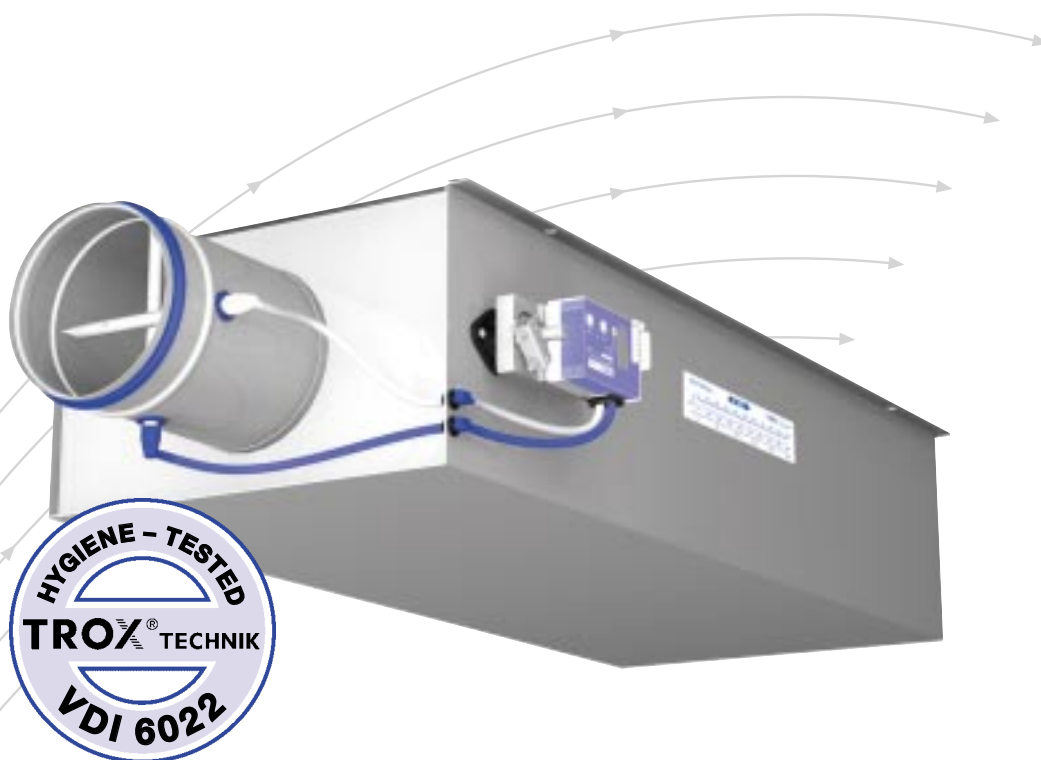


VARYCONTROL VAV Terminal Units

Type TVZ-Easy · TVA-Easy

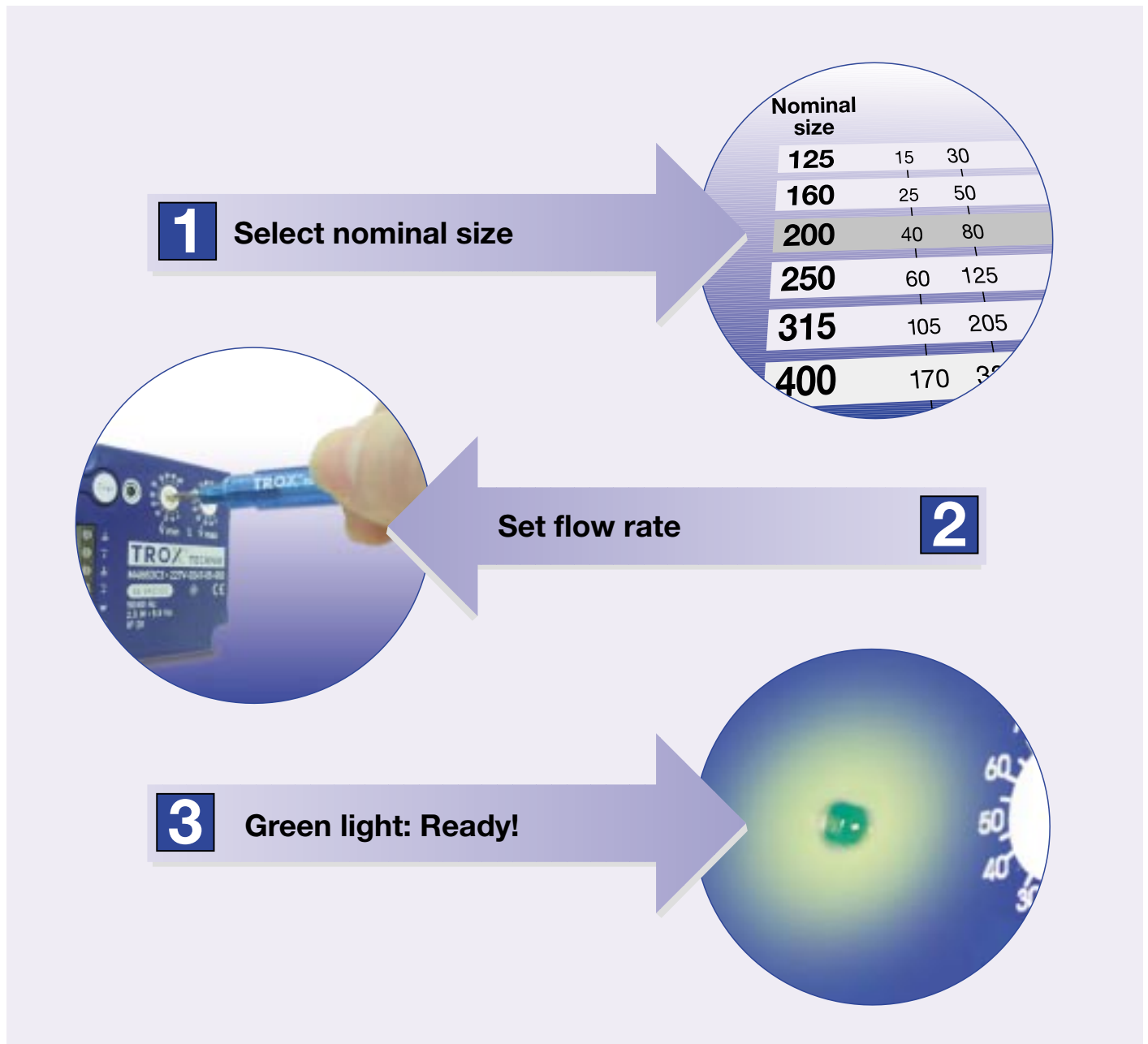


TROX® TECHNIK

The art of handling air

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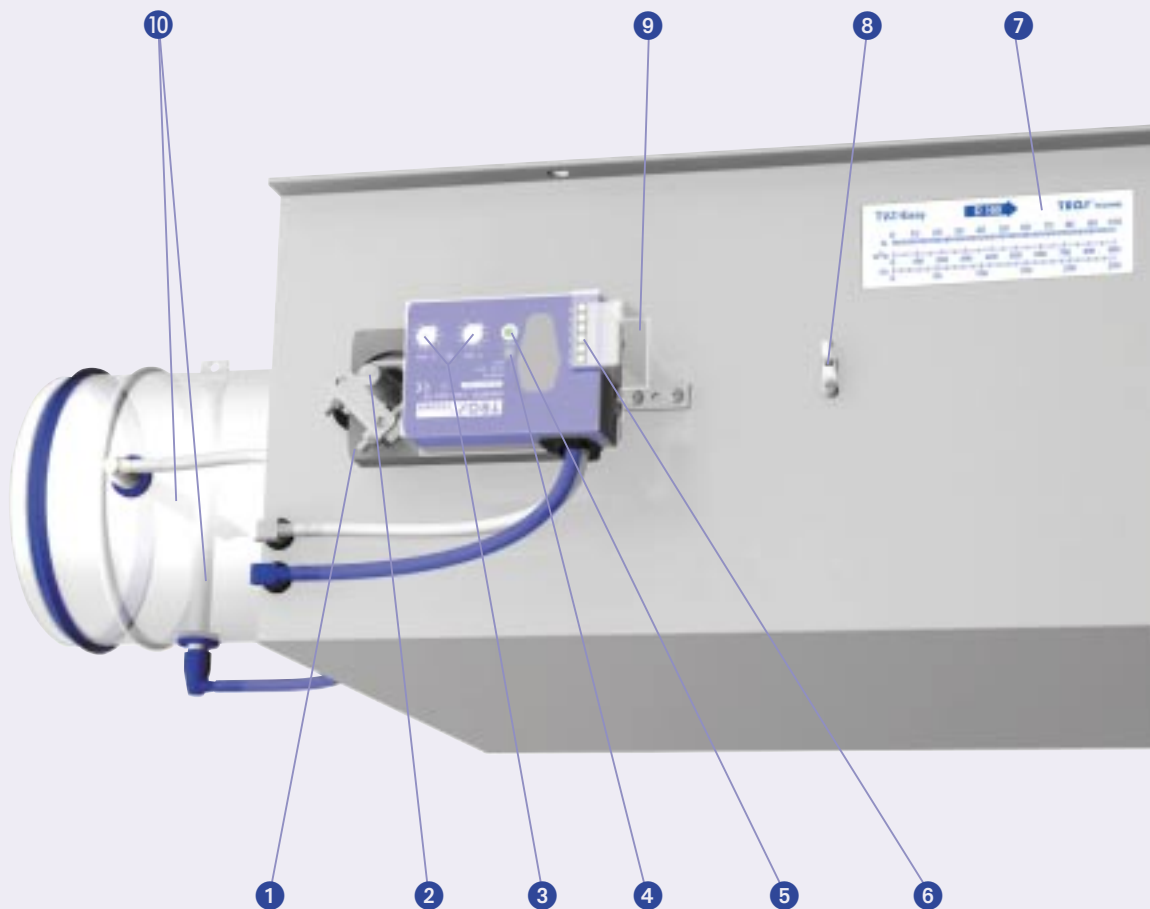


TROX TVZ-Easy · TVA-Easy – the innovative solution

- **Easy** Selection according to nominal size of the duct system
- **Easy** Flow rate adjustment without adjustment tool
- **Easy** Functional testing with service button
- **Easy** Functional check by indicator light

The proven technology of the compact flow rate controller has been optimized. Valuable on site time saved by simple set up.

TVZ-/TVA-Easy, developed with consultants and customers!



- | | |
|-----------------------------------|------------------------------|
| ① TROX Compact-controller | ⑥ Connection terminals |
| ② Damper blade position indicator | ⑦ Flow rate scale |
| ③ Potentiometers | ⑧ Wire clamping bracket |
| ④ Service button | ⑨ Protection cover |
| ⑤ Indicator light | ⑩ Differential pressure grid |

Construction · Dimensions

Characteristics

- Electronic flow rate control
- Green indicator light provides functional information:
 - permanently on = set
 - blinking = not set
 - off = no supply voltage
- Functional testing as follows:
 - Press service button for at least 1 second
 - Actuator opens damper blade
 - Actuator closes damper blade
 - Actuator returns damper blade to previous position
- High level of control accuracy for the flow rate settings, even if there is an elbow connection $R = 1 D$
- Transparent protection cover to prevent inadvertent resetting and provide general security
- Clamping bracket for wiring
- Differential pressure range 20 to 1000 Pa
- Suitable for non-aggressive air
- Independent of orientation
- Control damper closed blade air leakage complies with DIN EN 1751, class 4 (nominal size 125, class 3)
- For delivery, control damper blade in 45° position

