



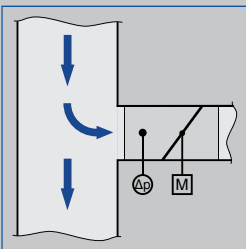
Easy cleaning of sensor tubes



Variant with Venturi nozzle and connecting circular spigot



Variant with bluff body and flange



For all upstream conditions



Tested to VDI 6022

VAV terminal units

Type TVLK



Optimised for use in laboratories and on fume cupboards

Plastic circular VAV terminal units for aggressive extract air in laboratories and production facilities

- Casing and damper blade made of flame-resistant polypropylene
- Compact construction, only 400 mm long
- High control accuracy even in case of unfavourable upstream conditions
- Combination with fast-running actuators (air management systems)
- Volume flow rate measurement with bluff body or Venturi nozzle
- Slide-out differential pressure sensor allows for easy cleaning
- Closed blade air leakage to EN 1751, class 4
- Casing air leakage to EN 1751, class C

Optional equipment and accessories

- With flanges on both ends
- Plastic secondary silencer Type CAK for the reduction of air-regenerated noise

1

Type		Page
TVLK	General information	1.1 – 2
	Order code	1.1 – 5
	Aerodynamic data	1.1 – 7
	Sizing	1.1 – 9
	Dimensions and weight – TVLK	1.1 – 10
	Dimensions and weight – TVLK-FL	1.1 – 11
	Specification text	1.1 – 12
	Basic information and nomenclature	1.3 – 1

Variants

Product examples

VAV terminal unit Type TVLK with bluff body and connecting circular spigot



VAV terminal unit Type TVLK with bluff body and flange



VAV terminal unit Type TVLK with Venturi nozzle and connecting circular spigot



VAV terminal unit Type TVLK with Venturi nozzle and flange



Description

For detailed information on the LABCONTROL control system see Chapter K6 – 2.

For detailed information on control components see the Control units catalogue, chapter K5 – 1.3.

Application

- Circular LABCONTROL VAV terminal units of Type TVLK, made of plastic, to control the volume flow rate of fume cupboards and fume hoods
- Suitable for contaminated air
- Closed-loop volume flow control using an external power supply
- Shut-off by means of switching (equipment supplied by others)

Variants

- TVLK: VAV terminal unit
- TVLK-FL: VAV terminal unit with flanges on both ends

Nominal sizes

- Bluff body: 250 – 100, 250 – 160
- Venturi nozzle: 250 – D10, 250 – D16
- Bluff body and Venturi nozzle available in two sizes each for different volume flow rate ranges

Attachments

- LABCONTROL: Control components for air management systems
- Universal controller: Controller, differential pressure transducer and actuators for special applications

Accessories

- Matching flanges for both ends

Useful additions

- Plastic secondary silencer Type CAK for demanding acoustic requirements

Special features

- High control accuracy even in case of unfavourable upstream conditions
- Integral slide-out differential pressure sensor with 3 mm measuring holes (resistant to dust and pollution)
- No metal parts come into contact with the airflow
- Factory set-up or programming and aerodynamic function testing
- Volume flow rate can be measured and subsequently adjusted on site; additional adjustment tool or configuration software may be necessary

Parts and characteristics

- Ready-to-operate unit which consists of the mechanical parts and the control components
- Averaging differential pressure sensor for volume flow rate measurement; can be removed for cleaning
- Control 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
- Unit carries test label with relevant data

Construction features

- Circular casing
- Short casing: 392 mm without flange, 400 mm with flange
- Spigot connection suitable for ducts according to DIN 8077
- Both spigots with same diameter (250 mm)
- Position of the damper blade indicated externally at shaft extension

Materials and surface

- Casing and damper blade made of flame-resistant polypropylene (PP), flammability to UL 94, V-0
- Differential pressure sensor (bluff body or Venturi nozzle) and plain bearing made of polypropylene (PP)
- Damper blade seal made of thermoplastic elastomers (TPE)

Installation and commissioning

- Installation orientation must be as shown on the sticker

Standards and guidelines

- Hygiene conforms to VDI 6022.
- Closed blade air leakage to EN 1751, class 4, meets the requirements of DIN 1946, part 4
- Casing air leakage to EN 1751, class C

Maintenance

- Maintenance-free as construction and materials are not subject to wear
- Zero point correction of the static differential pressure transducer should be carried out once per year (recommendation)

Technical data

Nominal sizes	250 mm
Volume flow rate range	30 – 360 l/s
Volume flow rate range	108 – 1296 m ³ /h
Volume flow rate control range	approx. 15 to 100 % of the nominal volume flow rate
Differential pressure	5 – 1000 Pa
Operating temperature	10 – 50 °C

Function

1

Functional description

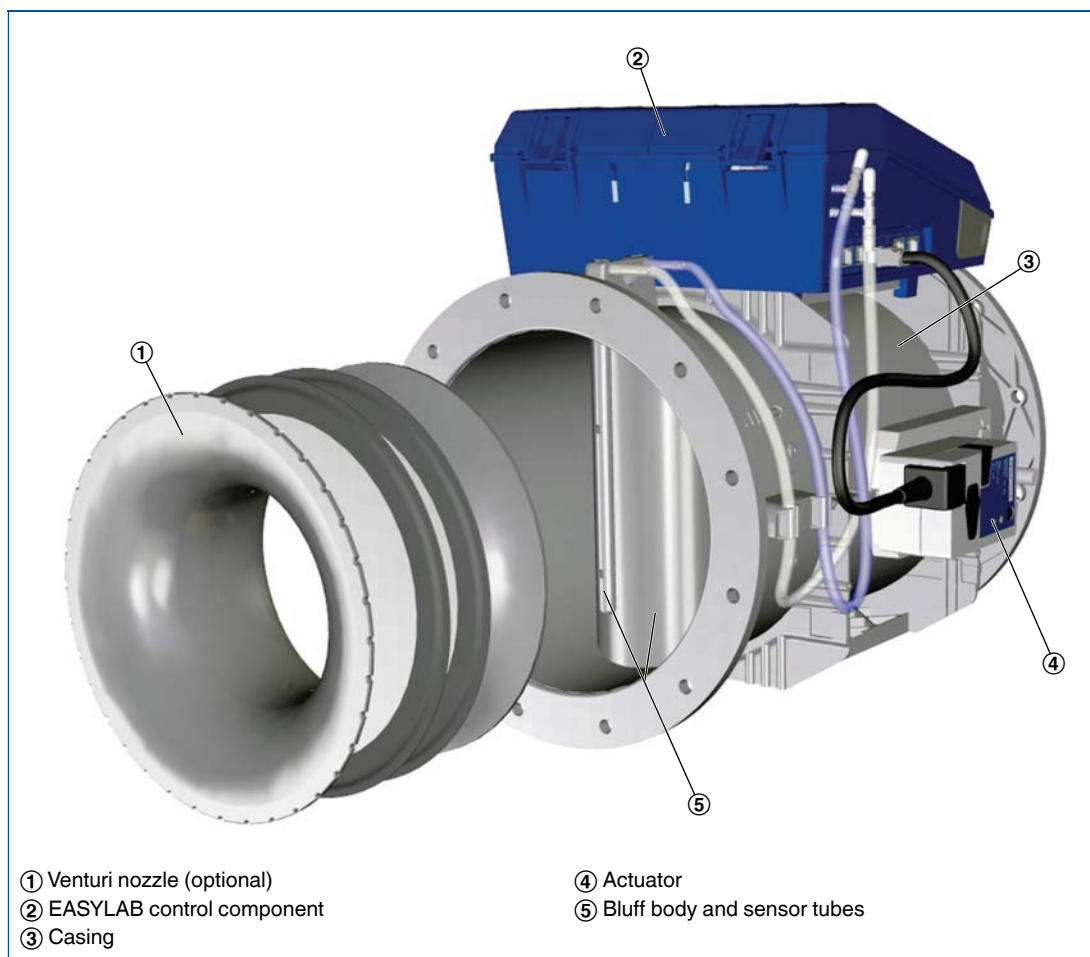
For measuring the volume flow rate the VAV terminal unit is fitted either with a bluff body and a differential pressure sensor or with a Venturi nozzle.

