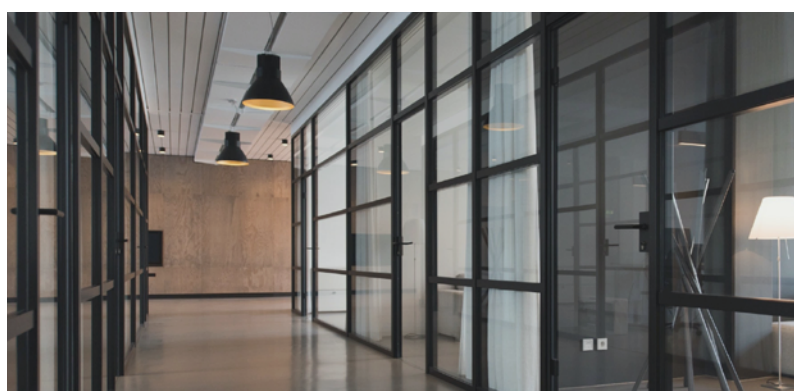




# VARIABLE AIR VOLUME DAMPERS

Installation instructions



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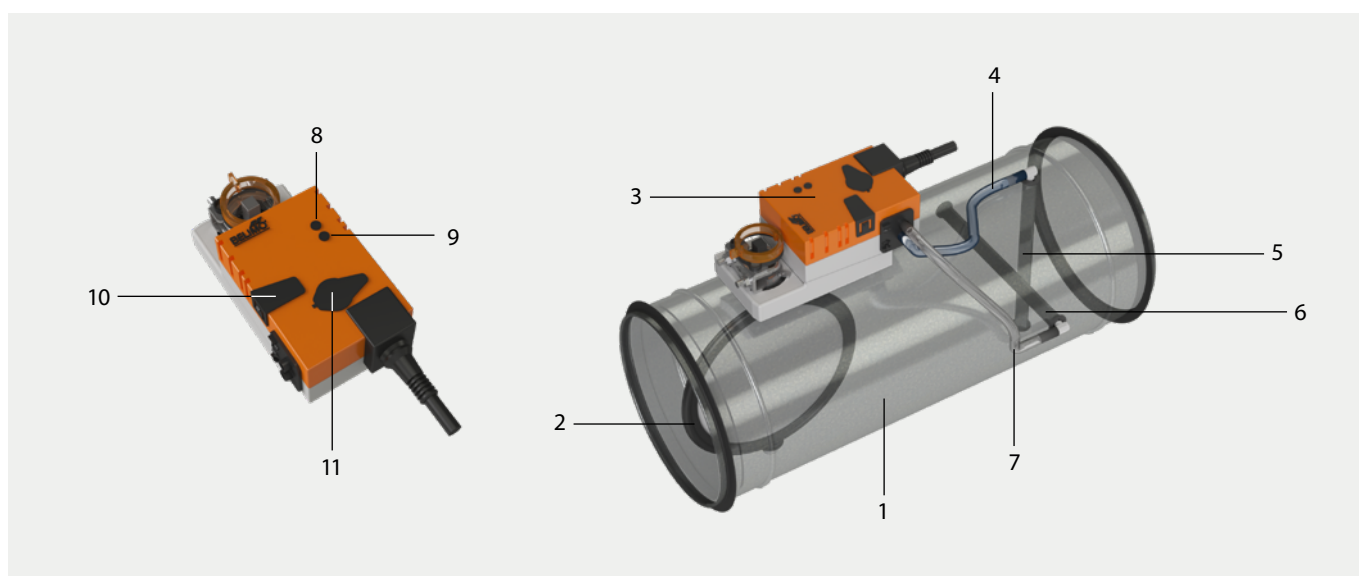
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**PLEASE READ THE INSTRUCTIONS CAREFULLY PRIOR TO ANY INSTALLATION WORKS!**

# 1. WHAT KOMFOVENT VARIABLE AIR FLOW DAMPER IS

**Variable air volume (VAV) damper** is a part of heating, ventilating, and/or air-conditioning (HVAC) system. VAV damper consists of damper casing, measuring unit and controller. Damper is fitted with a differential pressure sensor for measuring the volume flow rate.



**Fig. 1: VAV damper composition**

1 – damper casing, 2 – damper blade, 3 – VAV control unit, 4, 7 – measuring hoses, 5, 6 – control unit measuring tubes, 8 – green push button and LED display, 9 – yellow push button and LED display, 10 – gear disengagement button, 11 – service plug

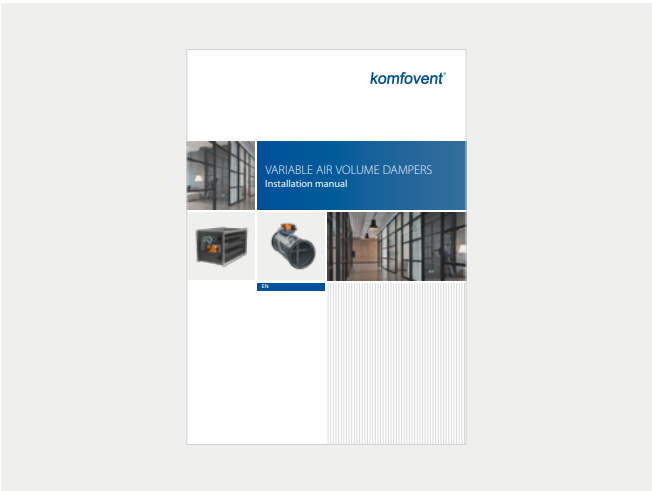
## Operating controls and indicators:

8	<b>Off:</b>	No power supply or fault
	<b>Illuminated:</b>	In operation
	<b>Flashing:</b>	Address mode: pulses according to set address (1 ... 16) when starting: reset to factory setting (communication)
	<b>Press button:</b>	In standard mode: switches on angle of rotation adaptation In address mode: confirmation of set address (1 ... 16)
9	<b>Off:</b>	The actuator is ready
	<b>Illuminated:</b>	Adaption or synchronizing process active or actuator in address mode (green LED indicator flashing)
	<b>Flickering:</b>	Modbus communication active
	<b>Press button:</b>	In operation (>3 s): switch address mode on and off In address mode: address setting by pressing several times When starting (>5 s): reset to factory setting (communication)
10	<b>Press button:</b>	Gear disengaged, motor stops, manual override possible
	<b>Release button:</b>	Gear engaged, synchronization starts, followed by standard operation
11	<b>Service plug</b>	For connecting parameterizing and service tools

Standard delivery contains:



1 fully assembled VAV damper



1 installation instructions



1 label for setting  $V_{min}$  and  $V_{max}$  parameters



2 protective transportation caps (*optional*)

## 2. GENERAL REQUIREMENTS FOR SAFETY



**WARNING! Danger of serious damage to health and risk of damage to property due to incorrect use!**

**Incorrect use of the electrical component could result in the creation of a dangerous situations.**



**Never use the VAV device:**

- in explosion protected junctions;
- in any aircrafts;
- unless efficient protection against weather conditions not assured;
- in wet conditions (swimming pools, bathrooms, boats).

**It is forbidden to modify the VAV damper or replace any unit part unless otherwise provided by KOMFOVENT. Only original replacement parts submitted by KOMFOVENT are allowed to be used. Qualified staff only are allowed to replace parts or service the VAV damper.**



1. The actuator must not be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
2. It may only be installed by suitably trained personnel. Any legal regulations or regulations issued by authorities must be observed during installation.
3. The device may only be opened at the manufacturer's site. It does not contain any parts that can be replaced or repaired by the user.
4. The cable must not be removed from the device.
5. When calculating the required torque, the specifications supplied by the damper manufacturers (cross-section, design, installation site), and the air flow conditions must be observed.
6. The device contains electrical and electronic components and is not permitted to be disposed of as household refuse. All locally valid regulations and requirements must be observed.

### 3. EQUIPMENT FOR PERSONAL PROTECTION

Personal protective equipment must be worn for such types of work: VAV damper electrical installation, VAV damper mechanical connection to the air duct system (ductwork) and any type of service or maintenance works.



#### **Protective gloves must be worn**

Protective gloves protect hands against abrasion, oily environment, sharp metal parts and contact with hot surfaces.



#### **Protective industrial helmet must be worn**

Industrial helmets protect the head against impact from objects falling from above, by resisting and deflecting blows to the head.



