

T 3010 EN

Type 42-10 RS Check Valve (backflow protection)

Series 42 Self-operated Pressure Regulators · ANSI version



Application

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

Differential pressure set point $\Delta p = 3 \text{ psi}$ · Nominal size **NPS ½ to 6** · Pressure rating **Class 150 and 300** · Liquids up to **300 °F** · Compressed air and nitrogen up to **175 °F/300 °F**¹⁾ · Saturated steam using a compensation chamber up to **430 °F**

The regulator prevents flowback from directly connected systems.

The regulator opens when the upstream pressure is at least 3 psi 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
- Increasing downstream pressure supports tight shut-off of the valve

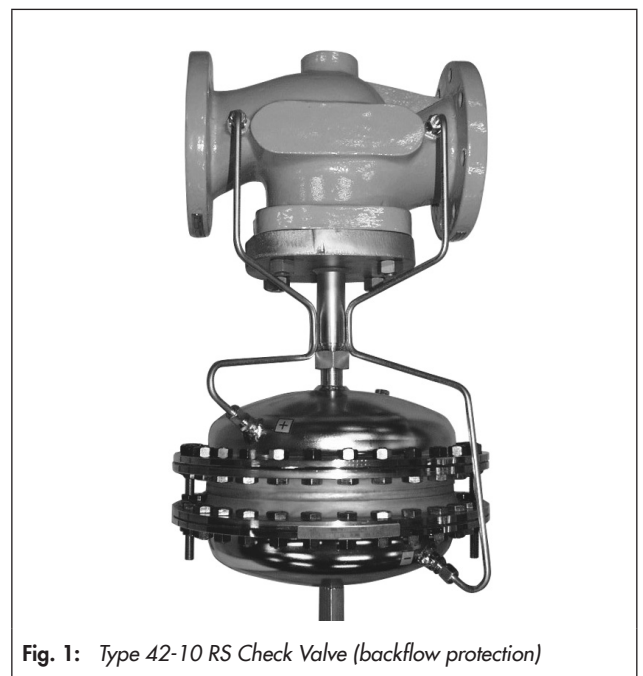


Fig. 1: Type 42-10 RS Check Valve (backflow protection)

Versions

Check valve in supply pipelines

Type 42-10 RS · Class 150 and 300 · Type 2421 RS Valve, NPS ½ to 6 · Type 2420 RS Actuator with two diaphragms · Set point fixed at 3 psi · Version suitable for steam · Version for deionized water · Oil-resistant version for liquids on request

Optional: diaphragm rupture indication with pressure switch · Fittings and diaphragm rupture indicator made of Monel® · FDA version²⁾

¹⁾ Version with FKM diaphragm

²⁾ This version is not suitable for direct contact with products manufactured in the food and pharmaceutical industries. It can only be used close to the product.

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, the valve begins to open; at 5 psi, the valve is fully 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 standard plug is soft-seated to ensure tight shut-off and to prevent backflow from the plant into the compressed air or nitrogen network.

