

Series 42 Self-operated Regulators



Type 42-10 RS Check Valve (backflow protection)

ANSI version

Application

Designed to protect nitrogen and compressed air networks against backflow from directly connected systems.

Differential pressure set point $\Delta p = 3 \text{ psi}/5 \text{ psi}^{1)}$ (0.2/0.3 bar)

Valve size **NPS ½ to 10 (DN 15 to 250)** · Pressure rating

Class 150 and 300 · Compressed air and nitrogen up to **175 °F/300 °F²⁾ (80 °C/150 °C)**

The regulator prevents flowback from directly connected systems.

The regulator is opened when the upstream pressure is at least 3 psi/5 psi¹⁾ (0.2 bar/0.3 bar) greater than the downstream pressure. It is closed automatically when the downstream pressure rises to or above the value of the upstream pressure.

The regulator closes reliably to prevent backflow from the plant into the compressed air or nitrogen network. The soft-seated plug and seat trim complies with leakage class VI.

Special features

- Low-noise, medium-controlled proportional regulators requiring little maintenance
- In the event of a diaphragm rupture, the undamaged operating diaphragm takes over the function of the damaged diaphragm
- Reliable functioning even in the event of a power failure or when other instruments in the control circuit malfunction
- Diaphragm rupture indicator
- Fixed set point
- Regulators delivered ready-to-install without supplementary devices, meaning no additional installations or start-ups are necessary
- Low purchase and installation costs
- Valve body optionally made of cast steel A216 WCC or cast stainless steel A351 CF8M
- All wetted parts are free of non-ferrous metal
- External adjustment not possible
- Backflow only leads to a minimum amount of leakage (leakage class VI) due to the soft-seated plug
- An increasing backpressure supports tight shut-off of the valve

¹⁾ NPS 8 and 10 version (DN 200 and 250)

²⁾ Version with FPM diaphragm

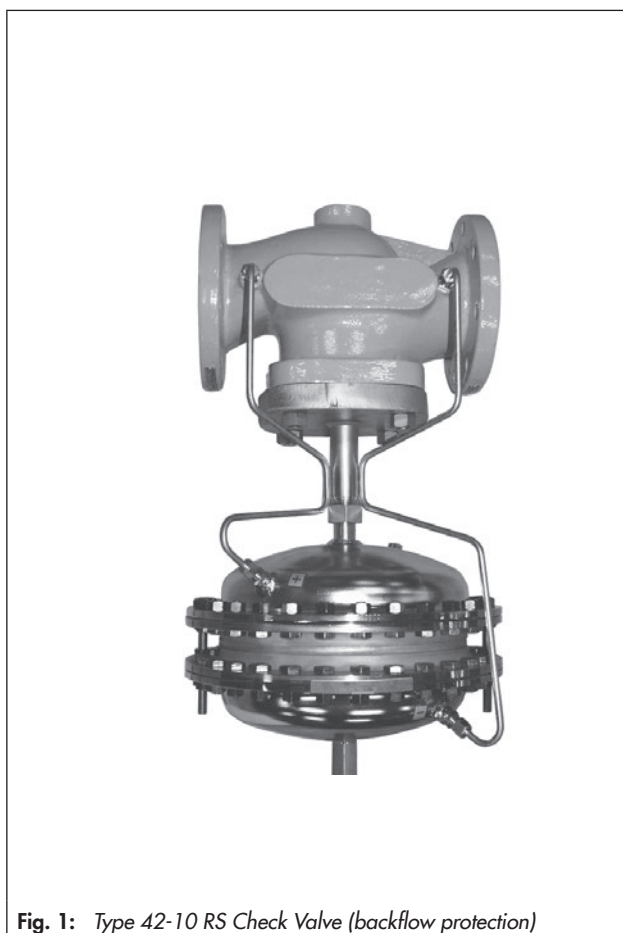


Fig. 1: Type 42-10 RS Check Valve (backflow protection)

Versions

Check valve in supply pipelines

Type 42-10 RS · Class 150 and 300 · Type 2421 RS Valve, NPS ½ to 10 (DN 15 to 250) · Type 2420 RS Actuator with two diaphragms · Set point fixed at 3 psi (0.2 bar) or 5 psi¹⁾ (0.3 bar) · Special version in stainless steel · Version suitable for steam on request · Version for deionized water on request

Optional: Diaphragm rupture indication with pressure switch · Fittings and diaphragm rupture indicator made of Monel

Principle of operation

The medium flows through the valve in the direction indicated by the arrow. The position of the valve plug (3) determines the differential pressure over the cross-sectional area released between the plug and seat (2). The valve is closed by the springs in the normal position.

