

MEDENUS

Gas Pressure Regulation



Gas pressure regulator R101



Product information

EN

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List of abbreviations and formula symbols

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

*) 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)

Characteristics

- Integral pressure-tight model (IS)
- Easy to maintain due to interchangeable functional units (modular design)
- outdoor version as standard

Type of model (options)

- with throttle valve (RSD) for the impulse line on the control units
- with noise reduction
- Coating with epoxy resin in RAL colours

Technical Data

Type	R101
Model	Integral druckfest (IS)
Max. allowable pressure PS	8 bar
Max. inlet pressure $p_{u,max}$	8 bar
Nominal size	R 101: DN 25, DN 40, DN 50, DN 65, 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 group	SZ 2,5

Gas pressure regulator

Accuracy class AC and closing pressure group SG at the outlet pressure range $p_{d, \text{minimum pressure differential 100 mbar}}$	AC	SG
22 mbar to 100 mbar	10	20
> 100 mbar to 500 mbar	5	10
> 500 mbar to 1500 mbar	2,5	10
>1000 mbar (only RE205 / 275)	5	10

Function, Strength and Tightness	DIN EN 334 and DIN EN 14382
CE mark acc. 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.

*) 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.



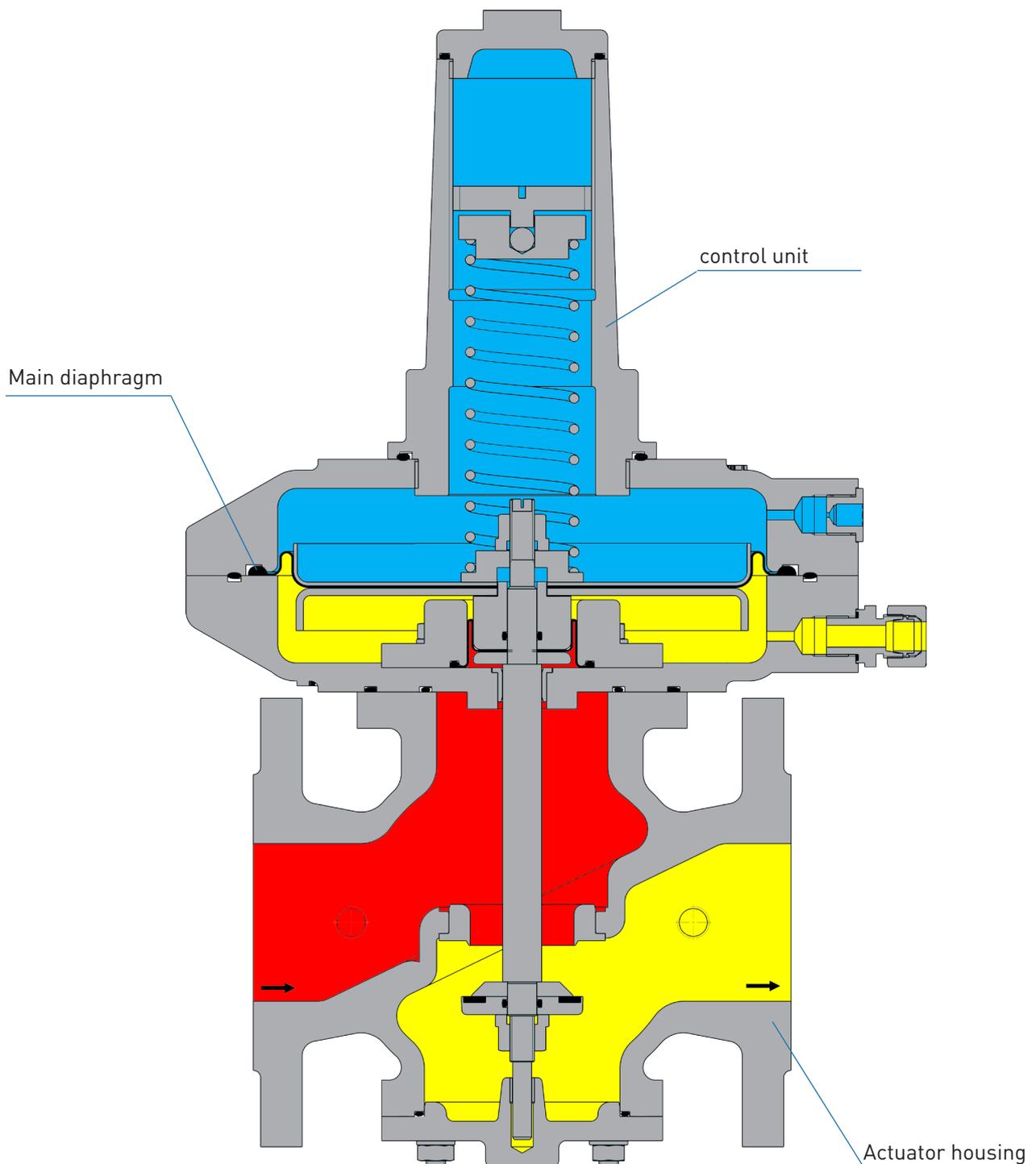
Application, Characteristics, Technical Data

