

MEDENUS

Gas Pressure Regulation



Gas pressure regulator RS 250 / RS 251



Product information

EN

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List of abbreviations and formula symbols

| | | | | | |
|-------------|-----------------------------------|-----------|-------------------------------|-----------------|---|
| AC | Accuracy class | PS | Maximum allowable pressure | W_{dsu} | Lower adjustment range (SSV) |
| AG_o | Upper response pressure group | p_u | Inlet pressure | Δp_{wo} | Min. re-engagement difference between upper response pressure and normal operating pressure |
| AG_u | Lower response pressure group | Q_n | Standard volumetric flow rate | | |
| HDS | High-pressure screw spindle value | RE | Control unit | | |
| K_G | | BV | Breather valve | Δp_{wu} | Min. re-engagement difference between lower response pressure and normal operating pressure |
| p_d | Outlet pressure | RSD | Throttle valve | | |
| p_{df} | SRV closing pressure | RSS | Switching valve | | |
| p_{do} | SRV opening pressure | SSV | Safety shut-off valve | | |
| p_{ds} | Setpoint of the response pressure | SRV | Safety relief valve | ρ_n | Gas density |
| $p_{ds o}$ | Upper SSV response pressure | SG | Closing pressure group | | |
| $p_{ds u}$ | Lower SSV response pressure | t_{Gas} | Gas inlet temperature | | |
| $p_{f,max}$ | Maximum closing pressure | VS | Valve seat | | |
| | | w_d | Outlet gas velocity | | |
| | | w_u | Inlet gas velocity | | |
| | | W_{dso} | Upper adjustment range (SSV) | | |

*) K_G value for natural gas: $d = 0,64$ ($\rho_n = 0,83 \text{ kg/m}^3$), $t_u = 15^\circ \text{ C}$

Application, Characteristics, Technical Data

Application

Gas pressure regulator (GDR), direct-acting (operating without auxiliary power), for systems acc. to DVGW - work sheet G 491 (A) and G 600 (A) (TRGI)

Particularly suitable for dynamic regulation sections (e.g. gas fireplaces, natural gas distribution plants, burner, gas engines)

Can be used as an equipment component on gas consumption facilities as defined in EC Directive (90/396/EEC)

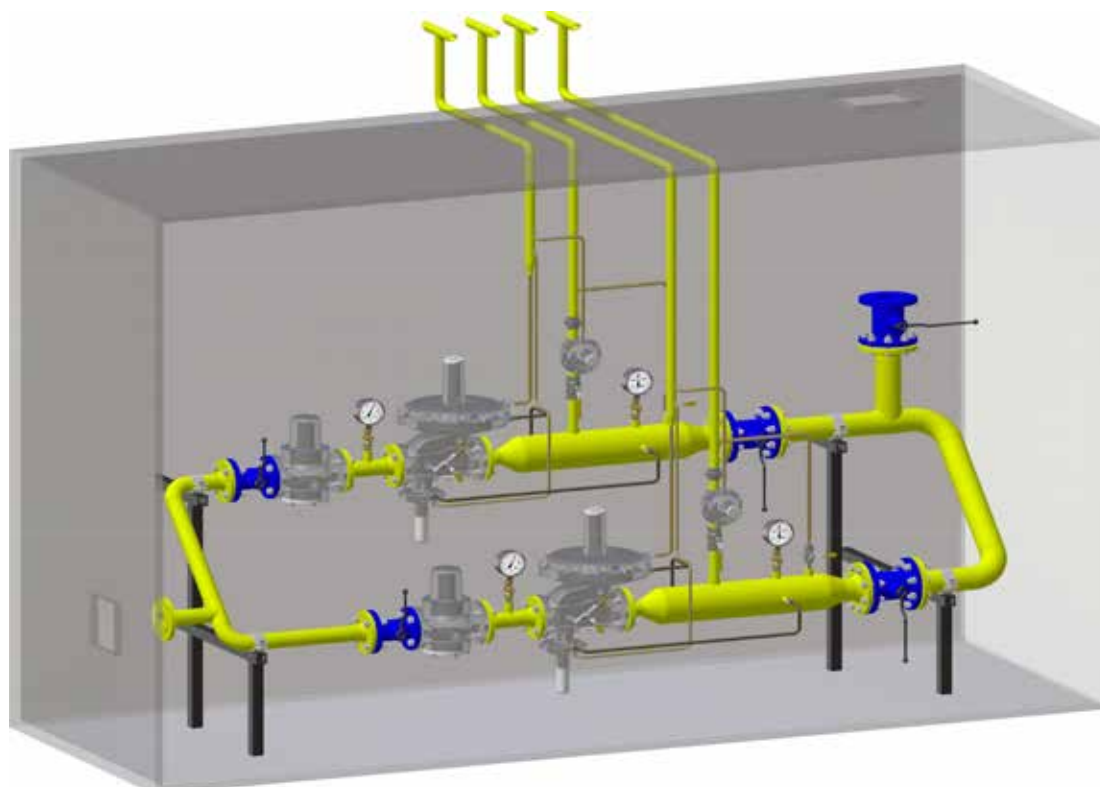
Can be used for the gases defined in DVGW - work sheet G 260 / G 262 and neutral non-aggressive gases. (other gases on request)

Features

- Integral pressure-tight model (IS)
- Gas pressure regulator with integrated SSV
- Easy maintenance through replaceable SSV functional units (modular design)
- SSV functional class, optionally A or B
- outdoor version as standard

Type of model (options)

- Oxygen model
- Without SSV
- With noise reduction
- With SSV manual release
- With SSV - electromagnetic remote release when power is applied or in case of power failure
- With electric position indicator SSV 'Closed' via inductive initiator or via Reed contact
- Control unit with integrated leakage gas SRV or safety diaphragm
- With BV breather valve for SSV
- With throttle valve (RSD) for impulse line of the regulator
- Coating with epoxy resin in RAL colours



double gas train

Technical Data

| | |
|--|---|
| Type | RS 250 / RS 251 |
| Model | Integral pressure-tight (IS) |
| Max. allowable pressure PS | 8 bar |
| Max. inlet pressure $p_{u,max}$ | 8 bar |
| Nominal size | RS 250: DN 25, DN 50, DN 80, DN 100, DN 150, DN 200 RS 251: DN 50, DN 80, DN 100 |
| Connection type | DIN EN 1092 - PN 16 flanges ASME - B16.5 flanges Class 150 RF |
| Material | |
| Housing / actuator housing/ Control device housing | Al cast alloy* |
| Temperature range, Class 2 (operating/ambient temperature) | -20°C to +60°C |
| Closing pressure zone group | SZ 2.5 |

Gas pressure regulator

| Accuracy class AC and closing pressure group SG at the outlet pressure range p_d | AC | SG |
|---|-----|----|
| 18 mbar to 100 mbar | 10 | 20 |
| > 100 mbar to 500 mbar | 5 | 10 |
| > 500 mbar to 1500 mbar | 2.5 | 10 |
| >1000 mbar (only RE 205 / 275) | 5 | 10 |

Safety shut-off valve

| Upper response pressure group AG_o in command area w_{dso} | AG_o | Lower response pressure AG_u in command area w_{dsu} | AG_u |
|---|--------|---|--------|
| 50 mbar to 100 mbar | 10 | 10 mbar to 30 mbar | 20 |
| > 100 mbar to 500 mbar | 5 | > 30 mbar to 50 mbar | 10 |
| > 500 mbar | 2.5 | > 50 mbar | 5 |

Function, Strength and Tightness DIN EN 334 and DIN EN 14382

CE mark to PED/ PIN number CE-0085-AQ0882 / CE-0085-AQ0883

Ex protection The mechanical parts of the device do not have any potential ignition sources of their own and therefore do not fall within the scope of ATEX 95 (94/9/EC). Electrical components fitted to the device comply with the ATEX requirements.

