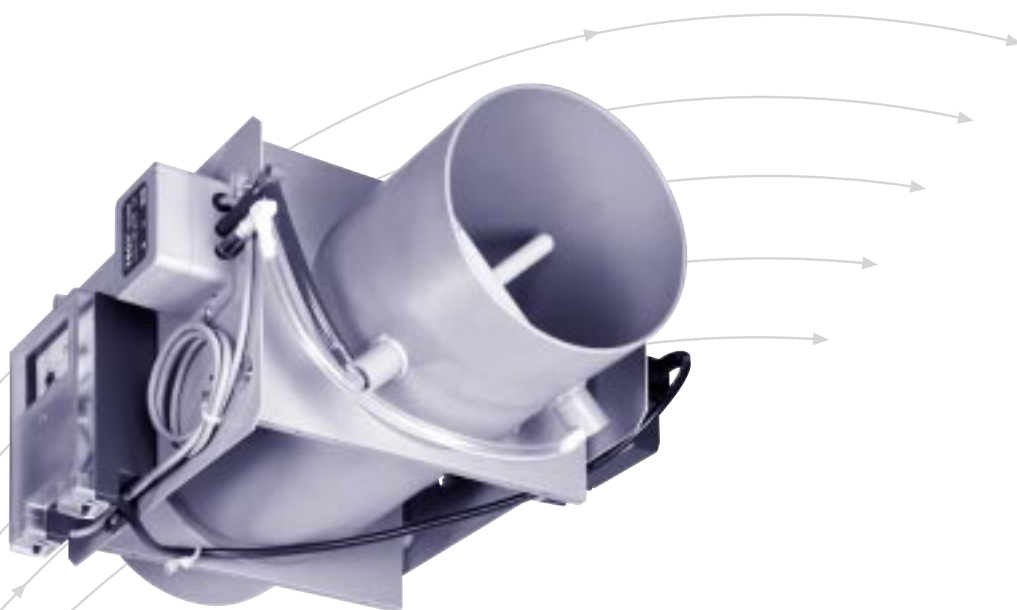


# VARYCONTROL® Plastic VAV Controller

for aggressive media  
Type TVRK



## TROX® TECHNİK

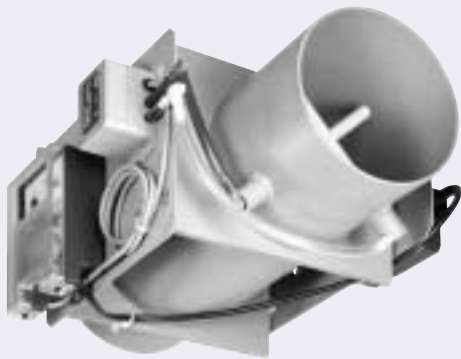
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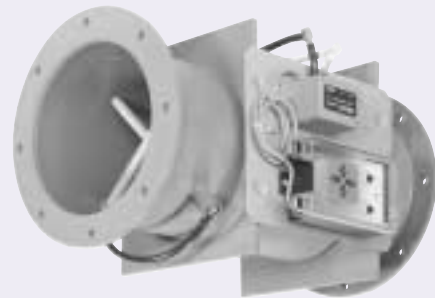
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**VAV controller type TVRK**



**VAV controller type TVRK, construction with flanges**



TROX VARYCONTROL® VAV controllers, Type TVRK, have been developed for the control of air flow, especially for variable extract air flow systems handling aggressive media.

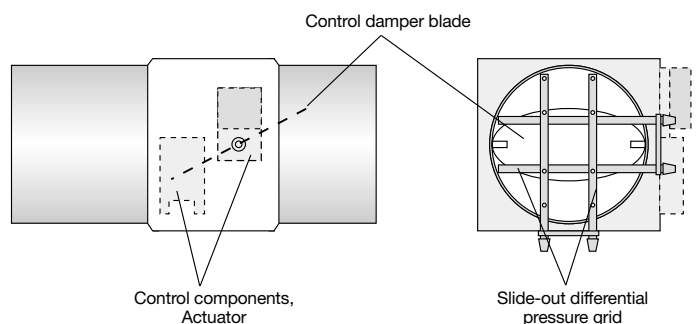
The mechanical components and electronic control components which are factory fitted, form the controls package. Every controller is factory tested and set to the required flow rates.

