

VMPR / VMPQ Mechanical volumetric flow controller

Contents

Field of application	2
Useable volumetric flow ranges	2
Function	3
Processing	Fehler! Textmarke nicht definiert.
Accessories	4
Dimensions of VMPR / VMPQ	5
Dimensions of VMPR accessories	6
Dimensions of VMPQ accessories	8
Prior to assembly and commissioning	9
Installation-maintenance-service	9
Minimum static pressure difference	10
VMPR - controller position ($\Delta p_{st\ min}$)	11
VMPR - controller position (m^3/h)	12
VMPR - Flow-generated noise	13
VMPR - Radiated noise	14
VMPR - Radiated noise with acoustic cladding	15
VMPR-RS - insertion loss	16
VMPQ - controller position part 1	17
VMPQ - controller position part 2	18
VMPQ - flow-generated noise part 1	19
VMPQ - flow-generated noise part 2	20
VMPQ - radiated noise part 1	21
VMPQ - radiated noise part 2	22
VMPQ - radiated noise with acoustic cladding part 1	23
VMPQ - radiated noise with acoustic cladding part 2	24
VMPQ-ZSQ - insertion loss	25
Legend	25
VMPR order code	26
Order code VMPQ	27
Order code ZSQ	28
Specification text VMPR	29
VMPQ specification text	29

FIELD OF APPLICATION

Volumetric flow controller for supply and return air systems, suitable for regulating a constant volumetric flow with the option of electrical setpoint adjustment.

ATTENTION

The VMPR/ VMPQ is an adjusted controller working by the mechanism of action principle. Tampering with the controller, whether manually or mechanically, are prohibited. When a high volumetric flow setting has been selected, the damper leaf must never be closed manually. Otherwise, the control mechanism will be changed, resulting in a loss of control accuracy. The field of application must always be complied with. If the VMPR/ VMPQ is used beyond its allowed field of application, this will result in mechanical overload and thus in a loss of control accuracy.

We would like to point out that to clean the stainless steel design, only suitable corresponding cleaning materials must be used.

CORRECTION FACTORS REGARDING THE AIR VOLUMES

For $\Delta p \geq 500$ Pa deviations of up to 20 % of the set value can occur.

Maximum deviation from the set value: NW 80

Air velocity	2-5 m/s	± 20 %
Air velocity	5-6 m/s	± 15 %
Air velocity	7-8 m/s	± 10 %
Scale accuracy		± 4 %

Maximum deviation from the set value:

Air velocity	1-4 m/s	± 20 %
Air velocity	4-5 m/s	± 10 %
Air velocity	5-7 m/s	± 8 %
Air velocity	7-10 m/s	± 6 %
Scale accuracy		± 4 %

USEABLE VOLUMETRIC FLOW RANGES

Volumetric flow ranges for VMPR

NW (mm)	V _{ZU} (m ³ /h)		V _{ZU} [l/s]	
	min.	max.	min.	max.
80	45	125	13	35
100	50	230	14	64
125	120	400	33	111
160	130	640	36	178
200	150	1050	42	292
250	300	1500	83	417
315	650	2450	181	681
400	700	4200	194	1167

Volumetric flow ranges for VMPQ

B x H (mm)	V _{ZU} (m ³ /h)		V _{ZU} [l/s]	
	min.	max.	min.	max.
200 x 100	200	800	56	222
300 x 100	325	1075	90	299
300 x 150	250	1500	69	417
300 x 200	225	1800	63	500
400 x 200	500	2050	139	569
400 x 250	850	3200	236	889
400 x 300	700	3600	194	1000
400 x 400	900	4400	250	1222
500 x 200	650	3100	181	861
500 x 250	950	4200	264	1167
500 x 300	1200	4800	333	1333
500 x 400	1300	6200	361	1722
600 x 200	450	4100	125	1139
600 x 250	1200	4600	333	1278
600 x 300	1700	5800	472	1611
600 x 400	1900	8200	528	2278

For the parameter setting of the control components, an air density of 1.2 kg/m³ has been taken into account. When the air volume drops below the V_{min} shown in the chart, the correct functioning of the volumetric flow controller is no longer guaranteed.

FUNCTION

The constant volumetric flow controller VMPR/ VMPQ works independently without requiring additional energy. The central, ball-bearing flap is moved by the air current. The control unit with control cam, spring and damper is attached to the outside of the galvanised sheet steel housing. The required volumetric flow is set in-factory. An adjustment of the volumetric flow at a later stage is possible (setting cam on housing). The control unit is protected with a cover. The controller can be assembled in any assembly position.

- Operating temperature: 10 – 50 °C
- Differential pressure range 50 - 1000 Pa
- Housing leakage according to DIN EN 1751, class C

The mechanical volumetric flow controller VMPR / VMPQ with actuator is suitable for adjusting the supply or return air volume to varying room occupations. Should this become necessary, it can be done without removing the false ceiling.

As-delivered the volumetric flow controllers VMPR/ VMPQ are set to V_{min} . The controller must be connected on-site to the power supply and then adjusted on-site to the desired controller position. The control unit, including regulating curve, spring, damper and actuator is attached to the outside of the galvanised sheet steel housing. The required volumetric flow is set in-factory.

Thanks to the actuator, the volumetric flow controller can be adjusted without problems to the required volumetric flow within the controller range. If a mechanical limitation of the controller range by means of stops is selected for the drive, the following setting values are possible:

To avoid unnecessary controller errors, the information given on p. 9 should be observed. The setting values for actuators with constant control can be obtained from the controller settings. In OPEN / CLOSED actuators, the control setting is effected through a mechanical limit.

- Limit stops for a mechanical limitation can only be achieved in the scale ranges 1-7 and 3-10 (see also: controller setting table)

PROCESSING

Housing

Galvanised sheet steel (standard) (-SV)
Galvanised sheet steel with DD coating (-DD)
Stainless steel 1.4301 (V2A) (-V2) or 1.4571 (V4A) (-V4)

Control damper

Aluminium (VMPR for NW ≤ 160)
Aluminium with DD coating (VMPR for NW ≤ 160)
Galvanised sheet steel (VMPR for NW > 160 | VMPQ)
Galvanised sheet steel with DD coating (VMPR for NW > 160 | VMPQ)
Stainless steel 1.4301 (V2A) or 1.4571 (V4A), optionally to galvanised sheet steel at an extra charge

Control unit housing

Plastic, halogen-free
Stainless steel 1.4301 (V2A) or 1.4571 (V4A)

ACCESSORIES

Acoustic cladding (-DS 2)

made of sound-absorbing, insulating 20 mm material, non-flammable to DIN 4102-17, with sheet steel casing made of galvanised sheet steel (standard), stainless steel 1.4301 (V2A) or 1.4571 (V4A), with cage nuts (M6) (VMPQ only)

Flat-bed acoustic cladding (-FD1) - VMPR only

Made of sound-absorbing, insulating 3 mm material with sheet steel casing made of galvanised sheet steel (standard), stainless steel 1.4301 (V2A) or 1.4571 (V4A)

Flat flange (-FF1/-FF2) - VMPR only

on both sides, to DIN 24 154/5, made of the same material as the housing

Rubber lip seal (-GD1) - VMPR only

on both sides, special rubber, silicone-free

METU flange (-MF1/-MF2) - VMPR only

on both sides, duct flange

Counter flange (-GF) (pair), loose - VMPR only

on both sides, to METU flange

Tension ring (-SR) (pair), loose - VMPR only

to connect METU flange to counter flange

Mineral wool silencer (-ZSQ) - VMPQ only

- Housing made of galvanised sheet steel (standard), stainless steel 1.4301 (V2A) or 1.4571 (V4A)
- Baffle frame made of galvanised sheet steel (standard), stainless steel 1.4301 (V2A) or 1.4571 (V4A), on both sides with METU profile M2
- Mineral fibre boards according to DIN 4102 A2, with glass filament cover, biosoluble, abrasion-resistant

Duct silencer (-RS) - VMPR only

- Rigid design
- Outer casing and perforated plate made of galvanised sheet steel (standard), stainless steel 1.4301 (V2A) or 1.4571 (V4A).
- Mineral wool filling

Electric actuator (-E044/-E045/-E046/-E016)

3-point control (standard):

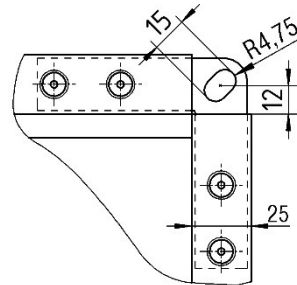
- VMPR/ VMPQ-...-E044; 24 V
- VMPR/ VMPQ-...-E045; 230 V

Constant control:

- VMPR/ VMPQ-...-E046; 24 V
- VMPR/ VMPQ-...-E016; 230 V

Corner angle - VMPQ only

As standard, the volumetric flow controller VMPQ is delivered with corner angle. The special form of the corner holes allows them to be connected to the connection systems available on the market (e.g. METU system M 2/M 3)



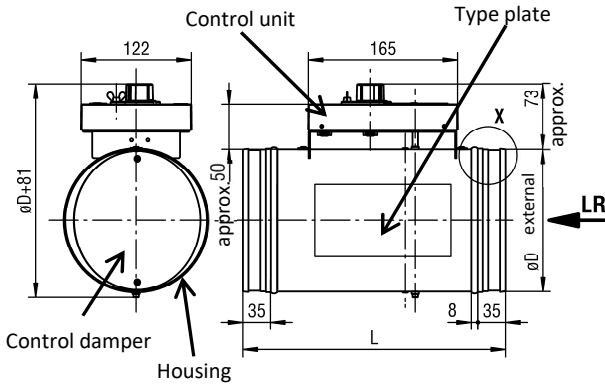
Please note!

Tension rings, counter flanges and duct silencers must be ordered separately and are supplied loose!

DIMENSIONS OF VMPR / VMPQ

VMPR

Round design, for duct connection to DIN EN 1506, position-independent installation.



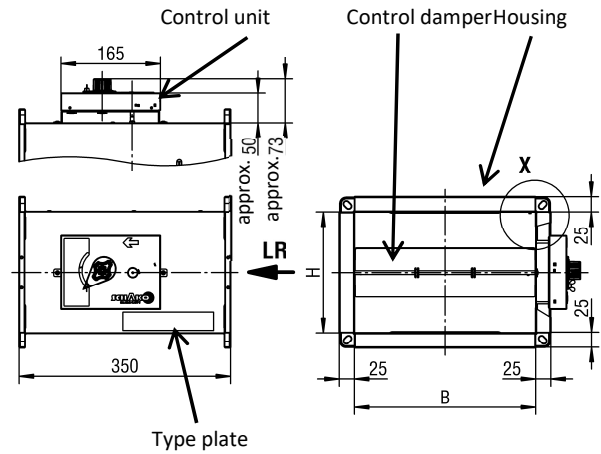
Available sizes for VMPR

NW	$\varnothing D$	L
80	78	290
100	98	290
125	123	290
160	158	290
200	198	290
250	248	390
315	313	390
400	398	490

VMPQ

Rectangular design, for duct connection to DIN 1505, right-hand design

The VMPQ is only delivered in right-hand design. If it is necessary to arrange the control unit on the left-hand side, then the VMPQ must be rotated by 180°.



