#### Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview of the system</td>
<td>2</td>
</tr>
<tr>
<td>System description</td>
<td>3</td>
</tr>
<tr>
<td>Technical data sheets</td>
<td></td>
</tr>
<tr>
<td>VRP-M self-adaptive, digital PID VAV controller</td>
<td>5</td>
</tr>
<tr>
<td>Application</td>
<td>8</td>
</tr>
<tr>
<td>Functions</td>
<td>9</td>
</tr>
<tr>
<td>System configuration</td>
<td>12</td>
</tr>
<tr>
<td>Operating data settings (with VRP-M-Tool)</td>
<td>13</td>
</tr>
<tr>
<td>Connection of the VRP-M-Tool</td>
<td>15</td>
</tr>
<tr>
<td>Bus operation</td>
<td>16</td>
</tr>
<tr>
<td>VFP-.. static differential pressure sensors for neutral to slightly aggressive gases</td>
<td>19</td>
</tr>
<tr>
<td>NMQB24-SRV-ST fast-running damper actuator for VAV and CAV units</td>
<td>21</td>
</tr>
<tr>
<td>NM24-V-ST damper actuator for VAV and CAV units</td>
<td>23</td>
</tr>
<tr>
<td>Dimensions</td>
<td>25</td>
</tr>
</tbody>
</table>
Overview of the system

Self-adaptive VAV controller

<table>
<thead>
<tr>
<th>VRP-M</th>
<th>Power supply</th>
<th>AC / DC 24 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAV control</td>
<td>0 ... 10 / 2 ... 10 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 ... 20 / 4 ... 20 mA</td>
<td></td>
</tr>
<tr>
<td>CAV control</td>
<td>Contacts, switches</td>
<td></td>
</tr>
<tr>
<td>Bus function</td>
<td>MP/®BUS</td>
<td></td>
</tr>
<tr>
<td>– LONWorks® integration</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>– EIB / Konnex integration</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Settings, diagnostics</td>
<td>VRP-M-Tool</td>
<td></td>
</tr>
</tbody>
</table>

Pressure sensors
for static differential pressure measurement

<table>
<thead>
<tr>
<th>VFP-100</th>
<th>VFP-300</th>
<th>VFP-600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure range</td>
<td>0 ... 100 Pa</td>
<td>0 ... 300 Pa</td>
</tr>
<tr>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Slightly dusty air</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>– Very dusty air</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>– Corrosive gases</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Power supply</td>
<td>From VRP-M</td>
<td>From VRP-M</td>
</tr>
<tr>
<td>VRP-M connection</td>
<td>Ready to connect</td>
<td>Ready to connect</td>
</tr>
</tbody>
</table>

Damper actuators

<table>
<thead>
<tr>
<th>NMQB24-SRV-ST</th>
<th>NM24-V-ST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque</td>
<td>4 Nm</td>
</tr>
<tr>
<td>Speed</td>
<td>&lt; 5 s</td>
</tr>
<tr>
<td>Power supply</td>
<td>From VRP-M</td>
</tr>
<tr>
<td>VRP-M connection</td>
<td>Ready to connect</td>
</tr>
</tbody>
</table>

Applications

| VAV: \( V_{\min} \ldots V_{\max} \) | ● | ● |
| CAV: \( V_{\min} / V_{\mid\text{mid}} / V_{\max} \) | ● | ● |
| Override functions: Open – closed | ● | ● |
| Extraction systems | ● | ● |
| Laboratory exhaust systems | ● |
| Bus integration | ● | ● |

* For a list of sensor materials which are allowed to come into contact with the medium, see «Technical data» for the VFP-.., page 19

Products no longer available
System description

Ready-to-connect system solution for
• Pressure-independent VAV and CAV systems, e.g. in laboratories
• Fast-running VAV and CAV applications, e.g. in digesters or generally for extracting contaminated or slightly aggressive air in closed rooms

Control:
DC 2 ... 10 V / 0 ... 10 V or bus

Integration into
• DDC controller with MP interface
• EIB Konnex systems
• LONWORKS® systems

Settings and diagnostics
with VRP-M-Tool

System components

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller</td>
<td>VRP-M self-adaptive, digital PID VAV controller for every application</td>
<td>7 ... 18</td>
</tr>
<tr>
<td>Sensor</td>
<td>Pressure sensors for static differential pressure measurement for every application</td>
<td></td>
</tr>
<tr>
<td>– VFP-100 with 0 ... 100 Pa measuring range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– VFP-300 with 0 ... 300 Pa measuring range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– VFP-600 with 0 ... 600 Pa measuring range</td>
<td>19 ... 20</td>
<td></td>
</tr>
<tr>
<td>Actuator</td>
<td>– NM24-V-ST damper actuator for standard applications</td>
<td></td>
</tr>
<tr>
<td>– NMQB24-SRV-ST damper actuator for fast-running applications</td>
<td>21 ... 24</td>
<td></td>
</tr>
</tbody>
</table>

Brief description

Application
This ready-to-connect system solution is an efficient control system for pressure-independent, standard and fast-running air volume applications.

Field of application
The system can be used for controlled extraction of contaminated or slightly aggressive air in closed rooms:
• Exhaust air systems for laboratory workplaces *
• Laboratories in chemical and pharmaceutical plants *
• Hospital buildings *

In combination with the NMQB24-SRV-ST fast-running actuator, this system is particularly suited to laboratory applications *:
• Digesters *
• Extraction of contaminated air *

* Air compatibility verification essential (see «Technical data» for the VFP... sensors, page 19).
VRP-M Ready-to-connect system solution

### Safety notes

- The VRP-M system solution is not allowed be used for applications outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- Only components explicitly approved for this purpose by Belimo are allowed to be used for the VRP-M system solution.
- The equipment configuration and settings form part of the unit manufacturer’s system solution (OEM) and are not allowed to be modified without prior authorisation. All changes are liable to disrupt operation and cause damage to the system or injury to persons!
- Attention must be paid to the following during the planning phase and before the VRP-M system solution is operated:
  - The compatibility of the VFP-.. sensor with the medium to be controlled must be verified,
  - The specifications supplied by the VAV unit manufacturer (design, installation site) must be consulted,
  - All local regulations must be observed.
- If the VRP solution is operated in a bus system, the cycle times of the MP-Bus and the higher-level system must be taken into account.
- The manufacturer of the VAV unit (OEM) is responsible for ensuring that the VRP-M system solution is installed and set correctly as well as for the overall precision of the VAV unit. If replacement devices are ordered, they are configured by the OEM at the factory according to the installed system. The VRP-M system solution is sold exclusively via the OEM channel for this reason.

