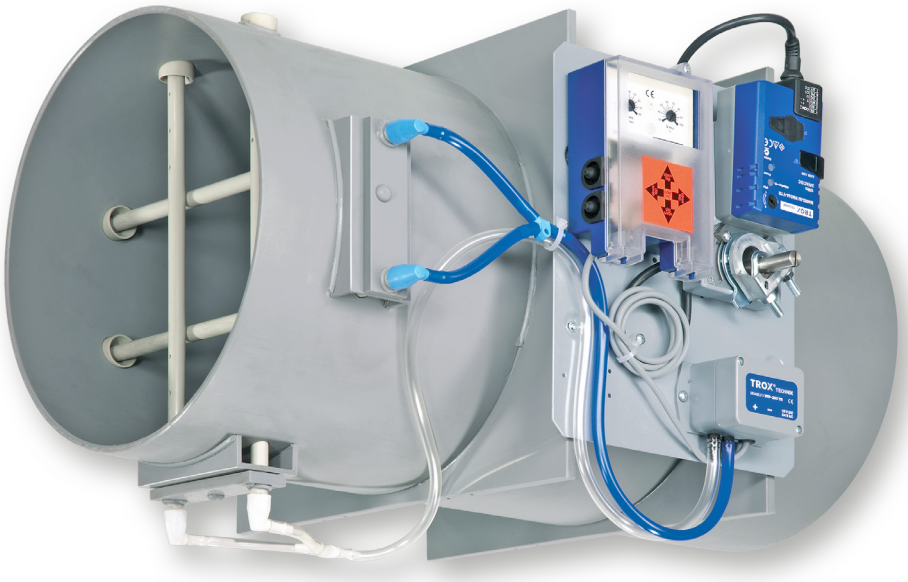
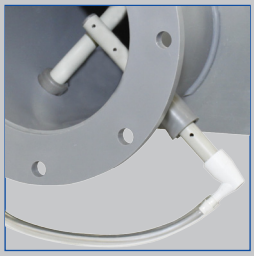
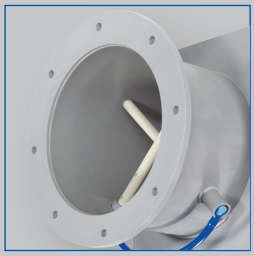
VAV terminal units
Type TVRK





Easy cleaning of sensor tubes



Variant with flange

Tested to VDI 6022

For contaminated air

Plastic circular VAV terminal units for aggressive extract air in variable air volume systems

- Casing and damper blade made of flame-resistant polypropylene
- Slide-out differential pressure sensor allows for easy cleaning
- Suitable for the control of volume flow rate, room pressure or duct pressure
- Electronic control components for different applications (Universal and LABCONTROL)
- Suitable for airflow velocities up to 13 m/s
- Closed blade air leakage to EN 1751, class 3
- Casing air leakage to EN 1751, class B

Optional equipment and accessories

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

Type		Page
TVRK	General information	TVRK – 2
	Function	TVRK – 3
	Technical data	TVRK – 4
	Quick sizing	TVRK – 5
	Specification text	TVRK – 6
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	Attachments	TVRK – 12
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Application

Application
- Circular VARYCONTROL VAV terminal units of Type TVRK, made of plastic, preferably for the extract air flow control in variable air volume systems
- Closed-loop volume flow control using an external power supply
- Suitable for contaminated air
- Shut-off by means of switching (equipment supplied by others)

Special characteristics
- Integral slide-out differential pressure sensor with 3 mm measuring holes (resistant to dust and pollution)
- 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

Nominal sizes
- 125, 160, 200, 250, 315, 400

Description

Variants
- TVRK: VAV terminal unit
- TVRK-FL: VAV terminal unit with flanges on both ends

Parts and characteristics
- Ready-to-commission unit which consists of mechanical parts and control components.
- Averaging differential pressure sensor for volume flow rate measurement; can be removed for cleaning
- Damper blade
- Factory-assembled control components complete with wiring and tubing
- Aerodynamic function testing on a special test rig prior to shipping of each unit
- Set-up data is given on a label or volume flow rate scale affixed to the unit
- High control accuracy (even with upstream bend R = 1D)

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

Accessories
- Matching flanges for both ends, including seals

Useful additions
- Plastic secondary silencer Type CAK for demanding acoustic requirements

Construction features
- Circular casing
- Spigot suitable for ducts according to DIN 8077
- Both spigots with same diameter
- Position of the damper blade indicated externally at shaft extension

Materials and surfaces
- Casing and damper blade made of flame-resistant polypropylene (PPs)
- Differential pressure sensor and plain bearings made of polypropylene (PP)
- Damper blade seal made of chloroprene rubber (CR)

