# Gas sampling probes and sample gas pumps

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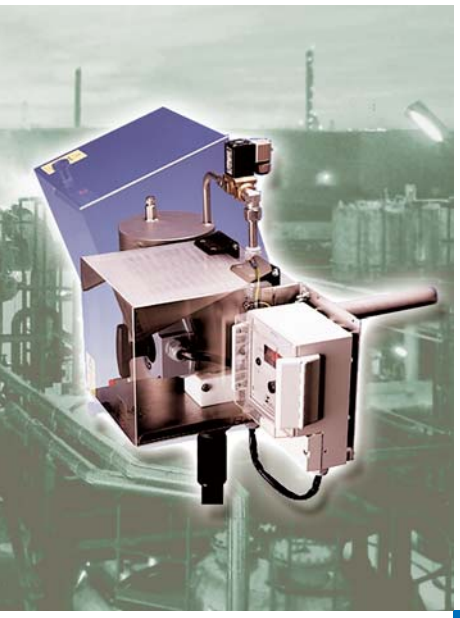


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# Gas sampling probes

## Gas sampling probe for process gas lines, without filter



### Application

For process gases with a dust concentration up to approx. 20 mg/m³, operating pressures up to max. 25 bar, and temperatures up to 600 °C.

### Design

Sampling pipe made of stainless steel (mat. No. 1.4571), length 0.6 m, optional outer diameter of 6 or 12 mm. With shut-off valve. Adjustable depth of penetration into the process gas line.

Flange DN 25, PN 16 DIN 1512 made of stainless steel (mat. No. 1.4571).

Other flanges on request.

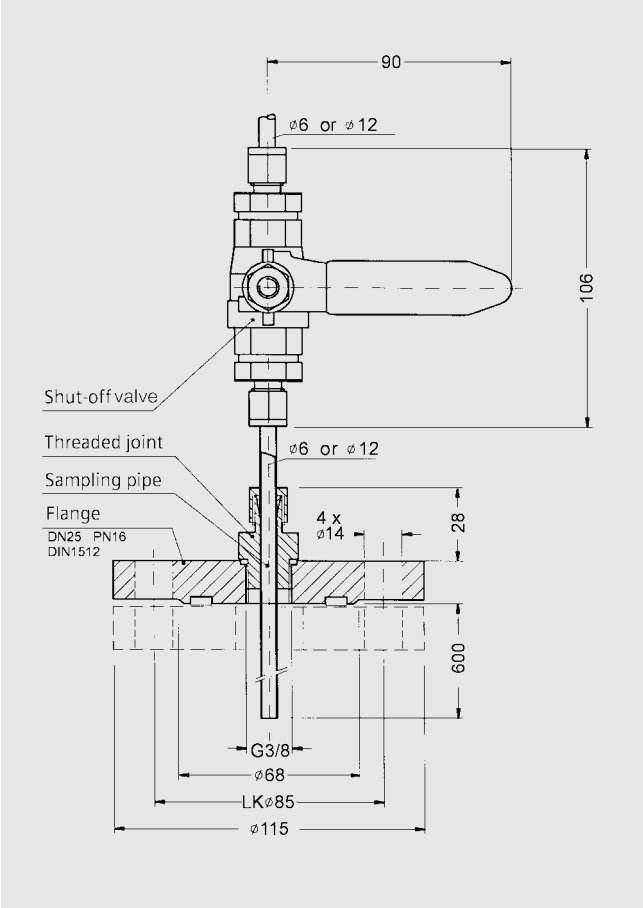


Fig. 2/1 Gas sampling probe for process gas lines with shut-off valve

| Ordering data | Order No. |
|---|---|
| **Gas sampling probe for process gas lines, without filter,** with shut-off valve and sampling pipe with | |
| • 6 mm outer diameter | **7MB1 943-1EA01** |
| • 12 mm outer diameter | **7MB1 943-1EA02** |
| Gas sampling probes for process gas lines with flange dimensions other than DN 25 | On request |