#### **Protective boots must be worn**

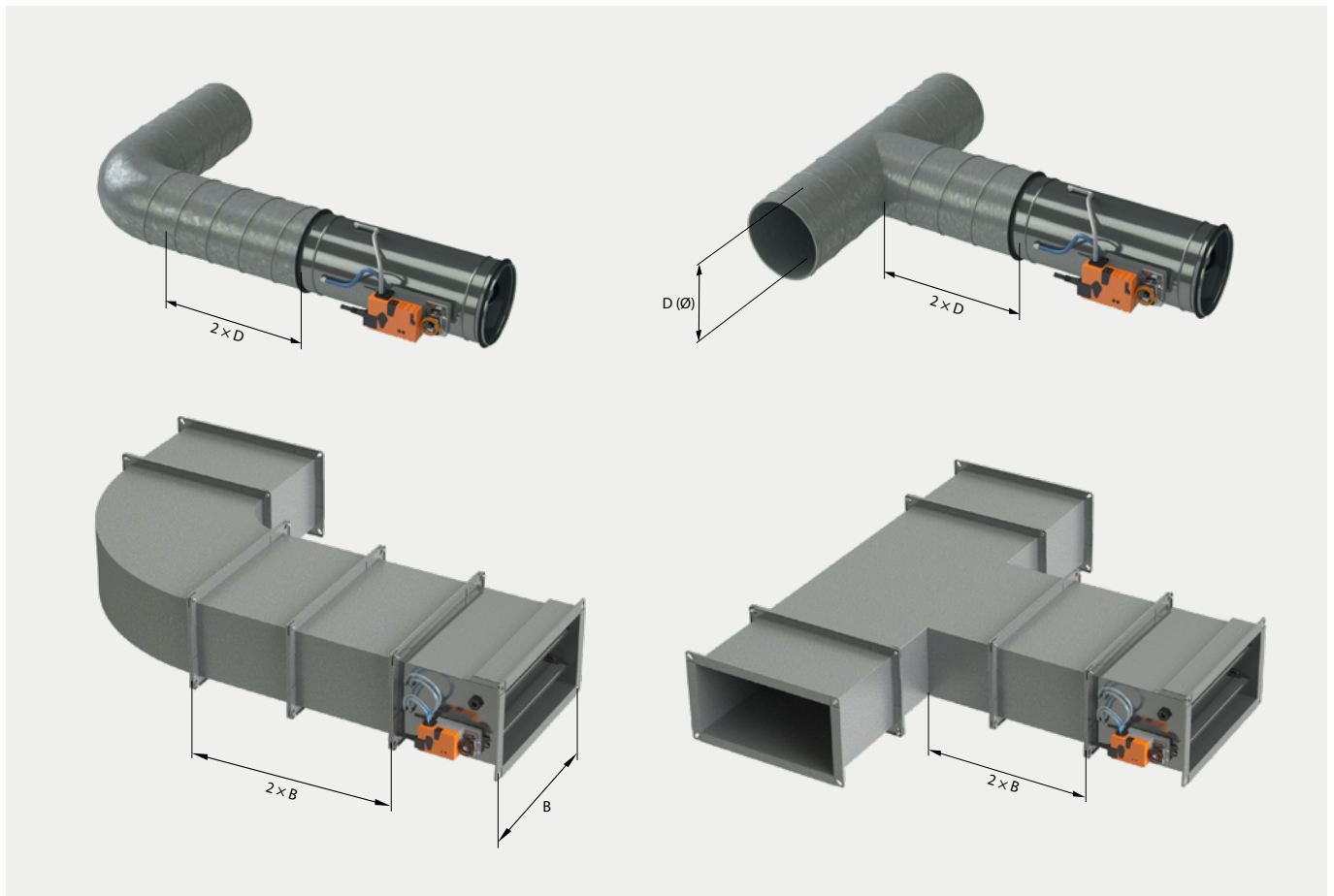
Protective boots protect the foot from falling objects or compression and prevent slipping on a slippery floor.

## 4. INSTALLATION INFORMATION

To avoid flow measurement deviation and unnecessary errors, the minimum distance before the VAV damper must be observed (see Fig. 2).

Straight section of duct equal to  $2 \times D$  (for circular ducts) or  $2 \times B$  (for rectangular ducts) from  $90^\circ$  bend or T-piece is the minimum requirement when installing VAV dampers.

Using smaller straight section will lead to a bigger flow measurement error. A bigger straight distance is recommended after silencers, fire dampers and other ventilation duct system components.



**Fig. 2: Minimum distance between VAV damper and duct system fittings**

Mounting the VAV damper onto the air duct system it is important to take into account the airflow direction. Required air-flow direction is shown on the damper label and indicated with blue arrow (see Fig.3).

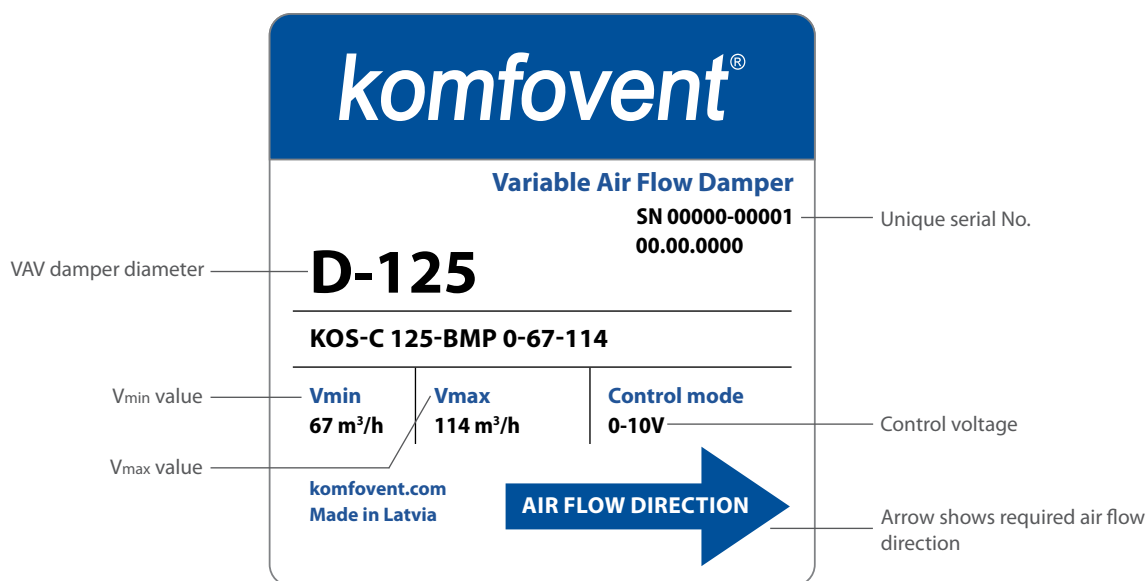


Fig. 3: VAV damper label

Each VAV damper is produced individually and configured to fulfil the project requirements. Unique serial number shown on the label should be used to identify damper designed location onto the mounting scheme.

