CAV controllers
Type RN

For the precise control of constant volume flow rates

Circular self-powered volume flow controllers for the control of supply air or extract air in constant air volume systems

- Volume flow rate can be set using an external scale, no tools required
- High control accuracy
- No on-site test measurements required for commissioning
- Suitable for airflow velocities of up to 12 m/s
- Any installation orientation; maintenance-free
- Casing air leakage to EN 1751, class C

Optional equipment and accessories

- Acoustic cladding for the reduction of case-radiated noise
- Secondary silencer Type CA, CS or CF for the reduction of air-regenerated noise
- Hot water heat exchanger Type WL and electric air heater Type EL for reheating the airflow
- Actuator for switching between setpoint values

Actuator for switching between setpoint values

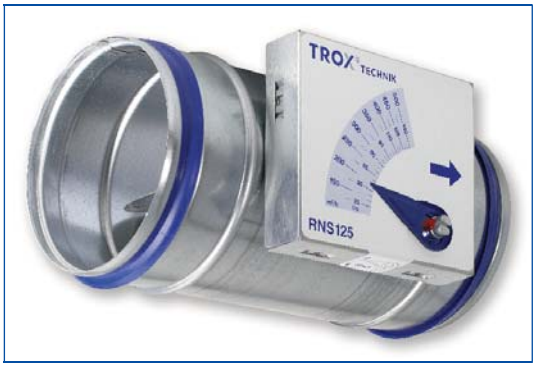
Tested to VDI 6022

2

Variants

Product examples

CAV controller variant RN-S, compact height



CAV controller variant RN

CAV controller variant RN-D

CAV controller variant RN, with actuator for switching between setpoint values

Description

For detailed information on actuators see Chapter K5 – 2.2.

Application

- Circular CONSTANTFLOW CAV controllers of Type RN for the precise supply air or extract air flow control in constant air volume systems
- Mechanical self-powered volume flow control without external power supply
- Simplified project handling with orders based on nominal size
- Volume flow rate setpoint can be set on external scale
- Switching between $\dot{V}_{min}$ and $\dot{V}_{max}$ using optional actuator

Variants

- RN-S: Compact-height volume flow controller
- RN: Volume flow controller
- RN-D: Volume flow controller with acoustic cladding
- RN-FL: Volume flow controller with flanges on both ends
- RN-D-FL: Volume flow controller with acoustic cladding and flanges on both ends
- Units with acoustic cladding and/or a secondary silencer Type CA, CS or CF for demanding acoustic requirements
- Acoustic cladding cannot be retrofitted

Construction
- Galvanised sheet steel
- P1: Powder-coated, silver grey (RAL 7001)
- A2: Stainless steel

Nominal sizes
- RN-S: 80, 100, 125
- RN: 80, 100, 125, 160, 200, 250, 315, 400
- RN-FL: 100, 125, 160, 200, 250, 315, 400

Attachments
- Min/Max actuators: Actuators for switching between minimum and maximum volume flow rate setpoint values
- Modulating actuators: Actuators for the stepless adjustment of volume flow rates or to switch between minimum and maximum volume flow rate setpoint values
- Retrofit kits: Actuators and installation accessories
- Variant RN-S cannot be combined with an actuator

Accessories
- Lip seals on both ends (factory fitted)
- Matching flanges for both ends

Useful additions
- Secondary silencer Type CA, CS or CF
- Heat exchanger Type WL
- Electric air heater Type EL

Special features
- Volume flow rate can be set using an external scale; no tools required
- High volume flow rate control accuracy
- Any installation orientation

Parts and characteristics
- Ready-to-commission controller
- Damper blade with low-friction bearings
- Bellows that acts as an oscillation damper
- Cam plate with leaf spring
- Scale with pointer to set the volume flow rate setpoint
- Aerodynamic function testing of each unit on a special test rig prior to shipping
- Correct operation even under unfavourable upstream conditions (1.5 D straight section required upstream)

Construction features
- Circular casing
- Spigot suitable for circular ducts to EN 1506 or EN 13180
- Spigot with groove for lip seal (RN-P1/80 without groove)
- RN-FL: Circular flanges to EN 12220

Materials and surfaces
Galvanised sheet steel construction
- Casing made of galvanised sheet steel
- Interior parts, nominal sizes 80 – 125: stainless steel 1.4301, nominal sizes 160 – 400: galvanised sheet steel
- Polyurethane bellows
- Plain bearings with PTFE coating
- Leaf spring made of stainless steel

Powder-coated construction (P1)
- Casing made of galvanised sheet steel, powder-coated
- Interior parts, nominal sizes 80 – 125: stainless steel 1.4301, nominal sizes 160 – 400: galvanised sheet steel, powder-coated

Stainless steel construction (A2)
- Casing made of stainless steel 1.4301
- Interior parts made of stainless steel

Variant with acoustic cladding (-D)
- Acoustic cladding made of galvanised sheet steel
- Rubber profile for the insulation of structure-borne noise
- Lining is mineral wool

Mineral wool
- To EN 13501, fire rating class A1, non-combustible
- RAL quality mark RAL-GZ 388
- Biosoluble and hence hygienically safe according to the German TRGS 905 (Technical Rules for Hazardous Substances) and EU directive 97/69/EG

Installation and commissioning
- Any installation orientation
- Volume flow rate can be set using an external scale; no tools required
- No repeat measurements or adjustments by an air conditioning engineer are necessary
- RN-D: For constructions with acoustic cladding, ducts on the room side should have cladding up to the acoustic cladding of the controller

Standards and guidelines
- Hygiene conforms to VDI 6022
- Casing air leakage to EN 1751, class C

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

Attachments

Order code detail	Actuator	Supply voltage	Auxiliary switch
Min/Max actuators			
B50	Actuator with mechanical stops TROX/Belimo	24 V AC/DC	–
B52			2
B60		230 V AC	–
B62			2
Modulating actuators			
B70	Actuator with mechanical stops TROX/Belimo	24 V AC/DC	–
B72			2

Technical data

Nominal sizes	80 – 400 mm
Volume flow rate range	11 – 1400 l/s or 40 – 5040 m^3/h
Volume flow rate control range	Approx. 25 to 100 % of the nominal volume flow rate
Scale accuracy	± 4 %
Minimum differential pressure	50 Pa
Maximum differential pressure	1000 Pa
Operating temperature	10 – 50 °C