Available sizes for VMPQ

		Width B				
		200	300	400	500	600
Height H	100	x	x	-	-	-
	150	-	x	-	-	-
	200	-	x	x	x	x
	250	-	-	x	x	x
	300	-	-	x	x	x
	400	-	-	x ^{1.)}	x ^{1.)}	x ^{1.)}

x = available

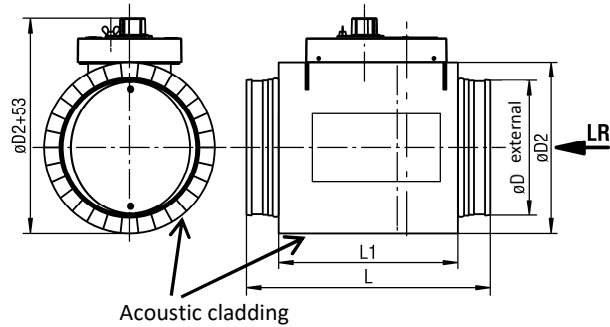
- = not available

LR = air flow direction

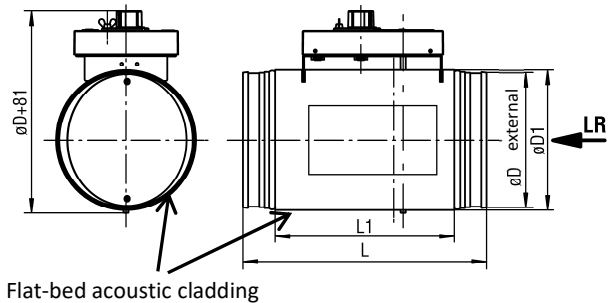
x^{1.)} = with two control units

DIMENSIONS OF VMPR ACCESSORIES

Acoustic cladding (-DS2, insulation = 20 mm)



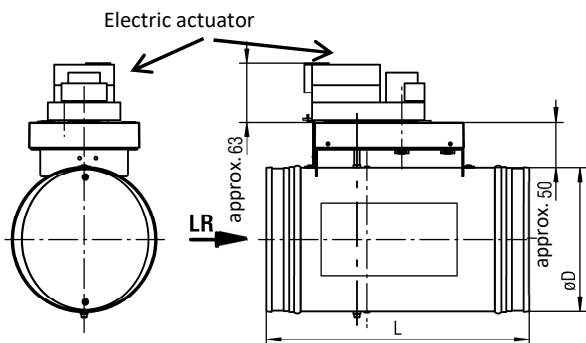
Flat-bed acoustic cladding (-FD1)



Available sizes for flat-bed acoustic cladding (-FD1)

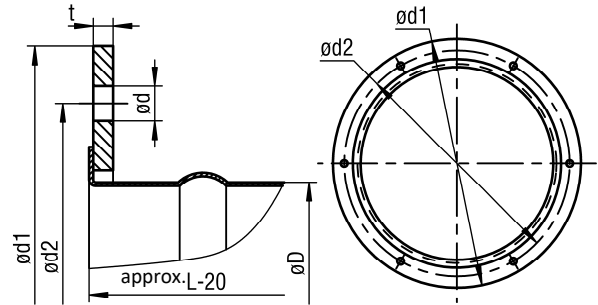
NW	$\varnothing D$	$\varnothing D1$	$\varnothing D2$	L	L1
80	78	84	120	290	205
100	98	104	140	290	205
125	123	129	165	290	205
160	158	164	200	290	205
200	198	204	240	290	205
250	248	254	290	390	230
315	313	319	355	390	260
400	398	404	440	490	360

Electric actuator (-E044/-E045/-E046/-E016)



Flat flange (-FF1/-FF2)

on both sides - VMPR only - according to DIN 24 154/5



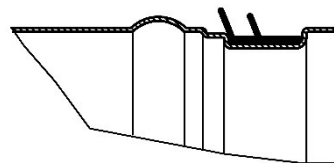
Available sizes flat flange (-FF1/-FF2)

NW	$\varnothing D$	L	$\varnothing d1$	$\varnothing d2$	$\varnothing d$	LOA*	t
80	78	290	132	108	7	4	3
100	98	290	154	129	7	4	3
125	123	290	177	155	7	4	3
160	158	290	222	194	7	6	4
200	198	290	263	235	7	6	4
250	248	390	313	286	7	6	4
315	313	390	388	356	9.5	8	5
400	398	490	474	438	9.5	12	5

* Number of holes

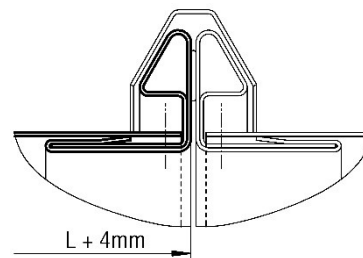
Rubber lip seal (-GD1)

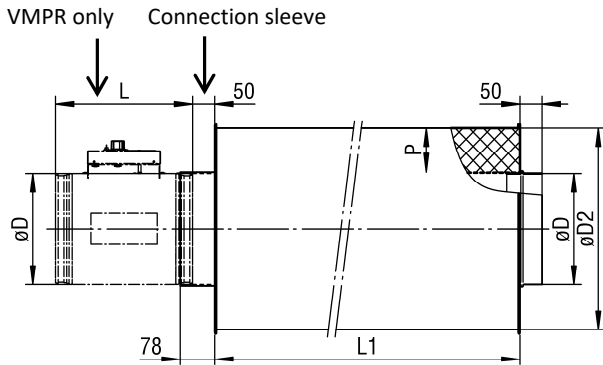
VMPR only Detail X



METU flange (-MF1/-MF2)

with counter flange (-GF), loose and tension ring (-SR), loose on both sides (VMPR only)



Duct silencer (-RS)

Packing thickness - duct silencer (-RS)

NW	L1=500		L1=950		L1=1450		L1=1950	
	P (mm)		P (mm)		P (mm)		P (mm)	
	50	100	50	100	50	100	50	100
80	x	x	x	x	-	-	-	-
100	x	x	x	x	x	-	x	-
125	x	x	x	x	x	-	x	-
160	x	x	x	x	x	x	-	x
200	x	x	x	x	x	x	-	x
250	x	x	x	x	x	x	-	x
315	x	x	x	x	x	x	-	-
400	x	x	x	x	x	x	-	-

x = available

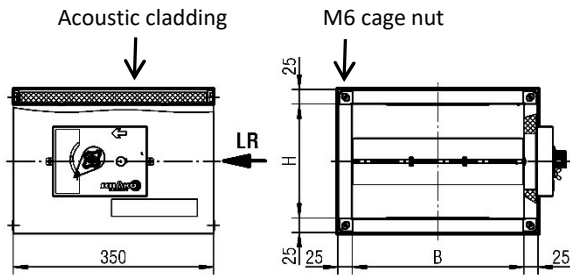
- = not available

Available sizes - duct silencer (-RS)

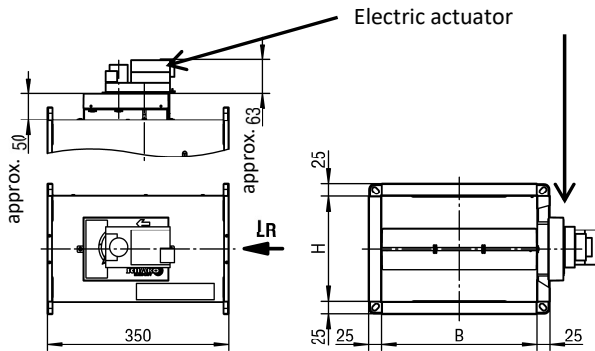
NW	L	øD	øD2	
			50	100
80	290	78	180	280
100	290	98	200	300
125	290	123	225	325
160	290	158	260	360
200	290	198	300	400
250	390	248	350	450
315	390	313	415	515
400	490	398	500	600

DIMENSIONS OF VMPQ ACCESSORIES

Acoustic cladding (-DS2, 20 mm insulation)



Electric actuator (-E044/-E045/-E046/-E016)



Available sizes -DS2 / -E...

Height H	Width B				
	200	300	400	500	600
100	x	x	-	-	-
150	-	x	-	-	-
200	-	x	x	x	x
250	-	-	x	x	x
300	-	-	x	x	x
400	-	-	x ^{1.)}	x ^{1.)}	x ^{1.)}

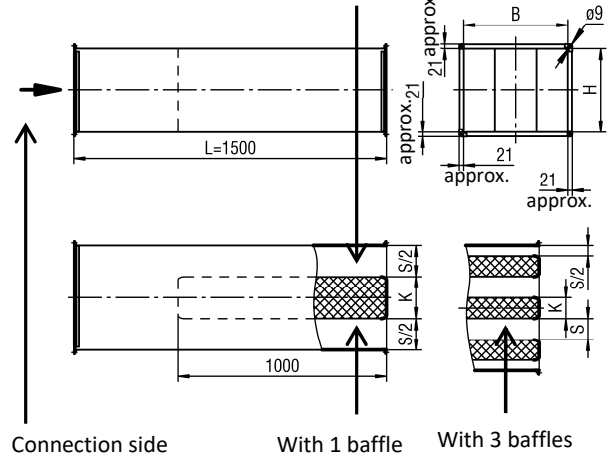
- x = available
- = not available
- LR = air flow direction
- x^{1.)} = with two control units

----->>>>----->>>>----->>>>

The parameters KA (number of baffles), K (baffle strength) and S (gap width) depend on the width B.

Mineral wool silencer (-ZSQ)

VMPQ only - with baffles type MWK-OB



Insertion loss ZSQ

B (mm)	D _e [dB/Okt]							
	f _m (Hz)							
	63	125	250	500	1000	2000	4000	8000
200	1	3	9	18	36	37	22	13
300	1	2	4	8	15	14	9	6
400	1	4	11	19	25	20	11	7
500	1	4	7	8	15	15	8	5
600	1	3	9	18	36	37	22	13

Available sizes ZSQ

H (mm)	B (mm)	KA (-)	K (mm)	S (mm)
100	200	1	100	100
100	300	1	100	200
150				
200	400	1	200	200
200				
250				
300				
200	500	1	200	300
250				
300				
200	600	3	100	100
250				
300				

PRIOR TO ASSEMBLY AND COMMISSIONING



An instruction leaflet containing information on safety, transport, disposal, installation, commissioning and maintenance is enclosed with each SCHAKO product. For safety reasons, this instruction leaflet must be read under all circumstances and completely adhered to.

MARKING

These devices are not suitable for use in non-approved Ex zones. The operating safety of the devices is only guaranteed when used in accordance with their designated use.

DISPOSAL

The devices have been prepared in accordance with the RoHS directive restricting the use of certain hazardous substances in electrical and electronic equipment (2002/95/EC). After its final decommissioning, the volumetric flow controller must be properly disposed of.

