



Easy controller,
Compactcontroller



Construction with acoustic
cladding and flange



Universal controller
(VARYCONTROL)



TROX UNIVERSAL
controller,
TROX LABCONTROL
controller



Tested to VDI 6022

VAV Terminal units Type TVR



For various standard applications

- Circular air terminal units for standard applications in supply air or extract aircsystems with variable volume flow rates
- Suitable for the control of volume flow rate, room pressure or duct pressure
- Electronic control components for different applications (Easy, Compact, Universal, and LABCONTROL)
- High control accuracy even with upstream bend ($R = 1D$)
- Closed blade air leakage to EN 1751, up to class 4
- Casing air leakage to EN 1751, class C
- Optional equipment and accessories
- Acoustic cladding for the reduction of case-radiated noise
- Secondary silencer CA (for Germany and Switzerland), CAH (for EMEA) or CF forthe reduction of air-regenerated noise
- Hot water heat exchanger WL and electric air heater EL for reheating the airflow

TROX® TECHNIK
The art of handling air

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CAV UNITS

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General information

Application

- Circular VAV terminal units for use in ventilation and airconditioning systems
- For controlling, restricting, or shutting off supply and 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

- Integral effective pressure sensor with 3 mm measuring holes (resistant to dust and pollution)
- 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

Nominal sizes

- 100, 125, 160, 200, 250, 315, 400 mm
- (4, 5, 6 ½, 8, 10, 12 ½, 16 in)

Variants

- TVR: VAV terminal unit
- TVR-D: VAV terminal unit with acoustic cladding
- TVR-FL: VAV terminal unit with flanges on both ends
- TVR-D-FL: VAV terminal unit with acoustic cladding and flanges on both ends
- Units with acoustic cladding and/or a circular silencer CA (for Germany and Switzerland), CH (for EMEA) or CF for demanding acoustic requirements
- Acoustic cladding cannot be retrofitted

Construction

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

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
- 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

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

Useful additions

- Circular silencer CA (for Germany and Switzerland), CH (for EMEA) or CF for demanding acoustic requirements
- Heat exchanger WL
- Electric air heater EL

Construction features

- Circular casing
- Spigot suitable for circular ducts to EN 1506 or EN 13180
- Spigots with groove for seal
- Position of the damper blade indicated externally at shaft extension
- TVR-FL: Flanges to EN 12220

Materials and surfaces

Galvanised sheet steel construction

- Casing and damper blade made of galvanised sheet steel
- Damper blade seal made of TPE plastic
- Aluminium sensor tubes
- Plastic plain bearings

Powder-coated construction (P1)

- Casing made of galvanised sheet steel, powder-coated
- Damper blade and shaft made of stainless steel 1.4301
- Sensor tubes made of aluminium, powder-coated

Stainless steel construction (A2)

- Casing, damper blade and shaft made of stainless steel 1.4301
- Sensor tubes made of aluminium, powder-coated

Variant with acoustic cladding (-D)

- Acoustic cladding made of galvanised sheet steel
- Rubber seal for the insulation of structure-borne noise
- Lining is mineral wool

Mineral wool

- To EN 13501, fire rating class A1, non-combustible
- RAL quality mark RAL-GZ 388
- Non-hazardous to health thanks to being highly biosoluble in accordance with the Ordinance on Hazardous Substances and Note Q of the European Directive (EC) No. 1272/2008

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Standards and guidelines

Fulfils 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:

NS 100

- EN 1751, Class 2
- Meets the general requirements of DIN 1946, part 4, with regard to the acceptable closed blade air leakage

NS 125 – 160

- EN 1751, Class 3

- Meets the increased requirements of DIN 1946, Part 4, with regard to the acceptable closed blade air leakage

NS > 160

- 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

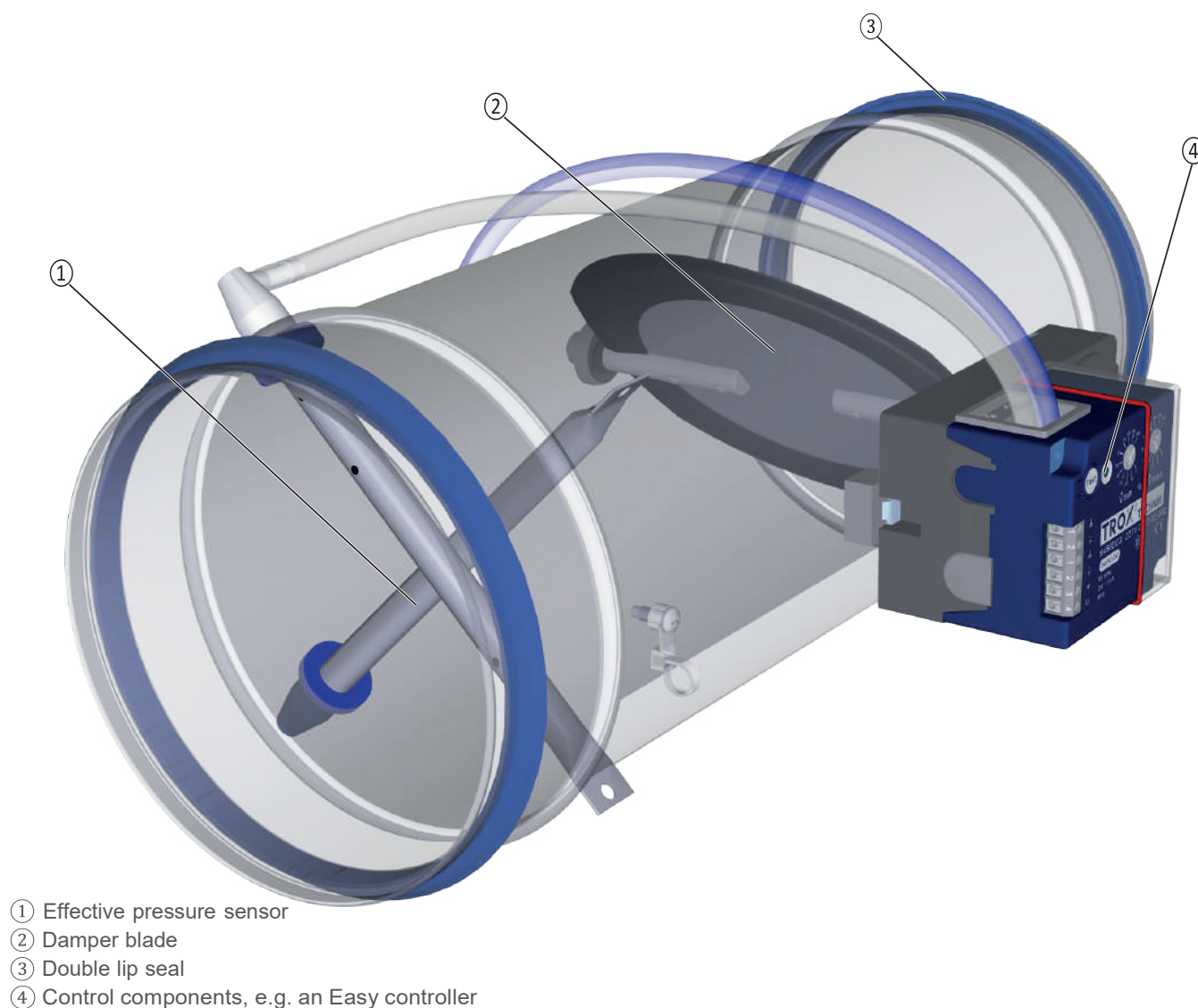
subject to wear

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.

Schematic illustration of the TVR



CAV UNITS

Technical Data and Quick Sizing

Technical data

Nominal sizes	100 – 400 mm or 4 – 16 in
Volume flow rate range	34 – 7591 m ³ /h or 10 – 2108 l/s or 20 – 4468 CFM
Volume flow rate control range (unit for dynamic effective pressure measurements)	Approx. 10 – 100% of the nominal volume flow rate
Volume flow rate control range (unit for static effective pressure measurements)	Approx. 15 to 100% of the nominal volume flow rate
Minimum differential pressure	Up to 117 Pa or 0,47 in w.g. (without circular silencer)
Maximum differential pressure	1000 Pa or 4,01 in w.g.
Operating temperature	10 to 50 °C or 50 to 122 °F

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 ($\Delta_{pstat,min}$) 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.

