komfovent

VARIABLE AIR VOLUME DAMPERS

PRODUCT CATALOGUE
VERSION 2026-02

Precise air volume control on demand

Content

About us

KOMFOVENT was established in Lithuania in 1997 and specializes in the development, production and distribution of air ventilation systems. Over more than twenty-five years of successful operation, the company has grown into an international group uniting 11 companies in Lithuania and other European countries. Today, it employs more than 1,000 people who design and manufacture high-quality ventilation equipment and components.

The company's product portfolio includes a wide range of energy-efficient air handling units as well as various ventilation system components – from air ducts to advanced VAV (Variable Air Volume) systems or essential fire safety equipment.

In 2018, the company expanded further and opened a modern factory in Riga, Latvia. This facility focuses on the development, testing, production and sales of fire and smoke dampers, fire-resistant ducts, VAV dampers, diffusers and other related products.

By continuously investing in modern technologies, KOMFOVENT provides solutions for diverse sectors – from industrial facilities, offices, hotels, restaurants and cafés to individual homes and apartments. Today, KOMFOVENT is the largest ventilation system manufacturer in the Baltics and continues to strengthen its position across Europe, offering innovative, reliable and comfort-oriented solutions.

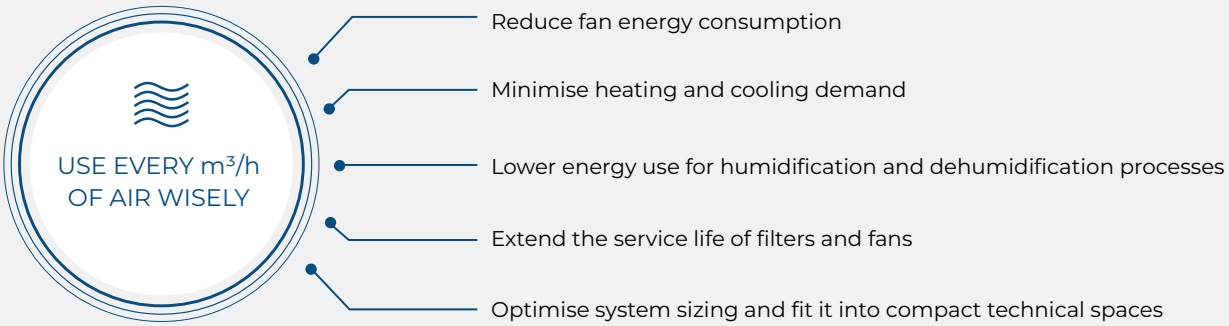
2026-02

Introduction

Variable air volume (VAV) dampers in ventilation systems

Variable Air Volume (VAV) dampers are smart control devices installed in supply and extract ducts to automatically regulate airflow according to the real-time demand of each room or zone. By continuously regulating airflow to match occupancy and thermal load, they ensure stable indoor comfort while significantly improving energy efficiency.

Precise air volume control reduces the energy consumption of fans, heating and cooling coils, humidification and dehumidification sections by up to 70%, while also lowering noise levels and extending the service life of ventilation equipment. In addition, VAV systems enable independent control of different zones, with accurate remote monitoring and management of the entire ventilation system. The result is a healthier indoor climate and measurable savings in operating costs every day.



VAV dampers

VAV Standard

The most used type of VAV dampers for airflow control, perfect for the wide variety of standard applications.

KOS-C / KOS-C-I / KOS-C-XT / KOS-R / KOS-R-I

VAV Box

The VAV Box series combines two independent VAV dampers (supply and extract) within a single housing. This compact solution enables easy installation and reduced installation and maintenance costs, making it well suited for multi-room buildings with a central ventilation system and independent demand-controlled ventilation requirements.
The KOS-BS model is equipped with two integrated sound attenuators (supply and extract) designed to reduce noise generated by the VAV damper blades during airflow regulation.

KOS-B / KOS-BS

VAV Lab

The advanced KOMFOVENT VAV-Lab damper range to control duct or room pressure, control flow, measure flow, provide fast actuator working or failsafe function, can work with polluted air.

KOS-C-U / KOS-C-U-I / KOS-R-U / KOS-R-U-I

2026-02

How VAV Dampers Work

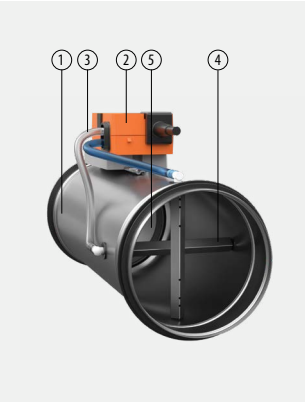
The operation of VAV dampers is based on continuous measurement of the air volume flowing through the damper. The measured airflow is constantly compared with the actual setpoint received from an external control device, such as a 0–10 V room controller or a central BMS controller.

Based on this comparison, the volumetric flow controller calculates the control signal for the damper actuator using a PID control algorithm. The actuator adjusts the damper blade position until the airflow passing through the damper reaches the minimum required value necessary to meet the demand defined by the external controller.

Airflow measurement is performed using Pitot tubes installed inside the damper casing and connected via plastic tubing to a differential pressure transmitter, which is part of the volumetric flow controller.

The Pitot tubes are designed so that one tube is exposed to the total pressure in the damper cross-section, while the second tube senses only static pressure. The difference between total and static pressure represents the dynamic pressure, which directly corresponds to the air velocity within the damper. The differential pressure transmitter processes the signals from the Pitot tubes and transmits the dynamic pressure data (air velocity and airflow rate) to the microprocessor of the volumetric flow controller.

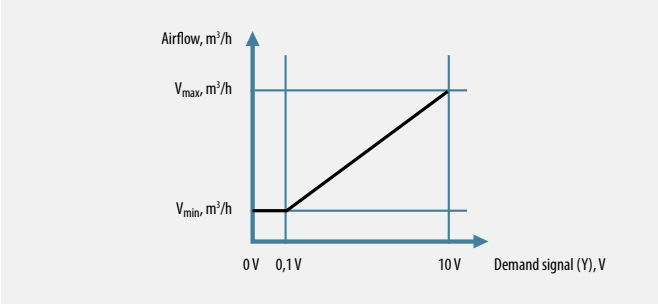
The microprocessor controls the damper actuator based on the setpoint received from the external controller, using a PID (Proportional, Integral and Derivative) control algorithm. By analyzing both the deviation from the setpoint and the rate of change, the controller applies proportional, corrective, and stabilizing control actions to modulate the damper opening. This ensures smooth, stable, and accurate maintenance of the airflow setpoint defined by the external control system.



① Casing
② Volumetric Flow Controller (contains microprocessor, pressure transmitter, actuator)
③ Connection air pipes
④ Pilot tubes
⑤ Damper blade

VAV dampers are factory-configured with predefined operating airflow limits: V_{min} (minimum airflow) and V_{max} (maximum airflow). These limits are specific to each damper size and define the allowable operating range of the device. When VAV dampers are applied in a ventilation system, they are adjusted to a project-specific operating range (user-defined V_{Cmin} and V_{Cmax}) that corresponds to the airflow requirements of a particular room or zone. These values are selected by the HVAC system designer and must fall within V_{min} and V_{max} range depending on the damper type, size and volumetric controller model (see Tables 1 and 4). The user-defined V_{Cmin} and V_{Cmax} can be preset at the factory during production, configured on site by the installer or assigned dynamically by a central BMS controller. To predict and verify the operation of VAV dampers, formulas can be used to determine the actual expected airflow rate (V_a) depending on the received analog 0..10 V or 2..10 V demand signal (Y) - this condition applies provided that the ventilation system ensures sufficient airflow and pressure:

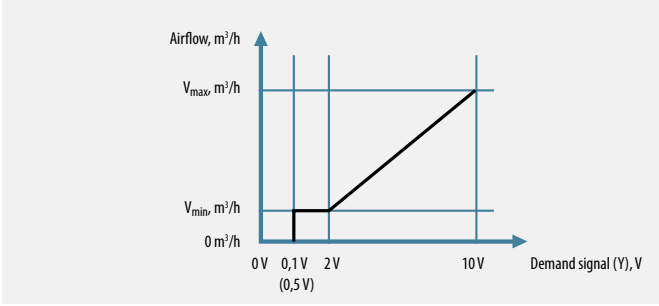
Volumetric flow controller setting: 0...10 V



$$V_a = V_{min} + \frac{Y\,(V_{max} - V_{min})}{10}$$

- *When 0 V ≤ Y ≤ 0.1 V VAV damper provides V_{min} flow*

Volumetric flow controller setting: 2...10 V



$$V_a = V_{min} + \frac{(Y\text{-}2)\,(V_{max} - V_{min})}{8}$$

- *When 0 V ≤ Y ≤ 0.1 V VAV damper is closed*
- *When 0.1 V ≤ Y ≤ 2 V VAV damper provides V_{min} flow*

In addition to variable air volume operation, VAV dampers can also operate in **CAV (Constant Air Volume) / Step control modes**. If required, VAV dampers can be configured to allow **full closure**, enabling complete isolation of a section of the ventilation system or supporting advanced airflow control strategies at the zone level.

2026-02

Products Description

VAV Standard series dampers

The most used type of VAV dampers for airflow control, perfect for the wide variety of standard applications, such as:

- Use in circular and rectangular ducts of ventilation and air conditioning systems.
- Provide both variable and constant air flow modes.
- Provides fully opened or closed position using override mode.
- Use for various measurement options, providing customer systems with relevant control data using analogue or BMS feedback.

KOS-C
Circular non-insulated VAV damper

KOS-C-I
Circular insulated VAV damper

KOS-C-XT
Easy cleanable circular non-insulated VAV damper

KOS-R
Rectangular non-insulated VAV damper

KOS-R-I
Rectangular insulated VAV damper

- Air flow from 8 m^3/h to 46800 m^3/h.
- Operational air velocity from 0,3 m/s to 13 m/s.
- High 5 % control measurement accuracy at velocities 3,0 to 13 m/s, 10 % at air velocities 1,3 to 3 m/s and 20 % at air velocities 0,7 to 1,2 m/s.
- Pressure range till 1000 Pa.
- Closed blade air leakage class 3 to EN 1751.
- Casing air leakage to EN 1751, class ATC 3.
- Hygienic certificate in acc. to VDI 6022.
- Working conditions 0...50 °C / 5...95 % RH, non-condensing.
- Constant Air Volume (CAV) and step control function available.
- Customer V_{min} and V_{max} values can be set on factory without additional charge.
- Galvanized or stainless-steel execution.
- Available in MagiCAD.
- Sticker with additional customer information (floor, room, system number etc.) can be placed on damper casing upon customer request without additional charge.

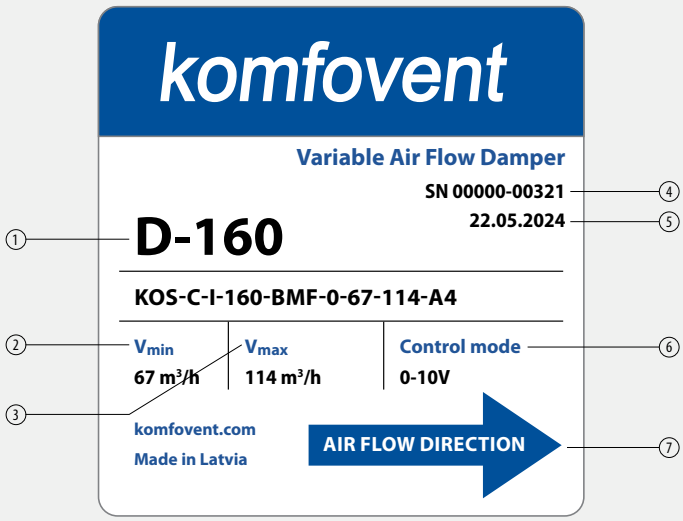
VAV Standard series dampers order example

KOS-C-I – 160(...×...) – BMF – 0 – 100-300 – A4

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①	**Damper type:** **KOS** – Variable Air Volume damper, VAV damper
②	**Design:** **C** – circular **R** – rectangular
③	**Options:** **I** – with insulation 50 mm (**KOS-C**; **KOS-R**) **XT** – with removable pitot cleaning function (only for circular **KOS-C**). D100-400 are available **No entry** – without above options
④	**Diameter:** 100/125/160/200/250/315/355/400/450/500/560/630 (for circular **KOS-C**; **KOS-C-I**, see Table 1) 100/125/160/200/250/315/355/400 (for circular **KOS-C-XT**, see Table 1) **Size:** (200×100 - 1000×1000 mm) with step 50 mm for height H (for rectangular **KOS-R**; **KOS-R-I**, see Table 4)
⑤	**Actuator type:** **BMF** – Analogue control DC 0/2...10 V (Belimo) **BMP** – Analogue control DC 0/2...10 V, MP-Bus communication, NFC (Belimo) **BMD** – Analogue control DC 0/2...10 V, Modbus RTU communication, BACnet MS/TP communication (Belimo) **BKX** – KNX communication (Belimo) **SMF** – Analogue control DC 0/2...10 V (Siemens) **SMD** – Modbus RTU communication (Siemens) **SKX** – KNX communication (Siemens) **GMF** – Analogue control DC 0/2...10 V (Grüner) **GMD** – Analogue control DC 0/2...10 V, Modbus RTU communication (Grüner)
⑥	**Control signal:** **0** – 0...10 V (0 V = V_{min}; 10 V = V_{max}) **2** – 2...10 V (0 V = closed; 2 V = V_{min}; 10 V = V_{max}) **No entry** – for BKX, SMD, SMX models
⑦	**Operating parameters:** **V_{min}** – **V_{max}** – customer defined air flow, m^3/h, for selected **Diameter** or **Size** at point ④ (see also Tables 1 and 4) **No entry** – DEFAULT FACTORY SETTINGS. (see also Tables 1 and 4)
⑧	**Material:** **No entry** – galvanized steel damper **A4** – stainless steel AISI304 damper with standard corrosion resistance. Pitot tubes and rectangular dampers blade material: aluminium **A6** – stainless steel AISI316 damper with higher corrosion resistance (like sea water and de-icing salts).Pitot tubes and rectangular dampers blade material: aluminium

Product factory lable example:

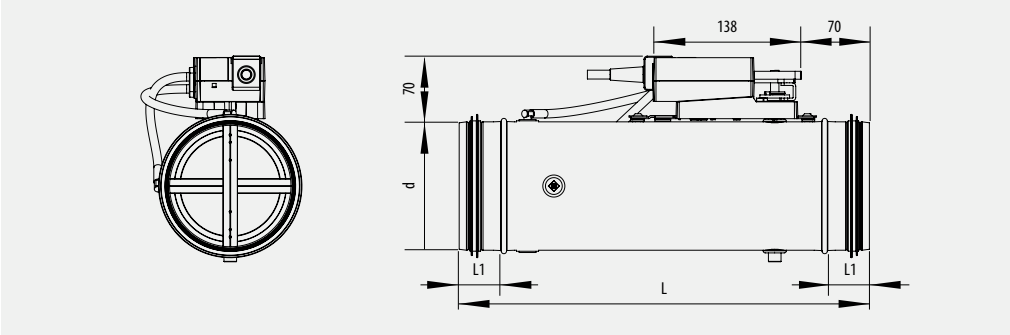


① VAV damper diameter/size
② Factory set V_{min} (default or customer requested)
③ Factory set V_{max} (default or customer requested)
④ Unique serial No.
⑤ Production date
⑥ Control Voltage
⑦ Arrow for air flow direction

2026-02

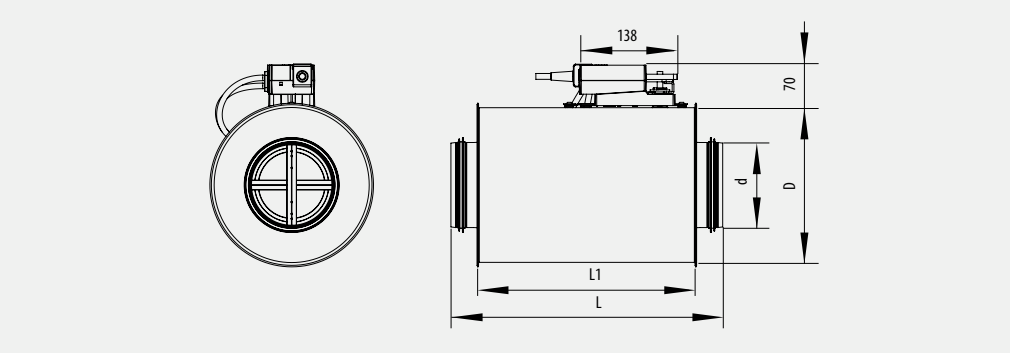
KOS-C damper

Circular design dampers available in 12 dimensions with nominal diameter: Ø 100-630 mm. Belimo, Siemens, Gruner actuators available.



KOS-C-I damper

Circular design dampers with additional 50 mm sound isolation available in 12 dimensions with nominal diameter: Ø 100-630 mm. The insulation is made from 50 mm mineral wool covered with a metal sheet made from zinc coated galvanized steel.



KOS-C-XT damper

Circular design dampers with removable Pitot tubes for easy cleaning possibility available in 8 dimensions with nominal diameter: Ø 100-400 mm.