VAV damper controllers are provisionally programmed to required Vmin and Vmax values at the factory.

For VAV damper connection, the matching supply voltage should be energized to the electrical components.

The connection should be must be carried out in such a way as specified in connection schemes.



**The matching voltage values and the connection conditions should be respected!  
Only qualified electricians are allowed to carry out work!**

There are four possible main VAV damper connection types:

Analogue connection	MP-Bus connection	Modbus / BACnet connection	KNX connection
LMV-D3-MF-F controller	LMV-D3-MP controller	LMV-D3-MOD controller	LMV-D3-KNX controller



## 4.1. Analogue connection

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

Type	Torque	Power consumption	Rating	Weight
LMV-D3-MF-F	5 Nm	2 W	3.5 VA (max. 8 A @ 5 ms)	Approx. 500 g

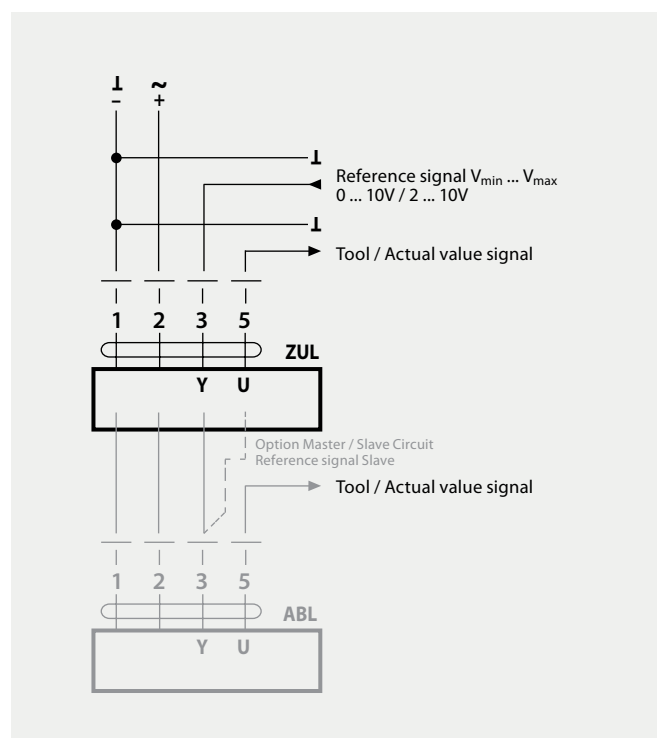
Damper is CLOSED via 0 ... 10 V reference signal (Mode 2 ... 10 V).

Setting parameters: Mode 2 ... 10 V, Shut off level 0.1 V or 0.5 V.

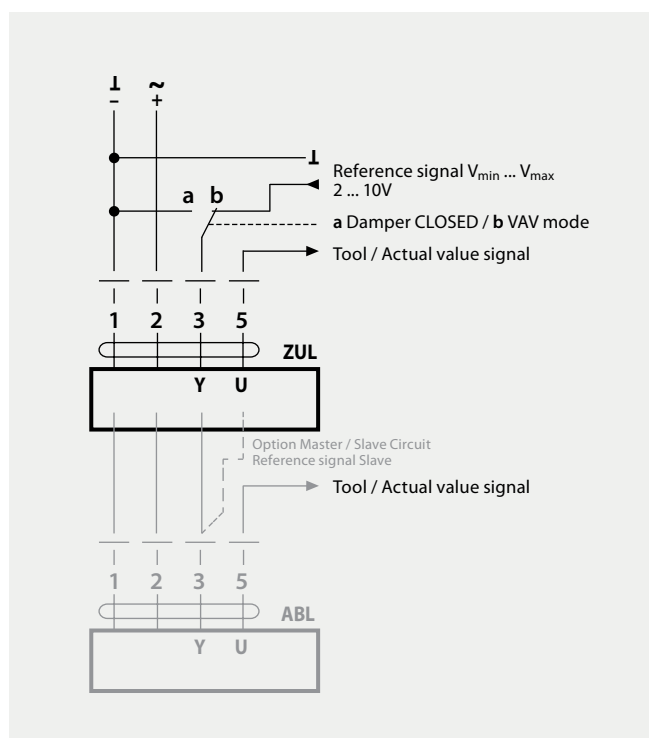
If the required switching threshold of 0.1 V cannot be attained, the value can be switched to 0.5 V with PCTool.

Function	Standard 0.1 V	Shut-off level 0.5 V
Damper CLOSED	<0.1 V	<0.5 V
V <sub>min</sub>	>0.1 ... 2 V	>0.5 V ... 2 V
V <sub>min</sub> ... V <sub>max</sub>	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.



**Wiring diagram 1: VAV, analogue reference signal**



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

## 4.2. MP-bus connection

For MP-bus connection master/slave bus technology a defined number of slaves can be connected to a MP-Master unit.