CAV UNITS

Quick Sizing

Volume flow rate ranges and minimum differential pressure values

Control component for dynamic pressure measurements – Easy (potentiometers)

Attachment: Easy

Nom. Size		qv [l/s]	qv [m³/h]	qv [CFM]	Δpstmin [Pa]				Δpstmin [in w.g.]				Δqv [±%]
[mm]	[in]				①	②	③	④	①	②	③	④	
100	4	10	34	20	1	1	1	2	0,00	0,00	0,00	0,01	16
100	4	38	136	80	12	14	16	19	0,05	0,06	0,06	0,08	9
100	4	66	239	141	35	42	50	57	0,14	0,17	0,20	0,23	7
100	4	94	341	201	71	86	101	116	0,29	0,35	0,41	0,47	6
125	5	16	55	32	1	1	1	2	0,00	0,00	0,00	0,01	16
125	5	62	223	131	12	14	16	18	0,05	0,06	0,06	0,07	8
125	5	108	390	230	37	43	49	55	0,15	0,17	0,20	0,22	7
125	5	155	558	328	75	87	100	112	0,30	0,35	0,40	0,45	6
160	6 ½	25	88	52	1	1	1	1	0,00	0,00	0,00	0,00	16
160	6 ½	99	357	210	11	13	14	15	0,04	0,05	0,06	0,06	9
160	6 ½	174	627	369	34	38	42	46	0,14	0,15	0,17	0,18	7
160	6 ½	248	896	527	69	77	86	94	0,28	0,31	0,35	0,38	6
200	8	40	143	84	1	1	1	1	0,00	0,00	0,00	0,00	16
200	8	162	582	343	11	12	13	14	0,04	0,05	0,05	0,06	8
200	8	283	1020	600	33	36	40	43	0,13	0,14	0,16	0,17	7
200	8	405	1459	859	67	74	81	87	0,27	0,30	0,33	0,35	6
250	10	60	216	127	1	1	1	1	0,00	0,00	0,00	0,00	16
250	10	245	881	519	8	9	9	10	0,03	0,04	0,04	0,04	9
250	10	430	1547	911	23	25	28	30	0,09	0,10	0,11	0,12	7
250	10	614	2212	1302	46	51	56	61	0,18	0,20	0,22	0,24	6
315	12 ½	100	359	211	1	1	1	1	0,00	0,00	0,00	0,00	16
315	12 ½	407	1464	862	5	6	7	7	0,02	0,02	0,03	0,03	8
315	12 ½	713	2568	1511	15	17	19	21	0,06	0,07	0,08	0,08	7
315	12 ½	1020	3673	2162	31	35	39	42	0,12	0,14	0,16	0,17	6
400	16	165	591	348	1	1	1	1	0,00	0,00	0,00	0,00	16
400	16	670	2413	1420	4	5	5	6	0,02	0,02	0,02	0,02	8
400	16	1177	4236	2493	12	14	15	16	0,05	0,06	0,06	0,06	7
400	16	1682	6058	3566	25	27	30	33	0,10	0,11	0,12	0,13	6

① Basic unit

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

③ Basic unit with circular silencer CF, insulation thickness 50 mm (2 in), length 1000 mm (40 in)

④ Basic unit with circular silencer CF, insulation thickness 50 mm (2 in), length 1500 mm (60 in)

CAV UNITS

Quick Sizing

Volume flow rate ranges and minimum differential pressure values

Control component dynamic measurement principle – q_v Extended

Attachments: BC0, BL0 **, BM0, BM0-J6

Nom. Size		qv [l/s]	qv [m³/h]	qv [CFM]	Δpstmin [Pa]				Δpstmin [in w.g.]				Δqv [±%]
[mm]	[in]				①	②	③	④	①	②	③	④	
100	4	10	34	20	1	1	1	2	0,00	0,00	0,00	0,01	16
100	4	46	165	97	17	20	24	28	0,07	0,08	0,10	0,11	8
100	4	83	297	175	54	65	77	88	0,22	0,26	0,31	0,35	6
100	4	118	428	252	111	135	158	182	0,45	0,54	0,63	0,73	5
125	5	16	55	32	1	1	1	2	0,00	0,00	0,00	0,01	16
125	5	75	270	159	18	21	24	27	0,07	0,08	0,10	0,11	8
125	5	134	484	285	57	66	75	84	0,23	0,26	0,30	0,34	6
125	5	194	699	411	117	137	156	175	0,47	0,55	0,63	0,70	5
160	6 ½	25	88	52	1	1	1	1	0,00	0,00	0,00	0,00	16
160	6 ½	120	433	255	17	18	20	22	0,07	0,07	0,08	0,09	8
160	6 ½	216	777	457	52	58	64	71	0,21	0,23	0,26	0,29	6
160	6 ½	311	1122	660	108	121	134	147	0,43	0,49	0,54	0,59	5
200	8	40	143	84	1	1	1	1	0,00	0,00	0,00	0,00	16
200	8	196	705	415	16	18	19	21	0,06	0,07	0,08	0,08	8
200	8	352	1266	745	51	56	61	66	0,20	0,22	0,24	0,26	6
200	8	507	1828	1076	105	116	126	137	0,42	0,47	0,51	0,55	5
250	10	60	216	127	1	1	1	1	0,00	0,00	0,00	0,00	16
250	10	297	1068	629	11	12	13	15	0,04	0,05	0,05	0,06	8
250	10	533	1919	1129	35	38	42	46	0,14	0,15	0,17	0,18	6
250	10	769	2771	1631	72	80	87	95	0,29	0,32	0,35	0,38	5
315	12 ½	100	359	211	1	1	1	1	0,00	0,00	0,00	0,00	16
315	12 ½	493	1774	1044	8	9	9	10	0,03	0,04	0,04	0,04	8
315	12 ½	886	3188	1876	24	26	29	32	0,10	0,10	0,12	0,13	6
315	12 ½	1278	4603	2709	49	55	60	66	0,20	0,22	0,24	0,26	5
400	16	165	591	348	1	1	1	1	0,00	0,00	0,00	0,00	16
400	16	812	2924	1721	6	7	7	8	0,02	0,03	0,03	0,03	8
400	16	1461	5258	3095	19	21	23	25	0,08	0,08	0,09	0,10	6
400	16	2108	7591	4468	38	43	47	51	0,15	0,17	0,19	0,20	5

① Basic unit

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

③ Basic unit with circular silencer CF, insulation thickness 50 mm (2 in), length 1000 mm (40 in)

④ Basic unit with circular silencer CF, insulation thickness 50 mm (2 in), length 1500 mm (60 in)

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

CAV UNITS

Quick Sizing

Volume flow rate ranges and minimum differential pressure values

Control component for dynamic pressure measurements – qv standard

Attachments: BUDN, BUDNF, LN0, LK0, LB0, XB0, XB4, (B13 *, B1B *)

Nom. Size		qv [l/s]	qv [m³/h]	qv [CFM]	Δpstmin [Pa]				Δpstmin [in w.g.]				Δqv [±%]
[mm]	[in]				①	②	③	④	①	②	③	④	
100	4	10	34	20	1	1	1	2	0,00	0,00	0,00	0,01	16
100	4	39	141	83	12	15	18	20	0,05	0,06	0,07	0,08	9
100	4	69	247	145	37	45	53	61	0,15	0,18	0,21	0,24	7
100	4	98	354	208	76	92	109	125	0,31	0,37	0,44	0,50	6
125	5	16	55	32	1	1	1	2	0,00	0,00	0,00	0,01	16
125	5	64	229	135	13	15	17	19	0,05	0,06	0,07	0,08	8
125	5	112	404	238	40	46	52	59	0,16	0,18	0,21	0,24	7
125	5	160	578	340	80	94	107	120	0,32	0,38	0,43	0,48	6
160	6 ½	25	88	52	1	1	1	1	0,00	0,00	0,00	0,00	16
160	6 ½	102	368	217	12	13	15	16	0,05	0,05	0,06	0,06	8
160	6 ½	180	648	381	36	41	45	49	0,14	0,16	0,18	0,20	7
160	6 ½	257	928	546	74	83	92	101	0,30	0,33	0,37	0,41	6
200	8	40	143	84	1	1	1	1	0,00	0,00	0,00	0,00	16
200	8	166	599	353	12	13	14	15	0,05	0,05	0,06	0,06	8
200	8	293	1056	622	35	39	42	46	0,14	0,16	0,17	0,18	6
200	8	420	1512	890	72	79	86	94	0,29	0,32	0,35	0,38	6
250	10	60	216	127	1	1	1	1	0,00	0,00	0,00	0,00	16
250	10	252	908	534	8	9	10	11	0,03	0,04	0,04	0,04	8
250	10	444	1600	942	24	27	29	32	0,10	0,11	0,12	0,13	7
250	10	636	2292	1349	49	55	60	65	0,20	0,22	0,24	0,26	6
315	12 ½	100	359	211	1	1	1	1	0,00	0,00	0,00	0,00	16
315	12 ½	419	1508	888	6	6	7	8	0,02	0,02	0,03	0,03	8
315	12 ½	738	2658	1564	17	19	20	22	0,07	0,08	0,08	0,09	6
315	12 ½	1057	3807	2241	33	37	42	46	0,13	0,15	0,17	0,18	6
400	16	165	591	348	1	1	1	1	0,00	0,00	0,00	0,00	16
400	16	691	2487	1464	5	5	5	6	0,02	0,02	0,02	0,02	8
400	16	1218	4383	2580	13	15	16	17	0,05	0,06	0,06	0,07	6
400	16	1744	6279	3696	26	29	32	35	0,10	0,12	0,13	0,14	5

