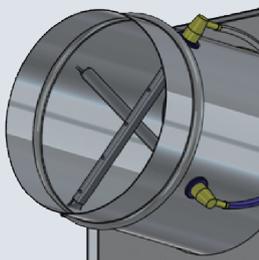


# VAV terminal units

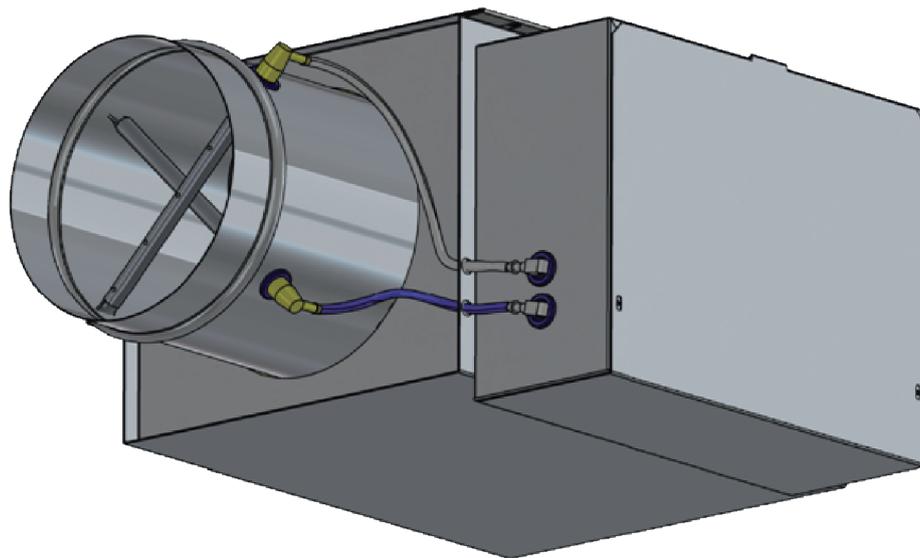
## Type TVB



Rectangular outlet connection



Circular inlet connection



### For the most diverse application regarding standard volume flow with demanding acoustic requirements

VAV terminal units for standard applications regarding the supply air or extract air control invariable air volume systems with demanding acoustic requirements

- Suitable for the control of volume flow rate, room pressure or duct pressure
- Electronic control components for different applications (Easy, Compact, Universal)
- Accurate air flow control even with upstream radius bend ( $R = 1D$ )
- Suitable for air velocities up to 13 m/s
- Operation pressure 20 to 1000 Pa
- Closed blade air leakage to EN 1751, Class 2 (4 – 10), Class 3 (12, 14, 16)
- Integral attenuator
- Box style construction for the reduction of the air flow velocity

#### Optional equipment and accessories

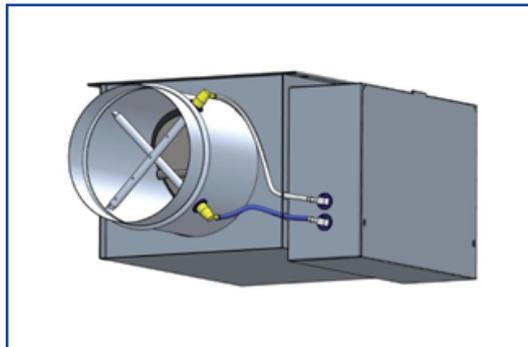
- Hot water heat exchanger of Type WT or electric heater for reheating the air flow

Type		Page
TVB	General information	1 - 4
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	Aerodynamic data	7
	Dimensions and weight – TVB - A/B	8
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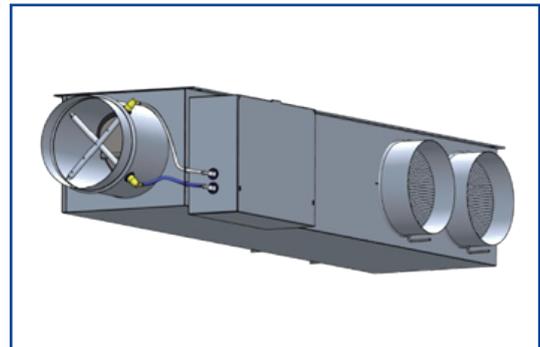
## Variants

