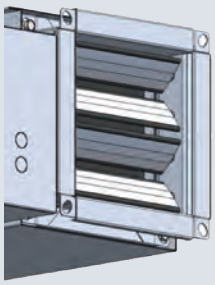
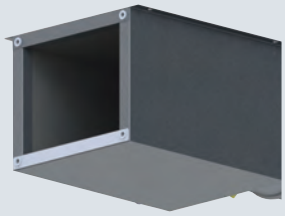
VAV terminal units

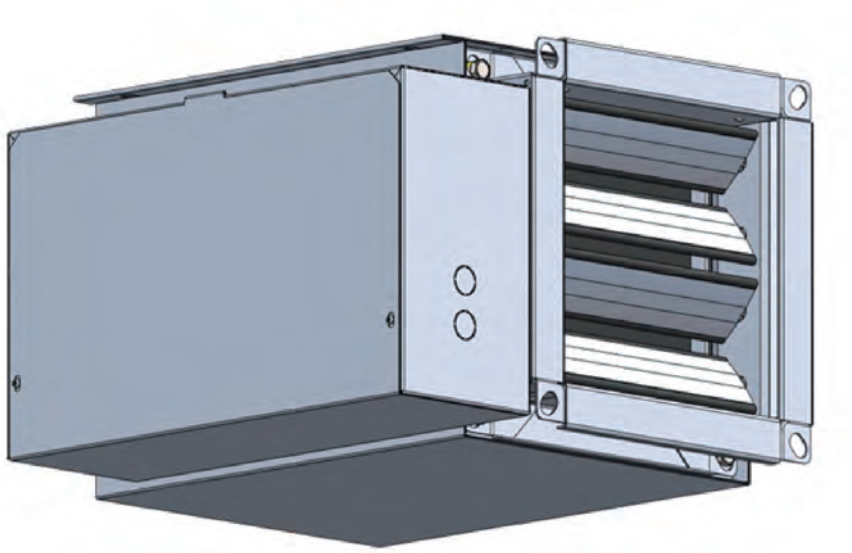
Type TVL



Rectangular outlet connection



Rectangular inlet connection



For normal and high volume flow rate range

Rectangular VAV terminal units for standard applications regarding the supply air or extract air control in variable air volume systems

- Suitable for the control of volume flow rate, room pressure or duct pressure
- Electronic control components for different applications (Easy, Compact, Universal)
- High control accuracy
- For volume flow rate ranges up to 36,360 m^3/h or 10,000 l/s
- Suitable for airflow velocities up to 10 m/s
- Operation pressure 50 to 1000 Pa

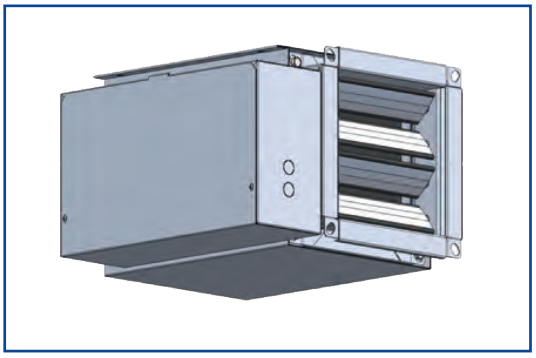
Optional equipment and accessories

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

Variants

VAV terminal unit, variant TVL

Product examples



Description

Application

- Rectangular VARYCONTROL VAV terminal units of Type TVL for the supply air or extract air flow control in variable air volume systems
- Closed-loop volume flow control using an external power supply
- For controlling, restricting, or shutting off the air flow in air conditioning systems
- Shut-off by means of switching (equipment supplied by others)

Construction

- Galvanised sheet steel

Nominal sizes

- 39 nominal sizes from 200 × 100 to 1000 × 1000

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

- Secondary silencer Type TX for demanding acoustic requirements
- Hot water heat exchanger Type WT
  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 maybe 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
- 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 volume flow rate control accuracy

Construction features
- Rectangular casing
- Aerofoil type damper blade in an opposed blade configuration
- Position of the damper blade indicated externally at shaft extension

Materials and surfaces
- Galvanized sheet steel construction
- Casing made of galvanized sheet steel
- Shaft made of galvanized steel
- Damper blades and differential pressure sensor made of aluminum
- Sintered bronze bearings

