

Ultrasonic Massflow Measuring System



ExactSonic P DN100 (above); ExactSonic P DN250 (below left); ExactSonic P DN50 (below right)

Functional principle

- non-invasive ultrasonic flow rate measurement based on transit time method

Application examples

- Test bench measurements for motors, filter, turbo charger, clima, valves, ...

Advantages

- marginal pressure loss
- short input and output sections

- low starting value
- high repeatability
- insensitive to contamination
- easy to maintain
- large number of nominal pipe sizes
- direction-sensing measuring
- correction „backflow“
- high turndown ratio (1:250)
- fast response time
- no separate evaluation unit necessary
- easy to install
- conform to e-CFR

Types

| Type | Artikel-No. |
|------------------------|-------------|
| ExactSonic P DN50 ZG1 | B015/871 |
| ExactSonic P DN80 ZG1 | B015/872 |
| ExactSonic P DN100 ZG1 | B015/873 |
| ExactSonic P DN150 ZG1 | B015/874 |
| ExactSonic P DN200 ZG1 | B015/875 |
| ExactSonic P DN250 ZG1 | B015/876 |

other sizes on request

Design / Functional principle

Measuring tube / transit time ultrasonic flowmeter with integrated flow-straightener combined with precision absolute pressure transmitter 0.6 ... 1.2 bar abs; 0.1 % FSO and 4-wire Pt100 temperature sensor, class AA DIN EN 60751, optional with additional measurement of the relative humidity (rh); design according drawing 1 (ZG1) with integrated transducer SMART-UA

Measured variables

| Measured variables | Unit of display |
|-------------------------|--------------------|
| Gas mass flow m/t | kg/h |
| Standard flow rate NV/t | Nm ³ /h |
| Actual flow rate V/t | m ³ /h |
| Working pressure p | hPa |
| Working temperature T | °C |

Measuring ranges (turn-down ratio 1 : 250)

| Nominal diameter | Inside diameter [mm] | Actual flowrate [m ³ /h] | Massflow* [kg/h] | Massflow** [kg/h] |
|------------------|----------------------|-------------------------------------|------------------|-------------------|
| DN 50 | 58.3 | 1.0 ... 240 | 1.2 ... 290 | 3.0 ... 713 |
| DN 80 | 80.0 | 1.8 ... 450 | 2.2 ... 540 | 5.5 ... 1340 |
| DN 100 | 110.3 | 3.5 ... 860 | 4.0 ... 1030 | 10 ... 2550 |
| DN 150 | 150.0 | 6.4 ... 1590 | 7.5 ... 1900 | 19 ... 4730 |
| DN 200 | 200.0 | 11 ... 2830 | 14 ... 3400 | 33 ... 8400 |
| DN 250 | 250.0 | 18 ... 4420 | 21 ... 5300 | 53 ... 13130 |

* Mass flow for example for = t_B +20 °C and p_B = 1013 hPa equates to a standard density of 1.204 kg/m³

** Mass flow for example for = t_B +20 °C and p_B = 2500 hPa equates to a standard density of 2.971 kg/m³

| | |
|--|---|
| Initial value | ± 0,1 m/s |
| Max. terminal value | ± 25 m/s |
| Measurement accuracy | < 1 % of actual value |
| Repeatability | < ± 0,5 % of actual value |
| Input/output section (see Accessories) | to achieve as great a measurement accuracy as possible, an input section of 20 x Di is recommended. The output section should be no shorter than 5 x Di. These can be reduced and operation without flow straightener is also possible. However, this leads in both cases to increased measurement uncertainties, which are dependent on the path of the pipeline, disturbances and the actual working flow velocity. With defined air intake requirements, such as suction filters, the input sections can be shortened to 10 x Di. (Please state when placing order). |

DAkKS Kalibrierung

| Calibration Range | Description | Art.-No. |
|------------------------------|-------------------|---------------|
| up to 1600 m ³ /h | incl. certificate | CQ-1600 DAKKS |
| up to 5500 m ³ /h | incl. certificate | CQ-5500 DAKKS |

Medium

Air, gases and gas mixtures

Materials in contact with the medium

stainless steel 1.4571, 1.4404, 1.4301, ceramics, FKM, aluminium

Working pressure

up to 1.2 bar / 1200 hPa absolute pressure,
alternatively up to 2.5 bar/ 2500 hPa absolute pressure, higher working pressure possible (on request)

Working temperature ranges

| | |
|---------------------|----------------|
| Medium | -20 ... +60 °C |
| Permissible ambient | -20 ... +60 °C |

