

MEDENUS

Gas Pressure Regulation



Gas pressure regulator R 100 / R 100U

Product information

EN

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List of abbreviations and formula symbols

AC	Accuracy class	RE	Control unit
HDS	High-pressure screw spindle	BV	Breather valve
K_G	Value	SG	Closing pressure group
p_d	Outlet pressure	t_u	Gas inlet temperature
p_{ds}	Setpoint of the response pressure	VS	Valve seat
PS	Maximum allowable pressure	w_d	Outlet gas velocity
p_u	Inlet pressure	w_u	Inlet gas velocity
Q_n	Standard volumetric flow rate	ρ_n	Gas density

*) 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 for gas consumption systems according to Regulation (EU) 2016/426.

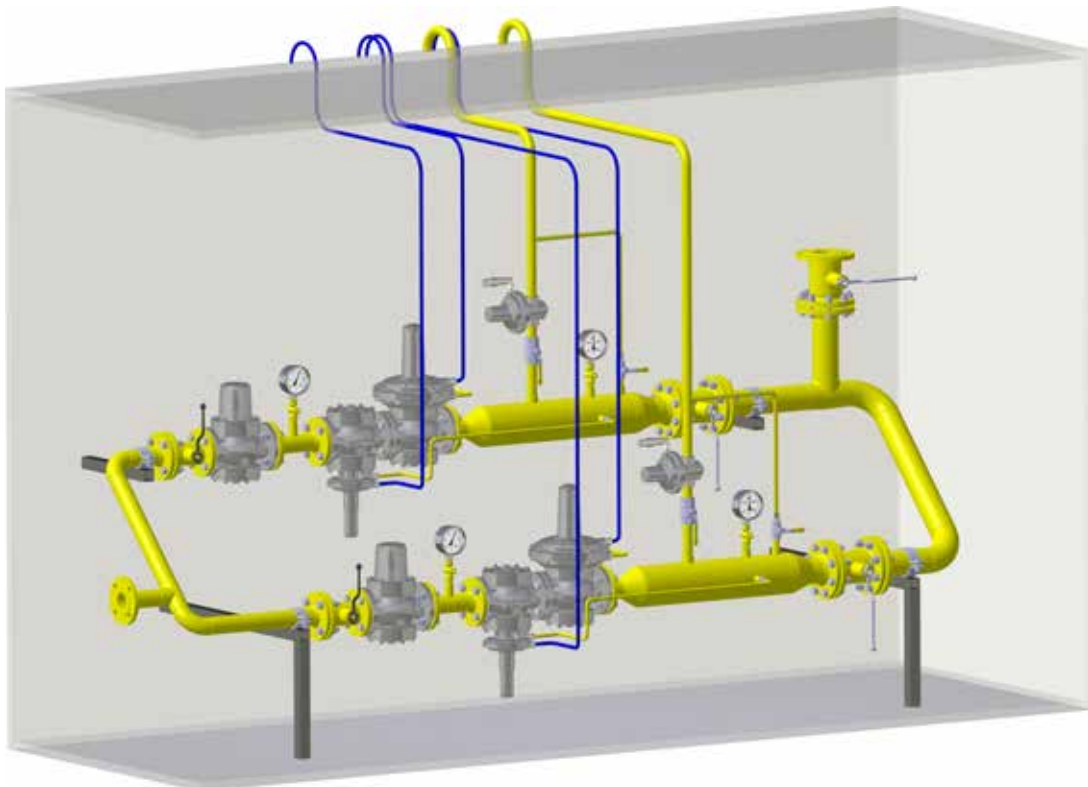
Can be used for the gases defined in DVGW - work sheet G 260 / G 262 and neutral non aggressive gases. (other gases on request)

Characteristics

- Integral pressure-tight model (IS)
- Pilot pressure-compensated double-seat valve
- High flow rate capacity
- outdoor version as standard

Type of model (options)

