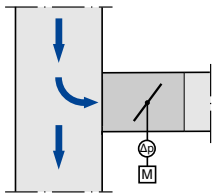




Differential pressure measurement via damper blade



Compact controller with display



Installation directly on the main duct



Conforms to VDI 6022

VAV terminal units

TVE-Q



Compact solution for low airflow velocities

Angular air terminal units for use in variable air terminal systems at low air velocities, even under unfavourable upstream conditions

- Tubeless differential pressure measurement via damper blade
- Differential pressure transmission through differential pressure duct in axis
- Connection terminals with protective cover, no junction box required
- Any airflow direction if dynamic transducer is used
- Suitable for air velocities from 0.8 - 8 m/s
- Compact dimensions for use in confined ceiling areas
- Plug-and-play solution in conjunction with X-AIRCONTROL room control
- Exact measurement even with low airflow velocities
- Any installation orientation also with static transducer
- Closed blade air leakage to EN 1751, at least class 3
- Casing air leakage to EN 1751, class C
- Volume flow rate range 1:10

Optional equipment and accessories

- Secondary silencer to reduce air-regenerated noise
- Hot water heat exchanger Type WT for reheating the airflow

General information	2	Order code	9
Function	3	Variants	11
Technical data	4	Dimensions and weight	13
Quick sizing	5	Product details	15
Specification text	8	Explanation	18

General information

Application

- Square VAV terminal units for use in ventilation and air conditioning systems (AHUs)
- For almost all tasks when controlling, restricting, or shutting off supply and extract air flows
- Also for unfavourable upstream conditions at low air velocities
- Closed-loop volume flow control using an external power supply
- For variable or constant volume flow systems
- Shut-off by override control (by the client)

Special characteristics

- High differential pressure signal with small angle of attack
- Factory set-up or programming and aerodynamic function testing
- Volume flow rate can be measured and subsequently adjusted. Additional adjustment tool may be required (depending on the variant of the control component)
- Tubeless differential pressure measurement via damper blade
- Differential pressure transmission through differential pressure duct in axis
- Any airflow direction if dynamic transducer is used
- Any installation orientation also with static transducer
- Suitable for air velocities from 0.8 - 8 m/s
- Compact dimensions for use in confined ceiling areas

Nominal sizes

- 200 × 100, 300 × 100
- 200 × 200, 300 × 200, 400 × 200, 500 × 200, 600 × 200

Variants

- TVE-Q: VAV terminal unit
- TVE-Q with TX secondary silencer to reduce air-regenerated noise

Construction

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

Parts and characteristics

- Ready-to-commission unit which consists of mechanical parts and control components.
- Damper blade with integrated measuring unit
- Axis with differential pressure duct for measured value transmission
- Control component factory mounted
- Each unit is tested on a special aerodynamic test rig at the factory
- Documentation of the test rig data with a test label or a volume flow scale on the unit
- High control accuracy even in case of unfavourable upstream conditions

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
- Compact controller: with Modbus RTU interface and display; plug-and-play solution in conjunction with X-AIRCONTROL room control system

Useful additions

- Secondary silencer Type TX for the reduction of air-regenerated noise
- Hot water heat exchanger Type WT for reheating the airflow

Construction features

- Rectangular casing
- Flanges on both ends, suitable for duct connections
- Position of the damper blade indicated externally at position indicator
- Simple exchange of the control components possible

Material and surfaces

Galvanised sheet steel

- Casing, damper blade made of galvanised sheet steel
- Shaft made of PA6 (H ≤ 200) or aluminium (H > 200)
- Damper blade seal and sealing plug made of EPDM
- Bearing bushes made of PBT or TPU
- Fastening (screws, rivets) Galvanised steel, aluminium

Powder-coated construction (P1)

- Casing, damper blade galvanised with powder coating, RAL 7001, silver-grey
- Shaft made of PA6 (H ≤ 200) or aluminium (H > 200)
- Damper blade seal and sealing plug made of EPDM
- Bearing bushes made of PBT or TPU
- Fastening (screws, rivets) stainless steel, aluminium

Standards and guidelines

Meets the hygiene requirements of

- EN 16798, Part 3
- VDI 6022, Sheet 1
- DIN 1946, Part 4
- For further standards and guidelines please refer to the hygiene certificate

Casing leakage

- EN 1751, Class C

Closed damper blade air leakage:

