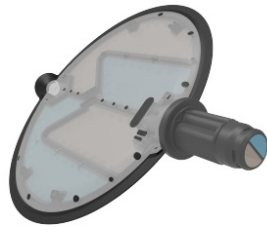


VARIABLE VOLUME FLOW CONTROL VAV TERMINAL UNITS



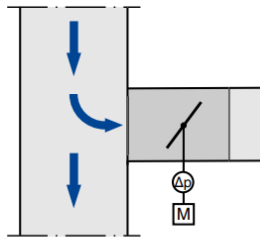
Effective pressure detection via damper blade

EFFECTIVE PRESSURE DETECTION VIA DAMPER BLADE



Compact controller with display

COMPACT CONTROLLER WITH DISPLAY



For all upstream conditions

FOR ALL UPSTREAM CONDITIONS



Tested to VDI 6022

TESTED TO VDI 6022

TYPE TVE

COMPACT SOLUTION FOR LOW AIRFLOW VELOCITIES

Circular air terminal units for use in variable air volume systems at low airflow velocities even under unfavourable upstream conditions

- Effective pressure monitoring tubeless via damper blade
- Effective pressure transmission through effective pressure channel in shaft
- Terminals with protective cover - no junction boxes required
- Any direction of flow with dynamic transducer
- Suitable for airflow velocity of 0.5 - 13 m/s
- Compact dimensions for use in confined ceiling areas
- Plug-and-play solution in conjunction with X-AIRCONTROL room control
- Exact measurement even at low airflow velocities
- Any installation orientation even with static transducers
- Closed blade air leakage to EN 1751, at least class 3
- Casing air leakage to EN 1751, class C
- Volume flow rate range 1:25

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

Application

- Round VAV terminal units for use in ventilation and air conditioning systems
- For virtually all control, inductor and shut-off tasks in the supply air or extract air area
- Also for unfavourable upstream conditions at low airflow velocities
- Closed-loop volume flow control using an external power supply
- For variable or constant volume flow systems
- Shut-off via override control by others

Special characteristics

- High effective pressure signal at a small angle of attack
- Factory set-up or programming and aerodynamic function testing
- Volume flow rate can be measured and subsequently adjusted on site; additional adjustment tool may be necessary (depending on the variant of the control component)
- Effective pressure monitoring tubeless via damper blade
- Effective pressure transmission through effective pressure channel in shaft
- Any direction of flow with dynamic transducer
- Any installation orientation even with static transducers
- Suitable for airflow velocity of 0.5 - 13 m/s
- Compact dimensions for use in confined ceiling areas

Nominal sizes

- 100, 125, 160, 200, 250

Description



Variants

- TVE: VAV terminal unit
- TVE-D: VAV terminal unit with acoustic cladding
- TVE-FL: VAV terminal unit with flanges on both ends
- TVE-D-FL: VAV terminal unit with acoustic cladding and flanges on both ends
- Units with acoustic cladding and/or a circular silencer, types CA, CS or CF, for demanding acoustic requirements

Construction

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

Parts and characteristics

- Ready-to-commission unit which consists of mechanical parts and control components.
- Damper blade with integrated measuring unit
- Shaft with effective pressure channel for measured value transmission
- Factory assembled control components complete with wiring
- Aerodynamic functional testing on a special test rig prior to shipping of each unit
- Set-up data is given on a label or volume flow rate scale affixed to the unit
- High control accuracy even in case of unfavourable upstream conditions

Attachments

- EASY controller: Compact unit consisting of controller with potentiometers, effective pressure transducer and actuator
- Compact controller: Compact unit consisting of controller with potentiometers, effective pressure transducer and actuator
- Compact controller Modbus: variant with Modbus RTU interface; Plug-and-play solution in conjunction with XAIRCONTROL room control

Accessories

- G2: Matching flanges for both ends
- D2: Double lip seals on both ends (factory fitted)

Useful additions

- Circular silencers, types CA, CS or CF
- Heat exchanger Type WL
- Electric air heater Type EL

Construction features

- Circular casing
- Spigot suitable for circular ducts to EN 1506 or EN 13180
- Spigots with groove for seal
- Position of the damper blade indicated externally at position indicator
- TVE-FL: Flanges to EN 12220
- Control component can be replaced

Materials and surfaces

Galvanised sheet steel construction

- Casing made of galvanised sheet steel
- Control damper blade, effective pressure sensor and shaft made of plastic, PA6, UL94, flame retardant (V-0)
- Damper blade seal made of plastic, TPU, micro bacterial resistant
- Plastic bearings

