

Pressure regulator in RAPAV ventilation systems

RAPAV



Description

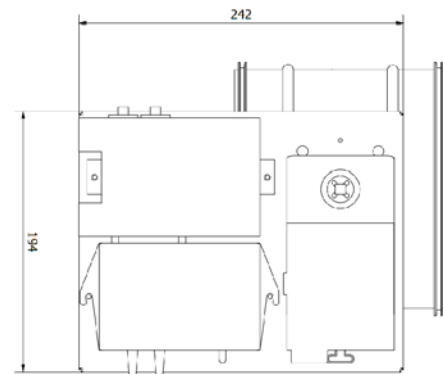
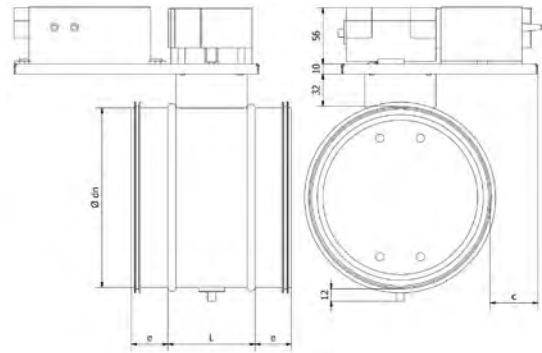
The RAPAV regulator is designed for use in mechanical ventilation systems, in which the volumetric flow depends on the difference in pressure between the two representative pressure zones. The pressure regulator consists of 3 main components: regulator casing with the damper, electric controller (3 possible variants), actuator (9 possible variants). The set is assembled according to individual needs.

The controllers are available in 3 variants and are selected according to the pressure range and purity of the flowing air and the location of the differential pressure measurement. Each of the controllers belonging to the Universal series has a built-in sensor (membrane or dynamic) that does not require calibration. The controllers can cooperate with external room temperature and CO2 sensors. They can be mounted in any position.

The main guidelines for the selection of an actuator are operating time, torque and safety feature. Set assembly allows to select from 9 types of actuators. Torque ranges from 4 to 20 Nm. The standard operating time is 120 seconds, and high-speed actuators are also available with operating times between 2.5 and 4 s. It is also possible to select actuators with a safety feature (with a spring).

The case of the regulator is made of galvanized Z275 sheet metal. Optionally, the casing can be made of 1.4301 stainless steel. The sides of the case with factory-installed EPDM rubber gaskets ensure tight connection to ventilation ducts. The adjusting damper inside the casing is also insulated. The automatic control system is installed on the regulator casing to allow thermal insulation of the system. The regulator is also available in a version with pre-installed 50 mm insulation and a shield made of sheet steel.

Dimensions



DN	L [mm]	e [mm]	c [mm]
100	86	36	87
125	86	36	75
160	86	36	47
200	86	36	37
250	86	36	12
315	86	36	-
400	141	55	-
500	141	75	-
630	141	75	-

VRU-D3-BAC is characterized by a dynamic sensor, which is why it is used for clean air in pressure difference range of 0 to 500Pa. VRU-M1-BAC has a built-in membrane sensor which allows it to work with contaminated air in pressure difference range of 0 to 600Pa. The VRU-M1R-BAC controller is used to measure the pressure difference between rooms. Used among others in laboratories, operation rooms, isolation rooms where constant negative and positive pressure between rooms should be maintained, within the operating range of -75 to +75 Pa. Can be used with contaminated air. The controller can cooperate with an independent 'door switch' sensor.

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- Communication tools : NFC (Belimo assistant App for Android and iOS), service port (PC- Tool), MP connection ZTH EU

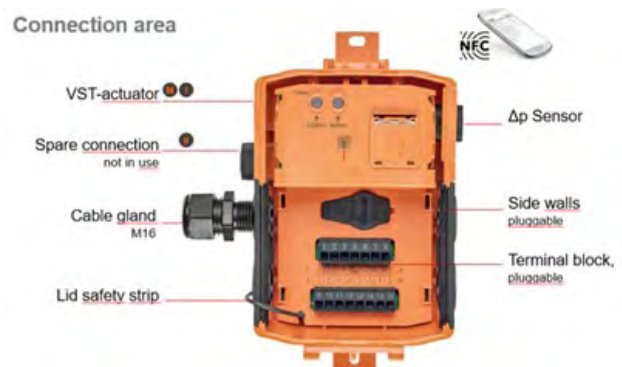
Belimo Assistant App allows you to:

- Check the set-up in real time: settings, current values, damper position
- Force a temporary set-up: open, close, stop, min, max