## Gas sampling probe with external, electrically heated filter, self-regulating



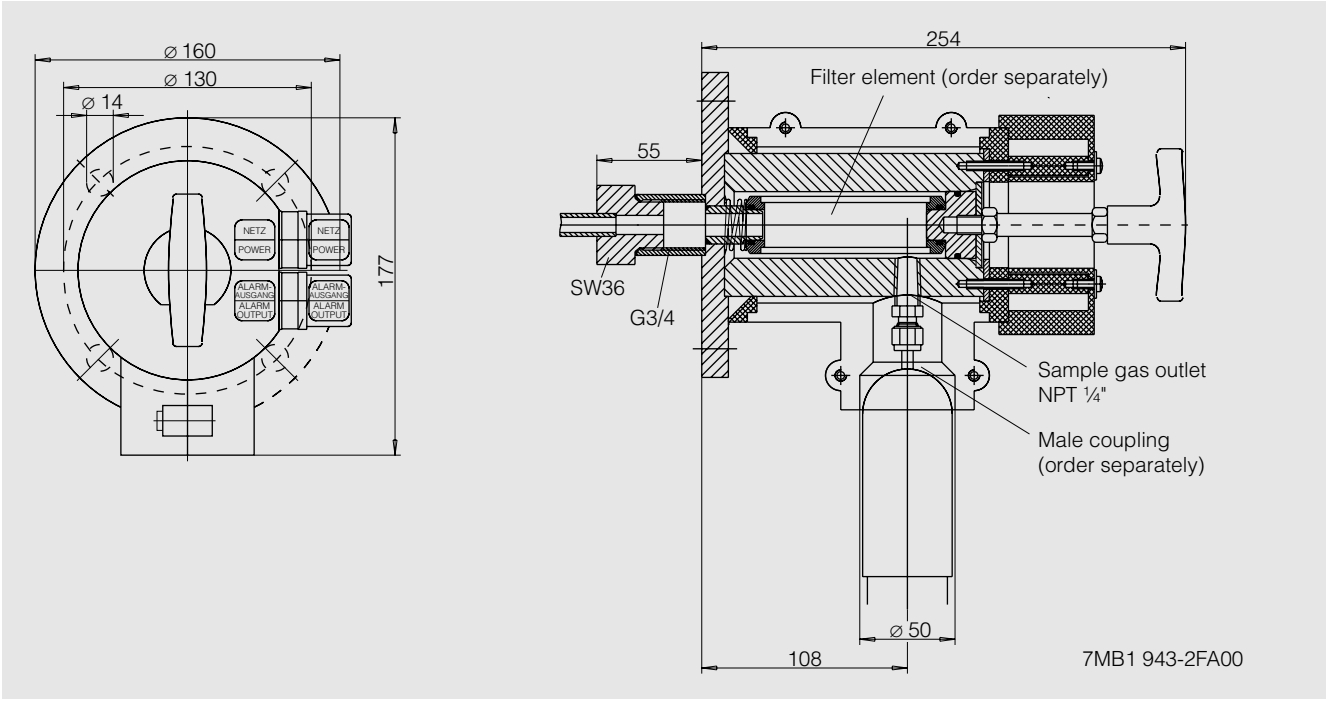


Fig. 2/2 Gas sampling probe with external, electrically heated filter without weatherproof cover

### Application

For continuous sampling of gases in processes with dust concentrations < 2 g/m³ and an operating pressure of max. 6 bar.

### Design

A filter chamber heated at 180 °C contains a filter element. Self-regulating heating elements are used. A temperature controller and limiter are not required.

The parts in contact with the sample gas are made of stainless steel (mat. No. 1.4571), Viton and ceramics.

### Technical data

| | |
|---|---|
| Operating pressure | Max. 6 bar |
| Operating temperature | +160 °C at ambient temperature of 0 ... +80 °C |
| Material of filter housing and flange | Stainless steel (mat. No. 1.4571) |
| Mounting flange | DN 65, PN 6, form B |
| Sample gas outlet connection | Female thread ¼ NPT |
| Electrical connection | Two Pg 11 cable glands, terminals for max. wire cross-section 2.5 mm² |
| Degree of protection to EN 60 529 | IP54 |
| Power supply | 110 to 240 V AC, 50/60 Hz |
| Power consumption | Approx. 400 VA |
| Weight | Approx. 9 kg |

### Ordering data

| | Order No. |
|---|---|
| **Gas sampling probe** with self-regulating heating elements, with low temperature alarm, heated, 115 to 230 V AC, 50/60 Hz, 400 VA, completely thermally insulated with protection cover, without weatherproof cover | **7MB1 943-2FA00** |

The filter element and the threaded joint must be ordered separately. See also the configuration example on page 2/6.

# Gas sampling probes

## Gas sampling probe with external, electrically heated filter, with temperature controller



### Application

For gases with a dust concentration up to approx. 2 g/m³ and an operating pressure < 6 bar.

### Design

The gas sampling probe with external, electrically heated filter has a mounting flange with G¾ female thread. Depending on the application, the flange can accommodate a sampling pipe or a pre-filter.

The filter is fitted in a housing with minimum dead volume.

The filter element can be replaced quickly and easily without tools and without the need to dismantle the sample line.

The gas sampling probe is equipped with a protection hood. Optimum heating of the complete filter housing, including the mounting flange, ensures safe outdoor operation without the temperature falling below the dew point. The temperature is controlled by an integral Pt100.

***Explosion-proof version for Zone 1 hazardous areas***

The design of the explosion-proof gas sampling probe corresponds to that of the standard version except:

- Heater with explosion-proof design
- Heating regulated at 100 °C

### Technical data

| | |
|---|---|
| Sampling pressure | Max. 6 bar |
| Filter housing and flange | Stainless steel, mat. No. 1.4571 |
| Filter volume | 120 cm³ |
| Sample gas outlet | 1 x female thread ¼ NPT |

### Technical data

| | |
|---|---|
| High-performance heating cartridge | |
| • Heating voltage | 230 V AC, 50/60 Hz, 400 VA or 115 V AC, 60 Hz, 400 VA |
| • Temperature setting range | Up to 200 °C; a high or low temperature is signaled by a floating changeover contact (adjustable to ±5 °C, ±10 °C or ±15 °C) |
| Load capacity of temperature alarm contact | 230 V AC, 3 A or 230 V DC, 0.25 A |
| Mounting flange | DN 65, PN 6, form B, mat. No. 1.4571 |
| Terminal box | With two Pg 13.5 screwed glands |
| Degree of protection to EN 60 529 | |
| • Standard version | IP54 |
| • Ex version | IP65 |
| Weight | |
| • Standard version | Approx. 15.4 kg |
| • Ex version | Approx. 16.0 kg |

### Ordering data

| | Order No. |
|---|---|
| **Gas sampling probe** with internal filter, heated, with weatherproof cover, with heating element controlled by attached controller with high and low temperature alarms | |
| • 230 V AC, 50/60 Hz, 440 VA | **7MB1 943-2FB01** |
| • 115 V AC, 50/60 Hz, 425 VA | **7MB1 943-2FB02** |
| **Gas sampling probe Ex** Degree of protection 2G EExe II T4 to ATEX, with weatherproof cover and Ex connection socket | |
| • 230 V AC, 50/60 Hz, 400 VA | **7MB1 943-2FC01** |
| • 115 V AC, 50/60 Hz, 400 VA | **7MB1 943-2FC02** |

The filter element and the threaded joint must be ordered separately. See also the configuration example on page 2/6.

