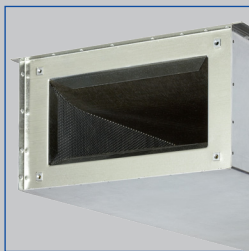




Easy controller



Compact controller



Rectangular connection
on the room end



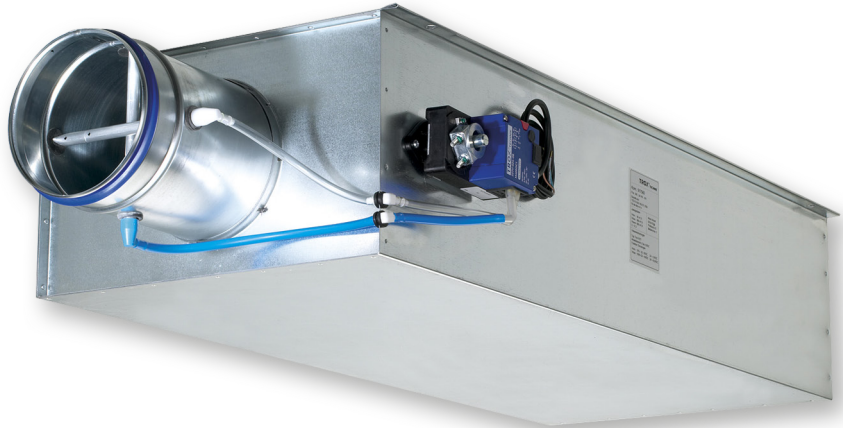
Circular connection on
the fan end



Tested to VDI 6022

VAV terminal units

Type 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)
- Suitable for airflow velocities up to 13 m/s
- Closed blade air leakage to EN 1751, up to class 4
- Casing air leakage to EN 1751, class A

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

Type		Page
TVZ	General information	TVZ – 2
	Function	TVZ – 4
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Application

Application

- VARYCONTROL VAV terminal units of Type TVZ for the supply air control in variable air volume systems
- Closed-loop volume flow control using an external power supply
- Integral attenuator for demanding acoustic requirements
- Shut-off by means of switching (equipment supplied by others)

- 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
- Volume flow rate can later be measured and adjusted on site; additional adjustment device may be necessary
- Inspection access for cleaning to VDI 6022

Special characteristics

Nominal sizes

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

Description

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

pressure transducer and actuators for special applications

- LABCONTROL: Control components for air management systems

Parts and characteristics

- Ready-to-commission unit which consists of mechanical parts and control components.
- Averaging differential 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 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 with upstream bend $R = 1D$)

Accessories

- 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 lip seal
- Connection on the room end suitable for air duct profiles
- Baffle plate is fitted after the damper blade for optimum aerodynamic performance
- Position of the damper blade indicated externally at shaft extension
- Thermal and acoustic insulation (lining)

Attachments

- Easy controller: Compact unit consisting of controller with potentiometers, differential pressure transducer and actuator
- Compact controller: Compact unit consisting of controller, differential pressure transducer and actuator
- Universal controller: Controller, differential

Materials and surfaces

- Casing and damper blade made of galvanised sheet steel
- Damper blade seal made of TPE plastic
- Lining is mineral wool
- Differential pressure sensor made of aluminium
- Plastic bearings

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
- Biosoluble and hence hygienically safe according to the German TRGS 905 (Technical Rules for Hazardous Substances) and EU directive 97/69/EG
- Faced with glass fibre fabric as protection against erosion through airflow velocities of up to 20 m/s
- Inert to fungal and bacterial growth

Standards and guidelines

- Hygiene conforms to VDI 6022
- VDI 2083, air cleanliness class 3, and US standard 209E, class 100
- Closed blade air leakage to EN 1751, class 4 (nominal sizes 125 and 160, class 3).
- Nominal sizes 125 and 160 meet the general requirements, nominal sizes 200 – 400 meet the increased requirements of DIN 1946, part 4, with regard to the acceptable closed blade air leakage
- Casing air leakage to EN 1751, class A

Maintenance

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

Functional description

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

The control components (attachments) include a differential pressure transducer that transforms the differential pressure (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 or LABCONTROL).

