

T 3016 EN

Type 42-36 Flow Regulator

Series 42 Self-operated Regulators · ANSI version



Application

Regulators for district heating and extended heating systems

Valve sizes **NPS ½ to 10/DN 15 to 250**¹⁾ · Pressure rating **Class 125 to 300/PN 16 to 40** · Suitable for liquids, gases and vapors from **40 to 300 °F/5 to 150 °C**²⁾

The valve **closes** when the flow rate **rises**.

The flow regulator is used to limit the flow rate in the pipeline. The set point for the flow rate is adjusted at the restriction.

Special features

- Low-noise, medium-controlled proportional regulator requiring little maintenance
- Valve body available in cast iron A 126 B, cast steel A216 WCC and cast stainless steel A351 CF8M
- Suitable for circuit water, water/glycol mixtures, steam and air as well as other liquids, gases and vapors, provided these do not affect the characteristics of the operating diaphragm
- Single-seated valve with a plug balanced by a stainless steel bellows or by a balancing diaphragm

Versions

Type 42-36 (Fig. 1) · Regulators for valve sizes NPS ½ to 10/DN 15 to 250¹⁾ · Type 2423 Valve with integrated restriction for adjusting the flow rate set point · Type 2426 Actuator with high-pressure control line · Flange connections · Balancing bellows made of CrNiMo steel or balancing diaphragm made of EPDM · Valve balanced by a diaphragm NPS 6 to 10/DN 125 or 250

The set point ranges for the flow rate based on water listed in Table 2 apply to a differential pressure at the restriction of either 3 or 7 psi/0.2 or 0.5 bar.

Special versions

- With internal parts made of FKM, e.g. for use with mineral oils
- Liquids and vapors up to max. 430 °F/220 °C

¹⁾ Valves in sizes larger than NPS 10 (DN 250) as well as version for steam and gases available on request

²⁾ Other temperature ranges on request



Fig. 1: Type 42-36 Flow Regulator (balanced by a bellows)

Principle of operation (Fig. 2)

The medium flows through the valve in the direction indicated by the arrow. The flow rate is determined by the free area between the restriction (1.4) adjusted at the set point adjuster (1.1) and the valve plug (3).

In a fully balanced valve, the position of the plug is not affected by pressure changes in the medium.

The principle of operation of the regulator balanced by a bellows or diaphragm only differs concerning the pressure balancing. Valves balanced by a bellows have a balancing bellows (5), whereas the valves balanced by a diaphragm (NPS 6 to 10/DN 150 to 250) have a balancing diaphragm (5.1). The pressure directly downstream of the restriction acts on the outer surface of the metal bellows or balancing diaphragm and the downstream pressure on the inside of the bellows or diaphragm. In both cases, the forces created by the upstream and downstream pressures that act on the valve plug are balanced out.

The differential pressure created at the restriction $\Delta p_{\text{restriction}}$ operates the actuator. The pressure upstream of the restriction (1.4) is transmitted through the control line (18) to the lower diaphragm chamber. The pressure downstream of the restriction passes through the hollow plug stem (7) to the diaphragm stem (6) and then into the top diaphragm chamber.

If the flow rate increases, the differential pressure ($\Delta p_{\text{restriction}}$) increases at the restriction and also at the operating diaphragm (12). This additional force causes the set point springs (14) to be pressed together until the forces are balanced out again. The plug starts to close. The cross-section of flow is reduced and the flow rate drops until it reaches the adjusted set point.

