



Easy controller, Compact controller



TROX UNIVERSAL controller, TROX LABCONTROL controller



Circular connection on the fan end



Rectangular connection on the room end



Tested to VDI 6022

Variable volume flow control VAV terminal units

TVZ



For supply air systems with demanding acoustic requirements

VAV terminal units for the supply air control in buildings with variable air volume systems and demanding acoustic requirements

- Highly effective integral attenuator
- Box style construction for the reduction of the airflow velocity
- Electronic control components for different applications (Easy, Compact, Universal, and LABCONTROL)
- Closed blade air leakage to EN 1751, up to class 4
- Casing air leakage to EN 1751, up to class C

Optional equipment and accessories

- Acoustic cladding for the reduction of case-radiated noise
- Secondary silencer Type TS for the reduction of air-regenerated noise
- Hot water heat exchanger of Type WT for reheating the airflow

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General information

Application

- Rectangular VAV terminal units for use in ventilation and air conditioning systems
- For controlling, restricting or shutting off the supply air flow in systems with high acoustic requirements
- Integral attenuator
- Closed-loop volume flow control using an external power supply
- For variable or constant volume flow systems
- Shut-off by means of switching (by others)
- Can also be used for duct or room pressure control with suitable control components

Special features

- Integral attenuator with at least 26 dB insertion loss at 250 Hz
- Hygiene tested and certified
- Factory set-up or programming and aerodynamic function testing
- Parameters can also later be set on the control component; additional adjustment device may be necessary
- Inspection access according to VDI 6022

Nominal sizes

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

Variants

- TVZ: Supply air unit
- TVZ-D: Supply air unit with acoustic cladding
- Units with acoustic cladding and/or secondary silencer Type TS for very demanding acoustic requirements
- Acoustic cladding cannot be retrofitted

Parts and characteristics

- Ready-to-commission unit which consists of mechanical parts and control components.
- Averaging effective pressure sensor for volume flow rate measurement
- Damper blade
- Integral attenuator
- Inspection access
- Factory assembled control components complete with wiring and tubing
- 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
- High control accuracy (even with upstream bend R = 1D)

Attachments

- EASY controller: Compact unit consisting of controller with potentiometers, effective pressure transducer and actuator
- Compact controller: Compact unit consisting of controller with potentiometers, effective pressure transducer and actuator
- Universal controller: Controller, effective pressure transducer and actuators for special applications
- LABCONTROL: Control components for air management systems

Accessories

- Double lip seal (factory fitted)

Useful additions

- Secondary silencer Type TS
- Heat exchanger Type WT

Construction features

- Rectangular casing
- Spigot on the fan end suitable for circular ducts to EN 1506 or EN 13180
- Spigot with groove for double lip seal
- Connection on the room end suitable for ducts
- Baffle plate, downstream of the damper blade, for achieving the best possible acoustic and aerodynamic performance
- Position of the damper blade indicated externally at shaft extension
- Thermal and acoustic insulation (lining)

Materials and surfaces

- Casing and damper blade made of galvanised sheet steel
- Damper blade seal made of TPE plastic
- Lining is mineral wool
- Effective pressure sensor made of aluminium
- Plastic plain bearings
- Shaft and linkage: Galvanised steel

Variant with acoustic cladding (-D)

- Acoustic cladding made of galvanised sheet steel
- Lining is mineral wool
- Rubber elements for the insulation of structure-borne noise

Mineral wool

- To EN 13501, fire rating Class A1, non-combustible
- RAL quality mark RAL-GZ 388
- Non-hazardous to health thanks to being highly biosoluble in accordance with the Ordinance on Hazardous Substances and Note Q of the European Directive (EC) No. 1272/2008
- Faced with glass fibre fabric as a protection against erosion from airflow velocities of up to 20 m/s
- Inert to fungal and bacterial growth

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:

Nominal sizes 125 – 200

- EN 1751, Class C

Nominal sizes 250 – 400

- EN 1751, Class B

Closed blade air leakage:

Nominal sizes 125 – 160

- EN 1751, Class 3
- Meets the general requirements of DIN 1946, Part 4, with regard to the acceptable closed damper blade air leakage

Nominal sizes 200 – 400

- EN 1751, Class 4
- Meets the increased requirements of DIN 1946, Part 4, with regard to the acceptable closed blade air leakage

Maintenance

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

Function

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

The control components (attachments) include an effective pressure transducer that transforms the effective pressure into an electric signal, a controller, and an actuator; the control functions can be achieved with an Easy controller or with a Compact controller or with individual components (Universal or LABCONTROL).

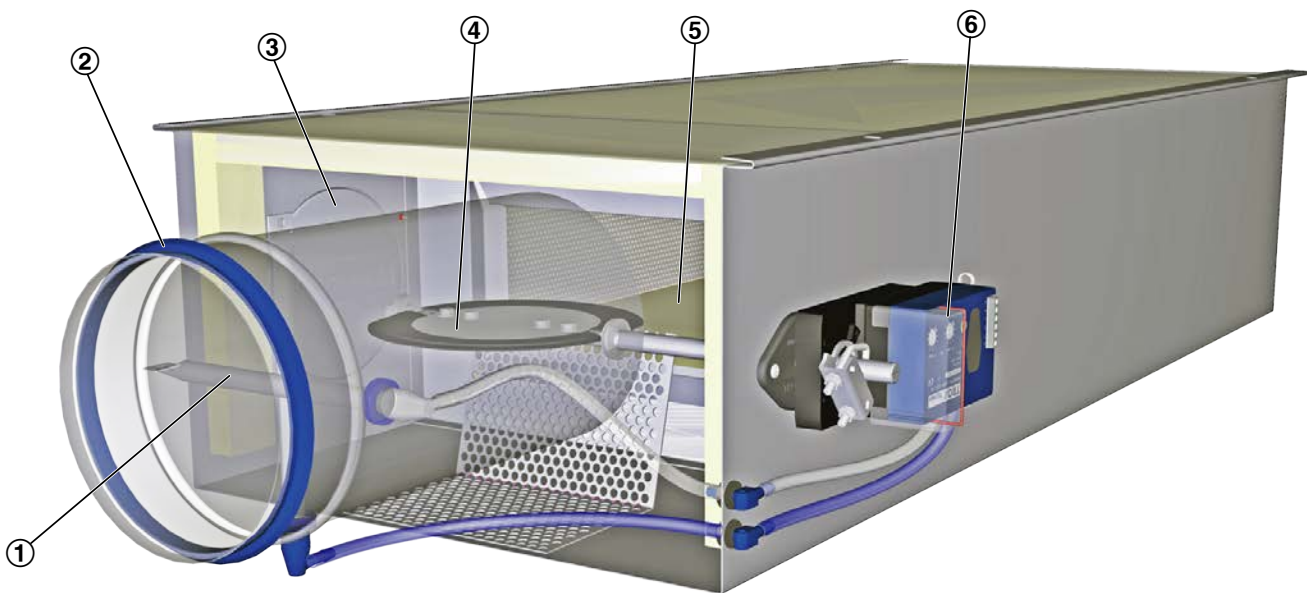
For most applications, the setpoint value comes from a room temperature controller.

The controller compares the actual value with the setpoint value and alters the control signal of the actuator if there is a difference between the two values.

An integral attenuator reduces the noise that is created by the restriction of the airflow.

The airflow velocity at the room end is, due to the larger rectangular cross section, about half the velocity in the circular duct.

