Technical data

Electrical data
- Nominal voltage: From VAV controller, AC 24 V, 50/60 Hz / DC 24 V
- Power supply range of VAV controller: AC 19.2 ... 28.8 V / DC 21.6 ... 28.8 V
- Power consumption:
  - In operation: 1 W
  - For wire sizing: 2 VA

Connection
- Plug socket for Belimo PP interface: RJ12 socket
- Communication: PP, no MP operation
- Connecting cable: See page 6

MP/PP interface
- Communication: PP, no MP operation

VAV controllers
- VAV-Universal VRD3: from 2008
- VAV-Universal VRP-M [VAV and STP (pressure application)]: from 2005
- VAV-Compact LMV-D2-MP, NMV-D2-MP, SMV-D2-MP, LHV-D2-MP: 2006
- VAV-Compact LMV-D2LON, NMV-D2LON: 2006

Operation
- LC display: 2 x 16 characters with backlighting
- Buttons: ▼ / ▲ / – / + / OK
- Quick start guide: Included, en/de

Safety / tests
- Protection class: III Safety extra-low voltage
- EMC: CE according to 89/336/EEC
- Operating temperature: 0 ... 50°C, non-condensing
- Storage conditions: –20 ... 50°C, non-condensing

Dimensions / weight
- Dimensions: See page 8
- Weight: Approx. 260 g

Safety notes

• The device is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
• Only suitable for connection to Belimo VAV devices with 24 V safety extra-low voltage and a PP/MP interface.

Brief description

Applications
The ZTH-VAV adjustment tool enables VAV and CAV systems to be tested efficiently. Systems equipped with Belimo VAV controllers can be easily adjusted to individual room and user requirements.

Can be used with: available since:
- VAV-Universal VRD3: from 2008
- VAV-Universal VRP-M [VAV and STP (pressure application)]: from 2005
- VAV-Compact LMV-D2-MP, NMV-D2-MP, SMV-D2-MP, LHV-D2-MP: 2006
- VAV-Compact LMV-D2LON, NMV-D2LON: 2006

1) Requires ZTH-VAV Firmware V1.02 or higher

Products no longer available
**Brief description**

**Connection and supply**

**Stand-alone operation:**
The tool can be connected and supplied using the service socket on the VAV controller or the connecting terminals.

**Bus operation:**
If the ZTH-VAV is connected to the local service socket, it can be used to test the following devices without interrupting the bus: VAV-Compact L/N/SMV-D2-MP and L/NMV-D2LON. The MP-Bus must be disconnected in order to test the VRP-M and L/NMV-D2M when the service socket is used.

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**Limitation**
The tool cannot be directly connected in an MP network or via an MP-Bus master.

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**Operating instructions**

These operating instructions describe handling of the ZTH-VAV adjustment tool. For a detailed description of VAV controllers, please refer to the separate product documentation, which can be downloaded from www.belimo.eu ¦ Documentation ¦ Room & System Solutions. A quick start guide in English and German is included with the ZTH-VAV as a sticker that can be affixed to the rear of the device.

**Compatibility**
The ZTH-VAV adjustment tool supersedes the old ZEV adjustment tool (1992–2007).

All standard Belimo VAV controllers with integrated PP communication that are sold in EU countries (from 1992) can be adjusted using the ZTH-VAV.

Belimo Automation AG reserves the right to make changes or improvements at any time without prior notice. The latest version of these operating instructions is published on our website: www.belimo.eu.

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**Connection**

See page 6.

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**Operation**

**Buttons, display**

RJ12 connection: PP / 24 V

See page 6

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**Device rear, quick start guide**

A quick start guide in English and German is included with the ZTH-VAV as a sticker that can be affixed to the rear of the device.

Contents:
- Connection
- Overview of types
- Access to Configuration menu
- Operating menu with navigation tree
Operation (Continued)

Configuration menu
You can set the language and the volumetric flow units in the Configuration menu. The settings are stored.