At a differential pressure of 3 psi/5 psi ¹⁾ (0.2 bar/3.0 bar), the valve begins to open; at 5 psi/7 psi (0.35 bar/0.55 bar), the valve is completely open. At this point, the upstream pressure p_1 (compressed air or nitrogen network pressure) must be greater than the downstream pressure p_2 . The valve closes automatically when the downstream pressure rises to or above the value of the upstream pressure.

The valve plug with soft sealing is standard to ensure tight shut-off and to prevent backflow from the plant into the compressed air or nitrogen network.

The mounted control lines (14) transmit the high pressure and low pressure to the actuator.

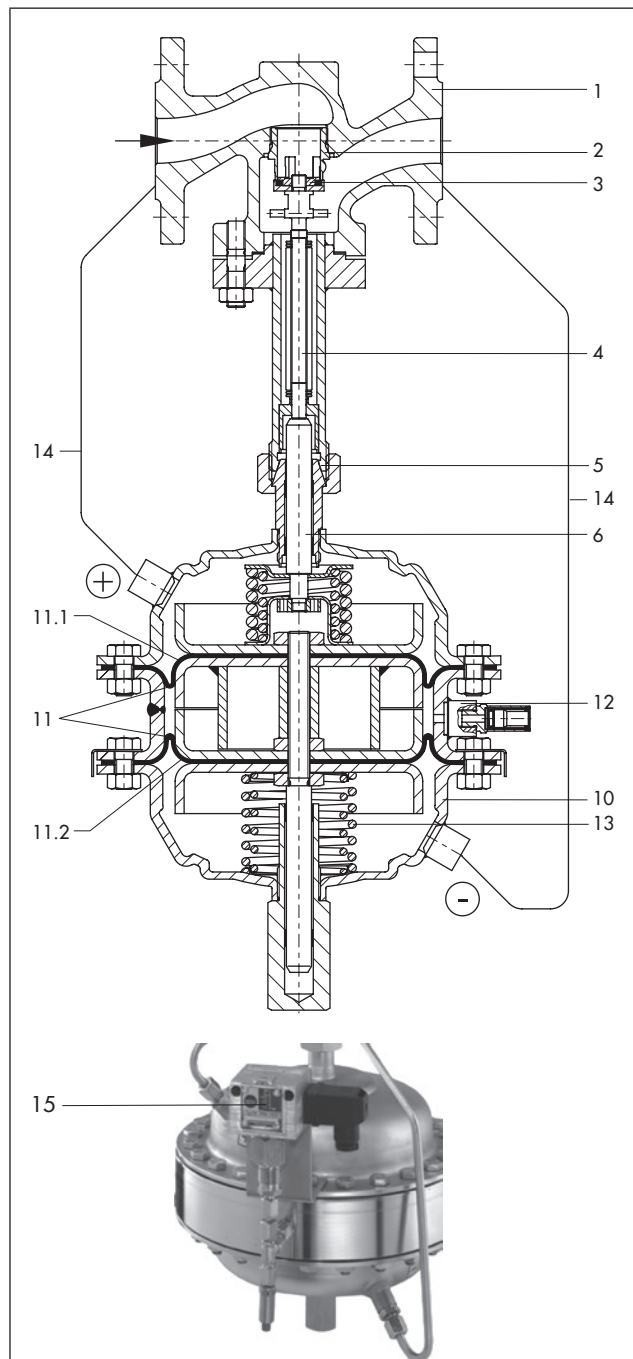
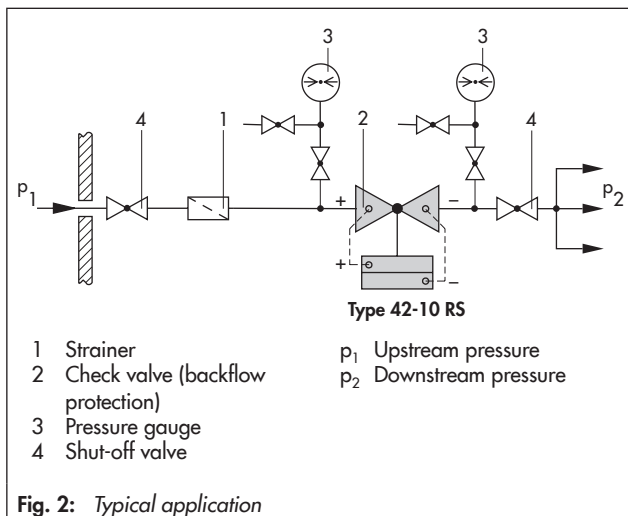
The actuator with two diaphragms (11) offers increased safety and reliability of functions. The operating diaphragm for high pressure (11.1) is connected to the valve input pressure, whereas the operating diaphragm for low pressure (11.2) is connected to the valve output pressure. There is a bore with a mechanical diaphragm rupture indication (12) in the intermediate ring located between the two diaphragms. The pressure of response of the diaphragm rupture indication is approximately 22 psi (1.5 bar). If the diaphragm ruptures, the pressure between the diaphragms will increase and cause the pin of the diaphragm rupture indication to move outward until the red marking appears to indicate the diaphragm rupture. The undamaged operating diaphragm then takes over the function of the damaged operating diaphragm.

