



Easy controller, Compact controller



TROX UNIVERSAL controller, TROX LABCONTROL controller

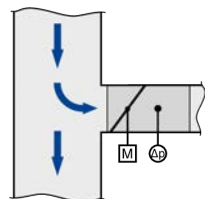
Variable volume flow control VAV terminal units

TZ-Silenzio



Rectangular connections on both ends

For supply air systems with demanding acoustic requirements and low airflow velocities



For all upstream conditions

Rectangular VAV terminal units for the supply air control in buildings with variable air volume systems, demanding acoustic requirements and low airflow velocities

- Highly effective integral attenuator
- Optimised for airflow velocities of 0.7 – approx. 7 m/s
- High control accuracy, even in case of unfavourable upstream conditions
- Compact construction with rectangular connections on both ends
- Electronic control components for different applications (Easy, Compact, Universal, and LABCONTROL)
- Closed blade air leakage to EN 1751, Class 4
- Casing leakage to EN 1751, Class C



Tested to VDI 6022

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 airflows in supply air systems with low velocities and demanding 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 differential pressure control with suitable control components

Special features

- Hygiene tested and certified
- Direct connection to ductwork
- 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

Nominal sizes

- 125, 160, 200, 250, 315

Variants

- TZ-Silenzio: supply air unit
- TZ-Silenzio-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
- Factory assembled control components complete with wiring and tubing
- Aerodynamic functional testing on a special test rig prior to 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 in case of unfavourable upstream conditions

Attachments

- Easy controller: compact unit with potentiometers
- 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

Useful additions

- Secondary silencer Type TS
- Heat exchanger Type WT

Construction features

- Rectangular casing
- Replaceable seals
- Flanges on both ends for the connection to ductwork
- Position of the damper blade indicated externally at shaft extension
- Thermal and acoustic insulation (lining)

Materials and surfaces

- Casing made of galvanised sheet steel
- Damper blade and effective pressure sensor made of aluminium
- Lining is mineral wool
- 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
- For other applicable standards and guidelines refer to the hygiene certificate

Casing leakage

- EN 1751, Class C

Closed blade air leakage

- 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.

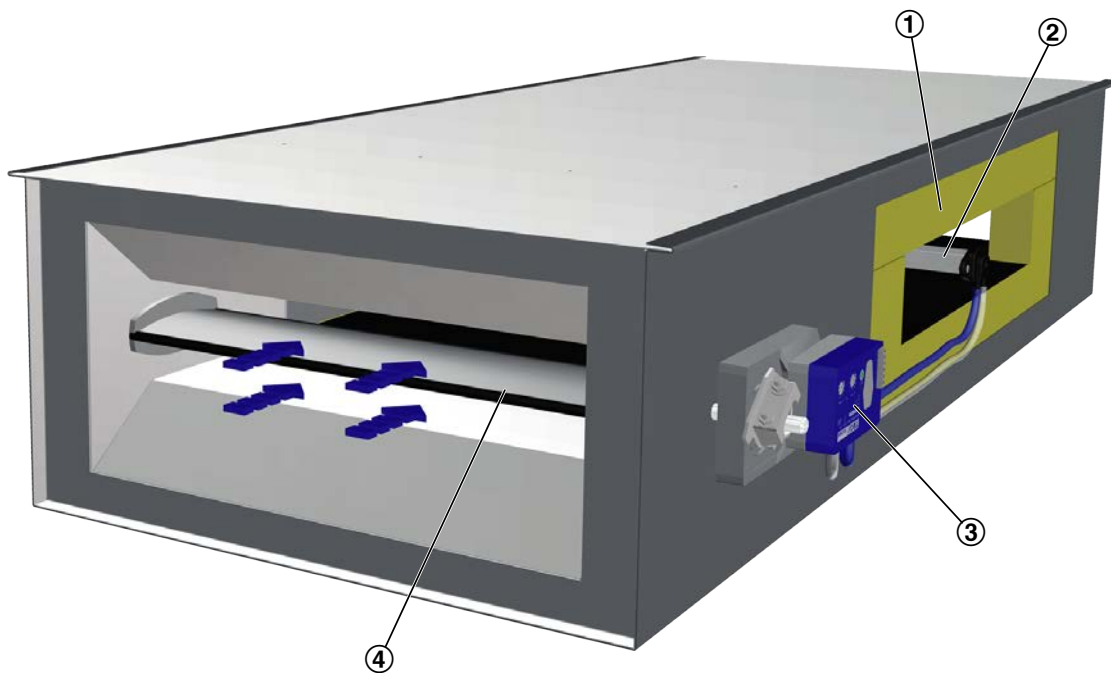
The control components (attachments) include an effective pressure transducer that transforms the effective pressure into an electric signal, a controller, and an actuator; the control functions can be achieved with an Easy controller, with a Compact controller, or with individual components (Universal).