Start Configuration menu
Action: Keep the (OK) button pressed while you connect the tool to the VAV controller.
Reaction: «Configuration menu» appears on the display
Continue with: (▼ ▲) buttons
Exit: Menu option «leave config-menu» or disconnect cable

Options

<table>
<thead>
<tr>
<th>Text</th>
<th>German * / English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>m³/h *, l/s, cfm</td>
</tr>
<tr>
<td>Supply</td>
<td>AC 24 V, AV 24 V</td>
</tr>
<tr>
<td>MP tester</td>
<td>MP-Bus level tester</td>
</tr>
<tr>
<td>Expert Mode</td>
<td>0 */ 1</td>
</tr>
<tr>
<td>Advanced Mode</td>
<td>0 */ 1</td>
</tr>
</tbody>
</table>

* Default

Operating menu – overview
The operating menu adapts to the functionality of the connected VAV controller. Options that are not relevant are not shown.

Legend
Change values, write
Configuration, Expert mode must be active
Displayed value
Display in %, Pa % Pa
Not possible

1) only with VRP-M V3.x

Products no longer available
Operation

Device identification
(Read only)

As soon as the ZTH-VAV is connected to a VAV controller, the display shows the version number and then a device ID containing the following information:

- **Type**
  - Type of the connected VAV controller, e.g. LMV-D2-MP
- **Position**
  - Text string programmed with the PC-Tool, e.g. system designation

Press (OK) to display the following additional information:

- **Address**
  - PP or MP1...8 (no addresses are supported by VRD2 / NMV-D2; display: ?)
- **Serial no.**
  - Unique, 16-character serial number

Press (+) to display the firmware version in addition to the type. This function is not supported by the NMV-D2 or VRD2.

Functions

**Actual volumetric flow**
(read only)

(0 ... 100 % $V_{nom}$)

The volumetric flow is indicated relative to the $V_{nom}$ setting.

**Setpoint**
(READ only)

(CLOSE, $V_{min}$ ... $V_{max}$, OPEN)

The setpoint setting range corresponds to $V_{min}$ ... $V_{max}$. If a local override function is active, e.g. NMV-D2-MP: CLOSE damper (jumper 1–3), this information is shown with the setpoint.

**Pressure**
(Read only)

The volumetric flow and the differential pressure at the sensor [Pa] are shown for the VRD3 and the VRP-M.

Note
Only characters in the ISO-8859-1 character table are supported.

Note
For a detailed description of these functions, please refer to the separate documentation for the VAV controllers concerned. Visit www.belimo.com or contact your local Belimo representative.

Note
Only characters in the ISO-8859-1 character table are supported.

Products no longer available
Functions (Continued)

**Damper position** [0 … 100 %] (Read only)

The position is shown in the following cases:
- Synchronisation, adaption: 0%.
- VAV controller without position feedback, VRD2, VRD3, VRP-M with NM24-V-ST, 0%

**Select CAV step**

[AUTO / CLOSE / OPEN / \( \min / \max / \text{STOP} \)] (Read / write)

The CAV steps shown opposite, also referred to as operating modes, can be used to test VAV / CAV units for L/N/SMV-D2-MP, L/NMV-D2LON, VRD3 and VRP-M. By activating a CAV step, you set the VAV controller to a fixed operating mode. The temporarily selected volumetric flow setpoint is indicated in the setpoint display.

If the ZTH-VAV is disconnected from the VAV controller, the controller is reset to automatic mode (control function) within two minutes.

The following operating modes are available:

<table>
<thead>
<tr>
<th>Step</th>
<th>Function</th>
<th>Control function</th>
<th>Available with</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTO</td>
<td>Setpoint of input 3 (w/y) or MP master active</td>
<td>VAV or CAV mode</td>
<td>VRD3, VRP-M, xMV-D2-MP, xMV-D2LON</td>
</tr>
<tr>
<td>CLOSE</td>
<td>Damper closes</td>
<td>No control mode</td>
<td></td>
</tr>
<tr>
<td>OPEN</td>
<td>Damper opens</td>
<td>No control mode</td>
<td></td>
</tr>
<tr>
<td>( \min )</td>
<td>Controller operates with volumetric flow ( \min )</td>
<td>CAV mode ( \min )</td>
<td></td>
</tr>
<tr>
<td>( \max )</td>
<td>Controller operates with volumetric flow ( \max )</td>
<td>CAV mode ( \max )</td>
<td></td>
</tr>
<tr>
<td>STOP</td>
<td>Damper stops in current position</td>
<td>No control mode</td>
<td></td>
</tr>
</tbody>
</table>

**Change mode** [0 … 10 / 2 … 10 V] (Read only)

The mode function can be used to adapt the setpoint input and the actual value output signal to the application or controller.

