

**VAV TERMINAL UNIT,  
VARIANT TVZ**

- VAV terminal unit for variable supply air volume flow control



**EASY CONTROLLER,  
COMPACT CONTROLLER**

Easy controller, Compact controller

**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



**TROX UNIVERSAL controller,  
TROX LABCONTROL controller**



**CIRCULAR CONNECTION  
ON THE FAN END**

Circular connection on the fan end



**RECTANGULAR  
CONNECTION ON THE  
ROOM END**

Rectangular connection on the



**TESTED TO VDI 6022**

Tested to VDI 6022

room end

## General information

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### 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

Fulfills 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

## TECHNICAL INFORMATION

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



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).

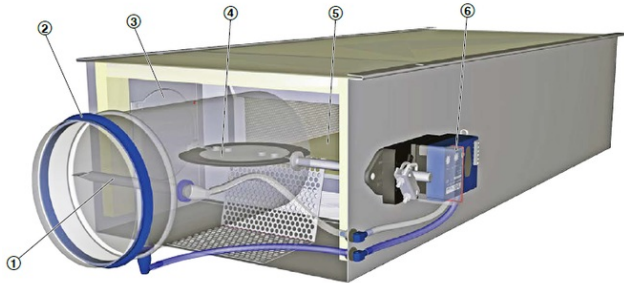
For most applications, the setpoint value comes from a room temperature controller.

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

Nominal sizes	125 – 400 mm
Volume flow rate range	14 – 2007 l/s or 50 – 7228 m <sup>3</sup> /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 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 [m³/h]	Δp <sub>stmin</sub> [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
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<sub>v</sub> Extended

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

NS	qv [l/s]	qv [m³/h]	Δp <sub>stmin</sub> [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<sub>v</sub> As standard

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

NS	qv [l/s]	qv [m³/h]	Δp <sub>stmin</sub> [Pa]		Δqv [±%]
			①	②	
125	14	50	1	2	20
125	58	207	14	19	9
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 <sub>stmin</sub> [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
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<sub>PA</sub>

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  $\Delta_{pst}$  of 150 or 500 Pa

① Basic unit

② Basic unit with secondary silencer TS

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

**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  $\Delta_{pst}$  of 150 or 500 Pa

① Basic unit

② Basic unit with acoustic cladding

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

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.

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 m<sup>3</sup>/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

- $q_v$  \_\_\_\_\_ [m<sup>3</sup>/h]
- $\Delta p_{st}$  \_\_\_\_\_ [Pa]

Air-regenerated noise

- $L_{PA}$  \_\_\_\_\_

[dB(A)]

Case-radiated noise

- $L_{PA}$  \_\_\_\_\_

[dB(A)]

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

2 Acoustic cladding

No entry required: None  
D With acoustic cladding

3 Nominal size [mm]1

25160200250315400

4 Accessories

No entry required: None  
D1 Double lip seal

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	With
Nominal size	200 mm
Attachments (control components)	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

2 Acoustic cladding

No entry required: None  
D With acoustic cladding

3 Nominal size [mm]

125160200250315400

4 Accessories

No entry required: None  
D1 Double lip seal

5 Attachments (control components)

For example  
BC0 Compact controller  
XB4 Universal controller (VARYCONTROL)

7 Operating mode

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

8 Signal voltage range  
 For the actual and setpoint value signals  
 0 0 – 10 V DC  
 2 2 – 10 V DC

9 Operating values for factory setting  
 Volume flow rate [m³/h or l/s]  
 q<sub>vconst</sub> (in operating mode F)  
 q<sub>vmin</sub> – q<sub>vmax</sub> (in operating mode V)

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<sub>vmin</sub> = 180 m³/h/q<sub>vmax</sub> = 850 m³/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

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 Room control  
 RS Supply air control (Room Supply)

7 Volume flow rate setting  
 M Master (RMF function)  
 S Slave  
 F Constant flow rate controller

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: Automatic zero point correction  
 No entry required: None  
 Z EM-AUTOZERO with solenoid valve