NS 200×100, NS 300×100, NS 200×200

- EN 1751, Class 2

NS 300×200, NS 400×200, NS 500×200, NS 600×200

- EN 1751, Class 3

Maintenance

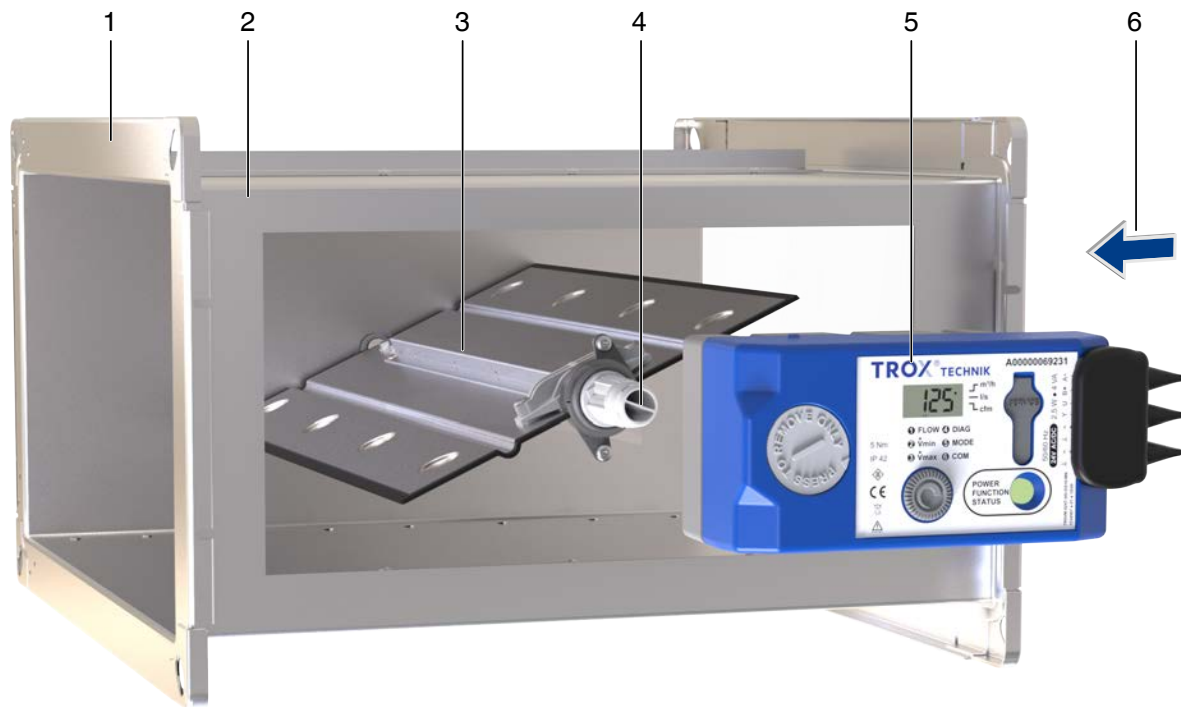
- Maintenance-free as construction and materials are not subject to wear and tear

Function

Functional description

The damper blade works as a control element and as a differential pressure sensor. Through the differential pressure duct in the axis, the detected differential pressure reaches the transducer (static or dynamic), and is converted into an electrical

signal and compared with the setpoint. In case of a control deviation, the integrated actuator changes the position of the damper blade. Thereby, the volume flow rate is kept constant in close tolerances over the entire differential pressure range.



- 1 Flange for air duct profiles
- 2 Casing
- 3 Damper blade including differential pressure sensor
- 4 Axis with differential pressure duct
- 5 Electronic volume flow controller
- 6 Preferred airflow direction

Note: Air direction arrow for preferred air direction must be observed for control components with static transmitter.