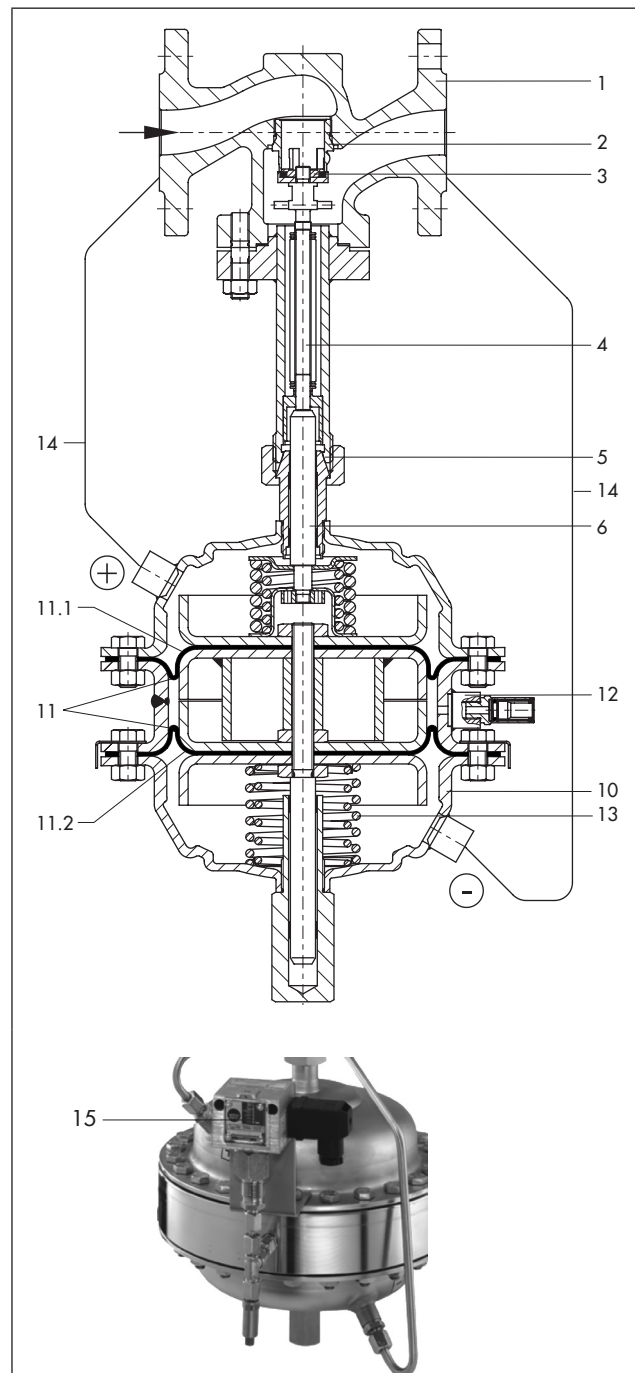
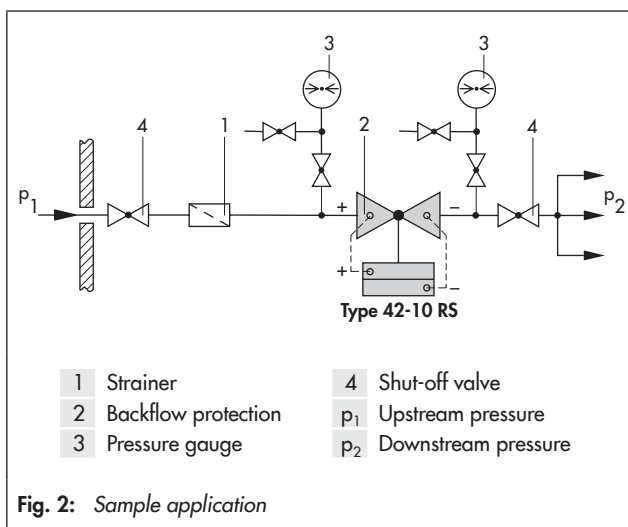
The mounted control lines (14) transmit the high pressure and low pressure to the actuator.

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. A bore with a mechanical diaphragm rupture indicator (12) is located in the intermediate ring located between the two diaphragms. The pressure of response of the diaphragm rupture indication is approximately 22 psi. In the event of a diaphragm rupture, the pressure in the space between the two operating diaphragm starts to increase. 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 intact operating diaphragm takes on the control task of the ruptured diaphragm.

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

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

Sample 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" |
| 15 | Pressure switch (optional) |

Fig. 3: Functional diagram

Table 1: Technical data

Type 2421 RS Valve										
Nominal size	NPS	½	¾	1	1½	2	2½	3	4	6
	DN	15	20	25	40	50	65	80	100	150
C _v and K _{vS} coefficient	C _v	4.5	7.5	9.4	23	37	60	94	145	330
	K _{vS}	4	6.3	8	20	32	50	80	125	280
Pressure rating	Class 150 or 300									
Max. constant operating pressure	360 psi									
Max. perm. pressure acting on one side	650 psi									
Leakage class according to	ANSI/FCI 70-2 ¹⁾	Leakage class VI								
	DIN EN 12266-1 ²⁾	Leakage rate A								
Max. permissible temperature	See Type 2420 RS Actuator									
Max. ambient temperature	120 °F									
Conformity	CE EAC									
Type 2420 RS Actuator										
Actuator area	50 in ²						100 in ²			
Differential pressure set point Δp, fixed	3 psi · 5 psi ²⁾									
Max. permissible temperature ³⁾	With EPDM diaphragm	175 °F for air and gases · 300 °F for water · 430 °F for steam using a compensation chamber								
	With FKM diaphragm	300 °F for air and gases								
Conformity	CE									

