



VME with control component BTM



Type VME with control component XTD



Type VME with control component ELAB TCU3



Tested to VDI 6022

Volume flow rate measurement

VME



For the measurement of volume flow rates in ducts

Rectangular volume flow rate measuring unit for recording or monitoring of volume flow rates

- Manual volume flow rate measuring
- Continuous volume flow rate measuring
- Recording of measured values for other controllers or for the LABCONTROL air management system
- Optional effective pressure transducer for the automatic recording of measured values, factory mounted and complete with wiring and tubing
- Casing air leakage to EN 15727, up to class D

Optional equipment and accessories

- Surface powder-coated, silver grey (RAL 7001)
- Dynamic or static effective pressure transducers

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General information

Application

- Rectangular volume flow rate measuring unit for the manual recording or automatic measuring of volume flow rates
- Simplified commissioning, approval and maintenance
- Optional dynamic effective pressure transducer for systems with clean air
- Optional static effective pressure transducer for systems with contaminated air

Special features

- Suitable for permanent installation because of low differential pressure
- High accuracy of volume flow rate measurements

Nominal sizes

- 39 nominal sizes from 200 × 100 to 1000 × 1000

Construction

- Galvanised sheet steel
- P1: Powder-coated, silver grey (RAL 7001)

Parts and characteristics

- Ready-to-commission unit which consists of mechanical parts and an optional differential pressure transducer.
- Averaging effective pressure sensor for volume flow rate measurement

Only for variant with optional differential pressure transducer as add-on part:

- Optional differential pressure transducer, factory mounted and wired
- Aerodynamic functional testing on a special test rig before shipping of each unit
- Set-up data is given on a label or volume flow rate scale affixed to the unit

Attachments

- Dynamic effective pressure transducer (BTD, XTD)
- Static effective pressure transducer (BTS, XTS)
- LABCONTROL: Components for air management systems

Construction features

- Rectangular casing
- Flanges on both ends, suitable for duct connection
- Connection points for effective pressure measuring tubes with 6 mm inside diameter

Materials and surfaces

Galvanised sheet steel variant

- Casing made of galvanised sheet steel
- Effective pressure sensor made of aluminium

Powder-coated construction (P1)

- Casing made of galvanised sheet steel, powder-coated
- Differential pressure sensor made of aluminium profiles with powder coating

Standards and guidelines

Meets the hygiene requirements of

- EN 16798, Part 3
- VDI 6022, Sheet 1
- DIN 1946, Part 4
- For other applicable standards and guidelines refer to the hygiene certificate

