Installation VAV-Compact Retrofit Set

NMV-D3-RE2-SET
VAV-Compact Retrofit Set for utilisation of existing VAV devices made by various manufacturers.
• for various air velocities

Note
Suitable for round VAV boxes only.

General Information

Application
The VAV-Compact Retrofit Set was designed for the retooling of existing VAV-/CAV units. Thanks to the set solution, the replacement of VAV control devices from a wide variety of manufacturers, including pneumatic solutions, is exceptionally simple. The set contains all of the components required for the conversion. The ZTH-GEN service tool is used for the adaptation of the VAV-Compact Retrofit to the existing VAV unit and the air velocity. The setting data required for this purpose are already stored in the VAV-Compact Retrofit in a table, the «TypeList». This simplifies the conversion sequence and reduces the amount of time required for its completion.

Package contents

1. VAV controller NMV-D3-RE2
2. Pick-up device ZPD-RE2
3. Anti-rotation stud
4. Form-fit insert 8 x 8 mm

Installation instructions
These installation instructions describe the application of the VAV-Compact Retrofit Set NMV-D3-RE2-SET. For a detailed description of the VAV controller, we draw your attention to the respective separate product documentation for VAV-Compact, ZTH-GEN and NMV-D3-MP; see www.belimo.eu.
Belimo Automation AG can at any time implement changes and improvements without prior notification. For the current edition of the operating instructions, see www.belimo.eu.

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.
• It may only be installed by suitably trained personnel. Any legal regulations or regulations issued by authorities must be observed 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.
• The cable must not be removed from the device.
• When calculating the required torque, the specifications supplied by the damper manufacturers (cross section, design, installation site), and the air flow conditions must be observed.
• 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.
Installation of the new pick-up device

**Measured value recording**

The installation position and the inflow of the pick-up device are of decisive importance for measuring accuracy. If the measurement recording is positioned in an area of turbulence or if no sufficiently wide-ranging flow takes place, then measurement inaccuracies could occur under certain circumstances.

**Installation position**

1. **Air duct**
2. **Bore hole for pick-up device installation**
3. **Clearance between the pick-up devices**
4. **Air direction**

**Note**

Two pick-up devices are required for VAV boxes from 280 to 400 mm.

For this purpose use the ZPD-RE2-SET.
Installation of the new pick-up device (Continued)

Preparations

1. Shorten the pick-up device to the diameter of the VAV unit. The auxiliary template is located on the packaging of sets.

Note
The specified lengths must be maintained without fail in order to ensure that the desired measuring accuracy can be achieved.

2. Mount pick-up device seal

3. Drill an opening in the duct; hole size: 36 mm

Installation

1. Installation of the pick-up device in the duct
Caution: Observe direction of arrow and of air

2. Mount pick-up device with accompanying screws
Installation of the new VAV controller

Spindle clamp installation

The VAV controller NMV-D3-RE2 is equipped with the base plate for form-fit mounting. The front mounting clip may not be used under any circumstances when the controller is used with clamp connection (Illustration 3). Damage to the VAV unit and/or the VAV controller would be the result.

Spindle clamp installation with short axes
Adjusting angle of rotation limiter

**Note**
Incorrect settings can lead to damage to the damper blade and to a diminishment of the quality of the control.

The two mechanical end stops for angle of rotation limiting must be tailored to the conditions of the VAV unit and are therefore to be adjusted very carefully. The dismantled actuator is used as an orientation aid for placing the end stops.

Attaching hoses to the controller and pick-up device

1. Mount the two accompanying angle pieces to the connection nipples of the pick-up device.

2. Attach hoses to VAV controller with pick-up device

   **Caution:** Observe connection (±)

**Note**
Depending on the type of installation of the VAV controller, individual parts such as screws, form-fit insert or universal mounting brackets are not required and remain left over after completion of the installation.
**VAV-Compact Retrofit Set**

**Installation**

### Electrical connection of the new VAV controller

The VAV controller NMV-D3-RE2 is equipped with a 4-wire connecting cable. An electrical connection socket should be used for ensuring a permanent connection with the existing installation.

The connection is made using the connecting cable mounted to the VAV-Compact device.

#### Cable connection

- 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 ZTH-VAV or 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>- + ~</td>
<td>black</td>
<td>Supply AC/DC 24 V</td>
</tr>
<tr>
<td>2</td>
<td>+ ~</td>
<td>red</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>- y</td>
<td>white</td>
<td>Reference signal VAV/CAV</td>
</tr>
<tr>
<td>5</td>
<td>- u</td>
<td>orange</td>
<td>– Actual value signal – MP-Bus connection</td>
</tr>
</tbody>
</table>

### Settings and commissioning

The adaptation of the VAV-Compact Retrofit Set to the nominal width of the VAV/CAV unit is accomplished by shortening the differential pressure sensor in accordance with the auxiliary template (see page 3).

#### Settings with ZTH-GEN

**TypeList function**

The TypeList stored in the NMV-D3-RE2 contains the parameter sets for the following unit diameters.

