DATA SHEET

T 3015 EN

Type 42-36 Flow Regulator

Series 42 Self-operated Regulators

CE

Application

Flow rate control in district heating systems or large heating networks. · Valves **DN 15** to **250** [1] · Pressure rating **PN 16** to **40** · Suitable for liquids, gases and vapors from **5** to **150 °C** [1]

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
- Nominal size DN 125 to 250 with fixed plug guide as standard, e.g. installation in riser pipes
- 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 a balancing diaphragm
- Valve body optionally available in cast iron, spheroidal graphite iron, cast steel, cast stainless steel or forged stainless steel

Versions

Type 42-36 (Fig. 1) · Regulators for nominal sizes DN 15 to 250 [1] · 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 (DN 65 to 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 0.2 or 0.5 bar.

Special version

– With internal parts made of FKM, e.g. for use with mineral oils
– Liquids and vapors up to 220 °C
– ANSI/JIS version

[1] On request: valves larger than DN 250 for steam and gases · Other temperature ranges



Fig. 1: *Type 42-36 Flow Regulator*

Accessories

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

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Principle of operation

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).

No flow forces act on the plug of a fully balanced valve.

Regulators balanced by a bellows or a diaphragm only differ in the pressure balancing principle applied. Valves balanced by a bellows have a balancing bellows (5), whereas the valves balanced by a diaphragm (DN 65 to 250) have a balancing diaphragm (5.1). The pressure directly downstream of the restriction acts on the outside of the metal bellows or balancing 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 $\Delta p_{restriction}$ operates the actuator. The pressure upstream of the restriction 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 into the top diaphragm chamber.

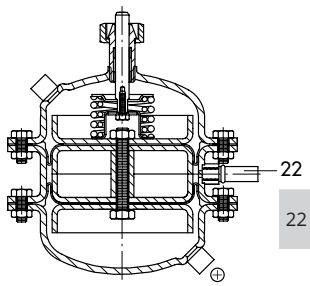
If the flow rate increases, the differential pressure ($\Delta p_{restriction}$) increases at the restriction and also at the operating diaphragm (12). This additional force causes the set point springs (14) to be pressed together until the forces are balanced out again. The plug starts to close. The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

Type 42-36 Differential Pressure Regulator with two diaphragms for increased functional safety (see Fig. 2)

An actuator with two diaphragms is always required when an FKM diaphragm is to be used. It is especially suitable for applications with thin oils (e.g. heat transfer oil).

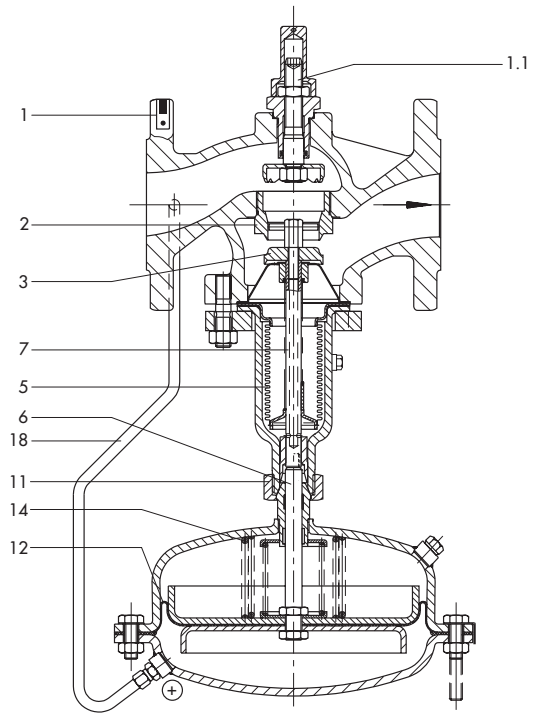
The two diaphragms separate both diaphragm chambers connected to the high-pressure and low-pressure connections. They generate a positioning force from the differential pressure. A mechanical diaphragm rupture indicator (22) is located between the two diaphragms. In the event of a diaphragm rupture, the pressure in the space between the two operating diaphragm starts to increase. This causes the pin in the diaphragm rupture indicator to be pushed outwards and a red ring appears, indicating the diaphragm rupture (response pressure approx. 1.5 bar). The intact operating diaphragm takes on the control task of the ruptured diaphragm.