10 Operating values for factory setting  
 Volume flow rate [m³/h or l/s]  
 Master (RMF function)  
 q<sub>vmin</sub>: Minimum volume flow rate  
 q<sub>vmax</sub>: Maximum volume flow rate  
 q<sub>vconst\_CLOSED</sub>: Constant supply air  
 q<sub>vconst\_Exhaust</sub>: Constant extract air  
 q<sub>vDiff</sub>: Supply air/extract air difference Constant value  
 q<sub>vconst</sub>: Constant volume flow rate Slave  
 No entry required

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

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 <sub>vmin</sub> = 600 m³/h, q <sub>vmax</sub> = 1250 m³/h q <sub>vconst_CLOSED</sub> = 0 m³/h, q <sub>vconst_Exhaust</sub> = 0 m³/h q <sub>vDiff</sub> = -100 m³/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

2 Acoustic cladding

No entry required: None

D With acoustic cladding

3 Nominal size [mm]

125160200250315400

4 Accessories No entry required: None

D1 Double lip seal

5 Attachments (control components)

For example

XF0 Compact controller for duct pressure

XF4 Universal controller for duct pressure (VARYCONTROL)

6 Equipment function/installation location

PDS Duct pressure control, supply air

PRS Room pressure control, supply air

7 Operating mode

F Constant value (a setpoint value)

V Variable (setpoint value range)

8 Signal voltage range

For the actual and setpoint value signals

0 0 – 10 V DC

2 2 – 10 V DC

9 Operating values for factory setting

Differential pressure [Pa]

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

$\Delta p_{const}$  (in operating mode F)

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

10 Damper blade position

Only spring return actuators

NO Power off to OPEN

NC Power off to CLOSE

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]

125160200250315400

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 Y

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  
 $\Delta p_{min}$ : minimum differential pressure  
 $\Delta p_{max}$ : maximum differential pressure Slave SFP  
 $\Delta p_{const}$ : Constant differential pressure Master MFP and MVP like Slave, but additionally  
 $q_{vmin}$ : minimum volume flow rate  
 $q_{vmax}$ : maximum volume flow rate  
 $q_{vconst\_CLOSED}$ : constant supply air  
 $q_{vconst\_Exhaust}$ : constant extract air  
 $q_{vDiff}$ : 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-MODBACnet MS/TP interface card
Operating values	$\Delta p_{min} = -10$ Pa, $\Delta p_{max} = -60$ Pa $q_{vmin} = 600$ m³/h, $q_{vmax} = 1250$ m³/h, $q_{const\_Supply\ air} = 0$ m³/h, $q_{const\_Extract\ air} = 0$ m³/h, $q_{Diff} = -100$ m³/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  
 2 Acoustic cladding  
 No entry required: None  
 D With acoustic cladding

3 Nominal size [mm]  
 125160200250315400

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 Room control  
 RS Supply air control (Room Supply)  
 PC Differential pressure control (Pressure Control)

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

10 Additional functions  
 Without room management function  
 LAB Extract air led system (laboratories)  
 CLR Supply air led system (clean rooms)  
 With room management function  
 LAB-RMF Extract air led system  
 CLR-RMF Supply air led system

11 Operating values for factory setting  
 (only required when room management function is active)  
 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  
 $\Delta p_{Set}$ : Setpoint pressure (only with differential pressure control)

Useful additions  
 Room control panel (only for devices with RMF)  
 BE-LCD 40-character display  
 The differential pressure transducer required for room pressure control (equipment function) has to be ordered separately, e.g.  
 PT-699 Measuring range  $\pm 50$  Pa or  $\pm 100$  Pa  
 PT-GB604 Measuring range  $\pm 100$  Pa

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
Operating values	$q_{v1} = 3500 \text{ m}^3/\text{h}$ / $q_{v2} = 1000 \text{ m}^3/\text{h}$ / $q_{v3} = 5000 \text{ m}^3/\text{h}$ / $q_{v4} = 250 \text{ m}^3/\text{h}$ / $q_{v5} = 0$ / $q_{v6} = -150 \text{ m}^3/\text{h}$

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]  
125160200250315400

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  
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 [m<sup>3</sup>/h or l/s]  
Depending on external volume flow rate setting  
E0, E2:  $q_{vmin}/q_{vmax}$   
2P:  $q_{v1}/q_{v2}$   
3P:  $q_{v1}/q_{v2}/q_{v3}$   
F:  $q_{v1}$