Transducer SMART-UA in the AS102 housing

| | |
|------------------------------|--|
| Sampling rate | resolution : 1 kHz |
| Input t : Pt100 | resolution : 0.1 K |
| Input rh* : 0-10 V | accuracy : ±2.5 % rh of actual value (in the range 10 ... 90 % rh) |
| Input p : 4-20 mA | resolution : 1 hPa time constant : 0.125 s |
| Analog output | default : 0 ... 10 V, impedance 1 kOhm on request (changeable inside by a connector) : 4 ... 20 mA, load max. 500 Ohm 16-bit resolution (1/65000) time constant : max. 1 kHz (1 ms), adjustable Output is not galvanically isolated Connection via 5-pin screw flange socket |
| TCP/IP | AK Protocol according VDA rule of 'Standardization exhaust gas measurement technology'; via RJ45 connection socket |
| USB | USB Interface for logging, safety access, factory reset, ... |
| Supply | 24 V DC |
| Consumption | < 15 W |
| LCD display in housing cover | touch intelligence - illuminated and installed in the housing lid, display of various modes and parameter levels, multi-level security areas |

* optional

Electromagnetic compatibility (EMC)

According EN 61 000-6-2 and EN 61 000-6-4

Transducer and connection housing

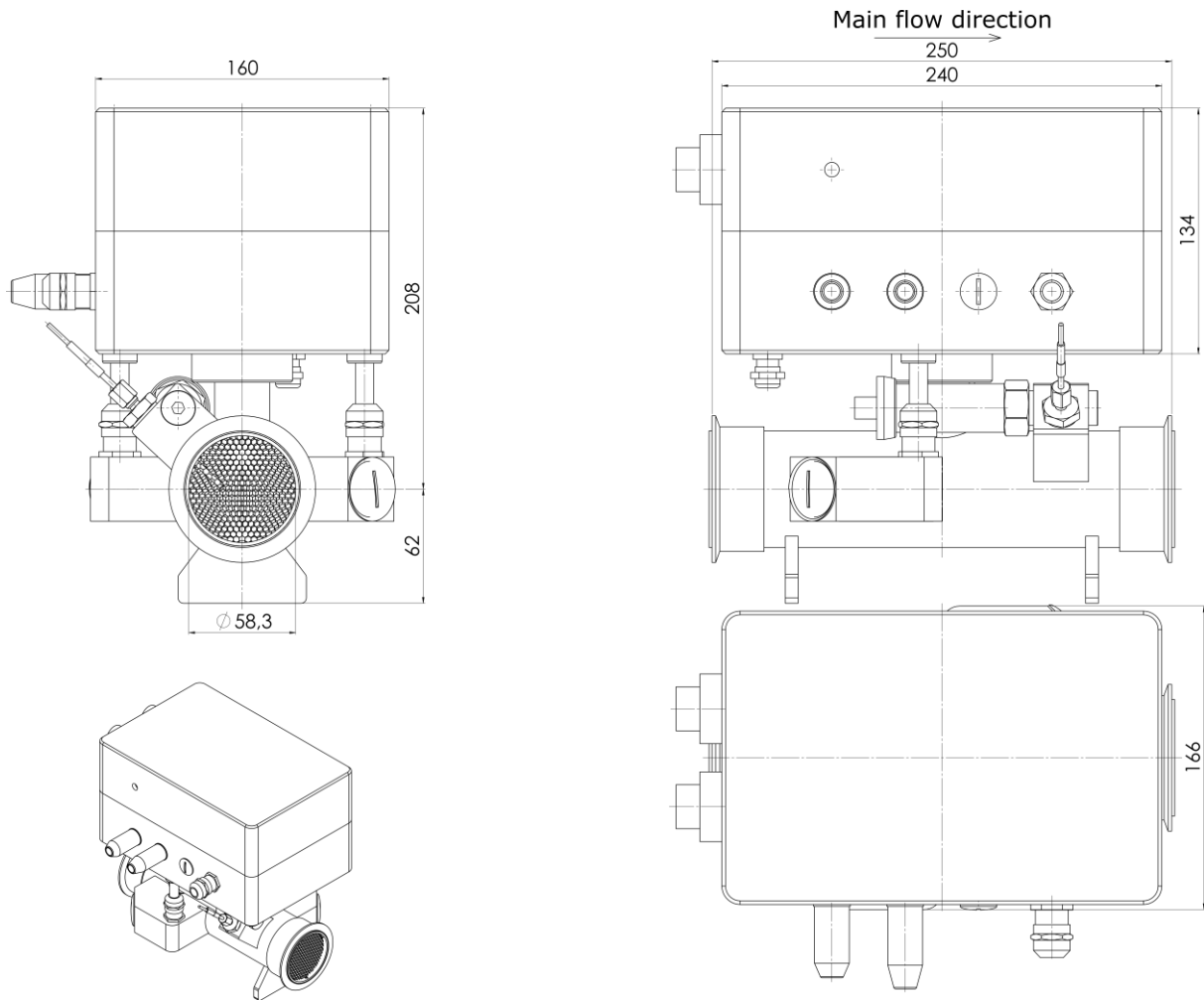
| | |
|------------|---|
| Dimensions | 240 / 160 / 134 mm (B / H / T) |
| Connection | Different plug connectors for power supply, analog output, TCP/IP, USB, ... |