Table 1. Universal series controllers

TYPE	Sensor type	Measuring range	Application			
			VAV Regulators	Pressure measurement in the duct	Pressure measurement in the room	For contaminated air
VRU-D3-BAC	Dynamic D3	0-500Pa	YES	YES	NO	NO
VRU-M1-BAC	Membrane M1	0-600 Pa	YES	YES	NO	YES
VRU-M1R-BAC	Membrane M1R	Od -75 do 75 Pa	NO	NO	YES	YES

Construction of the Universal series controller



Advantages and application of a membrane sensor (static):

- Applicable for contaminated air
- Shockproof
- Does not require calibration
- Long-term stability (temperature changes, age)
- Can be mounted in any position

Advantages of a dynamic sensor:

- Applicable for clean air
- Does not require calibration
- Can be mounted in any position

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Table 2. Automatic control of regulators:

1-	Duct pressure 0...500 Pa, comfort range (not contaminated media), standard actuators	VRU-D3-BAC + VST, rotary actuator, standard (LM/NM*24A-VST)
2-	Duct pressure 0...600 Pa, comfort range as well as contaminated media, standard actuators	VRU-M1-BAC + VST, rotary actuator, standard (LM/NM*24A-VST)
3-	Room pressure -75...75 Pa, standard actuators	VRU-M1R-BAC + VST, rotary actuator, standard (LM/NM*24A-VST)
SAFE-1-	Duct pressure 0...500 Pa, comfort range (not contaminated media), actuators with safety function	VRU-D3-BAC + VST, rotary actuator, with spring (LF24/NF*24A-VST)
SAFE-2-	Duct pressure 0...600 Pa, comfort range as well as contaminated media, actuators with safety function	VRU-M1-BAC + VST, rotary actuator, with spring (LF24/NF*24A-VST)
SAFE-3-	Room pressure -75...75 Pa, actuators with safety function	VRU-M1R-BAC + VST, rotary actuator, with spring (LF24/NF*24A-VST)
FAST-1-	Duct pressure 0...500 Pa, comfort range (not contaminated media), very fast running actuators	VRU-D3-BAC + VST, rotary actuator, fast (LMQ/NMQ*24A-VST)
FAST-2-	Duct pressure 0...600 Pa, comfort range as well as contaminated media, very fast running actuators	VRU-M1-BAC + VST, , rotary drive, fast (LMQ/NMQ*/NKQ24A-VST)
FAST-3-	Room pressure -75...75 Pa, very fast running actuators	VRU-M1R-BAC + VST, rotary actuator, fast (LMQ/NMQ*24A-VST)

* for DN 400-630 sizes

How to order**Marking example**

Product code:

A - material type

- default: galvanized steel
- K - 1.4301/304 steel

B - Insulation

- default: not insulated
- I - insulation with external shield, thickness: 50mm

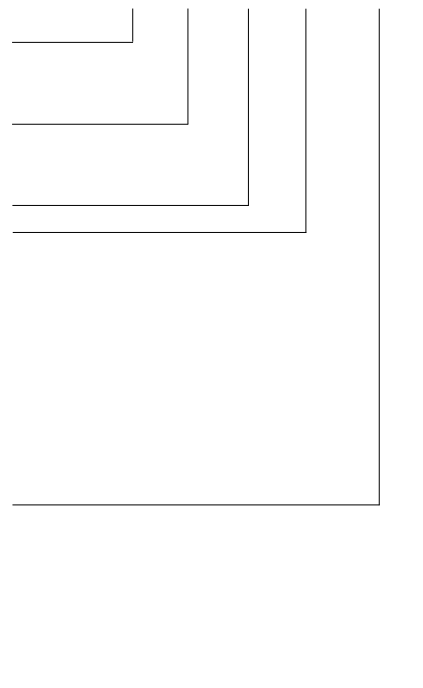
C - nominal diameter**D - type of automatic control (according to Table 2)**

- 1
- 2
- 3
- SAFE1
- SAFE2
- SAFE3
- FAST1
- FAST2
- FAST3

P_{nom} - nominal pressure

(nominal pressures given in Table 1.
may vary depending on selected
automatic control system)

- none - maximum factory pressure range offered by the wybraną automatykę
- F - type of communication
- none - 2...10 [V]
- 1- 0...10 [V]
- |MP | - MP BUS
- MOD- Modbus
- BAC - BACnet

RAPAV - aaa - bbb - ccc - ddd - P_{nom} - F

The manufacturer reserves the right to introduce changes.

