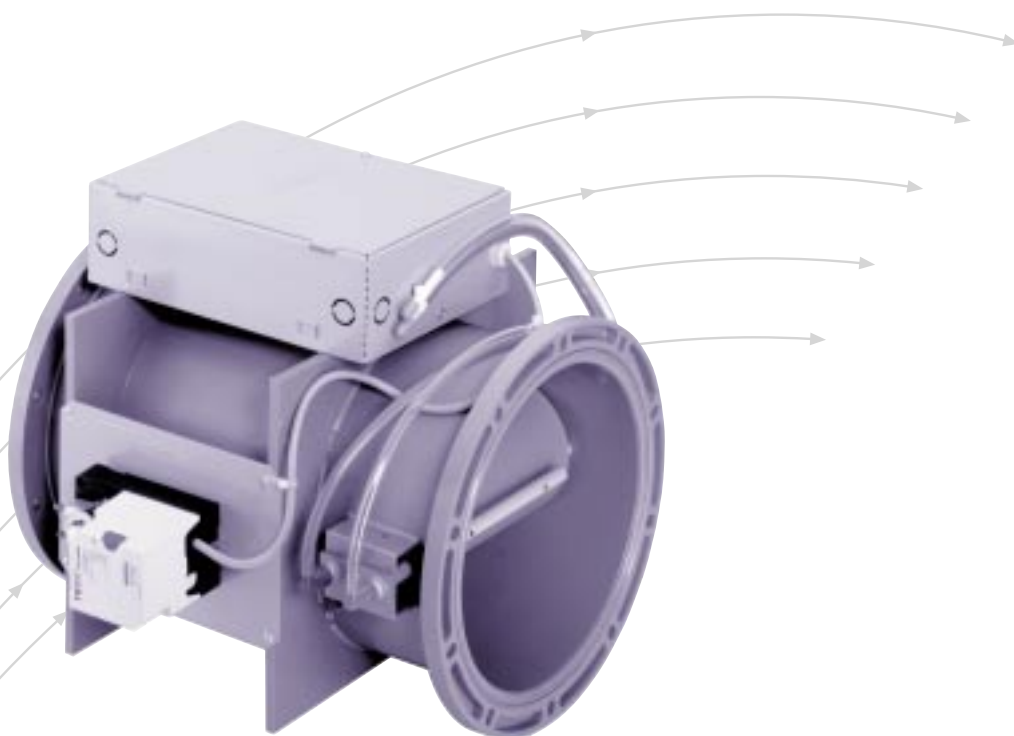


# LABCONTROL

Control devices for laboratories  
Type TVLK



**TROX<sup>®</sup> TECHNIK**

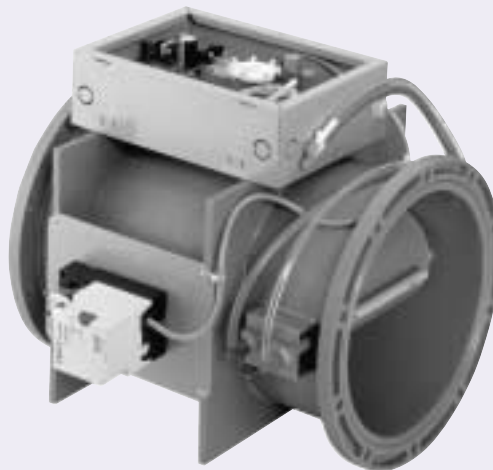
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## TVLK, electronic construction with TCU-LON II



### Area of application

The VAV-controlled TVLK was designed for very high ventilation requirements. Its application is primarily in laboratory ventilation. There it is used for flow rate control on fume cupboards. As the extract air from fume cupboards can contain a very wide range of aggressive components, the TVLK is made of very resistance material. All parts that come into contact with the air flow are made of PPS. The differential pressure sensors for measuring the differential pressure signal (is used for calculating the flow rate) can be removed so that it is possible to check for soiling in an efficient and straightforward manner. Incorrect re-fitting is not possible. The connection diameter on the TVLK is 250 mm, suitable for the standard connection on the majority of fume cupboards. To be able to cover different flow rates with one standard diameter, flow screens are used to guarantee optimum control behaviour at low differential pressure. In laboratory areas many installations must be incorporated in the ceiling area. For this reason the TVLK is only 400 mm long. The function has been optimised for this length and its insensitivity to disturbed incoming flow enables the TVLK to be used directly on the fume cupboard. An additional inlet flow section is not necessary. The TVLK is available with electronic or pneumatic control components. The electronic controller for regulating and monitoring fume cupboards in accordance with DIN 12924 and EN 14175 makes use of the advantages of LONWORKS® for communication.

