

RVP-R-SL

VAV ROUND VARIABLE FLOW REGULATOR FOR SMAYLAB SYSTEMS



Description:

VAV variable flow regulator with round cross-section, operating from 1 m/s and equipped with the actuator and metering panel. Specifically for the SmayLab system.

Table 1. Essential parameters.

Essential parameters	
Function	VAV
Operating range	1–8 m/s or 2–12 m/s (details in Table 2)
Material	Galvanised (DX51D+Z275) or stainless steel 1.4301
Operating pressure range	50-1000Pa
Air tightness class	B3/C3
Control precision	10%
Operating temperature range	0–50 °C

Intended Use

VAV regulators are used for the automatic control of airflow in ventilation systems in laboratories and clean rooms covered by the SmayLab system. RVP-R-SL regulators can be made in two versions that differ in operating speed. For the standard version the shift time of the regulator damper is 150 seconds, while for the fast version it is only 3 seconds.

Design

The housing and shutter of the regulator damper are made of galvanised steel sheet or, if a special order, of 1.4301 stainless steel. The damper baffle is equipped with a rubber seal, which ensures air tightness when the shutter is fully closed. The regulator, in accordance with PN-EN1751, meets the requirements of B3 (for Dn 100–125 mm) or C3 (for Dn 160–500 mm) air tightness class. Optionally, the RVP-R-SL are fitted with thermal and noise insulation – RVP-Rt-SL.

Dimensions

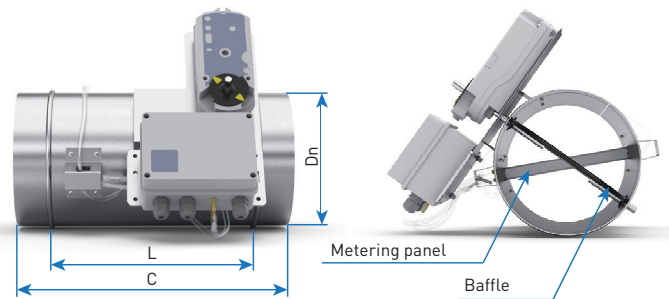


Figure 2. VAV air flow regulator, type: RVP-R-SL.

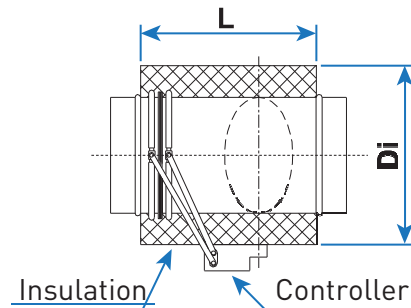


Figure 3. VAV air flow regulator, type: RVP-R-SL (with insulation).

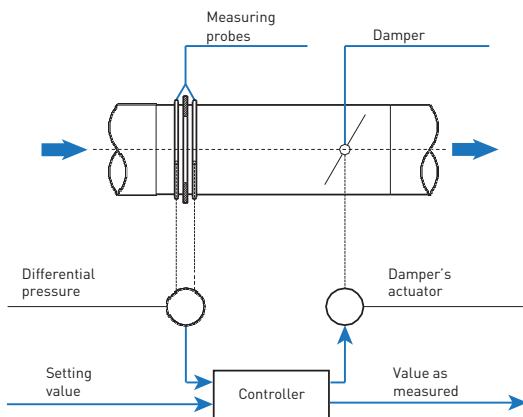
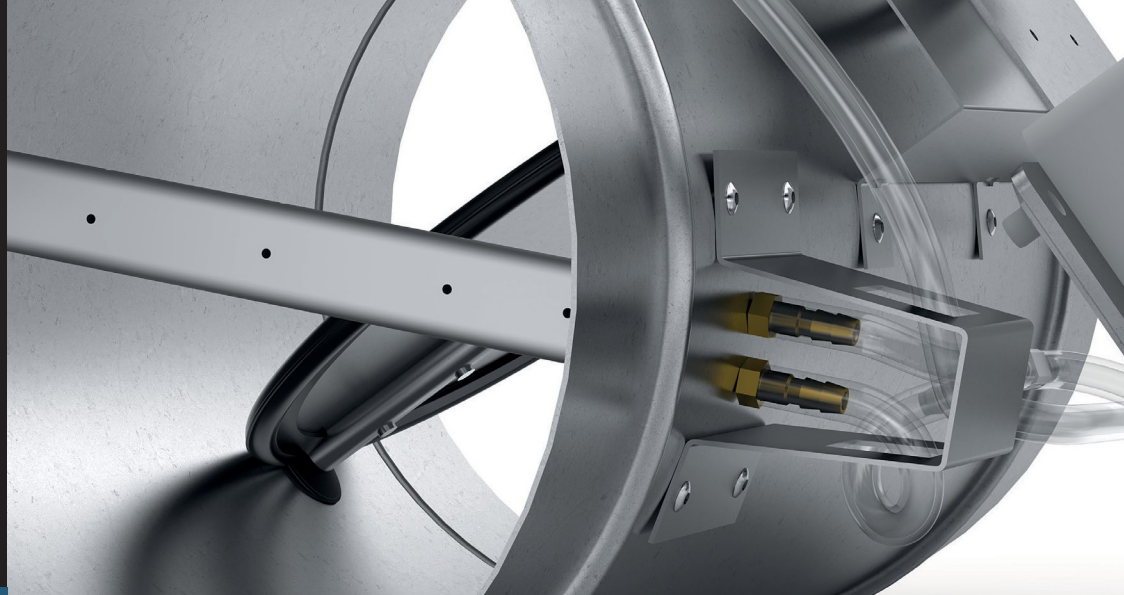