Technical data

Nominal sizes	<ul style="list-style-type: none">▪ 200 × 100, 300 × 100▪ 200 × 200, 300 × 200, 400 × 200, 500 × 200, 600 × 200
Volume flow rate range	16 - 960 l/s or 58 - 3456 m ³ /h
Volume flow rate control range (controller with dynamic differential pressure measurements)	approx. 10 - 100 % of the nominal volume flow rate
Minimum differential pressure	up to 50 Pa (without secondary silencer)
Maximum differential pressure	Control component with dynamic transducer: 900 Pa, Control component with static transducer: 600 Pa
Operating temperature	10 to 50 °C

Quick sizing

Quick sizing tables provide a good overview of the minimum pressure differences, the volume flow accuracy Δq_v and the expected sound pressure levels in the room. 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 obtained by using our Easy Product Finder design programme. The nominal size is initially selected according to the given 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 differential pressure is applied to each controller (Δp_{stmin}). The measurement point(s) for fan speed control must be selected accordingly. The volume flow rate range for VAV terminal units depends on the nominal size and on the control component (attachment) used.

Volume flow rate ranges and minimum differential pressure values

Controller for dynamic and static pressure measurements

Attachment: Easy, XB0, XM0, XM0-J6, XS0, XS0-J6

B	H	q_v [l/s]	q_v [m³/h]	Δp_{stmin} [Pa]		Δq_v [±%]
				(1)	(2)	
200	100	16	58	1	3	18
200	100	64	230	8	33	8
200	100	112	403	25	101	6
200	100	160	576	50	204	5
300	100	25	87	1	3	18
300	100	96	346	8	33	8
300	100	168	605	24	100	6
300	100	240	864	48	202	5
200	200	33	116	1	2	18
200	200	128	461	6	22	8
200	200	224	806	18	66	6
200	200	320	1152	37	133	5
300	200	48	173	1	2	18
300	200	192	691	6	22	8
300	200	336	1210	17	65	6
300	200	480	1728	35	131	5
400	200	65	231	1	2	18
400	200	256	922	6	22	8
400	200	448	1613	17	65	6
400	200	640	2304	34	130	5
500	200	80	288	1	2	18
500	200	320	1152	6	22	8
500	200	560	2016	16	64	6
500	200	800	2880	33	129	5
600	200	96	346	1	2	18
600	200	384	1382	6	22	8
600	200	672	2419	16	64	6
600	200	960	3456	33	129	5

(1) Basic unit

(2) Basic unit with secondary silencer TX

Quick sizing table for sound pressure levels

The quick sizing tables include common sound insulation and attenuation values. If the sound pressure level is above the permissible value, a larger air terminal unit and/or a silencer or acoustic cladding are 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 variants

B	H	q_v [l/s]	q_v [m ³ /h]	150 Pa		500 Pa	
				(1)	(2)	(1)	(2)
200	100	16	58	31	15	40	22
200	100	64	230	40	25	49	32
200	100	112	403	44	29	52	36
200	100	160	576	48	n. V.	54	39
300	100	25	87	25	10	36	18
300	100	96	346	37	23	48	32
300	100	168	605	42	30	52	36
300	100	240	864	46	n. V.	54	39
200	200	33	116	32	19	42	27
200	200	128	461	42	29	52	37
200	200	224	806	44	30	53	39
200	200	320	1152	45	30	54	40
300	200	48	173	35	19	47	30
300	200	192	691	44	27	55	38
300	200	336	1210	45	28	57	39
300	200	480	1728	46	30	58	39
400	200	65	231	31	17	43	27
400	200	256	922	38	24	50	35
400	200	448	1613	39	26	51	37
400	200	640	2304	40	29	52	38
500	200	80	288	33	15	44	26
500	200	320	1152	40	24	51	34
500	200	560	2016	42	26	53	36
500	200	800	2880	43	29	54	38
600	200	96	346	32	17	44	27
600	200	384	1382	38	24	50	34
600	200	672	2419	40	25	51	36
600	200	960	3456	41	29	52	37

(1) Basic unit

(2) Basic unit with secondary silencer TX

n.a.: Specified static differential pressure Δp_{st} is smaller than minimum differential pressure Δp_{stmin} .