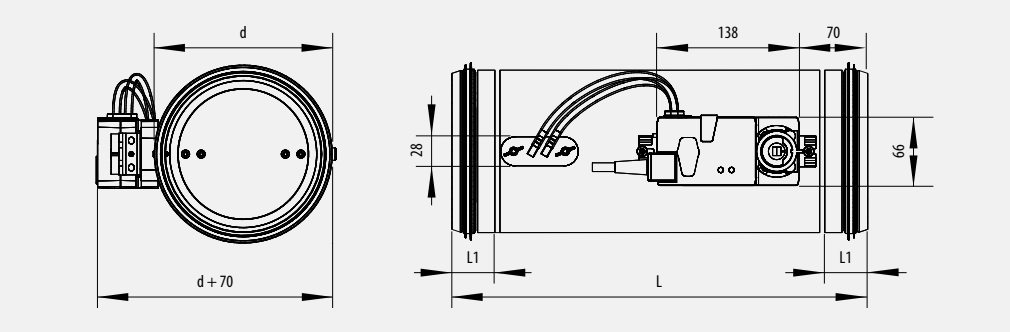


Table 1. KOS-C damper dimensions and operating air flow limits (factory defaults)

All	KOS-C-I	KOS-C	KOS-C-I	KOS-C-XT	All	KOS-C-I	KOS-C-XT	KOS-C	V_{min}						V_{max} range					
									Belimo BMF…, BMP…, BMD…, BKX / **Grüner** GMF…, GMD			**Siemens** SMF…, SMD…, SKX…			**Belimo** BMF…, BMP…, BMD…, BKX / **Siemens** SMF…, SMD…, SKX… / **Grüner** GMF…, GMD			**Belimo** BMF…, BMP…, BMD…, BKX / **Siemens** SMF…, SMD…, SKX… / **Grüner** GMF…, GMD		
									The lower limit						The upper limit					
d, mm	D, mm	M, kg	M, kg	M, kg	L, mm	L1, mm	Li, mm	Li, mm	Q, m^3/h	Q, l/s	v, m/s	Q, m^3/h	Q, l/s	v, m/s	Q, m^3/h	Q, l/s	v, m/s	Q, m^3/h	Q, l/s	v, m/s
100	199	1,3	3	1,3	390	312	45	40	20	5	0,7	8	2	0,3	34	9	1,2	367	102	13
125	224	1,5	3,5	1,5	390	312	45	40	31	9	0,7	13	4	0,3	53	15	1,2	574	159	13
160	259	1,8	4	1,8	390	312	45	40	51	14	0,7	22	6	0,3	87	24	1,2	940	261	13
200	299	2,2	4,7	2,2	390	312	45	40	79	22	0,7	34	9	0,3	136	38	1,2	1470	408	13
250	349	3,5	7,8	3,5	592	514	45	40	124	34	0,7	53	15	0,3	212	59	1,2	2296	638	13
315	414	4,5	9,5	4,5	592	514	45	40	196	55	0,7	84	23	0,3	336	93	1,2	3645	1013	13
355	453	8,8	14,3	6,7	600	480	60	65	249	69	0,7	107	30	0,3	427	119	1,2	4630	1286	13
400	498	10	17,4	8,8	600	480	60	65	317	88	0,7	136	38	0,3	543	151	1,2	5878	1633	13
450	548	12,3	20,8		675	555		65	401	111	0,7	172	48	0,3	687	191	1,2	7439	2067	13
500	598	15	25,5		750	630		65	495	137	0,7	212	59	0,3	848	236	1,2	9185	2551	13
560	658	20,8	31,5		791	671		65	620	172	0,7	266	74	0,3	1063	295	1,2	11521	3200	13
630	729	27,5	38,2		791	671		65	785	218	0,7	336	93	0,3	1346	374	1,2	14581	4050	13

d = connection diameter

D = diameter with isolation

M = weight

L = connection length

L1 = isolation length

Li = connecting size

Q = air volume

v = air velocity

2026-02

Table 2. Volumetric Flow Controllers data for KOS-C dampers

Non-insulated model name	KOS-C-XT-BMF	KOS-C-XT-BMP	KOS-C-XT-BMD	KOS-C-XT-BKX	KOS-C-XT-SMF	KOS-C-XT-SMD	KOS-C-XT-SKX	KOS-C-XT-GMF	KOS-C-XT-GMD	KOS-C-BMF	KOS-C-BMP	KOS-C-BMD	KOS-C-BKX	KOS-C-SMF	KOS-C-SMD	KOS-C-SKX	KOS-C-GMF	KOS-C-GMD
Insulated model name (insulation 50 mm)	–	–	–	–	–	–	–	–	–	KOS-C-I-BMF	KOS-C-I-BMP	KOS-C-I-BMD	KOS-C-I-BKX	KOS-C-I-SMF	KOS-C-I-SMD	KOS-C-I-SKX	KOS-C-I-GMF	KOS-C-I-GMD
Control function	Flow: Variable, Constant (step)				Flow: Variable, Constant (step)			Flow: Variable, Constant (step)		Flow: Variable, Constant (step)				Flow: Variable, Constant (step)			Flow: Variable, Constant (step)	
Regulation range	0,7-13 m/s				0,3-13 m/s			0,7-13 m/s		0,7-13 m/s				0,3-13 m/s			0,7-13 m/s	
Extractable tubes for easy cleaning	+	+	+	+	+	+	+	+	+	–	–	–	–	–	–	–	–	–
Volumetric flow controller origin	Belimo				Siemens			Gruner		Belimo				Siemens			Gruner	
Volumetric flow controller type	LMV-D3-MF-F	LMV-D3-MP-F	LMV-D3-MOD-F	LMV-D3-KNX-F	GDB181.1E/3	GDB181.1E/MO	GDB181.1E/KN	327VM-024-05	327VM-024-05-MB	LMV-D3-MF-F	LMV-D3-MP-F	LMV-D3-MOD-F	LMV-D3-KNX-F	GDB181.1E/3	GDB181.1E/MO	GDB181.1E/KN	327VM-024-05	327VM-024-05-MB
Size range	D100-400				D100-400			D100-400		D100-630				D100-630			D100-400	
Analog control and feedback	0(2)...10 V	0(2)...10 V	0(2)...10 V	–	0(2)...10 V	–	–	0(2)...10 V	0(2)...10 V	0(2)...10 V	0(2)...10 V	0(2)...10 V	–	0(2)...10 V	–	–	0(2)...10 V	0(2)...10 V
MP-Bus	–	+	+	–	–	–	–	–	–	–	+	+	–	–	–	–	–	–
Modbus RTU	–	–	+	–	–	+	–	–	+	–	–	+	–	–	+	–	–	+
BACnet MS TP	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
KNX	–	–	–	+	–	–	+	–	–	–	–	–	+	–	–	+	–	–
NFC communication	–	+	–	–	–	–	–	–	–	–	+	–	–	–	–	–	–	–
Power supply voltage	AC/DC 24 V				AC/DC 24 V			AC/DC 24 V		AC/DC 24 V				AC/DC 24 V			AC/DC 24 V	
Volumetric flow controller power supply	2W/3,5VA	2W/4VA	2W/4VA	2W/4VA	2,5W/3VA	2,5W/3VA	2,5W/3VA	3W/5,5VA	3W/5,5VA	2W/3,5VA	2W/4VA	2W/4VA	2W/4VA	2,5W/3VA	2,5W/3VA	2,5W/3VA	3W/5,5VA	3W/5,5VA
Display with backlighting	–	–	–	–	–	–	–	+	+	–	–	–	–	–	–	–	+	+
Scroll selection button	–	–	–	–	–	–	–	+	+	–	–	–	–	–	–	–	+	+
Actuator full rotating time	35-300 s				150 s			100 s		35-300 s				150 s			100 s	
On-site setpoint control	LINK.10 + Belimo Assistent 2 on Smartphone	Belimo Assistent 2 on Smartphone	LINK.10 + Belimo Assistent 2 on Smartphone, BUS	LINK.10 + Belimo Assistent 2 on Smartphone, BUS	AST20	AST20, BUS	AST20, BUS	Potentiometer on actuator	Potentiometer on actuator	LINK.10 + Belimo Assistent 2 on Smartphone	Belimo Assistent 2 on Smartphone	LINK.10 + Belimo Assistent 2 on Smartphone, BUS	LINK.10 + Belimo Assistent 2 on Smartphone, BUS	AST20	AST20, BUS	AST20, BUS	Potentiometer on actuator	Potentiometer on actuator

KOS-C pressure drop and sound pressure level diagrams

The diagrams provide an A-weighted sound pressure levels that KOS-C damper emits in duct, L_{wa}. Correction factors K are provided in Table 3, to find emitted sound power level at the conformable frequency. Emitted sound L_w should be calculated as: $L_w = L_{pA} + K$.

> Example: for KOS-C-125 damper with airflow Q = 25 l/s and project pressure drop ΔP = 60 Pa, A- weighted sound pressure level is found from diagram as 37 dB(A)

Diagram 1: Ø 100 A – weighted sound pressure level L_{pA}, dB(A)

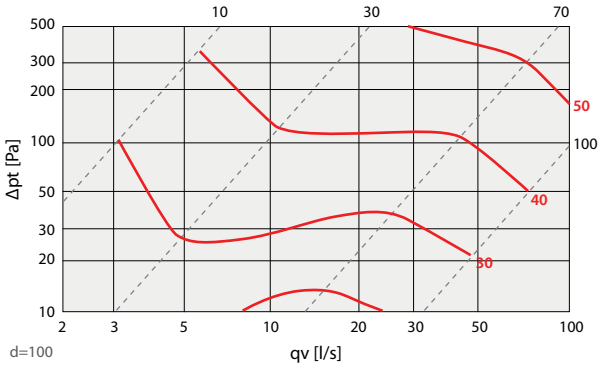


Diagram 2: Ø 125 A – weighted sound pressure level L_{pA}, dB(A)

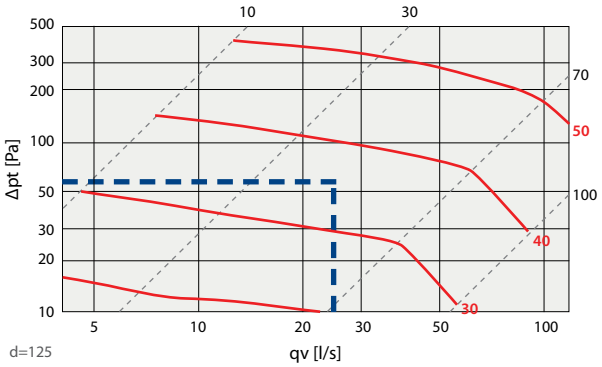


Diagram 3: Ø 160 A – weighted sound pressure level L_{pA}, dB(A)

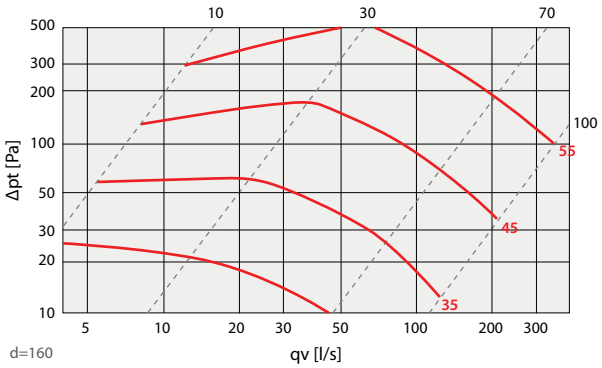


Diagram 4: Ø 200 A – weighted sound pressure level L_{pA}, dB(A)

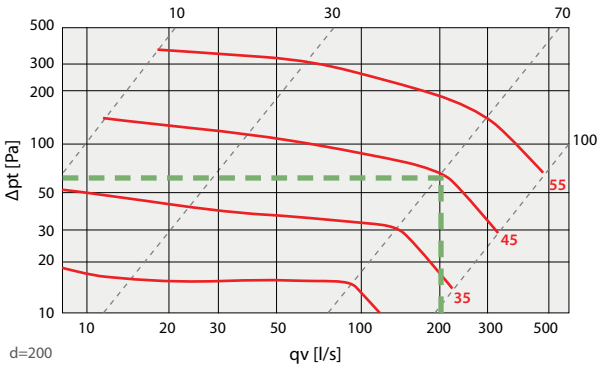


Diagram 5: Ø 250 A – weighted sound pressure level L_{pA}, dB(A)

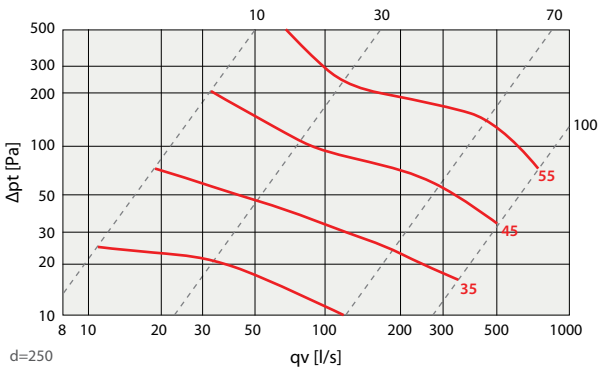
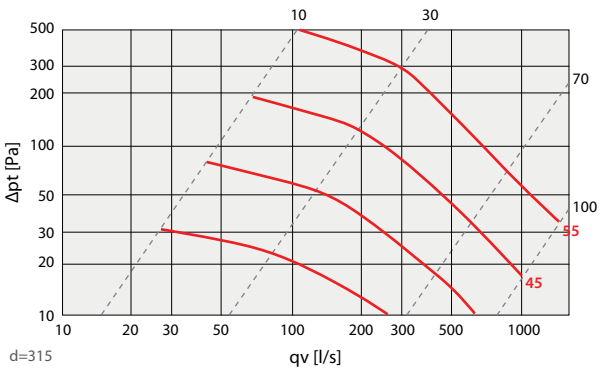


Diagram 6: Ø 315 A – weighted sound pressure level L_{pA}, dB(A)



2026-02

Diagram 7: Ø 355 A – weighted sound pressure level L_{pA}, dB(A)

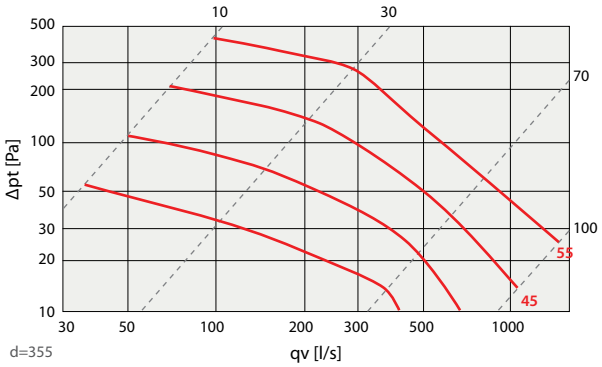


Diagram 8: Ø 400 A – weighted sound pressure level L_{pA}, dB(A)

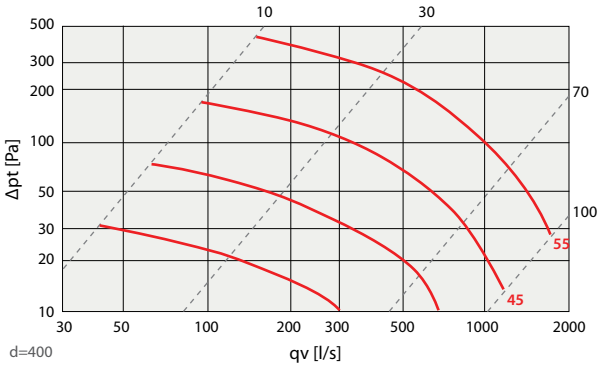


Diagram 9: Ø 500 A – weighted sound pressure level L_{pA}, dB(A)

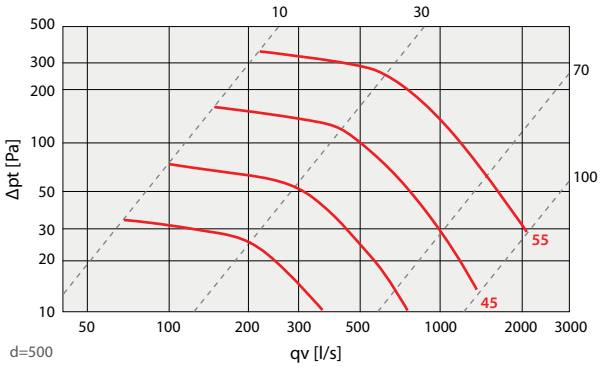


Diagram 10: Ø 560 A – weighted sound pressure level L_{pA}, dB(A)

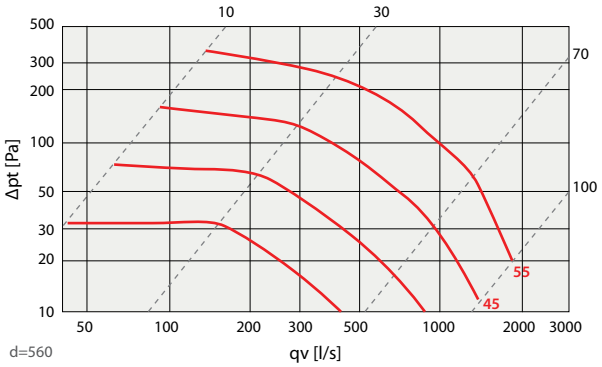
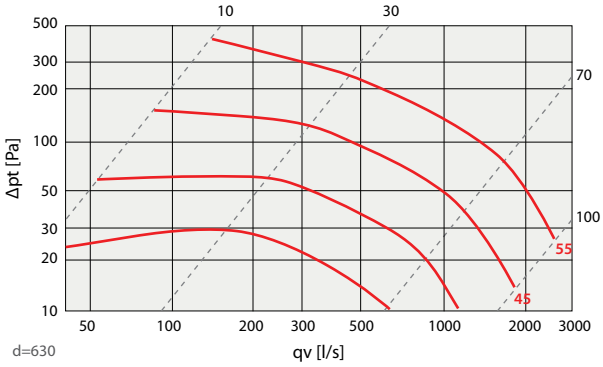