### The most important advantages:

- All components coming into contact with the extract air are made of resistant PPS. There are no metal parts in the contact with the airflow
- Overall length of controller 400 mm
- Standard diameter 250 mm
- Electronic or pneumatic control (electronic variant supports LON bus)
- Flow rate ranges: electronic approx. 8 : 1, pneumatic approx. 5 : 1
- Resistant to unfavourable air entry conditions
- Easy maintenance. The removable differential pressure sensor is designed to avoid the possibility of incorrect re-installation
- Available with flanges and matching flanges on request
- For critical acoustic requirements the TVLK can be combined with plastic circular silencers Type CAK
- All components fitted to the VAV controller are pre-piped and pre-wired

# Constructions · Dimensions

## Constructional features

### Casing

- Same 250 mm spigot diameter on both ends
- With optional flange both ends
- Compact 400 mm construction length
- Leakage flow rate to EN 1751, class A

### Flow rate control

- Choice of electronic or pneumatic, electronic version with LON bus technology
- The extract air control can be varied to prevent the escape of pollutants from the fume cupboard and save energy at the same time
- Close tolerances on flow rate without extended straight length upstream
- Differential pressure range from 80 to 1000 Pa
- Shut-off except air leakage rate possible when damper blade is closed
- Flow rate is factory set and every unit factory-tested
- Vertical or horizontal installation (see label on unit)
- Maintenance-free damper blade mechanism

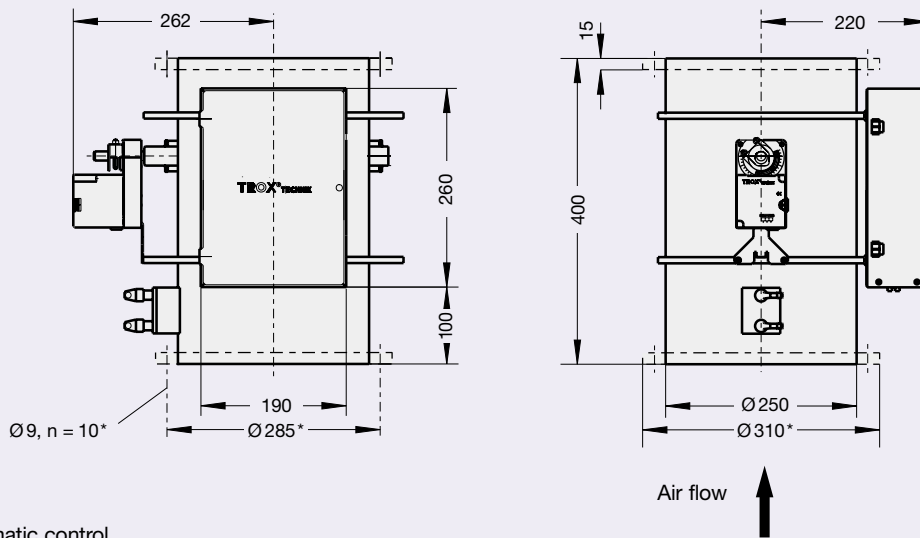
- Operating temperature 10 to 50 °C

- Flow rate can be measured and adjusted on site
- Electronic control can have parameters set using software and laptop

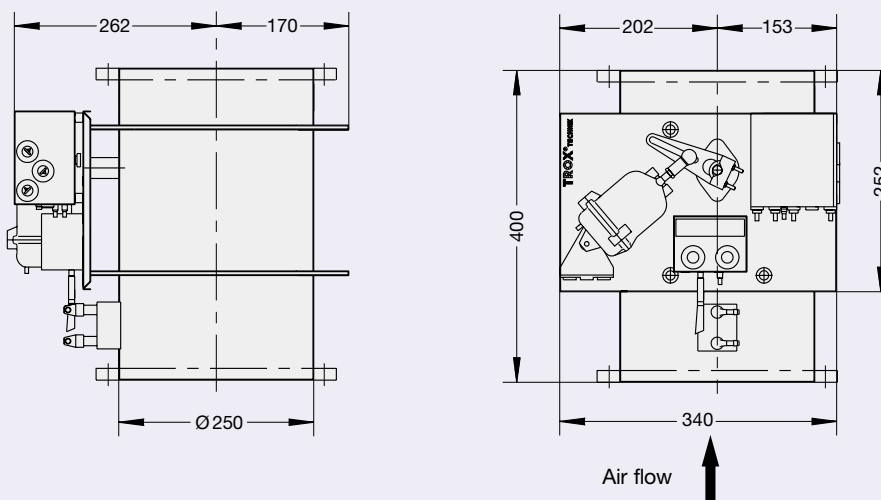
### Materials

- Casing and damper blade in flame resistant polypropylene (PPS)
- Polypropylene (PP) bearings
- Damper blade seal in chloroprene rubber (CR); seal as an surcharge option
- Removable plastic differential pressure sensor (PP)

TVLK, electronic control



TVLK, pneumatic control



\* For flange construction

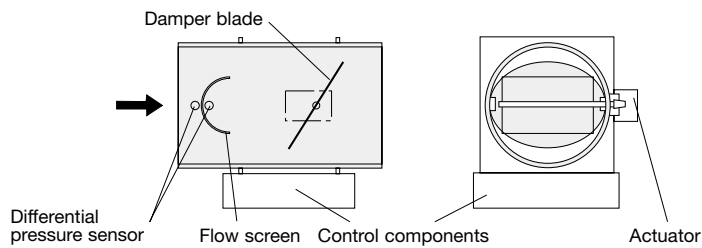
# Functional Description

## Flow rate control: Method of operation

The differential pressure measured on the differential pressure sensor is given by a transducer as an output signal to the electronic or pneumatic controller.

