

MEDENUS

Gas Pressure Regulation



Gas Pressure Regulator RS 250 / RS 251

Product information

EN

Table of Contents

| | |
|---|-----------|
| Application, Characteristics, Technical Data | 4 |
| Application | 4 |
| Characteristics | 4 |
| Types of models / Options | 4 |
| Technical data | 5 |
| Structure and function | 6 |
| Installation example | 6 |
| Sectional view | 7 |
| K_G^* value and diaphragm assemblies | 8 |
| RE - Diaphragm assembly | 8 |
| Diaphragm assembly setpoint spring table | 9 |
| SSV setpoint spring table - control device | 10 |
| Dimensions, Connection, and Weight | 11 |
| Dimensional drawing | 11 |
| Dimensions and weight | 11 |
| Types of Models / Options | 12 |
| Design | 14 |
| Calculation of the required K_G value | 14 |
| Device selection | 14 |
| Checking the gas velocities | 14 |
| Properties of Gases | 15 |
| Order Data | 16 |
| Contact | 17 |
| Notes | 19 |



ATTENTION

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

List of abbreviations and formula symbols

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

*) K_G value for natural gas

Application, Characteristics, Technical Data

Application

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

Particularly suitable for dynamic regulation sections (e.g. gas fireplaces, gas pressure regulating systems of gas distributors, industrial plants, burner circuits, gas motor operation).

Can be used as an equipment component on gas consumption facilities as defined in Regulation (EU) 2016/426.

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

Characteristics

- 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 ($W_{dsu} + W_{dso}$) or B (W_{dso})
- Open-air model

Type of models / Options (see pages 12-13)

- Diaphragm assembly optionally with safety diaphragm
- Diaphragm assembly and SSV optionally with breather valve
- With noise reduction
- With throttle valve (RSD) for impulse line of the regulator
- Without SSV
- With electric position indicator SSV "Closed" via inductive proximity initiator or via Reed contact
- With SSV electromagnetic remote release when power is applied or in case of power failure
- With SSV manual release
- Oxygen version
- Hydrogen version
- Coating with epoxy resin in RAL colors

| Accuracy class AC and closing pressure group SG at the outlet pressure range p_d | Diaphragm assembly | | | | | | |
|--|--------------------|----------|---------|----------|----------|----------|--------|
| | 205 | 275 | 275-2 | 330 | 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 1,000 mbar | 10 / 20 | | | | | | |
| > 500 mbar | | 2.5 / 10 | 5 / 10 | 2.5 / 10 | 2.5 / 10 | 2.5 / 10 | |
| > 1,000 mbar | 5 / 10 | | | | | | |

Safety shut-off valve

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

Technical data

| | |
|---|--|
| Type | RS 250 / RS 251 |
| Model | Integral pressure-tight (IS) |
| Max. allowable pressure PS | 8 bar |
| Nominal width | 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 flanges PN 16 / ASME - B16.5 flanges Class 150 RF |
| Material | |
| Housing / actuator housing/ Control device housing | Al cast alloy DIN EN 1706-AC-42100 ST6 |
| Corrosivity category | DIN EN ISO 12944-2 |
| C1 up to and including C5-I C5-M | without additional coating an epoxy resin coating is recommended (see page13) |
| Temperature range, Class 2 (operating/ambient temperature) | -20°C to +60°C |
| Closing pressure zone group | SZ 2.5 |
| Function, strength, and tightness CE mark to PED/ PIN number | DIN EN 334 and DIN EN 14382 CE-0085-AQ0882 / CE-0085-AQ0883 |
| Ex-protection | When used according to the designated use, the mechanical equipment does not have a potential ignition source of its own and is therefore not marked according to the ATEX guidelines. An internal assessment of the ignition hazards has been performed based on the standards DIN EN 1127-1 and DIN EN ISO 80079-36. |

Preferred installation position

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



Installation upside down only after consultation with Medenus GmbH

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

- DVGW - work sheets G 491 and G 600
- Operating and Maintenance Instructions RS 250 / 251

CE EAC

Structure and function

The spring-loaded gas pressure regulator RS 250 / 251 has the function of keeping the outlet pressure of a gaseous medium constant within allowable limit values (AC), independently of the effect of interferences, such as changes in the inlet pressure and/or in the gas tap, in the connected regulation section on the outlet side. The gas pressure regulator is composed of the actuator housing and the "diaphragm assembly plus actuator" and "SSV".

