

RPP-R

ROUND PRESSURE REGULATOR



TM **SMAY**



Specification:

Pressure regulator with a round section with an actuator for pressure control in rooms or ventilation ducts.

Table 1. Key parameters.

Key parameters	
Function	Pressure regulation
Operating range	2-600Pa
Material	Zinc-galvanized (DX51D+Z275) or stainless steel 1.4301
Operating pressure range	50-1000Pa
Air leakage class	B3 / C3
Control accuracy	10%
Operating temperature range	0-50°C

Intended use

RPP-R differential pressure regulator is intended for pressure control in airtight rooms and ventilation ducts, at the same time maintaining the set pressure difference between two zones. They should be used when the linear characteristic of pressure control is required, regardless of the volumetric flow value.

Depending on the assumed functionality, the device maintains constant or variable pressure difference, depending on the pre-calibration made by the manufacturer and on the controlling method.

Thanks to the static pressure sensor, the regulator may operate in the environment with a low and an average pollution and corrosiveness level (Corrosive Environments Classification according to ISO 12944 max. class C3). If a corrosiveness degree of the environment is not known for sure, it is recommended to pre-check the resistance of the device material and of the transducer itself to expected adverse operating conditions.

This regulator, according to PN-EN1751, has the air leakage class:

- B3 for Dn125
- C3 for Dn160-500

(B or C housing tightness, 3 partition tightness).

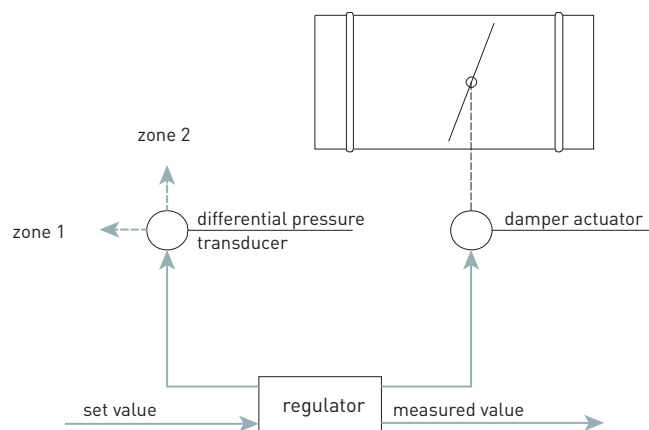


Figure 1. Operation principle.



The device parameters are set by the manufacturer at the manufacturing site and must not be modified by unauthorised personnel.



Pneumatic installation elements (measuring stab pipes, measuring hoses) are not included in the device equipment.

Dimensions

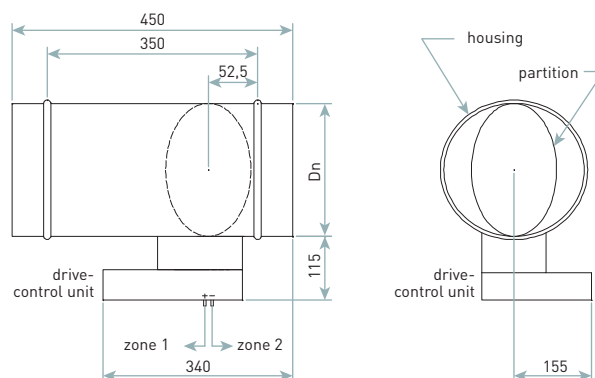


Figure 2. Pressure regulator type: RPP-R.

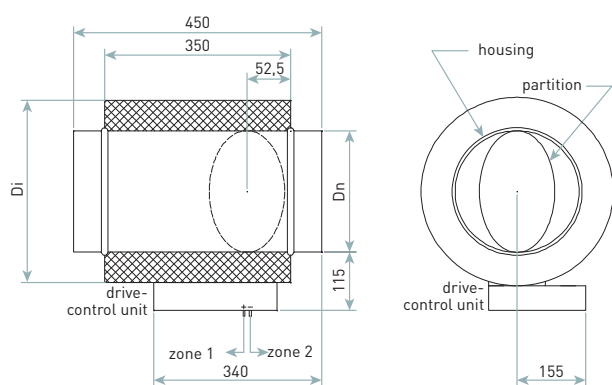


Figure 3. Pressure regulator type: RPP-Rt (with insulation).