### System characteristics

<table>
<thead>
<tr>
<th>Control characteristics</th>
<th>Self-adaptive, digital PID VAV controller (see «System components», page 3).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure measurement</td>
<td>Static Belimo pressure sensors (see «System components», page 3).</td>
</tr>
<tr>
<td>Damper actuators</td>
<td>Belimo VAV damper actuators (see «System components», page 3).</td>
</tr>
</tbody>
</table>

**Optimally matched components**
In addition to standard VAV and CAV applications, the VRP-M system solution is also suitable for fast-running applications such as those used in laboratories. The solution comprises optimally matched, ready-to-connect components. These are only permitted for use in the controller-sensor-actuator combinations specified by Belimo and selected by the unit manufacturer (see «System components», page 3).

**VAV – variable air volume**
Variable air volume applications based on a modulating reference signal, e.g. supplied by a DDC controller, room temperature controller, EIB Konnex or LONWORKS® system.
The reference signal for the \( V_{\text{min}} \ldots V_{\text{max}} \) working range can be set as follows: DC 2\ldots10\,V / DC 0\ldots10\,V / adjustable DC range / bus operation

**CAV – constant air volume**
Constant air volume applications with operating steps (relays, switching contacts).
The following operating steps are available: CLOSED / \( V_{\text{min}} \) / \( V_{\text{mid}} \) / \( V_{\text{max}} \) / OPEN / bus operation

**Bus function**
Up to eight Belimo MP devices (VRP-M / NMV-D2M / damper actuator / valve) can be connected via the MP-Bus and integrated into the following systems:
- DDC controller with integrated MP-Bus protocol
- EIB Konnex system with Belimo UK24EIB interface
- LONWORKS® system with Belimo UK24LON interface

**Diagnostics tool**
VRP-M-Tool, plugged either directly onto the VRP-M VAV controller or via a terminal in the control cabinet (connection 4 – PP/MP)
Ready-to-connect system solution

Electrical installation

Wiring diagrams: VAV operation

**Example 1:**
With analogue reference signal

**Example 2:**
DC 0 ... 10 V with shut-off (CLOSED)

**Example 3:**
DC 0 ... 10 V with shut-off / parallel control

**Example 4:**
With bus control

**Example 5:**
Typical application: MP with shut-off (CLOSED)

---

**Note**
- Supply via safety isolation transformer!
- We recommend routing connections 1, 2 (AC/DC 24 V), 4 (MP signal) and 5 (U5 signal) to accessible terminals (floor distributor, control cabinet, etc.), in order to simplify access with the VRP-M-Tool for diagnostic and service work.

---

**Note**
- Supply via safety isolation transformer!
- We recommend routing connections 1 and 2 (AC/DC 24 V) to accessible terminals (floor distributor, control cabinet, etc.), in order to simplify access with the VRP-M-Tool for diagnostic and service work.

---

**Note**
- Supply via safety isolation transformer!
- We recommend routing connections 1, 2 (AC/DC 24 V) and 4 (MP signal) to accessible terminals (floor distributor, control cabinet, etc.), in order to simplify access with the VRP-M-Tool for diagnostic and service work.

---

Reference value input w
- Supply via safety isolation transformer!
- We recommend routing connections 1, 2 (AC/DC 24 V) and 4 (MP signal) to accessible terminals (floor distributor, control cabinet, etc.), in order to simplify access with the VRP-M-Tool for diagnostic and service work.

---

Products no longer available
Ready-to-connect system solution

Electrical installation

Wiring diagrams: CAV operation

Example 1:

Example 2:

Note

– Supply via safety isolation transformer!
– We recommend routing connections 1, 2 (AC/DC 24 V), 4 (MP signal) and 5 (US signal) to accessible terminals (floor distributor, control cabinet, etc.), in order to simplify access with the VRP-M Tool for diagnostic and service work.

Commissioning

Prerequisites

– The VAV / CAV unit must be mounted
– The VRP-M system solution must have been set and calibrated for the VAV / CAV unit by the unit manufacturer
– The electrical connection must have been made and checked
– The 24 V supply and control must be ready for operation
– The system fan must be in operation

Procedure

– Check the electrical connection
– Check the zero offset of the pressure sensor
– Check the damper mobility
– Check the supply pressure (the system fan must be in operation and calibrated)
– Check the $V_{\text{min}}$ / $V_{\text{max}}$ settings and correct them if necessary
– Check the control signal setting and adjust it if necessary

Angle of rotation adaptation

The angle of rotation must be adapted whenever the angle of rotation limiting of the NMQB24-SRV-ST damper actuator is adjusted.

Procedure:

– Switch on the 24 V supply
– Press the manual override pushbutton twice
– The actuator moves into the CLOSED...OPEN...setpoint position

VFP-.. static pressure sensor

Zero offset

– Disconnect both (!) hose connections from the sensor
– Remove the cover of the VFP-.. sensor housing
– Turn the zero potentiometer inside the VFP-..
– until the LED in the VRP-M [$\Delta p>0$] lights up
– Turn the zero potentiometer back until the LED goes out again

Products no longer available
**Technical data sheet**

**VRP-M controller**

**Self-adaptive digital PID VAV controller**

- For pressure-independent VAV and CAV systems
- Control: DC 0 ... 10 V / 2 ... 10 V or bus
- Diagnostics socket for VRP-M-Tool

