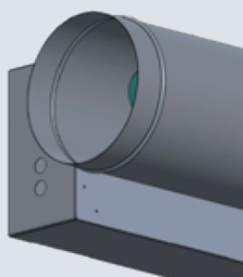
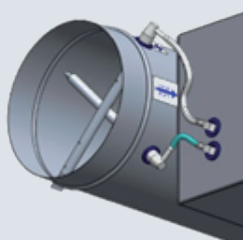


VAV terminal units

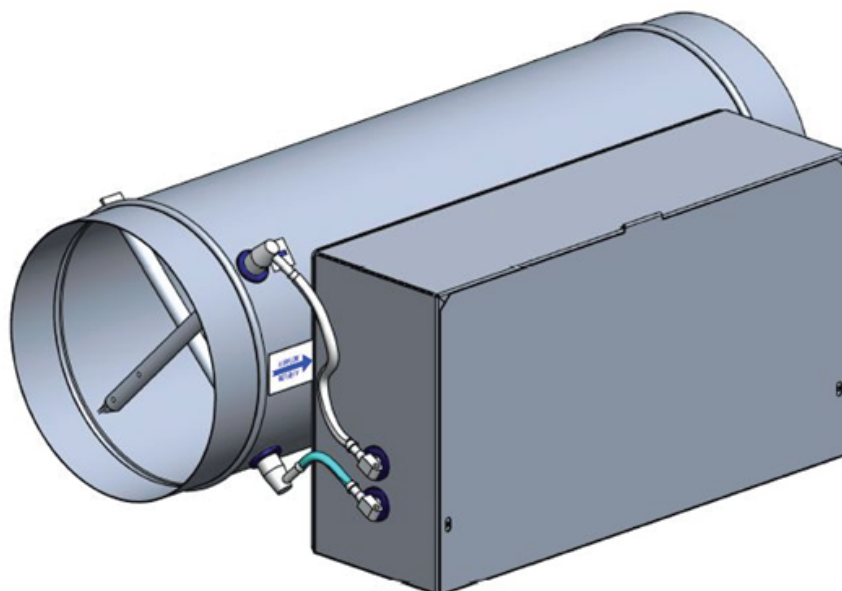
Type TVR



Circular outlet connection



Circular inlet connection



For the most diverse applications regarding standard volume flow rate ranges

Circular 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 even with upstream radius bend ($R = 1D$)
- Suitable for airflow 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)

Optional equipment and accessories

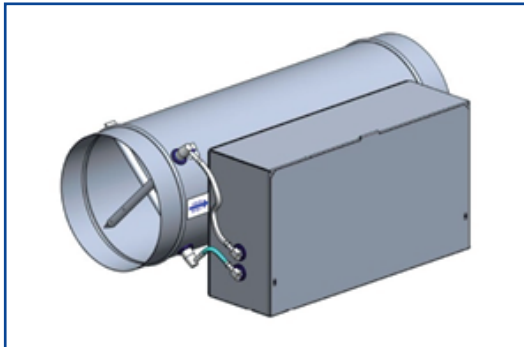
- Acoustic cladding for the reduction of case-radiated noise
- Secondary silencer Type CA for the reduction of air-regenerated noise

Type		Page
TVR	General information	1 - 4
	Order code	5
	Quick selection	6
	Aerodynamic data	7
	Dimensions and weight – TVR	8
	Dimensions and weight – TVR - D	9
	Installation details	10
	Specification text	11

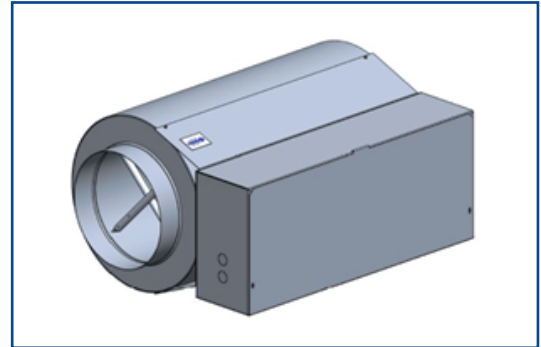
Variants

Product examples

VAV terminal unit, variant TVR



VAV terminal unit, variant TVR - D



Description

Application

- Circular VARYCONTROL VAV terminal units of Type TVR for the precise 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 airflow in air conditioning systems
- Shut-off by means of switching (equipment supplied by others)