The actuator housing can be provided with different valve seat diameters per nominal width. The gas pressure regulators 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 diaphragm assembly which compares the actual value with the control variable defined 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 diaphragm assembly can be equipped with a safety diaphragm or a breather valve BV. In the model with safety diaphragm, the safety diaphragm is located above the main diaphragm. When the main diaphragm is damaged, the safety diaphragm makes contact with the top cover of the diaphragm assembly and limits any inadmissible escape of gas into the surrounding atmosphere to a maximum of 30l/h (air).

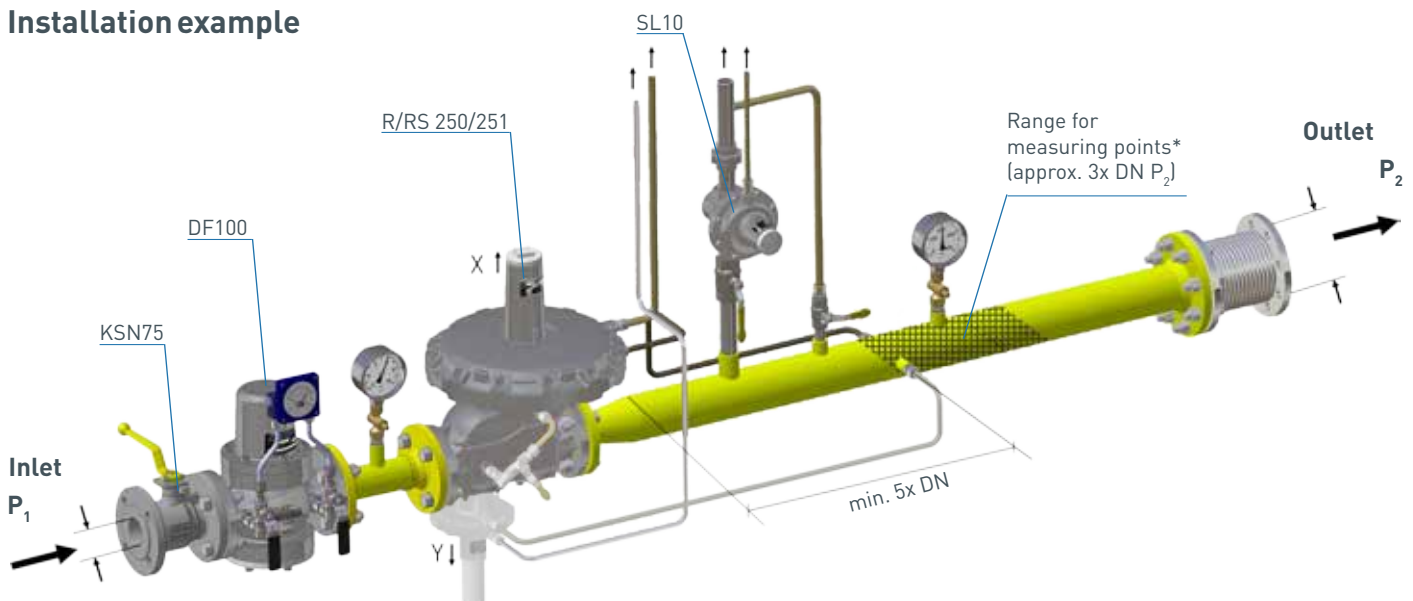
In case of inadmissible overpressure or lack of gas in the regulation section, the actuator of the safety shut-off valve arranged in the same housing on the inlet side will shut off the gas flow. To this end, the outlet pressure to be monitored is passed on to the SSV via a separate measurement line. As a function of the change in pressure, the diaphragm in the SSV is raised or lowered. When the outlet pressure in the regulation 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 ($p_{ds\ o}$) or raised above the lower response pressure ($p_{ds\ u}$) by at least the re-engaging differential amount (Δp_w). Moreover, the pressure in the red range of the actuator housing must be equalized via the bypass valve.

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

There is also the option of using a remote display for the SSV position "CLOSED", a breather valve BV, and a manual and remote release when power is applied or in case of power failure.

Installation example



*) Recommended max. velocity at the measurement line port 25 m/s

K_G value and diaphragm assemblies

(K_G value for natural gas: d = 0.64 (ρ_n = 0.83 kg/m³, t_v = 15° C)

| | RS 250 | | | | | | RS 251 | | |
|----------------------|-------------------------|-------|-------|--------|--------|--------|--------|-------|--------|
| | DN 25 | DN 50 | DN 80 | DN 100 | DN 150 | DN 200 | DN 50 | DN 80 | DN 100 |
| Nominal width | 25 | 50 | 80 | 100 | 150 | 200 | 50 | 80 | 100 |
| Diaphragm assembly Ø | 205 | 205 | 205 | 205 | 275-2 | 275-2 | 205 | 275-2 | 275-2 |
| Valve seat Ø | 330 | 330 | 275 | 275 | 385 | 385 | 275 | 385 | 385 |
| | | | 390 | 390 | 485 | 485 | 390 | 485 | 485 |
| 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 | | | | | | | | |

