

RVP-P-EX

FLOW REGULATORS VAV

IN EXPLOSION-PROOF EXECUTION

EX



Intended use:

Flow regulators are used for automatic regulation of the stream flowing through the air ventilation ducts both in the supply and exhaust part of the system.

Application

Flow regulators are used for automatic regulation of the stream flowing through the air ventilation ducts both in the supply and exhaust part of the system. By changing the air consumption, they enable to create the individual climate for each of the rooms in the building, considering the occurrence of non-uniform loads in those rooms, depending on the number of people present in the room, as well as on variable external factors such as: heat gains through non-transparent and transparent partitions as a result of sun exposure. Relative to the work environment, the regulators RVP-P-Ex may be executed in two versions.

In the standard explosion-proof version, the regulator is designed for the adjustment of clean stream of filtered air, whereas in special version also with application for transporting the contaminated air or slightly aggressive air (pursuant to Corrosive Environment Classification in compliance with ISO 12944 max. class C3).

The devices RVP-P-Ex provide the high safety level and are designed to be used in the places, in which the explosive atmospheres are likely to occur, caused by gases, vapours, mist or air-dust mixtures.

The regulators RVP-P-Ex are designed in compliance with the directive ATEX 94/9/EC as the devices of group II category 2 and designed for using in the explosion-hazard zones 1, 2, 21 and 22. The producer's ATEX certificate is available for the electric components.

ATEX: ExII -/2GD c IIC T6 (80°C).

Material

The casing and the multi-plane control damper are made out of the galvanised steel sheet. The multi-plane damper lamellas are equipped with the igelite sealing thanks to which the tightness is obtained at the division complete closing.

The damper drive elements are made out of plastics with surface resistance below 1GΩ.

The measuring orifice is made out of the galvanised steel sheet, at its both sides there are built-in connector pipes for the pressure measurement. The control and drive system of the flow regulator is the system consisting of the static sensor of the differential pressure, the actuator and the controller (the controller is placed beyond the explosion-hazard zone in compliance with the scheme no. 5)

Principles of operation

The principle of operation is based on the measurement of the air stream flowing through the regulator. This measurement is done by means of the measuring probes (4 pairs), situated at the both side of the piling-up element in the form of the measuring orifice. While the air is flowing through the measuring instrument, the pressure difference is created at its both sides, which depends on the flow rate. The rate is measured by the pressure sensor. The values are compared with the set value in the regulator. If the measured value is different than the set value, the volume control diaphragm actuator adjusts it into such position, so that the difference between the measured value and the set value would not occur.

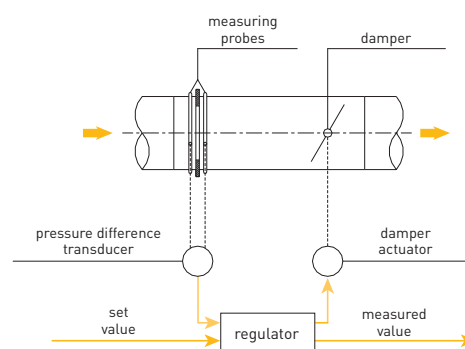


Figure 1. Regulator operation diagram.



The set parameters of the flow are set in the factory by the producer and must not be modified by unauthorised persons.

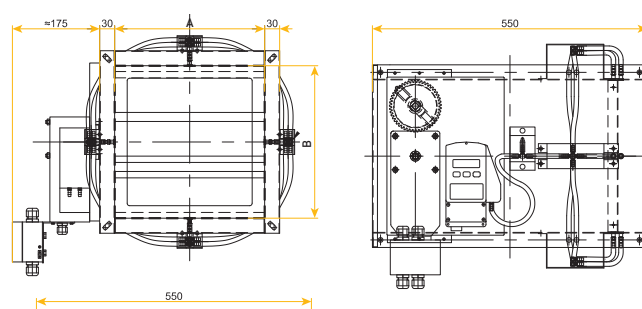


Figure 2. Flow regulator VAV type: RVP-P-Ex.



Typical dimensions and the application range

Table 1. Typical dimensions .

