Series 42 Self-operated Regulators

Type 42-10 RS Check Valve (backflow protection)

Application

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

Differential pressure set point **Δp = 0.2 bar (0.3 bar)** [1] · Nominal size **DN 15** to **250** · Nominal pressure **PN 16** to **40** · Compressed air and nitrogen up to **80 °C (150 °C)** [2]

The regulator prevents flowback from directly connected systems.

The regulator is opened when the upstream pressure is at least 0.2 bar (0.3 bar) [1] 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 available in cast steel, cast stainless steel or forged stainless steel
- 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) DN 200 and 250 version
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 · Type 2421 RS Valve, DN 15 to 250
Type 2420 RS Actuator with two diaphragms · Set point fixed at 0.2 bar (0.3 bar) [1] · 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 0.2 bar (3.0 bar with DN 200 and 250), the valve begins to open; at 0.35 bar (0.55 bar with DN 200 and 250), 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.

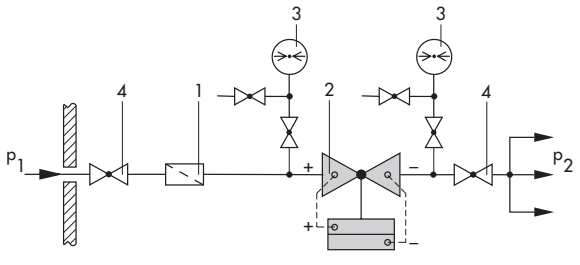
The mounted control lines (14) transmit the upstream pressure (+) and the downstream pressure (–) to the actuator.

The actuator with two diaphragms (11) offers increased safety and reliability of functions. The operating diaphragm for upstream pressure (11.1) is connected to the valve input pressure (+), whereas the operating diaphragm for downstream 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 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.

Typical application

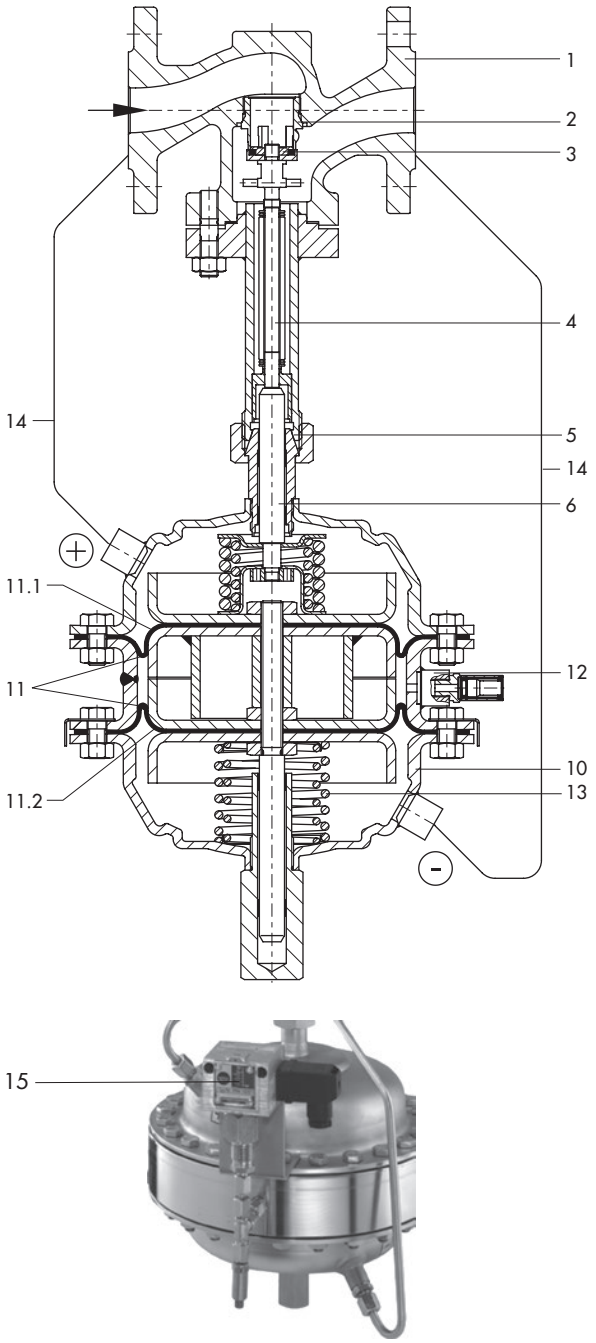


Type 42-10 RS

1 Strainer
2 Check valve (backflow protection)
3 Pressure gauge
4 Shut-off valve

p_1 Upstream pressure
p_2 Downstream pressure

Fig. 2: *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 upstream pressure (+)
11.2 Operating diaphragm for downstream pressure (–)
12 Diaphragm rupture indicator
13 Set point springs
14 Control line 8x1 mm
15 Pressure switch (optional)

