

RVT-R-EX

VAV ROUND VARIABLE FLOW REGULATOR MADE OF PLASTIC, ANTI-EXPLOSION VERSION



Specification:

VAV regulator operating from the flow rate of 1 m/s, equipped with an actuator and Venturi tube. Made of PPs, suitable for use in aggressive environment for explosion hazard zones (EX).

Table 1. Key parameters.

Key parameters	
Function	VAV-EX
Operating range	approx. 1-10 m/s (see Table 4)
Material	PPs
Operating pressure range	50(60)-1000Pa
Air leakage class	B1 / B2
Control accuracy	10%
Operating temperatures range	0-50°C

Intended use

VAV regulators are used for the automatic control of airflow volume in the ventilation installations where aggressive chemical compounds may occur. RVT-R-Ex devices ensure high safety level and are intended for locations where explosive atmospheres are likely to occur. RVT-R-Ex regulators are designed in accordance with ATEX 2014/34/EU as devices from group II category 2 intended for use in explosion hazard zones 1, 2. The manufacturer's ATEX Certificate is available for electric components.

ATEX characteristic:  II 2G Ex h IIC T6,T5 Gb

Performance

Housing, measuring element and regulation damper shutter are made of thermoplastic, nonconductive polypropylene PPs-el with resistance lower than 10^5 Ohm. This regulator, according to PN-EN1751, has the air leakage B1 (for Dn125 mm) or B2 (for Dn160-500 mm).

Operation principle

The control-drive system of the flow regulator is an integrated control-drive unit or an assembly consisting of a differential pressure static sensor, PID digital regulator and actuator. The operating rule is based on the measurement of the air stream flowing through the regulator. In RVT-R-Ex regulators, Venturi tube is used as an accumulating-measuring element, according to DIN EN ISO 5167-1, what guarantees a high precision level of measurement. Stab pipes for pressure measurement are placed on its both sides. During the air flowing through the measuring element, on its both sides, pressure difference is generated depending on the flow stream. The signal from accumulating elements is transmitted to the pressure sensor by means of flexible impulse tubes. A pressure value on the accumulating element is transmitted to the regulator in which it is converted to the flow value and compared with the set value. If the measured value differs from the set value, the regulation shutter actuator sets it to the position excluding the difference between the measured value and the set value.

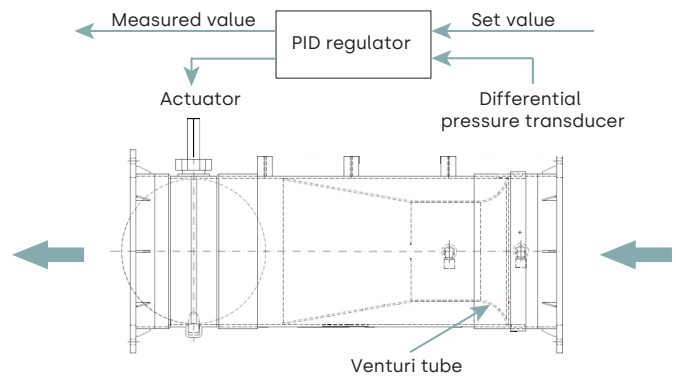


Figure 1. Diagram of RVT-R-Ex regulator operation.



The flow parameters are set by the manufacturer and they must not be modified by unauthorised personnel.

Dimensions

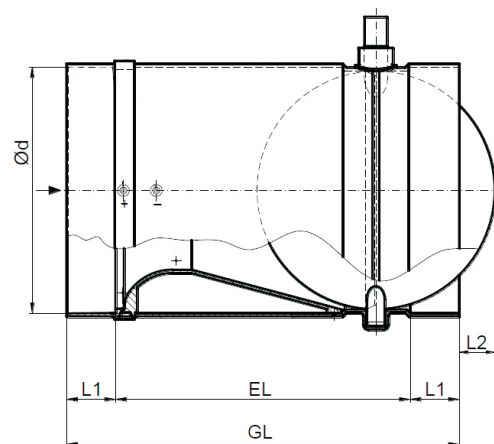


Figure 2. VAV RVT-R-Ex regulator without a mounting flange.

