



VAV regulators

# RVP-R



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## Application

VAV regulators are used for automatic airflow regulation in the ventilation and air conditioning systems. 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.

RVP-R regulators may be produced in two types with respect to the acting time. In the standard version time necessary for the full cycle (open to close) is 150 seconds, while the fast acting drive can do that in 3 seconds. In the special type RVP-R 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

The casing and air damper blade are made of galvanized steel sheet or on special orders it they can be made of stainless steel 1.4306. The damper blade has a rubber gasket, which assures air tightness at the fully closed position. The damper blade shaft is working on plastic or brass bearings. The measuring probe is an orifice or a linear. The orifice is made of galvanized steel sheet. On both sides tube nozzles are installed to measure differential pressure. The linear is made of aluminum profile with proper impulse holes distributed on it.

As an option RVP-R is made with thermal-acoustic insulation RVP-Rt.

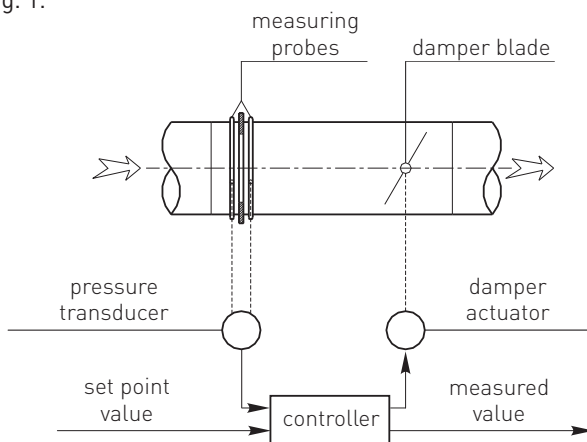
The control driving mechanism of the air flow regulator is a compact unit consisting of static pressure differential sensor, digital controller PID and the actuator.

The working principle depends on measuring air volume flowing through the regulator.

In the regulators with orifices reading is made by measuring probes located on both sides of the orifice. In the regulators with linears, reading is made on impulse holes located on both sides of the linear. When the air is flowing through the measuring probe on both sides is created pressure difference which corresponds to the actual air volume. Then the pneumatic signal is transmitted by plastic tubes to the pressure sensor.

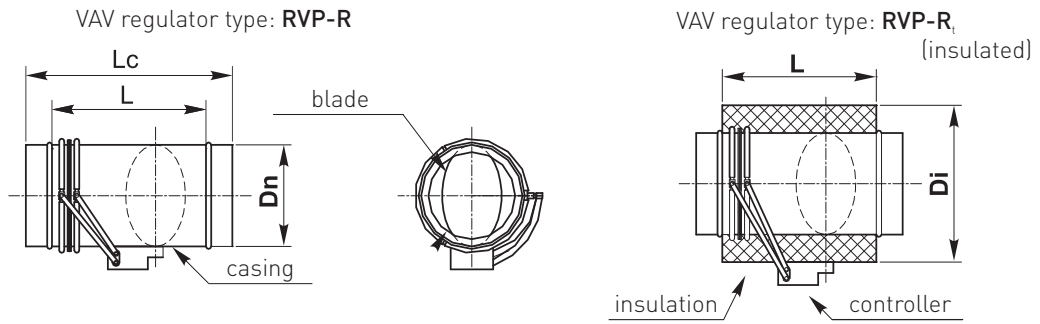
Pressure differential value is sent to the controller, where it is transduced to the air volume value and compared with the set point value. If the measured value is different that the set point, the actuator adjusts the air damper to the required position to eliminate the differences between measured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

Fig. 1.



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

Fig. 2.



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

Table 1.

Dn [mm]	Di [mm]	L [mm]	Lc [mm]	Air stream [m <sup>3</sup> /h]
125	225	265	365	90 - 445
160	260	280	380	145 - 725
200	300	300	400	225 - 1130
250	350	350	450	350 - 1770
315	415	415	515	560 - 2800
400	500	500	600	900 - 4540
500	600	600	700	1400 - 7100

### Installation guidelines

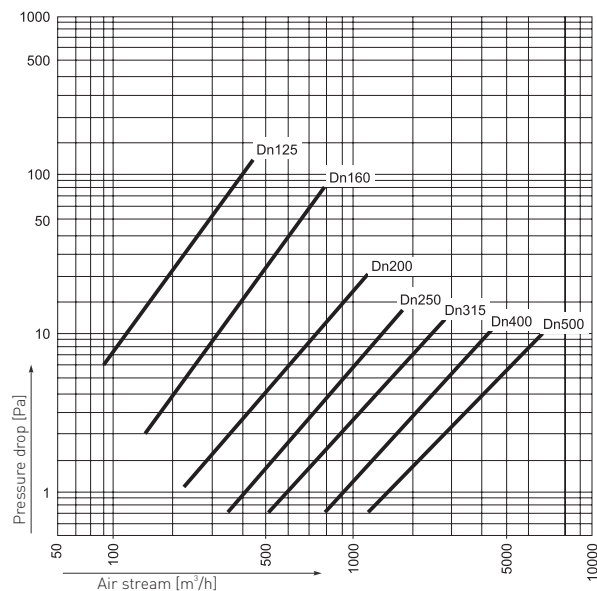
For the proper performance of the device the following rules should be maintained:

- keep the straight piece of ductwork on the regulator intake 2D
- keep the straight piece of ductwork on the regulator discharge 1D

Electrical wiring of the measuring-control-driving units should be done according to the supplied schematic with the device and it should be done by a professional.

