30°	35°
x_{min}/mm	133	138	143	147	151	153

Type 42 Probe tube (heated)

Use

- Low gas temperature
- High moisture content in gas
- Corrosive components in the process gas

Typical places of use are:

- Sampling points in wet desulphurization plants (crude gas, clean gas, part-cleaned clean gas)
- Waste incineration plants
- Auxiliary boilers and stack emission measurements

Process gas sampling conditions

Pressure

$p_{abs} = 200 \text{ kPa}$ (2 bar)

Temperature

Max. 200 °C

Flow rate

Max. 250 l/h

Flow velocity

Max. 12 m/s (> 1000 mm max. 7 m/s)

Dust content

Max. 3 g/m³ (application recommendation); max. 40 g/m³ with purge-back device in conjunction with FE2/PFE2 filter unit (see page 4 or page 6)

T₉₀ time

Approx. 0.4 s at 250 l/h

Design

Materials of gas-conducting parts

Stainless steel 1.4571 (AISI 316Ti)

Flange

DN 65, PN 6, facing type A to DIN EN 1092-1; positioning of holes: 45°, 135°, 225°, 315°

Weight

Nominal length	600 mm	1000 mm	1500 mm	2000 mm
Weight	7 kg	8 kg	10 kg	12 kg

Probe tube heater

Heat output

Nominal length	600 mm	1000 mm	1500 mm	2000 mm
Heating power	600 W	800 W	1200 W	1500 W

Nominal voltage

120 V AC or 230 V AC, 50 to 60 Hz

Control

Control temperature max. 200 °C

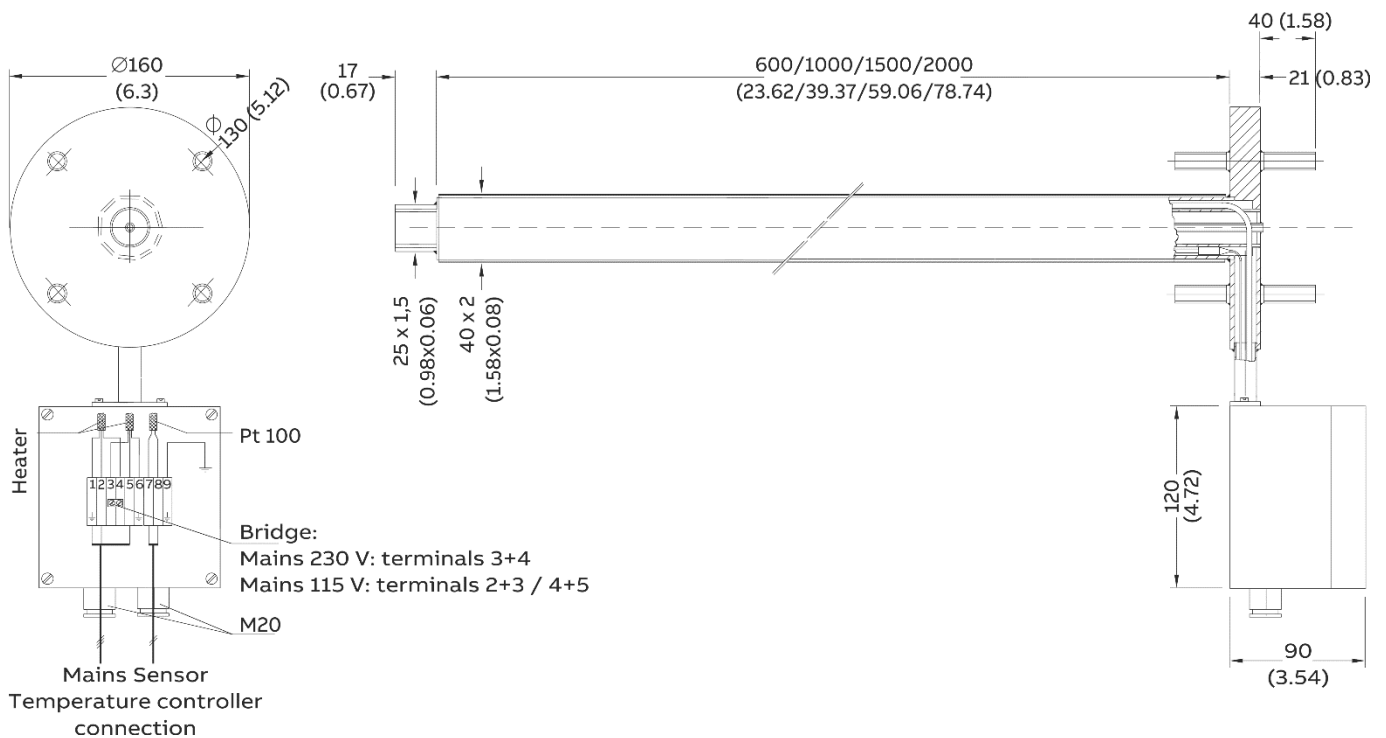
Temperature sensor

Pt 100

Ordering information

	Catalog No.
Length 600 mm	3KXG839050U0100
Length 1000 mm	23041-4-8018392
Length 1500 mm	23041-4-8018393
Length 2000 mm	23041-4-8018394

Dimensions and connections (dimensions in mm [inch])



Type 60 S Probe tube (cement flue gas probe)

Use and design

The water-cooled probe tube type 60 S is used in the sampling system SCK for sampling hot cement flue gas with high dust content for CO, CO₂, NO and SO₂ analysis in 'dry' cement production process (e.g. recuperator furnaces, furnaces with grate coolers), at rotary kiln inlet and/or after precalcination.

The probe tube type 60 S is installed in kilns where less hard encrustations are to be expected.