The unit consists of a removable (slide out) averaging differential pressure sensor for air flow measurement and a control damper. The damper blade with plastic seal when closed complies with the air tightness requirements of DIN EN 1751. There are circular spigot connections on both ends. A construction with flanges on both ends is available.

When low noise levels are required a plastic circular silencer Type CAK should be used.

The flow rate control is a closed loop system with auxiliary power supply. Transducer, controller and actuator are selected according to the operational and control requirements. TROX VAV terminal units can be supplied with control components from any reputable manufacturer to suit a project specification.

Further, current information on application, selection as well as control components available can be found in the “Technical Documents” download area of our website. Also available on the internet is the on-line design programme “air terminal units” for the design and selection of our units.



# Construction · Dimensions

## Characteristics

- Electronic flow rate control
- Suitable for supply or extract air
- Flow rate control range approx. 7 : 1, depending on type of controller
- High level of control accuracy for the flow rate settings, even if there is an elbow connection  $R = 1 D$   
Please ensure the most favourable aerodynamic configuration of ductwork is used
- Differential pressure range 20 to 1500 Pa
- Shut-off by switching (control switch by others)
- Installation orientation must be as shown on the label
- Control damper closed blade leakage complies with DIN EN 1751, class 3
- Factory set up of flow rate. This includes aerodynamic function test of each unit using a dedicated test rig. Data covering set up is given on a test label attached to each unit
- Flow rate can be measured and subsequently reset on site; an additional adjustment tool may be necessary
- Actual value signal referred to nominal flow rate
- The mechanical components are maintenance-free
- Operating temperature range 10 to 50 °C

## Constructional features

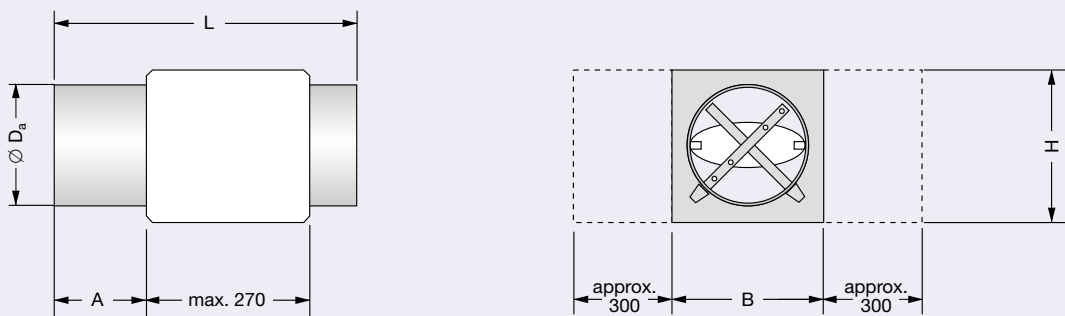
- Both ends same size (standard construction)
- Option both ends with flanges
- Casing air leakage complies with DIN EN 1751, class B

