



TROX UNIVERSAL
controller,
TROX LABCONTROL
controller



Universal controller
(VARYCONTROL)



Variant with flange



Easy cleaning of sensor
tubes



Conforms to VDI 6022

VAV Terminal units Type TVRK



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 effective 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 (2559 FPM)
- Closed blade air leakage to EN 1751, class 3
- Casing air leakage to EN 1751, class C

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

TROX® TECHNIK

The art of handling air

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TROX Social:



VAV UNITS

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General information

Application

Circular VAV terminal units for use in ventilation and air conditioning systems
 VAV terminal units made from plastic, suitable for contaminated air
 For controlling, restricting or shutting off airflows, preferably extract air flows
 Closed-loop volume flow control using an external power supply
 For variable or constant volume flow systems
 Shut-off by means of switching (by others)
 Can also be used for duct or room pressure control with suitable control components

Special features

Slide-out integral effective pressure sensor with 3 mm measuring holes (resistant to contamination)
 Factory set-up or programming and aerodynamic function testing
 Parameters can also later be set on the control component; an additional adjustment device may be necessary

Nominal sizes

125, 160, 200, 250, 315, 400 mm
 5, 6 ½, 8, 10, 12 ½, 16 in

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 effective pressure sensor for volume flow rate measurement; can be removed for cleaning
 Damper blade
 Factory mounted control components complete with wiring and tubing
 Aerodynamic functional testing on a special test rig before shipping of each unit
 Set-up data is given on a label affixed to the unit
 High control accuracy (even with upstream bend R = 1D)

Attachments

Universal controller: controller, effective pressure transducer, and actuators for special applications

- LABCONTROL: control components for air managementsystems

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 the same diameter
- Position of the damper blade indicated externally at shaft extension

Material and surfaces

- Casing and damper blade made of flame-resistant polypropylene (PPs)
- Effective pressure sensor and plain bearings made of polypropylene (PP)
- Damper blade seal made of chloroprene rubber (CR)
- Stainless steel shaft, material no. 14104

Standards and guidelines

- Fulfills the hygiene requirements of

EN 16798, Part 3

- VDI 6022, Sheet 1
- DIN 1946, Part 4

For other applicable standards and guidelines refer to the hygiene certificate

Casing leakage

- EN 1751, Class C
- Closed blade air leakage
- EN 1751, Class 3
- Meets the general 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

Zero point correction of the static effective pressure transducer should be carried out once per year (recommendation)

Function

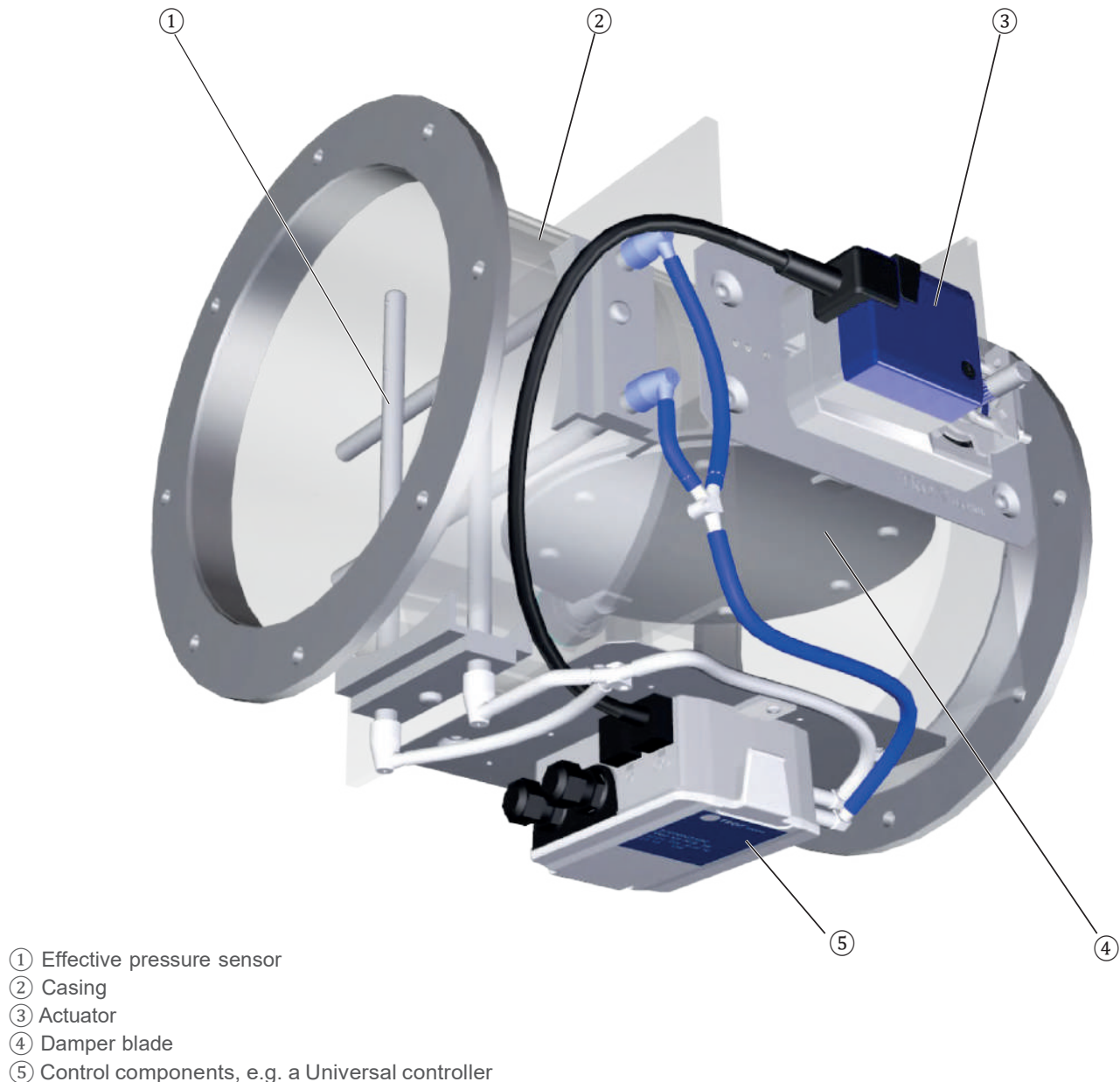
The VAV terminal unit is fitted with an effective pressure sensor for measuring the volume flow rate.

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



VAV UNITS

Technical data and Quick sizing

Technical data

Quick sizing

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". Precise results and spectral data for all control components can be calculated 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. Sufficient static differential pressure ($\Delta p_{stat,min}$) must be ensured for all operating conditions and for all controllers. 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

