Constant & Variable air volume controllers
Air volume the smart way
We consider your trust in us as a supplier an important goal. It is always included in our work on all levels and in all areas whether it is a question of cooperation, quality, deliveries or documentation. This catalogue is of course a part of this work.

With this catalogue, which features the new Optima Series Air Volume Control Units, we want to give you as a customer a general overview of what Systemair can offer within this field. More detailed information is available in our Online catalogue at www.systemair.com and as downloadable software. Systemair’s range of fans, air distribution products and accessories also appears in our printed main catalogue.

Our product development leads the field - latest technologies in unit design, fans, motors and heat recovery interact to give high efficiency and with that low power consumption. Systemair has grown each year since the start and we aim to continue with this trend.

Systemair strives to be a reliable supplier of quality products. We help our customers to focus on their own business. Reliable deliveries give the customer greater possibilities to quickly complete a job, and move on to the next project.

At Systemair we call this Trust.
Air Volume Control

**Offices**
Office buildings generally require good ventilation during the day as well as heat and cooling recovery and reconditioning of supply air depending on external conditions. Ventilation systems with demand control should be considered for offices where staffing levels vary. As a rule, offices develop an excess of heat produced by people, lighting, solar radiation, computer equipment, etc. In many cases there is a need to cool the air and prevent uncomfortably high temperatures. In larger buildings that accumulate heat energy easily, you should consider employing night cooling. If the office is in a city environment, a higher filtration class should be used. In an office environment, there is also considerable need to reduce the noise generated by the ventilation system.

**Schools and nurseries**
A school environment means a lot of people present at certain times of the day, i.e. generally there are relatively large variations. This means that it should be possible to use demand control for the ventilation system. Normally, with heat and/or cool recovery is warranted. There will be short periods during the year when heating may be required. However if there is effective sun screening, then air reconditioning is rarely required. High demand for low noise levels. At day nurseries, activities, such as cooking, that create odours are common, so there is often a need for supply air and extract air to be kept separate. There must be heat recovery in the form of a plate heat exchanger, for example.

**Shops**
As a rule, the number of people in a shop changes constantly throughout the day, making a control-on-demand ventilation system the sensible option. Recirculating air in combination with carbon dioxide control (CO₂) and heat recovery can be one optimised solution for these types of premises. When there are few people present, CO₂ levels will be low and an increased amount of return air can be mixed into the system. As the number of people present increases, the amount of return air is reduced and replaced with fresh outdoor air. If heating is required at night-time, the premises are warmed up using 100% recirculating air.
Industry
Industrial premises will often have high airflows if the work carried out there generates high levels of air pollution. If the pollutants are also aggressive, there may be requirements that affect the choice of material used. Systemair offers products for different environmental classes that can cope with tough environments. Filtration of processed air can be adapted to suit specific demands.

Hotels
The requirements for conditioning in hotels are characterised by demands relating to fire protection, demand control and low noise levels. The choice of air handling unit will probably be affected by these demands. What is important here is good functions for speed control and quiet operation. In addition to quiet air handling units with demand control, Systemair can also supply fans and dampers for fire protection.

Healthcare premises
Healthcare premises can encompass numerous activities, everything from operating theatres to wards. The activity determines the requirements. Operating theatres will have stringent demands for cleanliness and ventilation. Wards require low noise levels. If several areas are served by the same system, the unit must have demand control and possibly even sub-systems. Systemair’s range of air handling units can satisfy all requirements relating to healthcare premises, whether these have to do with air cleanliness, noise levels or demand control.
Air Volume Control

**General Description**

In Variable Air Volume (VAV) systems, supply of cool air increases as the cooling load increases, and the air supply decreases as the load decreases.

VAV systems are the most modern, energy efficient all air systems available for comfort air conditioning. VAV systems require less fan capacity than a comparable constant volume system because with VAV only the required air is used. Typically a VAV system fan volume is 60% of a CAV system.

Control of air flow in a VAV system is accomplished through an electronic device, which regulate the amount of supply air to the space in response to a proportional room/space temperature controller.

**Pressure Independent**

Systemair VAV units are pressure independent. The accurate volume control achieved by pressure independent VAV units results in substantial energy savings as well as increased comfort to the occupant. Conditioned air volume is precisely regulated according to demand. A maximum air volume setting avoids drafty air distribution; a minimum air volume setting avoids cold air dumping and stuffiness.

Minimum and Maximum air flow requirements are set to suit the space application. “Pressure independent units have controls consisting of an inlet duct sensor, damper, controller/actuator and room temperature controller”. The VAV device controls the air supply volume through the inlet duct velocity pressure sensor to maintain air flow, as the air-conditioning load in the space changes the thermostat signal will reset the VAV controller to change the supply air volume to suit the space requirements. At any given setting, the controller will maintain the required air volume regardless of inlet static pressure changing. This mode of operation is called “Pressure Independent”.

Variable Air Volume units allow the design to take full advantage of shifting loads from lights, occupancy, solar and equipment diversity, which typically leads up to a 40% saving in the total air volume required. Consequently, the central plant and ducting would cost less, thus compensating for the additional cost of VAV terminal units and fan speed controls.

Systemair offers complete range of VAV's factory tested and calibrated. The VAV range offered are as following:

1. Round single skin VAV units (Optima-R), used in installations for return or supply air in low pressure systems as single-zone control
2. Round double skin VAV units (Optima-R-I), used in installations for return or supply air in medium to high pressure systems as single-zone control
3. Round to rectangular single skin insulated VAV units (Optima-R-S), used in installations for return or supply air in medium to high pressure systems as multi-zone control

**Benefits**

The VAV system offers some advantage and benefits over conventional systems as given below

a) Fan energy savings from longhour usage at reduced volumes, also installed fan horsepower reductions.
b) Greater flexibility in respect to varying loads, which are easier zoned, resulting in occupancy controlled comfort and energy saving.
c) Reduced installation and set-up cost.
d) Reduced system energy consumption cost.
e) Single unit for easy mounting.
f) Integrated high efficiency sound attenuator.
g) Suited for mounting of all controls according to customer specification.
h) Accurate air volume control with centre averaging multi-point airflow differential cross velocity pressure sensor.
RDA

Description
The air flow regulator RDA is an element placed inside the duct in order to obtain a constant flow within a pressure range from 50 to 200 Pascal. It is used in ventilation or air conditioning systems for supply or return air.

Ordering code
RDA-80/15
80 - size
15 - air volume

Function
The air is forced to pass through predetermined space in which a flap can change the position according to the specified air flow. The flap is attached on to a calibrated spring and therefore no auxiliary power is needed.

Design
RDA is made from plastic material (polystyrene) classified M1 in grey colour. Maximum temperature is 60°C.

Mounting
RDA is inserted directly into a horizontal or vertical circular duct. It is fixed and kept airtight by a lip seal. Arrow indicates the airflow. If the unit is placed in supply duct, the space between the diffuser and the unit must be at least 3x diameter of the duct. If used for return air the space must be 1x diameter of the duct.

Dimensions

<table>
<thead>
<tr>
<th>Size</th>
<th>L (mm)</th>
<th>D1 (mm)</th>
<th>D2 (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>55</td>
<td>76</td>
<td>73</td>
</tr>
<tr>
<td>100</td>
<td>60</td>
<td>96</td>
<td>93</td>
</tr>
<tr>
<td>125</td>
<td>90</td>
<td>120</td>
<td>117</td>
</tr>
<tr>
<td>160</td>
<td>89</td>
<td>456</td>
<td>147</td>
</tr>
</tbody>
</table>
Constant Air Volume

RPK-R & RPK-R-I
Constant air flow regulator

Description
RPK-R is a round constant air flow regulator which is used for exact mechanical setting of required air volume in ventilation systems without need of any other energy. RPK-R is available in two versions:

RPK-R without outside insulation.
RPK-R-I with outside 50 mm thick heat and sound insulation.

