



VAV regulators

**RVP-P**



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## Application

VAV regulators are used for automatic airflow regulation in the ventilation systems for both supply and exhaust/return. They adjust the amount of supply/exhaust air to control the climate individually for every room/zone served. By using the control elements they can adjust accordingly to different heat gain / loses in the zones served with respect to amount of people gathered in the zone and also other factors such as heat gains and loses through the windows (sun loads).

RVP-P regulators may be produced in two types. In the standard version the regulator is applicable for use with clean filtered air and in the special type, regulators may also be applicable to work with contaminated air with light corrosive gases (according to Classification of Corrosive Environments ISO 12944 max. class C3).

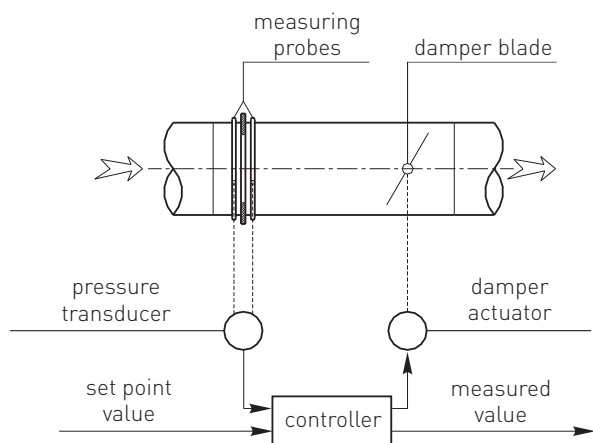
## Material

Regulator's body and air damper blade is made of galvanized steel sheet. Damper blades have plasticized PVC seals which assure air tightness at the fully closed position. The damper blade driving mechanism is made of plastic. The orifice is made of galvanized steel sheet. On both sides tube nozzles are installed to measure differential pressure. The control driving mechanism of the air flow regulator is a compact unit consisting of static pressure differential sensor, digital controller PID and the actuator.

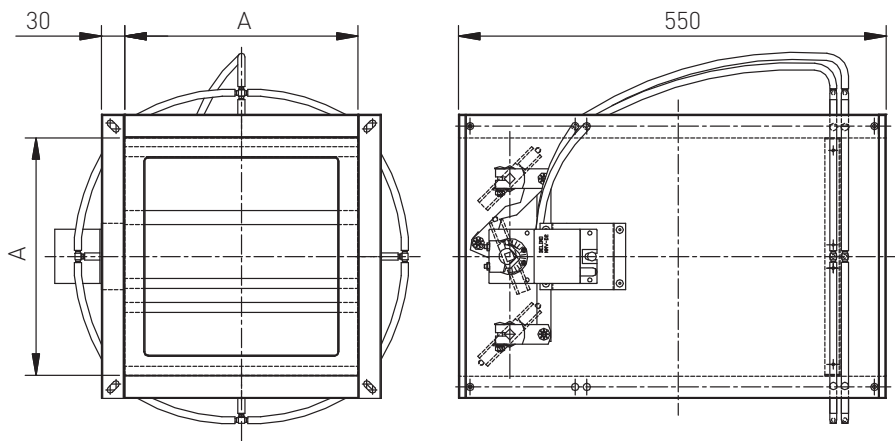
## Workin principle

The working principle depends on measuring air volume flowing through the regulator. The reading is made on four pairs of probes located on both sides of the orifice. When the air is flowing through the measuring probe on both sides of it pressure difference is created which corresponds to the actual air volume. Then the pneumatic signal is transmitted by plastic tubes to the pressure sensor.

Pressure differential value is send to the controller, where it is transduced to the air volume value and compared with the set point value. If the measured value is different that the set point, the actuator adjusts the air damper to the required position to eliminate the differences between measured and set point values.