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

Installation and commissioning
- Damper blades have to be horizontal
- Return edges of the casing with drilled holes suitable for M8 threaded rods

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

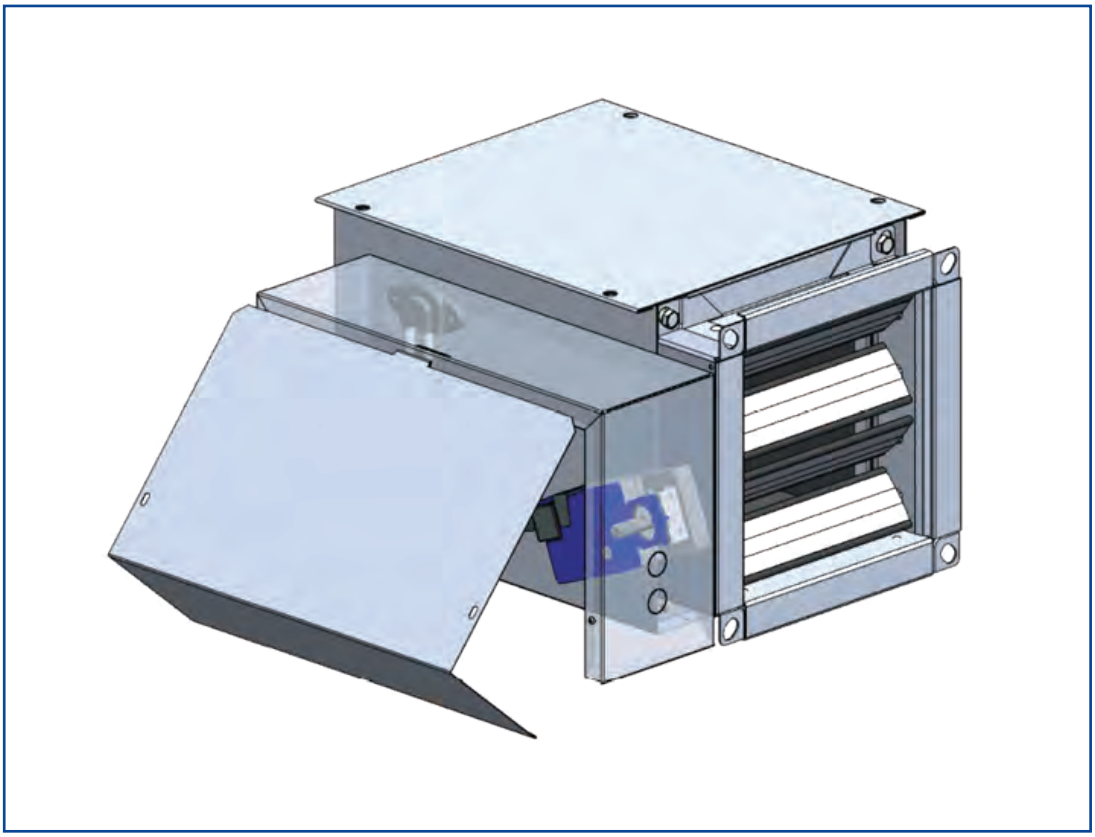
Function

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) in to 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.

Schematic illustration of the TVL



Order code
VARYCONTROL

TVL

TVL / 700 x 200 / 0 / 290 – 1450 l/s
1 2 3 4

1 Type
TVL VAV terminal unit

2 Nominal size [mm]
B x H

3 Attachments (control component)
Specific controller name

4 Design flow range [l/s or CFM], differential pressure [Pa]
V_{min} and V_{max} for factory setting or
Δp_{min} for factory setting

Order example
VARYCONTROL

TVL / 700 x 200 / 00 / 0 / 290 - 1450 l/s

Construction variation	normal
Norminal size	700 x 200 mm
Attachment	Controller
Volume flow rate	290 - 1450 l/s

Volume flow rate ranges

Quick selection tables provide a good overview of the room sound pressure levels that can be expected. Approximate intermediate values can be interpolated. 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.