Design and Function

The spring-loaded gas pressure regulator R 101 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“ functional unit.

The actuator of the control device can be carried out per nominal width in various valve seat diameters. The valve seat versions residual pressure compensated. 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.



Options

Safety diaphragm

Above the main membrane lies the safety diaphragm, which, when the main diaphragm breaks, comes into contact with the upper hood of the control device and prevents inadmissible gas leakage into the surrounding atmosphere.



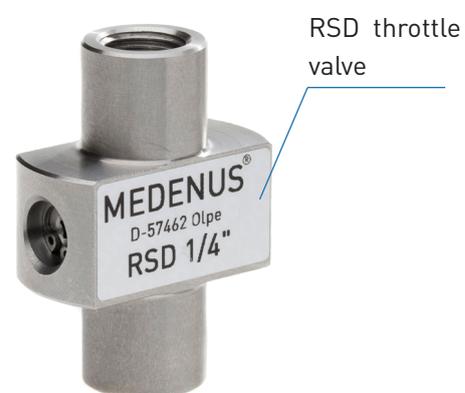
Noise reduction

The noise reduction made of metal foam reduces the noise generated by the flow velocity in the gas pressure control device by up to -15 dB (± 3 dB)



RSD throttle valve

The RSD is a throttle valve which regulates the flow in the measuring line through a stepless adjustable cross-sectional narrowing influenced from the outside. The adjustment is made by means of an Allen key (4mm)



Application, Characteristics, Technical Data

K_G^* value and control unit

	R 101				
Nominal size	DN 25	DN 40	DN 50	DN 65	DN 100
control unit \varnothing	160	160	205	205	275-2
	205	205	275	275	385
Valve seat \varnothing	320	320	390	390	485
17,5 mm	200	220			
27,5 mm	460	600			
32,5 mm		750	1.000	1.000	
42,5 mm			1.500	1.500	
52,5 mm			1.800	1.800	
65,0 mm					3.500
95,0 mm					5.800
Connection	DIN 1092 - PN16				

Accuracy class AC / Closing pressure group SG

Outlet pressure range p_a	control units							
18 mbar to 100 mbar	160	205	275	275-2	320	385	390	485
90 mbar to 500 mbar					10 / 20	10 / 20	10 / 20	5 / 10
100 mbar to 500 mbar			5 / 10					
350 mbar to 500 mbar					5 / 10	5 / 10	5 / 10	5 / 10
500 mbar to 1000 mbar				10 / 20				
> 500 mbar	10 / 20	10 / 20						
> 1000 mbar			2,5 / 10	5 / 10	2,5 / 10	2,5 / 10	2,5 / 10	
> 1.000 mbar	5 / 10	5 / 10						