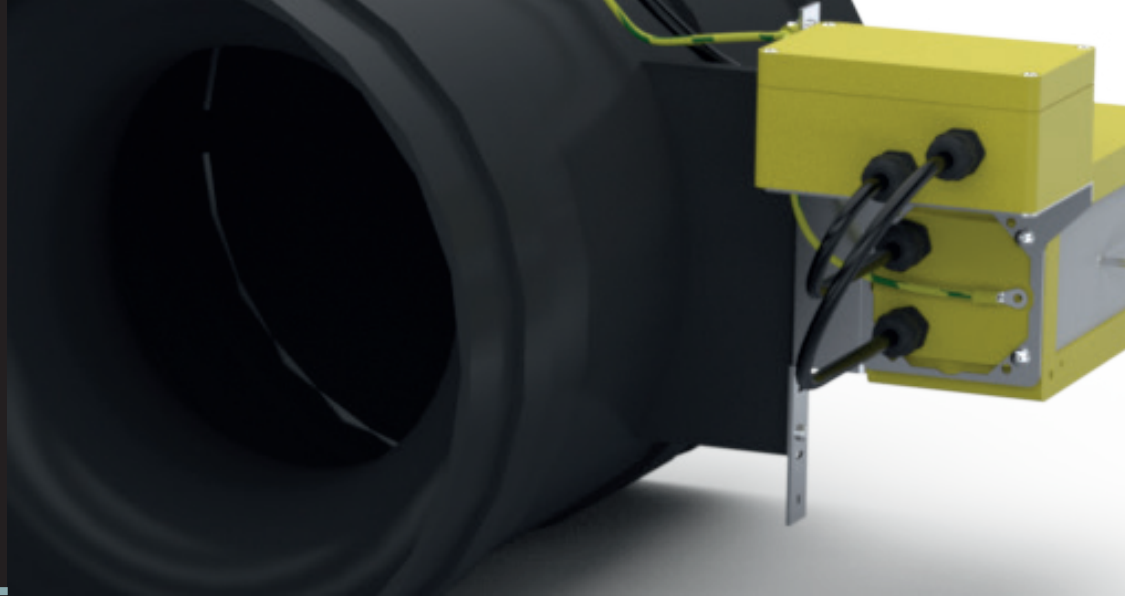
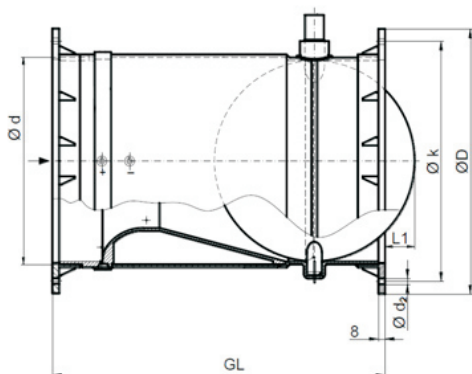


Table 2. Characteristic dimensions.

DN	Ød	EL	GL	L1	L2
125	126	320	400	40	73
160	161	230	310	40	0
200	201	250	340	50	11
250	251	300	400	50	36
315	316	390	490	50	68
400	401	1100	1200	50	200
500	501	1400	1540	70	280



Rysunek 3. VAV RVT-R-EX regulator with a mounting flange.

Table 3. Characteristic dimensions.

DN	Ød	ØD	GL	L1	Ød ₂ / quantity	Øk
125	125	185	400	107	7/8	165
160	160	230	310	0	7/8	200
200	200	270	350	11	7/8	240
250	250	320	400	36	7/12	290
315	315	395	490	58	9/12	350
400	400	480	1250	260	9/16	445
500	500	580	1400	260	9/20	545

Typical dimensions and application scope

Table 4. Nominal diameters and application scope.