*) RS 250: DN 50/ DN 80/ DN 100 housing also available in spheroidal cast iron (GJS)

**) Corrosivity category according to DIN EN ISO 12944-2.

The categories C1 to C5-I including guaranteed without additional coatings.
For the category C5-M a coating with epoxy resin is recommended.



Application, Characteristics, Technical Data

Design and function

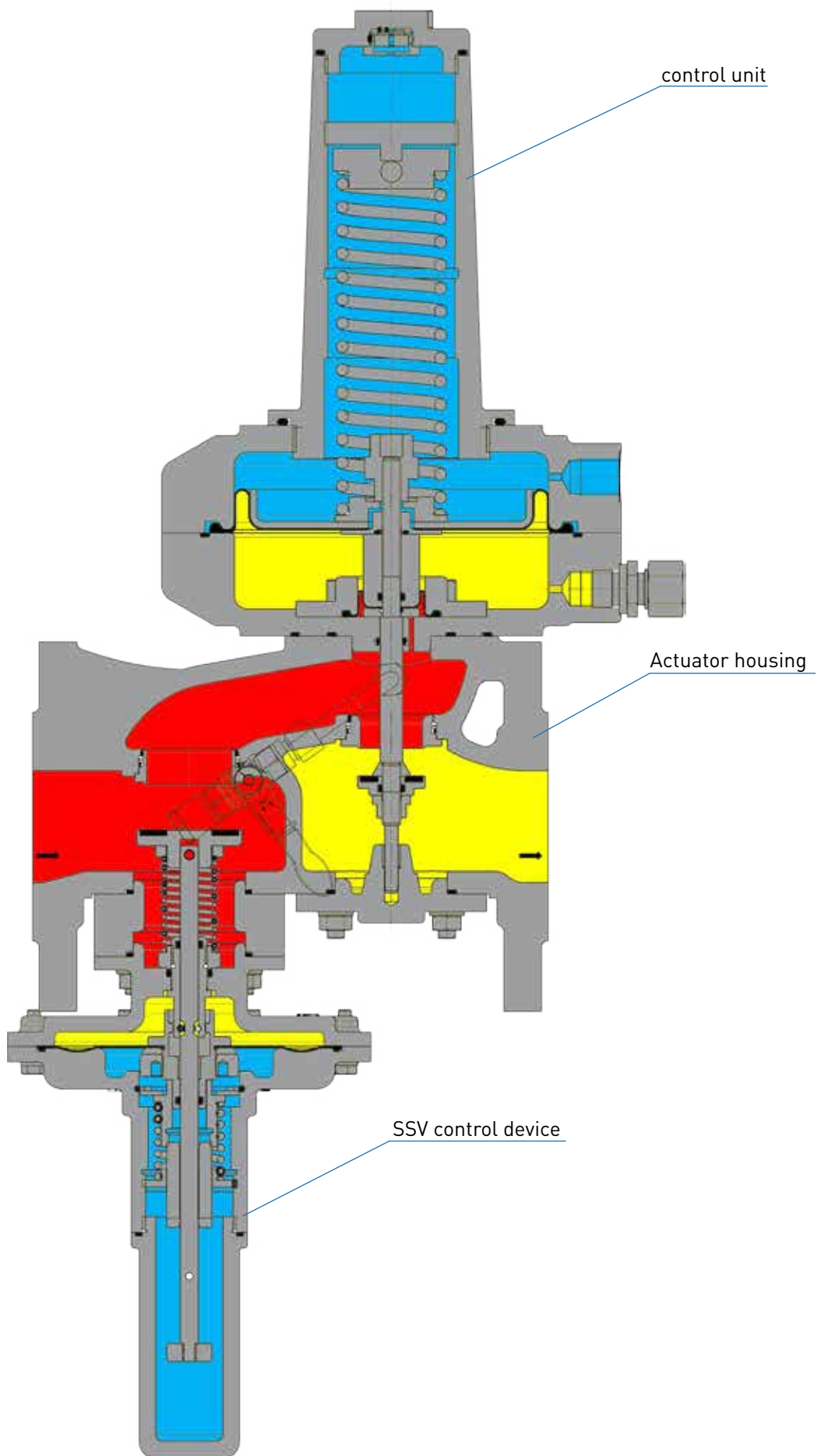
The spring-loaded gas pressure regulators RS 250 / RS 251 have the function of keeping the outlet pressure of a gaseous medium constant within allowable limit values, independently of the effect of interferences, such as changes in the inlet pressure and/or in the gas train, in the connected regulation section on the outlet side. The gas pressure regulator is composed of the actuator housing and the 'control unit plus actuator' and 'SSV control device/switching device plus actuator' functional units.

The actuator for the control unit can be produced in various valve seat diameters to suit different nominal size. The valve seat models are pre-pressure-compensated and can, if required, be equipped with noise reduction.

The gas flows through the actuator housing in the direction of the arrow. The external measurement line port is used to pass the outlet pressure to be regulated to the bottom of the main diaphragm of the control unit. It compares the actual value with the command variable preset by the force of the setpoint spring. The setpoint required in each case is set via the setting screw. Any deviation from the setpoint is transmitted by the screw spindle to the actuator, which is adjusted such that the actual value is adjusted to the setpoint. In case of zero tap, the actuator will close tight, causing the closing pressure to be established. Optionally, the control unit can be equipped with a leakage gas SRV or a safety diaphragm. In the model with safety diaphragm, the safety diaphragm is located above the main diaphragm. When the main diaphragm ruptures, the safety diaphragm makes contact with the top cover of the control unit and prevents any inadmissible escape of gas into the surrounding atmosphere. In case of inadmissible overpressure or lack of gas in the regulating section, the actuator of the safety shut-off valve arranged in the same housing on the inlet side will shut off the gas flow. To this end, the outlet pressure to be monitored is passed on to the SSV control device via a separate measurement line. As a function of the change in pressure, the SSV diaphragm in the controller is raised or lowered. When the outlet pressure in the regulating section exceeds or falls below a certain response pressure, the switch socket connected to the SSV diaphragm will move to the corresponding disengaging position, the balls of the engaging mechanism will release the SSV screw spindle, and the closing spring will press the SSV valve plate against the valve seat. The SSV actuator shuts off the gas flow gas-tight. The SSV can only be opened by hand and engaged in the open position. To do so, the outlet pressure at the measuring point must be lowered below the upper response pressure or raised above the lower response pressure by at least the re-engaging differential amount (Δp).

The SSV can, except where otherwise stipulated in specific national legislation, be used in either functional class A (with diaphragm rupture protection) and B (without diaphragm rupture protection).

There is also the option of using a remote indication for the SSV position 'CLOSED' and a manual and remote release when power is applied or in case of power failure.



Options

Safety diaphragm

The safety diaphragm design provides a safety diaphragm above the main diaphragm. In case the main diaphragm breaks, the safety diaphragm presses against the upper diaphragm cover and prevents leaking into the atmosphere.



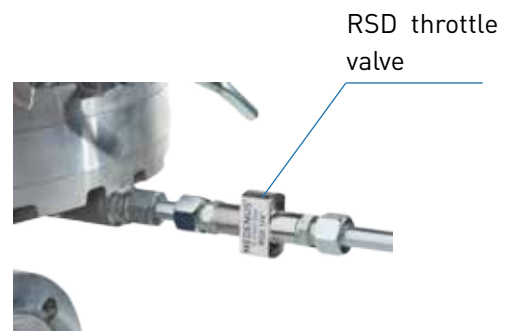
Noise reduction

The noise reduction is made of metal foam and reduces noise of the gas pressure regulator, caused by flow velocity up to -15 dB (± 3 dB).



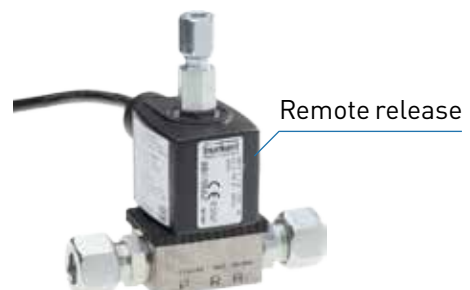
RSD throttle valve

The RSD is a throttle valve which regulates the volume flow within the measuring line from the outside. This is achieved by a continuously adjustable cross sectional narrowing. The adjustment is made by means of an Allen key (4mm).



