

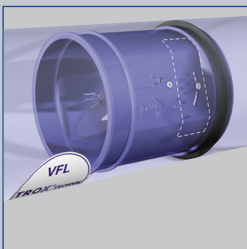
Aerodynamic damper blade



Sticker showing volume flow rates



Set the volume flow rate



Insert



Tested to VDI 6022

CAV controllers

Type VFL



Volume flow limiter for insertion into ducting

Circular, mechanical self-powered controllers for insertion into ducting, for the quick and easy balancing of constant volume flow rates in ventilation and air conditioning systems

- Unique damper blade edge for acoustic optimisation
- Simple and quick commissioning on site
- Range of volume flow rate setpoints for each nominal size
- Precise and simple setting of volume flow rates using a scale
- Best accuracy among controllers for insertion
- Suitable for low airflow velocities from 157 fpm
- Any installation orientation; maintenance-free

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Application

Application

- Circular volume flow limiters of Type VFL for the simple balancing of volume flow rates in air conditioning systems
- Mechanical self-powered volume flow limiter without external power supply
- Simplified project handling with orders based on nominal size
- Set the required volume flow rate using a scale
- Mechanical self-powered
- Low-friction bellows
- For circular ducts
- Lip seal for tight and secure fit
- Aerodynamically tested and factory set to a reference volume flow rate
- Sticker showing volume flow rates (cfm) that can be set each limiter

Special features

Nominal sizes

- 3, 4, 5, 6, 8, 10

Description

Parts and characteristics

- Ready-to-commission limiter
- Damper blade with low-friction bearings
- Bellows that acts as an oscillation damper
- Leaf spring
- Lip seal
- Multi-level volume flow rate setpoint values

Construction features

- Circular casing
- Suitable for insertion into circular ducts to EN 1506 or EN 13180
- Lip seal for tight and secure fit
- Acoustically optimised damper blade with low-friction bearings and special bellows
- Different damper blade construction and volume flow rate sticker for nominal size 6

Materials and surfaces

- Casing and damper blade made of high-quality plastic, to UL 94, V0 (PPO High flow, flame retardant); to DIN 4102, material classification B2
- Leaf spring made of stainless steel
- UL 2043 labeled for flame and smoke generation
- Polyurethane bellows

Standards and guidelines

- Hygiene conforms to VDI 6022 **Maintenance**
- Maintenance-free as construction and materials are not subject to wear

Functional description

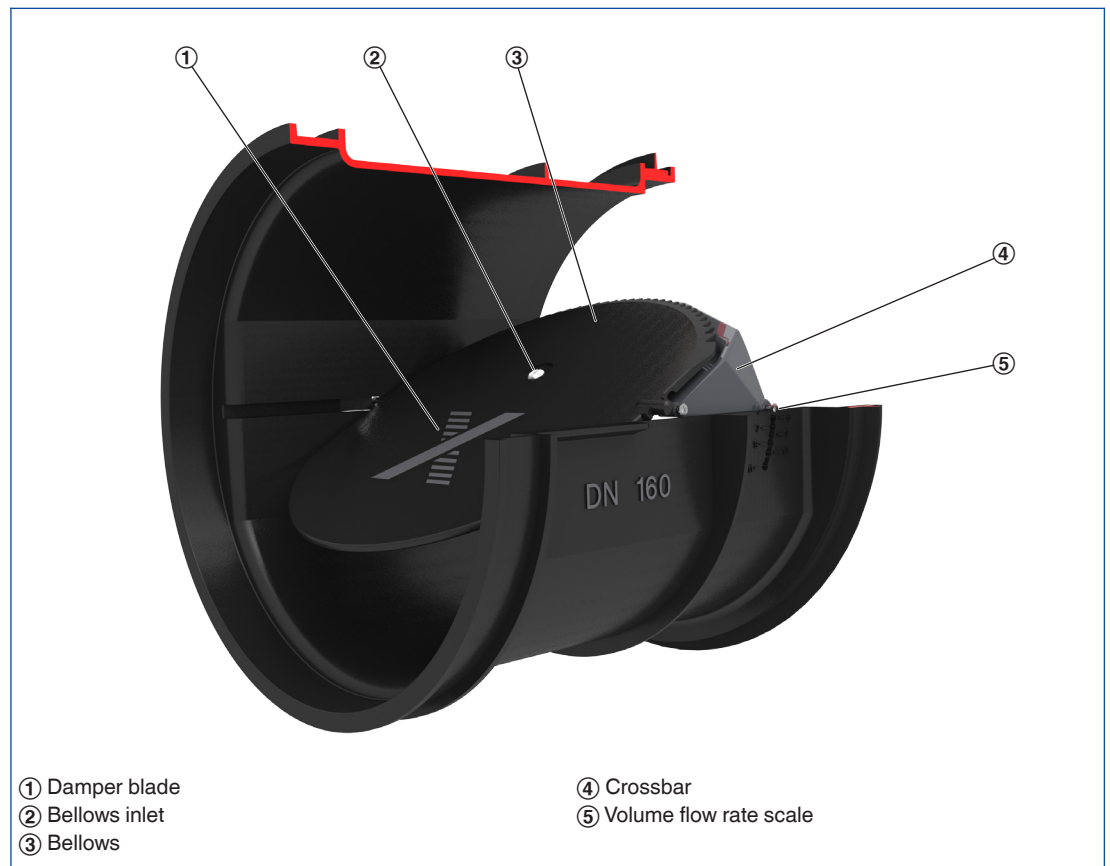
The volume flow limiter is a mechanical self-powered unit and works without external power supply. A damper blade with low-friction bearings is adjusted by aerodynamic forces such that the set volume flow rate is limited as a consequence. The aerodynamic forces of the airflow create a closing torque on the damper blade. The bellows extends and increases this force while at the same time acting as an oscillation damper. The closing force is countered by a leaf spring. As the differential pressure changes, the leaf spring adjusts the position of the damper blade such that

