

# Self-operated Regulators Series 42



## Differential Pressure Regulators with balanced Type 2422 Control Valve

Type 42-24 A · Type 42-24 B

Type 42-28 A · Type 42-28 B

### Application

Differential pressure regulators for district heating systems, large heating systems and industrial plants.

For **differential pressure set points ( $\Delta p$ ) from 0.05 to 10 bar** · Valve sizes **DN 15 to 250** · **Nominal pressure PN 16 to 40** · For liquids and vapours up to 220 °C, for air and non-combustible gases up to 80 °C.

The valve closes when the differential pressure rises.

### Conversion of valve sizing coefficients:

$$C_v \text{ (in U.S.-gallons/min)} = 1.17 \cdot K_{vs} \text{ (in m}^3\text{/h)}$$

$$K_{vs} \text{ (in m}^3\text{/h)} = 0.86 \cdot C_v \text{ (in U.S.-gallons/min)}$$

The regulators control the differential pressure according to the adjusted set point.

### Special features

- Low-noise, self-operated P-regulators requiring little maintenance
- Suitable for water, steam and air as well as other liquids, gases and vapours, provided these do not affect the characteristics of the operating diaphragm
- Valve body available in cast iron, spheroidal graphite iron or cast steel. Sizes DN 15 to DN 150 also in stainless cast steel
- Special version for oil available
- Versions free of non-ferrous metal available on request
- Single-seated valve with a plug balanced by a stainless steel bellows
- Especially suitable for district heating systems

### Versions

Differential pressure regulators for installation in low (-) pressure pipes, e.g. in return pipes (see "Typical applications"):

**Type 42-24 A** (Fig. 1) · with Type 2422 Control Valve in sizes DN 15 to 250\* and Type 2424 Actuator with adjustable set point

**Type 42-28 A** (Fig. 2) · with Type 2422 Control Valve in sizes DN 15 to 100 and Type 2428 Actuator with fixed set point, adjusted to  $\Delta p = 0.2, 0.3, 0.4$  or  $0.5$  bar

Differential pressure regulators for installation in high (+) pressure pipes, e.g. in flow pipes (see "Typical applications"):

**Type 42-24 B** · with Type 2422 Control Valve in sizes DN 15 to 250, distance piece and Type 2424 Actuator with adjustable set point

**Type 42-28 B** · with Type 2422 Control Valve in sizes DN 15 to 100, distance piece and Type 2428 Actuator with fixed set point, adjusted to  $\Delta p = 0.2, 0.3, 0.4$  or  $0.5$  bar

\* Valves larger than DN 250 available on request.

**ANSI versions** available on request.

### Ordering text

Differential Pressure Regulator Type 42-24 A / 42-24 B / 42-28 A / 42-28 B

DN ..., PN ..., body material ...,

Set point range / set point ... bar,

Optional accessories ...



Fig. 1 · Type 42-24 A · Differential Pressure Regulator



Fig. 2 · Type 42-28 A · Differential Pressure Regulator

### Principle of operation (Fig. 3)

The medium flows through the valve in the direction indicated by the arrow. The position of the plug (3) determines the differential pressure across the free area between the plug and the seat (2).

The valve is fully balanced. The upstream pressure acts on the outer surface of the metal bellows (5) and the downstream pressure on the inner side of the bellows. In this way, the forces which are generated by the differential pressure and act on the plug are equally balanced. The plug position is not affected by medium pressure changes.

The differential pressure to be controlled is transmitted to the operating diaphragm (12) where it is converted into a positioning force. This force moves the plug (3) according to the force of the positioning springs (14).

In Types 42-24 A and 42-24 B, the set point is adjusted at the set point adjustment (17).

In Types 42-28 A and 42-28 B, the positioning spring (14) in the actuator determines the set point.

Types 42-24 B and 42-28 B have a distance piece (20) which ensures a tight seal between the valve and actuator. It separates the pressure in the valve from the pressure in the actuator.

In all versions, the high pressure and the low pressure are transmitted through control lines which must be attached on installing the regulator.

Type 2424 and Type 2428 Actuator are equipped with an overload protection (15; 21). In extreme operating conditions, this overload protection causes a bypass to open and thus prevents the differential pressure from rising. In this way, the systems and the regulator are protected against excessive differential pressures.