- with throttle valve (RSD) for the impulse line on the control units
- Oxygen model
- with FKM sealings + stainless steel seat (e.g. for biogas applications)
- Coating with epoxy resin in RAL colours



double gas train

Technical Data

Type	R 100 / R 100 U
Model	Integral pressure-tight (IS)
Max. allowable pressure PS	8 bar
Max. inlet pressure $p_{u,max}$	R 100: 8 bar / R 100 U: 1.2 bar
Nominal size	R 100: DN 50, DN 80, DN 100, DN 150, DN 200
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 10

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
8 mbar to 22 mbar	10	50
> 22 mbar to 1200 mbar	10	20

Function, Strength and Tightness	DIN EN 334
CE mark acc. to PED/ PIN number	CE-0085-AQ0410

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.
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*) DN 200 flange - DIN EN 1092 PN 10

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

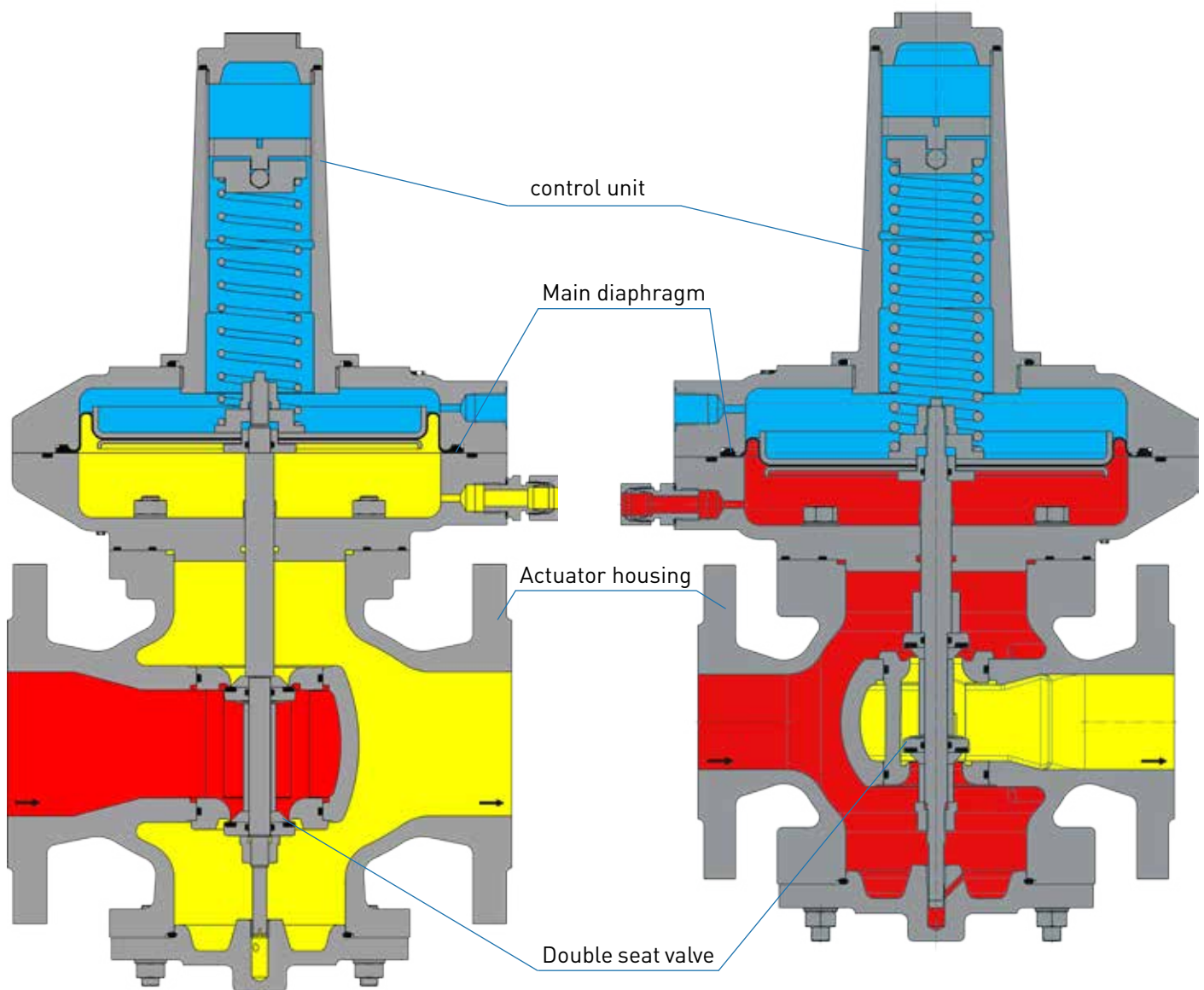
The categories C1 to C5-I including guaranteed without additional coatings.
For the category C5-M a coating with epoxy resin is recommended.