the volume flow rate is limited.

Efficient commissioning

The volume flow limiter performs the previously tedious and expensive balancing of volume flow rates in ventilation and air conditioning systems. Simple handling and perfect function help to save valuable working time on site. The required volume flow rate can be set at the point of installation, then the volume flow limiter is inserted into the duct. The set volume flow rate will then be limited and maintained within close tolerances.

Schematic illustration of the VFL



Nominal sizes	3" – 10"
Volume flow rate range	8 – 450 cfm
Volume flow rate control range	< 20 – 100 % of the nominal volume flow rate
Volume flow rate accuracy	approx. ± 10 % of the nominal volume flow rate
Minimum differential pressure	0.1 in WC
Maximum differential pressure	1 in WC
Operating temperature	50 – 122 °F

Volume flow rate ranges

The volume flow limiters are factory set to the reference volume flow rate $\dot{V}_{ref}$. Customers can

then simply set the required volume flow rate (setting values 1 to 11).

Available volume flow rate setpoint values [cfm]

Nominal size	1	2	3	4	5	6	7	8	9	10	11		
	$\dot{V}$											$\dot{V}_{Nenn}$	$\dot{V}_{ref}$
	cfm	cfm	cfm	cfm	cfm	cfm	cfm	cfm	cfm	cfm	cfm	cfm	cfm
3	8	10	13	16	19	23	29	36	43	48	–	48	19
4	11	14	19	23	28	34	42	46	54	62	72	72	42
5	23	28	34	41	48	58	67	77	88	101	115	115	58
6	29	41	50	62	71	82	94	109	121	135	156	156	94
6	34	48	60	75	92	103	115	128	142	160	190	190	92
8	55	74	98	122	149	175	202	230	257	283	311	311	175
10	94	127	164	198	235	278	305	338	372	415	450	450	278

Available volume flow rate setpoint values [l/s]

Nominal size	1	2	3	4	5	6	7	8	9	10	11		
	$\dot{V}$											$\dot{V}_{Nenn}$	$\dot{V}_{ref}$
	l/s	l/s	l/s	l/s	l/s	l/s	l/s	l/s	l/s	l/s	l/s	l/s	l/s
3	8	5	6	8	9	11	14	17	20	23	–	23	9
4	11	7	9	11	13	16	20	22	26	29	34	34	20
5	23	13	16	19	23	27	31	37	42	48	54	54	27
6	30	19	24	29	33	39	44	51	57	64	74	74	44
6	34	23	28	36	43	49	54	60	67	76	90	90	43
8	55	35	46	58	70	83	95	109	121	134	147	147	83
10	44	60	77	94	111	131	144	160	175	196	212	212	131