Schematic illustration of the TVZ



- ① Effective pressure sensor
- ② Double lip seal
- ③ Inspection access
- ④ Damper blade
- ⑤ Integral attenuator
- ⑥ Control components, e.g. an Easy controller

Technical data

Nominal sizes	125 – 400 mm
Volume flow rate range	14 – 2007 l/s or 50 – 7228 m ³ /h
Volume flow rate control range (unit with dynamic effective pressure measurement)	Approx. 10 – 100 % of the nominal volume flow rate
Minimum differential pressure	Up to 123 Pa (without secondary silencer)
Maximum differential pressure	1000 Pa
Operating temperature	10 to 50 °C

Quick sizing

Quick sizing tables provide a good overview of the minimum differential pressures, the volume flow rate accuracy and the room sound pressure levels that can be expected. Intermediate values may be achieved by interpolation.

The sound power levels for calculating the sound pressure levels were measured in the TROX laboratory according to DIN EN ISO 5135 - see "Basic information and nomenclature".

Precise results and spectral data for all control components can be calculated with our Easy Product Finder design program. The first selection criteria for the nominal size are the actual volume flow rates q_{vmin} and q_{vmax} .

Volume flow rate ranges and minimum differential pressure values

The minimum differential pressure of VAV terminal units is an important factor in designing the ductwork and in rating the fan including speed control. It must be ensured that for all operating conditions and for all terminal units a sufficient pressure differential is applied to each controller ($\Delta p_{stat,min}$). The measurement points for fan speed control must be selected accordingly. The volume flow rates given for VAV terminal units depend on the nominal size and on the control component (attachment) that is installed.

Volume flow rate ranges and minimum differential pressure values

Control component for dynamic pressure measurements – Easy (potentiometers)

Attachment: Easy

NS	qv [l/s]	qv [m ³ /h]	$\Delta p_{stat,min}$ [Pa]		Δqv [±%]
			①	②	
125	14	50	1	2	20
125	56	201	13	18	9
125	98	353	39	55	7
125	140	504	79	111	5
160	24	83	1	2	19
160	94	339	12	18	9
160	165	595	35	53	6
160	236	851	72	109	5
200	37	133	1	2	19
200	150	540	11	22	9
200	263	948	34	65	6
200	376	1355	70	133	5
250	58	208	1	2	19
250	236	848	12	24	9
250	413	1488	37	72	6
250	591	2128	74	146	5
315	96	344	1	2	19
315	390	1405	12	20	9
315	685	2467	36	59	6

NS	qv [l/s]	qv [m³/h]	Δpstmin [Pa]		Δqv [±%]
			①	②	
315	980	3528	73	121	5
400	157	563	1	1	19
400	638	2298	12	17	9
400	1120	4033	36	51	6
400	1602	5768	73	104	5

① Basic unit

② Basic unit with secondary silencer TS

Volume flow rate ranges and minimum differential pressure values

 Control component dynamic measurement principle – q_v Extended

Attachments: BC0, BL0 **, BM0, BM0-J6

NS	qv [l/s]	qv [m³/h]	Δpstmin [Pa]		Δqv [±%]
			①	②	
125	14	50	1	2	20
125	68	244	19	26	8
125	121	437	59	84	6
125	175	631	123	174	5
160	24	83	1	2	19
160	114	411	17	26	8
160	205	738	54	82	6
160	296	1066	113	170	5
200	37	133	1	2	19
200	182	655	17	31	8
200	327	1176	53	100	6
200	471	1698	109	208	5
250	58	208	1	2	19
250	285	1027	18	34	8
250	513	1847	56	110	6
250	740	2666	116	229	5
315	96	344	1	2	19
315	473	1703	17	29	8
315	851	3062	55	91	6
315	1228	4421	114	190	5
400	157	563	1	1	19
400	774	2785	17	25	8
400	1391	5006	55	78	6
400	2007	7228	115	162	5

① Basic unit

② Basic unit with secondary silencer TS

** Control component to be discontinued - do not include in new projects

Volume flow rate ranges and minimum differential pressure values

 Control component dynamic measurement principle - q_v As standard

Attachments: BUDN, BUDNF, LN0, LK0, LB0, XB0, XB4, (B13 *, B1B *)

NS	qv [l/s]	qv [m³/h]	Δpstmin [Pa]		Δqv [±%]
			①	②	
125	14	50	1	2	20
125	58	207	14	19	9

NS	qv [l/s]	qv [m³/h]	Δp _{stmin} [Pa]		Δqv [±%]
			①	②	
125	101	365	42	59	6
125	145	522	84	119	5
160	24	83	1	2	19
160	97	349	13	19	9
160	171	616	38	57	6
160	245	882	77	117	5
200	37	133	1	2	19
200	155	557	12	23	9
200	272	980	37	70	6
200	390	1404	75	143	5
250	58	208	1	2	19
250	243	874	13	25	9
250	428	1539	39	77	6
250	612	2205	80	157	5
315	96	344	1	2	19
315	402	1448	13	21	8
315	709	2553	38	64	6
315	1015	3657	78	130	5
400	157	563	1	1	19
400	658	2368	13	18	8
400	1159	4173	39	54	6
400	1660	5978	79	111	5

① Basic unit

② Basic unit with secondary silencer TS

* Control component already discontinued

Volume flow rate ranges and minimum differential pressure values

Control component of static measurement principle

Attachments: BUSN, BUSNF, BUSS, XD0, XD4, TUN, TUNF, TUS, TUSD, ELAB (BP3 *, BPG *, BPB *, BB3 *, BBB *)

NS	qv [l/s]	qv [m³/h]	Δp _{stmin} [Pa]		Δqv [±%]
			①	②	
125	21	73	2	3	16
125	62	223	16	22	8
125	103	372	43	61	6
125	145	522	84	119	5
160	35	123	2	3	16
160	104	376	14	22	8
160	175	629	40	60	6
160	245	882	77	117	5
200	55	195	2	3	16
200	166	598	14	26	8
200	278	1001	38	73	6
200	390	1404	75	143	5
250	85	306	2	4	16
250	261	939	15	29	8
250	437	1572	41	80	6
250	612	2205	80	157	5
315	142	508	2	3	15

NS	qv [l/s]	qv [m³/h]	Δpstmin [Pa]		Δqv [±%]
			①	②	
315	433	1558	15	24	8
315	724	2607	40	66	6
315	1015	3657	78	130	5
400	231	830	2	3	15
400	707	2546	15	21	8
400	1184	4262	40	57	6
400	1660	5978	79	111	5

① Basic unit

② Basic unit with secondary silencer TS

* Control component already discontinued

Quick sizing table for sound pressure level

The quick sizing tables are based on generally accepted attenuation and insulation levels. If the sound pressure level exceeds the required level, a larger air terminal unit and/or a silencer or acoustic cladding is required. For more information on the acoustic data, see basic information and nomenclature.

Quick sizing table for air-regenerated noise L_{PA}

Controller including silencer

(total flow rate range of type)

NS	qv [l/s]	qv [m³/h]	150 Pa		500 Pa	
			①	②	①	②
125	14	50	< 15	< 15	17	< 15
125	68	244	27	16	31	20
125	121	437	31	21	35	25
125	175	631	34	n.V.	37	28
160	24	83	16	< 15	20	< 15
160	114	411	31	21	34	24
160	205	738	35	25	38	28
160	296	1066	37	n.V.	40	30
200	37	133	< 15	< 15	18	< 15
200	182	655	23	< 15	28	16
200	327	1176	26	18	31	20
200	471	1698	28	n.V.	32	25
250	58	208	< 15	< 15	< 15	< 15
250	285	1027	20	< 15	27	16
250	513	1847	26	18	32	20
250	740	2666	30	n.V.	35	26
315	96	344	< 15	< 15	22	< 15
315	473	1703	23	< 15	30	17
315	851	3062	27	20	33	22
315	1228	4421	30	n.V.	36	26
400	157	563	< 15	< 15	22	< 15
400	774	2785	23	< 15	31	18
400	1391	5006	27	22	34	24
400	2007	7228	31	n.V.	37	29

 Air-regenerated noise L_{PA} [dB(A)] at static differential pressure Δ_{pst} of 150 or 500 Pa

① Basic unit

② Basic unit with secondary silencer TS

 n.a.: The specified static differential pressure Δ_{pst} is lower than the minimum differential pressure Δ_{pst min}.