Order example: TVZ/315/ELAB/S/SC/F/2800 m<sup>3</sup>/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	$q_{v1} = 2800 \text{ m}^3/\text{h}$

#### Attachments

[Type Easy](#)  
[Type Compact, dynamic](#)  
[Type Compact, static](#)  
[Type Universal, dynamic](#)  
[Type Universal, static](#)  
[Type EASYLAB TCU3](#)

#### Additional products

[Type TS](#)  
[Type WT](#)

#### VAV terminal unit, variant TVZ



- VAV terminal unit for variable supply air volume flow control

#### VAV terminal unit with acoustic cladding (TVZ-D)



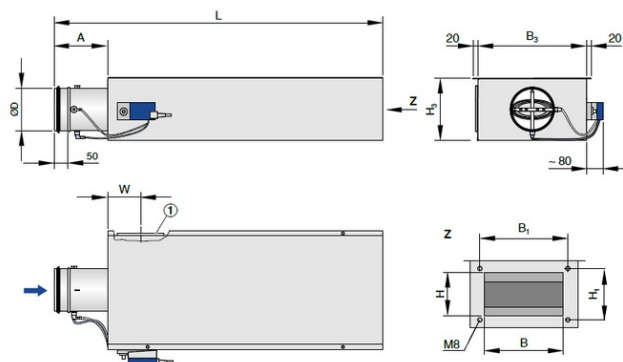
- VAV terminal unit with acoustic cladding for variable supply air volume flow control
- For rooms where the case-radiated noise of the unit is not sufficiently reduced by a false ceiling
- The circular ducts for the room under consideration must have adequate acoustic insulation (provided by others)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

NG	B	H	L	∅D	A	B <sub>1</sub>	B <sub>3</sub>	H <sub>1</sub>	H <sub>3</sub>	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	632	900	286	361	215	73
400	898	354	2070	399	250	932	1000	388	446	215	118

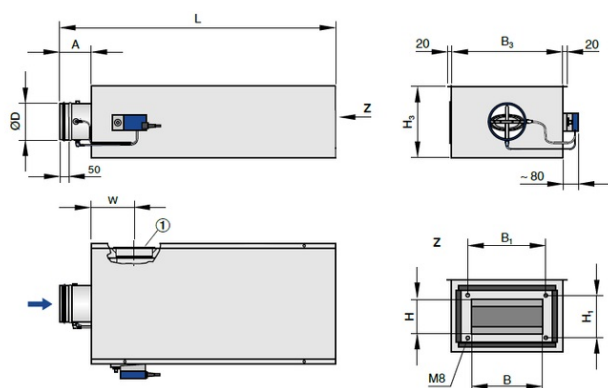
### Dimensions/weights of TVZ-D

NG	B	H	L	∅D	A	B <sub>1</sub>	B <sub>3</sub>	H <sub>1</sub>	H <sub>3</sub>	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	632	980	286	441	255	133
400	898	354	2070	399	210	932	1080	388	526	255	193