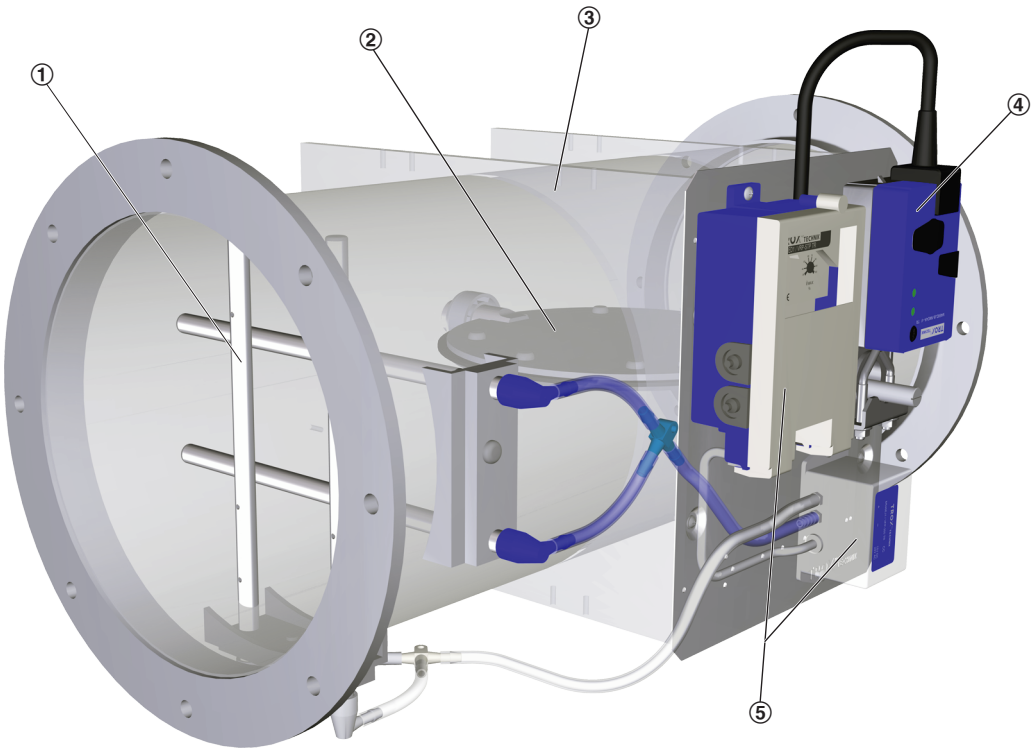
Standards and guidelines
- Hygiene conforms to VDI 6022
- Closed blade air leakage to EN 1751, class 3
- Meets the general requirements of DIN 1946, part 4, with regard to the acceptable closed blade air leakage
- Casing air leakage to EN 1751, class B

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)

Functional description

The VAV terminal unit is fitted with a differential pressure sensor for measuring the volume flow rate.
The control components (attachments) include a differential pressure transducer that transforms the differential pressure (effective pressure) into an electric signal, a controller, and an actuator; the control functions can be achieved with individual components (Universal or LABCONTROL).
For most applications, the setpoint value comes from an external setpoint adjuster.
The controller compares the actual value with the setpoint value and alters the control signal of the actuator if there is a difference between the two values.

Schematic illustration of the TVRK



① Differential pressure sensor
② Damper blade
③ Casing
④ Actuator
⑤ Control components, e.g. a Universal controller

Nominal sizes	125 – 400 mm
Volume flow rate range	25 – 1680 l/s or 90 – 6048 m³/h
Volume flow rate control range	Approx. 17 to 100 % of the nominal volume flow rate
Minimum differential pressure	5 – 90 Pa
Maximum differential pressure	1000 Pa
Operating temperature	10 – 50 °C

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 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. The table gives the minimum and maximum values for a VAV terminal unit. Some control components may only have a limited volume flow rate range. This applies in particular to control components with a static differential pressure transducer. For volume flow rate ranges for all control components refer to our Easy Product Finder design programme.

TVRK, Volume flow rate ranges and minimum differential pressures

Nominal size	①	②	③	④			
	$\dot{V}$		$\Delta p_{st\ min}$				$\Delta\dot{V}$
	l/s	m³/h	Pa	Pa	Pa	Pa	± %
125	**25**	**90**	5	5	5	5	9
	60	**216**	15	20	20	20	7
	105	**378**	45	50	55	60	6
	150	**540**	90	100	110	115	5
160	**40**	**144**	5	5	5	5	9
	80	**288**	10	10	10	15	8
	145	**522**	30	30	35	35	7
	250	**900**	80	90	95	100	5
200	**65**	**234**	5	5	5	5	9
	180	**648**	15	15	20	20	7
	310	**1116**	45	45	50	50	5
	405	**1458**	70	75	80	85	5
250	**95**	**342**	5	5	5	5	9
	270	**972**	10	15	15	15	7
	470	**1692**	30	35	35	40	5
	615	**2214**	50	55	60	65	5
315	**155**	**558**	5	5	5	5	9
	425	**1530**	5	10	10	10	7
	740	**2664**	5	25	25	30	6
	1030	**3708**	5	45	50	50	5
400	**255**	**918**	5	5	5	5	9
	715	**2574**	10	10	10	10	7
	1250	**4500**	25	25	25	30	6
	1680	**6048**	40	45	45	50	5

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

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.