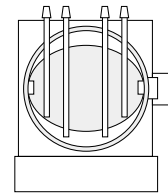
This compares the actual value with the required value. If there is a control deviation the damper blade is adjusted accordingly by the actuator and the volume control is maintained at a constant level to close tolerances across the whole differential pressure range.

## Construction with flow screen, Size 250-110, ... 250-180



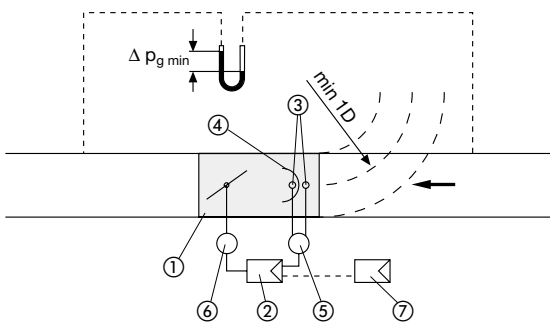
## Explanation of function of the fume cupboard controller

Fume cupboard control is the primary application of the TVLK. For this purpose pneumatic or electronic controllers are integrated with the TVLK. In this way different requirements, from control using LONWORKS® to usage for monitoring and control without electrical power, can be met. Both the pneumatic and the electronic system use the proven method of air inlet velocity measurement in the fume cupboard to vary the flow rate between  $V_{\min}$  and  $V_{\max}$ , parameters that can be set. In this way it is possible to provide variable flow rate control as a function of the sash window setting without expensive window sensors.

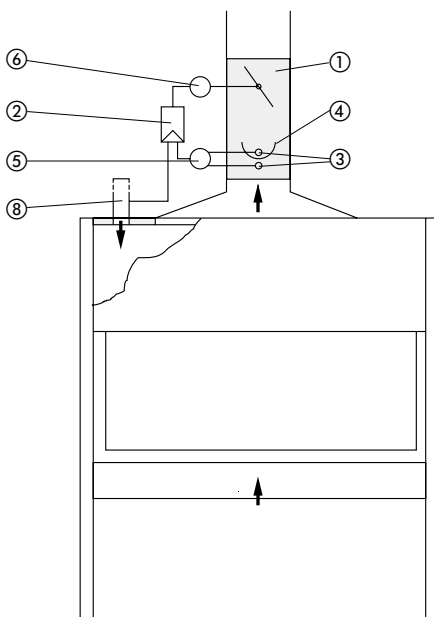


**Construction without flow screen, Size 250-0**

## Flow rate control



## Fume cupboard control



## Special features of the TCU-LON II controller

The new TCU-LON II electronic controller makes use of the advantages of LONWORKS® technology. In this way it is possible to achieve maximum performance with minimum wiring effort. Standardised network variables enable straightforward access to nominal and actual values. In addition, remote maintenance or the forwarding of error messages as faxes, e-mails, or SMS messages to a mobile phone is possible.

Further details on extract and room air control are explained in the LABCONTROL system descriptions ([www.trox.de](http://www.trox.de)).

- ① TVLK
- ② Flow rate controller
- ③ Differential pressure sensor
- ④ Flow screen
- ⑤ Diaphragm pressure transducer
- ⑥ Actuator
- ⑦ Room temperature controller
- ⑧ FCC-E transducer (Air intake velocity sensor)

# Technical Data · Dimensions · Nomenclature

## Technical data TCU-LON II

Supply voltage	: 24 VAC ± 10 %, 50 Hz
	Power consumption max. 50 VA
Permissible temperature range:	: 10 - 40 °C
Fuse TCU-LON II	: Fine wire fuse 2.5 A

## Technical data FCC-P

Operating pressure	: 1.3 ± 0.1 bar; Conditioned instrument compressed air, (oil-, dust- and water-free)
Output pressure (actuating signal)	: 0.2 - 1.0 bar
Air consumption	: 80 l <sub>n</sub> /h
Connection diameter	: 4 mm

## C-values differential pressure sensor

Type	C <sub>l/s</sub>	C <sub>m³/h</sub>
250 - 0	41.7	150.1
250 - 110	24.9	89.6
250 - 140	20.0	72.0
250 - 180	13.6	49.0

## Calculation formula

at  $\rho = 1.2 \text{ kg/m}^3$

$$\dot{V} = C \cdot \sqrt{\Delta p_w}$$

## Flow rate ranges, flow data TCU-LON II

Type	Flow rate		$\Delta p_{g \text{ min}}$ Pa	$\Delta \dot{V}$ ± %
	l/s	m³/h		
250-0	65	234	15	10
	250	900	30	7
	435	1566	40	5
	615	2214	50	5
250-110	40	144	5	10
	140	504	15	7
	240	864	40	5
	340	1224	80	5
250-140	35	126	5	10
	115	414	20	7
	200	720	45	5
	280	1008	90	5
250-180	25	90	5	10
	85	306	25	7
	145	522	50	5
	210	756	90	5