**Notice:**  
The device is programmed by the manufacturer and the parameters can not be changed by unauthorized people.



### Typical dimensions and working range of the particular regulator sizes

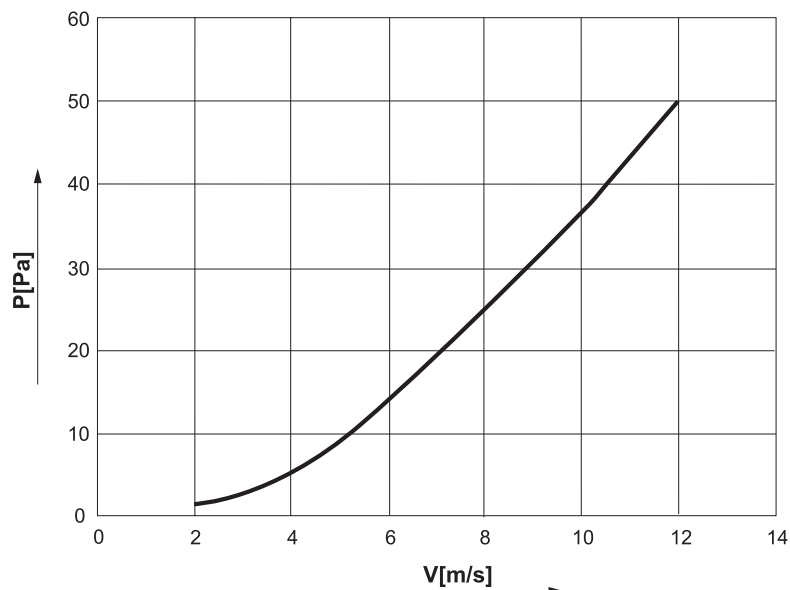
B [mm]	Adjusted air stream [m <sup>3</sup> /h]							
	A [mm]							
	200	250	315	400	500	630	800	1000
105	150 - 750	190 - 940	240 - 1190	x	x	x	x	x
205	290 - 1480	360 - 1850	460 - 2330	590 - 2960	730 - 3690	920 - 4650	x	x
305	440 - 2200	540 - 2750	690 - 3460	870 - 4400	1090 - 5490	1380 - 6920	1750 - 8790	2190 - 10980
405	580 - 2920	720 - 3650	910 - 4600	1160 - 5840	1450 - 7290	1830 - 9190	2330 - 11670	2910 - 14580
505	720 - 3640	900 - 4550	1140 - 5730	1450 - 7280	1810 - 9090	2290 - 11460	2900 - 14550	3630 - 18180

### Installation guidelines

For the proper performance of the device the following rules should be maintained:

The regulator should not be installed close to elbows, take offs and diffusers. Minimum recommended distances 2B or 3H should be maintained from any elbows and 1B or 1,5H from any elbows but perforated steel plate must be added to rectify the air stream.

### Air pressure drop on the RVP-P regulator (air damper blade fully open)



## Sound power level

Table 1.

