RMG Group Catalogue

Serving the Gas Industry Worldwide

RMG

by Honeywel

Preface and notes to the 14th edition

Preliminary remarks

The latest (14th) edition of RMG's "Pocket Book" offers an update on information and products covering gas-pressure control technology and gas safety and measurement engineering. This book a popular, indispensable tool for those who encounter gas pressure regulators and measuring devices in their daily work. The RMG Pocket Book contains important technical parameters and explanations of underlying theory. All data and indications stated were valid on the day of publication. However, RMG reserves the right to change parameters without further notice.

Note for planners:
Use the Pocket Book, CD-ROM and RMG website (www.rmg.com) for a provisional pre-selection of RMG products. For more detailed information, go to www.rmg.com/produkte.html or www.rmg.com/download.html. If you still need additional information, ask for our brochures.
There are Technical Product Information brochures for all products containing a functional description, dimensional details, measuring-line connection sizes, etc.
For example, the brochure RMG 402 is titled: Technical Product Information – Gas Pressure Regulator (Also see pdf files on CD-ROM and the web).
In addition please utilize the information and installation guidelines contained in our General Operating Manual for Gas Pressure Regulators and Safety Devices.

Please do not hesitate to contact our engineers should you have any additional questions. Did you know that RMG organises technical seminars to help customers extend their technical knowledge?
We wish you success in all your dealings with the latest edition of the RMG Pocket Book.

April 2010

Disclaimer

RMG Regel + Messtechnik GmbH shall not be held liable for typos.

SERVING THE GAS INDUSTRY WORLDWIDE

RMG by Honeywell

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PLANT CONSTRUCTION

The RMG GROUP

RMG is your worldwide leading partner in the gas industry. We offer our customers competence along the entire gas supply chain.

Our reliable products and systems enable you to exercise full control over your regulating and measuring needs. We design and build stations according to your requirements and provide reliable station automation – all from a single source.

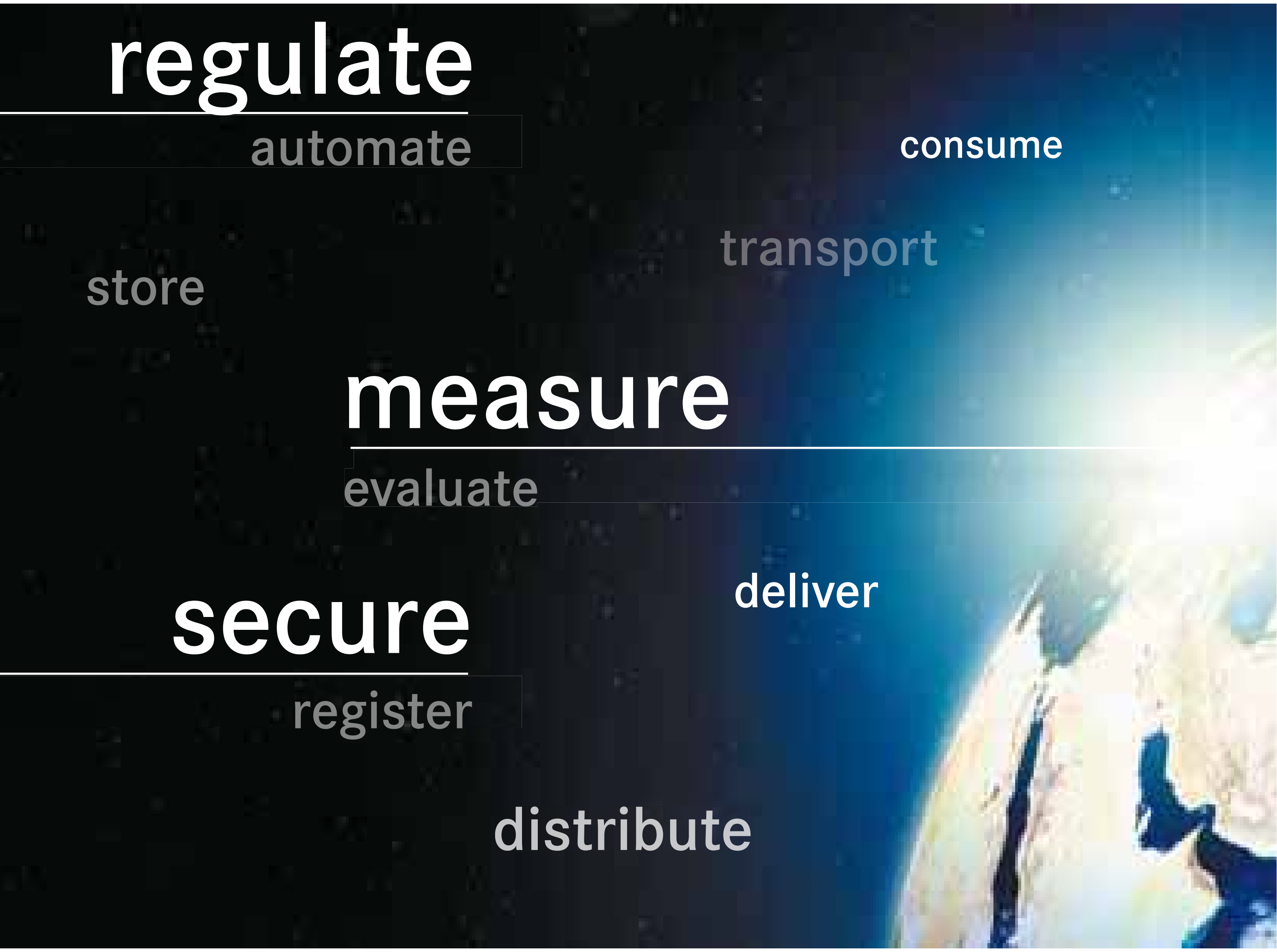
Furthermore, RMG can offer complete solutions for everything from gas filling stations to turbo expanders (energy recycling).

Key Figures

- Over 150 years experience in the gas business
- Over 7,000 active customers worldwide
- Partners in almost 100 countries in the world
- More than 1,200 employees worldwide

Head Office

- RMG Regel + Messtechnik GmbH, Germany



Subsidiaries

- Bryan Donkin RMG Gas Controls Ltd., England
- Bryan Donkin RMG Canada Ltd., Canada
- Gazomet Sp. z o.o., Poland
- Mercury Instruments LLC, USA
- RMG Gaselan Regel + Messtechnik GmbH, Germany
- RMG Messtechnik GmbH, Germany
- WÄGA Wärme-Gastechnik GmbH, Germany

Joint Ventures

- A.R.G Afcon RMG (Israel)
- RMG Atlas Pty. Ltd. (Australia)
- R.M.R. (Romania)
- RMG Autometers Gas Ltd. (India)
- RMG Gaz Kontrol Sistemleri (Turkey)
- RMG Imbema (Netherlands)
- SRI-Sociedade (Brasil)

Sales Offices & Partners

The RMG GROUP is there for you in another 80 countries with our own sales offices or representatives.

Stations in the gas infrastructure

Gas regulating and measuring technologies play a central role in all pipeline stations. With increasing transport distances and the ever expanding concentration of regional transport networks, the demands on regulating and measuring technologies continue to grow. The RMG GROUP, with its leading position in the regulating and measuriement industry, has a considerable influence on the standards of the worldwide gas infrastructure.

1 Exploration and Delivery

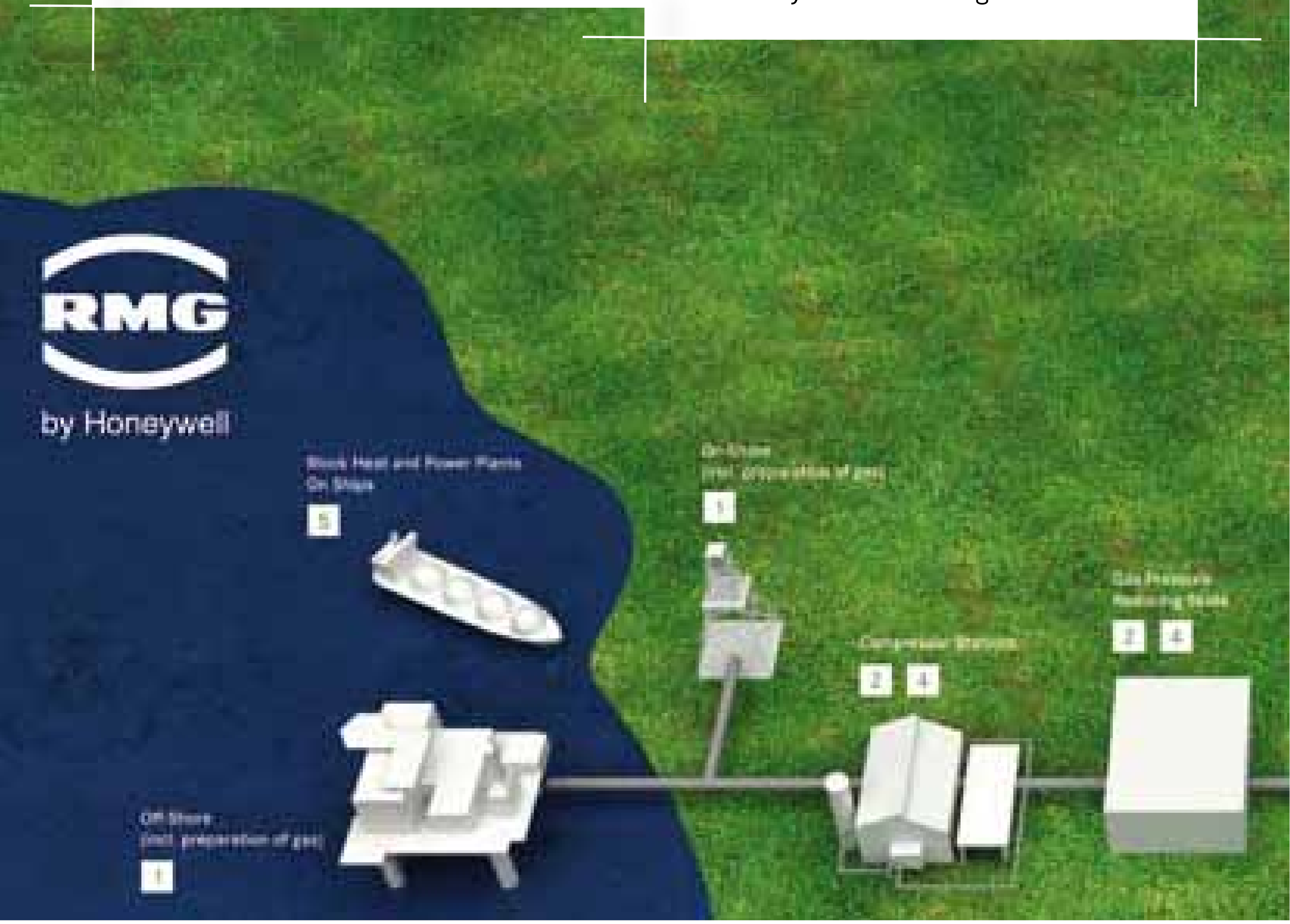
Natural gas comes from the well at high pressure and flows into reception stations. From the pressure stations, the products of the RMG GROUP ensure the control of the required pressure level and the preset flow volume. In the reminder of the subsequent supply chain, the RMG GROUP has the right solution for every conceivable regulating and measuring need.

2 Transportation

In order to use the millions of kilometres of transportation network worldwide (installed at a cost of billions of dollars) as efficiently as possible, natural gas needs to be compressed and then decompressed again and again as necessary along the pipeline.
The quality and accuracy afforded by RMG products - supplemented by sophisticated RMG automation technology - completely fulfills these needs.

3 Storage

In order to ensure a high level of security for the end user, underground storage is increasingly being exploited locally with pressures of up to 250 bar.
The RMG GROUP, with its comprehensive range of products and systems and its vast experience in their application, can maximise the effectiveness of local storage.
In addition the RMG GROUP concentrates exclusively on the natural gas business.

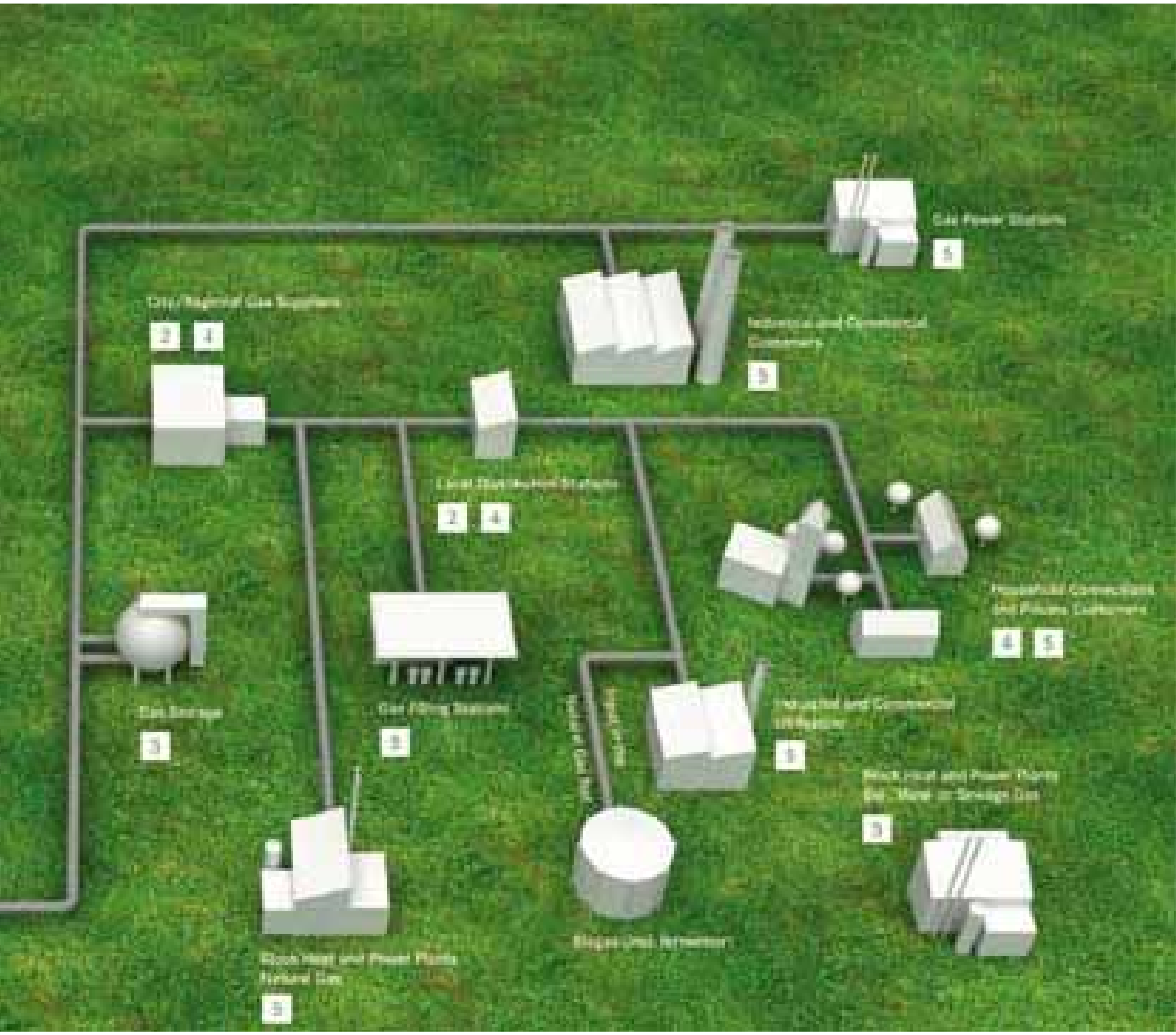


4 Distribution

Both at regional or citygate ‘offtakes’ and distribution feeds into the gas network, the broad RMG product line provides a reliable solution for pressure reduction, flow control, pre-heating, and volume/quality measurement, as well as the provision of data logging and communication. In addition, the RMG turbo expanders (energy recycling) help in using the existing energy potential of natural gas in an environmentally-friendly way.

5 Utilisation

The last step in the process is delivery to industrial and commercial customers as well as private households. For these applications the RMG GROUP offers comprehensive pressure regulation and metering solutions.
In addition, the RMG GROUP supplies the gas industry with gas trains, gas mixers, butterfly valves and flame arrestors. This can include for example, gas engines in block heat and power plants, which can be powered by natural, bio, mine or sewage gas.



Calculating the flow rate coefficient K_G

One of the most important parameters for selecting RMG devices is the so-called flow rate coefficient K_G.

The K_G value is defined in standards DIN EN 334 and DIN EN:
The K_G value is equal to the standard flow rate with the final control element fully open and the absolute inlet pressure p_u = 2 bar and absolute outlet pressure p_d = 1 bar.
For natural gas it is ρ_b = 0.83 kg/m³ at t = 15 °C. It is measured in m³/(h · bar).

The diagram on p. 25 will help in using the following operating parameters:

Min. inlet pressure	$p_{u\,min}$	in bar
Max. outlet pressure	$p_{d\,max}$	in bar
Max. standard flow rate	$Q_{b\,max}$	in m³/h

to determine the required valve flow rate coefficient K_G. It is based on the following equations:

Valve flow coefficient K_G at sub-critical pressure ratio

$$\frac{p_d}{p_u} \geq 0.5 \quad \text{or} \quad \frac{\Delta p}{p_u} \leq 0.5$$

$$K_G = \frac{Q_b}{\sqrt{p_d \cdot (p_u - p_d)}} \quad \text{in m}^3/(\text{h} \cdot \text{bar})$$

Valve flow coefficient K_G at super-critical pressure ratio

$$\frac{p_d}{p_u} \leq 0.5 \quad \text{or} \quad \frac{\Delta p}{p_u} \geq 0.5$$

$$K_G = \frac{2 \cdot Q_b}{p_u} \quad \text{in m}^3/(\text{h} \cdot \text{bar})$$

Please note:
- The standard flow rate Q_b refers to natural gas at ρ_b = 0,83 kg/m³ at T_b = 273.15 K (t = 0 °C) and p_b = 1.01325 bar. The K_G value uses an operating gas temperature of 15 °C.
- When entering pressures into the equations, use absolute values (generally p + 1 bar). The values in the diagram, however, are gauge pressure.

NOTE Always make sure the flow rate coefficient of the gas pressure regulator you select is above the value you calculated, so that you can be sure there's always a reserve.
We recommend always selecting devices with a flow rate coefficient at least 10 % higher than the calculated value.

CAUTION For gas pressure regulators with internal measuring impulse connections, the downstream flow velocity (where the outlet pressure is measured) should not exceed approx. 25 m/s. For additional information see "Excerpt from the General Operating Manual – Layout Examples for Gas-pressure Control Systems".

ICA engineers often use the K_V value to indicate the flow capacity of a control element. This value is based on water (ρ = 1,000 kg/m³). The interdependency between K_V and K_G is ruled by the following equation:

$$K_G = 33{,}57 \cdot K_V \quad \text{in m}^3/(\text{h} \cdot \text{bar})$$

Converting standard flow rate Q_b to operating flow rate Q_m

In the following equations, use the units with the formula symbols:
standard flow rate Q_b in m³/h, **operating flow rate Q_m** in m³/h,
absolute pressure p in bar, **overpressure $p_ü$** in bar, **ambient pressure p_{amb}** in bar,
temperature at standard conditions T_b in K or **t** in °C

$$Q_m = \frac{p_b}{p} \cdot \frac{t + T_b}{T_b} \cdot Q_b \qquad \text{in m}^3/\text{h}$$

Using general values of $p = p_ü + p_{amb}$, p_b = 1.01325 bar, T_b = 273.15 K and t = 15 °C results in:

$$Q_m = \frac{1.01325 \cdot (15 + 273.15)}{273.15} \cdot \frac{Q_b}{p_ü + p_{amb}} = 1.069 \cdot \frac{Q_b}{p_ü + p_{amb}} \qquad \text{in m}^3/\text{h}$$

To simplify matters, ambient pressure is often set at approx. p_{amb} = 1 bar (≙ 0 – 200 m amsl approx.). This results (with sufficient accuracy) in an operating flow rate:

$$Q_m \approx \frac{Q_b}{p_ü + p_{amb}} \approx \frac{Q_b}{p_ü + 1} \qquad \text{in m}^3/\text{h}$$

For different elevations above mean sea level, use the standard atmospheric pressures indicated on p. 513 for satisfactory approximations of pressures values (p_{amb}). A simplified conversion of the operating flow rate Q_m to standard flow rate Q_b will then result in: $Q_b \approx (p_ü + 1) \cdot Q_m$ in m³/h

Calculation and selection of gas pressure regulators, safety devices and gas filters

When using **other types of gas,** determine the KG value using the equivalent natural gas flow rate:

$$Q_{b\ natural\ gas} = \frac{Q_{b\ gas}}{f} \quad \text{in } m^3/h$$

Conversion factor $f = \sqrt{0.83/\rho_{b\ gas}}$			
Acetylene	0.84	Sewage gas, ρ_b = 1.16 kg/m³, av. value	≈ 0.84
Ammonia	1.04	Carbon monoxide	0.81
Butane	0.55	Carbon dioxide	0.65
Chlorine	0.51	Air	0.8
Waste dump gas, av. value	≈ 0.8	Methane	1.08
Natural gas – L, ρ_b = 0.83 kg/m³	1	Propane	0.64
Natural gas – H, ρ_b = 0.783 kg/m³	1.03	Oxygen	0.76
Ethane	0.78	Sulphur dioxide	0.53
Ethylene	0.97	Nitrogen	0.81
Mine gas (30 % CH_4), av. value	≈ 0.86	Hydrogen	3.04
Helium	2.15		

Caution: The table contains a number of aggressive gases (i.e., gas types that may not be suitable for RMG's standard devices. Please contact RMG).