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

VFL, Sound pressure level at differential pressure 50 Pa

Nominal size	$\dot{V}$	$\dot{V}$	Air-regenerated noise
			L_{PA}
	l/s	cfm	dB (A)
3	4	8	30
	6	13	30
	14	29	32
	20	43	33
	23	48	34
4	5	11	31
	11	23	33
	16	34	35
	26	54	36
	34	72	37
5	11	23	36
	19	41	37
	27	58	37
	42	88	38
	54	115	39
6	14	29	32
	29	62	32
	44	94	33
	57	121	33
	74	156	34
6	16	34	26
	28	60	29
	49	103	32
	67	142	34
	90	190	36
8	26	55	23
	70	149	27
	109	230	30
	134	283	31
	147	311	31
10	44	94	23
	94	198	26
	144	305	28
	175	372	28
	212	450	28

This specification text describes the general properties of the product. Texts for variants can be generated with our Easy Product Finder design programme.

Circular volume flow limiters in 7 nominal sizes, made of high-quality plastic, to limit and control volume flows in air conditioning systems. Ready-to-commission unit which consists of the casing with setpoint scale and the control mechanism with leaf spring and low-friction, silicone-free bellows.

Easy insertion into circular ducts to EN 1506 or EN 13180; secure fit ensured by a lip seal.

Aerodynamically tested and factory set to a reference volume flow rate. Can be subsequently accurately adjusted within a volume flow rate range of at least 5 : 1.

Special features

- Mechanical self-powered
- Low-friction bellows
- For circular ducts
- Lip seal for tight and secure fit
- Aerodynamically tested and factory set to a reference volume flow rate
- Sticker showing volume flow rates (in l/s, m³/h and cfm) that can be set each limiter

Materials and surfaces

- Casing and damper blade made of high-quality plastic, to UL 94, V0; to DIN 4102, material classification B2
- Leaf spring made of stainless steel
- Polyurethane bellows

Technical data

- Nominal sizes: 3" – 10"
- Volume flow rate range: 8 to 450 cfm
- Volume flow rate control range: < 20 to 100 % of the nominal volume flow rate
- Volume flow rate accuracy: approx. ± 10 % of the nominal volume flow rate
- Minimum differential pressure: 0.1 in WC
- Maximum differential pressure: 1 in WC

Sizing data

- $\dot{V}$ _____
[cfm]
- Δp_{st} _____
[in WC]
- Air-regenerated noise
- L_{PA} _____
[dB(A)]

VFL

VFL / 4	
1	2

1

 Type

VFL Volume flow limiter

2

 Nominal size [in]

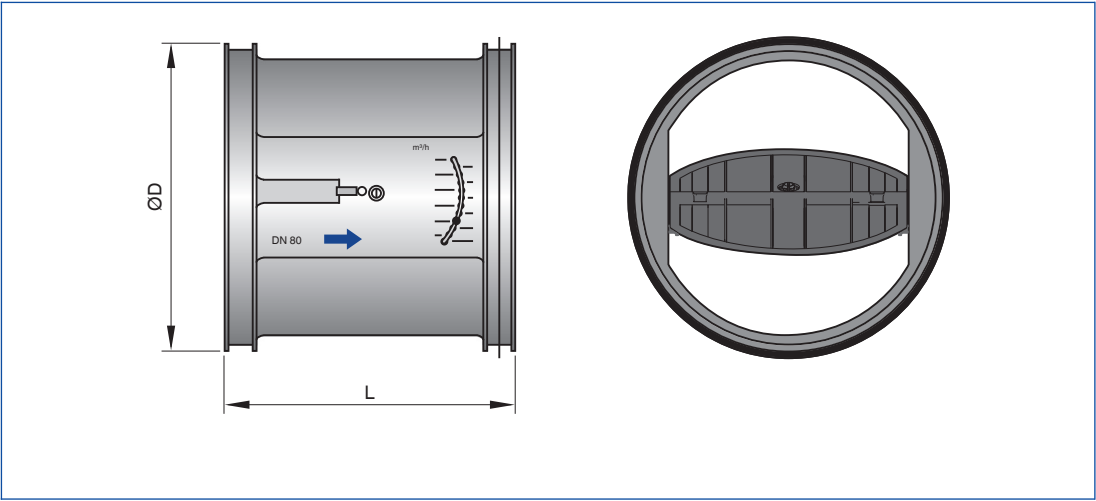
3
4
5
6
6
8
10

Order example: VFL/4

Nominal size

4"