A pressure switch (15) can be optionally mounted to the actuator to trigger an alarm.

If a diaphragm rupture is indicated, we recommend replacing both diaphragms.

¹⁾ NPS 8 and 10 version (DN 200 and 250)

Typical application



- 1 Valve body
- 2 Seat
- 3 Plug
- 4 Plug stem
- 5 Coupling nut (to connect diaphragm actuator)
- 6 Actuator stem
- 10 Actuator housing
- 11 Two diaphragms
- 11.1 Operating diaphragm for high pressure
- 11.2 Operating diaphragm for low pressure
- 12 Diaphragm rupture indicator
- 13 Set point springs
- 14 Control line 0.3"x0.04" (8x1 mm)
- 15 Pressure switch (optional)

Table 1: Technical data

Type 2421 RS Valve												
Valve size	NPS	½	¾	1	1½	2	2½	3	4	6	8	10
	DN	15	20	25	40	50	65	80	100	150	200	250
C _v and K _{vS} coefficient	C _v	4.5	7.5	9.4	23	37	60	94	145	330	490	585
	K _{vS}	4	6.3	8	20	32	50	80	125	280	420	500
Pressure rating	Class 150 or 300 (PN 25 or 40)											
Max. constant operating pressure	360 psi (25 bar)											
Max. perm. pressure acting on one side	650 psi (45 bar)											
Leakage class according to ANSI/FCI 70-2 ¹⁾	Leakage class VI											
Max. permissible temperature with EPDM diaphragm in actuator with FPM diaphragm in actuator	175 °F (80 °C) for air and gases · 300 °F (150 °C) for water 430 °F (220 °C) for steam with compensation chamber 300 °F (150 °C)											
Compliance	EAC											
Type 2420 RS Actuator												
Actuator area	50 in ² (320 cm ²)						100 in ² (640 cm ²)					
Differential pressure set point Δp, fixed NPS ½ to 6 NPS 8 and 10	3 psi · 0.2 bar 5 psi · 0.3 bar											
Max. permissible temperature with EPDM diaphragm with FPM diaphragm	175 °F (80 °C) for air and gases · 300 °F (150 °C) for water 430 °F (220 °C) for steam with compensation chamber 300 °F (150 °C)											
Compliance	EAC											