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Note! In the event that narrower pressure measurement range is required, the customer can, after installation of the regulator, independently change the P'max and P'min pressure ranges using the Belimo assistant App and the NFS function. P'max value can be set by the customer in the range of 20-100% of P'nom, and the P'min value = 0-100% of P'max. Default setting: P'max=100%P'nom, P'min=0%P'nom (the broadest possible measurement range). Do not change the direction of rotation of the actuator.

Additional information that can be provided when placing an order: place of installation of the regulator / name of the building (max. 16 characters), position of the regulator in the system / name of the room.

After installing the regulator in the facility, a qualified person has to set whether the device is to work on supply or exhaust using one of the service tool. The VRU-M1R-BAC controller also requires setting to negative or positive pressure. Default setting is set to supply and positive pressure.

Example of an order

RAPAV-I-315-FAST1- 500- MOD

Pressure regulator made of galvanized steel with 50mm thick insulation and nominal diameter of 315. The automatic control system includes a controller with a dynamic sensor + fast actuator.

Nominal pressure set to 500Pa. Modbus communication.

Characteristics

- The insulation of adjusting damper is classified as class 4 as per EN-1751:1998 (option),
- Casing leakage is class C as per EN-1751:1998,
- Operating temperatures range from 0 to 40 or 50 [°C] (depending on the actuator used),
- Differential pressure ranges from -75 to 75, 0-500 [Pa] or 0-600 [Pa] depending on the selected controller.

Assembly instructions

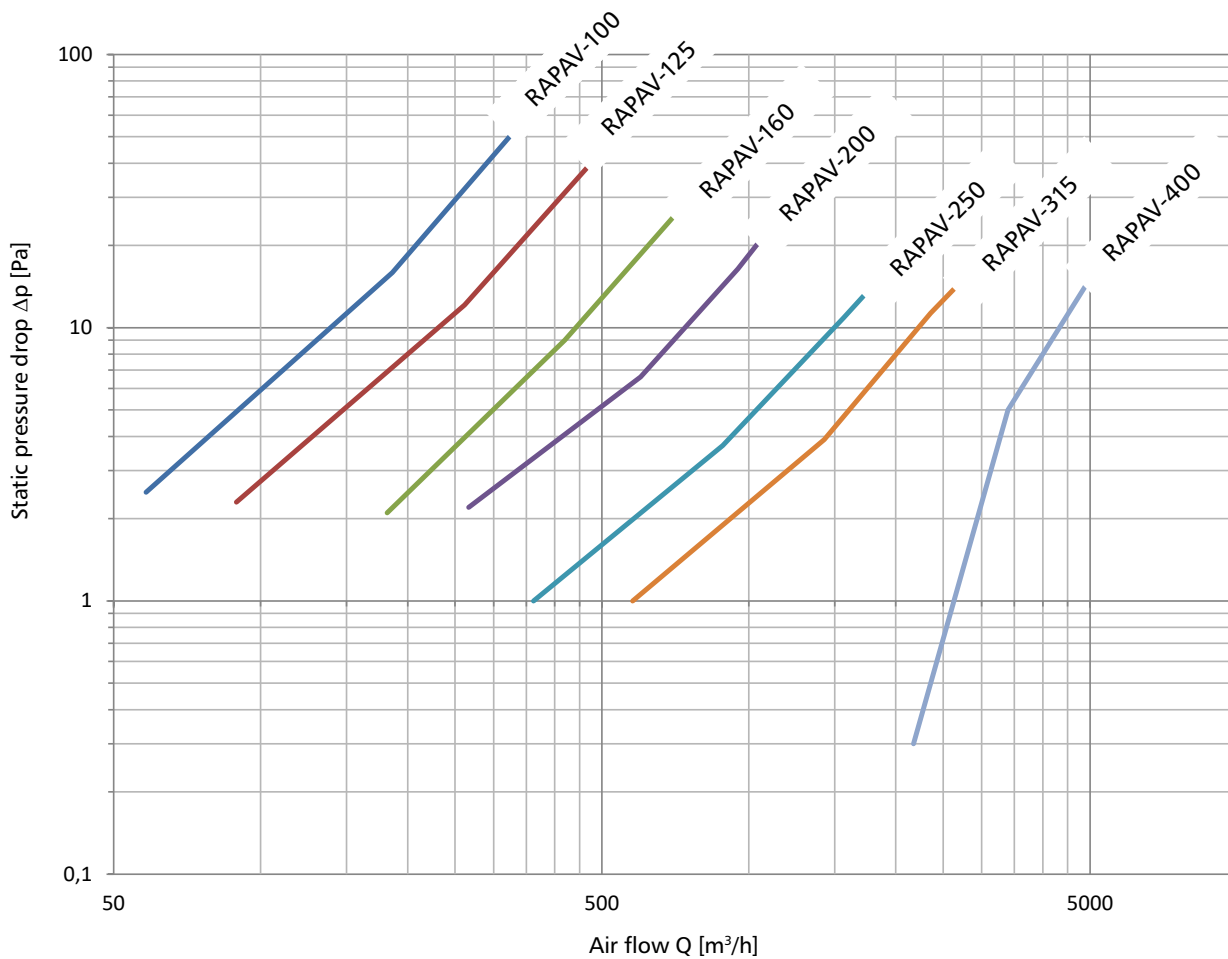
1. Impulse cables to the pressure sensor must be placed in the given zone at the place representative in terms of pressure measurement,
2. Recommended maximum length of pulse cables -20 linear meters. Use of longer cables will lead to an increase in measuring error,
3. Pulse cables with hose sockets are not included with the regulatorhe regulator.