Example: (diagram on p. 25)

Assumptions:	Max.	Inlet pressure	$p_{u\ max}$	= 60 bar
	Min.	Inlet pressure	$p_{u\ min}$	= 10 bar
	Max.	Outlet pressure	$p_{d\ max}$	= 2 bar
	Max.	Required flow rate	$Q_{b\ max}$	= 10,000 m³/h

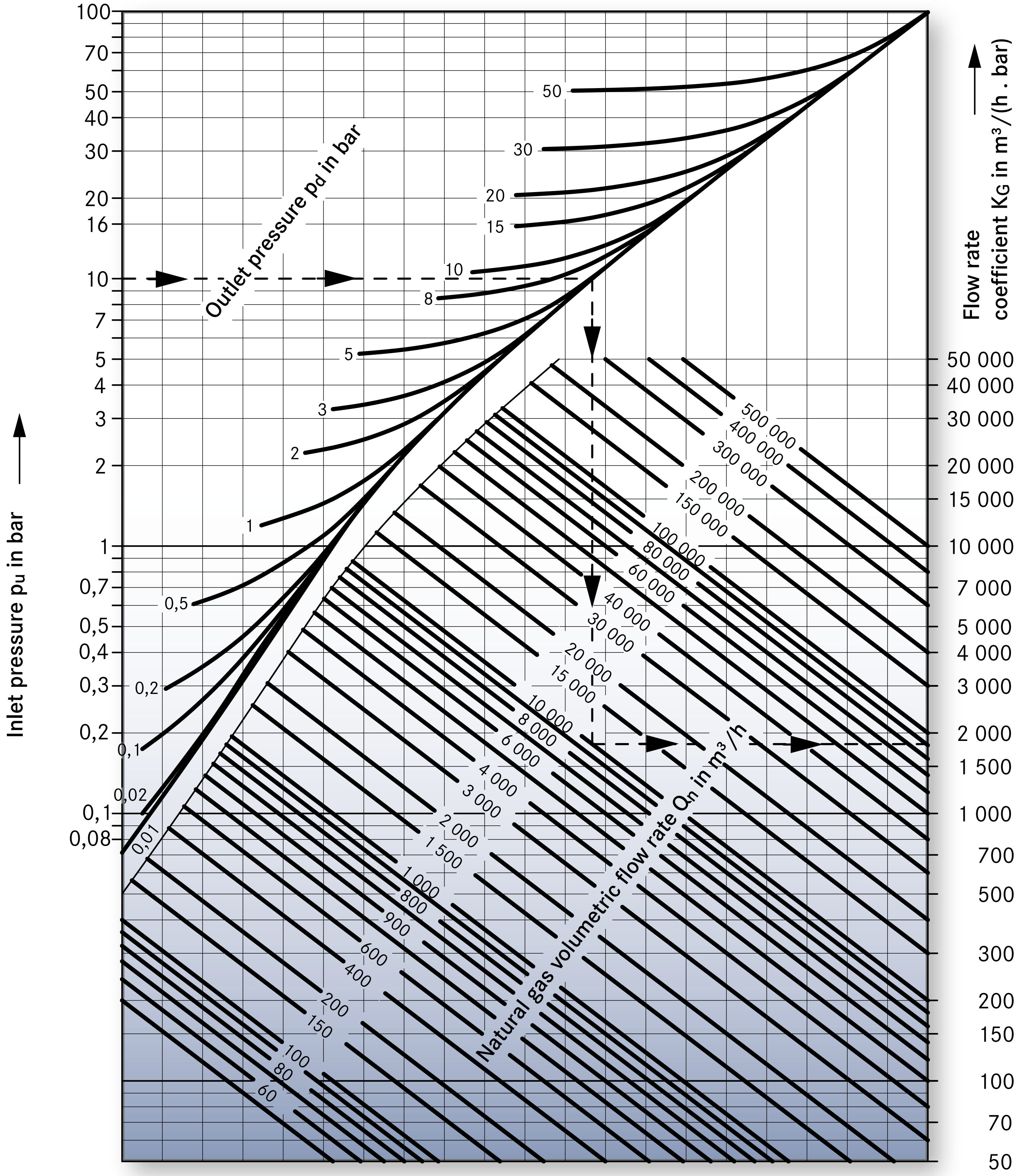
Results: Required flow rate coefficient K_G ≈ 1,800 m³/(h · bar)
Selection: Gas pressure regulator RMG 512- DN 50 at K_G = 2,200 m³/(h · bar)

$$\text{Max. load A} = \frac{K_{Greq}}{K_{Gdevice}} \cdot 100 = \frac{1,800}{2,200} \cdot 100 = 82\ \%$$

Note:
For safe operation, the gas pressure regulator selected must have a reserve of at least 10% above the calculated value.

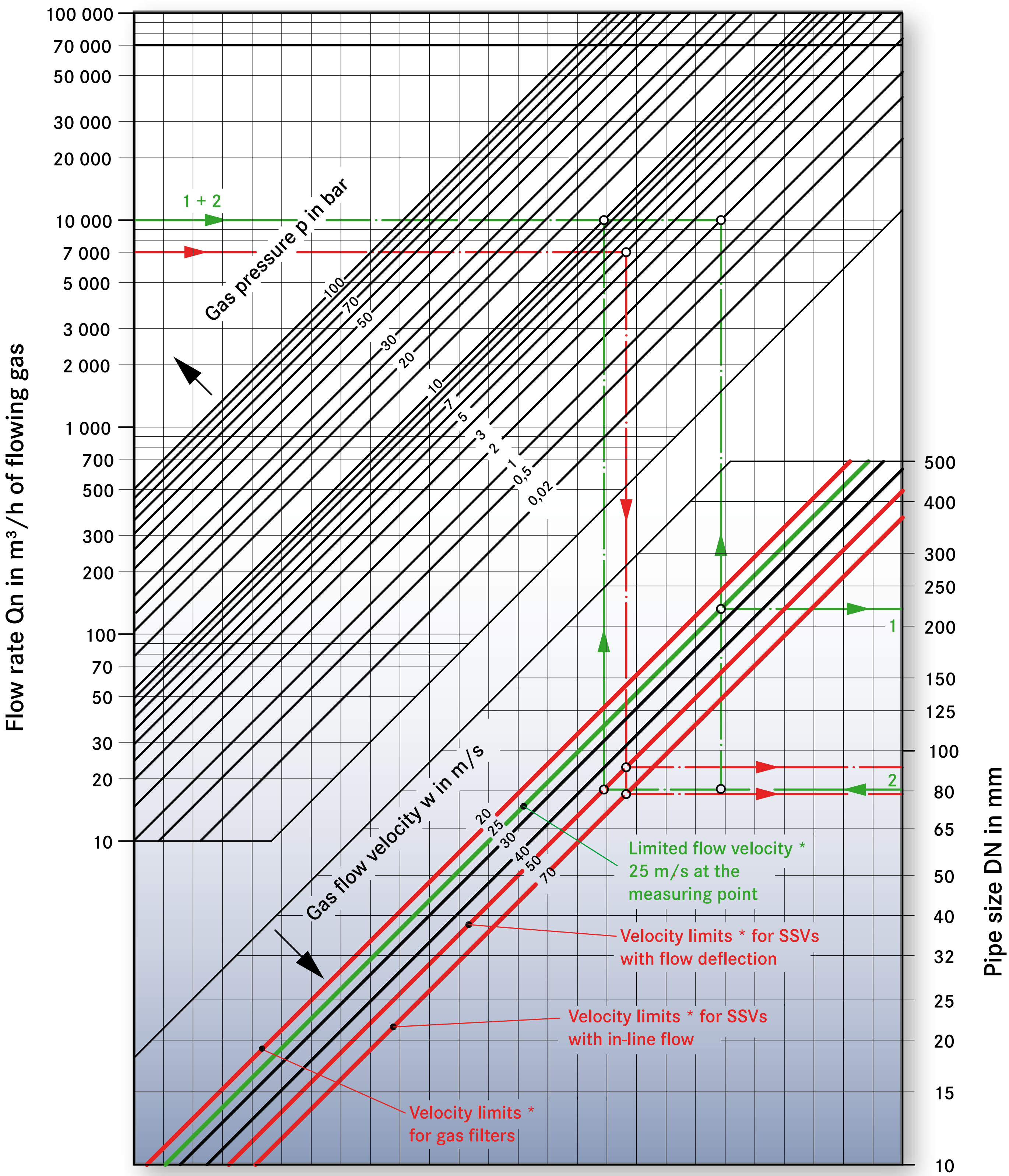
Calculation and selection of gas pressure regulators, safety devices and gas filters

Diagram for determining KG values for natural gas at ρ_b = 0.83 kg/m³ and t = 15 °C
(Pressures indicated are gauge pressure!)



Calculation and selection of gas pressure regulators, safety devices and gas filters

Diagram for determining pipe sizes DN (diameters of pipes)
(Important Note: Pressures indicated are gauge pressure)



* For different velocities, please contact RMG.

Determining the pipe size (Ø) and/or flow velocity

Example No 1: Determining the pipe size required at measuring point

Assumptions:	Max required flow rate	$Q_{b\ max}$	= 10,000 m³/h
	Gas pressure		
	Min. outlet pressure	$p_{d\ min}$	= 2 bar
	Flow velocity	w_{max}	= 25 m/s
Results:	Required pipe size at measuring point		DN 250

Example No 2: Determining inlet and outlet flow velocities at selected pipe size of a gas pressure regulator

Assumptions:	Max required flow rate	$Q_{b\ max}$	= 10,000 m³/h
	Gas pressure		
	Min. inlet pressure	$p_{u\ min}$	= 10 bar
	Max. outlet pressure	$p_{d\ min}$	= 2 bar
	Gas pressure regulator pipe size at inlet and outlet		DN 80
Results:	Inlet flow velocity	w	50 m/s approx.
	Outlet flow velocity	w	200 m/s approx.

It will be necessary to expand the downstream outlet pipe
(see values of example #1 above: expand to DN 250)

Example No 3: Determining pipe sizes of a safety shut-off valve (SSV)

Assumptions:	Max required flow rate	$Q_{b\ max}$	= 7,000 m³/h
	Gas pressure		
	Min. inlet pressure	$p_{u\ min}$	= 5 bar
	Max. velocity for SSV with flow deflection w_{max}		= 50 m/s
	Max. velocity for in-line SSV w_{max}		= 70 m/s
Results:	For SSV with flow deflection	= 100 mm	
	For straight in-line SSV		= 80 mm

Determining the pipe size (Ø) and/or flow velocity

Note:
With higher temperatures, it becomes more and more important to include temperature in calculations.

Flow velocities may be calculated using the following equation:

$$w = 380 \cdot \frac{Q_b}{DN(d)^2 \cdot p_{abs}}$$

w	= Flow velocity in m/s
Q_b	= Standard flow rate of gas in m³/h
DN (d)	= Pipe size (Ø) in mm
p_{abs}	= Absolute pressure of gas in bar (usually p + 1 bar)

Note: The factor 380 refers to an operational gas temperature of about 15 to 20 °C. For different temperatures, correct using the factor.

$$\frac{t_{gas} + 273.15}{290}$$

The pipe size (Ø) can be obtained from:

$$DN\ (d) = \sqrt{\frac{380 \cdot Q_b}{w \cdot p_{abs}}} \quad \text{in mm}$$

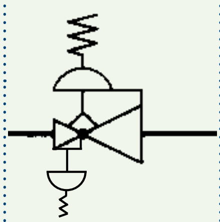
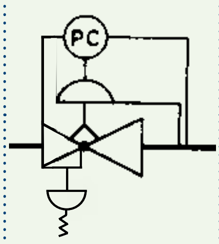
For w = 25 m/s we obtain:

$$DN(d) \approx 3.9 \cdot \sqrt{\frac{Q_b}{p_{abs}}} \quad \text{in mm}$$

Caution:
When calculating flow velocities w and/or pipe sizes (Ø), always use the actual type of gas that will be in the system. Never use converted values of equivalent gases!

Calculation and selection of gas pressure regulators, safety devices and gas filters

CRITERIA FOR SELECTING GAS PRESSURE REGULATORS

Gas pressure regulator	Technical information				Example	
	Features	Inlet pressure	Outlet pressure	Applications	Diagram	Type / Technical data
Direct-acting	Cost-efficient, fast switching behaviour, mounting position as required, setpoint easy to adjust (P-behaviour), outlet pressures rather low	up to 20 bar	mbar range up to 4 bar approx.	Gas consumers (e.g., burners, gas engines), supply to domestic customers, local distribution stations		e.g. RMG 320 with SSV: RMG 300, RMG 330, RMG 370, RMG 324 p_u up to 20 (16) bar pd 20 mbar up to 4 bar
Pilot-operated	Suitable for significant: - inlet pressure ranges, - outlet pressure ranges, - pressure drops, - flow areas, High regulating accuracy, and setpoint is easy to adjust. For operation, you need a min. pressure drop between inlet and outlet to compensate for spring-loaded devices. - Slower switching behaviour - Somewhat more complex & costly	up to 100 bar	0.01 bar up to 90 bar	Transfer stations, regional and local distribution stations, industrial gas consumers (e.g., burners, gas engines), power plants		with SSV: RMG 332 RMG 372 RMG 402 RMG 408 RMG 470 (buried module) p_u up to 40 bar (16, 20) bar p_d 20mbar up to 40 bar e.g. RMG 502, with SSV: RMG 503 Monitor active: RMG 505 e.g. RMG 512 p_u up to 100 bar p_d 0.5 to 90 bar

Selection table for Series 200, 300 and 400

OVERVIEW OF RMG GAS PRESSURE REGULATORS					
Series	Type	Max. inlet pressure $p_{u\,max}$ in bar	Outlet pressure range W_d in bar	K_G value* in $m^3/(h \cdot bar)$	Pipe sizes DN or DN_u/DN_d
200 Small pressure regulators (e.g., pressure reducers)	RMG 200	100	0.02 to 90	12 to 250	DN 25 (other sizes optional)
	RMG 201	100	0.02 to 2	2.5 to 80	DN 25 (other sizes optional)
	RMG 210	100	0.02 to 3.5	18	< DN 25
	RMG 213	200	0.2 to 50	6	< DN 25
	RMG 214	350	1 to 70	20 to 75	< DN 25
	RMG 218	50	0.008 to 3.5	2.5 to 90	< DN 25
	RMG 219	50	0.008 to 8	4.5 to 65	< DN 25
	RMG 265	100	0.5 to 90	1.5 to 6	< DN 25
	RMG 267	100	0.1 to 10	2	< DN 25
300 Gas pressure regulator	RMG 300	16	0.02 to 2	65	DN 25
	RMG 320	16	0.02 to 1	220 to 5800	DN 25, DN 50, DN 80, DN 100
	RMG 322	16	0.01 to 15	220 to 5800	DN 25, DN 50, DN 80, DN 100
	RMG 330	20	0.02 to 4	200 to 4700	DN 25, DN 50, DN 80, DN 100
	RMG 332	20	0.01 to 15	65 to 4700	DN 25, DN 50, DN 80, DN 100
	RMG 370	20	0.02 to 4	360 to 13200	DN 25, DN 50, DN 80, DN 100, DN 150
	RMG 372	20	0.01 to 15	360 to 13200	DN 25, DN 50, DN 80, DN 100, DN 150
400 Gas pressure regulator	RMG 402	50	0.01 to 40	350 to 5500	DN 25, DN 50, DN 80, DN 100 DN 50/100, DN 80/150, DN 100/200
	RMG 408	16	0.01 to 15	450 to 3800	DN 50/100, DN 80/150, DN 100/200

*) Flow rate coefficient for natural gas: (ρb = 0.83 kg/m^3, t = 15 °C)

Selection table for Series 500

OVERVIEW OF RMG GAS PRESSURE REGULATORS					
Series	Type	Max. inlet pressure $p_{u\,max}$ in bar	Outlet pressure range W_d in bar	K_G value* in $m^3/(h \cdot bar)$	Pipe sizes DN or DN_u/DN_d
500 Gas pressure regulator	RMG 502	100	0.3 to 90	450 to 27,000	DN 25/50, DN 50/100, DN 80/150, DN 100/200 DN 150/300, DN 200/300
	RMG 503	100	0.3 to 90	350 to 13,200	DN 25/50, DN 50/100, DN 80/150, DN 100/200, DN 150/300
	RMG 505	100	0.3 to 90	1,400 to 5,500	DN 50/100, DN 80/150, DN 100/200
	RMG 512	100	0.3 to 90	550 to 55,000	DN 25, DN 50, DN 80, DN 100, DN 150, DN 200, DN 250 DN 25/100, DN 25/150, DN 50/150, DN 50/200, DN 80/250, DN 100/300, DN 150/300, DN 150/400, DN 200/400, DN 200/500 DN 250/500, DN 250/600
OVERVIEW OF VOLUME CONTROL VALVES					
530 Volume control valve	RMG 530-E	100		1,300 to 15,000	DN 50/100, DN 80/150, DN 100/200, DN 150/300
	RMG 530-E-WG	100		30,000 to 90,000	DN 200/200, DN 200/300, DN 300/300, DN 400/400
	RMG 530-P	250		22,000 to 26,000	DN 200/200, DN 250/250

*) Flow rate coefficient for natural gas: (ρ_b = 0.83 kg/m^3, t = 15 °C)

Pilot-operated Gas Pressure Regulator According to DIN EN 334

Max. admissible pressure PS = 100 bar
depending on type of flange
Max. inlet pressure $p_{u\,max}$ up to 100 bar
Outlet pressure range W_d 0.02 bar
up to 90 bar
Min. pressure drop approx. 1 bar,
others on enquiry
Class of lock-up pressure zone SZ 2.5

Connection:
- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), for pipe diameters 18 mm, 22 mm, 25 mm, 28 mm, 38 mm, 42 mm;
- DIN flange PN 40 or Flange Class 300, Class 600 according to ANSI 16.5 with transition pieces in DN 25, DN 40, DN 50

- ☐ Device for offtake stations in gas transmission, industrial facilities and low-load lines in larger gas pressure regulating stations
- ☐ Optional outdoor type
- ☐ Suitable for large turn down ratios
- ☐ Installation of different valve seat diameters is possible
- ☐ Straightforward, easy-to-maintain design
- ☐ Suitable for controlling outlet and inlet pressure, outlet and differential pressure (flow control), and superimposed electric control loops
- ☐ Fail-close function
- ☐ Suitable for non-aggressive gases and other gases on enquiry

CE registration according to PED

RMG CE 0085

Supplemental fixture
(as requested by customer)
- ☐ Electrical and pneumatic remote setpoint adjustment
- ☐ Fitted with noise-reducing outlet device flanges PN 40 or Class 600 according to ANSI 16.5
- ☐ Pipe connection for use with SSVs RMG 703 and/or 704

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 200 Small Pressure Regulator (Pressure Reducer)

VALVE SPECIFICATIONS						
Valve seat diameter in mm	5	6	8	12	18	23
Flow rate coefficient K_G in $m^3/(h \cdot bar)$ for natural gas (ρ_b = 0.83 kg/m^3, t = 15 °C)	12	25	50	125	200	250
Max. inlet pressure variation $\Delta\, p_{u\,max}$ in bar (Please consider pressure rating)	100	100	100	80	40	25

Face-to-face dimensions: 234 to 440 mm depending on connection

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 610, PREFERABLY WITH ACTUATOR 2						
Load limiting stage			Pilot stage			
Measuring unit	Wire Ø in mm	Specific outlet pressure range W_{ds} in bar	Measuring unit	Wire Ø in mm	Colour coding	Specific outlet pressure range W_{ds} in bar
M	3.3 (green)	0.1 to 1.5	N	2,5 3 3,5 4 5	white yellow green red blue	0.01 to 0.04 0.02 to 0.06 0.04 to 0.12 0.08 to 0.2 0.1 to 0.5
	5 (silver)	0.5 to 5	M	3,3 4 4,7	green blue brown	0.3 to 1.5 1 to 2.5 2 to 3.5

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 650, PREFERABLY WITH ACTUATOR 1				
	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	Wire Ø in mm.	Colour coding	
Pilot stage with diaphragm measuring unit	0 1 2 3 4 5	4.5 3.6 4.5 5 6.3 7	black blue black grey brown red	0.3 to 1** 0.5 to 2 1 to 5 2 to 10 5 to 20 10 to 40
Pilot stage metal-harmonica measuring unit	6 7	☐ 8/7 9	green white	10 to 50 20 to 90
Control stage		5	green	0.5 to 15 automatic: above p_d

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS			
Outlet pressure range (p_d range) in bar	Accuracy Class AC with valve seat diameters up to 8 mm	Accuracy Class AC with valve seat diameters up to 12 mm	Lock-up pressure Class SG
0.01 to 0.03	5	10	30
>0.03 to 0.1	5	5*/10	20
>0.1 to 0.5	5	5	10
>0.5 to 1	2.5	2.5*/5	10
>1 to 2.5	2.5	2.5	10
>2.5 to 5	1	1	10
>5	1	1	5

*) This better accuracy Class applies if inlet pressure variations are smaller than half the max. inlet pressure $p_{u\,max}$.

**) Type with larger measuring diaphragm.

In general, much better values are possible in all outlet pressure ranges.

