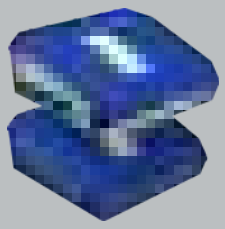
Variable volume flow control VAV Terminal Units

Type TVZ

Easy controller, Compact controller



TROX UNIVERSAL controller, TROX LABCONTROL controller

Circular connection on the fan end

Rectangular connection on the room end

Tested to VDI 6022

TROX® TECHNIK

The art of handling air

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Type TVZ

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VAV terminal units for the supply air control in buildings with variable air volume systems and demanding acoustic requirements

- Highly effective integral attenuator
- Box style construction for the reduction of the airflow velocity
- Electronic control components for different applications (Easy, Compact, Universal, and LABCONTROL)
- Closed blade air leakage to EN 1751, up to class 4
- Casing air leakage to EN 1751, up to class C

Optional equipment and accessories

- Acoustic cladding for the reduction of case-radiated noise
- Secondary silencer Type TS for the reduction of air-regenerated noise
- Hot water heat exchanger of Type WT for reheating the airflow

Application
- Rectangular VAV terminal units for use in ventilation and air conditioning systems
- For controlling, restricting or shutting off the supply air flow in systems with high acoustic requirements
- Integral attenuator
- 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
- Integral attenuator with at least 26 dB insertion loss at 250 Hz
- Hygiene tested and certified
- Factory set-up or programming and aerodynamic function testing
- Parameters can also later be set on the control component; additional adjustment device may be necessary
- Inspection access according to VDI 6022

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

Variants
- TVZ: Supply air unit
- TVZ-D: Supply air unit with acoustic cladding
- Units with acoustic cladding and/or secondary silencer Type TS for very demanding acoustic requirements
- Acoustic cladding cannot be retrofitted

Parts and characteristics
- Ready-to-commission unit which consists of mechanical parts and control components.
- Averaging effective pressure sensor for volume flow rate measurement
- Damper blade
- Integral attenuator
- Inspection access
- Factory assembled 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 or volume flow rate scale affixed to the unit
- High control accuracy (even with upstream bend R = 1D)

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

Accessories
- Double lip seal (factory fitted)

Useful additions
- Secondary silencer Type TS
- Heat exchanger Type WT

Construction features
- Rectangular casing
- Spigot on the fan end suitable for circular ducts to EN 1506 or EN 13180
- Spigot with groove for double lip seal
- Connection on the room end suitable for ducts
- Baffle plate, downstream of the damper blade, for achieving the best possible acoustic and aerodynamic performance
- Position of the damper blade indicated externally at shaft extension
- Thermal and acoustic insulation (lining)

Materials and surfaces
- Casing and damper blade made of galvanised sheet steel
- Damper blade seal made of TPE plastic
- Lining is mineral wool
- Effective pressure sensor made of aluminium
- Plastic plain bearings
- Shaft and linkage: Galvanised steel

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

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
- Faced with glass fibre fabric as a protection against erosion from airflow velocities of up to 20 m/s
- Inert to fungal and bacterial growth

Standards and guidelines

Fulfils 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 leakage:
Nominal sizes 125 – 200 (5” - 8”)
- EN 1751, Class C

Nominal sizes 250 – 400 (10” - 16”)
- EN 1751, Class B

Closed blade air leakage:
Nominal sizes 125 – 160 (5” - 6”)
- EN 1751, Class 3
- Meets the general requirements of DIN 1946, Part 4, with regard to the acceptable closed damper blade air leakage

Nominal sizes 200 – 400 (8” - 16”)
- EN 1751, Class 4
- Meets the increased requirements of DIN 1946, Part 4, with regard to the acceptable closed blade air leakage

Maintenance

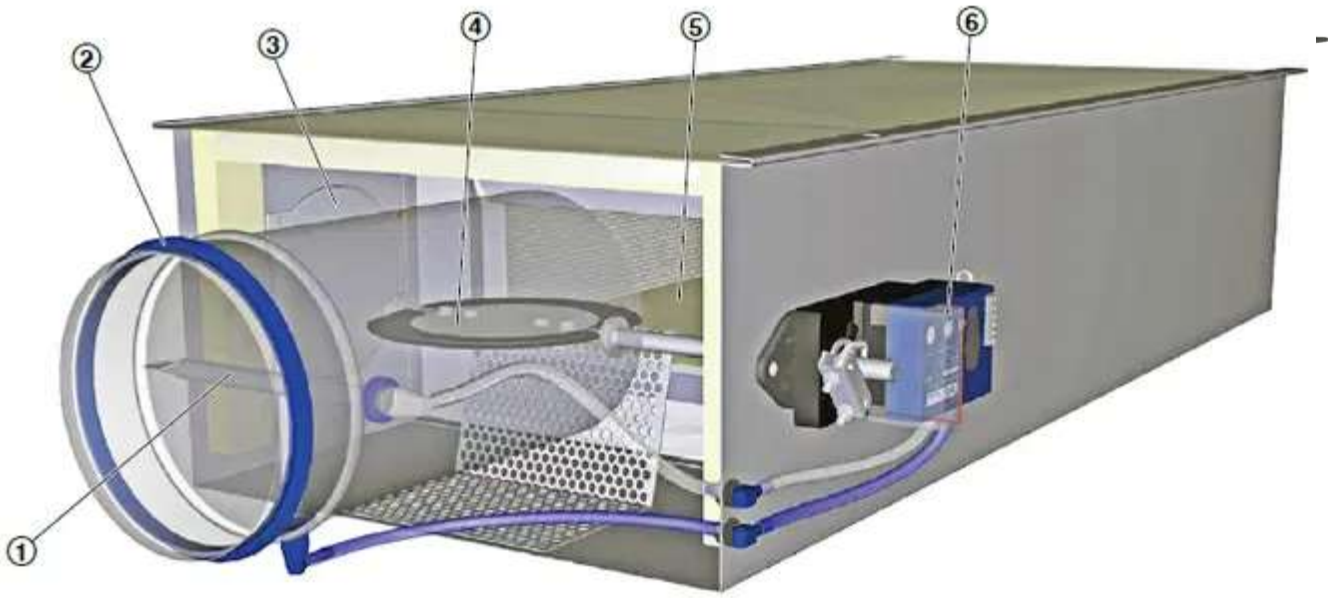
- Maintenance-free as construction and materials are not subject to wear

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; the control functions can be achieved with an Easy controller or with a Compact controller or with individual components (Universal or LABCONTROL).
For most applications, the setpoint value comes from a room temperature controller.

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.
An integral attenuator reduces the noise that is created by the restriction of the airflow.
The airflow velocity at the room end is, due to the larger rectangular cross section, about half the velocity in the circular duct.

Schematic illustration of the TVZ



① Effective pressure sensor
② Double lip seal
③ Inspection access
④ Damper blade
⑤ Integral attenuator
⑥ Control components, e.g. an Easy controller

Technical data

Nominal sizes	125 – 400 mm (5 – 16")
Volume flow rate range	14 – 2007 l/s or 50 – 7228 m^3/h (30 – 4253 CFM)
Volume flow rate control range (unit with dynamic effective pressure measurement)	Approx. 10 – 100 % of the nominal volume flow rate
Minimum differential pressure	Up to 123 Pa (0,49 in w.g.) (without secondary silencer)
Maximum differential pressure	1000 Pa (4,02 in w.g)
Operating temperature	10 to 50 °C (50 to 122 ºF)

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. It must be ensured that for all operating conditions and for all terminal units a sufficient pressure differential is applied to each controller ($\Delta_{pstat,min}$). 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 dynamic pressure measurements – Easy (potentiometers)
Attachment: Easy