TESTS AND STANDARDS

The volumetric flow controller VMPR/VMPQ has been tested by the notified body in accordance with the following regulations:

Completed tests

- VDI 6022, Sheet 1: Hygienic requirements of ventilation and air-conditioning systems
- DIN 1946, Sheet 2: Air-conditioning technology - Health requirements
- DIN EN 13779 (2007): Ventilation of non-residential buildings

Applied standards

- Leakage air: EN 1751 (2011-02)
- EMV 2014/30/EU

INSTALLATION-MAINTENANCE-SERVICE

Required distances

To avoid unnecessary controller errors, the min. distances according to the following table / drawings must be observed. For combinations of several connection pieces or pieces with fire dampers or silencers, the larger minimum distances must be observed. All volumetric flow controllers can be assembled with horizontal or vertical damper axis.

Distance to	VMPR	VMPQ
Bent connection spigot	1 x D	1 x diagonal
Other connection pieces (e.g. T-junction, branching piece, reduction piece, etc.)	2 x D	2 x diagonal
Fire Damper	2 x D	2 x diagonal
Silencer	2 x D	2 x diagonal

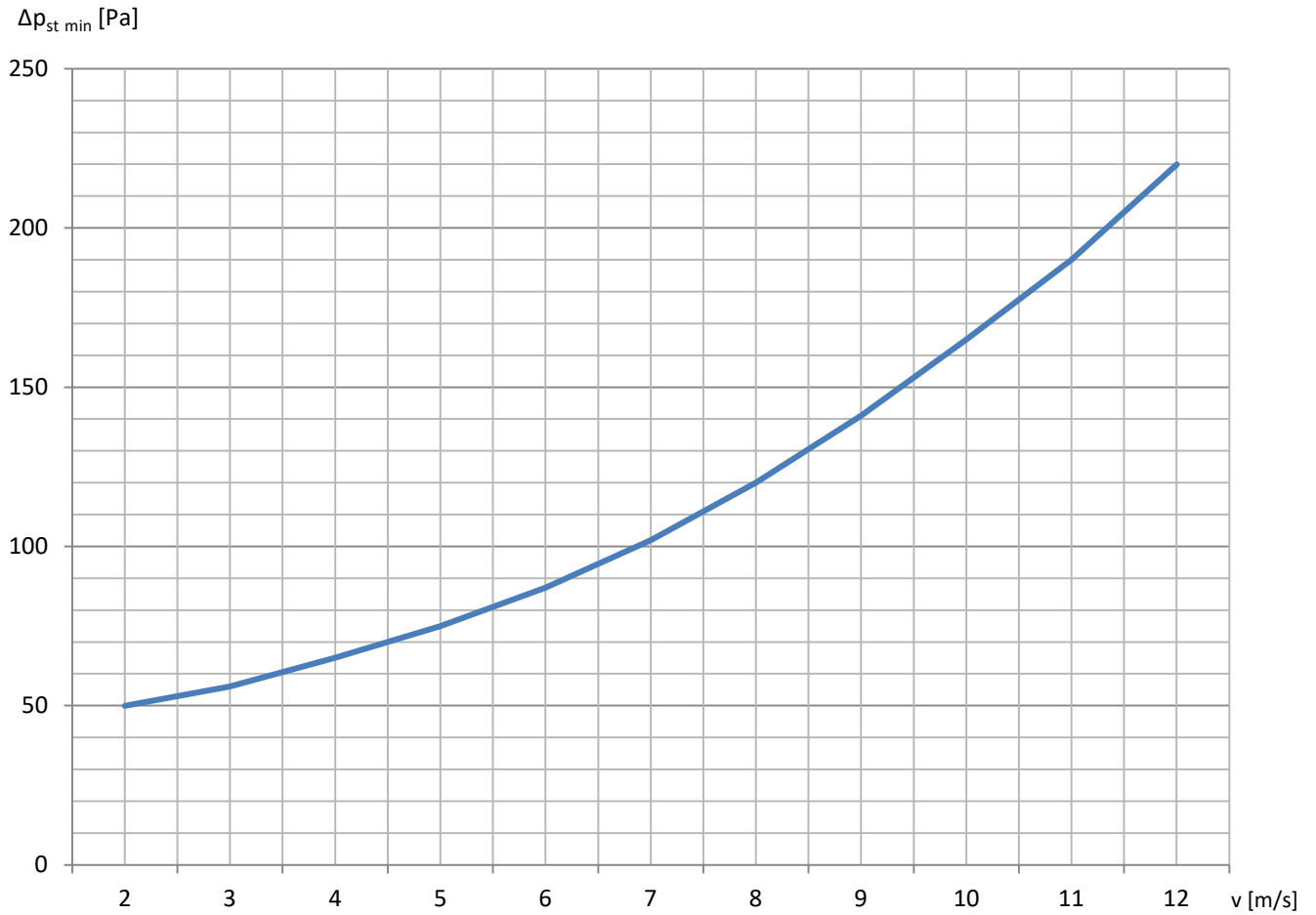
Mounting

The controllers must be assembled in a way to allow inspection. The volumetric flow controllers are not suitable for air containing sticky and greasy components.

- When the device is delivered, check whether the controllers are complete and have not been damaged during transport. Complaints have to be communicated immediately and directly to the transporter and SCHAKO.
- Volumetric flow controllers must not be carried on the regulation components or the damper blade, but only on the housing.
- The controllers must be carefully stored on-site. They must be protected from dust, dirt and from direct weather effects.
- The assembly must be done by skilled personnel, observing recognised technical rules and regulations.

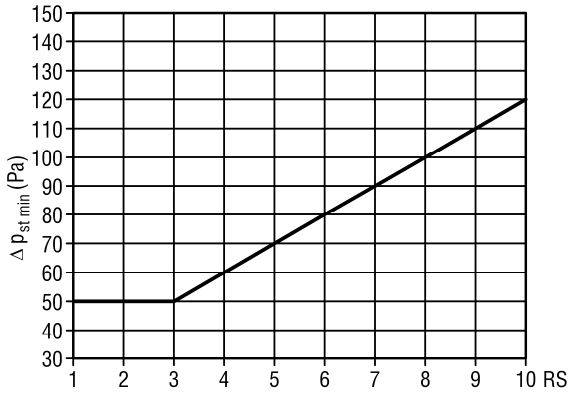
MINIMUM STATIC PRESSURE DIFFERENCE

VMPR / VMPQ

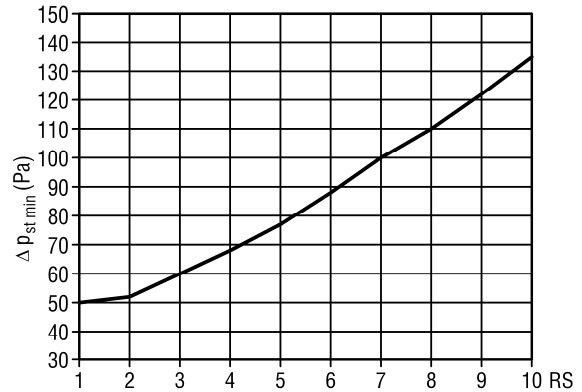


VMPR - CONTROLLER POSITION ($\Delta p_{st\ min}$)

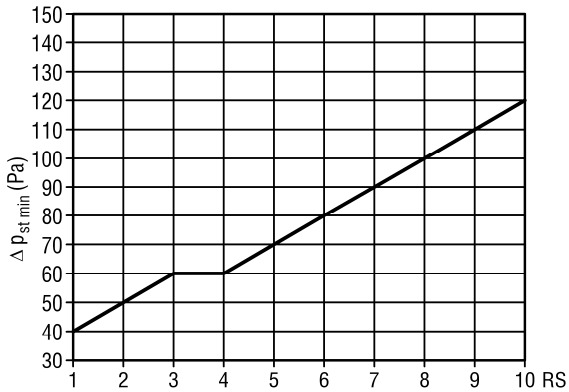
VMPR-80



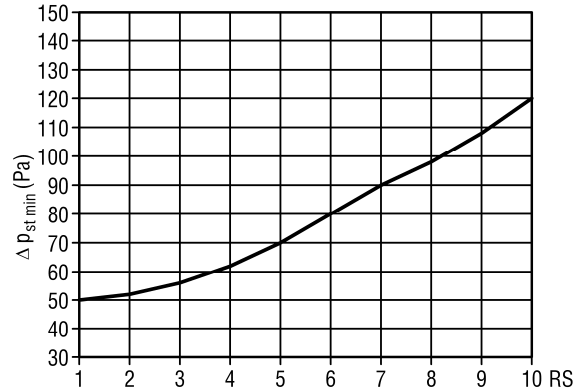
VMPR-250



VMPR-100



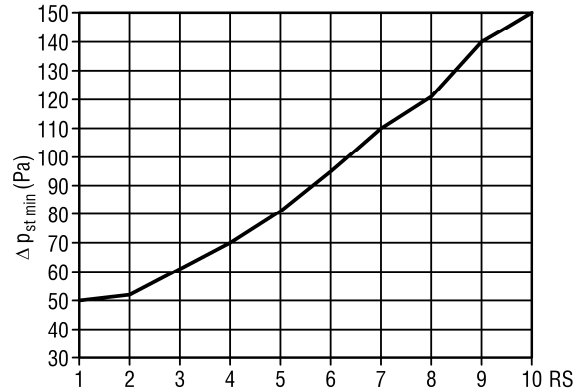
VMPR-315



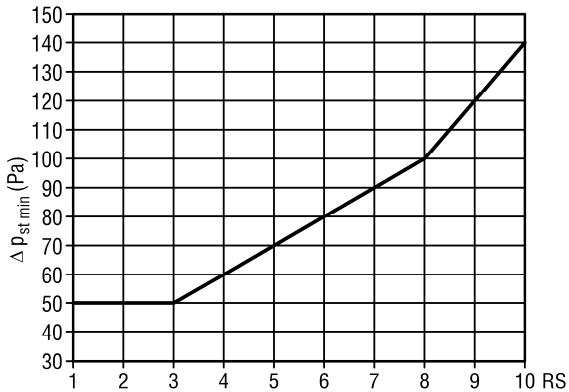
VMPR-125



VMPR-400



VMPR-160 / VMPR-200



VMPR - CONTROLLER POSITION (m³/h)

		V̇	Nominal size NW							V*	
			80	100	125	160	200	250	315		400
Controller position RS	1	(m ³ /h)	45	50	120	130	150	300	650	700	2
		[l/s]	13	14	33	36	42	83	181	194	
	2	(m ³ /h)	55	70	160	210	270	400	800	1000	2.9
		[l/s]	15	19	44	58	75	111	222	278	
	3	(m ³ /h)	65	100	200	280	400	575	1050	1600	3.8
		[l/s]	18	28	56	78	111	160	292	444	
	4	(m ³ /h)	80	130	240	350	520	750	1300	2000	4.7
		[l/s]	22	36	67	97	144	208	361	556	
	5	(m ³ /h)	90	150	270	410	630	900	1550	2500	5.6
		[l/s]	25	42	75	114	175	250	431	695	
	6	(m ³ /h)	100	170	300	460	730	1050	1800	2900	6.5
		[l/s]	28	47	83	128	203	292	500	806	
	7	(m ³ /h)	105	190	330	510	820	1175	2000	3300	7.3
		[l/s]	29	53	92	142	228	326	556	917	
	8	(m ³ /h)	110	210	360	560	900	1300	2150	3600	8.2
		[l/s]	31	58	100	156	250	361	597	1000	
	9	(m ³ /h)	120	220	380	600	980	1400	2300	4000	9.1
		[l/s]	33	61	106	167	272	389	639	1111	
	10	(m ³ /h)	125	230	400	640	1050	1500	2450	4200	10
		[l/s]	35	64	111	178	292	417	681	1167	

In controller positions 1 and 2, Δp must be >100 Pa.