Series 200 Small Pressure Regulator (Pressure Reducer)

Direct-acting Gas Pressure Regulator According to DIN EN 334

- ☐ For industrial and process applications
- ☐ For low-load lines in gas pressure regulating stations
- ☐ Two-stage device
- ☐ Suitable for large pressure differences
- ☐ With safety relief valve in:
  - intermediate pressure stage
  - control stage (up to $p_{d\,max}$ 0.5 bar)
- ☐ Easy operation, monitoring, maintenance
- ☐ Pipe connection for use with SSVs RMG 703 and/or 704
- ☐ Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure = PS 100 bar

Max. inlet pressure $p_{u\,max}$ up to 100 bar

Outlet pressure range W_d 0.02 bar up to 2 bar

Class of lock-up pressure zone SZ 2.5

Connection:

- Inlet:
  Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), for pipe diameters 12 mm, 16 mm, 18 mm
- Outlet:
  Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), for pipe diameters 12 mm, 16 mm, 18 mm, 22 mm, 25 mm, 28 mm, 38 mm, 42 mm

Flange in PN 40 or Class 300,
Class 600 according to ANSI 16.5 transition pieces in DN 25, DN 40, DN 50

CE registration according to PED

RMG CE 0085

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 200 Small Pressure Regulator (Pressure Reducer)

VALVE SPECIFICATIONS							
Intermediate pressure stage	Valve seat Ø in mm		2	3.7	5.5	8	-
	K_G* in $m^3/(h \cdot bar)$		4.5	15	35	65	-
Control stage	Valve seat Ø in mm		1.5	3.5	6	10	12
	K_G* in $m^3/(h \cdot bar)$	normal	2.5	12	20	35	40
		max.**	2.5	14	38	70	80

*) Flow rate coefficient for natural gas: ρ_b = 0.83 kg/m^3, t = 15 °C

**) For $K_{G\ max}$: Proportional deviation goes beyond the limits of the accuracy Class

SPECIFIC OUTLET PRESSURE RANGE W_{ds}	Setpoint spring	Specific outlet pressure range W_{ds}	Safety relief valve (SRV) – adjustment values
Intermediate pressure stage	F2	Up to 9 bar above p_d	Fixed setting 15 bar
	F3	Up to 15 bar above p_d	Fixed setting 20 bar
Control stage			Adjustable (only up to p_d = 0.5 bar) Factory settings:
	F2	20 to 40 mbar	25 mbar above p_d
	F3	30 to 100 mbar	50 mbar above p_d
	F4	75 to 250 mbar	75 mbar above p_d
	F5	150 to 500 mbar	100 mbar above p_d
	F6	250 to 1,000 mbar	150 mbar above p_d
	F7	0.5 to 1.8 bar	no SRV
	F8	0.75 to 2 bar	

Direct-acting Pressure Reducer with Fine Mesh Filter RMG 905 According to DIN EN 334

- ☐ Device for industrial facilities, laboratories, low-load lines in larger gas pressure regulating stations
- ☐ Low inlet pressure dependence
- ☐ Two-stage device
- ☐ Optional internal/external measuring impulse connection
- ☐ Easy operation and monitoring
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

Max. admissible pressure PS = 100 bar

Max. inlet pressure $p_{u\ max}$ up to 100 bar

Outlet pressure range W_d 0.01 bar up to 3.5 bar

Class of lock-up pressure zone SZ 2.5

Connection:
- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), for pipe diameters
  Inlet: 12 mm
  Outlet: 16 mm

Valve seat Ø = 6 mm

K_G = 16 $m^3/(h \cdot bar)$

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

<table>
<tr><th colspan="7">SPECIFIC OUTLET PRESSURE RANGE</th></tr>
<tr><th colspan="3">Load limiting stage</th><th colspan="4">Control stage</th></tr>
<tr><th>Measuring unit</th><th>Wire Ø in mm</th><th>Specific outlet pressure range W_{ds} in bar</th><th>Measuring unit</th><th>Wire Ø in mm</th><th>Colour coding</th><th>Specific outlet pressure range W_{ds} in bar</th></tr>
<tr><td rowspan="2">M</td><td>3.3
(green)</td><td>0.1 to 1.5</td><td>N</td><td>2.5
3
3.5
4
5</td><td>white
yellow
green
red
blue</td><td>0.01 to 0.04
0.02 to 0.06
0.04 to 0.12
0.08 to 0.2
0.1 to 0.5</td></tr>
<tr><td>5
(silver)</td><td>0.5 to 5</td><td>M</td><td>3.3
4
4.7</td><td>green
blue
brown</td><td>0.3 to 1.5
1 to 2.5
2 to 3.5</td></tr>
</table>

Direct-acting Pressure Reducer
SEP design

Max. admissible pressure PS = 150 bar

Max. inlet pressure $p_{u\,max}$ up to 150 bar

Outlet pressure range W_d 0.2 bar up to 50 bar

Class of lock-up pressure zone SZ 2.5

Valve seat diameter: 3 mm

Flow rate coefficient

K_G: 6 $m^3/(h \cdot bar)$ for natural gas (ρ_b = 0.83 kg/m^3, t = 15 °C)

Connection:

- ⅜" (female) with measuring units M, H, S

- ☐ For industrial and process applications
- ☐ Single-stage pressure reducer, suitable for high pressure differences
- ☐ Type with diaphragm measuring unit
- ☐ Integrated safety relief valve
- ☐ Optionally with incorporated non-return valve
- ☐ Bubble-tight sealing at zero flow
- ☐ Easy operation and monitoring
- ☐ Suitable for non-aggressive gases, other gases on enquiry

SEP design according to PED

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE, p_d DEPENDENCE				
Measuring unit with Diaphragm	Spring	Specific outlet pressure range W_{ds} in bar	p_d depending on	
			Flow rate*	Inlet pressure** in mbar/10 bar
M	F1 F2	0.2 to 4 1 to 10	0.25 0.7	40
H	F3 F4	1 to 20 2 to 30	2.5 4.5	65
S	F5	3 to 70	8	115

*) p_d down at Q_b up (values at 100 % valve stroke)

**) p_d down at p_u up

Direct-acting Pressure Reducer According to DIN EN 334

- ☐ For industrial and process applications
- ☐ Single-stage pressure reducer, suitable for high pressure differences
- ☐ Integrated safety relief valve
- ☐ Optionally with incorporated non-return valve (only valve seats Ø 6 mm)
- ☐ Bubble-tight sealing at zero flow
- ☐ Easy operation and monitoring
- ☐ Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 350 bar
Max. inlet pressure $p_{u\ max}$ up to 350 bar
Outlet pressure range W_d 1 bar up to 70 bar
Class of lock-up pressure zone SZ 2.5

SEP registration according to PED

Connection:
- 1" female

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

INLET PRESSURE DEPENDENCY			
Valve seat diameter in mm	6	8	11
Flow rate coefficient K_G* in $m^3/(h \cdot bar)$	20	40	75
Max. inlet pressure $p_{u\ max}$	350 bar	220 bar	150 bar
Outlet pressure changes at 10 bar inlet pressure change (p_d down at p_u up)	120 mbar	210 mbar	400 mbar

*) Flow rate coefficient for natural gas: (ρ_b = 0.83 kg/m^3, t =15 °C)

SPECIFIC OUTLET PRESSURE RANGE

$p_{u\,max}$ in bar	Spring	Specific outlet pressure range W_{ds} in bar for valve seats diameters in mm		
		6	8	11
50	F1	1 to 5	1 to 4.5	2 to 3.5
	F2	3 to 20	3 to 20	3 to 20
	F3	5 to 45	5 to 45	5 to 45
100	F1	1 to 4.4	1 to 3.4	
	F2	3 to 20	3 to 20	3 to 20
	F3	5 to 55	5 to 55	5 to 55
	F4	10 to 70	10 to 70	10 to 70
150	F1	1 to 3.8	1 to 2.3	
	F2	3 to 20	2 to 20	3 to 20
	F3	5 to 55	5 to 55	5 to 55
	F4	10 to 70	10 to 70	10 to 70
220	F1	1 to 2.8		
	F2	2.5 to 20	3 to 20	
	F3	5 to 55	5 to 55	
	F4	10 to 70	10 to 70	
250	F1	1.5 to 2.5		
	F2	2 to 20		
	F3	5 to 55		
	F4	10 to 70		
300	F1	1.5 to 1.9		
	F2	1.5 to 20		
	F3	5 to 55		
	F4	10 to 70		
350	F2	3 to 20		
	F3	5 to 55		
	F4	10 to 70		

Direct-acting Pressure Reducer, SEP design

Max. admissible pressure PS = 50 bar
Max. inlet pressure $p_{u\ max}$ up to 50 bar
Outlet pressure range W_d 8 mbar up to 3.5 bar

Connection:
- Inlet ¾" male
- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), for pipe diameters 10 mm, 12 mm, 16 mm
- Outlet 1¼" female

- ☐ For industrial and process applications
- ☐ Two-stage pressure reducer
- ☐ Suitable for high pressure differences
- ☐ Low inlet pressure dependence
- ☐ Bubble-tight sealing at zero flow
- ☐ With SRV for gas leakages in the first pilot stage
- ☐ Easy operation and monitoring
- ☐ Suitable for non-agressive gases, other gases on enquiry

SEP design according to PED SEP

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

VALVE SPECIFICATIONS							
Intermediate pressure stage	Valve seat Ø in mm	2	3.7	5.5	8	10	
	K_G* in $m^3/(h \cdot bar)$	4.5	15	35	65	90	
Control stage	Valve seat Ø in mm	1.5	3.5	4.8	6	7	10
	K_G* in $m^3/(h \cdot bar)$	2.5	14	25	38	50	90

*) Flow rate coefficient for natural gas: (ρ_b = 0.83 kg/m^3, t =15 °C)

SPECIFIC OUTLET PRESSURE RANGE MEASURING UNIT 2ND CONTROL STAGE				
Measuring unit	**Specific outlet pressure range** W_{ds}	**Spring**	**Wire Ø** in mm	**SRV setting range** (above p_d)
Intermediate pressure stage	0.1 to 1.5 bar		3.3 (green)	
	0.5 to 5 bar		5 (silver)	
Control stage G	8 to 12 mbar 10 to 40 mbar	F1 F2	2.5 3.2	10 to 40 mbar
	30 to 100 mbar	F3	4	40 to 90 mbar
	30 to 250 mbar	F4	4.5	40 to 90* mbar 90 to 150** mbar
	50 to 500 mbar	F5	5.6	40 to 90* mbar 90 to 150** mbar
	0.1 to 1 bar 0.2 to 1.8 bar 0.3 to 2 bar	F6 F7 F8	6.5 8 9	without SRV
Control stage GS	0.25 to 2.5 bar 0.35 to 3.5 bar	F7 F8	8 9	without SRV

*) only up to valve seat Ø 7 mm

**) only up to valve seat Ø 10 mm

SUITABLE CONTROL VALVES – 1st STAGE (BROKEN DOWN BY TYPES OF CONNECTION AND INLET PRESSURES)			
Connection Inlet and outlet	Valve seat – pilot stage Suitable up to inlet pressure in bar		
	50	50	25
$^3/_4$" male / $1^1/_4$" female	Valve Ø F2; F3.7; F5.5	F8	F10
Pipe Ø 10 / $1^1/_4$" female		-	-
Pipe Ø 12 / $1^1/_4$" female		F8	-
Pipe Ø 16 / $1^1/_4$" female		F8	F10

Direct-acting Pressure Reducer According to DIN EN 334

Max. admissible pressure PS = 50 bar
Max. inlet pressure $p_{u\,max}$ up to 50 bar
Outlet pressure range W_d 8 mbar up to 8 bar

Connection:
- Inlet 3/4" male
  Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), for pipe diameters 10 mm, 12 mm, 16 mm
- Outlet 3/4" male

- ☐ For industrial and process applications
- ☐ Single-stage pressure reducer
- ☐ Bubble-tight sealing at zero flow
- ☐ Integrated safety relief valve
- ☐ Easy operation and monitoring
- ☐ Suitable for non-aggressive gases, other gases on enquiry

SEP registration according to PED

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 200 Small Pressure Regulator (Pressure Reducer)

VALVE SPECIFICATIONS				
Valve seat diameter in mm	2	3.7	5.5	8
K_G value* in $m^3/(h \cdot bar)$	4.5	15	35	65

*) Flow rate coefficient for natural gas: (ρ_b = 0.83 kg/m^3, t =15 °C)

SPECIFIC OUTLET PRESSURE RANGE				
Measuring unit – description and size (Ø) in mm	**Specific outlet pressure range** W_{ds}	**Setpoint spring**		Valve Ø in mm
		Spring no.	Wire Ø in mm	
G 190	8 to 12 mbar 10 to 40 mbar 30 to 100 mbar 30 to 250 mbar 50 to 500 mbar 0.1 to 1 bar 0.2 to 1.8 bar 0.3 to 2 bar	F1 F2 F3 F4 F5 F6 F7 F8	2.5 3 4 4.5 6 6.5 8 9	2 3.7 5.5 8
V 112	0.1 to 1 bar 0.2 to 2 bar 0.4 to 4 bar 0.7 to 7 bar 0.8 to 8 bar	F4 F5 F6 F7 F8	4.5 6 6.5 8 9	

Direct-acting Pressure Reducer with Fine Mesh Filter RMG 905 According to DIN EN 334

- ☐ Device for industrial facilities, laboratories, low-load lines in larger gas pressure regulating stations
- ☐ Large outlet pressure range
- ☐ Low inlet pressure dependence
- ☐ Compact two-stage design (modular system)
- ☐ With fine mesh filter
- ☐ Optional internal/external measuring impulse connection
- ☐ Easy operation and monitoring
- ☐ Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 100 bar
Max. inlet pressure $p_{u\ max}$ up to 100 bar
Outlet pressure range W_d 0.5 bar
up to 90 bar
Class of lock-up pressure zone SZ 2.5

Connection:
- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), for pipe diameters
  Inlet: 10 mm
  Outlet: 10/12/16 and 18 mm

CE registration according to PED

Supplemental fixture
(as requested by customer):
- ☐ Electrical and pneumatic remote adjustment of the outlet pressure
- ☐ Single-stage design at option

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 200 Small Pressure Regulator (Pressure Reducer)

VALVE SPECIFICATIONS		
Valve seat diameter in mm	1.2	3
Flow rate coefficient K_G* in $m^3/(h \cdot bar)$	1.5	6

*) Flow rate coefficient for natural gas: (ρ_b = 0.83 kg/m³, t = 15 °C)

SPECIFIC OUTLET PRESSURE RANGE							
Intermediate pressure stage				**Outlet pressure stage**			
Setpoint spring			**Specific outlet pressure range** W_{ds} in bar	**Setpoint spring**			**Specific outlet pressure range** W_{ds} in bar
Spring no.	**Wire Ø** in mm	**Colour coding**		**Spring no.**	**Wire Ø** in mm	**Colour coding**	
Diaphragm measuring unit				**Diaphragm measuring unit**			
				0	4.5	black	0.3 to 1*
				1	3.6	blue	0.5 to 2
2	4.5	black	1 to 5	2	4.5	black	1 to 5
3	5	grey	2 to 10	3	5	grey	2 to 10
4	6.3	brown	5 to 20	4	6.3	brown	5 to 20
5	7	red	10 to 40	5	7	red	10 to 40
Metal-harmonica measuring unit				**Metal-harmonica measuring unit**			
6	□ 8/7	green	10 to 50	6	□ 8/7	green	10 to 50
7	8	white	20 to 90	7	8	white	20 to 90

FACE-TO-FACE DIMENSION		
Outlet connection	**Face-to-face dimension** in mm	
Pipe Ø in mm	with fine mesh filter	without fine mesh filter
10	222	195
12	222	195
16	253	226
18	254	227

*) Type with larger measuring diaphragm

Series 200 Small Pressure Regulator (Pressure Reducer)

Direct-acting Pressure Reducer According to DIN EN 334

- ☐ Device for industrial facilities and laboratories
- ☐ For auxiliary equipment of gas-pressure regulating stations according to G 491
- ☐ Pressure supply unit for pneumatic signalling equipment (e.g., supplying power to I/P transformers)
- ☐ Compact design (modular system)
- ☐ SRV stage for safeguarding supply pressure
- ☐ Optional internal/external measuring impulse connection
- ☐ Easy operation and monitoring
- ☐ Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 100 bar
Max. inlet pressure $_{pu\ max}$ up to 100 bar
Outlet pressure range W_d 0.1 bar
up to 10 bar
Class of lock-up pressure zone SZ 2.5

CE registration according to PED

Connection:
- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), for pipe diameters
  Inlet: 10 mm
  Outlet: 10/12/16 and 18 mm

Supplemental fixture
(as requested by customer)
- ☐ Electrical/pneumatic adjustment of the resultant outlet pressure value

Application:

The Safety Relief Valve (SRV) is designed to limit pressure in the event of gas leakages from the upstream pressure reducer. For further protection of downstream devices and pipes, it may be advisable to provide additional overpressure protection devices.

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Direct-acting Gas Pressure Regulator with Incorporated Direct-acting SSV According to DIN EN 334/14382/33822

Max. admissible pressure PS = 16 bar

Max. inlet pressure $p_{u\ max}$ up to 16 bar

Outlet pressure range W_d 20 mbar up to 2 bar

Class of lock-up pressure zone SZ 2.5

SSV setting range
W_{do} 50 mbar up to 4.5 bar
W_{du} 10 mbar up to 0.4 bar

SRV setting range (measuring unit 1 only)
W_d 10 mbar to 160 mbar above p_{ds}

Connection:
DIN flange PN 16 or Class 150 according to ANSI 16.5

- ☐ Device for offtake stations in gas transmission as well as commercial and industrial facilities
- ☐ Suitable for non-aggressive gases, other gases on enquiry
- ☐ Diaphragm assembly with inlet pressure compensation
- ☐ Excellent for dynamic regulating lines (e.g., gas furnaces)
- ☐ Optional HTB design ($p_{u\ max}$ = 5 bar)
- ☐ Large inlet pressure range
- ☐ Optional internal/external measuring impulse connection
- ☐ Optionally with vent valve RMG 915 with regulating assembly (SRV blocked) or safety diaphragm
- ☐ Excellent regulating dynamics
- ☐ Regulating assembly optionally:
  - in standard design
  - with safety relief valve (SRV) (only up to $p_{d\ max}$ 0.5 bar)
- ☐ With or without safety shut-off valve (SSV)
- ☐ SSV design optionally with control element K 1a or K 2a
- ☐ Very easy to maintain thanks to exchangeable functional units (cartridge assembly)

CE registration according to PED

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 300 Gas Pressure Regulators Up to Class 150

VALVE SPECIFICATIONS		
Valve seat Ø in mm	**Flow rate coefficient** K_G* in $m^3/(h \cdot bar)$	**Face-to-face dimension** in mm
11	65	160

*) Flow rate coefficient for natural gas: (ρ_b = 0.83 kg/m^3, t =15 °C)

SPECIFIC OUTLET PRESSURE RANGE				
Setpoint spring			**Specific outlet pressure range** W_{ds}	
No.	Wire Ø in mm	Colour coding	Measuring unit 1	Measuring unit 2
1	2.5	grey	20 to 45 mbar	
2	3	yellow	35 to 100 mbar	
3	3.6	ivory	80 to 200 mbar	
4	4	light red	150 to 300 mbar	
5	4	green	250 to 400 mbar	
6	4.5	light blue	300 to 500 mbar	0.6 to 0.8 bar
7	5.3	dark blue	450 to 800 mbar	0.6 to 2 bar

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS		
Outlet pressure range (p_d range)	**Accuracy Class** AC	**Lock-up pressure Class** SG
20 to 30 mbar	10	30
> 30 to 50 mbar	10	20
> 50 to 500 mbar	5	10
> 0.5 to 2 bar	2.5	10

SETTING RANGE OF SSV ACTUATOR SYSTEMS		
Actuator system	**Overpressure** W_{do}	**Underpressure** W_{du}
K 1a	50 mbar to 1.5 bar	10 to 120 mbar
K 2a	400 mbar to 5.2 bar	60 to 400 mbar

Direct-acting Gas Pressure Regulator According to DIN EN 334

Max. admissible pressure PS = 16 bar

Max. inlet pressure $p_{u\,max}$ up to 16 bar

Outlet pressure range W_d 20 mbar bar up to 1 bar

Class of lock-up pressure zone SZ 2.5

SRV setting range
W_{do} 10 mbar up to 300 mbar above p_{ds}
(only up to $p_{d\,max}$ = 0.5 bar)

Connection:
DIN flange PN 16 or Class 150 according to ANSI 16.5

- ☐ Device for offtake stations in gas transmission as well as commercial and industrial facilities
- ☐ Suitable for dynamic regulating lines (i.e., gas furnaces)
- ☐ Large inlet pressure range
- ☐ Diaphragm assembly with inlet pressure compensation
- ☐ Regulating assembly optionally with:
  - safety relief valve
  - safety diaphragm (only diaphragm assembly 1 and only up to $p_{d\,max}$ 0.5 bar)
- ☐ Very easy to maintain thanks to exchangeable functional units (cartridge assembly)
- ☐ Also available as zero-pressure gas regulators
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

RMG CE 0085

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 300 Gas Pressure Regulators Up to Class 150

VALVE SPECIFICATIONS

Pipe sizes	Valve seat diameter in mm	Flow rate coefficient K_G* in $m^3/(h \cdot bar)$	Inlet pressure range $\Delta\ p_u$ in bar (in brackets: max. inlet pressure, see p. 81)		Face-to-face dimension in mm
			Diaphragm assembly Size 1	Diaphragm assembly Size 2	
DN 25	20 33	220 480	16 16		184
DN 50	25 31 41 50	400 800 1,300 1,600	16 10 8 (16) 5 (10)	16 16 16 10 (16)	254
DN 80	25 31 41 50 60 80	400 900 1,500 1,800 2,700 4,000		16 16 16 10 (16) 10 (16) 6 (12)	298
DN 100	25 31 41 50 60 80 100	400 850 1,400 1,750 3,000 4,500 5,800		16 16 16 10 (16) 10 (16) 6 (12) 4 (8)	352

*) Flow rate coefficient for natural gas: $\rho_b = 0.83\ kg/m^3$, $t = 15\ °C$

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS

Outlet pressure range (p_d range) in mbar	Accuracy Class AC	Lock-up pressure Class SG
20 to 30	10**/20	30**/50
> 30 to 100	5**/10	10**/20
> 100 to 500	5	10
> 500 to 1,000	2.5	10

**) Values apply to inlet pressure changes up to 6 bar max.

SPECIFIC OUTLET PRESSURE RANGE FOR DIAPHRAGM ASSEMBLY 1			
Setpoint spring			Specific outlet pressure range W_{ds} in mbar
Spring no.	Wire Ø in mm	Colour coding	unit 1*
0	3.6	signal blue	20 to 30
1	4	grey	25 to 50
2	4.5	yellow	45 to 100
3	5.3	brown	90 to 200
4	6.3	light red	150 to 300
5	7	dark red	250 to 400
6	7.5	light blue	350 to 500
7	8.5	white	450 to 600
8	9.5	green	550 to 800
9	10.5	black	650 to 1,000

*) Version with incorporated Safety Relief Valve (SRV) or with additional safety diaphragm for outlet pressure ranges only up to $p_{d\ max}$ 0.5 bar

