

Application

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

Differential pressure set point $\Delta p = 0.2 \text{ bar (0.3 bar)}$ ¹⁾ · Nominal size **DN 15 to 250** · Nominal pressure **PN 16 to 40** · Compressed air and nitrogen up to **80 °C (150 °C)** ²⁾



The regulator prevents flowback from directly connected systems.

The regulator is opened when the upstream pressure is at least 0.2 bar (0.3 bar) ¹⁾ 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 available in cast steel, cast stainless steel or forged stainless steel
- 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
- An increasing backpressure supports tight shut-off of the valve

¹⁾ DN 200 and 250 version

²⁾ Version with FPM diaphragm



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

Versions

Check valve in supply pipelines

Type 42-10 RS · Type 2421 RS Valve, DN 15 to 250
Type 2420 RS Actuator with two diaphragms · Set point fixed at 0.2 bar (0.3 bar) ¹⁾ · Special version in stainless steel · Version suitable for steam on request · Version for deionized water on request

Optional: Diaphragm rupture indication with pressure switch · Fittings and diaphragm rupture indicator made of Monel

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 0.2 bar (3.0 bar with DN 200 and 250), the valve begins to open; at 0.35 bar (0.55 bar with DN 200 and 250), the valve is completely 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 valve plug with soft sealing is standard to ensure tight shut-off and to prevent backflow from the plant into the compressed air or nitrogen network.

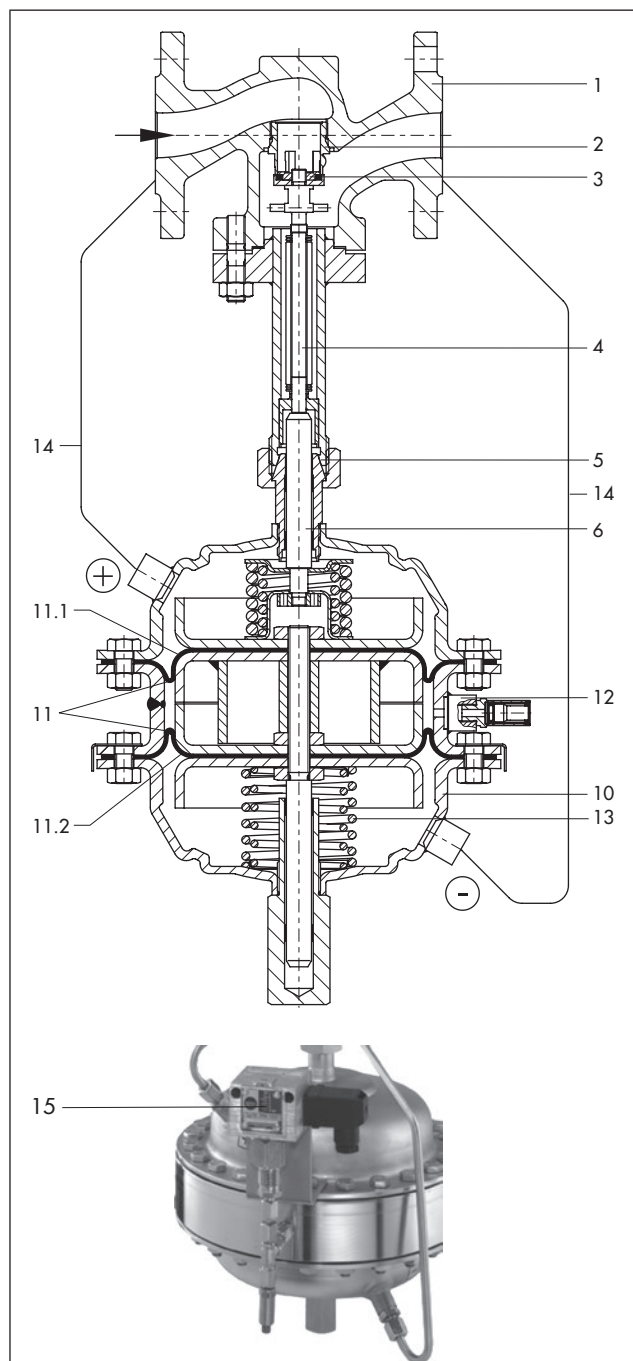
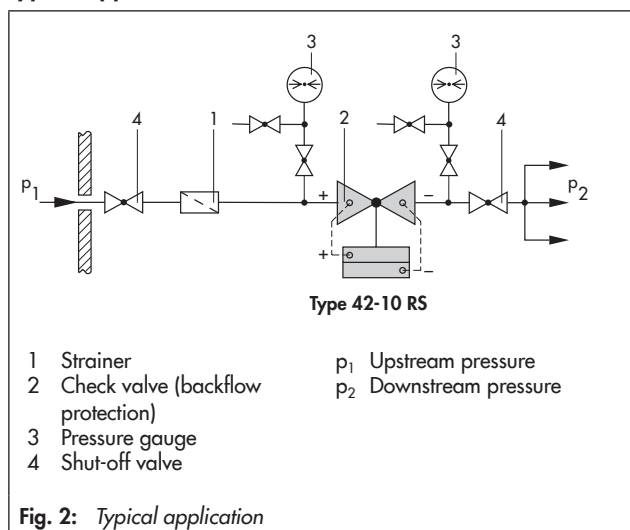
The mounted control lines (14) transmit the upstream pressure (+) and the downstream pressure (-) to the actuator.