RPK-R is characterized by:
• regulation accuracy
• easy mounting
• maintenance-free
• tight connection with the duct

Design
The RPK-R is manufactured from galvanized sheet metal only the blade is from aluminium. All steel parts are zinc plated, spring is made from high quality steel. Sliding bearing is suitable for high temperatures and doesn’t require any lubrication. The cover of adjusting mechanism is made from ABS plastic and the plastic functional parts are from PA plastic. The outside insulation is made from 50 mm thick glass fiber material with outside steel casing.

Function
The RPK-R enables regulation of individually required amounts of air in separate ventilation system zones. RPK-R works in temperature from -20 to 80°C and relative humidity up to 80%. Recommended air flow velocity is from 3 to 8 meters per second at pressure difference to Δp 500 Pa. Accuracy is ±5% (±10% for outer settings).

Mounting
Regulator can be mounted to horizontal, diagonal or vertical duct. The blade must be always horizontal. It is necessary to pay attention to correct direction of mounting, so that the air is entering the regulator according to the arrow direction, which is located on regulator casing. Connecting the duct and the regulator is done according to its size with grub screws ø3,2x13 to ø3,9x16, or with rivets of the same diameters and the connection is sealed with sealing tape. After mounting, set the required air volume by turning the working screw on the controller box.
## Technical part

<table>
<thead>
<tr>
<th>Size</th>
<th>( v ) (m.s(^{-1} ))</th>
<th>( q ) (m(^3).h(^{-1} ))</th>
<th>( \phi D ) (mm)</th>
<th>( \phi D 2 ) (mm)</th>
<th>( L ) (mm)</th>
<th>( L1 ) (mm)</th>
<th>( L2 ) (mm)</th>
<th>( L3 ) (mm)</th>
<th>( m ) (kg)</th>
<th>( m(f) ) (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>4.3-8.4</td>
<td>75-140</td>
<td>78</td>
<td>170</td>
<td>350</td>
<td>260</td>
<td>76</td>
<td>123</td>
<td>0.8</td>
<td>1.7</td>
</tr>
<tr>
<td>100</td>
<td>3.7-7.5</td>
<td>100-200</td>
<td>97</td>
<td>190</td>
<td>350</td>
<td>260</td>
<td>86</td>
<td>136</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>125</td>
<td>3.2-7.1</td>
<td>125-300</td>
<td>122</td>
<td>215</td>
<td>360</td>
<td>270</td>
<td>100</td>
<td>148</td>
<td>1.2</td>
<td>2.4</td>
</tr>
<tr>
<td>140</td>
<td>3.6-6.4</td>
<td>190-340</td>
<td>137</td>
<td>230</td>
<td>370</td>
<td>280</td>
<td>107</td>
<td>156</td>
<td>1.4</td>
<td>2.8</td>
</tr>
<tr>
<td>160</td>
<td>4.3-8.9</td>
<td>300-620</td>
<td>157</td>
<td>250</td>
<td>380</td>
<td>290</td>
<td>117</td>
<td>166</td>
<td>1.6</td>
<td>3.2</td>
</tr>
<tr>
<td>180</td>
<td>2.8-8.1</td>
<td>250-720</td>
<td>177</td>
<td>270</td>
<td>390</td>
<td>300</td>
<td>128</td>
<td>176</td>
<td>1.9</td>
<td>3.6</td>
</tr>
<tr>
<td>200</td>
<td>3.2-7.3</td>
<td>350-800</td>
<td>197</td>
<td>290</td>
<td>400</td>
<td>310</td>
<td>138</td>
<td>186</td>
<td>2.1</td>
<td>4</td>
</tr>
<tr>
<td>250</td>
<td>3.8-7.5</td>
<td>650-1300</td>
<td>247</td>
<td>340</td>
<td>425</td>
<td>335</td>
<td>164</td>
<td>208</td>
<td>3.3</td>
<td>5.8</td>
</tr>
<tr>
<td>315</td>
<td>3.1-6.0</td>
<td>850-1650</td>
<td>312</td>
<td>405</td>
<td>500</td>
<td>410</td>
<td>196</td>
<td>243</td>
<td>5</td>
<td>8.3</td>
</tr>
</tbody>
</table>

### Way of mounting RPK-R and RPK-R-I

- Air flow direction
- Front view
RPK-S and RPK-S-I
Constant Air Flow Regulator

Description
RPK-S is a square constant air flow regulator which is used for exact mechanical setting of required air volume in ventilation systems without need of any other energy. RPK-S is available in two versions:

RPK-S without outside insulation.
RPK-S-I with outside 50 mm thick heat and sound insulation.

RPK-S is characterized by:
• regulation accuracy
• easy mounting
• maintenance-free

Design
The RPK-S is manufactured from galvanized sheet metal only the blade is from aluminium. All steel parts are zinc plated, spring is made from high quality steel. Sliding bearing is suitable for high temperatures and doesn’t require any lubrication. The cover of adjusting mechanism is made from ABS plastic and the plastic functional parts are from PA plastic. The outside insulation is made from 50 mm thick glass fiber material with outside steel casing.

Function
The RPK-S enables regulation of individually required amounts of air in separate ventilation system zones. RPK-S works in temperature from -20 to 80°C and relative humidity up to 80%. Recommended air flow velocity is from 3 to 8 meters per second at pressure difference to Δp 500 Pa. Accuracy is ±5 % (±10% for outer settings).

Mounting
Regulator can be mounted to horizontal, diagonal or vertical duct. The blade must be always horizontal. It is necessary to pay attention to correct direction of mounting, so that the air is entering the regulator according to the arrow direction, which is located on regulator casing. Connecting the duct and the regulator is with flanges. After mounting, set the required air volume by turning the working screw on the controller box.

<table>
<thead>
<tr>
<th>Size</th>
<th>q (m³/h)</th>
<th>a (mm)</th>
<th>b (mm)</th>
<th>m (kg)</th>
<th>m(i) (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200x100</td>
<td>330-580</td>
<td>200</td>
<td>100</td>
<td>2,9</td>
<td>5,3</td>
</tr>
<tr>
<td>200x200</td>
<td>510-1200</td>
<td>200</td>
<td>100</td>
<td>3,7</td>
<td>6,6</td>
</tr>
<tr>
<td>300x100</td>
<td>470-850</td>
<td>300</td>
<td>150</td>
<td>3,7</td>
<td>6,6</td>
</tr>
<tr>
<td>300x150</td>
<td>600-1350</td>
<td>300</td>
<td>200</td>
<td>4,1</td>
<td>7,2</td>
</tr>
<tr>
<td>300x200</td>
<td>800-1670</td>
<td>300</td>
<td>200</td>
<td>4,6</td>
<td>8,0</td>
</tr>
<tr>
<td>400x200</td>
<td>1100-2400</td>
<td>400</td>
<td>200</td>
<td>5,4</td>
<td>9,3</td>
</tr>
<tr>
<td>400x250</td>
<td>1750-3400</td>
<td>400</td>
<td>250</td>
<td>6,1</td>
<td>10,1</td>
</tr>
<tr>
<td>400x300</td>
<td>1700-3600</td>
<td>400</td>
<td>300</td>
<td>6,5</td>
<td>10,8</td>
</tr>
<tr>
<td>400x400</td>
<td>2000-5400</td>
<td>400</td>
<td>400</td>
<td>9,0</td>
<td>13,7</td>
</tr>
<tr>
<td>500x200</td>
<td>1500-3200</td>
<td>500</td>
<td>200</td>
<td>6,2</td>
<td>10,5</td>
</tr>
<tr>
<td>500x250</td>
<td>2300-4500</td>
<td>500</td>
<td>250</td>
<td>6,7</td>
<td>11,0</td>
</tr>
<tr>
<td>500x300</td>
<td>2400-4300</td>
<td>500</td>
<td>300</td>
<td>7,0</td>
<td>11,7</td>
</tr>
<tr>
<td>500x400</td>
<td>2400-5500</td>
<td>500</td>
<td>400</td>
<td>10,1</td>
<td>15,1</td>
</tr>
<tr>
<td>500x500</td>
<td>3800-6500</td>
<td>500</td>
<td>500</td>
<td>13,0</td>
<td>18,6</td>
</tr>
<tr>
<td>600x200</td>
<td>1500-3500</td>
<td>600</td>
<td>200</td>
<td>7,0</td>
<td>12,3</td>
</tr>
<tr>
<td>600x250</td>
<td>2550-5100</td>
<td>600</td>
<td>250</td>
<td>7,4</td>
<td>12,8</td>
</tr>
<tr>
<td>600x300</td>
<td>2750-5000</td>
<td>600</td>
<td>250</td>
<td>7,4</td>
<td>12,8</td>
</tr>
<tr>
<td>600x400</td>
<td>2900-5500</td>
<td>600</td>
<td>300</td>
<td>10,2</td>
<td>15,3</td>
</tr>
<tr>
<td>600x500</td>
<td>3000-9000</td>
<td>600</td>
<td>400</td>
<td>11,4</td>
<td>17,0</td>
</tr>
<tr>
<td>600x600</td>
<td>4250-8600</td>
<td>600</td>
<td>500</td>
<td>14,6</td>
<td>20,7</td>
</tr>
</tbody>
</table>
Constant Air Volume