① Basic unit

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

③ Basic unit with circular silencer CF, insulation thickness 50 mm (2 in), length 1000 mm (40 in)

④ Basic unit with circular silencer CF, insulation thickness 50 mm (2 in), length 1500 mm (60 in)

* Control component has been discontinued

CAV UNITS

Quick Sizing

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 *)**

Nom. Size		qv [l/s]	qv [m³/h]	qv [CFM]	Δpstmin [Pa]				Δpstmin [in w.g.]				Δqv [±%]
[mm]	[in]				①	②	③	④	①	②	③	④	
100	4	14	50	29	2	2	3	3	0,01	0,01	0,01	0,01	14
100	4	42	151	89	14	17	20	23	0,06	0,07	0,08	0,09	8
100	4	70	253	149	39	47	56	64	0,16	0,19	0,22	0,26	7
100	4	98	354	208	76	92	109	125	0,31	0,37	0,44	0,50	6
125	5	23	81	48	2	2	3	3	0,01	0,01	0,01	0,01	13
125	5	69	247	145	15	18	20	22	0,06	0,07	0,08	0,09	8
125	5	114	412	242	41	48	54	61	0,16	0,19	0,22	0,24	6
125	5	160	578	340	80	94	107	120	0,32	0,38	0,43	0,48	6
160	6 ½	36	129	76	2	2	2	2	0,01	0,01	0,01	0,01	14
160	6 ½	110	395	232	14	15	17	19	0,06	0,06	0,07	0,08	8
160	6 ½	184	662	390	38	42	47	51	0,15	0,17	0,19	0,20	7
160	6 ½	257	928	546	74	83	92	101	0,30	0,33	0,37	0,41	6
200	8	59	210	124	2	2	2	2	0,01	0,01	0,01	0,01	13
200	8	179	644	379	13	15	16	17	0,05	0,06	0,06	0,07	8
200	8	299	1078	634	37	41	44	48	0,15	0,16	0,18	0,19	6
200	8	420	1512	890	72	79	86	94	0,29	0,32	0,35	0,38	6
250	10	89	318	187	1	2	2	2	0,00	0,01	0,01	0,01	14
250	10	271	976	574	9	10	11	12	0,04	0,04	0,04	0,05	8
250	10	454	1634	962	25	28	31	33	0,10	0,11	0,12	0,13	7
250	10	636	2292	1349	49	55	60	65	0,20	0,22	0,24	0,26	6
315	12 ½	147	529	311	1	1	1	1	0,00	0,00	0,00	0,00	13
315	12 ½	451	1622	955	6	7	8	9	0,02	0,03	0,03	0,04	8
315	12 ½	754	2714	1597	17	19	21	23	0,07	0,08	0,08	0,09	6
315	12 ½	1057	3807	2241	33	37	42	46	0,13	0,15	0,17	0,18	6
400	16	242	871	513	1	1	1	1	0,00	0,00	0,00	0,00	13
400	16	743	2674	1574	5	6	6	7	0,02	0,02	0,02	0,03	8
400	16	1243	4476	2634	14	15	17	18	0,06	0,06	0,07	0,07	6
400	16	1744	6279	3696	26	29	32	35	0,10	0,12	0,13	0,14	5

① Basic unit

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

③ Basic unit with circular silencer CF, insulation thickness 50 mm (2 in), length 1000 mm (40 in)

④ Basic unit with circular silencer CF, insulation thickness 50 mm (2 in), length 1500 mm (60 in)

* Control component has been discontinued

CAV UNITS

Quick Sizing

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
100	4	10	34	20	32	18	< 15	< 15	43	27	20	15
100	4	46	165	97	48	36	31	27	58	45	38	34
100	4	83	297	175	53	42	37	33	64	51	45	41
100	4	118	428	252	57	45	n.V.	n.V.	67	55	49	45
125	5	16	55	32	34	19	< 15	< 15	46	30	23	18
125	5	75	270	159	47	36	31	28	59	46	41	37
125	5	134	484	285	52	42	37	34	63	52	47	43
125	5	194	699	411	53	44	n.V.	n.V.	65	54	49	46
160	6 ½	25	88	52	39	25	19	15	51	36	30	25
160	6 ½	120	433	255	50	39	35	32	62	50	45	42
160	6 ½	216	777	457	52	42	38	35	64	53	49	46
160	6 ½	311	1122	660	53	44	40	37	65	55	51	47
200	8	40	143	84	41	30	24	20	51	41	36	31
200	8	196	705	415	50	42	38	36	61	52	48	44
200	8	352	1266	745	52	44	41	39	62	54	51	48
200	8	507	1828	1076	52	46	43	41	63	56	52	50
250	10	60	216	127	41	32	26	23	51	41	37	33
250	10	297	1068	629	48	41	37	35	57	51	47	45
250	10	533	1919	1129	49	43	40	38	58	53	50	47
250	10	769	2771	1631	49	44	42	40	59	54	51	48
315	12 ½	100	359	211	44	36	31	27	54	47	42	37
315	12 ½	493	1774	1044	49	42	39	36	60	53	49	46
315	12 ½	886	3188	1876	50	44	41	39	61	55	51	49
315	12 ½	1278	4603	2709	51	46	43	41	62	56	53	50
400	16	165	591	348	45	38	33	29	58	53	48	43
400	16	812	2924	1721	46	40	36	34	59	54	50	47
400	16	1461	5258	3095	46	41	38	36	60	55	51	48
400	16	2108	7591	4468	47	42	40	39	60	55	52	49

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

- ① Basic unit
- ② Basic unit with circular silencer CF, insulation thickness 50 mm (2 in), length 500 mm (20 in)
- ③ Basic unit with circular silencer CF, insulation thickness 50 mm (2 in), length 1000 mm (40 in)
- ④ Basic unit with circular silencer CF, 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 $\Delta_{pst \min}$.

CAV UNITS

Quick Sizing

Quick sizing table for case-radiated noise

L_{PA} Controller including acoustic cladding
(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	①	②
100	4	10	34	20	15	< 15	26	15
100	4	46	165	97	31	20	41	30
100	4	83	297	175	36	25	47	36
100	4	118	428	252	40	29	50	39
125	5	16	55	32	17	< 15	28	17
125	5	75	270	159	30	19	41	30
125	5	134	484	285	35	24	46	35
125	5	194	699	411	38	27	49	38
160	6 ½	25	88	52	19	< 15	30	23
160	6 ½	120	433	255	30	23	42	35
160	6 ½	216	777	457	34	27	46	39
160	6 ½	311	1122	660	37	30	48	41
200	8	40	143	84	21	< 15	31	16
200	8	196	705	415	32	17	42	27
200	8	352	1266	745	36	21	46	31
200	8	507	1828	1076	39	24	49	34
250	10	60	216	127	25	< 15	34	19
250	10	297	1068	629	35	20	45	30
250	10	533	1919	1129	39	24	48	33
250	10	769	2771	1631	41	26	51	36
315	12 ½	100	359	211	29	< 15	39	21
315	12 ½	493	1774	1044	40	22	50	32
315	12 ½	886	3188	1876	44	26	54	36
315	12 ½	1278	4603	2709	46	29	57	39
400	16	165	591	348	30	< 15	43	27
400	16	812	2924	1721	39	23	52	36
400	16	1461	5258	3095	42	26	55	39
400	16	2108	7591	4468	44	28	57	41

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

① Basic unit

② Basic unit with acoustic cladding

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 optional acoustic cladding 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 for variable and constant air volume systems, suitable for supply or extract air, available in 7 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 control 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).

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

Special features

- Integral effective pressure sensor with 3 mm measuring holes (resistant to dust and pollution)
- 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

Materials and surfaces

- Casing and damper blade made of galvanised sheet steel
- Damper blade seal made of TPE plastic
- Aluminium sensor tubes
- Plastic plain bearings

Connection

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

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 the volume flow rates without adjustment device via V_{min} and V_{max} potentiometers

- 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: 100 to 400 mm or 4 to 16 in
- Volume flow rate range: 34 – 6058 m³/h or 10 – 1682 l/s or 20 – 3566 CFM
- Volume flow rate control range (unit for dynamic effective pressure measurements): approx. 10 to 100 % of the nominal volume flow rate
- Minimum differential pressure: 1 – 117 Pa or 0,00 – 0,47 in w.g.
- Maximum differential pressure: 1000 Pa or 4,01 Pa
- Closed blade air leakage, class 2, 3 or 4 depending on nominal size.