Powder-coated construction (P1)

- Casing made of galvanised sheet steel, surface powder coated, silver grey (RAL 7001)
- Control damper blade, effective pressure sensor and shaft made of plastic, PA6, UL94, flame retardant (V-0)
- Damper blade seal made of plastic, TPU, micro bacterial resistant
- Plastic bearings

Stainless steel construction (A2)

- Casing made of stainless steel 1.4301
- Control damper blade, effective pressure sensor and shaft made of plastic, PA6, UL94, flame retardant (V-0)
- Damper blade seal made of plastic, TPU, micro bacterial resistant
- Plastic bearings

Acoustic cladding

- Variant with acoustic cladding (-D)
- Acoustic cladding made of galvanised sheet steel
- Rubber seal 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
- Non-hazardous to health thanks to being highly biosoluble in accordance with the Ordinance on Hazardous Substances and Note Q of the European Directive (EC) No. 1272/2008

Standards and guidelines

Fulfills the hygiene requirements of

- EN 16798, Part 3
- VDI 6022, Sheet 1
- DIN 1946, Part 4
- Further standards, guidelines in accordance with hygiene certificate

Casing air leakage

- EN 1751, Class C

Closed blade air leakage:

- NS 100 – 160
- EN 1751, Class 3
- Meets the general requirements of DIN 1946, part 4, with regard to the acceptable closed blade air leakage

NS 200 – 250

- EN 1751, Class 4
- Meets the increased requirements of DIN 1946, part 4, with regard to the acceptable closed blade air leakage

Maintenance

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

ТЕХНИЧЕСКА ИНФОРМАЦИЯ

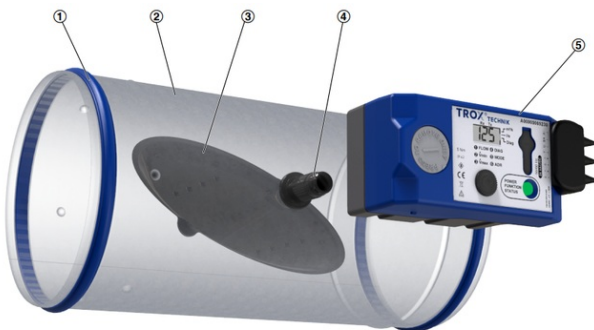
FUNCTION, TECHNICAL DATA, QUICK SIZING, SPECIFICATION TEXT, ORDER CODE



The control damper blade works as an actuator and as an effective pressure sensor. Through the effective pressure channel in the shaft of the detected effective pressure reaches the transducer (static or dynamic), is converted into an electrical signal and compared with the setpoint value.

In the case of a control deviation, the integrated actuator changes the position of the control damper blade. As a result, the volume flow rate is kept constant in close tolerances over the entire differential pressure range.

TVE VAV terminal unit



- ① Double lip seal
- ② Casing
- ③ Damper blade including effective pressure sensor

- ④ Shaft with effective pressure channel
- ⑤ Electronic volume flow controller

Nominal sizes	100 – 250 mm
Volume flow rate range	4 – 637 l/s or 14 – 2293 m ³ /h
Volume flow rate control range (unit with dynamic effective pressure measurement)	approx. 4 to 100 % of the nominal volume flow rate
Minimum differential pressure	Up to 82 Pa (without circular silencer)
Maximum differential pressure	Control component with dynamic transducer: 900 Pa, Control component with static transducer: 600 Pa
Operating temperature	10 to 50 °C

Quick sizing tables provide a good overview of the minimum differential pressures, the volume flow rate accuracy and the room sound pressure levels that can be expected. Intermediate values may be achieved by interpolation. The sound power levels for calculating the sound pressure levels were measured in the TROX laboratory according to DIN EN ISO 5135 - see "Basic information and nomenclature". Exact results as well as spectral data for all control components are provided by the design with our Easy Product Finder design program. The first selection criteria for the nominal size are the actual volume flow rates q_{vmin} and q_{vmax} .

Volume flow rate ranges and minimum differential pressure values

The minimum differential pressure of VAV terminal units is an important factor in designing the ductwork and in rating the fan including speed control. It must be ensured that under all operating conditions a sufficient pressure differential across the regulator ($\Delta p_{stat,min}$) is pending. The measurement points for fan speed control must be selected accordingly. The volume flow rates given for VAV terminal units depend on the nominal size and on the control component (attachment) that is installed.

