Pressure sensor, digital VAV controller and damper actuator as communicative compact solution for pressure-independent VAV and CAV systems in the comfort zone
• Communication via KNX (S mode)
• Conversion of sensor signals
• Service socket for operating devices

KNX®

LMV-D3-KNX
NMV-D3-KNX

Brief description

Application	The VAV-Compact with its PI control characteristic is used for the pressure-independent control of VAV units in the comfort zone.
Volumetric flow measurement	The integrated D3 differential pressure sensor is also suitable for very small volumetric flows. The maintenance-free sensor technology enables a wide range of applications in the comfort zone: residential construction, office, hospital, hotel, cruise ship, etc.
Actuator	A variety of actuator versions (5 or 10 Nm) are available to the VAV unit manufacturer for the different VAV unit designs.
Control function	Volumetric flow (VAV/CAV) or position control (Open Loop) for integration in external VAV control loop.
VAV (VVS) – Variable volumetric flow	Demand-dependent specification of the volumetric flow $V'_{min}...V'_{max}$ via modulating reference variable via KNX, e.g. room temperature/CO_2 controller, DDC or bus system, for energy-saving air conditioning of individual rooms or zones.
DCV – Demand Controlled Ventilation	In higher-level KNX system, e.g. with integrated Optimiser function.
Mode of operation	The actuator is fitted with an integrated interface for KNX (S mode), it receives the digital control signal from the KNX system and returns the current status.
Converter for sensors	Connection option for a sensor (passive or active sensor or switching contact). In this way, the analogue sensor signal can be easily digitised and passed along to KNX.
Parametrisation	The factory settings cover the most common applications. As desired, individual parameters can be adapted for specific systems or servicing with a service tool (e.g. ZTH EU).
Communication parameters	The VAV-Compact is equipped with an integrated interface for KNX (S-Mode). The VAV controller can be connected with all KNX devices that have corresponding data points available.
Operating and service devices	Service tool ZTH EU, PC-Tool service socket: local plug-in or via PP connection.
Electrical connection	The connection is made using the integrated connecting cable.
Sales, assembly and setting	The VAV-Compact is mounted by the VAV unit manufacturer (OEM), and the application is adjusted and calibrated accordingly. The VAV-Compact is sold exclusively via the OEM channel for this reason.

Type overview KNX versions

Type	Torque	Power consumption	For wire sizing	Weight
LMV-D3-KNX	5 Nm	2 W	4 VA (max. 8 A @ 5 ms)	Approx. 500 g
NMV-D3-KNX	10 Nm	3 W	5 VA (max. 8 A @ 5 ms)	Approx. 700 g

| **Other versions** | The VAV-Compact is also available with a built-in interface for direct integration in MP-Bus systems, Modbus and BACnet.
For more information and documentation, see www.belimo.com. |

Safety notes

⚠

- **The device is not allowed to be used outside the specified field of application, especially not in aircraft or in any other airborne means of transport.**
- **Outdoor applications: Only possible if no (sea) water, snow, ice, solar radiation or aggressive gases act directly on the actuator and it is guaranteed that the ambient conditions are always within the limit values according to the data sheet.**
- **Only authorised specialists may carry out installation. All applicable legal and government agency regulations must be complied with during use.**
- **The device may be opened only at the manufacturer's plant. It does not contain any parts that can be replaced or repaired by the user.**
- **Cables must not be removed from the device.**
- **When calculating the torque requirement, the specifications supplied by the damper manufacturers (cross-section, construction, installation situation), and the ventilation conditions must be observed.**
- **The device contains electrical and electronic components and is not permitted to be disposed of as household waste. Local and currently valid legislation must be observed.**

Electrical installation

Notes
⚠
– Supply via safety isolating transformer!
– KNX signal assignment:
   D+ (pink) = KNX+ (red)
   D- (grey) = KNX- (black)
– The connection to the KNX line must be made via the WAGO connecting terminals 222/221.
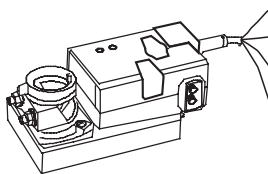
No.	Designation	Cable colour	Function
1	⊥ -	black	AC/DC 24 V supply
2	~ +	red	
3			
5	► MFT	orange	PP connection
6	D+	pink	KNX+ (red)
7	D-	grey	KNX– (black)