The control components (attachments) include a differential pressure transducer that transforms the differential pressure into an electric signal, a controller, and an actuator.

- Fume cupboard control: The volume flow rate setpoint depends on the control strategy for the fume cupboard and is based on the face velocity, the sash position, or a constant value.
- Volume flow rate control: The volume flow rate setpoint comes from an external unit or device.

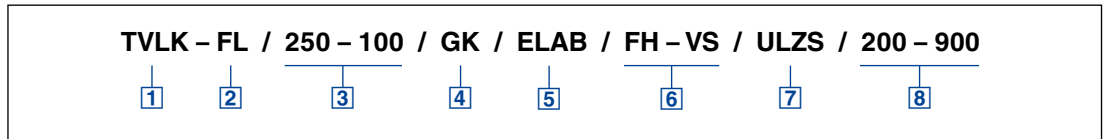
The controller compares the actual value with the setpoint value and alters the command signal of the actuator if there is a difference between the two values.

Schematic illustration of the TVLK



Order code

TVLK with EASYLAB for fume cupboard control



1 Type

TVLK VAV terminal unit made of plastic

2 Flange

No entry: none

FL Flanges on both ends

3 Nominal size

250 – 100 Bluff body 100

250 – 160 Bluff body 160

250 – D10 Venturi nozzle D10

250 – D16 Venturi nozzle D16

4 Accessories

No entry: none

GK Matching flanges for both ends

5 Control component

ELAB EASYLAB controller TCU3 with fast-running actuator

6 Equipment function – fume cupboard control

With face velocity transducer

FH-VS Face velocity control

With sash distance sensor

FH-DS Linear control strategy

FH-DV Safety-optimised control strategy

With switching steps for on-site switch contacts

FH-2P 2 switching steps

FH-3P 3 switching steps

Without signalling

FH-F Volume flow rate constant value

7 Expansion modules

Option 1: Supply voltage

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: Communications 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

Option 3: Automatic zero point correction

No entry: none

Z EM-AUTOZERO Solenoid valve for automatic zero point correction

Option 4: Lighting

No entry: none

S EM-LIGHT Wired socket for the connection of lighting and for switching the lighting on/off using the control panel (only with EM-TRF or EM-TRF-USV)

8 Operating values [m³/h or l/s]

Depending on the equipment function

FH-VS: $\dot{V}_{\min} - \dot{V}_{\max}$

FH-DS: $\dot{V}_{\min} - \dot{V}_{\max}$

FH-DV: $\dot{V}_{\min} - \dot{V}_{\max}$

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

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

FH-F: \dot{V}_1

Useful additions

Control panel for fume cupboard controllers, for displaying the functions of the control system according to EN 14175

BE-SEG-** with 2-character display

BE-LCD-01 with 40-character display

Order example

TVLK/250-100/ELAB/FH-VS/200-900 m³/h

Nominal size 250, with bluff body 100

Control component EASYLAB controller with fast-running actuator

Equipment function Fume cupboard control with face velocity transducer

Volume flow rate 200 – 900 m³/h

Order code

TVLK with TCU-LON-II for fume cupboard control

TVLK – FL / 250 – 100 / GK / TMB / FH / 200 – 900



1 Type

TVLK VAV terminal unit made of plastic

2 Flange

No entry: none

FL Flanges on both ends

3 Nominal size [mm]

250 – 100 Bluff body 100

250 – 160 Bluff body 160

250 – D10 Venturi nozzle D10

250 – D16 Venturi nozzle D16

4 Accessories

No entry: none

GK Matching flanges for both ends

5 Control components

TMA TCU-LON-II with fast-running actuator

TMB TCU-LON-II with fast-running actuator
(brushless motor)

6 Equipment function

FH Fume cupboard

Face velocity control with face velocity transducer

7 Operating values [m³/h or l/s]

FH: $\dot{V}_{\min} - \dot{V}_{\max}$

Useful additions

Control panel for fume cupboard controller, for displaying the functions of the control system according to EN 14175

BE-TCU-LON-II

Order example

TVLK-FL/250-D16/GK/TMA/FH/250-700 m³/h

Flanges both ends

Nominal size 250 with Venturi nozzle D16

Accessories matching flanges

Control component TCU-LON II
with fast-running actuator

Equipment function fume cupboard

Volume flow rate 250 – 700 m³/h

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 the speed control must be selected accordingly.

Volume flow ranges and minimum pressure differences for the TVLK with EASYLAB or TCU-LON II

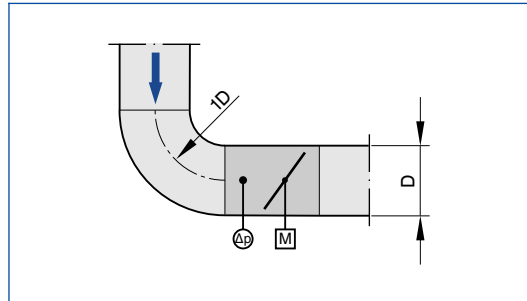
Nominal size	\dot{V}		$\Delta p_{st \min}$				$\Delta \dot{V}$
	l/s	m ³ /h	①	②	③	④	± %
			Pa	Pa	Pa	Pa	
250-100	55	198	5	5	5	5	10
	140	504	15	15	15	15	7
	220	792	35	35	35	35	6
	360	1296	85	85	85	90	5
250-160	30	108	5	5	5	5	10
	80	288	25	25	25	25	7
	120	432	50	50	50	50	6
	195	702	130	130	130	130	5
250-D10	55	198	5	5	5	5	10
	140	504	10	10	10	10	7
	220	792	20	20	20	20	6
	360	1296	50	50	55	55	5
250-D16	30	108	5	5	5	5	10
	80	288	15	15	15	15	7
	120	432	30	30	30	30	6
	195	702	70	70	75	75	5