SAV remote release

The direct-acting solenoid valve serves as an electromagnetic remote release for closing the safety shut-off valve in case of power flow and power failure.



Breathing valve BV

The breathing valve BV serves to protect the room of installation against inadmissible gas leakage from the venting space of safety shut-off valves.

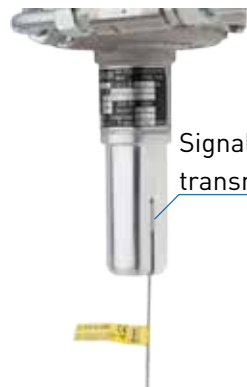
It is also an alternative to the cost- and work intensive installation of breathing pipes.



Breathing valve BV

Signal transmitter / Inductive Sensor

Signal and inductive sensors are used to monitor the position (closed or open position) of the safety shut-off valve by remote display.



Signal transmitter



Inductive sensor

Application, Characteristics, Technical Data

K_G^* value and control units

| Nominal size | RS 250 | | | | | | RS 251 | | |
|--------------------------|-------------------------|-------|-------|--------|--------|--------|--------|-------|--------|
| | DN 25 | DN 50 | DN 80 | DN 100 | DN 150 | DN 200 | DN 50 | DN 80 | DN 100 |
| control unit \emptyset | 205 | 205 | 205 | 205 | 275-2 | 275-2 | 205 | 275-2 | 275-2 |
| Valve seat \emptyset | 320 | 320 | 275 | 275 | 385 | 385 | 275 | 385 | 385 |
| 17.5 mm | 200 | 220 | | | | | | | |
| 27.5 mm | 420 | 500 | 550 | 600 | | | 550 | | |
| 32.5 mm | | 750 | 850 | 900 | | | 750 | | |
| 42.5 mm | | | 1,450 | 1,500 | 1,600 | | 1,250 | 1,500 | 1,500 |
| 52.5 mm | | | | 1,800 | 2,000 | | 1,700 | 1,800 | 1,850 |
| 65.0 mm | | | | | 3,500 | | | 2,600 | 3,200 |
| 85.0 mm | | | | | 4,600 | | | 3,500 | 4,300 |
| 95.0 mm | | | | | 5,800 | 6,100 | | | 4,800 |
| 115.0 mm | | | | | | 8,950 | | | |
| Connection type | DIN EN 1092 - PN16 | | | | | | | | |
| | ASME B 16.5 - Class 150 | | | | | | | | |

Integrated safety relief valve (Leakage gas SRV)

| Spring no. | control unit | Opening pressure** Setting via p_{ds} [mbar] |
|------------|--------------|---|
| FM 404 | 275 | 15 + 5 |
| | | 30 +10 |
| | | 60 +15 |
| | | 90 +15 |
| | 320 | 15 + 5 |
| | | 30 +10 |
| | | 60 +15 |
| | | 90 +15 |
| FM 405 | | 90 +15 |
| FM 404 | 385 / 390 | 15 + 5 |
| | | 30 +10 |
| | | 60 +15 |
| | | 90 +15 |
| FM 405 | 485 | 15 + 5 |
| | | 30 +10 |
| | | 60 +15 |
| | | 90 +15 |
| FD 919 | | 90 +15 |

*) K_G value for natural gas: $d = 0.64$ ($\rho_n = 0.83 \text{ kg/m}^3$), $t_u = 15^\circ\text{C}$

**) When selecting the opening pressure for the leakage gas SRV, the value must not drop below the closing pressure of the setpoint setting!

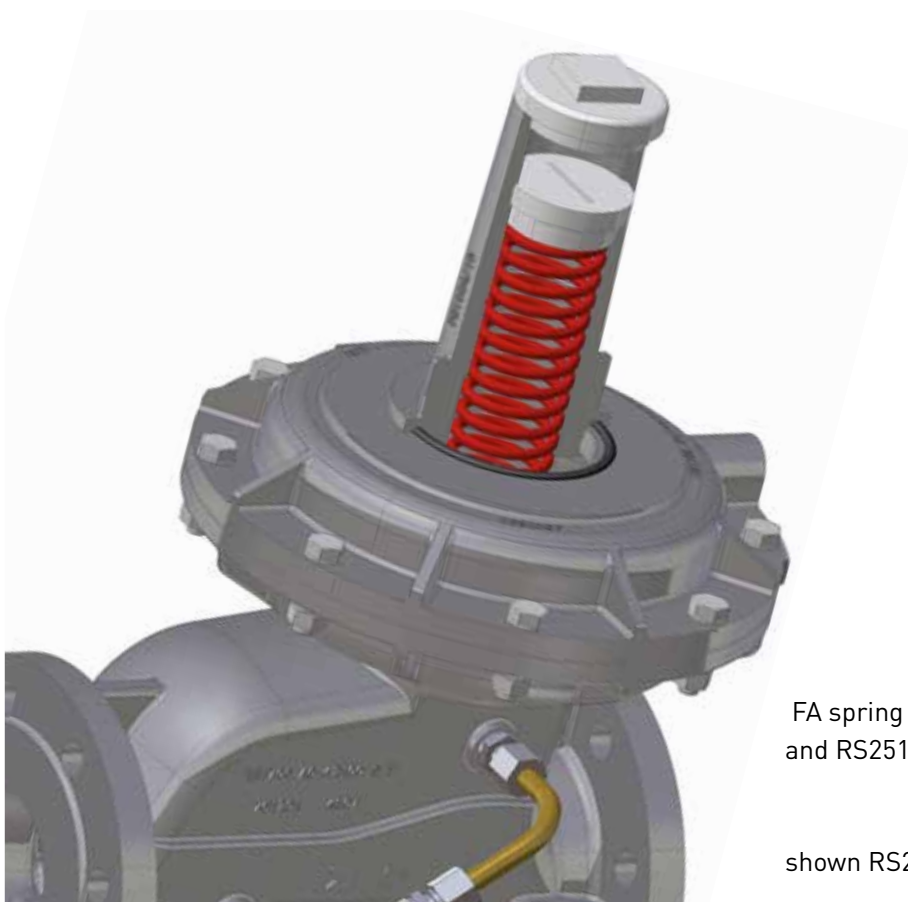
Accuracy class AC / Closing pressure group SG

| Outlet pressure range p_d | control units | | | | | | |
|-----------------------------|---------------|----------|---------|----------|----------|----------|--------|
| | 205 | 275 | 275-2 | 320 | 385 | 390 | 485 |
| 18 mbar to 100 mbar | | | | 10 / 20 | 10 / 20 | 10 / 20 | 5 / 10 |
| 90 mbar to 500 mbar | | 5 / 10 | | | | | |
| 100 mbar to 500 mbar | | | | 5 / 10 | 5 / 10 | 5 / 10 | 5 / 10 |
| 350 mbar to 500 mbar | | | 10 / 20 | | | | |
| 500 mbar to 1000 mbar | 10 / 20 | | | | | | |
| > 500 mbar | | 2.5 / 10 | 5 / 10 | 2.5 / 10 | 2.5 / 10 | 2.5 / 10 | |
| > 1000 mbar | 5 / 10 | | | | | | |