Installation position /orientation

| | |
|-----|--|
| Any | In general, the best result is achieved by calibrating and adjusting the measuring devices as close to the real application. |
|-----|--|

Nominal pipe size 50

| Type | Artikel-No. |
|-----------------------|-------------|
| ExactSonic P DN50 ZG1 | B015/871 |

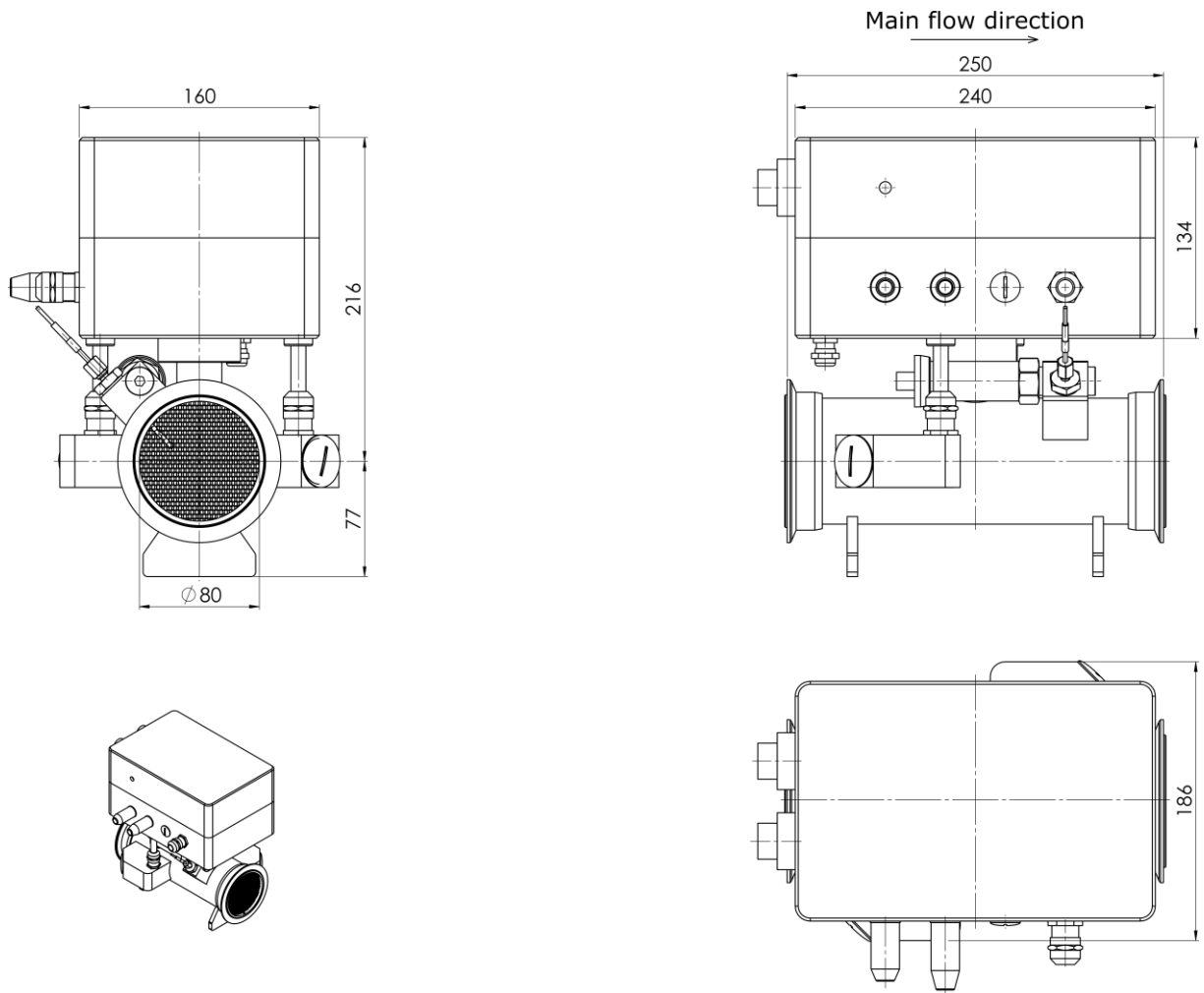


(1) Nominal pipe size / Inside pipe diameter / Dimensions / Weight

| Nominal pipe size [mm] | Inside pipe diameter \varnothing I [mm] | Sensor length C [mm] | Width B [mm] | Height H [mm] | Weight [kg] |
|------------------------|---|----------------------|--------------|---------------|-------------|
| 50 | 58.3 | 250 | 220 | 270 | 7.1 |

Nominal pipe size 80

| Type | Artikel-No. |
|-----------------------|-------------|
| ExactSonic P DN80 ZG1 | B015/872 |