### VAV terminal unit without acoustic cladding (TVZ)



### VAV terminal unit with acoustic cladding (TVZ-D)



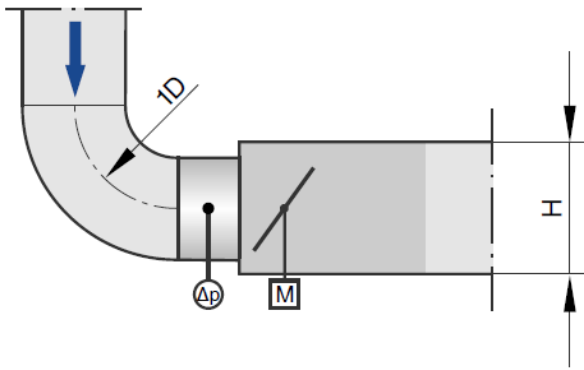
Installation and commissioning

- 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

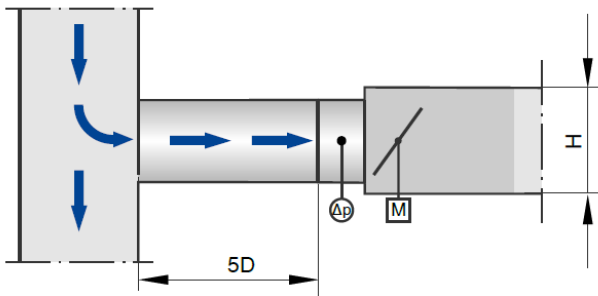
The volume flow rate accuracy  $\Delta_{qv}$  applies to straight upstream section of the duct. Bends, junctions or a narrowing or widening of the duct cause turbulence that may affect measurement. Duct connections, e.g. branches off the main duct, must comply with EN 1505. Some installation situations 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  $\Delta_{qv}$  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
<b>Easy controller, dynamic</b>					
Easy	qv	0 – 10 V	integral	slow-running integral	①
<b>Compact controller, dynamic</b>					
BC0	qv	0 – 10 V or 2 – 10 V or MP bus interface	integral	slow-running integral	②

Attachment	Controlled variable	Interface	Pressure transducer	Actuator	Manufacturer
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
<b>Compact controller, static</b>					
XD0	qv	0 – 10 V or 2 – 10 V	integral	slow-running integral	③
XF0	$\Delta p$	0 – 10 V or 2 – 10 V	integral, control range adjustable 25 - 550 Pa	slow-running integral	③
<b>Universal controller, dynamic</b>					
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/TP	integral	slow-running separate	②
BUDNF	qv	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TP	integral	spring return actuator separate	②
XB4	qv	0 – 10 V or 2 – 10 V	integral	spring return actuator separate	③
<b>VARYCONTROL Universal controller, static</b>					
BB3 *	qv	2 – 10 V	individual component	slow-running separate	②
BBB *	qv	2 – 10 V	individual component	spring return actuator separate	②
BG3 *	$\Delta p$	2 – 10 V	individual component 100 Pa	slow-running separate	②
BGB *	$\Delta p$	2 – 10 V	individual component 100 Pa	spring return actuator separate	②
BH3 *	$\Delta p$	2 – 10 V	individual component 600 Pa	slow-running separate	②
BHB *	$\Delta p$	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

Attachment	Controlled variable	Interface	Pressure transducer	Actuator	Manufacturer
BR3 *	$\Delta p$	0 – 10 V or 2 – 10 V or MP bus interface	individual component 100 Pa	slow-running separate	②
BRB *	$\Delta p$	0 – 10 V or 2 – 10 V or MP bus interface	individual component 100 Pa	spring return actuator separate	②
BRG *	$\Delta p$	0 – 10 V or 2 – 10 V or MP bus interface	individual component 100 Pa	fast-running separate	②
BS3 *	$\Delta p$	0 – 10 V or 2 – 10 V or MP bus interface	individual component 600 Pa	slow-running separate	②
BSB *	$\Delta p$	0 – 10 V or 2 – 10 V or MP bus interface	individual component 600 Pa	spring return actuator separate	②
BSG *	$\Delta p$	0 – 10 V or 2 – 10 V or MP bus interface	individual component 600 Pa	fast-running separate	②
BUPN	$\Delta p$	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TP	integral Control range adjustable 25 – 450 Pa	slow-running separate	②
BUPNF	$\Delta p$	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TP	integral Control range adjustable 25 – 450 Pa	spring return actuator separate	②
BURN	$\Delta p$	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TP	integral Control range adjustable -50 ... - 10 Pa or 10 ... 50 Pa	slow-running separate	②
BURNF	$\Delta p$	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TP	integral Control range adjustable -50 ... - 10 Pa or 10 ... 50 Pa	spring return actuator separate	②
BUSN	qV	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TP	integral	slow-running separate	②
BUSNF	qV	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TP	integral	spring return actuator separate	②
BUSS	qV	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TP	integral	fast-running separate	②
XD4	qV	0 – 10 V or 2 – 10 V	integral	spring return actuator separate	③
XF4	$\Delta p$	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