Product examples

VAV terminal unit, variant TVB - A



VAV terminal unit, variant TVB - C



## Description

### Application

- VAV terminal units of Type TVB for the supply air or extract air flow control invariable 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)

### Variants

- TVB - A : VAV terminal unit
- TVB - B : VAV terminal unit with extended casing for better acoustics performance
- TVB - C : VAV terminal unit with multiple outlets
- TVB - E : VAV terminal unit with electric reheat unit
- TVB - EC: VAV terminal unit with multiple outlets and reheat unit

### Nominal sizes

- 4, 5, 6, 7, 8, 10, 12, 14, 16

### 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 pressure transducer and actuators for special applications

### Useful additions

- Hot water heat exchanger Type WT
  - Electrical heater
- For more details contact TROX Malaysia

### Special characteristics

- 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

### 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
- 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

#### Construction features

- Rectangular casing
- Spigot on the inlet suitable for circular ducts to DW144, 1998
- Connection on the room end suitable for air duct profiles
- Position of the damper blade indicated externally at shaft extension
- Thermal and acoustical insulation (lining)

#### Materials and surfaces

- Casing and damper blade made of galvanized sheet steel
- Damper blade seal made of Chloroprene rubber
- Lining is fiber glass
- Differential pressure sensor made of aluminum
- Plastic bearings

#### Mineral wool

- Internal fiber glass insulation lining.
- Faced with woven glass fabric as protection against fiber erosion for air flow velocities up to 20 m/s
- Resistant to fungal and bacterial growth

#### Installation and commissioning

- Any installation orientation (except units with static differential pressure transducer)
- Return edges of the casing with drilled holes suitable for M8 threaded rods

#### Standards and guidelines

- Closed blade air leakage to EN1751, Class 2 (4 – 10), Class 3 (12, 14, 16)

#### Maintenance

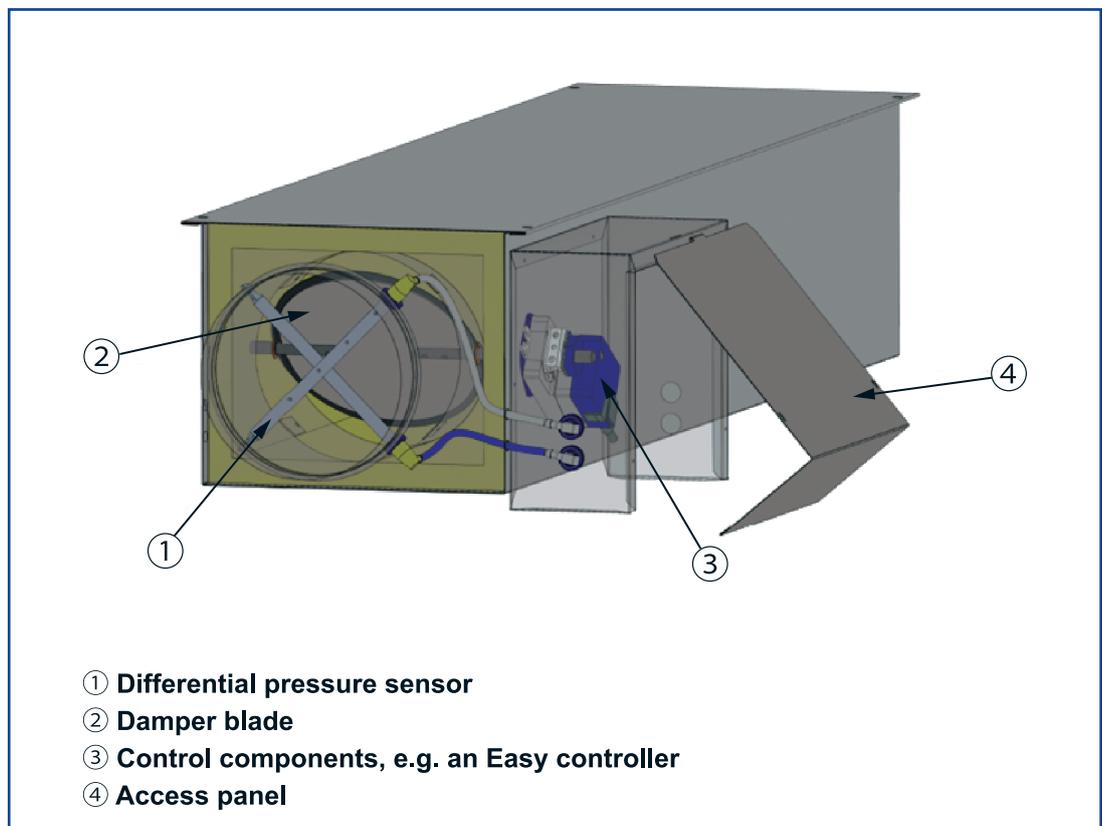
- Maintenance-free as construction and materials are not subject to wear

