

RVP-R-EX

VAV ROUND VARIABLE FLOW REGULATOR IN THE EXPLOSION-PROOF VERSION



TM **SMAY**

Specification:

VAV variable flow regulator with a round section, operating from the flow rate of 2 m/s, equipped with an actuator and a measuring strip. With flow control for EX explosion hazard zones.

Table 1. Key parameters

Key parameters	
Function	VAV-EX
Operating range	2-10m/s (see details Table 2)
Material	Zinc-plated steel (DX51D+Z275) or stainless steel 1.4301
Operating pressure range	50(60)-1000Pa
Air leakage class	B3 / C3
Control accuracy	10%
Operating temperatures range	0-50°C

Intended use

VAV air flow regulators are used for the automatic control of a stream flowing through the ventilation air ducts in the air supply and in the exhaust part of the installation.

RVP-R-Ex devices ensure high safety level and they are intended for locations with likely explosive atmospheres caused by gases, vapours, mists or air-dust mixtures.

RVP-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, 21 and 22. The manufacturer's ATEX Certificate is available for electric components. This regulator, according to PN-EN1751, is classified as C2 (air leakage class C for the housing, air leakage class 2 for the partition).

ATEX characteristic:  **II 2G Ex h IIC T6,T5 Gb**
II 2D Ex h IIC T80°C...T100°C Db

Performance

The housing and the shutter of the regulation damper is made of the zinc-plated steel sheet or on special request it is made of stainless steel 1.4301. The damper partition is equipped with rubber sealing guaranteeing tightness with the complete partition closure. The damper partition axis is placed in the bearing made of antistatic plastic or brass. The measuring strip is an accumulating-measuring element. The strip is made of aluminium profile with properly distributed impulse openings. The control-drive system of the flow regulator is a unit consisting of the static differential pressure sensor, actuator and controller (the controller is placed beyond the explosion hazard zone according to diagram 5).

Operating rule

The operating rule is based on the measurement of the air stream flowing through the regulator. In the regulators where the measuring strip is used, the measurement is carried out by means of impulse openings. During the air flowing through the measuring element, on its both sides, pressure difference is generated depending on the flow stream. A 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.

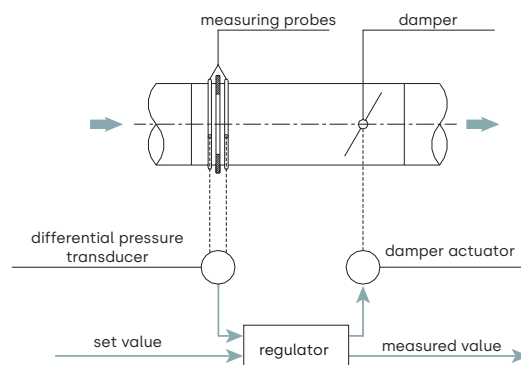
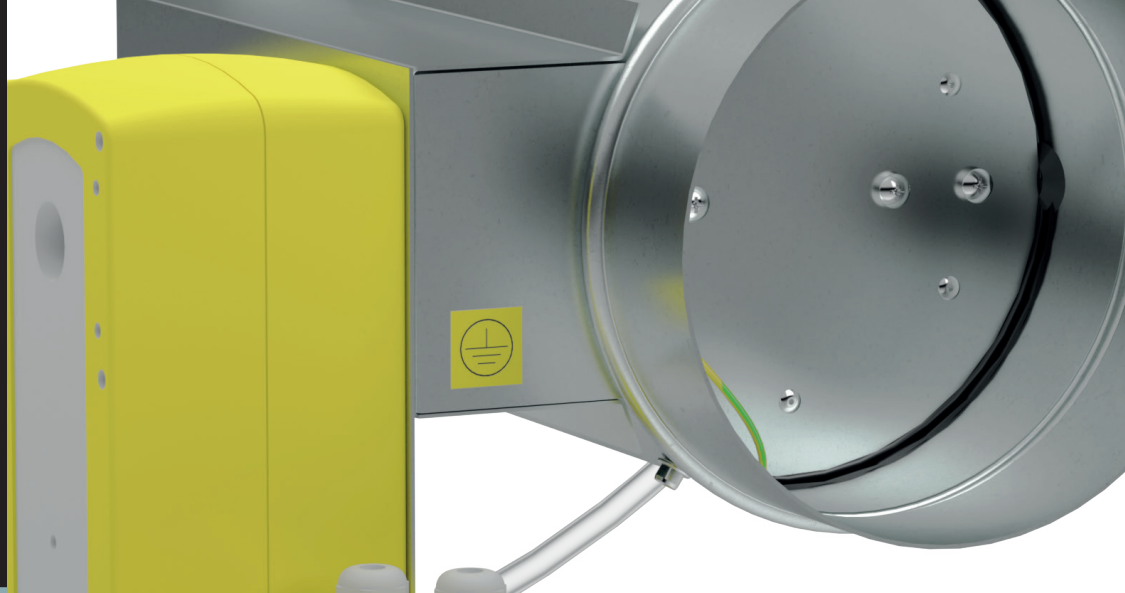