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.

Schematic illustration of the TZ-Silenzio



- ① Integral sound attenuator
- ② Effective pressure sensor
- ③ Control components, e.g. an Easy controller
- ④ Damper blade with seal

Technical data

Nominal sizes	125 – 315
Volume flow rate range	30 – 840 l/s or 108 – 3024 m ³ /h
Volume flow rate control range (unit with dynamic differential pressure measurement)	Approx. 10 to 100 % of the nominal volume flow rate
Minimum differential pressure	5 – 65 Pa
Maximum differential pressure	1000 Pa
Operating temperature	10 – 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]	Δp_{stmin} [Pa]		Δqv [±%]
			①	②	
125	27	95	2	3	8
125	79	283	13	23	6
125	131	472	35	63	5
125	183	660	68	123	4
160	42	150	2	3	8
160	124	447	11	21	6
160	207	745	30	58	5
160	289	1042	58	113	4
200	60	213	2	3	9
200	176	634	12	26	6
200	293	1056	32	71	5
200	410	1477	62	138	5
250	75	269	2	3	9
250	223	801	13	23	6
250	371	1334	34	62	5
250	518	1866	66	121	5
315	126	452	2	3	9
315	375	1349	13	20	6
315	624	2245	36	56	5
315	872	3142	70	108	5

① Basic unit

② Basic unit with secondary silencer TS

Volume flow rate ranges and minimum differential pressure values

Control component for dynamic pressure measurements – q_v with expansion module

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

NS	q_v [l/s]	q_v [m ³ /h]	Δp_{stmin} [Pa]		Δq_v [±%]
			①	②	
125	27	95	2	3	8
125	94	339	18	33	5
125	162	584	53	97	5
125	230	828	106	194	4
160	42	150	2	3	8
160	149	535	16	30	5
160	256	920	45	88	5
160	362	1305	90	177	4
200	60	213	2	3	9
200	211	759	17	37	6
200	363	1305	49	108	5
200	514	1851	98	216	5
250	75	269	2	3	9
250	266	959	18	32	6
250	458	1648	51	95	5
250	649	2338	103	190	5
315	126	452	2	3	9
315	448	1614	19	29	6
315	771	2775	55	85	5
315	1093	3937	109	170	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 for dynamic pressure measurements - q_v standard

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

NS	q_v [l/s]	q_v [m ³ /h]	Δp_{stmin} [Pa]		Δq_v [±%]
			①	②	
125	27	95	2	3	8
125	81	291	14	24	6
125	136	488	37	68	5
125	190	684	73	133	4
160	42	150	2	3	8
160	128	460	12	22	6
160	214	770	32	62	5
160	300	1080	62	121	4
200	60	213	2	3	9
200	181	652	13	27	6
200	303	1092	34	76	5
200	425	1531	67	148	5
250	75	269	2	3	9
250	229	824	13	24	6
250	383	1379	36	66	5

NS	qv [l/s]	qv [m³/h]	Δpstmin [Pa]		Δqv [±%]
			①	②	
250	537	1934	71	130	5
315	126	452	2	3	9
315	385	1387	14	22	6
315	645	2322	38	59	5
315	904	3257	75	116	5

① Basic unit

② Basic unit with secondary silencer TS

* Control component has been discontinued

Volume flow rate ranges and minimum differential pressure values

Control component for static pressure measurements

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

NS	qv [l/s]	qv [m³/h]	Δpstmin [Pa]		Δqv [±%]
			①	②	
125	27	95	2	3	8
125	81	291	14	24	6
125	136	488	37	68	5
125	190	684	73	133	4
160	42	150	2	3	8
160	128	460	12	22	6
160	214	770	32	62	5
160	300	1080	62	121	4
200	60	213	2	3	9
200	181	652	13	27	6
200	303	1092	34	76	5
200	425	1531	67	148	5
250	75	269	2	3	9
250	229	824	13	24	6
250	383	1379	36	66	5
250	537	1934	71	130	5
315	126	452	2	3	9
315	385	1387	14	22	6
315	645	2322	38	59	5
315	904	3257	75	116	5