Casing air leakage

- EN 15727, class D except B+H ≤ 700, class C

Maintenance

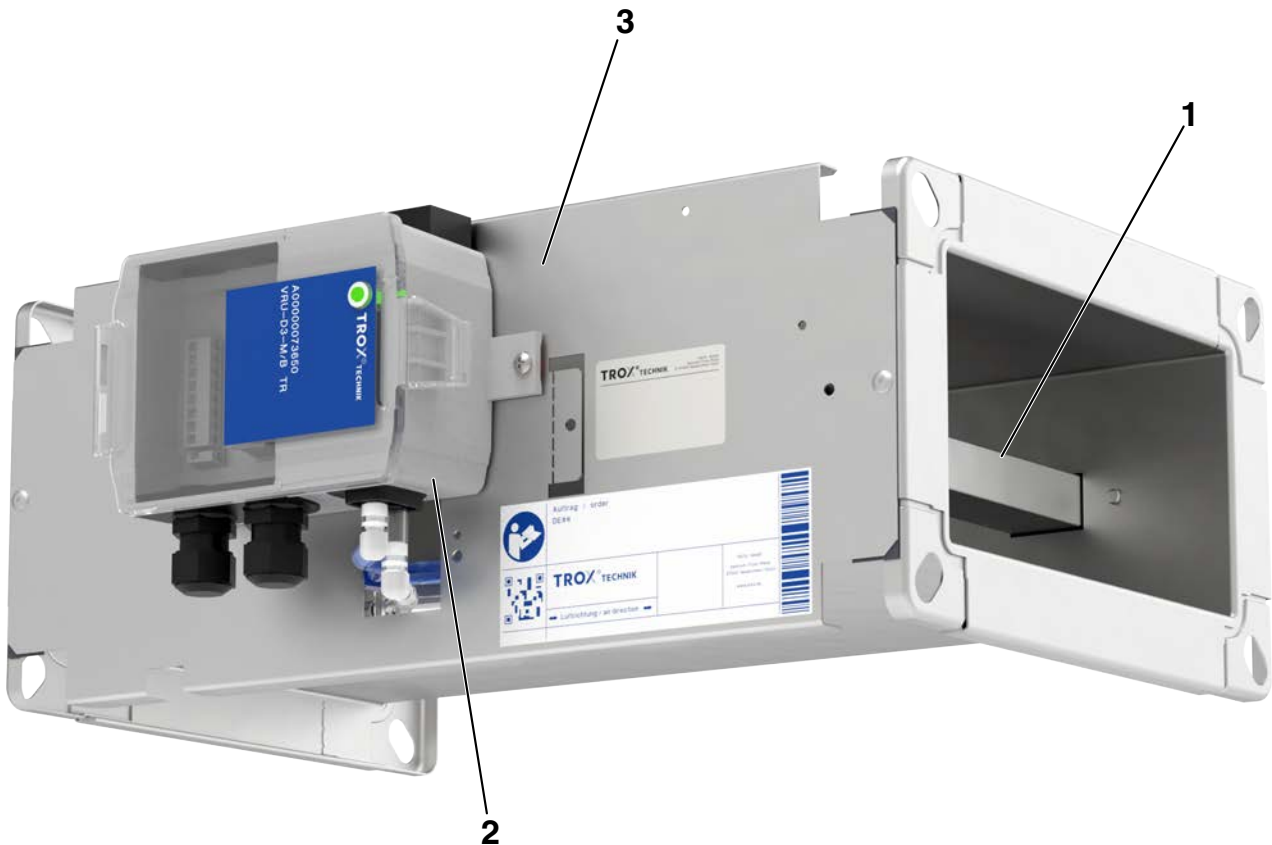
- Maintenance-free as construction and materials are not subject to wear

Function

The volume flow rate measuring unit is fitted with an effective pressure sensor for measuring the volume flow rate. The effective pressure recorded with this sensor is either measured

and evaluated manually, or transformed into an electrical signal by a measuring transducer (effective pressure transducer).

VME with attachment BTD



- 1: Effective pressure sensor
- 2: Transmitter (optional add-on part)
- 3: Casing

Technical data

Nominal sizes	200 × 100 – 1000 × 1000 mm
Volume flow rate range	42 – 14246 l/s or 149 – 51289 m³/h
Effective pressure range	approx. 2 – 260 Pa *
Operating temperature	10 to 50 °C
Measurement accuracy	±4 – 13% of the measured value
Maximum differential pressure	1000 Pa

Quick sizing

The quick sizing tables provide a good overview of the volume flow rate measuring ranges, pressure losses, the measurement accuracy, and the C values for each nominal size. Construction without attachments: For information on how volume flow rates are calculated based on the measured differential pressures, see 'Product details'.

Volume flow rate ranges

Attachment: none, XTD, BTD

W	H	qv [l/s]	qv [m³/h]	K value [l/s]	K value [m³/h]	Δqv [±%]
200	100	42	149	15.2	54.6	13
200	100	244	880	15.2	54.6	4
300	100	62	223	22.8	81.9	13
300	100	366	1320	22.8	81.9	4
400	100	83	298	30.3	109.2	13
400	100	489	1761	30.3	109.2	4
500	100	104	372	37.9	136.5	13
500	100	611	2201	37.9	136.5	4
600	100	124	446	45.5	163.8	13
600	100	733	2641	45.5	163.8	4
200	200	83	298	30.3	109.2	13
200	200	489	1761	30.3	109.2	4
300	200	124	446	45.5	163.8	13
300	200	733	2641	45.5	163.8	4
400	200	166	595	60.7	218.4	13
400	200	978	3521	60.7	218.4	4
500	200	207	743	75.8	273	13
500	200	1222	4402	75.8	273	4
600	200	248	892	91	327.6	13
600	200	1467	5282	91	327.6	4
700	200	289	1040	106.2	382.2	13
700	200	1711	6162	106.2	382.2	4
800	200	331	1189	121.3	436.8	13
800	200	1956	7043	121.3	436.8	4
300	300	203	730	74.5	268.2	13
300	300	1201	4325	74.5	268.2	4
400	300	271	973	99.4	357.7	12
400	300	1601	5767	99.4	357.7	4
500	300	339	1217	124.2	447.1	12
500	300	2002	7209	124.2	447.1	4
600	300	406	1460	149	536.5	12
600	300	2402	8650	149	536.5	4
700	300	474	1703	173.9	625.9	12