Control component for static pressure measurements

Attachment: XD0, XD4, BP3, BPG, BPB, BB3, BBB, BUSN, BUSNF, BUSS, TUN, TUNF, TUS, TUSD, ELAB

Nom. Size		qv [l/s]	qv [m³/h]	qv [CFM]	$\Delta p_{statmin}$ [Pa]				$\Delta p_{statmin}$ [in w.g.]				Δq_v [±%]
[mm]	[in]				①	②	③	④	①	②	③	④	
125	5	20	70	41	2	2	2	2	0,01	0,01	0,01	0,01	10
125	5	59	213	125	10	12	13	15	0,04	0,05	0,05	0,06	7
125	5	99	356	210	28	32	36	40	0,11	0,13	0,14	0,16	6
125	5	138	499	294	54	62	70	77	0,22	0,25	0,28	0,31	6
160	6 ½	34	122	72	2	2	2	2	0,01	0,01	0,01	0,01	10
160	6 ½	104	373	220	12	13	14	15	0,05	0,05	0,06	0,06	7
160	6 ½	174	625	368	32	35	38	42	0,13	0,14	0,15	0,17	6
160	6 ½	243	876	516	62	68	75	81	0,25	0,27	0,30	0,33	5
200	8	55	196	115	2	2	2	2	0,01	0,01	0,01	0,01	10
200	8	167	601	354	11	12	12	13	0,04	0,05	0,05	0,05	7
200	8	279	1005	592	29	31	34	36	0,12	0,12	0,14	0,14	6
200	8	391	1410	830	56	61	66	71	0,22	0,24	0,26	0,29	5
250	10	85	306	180	1	1	2	2	0,00	0,00	0,01	0,01	10
250	10	261	939	553	9	10	10	11	0,04	0,04	0,04	0,04	7
250	10	437	1572	925	24	26	28	30	0,10	0,10	0,11	0,12	6
250	10	612	2205	1298	47	51	55	59	0,19	0,20	0,22	0,24	5
315	12 ½	139	500	294	1	1	1	1	0,00	0,00	0,00	0,00	10
315	12 ½	426	1533	902	6	6	7	8	0,02	0,02	0,03	0,03	7
315	12 ½	713	2565	1510	16	17	19	21	0,06	0,07	0,08	0,08	6
315	12 ½	999	3598	2118	30	33	37	40	0,12	0,13	0,15	0,16	5
400	16	231	830	489	1	1	1	1	0,00	0,00	0,00	0,00	10
400	16	707	2546	1499	4	5	5	5	0,02	0,02	0,02	0,02	7
400	16	1184	4262	2509	11	12	13	14	0,04	0,05	0,05	0,06	6
400	16	1660	5978	3519	21	24	26	28	0,08	0,10	0,10	0,11	5

① Basic unit

② Basic unit with circular silencer CAK, insulation thickness 50 mm (2 in), length 500 mm (20 in)

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Quick Sizing

- ③ Basic unit with circular silencer CAK, insulation thickness 50 mm (2 in), length 1000 mm (40 in)
- ④ Basic unit with circular silencer CAK, insulation thickness 50 mm (2 in), length 1500 mm (60 in)

Quick sizing table for sound pressure levels

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 or acoustic cladding is required. For more information on the acoustic data, see basic information and nomenclature.

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

Controller including silencer
(total flow rate range of type)

Nom. Size		qv [l/s]	qv [m³/h]	qv [CFM]	150 Pa (0,60 in w.g.)				500 Pa (2,01 in w.g.)			
[mm]	[in]				①	②	③	④	①	②	③	④
125	5	20	70	41	35	20	< 15	< 15	41	24	18	< 15
125	5	59	213	125	46	32	27	22	52	37	31	26
125	5	99	356	210	51	38	33	29	57	43	37	32
125	5	138	499	294	54	42	37	33	60	47	41	37
160	6 ½	34	122	72	36	23	18	15	42	27	22	17
160	6 ½	104	373	220	47	35	30	27	53	40	34	29
160	6 ½	174	625	368	51	39	35	31	57	44	39	34
160	6 ½	243	876	516	53	41	37	34	58	47	41	37
200	8	55	196	115	41	28	23	19	51	40	35	30
200	8	167	601	354	44	32	27	23	55	43	38	34
200	8	279	1005	592	44	32	27	24	55	43	38	34
200	8	391	1410	830	44	32	29	28	55	43	38	34
250	10	85	306	180	41	29	23	18	52	40	34	29
250	10	261	939	553	44	33	28	24	55	44	39	34
250	10	437	1572	925	44	35	30	26	55	45	40	36
250	10	612	2205	1298	44	36	32	29	55	45	41	37
315	12 ½	139	500	294	43	33	28	24	49	38	33	29
315	12 ½	426	1533	902	47	39	34	31	53	44	40	36
315	12 ½	713	2565	1510	50	42	37	34	56	47	43	40
315	12 ½	999	3598	2118	51	43	39	36	57	49	45	42
400	16	231	830	489	40	32	28	25	46	39	35	31
400	16	707	2546	1499	45	38	35	32	52	45	41	38
400	16	1184	4262	2509	48	41	38	35	54	48	44	41
400	16	1660	5978	3519	49	43	40	37	56	49	46	43

Air-regenerated noise L_{PA} [dB] at static differential pressure Δ_{pst} 150 or 500 Pa (0,60 or 2,01 in w.g.)

- ① Basic unit
- ② Basic unit with circular silencer CAK, insulation thickness 50 mm (2 in), length 500 mm (20 in)
- ③ Basic unit with circular silencer CAK, insulation thickness 50 mm (2 in), length 1000 mm (40 in)
- ④ Basic unit with circular silencer CAK, insulation thickness 50 mm (2 in), length 1500 mm (60 in)

n.a.: The specified static differential pressure Δ_{pst} is lower than the minimum differential pressure Δ_{pst min}.

VAV UNITS

Quick Sizing

Quick sizing table for case-radiated noise L_{PA}

Nom. Size		qv [l/s]	qv [m³/h]	qv [CFM]	150 Pa (0,60 in w.g.)	500 Pa (2,01 in w.g.)
[mm]	[in]					
125	5	20	70	41	18	30
125	5	59	213	125	26	38
125	5	99	356	210	29	41
125	5	138	499	294	32	44
160	6 ½	34	122	72	19	30
160	6 ½	104	373	220	29	40
160	6 ½	174	625	368	34	44
160	6 ½	243	876	516	37	47
200	8	55	196	115	30	41
200	8	167	601	354	33	45
200	8	279	1005	592	35	46
200	8	391	1410	830	36	47
250	10	85	306	180	28	40
250	10	261	939	553	33	45
250	10	437	1572	925	36	48
250	10	612	2205	1298	37	49
315	12 ½	139	500	294	31	40
315	12 ½	426	1533	902	39	48
315	12 ½	713	2565	1510	43	51
315	12 ½	999	3598	2118	45	54
400	16	231	830	489	28	36
400	16	707	2546	1499	38	46
400	16	1184	4262	2509	42	51
400	16	1660	5978	3519	45	54

Case-radiated noise L_{PA} [dB] at static differential pressure Δ_{pst} 150 or 500 Pa (0,60 in w.g. or 2,01 in w.g.)

n.a.: The specified static differential pressure Δ_{pst} is lower than the minimum differential pressure $\Delta_{pst min}$.

Note:

Information on case-radiated noise for combinations of basic unit and secondary silencer can be found in the Easy Product Finder design program.

Specification text

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

Specification text

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 effective pressure sensor for volume flow rate measurement, and a damper blade. Factory mounted control components complete with wiring and tubing.

Effective pressure sensor with 3 mm measuring holes, hence

resistant to contamination.

Position of the damper blade indicated externally at shaft extension. The damper blade is factory set to open position, which allows a ventilation airflow even without control; this does not apply to variants with defined safe position NC (normally closed).

Closed blade air leakage to EN 1751, class 3.

Casing air leakage to EN 1751, class C.

Meets the hygiene requirements of EN 16798, Part 3, of VDI 6022, Sheet 1, and of DIN 1946, Part 4.

Special features

Slide-out integral effective pressure sensor with 3 mm measuring holes (resistant to contamination)

Factory set-up or programming and aerodynamic function testing

Parameters can also later be set on the control component; an additional adjustment device 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)

Connection type

- Spigot, suitable for ducts according to DIN 8077

Technical data

- Nominal sizes: 125 to 400 mm or 5 to 16 in
- Volume flow rate range: 20 – 1666 l/s, 70 – 5978 m³/h or 41 – 3519 CFM
- Volume flow rate control range: approx. 12 – 100 % of the nominal volume flow rate
- Minimum differential pressure: up to 62 Pa (0,25 in w.g.)
- Maximum differential pressure: 1000 Pa (4,01 in w.g.)