* = Activation in volts for VMPR with E016 and E046

Circuit diagram controller

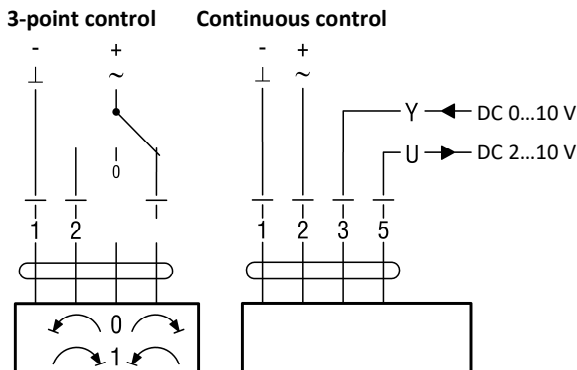
with electric actuator:

--- 3-point control

(standard: VMPR-...-E044; 24 V, VMPR-...-E045; 230 V)

--- Constant control

(VMPR-...-E046; 24 V, VMPR-...-E016; 230 V)



VMPR - FLOW-GENERATED NOISE

NW	RS	V̇ (m³/h) [l/s]		Δp _{st} = 100 Pa							L _{WA} [dB(A)]	Δp _{st} = 250 Pa							L _{WA} [dB(A)]	Δp _{st} = 500 Pa							L _{WA} [dB(A)]
				L _w (dB/Okt)								L _w (dB/Okt)								L _w (dB/Okt)							
				fm (Hz)								fm (Hz)								fm (Hz)							
				125	250	500	1000	2000	4000			125	250	500	1000	2000	4000			125	250	500	1000	2000	4000		
80	3	65	18	42	42	42	41	41	41	47	48	48	46	47	47	47	53	52	52	51	51	51	51	57			
	6	100	28	45	45	45	44	44	44	50	51	51	50	50	50	50	56	55	55	54	54	54	54	60			
	10	125	35	49	49	49	48	48	48	54	54	54	54	53	53	53	59	59	59	58	58	58	58	64			
100	3	100	28	35	35	35	35	34	31	40	42	42	41	41	41	41	47	48	48	48	47	47	47	53			
	6	170	47	39	39	39	39	38	37	44	46	47	46	45	46	46	52	52	52	52	52	52	49	58			
	10	230	64	42	42	42	42	42	41	48	52	52	51	51	51	51	57	55	56	57	56	54	51	61			
125	3	200	56	37	38	37	36	36	31	41	45	47	47	46	44	42	51	51	51	51	51	51	50	57			
	6	300	83	43	43	43	41	41	39	47	50	51	51	50	49	47	55	56	56	56	56	56	54	62			
	10	400	111	47	48	48	47	46	45	53	55	55	54	54	54	52	60	61	61	61	60	60	58	66			
160	3	280	78	43	43	43	43	42	37	48	51	51	53	53	51	46	57	57	57	57	57	57	56	63			
	6	460	128	48	47	47	47	47	43	52	55	55	56	56	54	51	61	61	62	62	62	62	61	68			
	10	640	178	50	49	49	49	49	46	54	57	57	58	58	56	55	63	64	64	64	64	64	62	70			
200	3	400	111	42	42	42	42	41	36	47	50	50	50	49	48	42	54	56	56	55	55	55	52	61			
	6	730	203	49	48	48	49	48	43	54	56	56	55	55	55	50	60	61	61	61	60	60	58	66			
	10	1050	292	53	53	53	53	52	48	58	60	60	60	59	59	56	65	65	65	64	64	64	62	70			
250	3	575	160	42	41	41	41	36	28	44	50	51	51	51	48	40	55	58	58	58	57	56	50	62			
	6	1050	292	48	48	48	48	45	37	52	55	56	55	55	54	48	60	61	61	60	60	59	56	65			
	10	1500	417	52	52	52	52	51	43	56	59	59	58	58	58	53	63	63	63	63	62	62	60	68			
315	3	1050	292	46	45	45	44	39	31	48	52	52	51	51	48	40	55	59	59	59	59	58	50	63			
	6	1800	500	51	51	51	50	46	38	54	58	58	57	57	55	47	61	64	63	63	63	63	56	68			
	10	2450	681	55	54	54	54	50	42	57	60	60	60	60	58	50	64	66	65	65	65	65	59	70			
400	3	1600	444	53	54	54	54	46	40	57	58	60	60	60	59	49	64	63	64	64	64	63	56	69			
	6	2900	806	56	57	57	57	49	44	60	61	63	63	63	62	52	67	67	68	67	67	68	60	72			
	10	4200	1167	60	61	60	60	55	48	63	65	67	67	67	66	56	71	70	71	70	70	70	63	75			

VMPR - RADIATED NOISE

NW	RS	\dot{V}		$\Delta p_{st} = 100 \text{ Pa}$							$L_{WA} \text{ [dB(A)]}$	$\Delta p_{st} = 250 \text{ Pa}$							$L_{WA} \text{ [dB(A)]}$	$\Delta p_{st} = 500 \text{ Pa}$							$L_{WA} \text{ [dB(A)]}$
				$L_w \text{ (dB/Okt)}$								$L_w \text{ (dB/Okt)}$								$L_w \text{ (dB/Okt)}$							
				fm (Hz)								fm (Hz)								fm (Hz)							
				125	250	500	1000	2000	4000			125	250	500	1000	2000	4000			125	250	500	1000	2000	4000		
80	3	65	18	27	28	30	31	28	27	34	31	32	34	38	33	32	40	38	37	39	42	37	35	44			
	6	100	28	29	31	33	34	30	29	37	33	35	38	41	36	35	43	42	40	43	45	40	37	47			
	10	125	35	33	35	36	38	34	33	41	37	38	42	43	40	38	47	44	44	47	49	44	41	51			
100	3	100	28	20	21	23	25	24	21	29	30	31	31	31	30	29	35	33	36	37	39	36	34	42			
	6	170	47	23	22	24	28	26	24	31	34	36	36	35	35	33	40	37	39	41	43	38	36	46			
	10	230	64	26	25	27	31	28	26	34	38	40	41	40	40	38	45	40	42	46	47	41	38	49			
125	3	200	56	24	26	25	28	24	26	31	33	34	36	37	33	30	40	36	38	40	41	40	37	45			
	6	300	83	29	30	31	32	29	26	35	38	39	40	41	38	34	44	41	43	45	46	44	42	50			
	10	400	111	32	32	35	36	33	27	39	42	43	44	45	42	38	48	45	48	50	51	47	46	54			
160	3	280	78	29	29	30	31	27	26	34	37	38	40	43	39	34	46	42	43	47	48	43	40	51			
	6	460	128	33	33	34	35	31	30	38	41	43	44	47	42	38	49	46	47	52	53	48	43	56			
	10	640	178	35	35	36	37	34	32	40	44	45	47	49	44	40	51	48	49	55	55	50	46	58			
200	3	400	111	24	26	28	30	26	20	33	35	38	38	39	36	33	42	41	43	44	46	43	38	49			
	6	730	203	31	33	34	35	33	27	39	41	43	45	45	42	40	48	46	47	50	51	48	43	54			
	10	1050	292	35	38	38	40	37	32	43	45	48	49	50	46	44	53	50	51	53	54	51	48	57			
250	3	575	160	25	26	27	27	24	22	31	35	37	39	41	34	34	43	43	45	47	47	45	37	51			
	6	1050	292	30	31	33	34	32	30	38	41	42	43	46	41	39	48	46	48	51	50	48	38	54			
	10	1500	417	33	35	37	39	38	35	43	45	45	47	49	46	43	52	48	51	52	54	51	39	57			
315	3	1050	292	26	29	33	34	29	23	37	38	38	41	42	38	34	44	44	46	48	50	43	39	52			
	6	1800	500	34	38	39	40	33	27	42	42	44	46	48	45	36	51	49	51	52	54	49	43	57			
	10	2450	681	37	41	40	42	34	28	44	43	45	48	50	46	36	53	50	52	53	54	51	44	58			
400	3	1600	444	41	43	43	44	36	30	46	43	46	49	50	47	39	53	48	51	53	55	51	43	58			
	6	2900	806	43	43	46	47	38	37	49	46	50	51	53	51	41	56	52	56	56	58	54	46	61			
	10	4200	1167	49	48	49	50	45	39	53	50	54	55	57	55	45	60	55	58	59	60	57	50	63			

