

# VAV Technical details

## Variable Flow Rate Control Unit



### Model

**BVAV-R:** VAV unit that has circular section.

**BVAV-RS:** VAV terminal unit.

**BVAV-Q:** VAV unit that has rectangular section.

### Material

The casing and blades of circular section VAV units are manufactured from galvanized sheet, blade impermeability is from silicone gasket. The casing of rectangular section VAV units is manufactured from galvanized sheet, their blades are from extruded aluminium profile.

### Usage

VAV terminal units include round entry neck and casing made of galvanized sheet, the inside of their casings consists of glasswool plates with thermal and sound insulation. VAV terminal units are designed for applications with variable flow rate at high velocities in one duct and can be used for both supply and return. These can be used for and duties of control, configuration and closing in air conditioning systems.

VAV units are designed for accurate measurement and control air flow rate. In VAV applications, the air volume going into the room, is controlled depending on the cooling load. Therefore, energy consumption is reduced.

### Installation

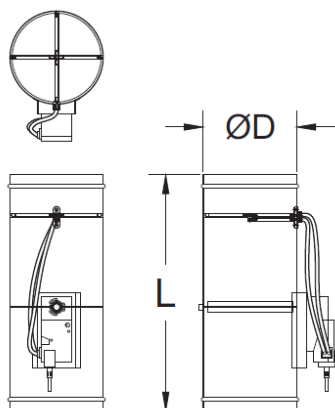
Circular section VAV units are installed with self tapping screw, rectangular section VAV units are with bolt-nut and VAV terminal boxes are with rod - nut.

### Accessory

In VAV terminal units, water coil or duct type electrical heater can be added to the outlet of the box.

## VAV Unit Technical Details

### BVAV-R Model VAV Unit

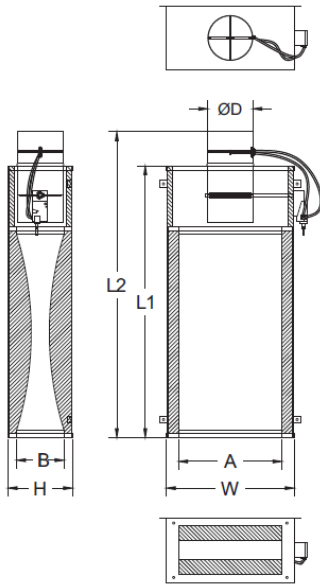


### Standard Dimensions - Air Flow Rates Table

| (Size) | u:2m/s<br>V <sub>min.</sub><br>(m <sup>3</sup> /h) | u:12m/s<br>V <sub>nom.</sub><br>(m <sup>3</sup> /h) | ØD<br>(mm) | L<br>(mm) |
|--------|--|---|------------|-----------|
| Ø125   | 90   | 520   | 123        | 450       |
| Ø160   | 150  | 870   | 158        | 450       |
| Ø200   | 230  | 1360  | 198        | 500       |
| Ø250   | 360  | 2120  | 248        | 500       |
| Ø315   | 560  | 3370  | 313        | 500       |
| Ø355   | 710  | 4280  | 353        | 550       |
| Ø400   | 910  | 5450  | 398        | 550       |

### BVAV-RS Model VAV Unit

### Standard Dimensions - Air Flow Rates Table

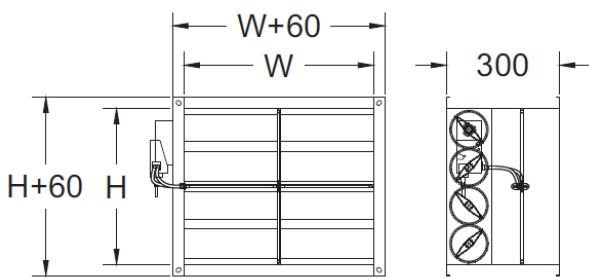


| (Size) | u:2m/s<br>V <sub>min.</sub><br>(m <sup>3</sup> /h) | u:12m/s<br>V <sub>nom.</sub><br>(m <sup>3</sup> /h) | ØD<br>(mm) | W<br>(mm) | H<br>(mm) | A<br>(mm) | B<br>(mm) | L1<br>(mm) | L2<br>(mm) |
|--------|--|---|------------|-----------|-----------|-----------|-----------|------------|------------|
| Ø125   | 90   | 520   | 123        | 333       | 283       | 225       | 210       | 1200       | 1350       |
| Ø160   | 150  | 870   | 158        | 483       | 283       | 375       | 210       | 1200       | 1350       |
| Ø200   | 230  | 1360  | 198        | 563       | 283       | 455       | 210       | 1200       | 1350       |
| Ø250   | 360  | 2120  | 248        | 633       | 323       | 525       | 250       | 1200       | 1350       |
| Ø315   | 560  | 3370  | 313        | 783       | 383       | 675       | 310       | 1200       | 1350       |
| Ø355   | 710  | 4280  | 353        | 783       | 430       | 675       | 355       | 1200       | 1350       |
| Ø400   | 910  | 5450  | 398        | 858       | 480       | 750       | 405       | 1200       | 1350       |