Application, Characteristics, Technical Data

Control unit setpoint spring table

| Specific command range W_{ds} [mbar] | | | | Spring data | |
|--|------------|------------|-----------|-------------|--------------|
| RE 205 | RE 275 | RE 320 | RE 390 | Spring no. | Colour [RAL] |
| 36 - 39 | 23 - 25 | 10 - 12 | 8 - 10 | FA 01 | blank |
| 38 - 45 | 24 - 28 | 11 - 13 | 9 - 12 | FA 02 | 9006 |
| 44 - 52 | 27 - 31 | 14 - 18 | 11 - 13 | FA 03 | 5015 |
| 51 - 64 | 30 - 37 | 17 - 22 | 12 - 15 | FA 04 | 4002 |
| 62 - 81 | 35 - 46 | 21 - 29 | 14 - 19 | FA 05 | 7037 |
| 78 - 107 | 43 - 59 | 28 - 39 | 18 - 24 | FA 06 | 9005 |
| 103 - 147 | 55 - 80 | 38 - 54 | 23 - 32 | FA 07 | 3020 |
| 140 - 205 | 73 - 110 | 53 - 77 | 31 - 45 | FA 08 | 9010 |
| 195 - 295 | 100 - 156 | 76 - 111 | 42 - 64 | FA 09 | 7016 |
| 280 - 430 | 141 - 225 | 110 - 166 | 59 - 94 | FA 10 | 6010 |
| 419 - 653 | 208 - 339 | 165 - 250 | 88 - 142 | FA 11 | 2002 |
| 595 - 935 | 293 - 484 | 239 - 361 | 124 - 203 | FA 12* | 7035 |
| 819 - 1408 | 436 - 726 | 360 - 544 | 185 - 305 | FA 13* | 5010 |
| 1245 - 1976 | 607 - 1017 | 506 - 765 | 258 - 428 | FA 14* | 1028 |
| 1212 - 2553 | 699 - 1333 | 535 - 978 | 297 - 568 | FA 15* | 6018 |
| 1330 - 3012 | 785 - 1580 | 602 - 1157 | 333 - 673 | FA 16* | 3020 |



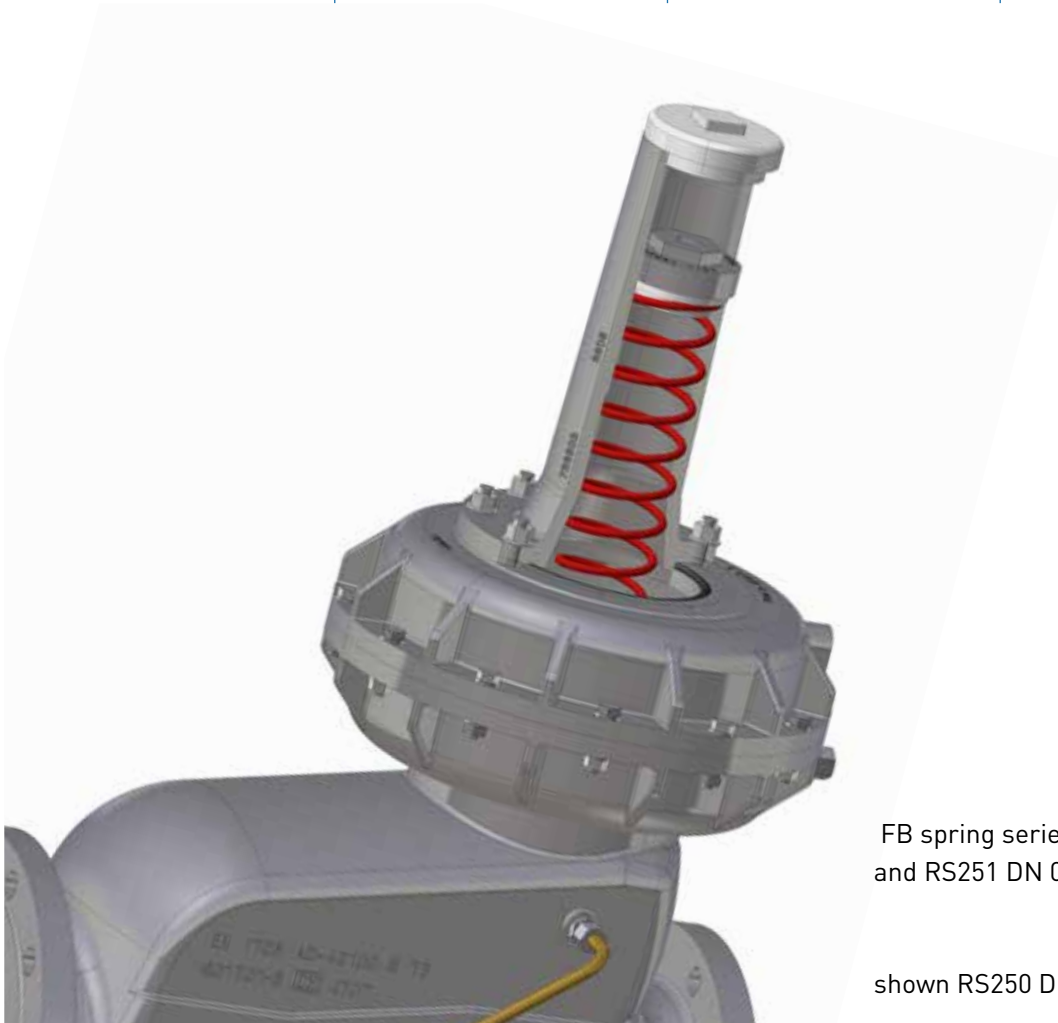
FA spring series for RS250 DN 025 - DN 100
and RS251 DN 050

shown RS250 DN 080 with FA11

*) with high-pressure screw spindle (HDS shown on p.14)

Control unit setpoint spring table

| Specific command range W_{ds} [mbar] | | | Spring data | |
|--|------------|-----------|-------------|--------------|
| RE 275-2 | RE 385-2 | RE 485 | Spring no. | Colour [RAL] |
| 59 - 69 | 31 - 35 | 19 - 22 | FB 701 | 6018 |
| 68 - 83 | 34 - 41 | 21 - 25 | FB 702 | 9006 |
| 80 - 105 | 40 - 51 | 24 - 31 | FB 703 | 5015 |
| 96 - 127 | 50 - 61 | 28 - 36 | FB 704 | 4002 |
| 112 - 156 | 60 - 77 | 33 - 44 | FB 705 | 7037 |
| 146 - 207 | 76 - 100 | 41 - 56 | FB 706 | 9005 |
| 184 - 266 | 98 - 127 | 51 - 71 | FB 707 | 3020 |
| 238 - 358 | 125 - 167 | 65 - 94 | FB 708 | 9010 |
| 302 - 450 | 165 - 215 | 82 - 118 | FB 709 | 7016 |
| 397 - 596 | 212 - 285 | 105 - 155 | FB 710 | 6010 |
| 542 - 814 | 280 - 390 | 140 - 209 | FB 711 | 2002 |
| 742 - 1078 | 385 - 520 | 188 - 275 | FB 712 | 7035 |
| 977 - 1442 | 515 - 671 | 246 - 369 | FB 713* | 5010 |
| 1245 - 1878 | 661 - 873 | 311 - 479 | FB 714* | 1028 |
| 1547 - 2469 | 712 - 1186 | 393 - 618 | FB 715* | 6018 |
| 2136 - 3008 | 975 - 1514 | 517 - 752 | FB 716* | 3020 |