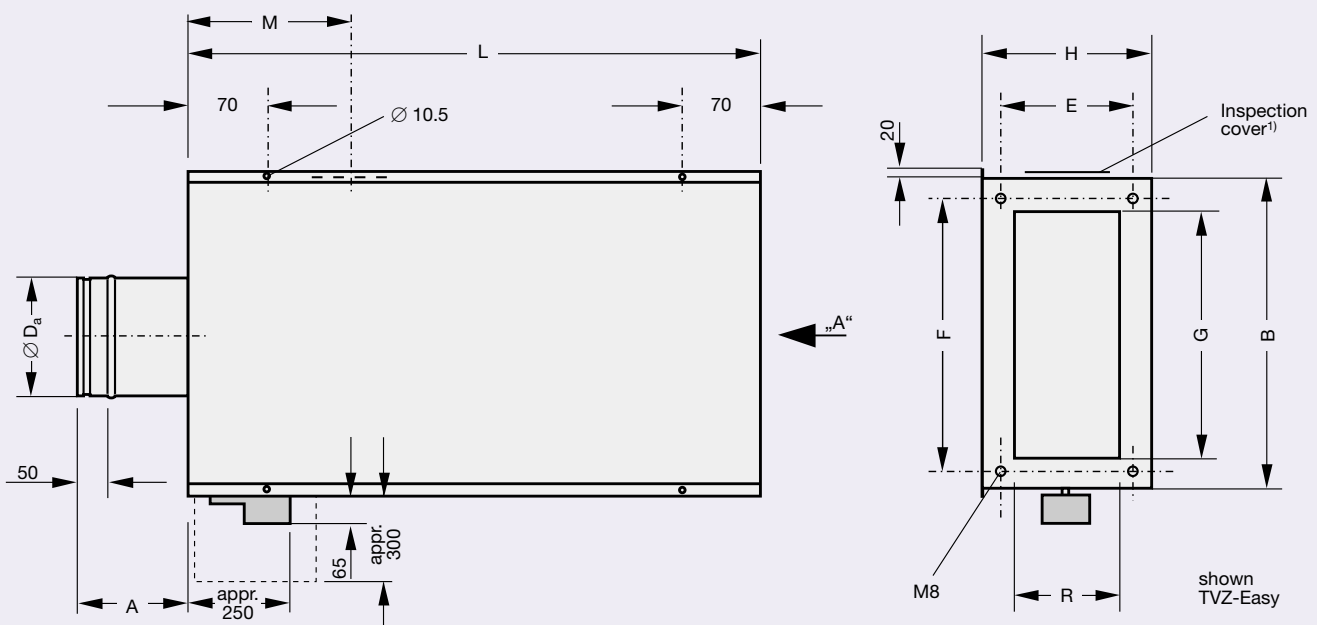
- Spigot connections on the fan (high pressure) side suitable for circular ducts to DIN EN 1506 or DIN EN 13180 with groove for lip seal
- Room (low pressure) side suitable for attachment of connecting flanges system 30
- Casing air leakage flow rate complies with DIN EN 1751, class A
- The mechanical components are maintenance-free
- Operating temperature range 10 to 50 °C
- Storage temperature range -20 to +80 °C

General information

Standard filtration in air-conditioning systems allows the use of TROX Compact-controllers for the supply air without additional dust protection filters. Since a small volume flow is passed through the transducer in order to measure the flow rate, the following must be noted:

- With heavy dust levels in the room, suitable extract air filters must be provided.
- If the air is contaminated with fluff or sticky particles or contains aggressive media, units should be selected with the on-line design program "Air terminal units".

TVZ(D)-Easy · TVA(D)-Easy



--- Keep clear to provide access to control components

Dimensions in mm															Weight in kg			
Nominal size	Ø D _a	TVZ-Easy TVA-Easy			TVZD-Easy TVAD-Easy			TVZ-Easy	TVA-Easy	TVZD-Easy	TVAD-Easy	M	E	F	R	G	Weight	
		L	B	H	L	B	H	A	TVZ-Easy TVA-Easy	TVZD-Easy TVAD-Easy								
125	124	1035	300	236	1075	380	316	150	185	110	145	115	186	232	152	198	21	41
160	159	1035	410	236	1075	490	316	200	170	160	130	140	186	342	152	308	25	50
200	199	1320	560	281	1360	640	361	200	140	160	100	175	244	492	210	458	33	63
250	249	1440	700	311	1480	780	391	250	100	210	60	215	235	632	201	598	55	95
315	314	1440	900	361	1480	980	441	250	245	210	205	265	286	832	252	798	73	133
400	399	1820	1000	446	1860	1080	526	250	175	210	135	335	388	932	354	898	118	193

1) Only for TVZ/TVZD (M + 40 mm for TVZD)

Please refer to leaflet no. 5/1/EN/.. for further details concerning the characteristics and the dimensions of the TS secondary silencer
Control components are situated on the right hand side when seen from the direction of airflow (with the folded seam uppermost!)

TROX Compact-controller technical data

Supply voltage:	24 VAC ± 20 %, 50/60 Hz or 24 VDC ± 10 %
Power rating:	max. 5 VA (for a.c. voltage) max. 2.5 W (for d.c. voltage)
Control signal:	0 to 10 VDC, Ri > 100 kΩ
Flow rate actual value signal:	0 to 10 VDC linear, max. 0.5 mA
Transducer range:	2 to 300 Pa
Running time:	120 to 300 sec. for 87°
Torque:	5 Nm
Safety class:	III (Save voltage)
Protection level:	min. IP 20



Additional safety requirements for the TROX Compact-controller:

- Installation and assembly must be performed by qualified personnel. Assembly must be carried out in compliance with local legal regulations.
- Connect only to a safety transformer.
- The air terminal units of the TROX-Easy type with TROX Compact-controllers may not be used outside of their standard area of application (air conditioning systems). Use in aircraft is not allowed.