Figure 1. Diagram of the regulator operation.



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



Dimensions

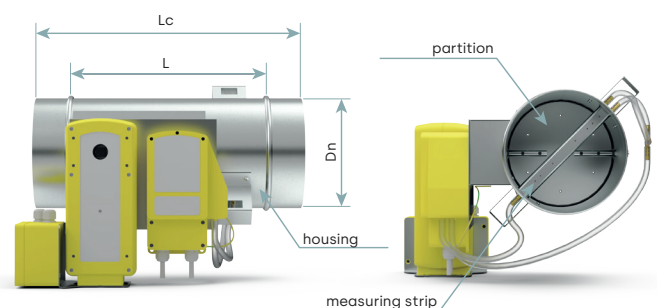


Figure 2. VAV flow regulator type: RVP-R-EX

Table 2. Typical dimensions and application scope.

Dn [mm]	L [mm]	Lc [mm]	Air stream [m³/h]
100	265	365	55-285
125	265	365	90-445
160	280	380	145-725
200	300	400	225-1130
250	350	450	350-1770
315	415	515	560-2800
400	500	600	900-4540
500	600	700	1400-7100

Mounting recommendations

In order to ensure the correct device operation, it is recommended to abide by the following rules when mounting the regulators:

- The length of the straight section in front of 2D regulator
- The length of the straight section behind 1D regulator
- If a static sensor of differential pressure is used, the only installation is allowed in which the plain to which the sensor is fastened is located vertically.

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

Pressure drop

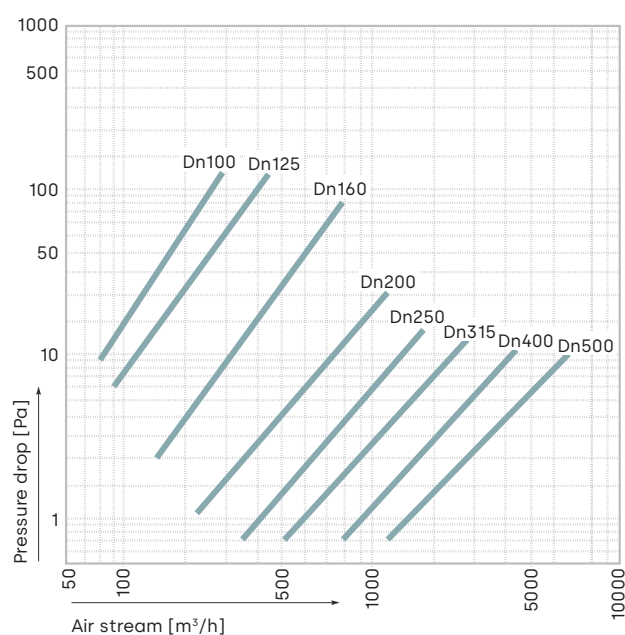


Chart 1. Pressure drop in RVP-R-Ex regulator (full damper opening)

RVP-R regulators underwent the analytical tests of the measuring elements distribution, aimed at reducing the calibration error limit of the adjustable air stream what was presented in the MA diploma defended in 2005 at AGH Kraków.