Typical dimensions and application scope

Table 2. Typical dimensions of RPP-R.

Dn [mm]	Di [mm]	L [mm]	Lc [mm]
125	225		
160	260		
200	300		
250	350	350	450
315	415		
400	500		
500	600		

Pressure difference control, depending on the transducer installed in the device, ranges from 2 to 600 Pa. Pmin must be $\geq 50\%$ Pmax and RPP-P dimensions must ensure the air velocity does not exceed 12 m/s due to the significant increase of flow resistances and generated noise.

Mounting recommendations

In order to ensure the correct device operation, it is recommended to follow the below rules when mounting the regulators:

- mount the device so that easy access to its components is ensured;
- mount the regulator so that the damper mechanism is horizontal.



The electric connection of automatics elements should be carried out in accordance with the scheme provided in the documentation attached to the device by a qualified person.

Air control in the duct – possible configurations

Flexible impulse tubes are ended with measuring stubs which must be mounted in proper zone locations (this may be a duct and a reference room or two ducts) according to the configuration presented below. The points in which the stab pipes will be placed must be selected so that they ensure the representativeness for the entire zone and, above all, they must be free from any adverse dynamic pressure impacts.

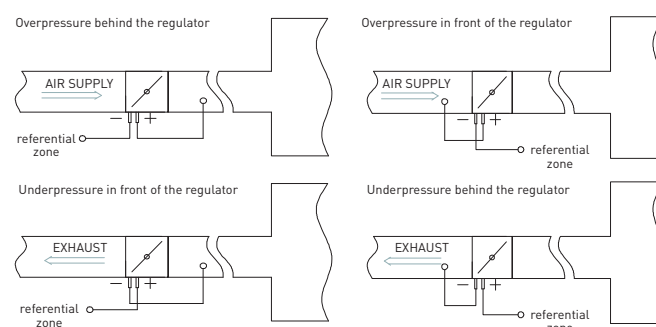


Figure 4. Pressure control in the duct.

Pressure control in the room – possible configurations

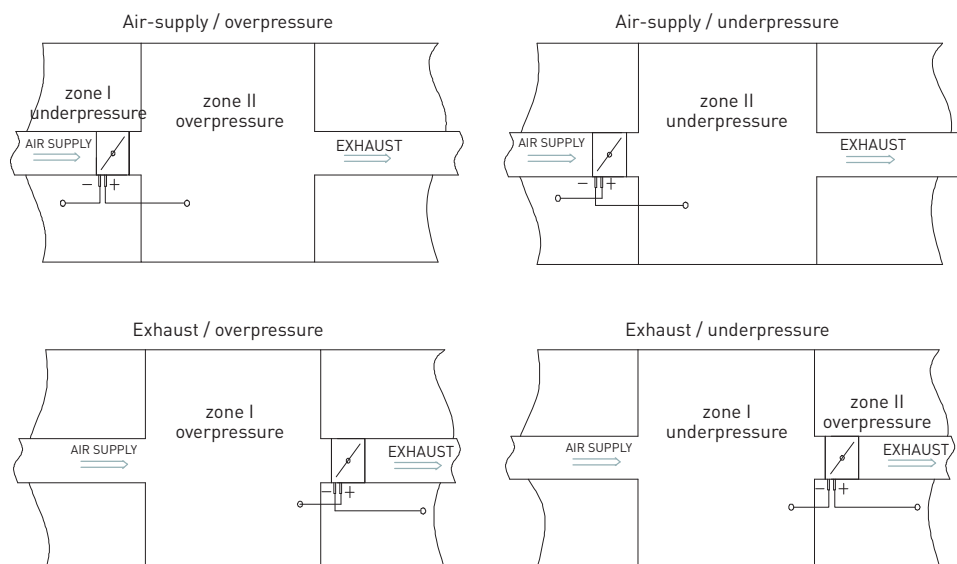


Figure 5. Pressure control in the room.