### Installation of the valve and attachment of the actuator

The valves must be installed in horizontal pipelines and with the actuator suspended downwards. The medium must flow through the valve in the direction indicated by the arrow on the valve body. The valve and actuator are delivered in separate cases. The actuator is easy to mount and can be mounted before or after the valve is installed in the pipeline. The actuator is connected to the valve with a coupling nut.

### Accessories

Accessories required e.g., screw joints, needle valves, intermediate tanks and control lines are listed in the Data Sheet T 3095 EN.

- 2 Seat
- 3 Plug
- 5 Metal bellows
- 7 Plug stem
- 12 Operating diaphragm
- 14 Positioning spring
- 15 Force limiting device
- 17 Set point adjustment
- 20 Distance piece
- 21 Overload protection

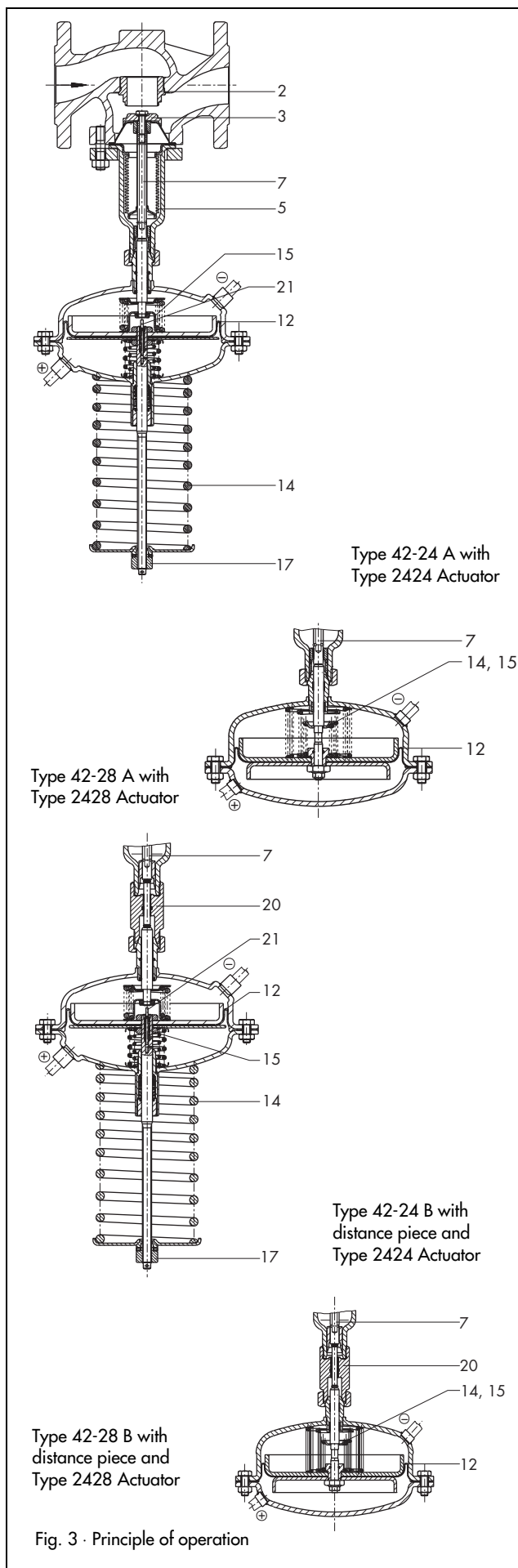


Fig. 3 - Principle of operation

**Table 1 · Technical data** · All pressures in bar (gauge)

Type		42-24 A 42-24 B	42-28 A 42-28 B
Nominal size	DN	15 to 250	15 to 100
Nominal pressure	PN	16, 25 or 40 (acc. to DIN 2401)	
Maximum permissible temperature	Body	See Pressure-Temperature Diagram	
	Actuator <sup>1)</sup>	With intermediate tanks: - Vapor and liquids up to 220 °C Without intermediate tanks: - Liquids up to 150 °C, - Air and gases up to 80 °C	
Set point ranges	bar	0.05 to 0.25 0.1 to 0.6 0.2 to 1 0.5 to 1.5 1 to 2.5 2 to 5 4.5 to 10	0.2, 0.3, 0.4 or 0.5
		Leakage rate ≤ 0.05 % of Kvs value	
For combinations of valves and actuators, see Table "Dimensions in mm and weights" on next page			