- V<sub>min.</sub>(m<sub>3</sub>/h):** Air flow rate when air velocity is 2 m/s
- V<sub>nom.</sub>(m<sub>3</sub>/h):** Air flow rate when air velocity is 12 m/s
- V<sub>max.</sub>(m<sub>3</sub>/h):** Air flow rate that customer wants between V<sub>min.</sub> and V<sub>nom.</sub> limit values
- u (m/s):** Air velocity at VAV unit inlet
- ØD (mm):** VAV unit internal diameter
- L (mm):** VAV unit length

### BVAV-Q Model VAV Unit

### Standard Dimensions - Air Flow Rates Table



| (Size)<br>(WxH)<br>(mm) | u:2m/s<br>V <sub>min.</sub><br>(m <sup>3</sup> /h) | u:10m/s<br>V <sub>nom.</sub><br>(m <sup>3</sup> /h) | A <sub>eff.</sub> (m <sup>2</sup> ) |
|-------------------------|--|---|-------------------------------------|
| 200x205                 | 259  | 1296  | 0,036                               |
| 300x205                 | 396  | 1980  | 0,055                               |
| 400x205                 | 525  | 2628  | 0,073                               |
| 500x205                 | 655  | 3276  | 0,091                               |
| 300x305                 | 568  | 2844  | 0,079                               |
| 400x305                 | 756  | 3780  | 0,105                               |
| 500x305                 | 950  | 4752  | 0,132                               |
| 600x305                 | 1137   | 5688  | 0,158                               |
| 700x305                 | 1332   | 6660  | 0,185                               |
| 800x305                 | 1519   | 7596  | 0,211                               |
| 400x405                 | 993  | 4968  | 0,138                               |
| 500x405                 | 1245   | 6228  | 0,173                               |
| 600x405                 | 1490   | 7452  | 0,207                               |
| 700x405                 | 1742   | 8712  | 0,242                               |
| 800x405                 | 1987   | 9936  | 0,276                               |
| 500x505                 | 1533   | 7668  | 0,213                               |
| 600x505                 | 1843   | 9216  | 0,256                               |
| 700x505                 | 2152   | 10764   | 0,299                               |
| 800x505                 | 2455   | 12276   | 0,341                               |

- V<sub>min.</sub>(m<sub>3</sub>/h):** Air flow rate when air velocity is 2 m/s
- V<sub>nom.</sub>(m<sub>3</sub>/h):** Air flow rate when air velocity is 10 m/s
- V<sub>max.</sub>(m<sub>3</sub>/h):** Air flow rate that customer wants between V<sub>min.</sub> and V<sub>nom.</sub> limit values
- u (m/s):** Air velocity at VAV unit inlet
- A<sub>2 eff.</sub> (m):** Effective area

# Motor BELIMO

## VAV-Compact MF

OEM customer specific VAV-Compact version consisting of a pressure sensor, digital VAV controller and damper positioning actuator for pressure independent VAV and CAV systems in comfort zone

- Control (0)2 ... 10 V
- Service socket for operating devices



**LMV-D3-MF-F**  
**NMV-D3-MF-F**

### Brief description

|   |  |
|---|--|
| <b>Application</b>                          | The VAV-Compact has PI control characteristics and is used for pressure-independent control of VAV units in the comfort zone.  |
| <b>Pressure measurement</b>                 | The integrated D3 differential pressure sensor is also suitable for very small volumetric flows. The maintenance-free sensor technology enables versatile applications in the comfort zone: in residential construction, offices, hospitals, hotels, cruise ships, etc..           |
| <b>Actuator</b>                             | 2 different actuator variants (5 or 10 Nm) are available for different VAV unit structures.  |
| <b>Control function</b>                     | Volumetric flow (VAV-CAV) or Open-Loop (for integration in an external VAV control loop).  |
| <b>VAV (VVS) – variable volumetric flow</b> | Demand-dependant setting of volumetric flows $\dot{V}_{min}$ ... max on a modulating reference variable (0/2 ... 10 V), e.g. room temperature / CO2 controller or DDC, for energy-saving air conditioning in individual rooms or zones.  |
| <b>CAV (KVS) – constant volumetric flow</b> | Step mode (via switching contact) for constant volume applications CLOSED / $\dot{V}_{min}$ / $\dot{V}_{mid}$ / $\dot{V}_{max}$ / OPEN.  |
| <b>DCV – Demand Controlled Ventilation</b>  | VAV-Compact MF versions are not compatible with Fan Optimiser!<br>The integration in one DCV/Fan Optimiser system requires VAV-Compact versions with integrated Bus interface (MP, KNX, LON or MOD).<br>See <a href="http://www.belimo.eu">www.belimo.eu</a> for more information. |
| <b>Operating and service devices</b>        | Service tool ZTH, PC-Tool service socket: locally pluggable or via PP connection.  |
| <b>Electrical connection</b>                | The connection is made with the integrated connection cable.   |
| <b>Sales, mounting and setting</b>          | VAV-Compact will be mounted by the VAV unit manufacturer (OEM), the application will be set and calibrated accordingly. The VAV-Compact is sold exclusively via the OEM channel for this reason.   |

### Type overview MF versions

| 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 |
| NMV-D3-MF-F | 10 Nm  | 3 W               | 5 VA (max. 8 A @ 5 ms)   | Approx. 700 g |

Both MF versions are specially manufactured customer versions of VAV-Compact (OEM version). They have no Bus interface and therefore are not compatible with Fan Optimiser.