## Materials

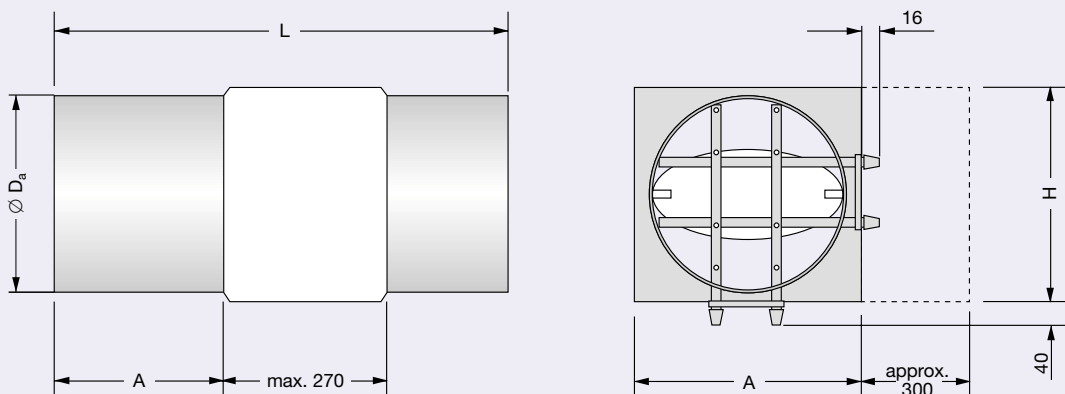
- Casing and damper blade in flame resistant polypropylene (PPs)
- Plain bearings in polypropylene (PP)
- Damper blade seals in chloroprene rubber (CR)
- Removable (slide out) differential pressure grid in plastic (PP)

The materials used have been selected for their proven suitability in use. Please note that in critical cases, material compatibility testing should be carried out on the air terminal unit and the diaphragm pressure transducer, taking into consideration the harmful substances involved and the concentrations in which they occur.

### TVRK, Nominal size 125... 200



### TVRK, Nominal size 250... 400



--- Keep clear to provide access to control components

# Nomenclature · Dimensions · Weight

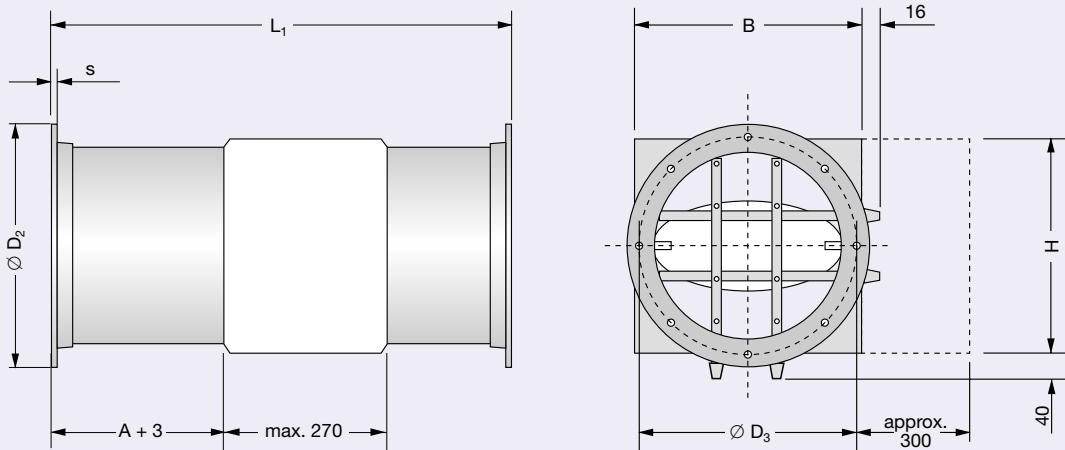
## Nomenclature

- $f_m$  in Hz: Octave band centre frequency  
 $L_W$  in dB: Sound power level of the air-regenerated noise in the ducting  
 $L_{W2}$  in dB: Sound power level of the case-radiated noise  
 $L_{pA}$  in dB(A): A-weighted sound pressure level of air-regenerated noise in the room, system attenuation taken into account  
 $L_{pA1}$  in dB(A): A-weighted sound pressure level of air-regenerated noise in the room with CAK circular silencer, system attenuation taken into account  
 $L_{pA2}$  in dB(A): A-weighted sound pressure level of case-radiated noise in the room, system attenuation taken into account  
 $\dot{V}_{nom}$  in m<sup>3</sup>/h or l/s: Nominal flow rate (100 %)  
 $\dot{V}$  in m<sup>3</sup>/h or l/s: Flow rate  
 $\Delta \dot{V}$  in  $\pm$  %: Flow rate tolerance from setpoint value  
 $\Delta p_g$  in Pa: Total pressure differential  
 $\Delta p_{g min}$  in Pa: Minimum total pressure differential

All sound power levels are based on 1 pW, all sound pressure levels on 20  $\mu$ Pa.