Quick sizing table for case-radiated noise L_{PA}

Controller including acoustic cladding
(total flow rate range of type)

NS	qv [l/s]	qv [m³/h]	150 Pa		500 Pa	
			①	②	①	②
125	14	50	17	< 15	24	< 15
125	68	244	25	15	32	21
125	121	437	29	20	35	25
125	175	631	32	23	37	28
160	24	83	15	< 15	23	< 15
160	114	411	25	17	33	24
160	205	738	30	23	37	28
160	296	1066	34	27	40	32
200	37	133	18	< 15	27	15
200	182	655	28	20	36	26
200	327	1176	33	25	39	30
200	471	1698	36	29	42	33
250	58	208	18	< 15	28	18
250	285	1027	27	20	37	28
250	513	1847	32	25	40	32
250	740	2666	36	29	43	35
315	96	344	19	< 15	30	19
315	473	1703	29	20	39	30
315	851	3062	34	26	43	34
315	1228	4421	39	31	46	38
400	157	563	23	< 15	34	24
400	774	2785	31	23	41	33
400	1391	5006	36	28	45	37
400	2007	7228	40	33	47	40

Case-radiated noise L_{PA} [dB(A)] at static differential pressure Δ_{pst} of 150 or 500 Pa

① Basic unit

② Basic unit with acoustic cladding

n.a.: The specified static differential pressure Δ_{pst} is lower than the minimum differential pressure $\Delta_{pst\ min}$.

Note:

Information on case-radiated noise for combinations of basic unit and optional acoustic cladding and secondary silencer can be found in the Easy Product Finder design program.

Specification text

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

Specification text

Rectangular VAV terminal units for variable and constant air volume systems, suitable for supply air, available in 6 nominal sizes. High control accuracy (even with upstream bend $R = 1D$). Ready-to-commission unit which consists of the mechanical parts and the electronic control components. Each unit contains an averaging effective pressure sensor for volume flow rate measurement, a damper blade, and an integral sound attenuator. Factory-assembled control components complete with wiring and tubing. Effective pressure sensor with 3 mm measuring holes, hence resistant to contamination. Baffle plate is fitted after the damper blade for optimum acoustic and aerodynamic performance. Casing with acoustic and thermal insulation. Position of the damper blade indicated externally at shaft extension. The damper blade is factory set to open position, which allows a ventilation airflow even without control; this does not apply to variants with defined safe position NC (normally closed). Meets the hygiene requirements of EN 16798, Part 3, of VDI 6022, Sheet 1, and of DIN 1946, Part 4.

Special features

- Integral attenuator with at least 26 dB insertion loss at 250 Hz
- Hygiene tested and certified
- Factory set-up or programming and aerodynamic function testing
- Parameters can also later be set on the control component; additional adjustment device may be necessary
- Inspection access according to VDI 6022

Materials and surfaces

- Casing and damper blade made of galvanised sheet steel
- Damper blade seal made of TPE plastic
- Lining is mineral wool
- Effective pressure sensor made of aluminium
- Plastic plain bearings
- Shaft and linkage: Galvanised steel

Mineral wool:

- To EN 13501, fire rating Class A1, non-combustible
- RAL quality mark RAL-GZ 388
- Non-hazardous to health thanks to being highly biosoluble in accordance with the Ordinance on Hazardous Substances and Note Q of the European Directive (EC) No. 1272/2008
- Faced with glass fibre fabric as protection against erosion from airflow velocities of up to 20 m/s
- Inert to fungal and bacterial growth

Connection

- Spigot with groove for double lip seal on the fan end, suitable for connecting ducts according to EN 1506 or EN 13180. Room end suitable for the connection of ducts.

Equivalence criteria

- Declaration of hygiene conformity in accordance with VDI 6022, Sheet 1 (01/2018), ÖNORM H 6020 (02/2007) and ÖNORM H 6021 (09/2003)
- Setting of the volume flow rates without an adjustment device using V_{\min} - and V_{\max} - potentiometer
- Electrical connections with screw terminals, no additional terminal boxes required
- Aerodynamic functional testing of each volume flow controller on test rigs at the factory, before a label is affixed to the controller
- Acoustic data measured to ÖNORM EN ISO 5135:1999

Technical data

- Nominal sizes: 125 to 400 mm
- Volume flow rate range: 14 – 1602 l/s or 50 – 5768 m³/h
- Minimum differential pressure: up to 123 Pa (without secondary silencer)
- Maximum differential pressure: 1000 Pa
- Closed blade air leakage to EN 1751, class 4 (nominal sizes 125 and 160, class 3).
- Casing air leakage to EN 1751, class 4 (nominal size 250, 315, 400, class B)

Specification text for attachment

Variable volume flow control with electronic Easy controller to connect an external control signal; actual value signal can be integrated into the central BMS.

- Supply voltage 24 V AC/DC
- Signal voltages 0 – 10 V DC
- Possible override controls with external switches using volt-free contacts: CLOSED, OPEN, $q_{v\min}$ and $q_{v\max}$
- Potentiometers with percentage scales to set the volume flow rates $q_{v\min}$ and $q_{v\max}$ without an adjustment device
- The actual value signal relates to the nominal volume flow rate such that commissioning and subsequent adjustment are simplified
- Volume flow rate control range: approx. 10 – 100 % of the nominal volume flow rate
- Clearly visible external indicator light for signalling the functions: Set, not set, and power failure
- Electrical connections with screw terminals
- Double terminals for looping the supply voltage, i.e. for the simple connection of voltage transmission to the next controller

Sizing data

- q_v _____ [m³/h]
- Δp_{st} _____ [Pa]



Air-regenerated noise

▪ L_{PA} _____ [dB(A)]

Case-radiated noise

▪ L_{PA} _____ [dB(A)]

Order code

Order code for volume flow control (with Easy attachment)

TVZ – D / 160 / D1 / Easy
| | | | |
1 2 3 4 5

1 Type

TVZ VAV terminal unit, supply air

250

315

400

2 Acoustic cladding

No entry required: None

D With acoustic cladding

4 Accessories

No entry required: None

D1 Double lip seal

3 Nominal size [mm]

125

160

200

5 Attachments (control components)

Easy Volume flow controller, dynamic, analogue interface, setting q_{vmin} and q_{vmax} with potentiometers

Order example: TVZ-D/200/Easy

Acoustic cladding

Nominal size

Attachments (control components)

With

200 mm

Easy volume flow controller, dynamic, analogue interface, setting of q_{vmin} and q_{vmax} with potentiometers

Order code for volume flow control (with VARYCONTROL attachment)

TVZ – D / 160 / D1 / XB4 / V 0 / **200 – 900 [m³/h]** / NO
 | | | | | | | | |
 1 2 3 4 5 7 8 9 10

1 Type

TVZ VAV terminal unit, supply air

XB4 Universal controller (VARYCONTROL)

2 Acoustic cladding

No entry required: None
 D With acoustic cladding

7 Operating mode

F Constant value (a setpoint value)
 V Variable (setpoint value range)

3 Nominal size [mm]

125
 160
 200
 250
 315
 400

8 Signal voltage range

For the actual and setpoint value signals
 0 0 – 10 V DC
 2 2 – 10 V DC

4 Accessories

No entry required: None
 D1 Double lip seal

9 Operating values for factory setting

Volume flow rate [m³/h or l/s]
 $q_{V_{const}}$ (in operating mode F)
 $q_{V_{min}} - q_{V_{max}}$ (in operating mode V)