Technical data

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

RVP-R-EX			dP=100Pa											through the housing	dP=300Pa											through the housing	dP=500Pa											through the housing	
			Noise of the air flowing to the duct												Noise of the air flowing to the duct												Noise of the air flowing to the duct												
DN [mm]	Flow	Rate		in frequency bands, L _w [dB]									TOATL		without insulation	in frequency bands, L _w [dB]									TOATL		without insulation	in frequency bands, L _w [dB]									TOATL		without insulation
				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)]				
100	2	57	16	43	39	41	38	32	31	26	22	32	26	51	49	50	47	38	48	45	39	44	40	56	53	54	51	41	55	54	47	52	47						
	4	113	31	50	50	50	47	41	41	35	30	41	32	59	57	58	54	49	51	50	44	50	43	63	61	61	58	53	56	56	51	55	49						
	6	170	47	55	56	55	53	43	46	41	35	46	35	63	62	62	59	51	54	52	47	53	45	67	65	65	62	55	57	57	53	57	50						
	8	226	63	58	60	59	56	51	50	45	38	50	38	66	66	65	61	56	55	54	49	56	47	69	68	68	64	59	57	58	55	59	51						
	10	283	79	61	64	61	59	53	53	48	41	53	40	68	69	68	64	58	56	55	51	58	48	71	71	71	67	60	58	59	56	61	52						
125	2	88	25	43	41	42	39	33	32	27	23	32	26	52	50	51	47	39	48	46	41	45	40	55	55	55	51	42	55	55	49	52	47						
	4	177	49	52	51	51	48	41	42	36	31	41	32	60	59	58	55	49	52	50	46	50	44	63	62	62	58	53	57	57	52	55	49						
	6	265	74	57	57	56	53	44	47	42	36	46	36	65	64	63	59	51	54	53	48	54	46	68	67	66	62	55	57	58	54	57	51						
	8	353	98	60	61	60	57	51	51	46	39	51	38	68	67	66	62	56	55	54	50	56	47	72	70	69	64	59	58	58	55	59	52						
	10	442	123	63	64	62	60	53	54	49	42	54	40	71	70	68	65	58	57	56	52	58	48	75	72	71	67	60	58	59	56	61	53						
160	2	145	40	44	43	43	39	34	34	28	24	33	27	52	53	52	47	40	49	47	43	46	41	56	57	56	51	43	56	55	51	53	48						
	4	289	80	53	52	52	48	41	43	38	33	42	33	60	60	59	55	50	52	51	47	51	44	64	64	63	58	53	57	57	54	56	50						
	6	434	121	59	58	57	54	51	48	43	38	48	36	67	65	64	60	52	54	53	50	54	46	70	68	67	62	55	57	58	55	58	51						
	8	579	161	63	62	61	58	51	52	47	41	52	39	71	68	67	62	56	56	55	51	57	48	74	71	70	64	58	58	58	56	59	52						
	10	723	201	66	65	63	62	54	55	50	44	55	40	74	71	69	65	58	57	56	53	59	49	78	73	72	67	61	58	59	57	61	53						
200	2	226	63	45	44	44	40	34	35	30	25	34	28	53	54	53	48	41	49	47	44	46	41	56	59	57	52	43	56	56	53	53	48						
	4	452	126	55	53	52	49	42	44	39	34	43	33	61	62	60	55	51	53	51	48	52	44	64	66	63	58	55	57	57	55	56	50						