By using the probe type 60S with two sample gas openings at the side of the probe tip, an effective pre-dedusting of the sample gas is achieved at the tip thus reducing the frequency of the automatic back purging actions.

Back-purging of the probe tube and the filter with compressed air as well as the probe retraction out of and insertion into the oven are controlled by the sampling system SCK (see data sheet 'Sampling System SCK').

Process gas sampling conditions

Pressure

p_{abs} = max. 200 kPa (2 bar)

Temperature

Installation length/mm	3.500	3.000	2.500	2.500	1.500
Max. temperature/°C	1.200	1.250	1.300	1.350	1.400

Flow rate

Max. 250 l/h

Dust content

Max. 2000 g/m³ with periodical compressed air cleaning in conjunction with FE2 filter unit (see page 4)

Dead time (T_d) for length = 3500 mm

Approx. 40 s at 60 l/h, approx. 9 s at 250 l/h

90% time (T₉₀) for length = 3500 mm

Approx. 82 s at 60 l/h, approx. 17 s at 250 l/h

Pressure drop

Approx. 10 hPa

Design

Materials of gas-conducting parts

Sampling pipe: Stainless steel 1.4571 (AISI 316Ti);
Cooling tube: Stainless steel 1.4541 (AISI 321)

Flange

DN 150, PN 10

Weight

45 to 70 kg

Mounting

A flanged probe connector (internal diameter 200 mm) should be installed by the customer. The mounting flange is essential for installing the probe tube. The connections should be aligned according to the local situation.

Cooling water supply

Quality

Drinking water quality with approx. 30 % anti-freeze if required

Outlet temperature

Min. 50 °C (or > dew point of the cement flue gas), max. 85 °C

Pressure

p_{abs} = max. 400 kPa (4 bar)

Quantity circulated

Approx. 3 m³/h (closed system)

Compressed air supply

Quality

Instrument air, free of dirt, oil and water droplets, 600 kPa (6 bar) positive pressure, dew point -40 °C

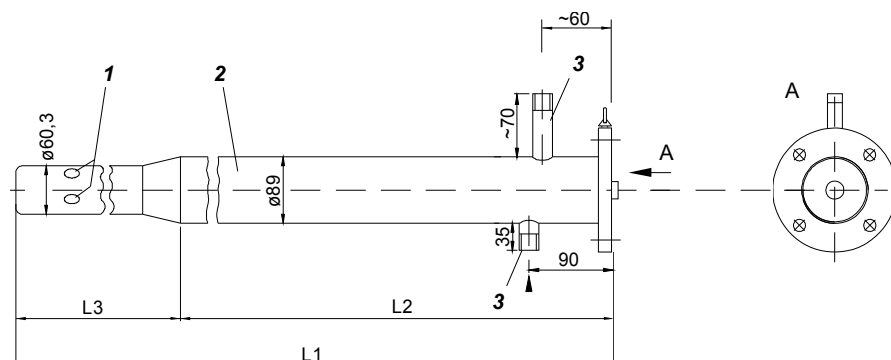
Consumption

Approx. 3 m³/h at standard conditions

Ordering information

	Catalog No.
Length 1500 mm	23038-4-0730642
Length 2000 mm	23038-4-0730643
Length 2500 mm	23038-4-0730644
Length 3000 mm	23038-4-0730645
Length 3500 mm	23038-4-0730646

Dimensions (in mm)



- 1 Sample gas inlet ports
- 2 Thickened shank of probe tube
- 3 Cooling water connections
- L1 Probe tube length
- L2 Length of thickened shank:
800 mm for $L1 \leq 2000$ mm
1300 mm for $L1 \geq 2500$ mm
- L3 200 mm with reinforced protection tube

Probe H (cement flue gas probe)

Use and design

The water-cooled gas sampling probe type H is used in the sampling system SCK for sampling hot cement flue gas with high dust content for CO, CO₂, NO and SO₂ analysis in 'dry' cement production process (e.g. recuperator furnaces, furnaces with grate coolers), at rotary kiln inlet and/or after precalcination.

The probe type H is installed in kilns, where extremely hard encrustations are to be expected.

By using the probe type H, long measuring periods without interruptions are possible: The pneumatically driven plunger which is welded on the filter tip mechanically breaks the encrustations at the probe gas entry without interruption of the measurement.

Back-purging of the probe with compressed air as well as the plunger movement and the probe retraction out of and insertion into the oven are controlled by the sampling system SCK (see data sheet 'Sampling System SCK').

Process gas sampling conditions

Pressure

p_{abs} = max. 200 kPa (2 bar)

Temperature

Installation length/mm	3.500	3.000	2.500	2.500	1.500
max. temperature/°C	1.200	1.250	1.300	1.350	1.400

Flow rate

Max. 250 l/h

Dust content

Max. 2000 g/m³ with periodical compressed air cleaning

Dead time (T_d) for length = 3500 mm

Approx. 40 s at 60 l/h, approx. 9 s at 250 l/h

90% time (T₉₀) for length = 3500 mm

Approx. 82 s at 60 l/h, approx. 17 s at 250 l/h

Pressure drop

Approx. 10 hPa

Design

Materials of gas-conducting parts

Sampling pipe: Stainless steel 1.4436 (AISI 316);
Cooling tube: Stainless steel 1.4541 (AISI 321)

Flange

DN 150, PN 10

Weight

60 to 90 kg

Mounting

A flanged probe connector (internal diameter 200 mm) should be installed by the customer. The mounting flange is essential for installing the probe tube. The connections should be aligned according to the local situation.