5 Attachments (control components)

For example
 BC0 Compact controller

10 Damper blade position

Only spring return actuators
 NO Power off to OPEN
 NC Power off to CLOSE

Order example: TVZ-D/160/D1/BC0/V0/180–850 m³/h

Acoustic cladding	with
Nominal size	160 mm
Accessories	Double lip seal
Attachments (control component)	Compact controller, dynamic, analogue interface
Operating mode	Variable
Signal voltage range	0 – 10 V DC
Operating values	$q_{V_{min}} = 180 \text{ m}^3/\text{h}$ $q_{V_{max}} = 850 \text{ m}^3/\text{h}$

Order code for volume flow control (with TROX UNIVERSAL attachment)

TVZ – D / 160 / D1 / TUNF / RS / M / 0 / UMZ / ... / NC
 | | | | | | | | | | |
 1 2 3 4 5 6 7 8 9 10 11

1 Type

TVZ VAV terminal unit, supply air

No entry required: 24 V AC/DC

T EM-TRF for 230 V AC

U EM-TRF-USV for 230 V AC, provides uninterruptible power supply (UPS)

2 Acoustic cladding

No entry required: None

D With acoustic cladding

Option 2: Digital communication interface

No entry required: None

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 web server

R EM-IP with real time clock

3 Nominal size [mm]

125

160

200

250

315

400

Option 3: Automatic zero point correction

No entry required: None

Z EM-AUTOZERO with solenoid valve

4 Accessories

No entry required: None

D1 Double lip seal

5 Attachments (control components)

TROX UNIVERSAL controller with

TUN Actuator (150 s)

TUNF Spring return actuator (150 s)

TUS Fast-running actuator (3 s)

TUSD Fast-running actuator (3 s), with digital communication interface (TROX HPD)

10 Operating values for factory setting

Volume flow rate [m³/h or l/s]

Master (RMF function)

q_{v,min}: Minimum volume flow rate

q_{v,max}: Maximum volume flow rate

q_{v,const,CLOSED}: Constant supply air

q_{v,const,Exhaust}: Constant extract air

q_{v,Diff}: Supply air/extract air difference

6 Equipment function

Room control

RS Supply air control (Room Supply)

Constant value

q_{v,const}: Constant volume flow rate

7 Volume flow rate setting

M Master (RMF function)

S Slave

F Constant flow rate controller

Slave

No entry required

8 Signal voltage range

0 0 – 10 V DC

2 2 – 10 V DC

11 Damper blade position

Only spring return actuators

NO Power off to OPEN

NC Power off to CLOSE

9 Expansion modules

Option 1: Power supply

Useful additions

Room control panel

BE-LCD 40-character display

Order example: TVZ 200/TUS/RS/M/0/UMZ/600/1250/0/0/-100

Nominal size	200 mm
Attachments (control components)	TROX UNIVERSAL controller, fast-running actuator (3 s)
Equipment function	Supply air control
Volume flow rate setting	Master (RMF function)
Signal voltage range	0 – 10 V DC
Expansion modules	with expansion module EM-TRF-USV Transformer for 230 V AC supply with UPS function with expansion module EM-BAC-MOD Modbus RTU interface with expansion module EM-AUTOZERO Solenoid valve for automatic zero point correction
Operating values	q _{v,min} = 600 m ³ /h, q _{v,max} = 1250 m ³ /h q _{v,const,CLOSED} = 0 m ³ /h, q _{v,const,Exhaust} = 0 m ³ /h q _{v,Diff} = -100 m ³ /h



Order code for differential pressure control (with VARYCONTROL attachment)

TVZ	-	D	/	160	/	D1	/	XF4	/	PRS	/	F	0	/	30 - 60 [Pa]	/	NO
1		2		3		4		5		6		7	8		9		10

1 Type

TVZ VAV terminal unit, supply air

PDS Duct pressure control, supply air

PRS Room pressure control, supply air

2 Acoustic cladding

No entry required: None

D With acoustic cladding

7 Operating mode

F Constant value (a setpoint value)

V Variable (setpoint value range)

3 Nominal size [mm]

125

160

200

250

315

400

8 Signal voltage range

For the actual and setpoint value signals

0 0 - 10 V DC

2 2 - 10 V DC

4 Accessories

No entry required: None

D1 Double lip seal

9 Operating values for factory setting

Differential pressure [Pa]

For duct pressure control, enter the differential pressure [Pa] as an absolute value

Δp_{const} (in operating mode F)

$\Delta p_{\text{min}} - \Delta p_{\text{max}}$ (in operating mode V)

5 Attachments (control components)

For example

XF0 Compact controller for duct pressure

XF4 Universal controller for duct pressure (VARYCONTROL)

10 Damper blade position

Only spring return actuators

NO Power off to OPEN

NC Power off to CLOSE

6 Equipment function/installation location

Order example: TVZ/160/D1/XF4/PDS/F/2/470 Pa/NO

Nominal size

160 mm

Accessories

Double lip seal (one end)

Attachments (control components)

VARYCONTROL Universal controller for duct pressure

Equipment function

Duct pressure control, supply air

Operating mode

Constant value

Signal voltage range

2 - 10 V DC

Operating value

470 Pa

Damper blade position

Power off to OPEN

Order code for differential pressure control (with TROX UNIVERSAL attachment)

TVZ – D / 160 / D1 / TUNF / PRS / MFP / 0 / UMZ / ... / NC
 | | | | | | | | | | |
 1 2 3 4 5 6 7 8 9 10 11

1 Type

TVZ VAV terminal unit, supply air

2 Acoustic cladding

No entry required: None

D With acoustic cladding

3 Nominal size [mm]

125

160

200

250

315

400

4 Accessories

No entry required: None

D1 Double lip seal

5 Attachments (control components)

TROX UNIVERSAL controller with

TUN Actuator (150 s)

TUNF Spring return actuator (150 s)

TUS Fast-running actuator (3 s)

TUSD Fast-running actuator (3 s), with digital communication interface (TROX HPD)

6 Equipment function

Pressure control

PRS Room pressure control, supply air

PDS Duct pressure control, supply air

7 Differential pressure setting

MFP Master, constant pressure control

MVP Master, variable differential pressure control

SFP Slave, constant pressure control

SVP Slave, variable differential pressure control

8 Signal voltage range

0 0 - 10 V DC

2 2 - 10 V DC

9 Expansion modules

Option 1: Power supply

No entry required: 24 V AC/DC

T EM-TRF for 230 V AC

U EM-TRF-USV for 230 V AC, provides uninterruptible power supply (UPS)

Option 2: Digital communication interface

No entry required: None

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 web server

R EM-IP with real time clock

Option 3: Volume flow rate measurement

No entry required: None

V EM-V Volume flow rate measurement for differential pressure control

Option 4: Automatic zero point correction

No entry required: None

Z EM-AUTOZERO solenoid valve (only with V)

10 Operating values for factory setting

Pressure [Pa], volume flow rate [m³/h or l/s]

Slave SVP

Δp_{\min} : minimum differential pressure

Δp_{\max} : maximum differential pressure

Slave SFP

Δp_{const} : Constant differential pressure

Master MFP and MVP like Slave, but additionally

$q_{v\min}$: minimum volume flow rate

$q_{v\max}$: maximum volume flow rate

$q_{v\text{const_CLOSED}}$: constant supply air

$q_{v\text{const_Exhaust}}$: constant extract air

$q_{v\text{Diff}}$: Supply air/extract air difference

11 Damper blade position

Only spring return actuators

NO Power off to OPEN

NC Power off to CLOSE

Useful additions

Room control panel

BE-LCD 40-character display

The differential pressure transducer required for room or duct pressure control has to be ordered separately, e.g.

