MEDENUS

Gas Pressure Regulation

100% Wasserstoff geeignet

H_2

100% Hydrogen ready

Gas Pressure Regulator RS 250 / RS 251

Product information

EN

Table of Contents

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
AG_o	Upper response pressure group
AG_u	Lower response pressure group
BV	Breather valve
GPR	Gas pressure regulator
HDS	High-pressure spindle
K_G	Valve flow rate coefficient
p	Pressure
p_d	Outlet pressure
p_{df}	SRV closing pressure
p_{do}	SRV opening pressure
p_{ds}	Setpoint of the response pressure
$p_{ds\,o}$	Upper SSV response pressure
$p_{ds\,u}$	Lower SSV response pressure
$p_{f,max}$	Maximum closing pressure
PS	Maximum allowable pressure
p_u	Inlet pressure
Q_n	Standard volumetric flow rate
RE	Diaphragm assembly
RSD2	Throttle valve
SSV	Safety shut-off valve
SRV	Safety relief valve
SG	Closing pressure group
t_{Gas}	Gas inlet temperature
VS	Valve seat
w_d	Outlet gas velocity
w_u	Inlet gas velocity
$W_{ds\,o}$	Upper spring adjustment range (SSV)
$W_{ds\,u}$	Lower spring adjustment range (SSV)
Δp	Pressure difference from inlet pressure to outlet pressure
Δp_{wo}	Min. re-engagement difference between upper response pressure and normal operating pressure
Δp_{wu}	Min. re-engagement difference between lower response pressure and normal operating pressure
ρ_n	Gas density

*) KG 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 13-14)

- Diaphragm assembly optionally with safety diaphragm
- Diaphragm assembly and SSV optionally with AV breather valve
- With noise reduction
- With throttle valve (RSD2) for impulse line of the regulator
- Without SSV
- With electric position indicator SSV "Closed" 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

	Diaphragm assembly						
Accuracy class AC and closing pressure group SG at the outlet pressure range p_d	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
10 mbar to 30 mbar	20
> 30 mbar to 50 mbar	10
> 50 mbar	5

Upper response pressure group AG_o in the command area w_{dso}	AG_o
50 mbar to 100 mbar	10
> 100 mbar to 500 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 C1 up to and including C5-I C5-M	DIN EN ISO 12944-2 without additional coating an epoxy resin coating is recommended (see page14)
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.

Other installation positions only after consultation with Medenus GmbH.

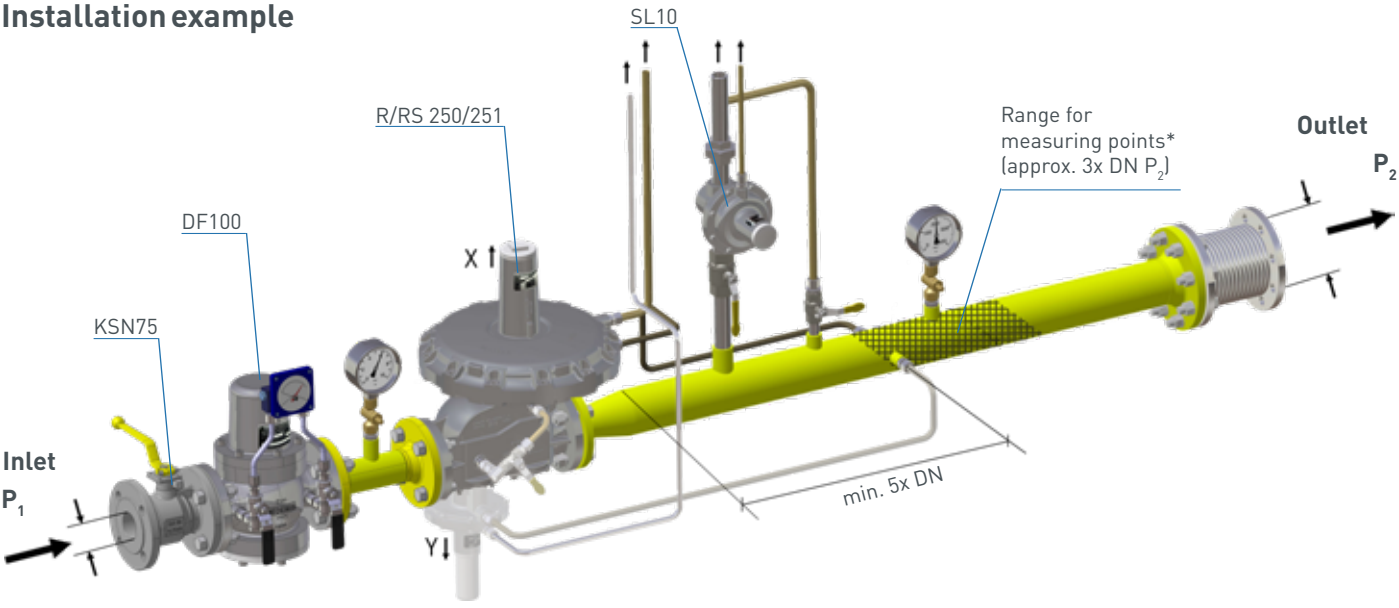
Note: Observe the following documents in relation to installation, start-up, and maintenance:

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

Structure and function

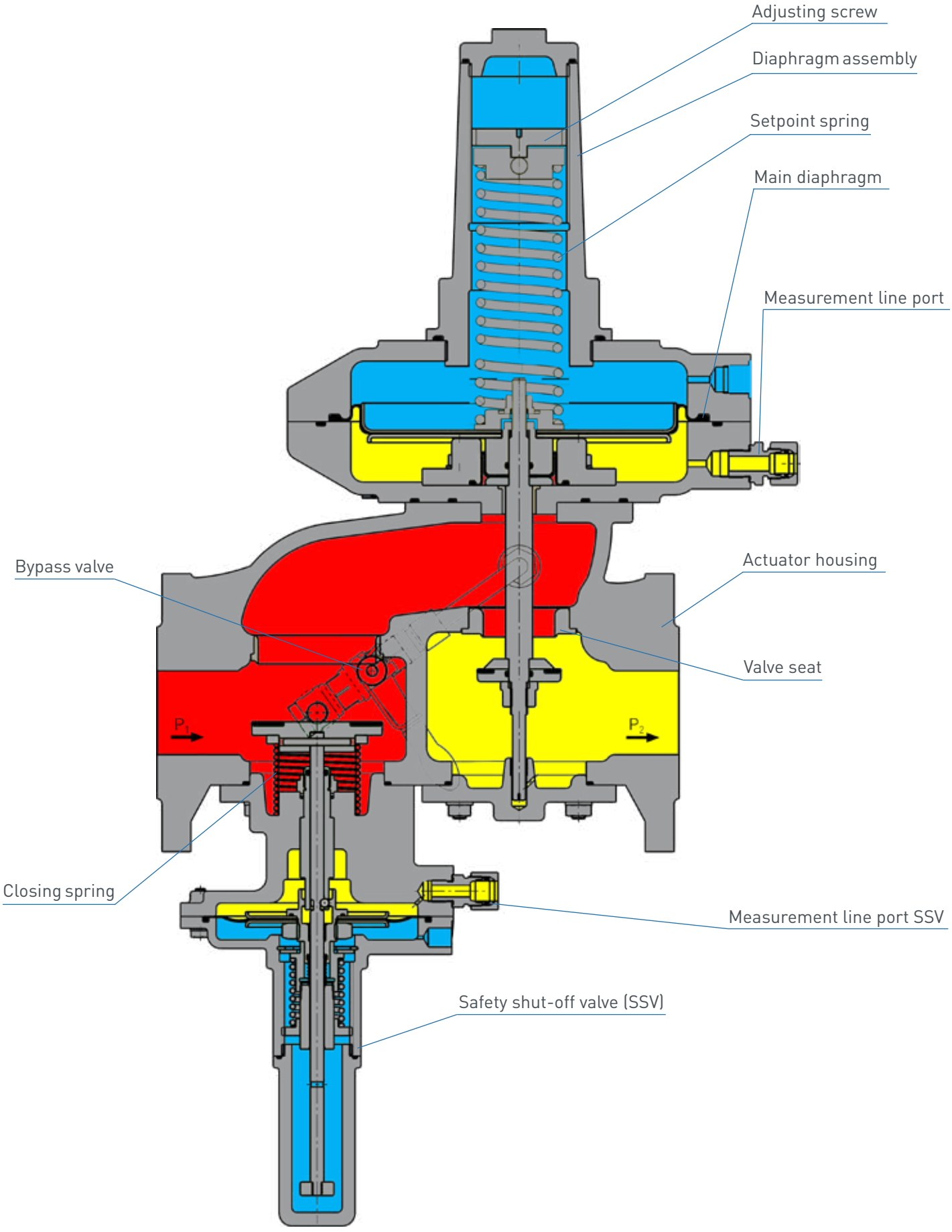
The spring-loaded gas pressure regulator RS 250 / 251 has the function of keeping the outlet pressure of a gaseous medium constant within allowable limit values (AC), independently of the effect of interferences, such as changes in the inlet pressure and/or in the gas tap, in the connected regulation 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