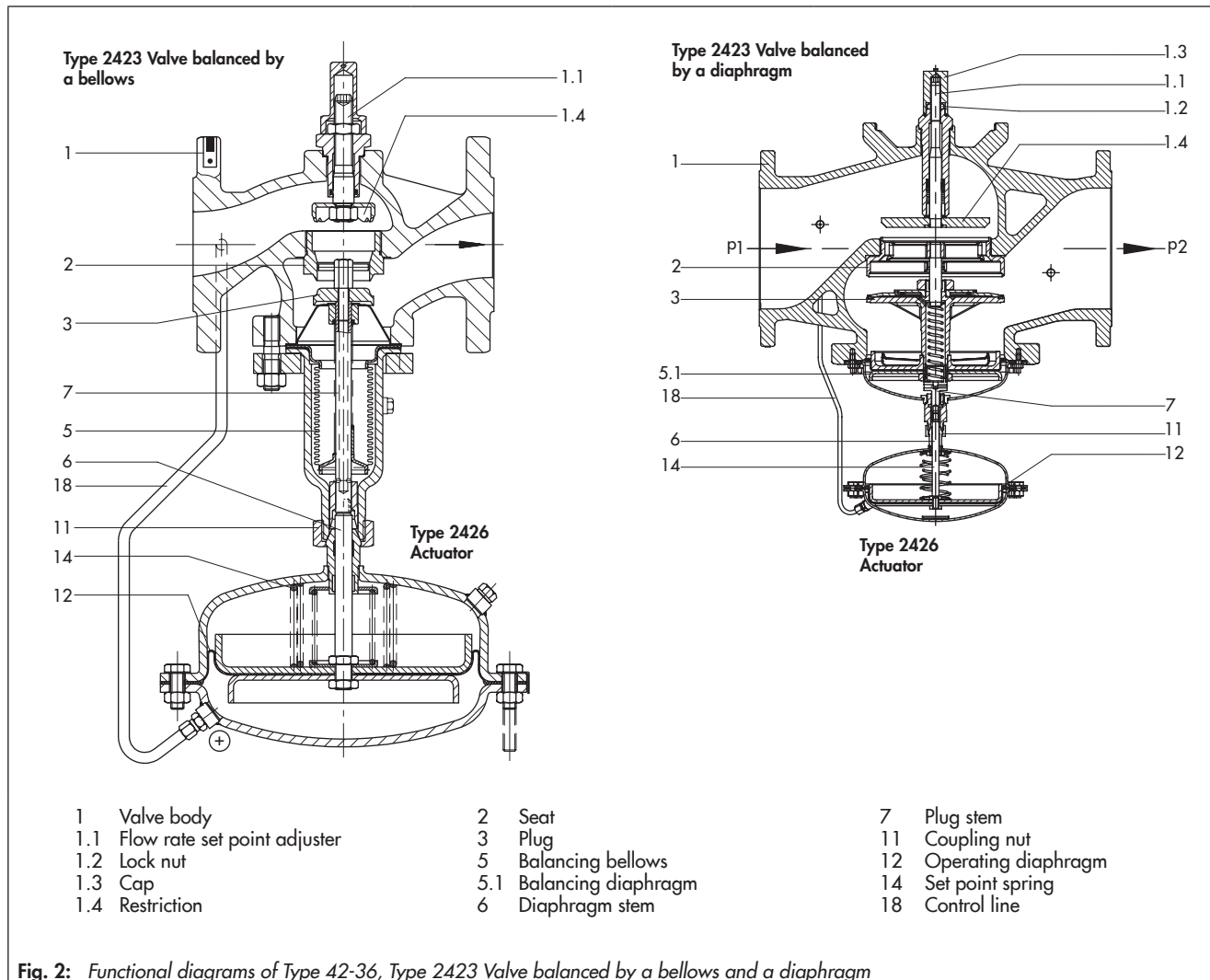


Table 1: Technical data

Type 42-36 Flow Regulator · Suitable for liquids, gases or vapors

Type 2423 Valve · Balanced by a bellows		
Valve size	NPS ½ to 10/DN 15 to 250	
Pressure rating	Class 125, 150 or 300/PN 16, 25 or 40	
Max. permissible temperature	Valve	Pressure-temperature diagram in ► T 3000
	Actuator	With equalizing tanks: Steam and liquids up to 430 °F/220 °C · Without equalizing tanks: Liquids up to 300 °F/150 °C · Air and nitrogen up to 300 °F/150 °C ¹⁾
Set point (differential pressure at restriction)	3 psi/0.2 bar 7 psi/0.5 bar	
Refer to "Dimensions" for the assignment of actuators and valves		