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

Control unit setpoint spring table

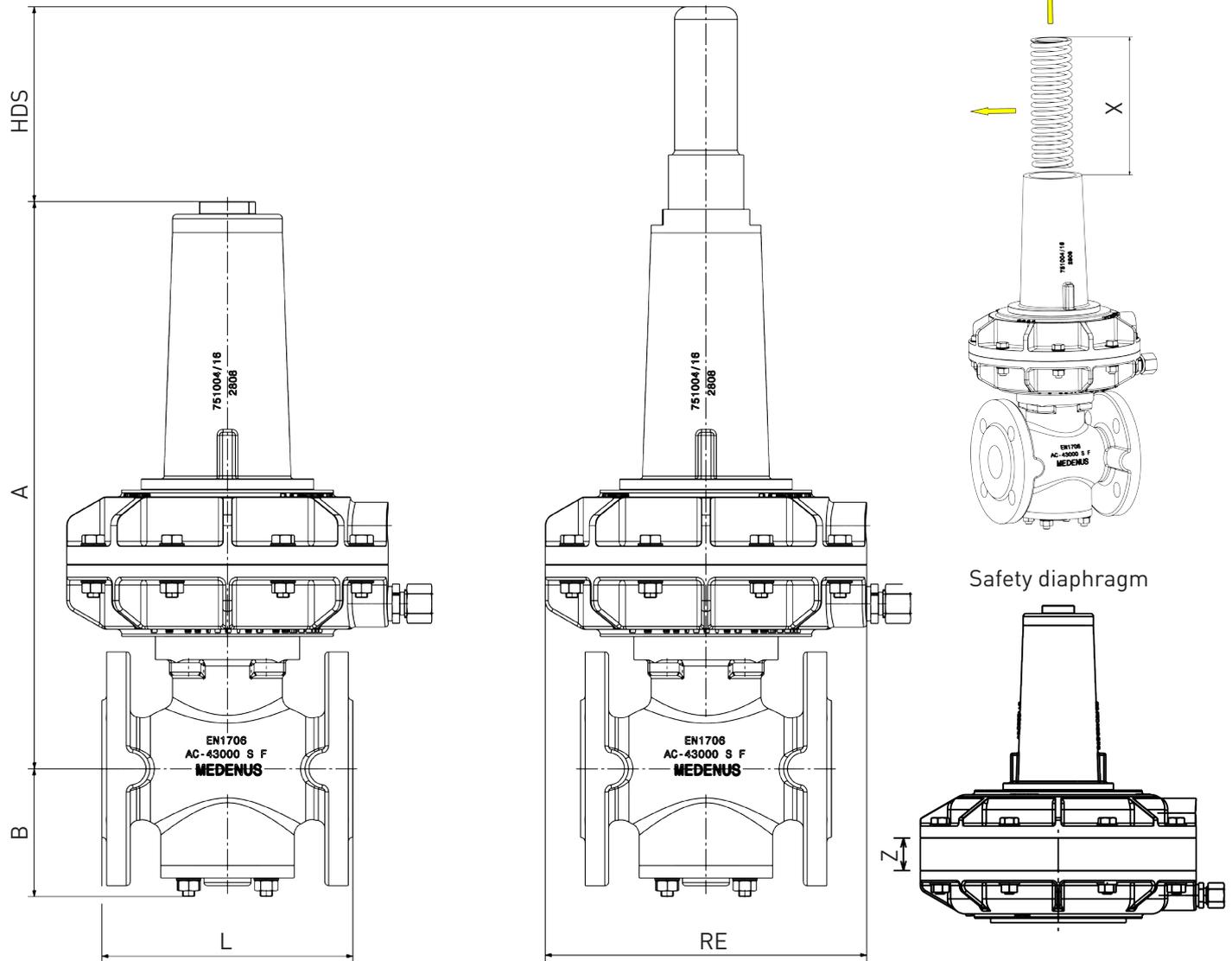
Specific command range W_{ds} [mbar]					Spring data	
RE 160	RE 205	RE 275	RE 320	RE 390	Spring no.	Colour [RAL]
61 - 70	36 - 39	23 - 25	10 - 12	8 - 10	FA 01	blank
66 - 80	38 - 45	24 - 28	11 - 13	9 - 12	FA 02	9006
77 - 98	44 - 52	27 - 31	14 - 18	11 - 13	FA 03	5015
91 - 121	51 - 64	30 - 37	17 - 22	12 - 15	FA 04	4002
111 - 158	62 - 81	35 - 46	21 - 29	14 - 19	FA 05	7037
143 - 213	78 - 107	43 - 59	28 - 39	18 - 24	FA 06	9005
191 - 297	103 - 147	55 - 80	38 - 54	23 - 32	FA 07	3020
262 - 422	140 - 205	73 - 110	53 - 77	31 - 45	FA 08	9010
369 - 611	195 - 295	100 - 156	76 - 111	42 - 64	FA 09	7016
533 - 899	280 - 430	141 - 225	110 - 166	59 - 94	FA 10	6010
802 - 1371	419 - 653	208 - 339	165 - 250	88 - 142	FA 11	2002
1143 - 1968	595 - 935	293 - 484	239 - 361	124 - 203	FA 12*	7035
1714 - 2971	819 - 1408	436 - 726	360 - 544	185 - 305	FA 13*	5010
2400 - 4176	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