Cooling water supply

Quality

Drinking water quality with approx. 30 % anti-freeze if required

Outlet temperature

Min. 50 °C (or > dew point of the cement flue gas), max. 85 °C

Pressure

p_{abs} = max. 400 kPa (4 bar)

Quantity circulated

Approx. 3 m³/h (closed system)

Compressed air supply

Quality

Instrument air, free of dirt, oil and water droplets, 600 kPa (6 bar) positive pressure, dew point -40 °C

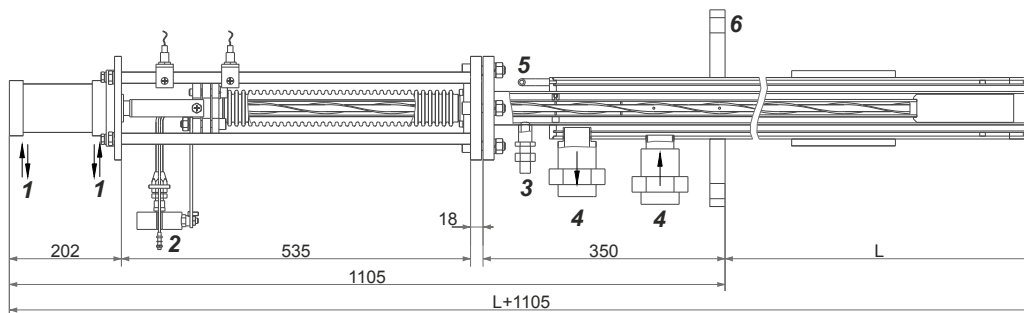
Consumption

Approx. 3 m³/h at standard conditions

Ordering information

	Catalog No.
Length 1500 mm	23020-4-0730656
Length 2000 mm	23020-4-0730647
Length 2500 mm	23020-4-0730648
Length 3000 mm	23020-4-0730649
Length 3500 mm	23020-4-0730650

Dimensions (in mm)



- 1 Control air conn. G³/₄
- 2 Sample gas conn. G³/₄
- 3 Compressed air connection for pipe nozzle with 18 mm outer diameter
- 4 Cooling water connections G 1 inch
- 5 Bleeding for cooling water circulation
- 6 Flange DN 150, PN 10
- L Installation length

Probe 2



Use

Wherever large volumes of gas are sampled, gas pressure is raised and there is a high moisture or dust content in the gas.

Process gas sampling conditions

Pressure

$p_{abs} = \text{max. } 400 \text{ kPa (4 bar)}$

Temperature

Max. $450 \text{ }^\circ\text{C}$ (probe tube partially heated),
max. $130 \text{ }^\circ\text{C}$ (probe tube heated)

Flow rate

Max. 2000 l/h

Dust content

Max. 20 g/m^3 (application recommendation),
max. 100 g/m^3 with purging

Purging pressure

Max. 600 kPa (6 bar)

Heating temperature of inlet filter

$\geq 200 \text{ }^\circ\text{C}$ (at process gas temperature of $20 \text{ }^\circ\text{C}$)

90% time (T_{90})

$< 2 \text{ s}$ at 250 l/h

Filter fineness

$0.3 \text{ } \mu\text{m}$

Material of gas-conducting parts

Support tube, heating rod, connecting pipe

Stainless steel 1.4571 (AISI 316Ti)

Inlet filter

Aluminum oxide

Seals

Ceramic fiber

Flange

Stainless steel 1.4581

Mounting

Flange

DN 65, PN 6, facing type A to DIN EN 1092-1;
positioning of holes: 45° , 135° , 225° , 315°

Mounting angle

Any; 10° to 35° downwards from the horizontal recommended
(take direction of flow into account), see 'Dimensions'

Sample gas outlet

$G\frac{3}{4}$ internal thread

Test gas/purge air inlet

$G\frac{3}{8}$ internal thread

Probe tube heating

Heat output (unregulated)

Nominal length 1200 mm : 650 W ,
partially heated (for heating of the wall bushing): 255 W

Nominal voltage

230 V AC , 50 to 60 Hz (120 V AC on inquiry)

Electrical connection

Silicone cable, $3 \times 1.5 \text{ mm}^2$, length 1000 mm

Protective case (option)

Dimensions

$270 \times 203 \times 330 \text{ mm}$ (H x W x D)

Material

Stainless steel 1.4301 (AISI 304)

Degree of protection of case

IP54

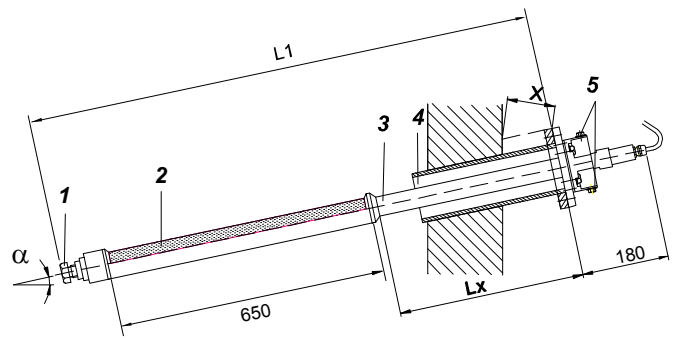
Weight

Approx. 7 kg

Ambient temperature

-20 to $+45 \text{ }^\circ\text{C}$

Dimensions and connections (dimensions in mm)



1 Mounting for the inlet filter

2 Inlet filter (inner filter) with internal heating rod

3 Gas sampling tube

4 Wall tube with flange

5 Sample gas outlet or test gas/purge air inlet

Minimum distance x_{min} of the mounting flange from the wall
depending on mounting angle α :

α	10°	15°	20°	25°	30°	35°
x_{min}/mm	133	138	143	147	151	153

Ordering information

	Catalog No.
1200 mm, 230 V, 50/60 Hz, 650 W	23022-4-0768301
1200 mm, 230 V, 50/60 Hz, 255 W, partially heated	23022-4-0768305
Protection box, insulated, IP54 ($330 \times 203 \times 270 \text{ mm}$)	23022-4-0730719

Probe 11

Use

Use in interior air, garage and tunnel monitoring, including corrosive atmospheres. The materials used ensure that with the gases normally occurring no adsorption occurs.