These versions are customised and labelled specifically for OEM on the sensors, damper spindles and fastening systems used. See documentation of the VAV unit manufacturer. Designation, e.g.: LMV-D3-MF-F ABC (ABC = Customer designation)

**Other versions** The VAV-Compact is also available with a built-in interface for direct integration in MP-Bus systems, KNX, LONWORKS® and Modbus.  
See [www.belimo.eu](http://www.belimo.eu) for more information and documentation.

## Volumetric flow compact control device for analogue versions

### Safety notes

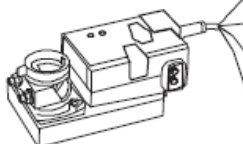


- The device must not be used outside the specified field of application, especially not in aircraft or in any other airborne means of transport.
- Outdoor applications: possible only in the absence of direct effects on the actuator from (sea)water, snow, ice, sunlight and aggressive gases and when it is guaranteed that the ambient conditions do not deviate at any time from the limit values specified in the datasheet.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied with during installation.
- 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.
- Cables must not be removed from the device.
- When calculating the torque required, the specifications supplied by the damper manufacturers (cross-section, construction, place of installation), and the ventilation conditions must be observed.
- The device contains electrical and electronic components and is not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.

### Electrical installation

#### Notes

- Supply via safety isolating transformer!
- It is recommended that the connections 1 to 5 (PP) are led to accessible terminals (e.g. floor distributor) in order to allow remote access for diagnostics and service work.



| No. | Designation | Wire colour | Function                              |
|-----|-------------|-------------|---------------------------------------|
| 1   | ⊥ -         | black       | } AC/DC 24 V supply                   |
| 2   | ~ +         | red         |                                       |
| 3   | ◀ Y         | white       | Reference signal / override           |
| 5   | ▶ U         | orange      | Actual value signal / tool connection |

***See separate documentation for description of functions and applications***

| Technical Data              |  |  |
|-----------------------------|--|--|
| Electrical data             | Nominal voltage                          | AC/DC 24 V, 50/60 Hz   |
|                             | Operating range                          | AC 19.2 ... 28.8V / DC 21.6 ... 28.8V  |
|                             | Performance data                         | See Overview of types (page 1)   |
|                             | Connecting                               | Cable, 4 x 0.75 mm <sup>2</sup> , preassembled   |
| VAV controllers             | Control function                         | VAV/CAV and Open-Loop  |
|                             | $\dot{V}_{nom}$ <sup>1)</sup>            | OEM specific nominal volumetric flow setting, suitable for VAV unit  |
|                             | $\Delta p @ \dot{V}_{nom}$ <sup>1)</sup> | 38 ... 500 Pa  |
|                             | $\dot{V}_{max}$                          | 20 ... 100 % of $\dot{V}_{nom}$ , adjustable   |
|                             | $\dot{V}_{mid}$                          | > $\dot{V}_{min}$ ... < $\dot{V}_{max}$ , adjustable   |
| Analogue control - VAV      | Mode (Y)                                 | 0 ... 10 V / 2 ... 10 V / (Y and U5 individually) adjustable, input resistance 100 k $\Omega$ (0/4 ... 20 mA with 500 $\Omega$ resistance)                                     |
|                             | Actual value signal (U)                  | 0 ... 10 V / 2 ... 10 V, max. 0.5 mA<br>Volumetric flow / damper position / $\Delta p$ , selectable  |
| Stepped control - CAV       | Operating stages                         | CLOSED / $\dot{V}_{min}$ / $\dot{V}_{mid}$ *) / $\dot{V}_{max}$ / OPEN *)<br>*) AC 24 V supply required  |
| Operation and servicing     | Service tool ZTH, PC-Tool                | Local plug / Remote via PP connection  |
|                             | LED                                      | Supply and status display  |
|                             | Push-button                              | Angle of rotation adaptation and test function   |
| Actuator                    | Rotary version                           | Brushless, non-blocking actuator with power-save mode  |
|                             | Direction of rotation <sup>1)</sup>      | Left / right, adjustable   |
|                             | Angle of rotation                        | 95°, adjustable mechanical or electronic limiting  |
|                             | Gear disengagement                       | Push-button self-resetting without functional impairment   |
|                             | Position indication                      | accessible (Tool)  |
|                             | Spindle holder                           | Form fit   |
| Volumetric flow measurement | Differential pressure sensor             | Belimo D3 sensor, dynamic measurement principle  |
|                             | Measurement range, operating range       | -20 ... 500 Pa, 0 ... 500 Pa   |
|                             | Overload capability                      | ±3000 Pa   |
|                             | Altitude compensation                    | Adaptation to system altitude (adjustable between 0 ... 3000 m above sea level)  |
|                             | Installation position                    | Any, no reset necessary  |
|                             | Materials in contact with medium         | Glass, epoxy resin, PA, TPE  |
|                             | Measuring air conditions                 | Comfort zone 0 ... 50°C / 5 ... 95% rH, non-condensing   |
| Safety                      | Protection class IEC/EN                  | III Safety extra-low voltage   |
|                             | 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 current voltage                    | 0.8 kV   |
|                             | Supply / control                         |  |
|                             | Control pollution degree                 | 3  |
|                             | Ambient temperature                      | -30...50°C   |
|                             | Non-operating temperature                | -40...80°C   |
|                             | Ambient humidity range                   | 95% r.h., non-condensing   |
|                             | Maintenance                              | Maintenance-free. Depending on the application, the differential pressure sensor (measuring cross, disc, ...) of the VAV unit is checked occasionally and cleaned if required. |