Diagram 11: Ø 630 A – weighted sound pressure level L_{pA}, dB(A)



Example: for KOS-C 200 damper with airflow Q = 200 l/s and blade position 70 %, total pressure drop ΔP = 60 Pa (see diagram 3 above)

Table 3. Sound power correction factors for KOS-C dampers

KOS-C has the following Correction factors K, provided to find duct emitted sound power level $L_W = L_{pA} + K$ for selected diameter and frequency (L_{pA} - weighted duct sound pressure level that can be found from above diagrams 1-11).

d, mm	K							
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
100	9	13	5	0	-3	-4	-6	-7
125	13	5	3	-3	-7	-11	-15	-20
160	10	6	0	-5	-9	-13	-17	-22
200	9	5	-1	-6	-10	-14	-19	-24
250	8	3	-3	-7	-10	-15	-20	-26
315	6	1	-4	-8	-12	-17	-22	-28
355	8	2	-2	-4	-9	-13	-17	-18
400	11	6	1	-2	-7	-13	-19	-20
500	10	5	-1	-2	-6	-12	-18	-17
560	10	3	1	-3	-6	-9	-13	-14
630	9	4	1	-3	-5	-8	-12	-14

Example: *Sound power level per octave calculation*

1. Damper KOS-C-125

2. Airflow 25 l/s (90 m^3/h)

3. Pressure drop 60 Pa

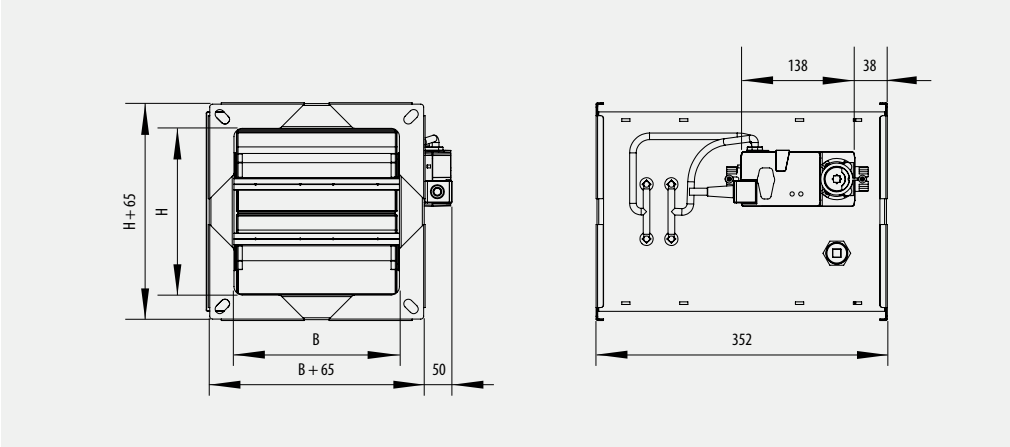
4. Sound pressure level L_{pA} 37 dB(A) (from diagram)

5. Formula $L_W/oct=L_{pA}+K$

L_{pA}, dB(A)	37							
Octave, Hz	63	125	250	500	1000	2000	4000	8000
K for KOS-C-125	13	5	3	-3	-7	-11	-15	-20
L_W/oct	50	42	40	34	30	26	22	17

KOS-R damper

Rectangular design dampers with available dimensions range: from 200×100 to 1000×1000 mm, and min height H selection step 50 mm. Belimo, Siemens, Gruner actuators available.



KOS-R-I damper

Rectangular design dampers with additional 50 mm sound isolation available with size dimensions range: from 200×100 to 1000×1000 mm, and min height H selection step 50 mm. Belimo, Siemens, Gruner actuators available. The insulation is made from 50 mm mineral wool covered with a metal sheet made from zinc coated galvanized steel.

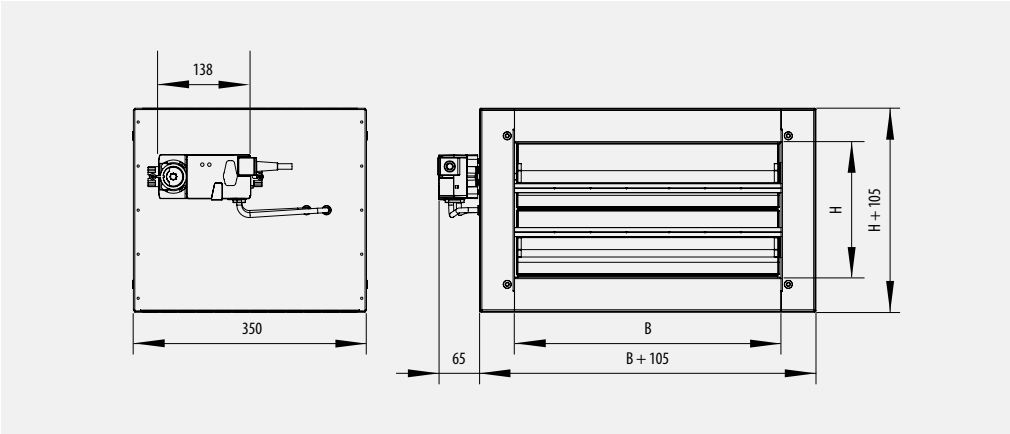


Table 4. KOS-R damper dimensions and operating air flow limits (factory defaults)

				V_{min}			V_{max} range					
		KOS-R	KOS-R-I	**Belimo** BMF…, BMP…, BMD…, BKX / **Siemens** SMF…, SMD…, SKX…/ **Grüner** GMF…, GMD			**Belimo** BMF…, BMP…, BMD…, BKX / **Siemens** SMF…, SMD…, SKX… / **Grüner** GMF…, GMD			**Belimo** BMF…, BMP…, BMD…, BKX / **Siemens** SMF…, SMD…, SKX… / **Grüner** GMF…, GMD		
							The lower limit			The upper limit		
B, mm	H, mm	M, kg	M, kg	Q, m³/h	Q, l/s	v, m/s	Q, m³/h	Q, l/s	v, m/s	Q, m³/h	Q, l/s	v, m/s
200	100	3,3	6,5	58	16	0,8	86	24	1,2	936	260	13
300		4,5	7,9	86	24	0,8	130	36	1,2	1404	390	13
400		5,3	9,3	115	32	0,8	173	48	1,2	1872	520	13
200	150	3,7	7,3	86	24	0,8	130	36	1,2	1404	390	13
300		4,8	8,7	130	36	0,8	194	54	1,2	2106	585	13
400		5,7	10,2	173	48	0,8	259	72	1,2	2808	780	13
200	200	4,1	8	115	32	0,8	173	48	1,2	1872	520	13
300		5,1	9,5	173	48	0,8	259	72	1,2	2808	780	13
400		6	11	230	64	0,8	346	96	1,2	3744	1040	13
500		7,3	13	288	80	0,8	432	120	1,2	4680	1300	13
600		8,1	14	346	96	0,8	518	144	1,2	5616	1560	13
300	250	5,6	10,3	216	60	0,8	324	90	1,2	3510	975	13
400		6,7	12	288	80	0,8	432	120	1,2	4680	1300	13
500		7,9	13,5	360	100	0,8	540	150	1,2	5850	1625	13
600		8,8	15	432	120	0,8	648	180	1,2	7020	1950	13
300	300	6,5	11	259	72	0,8	389	108	1,2	4212	1170	13
400		7,4	13	346	96	0,8	518	144	1,2	5616	1560	13
500		8,4	14	432	120	0,8	648	180	1,2	7020	1950	13
600		9,4	16	518	144	0,8	778	216	1,2	8424	2340	13
700		10	17	605	168	0,8	907	252	1,2	9828	2730	13
800		11	19	691	192	0,8	1037	288	1,2	11232	3120	13
900		12	21	778	216	0,8	1166	324	1,2	12636	3510	13
1000		13,3	22,2	864	240	0,8	1296	360	1,2	14040	3900	13
400	350	7,9	13,5	403	112	0,8	605	168	1,2	6552	1820	13
500		9	15	504	140	0,8	756	210	1,2	8190	2275	13
600		10,2	17	605	168	0,8	907	252	1,2	9828	2730	13
700		11	18	706	196	0,8	1058	294	1,2	11466	3185	13
800		12	20	806	224	0,8	1210	336	1,2	13104	3640	13
900		13	22	907	252	0,8	1361	378	1,2	14742	4095	13
1000		14,1	23,3	1008	280	0,8	1512	420	1,2	16380	4550	13
400	400	8,5	14	461	128	0,8	691	192	1,2	7488	2080	13
500		9,5	16	576	160	0,8	864	240	1,2	9360	2600	13
600		11	18	691	192	0,8	1037	288	1,2	11232	3120	13
700		12	19	806	224	0,8	1210	336	1,2	13104	3640	13
800		13	21	922	256	0,8	1382	384	1,2	14976	4160	13
900		14	23	1037	288	0,8	1555	432	1,2	16848	4680	13
1000		14,8	24,3	1152	320	0,8	1728	480	1,2	18720	5200	13
500	450	10,3	17	648	180	0,8	972	270	1,2	10530	2925	13
600		11,5	18,5	778	216	0,8	1166	324	1,2	12636	3510	13
700		12,5	20	907	252	0,8	1361	378	1,2	14742	4095	13
800		13,5	22	1037	288	0,8	1555	432	1,2	16848	4680	13
900		14,5	24	1166	324	0,8	1750	486	1,2	18954	5265	13
1000		15,6	25,4	1296	360	0,8	1944	540	1,2	21060	5850	13

				V_{min}			V_{max} range					
		KOS-R	KOS-R-I	**Belimo** BMF…, BMP…, BMD…, BKX / **Siemens** SMF…, SMD…, SKX…/ **Grüner** GMF…, GMD			**Belimo** BMF…, BMP…, BMD…, BKX / **Siemens** SMF…, SMD…, SKX… / **Grüner** GMF…, GMD			**Belimo** BMF…, BMP…, BMD…, BKX / **Siemens** SMF…, SMD…, SKX… / **Grüner** GMF…, GMD		
							The lower limit			The upper limit		
B, mm	H, mm	M, kg	M, kg	Q, m^3/h	Q, l/s	v, m/s	Q, m^3/h	Q, l/s	v, m/s	Q, m^3/h	Q, l/s	v, m/s
500	500	11	18	720	200	0,8	1080	300	1,2	11700	3250	13
600		12	19	864	240	0,8	1296	360	1,2	14040	3900	13
700		13	21	1008	280	0,8	1512	420	1,2	16380	4550	13
800		14	23	1152	320	0,8	1728	480	1,2	18720	5200	13
900		15	25	1296	360	0,8	1944	540	1,2	21060	5850	13
1000		16,4	26,5	1440	400	0,8	2160	600	1,2	23400	6500	13
600	550	12,5	20	950	264	0,8	1426	396	1,2	15444	4290	13
700		13,5	22	1109	308	0,8	1663	462	1,2	18018	5005	13
800		15	24	1267	352	0,8	1901	528	1,2	20592	5720	13
900		16	26	1426	396	0,8	2138	594	1,2	23166	6435	13
1000		17,2	27,6	1584	440	0,8	2376	660	1,2	25740	7150	13
600	600	13	21	1037	288	0,8	1555	432	1,2	16848	4680	13
700		14	23	1210	336	0,8	1814	504	1,2	19656	5460	13
800		16	25	1382	384	0,8	2074	576	1,2	22464	6240	13
900		17	27	1555	432	0,8	2333	648	1,2	25272	7020	13
1000		17,9	28,6	1728	480	0,8	2592	720	1,2	28080	7800	13
700	650	14	24	1310	364	0,8	1966	546	1,2	21294	5915	13
800		16,5	26	1498	416	0,8	2246	624	1,2	24336	6760	13
900		17,5	28	1685	468	0,8	2527	702	1,2	27378	7605	13
1000		18,7	29,7	1872	520	0,8	2808	780	1,2	30420	8450	13
700	700	14	25	1411	392	0,8	2117	588	1,2	22932	6370	13
800		17	27	1613	448	0,8	2419	672	1,2	26208	7280	13
900		18	29	1814	504	0,8	2722	756	1,2	29484	8190	13
1000		19,5	30,8	2016	560	0,8	3024	840	1,2	32760	9100	13
800	750	17,5	28	1728	480	0,8	2592	720	1,2	28080	7800	13
900		19	30	1944	540	0,8	2916	810	1,2	31590	8775	13
1000		20,3	31,9	2160	600	0,8	3240	900	1,2	35100	9750	13
800	800	18	29	1843	512	0,8	2765	768	1,2	29952	8320	13
900		20	31	2074	576	0,8	3110	864	1,2	33696	9360	13
1000		21,1	33	2304	640	0,8	3456	960	1,2	37440	10400	13
900	850	20,6	32	2203	612	0,8	3305	918	1,2	35802	9945	13
1000		21,9	34,1	2448	680	0,8	3672	1020	1,2	39780	11050	13
900	900	21	33	2333	648	0,8	3499	972	1,2	37908	10530	13
1000		22,6	35,1	2592	720	0,8	3888	1080	1,2	42120	11700	13
1000	950	23,4	36,2	2736	760	0,8	4104	1140	1,2	44460	12350	13
1000	1000	24,2	37,3	2880	800	0,8	4320	1200	1,2	46800	13000	13

B = width

H = height

M = weight

Q = air volume

v = air velocity

Table 5. Volumetric Flow Controllers data for KOS-R dampers

Non-insulated model name	KOS-R-BMF	KOS-R-BMP	KOS-R-BMD	KOS-R-BKX	KOS-R-SMF	KOS-R-SMD	KOS-R-SKX	KOS-R-GMF	KOS-R-GMD
Insulated model name (insulation 50 mm)	KOS-R-I-BMF	KOS-R-I-BMP	KOS-R-I-BMD	KOS-R-I-BKX	KOS-R-I-SMF	KOS-R-I-SMD	KOS-R-I-SKX	KOS-R-I-GMF	KOS-R-I-GMD
Model with sound attenuators	–	–	–	–	–	–	–	–	–
Control function	Flow: Variable, Constant (step)				Flow: Variable, Constant (step)			Flow: Variable, Constant (step)	
Regulation range	0,8-13 m/s				0,8-13 m/s			0,8-13 m/s	
Volumetric flow controller origin	Belimo				Siemens			Gruner	
Volumetric flow controller type	LMV-D3-MF-F	LMV-D3-MP-F	LMV-D3-MOD-F	LMV-D3-KNX-F	GDB181.1E/3	GDB181.1E/MO	GDB181.1E/KN	327VM-024-05	327VM-024-05-MB
Size range	200×100-1000×1000				200×100-1000×1000			200×100-1000×1000	
Analog control and feedback	0(2)...10 V	0(2)...10 V	0(2)...10 V	–	0(2)...10 V	–	–	0(2)...10 V	0(2)...10 V
MP-Bus	–	+	+	–	–	–	–	–	–
Modbus RTU	–	–	+	–	–	+	–	–	+
BACnet MS TP	–	–	–	–	–	–	–	–	–
KNX	–	–	–	+	–	–	+	–	–
NFC communication	–	+	–	–	–	–	–	–	–
Power supply voltage	AC/DC 24 V				AC 24 V			AC/DC 24 V	
Volumetric flow controller power supply	2W/3,5VA	2W/4VA	2W/4VA	2W/4VA	2,5W/3VA	2,5W/3VA	2,5W/3VA	3W/5,5VA	3W/5,5VA
Display with backlighting	–	–	–	–	–	–	–	+	+
Scroll selection button	–	–	–	–	–	–	–	+	+
Actuator full rotating time	35-300 s				150 s			100 s	
On-site setpoint control	LINK.10 + Belimo Assistent 2 on Smartphone	Belimo Assistent 2 on Smartphone	LINK.10 + Belimo Assistent 2 on Smartphone, BUS	LINK.10 + Belimo Assistent 2 on Smartphone, BUS	AST20	AST20, BUS	AST20, BUS	Potentiometer on actuator	Potentiometer on actuator