Technical data

Sampling pressure

Atmospheric pressure

Gas temperature

-25 to +50 °C, dry

Sample gas flow rate

Max. 70 l/h

Dust content

Max. 1 mg/m³

Pressure drop with new filter

≤ 10 hPa (mbar) at 70 l/h

Service life of filter (estimated)

$$d \text{ (days)} = \frac{\text{filter constant (2500)}}{\text{flow rate (l/h)} \times \text{dust concentration (mg/m}^3\text{)}}$$

Sample gas connection port

Bolted connection for flexible pipe with internal diameter 4 mm and external diameter 7 mm

Materials

Polycarbonate (probe head), aluminum oxide (filter)

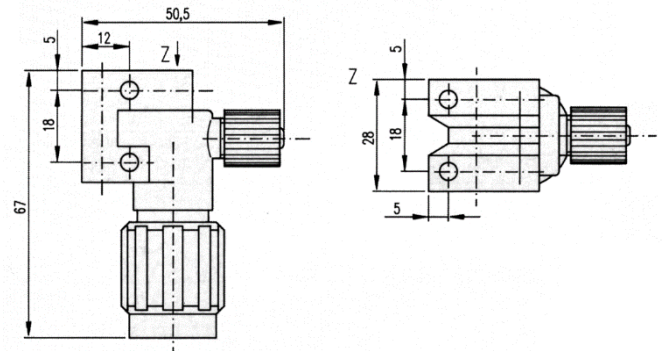
Transport and storage temperature

-25 to +70 °C

Mounting

On wall or suspended from ceiling

Dimensions (in mm)



Ordering information

	Catalog No.
Room air probe 11	23021-4-0859585

Ceramic filter



Use

The ceramic filter is used for filtering dust from gases in the gas conditioning systems of analyzer systems when the gas sampling probe does not have a filter. The ceramic filter is positioned upstream the other devices in the sample gas conditioning chain.

Technical data

Flow rate (air)

Max. 300 l/h

Gas pressure

$p_{\text{abs}} = 20 \text{ kPa}$ to 1.7 MPa (0.2 to 17 bar) at 20 °C filter temperature, max. 200 kPa (2 bar) at 180 °C

Pressure drop

0.1 to 0.85 hPa at 30 to 250 l/h (air)

Dynamic characteristics at

Flow rate (air)	30 l/h	60 l/h	90 l/h
Dead time T_t	3.7 s	2.3 s	1.7 s
90% time T_{90}	11.5 s	5.5 s	3.9 s

Filter fineness

0.3 μm

Construction, mounting

Materials of gas-conducting parts

Housing: steel, stainless steel 1.4571 (AISI 316Ti); filter: aluminum oxide; seals: FPM, Cu, Al_2O_3 fiber

Gas connection ports

$G\frac{1}{4}$ internal thread or pipe connectors for pipe of internal diameter 4 mm

Filter surface

Approx. 212 cm^2

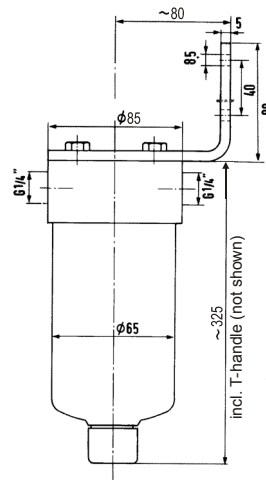
Weight

Approx. 2.1 kg

Mounting

On wall with angle bracket

Dimensions (not to scale, dimensions in mm)



Ordering information

	Catalog No.
Ceramic filter	23031-5-8018178

Process pressure reducers

Use

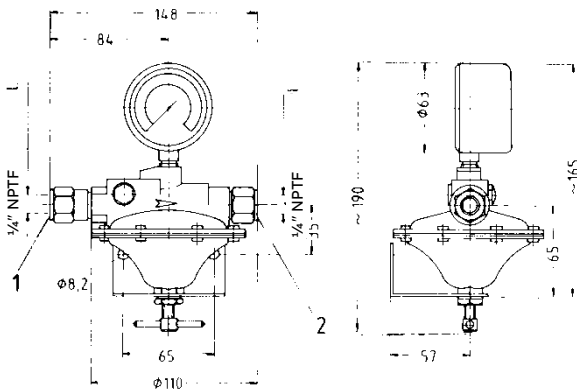
If the pressure of the process gas is too high for the analyzer, a pressure reducer is required to lower the pressure. The type of pressure reducer used is determined by the properties of the process gas and the required sample gas pressure.