Sound pressure level at differential pressure 150 Pa according to AHRI 880

Nominal size	Airflow		Air-regenerated noise		Case-radiated noise
			*1	*2	
	l/s	cfm	dB(A)		
200 x 100	45	95	9	7	13
	85	180	14	10	18
	150	318	19	14	22
	215	456	23	18	25
300 x 100	65	138	10	7	14
	120	254	15	11	19
	210	445	20	15	24
	320	678	25	19	27
400 x 100	85	180	11	8	15
	170	360	16	10	21
	300	636	22	16	25
	425	901	25	18	28
500 x 100	105	222	12	8	16
	200	424	17	11	21
	350	742	21	15	26
	535	1134	26	19	29
600 x 100	130	275	13	8	17
	260	551	18	12	23
	450	954	23	16	27
	650	1377	27	20	29
200 x 200	85	180	11	8	15
	160	339	16	11	20
	280	593	22	16	25
	415	879	24	18	28
300 x 200	125	265	12	8	17
	240	509	18	12	22
	420	890	22	16	27
	620	1314	26	19	29
400 x 200	165	350	13	8	18
	330	699	19	12	24
	580	1229	24	16	28
	825	1748	28	20	30
500 x 200	205	434	14	8	19
	400	848	19	12	24
	700	1483	25	17	29
	1035	2193	29	21	31
600 x 200	250	530	15	9	20
	500	1059	20	12	26
	870	1843	26	18	30
	1250	2649	30	22	32

Nominal size	Airflow		Air-regenerated noise		Case-radiated noise
			*1	*2	
	l/s	cfm	dB(A)		
700 x 200	290	614	15	9	20
	560	1187	20	13	26
	980	2077	26	19	30
	1450	3072	30	23	32
800 x 200	330	699	16	9	21
	660	1398	21	13	27
	1160	2458	27	19	31
	1650	3496	31	23	33
300 x 300	185	392	14	8	18
	360	763	18	12	24
	630	1335	24	17	28
	920	1949	28	21	31
400 x 300	245	519	15	8	19
	480	1017	20	12	25
	840	1780	26	17	29
	1230	2606	30	21	32
500 x 300	305	646	16	9	20
	600	1271	21	13	26
	1050	2225	27	18	30
	1535	3253	31	22	33
600 x 300	370	784	16	8	21
	740	1568	22	14	27
	1290	2733	28	19	31
	1850	3920	32	23	33
700 x 300	430	911	16	9	22
	840	1780	22	14	28
	1470	3115	29	20	32
	2150	4556	32	24	34
800 x 300	490	1038	17	9	23
	980	2077	23	14	29
	1720	3645	29	20	32
	2450	5191	33	24	34
900 x 300	555	1176	17	9	23
	1080	2288	24	15	29
	1890	4005	30	21	33
	2770	5869	34	25	35
1000 x 300	620	1314	18	9	24
	1240	2627	25	15	30
	2150	4556	31	21	33
	3100	6569	34	25	35

*1 = LPA Without attenuator TX
*2 = LPA With attenuator TX

Sound pressure level at differential pressure 150 Pa according to AHRI 880

Nominal size	Airflow		Air-regenerated noise		Case-radiated noise
			*1	*2	
	l/s	cfm	dB(A)		
400 x 400	325	689	16	9	21
	640	1356	29	13	27
	1120	2373	27	19	31
	1630	3454	31	22	33
500 x 400	410	869	16	8	22
	800	1695	22	14	28
	1400	2966	28	20	32
	2040	4323	32	23	34
600 x 400	490	1038	17	9	23
	980	2077	23	14	29
	1720	3645	29	21	32
	2450	5191	33	24	34
700 x 400	570	1208	18	9	23
	1120	2373	24	15	29
	1960	4153	30	22	33
	2850	6039	34	25	35
800 x 400	650	1377	18	9	24
	1300	2755	25	15	30
	2280	4831	31	22	34
	3250	6886	34	25	35
900 x 400	735	1557	19	10	24
	1440	3051	25	16	30
	2520	5340	31	22	34
	3670	7776	35	26	36
1000 x 400	820	1737	19	10	25
	1640	3475	26	16	31
	2850	6039	32	23	34
	4100	8687	35	26	36
500 x 500	510	1081	17	9	23
	1000	2119	23	14	29
	1750	3708	29	20	32
	2540	5382	33	24	35
600 x 500	610	1293	18	9	24
	1200	2543	24	15	29
	2100	4450	30	21	33
	3050	6463	34	25	35
700 x 500	710	1504	18	10	24
	1400	2966	25	16	30
	2450	5191	31	22	34
	3550	7522	35	26	36