Volume flow rate ranges and minimum differential pressure values

Dynamic and static measurement principle for controller

Attachment: Easy, XB0, XM0, XM0-J6, XS0, XS0-J6

NG	qv [l/s]	qv [m³/h]	$\Delta p_{statmin}$ [Pa]				Δq_v [±%]
100	4	14	1	1	1	1	18
100	35	127	11	13	15	17	7
100	67	241	38	46	53	61	5
100	98	354	82	98	115	131	5
125	6	21	1	1	1	1	19
125	58	207	9	11	13	14	7
125	109	393	32	38	45	51	5
125	160	579	70	83	96	109	5
160	10	35	1	1	1	1	18
160	93	333	6	7	9	10	7
160	175	631	21	25	29	33	5
160	258	929	45	54	63	72	5
200	16	55	1	1	1	1	18
200	150	541	5	6	7	8	7
200	285	1027	18	21	25	28	5
200	420	1513	39	46	53	60	5
250	25	87	1	1	1	1	18
250	228	822	4	5	5	6	7
250	433	1558	14	16	18	21	5
250	636	2293	29	34	39	44	5

- ① Basic unit
- ② Basic unit with circular silencer CS/CF, insulation thickness 50 mm, length 500 mm
- ③ Basic unit with circular silencer CS/CF, insulation thickness 50 mm, length 1000 mm
- ④ Basic unit with circular silencer CS/CF, insulation thickness 50 mm, length 1500 mm

Quick sizing table sound pressure level

In the quick sizing are generally accepted attenuation and insulation values have been taken into account. If the sound pressure level exceeds the required level, a larger air terminal unit and/or a silencer is required. Further information on the acoustic data can be found in the basic information and nomenclature.

Quick sizing table for air-regenerated noise L_{pA}

Controller including sound attenuator variants

			$\Delta p_{st} = 150 \text{ Pa}$				$\Delta p_{st} = 500 \text{ Pa}$			
NG	qv [l/s]	qv [m³/h]	LPA	LPA1	LPA1	LPA1	LPA	LPA1	LPA1	LPA1
100	4	14	32	< 15	< 15	< 15	42	17	< 15	< 15
100	35	127	46	32	28	24	56	40	34	31
100	67	241	51	37	33	29	60	47	42	38
100	98	354	55	37	32	30	63	50	46	42
125	6	21	37	15	< 15	< 15	48	26	16	< 15
125	58	207	48	34	28	25	59	42	35	31
125	109	393	52	39	34	31	62	47	41	37
125	160	579	56	41	37	34	63	49	44	40
160	10	35	42	24	15	< 15	54	38	29	22
160	93	333	45	33	28	25	58	43	36	31
160	175	631	50	38	34	31	58	44	38	34
160	258	929	53	40	35	33	57	44	39	36
200	16	55	33	20	< 15	< 15	44	32	26	21
200	150	541	46	36	31	28	57	47	42	39
200	285	1027	49	38	34	32	58	49	44	41
200	420	1513	53	43	40	38	58	49	45	42
250	25	87	40	29	22	17	52	42	36	31
250	228	822	46	37	32	29	58	50	45	41
250	433	1558	47	39	34	32	57	50	45	41
250	636	2293	52	45	41	38	57	50	45	42

Air-regenerated noise L_{PA} [dB] with static differential pressure Δp_{st} from 150 or 500 Pa

- ① Basic unit
- ② Basic unit with circular silencer CS/CF, insulation thickness 50 mm, length 500 mm
- ③ Basic unit with circular silencer CS/CF, insulation thickness 50 mm, length 1000 mm
- ④ Basic unit with circular silencer CS/CF, insulation thickness 50 mm, length 1500 mm

Quick sizing table case-radiated noise L_{PA}

Controller including acoustic cladding variants

			$\Delta p_{st} = 150 \text{ Pa}$		$\Delta p_{st} = 500 \text{ Pa}$	
NG	qv [l/s]	qv [m³/h]	LPA2	LPA3	LPA2	LPA3
100	4	14	15	< 15	25	< 15
100	35	127	29	18	39	28
100	67	241	34	23	43	32
100	98	354	37	26	46	35
125	6	21	20	< 15	31	20
125	58	207	31	20	42	31
125	109	393	35	24	45	34
125	160	579	40	29	47	36
160	10	35	22	15	34	27
160	93	333	25	18	38	31
160	175	631	31	24	39	32
160	258	929	36	29	40	33
200	16	55	< 15	< 15	24	< 15
200	150	541	26	< 15	37	22
200	285	1027	32	17	41	26
200	420	1513	38	23	43	28
250	25	87	24	< 15	36	21
250	228	822	32	17	44	29
250	433	1558	36	21	46	31
250	636	2293	43	28	48	33