Main dimension of RPK-S

Main dimension of RPK-S-I

Way of mounting RPK-S

\[ L_{\text{min}} = 3 \times d \text{ef} \]

AIR FLOW DIRECTION

ADJUSTING OF AIR FLOW VOLUME
Variable Air Volume

**Optima R**
Circular variable air volume unit

**Highlights:**
- Blade tightness class 4 according to EN 1751
- Casing tightness class C according to EN 1751
- ILH Hygienic certification VDI 6022 & VDI 3803 for Standard climatisation & Hospitals
- Very high accuracy of 5%
- Air speed from 2 to 12 m/s
- Works up to 1000 Pa pressure difference

**Function**
Systemair circular VAV terminal units are available in two versions:
Single skin Optima R & Double skin Optima R-I

Single skin circular VAV terminal units are commonly used for return air applications or for supply applications at low system pressures. Double skin circular VAV terminal units are commonly used for supply or for return air applications at medium to high system pressures. Terminal units are ideal for single zone control with supply and return in Master and Slave setup such as offices, hotel rooms or meeting rooms where the required cooling and heating load will vary on demand.

**Design**
VAV unit housing constructed of galvanized steel sheet, large surface pleated for extra stiffness. In Optima R-I the external acoustic insulation of fiber glass material is designed to absorb the radiated sound power level generated by the damper assembly. The insulation is once again is covered by a secondary galvanized sheet steel to protect the insulation and to add to the low frequency sound radiated in high pressure systems.

Special design of centre averaging multi-point airflow differential cross velocity pressure sensor assures an accurate air flow readings even in difficult installations. Button punch snap lock seams, lock form with airtight nylon bearings to assure low casing leakage.

**Available Sizes**
Inlet/outlet : from ø 80 to ø 630 mm

<table>
<thead>
<tr>
<th>Size</th>
<th>øD (mm)</th>
<th>L (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>78</td>
<td>400</td>
</tr>
<tr>
<td>100</td>
<td>97</td>
<td>600</td>
</tr>
<tr>
<td>125</td>
<td>122</td>
<td>800</td>
</tr>
<tr>
<td>140</td>
<td>137</td>
<td>1000</td>
</tr>
<tr>
<td>160</td>
<td>157</td>
<td></td>
</tr>
<tr>
<td>180</td>
<td>177</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>197</td>
<td></td>
</tr>
<tr>
<td>225</td>
<td>222</td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>247</td>
<td></td>
</tr>
<tr>
<td>280</td>
<td>277</td>
<td></td>
</tr>
<tr>
<td>315</td>
<td>312</td>
<td></td>
</tr>
<tr>
<td>355</td>
<td>352</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>397</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>497</td>
<td></td>
</tr>
<tr>
<td>630</td>
<td>627</td>
<td></td>
</tr>
</tbody>
</table>

* All dimensions given in mm in accordance to EN 1506 øD are the Inlet-Outlet dimensions
Optima RS
Single skin variable air volume unit
Round inlet and rectangular outlet

Highlights:
- Blade tightness class 4 according to EN 1751
- Casing tightness class C according to EN 1751
- ILH Hygienic certification VDI 6022 & VDI 3803 for Standard climatisation & Hospitals
- Very high accuracy of 5%
- Inlet air speed from 2 to 12 m/s
- Works up to 1000 Pa pressure difference
- Inside 30 mm noise insulation with anti abrasive layer

Function
Single skin round to square VAV terminal units is commonly used for supply air applications or for return air applications at low to medium system pressures. Optima-RS VAV terminal units are ideal for multi-zone control with supply and return in master and slave setup such as offices, hotel rooms or meeting rooms where the required cooling and heating load will vary on demand.

Design
VAV unit housing constructed of galvanized steel sheet, large surface pleated for extra stiffness. Internal thermal acoustic insulation of fibre glass material, dual density insulation cover tissue is used to protect the fiberglass insulation to protect the deterioration of the insulation for air speeds of 20-25m/s.

Acoustic insulation in the housing has aerodynamic flow for extra low sound level.

Double skin low leakage elliptical damper with airtight neoprene gasket seal. Special design of centre averaging multi-point airflow differential cross velocity pressure sensor assures an accurate airflow readings even in difficult installations. Button punch snap lock seams, lock form with airtight nylon bearings to assure low casing leakage. Rectangular outlet with M8 riveted nuts, suited for connecting to duct flange. 12 mm aluminium shaft with nylon bearings

Available Sizes
Inlet/outlet: from ø 100 to ø 400 mm

Controls:
The VAV terminal units are as standard equipped with Belimo compact controller without any MP or other communication capability to be used as stand alone or in Master and Slave setting.

The compact controllers which are supplied with MP-Bus communication capability, can be connected later in time to building management systems to create a zone controller by creating bus-rings solutions.

The compact controllers which are supplied only with MP-Bus communication can be connected later in time with or per-zones with other Bus-Interfaces. Compact controllers are factory calibrated prior to dispatch.