① Basic unit

② Basic unit with secondary silencer TS

* Control component has been 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	27	95	16	< 15	22	< 15
125	94	339	32	21	38	27

NS	qv [l/s]	qv [m³/h]	150 Pa		500 Pa	
			①	②	①	②
125	162	584	38	27	43	33
125	230	828	41	n.V.	46	36
160	42	150	17	< 15	23	< 15
160	149	535	32	22	38	27
160	256	920	37	26	42	31
160	362	1305	40	n.V.	45	33
200	60	213	< 15	< 15	19	< 15
200	211	759	27	15	33	21
200	363	1305	31	21	37	25
200	514	1851	34	n.V.	40	29
250	75	269	< 15	< 15	19	< 15
250	266	959	26	15	32	21
250	458	1648	31	19	36	25
250	649	2338	34	n.V.	39	28
315	126	452	< 15	< 15	20	< 15
315	448	1614	25	< 15	31	18
315	771	2775	29	20	35	23
315	1093	3937	32	n.V.	38	27

Air-regenerated noise L_{PA} [dB(A)] with 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 $\Delta_{pst\ min}$.

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	27	95	< 15	< 15	16	< 15
125	94	339	23	22	31	28
125	162	584	29	30	37	36
125	230	828	33	34	41	40
160	42	150	< 15	< 15	20	15
160	149	535	27	26	34	32
160	256	920	33	33	40	39
160	362	1305	37	38	44	44
200	60	213	< 15	< 15	20	< 15
200	211	759	27	25	34	31
200	363	1305	33	32	40	38
200	514	1851	37	37	44	43
250	75	269	< 15	< 15	21	< 15
250	266	959	28	25	35	31
250	458	1648	34	33	41	39
250	649	2338	38	37	45	43
315	126	452	17	< 15	25	18
315	448	1614	32	30	39	35
315	771	2775	38	37	45	43
315	1093	3937	42	42	49	47

Case-radiated noise L_{PA} [dB(A)] with 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 $\Delta_{\text{pst min}}$.

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

Specification text

Rectangular VAV terminal units for variable and constant air volume systems, for demanding acoustic requirements, suitable for supply air, available in 5 nominal sizes. High control accuracy even in case of unfavourable upstream conditions. 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. 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

- Hygiene tested and certified
- Direct connection to ductwork
- 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

Materials and surfaces

- Casing made of galvanised sheet steel
- Damper blade and differential pressure sensor made of aluminium
- Lining is mineral wool
- Plastic plain bearings

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 type

- Flanges on both sides, suitable for duct connection

Equivalence criteria

- Declaration of hygiene conformity in accordance with VDI 6022, part 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} potentiometers
- Electrical connections with screw terminals, no junction box required
- Aerodynamic functional testing of each volume flow controller on a test rig before shipping (test result on a sticker on the controller)
- No upstream section required
- Acoustic data to ÖNORM EN ISO 5135:1999
- Maximum control deviation of 5 % at $q_{v_{\max}}$, without upstream section

Technical data

- Nominal sizes: 125 – 315
- Volume flow rate range: 27 – 872 l/s or 95 – 3142 m³/h
- Minimum differential pressure: up to 106 Pa (without secondary silencer)
- Maximum differential pressure: 1000 Pa
- Closed blade air leakage to EN 1751, Class 4
- Casing leakage to EN 1751, Class C

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 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]
- Δ_{pst} _____ [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)

TZ-Silenzio – D / 200 / Easy
 | | | |
 1 2 3 4

1 Type

TZ-Silenzio VAV terminal unit, supply air

2 Acoustic cladding

No entry: None
 D With acoustic cladding

3 Nominal size

125, 160, 200, 250, 315

4 Attachments (control component)

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

Order example: TZ-Silenzio/125/Easy

Acoustic cladding	None
Nominal size	125
Attachments (control component)	Easy volume flow controller, dynamic, setting of q_{vmin} and q_{vmax} with potentiometers

Order code for volume flow control (with VARYCONTROL attachment)

TZ-Silenzio – D / 200 / XB4 / V 0 / 400 – 1200 [m³/h] / NO
 | | | | | | |
 1 2 3 4 6 7 8 9

1 Type

TZ-Silenzio VAV terminal unit, supply air

2 Acoustic cladding

No entry: None
 D With acoustic cladding

3 Nominal size

125, 160, 200, 250, 315

4 Attachments (control component)

For example
 BC0 Compact controller
 XB4 Universal controller (VARYCONTROL)

