TROX® TECHNIK
The art of handling air

VOLUME FLOW RATE MEASURING UNIT, VARIANT VME, WITH DIFFERENTIAL PRESSURE TRANSDUCER

DYNAMISCHER DIFFERENZDRUCKTRANSMIT

TYPE VME

FOR THE MEASUREMENT OF VOLUME FLOW RATES IN DUCTS

Rectangular volume flow rate measuring units for the recording or monitoring of volume flow rates

- Manual volume flow rate measuring
- Permanent volume flow rate measuring
- Recording of measured values for other controllers or for the LABCONTROL air management system
- Suitable for airflow velocities of up to 10 m/s
- Pressure transducer for the automatic recording of measured values, factory assembled and complete with wiring and tubing
- Casing air leakage to EN 15727, up to class C

STATISCHER DIFFERENZDRUCKTRANSMIT

Application

Application

- Rectangular volume flow rate measuring units Type VME for the manual recording or automatic measuring of volume flow rates
- Simplified commissioning, approval and maintenance
- Suitable for permanent installation because of low differential pressure

Special features

- Measurement accuracy ± 5 % even with unfavourable upstream conditions
- Effective pressure range: approx. 8 – 200 Pa
- Low differential pressure of only about 17 – 32 % of the measured effective pressure

Nominal sizes

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

Description

Construction

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

Parts and characteristics

- Ready-to-commission unit which consists of the mechanical parts and an optional pressure transducer
- Averaging differential pressure sensor for volume flow rate measurement
- Optional factory-assembled pressure transducers complete with wiring and tubing
- High measurement accuracy

Attachments

- Dynamic differential pressure transducer
- Static differential pressure transducer
- LABCONTROL: Components for air management systems

Construction features

- Rectangular casing
- Flanges on both sides, suitable for duct connection
- Connecting nipple for tubes with 6 mm inside diameter

Materials and surfaces

Galvanised sheet steel construction

- Casing made of galvanised sheet steel
- Aluminium sensor tubes

Powder-coated construction (P1)

- Casing made of galvanised sheet steel, powder-coated

Standards and guidelines

- Casing air leakage to EN 15727, class C (B + H) ≤ 400, class B)

Maintenance

- Maintenance-free as construction and materials are not subject to wear
- Zero point correction of the static differential pressure transducer should be carried out once per year (recommendation)

TECHNICAL INFORMATION

Function, Technical data, Specification text, Order code, Produktbeziehungen

Functional description

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

The effective pressure is either measured and evaluated manually, or transformed into an electric signal by a pressure transducer.

Nominal sizes	200 x 100 – 1000 x 1000
Volume flow rate range	45 – 10100 l/s or 162 – 36360 m^3/h
Measurement accuracy	± 5 % of the measured value
Effective pressure range	Approx. 5 – 250 Pa
Measuring unit differential pressure (pressure loss)	17 – 32 % of the measured effective pressure
Operating temperature	10 – 50 °C

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 permanent 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)

Both ends suitable for the connection of air duct profiles.

Casing air leakage to EN 15727, class B.

Special features

- Measurement accuracy ± 5 % even with unfavourable upstream conditions
- Effective pressure range: approx. 8 – 200 Pa
- Low differential pressure of only about 17 – 32 % of the measured effective pressure

Materials and surfaces

Galvanised sheet steel construction

- Casing made of galvanised sheet steel
- Aluminium sensor tubes

Powder-coated construction (P1)

- Casing made of galvanised sheet steel, powder-coated

Construction

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

Technical data

- Nominal sizes: 200 × 100 to 1000 × 1000
- Volume flow rate range: 45 to 10100 l/s or 162 to 36360 m³/h
- Effective pressure range: approx. 5 – 250 Pa
- Measuring unit differential pressure (pressure loss): 17 – 32 % of the measured effective pressure
- Operating temperature: 10 to 50 °C

Attachments

Volume flow rate measurement with static differential pressure transducer emitting an actual value signal for integration into the central BMS.