TVRK, Sound pressure level at differential pressure 150 Pa

Nominal size	$\dot{V}$	$\dot{V}$	Air-regenerated noise				Case-radiated noise
			①	②	③	④	①
			L_{PA}	L_{PA1}			L_{PA2}
	l/s	m³/h	dB(A)				
125	25	90	34	19	<15	<15	17
	60	216	44	30	25	20	27
	105	378	51	38	32	28	32
	150	540	55	41	35	31	37
160	40	144	36	23	18	<15	21
	80	288	42	31	27	23	28
	145	522	49	37	34	30	33
	250	900	53	41	38	34	40
200	65	234	44	33	28	25	33
	180	648	44	33	28	25	34
	310	1116	43	33	29	26	35
	405	1458	41	33	30	29	35
250	95	342	39	29	23	19	28
	270	972	45	35	31	27	35
	470	1692	44	35	30	27	37
	615	2214	44	35	31	29	39
315	155	558	39	29	24	21	29
	425	1530	46	37	33	29	40
	740	2664	50	41	37	33	45
	1030	3708	53	44	40	37	50
400	255	918	37	29	25	22	30
	715	2574	44	37	33	30	40
	1250	4500	49	42	38	36	46
	1680	6048	51	44	40	38	50

① TVRK
② TVRK with secondary silencer CAK, insulation thickness 50 mm, length 500 mm
③ TVRK with secondary silencer CAK, insulation thickness 50 mm, length 1000 mm
④ TVRK with secondary silencer CAK, insulation thickness 50 mm, length 1500 mm

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

Circular VAV terminal units made of PPs plastic, for variable and constant air volume systems, suitable for extract air, available in 6 nominal sizes. High control accuracy (even with upstream bend R = 1D).
Ready-to-commission unit which consists of the mechanical parts and the electronic control components. Each unit contains an averaging differential pressure sensor for volume flow rate measurement and a damper blade. Factory-assembled control components complete with wiring and tubing.
Differential pressure sensor with 3 mm measuring holes (resistant to dust and pollution)
Spigot, 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 3.
Casing air leakage to EN 1751, class B.
Hygiene conforms to VDI 6022

Special characteristics
- Integral slide-out differential pressure sensor with 3 mm measuring holes (resistant to dust and pollution)
- 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

Materials and surfaces
- Casing and damper blade made of flame-resistant polypropylene (PPs)
- Differential pressure sensor and plain bearings made of polypropylene (PP)
- Damper blade seal made of chloroprene rubber (CR)

Technical data
- Nominal sizes: 125 to 400 mm
- Volume flow rate range: 25 to 1680 l/s or 90 to 6048 m^3/h
- Volume flow rate control range: approx. 17 – 100 % of the nominal volume flow rate
- Minimum differential pressure: 5 – 90 Pa
- Maximum differential pressure: 1000 Pa

Attachments
Variable volume flow control with electronic Universal controller to switch an external control signal and an actual value signal for integration into the central BMS.
- Supply voltage 24 V AC/DC
- Signal voltages 0 – 10 V DC or 2 – 10 V DC
- Possible override controls with external switches using volt-free contacts: CLOSED, OPEN, $\dot{V}_{min}$ and $\dot{V}_{max}$
- Volume flow rate control range: approx. 17 – 100 % of the nominal volume flow rate

Sizing data
- $\dot{V}$ _____ _____ [m^3/h]
- Δp_{st} _____ _____ [Pa]

Air-regenerated noise
- L_{PA} _____ _____ [dB(A)]

Case-radiated noise
- L_{PA} _____ _____ [dB(A)]

TVRK

TVRK – FL / 160 / GK / BB3 / E 2 / 200 – 900 / NO

1 2 3 4 5 6 7 8 9

1 Type
TVRK VAV terminal unit, plastic

2 Flange
No entry: none
FL Flanges on both ends

3 Nominal size [mm]
125
160
200
250
315
400

4 Accessories
No entry: none
GK Matching flanges for both ends

5 Attachments (control component)
Example
BB3 Universal controller with static differential pressure transducer

6 Operating mode
E Single
M Master
S Slave
F Constant value
Z Differential pressure control – supply air
A Differential pressure control – extract air

7 Signal voltage range
For the actual and setpoint value signals
0 0 – 10 V DC
2 2 – 10 V DC

8 Volume flow rates [m^3/h or l/s], differential pressure [Pa]
$\dot{V}_{min}$ – $\dot{V}_{max}$ for factory setting
Δp_{min} for factory setting (operating modes A, Z)

9 Damper blade position
Only with spring return actuators
NO Power off to OPEN
NC Power off to CLOSE

Order example: TVRK/160/BB3/E2/200–900 m^3/h

Nominal size	160 mm
Attachment	Universal controller with static differential pressure transducer
Operating mode	Single
Signal voltage range	2 – 10 V DC
Volume flow rate	200 – 900 m^3/h