Sectional view



K_G value and diaphragm assemblies

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

	RS 250						RS 251		
Nominal width	DN 25	DN 50	DN 80	DN 100	DN 150	DN 200	DN 50	DN 80	DN 100
Diaphragm assembly Ø / Valve seat Ø	205 330	205 330	205 275 390	205 275 390	275-2 385 485	275-2 385 485	205 275 390	275-2 385 485	275-2 385 485
17.5 mm	200	220							
27.5 mm	420	500	550	600			550		
32.5 mm		750	850	900			750	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 04	4002	-	-	18 - 22	-
FA 05	7037	-	-	21 - 29	-
FA 06	9005	-	-	28 - 39	18 - 24
FA 07	3020	-	-	38 - 54	23 - 32
FA 08	9010	-	-	53 - 77	31 - 45
FA 09	7016	200 - 295	-	76 - 111	42 - 64
FA 10	6010	280 - 430	130 - 225	110 - 166	59 - 94
FA 11	2002	419 - 653	208 - 339	165 - 250	88 - 142
FA 12*	7035	595 - 935	293 - 450	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 - 1100	535 - 800	297 - 450
FA 16*	3020	1330 - 3000	-	-	-

* 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	RE 485
FB 701	6018	-	-	18 - 22
FB 702	9006	-	-	21 - 25
FB 703	5015	-	-	24 - 31
FB 704	4002	-	-	28 - 36
FB 705	7037	-	-	33 - 44
FB 706	9005	-	-	41 - 56
FB 707	3020	-	-	51 - 71
FB 708	9010	-	150 - 167	65 - 94
FB 709	7016	350 - 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 - 850	311 - 450
FB 715*	6018	1547 - 2469	-	-
FB 716*	3020	2136 - 3000	-	-

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

SSV setpoint spring table - control device

		RS 250: DN 25 - 100 / RS 251: DN 50 - 80							
		small ball lock							
		ND**				MD**			
		to $W_{ds\,o}$ 200mbar				to $W_{ds\,o}$ 300mbar			
Spring data		Lower response pressure		Upper response pressure		Lower response pressure		Upper response pressure	
Feder Nr.	Farbe [RAL]	$W_{ds\,u}$ [mbar]	Δp_{wu} [mbar]	$W_{ds\,o}$ [mbar]	Δp_{wo} [mbar]	$W_{ds\,u}$ [mbar]	Δp_{wu} [mbar]	$W_{ds\,o}$ [mbar]	Δp_{wo} [mbar]
FE 900	1028	1 - 3	15			1 - 8	20		
FE 901 VA	2002	4 - 6	15			6 - 17	20		
FE 902 VA	6010	5 - 15	15			12 - 24*	20		
FE 903	5015	10 - 17	15			22 - 40	20		
FE 904 VA	9005	12 - 19	15			30 - 50	20		
FE 905 VA	9010	20 - 25	15			45 - 70	20		
FE 906	4002					65 - 100	20		
FD 910	1028			8 - 17	15			20 - 40	20
FD 911	2002			20 - 30	15			35 - 70	20
FD 912	6010			30 - 55	15			65 - 110	20
FD 913	5015			44 - 74	15			100 - 160	20
FD 914	9005			63 - 110	15			150 - 235	20
FD 915	9010			99 - 178	15			225 - 300	20
FD 916	3020			157 - 200	15				
FD 917	5010								
FD 918	9006								
FD 919	4002								