- Supply voltage 24 V AC/DC
- Signal voltages 0 – 10 V DC or 2 – 10 V DC
- EASYLAB: Integration using either 0 – 10 V DC signals or expansion modules (LonWorks, BACnet MS/TP, Modbus RTU)

Sizing data

- V _____ [m³/h]

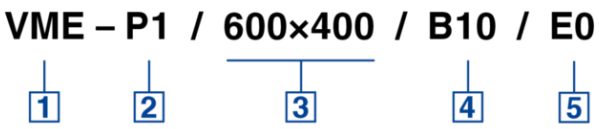
This specification text describes the general properties of the product. Texts for variants can be generated with our Easy Product Finder design programme.

Order example: VME/600×400/B10/E0

Nominal size	600 × 400 mm
Differential pressure transducer	Dynamic
Actual value signal	0 – 10 V

Order example: VME/600×400/B10/E0

Nominal size	600 × 400 mm
Differential pressure transducer	Dynamic
Actual value signal	0 – 10 V



1 Type

VME Rectangular volume flow rate measuring unit

2 Material

No entry: galvanised sheet steel
P1 Powder-coated (RAL 7001), silver grey

3 Nominal size [mm]

B × H

4 Attachments (differential pressure transducer)

No entry: none
B10 Dynamic differential pressure transducer
BB0 Static differential pressure transducer

5 Signal voltage range

For the actual value signal
Only for attachment B10
E0 0 – 10 V
E2 2 – 10 V

1 Type

VME Rectangular volume flow rate measuring unit

2 Material

No entry: galvanised sheet steel
P1 Powder-coated (RAL 7001), silver grey

3 Nominal size [mm]

B × H

4 Attachments

ELAB EASYLAB controller TCU3

5 Equipment function

SC Supply air recording
EC Extract air recording

6 Voltage range for the actual value signal

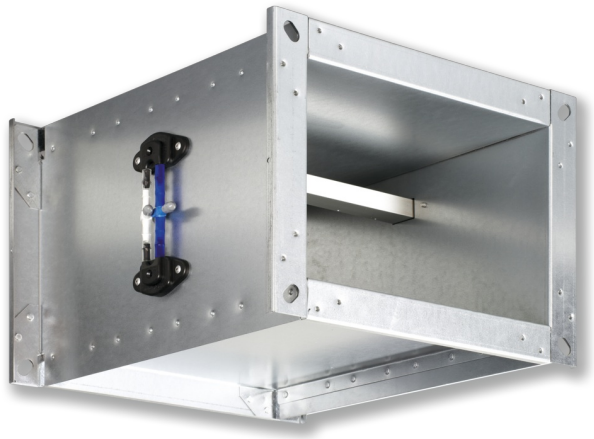
E0 Voltage signal 0 – 10 V DC
E2 Voltage signal 2 – 10 V DC

7 Module expansions

Option 1: Power supply
No entry: 24 V AC
T EM-TRF for 230 V AC
U EM-TRF-USV for 230 V AC, provides uninterruptible power supply (UPS)
Option 2: Communication interface
No entry: none
L EM-LON for LonWorks FTT-10A
B EM-BAC-MOD-01 for BACnet MS/TP
M EM-BAC-MOD-01 for Modbus RTU
I EM-IP for BACnet/IP, Modbus/IP and webserver
R EM-IP with real time clock
Option 3: Automatic zero point correction
No entry: none
Z EM-AUTOZERO Solenoid valve for automatic zero point correction

Variants, Attachments, Dimensions and weight, Product details

Volume flow rate measuring unit, variant VME



VME, VARYCONTROL differential pressure transducers

Order code detail	Differential pressure transducer	Measurement principle
Universal		
B10	Universal controller with integral differential pressure transducer TROX/Belimo	Dynamic
BB0	Universal controller with separate differential pressure transducer TROX/Belimo	Static

VME, LABCONTROL differential pressure transducers

Order code detail	Differential pressure transducer	Measurement principle
EASYLAB		
ELAB	EASYLAB TCU3 (recording of measured values for EASYLAB system)	Static