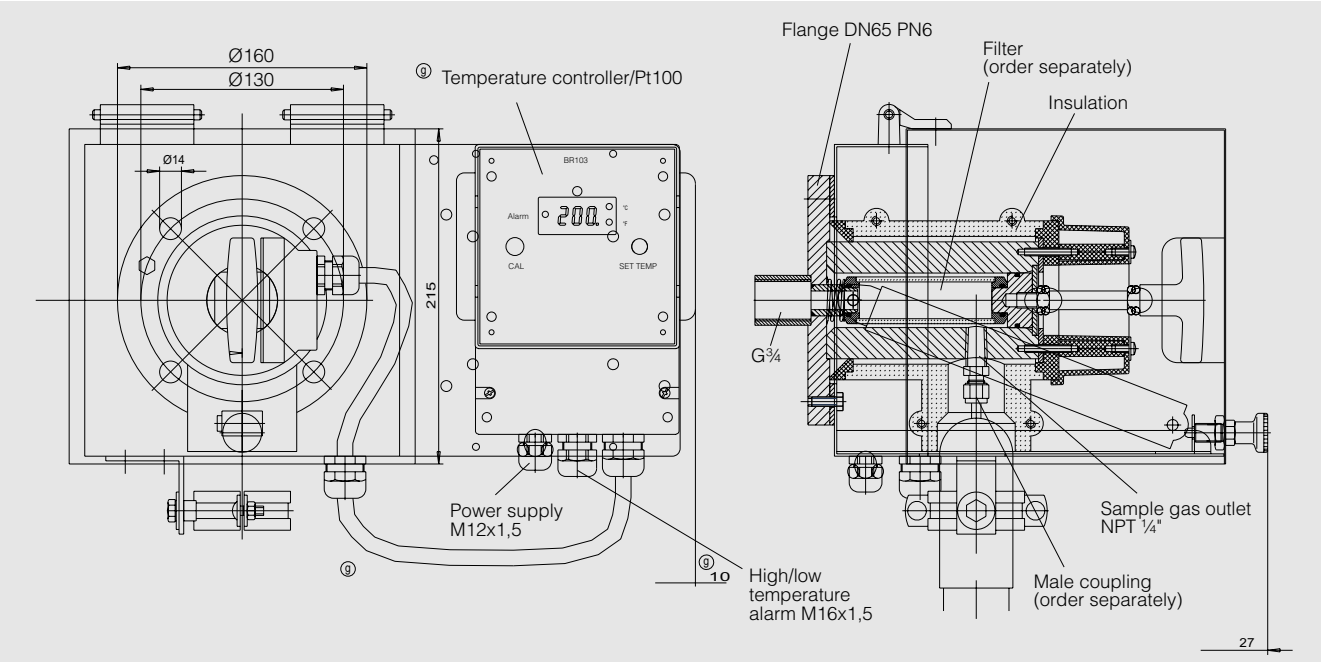


Fig. 2/3 Gas sampling probe with external, electrically heated filter with weatherproof cover

# Gas sampling probe with external, electrically heated filter, with temperature monitoring and connection for backflushing

## Application

Gas sampling probe with inlet filter.

For gases with a dust concentration up to approx. 20 g/m³ and a pressure < 6 bar.

## Design

The gas sampling probe is suitable for use with a hot sample gas with high dust concentration. An inlet filter is attached to the G1¼" thread in the case of sample gases with 2 to approx. 20 g dust/m³. A sampling pipe can be fitted between the inlet filter and the probe. This inlet filter is purged with instrument air. The connection for the purging air is located on the probe.

Prior to purging, the outlet to the analyzer system is closed by a pneumatically driven ball valve.

A high or low temperature alarm is output via a floating changeover contact. This alarm can be set to ±5 °C, ±10 °C or ±15 °C. A minimum dead volume in the probe permits a short T90 time for the measuring equipment. The filter element in the probe can be replaced quickly and easily without tools and without the need to dismantle the sample line. The probe has a weatherproof cover.

## Technical data

| | |
|---|---|
| Sampling pressure | Max. 6 bar |
| Filter housing and flange | Stainless steel, mat. No. 1.4571 |
| Filter volume | 120 cm³ |
| Sample gas outlet | 1 x female thread ¼ NPT |
| High-performance heating cartridge<br>• Heating voltage | 230 V AC, 50/60 Hz, 440 VA or<br>115 V AC, 60 Hz, 425 VA |
| • Temperature setting range | Up to 200 °C |
| Load capacity of temperature alarm contact | 230 V AC, 3 A or<br>230 V DC, 0.25 A |
| Mounting flange | DN 65, PN 6, form B,<br>mat. No. 1.4571 |

## Ordering data

| | Order No. |
|---|---|
| **Gas sampling probe**<br>with pneumatically driven shut-off valve, weatherproof cover, regulated heating with alarm output and backflushing connection, distribution of instrument air | |
| • 230 V AC, 50/60 Hz, 440 VA | **7MB1 943-2FF01** |
| • 115 V AC, 50/60 Hz, 425 VA | **7MB1 943-2FF02** |
| **Heated compressed air vessel**<br>Hot purging air prevents cooling down of the inlet filter and condensation of the sample gas<br>115...220 V AC, 50/60 Hz | **7MB1 943-2FF03** |
| **Calibration gas connection with pneumatic valve**<br>for calibration or plausibility test | **7MB1 943-2FF04** |

The filter element and the threaded joint must be ordered separately. See also the configuration example on page 2/6.