TVRK with EASYLAB for room control and single operation

TVRK – FL / 160 / GK / ELAB / RE / ULZ / LAB / ...
1 2 3 4 5 6 8 9 10

TVRK – FL / 160 / GK / ELAB / EC – E0 / ULZ / ...
1 2 3 4 5 6 7 8 10

1 Type
TVRK VAV terminal unit, plastic

2 Flange
No entry: none
FL Flanges on both ends

3 Nominal size [mm]
125
160
200
250
315
400

4 Accessories
No entry: none
GK Matching flanges for both ends

5 Attachment (control component)
ELAB EASYLAB controller TCU3 with fast-running actuator

6 Equipment function
Room control
RE Extract air control (Room Exhaust)
PC Differential pressure control

Single operation
EC Extract air controller

7 External volume flow rate setting
Only for single operation
E0 Voltage signal 0 – 10 V DC
E2 Voltage signal 2 – 10 V DC
2P On-site switch contacts for 2 switching steps
3P On-site switch contacts for 3 switching steps
F Volume flow rate constant value, without signalling

8 Module expansions
Option 1: Power supply
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: Communication 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
I EM-IP for BACnet/IP, Modbus/IP and webserver
R EM-IP with real time clock

Option 3: Automatic zero point correction
No entry: none
Z EM-AUTOZERO Solenoid valve for automatic zero point correction

9 Additional functions
Only for room control (equipment function)
Raum management function has been deactivated
LAB Extract air led system (laboratories)
CLR Supply air led system (clean rooms)
Raum management function is active
LAB-RMF Extract air led system (LAB)
CLR-RMF Supply air led system (CLR)

10 Operating values [m^3/h or l/s, Pa
For equipment function 'room control' with additional function RMF
Total room extract air/supply air
$\dot{V}_1$: Standard mode
$\dot{V}_2$: Reduced operation
$\dot{V}_3$: Increased operation
$\dot{V}_4$: Constant room supply air
$\dot{V}_5$: Constant room extract air
$\dot{V}_6$: Supply air/extract air difference
$\Delta p_{setpoint}$: Setpoint pressure (only with differential pressure control)
For equipment function 'single operation'
E0, E2: $\dot{V}_{min}$ / $\dot{V}_{max}$
2P: $\dot{V}_1$ / $\dot{V}_2$
3P: $\dot{V}_1$ / $\dot{V}_2$ / $\dot{V}_3$
F: $\dot{V}_1$

Useful additions
Room control panel (only for room control)
BE-LCD-01 40-character display

Order example: TVRK/160/BB3/E2/200–900 m³/h

Nominal size	160 mm
Attachment	Universal controller with static differential pressure transducer
Operating mode	Single
Signal voltage range	2 – 10 V DC
Volume flow rate	200 – 900 m³/h

TVRK with EASYLAB for fume cupboard control

TVRK – FL / 160 / GK / ELAB / FH – VS / ULZS / 200 – 900

1 2 3 4 5 6 7 8

1 Type
TVRK VAV terminal unit, plastic

2 Flange
No entry: none
FL Flanges on both ends

3 Nominal size [mm]
125
160
200
250
315
400

4 Accessories
No entry: none
GK Matching flanges for both ends

5 Attachments (control component)
ELAB EASYLAB controller TCU3 with fast-running actuator

6 Equipment function
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: Communication 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
I EM-IP for BACnet/IP, Modbus/IP and webserver
R EM-IP with real time clock

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)

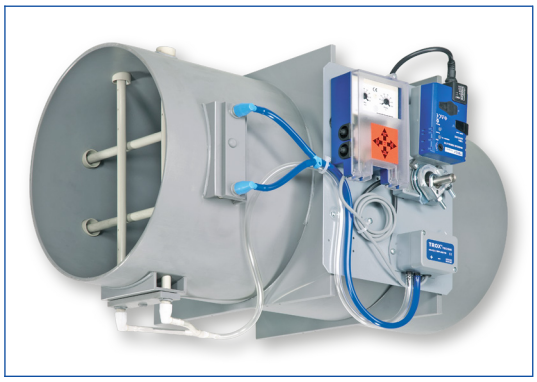
8 Operating values [m³/h or l/s]
Depending on the equipment function
VS: $\dot{V}_{min} – \dot{V}_{max}$
DS: $\dot{V}_{min} – \dot{V}_{max}$
DV: $\dot{V}_{min} – \dot{V}_{max}$
2P: $\dot{V}_1 / \dot{V}_2$
3P: $\dot{V}_1 / \dot{V}_2 / \dot{V}_3$
F: $\dot{V}_1$

Useful additions
Control panel for fume cupboard controller, for displaying the functions of the control system according to EN 14175
BE-SEG-** OLED display
BE-LCD-01 40-character display