Anbauteile: VARYCONTROL Regelkomponenten

☒	Regel- größe	Schnittstelle	V_{min} -/ V_{max} - Verstellung	Differenzdruck- transmitter	Stellantrieb	Fabrikat
		Easylabregler		Statisch		
Elab	RS, RE, PC, C	TCU3		Integriert	Schnelllaufender Stellantrieb	
	RS, PC, C	TCU3		Integriert	Schnelllaufender Stellantrieb	
Elab	RE, PC, C	TCU3		Integriert	Schnelllaufender Stellantrieb	
	RS, RE, PC, FH, C	TCU3		Integriert	Schnelllaufender Stellantrieb	
		Elektronischer Regler		Statisch	Elektronischer Regler	
TMA	RS, RE, PC	TCU-LON-II mit LonWorks-Schnittstelle		Integriert	Schnelllaufender Stellantrieb	
TMB	RS, RE, PC	TCU-LON-II mit LonWorks-Schnittstelle		Integriert	Schnelllaufender Stellantrieb (bürstenloser Motor)	
TMA	RS, RE,	TCU-LON-II mit LonWorks-Schnittstelle		Integriert	Schnelllaufender Stellantrieb	
TMB	RS, RE,	TCU-LON-II mit LonWorks-Schnittstelle		Integriert	Schnelllaufender Stellantrieb (bürstenloser Motor)	
TMA	RE ,PC	TCU-LON-II mit LonWorks-Schnittstelle		Integriert	Schnelllaufender Stellantrieb	
TMB	RE ,PC	TCU-LON-II mit LonWorks-Schnittstelle		Integriert	Schnelllaufender Stellantrieb (bürstenloser Motor)	
TMA	RS, RE ,PC, FH	TCU-LON-II mit LonWorks-Schnittstelle		Integriert	Schnelllaufender Stellantrieb	
TMB	RS, RE ,PC, FH	TCU-LON-II mit LonWorks-Schnittstelle		Integriert	Schnelllaufender Stellantrieb (bürstenloser Motor)	
XF3	Δp			Integriert, 600 Pa	Federrücklaufantrieb	③
BB3	V			Separates Bauteil	Stellantrieb	②

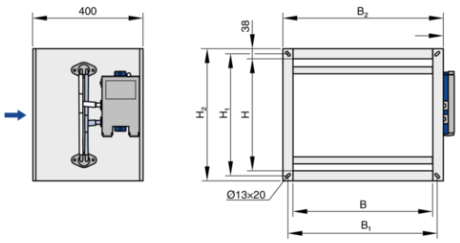
① TROX, ② TROX/Belimo, ③ TROX/Gruner, ④ Sauter, ⑤ Siemens