<sup>1)</sup> Setting by VAV manufacturer (OEM)

## VAV – variable operation $V_{min} \dots V_{max}$

### Wiring diagrams

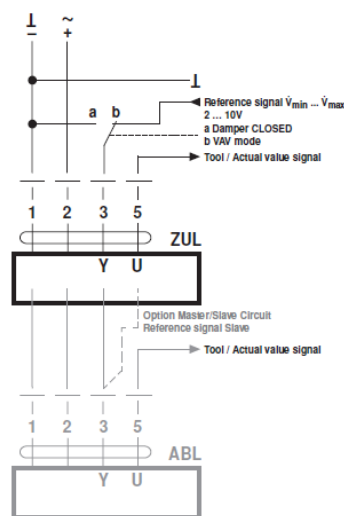
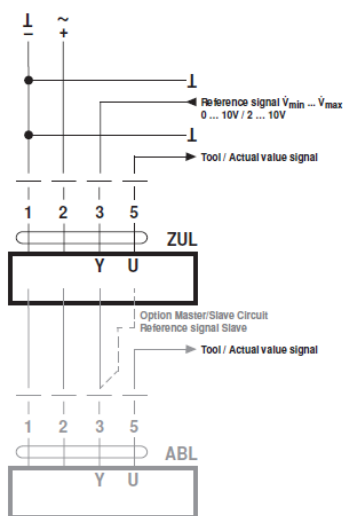
#### Example 1:

#### Example 2:

#### VAV, analogue referenced signal

#### VAV with shut-off (CLOSED), 2 ... 10V mode

**Description:**  
 Damper 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 PC-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  
 $V_{min} \dots V_{max}$  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.



## CAV – step mode CLOSED / $V_{min}$ / $V_{mid}$ / $V_{max}$ / OPEN

**CAV control** VAV-Compact can be adapted to the desired CAV function pattern for constant volumetric flow applications with PC-Tool by using the "CAV function":

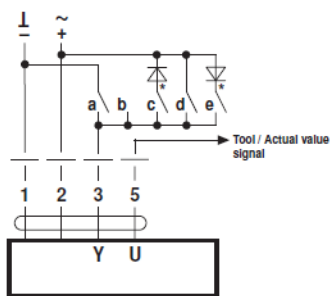
Damper CLOSED –  $V_{min}$  –  $V_{max}$  – damper OPEN (standard)

Damper CLOSED –  $V_{min}$  –  $V_{mid}$  –  $V_{max}$  – damper OPEN (NMV-D2M compatible)

### Wiring diagrams

#### Notes

- Note that the contacts are mutually interlocking.
- DC supply: \* c and e are not available with DC 24 V.
- Setting parameters in CAV applications:  
 Mode 2 ... 10 V, Shut-off level 0.1 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.



PC-Tool "CAV Function" setting:  
 2 ... 10 V, Shut-off level 0.1 V

#### CAV Function CLOSED – $V_{min}$ – $V_{max}$ – OPEN (standard)

|                      | a         | b         | c        | d         | e      |
|----------------------|-----------|-----------|----------|-----------|--------|
| Signal               | L<br>–    |           | ~        | ~<br>+    | ~      |
| Switching terminal 3 | <br>3     | <br>3     | <br>3    | <br>3     | <br>3  |
| Mode 2 ... 10 V      | CLOSED    | $V_{min}$ | CLOSED * | $V_{max}$ | OPEN * |
| Mode 0 ... 10 V      | $V_{min}$ | $V_{min}$ | CLOSED * | $V_{max}$ | OPEN * |

PC-Tool "CAV Function" setting:  
 CLOSED –  $V_{min}$  –  $V_{max}$ . Shut-off level CLOSED: 0.1 V

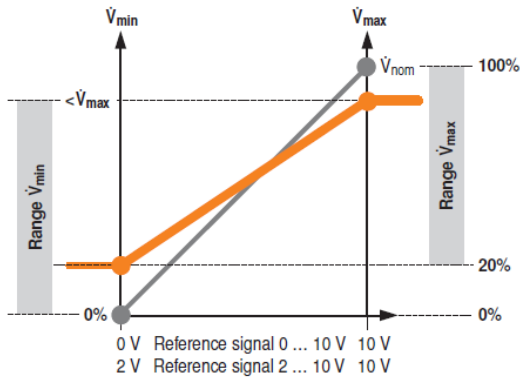
#### CAV function CLOSED – $V_{min}$ – $V_{mid}$ – $V_{max}$ – OPEN

|                      | a         | b         | c           | d         | e      |
|----------------------|-----------|-----------|-------------|-----------|--------|
| Signal               | L<br>–    |           | ~           | ~<br>+    | ~      |
| Switching terminal 3 | <br>3     | <br>3     | <br>3       | <br>3     | <br>3  |
| Mode 2 ... 10 V      | CLOSED    | $V_{min}$ | $V_{mid}$ * | $V_{max}$ | OPEN * |
| Mode 0 ... 10 V      | $V_{min}$ | $V_{min}$ | $V_{mid}$ * | $V_{max}$ | OPEN * |