Function

Functional description

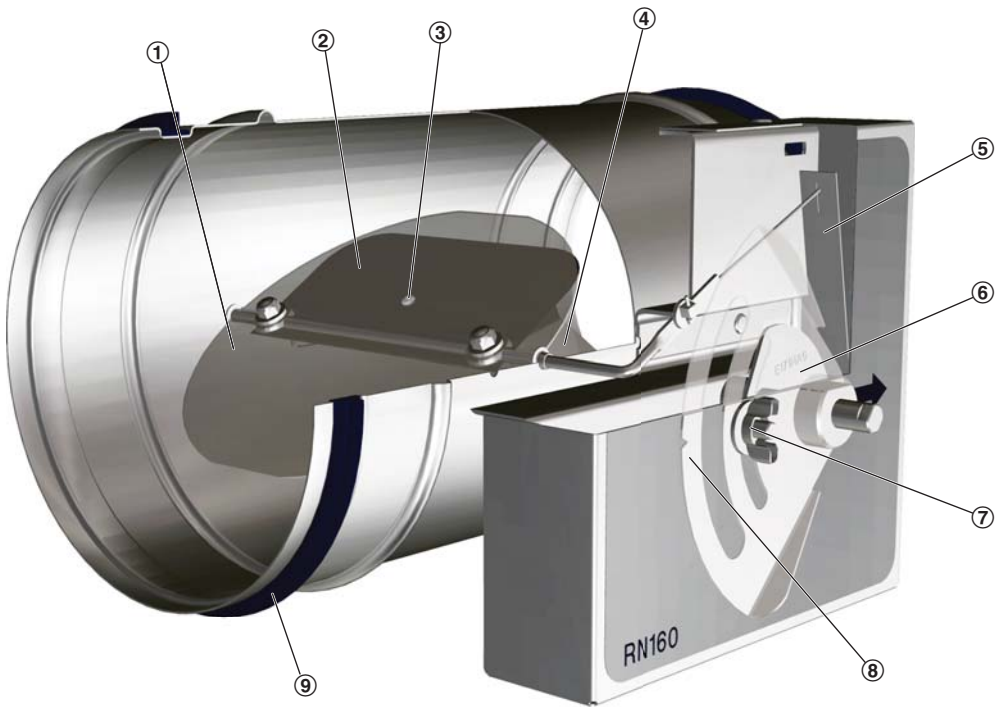
The volume flow controller is a mechanical self-powered unit and works without external power supply. A damper blade with low-friction bearings is adjusted by aerodynamic forces such that the set volume flow rate is maintained within the differential pressure range.
The aerodynamic forces of the airflow 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 that unrolls over a cam plate. The shape of the cam plate is such that a change in the differential pressure leads to an adjustment of the damper blade in a way that the volume flow rate is maintained almost exactly.

Efficient commissioning

The volume flow rate setpoint value can be set quickly and easily using the pointer on the external scale; no measurements are required. The advantage over flow adjustment dampers is that there is no need for repeat measurements or adjustments by an air conditioning engineer. Should the system pressure change, e.g. by opening or closing of duct sections, the flow rates in the entire system will also change if flow adjustment dampers are used; however, this is not the case with mechanical self-powered volume flow controllers A mechanical self-powered controller reacts immediately and adjusts the damper blade such that the set constant volume flow rate is maintained.

2

Schematic illustration of the RN



① Damper blade
② Bellows
③ Bellows inlet
④ Crossbar
⑤ Leaf spring
⑥ Cam plate
⑦ Volume flow rate scale lock
⑧ Volume flow rate scale
⑨ Lip seal

2

Order code

RN-S

RN-S – P1 / 100 / D2
1 2 3 4

1 Type
RN-S Volume flow controller

2 Material
No entry: galvanised sheet steel
P1 Powder-coated (RAL 7001), silver grey
A2 Stainless steel

3 Nominal size [mm]
80
100
125

4 Accessories
No entry: none
D2 Lip seals on both ends

Order code

RN

RN – D – P1 – FL / 160 / G2 / B50 / 300 – 800
1 2 3 4 5 6 7 8

1 Type
RN Volume flow controller

2 Acoustic cladding
No entry: none
D With acoustic cladding

3 Material
No entry: galvanised sheet steel
P1 Powder-coated (RAL 7001), silver grey
A2 Stainless steel

4 Flange
No entry: none
FL Flanges on both ends

5 Nominal size [mm]
80
100
125
160
200
250
315
400

6 Accessories
No entry: none
D2 Lip seals on both ends
G2 Matching flanges for both ends

7 Actuator
No entry: without
For example
B50 24 V AC/DC, 3-point
B52 24 V AC/DC, 3-point, with auxiliary switch
B70 24 V AC/DC, modulating 2 – 10 V DC

8 Volume flow rates [m³/h or l/s]
only actuators 7
$\dot{V}_{min}$ – $_{max}$ for factory setting

Order examples

RN/160/D2

Nominal size	160
Material	Galvanised sheet steel
Accessories	Lip seal on both ends

RN-D-FL/250/G2/B50

Acoustic cladding	With
Flange	Both ends
Material	Galvanised sheet steel
Nominal size	250
Accessories	Matching flanges for both ends
Actuator	B50

2

Volume flow rate ranges

The minimum differential pressure of CAV controllers 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 fan speed control must be selected accordingly.