- ① TVLK
- ② TVLK with circular silencer CAK, insulation thickness 50 mm, length 500 mm
- ③ TVLK with circular silencer CAK, insulation thickness 50 mm, length 1000 mm
- ④ TVLK with circular silencer CAK, insulation thickness 50 mm, length 1500 mm

Upstream conditions

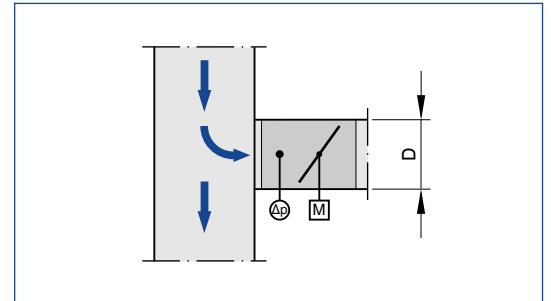
The volume flow rate accuracy $\Delta \dot{V}$ applies to all upstream conditions.

Bend



A bend with a 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



The stated volume flow rate accuracy $\Delta \dot{V}$ will be achieved even when the VAV terminal unit is installed at a junction. Even the installation on the dome of a fume cupboard will have no adverse effect.

1 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 the speed control must be selected accordingly.

Volume flow rate ranges and minimum differential pressure values for the TVLK with Universal controller

Nominal size	\dot{V}		①	②	③	④	$\Delta\dot{V}$
			$\Delta p_{st \min}$				
	l/s	m ³ /h	Pa	Pa	Pa	Pa	± %
250-100	65	234	5	5	5	5	10
	180	648	25	25	25	25	7
	290	1044	55	55	55	60	6
	360	1296	85	85	85	90	5
250-160	35	126	5	5	5	5	10
	100	360	35	35	35	35	7
	160	576	90	90	90	90	6
	195	702	130	130	130	130	5
250-D10	65	234	5	5	5	5	10
	180	648	15	15	15	15	7
	290	1044	35	35	35	35	6
	360	1296	50	50	55	55	5
250-D16	35	126	5	5	5	5	10
	100	360	20	20	20	20	7
	160	576	50	50	50	50	6
	195	702	70	70	75	75	5

① TVLK

② TVLK with circular silencer CAK, insulation thickness 50 mm, length 500 mm

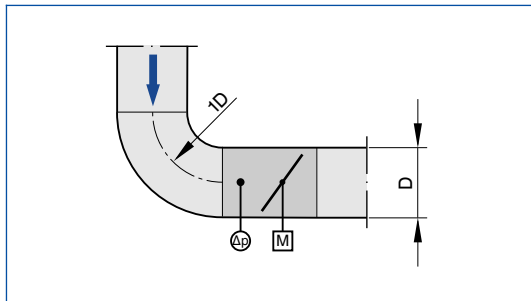
③ TVLK with circular silencer CAK, insulation thickness 50 mm, length 1000 mm

④ TVLK with circular silencer CAK, insulation thickness 50 mm, length 1500 mm

Upstream conditions

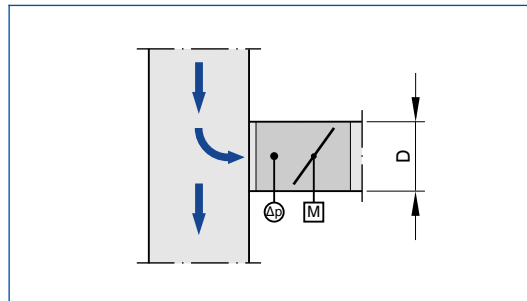
The volume flow rate accuracy $\Delta\dot{V}$ applies to all upstream conditions.

Bend



A bend with a 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



The stated volume flow rate accuracy $\Delta\dot{V}$ will be achieved even when the VAV terminal unit is installed at a junction. Even the installation on the dome of a fume cupboard will have no adverse effect.

Air-regenerated noise

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

Quick sizing: Sound pressure level at differential pressure 150 Pa TVLK with EASYLAB or TCU-LON-II

Nominal size	\dot{V}		Air-regenerated noise				Case-radiated noise
			①	②	③	④	①
	l/s	m ³ /h	L _{PA}	L _{PA1}			L _{PA2}
							dB(A)
250-100	55	198	40	33	29	26	26
	140	504	46	38	34	31	33
	220	792	47	39	35	31	37
	360	1296	48	39	35	32	42
250-160	30	108	37	32	28	25	22
	80	288	41	35	31	28	29
	120	432	43	37	33	30	32
	195	702	49	42	38	35	40
250-D10	55	198	36	28	24	21	24
	140	504	42	34	30	27	31
	220	792	43	35	31	28	35
	360	1296	45	37	33	29	38
250-D16	30	108	33	28	24	22	21
	80	288	39	33	30	28	28
	120	432	42	36	33	30	31
	195	702	47	42	38	36	38

- ① TVLK
- ② TVLK with circular silencer CAK, insulation thickness 50 mm, length 500 mm
- ③ TVLK with circular silencer CAK, insulation thickness 50 mm, length 1000 mm
- ④ TVLK with circular silencer CAK, insulation thickness 50 mm, length 1500 mm

Quick sizing: Sound pressure level at differential pressure 150 Pa TVLK with Universal controller

Nominal size	\dot{V}		Air-regenerated noise				Case-radiated noise
			①	②	③	④	①
	l/s	m ³ /h	L _{PA}	L _{PA1}			L _{PA2}
							dB(A)
250-100	65	234	41	34	30	27	27
	180	648	46	38	34	31	35
	290	1044	47	39	35	31	40
	360	1296	48	39	35	32	42
250-160	35	126	38	33	29	26	23
	100	360	42	36	32	29	30
	160	576	43	37	34	32	32
	195	702	49	42	38	35	40
250-D10	65	234	37	30	26	22	25
	180	648	43	35	31	28	33
	290	1044	44	36	32	29	36
	360	1296	48	39	35	32	42
250-D16	35	126	34	29	25	23	22
	100	360	41	35	32	29	30
	160	576	43	37	34	32	32
	195	702	47	42	38	36	38

- ① TVLK
- ② TVLK with circular silencer CAK, insulation thickness 50 mm, length 500 mm
- ③ TVLK with circular silencer CAK, insulation thickness 50 mm, length 1000 mm
- ④ TVLK with circular silencer CAK, insulation thickness 50 mm, length 1500 mm