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

²⁾ Special version on request

³⁾ FDA version: Max. permissible temperature 140 °F

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, FKM soft seal or PTFE 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	1.0332	Stainless steel 1.4301
Diaphragm	EPDM with fabric reinforcement · FKM with fabric reinforcement	
Guide bushing	DU bushing	PTFE bushing
Intermediate piece	Sheet steel DD11	Stainless steel 1.4301
Coupling pin	Stainless steel 1.4301	
Seals	EPDM · FKM	

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 (see Fig. 4).
- The direction of flow must match the direction indicated by the arrow on the body.
- Install a strainer upstream of the valve.

Ordering text

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

Set point fixed at 3 psi

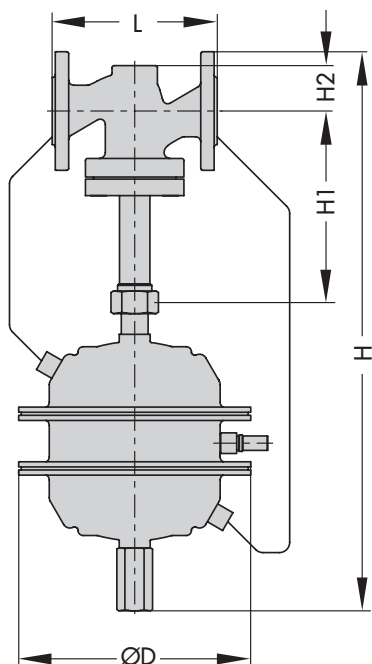
NPS ...,

Body material ...

Class ...

Special version

Dimensions



Dimensions in mm and weights

Nominal size DN	NPS	1/2	3/4	1	1 1/2	2	2 1/2	3	4	6	
Length L	Class 150	7.25			8.75	10	10.9	11.75	13.9	17.75	
	Class 300	7.5	7.6	7.75	9.25	10.5	11.5	12.5	14.5	18.6	
Height H		19.7			23.6		28		32.7	35.4	
Height H1		8.6					10		10.6	14.6	
Height H2	Cast steel	1.8			2.8		3.9		4.65	6.9	
	Forged steel	2.1	-	2.76	3.62	3.86	-	5.05	-		
Actuator	ANSI	ØD = 11.2" · A = 50 in ²					ØD = 15.4" · A = 100 in ²				
Weight, approx.	Class 150	57	58	62	78	87	131	144	165	360	
	Class 300	60	61	65	82	91	137	151	173	376	

Fig. 4: Dimensions

Table 3: Flow rates for Type 2421 RS Valve

5 psi pressure drop across the valve

Nominal size NPS	Flow rate set points for nitrogen									Flow rate set points for air									
	1/2	3/4	1	1 1/2	2	2 1/2	3	4	6	1/2	3/4	1	1 1/2	2	2 1/2	3	4	6	
C _v coefficient	4.5	7.5	9.4	23	37	60	94	145	330	4.5	7.5	9.4	23	37	60	94	145	330	
	Maximum flow rate of nitrogen (x10 ³ SCFH) at 70 °F									Maximum flow rate of air (x10 ³ SCFH) at 70 °F									
Input pressure p ₁ (gauge) in psi	75	4.99	8.32	10.4	25.5	41	66.6	104	137	366	4.92	7.97	10.3	25.2	40.5	65.7	103	134	361
	125	6.29	10.5	13.1	32.2	51.7	83.9	131	173	461	6.21	10.1	13	31.8	51.1	82.9	129.8	168	456
	275	9.15	15.2	19.1	46.7	75.2	122	191	252	671	9.05	14.6	18.9	46.2	74.4	121	189	245	663
	300	9.54	15.9	19.9	48.7	78.4	127	199	260	699	9.43	15.3	19.7	48.2	77.6	126	197	256	692
	350	10.3	17.1	21.5	52.5	84.5	137	215	283	754	10.2	16.5	21.3	52	83.7	136	213	276	746