Variants

- TVR : VAV terminal unit
- TVR - D : VAV terminal unit with acoustic cladding

Nominal sizes

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

Construction

- Galvanised sheet steel
- A2 : Stainless steel 304

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 CA for demanding acoustic requirements

Special characteristics

- Factory set-up or programming and aerodynamic function testing
- Volume flow rate can be measured and subsequently adjusted on site; additional tool 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
- Factory-assembled control components complete with wiring and tubing
- Aerodynamic function 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

- Circular casing
- Spigot on the inlet and outlet suitable for circular ducts to DW144, 1998
- Position of the damper blade indicated externally at shaft extension

Materials and surfaces

Galvanised sheet steel construction

- Casing and damper blade made of galvanised sheet steel
- Damper blade seal made of Chloroprene rubber
- Differential pressure sensor made of aluminium
- Plastic bearings

Stainless steel construction (A2)

- Casing, sensor tubes, damper blade and shaft made of stainless steel 304

Variant with acoustic cladding (-D)

- Acoustic cladding made of galvanized sheet steel
- Lining is mineral wool

Mineral wool

- Fibre glass insulation lining
- Resistant to fungal and bacterial growth
- Lining is mineral wool

Installation and commissioning

- Any installation orientation (except units with static differential pressure transducer)
- TVR-D: For constructions with acoustic cladding, controller enclosure not insulated

Standards and guidelines

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

Maintenance

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

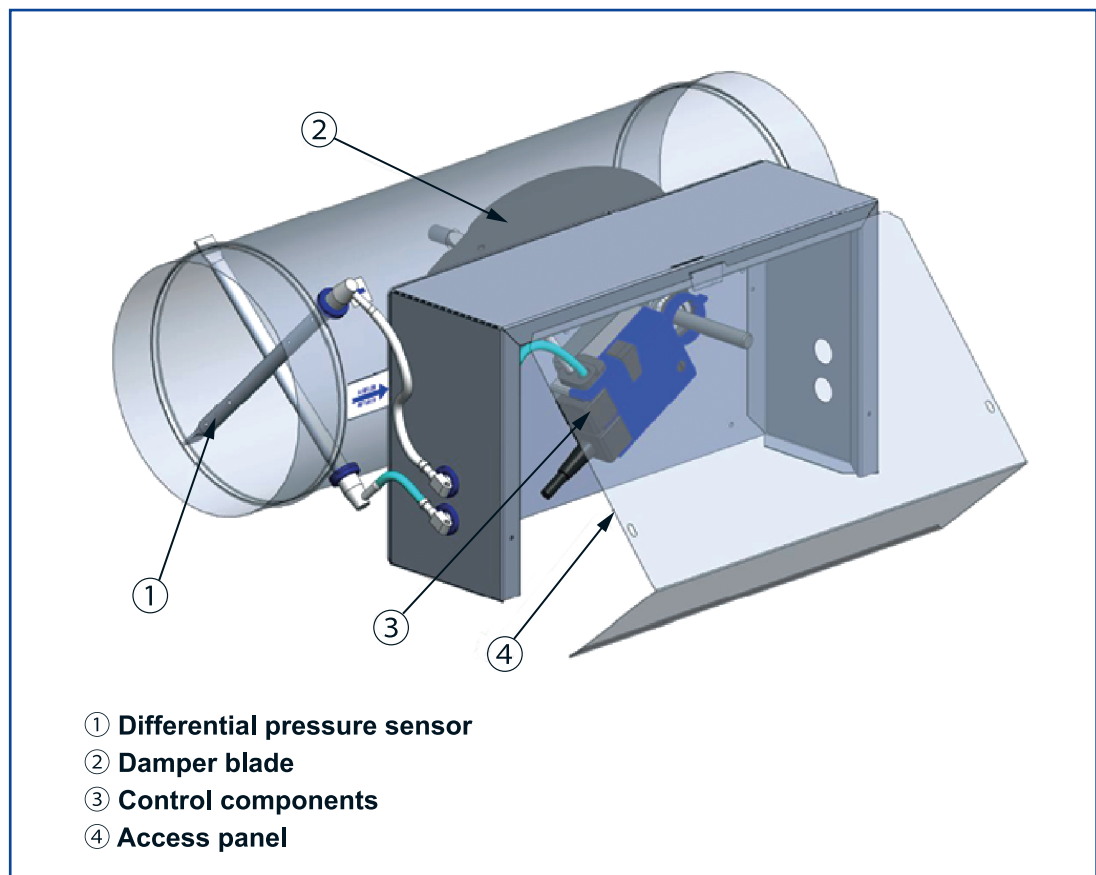
Function

Functional description

The VAV terminal units are 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.