Specification text attachment

Variable volume flow control with electronic Universal controller for applying a reference value and capturing an actual value to be integrated with 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: CLOSE, OPEN, q_{vmin} and q_{vmax}

Sizing data

- q_v _____ [m³/h]; [CFM]
- Δ_{pst} _____ [Pa]; [in w.g.] Air-regenerated noise
- L_{PA} _____ [dB(A)]

Case-radiated noise

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

Order code

Order code for volume flow control (with VARYCONTROL attachment)

TVRK – FL / 160 / GK / XD4 / V 2 / 200 – 900 [m³/h] / NO
1 2 3 4 5 7 8 9 10

1 Type

TVRK VAV terminal unit, plastic

2 Air duct connection

No entry: spigot

FL Flanges on both ends

3 Nominal size [mm]; [in]

125, 160, 200, 250, 315, 400

5, 6 ½, 8, 10, 12 ½, 16 in

4 Accessories

No entry: none

GK Matching flanges both ends

5 Attachments (control component)

For example

XD4 Universal controller (VARYCONTROL) with static effective pressure transducer

7 Operating mode

Order example: TVRK/160/XD4/V2/200–900 m³/h/NO

Duct connection

Nominal size

Attachments (control components)

Operating mode

Signal voltage range

Operating values

Damper blade position

F Constant value mode, one setpoint value (no external switch contact)

V Variable operation (adjustable setpoint value range)

8 Signal voltage range

For the actual and setpoint value signals

0 0 – 10 V DC

2 2 – 10 V DC

9 Operating values for factory setting

Volume flow rate [m³/h or l/s]

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

$q_{v\text{ min}} - q_{v\text{ max}}$ (with operating mode V)

10 Damper blade position

Only with spring return actuators

NO power off to open (Normally Open)

NC power off to close (Normally closed)

Spigot

160 mm (6 ½ in)

VARYCONTROL Universal controller with static effective pressure transducer and safe position function with spring return actuator

Variable operation

2 – 10 V DC

$q_{v\text{ min}} = 200\text{ m}^3/\text{h}$ (118 CFM)

$q_{v\text{ max}} = 900\text{ m}^3/\text{h}$ (530 CFM)

NO power off to OPEN

VAV UNITS

Order code

Order code for volume flow control (with TROX UNIVERSAL attachment)

TVRK – FL / 160 / GK / TUNF / RE / M / 0 / UZ / ... / NC
 1 2 3 4 5 6 7 8 9 10 11

1 Type

TVRK VAV terminal unit, plastic

2 Air duct connection

No entry: spigot

FL Flanges on both ends

3 Nominal size [mm]; [in]

125, 160, 200, 250, 315, 400 mm

5, 6 ½, 8, 10, 12 ½, 16 in

4 Accessories

No entry: none

GK Matching flanges both ends

5 Attachments (control component)

TROX UNIVERSAL controller variants:

TUN Actuator (150 s)

TUNF Spring return actuator (150 s)

TUS Fast-running actuator (3 s)

TUSD Fast-running actuator (3 s), with digital communication interface (TROX HPD)

6 Equipment function

Room control

RE Extract air controller (Room Extract)

7 Operating mode

F Single controller or room master, constant setpoint value

M Single controller or room master, variable setpoint value

S Slave controller (only with room solutions)

8 Signal voltage range

0 0 – 10 V DC

2 2 – 10 V DC

9 Expansion modules

Option 1: Power

supplyNo entry: 24 V

AC/DC

T with EM-TRF for 230 V AC mains supply

U with EM-TRF-USV (including battery pack) for uninterruptible 230 V AC power supply (UPS)

Option 2: Digital communication interface

No entry: none

B with EM-BAC-MOD for BACnet MS/TP

M with EM-BAC-MOD for Modbus RTU

I with EM-IP for BACnet IP, Modbus IP and web server

R with EM-IP (including real time clock, RTC) for BACnet IP, Modbus IP and web server

Option 3: Automatic zero point

correctionNo entry: none

Z with EM-AUTOZERO, solenoid valve for automatic zero point correction

10 Operating values for factory setting

Volume flow rate [m³/h, l/s or in w.g.]

For operating mode F

$q_{v_{const}}$: constant volume flow rate^{1, 2}

Other parameters are only relevant for the room master as part of a room solution³; for single controllers enter 0

$q_{v_{const_Supply}}$: constant supply air (room

value) $q_{v_{const_Extract}}$: constant extract air

(room value)

$q_{v_{Diff}}$: supply air/extract air difference (room value)

For operating mode M

$q_{v_{min}}$: minimum volume flow rate^{1, 2}

$q_{v_{max}}$: maximum volume flow rate^{1, 2}

Other parameters are only relevant for the room master as part of a room solution³; for single controllers enter 0

$q_{v_{const_Supply}}$: constant supply air (room

value) $q_{v_{const_Extract}}$: constant extract air

(room value)

$q_{v_{Diff}}$: supply air/extract air difference (room value)

For operating mode S

No parameters are required for the slave controller; all entries have to be made on the room master

For volume flow rate operating values please note:

¹ Single controller: $q_{v_{min}}$, $q_{v_{max}}$ or $q_{v_{const}}$ apply to the controller

² Room solutions: $q_{v_{min}}$, $q_{v_{max}}$, $q_{v_{const}}$ apply to the room

³ For more information on room solutions with several directly connected TROX UNIVERSAL controllers (Plug&Play) and for order examples, please refer to the product data sheet

11 Damper blade position

Only with spring return actuators

NO Power off to open (Normally Open)

NC Power off to close (Normally Closed)

Useful additions

Optional room control panel

CP-TOUCH with Touch display

Order example: TVRK-FL/125/TUN/RE/S/0/UZ/

Flange

both ends

Nominal size

125 mm (5 in)

Accessories

Without

Attachments (control components)

TROX UNIVERSAL controller, actuator run time 150 s

Equipment function

Extract air control

Volume flow rate setting

Slave

Signal voltage range

0 – 10 V DC

Expansion modules

With expansion module EM-TRF-USV, transformer for 230 V AC and uninterruptible power supply (UPS)

With expansion module EM-AUTOZERO, solenoid valve for automatic zero point correction

Operating values

No entry required (slave)

VAV UNITS

Order code

Order code for differential pressure control (with VARYCONTROL attachment)

TVRK	–	FL	/	160	/	GK	/	XF4	/	PDE	/	F	2	/	500 [Pa]	/	NO
1		2		3		4		5		6		7	8		9		10

1 Type

TVRK VAV terminal unit, plastic

2 Air duct connection

No entry: spigot

FL Flanges on both ends

3 Nominal size [mm]; [in]

125, 160, 200, 250, 315, 400 mm

5, 6 ½, 8, 10, 12 ½, 16 in

4 Accessories

No entry: none

GK Matching flanges both ends

5 Attachments (control component)

For example

XF0 Compact controller for duct pressure

XF4 Universal controller for duct pressure (VARYCONTROL)

6 Equipment function/Installation location

PDS Duct pressure controller – supply air (Pressure Duct

Duct

Supply)

PDE Duct pressure controller – extract air (Pressure Duct

Extract)

PRS Room pressure controller – supply air (Pressure Room

Supply)

Order example: TVRK/315/XF0/PDE/F0/550 Pa

Duct connection

Nominal size

Attachments (control components)