W	H	qv [l/s]	qv [m³/h]	K value [l/s]	K value [m³/h]	Δqv [±%]
700	300	2803	10092	173.9	625.9	4
800	300	541	1946	198.7	715.3	12
800	300	3203	11534	198.7	715.3	4
900	300	609	2190	223.5	804.7	12
900	300	3604	12976	223.5	804.7	4
1000	300	676	2433	248.4	894.2	12
1000	300	4005	14418	248.4	894.2	4
400	400	376	1352	138	496.9	12
400	400	2225	8012	138	496.9	4
500	400	470	1690	172.5	621.1	12
500	400	2781	10015	172.5	621.1	4
600	400	564	2028	207.1	745.4	12
600	400	3338	12018	207.1	745.4	4
700	400	658	2366	241.6	869.6	12
700	400	3894	14021	241.6	869.6	4
800	400	752	2704	276.1	993.8	12
800	400	4451	16024	276.1	993.8	4
900	400	845	3042	310.6	1118.1	12
900	400	5007	18028	310.6	1118.1	4
1000	400	939	3380	345.1	1242.3	12
1000	400	5564	20031	345.1	1242.29	4
500	500	545	1959	200	720.1	13
500	500	3225	11611	200	720.1	4
600	500	654	2351	240	864.1	13
600	500	3870	13933	240	864.1	4
700	500	762	2743	280	1008.1	13
700	500	4515	16255	280	1008.1	4
800	500	871	3135	320	1152.1	13
800	500	5160	18577	320	1152.1	4
900	500	980	3526	360.1	1296.2	13
900	500	5805	20900	360.1	1296.2	4
1000	500	1089	3918	400.1	1440.2	13
1000	500	6450	23222	400.1	1440.2	4
600	600	811	2919	298.1	1073	12
600	600	4805	17301	298.1	1073	4
800	600	1082	3892	397.4	1430.6	12
800	600	6407	23068	397.4	1430.6	4
900	600	1217	4379	447.1	1609.5	12
900	600	7208	25952	447.1	1609.5	4
1000	600	1352	4865	496.8	1788.3	12
1000	600	8010	28836	496.8	1788.3	4
800	800	1502	5407	552.1	1987.6	12
800	800	8902	32049	552.1	1987.6	4
1000	800	1878	6759	690.2	2484.6	12
1000	800	11128	40062	690.2	2484.6	4
1000	1000	2404	8653	883.6	3180.8	12
1000	1000	14246	51289	883.6	3180.8	4

Note:

- K values for air density 1.2 kg/m³ at 20°C



Volume flow rate ranges

Attachment: XTS, BTS, ELAB

W	H	qv [l/s]	qv [m³/h]	K value [l/s]	K value [m³/h]	Δqv [±%]
200	100	42	149	15.2	54.6	13
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W	H	qv [l/s]	qv [m³/h]	K value [l/s]	K value [m³/h]	Δqv [±%]
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1000	800	11128	40062	690.2	2484.6	4
1000	1000	2404	8653	883.6	3180.8	12
1000	1000	14246	51289	883.56	3180.8	4

Note:

- K values for air density 1.2 kg/m³ at 20°C

Specification text

This specification text describes just one variant of the product that is suitable for many applications. Texts for other variants can be generated with our Easy Product Finder design program.

Specification text

Rectangular volume flow rate measuring unit for the measurement of volume flow rates in air conditioning systems, available in 39 nominal sizes. For the manual volume flow rate measuring or for the continuous monitoring of the actual value signal. Ready-to-commission unit which consists of the casing with an averaging differential pressure sensor. Differential pressure sensor with 3 mm measuring holes (resistant to dust and pollution). Meets the hygiene requirements of EN 16798, Part 3, VDI 6022, Sheet 1, and DIN 1946, Part 4.