---

### Technical data

<table>
<thead>
<tr>
<th>Electrical data</th>
<th>Nominal voltage</th>
<th>AC 24 V, 50/60 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AC 24 V</td>
<td>DC 24 V</td>
</tr>
<tr>
<td>Power supply range</td>
<td>AC ±20% / DC ±10%</td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>In operation</td>
<td>1.1 W (incl. VFP-.. sensor, without actuator)</td>
</tr>
<tr>
<td></td>
<td>For wire sizing</td>
<td>2.6 VA (incl. VFP-.. sensor, without actuator)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Connection</th>
<th>Actuator</th>
<th>Plug, 6-pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure sensor</td>
<td>Plug, 4-pin</td>
<td></td>
</tr>
<tr>
<td>Terminals 1 ... 7</td>
<td>Screw terminals, 7-pin, 0.5 mm² ... 1.5 mm²</td>
<td></td>
</tr>
<tr>
<td>VRP-M-Tool</td>
<td>Plug, 3-pin</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Functional data</th>
<th>VAV reference signal w (terminal 3)</th>
<th>Input impedance &gt;200 kΩ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range: $V_{min}$ ... $V_{max}$</td>
<td>DC 0 ... 10 / 2 ... 10 V or</td>
<td>0 ... 20 / 4 ... 20 mA (with 500 Ω resistance)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Volumetric flow actual value $U_5$ (terminal 5)</th>
<th>Range 0 ... 100% $V_{nom}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC 0 ... 10 / 2 ... 10 V, max. 5 mA</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPEN operating step – z1 (terminal 6)</th>
<th>OPEN, input impedance &gt;300 kΩ</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAV operating steps ±2 (terminal 7)</td>
<td>CLOSED $V_{min}$ / $V_{mid}$ / $V_{max}$, contact current &lt;1 mA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control characteristics</th>
<th>PID, self-adaptive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control tolerance</td>
<td>±5% of $V_{nom}$</td>
</tr>
<tr>
<td>Ranges</td>
<td>$V_{nom}$</td>
</tr>
<tr>
<td></td>
<td>30 ... 100% of $V_{nom}$</td>
</tr>
<tr>
<td>$V_{max}$</td>
<td>0 ... 100% of $V_{max}$</td>
</tr>
<tr>
<td>$V_{min}$ *</td>
<td>0 ... 100% of $V_{min}$ ... $V_{max}$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LED indicator</th>
<th>AC/DC 24 V supply</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Volume too high / too low, sensor zero</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MP-Bus function (terminal 4) ***</th>
<th>MP 1 ... 8 (classic control: PP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address in bus operation</td>
<td>Adjustable with VRP-M-Tool and address pushbutton</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Functionality</th>
<th>Slave</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation / service</td>
<td>VRP-M-Tool</td>
</tr>
</tbody>
</table>

**Safety**

<table>
<thead>
<tr>
<th>Protection class</th>
<th>III Safety extra-low voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of protection</td>
<td>IP42</td>
</tr>
<tr>
<td>EMC</td>
<td>CE according to 89/336/EEC</td>
</tr>
<tr>
<td>Mode of operation</td>
<td>Type 1 (to EN 60730-1)</td>
</tr>
<tr>
<td>Ambient temperature range</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% r.H., non-condensating (EN 60730-1)</td>
</tr>
</tbody>
</table>

**Maintenance**

| Maintenance | Maintenance-free |

**Dimensions/weight**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>See «Dimensions» on page 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>Approx. 250 g (without sensor)</td>
</tr>
</tbody>
</table>

---

* See «Creep flow limitation and minimum setting limit», page 9
** Not available with DC 24 V supply
*** For bus operation, see pages 16...18

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* Products no longer available
Self-adaptive VAV controller

Safety notes

- The controller is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- The device does not contain any parts that can be replaced or repaired by the user.
- The manufacturer of the VAV unit (OEM) is responsible for ensuring that the VRP-M-controller is installed and set correctly as well as for the overall precision of the VAV unit. If replacement devices are ordered, they are configured by the OEM at the factory according to the installed system.
- The VRP-M controller is sold exclusively via the OEM channel for this reason.
- 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.

Application

Together with the VFP-.. static pressure sensor and a Belimo NM-..ST actuator, the VRP-M forms a control system for pressure-independent variable (VAV) and constant (CAV) air volume controls.

For more information, see «VRP-M system», pages 3 ... 6

Electrical connections

Front panel

Assignment of terminals 1 ... 7 for supply and control

Tab connection for damper actuator

Tab connection for pressure sensor

Diagnostics socket for VRP-M-Tool

1 AC 24 V
2 DC 24 V

VAV reference signal $V_{\min} \ldots V_{\max}$

PP/MP signal

Volumetric flow actual value $0 \ldots 100\%$

OPEN operating step

CAV operating step CLOSED / $V_{\min} / V_{\text{mid}} / V_{\max}$

LED indicator and address pushbutton

PWR Green LED

LED on:
– AC/DC 24 V supply OK
– Device ready

LED off:
– Supply failure
– Device defective

Blinking
– If Set pushbutton pressed during MP addressing

$V^+$ Red LED

LED on:
– Volumetric flow $> \text{setpoint} = \text{damper closes}$ or is closed

$V^-$ Red LED

LED on:
– Volumetric flow $< \text{setpoint} = \text{damper opens}$ or is open

$\Delta p>0$ Yellow LED

LED on:
– Zero offset of VFP-.. pressure sensor (refer to page 6 for procedure)

Set

LED on:
– Pushbutton for assigning MP address in bus operation (refer to page 18 for procedure)

Safety notes

• The controller is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
• The device does not contain any parts that can be replaced or repaired by the user.
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For more information, see «VRP-M system», pages 3 ... 6

Electrical connections

Front panel

Assignment of terminals 1 ... 7 for supply and control

Tab connection for damper actuator

Tab connection for pressure sensor

Diagnostics socket for VRP-M-Tool

1 AC 24 V
2 DC 24 V

VAV reference signal $V_{\min} \ldots V_{\max}$

PP/MP signal

Volumetric flow actual value $0 \ldots 100\%$

OPEN operating step

CAV operating step CLOSED / $V_{\min} / V_{\text{mid}} / V_{\max}$

LED indicator and address pushbutton

PWR Green LED

LED on:
– AC/DC 24 V supply OK
– Device ready

LED off:
– Supply failure
– Device defective

Blinking
– If Set pushbutton pressed during MP addressing

$V^+$ Red LED

LED on:
– Volumetric flow $> \text{setpoint} = \text{damper closes}$ or is closed

$V^-$ Red LED

LED on:
– Volumetric flow $< \text{setpoint} = \text{damper opens}$ or is open

$\Delta p>0$ Yellow LED

LED on:
– Zero offset of VFP-.. pressure sensor (refer to page 6 for procedure)

Set

LED on:
– Pushbutton for assigning MP address in bus operation (refer to page 18 for procedure)

Safety notes

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• The device does not contain any parts that can be replaced or repaired by the user.
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• 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.