Equipment function/installation location

Operating mode

Signal voltage range

Operating value

PRE Room pressure controller – extract air (Pressure Room Extract)

7 Operating mode

F Constant value mode, one setpoint value (no external switch contact)

V Variable operation (adjustable setpoint value range)

8 Signal voltage range

For the actual and setpoint value signals

0 0 – 10 V DC

2 2 – 10 V DC

9 Operating values for factory setting

Differential pressure [Pa]

For duct pressure control, enter the differential pressure [Pa] as an absolute value

Δp_{cons} (with operating mode F)

$\Delta p_{\text{min}} - \Delta p_{\text{max}}$ (with operating mode V)

10 Damper blade position

Only with spring return actuators

NO power off to open (Normally Open)

NC power off to close (Normally Closed)

Spigot

315 mm (12 ½ in)

Compact controller, static, duct pressure control

Duct pressure control, extract air

Constant value control

0 – 10 V DC

$\Delta p_{\text{const.}} = 550 \text{ Pa (2,21 in w.g.)}$

VAV UNITS

Order Code

Order code for differential pressure control (with TROX UNIVERSAL controller as attachment)

TVRK – FL / 160 / GK / TUNF / PRE / MFP / 0 / UMZ / ... / NC
 1 2 3 4 5 6 7 8 9 10 11

1 Type

TVRK VAV terminal unit, plastic

2 Air duct connection

No entry: spigot

FL both sides

3 Nominal size [mm]; [in]

125, 160, 200, 250, 315, 400 mm

5, 6 ½, 8, 10, 12 ½, 16 in

4 Accessories

No entry: none

GK Matching flanges both ends

5 Attachments (control component)

TROX UNIVERSAL controller variants:

TUN Actuator (150 s)

TUNF Spring return actuator (150 s)

TUS Fast-running actuator (3 s)

TUSD Fast-running actuator (3 s), with digital communication interface (TROX HPD)

6 Equipment function

Pressure control

PRE Room pressure controller – extract air (Pressure Room Extract)

PDE Duct pressure controller – extract air (Pressure Duct Extract)

7 Operating mode

MFP Single controller or room master, constant pressure setpoint

MVP Single controller or room master, variable pressure setpoint with room solutions only:

SFP Slave, constant pressure setpoint

SVP Slave, variable pressure setpoint

8 Signal voltage range

0 0 – 10 V DC

2 2 – 10 V DC

9 Expansion modules

Option 1: Power

supply No entry: 24 V

AC/DC

T with EM-TRF for 230 V AC mains supply

U with EM-TRF-USV (including battery pack) for uninterruptible 230 V AC power supply (UPS)

Option 2: Digital communication interface

No entry: none

B with EM-BAC-MOD for BACnet MS/TP

M with EM-BAC-MOD for Modbus RTU

I with EM-IP for BACnet IP, Modbus IP and web server

R with EM-IP (including real time clock, RTC) for BACnet IP, Modbus IP and web server

Option 3: Volume flow rate

measurement No entry: none

V with EM-V for volume flow rate measurement at the differential pressure controller

Option 4: Automatic zero point correction

No entry: none

Z with EM-AUTOZERO solenoid valve for automatic zero point correction (only in combination with EM-V)

10 Operating values for factory setting

Volume flow rate [m³/h, l/s or CFM], pressure [Pa or in w.g.]

For operating mode MFP and SFP

Δp_{const} : constant differential pressure

For operating mode MVP and SVP

Δp_{min} : minimum differential pressure

Δp_{max} : maximum differential pressure

Other parameters for operating modes MFP and MVP

Only relevant for the room master as part of a room solution¹; for single controller enter 0

$q_{v_{\text{min}}}$: minimum volume flow rate (room value)

$q_{v_{\text{max}}}$: maximum volume flow rate (room value)

$q_{v_{\text{const_Supply}}}$: constant supply air (room value)

$q_{v_{\text{const_Extract}}}$: constant extract air (room value)

$q_{v_{\text{Diff}}}$: supply air/extract air difference (room value)

Please note

¹ For more information on room solutions with several directly connected TROX UNIVERSAL controllers (Plug&Play) and for order examples, please refer to the product data sheet

11 Damper blade position

Only with spring return actuators

NO Power off to open (Normally Open)

NC Power off to close (Normally Closed)

Useful additions

Differential pressure transducers required for room or duct pressure control have to be ordered separately or provided by others, e.g.

PT-699 Differential pressure transducer for room pressure control

PT-699-DUCT Differential pressure transducers for duct pressure control, including duct pressure measurement kit Optional room control panel

CP-TOUCH with Touch display

Order example: TVRK/125/TUN/PDE/SVP/0/TVZ/100/350 Pa

Duct connection

Nominal size

Attachments (control components)

Equipment function

Effective pressure setting

Signal voltage characteristics

Expansion modules

Spigot

125 mm (5 in)

TROX UNIVERSAL controller, actuator run time 150 s

Duct pressure control, extract air

Slave, variable differential pressure control

0 – 10 V DC

With expansion module EM-TRF, transformer for 230 V AC supply

VAV UNITS

Order Code

With expansion module EM-V,
for volume flow rate measurement with differential pressure control
With expansion module EM-AUTOZERO, solenoid
valve for automatic zero point correction

Operating values

TVRK – FL / 160 / GK / ELAB / S / RE / UMZ / LAB / ...
1 2 3 4 5 6 8 9 10 11

1 Type

TVRK VAV terminal unit, plastic

2 Air duct connection

No entry: spigot

FL Flanges on both ends

3 Nominal size [mm]; [in]

125, 160, 200, 250, 315, 400 mm

5, 6 ½, 8, 10, 12 ½, 16 in

4 Accessories

No entry: none

GK Matching flanges both ends

5 Attachments (control component)

ELAB EASYLAB controller

TCU3 6 Actuators

S Fast-running actuator (3 s)

SD Fast-running actuator (3 s), with digital communication
interface (TROX HPD)

8 Equipment function

Room control

RE Extract air controller (Room Extract)

PC Room pressure controller (Pressure Control)

9 Expansion modules

Option 1: Power supply

No entry: 24 V AC/DC supply

T with EM-TRF for 230 V AC mains supply

U with EM-TRF-USV (including battery pack) for
uninterruptible 230 V AC power supply (UPS)

Option 2: Digital communication interface

No entry: none

B with EM-BAC-MOD for BACnet MS/TP

M with EM-BAC-MOD for Modbus RTU

I with EM-IP for BACnet IP, Modbus IP and web server

R with EM-IP (including real time clock, RTC) for BACnet IP,
Modbus IP and web server

Option 3: Automatic zero-point adjustment

No entry: none

Z with EM-AUTOZERO, solenoid valve for automatic zero point
correction

10 Additional functions

Without room management function

LAB extract air led system (Laboratory)

CLR supply air led system (Clean Room)

Room management function is active

LAB-RMF extract air led system (Laboratory) - with
room management function (RMF)

CLR-RMF supply air led system (Clean Room) with room
management function (RMF)

11 Operating values for factory setting

Volume flow rate [m³/h, l/s or CFM], pressure [Pa or in w.g.]

Only required when room management function is active; total
room extract air/supply air

q_{V1}: standard mode

q_{V2}: reduced

operation

q_{V3}: increased operation

q_{V4}: constant supply air

q_{V5}: constant extract air

q_{V6}: Supply air/extract air difference

Δp_{set}: setpoint pressure (only with differential pressure control)

Useful additions

room control panel

CP-TOUCH-4.3 Touch control panel with 4.3"

Differential pressure transducers required for room pressure
control have to be ordered separately or provided by the
client, e.g.