The actuator with two diaphragms (11) offers increased safety and reliability of functions. The operating diaphragm for upstream pressure (11.1) is connected to the valve input pressure (+), whereas the operating diaphragm for downstream pressure (11.2) is connected to the valve output pressure (-). There is a bore with a mechanical diaphragm rupture indication (12) in the intermediate ring located between the two diaphragms. The pressure of response of the diaphragm rupture indication is approximately 1.5 bar. 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 undamaged operating diaphragm then takes over the function of the damaged operating diaphragm.

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

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

Typical 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 upstream pressure (+) |
| 11.2 | Operating diaphragm for downstream pressure (-) |
| 12 | Diaphragm rupture indicator |
| 13 | Set point springs |
| 14 | Control line 8x1 mm |
| 15 | Pressure switch (optional) |

Fig. 3: Functional diagram

Table 1: Technical data

| Type 2421 RS Valve | | | | | | | | | | | | | | |
|---|---|-----|----|----|----|--------------------|----|----|---------------------|-----|-----|-----|-----|--|
| Nominal size | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 | 250 | |
| K _{VS} coefficient | 4 | 6.3 | 8 | 16 | 20 | 32 | 50 | 80 | 125 | 190 | 280 | 420 | 500 | |
| Nominal pressure | PN 16, 25 or 40 | | | | | | | | | | | | | |
| Max. constant operating pressure | 25 bar | | | | | | | | | | | | | |
| Max. perm. pressure acting on one side | 45 bar | | | | | | | | | | | | | |
| Leakage class according to IEC 60534-4 ¹⁾ | Leakage class VI | | | | | | | | | | | | | |
| Max. permissible temperature with EPDM diaphragm in actuator with FPM diaphragm in actuator | 80 °C for air and gases · 150 °C for water · 220 °C for steam with condensation chamber 150 °C | | | | | | | | | | | | | |
| Compliance | CE · EAC | | | | | | | | | | | | | |
| Type 2420 RS Actuator | | | | | | | | | | | | | | |
| Actuator area | 320 cm ² | | | | | | | | 640 cm ² | | | | | |
| Differential pressure set point Δp, fixed DN 15 to 150 DN 200 and 250 | | | | | | 0.2 bar 0.3 bar | | | | | | | | |
| Max. permissible temperature with EPDM diaphragm with FPM diaphragm | 80 °C for air and gases · 150 °C for water · 220 °C for steam with condensation chamber 150 °C | | | | | | | | | | | | | |
| Compliance | CE · EAC | | | | | | | | | | | | | |