**Function**

**Functional description**

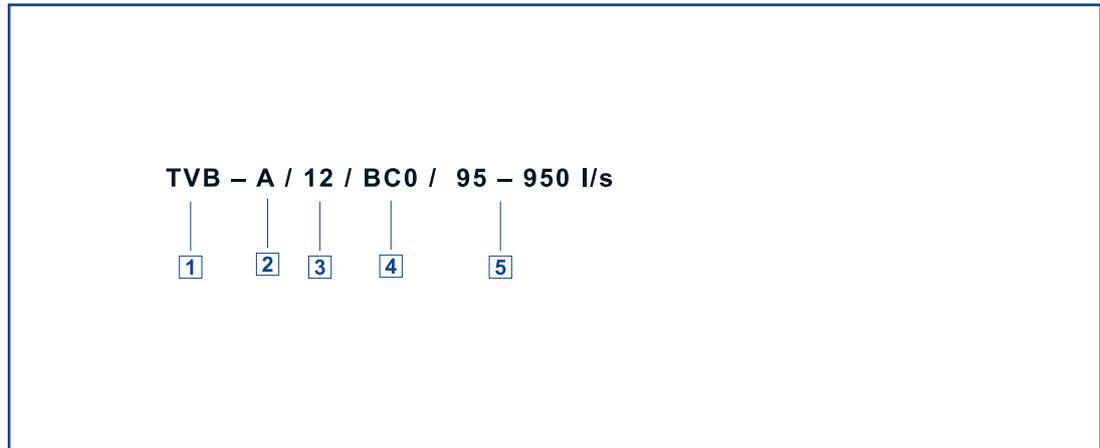
- The VAV terminal unit is fitted with a differential pressure sensor for measuring the volume flow rate. The control components (attachments) include a differential pressure transducer that transforms the differential pressure (effective pressure) into an electric signal, a controller, and an actuator; the control functions can be achieved with an Easy controller, with a Compact controller, or with individual components.
- 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 air flow. The air flow 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 TVB**



Order code  
VARYCONTROL

TVB, TVB - / ... / Easy



- 1 Type**  
**TVB**    VAV terminal unit
- 2 Construction variation**  
**A**    short casing  
**B**    long casing  
**C**    with multiple outlets  
**E**    with electric heater  
**EC**    with electric heater and multiple outlets
- 3 Nominal size [inch]**  
 4  
 5  
 6  
 7  
 8  
 10  
 12  
 14  
 16
- 4 Attachments (control component)**  
 Specific controller name
- 5 Design flow range [l/s or CFM], differential pressure [Pa]**  
 $V_{min}$  and  $V_{max}$  for factory setting or  
 $\Delta p_{min}$  for factory setting

Order example  
VARYCONTROL

TVB - A / 12 / BC0 / 100 - 1000 l/s

Construction variation	short casing
Norminal size	12 inch
Attachment	Controller
Volume flow rate	95 - 950 l/s

### Volume flow rate ranges Sound pressure level at differential pressure 150 Pa according to AHRI 880

Quick selection tables provide a good overview of the room sound pressure levels that can be expected. Approximate intermediate values can be interpolated. For precise intermediate values please contact TROX Malaysia.