q<sub>v</sub> Volume flow rate

$\Delta p$  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

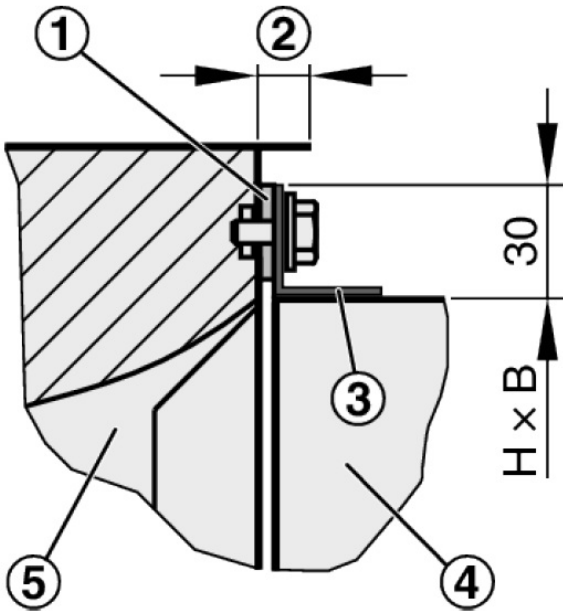
- TVR, TVRK: Fume cupboard, room supply air, room extract air, room pressure, single controller
- TVLK: Fume cupboard, single controller
- TVJ, TVT: Room supply air, room extract air, room pressure, single controller
- TVZ, TZ-Silenzio: Room supply air, room pressure, single controller
- TVA, TA-Silenzio: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





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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.

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

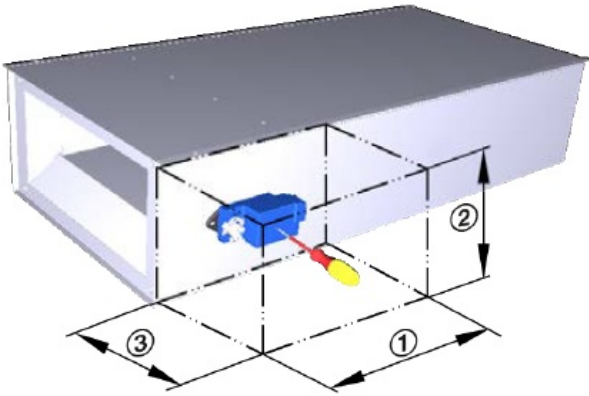
\* Control component has been discontinued

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

#### Space required for inspection access

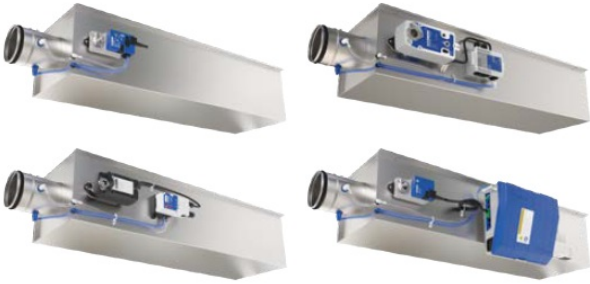
Attachment	①	②	③
Inspection access	400	300	300

#### Access to attachments



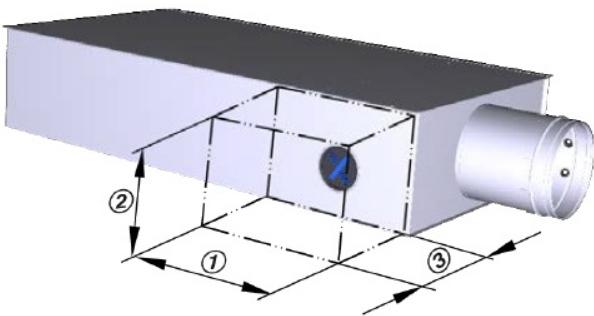
Schematic illustration of required installation space

**Product examples**



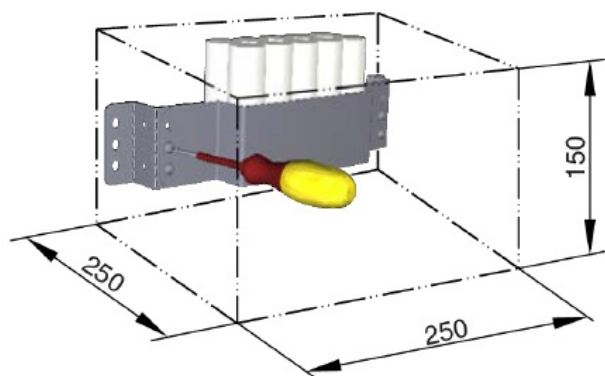
BC0, BUDNF, XD4, TUN

**Inspection access**



Schematic illustration of required installation space

**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 example



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