FB spring series for RS250 DN 150 - DN 200
and RS251 DN 080 - DN 100

shown RS250 DN 200 with FB707

Setpoint spring table - SSV

| Type | Upper response pressure | | Lower response pressure | | Spring data | |
|-----------------------------------|-------------------------|--------------------------------|-------------------------|--------------------------------|-------------|--------------|
| | w_{dso} [mbar] | Δp_{wo}^{**} [mbar] | w_{dsu} [mbar] | Δp_{wu}^{**} [mbar] | Spring no. | Colour [RAL] |
| MD* small ball lock | | | 1 - 8 | 15 | FE 900 | 1028 |
| | | | 6 - 17 | 15 | FE 901 | 2002 |
| | | | 12 - 24 | 20 | FE 902 | 6010 |
| | | | 22 - 40 | 30 | FE 903 | 5015 |
| | | | 30 - 50 | 30 | FE 904 | 9005 |
| | | | 45 - 70 | 40 | FE 905 | 9010 |
| | | | 65 - 100 | 50 | FE 906 | 4002 |
| | | 20 - 40 | 20 | | FD 910 | 1028 |
| | RS 250: DN 25 - 100 | 35 - 70 | 20 | | FD 911 | 2002 |
| | | 65 - 110 | 30 | | FD 912 | 6010 |
| RS 251: DN 50 - 80 | 100 - 160 | 30 | | FD 913 | 5015 | |
| | 150 - 235 | 40 | | FD 914 | 9005 | |
| | 225 - 355 | 60 | | FD 915 | 9010 | |
| | 345 - 510 | 80 | | FD 916 | 3020 | |
| | 500 - 710 | 80 | | FD 917 | 5010 | |
| | 655 - 1205 | 100 | | FD 918 | 9006 | |
| | 760 - 1550 | 200 | | FD 919 | 4002 | |
| | | | | | | |
| MD-R small ball lock | | | 30 - 55 | 30 | FE 900 | 1028 |
| | | | 50 - 80 | 40 | FE 901 | 2002 |
| | | | 70 - 105 | 50 | FE 902 | 6010 |
| | | | 100 - 140 | 80 | FE 903 | 5015 |
| | | | 110 - 160 | 80 | FE 904 | 9005 |
| | | | 150 - 205 | 100 | FE 905 | 9010 |
| | | | 200 - 300 | 100 | FE 906 | 4002 |
| | | 90 - 125 | 30 | | FD 910 | 1028 |
| | RS 250: DN 25 - 100 | 120 - 210 | 40 | | FD 911 | 2002 |
| | | 200 - 330 | 60 | | FD 912 | 6010 |
| RS 251: DN 50 - 80 | 285 - 460 | 80 | | FD 913 | 5015 | |
| | 450 - 680 | 80 | | FD 914 | 9005 | |
| | 640 - 1040 | 100 | | FD 915 | 9010 | |
| | 1030 - 1480 | 200 | | FD 916 | 3020 | |
| | 1450 - 2200 | 200 | | FD 917 | 5010 | |
| | 1900 - 3500 | 200 | | FD 918 | 9006 | |
| | 2200 - 4500 | 200 | | FD 919 | 4002 | |

Setpoint spring table - SSV

| Type | Upper response pressure | | Lower response pressure | | Spring data | |
|---|-------------------------|--------------------------------|-------------------------|--------------------------------|-------------|--------------|
| | w_{dso} [mbar] | Δp_{wo}^{**} [mbar] | w_{dsu} [mbar] | Δp_{wu}^{**} [mbar] | Spring no. | Colour [RAL] |
| MD large ball lock RS 250: DN 150 - 200 RS 251: DN 100 | | | 10 - 40 | 15 | FM 400 | 1028 |
| | | | 35 - 115 | 30 | FM 402 | 6010 |
| | | | 60 - 245 | 60 | FM 404 | 9005 |
| | 40 - 180 | 20 | | | FL 412 | 6010 |
| | 70 - 340 | 50 | | | FL 413 | 5015 |
| | 330 - 1100 | 80 | | | FL 415 | 9010 |
| MD-R large ball lock RS 250: DN 150 - 200 RS 251: DN 100 | | | 10 - 180 | 50 | FM 400 | 1028 |
| | | | 155 - 380 | 100 | FM 402 | 6010 |
| | | | 200 - 950 | 150 | FM 404 | 9005 |
| | 145 - 670 | 100 | | | FL 412 | 6010 |
| | 270 - 1230 | 200 | | | FL 413 | 5015 |
| | 1200 - 4500 | 200 | | | FL 415 | 9010 |

Determining the upper response pressure

| Outlet pressure P_d (mbar) | Upper response pressure w_{dso} *** |
|---------------------------------|--|
| ≤ 200 | $P_d + 100$ mbar |
| $> 200 - \leq 800$ | $P_d \times 1.5$ |
| $> 800 - \leq 1600$ | $P_d \times 1.3$ |
| > 1600 | $P_d + 500$ mbar |

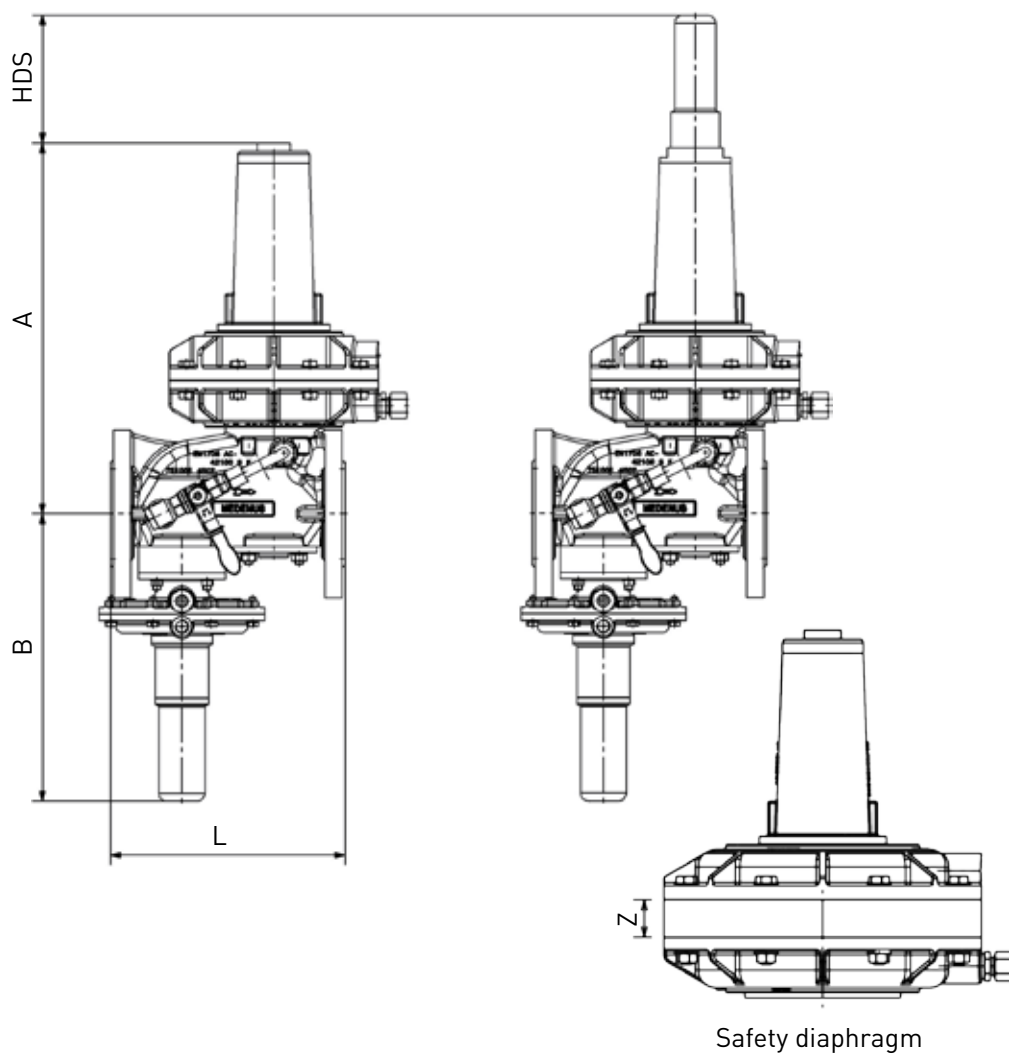
*) if possible not greater than 450 mbar

**) If the control device is set up for simultaneous monitoring of upper and lower response pressures, the difference between the setpoints for the upper and lower response pressures (p_{dso} and p_{dsu}) should be at least 10% greater than the total of values given for Δp_{wo} and Δp_{wu} .