Pressure drop in RPP-R regulators (full damper opening)

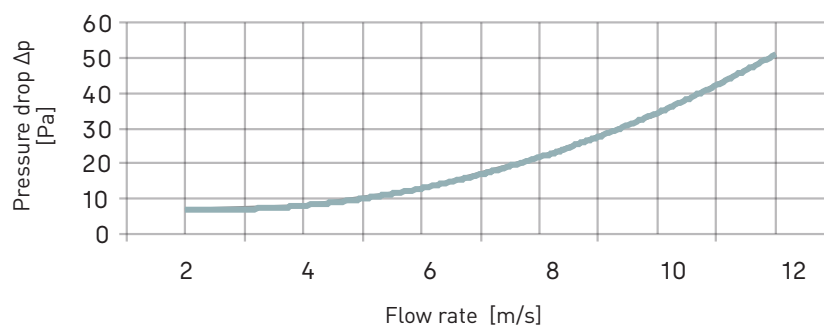


Chart 1. Pressure drop in RPP-R regulators for Dn125 and Dn160.

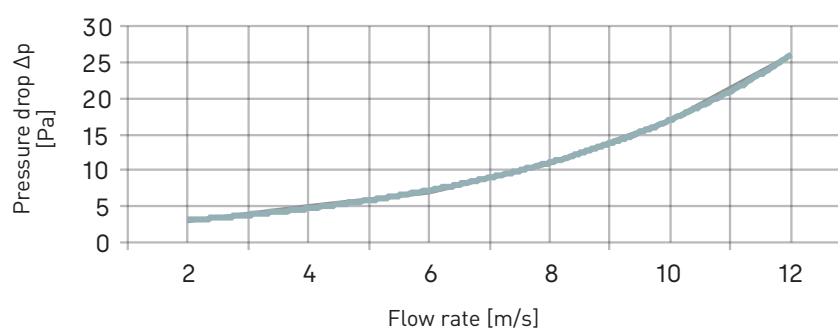


Chart 2. Pressure drop in RPP-R regulators for Dn200, Dn250 and Dn315.

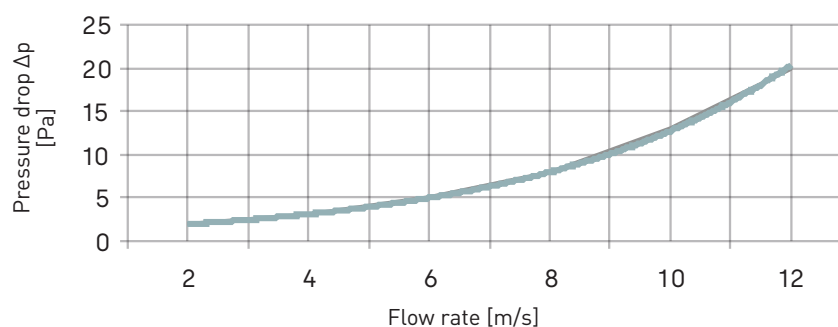


Chart 3. Pressure drop in RPP-R regulators for Dn400 and Dn500.

Sound power level

Table 3. Sound power level L_w [dB] and sound pressure level L_{pA} [dB(A)] emitted by RPP-R regulator.