See separate documentation for description of function and application

Technical data

Electrical data	Nominal voltage	AC/DC 24 V, 50/60 Hz
	Operating range	AC 19.2…28.8 V/DC 21.6…28.8 V
	Performance data	See type overview (page 1)
	Connection	Cable, 6 x 0.75 mm^2, pre-fabricated
Volumetric flow controller	Control function	VAV/CAV and position control (Open Loop)
	V'_{nom} [1]	Nominal flow rate setting OEM-specific, matches the VAV unit
	Δp @ V'_{nom} [1]	38…450 Pa
	V'_{max}	20...100% of V'_{nom}, adjustable
	V'_{mid}	>V'_{min}…<V'_{max}, adjustable
	V'_{min}	0…100% of V'_{nom}, adjustable (<V'_{max})
Sensor integration	Input	0…32 V, input impedance 100 kΩ
	Sensor	Active sensor (0…10 V) Switching contact (0/1) switching capacity 16 mA @ 24 V
Local override control	Override	CLOSE/V'_{max}/OPEN, AC 24 V supply required
Data for KNX	Communication medium	KNX TP
	Number of nodes	max. 64 per line segment, reduce number of nodes with connection cable with short lines
	Operating mode	S-Mode
	Voltage consumption of KNX-Bus	max. 5 mA
	Planning and commissioning tool	ETS4 or higher
	Parametrisation	with service tool ZTH EU
	Sensor integration	Active sensor (0…10 V) Switching contact (0/1) (switching capacity 16 mA @ 24 V)
Operation and service	Service Tool ZTH EU, PC-Tool	Local connector socket/remote via PP connection
	LED	Supply, status and communication display
	push-button	Addressing, angle-of-rotation adaptation and test function
Actuator	Rotary/linear version	Brushless, blockage-proof actuator with power-save mode
	Direction of rotation [1]	Left/right
	Angle of rotation	95°, adjustable mechanical or electrical limitation
	Gear disengaged	Push button, self-resetting without functional limitation
	Position indication	Mechanical or for read-out (Tool, Bus Client)
	Shaft holder	Shaft clamp for round and square axes
Volumetric flow measurement	Differential Pressure Sensor	Belimo D3 sensor, dynamic measurement principle
	Measurement, nominal voltage range	-20…500 Pa, 0…500 Pa
	Overload capacity	±3000 Pa
	Altitude compensation	Adaptation to system altitude (adjustment range 0...3000 meters above sea level)
	Installation position	Position-independent, no reset necessary
	Materials in contact with measuring materials	Glass, epoxy resin, PA, TPE
	Condition of measuring air	Comfort zone 0...50°C/5...95% RH, non-condensing
Security	Protection class IEC/EN	III Protective extra low voltage (PELV)
	Degree of protection IEC/EN	IP54
	EMC	CE according to 2014/30/EU
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14
	Rated impulse voltage Supply / Control	0.8 kV
	Control pollution degree	3
	Ambient temperature	0...50°C
	Storage temperature	-40...80°C
	Ambient humidity	95% RH, non-condensing
	Maintenance	Maintenance-free. Depending on use, the differential pressure pickup device (measuring cross, disc, etc.) of the VAV unit must be checked now and then and cleaned as needed.

[1] Setting by VAV manufacturer (OEM)