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

## TVRK, flange construction



... Keep clear to provide access to control components

Nominal size	Dimensions in mm											Weight in kg	
	$\varnothing D_a$	$\varnothing D_2$	$\varnothing D_3$	$\varnothing d$	L	$L_1$	B	H	A	$n^{1)}$	s	TVRK	Additional weight of flanges
125	125	185	165	10	394	400	195	200	130	8	8	3.0	0.3
160	160	230	200	10	394	400	230	200	130	8	8	3.4	0.4
200	200	270	240	10	394	400	270	200	130	8	8	3.6	0.5
250	250	320	290	10	594	600	320	280	230	12	8	4.6	0.6
315	315	395	350	10	594	600	385	280	230	12	10	6.0	0.7
400	400	475	445	10	594	600	470	280	230	16	10	10.0	1.6

1) n = Number of flange holes

# Functional Description

## Room temperature control

In VAV systems, the room temperature control takes the form of a cascade control. The primary controlled variable is the room temperature. The output signal of the room temperature controller is not fed directly to the supply air control damper but alters the setpoint value of the supply air flow rate control loop. The flow rate control also generates minimum and maximum limits for the air flow which has benefits in keeping the room temperature constant and for the functioning of the overall air conditioning system.

## Flow rate measurement

A sensor is necessary for the positive measurement of air flows, this is achieved by pressure measurement at several points distributed over the cross-section and provision of the resulting average value. The TROX differential pressure sensor is an optimum solution in terms of economics and product technology. This sensor delivers exact results for most ventilation applications with normal upstream flow conditions.

## Flow rate control

The volume flow is controlled in a closed control loop, i.e. measurement – comparison – control.

The controller receives the current actual value based on the pressure differential from the transducer. In 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 to the damper actuator in the event of a difference between the two values.

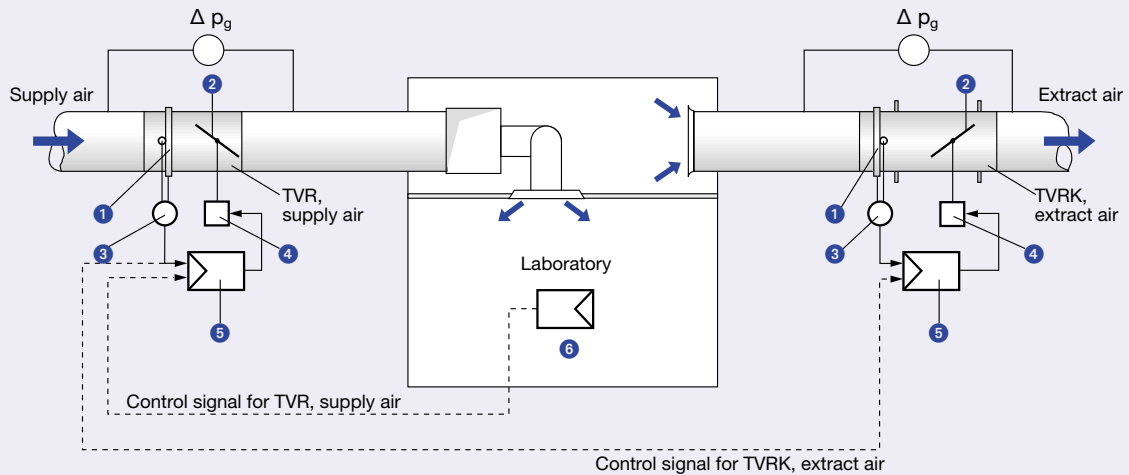
## Supply/extract air tracking control

The balance between supply and extract air flow rate has to be maintained in individual rooms and closed-off office areas. Otherwise, annoying whistling noises can occur at door gaps, and the doors can be difficult to open.

In laboratory applications control of potentially contaminated extract air can be of paramount importance.

For these reasons the variation of extract air flow should be linked to the supply air to provide a tracking control.