Nomenclature

f_m	in Hz:	Octave band centre frequency
L_{pA}	in dB:	A-weighted sound pressure level of air-regenerated noise in the room, system attenuation taken into account
L_{pA1}	in dB:	A-weighted sound pressure level of air-regenerated noise in the room with TS secondary silencer, system attenuation taken into account
L_{pA2}	in dB:	A-weighted sound pressure level of case-radiated noise in the room, system attenuation taken into account
L_{pA3}	in dB:	A-weighted sound pressure level of case-radiated noise in the room with additional acoustic cladding, system attenuation taken into account
\dot{V}_{Nom}	in m ³ /h or l/s:	Nominal flow rate (100 %)
\dot{V}	in m ³ /h or l/s:	Flow rate
$\Delta \dot{V}$	in ± %:	Flow rate tolerance from setpoint value
$\dot{V}_{min\ unit}$	in m ³ /h or l/s:	Minimum unit flow rate
\dot{V}_{max}	in m ³ /h or l/s:	Maximum flow rate setpoint
\dot{V}_{min}	in m ³ /h or l/s:	Minimum flow rate setpoint
Δp_{st}	in Pa:	Static pressure differential
$\Delta p_{st\ min}$	in Pa:	Minimum static pressure differential
v	in m/s:	Velocity in the duct system
U	in Volt:	Actual value signal output (0 to 10 VDC)
w	in Volt:	Control signal input (0 to 10 VDC)
$\perp, -$:	Ground, neutral
$\sim, +$:	24 V supply voltage

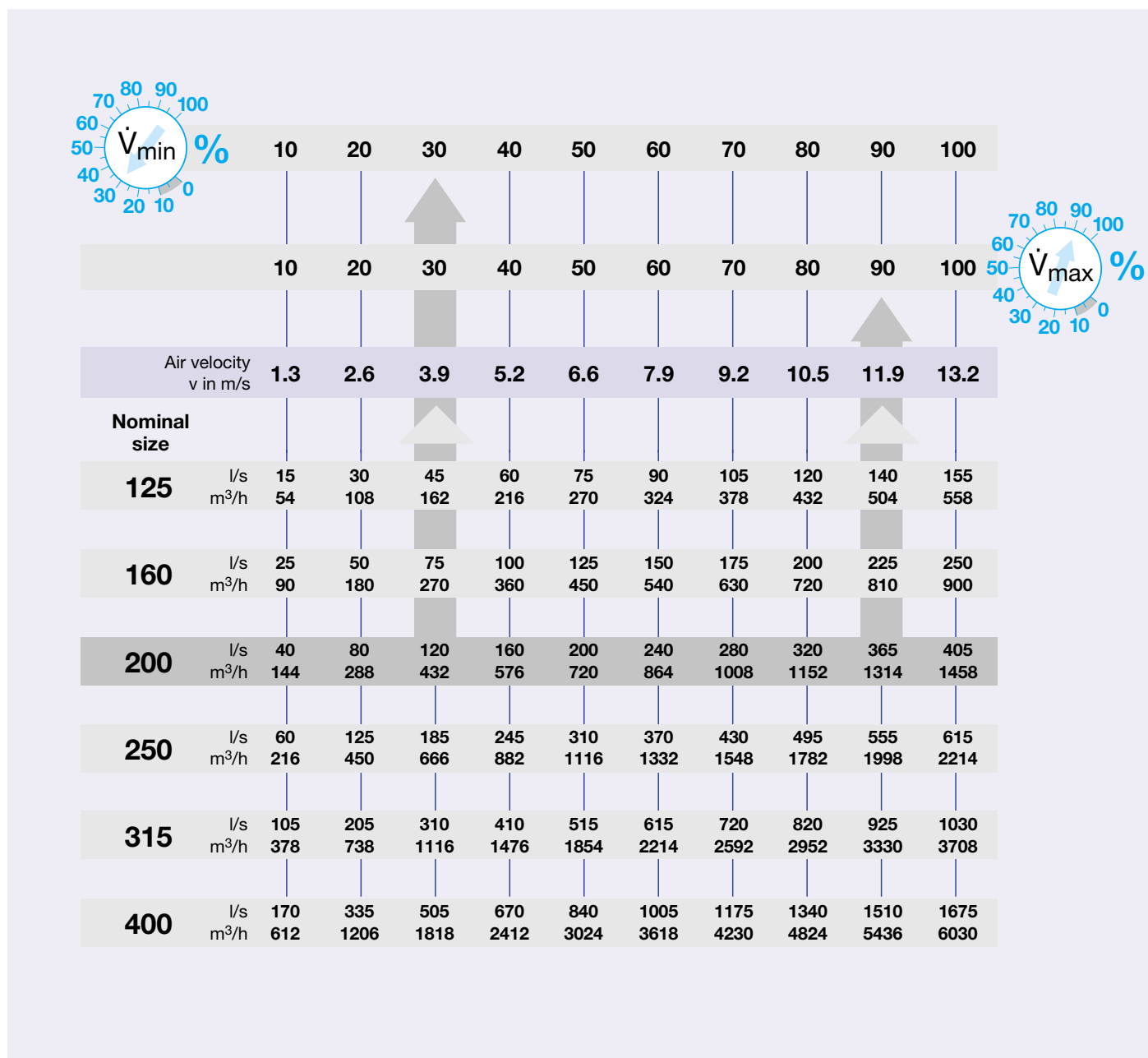
All sound pressure levels are based on 20 µPa.

All noise levels determined in a reverberation chamber.