NS	qv [l/s]	qv [m^3/h]	qv [CFM]	Δpstmin				Δqv [±%]
				①		②		
				[Pa]	[in w.g]	[Pa]	[in w.g]	
125 (5")	14	50	30	1	0,00	2	0,01	20
125 (5")	56	201	119	13	0,05	18	0,07	9
125 (5")	98	353	208	39	0,16	55	0,22	7
125 (5")	140	504	297	79	0,32	111	0,45	5
160 (6")	24	83	51	1	0,00	2	0,01	19
160 (6")	94	339	199	12	0,05	18	0,07	9
160 (6")	165	595	350	35	0,14	53	0,21	6
160 (6")	236	851	500	72	0,29	109	0,44	5
200 (8")	37	133	78	1	0,00	2	0,01	19
200 (8")	150	540	318	11	0,04	22	0,09	9
200 (8")	263	948	557	34	0,14	65	0,26	6
200 (8")	376	1355	797	70	0,28	133	0,53	5
250 (10")	58	208	123	1	0,00	2	0,01	19
250 (10")	236	848	500	12	0,05	24	0,10	9
250 (10")	413	1488	875	37	0,15	72	0,29	6
250 (10")	591	2128	1252	74	0,30	146	0,59	5
315 (12")	96	344	203	1	0,00	2	0,01	19
315 (12")	390	1405	826	12	0,05	20	0,08	9
315 (12")	685	2467	1451	36	0,14	59	0,24	6
315 (12")	980	3528	2077	73	0,29	121	0,49	5
400 (16")	157	563	333	1	0,00	1	0,00	19
400 (16")	638	2298	1352	12	0,05	17	0,07	9
400 (16")	1120	4033	2373	36	0,14	51	0,20	6
400 (16")	1602	5768	3394	73	0,29	104	0,42	5

Volume flow rate ranges and minimum differential pressure values
Control component dynamic measurement principle – qv
Attachments: BC0, BL0 **, BM0, BM0-J6

NS	qv [l/s]	qv [m³/h]	qv [CFM]	Δpstmin				Δqv [±%]
				①		②		
				[Pa]	[in w.g]	[Pa]	[in w.g]	
125 (5")	14	50	30	1	0,00	2	0,01	20
125 (5")	68	244	144	19	0,08	26	0,10	9
125 (5")	121	437	256	59	0,24	84	0,34	7
125 (5")	175	631	371	123	0,49	174	0,70	5
160 (6")	24	83	51	1	0,00	2	0,01	19
160 (6")	114	411	242	17	0,07	26	0,10	9
160 (6")	205	738	434	54	0,22	82	0,33	6
160 (6")	296	1066	627	113	0,45	170	0,68	5
200 (8")	37	133	78	1	0,00	2	0,01	19
200 (8")	182	655	386	17	0,07	31	0,12	9
200 (8")	327	1176	693	53	0,21	100	0,40	6
200 (8")	471	1698	998	109	0,44	208	0,84	5
250 (10")	58	208	123	1	0,00	2	0,01	19
250 (10")	285	1027	604	18	0,07	34	0,14	9
250 (10")	513	1847	1087	56	0,23	110	0,44	6
250 (10")	740	2666	1568	116	0,47	229	0,92	5
315 (12")	96	344	203	1	0,00	2	0,01	19
315 (12")	473	1703	1002	17	0,07	29	0,12	9
315 (12")	851	3062	1803	55	0,22	91	0,37	6
315 (12")	1228	4421	2602	114	0,46	190	0,76	5
400 (16")	157	563	333	1	0,00	1	0,00	19
400 (16")	774	2785	1640	17	0,07	25	0,10	9
400 (16")	1391	5006	2947	55	0,22	78	0,31	6
400 (16")	2007	7228	4253	115	0,46	162	0,65	5

Volume flow rate ranges and minimum differential pressure values
Control component dynamic measurement principle - qv As standard
Attachments: BUDN, BUDNF, LN0, LK0, LB0, XB0, XB4, (B13 *, B1B *)

NS	qv [l/s]	qv [m³/h]	qv [CFM]	Δpstmin				Δqv [±%]
				①		②		
				[Pa]	[in w.g]	[Pa]	[in w.g]	
125 (5")	14	50	30	1	0,00	2	0,01	20
125 (5")	58	207	123	14	0,06	19	0,08	9
125 (5")	101	365	214	42	0,17	59	0,24	6
125 (5")	145	522	307	84	0,34	119	0,48	5
160 (6")	24	83	51	1	0,00	2	0,01	19
160 (6")	97	349	206	13	0,05	19	0,08	9
160 (6")	171	616	362	38	0,15	57	0,23	6
160 (6")	245	882	519	77	0,31	117	0,47	5
200 (8")	37	133	78	1	0,00	2	0,01	19
200 (8")	155	557	328	12	0,05	23	0,09	9
200 (8")	272	980	576	37	0,15	70	0,28	6
200 (8")	390	1404	826	75	0,30	143	0,57	5
250 (10")	58	208	123	1	0,00	2	0,01	19
250 (10")	243	874	515	13	0,05	25	0,10	9
250 (10")	428	1539	907	39	0,16	77	0,31	6
250 (10")	612	2205	1297	80	0,32	157	0,63	5
315 (12")	96	344	203	1	0,00	2	0,01	19
315 (12")	402	1448	852	13	0,05	21	0,08	9
315 (12")	709	2553	1502	38	0,15	64	0,26	6
315 (12")	1015	3657	2151	78	0,31	130	0,52	5
400 (16")	157	563	333	1	0,00	1	0,00	19
400 (16")	658	2368	1394	13	0,05	18	0,07	9
400 (16")	1159	4173	2456	39	0,16	54	0,22	6
400 (16")	1660	5978	3517	79	0,32	111	0,45	5

Volume flow rate ranges and minimum differential pressure values
Control component of static measurement principle
Attachments: BUSN, BUSNF, BUSS, XD0, XD4, TUN, TUNF, TUS, TUSD, ELAB (BP3 *, BPG *, BPB *, BB3 *, BBB

NS	qv [l/s]	qv [m³/h]	qv [CFM]	Δpstmin				Δqv [±%]
				①		②		
				[Pa]	[in w.g]	[Pa]	[in w.g]	
125 (5")	21	73	44	2	0,01	3	0,01	16
125 (5")	62	223	131	16	0,06	22	0,09	8
125 (5")	103	372	218	43	0,17	61	0,25	6
125 (5")	145	522	307	84	0,34	119	0,48	5
160 (6")	35	123	74	2	0,01	3	0,01	16
160 (6")	104	376	220	14	0,06	22	0,09	8
160 (6")	175	629	371	40	0,16	60	0,24	6
160 (6")	245	882	519	77	0,31	117	0,47	5
200 (8")	55	195	117	2	0,01	3	0,01	16
200 (8")	166	598	352	14	0,06	26	0,10	8
200 (8")	278	1001	589	38	0,15	73	0,29	6
200 (8")	390	1404	826	75	0,30	143	0,57	5
250 (10")	85	306	180	2	0,01	4	0,02	16
250 (10")	261	939	553	15	0,06	29	0,12	8
250 (10")	437	1572	926	41	0,16	80	0,32	6
250 (10")	612	2205	1297	80	0,32	157	0,63	5
315 (12")	142	508	301	2	0,01	3	0,01	15
315 (12")	433	1558	917	15	0,06	24	0,10	8
315 (12")	724	2607	1534	40	0,16	66	0,27	6
315 (12")	1015	3657	2151	78	0,31	130	0,52	5
400 (16")	231	830	489	2	0,01	3	0,01	15
400 (16")	707	2546	1498	15	0,06	21	0,08	8
400 (16")	1184	4262	2509	40	0,16	57	0,23	6
400 (16")	1660	5978	3517	79	0,32	111	0,45	5

Quick sizing table for sound pressure level

The quick sizing tables are based on generally accepted attenuation and insulation 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 case-radiated noise L_{PA} Controller including acoustic cladding
(total flow rate range of type)

NS	qv [l/s]	qv [m³/h]	qv [CFM]	150 Pa (0,60 in w.g.)		500 Pa (2,01 in w.g.)	
				①	②	①	②
125	14	50	30	17	< 15	24	< 15
125	68	244	144	25	15	32	21
125	121	437	256	29	20	35	25
125	175	631	371	32	23	37	28
160	24	83	51	15	< 15	23	< 15
160	114	411	242	25	17	33	24
160	205	738	434	30	23	37	28
160	296	1066	627	34	27	40	32
200	37	133	78	18	< 15	27	15
200	182	655	386	28	20	36	26
200	327	1176	693	33	25	39	30
200	471	1698	998	36	29	42	33
250	58	208	123	18	< 15	28	18
250	285	1027	604	27	20	37	28
250	513	1847	1087	32	25	40	32
250	740	2666	1568	36	29	43	35
315	96	344	203	19	< 15	30	19
315	473	1703	1002	29	20	39	30
315	851	3062	1803	34	26	43	34
315	1228	4421	2602	39	31	46	38
400	157	563	333	23	< 15	34	24
400	774	2785	1640	31	23	41	33
400	1391	5006	2947	36	28	45	37
400	2007	7228	4253	40	33	47	40

Specification text

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

Specification text

Rectangular VAV terminal units for variable and constant air volume systems, suitable for supply 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, a damper blade, and an integral sound attenuator. Factory-assembled control components complete with wiring and tubing. Effective pressure sensor with 3 mm (1/8") measuring holes, hence resistant to contamination. Baffle plate is fitted after the damper blade for optimum acoustic and aerodynamic performance. Casing with acoustic and thermal insulation. 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). Meets the hygiene requirements of EN 16798, Part 3, of VDI 6022, Sheet 1, and of DIN 1946, Part 4.