Type	Torque	Power consumption	Rating	Weight
LMV-D3-MP	5 Nm	2 W	3.5 VA (max. 8 A @ 5 ms)	Approx. 500 g

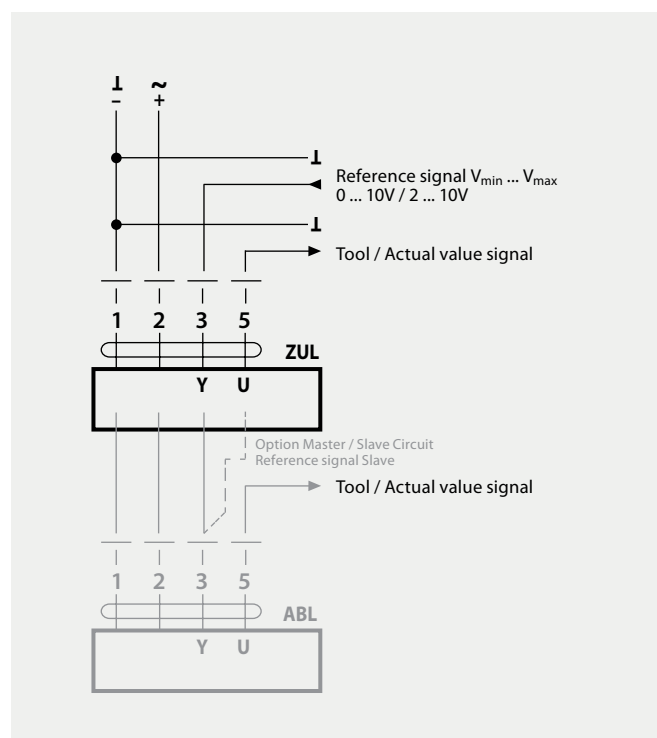
Damper is CLOSED via 0 ... 10 V reference signal (Mode 2 ... 10 V).

Setting parameters: Mode 2 ... 10 V, Shut off level 0.1 V or 0.5 V.

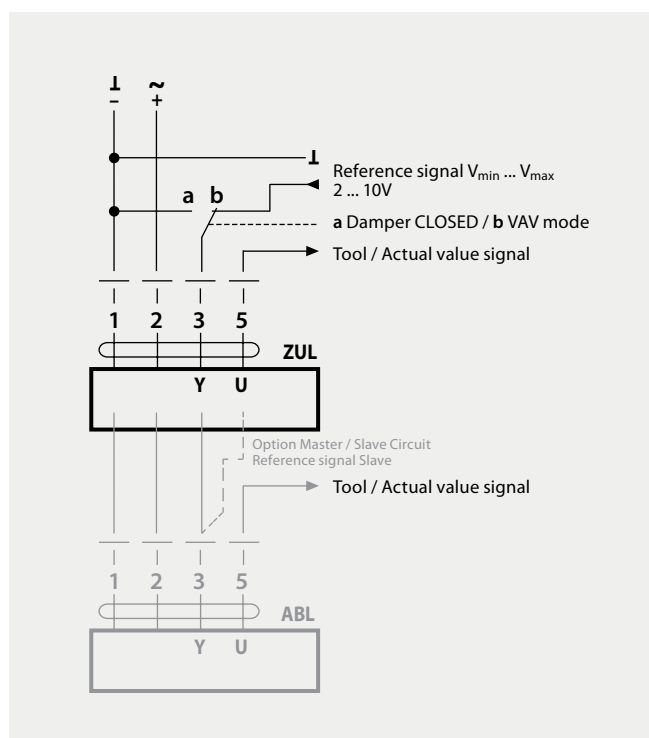
If the required switching threshold of 0.1 V cannot be attained, the value can be switched to 0.5 V with PCTool.

Function	Standard 0.1 V	Shut-off level 0.5 V
Damper CLOSED	<0.1 V	<0.5 V
V <sub>min</sub>	>0.1 ... 2 V	>0.5 V ... 2 V
V <sub>min</sub> ... V <sub>max</sub>	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.