KOS-R pressure drops and sound power levels

Table 6. Air pressure drop and sound power level L_{wa} of KOS-R dampers

p_s [Pa]	f_{sr} [Hz]	Size B × H [mm]															
		600															
		200				300				400				500			
		3	6	9	12	3	6	9	12	3	6	9	12	3	6	9	12
125	63	51	60	68	73	53	63	71	76	56	65	73	78	59	68	76	81
125	125	49	58	66	71	51	60	68	73	52	61	69	74	53	63	71	75
125	250	46	53	58	61	48	55	60	63	50	56	62	64	52	59	64	67
125	500	45	48	51	53	45	49	51	53	46	49	52	53	46	50	52	54
125	1000	48	50	53	54	48	51	53	55	49	52	54	55	50	52	55	56
125	2000	49	52	54	56	51	54	56	58	52	55	57	59	54	57	59	60
125	4000	41	46	50	52	43	47	51	53	44	49	52	55	45	50	54	56
125	8000	36	41	45	47	38	43	47	50	40	45	49	51	42	47	51	54
250	63	56	64	71	75	58	66	73	77	59	68	75	79	61	70	77	81
250	125	53	61	69	73	55	64	71	75	56	65	72	77	58	67	74	79
250	250	49	56	62	66	51	58	64	68	53	60	66	69	55	62	68	72
250	500	50	54	58	60	51	55	59	61	51	56	59	62	52	57	61	63
250	1000	52	56	59	61	53	57	60	61	54	57	60	62	55	58	61	63
250	2000	56	58	61	62	57	60	62	64	58	61	63	65	60	63	65	66
250	4000	51	54	57	59	52	56	59	60	53	56	59	61	54	58	61	63
250	8000	47	51	54	56	49	53	56	58	50	64	57	59	51	55	58	60
500	63	60	69	76	80	63	71	78	82	64	73	80	84	67	75	82	86
500	125	56	66	74	80	58	68	76	81	59	69	77	83	61	71	79	84
500	250	55	64	72	76	59	68	75	80	61	70	78	82	54	74	81	86
500	500	56	62	66	69	58	63	68	71	59	65	69	72	61	66	71	73
500	1000	61	64	66	67	62	64	67	68	62	65	68	69	63	66	69	70
500	2000	66	67	68	69	68	69	70	70	69	70	71	71	70	71	72	73
500	4000	65	66	67	68	66	67	68	69	67	68	69	69	68	69	70	70
500	8000	61	63	65	66	62	65	66	68	63	65	67	69	64	67	69	70

p_s [Pa]	f_{sr} [Hz]	Size B × H [mm]																			
		600				1000															
		600				700				800				900				1000			
		v [m/s]																			
		3	6	9	12	3	6	9	12	3	6	9	12	3	6	9	12	3	6	9	12
		L_w [dB/Okt]																			
125	63	59	68	76	81	62	71	79	84	64	74	82	87	65	75	83	88	66	76	83	88
125	125	53	63	71	75	55	65	73	77	57	66	74	79	57	67	75	80	57	67	75	80
125	250	52	59	64	67	54	61	66	69	56	63	68	71	57	64	69	72	58	64	69	73
125	500	46	50	52	54	47	51	53	55	47	51	53	55	48	51	54	55	48	51	54	55
125	1000	50	52	55	56	51	53	56	57	51	54	56	57	51	54	56	58	51	54	56	58
125	2000	54	57	59	60	56	59	61	62	57	60	62	64	58	61	63	65	58	61	63	65
125	4000	45	50	54	56	47	52	56	58	49	53	57	59	49	54	58	60	49	54	58	60
125	8000	42	47	51	54	45	50	54	56	47	52	56	58	48	53	57	59	48	53	57	59
250	63	61	70	77	81	63	72	79	83	65	74	80	85	66	75	81	86	66	75	82	86
250	125	58	67	74	79	60	69	77	81	62	71	79	83	63	72	80	84	64	72	80	84
250	250	55	62	68	72	57	65	70	74	59	67	72	76	60	68	73	77	61	68	73	77
250	500	52	57	61	63	54	58	62	64	55	59	63	65	55	60	63	66	55	60	63	66
250	1000	55	58	61	63	56	59	62	64	57	60	63	65	57	61	64	65	57	61	64	65
250	2000	60	63	65	66	62	65	67	68	63	66	68	69	64	67	69	70	64	67	69	70
250	4000	54	58	61	63	56	59	62	64	57	60	63	65	57	61	64	66	57	61	64	66
250	8000	51	55	58	60	53	57	60	62	54	58	61	63	55	59	62	64	55	59	62	64
500	63	67	75	82	86	69	78	85	89	71	80	87	91	72	81	88	92	72	81	88	92
500	125	61	71	79	84	63	73	81	86	64	74	83	88	65	75	84	89	65	75	84	89
500	250	65	74	81	86	69	78	85	90	72	81	88	93	73	82	89	94	74	83	90	95
500	500	61	66	71	73	63	68	73	75	64	70	74	77	65	71	75	78	65	71	75	78
500	1000	63	66	69	70	64	67	70	71	65	68	70	72	66	69	71	72	66	69	71	72
500	2000	70	71	72	73	72	73	74	75	73	75	75	76	74	75	76	77	74	75	76	77
500	4000	68	69	70	70	69	70	71	72	70	71	72	73	70	72	73	73	70	72	73	73
500	8000	64	67	69	70	66	68	70	71	67	69	71	72	68	70	72	73	68	70	72	73

VAV Box series dampers

The VAV Box series is a compact, integrated solution for supply and exhaust ventilation with demand-based airflow control. Two independent VAV dampers – one for supply air and one for exhaust air – are combined within a single housing, ensuring precise airflow balancing and stable indoor climate conditions.
The solution with Option C includes an integrated transformer, allowing both the VAV Box units and the room controller to be connected to a 230 V AC power supply.
The equipment is designed for use in ventilation systems with a central air-handling unit and individual airflow control for separate zones or rooms. It is ideally suited for residential buildings, apartment complexes, flats, hotel rooms, offices, and administrative spaces where high requirements for comfort, energy efficiency, and low noise levels are essential.
The VAV Box provides continuous automatic control of supply and exhaust airflow based on a control signal – either analog or from a building management system (BMS). All functions of the VAV Standard series dampers are available.

The compact "All included" design simplifies planning and installation. Depending on the model, the unit can be installed in walls, ceilings, drywall constructions, or placed within standard furniture niches.
The KOS-BS model is equipped with two built-in sound attenuators – for both supply and exhaust – effectively reducing noise generated by the VAV dampers during airflow regulation. This feature is particularly important for residential and office spaces with high acoustic comfort requirements.
The housing is equipped with installation brackets and a service hatch, providing convenient access to control elements and maintenance points. The supply and exhaust modules are fully removable, which simplifies cleaning and servicing of the entire unit.
The VAV Standard dampers included in the VAV Box units are VDI 6022 certified.

KOS-B

KOS-BS

- Air flow from 8 m^3/h to 940 m^3/h.
- Operational air velocity from 0,3 m/s to 13 m/s.
- High 5 % control measurement accuracy at velocities 3,0 to 13 m/s, 10 % at air velocities 1,3 to 3 m/s and 20 % at air velocities 0,7 to 1,2 m/s.
- Pressure range till 1000 Pa.
- Closed blade air leakage class 3 to EN 1751.
- Casing air leakage to EN 1751, class ATC 3.
- Working conditions 0...50 °C / 5...95 % RH, non-condensing.
- Constant Air Volume (CAV) and step control function available.
- Customer V_{min} and V_{max} values can be set on factory without additional charge
- Galvanized, powder coated casing (RAL9010) or stainless-steel execution.
- Master/slave or parallel connection of VAV dampers can be made on factory if product is ordered with option C .
- Sticker with additional customer information (floor, room, system number etc.) can be placed on damper casing upon customer request without additional charge.

VAV Box series damper order example

KOS-B – 160 – BMF – 0 – 100-300 – R – C – P
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① **Damper type:** **KOS-B** – Variable Air Volume (VAV) damper unit w/o silencer module
KOS-BS – Variable Air Volume (VAV) damper unit with silencer module

② **Duct connection diameter:** 100 mm / 125 mm / 160 mm (see Tables 7 and 8)

③ **Actuator type:**
Standard: **BMF** – Analogue control DC 0/2...10 V (Belimo)
BMP – Analogue control DC 0/2...10 V, MP-Bus communication, NFC (Belimo)
BMD – Analogue control DC 0/2...10 V, Modbus RTU communication, BACnet MS/TP communication (Belimo)
BKX – KNX communication (Belimo)
By request: **SMF** – Analogue control DC 0/2...10 V (Siemens)
SMD – Modbus RTU communication (Siemens)
SKX – KNX communication (Siemens)
GMF – Analogue control DC 0/2...10 V (Grüner)
GMD – Analogue control DC 0/2...10 V, Modbus RTU communication (Grüner)

④ **Control signal:** **0** – 0...10 V (0 V = V_{min}; 10 V = V_{max})
2 – 2...10 V (0 V = closed; 2 V = V_{min}; 10 V = V_{max})
No entry – for BKX, SMD, SMX models

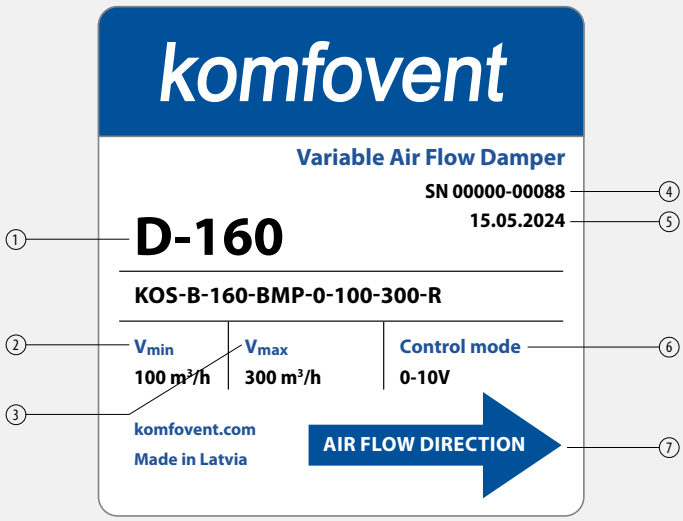
⑤ **Operating parameters:** **V_{min} – V_{max}** – air flow values, m^3/h,
for selected **Duct connection diameter at point** ② (see also Tables 7 and 8)
No entry – DEFAULT FACTORY SETTINGS (see also Tables 7 and 8)

⑥ **Supply air direction:** **R** – Supply air RIGHT / Extract air LEFT (see on page 24)
L – Supply air LEFT / Extract air RIGHT (see on page 24)

⑦ **Controller option:** **No entry** – w/o controller
C – with AEPS-230-24-10 power supply and commutation unit (see on page 45)

⑧ **Material:** **No entry** – galvanized steel damper
A4 – stainless steel AISI304 damper with standard corrosion resistance. Pitot tubes and rectangular dampers blade material: aluminium
A6 – stainless steel AISI316 damper with higher corrosion resistance (like sea water and de-icing salts)
P – galvanized steel VAV dampers, powder coated casing in RAL9010
(other tones on request)

Product factory lable example:

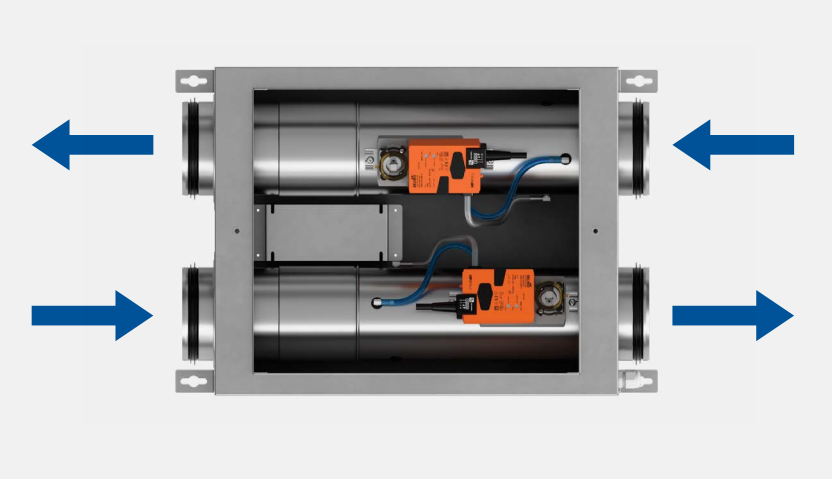


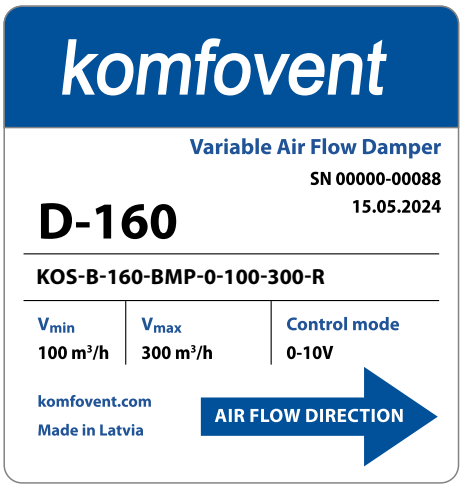
① VAV damper diameter/size
② Factory set V_{min} (default or customer requested)
③ Factory set V_{max} (default or customer requested)
④ Unique serial No.
⑤ Production date
⑥ Control Voltage
⑦ Arrow for air flow direction

2026-02

Intake and exhaust air directions

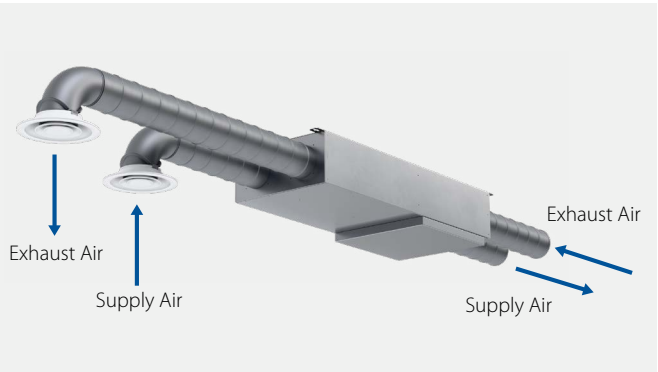
KOS-B and **KOS-BS** unit's intake and exhaust air directions should be as shown in the picture below in accordance to the label placed on the casing on each KOS-C VAV damper:



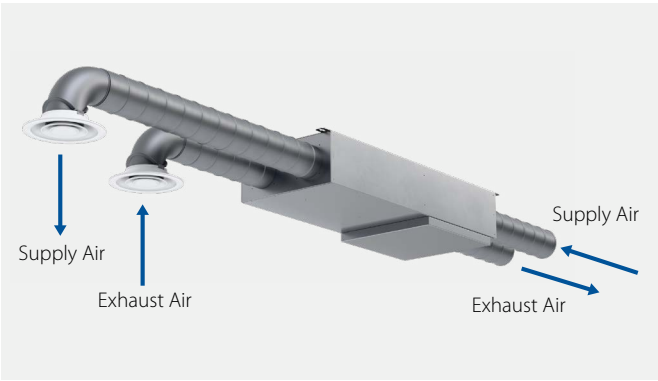


It is important to take into consideration project-based supply air side (supply air side RIGHT or supply air side LEFT) to achieve the compliance with design solution (*please refer to Section Ordering sample*). LEFT and RIGHT air supply side could be determined based on KOS-B unit positioning in the air distribution system.

RIGHT air supply connection is shown on the picture:

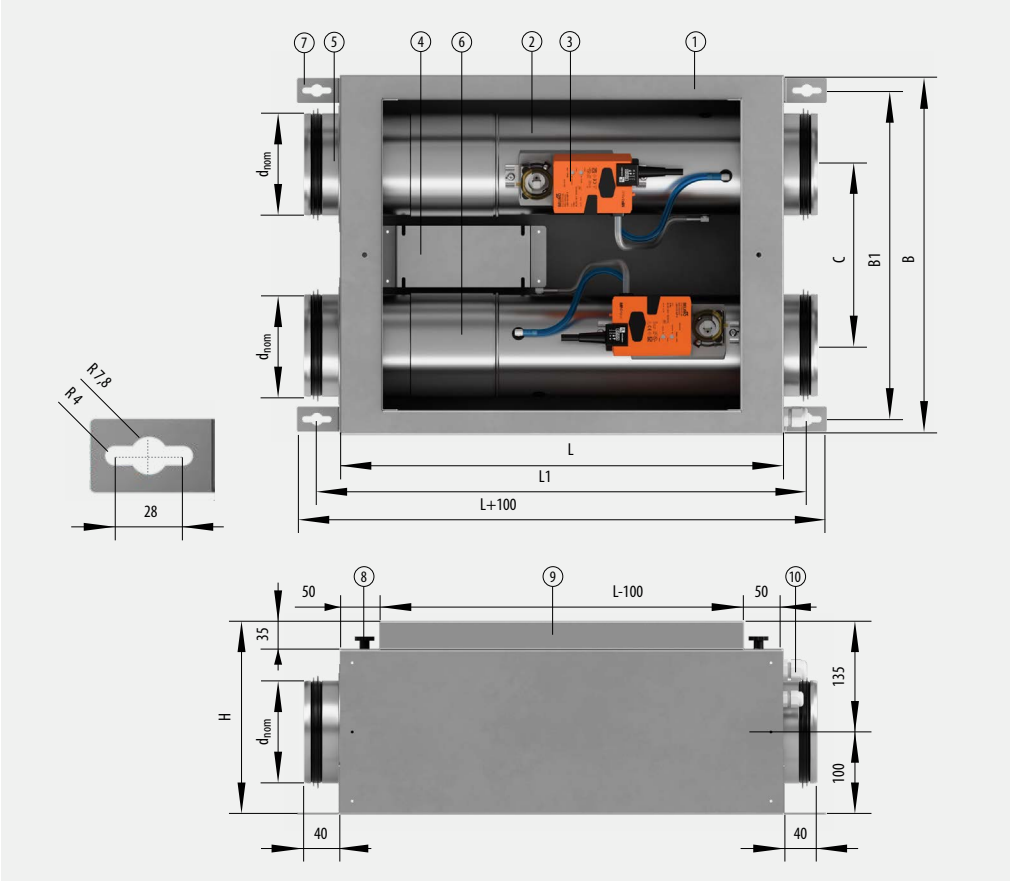


LEFT air supply connection is shown on the picture:



KOS-B damper

Double KOS-C VAV dampers BOX with integrated power supply and actuators controller.