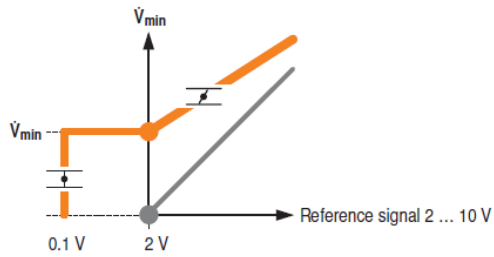
PC-Tool "CAV Function" setting:  
 CLOSED –  $V_{min}$  –  $V_{mid}$  –  $V_{max}$  (NMV-D2M compatible)

## Control functions - VAV / CAV

VAV-operating volumetric flow – Setting and control



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



**Description:**

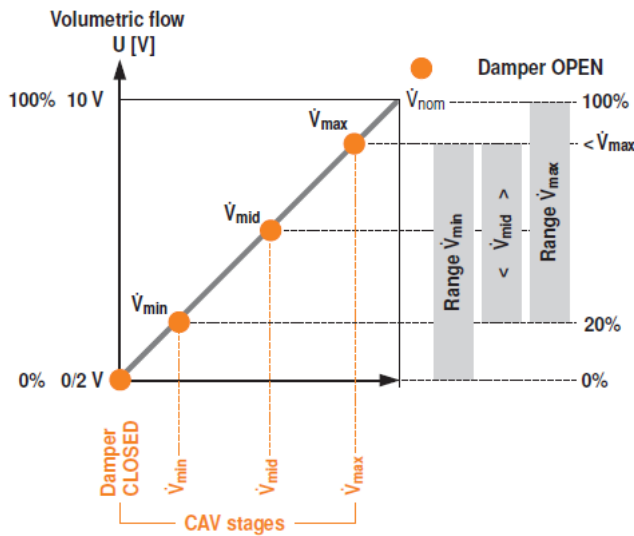
Setting parameters: Mode 2 ... 10 V, Shut-off level 0.1 V or 0.5 V

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

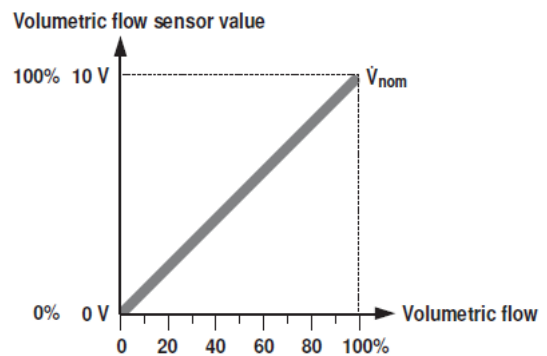
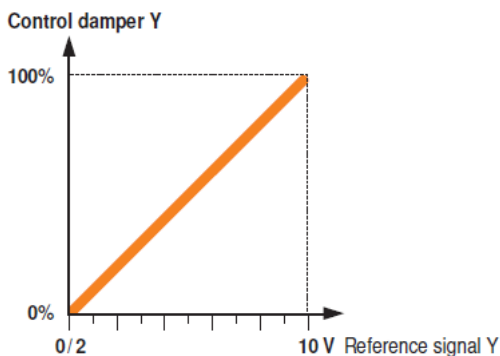
| Function                            | Standard 0.1 V | Shut-off level 0.5 V |
|-------------------------------------|----------------|----------------------|
| Damper CLOSED                       | <0.1 V         | <0.5 V               |
| $\dot{V}_{min}$                     | >0.1 ... 2 V   | >0.5 V ... 2 V       |
| $\dot{V}_{min} \dots \dot{V}_{max}$ | 2 ... 10V      | 2 ... 10V            |

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

CAV operating volumetric flow - setting



Open-Loop (separate external VAV-Control)