## Flow rate ranges, flow data FCC-P (RLP 100)

Type	Flow rate		$\Delta p_{g \text{ min}}$ Pa	$\Delta \dot{V}$ ± %
	l/s	m³/h		
250-0	50	180	10	10
	235	846	25	7
	416	1498	40	5
	600	2160	50	5
	250-110	25	90	5
250-110	120	432	15	7
	210	756	35	5
	305	1098	75	5
	250-140	20	72	5
250-140	90	324	20	7
	165	594	40	5
	235	846	80	5
	250-180	15	54	5
250-180	65	234	20	7
	115	414	40	5
	165	594	80	5

## Nomenclature

$f_m$	in Hz: Octave band centre frequency
$L_w$	in dB: Sound power level of air-regenerated noise in the room (low pressure) side ducting
$L_{w1}$	in dB: Sound power level of air-regenerated noise in the room with 3 m plastic duct on supply side
$L$	in dB(A): A-weighted sound pressure level of air-regenerated noise, allowing for end reflection attenuation and room attenuation of 8 dB/oct.
$L_1$	in dB(A): A-weighted sound pressure level of case-radiated noise, allowing for room attenuation of 8 dB/oct.
NC	: NC weighting of sound pressure spectrum, allowing for room attenuation of 8 dB/oct.

$\Delta p_g$	in Pa: Total pressure differential
$\Delta p_{g \text{ min}}$	in Pa: Minimum total pressure differential
$\dot{V}$	in l/s or m³/h: Flow rate
$\Delta \dot{V}$	in ± %: Flow rate tolerance from setpoint value
B	in mm: Nominal length of TROX Type CAK circular silencer

All sound power levels are based on 1 pW, all sound pressure levels on 20 µPa.

All noise levels determined in a reverberation chamber. The sound power data was determined and corrected according to DIN EN ISO 5135, February 1999.

# Air-regenerated Noise

without circular silencer

## Example

Given: TVLK with 110 mm flow screen (Type 250-110)  
 $\dot{V} = 40 \text{ l/s}$  or  $144 \text{ m}^3/\text{h}$   
 $\Delta p_g = 250 \text{ Pa}$   
 Required sound pressure level in the room  $52 \text{ dB(A)}$ ,  
 to DIN 12924 with  $5 \text{ dB}$  room attenuation

Sought: Air-regenerated noise in the room

## Method

$f_m$	63	125	250	500	1000	2000	4000	8000
$L_w$	49	49	48	45	43	40	31	25
End reflection <sup>2)</sup>	14	9	4	1	0	0	0	0
Room attenuation <sup>2)</sup>	5	5	5	5	5	5	5	5
	30	35	39	38	35	36	26	20
A-weighting	-26	-16	-9	-3	0	+1	+1	-1
Corrected level	<b>4</b>	<b>19</b>	<b>30</b>	<b>36</b>	<b>38</b>	<b>36</b>	<b>27</b>	<b>19</b>

- 1) No acoustic allowance made for fume cupboard (sash window open). For more accurate calculations request acoustic data from manufacturer of the fume cupboard.  
 2) See VDI 2081