Technical data and ordering information

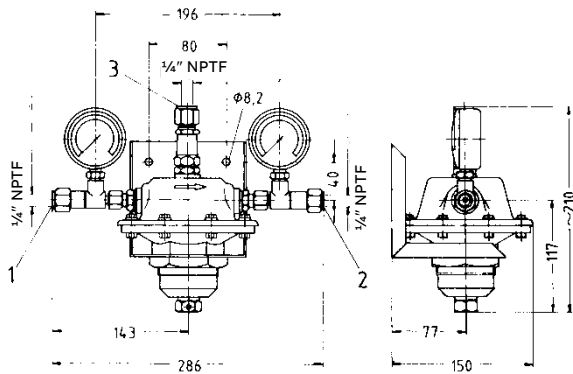
	Single-stage with one manometer (outlet)	Single-stage with two manometers (inlet/outlet)	Single-stage with two manometers (inlet/outlet)
Inlet pressure	Max. 1.5 MPa (15 bar)	Max. 3.5 MPa (35 bar)	Max. 3.5 MPa (35 bar)
Outlet pressure (adjustable)	0.8 to 10 kPa (8 to 100 mbar)	10 to 40 kPa (0.1 to 0.4 bar)	10 to 70 kPa (0.1 to 0.7 bar)
Safety valve set to	–	50 kPa (0.5 bar)	80 kPa (0.8 bar)
Manometer display inlet pressure	–	0 to 4 MPa (0 to 40 bar)	0 to 4 MPa (0 to 40 bar)
Manometer display outlet pressure	0 to 250 hPa (0 to 250 mbar)	0 to 60 kPa (0 to 0.6 bar)	–100 to +150 kPa (–1 to +1.5 bar)
Flow rate	25 to 250 l/h	25 to 250 l/h	25 to 250 l/h
Material diaphragm	Buna rubber	Buna rubber	Stainless steel
Material gasket	Buna rubber	Buna rubber	EPDM
Material housing	Brass	Stainless steel; gas-conducting parts: brass	Stainless steel
Weight	Approx. 1.25 kg	Approx. 2.65 kg	Approx. 2.35 kg
Gas and ambient temperature	Max. 50 °C	Max. 50 °C	Max. 50 °C
Scope of supply	Pressure reducer with angle bracket	Pressure reducer with angle bracket	Pressure reducer with angle bracket
Catalog No.	23035-5-5864958	23035-5-5864951	23422-4-0730700

Dimensions (in mm)

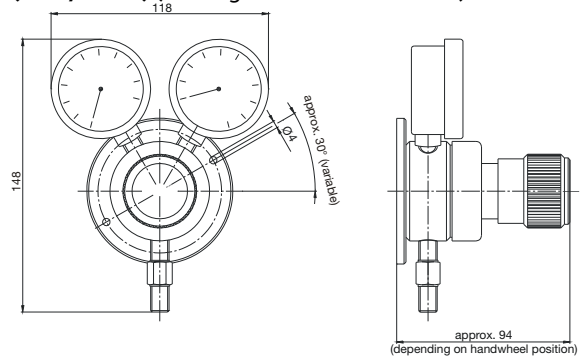
Pressure reducer single-stage with one manometer (outlet) (Catalog No. 23035-5-5864958)



Pressure reducer single-stage with two manometers (inlet/outlet) (Catalog No. 23035-5-5864951)



Pressure reducer single-stage with two manometers (inlet/outlet) (Catalog No. 23422-4-0730700)



Electronic temperature controller and switching relay

Temperature controller

Control range
-200 to +850 °C

Measurement input
Pt 100

Outputs
2 x relay 3 A, 250 V AC

Power supply
110 to 240 V AC +10/-15 %, 48 to 63 Hz

Dimensions
48 x 48 mm, C-rail housing

Weight
140 g

Switching relay

Load voltage
 $U_{rms} = 24$ to 265 V

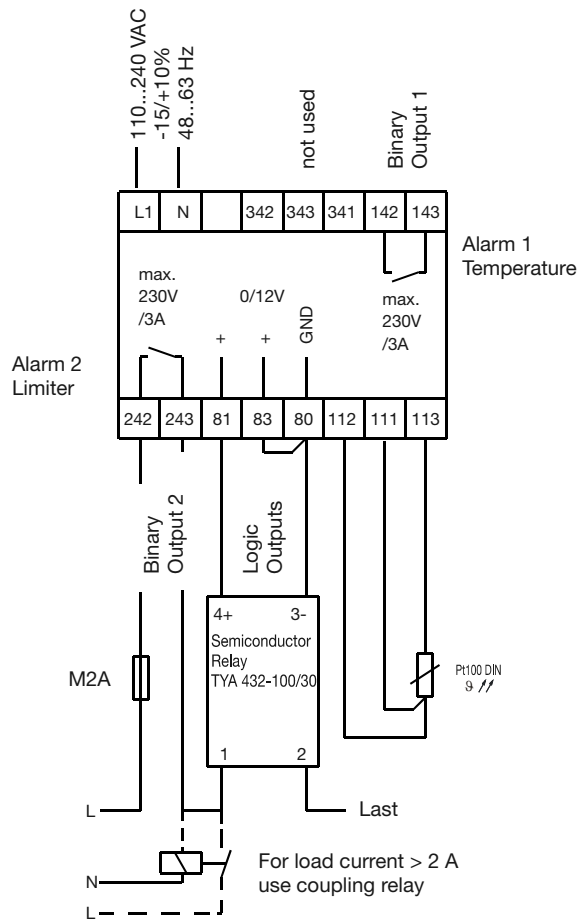
Max. load current
 $I_{rms} = 30$ A (ambient temperature = 25 °C)

Weight
200 g

Ordering information

	Catalog No.
Temperature controller	
Parameters not set	23345-5-8328907
Parameters set for self-regulating heater for ACMP, ACX	23345-5-8328907C
Parameters set for sample gas line	23345-5-8328907L
Parameters set for filter unit	23345-5-8328907P
Parameters set for probe 42	23345-5-8328907R
Switching relay	23345-5-8328731

Electrical connections



Heated sample gas lines

CGWB 13 Heated sample gas line

- Parallel strip heater (holding temperature max. 200 °C)
- Pt 100 resistance thermometer for regulation
- Self-regulating anti-frost heater (max. 30 °C)
- Self-regulating heater (option, holding temp. max. 100 °C)

TBL 01-C Heated sample gas line

- Self-regulating heater (holding temp. max. 100/120 °C)
- Integral pipe-end connectors for cement analysis systems