SPECIFIC OUTLET PRESSURE RANGE FOR DIAPHRAGM ASSEMBLY 2			
Setpoint spring			Specific outlet pressure range W_{ds} in mbar
Spring no.	Wire Ø in mm	Colour coding	unit 2
0	5	blue	20 to 30
1	6.3	grey	25 to 50
2	7	yellow	45 to 100
3	8	brown	90 to 200
4	9	light red	150 to 300
5	10	dark red	250 to 400
6	11	light blue	350 to 500
7	12	white	450 to 600
8	13	green	550 to 800
9	14	black	650 to 1,000

Pilot-operated Gas Pressure Regulator According to DIN EN 334 (operating with auxiliary energy from the inlet pressure range)

- ☐ Device for offtake stations in gas transmission as well as commercial and industrial facilities
- ☐ Large inlet pressure range
- ☐ Various valve seat diameters for best adaptation to operating conditions
- ☐ High regulating accuracy
- ☐ Diaphragm assembly with inlet pressure compensation
- ☐ Optionally with pilot, models RMG 610 (RS 10d) or RMG 650
- ☐ Very easy to maintain thanks to exchangeable functional units (cartridge assembly)
- ☐ Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 16 bar
Max. inlet pressure $p_{u\ max}$ up to 16 bar
Outlet pressure range W_d 10 mbar up to 15 bar
Minimum pressure drop 0.2 bar, others on enquiry
Class of lock-up pressure zone SZ 2.5

CE registration according to PED

Connection:
DIN flange PN 16 or
Class 150 according to ANSI 16.5

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

VALVE SPECIFICATIONS

Pipe sizes	Valve seat diameter in mm	Flow rate coefficient K_G* in $m^3/(h \cdot bar)$	Face-to-face dimension in mm
DN 25	20 33	220 480	184
DN 50	25 31 41 50	400 800 1,300 1,600	254
DN 80	25 31 41 50 60 80	400 900 1,500 1,800 2,700 4,000	298
DN 100	25 31 41 50 60 80 100	400 850 1,400 1,750 3,000 4,500 5,800	352

*) Flow rate coefficient for natural gas: (ρb = 0.83 kg/m^3, t =15 °C)

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 610 (RS 10D)						
Load-limiting stage			Control stage			
Measuring unit	Wire Ø in mm	Specific outlet pressure range W_{ds} in bar	Measuring unit	Wire Ø in mm	Colour coding	Specific outlet pressure range W_{ds}
M	3.3 (green)	0.1 to 1.5	N	2.5 3 3.5 4 5	white yellow green red blue	0.01 to 0.04 0.02 to 0.06 0.04 to 0.12 0.08 to 0.2 0.1 to 0.5
	5 (silver)	0.5 to 5	M	3.3 4 4.7	green blue brown	0.3 to 1.5 1 to 2.5 2 to 3.5

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 650				
	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	Wire Ø in mm	Colour coding	
Control stage	2 3 4	4.5 5 6.3	black grey brown	1 to 5 2 to 10 5 to 15
Automatic load limiting stage		5	green	0.5 to 15 automatic: above p_d

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS		
Outlet pressure range (p_d range)	Accuracy Class AC	Lock-up pressure Class SG
10 to 20 mbar	5	50
> 20 to 50 mbar	5	30
> 50 to 500 mbar	5	10
> 0.5 to 2.5 bar	2.5	10
> 2.5 to 5 bar	1	10
> 5 bar	1	5

Direct-acting Gas Pressure Regulator with Incorporated Direct-acting SSV According to DIN EN 334/14382

Max. admissible pressure PS = 16 bar

Max. inlet pressure $p_{u\ max}$ up to 16 bar

Outlet pressure range W_d 20 mbar up to 1 bar

Class of lock-up pressure zone SZ 2.5

SRV setting range
 W_d 10 mbar to 300 mbar above p_{ds}
(only up to $p_{d\ max}$ = 0.5 bar)

SSV setting range
 W_{do} 50 mbar up to 1.5 bar
 W_{du} 10 mbar to 120 mbar

Connection:
 DIN flange PN 16 or
 Class 150 according to ANSI 16.5

- ☐ Device for offtake stations in gas transmission as well as commercial and industrial facilities
- ☐ Suitable for dynamic regulating lines (gas furnaces)
- ☐ Large inlet pressure range
- ☐ Best adaptation to operating conditions thanks to various valve seat diameters
- ☐ Diaphragm assembly with inlet pressure compensation
- ☐ Regulating assembly optionally with:
  - Safety relief valve
  - Safety diaphragm
- ☐ Also available with safety shut-off valve (SSV)
  DN 25, DN 50:
   Actuator systems K 1a, K 2a
  DN 80, DN 100:
   Actuator systems K 4, K 5, K 6
- ☐ Easy to maintain thanks to exchangeable functional units (cartridge assembly)
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

RMG CE 0085

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

VALVE SPECIFICATIONS					
Pipe sizes	Valve seat diameter in mm	Flow rate coefficient K_G* in $m^3/(h \cdot bar)$	Inlet pressure range Δp_u in bar (in brackets: max. inlet pressure, see page 81)		Face-to-face dimension in mm
			Diaphragm assembly Size 1	Diaphragm assembly Size 2	
DN 25	20 33	200 420	16 10 (16)		200
DN 50	20 33	200 500	16 10 (16)		230
DN 80	25 31 41 50	400 850 1,400 1,750	16 10 (16) 8 (16) 5 (10)	16 16 16 10 (16)	420
DN 100	25 31 41 50 60 80 100	400 850 1,400 1,750 3,000 4,200 4,700		16 16 16 10 (16) 10 (16) 6 (12) 4 (8)	500

*) Flow rate coefficient for natural gas: (ρ_b = 0.83 kg/m^3, t =15 °C)

SPECIFIC OUTLET PRESSURE RANGE FOR DIAPHRAGM ASSEMBLY 1			
Setpoint spring			Specific outlet pressure range W_{ds} in mbar
Spring no.	Wire Ø in mm	Colour coding	Measuring unit 1*
0	3.6	signal blue	20 to 30
1	4	grey	25 to 50
2	4.5	yellow	45 to 100
3	5.3	brown	90 to 200
4	6.3	light red	150 to 300
5	7	dark red	250 to 400
6	7.5	light blue	350 to 500
7	8.5	white	450 to 600
8	9.5	green	550 to 800
9	10.5	black	650 to 1,000

*) Version with incorporated Safety Relief Valve (SRV) or with additional safety diaphragm for outlet pressure ranges only up to $p_{d\,max}$ 0.5 bar

SPECIFIC OUTLET PRESSURE RANGE FOR DIAPHRAGM ASSEMBLY 2			
Setpoint spring			Specific outlet pressure range W_{ds} in mbar
Spring no.	Wire Ø in mm	Colour coding	Measuring unit 2
0	5	blue	20 to 30
1	6.3	grey	25 to 50
2	7	yellow	45 to100
3	8	brown	90 to 200
4	9	light red	150 to 300
5	10	dark red	250 to 400
6	11	light blue	350 to 500
7	12	white	450 to 600
8	13	green	550 to 800
9	14	black	650 to 1,000

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS		
Outlet pressure range (p_d range in mbar)	Accuracy Class AC	Lock-up pressure Class SG
20 to 30	10*/20	30*/50
> 30 to 100	5*/10	10*/20
> 100 to 500	5	10
> 500 to 1,000	2.5	10

*) Values apply to inlet pressure variation up to 6 bar max.

SETTING RANGE OF SSV CONTROL ELEMENT		
Actuator system	Overpressure W_{do} in bar	Underpressure W_{du}
K 1a	0.05 to 1.5	10 to 120 mbar
K 2a	0.4 to 5.2	60 to 400 mbar
K 4	0.04 to 0.5	5 to 60 mbar
K 5	0.2 to 1.5	15 to 120 mbar
K 6	0.6 to 4.5	40 to 300 mbar

Pilot-operated Gas Pressure Regulator According to DIN EN 334 (operating with auxiliary energy from the inlet pressure range) with Incorporated Direct-acting SSV According to DIN EN 334/14382

Max. admissible pressure PS = 16 bar

Max. inlet pressure $p_{u\,max}$ up to 16 bar

Outlet pressure range W_d 10 mbar up to 15 bar

Minimum pressure drop 0.2 bar, others on enquiry

Class of lock-up pressure zone SZ 2.5

SSV setting range
- W_{do} 50 mbar up to 4.5 bar
- W_{du} 5 mbar up to 300 mbar

Connection:
- DIN flange PN 16
- DN 25, 50, 80 and 100
- Other flanges on enquiry

- ☐ Device for offtake stations in gas transmission as well as commercial and industrial facilities
- ☐ Large inlet pressure range
- ☐ Various valve seat diameters for best adaptation to operating conditions
- ☐ High regulating accuracy
- ☐ Diaphragm assembly with inlet pressure compensation
- ☐ Optionally with pilot, models RMG 610 (RS 10d) or RMG 650
- ☐ Also available with Safety Shut-off Valve (SSV)

  DN 25, DN 50:
  Actuator systems K 1a, K 2a

  DN 80, DN 100:
  Actuator systems K 4, K 5, K 6
- ☐ Very easy to maintain thanks to exchangeable functional units (cartridge assembly)
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

RMG CE 0085

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

VALVE SPECIFICATIONS			
Pipe sizes	Valve seat diameter in mm	Flow rate coefficient K_G* in $m^3/(h \cdot bar)$	Face-to-face dimension in mm
DN 25	11 20 33	65 200 420	160 200 200
DN 50	20 33	200 500	230
DN 80	25 31 41 50	400 850 1,400 1,750	420
DN 100	25 31 41 50 60 80 100	400 850 1,400 1,750 3,000 4,200 4,700	500

*) Flow rate coefficient for natural gas: (ρb = 0.83 kg/m^3, t =15 °C)

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 610 (RS 10D)						
Load-limiting stage			Control stage			
Measuring unit	Wire Ø in mm	Specific outlet pressure range W_{ds} in bar	Measuring unit	Wire Ø in mm	Colour coding	Specific outlet pressure range W_{ds} in bar
M	3.3 (green)	0.1 to 1.5	N		white yellow green red blue	0.01 to 0.04 0.02 to 0.06 0.04 to 0.12 0.08 to 0.2 0.1 to 0.5
	5 (silver)	0.5 to 5	M		green blue brown	0.3 to 1.5 1 to 2.5 2 to 3.5

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS		
Outlet pressure range (p_d range)	**Accuracy Class** AC	**Lock-up pressure Class** SG
10 to 20 mbar	5	50
> 20 to 50 mbar	5	30
> 50 to 500 mbar	5	10
> 0.5 to 2.5 bar	2.5	10
> 2.5 to 5 bar	1	10
> 5 bar	1	5

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 650				
	Setpoint spring			**Specific outlet pressure range** W_{ds} in bar
	Spring no.	**Wire Ø** in mm	**Colour coding**	
Control stage	2 3 4	4.5 5 6.3	black grey brown	1 to 5 2 to 10* 5 to 15*
Automatic load-limiting stage		5	green	0.5 to 15 automatic: above p_d

*) only without SSV

SETTING RANGE OF SSV CONTROL ELEMENT		
Actuator system	**Overpressure** W_{do} in bar	**Underpressure** W_{du}
K 1a	0.05 to 1.5	10 to120 mbar
K 2a	0.4 to 5.2	60 to 400 mbar
K 4	0.04 to 0.5	5 to 60 mbar
K 5	0.2 to 1.5	15 to 120 mbar
K 6	0.6 to 4.5	40 to 300 mbar

Direct-acting Gas Pressure Regulator with Incorporated Direct-acting SSV According to DIN EN 334 / 14382

- ☐ Device for offtake stations in gas transmission as well as commercial and industrial facilities
- ☐ Excellent for dynamic regulating lines (i.e., gas furnaces)
- ☐ Diaphragm assembly with inlet pressure compensation optionally with Safety Relief Valve (SRV) or safety diaphragm
- ☐ Optionally available with Safety Shut-off Valve (SSV) with in-line flow
- ☐ Noise reduction optional
- ☐ Very easy to maintain due to exchangeable functional units (cartridge assembly)
- ☐ Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 20 bar

Max. inlet pressure $p_{u\ max}$ up to 20 bar

Outlet pressure range:
W_d 20 mbar up to 4 bar

Class of lock-up pressure zone SZ 2.5

SSV setting range
W_{do} 25 mbar up to 5.2 bar
W_{du} 5 mbar up to 400 mbar

SRV setting range
W_d 15 up to 90 mbar above p_{ds}

Connection:
DIN flange PN 16 or Class 150
according to ANSI 16.5,
DN 25 thru DN 150
Other flange types on enquiry

CE registration according to PED

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE FOR DIAPHRAGM ASSEMBLY 0			
Setpoint spring			Specific outlet pressure range W_{ds} in bar
Spring no.	Wire Ø in mm	Colour coding	unit 0
1	8.5	creme white	1 to 2.5
2	10	emerald green	2 to 4

SPECIFIC OUTLET PRESSURE RANGE FOR DIAPHRAGM ASSEMBLY 1			
Setpoint spring			Specific outlet pressure range W_{ds} in mbar
Spring no.	Wire Ø in mm	Colour coding	unit 1*
1	3.6	signal blue	20 to 30
2	4	grey	25 to 50
3	4.5	gentian blue	45 to 75
4	4.5	yellow	70 to 100
5	5.3	bright red	90 to 160
6	5.3	brown	150 to 200
7	6.3	hazel	190 to 260
8	6.3	light red	250 to 300
9	7	rape yellow	290 to 360
10	7	dark red	350 to 400
11	7.5	light blue	390 to 500
12	8.5	rape yellow	490 to 560
13	9	creme white	550 to 660
14	9.5	gentian blue	650 to 760
15	9.5	emerald green	750 to 800
16	10	bright red	790 to 900
17	10	black	890 to 1000

*) Version with incorporated Safety Relief Valve (SRV) or with additional safety diaphragm for outlet pressure ranges only up to $p_{d\ max}$ 0.5 bar

SPECIFIC OUTLET PRESSURE RANGE FOR DIAPHRAGM ASSEMBLY 2			
Setpoint spring			Specific outlet pressure range W_{ds} in mbar
Spring no.	Wire Ø in mm	Colour coding	unit 2*
1	5	signal blue	20 to 30
2	6.3	grey	25 to 50
3	7	gentian blue	45 to 75
4	7	yellow	70 to 100
5	8	bright red	90 to 160
6	8	brown	150 to 200
7	9	hazel	190 to 260
8	9	light red	250 to 300
9	10	rape yellow	290 to 360
10	10	dark red	350 to 400
11	11	light blue	390 to 500
12	11	rape yellow	490 to 560
13	12	creme white	550 to 660
14	12	gentian blue	650 to 760
15	13	emerald green	750 to 800
16	13	bright red	790 to 900
17	14	black	890 to 1000

*) Optionally with incorporated Safety Relief Valve (SRV) or with additional safety diaphragm for outlet pressure ranges only up to $p_{d\ max}$ 0.5 bar

SPECIFIC OUTLET PRESSURE RANGE FOR DIAPHRAGM ASSEMBLY 3			
Setpoint spring			Specific outlet pressure range W_{ds} in mbar
Spring no.	Wire Ø in mm	Colour coding	unit 3*
1	7	signal blue	20 to 30
2	7.5	grey	25 to 50
3	9	gentian blue	45 to 75
4	9.5	yellow	70 to 100
5	11	bright red	90 to 160
6	12	brown	150 to 250

*) Optionally with incorporated Safety Relief Valve (SRV)

VALVE SPECIFICATIONS								
Pipe sizes	Valve seat Ø in mm	Flow rate coefficient K_G* in $m^3/(h \cdot bar)$		Max. inlet pressure $\Delta p_{u\,max}$ in bar with diaphragm assembly				Face-to-face dimension in mm
		without noise reduction	with noise reduction	RE 0	RE 1	RE 2	RE 3	
DN 25	25 31	370 460	360 440	20	20			184
DN 50	50 31	1500 900	1300 800	20	20	20		254
DN 80	80 60	3000 2500	2700 2300	20		20	20	298
DN 100	100 80 60	4500 4000 3200	3600 3300 2900			10	10	352
DN 150	140 100	11900 6100	10400 5300				10	451

*) Flow rate coefficient for natural gas: (ρ_b = 0.83 kg/m^3, t =15 °C)

SETTING RANGE OF SSV CONTROL ELEMENT		
Actuator system	Overpressure W_{do}	Underpressure W_{du}
K 1a K 2a	25 mbar to 1.5 bar 400 mbar to 5.2 bar	5 mbar to 120 mbar 60 mbar to 400 mbar

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS								
Outlet pressure range (p_d range)	Accuracy Class AC (diaphragm assembly)				Lock-up pressure Class SG (diaphragm assembly)			
	RE 3	RE 2	RE1	RE 0	RE 3	RE 2	RE 1	RE 0
20 to 30 mbar	10	10	30		30	30	50	
> 30 to 100 mbar	10	10	10		20	20	30	
> 100 to 500 mbar	5	5	5		10	10	20	
> 0.5 to 1 bar		2.5	5			10	10	
> 1 to 2 bar				10				20
> 2 to 4 bar				5				10

Pilot-operated Gas Pressure Regulator According to DIN EN 334 (operating with auxiliary energy from the inlet pressure range) with Incorporated Direct-acting SSV According to DIN EN 334 / 14382

Max. admissible pressure PS = 20 bar

Max. inlet pressure $p_{u\ max}$ up to 20 bar

Outlet pressure range:
W_d 10 mbar to 15 bar
Class of lock-up pressure zone SZ 2.5
Minimum pressure drop 0.2 bar,
others on enquiry
SSV setting range
W_{do} 50 mbar to 20 bar
W_{du} 10 mbar to 15 bar
Connection:
DIN flange PN 16 and Class 150
according to ANSI 16.5,
DN 25 thru DN 150
Other flange types on enquiry

- Device for offtake stations in gas transmission as well as commercial and industrial facilities
- Large inlet pressure range
- Noise reduction optional
- High regulating accuracy
- Diaphragm assembly with inlet pressure compensation
- Optionally with pilot, models RMG 610 (RS 10d), RMG 650 and BD-RMG 600
- Optionally available with Safety Shut-off Valve (SSV) with in-line flow
- Very easy to maintain thanks to exchange-able functional units (cartridge assembly)
- Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

- All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 300 Gas Pressure Regulators Up to Class 150

VALVE SPECIFICATIONS					
Pipe sizes	Valve seat diameter in mm	Flow rate coefficient K_G* in $m^3/(h \cdot bar)$ without noise reduction	Flow rate coefficient K_G* in $m^3/(h \cdot bar)$ with noise reduction	Max. inlet pressure $\Delta p_{u\,max}$ in bar	Face-to- face dimension in mm
DN 25	25 31	370 460	360 440	20	184
DN 50	50 31	1500 900	1300 800	20	254
DN 80	80 60	3000 2500	2700 2300	20	298
DN 100	100 80 60	4500 4000 3200	3600 3300 2900	20	352
DN 150	140 100	11900 6100	10400 5300	20	451

*) Flow rate coefficient for natural gas: (ρ_b = 0.83 kg/m^3, t =15 °C)

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT BD-RMG 600				
Control stage				
Measuring unit	Setpoint spring: Spring no.	Setpoint spring: Wire Ø in mm	Setpoint spring: Colour coding	Specific outlet pressure range W_{ds} in bar
LP	1047 TX002 TX003	 3.7 4.5	blue light blue	15 mbar to 140 mbar 25 mbar to 200 mbar 150 mbar to 500 mbar
MP	1047 TX002 TX003	 3.7 4.5	blue light blue	140 mbar to 350 mbar 350 mbar to 2 bar 2 bar to 4 bar
HP	TX002 TX003	3.7 4.5	 light blue	700 mbar to 4 bar 4 bar to 8 bar

Series 300 Gas Pressure Regulators Up to Class 150

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 610 (RS 10D)						
Load-limiting stage			Control stage			
Measuring unit	Wire Ø in mm	Specific outlet pressure range W_{ds} in bar	Measuring unit	Wire Ø in mm	Colour coding	Outlet pressure range W_{ds}
M	3.3 (green)	0.1 to 1.5	N	2.5 3 3.5 4 5	white yellow green red blue	10 mbar to 40 mbar 20 mbar to 60 mbar 40 mbar to 120 mbar 80 mbar to 200 mbar 100 mbar to 500 mbar
	4.7 (silver)	0.5 to 5	M	3.3 4 4.7	green blue brown	300 mbar to 1.5 bar 1 to 2.5 bar 2 to 3.5 bar

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 650				
	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	Wire Ø in mm	Colour coding	
Control stage	2 3 4	4.5 5 6.3	black grey brown	1 to 5 2 to 10 5 to 15
Automatic load-limiting stage		5	green	to 15 automatic 0.5 above p_d

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS		
Outlet pressure range (p_d range)	Accuracy Class AC	Lock-up pressure Class SG
10 to 20 mbar	10	50
> 20 to 50 mbar	5	20
> 50 to 500 mbar	5	10
> 0.5 to 2.5 bar	2.5	10
> 2.5 to 5 bar	1	10
> 5 bar	1	5

SETTING RANGE OF SSV CONTROL ELEMENT		
Actuator system	Overpressure W_{do}	Underpressure W_{du}
K 1a	50 mbar to 2.3 bar	10 mbar to 300 mbar
K 2a	400 mbar to 7 bar	60 mbar to 1 bar
K 16	2 to 20 bar	
K17		2 bar to 15 bar

Pilot-operated Gas Pressure Regulator According to DIN EN 334 (operating with auxiliary energy from the inlet pressure range) with Incorporated SSV According to DIN EN 334/14382

Max. admissible pressure PS = 50 bar

Max. inlet pressure $p_{u\ max}$ up to 50 bar

Outlet pressure range:
W_d 20 mbar to 40 bar

Minimum pressure drop 0.5 bar, others on enquiry

Class of lock-up pressure zone SZ 2.5

Flange connection (optional):
- Output DN = Input DN

DN 25:
DIN flange PN 16, PN 25, Class 150 according to ANSI 16.5
- Output DN = 2 x Input DN

DN 50 thru DN 100:
DIN flange PN 16, PN 25, PN 40 and Flange Class 150 and Class 300 according to ANSI 16.5

- ☐ Device for offtake stations in gas transmission as well as power plants and industrial facilities
- ☐ Large inlet pressure range
- ☐ With inline Pilot RMG 620 or Pilot Series RMG 630 (externally)
- ☐ RMG 630-1 (formerly RMG 640), single-stage type for inlet pressure variation <15 bar
- ☐ Also available with Safety Shut-off Valve (SSV)

  DN 25 (PN 16): actuator system K 1a, K 2a

  DN 50 thru DN 100 (inlet pipe sizes):

  - K 4, K 5, K 6 (thru PN 25)
  - K 10a, K 16, K 17 (thru Class 300)

  SSV setting range
  W_{do} 40 mbar to 40 bar
  W_{du} 5 mbar to 40 bar
- ☐ Less parts, easy to maintain, quiet operation
- ☐ Noise reduction can be retrofitted.
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

RMG CE 0085

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 620				
Pilot	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	Wire Ø in mm	Colour coding	
Incorporated pilot	2	3.6	blue	0.02 to 0.15
	3	5.6	yellow	0.1 to 0.5
	4	6.3	brown	0.2 to 1
	5	7	red	0.5 to 2
	6	☐ 8/7	green	1 to 4

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 630				
	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	Wire Ø in mm	Colour coding	
Control stage	0	4.5	black	0.3 to 1*
	1	3.6	blue	0.5 to 2
	2	4.5	black	1 to 5
	3	5	grey	2 to 10
	4	6.3	brown	5 to 20
	5	7	red	10 to 40
Automatic load limiting stage		5	green	0.5 to 15 automatic: above p_d

SPECIFIC OUTLET PRESSURE RANGES WITH PILOT RMG 630-1 (FORMERLY RMG 640)				
	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	Wire Ø in mm	Colour coding	
Control stage	0	4.5	black	0.3 to 1*
	1	3.6	blue	0.5 to 2
	2	4.5	black	1 to 5
	3	5.6	grey	2 to 10
	4	6.3	brown	5 to 20
	5	7	red	10 to 40

*) Type with larger measuring diaphragm

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS WITH PILOT RMG 620		
Outlet pressure range (p_d range)	**Accuracy Class** AC	**Lock-up pressure Class** SG
20 mbar to 30 mbar	10*/20	30*/50
> 30 mbar to 100 mbar	5*/10	20*/30
> 100 mbar to 500 mbar	5*/10	10*/20
> 500 mbar to 2.5 bar	5	10
> 2.5 bar to 4 bar	1	10

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS WITH PILOT RMG 630		
Outlet pressure range (p_d range) in bar	**Accuracy Class** AC	**Lock-up pressure Class** SG
0.3 to 0.5	20	30
> 0.5 to 1	10	20
> 1 to 5	2.5	10
> 5 to 90	1	5

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS WITH PILOT RMG 630-1 (FORMERLY RMG 640)		
Outlet pressure range (p_d range) in bar	**Accuracy Class** AC	**Lock-up pressure Class** SG
0.3 to 1	20*/30	30*/50
> 1 to 3	20	30
> 3 to 5	10	20
> 5	2.5	10

*) Better accuracy and lock-up pressure classes apply if inlet pressure variation < 8 bar.