Volume flow rate ranges and minimum differential pressure values

Nominal size	$\dot{V}$		①	②	③	④	$\Delta\dot{V}$
			$\Delta p_{st\ min}$				
	l/s	m^3/h	Pa				± %
80	**11**	**40**	100	105	105	105	20
	20	**72**	100	105	105	105	15
	40	**144**	100	110	115	120	10
	45	**162**	100	110	120	125	8
100	**22**	**79**	50	55	55	55	10
	40	**144**	50	55	55	60	8
	70	**252**	50	60	65	70	6
	90	**324**	50	60	70	80	5
125	**35**	**126**	50	55	55	55	10
	60	**216**	50	55	55	55	8
	115	**414**	50	60	65	70	6
	140	**504**	50	60	70	80	5
160	**60**	**216**	50	55	55	55	10
	105	**378**	50	55	55	55	8
	190	**684**	50	55	60	60	6
	240	**864**	50	55	65	70	5
200	**90**	**324**	50	55	55	55	10
	160	**576**	50	55	55	55	8
	300	**1080**	50	55	60	65	6
	360	**1296**	50	55	60	65	5
250	**145**	**522**	50	55	55	55	10
	255	**918**	50	55	55	55	8
	470	**1692**	50	55	60	60	6
	580	**2088**	50	55	60	65	5
315	**230**	**828**	50	55	55	55	10
	400	**1440**	50	55	55	55	8
	750	**2700**	50	55	60	60	6
	920	**3312**	50	55	60	65	5
400	**350**	**1260**	50	55	55	55	10
	610	**2196**	50	55	55	55	8
	1130	**4068**	50	55	55	55	6
	1400	**5040**	50	55	55	60	5

① RN
② RN with secondary silencer CS/CF, insulation thickness 50 mm, length 500 mm
③ RN with secondary silencer CS/CF, insulation thickness 50 mm, length 1000 mm
④ RN with secondary silencer CS/CF, insulation thickness 50 mm, length 1500 mm

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 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.

Quick sizing: Sound pressure level at differential pressure 150 Pa

Nominal size	$\dot{V}$		Air-regenerated noise				Case-radiated noise	
			①	②	③	④	①	⑤
			L_{PA}	L_{PA1}			L_{PA2}	L_{PA3}
	l/s	m³/h	dB(A)					
80	**11**	**40**	37	24	17	15	22	<15
	20	**72**	39	27	19	17	24	<15
	40	**144**	47	34	24	22	31	<15
	45	**162**	48	35	25	24	32	<15
100	**22**	**79**	37	24	17	15	22	<15
	40	**144**	40	47	22	20	21	<15
	70	**252**	47	47	27	26	29	<15
	90	**324**	50	50	30	29	33	<15
125	**35**	**126**	37	27	21	18	15	<15
	60	**216**	43	34	27	25	19	<15
	115	**414**	50	41	35	33	27	<15
	140	**504**	52	44	39	37	30	<15
160	**60**	**216**	40	32	26	24	29	<15
	105	**378**	45	37	32	29	33	<15
	190	**684**	49	41	35	33	39	<15
	240	**864**	50	41	36	34	41	16
200	**90**	**324**	40	31	24	22	28	<15
	160	**576**	43	35	28	26	32	<15
	300	**1080**	48	40	33	32	40	17
	360	**1296**	49	41	35	33	42	20
250	**145**	**522**	41	32	24	22	29	15
	255	**918**	42	34	28	26	33	<15
	470	**1692**	46	39	33	31	40	19
	580	**2088**	48	41	35	34	43	22
315	**230**	**828**	39	33	26	23	30	<15
	400	**1440**	42	35	29	27	35	<15
	750	**2700**	44	38	32	31	40	19
	920	**3312**	46	41	35	34	43	23
400	**350**	**1260**	46	39	33	29	45	<15
	610	**2196**	48	42	36	32	49	18
	1130	**4068**	50	44	38	35	54	24
	1400	**5040**	51	45	40	37	56	27

① RN
② RN with secondary silencer CS/CF, insulation thickness 50 mm, length 500 mm
③ RN with secondary silencer CS/CF, insulation thickness 50 mm, length 1000 mm
④ RN with secondary silencer CS/CF, insulation thickness 50 mm, length 1500 mm
⑤ RN-D

Description

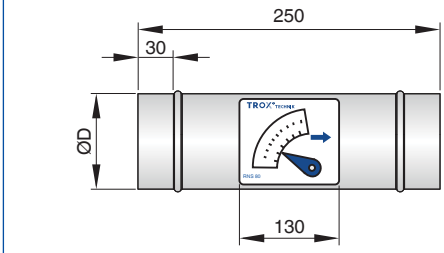
– Compact-height volume flow controller for constant volume flow rate control
– Spigot to make connections to the ducting

CAV controller variant RN-S, compact height

2

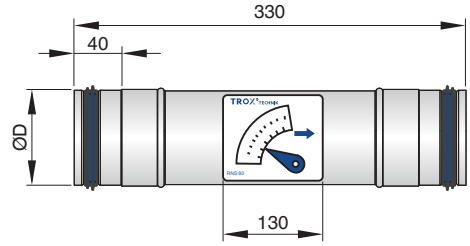
Dimensions

RN-S, nominal size 80



RN-S/80, RN-S-P1/80, RN-S-A2/80

RN-S, nominal size 80, lip seal

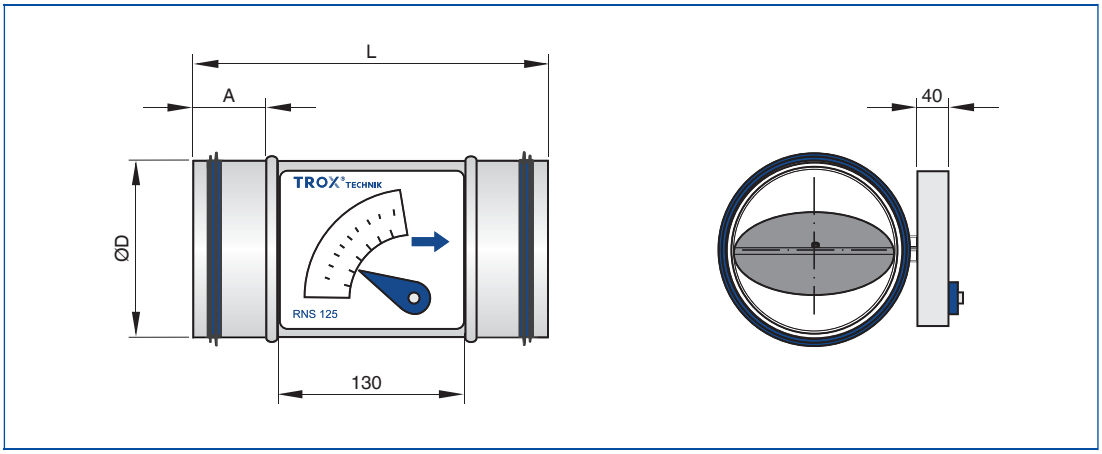


RN-S/80/D2, RN-S-P1/80/D2

Dimensions [mm] and weight [kg]