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

Table 2: Materials· Material numbers according to DIN EN

| Type 2421 RS Valve | | | |
|------------------------------|--|-----------------------------|---|
| Nominal pressure | PN 16/25/40 | PN 16/25/40 | PN 40 |
| Valve body | Cast steel 1.0619 | Cast stainless steel 1.4408 | Forged stainless steel ¹⁾ 1.4571 |
| Seat and plug | Stainless steel 1.4404 with EPDM soft seal | | |
| Plug stem | Stainless steel 1.4301 | | |
| Bottom section | Stainless steel 1.4404/1.4301 | | |
| Body gasket | novatec® PREMIUM | | |
| Type 2420 RS Actuator | | | |
| Diaphragm cases | Sheet steel DD11 | Stainless steel 1.4301 | |
| Diaphragm | EPDM with fabric reinforcement · FPM | | |
| Guide bushing | DU bushing | PTFE bushing | |
| Distance piece | Sheet steel DD11 | Stainless steel 1.4301 | |
| Coupling pin | Stainless steel 1.4301 | | |
| Seals | EPDM · FPM | | |

¹⁾ DN 15, 20, and 50 only

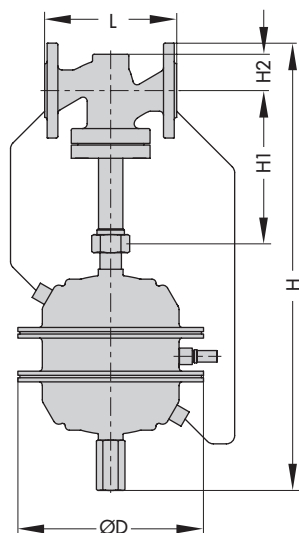
Installation

The regulator is delivered ready for installation.

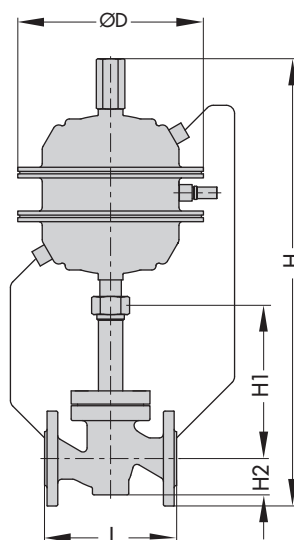
The following points must be observed:

- Install the valves in horizontal pipelines free of stress with the actuator suspended downwards (or facing upwards with DN 200 and 250; see Fig. 4).
- Direction of flow must match the direction indicated by the arrow on the body.
- Install a strainer upstream of the valve.

Dimensions



Type 42-10 RS · DN 15 to 150



Type 42-10 RS · DN 200 and 250

Dimensions in mm and weights in kg

| 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 | Other materials | 55 | | | 72 | | 100 | | 120 | 145 | 175 | 260 | |
| | Forged steel | 53 | - | 70 | - | 92 | 98 | - | - | - | - | - | |
| Height H | 550 | | | 600 | | 800 | | 830 | 1000 | | 1144 | | |
| Actuator | ØD = 285 mm · A = 320 cm ² | | | | | | ØD = 390 mm · A = 640 cm ² | | | | | | |
| Weight, approx. kg | 26 | 26.5 | 28 | 35 | 35.5 | 39.5 | 59.5 | 65.5 | 75 | 110 | 165 | 410 | 470 |

Fig. 4: Dimensions

Ordering text

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

Set point fixed at 0.2 bar (0.3 bar with DN 200 and 250)

DN ...

Body material ..., PN ...