		RS 250: DN 25 - 100 / RS 251: DN 50 - 80							
		small ball lock							
		MD-R**				HD**			
		to $W_{ds\,o}$ 3500mbar				to $W_{ds\,o}$ 8000mbar			
Spring data		Lower response pressure		Upper response pressure		Lower response pressure		Upper response pressure	
Feder Nr.	Farbe [RAL]	$W_{ds\,u}$ [mbar]	Δp_{wu} [mbar]	$W_{ds\,o}$ [mbar]	Δp_{wo} [mbar]	$W_{ds\,u}$ [mbar]	Δp_{wu} [mbar]	$W_{ds\,o}$ [mbar]	Δp_{wo} [mbar]
FE 900	1028	35 - 50	50			120 - 180	500		
FE 901 VA	2002	50 - 80*	50			150 - 280*	500		
FE 902 VA	6010	70 - 105	50			280 - 480	500		
FE 903	5015	100 - 140	50			330 - 500	500		
FE 904 VA	9005	110 - 160	50			400 - 550	500		
FE 905 VA	9010	150 - 205	50			550 - 800	500		
FE 906	4002	200 - 300	50			800 - 1200	500		
FD 910	1028			90 - 125	50				
FD 911	2002			120 - 210	50				
FD 912	6010			200 - 330	50				
FD 913	5015			285 - 460	50				
FD 914	9005			450 - 680	50				
FD 915	9010			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				50				

		RS 250: DN 150 - 200 / RS 251: DN 100							
		large ball lock							
		ND**				MD**			
		to $W_{ds\,o}$ 200mbar				to $W_{ds\,o}$ 300mbar			
Spring data		Lower response pressure		Upper response pressure		Lower response pressure		Upper response pressure	
Feder Nr.	Farbe [RAL]	$W_{ds\,u}$ [mbar]	Δp_{wu} [mbar]	$W_{ds\,o}$ [mbar]	Δp_{wo} [mbar]	$W_{ds\,u}$ [mbar]	Δp_{wu} [mbar]	$W_{ds\,o}$ [mbar]	Δp_{wo} [mbar]
FM 400	1028	2 - 25	20			10 - 40*	20		
FM 402	6010					35 - 115	20		
FM 404	9005					60 - 245	20		
FL 411	2002			28 - 76	20				
FL 412	6010			48 - 114	20			40 - 180	20
FL 413	5015			93 - 200	20			70 - 300	20
FL 415	9010								
FL 417	4010								