Nominal size	Airflow		Air-regenerated noise		Case-radiated noise
			*1	*2	
	l/s	cfm	dB(A)		
800 x 500	810	1716	19	10	25
	1600	3390	26	16	31
	2800	5933	32	22	34
	4050	8582	35	26	36
900 x 500	915	1939	20	10	26
	1800	3814	27	16	31
	3150	6675	32	23	35
	4570	9683	36	27	37
1000 x 500	1020	2161	20	10	26
	2000	4238	27	17	32
	3500	7416	33	23	35
	5100	10806	36	27	37
600 x 600	730	1547	19	10	24
	1440	3051	25	16	30
	2520	5340	31	22	34
	3650	7734	35	26	36
800 x 600	970	2055	20	10	26
	1920	4068	27	17	31
	3360	7120	33	23	35
	4850	10277	36	27	37
1000 x 600	1220	2585	21	11	27
	2400	5085	28	18	32
	4200	8899	34	24	36
	6100	12925	37	28	38
800 x 800	1300	2755	21	11	27
	2560	5424	28	17	33
	4480	9493	34	24	36
	6500	13773	37	28	38
1000 x 800	1620	3433	22	12	28
	3200	6780	30	18	34
	5600	11866	35	25	37
	8100	17163	38	29	39
1000 x 1000	2020	4280	24	12	29
	4000	8476	31	19	35
	7000	14832	36	25	38
	10100	21401	39	30	40

*1 = LPA Without attenuator TX
*2 = LPA With attenuator TX

Air regenerated 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

B x H mm	l/s	m/s	ΔV ±%	Δ Pg min in Pa
200 x 100	45	2	14	20
	85	4	8	20
	150	7	5	30
	215	10	5	40
300 x 100	65	2	14	20
	120	4	8	20
	210	7	5	30
	320	10	5	40
400 x 100	85	2	14	20
	170	4	8	20
	300	7	5	30
	425	10	5	40
500 x 100	105	2	14	20
	200	4	8	20
	350	7	5	30
	535	10	5	40
600 x 100	130	2	14	20
	260	4	8	20
	450	7	5	30
	650	10	5	40
200 x 200	85	2	14	20
	160	4	8	20
	280	7	5	30
	415	10	5	40
300 x 200	125	2	14	20
	240	4	8	20
	420	7	5	30
	620	10	5	40
400 x 200	165	2	14	20
	330	4	8	20
	580	7	5	30
	825	10	5	40
500 x 200	205	2	14	20
	400	4	8	20
	700	7	5	30
	1035	10	5	40
600 x 200	250	2	14	20
	500	4	8	20
	870	7	5	30
	1250	10	5	40

B x H mm	l/s	m/s	ΔV ±%	Δ Pg min in Pa
700 x 200	290	2	14	20
	560	4	8	20
	980	7	5	30
	1450	10	5	40
800 x 200	330	2	14	20
	660	4	8	20
	1160	7	5	30
	1650	10	5	40
300 x 300	185	2	14	20
	360	4	8	20
	630	7	5	25
	920	10	5	35
400 x 300	245	2	14	20
	480	4	8	20
	840	7	5	25
	1230	10	5	35
500 x 300	305	2	14	20
	600	4	8	20
	1050	7	5	25
	1535	10	5	35
600 x 300	370	2	14	20
	740	4	8	20
	1290	7	5	25
	1850	10	5	35
700 x 300	430	2	14	20
	840	4	8	20
	1470	7	5	25
	2150	10	5	35
800 x 300	490	2	14	20
	980	4	8	25
	1720	7	5	35
	2450	10	5	40
900 x 300	555	2	14	20
	1080	4	8	20
	1890	7	5	25
	2770	10	5	35
1000 x 300	620	2	14	20
	1240	4	8	20
	2150	7	5	25
	3100	10	5	35

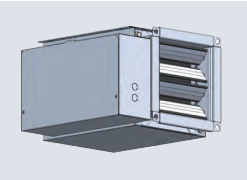
Volume flow rate ranges and minimum differential pressure values