The first selection criteria for the nominal size are the actual volume flow rates  $V_{min}$  and  $V_{max}$ .

The quick sizing tables are based on normally accepted attenuation levels. If the sound pressure level exceeds the required level, a larger VAV terminal unit and/or a silencer is required.

Nominal size	Airflow V		Air-regenerated noise			Case-radiated noise
			TVB-A	TVB-B	TVB-C	
	l/s	CFM	L <sub>PA</sub> dB(A)			
4	10	21	6	6	6	7
	45	95	17	11	14	16
	70	148	22	16	18	21
	100	212	25	20	22	25
5	15	32	6	6	7	9
	70	148	15	14	18	18
	115	244	22	20	25	21
	155	328	24	22	27	23
6	25	53	7	6	7	9
	110	233	18	16	20	20
	170	360	22	20	25	24
	235	498	26	24	30	26
7	30	64	7	6	7	9
	140	297	22	15	25	21
	225	477	27	20	29	26
	310	657	31	24	34	30
8	40	85	8	8	11	9
	190	403	20	18	28	21
	300	636	25	23	34	25
	410	869	27	24	35	28
10	65	138	9	9	11	8
	290	614	22	18	28	21
	460	975	24	20	32	25
	630	1335	28	23	36	28
12	95	201	9	7	8	10
	440	932	20	15	26	24
	695	1472	25	20	33	28
	950	2013	28	23	38	31
14	125	265	9	9	11	10
	575	1218	20	16	28	22
	910	1928	24	20	33	26
	1250	2648	27	22	37	29
16	180	381	8	7	9	8
	820	1737	20	15	27	25
	1295	2744	24	19	34	32
	1775	3761	27	22	39	36

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. For volume flow rate ranges for all control components refer to TROX Malaysia.

### Air regenerate Noise

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

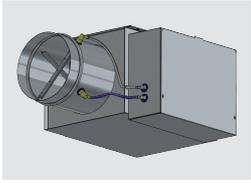
Sufficient duct pressure must be ensured for all operating conditions and for all control units. The measurement points for fan speed control must be selected accordingly.

### Volume flow rate ranges and minimum differential pressure values

Nominal Size	Airflow V		TVB-A	TVB-B	TVB-C	$\Delta V, \pm\%$
	l/s	CFM				
4	10	21	20	20	20	15
	45	95	20	25	40	8
	70	148	40	65	90	7
	100	212	75	130	185	5
5	15	32	20	20	20	15
	70	148	20	20	30	7
	115	244	20	40	70	6
	155	328	30	70	115	5
6	25	53	20	20	20	15
	110	233	20	20	20	8
	170	360	20	20	20	7
	235	498	20	20	40	5
7	30	64	20	20	20	15
	140	297	20	20	20	8
	225	477	20	20	20	7
	310	657	20	20	35	5
8	40	85	20	20	20	15
	190	403	20	20	20	7
	300	636	20	20	20	5
	410	869	20	20	20	5
10	65	138	20	20	20	15
	290	614	20	20	20	7
	460	975	20	20	20	5
	630	1335	20	20	20	5
12	95	201	20	20	20	15
	440	932	20	20	20	7
	695	1473	20	20	20	6
	950	2013	20	20	20	5
14	125	265	20	20	20	15
	575	1218	20	20	20	7
	910	1928	20	20	20	6
	1250	2649	20	20	20	5
16	180	381	20	20	20	15
	820	1737	20	20	20	7
	1295	2744	20	20	20	6
	1775	3761	20	20	20	5