Special features

- Integral attenuator with at least 26 dB insertion loss at 250 Hz
- Hygiene tested and certified
- Factory set-up or programming and aerodynamic function testing
- Parameters can also later be set on the control component; additional adjustment device may be necessary
- Inspection access according to VDI 6022

Materials and surfaces

- Casing and damper blade made of galvanised sheet steel
- Damper blade seal made of TPE plastic
- Lining is mineral wool
- Effective pressure sensor made of aluminium
- Plastic plain bearings
- Shaft and linkage: Galvanised steel

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
- Faced with glass fibre fabric as protection against erosion from airflow velocities of up to 20 m/s (3937 FPM)
- Inert to fungal and bacterial growth

Connection

- Spigot with groove for double lip seal on the fan end, suitable for connecting ducts according to EN 1506 or EN 13180. Room end suitable for the connection of ducts.

Equivalence criteria

- Declaration of hygiene conformity in accordance with VDI 6022, Sheet 1 (01/2018), ÖNORM H 6020 (02/2007) and ÖNORM H 6021 (09/2003)
- Setting of the volume flow rates without an adjustment device using V_{min}- and V_{max}- potentiometer
- Electrical connections with screw terminals, no additional terminal boxes required
- Aerodynamic functional testing of each volume flow controller on test rigs at the factory, before a label is affixed to the controller
- Acoustic data measured to ÖNORM EN ISO 5135:1999

Technical data

- Nominal sizes: 5 to 16"
- Volume flow rate range: 14 - 1602 l/s or 50 - 5768 m³/h or 30 - 3394 CFM
- Minimum differential pressure: up to 0,49 in w.g (without secondary silencer)
- Maximum differential pressure: 4,02 in w.g
- Closed blade air leakage to EN 1751, class 4 (nominal sizes 125(5") and 160(6"), class 3
- Casing air leakage to EN 1751, class 4 (nominal size 250, 315, 400, class B) (10", 12", 16", class B)

Specification text for 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 contacts: CLOSED, OPEN, $q_{v_{min}}$ and $q_{v_{max}}$
- Potentiometers with percentage scales to set the volume flow rates $q_{v_{min}}$ and $q_{v_{max}}$ without an adjustment device
- 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. 10 – 100 % of the nominal volume flow rate
- Clearly visible external indicator light for signalling the functions: Set, not set, and power failure
- 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

- q_v _____ [m³/h] or [CFM]
- Δpst _____ [Pa] or [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 Easy attachment)

TVZ – D / 160 / D1 / Easy
| | | | | |
1 2 3 4 5

1 Type
TVZ VAV terminal unit, supply air

2 Acoustic cladding
No entry required: None
D With acoustic cladding

3 Nominal size [mm] (in)
125 (5")
160 (6")
200 (8")
250
315
400

4 Accessories
No entry required: None
D1 Double lip seal

5 Attachments (control components)
Easy Volume flow controller, dynamic, analogue interface, setting q_{vmin} and q_{vmax} with potentiometers

Order example: TVZ-D/200/Easy

Acoustic cladding	With
Nominal size	200 mm (8")
Attachments (control components)	Easy volume flow controller, dynamic, analogue interface, setting of q_{vmin} and q_{vmax} with potentiometers

Order code for volume flow control (with VARYCONTROL attachment)

TVZ	–	D	/	160	/	D1	/	XB4	/	V	0	/	**200 – 900 [m³/h]**	/	NO
|		|		|		|		|				|			|		|
1		2		3		4		5		7	8		9		10

1 Type
TVZ VAV terminal unit, supply air

2 Acoustic cladding
No entry required: None
D With acoustic cladding

3 Nominal size [mm] (in)
125 (5")
160 (6")
200 (8")
250 (10")
315 (12")
400 (16")

4 Accessories
No entry required: None
D1 Double lip seal

5 Attachments (control components)
For example
BC0 Compact controller
XB4 Universal controller (VARYCONTROL)

7 Operating mode
F Constant value (a setpoint value)
V Variable (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]
$q_{v_{const}}$ (in operating mode F)
$q_{v_{min}}$ – $q_{v_{max}}$ (in operating mode V)

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

Order example: TVZ-D/160/D1/BC0/V0/180–850 m³/h

Acoustic cladding	with
Nominal size	160 (6")
Accessories	Double lip seal
Attachments (control component)	Compact controller, dynamic, analogue interface
Operating mode	Variable
Signal voltage range	0 – 10 V DC
Operating values	$q_{v_{min}}$ = 180 m³/h (106 CFM) $q_{v_{max}}$ = 850m³/h (500 CFM)

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

TVZ – D / 160 / D1 / TUNF / RS / M / 0 / UMZ / … / NC
1 2 3 4 5 6 7 8 9 10 11

1 Type
TVZ VAV terminal unit, supply air

2 Acoustic cladding
No entry required: None
D With acoustic cladding

3 Nominal size [mm] (in)
125 (5")
160 (6")
200 (8")
250 (10")
315 (12")
400 (16")+

4 Accessories
No entry required: None
D1 Double lip seal

5 Attachments (control components)
TROX UNIVERSAL controller with
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
RS Supply air control (Room Supply)

7 Volume flow rate setting
M Master (RMF function)
S Slave
F Constant flow rate controller

8 Signal voltage range
0 0 – 10 V DC
2 2 – 10 V DC

9 Expansion modules
Option 1: Power supply
No entry required: 24 V AC/DC
T EM-TRF for 230 V AC
U EM-TRF-USV for 230 V AC, provides uninterruptible power supply (UPS)

Option 2: Digital communication interface
No entry required: None
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 web server
R EM-IP with real time clock

Option 3: Automatic zero point correction
No entry required: None
Z EM-AUTOZERO with solenoid valve

10 Operating values for factory setting
Volume flow rate [m³/h or l/s or CFM]
Master (RMF function)
$q_{v_{min}}$: Minimum volume flow rate
$q_{v_{max}}$: Maximum volume flow rate
$q_{v_{const\_CLOSED}}$: Constant supply air
$q_{v_{const\_Exhaust}}$: Constant extract air
$q_{v_{Diff}}$: Supply air/extract air difference

Constant value
$q_{v_{const}}$: Constant volume flow rate

Slave
No entry required

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

Useful additions
Room control panel
BE-LCD 40-character display

Order example: TVZ 200/TUS/RS/M/0/UMZ/600/1250/0/0/-100

Nominal size	200 mm (8")
Attachments (control components)	TROX UNIVERSAL controller, fast-running actuator (3 s)
Equipment function	Supply air control
Volume flow rate setting	Master (RMF function)
Signal voltage range	0 – 10 V DC
Expansion modules	with expansion module EM-TRF-USV Transformer for 230 V AC supply with UPS function with expansion module EM-BAC-MOD Modbus RTU interface with expansion module EM-AUTOZERO Solenoid valve for automatic zero point correction
Operating values	$q_{v_{min}}$ = 600 m³/h (353 CFM), $q_{v_{max}}$ = 1250 m³/h (736 CFM) $q_{v_{const\_CLOSED}}$ = 0 m³/h (0 CFM), $q_{v_{const\_Exhaust}}$ = 0 m³/h (0 CFM) $q_{v_{Diff}}$ = -100 m³/h (-59 CFM)