	6	678	188	61	59	58	55	44	49	44	39	48	37	68	66	64	60	52	55	54	51	55	46	72	70	67	62	56	57	58	56	58	51						
	8	904	251	65	63	61	59	52	53	48	43	52	39	73	69	67	63	57	56	55	52	57	48	77	72	70	64	59	58	58	57	60	52						
	10	1130	314	68	66	64	63	55	56	51	45	56	41	77	72	70	65	59	57	56	53	60	49	81	74	72	67	61	58	59	57	62	53						
250	2	353	98	46	46	44	40	35	36	31	27	35	29	53	56	53	48	41	50	48	46	47	42	56	61	58	52	44	56	56	55	54	48						
	4	707	196	57	55	53	49	43	45	40	35	44	34	62	63	61	55	51	53	52	50	52	45	64	67	64	58	55	57	57	56	56	50						
	6	1060	294	63	60	59	56	45	50	45	40	49	37	70	67	65	60	52	55	54	52	55	47	73	71	68	62	56	58	58	57	58	52						
	8	1413	393	67	63	62	60	52	54	49	44	53	39	75	70	68	63	56	57	56	53	58	48	79	74	71	64	58	58	58	57	60	53						
	10	1766	491	71	66	65	64	56	57	52	47	57	41	80	73	70	66	59	58	57	54	60	49	84	76	73	67	61	58	59	58	62	54						
315	2	561	156	47	48	45	41	36	37	32	28	36	30	54	58	54	48	42	50	49	48	48	43	57	63	58	52	45	56	57	57	55	49						
	4	1122	312	58	56	54	50	44	46	41	37	45	35	63	65	62	56	51	54	52	51	53	45	65	69	65	58	55	57	58	57	57	50						
	6	1682	467	65	61	59	57	46	51	47	42	50	38	72	69	66	61	53	56	54	53	56	47	75	73	69	63	56	58	58	58	59	52						
	8	2243	623	70	64	63	61	52	55	50	46	54	40	78	71	69	64	57	57	56	54	58	49	82	75	71	65	59	58	58	58	61	53						
	10	2804	779	73	67	66	65	57	58	53	48	58	42	83	74	71	66	60	58	57	55	61	50	87	77	74	68	61	58	59	58	63	54						
400	2	904	251	48	50	46	42	38	38	34	29	37	31	54	60	55	49	44	51	50	50	49	43	57	65	59	53	47	57	57	59	55	49						
	4	1809	502	60	57	55	50	47	47	43	38	46	35	63	67	62	56	53	54	53	52	54	46	65	71	66	58	55	57	58	59	58	51						
	6	2713	754	67	62	60	57	47	52	48	43	51	38	73	70	67	61	54	56	55	54	57	48	76	74	69	63	57	58	58	59	59	53						
	8	3617	1005	72	65	64	62	56	56	51	47	56	40	80	73	70	64	58	57	56	55	59	49	84	76	72	65	59	58	59	59	61	54						
	10	4522	1256	76	67	67	66	58	59	54	50	59	42	86	75	72	67	60	59	57	56	62	51	91	78	74	68	62	59	59	58	64	55						
500	2	1413	393	49	51	46	42	38	39	35	30	38	32	55	62	56	49	45	51	51	51	50	44	58	67	60	53	48	57	58	61	56	49						
	4	2826	785	61	58	56	51	47	48	44	39	46	36	64	68	63	56	53	54	54	54	54	46	65	72	66	59	56	58	58	60	58	51						
	6	4239	1178	69	62	61	58	48	53	49	45	52	39	75	71	67	61	54	56	55	55	57	49	78	75	70	63	57	58	58	59	60	53						
	8	5652	1570	74	65	65	63	56	57	53	49	57	41	83	74	70	65	59	58	57	56	60	50	87	78	73	65	60	58	59	59	62	55						
	10	7065	1963	78	68	68	66	59	59	55	52	59	43	89	76	73	67	61	59	58	57	62	52	94	79	75	68	62	59	59	59	65	56						