Wiring diagram 1: VAV, analogue reference signal

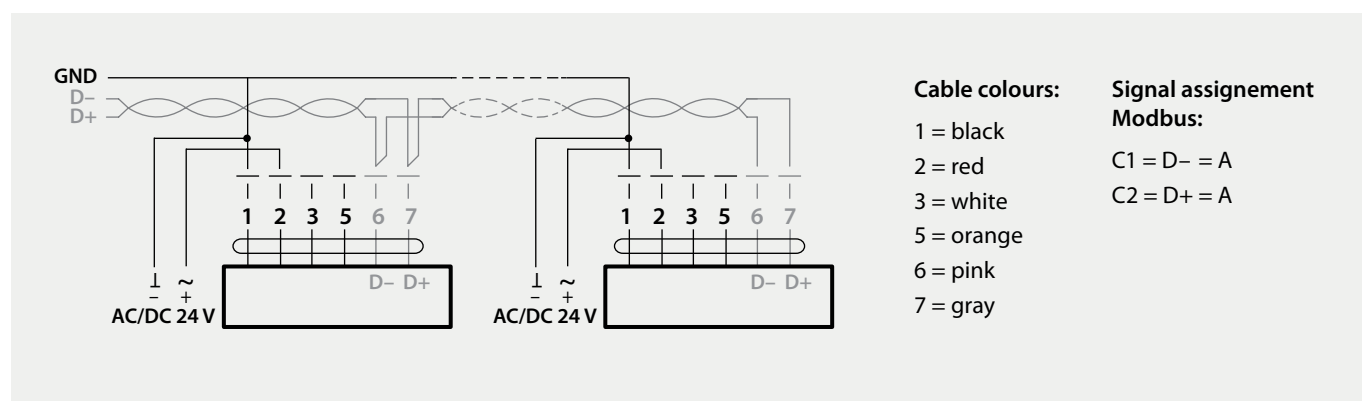


Wiring diagram 2: VAV with shut-off (CLOSED), 2 ... 10 V mode

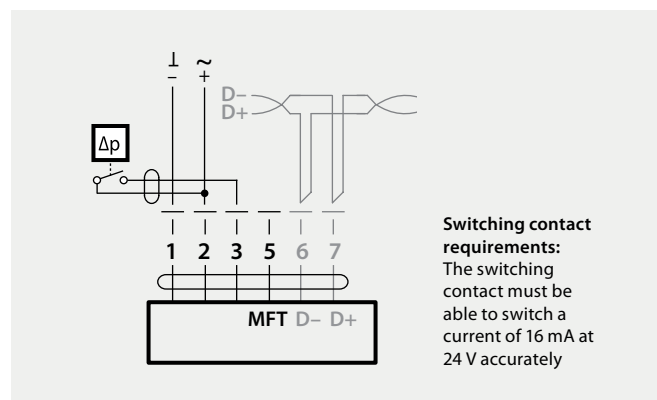
## 4.3. Modbus connection

For Modbus 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.

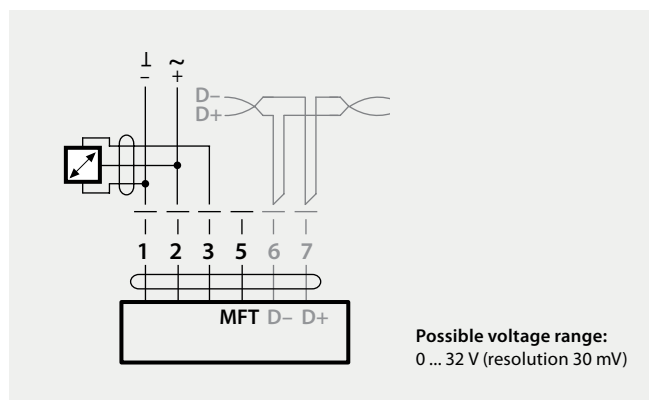
Type	Torque	Power consumption	Rating	Weight
LMV-D3-MOD	5 Nm	2 W	3.5 VA (max. 8 A @ 5 ms)	Approx. 500 g



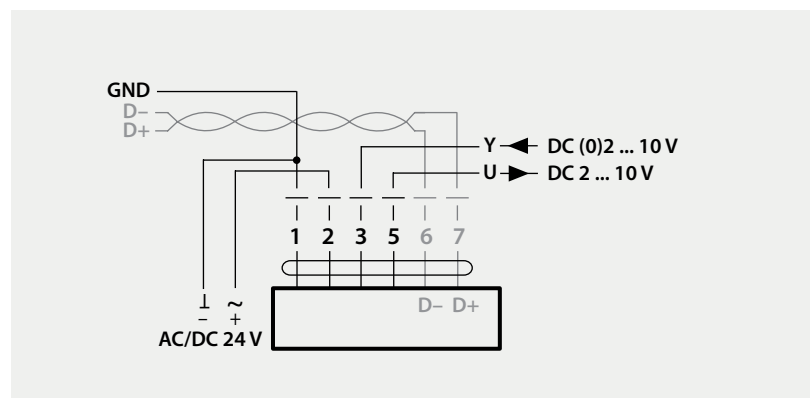
### BACnet MS/TP / Modbus RTU



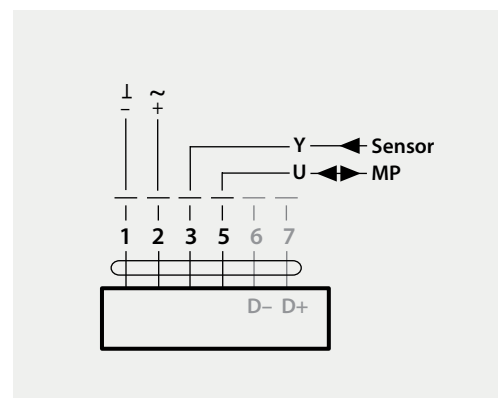
Connection with switching contact, e.g.  $\Delta p$ -monitor