Description

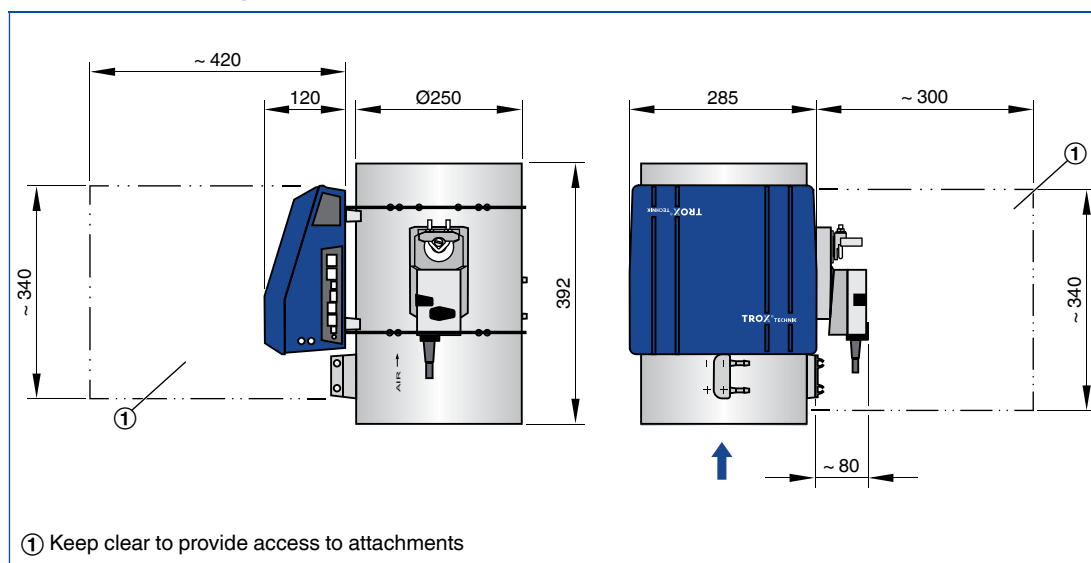
- VAV terminal unit for the control of variable air volume flow rates
- Spigot connection



VAV terminal unit, variant TVLK, with connecting circular spigot

Dimensions

Dimensional drawing of TVLK



Weight

Nominal size	m
	kg
250	5.1

Description

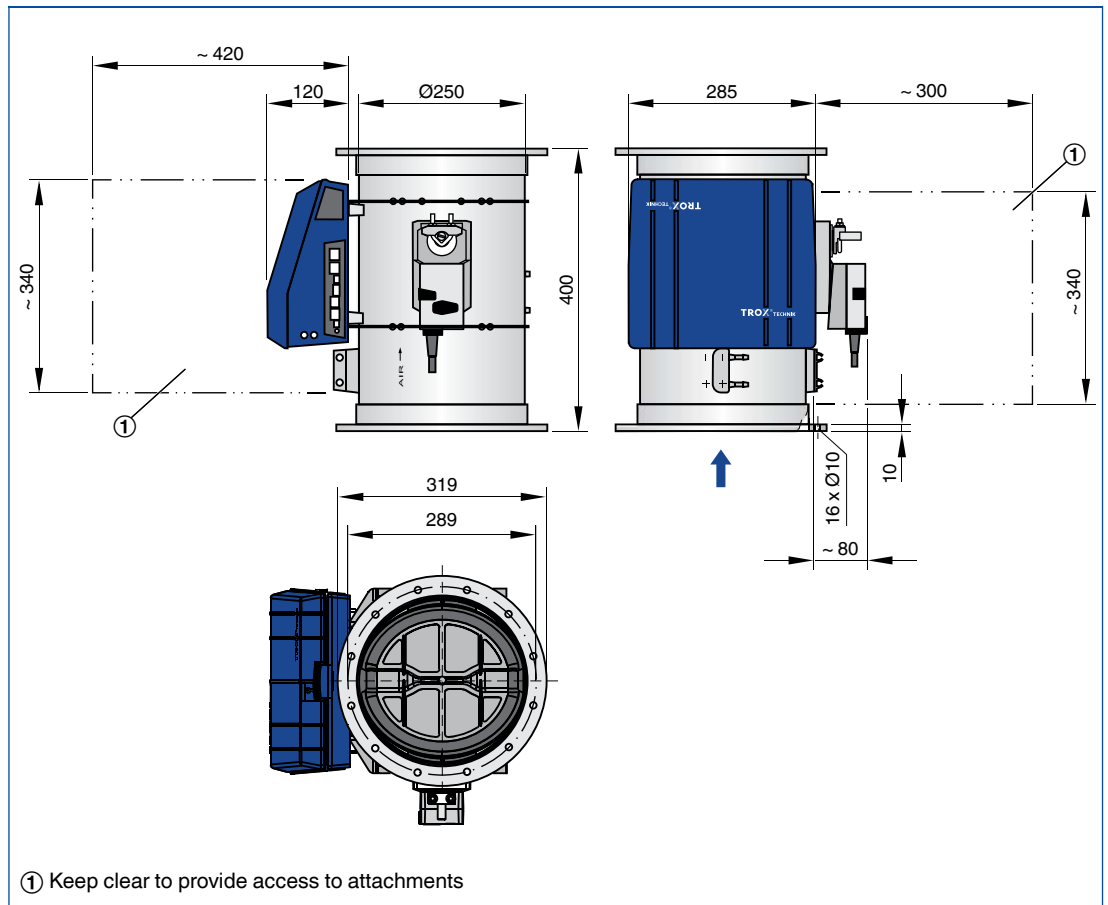


VAV terminal unit, variant TVLK, with flange

- VAV terminal unit for the control of variable air volume flow rates
- With flanges to make detachable connections to the ductwork

Dimensions

Dimensional drawing of TVLK-FL



Weight

Nominal size	m
	kg
250	5.7

Standard text

This specification text describes just one variant of the product that applies to many applications. Texts for other variants can be generated with our Easy Product Finder design programme.

Circular VAV terminal units made of flame-resistant plastic, for variable air volume systems and fume cupboards. Suitable for the control of extract air containing aggressive media since all components coming into contact with the airflow are made of plastic (no interior metal parts). Ready-to-commission unit consists of the mechanical parts and the electronic control components. Each unit contains an averaging differential pressure sensor with a bluff body or a Venturi nozzle for volume flow rate measurement, and a damper blade. Factory-assembled control components complete with wiring and tubing. Differential pressure sensor with 3 mm measuring holes (resistant to dust and pollution). Spigot connection, suitable for ducts according to DIN 8077.

Position of the damper blade indicated externally at shaft extension.
Closed blade air leakage to EN 1751, class 4.
Casing air leakage to EN 1751, class C.