Application, Characteristics, Technical Data

Design and Function R 100

The spring-loaded gas pressure regulator R 100 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 double-seat valve seat model is pre-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.



shown R 100

shown R 100 U

Design and Function R 100 U

The spring-loaded gas pressure regulator R 100 U have the function of keeping the inlet pressure of a gaseous medium constant within allowable limit values, independently of the effect of interferences, such as changes in the outlet pressure and/or in the gas train, in the connected regulation section on the inlet side. The gas pressure regulator is composed of the actuator housing and the "control unit plus actuator" functional unit. The double-seat valve seat model is pre-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 inlet 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.

Options

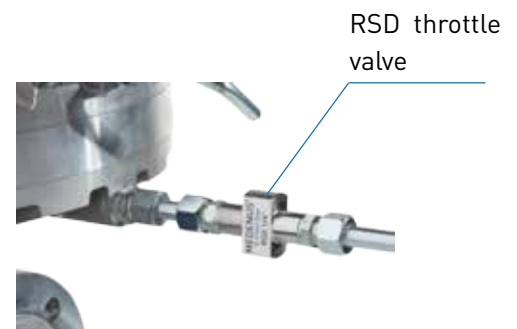
Safety diaphragm

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.



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).



Application, Characteristics, Technical Data

K_G^* value and control unit

	R 100					R 100 U				
	DN 50	DN 80	DN 100	DN 150	DN 200	DN 50	DN 80	DN 100	DN 150	DN 200
Nominal size	DN 50	DN 80	DN 100	DN 150	DN 200	DN 50	DN 80	DN 100	DN 150	DN 200
control unit \varnothing	160	160	160	275-2	275-2	160	160	160	275-2	275-2
	275	275	275	385	385	275	275	275	385	385
Valve seat \varnothing	390	390	390			390	390	390		
27.5 - 27.5 mm	800					1100				
32.5 - 32.5 mm		1500					1700			
42.5 - 42.5 mm			2400					3200		
45.0 - 50.0 mm		2500					3400			
60.0 - 65.0 mm			4700					6000		
65.0 - 65.0 mm				5200					7000	
90.0 - 90.0 mm					10000					11000
95.0 - 100.0 mm				12000					13500	
125.0 - 130.0 mm					20200					25000
Connection	DIN EN 1092 - PN16**									

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

***) DN 200 flange - DIN EN 1092 PN10

Application, Characteristics, Technical Data

Control unit setpoint spring table* R 100 / R 100 U

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

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

Dimensions and weight

Nominal size		R100 / R100 U					
		RE	DN 50	DN 80	DN 100	DN 150	DN 200
Dimensions	A [mm]	160	398	421	433	-	-
		275	372	395	407	694	724
		385/390	372	395	407	647	677
	HDS [mm]		125	125	125	205	205
	B [mm]		115	138	150	195	245
	L [mm]		250	280	300	380	420
	X [mm]		260	260	260	410	410
Weight [kg]		160	14	16	19	-	-
		275	17	19	22	62	60
		385/390	19	22	25	65	64
Safety diaphragm - SM		275	3	3	3	3,3	3,3
- Weight [kg]		385/390	5	5	5	6	6
HDS - Weight [kg]			0.6	0.6	0.6	1.6	1.6
Connection			DIN EN 1092 - PN16*				