① Casing of the KOS-B unit
② KOS-C-type VAV damper (2 pcs)
③ Volumetric flow controller of the damper
④ Power supply and commutation unit mounting platform (unit can be installed as option)
⑤ Duct connection nipple with lip seal (4 pcs)
⑥ Connecting sleeve of the VAV dampers (2 pcs)
⑦ Installation bracket of the KOS-B unit
⑧ Lid fastener (2 pcs)
⑨ Lid of the unit
⑩ Cable outlet

Table 7. KOS-B damper box dimensions and operating air flow limits

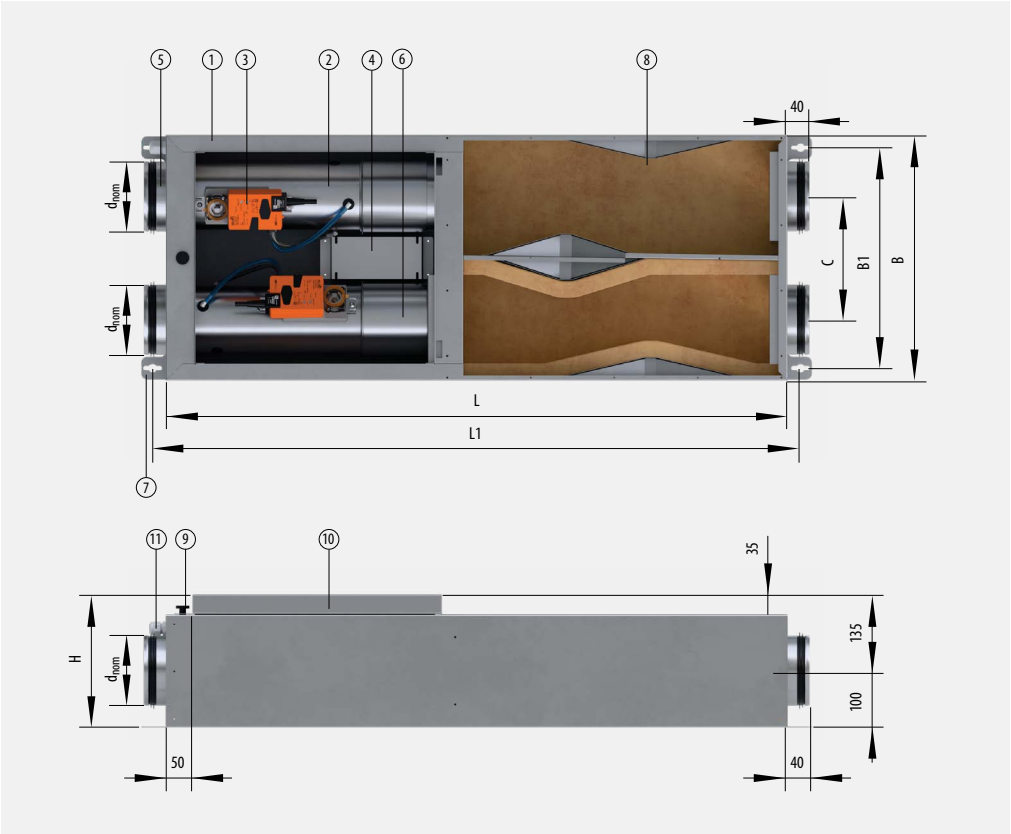
								V_{min}						V_{max} range					
								Belimo BMF…, BMP…, BMD…, BKX / **Grüner** GMF…, GMD			**Siemens** (optional) SMF…, SMD…, SKX…			**Belimo** BMF…, BMP…, BMD…, BKX / **Siemens** (optional) SMF…, SMD…, SKX… / **Grüner** (optional) GMF…, GMD			**Belimo** BMF…, BMP…, BMD…, BKX / **Siemens** (optional) SMF…, SMD…, SKX… / **Grüner** (optional) GMF…, GMD		
														The lower limit			The upper limit		
d_{nom} mm	M, kg	B1, mm	B, mm	L1, mm	L, mm	H, mm	C, mm	Q, m³/h	Q, l/s	v, m/s	Q, m³/h	Q, l/s	v, m/s	Q, m³/h	Q, l/s	v, m/s	Q, m³/h	Q, l/s	v, m/s
100	1,3	350	388	596	540	210	195	20	5	0,7	8	2	0,3	34	9	1,2	367	102	13
125	1,5	400	438	596	540	235	220	31	9	0,7	13	4	0,3	53	15	1,2	574	159	13
160	1,8	470	508	596	540	270	255	51	14	0,7	22	6	0,3	87	24	1,2	940	261	13

d = connection diameter
M = weight
B1 = installation bracket centers width
B = box width
L1 = installation bracket centers length
L = box length
H = height
C = distance between kos-c centers
Q = air volume
v = air velocity

2026-02

KOS-BS damper

Double KOS-C VAV dampers BOX with integrated power supply, actuators controller and silencer.



1. Casing of the KOS-BS unit
2. KOS-C-type VAV damper (2 pcs)
3. Volumetric flow controller of the damper
4. Power supply and commutation unit mounting platform (unit can be installed as option)
5. Duct connection nipple with lip seal (4 pcs)
6. Connecting sleeve of the VAV dampers (2 pcs)
7. Installation bracket of the KOS-BS unit
8. Sound attenuating material
9. Lid fastener (2 pcs)
10. Lid of the unit
11. Cable outlet

Table 8. KOS-BS damper box dimensions and operating air flow limits

								V_{min}						V_{max} range					
								Belimo BMF…, BMP…, BMD…, BKX / **Grüner** (optional) GMF…, GMD			**Siemens** (optional) SMF…, SMD…, SKX…			**Belimo** BMF…, BMP…, BMD…, BKX / **Siemens** (optional) SMF…, SMD…, SKX… / **Grüner** (optional) GMF…, GMD			**Belimo** BMF…, BMP…, BMD…, BKX / **Siemens** (optional) SMF…, SMD…, SKX… / **Grüner** (optional) GMF…, GMD		
														The lower limit			The upper limit		
d_{nom} mm	M, kg	B1, mm	B, mm	L1, mm	L, mm	H, mm	C, mm	Q, m^3/h	Q, l/s	v, m/s	Q, m^3/h	Q, l/s	v, m/s	Q, m^3/h	Q, l/s	v, m/s	Q, m^3/h	Q, l/s	v, m/s
100	1,3	350	388	1198	1142	210	193	20	5	0,7	8	2	0,3	34	9	1,2	367	102	13
125	1,5	400	438	1198	1142	235	220	31	9	0,7	13	4	0,3	53	15	1,2	574	159	13
160	1,8	470	508	1198	1142	270	251	51	14	0,7	22	6	0,3	87	24	1,2	940	261	13

d = connection diameter
M = weight
B1 = installation bracket centers width
B = box width
L1 = installation bracket centers length
L = box length
H = height
C = distance between kos-c centers
Q = air volume
v = air velocity

2026-02

Table 9. Actuators and Volumetric Flow Controllers data for VAV BOX series

Base model name	KOS-B-BMF	KOS-B-BMP	KOS-B-BMD	KOS-B-BKX	KOS-B-SMF	KOS-B-SMD	KOS-B-SKX
Model with sound attenuators name	KOS-BS-BMF	KOS-BS-BMP	KOS-BS-BMD	KOS-BS-BKX	KOS-BS-SMF	KOS-BS-SMD	KOS-BS-SKX
Control function	Flow: Variable, Constant (step)				Flow: Variable, Constant (step)		
Regulation range	0,7-13 m/s				0,3-13 m/s		
Volumetric flow controller origin	Belimo				Siemens		
Volumetric flow controller type	LMV-D3-MF-F x2	LMV-D3-MP-F x2	LMV-D3-MOD-F x2	LMV-D3-KNX-F x2	GDB181.1E/3 x2	GDB181.1E/MO x2	GDB181.1E/KN x2
Size range	D100-160				D100-160		
Analog control and feedback	0(2)...10 V	0(2)...10 V	0(2)...10 V	–	0(2)...10 V	–	–
MP-Bus	–	+	+	–	–	–	–
Modbus RTU	–	–	+	–	–	+	–
BACnet MS TP	–	–	–	–	–	–	–
KNX	–	–	–	+	–	–	+
NFC communication	–	+	–	–	–	–	–
Power supply voltage	AC/DC 24 V				AC 24 V		
Volumetric flow controller power supply	2W/3,5VA x2	2W/4VA x2	2W/4VA x2	2W/4VA x2	2,5W/3VA x2	2,5W/3VA x2	2,5W/3VA x2
Power supply with C option	AC 230 V	AC 230 V	AC 230 V	AC 230 V	AC 230 V	AC 230 V	AC 230 V
Display with backlighting	–	–	–	–	–	–	–
Scroll selection button	–	–	–	–	–	–	–
Actuator full rotating time	35-300 s				150 s		
On-site setpoint control	LINK.10 + Belimo Assistent 2 on Smartphone	Belimo Assistent 2 on Smartphone	LINK.10 + Belimo Assistent 2 on Smartphone, BUS	LINK.10 + Belimo Assistent 2 on Smartphone, BUS	AST20	AST20, BUS	AST20, BUS

VAV Lab series dampers

Precision in Air Management

The advanced KOMFOVENT VAV-Lab dampers range for VAV/CAV air flow regulation, air flow measurement, duct pressure and room pressure control with dynamic or static pressure transmitters for clean or polluted air conditions.
Usage area: hospitals and health care premises, laboratories, industrial sector, public, commercial, sport and administrative spaces.

KOS-C-U
Circular non-insulated VAV damper

KOS-C-U-I
Circular insulated VAV damper

KOS-R-U
Rectangular non-insulated VAV damper

KOS-R-U-I
Rectangular insulated VAV damper

Highlights:

- Applications: duct or room pressure control (variable/constant pressure), airflow measurement, VAV/CAV airflow control.
- Actuator Options: Standard (120 s / 90°) and fast-running (2,5–6 s / 90°) models for versatile applications.
- Fail-Safe Function: Reliable operation during power loss, system failures, or emergencies.
- Dynamic pressure controller for clean air environments.
- Static pressure controller for air with chemical contaminants or dust.
- Flow control dampers pressure airflow range flow from 20 m^3/h to 46800 m^3/h.
- Flow control dampers pressure opretaing range up to 1000 Pa.
- Room pressure control dampers pressure control range up to 75Pa (positive or negative).
- Duct pressure control dampers with static pressure transmitter (polluted air) pressure control range up to 600 Pa.
- Duct pressure control dampers with dynamic pressure transmitter (clean air) pressure control range up to 500 Pa.
- Closed blade air leakage class 3 to EN 1751.
- Casing air leakage to EN 1751, class ATC 3.
- Galvanized or stainless-steel execution.
- Hygienic certificate in acc. to VDI 6022.
- Working conditions 0...50 °C / 5...95 % RH, non-condensing.
- Constant Air Volume or Pressure (and step) control function available.
- Customer min/max air flow or pressure values can be set on factory without additional charge.
- Sticker with additional customer information (floor, room, system number etc.) can be placed on damper casing upon customer request without additional charge.

Product design components:

VAV Lab damper for flow control

VAV Lab damper for duct or room pressure control

VAV Lab unit for flow measurement

① Casing
② Actuator
③ Damper blade
④ Pitot tubes
⑤ Controller with manometer

VAV Lab series damper order example

KOS-C-U-I – 125(...x...) – DDN – S – 20-400 – A4

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

①	**Damper type: KOS** – Variable Air Volume damper, VAV damper
②	**Design: C** – circular **R** – rectangular
③	**Options: U** – Universal VAV for various demanding air control/supply applications
④	**Options: I** – with insulation 50 mm **No entry** – without insulation
⑤	**Diameter:** 100/125/160/200/250/315/355/400/450/500/560/630 (for circular **KOS-C-U**; **KOS-C-U-I**, see Table1) **Size:** (200×100 to 1000×1000 mm) with step 50 mm for height H (for rectangular **KOS-R-U**; **KOS-R-U-I**, see Table 4)
⑥	**Controller fuction type: DDN** – Duct pressure control; Clean air controller; 0...500 Pa **DST** – Duct pressure control; Polluted air controller; 0...600 Pa **RST** – Room pressure control; Polluted air controller; -75...75 Pa **MDN** – Measuring (no actuator); Clean air controller; 0...500 Pa **MST** – Measuring (no actuator); Polluted air controller; 0...600 Pa **FDN** – Flow control; Clean air controller; 0...500 Pa **FST** – Flow control; Polluted air controller; 0...600 Pa
⑦	**Actuator type: S** – Standard velocity no failsafe; 120 s **F** – Fast Running no fail safe; 2,4 s, 4 s **SFS** – Standard velocity 120 s+ spring fail-safe 20 s **FFS** – Fast velocity + Fail Safe; 4 s
⑧	**Operating parameters: For MND, MST, FDN, FST models:** V_{min} - V_{max} – customer defined air flow, m³/h. For selected Diameter or Size at point 5 (see also Tables 1 and 4) **For DDN, DST, RST models:** P_{min} - P_{max} – customer defined air pressure, Pa **No entry** – DEFAULT FACTORY SETTINGS V_{min} - V_{max} =13 m/s; P_{min} – P_{max}
⑨	**Material: No entry** – galvanized steel damper **A4** – stainless steel AISI304 damper with standard corrosion resistance. Pitot tubes and rectangular dampers blade material: aluminium **A6** – stainless steel AISI316 damper with higher corrosion resistance (like sea water and de-icing salts).Pitot tubes and rectangular dampers blade material: aluminium (other AISI on request)

Product factory lable example:

① VAV damper diameter/size
② V_{min}, only for controller types FDN and FST
③ V_{max}, only for controller types FDN and FST
④ Unique serial No.
⑤ Production date
⑥ Control Voltage
⑦ Arrow for air flow direction, only for controller types FDN and FST

2026-02

Functional description for VAV LAB types

VAV Lab dampers for room pressure control

VAV Lab dampers **KOS-C/R-U-(I)-RST** are used to maintain the specified pressure in the room and designed with controller for clean and polluted air (with static pressure transmitter).
VAV Lab dampers for supply or exhaust air change air flow, the room pressure is the result of the balance between supply and exhaust air.
To prevent polluted air from entering (e.g. clean rooms, operating rooms), a positive pressure is required. This is achieved by maintaining a higher supply airflow rate than the exhaust airflow rate.
To prevent polluted air from escaping (e.g. laboratories, infectious disease rooms, commercial kitchens, smoking rooms), a negative pressure is required. This is achieved by maintaining a higher exhaust airflow rate than the supply airflow rate.
The damper design does not include Pitot tubes, as the pressure difference is measured between the room where pressure control is required and an adjacent room or different zones. The controller compares the measured pressure difference with a constant or variable setpoint, calculates the required control signal, and sends it to the actuator, thereby opening or closing the damper blade to the angle necessary to maintain the required room pressure.
Functional range differential pressure -75...75 Pa.

VAV Lab dampers for duct pressure control.

VAV Lab dampers **KOS-C/R-U-(I)-DST/DDN** are used for duct pressure control in ventilation systems. The pressure is maintained at the specific part of ventilation system (e.g. on a specific floor of the building) or constant duct pressure is maintained in the duct before cooling units for smooth operation.
KOS-C/R-U-(I)- DST and designed with controller for clean and polluted air (with static pressure transmitter).
KOS-C/R-U-(I)- DDN and designed with controller for clean (with dynamic pressure transmitter).
The damper design does not include Pitot tubes, as the pressure difference is measured between pressure at the specific point in the duct (usually at the end of a branch or before the air consumer) and zero pressure (only one plastic pipe is connected to damper controller pressure transmitter). The controller compares the measured pressure difference with a constant or variable setpoint, calculates the required control signal, and sends it to the actuator, thereby opening or closing the damper blade to the necessary angle and changes the resistance of the branch, thereby affecting the pressure at the selected point.
Functional range differential pressure 20-500 Pa for KOS-C/R-U-(I)-DDN. Functional range differential pressure 20-600 Pa for KOS-C/R-U-(I)- DST.

VAV Lab units for flow measuring

VAV Lab units **KOS-C/R-U-(I)-MST/MDN** are used as volumetric flow measuring devices (also transmitters) for detecting or monitoring volumetric air flow.
KOS-C/R-U-(I)-MST and designed with controller for clean and polluted air (with static pressure transmitter).
KOS-C/R-U-(I)- MDN and designed with controller for clean (with dynamic pressure transmitter).
VAV Lab units **KOS-C/R-U-(I)-MST/MDN** are designed with Pitot tubes and use the same air flow measuring method as VAV Standard series dampers. Unirs are not equipped with rotating blades and actuators.

The dampers are used in cases where control of the supply-exhaust balance is important (e.g. to record the total supply air for setting the airflow of a common extract VAV unit); where it is constantly necessary to know the actual flow rate (e.g. balancing complex ventilation systems with long ducts, a large number of branches and variable operating modes); there is a BMS and control requirements
The airflow operating range is identical to the range of the VAV Standard series dampers.

VAV Lab dampers for flow control

VAV Lab dampers **KOS-C/R-U-(I)-DST/DDN** are used for are used for flow regulation like Standard series VAV dampers but in cases of maintaining the precision and reliability of ventilation system under high-demand conditions: e.g., very precise control of temperature and humidity is required or there is presence of polluted air, or a quick response to rapid changes in temperature and humidity is required, or failsafe function is required.

KOS-C/R-U-(I)- FST and designed with controller for clean and polluted air (with static pressure transmitter).
KOS-C/R-U-(I)- FDN and designed with controller for clean (with dynamic pressure transmitter).
The airflow operating range is identical to the range of the VAV Standard series dampers.

2026-02

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Functional description with different actuator types

Each actuator of VAV Lab damper is characterized by running time (sec) which determinates how quickly the blade of damper responds to the control signal (rotation to 90°). The actuator running time is detected by the controller and used to optimize the control performance. To predict system behavior in emergency situations, a failsafe function can be optionally used, which determines which safe position the damper will move to (open/close) if power or a control signal is lost, or an error occurs. The actuator with mechanical failsafe has spring return which immediately moves the blade of damper to the emergency position when power is lost. The actuator with electrical failsafe has a supercapacitor where energy is stored and further is used for moving the blade of damper to the emergency position when power is lost.