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

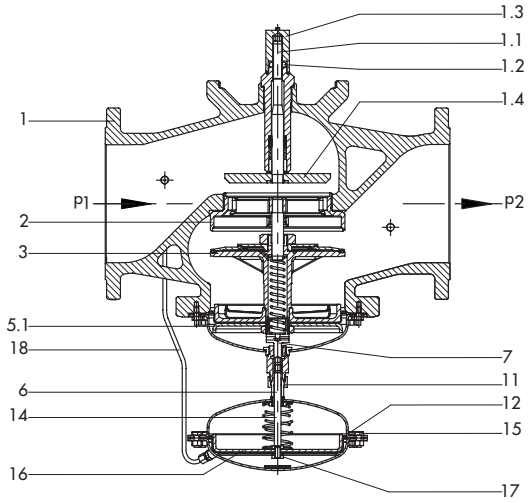


22 Diaphragm rupture indicator

Fig. 2: *Actuator with two diaphragms for Type 42-36 (special version)*



Type 42-36 balanced by a bellows



Type 42-36 balanced by a diaphragm

1	Type 2423 Valve (balanced by a bellows)	1.3	Cap	5	Balancing bellows
1.1	Set point adjuster for flow rate	1.4	Restriction	5.1	Balancing diaphragm
1.2	Lock nut	2	Seat	6	Diaphragm stem
		3	Plug	7	Plug stem

11	Coupling nut
12	Operating diaphragm
14	Set point springs
18	Control line

Fig. 3: *Type 42-36 · Type 2423 Valve balanced by a bellows or diaphragm*

Table 1: *Technical data*

Type 2423 Valve · Balanced by a bellows			
Nominal size		**DN 15 to 100**	**DN 125 to 250**
Pressure rating		PN 16, 25 or 40	
Max. permissible temperature	Valve body	180 °C · Special version for steam: 220 °C	220 °C
		See also pressure-temperature diagram in ▶ T 3000	
	Actuator	With compensation chamber: steam and liquids up to 220 °C · Without compensation chamber: liquids up to 150 °C, air and nitrogen up to 150 °C [1]	
Set point (differential pressure at restriction) [2]		0.2 bar · 0.5 bar	
Leakage class according to IEC 60534-4		≤0.05 % of K_{VS} coefficient	
Conformity		CE	
Refer to 'Dimensions' for the assignment of actuator and valve			
Type 2423 Valve · Balanced by a diaphragm			
Nominal size		**DN 65 to 250**	
Pressure rating		PN 16, 25 or 40	
Max. permissible temperature	Valve body	See pressure-temperature diagram in ▶ T 3000	
	Actuator	Liquids 150 °C, air and gases 80 °C	
Set point (differential pressure at restriction) [2]		0.2 bar · 0.5 bar	
Leakage class according to IEC 60534-4		≤0.05 % of K_{VS} coefficient	
Conformity		CE	
Refer to 'Dimensions' for the assignment of actuator and valve			

[1] Special version: valve with orifice stem seal and operating diaphragm made of FKM

[2] $\Delta p_{restriction}$ in 0.3 bar possible as special version · $\Delta p_{restriction}$ in 0.1 bar only possible as special version up to DN 50