Special features

- High control accuracy even in case of unfavourable upstream conditions
- Integral slide-out differential pressure sensor with 3 mm measurement holes (resistant to dust and pollution)
- No metal parts come into contact with the airflow
- Factory set-up or programming and aerodynamic function testing
- Volume flow rate can be measured and subsequently adjusted on site; additional adjustment tool or configuration software may be necessary

Materials and surface

- Casing and damper blade made of flame-resistant polypropylene (PP), flammability to UL 94, V-0
- Differential pressure sensor (with bluff body, or Venturi nozzle) and plain bearing made of polypropylene (PP)
- Damper blade seal made of thermoplastic elastomers (TPE)

Technical data

- Nominal sizes: 250 mm
- Volume flow rate range: 30 to 360 l/s or 108 to 1296 m³/h
- Volume flow rate control range: approx. 15 to 100 % of the nominal volume flow rate
- Differential pressure: 5 – 1000 Pa

Attachments

Variable volume flow control with electronic EASYLAB controller for fume cupboards.

- Supply voltage 24 V AC
- Fast and stable control
- Static differential pressure measurement
- Fast-running actuator
- Easy commissioning due to plug and play communication system
- Controller is a modular system and can be expanded
- Volume flow rate monitoring

Selection data

- \dot{V} _____ [m³/h]
- Δp_{st} _____ [Pa]
- L_{PA} Air-regenerated noise _____ [dB(A)]
- L_{PA} Case-radiated noise _____ [dB(A)]

Order options

TVR with EASYLAB

1 Type

TVLK VAV terminal unit made of plastic

2 Flange

No entry: none

FL Flanges on both ends

3 Nominal size

- 250 – 100** Bluff body 100
- 250 – 160** Bluff body 160
- 250 – D10** Venturi nozzle D10
- 250 – D16** Venturi nozzle D16

4 Accessories

No entry: none

GK Matching flanges for both ends

5 Control component

ELAB EASYLAB controller TCU3 with fast-running actuator

6 Equipment function – fume cupboard control

With face velocity transducer

FH-VS Face velocity control

With sash distance sensor

- FH-DS** Linear control strategy
- FH-DV** Safety-optimised control strategy

With switching steps for on-site switch contacts

- FH-2P** 2 switching steps
- FH-3P** 3 switching steps

Without signalling

FH-F Volume flow rate constant value

7 Expansion modules

Option 1: Supply voltage

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: Communications 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

Option 3: Automatic zero point correction

No entry: none

- Z** EM-AUTOZERO Solenoid valve for automatic zero point correction

Option 4: Lighting

No entry: none

- S** EM-LIGHT Socket for switching the lighting on/off using the control panel (only with EM-TRF or EM-TRF-USV)

8 Operating values [m³/h or l/s]

Depending on the equipment function

- FH-VS:** $\dot{V}_{\min} - \dot{V}_{\max}$
- FH-DS:** $\dot{V}_{\min} - \dot{V}_{\max}$
- FH-DV:** $\dot{V}_{\min} - \dot{V}_{\max}$
- FH-2P:** \dot{V}_1 / \dot{V}_2
- FH-3P:** $\dot{V}_1 / \dot{V}_2 / \dot{V}_3$
- FH-F:** \dot{V}_1

Useful additions

Control panel for fume cupboard controllers, for displaying the functions of the control system according to EN 14175

- BE-SEG-**** with 2-character display
- BE-LCD-**** with 40-character display

Order options

TVLK with TCU-LON II

1 Type

TVLK VAV terminal unit made of plastic

2 Flange

No entry: none

FL Flanges on both ends

3 Nominal size [mm]

- 250 – 100** Bluff body 100
- 250 – 160** Bluff body 160
- 250 – D10** Venturi nozzle D10
- 250 – D16** Venturi nozzle D16

4 Accessories

No entry: none

GK Matching flanges for both ends

5 Control components

Example

- TMA** TCU-LON-II with fast-running actuator
- TMB** TCU-LON-II with fast-running actuator (brushless motor)
- BB3** Universal controller
- BPG** Universal controller with fast-running actuator

6 Equipment function

- FH** Fume cupboard (only TM*)
- RE** Extract air controller (only TM*)
- E2** Single room controller (only B**)
- F2** Constant volume flow controller (only B**)

7 Operating values [m³/h or l/s]

Depending on the equipment function

- FH:** $\dot{V}_{\min} - \dot{V}_{\max}$
- RE:** $\dot{V}_{\text{day}} / \dot{V}_{\text{night}} / \dot{V}_{\text{constant}}$
- E2:** $\dot{V}_{\min} - \dot{V}_{\max}$
- F2:** $\dot{V}_{\text{constant}}$

Useful additions

Control panel for fume cupboard controller for displaying the functions of the control system according to EN 14175

BE-TCU-LON-II 40-character display

Variable volume flow control 1

LABCONTROL

Basic information and nomenclature



- Product selection
- Principal dimensions
- Nomenclature
- Correction values for system attenuation
- Measurements
- Sizing and sizing example
- Function
- Operating modes

Variable volume flow control – VARYCONTROL

Basic information and nomenclature

Product selection

	Type											
	LVC-LowVelocity	TVR	TVJ	TVT	TZ-Silenzio	TA-Silenzio	TVZ	TVA	TVM	TVRK	TVLK	TVR-Ex
Type of system												
Supply air	●	●	●	●	●		●			●		●
Extract air	●	●	●	●		●		●		●	●	●
Dual duct (supply air)									●			
Duct connection, fan end												
Circular	●	●					●	●	●	●	●	●
Rectangular			●	●	●	●						
Volume flow rate range												
Up to [m³/h]	1080	6050	36360	36360	3025	3025	6050	6050	6050	6050	1295	6050
Up to [l/s]	300	1680	10100	10100	840	840	1680	1680	1680	1680	360	1680
Air quality												
Filtered	●	●	●	●	●	●	●		●	●	●	●
Office extract air	●	●	●	●		●		●		●	●	●
Polluted		○	○	○		○		○		●	●	○
Contaminated										●	●	
Control function												
Variable	●	●	●	●	●	●	●	●	●	●	●	●
Constant	●	●	●	●	●	●	●	●	●	●	●	●
Min/Max	●	●	●	●	●	●	●	●	●	●	●	●
Differential pressure control		○	○	○	○	○	○	○		○		○
Master/Slave	●	●	●	●	●	●	●	●	Master	●	●	●
Shut-off												
Leakage			●									
Low leakage	●	●		●	●	●	●	●	●	●	●	●
Acoustic requirements												
High < 40 dB (A)			○	○	●	●	●	●	○			
Low < 50 dB (A)	●	●	●	●	●	●	●	●	●	●	●	●
Other functions												
Volume flow rate measurement	●	●	●	●	●	●	●	●	●	●	●	●
Special areas												
Potentially explosive atmospheres												●
Laboratories, clean rooms, operation theatres (EASYPOL, TCU-LON II)		●	●	●			●	●		●	●	