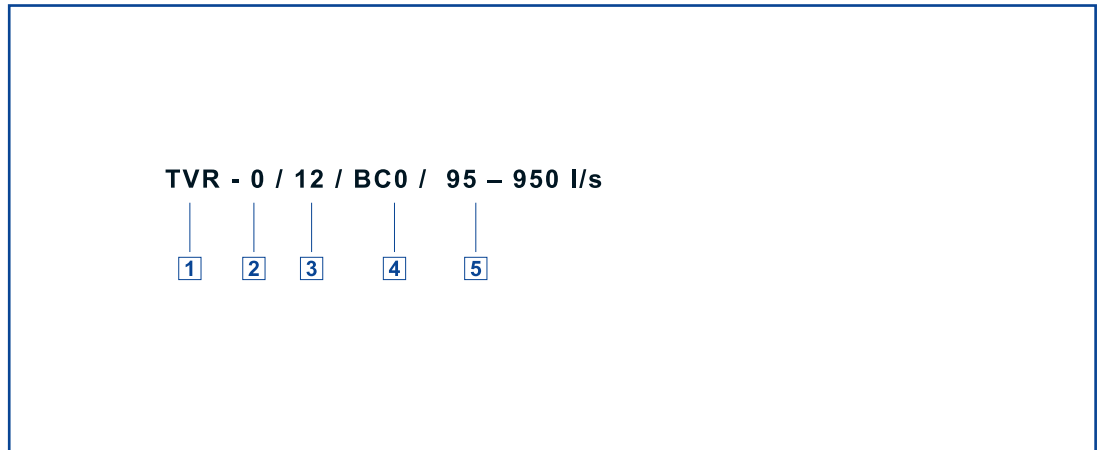
For most applications, the setpoint value comes from a room temperature controller. The controller compares the actual value with the setpoint value and alters the control signal of the actuator if there is a difference between the two values.

Schematic illustration of the TVR



Order code
VARYCONTROL

TVR, TVRD / ... / Easy



1 Type

TVR VAV terminal unit
TVRD

5 Design flow range [l/s or CFM], differential pressure [Pa]

V_{min} and V_{max} for factory setting or Δp_{min} for factory setting

2 Construction variation

A2 Stainless, steel material

3 Nominal size [inch]

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

4 Attachments(control component)

Specific controller name

Order example
VARYCONTROL

TVR - 0 / 12 / BC0 / 95 - 950 l/s

Construction variation	normal
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 at tenation levels. If the sound pressure level exceeds the required level, a larger VAV terminal unit and/or a silencer is required.

Nominal Size	Airflow, l/s	Airflow, cfm	Air-regenerated noise					Case-radiated noise	
			-	CA50-500	CA50-1000	CA100-500	CA100-1000	TVR	TVRD
			L _{PA} dB(A)						
4	10	21	10	7	7	7	6	8	7
	45	95	24	18	14	15	9	18	18
	70	148	29	23	18	19	11	21	22
	100	212	32	26	22	22	14	25	26
5	15	32	10	7	7	7	6	7	7
	70	148	22	18	15	15	9	15	15
	115	244	27	22	19	19	13	19	19
	155	328	28	23	20	20	13	21	21
6	25	53	8	7	6	6	6	8	6
	110	233	19	15	11	12	8	15	14
	170	360	20	18	14	15	9	23	19
	235	498	27	21	17	18	11	23	22
7	30	64	8	6	6	6	6	7	6
	140	297	19	15	13	12	8	14	11
	225	477	24	19	16	16	10	20	16
	310	657	28	22	19	19	12	25	21
8	40	85	13	10	9	8	7	8	7
	190	403	25	22	20	19	15	17	13
	300	636	29	26	24	23	19	20	17
	410	869	30	27	25	24	20	23	19
10	65	138	13	11	10	9	7	9	7
	290	614	24	21	20	19	15	19	14
	460	975	26	23	22	21	17	22	18
	630	1335	28	26	25	24	20	24	20
12	95	201	10	8	8	7	7	8	6
	440	932	18	15	14	13	10	17	11
	695	1473	23	19	18	16	13	22	15
	950	2013	29	25	24	22	17	30	22
14	125	265	10	9	8	8	7	8	6
	575	1218	18	16	14	13	10	17	11
	910	1928	23	20	19	18	14	23	16
	1250	2649	30	27	25	24	19	31	22
16	180	381	11	11	10	10	8	14	7
	820	1737	24	22	21	19	17	22	16
	1295	2744	27	25	24	23	20	25	19
	1775	3761	29	27	26	25	23	26	21