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.

- 24 V AC/DC supply voltage
- Signal voltages 0 – 10 V DC
- Possible override controls with external switches using volt-free contacts: CLOSE, OPEN, q_{vmin} and q_{vmax}
- Potentiometers with percentage scales to set the volume flow rates q_{vmin} and q_{vmax}
- The actual value signal relates to the nominal volume flow rate such that commissioning and subsequent adjustment are simplified
- Clearly visible external indicator light for signalling the functions: Set, not set, and power failure
- Electrical connections with screw terminals
- Single or double terminals (depending on control component) for looping the supply voltage, i.e. for the simple connection of voltage transmission to the next controller.

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 Easy attachment)

TVR – D / 200 (8") / D2 / Easy

| | | | |
 1 2 5 6 7

1 Type

TVR VAV terminal unit

2 Acoustic cladding

No entry: none

D With acoustic cladding

5 Nominal size [mm]; [in]

100, 125, 160, 200, 250, 315, 400

4", 5", 6 1/2", 8", 10", 12 1/2", 16"

Order example: TVR-D/200/D2/Easy

Type	TVR
Acoustic cladding	With acoustic cladding
Nominal size [mm];[in]	200 mm (8 in)
Accessories	Double lip seal both ends
Attachments (control components)	Volume flow controller, dynamic, analogue interface, setting of q_{Vmin} and q_{Vmax} with potentiometers (by others)

Order example: TVR/125/D2/Easy

Type	TVR
Acoustic cladding	Without acoustic cladding
Nominal size [mm];[in]	125 mm (5")
Accessories	Double lip seal both ends
Attachments (control components)	Volume flow controller, dynamic, analogue interface, setting of q_{Vmin} and q_{Vmax} with potentiometers (by others)

Order code for volume flow control (with VARYCONTROL attachment)

TVR – D – A2 – FL / 160 / G2 / XD4 / V 0 / 200 – 900 [m³/h] / NO

| | | | | | | | | | |
 1 2 3 4 5 6 7 9 10 11 12

1 Type

TVR VAV terminal unit

2 Acoustic cladding

No entry: none

D With acoustic cladding

3 Material

No entry: galvanised sheet steel

P1 Powder-coated RAL 7001 (silver grey)

A2 Stainless steel construction

4 Duct connection

No entry: push-fit, suitable for ducts according to EN 1506; with groove for optional lip seal

FL Flanges both ends (not for TVR-D-P1)

5 Nominal size [mm]; [in]

100, 125, 160, 200, 250, 315, 400 mm

4, 5, 6 1/2, 8, 10, 12 1/2, 16 in

6 Accessories

No entry: without accessories

D2 Double lip seal both ends

G2 Matching flanges for both ends

7 Attachments (control components)

For example

BC0 Compact controller

XD4 Universal controller (VARYCONTROL)

9 Operating mode

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

V Variable operation (adjustable setpoint value range)

10 Signal voltage range

For the actual and setpoint value signals

0 0 – 10 V DC

2 2 – 10 V DC

11 Operating values for factory setting

Volume flow rate [m³/h or l/s] q_{Vconst}
(with operating mode F)

q_{Vmin} – (with operating mode V)
 q_{Vmax}

NO Power off to open (Normally Open)
NC Power off to close (Normally Closed)

12 Damper blade position

Only with spring return actuators

Order example: TVR-D-A2-FL/160/G2/XD4/V0/200-900[m³/h]/NO

Type	TVR
Acoustic cladding	With acoustic cladding
Material	Stainless steel construction
Duct connection	Flanges on both ends
Nominal size [mm];[in]	160 mm (6 ½ in)
Accessories	Matching flanges for both ends
Attachments (control components)	VARYCONTROL Universal controller; static transducer; analogue control; safe position with spring
Operating mode	Variable operation
Signal voltage range	0 – 10 V DC
Operating values for factory setting	200 – 900 m³/h or 118-530 CFM
Damper blade position	Power off to open (Normally Open)

Order example: TVR/200/XD4/V2/500-1200[m³/h]/NO

Type	TVR
Acoustic cladding	Without acoustic cladding
Material	Galvanised sheet steel
Duct connection	Push-fit, suitable for ducts according to EN 1506; with groove for optional lip seal
Nominal size [mm]	200 mm (8 in)
Accessories	Without accessories
Attachments (control components)	VARYCONTROL Universal controller; static transducer; analogue control; safe position with spring
Operating mode	Variable operation
Signal voltage range	2 – 10 V DC
Operating values for factory setting	500 – 1200 m³/h or 294-706 CFM
Damper blade position	Power off to open (Normally Open)

CAV UNITS

Order Code

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

TVR – D – A2 – FL / 160 / G2 / TUNF / RS / M / 0 / UMZ / ... / NC
 1 2 3 4 5 6 7 8 9 10 11 12 13

1 Type

TVR VAV terminal unit

2 Acoustic cladding

No entry: none

D With acoustic cladding

3 Material

No entry: galvanised sheet steel

P1 Powder-coated RAL 7001 (silver grey)

A2 Stainless steel construction

4 Duct connection

No entry: push-fit, suitable for ducts according to EN 1506; with groove for optional lip seal

FL Flanges both ends (not for TVR-D-P1)

5 Nominal size [mm]; [in]

100, 125, 160, 200, 250, 315, 400 mm

4, 5, 6 1/2, 8, 10, 12 1/2, 16 in

6 Accessories

No entry: without accessories

D2 Double lip seal both ends

G2 Matching flanges for both ends

7 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)

8 Equipment function

Room control

RS Supply air controller (Room Supply)

RE Extract air controller (Room Extract)

9 Operating mode

F Room master or single controller, constant setpoint value

M Room master or single controller, variable setpoint value

S Slave controller (only with room solutions)

10 Signal voltage range

0 0 – 10 V DC

2 2 – 10 V DC

11 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: without communication interface

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: no zero point correction

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

12 Operating values for factory setting

Volume flow rate [m³/h or l/s or CFM]

For operating mode F

q_{Vconst} : 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_{Vconst_sup} : constant supply air (room value)

q_{Vconst_ext} : constant extract air (room value)

q_{Vdiff} : supply air/extract air difference (room value)

For operating mode M

q_{Vmin} : minimum volume flow rate^{1, 2}

q_{Vmax} : 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_{Vconst_sup} : constant supply air (room value)

q_{Vconst_ext} : constant extract air (room value)

q_{Vdiff} : 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_{Vmin} , q_{Vmax} or q_{Vconst} apply to the controller

² Room solutions: q_{Vmin} , q_{Vmax} , q_{Vconst} apply to the room

³ For more information on room solutions with several TROX UNIVERSAL controllers connected with plug and play and for order examples please refer to the product datasheet

13 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

BE-LCD with 40-character display

CAV UNITS

Order Code

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

TVR	-	D	-	A2	-	FL	/	160	/	G2	/	TUNF	/	RS	/	M	/	0	/	UMZ	/	...	/	NC
1		2		3		4		5		6		7		8		9		10		11		12		13

1 Type

TVR VAV terminal unit

2 Acoustic cladding

No entry: none

D With acoustic cladding

3 Material

No entry: galvanised sheet steel

P1 Powder-coated RAL 7001 (silver grey)

A2 Stainless steel construction

4 Duct connection

No entry: push-fit, suitable for ducts according to EN 1506; with groove for optional lip seal

FL Flanges both ends (not for TVR-D-P1)

5 Nominal size [mm]; [in]

100, 125, 160, 200, 250, 315, 400 mm

4, 5, 6 ½, 8, 10, 12 ½, 16 in

6 Accessories

No entry: without accessories

D2 Double lip seal both ends

G2 Matching flanges for both ends

7 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)

8 Equipment function

Room control

RS Supply air controller (Room Supply)

RE Extract air controller (Room Extract)

9 Operating mode

F Room master or single controller, constant setpoint value

M Room master or single controller, variable setpoint value

S Slave controller (only with room solutions)

10 Signal voltage range

0 0 – 10 V DC

2 2 – 10 V DC

11 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: without communication interface

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: no zero point correction

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

12 Operating values for factory setting

Volume flow rate [m³/h or l/s or CFM]

For operating mode F

q_{Vconst} : 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_{Vconst_sup} : constant supply air (room value)

q_{Vconst_ext} : constant extract air (room value)

q_{Vdiff} : supply air/extract air difference (room value)

For operating mode M

q_{Vmin} : minimum volume flow rate^{1, 2}

q_{Vmax} : 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_{Vconst_sup} : constant supply air (room value)

q_{Vconst_ext} : constant extract air (room value)

q_{Vdiff} : 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_{Vmin} , q_{Vmax} or q_{Vconst} apply to the controller

² Room solutions: q_{Vmin} , q_{Vmax} , q_{Vconst} apply to the room

³ For more information on room solutions with several TROX UNIVERSAL controllers connected with plug and play and for order examples please refer to the product datasheet