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Pressure drops

Pressure drop in RAPAV regulator with the fully opened damper.



Pressure regulator in RAPAV ventilation systems

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Pressure drops

Pressure drop and level of sound power emitted to the system for different damper settings.

DN	v			q			$\alpha = 15^\circ$											$\alpha = 30^\circ$										
							Δp	L_w [dB/Okt]								L_w [dB]	L_{va} [dB(A)]	Δp	L_w [dB/Okt]								L_w [dB]	L_{va} [dB(A)]
	[Pa]	f_m [Hz]								[Pa]	f_m [Hz]																	
		[m/s]	[m ³ /h]	[l/s]	63	125	250	500	1000		2000	4000	8000	63	125	250	500	1000	2000	4000	8000							
100	2	53	15	3	0	0	0	-1	-1	-8	-15	-23	7	2	10	8	8	8	8	8	4	-4	-11	15	11			
	4	105	29	14	18	18	18	18	17	17	10	3	26	23	39	27	27	26	26	26	22	15	34	31				
	6	158	44	30	29	29	29	28	28	28	26	18	37	34	87	37	29	29	28	28	28	26	18	40	34			
	8	211	59	54	37	36	36	36	36	36	35	28	45	42	155	45	45	45	44	44	44	44	40	53	51			
	10	263	73	85	42	42	42	42	42	41	41	37	50	48	242	51	51	50	50	50	50	50	49	59	57			
	12	316	88	122	47	47	47	47	46	46	46	44	55	53	348	56	55	55	55	55	55	54	54	64	62			
125	2	83	23	3	2	2	2	1	0	-8	-16	-24	8	3	10	10	10	10	10	10	4	-4	-12	17	13			
	4	167	46	14	20	20	20	20	19	18	10	2	27	24	39	29	28	28	28	28	28	22	14	36	33			
	6	250	70	30	31	31	30	30	30	25	17	38	35	87	39	39	39	39	39	38	37	29	47	44				
	8	334	93	54	38	38	38	38	38	37	36	28	46	43	155	39	39	39	39	39	38	37	29	47	44			
	10	417	116	85	44	44	44	44	44	43	43	36	52	50	242	53	53	52	52	52	52	52	48	61	58			
	12	501	139	122	49	49	49	49	48	48	48	43	57	55	348	58	57	57	57	57	57	56	55	66	63			
160	2	139	38	3	4	4	4	3	-1	-9	-17	-24	10	4	10	13	12	12	12	11	3	-5	-12	19	14			
	4	277	77	14	22	22	22	22	22	17	9	2	29	25	39	31	31	30	30	30	29	21	13	38	35			
	6	416	115	30	33	33	33	32	32	32	24	17	40	37	87	41	41	41	41	41	40	36	29	49	46			
	8	554	154	54	41	40	40	40	40	40	35	27	48	45	155	49	49	49	48	48	48	47	39	57	54			
	10	693	192	85	46	46	46	46	46	45	43	36	54	51	242	55	55	55	54	54	54	54	48	63	60			
	12	831	231	122	51	51	51	51	50	50	50	42	59	57	348	60	60	59	59	59	59	58	54	68	65			
200	2	218	61	3	6	6	6	5	-1	-9	-17	-25	12	5	10	14	14	14	14	10	3	-5	-13	21	15			
	4	436	121	14	24	24	24	24	23	19	11	3	31	27	39	33	32	32	32	32	29	21	13	40	36			
	6	654	182	30	35	35	35	34	34	32	24	16	42	38	87	43	43	43	43	43	42	36	28	51	48			
	8	872	242	54	43	42	42	42	42	41	35	27	50	47	155	51	51	51	50	50	50	47	39	59	56			
	10	1091	303	85	48	48	48	48	48	47	43	35	56	53	242	57	57	56	56	56	56	55	47	65	62			
	12	1309	364	122	53	53	53	53	52	52	50	42	61	58	348	62	61	61	61	61	61	60	54	70	67			
250	2	342	95	3	8	8	7	6	-2	-10	-18	-25	13	5	10	16	16	16	16	10	2	-6	-13	22	16			
	4	684	190	14	26	26	26	26	24	16	8	0	33	27	39	35	34	34	34	34	28	20	12	41	37			
	6	1027	285	30	37	37	36	36	36	31	23	16	44	39	87	45	45	45	45	44	43	35	28	52	49			
	8	1369	380	54	44	44	44	44	44	42	34	26	52	48	155	53	53	52	52	52	52	46	38	60	57			
	10	1711	475	85	50	50	50	50	49	49	42	35	58	55	242	59	59	58	58	58	58	54	47	66	63			
	12	2053	570	122	55	55	55	54	54	54	49	41	63	60	348	64	63	63	63	63	62	61	53	71	69			
315	2	546	152	3	10	10	9	5	-3	-10	-18	-26	15	6	10	18	18	18	17	9	2	-6	-14	24	17			
	4	1092	303	14	28	28	28	27	23	15	8	0	34	28	39	37	36	36	36	35	27	20	12	43	38			
	6	1639	455	30	39	39	38	38	38	31	23	15	46	41	87	47	47	47	47	46	43	35	27	54	50			
	8	2185	607	54	46	46	46	46	46	41	34	26	53	49	155	55	55	54	54	54	53	45	38	62	59			
	10	2731	759	85	52	52	52	52	51	50	42	34	59	56	242	61	60	60	60	60	60	54	46	68	65			
	12	3277	910	122	57	57	57	56	56	56	49	41	64	61	348	66	65	65	65	65	64	61	53	73	70			
400	2	884	246	3	12	12	11	5	-3	-11	-19	-27	17	6	10	20	20	20	17	9	1	-7	-15	26	17			
	4	1768	491	14	30	30	30	29	23	15	7	-1	36	29	39	39	38	38	38	35	27	19	11	45	39			
	6	2652	737	30	41	41	40	40	38	30	22	14	47	42	87	49	49	49	49	48	42	34	26	56	51			
	8	3536	982	54	48	48	48	48	48	41	33	25	55	51	155	57	57	56	56	56	53	45	37	64	60			
	10	4420	1228	85	54	54	54	54	53	49	41	33	61	57	242	63	63	62	62	62	61	53	45	70	67			
	12	5305	1473	122	59	59	59	58	58	56	48	40	66	62	348	68	67	67	67	67	66	60	52	75	72			