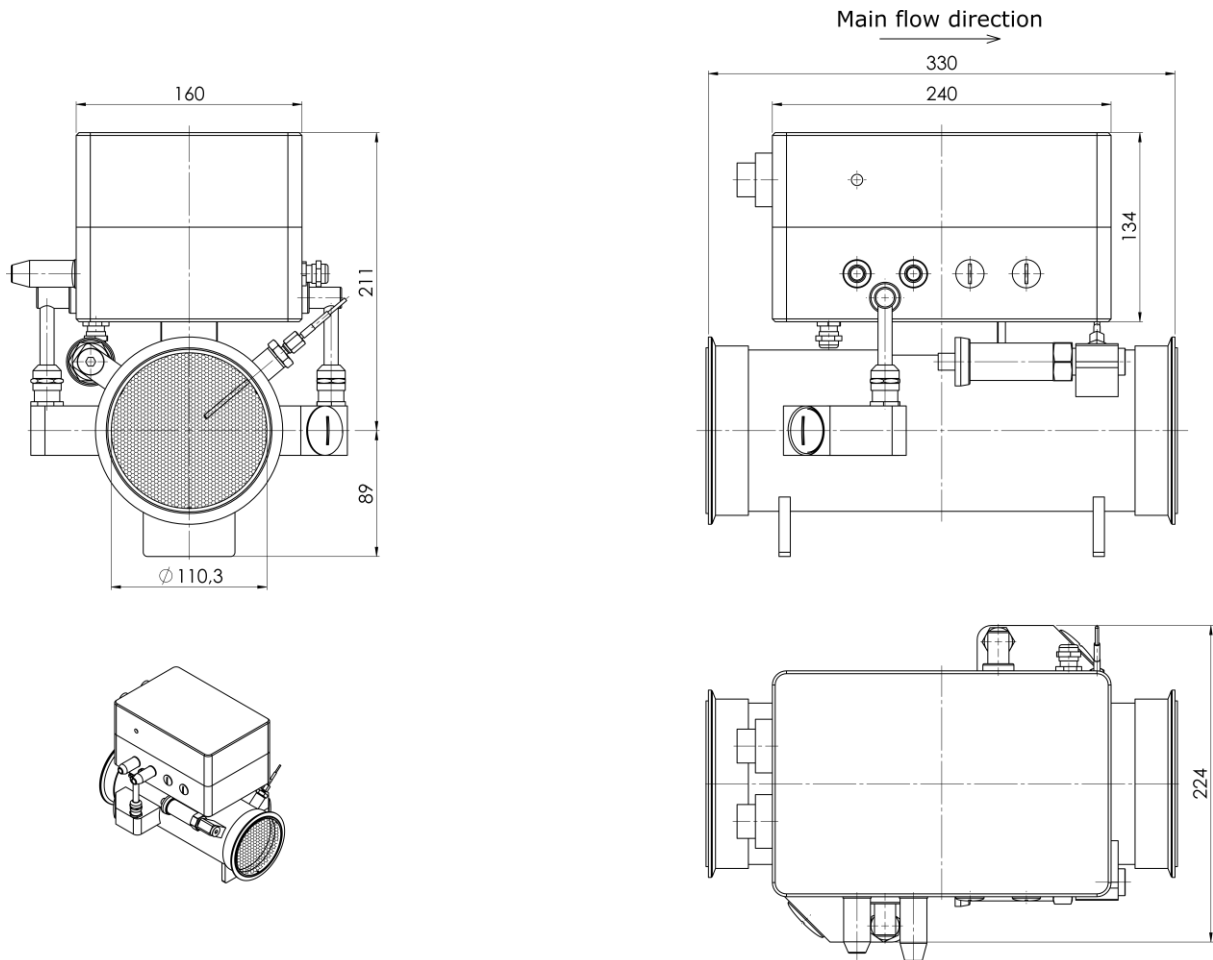


(1) Nominal pipe size / Inside pipe diameter / Dimensions / Weight

| Nominal pipe size [mm] | Inside pipe diameter Ø I [mm] | Sensor length C [mm] | Width B [mm] | Height H [mm] | Weight [kg] |
|------------------------|-------------------------------|----------------------|--------------|---------------|-------------|
| 80 | 80.0 | 250 | 220 | 293 | 7.5 |

Nominal pipe size 100

| Type | Artikel-No. |
|------------------------|-------------|
| ExactSonic P DN100 ZG1 | B015/873 |