13 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

BE-LCD with 40-character display

CAV UNITS

Order Code

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

TVR	-	D	-	A2	-	FL	/	160	/	G2	/	TUNF	/	RS	/	M	/	0	/	UMZ	/	...	/	NC
1		2		3		4		5		6		7		8		9		10		11		12		13

1 Type

TVR VAV terminal unit

2 Acoustic cladding

No entry: none

D With acoustic cladding

3 Material

No entry: galvanised sheet steel

P1 Powder-coated RAL 7001 (silver grey)

A2 Stainless steel construction

4 Duct connection

No entry: push-fit, suitable for ducts according to EN 1506; with groove for optional lip seal

FL Flanges both ends (not for TVR-D-P1)

5 Nominal size [mm]; [in]

100, 125, 160, 200, 250, 315, 400 mm

4, 5, 6 ½, 8, 10, 12 ½, 16 in

6 Accessories

No entry: without accessories

D2 Double lip seal both ends

G2 Matching flanges for both ends

7 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)

8 Equipment function

Room control

RS Supply air controller (Room Supply)

RE Extract air controller (Room Extract)

9 Operating mode

F Room master or single controller, constant setpoint value

M Room master or single controller, variable setpoint value

S Slave controller (only with room solutions)

10 Signal voltage range

0 0 – 10 V DC

2 2 – 10 V DC

11 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: without communication interface

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: no zero point correction

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

12 Operating values for factory setting

Volume flow rate [m³/h or l/s or CFM]

For operating mode F

q_{Vconst} : 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_{Vconst_sup} : constant supply air (room value)

q_{Vconst_ext} : constant extract air (room value)

q_{Vdiff} : supply air/extract air difference (room value)

For operating mode M

q_{Vmin} : minimum volume flow rate^{1, 2}

q_{Vmax} : 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_{Vconst_sup} : constant supply air (room value)

q_{Vconst_ext} : constant extract air (room value)

q_{Vdiff} : 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_{Vmin} , q_{Vmax} or q_{Vconst} apply to the controller

² Room solutions: q_{Vmin} , q_{Vmax} , q_{Vconst} apply to the room

³ For more information on room solutions with several TROX UNIVERSAL controllers connected with plug and play and for order examples please refer to the product datasheet

13 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

BE-LCD with 40-character display

CAV UNITS

Order Code

No entry: without digital communication interface

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: without volume flow rate measurement

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

Option 4: Automatic zero point correction

No entry: no automatic zero point correction

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

12 Operating values for factory setting

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

For operating mode MFP or SFP

Δp_{const} : constant differential pressure

For operating mode MVP or 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

Order example: TVR-D-FL/160/G2/TUNF/PRS/MFP/0/UMZ/250[Pa]/NC

Type	TVR
Acoustic cladding	Without acoustic cladding
Material	Galvanised sheet steel
Duct connection	Push-fit, suitable for ducts according to EN 1506; with groove for optional lip seal
Nominal size	160 mm (6 ½ in)
Accessories	Matching flanges for both ends
Attachments (control components)	TROX UNIVERSAL controller with spring return actuator (150 s)
Equipment function	Room pressure controller – supply air (Pressure Room Supply)
Operating mode	Room master or single controller, constant pressure setpoint value
Signal voltage range	0 – 10 V DC
Expansion modules	With EM-TRF-USV (including battery pack) for uninterruptible 230 V AC power supply (UPS) With EM-BAC-MOD for Modbus RTU Without volume flow rate measurement With EM-AUTOZERO solenoid valve for automatic zero point correction
Damper blade position	250 Pa (1,00 in w.g.)

Order code for room control (with EASYLAB attachment)

TVR	-	D	-	...	-	FL	/	160	/	G2	/	ELAB	/	S	/	RS	/	UMZ	/	LAB	/	...
1		2		3		4		5		6		7		8		9		11		12		13

1 Type

TVR VAV terminal unit

2 Acoustic cladding

No entry: none

single controllers enter 0

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

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

$q_{v\text{const_sup}}$: constant supply air (room value)

$q_{v\text{const_ext}}$: 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 TROX UNIVERSAL controllers connected with plug and play and for order examples please refer to the product datasheet

13 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 pressure measurement kit

Optional room control panel

BE-LCD with 40-character display

CAV UNITS

Order Code

A2 Stainless steel construction

4 Duct connection

No entry: push-fit, suitable for ducts according to EN 1506; with groove for optional lip seal

FL Flanges both ends (not for TVR-D-P1)

5 Nominal size [mm]; [in]

100, 125, 160, 200, 250, 315, 400 mm

4, 5, 6 ½, 8, 10, 12 ½, 16 in

6 Accessories

No entry: none

D2 Double lip seal both ends

G2 Matching flanges on both ends

7 Attachments (control components)

ELAB EASYLAB controller TCU3

8 Actuators

S Fast-running actuator (3 s)

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

9 Equipment function

Room control

RS Supply air controller (Room Supply)

RE Extract air controller (Room Extract)

PC Room pressure controller (Pressure Control)

11 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: Automatic zero point correction

No entry: none

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

12 Additional functions

Without room management function

LAB extract air led system (Laboratory)

CLR supply air led system (Clean Room)

With active room management function

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

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

13 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 (only for devices with RMF)

BE-LCD 40-character display

Differential pressure transducers required for room pressure control have to be ordered separately or provided by others, 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: TVR-D-FL/200/D2/ELAB/SD/RS/MZ/LAB-RMF/2000/1500/2500/100/100/200

Acoustic cladding	With
Duct connection	Flanges on both ends
Material	galvanised sheet steel
Nominal size	200 mm
Accessories	Double lip seal both ends
Attachments (control components)	EASYLAB controller TCU3
Actuator	Fast-running actuator (3 s) with digital communication interface (TROX HPD)
Equipment function	Supply air controller (Room Supply)
Expansion modules	Expansion modules EM-BAC-MOD for Modbus RTU and EM-AUTOZERO for automatic zero point correction
Additional function	Room management function for extract air led system, e.g. laboratory Standard mode = 2000 m³/h Reduced operation = 1500 m³/h Increased operation = 2500 m³/h Constant supply air = 100 m³/h Constant extract air = 100 m³/h Supply air/extract air difference = 200 m³/h
Operating values	

Order code for single operation (with EASYLAB attachment)

TVR – D – ... – FL / 160 / G2 / ELAB / S / EC – E0 / UMZ / ...
 1 2 3 4 5 6 7 8 9 10 11 13

1 Type

TVR VAV terminal unit

CAV UNITS

Order Code

2 Acoustic cladding

No entry: none

D With acoustic cladding

3 Material

No entry: galvanised sheet steel

P1 Powder-coated RAL 7001 (silver grey)

A2 Stainless steel construction

4 Duct connection

No entry: push-fit, suitable for ducts according to EN 1506; with groove for optional lip seal

FL Flanges both ends (not for TVR-D-P1)

5 Nominal size [mm]; [in]

100, 125, 160, 200, 250, 315, 400 mm

4, 5, 6 ½, 8, 10, 12 ½, 16 in

6 Accessories

No entry: none

D2 Double lip seal both ends

G2 Matching flanges on both ends

7 Attachments (control components)

ELAB EASYLAB controller TCU3

8 Actuators

S Fast-running actuator (3 s)

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

9 Equipment function

Single operation

SC Single controller – supply air (Supply Controller)

EC Single controller – extract air (Extract Controller) **10 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 switch contact)

11 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 correction

No entry: none

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

13 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}

Order example: TVR-P1/100/ELAB/S/EC-2P/100/300

Acoustic cladding	Without
Duct connection	Push-fit
Material	Galvanised sheet steel – surface powder-coated, RAL 7001, silver grey
Nominal size	100 mm (4 in)
Accessories	Without
Attachments (control components)	EASYLAB controller TCU3
Actuator	Fast-running actuator (3 s)
Equipment function	Single controller – extract air
Expansion modules	Switch contact for 2 volume flow rate values (by others) Without
Operating values	$q_{v1} = 100 \text{ m}^3/\text{h}$ (59 CFM) $q_{v2} = 300 \text{ m}^3/\text{h}$ (177 CFM)

CAV UNITS

Order Code

Order code for fume cupboard control (with EASYLAB attachment)

TVR – D – ... – FL / 160 / G2 / ELAB / S / FH – VS / UMZS / 200 – 900 [m³/h]

1 2 3 4 5 6 7 8 9 10 11

1 Type

TVR VAV terminal unit

2 Acoustic cladding

No entry: none

D With acoustic cladding

3 Material

No entry: galvanised sheet steel

P1 Powder-coated RAL 7001 (silver grey)

A2 Stainless steel construction

4 Duct connection

No entry: push-fit, suitable for ducts according to EN 1506; with groove for optional lip seal