DN	V _{min} [m ³ /h]	V _{max} [m ³ /h]
125	60	442
160	85	690
200	110	950
250	195	1766
315	310	2804
400	585	4522
500	710	7065

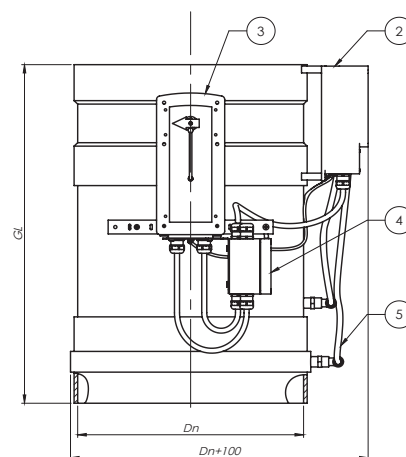
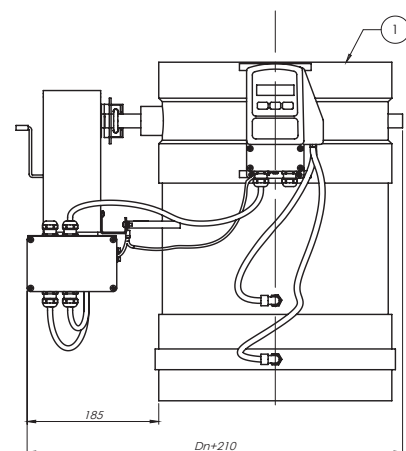


Figure 4. Diagram of RVT-R-Ex regulator design: 1. Regulator body; 2. ExReg-V300A regulator or ExCos-P250 pressure transducer; 3. ExMax-5.10-Y or ExMax-5.10-YC actuator; 4. ExBox-Y/S; 5 electric box. PVC 5x8 impulse tube.

RVT-R regulator must be mounted according to the air flow direction marked with an arrow on the device casing. In order to ensure the correct device operation, it is recommended to follow the below rules when mounting the modules:

- Straight section before the regulator – 4D ,
- Straight section behind the regulator – 1D,
- If a static sensor of differential pressure is used, it is only permissible to mount the sensor in such a way that the plane to which the sensor is mounted is vertical.



The electric connection of the measurement-control-execution unit should be carried out in accordance with the scheme provided in the documentation attached to the device by a qualified person.

Pressure drop

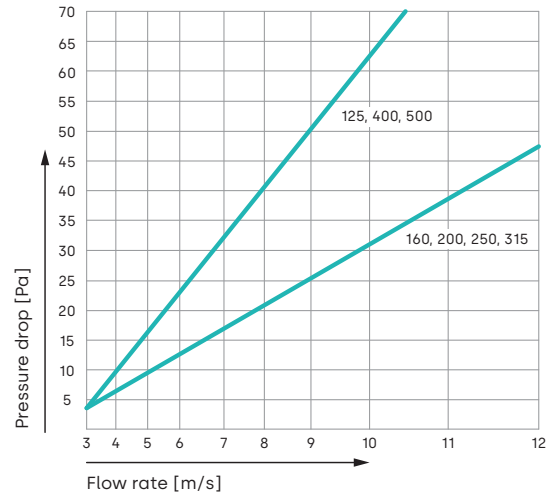


Chart 1. Nomogram of pressure drop in RVT-R-Ex regulator (full damper opening).

Table 5. Sound power level L_w [dB] and sound pressure level L_{pa} [dB(A)] emitted by RVT-R-EX regulator.