Nominal size	ØD	m
	mm	kg
80	79	1.4

RN-S, nominal size 100, 125



Dimensions [mm] and weight [kg]

Nominal size	ØD	L	A	m
	mm			kg
100	99	250	50	1.8
125	124	250	50	2.0

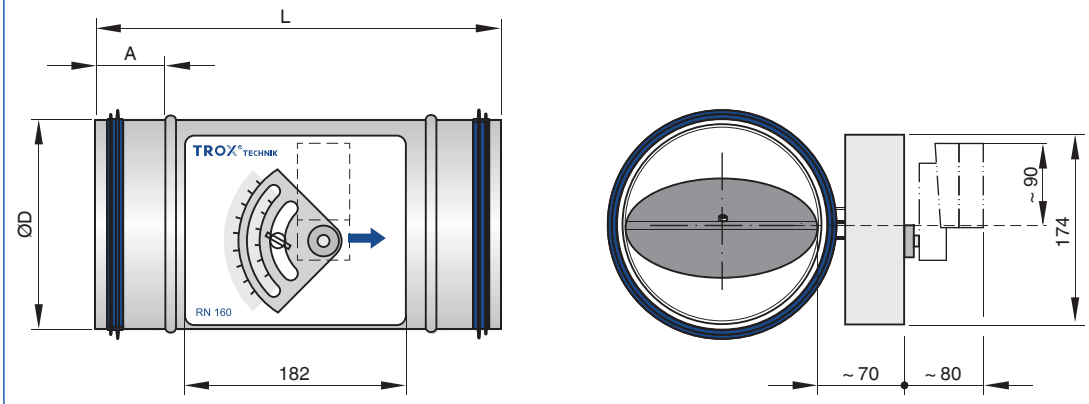
Description

- Volume flow controller for constant air volume flow control
- Spigot to make connections to the ducting

CAV controller variant RN

Dimensions

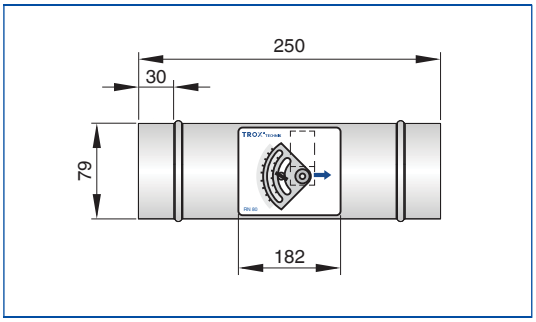
RN



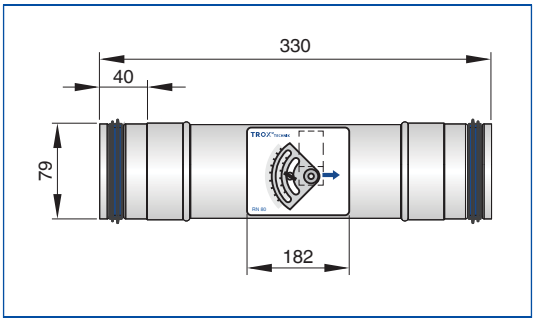
Dimensions [mm] and weight [kg]

Nominal size	ØD	L	A	m
	mm			kg
80	79	310	50	1.4
100	99	310	50	1.8
125	124	310	50	2.0
160	159	310	50	2.5
200	199	310	50	3.0
250	249	400	50	3.5
315	314	400	50	4.8
400	399	400	50	5.7

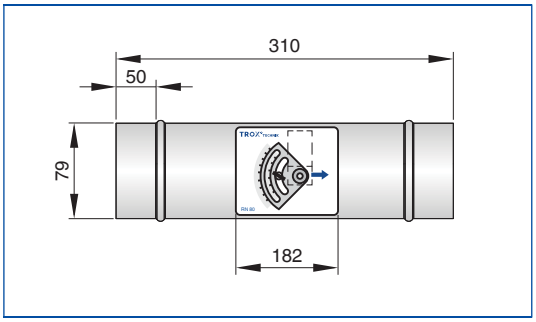
RN-P1/80



RN-P1/80/D2



RN-A2/80



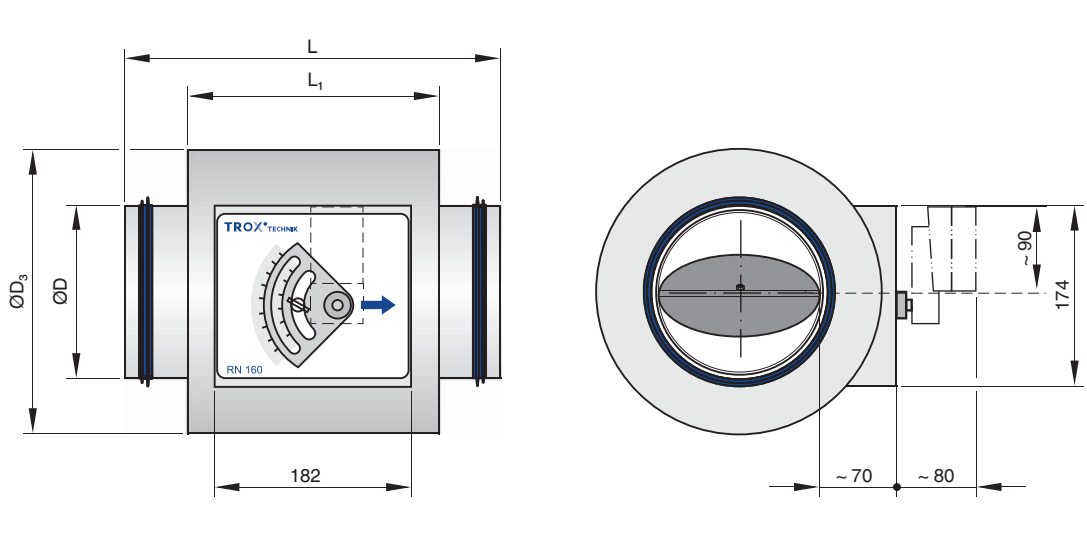
Description

CAV controller
variant RN-D

- Volume flow controller with acoustic cladding for constant air volume flow control
- Spigot to make connections to the ducting
- 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) on the fan and room ends
- Acoustic cladding cannot be retrofitted