Table 10. Actuators and Volumetric Flow Controllers data for Circular VAV LAB series

Non-insulated model name	KOS-C-U-RST-S	KOS-C-U-RST-F	KOS-C-U-RST-FS	KOS-C-U-RST-FFS
Insulated model name (insulation 50 mm)	KOS-C-U-I-RST-S	KOS-C-U-I-RST-F	KOS-C-U-I-RST-FS	KOS-C-U-I-RST-FFS
Control function	Room pressure: Variable, Constant (step)			
Regulation range	.-75...75 Pa			
Controller and actuator origin	Belimo			
Controller type	VRU-M1R-BAC			
Actuator type	LM24A-VST	LMQ24A-VST (d100-d315) NMQ24A-VST (d355-d630)	LF24A-VST (d100-d315) NF24A-VST (d355-d630)	NKQ24A-VST
Size range	D100-630			
Analog control and feedback	0(2)...10 V			
Communication protocols	MP-Bus, Modbus RTU, BACnet MS TP, KNX, NFC			
Power supply voltage	AC/DC 24 V			
Controller power supply	1,5W/2VA			
Actuator power supply	1W/2VA	13W/23VA	LF24A-VST 2,5W/5VA NF24A-VST 5W/8VA	11W/22VA
Air condition	clean, polluted			
Actuator full rotating time	120 s	2,5 s	120 s, spring 20 s	4 s
Fail-safe function	–	–	+ (spring)	+ (capacitor)
On-site setpoint control	Belimo Assistent 2 on Smartphone, BUS			

Non-insulated model name	KOS-C-U-DDN-S	KOS-C-U-DDN-F	KOS-C-U-DDN-FS	KOS-C-U-DDN-FFS	KOS-C-U-DST-S	KOS-C-U-DST-F	KOS-C-U-DST-FS	KOS-C-U-DST-FFS
Insulated model name (insulation 50 mm)	KOS-C-U-I-DDN-S	KOS-C-U-I-DDN-F	KOS-C-U-I-DDN-FS	KOS-C-U-I-DDN-FFS	KOS-C-U-I-DST-S	KOS-C-U-I-DST-F	KOS-C-U-I-DST-FS	KOS-C-U-I-DST-FFS
Control function	Duct pressure: Variable, Constant (step)							
Regulation range	20-500 Pa				20-600 Pa			
Controller and actuator origin	Belimo							
Controller type	VRU-D3-BAC				VRU-M1-BAC			
Actuator type	LM24A-VST	LMQ24A-VST (d100-d315) NMQ24A-VST (d355-d630)	LF24A-VST (d100-d315) NF24A-VST (d355-d630)	NKQ24A-VST	LM24A-VST	LMQ24A-VST (d100-d315) NMQ24A-VST (d355-d630)	LF24A-VST (d100-d315) NF24A-VST (d355-d630)	NKQ24A-VST
Size range	D100-630							
Analog control and feedback	0(2)...10 V							
Communication protocols	MP-Bus, Modbus RTU, BACnet MS TP, KNX, NFC							
Power supply voltage	AC/DC 24 V							
Controller power supply	1,5W/2VA							
Actuator power supply	1W/2VA	13W/23VA	LF24A-VST 2,5W/5VA NF24A-VST 5W/8VA	11W/22VA	1W/2VA	13W/23VA	LF24A-VST 2,5W/5VA NF24A-VST 5W/8VA	11W/22VA
Air condition	clean				clean, polluted			
Actuator full rotating time	120 s	2,5 s	120 s, spring 20 s	4 s	120 s	2,5 s	120 s, spring 20 s	4 s
Fail-safe function	–	–	+ (spring)	+ (capacitor)	–	–	+ (spring)	+ (capacitor)
On-site setpoint control	Belimo Assistent 2 on Smartphone, BUS							

Non-insulated model name	KOS-C-U-FDN-S	KOS-C-U-FDN-F	KOS-C-U-FDN-FS	KOS-C-U-FDN-FFS	KOS-C-U-FST-S	KOS-C-U-FST-F	KOS-C-U-FST-FS	KOS-C-U-FST-FFS
Insulated model name (insulation 50 mm)	KOS-C-U-I-FDN-S	KOS-C-U-I-FDN-F	KOS-C-U-I-FDN-FS	KOS-C-U-I-FDN-FFS	KOS-C-U-I-FST-S	KOS-C-U-I-FST-F	KOS-C-U-I-FST-FS	KOS-C-U-I-FST-FFS
Control function	Flow: Variable, Constant (step)							
Regulation range	0,7-13 m/s							
Controller and actuator origin	Belimo							
Controller type	VRU-D3-BAC				VRU-M1-BAC			
Actuator type	LM24A-VST	LMQ24A-VST (d100-d315) NMQ24A-VST (d355-d630)	LF24A-VST (d100-d315) NF24A-VST (d355-d630)	NKQ24A-VST	LM24A-VST	LMQ24A-VST (d100-d315) NMQ24A-VST (d355-d630)	LF24A-VST (d100-d315) NF24A-VST (d355-d630)	NKQ24A-VST
Size range	D100-630							
Analog control and feedback	0(2)...10V							
Communication protocols	MP-Bus, Modbus RTU, BACnet MS TP, KNX, NFC							
Power supply voltage	AC/DC 24 V							
Controller power supply	1,5W/2VA							
Actuator power supply	1W/2VA	13W/23VA	LF24A-VST 2,5W/5VA NF24A-VST 5W/8VA	11W/22VA	1W/2VA	13W/23VA	LF24A-VST 2,5W/5VA NF24A-VST 5W/8VA	11W/22VA
Air condition	clean				clean, polluted			
Actuator full rotating time	120 s	2,5 s	120 s, spring 20 s	4 s	120 s	2,5 s	120 s, spring 20 s	4 s
Fail-safe function	–	–	+ (spring)	+ (capacitor)	–	–	+ (spring)	+ (capacitor)
On-site setpoint control	Belimo Assistent 2 on Smartphone, BUS							

Non-insulated model name	KOS-C-U-MDN	KOS-C-U-MST
Insulated model name (insulation 50 mm)	KOS-C-U-I-MDN	KOS-C-U-I-MST
Control function	Flow measuring unit	
Regulation range	0,7-13 m/s	
Controller and actuator origin	Belimo	
Controller type	VRU-D3-BAC	VRU-M1-BAC
Actuator type	n/a	n/a
Size range	D100-630	
Analog control and feedback	feedback 0(2)...10V	
Communication protocols	MP-Bus, Modbus RTU, BACnet MS TP, KNX, NFC	
Power supply voltage	AC/DC 24 V	
Controller power supply	1,5W/2VA	
Actuator power supply	n/a	n/a
Air condition	clean	clean, polluted
Actuator full rotating time	n/a	n/a
Fail-safe function	n/a	n/a
On-site setpoint control	Belimo Assistent 2 on Smart-phone, BUS	

Table 11. Actuators and Volumetric Flow Controllers data for Rectangular VAV LAB series

Non-insulated model name	KOS-R-U-RST-S	KOS-R-U-RST-F	KOS-R-U-RST-FS	KOS-R-U-RST-FFS	KOS-R-U-DDN-S	KOS-R-U-DDN-F	KOS-R-U-DDN-FS	KOS-R-U-DDN-FFS	KOS-R-U-DST-S	KOS-R-U-DST-F	KOS-R-U-DST-FS	KOS-R-U-DST-FFS	KOS-R-U-FDN-S	KOS-R-U-FDN-F	KOS-R-U-FDN-FS	KOS-R-U-FDN-FFS	KOS-R-U-FST-S	KOS-R-U-FST-F	KOS-R-U-FST-FS	KOS-R-U-FST-FFS	KOS-R-U-MDN	KOS-R-U-MST
Insulated model name (insulation 50 mm)	KOS-R-U-I-RST-S	KOS-R-U-I-RST-F	KOS-R-U-I-RST-FS	KOS-R-U-I-RST-FFS	KOS-R-U-I-DDN-S	KOS-R-U-I-DDN-F	KOS-R-U-I-DDN-FS	KOS-R-U-I-DDN-FFS	KOS-R-U-I-DST-S	KOS-R-U-I-DST-F	KOS-R-U-I-DST-FS	KOS-R-U-I-DST-FFS	KOS-R-U-I-FDN-S	KOS-R-U-I-FDN-F	KOS-R-U-I-FDN-FS	KOS-R-U-I-FDN-FFS	KOS-R-U-I-FST-S	KOS-R-U-I-FST-F	KOS-R-U-I-FST-FS	KOS-R-U-I-FST-FFS	KOS-R-U-I-MDN	KOS-R-U-I-MST
Control function	Room pressure: Variable, Constant (step)				Duct pressure: Variable, Constant (step)								Flow: Variable, Constant (step)								Flow measuring unit	
Regulation range	.-75...75 Pa				20-500 Pa				20-600 Pa				0,7-13 m/s								0,7-13 m/s	
Controller and actuator origin	Belimo				Belimo								Belimo								Belimo	
Controller type	VRU-M1R-BAC				VRU-D3-BAC				VRU-M1-BAC				VRU-D3-BAC				VRU-M1-BAC				VRU-D3-BAC	VRU-M1-BAC
Actuator type	LM24A-VST	LMQ24A-VST / NMQ24A-VST	LF24A-VST / NF24A-VST	NKQ24A-VST	LM24A-VST	LMQ24A-VST / NMQ24A-VST	LF24A-VST / NF24A-VST	NKQ24A-VST	LM24A-VST	LMQ24A-VST / NMQ24A-VST	LF24A-VST / NF24A-VST	NKQ24A-VST	LM24A-VST	LMQ24A-VST / NMQ24A-VST	LF24A-VST / NF24A-VST	NKQ24A-VST	LM24A-VST	LMQ24A-VST / NMQ24A-VST	LF24A-VST / NF24A-VST	NKQ24A-VST	n/a	n/a
Size range	200×100-1000×1000				200×100-1000×1000								200×100-1000×1000								200×100-1000×1000	
Analog control and feedback	0(2)...10V				0(2)...10 V								0(2)...10V								feedback 0(2)...10V	
Communication protocols	MP-Bus, Modbus RTU, BACnet MS TP, KNX, NFC				MP-Bus, Modbus RTU, BACnet MS TP, KNX, NFC								MP-Bus, Modbus RTU, BACnet MS TP, KNX, NFC								MP-Bus, Modbus RTU, BACnet MS TP, KNX, NFC	
Power supply voltage	AC/DC 24 V				AC/DC 24 V								AC/DC 24 V								AC/DC 24 V	
Controller power supply	1,5W/2VA				1,5W/2VA								1,5W/2VA								1,5W/2VA	
Actuator power supply	1W/2VA	13W/23VA	LF24A-VST 2,5W/5VA NF24A-VST 5W/8VA	11W/22VA	1W/2VA	13W/23VA	LF24A-VST 2,5W/5VA NF24A-VST 5W/8VA	11W/22VA	1W/2VA	13W/23VA	LF24A-VST 2,5W/5VA NF24A-VST 5W/8VA	11W/22VA	1W/2VA	13W/23VA	LF24A-VST 2,5W/5VA NF24A-VST 5W/8VA	11W/22VA	1W/2VA	13W/23VA	LF24A-VST 2,5W/5VA NF24A-VST 5W/8VA	11W/22VA	n/a	n/a
Air condition	clean, polluted				clean				clean, polluted				clean				clean, polluted				clean	clean, polluted
Actuator full rotating time	120 s	2,5 s	120 s, spring 20 s	4 s	120 s	2,5 s	120 s, spring 20 s	4 s	120 s	2,5 s	120 s, spring 20 s	4 s	120 s	2,5 s	120 s, spring 20 s	4 s	120 s	2,5 s	120 s, spring 20 s	4 s	n/a	n/a
Fail-safe function	–	–	+ (spring)	+ (capacitor)	–	–	+ (spring)	+ (capacitor)	–	–	+ (spring)	+ (capacitor)	–	–	+ (spring)	+ (capacitor)	–	–	+ (spring)	+ (capacitor)	n/a	n/a
On-site setpoint control	Belimo Assistent 2 on Smartphone, BUS				Belimo Assistent 2 on Smartphone, BUS								Belimo Assistent 2 on Smartphone, BUS								Belimo Assistent 2 on Smartphone, BUS	

Used actuarators according to dampers sizes

H / B	Dimensions, mm																		
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
200																			
300																			
400																			
500																			
600																			
700																			
800																			
900																			
1000																			

NMQ24A-VST or NF24A-VST LMQ24A-VST or LF24A-VST

Control Systems, Tools, and Accessories

Air quality controllers with built-in transmitters SQR / SCR / SCD / SQD

To control VAV dampers by analogue 0/2...10 V signal room controllers SQR/SCR or duct controllerc SCD/SQD can be used.

Controllers can work in 3 modes: PID cotroller, relay or transmit:
- *In PID controller mode* user selects setpoint value and controller sends demand 0/2...10 V signal to VAV dampers.
- *In relay mode* user selects setpoint value and controller swithces relay. This function can be use for CAV/Step control mode of VAV dampers.
- *In transmitter mode* controller transmits measured parameter value to analogue 0/2...10 V (or 0/4...20 mA) signal and sends it to external controller (for example: AHU controller working in Air Quality mode).

SCR / SQR Room controllers

SCR Room controller has built-in CO_2, temperature and humidity transmitters. CO_2 is parameter for analogue output 1 (AO1). Temperature or humiduity (user selects one of them) is parameter for analogue output 2 (AO2). Setpoint selection can be made by touch-sensitive buttons on the housing of the device and potentiometer on the board. LED light on casing shows (by color/static) parameter value or selected setpoint value (by color/blinking) when user makes setpint changing.

SQR Room controller has built-in Air Quality VOC, temperature and humidity transmitters. Air Quality VOC is parameter for analogue output 1 (AO1). Temperature or humiduity (user selects one of them) is parameter for analogue output 2 (AO2). Setpoint selection can be made by touch-sensitive buttons on the housing of the device and potentiometer on the board. LED light on casing shows (by color/static) parameter value or selected setpoint value (by color/blinking) when user makes setpint changing.

Parameters:
- 24 VAC / 24 VDC supply voltage.
- SRC. 3 sensor type options (CO_2, %RH or °C).
- SRQ. 3 sensor type options (VOC, %RH or °C).
- 2 analog output options (0...10 V / 4...20 mA).
- Relay output for ON / OFF control.
- RS-485 Modbus interface.
- PID functionality for VAV damper control.
- Compact design 80×80×26 mm.
- High measurement accuracy (CO_2: ±6%, VOC: ±15%, %RH: ±3 %, °C: ±1,0°C).

Type of the Sensor	CO_2	VOC	%RH	°C
SCR	+		+	+
SQR		+	+	+

SCR / SQR

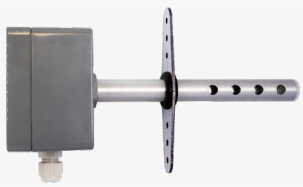
SCD / SQD Duct controller

SCD Duct controller has built-in CO_2, temperature and humidity transmitters. CO_2 is parameter for analogue output 1 (AO1). Temperature or humiduity (user selects one of them) is parameter for analogue output 2 (AO2). Setpoint selection can be made by potentiometer on the board.

SQD Duct controller has built-in Air Quality VOC, temperature and humidity transmitters. Air Quality VOC is parameter for analogue output 1 (AO1). Temperature or humiduity (user selects one of them) is parameter for analogue output 2 (AO2). Setpoint selection can be made by potentiometer on the board.

Parameters:
- Supply voltage: 24 Vac / 24 Vdc ±20 %.
- CO_2: 0...2000 ppm.
- VOC: 0...100 %.
- Relative humidity: 0 %...100 %.
- Temperature: 0 °C...50 °C.
- 2 selectable output signals: 0...10 V.
- RS-485 Modbus interface.
- Relay output for on/off control.
- Adjustable setpoint for VAV control.
- Protection class: IP65.
- Dimensions: 82×80×54 (208) mm.

Type of the Sensor	CO_2	VOC	%RH	°C
SCD	+		+	+
SQD		+	+	+



SCD / SQD

2026-02

Actuator adjustment tools

Belimo LINK.10 converter

Designed for the connection of Belimo Assistant 2 app (on smartphone or laptop) and configurable and communicative devices from Belimo (Belimo Volumetric Flow controllers of VAV dampers). Supports Bluetooth and USB to NFC and MP-Bus. Configuration of powered and unpowered devices. Cable ZK1-GEN is needed to connect LINK.10 to VAV damper.

Belimo assistant app via NFC

Belimo Assistant 2 app allows you to check and control your actuator using your smartphone. No ZTH tool needed! Simple, wireless connection via integrated NFC interface. App displays device-specific identification data: device type, position, designation, serial number, MP address. Even when actuator is deenergized data can be read and written.
It is also possible to store operating/setting data on the smartphone or send data directly from system via e-mail, WhatsApp or SMS.
For using hold smartphone close to Belimo actuator. The NFC- antenna of the phone, respectively the converter's eye must be placed right over the actuator's NFC-logo. After connection is succeed application will display set- tings automatically.
Additional information can be obtained from **BELIMO TOOL**.

Siemens Handheld Tool AST20

Siemens Handheld Tool AST20 for VAV Controllers and Communicative Actuators.

For configuration and maintenance of OpenAir VAV compact and modular controllers and actuators with Modbus RTU communication:

- G..B181.. VAV compact controllers 5 / 10 Nm (series D or newer).
- ASV181.. VAV modular controller.
- G..B111../MO communicative actuators 5 / 10 Nm (no spring-return).
- Monitoring and configuration of VAV controllers and communicative actuators.
- Bus configuration of Modbus / BACnet MS/TP field devices.
- Mass configuration ("Copying mode").
- Diagnostic and maintenance data.
- Access levels for service and OEM.
- Additional information can be obtained from **SIEMENS TOOL**.