Result: **42 dB(A)** using logarithmic addition, requirement met.<sup>1)</sup>

## Air-regenerated noise, on air inlet side

Type	$\dot{V}$		$\Delta p_g = 100 \text{ Pa}$														$\Delta p_g = 250 \text{ Pa}$														$\Delta p_g = 500 \text{ Pa}$														$\Delta p_g = 1000 \text{ Pa}$													
			$L_w$ in dB														$L_w$ in dB														$L_w$ in dB														$L_w$ in dB													
			$f_m$ in Hz														$f_m$ in Hz														$f_m$ in Hz														$f_m$ in Hz													
			63	125	250	500	1000	2000	4000	8000	L in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L in dB(A)	NC																
250 - 0	65	234	47	45	41	38	37	29	19	<	31	27	44	48	47	45	46	46	36	28	42	38	49	51	50	50	49	53	48	46	49	45	54	47	36	36	39	45	53	49	48	47																
	250	900	58	54	49	52	46	43	35	27	43	38	62	60	56	57	54	53	48	41	51	45	62	64	59	60	58	58	55	50	56	50	65	65	62	63	63	63	62	58	61	56																
	435	1566	55	60	55	56	49	45	40	36	47	42	69	69	61	62	58	55	51	45	55	49	72	73	66	65	63	62	59	54	60	54	72	75	68	68	67	67	65	61	65	59																
	615	2214	52	63	59	59	50	46	42	42	49	45	68	73	64	65	60	56	52	46	57	52	78	78	70	69	66	64	60	55	63	56	78	82	73	72	70	69	67	63	67	61																
250 - 110	40	144	49	50	46	41	34	25	16	<	32	25	49	49	48	45	43	40	31	25	39	33	52	50	49	48	47	48	46	49	46	43	52	46	44	45	51	52	52	54	50	49																
	140	504	57	60	54	51	44	38	31	25	42	37	60	64	60	58	53	49	44	38	50	44	60	65	63	62	58	56	52	50	55	49	60	64	63	63	63	62	59	58	60	54																
	240	864	59	62	56	54	47	41	35	29	45	41	67	70	65	63	57	52	48	42	54	50	68	72	69	68	63	60	56	52	60	55	68	72	71	70	68	66	63	60	65	59																
	340	1224	58	59	55	54	49	43	37	33	45	40	70	73	68	65	58	53	48	42	56	52	71	77	73	71	66	62	58	54	63	59	73	78	76	75	71	68	65	61	68	62																
250 - 140	35	126	50	53	48	43	35	27	19	15	33	28	49	52	49	45	43	41	31	23	39	33	51	55	53	48	47	48	47	55	48	49	52	47	42	43	48	49	53	52	49	47																
	115	414	58	61	56	52	44	38	31	25	43	38	62	67	62	58	53	49	43	37	50	44	62	68	65	62	58	56	52	48	55	49	62	68	65	64	63	62	59	58	60	54																
	200	720	61	61	55	54	47	40	33	28	44	40	68	72	66	64	57	52	47	41	55	51	69	74	71	68	63	60	55	51	60	55	69	75	73	71	68	66	62	59	65	59																
	280	1008	60	59	53	53	48	42	35	31	44	39	72	74	68	67	60	53	49	43	57	54	75	78	74	71	66	62	58	54	63	59	75	80	77	75	70	68	64	60	67	62																
250 - 180	25	90	52	55	49	43	35	27	20	26	34	28	49	54	51	45	40	36	28	23	37	30	41	41	40	37	38	41	40	32	37	34	48	44	44	41	47	47	49	48	46	43																
	85	306	63	64	58	53	44	37	30	26	44	39	71	71	65	59	54	49	44	38	51	46	70	72	67	62	58	56	52	48	56	49	65	69	68	64	64	62	59	59	60	54																
	145	522	60	60	55	52	45	39	32	27	43	38	71	75	69	64	57	51	47	40	55	51	76	81	74	69	63	60	55	51	61	56	72	78	76	71	68	66	62	59	65	59																
	210	756	53	51	48	48	46	41	33	27	40	33	71	75	71	67	58	52	47	40	57	54	77	86	79	73	66	61	56	52	65	61	78	85	82	76	71	69	64	59	69	63																

< indicates values below 15

# Air-regenerated Noise

with circular silencer Type CAK

## Example

Given: TVLK with 140 mm flow screen (type 250-140)  
 $\dot{V} = 200 \text{ l/s}$  or  $720 \text{ m}^3/\text{h}$   
 $\Delta p_g = 250 \text{ Pa}$   
 Required sound pressure level in the room 52 dB(A),  
 to DIN 12924 with 5 dB room attenuation

Sought: Air-regenerated noise in the room

## Method 1, without circular silencer

$f_m$	63	125	250	500	1000	2000	4000	8000
$L_W^{2)}$	68	72	66	64	57	52	47	41
End reflection <sup>4)</sup>	14	9	4	1	0	0	0	0
Room attenuation <sup>4)</sup>	5	5	5	5	5	5	5	5
A-weighting	-26	-16	-9	-3	0	+1	+1	-1
Corrected level	<b>23</b>	<b>42</b>	<b>48</b>	<b>55</b>	<b>52</b>	<b>48</b>	<b>43</b>	<b>35</b>

Result: **L approx. 58 dB(A)**, requirement not met.<sup>1)</sup>

## Method 2, with circular silencer CAK, length 0.5 m

$f_m$	63	125	250	500	1000	2000	4000	8000
$L_W^{3)}$	66	67	61	53	35	38	38	35
End reflection <sup>4)</sup>	14	9	4	1	0	0	0	0
Room attenuation <sup>4)</sup>	5	5	5	5	5	5	5	5
A-weighting	-26	-16	-9	-3	0	+1	+1	-1
Corrected level	<b>21</b>	<b>37</b>	<b>43</b>	<b>44</b>	<b>30</b>	<b>34</b>	<b>34</b>	<b>29</b>

Result: **L approx. 48 dB(A)**, requirement met.<sup>1)</sup>

- 1) No acoustic allowance made for fume cupboard (sash window open). For more accurate calculations request acoustic data from manufacturer of the fume cupboard.
- 2) Values without circular silencer from table page 6
- 3) Values with circular silencer from table page 7
- 4) See VDI 2081