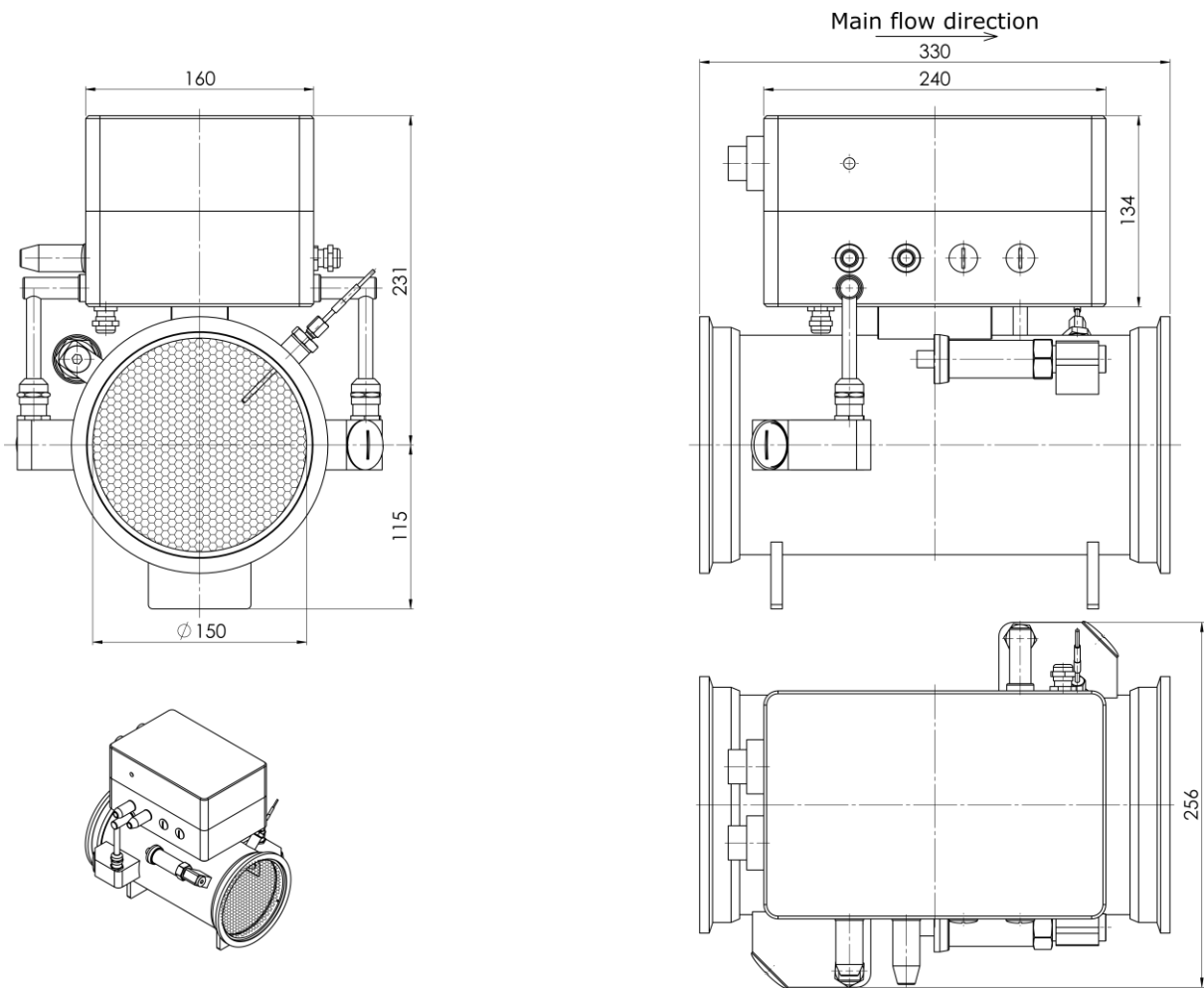


(1) Nominal pipe size / Inside pipe diameter / Dimensions / Weight

| Nominal pipe size [mm] | Inside pipe diameter \varnothing I [mm] | Sensor length C [mm] | Width B [mm] | Height H [mm] | Weight [kg] |
|------------------------|---|----------------------|--------------|---------------|-------------|
| 100 | 110.3 | 330 | 250 | 300 | 9.2 |