RPP-R			dP=100Pa											dP=300Pa											dP=500Pa											
			Noise of the air flowing to the duct										through the housing	Noise of the air flowing to the duct										through the housing	Noise of the air flowing to the duct										through the housing	
DN [mm]	Velocity v [m/s]	Flow rate V [m³/h] V [l/s]	in frequency bands, L_w [dB]								total	without insulation	with insulation	in frequency bands, L_w [dB]								total	without insulation	with insulation	in frequency bands, L_w [dB]								total	without insulation	with insulation	
			63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	L_{pA} [dB(A)]	L_{pA} [dB(A)]	L_{pA} [dB(A)]	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	L_{pA} [dB(A)]	L_{pA} [dB(A)]	L_{pA} [dB(A)]	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	L_{pA} [dB(A)]	L_{pA} [dB(A)]	L_{pA} [dB(A)]	
125	2	88	25	43	41	42	39	33	32	27	23	32	26	<20	52	50	51	47	39	48	46	41	45	40	24	55	55	55	51	42	55	55	49	52	47	30
	4	177	49	52	51	51	48	41	42	36	31	41	32	<20	60	59	58	55	49	52	50	46	50	44	27	63	62	62	58	53	57	57	52	55	49	32
	6	265	74	57	57	56	53	44	47	42	36	46	36	22	65	64	63	59	51	54	53	48	54	46	31	68	67	66	62	55	57	58	54	57	51	35
	8	353	98	60	61	60	57	51	51	46	39	51	38	23	68	67	66	62	56	55	54	50	56	47	32	72	70	69	64	59	58	58	55	59	52	36
	10	442	123	63	64	62	60	53	54	49	42	54	40	24	71	70	68	65	58	57	56	52	58	48	33	75	72	71	67	60	58	59	56	61	53	37
	12	530	147	65	67	65	63	55	56	51	44	56	42	25	73	72	70	68	60	58	57	53	61	49	34	77	74	73	70	62	59	59	57	63	53	39
160	2	145	40	44	43	43	39	34	34	28	24	33	27	<20	52	53	52	47	40	49	47	43	46	41	24	56	57	56	51	43	56	55	51	53	48	31
	4	289	80	53	52	52	48	41	43	38	33	42	33	<20	60	60	59	55	50	52	51	47	51	44	28	64	64	63	58	53	57	57	54	56	50	32
	6	434	121	59	58	57	54	51	48	43	38	48	36	22	67	65	64	60	52	54	53	50	54	46	31	70	68	67	62	55	57	58	55	58	51	36
	8	579	161	63	62	61	58	51	52	47	41	52	39	24	71	68	67	62	56	56	55	51	57	48	33	74	71	70	64	58	58	58	56	59	52	37
	10	723	201	66	65	63	62	54	55	50	44	55	40	25	74	71	69	65	58	57	56	53	59	49	34	78	73	72	67	61	58	59	57	61	53	38
	12	868	241	68	68	66	64	56	58	54	46	57	42	26	77	73	71	68	60	59	58	54	61	50	35	81	75	74	70	62	60	60	57	63	54	40
200	2	226	63	45	44	44	40	34	35	30	25	34	28	<20	53	54	53	48	41	49	47	44	46	41	25	56	59	57	52	43	56	56	53	53	48	31
	4	452	126	55	53	52	49	42	44	39	34	43	33	<20	61	62	60	55	51	53	51	48	52	44	28	64	66	63	58	55	57	57	55	56	50	33
	6	678	188	61	59	58	55	44	49	44	39	48	37	22	68	66	64	60	52	55	54	51	55	46	32	72	70	67	62	56	57	58	56	58	51	36
	8	904	251	65	63	61	59	52	53	48	43	52	39	24	73	69	67	63	57	56	55	52	57	48	33	77	72	70	64	59	58	58	57	60	52	37