Gruner

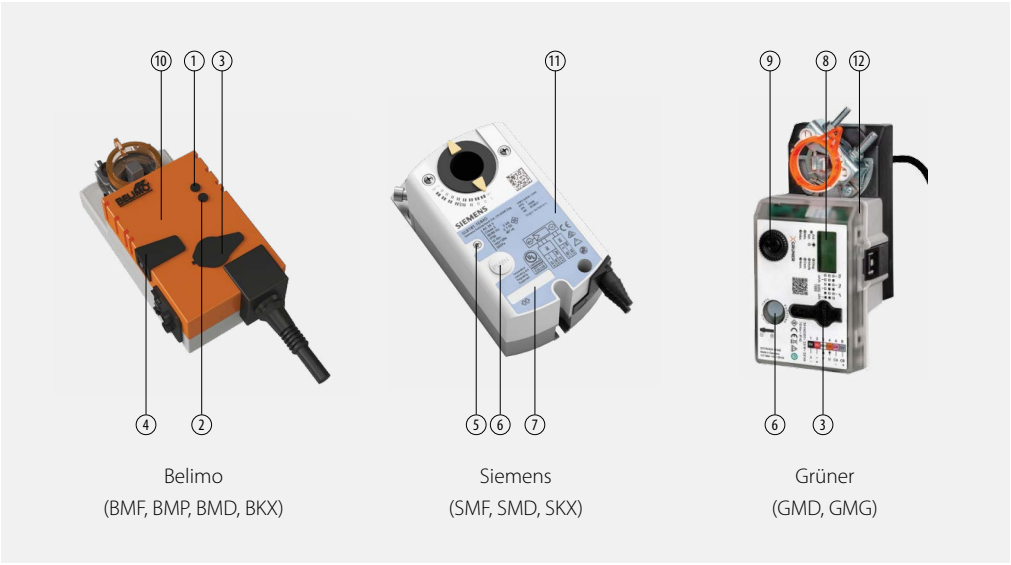
Gruner Parameters setting solution for VAV controllers 327VM-024-05, 327VM-024-05-MB with integrated user interface (optional configuration tool GUIV3-M available).

Gruner universal interface for setting actuators with integrated control panel (setting various parameters right on the VAV controller).
Additional information can be obtained from **GRUNER TOOL**.

Volumetric flow controller specification

Main description

VAV Standard and VAV BOX series dampers can be delivered with different types of the Volumetric flow controllers



Belimo
(BMF, BMP, BMD, BKX)

Siemens
(SMF, SMD, SKX)

Grüner
(GMD, GMG)

① Green push button and LED display
② Yellow push button and LED display
③ Service plug
④ Actuator disengagement button
⑤ LED display
⑥ PUSH button
⑦ Configuration and maintenance interface
⑧ Display with backlight
⑨ Value selector
⑩ BMF..., BMP..., BMD... and BKX Controllers
⑪ SMF, SMD and SKX Controllers
⑫ GMF, GMD Controllers

Analogue connection – With analogue connection it is possible to connect analog output controller (PLC) 0…10 V or 2…10 V to the VAV damper and control the air volume, depending on the given signal and set up.

MP-Bus connection – The MP-Bus is master/slave bus technology where defined number of slaves can be connected to a MP-Master unit. Below is a connection scheme for MP-bus type actuators.

Modbus or BACnet connection – For Modbus connection the Modbus protocol is used to establish master-slave / client-server communication between intelligent devices (BMS). Using Modbus, a master (e.g., automation station) and several slaves can be interconnected.

KNX connection – For KNX connection KNX devices are generally connected by a twisted pair bus and can be modified from a controller.

Analog connection

For analogue connection for Volumetric Flow controllers it is possible to connect 0...10 V or 2...10 V controller to the damper and control the air volume, depending on the given signal and set up.

VAV – variable operation V_{min}...V_{max}

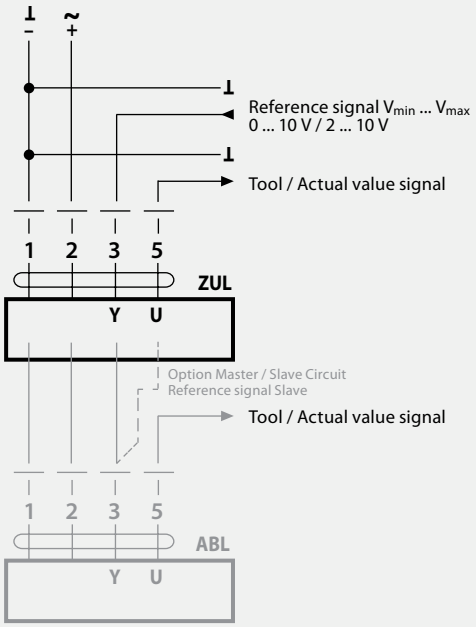
Damper is CLOSED via 0...10 V reference signal (Mode 2...10 V).
Setting parameters: Mode 2...10 V, Shut off level 0,1 V or 0,5 V.
If the required switching threshold of 0,1 V cannot be attained, the value can be switched to 0,5 V with PCT tool.

Function	Standard 0,1 V	Shut-off level 0,5 V
Damper CLOSED	<0,1 V	<0,5 V
V_{min}	>0,1...2 V	>0,5 V...2 V
V_{min}...V_{max}	2...10 V	2...10 V

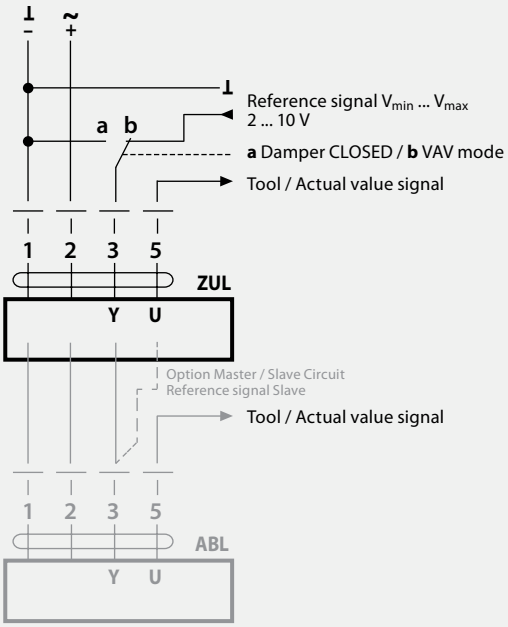
In CAV applications shut-off level must not be set to 0.5 V, otherwise the open connection 3 is interpreted as damper CLOSED.

KOS...BMF, BMP, BMD wiring diagrams

Wiring diagram 1:
VAV, analogue reference signal



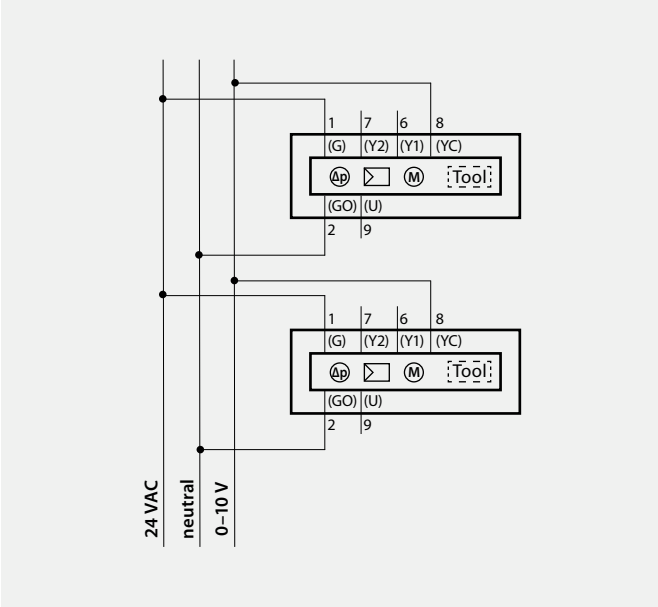
Wiring diagram 2:
VAV with shut-off (CLOSED), 2...10 V mode



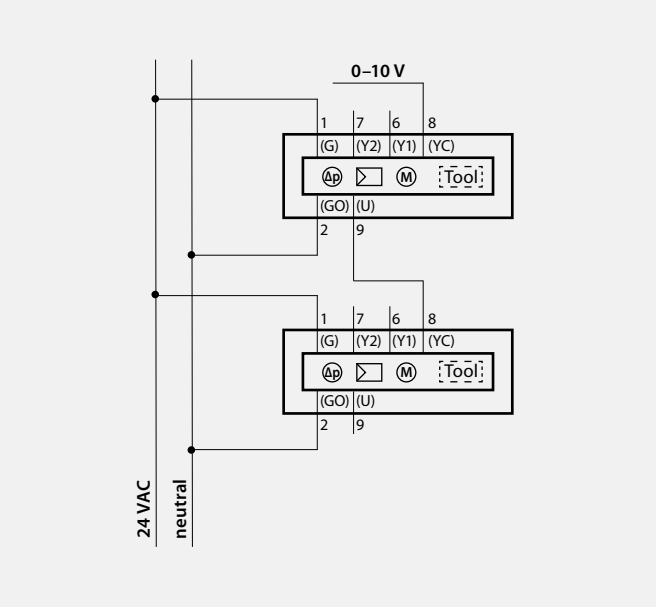
KOS...SMF wiring diagrams

For **Siemens** controller operation in VAV mode provided a DC 0…10 V provided a DC 0…10 V or DC 2…10 V signal is fed into the input YC. The setpoint signal controls the operating range V_{min}…V_{max}.

Parallel connection

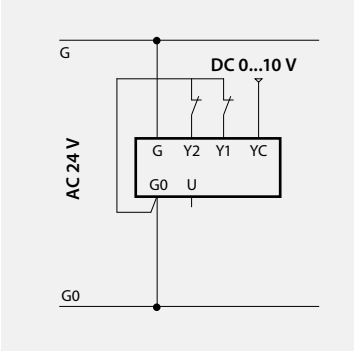


Master – Slave connection



Terminal label	Color code	Terminal code	Description
1	Red (RD)	G	System potential AC 24 V
2	Black (BK)	G0	System neutral AC 24 V
6	Violet (VT)	Y1	Positioning signal "Actuator's direction of rotation" (G0 switched) dependent on the setting of direction
7	Orange (OG)	Y2	Positioning signal "Actuator's direction of rotation" (G0 switched) dependent on the setting of direction
8	Grey (GY)	YC 1	Air volume flow reference signal DC 0/2...10 V (setpoint) or communication signal
9	Pink (PK)	U	Air volume flow measuring signal DC 0/2...10 V (actual value)

Forced control in VAV mode



VAV operating mode (Type "con")

YC	DC 0/2...10 V			
Y1	open	G0	G0	open
Y2	open	open	G0	G0
Action	VAV control with DC 0/2...10 V setpoint compensation	Dir **r** → rotation CW Dir **L** → rotation CCW **"Damper fully open"**	VAV control with DC 0/2...10 V setpoint compensation	Dir **r** → rotation CCW Dir **L** → rotation CW **"Damper fully closed"**

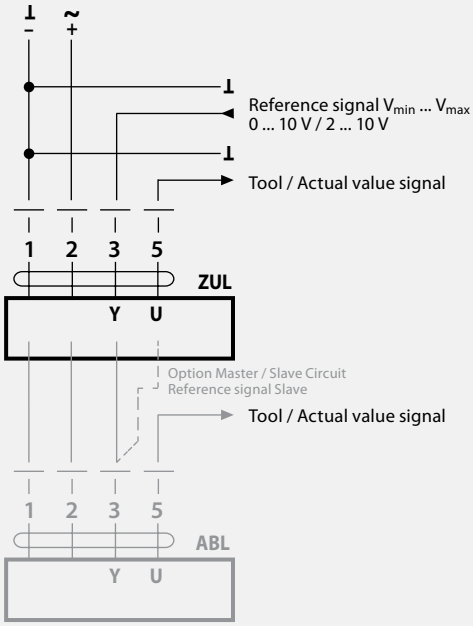
MP-BUS connection

For MP-bus connection master/slave bus technology a defined number of slaves can be connected to a MP Master unit.
Damper is CLOSED via 0…10 V reference signal (Mode 2…10 V).
Setting parameters: Mode 2…10 V, Shut off level 0,5 V.

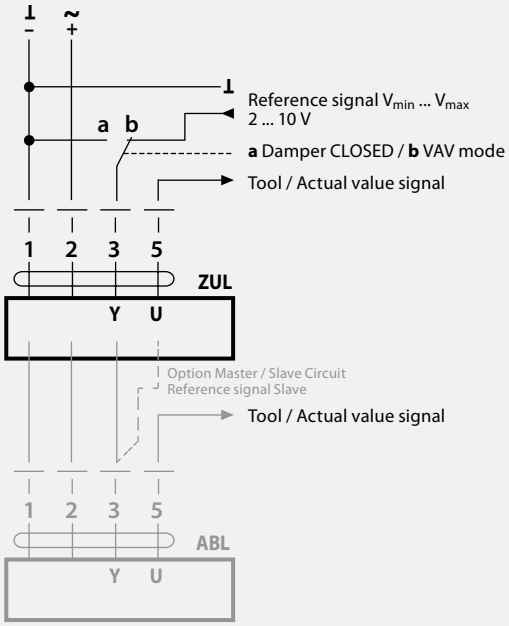
Function	Shut-off level 0,5 V
Damper CLOSED	<0,5 V
V_{min}	>0,5 V...2 V
V_{min}...V_{max}	2...10 V

KOS...BMP wiring diagrams

Wiring diagram 1:
VAV, analogue reference signal



Wiring diagram 2:
VAV with shut-off (CLOSED), 2. . .10 V mode



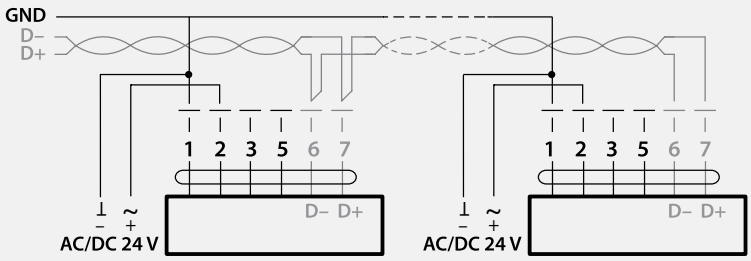
Modbus or BACnet connection

The Modbus protocol is used to establish master-slave / client-server communication between intelligent devices.
Using Modbus, a master (e.g. automation station) and several slaves can be interconnected. Below is a connection scheme for Modbus type actuators.

KOS...BMD wiring diagrams

Electrical installation

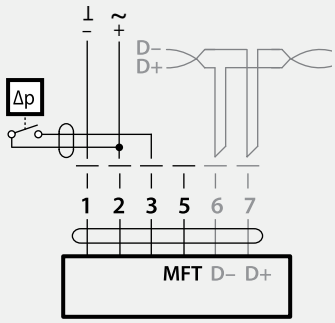
BACnet MS/TP / Modbus RTU



Cable colors:
1=black
2=red
3=white
4=orange
6=pink
7=grey

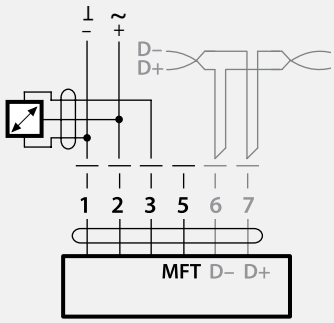
Signal assignment Modbus:
C1=D-=A
C2=D+=B

Connection with switching contact, e.g. Δp-monitor



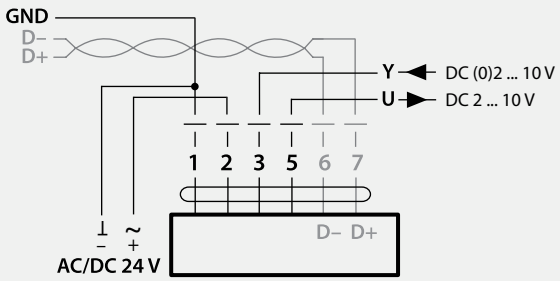
Switching contact requirements:
The switching contact must be able to switch a current of 16 mA at 24 V accurately

Connection of active sensors, e.g. 0...10 V @ 0...50 °C

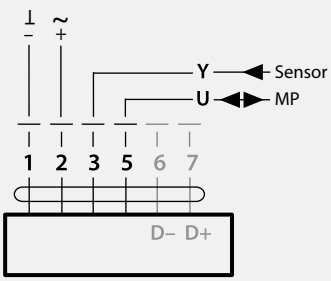


Possible voltage range:
0...32 V (resolution 30 mV)

BACnet MS/TP / Modbus RTU with analog setpoint (hybrid mode)



Operating on the MP-Bus

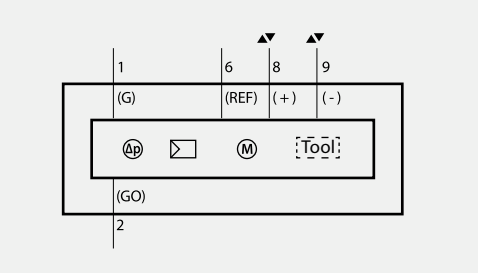


2026-02

KOS...SMD wiring diagram

The devices can be configured over bus if the pre-commis- sioning setting allow for a connection between the Modbus master or programming tool and a peripheral device.