<sup>1)</sup> Higher temperatures available on request

**Terms** for control valve sizing in accordance with DIN IEC 534, Parts 2-1 and 2-2:  $F_L = 0.95$ ;  $x_T = 0.75$

**Table 2 · Materials** (WN = Material Number acc. to DIN)

Type 2422 Control Valve				
Nom. pressure	PN 16	PN 25	PN 25/40	
Valve body	Cast iron GG-25 WN 0.6025	Spheroidal graphite iron GGG 40.3 WN 0.7043	Cast steel GS-C 25 <sup>1)</sup>	Stainless cast steel <sup>1),2)</sup> WN 1.4581
Seat and plug	Stainless steel WN 1.4006			WN 1.4571
Plug stem	Stainless steel WN 1.4301			
Metal bellows	Stainless steel WN 1.4571 or for DN 125 and larger WN 1.4404			
Lower part of body	St 35.8 WN 1.0305		WN 1.4571	
Body gasket	Graphite with metal core			
Type 2424 and Type 2428 Actuator				
Diaphragm cases	StW 22 (DIN 1614)			WN 1.4301
Diaphragm	EPDM with fabric insert <sup>3)</sup>			
Guide bushing	DU bushing		PTFE	
Distance piece				
Housing	CuZn 40 Pb WN 2.0402 (Special version WN 1.4301)			Stainless steel WN 1.4301
Coupling pin	Stainless steel WN 1.4301			
Sealing rings	EPDM <sup>3)</sup>			

<sup>1)</sup> PN 16 on request

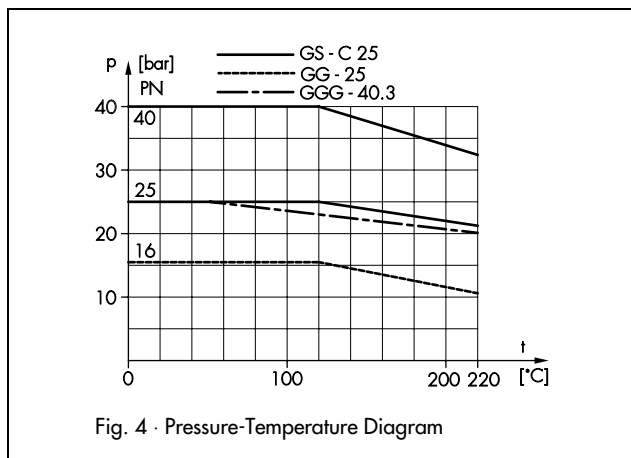
<sup>2)</sup> Only for sizes DN 15 to 150

<sup>3)</sup> For special version for oils (ASTM I, II, III): FPM (FKM)

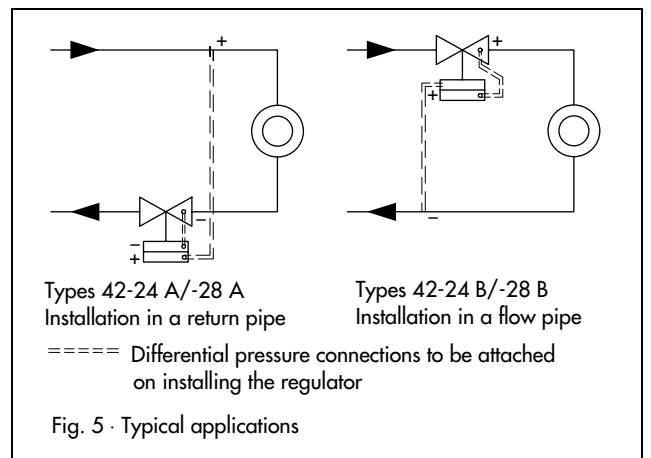
**Table 3 · Kvs and z values and maximum permissible differential pressures**