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.

Volume flow rate ranges and minimum differential pressure values

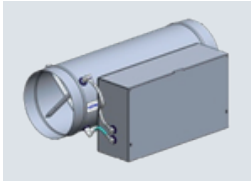
The minimum differential pressure of VAV terminal units is an important factor in designing the duct work and in rating the fan including speed control.

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.

Nominal Size	Airflow, l/s	Airflow, cfm	TVR	TVR-D	$\Delta V, \pm\%$
			$\Delta P_{st\ min}, Pa$		
4	10	21	20	20	15
	45	95	20	20	8
	70	148	40	40	7
	100	212	70	70	5
5	15	32	20	20	15
	70	148	20	20	7
	115	244	70	70	6
	155	328	100	100	5
6	25	53	20	20	15
	110	233	20	20	8
	170	360	40	40	7
	235	498	80	80	5
7	30	64	20	20	15
	140	297	20	20	8
	225	477	40	40	7
	310	657	70	70	5
8	40	85	20	20	15
	190	403	20	20	7
	300	636	30	30	5
	410	869	60	60	5
10	65	138	20	20	15
	290	614	20	20	7
	460	975	30	30	5
	630	1335	45	45	5
12	95	201	20	20	15
	440	932	20	20	7
	695	1473	20	20	6
	950	2013	30	30	5
14	125	265	20	20	15
	575	1218	20	20	7
	910	1928	20	20	6
	1250	2649	30	30	5
16	180	381	20	20	15
	820	1737	20	20	7
	1295	2744	20	20	6
	1775	3761	30	30	5

Description

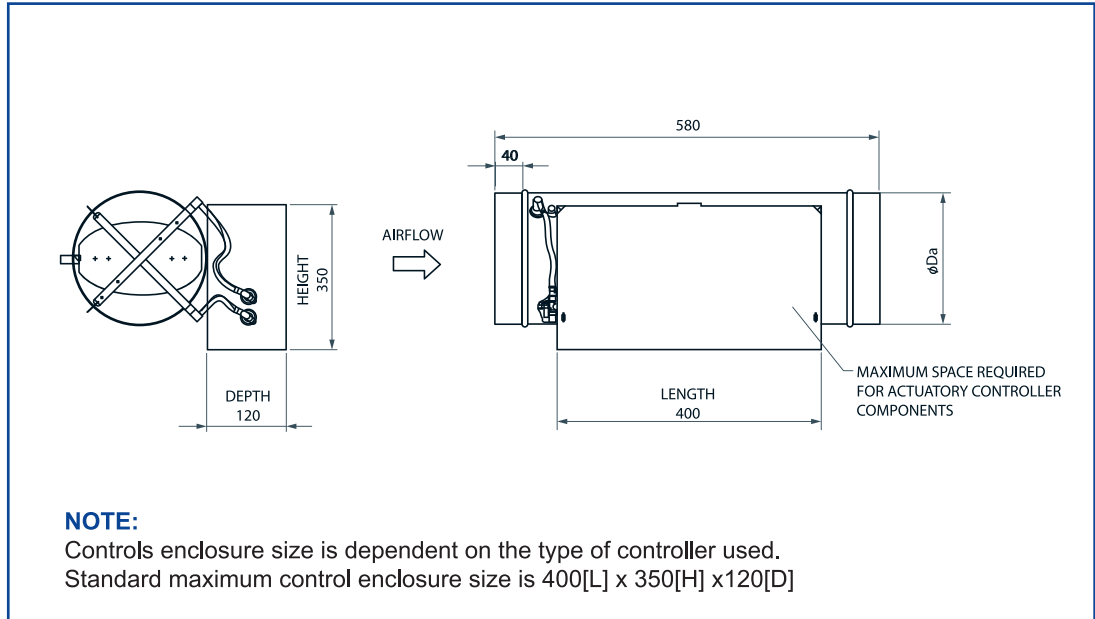
- VAV terminal unit for the control of variable air volume flows
- Spigot to make connections to the ducting