6 Operating mode

F Constant value (one setpoint value)

V Variable (setpoint value range)

7 Signal voltage range

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

8 Operating values for factory setting

Volume flow rates [m³/h or l/s]
 q_{vconst} (with operating mode F)
 $q_{vmin} - q_{vmax}$ (with operating mode V)

9 Damper blade position

Only with spring return actuators
 NO Power off to OPEN
 NC Power off to CLOSED

Order example: TZ-Silenzio/200/BC0/V0/300–1200 m³/h

Acoustic cladding	None
Nominal size	200
Attachments (control component)	Compact controller, dynamic transducer, analogue or MP bus interface
Operating mode	Variable operation $q_{vmin} - q_{vmax}$
Signal voltage range	0 – 10 V DC
Operating values	$q_{vmin} = 300 \text{ m}^3/\text{h}$ $q_{vmax} = 1200 \text{ m}^3/\text{h}$

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

TZ-Silenzio – D / 200 / TUNF / RS / M / 0 / UMZ / ... / NC
 | | | | | | | | |
 1 2 3 4 5 6 7 8 9 10

1 Type

TZ-Silenzio VAV terminal unit, supply air

2 Acoustic cladding

No entry: None
 D With acoustic cladding

3 Nominal size

125, 160, 200, 250, 315

4 Attachments (control component)

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)

5 Equipment function

Room control
 RE Extract air control (Room Exhaust)

6 Volume flow rate setting

M Master (RMF)
 S Slave
 F Constant volume flow controller

7 Signal voltage range

0 0 – 10 V DC
 2 2 – 10 V DC

8 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: 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: None
 Z EM-AUTOZERO with solenoid valve

9 Operating values for factory setting

Volume flow rate [m³/h] or [l/s]

Master (RMF)
 q_{vmin} : Minimum volume flow rate
 q_{vmax} : Maximum volume flow rate
 q_{vconst_sup} : Constant supply air
 q_{vconst_ext} : Constant extract air
 q_{vDiff} : Supply air/extract air difference

Constant value

q_{vconst} : Constant volume flow rate

Slave

No entry required

10 Damper blade position

Only with 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: TZ-Silenzio/200/TUN/RS/M/2/UIZ/600/1250/0/0/-100

Acoustic cladding	None
Nominal size	200
Attachments (control component)	TROX UNIVERSAL controller, actuator 150 s
Equipment function	Supply air control
Volume flow rate setting	Master (RMF)
Signal voltage characteristic	2 – 10 V DC
Expansion modules	with expansion module EM-TRF-USV (transformer for 230 V AC and uninterruptible power supply), with expansion module EM-IP (communication interface BACnet IP, Modbus IP, web server), with expansion module EM-AUTOZERO (solenoid valve for automatic zero point correction)

Operating values	$q_{vmin} = 600 \text{ m}^3/\text{h}$ $q_{vmax} = 1250 \text{ m}^3/\text{h}$ $q_{vconst_sup} = 0 \text{ m}^3/\text{h}$ $q_{vconst_ext} = 0 \text{ m}^3/\text{h}$ $q_{vDiff} = -100 \text{ m}^3/\text{h}$
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Order code for differential pressure control (with VARYCONTROL attachment)

TZ-Silenzio – D / 200 / XF4 / PRS / V 0 / 30 – 60 [Pa] / NO
 | | | | | | | | |
 1 2 3 4 5 6 7 8 9

1 Type

TZ-Silenzio VAV terminal unit, supply air

F Constant value (one setpoint value)

V Variable (setpoint value range)

2 Acoustic cladding

No entry: None

D With acoustic cladding

7 Signal voltage range

For the actual and setpoint value signals

0 0 – 10 V DC

2 2 – 10 V DC

3 Nominal size

125, 160, 200, 250, 315

8 Operating values for factory setting

With duct pressure control, the differential pressure [Pa] is always an absolute value

$\Delta_{p, \text{const}}$ (with operating mode F)

$\Delta_{p, \text{min}} - \Delta_{p, \text{max}}$ (with operating mode V)

4 Attachments (control component)

For example

XF0 Compact controller for duct pressure

XF4 Universal controller for duct pressure (VARYCONTROL)

5 Equipment function/Installation location

PDS Duct pressure control, supply air

PRS Room pressure control, supply air

9 Damper blade position

Only with spring return actuators

NO Power off to OPEN

NC Power off to CLOSED

6 Operating mode

Order example: TZ-Silenzio-D/315/XF0/PDS/V2/250 – 375 Pa

Acoustic cladding

With

Nominal size

315

Attachments (control component)