PT-699 Measuring range ±50 Pa (0,20 in w.g.) or ±100 Pa
(0,40 in w.g.)

PT-GB604 Measuring range ±100 Pa (0,40 in w.g.)

Order example: TVRK-FL/160/GK/ELAB/S/RE/LAB

Duct connection

Nominal size

Accessories

Attachments (control components)

Actuator

Equipment function

Additional function

Operating values

Flanges on both ends

160 mm (6 ½ in)

Matching flanges for both ends

EASYLAB controller TCU3

Fast-running (3 s)

Extract air control

Room management function has been
deactivated Extract air led system

not required

VAV UNITS

Order code

Order code for single operation (with EASYLAB attachment)

TVRK – FL / 160 / GK / ELAB / S / EC – E0 / UMZ / ...
 1 2 3 4 5 6 7 8 9 10

1 Type

TVRK VAV terminal unit, plastic

2 Air duct connection

No entry: spigot

FL Flanges on both ends

3 Nominal size [mm]; [in]

125, 160, 200, 250, 315, 400 mm

5, 6 ½, 8, 10, 12 ½, 16 in

4 Accessories

No entry: none

GK Matching flanges both ends

5 Attachments (control component)

ELAB EASYLAB controller

TCU3 6 Actuators

S Fast-running actuator (3 s)

SD Fast-running actuator (3 s), with digital communication interface (TROX HPD)

7 Equipment function

Single operation

EC Single controller – extract air (Extract Controller)

8 External volume flow rate setting

E0 Variable, signal voltage range 0 – 10 V DC

E2 Variable, signal voltage range 2 – 10 V DC

2P 2 switching steps (for one switch contact, by others)

3P 3 switching steps (for two switch contacts, by others)

F Constant value mode, one setpoint value (no external switchcontact)

9 Expansion modules

Order example: TVRK/200/ELAB/S/EC/E2/600/900

Duct connection

Nominal size

Attachments (control components)

Actuator

Equipment function

External volume flow rate setting

Operating values

Option 1: Power

supplyNo entry: 24 V

AC/DC

T with EM-TRF for 230 V AC mains supply

U with EM-TRF-USV (including battery pack) for uninterruptible

230 V AC power supply (UPS)

Option 2: Digital communication

interfaceNo entry: none

B with EM-BAC-MOD for BACnet MS/TP

M with EM-BAC-MOD for Modbus RTU

I with EM-IP for BACnet IP, Modbus IP and web server

R with EM-IP (including real time clock, RTC) for BACnet IP,

Modbus IP and web server

Option 3: Automatic zero point correction

No entry: none

Z with EM-AUTOZERO solenoid valve for automatic zero point correction

10 Operating values for factory setting

Volume flow rate [m³/h, l/s or CFM]

Depends on external volume flow rate

settingE0: $q_{vmin} - q_{vmax}$

E2: $q_{vmin} - q_{vmax}$

2P: q_{v1}/q_{v2}

3P: $q_{v1}/q_{v2}/q_{v3}$

F: q_{v1}

Spigot

200 mm (8 in)

EASYLAB controller TCU3

Fast-running actuator (3 s)

Extract air controller

Voltage signal 2 – 10 V DC

$q_{vmin} = 600 \text{ m}^3/\text{h}$ (353 CFM)

$q_{vmax} = 900 \text{ m}^3/\text{h}$ (530 CFM)

VAV UNITS

Order code

Order code for fume cupboard control (with EASYLAB attachment)

TVRK – FL / 160 / GK / ELAB / S / FH – VS / UMZS / 200 – 900 [m³/h]

1 2 3 4 5 6 7 8 9

1 Type

TVRK VAV terminal unit, plastic

2 Air duct connection

No entry: spigot

FL Flanges on both ends

3 Nominal size [mm]; [in]

125, 160, 200, 250, 315, 400 mm

5, 6 ½, 8, 10, 12 ½, 16 in

4 Accessories

No entry: none

GK Matching flanges both ends

5 Attachments (control component)

ELAB EASYLAB controller

TCU3 6 Actuators

S Fast-running actuator (3 s)

SD Fast-running actuator (3 s), with digital communication interface (TROX HPD)

7 Equipment function

Fume cupboard control

With face velocity transducer

FH-VS Fume cupboard control – control strategy based on face

velocity (for face velocity transducer)

With face velocity transducer and sash distance sensor

FH-VD Fume cupboard control – optimised control

strategy based on face velocity (for face velocity

transducer + sash distance sensor)

With sash distance sensor

FH-DS Fume cupboard control – linear control strategy (with sash distance sensor)

FH-DV Fume cupboard control – safety optimised control strategy (with sash distance sensor)

With switch contacts (provided by the client) for switching

steps FH-2P Fume cupboard control – 2 switching steps (for one switch contact, provided by the client)

FH-3P Fume cupboard control – 3 switching steps (for two switch

contacts, provided by the

client) Without signalling

FH-F Fume cupboard control - constant value mode, one setpoint value (no external switch contact)

8 Expansion modules

Option 1: Supply voltage

No entry: 24 V AC/DC supply

T with EM-TRF for 230 V AC mains supply

U with EM-TRF-USV (including battery pack) for uninterruptible

230 V AC power supply (UPS)

Option 2: Digital communication interface

No entry: none

B with EM-BAC-MOD for BACnet MS/TP

M with EM-BAC-MOD for Modbus RTU

I with EM-IP for BACnet IP, Modbus IP and web server

R with EM-IP (including real time clock, RTC) for BACnet IP, Modbus IP and web server

Option 3: Automatic zero-point adjustment

No entry: none

Z with EM-AUTOZERO, solenoid valve for automatic zero point correction

Option 4:

Lighting No entry:

none

S with EM-LIGHT, connection socket for lighting, switchable on control panel (can only be used in conjunction with EM-TRF or EM-TRF UPS)

9 Operating values for factory setting

Volume flow rate [m³/h, l/s or CFM]

depending on the equipment

function FH-VS:

FH-VS: $q_{vmin} - q_{vmax}$

FH-VD: $q_{vmin} - q_{vmax}$

FH-DS: $q_{vmin} - q_{vmax}$

FH-DV: $q_{vmin} - q_{vmax}$

FH-2P: q_{v1}/q_{v2}

FH-3P: $q_{v1}/q_{v2}/q_{v3}$

FH-F: q_{v1}

Useful additions

Control panel for fume cupboard controllers, for displaying

the functions of the control system according to DIN EN

14175 BE-SEG-02 OLED-Display

CP-TOUCH-4.3 Touch control panel with 4.3"

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

Duct connection

Nominal size

Attachments (control components)

Actuator

Equipment function

Expansion module

Operating values

Spigot

200 mm (8 in)

EASYLAB controller TCU3 with fast-running actuator

Fast-running actuator (3 s)

Two switching steps

With expansion module EM-TRF,

transformer for 230 V AC supply

With expansion module EM-AUTOZERO,

solenoid valve for automatic zero point

correction

$q_{vmin} = 600 \text{ m}^3/\text{h}$ (353 CFM)

$q_{vmax} = 1200 \text{ m}^3/\text{h}$ (706 CFM)

Variants

VAV terminal unit, variant TVRK



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

VAV terminal unit, variant TVRK-FL



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

Material

Order code detail	Part	Material
-	Casing	Plastic, polypropylene (PPs), flame resistant
	Effective pressure sensor	

VAV UNITS

Variants

Order code detail	Part	Material
	Damper blade	
	Damper blade seal	Chloroprene rubber (CR)
	Shaft	Stainless steel, material no. 1.4104
	Plain bearings	Plastic, polypropylene (PPs), flame resistant