Application

Together with the VFP-.. static pressure sensor and a Belimo NM-..ST actuator, the VRP-M forms a control system for pressure-independent variable (VAV) and constant (CAV) air volume controls.

For more information, see «VRP-M system», pages 3 ... 6

Electrical connections

Front panel

Assignment of terminals 1 ... 7 for supply and control

Tab connection for damper actuator

Tab connection for pressure sensor

Diagnostics socket for VRP-M-Tool

1 AC 24 V
2 DC 24 V

VAV reference signal $V_{\min} \ldots V_{\max}$

PP/MP signal

Volumetric flow actual value $0 \ldots 100\%$

OPEN operating step

CAV operating step CLOSED / $V_{\min} / V_{\text{mid}} / V_{\max}$

LED indicator and address pushbutton

PWR Green LED

LED on:
– AC/DC 24 V supply OK
– Device ready

LED off:
– Supply failure
– Device defective

Blinking
– If Set pushbutton pressed during MP addressing

$V^+$ Red LED

LED on:
– Volumetric flow $> \text{setpoint} = \text{damper closes}$ or is closed

$V^-$ Red LED

LED on:
– Volumetric flow $< \text{setpoint} = \text{damper opens}$ or is open

$\Delta p>0$ Yellow LED

LED on:
– Zero offset of VFP-.. pressure sensor (refer to page 6 for procedure)

Set

LED on:
– Pushbutton for assigning MP address in bus operation (refer to page 18 for procedure)
Functions

Nominal volumetric flow $V_{\text{nom}}$

The VRP-M system solution is adapted to the dimensions of the VAV unit by means of the nominal volumetric flow setting. $V_{\text{nom}}$ corresponds to the maximum volumetric flow of the VAV unit at which the pressure drop and noise are still within the permissible operating conditions. The $V_{\text{nom}}$ values are specified and fixed-programmed by the unit manufacturer.

The volumetric flow actual value signal $U_5$ is always in relation to $V_{\text{nom}}$. Changes in the operating volumetric flow settings $V_{\text{min}}$ and $V_{\text{max}}$ therefore have no influence on the $U_5$ voltage signal.

Creep flow limitation

Minimum setting limit $V_{\text{max}}$

This function suppresses differential pressure signals in the zero region. Undefined actuator movements in the 1 ... 6 Pa differential pressure range are prevented by this limitation. The working range is physically limited owing to the dynamic behaviour of the differential pressure sensor, the flow pattern of the media and the response threshold of the sensor.

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>VFP-100</td>
<td>1 Pa</td>
</tr>
<tr>
<td>VFP-300</td>
<td>3 Pa</td>
</tr>
<tr>
<td>VFP-600</td>
<td>6 Pa</td>
</tr>
</tbody>
</table>

Unit manufacturer’s minimum setting limit (2)

Oversized VAV units can make control more difficult in the lowest differential pressure range. A minimum volumetric flow, usually corresponding to a differential pressure of approximately 5 ... 12 Pa, is therefore specified for the units by the manufacturer. Functional restrictions in this range can be avoided by complying with the unit manufacturer’s volumetric flow setting.

Diagram:

1. Creep flow limitation <2 Pa
2. Unit manufacturer’s minimum setting limit
Control tolerance

The maximum permissible control tolerance is defined as a percentage of the nominal volumetric flow \( V_{\text{nom}} \). If the system deviation exceeds or undershoots this tolerance, the actuator is adjusted so that the volumetric flow actual value corresponds to the required setpoint.

Control tolerance: \( \pm 5\% \) of \( V_{\text{nom}} \)

The two LEDs \([+p]\) and \([-p]\) indicate when the maximum control tolerance is exceeded or undershot or when the deviation is being corrected by means of an actuator movement:

LED \([+p]\): Volumetric flow actual value > (setpoint + control tolerance) = damper closes.
LED \([-p]\): Volumetric flow actual value < (setpoint + control tolerance) = damper opens.

VAV operating volumetric flow

In variable operation, the volumetric flow is specified by means of the reference signal in the \( V_{\text{min}} \)... \( V_{\text{max}} \) range.

- \( V_{\text{max}} \) forms the upper limit value as a function of the nominal volumetric flow.
  Range 30 ... 100\% of \( V_{\text{nom}} \).
- \( V_{\text{min}} \) forms the lower limit value as a function of \( V_{\text{max}} \).
  Range 0 ... 100\% of \( V_{\text{max}} \).

For override control in VAV operation, for example CLOSED or OPEN, the reference signal \( w \) (input 3) can be overridden by connecting control inputs 6 (z1) and 7 (z2).

CAV operating steps

Five operating steps are available for step operation:

- Shut-off operation – damper CLOSED: The damper is moved into the CLOSED position in a defined manner.
- Operating steps \( V_{\text{min}} \) ... \( V_{\text{mid}} \) ... \( V_{\text{max}} \): The VRP-M adjusts the volumetric flow to the fixed selected value.
- Flushing operation – damper OPEN: The damper can be opened for maximum ventilation, in which case air volume control is deactivated.

The operating mode control signals are connected to inputs 6 (z1) and 7 (z2). If signals appear at these two inputs simultaneously, input 6 (z1) for the OPEN function takes priority.
Functions (Continued)

VAV override operation
CLOSED /  \( \dot{V}_{\text{min}} / \dot{V}_{\text{mid}} / \dot{V}_{\text{max}} / \text{OPEN} \)

If necessary, the VAV  \( \dot{V}_{\text{min}} ... \dot{V}_{\text{max}} \) range can be overridden by fixed operating steps in VAV applications.