Order example: TVRK/200/ELAB/FH-2P/TZ/600/1200

Nominal size	200 mm
Attachment	EASYLAB controller TCU3 with fast-running actuator
Equipment function	Two switching steps
Expansion modules	EM-TRF for 230 V AC, EM-AUTOZERO Solenoid valve for automatic zero point correction
Operating values	600 – 1200 m^3/h

VAV terminal unit, variant TVRK



VVS-Regelgerät Variante TVRK-FL

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

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

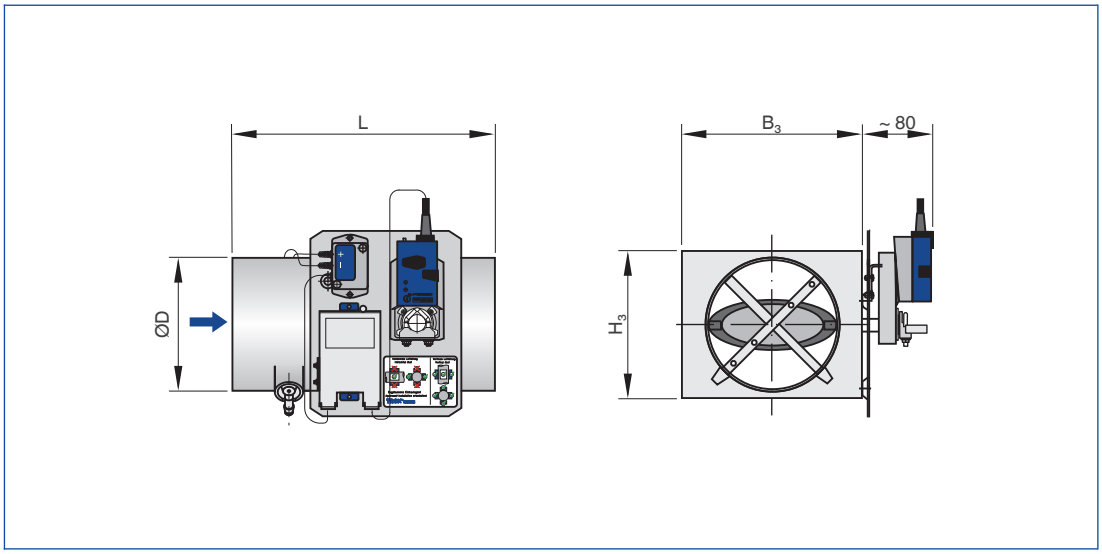
TVRK, VARYCONTROL control components

Order code detail	Controlled variable	Controller	Differential pressure transducer	Actuator
Compact controller, static				
SA0	Volume flow rate	Compact controller with SLC interface Sauter	Static, integral	Integral
SC0				Fast-running actuator, integral
Universal controller, static				
BP3	Volume flow rate	Universal controller with MP bus interface TROX/Belimo	Static	Actuator
BPB				Spring return actuator
BPG				Fast-running actuator
BB3		Universal controller TROX/Belimo		Actuator
BBB				Spring return actuator
XD1		Universal controller TROX/Gruner	Static, integral	Actuator
XD3				Spring return actuator
BR3	Differential pressure	Universal controller with MP bus interface TROX/Belimo	Static, integral 100 Pa	Actuator
BRB				Spring return actuator
BRG				Fast-running actuator
BS3			Static, integral 600 Pa	Actuator
BSB				Spring return actuator
BSG				Fast-running actuator
BG3		Differential pressure controller TROX/Belimo	Static, integral 100 Pa	Actuator
BGB				Spring return actuator
BH3			Static, integral 600 Pa	Actuator
BHB				Spring return actuator
XE1		Differential pressure controller TROX/Gruner	Static, integral 100 Pa	Actuator
XE3				Spring return actuator
XF1			Static, integral 600 Pa	Actuator
XF3				Spring return actuator

TVRK, LABCONTROL control components

Order code detail	Controlled variable	Controller	Differential pressure transducer	Actuator
EASYLAB				
ELAB	Room supply air Room extract air Room pressure Fume cupboard Single controller	EASYLAB controller TCU3	Static, integral	Fast-running actuator