VAV terminalunit,
Variant TVR

Dimensions

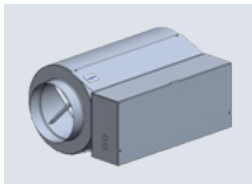
TVR



Dimensions[mm] and weight[kg]

	SIZE								
	4	5	6	7	8	10	12	14	16
Da (mm)	99	124	149	174	199	249	299	349	399
kg	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0
Length	580.0								

Description

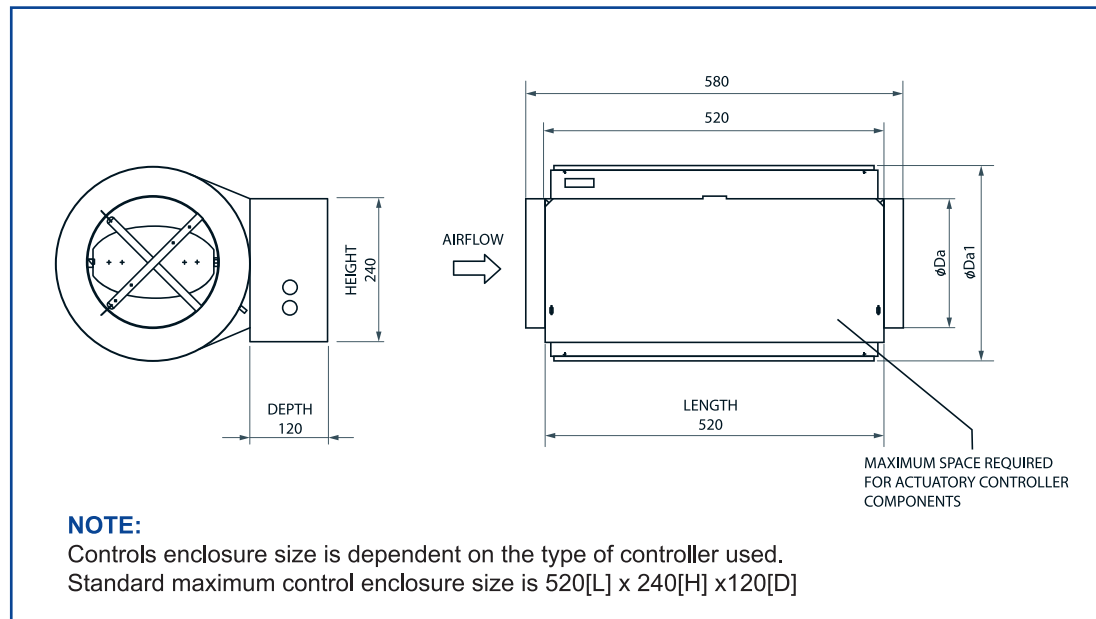


VAV terminal unit,
variant TVR-D

- VAV terminal unit with a coustic 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)
- Acoustic cladding can not be retrofitted

Dimensions

TVR

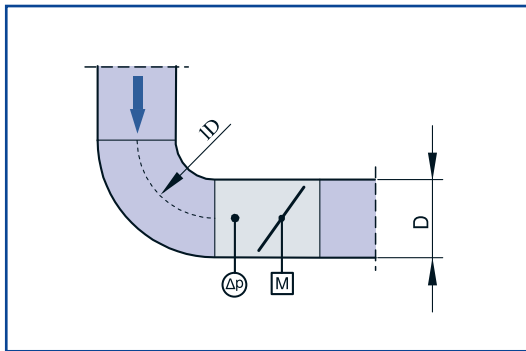


Dimensions [mm] and weight [kg]