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

Draw 1.



## Technical data

Table 2.

	Sound power level on the discharge of RVP-R 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
Dn 125	42	49	58	63	55	63	65	69	60	66	70	71
Dn 160	43	53	60	65	54	64	67	72	62	66	71	72
Dn 200	42	52	59	63	55	60	65	71	62	65	70	73
Dn 250	44	55	61	66	55	62	66	72	62	62	70	74
Dn 315	41	56	62	71	57	62	67	75	61	61	73	78
Dn 400	45	54	60	70	58	64	69	75	64	64	75	79
Dn 500	44	56	61	72	58	63	68	73	63	63	74	78

Table 3.

	Sound power level emitted by RVP-R with respect to air pressure and air velocity. Regulator without 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
Dn 125	24	29	36	43	32	38	43	51	33	39	47	53
Dn 160	24	32	38	45	33	40	44	53	41	44	48	55
Dn 200	25	31	42	48	36	44	47	52	42	46	52	54
Dn 250	30	41	44	49	39	46	47	55	48	51	54	59
Dn 315	33	46	47	53	45	51	53	55	49	56	57	59
Dn 400	36	49	50	53	48	55	56	58	54	56	61	64
Dn 500	35	50	51	53	47	55	57	59	53	55	61	63

Table 4.

	Sound power level emitted by RVP-R 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
Dn 125	20	23	31	38	30	31	36	41	29	30	36	46
Dn 160	20	25	32	40	30	32	37	44	35	38	39	44
Dn 200	22	25	34	42	29	34	39	42	33	38	40	45
Dn 250	23	30	36	44	37	39	42	47	38	42	44	48
Dn 315	23	35	39	46	40	44	46	49	44	46	47	51
Dn 400	25	39	44	50	43	48	49	50	44	51	53	54
Dn 500	25	40	44	51	44	49	50	52	44	51	54	55

**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 diameters Dn.

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:

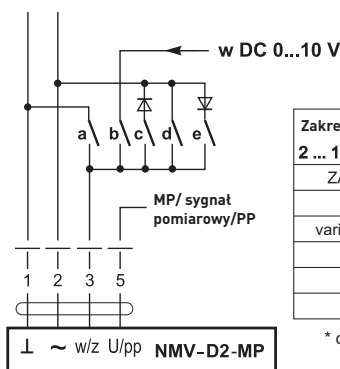
- DDC controller with the MP interface
- EIB Konnex systems
- LonWorks® systems
- with fan speed optimizer systems

### Wiring diagram

**With relay contacts**

⊥ ~ AC 24 V  
- + DC 24 V

⚠ Connecting via safety isolating transformer

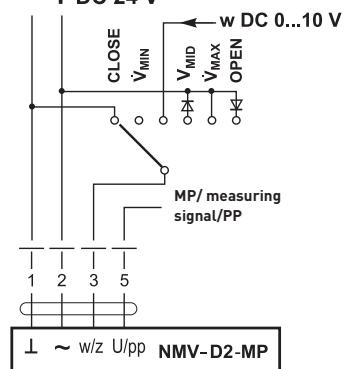


Zakres roboczy / Funkcja	a	b	c *	d	e *
2 ... 10 V ≙					
0 ... 10 V ≙					
ZAM	—	—	—	—	—
$\dot{V}_{MIN}$	—	—	—	—	—
variable $\dot{V}_{MIN} \dots \dot{V}_{MAX}$	—	—	—	—	—
$V_{MID}$	—	—	—	—	—
$\dot{V}_{MAX}$	—	—	—	—	—
OTW	—	—	—	—	—

\* only at 24V

**With rotary switch from controller**

⊥ ~ AC 24 V  
- + DC 24 V



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

## Control and driving compartment

<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 - maks.05mA - 0...10VDC - maks.05mA - Nastawialny: przepływ objętościowy lub położenie przepustnicy - maks.05mA	
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 optimiser	Optimiser Belimo COU24-A-MP	

**B) 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]	

## Control and driving compartment

- LMQ24A-SRV-ST – 4[Nm] - application for fast acting devices

<b>Technical data:</b>		
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] - application for fast acting devices

<b>Technical data:</b>		
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.



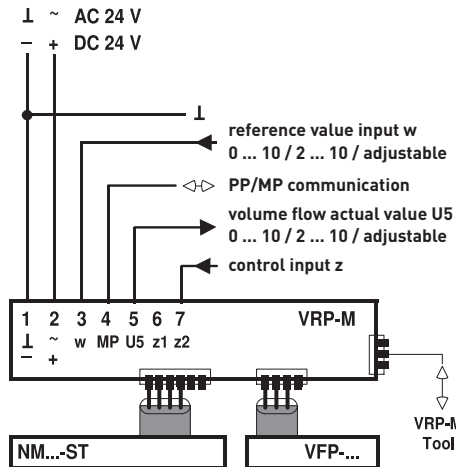
### Wiring diagram

**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-Rt-1300/1100/700-Q-MP BUS-7

**RVP-R** **I** - **D** - **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