Dimensions

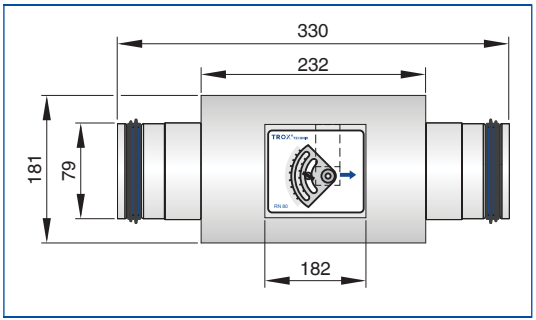
RN-D



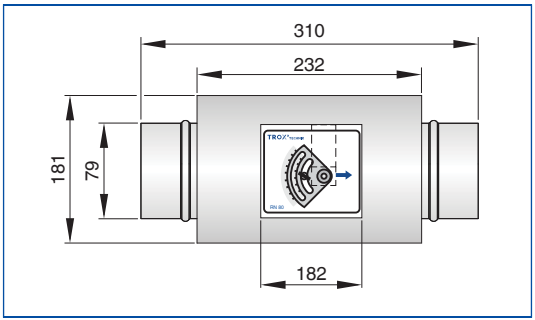
Dimensions [mm] and weight [kg]

Nominal size	ØD	L	$ØD_3$	L_1	m
	mm				kg
80	79	310	181	232	2.2
100	99	310	200	232	3.6
125	124	310	220	232	4.0
160	159	310	262	232	5.0
200	199	310	300	232	6.0
250	249	400	356	312	7.3
315	314	400	418	312	9.8
400	399	400	500	312	11.8

RN-D-P1/80/D2



RN-D-A2/80

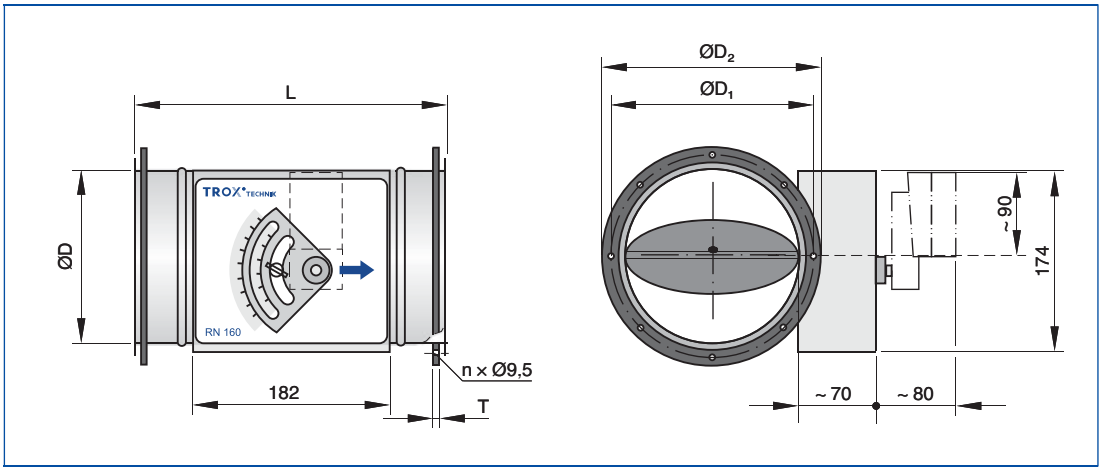


Description

- Volume flow controller for constant air volume flow control
- With flanges to make detachable connections to the ductwork

Dimensions

RN-FL



Dimensions [mm] and weight [kg]

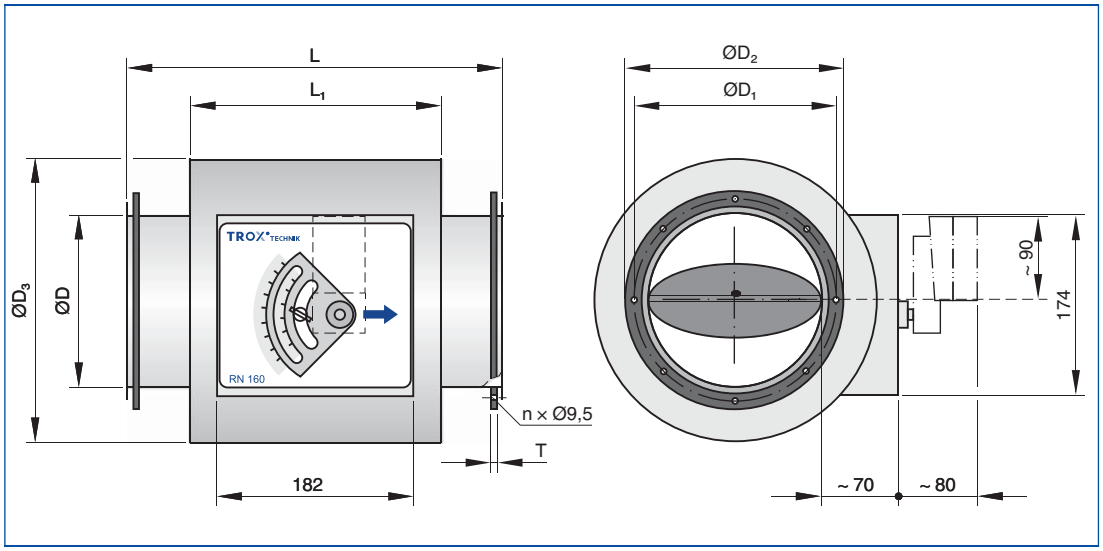
Nominal size	ØD	L	$ØD_1$	$ØD_2$	n	T	m
	mm					mm	kg
100	99	290	132	152	4	4	2.4
125	124	290	157	177	4	4	2.7
160	159	290	192	212	6	4	3.5
200	199	290	233	253	6	4	4.4
250	249	380	283	303	6	4	5.3
315	314	380	352	378	8	4	7.3
400	399	380	438	464	8	4	9.6

Description

- Volume flow controller with acoustic cladding for constant air volume flow control
- With flanges to make detachable connections to the ductwork
- 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) on the fan and room ends
- Acoustic cladding cannot be retrofitted
- Powder-coated surface (P1) or stainless steel construction (A2) not possible