RVT-R-EX			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]	Flow.	Rate	in frequency bands, L_w [dB]								total	without insulation	in frequency bands, L_w [dB]								total	without insulation	in frequency bands, L_w [dB]								total	without insulation			
	v [m/s]	V [m³/h]	V [l/s]	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	L_{pa} [dB(A)]	L_{pa} [dB(A)]	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	L_{pa} [dB(A)]	L_{pa} [dB(A)]	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	L_{pa} [dB(A)]	L_{pa} [dB(A)]		
125	2	88	25	43	43	45	48	46	43	35	30	42	25	49	48	51	53	54	56	54	46	53	36	52	51	54	55	58	62	63	64	63	54	60	41
	4	177	49	47	47	49	52	48	45	39	33	45	28	54	54	56	58	58	57	55	49	55	38	57	57	59	61	62	63	62	56	61	43		
	6	265	74	50	50	51	54	50	46	41	35	47	29	56	57	58	61	59	58	55	49	57	39	59	60	62	64	64	64	61	55	61	44		
	8	353	98	52	52	52	56	51	47	42	36	48	30	58	59	60	63	61	59	55	49	58	40	61	63	64	66	65	64	60	55	62	44		
	10	442	123	53	53	53	57	52	48	43	37	49	31	60	61	62	65	62	59	55	50	59	40	62	65	65	68	66	65	60	55	63	45		
160	2	145	40	45	46	47	49	47	45	35	31	43	27	52	53	54	55	56	57	55	47	54	38	55	57	57	58	60	62	64	54	60	43		
	4	289	80	50	51	51	53	50	47	40	34	47	30	57	59	59	60	59	58	56	49	56	40	61	62	62	63	63	63	63	56	61	45		
	6	434	121	53	53	53	56	52	48	43	37	49	32	60	62	62	63	61	59	56	50	58	42	64	66	65	66	65	64	62	56	62	47		
	8	579	161	55	55	55	58	53	48	45	38	50	33	63	64	63	65	62	59	56	51	59	43	66	68	67	68	66	65	61	56	63	48		
	10	723	201	57	56	56	59	54	49	46	39	51	34	64	66	65	66	63	60	56	51	60	44	68	70	69	69	67	65	60	56	64	49		
200	2	226	63	46	50	49	49	48	47	36	31	45	29	54	58	57	56	58	58	55	48	55	40	57	61	61	60	62	63	64	55	61	45		
	4	452	126	52	54	53	54	51	48	41	35	48	32	60	63	62	61	60	59	56	50	57	43	64	67	66	64	65	64	63	57	62	48		
	6	678	188	55	56	56	57	53	49	44	38	50	34	64	66	65	64	62	59	57	51	59	45	68	71	69	67	66	64	62	57	63	50		
	8	904	251	58	58	57	59	54	49	47	40	52	35	67	68	66	66	63	60	57	52	60	46	71	73	71	69	67	65	61	57	64	51		
	10	1130	314	60	59	58	61	55	50	48	41	53	37	69	70	68	68	64	60	57	52	61	47	73	75	72	71	68	65	61	57	65	52		
250	2	353	98	48	53	51	50	50	48	36	32	46	31	56	62	60	58	59	58	56	48	56	42	60	66	64	62	63	63	65	56	62	48		
	4	707	196	54	57	55	55	53	49	43	36	49	34	64	67	65	63	62	59	57	51	59	46	68	72	69	66	66	64	64	58	63	51		
	6	1060	294	58	60	58	59	54	50	46	39	52	37	68	70	67	65	63	60	57	52	60	48	73	75	72	69	67	65	63	58	65	53		
	8	1413	393	61	61	60	61	56	50	49	41	53	38	71	73	69	67	64	60	58	53	62	49	76	78	74	70	68	65	62	58	66	55		
	10	1766	491	63	62	61	63	57	51	51	43	55	39	73	74	71	69	65	61	58	53	63	51	78	80	76	72	69	66	61	58	67	56		
315	2	561	156	50	57	53	51	51	50	37	32	47	33	59	67	63	60	61	59	56	49	57	45	63	71	67	64	65	63	65	56	63	50		
	4	1122	312	57	61	58	57	54	51	44	37	51	37	67	72	68	64	63	60	58	52	60	49	72	77	72	68	67	64	64	59	65	54		
	6	1682	467	61	63	60	60	56	51	48	41	53	39	72	75	71	67	64	61	58	53	62	51	77	80	75	70	68	65	63	59	66	57		
	8	2243	623	63	64	62	63	57	51	51	43	55	41	75	77	73	69	66	61	59	54	63	53	81	83	77	72	69	65	62	59	67	59		
	10	2804	779	66	66	64	64	58	52	53	45	57	43	78	79	74	70	66	61	59	55	64	55	84	85	79	73	70	66	62	59	69	61		
400	2	904	251	52	60	55	52	52	52	37	33	49	35	61	71	66	61	62	60	56	49	59	47	65	76	71	66	67	63	65	57	64	53		
	4	1809	502	59	64	60	58	56	52	45	38	52	40	70	76	71	66	65	61	59	53	62	52	76	82	76	69	69	65	65	59	67	58		
	6	2713	754	63	66	63	62	57	52	50	42	55	42	76	79	74	68	66	61	59	54	64	55	82	86	79	72	70	65	64	60	68	61		
	8	3617	1005	66	68	65	64	59	52	53	45	57	44	80	82	76	70	67	62	60	55	65	57	86	88	81	73	70	66	63	60	70	63		
	10	4522	1256	69	69	66	66	60	53	55	47	59	46	83	83	77	72	67	62	60	56	67	59	89	90	82	74	71	66	62	60	71	65		