Order code for differential pressure control (with VARYCONTROL attachment)

TVZ – D / 160 / D1 / XF4 / PRS / F 0 / **30 – 60 [Pa]** / NO
1 2 3 4 5 6 7 8 9 10

1 Type
TVZ VAV terminal unit, supply air

2 Acoustic cladding
No entry required: None
D With acoustic cladding

3 Nominal size [mm] (in)
125 (5")
160 (6")
200 (8")
250 (10")
315 (12")
400 (16")

4 Accessories
No entry required: None
D1 Double lip seal

5 Attachments (control components)
For example
XF0 Compact controller for duct pressure
XF4 Universal controller for duct pressure (VARYCONTROL)

6 Equipment function/installation location
PDS Duct pressure control, supply air
PRS Room pressure control, supply air

7 Operating mode
F Constant value (a setpoint value)
V Variable (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] [in w.g.]
For duct pressure control, enter the differential pressure [Pa] [in w.g.] as an absolute value

Δp_{const} (in operating mode F)
Δp_{min} – Δp_{max} (in operating mode V)

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

Order example: TVZ/160/D1/XF4/PDS/F/2/470 Pa/NO

Nominal size	160 (6")
Accessories	Double lip seal (one end)
Attachments (control components)	VARYCONTROL Universal controller for duct pressure
Equipment function	Duct pressure control, supply air
Operating mode	Constant value
Signal voltage range	2 – 10 V DC
Operating value	470 Pa (1,89 in w.g.)
Damper blade position	Power off to OPEN

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

TVZ – D / 160 / D1 / TUNF / PRS / MFP / 0 / UMZ / ... / NC
1 2 3 4 5 6 7 8 9 10 11

1 Type
TVZ VAV terminal unit, supply air

2 Acoustic cladding
No entry required: None
D With acoustic cladding

3 Nominal size [mm] (in)
125 (5")
160 (6")
200 (8")
250 (10")
315 (12")
400 (16")

4 Accessories
No entry required: None
D1 Double lip seal

5 Attachments (control components)
TROX UNIVERSAL controller with
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
PRS Room pressure control, supply air
PDS Duct pressure control, supply air

7 Differential pressure setting
MFP Master, constant pressure control
MVP Master, variable differential pressure control
SFP Slave, constant pressure control
SVP Slave, variable differential pressure control

8 Signal voltage range
0 0 - 10 V DC
2 2 - 10 V DC

9 Expansion modules
Option 1: Power supply
No entry required: 24 V AC/DC
T EM-TRF for 230 V AC
U EM-TRF-USV for 230 V AC, provides uninterruptible power supply (UPS)

Option 2: Digital communication interface
No entry required: None
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 web server
R EM-IP with real time clock

Option 3: Volume flow rate measurement
No entry required: None
V EM-V Volume flow rate measurement for differential pressure control

Option 4: Automatic zero point correction
No entry required: None
Z EM-AUTOZERO solenoid valve (only with V)

10 Operating values for factory setting
Pressure [Pa], volume flow rate [m³/h or l/s]
Slave SVP
Δp_{min}: minimum differential pressure
Δp_{max}: maximum differential pressure

Slave SFP
Δp_{const}: Constant differential pressure

Master MFP and MVP like Slave, but additionally
$q_{v_{min}}$: minimum volume flow rate
$q_{v_{max}}$: maximum volume flow rate
$q_{v_{const\_CLOSED}}$: constant supply air
$q_{v_{const\_Exhaust}}$: constant extract air
$q_{v_{Diff}}$: Supply air/extract air difference

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

Useful additions
Room control panel
BE-LCD 40-character display

The differential pressure transducer required for room or duct pressure control has to be ordered separately, e.g.
PT-699 for room pressure control
PT-699-DUCT for duct pressure control, including tube and pressure tap

Order example: TVZ/200/TUS/PRS/MVP/0/B/-10/-60/ 600/1250/ 0/ 0/-100

Nominal size	200 (8")
Attachments (control components)	TROX UNIVERSAL controller, fast-running actuator (3 s)
Equipment function	Room pressure control, supply air
Differential pressure setting	Master, variable differential pressure control
Signal voltage range	0 – 10 V DC
Expansion modules	with expansion module EM-BAC-MOD BACnet MS/TP interface card

Operating values	Δp_{min} = -10 Pa (-0,04 in w.g.), Δp_{max} = -60 Pa (-0,24 in w.g.) $q_{v_{min}}$ = 600 m³/h (353 CFM) ,$q_{v_{max}}$ = 1250 m³/h (736 CFM) $q_{v_{const\_Supply\ air}}$ = 0 m³/h (0 CFM) $q_{v_{const\_Extract\ air}}$ = 0 m³/h (0 CFM) $q_{v_{Diff}}$ = - 100 m³/h (-59 CFM)

Order code for room control (with EASYLAB attachment)

TVZ – D / 160 / D1 / ELAB / S / RS / UMZ / LAB / ...
| | | | | | | | | |
1 2 3 4 5 6 7 9 10 11

1 Type
TVZ VAV terminal unit, supply air

2 Acoustic cladding
No entry required: None
D With acoustic cladding

3 Nominal size [mm] (in)
125 (5")
160 (6")
200 (8")
250 (10")
315 (12")
400 (16")

4 Accessories
No entry required: None
D1 Double lip seal

5 Attachments (control components)
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
Room control
RS Supply air control (Room Supply)
PC Differential pressure control (Pressure Control)

9 Expansion modules
Option 1: Power supply
No entry required: 24 V AC/DC
T EM-TRF for 230 V AC
U EM-TRF-USV for 230 V AC, provides uninterruptible power supply (UPS)

Option 2: Digital communication interface
No entry required: None
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 web server
R EM-IP with real time clock

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

10 Additional functions
Without room management function
LAB Extract air led system (laboratories)
CLR Supply air led system (clean rooms)

With room management function
LAB-RMF Extract air led system
CLR-RMF Supply air led system

11 Operating values for factory setting
(only required when room management function is active)

Volume flow rate [m³/h or l/s], pressure [Pa]

Total extract air/supply air of room:
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 (only for devices with RMF)
BE-LCD 40-character display

The differential pressure transducer required for room pressure control (equipment function) has to be ordered separately, 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 ±50 Pa (± 0,20 in w.g.)

Order example: TVZ/200/ELAB/SD/RS/CLR-RMF/3500/1000/5000/250/0/-150

Acoustic cladding	without
Nominal size	200mm(8")
Attachments (control components)	EASYLAB controller TCU3 with fast-running actuator (3 s)
Actuator	Fast-running actuator (3 s), with digital communication interface
Equipment function	Supply air control (Room Supply)
Additional function	Supply air led system with room management function
Operating values	q_{v1} = 3500 m³/h (2060 CFM) q_{v2} = 1000 m³/h (589 CFM) q_{v3} = 5000 m³/h (2943 CFM) q_{v4} = 250 m³/h (147 CFM) q_{v5} = 0 m³/h (0 CFM) q_{v6} = -150 m³/h (-88 CFM)

Order code for single operation (with EASYLAB attachment)

TVZ – D / 160 / D1 / ELAB / S / SC – E0 / UMZ / ...
| | | | | | | | | |
1 2 3 4 5 6 7 8 9 11

1 Type
TVZ VAV terminal unit, supply air

2 Acoustic cladding
No entry required: None
D With acoustic cladding

3 Nominal size [mm] (in)
125 (5")
160 (6")
200 (8")
250 (10")
315 (12")
400 (16")

4 Accessories
No entry required: None
D1 Double lip seal

5 Attachments (control components)
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
SC Supply air controller

8 External volume flow rate setting
E0 Voltage signal 0 – 10 V DC
E2 Voltage signal 2 – 10 V DC
2P Switch contacts (provided by others) for 2 switching steps
3P Switch contacts (provided by others) for 3 switching steps
F Volume flow rate constant value, without signalling