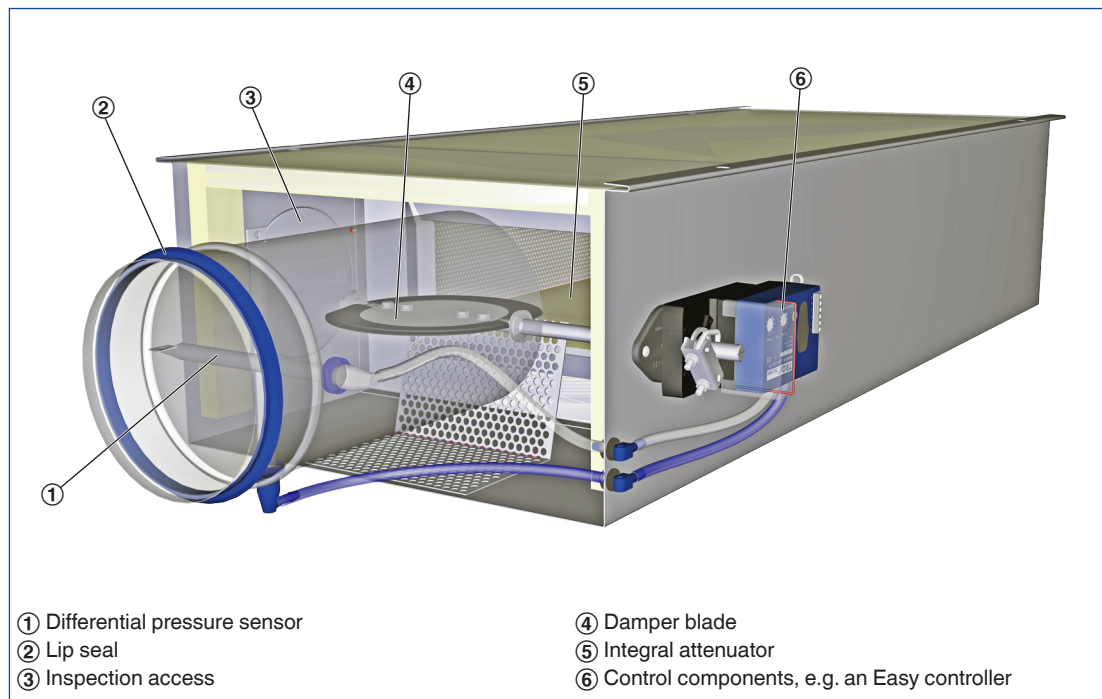
For most applications, the setpoint value comes from a room temperature controller.

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



Nominal sizes	125 – 400 mm
Volume flow rate range	15 – 1680 l/s or 54 – 6048 m ³ /h
Volume flow rate control range (unit with dynamic differential pressure measurement)	Approx. 10 – 100% of the nominal volume flow rate
Minimum differential pressure	5 – 80 Pa
Maximum differential pressure	1000 Pa
Operating temperature	10 – 50 °C

Volume flow rate ranges

The minimum differential pressure of VAV terminal units is an important factor in designing the ductwork and in rating the fan including speed control.

Sufficient duct pressure must be ensured for all operating conditions and for all control units. 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. The table gives the minimum and maximum values for a VAV terminal unit. Some control components may only have a limited volume flow rate range. This applies in particular to control components with a static differential pressure transducer. For volume flow rate ranges for all control components refer to our Easy Product Finder design programme.

TVZ, Volume flow rate ranges and minimum differential pressures

Nominal size	①	②			
	\dot{V}		$\Delta p_{\text{st min}}$		$\Delta \dot{V}$
	l/s	m³/h	Pa	Pa	± %
125	15	54	5	5	19
	60	216	15	25	8
	105	378	45	65	7
	150	540	90	130	5
160	25	90	5	5	19
	100	360	15	20	8
	175	630	40	50	7
	250	900	80	100	5
200	40	144	5	5	19
	160	576	15	20	8
	280	1008	40	50	7
	405	1458	80	100	5
250	60	216	5	5	19
	250	900	15	20	8
	430	1548	40	50	7
	615	2214	80	100	5
315	100	360	5	5	19
	410	1476	15	20	8
	720	2592	40	60	7
	1030	3708	80	120	5
400	170	612	5	5	19
	670	2412	15	20	8
	1175	4230	40	60	7
	1680	6048	80	120	5

① TVZ

② TVZ with secondary silencer TS

Quick sizing tables provide a good overview of the room sound pressure levels that can be expected. Approximate intermediate values can be interpolated. Precise intermediate values and spectral data can be calculated with our Easy Product Finder design programme. The first selection criteria for the nominal size are the actual volume flow rates \dot{V}_{\min} and \dot{V}_{\max} . The quick sizing tables are based on generally accepted attenuation levels. If the sound pressure level exceeds the required level, a larger air terminal unit and/or a silencer is required.