PT-699 for room pressure control

PT-699-DUCT for duct pressure control, including tube and pressure tap

Order example: TVZ/200/TUS/PRS/MVP/0/B/-10/-60/ 600/1250/ 0/ 0/-100

Nominal size

200 mm

Attachments (control components)

TROX UNIVERSAL controller, fast-running actuator (3 s)

Equipment function

Room pressure control, supply air

Differential pressure setting

Master, variable differential pressure control

Signal voltage range

0 – 10 V DC

Expansion modules

with expansion module EM-BAC-MOD
BACnet MS/TP interface card



Operating values

$\Delta p_{\min} = -10 \text{ Pa}$, $\Delta p_{\max} = -60 \text{ Pa}$
 $q_{v\min} = 600 \text{ m}^3/\text{h}$, $q_{v\max} = 1250 \text{ m}^3/\text{h}$
 $q_{v\text{const_Supply air}} = 0 \text{ m}^3/\text{h}$, $q_{v\text{const_Extract air}} = 0 \text{ m}^3/\text{h}$
 $q_{v\text{Diff}} = -100 \text{ m}^3/\text{h}$

Order code for room control (with EASYLAB attachment)

TVZ	-	D	/	160	/	D1	/	ELAB	/	S	/	RS	/	UMZ	/	LAB	/	...
1		2		3		4		5		6		7		9		10		11

1 Type

TVZ VAV terminal unit, supply air

M EM-BAC-MOD-01 for Modbus RTU

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

R EM-IP with real time clock

2 Acoustic cladding

No entry required: None

D With acoustic cladding

Option 3: Automatic zero point correction

No entry required: None

Z EM-AUTOZERO Solenoid valve for automatic zero point correction

3 Nominal size [mm]

125

160

200

250

315

400

10 Additional functions

Without room management function

LAB Extract air led system (laboratories)

CLR Supply air led system (clean rooms)

4 Accessories

No entry required: None

D1 Double lip seal

With room management function

LAB-RMF Extract air led system

CLR-RMF Supply air led system

5 Attachments (control components)

ELAB EASYLAB controller TCU3

11 Operating values for factory setting

(only required when room management function is active)

6 Actuators

S Fast-running actuator (3 s)

SD Fast-running actuator (3 s), with digital communication interface (TROX HPD)

Volume flow rate [m³/h or l/s], pressure [Pa]

Total extract air/supply air of room:

q_{v1}: Standard mode

q_{v2}: reduced operation

q_{v3}: increased operation

q_{v4}: constant supply air

q_{v5}: constant extract air

q_{v6}: Supply air/extract air difference

Δp_{set}: Setpoint pressure (only with differential pressure control)

7 Equipment function

Room control

RS Supply air control (Room Supply)

PC Differential pressure control (Pressure Control)

Useful additions

Room control panel (only for devices with RMF)

BE-LCD 40-character display

9 Expansion modules

Option 1: Power supply

No entry required: 24 V AC/DC

T EM-TRF for 230 V AC

U EM-TRF-USV for 230 V AC, provides uninterruptible power supply (UPS)

The differential pressure transducer required for room pressure

control (equipment function) has to be ordered separately, e.g.

PT-699 Measuring range ±50 Pa or ±100 Pa

PT-GB604 Measuring range ±100 Pa

Option 2: Digital communication interface

No entry required: None

B EM-BAC-MOD-01 for BACnet MS/TP

Order example: TVZ/200/ELAB/SD/RS/CLR-RMF/3500/1000/5000/250/0/-150

Acoustic cladding

without

Nominal size

200 mm

Attachments (control components)

EASYLAB controller TCU3 with fast-running actuator (3 s)

Actuator

Fast-running actuator (3 s), with digital communication interface

Equipment function

Supply air control (Room Supply)

Additional function

Supply air led system with room management function

q_{v1} = 3500 m³/h

q_{v2} = 1000 m³/h

q_{v3} = 5000 m³/h

q_{v4} = 250 m³/h

q_{v5} = 0

q_{v6} = -150 m³/h

Operating values

Order code for single operation (with EASYLAB attachment)

TVZ	–	D	/	160	/	D1	/	ELAB	/	S	/	SC	–	E0	/	UMZ	/	...
1		2		3		4		5		6		7		8		9		11

1 Type

TVZ VAV terminal unit, supply air

2 Acoustic cladding

No entry required: None

D With acoustic cladding

3 Nominal size [mm]

125

160

200

250

315

400

4 Accessories

No entry required: None

D1 Double lip seal

5 Attachments (control components)

ELAB EASYLAB controller TCU3

6 Actuators

S Fast-running actuator (3 s)

SD Fast-running actuator (3 s), with digital communication interface (TROX HPD)

7 Equipment function

Single operation

SC Supply air controller

8 External volume flow rate setting

E0 Voltage signal 0 – 10 V DC

Order example: TVZ/315/ELAB/S/SC/F/2800 m³/h

Nominal size

315 mm

Attachments (control components)

EASYLAB controller TCU3

Actuator

Fast-running actuator (3 s)

Equipment function

Supply air controller

External volume flow rate setting

Volume flow rate constant value

Operating value

$q_{v1} = 2800 \text{ m}^3/\text{h}$

E2 Voltage signal 2 – 10 V DC

2P Switch contacts (provided by others) for 2 switching steps

3P Switch contacts (provided by others) for 3 switching steps

F Volume flow rate constant value, without signalling

9 Expansion modules

Option 1: Power supply

No entry required: 24 V AC/DC

T EM-TRF for 230 V AC

U EM-TRF-USV for 230 V AC, provides uninterruptible power supply (UPS)

Option 2: Digital communication interface

No entry required: None

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 web server

R EM-IP with real time clock

Option 3: Automatic zero point correction

No entry required: None

Z EM-AUTOZERO Solenoid valve for automatic zero point correction

11 Operating values for factory setting

Volume flow rate [m³/h or l/s]

Depending on external volume flow rate setting

E0, E2: $q_{v_{min}}/q_{v_{max}}$

2P: q_{v1}/q_{v2}

3P: $q_{v1}/q_{v2}/q_{v3}$

F: q_{v1}

Variants

VAV terminal unit, variant TVZ



- VAV terminal unit for variable supply air volume flow control
-

VAV terminal unit with acoustic cladding (TVZ-D)



- VAV terminal unit with acoustic cladding for variable supply air volume flow control
 - For rooms where the case-radiated noise of the unit is not sufficiently reduced by a false ceiling
 - The circular ducts for the room under consideration must have adequate acoustic insulation (provided by others) on the fan end
 - Ideally, the ducts on the room side should also be insulated (by others)
 - Acoustic cladding cannot be retrofitted
-

Material

Standard construction



Order code detail	Part	Material
-	Casing	Galvanised sheet steel
	Effective pressure sensor	Aluminium tube
	Damper blade	Galvanised sheet steel
	Damper blade seal	Thermoplastic elastomer (TPE)
	Shaft and linkage	Galvanised steel
	Plain bearings	Thermoplastic elastomer (TPE)
	Lining	Mineral wool to EN 13501, fire rating class A1, non-combustible