Dimensions and Airflow

<table>
<thead>
<tr>
<th>Size</th>
<th>øD (mm)</th>
<th>L (mm)</th>
<th>L0 (mm)</th>
<th>L1 (mm)</th>
<th>W (mm)</th>
<th>W1 (mm)</th>
<th>H (mm)</th>
<th>H1 (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>97</td>
<td>450</td>
<td>150</td>
<td>300</td>
<td>200</td>
<td>200</td>
<td>260</td>
<td>260</td>
</tr>
<tr>
<td>125</td>
<td>122</td>
<td>450</td>
<td>150</td>
<td>300</td>
<td>200</td>
<td>200</td>
<td>260</td>
<td>260</td>
</tr>
<tr>
<td>140</td>
<td>137</td>
<td>600</td>
<td>200</td>
<td>400</td>
<td>250</td>
<td>250</td>
<td>310</td>
<td>310</td>
</tr>
<tr>
<td>160</td>
<td>157</td>
<td>600</td>
<td>200</td>
<td>400</td>
<td>250</td>
<td>250</td>
<td>310</td>
<td>310</td>
</tr>
<tr>
<td>180</td>
<td>177</td>
<td>600</td>
<td>200</td>
<td>400</td>
<td>250</td>
<td>250</td>
<td>310</td>
<td>310</td>
</tr>
<tr>
<td>200</td>
<td>197</td>
<td>700</td>
<td>500</td>
<td>500</td>
<td>400</td>
<td>400</td>
<td>460</td>
<td>460</td>
</tr>
<tr>
<td>250</td>
<td>247</td>
<td>750</td>
<td>500</td>
<td>500</td>
<td>250</td>
<td>250</td>
<td>310</td>
<td>310</td>
</tr>
<tr>
<td>315</td>
<td>312</td>
<td>950</td>
<td>700</td>
<td>600</td>
<td>350</td>
<td>350</td>
<td>410</td>
<td>410</td>
</tr>
<tr>
<td>400</td>
<td>397</td>
<td>950</td>
<td>700</td>
<td>600</td>
<td>400</td>
<td>400</td>
<td>460</td>
<td>460</td>
</tr>
</tbody>
</table>

*All dimensions given in mm in accordance to EN 1505 Od are the Inlet dimensions.
## Accessories

### • Attenuators

#### LDC

Circular Attenuator

<table>
<thead>
<tr>
<th>Size</th>
<th>Ø D  (mm)</th>
<th>L nom (mm)</th>
<th>Ø D1 (mm)</th>
<th>L (mm)</th>
<th>m (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-300</td>
<td>97</td>
<td>300</td>
<td>200</td>
<td>360</td>
<td>2,28</td>
</tr>
<tr>
<td>100-600</td>
<td>97</td>
<td>600</td>
<td>200</td>
<td>660</td>
<td>4,09</td>
</tr>
<tr>
<td>100-900</td>
<td>97</td>
<td>900</td>
<td>200</td>
<td>960</td>
<td>5,18</td>
</tr>
<tr>
<td>100-1200</td>
<td>97</td>
<td>1200</td>
<td>200</td>
<td>1260</td>
<td>6,46</td>
</tr>
<tr>
<td>125-600</td>
<td>122</td>
<td>600</td>
<td>224</td>
<td>665</td>
<td>4,39</td>
</tr>
<tr>
<td>125-900</td>
<td>122</td>
<td>900</td>
<td>224</td>
<td>965</td>
<td>6,2</td>
</tr>
<tr>
<td>125-1200</td>
<td>122</td>
<td>1200</td>
<td>224</td>
<td>1265</td>
<td>7,47</td>
</tr>
<tr>
<td>150-600</td>
<td>147</td>
<td>600</td>
<td>250</td>
<td>600</td>
<td>5,37</td>
</tr>
<tr>
<td>150-900</td>
<td>157</td>
<td>900</td>
<td>260</td>
<td>970</td>
<td>7,48</td>
</tr>
<tr>
<td>200-600</td>
<td>197</td>
<td>600</td>
<td>300</td>
<td>685</td>
<td>6,9</td>
</tr>
<tr>
<td>200-900</td>
<td>197</td>
<td>900</td>
<td>300</td>
<td>985</td>
<td>9,74</td>
</tr>
<tr>
<td>250-600</td>
<td>247</td>
<td>600</td>
<td>355</td>
<td>600</td>
<td>8,55</td>
</tr>
<tr>
<td>250-900</td>
<td>247</td>
<td>900</td>
<td>355</td>
<td>900</td>
<td>11,7</td>
</tr>
<tr>
<td>315-600</td>
<td>312</td>
<td>600</td>
<td>415</td>
<td>600</td>
<td>11,8</td>
</tr>
<tr>
<td>315-900</td>
<td>312</td>
<td>900</td>
<td>415</td>
<td>900</td>
<td>16,3</td>
</tr>
<tr>
<td>355-900</td>
<td>352</td>
<td>900</td>
<td>560</td>
<td>900</td>
<td>25,2</td>
</tr>
<tr>
<td>400-900</td>
<td>397</td>
<td>900</td>
<td>600</td>
<td>900</td>
<td>24,3</td>
</tr>
</tbody>
</table>

#### Optima A

Square Attenuator

<table>
<thead>
<tr>
<th>Size</th>
<th>W (mm)</th>
<th>B (mm)</th>
<th>L (mm)</th>
<th>m (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200x200-1000</td>
<td>200</td>
<td>200</td>
<td>1000</td>
<td>9,1</td>
</tr>
<tr>
<td>250x200-1000</td>
<td>250</td>
<td>200</td>
<td>1000</td>
<td>10,2</td>
</tr>
<tr>
<td>400x200-1000</td>
<td>400</td>
<td>200</td>
<td>1000</td>
<td>13,4</td>
</tr>
<tr>
<td>500x250-1000</td>
<td>500</td>
<td>250</td>
<td>1000</td>
<td>19,1</td>
</tr>
<tr>
<td>600x350-1000</td>
<td>600</td>
<td>350</td>
<td>1000</td>
<td>22,7</td>
</tr>
<tr>
<td>700x400-1000</td>
<td>700</td>
<td>400</td>
<td>1000</td>
<td>26,4</td>
</tr>
</tbody>
</table>

#### Optima M

Multioutlet box

<table>
<thead>
<tr>
<th>Size</th>
<th>øD in (mm)</th>
<th>øD out (mm)</th>
<th>B (mm)</th>
<th>H (mm)</th>
<th>L (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-80</td>
<td>97</td>
<td>78</td>
<td>250</td>
<td>190</td>
<td>150</td>
</tr>
<tr>
<td>100-100</td>
<td>97</td>
<td>97</td>
<td>300</td>
<td>210</td>
<td>170</td>
</tr>
<tr>
<td>125-100</td>
<td>122</td>
<td>97</td>
<td>300</td>
<td>210</td>
<td>170</td>
</tr>
<tr>
<td>125-125</td>
<td>122</td>
<td>122</td>
<td>350</td>
<td>210</td>
<td>170</td>
</tr>
<tr>
<td>140-100</td>
<td>137</td>
<td>97</td>
<td>300</td>
<td>230</td>
<td>170</td>
</tr>
<tr>
<td>140-140</td>
<td>137</td>
<td>137</td>
<td>380</td>
<td>230</td>
<td>210</td>
</tr>
<tr>
<td>160-125</td>
<td>157</td>
<td>122</td>
<td>350</td>
<td>230</td>
<td>190</td>
</tr>
<tr>
<td>160-160</td>
<td>157</td>
<td>157</td>
<td>420</td>
<td>230</td>
<td>230</td>
</tr>
<tr>
<td>180-140</td>
<td>177</td>
<td>137</td>
<td>380</td>
<td>230</td>
<td>210</td>
</tr>
<tr>
<td>180-180</td>
<td>177</td>
<td>177</td>
<td>460</td>
<td>290</td>
<td>250</td>
</tr>
<tr>
<td>200-160</td>
<td>197</td>
<td>157</td>
<td>420</td>
<td>290</td>
<td>270</td>
</tr>
<tr>
<td>200-200</td>
<td>197</td>
<td>197</td>
<td>500</td>
<td>290</td>
<td>270</td>
</tr>
<tr>
<td>225-180</td>
<td>222</td>
<td>177</td>
<td>460</td>
<td>320</td>
<td>250</td>
</tr>
<tr>
<td>225-225</td>
<td>222</td>
<td>222</td>
<td>560</td>
<td>320</td>
<td>300</td>
</tr>
<tr>
<td>250-200</td>
<td>247</td>
<td>197</td>
<td>500</td>
<td>340</td>
<td>270</td>
</tr>
<tr>
<td>250-250</td>
<td>247</td>
<td>247</td>
<td>610</td>
<td>340</td>
<td>330</td>
</tr>
<tr>
<td>280-225</td>
<td>277</td>
<td>222</td>
<td>560</td>
<td>370</td>
<td>300</td>
</tr>
<tr>
<td>280-280</td>
<td>277</td>
<td>277</td>
<td>670</td>
<td>370</td>
<td>370</td>
</tr>
<tr>
<td>315-250</td>
<td>312</td>
<td>247</td>
<td>610</td>
<td>410</td>
<td>330</td>
</tr>
<tr>
<td>315-315</td>
<td>312</td>
<td>312</td>
<td>740</td>
<td>410</td>
<td>390</td>
</tr>
<tr>
<td>355-280</td>
<td>352</td>
<td>277</td>
<td>670</td>
<td>450</td>
<td>370</td>
</tr>
<tr>
<td>355-355</td>
<td>352</td>
<td>352</td>
<td>820</td>
<td>450</td>
<td>430</td>
</tr>
<tr>
<td>400-315</td>
<td>397</td>
<td>312</td>
<td>740</td>
<td>480</td>
<td>390</td>
</tr>
<tr>
<td>400-400</td>
<td>397</td>
<td>397</td>
<td>910</td>
<td>480</td>
<td>470</td>
</tr>
</tbody>
</table>
• Re-heat and cooling battery