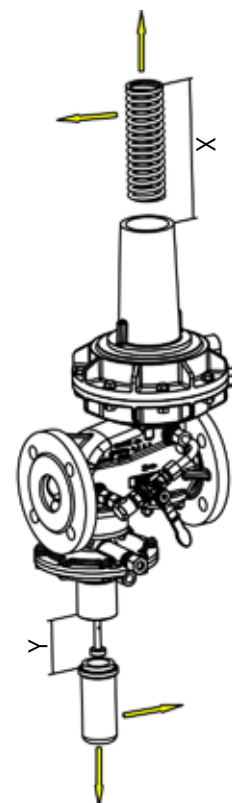
***) The upper response pressure is rounded up to full tens, for example 251 mbar -> 260 mbar

Dimensions, Connection and Weight

Dimensional drawing

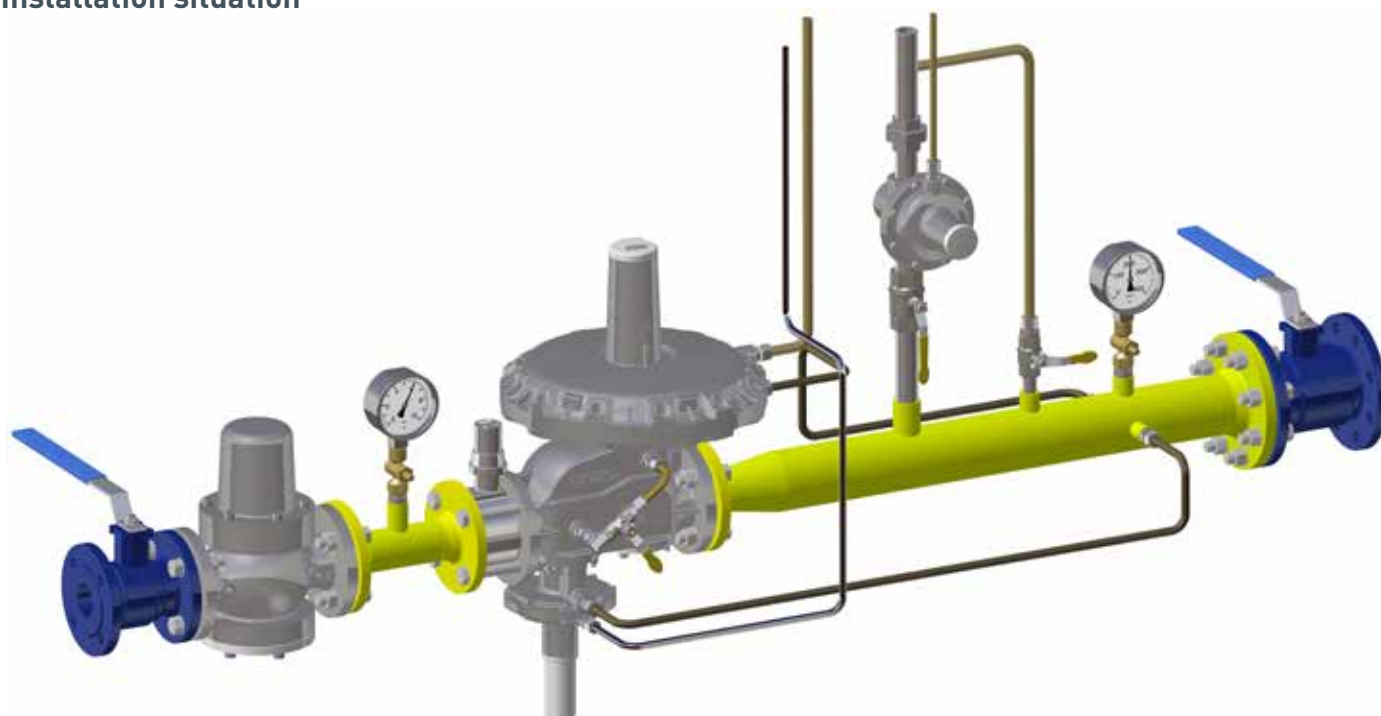


Dismounting dimensions for springs / HDS



Reactivation of SSV

Installation situation



Dimensions and weight

| Nominal size | RE | RS 250 | | | | | | RS 251 | | |
|--|-------------------------|--------|-------|-------|--------|--------|--------|--------|-------|--------|
| | | DN 25 | DN 50 | DN 80 | DN 100 | DN 150 | DN 200 | DN 50 | DN 80 | DN 100 |
| Dimensions | 205 | 346 | 364 | 406 | 421 | - | - | 406 | - | - |
| | 275 | - | - | 406 | 421 | 730 | 799 | 406 | 658 | 730 |
| | 320 | 328 | 346 | - | - | - | - | - | - | - |
| | 385/390 | - | - | 406 | 421 | 716 | 785 | 406 | 644 | 716 |
| | 485 | - | - | - | - | 722 | 791 | - | 644 | 722 |
| HDS [mm] | | 125 | 125 | 125 | 125 | 205 | 205 | 125 | 205 | 205 |
| B [mm] | | 270 | 282 | 305 | 315 | 386 | 400 | 305 | 311 | 386 |
| L* [mm] | | 230 | 230 | 310 | 350 | 480 | 600 | 310 | 410 | 480 |
| X [mm] | | 260 | 260 | 260 | 260 | 410 | 410 | 260 | 410 | 410 |
| Y [mm] | | 100 | 100 | 100 | 100 | 150 | 150 | 100 | 150 | 150 |
| Safety diaphragm - SM Z [mm] | | 32.5 | 32.5 | 32.5 | 32.5 | 32.5 | 32.5 | 32.5 | 32.5 | 32.5 |
| Weight [kg] | 205 | 11.5 | 13 | 22 | 23 | - | - | 16 | - | - |
| | 275 | - | - | 24 | 25 | 52 | 82 | 19 | 37 | 52 |
| | 320 | 13.5 | 15 | - | - | - | - | 22 | - | - |
| | 385/390 | - | - | 28 | 29 | 58 | 88 | - | 42 | 58 |
| | 485 | - | - | - | - | 68 | 98 | - | - | 68 |
| HDS - Weight [kg] | | 0.6 | 0.6 | 0.6 | 0.6 | 1.6 | 1.6 | 0.6 | 1.6 | 1.6 |
| Safety diaphragm - SM - Weight [kg] | 205 | 2 | 2 | 2 | 2 | - | - | 2 | - | - |
| | 275 | - | - | 3 | 3 | 3.3 | 3.3 | 3 | 3.3 | 3.3 |
| | 320 | 3 | 3 | - | - | - | - | - | - | - |
| | 385/390 | - | - | 5 | 5 | 6 | 6 | 5 | 6 | 6 |
| Connection | DIN EN 1092 - PN16 | | | | | | | | | |
| | ASME B 16.5 - Class 150 | | | | | | | | | |

Example:

RS250/050/320 with HDS and safety diaphragm

Weight (regulator + HDS + SM): $15 \text{ kg} + 0.6 \text{ kg} + 3 \text{ kg} = 18.6 \text{ kg}$

Dimensions (A + HDS + SM): $346 \text{ mm} + 125 \text{ mm} + 32.5 \text{ mm} = 503.5 \text{ mm}$

* Alternatively, for the RS 250 for nominal sizes of DN 50, DN 80 and DN 100 the housings are also available on request in spheroidal cast iron (GJS)

Dimensions, Connection and Weight

RS 250: Connection of the measuring lines and breather lines

| Nominal size | control unit | | SSV control device / switching device | |
|--------------|---|---------------|--|---------------|
| | Measuring line | Breather line | Measuring line | Breather line |
| DN 025 | Connection* for: Tube 12 x 1.5 (thread G 3/8) | | Connection* for: tube 12 x 1.5 (thread G 1/4) | |
| DN 050 | | | | |
| DN 080 | | | | |
| DN 100 | | | Connection* for: tube 12 x 1.5 (thread G 3/8) | |
| DN 150 | | | | |
| DN 200 | | | | |

RS 251: Connection of the measuring lines and breather lines

| Nominal size | control unit | | SSV control device / switching device | |
|--------------|---|---------------|--|---------------|
| | Measuring line | Breather line | Measuring line | Breather line |
| DN 050 | Connection* for: Tube 12 x 1.5 (thread G 3/8) | | Connection* for: tube 12 x 1.5 (thread G 1/4) | |
| DN 080 | | | | |
| DN 100 | | | Connection* for: tube 12 x 1.5 (thread G 3/8) | |

Note: Observe the following publications in relation to installation, start-up and maintenance:

DVGW - work sheets G 491 and G 600

Operating and Maintenance Instructions RS 250 /251

The gas pressure regulators RS 250 / 251 shall be installed in the pipeline preferably in horizontal position with vertical position of the control unit spring cap. For all nominal sizes, the direction of flow is indicated by an arrow on the housing.