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														
Nominal size DN		**15**	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**	**200**	**250**
Valve travel		10 mm						16 mm			22 mm			
K_{VS} coefficient		4	6.3	8	16	20	32	50	80	125	190	280	420	500
x_{FZ} value		0.65	0.6	0.55		0.45	0.4		0.35				0.3	
Flow rate set point ranges for water in m³/h														
Differential pressure across restriction $Δp_{restriction}$	0.2 bar	0.05 to 2	0.15 to 3	0.25 to 3.5	0.4 to 7	0.6 to 11	0.9 to 16	2 to 28	3.5 to 35 [1]	6.5 to 63	11 to 80	18 to 120	20 to 180	26 to 220
	0.5 bar	0.15 to 3	0.25 to 4.5	0.4 to 5.3	0.6 to 9.5	0.9 to 16	2 to 24	3.5 to 40	6.5 to 55	11 to 90	18 to 120	20 to 180	26 to 260	30 to 300
Max. perm. diff. pressure Δp		25 bar						20 bar		16 bar		12 bar	10 bar	

Type 2423 Valve balanced by a diaphragm								
Nominal size DN		**65**	**80**	**100**	**125**	**150**	**200**	**250**
Valve travel		15 mm			35 mm			
K_{VS} coefficient		50	80	125	250	390	650	800
x_{FZ} value		0.4	0.35				0.3	
Flow rate set point ranges for water in m³/h								
Differential pressure across restriction $Δp_{restriction}$	0.2 bar	2 to 28	3.5 to 35 [1]	6.5 to 63	11 to 120	18 to 180	20 to 320	26 to 350
	0.5 bar	3.5 to 40	6.5 to 55	11 to 90	18 to 180	20 to 260	26 to 450	30 to 520
Max. perm. differential pressure Δp		12 bar		10 bar	12 bar		10 bar	

[1] 7 to 35 m³/h (160 cm² actuator), 7 to 40 m³/h (320 cm² actuator)

Differential pressure across the valve

The minimum required differential pressure $\mathbf{Δp_{min}}$ across the valve is calculated as follows:

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

$\mathbf{Δp_{min}}$	Minimum differential pressure across the valve in bar
$\mathbf{Δp_{restriction}}$	Differential pressure created at the restriction for measuring the flow rate in the regulator
$\dot{\mathbf{V}}$	Adjusted flow rate in m³/h
$\mathbf{K_{VS}}$	Valve flow coefficient in m³/h

Table 3: *Materials · Material numbers according to DIN EN*

Type 2423 Valve · Balanced by a bellows						
Pressure rating		**PN 16**	**PN 25**	**PN 16, 25 and 40**		
Valve body		Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400-18-LT	Cast steel 1.0619	Cast stainless steel 1.4408	Forged stainless steel 1.4404 [1]
Seat		1.4104, 1.4006			1.4404	
Plug	Up to DN 100	1.4104, 1.4006 [2]			1.4404	
	DN 125 to 250	1.4301, 1.4404 with PTFE seal				
Plug stem		1.4301				
Metal bellows		1.4571 · DN 125 and larger: 1.4404				
Bottom section		P265GH			1.4571	
Body gasket		Graphite on metal core				

[1] DN 15, 25, 40 and 50 only
[2] Optionally with soft seal with standard K_{VS} coefficients
[3] Special version 1.4409
[4] DN 65 to 100: 1.4006
[5] DN 65 to 80: 1.4104, DN 100: 1.4006, with metal seal
[6] Only with actuator with two diaphragms, height H +55 mm
[7] Only with mounting position with the actuator suspended (see Permissible mounting position)
[8] Only with actuator with one diaphragm, max. 80 °C, only with 0.2 bar differential pressure across the restriction
[9] Only for temperatures from –60 to +90 °C with air and gases
[10] DN 125 to 250 only