KNX Group Objects

Name	Type	Flags					Data point type				Values range
		C	R	W	T	U	ID	DPT_Name	Format	Unit	
Setpoint	I	C	–	W	–	–	5.001	_percentage	1 Byte	%	[0...100] Resolution 0.4%
Override control	I	C	–	W	–	–	20.*	_enum	1 Byte	–	0 = no override 1 = Open 2 = Closed 3 = Min 4 = Mid 5 = Max
Reset	I	C	–	W	–	–	1.015	_reset	1 Bit	–	0 = no action 1 = reset
Adaptation	I	C	–	W	–	–	1.001	_switch	1 Bit	–	0 = no action 1 = adapt
Testrun	I	C	–	W	–	–	1.001	_switch	1 Bit	–	0 = no action 1 = Testrun
Min	I/O	C	R	W	–	–	5.001	_percentage	1 Byte	%	[0...100] Resolution 0.4%
Max	I/O	C	R	W	–	–	5.001	_percentage	1 Byte	%	[0...100] Resolution 0.4%
Relative position	O	C	R	–	T	–	5.001	_percentage	1 Byte	%	[0...100] Resolution 0.4%
Absolute position	O	C	R	–	T	–	8.011 7.011	_rotation_angle _length	2 Byte	° mm	[−32'768...32'768] [0...65'535]
Relative volumetric flow	O	C	R	–	T	–	5.001	_percentage	1 Byte	%	[0...100] Resolution 0.4%
Absolute volumetric flow	O	C	R	–	T	–	14.077 9.009	_volume_flux _air_flow	4 Byte 2 Byte	m^3/s m^3/h	$1.0 \times 10^{-10}\ m^3/s$ $1.0 \times m^3/h$
Nominal volumetric flow	O	C	R	–	T	–	14.077 9.009	_volume_flux _air_flow	4 Byte 2 Byte	m^3/s m^3/h	$1.0 \times 10^{-10}\ m^3/s$ $1.0 \times m^3/h$
Fault state	O	C	R	–	T	–	1.002	_boolean	1 Bit	–	0 = no error 1 = error
Overriden	O	C	R	–	T	–	1.002	_boolean	1 Bit	–	0 = not active 1 = active
Gear disengagement active	O	C	R	–	T	–	1.002	_boolean	1 Bit	–	0 = engaged 1 = disengaged
Service information	O	C	R	–	T	–	22.*	_bitset16	2 Byte	–	Bit 0 (1) Utilisation too high Bit 1 (2) Actuation path increased Bit 2 (4) Mechanical overload Bit 3 (8) – (Not used) Bit 4 (16) – (Not used) Bit 5 (32) – (Not used) Bit 6 (64) – (Not used) Bit 7 (128) – (Not used) Bit 8 (256) Internal activity Bit 9 (512) Bus monitoring triggered
Sensor value – Relative Humidity – Air Quality – Voltage mV – Value voltage scaled – Voltage scaled % – switch	O	C	R	–	T	–	 9.007 9.008 9.020 7.* 5.001 1.001	 _humidity _parts/million _voltage _pulses_length _percentage _switch	 2 Byte 2 Byte 2 Byte 2 Byte 1 Byte –	 % RH ppm mV mm % –	 [0...670'760] [0...670'760] [−670'760...670'760] [0...65'535] [0...100] 0/1

KNX Group Objects (Continued)

Setpoint	Specification of set volume or actuator position in % between the parameterised Min and Max limits. The operating mode is set by the manufacturer of the volumetric flow unit.
Override control	Overriding the setpoint with defined compulsions. As data point type, 1 Byte (without algebraic sign) is recommended (DPT 20.*)
Reset	Resetting the saved service messages (see KNX group object *Service information*).
Adaptation	Perform the adaption. The first-time adaption is performed by the manufacturer of the volumetric flow unit. An active adaptation is signaled in Bit 8 of *Service information.*
Testrun	Performance of a testrun that checks the entire operating range. An active testrun is signalled in Bit 8 of *Service information.* After completion, detected faults (mechanical overload, actuation path exceeded) are signalled in *Service information.*
Min	Minimum Limit (volumetric flow or position) in % of the nominal volumetric flow V_{nom} Caution: Changing the setting may result in malfunctions.
Max	Maximum Limit (volumetric flow or position) in % of the nominal volumetric flow V_{nom} Caution: Changing the setting may result in malfunctions.
Relative position	Current actuator position in %
Absolute position	Absolute position/stroke The data point type is to be selected depending on the type of movement: [°] DPT 8.011 [mm] DPT 7.011
Relative volumetric flow	Relative volumetric flow in % of the nominal volumetric flow V_{nom}
Absolute volumetric flow	Absolute volumetric flow in m^3/s and m^3/h
Nominal volumetric flow	Nominal volumetric flow in m^3/s and m^3/h The nominal volumetric flow is determined by the manufacturer of the volumetric flow unit.
Fault state	Collective fault based on Bit 0…Bit 7 of *Service information.*
Overridden	Signalling of an active override control (OPEN/CLOSED) The device can be commanded via the KNX group object *Override control* or via the forced switching at the input Y/3. Only the override controls OPEN and CLOSED are signalled.
Gear disengagement active	Signalling an active gear disengagement
Service information	Detailed information regarding instrument status As data point type, Bitset 16-Bit is recommended (DPT 22.*) Status information:

Bit 0:   Motor operation in relation to operating period too high
Bit 1:   Actuation path increased, e.g. defined end position exceeded
Bit 2:   Mechanical overload, i.e. defined end position not reached
Bit 3…7: not used with this instrument type
Bit 8:   Internal activity (Synchronisation, Adaptation, Testrun, …)
Bit 9:   Bus monitoring triggered
Bit 0:   Bit 7 are stored by the device and can be reset with the KNX group object *Reset*. As an alternative, they can be read as total fault status.

Sensor value	The representation of the sensor value is dependent on the parameterization. See section „KNX parameters – Sensor"

KNX parameters

Common

System altitude [m]	The specification of the system altitude increases the precision of the volumetric flow control.

Values range: 0...3'000 m
Factory setting: 500 m

Setpoint with bus fail	A setpoint can be defined for cases of communication interruption.

Values range: None (last setpoint)
Open
Closed
Mid
Factory setting: None (last setpoint)

The monitoring of the communication takes place for the KNX group objects *Setpoint* and *Override control*. If none of the objects is written within the parameterised monitoring time, the bus fail position is set and signalled in the *Service information* (Bit 9).

Bus monitoring time [min]	Monitoring time for the detection of a communication interruption.

Values range: 1...120 min
Factory setting: –

Difference value for sending the actual values [%]	Actual values (position, volumetric flow) are transferred at the time of a value change insofar as these change by the parameterised difference value. If the relative value changes by the difference value, not only the relative actual value but also the absolute actual value are transferred.

Values range: 0...100%
Factory setting: 5%

The transfer is deactivated with 0% in the event of a value change.

Repetition time [s]	Repetition time for all position and sensor actual values. Status objects are not transferred except with a change.

Values range: 0...3'600 s
Factory setting: 0 = no periodic transmission

Sensor

Sensor type	The input Y/3 can be used to connect a sensor. The sensor value is digitised and made available as KNX communication object.

Values range: No sensor
Active sensor (0...32 V)
Switching contact (0 / 1)
Humidity sensor (0...10 V corresponds 0...100%)
Air quality sensor CO2 (0...10 V corresponds 0...2'000 ppm)
Factory setting: No sensor

A switching to Y/3 is treated as local override switching in the absence of sensor parameterization.

Difference value for sending the sensor value	The sensor value is transferred at the time of a value change insofar as this changes by the parameterised difference value.

Values range: 0...65'535
Factory setting: 1

The transfer is deactivated with 0 in the event of a value change. Without value change, the sensor value is sent because of the repetition time.

Output (for sensor type „Active sensor")	Only for „Active sensor" sensor type

Values range: Sensor value mV (DPT 9.020)
Sensor value scaled (DPT 7.xxx)
Sensor value scaled % (DPT 5.001)
Factory setting: –

For „Sensor value mV", the measured voltage is made available without processing. In the case of the scaled sensor values, a linear transformation can be defined with two points.

Polarity (for sensor type «Switching contact»)	The polarity can be defined for the sensor type „Switching contact".

Values range: Normal
Inverted
Factory setting: –

Work procedures

Product database The product database for the import in ETS4 or higher is available at the Belimo website www.belimo.com (Download Centre)

Setting physical address The programming of the physical address takes place by ETS and the programming button on the device.

If the programming button is not accessible or accessible only with difficulty, then the address can be set using a point-to-point connection:
„Overwrite physical address: 15.15.255"

As a third possibility, the physical address can be programmed on the basis of the KNX series number (e.g. with Move'n'Group). The KNX series number is place on the device in two versions. One sticker can be removed for adhesion on the commissioning journal, for example.

Firmware upgrade The KNX firmware of the device is updated automatically with the programming of the application program insofar as the product database has a more recent version. The first programming procedure takes somewhat longer in such cases (>1 min).

Resetting to KNX factory settings If necessary, the device can be reset manually to the KNX factory settings (physical address, group address, KNX parameters).