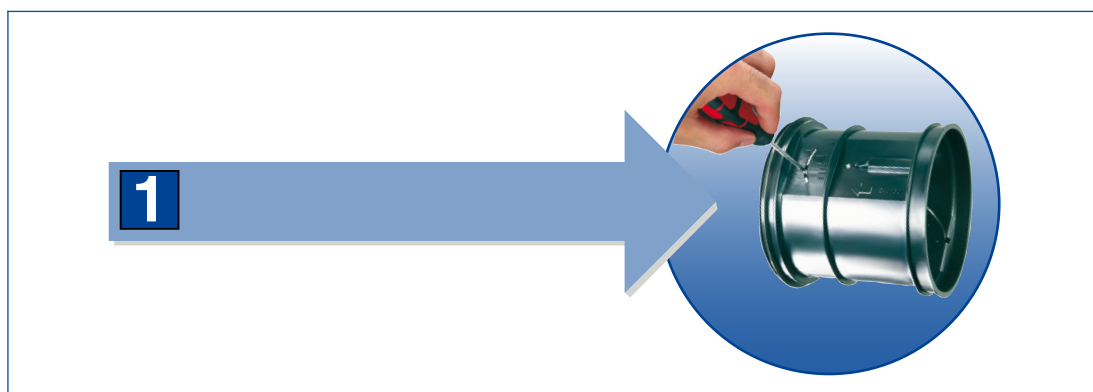
VFL



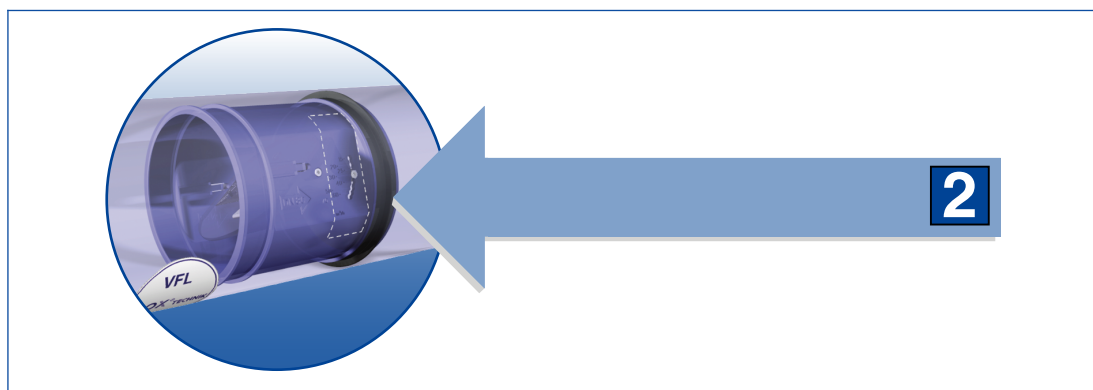
VFL

Nominal size	$\varnothing D$		L		m	
	in		in		lbs	
3		3		3		0.22
4		4		4		0.33
5		5		5		0.55
6		6		6		0.88
8		8		7		1.10
10		10		9		1.54

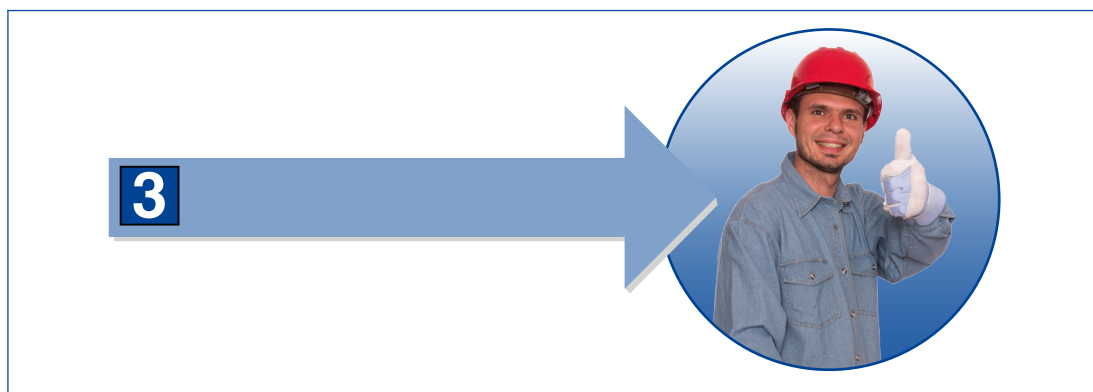
Set



Insert



Done



Principal dimensions

$\varnothing D$ [in]