<table>
<thead>
<tr>
<th>TypeList designation</th>
<th>VAV unit [mm]</th>
<th>$V_{nom}$ [l/s]</th>
<th>$V_{nom}$ [m³/h]</th>
<th>TypeList designation</th>
<th>VAV unit [mm]</th>
<th>$V_{nom}$ [l/s]</th>
<th>$V_{nom}$ [m³/h]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZPD-12 m/s 100</td>
<td>100</td>
<td>97</td>
<td>349</td>
<td>ZPD-6 m/s 100</td>
<td>100</td>
<td>48</td>
<td>175</td>
</tr>
<tr>
<td>ZPD-12 m/s 125</td>
<td>125</td>
<td>153</td>
<td>551</td>
<td>ZPD-6 m/s 125</td>
<td>125</td>
<td>77</td>
<td>276</td>
</tr>
<tr>
<td>ZPD-12 m/s 160</td>
<td>160</td>
<td>250</td>
<td>900</td>
<td>ZPD-6 m/s 160</td>
<td>160</td>
<td>125</td>
<td>450</td>
</tr>
<tr>
<td>ZPD-12 m/s 200</td>
<td>200</td>
<td>403</td>
<td>1451</td>
<td>ZPD-6 m/s 200</td>
<td>200</td>
<td>202</td>
<td>726</td>
</tr>
<tr>
<td>ZPD-12 m/s 224</td>
<td>224</td>
<td>525</td>
<td>1890</td>
<td>ZPD-6 m/s 224</td>
<td>224</td>
<td>263</td>
<td>945</td>
</tr>
<tr>
<td>ZPD-12 m/s 250</td>
<td>250</td>
<td>617</td>
<td>2221</td>
<td>ZPD-6 m/s 250</td>
<td>250</td>
<td>309</td>
<td>1111</td>
</tr>
<tr>
<td>ZPD-12 m/s 280</td>
<td>280</td>
<td>795</td>
<td>2862</td>
<td>ZPD-6 m/s 280</td>
<td>280</td>
<td>398</td>
<td>1431</td>
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<tr>
<td>ZPD-12 m/s 315</td>
<td>315</td>
<td>1028</td>
<td>3701</td>
<td>ZPD-6 m/s 315</td>
<td>315</td>
<td>514</td>
<td>1851</td>
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<tr>
<td>ZPD-12 m/s 355</td>
<td>355</td>
<td>1275</td>
<td>4590</td>
<td>ZPD-6 m/s 355</td>
<td>355</td>
<td>638</td>
<td>2295</td>
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<tr>
<td>ZPD-12 m/s 400</td>
<td>400</td>
<td>1676</td>
<td>6034</td>
<td>ZPD-6 m/s 400</td>
<td>400</td>
<td>838</td>
<td>3017</td>
</tr>
</tbody>
</table>

The desired data record can be selected with the TypeList function of the ZTH-GEN or of the PC-Tool.

#### ZTH-GEN service tool

**Note**

For the functions and applications of the ZTH-GEN, see separate service tool documentation. Available at www.belimo.eu or from your local Belimo representative.
### Settings and commissioning (continued)

**ZTH-GEN preparation**

- Expert and Advanced option enabled (Configuration menu)
- Enter OEM number

A password (OEM number) is required for access to the TypeList function of the VAV-Compact Retrofit. Please contact your local Belimo representative.

**Applying the TypeList sequence**

**ZTH-GEN**

**• TypeList function**

* Preparation
* Start function
* Press button
* Connect ZTH-GEN RJ plug

Pull out the ZTH-GEN RJ plug

Scroll

Select type

ZPD-12 m/s 100, ZPD-12 m/s 125, ...

**• Standard function**

Start/End

RJ plug

Scroll

Select type

ZPD-12 m/s 125

ZPD-12 m/s 125

ZPD-12 m/s 125

Write OK

'Designation' type is written in the 'Designation' string

**Setting parameters**

The following parameters are to be adjusted in relation to the VAV unit or to the room, respectively:

- \( V_{\text{min}} \) Minimum volumetric flow
- \( V_{\text{max}} \) Maximum volumetric flow
- \( \Delta p \) Control signal Y (0 ... 10 V / 2 ... 10 V)
- **Mode** Opening damper cw (clockwise) or ccw (counterclockwise)

\[ V_{\text{nom}} / \Delta p @ V_{\text{nom}} \] – Manual setting

For ZTH-GEN preparation, see above.

\[ \Delta p @ V_{\text{nom}} \] (pick-up device ZPD, page 6)

- Air velocity up to 6 m/s: 38 Pa
- Air velocity up to 12 m/s: 150 Pa

\( V_{\text{nom}} \) in accordance with pick-up device ZPD, page 6

\( V_{\text{min}} \) see above

... Adapting the actuator (angle of rotation)

An adaption is made to adapt the actuator to match the available damper angle of rotation, e.g. 60°. This procedure should be carried out at the time of commissioning after each adjustment to the angle of rotation limitation.

- Switch on the 24 V supply
- Press the 'Adaption' push-button.

The actuator now moves to the CLOSE – OPEN – setpoint position.
Functional check

After the adjustment has been completed, it is recommended that a functional check be carried out on the VAV/CAV unit. The VAV controller is set to the desired operating mode with the ZTH-GEN and a setpoint/actual value comparison is made.

<table>
<thead>
<tr>
<th>ZTH-GEN Stage selection</th>
<th>Volume 400 m³/h</th>
<th>Stage $&gt;$V&lt;max&lt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available stages CLOSED / $V_{\text{min}}$ / $V_{\text{max}}$ / Motor stop / OPEN</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Possible sources of errors

If the setpoint is not achieved, then this could be for several reasons:

- No volumetric flow or negative $\Delta p$ value, respectively:
  - Pressure hoses incorrectly connected
  - Direction of rotation set incorrectly
- Fire damper closed
- Actual volumetric flow is too low:
  - Supply pressure too low (supply pressure control, FU setting, air performance too low)
  - Damper spindle is mounted with an offset (damper cannot be opened all the way)

Extended energy-savings measure

<table>
<thead>
<tr>
<th>Single room control</th>
<th>Fan Optimiser System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extended energy savings measures and comfort enhancements can be achieved through the utilisation of the BELIMO single room controller CR24.. and through the integration of the VAV system in a Fan Optimiser System</td>
<td></td>
</tr>
</tbody>
</table>

You will find more detailed information on these components and systems at the BELIMO website www.belimo.eu or consult your local BELIMO representative.