**Change mode** 0 … 10 V

**Change mode** 2 … 10 V

**Restore \( \min / \max \) defaults**

[yes / no] (Write)

The original \( \min / \max \) values set by the unit manufacturer (OEM) are restored. All values set in the meantime are overwritten by the original values.

**Operating volumetric flow \( \min \)**

[0 … 100 % \( \text{\( \text{\text{\( \min \)}} \)} \)] (Read / write)

**Operating volumetric flow \( \max \)**

[30 … 100 % \( \text{\( \text{\( \text{\( \max \)}} \)} \)] (Read / write)

**Minimum setting limit** *) Oversizing of the VAV units can make control more difficult in the lowest differential pressure range. A minimum volumetric flow, usually corresponding to a differential pressure of ~2 ... 5 Pa, is therefore specified for these units by the manufacturer. Functional restrictions in this range can be avoided by complying with the unit manufacturer's volumetric flow setting.

\( \min \) setting 0 m³/h or 0%:

If the damper needs to be shut off by means of a 0.0 V setpoint signal in VAV mode, this can be achieved by setting \( \min 0 \text{m}^3/\text{h} \) or 0%.
Functions (Continued)

$V_{\text{nom}}$ setting on the VAV unit (Read only)

When the VAV unit is calibrated, the unit manufacturer stores a displayed value in m³/h or l/s for the differential pressure at $V_{\text{nom}}$. This value is used to indicate the actual volumetric flow on a display unit or on the higher-level control system of a bus system.

If no displayed value for $V_{\text{nom}}$ is stored for the VAV controller (ZTH-VAV $V_{\text{nom}}$: 100%), the operating volumetric flow values $V_{\text{min}}$ and $V_{\text{max}}$ are shown and entered in percent.

This parameter describes the pressure difference (Pa) at nominal volumetric flow $V_{\text{nom}}$, measured to the D3 sensor. The $\Delta p @ V_{\text{nom}}$ parameter is set by the VAV unit manufacturer when the unit is calibrated and cannot be altered by the user.

If a VAV-Compact is programmed as an open-loop controller, VAV control is deactivated. In this case, the Compact device acts as a remote actuator and sensor unit for an external VAV controller.

- The actual volumetric flow and the damper position are indicated correctly.
- It only makes sense to display the setpoint in this application, however, if $V_{\text{nom}}$ is set to 0 m³/h or l/s, i.e. display ZTH-VAV $V_{\text{nom}}$: 100%.

Note

The VRD2, VRD3 and NMV-D2 do not support the display of $V_{\text{nom}}$ as absolut value. $V_{\text{nom}}$ equals to 100%.

Connection

Local service socket

<table>
<thead>
<tr>
<th>Connection to</th>
<th>Cable type and order designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>L/N/SMV-D2-MP</td>
<td>ZK1-GEN Included with ZTH-VAV</td>
</tr>
<tr>
<td>L/NMV-D2LCN</td>
<td>ZK1-VAV Accessory</td>
</tr>
<tr>
<td>L/NMV-D2M, CR24</td>
<td>ZK1-VAV Accessory</td>
</tr>
<tr>
<td>VRP-M</td>
<td>ZK4-GEN Accessory</td>
</tr>
<tr>
<td>VRD3</td>
<td>ZK6-GEN Accessory</td>
</tr>
</tbody>
</table>