B [mm]	Regulated flow [m³/h]							
	A [mm]							
	200	250	315	400	500	630	800	1000
105	150-750	190-940	240-1190	X	X	X	X	X
205	290-1480	360-1850	460-2330	590-2960	730-3690	920-4650	X	X
305	440-2200	540-2750	690-3460	870-4400	1090-5490	1380-6920	1750-8790	2190-10980
405	580-2920	720-3650	910-4600	1160-5840	1450-7290	1830-9190	2330-11670	2910-14580
505	720-3640	900-4550	1140-5730	1450-7280	1810-9090	2290-11460	2900-14550	3630-18180

Assembly recommendations

To ensure the proper operation of the device, it is recommended while assembling the regulators to keep the following principles:

1. The regulator should not be mounted directly behind the turns, the T-pipe branching, the diffuser nor confusor with the apex angle greater than 15°.
2. The minimum distances should be: 2A or 3B from the arches, turns and T-pipes 1A or 1,5B from the arches, turns and T-pipes with application of the perforated sheet of free section 50% as the stream straightener. The electric connection of the measuring-controlling-executing device unit should be made according to the diagram given in the documentation enclosed to the device by properly qualified person.



The set parameters of the flow are set in the factory by the producer and must not be modified by unauthorised persons.

Pressure drop in the regulator RVP-P-Ex (damper full opening)

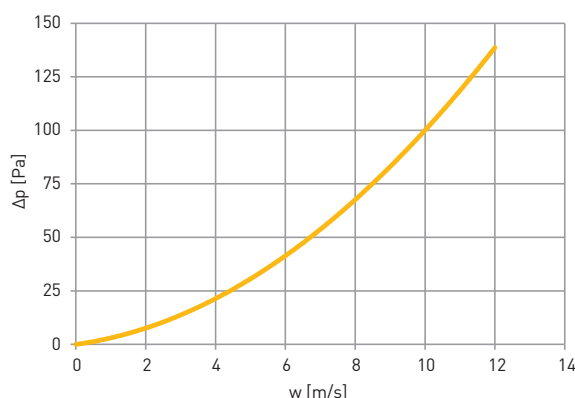


Chart 1. Pressure drop in the regulator RVP-P-Ex (damper full opening).

Poziom mocy akustycznej

Table 2. Sound power level at the outlet of the regulator
RVP-P-Ex.

	$L_{WA}[dB_{(A)}]$											
	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
200x105	39	48	66	61	50	55	61	67	55	60	65	68
250x105	40	49	57	62	51	56	61	68	56	61	66	69
315x105	44	50	61	66	55	60	66	72	60	65	70	73
200x205	39	51	57	66	51	55	60	70	56	61	68	73
250x205	40	52	58	67	52	56	61	71	57	61	69	74
315x205	42	54	60	69	54	58	63	73	59	64	71	76
400x205	43	55	61	70	55	59	64	74	60	65	72	77
500x205	44	56	62	71	56	60	65	75	61	66	73	78
630x205	45	57	63	72	57	61	66	76	62	67	74	79
800x205	46	58	64	73	58	62	67	77	63	68	75	80
200x305	39	51	57	65	51	58	64	70	59	65	70	74
250x305	40	51	58	61	52	59	63	71	60	66	71	75
315x305	42	54	60	68	54	61	67	73	62	68	73	77
400x305	43	55	61	69	55	62	68	74	63	69	74	78
500x305	44	56	62	70	56	63	69	75	64	70	75	79
630x305	45	57	63	71	57	64	70	74	65	71	76	80
800x305	46	58	64	72	58	65	71	75	66	72	77	81
1000x305	47	59	65	73	59	66	72	76	67	73	78	82
200x405	40	51	56	65	53	60	65	71	59	65	70	75
250x405	41	52	57	66	54	61	66	72	60	66	71	76
315x405	42	53	58	67	55	62	67	73	61	67	72	77
400x405	43	54	59	67	56	63	68	74	62	68	73	78
500x405	44	55	60	68	57	64	69	75	63	69	74	79
630x405	45	56	61	69	58	65	70	76	64	70	75	80
800x405	46	57	62	70	59	66	71	77	65	71	76	81
1000x405	47	58	63	71	60	66	72	78	66	72	77	82
200x505	40	54	49	66	55	60	65	72	61	66	71	77
250x505	41	55	50	67	56	61	66	73	62	67	72	78
315x505	42	56	51	68	57	62	67	74	63	68	73	79
400x505	43	57	52	69	58	63	69	75	64	69	74	80
500x505	44	58	63	70	59	64	70	76	65	70	75	81
630x505	45	59	64	71	60	65	71	77	66	71	76	82
800x505	46	60	65	72	61	66	72	78	67	72	77	83
1000x505	47	61	66	73	62	67	73	79	68	73	78	84