## Air-regenerated noise, on air inlet side, with circular silencer CAK

Type	B in mm	$\dot{V}$ l/s    m <sup>3</sup> /h		$\Delta p_g = 100 \text{ Pa}$										$\Delta p_g = 250 \text{ Pa}$										$\Delta p_g = 500 \text{ Pa}$										$\Delta p_g = 1000 \text{ Pa}$									
				$L_W$ in dB					$L_W$ in dB					$L_W$ in dB					$L_W$ in dB					$L_W$ in dB					$L_W$ in dB														
				$f_m$ in Hz					$f_m$ in Hz					$f_m$ in Hz					$f_m$ in Hz					$f_m$ in Hz					$f_m$ in Hz														
				63	125	250	500	1000	2000	4000	8000	L in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L in dB(A)	NC
250 - 0	500	65	234	48	42	37	29	16	<	<	<	21	<	49	44	43	36	24	28	26	15	28	21	56	52	52	45	30	35	39	45	40	40	55	46	33	20	<	17	27	28	24	23
		250	900	59	52	45	43	25	29	28	25	33	28	62	57	52	48	33	40	40	33	40	34	66	61	56	52	37	45	46	42	45	41	66	63	59	53	40	48	52	49	49	46
		435	1566	55	54	50	44	32	29	25	26	35	29	68	67	57	53	37	41	43	37	44	39	73	69	61	56	41	48	51	45	49	45	73	73	65	59	45	53	57	53	54	51
		615	2214	51	56	54	44	37	28	22	26	37	30	66	69	60	56	43	42	41	37	47	43	79	74	65	60	44	50	53	46	52	47	78	78	69	63	48	55	60	55	57	54
1000	65	234	50	40	33	25	<	<	<	<	17	<	50	43	39	30	16	25	31	19	27	26	49	46	41	33	19	31	37	39	34	35	56	49	44	38	27	36	45	48	42	43	
	250	900	60	51	42	38	19	17	21	15	28	23	62	54	46	40	24	29	33	28	32	26	65	59	50	43	27	36	41	37	38	36	67	61	54	46	31	40	48	45	44	42	
	435	1566	56	58	48	42	30	26	23	25	33	27	69	64	53	47	33	32	35	30	39	32	73	68	56	49	34	39	46	40	44	40	74	71	61	52	37	45	53	48	49	47	
	615	2214	53	63	51	44	38	32	25	32	37	30	71	71	57	52	41	38	36	37	44	38	79	72	61	53	42	41	46	41	47	40	79	77	65	56	43	47	55	50	52	49	
250 - 110	500	40	144	45	46	42	32	<	<	<	<	24	16	49	46	46	37	21	26	24	15	29	21	51	50	49	42	27	35	38	38	36	33	50	47	46	40	31	41	44	48	42	43
		140	504	57	56	49	43	23	22	21	24	33	28	61	60	57	50	32	35	35	29	41	36	64	63	60	54	37	43	44	42	46	40	62	63	61	56	42	48	51	50	49	45
		240	864	60	59	52	46	26	26	26	26	36	32	67	66	61	55	36	38	39	36	45	41	69	70	66	59	42	46	47	43	50	46	70	70	68	62	46	51	54	51	54	49
		340	1224	56	57	51	46	29	27	27	26	36	32	72	70	63	57	37	38	40	37	48	43	73	74	69	62	44	47	49	45	53	49	77	76	72	66	50	54	56	53	58	53
1000	40	144	47	44	38	27	<	<	<	<	20	<	48	46	42	31	14	20	28	15	26	23	48	46	42	34	18	30	37	41	34	36	51	49	45	39	25	37	46	52	44	47	
	140	504	57	53	45	37	15	14	17	13	28	21	59	58	51	42	23	26	30	26	34	27	61	60	54	46	28	34	39	38	39	34	63	62	56	49	32	41	48	46	45	42	
	240	864	59	56	47	39	18	15	18	14	30	24	66	64	56	47	27	29	33	28	39	33	68	66	60	51	32	36	41	37	43	37	71	68	62	54	36	43	49	46	48	43	
	340	1224	58	55	48	38	22	18	20	17	31	23	73	68	59	51	30	30	34	29	42	36	74	70	63	55	35	39	43	39	47	41	81	73	66	58	39	44	51	47	51	45	
250 - 140	500	35	126	50	49	45	36	18	16	15	<	27	20	52	49	48	39	23	30	33	22	32	27	53	51	49	42	28	40	43	49	42	44	57	53	51	47	35	46	51	53	48	48
		115	414	60	58	51	45	25	25	24	25	35	30	60	61	55	48	30	33	34	28	39	33	62	62	58	52	35	42	43	42	44	38	65	64	61	54	40	48	52	49	49	46
		200	720	62	59	53	49	28	26	25	26	39	35	66	67	61	53	35	38	38	35	44	39	68	68	64	56	39	44	46	42	48	43	71	70	66	59	43	50	53	49	52	47
		280	1008	63	60	54	51	29	26	26	26	40	37	71	70	64	57	38	40	40	39	48	43	73	72	68	60	42	47	48	43	52	47	75	73	69	62	45	52	54	50	54	48
1000	35	126	52	43	36	24	<	<	<	<	18	<	46	48	43	32	<	19	24	15	26	18	51	52	47	38	20	30	37	40	35	35	54	52	47	40	26	38	46	50	43	45	
	115	414	56	55	45	36	15	13	16	15	29	21	60	60	52	42	22	24	29	26	35	28	62	61	55	46	27	32	38	36	39	32	62	61	55	47	31	39	47	45	43	41	
	200	720	60	58	48	42	19	17	20	24	33	27	66	65	57	47	26	28	32	30	40	33	69	67	60	51	30	35	40	38	44	38	70	69	62	53	35	41	48	45	47	42	
	280	1008	62	58	49	44	21	19	22	29	34	29	71	68	60	50	29	30	34	34	43	37	74	71	64	54	33	37	42	40	47	42	75	74	66	57	37	43	49	46	50	43	
250 - 180	500	25	90	55	52	46	35	<	<	<	<	28	21	46	50	47	35	17	20	19	<	28	22	52	54	52	42	26	32	35	42	37	36	49	47	44	37	27	35	41	42	37	37
		85	306	62	60	53	44	22	21	20	25	36	29	73	67	60	51	31	33	35	35	43	38	74	70	65	54	37	41	43	42	48	43	67	65	63	55	40	46	50	51	49	46
		145	522	59	56	49	43	23	22	22	21	33	28	73	71	65	56	36	36	38	37	48	43	78	78	71	60	42	45	46	46	54	50	75	75	71	63	46	51	53	52	55	51
	210	756	50	48	42	38	22	22	22	13	27	22	73	72	66	58	38	37	39	37	50	45	78	84	75	65	45	47	48	48	58	55	81	82	78	68	50	54	56	52	60	58	
	1000	25	90	52	51	41	27	3	2	5	8	23	15	52	53	46	33	<	<	18	23	28	21	50	52	49	36	16	23	30	44	35	38	49	44	38	30	17	28	37	37	32	33
		85	306	61	59	49	38	14	13	17	25	32	25	72	67	57	45	23	25	30	35	40	34	73	70	62	49	28	33	38	39	44	39	65	66	60	50	32	38	44	46	45	42
145		522	61	57	47	40	16	14	18	21	31	25	72	70	61	50	27	27	33	36	44	38	77	78	67	55	33	36	41	40	50	47	74	75	69	57	37	42	48	47	51	48	
210	756	59	52	43	41	16	14	18	10	29	25	72	71	62	53	30	28	34	36	45	40	77	82	71																			