For the reset, the programming button on the device must be pressed down for at least 5 s during start-up.
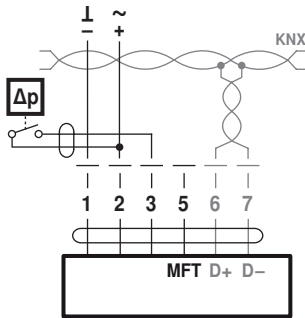
Electrical installation

Connection without sensor
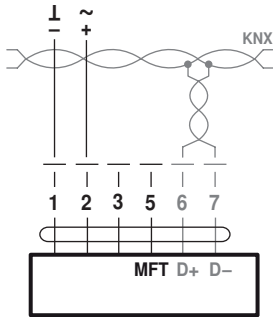
KNX signal assignment:
D+ (pink) = KNX+ (red)
D- (grey) = KNX- (black)
The connection to the KNX line must be made via the WAGO connecting terminals 222/221.

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.

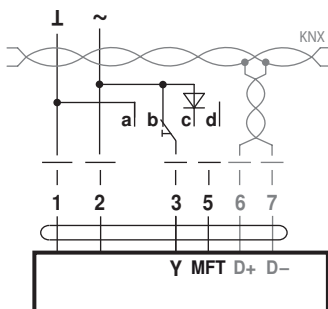### Connection of active sensors, e.g. 0...10 V @ 0...50°C
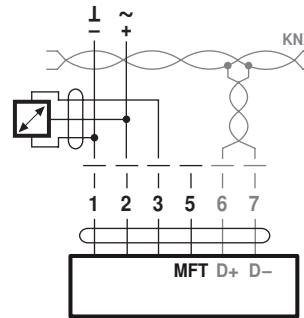
Possible input voltage range:
0...32 V (resolution 30 mV)

Local override control

If no sensor is integrated, then connection 3 (Y) is available as the protective circuit for a local override control.
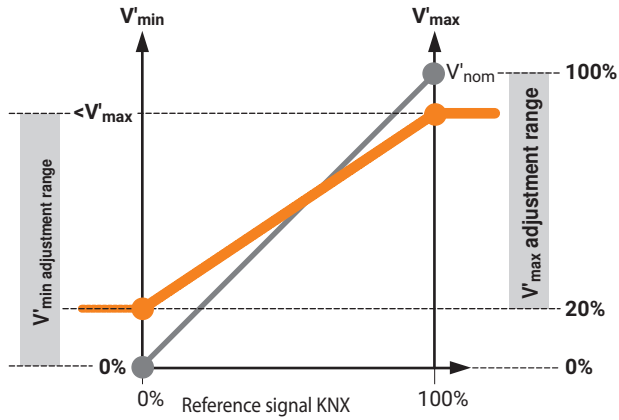Options: CLOSE – V'max – OPEN
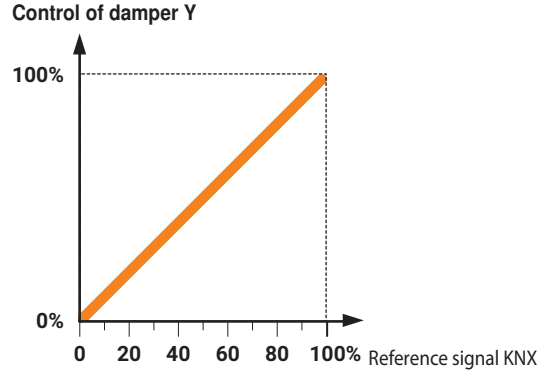
Caution: Functions only with AC 24 V supply!

a Damper CLOSE
b V'max
c Damper OPEN
d Bus mode

Control functions - VAV/CAV

VAV operating volumetric flow - Setting and control


Open Loop (separate external VAV control)