TBL 01-S Heated sample gas line

- see separate data sheet *DS/CGA/SAMPLE_GAS_SAMPLING-EN*

Selection table for heated sample gas lines

	CGWB 13	TBL 01-C
Heater		
Self-regulating strip heater (30 °C)	x	–
Self-regulating strip heater (100 °C)	x	x
Self-regulating strip heater (120 °C)	–	x
Fixed resistor heat. cond. (200 °C)	–	–
Parallel strip heater (200 °C)	x	–
Outer covering	Polyvinyl chloride (PVC)	Metal or PVC
Options		
Line can be shortened	x	x
Small bending radius	–	x
Gas connections	Various options	Various options
Electrical connections	Heater and Pt 100 fixed	Heater and Pt 100 fixed
Maximum line length	130 m	70 m
Applications		
CO, O ₂ , CO ₂	Anti-frost heater	–
CO, O ₂ , CO ₂	Holding temperature 100 °C	–
SO ₂ , NO _x , C _n H _m	Holding temperature 200 °C	–
Cement analysis systems	–	Holding temperature ≤ 120 °C
Technical data see ...	Page 30	Page 35

Integral pipe-end connectors

Flange



Metal cap



Hard cap



Silicone cap



POM cap and shrunk-on hose



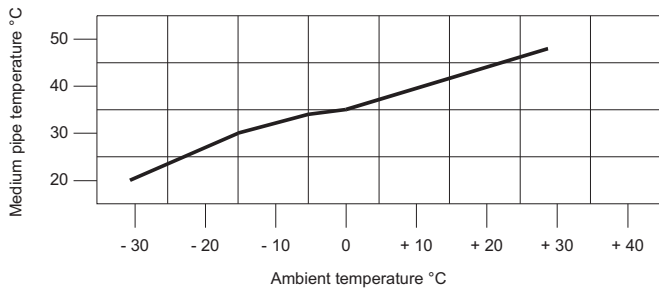
CGWB 13 Heated sample gas line

Technical data

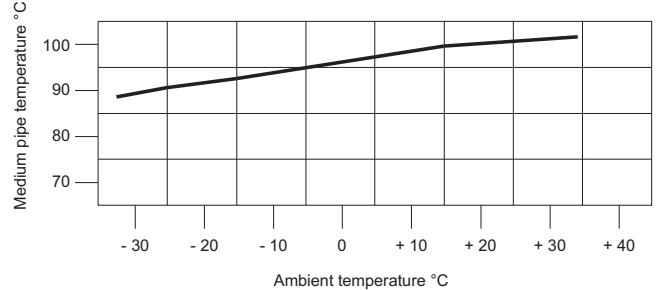
	Frost protected line	Self-regulating strip heater	Regulated parallel strip heater
Outer covering	PVC	PVC	PVC
Medium-carrying pipe	PTFE	PTFE	PTFE
Integral pipe-end connectors	Various options (see ordering info.)	Various options (see ordering info.)	Various options (see ordering info.)
Heater	self-regulating strip heater	self-regulating strip heater	CPD heating element, regulated
Power supply	230 V or 120 V, 50 to 60 Hz	230 V or 120 V, 50 to 60 Hz	230 V or 120 V, 50 to 60 Hz
Heat output	16 W/m	30 W/m	60 W/m
Current consumption	Making/holding current = 65/25 mA	0.15 A/m	0.3 A/m
Holding temperature	see diagram	see diagram	200 °C
Ambient temperature	-30 to +60 °C	-30 to +60 °C	-30 to +60 °C
Outer diameter	30 mm	43 mm	40 mm
Flexible sample gas pipe	6 x 4 x 1 mm or 8 x 6 x 1 mm	6 x 4 x 1 mm or 8 x 6 x 1 mm	6 x 4 x 1 mm or 8 x 6 x 1 mm
Maximum line length	130 m	90 m	60 m
Line duct	M42	M42	M42
Minimum bending radius	300 mm	300 mm	300 mm
Weight	Approx. 1 kg/m	Approx. 1 kg/m	Approx. 1 kg/m
Connect. lead for heater (fixed)	3 x 2.5 mm ² ; length 5 m	3 x 2.5 mm ² ; length 5 m	3 x 2.5 mm ² ; length 5 m
Connect. lead for Pt 100 (fixed)	-	-	LIYCI 2 x 0.14 mm ² ; length 5 m