Fig. 3: *Functional diagram*

Table 1: *Technical data*

Type 2421 RS Valve													
Nominal size	**15**	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**	**200**	**250**
K_{VS} coefficient	4	6.3	8	16	20	32	50	80	125	190	280	420	500
Nominal pressure	PN 16, 25 or 40												
Max. constant operating pressure	25 bar												
Max. perm. pressure acting on one side	45 bar												
Leakage class according to IEC 60534-4 [1]	Leakage class VI												
Max. permissible temperature with EPDM diaphragm in actuator with FPM diaphragm in actuator	80 °C for air and gases · 150 °C for water · 220 °C for steam with condensation chamber 150 °C												
Compliance	CE · EAC												
Type 2420 RS Actuator													
Actuator area	320 cm²							640 cm²					
Differential pressure set point Δp, fixed DN 15 to 150 DN 200 and 250	0.2 bar 0.3 bar												
Max. permissible temperature with EPDM diaphragm with FPM diaphragm	80 °C for air and gases · 150 °C for water · 220 °C for steam with condensation chamber 150 °C												
Compliance	CE · 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			
Nominal pressure	**PN 16/25/40**	**PN 16/25/40**	**PN 40**
Valve body	Cast steel 1.0619	Cast stainless steel 1.4408	Forged stainless steel [1] 1.4571
Seat and plug	Stainless steel 1.4404 with EPDM soft seal		
Plug stem	Stainless steel 1.4301		
Bottom section	Stainless steel 1.4404/1.4301		
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		

[1] DN 15, 20, and 50 only

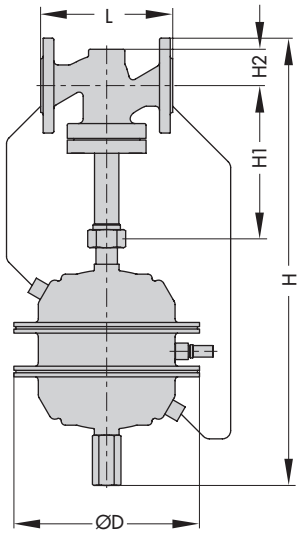
Installation

The regulator is delivered ready for installation.

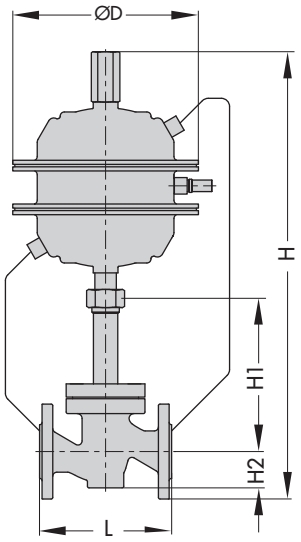
The following points must be observed:

- Install the valves in horizontal pipelines free of stress with the actuator suspended downwards (or facing upwards with 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 · DN 15 to 150



Type 42-10 RS · DN 200 and 250

Dimensions in mm and weights in kg

Nominal size DN		15	20	25	32	40	50	65	80	100	125	150	200	250
Length L		130	150	160	180	200	230	290	310	350	400	480	600	730
Height H1		225						300		355	460	590	730	
Height H2	Other materials	55			72			100		120	145	175	260	
	Forged steel	53	–	70	–	92	98	–	–	–	–	–	–	
Height H		550			600			800		830	1000		1144	
Actuator		ØD = 285 mm · A = 320 cm²						ØD = 390 mm · A = 640 cm²						
Weight, approx. kg		26	26.5	28	35	35.5	39.5	59.5	65.5	75	110	165	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 0.2 bar (0.3 bar with DN 200 and 250)