RE - Diaphragm assembly

| Regulator type | Nominal width | Diaphragm assembly | Standard / outlet pressure ranges [mbar] | Outlet pressure range with high-pressure spindle HDS [mbar] (illustration with HDS on p. 12) |
|----------------|---------------|--------------------|--|--|
| RS250 | DN 25 | RE 330 | 18 - 200 | 200 - 800 |
| | | RE 205 | 200 - 750 | 750 - 3,000 |
| | DN 50 | RE 330 | 18 - 200 | 200 - 800 |
| | | RE 205 | 200 - 750 | 750 - 3,000 |
| | DN 80 | RE 390 | 18 - 130 | 130 - 450 |
| | | RE 275 | 130 - 400 | 400 - 1,100 |
| | | RE 205 | 400 - 750 | 750 - 3,000 |
| | DN 100 | RE 390 | 18 - 130 | 130 - 450 |
| | | RE 275 | 130 - 400 | 400 - 1,100 |
| | | RE 205 | 400 - 750 | 750 - 3,000 |
| | DN 150 | RE 485 | 18 - 150 | 150 - 450 |
| | | RE 385 | 150 - 350 | 350 - 850 |
| RE 275-2 | | 350 - 850 | 850 - 3,000 | |
| DN 200 | RE 485 | 18 - 150 | 150 - 450 | |
| | RE 385 | 150 - 350 | 350 - 850 | |
| | RE 275-2 | 350 - 850 | 850 - 3,000 | |
| RS251 | DN 50 | RE 390 | 18 - 130 | 130 - 450 |
| | | RE 275 | 130 - 400 | 400 - 1,100 |
| | | RE 205 | 400 - 750 | 750 - 3,000 |
| | DN 80 | RE 385 | 18 - 350 | 350 - 850 |
| | | RE 275-2 | 350 - 850 | 850 - 3,000 |
| | DN 100 | RE 485 | 18 - 150 | 150 - 450 |
| RE 385 | | 150 - 350 | 350 - 850 | |
| RE 275-2 | | 350 - 850 | 850 - 3,000 | |

Diaphragm assembly setpoint spring table

| Spring data | | Specific command range W_{ds} [mbar] | | | |
|-------------|-------------|--|------------|------------|-----------|
| Spring no. | Color [RAL] | RE 205 | RE 275 | RE 330 | RE 390 |
| FA 01 | blank | 36 - 39 | 23 - 25 | 10 - 12 | 8 - 10 |
| FA 02 | 9006 | 38 - 45 | 24 - 28 | 11 - 13 | 9 - 12 |
| FA 03 | 5015 | 44 - 52 | 27 - 31 | 14 - 18 | 11 - 13 |
| FA 04 | 4002 | 51 - 64 | 30 - 37 | 17 - 22 | 12 - 15 |
| FA 05 | 7037 | 62 - 81 | 35 - 46 | 21 - 29 | 14 - 19 |
| FA 06 | 9005 | 78 - 107 | 43 - 59 | 28 - 39 | 18 - 24 |
| FA 07 | 3020 | 103 - 147 | 55 - 80 | 38 - 54 | 23 - 32 |
| FA 08 | 9010 | 140 - 205 | 73 - 110 | 53 - 77 | 31 - 45 |
| FA 09 | 7016 | 195 - 295 | 100 - 156 | 76 - 111 | 42 - 64 |
| FA 10 | 6010 | 280 - 430 | 141 - 225 | 110 - 166 | 59 - 94 |
| FA 11 | 2002 | 419 - 653 | 208 - 339 | 165 - 250 | 88 - 142 |
| FA 12* | 7035 | 595 - 935 | 293 - 484 | 239 - 361 | 124 - 203 |
| FA 13* | 5010 | 819 - 1408 | 436 - 726 | 360 - 544 | 185 - 305 |
| FA 14* | 1028 | 1245 - 1976 | 607 - 1017 | 506 - 765 | 258 - 428 |
| FA 15* | 6018 | 1212 - 2553 | 699 - 1333 | 535 - 978 | 297 - 568 |
| FA 16* | 3020 | 1330 - 3012 | 785 - 1580 | 602 - 1157 | 333 - 673 |

* High-pressure spindle HDS required (illustration p. 12)

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

* High-pressure spindle HDS required (illustration p. 12)

