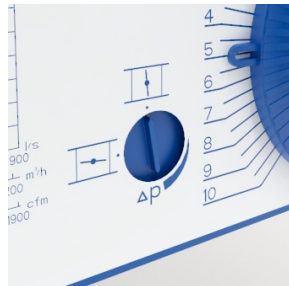
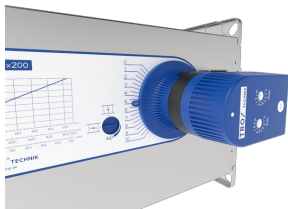




CAV CONTROLLERS



Visual display of the damper blade position



CAV CONTROLLERS

Actuator for switching between setpoint values or steady operation



CAV CONTROLLERS

Large dimensions as double version



TESTED TO VDI 6022

Getestet volgens VDI 6022

EN

FOR PRECISE CONTROL OF NORMAL TO HIGH CONSTANT VOLUME FLOW RATES

Rectangular, mechanically self-powered air terminal units for supply and extract air systems with constant air volume flows

- Suitable for volume flow rates up to 12600 m³/h or 3500 l/s
- Volume flow rate adjustment from outside by rotary knob
- Easy retrofitting of an actuator for volume flow setpoint adjustment
- High control accuracy

- No on-site test measurements required for commissioning
- Casing air leakage to EN 1751, class C
- Visual display of the damper blade position for operating point optimisation

Optional equipment and accessories

- Acoustic cladding for the reduction of case-radiated noise
- Secondary silencer Type TX for the reduction of air-regenerated noise
- Hot water heat exchanger Type WT for reheating the airflow
- Actuator for setpoint value switching or steady operation

General information



Application

- Rectangular CAV terminal units for supply or extract air volume flow control in constant volume flow systems
- Mechanical self-powered volume flow control without external power supply
- Simplified project handling by ordering based on nominal size

Special features

- Setting of the volume flow setpoint from the outside by rotary knob
- High control accuracy of the set volume flow rate
- Correct operation even under unfavourable upstream conditions
- Visual display of the damper blade position for operating point optimisation
- Easy retrofitting of an actuator for volume flow setpoint adjustment

Nominal sizes

- 19 nominal sizes from 200 × 100 – 600 × 600 mm

Variants

- EN: Air terminal units
- EN-D: Air terminal units with acoustic cladding
- Air terminal units with acoustic cladding and/or secondary silencer type TX for high acoustic requirements

Construction

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

Parts and characteristics

- Air terminal unit ready for commissioning
- Damper blade with low-friction bearings
- Bellows for vibration damping
- Cam plate with leaf spring
- Rotary knob pointer and scale for adjusting the flow rate setpoint
- Each air terminal unit is tested in the factory on a special ventilation test rig
- Visual display of the damper blade position for operating point optimisation

Attachments

- Min/Max actuators: Actuators for switching between minimum and maximum volume flow rate setpoint values
- Variable actuators: actuators for variable volume flow or for switching volume flow setpoints
- EN with actuator only up to H = 300 mm

Useful additions

- Secondary silencer Type TX
- Heat exchangers Type WT

Construction features

- Rectangular casing
- Flanges on both ends, suitable for duct connections
- Air terminal units from H = 400 mm as double version (2 dampers with separate setting scales)
- Acoustic cladding cannot be retrofitted

Materials and surfaces

Galvanised sheet steel construction

- Casing and damper blade made of galvanised sheet steel
- Leaf spring made of stainless steel
- Polyurethane bellows
- Plain bearings with PTFE coating
- Cam plate and adjusting unit made of galvanised sheet steel

Powder-coated construction (P1)

- Casing and damper blade made of galvanised sheet steel, powder-coated
- Leaf spring made of stainless steel
- Polyurethane bellows
- Plain bearings with PTFE coating
- Cam plate and adjusting unit made of galvanised sheet steel

Variant with acoustic cladding (-D)

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

Mineral wool

- Acc. to EN 13501, fire rating class A1, non-combustible
- RAL quality mark RAL-GZ 388
- Non-hazardous thanks to high biosolubility according to the German Ordinance on Hazardous Substances and Note Q of the European Regulation (EC) No. 1272/2008

Standards and guidelines

Meets the hygiene requirements of

- EN 16798, Part 3
- VDI 6022, Sheet 1
- DIN 1946, Part 4
- For further standards and guidelines, please refer to the hygiene certificate

Casing air leakage

- EN 1751, Class C

Maintenance

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

TECHNICAL INFORMATION

Function Technical data, Quick sizing, Specification text, Order code



Functional description

The air terminal unit is a mechanical self-powered unit and works without external power supply. A damper blade with low-friction bearings is adjusted by aerodynamic forces so that the set volume flow rate is kept constant within the differential pressure range. The aerodynamic forces of the airflow create a closing torque on the damper blade. An inflating bellows amplifies this force and at the same time acts as a damping element. The closing torque is countered by a leaf spring that unrolls over a cam plate. The cam plate is adapted in such a way that the damper blade moves when the differential pressure changes. As a result, the volume flow rate remains constant within narrow tolerances.