Dimensions

RN-D-FL



Dimensions [mm] and weight [kg]

Nominal size	ØD	L	$ØD_1$	$ØD_2$	$ØD_3$	L_1	n	T	m
	mm							mm	kg
100	99	370	132	152	200	232	4	4	4.2
125	124	370	157	177	220	232	4	4	4.7
160	159	370	192	212	262	232	6	4	6.0
200	199	370	233	253	300	232	6	4	7.4
250	249	460	283	303	356	312	6	4	9.1
315	314	460	352	378	418	312	8	4	12.3
400	399	460	438	464	500	312	8	4	15.7

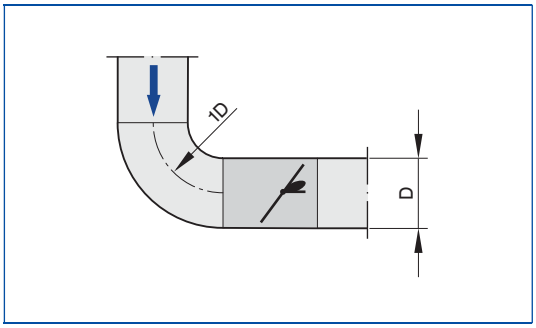
2

Upstream conditions

The volume flow rate accuracy $\Delta\dot{V}$ 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. Duct connections, e.g. branches off the main duct, must comply with EN 1505. Some installation situations require straight duct sections upstream.

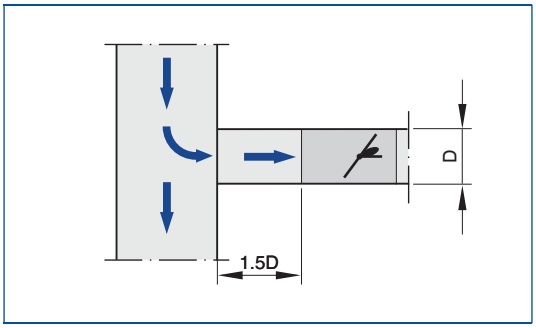
Free air intake only with a straight duct section of 1D upstream.

Bend



A bend with a curvature radius of at least 1D – without an additional straight duct section upstream of the CAV controller – has only a negligible effect on the volume flow rate accuracy.

Junction

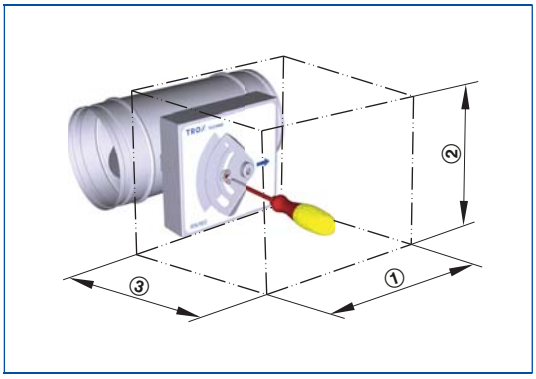


A junction causes strong turbulence. The stated volume flow rate accuracy $\Delta\dot{V}$ can only be achieved with a straight duct section of at least 1.5D upstream. Shorter upstream sections require a perforated plate in the branch and before the CAV controller. If there is no straight upstream section at all, the control will not be stable, even with a perforated plate.

Space requirement for commissioning and maintenance

Sufficient space must be kept clear near any attachments to allow for commissioning and maintenance. It may be necessary to provide sufficiently sized inspection access openings.

Access for commissioning and maintenance



Space required

Attachments	①	②	③
	mm		
Without actuator	200	200	200
With actuator	200	320	300

Standard text

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 controllers for constant air volume systems, mechanical self-powered, without external power supply, suitable for supply or extract air, available in 8 nominal sizes. Ready-to-commission unit consists of the casing containing a damper blade with low-friction bearings, bellows, external cam plate and leaf spring.
Volume flow controllers without actuators are factory set to a reference volume flow rate (customers can set the required volume flow rate on site).
Spigot with groove for lip seal, suitable for connecting ducts according to EN 1506 or EN 13180.
Casing air leakage to EN 1751, class C.

Special features
- Volume flow rate can be set using an external scale; no tools required
- High volume flow rate control accuracy
- Any installation orientation

Materials and surfaces
Galvanised sheet steel construction
- Casing made of galvanised sheet steel
- Interior parts, nominal sizes 80 – 125: stainless steel 1.4301, nominal sizes 160 – 400: galvanised sheet steel
- Polyurethane bellows
- Plain bearings with PTFE coating
- Leaf spring made of stainless steel

Powder-coated construction (P1)
- Casing made of galvanised sheet steel, powder-coated
- Interior parts, nominal sizes 80 – 125: stainless steel 1.4301, nominal sizes 160 – 400: galvanised sheet steel, powder-coated

Stainless steel construction (A2)
- Casing made of stainless steel 1.4301
- Interior parts made of stainless steel

Variant with acoustic cladding (-D)
- Acoustic cladding made of galvanised sheet steel
- Rubber profile for the insulation of structure-borne noise
- Lining is mineral wool

Mineral wool
- To EN 13501, fire rating class A1, non-combustible
- RAL quality mark RAL-GZ 388
- Biosoluble and hence hygienically safe according to the German TRGS 905 (Technical Rules for Hazardous Substances) and EU directive 97/69/EG

Construction
- Galvanised sheet steel
- P1: Powder-coated, silver grey (RAL 7001)
- A2: Stainless steel

Technical data
- Nominal sizes: 80 to 400 mm
- Volume flow rate range: 11 to 1400 l/s or 40 to 5040 m^3/h
- Volume flow rate control range: approx. 25 – 100 % of the nominal volume flow rate
- Minimum differential pressure: 50 Pa
- Maximum differential pressure: 1000 Pa

Sizing data
- $\dot{V}$ _____ [m^3/h]
- Δp_{st} _____ [Pa]
- L_{PA} air-regenerated noise _____ [dB(A)]
- L_{PA} Case-radiated noise _____ [dB(A)]