DN …

Body material ..., PN …

Special version

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

Table 3.1: *Flow rates for nitrogen*

0.25 bar pressure drop across the valve

DN		15	20	25	32	40	50	65	80	100	125	150
K_{VS}		4	6.3	8	16	20	32	50	80	125	190	280
		Maximum flow rate of nitrogen in Nm³/h at 20 °C · 0.25 bar pressure drop across the valve										
Inlet pressure p_1 (gauge) in bar	2	82.19	129.4	164.5	328.8	411.3	658	1028	1645	2160	3907	5758
	3	95.9	151	191.8	383.6	497.7	767.5	1199	1918	2519	4557	6716
	4	107.8	169.9	215.8	431.5	539.5	863.3	1349	2158	2833	5126	7554
	5	118.6	186.9	237.4	474.6	593.5	949.5	1483	2374	3116	5638	8309
	6	128.5	202.4	257.1	514.2	642.9	1028	1607	2571	3376	6108	9001
	8	146.3	230.5	292.8	585.5	732	1171	1830	2928	3844	6954	10240
	10	162.2	255.6	324.6	649.1	811.5	1298	2029	3246	4261	7709	11360
	12	176.7	278.4	353.6	707.1	884	1414	2210	3536	4641	8398	12370
	15	196.5	309.6	393.1	786.2	982.9	1572	2457	3931	5161	9338	13760
	20	225.7	355.6	451.6	903.1	1129	1806	2822	4516	5928	10720	15800
	25	251.7	396.4	503.4	1006	1258	2013	3146	5034	6608	11950	17620

0.5 bar pressure drop across the valve

DN		15	20	25	32	40	50	65	80	100	125	150
K_{VS}		4	6.3	8	16	20	32	50	80	125	190	280
		Maximum flow rate of nitrogen in Nm³/h at 20 °C · 0.5 bar pressure drop across the valve										
Inlet pressure p_1 (gauge) in bar	2	111.3	175.4	223	445.5	557.5	892	1394	2230	2930	5298	7806
	3	131.3	206.9	263	525.6	657.5	1052	1644	2630	3455	6247	9206
	4	148.7	234.3	297.7	595.1	744.4	1191	1861	2977	3911	7072	10420
	5	164.3	258.9	328.9	657.5	822.3	1315	2056	3289	4319	7812	11510
	6	178.6	281.3	357.4	714.5	893.5	1429	2234	3574	4693	8489	12510
	8	204.2	321.6	408.5	816.8	1021	1634	2553	4085	5364	9704	14300
	10	226.9	357.4	454	907.8	1135	1816	2838	4540	5961	10780	15890
	12	247.6	390.1	495.4	990.7	1238	1981	3097	4955	6504	11760	17340
	15	275.8	434.5	551.8	1103	1379	2207	3449	5519	7245	13100	19310
	20	317.5	500.1	635.1	1270	1587	2540	3969	6351	8337	15080	22220
	25	354.4	558.1	708.7	1417	1772	2835	4430	7088	9304	16830	24800

1 bar pressure drop across the valve

DN		15	20	25	32	40	50	65	80	100	125	150
K_{VS}		4	6.3	8	16	20	32	50	80	125	190	280
		Maximum flow rate of nitrogen in Nm³/h at 20 °C · 1 bar pressure drop across the valve										
Inlet pressure p_1 (gauge) in bar	2	143.6	226.3	288	574.9	720.4	1152	1802	2881	3792	6846	10090
	3	173.8	273.8	348.2	695.5	870.9	1393	2178	3483	4581	8276	12190
	4	199.7	314.5	399.9	798.9	1000	1599	2501	4000	5258	9502	14000
	5	222.6	350.7	445.8	890.9	1114	1783	2788	4459	5859	10590	15600
	6	243.5	383.6	487.6	974.4	1219	1950	3048	4876	6407	11580	17060
	8	280.8	442.3	562	1123	1405	2248	3514	5621	7383	13350	19670
	10	313.7	494.2	627.9	1255	1570	2511	3925	6279	8247	14910	21980
	12	343.6	541.3	687.6	1374	1719	2750	4298	6877	9030	16330	24070
	15	384.2	605.2	768.7	1537	1920	3075	4805	7688	10090	18260	26900
	20	443.8	699.1	887.9	1775	2220	3551	5550	8880	11650	21090	31080
	25	496.5	782	993.2	1986	2483	3973	6208	9933	13040	23590	34760