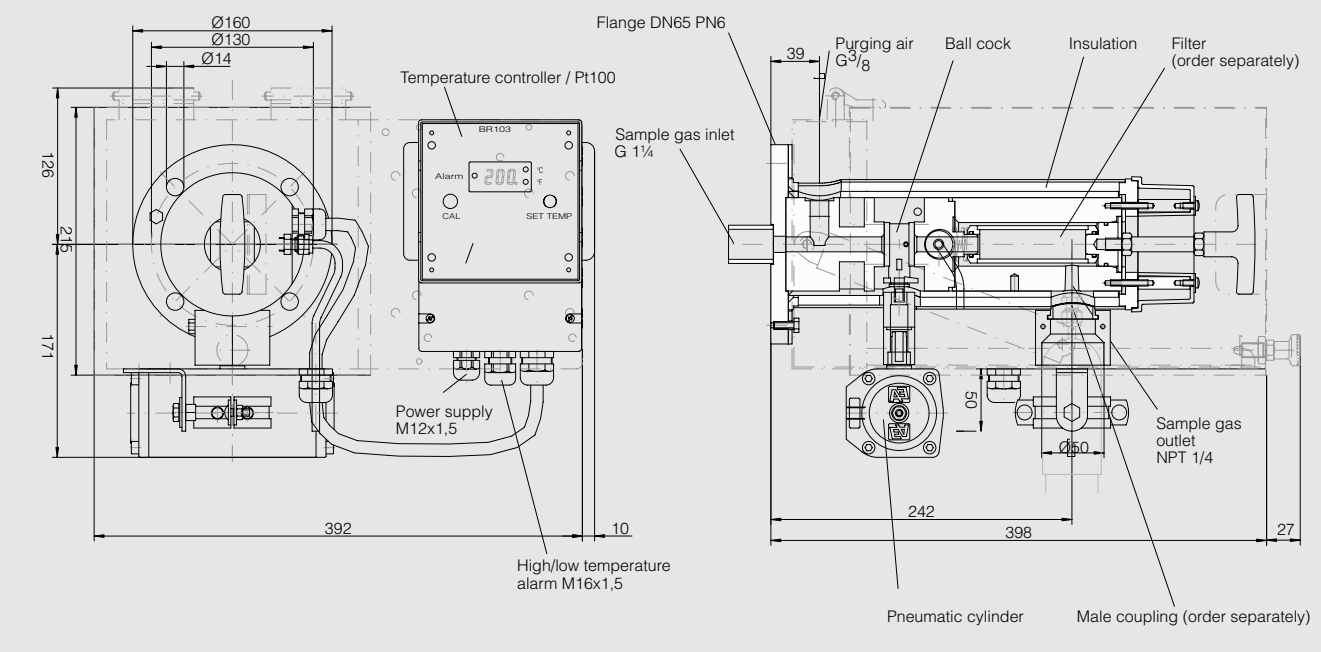


Fig. 2/4 Gas sampling probe with external, electrically heated filter, weatherproof cover and backflushing connection, ball valve

# Gas sampling probes

## Accessories and configuration example

### Design

Depending on the application, a complete gas sampling probe comprises

- an internal inlet filter,
- the sampling pipe, and
- the probe body with external filter.

Each component is selected individually. The following drawing and table will help you to select the components. In addition to the dust concentration, the temperature and corrosiveness of the media are criteria for selecting the probe components.

Further special versions are available on request.