Nominal pipe size 150

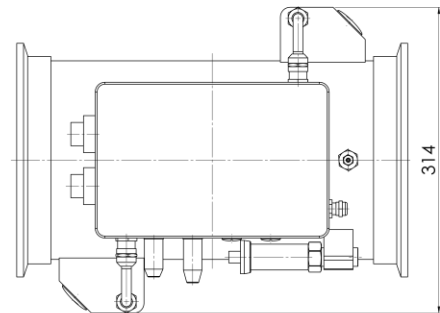
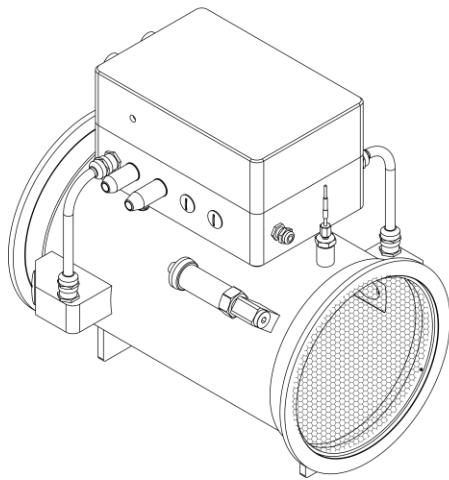
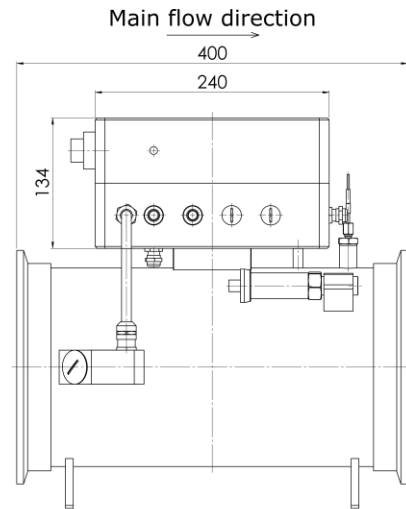
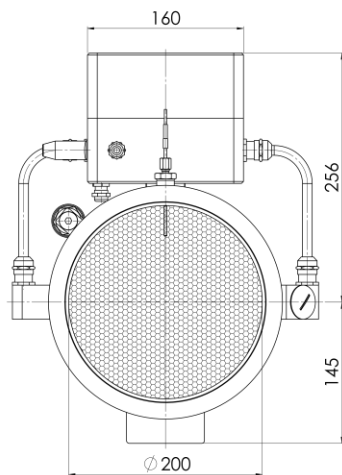
| Type | Artikel-No. |
|------------------------|-------------|
| ExactSonic P DN150 ZG1 | B015/874 |



| (1) Nominal pipe size / Inside pipe diameter / Dimensions / Weight | | | | | |
|---|-------------------------------|----------------------|--------------|---------------|-------------|
| Nominal pipe size [mm] | Inside pipe diameter Ø I [mm] | Sensor length C [mm] | Width B [mm] | Height H [mm] | Weight [kg] |
| 150 | 150.0 | 330 | 256 | 346 | 11.2 |

Nominal pipe size 200

| Type | Artikel-No. |
|------------------------|-------------|
| ExactSonic P DN200 ZG1 | B015/875 |