Type 2423 Valve · Balanced by a diaphragm		
Valve size	NPS 6 to 10/DN 150 to 250	
Pressure rating	Class 125, 150 or 300/PN 16, 25 or 40	
Max. permissible temperature	Water 300 °F/150 °C · Air and gases 175 °F/80 °C	
Set point (differential pressure at restriction)	3 psi/0.2 bar 7 psi/0.5 bar	
Refer to "Dimensions" for the assignment of actuators and valves		

¹⁾ Valve with FPM orifice stem sealing, actuator with FPM diaphragm

Table 2: K_{VS} coefficients, x_{FZ} values, flow rate set point ranges for water and max. permissible differential pressures Δp

Type 2423 Valve · Balanced by a bellows													
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 (K_{VS}) coefficient	C_v	5	7.5	9.4	23	37	60	94	145	330	490	590	
	K_{VS}	4	6.3	8	20	32	50	80	125	280	420	500	
x_{FZ} value		0.65	0.6	0.55	0.45	0.4		0.35			0.3		
Max. perm. differential pressure Δp		360 psi/25 bar					290 psi/20 bar		230 psi/16 bar	175 psi/12 bar	145 psi/10 bar		
Differential pressure		Flow rate set point ranges for water in US gal/min (m³/h)											
$\Delta p_{restriction} = 3 \text{ psi}/0.2 \text{ bar}$	US gal/min	0.2 to 8.8	0.7 to 13	1.1 to 15	2.6 to 48	4 to 70	8.8 to 120	15 to 155	30 to 280	80 to 530	90 to 790	115 to 970	
	m³/h	0.05 to 2	0.15 to 3	0.25 to 3.5	0.6 to 11	0.9 to 16	2 to 28	3.5 to 35	6.5 to 63	18 to 120	20 to 180	26 to 220	
$\Delta p_{restriction} = 7 \text{ psi}/0.5 \text{ bar}$	US gal/min	0.7 to 13	1.1 to 20	1.8 to 23	4 to 70	8.8 to 105	15 to 175	30 to 240	48 to 400	90 to 790	115 to 1140	130 to 1300	
	m³/h	0.15 to 3	0.25 to 4.5	0.4 to 5.3	0.9 to 16	2 to 24	3.5 to 40	6.5 to 55	11 to 90	20 to 180	26 to 260	30 to 300	

Type 2423 Valve · Balanced by a diaphragm					
Valve size	NPS	6 (DN 150)	8 (DN 200)	10 (DN 250)	
C_v (K_{VS}) coefficient		445 (380)	760 (650)	930 (800)	
x_{FZ} value		0.35		0.3	
Max. perm. differential pressure Δp		174 psi/12 bar		145 psi/10 bar	
Differential pressure		Flow rate set point ranges for water in US gal/min (m³/h)			
$\Delta p_{restriction} = 3 \text{ psi}/0.2 \text{ bar}$	US gal/min	80 to 795		90 to 1410	115 to 1540
	m³/h	18 to 180		20 to 320	26 to 350
$\Delta p_{restriction} = 7 \text{ psi}/0.5 \text{ bar}$	US gal/min	88 to 1145		115 to 2200	132 to 2290
	m³/h	20 to 260		26 to 500	30 to 520

The minimum required differential pressure p_{min} across the valve is calculated as follows:

$$\text{ANSI: } \Delta p_{min} = \Delta p_{restriction} + \left(\frac{\dot{V}}{C_v} \right)^2$$

$$\text{DIN } p_{min} = \Delta p_{restriction} + \left(\frac{\dot{V}}{K_{vs}} \right)^2$$

Δp_{min} Minimum differential pressure across the valve in psi (bar)

$\Delta p_{restriction}$ Differential pressure created at the restriction for measuring the flow rate in the regulator

\dot{V} Adjusted flow rate in US gal/min (m³/h)

C_v (K_{vs}) Valve flow coefficient in US gal/min (m³/h)

