A pressure sensor, digital VAV controller and damper actuator all in one, providing a VAV-Compact solution with a communications capability for pressure-independent VAV and CAV systems in the comfort zone.

Control function: VAV-CAV / Open-Loop Control:
DC 2...10 V / 0...10 V / MP-bus

Integration into
- DDC controller with MP interface
- LONWORKS® systems
- EIB-Konnex systems
- Fan Optimiser systems

Service button and LEDs for servicing and commissioning
Diagnostic socket for operating devices
With additional connection facility for sensors or switches (not available for LMV...-RM)

**Brief Description**

**Application**
The digital VAV-Compact has PI control characteristics and is used for pressure-independent control of VAV units in the comfort zone.

**Pressure measurement**
Maintenance-free, dynamic, differential pressure sensor technology, proven in a wide range of applications, suitable for use in offices, hospital wards, alpine hotels or cruise liners.

**Actuator**
Three versions available, depending on the size of the VAV unit: 5 / 10 Nm.
- Rotary actuator, depending on size

**Control function**
VAV-CAV or open-loop operation (actuator/volumetric flow sensor) for integration in an external VAV control circuit. Feedback of damper position for fan optimisation

**VAV – variable air volume**
For variable air volume applications based on a modulating reference variable, e.g. supplied by a room temperature controller or a DDC or bus system. It facilitates demand-related, power-saving ventilation in individual rooms or in zones of air conditioning systems. The V_min ... V_max working range can be subdivided by selecting a mode. The following operating modes are available: DC 2...10 V / 0...10 V / adjustable / bus.

**CAV – constant air volume**
For constant air volume applications, e.g. in step mode, controlled by means of a switch. The following operating modes are available: CLOSE / V_min / V_mid / V_max / OPEN

**Bus function**
Up to eight Belimo MP devices (VAV / damper actuator / valve) can be connected together over the MP-Bus and integrated into the following systems:
- LONWORKS® applications with Belimo UK24LON interface
- EIB-Konnex applications with Belimo UK24EIB interface
- DDC controller with integrated MP-Bus protocol *
- Fan optimiser applications with optimisation COU24-A-AM

A sensor (0...10 V or passive, e.g. a temperature sensor) or a switch can optionally be integrated into the higher-level DDC or bus system via the MP-Bus. (Not available for LMV...-RM)

**Test function / test display**
The VAV-Compact features an LED with a ready display for commissioning and functional checking as well as a service mode with air shortage, excess air and setpoint = actual value display with LEDs.

**Operating and service devices**
Belimo PC-Tool, remote control or ZTH-VAV, plugged into the VAV-Compact Via MP-Bus

**Assembly and connection**
The VAV-Compact, which is assembled on the unit by the OEM, is connected using the prefabricated connecting cable.

**OEM factory settings**
The VAV-Compact is mounted on the VAV unit by the unit manufacturer, who adjusts and tests it according to the application. The VAV-Compact is sold exclusively via the OEM channel for this reason.

**Overview of Types**

<table>
<thead>
<tr>
<th>Type</th>
<th>Torque</th>
<th>Power consumption</th>
<th>For wire sizing</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMV-D2-MFT-RM</td>
<td>5 Nm</td>
<td>3 W</td>
<td>5 VA (max. 5 A @ 5 ms)</td>
<td>approx. 500 g</td>
</tr>
<tr>
<td>LMV-D2-MP</td>
<td>5 Nm</td>
<td>3 W</td>
<td>5 VA (max. 5 A @ 5 ms)</td>
<td>approx. 500 g</td>
</tr>
<tr>
<td>NMV-D2-MP</td>
<td>10 Nm</td>
<td>3.5 W</td>
<td>5.5 VA (max. 5 A @ 5 ms)</td>
<td>approx. 700 g</td>
</tr>
</tbody>
</table>
## Convenient solutions VAV-Compact

### Technical data

#### Supply
- **Nominal voltage**: AC 24 V, 50/60 Hz; DC 24 V
- **Power supply range**: AC 19.2 ... 28.8 V; DC 21.6 ... 28.8 V
- **Differential pressure sensor**: 2 ... 300 Pa (OEM-specific)
- **Operating pressure**: max. 1000 Pa
- **Characterising**: OEM-specific Differential pressure sensor Linearisation

#### Installation position
- Any, no reset necessary

#### Operating medium (see "Materials")
Supply and exhaust air in the comfort zone and in applications with sensor-compatible media

