

Self-operated Pressure Regulators

Universal Pressure Reducing Valve Type 41-23



Application

Pressure regulator for set points from **25 mbar** to **28 bar** · Valves in sizes **DN 15** to **100** · Nominal pressure **PN 16** to **40** · For liquids, gases and steam up to **350 °C**

The valve **closes** when the **downstream** pressure increases.



Special features

- Low-maintenance P-regulator requiring no auxiliary energy
- Frictionless plug stem seal with stainless steel bellows
- Control line kit for pressure tapping directly at the body (accessories)
- Wide set point range and convenient set point adjustment on a nut
- Exchangeable actuator and positioning springs
- Spring-loaded single-seated valve with upstream and downstream pressure balancing¹⁾ by a stainless steel bellows
- Plug with soft seal for high sealing requirements
- Standard low-noise plug · Special version with flow divider St I or St III (DN 65 to 100) for further noise reduction (refer to Data Sheet T 8081 EN)

Versions

Pressure reducing valve to control the downstream pressure p_2 to the adjusted set point. The valve closes when the downstream pressure increases.

Type 41-23 · Standard version

Type 2412 Valve in DN 15 to 100 · Plug with metal seal · Body made of cast iron EN-JL1040, spheroidal graphite iron EN-JS1049, cast steel 1.0619, forged steel or CrNiMo steel 1.4408

Type 2413 Actuator with EPDM rolling diaphragm · All wetted parts free of non-ferrous metal

Extended versions

Millibar pressure reducing valve (DN 65 to 80)

Pressure set points from 25 to 50 mbar

Pressure reducing valve for low flow rates

Valve with micro-trim ($K_{VS} = 0.001$ to 0.04) or K_{VS} in special version (reduced cross-sectional area of flow)

Steam pressure reducing valve

With condensation chamber for steam up to 350 °C

Safety pressure reducing valve

Actuator with leakage line connection and seal or two diaphragms and diaphragm rupture indicator · Valve with downstream packing



Type 41-23 without control line

Fig. 1 · Type 41-23 Universal Pressure Reducing Valve

Special versions

- Control line kit for pressure tapping at the valve body (accessories)
- FPM rolling diaphragm for oils
- Free of oil and grease for oxygen with FPM diaphragm
- EPDM diaphragm with protective PTFE foil
- Actuator for remote set point adjustment (autoclave control)
- Bellows actuator for valves in DN 15 to 100 · Set point ranges 2 to 6, 5 to 10, 10 to 22, 20 to 28 bar
- Valve with flow divider St I or St III (DN 65 to 100) for particularly low-noise operation with gases and vapors
- Version entirely made of stainless steel
- Seat and plug of stainless Cr steel with PTFE soft seal (max. 220 °C) · With EPDM soft seal (max. 150 °C)
- Hard-faced seat and plug for low-wear operation

¹⁾ $K_{VS} \leq 2.5$: without balancing bellows

- Free of lubricants for high-purity water or gas
- Free of oil and grease for high-purity applications
- Wetted plastic parts complying with FDA regulations (max. 60 °C)

Principle of operation (Fig. 2)

The medium flows through the valve body (1) in the direction indicated by the arrow. The position of the valve plug (3) determines the flow rate across the area released between the plug and seat (2). The plug stem (5) with the plug is connected to the actuator stem (11).

To control the pressure, the operating diaphragm (12) is pretensioned by the positioning springs (7) and the set point adjuster (6). As a result, the valve is open by the force of the positioning springs in pressureless state ($p_1 = p_2$).

The downstream pressure p_2 to be controlled is tapped downstream of the valve and transmitted through the control line (14) to the operating diaphragm (12) where it is converted into a positioning force. This force is used to move the valve plug (3) depending on the force of the positioning springs (7). The spring force can be adjusted on the set point adjuster (6). When the force resulting from the downstream pressure p_2 exceeds the adjusted pressure set point, the valve is closed proportionally to the change in pressure.

The fully balanced valve is equipped with a balancing bellows (4): The downstream pressure p_2 acts on the inside of the bellows, the upstream pressure p_1 acts on the outside of the bellows. As a result, the forces produced by the upstream and downstream pressures acting on the valve plug are balanced.