Table 3: Materials · Material numbers according to ASTM and DIN EN

Type 2423 Valve · Balanced by a bellows				
Pressure rating		Class 125/PN 16	Class 150 and 300/PN 25 and 40	
Valve body		Cast iron A126B	Cast steel A216 WCC	Cast stainless steel A351 CF8M
Seat		Stainless steel 1.4104 or 1.4006		1.4571 or 1.4404
Plug	Up to NPS 4/ DN 100	Stainless steel 1.4104, 1.4112 or 1.4006		1.4571
	NPS 6 to 10/ DN 150 to 250	1.4301, plug with PTFE seal		1.4301 and 1.4571, plug with PTFE seal
Plug stem		1.4301		
Metal bellows		1.4571 · NPS 6 (DN 150) and larger: 1.4404		
Bottom section		P265GH		1.4571
Body gasket		Graphite on metal core		
Type 2423 Valve · Balanced by a diaphragm				
Pressure rating		Class 125/PN 16	Class 150 and 300/PN 25 and 40	
Valve body		Cast iron A126B	Cast steel A216 WCC	Cast stainless steel A351 CF8M
Valve seat		Red brass ¹⁾		
Plug Standard version		Red brass ¹⁾ · With EPDM soft seal, max. 300 °F/150 °C or with PTFE soft seal, max. 300 °F/150 °C		
Pressure balancing		Balancing cases made of sheet steel DD11 · EPDM balancing diaphragm, max. 300 °F/150 °C or NBR diaphragm, max. 175 °F/80 °C		
Type 2426 Actuator				
Diaphragm cases		DD11		1.4301
Diaphragm		EPDM ²⁾ with fabric reinforcement		
Guide bushing		DU bushing		PTFE
Seals		EPDM/PTFE ²⁾		

¹⁾ Special version: 1.4409

²⁾ Special version, e.g. for mineral oils: FPM (FKM)

Application

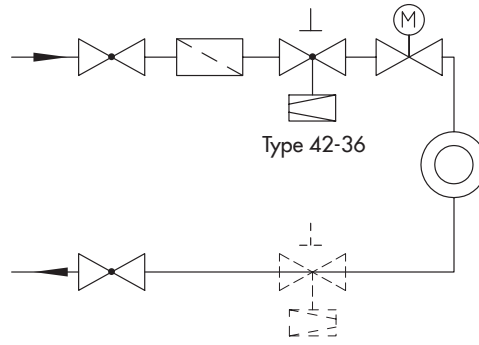
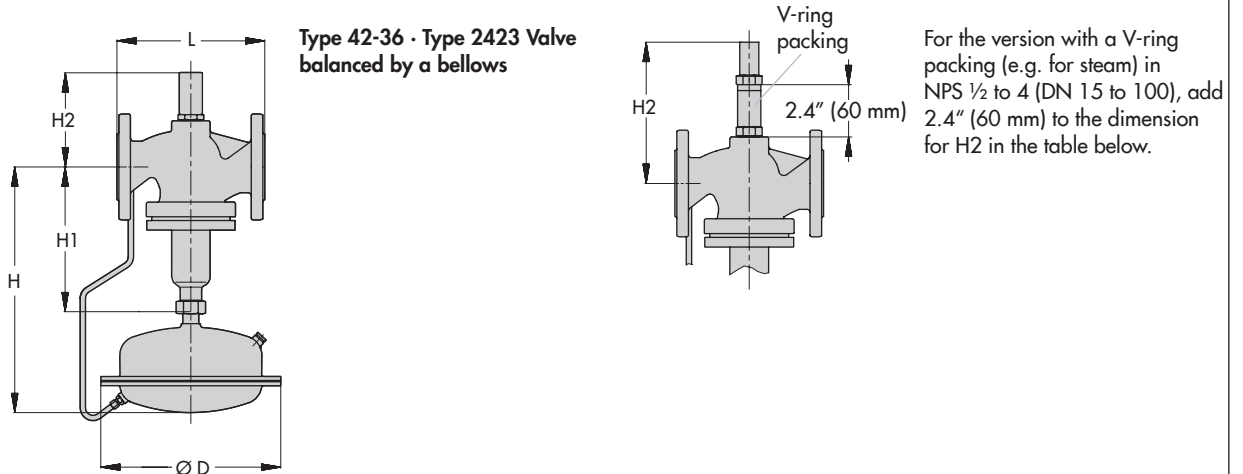