¹⁾ Terms for control valve sizing according to IEC 60534: F_L = 0.95, X_T = 0.75

Table 2: Materials: Material numbers according to DIN EN

Type 2421 RS Valve				
Pressure rating	Class 150		Class 300	
Valve body	Cast steel A216 WCC		Cast stainless steel A351 CF8M	
Seat and plug	Stainless steel 1.4404 with EPDM soft seal			
Plug stem	Stainless steel 1.4301			
Bottom section	Stainless steel A479 316L/1.4404 · S30400/1.4301			
Body gasket	novatec® PREMIUM			
Type 2420 RS Actuator				
Diaphragm cases	Sheet steel DD11		Stainless steel 1.4301	
Diaphragm	EPDM with fabric reinforcement · FPM			
Guide bushing	DU bushing		PTFE bushing	
Distance piece	Sheet steel DD11		Stainless steel 1.4301	
Coupling pin	Stainless steel 1.4301			
Seals	EPDM · FPM			

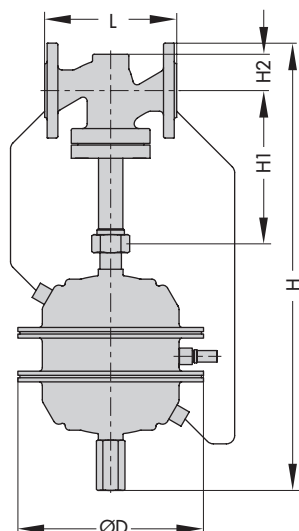
Installation

The regulator is delivered ready for installation.

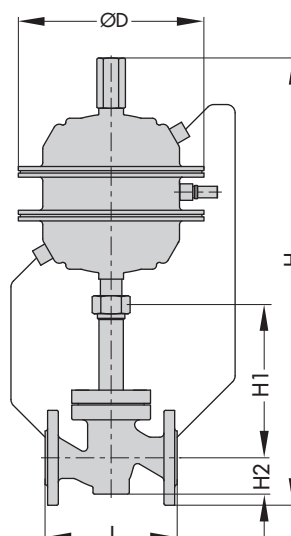
The following points must be observed:

- Install the valves in horizontal pipelines free of stress with the actuator suspended downwards (or facing upwards with NPS 8 and 10/DN 200 and 250; see Fig. 4).
- Direction of flow must match the direction indicated by the arrow on the body.
- Install a strainer upstream of the valve.

Dimensions



Type 42-10 RS · NPS ½ to 6 (DN 15 to 150)



Type 42-10 RS · NPS 8 and 10 (DN 200 and 250)

Dimensions in mm and weights

Valve size	NPS	½	¾	1	1½	2	2½	3	4	6	8	10	
	DN	15	20	25	40	50	65	80	100	150	200	250	
Length L	Class 150	inch	7.25			8.75	10	10.9	11.75	13.9	17.75	21.4	26.5
		mm	184			222	254	276	298	352	451	543	673
	Class 300	inch	7.5	7.6	7.75	9.25	10.5	11.5	12.5	14.5	18.6	22.4	27.9
		mm	191	194	197	235	267	292	318	368	473	568	708
Height H	inch	19.7			23.6		31.5		32.7	39.4	44.9		
	mm	550			600		800		830	1000	1144		
Height H1	inch	8.6					11.8		14	23.2	28.7		
	mm	225					300		355	590	730		
Height H2	inch	1.8			2.8		3.9		4.5	6.9	10.2		
	mm	45			72		98		113	175	260		
Actuator	ANSI	ØD = 11.2" · A = 50 in ²					ØD = 15.4" · A = 100 in ²						
	DIN	ØD = 285 mm · A = 320 cm ²					ØD = 390 mm · A = 640 cm ²						
Weight, approx.	Class 150	lb	57	58	62	78	87	131	144	165	360	893	1025
		kg	26	26.5	28	35.5	39.5	59.5	65.5	75	165	405	465
	Class 300	lb	60	61	65	82	91	137	151	173	376	900	1040
		kg	27	27.5	29.5	37	41.5	62	68.5	78.5	170.5	410	470

Fig. 4: Dimensions

Ordering text

Type 42-10 RS Check Valve (= Valve 4210 RS + Actuator 2420 RS + Mounting unit M 4210 RS)

Set point fixed at 3 psi (0.2 bar) with NPS ½ to 6

Set point fixed at 5 psi (0.3 bar) with NPS 8 and 10

NPS (DN) ...

Body material ..., Class ...