Table 3. Sound power level emitted to the surroundings of the
regulator RVP-P-Ex

	$L_{WA}[dB_{(A)}]$											
	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
200x105	29	37	43	47	32	42	46	54	47	47	52	57
250x105	30	38	44	49	33	43	47	55	48	48	53	59
315x105	31	39	45	50	34	44	48	56	49	49	54	60
200x205	30	40	43	50	42	47	48	52	45	51	53	56
250x205	31	41	44	51	43	48	49	53	46	52	54	57
315x205	32	42	42	52	44	49	50	54	47	53	55	58
400x205	33	43	46	53	45	50	51	55	48	54	56	59
500x205	34	44	47	54	46	51	52	56	49	55	57	60
630x205	35	45	48	55	47	52	53	57	50	56	58	61
800x305	36	46	49	56	48	53	54	58	51	57	59	62
200x305	33	44	46	50	45	50	52	55	51	52	55	51
250x305	34	45	47	51	46	51	53	56	52	53	56	52
315x305	35	46	48	52	47	52	54	57	53	54	57	53
400x305	36	47	49	53	48	53	55	58	54	55	58	64
500x305	37	48	50	54	49	54	56	59	55	56	59	65
630x305	38	49	51	55	50	55	57	60	56	57	60	66
800x305	39	50	53	56	51	56	58	61	57	58	61	67
1000x305	40	51	54	57	52	57	59	62	58	59	62	68
200x405	33	45	47	50	46	50	52	56	51	54	58	60
250x405	34	46	48	51	47	51	53	57	52	55	59	61
315x405	35	47	49	52	48	52	54	58	53	56	60	62
400x405	36	48	50	53	49	53	55	59	54	57	61	64
500x405	37	49	51	54	50	54	56	60	55	58	62	65
630x405	38	50	52	55	51	55	57	61	56	59	62	66
800x405	39	51	53	56	52	56	58	62	57	60	63	67
1000x405	40	52	54	57	53	57	59	63	58	61	64	68
200x505	34	46	47	61	46	52	53	56	51	55	58	62
250x505	35	47	48	62	47	53	54	57	52	56	59	63
315x505	36	48	49	63	48	54	55	58	53	57	60	64
400x505	37	49	50	64	49	55	56	59	54	58	61	65
500x505	38	50	51	65	50	56	57	60	55	59	62	66
630x505	39	51	52	66	51	57	58	61	56	60	63	67
800x505	40	52	53	67	52	58	59	62	57	61	64	68
1000x505	41	53	54	68	53	59	60	63	58	62	65	69

Układ regulacyjno-napędowy

The unit has the following control possibilities:

- **control – constant setting:** 2...10, 0...10 [V] – the regulator controls the air flow in the duct between the given settings V_{min} , V_{max} , depending on the continuous leading signal, within the range of programmed control voltage [0...10, 2...10 [V]]
- **control – forced setting:**
 - „Close” – the damper diaphragm is in complete closed position – the damper closing at air supply or air exhaust to the unused rooms enables to save the energy.
 - „Open” – the damper diaphragm is in complete open position – it is used for supporting the room smoke-removal (intensive aeration) or the most frequently as the safe position.
 - V_{min} – minimum volume flow – depending on the needs or if there are no operators for the room, the particular zones are shifted into the readiness and therefore the significant reduction of energy consumption is possible.
 - V_{mid} – intermediate position – possible position for operation at the calculated air demand in the room.
 - V_{max} – maximum volume flow – single room or group of rooms must be supplied with maximum air stream for short time – it enables to aerate the room, to cool it in the evening or to warm it quickly in the morning.
- **control by means of LonWorks® system**

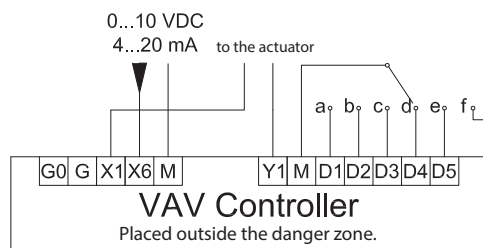


Diagram 1. Diagram of changing the VAV-Ex regulator mode with LonWorks® communication by means of the rotational switch from the regulator: a - close, b - open, c - V_{min} , d - V_{mid} , e - V_{max} , f - no forcing.