Option acoustic cladding

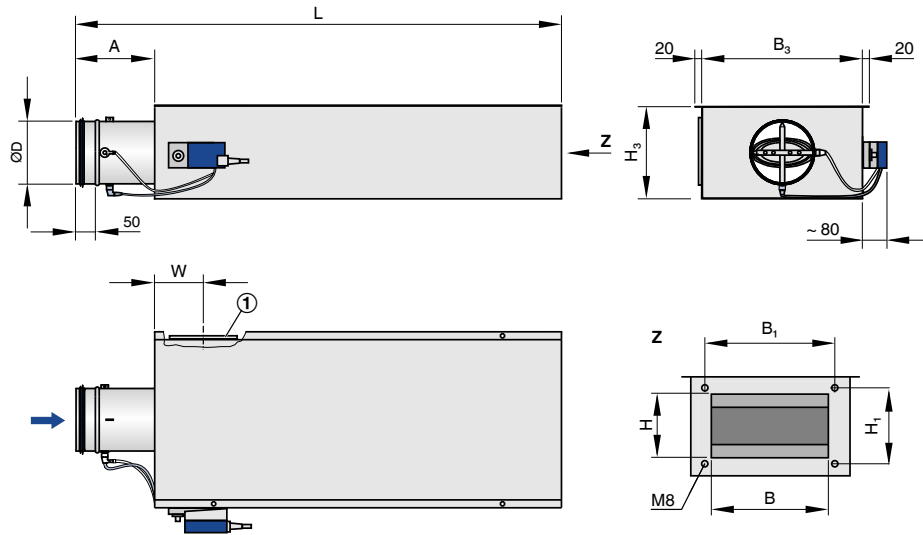
Order code detail	Part	Material
D	Acoustic cladding casing	Galvanised sheet steel
	Insulation of structure-borne noise	Polyethylene, PE
	Lining	Mineral wool to EN 13501, fire rating class A1, non-combustible

Option double lip seal

Order code detail	Part	Material
D1	Double lip seal	Rubber, EPDM

Dimensions and weight

VAV terminal unit without acoustic cladding (TVZ)



Note:

Total length L is the total casing length.

The length of the installed unit is approx. 12 mm less. See flange detail.

The illustration shows control component types Easy, Compact.

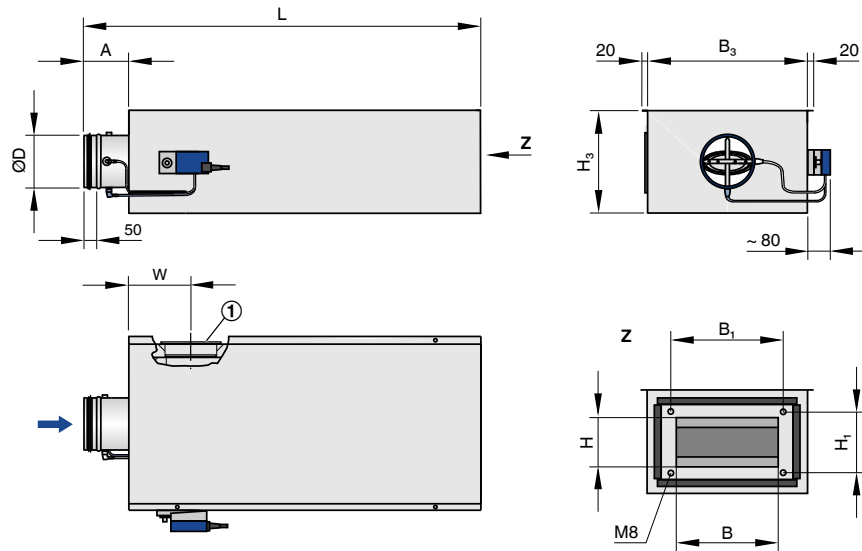
For exact dimensions see the section 'Space required for commissioning and maintenance'.

① Inspection access

Dimensions/weights of TVZ

NG	B	H	L	ØD	A	B ₁	B ₃	H ₁	H ₃	W	kg
125	198	152	1185	124	150	232	300	186	236	115	21
160	308	152	1235	159	200	342	410	186	236	115	25
200	458	210	1520	199	200	492	560	244	281	115	33
250	598	201	1690	249	250	632	700	235	311	215	55
315	798	252	1690	314	250	832	900	286	361	215	73
400	898	354	2070	399	250	932	1000	388	446	215	118

VAV terminal unit with acoustic cladding (TVZ-D)



Note:

Total length L is the total casing length.

The length of the installed unit is approx. 12 mm less. See flange detail.

The illustration shows control component types Easy, Compact.

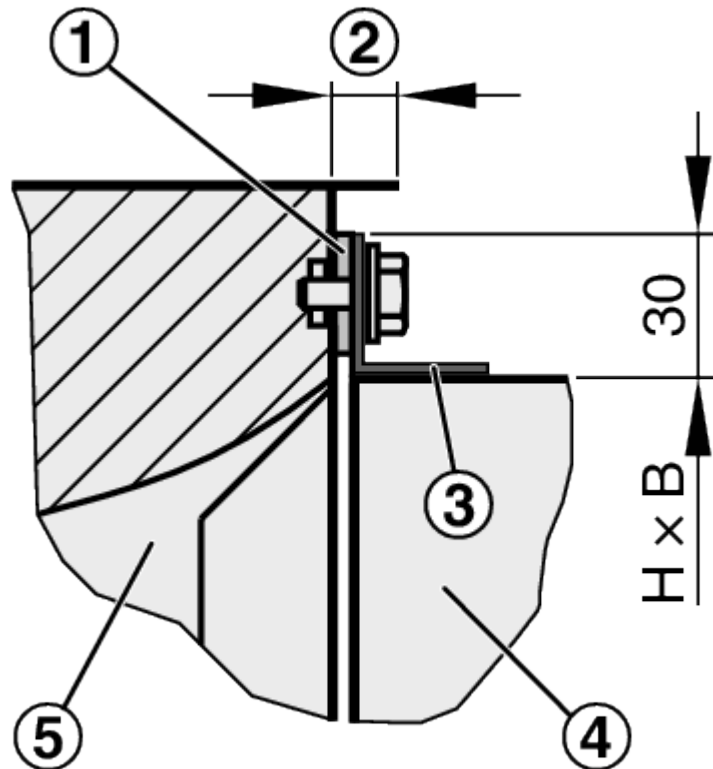
For exact dimensions see the section 'Space required for commissioning and maintenance'.

① Inspection access

Dimensions/weights of TVZ-D

NG	B	H	L	ØD	A	B ₁	B ₃	H ₁	H ₃	W	kg
125	198	152	1185	124	110	232	380	186	316	155	41
160	308	152	1235	159	160	342	490	186	316	155	50
200	458	210	1520	199	160	492	640	244	361	155	63
250	598	201	1690	249	210	632	780	235	391	255	95
315	798	252	1690	314	210	832	980	286	441	255	133
400	898	354	2070	399	210	932	1080	388	526	255	193

Flange detail

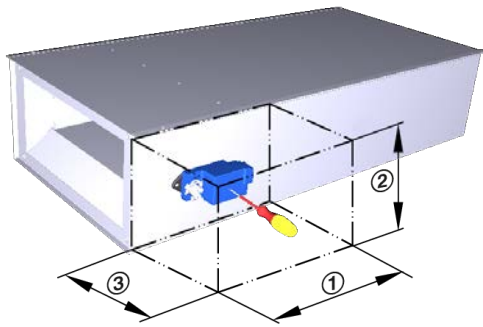


- 1 Compressible seal, to be provided by others
- 2 Flanges on both ends indented by approx. 12 mm
- 3 Flange
- 4 Duct
- 5 VAV terminal unit

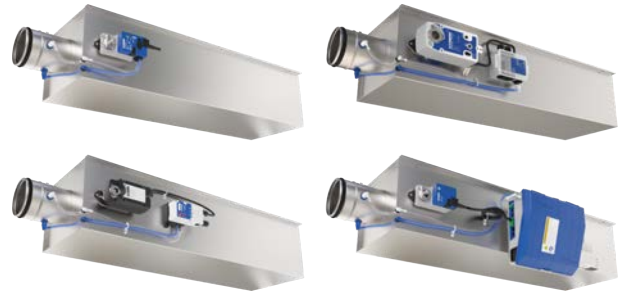
Space required for commissioning and maintenance

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.