Case-radiated noise L_{PA} [dB] with static differential pressure Δp_{st} from 150 or 500 Pa

- ① Basic unit
- ② Basic unit with acoustic cladding

Note:

Information on case-radiated noise for combinations of basic unit and optional acoustic cladding and secondary silencer can be found in the

Easy Product Finder design program.

Circular VAV terminal units for variable and constant air volume systems, suitable for supply or extract air, available in five nominal sizes. High control accuracy even in case of unfavourable upstream conditions. Control range at least 1:25. Differential pressure detection and control via the control damper blade. Transmission of effective pressure tubeless through differential pressure channel in the shaft. Closed blade air leakage to EN 1751: at least class 3, from NS 200: class 4. Casing air leakage to EN 1751, class C. Ready-to-commission unit which consists of the mechanical parts and the factory installed electronic control component. Position of the damper blade can be seen from the outside on the control component. Damper blade is factory set to open position which allows ventilation airflow even without control.

Special characteristics

- High effective pressure signal at a small angle of attack
- Factory set-up or programming and aerodynamic function testing
- Volume flow rate can be measured and subsequently adjusted on site; additional adjustment tool may be necessary (depending on the variant of the control component)
- Effective pressure monitoring tubeless via damper blade
- Effective pressure transmission through effective pressure channel in shaft
- Any direction of flow with dynamic transducer
- Any installation orientation even with static transducers
- Suitable for airflow velocity of 0.5 - 13 m/s
- Compact dimensions for use in confined ceiling areas

Materials and surfaces

- Casing made of galvanised sheet steel
- Control damper blade, effective pressure sensor and shaft made of plastic, PA6, UL94, flame retardant (V-0)
- Damper blade seal made of plastic, TPU, microbacterial resistant
- Plastic bearings

Connection type

- Spigot with groove for lip seal, suitable for ducts according to
- EN 1506 or EN 13180

Technical data

- Minimum differential pressure: Up to 82 Pa (without circular silencer)

Maximum differential pressure

- Control component with dynamic transducer: 900 Pa
- Control component with static transducer: 600 Pa

Specification text attachment

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 24 V AC/DC
- Signal voltages 0 – 10 V DC
- Possible override controls with external switches using volt-free switches: CLOSED, OPEN, qvmin and qvmax
- Potentiometers with percentage scales to set the volume flow rates qvmin and qvmax
- 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. 4 – 100 % of the nominal volume flow rate
- From the outside well visible indicator light for signaling the various operating conditions

Electrical connections with screw terminals. Double terminals for looping the supply voltage, i.e. for the simple connection of voltage transmission to the next controller.

Sizing data

qv _____ [m³/h]

Δpst _____ [Pa]

3 Material

No entry: galvanised sheet steel

P1 Duct powder-coated, RAL 7001, silver grey

A2 Duct made of stainless steel

4 Duct connection

No entry required: Attachment for duct in accordance with EN 1506; with groove for optional seal

FL Flanges on both ends

5 Nominal size [mm]

100, 125, 160, 200, 250

6 Accessories

No entry: none

D2 Double lip seal both sides (only with insertion with groove)

G2 Matching flange to each flange (only with FL)

7 Attachment (control component)

XB0 Volume flow controller, dynamic, analogue interface

XM0 Volume flow controller, analogue interface and Modbus RTU, display

XM0-J6 Volume flow controller, Modbus RTU interface, display, RJ12 bush (for X-AIRCONTROL)
XS0 Volume flow controller, static, interface analogue and Modbus RTU, display

XS0-J6 Volume flow controller, static, Modbus RTU interface, display, RJ12 bush (for X-AIRCONTROL)

8 Operating mode

V Variable, setpoint value range (not for XM0-J6, XS0-J6)

F Constant value, a setpoint value (not for XM0-J6, XS0-J6)

M Modbus RTU interface (only selectable with XM0, XS0 attachment, mandatory for XM0-J6, XS0-J6)