B x H mm	l/s	m/s	ΔV ±%	Δ Pg min in Pa
400 x 400	325	2	14	20
	640	4	8	20
	1120	7	5	25
	1630	10	5	35
500 x 400	410	2	14	20
	800	4	8	20
	1400	7	5	25
	2040	10	5	35
600 x 400	490	2	14	20
	980	4	8	20
	1720	7	5	25
	2450	10	5	35
700 x 400	570	2	14	20
	1120	4	8	20
	1960	7	5	25
	2850	10	5	35
800 x 400	650	2	14	20
	1300	4	8	20
	2280	7	5	25
	3250	10	5	35
900 x 400	735	2	14	20
	1440	4	8	20
	2520	7	5	25
	3670	10	5	35
1000 x 400	820	2	14	20
	1640	4	8	20
	2850	7	5	25
	4100	10	5	35
500 x 500	510	2	14	20
	1000	4	8	20
	1750	7	5	30
	2540	10	5	40
600 x 500	610	2	14	20
	1200	4	8	20
	2100	7	5	30
	3050	10	5	40
700 x 500	710	2	14	20
	1400	4	8	20
	2450	7	5	30
	3550	10	5	40

B x H mm	l/s	m/s	ΔV ±%	Δ Pg min in Pa
800 x 500	810	2	14	20
	1600	4	8	20
	2800	7	5	30
	4050	10	5	40
900 x 500	915	2	14	20
	1800	4	8	20
	3150	7	5	30
	4570	10	5	40
1000 x 500	1020	2	14	20
	2000	4	8	20
	3500	7	5	30
	5100	10	5	40
600 x 600	730	2	14	20
	1440	4	8	20
	2520	7	5	30
	3650	10	5	40
800 x 600	970	2	14	20
	1920	4	8	20
	3360	7	5	30
	4850	10	5	40
1000 x 600	1220	2	14	20
	2400	4	8	20
	4200	7	5	30
	6100	10	5	40
800 x 800	1300	2	14	20
	2560	4	8	20
	4480	7	5	30
	6500	10	5	40
1000 x 800	1620	2	14	20
	3200	4	8	20
	5600	7	5	30
	8100	10	5	40
1000 x 1000	2020	2	14	20
	4000	4	8	20
	7000	7	5	30
	10100	10	5	40