Table 3: *Materials · Material numbers according to DIN EN*

Type 2423 · Balanced by a diaphragm					
Pressure rating	**PN 16**	**PN 25**	**PN 16, 25 and 40**		
Valve body	Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400-18-LT	Cast steel 1.0619	Cast stainless steel 1.4408 10)	–
Valve seat	Red brass [3) 4)]				
Plug (standard version)	Red brass [3) 5)] with EPDM soft seal, max. 150 °C or with PTFE soft seal, max. 150 °C				
Pressure balancing	Balancing cases made of sheet steel DD11 · EPDM balancing diaphragm, max. 150 °C or NBR diaphragm, max. 80 °C				
Type 2426 Actuator					
Diaphragm cases	1.0332			1.4301	
Diaphragm	EPDM with fabric reinforcement · Special version for mineral oils: (FKM with fabric reinforcement) [6)] or (FKM without fabric reinforcement) [8)] · PVMQ diaphragm [9)] for inert gases				
Max. perm. temperature at the diaphragm	Air and gases 80 °C; liquids 80 °C · 90 °C 9) · 120 °C · 150 °C 7)				
Guide bushing	DU bushing			PTFE	
Seals	EPDM/PTFE [6)]				

1) DN 15, 25, 40 and 50 only
2) Optionally with soft seal with standard K_{VS} coefficients
3) Special version 1.4409
4) DN 65 to 100: 1.4006
5) DN 65 to 80: 1.4104, DN 100: 1.4006, with metal seal
6) Only with actuator with two diaphragms, height H +55 mm
7) Only with mounting position with the actuator suspended (see Permissible mounting position)
8) Only with actuator with one diaphragm, max. 80 °C, only with 0.2 bar differential pressure across the restriction
9) Only for temperatures from –60 to +90 °C with air and gases
10) DN 125 to 250 only

Application

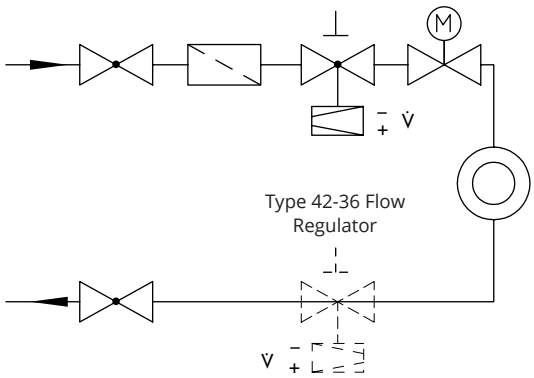


Fig. 4: *Sample application for flow rate control in the flow and return pipes with Type 42-36*

Installing the regulators

Valve, actuator and control lines are delivered unattached.

Mount the actuator preferably after the valve is installed in the pipeline. It is connected to the bottom section of the valve with a coupling nut (11).

The following points must be observed:

- Preferably install the valve in horizontal pipelines.
- The direction of flow must match the arrow on the valve body.
- Install a strainer (e.g. SAMSON Type 2 NI) upstream of the valve.
- Valve, actuator and control line must be assembled before start-up.



Permissible mounting positions:

Suspended mounting position (standard) · Balanced by a bellows or diaphragm
- All versions
- – Air and gases up to 80 °C
- – Liquids up to 150 °C

Balanced by a bellows
- – All media above 80 °C
- – Steam applications

Upright mounting position · Balanced by a diaphragm (DN 65 and 80)
- – Air and gases up to 80 °C
- – Liquids up to 120 °C

Balanced by a bellows · DN 15 to 80
- All versions **plus**:
- – Air and gases up to 80 °C
- – Liquids up to 120 °C

Lying mounting position e.g. for·riser pipes · Balanced by a bellows
- Version with fixed plug guide **plus**:
- – Air and gases up to 80 °C
- – Liquids up to 120 °C

Ordering text

Type 42-36 Flow Regulator

DN …

Valve balanced by a bellows/diaphragm

Body material …

PN …

Differential pressure at the restriction 0.2/0.5 bar

Optionally, special version …

Optionally, accessories … (▶ T 3095)