Efficient commissioning

Using the rotary knob, the desired volume flow setpoint can be set quickly on the external scale, no prior measurement required. The advantage over conventional flow adjustment dampers is that no repeated measurements or adjustments during commissioning are required. Should the system pressure change, e.g. by opening or closing of duct sections, the flow rates in the entire system will also change if flow adjustment dampers are used; however, this is not the case with mechanical self-powered air terminal units. The air terminal unit reacts immediately and keeps the set air volume constant.

Schematic illustration of the EN



- ① Damper blade
- ② Bellows
- ③ Bellows inlet
- ④ Scale sticker
- ⑤ Visual display of the damper blade position
- ⑥ Rotary knob
- ⑦ Actuator (optional)

Volume flow rate ranges and minimum differential pressure values 1/2

NS	qv [l/s]	qv [m³/h]	①		Δqv [±%]
			Δp _{stmin} [Pa]	Δp _{stmin} [Pa]	
200 x 100	39	140	50	7	17
200 x 100	68	246	50	22	11
200 x 100	104	376	50	51	8
200 x 100	164	590	50	125	5
300 x 100	65	234	50	9	13
300 x 100	137	492	50	39	8
300 x 100	199	716	50	82	6
300 x 100	260	936	50	140	5
300 x 150	82	295	50	5	15
300 x 150	152	547	50	17	10
300 x 150	294	1059	50	64	6
300 x 150	460	1656	50	157	5
300 x 200	120	432	50	6	14
300 x 200	197	710	50	16	10
300 x 200	349	1257	50	51	7
300 x 200	515	1854	50	111	5
400 x 200	200	720	50	9	12
400 x 200	337	1213	50	27	8
400 x 200	585	2106	50	80	6
400 x 200	875	3150	50	179	4
500 x 200	180	648	50	5	15
500 x 200	271	977	50	11	11
500 x 200	554	1995	50	46	7
500 x 200	900	3240	50	122	5
600 x 200	225	810	50	5	15
600 x 200	381	1370	50	15	10
600 x 200	689	2480	50	49	7
600 x 200	1010	3636	50	106	5
400 x 250	200	720	50	6	14
400 x 250	333	1198	50	17	10
400 x 250	537	1932	50	43	7
400 x 250	885	3186	50	117	5

Volume flow rate ranges and minimum differential pressure values 2/2

NS	qv [l/s]	qv [m³/h]	①		Δqv [±%]
			Δp _{stmin} [Pa]	Δp _{stmin} [Pa]	
500 x 250	235	846	50	5	15
500 x 250	460	1655	50	20	9
500 x 250	815	2932	50	64	6
500 x 250	1190	4284	50	136	5
600 x 250	300	1080	50	6	14
600 x 250	499	1795	50	17	10
600 x 250	897	3231	50	54	7
600 x 250	1310	4716	50	114	5
400 x 300	310	1116	50	10	12
400 x 300	563	1992	50	32	8
400 x 300	902	3249	50	85	6
400 x 300	1280	4608	50	171	4
500 x 300	365	1314	50	9	12
500 x 300	535	1928	50	19	9
500 x 300	998	3593	50	66	6
500 x 300	1580	5688	50	166	4
600 x 300	350	1260	50	6	14
600 x 300	669	2409	50	21	9
600 x 300	1137	4094	50	60	6
600 x 300	1750	6300	50	142	5
400 x 400	400	1440	50	9	12
400 x 400	674	2425	50	27	8
400 x 400	1170	4212	50	80	6
400 x 400	1750	6300	50	179	4
500 x 400	360	1296	50	5	15
500 x 400	715	2574	50	19	9
500 x 400	1330	4787	50	66	6
500 x 400	1800	6480	50	122	5
600 x 400	450	1620	50	5	15
600 x 400	958	3448	50	24	9
600 x 400	1595	5741	50	66	6
600 x 400	2020	7272	50	106	5
500 x 500	470	1692	50	5	15
500 x 500	1143	4113	50	31	8
500 x 500	1882	6776	50	85	6
500 x 500	2380	8568	50	136	5
600 x 500	600	2160	50	6	14
600 x 500	1246	4487	50	26	8
600 x 500	2084	7503	50	72	6
600 x 500	2620	9432	50	114	5
600 x 600	700	2520	50	6	14
600 x 600	1948	7014	50	44	7
600 x 600	2921	10517	50	99	5
600 x 600	3500	12600	50	142	5