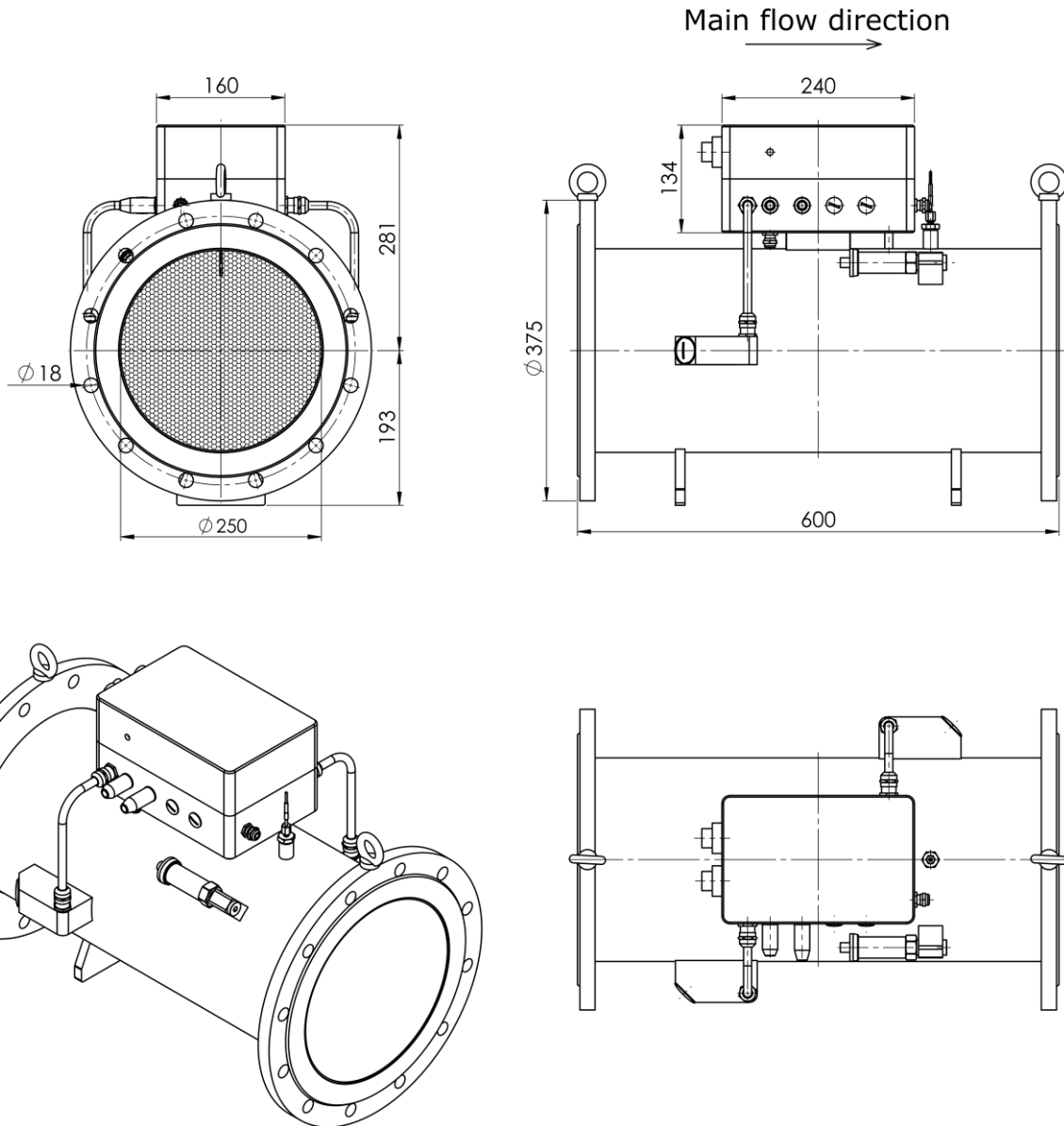


(1) Nominal pipe size / Inside pipe diameter / Dimensions / Weight

| Nominal pipe size [mm] | Inside pipe diameter Ø I [mm] | Sensor length C [mm] | Width B [mm] | Height H [mm] | Weight [kg] |
|------------------------|-------------------------------|----------------------|--------------|---------------|-------------|
| 200 | 200.0 | 400 | 314 | 401 | 15.6 |

Nominal pipe size 250

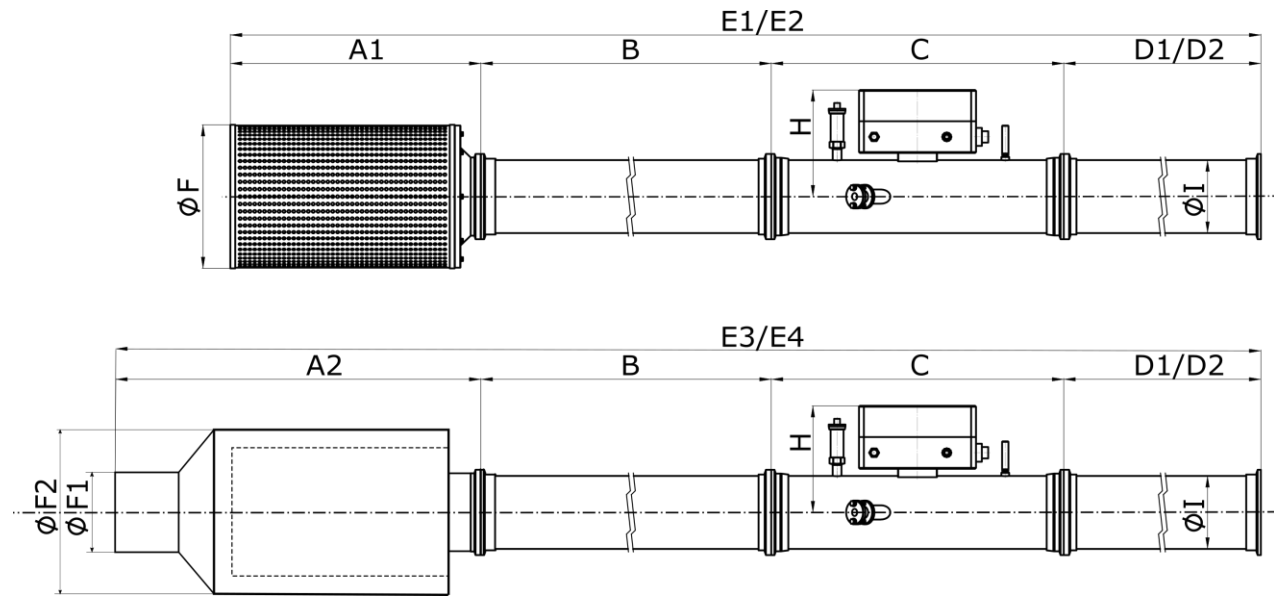
| Type | Artikel-No. |
|------------------------|-------------|
| ExactSonic P DN250 ZG1 | B015/876 |



(1) Nominal pipe size / Inside pipe diameter / Dimensions / Weight

| Nominal pipe size [mm] | Inside pipe diameter Ø I [mm] | Sensor length C [mm] | Width B [mm] | Height H [mm] | Weight [kg] |
|------------------------|-------------------------------|----------------------|--------------|---------------|-------------|
| 250* | 250.0 | 600 | 400 | 474 | 32.9 |