Special version

Table 3: Flow rates for Type 2421 RS Valve

Table 3.1: Flow rates for nitrogen

0.25 bar pressure drop across the valve

| DN | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | |
|---|----|-------|-------|-------|-------|-------|-------|------|------|------|-------|-------|
| K_{Vs} | 4 | 6.3 | 8 | 16 | 20 | 32 | 50 | 80 | 125 | 190 | 280 | |
| Maximum flow rate of nitrogen in Nm³/h at 20 °C · 0.25 bar pressure drop across the valve | | | | | | | | | | | | |
| Inlet pressure p_1 (gauge) in bar | 2 | 82.19 | 129.4 | 164.5 | 328.8 | 411.3 | 658 | 1028 | 1645 | 2160 | 3907 | 5758 |
| | 3 | 95.9 | 151 | 191.8 | 383.6 | 497.7 | 767.5 | 1199 | 1918 | 2519 | 4557 | 6716 |
| | 4 | 107.8 | 169.9 | 215.8 | 431.5 | 539.5 | 863.3 | 1349 | 2158 | 2833 | 5126 | 7554 |
| | 5 | 118.6 | 186.9 | 237.4 | 474.6 | 593.5 | 949.5 | 1483 | 2374 | 3116 | 5638 | 8309 |
| | 6 | 128.5 | 202.4 | 257.1 | 514.2 | 642.9 | 1028 | 1607 | 2571 | 3376 | 6108 | 9001 |
| | 8 | 146.3 | 230.5 | 292.8 | 585.5 | 732 | 1171 | 1830 | 2928 | 3844 | 6954 | 10240 |
| | 10 | 162.2 | 255.6 | 324.6 | 649.1 | 811.5 | 1298 | 2029 | 3246 | 4261 | 7709 | 11360 |
| | 12 | 176.7 | 278.4 | 353.6 | 707.1 | 884 | 1414 | 2210 | 3536 | 4641 | 8398 | 12370 |
| | 15 | 196.5 | 309.6 | 393.1 | 786.2 | 982.9 | 1572 | 2457 | 3931 | 5161 | 9338 | 13760 |
| | 20 | 225.7 | 355.6 | 451.6 | 903.1 | 1129 | 1806 | 2822 | 4516 | 5928 | 10720 | 15800 |
| | 25 | 251.7 | 396.4 | 503.4 | 1006 | 1258 | 2013 | 3146 | 5034 | 6608 | 11950 | 17620 |

0.5 bar pressure drop across the valve

| DN | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | |
|--|----|-------|-------|-------|-------|-------|------|------|------|------|-------|-------|
| K_{Vs} | 4 | 6.3 | 8 | 16 | 20 | 32 | 50 | 80 | 125 | 190 | 280 | |
| Maximum flow rate of nitrogen in Nm³/h at 20 °C · 0.5 bar pressure drop across the valve | | | | | | | | | | | | |
| Inlet pressure p_1 (gauge) in bar | 2 | 111.3 | 175.4 | 223 | 445.5 | 557.5 | 892 | 1394 | 2230 | 2930 | 5298 | 7806 |
| | 3 | 131.3 | 206.9 | 263 | 525.6 | 657.5 | 1052 | 1644 | 2630 | 3455 | 6247 | 9206 |
| | 4 | 148.7 | 234.3 | 297.7 | 595.1 | 744.4 | 1191 | 1861 | 2977 | 3911 | 7072 | 10420 |
| | 5 | 164.3 | 258.9 | 328.9 | 657.5 | 822.3 | 1315 | 2056 | 3289 | 4319 | 7812 | 11510 |
| | 6 | 178.6 | 281.3 | 357.4 | 714.5 | 893.5 | 1429 | 2234 | 3574 | 4693 | 8489 | 12510 |
| | 8 | 204.2 | 321.6 | 408.5 | 816.8 | 1021 | 1634 | 2553 | 4085 | 5364 | 9704 | 14300 |
| | 10 | 226.9 | 357.4 | 454 | 907.8 | 1135 | 1816 | 2838 | 4540 | 5961 | 10780 | 15890 |
| | 12 | 247.6 | 390.1 | 495.4 | 990.7 | 1238 | 1981 | 3097 | 4955 | 6504 | 11760 | 17340 |
| | 15 | 275.8 | 434.5 | 551.8 | 1103 | 1379 | 2207 | 3449 | 5519 | 7245 | 13100 | 19310 |
| | 20 | 317.5 | 500.1 | 635.1 | 1270 | 1587 | 2540 | 3969 | 6351 | 8337 | 15080 | 22220 |
| | 25 | 354.4 | 558.1 | 708.7 | 1417 | 1772 | 2835 | 4430 | 7088 | 9304 | 16830 | 24800 |