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

B	H	q_v [l/s]	q_v [m³/h]	150 Pa	500 Pa
				(1)	
200	100	16	58	18	26
200	100	64	230	27	35
200	100	112	403	30	39
200	100	160	576	35	41
300	100	24	87	13	24
300	100	96	346	26	36
300	100	168	605	31	41
300	100	240	864	37	45
200	200	32	116	20	29
200	200	128	461	30	39
200	200	224	806	34	43
200	200	320	1152	36	46
300	200	48	173	24	36
300	200	192	691	34	46
300	200	336	1210	38	50
300	200	480	1728	40	52
400	200	64	231	19	31
400	200	256	922	29	41
400	200	448	1613	33	45
400	200	640	2304	35	47
500	200	80	288	20	31
500	200	320	1152	31	42
500	200	560	2016	35	46
500	200	800	2880	38	49
600	200	96	346	19	31
600	200	384	1382	29	41
600	200	672	2419	33	45
600	200	960	3456	36	48

(1) Basic unit

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

VAV terminal units in rectangular design for variable and constant volume flow systems, for supply air or extract air, in several nominal sizes. High control accuracy of set volume flow rates, even in unfavourable upstream conditions. Control range at least 1:10. Differential pressure measurement and control via damper blade. Tubeless differential pressure transmission through differential pressure duct in axis Air leakage with closed damper blade according to EN 1751: Class 3. Casing air leakage according to EN 1751: Class C. Ready-to-commission unit which consists of the mechanical parts and the factory mounted electronic control component. Position of the damper blade indicated externally at the control component The damper blade is factory set to open position, which allows a ventilation airflow even without control. Meets the hygiene requirements of EN 16798, Part 3, of VDI 6022, Sheet 1, and of DIN 1964, Part 4.

Special characteristics

- High differential pressure signal with small angle of attack
- Factory set-up or programming and aerodynamic function testing
- Volume flow rate can be measured and subsequently adjusted. Additional adjustment tool may be required (depending on the variant of the control component)
- Tubeless differential pressure measurement via damper blade
- Differential pressure transmission through differential pressure duct in axis
- Any airflow direction if dynamic transducer is used
- Any installation orientation also with static transducer
- Suitable for air velocities from 0.8 - 8 m/s
- Compact dimensions for use in confined ceiling areas

Materials and surfaces

- Casing and damper blade made of galvanised sheet steel
- Shaft made of PA6, UL94-V0 ($H \leq 200$) or aluminium ($H > 200$)
- Closed-cell damper blade seal made of EPDM
- Bearings made of plastic

Equivalence criteria

- Declaration of hygiene conformity in accordance with VDI 6022, part 1 (01/2018), ÖNORM H 6020 (03/2015) and ÖNORM H 6021 (08/2016)

- Independent of air direction - air flow in both directions
- Suitable for airflow velocities of 0.8 – 8 m/s
- No inflow lengths required (even after T-piece)
- Meets the hygiene requirements according to EN 16798 Part 3, VDI 6022 Sheet 1, DIN 1946 Part 4
- Setting the volume flow rates without adjustment device via V_{\min} - and V_{\max} -potentiometer
- Electrical connections with screw terminals, no additional connection box required
- Acoustic data determined according to ÖNORM EN ISO 5135
- Maximum control deviation of 5 % at $q_{v\max}$, without upstream section

Connection type

- Flanges on both ends, suitable for duct connections

Technical data

- Minimum differential pressure: up to 50 Pa (without secondary silencer)

Maximum differential pressure

- Control component with dynamic transducer: 900 Pa
- Control component with static transducer: 600 Pa

Specification text attachment

Variable volume flow control with electronic Easy controller for applying a reference value and capturing an actual value to be integrated with the central BMS.

- 24 V AC/DC supply voltage
- Signal voltages 0 – 10 V DC
- Possible override controls with external switches using volt-free contacts: CLOSE, OPEN, $q_{v\min}$ and $q_{v\max}$
- Potentiometers with percentage scales to set the volume flow rates $q_{v\min}$ and $q_{v\max}$
- The actual value signal relates to the nominal volume flow rate so that commissioning and subsequent adjustment are simplified
- Volume flow rate control range: approx. 10 – 100% of the nominal volume flow rate
- Visible indicator light for signalling the various operating conditions
- Electrical connections with screw terminals.
- Double screw terminals for looping the supply voltage, i.e. for simple connection of voltage transmission to the next controller.