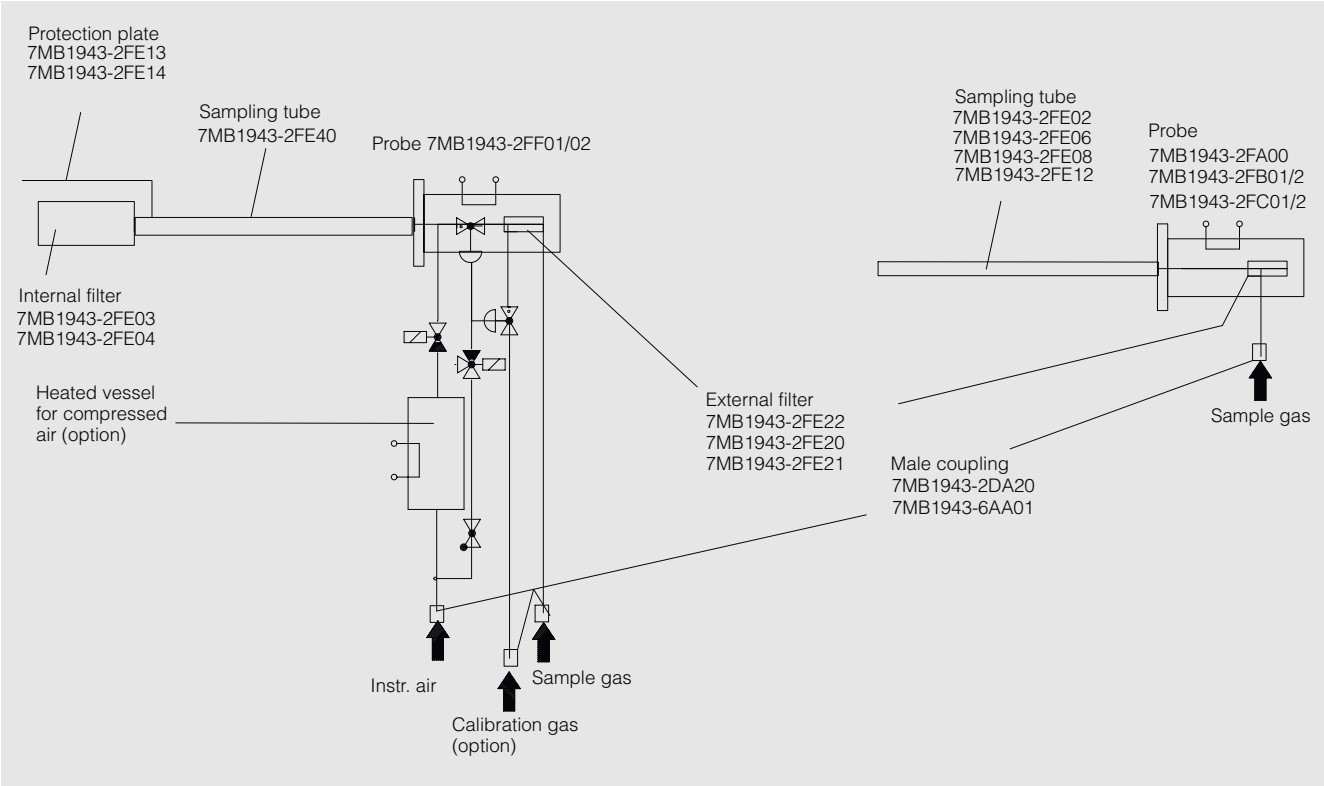


Fig. 2/5 Example configuration of sampling probe

| | Dust in the sample gas | Sample gas | | Installation | | Probe type |
|---|---|---|---|---|---|---|
| | | Wet | Dry | Indoors | Outdoors | |
| **1** | < 20 mg/m³ | | x | x | x | 7MB1 943-1EA01/02 |
| **2** | < 2 g/m³ | x | x | x | | 7MB1 943-2FA01/02 |
| **3** | < 2 g/m³ | x | x | | x | 7MB1 943-2FB01/02 |
| **4** | <20 g/m³ | x | x | x | x | 7MB1 943-2FF01/02 with 7MB1 943-2FE14<br>7MB1 943-2FE41...44<br>7MB1 943-2FE04 (up to 600 °C) |

For applications 2-3, add: sampling pipe e.g. 7MB1 943-2FE12

For applications 2-4, add: external filter, e.g. 7MB1 943-2FE 20

Table 2/1 Selection table for sampling probes

| Ordering data | Order No. |
|---|---|
| **External filters including O-rings** | |
| • Ceramic filter, pore size 2 µm | **7MB1 943-2FE20** |
| • Filter made of sintered stainless steel, pore size 5 µm | **7MB1 943-2FE21** |
| • Filter made of bent stainless steel fabric, pore size 10 µm | **7MB1 943-2FE22** |
| **Internal filters** | |
| • Up to <10 g/m³ dust: filter made of sintered stainless steel, L=235 mm, gas temperature up to 600 °C | **7MB1 943-2FE03** |
| • Up to <20 g/m³ dust: filter made of sintered stainless steel, L=538 mm, connection G¾", gas temperature up to 600 °C | **7MB1 943-2FE04** |
| • For high-temperature applications: filter made of ceramic, L=500 mm, connection G¾", gas temperature up to 1,000 °C, with adapter flange DN65 PN6 | **7MB1 943-2FE07** |
| **Threaded joint** for connecting a steel pipe to the probe | |
| • For 6 mm outer diameter | **7MB1 943-2DA20** |
| • For 8 mm outer diameter | **7MB1 940-6AA01** |
| **Supporting sleeve for threaded joint** is required in addition to the supporting sleeve to secure a PTFE hose to the probe | |
| • Supporting sleeve for 6 mm threaded joint | **7MB1 943-2DA10** |
| • Supporting sleeve for 8 mm threaded joint | **7MB1 940-6AB01** |

| Ordering data | Order No. |
|---|---|
| **Sampling pipes** | |
| • Sampling pipe made of stainless steel, L=1,000 mm, D=20 mm, gas temperature up to 600 °C, without connection for internal filter | **7MB1 943-2FE12** |
| - Extension of 7MB1 943-2FE12 per commenced meter up to L max. 1,500 mm | **7MB1 943-2FE00** |
| • Sampling pipe made of ceramics, L=1,000 mm, D=24 mm, gas temperature up to 1,600 °C, without connection for internal filter | **7MB1 943-2FE02** |
| - Extension of 7MB1 943-2FE02, per commenced meter up to L max. 1,500 mm | **7MB1 943-2FE01** |
| • Sampling pipe made of Inconel 600, L=1,000 mm, D=21.3 mm, gas temperature up to 1,050 °C, without connection for internal filter | **7MB1 943-2FE08** |
| • Sampling pipe made of Hastelloy C4, L=1,000 mm, D=12 mm, gas temperature up to 400 °C, without connection for internal filter | **7MB1 943-2FE06** |
| • Sampling pipe made of stainless steel with two threaded joints for connection of an internal filter, gas temperature up to 600 °C | |
| - L = 500 mm | **7MB1 943-2FE41** |
| - L = 1,000 mm | **7MB1 943-2FE42** |
| - L = 1,500 mm | **7MB1 943-2FE43** |
| - L = 2,000 mm | **7MB1 943-2FE44** |
| **Replacement O-rings for probe and internal filter, 1 set** | **7MB1 943-2FE23** |
| **Protection plate** Plate as mechanical protection for internal filter Material: stainless steel | |
| • For filter 7MB1 943-2FE03 | **7MB1 943-2FE13** |
| • For filter 7MB1 943-2FE04 | **7MB1 943-2FE14** |

# Sample gas pumps

## Corrosion-resistant diaphragm pump with metal-free gas ducts



### Application

Suction or pressure driven handling of sample and reference gases. For mounting in analyzer cabinets. Also suitable if weakly acidic condensation is briefly produced.