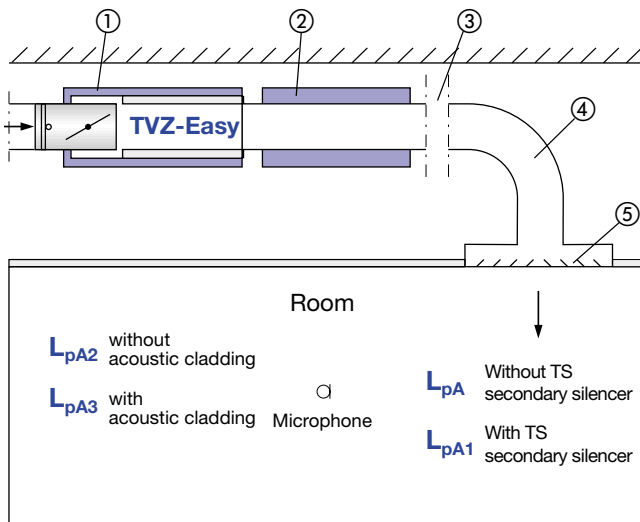
Selection of Nominal Size

The selection of the nominal sizes takes place according to the flow rate range specified by the consultant.

The accurate adjustment of the flow rate setpoints is carried out using a flow rate scale, which is attached on each controller.



Acoustic Quick Selection TVZ-Easy · TVZD-Easy



- ① Additional acoustic cladding
- ② TS secondary silencer
- ③ Air distribution to several diffusers
- ④ Duct elbow
- ⑤ End reflection based on diffuser

Nomenclature, see page 5

Sound power levels of units, see leaflet 5/1/EN/..

System attenuation in dB/Oct. acc. to VDI 2081 (values incorporated into the quick selection table)

f_m in Hz	63	125	250	500	1000	2000	4000	8000
Duct attenuation	0	0	1	2	3	3	3	3
Room attenuation	5	5	5	5	5	5	5	5
End reflection	10	5	2	0	0	0	0	0

Correction for distribution into the duct system (values incorporated into the quick selection table)

\dot{V}	I/s	150	300	450	600	750	900	1200	1500	1800
	m ³ /h	540	1080	1620	2160	2700	3240	4320	5400	6480
dB per octave		0	3	5	6	7	8	9	10	11

Quick selection of sound pressure level in dB(A)

Nominal size	\dot{V}		$\Delta p_{st\ min}$		$\Delta p_{st} = 100\ Pa$				$\Delta p_{st} = 200\ Pa$				$\Delta p_{st} = 500\ Pa$			
					Air-regenerated noise		Case-radiated noise ¹⁾		Air-regenerated noise		Case-radiated noise ¹⁾		Air-regenerated noise		Case-radiated noise ¹⁾	
	I/s	m ³ /h	Pa	$\pm\ %$	TVZ-Easy L_{pA}	TVZ-Easy+TS L_{pA1}	TVZ-Easy L_{pA2}	TVZD-Easy L_{pA3}	TVZ-Easy L_{pA}	TVZ-Easy+TS L_{pA1}	TVZ-Easy L_{pA2}	TVZD-Easy L_{pA3}	TVZ-Easy L_{pA}	TVZ-Easy+TS L_{pA1}	TVZ-Easy L_{pA2}	TVZD-Easy L_{pA3}
125	15	54	20	15	15	15	20	13	18	14	21	13	19	14	23	14
	60	216	20	7	22	19	21	15	25	15	25	16	26	16	31	21
	105	378	45	6	28	23	25	18	29	16	29	20	35	20	34	24
	155	558	90	5	34	28	30	22	37	23	33	24	40	25	36	27
160	25	90	20	15	16	15	17	13	22	14	19	13	20	14	25	15
	100	360	25	8	28	23	22	16	29	17	25	18	32	18	32	23
	175	630	40	7	33	27	26	19	36	21	30	22	37	22	36	27
	250	900	80	5	35	29	32	24	37	22	35	27	41	26	39	31
200	40	144	20	15	15	14	19	14	17	14	22	14	19	14	29	18
	160	576	20	7	20	17	24	18	22	13	28	20	28	15	35	25
	280	1008	35	5	21	16	28	21	24	13	32	24	30	16	38	29
	405	1458	80	5	30	23	36	29	32	17	39	31	34	21	43	34
250	60	216	20	15	15	14	19	14	17	14	23	15	19	14	29	18
	245	882	20	7	17	14	23	18	20	12	28	20	26	15	35	26
	430	1548	35	5	23	14	26	20	26	14	31	24	30	19	38	30
	615	2214	80	5	29	20	34	26	32	18	38	30	36	24	43	35
315	105	378	20	15	17	15	19	14	18	14	22	14	22	15	31	20
	410	1476	20	7	19	15	23	17	23	14	29	21	32	22	39	29
	720	2592	40	6	21	16	30	22	25	18	35	26	33	24	42	33
	1030	3708	80	5	28	20	35	28	31	20	40	31	37	27	45	37
400	170	612	20	15	16	14	22	15	18	13	26	18	23	16	34	24
	670	2412	20	7	18	13	25	19	22	15	31	23	30	22	42	32
	1175	4230	35	6	25	19	31	25	28	22	35	29	32	26	43	34
	1675	6030	80	5	31	26	43	37	34	26	45	40	38	31	48	42

1) 4 dB/octave ceiling reduction and 5 dB/octave room attenuation have been allowed for in the calculation of case-radiated noise. Acoustic data for differential pressure up to 1000 Pa, see on-line design programme "Air terminal units".

Acoustic Quick Selection TVA-Easy · TVAD-Easy

Example

Given: $\dot{V}_{\max} = 280 \text{ l/s}$ or $1008 \text{ m}^3/\text{h}$
 $\Delta p_{\text{st}} = 500 \text{ Pa}$
 Specified sound pressure level in the room 35 dB(A)
 For further assumptions, see calculation procedure

Calculation procedure:

Quick selection:

TVA-Easy 200

Air-regenerated noise $L_{pA} = 30 \text{ dB(A)}$

Case-radiated noise $L_{pA2} = 36 \text{ dB(A)}$

Specification is not met, so additional acoustic cladding required

TVAD-Easy 200

Case-radiated noise $L_{pA3} = 31 \text{ dB(A)}$

Sound pressure level in the room = 34 dB(A)

(after logarithmic addition, as the box is in the false ceiling of the room, see sketch on page 7)

Sound power levels of units, see leaflet 5/1/EN/..