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

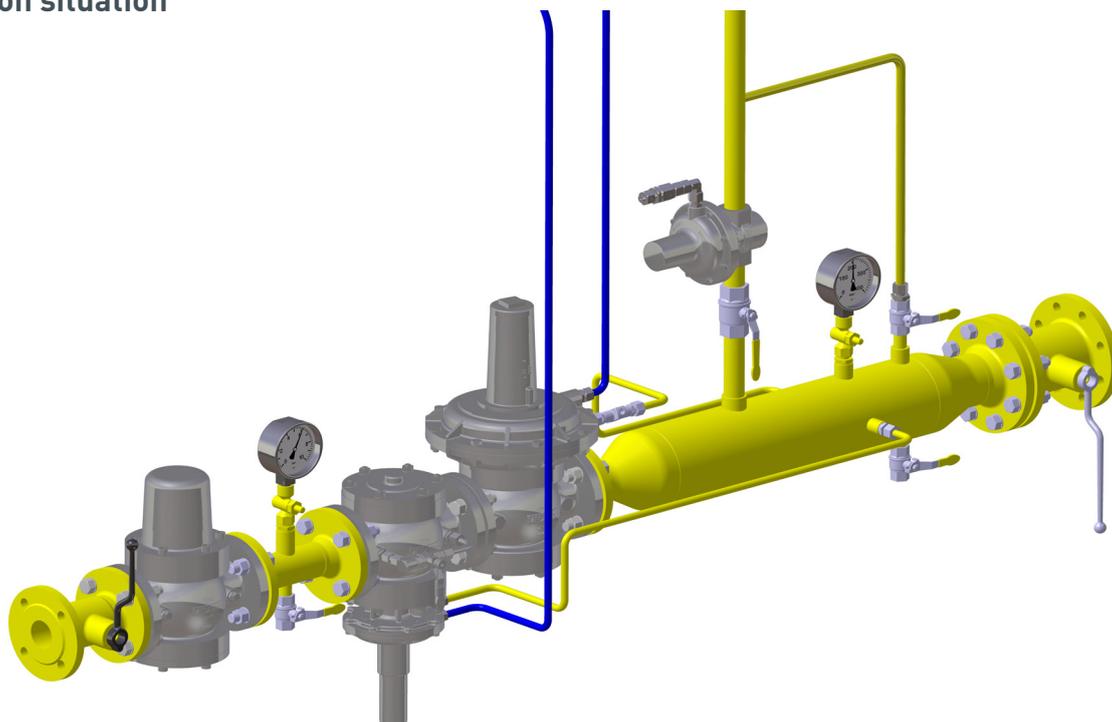
*) with high-pressure screw spindle

Dimensions, Connection and Weight

Dimensional drawing



Installation situation



Dimensions and weight

Nominal size		R 101					
		RE	DN 25	DN 40	DN 50	DN 65	DN 100
Dimensions	A [mm]	160	356	356	-	-	-
		205	364	364	408	376	-
		275	-	-	408	376	661
		320	346	346	-	-	-
		385/390	-	-	408	376	661
		485	-	-	-	-	661
	HDS [mm]		125	125	125	125	205
	B [mm]		84	84	115	101	188
	L [mm]		160	160	250	220	350
	X [mm]		210	210	210	210	410
	Z [mm]		32,5	32,5	32,5	32,5	32,5
Weight [kg]		160	6,5	7,5	-	-	-
		205	8	9	16	16	-
		275	-	-	18	18	38
		320	10,5	11	-	-	-
		385/390	-	-	22	22	43
		485	-	-	-	-	53
Safety diaphragm - SM - Weight [kg]		205	2	2	2	2	-
		275	-	-	3	3	3,3
		320	3	3	-	-	-
		385/390	-	-	5	5	6
HDS - Weight [kg]		0,6	0,6	0,6	0,6	1,6	
Connection		DIN 1092 - PN16					

Example:

R101/050/390 with HDS and safety diaphragm

Weight (regulator + HDS + SM): $16\text{kg} + 0,6\text{kg} + 5\text{kg} = 21,6\text{kg}$

Dimensions (A + HDS + SM): $408\text{mm} + 125\text{mm} + 32,5\text{mm} = 565,5\text{mm}$

Dimensions, Connection and Weight

R 101: Connection of the measuring lines and breather lines

Nominal size	control unit	
	Measuring line	Breather line
DN 025		
DN 040	Connection* for: Tube 12 x 1.5 (thread G 3/8)	
DN 050		
DN 065		
DN 100		

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 R 101

The gas pressure regulators R 101 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

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

Hinweis: Alle Berechnungsdrücke sind Absolutdrücke.