## Setting and Tool function

| Designation  | Adjustment values, limits, explanations   | Units                                   | Tools <sup>5)</sup> |         | Remarks   |
|--|---|---|---------------------|---------|---|
|  |   |   | ZTH EU              | PC-Tool |   |
| <b>System specific data</b>  |   |   |                     |         |   |
| Position   | 16 characters e.g.: Office 4 6.OG ZL  | Text                                    | r                   | r/w     |   |
| Designation  | 16 Characters: Unit designation, etc.   | Text                                    | r                   | r/w     |   |
| $\dot{V}_{max}$  | 20...100 % [ $\dot{V}_{nom}$ ]  | m <sup>3</sup> /h / l/s / cfm           | r/w                 | r/w     | $\geq \dot{V}_{min}$  |
| $\dot{V}_{mid}$  | $\dot{V}_{min}$ ... $\dot{V}_{max}$   | m <sup>3</sup> /h / l/s / cfm           | r/w                 | r/w     |   |
| $\dot{V}_{min}$  | 0...100 % [ $\dot{V}_{nom}$ ]   | m <sup>3</sup> /h / l/s / cfm           | r/w                 | r/w     | $\leq \dot{V}_{max}$  |
| System altitude  | 0...3000  | Meter                                   | r/w                 | r/w     | Adaptation of $\Delta p$ -Sensor to system altitude (above sea level) |
| <b>Controller settings</b>   |   |   |                     |         |   |
| Controller function  | Volumetric flow / open loop   |   | -                   | r/w     |   |
| Mode   | 0...10 / 2...10   | Volt                                    | r/w <sup>1)</sup>   | r/w     |   |
| CAV function   | CLOSED/ $\dot{V}_{min}$ / $\dot{V}_{max}$ ; Shut-off level<br>CLOSED 0.1 V<br>CLOSED/ $\dot{V}_{min}$ / $\dot{V}_{max}$ ; Shut-off level<br>CLOSED 0.5 V<br>$\dot{V}_{min}$ / $\dot{V}_{mid}$ / $\dot{V}_{max}$ ; (NMV-D2M comp.) |   | -                   | r/w     | For an explanation see <sup>2)</sup>                                  |
| Positioning signal Y   | Start value: 0.6 ... 30; Stop value: 2.6 ... 32   | Volt                                    | r                   | r/w     |   |
| Feedback U   | Volume / damper position / $\Delta p$   |   | -                   | r/w     | Definition feedback signal  |
| Feedback U   | Start value: 0.0 ... 8.0; Stop value: 2.0 ... 10  | Volt                                    | -                   | r/w     |   |
| Response when switched on (Power-On) <sup>4)</sup>   | No action / Adaption / Synchronisation  |   | -                   | r/w     |   |
| Synchronisation behaviour  | Y=0 %<br>Y=100 %  |   | -                   | r/w     | Synchronisation to damper position 0 or 100 %                         |
| <b>Unit specific settings</b> <sup>3)</sup> Write function only available for VAV manufacturer |   |   |                     |         |   |
| $\dot{V}_{nom}$  | 0 ... 60'000 m <sup>3</sup> /h  | m <sup>3</sup> /h / l/s / cfm           | r                   | r/(w*)  | Unit specific adjustment value  |
| $\Delta p @ \dot{V}_{nom}$   | 38 ... 500 Pa   | Pa                                      | r                   | r/(w*)  | Unit specific adjustment value  |
| Label print function   |   |   | -                   | w       | Incl. customer logo   |
| <b>Other settings</b>  |   |   |                     |         |   |
| Direction of rotation (for Y = 100%)   | cw/ccw or ▲/▼   |   | r/w <sup>1)</sup>   | r/w     |   |
| Range of rotation  | Adapted <sup>3)</sup> / programmed 30...95  | °                                       | -                   | r/w     |   |
| Torque   | 100 / 75 / 50 / 25  | %                                       |                     | r/w     | % of nominal torque   |
| <b>Operating data</b>  |   |   |                     |         |   |
| Setpoint / actual value<br>Damper position   |   | m <sup>3</sup> /h / l/s / cfm<br>Pa / % | r                   | r       | Trend display with print function and data storage on HD              |
| Simulation   | Damper CLOSED / OPEN<br>$\dot{V}_{min}$ / $\dot{V}_{mid}$ / $\dot{V}_{max}$ / motor stop  |   | w                   | w       |   |
| Running times  | Operating time, running time<br>Ratio   | h<br>%                                  | -                   | r       |   |
| Alarm messages   | Setting range enlarged,<br>mech. overload, Stop&Go ratio too high   |   | -                   | r/w     |   |
| Series number  | Device ID.  |   | r                   | r       | incl. date of manufacture   |
| Type   | Type designation  |   | r                   | r       |   |
| Version display  | Firmware, Config table ID   |   | r                   | r       |   |
| <b>Configuration data</b>  |   |   |                     |         |   |
| Print, create PDF  |   |   | -                   | Yes     |   |
| Save to file   |   |   | -                   | Yes     |   |
| Log data / book  | Activity log  |   | -                   | Yes     | incl. complete setting data   |

### Explanations

1) Access only on operating level 2

2) Shut-off level 0.1 / 0.5V - Application: VAV mode, in Mode 2...10 V, Damper CLOSED via 0...10 V control signal.

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

Note on CAV application: the shut-off level must not be set to 0.5 V. If the line 3 (Y) is open, damper will be CLOSED instead, min will be activated.

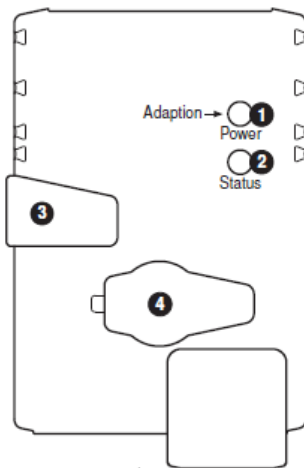
3) within the mechanical limit.

4) The first time the supply voltage is switched on, i.e. at the time of 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 positioning signal.

5) See [www.belimo.eu](http://www.belimo.eu) for function and version history.