TVZ, Sound pressure level at differential pressure 150 Pa

Nominal size	\dot{V} l/s	\dot{V} m³/h	Air-regenerated noise		Case-radiated noise	
			①	②	①	③
			L_{PA}	L_{PA1}	L_{PA2}	L_{PA3}
			dB(A)			
125	15	54	17	16	21	<15
	60	216	24	20	24	16
	105	378	29	24	27	19
	150	540	34	29	32	23
160	25	90	18	16	20	<15
	100	360	28	24	25	18
	175	630	35	29	29	21
	250	900	36	30	35	27
200	40	144	16	<15	22	15
	160	576	21	17	27	20
	280	1008	23	17	31	23
	405	1458	31	24	39	31
250	60	216	16	15	22	16
	250	900	17	<15	26	19
	430	1548	22	15	29	22
	615	2214	31	21	37	28
315	105	378	18	15	21	15
	410	1476	21	16	27	19
	720	2592	24	18	33	24
	1030	3708	29	22	38	29
400	170	612	17	<15	25	17
	670	2412	19	15	29	20
	1175	4230	26	20	33	25
	1680	6048	32	27	43	35

- ① TVZ
- ② TVZ with secondary silencer TS
- ③ TVZ-D

Sizing example

Given data

$\dot{V}_{\max} = 280$ l/s (1010 m³/h)
 $\Delta p_{st} = 150$ Pa
 Required sound pressure level in the room 30 dB(A)

Quick sizing

TVZ-D/200
 Air-regenerated noise $L_{PA} = 23$ dB(A)
 Case-radiated noise $L_{PA3} = 24$ dB(A)

Sound pressure level in the room = 27 dB(A)
 (logarithmic addition since the terminal unit is

installed in the suspended ceiling of the room)

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

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 differential pressure sensor for volume flow rate measurement, a damper blade, and an integral attenuator. Factory-assembled control components complete with wiring and tubing. Differential pressure sensor with 3 mm measuring holes (resistant to dust and pollution)

On the fan end, spigot with groove for lip seal, suitable for connecting ducts according to EN 1506 or EN 13180.

Room end suitable for the connection of air duct profiles.

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.

Closed blade air leakage to EN 1751, class 4 (nominal sizes 125 and 160, class 3).

Casing air leakage to EN 1751, class B.

Complies with VDI 2083, clean room class 3, and US standard 209E, class 100. Hygiene complies with VDI 6022, DIN 1946, part 4, as well as EN 13779 and VDI 3803.

Special characteristics

- 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
- Volume flow rate can later be measured and adjusted on site; additional adjustment device may be necessary
- Inspection access for cleaning 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
- Differential pressure sensor made of aluminium
- Plastic bearings

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
- Biosoluble and hence hygienically safe according to the German TRGS 905 (Technical Rules for Hazardous Substances) and EU directive 97/69/EG
- Faced with glass fibre fabric as protection against erosion through airflow velocities of up to 20 m/s
- Inert to fungal and bacterial growth

Technical data

- Nominal sizes: 125 to 400 mm
- Volume flow rate range: 15 to 1680 l/s or 54 to 6048 m³/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 – 80 Pa
- Maximum differential pressure: 1000 Pa

Attachments

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, \dot{V}_{\min} and \dot{V}_{\max}
- Potentiometers with percentage scales to set the volume flow rates \dot{V}_{\min} and \dot{V}_{\max}
- 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

- \dot{V} _____
[m³/h]
- Δp_{st} _____
[Pa]

Air-regenerated noise

- L_{PA} _____
[dB(A)]

Case-radiated noise

- L_{PA} _____
[dB(A)]

TVZ, TVZ/.../Easy

TVZ – D / 160 / D1 / B1B / E 0 / 200 – 900 / NO								
1	2	3	4	5	6	7	8	9
TVZ – D / 160 / D1 / Easy								
1	2	3	4	5				

1 Type

TVZ VAV terminal unit, supply air

2 Acoustic cladding

No entry: none

D With acoustic cladding

3 Nominal size [mm]

125

160

200

250

315

400

4 Accessories

No entry: none

D1 Lip seal

5 Attachments (control component)

Example

Easy Easy controller

BC0 Compact controller

B13 Universal controller

Order example: TVZ-D/160/D1/BC0/E0/180–850 m³/h

Acoustic cladding	With
Nominal size	160 mm
Accessories	Lip seal
Attachment	Compact controller
Operating mode	Single
Signal voltage range	0 – 10 V DC
Volume flow rate	180 – 850 m³/h