Control of damper Y

Settings and tool functions

Designation	Setting values, limits, explanations	Units	Tools 6)		Remarks
			ZTH EU	PC-Tool	
System-specific data					
Position	16 characters, e.g. Office 4 6th OG ZL	Text	r	r/w	
Designation	16 characters: Unit designation, etc.	Text	r	r/w	
Address (MP)	PP		r/w	r/w	For KNX applications: PP
V'max	20…100% [V'nom]	m³/h / l/s / cfm	r/w	r/w	>/= V'min
V'mid	V'min…V'max	m³/h / l/s / cfm	r/w	r/w	
V'min	0…100% [V'nom]	m³/h / l/s / cfm	r/w	r/w	</= V'max
Altitude of installation	0…3000	Meter	r/w	r/w	Adaptation of Δp sensor to altitude (meters above sea level)
Controller settings					
Control function	Volumetric flow / Position control (Open Loop)		-	-	
Mode	0…10 / 2…10	Volt	r/w 2)	r/w	For KNX applications: 2…10
CAV function 3)	CLOSE/V'min/V'max; Shut-off level CLOSE 0.1 V CLOSE/V'min/V'max; Shut-off level CLOSE 0.5 V V'min/V'mid/V'max; (NMV-D2M-comp.)		-	r/w	Not relevant for KNX applications
Positioning signal Y	Start value: 0.6…30; Stop value: 2.6…32	Volt	r	r/w	Not relevant for KNX applications
Feedback U	Volume / Damper position / Δp		-	r/w	Definition of feedback signal
Feedback U	Start value: 0.0…8.0; Stop value: 2.0…10	Volt	-	r/w	
Behaviour when switched on (Power-on) 5)	No action / Adaption / Synchronisation		-	r/w	
Synchronisation behaviour	Y=0% Y=100%		-	r/w	Synchronisation at damper position 0 or 100%
Bus fail position	Last setpoint / Damper CLOSE V'min / V'max / Damper OPEN		-	r/w	
Unit-specific settings					
V'nom	0…60000 m³/h	m³/h / l/s / cfm	r	r/(w) 1)	Unit-specific setting value
Δp@V'nom	38…450 Pa	Pa	r	r/(w) 1)	Unit-specific setting value
Print function label			-	w	Incl. customer logo
Other settings					
Direction of rotation (for Y=100%)	cw/ccw		r/w 2)	r/w	
Range of rotation	Adapted 4) / programmed 30…95	°	-	r/w	
Torque	100 / 75 / 50 / 25	%		r/w	% of nominal torque
Operating data					
Actual value / Setpoint Damper position		m³/h / l/s / cfm Pa/%	r Trend	r	Trend display with print function and data saving to HD
Simulation	Damper OPEN/CLOSE V'min / V'mid / V'max / Motor Stop		w	w	
Running times	Operating time, running time Ratio (relation)	h %	-	r	
Alarm messages	Setting range enlarged, Mech. overload, Stop&Go ratio too high		-	r/w	
Serial number	Device ID		r	r	Incl. production date
Type	Type designation		r	r	
Version display	Firmware, Config. table ID		r	r	
Configuration data					
Print, send			-	yes	
Backup in file			-	yes	
Log data / Logbook	Activities log		-	yes	Incl. complete setting data

Explanations

1) Write function accessible only for VAV manufacturers
2) Access only via Servicing level 2
3) CAV setting for MP/MF type
4) Within the mechanical limitation
5) The first time the supply voltage is switched on, i.e. at the time of initial commissioning, the actuator carries out an adaption, which is when the operating range and position feedback adjust themselves to the mechanical setting range. The actuator then moves into the required position in order to ensure the volumetric flow defined by the control signal.
6) For function and version overview, see www.belimo.com.

Display and operation
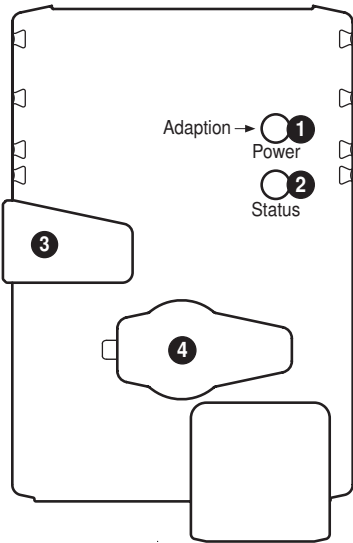
1 **Push-button and LED display green**

Off:	No power supply or fault
On:	Operation
Press button:	Switches on angle-of-rotation adaptation

2 **Push-button and LED display yellow**

Off:	The actuator is ready for operation
On:	Adaptation or synchronising process active
	Or actuator in programming mode (KNX)
Flashing:	Connection test (KNX) active
Press button:	In operation (>1 s): Switching the programming mode (KNX) on and off
	When starting (>5 s): Reset to factory setting (KNX)