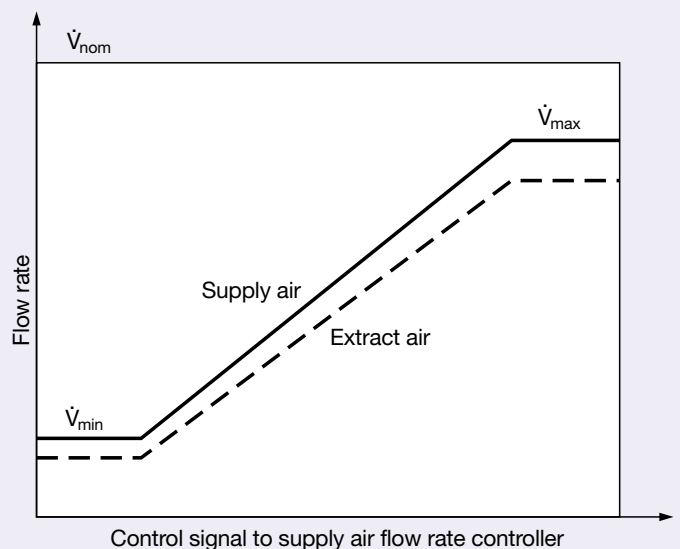
## System diagram



## Legend

- ① Differential pressure sensor
- ② Control damper blade
- ③ Differential pressure transducer
- ④ Actuator
- ⑤ Flow rate controller
- ⑥ Room temperature controller (supplied by others)
- Wiring by others

## Control diagram



# Aerodynamic and Acoustic Quick Selection

**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 bend 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)**

$\dot{V}$	m <sup>3</sup> /h	500	1000	1500	2000	2500	3000	4000	5000	6000
	l/s	139	278	417	556	694	833	1111	1389	1667
dB per octave		0	3	5	6	7	8	9	10	11

**Correction for other pressure differentials**

$\Delta p_g$ in Pa	100	200	400	600	800	1000
dB	-5	0	6	9	11	14

**Quick selection of sound pressure level in dB(A) with  $\Delta p_g = 200$  Pa**

Nominal size	$\dot{V}$		$\Delta p_{g \min}$ in Pa		$\Delta \dot{V}^{2)}$	Air-regenerated noise					Case-radiated noise <sup>3)</sup>
			TVRK	CAK <sup>1)</sup>		$\pm \%$	$L_{pA}$	$L_{pA1}$			
	without	with silencer Type CAK			500 mm			1000 mm	1500 mm		
125	25	90	20	-	9	35	19	12	7	18	
	60	216	30	-	7	45	30	23	19	29	
	105	378	60	5	6	52	38	32	28	36	
	150	540	90	10	5	57	42	36	32	41	
160	40	144	20	-	9	36	23	18	14	22	
	80	288	30	-	8	43	31	27	23	30	
	145	522	50	5	7	49	37	34	30	36	
	250	900	80	10	5	55	42	38	34	42	
200	65	234	20	-	9	45	34	29	25	35	
	180	648	30	-	7	46	35	30	27	36	
	310	1116	40	5	5	46	36	31	28	39	
	405	1458	70	10	5	45	34	31	29	41	
250	95	342	20	-	9	42	31	26	20	32	
	270	972	30	-	7	47	38	33	29	41	
	470	1692	40	5	5	48	38	33	30	43	
	615	2214	50	10	5	47	37	33	30	44	
315	155	558	20	-	9	40	30	26	22	31	
	425	1530	20	-	7	48	39	35	31	43	
	740	2664	30	5	6	51	42	38	35	48	
	1025	3690	40	10	5	54	46	42	38	52	
400	255	918	20	-	9	29	19	15	12	20	
	715	2574	20	-	7	39	32	27	25	36	
	1250	4500	30	5	6	47	40	36	33	46	
	1680	6048	40	10	5	52	46	42	39	53	

1) must be allowed for based on a length of 1000 mm

2) typical values

3) 4 dB/octave ceiling reduction and 5 dB/octave room attenuation have been allowed for in the calculation of case-radiated noise.