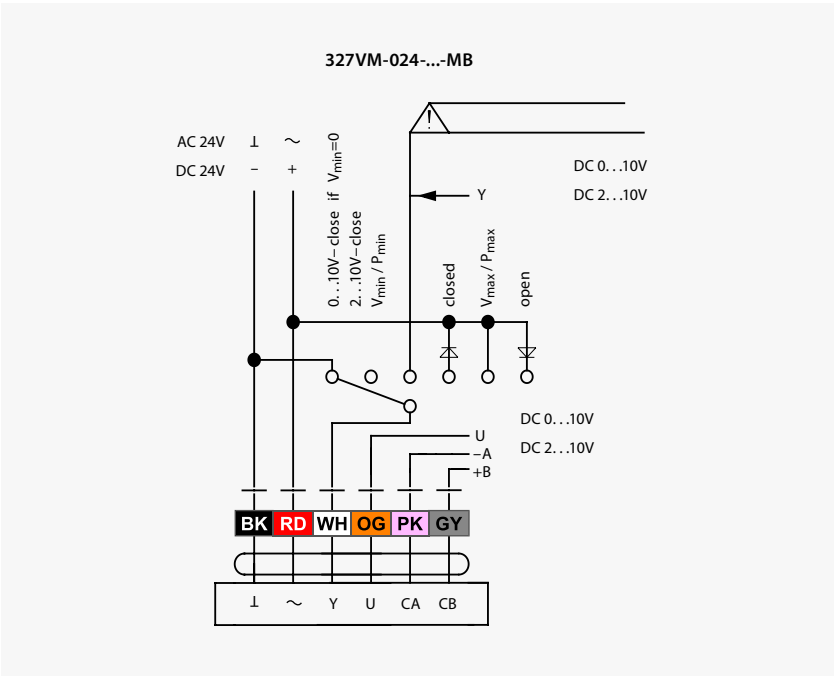
Tool = Configuration and maintenance interface (7-pin).



Core designation	Core color	Terminal code	Description
Cable 1: Power / black sheathing			
1	Red (RD)	G	System voltage AC 24 V
2	Black (BK)	G0	System neutral AC 24 V
Cable 2: Communication / blue sheathing			
6	Violet (VT)	REF	Reference
8	Grey (GY)	+	Bus (Modbus RTU)
9	Pink (PK)	-	Bus (Modbus RTU)

Various settings possible via actuator display: V_{min}, V_{max}, override control, mode, direction of rotation, etc..

KOS...GMF wiring diagram



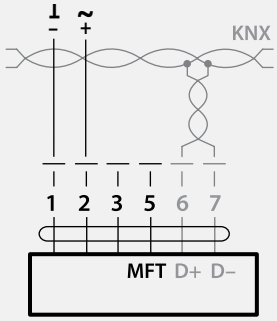
KNX connection

KNX devices are generally connected by a twisted pair bus and can be modified from a controller. Below is a connection scheme for KNX type actuators.

KOS...BKX wiring diagrams

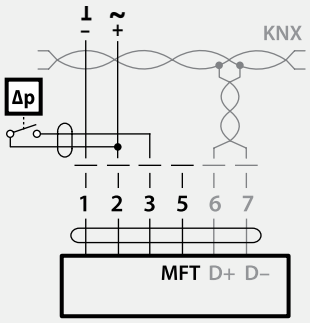
Electrical installation

Connection without sensor



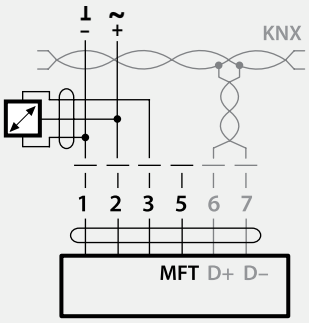
KNX signal assignment:
D+ = KNX+ (pink > red)
D – = KNX – (grey > black)
The connection to the KNX line should take place via WAGO connection terminals 222/221

Connection with switching contact, e.g. Δp-monitor



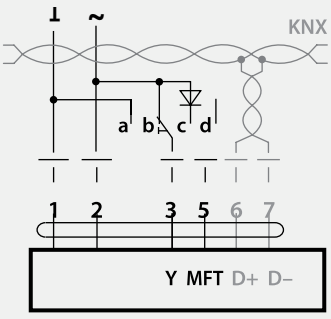
Switching contact requirements:
The switching contact must be able to switch a current of 16 mA at 24 V accurately

Connection of active sensors, e.g. 0...10 V @ 0...50 °C



Possible voltage range:
0...32 V (resolution 30 mV)

Local override control



If no sensor is integrated, then connection 3 (Y) is available for the protective circuit of a local override control.
Options: CLOSED – V_{max} – OPEN
Note: Functions only with AC 24 V supply!

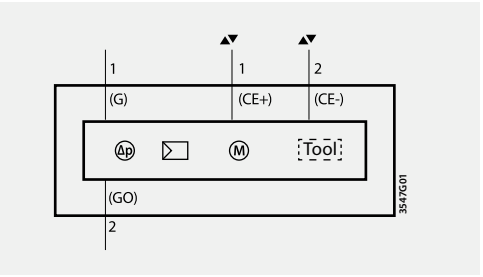
a Damper CLOSED
b V_{max}
c Damper OPEN
d Bus mode

2026-02

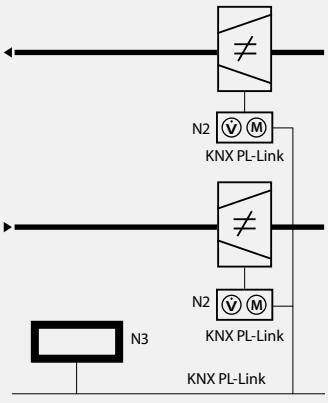
KOS...SKX wiring diagram

KNX devices are generally connected by a twisted pair bus and can be modified from a controller.

Tool = Configuration and maintenance interface: 7-pin connection.



Core designation	Core color	Terminal code	Description
Cable 1: Power / black sheathing			
1	Red (RD)	G	System voltage AC 24 V
2	Black (BK)	G0	System neutral AC 24 V
Cable 2: Communication / green sheathing			
1	Red (RD)	CE+	KNX CE+
2	Black (BK)	CE-	KNX CE+



N2 – GDB181.1E/KNVAV

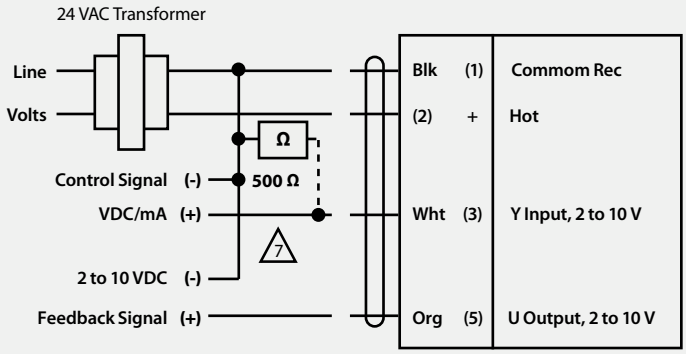
Actuators power supply solution

Always read the controller manufacturer's installation literature carefully before making any connections.

- Most VAV actuators use 24V AC/ DC typical power supply via 220V AC / 24V AC power transformer.
- Actuators may also be powered by 24 VDC.
- Actuators with plenum rated cable do not have numbers on wires; use standard color codes instead.
- Actuators with appliance cables are numbered.
- Provide overload protection and disconnect ability as required.
- A 500ohm resister converts the 4 to 20 mA control signal to 2 to 10 VDC when required.

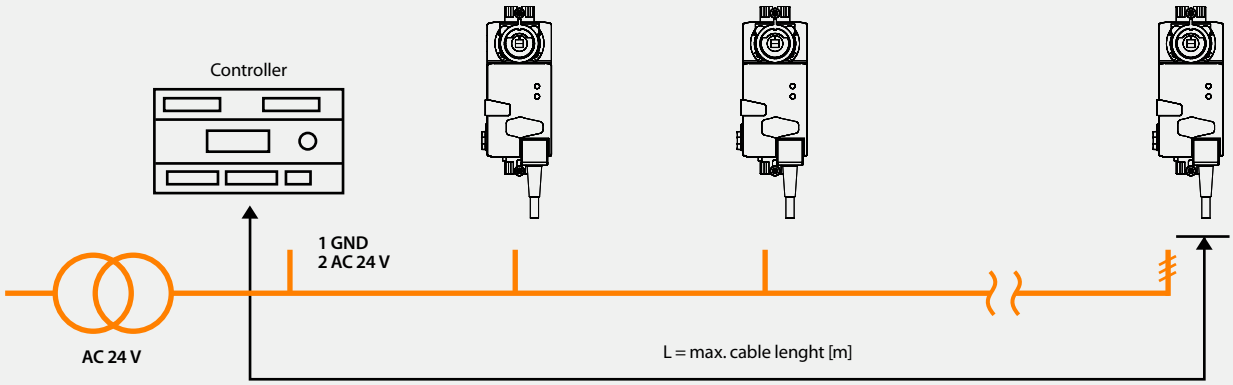
Two types of actuator power supply systems may be used:

MULTIPLE ACTUATORS, ONE TRANSFORMER	**Multiple actuators may be powered from one transformer provided the following rules are followed**	The TOTAL current draw of the nr. of actuators connected (VA rating) is less than or equal to the rating of the transformer
		Polarity on the secondary of the transformer is strictly followed. This means that all No. 1 wires from all actuators are connected to the common leg on the transformer and all No. 2 wires from all actuators are connected to the hot leg. Mixing wire No. 1 & 2 on one leg of the transformer will result in erratic operation or failure of the actuator and/or controls
MULTIPLE ACTUATORS, MULTIPLE TRANSFORMERS	**Multiple actuators positioned by the same control signal may be powered from multiple transformers provided the following rules are followed**	The transformers are properly sized
		All No. 1 wires from all actuators are tied together and tied to the negative leg of the control signal. See wiring diagram example for Belimo LM actuator



2026-02

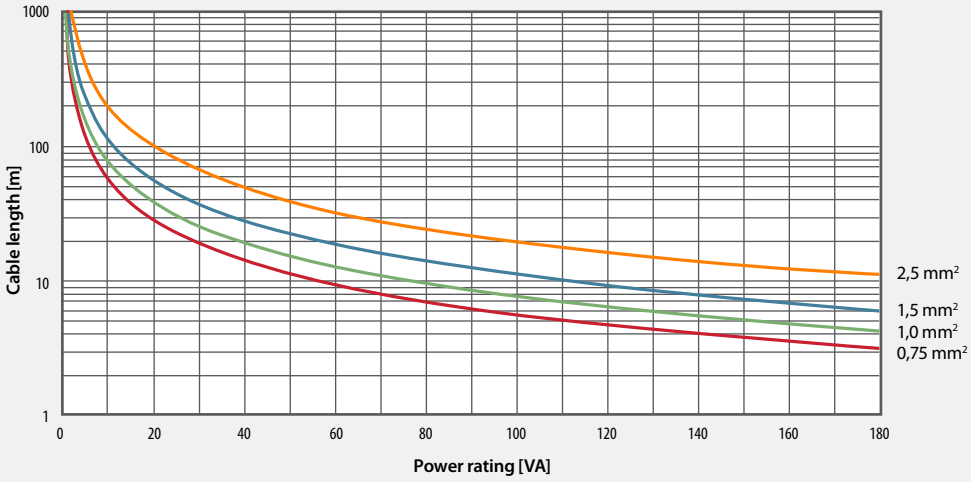
Cable length for AC 24V power supply selection:



The power ratings (VA) of the individual devices must be selected or added together. The corresponding cable lengths can then be read from the table 5.1. graph.

Example: *5 × Damper controller LMV..... with Total power rating: 5 × 4 VA = 20 VA*
Values read from the graph:
1. Cable with wire Ø 0,75 mm² requires: Cable length 28 m
2. Cable with wire Ø 1,0 mm² requires: Cable length 40 m
3. Cable with wire Ø 1,5 mm² requires: Cable length 54 m
4. Cable with wire Ø 2,5 mm² requires: Cable length 100m

Table 12
Cable length vs. power rating applies to AC supply (minimum transformer voltage AC 21.6 V).



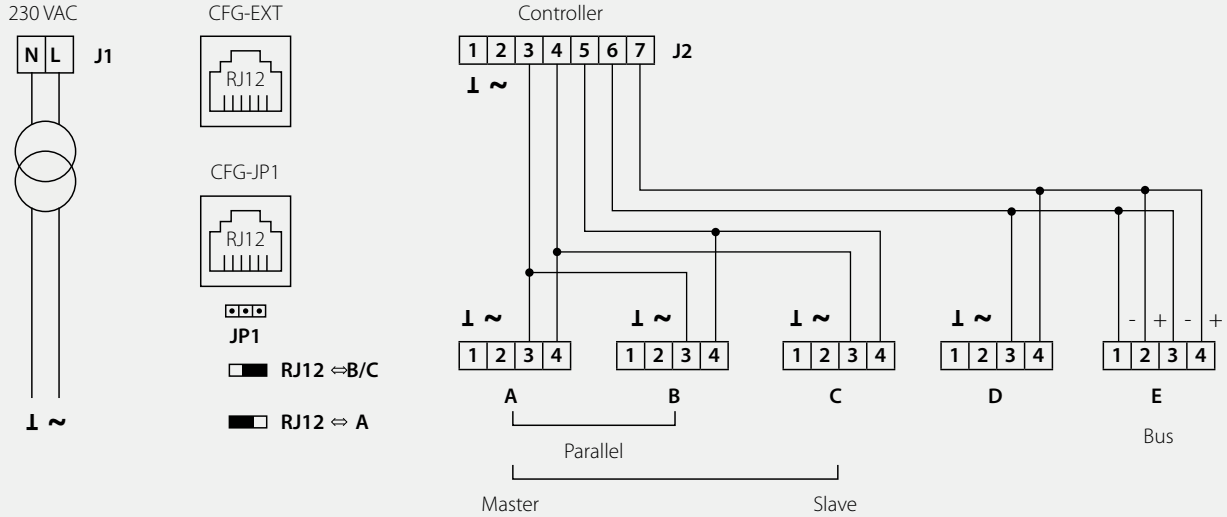
Power supply and commutation unit for VAV dampers (option C for VAV BOX series units) AEPS-230-24-10

The Power Supply **AEPS-230-24-10** unit providing 24 V AC power supply for VAV dampers and room controller. Unit **AEPS-230-24-10** is installed inside VAV BOX series units casings if option C is selected. Master-Slave or parallel configuration of both VAV dampers (supply and extract) is provided by simply plugging in the actuator plug to the appropriate connector.

Features:

- 230 VAC power supply.
- 24 VAC / 10VA nominal output voltage.
- Master-Slave or parallel configuration of actuators.
- Power indication LED.
- RJ12 socket for configuration of actuators.
- IP40.
- Up to 3 VAV controllers simultaneously connectable.
- Suitable for wall mounting.

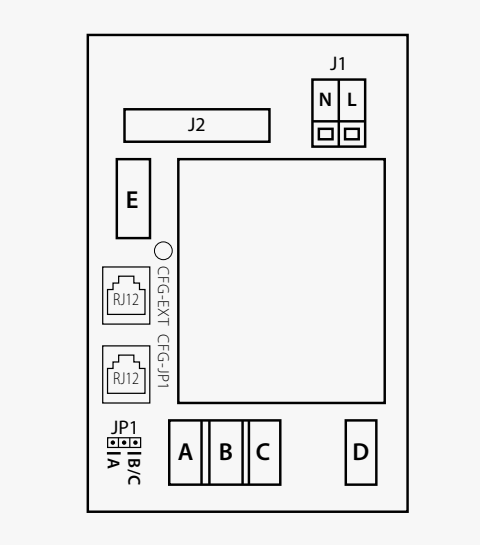
Wiring diagram:



2026-02

Connection description:

J1	**Supply 230 V**
J2	**Control unit / control signal** 1 = 24 VAC ⊥ 2 = 24 VAC ~ 3 = 2 ... 10 VDC control signal for drive A and B 4 = Feedback signal from A as well as control signal for C 5 = Feedback signal from B or C 6 = Control signal drive D 7 = Feedback signal drive D
CFG-EXT	**Programming device for external A - BC switch**
CFG-JP1	**Programming device for internal A – BC switch (JP1)** JP1 – A = RJ12 Connected to Actuator A JP1 – B/C = RJ12 Connected to Actuator B or C
A, B, C, (D) A = Intake B = Exhaust parallel C = Exhaust slave	**Actuators** - drive, VAV controllers 1 = 24 V ⊥ 2 = 24 V ~ 3 = 2…10 V control signal 4 = Feedback signal
E	**Bus** **1 = - 2 = + 3 = - 4 = +**



Configuration:

Function	Plug A	Plug B	Plug C	Plug D	Plug E
Master / Slave	Master-actuator	-	Slave-actuator	-	-
Parallel	Actuator 1	Actuator 2	-	-	-
Single drive	-	Actuator 1	-	-	-
Communication	-	-	-	-	Bus

Technical specification:

POWER SUPPLY	**Operating voltage**	210...250 VAC, 50/60 Hz
	Maximum Power	10 VA
	Electrical connection	Terminal connectors, wire 2x 1...2,5 mm²
OUTPUTS	**Nominal voltage**	20...27 VAC
	Connections: **Drive and VAV-controllers** **Control** **Configuration**	 Plug 4 × 0,34...1,5 mm² Screw terminals: 7 × 0,34...2,5 mm² RJ12
ENVIRONMENT	**Operation**	To IEC 721-3-3
	Climatic conditions	Class 3K5
	Temperature	-10...+40 °C
	Humidity	<90 % RH non-condensing
STANDARDS	**Conformity acc. to** **2014/30/EU EMC** **2014/35/EU LVD**	 EN 61000-6-1 EN 61000-6-3
	Degree of protection	IP40 (EN 60529)
	Environment class	II (EN 60730-1)
	Safety class	II (IEC 60536)
	Overvoltage category	III (EN 60730-1)
GENERAL	**Material**	PC + APS plastics
	Dimensions (L × B × H)	160 × 75 × 50 mm
	Weight incl. package	550 g

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