Order code

Order code for volume flow control (with Easy controller)

TVE-Q / 300 × 200 / Easy
| | |
1 3 5

1 Type

TVE-Q VAV terminal unit

3 Nominal size [mm]

Specify size width × height

Order example: TVE-Q/300×200/Easy

Type

Nominal size [mm]

Attachments (control component)

5 Attachments (control component)

Easy Volume flow controller, dynamic, analogue interface, setting of q_{vmin} and q_{vmax} with potentiometers (provided on site)

TVE-Q

Width 300, height 200

Volume flow controller, dynamic, analogue interface, setting of q_{vmin} and q_{vmax} with potentiometers (provided on site)

Order code for volume flow control (with VARYCONTROL attachment)

TVE-Q – P1 / 300 × 200 / XB0 / V 0 / 200 – 900 [m³/h]
 | | | | | |
1 3 4 5 6 7 8

1 Type

TVE-Q VAV terminal unit

3 Material

No entry: galvanised sheet steel

P1 Air duct powder-coated RAL 7001, silver grey

4 Nominal size [mm]

Specify width × height

5 Attachment (control component)

XB0 Volume flow controller, dynamic, analogue interface

XM0 Dynamic volume flow controller with display, interface Modbus RTU or analogue

XM0-J6 Dynamic volume flow controller with display, Modbus RTU interface, RJ12 socket (for X-AIRCONTROL)

XS0 Static volume flow controller with display, Modbus RTU or analogue interface

XS0-J6 Static volume flow controller with display, Modbus RTU interface, RJ12 socket (for X-AIRCONTROL)

XDMB0 Volume flow controller with display, Modbus RTU or BACnet MS/TP or analogue interface

XSMB0 Static volume flow controller with display, Modbus RTU or BACnet MS/TP or analogue interface

Order example: TVE-Q-P1/500×200/XB0/V0/850-2200[m³/h]

Type	TVE-Q
Material	Air duct powder-coated RAL 7001, silver grey
Nominal size [mm]	Width 500, height 200
Attachments (control component)	Volume flow controller, dynamic, analogue interface
Operating mode	Variable operation
Signal voltage range	0 – 10 V DC
Operating values for factory setting	850 – 2200 [m³/h]

Order example: TVE-Q-P1/300×200/XM0/M/600-1400[m³/h]

Type	TVE-Q
Material	Air duct powder-coated RAL 7001, silver grey
Nominal size [mm]	Width 300, height 200
Attachments (control component)	Volume flow controller, dynamic, analogue interface and Modbus RTU, display
Operating mode	Variable operation
Bus interface	Modbus RTU
Operating values for factory setting	600 – 1400 [m³/h]

6 Operating mode

For attachments XB0, XM0, XS0, XDMB0, XSMB0

F Constant value mode, one setpoint value (no external switch contact)

V variable operation (default setpoint value from analogue signal)

For control components XM0, XM0-J6, XS0, XS0-J6

M Modbus RTU interface, variable operation (setpoint value specification in Modbus register)

For attachments XDMB0, XSMB0

B BACnet MS/TP interface, variable operation (setpoint specification via BACnetObject)

7 Signal voltage range

Only with operating mode F or V

0 0 – 10 V DC

2 2 – 10 V DC

8 Operating values for factory setting

Volume flow rate [m³/h or l/s]

q_{vconst} (with operating mode F)

$q_{vmin} - q_{vmax}$ (for operating mode V, M, B)

Variants

VAV terminal unit variant TVE-Q (standard, galvanised steel)



Materials

Standard construction

Order code detail	Part	Material
-	Casing	Galvanised steel
-	Damper blade	Galvanised steel
-	Damper blade seal	EPDM, closed cell
-	Differential pressure sensor	Aluminium
-	Axis (drive side)	up to H ≤ 200: PA6 from H > 200: aluminium
-	Bearing bush (drive side)	PBT
-	Axis (non-drive side)	Steel (free cutting steel)
-	Bearing bush (non-drive side)	TPU
-	Sealing plug	EPDM, solid material
-	Sealing ring	EVA
-	Fixing (screws, rivets)	Galvanised steel, stainless steel, aluminium

VAV control unit variant TVE-Q-P1 (powder-coated)