6 Operating mode

E Single

M Master

S Slave

F Constant value

Z Differential pressure control – supply air

7 Signal voltage range

For the actual and setpoint value signals

0 0 – 10 V DC

2 2 – 10 V DC

8 Volume flow rates [m³/h or l/s], differential pressure [Pa]

$\dot{V}_{\min} - \dot{V}_{\max}$ for factory setting

Δp_{\min} for factory setting (operating mode Z)

9 Damper blade position

Only with spring return actuators

NO Power off to OPEN

NC Power off to CLOSE

TVZ with EASYLAB for room control and single operation

TVZ – D / 160 / D1 / ELAB / RS / ULZ / LAB / ...									
1	2	3	4	5	6	8	9	10	
<hr/>									
TVZ – D / 160 / D1 / ELAB / SC – E0 / ULZ / ...									
1	2	3	4	5	6	7	8	10	

1 Type

TVZ VAV terminal unit, supply air

2 Acoustic cladding

No entry: none

D With acoustic cladding

3 Nominal size [mm]

125

160

200

250

315

400

4 Accessories

No entry: none

D1 Lip seal

5 Attachments (control component)

ELAB EASYLAB controller TCU3 with fast-running actuator

6 Equipment function

Room control

RS Supply air control (Room Supply)

PC Differential pressure control

Single operation

SC Supply air controller

7 External volume flow rate setting

Only for single operation

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

8 Expansion modules

Option 1: Power supply

No entry: 24 V AC

T EM-TRF for 230 V AC

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

Option 2: Communication interface

No entry: none

L EM-LON for LonWorks FTT-10A

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

M EM-BAC-MOD-01 for Modbus RTU

I EM-IP for BACnet/IP, Modbus/IP and webserver

R EM-IP with real time clock

Option 3: Automatic zero point correction

No entry: none

Z EM-AUTOZERO Solenoid valve for automatic zero point correction

9 Additional functions

Only for room control (equipment function)

Room management function has been deactivated

LAB Extract air led system (laboratories)

CLR Supply air led system (clean rooms)

Room management function is active

LAB-RMF Extract air led system (LAB)

CLR-RMF Supply air led system

10 Operating values [m³/h or l/s, Pa]

For equipment function 'room control' with additional function RMF

Total room extract air/supply air

\dot{V}_1 : Standard mode

\dot{V}_2 : Reduced operation

\dot{V}_3 : Increased operation

\dot{V}_4 : Constant room supply air

\dot{V}_5 : Constant room extract air

\dot{V}_6 : Supply air/extract air difference

$\Delta p_{\text{setpoint}}$: Setpoint pressure (only with differential pressure control)

For equipment function 'single operation'

E0, E2: $\dot{V}_{\text{min}} / \dot{V}_{\text{max}}$

2P: \dot{V}_1 / \dot{V}_2

3P: $\dot{V}_1 / \dot{V}_2 / \dot{V}_3$

F: \dot{V}_1

Useful additions

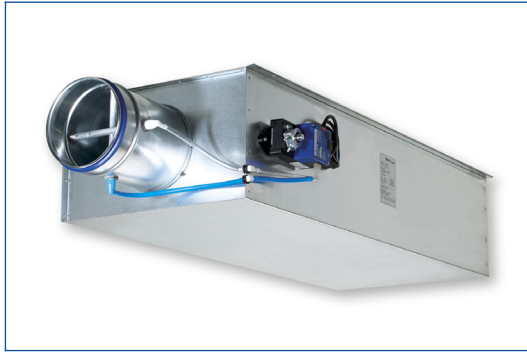
Room control panel

BE-LCD-01 40-character display

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

Acoustic cladding	Without
Nominal size	200 mm
Attachment	EASYLAB controller TCU3 with fast-running actuator
Equipment function	Supply air control (Room Supply)
Additional functions	Supply air led system
Operating values	Total supply air – standard mode 3500 m³/h Reduced operation 1000 m³/h Increased operation 5000 m³/h Constant supply air 250 m³/h Constant extract air 0 Supply air/extract air difference –150 m³/h

VAV terminal unit, variant TVZ



VAV terminal unit, variant TVZ-D



TVZ

- VAV terminal unit for the control of variable

supply air volume flows

TVZ-D

- VAV terminal unit with acoustic cladding for the control of variable supply air volume flows
- 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
- Acoustic cladding cannot be retrofitted