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



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

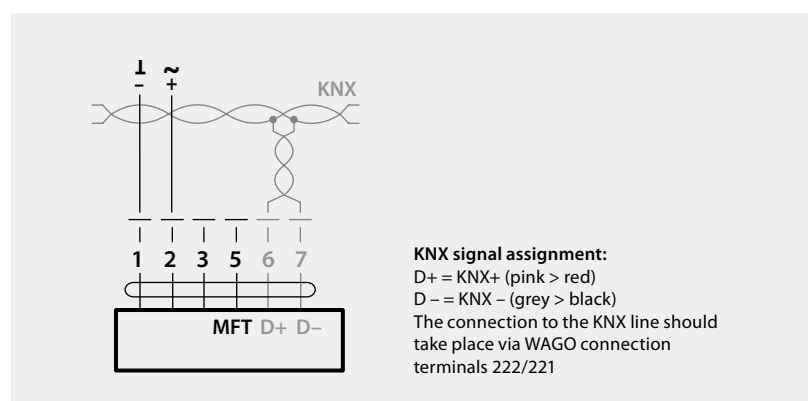


Operating on the MP-Bus

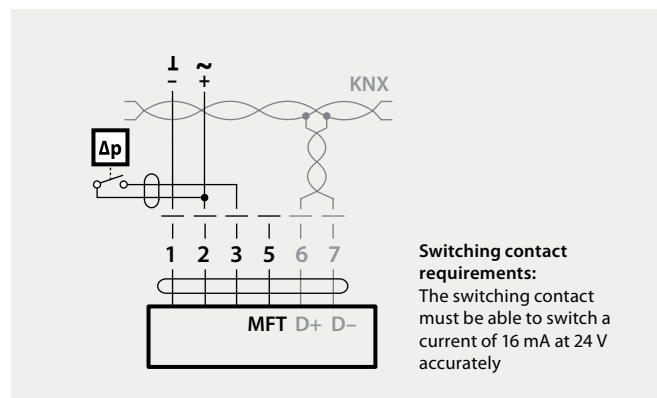
## 4.4. KNX connection

For 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.

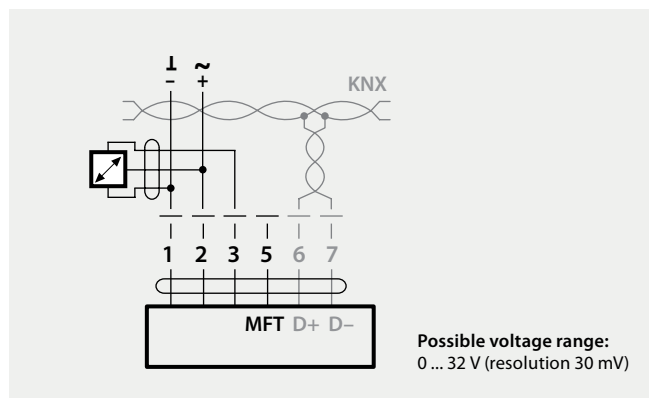
Type	Torque	Power consumption	Rating	Weight
LMV-D3-KNX	5 Nm	2 W	4 VA (max. 8 A @ 5 ms)	Approx. 500 g



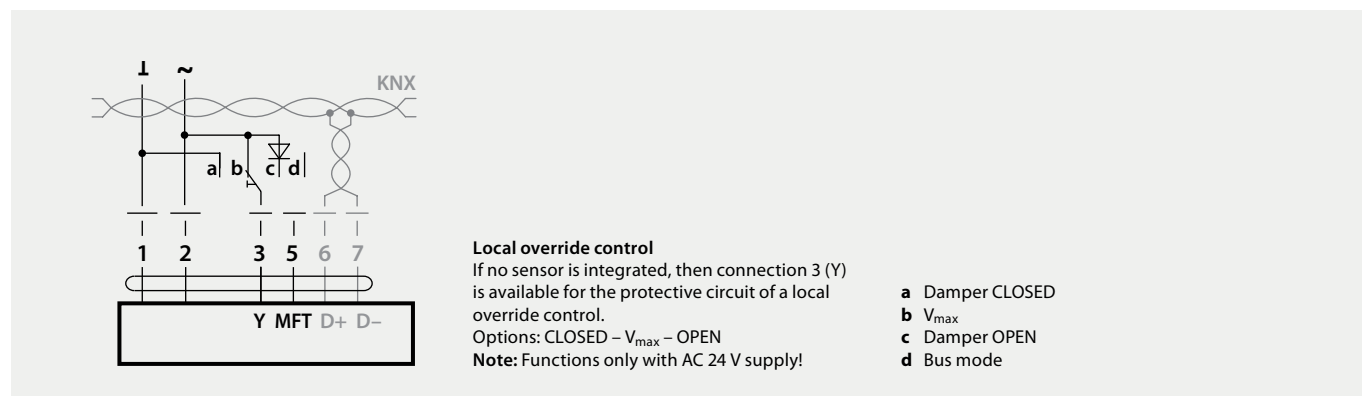
### Connection without sensor



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



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



## 5. STORAGE AND TRANSPORTATION

Please check received VAV dampers directly after delivery for transportation spoilage and other nonconformities.