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Pressure drops

Pressure drop and level of sound power emitted to the system for different damper settings.

DN	v			q			$\alpha = 45^\circ$												$\alpha = 60^\circ$											
							Δp	L_w [dB/Okt]								L_w [dB]	L_{WA} [dB(A)]	Δp	L_w [dB/Okt]								L_w [dB]	L_{WA} [dB(A)]		
	[Pa]	f_m [Hz]								[Pa]	f_m [Hz]																			
		[m/s]	[m³/h]	[l/s]	63	125	250	500	1000		2000	4000	8000	63	125	250	500	1000	2000	4000	8000	L_w [dB]	L_{WA} [dB(A)]							
100	2	53	15	41	19	19	18	18	18	18	11	3	26	23	206	33	33	33	33	33	32	32	24	41	39					
	4	105	29	165	37	37	37	36	36	36	29	45	43	823	52	51	51	51	51	51	50	50	60	60	58					
	6	158	44	370	48	48	47	47	47	47	44	56	53	1851	62	48	47	47	47	47	47	44	63	63	54					
	8	211	59	658	55	55	55	55	55	54	54	64	61	3291	70	70	70	69	69	69	69	69	68	78	76					
	10	263	73	1029	61	61	61	61	60	60	60	70	67	5143	76	76	75	75	75	75	75	75	74	84	82					
	12	316	88	1481	66	66	66	65	65	65	65	74	72	7405	81	80	80	80	80	80	80	79	79	89	87					
125	2	83	23	41	21	21	20	20	20	18	11	3	28	24	206	35	35	35	35	35	34	31	23	43	40					
	4	167	46	165	39	39	39	38	38	38	36	29	47	44	823	54	53	53	53	53	53	52	49	62	59					
	6	250	70	370	50	49	49	49	49	49	48	44	58	55	1851	64	64	64	64	63	63	63	63	63	73	70				
	8	334	93	658	57	57	57	57	56	56	56	55	65	63	3291	64	64	64	64	63	63	63	63	63	73	70				
	10	417	116	1029	63	63	63	63	62	62	62	62	71	69	5143	78	78	77	77	77	77	77	76	86	84					
	12	501	139	1481	68	68	68	67	67	67	67	67	76	74	7405	83	82	82	82	82	82	82	81	81	91	89				
160	2	139	38	41	23	23	22	22	22	18	10	2	30	26	206	37	37	37	37	37	36	31	23	45	42					
	4	277	77	165	41	41	41	41	40	40	36	28	49	46	823	56	56	55	55	55	55	54	49	64	61					
	6	416	115	370	52	52	51	51	51	51	51	43	60	57	1851	66	66	66	66	66	65	65	64	75	72					
	8	554	154	658	59	59	59	59	59	58	58	54	67	65	3291	74	74	74	73	73	73	73	73	82	80					
	10	693	192	1029	65	65	65	65	64	64	64	62	73	71	5143	80	80	79	79	79	79	79	79	78	88	86				
	12	831	231	1481	70	70	70	69	69	69	69	69	78	76	7405	85	84	84	84	84	84	84	83	83	93	91				
200	2	218	61	41	25	25	24	24	24	17	10	2	32	27	206	39	39	39	39	39	38	30	22	47	43					