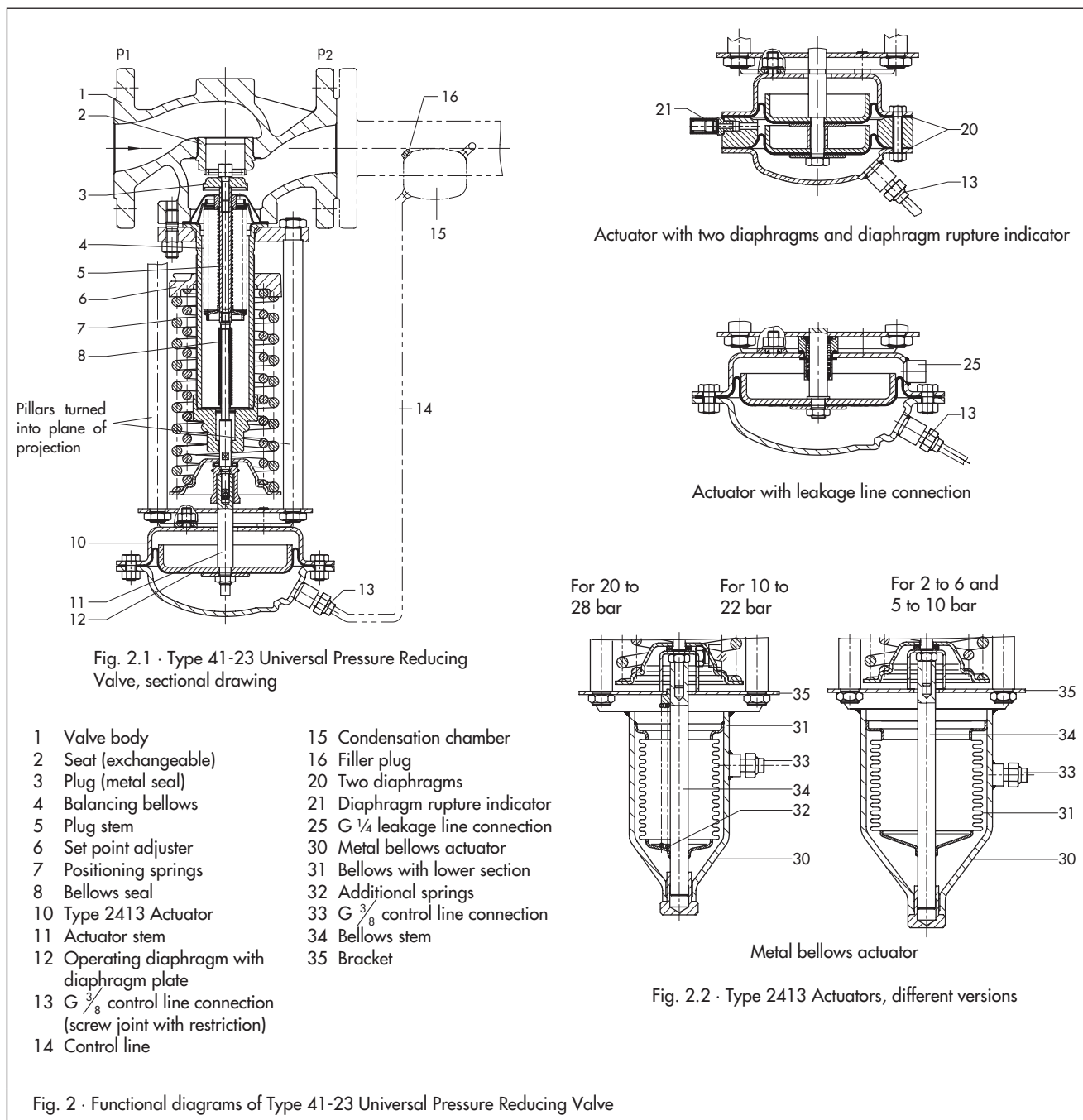


Fig. 2 · Functional diagrams of Type 41-23 Universal Pressure Reducing Valve

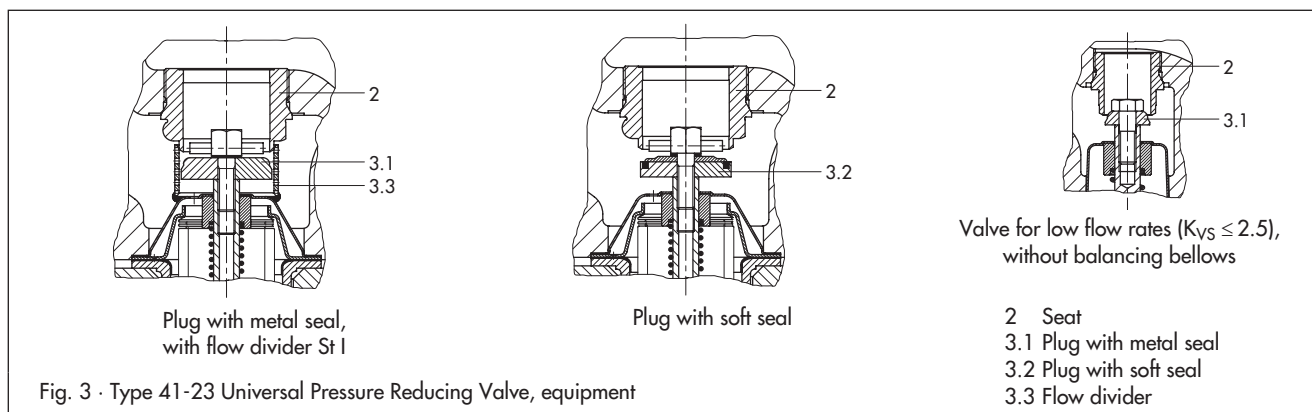


Table 1 · Technical data · All pressures in bar (gauge)

| Valve | Type 2412 | | |
|---|--|---|--------|
| Nominal pressure | PN 16, PN 25 or PN 40 | | |
| Nominal size | DN 15 to 50 | DN 65 to 80 | DN 100 |
| Max. perm. differential pressure Δp | 25 bar ¹⁾ | 20 bar ¹⁾ | 16 bar |
| Temperature ranges | Refer to pressure-temperature diagram (Fig. 6) | | |
| Valve plug | Metal seal: max. 350 °C · Soft seal, PTFE: max. 220 °C · Soft seal, EPDM, FPM: max. 150 °C Soft seal, NBR: max. 80 °C ³⁾ | | |
| Leakage rate (standard version) | Metal seal: leakage class I ≤ 0.05 % of K_{VS} coefficient · Soft seal: leakage class IV | | |
| Actuator with diaphragm | Type 2413 | | |
| Set point ranges | 25 to 50 mbar · 0.05 to 0.25 bar · 0.1 to 0.6 bar · 0.2 to 1.2 bar · 0.8 to 2.5 bar 2 to 5 bar · 4.5 to 10 bar · 8 to 16 bar | | |
| Max. perm. pressure at the actuator | 1.5 × max. set point ²⁾ | | |
| Max. perm. temperature | Gases 350 °C, however, max. 80 °C at the actuator ³⁾ · Liquids 150 °C, with condensation chamber max. 350 °C · Steam with condensation chamber max. 350 °C | | |
| Actuator with metal bellows | Type 2413 | | |
| Effective area | 33 cm ² | 62 cm ² | |
| Perm. pressure at the actuator | 30 bar | 20 bar | |
| Set point ranges | 10 to 22 bar 20 to 28 bar | 2 to 6 bar ⁴⁾ 5 to 10 bar | |
| Set point spring | 8000 N | | |

¹⁾ For millibar pressure reducing valve: max. perm. differential pressure Δp 10 bar · ²⁾ Millibar pressure reducing valve: max. 0.5 bar · ³⁾ Max. 60 °C for oxygen