Order options

1 Type
RN-S Volume flow controller

2 Material
No entry: galvanised sheet steel
☐ **P1** Powder-coated (RAL 7001), silver grey
☐ **A2** Stainless steel

3 Nominal size [mm]
☐ **80**
☐ **100**
☐ **125**

4 Accessories
No entry: none
☐ **D2** Lip seals on both ends

2

Order options

1 Type
RN Volume flow controller

2 Acoustic cladding
No entry: none
☐ **D** With acoustic cladding

3 Material
No entry: galvanised sheet steel
☐ **P1** Powder-coated (RAL 7001), silver grey
☐ **A2** Stainless steel

4 Flange
No entry: none
☐ **FL** Flanges on both ends

5 Nominal size [mm]
☐ **80**
☐ **100**
☐ **125**
☐ **160**
☐ **200**
☐ **250**
☐ **315**
☐ **400**

6 Accessories
No entry: none
☐ **D2** Lip seals on both ends
☐ **G2** Matching flanges for both ends

7 Actuator
No entry: without
For example
☐ **B50** 24 V AC/DC, 3-point
☐ **B52** 24 V AC/DC, 3-point, with auxiliary switch
☐ **B70** 24 V AC/DC, modulating 2 – 10 V DC

8 Volume flow rates [m³/h or l/s]
only actuators 7
$\dot{V}_{min}$ – $_{max}$ for factory setting

Constant volume flow control – CONSTANTFLOW

Basic information and nomenclature

2

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

Product selection

	Type					
	RN	EN	VFL	VFC	RN-Ex	EN-Ex
Type of system						
Supply air	●	●	●	●	●	●
Extract air	●	●	●	●	●	●
Duct connection, fan end						
Circular	●		●	●	●	
Rectangular		●				●
Volume flow rate range						
Up to [m^3/h]	5040	12100	900	1330	5040	12100
Up to [l/s]	1400	3360	250	370	1400	3360
Air quality						
Filtered	●	●	●	●	●	●
Office extract air	●	●	●	●	●	●
Polluted	○	○	○	○	○	○
Contaminated	○	○	○	○	○	○
Control function						
Constant	●	●	●	●	●	●
Variable	○	○		○		
Min/Max	○	○		○		
Acoustic requirements						
High < 40 dB(A)	○	○		○	○	○
Low < 50 dB (A)	●	●	●	●	●	●
Special areas						
Areas with explosive atmospheres					●	●

●	Possible
○	Possible under certain conditions: Robust unit variant and/or specific actuator or a useful additional product
	Not possible

Basic information and nomenclature

Principal dimensions

ØD [mm]
Outside diameter of the spigot

$ØD_1$ [mm]
Pitch circle diameter of flanges

$ØD_2$ [mm]
Outside diameter of flanges

$ØD_4$ [mm]
Inside diameter of the screw holes of flanges

L [mm]
Length of unit including connecting spigot

L_1 [mm]
Length of casing or acoustic cladding

B [mm]
Duct width

B_1 [mm]
Screw hole pitch of flange (horizontal)

B_2 [mm]
Outside dimension of flange (width)

B_3 [mm]
Width of device

H [mm]
Duct height

H_1 [mm]
Screw hole pitch of flange (vertical)

H_2 [mm]
Outside dimension of flange (height)

H_3 [mm]
Unit height

n [ ]
Number of flange screw holes

T [mm]
Flange thickness

m [kg]
Unit weight including the minimum required attachments for manual adjustment

Nomenclature

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

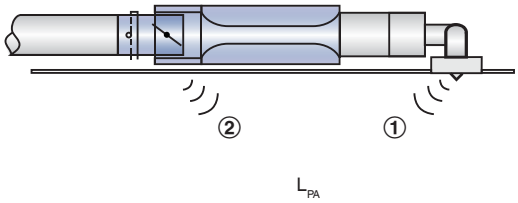
L_{PA1} [dB(A)]
A-weighted sound pressure level of air-regenerated noise of the VAV terminal unit with secondary silencer, system attenuation taken into account

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 µPa.

Definition of noise



① Air-regenerated noise
② Case-radiated noise

Volume flow rates

$\dot{V}_{nom}$ [m³/h] and [l/s]
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

$\dot{V}$ [m³/h] and [l/s]
Volume flow rate

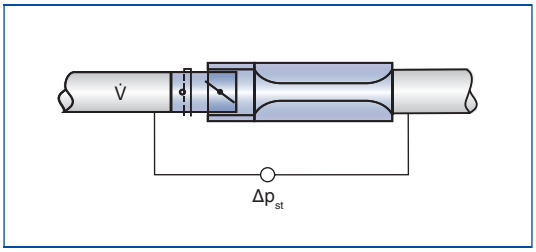
$\Delta\dot{V}$ [± %]
Volume flow rate tolerance from setpoint value

Differential pressure

Δp_{st} [Pa]
Static differential pressure

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



Constructions

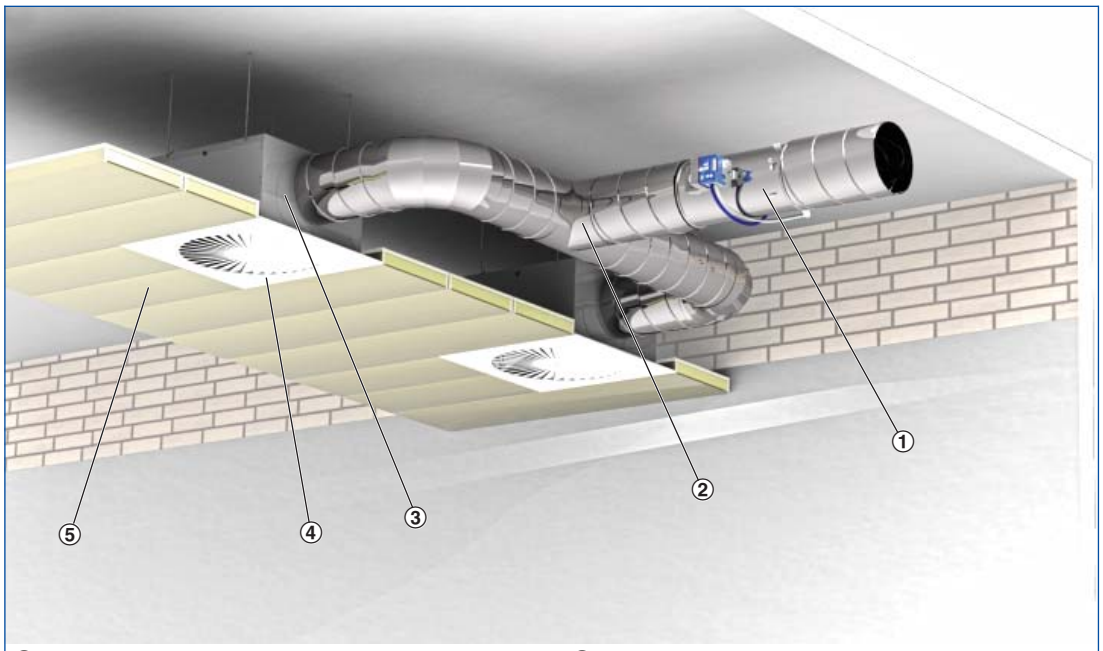
Galvanised sheet steel
- Casing made of galvanised sheet steel
- Parts in contact with the airflow as described for the product type
- External parts, e.g. mounting brackets or covers, are usually made of galvanised sheet steel