1 bar pressure drop across the valve

| DN | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | |
|--|----|-------|-------|-------|-------|-------|------|------|------|-------|-------|-------|
| K_{Vs} | 4 | 6.3 | 8 | 16 | 20 | 32 | 50 | 80 | 125 | 190 | 280 | |
| Maximum flow rate of nitrogen in Nm³/h at 20 °C · 1 bar pressure drop across the valve | | | | | | | | | | | | |
| Inlet pressure p_1 (gauge) in bar | 2 | 143.6 | 226.3 | 288 | 574.9 | 720.4 | 1152 | 1802 | 2881 | 3792 | 6846 | 10090 |
| | 3 | 173.8 | 273.8 | 348.2 | 695.5 | 870.9 | 1393 | 2178 | 3483 | 4581 | 8276 | 12190 |
| | 4 | 199.7 | 314.5 | 399.9 | 798.9 | 1000 | 1599 | 2501 | 4000 | 5258 | 9502 | 14000 |
| | 5 | 222.6 | 350.7 | 445.8 | 890.9 | 1114 | 1783 | 2788 | 4459 | 5859 | 10590 | 15600 |
| | 6 | 243.5 | 383.6 | 487.6 | 974.4 | 1219 | 1950 | 3048 | 4876 | 6407 | 11580 | 17060 |
| | 8 | 280.8 | 442.3 | 562 | 1123 | 1405 | 2248 | 3514 | 5621 | 7383 | 13350 | 19670 |
| | 10 | 313.7 | 494.2 | 627.9 | 1255 | 1570 | 2511 | 3925 | 6279 | 8247 | 14910 | 21980 |
| | 12 | 343.6 | 541.3 | 687.6 | 1374 | 1719 | 2750 | 4298 | 6877 | 9030 | 16330 | 24070 |
| | 15 | 384.2 | 605.2 | 768.7 | 1537 | 1920 | 3075 | 4805 | 7688 | 10090 | 18260 | 26900 |
| | 20 | 443.8 | 699.1 | 887.9 | 1775 | 2220 | 3551 | 5550 | 8880 | 11650 | 21090 | 31080 |
| | 25 | 496.5 | 782 | 993.2 | 1986 | 2483 | 3973 | 6208 | 9933 | 13040 | 23590 | 34760 |

Table 3.2: Flow rates for air

0.25 bar pressure drop across the valve

| DN | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | |
|--|-------|-------|-------|-------|-------|-------|-------|------|------|-------|-------|-------|
| K_{VS} | 4 | 6.3 | 8 | 16 | 20 | 32 | 50 | 80 | 125 | 190 | 280 | |
| Maximum flow rate of air in Nm³/h at 20 °C · 0.25 bar pressure drop across the valve | | | | | | | | | | | | |
| Inlet pressure p_1 (gauge) in bar | 2 | 80.95 | 127.5 | 161.8 | 323.4 | 404.5 | 647.2 | 1011 | 1618 | 2125 | 3843 | 5663 |
| | 3 | 94.32 | 148.5 | 188.7 | 377.3 | 471.8 | 754.8 | 1179 | 1887 | 2478 | 4482 | 6605 |
| | 4 | 106.1 | 167.1 | 212.2 | 424.4 | 530.7 | 849.1 | 1326 | 2122 | 2787 | 5042 | 7430 |
| | 5 | 116.7 | 183.8 | 233.4 | 466.8 | 583.7 | 933.9 | 1459 | 2335 | 3065 | 5545 | 8172 |
| | 6 | 126.4 | 199.1 | 252.9 | 505.8 | 632.4 | 1011 | 1581 | 2529 | 3320 | 6008 | 8853 |
| | 8 | 143.9 | 226.7 | 288 | 575.9 | 720 | 1152 | 1800 | 2880 | 3780 | 6840 | 10080 |
| | 10 | 159.6 | 251.4 | 319.2 | 638.5 | 798.2 | 1277 | 1995 | 3193 | 4191 | 7583 | 11170 |
| | 12 | 173.8 | 273.5 | 347.8 | 695.5 | 869.5 | 1391 | 2174 | 3478 | 4565 | 8261 | 12170 |
| | 15 | 193.3 | 304.5 | 386.7 | 774 | 966.9 | 1547 | 2417 | 3867 | 5076 | 9185 | 13530 |
| | 20 | 222.1 | 349.8 | 444.2 | 888.5 | 1110 | 1777 | 2776 | 4442 | 5831 | 10550 | 15550 |
| 25 | 247.8 | 390 | 495.3 | 990.6 | 1238 | 1981 | 3095 | 4953 | 6501 | 11760 | 17330 | |