☒ Bestellschlüsseldetail, V Volumenstrom, Δp Differenzdruck

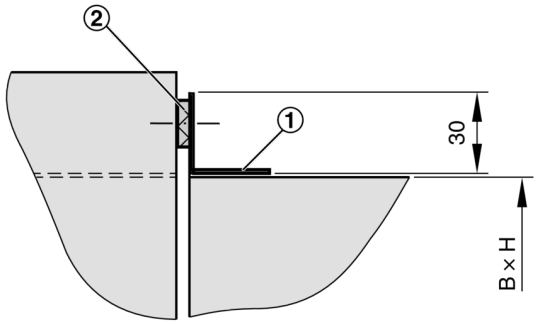
VME

Nominal size	Nominal width mm B_N	Nominal height mm H_N	B_1 mm	B_2 mm	H_1 mm	H_2 mm	m kg
200 × 100	200	100	234	276	134	176	5.0
300 × 100	300	100	334	376	134	176	6.0
400 × 100	400	100	434	476	134	176	7.0
500 × 100	500	100	534	576	134	176	8.0
600 × 100	600	100	634	676	134	176	10.0
200 × 200	200	200	234	276	234	276	6.0
300 × 200	300	200	334	376	234	276	7.0
400 × 200	400	200	434	476	234	276	8.5
500 × 200	500	200	534	576	234	276	10.0
600 × 200	600	200	634	676	234	276	11.0
700 × 200	700	200	734	776	234	276	12.5
800 × 200	800	200	834	876	234	276	13.5
300 × 300	300	300	334	376	334	376	8.0
400 × 300	400	300	434	476	334	376	9.5
500 × 300	500	300	534	576	334	376	11.0
600 × 300	600	300	634	676	334	376	12.0
700 × 300	700	300	734	776	334	376	13.5
800 × 300	800	300	834	876	334	376	14.5
900 × 300	900	300	934	976	334	376	16.0
1000 × 300	1000	300	1034	1076	334	376	17.0
400 × 400	400	400	434	476	434	476	10.5
500 × 400	500	400	534	576	434	476	11.5
600 × 400	600	400	634	676	434	476	13.0
700 × 400	700	400	734	776	434	476	14.5
800 × 400	800	400	834	876	434	476	15.5
900 × 400	900	400	934	976	434	476	17.0
1000 × 400	1000	400	1034	1076	434	476	18.0
500 × 500	500	500	534	576	534	576	14.0
600 × 500	600	500	634	676	534	576	16.0
700 × 500	700	500	734	776	534	576	17.5
800 × 500	800	500	834	876	534	576	19.5
900 × 500	900	500	934	976	534	576	23.0
1000 × 500	1000	500	1034	1076	534	576	20.5
600 × 600	600	600	634	676	634	676	17.0
800 × 600	800	600	834	876	634	676	20.0
1000 × 600	1000	600	1034	1076	634	676	23.0
800 × 800	800	800	834	876	834	876	22.0
1000 × 800	1000	800	1034	1076	834	876	25.0
1000 × 1000	1000	1000	1034	1076	1034	1076	27.0

VME



Detail of flange



① Flange
② Compressible seal, to be provided by others

Installation details, Commissioning, Basic information and nomenclature

Installation and commissioning

- Any installation orientation (except units with static differential pressure transducer)
- Note the upstream and downstream conditions
- Static differential pressure transducer: Check zero point and correct, if necessary

Upstream conditions

The volume flow rate accuracy ΔV 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.

Space required for commissioning and maintenance

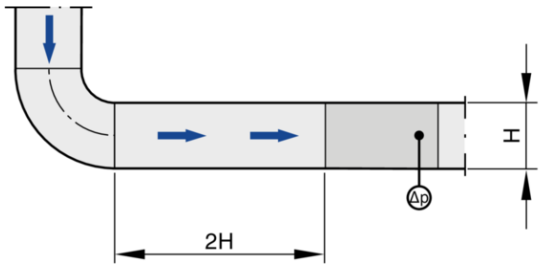
Sufficient space must be kept clear near any attachments to allow for commissioning and maintenance. It may be necessary to provide sufficiently sized inspection access openings.

Space required

Attachments	①	②	③
	mm		
Without attachments	200	H	200
VARYCONTROL			
Universal controller	300	H	300
LABCONTROL			
EASYLAB	500	H	400

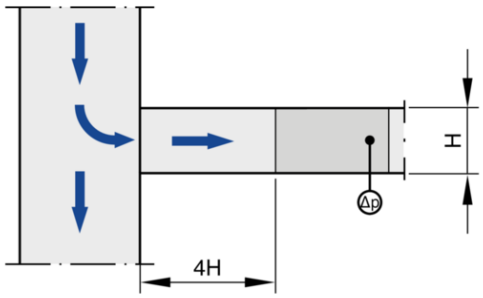
H: Unit height

Bend, vertical



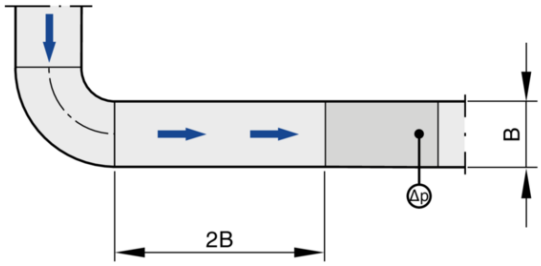
A bend – with a straight duct section of at least 2H upstream of the volume flow rate measuring unit – has only a negligible effect on the volume flow rate accuracy.