Example:

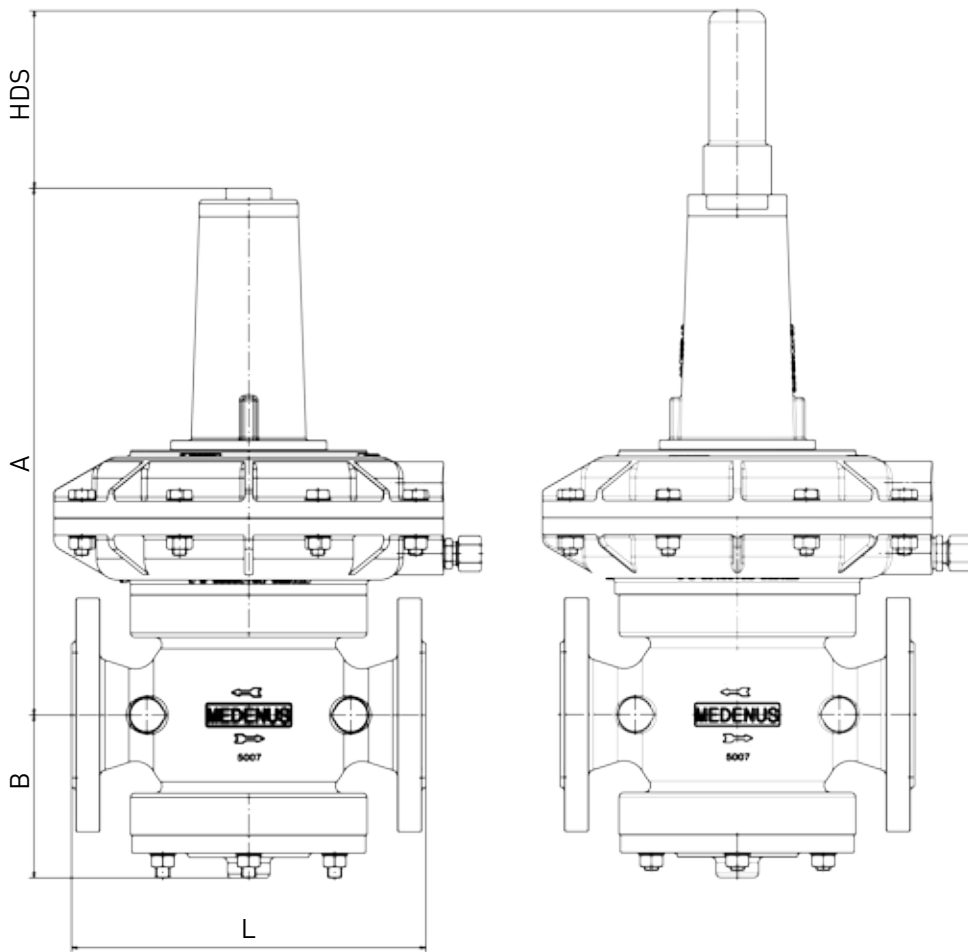
R100/050/390 with HDS and Safety diaphragm

Weight (regulator + HDS + SM): $19\text{kg} + 0,6\text{kg} + 5\text{kg} = 24,6\text{kg}$

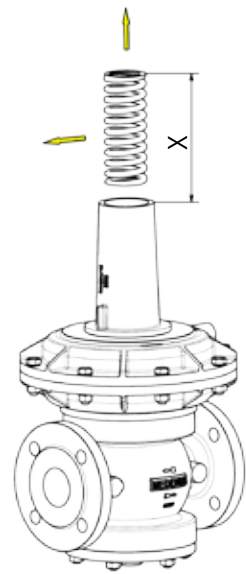
Dimensions (A + HDS + SM): $372\text{mm} + 125\text{mm} + 32,5\text{mm} = 529,5\text{mm}$