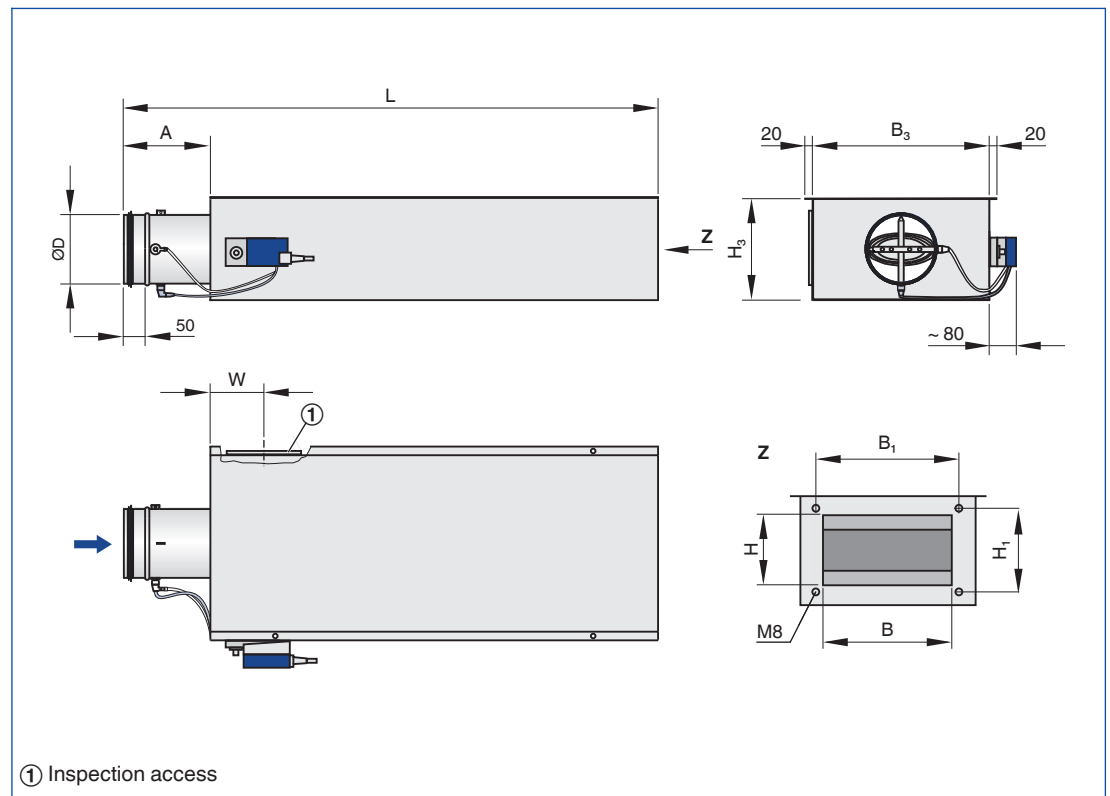
TVZ, VARYCONTROL control components

Order code detail	Controlled variable	Controller	Differential pressure transducer	Actuator
Easy controller				
Easy	Volume flow rate	Easy controller TROX	Dynamic, integral	Integral
Compact controller, dynamic				
BC0	Volume flow rate	Compact controller with MP bus interface TROX/Belimo	Dynamic, integral	Integral
BL0		Compact controller with LonWorks interface TROX/Belimo		
BM0		Compact controller with Modbus RTU interface (with connecting cable) TROX/Belimo		
BM0-J6		Compact controller with Modbus RTU interface (with socket) TROX/Belimo		
XB0		Compact controller TROX/Gruner		
LN0		Compact controller Siemens		
LK0		Compact controller with KNX interface Siemens		
Compact controller, static				
SA0	Volume flow rate	Compact controller with SLC interface Sauter	Static, integral	Integral
SC0				Fast-running actuator, integral
Universal controller, dynamic				
B13	Volume flow rate	Universal controller TROX/Belimo	Dynamic, integral	Actuator
B1B		Universal controller TROX/Gruner		Spring return actuator
XC3				
Universal controller, static				
BP3	Volume flow rate	Universal controller with MP bus interface TROX/Belimo	Static	Actuator
BPB				Spring return actuator
BPG				Fast-running actuator
BB3		Universal controller TROX/Belimo		Actuator
BBB				Spring return actuator
XD1		Universal controller TROX/Gruner		Static, integral
XD3	Spring return actuator			
BR3	Differential pressure	Universal controller with MP bus interface TROX/Belimo	Static, integral 100 Pa	Actuator
BRB				Spring return actuator
BRG				Fast-running actuator
BG3		Differential pressure controller TROX/Belimo		Actuator
BGB				Spring return actuator
XE1		Differential pressure controller TROX/Gruner		Actuator
XE3				Spring return actuator