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

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. Generally accepted attenuation and insulation values have been taken into account.
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



① VAV terminal unit
② Distribution in the ducting
③ Change of direction
④ End reflection
⑤ Ceiling insulation

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 air terminal unit. If there is just one diffuser (assumption: 140 l/s or 500 m^3/h), no correction is necessary.

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.

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

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

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							
Change of direction	0	0	1	2	3	3	3	3
Mündungsreflexion	10	5	2	0	0	0	0	0
Room attenuation	5	5	5	5	5	5	5	5

The calculation is based on the end reflection for nominal size 250

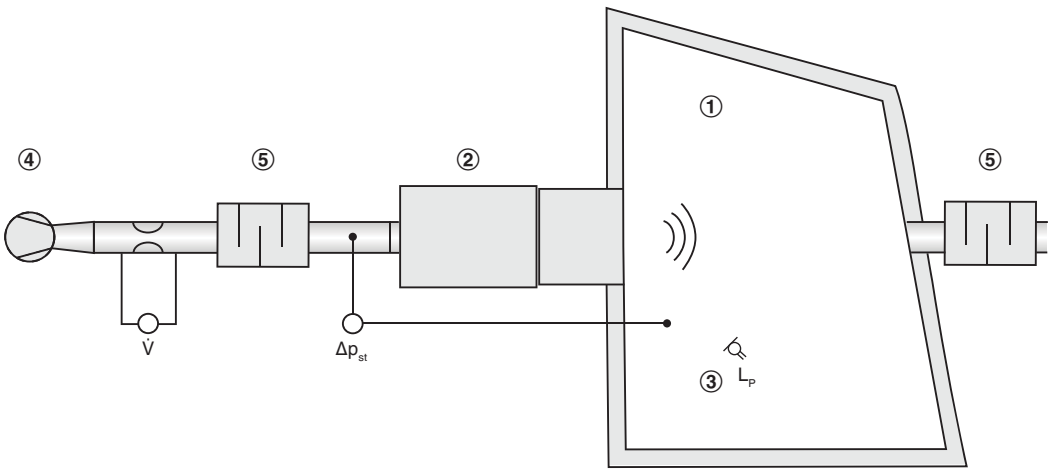
Octave correction for the calculation of case-radiated noise

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

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 in a reverberation chamber to EN ISO 3741.

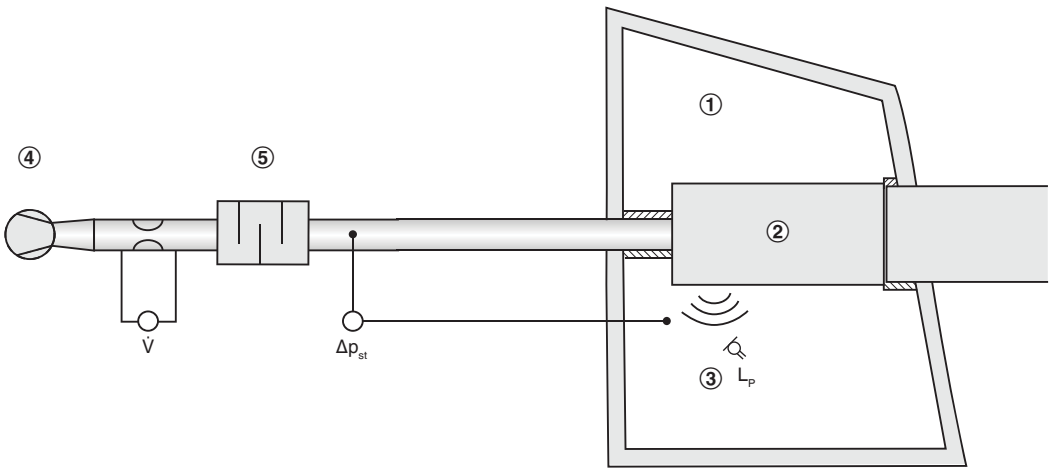
Measuring the air-regenerated noise



① Reverberation chamber
② VAV terminal unit
③ Microphone
④ Fan
⑤ Sound attenuator

The sound pressure levels for air-regenerated noise L_{PA} given by us result from measurements in a reverberation chamber. The sound pressure L_P is measured for the entire frequency range. The evaluation of the measurements, including system attenuation and A-weighting, results in the sound pressure level L_{PA}.

Measuring the case-radiated noise



① Reverberation chamber
② VAV terminal unit
③ Microphone
④ Fan
⑤ Sound attenuator

The sound pressure levels for case-radiated noise L_{PA2} given by us result from measurements in a reverberation chamber. The sound pressure L_P is measured for the entire frequency range. The evaluation of the measurements, including system attenuation and A-weighting, results in the sound pressure level L_{PA2}.

2

Sizing with the help of this catalogue

This catalogue provides convenient quick sizing tables for CAV controllers. 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

$\dot{V}_{max}$ = 280 l/s (1010 m³/h)
Δp_{st} = 150 Pa
Required sound pressure level in the room 35 dB(A)

Quick sizing

RN/200 with circular silencer CS 050/200×1000
Air-regenerated noise L_{PA} = 26 dB(A)
Case-radiated noise L_{PA} = 31 dB(A)

Easy Product Finder

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

You will find the Easy Product Finder on our website.