3 **Gear disengagement button**

Press button:	Gear disengaged, motor stops, manual override possible
Release button:	Gear engaged, synchronisation starts, followed by standard mode

4 **Service plug**

For connecting the parametrisation and service tools

ZTH EU/PC-Tool - Local service connection

Setting and diagnostics of the VAV-Compact can be carried out quickly and easily with the Belimo PC-Tool or the ZTH EU service tool. When the PC-Tool is used, the ZTH EU acts as the interface converter.
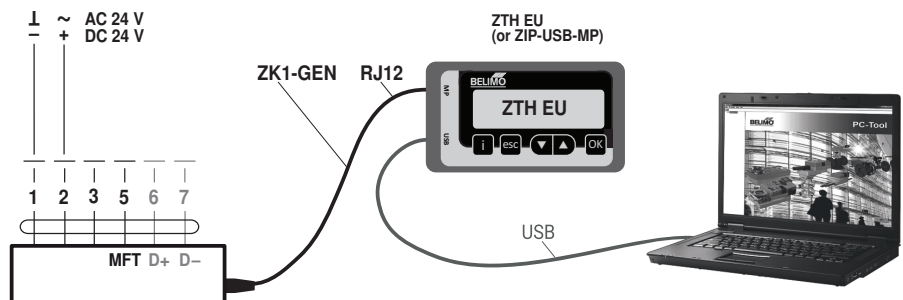
Download PC-Tool (MFT-P)
from www.belimo.com

ZTH EU/PC-Tool - Remote connection

The VAV-Compacts can communicate with the service tools via the PP connection (wire 5). The connection can be made during operation in the connector socket or at the switchbox terminals. The ZTH EU is used as interface converter with the PC-Tool is used.
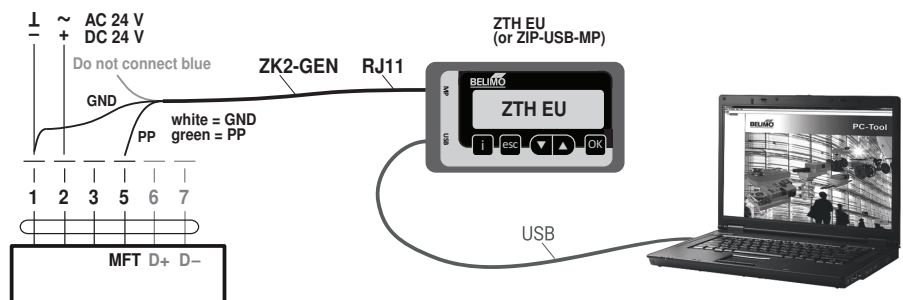
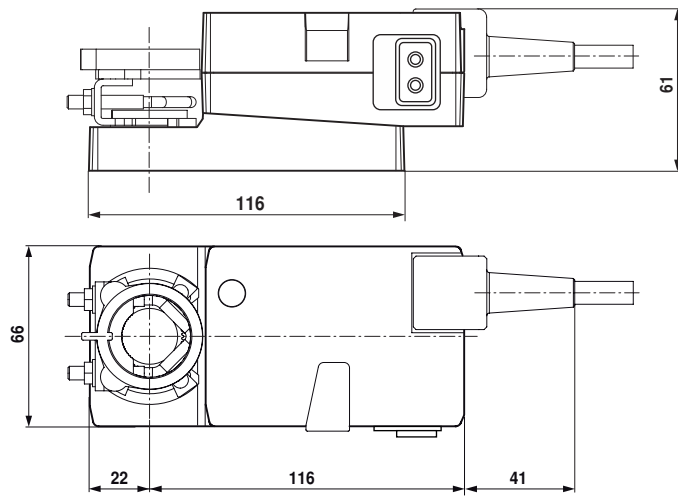Download PC-Tool (MFT-P)
from www.belimo.com

Accessories

VAV-Compact / VAV-Universal	Description	
	VAV-Compact: Version with integrated MP-Bus, LonWorks and Modbus interface	
	VAV-Universal: VAV/pressure controllers, Δp sensors, actuators (spring-return, fast running actuator, etc.)	
	For more information and documentation, see www.belimo.com	