FL Flanges both ends (not for TVR-D-P1)

5 Nominal size [mm]; [in w.g.]

100, 125, 160, 200, 250, 315, 400

4, 5, 6 ½, 8, 10, 12 ½, 16 in

6 Accessories

No entry: none

D2 Double lip seal both ends

G2 Matching flanges on both ends

7 Attachments (control components)

ELAB EASYLAB controller TCU3

8 Actuators

S Fast-running actuator (3 s)

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

9 Equipment function

Fume cupboard control

With face velocity transducer

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

velocity (with face velocity transducer)

With face velocity transducer and sash distance sensor

FH-VD Fume cupboard control – optimised control strategy based on face velocity (with face velocity transducer and 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 (by others) for switching steps

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

FH-3P Fume cupboard control – 3 switching steps (for two switch contacts, by others)

Order example: TVR/200/D2/ELAB/FH-2P/TS/200 – 700

Acoustic cladding

Nominal size

Duct connection

Accessories

Attachments (control components)

Actuator

Equipment function

Expansion modules

Without signalling

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

10 Expansion modules

Option 1: Supply

voltageNo 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 correction

No entry: none

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

Option 4:

LightingNo entry:

none

S with EM-LIGHT, wired socket for the connection of lighting andfor switching the lighting on/off using the control panel (only with EM-TRF or EM-TRF-USV)

11 Operating values for factory setting

Volume flow rate [m³/h, l/s or CFM]

Depending on the equipment function

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 EN 14175

BE-SEG-02 OLED display

BE-LCD 40-character display

Without

200 mm (8 in)

Push-fit

Double lip seal both ends

EASYLAB controller TCU3

Fast-running actuator (3 s)

Fume cupboard control with 2 switching steps(for one switch contact, by others)

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

with expansion module EM-LIGHT

for the connection of lighting and for switching the lighting on/off

CAV UNITS

Variants

Operating values

$q_{v1} = 200 \text{ m}^3/\text{h}$ (118 CFM)

$q_{v2} = 700 \text{ m}^3/\text{h}$ (412 CFM)

Variants

VAV terminal unit, variant TVR



TVR with attachment BC0

- Spigot
-

VAV terminal unit, variant TVR-D



- With acoustic cladding
- For rooms where the case-radiated noise of the unit is not sufficiently reduced by a false ceiling
- The circular ducts for the room under consideration must have adequate acoustic insulation (provided by others) on the fan and room ends
- Acoustic cladding cannot be retrofitted

CAV UNITS

Variants

VAV terminal unit, variant TVR-FL



- With flanges on both ends to make detachable connections to the ducting

VAV terminal unit, variant TVR-D-FL



- With flanges on both ends to make detachable connections to the ducting
- With acoustic cladding
- For rooms where the case-radiated noise of the unit is not sufficiently reduced by a false ceiling
- The circular ducts for the room under consideration must have adequate acoustic insulation (provided by others) on the fan and room ends
- Acoustic cladding cannot be retrofitted
- The acoustic cladding is always galvanised steel, also for powder-coated (P1) and stainless steel (A2) terminal units
- TVR variants that are powder-coated (P1) or stainless steel (A2) constructions and have a flange (FL) cannot have acoustic cladding (D)

CAV UNITS

Variants

Material

Standard construction

Order code detail	Part	Material
–	Shaft	Galvanised steel
	Effective pressure sensor	Aluminium tube
	Casing	Galvanised sheet steel
	Plain bearings	Thermoplastic polyurethane (TPU)
	Damper blade	Galvanised sheet steel
	Damper blade seal	Thermoplastic elastomer (TPE)
	Anti-rotation lock	Easy, BC0: EPDM; other: galvanised steel

Powder-coated construction

Order code detail	Part	Material
P1	Shaft	Stainless steel, material no. 1.4305
	Effective pressure sensor	Aluminium - powder coated, RAL 7001, silver grey
	Casing	Galvanised sheet steel - powder coated, RAL 7001, silver grey
	Plain bearings	Thermoplastic polyurethane (TPU)
	Damper blade	Stainless steel, material no. 1.4301
	Damper blade seal	Thermoplastic elastomer (TPE)
	Anti-rotation lock	Easy, BC0: EPDM; other: galvanised steel

Stainless steel construction

Order code detail	Part	Material
A2	Shaft	Stainless steel, material no. 1.4305
	Effective pressure sensor	Aluminium - powder coated, RAL 7001, silver grey
	Casing	Stainless steel, material no. 1.4301
	Plain bearings	Thermoplastic polyurethane (TPU)
	Damper blade	Stainless steel, material no. 1.4301
	Damper blade seal	Thermoplastic elastomer (TPE)
	Anti-rotation lock	Easy, BC0: EPDM; other: galvanised steel

CAV UNITS

Dimensions and weight

Optional acoustic cladding

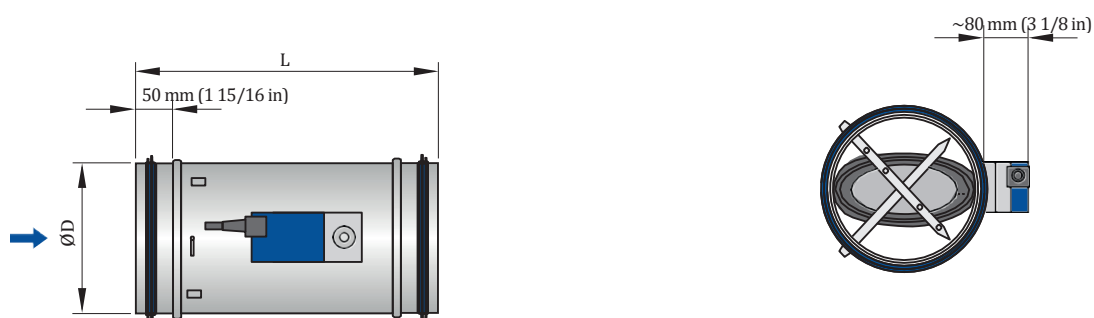
Order code detail	Part	Material
D	Lining	Mineral wool to EN 13501, fire rating class A1, non-combustible
	Acoustic cladding casing	Galvanised sheet steel
	Insulation of structure-borne noise	Polyethylene, PE

Optional double lip seal

Order code detail	Part	Material
D2	Double lip seal	Rubber, EPDM

Dimensions and weight

Terminal units without acoustic cladding (TVR)



Note:

The overall length L depends on nominal size and selected control component.

Note:

The illustration shows control component types Easy, Compact. For individual dimensions, see section on space requirements for commissioning and maintenance.

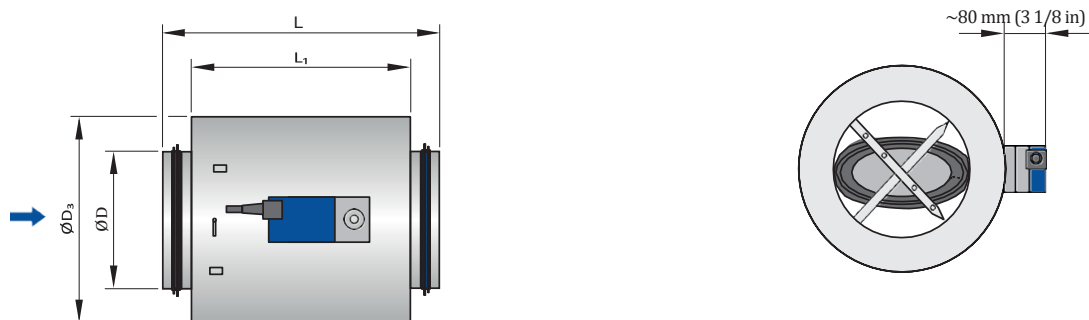
Dimensions/weight of TVR

Nominal Size		Easy, Compact		Universal, LABCONTROL		ØD		m	
[mm]	[in]	L [mm]	L [in]	L [mm]	L [in]	[mm]	[in]	[kg]	[lb]
100	4	310	12 3/16	600	23 5/8	99	3 7/8	3,3	7,3
125	5	310	12 3/16	600	23 5/8	124	4 7/8	3,6	7,9
160	6 1/2	400	15 3/4	600	23 5/8	159	6 1/4	4,2	9,3
200	8	400	15 3/4	600	23 5/8	199	7 13/16	5,1	11,2
250	10	400	15 3/4	600	23 5/8	249	9 13/16	6,1	13,4
315	12 1/2	500	19 11/16	600	23 5/8	314	12 3/8	7,2	15,9
400	16	500	19 11/16	600	23 5/8	399	15 11/16	9,4	20,7

CAV UNITS

Dimensions and weight

VAV terminal unit with acoustic cladding (TVR-D)



Note:
The overall lengths L and L1 depend on nominal size and selected control component.