The following operating steps are available:
- Shut-off operation – damper CLOSED: The damper is moved into the CLOSED position in a defined manner.
- Operating steps  \( \dot{V}_{\text{min}} / \dot{V}_{\text{mid}} / \dot{V}_{\text{max}} \): The VRP-M adjusts the volumetric flow to the fixed selected value.
- Flushing operation – damper OPEN: The damper can be opened for maximum ventilation, in which case air volume control is deactivated.

Priorities for reference value input 3 (w) and control inputs 6 (z1) / 7 (z2)

If several signals appear simultaneously, they are processed acc. to the following table of priorities:

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Priority</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>z1</td>
<td>OPEN</td>
</tr>
<tr>
<td>7</td>
<td>z2</td>
<td>CLOSED /  ( \dot{V}<em>{\text{min}} / \dot{V}</em>{\text{mid}} / \dot{V}_{\text{max}} )</td>
</tr>
<tr>
<td>3</td>
<td>w</td>
<td>( \dot{V}<em>{\text{min}} ... \dot{V}</em>{\text{max}} )</td>
</tr>
</tbody>
</table>

Note

\( \dot{V}_{\text{mid}} \) is not available with DC 24 V supply.

Example: 2 ... 10 V mode

[Graph showing volumetric flow actual value signal U5 [V] and reference signal w [V]].
**System configuration**

**Unit manufacturer’s settings**
The system solution selected by the unit manufacturer is mounted by the latter on the VAV unit and configured according to the system requirements (as stated in the order). This configuration comprises the following settings.

**Volumetric flow – pressure sensor**
The pressure sensor type is specified to enable the pressure range to be adapted.

**Actuator – damper actuator**
The actuator type is specified to enable the running time characteristics to be adapted.

**Control – reference signal w, volumetric flow actual value signal U5**
The reference signal $w$ and the volumetric flow actual value signal $U_5$ are adapted to the MCR system.
Selection: DC 0...10 V / DC 2...10 V / adjustable (sequence matching in the 0...10 V range)

**Calibration – $V_{\text{nom}}$**
The $V_{\text{nom}}$ values are specified and fixed-programmed by the unit manufacturer. Each VRP-M system solution is optimally adapted to the VAV unit by means of the $V_{\text{nom}}$ setting. $V_{\text{nom}}$ corresponds to the maximum volumetric flow of the VAV unit at which the pressure drop and noise are still within the permissible operating conditions. The $V_{\text{nom}}$ setting is specified by the unit manufacturer.

<table>
<thead>
<tr>
<th>Volumetric flow actual value signal $U_5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\text{Smallest nominal width}$</td>
</tr>
<tr>
<td>$\text{Largest nominal width}$</td>
</tr>
<tr>
<td>$V_{\text{nom}}$</td>
</tr>
</tbody>
</table>

**Replacement orders**
If replacement devices are ordered, they must be parameterised beforehand by the OEM at the factory according to the installed system. The VRP-M is sold exclusively via the OEM channel for this reason.

**Note**
The equipment configuration and settings form part of the unit manufacturer’s system solution (OEM) and are not allowed to be modified without prior authorisation. All changes are liable to disrupt operation and cause damage to the system or injury to persons!
Self-adaptive VAV controller

Operating data settings

Adjustments on the system with VRP-M-Tool

The VRP-M-Tool can be used to adjust the operating data ($V_{\text{min}}$, $V_{\text{mid}}$, $V_{\text{max}}$ settings) and the reference signals (mode setting – voltage range) directly on the system if necessary. The VRP-M-Tool adapter must be connected to the diagnostics socket on the VRP-M or to the MP connection routed to the terminals for this purpose (see Note on page 15).

VRP-M-Tool
Service tab

1 Identification
2 Operating volumetric flow settings
3 System designation entry
4 Operational test:
   Reference signal
   Differential pressure [pascal]
   Setpoint / actual value [m³/h, l/s]
   Selected operating mode:
   – AUTO / CLOSED / OPEN
   – $V_{\text{min}}$ / $V_{\text{mid}}$ / $V_{\text{max}}$ / $V_{\text{nom}}$
   – Variable setpoint ($V_{\text{min}}$ ... $V_{\text{max}}$)

Operating volumetric flow settings

These parameters are used to set the VAV unit to the air volumes required for each application. The settings are based on the air volumes calculated by the planning engineer and can either be preset by the VAV unit manufacturer or adjusted on the system using the VRP-M-Tool.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{\text{nom}}$</td>
<td>Nominal volumetric flow</td>
</tr>
<tr>
<td>$V_{\text{max}}$</td>
<td>Upper volumetric flow limit</td>
</tr>
<tr>
<td>$V_{\text{min}}$</td>
<td>Lower volumetric flow limit</td>
</tr>
<tr>
<td>$V_{\text{mid}}$</td>
<td>Intermediate volumetric flow</td>
</tr>
</tbody>
</table>

System designation entry

Input field (16 characters) for specific system designations, e.g., MCR address, system name, item number in diagram, etc.
Operating data settings (Continued)

**VRP-M Tool**

**Expert tab**

**1. Mode setting**
- Standard 0...10 / 2...10 V

**2. Control**
- System-specific settings
  - Reference signal w
  - Volumetric flow actual value signal U5

**Mode setting**
Options: 0...10 V / 2...10 V / system-specific

The mode setting acts on the reference signal w and the volumetric flow actual value signal U5. Variable settings are displayed here and can also be reset by selecting 2...10 / 0...10 V. Variable settings are entered in the «Control» field above.

**Control**

**System-specific settings**
It is sometimes essential to adapt the reference signal w or the volumetric flow actual value signal U5 to the MCR system directly on the control system.
The reference signal w and the volumetric flow actual value signal U5 can be set to different values (e.g. reference signal w: 2...10 V / actual value signal U5: 0...10 V).