	10	1130	314	68	66	64	63	55	56	51	45	56	41	26	77	72	70	65	59	57	56	53	60	49	35	81	74	72	67	61	58	59	57	62	53	39
	12	1356	377	71	68	67	66	57	59	53	48	58	42	27	80	74	72	69	60	60	58	54	62	50	36	84	76	74	70	62	60	60	58	64	54	40
250	2	353	98	46	46	44	40	35	36	31	27	35	29	<20	53	56	53	48	41	50	48	46	47	42	25	56	61	58	52	44	56	56	55	54	48	31
	4	707	196	57	55	53	49	43	45	40	35	44	34	<20	62	63	61	55	51	53	52	50	52	45	28	64	67	64	58	55	57	57	56	56	50	33
	6	1060	294	63	60	59	56	45	50	45	40	49	37	23	70	67	65	60	52	55	54	52	55	47	33	73	71	68	62	56	58	58	57	58	52	37
	8	1413	393	67	63	62	60	52	54	49	44	53	39	25	75	70	68	63	56	57	56	53	58	48	34	79	74	71	64	58	58	58	57	60	53	38
	10	1766	491	71	66	65	64	56	57	52	47	57	41	27	80	73	70	66	59	58	57	54	60	49	36	84	76	73	67	61	58	59	58	62	54	40
	12	2120	589	74	68	68	67	58	60	55	49	59	43	29	83	74	72	69	61	61	58	55	63	50	37	88	77	75	70	62	61	60	58	64	54	42
315	2	561	156	47	48	45	41	36	37	32	28	36	30	<20	54	58	54	48	42	50	49	48	48	43	26	57	63	58	52	45	56	57	57	55	49	32
	4	1122	312	58	56	54	50	44	46	41	37	45	35	20	63	65	62	56	51	54	52	51	53	45	29	65	69	65	58	55	57	58	57	57	50	34
	6	1682	467	65	61	59	57	46	51	47	42	50	38	24	72	69	66	61	53	56	54	53	56	47	34	75	73	69	63	56	58	58	58	59	52	39
	8	2243	623	70	64	63	61	52	55	50	46	54	40	26	78	71	69	64	57	57	56	54	58	49	36	82	75	71	65	59	58	58	58	61	53	40
	10	2804	779	73	67	66	65	57	58	53	48	58	42	28	83	74	71	66	60	58	57	55	61	50	38	87	77	74	68	61	58	59	58	63	54	42
	12	3365	935	76	69	69	68	58	61	56	51	61	43	30	87	75	73	70	61	61	59	56	63	51	39	92	78	75	70	63	62	60	58	65	55	44
400	2	904	251	48	50	46	42	38	38	34	29	37	31	<20	54	60	55	49	44	51	50	50	49	43	27	57	65	59	53	47	57	57	59	55	49	33
	4	1809	502	60	57	55	50	47	47	43	38	46	35	21	63	67	62	56	53	54	53	52	54	46	30	65	71	66	58	55	57	58	59	58	51	35
	6	2713	754	67	62	60	57	47	52	48	43	51	38	24	73	70	67	61	54	56	55	54	57	48	36	76	74	69	63	57	58	58	59	59	53	41
	8	3617	1005	72	65	64	62	56	56	51	47	56	40	28	80	73	70	64	58	57	56	55	59	49	38	84	76	72	65	59	58	59	59	61	54	42
	10	4522	1256	76	67	67	66	58	59	54	50	59	42	30	86	75	72	67	60	59	57	56	62	51	40	91	78	74	68	62	59	59	58	64	55	44
	12	5426	1507	79	69	70	69	60	62	57	53	62	44	32	90	76	74	71	62	63	59	56	64	52	42	96	79	76	71	63	63	60	58	67	56	46
500	2	1413	393	49	51	46	42	38	39	35	30	38	32	<20	55	62	56	49	45	51	51	51	50	44	28	58	67	60	53	48	57	58	61	56	49	33
	4	2826	785	61	58	56	51	47	48	44	39	46	36	21	64	68	63	56	53	54	54	54	54	46	31	65	72	66	59	56	58	58	60	58	51	36
	6	4239	1178	69	62	61	58	48	53	49	45	52	39	25	75	71	67	61	54	56	55	55	57	49	37	78	75	70	63	57	58	58	59	60	53	43
	8	5652	1570	74	65	65	63	56	57	53	49	57	41	29	83	74	70	65	59	58	57	56	60	50	39	87	78	73	65	60	58	59				