Note:
The illustration shows control component types Easy, Compact. For individual dimensions, see section on space requirements for commissioning and maintenance.

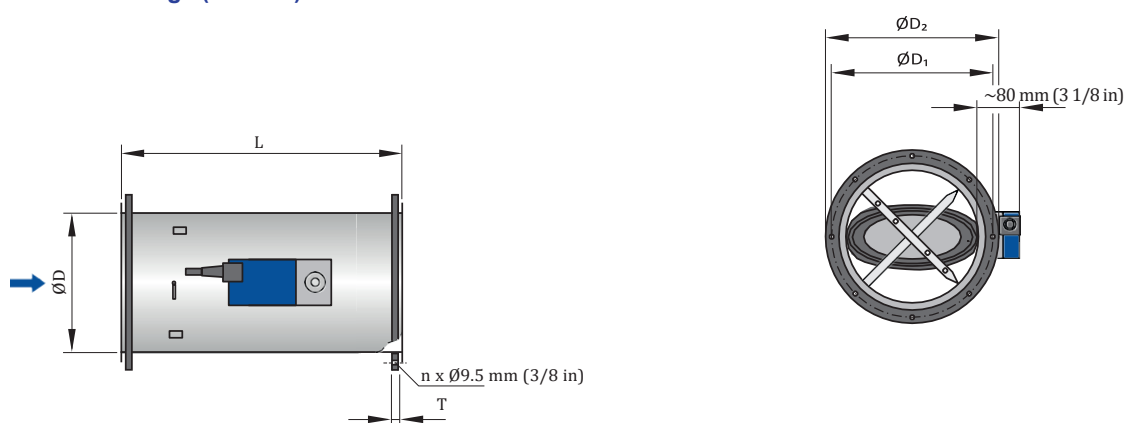
Dimensions/weight of TVR-D

Nominal Size		Easy, Compact				Universal, LABCONTROL								m	
[mm]	[in]	L [mm]	L [in]	L1 [mm]	L1 [in]	L [mm]	L [in]	L1 [mm]	L1 [in]	ØD [mm]	ØD [in]	ØD ₃ [mm]	ØD ₃ [in]	[kg]	[lb]
100	4	310	12 3/16	232	9 1/8	600	23 5/8	517	20 3/8	99	3 7/8	199	7 13/16	7,2	15,9
125	5	310	12 3/16	232	9 1/8	600	23 5/8	517	20 3/8	124	4 7/8	219	8 5/8	8,5	18,7
160	6 1/2	400	15 3/4	312	12 5/16	600	23 5/8	517	20 3/8	159	6 1/4	261	10 1/4	11	24,3
200	8	400	15 3/4	312	12 5/16	600	23 5/8	517	20 3/8	199	7 13/16	299	11 3/4	13,9	30,6
250	10	400	15 3/4	312	12 5/16	600	23 5/8	517	20 3/8	249	9 13/16	354	13 15/16	15,9	35,1
315	12 1/2	500	19 11/16	417	16 7/16	600	23 5/8	517	20 3/8	314	12 3/8	416	16 3/8	18	39,7
400	16	500	19 11/16	417	16 7/16	600	23 5/8	517	20 3/8	399	15 11/16	498	19 5/8	22,6	49,8

CAV UNITS

Dimensions and weight

Terminal unit with flange (TVR-FL)



Note:
The overall length L depends on nominal size and selected control component.

Note:
The illustration shows control component types Easy, Compact. For individual dimensions, see section on space requirements for commissioning and maintenance.

Dimensions/weight of TVR-FL

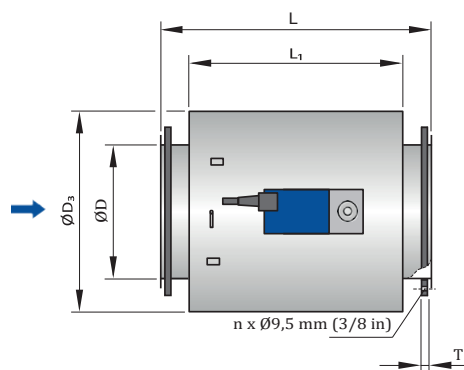
Nominal Size		Easy, Compact		Universal, LABCONTROL		ØD		ØD ₁		ØD ₂				m	
[mm]	[in]	L [mm]	L [in]	L [mm]	L [in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	D	n	[kg]	[lb]
100	4	298	11 3/4	588	23 1/8	99	3 7/8	132	5 3/16	152	6	4	4	3,9	8,6
125	5	298	11 3/4	588	23 1/8	124	4 7/8	157	6 3/16	177	6 15/16	4	4	4,2	9,3
160	6 1/2	388	15 1/4	588	23 1/8	159	6 1/4	192	7 9/16	212	8 3/8	4	6	5,3	11,7
200	8	388	15 1/4	588	23 1/8	199	7 13/16	233	9 3/16	253	9 15/16	4	6	6,5	14,3
250	10	388	15 1/4	588	23 1/8	249	9 13/16	283	11 1/8	303	11 15/16	4	6	7,8	17,2
315	12 1/2	488	19 3/16	588	23 1/8	314	12 3/8	352	13 7/8	378	14 7/8	4	8	10,3	22,7
400	16	488	19 3/16	588	23 1/8	399	15 11/16	438	17 1/4	464	18 1/4	4	8	13,3	29,3

Note: Tolerance for dimension L: ± 5 mm (3/16 in)

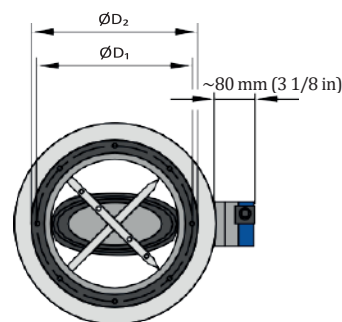
CAV UNITS

Dimensions and weight

Terminal unit with acoustic cladding and flange (TVR-D-FL)



Note:
The overall lengths L and L1 depend on nominal size and selected control component.



Note:
The illustration shows control component types Easy, Compact. For individual dimensions, see section on space requirements for commissioning and maintenance.

Dimensions/weight of TVR-D-FL

Nominal Size		Easy, Compact				Universal, LABCONTROL				ØD		ØD ₁		ØD ₂		ØD ₃		n	m	
[mm]	[in]	L [mm]	L [in]	L1 [mm]	L1 [in]	L [mm]	L [in]	L1 [mm]	L1 [in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]		[kg]	[lb]
100	4	298	11 3/4	232	9 1/8	588	23 1/8	517	20 3/8	99	3 7/8	132	5 3/16	152	6	199	7 13/16	4	7,8	17,2
125	5	298	11 3/4	232	9 1/8	588	23 1/8	517	20 3/8	124	4 7/8	157	6 3/16	177	6 15/16	219	8 5/8	4	9,1	20,1
160	6 1/2	388	15 1/4	312	12 5/16	588	23 1/8	517	20 3/8	159	6 1/4	192	7 9/16	212	8 3/8	261	10 1/4	6	12,1	26,7
200	8	388	15 1/4	312	12 5/16	588	23 1/8	517	20 3/8	199	7 13/16	233	9 3/16	253	9 15/16	299	11 3/4	6	14,3	31,5
250	10	388	15 1/4	312	12 5/16	588	23 1/8	517	20 3/8	249	9 13/16	283	11 1/8	303	11 15/16	354	14	6	17,6	38,8
315	12 1/2	488	19 3/16	417	16 7/16	588	23 1/8	517	20 3/8	314	12 3/8	352	13 7/8	378	14 7/8	416	16 3/8	8	21,2	46,7
400	16	488	19 3/16	417	16 7/16	588	23 1/8	517	20 3/8	399	15 11/16	438	17 1/4	464	18 1/4	498	19 5/8	8	26,5	58,4

Note: Tolerance for dimension L: ± 5 mm (3/16 in)

CAV UNITS

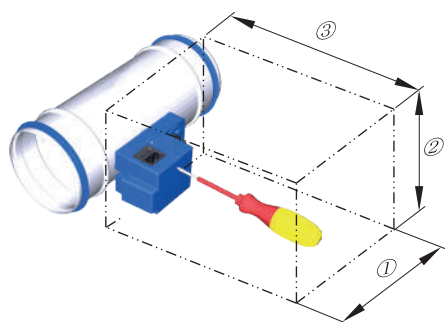
Dimensions and weight

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.

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.