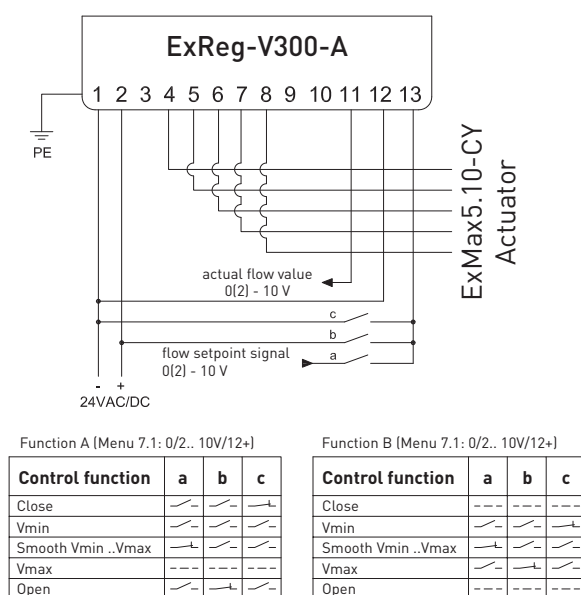


Diagram 2. Diagram of controller mode change, forced control in case of communication 0/2 ...10V.

Actuator: ExMax-5.10-Y (ExMax-5.10-CY)

ExMax-5.10-Y – used for LonWorks communication

ExMax-5.10-CY – used for 0/2...10V communication

Technical data:	
Power supply:	24[V] AC/DC
Torque:	5Nm/10[Nm]
Direction of rotation:	chosen by the switch
Angle of rotation:	(grounded)
Time of movement:	7,5/15/30/60/120 [s] (from 0 to 90°)
Protection class:	III [safe voltage - low]
Casing protection category:	IP66
Ambient temperature range:	-40...+40[°C]
Storage temperature range:	-40...+70[°C]
Maintenance:	service-free
Dimensions:	210 x 95 x 80 mm
Weight:	3,5 [kg]

Conformity certificates:	
Tested in PTB:	PTB 04 ATEX 1028X
According to the directive ATEX:	94/9/EC (ATEX)
Approved for gases:	II2G EEx d [ia] IIC T6/T5 do stref 1, 2
Approved for dust:	II2D IP66 T80°C do stref 21, 22
Identification:	CE Nr 0158
EMC:	89/336/EC directive EMC
Low voltage:	72/23/EC low-voltage directive
Type of protection:	IP 66 in compliance with EN 60529
Potential compensation:	External terminal PA, 4 mm ²

The parameter selection for the power supply sources in the facility depends on the selected time of rotation and the supply voltage rate. The connected current rates are the approximate values, because due to the unit construction the power dissipation within the electronics may occur. The power input in the lockout position, regardless of the time, amounts max. 20 W. The power consumption, because of the heater, fluctuates within the range from 5 to 12 W.

The heater is switched on when the engine does not work. At the time of starting up, the current value taken by the actuator amounts ca. 4,5A for 1sec (please take it into account while choosing the cables and power supply).

Table 4. The current input depending on the set time for the actuator rotation.

	7,5s	15s	30s	60s	120s
24 V	4,7 A	1,45 A	0,52 A	0,4 A	0,4 A

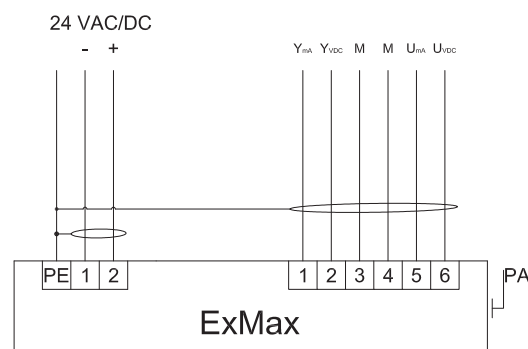


Diagram 3. The general connection diagram for the actuator ExMax.