### Description

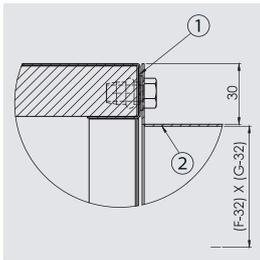
– VAV terminal unit for the control of variable air volume flows



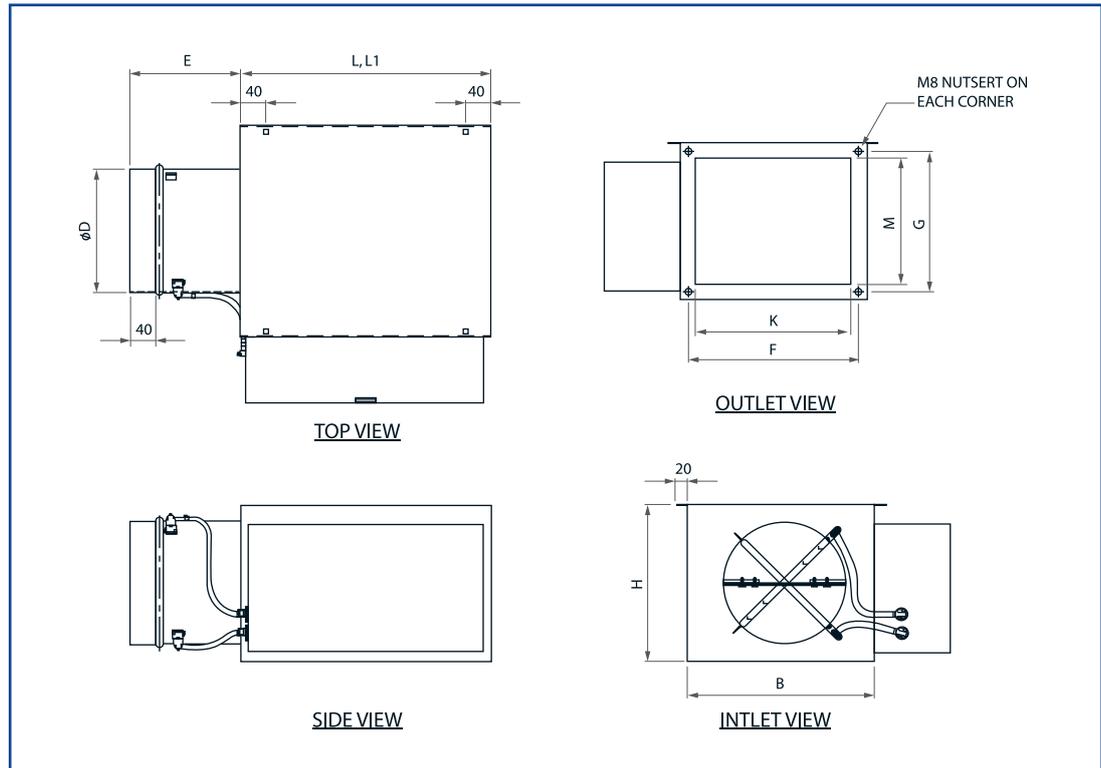
VAV terminal unit,  
Variant TVB

### Dimensions

### TVB - A/B



- ① Compressible seal, to be provided by others
- ② Air duct profile to be provided by others



### Dimensions [mm] and weight [kg]

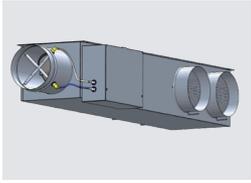
Nominal size	ØD	B	H	L*	L <sub>1</sub> *	mm					TVB - A	TVB - B
						E	F	G	K	M		
4	99	300	203	400	1320	147	268	171	248	151	6	13
5	124	300	203	400	1320	154	268	171	248	151	6	13
6	149	300	203	400	1320	163	268	171	248	151	6	13
7	174	300	244	400	1320	170	268	222	248	202	7	16
8	199	300	254	400	1320	176	268	222	248	202	7	16
10	249	355	311	400	1320	216	323	279	303	259	9	21
12	299	400	381	655	1570	260	368	349	348	329	15	27
14	349	500	450	655	1570	315	468	418	448	398	19	37
16	399	600	450	765	1680	360	568	418	548	398	23	45