SSV setpoint spring table - control device

| RS 250: DN 150 - 200 / RS 251: DN 100 | | | | | | | | | | | | | |
|---------------------------------------|-------------|-------------------------|------------------------|-------------------------|------------------------|--------------------------|------------------------|-------------------------|------------------------|--------------------------|------------------------|-------------------------|------------------------|
| small ball lock | | | | | | | | | | | | | |
| Spring data | | MD** | | | | MD-R | | | | HD | | | |
| | | to $W_{ds\ o}$ 300 mbar | | Upper response pressure | | to $W_{ds\ o}$ 3500 mbar | | Upper response pressure | | to $W_{ds\ o}$ 8000 mbar | | Upper response pressure | |
| Spring no. | Color [RAL] | $W_{ds\ u}$ [mbar] | Δp_{wu} [mbar] | w_{dso} [mbar] | Δp_{wo} [mbar] | $W_{ds\ u}$ [mbar] | Δp_{wu} [mbar] | w_{dso} [mbar] | Δp_{wo} [mbar] | $W_{ds\ u}$ [mbar] | Δp_{wu} [mbar] | w_{dso} [mbar] | Δp_{wo} [mbar] |
| FE 900 | 1028 | 1 - 8 | 20 | | | 35 - 50 | 50 | | | 120 - 180 | 500 | | |
| FE 901 VA | 2002 | 6 - 17 | 20 | | | 50 - 80* | 50 | | | 150 - 280* | 500 | | |
| FE 902 VA | 6010 | 12 - 24* | 20 | | | 70 - 105 | 50 | | | 280 - 480 | 500 | | |
| FE 903 | 5015 | 22 - 40 | 20 | | | 100 - 140 | 50 | | | 330 - 500 | 500 | | |
| FE 904 VA | 9005 | 30 - 50 | 20 | | | 110 - 160 | 50 | | | 400 - 550 | 500 | | |
| FE 905 VA | 9010 | 45 - 70 | 20 | | | 150 - 205 | 50 | | | 550 - 800 | 500 | | |
| FE 906 | 4002 | 65 - 100 | 20 | | | 200 - 300 | 50 | | | 800 - 1200 | 500 | | |
| FD 910 | 1028 | | | 20 - 40 | 20 | | | 90 - 125 | 50 | | | | |
| FD 911 | 2002 | | | 35 - 70 | 20 | | | 120 - 210 | 50 | | | | |
| FD 912 | 6010 | | | 65 - 110 | 20 | | | 200 - 330 | 50 | | | | |
| FD 913 | 5015 | | | 100 - 160 | 20 | | | 285 - 460 | 50 | | | | |
| FD 914 | 9005 | | | 150 - 235 | 20 | | | 450 - 680 | 50 | | | | |
| FD 915 | 9010 | | | 225 - 300 | 20 | | | 640 - 1040 | 50 | | | 2200 - 4000 | 300 |
| FD 916 | 3020 | | | | | | | 1030 - 1480 | 50 | | | 3400 - 4750 | 300 |
| FD 917 | 5010 | | | | | | | 1450 - 2200 | 50 | | | 4700 - 7400 | 300 |
| FD 918 | 9006 | | | | | | | 1900 - 3500 | 50 | | | 7200 - 8000 | 300 |
| FD 919 | 4002 | | | | | | | | | | | | |

