VAV terminal units
Type TVRK

For contaminated air
Plastic circular VAV terminal units for aggressive extract air in variable air volume systems
- Casing and damper blade made of flame-resistant polypropylene
- Slide-out differential pressure sensor allows for easy cleaning
- Suitable for the control of volume flow rate, room pressure or duct pressure
- Electronic control components for different applications (Universal and LABCONTROL)
- Suitable for airflow velocities up to 13 m/s
- Closed blade air leakage to EN 1751, class 3
- Casing air leakage to EN 1751, class B

Optional equipment and accessories
- With flanges on both ends
- Matching flanges for both ends
- Plastic secondary silencer Type CAK for the reduction of air-regenerated noise
Application

- Circular VARYCONTROL VAV terminal units of Type TVRK, made of plastic, preferably for the extract air flow control in variable air volume systems
- Closed-loop volume flow control using an external power supply
- Suitable for contaminated air
- Shut-off by means of switching (equipment supplied by others)

Special characteristics

- Integral slide-out differential pressure sensor with 3 mm measuring holes (resistant to dust and pollution)
- Factory set-up or programming and aerodynamic function testing
- Volume flow rate can be measured and subsequently adjusted on site; additional adjustment tool may be necessary

Nominal sizes

- 125, 160, 200, 250, 315, 400

Variants

- TVRK: VAV terminal unit
- TVRK-FL: VAV terminal unit with flanges on both ends

Parts and characteristics

- Ready-to-commission unit which consists of mechanical parts and control components.
- Averaging differential pressure sensor for volume flow rate measurement; can be removed for cleaning
- Damper blade
- Factory-assembled control components complete with wiring and tubing
- Aerodynamic function testing on a special test rig prior to shipping of each unit
- Set-up data is given on a label or volume flow rate scale affixed to the unit
- High control accuracy (even with upstream bend R = 1D)

Attachments

- Universal controller: Controller, differential pressure transducer and actuators for special applications
- LABCONTROL: Control components for air management systems

Accessories

- Matching flanges for both ends, including seals

Useful additions

- Plastic secondary silencer Type CAK for demanding acoustic requirements
Functional description
The VAV terminal unit is fitted with a differential pressure sensor for measuring the volume flow rate. The control components (attachments) include a differential pressure transducer that transforms the differential pressure (effective pressure) into an electric signal, a controller, and an actuator; the control functions can be achieved with individual components (Universal or LABCONTROL). For most applications, the setpoint value comes from an external setpoint adjuster. The controller compares the actual value with the setpoint value and alters the control signal of the actuator if there is a difference between the two values.

Schematic illustration of the TVRK

1. Differential pressure sensor
2. Damper blade
3. Casing
4. Actuator
5. Control components, e.g. a Universal controller
Volume flow rate ranges

The minimum differential pressure of VAV terminal units is an important factor in designing the ductwork and in rating the fan including speed control. Sufficient duct pressure must be ensured for all operating conditions and for all control units. The measurement points for fan speed control must be selected accordingly. The volume flow rates given for VAV terminal units depend on the nominal size and on the control component (attachment) that is installed. The table gives the minimum and maximum values for a VAV terminal unit. Some control components may only have a limited volume flow rate range. This applies in particular to control components with a static differential pressure transducer. For volume flow rate ranges for all control components refer to our Easy Product Finder design programme.

<table>
<thead>
<tr>
<th>Nominal size</th>
<th>Volume flow rate control range</th>
<th>Minimum differential pressure</th>
<th>Maximum differential pressure</th>
<th>Operating temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>125</td>
<td>25 – 1680 l/s or 90 – 6048 m³/h</td>
<td>5 – 90 Pa</td>
<td>1000 Pa</td>
<td>10 – 50 °C</td>
</tr>
<tr>
<td>160</td>
<td></td>
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<tr>
<td>200</td>
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<td>250</td>
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<tr>
<td>315</td>
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<tr>
<td>400</td>
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</table>