Special features

- Suitable for permanent installation because of low differential pressure
- High accuracy of volume flow rate measurements

Materials and surfaces

Galvanised sheet steel construction

- Casing made of galvanised sheet steel

- Effective pressure sensor made of aluminium
- Powder-coated construction (P1)
- Casing made of galvanised sheet steel
- Surface powder-coated, silver grey (RAL 7001)
- Effective pressure sensor made of aluminium

Connection type

- Flanges on both ends, suitable for duct connection

Technical data

- Nominal sizes: 200 × 100 to 1000 × 1000 mm
- Volume flow rate range: 42 – 14246 l/s or 149 – 51289 m³/h
- Effective pressure range: approx. 2 – 260 Pa
- Operating temperature: 10 to 50 °C
- EN 15727, class D except B+H ≤ 700, class C

Order code

VME – P1 / 600 × 400 / XTD / 0
 | | | | |
 1 2 3 4 5

1 Type

VME Volume flow rate measuring unit, rectangular

2 Material

No entry: galvanised sheet steel

P1 Powder-coated RAL 7001 (silver grey)

3 Nominal size [mm]

Specify size (width × height)

4 Attachment

No entry: without attachment

XTD dynamic effective pressure transducer, analogue, display
BTD dynamic effective pressure transducer, analogue, MP bus, Modbus RTU, BACnet MS/TP
XTS static effective pressure transducer, analogue, display
BTS static effective pressure transducer, analogue, MP bus, Modbus RTU, BACnet MS/TP

5 Signal voltage range

For the actual value signal (required only if an attachment has been selected)

0 0 – 10 V DC
2 2 – 10 V DC

Order example: VME-P1/600x400/XTD/0

Type	VME
Material	Powder-coated RAL 7001 (silver grey)
Nominal size [mm]	Width 600, height 400
Attachment	Dynamic differential pressure transducer, analogue, display
Signal voltage range	0 – 10 V DC

Order example: VME/600x600/BTD/2

Type	VME
Material	Galvanised sheet steel
Nominal size [mm]	Width 600, height 600
Attachment	Dynamic differential pressure transducer, analogue, MP bus, Modbus RTU, BACnet MS/TP
Signal voltage range	2 – 10 V DC

Order example 3: VME/600x200

Material	Galvanised sheet steel
Nominal size	600 × 200
Attachments (effective pressure transducer)	None, manual measurement only

VME – P1 / 600 × 400 / ELAB / EC – E0 / UMZ
| | | | | | |
1 2 3 4 5 6 7

1 Type

VME Volume flow rate measuring unit, rectangular

2 Material

No entry: galvanised sheet steel

P1 Powder-coated RAL 7001 (silver grey)

3 Nominal size [mm]

Specify size (width × height)

4 Attachment (control component)

ELAB EASYLAB TCU3

5 Equipment function

SC Supply air capture

EC Extract air capture

6 Signal voltage range

For the actual value signal

E0 0 – 10 V DC

E2 2 – 10 V DC

Order example: VME-P1/600×400/ELAB/EC-E0/UMZ

Type	VME
Material	Powder-coated RAL 7001 (silver grey)
Nominal size [mm]	Width 600, height 400
Attachment (control component)	EASYLAB TCU3
Equipment function	Extract air capture
Signal voltage range	0 – 10 V DC
Expansion modules	Power supply: with EM-TRF UPS (incl. battery) for 230 V AC uninterruptible mains supply (UPS) Communication interface: with EM-BAC-MOD for Modbus RTU Automatic zero point adjustment: with EM-AUTOZERO, solenoid valve for automatic zero point adjustment

7 Expansion modules

Option 1: Power supply

No entry: 24 V AC/DC

T with EM-TRF for 230 V AC mains supply

U with EM-TRF-USV (including battery pack) for uninterruptible 230 V AC power supply (UPS)

Option 2: Communication interface

No entry: without communication interface

B with EM-BAC-MOD for BACnet MS/TP

M with EM-BAC-MOD for Modbus RTU

I with EM-IP for BACnet IP, Modbus IP and web server

R with EM-IP (including real time clock, RTC) for BACnet IP, Modbus IP and web server

Option 3: Automatic zero point correction

No entry: without automatic zero point adjustment

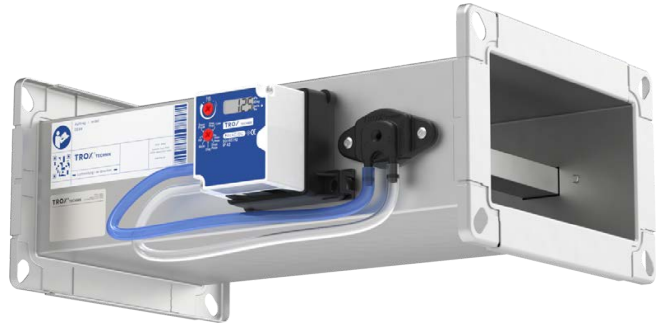
Z with EM-AUTOZERO solenoid valve for automatic zero point correction