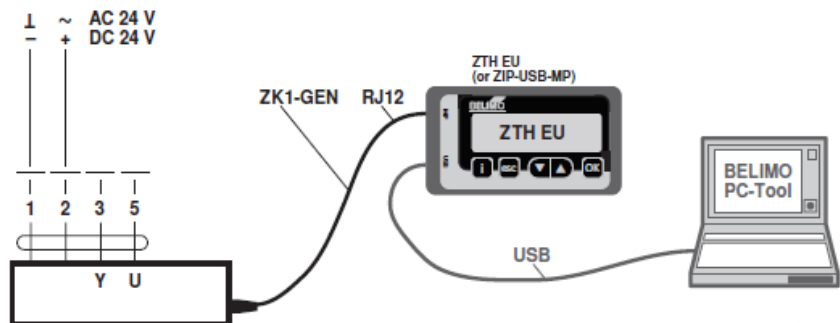
## Display and operation



- 1 Push-button and LED display green**  
 Off: No power supply or malfunction  
 On: In operation  
 Press button: Triggers angle of rotation adaptation
- 2 Push-button and LED display yellow**  
 Off: Normal operation  
 On: Adaption or synchronising process active
- 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 parameterisation and service tools

### ZTH / PC-Tool - local service connection

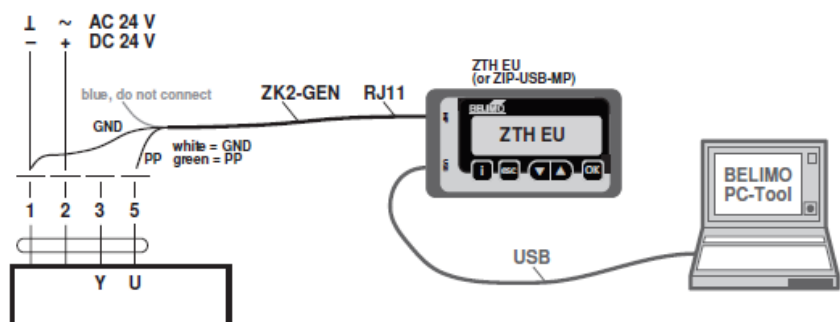
The settings and diagnostics of the VAV-Compact can be performed easily and rapidly with the Belimo PC-Tool or with the ZTH-EU service tool. When using the PC-Tool, the ZTH EU serves as an interface converter.



Download PC-Tool (MFT-P)  
from [www.belimo.eu](http://www.belimo.eu)

### ZTH / PC-Tool - remote connection

The VAV-Compact can communicate with the service tools via the PP connection (wire 5). The connection can be made in operating mode in the junction box, tool socket of room controllers CR 24 or the control cabinet terminals. When using the PC-Tool, the ZTH EU serves as an interface converter.



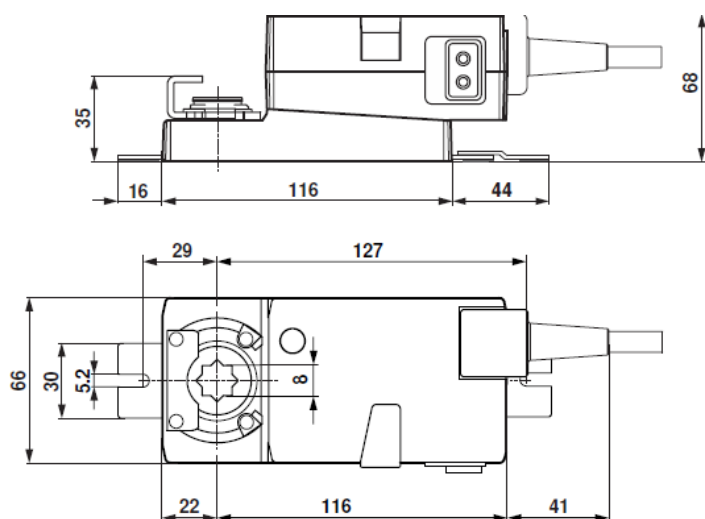
Download PC-Tool (MFT-P)  
from [www.belimo.eu](http://www.belimo.eu)

## Accessories

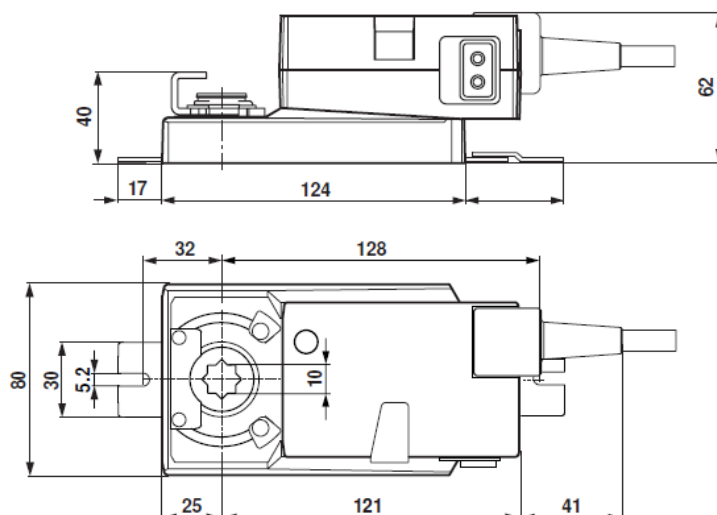
|   | Description  | Type      |
|---|--|-----------|
| Room controller<br>(2 ... 10 V control) | Room temperature controller, AO: VAV; DI: Standby/EHO/C-O                                | CR24-B1   |
|   | Room temperature controller, AO: VAV/Htg 3-point; DI: Standby/EHO/Ventilation            | CR24-B2   |
|   | Room temperature controller, AO: VAV/Htg EI-RH; DI: Standby/EHO/Boost                    | CR24-B2E  |
|   | Room temperature controller, AO: VAV/Htg 3-point; H/C 0...10V; DI: Standby/EHO/C-O/Boost | CR24-B3   |
|   | Residential ventilation controller, AO: 2 x VAV/Htg-Valve; DI: EHO/Override Kitchen+Bath | CRA24-B3  |
|   | Contactor step control, 3 positions (Min/COMF/Max)                                       | CRA24-B1P |
|   | Positioner, 0...100%   | CRP24-B1  |
| Electrical accessories                  | Description  | Type      |
|   | Connection cable 5 m, to ZTH / ZIP-USB-MP (RJ12) with service plug                       | ZK1-GEN   |
|   | Connection cable 5 m, to ZTH / ZIP-USB-MP (RJ11) with free wire ends                     | ZK2-GEN   |
| Tools                                   | Description  | Type      |
|   | Service Tool, for MF/MP/Modbus/LonWorks® actuators and VAV controllers                   | ZTH EU    |
|   | Belimo PC-Tool, software for adjustments and diagnostics                                 | MFT-P     |