0.5 bar pressure drop across the valve

| DN | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | |
|---|-------|-------|-------|-------|-------|-------|-------|------|------|-------|--------|-------|
| K_{VS} | 4 | 6.3 | 8 | 16 | 20 | 32 | 50 | 80 | 125 | 190 | 280 | |
| Maximum flow rate of air in Nm³/h at 20 °C · 0.5 bar pressure drop across the valve | | | | | | | | | | | | |
| Inlet pressure p_1 (gauge) in bar | 2 | 109.6 | 172.7 | 219.3 | 438.2 | 548.4 | 877.3 | 1371 | 2193 | 2882 | 5390 | 7678 |
| | 3 | 129.2 | 203.5 | 258.6 | 517 | 646.7 | 1034 | 1617 | 2587 | 3398 | 6357 | 9054 |
| | 4 | 146.3 | 230.5 | 292.8 | 585.4 | 732.2 | 1171 | 1830 | 2928 | 3846 | 7198 | 10250 |
| | 5 | 161.6 | 254.6 | 323.5 | 646.7 | 808.8 | 1294 | 2022 | 3235 | 4248 | 7952 | 11320 |
| | 6 | 175.6 | 276.7 | 351.5 | 702.8 | 878.9 | 1406 | 2197 | 3515 | 4616 | 8642 | 12300 |
| | 8 | 200.8 | 316.3 | 401.8 | 803.4 | 1004 | 1607 | 2512 | 4018 | 5276 | 9881 | 14060 |
| | 10 | 223.2 | 351.6 | 446.6 | 893.0 | 1116 | 1786 | 2791 | 4466 | 5863 | 109080 | 15630 |
| | 12 | 243.6 | 383.2 | 487.3 | 974.5 | 1218 | 1949 | 3046 | 4873 | 6398 | 11980 | 17050 |
| | 15 | 271.3 | 427.4 | 542.8 | 1086 | 1357 | 2171 | 3393 | 5429 | 7127 | 13350 | 19000 |
| | 20 | 312.3 | 491.9 | 624.7 | 1249 | 1562 | 2499 | 3905 | 6247 | 8201 | 15380 | 21860 |
| 25 | 348.9 | 549.1 | 697.3 | 1394 | 1743 | 2789 | 4358 | 6973 | 9153 | 17170 | 24400 | |

1 bar pressure drop across the valve

| DN | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | |
|---|-------|-------|-------|-------|-------|-------|------|------|-------|-------|-------|-------|
| K_{VS} | 4 | 6.3 | 8 | 16 | 20 | 32 | 50 | 80 | 125 | 190 | 280 | |
| Maximum flow rate of air in Nm³/h at 20 °C · 1 bar pressure drop across the valve | | | | | | | | | | | | |
| Inlet pressure p_1 (gauge) in bar | 2 | 141.4 | 222.8 | 283.3 | 565.6 | 708.7 | 1133 | 1773 | 2834 | 3770 | 6735 | 9922 |
| | 3 | 171 | 269.3 | 342.6 | 684.2 | 856.7 | 1370 | 2143 | 3426 | 4506 | 8141 | 11990 |
| | 4 | 196.4 | 309.4 | 393.4 | 785.9 | 983.7 | 1573 | 2460 | 3934 | 5172 | 9347 | 13770 |
| | 5 | 219 | 345 | 438.5 | 876.3 | 1096 | 1754 | 2742 | 4386 | 5764 | 10420 | 15350 |
| | 6 | 239.5 | 377.3 | 479.6 | 958.4 | 1199 | 1918 | 2998 | 4796 | 6302 | 11390 | 16780 |
| | 8 | 276.2 | 435.1 | 552.8 | 1105 | 1382 | 2211 | 3456 | 5529 | 7262 | 13130 | 19350 |
| | 10 | 308.6 | 486.1 | 617.6 | 1234 | 1544 | 2470 | 3861 | 6177 | 8112 | 14670 | 21620 |
| | 12 | 338.0 | 531.6 | 676.4 | 1352 | 1691 | 2705 | 4228 | 6764 | 8883 | 16060 | 23670 |
| | 15 | 377.9 | 595.3 | 756.2 | 1513 | 1890 | 3025 | 4727 | 7562 | 9930 | 17960 | 26470 |
| | 20 | 436.6 | 687.7 | 873.5 | 1746 | 2184 | 3494 | 5460 | 8736 | 11470 | 20750 | 30570 |
| 25 | 488.9 | 769.4 | 977.2 | 1954 | 2443 | 3908 | 6108 | 9772 | 12830 | 23210 | 34200 | |

Specifications subject to change without notice



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