9 signal voltage range (only with operating mode V, F)

0 0 – 10 V DC

2 2 – 10 V DC

10 Operating values for factory setting

Volume flow rates in [m³/h or l/s] see unit

$q_{v\text{const}}$ (in operating mode F)

$q_{v\text{min}} - q_{v\text{max}}$ (in operating mode V, M)

11 Unit

m³/h Volume flow rates in m³/h

l/s Volume flow rates in l/s

Order example: TVE/200/D2/XB0/V0/500–1200 m³/h

Acoustic cladding	Without
Material	Galvanised sheet steel
Flange	Without
Nominal size	200 mm
Accessories	Double lip seal both sides
Attachments (control component)	Volume flow controller, dynamic, analogue interface
Operating mode	Variable
Signal voltage range	0 – 10 V DC
Volume flow rate	$q_{v\text{min}} = 500 \text{ m}^3/\text{h}$ $q_{v\text{max}} = 1200 \text{ m}^3/\text{h}$



VAV terminal unit, variant TVE

Application

- VAV terminal unit for variable volume flow control
- Spigot

VAV terminal unit, variant TVE-D

Application

- Air terminal unit with acoustic cladding for variable volume flow control
- 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

VAV terminal unit, variant TVE-FL

Application

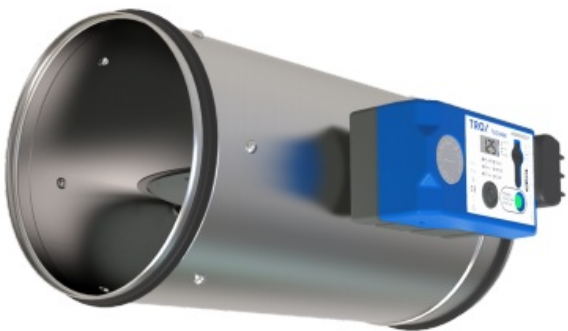
- VAV terminal unit for variable volume flow control
- With flanges on both ends to make detachable connections to the ducting
- Optional available with matching flanges

VAV terminal unit, variant TVE-D-FL

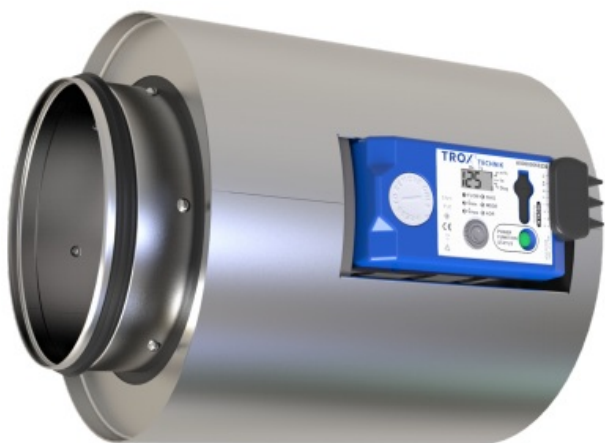
Application

- Air terminal unit with acoustic cladding for variable volume flow control
- With flanges on both ends to make detachable connections to the ducting
- Optional available with matching flanges
- 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