#### Materials
PC + ABS to UL94-V0; stainless steel, DIN 1.4301 X10CrNiS1810; PP Santoprene

#### Measuring air conditions
0 ... +50°C / 5 ... 95% r.h., non-condensing

### Control function
- VAV-CAV
- Open-loop operation

### VAV and CAV applications
- Supply/exhaust air units in stand-alone operation / master-slave / parallel connection for rooms with positive/negative pressure or neutral air pressure
- Mixing units

#### Operating volumetric flow
- **V<sub>nom</sub>**: OEM-specific nominal volumetric flow setting, matches VAV box
- **V<sub>max</sub>**: 30 ... 100% of V<sub>nom</sub>
- **V<sub>min</sub>**: 0 ... 100% of V<sub>nom</sub> (see page ... «Minimum setting limit»)
- **V<sub>mid</sub>**: 0 ... 100% of (V<sub>min</sub> ... V<sub>max</sub>)

#### Classic control
- Mode for reference value input w (connection 3)
  - DC 2 ... 10 V / (4 ... 20 mA with 500 Ω resistance)
  - DC 0 ... 10 V / (0 ... 20 mA with 500 Ω resistance)
  - Adjustable DC 0 ... 10 V
- Mode for actual volumetric flow signal US (connection 5)
  - DC 2 ... 10 V
  - DC 0 ... 10 V
  - Adjustable DC 0 ... 10 V

#### Operating modes for constant air volume
- CLOSE / V<sub>min</sub> / V<sub>mid</sub> / V<sub>max</sub> / OPEN (* only with AC 24 V supply)

### MP-Bus function
- **Address in bus operation**: MP 1 ... 8 (classic control: PP)
- **LonWorks® / EIB-Konnex**: With BELIMO UK24LON / UK24EIB interface, 1 ... 8 BELIMO MP devices (VAV / damper actuator / valve actuator)
- **DDC controller**: DDC controller / PLC from various manufacturers, with integrated MP interface
- **Fan optimiser**: With BELIMO optimiser COU24-A-MP
- **Sensor integration (only available for LMV/NMV-D2-MP)**: Passive (P1000, N1000 etc.) and active sensors (0...10 V) e.g. temperature, humidity
- **2-point signal (switching capacity 16 mA @ 24 V)**, e.g. switches, occupancy switches

#### Operation and servicing
- Pluggable / PC-Tool (V3.1 or higher) / ZEV hand-operated device
- **Communication**: PP/MP-Bus, max. DC 15 V; 1200 baud
- **Button**: Adaptation / addressing / service function
- **LED indicator**: - 24 V feed
  - Status / service / bus function

#### Actuator
- **Actuator**: Brushless, non-blocking actuator with current reduction

#### Direction of rotation
- ccw/cw or / ↑ ↓

#### Adaptation
- Setting range recording and resolution to control range

#### Manual disengagement
- Pushbutton, self-resetting without affecting functions

#### Actuator - full-rotation
- **Angle of rotation**: 95° -4°, with adjustable mechanical or electronic limiting
- **Position indication**: Mechanical with pointer
- **Spindle driver**: - Clamp, for round spindles 10 ... 20 mm / square spindles 8 ... 16 mm
  - Positive fit, wide range of versions, e.g. 8 x 8 mm

#### Connection
- Cable, 4 x 0.75 mm², terminals

#### Safety
- **Protection class**: III Safety extra-low voltage
- **Degree of protection**: IP 54
- **EMC**: CE according to 89/336/EEC
- **Mode of operation**: Type 1 (to EN 60730-1)
### Convenience Solutions VAV-Compact

#### Technical data (continued)

<table>
<thead>
<tr>
<th>Safety</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated impulse voltage</td>
<td>0.5 kV (to EN 60730-1)</td>
</tr>
<tr>
<td>Control pollution degree</td>
<td>2 (to EN 60730-1)</td>
</tr>
<tr>
<td>Ambient conditions</td>
<td>0 ... +50°C</td>
</tr>
<tr>
<td>Non-operating temperature</td>
<td>-20 ... +80°C</td>
</tr>
<tr>
<td>Ambient humidity range</td>
<td>5 ... 95% RH, non-condensing (to EN 60730-1)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Maintenance-free</td>
</tr>
</tbody>
</table>

#### Connection

**Connecting cable** The connection is established via the connection cable installed on the VAV Compact device.

**Note**
- Supply via safety isolation transformer!
- Connections 1, 2 (AC/DC 24 V) and 5 (MP signal) must be routed to accessible terminals (room temperature controller, floor distributor, control cabinet, etc.), in order to simplify access with the PC-Tool for diagnostic and service work.