**VBC-2**

VBC-2 water heating battery for heating air in ventilation systems with circular ducts.

Aluzinc-coated casing, heat transmission element with copper tubes and aluminium fins. Removable cover for cleaning the unit.

The water-heating battery can be installed in a horizontal or a vertical duct with optional direction of airflow. Max operating temperature 150 °C Max operating pressure 1,6 MPa (16Bar) 2-rows battery

<table>
<thead>
<tr>
<th>Size</th>
<th>øD (mm)</th>
<th>B (mm)</th>
<th>H (mm)</th>
<th>ødy (mm)</th>
<th>F (mm)</th>
<th>G (mm)</th>
<th>K (mm)</th>
<th>L (mm)</th>
<th>m (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>125-2</td>
<td>123</td>
<td>179</td>
<td>225</td>
<td>10</td>
<td>137</td>
<td>40</td>
<td>300</td>
<td>380</td>
<td>3.8</td>
</tr>
<tr>
<td>160-2</td>
<td>158</td>
<td>253</td>
<td>300</td>
<td>10</td>
<td>212</td>
<td>40</td>
<td>300</td>
<td>380</td>
<td>5.7</td>
</tr>
<tr>
<td>200-2</td>
<td>198</td>
<td>253</td>
<td>300</td>
<td>10</td>
<td>212</td>
<td>40</td>
<td>300</td>
<td>380</td>
<td>5.7</td>
</tr>
<tr>
<td>250-2</td>
<td>248</td>
<td>328</td>
<td>385</td>
<td>22</td>
<td>250</td>
<td>40</td>
<td>300</td>
<td>380</td>
<td>8.2</td>
</tr>
<tr>
<td>315-2</td>
<td>313</td>
<td>460</td>
<td>460</td>
<td>22</td>
<td>325</td>
<td>40</td>
<td>300</td>
<td>380</td>
<td>10.6</td>
</tr>
</tbody>
</table>

**CWK**

CWK water-cooling battery for circular ducts Casing of galvanised sheet steel with copper tubes and aluminium fins. Inspection covers for easy cleaning and maintenance. Connection sleeves with rubber seal. Max operating temperature 150 °C Max operating pressure 1,6 MPa (16Bar)

<table>
<thead>
<tr>
<th>Size</th>
<th>øD (mm)</th>
<th>B (mm)</th>
<th>H (mm)</th>
<th>ødy (mm)</th>
<th>F (mm)</th>
<th>G (mm)</th>
<th>K (mm)</th>
<th>L (mm)</th>
<th>m (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>125-3-2.5</td>
<td>123</td>
<td>326</td>
<td>255</td>
<td>10</td>
<td>175</td>
<td>40</td>
<td>300</td>
<td>276</td>
<td>6.5</td>
</tr>
<tr>
<td>160-3-2.5</td>
<td>158</td>
<td>326</td>
<td>255</td>
<td>10</td>
<td>175</td>
<td>40</td>
<td>300</td>
<td>276</td>
<td>6.7</td>
</tr>
<tr>
<td>200-3-2.5</td>
<td>198</td>
<td>411</td>
<td>330</td>
<td>10</td>
<td>250</td>
<td>40</td>
<td>300</td>
<td>276</td>
<td>9.4</td>
</tr>
<tr>
<td>250-3-2.5</td>
<td>248</td>
<td>486</td>
<td>405</td>
<td>22</td>
<td>325</td>
<td>40</td>
<td>300</td>
<td>276</td>
<td>11</td>
</tr>
<tr>
<td>315-3-2.5</td>
<td>313</td>
<td>560</td>
<td>504</td>
<td>22</td>
<td>400</td>
<td>40</td>
<td>300</td>
<td>276</td>
<td>14.3</td>
</tr>
</tbody>
</table>
VBR

VBR Water-heating battery  Water-heating battery for heating air in ventilation systems with rectangular ducts. Hot-zinc-coated casing, heat transmission element with copper tubes and aluminium fins. In cold conditions, a frost protection device with sensor should be fitted to reduce the risk of damage from freezing. The water-heating battery can be installed in a horizontal or vertical duct with an optional direction.

Dimensions

<table>
<thead>
<tr>
<th>Size</th>
<th>A (mm)</th>
<th>c/c A (mm)</th>
<th>B (mm)</th>
<th>c/c B (mm)</th>
<th>E (°)</th>
<th>m (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-20-2</td>
<td>438</td>
<td>420</td>
<td>238</td>
<td>220</td>
<td>R ¾''</td>
<td>5.5 kg</td>
</tr>
<tr>
<td>50-25-2</td>
<td>538</td>
<td>520</td>
<td>288</td>
<td>270</td>
<td>R ¾''</td>
<td>7 kg</td>
</tr>
<tr>
<td>50-30-2</td>
<td>538</td>
<td>520</td>
<td>338</td>
<td>320</td>
<td>R ¾''</td>
<td>8 kg</td>
</tr>
<tr>
<td>60-35-2</td>
<td>638</td>
<td>620</td>
<td>388</td>
<td>370</td>
<td>R ¾''</td>
<td>10 kg</td>
</tr>
<tr>
<td>70-40-2</td>
<td>738</td>
<td>720</td>
<td>438</td>
<td>420</td>
<td>R 1''</td>
<td>12.5 kg</td>
</tr>
<tr>
<td>80-50-2</td>
<td>838</td>
<td>820</td>
<td>538</td>
<td>520</td>
<td>R 1''</td>
<td>16 kg</td>
</tr>
<tr>
<td>100-50-2</td>
<td>1038</td>
<td>1020</td>
<td>538</td>
<td>520</td>
<td>R 1''</td>
<td>18.5 kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>A (mm)</th>
<th>c/c A (mm)</th>
<th>B (mm)</th>
<th>c/c B (mm)</th>
<th>E (°)</th>
<th>m (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-20-4</td>
<td>438</td>
<td>420</td>
<td>238</td>
<td>220</td>
<td>R ¾''</td>
<td>7 kg</td>
</tr>
<tr>
<td>50-25-4</td>
<td>538</td>
<td>520</td>
<td>288</td>
<td>270</td>
<td>R ¾''</td>
<td>9 kg</td>
</tr>
<tr>
<td>50-30-4</td>
<td>538</td>
<td>520</td>
<td>338</td>
<td>320</td>
<td>R 1''</td>
<td>10.5 kg</td>
</tr>
<tr>
<td>60-30-4</td>
<td>638</td>
<td>620</td>
<td>338</td>
<td>320</td>
<td>R 1''</td>
<td>11.5 kg</td>
</tr>
<tr>
<td>60-35-4</td>
<td>638</td>
<td>620</td>
<td>388</td>
<td>370</td>
<td>R 1''</td>
<td>13 kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>A (mm)</th>
<th>c/c A (mm)</th>
<th>B (mm)</th>
<th>c/c B (mm)</th>
<th>E (°)</th>
<th>m (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-40-3</td>
<td>738</td>
<td>720</td>
<td>438</td>
<td>420</td>
<td>R 1''</td>
<td>15.5 kg</td>
</tr>
<tr>
<td>80-50-3</td>
<td>838</td>
<td>820</td>
<td>538</td>
<td>520</td>
<td>R 1''</td>
<td>19 kg</td>
</tr>
<tr>
<td>100-50-3</td>
<td>1038</td>
<td>1020</td>
<td>538</td>
<td>520</td>
<td>R 1''</td>
<td>22.5 kg</td>
</tr>
</tbody>
</table>