9 Expansion modules
Option 1: Power supply
No entry required: 24 V AC/DC
T EM-TRF for 230 V AC
U EM-TRF-USV for 230 V AC, provides uninterruptible power supply (UPS)

Option 2: Digital communication interface
No entry required: None
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 web server
R EM-IP with real time clock

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

11 Operating values for factory setting
Volume flow rate [m³/h or l/s]
Depending on external volume flow rate setting
E0, E2: $q_{v_{min}}/q_{v_{max}}$
2P: q_{v_1}/q_{v_2}
3P: $q_{v_1}/q_{v_2}/q_{v_3}$
F: q_{v_1}

Order example: TVZ/315/ELAB/S/SC/F/2800 m³/h

Nominal size	315 mm (12")
Attachments (control components)	EASYLAB controller TCU3
Actuator	Fast-running actuator (3 s)
Equipment function	Supply air controller
External volume flow rate setting	Volume flow rate constant value
Operating value	q_{v_1} = 2800 m³/h (1648 CFM)

Variants

VAV terminal unit, variant TVZ

- VAV terminal unit for variable supply air volume flow control

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VAV terminal unit with acoustic cladding (TVZ-D)

- VAV terminal unit with acoustic cladding for variable supply air 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 end
- Ideally, the ducts on the room side should also be insulated (by others)
- Acoustic cladding cannot be retrofitted

Material

Standard construction

Order code detail	Part	Material
–	Casing	Galvanised sheet steel
	Effective pressure sensor	Aluminium tube
	Damper blade	Galvanised sheet steel
	Damper blade seal	Thermoplastic elastomer (TPE)
	Shaft and linkage	Galvanised steel
	Plain bearings	Thermoplastic elastomer (TPE)
	Lining	Mineral wool to EN 13501, fire rating class A1, non-combustible

Option acoustic cladding

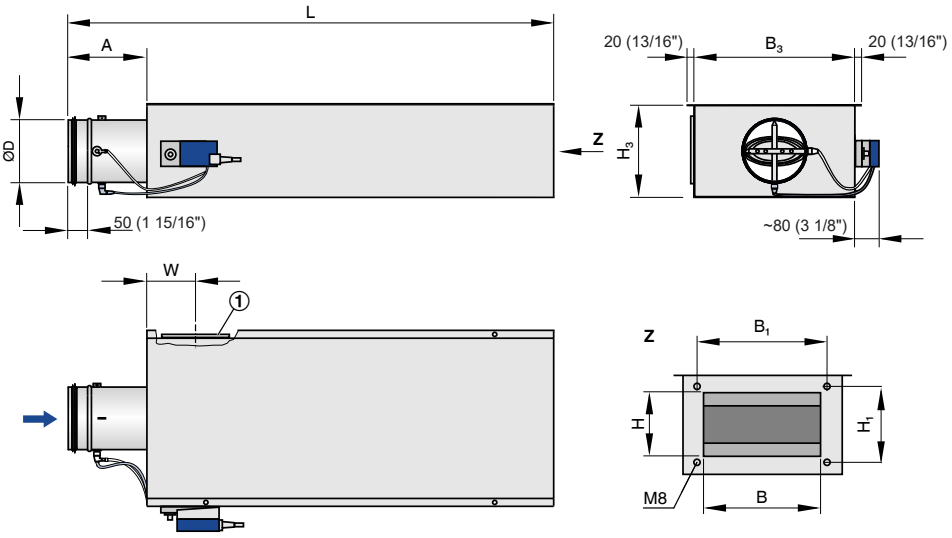
Order code detail	Part	Material
D	Acoustic cladding casing	Galvanised sheet steel
	Insulation of structure-borne noise	Polyethylene, PE
	Lining	Mineral wool to EN 13501, fire rating class A1, non-combustible

Option double lip seal

Order code detail	Part	Material
D1	Double lip seal	Rubber, EPDM

Dimensions and weight

VAV terminal unit without acoustic cladding (TVZ)



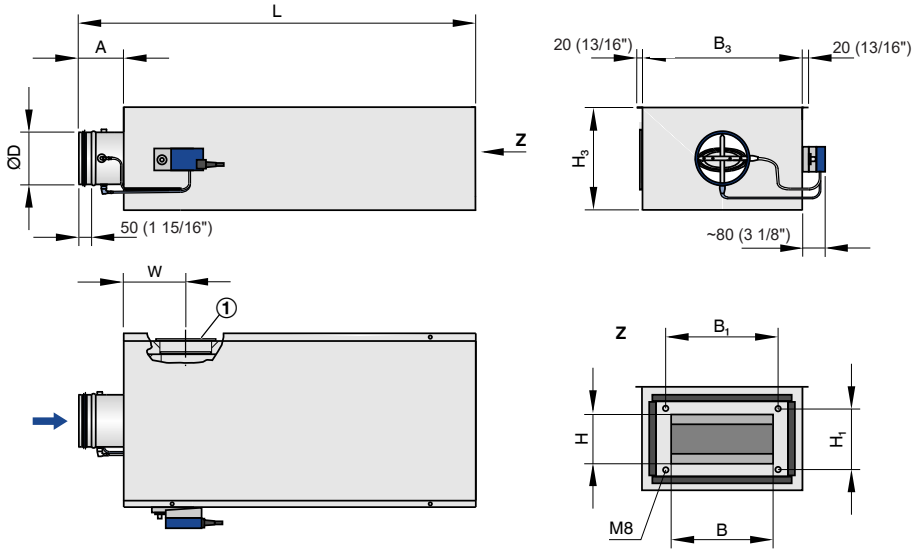
Note:
Total length L is the total casing length.
The length of the installed unit is approx. 12mm (1/2") See flange details.
The illustration shows control component types Easy, Compact.
For exact dimensions see the section 'Space required for commissioning and maintenance'.

① Inspection access

Dimensions and weight

NG		B		H		L		ØD		A		B_1		B_3		H_1		H_3		W		kg	lb
mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in		
125	5	198	7 13/16	152	6	1185	46 5/8	124	4 7/8	150	5 14/16	232	9 1/8	300	11 13/16	186	7 5/16	236	9 5/16	115	4 1/2	21	46
160	6	308	12 1/8	152	6	1235	48 5/8	159	6 1/4	200	7 14/16	342	13 7/16	410	16 1/8	186	7 5/16	236	9 5/16	115	4 1/2	25	55
200	8	458	18 1/16	210	8 1/4	1520	59 13/16	199	7 13/16	200	7 14/16	492	19 3/8	560	22 1/16	244	9 10/16	281	11 1/16	115	4 1/2	33	73
250	10	598	23 9/16	201	7 15/16	1690	66 9/16	249	9 13/16	250	9 13/16	632	24 7/8	700	27 9/16	235	9 1/4	311	12 1/4	215	8 7/16	55	121
315	12	798	31 7/16	252	9 15/16	1690	66 9/16	314	12 3/8	250	9 13/16	832	32 3/4	900	35 7/16	286	11 1/4	361	14 3/16	215	8 7/16	73	161
400	16	898	35 3/8	354	13 15/16	2070	81 1/2	399	15 11/16	250	9 13/16	932	36 11/16	1000	39 3/8	388	15 1/4	446	17 9/16	215	8 7/16	118	260

VAV terminal unit with acoustic cladding (TVZ-D)