**Reference signal [w] / working range** \(v_{\text{min}} \rightarrow v_{\text{max}}\)
- Start point: DC 0.0 ... 8 V
- Stop point: DC 2.0 ... 10 V

**Volumetric flow actual value signal [U5] / display range** \(0\% \rightarrow 100\% v_{\text{nom}}\)
- Start point: DC 0.0 ... 8 V
- Stop point: DC 2.0 ... 10 V
Connection of the VRP-M-Tool

The VRP-M-Tool required for settings and servicing can be connected either directly to the 3-pin service socket on the VRP-M controller or via the MP connection (terminal 4). A ZIP-RS232 adapter must be used for level conversion.

Connection via service socket

Connection in control cabinet

Note

- The service plug integrated in the VRP-M is not available with bus operation.
- The MP-Bus cannot be used to transmit control functions if it is also used to connect the VRP-M-Tool.

Workaround: Disconnect the MP-Bus (terminal 4) and use the local MP plug instead.
Self-adaptive VAV controller

Bus operation

The VRP-M system solution can be interconnected with other Belimo MP actuators (damper actuators, valve actuators, VAV-Compact controllers, VRP-M system solutions) thanks to the integrated communication principle over the Belimo MP-Bus. Up to eight Belimo MP devices are supplied with a digital control signal by the higher-level bus master and then opened to the position dictated by this signal.

The switch-over from conventional to bus operation is automatic as soon as the MP actuator is assigned an MP address (1…8).

Belimo MP devices can be integrated into the following systems:
- LONWORKS®: The variables of Functional Profile 8110 can be used in conjunction with the Belimo UK24LON interface.
- EIB Konnex: Can be used with the Belimo UK24EIB interface
- DDC controller with an integrated MP-Bus protocol: Available from several manufacturers

Damper position

(nvoAbsAngle · absolute actuator position in angular degrees (°))

VRP-M with NM24-V-ST: There is no feedback signal with this actuator type, i.e. the nvoAbsAngle network variable is NOT allowed to be used in this application.

The nvoAbsAngle network variable is available in the VRP-M application with the NMQB24-SRV-ST fast-running variant.

MP-Bus cycle time

The MP-Bus cycle time must be noted when integrating setpoints and actual values. It is typically 2…8 s, depending on the number of connected bus users and integrated sensors.

The local VRP-M control function is not affected by the cycle time. The cycle time of the MP-Bus must always be taken into account, however, when selecting setpoints via the MP-Bus.

Sensor integration

The «integrate additional sensors / switches» option of the MP-Bus cannot be used with VPR-M controllers.

Principle of VRP-M in bus operation

In bus operation, the VRP-M controller receives its reference signal from the higher-level control system and adjusts the volumetric flow to the fixed selected value in the vmin … vmax range. If necessary, the VAV vmin … vmax range can be overridden by fixed operating steps (control inputs z1 and z2) in bus operation.

The following operating modes are available:
- Shut-off operation – damper CLOSED: The damper is moved into the CLOSED position in a defined manner.
- Operating steps vmin / vmax: The VRP-M adjusts the volumetric flow to the fixed selected value.
- Flushing operation – damper OPEN: The damper can be opened for maximum ventilation, in which case air volume control is deactivated.

Note

Vmid not available with DC 24 V supply.

Products no longer available
Bus operation (Continued)

Operating volumetric flow setting $V_{\text{min}} / V_{\text{max}}$

The setpoint selected over the MP-Bus is resolved by means of the $V_{\text{min}}$ and $V_{\text{max}}$ settings on the VRP-M.

<table>
<thead>
<tr>
<th>Function</th>
<th>Volumetric flow</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{\text{nom}}$</td>
<td>Nominal</td>
<td>OEM-specific value, depending on the application and the VAV unit type</td>
</tr>
<tr>
<td>$V_{\text{max}}$</td>
<td>Maximum</td>
<td>30 ... 100% of $V_{\text{nom}}$</td>
</tr>
<tr>
<td>$V_{\text{min}}$</td>
<td>Minimum</td>
<td>0 * ... 100% of $V_{\text{max}}$</td>
</tr>
</tbody>
</table>

* The minimum volumetric flow setting $V_{\text{min}}$ varies according to the type of VAV unit and is also influenced by the creep flow limitation function (see «Creep flow limitation / minimum setting limit»).

Open operating volumetric flow setting

The $V_{\text{min}}/V_{\text{max}}$ setting can be left open if necessary, i.e. $V_{\text{min}}$ 0% / $V_{\text{max}}$ 100%. In this case, the volumetric flow must be limited in the higher-level system.

This operating setting allows the limitation of the volumetric flow to be adjusted without altering the parameters on the VAV controller.

Responsibility for the limiting function passes from the unit manufacturer to the system supplier or integrator.

Priorities for bus signal (MP setpoint) and control inputs 6 (z1) / 7 (z2)

If several signals appear simultaneously, they are processed according to the following table of priorities.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Priority</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 z1</td>
<td>1</td>
<td>OPEN</td>
</tr>
<tr>
<td>7 z2</td>
<td>2</td>
<td>CLOSED / $V_{\text{min}}$ / $V_{\text{mid}}$ / $V_{\text{max}}$</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>MP override function</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>OPEN</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>CLOSED</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>$V_{\text{max}}$</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>$V_{\text{min}}$</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>$V_{\text{mid}}$</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>$V_{\text{nom}}$</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>MP setpoint 0 ... 100% = $V_{\text{min}}$ ... $V_{\text{max}}$</td>
</tr>
</tbody>
</table>

Note

Note the speed of the MP-Bus!
VRP-M

Self-adaptive VAV controller

MP-Bus

Topology
The cables of up to eight actuators can be laid in a freely definable topology. The following topologies are permitted: Star-shaped, ring-shaped, tree-shaped or mixed forms.

Connection
The network consists of a 3-pin connection (MP communication and 24 V supply). Neither special cables nor terminating resistors are required. Power can be supplied either over the bus cable or from a local power supply.

Network
Up to eight MP actuators can be connected in a network (NMV-D2M, VRP-M, etc.).