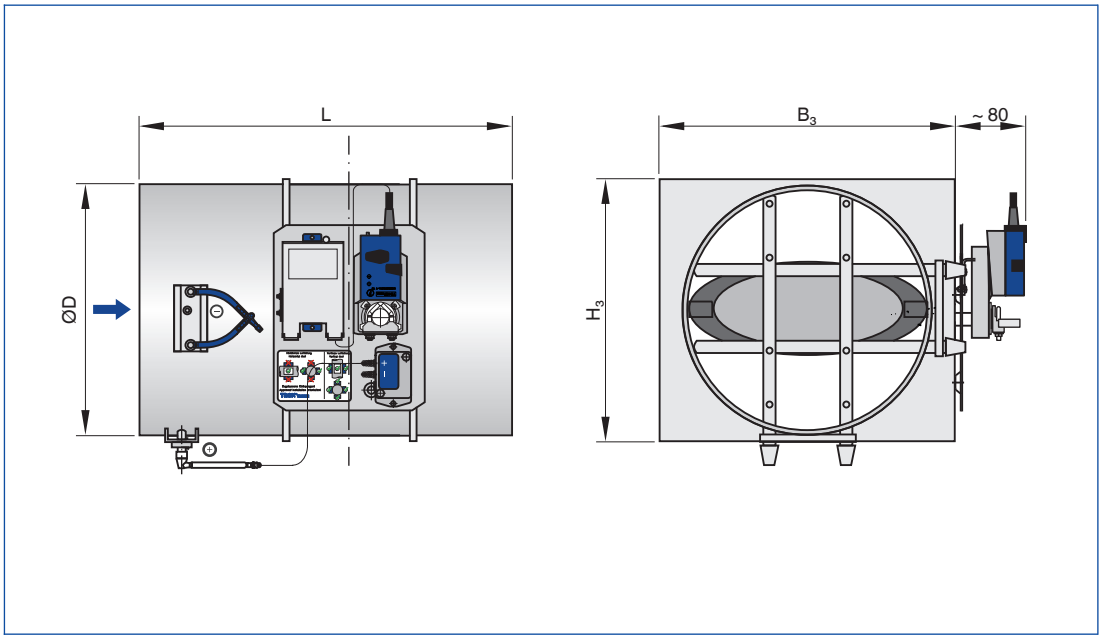
TVRK,
Nominal sizes 125 – 200



TVRK

Nominal size	ØD	L	B_3	H_3	m
	mm	mm	mm	mm	kg
125	125	394	195	145	4.5
160	160	394	230	180	4.8
200	200	394	270	220	5.2

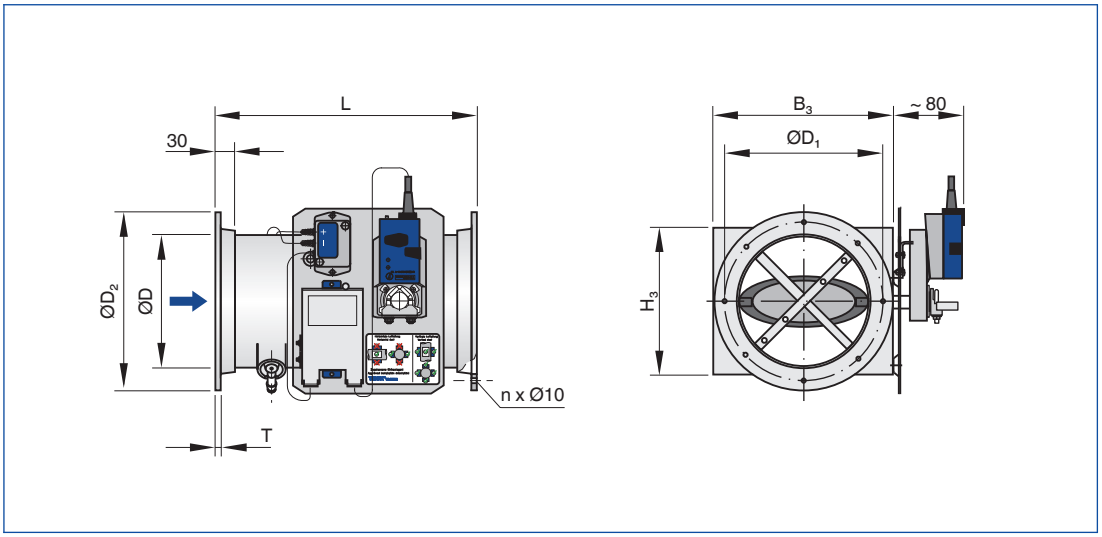
TVRK,
Nominal sizes 250 – 400



TVRK

Nominal size	ØD	L	B_3	H_3	m
	mm	mm	mm	mm	kg
250	250	394	320	270	6.4
315	315	594	385	335	8.5
400	400	594	470	420	10.7