TVZ, LABCONTROL control components

Order code detail	Controlled variable	Controller	Differential pressure transducer	Actuator
EASYLAB				
ELAB	Room supply air Room pressure Single controller	EASYLAB controller TCU3	Static, integral	Fast-running actuator

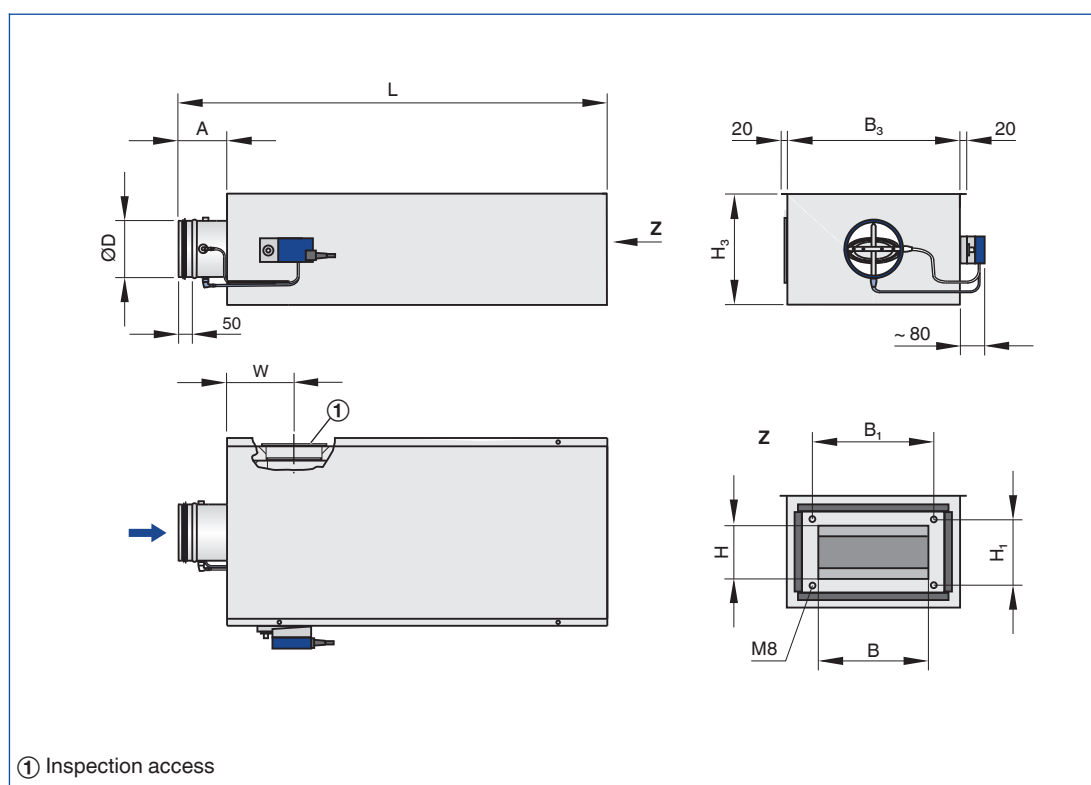
TVZ



TVZ

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

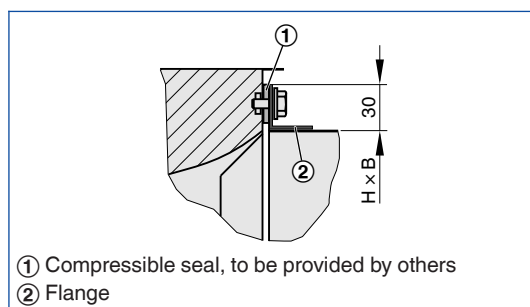
TVZ-D



TVZ-D

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

Detail of flange



Installation and commissioning

- Any installation orientation (except units with static differential 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

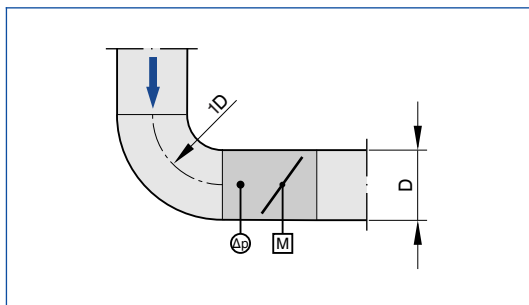
Upstream conditions

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

Space required for commissioning and maintenance

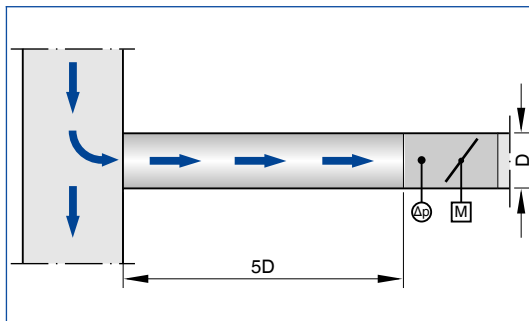
Sufficient space must be kept clear near any attachments to allow for commissioning and maintenance. It may be necessary to provide sufficiently sized inspection access openings.