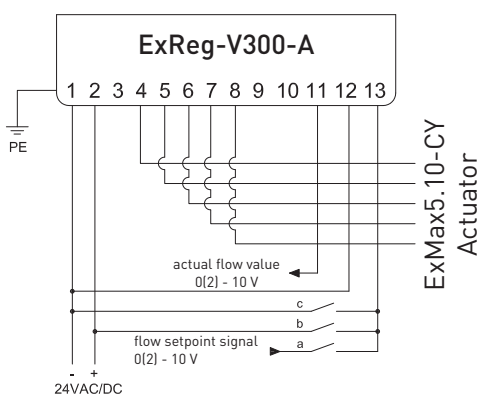
Sound pressure level provides for the attenuation of the room and ceiling for a model room accepted at the level of 8 dB. The actual parameters may differ depending on the conditions.

Acoustic data for other pressure and consumption 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 when a room is 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 – a single room or the group of rooms must be supplied on a short-term basis with the maximum air stream – it enables ventilation, evening cooling down or morning fast warming of rooms.



Function A (Menu 7.1: 0/2... 10V/12+)

Control function	a	b	c
Close	✓	✓	✓
V_{min}	✓	✓	✓
Smooth $V_{min} \dots V_{max}$	✓	✓	✓
V_{max}	✓	✓	✓
Open	✓	✓	✓

Function B (Menu 7.1: 0/2... 10V/12+)

Control function	a	b	c
Close	---	---	---
V_{min}	✓	✓	✓
Smooth $V_{min} \dots V_{max}$	✓	✓	✓
V_{max}	✓	✓	✓
Open	---	---	---

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

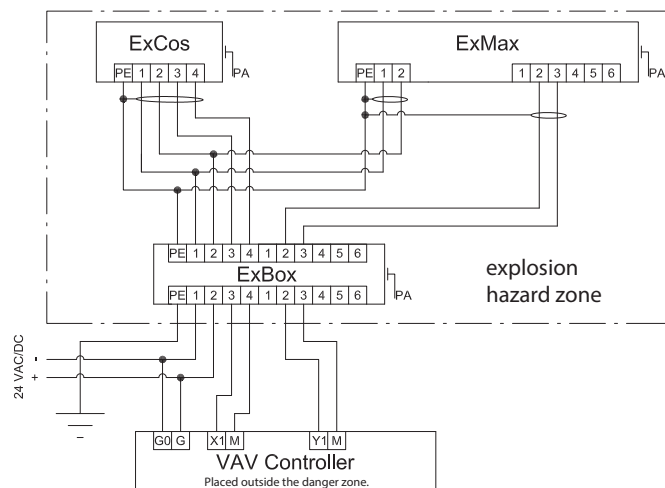


Diagram 2. The general diagram of connecting VAV Ex automatics with SmayLab driver.

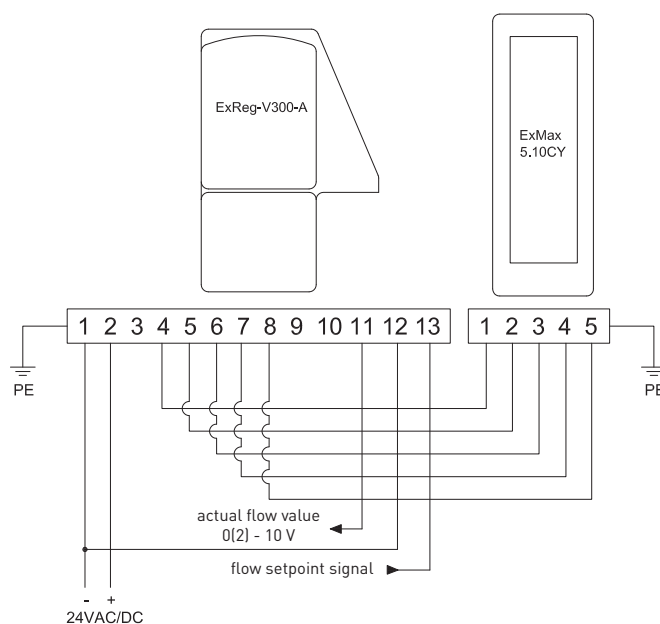


Diagram 3. The general diagram of connecting VAV Ex automatics with communication 0/2 ...10V.

The electric connection 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.