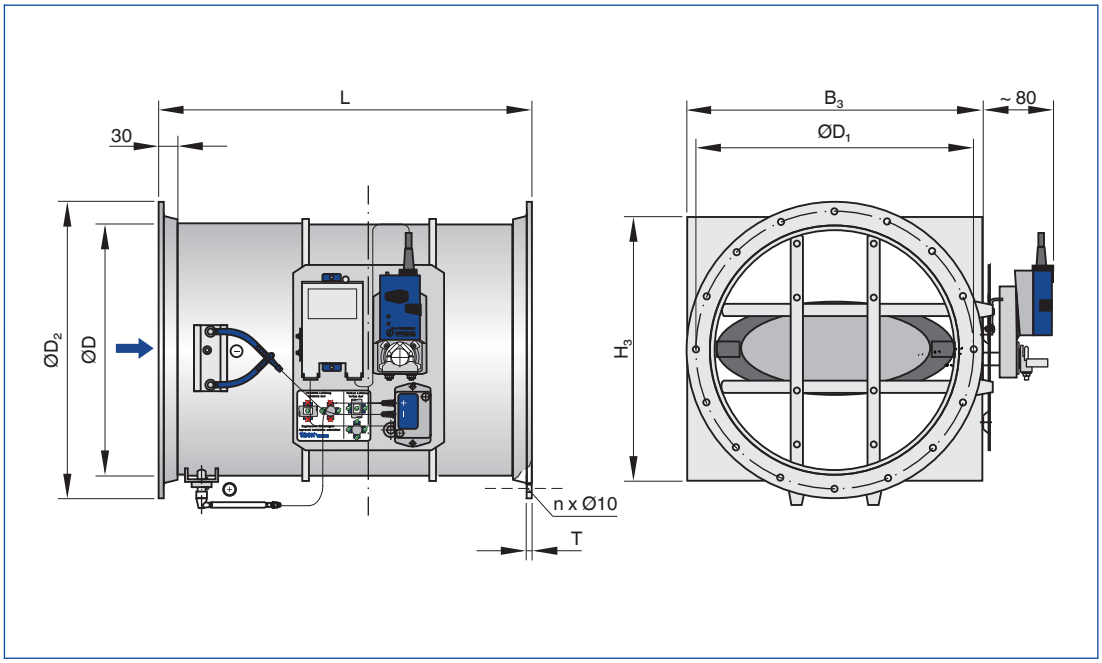
TVRK-FL, nominal sizes 125 – 200



TVRK-FL

Nominal size	ØD	L	B_3	H_3	$ØD_1$	$ØD_2$	n	T	m
	mm	mm	mm	mm	mm	mm		mm	kg
125	125	400	195	145	165	185	8	8	4.7
160	160	400	230	180	200	230	8	8	5.2
200	200	400	270	270	240	270	8	8	5.7

TVRK-FL, nominal sizes 250 – 400



TVRK-FL

Nominal size	ØD	L	B_3	H_3	$ØD_1$	$ØD_2$	n	T	m
	mm	mm	mm	mm	mm	mm		mm	kg
250	250	400	320	270	290	320	12	8	7.0
315	315	600	385	335	350	395	12	10	9.4
400	400	600	470	420	445	475	16	10	11.9

Installation and commissioning

– Installation orientation must be as shown on the sticker

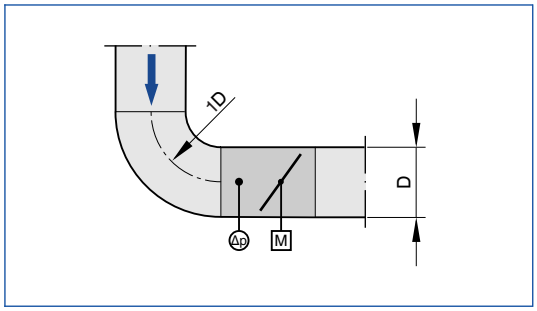
Upstream conditions

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.

Space required for commissioning and maintenance

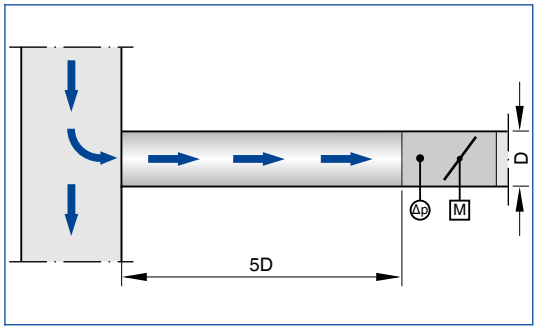
Sufficient space must be kept clear near any attachments to allow for commissioning and maintenance. It may be necessary to provide sufficiently sized inspection access openings.

Bend



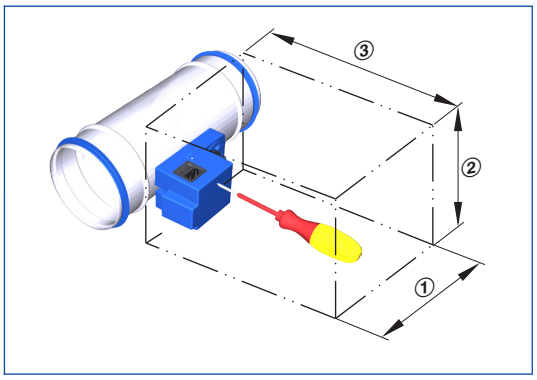
A bend with a centre line curvature radius of at least 1D – without an additional straight duct section upstream of the VAV terminal unit – has only a negligible effect on the volume flow rate accuracy.

Junction



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 5D upstream. Shorter upstream sections require a perforated plate in the branch and before the VAV terminal unit. If there is no straight upstream section at all, the control will not be stable, even with a perforated plate.