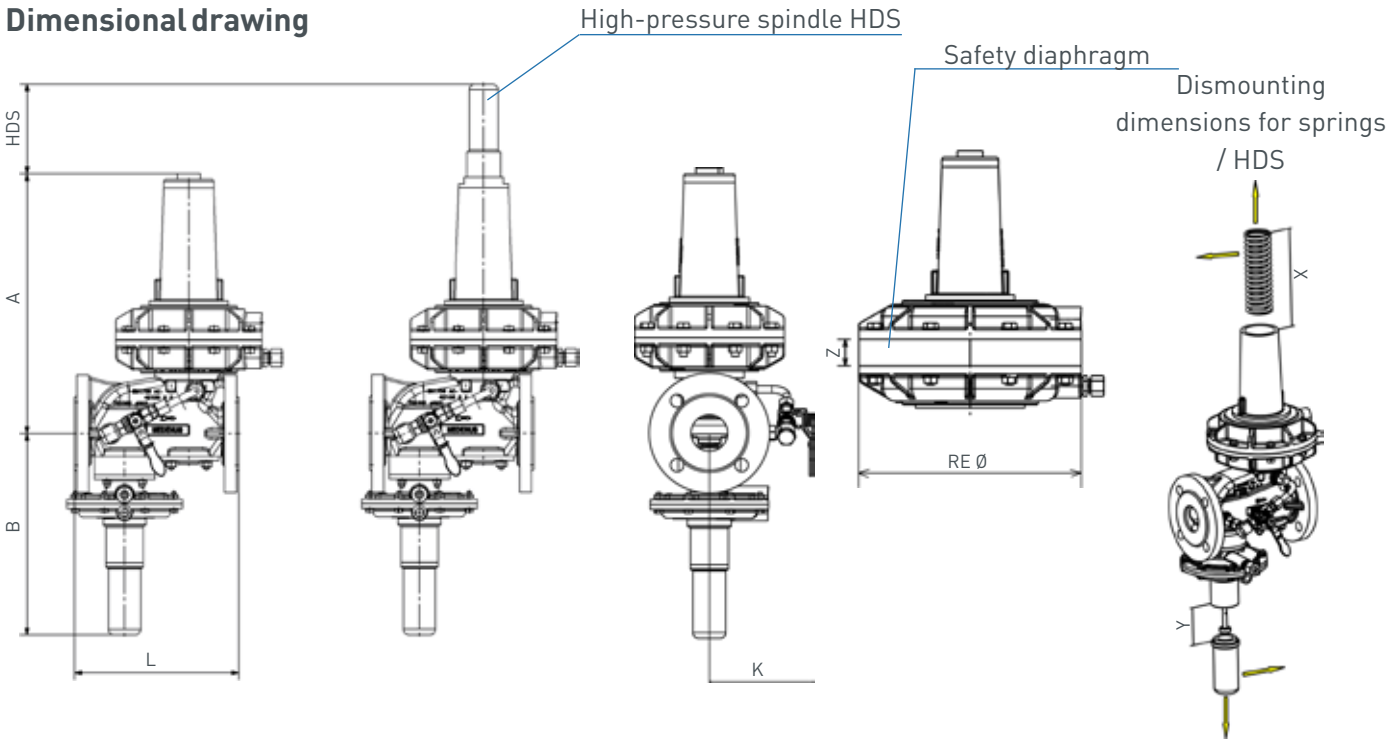
		RS 250: DN 150 - 200 / RS 251: DN 100							
		large ball lock							
		MD-R**				HD**			
		bis $W_{ds\,o}$ 3500mbar				bis $W_{ds\,o}$ 8000mbar			
Spring data		Lower response pressure		Upper response pressure		Lower response pressure		Upper response pressure	
Feder Nr.	Farbe [RAL]	$W_{ds\,u}$ [mbar]	Δp_{wu} [mbar]	$W_{ds\,o}$ [mbar]	Δp_{wo} [mbar]	$W_{ds\,u}$ [mbar]	Δp_{wu} [mbar]	$W_{ds\,o}$ [mbar]	Δp_{wo} [mbar]
FM 400	1028	20 - 180*	50			0 - 250	500		
FM 402	6010	155 - 380	50			150 - 1000*	500		
FM 404	9005	200 - 950	50			650 - 2050	500		
FL 411	2002								
FL 412	6010			145 - 670	50			380 - 1400	300
FL 413	5015			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 simultaneously for the upper and lower set pressure (functional class A) the difference between the setpoints of the upper and lower response pressure (p_{dso} and p_{dsu}) and the outlet pressure pd must be at least "Δp_{wo} + 10%" or "Δp_{wu} + 10%". Otherwise it cannot be guaranteed that the control device will re-engage.

Dimensions, Connection, and Weight

Dimensional drawing



Dimensions and weight

Dimensions / Nominal width	Ø RE	RS 250 DN 25	RS 250 DN 50	RS 250 DN 80	RS 250 DN 100	RS 250 DN 150	RS 250 DN 200	RS 251 DN 50	RS 251 DN 80	RS 251 DN 100
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	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	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).

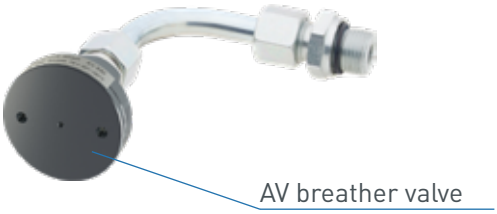
(Option not available for hydrogen version H_2)

AV breather valve

The AV 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).

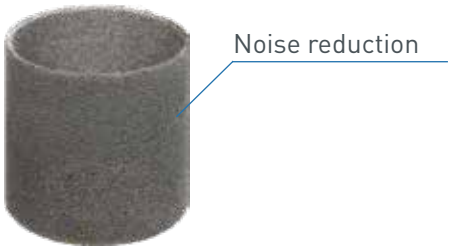
It also serves as a substitute for an expensive and complex installation of breather lines.

(Option not available for hydrogen version H_2)



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).



RSD2 throttle valve

The RSD2 is a throttle valve which regulates the volume flow in the sensing/impulse line by means of a continuously adjustable cross-sectional reduction. The setting is made tool-free by means of a rotary knob and can be adjusted using a screw to be fixed. The throttle valve cannot be completely shut off, therefore a guaranteed minimum flow is ensured.

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

SSV manual and 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.