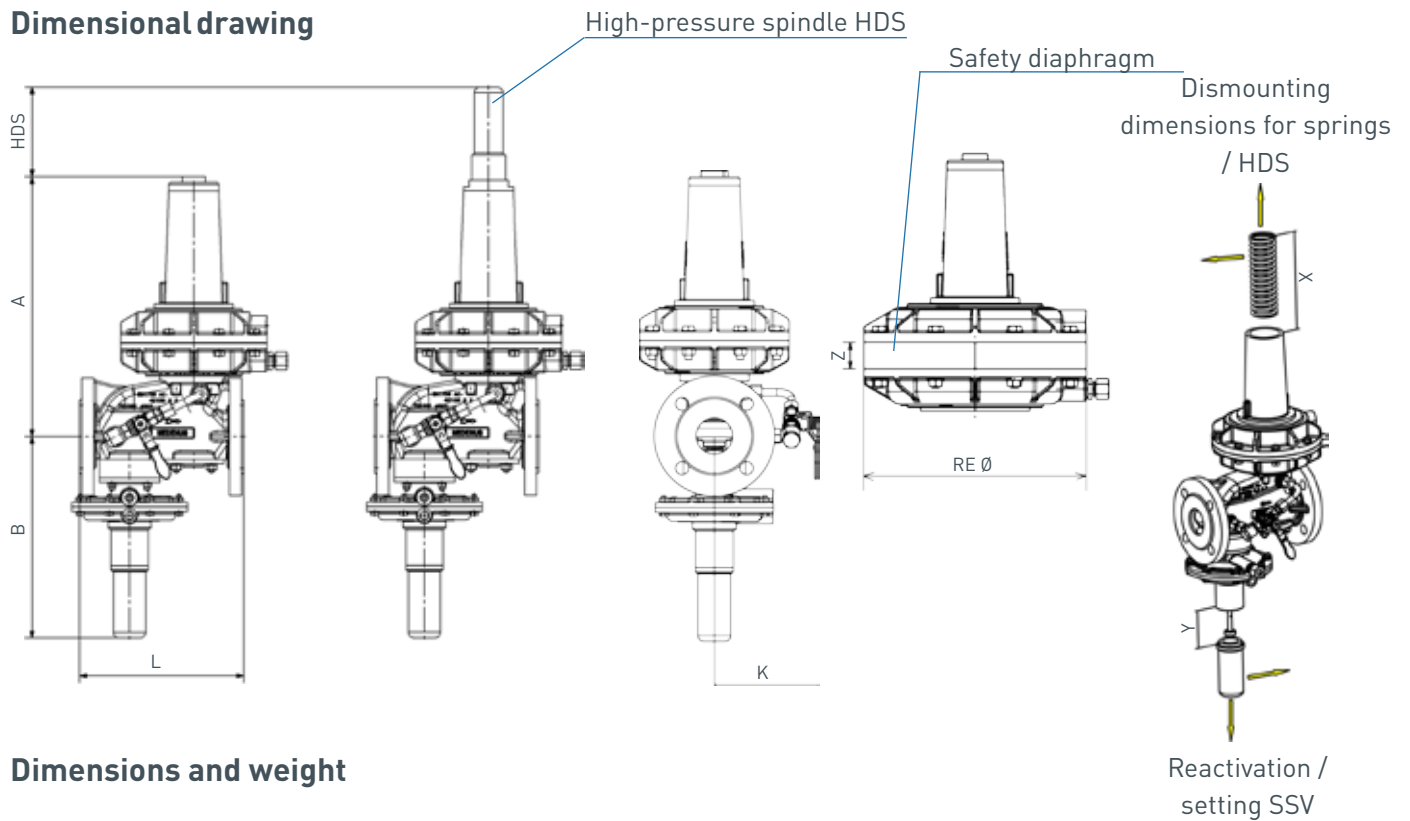
| RS 250: DN 150 - 200 / RS 251: DN 100 | | | | | | | | | | | | | |
|---------------------------------------|-------------|-------------------------|------------------------|-------------------------|------------------------|--------------------------|------------------------|-------------------------|------------------------|--------------------------|------------------------|-------------------------|------------------------|
| large ball lock | | | | | | | | | | | | | |
| Spring data | | MD** | | | | MD-R | | | | HD | | | |
| | | to $W_{ds\ o}$ 300 mbar | | Upper response pressure | | to $W_{ds\ o}$ 3500 mbar | | Upper response pressure | | to $W_{ds\ o}$ 8000 mbar | | Upper response pressure | |
| Spring no. | Color [RAL] | $W_{ds\ u}$ [mbar] | Δp_{wu} [mbar] | w_{dso} [mbar] | Δp_{wo} [mbar] | $W_{ds\ u}$ [mbar] | Δp_{wu} [mbar] | w_{dso} [mbar] | Δp_{wo} [mbar] | $W_{ds\ u}$ [mbar] | Δp_{wu} [mbar] | w_{dso} [mbar] | Δp_{wo} [mbar] |
| FM 400 | 1028 | 10 - 40* | 20 | | | 20 - 180* | 50 | | | 0 - 250 | 500 | | |
| FM 402 | 6010 | 35 - 115 | 20 | | | 155 - 380 | 50 | | | 150 - 1000* | 500 | | |
| FM 404 | 9005 | 60 - 245 | 20 | | | 200 - 950 | 50 | | | 650 - 2050 | 500 | | |
| FL 412 | 6010 | | | 40 - 180 | 20 | | | 145 - 670 | 50 | | | 380 - 1400 | 300 |
| FL 413 | 5015 | | | 70 - 300 | 20 | | | 270 - 1230 | 50 | | | 800 - 2800 | 300 |
| FL 415 | 9010 | | | | | | | 1200 - 3500 | 50 | | | 3200 - 5500 | 300 |
| FL 417 | 4010 | | | | | | | | | | | 4500 - 8000 | 300 |