Order code detail	Part	Material
FL	Flange	Plastic, polypropylene (PPs), flame resistant

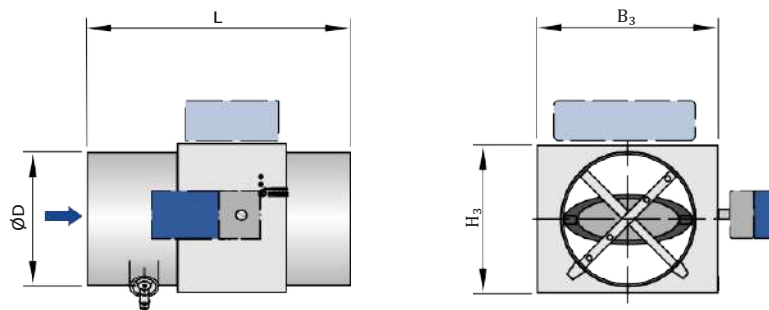
Order code detail	Part	Material
GK	Matching flange	Plastic, polypropylene (PPs), flame resistant
	Seal	Rubber, EPDM

VAV UNITS

Dimensions and weight

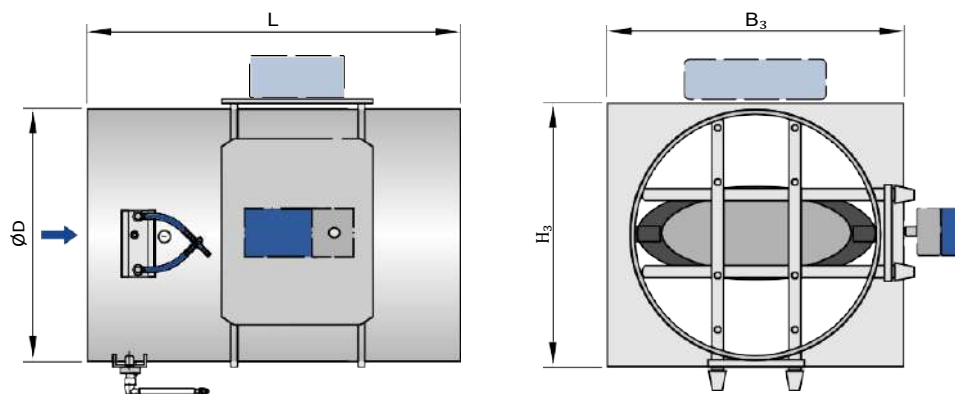
Dimensions and weight

Terminal unit (TVRK, nominal sizes 125 – 200 mm or 5 – 8 in)...



Notes: Length L depends on the nominal size. Only one of the suitable control components is shown. For exact dimensions see the section 'Space required for commissioning and maintenance'.

Terminal unit (TVRK, nominal sizes 250 – 400)...



Notes: Length L depends on the nominal size. Only one of the suitable control components is shown. For exact dimensions see the section 'Space required for commissioning and maintenance'.

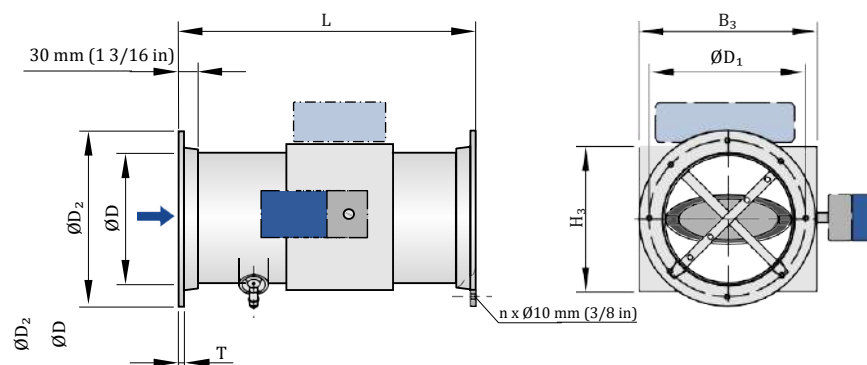
Dimensions and weights of TVRK

Nom. Size		L	ØD	B ₃	H ₃	L	ØD	B ₃	H ₃	m	
[mm]	[in]	[mm]				[in]				kg	lb
125	5	394	125	195	145	15 1/2	4 15/16	7 11/16	5 11/16	4,5	9,9
160	6 ½	394	160	230	180	15 1/2	6 5/16	9 1/16	7 1/16	4,8	10,6
200	8	394	200	270	220	15 1/2	7 7/8	10 5/8	8 11/16	5,2	11,5
250	10	394	250	320	270	15 1/2	9 13/16	12 5/8	10 5/8	6,4	14,1
315	12 ½	594	315	385	335	23 3/8	12 3/8	15 3/16	13 3/16	8,5	18,7
400	16	594	400	470	420	23 3/8	15 3/4	18 1/2	16 9/16	10,7	23,6

VAV UNITS

Dimensions and weight

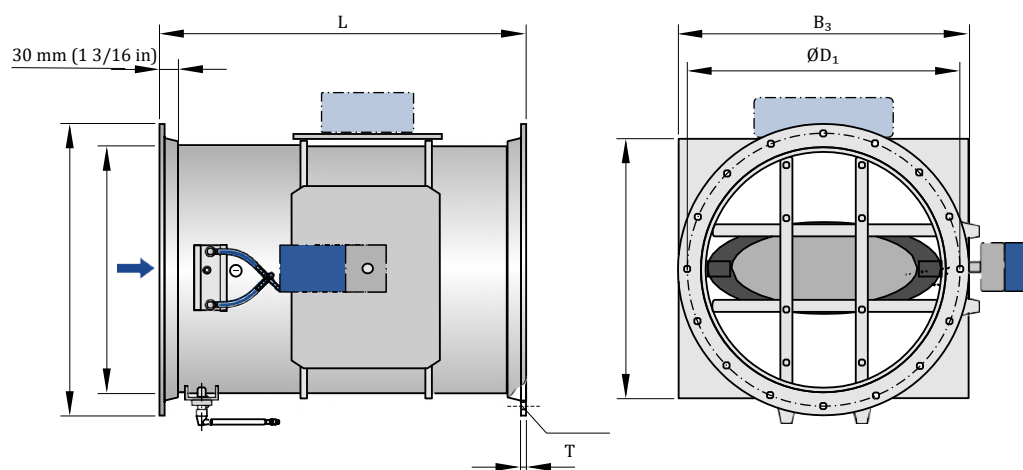
Terminal unit with flange TVRK-FL, nominal sizes 125 – 200 mm (5 – 8 in)



Notes:

Length L depends on the nominal size. Only one of the suitable control components is shown. For exact dimensions see the section 'Space required for commissioning and maintenance'.

Terminal unit with flange TVRK-FL, nominal sizes 250 – 400 mm (10 – 16 in)



Note:

Length L depends on the nominal size. Only one of the suitable control components is shown. For exact dimensions see the section 'Space required for commissioning and maintenance'.