VMPR - RADIATED NOISE WITH ACOUSTIC CLADDING

NW	RS	V		$\Delta p_{st} = 100 \text{ Pa}$							$L_{WA} \text{ [dB(A)]}$	$\Delta p_{st} = 250 \text{ Pa}$							$L_{WA} \text{ [dB(A)]}$	$\Delta p_{st} = 500 \text{ Pa}$							$L_{WA} \text{ [dB(A)]}$
				$L_w \text{ (dB/Okt)}$								$L_w \text{ (dB/Okt)}$								$L_w \text{ (dB/Okt)}$							
				fm (Hz)								fm (Hz)								fm (Hz)							
				125	250	500	1000	2000	4000			125	250	500	1000	2000	4000			125	250	500	1000	2000	4000		
80	3	65	18	22	25	27	25	19	15	29	26	29	31	32	24	20	34	33	34	36	36	28	23	39			
	6	100	28	24	28	30	28	21	17	32	28	32	35	35	27	23	38	37	37	40	39	31	25	42			
	10	125	35	28	32	33	32	25	21	35	32	35	39	37	31	26	41	39	41	44	43	35	29	46			
100	3	100	28	15	18	20	19	15	15	23	25	28	28	25	21	17	30	28	33	34	33	27	22	36			
	6	170	47	18	19	21	22	17	15	25	29	33	33	29	26	21	34	32	36	38	37	29	24	40			
	10	230	64	21	22	24	25	19	15	28	33	37	38	34	31	26	39	35	39	43	41	32	26	44			
125	3	200	56	19	23	22	22	15	15	25	28	31	33	31	24	18	35	31	35	37	35	31	25	39			
	6	300	83	24	27	28	26	20	15	30	33	36	37	35	29	22	39	36	40	42	40	35	30	44			
	10	400	111	27	29	32	30	24	15	34	37	40	41	39	33	26	43	40	45	47	45	38	34	49			
160	3	280	78	24	26	27	25	18	15	29	32	35	37	37	30	22	40	37	40	44	42	34	28	45			
	6	460	128	28	30	31	29	22	18	33	36	40	41	41	33	26	44	41	44	49	47	39	31	50			
	10	640	178	30	32	33	31	25	20	35	39	42	44	43	35	28	46	43	46	52	49	41	34	53			
200	3	400	111	19	23	25	24	17	15	27	30	35	35	33	27	21	37	36	40	41	40	34	26	43			
	6	730	203	26	30	31	29	24	15	33	36	40	42	39	33	28	43	41	44	47	45	39	31	49			
	10	1050	292	30	35	35	34	28	20	37	40	45	46	44	37	32	48	45	48	50	48	42	36	52			
250	3	575	160	20	23	24	21	15	15	25	30	34	36	35	25	22	38	38	42	44	41	36	25	45			
	6	1050	292	25	28	30	28	23	18	32	36	39	40	40	32	27	43	41	45	48	44	39	26	49			
	10	1500	417	28	32	34	33	29	23	37	40	42	44	43	37	31	46	43	48	49	48	42	27	51			
315	3	1050	292	21	26	30	28	20	15	29	33	35	38	36	30	22	39	39	43	45	44	34	27	47			
	6	1800	500	29	35	36	34	24	16	37	37	41	43	42	36	24	45	44	48	49	48	40	31	51			
	10	2450	681	32	38	37	36	25	16	39	38	42	45	44	37	24	47	45	49	50	48	42	32	52			
400	3	1600	444	36	40	40	38	27	18	41	38	43	46	44	38	27	48	43	48	50	49	42	31	52			
	6	2900	806	38	40	43	41	29	25	44	41	47	48	47	42	29	50	47	53	53	52	45	34	55			
	10	4200	1167	44	45	46	44	36	27	47	45	51	52	51	46	33	54	50	55	56	54	48	38	58			

VMPR-RS - INSERTION LOSS

With duct silencer (-RS)

		D _e (dB/Okt)																
		P=50								P=100								
		f _m (Hz)								f _m (Hz)								
		63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000	
L1=500	NW	80	4	7	12	18	26	33	17	15	6	16	18	23	39	36	33	20
		100	3	6	10	16	22	30	14	13	5	13	15	19	33	31	25	15
		125	3	5	9	14	20	24	12	11	4	10	13	18	29	25	18	12
		160	2	4	7	12	18	19	10	9	3	9	11	16	26	19	14	10
		200	1	3	6	10	16	15	7	6	3	7	9	15	25	17	11	9
		250	1	2	4	9	15	11	4	3	2	6	8	14	23	15	9	7
		315	1	1	3	8	12	8	3	2	2	4	7	13	20	12	7	5
		400	1	1	3	7	10	7	2	1	1	3	6	12	18	9	4	4
L1=950	NW	80	5	14	27	42	50	50	40	24	9	22	30	45	50	50	50	39
		100	5	12	23	36	50	50	34	21	7	19	28	40	50	50	50	32
		125	4	11	21	33	50	50	32	19	6	17	25	34	49	50	36	22
		160	3	8	15	23	34	29	18	14	5	12	18	28	41	48	26	16
		200	2	5	11	18	30	24	14	11	4	10	15	24	35	41	22	13
		250	2	4	9	15	27	18	11	9	3	8	13	20	31	35	20	11
		315	1	3	6	12	24	14	7	6	2	6	8	15	26	27	14	8
		400	1	2	4	10	19	10	4	4	2	4	6	11	23	20	10	6
L1=1450	NW	80	8	22	44	50	50	50	46	28	-	-	-	-	-	-	-	-
		100	8	22	44	50	50	50	46	28	-	-	-	-	-	-	-	-
		125	7	20	39	50	50	50	39	25	-	-	-	-	-	-	-	-
		160	6	14	27	42	48	42	26	18	6	17	30	47	50	49	30	18
		200	4	6	15	29	42	30	17	14	5	14	26	42	50	46	28	16
		250	3	4	10	20	37	24	13	11	4	12	22	36	46	43	25	14
		315	2	4	8	16	34	19	10	7	2	8	15	27	35	32	17	9
		400	1	2	6	15	27	13	8	5	2	6	12	23	30	25	13	7
L1=1950	NW	80	9	30	50	50	50	50	50	38	-	-	-	-	-	-	-	-
		100	9	30	50	50	50	50	50	38	-	-	-	-	-	-	-	-
		125	8	26	50	50	50	50	50	33	-	-	-	-	-	-	-	-
		160	-	-	-	-	-	-	-	-	8	23	39	50	50	50	41	25
		200	-	-	-	-	-	-	-	-	7	19	34	50	50	50	37	21
		250	-	-	-	-	-	-	-	-	6	16	29	48	50	49	33	18
		315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

VMPQ - CONTROLLER POSITION PART 1

(200x100 to 400x400)

	V	Nominal width NW (W x H)								V*
		200x100	300x100	300x150	300x200	400x200	400x250	400x300	400x400	
1	(m ³ /h)	200	325	250	225	500	850	700	900	2
	[l/s]	56	90	69	63	139	236	194	250	
2	(m ³ /h)	275	425	375	450	700	1100	1100	1400	2.9
	[l/s]	76	118	104	125	194	306	306	389	
3	(m ³ /h)	375	500	525	700	900	1450	1500	1800	3.8
	[l/s]	104	139	146	194	250	403	417	500	
4	(m ³ /h)	475	600	675	900	1100	1800	1850	2300	4.7
	[l/s]	132	167	188	250	306	500	514	639	
5	(m ³ /h)	550	700	850	1050	1300	2100	2200	2700	5.6
	[l/s]	153	194	236	292	361	583	611	750	
6	(m ³ /h)	600	775	1000	1250	1450	2400	2500	3100	6.5
	[l/s]	167	215	278	347	403	667	694	861	
7	(m ³ /h)	650	850	1150	1400	1600	2700	2800	3400	7.3
	[l/s]	181	236	319	389	444	750	778	944	
8	(m ³ /h)	700	925	1275	1500	1750	2900	3100	3800	8.2
	[l/s]	194	257	354	417	486	806	861	1056	
9	(m ³ /h)	750	1000	1400	1650	1900	3100	3400	4200	9.1
	[l/s]	208	278	389	458	528	861	944	1167	
10	(m ³ /h)	800	1075	1500	1800	2050	3200	3600	4400	10
	[l/s]	222	299	417	500	569	889	1000	1222	

 In controller positions 1 and 2, Δp must be >100 Pa.

* = Activation in volts for VMPQ with E016 and E046

Circuit diagram controller

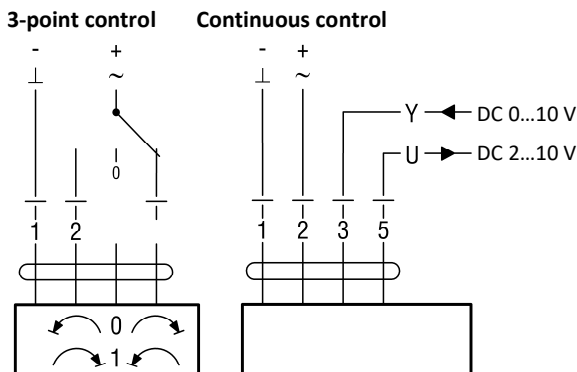
with electric actuator:

--- 3-point control

(standard: VMPQ-...-E044; 24 V, VMPQ-...-E045; 230 V)

--- Constant control

(VMPQ-...-E046; 24 V, VMPQ-...-E016; 230 V)



VMPQ - CONTROLLER POSITION PART 2

(500x200 to 600x400)

		V̇	Nominal width NW (W x H)							V*	
			500x200	500x250	500x300	500x400	600x200	600x250	600x300		600x400
Controller position RS	1	(m ³ /h)	650	950	1200	1300	450	1200	1700	1900	2
		[l/s]	181	264	333	361	125	333	472	528	
	2	(m ³ /h)	1000	1300	1650	2000	1000	1500	2100	2500	2.9
		[l/s]	278	361	458	556	278	417	583	694	
	3	(m ³ /h)	1300	1600	2100	2600	1450	1950	2600	3400	3.8
		[l/s]	361	444	583	722	403	542	722	944	
	4	(m ³ /h)	1600	2100	2600	3200	1950	2350	3200	4300	4.7
		[l/s]	444	583	722	889	542	653	889	1194	
	5	(m ³ /h)	1950	2500	3050	3900	2400	2800	3700	5000	5.6
		[l/s]	542	694	847	1083	667	778	1028	1389	
	6	(m ³ /h)	2200	2850	3500	4400	2800	3200	4150	5800	6.5
		[l/s]	611	792	972	1222	778	889	1153	1611	
	7	(m ³ /h)	2450	3200	3850	4900	3200	3600	4600	6400	7.3
		[l/s]	681	889	1069	1361	889	1000	1278	1778	
	8	(m ³ /h)	2650	3550	4200	5300	3500	3950	5000	7000	8.2
		[l/s]	736	986	1167	1472	972	1097	1389	1944	
	9	(m ³ /h)	2900	3900	4550	5800	3800	4300	5400	7600	9.1
		[l/s]	806	1083	1264	1611	1056	1194	1500	2111	
	10	(m ³ /h)	3100	4200	4800	6200	4100	4600	5800	8200	10
		[l/s]	861	1167	1333	1722	1139	1278	1611	2278	

In controller positions 1 and 2, Δp must be >100 Pa.