**TVRK, Volume flow rate ranges and minimum differential pressures**

<table>
<thead>
<tr>
<th>Nominal size</th>
<th>Volume flow rate range</th>
<th>Δp_{min}</th>
<th>ΔV</th>
<th>± %</th>
</tr>
</thead>
<tbody>
<tr>
<td>125</td>
<td>25 – 90</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>160</td>
<td>60 – 216</td>
<td>15</td>
<td>20</td>
<td>20</td>
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<tr>
<td>200</td>
<td>105 – 378</td>
<td>45</td>
<td>50</td>
<td>55</td>
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<tr>
<td>250</td>
<td>150 – 540</td>
<td>90</td>
<td>100</td>
<td>110</td>
</tr>
<tr>
<td>315</td>
<td>40 – 144</td>
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<td>400</td>
<td>80 – 288</td>
<td>10</td>
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<td>15</td>
</tr>
<tr>
<td></td>
<td>145 – 522</td>
<td>30</td>
<td>30</td>
<td>35</td>
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<td></td>
<td>250 – 900</td>
<td>80</td>
<td>90</td>
<td>95</td>
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<tr>
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<td>65 – 234</td>
<td>5</td>
<td>5</td>
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<tr>
<td></td>
<td>180 – 648</td>
<td>15</td>
<td>15</td>
<td>20</td>
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<td>310 – 1116</td>
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<td>50</td>
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<td>405 – 1458</td>
<td>70</td>
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<td>80</td>
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<td>95 – 342</td>
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<td>270 – 972</td>
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<tr>
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<td>470 – 1692</td>
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<td>35</td>
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<tr>
<td></td>
<td>615 – 2214</td>
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<td>55</td>
<td>60</td>
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<tr>
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<td>155 – 558</td>
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<td>715 – 2574</td>
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<td></td>
<td>1250 – 4500</td>
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<td></td>
<td>1680 – 6048</td>
<td>40</td>
<td>45</td>
<td>50</td>
</tr>
</tbody>
</table>

1. TVRK
2. TVRK with secondary silencer CS/CF, insulation thickness 50 mm, length 500 mm
3. TVRK with secondary silencer CS/CF, insulation thickness 50 mm, length 1000 mm
4. TVRK with secondary silencer CS/CF, insulation thickness 50 mm, length 1500 mm
Quick sizing tables provide a good overview of the room sound pressure levels that can be expected. Approximate intermediate values can be interpolated. Precise intermediate values and spectral data can be calculated with our Easy Product Finder design programme. The first selection criteria for the nominal size are the actual volume flow rates $V_{\text{min}}$ and $V_{\text{max}}$. The quick sizing tables are based on generally accepted attenuation levels. If the sound pressure level exceeds the required level, a larger air terminal unit and/or a silencer is required.

**TVRK, Sound pressure level at differential pressure 150 Pa**

<table>
<thead>
<tr>
<th>Nominal size</th>
<th>$V$ l/s</th>
<th>$V$ m³/h</th>
<th>Air-regenerated noise</th>
<th>Case-radiated noise</th>
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<tbody>
<tr>
<td></td>
<td></td>
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<td>$L_{PA}$</td>
<td>$L_{PA1}$</td>
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<td>$L_{PA2}$</td>
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<td>3708</td>
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<td>255</td>
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<td>4500</td>
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<td></td>
<td>1680</td>
<td>6048</td>
<td>51</td>
<td>40</td>
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</tbody>
</table>

|               |          |          |                       |                   |
| 1: TVRK       |          |          |                       |                   |
| 2: TVRK with secondary silencer CAK, insulation thickness 50 mm, length 500 mm |
| 3: TVRK with secondary silencer CAK, insulation thickness 50 mm, length 1000 mm |
| 4: TVRK with secondary silencer CAK, insulation thickness 50 mm, length 1500 mm |
This specification text describes the general properties of the product. Texts for variants can be generated with our Easy Product Finder design programme.

Circular VAV terminal units made of PPs plastic, for variable and constant air volume systems, suitable for extract air, available in 6 nominal sizes. High control accuracy (even with upstream bend R = 1D). Ready-to-commission unit which consists of the mechanical parts and the electronic control components. Each unit contains an averaging differential pressure sensor for volume flow rate measurement and a damper blade. Factory-assembled control components complete with wiring and tubing.

Differential pressure sensor with 3 mm measuring holes (resistant to dust and pollution)
Spigot, suitable for ducts according to DIN 8077. Position of the damper blade indicated externally at shaft extension.
Closed blade air leakage to EN 1751, class 3.
Casing air leakage to EN 1751, class B.
Hygiene conforms to VDI 6022

**Special characteristics**
- Integral slide-out differential pressure sensor with 3 mm measuring holes (resistant to dust and pollution)
- Factory set-up or programming and aerodynamic function testing
- Volume flow rate can be measured and subsequently adjusted on site; additional adjustment tool may be necessary

**Materials and surfaces**
- Casing and damper blade made of flame-resistant polypropylene (PPs)
- Differential pressure sensor and plain bearings made of polypropylene (PP)
- Damper blade seal made of chloroprene rubber (CR)