Junction, vertical



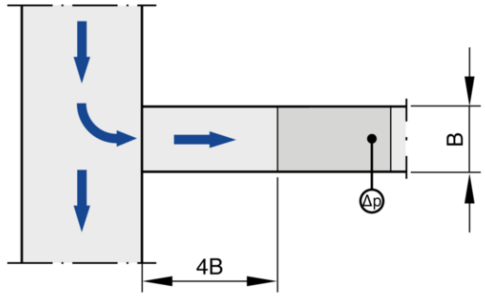
A junction causes strong turbulence. The stated volume flow rate accuracy ΔV can only be achieved with a straight duct section of at least 4H upstream. Shorter upstream sections require a perforated plate in the branch and before the measuring unit. If there is no straight upstream section at all, the actual value signal may not be stable, even with a perforated plate.

Bend, horizontal



A bend – with a straight duct section of at least 2B upstream of the volume flow rate measuring unit – has only a negligible effect on the volume flow rate accuracy.

Junction, horizontal



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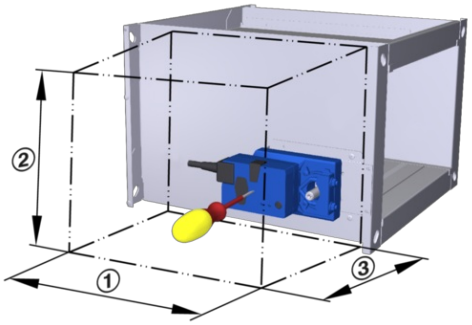
Access to attachments



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 ρ = 1.2 kg/m³

Given data

- VME/400 × 200
- Δp_w = 100 Pa (manometer reading of effective pressure)
- Volume flow rate V [m³/h]

Unit data

- K value from table: K = 216 m³/h (60 l/s)

Volume flow rate calculation for air density 1.2 kg/m³

$$\dot{V} = C \times \sqrt{\Delta p_w}$$

Volume flow rate calculation for other air densities

$$\dot{V} = C \times \sqrt{\Delta p_w} \times \sqrt{\frac{1.2}{\rho}}$$

Calculation procedure

$$\dot{V} = 60.0 \times \sqrt{100}$$

$$\dot{V} = 600 \text{ l/s}$$

Principal dimensions

ØD [mm]

VAV terminal units made of stainless steel: Outer diameter of the spigot

VAV terminal units made of plastic: Inside diameter of the connecting spigot

ØD₁ [mm]

Pitch circle diameter of flanges

ØD₂ [mm]

Outer diameter of flanges

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ØD$_4$ [mm]

Inside diameter of the screw holes of flanges

L [mm]

Length of unit including connecting spigot

L$_1$ [mm]

Length of casing or acoustic cladding

B [mm]

Duct width

B$_1$ [mm]

Screw hole pitch of flange (horizontal)

B$_2$ [mm]

Outside dimension of flange (width)

B$_3$ [mm]

Width of device

H [mm]

Duct height

H$_1$ [mm]

Screw hole pitch of flange (vertical)

H$_2$ [mm]

Outside dimension of flange (height)

H$_3$ [mm]

Unit height

n [ ]

Number of flange screw holes

T [mm]

Flange thickness

m [kg]

Weight including attachments for the automatic differential pressure measurement

Nomenclature

V_{nom} [m³/h] and [l/s]

Nominal volume flow rate (100 %)

V_{min} [m³/h] and [l/s]

Volume flow rate

ΔV [± %]

Volume flow rate accuracy

K value [m³/h] and [l/s]

Unit-related constant for air density 1.2 kg/m³

Δp_w [Pa]

Effective pressure

Δp_{st} [%]

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Static differential pressure in relation to the measured effective pressure

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