Control component for type TVE

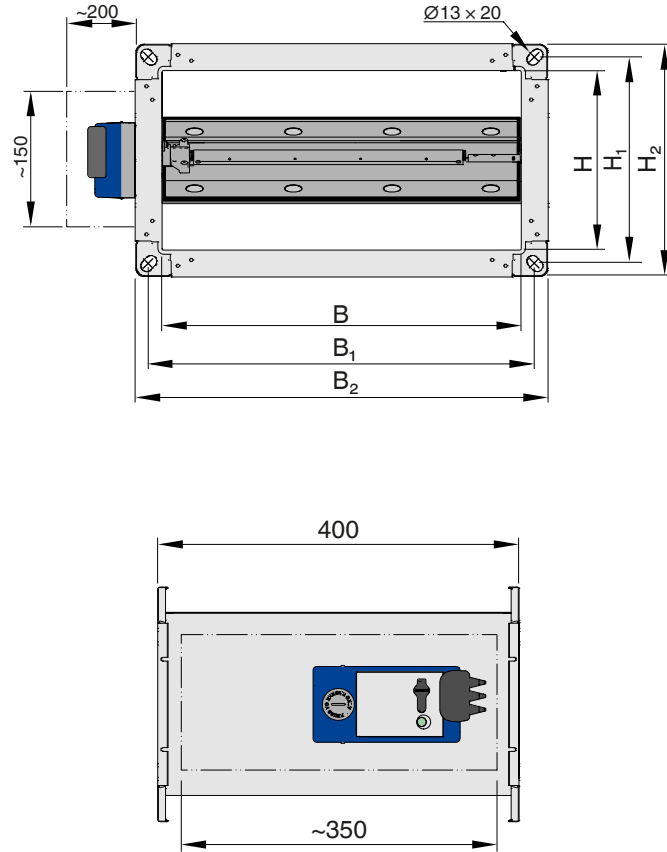
Materials

Powder-coated construction

Order code detail	Part	Material
P1	Casing	Galvanised steel with powder coating, RAL 7001, silver-grey
P1	Damper blade	Galvanised steel with powder coating, RAL 7001, silver-grey
P1	Damper blade seal	EPDM, closed cell
P1	Differential pressure sensor	Aluminium
P1	Axis (drive side)	up to H ≤ 200: PA6 from H > 200: aluminium
P1	Bearing bush (drive side)	PBT
P1	Axis (non-drive side)	Stainless steel
P1	Bearing bush (non-drive side)	TPU
P1	Sealing plug	EPDM, solid material
P1	Sealing ring	EVA
P1	Fixing (screws, rivets)	Stainless steel, aluminium

Dimensions and weight

Control unit (TVE-Q)

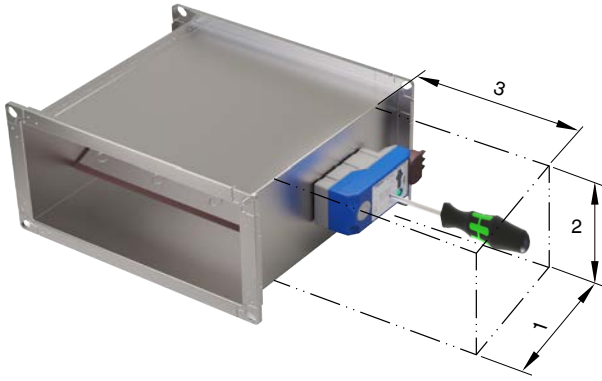


Dimensions and weights [kg] for TVE-Q

NS	B	H	B ₁	B ₂	H ₁	H ₂	kg
200 × 100	200	100	230	260	130	160	3.3
300 × 100	300	100	330	360	130	160	4.1
200 × 200	200	200	230	260	230	230	4.2
300 × 200	300	200	330	360	230	260	5.2
400 × 200	400	200	430	460	230	260	6.1
500 × 200	500	200	530	560	230	260	7.6
600 × 200	600	200	630	660	230	260	8.3

Note: Weights including electronic control component

Access to control components, mounted on one side



Space required for single-sided installation

Attachment	(1)	(2)	(3)
Easy controller: Easy	250	200	300
Compact controllers: XB0, XM0, XM0-J6, XS0, XS0-J6	250	200	300

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.

Product details

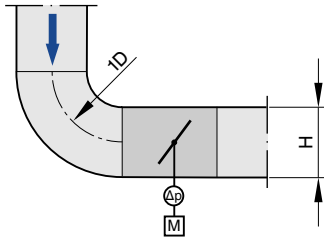
Installation and commissioning

- Almost any installation orientation
- EN 1505 must be observed when making air duct connections, such as the junction from a main duct

Upstream conditions

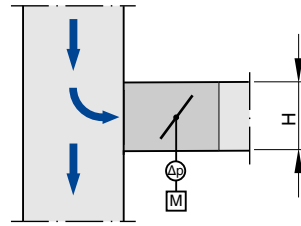
The differential pressure, which is decisive for the volume flow rate, is recorded and averaged on the damper blade. Therefore, the volume flow rate accuracy Δq_v independent of the upstream length, but in the case of junctions from the main line, dependent on the installation variant of the control unit in the branch duct.