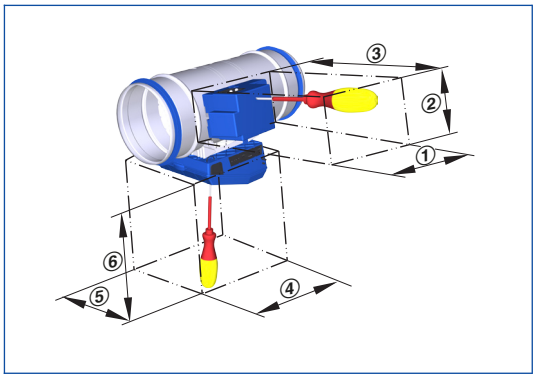
Access to attachments, attached on one side



Space requirement, control component on one side

Attachments	①	②	③
	mm		
VARYCONTROL			
Universal controller	300	320	300

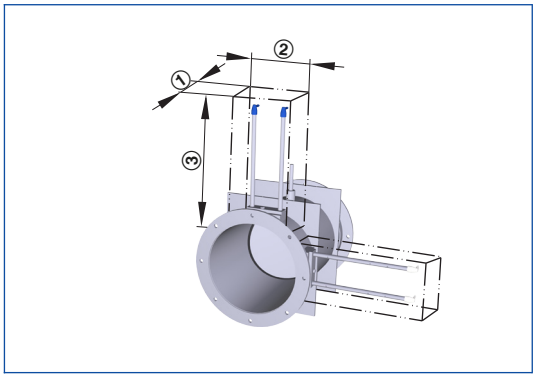
Zugänglichkeit der Anbauteile, zweiseitig angebaut



Space requirement, control components on two sides

Attachments	①	②	③	④	⑤	⑥
	mm					
LABCONTROL						
EASYLAB	300	250	300	350	350	400

Access to sensor tubes for cleaning



Space required for cleaning the sensor tubes

Nominal size	①	②	③
	mm		
125 – 200	100	100	D
250 – 400	100	160	D

D: Casing diameter

Principal dimensions

ØD [mm]
VAV terminal units made of stainless steel: Outside diameter of the spigot
VAV terminal units made of plastic: Inside diameter of the connecting 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 (e.g. Compact controller)

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

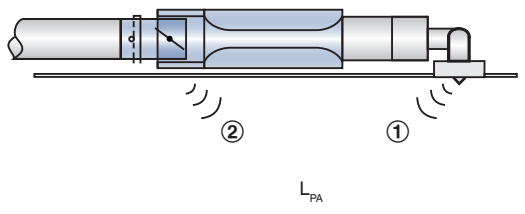
L_{PA1} [dB(A)]
A-weighted sound pressure level of air-regenerated noise of the VAV terminal unit with secondary silencer, system attenuation taken into account

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.
- Reference value for calculating percentages (e.g. $\dot{V}_{max}$)
- Upper limit of the setting range and maximum volume flow rate setpoint value for the VAV terminal unit

$\dot{V}_{min\ unit}$ [m³/h] and [l/s]
Technically possible minimum volume flow rate
- The value depends on product type, nominal size and control component (attachment)
- Values are stored in the Easy Product Finder design software
- Lower limit of the setting range and minimum volume flow rate setpoint value for the VAV terminal unit
- Depending on the controller, setpoint values below $\dot{V}_{min\ unit}$ (if $\dot{V}_{min}$ equals zero) may result in unstable control or shut-off

$\dot{V}_{max}$ [m³/h] and [l/s]
Upper limit of the operating range for the VAV terminal unit that can be set by customers
- $\dot{V}_{max}$ can only be smaller than or equal to $\dot{V}_{nom}$
- In case of analog signalling to volume flow controllers (which are typically used), the set maximum value ($\dot{V}_{max}$) is allocated to the setpoint signal maximum (10 V) (see characteristic)

$\dot{V}_{min}$ [m³/h] and [l/s]
Lower limit of the operating range for the VAV terminal unit that can be set by customers
- $\dot{V}_{min}$ should be smaller than or equal to $\dot{V}_{max}$
- Do not set $\dot{V}_{min}$ smaller than $\dot{V}_{min\ unit}$, otherwise the control may become unstable or the damper blade may close
- $\dot{V}_{min}$ may equal zero
- In case of analog signalling to volume flow controllers (which are typically used), the set minimum value ($\dot{V}_{min}$) is allocated to the setpoint signal minimum (0 or 2 V) (see characteristic)

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

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

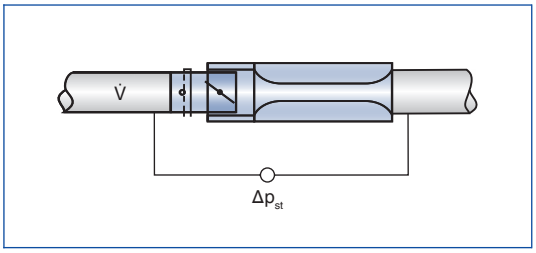
$\Delta\dot{V}_{warm}$ [± %]
Volume flow rate tolerance for the warm air flow of dual duct terminal units

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 VAV terminal unit when the damper blade is open, caused by flow resistance (sensor tubes, damper mechanism)
- If the pressure on the VAV terminal unit 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 terminal units, 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