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:

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

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

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

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

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

R 101 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)

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

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 $\varnothing = 32.5$)

$$p_{f \max} = 500 \cdot (1 + 10 / 100) = 550 \text{ mbar}$$

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

Selected widening of outlet pipeline: 150 mm

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

$$w_d = 380 \cdot 1500 / (50^2 \cdot 1,5) = 152 \text{ m/s}$$

$$w_{\text{impuls}} = 380 \cdot 1500 / (150^2 \cdot 1,5) = 17 \text{ m/s}$$

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

Order data

Example:

Gas pressure regulator: R101/050/205/32,5/HDS/links/SR/SM/RSD/WAZ/So

	Order code:	R 101	050	-	205	32,5	HDS	links	SR	SM	RSD	WAZ	So
Order selection	Designation												
Type													
R 101	R 101	R 101											
DN - Nominal size	Table p.14		050										
Flange model													
PN 16	-			-									
RE - Control unit	Table p.15				205								
D - Orifice (valve seat diameter)	Table p.15					32,5							
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		
Acceptance test certificate to EN 10204/3.1													
without	-												
with acceptance test certificate	WAZ											WAZ	
Special model	So*												So

DN - Nominal size

Regulator type	025	040	050	065	100
R101	X	X	X	X	X

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

So*) e.g.:

- Coating with epoxy resin in RAL colours
- Oxygen model

RE - Control unit

Regulator type	Nominal size	Description	Outlet pressure ranges [mbar]	Recommended use of the high-pressure screw spindle in the pressure range [mbar]
R101	DN 25	mit RE 320	22 - 200	200 - 800
		mit RE 205	200 - 750	750 - 1.200
		mit RE 160	750 - 1.200	-
	DN 40	mit RE 320	22 - 200	200 - 800
		mit RE 205	200 - 750	750 - 1.200
		mit RE 160	750 - 1.200	-
	DN 50	mit RE 390	22 - 130	130 - 450
		mit RE 275	130 - 400	400 - 1.100
		mit RE 205	400 - 750	750 - 1.200
	DN 65	mit RE 390	22 - 130	130 - 450
		mit RE 275	130 - 400	400 - 1.100
		mit RE 205	400 - 750	750 - 1.200
	DN 100	mit RE 485	22 - 150	150 - 450
		mit RE 385	150 - 350	350 - 850
		mit RE 275-2	350 - 850	850 - 1.200

D - Orifice (valve seat diameter)

Regulator type	Nominal size	17,5	27,5	32,5	42,5	52,5	65	95
R101	025	X	X					
	040	X	X	X				
	050			X	X	X		
	065			X	X	X		
	100						X	X

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If you want to know more about our products and services, please contact your local representative or visit our website at www.medenus.de/en.



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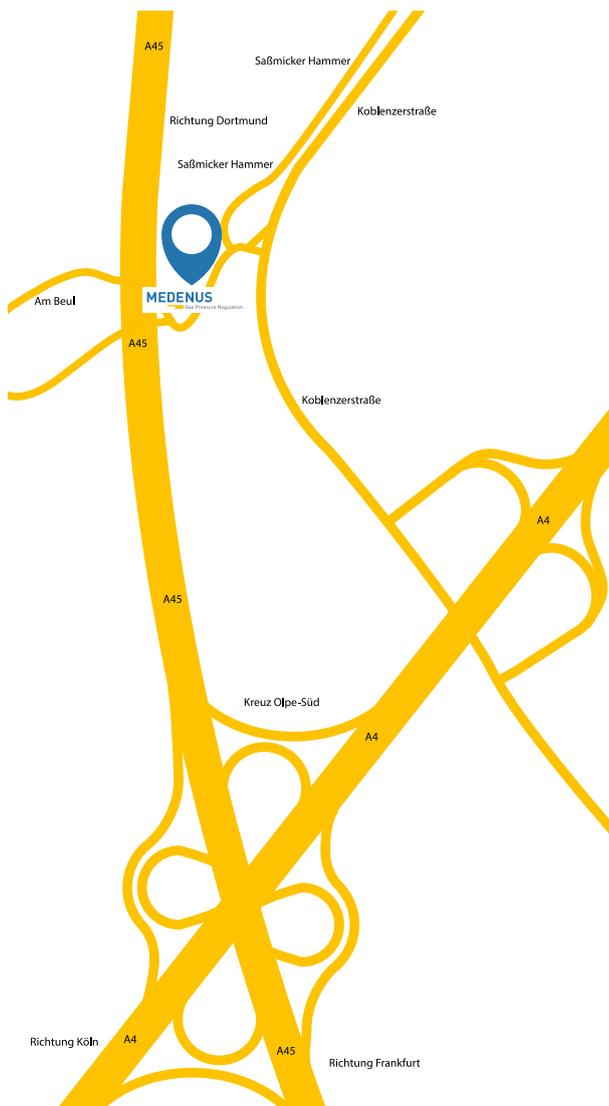
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