MEDENUS

Gas Pressure Regulation

MADE IN GERMANY

100% Wasserstoff geeignet

H_2

100% Hydrogen ready

Gas Pressure Regulator R 50

Product information

EN

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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 R50

List of abbreviations and formula symbols

AC	Accuracy class	PS	Maximum allowable pressure	t_u	Gas inlet temperature
HDS	High-pressure spindle	p_u	Inlet pressure	VS	Valve seat
K_G	Valve flow rate coefficient	Q_n	Standard volumetric flow rate	w_d	Outlet gas velocity
p_d	Outlet pressure				
p_{ds}	Setpoint of the response pressure	RE	Diaphragm assembly	w_u	Inlet gas velocity
		SG	Closing pressure group	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 sheet G 491 (A) and G 600 (A) (TRGI). Particularly suitable for dynamic regulation sections (e.g. natural gas supply systems, low flow regulators, gas fireplaces, burner circuits, gas motor operation). 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)
- Diaphragm assembly with internal measuring line

Type of model (options) (see page 8)

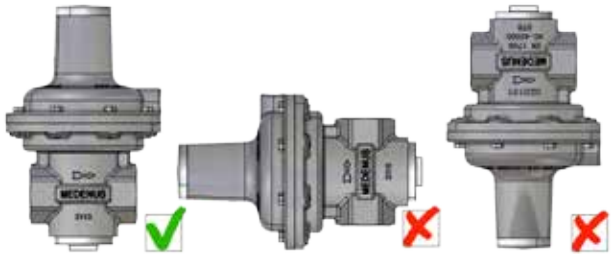
- Oxygen model
- Hydrogen model
- Coating with epoxy resin in RAL colors

Technical data

Type	R 50
Model	Integral pressure-tight (IS)
Max. allowable pressure PS	5 bar
Max. inlet pressure $p_{u,ma}$	3 bar
Nominal width	Rp 1“ (DN 25), Rp 1½“ (DN 40), Rp 2“ (DN 50) (NPT thread on request)
Type of connection	Internal thread acc. to EN 10226-1
Material Housing / actuator housing	Al - cast alloy
Corrosivity category C1 to C5-I C5-M	DIN EN ISO 12944-2 without additional coatings an epoxy resin coating is recommended
Temperature range, Class 2 (operating/ambient temperature)	-20°C to +60°C
Function, strength and tightness	DIN EN 334
CE mark acc. to PED/ PIN number	CE-0085-BR0220
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.

Preferred installation position

The gas pressure regulators R50 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.



Only after consultation with Medenus GmbH

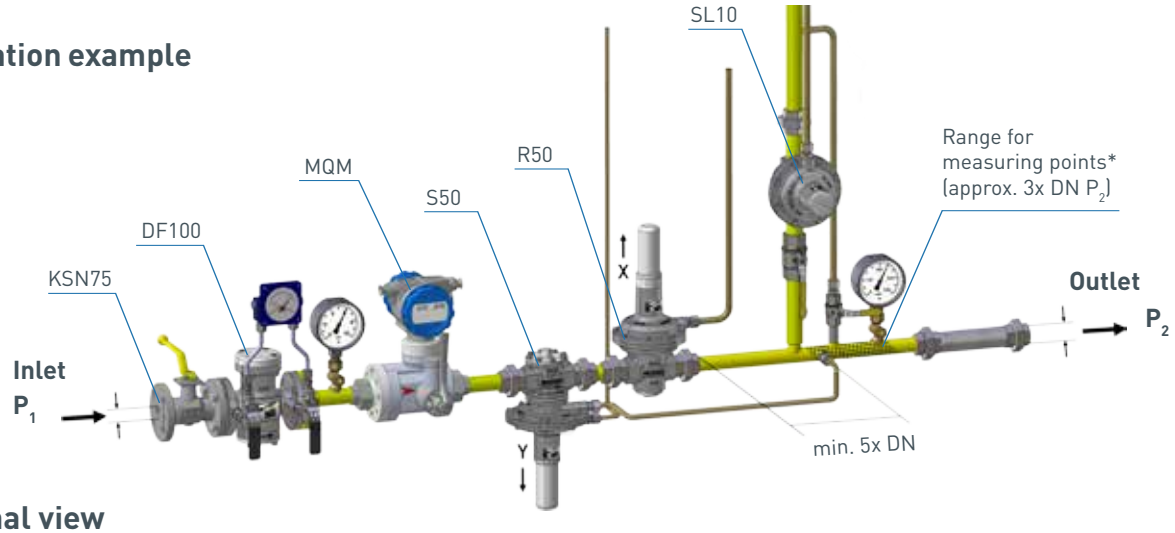
Note: Observe the following documents in relation to installation, start-up, and maintenance:

- DVGW - work sheets G 491 and G 600
- Operating and Maintenance Instructions R50

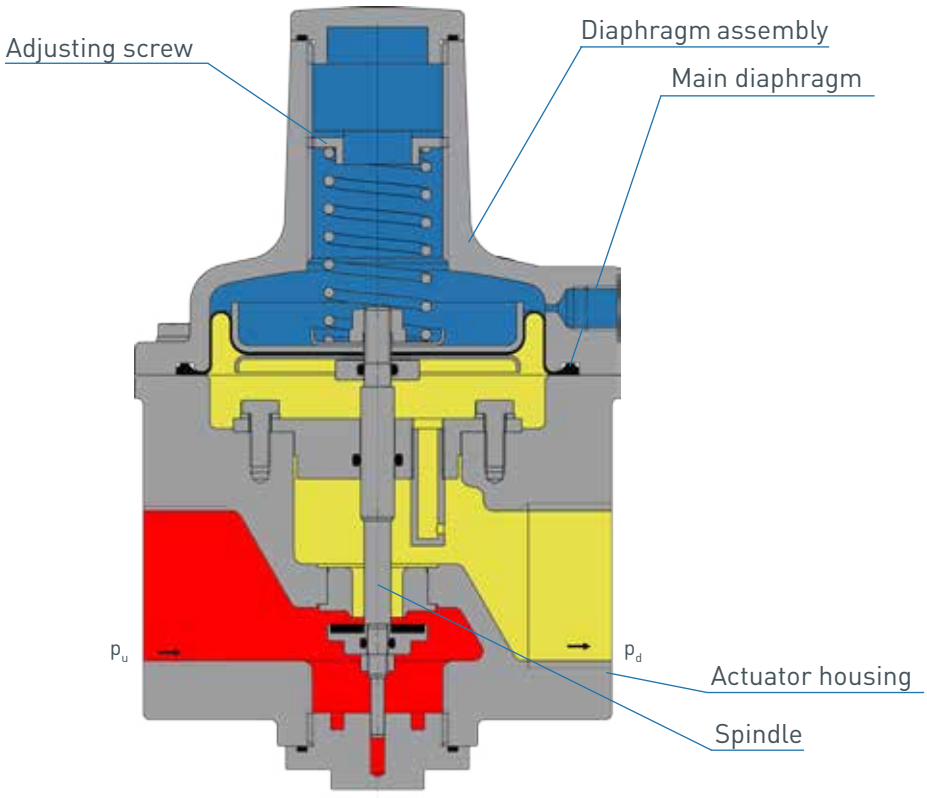
Structure and function

The spring-loaded gas pressure regulator R 50 has the function of keeping the outlet pressure of a gaseous medium constant within permissible limit values, independently of the effect of interferences, such as e.g changes in the gas tap, in the connected regulation section on the outlet side.
Due to the absence of an intermediate diaphragm, the gas pressure regulator is not independent of upstream pressure if the inlet pressure is inconstant. The gas pressure regulator is composed of the actuator housing and the "diaphragm assembly plus actuator" functional unit.
The gas flows through the actuator housing in the direction of the arrow. The internal measurement line port is used to pass the outlet pressure to be regulated to the bottom of the main diaphragm of the diaphragm assembly. 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.

Installation example



Sectional view



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

Valve seat diameter, measuring unit diameter

Nominal width	Connection	Valve seat Ø (mm)	Flow rate coefficient K_G* [(m³/(h*bar)]	Diaphragm assembly
DN 25	Rp 1	11.0 / 15.0 / 20.0	70/120/200	160
DN 40	Rp 1½	15.0 / 25.0	120/380	160
DN 50	Rp 2	15.0 / 25.0	120/380	160