Table 3.2: *Flow rates for air*

0.25 bar pressure drop across the valve

DN		15	20	25	32	40	50	65	80	100	125	150
K_{VS}		4	6.3	8	16	20	32	50	80	125	190	280
		Maximum flow rate of air in Nm³/h at 20 °C · 0.25 bar pressure drop across the valve										
Inlet pressure p_1 (gauge) in bar	**2**	80.95	127.5	161.8	323.4	404.5	647.2	1011	1618	2125	3843	5663
	3	94.32	148.5	188.7	377.3	471.8	754.8	1179	1887	2478	4482	6605
	4	106.1	167.1	212.2	424.4	530.7	849.1	1326	2122	2787	5042	7430
	5	116.7	183.8	233.4	466.8	583.7	933.9	1459	2335	3065	5545	8172
	6	126.4	199.1	252.9	505.8	632.4	1011	1581	2529	3320	6008	8853
	8	143.9	226.7	288	575.9	720	1152	1800	2880	3780	6840	10080
	10	159.6	251.4	319.2	638.5	798.2	1277	1995	3193	4191	7583	11170
	12	173.8	273.5	347.8	695.5	869.5	1391	2174	3478	4565	8261	12170
	15	193.3	304.5	386.7	774	966.9	1547	2417	3867	5076	9185	13530
	20	222.1	349.8	444.2	888.5	1110	1777	2776	4442	5831	10550	15550
	25	247.8	390	495.3	990.6	1238	1981	3095	4953	6501	11760	17330

0.5 bar pressure drop across the valve

DN		15	20	25	32	40	50	65	80	100	125	150
K_{VS}		4	6.3	8	16	20	32	50	80	125	190	280
		Maximum flow rate of air in Nm³/h at 20 °C · 0.5 bar pressure drop across the valve										
Inlet pressure p_1 (gauge) in bar	**2**	109.6	172.7	219.3	438.2	548.4	877.3	1371	2193	2882	5390	7678
	3	129.2	203.5	258.6	517	646.7	1034	1617	2587	3398	6357	9054
	4	146.3	230.5	292.8	585.4	732.2	1171	1830	2928	3846	7198	10250
	5	161.6	254.6	323.5	646.7	808.8	1294	2022	3235	4248	7952	11320
	6	175.6	276.7	351.5	702.8	878.9	1406	2197	3515	4616	8642	12300
	8	200.8	316.3	401.8	803.4	1004	1607	2512	4018	5276	9881	14060
	10	223.2	351.6	446.6	893.0	1116	1786	2791	4466	5863	109080	15630
	12	243.6	383.2	487.3	974.5	1218	1949	3046	4873	6398	11980	17050
	15	271.3	427.4	542.8	1086	1357	2171	3393	5429	7127	13350	19000
	20	312.3	491.9	624.7	1249	1562	2499	3905	6247	8201	15380	21860
	25	348.9	549.1	697.3	1394	1743	2789	4358	6973	9153	17170	24400

1 bar pressure drop across the valve

DN		15	20	25	32	40	50	65	80	100	125	150
K_{VS}		4	6.3	8	16	20	32	50	80	125	190	280
		Maximum flow rate of air in Nm³/h at 20 °C · 1 bar pressure drop across the valve										
Inlet pressure p_1 (gauge) in bar	**2**	141.4	222.8	283.3	565.6	708.7	1133	1773	2834	3770	6735	9922
	3	171	269.3	342.6	684.2	856.7	1370	2143	3426	4506	8141	11990
	4	196.4	309.4	393.4	785.9	983.7	1573	2460	3934	5172	9347	13770
	5	219	345	438.5	876.3	1096	1754	2742	4386	5764	10420	15350
	6	239.5	377.3	479.6	958.4	1199	1918	2998	4796	6302	11390	16780
	8	276.2	435.1	552.8	1105	1382	2211	3456	5529	7262	13130	19350
	10	308.6	486.1	617.6	1234	1544	2470	3861	6177	8112	14670	21620
	12	338.0	531.6	676.4	1352	1691	2705	4228	6764	8883	16060	23670
	15	377.9	595.3	756.2	1513	1890	3025	4727	7562	9930	17960	26470
	20	436.6	687.7	873.5	1746	2184	3494	5460	8736	11470	20750	30570
	25	488.9	769.4	977.2	1954	2443	3908	6108	9772	12830	23210	34200

Specifications subject to change without notice

SAMSON AG · MESS- UND REGELTECHNIK
Weismüllerstraße 3 · 60314 Frankfurt am Main, Germany
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507
samson@samson.de · www.samson.de

T 3009 EN

2016-06-17 · English