Sound pressure level takes into account the attenuation of the room and ceiling for a model room accepted at the level of 8 dB. The actual parameters may differ depending on the conditions.

Acoustic data for other pressure and air flow values, including sound power level in respective frequency bands, are available in the design department of SMAY.

Control-drive system

This unit has the following control possibilities:

- **Control – continuous setting:** 2...10, 0...10 [V] – the regulator controls the air flow in the line between the set values V_{min} , V_{max} , depending on the continuous leading signal, in the range of the programmed control voltage (0...10, 2...10 [V]);
- **Control – forced setting:**
 - “Close” – the damper shutter in the completely closed position – closing the damper at the air supply to or discharge from not used rooms enables energy-saving.
 - “Open” - the damper shutter in the completely opened position – used to aid the de-smoking of rooms (strong ventilation) or most often as a safe position.
- V_{min} - minimum volumetric flow - depending on needs or if rooms are not occupied, given zones are switched to the readiness status – in such an operation, the rooms are ventilated minimally, thus obtaining significant energy consumption reduction.
- V_{mid} – medium position – possible operation position with the calculated demand for air in the room.
- V_{max} - maximum volumetric flow - single room or a group of rooms must be supplied with maximum air stream for short time - it enables ventilation, evening cooling down or morning fast warming of rooms.

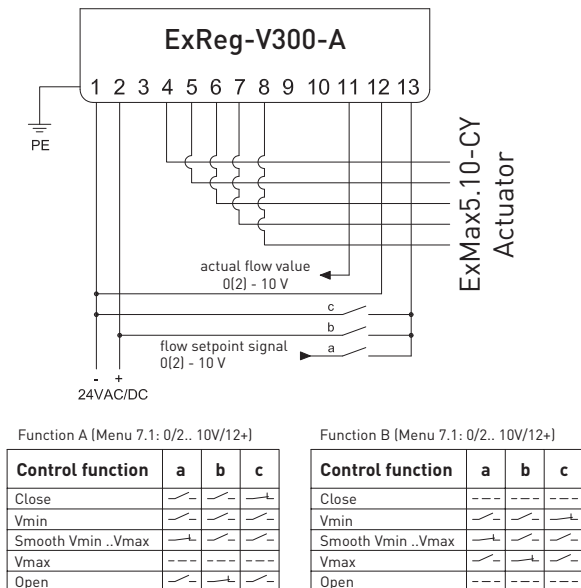


Diagram 1. The diagram of changing the regulator mode to forced controlling in the event of communication 0/2 ...10V

Table 6. The technical data of actuators.