	Sound power level on the discharge of RVP-P regulator											
	L <sub>WA</sub> [dB <sub>(A)</sub> ]											
	100 [Pa]				250 [Pa]				500 [Pa]			
	3	6	9	12	3	6	9	12	3	6	9	12
	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s
200 x 105	39	48	66	61	50	55	61	67	55	60	65	68
250 x 105	40	49	57	62	51	56	61	68	56	61	66	69
315 x 105	44	53	61	66	55	60	66	72	60	65	70	73
200 x 205	39	51	57	66	51	55	60	70	56	61	68	73
250 x 205	40	52	58	67	52	56	61	71	57	61	69	74
315 x 205	42	54	60	69	54	58	63	73	59	64	71	76
400 x 205	43	55	61	70	55	59	64	74	60	65	72	77
500 x 205	44	56	62	71	56	60	65	75	61	66	73	78
630 x 205	45	57	63	72	57	61	66	76	62	67	74	79
200 x 305	39	51	57	65	51	58	64	70	59	65	70	74
250 x 305	40	51	58	61	52	59	62	71	60	66	71	75
315 x 305	42	54	60	68	54	61	67	73	62	68	73	77
400 x 305	43	55	61	69	55	62	68	74	63	69	74	78
500 x 305	44	56	62	70	56	63	69	75	64	70	75	79
630 x 305	45	57	63	71	57	64	70	74	65	71	76	80
800 x 305	46	58	64	72	58	65	71	75	66	72	77	81
1000 x 305	47	59	65	73	59	66	72	76	67	73	78	82
200 x 405	40	51	56	65	53	60	65	71	59	65	70	75
250 x 405	41	52	57	66	54	61	66	72	60	66	71	76
315 x 405	42	53	58	67	55	62	67	73	61	67	72	77
400 x 405	43	54	59	67	56	63	68	74	62	68	73	78
500 x 405	44	55	60	68	57	64	69	75	63	69	74	79
630 x 405	45	56	61	69	58	65	70	76	64	70	75	80
800 x 405	46	57	62	70	59	66	71	77	65	71	76	81
1000 x 405	47	58	63	71	60	66	72	78	66	72	77	82
200 x 505	40	54	49	66	55	60	65	72	61	66	71	77
250 x 505	41	55	50	67	56	61	66	73	62	67	72	78
315 x 505	42	56	51	68	57	62	67	74	63	68	73	79
400 x 505	43	57	52	69	58	63	69	75	64	69	74	80
500 x 505	44	58	63	70	59	64	70	76	65	70	75	81
630 x 505	45	59	64	71	60	65	71	77	66	71	76	82
800 x 505	46	60	65	72	61	66	72	78	67	72	77	83
1000 x 505	47	61	66	73	62	67	73	79	68	73	78	84

Table 2.

Sound power level emitted by RVP-P with respect to air pressure and air velocity.  
Regulator without acoustic insulation.

	$L_{WA} [dB_{(A)}]$											
	100 [Pa]				250 [Pa]				500 [Pa]			
	3	6	9	12	3	6	9	12	3	6	9	12
	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s
<b>200 x 105</b>	29	37	43	47	32	42	46	54	47	47	52	57
<b>250 x 105</b>	30	38	44	49	33	43	47	55	48	48	53	59
<b>315 x 105</b>	31	39	45	50	34	44	48	56	49	49	54	60
<b>200 x 205</b>	30	40	43	50	42	47	48	52	45	51	53	56
<b>250 x 205</b>	31	41	44	51	43	48	49	53	46	52	54	57
<b>315 x 205</b>	32	42	45	52	44	49	50	54	47	53	55	58
<b>400 x 205</b>	33	43	46	53	45	50	51	55	48	54	56	59
<b>500 x 205</b>	34	44	47	54	46	51	52	56	49	55	57	60
<b>630 x 205</b>	35	45	48	55	47	52	53	57	50	56	58	61
<b>200 x 305</b>	33	44	46	50	45	50	52	55	51	52	55	51
<b>250 x 305</b>	34	45	47	51	46	51	53	56	52	53	56	52
<b>315 x 305</b>	35	46	48	52	47	52	54	57	53	54	57	53
<b>400 x 305</b>	36	47	49	53	48	53	55	58	54	55	58	64
<b>500 x 305</b>	37	48	50	54	49	54	56	59	55	56	59	65
<b>630 x 305</b>	38	49	51	55	50	55	57	60	56	57	60	66
<b>800 x 305</b>	39	50	52	56	51	56	58	61	57	58	61	67
<b>1000 x 305</b>	40	51	53	57	52	57	59	62	58	59	62	68
<b>200 x 405</b>	33	45	47	50	46	50	52	56	51	54	58	60
<b>250 x 405</b>	34	46	48	51	47	51	53	57	52	55	59	61
<b>315 x 405</b>	35	47	49	52	48	52	54	58	53	56	60	62
<b>400 x 405</b>	36	48	50	53	49	53	55	59	54	57	61	64
<b>500 x 405</b>	37	49	51	54	50	54	56	60	55	58	62	65
<b>630 x 405</b>	38	50	52	55	51	55	57	61	56	59	62	66
<b>800 x 405</b>	39	51	53	56	52	56	58	62	57	60	63	67
<b>1000 x 405</b>	40	52	54	57	53	57	59	63	58	61	64	68
<b>200 x 505</b>	34	46	47	61	46	52	53	56	51	55	58	62
<b>250 x 505</b>	35	47	48	62	47	53	54	57	52	56	59	63
<b>315 x 505</b>	36	48	49	63	48	54	55	58	53	57	60	64
<b>400 x 505</b>	37	49	50	64	49	55	56	59	54	58	61	65
<b>500 x 505</b>	38	50	51	65	50	56	57	60	55	59	62	66
<b>630 x 505</b>	39	51	52	66	51	57	58	61	56	60	63	67
<b>800 x 505</b>	40	52	53	67	52	58	59	62	57	61	64	65
<b>1000 x 505</b>	41	53	54	68	53	59	60	63	58	62	65	66