Access to attachments



Product examples



Schematic illustration of required installation space

BC0, BUDNF, XD4, TUN

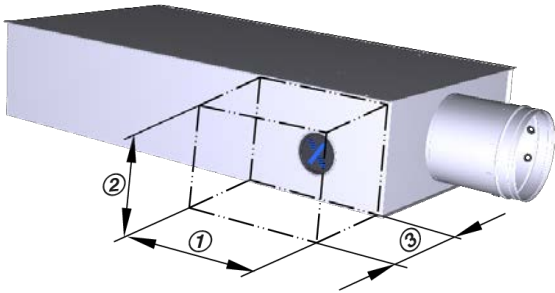
Space required

Attachment	①	②	③
VARYCONTROL			
Easy controller: Easy	400	300	300
Compact controller: BC0, BL0 *, BM0, BM0-J6, LN0, LK0, XB0, XD0, XF0	400	300	300
Universal controller: B13 *, B1B *, BB3 *, BBB *, BG3 *, BGB *, BH3 *, BHB *, BP3 *, BPB *, BPG *, BR3 *, BRB *, BRG *, BS3 *, BSB *, BSG *, BUDN, BUDNF, BUSN, BUSNF, BUSS, BUPN, BUPNF, BURN, BURNF, XB4, XD4, XF4	700	300	300
TROX UNIVERSAL			
TROX UNIVERSAL: TUN, TUS, TUSD	900	350	400
LABCONTROL			
EASYLAB: ELAB	900	350	400

* Control component has been discontinued

** Control component to be discontinued - do not include in new projects

Inspection access

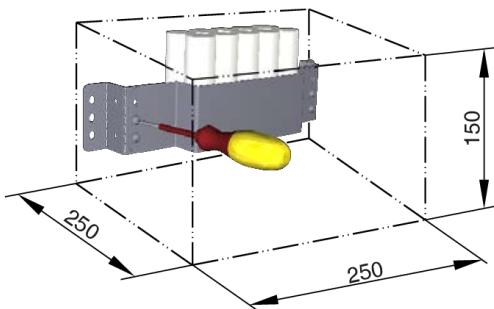


Schematic illustration of required installation space

Space required for inspection access

Attachment	①	②	③
Inspection access	400	300	300

Accessibility to the battery pack



Product example



Schematic illustration of required installation space

Attachment TVZ/.../TUN/.../U

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

Product details

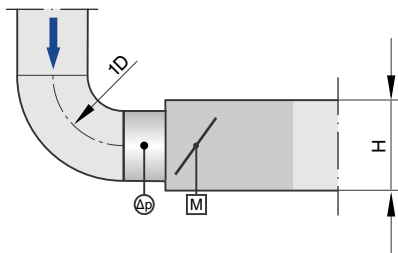
Installation and commissioning

- Any installation orientation (except units with static effective pressure transducer)
- Return edges of the casing with drilled holes suitable for M10 threaded rods
- TVZ-D: For constructions with acoustic cladding, ducts on the room side should have cladding up to the acoustic cladding of the controller

Upstream conditions

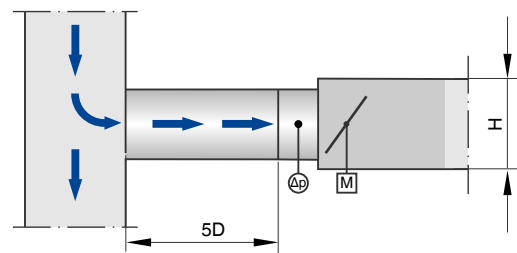
The volume flow rate accuracy Δ_{qv} applies to straight upstream section of the duct. Bends, junctions or a narrowing or widening of the duct cause turbulence that may affect measurement. Duct connections, e.g. branches off the main duct, must comply with EN 1505. Some installation situations require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

Bend



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

Junction



A junction causes strong turbulence. The stated volume flow rate accuracy Δ_{qv} can only be achieved with a straight duct section of at least 5D upstream.

VARYCONTROL control components

Attachment	Controlled variable	Interface	Pressure transducer	Actuator	Manufacturer
Easy controller, dynamic					
Easy	qv	0 – 10 V	integral	slow-running integral	①
Compact controller, dynamic					
BC0	qv	0 – 10 V or 2 – 10 V or MP bus interface	integral	slow-running integral	②
BL0 **	qv	LonWorks FTT 10 interface	integral	slow-running integral	②
BM0	qv	Modbus RTU/BACnet MS/TP	integral	slow-running integral	②
BM0-J6	qv	Modbus RTU/BACnet MS/TP with RJ12 socket (for X-AIRCONTROL)	integral	slow-running integral	②
LK0	qv	KNX interface	integral	slow-running integral	⑤
LN0	qv	0 – 10 V or 2 – 10 V	integral	slow-running integral	⑤
XB0	qv	0 – 10 V or 2 – 10 V	integral	slow-running integral	③
Compact controller, static					
XD0	qv	0 – 10 V or 2 – 10 V	integral	slow-running integral	③
XF0	Δp	0 – 10 V or 2 – 10 V	integral, control range adjustable 25 - 550 Pa	slow-running integral	③
Universal controller, dynamic					
B13 *	qv	0 – 10 V or 2 – 10 V	integral	slow-running separate	②
B1B *	qv	0 – 10 V or 2 – 10 V	integral	spring return actuator separate	②
BUDN	qv	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TPTP	integral	slow-running separate	②
BUDNF	qv	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TPTP	integral	spring return actuator separate	②
XB4	qv	0 – 10 V or 2 – 10 V	integral	spring return actuator separate	③
VARYCONTROL Universal controller, static					
BB3 *	qv	2 – 10 V	individual component	slow-running separate	②

Attachment	Controlled variable	Interface	Pressure transducer	Actuator	Manufacturer
BBB *	qv	2 – 10 V	individual component	spring return actuator separate	②
BG3 *	Δp	2 – 10 V	individual component 100 Pa	slow-running separate	②
BGB *	Δp	2 – 10 V	individual component 100 Pa	spring return actuator separate	②
BH3 *	Δp	2 – 10 V	individual component 600 Pa	slow-running separate	②
BHB *	Δp	2 – 10 V	individual component 600 Pa	spring return actuator separate	②
BP3 *	qv	0 – 10 V or 2 – 10 V or MP bus interface	individual component	slow-running separate	②
BPB *	qv	0 – 10 V or 2 – 10 V or MP bus interface	individual component	spring return actuator separate	②
BPG *	qv	0 – 10 V or 2 – 10 V or MP bus interface	individual component	fast-running separate	②
BR3 *	Δp	0 – 10 V or 2 – 10 V or MP bus interface	individual component 100 Pa	slow-running separate	②
BRB *	Δp	0 – 10 V or 2 – 10 V or MP bus interface	individual component 100 Pa	spring return actuator separate	②
BRG *	Δp	0 – 10 V or 2 – 10 V or MP bus interface	individual component 100 Pa	fast-running separate	②
BS3 *	Δp	0 – 10 V or 2 – 10 V or MP bus interface	individual component 600 Pa	slow-running separate	②
BSB *	Δp	0 – 10 V or 2 – 10 V or MP bus interface	individual component 600 Pa	spring return actuator separate	②
BSG *	Δp	0 – 10 V or 2 – 10 V or MP bus interface	individual component 600 Pa	fast-running separate	②
BUPN	Δp	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TPTP	integral Control range adjustable 25 – 450 Pa	slow-running separate	②
BUPNF	Δp	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TPTP	integral Control range adjustable 25 – 450 Pa	spring return actuator separate	②
BURN	Δp	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TPTP	integral Control range adjustable -50 ... -10 Pa or 10 ... 50 Pa	slow-running separate	②
BURNF	Δp	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TPTP	integral Control range adjustable -50 ... -10 Pa or 10 ... 50 Pa	spring return actuator separate	②