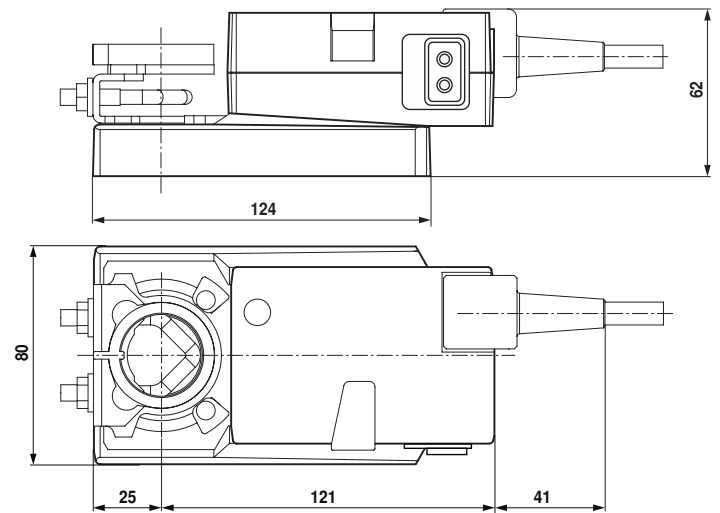| Electrical accessories	Description	Type
	Connection cable 5 m, to ZTH EU/ZIP-USB-MP (RJ12) with service plug	ZK1-GEN
	Connection cable 5 m, to ZTH EU/ZIP-USB-MP (RJ11) with free wire ends	ZK2-GEN

Service tools	Description	Type
	Service tool, with ZIP-USB function, for parametrisable and communicative actuators, VAV controllers and HVAC performance devices from Belimo	ZTH EU
	Belimo PC-Tool, software for adjustments and diagnostics	MFT-P

Dimensions [mm]

Dimensional drawings LMV-D3-KNX

Dimensional drawings NMV-D3-KNX

Further documentation

- Tool connections

VAV-Compact
Model overview /Function comparison

BELIMO

	-MF	-MP	-KNX	-MOD
		MP BUS	KNX	ASHRAE BACnet / Modbus
Field of application: Supply air/extract air in the comfort zone and in sensor-compatible media	X	X	X	X
AC/DC 24 V supply	X	X	X	X
Δp Sensor installed, dynamic D3, measuring range:	-20…500 Pa	-20…500 Pa	-20…500 Pa	-20…500 Pa
Actuator variants: - Rotary actuator – Linear actuator	5 / 10 Nm –	5/10/20 Nm 150 / 200 / 300 mm	5/10/20* Nm 150* / 200* / 300* mm	5/10/20* Nm 150* / 200* / 300* mm
VAV-Function Close, $V'_{min}…V'_{max}$	X	X	X	X
CAV steps V'_{min} / V'_{mid} / V'_{max} / Close	X	X	–	–
Position Control (Open Loop / External V control)	X	X	X	X
DCV (Optimiser function)	–	DDC MP Partner	Yes, programmable	Yes, programmable
Analogue control	0/2…10 V	0/2…10 V	–	0/2…10 V
Bus actuation	–	X	X	X
Bus specification	–	Belimo MP-Bus	KNX S-Mode	Modbus RTU/ BACnet MS/TP / RS485
Direct integration DDC MP-Partner	–	X	–	–
Integration via Gateway - BACnet - KNX - Modbus RTU	–	X X X	–	–
Number of bus subscribers	–	8 per string	64 per line segment	32 per string
Sensor integration – Passive (resistance) – Active (0…10 V) – Switching contact	–	X X X	– X X	– X X
Optional control function	–	–	–	–
Local override	–	CLOSE / V'_{max} / OPEN	CLOSE / V'_{max} / OPEN	CLOSE / V'_{max} / OPEN
Aids	–	MP-Bus tester MP monitor	ETS Product database	–
Integration tool	PC-Tool	PC-Tool	ETS	…
TypeList function (Retrofit, OEM)	–	X	(–)	(–)
Tool connection (U – PP/MP)	PP	PP/MP	PP	PP
Service socket ZTH EU/PC-Tool	X	X	X	X
NFC interface	–	X	–	–
Assistant app	–	X	–	–
Service tool ZTH EU	X	X	X	X
PC-Tool – Parameters – Save data – Trend, Logbook – Label Print	X	X	X	X

* on request

MP BUS

KNX

ASHRAE BACnet / Modbus