<table>
<thead>
<tr>
<th>No</th>
<th>Designation</th>
<th>Wire colour</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BKCOM</td>
<td>black</td>
<td>T</td>
</tr>
<tr>
<td>2</td>
<td>RD + ~</td>
<td>red</td>
<td>~ +</td>
</tr>
<tr>
<td>3</td>
<td>WH Y</td>
<td>white</td>
<td>Reference signal VAV / CAV</td>
</tr>
<tr>
<td>5</td>
<td>OG U</td>
<td>orange</td>
<td>Actual value signal / MP-Bus connection</td>
</tr>
</tbody>
</table>

#### VAV - Variable operation Vmin ... Vmax

**Wiring diagrams**

- **Example 1:** VAV with analogue reference signal
- **Example 2:** VAV with shut-off (CLOSE), 2...10 V mode
- **Example 3:** VAV parallel operation with analogue reference signal Supply/exhaust air
- **Example 4:** VAV master-slave operation with analogue reference signal

---

3
CAV – Step mode CLOSED / V\text{min} / V\text{mid} / V\text{max} / OPEN

CAV control

Two options are available for CAV control:
- Standard: CLOSED – V\text{min} – V\text{max} – OPEN (default setting)
- NMV-D2M-compatible CLOSED – V\text{min} – V\text{mid} – V\text{max} – OPEN

The setting can be changed with the PC-Tool from Version V3.1

Wiring diagrams

Note
The contacts are mutually interlocking!

CAV function: Standard

Example:
CAV application: CLOSED – V\text{min} – V\text{max}
(2...10 V mode)

CAV function: NMV-D2M-compatible

Example:
CAV application V\text{min} – V\text{mid} – V\text{max}
(0...10 or 2...10 V mode)

Legend
- Contact closed, function active
- Contact closed, function active, only in 2...10 V mode
- Contact open
* Not available with DC 24 V supply

Note
You must set the CAV function to NMV-D2M-compatible in order to use the CAV V\text{mid} step

Note
- Supply via safety isolation transformer!
- Connections 1, 2 (AC/DC 24 V) and 5 (MP signal) must be routed to accessible terminals (room temperature controller, floor distributor, control cabinet, etc.) in order to simplify access with the PC-Tool for diagnostic and service work.
**MP-Bus operation – VAV- / CAV operation**

**Connecting cable**
The connection to the MP-Bus is established via the connection cable installed in the VAV-Compact device.

**Note**
- Supply via safety isolation transformer!
- Connections 1, 2 (AC/DC 24 V) and 5 (MP signal) must be routed to accessible terminals (room temperature controller, floor distributor, control cabinet, etc.), in order to simplify access with the PC-Tool for diagnostic and service work.

<table>
<thead>
<tr>
<th>No</th>
<th>Designation</th>
<th>Wire colour</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BKCOM L</td>
<td>black</td>
<td>Supply AC/DC 24 V</td>
</tr>
<tr>
<td>2</td>
<td>RD + ~</td>
<td>red</td>
<td>Input for - Sensor linking - Override control</td>
</tr>
<tr>
<td>3</td>
<td>WH Y</td>
<td>white</td>
<td>- Sensor linking - Override control</td>
</tr>
<tr>
<td>5</td>
<td>OG U</td>
<td>orange</td>
<td>MP-Bus connection</td>
</tr>
</tbody>
</table>

**Wiring diagrams**

**Bus operation - VAV function**
For detailed information, see section «MP-Bus integration»

**Bus operation - VAV function with integrated switch**
For detailed information on sensor integration, see section «MP-Bus integration»

**Sizing of feed and connection cables**

**General**
In addition to the actual wire sizing, attention must also be paid to the surrounding area and the cable routing. Signal cables must not be laid in the vicinity of load cables, objects liable to cause EMC interference etc. if possible. Paired or layer stranded cables improve immunity to interference.

**24V feed, sizing and wiring**
The wire sizing and installation of the AC 24 V supply, the fuse protection, and the cables are dependent on the total operated load and local regulations. Account must be taken of the following performance data, including starting currents of the actuators:
- Sizing values VAV-Compact controller, see Technical Data.
- Sizing values of further controlling elements etc. can be found in the current data sheets and product information.
- Other devices which are intended to be connected to the same 24 V feed.
- Reserve capacity for subsequent expansion, if planned.

**MP-Bus integration - supply, sizing and wiring**
See MP-Bus integration.
For more details information, please refer to tool connection guild.