* Design DN 250: with flat pipe ends and not with cone flange



| Nominal pipe size | Inside pipe diameter Ø I [mm] | Air filter open A1 [mm] | Flow rectifier A2 [mm] | Input section B [mm] | Sensor length C [mm] | Output section D1* [mm] |
|-------------------|-------------------------------|-------------------------|------------------------|----------------------|----------------------|-------------------------|
| DN 50 | 58.3 | 356 | 773 | 506 | 250 | 256 |
| DN 80 | 80.0 | 401 | 773 | 806 | 250 | 406 |
| DN 100 | 110.3 | 526 | 843 | 1006 | 330 | 506 |
| DN 150 | 150.0 | 513 | 903 | 1518 | 330 | 768 |
| DN 200 | 200.0 | 513 | 783 | 2018 | 400 | 1018 |
| DN 250 | 250.0 | 513 | on request | 2018 | 600 | 1018 |

| Nominal pipe size | Output section D2** [mm] | Overall length E1*/E2** [mm] | Overall length E3*/E4** [mm] | Air filter open -Ø Ø F [mm] | Flow rectifier Ø F1 [mm] | Flow rectifier Ø F2 [mm] |
|-------------------|--------------------------|------------------------------|------------------------------|-----------------------------|--------------------------|--------------------------|
| DN 50 | 254 | 1368/1366 | 1785/1783 | 150 | 80 | 203 |
| DN 80 | 404 | 1863/1861 | 2235/2233 | 198 | 103 | 253 |
| DN 100 | 504 | 2368/2366 | 2685/2683 | 243 | 153 | 303 |
| DN 150 | 759 | 3129/3120 | 3519/3510 | 303 | 203 | 353 |
| DN 200 | 1009 | 3949/3940 | 4219/4210 | 303 | 253 | 353 |
| DN 250 | 1009 | 4149/4140 | on request | 303 | on request | on request |

* with flange at the end of the output section (D1, E1 and E3)

** with flat pipe ends on the output section (D2, E2 and E4)

Air filter / flow rectifier with cone flange (KF) connection for tension ring / chain assembly *

| | | Air filter open | Flow rectifier | |
|------------|--------|-----------------|----------------|-------------|
| | | Article-No. | Article-No. | Weight [kg] |
| Air filter | DN 50 | B015/611-S05 | B015/611-S06 | 9.5 |
| Air filter | DN 80 | B015/612-S05 | B015/612-S06 | 12.8 |
| Air filter | DN 100 | B015/613-S05 | B015/613-S06 | 18.0 |
| Air filter | DN 150 | B015/614-S05 | B015/614-S07 | 22.6 |
| Air filter | DN 200 | B015/615-S05 | B015/615-S07 | 21.4 |
| Air filter | DN 250 | on request | on request | on request |

* If installed horizontally, the flow conditioner must be supported due to its weight!

Pipe sections for input/output sections for tension ring/chain assembly

Stainless steel 1.4301 or 1.4571

| | Installation length [mm] | Article No. |
|-------------------------------|-----------------------------|--------------|
| Input section ZF/KF DN 50 | 506 | B015/611-S01 |
| Output section KF/ZF DN 50 | 256 | B015/611-S02 |
| Output section KF/flat DN 50 | 254 | B015/611-S04 |
| Input section ZF/KF DN 80 | 806 | B015/612-S01 |
| Output section KF/ZF DN 80 | 406 | B015/612-S02 |
| Output section KF/flat DN 80 | 404 | B015/612-S04 |
| Input section ZF/KF DN 100 | 1006 | B015/613-S01 |
| Output section KF/ZF DN 100 | 506 | B015/613-S02 |
| Output section KF/flat DN 100 | 504 | B015/613-S04 |
| Input section ZF/KF DN 150 | 1518 | B015/614-S01 |
| Output section KF/ZF DN 150 | 768 | B015/614-S02 |
| Output section KF/flat DN 150 | 759 | B015/614-S04 |
| Input section ZF/KF DN 200 | 2018 | B015/615-S01 |
| Output section KF/ZF DN 200 | 1018 | B015/615-S02 |
| Output section KF/flat DN 200 | 1009 | B015/615-S04 |
| Input section DN 250 | tbd | tbd |
| Output section DN 250 | tbd | tbd |

Pipe connection

with tension ring or chain

Flange on both sides for quick connectors.

DIN or ANSI integral flange connection, on request.

Tension rings/chains for cone and intermediate flange (ZF) connection

each with silicone flat seal ring

| | Article No. |
|--------------|--------------|
| Ring DN 50 | B015/611-S03 |
| Ring DN 80 | B015/612-S03 |
| Ring DN 100 | B015/613-S03 |
| Chain DN 150 | B015/614-S03 |
| Chain DN 200 | B015/615-S03 |

Cone flanges (KF) for welding on for customer adaptations

each with FKM O-ring seal

| | Article No. |
|--------------------|--------------|
| Cone flange DN 50 | B015/611-S10 |
| Cone flange DN 80 | B015/612-S10 |
| Cone flange DN 100 | B015/613-S10 |
| Cone flange DN 150 | B015/614-S10 |
| Cone flange DN 200 | B015/615-S10 |

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Subject to change