**Technical data**
- Nominal sizes: 125 to 400 mm
- Volume flow rate range: 25 to 1680 l/s or 90 to 6048 m³/h
- Volume flow rate control range: approx. 17 – 100 % of the nominal volume flow rate
- Minimum differential pressure: 5 – 90 Pa
- Maximum differential pressure: 1000 Pa

**Attachments**
Variable volume flow control with electronic
Universal controller to switch an external control signal and an actual value signal for integration into the central BMS.
- Supply voltage 24 V AC/DC
- Signal voltages 0 – 10 V DC or 2 – 10 V DC
- Possible override controls with external switches using volt-free contacts: CLOSED, OPEN, \( V_{\text{min}} \) and \( V_{\text{max}} \)
- Volume flow rate control range: approx. 17 – 100 % of the nominal volume flow rate

**Sizing data**
- \( V \) \[m³/h]\n- \( \Delta p_{st} \) \[Pa]\n
Air-regenerated noise
- \( L_{PA} \) \[dB(A)]

Case-radiated noise
- \( L_{PA} \) \[dB(A)]
VAV terminal units
Order code

**TVRK**


1. **Type**
   TVRK  VAV terminal unit, plastic

2. **Flange**
   - No entry: none
   - FL  Flanges on both ends

3. **Nominal size [mm]**
   - 125
   - 160
   - 200
   - 250
   - 315
   - 400

4. **Accessories**
   - No entry: none
   - GK  Matching flanges for both ends

5. **Attachments (control component)**
   - Example
   - BB3  Universal controller with static differential pressure transducer

6. **Operating mode**
   - E  Single
   - M  Master
   - S  Slave
   - F  Constant value
   - Z  Differential pressure control – supply air
   - A  Differential pressure control – extract air

7. **Signal voltage range**
   - For the actual and setpoint value signals
   - 0  0 – 10 V DC
   - 2  2 – 10 V DC

8. **Volume flow rates [m³/h or l/s], differential pressure [Pa]**
   - \( \Delta p \) for factory setting (operating modes A, Z)

9. **Damper blade position**
   - Only with spring return actuators
   - NO  Power off to OPEN
   - NC  Power off to CLOSE

**Order example: TVRK/160/BB3/E2/200–900 m³/h**

<table>
<thead>
<tr>
<th>Nominal size</th>
<th>Attachment</th>
<th>Operating mode</th>
<th>Signal voltage range</th>
<th>Volume flow rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>160 mm</td>
<td>Universal controller with static differential pressure transducer</td>
<td>Single</td>
<td>2 – 10 V DC</td>
<td>200 – 900 m³/h</td>
</tr>
</tbody>
</table>
### TVRK with EASYLAB for room control and single operation

<table>
<thead>
<tr>
<th>TVRK – FL / 160 / GK / ELAB / RE / ULZ / LAB / ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>TVRK – FL / 160 / GK / ELAB / EC – E0 / ULZ / ...</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

### 1 Type

TVRK  VAV terminal unit, plastic

### 2 Flange

- No entry: none
- FL  Flanges on both ends

### 3 Nominal size [mm]

- 125
- 160
- 200
- 250
- 315
- 400

### 4 Accessories

- No entry: none
- GK  Matching flanges for both ends

### 5 Attachment (control component)

- ELAB  EASYLAB controller TCU3 with fast-running actuator

### 6 Equipment function

- Room control
- RE  Extract air control (Room Exhaust)
- PC  Differential pressure control
- Single operation
- EC  Extract air controller

### 7 External volume flow rate setting

- Only for single operation
- E0  Voltage signal 0 – 10 V DC
- E2  Voltage signal 2 – 10 V DC
- 2P  On-site switch contacts for 2 switching steps
- 3P  On-site switch contacts for 3 switching steps
- F  Volume flow rate constant value, without signalling

### 8 Module expansions

- Option 1: Power supply
  - No entry: 24 V AC
  - T  EM-TRF for 230 V AC
- Option 2: Communication interface
  - No entry: none
  - L  EM-LON for LonWorks FTT-10A
  - B  EM-BAC-MOD-01 for BACnet MS/TP
  - M  EM-BAC-MOD-01 for Modbus RTU
  - I  EM-IP for BACnet/IP, Modbus/IP and webservice
  - R  EM-IP with real time clock
- Option 3: Automatic zero point correction
  - No entry: none
- Z  EM-AUTOZERO Solenoid valve for automatic zero point correction