**VAV damper cannot be installed if there are visible signs of electrical parts damage!**

VAV dampers can be transported by any means of transport. During transportation, the dampers must be fixed in such a way as to prevent their movement and deformation. VAV dampers should be stored indoors in a ventilated area under normal conditions. Recommended storage temperature range is 5 - 35 °C. Dampers must be protected from direct atmospheric exposure, direct sunlight, rainfall or wind.

During storage and transportation, the VAV controller must be protected from loading.

It is recommended to keep the original boxes and / or protective caps or lids to avoid damper measuring tubes contamination with dust and sweepings. Please do not remove the protective caps until just before installation.

## 6. PRODUCT LIFE CYCLE

VAV damper is designed in nature-way to have minimum impact on environment.

RAW MATERIALS	Casing Blade	Galvanized sheet metal as per EN 10346-15 Continuously hot-dip coated steel flat products for cold forming - Technical delivery conditions. DX51D: Bending and profiling quality 0.7 mm chemically passivated sheet metal. Zinc coating thickness per surface in the single spot test - 15 to 27 µm.
	Axes	Hot-rolled steel as per EN 10025-2:2004 European standard for hot-rolled structural steel. Part 2 - Technical delivery conditions for nonalloy structural steels.
	Sealing rings	EPDM rubber with self-lubricating properties. Shore A hardness 64. Elongation at break over 200% as per ISO 37-2017 Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties. Ozon resistance with no cracks under the conditions 96h/20%/50pphm/30°C as per ISO 1431-1-2012 Rubber, vulcanized or thermoplastic - Resistance to ozone cracking -- Part 1: Static and dynamic strain testing.
	Aluminum tubes	Aluminum tube 10x10x1 mm as per EN 755-1:2008 Aluminum and aluminum alloys. Extruded rod/bar, tube and profiles. Technical conditions for inspection and delivery.
	Digital VAV controller	Control pollution degree categorized by Underwriters Laboratories (UL) and IEC: 3. Protection class as per IEC/E III Safety: extra-low voltage.
	Other materials	Plastic fittings, stainless steel connecting plate, bushings, galvanized fasteners, polymer material stickers, vegetable grease, talc (in average less than 5% of the product total weight).
ENERGY CONSUMPTION	Space heating	Heat-pumping technology is used to heat the manufacturing places. Additionally, natural gas is in use.
	Water heating	Compressor's heat exchanger additionally is used for supplied water heating.
EMISSIONS	Air emissions	Automated casing production line is equipped with smoke receiver. The new generation laser cutting machine CO2 emission amount is reduced by 25%.
	Water emissions	There are no any water emissions.
PACKAGING	Primary packaging	Cardboard box producer has received Ecolabel, FSC® and PEFC Chain of custody Certificates.
	Secondary packaging	EUR pallet producer has received PEFC Chain of custody Certificates and provides pallets restoration to decrease environmental influence.
ENVIRONMENTAL LOAD	Product life cycle	Product life cycle normally is equal to air duct lifespan, i.e. 30 years.
	Product utilization	Product utilization has no environmental influence. Up to 25% of the total steel content can be recovered for further use.
	Packaging utilization	All packaging materials are 100% recyclable.

## 7. HYGIENE ASPECTS

As VAV damper manufacturer Komfovent Ltd. developed a product composed only of materials and components with approved quality and safety properties.

The hygiene check was conducted for the following used materials:

- Stainless steel AISI 304;
- Galvanized steel DX51D+Z275;
- Mineral wool Isover KT-40;
- VAV-Compact MP, VAV-Compact MOD and VAV-Compact MF controllers;
- Insulating rubber CO5/HD0426.

Latvian Health Inspectorate under Ministry of Health of the republic of Latvia conducted a VAV damper hygiene assessment and authorized the safe VAV dampers application in air distributing systems installed in public, residential and industrial facilities.

## 8. ORDERING SAMPLE

**KOS - C - I - N - 160 - BMF - 0 - 100-300**

- |   |  |       |
|---|--|-------|
| ① | <b>Damper type:</b> KOS  | _____ |
| ② | <b>C</b> – circular<br><b>R</b> – rectangular  | _____ |
| ③ | <b>I</b> – with insulation 50 mm<br><b>No entry</b> – without insulation   | _____ |
| ④ | <b>N</b> – stainless steel casing<br><b>No entry</b> – galvanized steel casing   | _____ |
| ⑤ | <b>Diameter:</b> 100/125/160/200/250/315/355/400/500/600   | _____ |
| ⑥ | <b>Actuator type:</b> <b>BMF</b> – analogue connection<br><b>BMP</b> – MP-bus connection<br><b>BMD</b> – Modbus communication<br><b>BMDbn</b> – BACnet communication<br><b>BKX</b> – KNX communication | _____ |
| ⑦ | <b>Control signal:</b> <b>0</b> – 0..10 V<br><b>2</b> – 2..10 V  | _____ |
| ⑧ | <b>V<sub>min</sub>-V<sub>max</sub></b> – defined air flow, m <sup>3</sup> /h   | _____ |

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