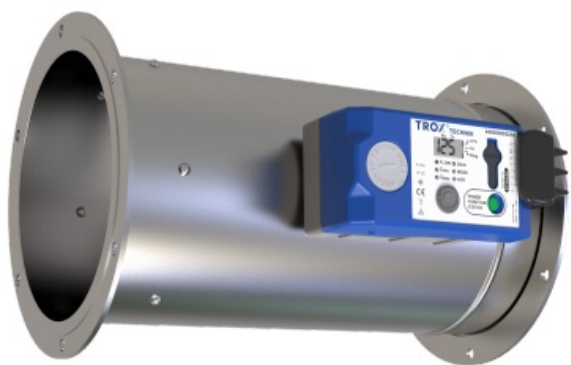
VAV terminal unit, variant TVE



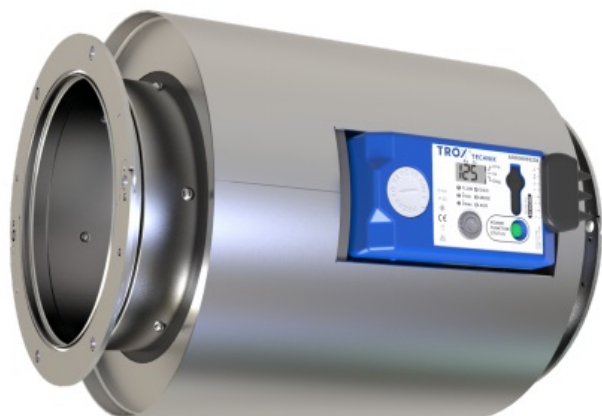
VAV terminal unit, variant TVE-D



VAV terminal unit, variant TVE-FL



VAV terminal unit, variant TVE-D-FL



Dimensions/weight for TVE

NG	L	ØD	kg
100	310	99	3,3
125	310	124	3,6
160	310	159	4,2
200	400	199	5,1
250	400	249	6,1

Dimensions/weight TVE-D

NG	L	L ₁	ØD	ØD ₁	kg
100	310	233	99	199	7,2
125	310	233	124	219	8,5
160	310	233	159	261	11
200	400	312	199	299	12,9
250	400	312	249	354	15,9

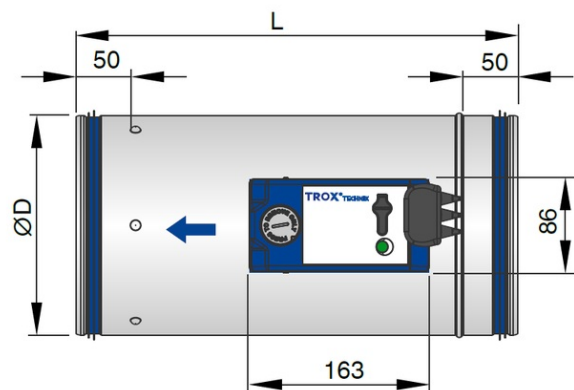
Dimensions/weight TVE-FL

NG	L	ØD	ØD ₁	ØD ₂	n	D	kg
100	298	99	132	152	4	4	3,9
125	298	124	157	177	4	4	4,2
160	298	159	192	212	6	4	5,3
200	388	199	233	253	6	4	6,5
250	388	249	283	303	6	4	7,8

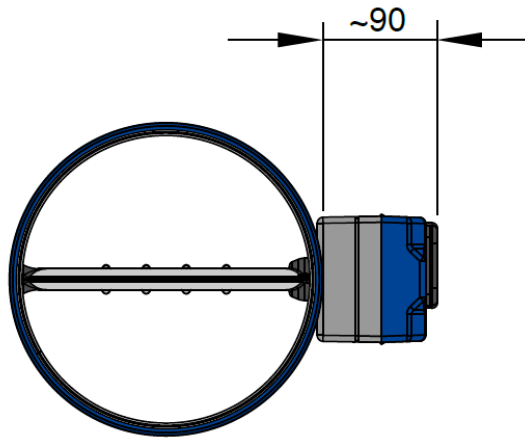
Dimensions/weight for TVE-D-FL

NG	L	L ₁	ØD	ØD ₁	ØD ₂	ØD ₃	n	D	kg
100	298	233	99	132	152	199	4	4	7,8
125	298	233	124	157	177	219	4	4	9,1
160	298	233	159	192	212	261	6	4	12,1
200	388	312	199	233	253	299	6	4	14,3
250	388	312	249	283	303	354	6	4	17,6

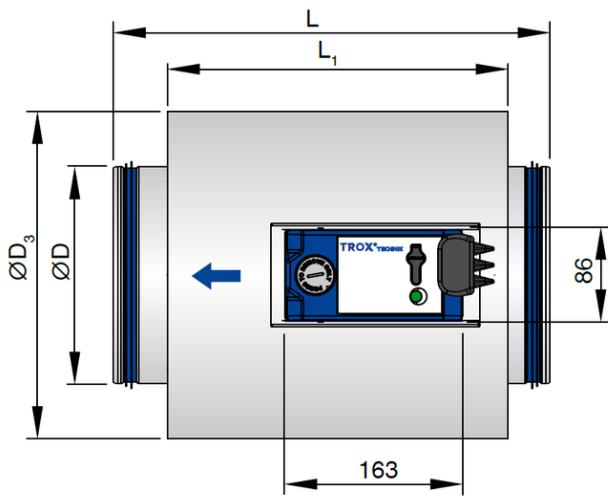
VAV terminal unit without acoustic cladding (TVE)