Bend, vertical



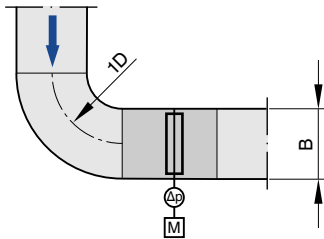
A bend without additional straight upstream flow length in front of the VAV control unit has no significant influence on the volume flow rate accuracy Δq_v .

Junction, vertical



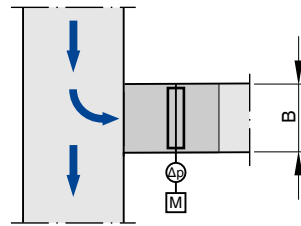
A junction from main duct causes strong turbulence. The specified volume flow rate accuracy Δq_v can be achieved for installation variants 1 and 2 without an upstream section. For installation variants 3 and 4, the specified volume flow rate accuracy Δq_v can also be achieved without an upstream section if the installation position of the control unit is adapted to the air direction in the main duct.

Bend, horizontal



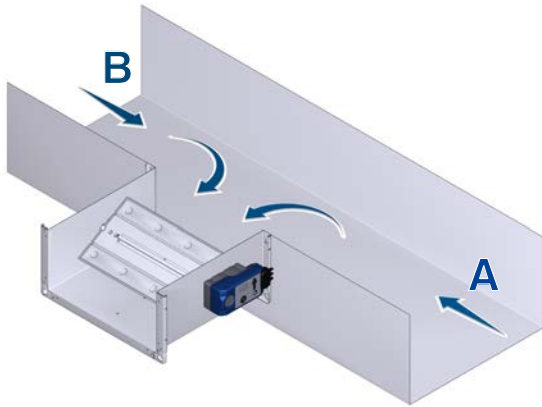
A bend without additional straight upstream flow length in front of the VAV control unit has no significant influence on the volume flow rate accuracy Δq_v .

Junction, horizontal



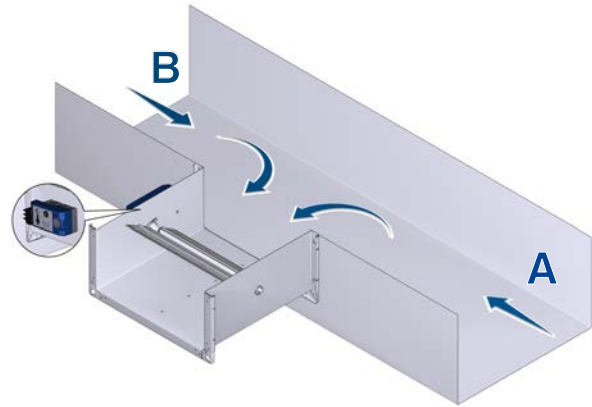
A junction from main duct causes strong turbulence. The specified volume flow rate accuracy Δq_v can be achieved for installation variants 1 and 2 without an upstream section. For installation variants 3 and 4, the specified volume flow rate accuracy Δq_v can also be achieved without an upstream section if the installation position of the control unit is adapted to the air direction in the main duct.

Junction from main duct: Installation variant 1



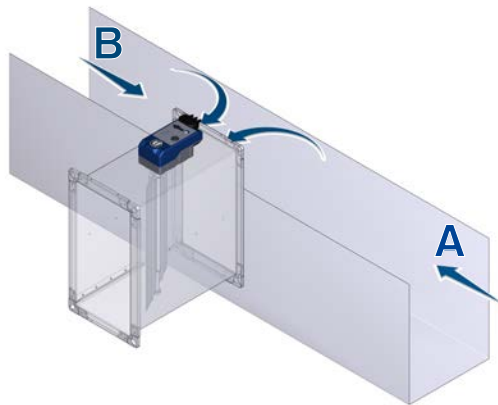
Air direction A or B have no significant influence on Δq_v .

Junction from main duct: Installation variant 2



Air direction A or B have no significant influence on Δq_v .