Series 400 Gas Pressure Regulators Up to Class 300

VALVE SPECIFICATIONS							
Pipe sizes	**DN 25**	**DN 50**	**DN 50/ DN 100**	**DN 80**	**DN 80/ DN 150**	**DN 100**	**DN 100/ DN 200**
K_G value* in $m^3/(h \cdot bar)$	350	1300	1500	3500	3800	5200	5500
Face-to-face dimension in mm for:							
DIN and Class 150 ANSI 16.5	184	254	310	298	400	352	430
Class 300 ANSI 16.5	-	267	310	318	400	368	430

*) Flow rate coefficient for natural gas: (ρ_b = 0.83 kg/m^3, t =15 °C)

SETTING RANGE OF SSV CONTROL ELEMENT		
Actuator system	**Overpressure** W_{do} in bar	**Underpressure** W_{du}
K 1a	0.05 to 1.5	10 to 120 mbar
K 2a	0.4 to 5.2	60 to 400 mbar
K 4	0.04 to 0.5	5 to 60 mbar
K 5	0.2 to 1.5	15 to 120 mbar
K 6	0.6 to 4.5	40 to 300 mbar
K 10a	0.05 to 1.5	10 to 120 mbar
K 16	0.8 to 40	
K 17		2 to 40 bar

Pilot-operated Gas Pressure Regulator According to DIN EN 334 (operating with auxiliary energy from the inlet pressure range) with Incorporated SSV According to DIN EN 334/14382

Max. admissible pressure PS = 16 bar

Max. inlet pressure $p_{u\ max}$ up to 16 bar

Outlet pressure range:
W_d 10 mbar to 15 bar
Minimum pressure drop 0.5 bar, others on enquiry
Class of lock-up pressure zone SZ 2.5

SSV setting range
W_{do} 40 mbar to 16 bar
W_{du} 5 mbar to 16 bar

Connection:
- Outlet DN = Inlet DN x 2
DIN flange PN 16, in DN 50/100, DN 80/150 and DN 100/200

- ☐ Device for offtake stations in gas transmission as well as power plants and industrial facilities
- ☐ Primary noise reduction measures
- ☐ Large inlet pressure range
- ☐ Various valve seat diameters for best adaptation to operating conditions
- ☐ Diaphragm assembly with inlet pressure compensation
- ☐ Also available with Safety Shut-off Valve (SSV)
  Actuator systems: K 4, K 5, K 6, K 10a, K 16, K 17
- ☐ Easy to maintain thanks to exchangeable functional units (cartridge assembly)
- ☐ Noise protection system also available with metal foam
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

RMG CE 0085

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

VALVE SPECIFICATIONS			
Pipe sizes	**Valve seat diameter** in mm	**Flow rate coefficient** K_G* in $m^3/(h \cdot bar)$	**Face-to-face dimension** in mm
DN 50/100	30 37 52	450 650 1150	450
DN 80/150	37 52 81	750 1400 2400	500
DN 100/200	52 81 102	1700 3400 3800	650

*) Flow rate coefficient for natural gas: (ρ_b = 0.83 kg/m³, t = 15 °C)

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 610 (RS 10D)						
Load limiting stage			**Control stage**			
Measuring unit	Wire Ø in mm	Specific outlet pressure range W_{ds} in bar	Measuring unit	Wire Ø in mm	Colour coding	Specific outlet pressure range W_{ds} in bar
M	3.3 (green)	0.1 to 1.5	N	2,5 3 3.5 4 5	white yellow green red blue	0.01 to 0.04 0.02 to 0.06 0.04 to 0.12 0.08 to 0.2 0.1 to 0.5
	5 (silver)	0.5 to 5	M	3.3 4 4.7	green blue brown	0.3 to 1.5 1 to 2.5 2 to 3.5

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 650	Setpoint spring			Outlet pressure range W_{ds}
	Spring no.	Wire Ø in mm	Colour coding	
Control stage	2 3 4	4.5 5 6.3	black grey brown	1 to 5 bar 2 to 10 bar 5 to 15 bar
Automatic load-limiting stage		5	green	0.5 to 15 automatic: above p_d

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS

Outlet pressure range (p_d range)	Accuracy Class AC	Lock-up pressure Class SG
10 to 20 mbar	20	50
> 20 to 30 mbar	10	30
> 30 to 50 mbar	10	20
> 50 to 100 mbar	5*/10	10*/20
> 100 to 500 mbar	5	10
> 0.5 to 2.5 bar	2.5	10
> 2.5 to 5 bar	1	10
> 5 bar	1	5

*) Better accuracy and lock-up pressure classes apply if inlet pressure variation < 8 bar.

SETTING RANGE OF SSV CONTROL ELEMENT

Actuator system	Overpressure W_{do} in bar	Underpressure W_{du}
K 4	0.04 to 0.5	5 to 60 mbar
K 5	0.2 to 1.5	15 to 120 mbar
K 6	0.6 to 4.5	40 to 300 mbar
K 10a	0.05 to 1.5	10 to 120 mbar
K 16	0.8 to 16	
K 17		2 to 16 bar

Max. inlet pressure $p_{u\ max}$ and max. inlet pressure difference $\Delta p_{u\ max}$ for gas pressure regulators and flow control valves

The following condition must be fulfilled to make sure that the accuracy and lock-up pressure classes of gas pressure regulators and volume control valves are observed as fixed during type examinations:

The inlet pressure p_u may exceed the $\Delta p_{u\ max}$ values stated in the tables by up to 100% but without exceeding the limit of the max. admissible pressure PS, on condition that inlet pressure changes do not exceed the value of $\Delta p_{u\ max}$.
(Example: see following page)

$\Delta p_{u\ max}$ of the regulating assembly is limited, not for reasons of strength, but to ensure accuracy. Inlet pressure changes with larger $\Delta p_{u\ max}$ values will have higher values with respect to accuracy and lock-up pressure classes.

However, the max. inlet pressure stated in brackets must not be exceeded!

For functional reasons, the max. inlet pressure difference $\Delta p_{u\ max}$ is usually equal to the value of the max. inlet pressure value $p_{u\ max}$.

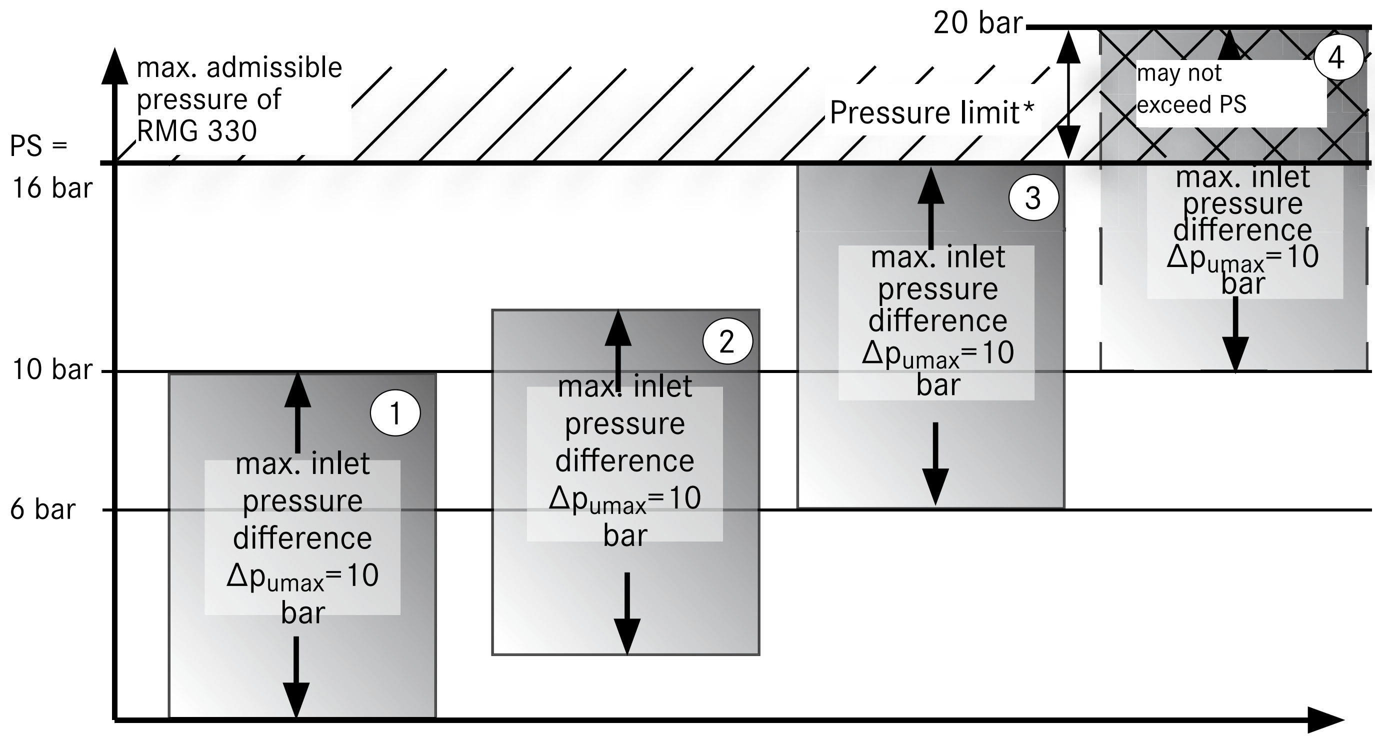
Example: RMG 330, DN 50, regulating assembly size 1, valve seat Ø 33 mm

According to the table, the max. inlet pressure difference $\Delta p_{u\,max}$ is 10 bar. That means all inlet pressure changes must stay below $\Delta p_{u\,max}$ = 10 bar in order not to compromise the stated accuracy and lock-up pressure classes.

On the basis of this range situated between p_{u1} = 0 bar and p_{u2} = 10 bar, the differential inlet pressure may be shifted. Calculating the max. inlet pressure that is attainable (in theory), we find $2 \cdot \Delta p_{u\,max} = p_{u\,max\,new}$ = 20 bar. In this particular case, however, the max. admissible pressure PS of this device sets the limit at 16 bar max. admissible inlet pressure (i.e., the value in brackets).

That means the usable inlet pressure range will be between min. p_{u1} = 0 bar and p_{u2} = 10 bar and max. p_{u1} = 6 bar and p_{u2} = 16 bar.

Note:
The diagram shows the admissible shift (3) of the max. inlet pressure difference $\Delta p_{u\,max}$ for the gas pressure regulator RMG 330. Everything beyond 16 bar is not admissible in this example. Section (4) is, therefore, out of reach. The upper limit is defined by section (3). A possible interim range is defined by section (2).



* The max. admissible pressure PS must not be exceeded!

Pilot-operated Gas Pressure Regulator According to DIN EN 334 (operating with auxiliary energy from the inlet pressure range)

Max. admissible pressure PS = 100 bar
Max. inlet pressure $p_{u\ max}$ up to 100 bar
Outlet pressure range:
W_d 0.3 bar to 90 bar
Min pressure drop approx. 1.5 bar, others on enquiry
Max. pressure drop 90 bar
Class of lock-up pressure zone SZ 2.5

Connection:
- Flange PN 40 and
- Flange Class 300,
  Class 600 according to ANSI 16.5

With pipe sizes inlet/outlet
- DN 25/50, DN 50/100, DN 80/150,
  DN 100/200, DN 150/300, DN 200/300

- ☐ Device for transfer stations in gas transport networks for power plants and industrial facilities
- ☐ Wide inlet pressure range
- ☐ Pilot Series RMG 630
- ☐ RMG 630-1 (formerly RMG 640), single-stage type for inlet pressure varation < 15 bar
- ☐ Outlet DN double as inlet DN
- ☐ Less parts, easy to maintain, quiet operation
- ☐ Grid plate for noise reduction
- ☐ Also available with metal foam for additional noise reduction
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

RMG
CE 0085

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 500 Gas Pressure Regulators Up to Class 600

VALVE SPECIFICATIONS			
Pipe sizes DN	Valve seat diameter in mm	Flow rate coefficient K_G* in $m^3/(h \cdot bar)$	Face-to-face dimension in mm
25/50	25	450	340
50/100	50	1,700	380
80/150	80	4,600	550
100/200	100	7,000	550
150/300	150	15,000	750
200/300	200	27,000	775

*) Flow rate coefficient for natural gas: (ρb = 0.83 kg/m³, t =15 °C)

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 630/630-1 (FORMERLY RMG 640)				
	Setpoint spring			Specific outlet pressure range W_d in bar
	Spring no.	Wire Ø in mm.	Colour coding	
Control stage	0	4.5	black	0.3 to 1**
	1	3.6	blue	0.5 to 2
	2	4.5	black	1 to 5
	3	5	grey	2 to 10
	4	6.3	brown	5 to 20
	5	7	red	10 to 40
Control stage with metal harmonica measuring unit	6	☐ 8/7	green	10 to 50
	7	9	white	20 to 90
Automatic load limiting stage		5	green	0.5 to 15 automatic: above p_d

**) Type with larger measuring diaphragm

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS WITH PILOT RMG 630		
Outlet pressure range (p_d range) in bar	Accuracy Class AC	Lock-up pressure Class SG
0.3 to 0.5	20	30
> 0.5 to 1	10	20
> 1 to 5	2.5	10
> 5	1	5

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS WITH PILOT RMG 630-1 (FORMERLY RMG 640)		
Outlet pressure range (p_d range) in bar	Accuracy Class AC	Lock-up pressure Class SG
0.3 to 1	20*/30	30*/50
> 1 to 3	20	30
> 3 to 5	10	20
> 5 to 10	5	10
> 10 to 40	2.5	10
> 40	1	5

*) Better accuracy and lock-up pressure classes apply if inlet pressure variation < 8 bar.

Series 500 Gas Pressure Regulators Up to Class 600

Pilot-operated Gas Pressure Regulator According to DIN EN 334 (operating with auxiliary energy from the inlet pressure range) with Incorporated SSV According to DIN EN 334/14382

- ☐ Device for transfer stations in gas transport networks for power plants and industrial facilities
- ☐ Wide inlet pressure range
- ☐ Outlet DN double as inlet DN
- ☐ Less parts, easy to maintain, quiet operation
- ☐ Grid plate for noise reduction
- ☐ Also available with metal foam for additional noise reduction
- ☐ Version with Safety Shut-off Valve (SSV), actuators K 1a, K 2a/1, K 2a/2, K 10a, K 11a/1, K 11a/2, K 16, K 17, K 18, K 19
- ☐ Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 100 bar
Max. inlet pressure $p_{u\,max}$ up to 100 bar
Outlet pressure range:
W_d 0.3 bar to 90 bar
Minimum pressure drop 1.5 bar
(4 bar for DN 25/25),
others on enquiry
Max. pressure drop 90 bar
Class of lock-up pressure zone SZ 2.5
SSV setting range for overpressure:
W_{do} 50 mbar to 90 bar
For underpressure:
W_{du} 10 mbar up to 90 bar

CE registration according to PED

Connection:
- DIN flange PN 40 and Class 150 according to ANSI 16.5 for DN 25/25
- Flange Class 300, Class 600 according to ANSI 16.5

With pipe sizes inlet/outlet
- DN 25/25, DN 25/50, DN 50/100, DN 80/150, DN 100/200, DN 150/300

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

VALVE SPECIFICATIONS			
Pipe sizes DN	**Valve seat diameter** in mm	**Flow rate coefficient** K_G* in $m^3/(h \cdot bar)$	**Face-to-face dimension** in mm
25/25	25	350	230
25/50	25	380	340
50/100	50	1,550	380
80/150	80	4,000	550
100/200	100	6,000	550
150/300	150	13,200	750

*) Flow rate coefficient for natural gas: ρ_b = 0.83 kg/m^3, t =15 °C

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 630 / 630-1 (FORMERLY RMG 640)				
	Setpoint spring			**Specific outlet pressure range** W_{ds} in bar
	Spring no.	**Wire Ø** in mm	**Colour coding**	
Control stage	0	4.5	black	0.3 to 1**
	1	3.6	blue	0.5 to 2
	2	4.5	black	1 to 5
	3	5	grey	2 to 10
	4	6.3	brown	5 to 20
	5	7	red	10 to 40
Control stage with metal-harmonica	6	☐ 8/7	green	10 to 50
	7	9	white	20 to 90
Automatic load limiting stage		5	green	0.5 to 15 automatic: above p_d

**) Type with larger measuring diaphragm

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS WITH PILOT RMG 630		
Outlet pressure range (p_d range) in bar	Accuracy Class AC	Lock-up pressure Class SG
0.3 to 0.5	20	30
> 0.5 to 1	10	20
> 1 to 5	2.5	10
> 5	1	5

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS WITH PILOT RMG 630-1 (FORMERLY RMG 640)		
Outlet pressure range (p_d range) in bar	Accuracy Class AC	Lock-up pressure Class SG
0.3 to 1	20*/30	30*/50
> 1 to 3	20	30
> 3 to 5	10	20
> 5 to 10	5	10
> 10 to 40	2.5	10
> 40	1	5

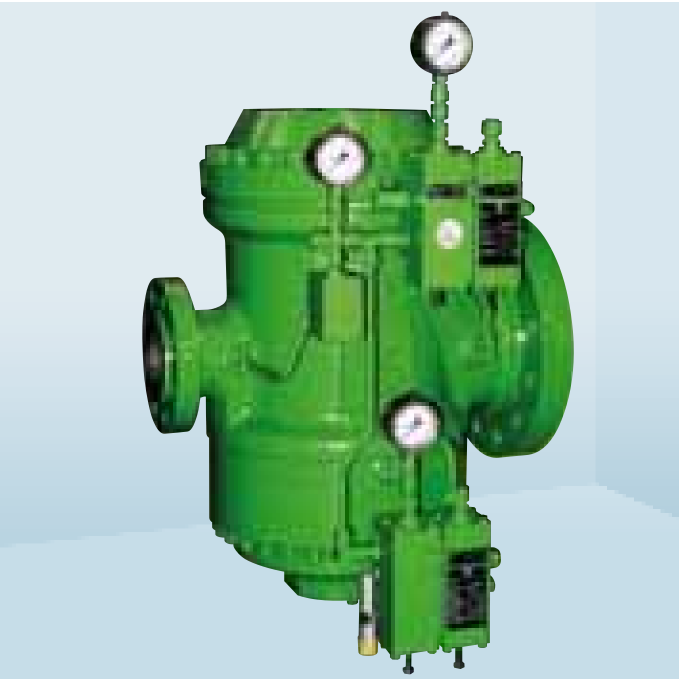
*) Better accuracy and lock-up pressure classes apply if inlet pressure variation < 8 bar.