### 9 Additional functions

- Only for room control (equipment function)
- LAB  Extract air led system (laboratories)
- CLR  Supply air led system (clean rooms)
- Raum management function is active
- LAB-RMF  Extract air led system (LAB)
- CLR-RMF  Supply air led system (CLR)

### 10 Operating values [m³/h or l/s, Pa]

For equipment function 'room control' with additional function RMF

- Total room extract air/supply air
  - \( V_1 \): Standard mode
  - \( V_2 \): Reduced operation
  - \( V_3 \): Increased operation
  - \( V_4 \): Constant room supply air
  - \( V_5 \): Constant room extract air
  - \( V_6 \): Supply air/extract air difference
  - \( \Delta p_{\text{setpoint}} \): Setpoint pressure (only with differential pressure control)

For equipment function 'single operation'

- E0, E2: \( V_{\min} / V_{\max} \)
- 2P: \( V_1 / V_2 \)
- 3P: \( V_1 / V_2 / V_3 \)
- F: \( V_1 \)

### Useful additions

- Room control panel (only for room control)
- BE-LCD-01  40-character display
VAV terminal units
Order code

TVRK

Order example: TVRK/160/BB3/E2/200–900 m³/h

Nominal size | 160 mm
Attachment | Universal controller with static differential pressure transducer
Operating mode | Single
Signal voltage range | 2 – 10 V DC
Volume flow rate | 200 – 900 m³/h

TVRK with EASYLAB for fume cupboard control

<table>
<thead>
<tr>
<th></th>
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<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

1 Type
TVRK VAV terminal unit, plastic

2 Flange
No entry: none
FL Flanges on both ends

3 Nominal size [mm]
125
160
200
250
315
400

4 Accessories
No entry: none
GK Matching flanges for both ends

5 Attachments (control component)
ELAB EASYLAB controller TCU3 with fast-running actuator

6 Equipment function
With face velocity transducer
FH-VS Face velocity control
With sash distance sensor
FH-DS Linear control strategy
FH-DV Safety-optimised control strategy
With switching steps for on-site switch contacts
FH-2P 2 switching steps
FH-3P 3 switching steps
Without signalling
FH-F Volume flow rate constant value

7 Expansion modules
Option 1: Supply voltage
No entry: 24 V AC
T EM-TRF for 230 V AC
U EM-TRF-USV for 230 V AC, provides uninterruptible power supply (UPS)

Option 2: Communication interface
No entry: none
L EM-LON for LonWorks FTT-10A
B EM-BAC-MOD-01 for BACnet MS/TP
M EM-BAC-MOD-01 for Modbus RTU
I EM-IP for BACnet/IP, Modbus/IP and webserver
R EM-IP with real time clock

Option 3: Automatic zero point correction
No entry: none
Z EM-AUTOZERO Solenoid valve for automatic zero point correction

Option 4: Lighting
No entry: none
S EM-LIGHT Wired socket for the connection of lighting and for switching the lighting on/off using the control panel (only with EM-TRF or EM-TRF-USV)

8 Operating values [m³/h or l/s]
Depending on the equipment function
VS: \( V_{\min} \rightarrow V_{\max} \)
DS: \( V_{\min} \rightarrow V_{\max} \)
DV: \( V_{\min} \rightarrow V_{\max} \)
2P: \( V_1 / V_2 \)
3P: \( V_1 / V_2 / V_3 \)
F: \( V_1 \)

Useful additions
Control panel for fume cupboard controller, for displaying the functions of the control system according to EN 14175
BE-SEG-** OLED display
BE-LCD-01 40-character display

11/2017 – DE/en TROXTECHNIK

PD – TVRK – 9
<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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<tbody>
<tr>
<td>Nominal size</td>
<td>200 mm</td>
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<tr>
<td>Attachment</td>
<td>EASYLAB controller TCU3 with fast-running actuator</td>
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<tr>
<td>Equipment function</td>
<td>Two switching steps</td>
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<tr>
<td>Expansion modules</td>
<td>EM-TRF for 230 V AC, EM-AUTOZERO Solenoid valve for automatic zero point correction</td>
</tr>
<tr>
<td>Operating values</td>
<td>600 – 1200 m³/h</td>
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</tbody>
</table>
**TVRK**
- VAV terminal unit for the control of variable air volume flow rates
- Spigot to make connections to the ducting

**TVRK-FL**
- VAV terminal unit for the control of variable air volume flow rates
- With flanges to make detachable connections to the ductwork
### TVRK, VARYCONTROL control components