Compact controller for duct pressure

Equipment function

Duct pressure control, supply air

Operating mode

Variable pressure control $P_{\text{min}} - P_{\text{max}}$

Signal voltage characteristic

2 – 10 V DC

Operating values

$P_{\text{min}} = 250 \text{ Pa}$

$P_{\text{max}} = 375 \text{ Pa}$

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

TZ-Silenzio – D / 200 / TUNF / PRS / MFP / 0 / UMZ / ... / NC
 | | | | | | | | | |
 1 2 3 4 5 6 7 8 9 10

1 Type

TZ-Silenzio VAV terminal unit, supply air

2 Acoustic cladding

No entry: None

D With acoustic cladding

3 Nominal size

125, 160, 200, 250, 315

4 Attachments (control component)

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)

5 Equipment function

Differential pressure control

PRS Room pressure control, supply air

PDS Duct pressure control, supply air

6 Differential pressure setting

MFP Master, constant pressure control

MVP Master, variable pressure control

SFP Slave, constant pressure control

SVP Slave, variable pressure control

7 Signal voltage range

0 0 – 10 V DC

2 2 – 10 V DC

8 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: None

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

Order example: TZ-Silenzio/200/TUSD/PRS/MFP/2/BV/-20 Pa/600/1250/0/0/-100

Acoustic cladding

Nominal size

Attachments (control component)

Equipment function/installation location

Differential pressure setting

Signal voltage range

Expansion modules

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: None

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

Option 4: Automatic zero point correction

No entry: None

Z EM-AUTOZERO solenoid valve (only with V)

9 Operating values for factory setting

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

Slave SVP

Δp_{\min} : Minimum differential pressure

Δp_{\max} : Maximum differential pressure slave SFP

Δp_{const} : Constant differential pressure

Master MFP and MVP – same as slave, but additionally:

$q_{v_{\min}}$: Minimum volume flow rate

$q_{v_{\max}}$: Maximum volume flow rate

$q_{v_{\text{const_sup}}}$: Constant supply air

$q_{v_{\text{const_ext}}}$: Constant extract air

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

10 Damper blade position

Only with spring return actuators

NO Power off to OPEN

NC Power off to CLOSE

Useful additions

Room control panel

BE-LCD 40-character display

Order differential pressure transducer for room or duct pressure control separately, e.g.

PT-699 For room pressure control

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



Operating values

$\Delta_{pconst} = -20 \text{ Pa}$
 $q_{wmin} = 600 \text{ m}^3/\text{h}$
 $q_{wmax} = 1250 \text{ m}^3/\text{h}$
 $q_{vconst_sup} = 0 \text{ m}^3/\text{h}$
 $q_{vconst_ext} = 0 \text{ m}^3/\text{h}$
 $q_{vDiff} = -100 \text{ m}^3/\text{h}$

Order code for room control (with EASYLAB attachment)

TZ-Silenzio – D / 200 / ELAB / S / RS / UMZ / LAB / ...
 | | | | | | | | |
 1 2 3 4 5 6 8 9 10

1 Type

TZ-Silenzio VAV terminal unit, supply air

R EM-IP with real time clock

2 Acoustic cladding

No entry: None

D With acoustic cladding

Option 3: Automatic zero point correction

No entry: None

Z EM-AUTOZERO Solenoid valve for automatic zero point correction

3 Nominal size

- 125
- 160
- 200
- 250
- 315

9 Additional functions

Without room management function

LAB Extract air led system (laboratories)

CLR Supply air led system (clean rooms)

4 Attachments (control component)

ELAB EASYLAB controller TCU3

With room management function

LAB-RMF Extract air led system

CLR-RMF Supply air led system

5 Actuators

S Fast-running actuator (3 s)

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

10 Operating values for factory setting

(only required when room management function is active)

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

6 Equipment function

Room control

RS Supply air control (Room Supply)

PC Differential pressure control (Pressure Control)

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)

8 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)

Useful additions

Room control panel (only for units with RMF)

BE-LCD 40-character display

Option 2: Digital communication interface

No entry: 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

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

Order example: TZ-Silenzio/200/ELAB/S/RS/LAB

Acoustic cladding

None

Nominal size

200

Attachments (control component)

EASYLAB controller TCU3

Actuator

Fast-running actuator (3 s)