	4	436	121	165	43	43	43	42	42	42	38	30	51	48	823	58	57	57	57	57	57	56	48	66	63					
	6	654	182	370	54	54	53	53	53	53	50	43	61	59	1851	68	68	68	68	67	67	67	63	76	74					
	8	872	242	658	61	61	61	61	60	60	60	53	69	67	3291	76	76	75	75	75	75	75	74	84	82					
	10	1091	303	1029	67	67	67	67	66	66	66	62	75	73	5143	82	82	81	81	81	81	81	80	90	88					
	12	1309	364	1481	72	72	72	71	71	71	71	69	80	78	7405	87	86	86	86	86	86	85	85	95	93					
250	2	342	95	41	27	26	26	26	25	17	9	1	33	28	206	41	41	41	41	40	37	30	22	48	44					
	4	684	190	165	45	45	45	44	44	43	35	27	52	49	823	60	59	59	59	59	58	55	48	67	64					
	6	1027	285	370	56	55	55	55	55	55	50	42	63	60	1851	70	70	70	70	69	69	69	63	78	76					
	8	1369	380	658	63	63	63	63	62	62	61	53	71	68	3291	78	78	77	77	77	77	77	74	86	83					
	10	1711	475	1029	69	69	69	68	68	68	68	61	77	75	5143	84	83	83	83	83	83	82	82	92	90					
	12	2053	570	1481	74	74	73	73	73	73	73	68	82	79	7405	88	88	88	88	88	87	87	87	97	94					
315	2	546	152	41	29	28	28	28	24	16	8	1	35	29	206	43	43	43	43	42	37	29	21	50	46					
	4	1092	303	165	47	47	46	46	46	42	34	26	54	50	823	61	61	61	61	61	60	55	47	69	66					
	6	1639	455	370	58	57	57	57	57	57	49	42	65	62	1851	72	72	72	72	71	71	70	62	80	77					
	8	2185	607	658	65	65	65	65	64	64	60	52	73	70	3291	80	80	79	79	79	79	79	73	88	85					
	10	2731	759	1029	71	71	71	70	70	70	68	61	79	76	5143	86	85	85	85	85	85	84	81	94	91					
	12	3277	910	1481	76	76	75	75	75	75	75	67	84	81	7405	90	90	90	90	90	89	89	88	99	96					
400	2	884	246	41	31	30	30	30	23	16	8	0	37	30	206	45	45	45	45	44	36	28	21	52	47					
	4	1768	491	165	49	49	48	48	48	41	34	26	56	51	823	64	63	63	63	63	62	54	47	71	68					
	6	2652	737	370	60	59	59	59	59	57	49	41	67	63	1851	74	74	74	74	73	73	69	62	82	79					
	8	3536	982	658	67	67	67	67	66	66	60	52	75	71	3291	82	82	81	81	81	81	80	72	90	87					
	10	4420	1228	1029	73	73	73	72	72	72	68	60	81	78	5143	88	87	87	87	87	87	86	81	96	93					
	12	5305	1473	1481	78	78	77	77	77	77	75	67	86	83	7405	92	92	92	92	92	91	91	88	101	98					

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Servomotor specification

Table 1. Specification of Universal series regulators

RAPAV can be supplied with actuators with standard timing of motion or with fast actuators.