<table>
<thead>
<tr>
<th>Order code detail</th>
<th>Controlled variable</th>
<th>Controller</th>
<th>Differential pressure transducer</th>
<th>Actuator</th>
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</thead>
<tbody>
<tr>
<td>Compact controller, static</td>
<td>Volume flow rate</td>
<td>Compact controller with SLC interface Sauter</td>
<td>Static, integral</td>
<td>Fast-running actuator, integral</td>
</tr>
<tr>
<td>SA0</td>
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<td></td>
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</tr>
<tr>
<td>SC0</td>
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</tr>
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<td>Universal controller, static</td>
<td>Volume flow rate</td>
<td>Universal controller with MP bus interface TROX/Belimo</td>
<td>Static</td>
<td>Actuator</td>
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### TVRK, LABCONTROL control components

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<th>Controller</th>
<th>Differential pressure transducer</th>
<th>Actuator</th>
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<td>Fume cupboard</td>
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TVRK

Nominal sizes 125 – 200

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TVRK

Nominal sizes 250 – 400
### TVRK

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### TVRK-FL, nominal sizes 125 – 200

#### TVRK-FL

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### TVRK-FL, nominal sizes 250 – 400

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<th>Nominal size</th>
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<th>B₂</th>
<th>H₃</th>
<th>ØD₁</th>
<th>ØD₂</th>
<th>n</th>
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<td>475</td>
<td>16</td>
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</table>
**Installation and commissioning**
- Installation orientation must be as shown on the sticker

**Upstream conditions**
The volume flow rate accuracy $\Delta V$ applies to a straight upstream section of the duct. Bends, junctions or a narrowing or widening of the duct cause turbulence that may affect measurement. Duct connections, e.g. branches off the main duct, must comply with EN 1505. Some installation situations require straight duct sections upstream.

**Space required for commissioning and maintenance**
Sufficient space must be kept clear near any attachments to allow for commissioning and maintenance. It may be necessary to provide sufficiently sized inspection access openings.

**Bend**

A bend with a centre line curvature radius of at least 1D – without an additional straight duct section upstream of the VAV terminal unit – has only a negligible effect on the volume flow rate accuracy.

**Junction**

A junction causes strong turbulence. The stated volume flow rate accuracy $\Delta V$ can only be achieved with a straight duct section of at least 5D upstream. Shorter upstream sections require a perforated plate in the branch and before the VAV terminal unit. If there is no straight upstream section at all, the control will not be stable, even with a perforated plate.
VAV terminal units
Installation details

Access to attachments, attached on one side

Space requirement, control component on one side

<table>
<thead>
<tr>
<th>Attachments</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>VARYCONTROL</td>
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<tr>
<td>Universal controller</td>
<td>300</td>
</tr>
</tbody>
</table>

Zugänglichkeit der Anbauteile, zweiseitig angebaut

Space requirement, control components on two sides

<table>
<thead>
<tr>
<th>Attachments</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>LABCONTROL</td>
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<tr>
<td>EASYLAB</td>
<td>300</td>
</tr>
</tbody>
</table>

Access to sensor tubes for cleaning
### Space required for cleaning the sensor tubes

<table>
<thead>
<tr>
<th>Nominal size</th>
<th>①</th>
<th>②</th>
<th>③</th>
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</thead>
<tbody>
<tr>
<td>125 – 200</td>
<td>100</td>
<td>100</td>
<td>D</td>
</tr>
<tr>
<td>250 – 400</td>
<td>100</td>
<td>160</td>
<td>D</td>
</tr>
</tbody>
</table>

D: Casing diameter
**Principal dimensions**

- **ØD [mm]**
  - VAV terminal units made of stainless steel: Outside diameter of the spigot
  - VAV terminal units made of plastic: Inside diameter of the connecting spigot

- **ØD₁ [mm]**
  - Pitch circle diameter of flanges

- **ØD₂ [mm]**
  - Outside diameter of flanges

- **ØD₃ [mm]**
  - Inside diameter of the screw holes of flanges

- **L [mm]**
  - Length of unit including connecting spigot

- **L₁ [mm]**
  - Length of casing or acoustic cladding

- **B [mm]**
  - Duct width

- **B₁ [mm]**
  - Screw hole pitch of flange (horizontal)

- **B₂ [mm]**
  - Outside dimension of flange (width)

- **B₃ [mm]**
  - Width of device

- **H [mm]**
  - Duct height

- **H₁ [mm]**
  - Screw hole pitch of flange (vertical)