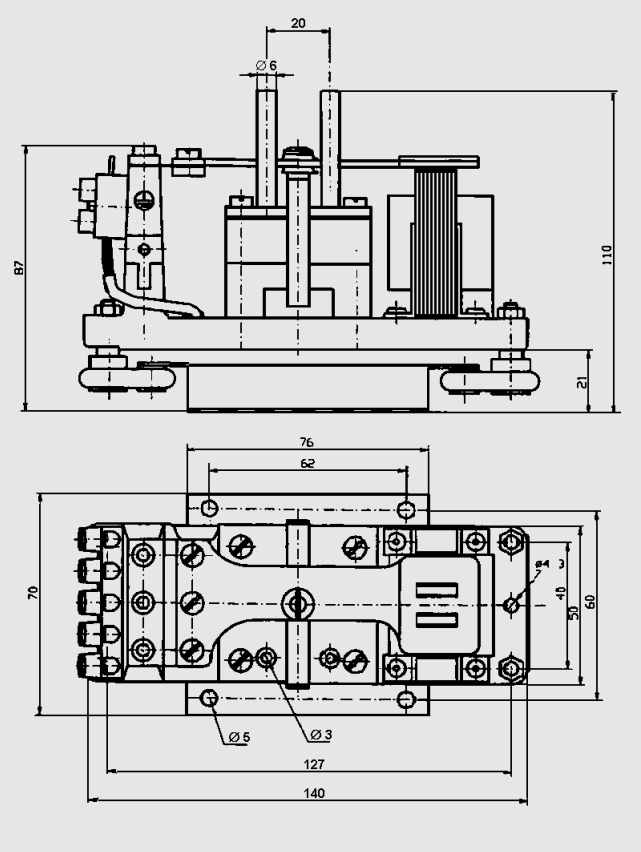


Fig. 2/6 Corrosion-resistant diaphragm pump with metal-free gas ducts and pump suspension

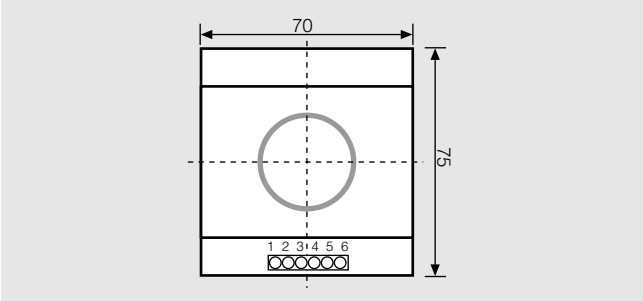


Fig. 2/7 Pump controller

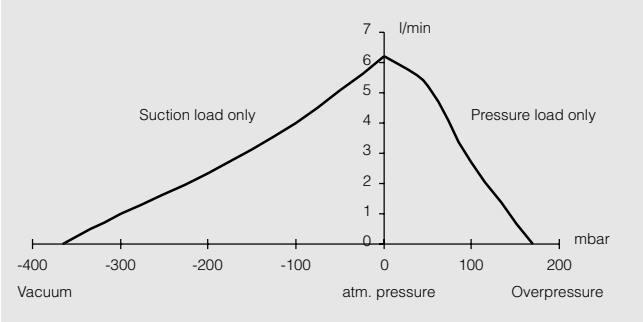


Fig. 2/8 Corrosion-resistant diaphragm pump, capacity

### Technical data

| | |
|---|---|
| Pump capacity | See Fig. 2/8 |
| Materials | |
| • Diaphragm and valve reed | EPDM |
| • Gas couplings | Polyvinylidene fluoride (PVDF) |
| • Pump manifold | PVDF |
| Permissible ambient temperature | Max. 50 °C |
| Degree of protection to EN 60 529 | IP20 |
| Power supply | See Ordering data |
| Power consumption | 6.5 VA, approx. 45 mA at 230 V AC, 50 Hz |
| Weight | Approx. 1.2 kg |

### Ordering data

| | Order No. |
|---|---|
| **Corrosion-resistant diaphragm pump with pump suspension and metal-free gas ducts,** without housing | |
| • Power supply 115/230 V AC, 50 Hz, switchable | **7MB1 943-3AA00** |
| • Power supply 120/240 V AC, 60 Hz, switchable | **7MB1 943-3AA01** |
| **Set of consumable parts** (diaphragm, valve reed and gaskets) | **7MB1 943-3AA04** |
| **PVDF fitting for S1 connection** | See page 4/31 |
| **Pump controller** for mounting on a 35 mm rail | |
| • 230 V AC | **7MB1 943-3AA02** |
| • 115 V AC | **7MB1 943-3AA03** |