- ① EN
- ② Secondary silencer TX (to be considered additionally)

Quick sizing tables provide a good overview of the room sound pressure levels that can be expected. The first selection criteria for the nominal size are the actual

volume flow rates $q_{v,min}$ and $q_{v,max}$. Intermediate values can be interpolated. Precise results and spectral data can be calculated with our Easy Product Finder design programme. 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 are required.

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. Exact results as well as spectral data for all control components are provided by the design with our Easy Product Finder design program. The first selection criteria for the nominal size are the actual volume flow rates $q_{v,min}$ and $q_{v,max}$.

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 a sufficient differential pressure across the controller ($\Delta p_{stat, min}$) is present under all operating conditions on all control units. The measurement points for fan speed control must be selected accordingly. The volume flow rates given for VAV terminal units depend on the nominal size and on the control component (attachment) that is installed.

Volume flow rate ranges and minimum differential pressure values

NS	qv [l/s]	qv [m³/h]	$\Delta p_{statmin}$ [Pa]		Δqv [±%]
			①	②	
200 x 100	39	140	50	7	17
200 x 100	68	246	50	22	11
200 x 100	104	376	50	51	8
200 x 100	164	590	50	125	5
300 x 100	65	234	50	9	13
300 x 100	137	492	50	39	8
300 x 100	199	716	50	82	6
300 x 100	260	936	50	140	5
300 x 150	82	295	50	5	15
300 x 150	152	547	50	17	10
300 x 150	294	1059	50	64	6
300 x 150	460	1656	50	157	5
300 x 200	120	432	50	6	14
300 x 200	197	710	50	16	10
300 x 200	349	1257	50	51	7
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400 x 200	337	1213	50	27	8
400 x 200	585	2106	50	80	6
400 x 200	875	3150	50	179	4
500 x 200	180	648	50	5	15
500 x 200	271	977	50	11	11
500 x 200	554	1995	50	46	7
500 x 200	900	3240	50	122	5
600 x 200	225	810	50	5	15
600 x 200	381	1370	50	15	10
600 x 200	689	2480	50	49	7
600 x 200	1010	3636	50	106	5
400 x 250	200	720	50	6	14
400 x 250	333	1198	50	17	10
400 x 250	537	1932	50	43	7
400 x 250	885	3186	50	117	5
500 x 250	235	846	50	5	15
500 x 250	460	1655	50	20	9
500 x 250	815	2932	50	64	6
500 x 250	1190	4284	50	136	5
600 x 250	300	1080	50	6	14
600 x 250	499	1795	50	17	10
600 x 250	897	3231	50	54	7
600 x 250	1310	4716	50	114	5
400 x 300	310	1116	50	10	12

NS	qv [l/s]	qv [m³/h]	Δp _{st} min [Pa]		Δqv [±%]
			①	②	
400 x 300	553	1992	50	32	8
400 x 300	902	3249	50	85	6
400 x 300	1280	4608	50	171	4
500 x 300	365	1314	50	9	12
500 x 300	535	1928	50	19	9
500 x 300	998	3593	50	66	6
500 x 300	1580	5688	50	166	4
600 x 300	350	1260	50	6	14
600 x 300	669	2409	50	21	9
600 x 300	1137	4094	50	60	6
600 x 300	1750	6300	50	142	5
400 x 400	400	1440	50	9	12
400 x 400	674	2425	50	27	8
400 x 400	1170	4212	50	80	6
400 x 400	1750	6300	50	179	4
500 x 400	360	1296	50	5	15
500 x 400	715	2574	50	19	9
500 x 400	1330	4787	50	66	6
500 x 400	1800	6480	50	122	5
600 x 400	450	1620	50	5	15
600 x 400	958	3448	50	24	9
600 x 400	1595	5741	50	66	6
600 x 400	2020	7272	50	106	5
500 x 500	470	1692	50	5	15
500 x 500	1143	4113	50	31	8
500 x 500	1882	6776	50	85	6
500 x 500	2380	8568	50	136	5
600 x 500	600	2160	50	6	14
600 x 500	1246	4487	50	26	8
600 x 500	2084	7503	50	72	6
600 x 500	2620	9432	50	114	5
600 x 600	700	2520	50	6	14
600 x 600	1948	7014	50	44	7
600 x 600	2921	10517	50	99	5
600 x 600	3500	12600	50	142	5