## Sound power level

Table 3.

Sound power level emitted by RVP-P with respect to air pressure and air velocity.  
Regulator with acoustic insulation.

	L <sub>WA</sub> [dB <sub>(A)</sub> ]											
	100 [Pa]				250 [Pa]				500 [Pa]			
	3	6	9	12	3	6	9	12	3	6	9	12
	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s
200 x 105	21	26	35	43	37	38	41	46	36	40	42	47
250 x 105	22	27	36	44	38	39	42	47	37	41	43	48
315 x 105	23	28	37	45	39	40	42	48	38	42	44	49
200 x 205	20	29	36	43	37	40	41	46	41	43	44	48
250 x 205	21	30	37	44	38	41	42	47	42	44	45	49
315 x 205	22	31	38	45	39	42	43	48	43	45	46	50
400 x 205	23	32	39	46	40	43	44	49	44	46	47	51
500 x 205	24	33	40	47	41	44	45	50	45	47	48	52
630 x 205	25	32	41	48	42	45	46	51	46	48	49	53
200 x 305	22	34	40	47	40	43	44	47	41	48	50	48
250 x 305	23	35	41	48	41	44	45	48	42	49	51	49
315 x 305	24	36	42	49	42	45	46	49	43	50	52	50
400 x 305	25	37	43	50	43	46	47	50	44	51	53	51
500 x 305	26	38	44	51	44	47	48	51	45	52	54	52
630 x 305	27	39	45	52	45	48	49	52	46	53	55	53
800 x 305	28	40	46	53	46	49	50	51	47	54	56	54
1000 x 305	29	41	47	54	47	50	51	52	48	55	57	55
200 x 405	23	37	39	47	40	44	45	48	42	48	50	51
250 x 405	24	38	40	48	41	45	46	49	43	49	51	52
315 x 405	25	39	41	49	42	46	47	50	44	50	52	53
400 x 405	26	40	42	50	43	47	48	51	45	51	53	54
500 x 405	27	41	43	51	44	48	49	52	46	52	54	55
630 x 405	28	42	44	52	45	49	50	53	47	53	55	56
800 x 405	29	43	45	53	46	50	51	54	48	54	56	57
1000 x 405	30	44	46	54	47	51	52	55	49	55	57	58
200 x 505	24	37	39	48	41	46	48	49	43	48	51	52
250 x 505	25	38	40	49	42	47	49	50	44	49	52	53
315 x 505	26	39	41	50	43	48	50	51	45	50	53	54
400 x 505	27	40	42	51	44	49	51	52	46	51	54	55
500 x 505	28	41	43	52	45	50	52	53	47	52	55	56
630 x 505	29	42	44	53	46	51	53	54	48	53	56	57
800 x 505	30	43	45	54	47	52	54	55	49	54	57	58
1000 x 505	31	44	46	55	48	53	55	56	50	55	58	58

**Standard performance** - standard version of RVP-R (for regulation of clean air with full control timing cycle open/close of 150 seconds).