Connecting terminals

<table>
<thead>
<tr>
<th>Connection to</th>
<th>Cable type and order designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>L/N/SMV-D2-MP</td>
<td>ZK2-GEN</td>
</tr>
<tr>
<td>L/NMV-D2LCN</td>
<td></td>
</tr>
<tr>
<td>L/NMV-D2M</td>
<td></td>
</tr>
<tr>
<td>NMV-D2, VRD2</td>
<td></td>
</tr>
<tr>
<td>VRD3, VRP-M</td>
<td></td>
</tr>
</tbody>
</table>

ZK2-GEN wiring assignment

- PP (Turq.)
- +/− (Blue)
- GND (White)
Supply voltage test for VAV controllers (AC/DC 24 V)

The ZTH-VAV can be used to test the AC 24 V supply voltage of the VAV controllers in conjunction with the ZK2-GEN connecting cable.

Measuring the AC 24 V supply voltage with the ZTH-VAV helps pinpoint the cause of a malfunction, e.g. when the system is started up.

To test the supply voltage

Equipment: ZTH-VAV, ZK2-GEN

Connection:
- Connect the free wires of the ZK2-GEN to AC 24 V.
  - White to GND (terminal 1 on the VAV controller)
  - Blue to ~ (terminal 2 on the VAV controller)
  - Do not connect the third wire (turquoise)
- Do not connect the RJ11 plug to the ZTH-VAV for the time being!

Start:
- Keep the (OK) button pressed while you connect the ZTH-VAV to the VAV controller
- Using the arrow key (▼) select «Supply»

Exit: Disconnect the ZTH-VAV from the VAV controller or select «leave config-menu» (Set)

Display format

Supply voltage quality
AC 24 V VHW: 88%

AC voltage (AC 24 V)
Supply okay
AC 25 V VHW: 88%

Quality: okay: AC supply in the range from 19.2 to 28.8 V
AC value: Measured AC voltage (accuracy: ±1.0 V, if VHW >95%)
VHW: Ratio of the positive half-wave to the negative half-wave

The difference between the positive half-wave value and the negative half-wave value must not be too large.
Rule of thumb: Pos. HW / neg. HW x 100 must not be >80%.

Explanation of VHW

Potential problems
The half-wave load is influenced if:
- The transformer is too small
- The cable between the transformer and the VAV controller is too long

DC voltage (DC 24 V)
A voltmeter should be used to test a DC 24 V installation.

Restriction
The supply voltage cannot be tested if the ZTH-VAV is connected to the service socket of the VAV or CR24 controller (transformed DC voltage).
## Accessories

<table>
<thead>
<tr>
<th>Cable type and order designation</th>
<th>Compatible with</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZK1-GEN</td>
<td>LMV-D2-MP, LHV-D2-MP</td>
<td>Included with ZTH-VAV</td>
</tr>
<tr>
<td>ZK1-VAV</td>
<td>LMV-D2M, NMV-D2M</td>
<td>1)</td>
</tr>
<tr>
<td>ZK2-GEN</td>
<td>All VAV controllers connected via connecting terminals</td>
<td>1)</td>
</tr>
<tr>
<td>ZK4-GEN</td>
<td>VBR-M</td>
<td>1)</td>
</tr>
<tr>
<td>ZK6-GEN</td>
<td>VRD3</td>
<td>1)</td>
</tr>
</tbody>
</table>

1) Available as accessories

### Dimensions (mm)

**Dimensional diagrams**

```
85

85

23
```

**Cable type and order designation**

- **ZK1-GEN**
- **ZK1-VAV**
- **ZK2-GEN**
- **ZK4-GEN**
- **ZK6-GEN**

**Compatible with**

- LMV-D2-MP, LHV-D2-MP
- NMV-D2-MP
- SMV-D2-MP
- LMV-D2LON, NMV-D2LON

**Remarks**

Included with ZTH-VAV

**Included with ZTH-VAV**

- ZK1-GEN
- ZK1-VAV
- ZK2-GEN
- ZK4-GEN
- ZK6-GEN

**Available as accessories**

- ZK1-GEN
- ZK1-VAV
- ZK2-GEN
- ZK4-GEN
- ZK6-GEN

**Products no longer available**

- ZK2-GEN
- ZK4-GEN
- ZK6-GEN

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