SETTING RANGE OF SSV CONTROL ELEMENT		
Actuator system	Overpressure W_{do}	Underpressure W_{du} in bar
K 1a*	50 mbar to 1.5 bar	10 mbar to 120 mbar
K 2a/1*	40 mbar to 800 mbar	60 mbar to 400 mbar
K 2a/2*	2.5 to 8 bar	800 mbar to 2.2 bar
K 10a**	80 mbar to 1.5 bar	10 mbar to 120 mbar
K 11a/1**	400 mbar to 4.5 bar	60 mbar to 1 bar
K 11a/2**	2.5 to 8 bar	800 mbar to 2.2 bar
K 16	800 mbar to 40 bar	
K 17		2 to 40 bar
K 18	20 to 90 bar	
K 19		20 to 90 bar

*) only for size DN 25/25

**) not available for DN 25/25

Pilot-operated Active Gas Pressure Regulator According to DIN EN 334 (operating with auxiliary energy from the inlet pressure range)



- ☐ Device used for gas distribution
- ☐ Compact design
- ☐ Active and monitor regulator in one housing
- ☐ Active with fail-open function
- ☐ Monitor with fail-close function
- ☐ Less parts, easy to maintain
- ☐ Quiet operation
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

Max. admissible pressure PS = 100 bar
Max. inlet pressure $p_{u\ max}$ up to 100 bar
Outlet pressure range:
W_d 0.3 bar to 90 bar
Minimum pressure drop 2 bar, others on enquiry
Max. pressure drop 90 bar
Class of lock-up pressure zone SZ 2.5

Active regulator applicable with pilot:
- RMG 630 (two-stage design)
- RMG 630-1 (single-stage design) for inlet pressure variation up to 15 bar

Monitor regulator applicable with pilot:
- RMG 650 (single/double stage design)

Connection:
- DIN flange PN 40 and
- Flange Class 300, Class 600 according to ANSI 16.5

With pipe sizes inlet/outlet
- DN 50/100, DN 80/150, DN 100/200

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

VALVE SPECIFICATIONS			
Pipe sizes DN	**Valve seat diameter** in mm	**Flow rate coefficient** K_G* in $m^3/(h \cdot bar)$	**Face-to-face dimension** in mm
50/100	50	1,700	380
80/150	80	4,600	550
100/200	100	7,000	550

*) Flow rate coefficient for natural gas: ρ_b = 0.83 kg/m³, t = 15 °C

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 630/630-1 (FORMERLY RMG 640)				
	Setpoint spring			**Specific outlet pressure range** W_{ds} in bar
	Spring no.	**Wire Ø in mm**	**Colour coding**	
Control stage	0	4.5	black	0.3 to 1**
	1	3.6	blue	0.5 to 2
	2	4.5	black	1 to 5
	3	5	grey	2 to 10
	4	6.3	brown	5 to 20
	5	7	red	10 to 40
Control stage with metal-harmonica	6	□ 8/7	green	10 to 50
	7	9	white	20 to 90
Automatic load limiting stage		5	green	0.5 to 15 automatic: above p_d

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS WITH PILOT RMG 630		
Outlet pressure range (p_d range) in bar	**Accuracy Class** AC	**Lock-up pressure Class** SG
0.3 to 0.5	20	30
> 0.5 to 1	10	20
> 1 to 5	2.5	10
> 5	1	5

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS WITH PILOT RMG 630-1 (FORMERLY RMG 640)		
Outlet pressure range (p_d range) in bar	**Accuracy Class** AC	**Lock-up pressure Class** SG
0.3 to 1	20*/30	30*/50
> 1 to 3	20	30
> 3 to 5	10	20
> 5 to 10	5	10
> 10 to 40	2.5	10
> 40	1	5

*) Better accuracy and lock-up pressure classes apply if inlet pressure variation < 8 bar.

**) Type with larger measuring diaphragm.

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 650				
	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	Wire Ø in mm	Colour coding	
Control stage	0 1 2 3 4 5	4.5 3.6 4.5 5 6.3 7	black blue black grey brown red	0.3 to 1* 0.5 to 2 1 to 5 2 to 10 5 to 20 10 to 40
Control stage with metal-harmonica	6 7	☐ 8/7 9	green white	10 to 50 20 to 90
Automatic load-limiting stage		5	green	0.5 to 15 automatic: above p_d

*) Type with larger measuring diaphragm

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS WITH PILOT RMG 650 (SINGLE/DOUBLE STAGE) FOR MONITOR DEVICE		
Outlet pressure range (p_d range) in bar	Accuracy Class AC	Lock-up pressure Class SG
0.3 to 0.5	10	30
> 0.5 to 1	10	20
> 1 to 2.5	2.5	10
> 2.5 to 5	1	10
> 5	1	5

Pilot-operated Gas Pressure Regulator According to DIN EN 334 (operating with auxiliary energy from the inlet pressure range)

Max. admissible pressure PS = 100 bar

Max. inlet pressure $p_{u\ max}$ up to 100 bar

Outlet pressure range:

W_d 0.3 bar to 90 bar

Minimum pressure drop 1.5 bar, others on enquiry

Class of lock-up pressure zone SZ 2.5

Connection:

- DIN flange PN 25, PN 40
- Flange Classes 150, 300 and 600 according to ANSI 16.5 with pipe sizes inlet
- DN 25, DN 50,DN 80, DN 100, DN 150, DN 200, DN 250, DN 300 Flange Class 900 upon request

☐ Device for transfer stations in gas transport networks for power plants and industrial facilities

☐ Well suited for gas turbines due to exel-lent regulating dynamics

☐ Reverse flow protection as option

☐ Rugged and simple design

☐ High K_G values of pipe sizes due to axial flow

☐ Also available with reduced K_G values for best adaptation to operating conditions

☐ Can be supplied outlet DN = inlet DN or with noise-reducing outlet

☐ Suitable for complex pneumatic & electric automation systems

☐ Fail-close and fail-open function also available

☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

RMG CE 0085

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 500 Gas Pressure Regulators Up to Class 600

VALVE SPECIFICATIONS			
Pipe size Inlet (DN)	Pipe size Outlet (DN)	Valve seat diameter in mm	Flow rate coefficient K_G* in $m^3/(h \cdot bar)$
25	25 100 150	25	550 490 490
50	50 150 200	50	2,200 1,920 1,980
80	80 250	80	5,610 5,060
100	100 300	100	8,800 7,810
150	150 300 400	150	19,800 14,630 16,830
200	200 400 500	200	37,400 25,850 30,800
250	250 400 500	200	41,800 25,850 30,800
250	250 500 600	250	55,000 39,600 46,750

*) Flow rate coefficient for natural gas: $\rho_b = 0.83\ kg/m^3$, $t = 15\ °C$

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 630/630-1 (FORMERLY RMG 640)				
	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	Wire Ø in mm.	Colour coding	
Control stage	0 1 2 3 4 5	4.5 3.6 4.5 5 6.3 7	black blue black grey brown red	0.3 to 1** 0.5 to 2 1 to 5 2 to 10 5 to 20 10 to 40
Control stage with metal-harmonica	6 7	□ 8/7 9	green white	10 to 50 20 to 90
Automatic load limiting stage		5	green	0.5 to 15 automatic: above p_d

**) Type with larger measuring diaphragm

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS WITH PILOT RMG 650		
Outlet pressure range (p_d range) in bar	Accuracy Class AC	Lock-up pressure Class SG
0.3 to 0.5	10	30
> 0.5 to 1	10	20
> 1 to 2.5	2.5	10
> 2.5 to 5	1	10
> 5	1	5

FACE-TO-FACE DIMENSION IN mm						
Pipe size DN		Revised design version	Flange PN 25 + PN 40	Flange according to ANSI 16.5		
Inlet	Outlet			Class 300 RF	Class 300 RTJ	Class 600 RF/RTJ
25	25	b	200	197	210	210
	*100	b	360	359	365	365
	*150	b	360	359	365	365
50	50	b	270	267	283	286
	*150	b	422	421	429	430
	*200	b	422	421	429	430
80	80	b	310	318	333	337
	*250	b	512	516	523	525
100	100	b	370	368	384	394
	*300	b	548	548	555	560
150	150	c	508	508	508	508
	*300	c	550	550	550	550
	*400	c	550	550	550	550
200	200	c	610	610	610	610
	*400	c	650	650	650	650
	*500	c	650	650	650	650
**250	*250	c	630	630	630	630
	*400	c	660	660	660	660
	*500	c	660	660	660	660
250	250	c	752	752	752	752
	*500	c	752	752	752	752
	*600	c	752	752	752	752

*) with noise-reducing outlet (flange only Class 600)

**) with valve seat Ø 200

Electrically-operated Flow Control Valve, also with Incorporated SSV Up to DN 150/300 to Class 600 According to DIN EN 334/14382

Max. admissible pressure PS = 100 bar

Max. inlet pressure $p_{u\ max}$ up to 100 bar

SSV setting range

For overpressure:

W_{do} 0.08 bar to 90 bar

For underpressure:

W_{du} 0.01 bar to 90 bar

Connection:

- DIN flange PN 16, PN 40
- Flange according to ANSI 300, ANSI 600 in DN 50/100, DN 80/150, DN 100/200, DN 150/300 (Class 900 on enquiry)

Accessories

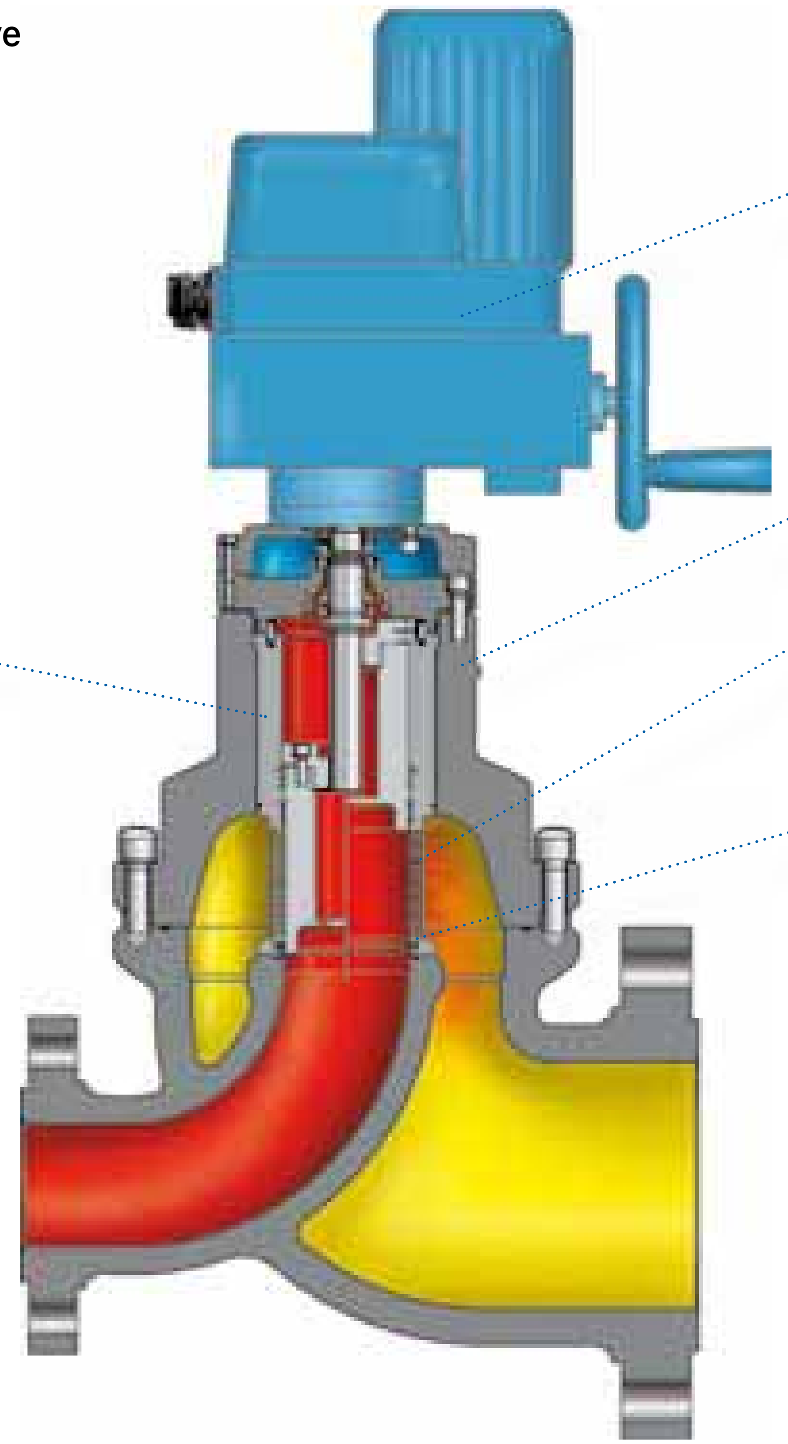
Electronic control (e.g., for pressure and flow)
Other regulating tasks according to customer's requirements

- ☐ Device for flow and pressure control tasks
- ☐ Safety Shut-off Valve (SSV) for: DN 25/50, DN 80/150 and DN 100/200 optionally: actuator systems K 10a, K 11a/1, K 11a/2, K 16, K 17, K 18, K 19
- ☐ Valve sleeve with full pressure compensation
- ☐ Noise reducing devices as a standard feature
- ☐ Bubble-tight shut-off
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

RMG 530-E
Flow Control Valve



VALVE SPECIFICATIONS FOR RMG 530-E WITHOUT SAFETY SHUT-OFF VALVE (SSV)			
Pipe sizes DN	**Valve seat diameter** in mm	**Flow rate coefficient** K_G* in $m^3/(h \cdot bar)$	**Face-to-face dimension** in mm
50/50	50	2,000	380
50/100	50	2,000	380
80/80	80	5,100	530
80/150	80	5,100	550
100/100	100	8,000	550
100/200	100	8,000	550
150/300	150	15,000	750

VALVE SPECIFICATIONS FOR RMG 530-E WITH SAFETY SHUT-OFF VALVE (SSV)			
Pipe sizes DN	**Valve seat diameter** in mm	**Flow rate coefficient** K_G* in $m^3/(h \cdot bar)$	**Face-to-face dimension** in mm
50/100	50	1,300	380
80/150	80	4,600	550
100/200	100	7,200	550

SETTING RANGE OF SSV CONTROL ELEMENT		
Actuator system	**Overpressure** W_{do} in bar	**Underpressure** W_{du} in bar
K 10a	0.08 to 1.5	0.01 to 0.12
K 11a/1	0.4 to 4.5	0.06 to 1
K 11a/2	2.5 to 8	0.8 to 2.2
K 16	0.8 to 40	
K 17		2 to 40
K 18	20 to 90	
K 19		20 to 90

*) Flow rate coefficient for natural gas: ρ_b = 0.83 kg/m^3, t = 15 °C

Flow Control Valve with Electric Actuator for Electronic Flow or Pressure Control According to DIN EN 334

Max. admissible pressure PS = 100 bar

Max. inlet pressure $p_{u\ max}$ up to 100 bar

Connection:
Flange Class 600 and Class 900
according to ANSI 16.5

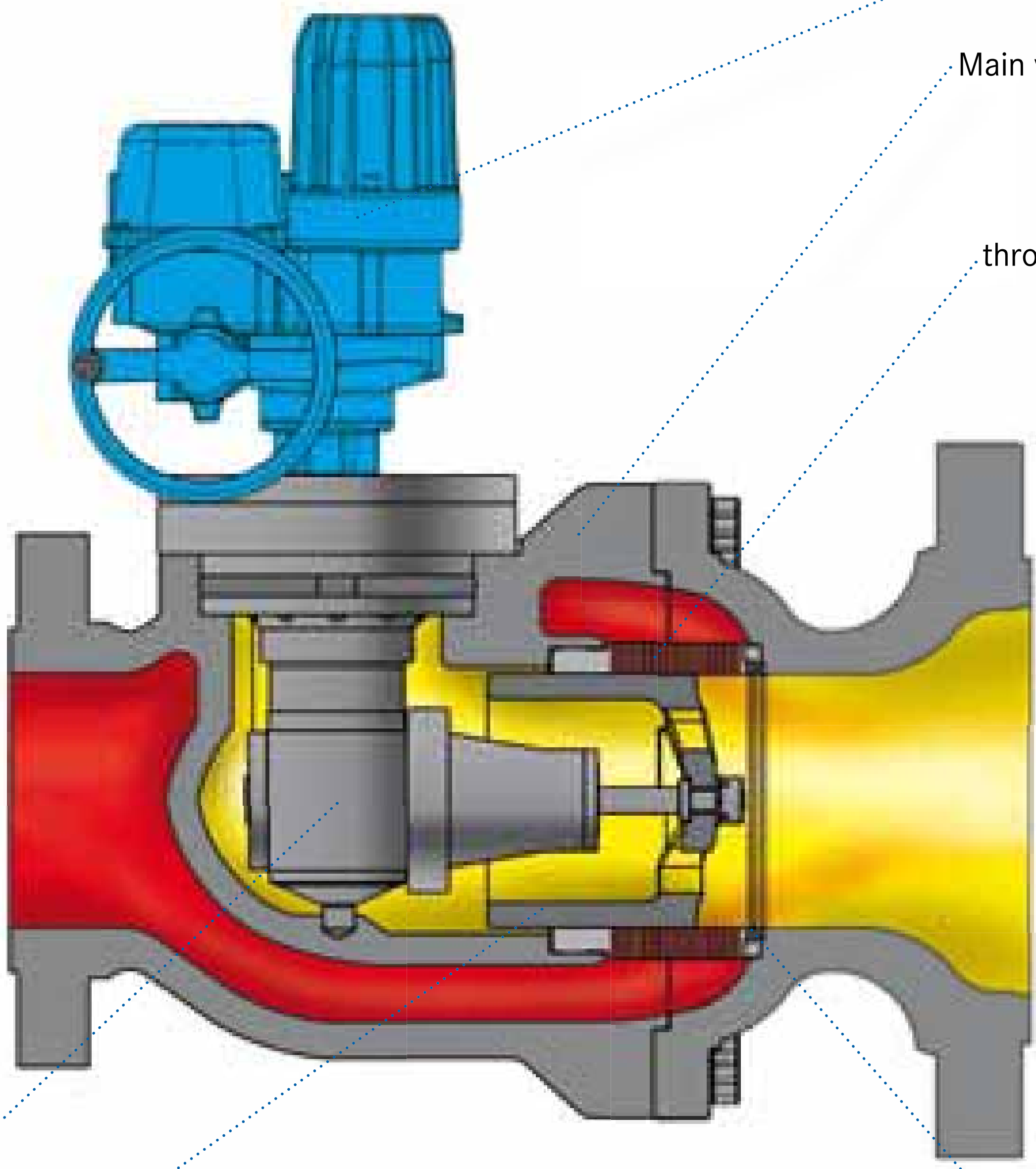
- ☐ For feeding gas into and/or withdrawing gas from gas storage facilities and important gas mains
- ☐ Valve sleeve with full pressure compensation
- ☐ Noise reducing devices as a standard feature
- ☐ Bubble-tight shut-off
- ☐ Axial flow high K_G value depending on the pipe size
- ☐ In case of a current failure → valve remains in last position
- ☐ Control speeds are frequency-dependent and are set by means of a frequency converter depending on operating conditions
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

RMG CE 0085

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Flow Control Valve RMG 530-E-WG DN 200/300



VALVE SPECIFICATIONS FOR DESIGN FOR PS UP TO 100 BAR			
Pipe size** DN	Valve seat diameter in mm	Flow rate coefficient K_G* in $m^3/(h \cdot bar)$	Face-to-face dimension in mm
200/200	200	30,000	720
200/250	200	30,000	783
200/300	200	30,000	803
250/250	200	30,000	850
250/300	200	30,000	870
300/300	300	54,000	900
400/400	400	90,000	1,150

*) Flow rate coefficient for natural gas: ρ_b = 0.83 kg/m^3, t = 15 °C

**) Other pipe sizes on enquiry

VALVE SPECIFICATIONS FOR DESIGN FOR PS UP TO 150 BAR			
Pipe size** DN	Valve seat diameter in mm	Flow rate coefficient K_G* in $m^3/(h \cdot bar)$	Face-to-face dimension in mm
200/200	200	27,000	760
300/300	300	50,000	960

Flow Control Valve with Pneumatic Actuator with Electrical/Pneumatic Position Control for Flow and Pressure Control Loops According to DIN EN 334

- Unit for volume and pressure control tasks
- High flow rate coefficient due to axial flow
- Valve sleeve with full pressure compensation
- May be operated bi-directionally
- Bubble-tight shut-off
- Optional design with noise reduction
- In case of current failure, valve may either remain in last position or closes at option
- Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 250 bar

Max. inlet pressure $p_{u\ max}$ up to 250 bar

Connection:
Flange Classes 600, 900 and 1500 according to ANSI 16.5
DN 80/80, DN 100/100, DN 150/150, DN 200/200, DN 250/250, DN 300/300

Class of lock-up pressure zone SZ 2.5

CE registration according to PED

- All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

VALVE SPECIFICATIONS FOR DESIGN FOR PS UP TO 250 BAR					
Pipe size** DN	**Valve seat diameter** in mm	**Pressure stage** in bar	**Flange**	**Flow rate coefficient** K_G* in $m^3/(h \cdot bar)$	**Face-to-face dimension** in mm
80/80	80	100	Class 600	4,500	337
100/100	100	100	Class 600	8,000	394
150/150	150	100	Class 600	14,500	508
200/200	170	250	Class 600, 900, 1500	22,000	1,000
250/250	170	250	Class 600, 900, 1500	22,000	1,000
300/300	170	250	Class 600, 900, 1500	22,000	1,000

*) Flow rate coefficient for natural gas: ρ_b = 0.83 kg/m^3, t =15 °C

**) Other pipe sizes on enquiry

Series 600 – Pilots for Pilot-operated Gas Pressure Regulators

OVERVIEW					
Type	Mode of operation	Max. inlet pressure $p_{u\,max}$ in bar	Outlet pressure range W_d in bar		
			Load-limiting/ control stage	Pilot stage	Differential pressure stage
RMG 610	Outlet pressure control	100	0.1 to 5	0.01 to 3.5	-
RMG 610...E	Inlet pressure control	80	0.1 to 5	0.01 to 6	-
RMG 610...D	Differential pressure control		0.1 to 5	-	0.006 to 1.2
RMG 620	Outlet pressure control	25	-	0.02 to 4	-
RMG 630	Outlet pressure control	100	0.5 to 15 above p_d	0.3 to 90	-
RMG 630-FE	Remote outlet pressure control by means of pressure loading		0.5 to 15 above p_d	0.3 to 90	-
RMG 638-EP	Electronic operational management		Depending on operation mode		
RMG630-1 formerly RMG 640)	Outlet pressure control		-	0.3 to 90	-
RMG 650	Outlet pressure control		0.5 to 15 above p_d	0.3 to 90	-
RMG 650-FE	Remote outlet pressure control by means of pressure loading		0.5 to 15 above p_d	0.3 to 90	-
RMG 652	Inlet pressure control		0.5 to 15 above p_d	0.3 to 90	-
RMG 655-EP	Electronic operational management		Depending on operation mode		
RMG 655-DP	Outlet and differential pressure control		0.5 to 15 above p_d	0.3 to 90	0.05 to 1.2
RMG 658-EP	Electronic operational management		Depending on operation mode		
RMG 658-DP	Outlet and differential pressure control with additional p_d stage		0.5 to 15 above p_d	0.3 to 90	0.05 to 1.2

Other designs on enquiry (e.g., pneumatic resultant value control systems).