Holding temperature diagrams

Frost protected line, 6 x 4 x 1 mm PTFE, 16 W/m, self-regulating



Self-regulating strip heater, 6 x 4 x 1 mm PTFE, 30 W/m

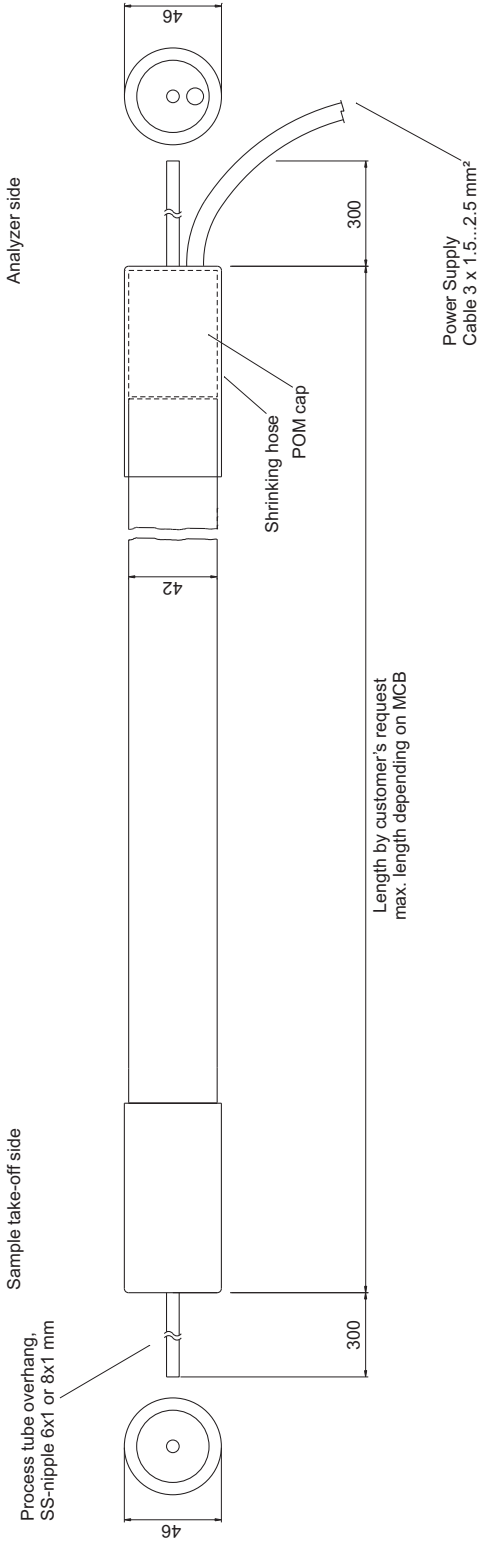


Ordering information

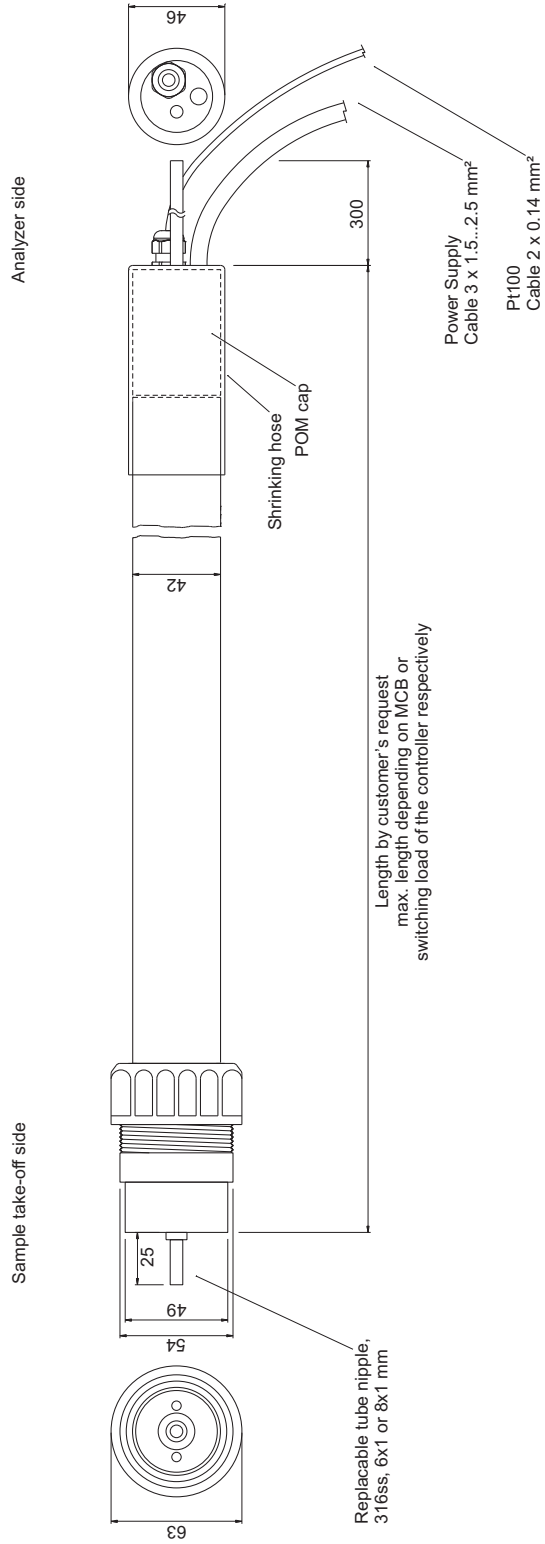
	Catalog No. 23281-0-									
Version										0 0 0 0 0 0 0
Parallel strip heater 60 W/m, line can be shortened, regulated (Pt 100), 200 °C		2								
Self-regulating 16 W/m, 30 °C (antifreeze)		3								
Self-regulating 30 W/m, 100 °C		7								
Integral pipe-end connectors										
Probe: metal cap for PFE2/3 – analysis: plastic cap with shrunk-on hose			2							
Probe: metal cap for PFE2/3 – analysis: flange			3							
Both sides with POM plastic cap (for self-regulated versions only)			4							
Probe: PTFE cap for PFE2/3 in conf. set – analysis: POM plastic cap			5							
Probe: metal cap for PFE2/3 in conf. set – analysis: plastic cap with shrunk-on hose			6							
Gas conducting line										
PTFE tube 6x4x1 mm						1				
PTFE tube 8x6x1 mm						2				
Power supply										
230 V, 50 to 60 Hz							1			
120 V, 50 to 60 Hz							2			
Controlling and monitoring										
without Pt 100 (for self-regulated versions only)								0		
with 1 x Pt 100 (fixed built-in)								1		

Dimensions (in mm)