*) DN 200 flange - DIN EN 1092 PN10

Dimensional drawing



Dismounting dimensions for springs / HDS



Installation situation



Dimensions, Connection and Weight

Connection of the measuring lines and breather lines

Nominal size	control unit	
	Measuring line	Breather line
DN 050		
DN 080	Connection* for: Rohr 12 x 1.5 (thread G 3/8)	
DN 100		
DN 150		
DN 200		

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 100 / R 100 U

The gas pressure regulators R 100 and R 100 U 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

The standard flow rate value for a completely open actuator ($p_u = 2$ bar; $p_d = 1$ bar) corresponds to the K_G value.

The K_G value refers to natural gas of density 0.83 kg/m^3

at 15°C . For other gases, a flow rate equivalent to that of natural gas is to be expected.

$$Q_{n \text{ natural gas}} = Q_{n \text{ gas}} / \sqrt{(0.83 / \rho_{n \text{ gas}})}$$

Valve flow rate coefficient K_G at a sub-critical pressure ratio

$$p_d / p_u > 0.5$$

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

K_G value at a super-critical pressure ratio

$$p_d / p_u \leq 0.5$$

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

Note: all calculated pressures are absolute pressures.

Device selection

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

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

Checking the gas velocities

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

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

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

Example:

$$\begin{array}{l} p_u \text{ min } 5 \text{ bar} \quad / \quad p_u \text{ max } 8 \text{ bar} \\ p_{ds} 0.5 \text{ bar} \quad / \quad Q_n 2500 \text{ m}^3/\text{h} \end{array}$$

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

$$K_G = 2 \cdot 2500 / 6 = 833 \text{ (m}^3/\text{h)/bar}$$

R 100 DN 80 VS 32.5 - 32.5
 K_G value: 1500 (m³/h)/bar

Inlet and outlet nominal size of the pipeline according to the selected device: 80 mm

Selected widening of outlet pipeline: 200 mm

$$w_u = 380 \cdot 2500 / (80^2 \cdot 6) = 24.7 \text{ m/s}$$

$$w_d = 380 \cdot 2500 / (80^2 \cdot 1.5) = 99 \text{ m/s}$$

$$w_{\text{impulse}} = 380 \cdot 2500 / (200^2 \cdot 1.5) = 16 \text{ m/s}$$

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

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)

Order data

Example:

Gas pressure regulator: R100/050/205/32,5/HDS/links/SM/RSD/WAZ/So

Order selection	Designation	R100	050	-	205	32,5	HDS	links	SM	RSD	WAZ	So
Typ												
R 100	R 100	R100										
R 100 U	R 100 U											
DN - Nominal size	Table p. 15		050									
Flange model												
PN 16	-			-								
Class 150	C											
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				
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

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

So*) e.g.:

- Coating with epoxy resin in RAL colours
- BV breather valve
- Oxygen model
- FKM sealings + stainless steel seat

DN - Nominal size

Regulator type	050	080	100	150	200
R100 / R100U	X	X	X	X	X

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]
R100 / R100U	DN 50 DN 80 DN100	with RE 390	130 - 450	8 - 130
		with RE 275	450 - 1,100	130 - 450
		with RE 160		450 - 1,200
	DN 150 DN 200	with RE 385	350 - 850	8 - 350
		with RE 275	850 - 1,200	350 - 850

D - Orifice (valve seat diameter)

Regulator type		R100 / R100 U				
Valve	Nominal size	050	080	100	150	200
	27.5-27.5		X			
32.5-32.5			X			
42.5-42.5				X		
45-50			X			
60-65				X		
65-65					X	
90-90						X
95-100					X	
125-130						X

Contact

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