① Basic unit

② Basic unit with secondary silencer TX (to be considered additionally)

Quick sizing table sound pressure level

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

sound pressure level at differential pressure 150 Pa

NS	qv [l/s]	qv [m³/h]	①	②	③	④
200 x 100	39	140	40	23	26	18
200 x 100	68	246	44	29	31	23
200 x 100	104	376	47	34	35	27
200 x 100	164	590	50	38	38	31
300 x 100	65	234	41	26	28	20
300 x 100	137	492	47	35	35	28
300 x 100	199	716	48	38	38	33
300 x 100	260	936	49	40	41	36

NS	qv [l/s]	qv [m³/h]	①	②	③	④
300 x 150	82	295	43	26	30	21
300 x 150	152	547	47	32	35	27
300 x 150	294	1059	49	36	40	33
300 x 150	460	1656	50	38	44	38
300 x 200	120	432	44	29	31	23
300 x 200	197	710	47	33	36	29
300 x 200	349	1257	49	37	42	36
300 x 200	515	1854	51	39	46	41
400 x 200	200	720	45	30	34	25
400 x 200	337	1213	47	33	39	31
400 x 200	585	2106	50	37	45	38
400 x 200	875	3150	53	40	49	43
500 x 200	180	648	47	29	34	23
500 x 200	271	977	48	30	37	27
500 x 200	554	1995	49	33	42	33
500 x 200	900	3240	50	36	45	38
600 x 200	225	810	48	28	36	25
600 x 200	381	1370	48	29	39	29
600 x 200	689	2480	48	32	43	34
600 x 200	1010	3636	49	33	45	37
400 x 250	200	720	44	28	32	23
400 x 250	333	1198	46	30	37	28
400 x 250	537	1932	48	33	41	33
400 x 250	885	3186	49	36	45	38
500 x 250	235	846	47	28	35	24
500 x 250	460	1655	47	30	39	29
500 x 250	815	2932	47	32	42	34
500 x 250	1190	4284	47	34	44	37
600 x 250	300	1080	47	29	37	26
600 x 250	499	1795	47	30	39	30
600 x 250	897	3231	47	32	43	35
600 x 250	1310	4716	47	34	45	37
400 x 300	310	1116	44	29	35	27
400 x 300	553	1992	47	33	41	33
400 x 300	902	3249	50	36	46	39
400 x 300	1280	4608	52	39	50	43
500 x 300	365	1314	47	30	38	28
500 x 300	535	1928	48	31	40	31
500 x 300	998	3593	48	33	44	36
500 x 300	1580	5688	49	35	47	39
600 x 300	350	1260	47	29	37	26
600 x 300	669	2409	47	30	41	31
600 x 300	1137	4094	47	32	43	35
600 x 300	1750	6300	47	34	46	39
400 x 400	400	1440	45	29	37	28
400 x 400	674	2425	47	33	42	34
400 x 400	1170	4212	50	37	48	41
400 x 400	1750	6300	53	40	52	46
500 x 400	360	1296	47	28	37	26
500 x 400	715	2574	48	31	42	32
500 x 400	1330	4787	49	34	46	38
500 x 400	1800	6480	50	36	48	41
600 x 400	450	1620	48	28	39	28
600 x 400	958	3448	48	30	43	34
600 x 400	1595	5741	48	32	47	38
600 x 400	2020	7272	49	33	48	40
500 x 500	470	1692	47	28	38	27
500 x 500	1143	4113	47	31	43	34
500 x 500	1882	6776	47	33	45	38
500 x 500	2380	8568	47	34	47	40
600 x 500	600	2160	47	29	40	29
600 x 500	1246	4487	47	31	44	35
600 x 500	2084	7503	47	32	47	39
600 x 500	2620	9432	47	34	48	40
600 x 600	700	2520	47	29	40	29
600 x 600	1948	7014	47	31	46	37
600 x 600	2921	10517	47	33	48	40
600 x 600	3500	12600	47	34	49	42

Air-regenerated noise

- ① Basic unit
- ② Basic unit with secondary silencer TX

Case-radiated noise

- ③ Basic unit
- ④ Basic unit with acoustic cladding

Specification text

Air terminal units in rectangular design for constant air volume systems, mechanically self-powered, without external power supply, for supply or extract air, in 19 nominal sizes.