*) Standard spring

**) 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} .

Dimensions, Connection, and Weight

Dimensional drawing



Dimensions and weight

| | | RS 250 | | | | | | RS 251 | | | |
|------------|---------------------------------|-----------------|-------|-------|-------|--------|--------|--------|-------|-------|--------|
| | | Ø RE | DN 25 | DN 50 | DN 80 | DN 100 | DN 150 | DN 200 | DN 50 | DN 80 | DN 100 |
| Dimensions | A [mm] | 205 | 346 | 364 | 406 | 421 | - | - | 406 | - | - |
| | | 275 | - | - | 406 | 421 | 730 | 799 | 406 | 658 | 730 |
| | | 330 | 328 | 346 | - | - | - | - | - | - | - |
| | | 385/390 | - | - | 406 | 421 | 716 | 785 | 406 | 644 | 716 |
| | | 485 | - | - | - | - | 722 | 791 | - | 644 | 722 |
| | | HDS [mm] | | 125 | 125 | 125 | 205 | 205 | 125 | 205 | 205 |
| | B [mm] | | 270 | 282 | 305 | 315 | 386 | 400 | 305 | 311 | 386 |
| | B [mm] model with HD SSV | | +10 | +10 | +10 | +10 | +23 | +23 | +10 | +10 | +23 |
| | L [mm] | | 230 | 230 | 310 | 350 | 480 | 600 | 310 | 410 | 480 |
| | K [mm] | | 144 | 144 | 160 | 171 | 199 | 228.5 | 160 | 176 | 199 |
| | 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 | Weight [kg] | 205 | 11.5 | 13 | 22 | 23 | - | - | 16 | - | - |
| | | 275 | - | - | 24 | 25 | 52 | 82 | 19 | 37 | 52 |
| | | 330 | 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 |
| | SM safety diaphragm weight [kg] | 205 | 2 | 2 | 2 | 2 | - | - | 2 | - | - |
| | | 275 | - | - | 3 | 3 | 3.3 | 3.3 | 3 | 3.3 | 3.3 |
| | | 330 | 3 | 3 | - | - | - | - | - | - | - |
| | | 385/390 | - | - | 5 | 5 | 6 | 6 | 5 | 6 | 6 |

Example: R250/050/330 with HDS and safety diaphragm

Weight (regulator + HDS + SM): 15 kg + 0.6 kg + 3 kg = 18.6 kg

Dimensions (A + HDS + SM): 346 mm + 125 mm + 32.5 mm = 503.5 mm

Types of models / Options

Safety diaphragm

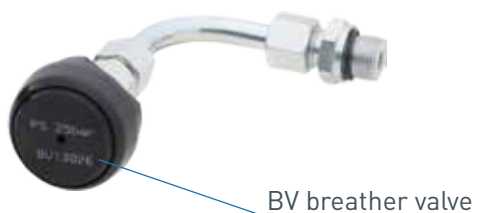
In the model with safety diaphragm, the safety diaphragm is located above the main diaphragm. When the main diaphragm is damaged, the safety diaphragm makes contact with the top cover of the diaphragm assembly and limits any inadmissible escape of gas into the surrounding atmosphere to a maximum of 30l/h (air).



(Option not available for hydrogen version H₂)

BV breather valve

The BV breather valve is used as for securing the installation room against inadmissible escape of gas from diaphragm comparator compartments of safety shut-off valves. In case of a defect, the impermissible escape of gas into the surrounding atmosphere is limited to a maximum of 30l/h (air).



It also serves as a substitute for an expensive and complex installation of breather lines.

(Option not available for hydrogen version H₂)

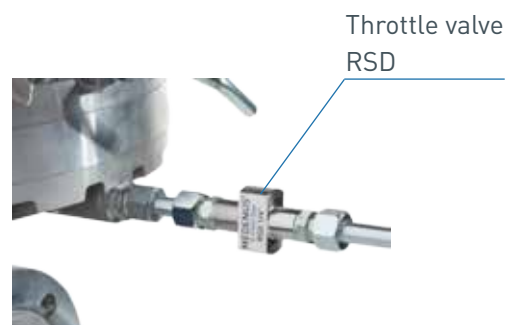
Noise reduction

The noise reduction made of metallic foam reduces noise in the gas pressure regulator produced by the flow rate by up to -15 dB (± 3 dB).



RSD / RSD2 throttle valve

The RSD is a throttle valve that affects the volumetric flow in the measurement line from outside by means of a continuously adjustable narrowing of the cross-section. The adjustment is done by means of an Allen key (4 mm).