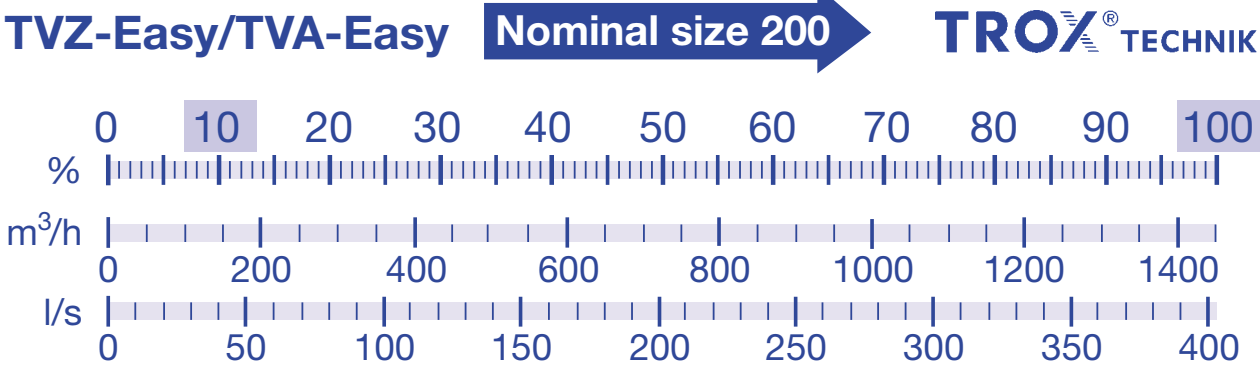
System attenuation in dB/Oct. acc. to VDI 2081 (values incorporated into the quick selection table)								
f_m in Hz	63	125	250	500	1000	2000	4000	8000
Duct attenuation	0	0	1	2	3	3	3	3
Room attenuation	5	5	5	5	5	5	5	5
End reflection	10	5	2	0	0	0	0	0

Correction for distribution into the duct system (values incorporated into the quick selection table)										
\dot{V}	l/s	150	300	450	600	750	900	1200	1500	1800
	m^3/h	540	1080	1620	2160	2700	3240	4320	5400	6480
dB per octave		0	3	5	6	7	8	9	10	11

Quick selection of sound pressure level in dB(A)																
Nominal size	\dot{V}		Δp_{stmin}		$\Delta p_{\text{st}} = 100 \text{ Pa}$				$\Delta p_{\text{st}} = 200 \text{ Pa}$				$\Delta p_{\text{st}} = 500 \text{ Pa}$			
					Air-regenerated noise		Case-radiated noise ¹⁾		Air-regenerated noise		Case-radiated noise ¹⁾		Air-regenerated noise		Case-radiated noise ¹⁾	
	l/s	m^3/h	Pa	$\pm \%$	TVA-Easy L_{pA}	TVA-Easy+TS L_{pA1}	TVA-Easy L_{pA2}	TVAD-Easy L_{pA3}	TVA-Easy L_{pA}	TVA-Easy+TS L_{pA1}	TVA-Easy L_{pA2}	TVAD-Easy L_{pA3}	TVA-Easy L_{pA}	TVA-Easy+TS L_{pA1}	TVA-Easy L_{pA2}	TVAD-Easy L_{pA3}
125	15	54	20	15	17	16	13	13	19	17	15	13	19	17	21	16
	60	216	25	7	23	20	24	22	24	21	27	22	27	23	30	25
	105	378	80	6	25	21	28	26	28	24	31	26	35	30	34	29
	155	558	150	5	-	-	-	-	27	27	33	28	36	32	37	32
160	25	90	20	15	15	14	13	13	17	15	14	13	20	18	20	15
	100	360	40	8	27	23	22	20	29	24	26	20	34	29	30	25
	175	630	70	7	26	21	27	25	30	25	30	25	37	32	35	29
	250	900	150	5	-	-	-	-	26	23	33	28	39	34	39	33
200	40	144	20	15	15	14	14	14	17	15	17	14	20	15	19	15
	160	576	30	7	21	17	24	21	23	18	26	21	29	20	31	26
	280	1008	90	5	22	17	27	26	25	19	31	26	30	23	36	31
	405	1458	190	5	-	-	-	-	28	26	32	28	32	28	40	36
250	60	216	20	15	15	14	14	13	17	15	14	13	20	15	15	13
	245	882	20	7	19	16	25	23	22	17	27	23	27	21	32	28
	430	1548	70	5	19	18	27	26	23	22	31	26	30	25	37	32
	615	2214	150	5	-	-	-	-	28	29	33	29	32	30	41	36
315	105	378	20	15	16	15	14	14	17	15	14	14	18	16	21	16
	410	1476	30	7	25	21	26	25	27	22	29	25	31	25	36	31
	720	2592	90	6	24	20	32	31	27	24	35	31	33	28	41	36
	1030	3708	180	5	-	-	-	-	30	29	39	35	35	31	43	38
400	170	612	20	15	15	14	14	14	18	15	19	14	21	16	28	22
	670	2412	25	7	17	13	29	28	21	16	33	28	28	23	39	33
	1175	4230	40	6	22	19	35	34	27	23	39	34	32	27	44	39
	1675	6030	150	5	-	-	-	-	34	31	44	40	36	32	47	43

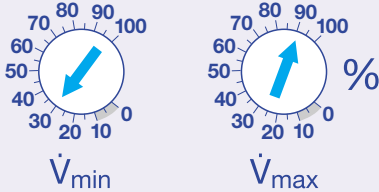
¹⁾ 4 dB/octave ceiling reduction and 5 dB/octave room attenuation have been allowed for in the calculation of case-radiated noise. Acoustic data for differential pressure up to 1000 Pa, see on-line design programme "Air terminal units".