Figure 1. VAV scheme of operation.

Typical Dimensions and Application Range

Table 2. Typical dimensions and application range.

Dn [mm]	Di [mm]	L [mm]	Lc [mm]	Operating range Vmin-Vmax [m³/h], range 1	Operating range Vmin-Vmax [m³/h], range 2
100	200	265	365	28–226	55–339
125	225	265	365	44–353	90–530
160	260	280	380	72–579	145–869
200	300	300	400	113–905	225–1357
250	350	350	450	177–1414	350–2121
315	415	415	515	281–2244	560–3367
400	500	500	600	452–3619	900–3619
500	600	600	700	707–5655	1400–8482



Installation Recommendations

To ensure proper operation of the device, please observe the following rules when installing the regulators:

- Straight section length before the regulator 2D
- Straight section length after the regulator 1D.
- If a differential pressure static sensor is being used, the only permitted way of installation is such that the plane where the sensor is attached is positioned vertically.

The electrical connection of the measurement, control and actuating unit should be made in accordance with the diagram included in the documentation enclosed with the device by a properly qualified person.

Pressure Drop

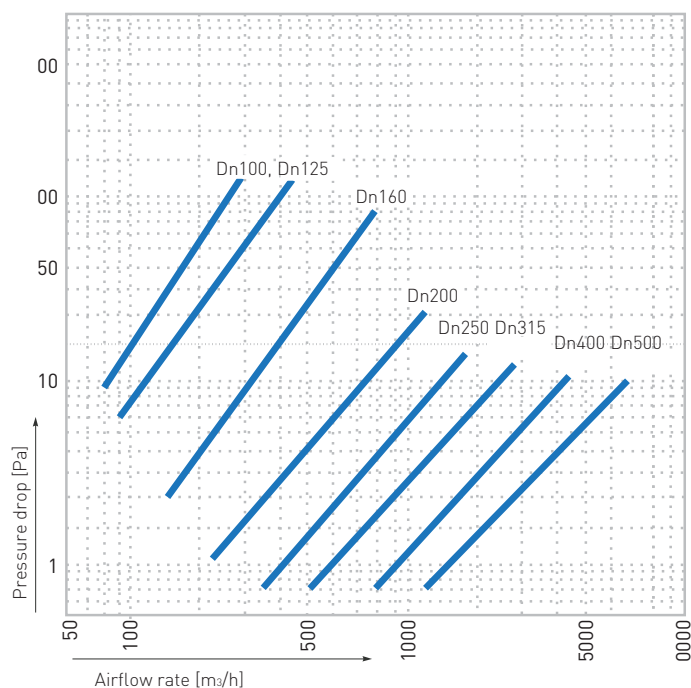


Chart 1. Pressure drop in RVP-R-SL regulator when the control damper is fully open.

RVP-R-SL regulators have undergone and passed analytical tests for the arrangement of the measuring elements to reduce calibration error margin of the airflow rate that is being controlled. This has been the basis for the master's thesis defended in 2005, at the AGH University of Science and Technology in Krakow, Poland.



The airflow settings are set at the factory by the manufacturer and may not be modified by any unauthorised personnel.