Equipment function

Supply air control (Room Supply)

Additional function

Extract air led system (laboratories)

Operating values

Not required (room management function is not active)

Order code for single operation (with EASYLAB attachment)

TZ-Silenzio – D / 200 / ELAB / S / SC – E0 / UMZ / ...
 | | | | | | | | |
 1 2 3 4 5 6 7 8 10

1 Type

TZ-Silenzio VAV terminal unit, supply air

2 Acoustic cladding

No entry: None

D With acoustic cladding

3 Nominal size

125

160

200

250

315

4 Attachments (control component)

ELAB EASYLAB controller TCU3

5 Actuators

S Fast-running actuator (3 s)

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

6 Equipment function

Single operation

SC Supply air controller

7 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

Order example: TZ-Silenzio/160/ELAB/S/SC/3P/400/600/800 m³/h

Acoustic cladding

Nominal size

Attachments (control component)

Actuators

Equipment function

External volume flow rate setting

Operating values

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

F Volume flow rate constant value, without signalling

8 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: 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: None

Z EM-AUTOZERO Solenoid valve for automatic zero point correction

10 Operating values for factory setting

Volume flow rate [m³/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}

None

160

ELAB

Fast-running actuator (3 s)

Single controller for supply air

Switch contacts (provided by others) for 3 switching steps

$q_{v1} = 400 \text{ m}^3/\text{h}$

$q_{v2} = 600 \text{ m}^3/\text{h}$

$q_{v3} = 800 \text{ m}^3/\text{h}$

Variants

VAV terminal unit, variant TZ-Silenzio



Application

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

VAV terminal unit, variant TZ-Silenzio-D



Application

- 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 ducts for the room under consideration must have adequate acoustic insulation (to be 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

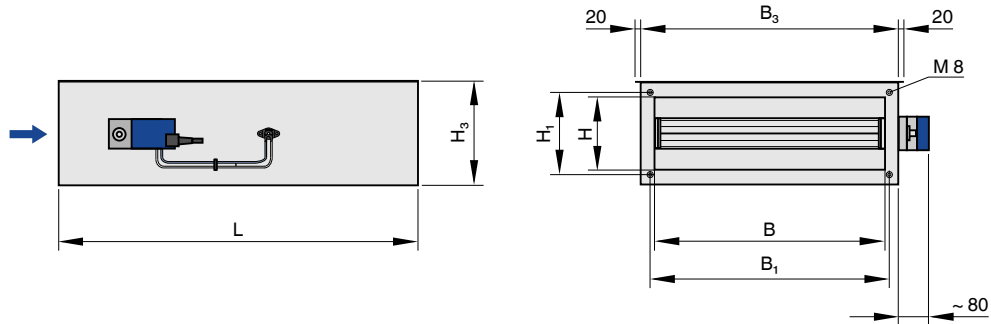
Order code detail	Part	Material
-	Casing	Galvanised sheet steel
	Effective pressure sensor	Aluminium
	Damper blade	Polyethylene, PE
	Damper blade seal	Galvanised steel
	Shaft and linkage	Plastic
	Plain bearings	Plastic, ABS
	Gears	

With acoustic cladding (optional)

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

Dimensions and weight

VAV terminal unit without acoustic cladding (TZ-Silenzio)



Note:

Total length L is the total casing length.

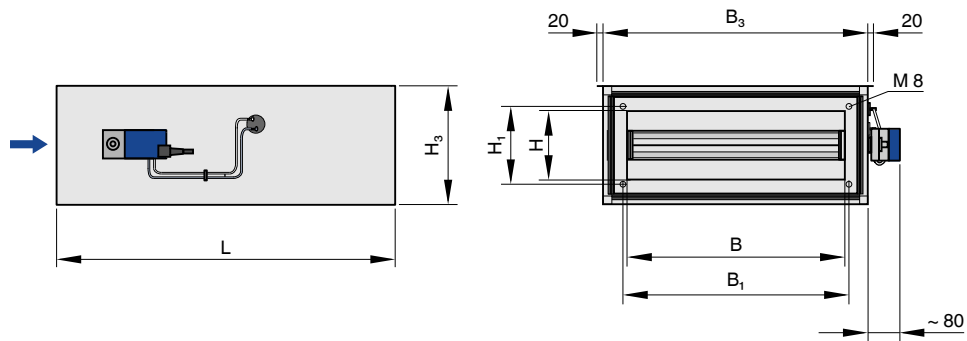
The length of the installed unit is approx. 24 mm less. See flange detail.