- Possible
- Possible under certain conditions: Robust unit variant and/or specific control component or useful additional product
- Not possible

Variable volume flow control – VARYCONTROL

Basic information and nomenclature

Principal dimensions

ØD [mm]

VAV terminal units made of stainless steel:
Outside diameter of the connecting spigot
VAV terminal units made of plastic: Inside diameter of the connecting spigot

ØD₁ [mm]

Pitch circle diameter of flanges

ØD₂ [mm]

Outside diameter of flanges

ØD₄ [mm]

Inside diameter of the screw holes of flanges

L [mm]

Length of unit including connecting spigot

L₁[mm]

Length of casing or acoustic cladding

W [mm]

Width of the duct

B₁ [mm]

Screw hole pitch of air duct profile (horizontal)

B₂ [mm]

Outside dimension of air duct profile (width)

B₃ [mm]

Width of device

H [mm]

Duct height

H₁ [mm]

Screw hole pitch of air duct profile (vertical)

H₂ [mm]

Outside dimension of air duct profile (height)

H₃ [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)

Nomenclature

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

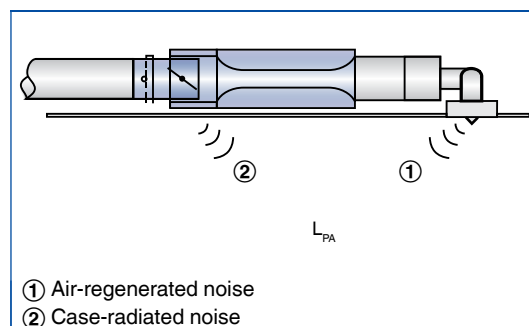
L_{PA2} [dB(A)]

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

Definition of noise



\dot{V}_{nom} [m³/h] and [l/s]

Nominal volume flow rate (100 %)

\dot{V} [m³/h] and [l/s]

Volume flow rate

$\Delta\dot{V}$ [± %]

Volume flow rate tolerance from setpoint value

$\Delta\dot{V}_{warm}$ [± %]

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

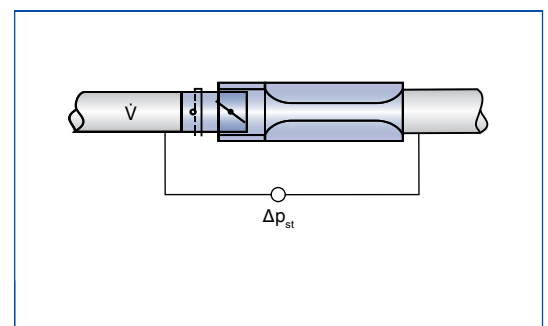
ΔP_{st} [Pa]

Static differential pressure

$\Delta P_{st min}$ [Pa]

Static differential pressure, minimum

Static differential pressure



Variable volume flow control – VARYCONTROL

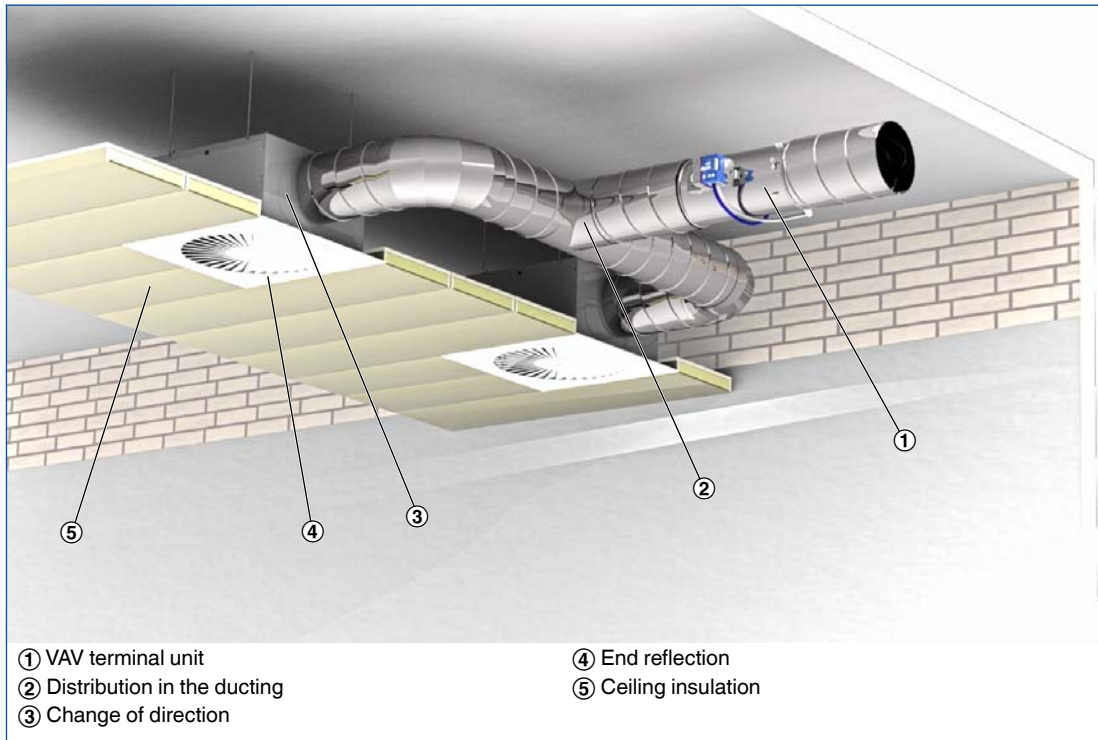
Basic information and nomenclature

1

The quick sizing tables show the sound pressure levels that can be expected in a room both for the air-regenerated noise and for the case-radiated noise. The sound pressure level in a room results from the sound power level of the products – for a given volume flow rate and differential pressure – and the attenuation and insulation on site. This is why generally accepted attenuation and insulation values have been taken into account for the tables.

The distribution of air across the ductwork, changes of direction, end reflection, and room attenuation all affect the sound pressure level of the air-regenerated noise. Ceiling insulation and room attenuation influence the sound pressure level of the case-radiated noise.

Reducing the sound pressure level of the air-regenerated noise



Correction values for acoustic quick sizing

The correction values for the distribution in the ducting are based on the number of diffusers assigned to any one CAV controller. If there is just one diffuser (assumption: 140 l/s or 500 m³/h), no correction is necessary.

Octave correction for the distribution in the ducting, used to calculate the air-regenerated noise

\dot{V} [m ³ /h]	500	1000	1500	2000	2500	3000	4000	5000	6000
[l/s]	140	280	420	550	700	840	1100	1400	1700
[dB]	0	3	5	6	7	8	9	10	11

One change of direction, e.g. at the horizontal connection of the diffuser plenum box, has been taken into consideration for the system attenuation values. Vertical connection of the plenum box does not result in a system attenuation. Additional bends result in lower sound pressure levels.