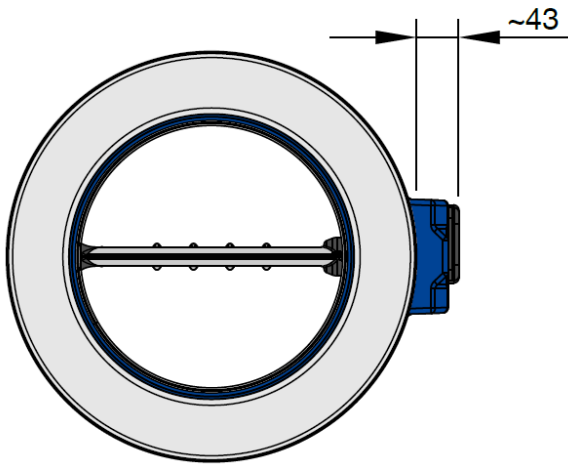
Note:
Length L depending on nominal size.
TVE-D



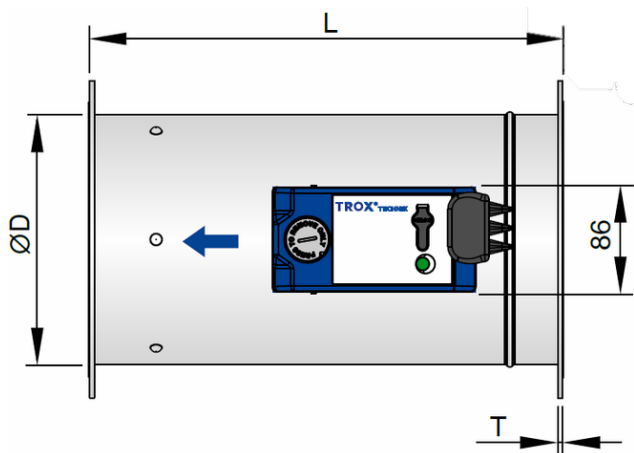
Note:
 Illustrated is control component type Easy, Compact. For individual dimensions see section space requirements for commissioning and maintenance.
 VAV terminal unit with acoustic cladding (TVE-D)



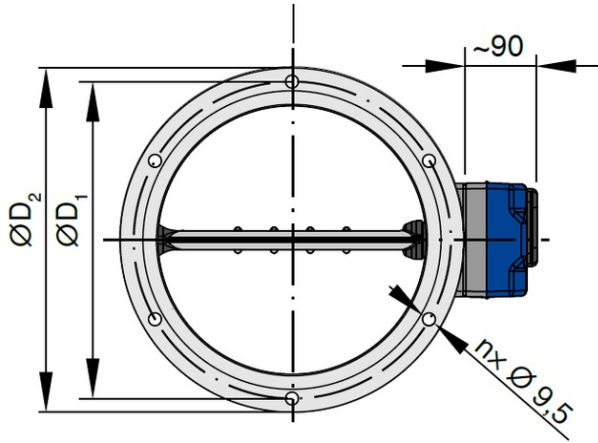
Note:
 Length L, L1 depending on nominal size.
 TVE-D



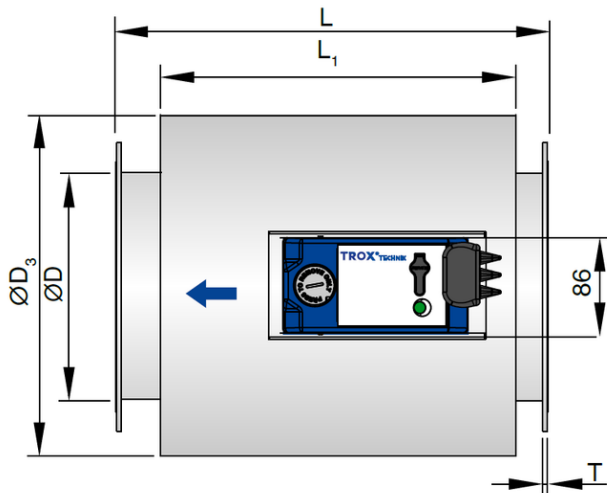
Note:
 Illustrated is control component type Easy, Compact. For individual dimensions see section space requirements for commissioning and maintenance.
 TVE-FL