Attachment	Controlled variable	Interface	Pressure transducer	Actuator	Manufacturer
BUSN	qv	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TPTP	integral	slow-running separate	②
BUSNF	qv	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TPTP	integral	spring return actuator separate	②
BUSS	qv	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TPTP	integral	fast-running separate	②
XD4	qv	0 - 10 V or 2 - 10 V	integral	spring return actuator separate	③
XF4	Δp	0 - 10 V or 2 - 10 V	integral, control range adjustable 25 - 550 Pa	spring return actuator separate	③

* Control component has been discontinued

** Control component to be discontinued - do not include in new projects

qv, Volume flow rate

Δp, Differential pressure

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

TROX UNIVERSAL control components

Attachment	Controlled variable	Interface	Pressure transducer	Actuator	Manufacturer
VARYCONTROL Universal controller, static					
TUN	qv, Δp	TROX Plug&Play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: Modbus, BACnet, web server	qv = integral Δp = separate	slow-running separate	①
TUNF	qv, Δp	TROX Plug&Play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: Modbus, BACnet, web server	qv = integral Δp = separate	spring return actuator separate	①
TUS	qv, Δp	TROX Plug&Play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: Modbus, BACnet, web server	qv = integral Δp = separate	fast-running separate	①
TUSD	qv, Δp	TROX Plug&Play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: Modbus, BACnet, web server	qv = integral Δp = separate	fast-running with digital communication interface (TROX HPD), separate	①

qv, Volume flow rate

Δp, Differential pressure

① TROX

LABCONTROL EASYLAB control components

Attachment	Controlled variable	Interface	Pressure transducer	Actuator	Manufacturer
EASYLAB					
ELAB	qv, Δp *	TROX plug and play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: Modbus, BACnet, web server	qv = integral Δp = separate	fast-running, separate or fast-running with digital communication interface (TROX HPD), separate	③

① TROX

* The controlled variable depends on the type of VAV terminal unit

- TVR, TVRK: Fume cupboard, room supply air, room extract air, room pressure, single controller
- TVLK: Fume cupboard, single controller
- TVJ, TVT: Room supply air, room extract air, room pressure, single controller
- TVZ, TZ-Silenzio: Room supply air, room pressure, single controller
- TVA, TA-Silenzio: Room extract air, room pressure, single controller

Nomenclature

Dimensions of rectangular units

B [mm]
Duct width

B_1 [mm]
Screw hole pitch of flange (horizontal)

B_2 [mm]
Overall dimension of flange (width)

H [mm]
Duct height

H_1 [mm]
Screw hole pitch of flange (vertical)

H_2 [mm]
Overall dimension of flange (height)

Dimensions of circular units

$\varnothing D$ [mm]
Basic units made of sheet steel: Outer diameter of the spigot;
basic units made of plastic: Inside diameter of the spigot

$\varnothing D_1$ [mm]
Pitch circle diameter of flanges

$\varnothing D_2$ [mm]
Outer diameter of flanges

L [mm]
Length of unit including connecting spigot

L_1 [mm]
Length of casing or acoustic cladding

n []
Number of flange screw holes

T [mm]
Flange thickness

General information

m [kg]
Unit weight including the minimum required attachments (control component)

NS [mm]
Nominal size

f_m [Hz]
Octave band centre frequency

L_{PA} [dB(A)]
A-weighted sound pressure level of air-regenerated noise of the VAV terminal unit, system attenuation taken into account

L_{PA1} [dB(A)]

A-weighted sound pressure level of air-regenerated noise of the VAV terminal unit with secondary silencer, system attenuation taken into account

L_{PA2} [dB(A)]
A-weighted sound pressure level of case-regenerated noise of the VAV terminal unit, system attenuation taken into account

L_{PA3} [dB(A)]
A-weighted sound pressure level of case-regenerated noise of the VAV terminal unit with acoustic cladding, system attenuation taken into account

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

q_{vNom} [m^3/h]; [l/s]
Nominal flow rate (100 %): The value depends on product type, nominal size and control component (attachment). Values are published on the internet and in technical leaflets and stored in the Easy Product Finder design program. Reference value for calculating percentages (e.g. q_{vmax}). Upper limit of the setting range and maximum volume flow rate setpoint value for the VAV terminal unit.

$q_{vmin Unit}$ [m^3/h]; [l/s]
Technically possible minimum volume flow rate: The value depends on product type, nominal size and control component (attachment). Values are stored in the Easy Product Finder design program. Lower limit of the setting range and minimum volume flow rate setpoint value for the VAV terminal unit. Setpoint values below $q_{vmin unit}$ (if q_{vmin} equals zero) may result in unstable control or shut-off.

q_{vmax} [m^3/h]; [l/s]
Upper limit of the operating range for the VAV terminal unit that can be set by customers: q_{vmax} can be set to less than or equal to q_{vNom} . In case of analogue signalling to volume flow controllers (which are typically used), the set maximum value (q_{vmax}) is allocated to the maximum setpoint signal (10 V) (see characteristic).

q_{vmin} [m^3/h]; [l/s]
Lower limit of the operating range for the VAV terminal unit that can be set by customers: q_{vmin} should be set to less than or equal to q_{vmax} . Do not set q_{vmin} to less than $q_{vmin unit}$ as the control may become unstable or the damper blade may close. q_{vmin} may equal zero. In case of analogue signalling to volume flow controllers (which are typically used), the set minimum value (q_{vmin}) is allocated to the minimum setpoint signal (0 or 2 V) (see characteristic).

q_v [m^3/h bzw. l/s]
Volume flow rate

Δ_{qv} [%]
Volume flow rate accuracy in relation to the setpoint (tolerance)

Δp_{st} [Pa]

Static differential pressure

 $\Delta p_{st\ min}$ [Pa]

Static minimum differential pressure: The static minimum differential pressure is equal to the pressure loss of the VAV terminal unit when the damper blade is open, caused by flow resistance (damper blade). If the differential pressure on the VAV terminal unit is too low, the setpoint volume flow rate may not be achieved, not even when the damper blade is open. Important factor in designing the ductwork and in rating the fan including speed control. Sufficient static differential pressure must be ensured for all operating conditions and for all controllers, and the measurement point or points for speed control must have been selected accordingly to achieve this.

Lengths

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

Basic unit

Unit for controlling a volume flow without an attached control component. The main components include the casing with sensor(s) to measure the effective pressure and the damper

blade to restrict the volume flow. The basic unit is also referred to as a VAV terminal unit. Important distinguishing features: Geometry or unit shape, material and types of connection, acoustic characteristics (e.g. acoustic cladding or integral sound attenuator), volume flow rate range.

Control component

Electronic unit(s) mounted on the basic unit to control the volume flow rate or the duct pressure or the room pressure by adjusting the damper blade position. The electronic unit consists basically of a controller with effective pressure transducer (integral or external) and an integral actuator (Easy and Compact controllers) or external actuator (Universal or LABCONTROL controllers). Important distinguishing features: Transducer: dynamic transducer for clean air or static transducer for contaminated air. Actuator: slow-running actuator as standard, spring return actuator for safe position, or fast-running actuator. Interface: analogue interface or digital bus interface for the capturing of signals and data.

VAV terminal unit

Consists of a basic unit with an attached control component.