Dimensions and weight of TVRK-FL

Dimensions and weight of FVXR 1-E																
Nom. Size		ØD	ØD ₁	ØD ₂	B ₃	H ₃	T	ØD	ØD ₁	ØD ₂	B ₃	H ₃	T	m		n
[mm]	[in]	[mm]						[in]						kg	lb	
125	5	125	165	185	195	145	8	4 15/16	6 1/2	7 5/16	7 11/16	5 11/16	5/16	4,7	10,4	8
160	6 ½	160	200	230	230	180	8	6 5/16	7 7/8	9 1/16	9 1/16	7 1/16	5/16	5,2	11,5	8
200	8	200	240	270	270	270	8	7 7/8	9 7/16	10 5/8	10 5/8	10 5/8	5/16	5,7	12,6	8
250	10	250	290	320	320	270	8	9 13/16	11 7/16	12 5/8	12 5/8	10 5/8	5/16	7	15,4	12
315	12 ½	315	350	395	385	335	10	12 3/8	13 3/4	15 9/16	15 3/16	13 3/16	3/8	9,4	20,7	12
400	16	400	445	475	470	420	10	15 3/4	17 1/2	18 11/16	18 1/2	16 9/16	3/8	11,9	26,2	16

VAV UNITS

Dimensions and Weight

Space required for commissioning and maintenance

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

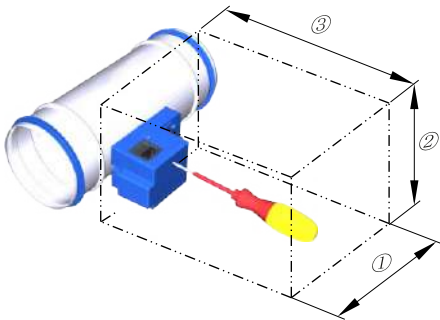
Product illustrations do not show any installation situation details.

If an attachment requires a certain installation orientation, this is specified on a sticker on the product.

VAV UNITS

Dimensions and weight

Access to attachments



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Schematic illustration of required installation space

XD0, XD4

Space requirement, control component on one side

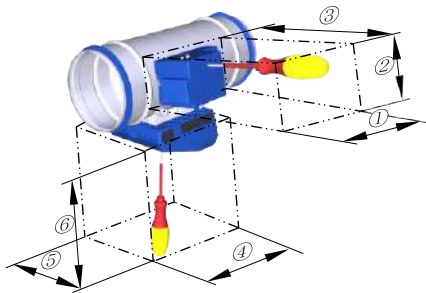
Attachment	①	②	③
VARYCONTROL			
Universal controller: BP3, BPB,BPG, BB3, BBB, BR3, BRB, BRG, BS3, BSB, BSG, BG3, BGB, BH3, BHB, XB0, XF0, XD4, XF4	300 mm (12 in)	320 mm (13 in)	300 mm (12 in)

VAV UNITS

Dimensions and weight

Access to attachments on two sides

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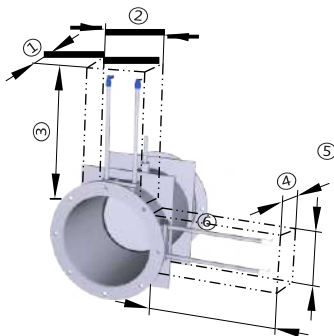
Schematic illustration of required installation space

TUS, BUDN

Space requirement, control components on two sides

Attachment	①	②	③	④	⑤	⑥
LABCONTROL						
EASYLAB: ELAB	300 mm (12 in)	250 mm (10 in)	300 mm (12 in)	350 mm (14 in)	350 mm (14 in)	400 mm (16 in)
TROX UNIVERSAL						
TUN, TUNF, TUS, TUSD	300 mm (12 in)	250 mm (10 in)	300 mm (12 in)	350 mm (14 in)	350 mm (14 in)	400 mm (16 in)
VARYCONTROL						
BUSN, BUSNF, BUSS, BUPN, BUPNF, BURN, BURNF	300 mm (12 in)	320 (13 in)	300 mm (12 in)	250 mm (10 in)	250 mm (10 in)	250 mm (10 in)

Access to sensor tubes for cleaning



VAV UNITS

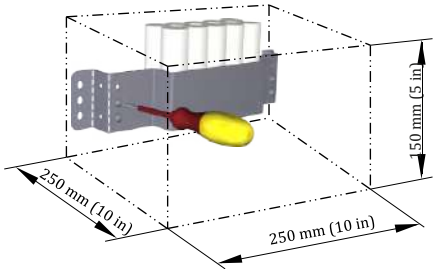
Dimensions and weight

Space required for cleaning the sensor tubes

Nominal size	①	②	③	④	⑤	⑥
125 – 200	100 mm (4 in)	100 mm (4 in)	D			
250 – 400	100 mm (4 in)	160 mm (6 ½ in)	D	100 mm (4 in)	160 mm (6 ½ in)	D

D: Casing diameter

Accessibility to the battery pack



Schematic illustration of required installation space

Note: Additional space for fixing and accessing the battery pack (optional accessory for TROX UNIVERSAL or LABCONTROL EASYLAB control component).

Product details

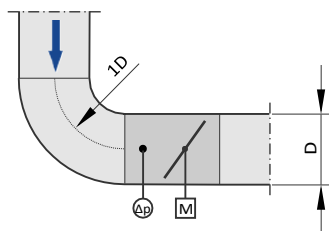
Installation and commissioning

- Installation orientation must be as shown on the sticker

Upstream conditions

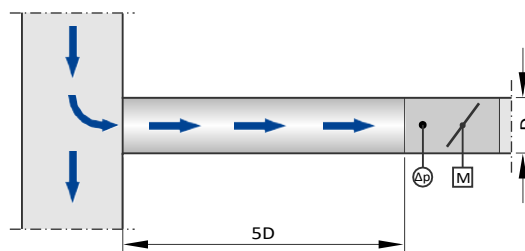
The volume flow rate accuracy Δq_v applies to a straight upstream section of the duct. Bends, junctions or a narrowing or widening of the duct cause turbulence that may affect measurement. Duct connections, e.g. branches off the main duct, must comply with EN 1505. Some installation situations require straight duct sections upstream.

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 Δq_v can only be achieved with a straight duct section of at least $5D$ upstream.

VAV UNITS

Product details

VARYCONTROL control components

Attachment	Controlled variable	Interface	Pressure transducer	Actuator	Manufacturer
Compact controller, static					
SB0N	q _v , Δp	0 – 10 V or 2 – 10 V or BACnet MS/TP or Sauter SLC	integral, 300 Pa (1,20 in w.g.)	slow-running, integrated	④
SB0S	q _v , Δp	0 – 10 V or 2 – 10 V or BACnet MS/TP or Sauter SLC	integral, 300 Pa (1,20 in w.g.)	fast-running, integrated	④
XD0	q _v	0 – 10 V or 2 – 10 V	integrated	Slow running integrated	3
XF0	Δp	0 – 10 V or 2 – 10 V	integral, control range adjustable 25 - 550 Pa (0,10 – 2,21 in w.g.)	Slow running integrated	3
VARYCONTROL Universal controller, static					
XD4	q _v	0 – 10 V or 2 – 10 V	integrated	Spring return actuator separate	3
XF4	Δp	0 – 10 V or 2 – 10 V	integral, control range adjustable 25 - 550 Pa (0,10 – 2,21 in w.g.)	Spring return actuator separate	3
BUSN	q _v	0 - 10 V or 2 - 10 V or MP-Bus or Modbus RTU or BACnet MS/TP	integrated	Slow running separate	2
BUSS	q _v	0 - 10 V or 2 - 10 V or MP-Bus or Modbus RTU or BACnet MS/TP	integrated	fast-running separate	2
BUSNF	q _v	0 - 10 V or 2 - 10 V or MP-Bus or Modbus RTU or BACnet MS/TP	integrated	Spring return actuator separate	2
BUPN	Δp	0 - 10 V or 2 - 10 V or MP-Bus or Modbus RTU or BACnet MS/TP	integrated Control range adjustable 25 - 450 Pa (0,10 – 1,81 in w.g.)	Slow running separate	2
BUPNF	Δp	0 - 10 V or 2 - 10 V or MP-Bus or Modbus RTU or BACnet MS/TP	integrated Control range adjustable 25 - 450 Pa (0,10 – 1,81 in w.g.)	Spring return actuator separate	2
BURN	Δp	0 - 10 V or 2 - 10 V or MP-Bus or Modbus RTU or BACnet MS/TP	integrated Control range adjustable -50 – -10 Pa or 10 – 50 Pa (-0,20 – -0,04 in w.g. or 0,20 – 0,04 in w.g.)	Slow running separate	2
BURNF	Δp	0 - 10 V or 2 - 10 V or MP-Bus or Modbus RTU or BACnet MS/TP	integrated Control range adjustable -50 – -10 Pa or 10 – 50 Pa (-0,20 – -0,04 in w.g. or 0,20 – 0,04 in w.g.)	Spring return actuator separate	2

