



VMR-125-XTD

Type VMR with control component XTD



VMR with control component BTD



Type VMR with control component ELAB TCU3



TESTED TO VDI 6022

Tested to VDI 6022

VMR

FOR THE MEASUREMENT OF VOLUME FLOW RATES IN DUCTS

Circular volume flow rate measuring device for recording or monitoring the volume flow rate

- Manual volume flow rate measuring
- Permanent volume flow rate measuring
- Recording of measured values for other controllers or for the LABCONTROL air management system
- Effective pressure transducer for the automatic recording of measured values, factory assembled
- With wiring and tubing
- Casing leakage according to EN 15727, Class C

Optional equipment and accessories

- With flanges on both ends
- Lip seal
- Dynamic or static effective pressure transducer

General Information



Application

- Circular volume flow rate measuring units for the manual or automatic measuring of volume flow rates
- Simplified commissioning, approval and maintenance

- Suitable for permanent installation because of low differential pressure
- Optional static effective pressure transducer for systems with contaminated air

Special features

- Suitable for permanent installation because of low differential pressure
- High measurement accuracy (even with upstream bend $R = 1D$)

Nominal sizes

- 100, 125, 160, 200, 250, 315, 400 mm

Variants

- VMR: Volume flow rate measuring unit
- VMR-FL: Volume flow rate measuring unit with flanges on both ends

Construction

- Galvanised sheet steel
- P1: Powder-coated, silver grey (RAL 7001)
- A2: Stainless steel

Parts and characteristics

- Ready-to-commission unit which consists of the mechanical parts and optional effective pressure transducers
- Averaging differential pressure sensor for volume flow rate measurement
- Optional effective pressure transducers, factory-assembled and wired
- High measurement accuracy of volume flow rates (even with bend $R = 1D$).

Attachments

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

Accessories

- G2: Matching flanges for both ends
- D2: Double lip seals on both ends (factory fitted)

Construction features

- Circular casing
- Spigot suitable for circular ducts to EN 1506 or EN 13180
- Spigots with groove for seal
- TVR-FL: Flanges to EN 12220

Materials and surfaces

Galvanised sheet steel construction

- Casing and damper blade made of galvanised sheet steel
- Aluminium sensor tubes

Powder-coated construction (P1)

- Casing made of galvanised sheet steel, powder-coated
- Sensor tubes made of aluminium, powder-coated

Stainless steel construction (A2)

- Casing, damper blade and shaft made of stainless steel 1.4301
- Sensor tubes made of aluminium, powder-coated

Standards and guidelines

Fulfils the hygiene requirements of

- EN 16798, Part 3
- VDI 6022, Sheet 1
- DIN 1946, Part 4
- Further standards, guidelines in accordance with hygiene certificate

Casing leakage

- EN 1751, Class C

Maintenance

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

Description



Variants

- VMR: Volume flow rate measuring unit
- VMR-FL: Volume flow rate measuring unit with flanges on both ends

Parts and characteristics

- Ready-to-commission unit which consists of the mechanical parts and optional effective pressure transducers
- Averaging differential pressure sensor for volume flow rate measurement
- Optional effective pressure transducers, factory-assembled and wired
- High measurement accuracy of volume flow rates (even with bend $R = 1D$).

Attachments

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

Nominal sizes

- 100, 125, 160, 200, 250, 315, 400 mm

TECHNICAL INFORMATION

Function, Technical data, Quick sizing, Specification text, Order code

The volume flow rate 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 measuring transducer (effective pressure transducer).

VMR with control component XTS



- 1: Effective pressure sensor
2: Measuring transducer
3: Casing

Nominal sizes	100 – 400 mm
Volume flow rate range	34 – 6279 m³/h bzw. 10 – 1744 l/s
Maximum differential pressure	1000 Pa
Effective pressure range	Approx. 2 – 260 Pa *
Measurement accuracy	5 – 16 %
Operating temperature	10 to 50 °C

* 260 Pa of the nominal volume flow rate

Volume flow rate ranges and minimum differential pressure values
Attachment: Without attachment, XTD, BTD