# Case-radiated Noise

## Example

Given: TVLK with 140 mm flow screen (type 250-140)  
 $\dot{V} = 115 \text{ l/s}$  or  $414 \text{ m}^3/\text{h}$   
 $\Delta p_g = 250 \text{ Pa}$   
 Required sound pressure level in the room 52 dB(A),  
 to DIN 12924 with 5 dB room attenuation

Sought: Case-radiated noise in the room

## Method

$f_m$	<b>63</b>	<b>125</b>	<b>250</b>	<b>500</b>	<b>1000</b>	<b>2000</b>	<b>4000</b>	<b>8000</b>
$L_W$	43	36	33	34	42	43	35	31
Room attenuation <sup>2)</sup>	5	5	5	5	5	5	5	5
A-weighting	-26	-16	-9	-3	0	+1	+1	-1
Corrected level	<b>12</b>	<b>15</b>	<b>19</b>	<b>26</b>	<b>37</b>	<b>39</b>	<b>31</b>	<b>25</b>

- 1) No acoustic allowance made for fume cupboard (sash window open). For more accurate calculations request acoustic data from manufacturer of the fume cupboard.  
 2) See VDI 2081

Result: **42 dB(A)** using logarithmic addition, requirement met.<sup>1)</sup>

Case-radiated noise																																										
Type	$\dot{V}$		$\Delta p_g = 100 \text{ Pa}$														$\Delta p_g = 250 \text{ Pa}$																									
			$L_W$ in dB														$L_W$ in dB																									
			$f_m$ in Hz														$f_m$ in Hz																									
			$L$ in dB(A)														$L$ in dB(A)																									
	l/s	m <sup>3</sup> /h	63	125	250	500	1000	2000	4000	8000	NC	63	125	250	500	1000	2000	4000	8000	NC	63	125	250	500	1000	2000	4000	8000	NC	63	125	250	500	1000	2000	4000	8000	NC				
250 - 0	65	234	39	28	18	17	26	24	<	<	21	17	32	27	26	25	33	39	28	23	33	32	34	32	32	32	38	47	41	45	42	40	42	37	39	40	49	53	48	49	49	45
	250	900	41	33	25	32	33	30	20	<	28	23	44	38	33	33	39	44	35	27	39	36	47	44	42	40	43	49	43	39	44	42	50	48	49	49	51	55	51	49	51	47
	435	1566	40	35	32	40	37	34	23	16	33	27	49	43	39	42	46	44	35	29	41	37	56	50	45	44	50	53	45	40	48	45	55	55	54	52	54	59	54	50	55	51
	615	2214	44	39	40	48	44	42	31	27	41	35	44	41	43	49	46	44	33	27	43	37	62	52	49	49	55	55	46	42	51	47	63	58	56	54	57	61	55	51	57	54
250 - 110	40	144	35	27	25	26	27	26	19	<	23	19	35	29	26	32	35	35	27	24	32	28	32	27	24	30	38	41	36	38	37	34	38	34	31	31	41	42	39	42	40	38
	140	504	36	30	26	26	33	31	22	15	28	24	39	35	33	35	43	44	36	32	40	36	40	37	37	40	49	51	44	43	47	44	44	41	42	47	56	58	51	51	54	50
	240	864	39	33	30	30	34	32	22	16	30	25	45	40	37	37	45	46	38	32	42	38	46	43	42	44	52	54	47	44	50	47	48	47	46	50	58	60	54	52	56	53
	340	1224	41	35	35	37	36	34	24	21	32	27	50	44	40	40	46	45	37	31	42	38	51	48	45	46	54	55	47	44	51	48	52	51	50	51	60	62	55	53	58	54
250 - 140	35	126	29	25	23	23	25	24	17	<	22	17	33	26	22	23	31	33	23	20	28	25	33	30	23	23	31	37	33	25	32	30	41	35	29	20	22	23	23	20	22	17
	115	414	37	31	26	26	33	32	23	16	29	24	43	36	33	34	42	43	35	31	39	36	40	38	37	41	49	50	43	40	46	43	43	39	40	46	54	54	48	48	51	47
	200	720	38	33	29	29	35	33	23	16	30	26	51	44	37	37	45	46	38	33	42	39	46	44	42	44	52	54	46	43	49	46	48	46	46	50	58	60	54	52	56	53
	280	1008	39	35	32	33	36	33	23	17	31	26	55	49	40	40	47	48	40	33	44	41	51	48	45	45	53	55	48	45	51	47	52	51	49	51	59	62	56	53	58	54
250 - 180	25	90	31	27	19	17	23	21	<	<	18	<	35	24	18	20	28	29	19	16	25	21	33	25	20	22	32	34	30	27	30	27	37	28	23	25	36	39	37	30	36	32
	85	306	42	34	27	26	32	30	21	15	28	23	47	40	34	34	42	42	34	29	38	34	47	40	38	40	49	49	42	39	45	42	45	39	38	44	53	53	47	48	50	46
	145	522	43	36	32	33	35	32	22	16	30	25	50	44	39	38	45	44	37	31	41	37	55	49	44	44	53	53	45	43	49	45	51	46	45	51	58	60	52	51	56	52
	210	756	42	37	37	44	38	34	23	18	36	31	51	45	42	41	47	45	38	32	43	38	58	55	48	47	55	55	47	44	51	47	58	51	51	53	61	62	55	52	58	55