* = Activation in volts for VMPQ with E016 and E046

VMPQ - FLOW-GENERATED NOISE PART 1

(200x100 to 400x400)

BxH	RS	V̇ (m³/h) [l/s]		Δp _{st} = 100 Pa							L _{WA} [dB(A)]	Δp _{st} = 250 Pa							L _{WA} [dB(A)]	Δp _{st} = 500 Pa							L _{WA} [dB(A)]						
				L _w (dB/Okt)								L _w (dB/Okt)								L _w (dB/Okt)													
				f _m (Hz)								f _m (Hz)								f _m (Hz)													
				125	250	500	1000	2000	4000		125	250	500	1000	2000	4000		125	250	500	1000	2000	4000		125	250	500	1000	2000	4000			
200 x 100	3	375	104	44	44	43	43	43	42	49	51	51	51	51	50	50	57	57	57	56	56	56	56	56	56	56	56	56	56	56	56	56	62
	6	600	167	50	50	49	49	49	49	55	57	57	56	56	56	56	62	62	62	61	61	61	61	61	61	61	61	61	61	61	61	61	67
	10	800	222	53	53	52	52	52	52	58	60	60	59	59	60	59	66	65	65	64	64	64	64	64	64	64	64	64	64	64	64	64	70
300 x 100	3	500	139	45	45	43	43	43	42	49	52	51	51	51	51	51	57	58	58	57	57	57	57	57	57	57	57	57	57	57	57	57	63
	6	775	215	50	50	49	49	49	49	55	57	56	56	56	56	56	62	62	62	61	61	61	61	61	61	61	61	61	61	61	61	61	67
	10	1075	299	53	53	53	53	53	52	59	60	60	60	60	60	60	66	66	65	65	65	65	65	65	65	65	65	65	65	65	65	65	71
300 x 150	3	525	146	42	42	42	41	41	35	46	50	49	49	49	49	46	54	57	57	57	56	56	56	56	56	56	56	56	56	56	56	56	62
	6	1000	278	50	50	50	49	49	46	55	56	56	56	56	56	55	62	62	62	61	61	61	61	61	61	61	61	61	61	61	61	61	67
	10	1500	417	54	54	54	54	53	52	59	61	61	61	61	61	60	67	66	66	66	66	66	66	65	65	65	65	65	65	65	65	65	72
300 x 200	3	700	194	43	43	43	43	40	33	46	52	51	51	51	51	45	56	57	58	58	56	56	56	55	55	55	55	55	55	55	55	55	62
	6	1250	347	50	50	50	49	50	44	55	57	57	56	56	56	53	62	63	62	62	61	62	62	61	62	62	61	62	61	62	61	68	
	10	1800	500	54	54	54	54	54	49	59	62	61	61	61	61	59	67	67	66	66	66	66	66	66	66	65	66	65	66	65	65	72	
400 x 200	3	900	250	46	46	45	45	41	33	49	51	50	53	53	51	42	57	56	57	59	60	56	49	56	49	63	61	61	61	61	61	61	63
	6	1450	403	51	50	53	52	48	39	56	53	56	58	59	57	48	62	60	62	63	62	60	54	66	63	63	63	63	63	63	63	63	66
	10	2950	569	56	56	55	56	55	47	59	56	55	61	62	58	54	65	63	65	65	66	63	61	69	63	63	63	63	63	63	63	63	69
400 x 250	3	1450	403	48	48	48	47	44	37	51	56	54	54	54	54	46	59	61	61	61	61	60	56	66	61	61	61	61	61	61	61	66	
	6	2400	667	54	54	54	53	53	45	58	61	60	60	60	60	54	65	66	66	65	65	65	65	65	65	65	65	65	65	65	65	65	71
	10	3200	889	57	57	57	56	56	49	61	64	64	64	64	63	60	69	69	69	69	69	69	68	66	74	69	69	69	69	68	66	74	
400 x 300	3	1500	417	47	47	47	46	41	33	50	55	54	54	54	51	44	58	61	61	61	61	60	53	66	61	61	61	61	60	53	66		
	6	2500	694	53	54	53	53	50	42	57	61	60	60	60	59	52	65	66	66	66	66	66	65	59	71	66	66	66	66	65	59	71	
	10	3600	1000	58	57	57	57	55	47	61	65	64	64	64	64	58	69	70	70	69	69	69	69	64	74	69	70	70	69	69	64	74	
400 x 400	3	1800	500	47	47	47	45	37	30	49	55	55	55	54	48	40	57	62	62	61	61	58	50	65	62	62	62	61	58	50	65		
	6	3100	861	53	53	53	52	46	38	55	61	60	60	60	55	46	63	67	67	65	65	64	56	70	67	67	67	65	64	56	70		
	10	4400	1222	58	58	57	56	52	44	60	65	64	64	64	61	53	68	70	70	69	69	68	61	74	68	70	70	69	68	61	74		

VMPQ - FLOW-GENERATED NOISE PART 2

(500x200 to 600x400)

BxH	RS	V̇ (m³/h) [l/s]		Δp _{st} = 100 Pa							L _{WA} [dB(A)]	Δp _{st} = 250 Pa							L _{WA} [dB(A)]	Δp _{st} = 500 Pa							L _{WA} [dB(A)]
				L _w (dB/Okt)								L _w (dB/Okt)								L _w (dB/Okt)							
				f _m (Hz)								f _m (Hz)								f _m (Hz)							
				125	250	500	1000	2000	4000			125	250	500	1000	2000	4000			125	250	500	1000	2000	4000		
500 x 200	3	1300	36	47	47	46	46	45	37	51	54	54	54	54	53	48	59	61	60	60	60	60	57	65			
	6	2200	611	53	53	53	52	52	47	57	60	59	59	59	59	56	64	66	65	64	64	65	63	70			
	10	3100	861	57	57	57	57	56	52	62	61	64	64	64	64	61	69	69	69	68	68	68	68	74			
500 x 250	3	1600	444	48	48	47	47	43	35	51	55	55	55	55	54	46	60	62	62	61	61	61	56	66			
	6	2850	792	55	55	54	54	53	46	59	61	61	61	61	60	55	66	66	66	66	66	66	62	71			
	10	4200	1167	59	58	58	58	58	51	63	66	66	66	65	65	62	71	71	71	70	70	70	68	76			
500 x 300	3	2100	583	47	47	46	46	39	31	49	54	54	54	54	51	43	58	62	62	61	61	61	53	66			
	6	3500	972	52	52	52	52	48	40	55	59	59	58	58	57	49	63	65	65	65	65	65	57	70			
	10	4800	1333	57	57	57	57	54	46	61	63	63	63	63	63	56	68	68	68	68	68	68	63	73			
500 x 400	3	2600	722	50	50	50	48	40	32	52	57	57	57	56	51	43	60	64	64	63	63	60	52	67			
	6	4400	1222	56	56	56	56	50	42	59	63	63	62	62	59	51	66	68	68	68	67	66	59	72			
	10	6200	1722	60	59	59	59	54	46	62	67	66	66	66	64	57	70	72	71	71	71	71	64	76			
600 x 200	3	1450	403	47	47	46	46	44	37	50	55	55	54	54	54	47	59	61	61	61	61	60	58	66			
	6	2800	778	54	54	54	54	48	48	59	61	61	61	60	60	57	66	66	66	66	66	65	65	72			
	10	4100	1139	58	58	58	57	57	52	62	65	65	65	64	64	62	71	70	70	70	69	69	69	76			
600 x 250	3	1950	542	48	48	48	48	44	37	52	56	56	55	55	54	47	60	62	62	62	62	61	57	67			
	6	3200	889	54	54	54	54	53	46	59	61	61	60	60	60	55	65	66	66	66	66	65	63	71			
	10	4600	1278	59	58	58	58	58	51	63	66	66	65	65	65	61	70	71	71	70	70	70	68	76			
600 x 300	3	2600	722	51	51	51	50	45	37	54	59	58	57	58	56	47	62	63	63	63	63	62	56	68			
	6	4150	1153	56	56	56	56	53	46	60	63	63	63	62	62	54	67	68	68	68	68	67	62	73			
	10	5800	1611	60	59	59	59	58	50	63	67	67	67	66	66	60	71	72	72	71	71	71	67	76			
600 x 400	3	3400	944	51	51	51	49	43	35	53	58	58	58	58	52	44	61	65	65	65	64	62	54	68			
	6	5800	1611	58	58	58	57	52	44	61	65	64	64	64	61	53	68	71	70	70	70	68	60	74			
	10	8200	2278	62	62	62	62	57	49	65	70	69	69	69	67	60	73	75	74	74	74	74	66	79			

VMPQ - RADIATED NOISE PART 1

(200x100 to 400x400)

BxH	RS	V̇ (m³/h) [l/s]		Δp _{st} = 100 Pa							L _{WA} [dB(A)]	Δp _{st} = 250 Pa							L _{WA} [dB(A)]	Δp _{st} = 500 Pa							L _{WA} [dB(A)]
				L _w (dB/Okt)								L _w (dB/Okt)								L _w (dB/Okt)							
				fm (Hz)								fm (Hz)								fm (Hz)							
				125	250	500	1000	2000	4000			125	250	500	1000	2000	4000			125	250	500	1000	2000	4000		
200 x 100	3	375	104	27	29	32	32	31	26	37	35	37	40	40	39	34	45	42	44	46	46	46	41	51			
	6	600	167	32	35	37	37	36	30	42	40	43	45	45	44	38	50	46	49	51	51	50	44	56			
	10	800	222	35	40	41	40	39	34	45	43	48	49	48	47	42	53	50	55	56	54	54	49	60			
300 x 100	3	500	139	29	32	34	34	33	28	39	37	40	42	42	41	36	47	43	46	48	48	47	42	53			
	6	775	215	33	36	38	38	37	31	43	42	45	47	47	46	40	52	47	50	52	52	51	45	57			
	10	1075	299	37	42	43	41	41	36	47	45	50	51	50	49	44	55	51	56	57	55	55	50	61			
300 x 150	3	525	146	29	31	33	33	33	28	38	34	36	39	38	38	33	43	42	44	47	46	46	41	51			
	6	1000	278	33	36	38	38	37	31	43	40	43	45	45	44	38	50	46	49	51	51	50	44	56			
	10	1500	417	37	42	43	41	41	36	47	45	50	51	49	49	44	55	50	55	56	54	54	49	60			
300 x 200	3	700	194	29	31	33	33	33	27	38	34	36	39	39	38	33	44	42	44	47	47	46	41	52			
	6	1250	347	33	37	38	38	37	31	43	40	43	45	44	44	38	49	46	50	52	51	50	45	56			
	10	1800	500	37	42	43	41	41	36	47	45	50	51	49	49	44	55	51	56	57	55	55	50	61			
400 x 200	3	900	250	30	33	34	35	33	26	38	35	38	45	45	42	34	47	41	45	48	50	45	37	53			
	6	1450	403	37	38	43	44	40	34	46	36	41	48	49	45	36	52	44	50	52	53	49	42	56			
	10	2950	569	42	44	45	46	45	39	49	41	44	49	52	48	42	55	48	52	55	56	53	48	59			
400 x 250	3	1450	403	32	34	36	36	36	30	41	38	42	44	43	42	37	48	45	50	51	49	49	44	55			
	6	2400	667	38	41	43	43	42	36	48	44	49	50	48	48	43	54	50	55	56	54	54	49	60			
	10	3200	889	40	45	46	44	44	40	50	48	53	54	52	52	47	58	54	59	60	58	58	53	64			
400 x 300	3	1500	417	30	32	35	34	34	30	39	37	40	42	42	41	35	47	45	48	50	50	49	43	55			
	6	2500	694	36	38	41	40	40	36	45	43	48	49	48	47	42	53	49	54	55	54	53	48	59			
	10	3600	1000	41	43	46	45	45	41	50	48	53	54	52	52	46	57	53	58	59	57	57	52	63			
400 x 400	3	1800	500	29	31	34	33	33	29	38	36	39	41	41	40	34	46	44	49	50	48	48	43	54			
	6	3100	861	35	37	40	39	39	35	44	42	46	47	46	45	40	51	49	54	55	53	53	48	59			
	10	4400	1222	40	42	45	44	44	40	49	47	52	53	51	51	46	57	53	58	59	57	57	52	63			

VMPQ - RADIATED NOISE PART 2

(500x200 to 600x400)