CGWB 13 Self-regulating strip heater



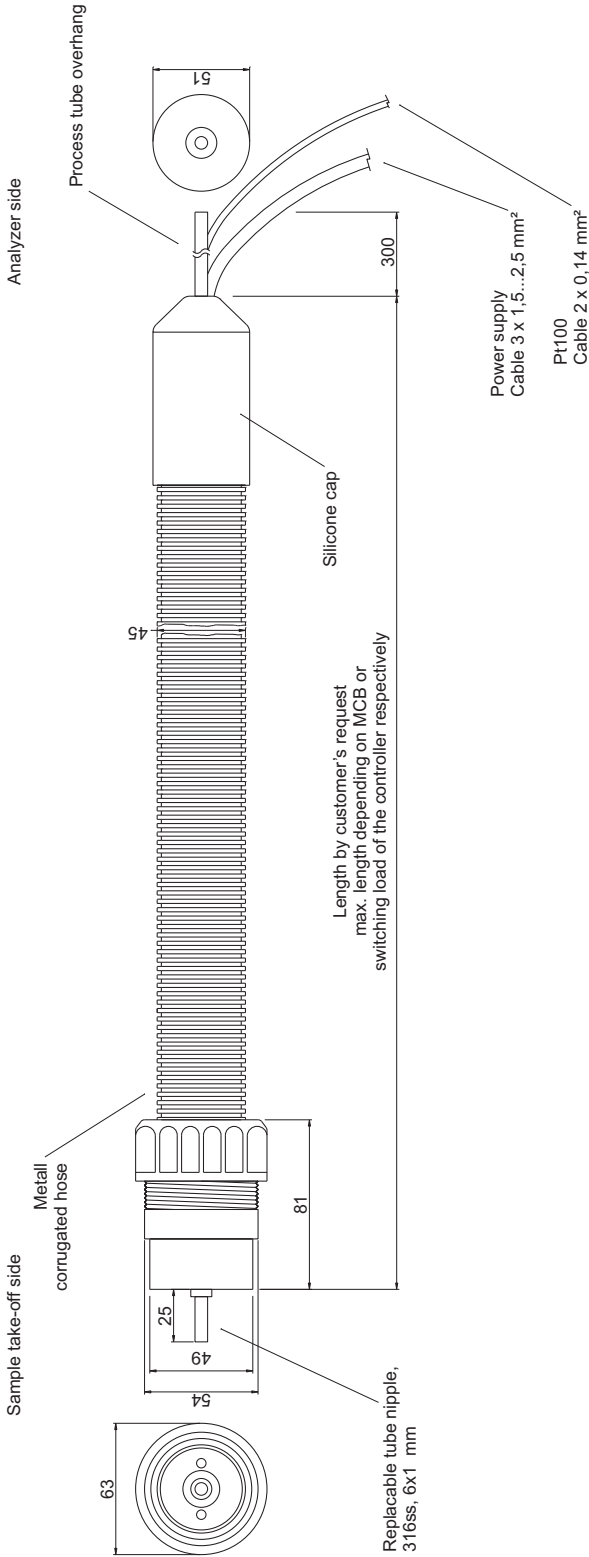
CGWB 13 Regulated parallel strip heater



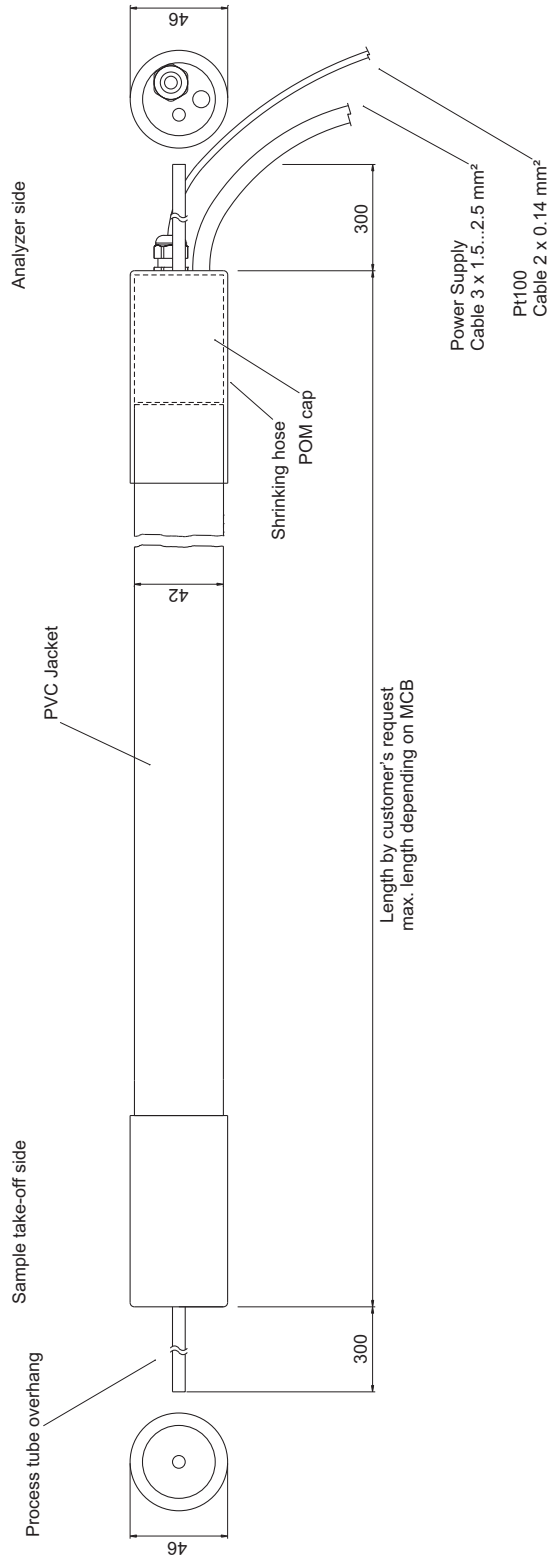
... TBL 01-C Heated sample gas line

Dimensions (in mm)

TBL 01-C, pipe end connectors for ACK



TBL 01-C, pipe end connectors for ACMP and ACX





Notes



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