⁴⁾ Set point spring 4400 N

Table 2 · Materials · Material numbers acc. to DIN EN

| Valve | Type 2412 | | | | | |
|------------------------------------|---|--|----------------------|---------------------------|--------------------------------------|---|
| Nominal pressure | PN 16 | PN 25 | PN 40 | | | |
| Max. perm. temperature | 300 °C | 350 °C | 350 °C | 350 °C | 350 °C | 350 °C |
| Body | Cast iron EN-JL1040 | Spheroidal graphite iron EN-JS1049 | Cast steel 1.0619 | Stainless steel 1.4408 | Forged steel ¹⁾ 1.0460 | Stainless forged steel ¹⁾ 1.4571 |
| Sitz | CrNi steel | | | CrNiMo steel | CrNi steel | CrNiMo steel |
| Plug | CrNi steel | | | CrNiMo steel | CrNi steel | CrNiMo steel |
| Soft sealing ring | PTFE with 15 % glass fiber · EPDM · NBR · FPM | | | | | |
| Guide bushing | PTFE/graphite | | | | | |
| Balancing bellows and bellows seal | Stainless forged steel 1.4571 | | | | | |
| Actuator | Type 2413 | | | | | |
| Diaphragm cases | Sheet steel DD11 (StW22) ²⁾ | | | | | |
| Diaphragm | EPDM with fabric insert ³⁾ · FPM for oils · NBR · EPDM with protective PTFE foil | | | | | |

¹⁾ Only DN 15, 25, 40, 50 and 80 · ²⁾ CrNi steel in stainless steel version · ³⁾ Standard version; for details refer to "Special versions"

Table 3 · K_{VS} coefficients and z values

| DN | Seat Ø in mm | $K_{VS}^{2)}$ | | $K_{VS} I^{1)}$ | $K_{VS} III^{1)}$ | z ¹⁾ |
|-----|--------------|------------------|------------------------------|-------------------|-------------------|-----------------|
| | | Standard version | Special version | With flow divider | | |
| 15 | 6 | | $0.1 \cdot 0.4^{2)} \cdot 1$ | | | |
| | 9.5 | | 2.5 | | | |
| | 22 | 4 | | 3 | | 0.65 |
| 20 | 6 | | $0.1 \cdot 0.4^{2)} \cdot 1$ | | | |
| | 9.5 | | 2.5 | | | |
| | 22 | 6.3 | 4 | 5 | | 0.6 |
| 25 | 6 | | $0.1 \cdot 0.4^{2)} \cdot 1$ | | | |
| | 9.5 | | 2.5 | | | |
| | 22 | 8 | $4 \cdot 6.3$ | 6 | | 0.55 |
| 32 | 22 | | $6.3 \cdot 8$ | | | |
| | 40 | 16 | | 12 | | 0.55 |
| 40 | 22 | | $6.3 \cdot 8$ | | | |
| | 40 | 20 | 16 | 15 | | 0.45 |
| 50 | 22 | | 8 | | | |
| | 40 | 32 | $16 \cdot 20$ | 25 | | 0.4 |
| 65 | 40 | | $20 \cdot 32$ | | | |
| | 65 | 50 | | 38 | 25 | 0.4 |
| 80 | 40 | | 32 | | | |
| | 65 | 80 | 50 | 60 | 40 | 0.35 |
| 100 | 65 | | 50 | | | |
| | 89 | 125 | | 95 | 60 | 0.35 |

1) Terms for noise level calculation according to VDMA 24422, 1989-01

2) For K_{VS} 0.001 to 0.04: valve with micro-flow trim without balancing bellows

Valve-specific correction terms

ΔL_G · For gases and vapors:

Values as specified in the diagram in Fig. 4

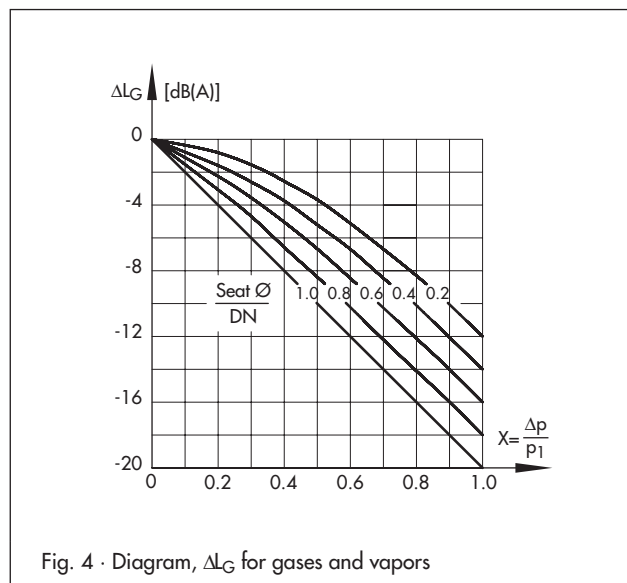


Fig. 4 · Diagram, ΔL_G for gases and vapors

ΔL_F · For liquids:

$$\Delta L_F = -10 \cdot (X_F - z) \cdot y$$

$$\text{with } X_F = \frac{\Delta p}{p_1 - p_v} \text{ and } y = \frac{K_v}{K_{vs}}$$

Terms for valve sizing according to DIN EN 60534, parts 2-1 and 2-2:

$$F_L = 0.95 \quad X_T = 0.75$$

z · Acoustical valve coefficient

$K_{VS} I, K_{VS} III$ · When a flow divider St I or St III has been installed to reduce the noise level

Table 4 · Dimensions in mm and weights

| Pressure Reducing Valve | | Type 41-23 | | | | | | | | |
|-------------------------|--|---------------------------------------|------|------|------|-----|-----|---|-----|-----|
| Nominal size | DN | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 |
| Set point range in bar | Length L | 130 | 150 | 160 | 180 | 200 | 230 | 290 | 310 | 350 |
| | Length PN 16 L1 PN 40 | 220 | 256 | 278 | 314 | 337 | 380 | 464 | 510 | 556 |
| | | | | | | | | 471 | | 570 |
| | Height H1 | 335 | | | 390 | | | 510 | | 525 |
| | Height H3 | 55 | | | 72 | | | 100 | | 120 |
| | Other materials Forged steel | 53 | - | 70 | - | 92 | 98 | - | 128 | - |
| 0.025 to 0.05 | Height H | | | | | | | 610 | | - |
| | Actuator | - | | | | | | Ø D = 490 mm, A = 1200 cm ² | | |
| | Valve spring force F | | | | | | | 1200 N | | |
| 0.05 to 0.25 | Height H | 445 | | | 500 | | | 620 | 635 | |
| | Actuator | Ø D = 380 mm, A = 640 cm ² | | | | | | | | |
| | Valve spring force F | 1750 N | | | | | | | | |
| 0.1 to 0.6 | Height H | 445 | | | 500 | | | 620 | 635 | |
| | Actuator | Ø D = 380 mm, A = 640 cm ² | | | | | | | | |
| | Valve spring force F | 4400 N | | | | | | | | |
| 0.2 to 1.2 | Height H | 430 | | | 480 | | | 600 | 620 | |
| | Actuator | Ø D = 285 mm, A = 320 cm ² | | | | | | | | |
| | Valve spring force F | 4400 N | | | | | | | | |
| 0.8 to 2.5 | Height H | 430 | | | 485 | | | 605 | 620 | |
| | Actuator | Ø D = 225 mm, A = 160 cm ² | | | | | | | | |
| | Valve spring force F | 4400 N | | | | | | | | |
| 2 to 5 | Height H | 410 | | | 465 | | | 585 | 600 | |
| | Actuator | Ø D = 170 mm, A = 80 cm ² | | | | | | | | |
| | Valve spring force F | 4400 N | | | | | | | | |
| 4.5 to 10 | Height H | 410 | | | 465 | | | 585 | 600 | |
| | Actuator | Ø D = 170 mm, A = 40 cm ² | | | | | | | | |
| | Valve spring force F | 4400 N | | | | | | | | |
| 8 to 16 | Height H | 410 | | | 465 | | | 585 | 600 | |
| | Actuator | Ø D = 170 mm, A = 40 cm ² | | | | | | | | |
| | Valve spring force F | 8000 N | | | | | | | | |
| 0.025 to 0.05 | Approx. weight in kg for cast iron ¹⁾ | 28.5 | 29.5 | 35.5 | 37.5 | 41 | 57 | 64 | - | |
| 0.05 to 0.6 | | 22.5 | 23.5 | 29.5 | 31.5 | 35 | 51 | 58 | 67 | |
| 0.2 to 2.5 | | 16 | 18 | 23.5 | 25.5 | 29 | 45 | 52 | 61 | |
| 2 to 16 | | 12 | 13 | 18.5 | 21 | 24 | 40 | 47 | 56 | |