Variants

Volume flow rate measuring unit VME without attachment



Volume flow rate measuring unit VME with attachment XTS/XTD



Volume flow rate measuring unit VME with attachment BTS/BTD



Volume flow rate measuring unit VME with attachment ELAB





Material

Standard construction

Order code detail	Part	Material
-	Casing	Galvanised sheet steel
	Effective pressure sensor	Aluminium

With acoustic cladding (optional)

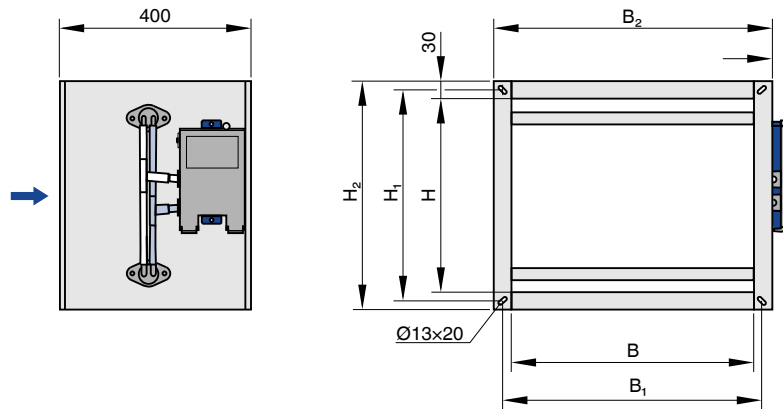
Order code detail	Part	Material
D	Acoustic cladding casing	Galvanised sheet steel
	Insulation of structure-borne noise	Polyethylene, PE
	Lining	Mineral wool to EN 13501, fire rating class A1, non-combustible

Powder-coated construction

Order code detail	Part	Material
P1	Casing	Galvanised sheet steel - powder coated, RAL 7001, silver grey
	Effective pressure sensor	Aluminium - powder coated, RAL 7001, silver grey

Dimensions and weight

VME



Note:

The drawing of the attachment (differential pressure transducer) is only to give you a rough idea. For more realistic examples see the Variants section. For exact dimensions see the section 'Space required for commissioning and maintenance'.

Dimensions/weights of VME

NG (W × H)	W_1	W_2	H_1	H_2	kg
200 × 100	230	260	130	160	3
200 × 200	230	260	230	260	4
300 × 100	330	360	130	160	4
300 × 200	330	360	230	260	5
300 × 300	330	360	330	360	5
400 × 100	430	460	130	160	4
400 × 200	430	460	230	260	5
400 × 300	430	460	330	360	6
400 × 400	430	460	430	460	7
500 × 100	530	560	130	160	5
500 × 200	530	560	230	260	6
500 × 300	530	560	330	360	7
500 × 400	530	560	430	460	8
500 × 500	530	560	530	560	9
600 × 100	630	660	130	160	6
600 × 200	630	660	230	260	7
600 × 300	630	660	330	360	8
600 × 400	630	660	430	460	9
600 × 500	630	660	530	560	10
600 × 600	630	660	630	660	11
700 × 200	730	760	230	260	8
700 × 300	730	760	330	360	9
700 × 400	730	760	430	460	9
700 × 500	730	760	530	560	11
800 × 200	830	860	230	260	9
800 × 300	830	860	330	360	10
800 × 400	830	860	430	460	10
800 × 500	830	860	530	560	12
800 × 600	830	860	630	660	13
800 × 800	830	860	830	860	14
900 × 300	930	960	330	360	10

NG (W × H)	W ₁	W ₂	H ₁	H ₂	kg
900 × 400	930	960	430	460	11
900 × 500	930	960	530	560	13
1000 × 300	1030	1060	330	360	11
1000 × 400	1030	1060	430	460	12
1000 × 500	1030	1060	530	560	14
1000 × 600	1030	1060	630	660	15
1000 × 800	1030	1060	830	860	16
1000 × 1000	1030	1060	1030	1060	18

Note:

Weight indication applies to VME without attachments.