BxH	RS	V̇ (m³/h) [l/s]		Δp _{st} = 100 Pa							L _{WA} [dB(A)]	Δp _{st} = 250 Pa							L _{WA} [dB(A)]	Δp _{st} = 500 Pa							L _{WA} [dB(A)]
				L _w (dB/Okt)								L _w (dB/Okt)								L _w (dB/Okt)							
				fm (Hz)								fm (Hz)								fm (Hz)							
				125	250	500	1000	2000	4000			125	250	500	1000	2000	4000			125	250	500	1000	2000	4000		
500 x 200	3	1300	36	31	33	36	35	35	31	40	39	41	44	43	43	39	48	45	50	51	49	49	44	55			
	6	2200	611	37	39	42	41	41	35	46	44	49	50	48	48	44	54	49	55	55	53	53	48	59			
	10	3100	861	41	44	46	46	45	38	50	49	54	55	53	53	47	58	53	58	59	57	57	52	63			
500 x 250	3	1600	444	31	33	36	35	35	31	40	39	42	44	43	43	37	48	45	50	51	49	49	44	55			
	6	2850	792	39	41	44	43	43	39	48	45	50	51	49	49	44	55	50	55	56	54	54	49	60			
	10	4200	1167	43	45	48	47	47	43	52	50	55	56	54	54	49	60	54	59	60	58	58	53	64			
500 x 300	3	2100	583	30	32	35	34	34	29	39	38	40	43	42	42	36	47	45	50	51	49	49	44	55			
	6	3500	972	35	38	40	40	39	33	45	43	45	48	47	47	43	52	48	53	54	52	52	47	58			
	10	4800	1333	40	43	45	45	44	40	50	48	52	53	51	52	47	57	52	57	58	56	56	51	62			
500 x 400	3	2600	722	32	34	37	36	36	32	41	38	42	44	43	42	37	48	46	51	52	50	50	45	56			
	6	4400	1222	39	41	44	43	43	39	48	45	50	51	49	49	44	55	50	55	56	54	54	49	60			
	10	6200	1722	41	44	46	46	45	39	51	50	55	56	54	54	49	60	55	60	61	59	59	54	65			
600 x 200	3	1450	403	30	33	35	35	34	30	40	38	41	43	43	42	37	48	46	51	52	50	50	45	56			
	6	2800	778	38	41	43	43	42	37	48	45	48	50	49	49	44	54	51	57	57	55	55	50	61			
	10	4100	1139	42	44	47	46	46	42	54	49	54	55	53	53	48	62	54	59	60	58	58	53	66			
600 x 250	3	1950	542	33	35	37	36	36	32	41	39	43	45	43	43	40	49	46	51	52	50	50	45	56			
	6	3200	889	39	41	44	43	43	39	48	44	49	50	48	48	46	54	50	55	56	54	54	49	60			
	10	4600	1278	43	45	48	47	47	43	52	49	54	55	53	53	48	59	55	60	61	59	59	54	65			
600 x 300	3	2600	722	35	37	40	39	39	35	44	41	45	47	45	45	39	50	48	52	54	52	52	48	58			
	6	4150	1153	40	42	45	44	44	40	49	46	51	52	50	50	45	56	52	57	58	56	57	51	62			
	10	5800	1611	44	46	49	48	48	44	53	50	55	56	54	54	49	60	55	60	61	59	59	54	65			
600 x 400	3	3400	944	32	35	37	37	36	31	42	41	45	46	45	45	39	50	48	53	54	52	52	47	58			
	6	5800	1611	39	42	44	44	43	38	49	47	52	53	52	51	46	57	47	52	53	52	51	46	57			
	10	8200	2278	45	47	50	49	49	45	56	53	59	60	58	58	52	65	58	63	64	62	62	57	69			

VMPQ - RADIATED NOISE WITH ACOUSTIC CLADDING PART 1

(200x100 to 400x400)

BxH	RS	V̇ (m³/h) [l/s]		Δp _{st} = 100 Pa							L _{WA} [dB(A)]	Δp _{st} = 250 Pa							L _{WA} [dB(A)]	Δp _{st} = 500 Pa							L _{WA} [dB(A)]
				L _w (dB/Okt)								L _w (dB/Okt)								L _w (dB/Okt)							
				fm (Hz)								fm (Hz)								fm (Hz)							
				125	250	500	1000	2000	4000			125	250	500	1000	2000	4000			125	250	500	1000	2000	4000		
200 x 100	3	375	104	22	26	29	26	22	15	30	30	34	37	34	30	22	38	37	41	43	40	37	29	45			
	6	600	167	27	32	34	31	27	18	35	35	40	42	39	35	26	43	41	46	48	45	41	32	49			
	10	800	222	30	37	38	34	30	22	39	38	45	46	42	38	30	47	45	52	53	48	45	37	54			
300 x 100	3	500	139	24	29	31	28	24	16	32	32	37	39	36	32	24	40	38	43	45	42	38	30	46			
	6	775	215	28	33	35	32	28	19	36	37	42	44	41	37	28	45	42	47	49	46	42	33	50			
	10	1075	299	32	39	40	35	32	24	41	40	47	48	44	40	32	49	46	53	54	49	46	38	55			
300 x 150	3	525	146	24	28	30	27	24	16	32	29	33	36	32	29	21	37	37	41	44	40	37	29	45			
	6	1000	278	28	33	35	32	28	19	36	35	40	42	39	35	26	43	41	46	48	45	41	32	49			
	10	1500	417	32	39	40	35	32	24	41	40	47	48	43	40	32	49	45	52	53	48	45	37	54			
300 x 200	3	700	194	24	28	30	27	24	15	32	29	33	36	33	29	21	37	37	41	44	41	37	29	45			
	6	1250	347	28	34	35	32	28	19	36	35	40	42	38	35	26	43	41	47	49	45	41	33	50			
	10	1800	500	32	39	40	35	32	24	41	40	47	48	43	40	32	49	46	53	54	49	46	38	55			
400 x 200	3	900	250	25	29	31	29	27	24	34	30	33	38	38	32	24	41	36	40	43	45	41	36	48			
	6	1450	403	32	36	38	37	31	25	40	33	39	43	43	39	27	46	39	42	46	47	45	32	51			
	10	2950	569	36	38	38	40	37	28	43	38	38	45	46	41	40	49	43	46	50	51	48	39	54			
400 x 250	3	1450	403	27	31	33	30	27	18	35	33	39	41	37	33	25	42	40	47	48	43	40	32	49			
	6	2400	667	33	38	40	37	33	24	41	39	46	47	42	39	31	48	45	52	53	48	45	37	54			
	10	3200	889	35	42	43	38	35	28	44	43	50	51	46	43	35	52	49	56	57	52	49	41	58			
400 x 300	3	1500	417	25	29	32	28	25	18	33	32	37	39	36	32	23	40	40	45	47	44	40	31	48			
	6	2500	694	31	35	38	34	31	24	39	38	45	46	42	38	30	47	44	51	52	48	44	36	53			
	10	3600	1000	36	40	43	39	36	29	44	43	50	51	46	43	34	52	48	55	56	51	48	40	57			
400 x 400	3	1800	500	24	28	31	27	24	17	32	31	36	38	35	31	22	39	39	46	47	42	39	31	48			
	6	3100	861	30	34	37	33	30	23	38	37	43	44	40	36	28	45	44	51	52	47	44	36	53			
	10	4400	1222	35	39	42	38	35	28	43	42	49	50	45	42	34	51	48	55	56	51	48	40	57			

VMPQ - RADIATED NOISE WITH ACOUSTIC CLADDING PART 2

(500x200 to 600x400)

B x H	RS	V̇ (m³/h) [l/s]		Δp _{st} = 100 Pa							L _{WA} [dB(A)]	Δp _{st} = 250 Pa							L _{WA} [dB(A)]	Δp _{st} = 500 Pa							L _{WA} [dB(A)]
				L _w (dB/Okt)								L _w (dB/Okt)								L _w (dB/Okt)							
				f _m (Hz)								f _m (Hz)								f _m (Hz)							
				125	250	500	1000	2000	4000			125	250	500	1000	2000	4000			125	250	500	1000	2000	4000		
500 x 200	3	1300	36	26	30	33	29	26	19	34	34	38	41	37	34	27	42	40	47	48	43	40	32	49			
	6	2200	611	32	36	39	35	32	23	40	39	46	47	42	39	32	48	44	52	52	47	44	36	53			
	10	3100	861	36	41	43	40	36	26	44	44	51	52	47	44	35	53	48	55	56	51	48	40	57			
500 x 250	3	1600	444	26	30	33	29	26	19	34	34	39	41	37	34	25	42	40	47	48	43	40	32	49			
	6	2850	792	34	38	41	37	34	27	42	40	47	48	43	40	32	49	45	52	53	48	45	37	54			
	10	4200	1167	38	42	45	41	38	31	46	45	52	53	48	45	37	54	49	56	57	52	49	41	58			
500 x 300	3	2100	583	25	29	32	28	25	17	33	33	37	40	36	33	24	41	40	47	48	43	40	32	49			
	6	3500	972	30	35	37	34	30	21	38	38	42	45	41	38	31	46	43	50	51	46	43	35	52			
	10	4800	1333	35	40	42	39	35	28	43	43	49	50	45	43	35	51	47	54	55	50	47	39	56			
500 x 400	3	2600	722	27	31	34	30	27	20	35	33	39	41	37	33	25	42	41	48	49	44	41	33	50			
	6	4400	1222	34	38	41	37	34	27	42	40	47	48	43	40	32	49	45	52	53	48	45	37	54			
	10	6200	1722	36	41	43	40	36	27	44	45	52	53	48	45	37	54	50	57	58	53	50	42	59			
600 x 200	3	1450	403	25	30	32	29	25	18	33	33	38	40	37	33	25	41	41	48	49	44	41	33	50			
	6	2800	778	33	38	40	37	33	25	41	40	45	47	43	40	32	48	46	54	54	49	46	38	55			
	10	4100	1139	37	40	44	40	37	29	45	44	51	52	47	44	36	54	49	56	57	52	49	41	59			
600 x 250	3	1950	542	28	32	34	30	27	20	35	34	40	42	37	34	28	43	41	48	49	44	41	33	50			
	6	3200	889	34	38	41	37	34	27	42	39	46	47	42	39	34	48	45	52	53	48	45	37	54			
	10	4600	1278	38	42	45	41	38	31	46	44	51	52	47	44	36	53	50	57	58	53	50	42	59			
600 x 300	3	2600	722	30	34	37	33	30	23	38	36	42	44	39	36	27	45	43	49	51	46	43	36	52			
	6	4150	1153	35	39	42	38	35	28	43	41	48	49	44	41	33	50	47	54	55	50	48	39	56			
	10	5800	1611	39	43	46	42	39	32	47	45	52	53	48	45	37	54	50	57	58	53	50	42	59			
600 x 400	3	3400	944	27	32	34	31	27	19	35	36	42	43	39	36	27	44	43	50	51	46	43	35	52			
	6	5800	1611	34	39	41	38	34	26	42	42	49	50	46	42	34	51	48	56	57	51	48	41	57			
	10	8200	2278	39	43	46	42	38	32	48	47	54	55	50	47	39	57	52	59	60	55	52	44	62			