Bend



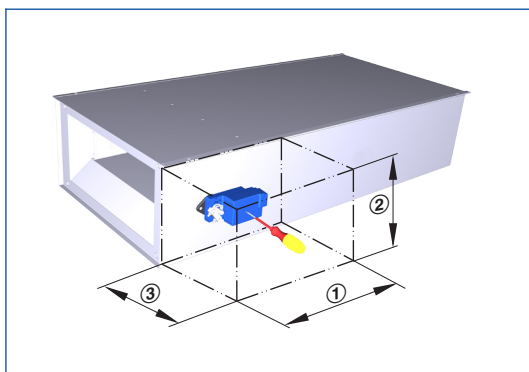
A bend with a centre line curvature radius of at least 1D – without an additional straight duct section upstream of the VAV terminal unit – has only a negligible effect on the volume flow rate accuracy.

Junction



A junction causes strong turbulence. The stated volume flow rate accuracy $\Delta\dot{V}$ can only be achieved with a straight duct section of at least 5D upstream. Shorter upstream sections require a perforated plate in the branch and before the VAV terminal unit. If there is no straight upstream section at all, the control will not be stable, even with a perforated plate.

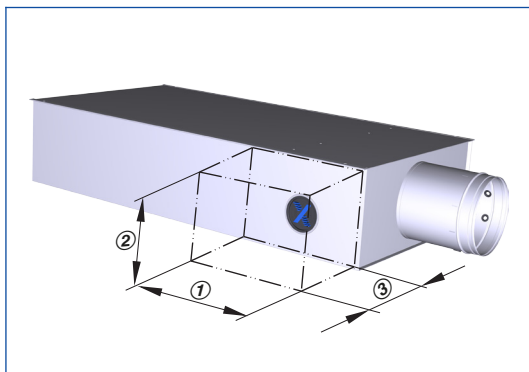
Access to attachments



Space required

Attachments	①	②	③
	mm		
VARYCONTROL			
Easy controller	400	300	300
Compact controller	400	300	300
Universal controller	700	300	300
LABCONTROL			
EASYPAD	900	350	400

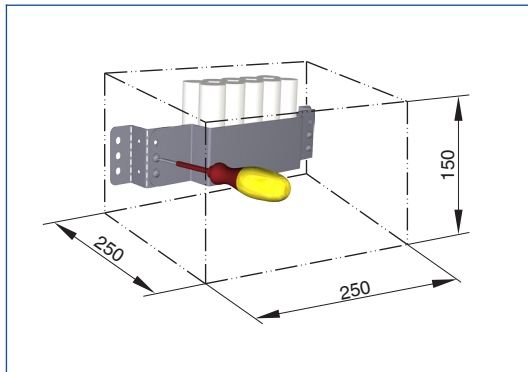
Inspection access



Space required for inspection access

Part	①	②	③
	mm		
Inspection access	400	300	300

Access to battery pack



Separate space for fixing and accessing the battery pack (LABCONTROL EASYLAB accessory)

Principal dimensions

$\varnothing D$ [mm]

VAV terminal units made of stainless steel:

Outside diameter of the spigot

VAV terminal units made of plastic: Inside

diameter of the connecting spigot

$\varnothing D_1$ [mm]

Pitch circle diameter of flanges

$\varnothing D_2$ [mm]

Outside diameter of flanges

$\varnothing D_4$ [mm]

Inside diameter of the screw holes of flanges

L [mm]

Length of unit including connecting spigot

L_1 [mm]

Length of casing or acoustic cladding

B [mm]

Duct width

B_1 [mm]

Screw hole pitch of flange (horizontal)

B_2 [mm]

Outside dimension of flange (width)

B_3 [mm]

Width of device

H [mm]

Duct height

H_1 [mm]

Screw hole pitch of flange (vertical)

H_2 [mm]

Outside dimension of flange (height)

H_3 [mm]

Unit height

n []

Number of flange screw holes

T [mm]

Flange thickness

m [kg]