Pressure transducer: ExCos - P

Technical specification:	
Power supply:	24 VAC/DC \pm 20% (19,2...28,8 VAC/DC) 50... 60 Hz
Intensity, power consumption:	150 mA, - 4 W, internal fuse 500 mA, with no clamp, irremovable
Electric isolation:	Power supply - analogue output 1,5 kV (Ex 60 V)
Electric connection:	Terminals 0,14... 2,5 mm in the integrated switchbox Ex
Movement time:	7,5/15/30/60/120 [s] (od 0 do 90°)
Protection class:	Class I (earthed)
Display:	2 x 16 digits, dot matrix with highlighting
Casing protection:	IP66 in compliance with IEC 60529
Casing material:	Aluminium casting, coated
Sensor:	Piezoelectric pressure transducer
Sensor reaction time:	T90 / 5 sec.
Sensor accuracy:	\pm 2% value \pm 1 Pa
Non-linearity and hysteresis:	Usually \pm 0,05 %, max. 0,25% value
Output:	Voltage U(V) or intensity I (mA) to be selected in menu in situ
Voltage U at output:	From 0...10 VDC adjustable, reversible, load $<$ 1kO, influence $<$ 0,05 % /100 O
Intensity I at output:	From 0...20 mA adjustable, reversible, load $<$ 500 O, influence $<$ 0,1 % /100 O, open circuit $<$ 24V

Conformity certificates:	
Tested in PTB:	PTB 04 ATEX 1028X
According to the directive ATEX:	94/9/EC (ATEX)
Approved for gases:	II2(1)G Ex e ma [ia] IIC T6 for zones 1, 2
Approved for dust:	II2(1)D Ex tD A21 [iaD] IP66 T80°C for zones 21,22
Identification:	CE Nr 0158
EMC:	89/336/EC directive EMC
Low voltage:	72/23/EC low-voltage directive
Type of protection:	IP 66 in compliance with EN 60529
Potential compensation:	External terminal PA, 4 mm ²

Pressure transducer: ExReg-V300-A

Technical specification:	
Power supply:	24 VAC/DC \pm 20% (19,2...28,8 VAC/DC) 50... 60 Hz
Intensity, power consumption:	150 mA, - 4 W, internal fuse 500 mA, with no clamp, irremovable
Electric isolation:	Power supply - analogue output 1,5 kV (Ex 60 V)
Electric connection:	Terminals 0,14... 2,5 mm in the integrated switchbox Ex
Movement time:	7,5/15/30/60/120 [s] (od 0 do 90°)
Protection class:	Class I (earthed)
Display:	2 x 16 digits, dot matrix with highlighting
Casing protection:	IP66 in compliance with IEC 60529
Casing material:	Aluminium casting, coated
Sensor:	Piezoelectric pressure transducer
Sensor reaction time:	T90 / 5 sec.
Sensor accuracy:	\pm 2% value \pm 1 Pa
Non-linearity and hysteresis:	Usually \pm 0,05 %, max. 0,25% value
Output:	Voltage U(V) or intensity I (mA) to be selected in menu in situ
Voltage U at output:	From 0...10 VDC adjustable, reversible, load $<$ 1kO, influence $<$ 0,05 % /100 O
Intensity I at output:	From 0...20 mA adjustable, reversible, load $<$ 500 O, influence $<$ 0,1 % /100 O, open circuit $<$ 24V

Conformity certificates:	
According to the directive ATEX:	EPS 11 atex 1 380 94/9/EG
Approved for gases:	II2G Ex e mb ib[ia] IIC T6 for zones 1, 2
Approved for dust:	II2D Ex tb [iaD] IIIC T80 C for zones 21, 22
According to the directive IECEx:	IECEx EPS 12.0028
Identification:	CE Nr 0158
EMC:	89/336/EC directive EMC
Low voltage:	72/23/EC low-voltage directive
Type of protection:	IP 66 in compliance with EN 60529
Potential compensation:	External terminal PA, 4 mm ²

Table 5. Technical specification for the pressure transducer and regulator.