¹⁾ +10 % for cast steel, spheroidal graphite iron and forged steel

Type 41-23 Universal Pressure Reducing Valve

Actuator with two diaphragms:
Height H + 50 mm

Fig. 5 · Dimensions

Type 2413 Actuator with metal bellows

| Height | | |
|----------------|--------------------|--------------------|
| Effective area | 33 cm ² | 62 cm ² |
| H4 | 200 mm | 215 mm |
| Weight | | |
| DN 15 to 50 | 8 kg | 17 kg |
| DN 65 to 100 | 12 kg | 18 kg |

Installation

Standard installation: Install the regulator with the actuator suspended (pointing down). Install the horizontal pipeline with a slight downward slope on both sides of the valve for condensate drainage.

Install millibar pressure reducing valves upright with the actuator pointing up.

For further details on installation refer to EB 2512 EN.

Install the regulator with the direction of flow matching the arrow on the valve body.

- Valve and actuator are delivered as separate units.
- Adapt the control line (not included in the scope of delivery) to the conditions on site. A control line kit for pressure tapping directly at the valve body is available on request (accessories).

Pressure-temperature diagram according to DIN EN 12516-1

The application range of the valves as well as the permissible pressures and temperatures are limited by the specifications of the pressure-temperature diagram and the nominal pressure.

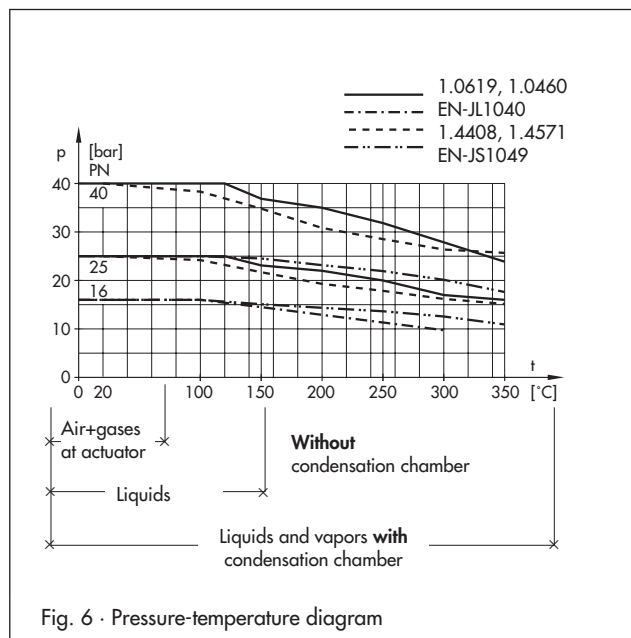


Fig. 6 · Pressure-temperature diagram

Accessories

- Screw joint for connection of the 3/8" control line to the filler neck. Other screw joints available on request.
- Condensation chamber for steam condensation and protection of the operating diaphragm against excessive temperatures. Required for steam and liquids at temperatures exceeding 150 °C.
- Control line kit (optionally with or without condensation chamber) for direct attachment to the valve and actuator (pressure tapping directly at the valve body, for set points ≥ 0.8 bar).
- Conical expansion piece to double the nominal outlet diameter in sizes DN 15/DN 32 to DN 100/DN 200, nominal pressure PN 16 or PN 40.

For details on the accessories refer to Data Sheet T 2595 EN.

Ordering text

Universal Pressure Reducing Valve **Type 41-23**

Extended version ...

DN ...

PN ...

Body material ...

Kvs ...

Set point range ... bar

Optionally, accessories ... (refer to T 2595 EN)

Optionally, special version ...

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
Internet: <http://www.samson.de>

T 2512 EN

2011-03