Supply with AC or DC voltage
- Nominal voltage: AC 24 V, 50/60 Hz DC 24 V
- Power supply range: AC 19.2...28.8 V DC 21.6...26.4 V
- Wire sizing: See «Technical data», page 7

Length of MP-Bus cable
The cable lengths are limited:
- By the sum of the performance data of the connected devices, VAV controllers and actuators
- By the type of supply (AC 24 V or DC 24 V)
- By the cable cross-section

For more information about planning and installation, see www.belimo.com
- VAV-Compact NMV-D2M Product Information, pages 22 and 23, or
- Bus and communication systems section

Addressing
If the VRP-M system solution is integrated in a bus system, each connected VRP-M must be assigned an MP address in the range 1 ... 8.

Procedure
- Start the addressing procedure on the MP-Bus master with the VRP-M-Tool, UK24LON, etc.
- Refer to the bus master documentation for further details
- Procedure with VRP-M-Tool:
  a) Select the address by means of the serial number
  b) Enter the serial number of the VRP-M (sticker on VRP-M, displayed in VRP-M-Tool)
- Select addressing with acknowledgement on the VRP-M
  a) Acknowledge the selected address by pressing the Set pushbutton on the required VRP-M
  b) The power LED (green) blinks when the Set pushbutton is pressed
### Static differential pressures sensor
for neutral to slightly aggressive gases

<table>
<thead>
<tr>
<th>Type</th>
<th>Measuring ranges</th>
<th>Overload protection</th>
<th>Temperature sensitivity of zero</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>VFP-100</td>
<td>0 ... 100 Pa</td>
<td>max. 500 Pa</td>
<td>±0.1% / K</td>
<td>Approx. 500 g</td>
</tr>
<tr>
<td>VFP-300</td>
<td>0 ... 300 Pa</td>
<td>max. 5000 Pa</td>
<td>±0.05% / K</td>
<td>Approx. 280 g</td>
</tr>
<tr>
<td>VFP-600</td>
<td>0 ... 600 Pa</td>
<td>max. 3000 Pa</td>
<td>±0.05% / K</td>
<td>Approx. 280 g</td>
</tr>
</tbody>
</table>

### Technical data sheet VFP-.. sensors

#### Overview of types

<table>
<thead>
<tr>
<th>Type</th>
<th>Measuring ranges</th>
<th>Overload protection</th>
<th>Temperature sensitivity of zero</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>VFP-100</td>
<td>0 ... 100 Pa</td>
<td>max. 500 Pa</td>
<td>±0.1% / K</td>
<td>Approx. 500 g</td>
</tr>
<tr>
<td>VFP-300</td>
<td>0 ... 300 Pa</td>
<td>max. 5000 Pa</td>
<td>±0.05% / K</td>
<td>Approx. 280 g</td>
</tr>
<tr>
<td>VFP-600</td>
<td>0 ... 600 Pa</td>
<td>max. 3000 Pa</td>
<td>±0.05% / K</td>
<td>Approx. 280 g</td>
</tr>
</tbody>
</table>

#### Technical data

**Electrical data**
- Power supply: DC 15 V (from VRP-M controller)
- Connection: 1 m cable with 4-pin plug (compatible with VRP-M controller)

**Functional data**
- Measuring range: See «Overview of types»
- Overload protection: See «Overview of types»
- Measuring principle: Diaphragm differential pressure measurement (inductive)
- Medium: Neutral to slightly aggressive gases
- Parts in contact with medium: Ni, Al, CuBe, PU
- Linearity: ±1% of final value (FS)
- Hysteresis: Max. 0.1% of final value
- Temperature sensitivity of zero: See «Overview of types»
- Measuring range: See «Overview of types»
  - t = +10 ... 40°C (reference temperature t0 = 25°C)
- Mounting position: Upright (connection on bottom or side)
- Position dependency: Max. ±4.5 Pa when rotated 90°<4 about horizontal axis
- Pressure port: Hose connection for hose with 4 ... 6 mm internal diameter

**Safety**
- Protection class: III Safety extra-low voltage
- Degree of protection: IP42
- EMC: CE according to 89/336/EEC
- Mode of operation: Type 1 (to EN 60730-1)
- Ambient temperature range: 0 ... +50°C
- Non-operating temperature: −10 ... +70°C
- Ambient humidity range: 5 ... 95% r.H., non-condensating (EN 60730-1)
- Maintenance: Maintenance-free

**Dimensions/weight**
- Dimensions: See «Dimensions» on page 25
- Weight: See «Overview of types»

#### Safety notes

- The sensors are not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- They may only be installed by suitably trained personnel.
- All applicable legal or institutional installation regulations must be complied with.
- The devices do not contain any parts that can be replaced or repaired by the user.
- The devices contain electrical and electronic components and are not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.
Static differential pressure sensors

Product features

Application
Together with a VRP-M controller and a Belimo NM..ST actuator, the VFP-.. static pressure sensors form a control system for pressure-independent variable (VAV) and constant (CAV) air volume controls.

The pressure sensors are used for static differential pressure measurement with differential pressure pickups installed in air ducts. They are also suitable for contaminated or slightly aggressive air. Their robust design makes them ideal for installation in laboratories, clean room systems and industrial applications.

Mode of operation
A high-quality metal diaphragm is used in the sensor. The measured pressure produces a corresponding diaphragm stroke, which is detected inductively and converted to a pressure-linearised output signal.

The measuring signal is influenced by the mounting position due to the dead weight of the diaphragm. The sensor is calibrated at the factory in the vertical position, but can be readjusted on site if necessary, e.g. in order to mount it in another position.

The temperature is compensated to reduce drift to a minimum. The wear-free, inductive measurement method guarantees maintenance-free operation.