Standard Pilots for Gas Pressure Regulators According to DIN EN 334

Max. admissible pressure PS = 100 bar

Max. inlet pressure $p_{u\,max}$ up to 100 bar

Outlet pressure range W_d 0.01 bar up to 3.5 bar

- ☐ Type RMG 610 **for outlet pressure**
  Type RMG 610 ...E **for inlet pressure**
  Type RMG 610 ...D **for differential pressure**
- ☐ Load-limiting and control stage in one housing (two-stage)
- ☐ Adaptable to various types of gas pressure regulators and regulating lines
- ☐ Equipped with loading pressure gauge and upstream fine mesh filter RMG 905
- ☐ May be equipped with electric remote setpoint adjustment and automatic load limiting stage
- ☐ Optionally with vent valve RMG 915
- ☐ Suitable for non-aggressive gases, other gases on enquiry
  Special version available for oxygen

CE registration according to PED in combination with RMG Gas Pressure Regulators
According to DIN EN 334, the pilot is an integral component of this device.

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 600 – Pilots for Pilot-operated Gas Pressure Regulators

VALVE SEAT DIAMETER	
Control stage	3.7 mm
Load-limiting stage	3.7 mm

SPECIFIC OUTLET PRESSURE RANGE FOR OUTLET PRESSURE CONTROL						
Load-limiting stage			Control stage			
Measuring unit	Wire Ø in mm	Specific outlet pressure range W_{ds} in bar	Measuring unit	Wire Ø in mm	Colour coding	Specific outlet pressure range W_{ds} in bar
M 0*	3.3 green	0.1 to 1.5	N	2.5 3 3.5 4 5	white yellow green red blue	0.01 to 0.04 0.02 to 0.06 0.04 to 0.12 0.08 to 0.2 0.1 to 0.5
	5 silver	0.5 to 5	M	3.3 4 4.7	green blue brown	0.3 to 1.5 1 to 2.5 2 to 3.5

SPECIFIC OUTLET PRESSURE RANGE FOR INLET PRESSURE CONTROL**						
Load-limiting stage			Control stage			
Measuring unit	Wire Ø in mm	Specific outlet pressure range W_{ds} in bar	Measuring unit	Wire Ø in mm	Colour coding	Specific outlet pressure range W_{ds} in bar
Optionally M, MD, 0*	3.3 green	0.1 to 1.5	NE	2.5 3 3.5 4 5	white yellow green red blue	0.01 to 0.04 0.02 to 0.06 0.04 to 0.12 0.08 to 0.2 0.1 to 0.5
	5 silver	0.5 to 5	ME	3.5 4 5	green red blue	0.1 to 0.7 0.4 to 1.5 0.8 to 2.5
	6 silver	2 to 8		6	silver	1.5 to 6

*) 0 = without load limiting stage

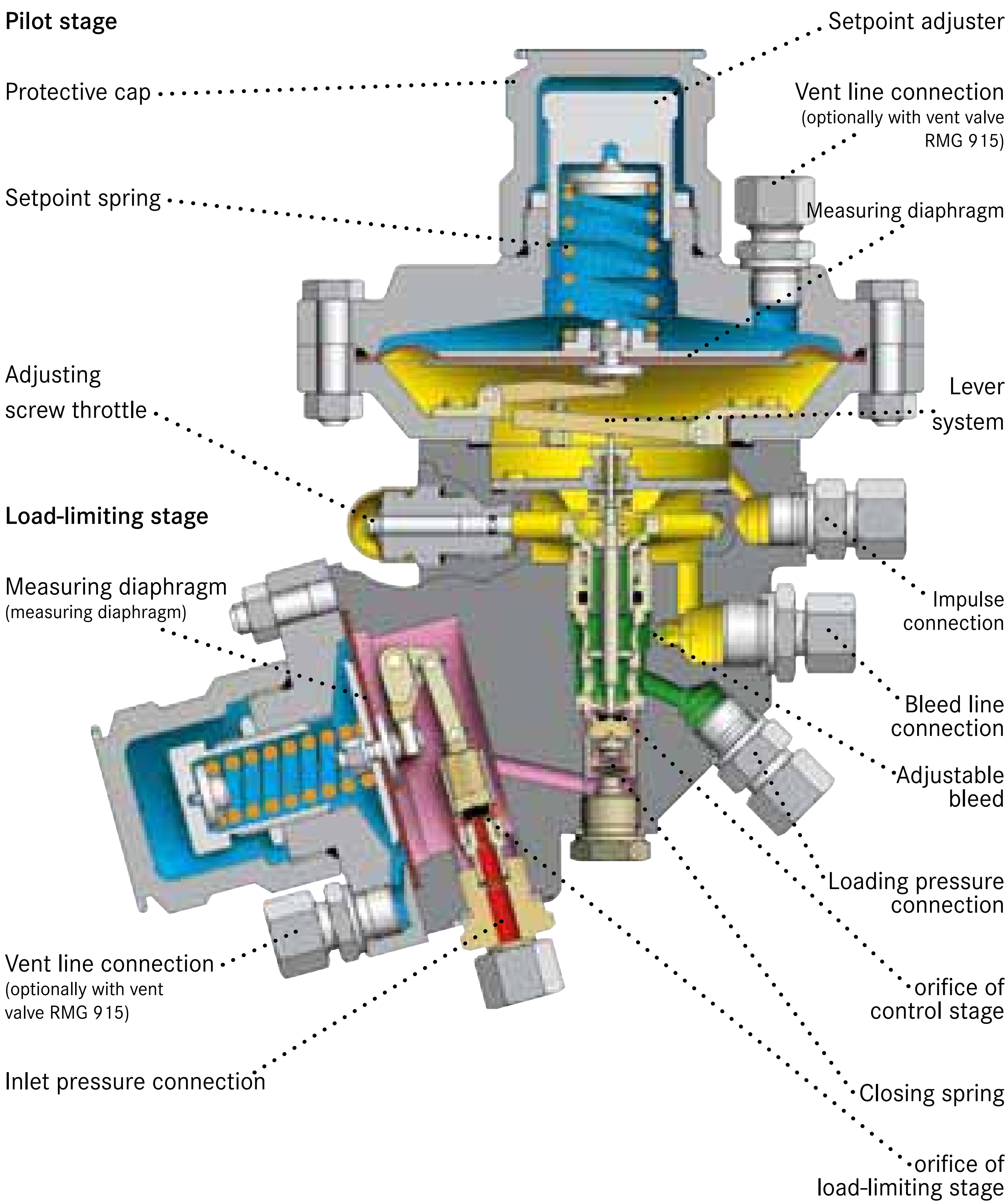
**) Optionally zero pressure control, underpressure control or resultant value control

Series 600 – Pilots for Pilot-operated Gas Pressure Regulators

SPECIFIC OUTLET PRESSURE RANGE FOR DIFFERENTIAL PRESSURE CONTROL						
Load-limiting stage			Control stage			
Measuring unit	Wire Ø in mm	Specific outlet pressure range W_{ds} in bar	Measuring unit	Wire Ø in mm	Colour coding	Specific outlet pressure range W_{ds} in bar
M 0*	3.3 green	0.1 to 1.5	ND	2.5 3 3.5 4 5	white yellow green red blue	0.01 to 0.04 0.02 to 0.06 0.04 to 0.12 0.08 to 0.2 0.1 to 0.5
M 0*	4.7 brown	0.5 to 5	MD	4	red	0.4 to 1.2

*) 0 = without load limiting stage

Sectional drawing of RMG 610 – version for outlet pressure control



Pilot for Pilot-operated Gas Pressure Regulator RMG 402 According to DIN EN 334

Max. admissible pressure PS = 25 bar

Max. inlet pressure $p_{u\,max}$ up to 25 bar

Outlet pressure range W_d 0.02 bar up to 4 bar

- ☐ Inline pilot for regulator RMG 402
- ☐ For **outlet pressure control**
- ☐ With auxiliary energy from inlet pressure
- ☐ Single-stage pilot with double diaphragm system for low outlet pressures
- ☐ Incorporated compensation of inlet pressure changes
- ☐ Optionally with vent valve RMG 915
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED in combination with RMG Gas Pressure Regulators

According to DIN EN 334, the pilot is an integral component of this device.

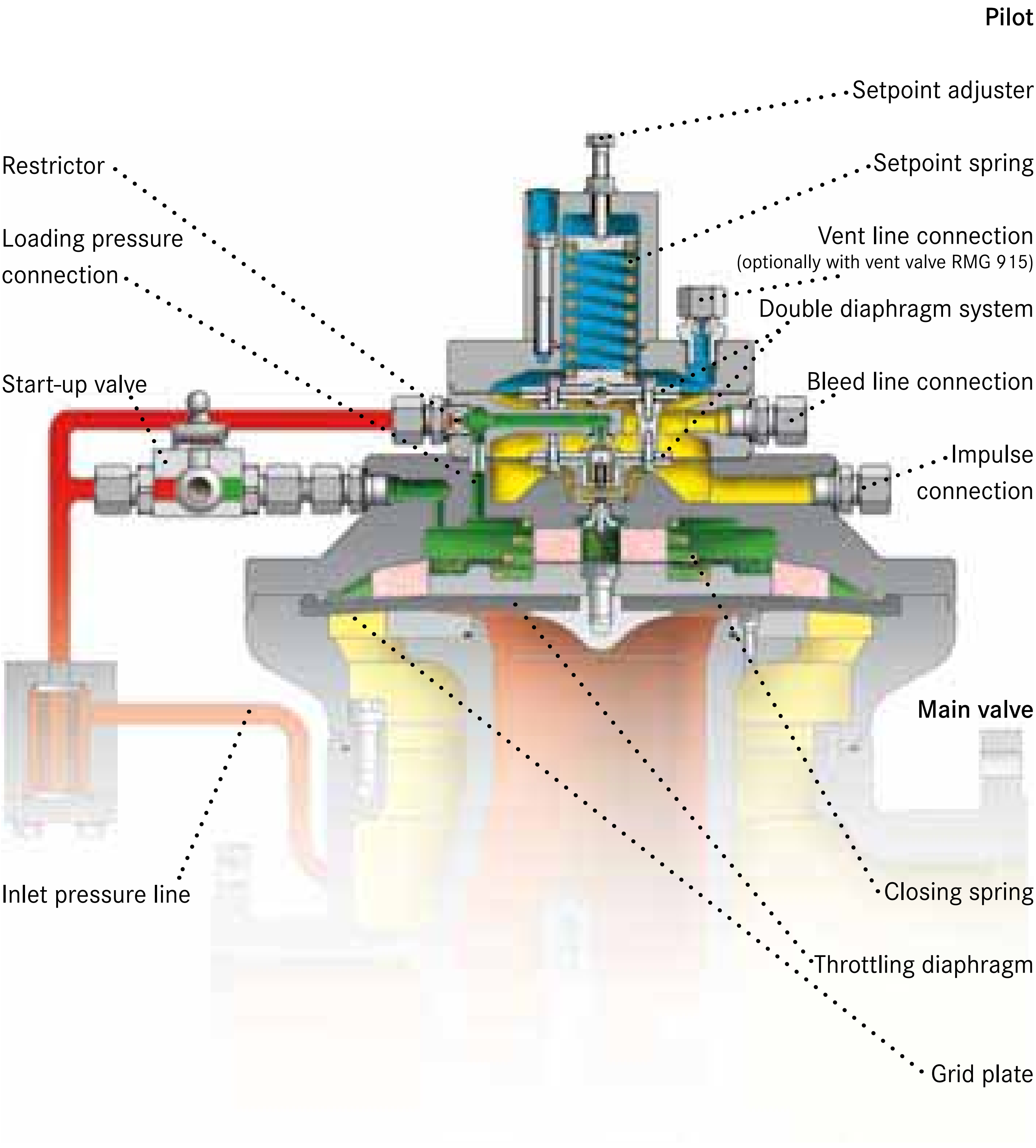
CE 0085

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE

Setpoint spring			Specific outlet pressure range W_{ds} in bar
Spring no.	**Wire Ø** in mm	**Colour coding**	
2	3.6	blue	0.02 to 0.15
3	5.6	yellow	0.1 to 0.5
4	6.3	brown	0.2 to 1
5	7	red	0.5 to 2
6	☐ 8/7	green	1 to 4

Sectional drawing of RMG 620
(component of the RMG 402 Gas Pressure Regulator)



Pneumatic Pilot for Gas Pressure Regulators with Throttling Diaphragm RMG 402, RMG 502, RMG 503, RMG 505 According to DIN EN 334

Max. admissible pressure PS = 100 bar

Max. inlet pressure $p_{u\ max}$ up to 100 bar

Outlet pressure range W_d 0.3 to 90 bar

- ☐ For **outlet pressure control**
- ☐ High regulating accuracy even in case of wide inlet pressure variation
- ☐ Double control stages, single-stage version optionally
- ☐ With inlet-pressure and loading-pressure gauges and upstream fine-mesh filter RMG 905, also available with outlet pressure gauge (optionally)
- ☐ Optionally with vent valve RMG 915
- ☐ Optionally with electric remote setpoint adjustment
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED in combination with RMG Gas Pressure Regulators
According to DIN EN 334, the pilot is an integral component of this device.

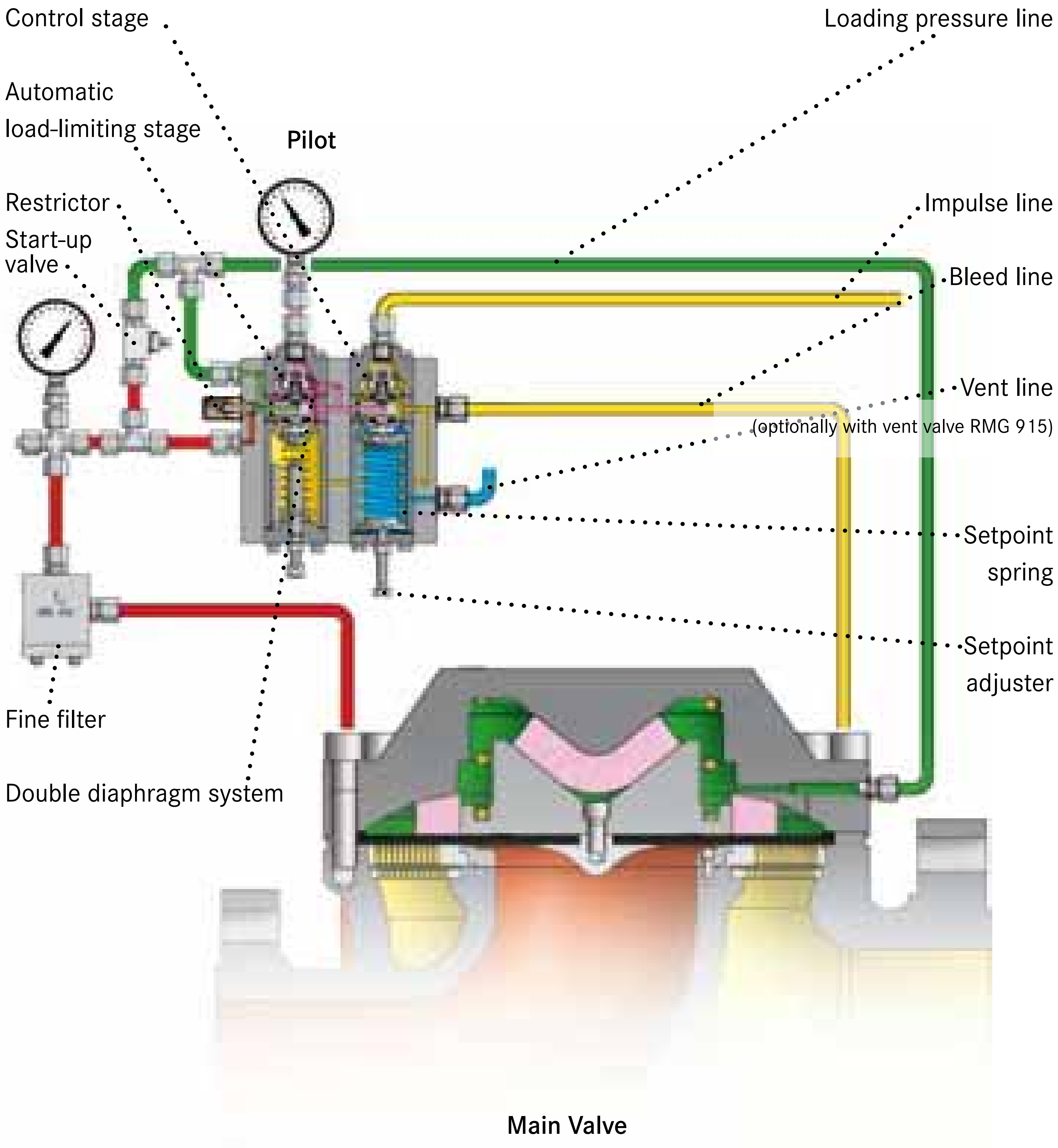
SPECIFIC OUTLET PRESSURE RANGE

	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	Wire Ø in mm	Colour coding	
Control stage with diaphragm measuring unit	0	4.5	black	0.3 to 1*
	1	3.6	blue	0.5 to 2
	2	4.5	black	1 to 5
	3	5	grey	2 to 10
	4	6.3	brown	5 to 20
	5	7	red	10 to 40
Control stage with metal-harmonica measuring unit	6	□ 8/7	green	10 to 50
	7	9	white	20 to 90
Automatic load-limiting stage		5	green	0.5 to 15 automatic: above p_d

*) Type with larger measuring diaphragm

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 600 – Pilots for Pilot-operated Gas Pressure Regulators



Pneumatic Pilot with Electric Remote Setpoint Adjustment RMG 402, RMG 502, RMG 503 According to DIN EN 334

- For **outlet pressure control**
- Pilot with electric setpoint adjustment for stations with variable outlet pressure
- Setpoint may be adjusted from control room or similar
- Manual setpoint adjustment on electric actuator is possible
- Optionally with vent valve 915
- Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 100 bar

Max. inlet pressure $p_{u\ max}$ up to 100 bar

Outlet pressure range W_d 0.3 to 90 bar

Electric actuator with drive shaft according to DIN/ISO 5210 T1 F10, fitted to control stage

Details concerning motor and electrical connections on enquiry

CE registration according to PED in combination with RMG Gas Pressure Regulators

According to DIN EN 334, the pilot is an integral component of this device.

- All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	Wire Ø in mm	Colour coding	
Control stage diaphragm measuring unit	0 1 2 3 4 5	4.5 3.6 4.5 5 6.3 7	black blue black grey brown red	> 0.3 to 1* 0.5 to 2 1 to 5 2 to 10 5 to 20 10 to 40
Control stage metal-harmonica measuring unit	6 7	☐ 8/7 9	green white	10 to 50 20 to 90
Automatic load-limiting stage		5	green	0.5 to 15 automatic: above p_d

*) Type with larger measuring diaphragm

Specific outlet pressure range W_{ds} in bar	Without impulse control in bar/min
0.3 to 1*	0.057
0.5 to 2	0.17
1 to 5	0.32
2 to 10	0.65
5 to 20	1.5
10 to 40	3.49
10 to 50	6.12
20 to 90	7.17

*) Type with larger measuring diaphragm

A speed control may be used to slow down setpoint adjustment.

Series 600 – Pilots for Pilot-operated Gas Pressure Regulators

Pilot $p_{d\ min}$, $p_{d\ max}$ with Electric/pneumatic Loading Pressure Stage for Gas Pressure Regulators with Throttling Diaphragm RMG 402, RMG 502, RMG 503, RMG 505 According to DIN EN 334

Max. admissible pressure PS = 100 bar

Max. inlet pressure pu max up to 100 bar

Pilot RMG 638-EP consists of functional modules on a common base plate:

1st stage	automatic load-limiting stage
2nd stage	pilot stage controlling the lower outlet pressure limit $p_{d\ min}$
3rd stage	pilot stage controlling the upper outlet pressure limit $p_{d\ max}$
4th stage	electro-pneumatic loading pressure stage converting electric signals into pneumatic signals

The pneumatic pressure control stages are monitoring the preset limit values.
As soon as outlet pressure gets close to these limits during operation, the pneumatic pressure control stages take over and keeps the pressure constant. Transition from electronic control to pneumatic control is effected automatically and will be operated smoothly in both directions.