Specification	VRU-D3-BAC	VRU-M1-BAC	VRU-M1R-BAC
Rated voltage	AC/DC 24V, 50/60Hz, AC 19.2...28.8 V / DC 21.6...28.8 V		
Power consumption	1,5 W		
Communications	BACnet MS/TP, Modbus RTU, MP-Bus		
Working range Y/ Variable Y working range	2-10 V / 0,5-10 V		
Feedback signal U	Max 0,5 mA Options: flow, Δp, position		Max 0,5 mA Options: Δp, position
Variable U Feedback signal	0...10 V Start point 0...8 V End point 2...10 V		
Measurement accuracy	±1 [Pa] in the range of 0...20 [Pa], ±5% in the range of 20...500 [Pa]	-	-
Maximum duct pressure	1500 Pa	1500 Pa	-
Elevation reduction	Adapted for installation at 0-3000 m.n.p.m. above sea level		
Specification of measured air	Temperature 0...+50°C, humidity 5...95% r.H., no condensation		
Connection pressure hoses	5.3mm diameter, max. 20m of length for the measurement of duct pressure (inner diameter 5 mm)	Diameter 5.3 mm (inner diameter 5mm)	
Casing insulation class	IP42		
Storage and transport temperature	-20...80°C		
Maintenance	Maintenance-free		
Weight	0,34 kg		

- Controllers can work with room temperature sensors, CO2 sensors
- VRU-M1R-BAC can operate with the 'door switch' sensor
- For VRU-D3-BAC, the maximum length of measuring tubes is 20m, for longer tubes, the VRU-M1-BAC is recommended

Table 2. Actuator Specification

Specification	LM24A-VST	NM24A-VST	SM24A-VST	LMQ24A-VST	NMQ24A-VST	NMQ24A-VST	LF24-VST	NF24A-VST	SF24A-VST
Rated voltage (from VRU regulator...)	AC/DC 24V 50/60 Hz								
Power consumption (in operation/idle)	1/ 0,4 W	2/ 0,4 W	2/ 0,4 W	13/2 W	13/2 W	11/ 3 W	2,5/1 W	5/ 2,5 W	8,5/ 3,5 W
Protection class	III Safe voltage - low								
Torque	5 Nm	10 Nm	20Nm	4 Nm	8 Nm	6 Nm	4 Nm	10 Nm	20 Nm
Motion time	120 s			2,5 s	4 s		120 s		
Safety feature	No					Yes			
Casing insulation class	IP 54								
Electromagnetic compatibility	CE as per 2014/30/WE								
Ambient temperature	-30...50 °C			-30...40 °C			-30...50 °C		
Ambient humidity	Max. 95% relative humidity, no condensation								
Manual setting	Button with an option to lock					Button	No	Using a crank and a lock switch	
Maintenance	Maintenance-free								
Mass	0,5 kg	0,8 kg	0,5 kg	0,85 kg	0,90 kg	1,1 kg	1,9 kg	1,9 kg	2,2 kg

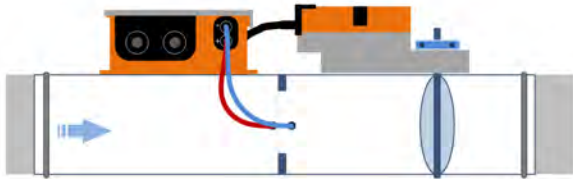
Pressure regulator in RAPAV ventilation systems

RAPAV

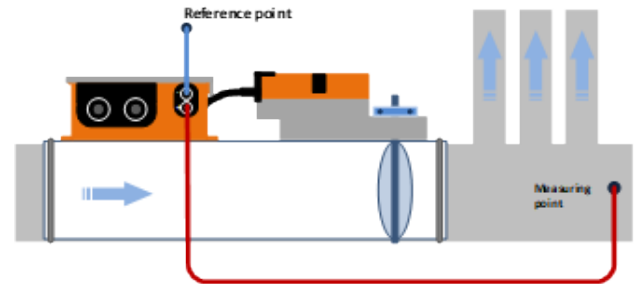
Operating diagram

1. Measurement of the pressure difference in a duct on a measuring element (on a flange/reductor)
2. Measure the pressure difference between the duct and outside the duct

Volume flow VAV/CAV



Channel / ribbon pressure STP



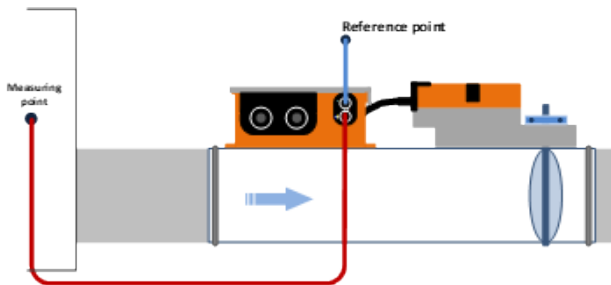
*Pre-installed jumpers 2-4.