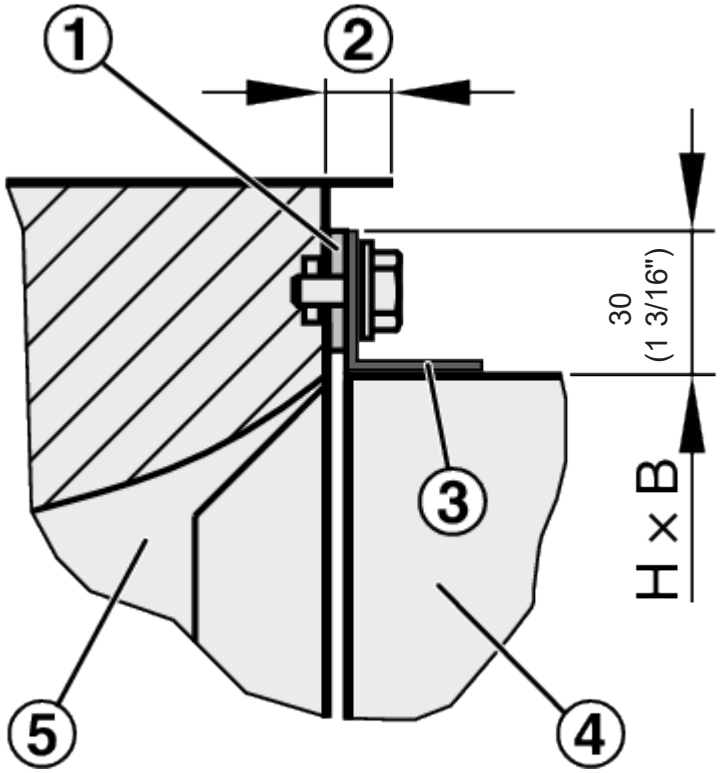


Note:
Total length L is the total casing length.
The length of the installed unit is approx. 1/2" less. See flange detail
The illustration shows control component types Easy, Compact.
For exact dimensions see the section 'Space required for commissioning and maintenance'.

① Inspection access

NG		B		H		L		ØD		A		B_1		B_3		H_1		H_3		W		kg	lb
mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in		
125	5	198	7 13/16	152	6	1185	46 5/8	124	4 7/8	110	4 5/16	232	9 1/8	380	14 15/16	186	7 5/16	316	12 7/16	155	6 1/8	41	90
160	6	308	12 1/8	152	6	1235	48 5/8	159	6 1/4	160	6 5/16	342	13 7/16	490	19 5/16	186	7 5/16	316	12 7/16	155	6 1/8	50	110
200	8	458	18 1/16	210	8 1/4	1520	59 13/16	199	7 13/16	160	6 5/16	492	19 3/8	640	25 3/16	244	9 5/8	361	14 3/16	155	6 1/8	63	139
250	10	598	23 9/16	201	7 15/16	1690	66 9/16	249	9 13/16	210	8 1/4	632	24 7/8	780	30 11/16	235	9 1/4	391	15 3/8	255	10 1/16	95	209
315	12	798	31 7/16	252	9 15/16	1690	66 9/16	314	12 3/8	210	8 1/4	832	32 3/4	980	38 9/16	286	11 1/4	441	17 3/8	255	10 1/16	133	293
400	16	898	35 3/8	354	13 15/16	2070	81 1/2	399	15 11/16	210	8 1/4	932	36 11/16	1080	42 1/2	388	15 1/4	526	20 11/16	255	10 1/16	193	425

Flange detail

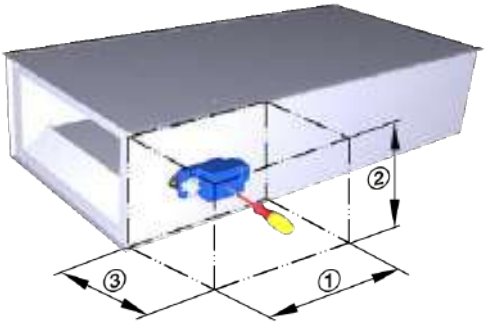


1 Compressible seal, to be provided by others
2 Flanges on both ends indented by approx. 12mm (1/2")
3 Flange
4 Duct
5 VAV terminal unit

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.

Access to attachments



Schematic illustration of required installation space

Product examples

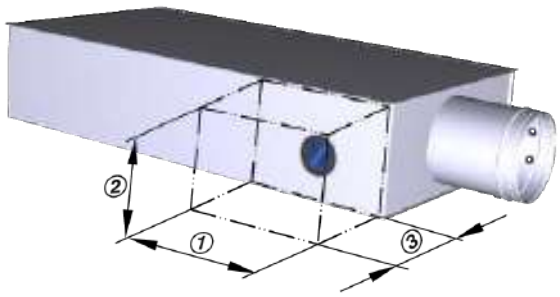
BC0, BUDNF, XD4, TUN

Space required

Attachment	①		②		③	
	mm	in	mm	in	mm	in
VARYCONTROL						
Easy controller: Easy	400	16	300	12	300	12
Compact controller: BC0, BL0 *, BM0, BM0-J6, LN0, LK0, XB0, XD0, XF0	400	16	300	12	300	12
Universal controller: B13 *, B1B *, BB3 *, BBB *, BG3 *, BGB *, BH3 *, BHB *, BP3 *, BPB *, BPG *, BR3 *, BRB *, BRG *, BS3 *, BSB *, BSG *, BUDN, BUDNF, BUSN, BUSNF, BUSS, BUPN, BUPNF, BURN, BURNF, XB4, XD4, XF4	700	28	300	12	300	12
TROX UNIVERSAL						
TROX UNIVERSAL: TUN, TUS, TUSD	900	35	350	14	400	16
LABCONTROL						
EASYLAB: ELAB	900	35	350	14	400	16

* Control component has been discontinued
** Control component to be discontinued - do not include in new projects

Inspection access

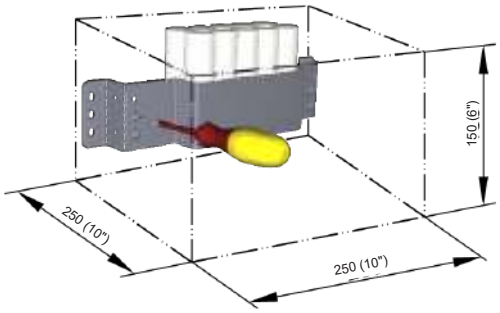


Schematic illustration of required installation space

Space required for inspection access

Attachment	①	②	③
Inspection access	400mm (16")	300 mm (12")	300 mm (12")

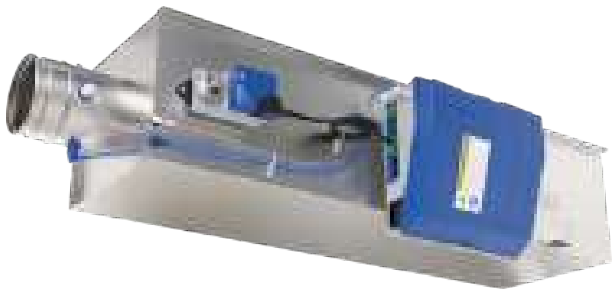
Accessibility to the battery pack



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 example



Attachment TVZ/.../TUN/.../U

Product details

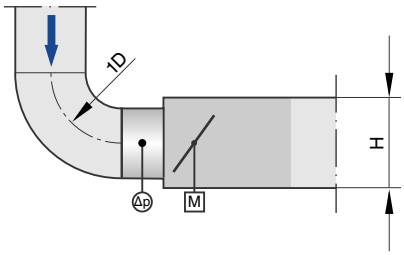
Installation and commissioning

- Any installation orientation (except units with static effective pressure transducer)
- Return edges of the casing with drilled holes suitable for M10 threaded rods
- TVZ-D: For constructions with acoustic cladding, ducts on the room side should have cladding up to the acoustic cladding of the controller

Upstream conditions

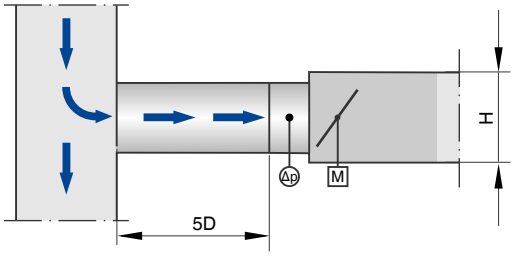
The volume flow rate accuracy Δ_{qv} applies to straight upstream section of the duct. Bends, junctions or a narrowing or widening of the duct cause turbulence that may affect measurement. Duct connections, e.g. branches off the main duct, must comply with EN 1505. Some installation situations require 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 Δ_{qv} can only be achieved with a straight duct section of at least 5D upstream.