PGK

PGK Cold water-cooling battery for rectangular ducts. Casing from galvanised sheet steel.

Water-battery from copper tubes and aluminium fins. Air vent and drain valve included. Drip pan from stainless steel and condensate connection (R ½’’). Max working pressure 1.6 MPa (16 bar).

For water connection left or right, Two inspection covers for cleaning and maintenance. Droplet separator DE as an accessory regardless of air direction. Recommended for air velocities from 3m/s.

Dimensions

<table>
<thead>
<tr>
<th>Size</th>
<th>A (mm)</th>
<th>c/c A (mm)</th>
<th>B (mm)</th>
<th>c/c B (mm)</th>
<th>E (°)</th>
<th>m (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-20-4</td>
<td>438</td>
<td>420</td>
<td>238</td>
<td>220</td>
<td>R ¾''</td>
<td>7 kg</td>
</tr>
<tr>
<td>50-25-4</td>
<td>538</td>
<td>520</td>
<td>288</td>
<td>270</td>
<td>R ¾''</td>
<td>9 kg</td>
</tr>
<tr>
<td>50-30-4</td>
<td>538</td>
<td>520</td>
<td>338</td>
<td>320</td>
<td>R 1''</td>
<td>10.5 kg</td>
</tr>
<tr>
<td>60-30-4</td>
<td>638</td>
<td>620</td>
<td>338</td>
<td>320</td>
<td>R 1''</td>
<td>11.5 kg</td>
</tr>
<tr>
<td>60-35-4</td>
<td>638</td>
<td>620</td>
<td>388</td>
<td>370</td>
<td>R 1''</td>
<td>13 kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>A (mm)</th>
<th>c/c A (mm)</th>
<th>B (mm)</th>
<th>c/c B (mm)</th>
<th>E (°)</th>
<th>m (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-40-3</td>
<td>738</td>
<td>720</td>
<td>438</td>
<td>420</td>
<td>R 1''</td>
<td>15.5 kg</td>
</tr>
<tr>
<td>80-50-3</td>
<td>838</td>
<td>820</td>
<td>538</td>
<td>520</td>
<td>R 1''</td>
<td>19 kg</td>
</tr>
<tr>
<td>100-50-3</td>
<td>1038</td>
<td>1020</td>
<td>538</td>
<td>520</td>
<td>R 1''</td>
<td>22.5 kg</td>
</tr>
</tbody>
</table>
• **Valves**

**RVAZ4 Valve actuator**

24 Actuator 3points  
24A Actuator 0-10 V

RVAZ4 24 is a valve actuator for 3-position control, 24 V AC supply voltage. Suitable for controlling ZTV/ZTR valves, kvs <= 6,0.

RVAZ4 24A is a valve actuator for 0...10 V DC control signal, 24 V AC supply voltage. Suitable for controlling ZTV/ZTR valves, kvs <= 6,0.

This product conforms with the EMC requirements of European harmonised standards EN60730-1:2000 and EN60730-2-8:2002 and carries the CE mark.

**Technical Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage supply</td>
<td>24V AC +/- 15%</td>
<td>V</td>
</tr>
<tr>
<td>Power consumption</td>
<td>max 6 W</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60 Hz</td>
<td></td>
</tr>
<tr>
<td>Max. stroke</td>
<td>5.5 mm</td>
<td></td>
</tr>
<tr>
<td>Full stroke time</td>
<td>121 sec</td>
<td></td>
</tr>
<tr>
<td>Stem force</td>
<td>400 N</td>
<td>Nm</td>
</tr>
<tr>
<td>Permitted max. ambient humidity [%RH]</td>
<td>95 %RH</td>
<td></td>
</tr>
<tr>
<td>Permitted range for ambient temperature</td>
<td>0...50 °C</td>
<td></td>
</tr>
<tr>
<td>Enclosure class</td>
<td>44</td>
<td>IP</td>
</tr>
</tbody>
</table>

**ZTV and ZTR**

ZTV 2-way valve  
ZTR 3-way valve

• For water and cooling media (max 30% glycol)  
• Media temperature 1...110°C  
• Pressure class PN16  
• Range ability better than 50:1  
• Differential pressure up to 350 kPa

The body is manufactured in brass and the spindle in stainless steel, the plug in brass and O-ring in EPDM.

The valves have equal percentage flow characteristics.

Valve actuators

The valves are intended to be used together with actuator RVAZ4-24A
VAV Controls

Compact or universal air volume control with Belimo.

The cost-efficient way to controlled room climate.

Human health
well-being and work performance are crucially influenced by room climate. Belimo room and system solutions – a complete range of products for cost-efficient motorisation and control of zones and single rooms in the comfort zone, industry, trade and sensitive working areas – are proven in countless installations all over the world.

VAV-Compact – efficient room control with a single unit
Actuator, controller and sensor in one unit – VAV-Compact provides an economical solution for variable and constant air volume control systems in office buildings, hotels, hospitals, etc. Special rotary actuators with a torque of 5, 10 or 20 Nm and linear actuators with 150 Nm can be supplied for a wide range of VAV/CAV unit sizes and types. VAV-Compact controllers can be controlled conventionally or via the Belimo MP-Bus®. The MP types can be integrated in a higher-level system – together with one sensor per device – either via a DDC controller with an MP interface or by means of a gateway. The fans are incorporated in an MP-Bus® based Fan Optimiser to facilitate cost-optimised control according to demand.

VAV-Universal – flexibility in problematic environments
The ready-to-connect VAV-Universal range encompasses rotary and safety actuators as well as controllers with dynamic and static pressure sensors. These devices can be finely tuned to exacting requirements in industry, trade and public buildings. Digital, self-adaptive VRP-M controllers interact with fast-running actuators in laboratories or production areas with a severely polluted room atmosphere to assure an instant supply of fresh air. Depending on what is chosen, the control systems can be integrated in a higher-level fieldbus and equipped – directly or over the MP-Bus® – with the Belimo Fan Optimiser to cut fan energy consumption by up to 50%.
Increased convenience
a better working atmosphere, optimum energy efficiency.