	SIZE								
	4	5	6	7	8	10	12	14	16
Da (mm)	99	124	149	174	199	249	299	349	399
Da1 (mm)	199	224	249	274	299	349	399	449	499
kg	5.5	6	6.5	7.5	8	10.5	11.5	13.5	16
Length	580								

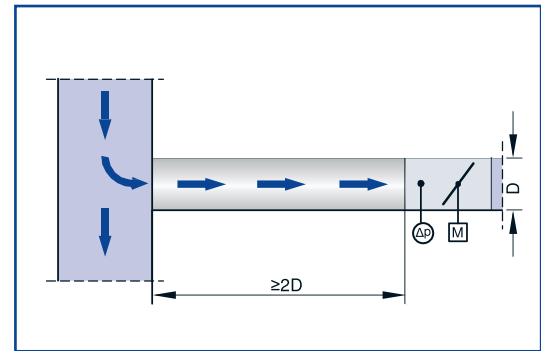
Up stream conditions **Bend**

The volume flow rate accuracy ΔV 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. Some installation situations require straight duct sections up stream.



A bend with a centre line curvature radius of at least 1D – 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 ΔV can only be achieved with a straight duct section of at least 2D upstream. Shorter up stream sections require a perforated plate in the branch and before the VAV terminal unit. If there is no straight up stream section at all, the control will not be stable, even with a perforated plate.

Depending on the application, this terminal unit can be used for either one of two basic control options;

- Volume Flow Control
- Pressure Control

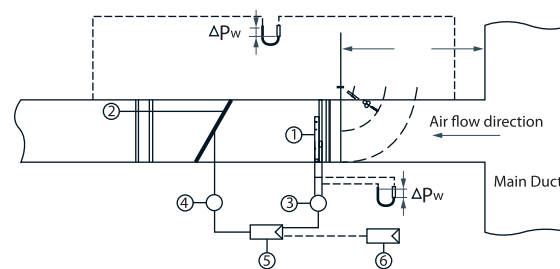
Volume Flow Control

The pressure differential (Δp_w) measured across the air flow sensor grid will be transmitted to the VAV controller via the transducer as a reference signal. The controller then compares the actual value with the set value. If there is a discrepancy, the damper will adjust its position accordingly to supply the appropriate air flow into the space to maintain the required room temperature.

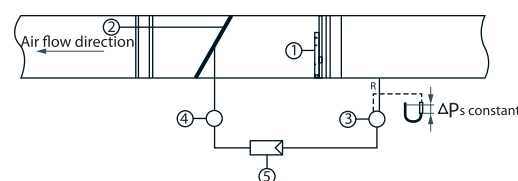
Pressure Control

This terminal unit can be used for either duct or room pressure control. The pressure differential pressure between the duct and the surrounding area or, between two rooms is measured and transmitted to the controller as a reference signal.

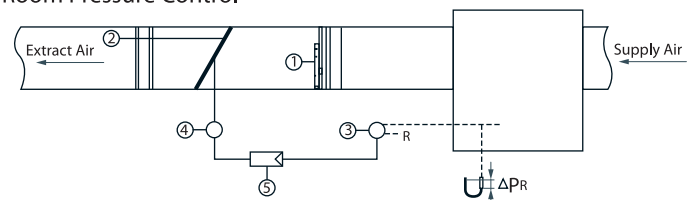
Volume Flow Control



Duct Pressure Control



Room Pressure Control



- Differential pressure sensor
- Control damper
- Transducer
- Damper actuator
- Volume flow controller
- Room temperature controller ---
Wiring or piping by other

Standard text

This specification text describes the general properties of the product.

Circular 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 on the inlet and outlet 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 subsequently adjusted onsite; additional adjustment device may be necessary

Materials and surfaces

Galvanised sheet steel construction

- Casing and damper blade made of galvanised sheet steel
- Damper blade seal made of Chloroprene rubber
- Differential pressure sensor made of aluminium
- ABS bearings

Stainless steel construction (A2)

- Casing, sensor tubes, damper blade and shaft made of stainless steel 304

Variant with acoustic cladding (-D)

- Acoustic cladding made of galvanised sheet steel
- Lining is mineral wool

Mineral wool

- Internal fibre glass insulation lining.
- 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
- 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. 10 – 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