Dimensions

Dimensional drawing · Type 2423 Valve balanced by a bellows

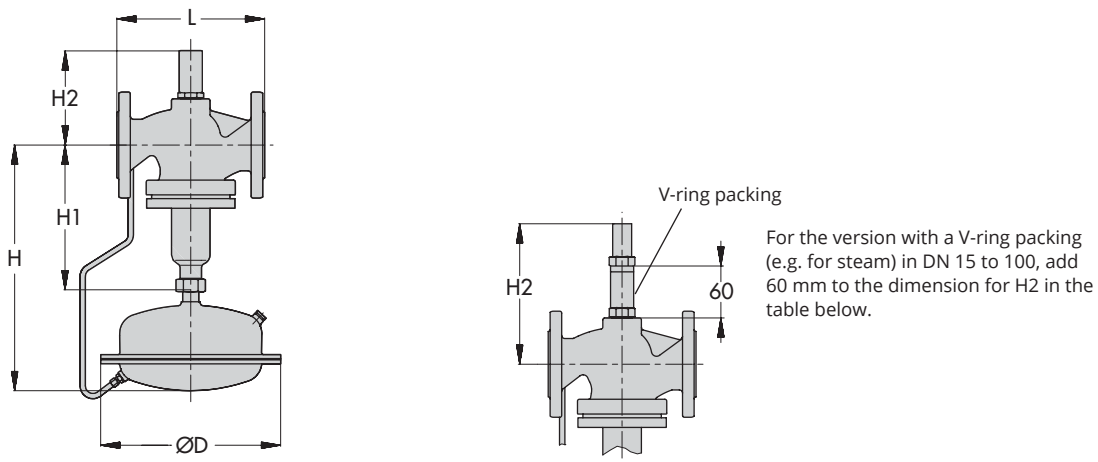


Fig. 5: *Regulator with Type 2423 Valve balanced by a bellows*

Table 4: *Dimensions in mm and weights · Type 2423 Valve* ***balanced by a bellows***

Nominal size DN		**15**	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**	**200**	**250**
Overall 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 [1]	Forged steel	113	–	130	–	170	176	–						
	Other materials	115			150			175	180	200	250	280	400	
Height H [5] [6]		390						465		520	625	765	895	
Actuator		(ØD = 225 mm, A = 160 cm²) [2]									(ØD = 285 mm, A = 320 cm²) [3]			
Weight for PN 16 [4] in kg (approx.)		12	12.5	13.5	20	20.5	23	39	44	59	121	171	425	485

[1] Version with V-ring packing in DN 15 to 100: +60 mm.
[2] Optionally with 320 cm² actuator (DN 65 to 100). For regulators with double adapter Do2 (▶ T 3019) for DN 65 to 100, actuator 320 cm² recommended.
[3] Optionally with 640 cm² actuator
[4] Valve in PN 25/40: +10 %
[5] Minimum clearance required to remove the actuator: +100 mm
[6] Actuator with two diaphragms: Height H +55 mm · With FKM diaphragm for mineral oils

Dimensional drawing · Type 2423 Valve balanced by a diaphragm

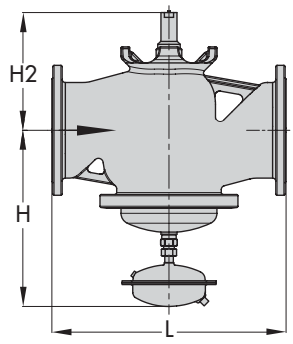


Fig. 6: *Regulator with Type 2423 Valve balanced by a diaphragm*

Table 5: *Dimensions in mm and weights · Type 2423 Valve* ***balanced by a diaphragm***

Nominal size	**DN 65**	**DN 80**	**DN 100**	**DN 125**	**DN 150**	**DN 200**	**DN 250**
Overall length L	290	310	350	400	480	600	730
Height H [2) 3)]	355		380	450	475	585	
Height H2	195		220	295	325	345	375
Weight for PN 16 [1)] in kg (approx.)							
Type 2423 Valve	34	39	56	65	85	250	270
Type 2426 Actuator	7			20		30	

1) PN 25/40: +10 %
2) Minimum clearance required to remove the actuator: +100 mm
3) Actuator with two diaphragms: Height H +55 mm · With FKM diaphragm for mineral oils