### VAV – Compact

In this variant control and driving compartment consists of dynamic differential pressure sensor, controller and damper actuator integrated as one compact unit with NMV-D2-MP or LMV-D2-MP symbols and they are attached to the RVP regulator respectively to its nominal dimensions BxH.

This unit has the following control sequences possible:

- **control - signal in the range between** 2 ... 10V, 0 ... 10V - regulator controls the flow of air in the duct between the desired or capacities,  $V_{min}$ ,  $V_{max}$ , as the continuous signal from the lead in terms of programmed control voltage (0 ... 10V, 2 ... 10V)

- **control - fixed signal :**

- **“Close”** – the air damper fully closed – closing the air damper on air supply or air exhaust ducts to unoccupied rooms let to conserve energy.
- **“Open”** – the air damper fully open – it is used to help in smoke evacuation from the rooms (heavy ventilating) or quite often as a safe position.
- $V_{min}$  – min. air volume – regarding the actual needs or during the unoccupied time particular building zones may be switched to stand by mode and system is providing only minimum required air for ventilation purposes and in such layout it gives additional energy savings.
- $V_{mid}$  – indirect air damper position – possible position of the air damper based on mathematical load calculations for the room/zone served.
- $V_{max}$  – max. air volume – single room or a group of rooms must temporarily receive maximum air volume – this sequence lets to ventilate, evening cooling or morning warm up of the rooms.

- **control through the digital communication protocol** – possibility to integrate with:

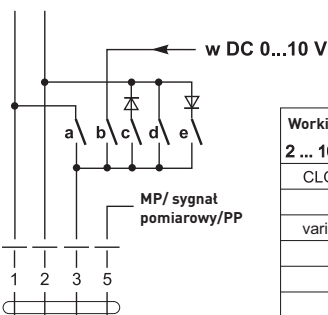
- DDC controller with the MP interface
- EIB Konnex systems
- LonWorks® systems
- with fan speed optimizer systems

### Wiring diagram

With relay contacts

⊥ ~ AC 24 V  
- + DC 24 V

⚠ Connecting via safety isolating transformer



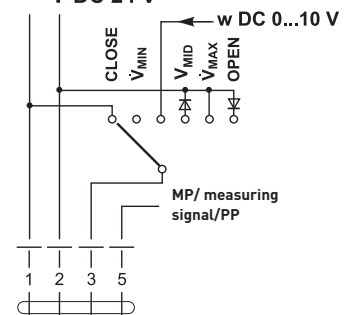
Working range / Function	a	b	c*	d	e*
2 ... 10 V ≙ 0 ... 10 V ≙					
CLOSE   $\dot{V}_{MIN}$	—	—	—	—	—
$\dot{V}_{MIN}$	—	—	—	—	—
variable $\dot{V}_{MIN} \dots \dot{V}_{MAX}$	—	—	—	—	—
$\dot{V}_{MID}$	—	—	—	—	—
$\dot{V}_{MAX}$	—	—	—	—	—
OPEN	—	—	—	—	—