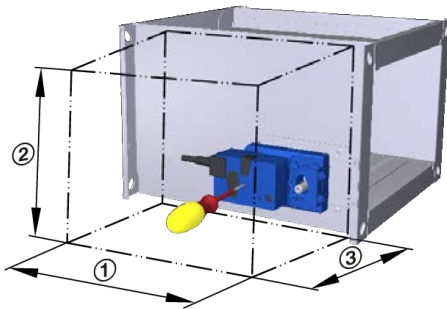
Note that an optional differential pressure transducer (attachments BTD, XTD, BTS, XTS and ELAB) may add to the weight.

Note variant.

Space required for commissioning and maintenance

Sufficient space must be kept clear near any attachments to allow for commissioning and maintenance. It may be necessary to provide sufficiently sized inspection access openings.

Product illustrations do not show any installation situation details. If an attachment requires a certain installation orientation, this is specified on a sticker on the product.

Access to attachments


Schematic illustration of required installation space

Unit with fitted attachments


XTD/XTS, BTD/BTS, ELAB

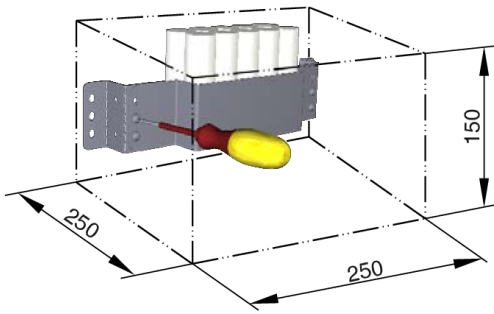
Space required

Attachments (Effectiv pressure transducer)	(1)	(2)	(3)
BTD and BTS	250	H	250
XTD and XTS	520	H	250
ELAB TCU3	550	H *	250

H: Unit height

H*: Unit height or at least 350

Accessibility to the battery pack



Schematic illustration of required installation space

Note: Additional space for fixing and accessing the battery pack (optional accessory for TROX UNIVERSAL or LABCONTROL EASYLAB control component).

Product details

Calculation conditions

- The volume flow rate is calculated based on the measured effective pressure
- The effective pressure is measured using an electronic manometer or an inclined tube manometer
- Air density $\rho = 1.2 \text{ kg/m}^3$

Given data

- VME/400 \times 200
- $\Delta p_w = 100 \text{ Pa}$ (manometer reading of effective pressure)
- Volume flow rate q_v in m^3/h

Unit data

- K value from table: $K = 218 \text{ m}^3/\text{h}$ (60.5 l/s)

Volume flow rate calculation for air density 1.2 kg/m^3

$$q_v = C \times \sqrt{\Delta p_w}$$

Volume flow rate calculation for other air densities

$$q_v = \sqrt{\frac{1,2}{\rho}} \times C \times \sqrt{\Delta p_w}$$

Calculation procedure

$$q_v = 218 \text{ m}^3/\text{h} \times \sqrt{100}$$

$$q_v = 2180 \text{ m}^3/\text{h}$$

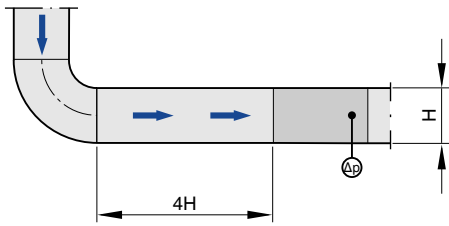
Installation and commissioning

- The installation orientation of ELAB must be as shown on the sticker
- The installation orientation of XTD/XTS or BTD/BTS is not critical

Upstream conditions

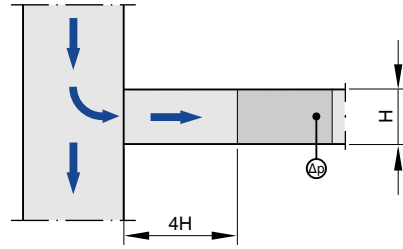
The volume flow rate accuracy Δq_v applies to a straight upstream section of the duct. Bends, junctions or a narrowing or widening of the duct cause turbulence that may affect measurement. Duct connections, e.g. branches off the main duct, must comply with EN 1505. Some installation situations require straight duct sections upstream.

Bend, vertical



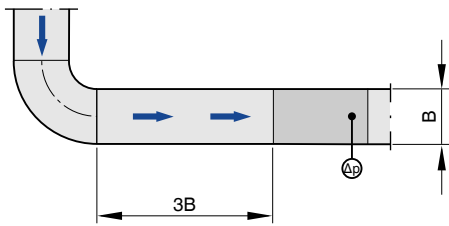
A bend – with a straight duct section of at least 4H upstream of the measuring unit – has only a negligible effect on the volume flow rate accuracy.