Access to attachments



Schematic illustration of required installation space

Product example



Attachments, for example Easy, XB4, BUDN, ELAB

Space requirement, control component on one side

Attachment	①	②	③
VARYCONTROL			
Easy controller: Easy	250 mm (10 in)	200 mm (8 in)	300 mm (12 in)
Compact controllers: BC0, BL0 **, BM0, BM0-J6, LN0, LK0, XB0, XD0, XF0	250 mm (10 in)	200 mm (8 in)	250 mm (10 in)
Universal controller: BUDN, BUSN, BUSS, BUPN, BURN, XB4, XD4, XF4, B13 *, B1B *, BG3 *, BR3 *, BRG *, BB3 *, BP3 *, BPG *, BH3 *, BS3 *, BSG *	520 mm (20 ½ in)	250 mm (10 in)	250 mm (10 in)
TROX UNIVERSAL			
TROX UNIVERSAL: TUN, TUS, TUSD	550 mm (22 in)	350 mm (14 in)	400 mm (16 in)
LABCONTROL			
EASYPOL: ELAB	550 mm (22 in)	350 mm (14 in)	400 mm (16 in)

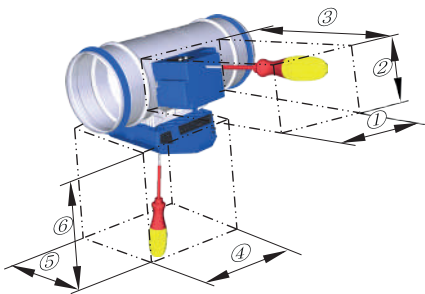
* Control component has been discontinued

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

CAV UNITS

Dimensions and weight

Access to attachments on two sides



Product example



Schematic illustration of required installation space

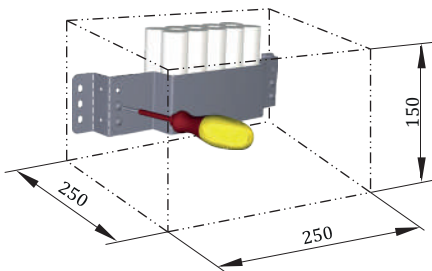
Attachments, for example BUDNF, TUNF

Space requirement, control components on two sides

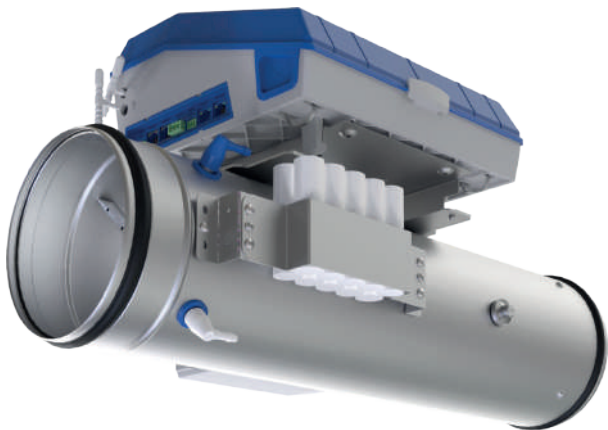
Attachment	(1)	(2)	(3)	(4)	(5)	(6)
VARYCONTROL						
Universal controller: BUSNF, BUPNF, BURNF, BGB *, BRB *, BBB *, BPB *, BHB *, BSB *	520 mm (20 ½ in)	250 mm (10 in)	250 mm (10 in)	250 mm (10 in)	250 mm (10 in)	250 mm (10 in)
TROX UNIVERSAL						
TROX UNIVERSAL: TUNF	250 mm (10 in)	250 mm (10 in)	350 mm (14 in)	400 mm (16 in)	400 mm (16 in)	350 mm (14 in)

* Control component has been discontinued

Accessibility to the battery pack



Product example



Schematic illustration of required installation space

Attachment TUN / ... / U

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

Product details

Installation and commissioning

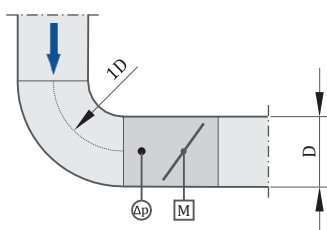
- Any installation orientation (except units with static effective pressure transducer)
- TVR-D: For constructions with acoustic cladding, ducts on the room side should have cladding up to the acoustic cladding of the controller

Upstream conditions

The volume flow rate accuracy Δ_{qv} applies to 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

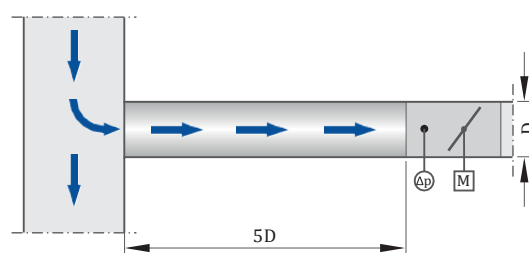
EN 1505. Some installation situations require straight duct sections upstream.

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 Δ_{qv} can only be achieved with a straight duct section of at least $5D$ upstream.

CAV UNITS

Product Details

VARYCONTROL control components

Attachment	Controlled variable	Interface	Effective pressure transducer	Actuator	Manufacturer
Easy controller, dynamic					
Easy	qv	0 – 10 V	integral	Slow running integral	①
Compact controller, dynamic					
BL0 **	qv	LonWorks FTT 10 interface	integral	Slow running integral	②
BM0-J6	qv	Modbus RTU/BACnet MS/TP with RJ12 socket (for X- AIRCONTROL)	integral	Slow running integral	②
XB0	qv	0 – 10 V or 2 – 10 V	integral	Slow running integral	①
LN0	qv	0 – 10 V or 2 – 10 V	integral	Slow running integral	⑤
LK0	qv	KNX interface	integral	Slow running integral	⑤
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 (0,10 – 2,21 in w.g.)	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/TP	integral	Slow running separate	②
BUDNF	qv	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TP	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					
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

CAV UNITS

Product Details

BB3 *	qv	2 – 10 V	individual component	Slow running separate	②
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CAV UNITS

Product Details

Attachment	Controlled variable	Interface	Effective pressure transducer	Actuator	Manufacturer
BBB *	qv	2 – 10 V	individual component	spring return actuator separate	②
BR3 *	Δp	0 – 10 V or 2 – 10 V or MP bus interface	individual component 100 Pa (0,40 in w.g.)	Slow running separate	②
BRB *	Δp	0 – 10 V or 2 – 10 V or MP bus interface	individual component 100 Pa (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 100 Pa (0,40 in w.g.)	fast-running separate	②
BS3 *	Δp	0 – 10 V or 2 – 10 V or MP bus interface	individual component 600 Pa (2,41 in w.g.)	Slow running separate	②
BSB *	Δp	0 – 10 V or 2 – 10 V or MP bus interface	individual component 600 Pa (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 600 Pa (2,41 in w.g.)	fast-running separate	②
BG3 *	Δp	2 – 10 V	individual component 100 Pa (0,40 in w.g.)	Slow running separate	②
BGB *	Δp	2 – 10 V	individual component 100 Pa (0,40 in w.g.)	spring return actuator separate	②
BH3 *	Δp	2 – 10 V	individual component 600 Pa (2,41 in w.g.)	Slow running separate	②
BHB *	Δp	2 – 10 V	individual component 600 Pa (2,41 in w.g.)	spring return actuator separate	②
BUPN	Δp	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TP	integral Control range adjustable 25 – 450 Pa (0,10 – 1,81 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	integral Control range adjustable +- 10 to 50 Pa (+- 0,04 to 0,20 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	integral Control range adjustable +- 10 to 50 Pa (+- 0,04 to 0,20 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	integral Control range adjustable 25 – 450 Pa (0,10 – 1,81 in w.g.)	spring return actuator separate	②
BUSN	qv	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TP	integral	Slow running separate	②
BUSNF	qv	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TP	integral	spring return actuator separate	②
BUSS	qv	0 - 10 V or 2 - 10 V or MP bus or Modbus RTU or BACnet MS/TP	integral	fast-running separate	②

CAV UNITS

Product Details

Attachment	Controlled variable	Interface	Effective pressure transducer	Actuator	Manufacturer
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 (0,10 – 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
qv, Volume flow rate

Δp , Differential pressure

① TROX, ② TROX/Belimo, ③ TROX/Gruner, ⑤ Siemens

TROX UNIVERSAL control components

Attachment	Controlled variable	Interface	Effective pressure transducer	Actuator	Manufacturer
TROX UNIVERSAL-Regler – statisch					
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

qv, Volume flow rate

Δp , Differential pressure

① TROX

CAV UNITS

Product Details

LABCONTROL EASYLAB control components

Attachment	Controlled variable	Interface	Effective pressure transducer	Actuator	Manufacturer
EASYLAB Regler – statisch					
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

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]; [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 CAV controller, system attenuation taken into account

L_P [dB(A)]
A1

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_P [dB(A)]
A3

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 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_{vm} [m³/h]; [l/s]; [CFM]
ax

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}. For analogue signalling to volume flow controllers (typically used), the maximum value of the setpoint signal (10 V) is assigned the set maximum value (q_{vmax}) (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

Δq_v [%]

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

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

$\Delta_{p_{st\ min}}$ [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.

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.