Setpoint spring

Note

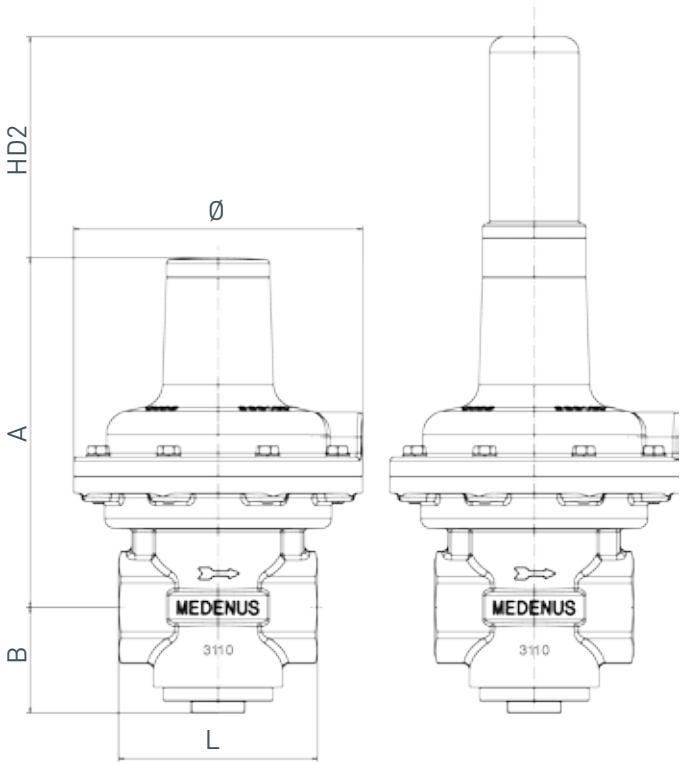
The setpoint spring ranges for the gas pressure regulator R 50 depend on the initial pressure.
For more detailed information, please contact the company MEDENUS Gas-Druckregeltechnik GmbH.
The contact data are given on page 11.

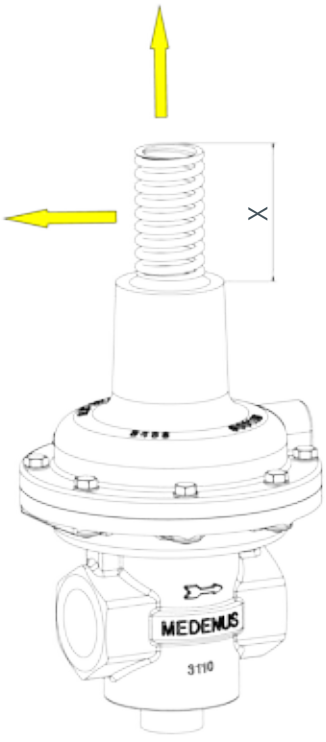
Dimensions, Connection, and Weight

Dimensions and weight

Nominal width DN	Connection	Ø (mm)	A (mm)	B (mm)	L (mm)	HD2 (mm)	X (mm)	Weight (kg)	Weight HD2 (kg)
25	Rp 1	145	173	53	100	112	180	2.5	0.4
40	Rp 1½	145	173	61	140	112	180	3.5	0.4
50	Rp 2	145	173	61	160	112	180	3.5	0.4

Dimensional drawing





Example:

R50/Rp 1“ with HD2

Weight (GDR + HD2):
2.5kg + 0.4kg = 2.9kg

Dimensions (A + HD2):
173mm + 112mm = 285mm

Types of Models / Options

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 model O_2

Hydrogen model 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. (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

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

$p_d / p_u \leq 0.5$
Value 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
$Q_{n\ min}$	200 m³/h	

1.5 bar /6 bar = 0.25 < 0.5
→ Supercritical pressure ratio
$K_G = 2 \bullet 200 / 6 = 67$ m³/(h*bar)

Device selection

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 6)

Selected device

Type	R50
DN - Nominal width	25
D - Nozzle	V 11
K_G value	175 m³/(h*bar)

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

Nominal width of input and output of pipeline according to the selected device: 25 mm
Selected widening of outlet pipeline: 50 mm

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

$w_u = 380 \bullet 200 / (25^2 \bullet 6) = 20$m/s

Recommended max. gas velocity at the outlet flange:
100 - 200 m/s lower value to reduce noise emissions

$w_d = 380 \bullet 200 / (25^2 \bullet 1.5) = 81$ m/s

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

$w_{Impulse} = 380 \bullet 200 / (50^2 \bullet 1.5) = 20$ m/s

The device selected in the example of nominal width DN 25 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)**

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 from 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	-			

Notes

Order Data

Example:

	Gas pressure regulator:	R50/Rp1"/160/11/HDS/WAZ/So						
	Order code:	R50	Rp1"	160	11.0	HDS	WAZ	So
Order selection	**Designation**							
Type								
R50	R50	R50						
DN - Nominal width	Table p. 9		Rp1"					
RE - Diaphragm assembly	160			160				
D - Nozzle (valve seat diameter)	Table p. 9				11.0			
High-pressure spindle								
without high-pressure spindle	-							
with high-pressure spindle	HDS					HDS		
Acceptance test certificate to EN 10204/3.1								
without acceptance test certificate	-							
with acceptance test certificate	WAZ						WAZ	
Special model - Coating with epoxy resin in RAL colors - Oxygen model	So							So

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

Notes

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Trade representation worldwide
medenus.de/de/kontakt.html

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Notes

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Notes

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