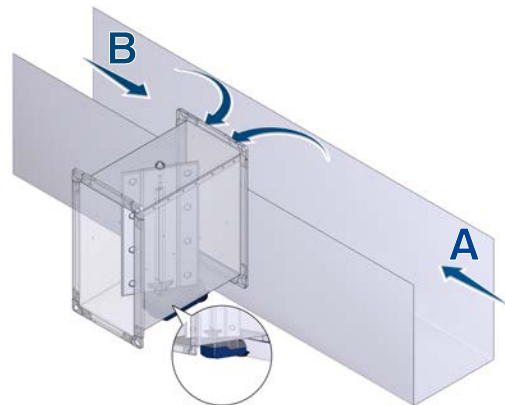
Junction from main duct: Installation variant 3



For air direction A in the main duct: specified volume flow rate accuracy Δq_v achievable.

For air direction B in the main duct: For the specified volume flow rate accuracy Δq_v a surcharge of 10 % must be taken into account in the upper third of the nominal volume flow range.

Junction from main duct: Installation variant 4



For air direction A in the main duct: For the specified volume flow rate accuracy Δq_v a surcharge of 10 % must be taken into account in the upper third of the nominal volume flow range.

For air direction B in the main duct: specified volume flow rate accuracy Δq_v achievable.

Explanation

Dimensions of rectangular units

B [mm]; [in]
Duct width

B₁ [mm]; [in]
Screw hole pitch of flange (horizontal)

B₂ [mm]; [in]
Overall dimension of flange (width)

H [mm]; [in]
Duct height

H₁ [mm]; [in]
Screw hole pitch of flange (vertical)

H₂ [mm]; [in]
Overall dimension of flange (height)

Dimensions of circular units

ØD [mm]; [in]
Basic units made of sheet steel: Outer diameter of the spigot;
basic units made of plastic: Inside diameter of the spigot

ØD₁ [mm]; [in]
Pitch circle diameter of flanges

ØD₂ [mm]; [in]
Outer diameter of flanges

L [mm]; [in]
Length of unit including connecting spigot

L₁ [mm]; [in]
Length of casing or acoustic cladding

n []
Number of flange screw holes

T [mm]; [in]
Flange thickness

General information

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

NS [mm]; [in]
Nominal size

f_m [Hz]
Octave band centre frequency

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

L_{PA1} [dB(A)]

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

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

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

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

q_{vNom} [m³/h]; [l/s]; [CFM]
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 defined in the Easy Product Finder design programme. 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} [m³/h]; [l/s]; [CFM]
Technical minimum volume flow: The value depends on product type, nominal size and control component (attachment). Values are defined in the Easy Product Finder design programme 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} [m³/h]; [l/s]; [CFM]
Client-adjustable upper limit of the operating range for the VAV terminal unit: q_{vmax} can be set to less than or equal to q_{vNom} on the terminal unit. In case of analogue control of volume flow controllers (typically used), the maximum value of the setpoint signal (10 V) is assigned to the set maximum value (q_{vmax}, see characteristics).

q_{vmin} [m³/h]; [l/s]; [CFM]
Client-adjustable lower limit of the operating range of the VAV terminal unit: q_{vmin} should be set to less than or equal to q_{vmax}. q_{vmin} must not be set 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 control of volume flow controllers (typically used), the minimum value of the setpoint signal (0 or 2 V) is assigned to the set minimum value (q_{vmin}, see characteristics).

q_v [m³/h]; [l/s]; [CFM]
Volume flow rate

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

Δp_{st} [Pa]; [inWg]
Static differential pressure

Δp_{stmin} [Pa]; [inWg]

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 pressure on the CAV controller 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 [mm]; [in]

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

Basic unit

Unit for controlling volume flow rates without an attached control component. The main components include the casing with sensor(s) to measure the differential 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 connection variants, acoustic characteristics (e.g. optional acoustic cladding or integrated silencers), range of volume flow.

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 mainly consists of a controller with differential pressure transducer (integrated or external), and an integrated actuator (Easy and Compact controllers) or external actuator (Universal or LABCONTROL controller). Important distinguishing features: Transducer: dynamic transducer for clean air, or static transducer for polluted air. Actuator: Standard actuator (slow-running), spring return actuator for fail-safe position, or fast-running actuator. Interface technology: analogue interface or digital bus interface for connecting and recording signals and data.

Volume flow controller

Consists of a basic unit with an attached control component.