Technical Data

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

RVP-R-SL			dP = 100 Pa											dP = 300 Pa						dP = 500 Pa																
			Noise emitted by the flow into the duct											Through the housing			Noise emitted by the flow into the duct						Through the housing			Noise emitted by the flow into the duct									Through the housing	
DN [mm]	Airflow V [m³/s]	Rate V [m³/h] V [l/s]	In frequency bands, L_w [dB]								Total L_{pA} [dB(A)]	w/o insul. L_{pA} [dB(A)]	w. insul. L_{pA} [dB(A)]	In frequency bands, L_w [dB]								Total L_{pA} [dB(A)]	w/o insul. L_{pA} [dB(A)]	w. insul. L_{pA} [dB(A)]	In frequency bands, L_w [dB]								Total L_{pA} [dB(A)]	w/o insul. L_{pA} [dB(A)]	w. insul. L_{pA} [dB(A)]	
			63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz				63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz				63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz				
100	2	57	16	43	39	41	38	32	31	26	22	32	26	<20	51	49	50	47	38	48	45	39	44	40	23	56	53	54	51	41	55	54	47	52	47	30
	4	113	31	50	50	50	47	41	41	35	30	41	32	<20	59	57	58	54	49	51	50	44	50	43	26	63	61	61	58	53	56	56	51	55	49	31
	6	170	47	55	56	55	53	43	46	41	35	46	35	21	63	62	62	59	51	54	52	47	53	45	31	67	65	65	62	55	57	57	53	57	50	35
	8	226	63	58	60	59	56	51	50	45	38	50	38	22	66	66	65	61	56	55	54	49	56	47	31	69	68	68	64	59	57	58	55	59	51	36
	10	283	79	61	64	61	59	53	53	48	41	53	40	23	68	69	68	64	58	56	55	51	58	48	32	71	71	71	67	60	58	59	56	61	52	37
	12	339	94	63	67	64	62	55	55	50	43	55	41	24	70	71	70	67	59	58	56	52	60	49	33	73	73	73	69	61	59	59	57	62	53	38
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	5		

the room and ceiling attenuation for a reference room, which has been assumed to be 8 dB.

The actual parameters may vary, depending on the conditions.

For the sound performance data for other pressures and flow rates, including the sound power level in individual frequency bands, please contact the SMAY engineering department.

Regulation and Actuating System

This unit is controlled by the SmayLab system controller.

The regulators are manufactured in two versions.

A) Standard automation design – a standard version of RVP-P-SL.

(with the total shift time of the shutter equal to 150 seconds) and is used for local exhaust systems, exhaust arms, etc.

VAV – Compact

In this version, the regulation and actuating system of the device consists of the differential pressure dynamic sensor, actuator and damper drive. It constitutes a compact unit with the designation GDB181.1E and is mounted to the RVP regulator depending on the nominal diameter Dn.

B) High-speed automation design – a standard version of the RVP-P-SL (with the total shift time of the shutter equal to 3 seconds) and is used for air supply, air exhaust and fume ventilation hoods.

In this version, the regulation and actuating system of the device consists of a differential pressure static sensor with an actuator with the designation GAP191.1E. All the components are mounted to the RVP regulator depending on the nominal diameter Dn.



The electrical connections of the units should be made in accordance with the automation diagram included in the documentation of the designed system by a properly qualified person.

Table 4. Actuator technical data.

Technical Data		GDB 181.1E	GAP 191.1E
		Nominal voltage	24 V AC, 50/60 Hz
Power consumption	Duty	2.5 [W]	22 [W]
	Idle	0.5 [W]	5 [W]
	Rated power	3 [VA]	22 [W]
Torque		5 [Nm] (10 [Nm])	6 [Nm]
Run time from 0 to 100%		150 secs	2 secs
Connection diagram		SmayLab diagram	SmayLab diagram

Additional technical data is provided in the data sheets of individual actuators and in the full data sheet.

RVP-R-SL – VAV Round Variable Flow Regulator for SmayLab Systems

When ordering, please provide information as follows:

RVP-R <X> - <I> - SL - <D> - <V_{MAX}> / <V_{MIN}> - <Ts> - <Z> - <P>

Where:

X	Measuring element*
	L – Metering panel
I	Insulation*
	None – non-insulated
	t – Acoustic insulation
D	Diameter [mm]
V_{MAX}	Maximum airflow rate [m ³ /h]
V_{MIN}	Minimum airflow rate [m ³ /h]
Ts	Actuator* (in the case of controllers for fume hoods it is possible to order a controller with a GAP191.1E actuator only)
	GAP – GAP191.1E (actuator 3s), QBM-3460-1 (pressure transmitter)
	GDB – GDB181.1E (actuator 150s)

Z	Application
	N – Air supply
	W – Exhaust
	O – Local exhaust system
	D – Fume hood
P	Material*
	None – Galvanised steel
	SN – Stainless steel

*Optional values – if blank, default values will be used.

Example product marking: **RVP-RLt-SL-250-1450/420-GAP-O-SN**