Nominal size	DN	15	20	25	32	40	50	65	80	100	125	150	200	250
Seat diameter	mm	22		40			65		89	103	125	207		
Kvs value	Standard	4	6.3	8	16	20	32	50	80	125	190	280	420	500
	Reduced	1	2.5	4	6.3	8	16	20	32	50	-			
z value		0.65	0.6	0.55	0.45	0.4	0.35			0.3				
Max. permissible differential pressure $\Delta p$	bar	25						20		16	12	10		

**Pressure-Temperature Diagram**



**Typical applications**



**Table 4 · Dimensions in mm and weights**

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	55			72			100	120	145	175	270			
<b>Type 42-24 A Differential Pressure Regulator</b>														
Set point range bar														
0.05 to 0.25	Height H	610						685	740	990	1120	1260		
	Actuator	$\varnothing D = 285 \text{ mm}$ , $A = 320 \text{ cm}^2$ 2)									$\varnothing D = 390 \text{ mm}$ , $A = 640 \text{ cm}^2$			
	Weight for PN 16, GG-25 <sup>1)</sup> kg	21	21.5	22.5	29	29.5	32	46	51	65	135	185	425	485
0.1 to 0.6	Height H	610						685	740	990	1120	1260		
	Actuator	$\varnothing D = 225 \text{ mm}$ , $A = 160 \text{ cm}^2$ 3)						$\varnothing D = 285 \text{ mm}$ , $A = 320 \text{ cm}^2$			$\varnothing D = 390 \text{ mm}$ , $A = 640 \text{ cm}^2$			
	Weight for PN 16, GG-25 <sup>1)</sup> kg	16	16.5	17.5	24	24.5	27	46	51	65	135	185	425	485
0.2 to 1	Height H	610						685	740	990	1120	1260		
	Actuator	$\varnothing D = 225 \text{ mm}$ , $A = 160 \text{ cm}^2$ 3)						$\varnothing D = 390 \text{ mm}$ , $A = 640 \text{ cm}^2$						
	Weight for PN 16, GG-25 <sup>1)</sup> kg	16	16.5	17.5	24	24.5	27	42	47	61	135	185	425	485
0.5 to 1.5	Height H	610						685	740	910	1040	1180		
	Actuator	$\varnothing D = 225 \text{ mm}$ , $A = 160 \text{ cm}^2$ 3)						$\varnothing D = 285 \text{ mm}$ , $A = 320 \text{ cm}^2$						
	Weight for PN 16, GG-25 <sup>1)</sup> kg	16	16.5	17.5	24	24.5	27	42	47	61	125	175	415	475
1 to 2.5	Height H	610						685	740	910	1040	1180		
	Actuator	$\varnothing D = 225 \text{ mm}$ , $A = 160 \text{ cm}^2$												
	Weight for PN 16, GG-25 <sup>1)</sup> kg	16	16.5	17.5	24	24.5	27	42	47	61	125	175	415	475
2 to 5 4.5 to 10	Height H	610						685	740	910	1040	1180		
	Actuator	$\varnothing D = 170 \text{ mm}$ , $A = 80 \text{ cm}^2$									$\varnothing D = 225 \text{ mm}$ , $A = 160 \text{ cm}^2$ 4)			
	Weight for PN 16, GG-25 <sup>1)</sup> kg	16	16.5	17.5	24	24.5	27	42	47	61	120	170	410	470
<b>Type 42-28 A Differential Pressure Regulator</b>														
Set point 0.2, 0.3, 0.4 or 0.5 bar	Height H	390						465	520					
	Actuator	$\varnothing D = 225 \text{ mm}$ , $A = 160 \text{ cm}^2$ 3)						$\varnothing D = 285 \text{ mm}$ , $A = 320 \text{ cm}^2$						
	Weight for PN 16, GG-25 <sup>1)</sup> kg	11.5	12	13	19.5	20	22.5	38	43	57				

1) +10% for cast steel PN 40 and spheroidal graphite iron PN 25  
2) Optionally with actuator A = 640 cm<sup>2</sup> for DN 65 and larger

3) Optionally with actuator A = 320 cm<sup>2</sup> for DN 65 and larger  
4) For set point range 4.5 to 10 bar: A = 80 cm<sup>2</sup>