Selection

Calculation of the required K_G value

$$p_d / p_u > 0.5$$

K_G value at
a sub-critical pressure ratio

$$K_G = Q_n / \sqrt{p_d \cdot (p_u - p_d)}$$

$$p_d / p_u \leq 0.5$$

K_G value at
a super-critical pressure ratio

$$K_G = 2 \cdot Q_n / p_u$$

Note: all calculated pressures are absolute pressures.

Device selection

The device is selected on the basis of its K_G value from the table of flow rate coefficients (page 8)

Note: For spring-loaded devices, a capacity reserve of 10-20% is recommended in order to comply with the accuracies given.

Example:

$$p_{u \min} 5.0 \text{ bar} \quad / \quad p_{u \max} 8.0 \text{ bar}$$

$$p_{d \min} 0.3 \text{ bar} \quad / \quad p_{d \max} 0.5 \text{ bar}$$

$$Q_{n \min} 800 \text{ m}^3/\text{h} \quad / \quad Q_{n \max} 1500 \text{ m}^3/\text{h}$$

$$1.5 \text{ bar} / 6 \text{ bar} = 0.25 < 0.5$$

→ Supercritical pressure ratio

$$K_G = 2 \cdot 1500 / 6 = 500 \text{ ((m}^3/\text{h)/bar)}$$

RS 250 DN 50 VS 32.5
 K_G value: 750 (m³/h)/bar

Note: To obtain a more accurate design configuration of our gas pressure regulators, you can use our configurator, on our homepage medenus.de, under Service. (medenus.de/de/service/konfigurator.html)

*) Threaded pipe connections to DIN EN ISO 8434-1 (DIN 2353)

Selection

Device selection

For the small load Q_{\min} with SZ this yields 2.5: $Q_{\min} = 0.025 \cdot K_G \cdot p_{u \max}$

Note: Small load Q_{\min} - When burner is started or at Q_{\min} a

K_G utilization level of at least 1% should be reached.

Selection of the control unit from the diaphragm assembly setpoint spring table (page 10)

Selection of the closing pressure group from the closing pressure group table (page 9)

$$p_{f \max} = p_{ds} \cdot (1 + SG/100)$$

Selection of the SSVs from the SSV control device table (page 11)

Note: Recommended upper SSV response pressure $p_{ds \ o} < 500 \text{ mbar} + p_{ds}$

Note: When selecting springs, AG_o and AG_u must be observed. The possible minimum and maximum response pressures are calculated as follows:

$$p_{dso \ min/max} = p_{ds \ o} \cdot (1 \pm AG_o / 100)$$

$$p_{dsu \ min/max} = p_{ds \ u} \cdot (1 \pm AG_u / 100)$$

$$p_{dso \ min} > p_{f \ max} \text{ and } p_{dsu \ max} \ll p_{ds} \cdot (1 - AC / 100)$$

Use of a leakage gas SRV:

Selection of leakage gas SRV - Settings from table (page 8)

Note: The opening pressure (p_{do}) and closing pressure (p_{df}) to be selected for the SRV must be greater than the maximum allowable closing pressure $p_{f \ max}$ on the regulator. We recommend: $p_{do} = p_{df} > 1.1 \cdot p_{f \ max}$

Note: When using an SRV, $p_{dso \ min}$ must be $> p_{ds} + p_{do} + p_{do \ tolerance}$ (page 8).

Checking the gas velocities

$$w = 380 \cdot Q_n / (DN^2 \cdot p_{abs})$$

Note: The factor 380 refers to an operating gas temperature from approx. 15°C to 20°C. For other temperatures, the velocity must be corrected as follows: $w_{corr} = w \cdot (t_{gas} + 273.15) / 290$

Recommended max. gas velocity at the inlet flange:

50 - 70 m/s Lower value for redirections upstream of the control valve, 20 m/s for upstream filters

Recommended max. gas velocity at the outlet flange:

100 - 200 m/s Lower value to reduce noise emissions

Recommended max. gas velocity on impulse tap: 15 - 25 m/s Lower value for outlet pressures below 100 mbar

$$Q_{\min} = 0.025 \cdot 750 \cdot 9 = 169 \text{ m}^3/\text{h}$$

RE320 with spring FA13 (300-600 mbar)

AC 5/SG 10 (for RE 320 valve $\varnothing = 32.5$)
 $p_{f \ max} = 500 \cdot (1 + 10 / 100) = 550 \text{ mbar}$

MDR with FD 914 (440-770 mbar)
AG_o 10

set to $p_{ds \ o} = 700 \text{ mbar}$
and FE 904 (110-150 mbar) AG_u 5
set to $p_{ds \ u} = 130 \text{ mbar}$

$$p_{dso \ max} = 700 \cdot (1 + 10 / 100) = 770 \text{ mbar}$$

$$p_{dso \ min} = 700 \cdot (1 - 10 / 100) = 630 \text{ mbar}$$

$$p_{dsu \ max} = 130 \cdot (1 + 5 / 100) = 136.5 \text{ mbar}$$

$$p_{dsu \ min} = 130 \cdot (1 - 5 / 100) = 123.5 \text{ mbar}$$

$$630 > 550 \text{ and } 136.5 \ll 475$$

FM 404 set to 60 mbar over 500 mbar

$$(p_{do} = p_{df} = 560 \text{ mbar})$$

FM 405 set to 90 mbar over 500 mbar

$$(p_{do} = p_{df} = 590 \text{ mbar})$$

Selected: FM 405 ($p_{do} = p_{df} = 590 \text{ mbar}$)

$$630 > 500 + 90 + 15$$

$$630 > 605$$

Inlet and outlet nominal size of the pipeline according to the selected device: 50 mm

Selected widening of outlet pipeline: 150 mm

$$w_u = 380 \cdot 1500 / (50^2 \cdot 6) = 38 \text{ m/s}$$

$$w_d = 380 \cdot 1500 / (50^2 \cdot 1.5) = 152 \text{ m/s}$$

$$w_{\text{impulse}} = 380 \cdot 1500 / (150^2 \cdot 1.5) = 17 \text{ m/s}$$

The device selected in the example of nominal size DN 50 can be operated under these conditions.

Order data

Example:

Gas pressure regulator: RS250/050/205/32,5/MD-R/HDS/links/SR/SM/RSD/BV/N/H/WAZ/So