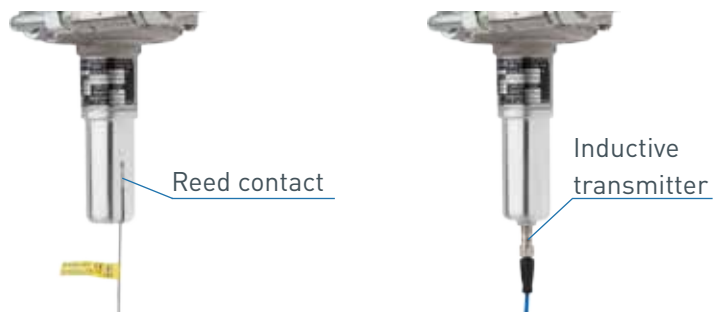
High-pressure spindle HDS

The high pressure spindle (HDS) is used to adjust the control spring at high outlet pressure. (See spring tables p. 9)



Reed contact / inductive transmitter

Reed contacts and inductive transmitters are used to monitor the position (closed or open position) of the safety shut-off valve via remote display.



SSV remote release

The direct-acting safety solenoid valve is used as electromagnetic remote release for closing the safety shut-off valve when power is applied or in case of power failure.



Epoxy resin coating in RAL colors

To protect the gas pressure regulator from external influences, starting from a corrosivity category C5-M we recommend an epoxy resin coating.



Types of models

Oxygen version O_2

Hydrogen version H_2 (with helium leak test)

The Medenus gas pressure regulators are suitable for use with hydrogen as a medium up to a proportion of 100%. Further information can be found in the special edition (10/2019) of gwf Gas+Energie and on our homepage at

(www.medenus.de)



Design

Note All calculated pressures are absolute pressures for natural gas. (p+1 bar) The required KG value for a gas pressure regulator is determined with the smallest inlet pressure or lowest pressure drop.

Calculation of the required K_G value

$p_d / p_u > 0.5$
Valve flow rate coefficient K_G at a subcritical pressure ratio
 $K_G = Q_n / \sqrt{p_d \cdot (p_u - p_d)}$

$p_d / p_u \leq 0.5$
Valve flow rate coefficient K_G at a supercritical pressure ratio
 $K_G = 2 \cdot Q_n / p_u$

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

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

Device selection

Note Closing pressure zone group: SZ 2.5

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

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 diaphragm assembly from the diaphragm assembly setpoint spring table (page 9)

Selection of the closing pressure group from the closing pressure group table (page 4)

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

Selection of the SSVs from the SSV control device table (page 10)
Recommended upper SSV response pressure $p_{ds,o} < 500 \text{ mbar} + p_{ds}$

Determining the upper response pressure

| Outlet pressure P _d (mbar) | Upper response pressure W _{dso} * |
|---------------------------------------|--|
| ≤200 | P _d +100 mbar |
| >200 - ≤800 | P _d x 1.5 |
| >800 - ≤1600 | P _d x 1.3 |
| >1600 | P _d +500 mbar |

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
15 m/s max. value for outlet pressures below 100 mbar

The device selected in the example of nominal width DN 80 can be operated under these conditions.

*) The upper response pressure is rounded up to full tens (e.g. 251 mbar -> 260 mbar)

p_u Inlet pressure (bar)
p_d Outlet pressure (bar)
Q_n Standard volumetric flow rate (m³/h)

Example: Overpressure Absolute pressure

P_{u min} 5.0 bar 6.0 bar
P_{d min} 0.5 bar 1.5 bar
Q_{n min} 1500 m³/h

1.5bar / 6 bar = 0.25 < 0.5
→ Supercritical pressure ratio
K_G = 2 • 1500 / 6 = 500 [m³/(h•bar)]

Selected device

Type RS 250
DN - Nominal width 050
D - Nozzle V 32.5
K_G value 750 m³/(h•bar)

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

Selected diaphragm assembly

RE - Diaphragm assembly 330
Setpoint spring FA13
(W_{ds} 360-544)

AC 5/SG 10 (for RE 330 D - Nozzle 32.5)

Selected SSV

MD-R with FD 913 (285 - 460mbar) AG_o 10
set to P_{dso} = 375 mbar
and FE 901 (50 - 80 mbar) AG_u 5

Note Standard setpoint springs SSV

(small ball lock)

MD FE 902 (12 - 24 mbar)
MD-R FE 901 (50 - 80 mbar)
HD FE 901 (150 - 280 mbar)

(large ball lock)

MD FM 401 (10 - 40 mbar)
MD-R FM 400 (20 - 180 mbar)
HD FM 402 (150 - 1000 mbar)