Flow Rate Adjustment



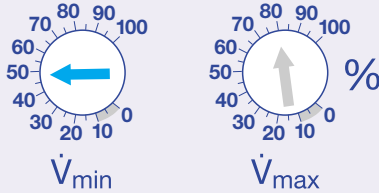
On each unit, a flow rate scale is available in order to determine the settings on site (see example nominal size 200 above).

Variable flow rate control



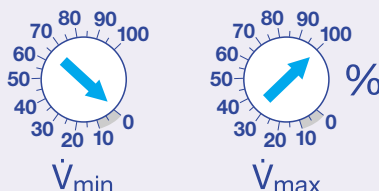
The required flow rates must be adjusted by the customer. If \dot{V}_{\min} is set higher than \dot{V}_{\max} , then \dot{V}_{\min} is provided as a constant flow rate, even if a control signal is transmitted. If \dot{V}_{\min} is set on 0 %, then control is between shut-off and \dot{V}_{\max} . If the control signal falls below 0.1 VDC, the control damper closes (leakage flow only).

Constant flow rate control



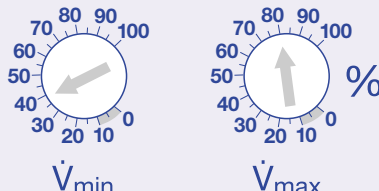
The constant flow rate can be set with the \dot{V}_{\min} -potentiometer. The setting of the \dot{V}_{\max} -potentiometer is unimportant.

BMS operation



If the flow rate is set by the BMS, the \dot{V}_{\min} -potentiometer must be set at 0 % and the \dot{V}_{\max} -potentiometer must be set at 100 %. If the control signal falls below 0.1 VDC, the control damper closes (leakage flow only).

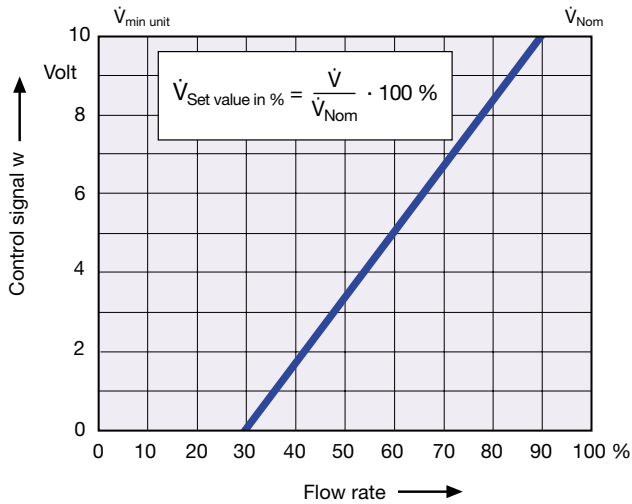
Factory setting



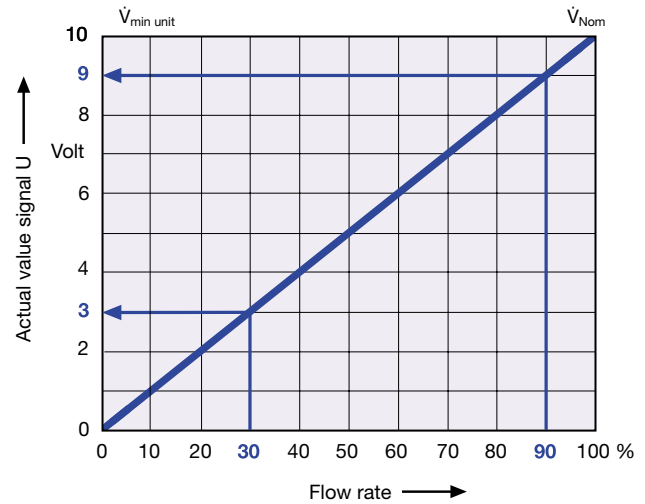
For delivery, settings are, $\dot{V}_{\min} = 40 \%$ and $\dot{V}_{\max} = 80 \%$.

Characteristics · Wiring Examples

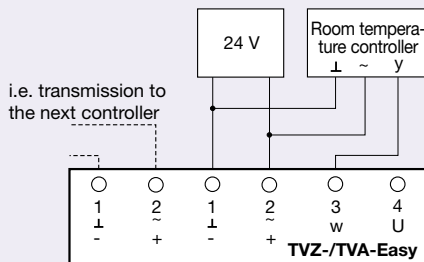
Characteristics of the control signal (Example)



Characteristics of actual value signal

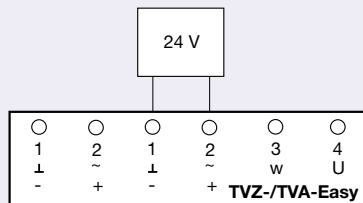


Variable flow rate control



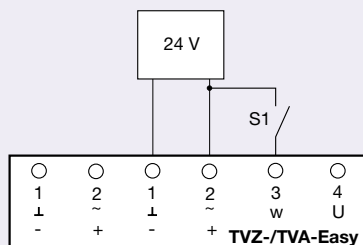
The connection of supply voltage and of remote room temperature controller must be carried out as shown in the circuit diagram opposite.

Constant flow rate control



As soon as the 24 V supply voltage is applied, the controller runs the set \dot{V}_{min} -value as a constant flow rate.

$\dot{V}_{\text{min}} / \dot{V}_{\text{max}}$ changeover

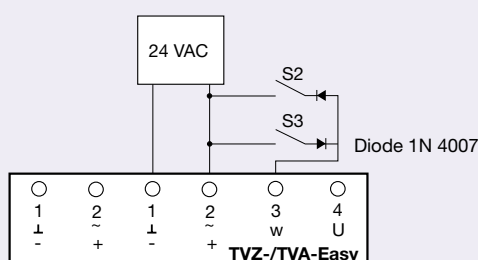


The switch S1 enables a changeover between the two constant flow rates of \dot{V}_{min} and \dot{V}_{max} .