System attenuation per octave to VDI 2081 for the calculation of the air-regenerated noise

Centre frequency [Hz]	63	125	250	500	1000	2000	4000	8000
	ΔL							
	dB	dB	dB	dB	dB	dB	dB	dB
Change of direction	0	0	1	2	3	3	3	3
End reflection	10	5	2	0	0	0	0	0
Room attenuation	5	5	5	5	5	5	5	5

Octave correction for the calculation of case-radiated noise

Centre frequency [Hz]	63	125	250	500	1000	2000	4000	8000
	ΔL							
	dB	dB	dB	dB	dB	dB	dB	dB
Ceiling insulation	4	4	4	4	4	4	4	4
Room attenuation	5	5	5	5	5	5	5	5

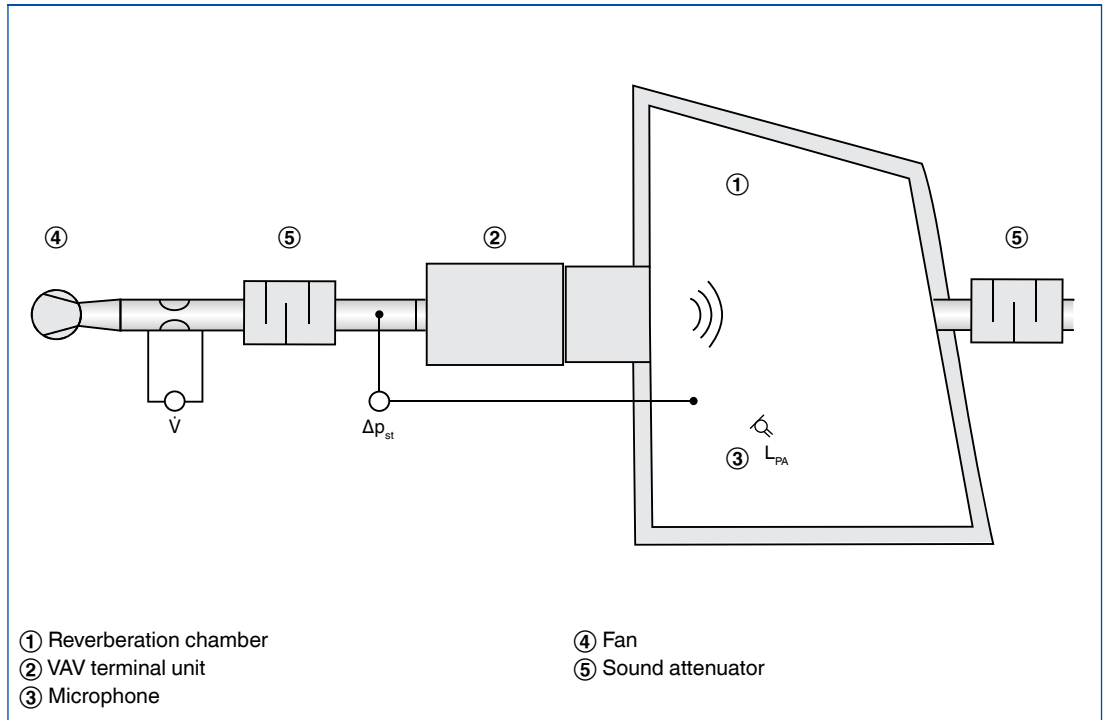
Variable volume flow control – VARYCONTROL

Basic information and nomenclature

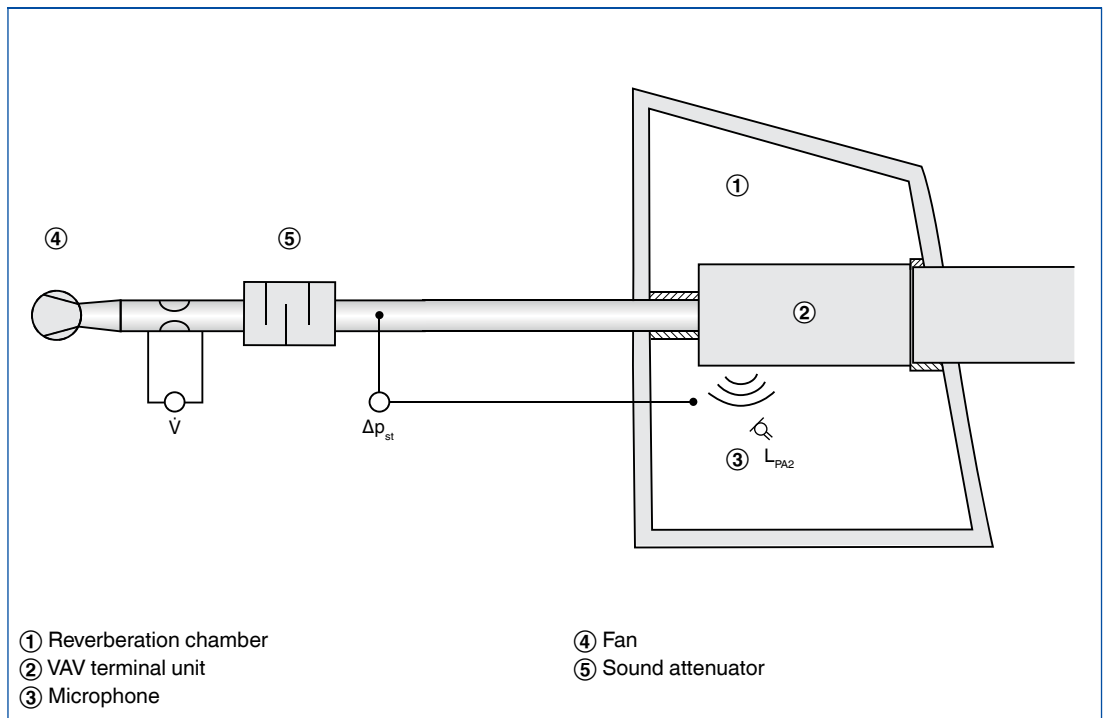
Measurements

The acoustic data for the air-regenerated noise and case-radiated noise are determined according to EN ISO 5135. All measurements are carried out to EN ISO 3741 in a reverberation chamber.

Measuring the air-regenerated noise



Measuring the case-radiated noise



Variable volume flow control – VARYCONTROL

Basic information and nomenclature

1 Sizing with the help of this catalogue

This catalogue provides convenient quick sizing tables for VAV terminal units. The sound pressure levels for air-regenerated noise and for case-radiated noise are provided for all nominal sizes. In addition, generally accepted attenuation and insulation values have been taken

into account. Sizing data for other volume flow rates and differential pressures can be determined quickly and precisely using the Easy Product Finder design programme.