VAV-Compact for convenient solutions
Individual room comfort
- Wide range of potential applications
- Adjustable to each application
- Demand-based single-room application
- Operation with Fan Optimiser

VAV-Universal with VRP-M controller and fast-running actuators for sensitive working areas
Instant pure air
- Extraction of polluted air
- Ready-to-connect control system for maximum safety
- Integration in MP-Bus® network
- Volumetric flow or pressure control

VAV-Compact with bus connection
Intelligent simplicity
- System connection to DDC controller with MP interface via MP-Bus®
- Integration in higher-level systems such as LonWorks®, Konnex, Ethernet TCP/IP, Profibus DP, etc. via MP gateway
- Convenient, cost-efficient wiring
- Maximum flexibility in new, retrofitted, converted or renovated buildings

VAV-Compact with Belimo Fan Optimiser for reduced energy consumption
Up to 50% fan energy saving
- Optimised consumption and operating costs
- Reduced flow noise thanks to lower supply pressure in the air duct system
- Reduced wiring expenses thanks to MP-Bus® network
Product Range Overview
Air volume and line pressure control

VAV-Compact
LON version MP types
LMV-D2LON
NMV-D2LON

VAV-Universal
LON version MP types
VMV-D2LON
NMV-D2-MP
SMV-D2-MP
LHV-D2-MP

Sensor
VFP-..
VFP-M
VRP-M STP [STP pressure]
LM/NM/SM24-A-V
VNMQB24-SRV-ST

VAV controller
Actuator

COU24-A-MP
Fan optimiser

CR24-.. Single-room controller

SG-.. Position sensor

Accessories

Bus integration and tools:
UK24LON Interface for LONWORKS® applications
UK24EIB Interface for EIB-Konex applications

ZTH-VAV VAV-Compact setting device

Parameterisation and service software
- VAV-Compact module
- VRP-M module

Note:
Room pressure ratio

In a master / slave connection, any changes in the air system of the master (supply pressure too low, e.g. due to a pressure control fault) are detected and reported to the slave. This guarantees an equal percentage ratio of supply air to exhaust air.

In a master / slave configuration, only one controller can act as master. However, one master controller can control several parallel slave controllers.

When are master / slave connections used?
• In systems with air volume controllers in the supply and exhaust air that are required to work sequentially
• When an equal percentage ratio of supply air to exhaust air is specified.

Operating volumetric flow settings

The \( V_\text{max} \) and \( V_\text{min} \) values used for the required volumetric flow are set on the master and transferred to the slave by means of a reference signal.

CAV application

In constant air volume applications, operating mode control (CLOSED / \( V_\text{min} \) etc.) is only set on the master controller.

Slave setting if the room pressure ratio is balanced

The \( V_\text{min} \) setting on the slave is always 0%. If the room pressure ratio is 1:1 and all controllers are the same size, the slave controller is set to \( V_\text{max} \) 100% / \( V_\text{min} \) 0%.

Slave setting if the room pressure ratio is unbalanced

The \( V_\text{min} \) setting on the slave is always 0%.

Setting with % scale on the ZTH-VAV hand-operated device

The ratio of slave volume to master volume is set as follows with the \( V_\text{max} \) value on the slave controller:

\[
V_\text{max} \% = \frac{V_\text{max} \cdot V_{\text{max}, M}}{V_{\text{max}, M} \cdot V_{\text{nom}, S}} \cdot 100
\]

\( V_\text{max} \% \) = \( V_\text{max} \) value that must be set on the controller in %

\( V_{\text{max}, M} \) = Nominal volume of the master unit in m³/h

\( V_{\text{max}, S} \) = Maximum volume of the master unit in m³/h

\( V_{\text{nom}, S} \) = Nominal volume of the slave unit in m³/h

\( V_{\text{nom}, S} \) = Maximum volume of the slave unit in m³/h

Example

Required: Positive pressure in the room with 20% excess air
– Supply air unit: \( V_{\text{nom}} \) 1600 m³/h / \( V_{\text{max}} \) 1500 m³/h
– Exhaust air unit: \( V_{\text{nom}} \) 2400 m³/h / \( V_{\text{max}} \) 1200 m³/h

Find: \( V_{\text{max}} \) setting of the slave controller

\[
53% = \frac{1200 \cdot 1600}{1500 \cdot 2400} \cdot 100
\]
VAV Controls

VAV-Compact

Functions

Parallel connection

Room pressure ratio
In a parallel connection, the two VAV units are operated independently of one another with a common reference signal. The operating volumetric flows of the supply and exhaust air units must be set according to the required room pressure ratio.

The supply and exhaust air controllers work independently of one another, i.e. if a fault occurs in the supply or exhaust air system, the room pressure ratio is impaired for technical reasons. In the worst case, the unit tolerances may be accumulated. This circumstance must be taken into account by the project planning engineer.

When are parallel connections used?
- If air volume controllers operate with parallel supply and exhaust air (controlled by a common reference variable)
- If the supply and exhaust air devices have different sizes and different minimum and maximum volumetric flow settings
- If constant differential control is active between the supply and exhaust air
- In systems with several supply and exhaust air devices
- In circulating air systems for airtight rooms.

Operating volumetric flow settings
The \( V_{\text{max}} \) and \( V_{\text{min}} \) values used for the required volumetric flow must be set on each VAV controller.

CAV application
In constant air volume applications, operating mode control (CLOSED / \( V_{\text{min}} \) etc.) is set on both controllers.

Setting if the room pressure ratio is balanced
Owing to the proportional assignment of the reference signal to the value ranges for \( V_{\text{max}} \) and \( V_{\text{min}} \), it is possible to operate VAV units with different nominal widths and differentiated ranges parallel to one another.

Setting if the room pressure ratio is unbalanced
The operating volumetric flows of the supply and exhaust air units must be set according to the difference:
- Positive pressure ratio in the room Supply air volume > exhaust air volume
- Negative pressure ratio in the room Exhaust air volume > supply air volume
**VAV-Compact**

**Conventional applications**

**Single-duct systems**

**Function diagram**

- Room occupied
- Room unoccupied
- Volumetric flow $\dot{V}_{\text{max}}$
- $\dot{V}_{\text{min}}$

**Brief Description**

Control solution for CAV single-room application

CAV single-duct system, occupancy-controlled Stand-alone operation or integrated in a building automation system (I/O integration)

**Functions**

The CAV controller is controlled by means of the motion detector in two modes on the basis of room occupancy $\dot{V}_{\text{min}} \ldots \dot{V}_{\text{max}}$

- Room unoccupied: constant air volume $\dot{V}_{\text{min}}$
- Room occupied: constant air volume $\dot{V}_{\text{max}}$

**Motion detector**

With switching output for low switching capacity (load 0,24 mA)

**VAV-Compact control device**

..MV-D2-MP

VAV-Compact control device for supply air, exhaust air or mixing units, comprising a sensor, VAV controller and actuator for pressure-independent air volume controls.

- Damper position feedback controlled via the MP-Bus for demand based fan optimisation.

**Notes**

- Connection and terminal designations of the motion detector in accordance with the manufacturer's specification
- Mode setting on the CAV controller: 0 \ldots 10 V oder 2 \ldots 10 V

---

**Wiring diagram**

**IRC-VAV CAV room solution with motion detector**

CAV single-duct system, occupancy-controlled

1) Master-Slave
2) parallel
VAV Controls

VAV-Compact
Conventional applications

Single-duct systems

IRC-VAV CAV room solution with 0…10V control

Brief Description
Control solution for VAV single-room application
Stand-alone operation or integrated in a building automation system (I/O integration)

Functions
The 0 ... 10 V V single-room or DDC controller controls the VAV controller with variable air volume in the range from \( \min \) ... \( \max \), depending on the room cooling needs.

Single-room or DDC controller
With The 0 ... 10 V output single (cooling sequence).
Controller functions in accordance with the manufacturer's specification.

VAV-Compact control device
..MV-D2-MP
VAV-Compact control device for supply air, exhaust air or mixing units, comprising a sensor, VAV controller and actuator for pressure-independent air volume controls.
- Damper position controlled via the MP-Bus for demand based fan optimisation.