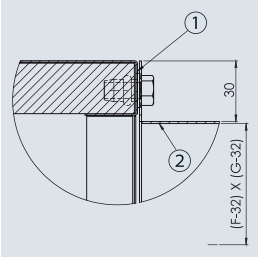
Description

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



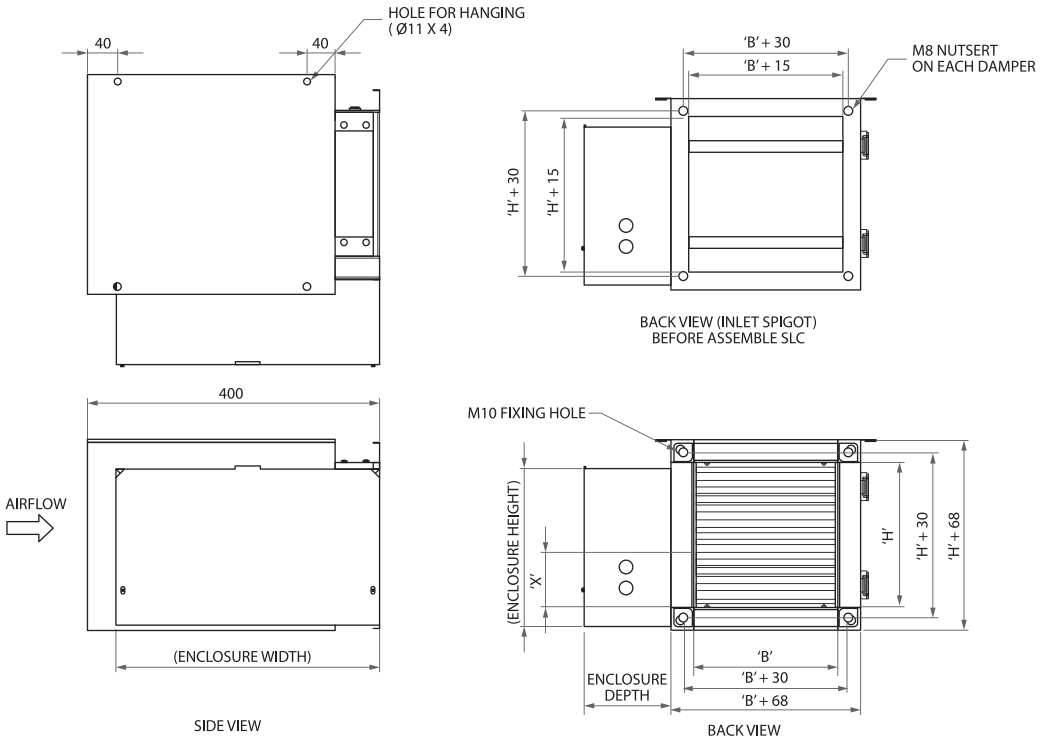
VAV terminal unit,
Variant TVL

Dimensions



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

TVL



NOTE:
Controls enclosure size is dependent on the type of controller used.
Standard maximum control enclosure size is 400[L] x 350[H] x120[D]

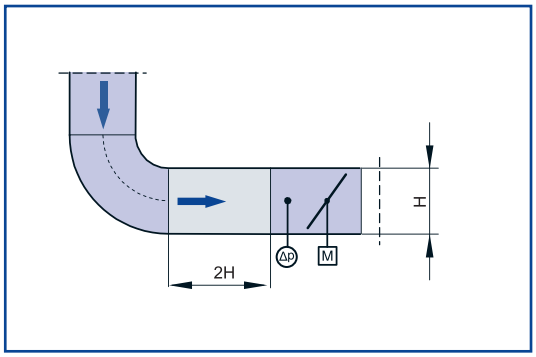
Dimensions [mm] and weight [kg]

H \ B	200	300	400	500	600	700	800	900	1000
100	6	7	8	10	11				
200	7	8	10	11	12	13	15		
300		10	11	12	14	15	16	17	18
400			12	13	15	16	17	18	19
500				14	16	17	18	19	20
600					17	18	19	20	21
700						19	20	21	22
800							21	22	23
900								24	25
1000									26

Upstream conditions

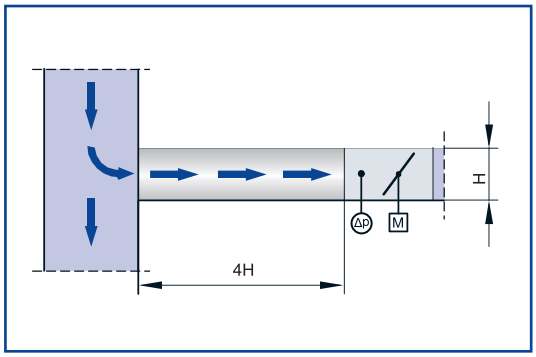
The volume flow rate accuracy Δp applies to a straight upstream section of the duct. Bends, junctions or a narrowing or widening of the duct cause turbulence that may affect measurement. Some installation situations require straight duct sections upstream.

Bend



A bend – with a straight duct section of at least 2H 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 ΔV can only be achieved with a straight duct section of at least 4H 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 text describes the general properties of the product.

Rectangular VAV terminal units for variable and constant air volume systems, suitable for supply or extract air, available in 39 nominal sizes. High volume flow rate control accuracy. 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. Factory - assembled control components complete with wiring and tubing. Differential pressure sensor with measuring holes (resistant to dust and pollution) Both ends suitable for the connection of ducts. Position of the damper blade indicated externally at shaft extension.

Special characteristics

- Factory set-up or programming and aerodynamic function testing
- Volume flow rate can be measured and subsequently adjusted on site; additional adjustment tool may be necessary

Materials and surfaces

- Casing made of galvanised sheet steel
- Shafts made of galvanised steel
- Damper blade and differential pressure sensor made of aluminium
- Sintered bronze bearings

Mineral wool

- Internal fibre 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: 200 × 100 to 1000 × 1000 mm
- Volume flow rate range: 45 to 10100 l/s or 162 to 36360 m³/h
- Volume flow rate control range (unit with dynamic differential pressure measurement): approx. 20 to 100 % of the nominal volume flow rate
- Minimum differential pressure: 50 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
- 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. 20 – 100% of the nominal volume flow rate
- Clearly visible external indicator light for signaling the functions: Set, notset, and power failure.

Electrical connections with screw terminal.