	ExCos-P250 communication LonWorks	ExReg-V300-A communication 0/2...10 V
Sensor	Pressure/ pressure difference	Regulator
Power supply	24VAC/DC	24VAC/DC
Scope	\pm 250 Pa	\pm 300 Pa
Scope min	50 Pa	60 Pa
Pressure max	25000 Pa	25000 Pa
Output	[0] 4...20 m/0...10V	[0] 4...20 m/0...10V

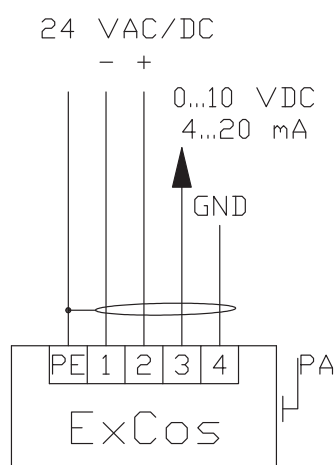


Diagram 4. The general connection diagram for the pressure transducer ExCos-P.

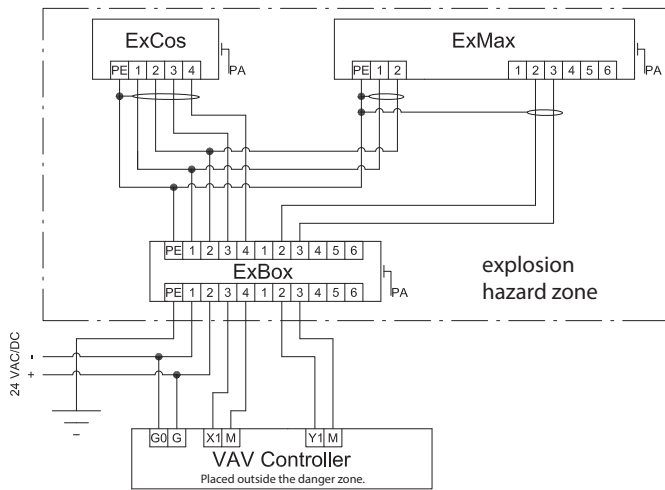


Diagram 5. The general connection diagram for the automatic VAV Ex with LonWorks communication.

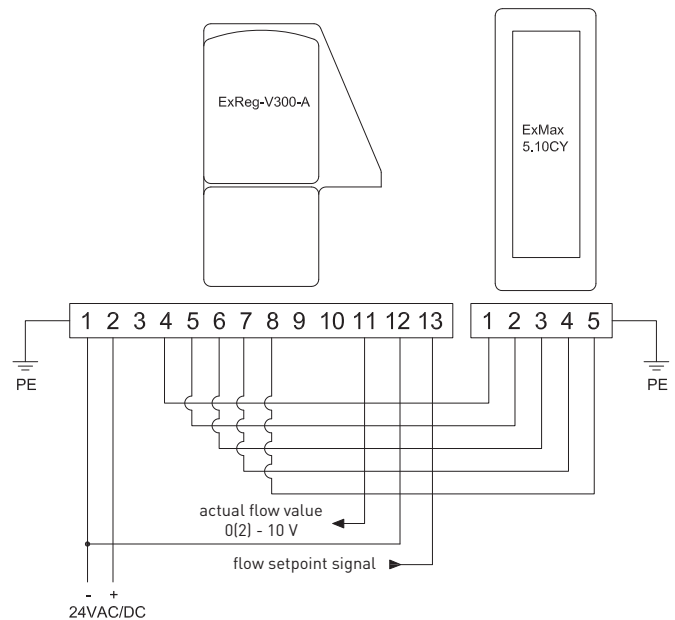


Diagram 6. The general connection diagram for the automatic VAV Ex with 0/2...10V communication.



The drive and control system is connected by wires by the manufacturer, while the buyer is obliged to bring the controller and power supply and control signals from the controller to the controller.



The electrical connection of the units should be made in accordance with the automation diagram attached to the documentation of the designed system by a suitably qualified person.

RVP-P-EX - Flow regulators VAV in explosion-proof execution

While ordering, please provide the information using the following method:

RVP-P-Ex - <A> x - <V_{MAX}> / <V_{MIN}> - <K> - <P>

Where:

A	span width [mm]
B	span height [mm]
V_{MAX}	maximum flow stream [m ³ /h]
V_{MIN}	minimum flow stream [m ³ /h]
K	communication*
	none - 2...10[V]
	1 - 0...10[V]
	Lon - LonWorks (SmayLab)
P	material*
	none - galvanised steel
	SN - stainless steel**

*optional values - default values will be used if optional values are not specified

**the damper blades are made out of aluminium

Order example: **RVP-P-Ex-500x305-1300/1100/700**