Unit weight including the minimum required attachments (e.g. Compact controller)

Acoustic data

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)]

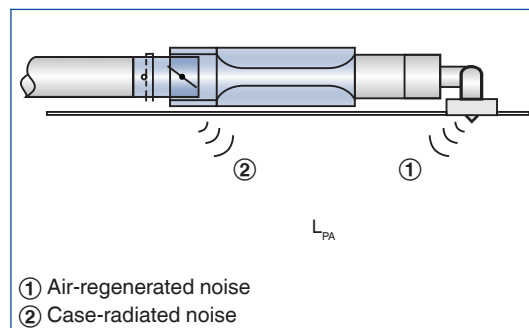
A-weighted sound pressure level of case-regenerated noise of the VAV terminal unit, system attenuation taken into account

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

All sound pressure levels are based on 20 μ Pa.

Definition of noise



Volume flow rates

\dot{V}_{nom} [m³/h] and [l/s]

Nominal volume flow rate (100 %)

- The value depends on product type and nominal size
- Values are published on the internet and in technical leaflets, and stored in the Easy

- Product Finder design software.
- Reference value for calculating percentages (e.g. \dot{V}_{\max})
- Upper limit of the setting range and maximum volume flow rate setpoint value for the VAV terminal unit

$\dot{V}_{\min \text{ unit}}$ [m^3/h] and [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 software
 - Lower limit of the setting range and minimum volume flow rate setpoint value for the VAV terminal unit
 - Depending on the controller, setpoint values below $\dot{V}_{\min \text{ unit}}$ (if \dot{V}_{\min} equals zero) may result in unstable control or shut-off

\dot{V}_{\max} [m^3/h] and [l/s]

- Upper limit of the operating range for the VAV terminal unit that can be set by customers
- \dot{V}_{\max} can only be smaller than or equal to \dot{V}_{nom}
 - In case of analogue signalling to volume flow controllers (which are typically used), the set maximum value (\dot{V}_{\max}) is allocated to the

setpoint signal maximum (10 V) (see characteristic)

\dot{V}_{\min} [m^3/h] and [l/s]

- Lower limit of the operating range for the VAV terminal unit that can be set by customers
- \dot{V}_{\min} should be smaller than or equal to \dot{V}_{\max}
 - Do not set \dot{V}_{\min} smaller than $\dot{V}_{\min \text{ unit}}$, otherwise the control may become unstable or the damper blade may close
 - \dot{V}_{\min} may equal zero
 - In case of analogue signalling to volume flow controllers (which are typically used), the set minimum value (\dot{V}_{\min}) is allocated to the setpoint signal minimum (0 or 2 V) (see characteristic)

\dot{V} [m^3/h] and [l/s]

Volume flow rate

$\Delta \dot{V}$ [$\pm \%$]

Volume flow rate tolerance from setpoint value

$\Delta \dot{V}_{\text{warm}}$ [$\pm \%$]

Volume flow rate tolerance for the warm air flow of dual duct terminal units

Differential pressure

Δp_{st} [Pa]

Static differential pressure

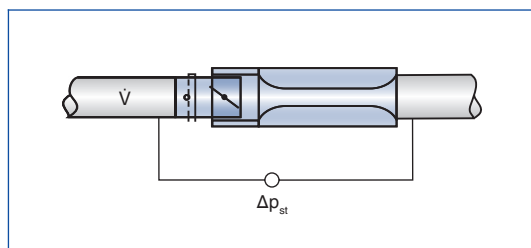
$\Delta p_{\text{st min}}$ [Pa]

Static differential pressure, minimum

- 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 (sensor tubes, damper mechanism)

- If the 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 duct pressure must be ensured for all operating conditions and for all terminal units, and the measurement point or points for speed control must have been selected accordingly to achieve this

Static differential pressure



Construction

Galvanised sheet steel

- Casing made of galvanised sheet steel
- Parts in contact with the airflow as described for the product type
- External parts, e.g. mounting brackets or covers, are usually made of galvanised sheet steel

Powder-coated surface (P1)

- Casing made of galvanised sheet steel, powder-coated RAL 7001, silver grey
- Parts in contact with the airflow are powder-coated or made of plastic
- Due to production, some parts that come into contact with the airflow may be stainless steel or aluminium, powder-coated
- External parts, e.g. mounting brackets or

covers, are usually made of galvanised sheet steel

Stainless steel (A2)

- Casing made of stainless steel 1.4201

- Parts in contact with the airflow are powder-coated or made of stainless steel
- External parts, e.g. mounting brackets or covers, are usually made of galvanised sheet