Air terminal unit ready for commissioning. Unit consists of the casing with damper blade with low friction bearings, bellows, and external cam plate with leaf spring. The air terminal units are factory adjusted and preset to a reference air volume. Sound power level measured according to DIN EN ISO 5135. Meets the hygiene requirements according to VDI 6022.

Special features

- Setting of the volume flow setpoint from the outside by rotary knob
- High control accuracy of the set volume flow rate
- Correct operation even under unfavourable upstream conditions
- Visual display of the damper blade position for operating point optimisation
- Easy retrofitting of an actuator for volume flow setpoint adjustment

Materials and surfaces

Galvanised sheet steel construction

- Casing and damper blade made of galvanised sheet steel
- Leaf spring made of stainless steel
- Polyurethane bellows
- Plain bearings with PTFE coating
- Cam plate and adjusting unit made of galvanised sheet steel

Powder-coated construction (P1)

- Casing and damper blade made of galvanised sheet steel, powder-coated
- Leaf spring made of stainless steel
- Polyurethane bellows
- Plain bearings with PTFE coating
- Cam plate and adjusting unit made of galvanised sheet steel

Variant with acoustic cladding (-D)

- Acoustic cladding made of galvanised sheet steel

- Rubber seal for the insulation of structure-borne noise
- Lining made of mineral wool

Mineral wool

- Acc. to EN 13501, fire rating class A1, non-combustible
- RAL quality mark RAL-GZ 388
- Non-hazardous thanks to high biosolubility according to the German Ordinance on Hazardous Substances and Note Q of the European Regulation (EC) No. 1272/2008

Construction

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

Technical data

- Nominal sizes: 200 × 100 to 600 × 600 mm
- Volume flow rate range: 39 – 3500 l/s or 140 – 12600 m³/h
- Volume flow rate control range: approx. 25 – 100 % of the nominal volume flow rate
- Minimum differential pressure: 50 Pa
- Maximum permissible differential pressure: 1000 Pa
- Casing air leakage acc. to EN 1751, class C

Sizing data

- q_v [m³/h]
- Δp_{st} [Pa]

Air-regenerated noise

- L_{PA} [dB(A)]

Case-radiated noise

- L_{PA} [dB(A)]

EN	-	D	-	P1	/	400 x 200	/	E01	/	800 – 3000 [m³/h]
1		2		3		4		5		6

1 Type
EN Air 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)

4 Nominal size [mm]
B x H

5 Actuator for setpoint adjustment
No entry: none
E01 24 V AC/DC, 3-point (min/max), potentiometer
E02 230 V AC, 3-point (min/max), potentiometer
E03 24 V AC/DC, modulating 0 – 10 V DC, potentiometer

Variants, Product details



- Air terminal units for constant air volume flow control

- Air terminal units with acoustic cladding for constant air volume flow control
- For rooms in which the case-radiated noise of the unit is not sufficiently reduced by a suspended ceiling
- The rectangular 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

EN



EN-D



Installation and commissioning

- Installation with horizontal air flow: Do not point the operating side (setting scale, rotary knob or optional actuator) upwards
- Setting of the volume flow setpoint from the outside by rotary knob
- Loosen and lock the rotary knob with hexagon socket screw
- No repeated measuring or re-adjusting required during commissioning
- EN-D: For constructions with acoustic cladding, ducts on the room side should have cladding up to the acoustic cladding of the air terminal unit

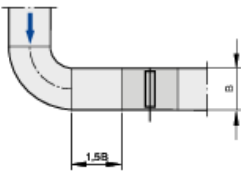
Upstream conditions

The volume flow rate accuracy Δq_v applies to a straight upstream section of the duct. Fittings such as bends, junctions, or changes in cross-section cause turbulence that can influence the volume flow accuracy. Duct connections, e.g. branches off the main duct, must comply with EN 1505. Free air intake only with 1.5B or 1.5H straight upstream length.

Space required for commissioning and maintenance

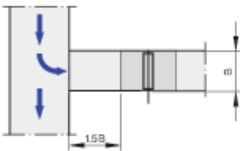
To enable commissioning and maintenance work, keep sufficient installation space clear in the area of the operating side (setting scale, rotary knob, optional attachment parts). It may be necessary to provide sufficiently sized inspection openings to make sure the attachments are easily accessible.

Bend, horizontal



Between any bend and the CAV terminal unit, a straight duct section of at least 1.5B upstream length is required to achieve the stated volume flow rate accuracy Δq_v .

Junction, horizontal



A junction from main duct causes strong turbulence. The specified volume flow rate accuracy Δq_v can only be achieved with a straight duct section of at least 1.5B upstream. If there is no straight upstream section at all, the control may not be stable, even with a perforated plate.