## Corrosion-resistant sample gas pump

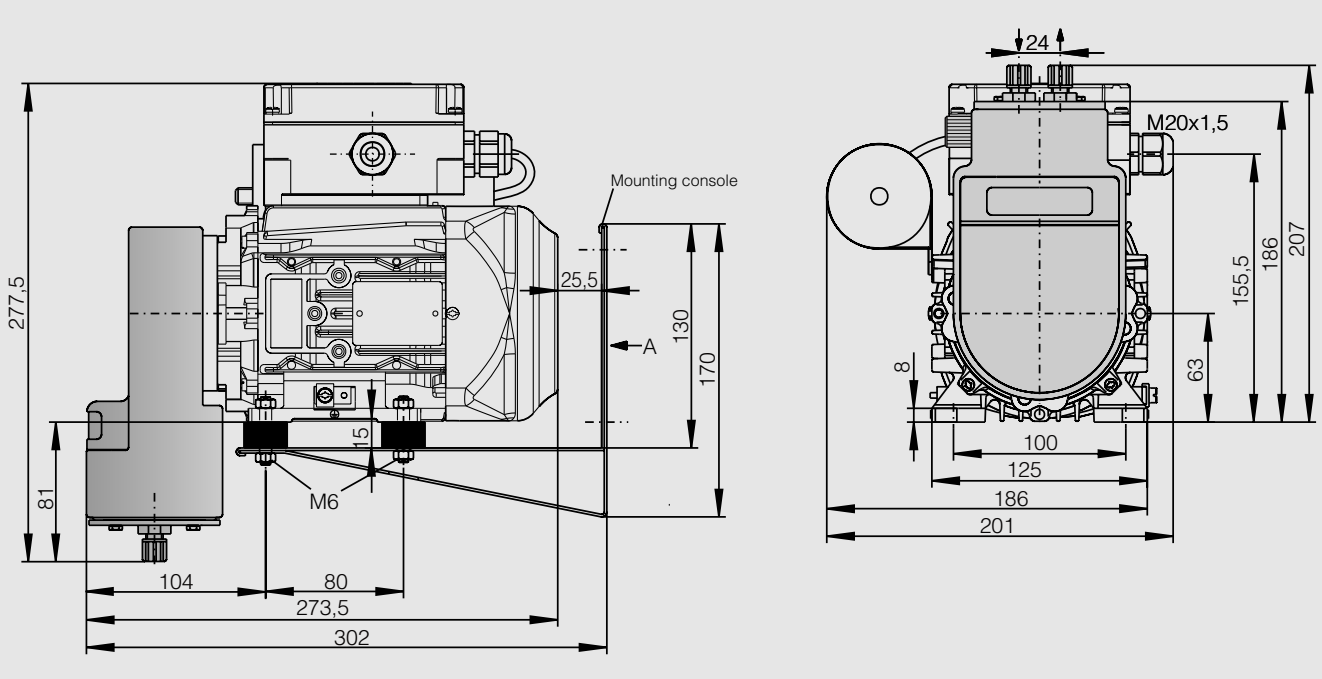


Fig. 2/9 Corrosion-resistant sample gas pump

### Application

Handling corrosive gases with temperatures up to 80 °C.

### *Special features*

- Suitable for continuous operation
- Parts which come into contact with the sample gas are made of PTFE (Teflon) and PVDF
- Inlet and outlet at bottom

### Technical data

| | |
|---|---|
| Pump capacity | See Fig. 2/10 |
| • Non-explosion-proof pumps | Adjustable using integral bypass valve |
| • Explosion-proof pumps | Non-adjustable |
| Operating pressure | Max. 1.5 bar |
| Permissible gas temperature | Max. 80 °C |
| Max. permissible ambient temperature | Max. 60 °C |
| • In Ex version | Max. 40 °C |
| Degree of protection to EN 60 529 | IP54 |
| Degree of protection of explosion-proof pump | 2GEEx e II T1-T4 |
| PTB No. | 023 ATEX 3147 |
| Power supply | See Ordering data |
| Connection | For PTFE hose DN 4/6 |
| Dimensions | See Fig. 2/9 |
| Weight | 8 kg or 8.5 kg for ATEX |
| Parts in contact with the medium | PTFE (Teflon) and PVDF |

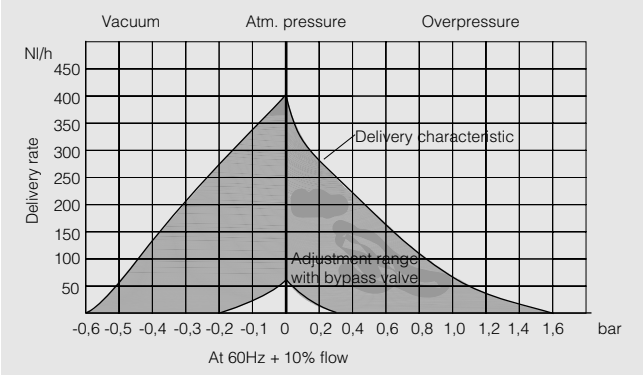


Fig. 2/10 Corrosion-resistant sample gas pump, capacity

### Ordering data

| | Order No. |
|---|---|
| **Corrosion-resistant sample gas pump** | |
| Degree of protection IP54, with pump holder | |
| • Power supply 230 V AC, 50/60 Hz; 0.88 A | **7MB1 943-3CA10** |
| • Power supply 115 V AC, 50/60 Hz; 1.8 A | **7MB1 943-3CA11** |
| **Corrosion-resistant sample gas pump, explosion-proof version** | |
| 2GEEx e II T1-T4, with pump holder | |
| • Power supply 230 V AC, 50/60 Hz; 0.88 A | **7MB1 943-3CA12** |
| • Power supply 115 V AC, 50/60 Hz; 1.8 A | **7MB1 943-3CA13** |
| **Spare parts** | |
| **Valves** (2 valves required) | **7MB1 943-3CA15** |
| **Bellows** | **7MB1 943-3CA16** |