The illustration shows control component type Easy, Compact. For individual dimensions see section 'Space required for commissioning and maintenance'.

Dimensions/weights of TZ-Silenzio

NG	B	H	L	B ₁	B ₃	H ₁	H _s	kg
125	198	152	1035	232	300	186	236	17
160	308	152	1035	342	410	186	236	21
200	458	210	1250	492	560	244	281	32
250	598	201	1250	632	700	235	311	41
315	798	252	1250	832	900	286	361	54

Terminal unit with acoustic cladding (TZ-Silenzio-D)



Note:

Total length L is the total casing length.

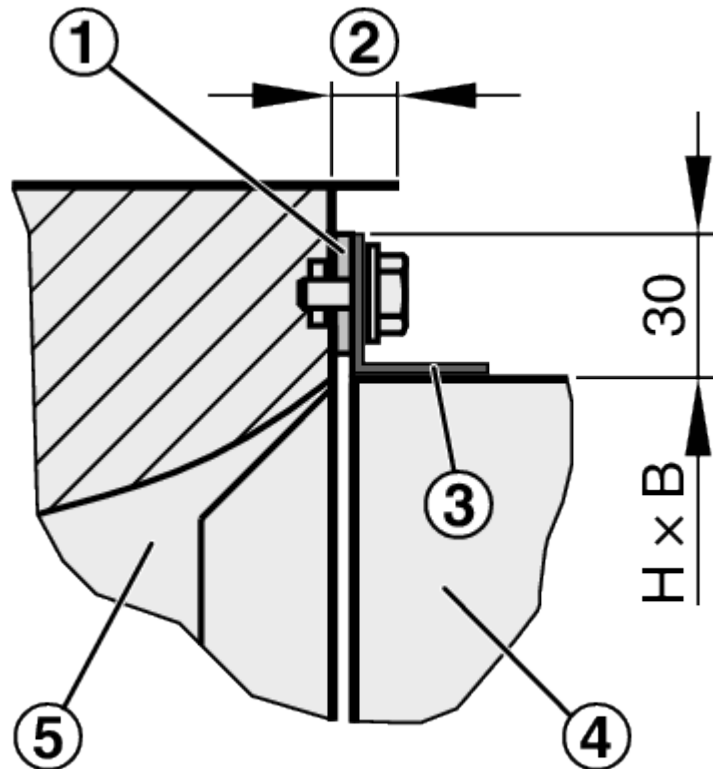
The length of the installed unit is approx. 24 mm less. See flange detail.

The illustration shows control component type Easy, Compact. For individual dimensions see section 'Space required for commissioning and maintenance'.

Dimensions/weights of TZ-Silenzio-D

NG	B	H	L	B ₁	B ₃	H ₁	H ₃	kg
125	198	152	1035	232	380	186	316	32
160	308	152	1035	342	490	186	316	38
200	458	210	1250	492	640	244	361	64
250	598	201	1250	632	780	235	391	72
315	798	252	1250	832	980	286	441	91

Flange detail

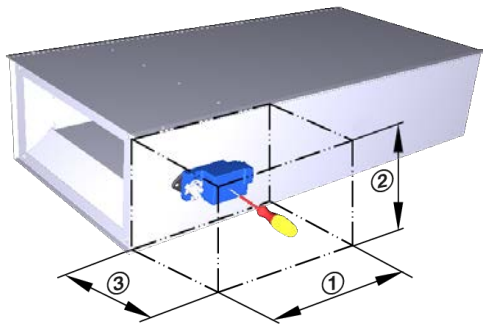


- 1 Compressible seal, to be provided by others
- 2 Flanges on both ends indented approx. 12 mm
- 3 Flange
- 4 Duct
- 5 VAV terminal unit