## Dimensions [mm]

### Dimensional drawings LMV-D3-MF-F



### Dimensional drawings NMV-D3-MF-F



## VAV-Compact Model overview / feature comparison

|  | -MF            | -MP                                     | -KNX                                     | LON                                      | -MOD                                     |
|--|----------------|---|--|--|--|
|  |                |   |  |  |  |
| Field of application: Supply and exhaust air in the comfort zone and sensor-compatible media | X              | X                                       | X  | X  | X  |
| AC/DC 24 V supply  | X              | X                                       | X  | X  | X  |
| Integrated $\Delta p$ sensor, dynamic D3, measuring range:                                   | -20 ... 500 Pa | -20 ... 500 Pa                          | -20 ... 500 Pa                           | -20 ... 500 Pa                           | -20 ... 500 Pa                           |
| Actuator variants:<br>– Rotary actuator<br>– Linear actuator                                 | 5 / 10 Nm<br>– | 5 / 10 / 20 Nm<br>150 / 200 / 300 mm    | 5 / 10 / 20* Nm<br>150* / 200* / 300* mm | 5 / 10 / 20* Nm<br>150* / 200* / 300* mm | 5 / 10 / 20* Nm<br>150* / 200* / 300* mm |
| VAV function $\dot{V}_{min} \dots \dot{V}_{max}$   | X              | X                                       | X  | X  | X  |
| CAV stages $\dot{V}_{min} / \dot{V}_{mid} / \dot{V}_{max}$                                   | X              | X                                       | –  | –  | –  |
| Open Loop (external V control)   | X              | X                                       | X  | X  | X  |
| DCV (Optimiser function)   | –              | DDC MP Partners<br>Belimo fan optimiser | Yes, programmable                        | Yes, programmable                        | Yes, programmable                        |
| Analogue control   | 0/2 ... 10 V   | 0/2 ... 10 V                            | –  | –  | –  |
| With bus control   | –              | X                                       | X  | X  | X  |
| Bus specification  | –              | Belimo MP bus                           | KNX<br>S mode                            | LonWorks<br>FTT-10A                      | Modbus RTU<br>RS485                      |
| Direct integration DDC MP Partners   | –              | X                                       | –  | –  | –  |
| Integration via Gateway<br>– BACnet<br>– KNX<br>– LonWorks®<br>– Modbus RTU                  | –              | X<br>X<br>X<br>X                        | –  | –  | –  |
| Number of bus devices  | –              | 8 per strand                            | 64 per line segment                      | 64 per bus segment                       | 32 per strand                            |
| Sensor integration<br>– passive (resistance)<br>– active (0...10 V)<br>– Switching contact   | –              | X<br>X<br>X                             | –<br>X<br>X                              | –<br>X<br>X                              | –<br>X<br>X                              |
| Optional control function  | –              | –                                       | –  | Temperature / CO <sub>2</sub>            | –  |
| Local forced (override)  | –              | CLOSED / $\dot{V}_{max}$ /<br>OPEN      | CLOSED / $\dot{V}_{max}$ /<br>OPEN       | CLOSED / $\dot{V}_{max}$ /<br>OPEN       | CLOSED / $\dot{V}_{max}$ /<br>OPEN       |
| Aids   | –              | MP-Bus Tester<br>MP Monitor             | ETS<br>Product database                  | –  | –  |
| Integration tools  | –              | PC-Tool                                 | ETS                                      | LNS Tool + Plug-in                       | ...                                      |
| TypeList function (Retrofit, OEM)  | –              | X                                       | (–)                                      | (–)                                      | (–)                                      |
| Tool connection (U – PP/MP)  | PP             | PP/MP                                   | PP                                       | PP                                       | PP                                       |
| Service socket ZTH / PC-Tool   | X              | X                                       | X  | X  | X  |
| NFC interface  | –              | X                                       | –  | –  | –  |
| Assistant App  | –              | X                                       | –  | –  | –  |
| Service tool ZTH EU  | X              | X                                       | X  | X  | X  |
| PC-Tool<br>– Parameter<br>– Save data<br>– Trend, Logbook<br>– Label Print                   | X              | X                                       | X  | X  | X  |

\* on request