1) See «Technical data», page 19
For zero offset and more information, see «System description», page 6

Electrical installation
The ready-to-connect sensor unit is connected to the VRP-M controller with the 4-pin plug.
# Technical data sheet

## Fast-running damper actuator for VAV and CAV units

### Technical data

<table>
<thead>
<tr>
<th>Electrical data</th>
<th>Power supply: AC/DC 24 V (from VRP-M controller)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power consumption</td>
<td>In operation: 9 W</td>
</tr>
<tr>
<td></td>
<td>At rest: &lt;1.2 W</td>
</tr>
<tr>
<td></td>
<td>For wire sizing: 12 VA (max. 8.3 A @ 5 ms)</td>
</tr>
<tr>
<td>Connection</td>
<td>Cable with plug (compatible with VRP-M controller)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Functional data</th>
<th>Torque (nominal torque): Min. 4 Nm @ nominal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction of rotation</td>
<td>Reversible with switch or</td>
</tr>
<tr>
<td>Angle of rotation</td>
<td>Max. 95°&lt;sup&gt;−3&lt;/sup&gt;, mechanical end stops adjustable</td>
</tr>
<tr>
<td>Permissible range of rotation</td>
<td>63 ... 95%</td>
</tr>
<tr>
<td>Running time</td>
<td>5 s</td>
</tr>
<tr>
<td>Sound power level</td>
<td>52 dB (A)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety</th>
<th>Protection class: III Safety extra-low voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of protection</td>
<td>IP54 (cable entry at bottom)</td>
</tr>
<tr>
<td>EMC</td>
<td>CE according to 89/336/EEC</td>
</tr>
<tr>
<td>Mode of operation</td>
<td>Type 1 (to EN 60730-1)</td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>−30 ... +50°C</td>
</tr>
<tr>
<td>Non-operating temperature</td>
<td>−40 ... +80°C</td>
</tr>
<tr>
<td>Ambient humidity range</td>
<td>5 ... 95% r.H., non-condensating (EN 60730-1)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Maintenance-free</td>
</tr>
</tbody>
</table>

### Dimensions/weight

- Dimensions: See «Dimensions» on page 25
- Weight: Approx. 900 g

### Safety notes

- The actuator is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- It may only be installed by suitably trained personnel. All applicable legal or institutional installation regulations must be complied with.
- The device does not contain any parts that can be replaced or repaired by the user.
- The actuator is synchronised when the supply voltage is switched on or when the manual override switch is actuated. The actuator or the damper blade is moved into the «CLOSED» position in a defined manner and then into the position dictated by the system.
- 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.

**Products no longer available**
Fast-running damper actuator for VAV and CAV units

**Product features**

**Simple direct mounting**
Simple direct mounting on the damper spindle with a universal spindle clamp, supplied with an anti-rotation strap to prevent the actuator from rotating.

**Manual control**
Manual operation with self-resetting pushbutton. The position calculation is synchronised in order to prevent deviations as a result of manual control. This synchronisation also permits a simple functional check (see «Synchronisation» below).

**Adjustable angle of rotation**
The angle of rotation is adapted to the available setting range by the manufacturer of the VAV unit by means of integrated, mechanical end stops. Permissible range: 63 ... 100%.

**Adaptation to the available angle of rotation**
This function detects the upper and lower spindle end stops and stores them in the actuator. The running time and the working range are adapted to the available angle of rotation. Detection of the mechanical end stops enables a gentle approach to the end position and protects the actuator and damper mechanisms.

**Synchronisation**
The actuator moves into the «CLOSED» position (left or right end stop, depending on the position of the direction of rotation switch) when the supply voltage is switched on, in the event of a power failure >5 s or if the pushbutton is actuated again. It then moves into the position required by the system.

**Functional check**
Correct functioning of the dampers can be checked extremely easily: The gearing latch can be disengaged simply by pressing a pushbutton on the housing. As long as the pushbutton remains pressed, the damper can be operated manually.

**High functional reliability**
The actuators are overload-proof, require no limit switches and automatically stop when the end stop is reached.

**Electrical installation**

The ready-to-connect actuator unit is connected to the VRP-M controller with the 6-pin plug.

---

**Caution!**
Adaptation is necessary when the system is commissioned or whenever the end stops for angle of rotation limiting are adjusted (press the pushbutton twice).
## Technical data

### Electrical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>AC/DC 24 V (from VRP-M controller)</td>
</tr>
<tr>
<td>Power consumption in operation</td>
<td>4.5 W</td>
</tr>
<tr>
<td>For wire sizing</td>
<td>4.5 VA</td>
</tr>
<tr>
<td>Connection</td>
<td>Cable with plug (compatible with VRP-M controller)</td>
</tr>
</tbody>
</table>

### Functional data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque (nominal torque)</td>
<td>Min. 8 Nm @ nominal voltage</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>Reversible with switch</td>
</tr>
<tr>
<td>Angle of rotation</td>
<td>Max. 95°&lt;, mechanical end stops adjustable</td>
</tr>
<tr>
<td>Running time</td>
<td>120 s</td>
</tr>
<tr>
<td>Sound power level</td>
<td>Max. 35 dB (A)</td>
</tr>
</tbody>
</table>

### Safety

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection class</td>
<td>III Safety extra-low voltage</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP54 (cable entry at bottom)</td>
</tr>
<tr>
<td>EMC</td>
<td>CE according to 89/336/EEC</td>
</tr>
<tr>
<td>Mode of operation</td>
<td>Type 1 (to EN 60730-1)</td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>–30 ... +50°C</td>
</tr>
<tr>
<td>Non-operating temperature</td>
<td>–40 ... +80°C</td>
</tr>
<tr>
<td>Ambient humidity range</td>
<td>5 ... 95% r.H., non-condensating (EN 60730-1)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Maintenance-free</td>
</tr>
</tbody>
</table>

### Dimensions/weight

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>See «Dimensions» on page 25</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 900 g</td>
</tr>
</tbody>
</table>

## Safety notes

- The actuator is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- It may only be installed by suitably trained personnel. All applicable legal or institutional installation regulations must be complied with.
- The device does not contain any parts that can be replaced or repaired by the user.
- 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

The ready-to-connect actuator unit is connected to the VRP-M controller with the 6-pin plug.

Products no longer available.
Dimensions

Dimensional drawings
VRP-M controller

Dimensional drawings
VFP-100 sensor

Dimensional drawings
VFP-300 and VFP-600 sensors

Dimensional drawings
NMQB24-SRV-ST and NM24-V-ST actuators

Products no longer available
Products no longer available
All-inclusive.