\* only at 24V

⊥ ~ w/z U/pp NMV-D2-MP

With rotary switch from controller

⊥ ~ AC 24 V  
- + DC 24 V



⊥ ~ w/z U/pp NMV-D2-MP

Function "CLOSE", "OPEN": air volume control is inoperative in this case

<b>Technical data:</b>		<b>LMV-D2-MP (NMV-D2-MP)</b>
Nominal voltage		24 V AC, 50/60 Hz
Power supply range		19,2...28,8 V DC 21,6...28,8 V DC
For wire sizing		5 VA max. 5A@5ms [5,5 VA max. 5A@5ms]
Power consumption	In operation	3 W [3,5 W]
	At rest	1,25[W]
	For wire sizing	5,5[VA]
Torque (nominal torque)		5 Nm (10 Nm)
Direction of rotation		Can be selected with 0/1 switch
Angle of rotation		Max.95°, can be limited at both ends with adjustable mechanical end stops
Protection class		III [ safety extra - low voltage]
Sound power level		Max. 35dB
Degree of protection		IP54
Ambient temperature range		0...+50[°C]
Non-operating temperature range		-20...+80[°C]
Ambient humidity range		5...95 rH. non-condensating
Maintenance		Maintenance-free
Weight		500g (700g)
<b>Classic control</b>		
Mode for reference value input w (connection 3)		- 2...10VDC / 4...20mA with 500Ω resistance - input resistance min. 100kΩ - 0...10VDC / 0...20mA with 500Ω resistance - input resistance min. 100kΩ - 0...10VDC , adjustable - input resistance min. 100kΩ
Mode for actual value signal U5 (connection 5)		- 2...10VDC – max. 0.5mA - 0...10VDC – max. 0.5mA - Adjustable: air volume or damper position
Operating modes for constant air volume		CLOSE / Vmin / Vmid / Vmax / OPEN (only with AC 24V supply)
<b>MP-BUS function</b>		
Address in bus operation		MP 1 ... 8 / classic control: PP
LonWorks®/ EIB Konnex		With BELIMO UK24LON / UK24EIB interface, 1...8 BELIMP MP devices (VAV / damper actuator / valve)
DCC Controller		DDC Controller / PLC, with integrated MP interface
Fan optimizer		Optimizer Belimo COU24-A-MP



**Special enforcement** – quick version of RVP-R (with full control timing cycle open/close of 3 seconds) applicable for use in environments with light chemical contaminations

Control driving compartment of the vav regulator is the Belimo device which consists of static pressure differential sensor, digital controller PID VAV and actuator.

**In the control and driving compartment there are the following items:**

1. **Controller PID VAV** with the following options control:
  - control - signal in the range between 2...10V, 0...10V
  - control - fixed signal: „Close“, „Open“,  $V_{min}$ ,  $V_{mid}$ ,  $V_{max}$
  - control through the digital communication protocol – possibility to integrate with:
    - DDC controller with the MP interface
    - EIB Konnex systems
    - LonWorks® systems
    - Fan optimiser systems
2. **Static pressure differentia sensor** – is applicable for pressure differential readings in air ducts or in rooms. They are adapted to work with contaminated air with light chemical aggressive gases. Solid design makes them available for use in laboratories, GMP rooms and in the industry.

Type	Reading ranges	Protection against high pressures	Temperature dependance	Weight
VFP-300	0...300[Pa]	Max. 5000[Pa]	±0,05%/K	Approx. 280g

3. **Actuator:**
  - NM24A-V-ST – 10[Nm] - standard application

Technical data:		
Nominal voltage	24[V] AC/DC (from VRP-... controller)	
Power consumption	In operation	3,5[W]
	At rest	1,25[W]
	For wire sizing	5,5[VA]
Torque (nominal torque)	Min. 10[Nm] at nominal voltage	
Direction of rotation	Can be selected with 0/1 switch	
Angle of rotation	Max.95°, can be limited at both ends with Adjustable mechanical end stops	
Running time	150[s]	
Protection class	III (safety extra - low voltage)	
Sound power level	Max. 35[dB]	
Degree of protection	IP54	
Ambient temperature range	-30...+50[°C]	
Non-operating temperature range	-40...+80[°C]	
Maintenance	Maintenance-free	
Dimensions	146/80/75[mm]	
Weight	710[g]	