| Order selection | Designation | RS250 | 050 | - | 205 | 32.5 | MD-R | - | HDS | links | SR | SBV | RSD | BV | N | H | WAZ | So | |
|---|-------------|--------|-----|---|-----|------|------|---|-----|-------|----|-----|-----|----|---|---|-----|----|-----|
| Type | | | | | | | | | | | | | | | | | | | |
| RS 250 | RS250 | RS 250 | | | | | | | | | | | | | | | | | |
| RS 251 | RS251 | | | | | | | | | | | | | | | | | | |
| DN - Nominal size | Table p.18 | | 050 | | | | | | | | | | | | | | | | |
| Flange model | | | | | | | | | | | | | | | | | | | |
| PN 16 | - | | | - | | | | | | | | | | | | | | | |
| Class 150 | C | | | | | | | | | | | | | | | | | | |
| RE - Control unit | Table p.19 | | | | 205 | | | | | | | | | | | | | | |
| D - Orifice (valve seat diameter) | Table p.19 | | | | | 32.5 | | | | | | | | | | | | | |
| SSV | | | | | | | | | | | | | | | | | | | |
| with MD control device | MD | | | | | | | | | | | | | | | | | | |
| with MD-R control device | MD-R | | | | | | MD-R | | | | | | | | | | | | |
| SSV functional class | | | | | | | | | | | | | | | | | | | |
| A | - | | | | | | | - | | | | | | | | | | | |
| B | B | | | | | | | | | | | | | | | | | | |
| High-pressure screw spindle | | | | | | | | | | | | | | | | | | | |
| without | - | | | | | | | | | | | | | | | | | | |
| with high-pressure screw spindle | HDS | | | | | | | | HDS | | | | | | | | | | |
| Direction of flow | | | | | | | | | | | | | | | | | | | |
| Right (from left to right) | - | | | | | | | | | | | | | | | | | | |
| Left (from right to left) | links | | | | | | | | | links | | | | | | | | | |
| Noise reduction | | | | | | | | | | | | | | | | | | | |
| without | - | | | | | | | | | | | | | | | | | | |
| with noise reduction | SR | | | | | | | | | | SR | | | | | | | | |
| Additional unit, control unit | | | | | | | | | | | | | | | | | | | |
| without | - | | | | | | | | | | | | | | | | | | |
| Safety diaphragm | SM | | | | | | | | | | | SM | | | | | | | |
| Throttle valve | | | | | | | | | | | | | | | | | | | |
| without | - | | | | | | | | | | | | | | | | | | |
| with throttle valve | RSD | | | | | | | | | | | | RSD | | | | | | |
| SSV valve accessories | | | | | | | | | | | | | | | | | | | |
| without | - | | | | | | | | | | | | | | | | | | |
| Breather valve | BV | | | | | | | | | | | | | BV | | | | | |
| Electrical position indicator, SSV 'Closed' | | | | | | | | | | | | | | | | | | | |
| without | - | | | | | | | | | | | | | | | | | | |
| with ... , via proximity switch | N | | | | | | | | | | | | | | N | | | | |
| with ... , via Reed contact | R | | | | | | | | | | | | | | | | | | |
| SSV release | | | | | | | | | | | | | | | | | | | |
| without | - | | | | | | | | | | | | | | | | | | |
| with manual release | H | | | | | | | | | | | | | | | | | H | |
| with electromagnetic remote release, when power is supplied | SG | | | | | | | | | | | | | | | | | | |
| with electromagnetic remote release, in case of power failure | SA | | | | | | | | | | | | | | | | | | |
| Acceptance test certificate to EN 10204/3.1 | | | | | | | | | | | | | | | | | | | |
| without | - | | | | | | | | | | | | | | | | | | |
| with acceptance test certificate | WAZ | | | | | | | | | | | | | | | | | | WAZ |
| Special model | So* | | | | | | | | | | | | | | | | | | |

DN - Nominal size

| Regulator type | 025 | 050 | 080 | 100 | 150 | 200 |
|----------------|-----|-----|-----|-----|-----|-----|
| RS250 | X | X | X | X | X | X |
| RS251 | | X | X | X | | |

In each selection group, only one option can be selected in each case.

*) for example coating with epoxy resin in RAL colours

RE - Control unit

| Regulator type | Nominal size | Description | Recommended use of the high-pressure screw spindle in the pressure range [mbar] | Outlet pressure ranges [mbar] |
|----------------|--------------|---------------|---|-------------------------------|
| RS250 | DN 25 | with RE 320 | 200 - 800 | 18 - 200 |
| | | with RE 205 | 750 - 3.000 | 200 - 750 |
| | DN 50 | with RE 320 | 200 - 800 | 18 - 200 |
| | | with RE 205 | 750 - 3.000 | 200 - 750 |
| | DN 80 | with RE 390 | 130 - 450 | 18 - 130 |
| | | with RE 275 | 400 - 1.100 | 130 - 400 |
| | | with RE 205 | 750 - 3.000 | 400 - 750 |
| | DN 100 | with RE 390 | 130 - 450 | 18 - 130 |
| | | with RE 275 | 400 - 1.100 | 130 - 400 |
| | | with RE 205 | 750 - 3.000 | 400 - 750 |
| | DN 150 | with RE 485 | 150 - 450 | 18 - 150 |
| | | with RE 385 | 350 - 850 | 150 - 350 |
| | | with RE 275-2 | 850 - 3.000 | 350 - 850 |
| | DN 200 | with RE 485 | 150 - 450 | 18 - 150 |
| | | with RE 385 | 350 - 850 | 150 - 350 |
| with RE 275-2 | | 850 - 3.000 | 350 - 850 | |
| RS251 | DN 50 | with RE 390 | 130 - 450 | 18 - 130 |
| | | with RE 275 | 400 - 1.100 | 130 - 400 |
| | | with RE 205 | 750 - 3.000 | 400 - 750 |
| | DN 80 | with RE 385 | 350 - 850 | 18 - 350 |
| | | with RE 275-2 | 850 - 3.000 | 350 - 850 |
| | DN 100 | with RE 485 | 150 - 450 | 18 - 150 |
| | | with RE 385 | 350 - 850 | 150 - 350 |
| | | with RE 275-2 | 850 - 3.000 | 350 - 850 |

D - Orifice (valve seat diameter)

| Regulator type | Nominal size | 17.5 | 27.5 | 32.5 | 42.5 | 52.5 | 65 | 85 | 95 | 115 |
|----------------|--------------|------|------|------|------|------|----|----|----|-----|
| RS250 | 025 | X | X | | | | | | | |
| | 050 | X | X | X | | | | | | |
| | 080 | | X | X | X | | | | | |
| | 100 | | X | X | X | X | | | | |
| | 150 | | | | X | X | X | X | X | |
| | 200 | | | | | | | | X | X |
| RS251 | 050 | | X | X | X | X | | | | |
| | 080 | | | | X | X | X | X | | |
| | 100 | | | | X | X | X | X | X | |

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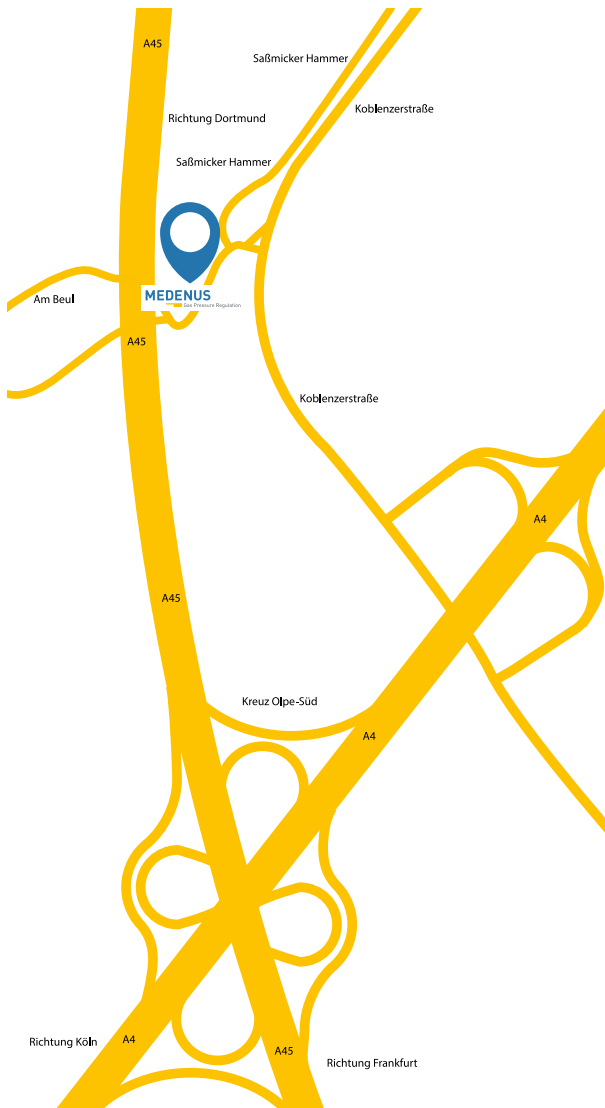
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