# Sample gas pumps

## Corrosion-resistant sample gas pump with high capacity



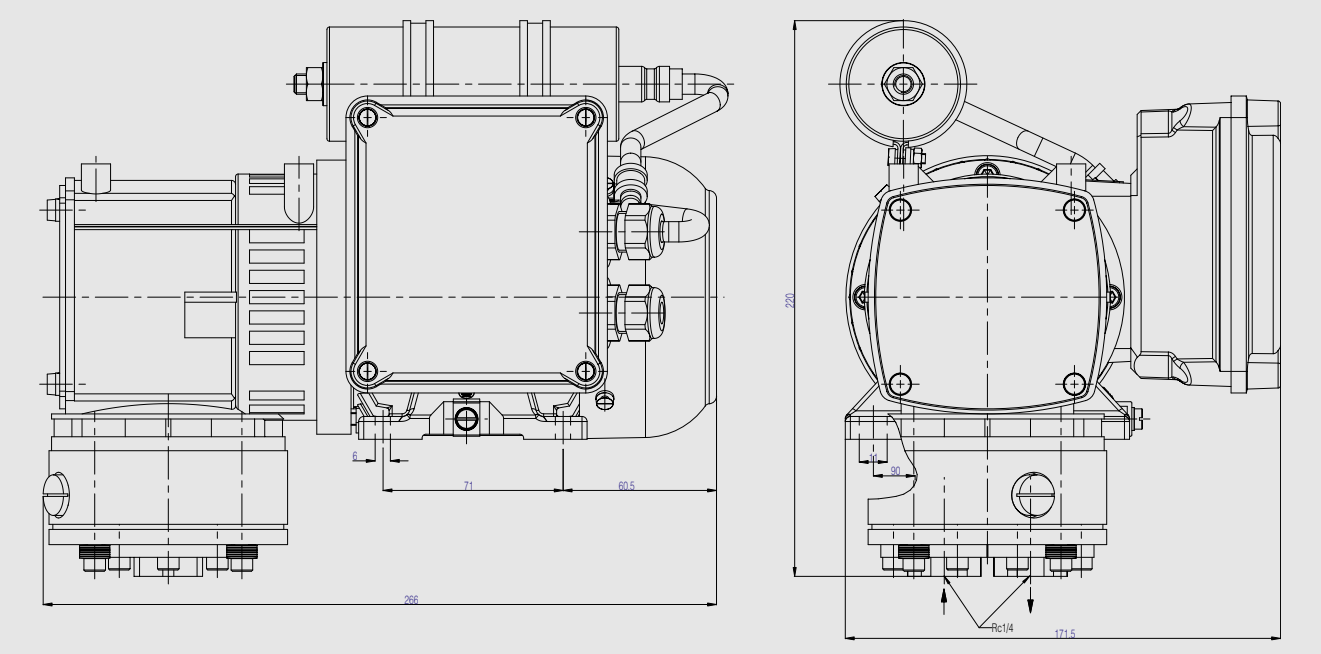


Fig. 2/11 Corrosion-resistant sample gas pump, explosion-proof version

### Application

Handling corrosive gases with temperatures up to 60 °C.

***Special features***

- High capacity
- Suitable for continuous operation
- Parts in contact with medium are made of PTFE and FFPM
- Inlet and outlet at bottom

### Technical data

| | |
|---|---|
| Pump capacity at atmospheric pressure | 960 l/h |
| Final vacuum | 125 mbara |
| Max. pressure | 1 bar |
| Temperature of medium | 5...60 °C |
| Permissible ambient temperature | 5...40 °C |
| Gas connection | R¼" |
| Parts in contact with the medium | |
| • Head components | PTFE |
| • Diaphragm | PTFE-coated |
| • Valves | FFPM |

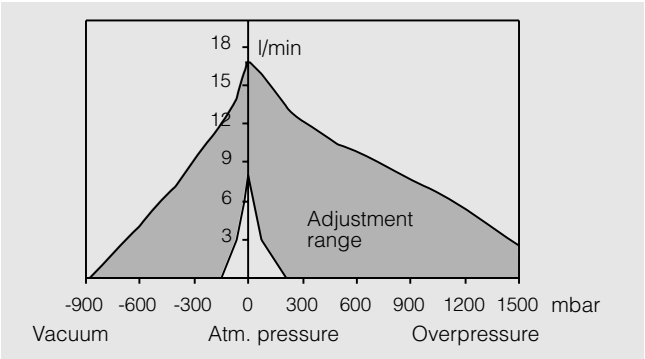


Fig. 2/12 Corrosion-resistant sample gas pump, capacity

### Ordering data

| | Order No. |
|---|---|
| **Corrosion-resistant sample gas pump** | |
| Degree of protection IP44, with pump holder | |
| • Power supply 230 V AC, 50 Hz | **7MB1 943-3CB01** |
| • Power supply 220 V AC, 60 Hz | **7MB1 943-3CB02** |
| • Power supply 115 V AC, 60 Hz | **7MB1 943-3CB03** |
| **Corrosion-resistant sample gas pump, explosion-proof version** | |
| Degree of protection IP44, with pump holder EEx e II T3 according to ATEX | |
| • Power supply 230 V AC, 50 Hz | **7MB1 943-3CB11** |
| • Power supply 220 V AC, 60 Hz | **7MB1 943-3CB12** |
| • Power supply 115 V AC, 60 Hz | **7MB1 943-3CB13** |
| **Spare parts** | |
| **Diaphragm** | **7MB1 943-3CB17** |
| **Valve reed** | **7MB1 943-3CB18** |