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

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
$K_G = 2 \bullet Q_n / p_u$

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
$K_G = 2 \bullet 1500 / 6 = 500$ [m³/(h*bar)]

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: $Q_{min} = 0.025 \bullet K_G \bullet p_{u\ max}$

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)

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

Selected device

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

$Q_{min} = 0.025 \bullet 750 \bullet 9 = 169$ m³/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

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

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)

Checking the gas velocities

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

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: $w_{corr} = w \bullet (t_{gas} + 273.15)/290$

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

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

$w_u = 380 \bullet 1500 / (50^2 \bullet 6) = 38$ m/s

$w_d = 380 \bullet 1500 / (50^2 \bullet 1.5) = 152$ m/s

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

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)

Properties of Gases

- for natural gas (ρ_n = 0.83 kg/m³; t = 15°C)
- Δp = pressure difference from inlet pressure to outlet pressure
- Q_n = max. possible volume flow (determined using K_G values with a safety margin of 10%)
- f - natural gas conversion factor- L

Gas	f	Hs,n [kWh/m³]	Gas	f	Hs,n [kWh/m³]
Acetylene	0.84	16.25	Sewage gas	0.84	
Ammonia	1.04	4.83	Carbon monoxide	0.81	3.51
Butane	0.55	37.23	Carbon dioxide	0.65	-
Chlorine	0.51	-	Air	0.80	-
Landfill gas	approx. 0.80		Methane	1.08	11.06
Natural gas L	1.00	9.77	Propane	0.64	28.03
Natural gas H	1.03	11.45	Oxygen	0.76	-
Ethane	0.78	19.55	Sulphur dioxide	0.53	-
Ethylene	0.97	16.516	Nitrogen	0.81	-
Mine gas	(30% CH4)	0.86	Hydrogen	3.04	13.43
Helium	2.15	-			

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/RSD2/BV/R/H/WAZ/So

Order selection	Designation	Order code:	RS250	080	-	275	27.5	MD-R	-	HDS	left	SR	SM	RSD2	BV	N	H	WAZ	So
Type																			
RS 250	RS250		RS 250																
RS 251	RS251																		
DN - Nominal width	Table page 8			080															
Flange model																			
PN 16	-				-														
Class 150	C																		
RE - Diaphragm assembly	Table page 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	page 13																		
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	page 13																		
without noise reduction	-																		
with noise reduction	SR											SR							
Additional unit, diaphragm assembly	page 13																		
without additional unit, diaphragm assembly	-																		
Safety diaphragm	SM												SM						
Breather valve	BV																		
Throttle valve	page 13																		
without throttle valve	-																		
with throttle valve	RSD2													RSD2					
SSV valve accessories	page 14																		
without SSV valve accessories	-																		
Breather valve	BV																		
Electrical position indicator, SSV "Closed"	page 14																		
without electrical position indicator	-																		
with ... , via Reed contact	R																		
SSV release	page 14																		
without release	-																		
with manual release	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																		
Special model	So																		
- Coating with epoxy resin in RAL colors - Oxygen model - Hydrogen model (Helium leak test)																			

Contact

Management
ALEXANDER CHRISTIANI

Phone: +49 (0) 2761 / 82788-18
Mail: a.christiani@medenus.de

Head of Inside Sales Department
MANUEL SCHEPP

Phone: +49 (0) 2761 / 82788-20
Mobile phone: +49 (0) 170 / 6355309
Mail: m.schepp@medenus.de

Technical Inside Sales Department
MINDAUGAS PECKAITIS

Phone: +49 (0) 2761 / 82788-23
Mail: m.peckaitis@medenus.de

Inside Sales Department
SEBASTIAN HUCKESTEIN

Phone: +49 (0) 2761 / 82788-11
Mail: s.huckestein@medenus.de

Inside Sales Department
STEFANIE MÜLLER

Phone: +49 (0) 2761 / 82788-13
Mail: s.mueller@medenus.de

If you want to know more about solutions from MEDENUS for the gas industry, please contact your local contact person or go to our internet site at www.medenus.de

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MEDENUS
Gas-Druckregeltechnik GmbH

Im Langen Feld 3
D-57462 Olpe
Phone: +49 (0)2761 82788-0
Fax: +49 (0)2761 82788-9
Mail: info@medenus.de
Internet: www.medenus.de

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Flowstar (UK) Ltd
Phone +44 (0)1482 601030
WhatsApp +44 (0)7708 461097
Wiltshire Road, Hull, HU4 6PA
sales@flowstar.co.uk
www.flowstar.co.uk

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