VMPQ-ZSQ - INSERTION LOSS

With mineral wool silencer (-ZSQ)

(VMPQ with baffles type MWK-OB only)

B (mm)	D _e [dB/Okt]							
	f _m (Hz)							
	63	125	250	500	1000	2000	4000	8000
200	1	3	9	18	36	37	22	13
300	1	2	4	8	15	14	9	6
400	1	4	11	19	25	20	11	7
500	1	4	7	8	15	15	8	5
600	1	3	9	18	36	37	22	13

CALCULATION FORMULAE

Calculation of the volumetric flow

$$\dot{V} = v_K \times F \times 3600$$

where : v_K (m/s) = duct velocity | F (m²) = area

Example for diameter 200 mm

$$v_K = 4 \text{ m/s}$$

$$F = 0.0314 \text{ m}^2$$

$$\dot{V} = v_K \times F \times 3600 = 4 \text{ m/s} \times 0.0314 \text{ m}^2 \times 3600$$

$$\dot{V} = 452 \text{ m}^3/\text{h}$$

LEGEND

ΔL_W	[dB/Okt]	= Level correction value / octave
Δp	(Pa)	= Pressure difference
$\Delta p_{st \min}$	[Pa]	= minimum static pressure difference
Δp_{st}	[Pa]	= pressure loss
Δp_w	(Pa)	= Effective pressure
A	(m ²)	= Inflow area (W x H)
B	(mm)	= Width
D _e	[dB/Okt]	= Insertion loss
EW _{vmax}	(m ³ /h)	= maximum air volume set value
f _m	(Hz)	= Octave band centre frequency
H	(mm)	= Height
K		= Baffle thickness
KA	(-x-)	= Number of baffles
KF	(-x-)	= Correction factor
LOA		= number of holes
L _{w abst}	[dB/Okt]	= Radiated noise / octave
L _w	[dB/Okt]	= Sound power level/octave ($L_w = L_{w1} + KF$)
L _{w1}	[dB/Okt]	= Sound power level / octave, relative to 1 m ² of inflow area
L _{WA}	[dB(A)]	= A-weighted sound power level ($L_{WA} = L_{WA1} + KF$)
NW	(mm)	= Nominal width
S		= Gap width
V	(m ³ /h) [l/s]	= air volume
V _{ZU}	(m ³ /h) [l/s]	= supply air volumetric flow
V _{max}	(m ³ /h) [l/s]	= maximum air volume
V _{min}	(m ³ /h) [l/s]	= minimum air volume
V _{Nenn}	(m ³ /h) [l/s]	= nominal air volume
\dot{V}	(m ³ /h) [l/s]	= volumetric flow
v _K	(m/s)	= duct velocity
øD	(-)	= hydraulic diameter
ρ	(kg/m ³)	= Density
RS		= controller position

VMPR ORDER CODE

01	02	03	04	05	06	07
Type	Nominal width	Material	Volumetric flow set value V_{kon}	Duct connection	Acoustic cladding	Actuator
Example						
VMPR	-125	-SV	-0180	-GD1	-DS2	-E000

Sample

VMPR-125-SV-0180-GD1-DS2-E000

Volumetric flow controller type VMPR, round design | nominal width NW 125 | galvanised sheet steel | with set value $V_{kon}=180$ m³/h | with rubber lip seal | with acoustic cladding 20 mm | without actuator

ORDER DETAILS

01 - Type

VMPR = VMPR volumetric flow controller, round design

02 - Nominal width

080 = NW 80 mm
 100 = NW 100 mm
 125 = NW 125 mm
 160 = NW 160 mm
 200 = NW 200 mm
 250 = NW 250 mm
 315 = NW 315 mm
 400 = NW 400 mm

03 - Material

SV = galvanised sheet steel (standard)
 V2 = stainless steel V2A, 1.4301
 V4 = stainless steel V4A, 1.4571
 DD = DD-coating on the inside with galvanised sheet steel

04 - Volumetric flow set value V_{kon} (provided by customer)

xxxx = value must be entered with 4 digits

05 - Duct connection

KA0 = without rubber lip seal / without flange (standard)
 GD1 = with rubber lip seal
 FF1 = flat flange, galvanised steel
 FF2 = flat flange, stainless steel V2A 1.4301
 MF1 = METU flange, galvanised steel
 MF2 = METU flange, stainless steel V2A 1.4301

06 - Acoustic cladding

DS0 = without acoustic cladding (standard)
 DS2 = acoustic cladding 20 mm
 FD1 = flat-bed acoustic cladding 3 mm

07 - Actuator

E000 = no actuator (standard)
 E044 = LM24A-F; 24 V, 3-point, OPEN/CLOSED
 E045 = LM230A-F; 230 V, 3-point, OPEN/CLOSED
 E046 = LM24A-SR-F; 24 V, continuous 2-10 V
 E016 = LM230A-SR-F; 230 V, continuous 2-10 V

Please note!

Tension rings, counter flanges or duct silencers must be ordered separately and are supplied loose!

ORDER CODE VMPQ

01	02	03	04	05	06	07
Type	Width	Height	Material	Volumetric flow set value V_{kon}	Acoustic cladding	Actuator
Example						
VMPQ	-200	-100	-DD	-0400	-DS2	-E000

Sample
VMPQ-200-100-DD-0400-DS2-E000

Volumetric flow controller type VMPQ, rectangular design | width 200 mm | height 100 mm | galvanised sheet steel with DD coating | with set value $V_{kon}= 400 \text{ m}^3/\text{h}$ | with acoustic cladding 20 mm | without actuator

ORDER DETAILS
01 - Type

VMPQ = VMPQ volumetric flow controller, rectangular design

02 - Width

200 = 200 mm
 300 = 300 mm
 400 = 400 mm
 500 = 500 mm
 600 = 600 mm

03 - Height

100 = 100 mm
 150 = 150 mm
 200 = 200 mm
 250 = 250 mm
 300 = 300 mm
 400 = 400 mm

04 - Material

SV = galvanised sheet steel (standard)
 V2 = stainless steel V2A, 1.4301
 V4 = stainless steel V4A, 1.4571
 DD = DD-coating on the inside with galvanised sheet steel

05 - Volumetric flow set value V_{kon} (provided by customer)

Xxxx = value must be entered with 4 digits.

06 - Acoustic cladding

DS0 = without acoustic cladding (standard)
 DS2 = acoustic cladding with 20 mm

07 - Actuator

E000 = no actuator (standard)
 E044 = LM24A-F; 24 V, 3-point, open/closed
 E045 = LM230A-F; 230 V, 3-point, open/closed
 E046 = LM24A-SR-F; 24 V, continuous 2-10 V
 E016 = LM230A-SR-F; 230 V, continuous 2-10 V

Please note!

Silencers must be ordered separately!

ORDER CODE ZSQ

01	02	03	04	05
Type	Width	Height	Material	Profiled connection
Example				
ZSQ	-0600	-0400	-SV	-M2

Sample
ZSQ-0600-0400-SV-M2

Mineral wool silencer, rectangular design, with baffle type MWK-OB | width 600 mm | height 400 mm | galvanised sheet steel | with METU flange M2

ORDER DETAILS
01 - Type

ZSQ = Mineral wool silencer, rectangular design, with Baffles type MWK-OB

02 - Width

xxxx = value must be entered with 4 digits (0200 to 0600 mm)

03 - Height

xxxx = value must be entered with 4 digits (0100 to 0400 mm)

04 - Material

SV = galvanised sheet steel

05 - Profile connection

M2 = Metu profile M2 for VMPQ

SPECIFICATION TEXT VMPR

Round model

Mechanical volumetric flow controller type VMPR, in round design, position-independent installation, for constant volumetric flow control up to a max. differential pressure of 1000 Pa, for duct connection to DIN EN 1506. Housing and control damper made of galvanised sheet steel (-SV), control housing made of plastic.

Product: SCHAKO type VMPR

NW

Housing and control damper (at an extra charge) made of:

- Galvanised sheet steel with DD-coating (-DD)
- Stainless steel 1.4301 (-V2)
- Stainless steel 1.4571 (-V4)

Control housing (at an extra charge) made of:

- Stainless steel 1.4301 (-V2)
- Stainless steel 1.4571 (-V4)

Accessories (at an extra charge):

- Acoustic cladding (-DS2), made of 20 mm sound-absorbing material, non-flammable according to DIN 4102-17, with sheet metal casing.
- Flat-bed acoustic cladding (-FD1), made of 3 mm sound-absorbing material with sheet metal casing.
- METU flange (-MF1/-MF2), on both sides, duct flange AF.
- Counter flange (-GF) (pair), loose, on both sides, for METU flange.
- Tension ring (-SR) (pair), loose, for connecting the METU flange to the counter flange.
- Flat flange (-FF1/-FF2), on both sides, according to DIN 24 154 / 5, made of the same material as the housing.
- Rubber lip seal (-GD1), on both sides, made of special rubber, silicone-free.
- Duct silencer (-RS), outer casing and perforated plate made of galvanised sheet steel or stainless steel 1.4301 (V2A) or 1.4571 (V4A) (at an extra charge), with mineral wool filling.
- Electric actuator (-E), 3-point control (standard, VMPR-...-E044; 24V, VMPR-...-E045; 230V) or constant control (VMPR-...-E046; 24V, VMPR-...-E016; 230V), for adapting the supply air and return air volume to varying room occupations.

VMPQ SPECIFICATION TEXT

Rectangular model

Mechanical volumetric flow controller type VMPQ, in rectangular design, right-hand model, for constant volumetric flow control up to a max. differential pressure of 1000 Pa, for duct connection to DIN EN 1505. Housing and control damper made of galvanised sheet steel (-SV), control housing made of plastic.

Product: SCHAKO type VMPQ

Size x (width x height)

Housing and control damper (at an extra charge) made of:

- Galvanised sheet steel with DD-coating (-DD)
- Stainless steel 1.4301 (-V2)
- Stainless steel 1.4571 (-V4)

Control housing (at an extra charge) made of:

- Stainless steel 1.4301 (-V2)
- Stainless steel 1.4571 (-V4)

Accessories (at an extra charge):

- Acoustic cladding (-DS2) made of 20 mm sound-absorbing material, non-flammable according to DIN 4102-17, with sheet metal casing and M6 cage nuts.
- Mineral wool silencer (-ZSQ) with METU profile M2 on both sides, housing (L=1500) made of galvanised sheet steel or stainless steel 1.4301 (V2A) or 1.4571 (V4A) (at an extra charge), with integrated MWK sound-absorbing baffles (L=1000). The MWK silencing baffles with RAL quality seal consist of abrasion-resistant mineral fibre boards covered with fibre glass filament (biosoluble, non-flammable to DIN 4102) in a frame made of the same material as the mineral wool silencer housing. Baffles measured to ISO/DIS 7235 and to DIN 45646.
- Electric actuator (-E), 3-point control (standard, VMPQ-...-E044; 24 V, VMPQ-...-E045; 230 V) or constant control (VMPQ-...-E046; 24 V, VMPQ-...-E016; 230 V), for adapting the supply air and return air volume to varying room occupations.