- Delete during remote specification of the set-point.

- VRU-D3-BAC 0...500 Pa (max. 20 m)
- VRU-M1-BAC 0...600 Pa

3. Measurement of the pressure difference between two rooms or between a room and another reference point; can operate with positive and negative pressures

Control function: Room pressure



- VRU-M1R-BAC -75...75 Pa
- L/N/SM24A-VST, N/SF24A-VST

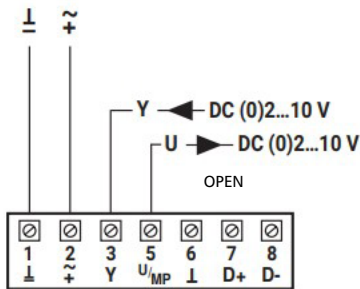
Pressure regulator in RAPAV ventilation systems

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Connections diagram

Analogue contro:

AC/DC 24 V, modulating (VAV)



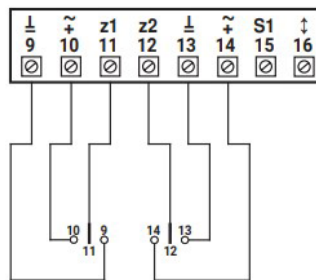
Override control z1

Contact 11-9 = Motor STOP
Contact 11-10 = Damper OPEN

Override control z2

Contact 12-13 = Damper CLOSED
Contact 12-14 = MAX

11/12 uncoated = priority rule
a/b/c/d/e



Modulation

VAV and pressure applications: Min ... Max

Adjustment levels

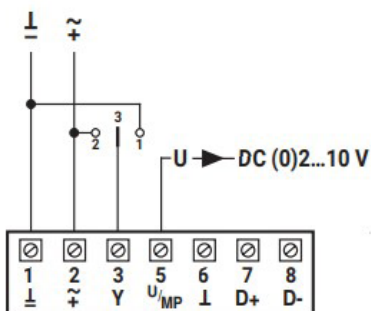
- VAV and pressure applications
- Min.
- Max
- Damper CLOSED
- Damper open
- (Motor-stop)

No half-wave circuit (diodes)

24 V AC/DC Step control (CAV)

Contact 2-3 = MAX 3 uncoated = MIN
Contact 1-3 = CLOSE (Mode 2...10 V)

MIN (Mode 0...10 V)



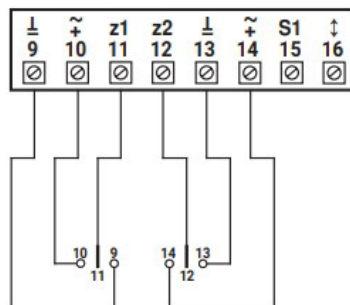
Override control z1

Contact 11-9 = Motor STOP
Contact 11-10 = Damper OPEN

Override control z2

Contact 12-13 = Damper CLOSED
Contact 12-14 = MAX

11/12 uncoated = priority rule
a/b/c/d/e



Modulation

VAV and pressure application: Min / Max

Adjustment levels

- VAV application and Print
- min
- max
- Flap closed
- Flap OPEN
- (motor stops)
-)

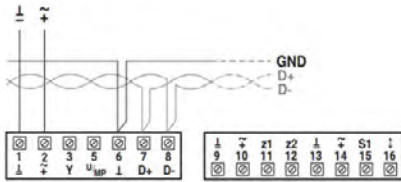
No half-wave circuit (diodes)

Pressure regulator in RAPAV ventilation systems

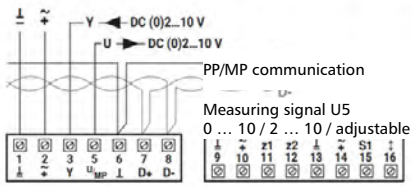
RAPAV

BACnet / Modbus RTU control:

BACnet MS/TP / Modbus RTU



BACnet MS/TP / Modbus RTU with analog setpoint (hybrid mode)



Connection passive Sensor (bus operation)



1)	2)
200 Ω...2 kΩ	0.5 Ω
2 kΩ...10 kΩ	2.7 Ω
10 kΩ...55 kΩ	14.7 Ω