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

Table 4. 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]
	While idle	9 [W]
	Nominal power	5,5 [VA]
Torque		5/10 [Nm]
Running time from 0 to 100%		7,5/15/30/60/120 s

RVP-R-EX - VAV round variable air flow regulator in the explosion-proof version

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

RVP-R-Ex - <D> - <V_{MAX}> / <V_{MIN}> - <K> - <P>

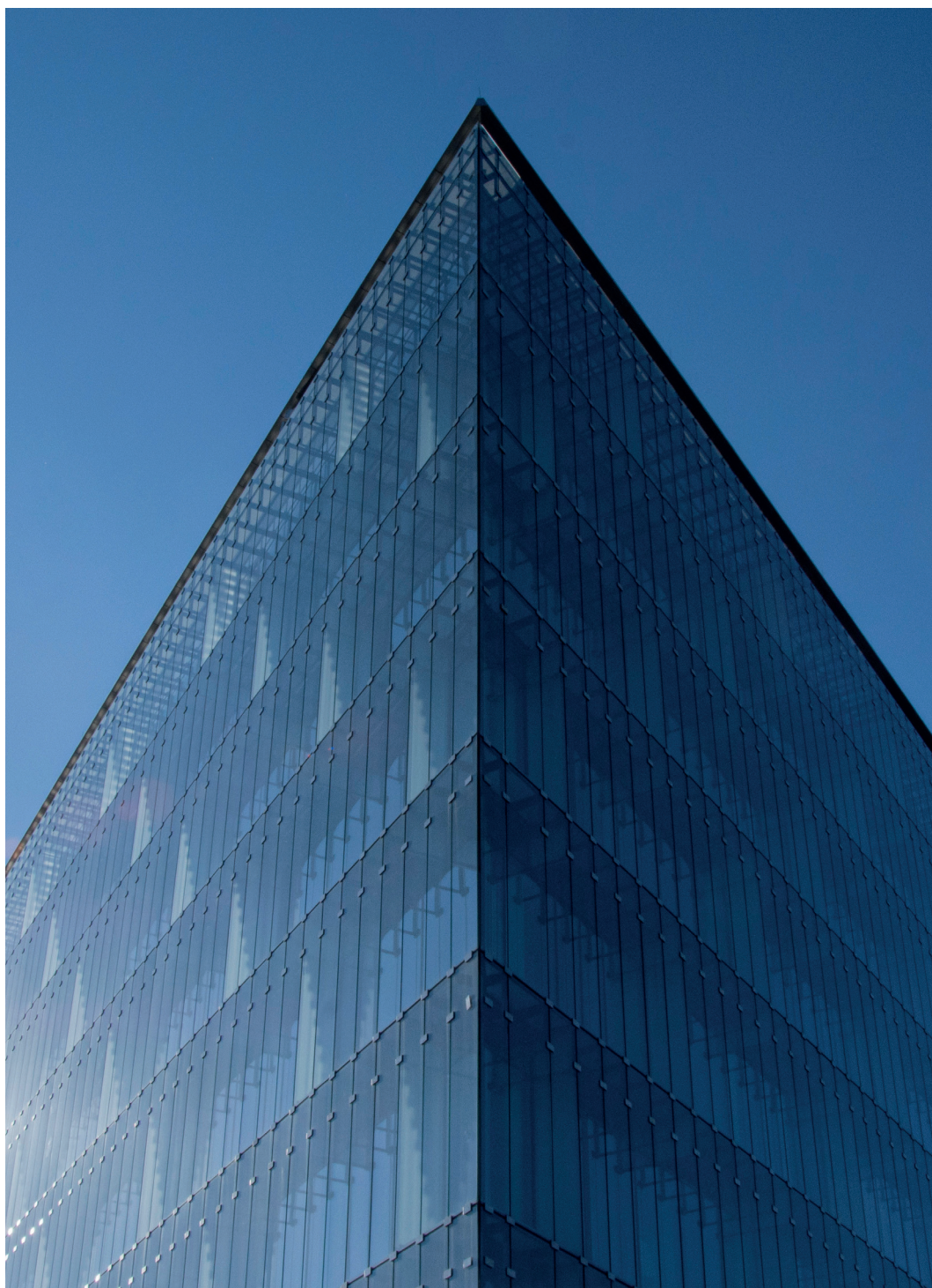
Where:

D	diameter [mm]
V _{MAX}	maximum flow stream [m³/h]
V _{MIN}	mnimum flow stream [m³/h]
K	communication
	none - 2...10[V]
	1 - 0...10[V]
	SL - SmayLab
P	material*
	none zinc plated steel
	SN stainless steel

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

Exemplary marking of the product: **RVP-R-Ex-315-1100/700**

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