- LMQ24A-SRV-ST – 4[Nm] - fast running damper actuator

Technical data:		
Nominal voltage		24[V] AC/DC ( from VRP-... controller)
Power consumption	In operation	12[W]
	At rest	1,5[W]
	For wire sizing	18[VA]
Torque (nominal torque)		Min. 4[Nm] at nominal voltage
Direction of rotation		Can be selected with 0/1 switch
Angle of rotation		Max.95°, can be limited at both ends with adjustable mechanical end stops
Protection class		III ( safety extra - low voltage )
Running time		2,5[s]/90°
Degree of protection		IP54
Sound power level		52[dB] (A)
Ambient temperature range		-30...+50[°C]
Non-operating temperature range		-40...+80[°C]
Maintenance		Maintenance-free
Dimensions :		146/80/75[mm]
Weight		810[g]

- NMQ24A-SRV-ST – 8[Nm] - fast running damper actuator

Technical data:		
Nominal voltage		24[V] AC/DC (from VRP-... controller)
Power consumption	In operation	12[W]
	At rest	1,5[W]
	For wire sizing	18[VA]
Torque (nominal torque)		Min. 8[Nm] at nominal voltage
Direction of rotation		Can be selected with 0/1 switch
Angle of rotation		Max.95°, can be limited at both ends with adjustable mechanical end stops
Protection class		III ( safety extra - low voltage )
Running time		4[s]/90°
Degree of protection		IP54
Sound power level		52[dB] (A)
Ambient temperature range		-30...+50[°C]
Non-operating temperature range		-40...+80[°C]
Maintenance		Maintenance-free
Dimensions		156/88/77[mm]
Weight		930[g]

Notice:

Any orders regarding regulators with fast acting drives must be discussed with and accepted by Smay technical department.

The control and driving compartment is all connected by the manufacturer, but the customer must bring the power supply and do the control wiring himself. Electrical wiring of the VRP-M unit should be done according to the supplied schematic and it should be done by a professional.

### Wiring diagram

**Notice**

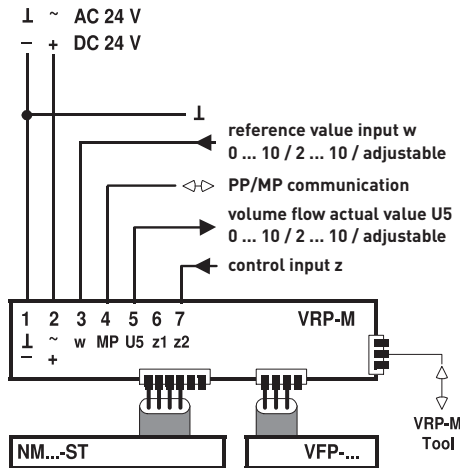
- Supply via safety isolation transformer!
- Connection 1, 2 (AC/DC 24V) and 5 (MP signal) must be routed to accessible terminals (room temperature controller, floor distribution, control cabinet, etc.) in order to simplify access with the PC-Tool for diagnostic and service work.



### Override control

Function	Connection
Close	1 — 7
Open	2 → 6
$V_{min}$	2 — 7
$V_{max}$	2 — 7
$V_{mid}$	2 → 7

### VAV with analogue reference signal



### Product symbolic description - how to order

## RVP-P-500x305-1300/1100/700-Q-MP BUS-7

RVP-P **I** - **A** x **B** - **V<sub>nom</sub>** / **V<sub>max</sub>** / **V<sub>min</sub>** - **T<sub>s</sub>** - **K** - **N** - **S** - **P**

**I** insulation\*  
 - **not insulated**  
 t insulated

**D** diameter [mm]

**V<sub>nom</sub>** nominal air volume [m³/h]

**V<sub>max</sub>** max. air volume [m³/h]

**V<sub>min</sub>** min. air volume [m³/h]

**T<sub>s</sub>** actuator\*  
 - **standard**  
 Q fast acting

**K** communication\*  
 - **analog value**

**N** number of the regulator in the system - applies only for MP-BUS communication

**S** environment\*  
 - **clean air**  
 C3 environment with class C3

**P** material  
**S0** **galvanised steel**  
 SN stainless steel

\* optional values – lack of them will cause application of default values