- **H₂ [mm]**
  - Outside dimension of flange (height)

- **H₃ [mm]**
  - Unit height

- **n [ ]**
  - Number of flange screw holes

- **T [mm]**
  - Flange thickness

- **m [kg]**
  - Unit weight including the minimum required attachments (e.g. Compact controller)

**Acoustic data**

- **fₘ [Hz]**
  - Octave band centre frequency

- **Lₚₐ [dB(A)]**
  - A-weighted sound pressure level of air-regenerated noise of the VAV terminal unit, system attenuation taken into account

- **Lₚₐ₁ [dB(A)]**
  - A-weighted sound pressure level of air-regenerated noise of the VAV terminal unit with secondary silencer, system attenuation taken into account

- **Lₚₐ₂ [dB(A)]**
  - A-weighted sound pressure level of case-regenerated noise of the VAV terminal unit, system attenuation taken into account

- **Lₚₐ₃ [dB(A)]**
  - A-weighted sound pressure level of case-regenerated noise of the VAV terminal unit with acoustic cladding, system attenuation taken into account

All sound pressure levels are based on 20 μPa.

**Definition of noise**

1. Air-regenerated noise
2. Case-radiated noise

**Volume flow rates**

- **Vₙ₉₀ [m³/h] and [l/s]**
  - Nominal volume flow rate (100 %)

- The value depends on product type and nominal size
- Values are published on the internet and in technical leaflets, and stored in the Easy
Product Finder design software.
- Reference value for calculating percentages (e.g. $V_{\text{max}}$)
- Upper limit of the setting range and maximum volume flow rate setpoint value for the VAV terminal unit

$V_{\text{min unit}}$ [m³/h] and [l/s]
Technically possible minimum volume flow rate
- The value depends on product type, nominal size and control component (attachment)
- Values are stored in the Easy Product Finder design software
- Lower limit of the setting range and minimum volume flow rate setpoint value for the VAV terminal unit
- Depending on the controller, setpoint values below $V_{\text{min unit}}$ (if $V_{\text{min}}$ equals zero) may result in unstable control or shut-off

$V_{\text{max}}$ [m³/h] and [l/s]
Upper limit of the operating range for the VAV terminal unit that can be set by customers
- $V_{\text{max}}$ can only be smaller than or equal to $V_{\text{nom}}$
- In case of analog signalling to volume flow controllers (which are typically used), the set maximum value ($V_{\text{max}}$) is allocated to the setpoint signal maximum (10 V) (see characteristic)

$V_{\text{min}}$ [m³/h] and [l/s]
Lower limit of the operating range for the VAV terminal unit that can be set by customers
- $V_{\text{min}}$ should be smaller than or equal to $V_{\text{max}}$
- Do not set $V_{\text{min}}$ smaller than $V_{\text{min unit}}$, otherwise the control may become unstable or the damper blade may close
- $V_{\text{min}}$ may equal zero
- In case of analog signalling to volume flow controllers (which are typically used), the set minimum value ($V_{\text{min}}$) is allocated to the setpoint signal minimum (0 or 2 V) (see characteristic)

$V$ [m³/h] and [l/s]
Volume flow rate

$\Delta V$ [$\pm$ %]
Volume flow rate tolerance from setpoint value

$\Delta V_{\text{warm}}$ [$\pm$ %]
Volume flow rate tolerance for the warm air flow of dual duct terminal units

Differential pressure

$\Delta p_s$ [Pa]
Static differential pressure

$\Delta p_{s \text{ min}}$ [Pa]
Static differential pressure, minimum
- The static minimum differential pressure is equal to the pressure loss of the VAV terminal unit when the damper blade is open, caused by flow resistance (sensor tubes, damper mechanism)

Static differential pressure

Construction

Galvanised sheet steel
- Casing made of galvanised sheet steel
- Parts in contact with the airflow as described for the product type
- External parts, e.g. mounting brackets or covers, are usually made of galvanised sheet steel

Powder-coated surface (P1)
- Casing made of galvanised sheet steel, powder-coated RAL 7001, silver grey
- Parts in contact with the airflow are powder-coated or made of plastic
- Due to production, some parts that come into contact with the airflow may be stainless steel or aluminium, powder-coated
- External parts, e.g. mounting brackets or
covers, are usually made of galvanised sheet steel

**Stainless steel (A2)**
- Casing made of stainless steel 1.4201

- Parts in contact with the airflow are powder-coated or made of stainless steel
- External parts, e.g. mounting brackets or covers, are usually made of galvanised sheet