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, XB4, BUDNF, TUN

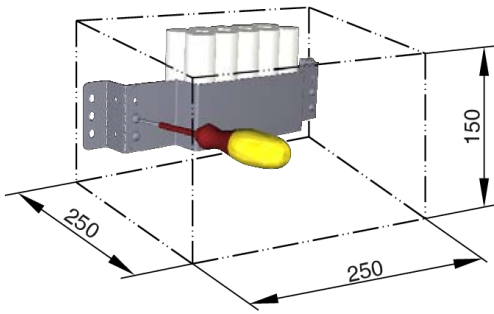
Space required

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

* Control component has been discontinued

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

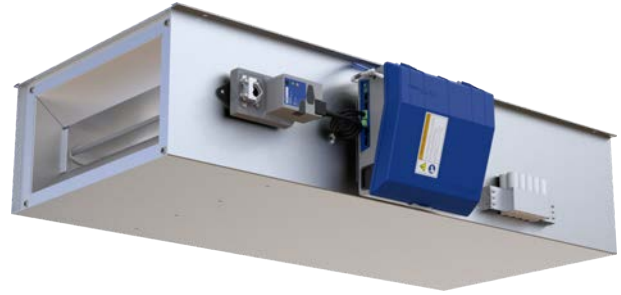
Accessibility to the battery pack



Schematic illustration of required installation space

Note: Separate installation space for fixing and accessing the battery pack (optional accessory for TROX UNIVERSAL and LABCONTROL EASYLAB control components).

Product example



TZ-Silenzio/.../TUN/.../U with attachment

Product details

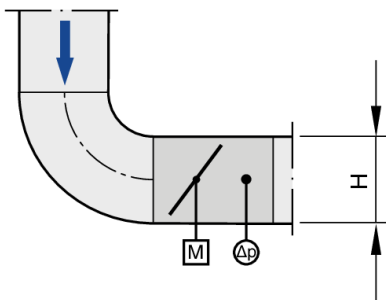
Installation and commissioning

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

Upstream conditions

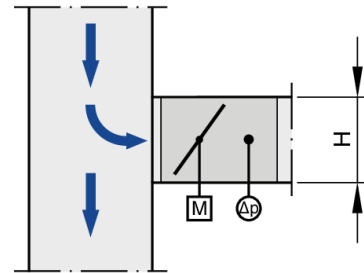
The volume flow rate accuracy Δ_{qv} applies to a straight upstream section of the duct, bends, junctions or a narrowing or widening of the duct cause turbulence that may affect measurement. Duct connections, e.g. branches off the main duct, must comply with EN 1505. Some installation situations require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

Bend, vertical



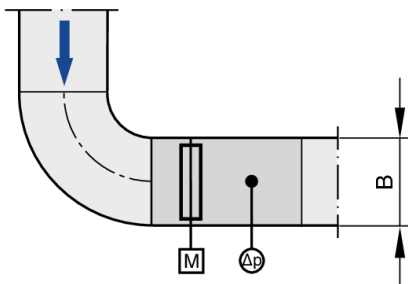
A bend – without a straight duct section upstream of the VAV terminal unit – has only a negligible effect on the volume flow rate accuracy.

Junction, vertical



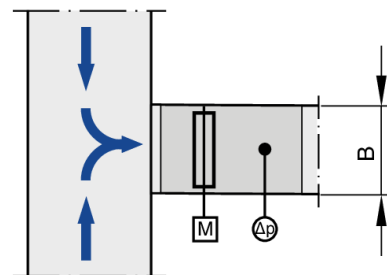
The stated volume flow rate accuracy Δ_{qv} will be achieved, even when the VAV terminal unit is installed at a junction and at the point of convergence of two airflows.

Bend, horizontal



A bend – without a straight duct section upstream of the VAV terminal unit – has only a negligible effect on the volume flow rate accuracy.

Convergence of two airflows, horizontal



The stated volume flow rate accuracy Δ_{qv} will be achieved, even when the VAV terminal unit is installed at a junction and at the point of convergence of two airflows.

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	-	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
LN0	qv	0 – 10 V or 2 – 10 V	integral	slow-running integral	⑤
LK0	qv	KNX interface	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
Universal controller, static					
BP3 *	qv	0 – 10 V or 2 – 10 V or MP bus interface	individual component	slow-running separate	②

Attachment	Controlled variable	Interface	Pressure transducer	Actuator	Manufacturer
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
BB3 *	qv	2 – 10 V	individual component	slow-running separate	②
BBB *	qv	2 – 10 V	individual component	spring return actuator 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
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
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
BUSN	qv	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TPTP	integral	slow-running separate	②

Attachment	Controlled variable	Interface	Pressure transducer	Actuator	Manufacturer
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
Universal controller, static					
TUN	qv, Δp	TROX Plug&Play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: LonWorks, 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: LonWorks, 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: LonWorks, Modbus, BACnet, web server	qv = integral Δp = separate	fast-running 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&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

* Controlled variable dependent on the VAV terminal unit type

- 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]; [l/s]
Volume flow rate

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

Δ_{pst} [Pa]

Static differential pressure

 $\Delta_{pst\ min}$ [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.