Switch S1 open : \dot{V}_{min}
Switch S1 closed: \dot{V}_{max}

When there is parallel connection of multiple TVZ-Easy/ TVA-Easy controllers, the switch S1 must be used as changeover switch and the contact for the \dot{V}_{min} operation must be connected to the ground (terminal 1).

Override controls OPEN / CLOSED



The override controls to provide OPEN and CLOSED can be achieved using external switches (potential-free contacts), only for a.c. voltage.

Switch S2 closed: Damper blade CLOSED
Switch S3 closed: Damper blade OPEN

All override controls can be combined among themselves and with the different circuit options.

The customer made connections and wiring must comply with the local standards for electrical wiring!

Specification text

Make: TROX. VAV terminal box Type TVZ-Easy for supply air or TVA-Easy for extract air of variable air volume flow systems, in 6 nominal sizes.

Selection based on nominal size determination. Simple setting by the customers of the volume flow with \dot{V}_{\min} - and \dot{V}_{\max} -adjustment potentiometers with percentage scales. During the installation or commissioning of controller, adjustment is possible without supply voltage. A transparent protection cover prevents inadvertent resetting and provides general security. Control damper blade delivery is in 45° position in order to allow ventilation air flow without additional control functions.

Special characteristics:

- Flow rate adjustment without adjustment tool
- Functional testing with service button
- Functional check by indicator light
- Integral silencer with at least 26 dB insertion loss at 250 Hz
- Hygiene tested and certified in accordance with VDI 6022, TVZ-Easy with inspection cover
- Factory functional testing of each unit using a dedicated test rig

High visibility external indicator light for signalling the functions:

Set, not set and power failure.

Functional testing of actuator 'CLOSED, OPEN and control operation' possible with service button.

Electrical connections with screw terminals. Terminal for looping the 24 V supply voltage, i.e. for the connection of simple voltage transmission to the next controller. Wire clamping bracket fixed to the casing.

Voltage range for control and actual value signal 0 to 10 VDC. Possible override controls with external switches using potential-free contacts: CLOSED, OPEN, \dot{V}_{\min} or \dot{V}_{\max} .

Integral differential pressure sensor with 3 mm measurement holes which are, to a large extent resistant to contamination. Damper blade closed leakage to DIN EN 1751, class 4 (nominal size 125, class 3). Position of the damper blade visible externally based on shaft extension. TROX Compact electronic flow rate controller factory fitted. Casing air leakage complies with DIN EN 1751, class A. Differential pressure range 20 to 1000 Pa.

Materials:

Casing in galvanised sheet steel, aluminium sensor tubes, thermoplastic elastomer control damper blade seal and plain bearings. Lining in the silencer section and in the control damper chamber is mineral wool conforming to DIN 4102, building material class A2, with RAL quality mark RAL-GZ 388, bio-degradable as defined by TRGS 905 and EU directive 97/69/EG. Mineral wool faced with fibreglass as protection against erosion suitable for air velocities up to 20 m/s, inert to fungal and bacterial growth.

Unit variant with:

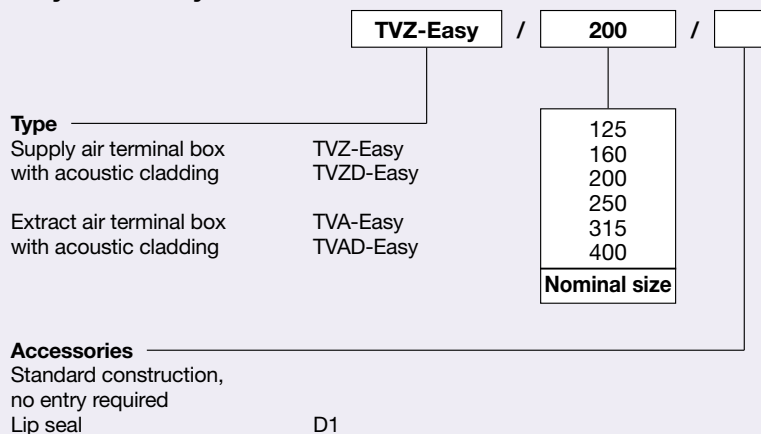
Additional acoustic cladding to reduce case-radiated noise.

Consists of 40 mm mineral wool and outer cover of galvanised sheet steel. This gives a reduction in case-radiated noise of minimum 5 dB providing the upstream (fan side) ducting has a rigid external insulation. Non-retrofitable.

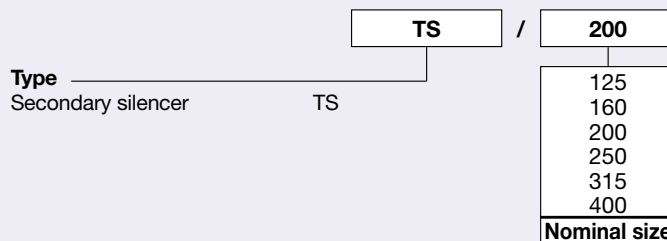
Optionally with:

TS secondary silencer, for the reduction of air-regenerated noise, total insertion loss of the basic unit with TS at least 32 dB at 250 Hz. Lining of mineral wool conforming to DIN 4102, fire rating class A2, with RAL-quality mark RAL-GZ 388, bio-degradable pursuant to TRGS 905 and EU directive 97/69/EG. Mineral wool faced with fibreglass as protection against erosion, suitable for air velocities up to 20 m/s, inert to fungal and bacterial growth.

Order code TVZ-Easy · TVA-Easy



Order code TS



Order example TVZ-Easy · TVA-Easy

Make: TROX

Type: TVZ-Easy / 200

Order example TS

Make: TROX

Type: TS / 200