< indicates values below 15

## Specification text Type TVLK

Circular plastic VAV controller for variable volume flow systems and for laboratory fume cupboards. Can be used to control the flow rate of aggressive media, as all components coming into contact with the airflow are made of plastic (no internal metal components). Compact 400 mm construction length. Resistant to unfavourable air entry conditions. 250 mm spigot diameter; 4 types, with flow screens for all normal flow rate ranges. Comprising casing with damper blade and integral differential pressure sensor to provide the mean value. The sensor element can be easily removed for cleaning when necessary without dismantling the VAV controller.

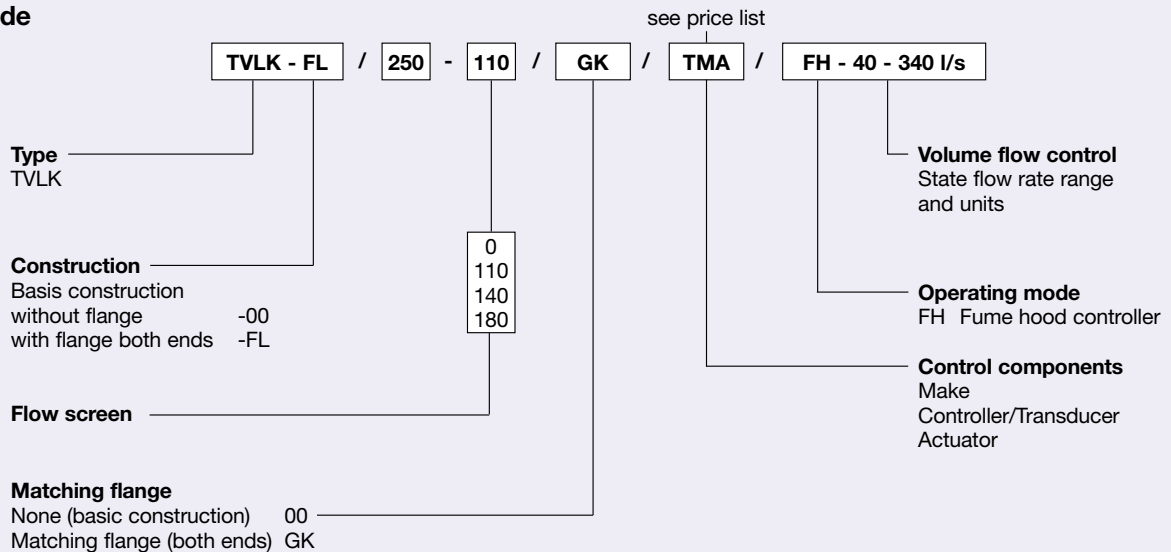
## Specification text silencers Type CAK

PPS plastic circular silencers for use in circular ventilation duct with aggressive media for the attenuation of fan and other noise, e.g. as produced by air terminal units.

### Construction:

Outer casing and perforated inner duct in flame resistant polypropylene. Mineral wool non-combustible to DIN 4102 A2; protected by glass fibre scrim against corrosion caused by airflow up to air velocity of 20 m/s. Standard construction with circular spigot on both ends, optional flange.

## Order code



## Order example

Make: TROX-LABCONTROL

Type: TVLK - FL / 250 - 110 / GK / TMA / FH - 40 - 340 l/s