\*Note:

L: For Type TVB - A

L<sub>1</sub>: For Type TVB - B

### Description

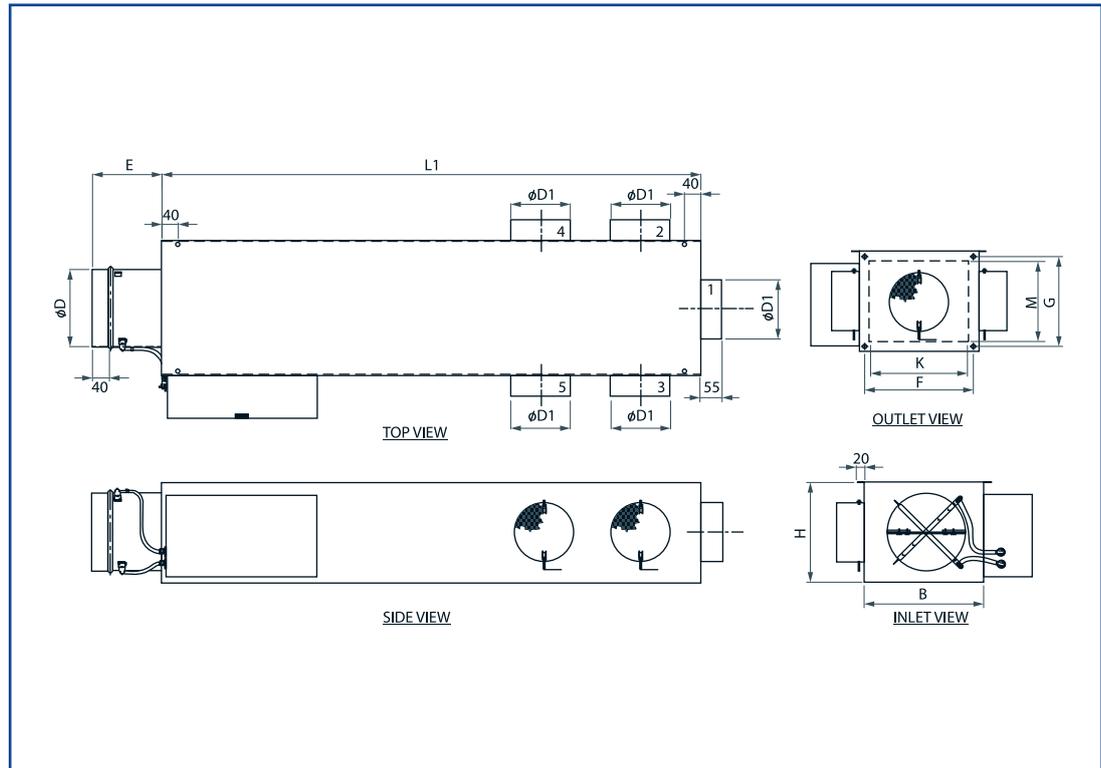


VAV terminal unit,  
variant TVB - C

- VAV terminal unit with acoustic cladding for the control of variable supply air volume flows
- For rooms where the case-radiated noise of the units is not sufficiently reduced by a false ceiling
- The circular ducts for the room under consideration must have a adequate acoustic insulation (provided by others) on the fan end
- Acoustic cladding can not be retrofitted
- Outlet spigot with adjustable perforated damper

### Dimensions

### TVB - C



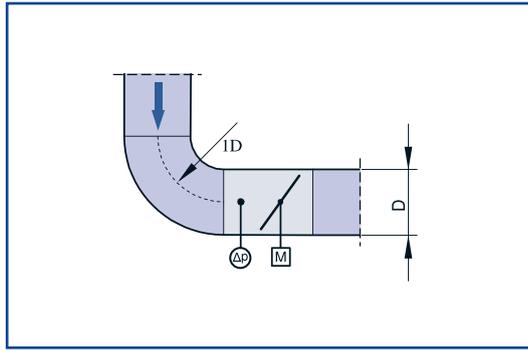
### Dimensions [mm] and weight [kg]