NS	qv [l/s]	qv [m³/h]	C-value [l/s]	C-value [m³/h]	Δqv [±%]
100	10	34	6,1	22,0	16
100	98	354	6,1	22,0	6
125	16	55	10,0	35,9	16
125	160	578	10,0	35,9	6
160	25	88	16,0	57,6	16
160	257	928	16,0	57,6	6
200	40	143	26,1	93,8	16
200	420	1512	26,1	93,8	6
250	60	216	39,5	142,2	16
250	636	2292	39,5	142,2	6
315	100	359	65,6	236,2	16
315	1057	3807	65,6	236,2	6
400	165	591	108,2	389,5	16
400	1744	6279	108,18	389,5	5

Note:

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

Volume flow rate ranges and minimum differential pressure values
Attachment: XTS, BTS, ELAB

NS	qv [l/s]	qv [m³/h]	C-value [l/s]	C-value [m³/h]	Δqv [±%]
100	14	50	6,1	22,0	14
100	98	354	6,1	22,0	6
125	23	81	9,9	35,9	13
125	160	578	9,9	35,9	6
160	36	129	16,0	57,6	14
160	257	928	16,0	57,6	6
200	59	210	26,1	93,8	13
200	420	1512	26,1	93,8	6
250	89	318	39,5	142,2	14
250	636	2292	39,5	142,2	6
315	147	529	65,6	236,2	13
315	1057	3807	65,6	236,2	6
400	242	871	108,2	389,5	13
400	1744	6279	108,2	389,5	5

Note:

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

Specification text

Circular volume flow rate measuring unit for the measurement of volume flow rates in ventilation and air conditioning systems, available in 7 nominal sizes. For manual volume flow rate measurement 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, hence resistant to contamination.

Special features

- Suitable for permanent installation because of low differential pressure
- High measurement accuracy (even with upstream bend R = 1D)

Materials and surfaces

Galvanised sheet steel construction

- Casing made of galvanised sheet steel
- Aluminium sensor tubes

P1: Powder-coated construction (P1)

- Casing made of galvanised sheet steel, surface powder coated, silver (RAL 7001)
- Sensor tubes made of aluminium, powder-coated

A2: Stainless steel construction (A2)

- Casing made of stainless steel 1.4301
- Sensor tubes made of aluminium, powder-coated

Connection

Spigot with groove for lip seal,
suitable for ducts to EN 1506 or EN 13180

- FL: Flanges on both ends according to EN 12220

Technical data

- Nominal sizes: 100 to 400 mm
- Volume flow rate range: 34 – 6279 m³/h or 10 – 1744 l/s
- Effective pressure range: approx. 2 – 260 Pa
- Measurement accuracy: 5 – 16 %
- Operating temperature: 10 to 50 °C
- Casing air leakage to EN 1751, Class C

VMR	–	P1	–	FL	/	160	/	G2	/	BTD	/	0
1		2		3		4		5		6		7

1 Type
VMR Circular volume flow rate measuring unit

2 Material
No entry required: Galvanised sheet steel
P1 Powder-coated RAL 7001, silver grey
A2 Stainless steel construction

3 Flange
No entry required: None
FL Flanges on both ends

4 Nominal size [mm]
100, 125, 160, 200, 250, 315, 400

5 Accessories

No entry required: None
D2 Lip seals on both ends
G2 Matching flanges both sides

6 Attachments (effective pressure transducer)
No entry required: None
XTD dynamic effective pressure transducer, analogue, display
BTD dynamic effective pressure transmitter, analogue, and MP-Bus, Modbus RTU, BACnet MS/TP
XTS static effective pressure transducer, analogue, display
BTS static effective pressure transmitter, analogue, and MP-Bus, Modbus RTU, BACnet MS/TP

7 Signal voltage range
Only required if attachment is selected
For the actual value signal
0 0 – 10 V DC
2 2 – 10 V DC

Order example 1: VMR-P1-FL/315/G2/XTS/0
Material Powder-coated, RAL 7001, silver grey
Duct connection Flanges on both ends
Nominal size 315 mm
Accessories Matching flanges on both ends
Attachments (effective pressure transducer) Static effective pressure transducer with display
Signal voltage range Actual value signal 0 – 10 V DC