Technical data	Standard performance	
	ExMax-5.10-Y*	ExMax-5.10-CY
Nominal voltage		24 V AC/DC, 50/60 Hz
Power consumption	Operation	21 [W]
	At standby	9 [W]
	Nominal power	5,5 [VA]
Torque		5/10 [Nm]
Running time from 0 to 100%		7,5/15/30/60/120 s

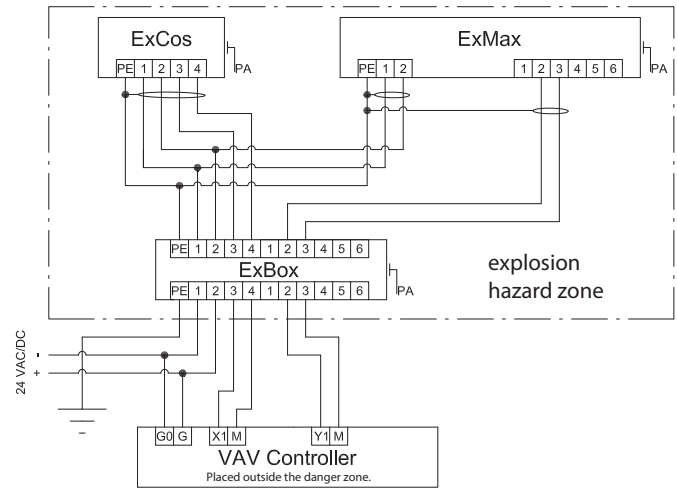


Diagram 2. The general diagram of connecting VAV Ex automatics with SmayLab driver.

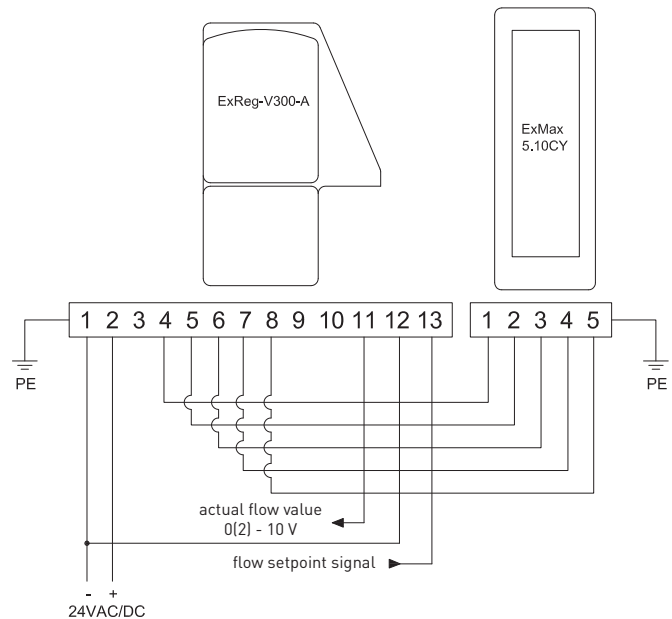


Diagram 3. The general diagram of connecting VAV Ex automatics with communication 0/2 ...10V.

! The drive-control system is connected through wires by the manufacturer; the purchaser is obliged to supply power and possibly control signals to the regulator and driver from the controller.

! The electric connections of the units should be carried out in accordance with the automatics diagram attached to the documentation of the designed system by a properly qualified person.

RVT-R-EX - VAV round variable flow regulator made of plastic, in anti-explosion version

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

RVT-R-Ex - <D> - <J> - <V_{MAX}> / <V_{MIN}> - <K> - <Z>

Where:

D	diameter
J	connection type* <ul style="list-style-type: none"> none - coupler PSK - flange
V_{MAX}	maximum airflow [m ² /h]
V_{MIN}	minimum airflow [m ² /h]
K	communication* <ul style="list-style-type: none"> none - 2...10[V] 1 - 0...10[V] SL - SmayLab
Z	application* <ul style="list-style-type: none"> N/W - air supply/exhaust O - technological extraction* D - fume hood

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

Exemplary marking of the product: **RVT-R-Ex – 250 - 1100/200 - N/W**