q_v Volume flow rate

Δp Differential pressure

① TROX, ② TROX/Belimo, ③ TROX/Gruner

* Control component has been discontinued

TROX UNIVERSAL control components

VAV UNITS

Contents . Description

Attachment	Controlled variable	Interface	Effective pressure transducer	Actuator	Manufacturer
TROX UNIVERSAL controller – static					
TUN	q_v , Δp	TROX Plug&Play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: Modbus, BACnet, web server	q_v = integriert, Δp = separat	Slow running separate	①
TUNF	q_v , Δp	TROX Plug&Play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: Modbus, BACnet, web server	q_v = integriert, Δp = separat	Spring return actuator separate	①
TUS	q_v , Δp	TROX Plug&Play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: Modbus, BACnet, web server	q_v = integriert, Δp = separat	fast-running separate	①
TUSD	q_v , Δp	TROX Plug&Play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: Modbus, BACnet, web server	q_v = integriert, Δp = separat	fast-running with digital communication interface (TROX HPD), separate	①

q_v Volume flow rate

Δp Differential pressure

① TROX

LABCONTROL EASYLAB control components

Attachment	Controlled variable	Interface	Effective pressure transducer	Actuator	Manufacturer
EASYLAB Regler – statisch					
ELAB	q_v , Δp *	TROX plug and play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: Modbus, BACnet, web server	q_v = integriert, Δp = separat	fast-running, separate or fast-running with digital communication interface (TROX HPD), separate	①

① TROX

* The controlled variable depends on the type of VAV terminal unit

- TVR, TVRK: Fume cupboard, room supply air, room extract air, room pressure, single controller
- TVLK: Fume cupboard, single controller
- TVJ, TVT: Room supply air, room extract air, room pressure, single controller
- TVZ, TZ-Silenzio: Room supply air, room pressure, single controller
- TVA, TA-Silenzio: Room extract air, room pressure, single controller

VAV UNITS

Nomenclature

Nomenclature

Dimensions of rectangular units

B [mm]; [in]
Duct width

B₁ [mm]; [in]
Screw hole pitch of flange (horizontal)

B₂ [mm]; [in]
Overall dimension of flange (width)

H [mm]; [in]
Duct height

H₁ [mm]; [in]
Screw hole pitch of flange (vertical)

H₂ [mm]; [in]
Overall dimension of flange (height)

Dimensions of circular units

ØD [mm]; [in]
Basic units made of sheet steel: Outer diameter of the spigot;
basic units made of plastic: Inside diameter of the spigot

ØD₁ [mm]; [in]
Pitch circle diameter of flanges

ØD₂ [mm]; [in]
Outer diameter of flanges

L [mm]; [in]
Length of unit including connecting spigot

L₁ [mm]; [in]
Length of casing or acoustic cladding

n []
Number of flange screw holes

T [mm]; [in]
Flange thickness

General information

m [kg]; [lb]
Unit weight including the minimum required attachments (control component)

NS [mm] Nominal size

f_m [Hz]
Octave band centre frequency

L_{PA} [dB(A)]

A-weighted sound pressure level of air-regenerated noise of the CAV controller, system attenuation taken into account

L_{PA1} [dB(A)]

A-weighted sound pressure level of air-regenerated noise of the CAV controller with secondary silencer, system attenuation taken into account

L_{PA2} [dB(A)]

A-weighted sound pressure level of case-regenerated noise of the CAV controller, system attenuation taken into account

L_{PA3} [dB(A)]

A-weighted sound pressure level of case-regenerated noise of the CAV controller with acoustic cladding, system attenuation taken into account

Note on acoustic data: All sound pressure levels are based on a reference value of 20 µPa.

q_{vNom} [m³/h]; [l/s]; [CFM]

Nominal flow rate (100 %): The value depends on product type, nominal size and control component (attachment). Values are published on the internet and in technical leaflets and defined in the Easy Product Finder design programme. Reference value for calculating percentages (e.g. q_{vmax}). Upper limit of the setting range and maximum volume flow rate setpoint value for the VAV terminal unit.

q_{vmin Unit} [m³/h]; [l/s]; [CFM]

Technical minimum volume flow: The value depends on product type, nominal size and control component (attachment). Values are defined in the Easy Product Finder design programme. Lower limit of the setting range and minimum volume flow rate setpoint value for the VAV terminal unit. Setpoint values below q_{vmin unit}, (if

q_v equals zero) may result in unstable control or shut-off.

q_{vmax} [m³/h]; [l/s]; [CFM]

Adjustable by others at upper limit of the operating range for the VAV terminal unit: q_{vmax} can be set to less than or equal to q_{vnom} on the terminal unit. In case of analogue control of volume flow controllers (typically used), the maximum value of the setpoint signal (10 V) is assigned to the set maximum value (q_{vmax}) (see characteristics).

q_{vmin} [m³/h]; [l/s]; [CFM]

Adjustable by others at lower limit of the operating range for the VAV terminal unit: q_{vmin} should be set to less than or equal to q_{vmax}. q_{vmin} to less than q_{vmin unit}, as the control may become unstable or the damper blade may close. q_{vmin} may equal zero. In case of analogue control of volume flow controllers (typically used), the minimum value of the setpoint signal (0 or 2 V) is assigned to the set minimum value (q_{vmin}) (see characteristics).

q_v [m³/h]; [l/s]; [CFM]

Volume flow rate

Δq_v [%]

Volume flow rate accuracy in relation to the setpoint (tolerance)

Δp_{st} [Pa]; [inWg]

Static differential pressure

Δp_{stmin} [Pa]; [inWg]

VAV UNITS

Nomenclature

Static minimum differential pressure: 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 (damper blade). 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 static differential 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.

Lengths [mm]; [in]

All lengths are given in millimetres [mm] unless stated otherwise. ▪

Basic unit

Unit for controlling volume flow rates without an attached control component. The main components include the casing with sensor(s) to measure the differential pressure and the damper blade to restrict the volume flow. The basic unit is also referred

to as a VAV terminal unit. Important distinguishing features: Geometry or unit shape, material and connection variants, acoustic characteristics (e.g. optional acoustic cladding or integrated silencers), range of volume flow.

Control component

Electronic unit(s) mounted on the basic unit to control the volume flow rate, or the duct pressure, or the room pressure by adjusting the damper blade position. The electronic unit essentially consists of a controller with differential pressure transmitter (integrated or external) and an integrated actuator (Easy and Compact controller).

Important distinguishing features:

- Transmitter: dynamic transmitter for clean air or static transmitter for contaminated air
- Actuator: Standard actuator, slow-running
- Interface technology: analogue interface or digital bus interface for connecting and recording signals and data

Volume flow controller

Consists of a basic unit with an attached control component.