VMR	–	P1	–	FL	/	160	/	G2	/	ELAB	/	EC	–	E0	/	UMZ
1		2		3		4		5		6		7		8		9

1 TypeVMR Circular volume flow rate measuring unit 2 MaterialNo entry: galvanised sheet steelP1 Powder-coated surface RAL 7001, silver grey (RAL 7001)A2 Stainless steel construction 3 FlangeNo entry required: NoneFL Flanges on both ends 4 Nominal size [mm]100 125 160 200 250 315 400 5 AccessoriesNo entry required: NoneD2 Lip seals on both endsG2 Matching flanges both sides 6 Attachments (effective pressure transducer)ELAB EASYLAB TCU3 7 Equipment functionSC Supply air recordingEC Extract air recording 8 Voltage range for the actual value signalE0 Voltage signal 0 – 10 V DCE2 Voltage signal 2 – 10 V DC 9 Expansion modulesOption 1: Power supplyNo entry: 24 V ACT EM-TRF for 230 V ACU EM-TRF-USV for 230 V AC, provides uninterruptible power supply (UPS) Option 2: Communication interfaceNo entry required: NoneB EM-BAC-MOD-01 for BACnet MS/TPM EM-BAC-MOD-01 for Modbus RTUI EM-IP for BACnet/IP, Modbus/IP and web serverR EM-IP with real time clock Option 3: Automatic zero point correctionNo entry required: NoneZ EM-AUTOZERO Solenoid valve for automatic zero point correction

Order example 1: VMR-P1-FL/200/ELAB/EC/E2/TZ
Material Powder-coated, RAL 7001, silver grey
Nominal size 200 mm
Attachments EASYLAB TCU3
Equipment function Extract air controller
external volume flow rate setting Voltage signal 2 – 10 V DC
Expansion module With expansion module EM-TRF, transformer for 230 V AC supply with expansion module EM-AUTOZERO, solenoid valve for automatic zero point correction

Variants, Dimensions and weight, Product details

▼

Material

Standard construction

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

Powder-coated construction

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

Stainless steel construction

Order code detail	Part	Material
A2	Effective pressure sensor	Aluminium - powder coated, RAL 7001, silver grey
A2	Casing	Stainless steel, material no. 1.4301

Option double lip seal

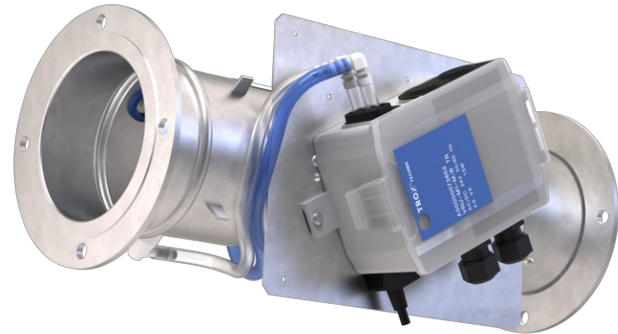
Order code detail	Part	Material
D2	Double lip seal	Rubber, EPDM

Volume flow rate measuring unit VMR



Spigot

Volume flow rate measuring unit VMR-FL



With flanges on both ends to make detachable connections to the ducting

Dimensions/weights for VMR (standard)

NS	ØD	kg
100	99	0.8
125	124	1
160	159	1.2
200	199	1.6
250	249	1.9
315	314	2.4
400	399	3.1

Note:
Weight value only for VMR without attachment.
Note possible additional weights due to optional effective pressure transducers (BTD, XTD, BTS, XTS, ELAB attachments) depending on the construction.

Dimensions/weights for VMR-FL

NS	ØD	ØD ₁	ØD ₂	D _n	kg
100	99	132	152	44	1.2
125	124	157	177	44	1.5
160	159	192	212	46	2.1
200	199	233	253	46	2.7
250	249	283	303	46	3.3
315	314	352	378	48	4.5
400	399	438	464	48	5.7

Note:
Weight value only for VMR-FL without attachment.
Note possible additional weights due to optional effective pressure transducers (BTD, XTD, BTS, XTS, ELAB attachments) depending on the construction. Note: Tolerances for dimensions L: ±5 mm

Space required for commissioning and maintenance

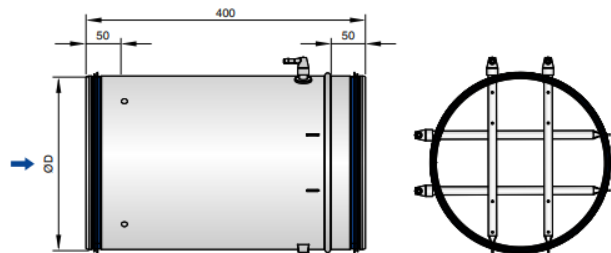
Keep sufficient space free in the area of the attachments for commissioning and maintenance. It may be necessary to provide sufficiently sized inspection access openings.