Wiring diagram

Notes
- Connection and terminal designations in accordance with the controller manufacturer's specification
- Mode setting on the VAV controller: 0 ... 10 V
### VAV-Compact

#### Conventional applications

**Single-duct systems**

Function diagram

Note

For technical data and a detailed description of functions, see CR24 product information.

#### Wiring diagram

Input and output assignment

<table>
<thead>
<tr>
<th>Functions</th>
<th>Description</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAV</td>
<td>VAV system output (0) 2 … 10 V</td>
<td>Output ao1</td>
</tr>
<tr>
<td>Optional functions</td>
<td>Description</td>
<td>Assignment</td>
</tr>
<tr>
<td>EHO</td>
<td>Energy hold off (window)</td>
<td>Input di1</td>
</tr>
<tr>
<td>Sensor</td>
<td>External temperature sensor NTC 5K</td>
<td>Input ai1</td>
</tr>
<tr>
<td>Shift</td>
<td>External shift 0 … 10 V (Summer / Winter compensation)</td>
<td>Input ai2</td>
</tr>
</tbody>
</table>

**Note**

Terminal designations in accordance with the Belimo final controlling element.

**Notes**

- Further VAV applications such as boost (fast heat up), night cool down (air heated with water or electrically), night cooling, combination available with chilled ceiling.
- Mode setting for VAV controller for this application: 2 … 10 V

### Brief description

Control solution for VAV single-room application, VAV single-duct system, room temperature-controlled, Stand-alone operation or integrated in a building automation system (I/O integration)

### Functions

The CR24-B1 single-room controller controls the connected VAV controllers with a variable air volume in the range from \( \min \) … \( \max \), depending on the room cooling needs. Other functions can be optionally connected (e.g. with a motion detector): energy hold off, standby, etc.

### Room temperature controller

CR24-B1 (automatic) CR24-A1

Room temperature controller (15 … 36°C) with an integrated or external temperature sensor

- Mode selection with a pushbutton and three LEDs: AUTO, ECO (reduced room temperature for standby or night operation) and MAX (flushing operation with 15' timer)
- Room protection function (frost / excess temperature)
- Inputs for energy hold off, standby operation, external temperature sensor, summer / winter compensation
- VAV system output
- Self-resetting start-up and service function
- Tool connection for diagnostics, settings and trend recordings

VAV-Compact control device MV-D2-MP, VAV-Compact control device for supply air, exhaust air or mixing units, comprising a sensor, VAV controller and actuator for pressure-independent air volume controls.

- Damper position controlled via the MP-Bus for demand based fan optimisation.
VAV Controls

VAV-Compact
Conventional applications

Dual-duct systems

VAV dual-duct system, room temperature-controlled

Note
For technical data and a detailed description of functions, see CR24 product information.

Wiring diagram

Control solution for VAV single-room application

VAV dual-duct system, room temperature-controlled
Stand-alone operation or integrated in a building automation system (I/O integration)

Functions
The two air volume controllers mix the hot and cold air supplied by the dual-duct air conditioning system to obtain the condition requested by the CR24-B1 room temperature controller. The constant air volume (CAV) controller for the hot air adjusts to the set \( \dot{V}_{\text{max}} \) volume for heating. The variable air volume (VAV) controller for the cold air adds the variable amount of cold air requested by the room temperature controller. If cooling needs exceed the hot air volume, the hot-air part is shut off and only cold air is supplied.

Optional: The cold-air part can be shut off by means of a switching contact at input d1.

Room temperature controller
CR24-B1 (automatic) CR24-A1
Room temperature controller (15 … 36°C) with an integrated or external temperature sensor
• Mode selection with a pushbutton and three LEDs: AUTO, ECO (reduced room temperature for standby or night operation) and MAX (flushing operation with 15' timer)
• Room protection function (frost / excess temperature)
• Inputs for cold air shut-off, external temperature sensor, summer / winter compensation
• VAV system output
• Self-resetting start-up and service function
• Tool connection for diagnostics, settings and trend recordings

VAV-Compact control device ..MV-D2-MP
VAV-Compact control device for supply air, exhaust air or mixing units, comprising a sensor, VAV controller and actuator for pressure-independent air volume controls.

Input and output assignment

<table>
<thead>
<tr>
<th>Functions</th>
<th>Description</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAV</td>
<td>VAV system output (0) 2 ... 10 V</td>
<td>Output ao1</td>
</tr>
<tr>
<td>Optional functions</td>
<td>Description</td>
<td>Assignment</td>
</tr>
<tr>
<td>Shut-off CA</td>
<td>Cold air shut-off</td>
<td>Assignment</td>
</tr>
<tr>
<td>Sensor</td>
<td>External temperature sensor NTC 5K</td>
<td>Input ai1</td>
</tr>
<tr>
<td>Shift</td>
<td>External shift 0 ... 10 V (Summer / Winter compensation)</td>
<td>Input ai2</td>
</tr>
</tbody>
</table>

Configuration, settings

DIP switches

<table>
<thead>
<tr>
<th>DIP switch</th>
<th>Setting</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P-Band</td>
<td>normal wide</td>
</tr>
<tr>
<td>2</td>
<td>di2</td>
<td>Stand by Change over</td>
</tr>
</tbody>
</table>

Setpoint WH range: 15 … 36 °C
Product range

Systemair has an extensive range of ventilation products, the majority of which are fans and air handling units. Other products include a wide range of air terminal devices for various applications. These products are installed in a variety of locations, including homes, offices, healthcare premises, shops, industrial buildings, tunnels, parking garages, training facilities, sports centres. The most common usage is comfort ventilation, but safety ventilation in various forms is also an important market. Smoke gas ventilation and tunnel ventilation are two examples.

Fans

Systemair is one of the world's largest suppliers of fans for use in various types of property.

Our range includes everything from duct fans with a round connection – the company's original product - to rectangular duct fans, roof fans, axial fans, explosion-proof fans, and smoke gas fans.

These fans can be supplied in sizes suitable for everything from ducts with a diameter of just 100 mm to large road tunnel fans. All our fans have been developed to comply with stringent requirements and are characterised by user-friendliness, a high level of quality and a long service life.

Circular duct fans

Duct fans with a circular connection.

Radial fans

Single-inlet radial fans.

Axial fans

Axial fans for duct connection or wall mounting.

Rectangular duct fans

Duct fans with a rectangular connection.

Box fans

For extract air systems that transport normal or high-temperature media.

Explosion-proof fans

Explosion-proof fans for duct, roof and axial installations.

Jet fans

The jet fan range includes products for garages and road and rail tunnels.

Thermo fans

Systemair supplies high temperature fans that can withstand conditions of up to 600°C for 120 minutes.

Roof fans

Roof fans with a circular or square connection.
**Fire safety ventilation**
Systemair produces fans, dampers and control equipment for protection against smoke and fire certified for use during normal operation and in the event of a fire. The axial fans are certified for installation inside or outside fire risk areas.

**Smoke gas fans**
High-capacity fans for evacuation of smoke gases.

**Fire dampers**
Dampers that reduce the spread of smoke and fire.

**Residential ventilation**
Complete energy-efficient air handling units with heat recovery and built-in control systems. Designed to be mounted over the cooker, on walls or horizontally in attics.

**Residential units**
For homes with living areas of 60-320 m².

**Cooker hoods**
Good at capturing odours even at low airflows.

**Air terminal devices**
Systemair’s range also includes a wide selection of air terminal devices for all possible environments and positions. Development and manufacture take place at a modern factory in Slovakia.

**Supply, extract & transfer air terminal devices**
For mounting in ceilings or walls.

**Nozzle air devices**
Optimum air distribution for rooms.

**Supply & extract air ventilators**
For mounting in ceilings and walls

**Duct products**
Dampers, plenum boxes, and duct accessories.