Control-drive system

The control-drive system of the pressure regulator consisting of a digital PID VAV regulator (VRU- M1-BAC or VRU-M1R-BAC) with the integrated static sensor of differential pressure and actuator made by BELIMO. This is a solution which, apart from adjusting the pressure between two zones, is also applied in:

- VAV and CAV systems with flow independent from pressure, e.g. in laboratories;
- in fast VAV and CAV systems e.g. in fermentation chambers;
- in slightly contaminated and aggressive environments (according to Corrosive Environments Classification in accordance with ISO 12944 max. class C3).

Regulators are manufactured in two variants:

Standard version – RPP-R standard version (with the full damper running time equalling 150 seconds), used actuator: NM24A-VST* – 10[Nm]

Special performance – fast RPP-R-Q version (with the full damper running time equalling 3s, used actuator (depending on the size of the regulator):

Table 4. The technical data of actuators.

Technical data		Standard performance	Fast performance	
		NM24A-VST	LMQ24A-VST	NMQ24A-VST
Nominal voltage		24V with reg. VRU		
Power consumption	Operation	2 [W]	13 [W]	13 [W]
	At standby	1,25 [W]	1,5 [W]	1,5 [W]
	Nominal power	4 [VA]	23 [VA]	23 [VA]
Torque		10 [Nm]	4 [Nm]	8 [Nm]
Running time from 0 to 100%		150 s.	2,5 s.	4 s.

More technical data are provided in the catalogue sheets of respective actuators or in the complete catalogue sheet.

RPP-R - Pressure regulator

When placing an order, provide information according to the below pattern:

RPP-R <I> - <D> - <P_{MAX}> / <P_{MIN}> - <Ts> - <K> - <N>

Where:

I	insulation*	none - non-insulated t - insulated
D	diameter [mm]	
P_{MAX}	maximum set pressure difference [Pa]	
P_{MIN}	minimum set pressure difference [Pa]	
Ts	actuator*	none - standard Q - fast
K	communication*	none - 2...10[V] 1 - 0...10[V] MP BUS - total value MP BUS MOD - Modbus BAC - BACnet
N	system regulator number (only for communication MP BUS or Modbus)	from 1 to 8 - the range of numbers for MP BUS communication from 1 to 32 - the range of numbers for Modbus

*Optional values - if they are missing, default values are applied

Exemplary product marking method:

RPP-Rt-200-30/20-Q-MP BUS-7

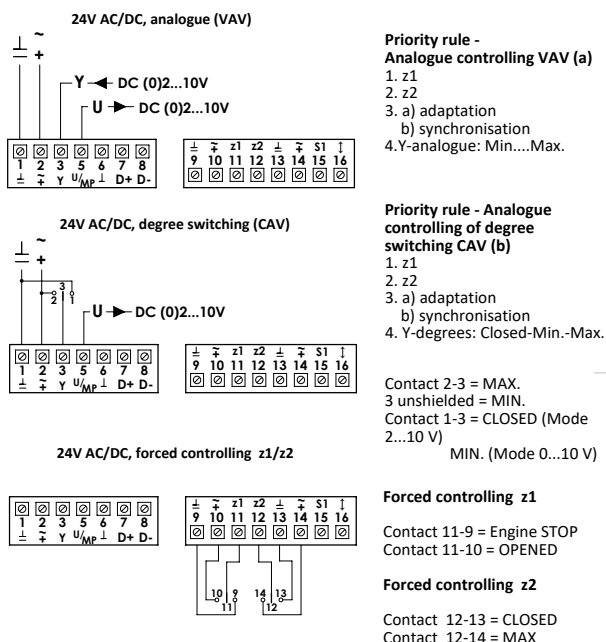


Diagram 1. Diagram of VRU regulator connection.

- Power supply must be connected through the safety transformer!

- In order to enable the performance of diagnostic and service works by means of PC-Tool software, wires 1, 2 (24V AC/DC) and 5 (signal U5) must be supplied to accessible terminal blocks (switching station, control cabinet, etc.)

The drive-control system is connected through wires by the manufacturer; the purchaser is obliged to supply power to the regulator and possibly controls.