VARYCONTROL control components

Attachment	Controlled variable	Interface	Pressure transducer	Actuator	Manufacturer
Easy controller, dynamic					
Easy	qv	0 – 10 V	integral	slow-running integral	①
Compact controller, dynamic					
BC0	qv	0 – 10 V or 2 – 10 V or MP bus interface	integral	slow-running integral	②
BL0 **	qv	LonWorks FTT 10 interface	integral	slow-running integral	②
BM0	qv	Modbus RTU/BACnet MS/TP	integral	slow-running integral	②
BM0-J6	qv	Modbus RTU/BACnet MS/TP with RJ12 socket (for X-AIRCONTROL)	integral	slow-running integral	②
LK0	qv	KNX interface	integral	slow-running integral	⑤
LN0	qv	0 – 10 V or 2 – 10 V	integral	slow-running integral	⑤
XB0	qv	0 – 10 V or 2 – 10 V	integral	slow-running integral	③
Compact controller, static					
XD0	qv	0 – 10 V or 2 – 10 V	integral	slow-running integral	③
XF0	Δp	0 – 10 V or 2 – 10 V	integral, control range adjustable 25 - 550 Pa	slow-running integral	③
Universal controller, dynamic					
B13 *	qv	0 – 10 V or 2 – 10 V	integral	slow-running separate	②
B1B *	qv	0 – 10 V or 2 – 10 V	integral	spring return actuator separate	②
BUDN	qv	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TPTP	integral	slow-running separate	②
BUDNF	qv	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TPTP	integral	spring return actuator separate	②
XB4	qv	0 – 10 V or 2 – 10 V	integral	spring return actuator separate	③
VARYCONTROL Universal controller, static					
BB3 *	qv	2 – 10 V	individual component	slow-running separate	②

Attachment	Controlled variable	Interface	Pressure transducer	Actuator	Manufacturer
BBB *	qv	2 – 10 V	individual component	spring return actuator separate	②
BG3 *	Δp	2 – 10 V	individual component 0,40 in w.g	slow-running separate	②
BGB *	Δp	2 – 10 V	individual component 0,4 in w.g	spring return actuator separate	②
BH3 *	Δp	2 – 10 V	individual component 2,41 in w.g	slow-running separate	②
BHB *	Δp	2 – 10 V	individual component 2,41 in w.g	spring return actuator separate	②
BP3 *	qv	0 – 10 V or 2 – 10 V or MP bus interface	individual component	slow-running separate	②
BPB *	qv	0 – 10 V or 2 – 10 V or MP bus interface	individual component	spring return actuator separate	②
BPG *	qv	0 – 10 V or 2 – 10 V or MP bus interface	individual component	fast-running separate	②
BR3 *	Δp	0 – 10 V or 2 – 10 V or MP bus interface	individual component 0,40 in w.g	slow-running separate	②
BRB *	Δp	0 – 10 V or 2 – 10 V or MP bus interface	individual component 0,40 in w.g	spring return actuator separate	②
BRG *	Δp	0 – 10 V or 2 – 10 V or MP bus interface	individual component 0,40 in w.g	fast-running separate	②
BS3 *	Δp	0 – 10 V or 2 – 10 V or MP bus interface	individual component 2,41 in w.g	slow-running separate	②
BSB *	Δp	0 – 10 V or 2 – 10 V or MP bus interface	individual component 2,41 in w.g	spring return actuator separate	②
BSG *	Δp	0 – 10 V or 2 – 10 V or MP bus interface	individual component 2,41 in w.g	fast-running separate	②
BUPN	Δp	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TPTP	integral Control range adjustable 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/TPTP	integral Control range adjustable 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/TPTP	integral Control range adjustable -0,20... 0,04 in w.g or 0,04... 0,20 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/TPTP	integral Control range adjustable -0,20... 0,04 in w.g or 0,04... 0,20 in w.g	spring return actuator separate	②

Attachment	Controlled variable	Interface	Pressure transducer	Actuator	Manufacturer
BUSN	qv	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TPTP	integral	slow-running separate	②
BUSNF	qv	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TPTP	integral	spring return actuator separate	②
BUSS	qv	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TPTP	integral	fast-running separate	②
XD4	qv	0 – 10 V or 2 – 10 V	integral	spring return actuator separate	③
XF4	Δp	0 – 10 V or 2 – 10 V	integral, control range adjustable 25 - 550 Pa (0,1 - 2,21 in w.g.)	spring return actuator separate	③

* Control component has been discontinued
** Control component to be discontinued - do not include in new projects
q_v Volume flow rate
Δ_p Differential pressure
① TROX, ② TROX/Belimo, ③ TROX/Gruner, ⑤ Siemens

TROX UNIVERSAL control components

Attachment	Controlled variable	Interface	Pressure transducer	Actuator	Manufacturer
VARYCONTROL Universal controller, static					
TUN	qv, Δp	TROX Plug&Play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: Modbus, BACnet, web server	qv = integral Δp = separate	slow-running separate	①
TUNF	qv, Δp	TROX Plug&Play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: Modbus, BACnet, web server	qv = integral Δp = separate	spring return actuator separate	①
TUS	qv, Δp	TROX Plug&Play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: Modbus, BACnet, web server	qv = integral Δp = separate	fast-running separate	①
TUSD	qv, Δp	TROX Plug&Play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: Modbus, BACnet, web server	qv = integral Δp = separate	fast-running with digital communication interface (TROX HPD), separate	①

q_v Volume flow rate
Δ_p Differential pressure
① TROX

Attachment	Controlled variable	Interface	Pressure transducer	Actuator	Manufacturer
EASYLAB					
ELAB	qv, Δp *	TROX plug and play communication system and 0 - 10 V or 2 - 10 V or with optional accessories: Modbus, BACnet, web server	qv = integral Δp = separate	fast-running, separate or fast-running with digital communication interface (TROX HPD), separate	③

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

Nomenclature

Dimensions of rectangular units

B [mm] [in]
Duct width

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

B_2 [mm] [in]
Overall dimension of flange (width)

H [mm] [in]
Duct height

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

H_2 [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

$ØD_1$ [mm] [in]
Pitch circle diameter of flanges

$ØD_2$ [mm] [in]
Outer diameter of flanges

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

L_1 [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] [in]
Nominal size

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

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 stored in the Easy Product Finder design program. 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]
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 program. 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_{vmin} equals zero) may result in unstable control or shut-off.

q_{vmax} [m³/h]; [l/s]; [CFM]
Upper limit of the operating range for the VAV terminal unit that can be set by customers: q_{vmax} can be set to less than or equal to q_{vNom} . In case of analogue signalling to volume flow controllers (which are typically used), the set maximum value (q_{vmax}) is allocated to the maximum setpoint signal (10 V) (see characteristic).

q_{vmin} [m³/h]; [l/s]; [CFM]
Lower limit of the operating range for the VAV terminal unit that can be set by customers: q_{vmin} should be set to less than or equal to q_{vmax} . Do not set 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 signalling to volume flow controllers (which are typically used), the set minimum value (q_{vmin}) is allocated to the minimum setpoint signal (0 or 2 V) (see characteristic).

q_v [m³/h]; [l/s]; [CFM]
Volume flow rate

Δ_{qv} [%]
Volume flow rate accuracy in relation to the setpoint (tolerance)

Δp_{st} [Pa] [in w.g.]
Static differential pressure

$\Delta_{pst\ min}$ [Pa] [in w.g.]
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 differential 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 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
All lengths are given in millimetres [mm] unless stated otherwise.

Basic unit
Unit for controlling a volume flow without an attached control component. The main components include the casing with sensor(s) to measure the effective 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 types of connection, acoustic characteristics (e.g. acoustic cladding or integral sound attenuator), volume flow rate range.

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 consists basically of a controller with effective pressure transducer (integral or external) and an integral actuator (Easy and Compact controllers) or external actuator (Universal or LABCONTROL controllers). Important distinguishing features: Transducer: dynamic transducer for clean air or static transducer for contaminated air. Actuator: slow-running actuator as standard, spring return actuator for safe position, or fast-running actuator. Interface: analogue interface or digital bus interface for the capturing of signals and data.

VAV terminal unit
Consists of a basic unit with an attached control component.