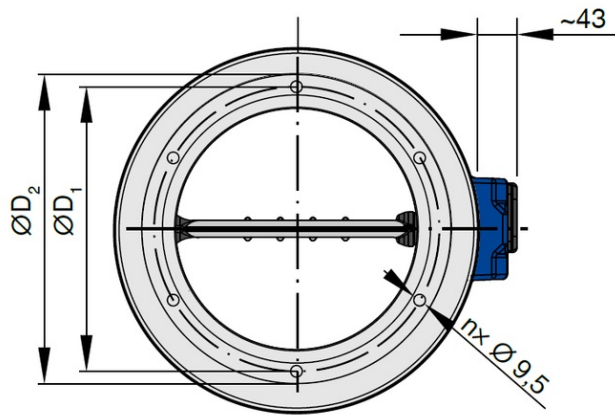
Note:
 Length L depending on nominal size.
 TVE-FL



Note:
 Illustrated is control component type Easy, Compact. For individual dimensions see section space requirements for commissioning and maintenance.
 Control unit with acoustic cladding and flange (TVE-D-FL)



Note:
 Length L , L_1 depending on nominal size.
 TVE-D-FL



Note:
 Illustrated is control component type Easy, Compact. For individual dimensions see section space requirements for commissioning and maintenance.

Space requirement, control component on one side

Attachments	①	②	③
Easy controller: Easy	250	200	300
Compact controller: XB0, XM0, XM0-J6, XS0, XS0-J6	250	200	300

Space required 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.

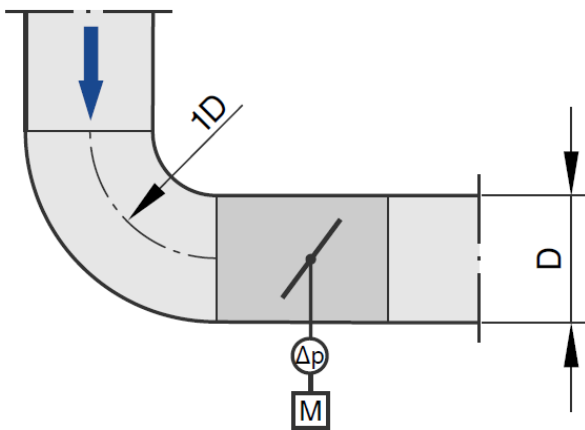
Installation and commissioning

- Any installation orientation
- TVE-D: For constructions with acoustic cladding, ducts on the room side should have cladding up to the acoustic cladding of the controller

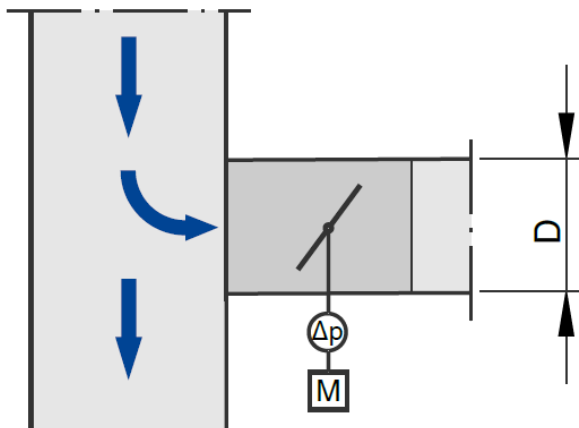
Upstream conditions

The effective pressure, which is decisive for the volume flow rate, is recorded and averaged on the control damper blade. Therefore, the volume flow rate accuracy Δq_v is independent of the upstream section. Duct connections, e.g. branches off the main duct, must comply with EN 1506 and EN 13180.

Bend



Junction



TVE, VARYCONTROL control components

Easy controller, dynamic					
Easy	qv	0 – 10 V	integrated	slow running integrated	①
Compact controller, dynamic					
XB0	qv	0 – 10 V or 2 – 10 V	integrated	slow running integrated	③
XM0	qv	Modbus-RTU-Schnittstelle	integrated	slow running integrated	①
XM0-J6	qv	Modbus-RTU-Schnittstelle mit RJ12 Steckbuchse (für X-AIRCONTROL)	integrated	slow running integrated	①
Compact controller, static					
XS0	qv	Modbus-RTU-Schnittstelle	integrated	slow running integrated	①
XS0-J6	qv	Modbus-RTU-Schnittstelle mit RJ12 Steckbuchse (für X-AIRCONTROL)	integrated	slow running integrated	①

qv Volume flow rate

① TROX, ③ TROX/Gruner

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- › ТРОХ Академия
- › Вашият партньор за контакт
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TROX В СОЦИАЛНАТА МРЕЖА