Junction, vertical



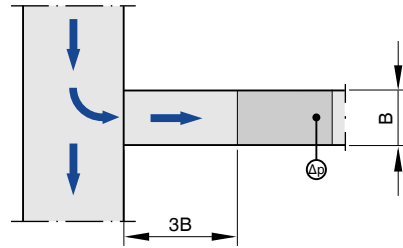
A junction causes strong turbulence. The stated volume flow rate accuracy Δq_v can only be achieved with a straight duct section of at least 4H upstream.

Bend, horizontal



A bend – with a straight duct section of at least 3B upstream of the measuring unit – has only a negligible effect on the volume flow rate accuracy.

Junction, horizontal



A junction causes strong turbulence. The stated volume flow rate accuracy Δq_v can only be achieved with a straight duct section of at least 3B upstream.



Optional attachments for effective pressure transducers

Attachment	Interface	Effective pressure transducer	Manufacturer
Differential pressure transducer, dynamic			
XTD	0 – 10 V or 2 – 10 V	integrated	①
BTD	0 - 10 V or 2 - 10 V or MP-Bus or Modbus RTU or BACnet MS/TP	integrated	②
Differential pressure transducer, static			
XTS	0 – 10 V or 2 – 10 V	integrated	①
BTS	0 - 10 V or 2 - 10 V or MP-Bus or Modbus RTU or BACnet MS/TP	integrated	②
ELAB	TROX plug and play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: Modbus, BACnet, web server	integrated	③

① TROX/Gruner, ② TROX/Belimo, ③ TROX

Nomenclature

Dimensions of rectangular units

B [mm]

Duct width

B₁ [mm]; [in]

Screw hole pitch of flange (horizontal)

B₂ [mm]; [in]

Overall dimension of flange (width)

H [mm]

Duct height

H₁ [mm]

Screw hole pitch of flange (vertical)

H₂ [mm]

Overall dimension of flange (height)

Dimensions of circular units

ØD [mm]; [in]

Basic units made of sheet steel: Outer diameter of the spigot;
basic units made of plastic: Inside diameter of the spigot

ØD₁ [mm]; [in]

Pitch circle diameter of flanges

ØD₂ [mm]; [in]

Outer diameter of flanges

L [mm]; [in]

Length of unit including connecting spigot

L₁ [mm]; [in]

Length of casing or acoustic cladding

n []

Number of flange screw holes

T [mm]; [in]

Flange thickness

General information

m [kg]

Unit weight without any attachments

NS [mm]; [in]

Nominal size

q_{vNom} [m³/h]; [l/s]

Nominal volume flow rate (100 %): The value depends on product type and nominal size. Values are published on the internet and in technical leaflets and stored in the Easy Product Finder design program.

Note on acoustic data: All sound pressure levels are based on a reference value of 20 µPa.

q_v [m³/h]; [l/s]; [CFM]

Volume flow rate

Δ_{qv} [%]

Volume flow rate accuracy

Δ_{pw}

Quantity measured with the sensor (in this case the differential pressure). Basis for the calculation of the actual volume flow rate or for the conversion into an electrical signal (linear to the volume flow rate) by an effective pressure transducer.

Lengths [mm]; [in]

All lengths are given in millimetres [mm] unless stated otherwise.

Volume flow rate measuring unit

Consists of a basic unit and an optional effective pressure transducer.

Basic unit

Unit for recording volume flow rates without an attached measuring transducer. The main components include the casing with sensor(s) to measure the effective pressure and the connection points for effective pressure tubes. In contrast to a volume flow controller, there is no damper blade. Distinguishing features of the basic unit: unit shape (geometry), materials and types of connection. The basic unit can either be prepared for manual measurement with a mobile differential pressure measuring unit or be fitted with an electric attachment for converting the effective pressure into an electrical (effective pressure transducer).

Effective pressure transducer

Electronic device mounted on the basic unit for measuring volume flow rates. The electronic device essentially consists of an effective pressure transducer. Important distinguishing features: Transducer for dynamic pressure measurements that is suitable for clean air or transducer for static pressure measurements that is suitable for contaminated air and interface(s) (analogue interface and digital bus interface).