Special version

Table 3: Flow rates for Type 2421 RS Valve**Table 3.1: Flow rates for nitrogen**

5 psi pressure drop across the valve

Valve size	NPS	½	¾	1	1½	2	2½	3	4	6
C_v coefficient		4.5	7.5	9.4	23	37	60	94	145	330
Input pressure p₁ (gauge) in psi		Maximum flow rate of nitrogen (x10³ SCFH) at 70 °F								
75		4.99	8.32	10.4	25.5	41	66.6	104	137	366
125		6.29	10.5	13.1	32.2	51.7	83.9	131	173	461
275		9.15	15.2	19.1	46.7	75.2	122	191	252	671
300		9.54	15.9	19.9	48.7	78.4	127	199	260	699
350		10.3	17.1	21.5	52.5	84.5	137	215	283	754

10 psi pressure drop across the valve

Valve size	NPS	½	¾	1	1½	2	2½	3	4	6
C_v coefficient		4.5	7.5	9.4	23	37	60	94	145	330
Inlet pressure p₁ (gauge) in psi		Maximum flow rate of nitrogen (x10³ SCFH) at 70 °F								
75		6.86	11.4	14.3	35.1	56.4	91.5	143	189	503
125		8.74	14.6	18.3	44.7	71.9	117	183	240	641
275		12.8	21.4	26.8	65.5	105	171	268	350	940
300		13.4	22.3	28	68.4	110	178	280	365	981
350		14.4	24.1	30.2	73.8	119	193	302	397	1059

15 psi pressure drop across the valve

Valve size	NPS	½	¾	1	1½	2	2½	3	4	6
C_v coefficient		4.5	7.5	9.4	23	37	60	94	145	330
Inlet pressure p₁ (gauge) in psi		Maximum flow rate of nitrogen (x10³ SCFH) at 70 °F								
75		8.16	13.6	17.1	41.7	67.1	109	171	225	599
125		10.5	17.5	22	53.7	86.4	140	220	289	771
275		15.6	26	32.5	79.6	128	208	325	429	1142
300		16.3	27.1	34	83.1	134	217	340	448	1193
350		17.6	29.3	36.7	89.8	144	234	367	484	1288

Table 3.2: Flow rate set points for air**5 psi pressure drop across the valve**

Valve size	NPS	½	¾	1	1½	2	2½	3	4	6
C_v coefficient		4.5	7.5	9.4	23	37	60	94	145	330
Inlet pressure p₁ (gauge) in psi		Maximum flow rate of air (x10³ SCFH) at 70 °F								
75		4.92	7.97	10.3	25.2	40.5	65.7	103	134	361
125		6.21	10.1	13	31.8	51.1	82.9	129.8	168	456
275		9.05	14.6	18.9	46.2	74.4	121	189	245	663
300		9.43	15.3	19.7	48.2	77.6	126	197	256	692
350		10.2	16.5	21.3	52	83.7	136	213	276	746

10 psi pressure drop across the valve

Valve size	NPS	½	¾	1	1½	2	2½	3	4	6
C_v coefficient		4.5	7.5	9.4	23	37	60	94	145	330
Inlet pressure p₁ (gauge) in psi		Maximum flow rate of air (x10³ SCFH) at 70 °F								
75		6.77	11	14.2	34.6	55.7	90.4	142	184	497
125		8.63	14	18	44.1	71	115	180	234	633
275		12.7	20.5	26.5	64.9	104	169	265	344	931
300		13.2	21.4	27.7	67.7	109	177	278	359	971
350		14.3	23.1	29.9	73.1	118	191	299	388	1049

15 psi pressure drop across the valve

Valve size	NPS	½	¾	1	1½	2	2½	3	4	6
C_v coefficient		4.5	7.5	9.4	23	37	60	94	145	330
Inlet pressure p₁ (gauge) in psi		Maximum flow rate of air (x10³ SCFH) at 70 °F								
75		8.06	13.3	16.8	41.2	66.3	107.6	168	219	591
125		10.4	16.8	21.7	53.1	85.4	138	217	282	762
275		15.4	25	32.2	78.8	127	205	322	418	1130
300		16.1	26	33.6	82.3	132	215	336	437	1180
350		17.4	28.2	36.4	89	143	232	364	472	1276

Specifications subject to change without notice



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