Fig. 3: Typical application, flow rate control in the flow and return flow pipes

Dimensions



Type 42-36 · Balanced by a bellows

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 125/150	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 H1	inch	8.9				11.8			14	23.3	28.7		
	mm	225				300			355	590	730		
Height H2 ¹⁾	inch	4.5		5.7		7.7	8.7	11.6	15.75				
	mm	115		144		195	220	295	400				
Height H	inch	15.4				18.3			20.5	30.1	35.25		
	mm	390				465			520	765	895		
Actuator	Ø D = 8.9" (225 mm) · A = 25 in ² (160 cm ²) ²⁾								Ø D = 11.2" (285 mm) · A = 50 in ² (320 cm ²) ³⁾				
Weight for Class 125 (PN 16) ⁴⁾ (approx.)	lb	26.5	27.6	29.8	45.2	50.7	86	97	130.1	377	937	1070	
	kg	12	12.5	13.5	20.5	23	39	44	59	171	425	485	

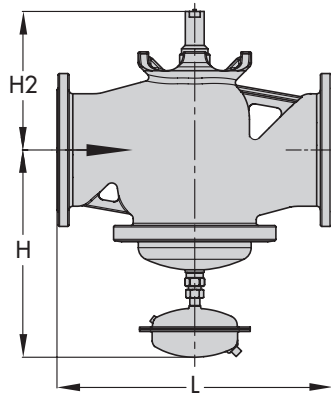
¹⁾ Version with V-ring packing in NPS ½ to 4 (DN 15 to 100): +2.4" (60 mm)

²⁾ Optionally with actuator 50 in² (320 cm²) for NPS 2½ to 4 (DN 65 to 100). For regulators with double adapter (see T 3019), actuator 50 in² (320 cm²) recommended for NPS 2½ to 4 (DN 65 to 100)

³⁾ Optionally with actuator 100 in² (640 cm²)

⁴⁾ For valve in Class 150 (PN 25)/Class 300 (PN 40): +10 %

Fig. 4: Dimensions



Type 42-36 · Type 2423 Valve
balanced by a diaphragm

Type 42-36 · Balanced by a diaphragm					
Valve size		NPS	6	8	10
		DN	150	200	250
Length L	Class 125/150	inch	17.75	21.4	26.5
		mm	451	543	673
	Class 300	inch	18.6	22.4	27.9
		mm	473	568	708
Height H	inch	18.7	21.45		
	mm	475	545		
Height H2	inch	12.8	13.6	14.75	
	mm	325	345	375	
Weight for Class 125/PN 16 ¹⁾					
Type 2423 Valve	lb	187.4	551.2	595.3	
	kg	85	250	270	
Type 2426 Actuator	lb	44.1	66.2		
	kg	20	30		

¹⁾ For valve in Class 150 (PN 25)/Class 300 (PN 40): +10 %

Fig. 5: Dimensions (continued)

Installation

Valve, actuator and control lines are delivered unattached.

The actuator can be easily mounted before or after the valve is installed using a coupling nut (11).

The following points must be observed:

- Install valves in horizontal pipelines.
- Direction of flow must match the direction indicated by the arrow on the body
- Install a strainer (e.g. SAMSON Type 2 NI) upstream of the valve.



Permissible mounting positions

- All valve sizes: Install the actuator suspended downwards (see photo)
- NPS ½ to 3 (DN 15 to 80) plus max. 250 °F (120 °C): Install the actuator either suspended or upright
- All valve sizes with fixed plug guide and max. 250 °F (120 °C): Any position possible
- Steam applications: Always install actuator suspended downwards

Further details can be found in ► EB 3015.

Accessories

Required accessories, such as compression-type fittings, needle valves, equalizing tanks and control lines, are listed in Data Sheet T 3095 EN.

Ordering text

Type 42-36 Flow Regulator

NPS (DN) ..., Class (PN) ..., body material ..., valve balanced by a bellows/diaphragm

Differential pressure at the restriction 3 psi (0.2 bar)/7 psi (0.5 bar)

Accessories ...

Optionally, special version ...