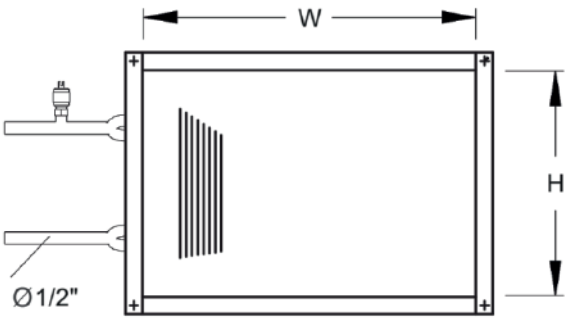
Construction and Dimensions

Hot Water Reheat Coil

- For terminal reheat of primary air;
- Has flanged connections on both ends of the hot water coil;
- Hot water coil is made from copper tubes with aluminum fin plates;
- Available with one to four rows of heating coil;
- Hot water connections on the side of the coil;
- Refer to the selection data for hot water coil.

No. of Rows	TVZ Size	125	160	200	250	315	400
		5"	6"	8"	10"	12"	16"
1	kg	5,4	5,9	7,3	7,7	10,4	12,7
	lb	12	13	16	17	23	28
2	kg	5,9	6,4	8,6	9,1	12,7	16,3
	lb	13	14	19	20	28	36
3	kg	6,4	7,3	10,0	10,9	15,4	20,4
	lb	14	16	22	24	34	45
4	kg	7,7	9,1	12,7	14,1	20,4	27,2
	lb	17	20	28	31	45	60

Table 1: Weight (dry) of hot water coils



Dimension	TVZ Size	125	160	200	250	315	400
		5"	6"	8"	10"	12"	16"
W	mm	200	310	460	600	800	900
	in	7 7/8	12 1/4	18 1/8	23 5/8	31 1/2	35 3/8
H	mm	152	152	203	203	254	356
	in	6	6	8	8	10	14

Table 2: Fin dimensions.

Reheat Coil Selection

TVZ SIZE		Coil	Air Flow		Air DT		Capacity		Air ΔP		Water Flow		Fluid DT		Fluid Press. Drop	
mm	in	Rows	m³/h	CFM	ºC	ºF	kW	MBH	Pa	in.w.g.	L/s	gpm	ºC	ºF	kPa	ft.w.g.
125	5"	1	19	32	26,7	48,1	0,49	2	2	0,01	0,01	0,17	11,1	20	0,03	0,01
			187	318	10,7	19,2	1,96	7	30	0,12	0,04	0,68	11,1	20	0,48	0,16
		2	19	32	45,4	81,8	0,84	3	2	0,01	0,02	0,29	11,1	20	0,18	0,06
			187	318	22,5	40,5	4,12	14	60	0,24	0,09	1,44	11,1	20	3,89	1,30
		3	19	32	51,4	92,5	0,95	3	5	0,02	0,02	0,33	11,1	20	0,18	0,06
			187	318	28,7	51,7	5,26	18	87	0,35	0,12	1,84	11,1	20	2,42	0,81
		4	19	32	57,5	103,5	1,06	4	5	0,02	0,02	0,37	11,1	20	0,21	0,07
			187	318	36,2	65,2	6,63	23	117	0,47	0,15	2,32	11,1	20	4,24	1,42
160	6"	1	31	53	28,5	51,3	0,87	3	2	0,01	0,02	0,30	11,1	20	0,12	0,04
			312	530	11,5	20,7	3,51	12	32	0,13	0,08	1,23	11,1	20	1,70	0,57
		2	31	53	43,6	78,5	1,33	5	2	0,01	0,03	0,46	11,1	20	0,27	0,09
			312	530	20,9	37,6	6,37	22	67	0,27	0,14	2,23	11,1	20	2,99	1,00
		3	31	53	53,1	95,6	1,62	6	5	0,02	0,04	0,57	11,1	20	0,39	0,13
			312	530	30,0	53,9	9,14	31	100	0,40	0,20	3,19	11,1	20	5,44	1,82
		4	31	53	58,7	105,6	1,79	6	5	0,02	0,04	0,63	11,1	20	0,51	0,17
			312	530	37,2	67,0	11,35	39	132	0,53	0,25	3,97	11,1	20	10,04	3,36
200	8"	1	50	85	31,0	55,8	1,52	5	2	0,01	0,03	0,53	11,1	20	0,36	0,12
			505	858	13,1	23,5	6,46	22	22	0,09	0,14	2,26	11,1	20	3,17	1,06
		2	50	85	48,9	88,1	2,39	8	2	0,01	0,05	0,84	11,1	20	0,87	0,29
			505	858	25,7	46,2	12,68	43	42	0,17	0,28	4,43	11,1	20	9,24	3,09
		3	50	85	53,9	97,0	2,64	9	5	0,02	0,06	0,92	11,1	20	0,63	0,21
			505	858	32,0	57,5	15,78	54	65	0,26	0,35	5,51	11,1	20	2,75	0,92
		4	50	85	59,4	107,0	2,91	10	5	0,02	0,06	1,02	11,1	20	0,72	0,24
			505	858	39,4	71,0	19,48	66	87	0,35	0,43	6,81	11,1	20	4,54	1,52
250	10"	1	75	127	28,9	51,9	2,11	7	2	0,01	0,05	0,74	11,1	20	0,51	0,17
			767	1303	11,5	20,8	8,65	30	37	0,15	0,19	3,02	11,1	20	3,44	1,15
		2	75	127	45,3	81,5	3,31	11	2	0,01	0,07	1,16	11,1	20	0,90	0,30
			767	1303	21,9	39,5	16,44	56	72	0,29	0,36	5,75	11,1	20	5,50	1,84
		3	75	127	54,3	97,7	3,97	14	5	0,02	0,09	1,39	11,1	20	1,32	0,44
			767	1303	30,8	55,4	23,09	79	109	0,44	0,51	8,07	11,1	20	12,58	4,21
		4	75	127	58,9	106,0	4,30	15	5	0,02	0,09	1,50	11,1	20	1,32	0,44
			767	1303	37,1	66,7	27,81	95	144	0,58	0,61	9,72	11,1	20	10,91	3,65
315	12"	1	131	222	29,6	53,3	3,78	13	2	0,01	0,08	1,32	11,1	20	1,23	0,41
			1278	2172	12,3	22,1	15,33	52	32	0,13	0,34	5,36	11,1	20	4,33	1,45
		2	131	222	46,4	83,6	5,93	20	2	0,01	0,13	2,07	11,1	20	2,36	0,79
			1278	2172	23,3	42,0	29,15	99	65	0,26	0,64	10,19	11,1	20	9,95	3,33
		3	131	222	54,1	97,4	6,92	24	5	0,02	0,15	2,42	11,1	20	2,72	0,91
			1278	2172	31,2	56,2	39,01	133	97	0,39	0,86	13,63	11,1	20	9,30	3,11
		4	131	222	58,7	105,7	7,50	26	5	0,02	0,17	2,62	11,1	20	1,61	0,54
			1278	2172	37,5	67,5	46,87	160	129	0,52	1,03	16,38	11,1	20	7,41	2,48
400	16"	1	212	360	29,6	53,3	6,14	21	2	0,01	0,14	2,15	11,1	20	2,84	0,95
			2095	3560	12,2	22,0	25,00	85	35	0,14	0,55	8,73	11,1	20	6,37	2,13
		2	212	360	43,9	79,0	9,09	31	2	0,01	0,20	3,18	11,1	20	2,39	0,80
			2095	3560	21,1	38,0	43,25	148	72	0,29	0,95	15,11	11,1	20	3,59	1,20
		3	212	360	53,3	95,9	11,03	38	5	0,02	0,24	3,86	11,1	20	3,23	1,08
			2095	3560	30,1	54,1	61,58	210	107	0,43	1,36	21,51	11,1	20	7,56	2,53
		4	212	360	58,7	105,7	12,17	42	5	0,02	0,27	4,25	11,1	20	1,64	0,55
			2095	3560	37,2	67,0	76,27	260	142	0,57	1,68	26,65	11,1	20	10,91	3,65

Table 3: Standard coil selection data for minimum and maximum air flow for each TVZ size.