The selected product illustrations do not contain information on possible installation situations. Some attachments require a certain installation orientation; this is specified on the product's installation orientation label.

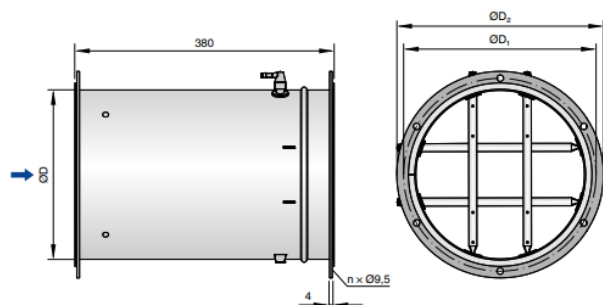
Space required

Attachment	①	②	③
Effective pressure transducer: XTD, XTS	250	200	250
Effective pressure transducer: BTD, BTS	520	250	250
Effective pressure transducer: ELAB	550	350	400

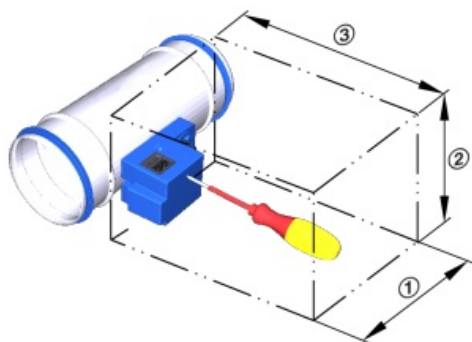
VMR



VMR-FL



Access to attachments



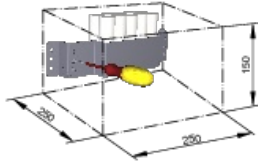
Schematic illustration of required installation space

Assembly overview of attachments



XTD/XTS, BTS/BTS, ELAB

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).

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 $\rho = 1.2 \text{ kg/m}^3$

Required

- VMR/160
- $\Delta p_w = 100 \text{ Pa}$ (manometer reading of effective pressure)
- Volume flow rate q_v in m^3/h Device data K value from table: $K = 58 \text{ m}^3/\text{h}$ (16.11 l/s)

Installation and commissioning

- The installation orientation of ELAB must be as shown on the sticker
- Installation orientation of XTD/XTS and BTB/BTS attachments not critical

Upstream conditions

The volume flow rate accuracy Δ_{qv} applies for a straight upstream flow. 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.

Installation component

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

① TROX/Gruner, ② TROX/Belimo, ③ TROX

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

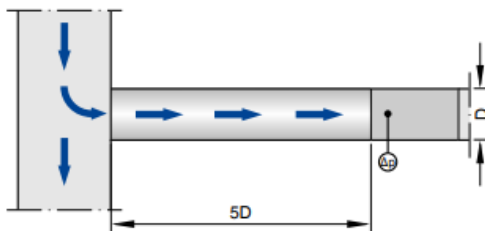
$$q_v = \sqrt{\frac{1,2}{\rho}} \times C \times \sqrt{\Delta p_w}$$

Calculation procedure

$$q_v = 58 \text{ m}^3/\text{h} \times \sqrt{100}$$

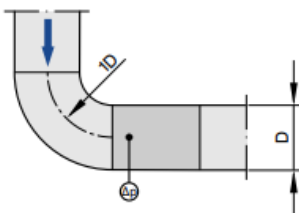
$$q_v = 580 \text{ m}^3/\text{h}$$

Junction



A junction causes strong turbulences. The stated volume flow rate accuracy Δq_v can only be achieved with a straight duct section of at least 5D upstream.

Bend



A bend with a curvature radius of at least 1D – without an additional straight duct section upstream of the volume flow rate measuring unit – has only a negligible effect on the volume flow rate accuracy.