Outside diameter of the spigot

$\varnothing D_1$ [in]

Pitch circle diameter of flanges

$\varnothing D_2$ [in]

Outside diameter of flanges

$\varnothing D_4$ [in]

Inside diameter of the screw holes of flanges

L [in]

Length of unit including connecting spigot

L_1 [in]

Length of casing or acoustic cladding

B [in]

Duct width

B_1 [in]

Screw hole pitch of flange (horizontal)

B_2 [in]

Outside dimension of flange (width)

B_3 [in]

Width of device

H [in]

Duct height

H_1 [in]

Screw hole pitch of flange (vertical)

H_2 [in]

Outside dimension of flange (height)

H_3 [in]

Unit height

n []

Number of flange screw holes

T [in]

Flange thickness

m [lbs]

Unit weight including the minimum required attachments for manual adjustment

Acoustic data

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)]

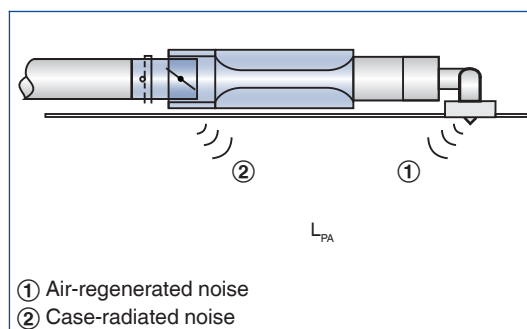
A-weighted sound pressure level of case-regenerated noise of the VAV terminal unit, system attenuation taken into account

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

All sound pressure levels are based on 20 μ Pa.

Definition of noise



Volume flow rates

$\dot{V}_{nom}$ [cfm]

Nominal volume flow rate (100 %)

- The value depends on product type and

nominal size

- Values are published on the internet and in technical leaflets, and stored in the Easy Product Finder design software.
- Upper limit of the setting range and maximum

volume flow rate setpoint value for the CAV controller

$\dot{V}$ [cfm]

Volume flow rate

$\Delta\dot{V}$ [± %]

Volume flow rate tolerance from setpoint value

Differential pressure

Δp_{st} [in WC]

Static differential pressure

$\Delta p_{st \min}$ [in WC]

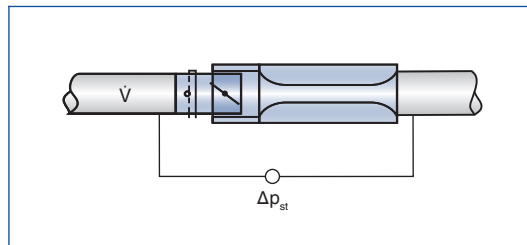
Static differential pressure, minimum

- The static minimum differential pressure is equal to the pressure loss of the CAV controller when the damper blade is open, caused by flow resistance (bellows, crossbar)
- 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 duct 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

Static differential pressure



Construction

Galvanised sheet steel

- Casing made of galvanised sheet steel
- Parts in contact with the airflow as described for the product type
- External parts, e.g. mounting brackets or covers, are usually made of galvanised sheet steel

Powder-coated surface (P1)

- Casing made of galvanised sheet steel, powder-coated RAL 7001, silver grey
- Parts in contact with the airflow are powder-coated or made of plastic

- Due to production, some parts that come into contact with the airflow may be stainless steel or aluminium, powder-coated
- External parts, e.g. mounting brackets or covers, are usually made of galvanised sheet steel

Stainless steel (A2)

- Casing made of stainless steel 1.4201
- Parts in contact with the airflow are powder-coated or made of stainless steel
- External parts, e.g. mounting brackets or covers, are usually made of galvanised sheet steel