Sizing example

Given data

$V_{\max} = 280 \text{ l/s}$ (1010 m^3/h)
 $\Delta p_{\text{st}} = 150 \text{ Pa}$
 Required sound pressure level in the room
 30 dB(A)

Sizing

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

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

Easy Product Finder



The Easy Product Finder allows you to size products using your specific data.

You will find the Easy Product Finder on our website.

The screenshot shows the software interface with the following data:

- Bestellschlüssel:** TVZ / 200 / BCO / E0 / 144-1010 m^3/h
- Regelkomponente:** nicht belastet (verzinktes Stahlblech)
- Betriebsmedium:** elektrisch
- Betriebsfunktion:** stetig / analoge Ansteuerung VAV
- Ansteuerung:** 0-10 VDC
- Schnelllaufend:** ohne
- Sicherheitsfunktion:** ohne
- Regelung:** BCO(VAV-Compact(0-10VDC))LMV-D2MP
- Volumenstrom:** variabel / konstant
- V_{min}:** 144 m^3/h (54...6048)
- V_{max}:** 1.010 m^3/h (162...6048)
- Volumenstrom-Regelgerät:** Filter
- Dämmschale:** ohne Dämmschale
- Schalldämpfer:** ohne und mit

Serie	Abmessung	V _{min} [m^3/h]		V _{max} [m^3/h]		L _p [dB(A)]	
		von	bis	von	bis	Strömungsgerä...	Abstrahlgeräusch
TVZ	200	144	1458	432	1458	23	31
TVZ+TS	200	144	1458	432	1458	18	31
TVZ	250	216	2214	666	2214	18	26
TVZ+TS	250	216	2214	666	2214	<15	26

Akustische Eingabedaten:
 L_p Strömung \leq 23 dB(A)
 L_p Abstrahlung \leq 31 dB(A)
 Δp_{st} 150 Pa (100...1000)

Akustische Ergebnisse:
 Bar chart showing $L_{w, \text{str}}$ [dB] vs f [Hz] for frequencies 63, 125, 250, 500, 1K, 2K, 4K, 8K Hz.

Variable volume flow control – VARYCONTROL

Basic information and nomenclature

Function

Volume flow control

The volume flow rate is controlled in a closed loop. The controller receives from the transducer the actual value that results from the effective pressure. 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 command signal of the actuator if there is a difference between the two values.

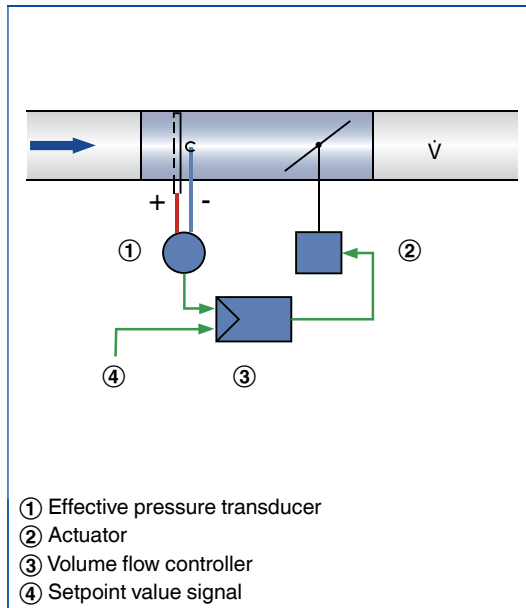
Correction of duct pressure changes

The controller detects and corrects changes of the duct pressure that may occur, for example, due to volume flow rate changes from other units. Pressure changes will therefore not affect the room temperature.

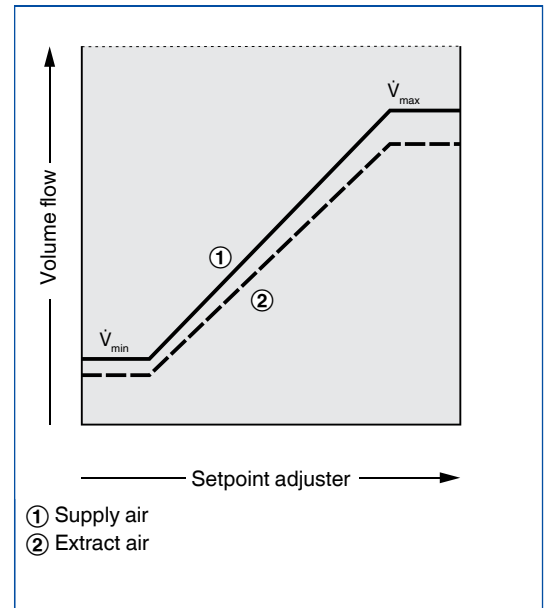
Variable volume flow control

If the input signal is changed, the controller adjusts the volume flow rate to the new setpoint. The variable volume flow rate range is limited, i.e. there is a minimum value and a maximum value. This control strategy can be overridden, e.g. by shutting off the duct.

Control loop

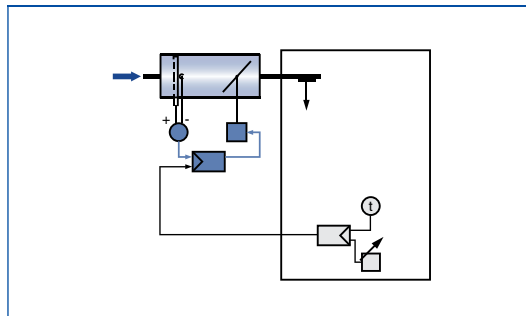


Control diagram

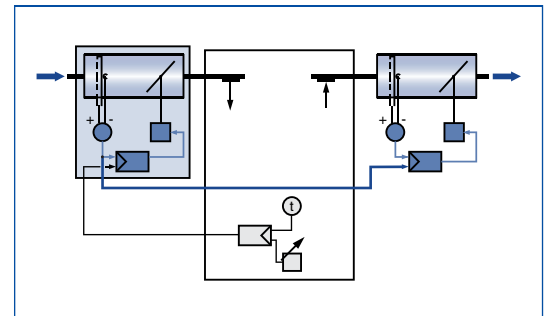


Operating modes

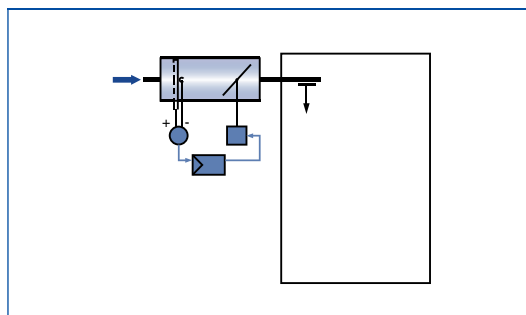
Single operation



Master slave operation (master)



Constant value



Master slave operation (slave)