Nominal size	ØD	B	H	L <sub>1</sub>	E	Pos. spigot	ØD <sub>1</sub>	TVB - C
	mm						mm	kg
4	99	300	203	1320	147	1-3	149	14
5	124	300	203	1320	154	1-3	149	14
6	149	300	203	1320	163	1-3	149	14
7	174	300	244	1320	170	2-5	199	17
8	199	300	254	1320	176	2-5	199	17
10	249	355	311	1320	216	1-5	199	22
12	299	400	381	1570	260	1-5	199	28
14	349	500	450	1570	315	1-5	199	38
16	399	600	450	1680	360	1-5	199	46

## Upstream conditions

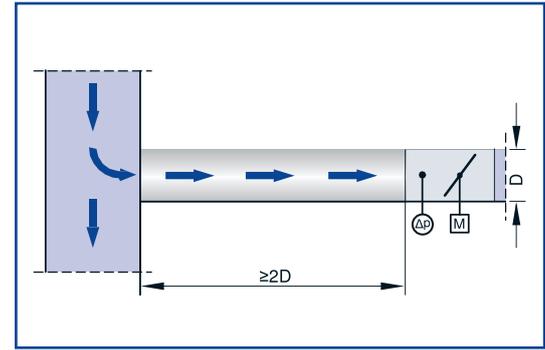
The volume flow rate accuracy  $\Delta p$  applies to a straight up stream section of the duct. Bends, junctions or a narrowing or widening of the duct cause turbulence that may affect measurement. Duct connections, e.g. branches off the main duct, must comply with EN1505. Some installation situations require straight duct sections upstream.

## Bend



A radius bend with at least 1D radius at a centre line curvature – without an additional straight duct section up stream 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  $\Delta V$  can only be achieved with a straight duct section of at least 2D length 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.

### Standard text

This specification describes the general properties of the product.

VAV terminal units for variable and constant air volume systems, suitable for supply or extract air, available in 9 nominal sizes.

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 and a damper blade.

Factory assembled control components complete with wiring and tubing.

Spigot suitable for circular ducts to DW 144, 1998

Position of the damper blade indicated externally at shaft extension.

Closed blade air leakage to EN 1751, Class 2 (4-10), Class 3 (12, 14, 16)

### Special characteristics

- Factory set-up or programming and function testing
- Volume flow rate can later be measured and adjusted on site; additional adjustment device maybe necessary

### Materials and surfaces

- Casing and damper blade made of galvanized sheet steel
- Damper blade seal made of Chloroprene rubber
- Lining is mineral wool
- Differential pressure sensor made of aluminum
- ABS bearings

### Mineral wool

- Internal fiber glass insulation lining.
- Faced with woven glass fabric as protection against erosion through airflow velocities of up to 20 m/s
- Resistant to fungal and bacterial growth

### Technical data

- Nominal sizes: 4 to 16 inches
- Volume flow rate range: 10 to 1775 l/s or 21 to 3761 CFM
- Volume flow rate range with electric heater: 56 to 1775 l/s or 21 to 3761 CFM
- Volume flow rate control range (unit with dynamic differential pressure measurement): approx. 10 to 100% of the nominal volume flow rate
- Minimum differential pressure: 20 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 to controller 24 V AC
- Transformer step down from 230 V AC to 24 V AC
- Signal voltages 0(2) – 10 V DC
- Possible override controls with external switches using volt-free contacts: CLOSED, OPEN,  $V_{min}$  and  $V_{max}$
- Potentiometers with percentage scales to set the volume flow rates  $V_{min}$  and  $V_{max}$
- 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. 0 – 100% of the nominal volume flow rate
- Clearly visible external indicator light for signaling the functions: Set, not set, and power failure

Electrical connections with screw terminal.