Nominal width of input and output of pipeline according to the selected device: 50 mm
Selected widening of outlet pipeline: 150 mm

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

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

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

Order Data

(In every selection group, only one option can be selected in each case)

Example:

Gas pressure regulator: RS250/080/275/27.5/MD-R/HDS/left/SR/SM/RSD/BV/N/H/WAZ/So

| Order selection | Designation | RS250 | 080 | - | 275 | 27.5 | MD-R | - | HDS | left | SR | SM | RSD | BV | N | H | WAZ | So | |
|---|-------------|--------|-----|---|------|------|------|---|-----|------|----|----|-----|----|---|---|-----|----|-----|
| Type | | | | | | | | | | | | | | | | | | | |
| RS 250 | RS250 | RS 250 | | | | | | | | | | | | | | | | | |
| RS 251 | RS251 | | | | | | | | | | | | | | | | | | |
| DN - Nominal width | Table p. 8 | | 080 | | | | | | | | | | | | | | | | |
| Flange model | | | | | | | | | | | | | | | | | | | |
| PN 16 | - | | | - | | | | | | | | | | | | | | | |
| Class 150 | C | | | | | | | | | | | | | | | | | | |
| RE - Diaphragm assembly | Table p. 8 | | | | 275 | | | | | | | | | | | | | | |
| D - Nozzle (valve seat diameter) | | | | | 27.5 | | | | | | | | | | | | | | |
| SSV | | | | | | | | | | | | | | | | | | | |
| with control device MD | MD | | | | | | | | | | | | | | | | | | |
| with control device MD-R | MD-R | | | | | | MD-R | | | | | | | | | | | | |
| with control device HD | HD | | | | | | | | | | | | | | | | | | |
| SSV functional class | | | | | | | | | | | | | | | | | | | |
| A | - | | | | | | | - | | | | | | | | | | | |
| B | B | | | | | | | | | | | | | | | | | | |
| High-pressure spindle | Fig. p. 12 | | | | | | | | | | | | | | | | | | |
| without high-pressure spindle | - | | | | | | | | | | | | | | | | | | |
| with high-pressure spindle | HDS | | | | | | | | HDS | | | | | | | | | | |
| Direction of flow | | | | | | | | | | | | | | | | | | | |
| Right (from left to right) | - | | | | | | | | | | | | | | | | | | |
| Left (from right to left) | left | | | | | | | | | left | | | | | | | | | |
| Noise reduction | Fig. p. 12 | | | | | | | | | | | | | | | | | | |
| without noise reduction | - | | | | | | | | | | | | | | | | | | |
| with noise reduction | SR | | | | | | | | | | SR | | | | | | | | |
| Additional unit, diaphragm assembly | Fig. p. 12 | | | | | | | | | | | | | | | | | | |
| without additional unit, diaphragm assembly | - | | | | | | | | | | | | | | | | | | |
| Safety diaphragm | SM | | | | | | | | | | | SM | | | | | | | |
| Breather valve | BV | | | | | | | | | | | | | | | | | | |
| Throttle valve | Fig. p. 12 | | | | | | | | | | | | | | | | | | |
| without throttle valve | - | | | | | | | | | | | | | | | | | | |
| with throttle valve | RSD | | | | | | | | | | | | RSD | | | | | | |
| SSV valve accessories | Fig. p. 13 | | | | | | | | | | | | | | | | | | |
| without SSV valve accessories | - | | | | | | | | | | | | | | | | | | |
| Breather valve | BV | | | | | | | | | | | | | | | | | | |
| Electrical position indicator, SSV "Closed" | Fig. p. 13 | | | | | | | | | | | | | | | | | | |
| without electrical position indicator | - | | | | | | | | | | | | | | | | | | |
| with ... , via proximity switch | N | | | | | | | | | | | | | | | | | N | |
| with ... , via Reed contact | R | | | | | | | | | | | | | | | | | | R |
| SSV release | Fig. p. 13 | | | | | | | | | | | | | | | | | | |
| without release | - | | | | | | | | | | | | | | | | | | |
| 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 acceptance test certificate | - | | | | | | | | | | | | | | | | | | |
| with acceptance test certificate | WAZ | | | | | | | | | | | | | | | | | | WAZ |
| Special model | So | | | | | | | | | | | | | | | | | | |
| - Coating with epoxy resin in RAL colors | | | | | | | | | | | | | | | | | | | |
| - Oxygen model | | | | | | | | | | | | | | | | | | | |
| - Hydrogen model (Helium leak test) | | | | | | | | | | | | | | | | | | | |