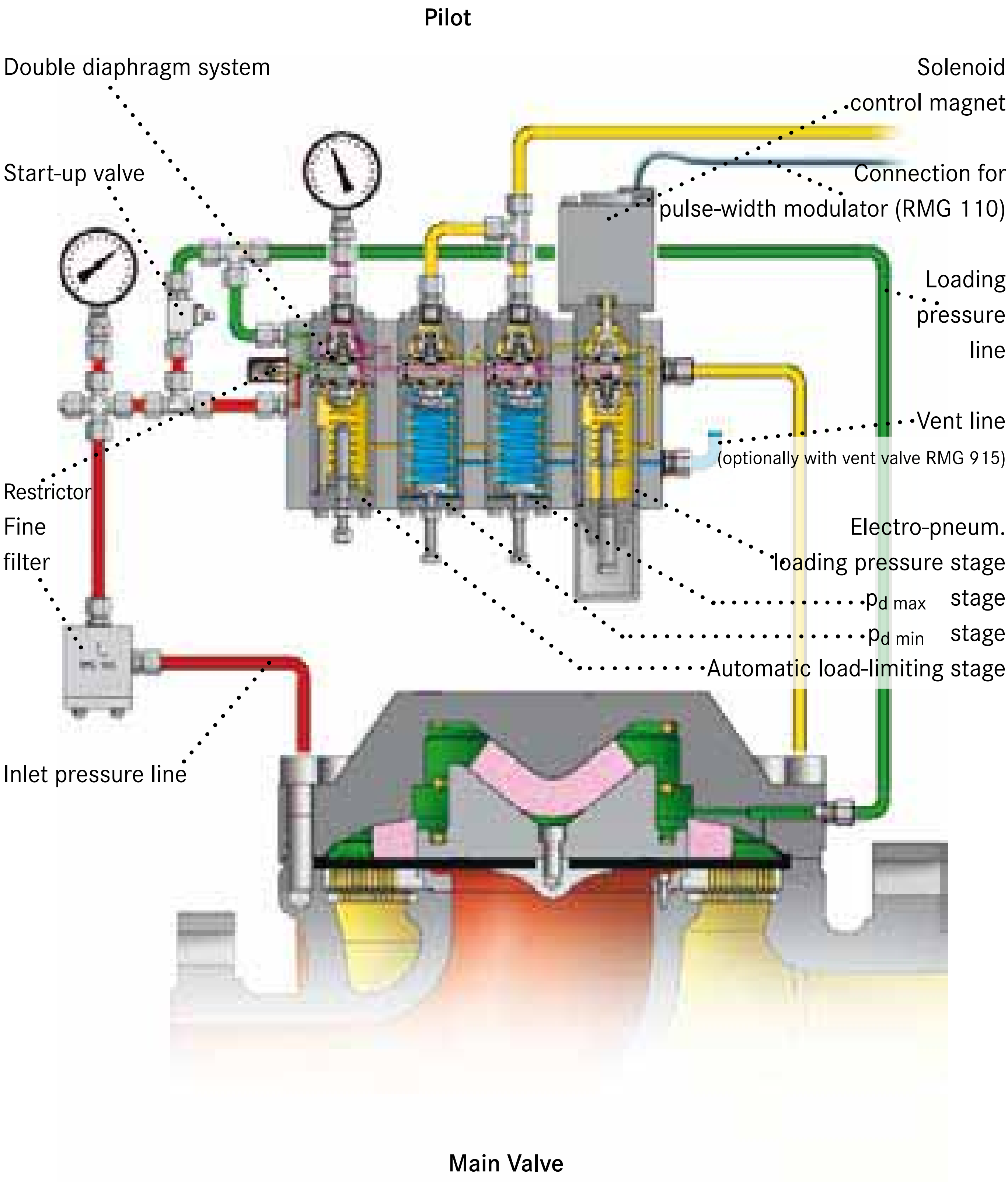
The following operation modes may be realized between the two pressure limits:

- ☐ Remote setpoint adjustment
  - adaption of setpoints due to frequently changing operating conditions
  - integration into process control systems
- ☐ Flow control, optimising efficient gas supply
  - gas storage in networks and tanks
  - meter protection by means of actual flow limitation
- ☐ Pressure control
  - meter protection by means of actual flow limitation
  - acc. to defined pressure curves throughout a day or week
  - to improve regulating accuracy and stability due to electronic PI or PID control

CE registration according to PED in combination with RMG Gas Pressure Regulators
According to DIN EN 334, the pilot is an integral component of this device.

Pulse-width modulator RMG 110a - see p. 144

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.


Pilot
Double diaphragm system
Start-up valve
Solenoid control magnet
Connection for pulse-width modulator (RMG 110)
Loading pressure line
Vent line
(optionally with vent valve RMG 915)
Restrictor
Fine filter
Electro-pneum. loading pressure stage
pd max stage
pd min stage
Automatic load-limiting stage
Inlet pressure line
Main Valve

Pneumatic Pilot for Pilot-operated Gas Pressure Regulators with Throttling Diaphragms RMG 402, RMG 502, RMG 503 According to DIN EN 334

- For **outlet pressure control**
- With inlet pressure gauge and upstream fine-mesh filter RMG 905, also available with outlet pressure gauge (optionally)
- Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED in combination with RMG Gas Pressure Regulators
According to DIN EN 334, the pilot is an integral component of this device.

Max. admissible pressure PS = 100 bar

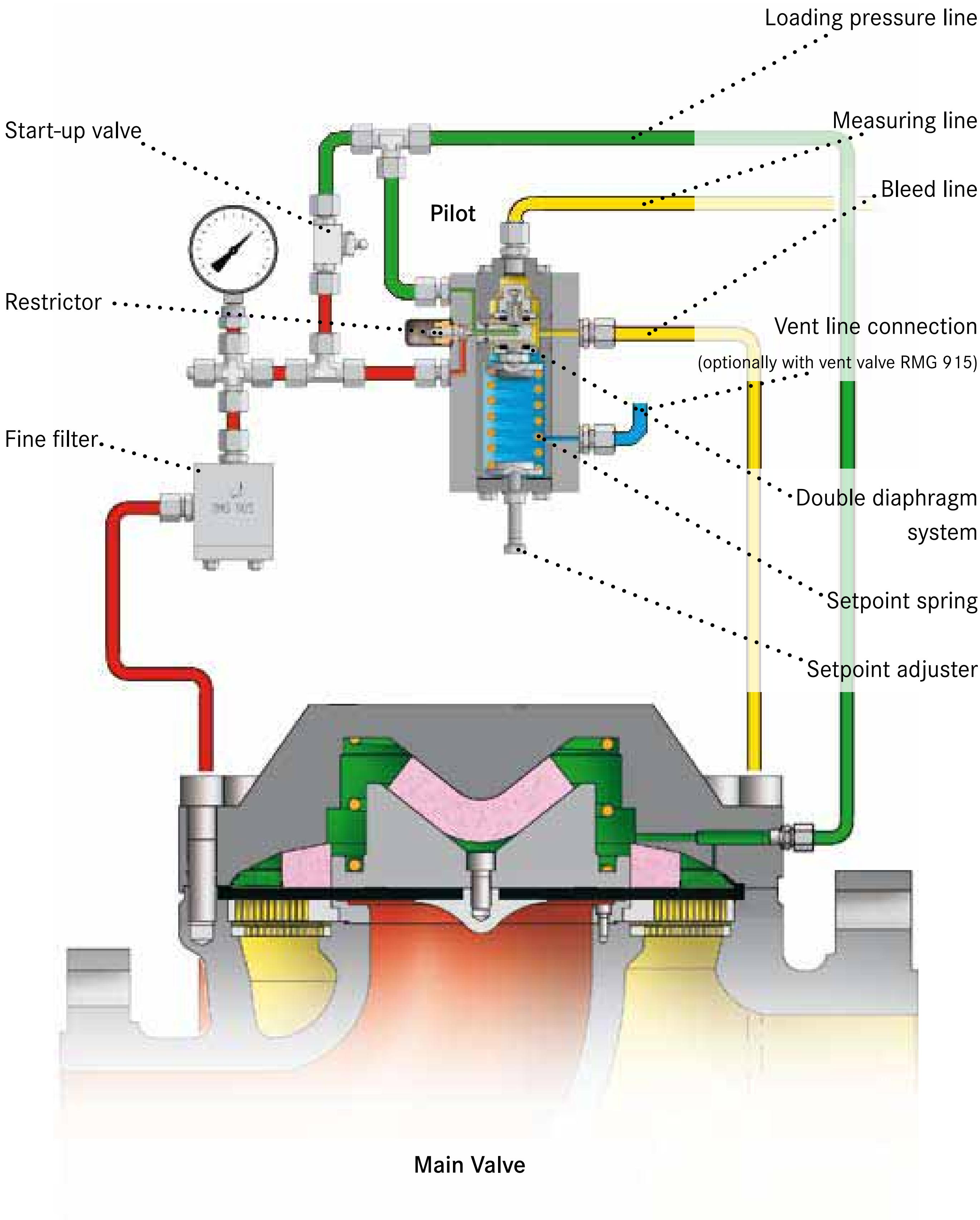
Max. inlet pressure $p_{u\,max}$ up to 100 bar

Outlet pressure range W_d 0.3 bar up to 90 bar

SPECIFIC OUTLET PRESSURE RANGE	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	Wire Ø in mm.	Colour coding	
Control stage diaphragm measuring unit	0	4.5	black	> 0.3 to 1*
	1	3.6	blue	0.5 to 2
	2	4.5	black	1 to 5
	3	5	grey	2 to 10
	4	6.3	brown	5 to 20
	5	7	red	10 to 40
Control stage metal-harmonica measuring unit	6	□ 8/7	green	10 to 50
	7	9	white	20 to 90

*) Type with larger measuring diaphragm

- All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.


Loading pressure line
Start-up valve
Measuring line
Bleed line
Pilot
Restrictor
Vent line connection
(optionally with vent valve RMG 915)
Fine filter
Double diaphragm system
Setpoint spring
Setpoint adjuster
Main Valve

Standard-design Pneumatic Pilots for Gas Pressure Regulators According to DIN EN 334

- ☐ For **outlet pressure control**
- ☐ High regulating accuracy even in case of wide inlet pressure variation
- ☐ Double control stages, single-stage version option
- ☐ With inlet-pressure and loading-pressure gauges and upstream fine-mesh filter RMG 905, also available with outlet pressure gauge (optionally)
- ☐ Optionally with vent valve RMG 915
- ☐ Optionally with electric remote setpoint adjustment
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED in combination with RMG Gas Pressure Regulators
According to DIN EN 334, the pilot is an integral component of this device.

Max. admissible pressure PS = 100 bar
Max. inlet pressure $p_{u\,max}$ up to 100 bar
Outlet pressure range W_d 0.3 bar up to 90 bar

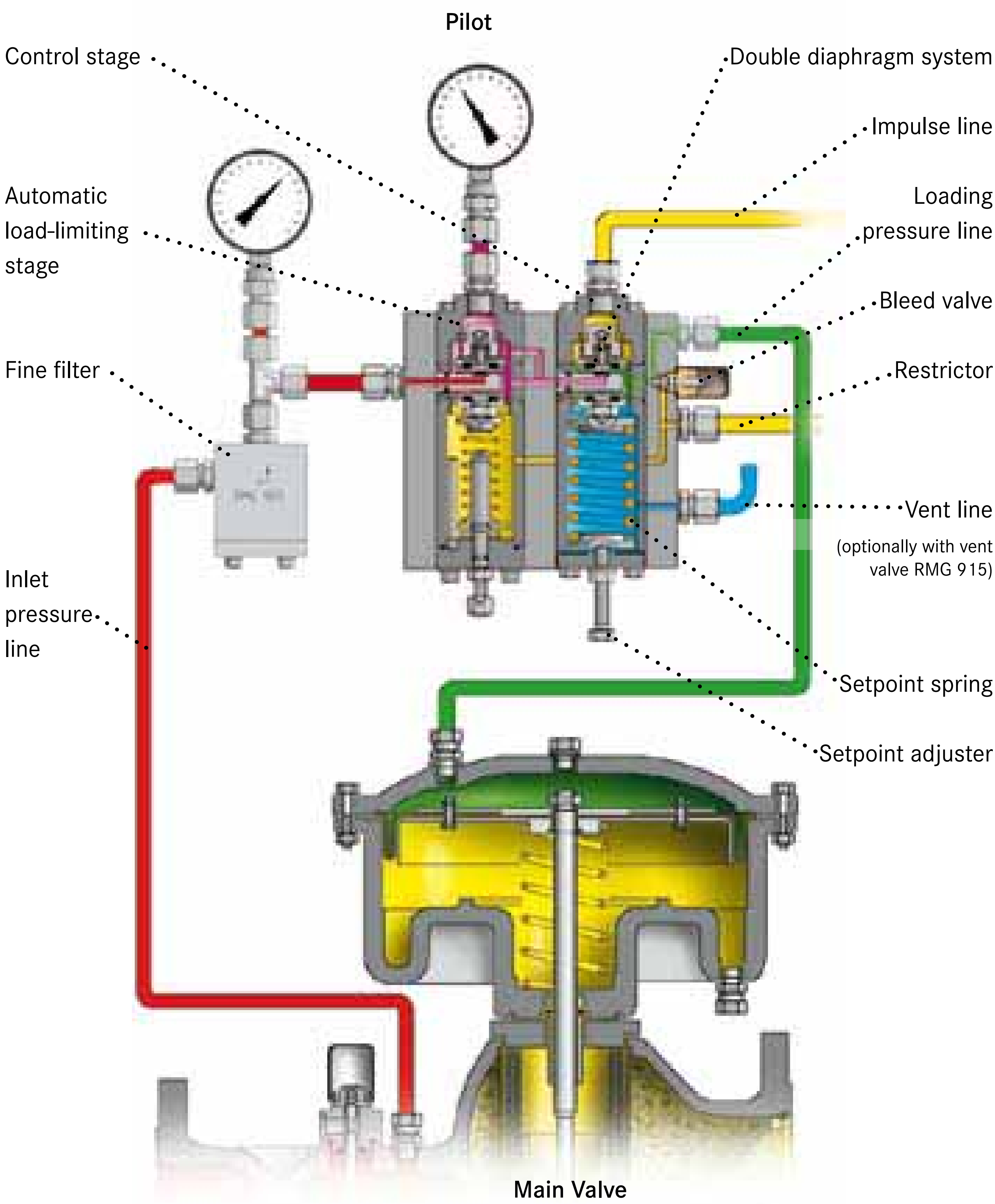
SPECIFIC OUTLET PRESSURE RANGE

	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	Wire Ø in mm	Colour coding	
Control stage diaphragm measuring unit	0	4.5	black	0.3 to 1*
	1	3.6	blue	0.5 to 2
	2	4.5	black	1 to 5
	3	5	grey	2 to 10
	4	6.3	brown	5 to 20
	5	7	red	10 to 40
Control stage with metal-harmonica measuring unit	6	☐ 8/7	green	10 to 50
	7	9	white	20 to 90
Automatic load-limiting stage		5	green	0.5 to 15 automatic: above p_d

*) Type with larger measuring diaphragm

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 600 – Pilots for Pilot-operated Gas Pressure Regulators



Pneumatic Pilot with Electric Remote Setpoint Adjustment According to DIN EN 334

Max. admissible pressure PS = 100 bar
Max. inlet pressure $p_{u\ max}$ up to 100 bar
Outlet pressure range W_d 0.3 bar up to 90 bar

Details concerning motor and electrical connections on enquiry.

- ☐ For outlet pressure control
- ☐ Pilot with electric remote setpoint adjustment for stations with variable outlet pressure
- ☐ Setpoint may be adjusted from control room or similar
- ☐ Electric actuator with drive shaft according to DIN/ISO 5210 T1 F10, fitted to control stage
- ☐ Manual setpoint adjustment on electric actuator is possible
- ☐ Optionally with vent valve RMG 915
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED in combination with RMG Gas Pressure Regulators
According to DIN EN 334, the pilot is an integral component of this device.

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE FOR RMG 650-FE				
	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	Wire Ø in mm	Colour coding	
Control stage diaphragm measuring unit	0 1 2 3 4 5	4.5 3.6 4.5 5 6.3 7	black blue black grey brown red	0.3 to 1* 0.5 to 2 1 to 5 2 to 10 5 to 20 10 to 40
Control stage with metal-harmonica measuring unit	6 7	☐ 8/7 9	green white	10 to 50 20 to 90
Automatic load-limiting stage		5	green	0.5 to 15 automatic: above p_d

*) Type with larger measuring diaphragm

SPECIFIC OUTLET PRESSURE RANGE FOR THE ELECTRONIC STEERING OF RMG 650-FE	
Specific outlet pressure range W_{ds} in bar	Without impulse control in bar/min
0.3 to 1*	0.057
0.5 to 2	0.17
1 to 5	0.32
2 to 10	0.65
5 to 20	1.5
10 to 40	3.49
10 to 50	6.12
20 to 90	7.17

*) Type with larger measuring diaphragm

Pilot for Inlet Pressure Control According to DIN EN 334

- For **inlet pressure control**
- Double control stages, single-stage version optional
- With an inlet-pressure and loading-pressure gauge and upstream fine-mesh filter RMG 905
- Optionally with vent valve RMG 915
- Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED in combination with RMG Gas Pressure Regulators
According to DIN EN 334, the pilot is an integral component of this device.

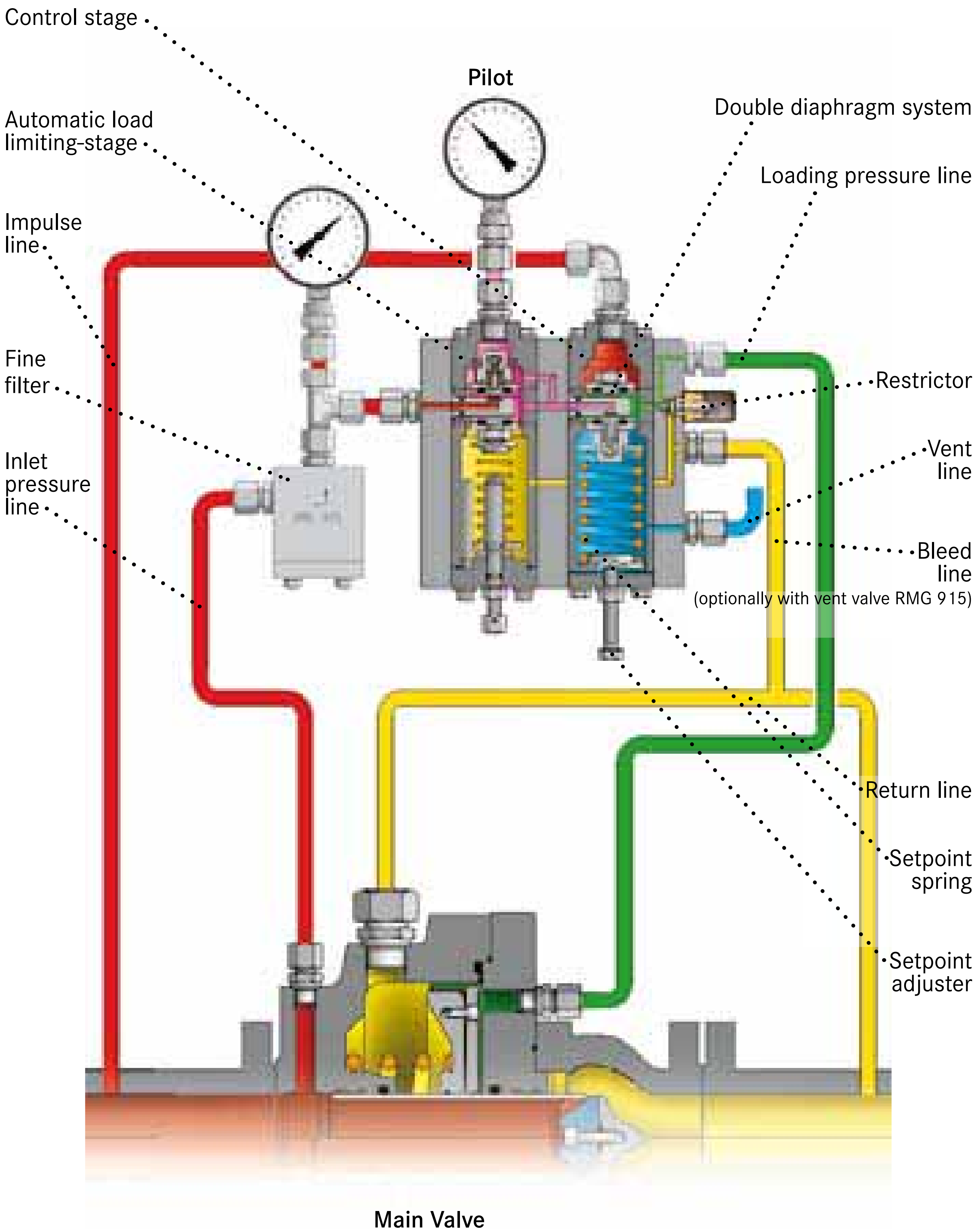
Max. admissible pressure PS = 100 bar
Max. inlet pressure $p_{u\ max}$ up to 100 bar
Outlet pressure range W_d 0.3 bar up to 90 bar

SPECIFIC INLET PRESSURE RANGE FOR RMG 652

	Setpoint spring			Specific inlet pressure range W_{us} in bar
	Spring no.	Wire Ø in mm	Colour coding	
Control stage diaphragm measuring unit	0	4.5	black	0.3 to 1*
	1	3.6	blue	0.5 to 2
	2	4.5	black	1 to 5
	3	5	grey	2 to 10
	4	6.3	brown	5 to 20
	5	7	red	10 to 40
Control stage with metal-harmonica measuring unit	6	□ 8/7	green	10 to 50
	7	9	white	20 to 90
Automatic load-limiting stage		5	green	0.5 to 10 automatic: above p_d

*) Type with larger measuring diaphragm

- All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.


Control stage
Pilot
Automatic load limiting-stage
Double diaphragm system
Loading pressure line
Impulse line
Fine filter
Restrictor
Vent line
Inlet pressure line
Bleed line
(optionally with vent valve RMG 915)
Return line
Setpoint spring
Setpoint adjuster
Main Valve

Pilot with Electric/Pneumatic Loading Pressure Stage According to DIN EN 334

Max. admissible pressure PS = 100 bar

Max. inlet pressure $p_{u\ max}$ up to 100 bar

Pilot RMG 655-EP consists of functional modules on a common base plate:

1st stage	Automatic load-limiting stage
2nd stage	Pilot stage for the upper outlet pressure limit $p_{d\ max}$ optionally $p_{d\ min}$
3rd stage	Electro-pneumatic loading pressure stage converting electrical signals into pneumatic signals

The pneumatic pressure control stages are monitoring the preset limit values.
As soon as outlet pressure gets close to these limits during operation, the pneumatic pressure control stages take over and keeps the pressure constant. Transition from electronic control to pneumatic control is effected automatically and will be operated smoothly in both directions.

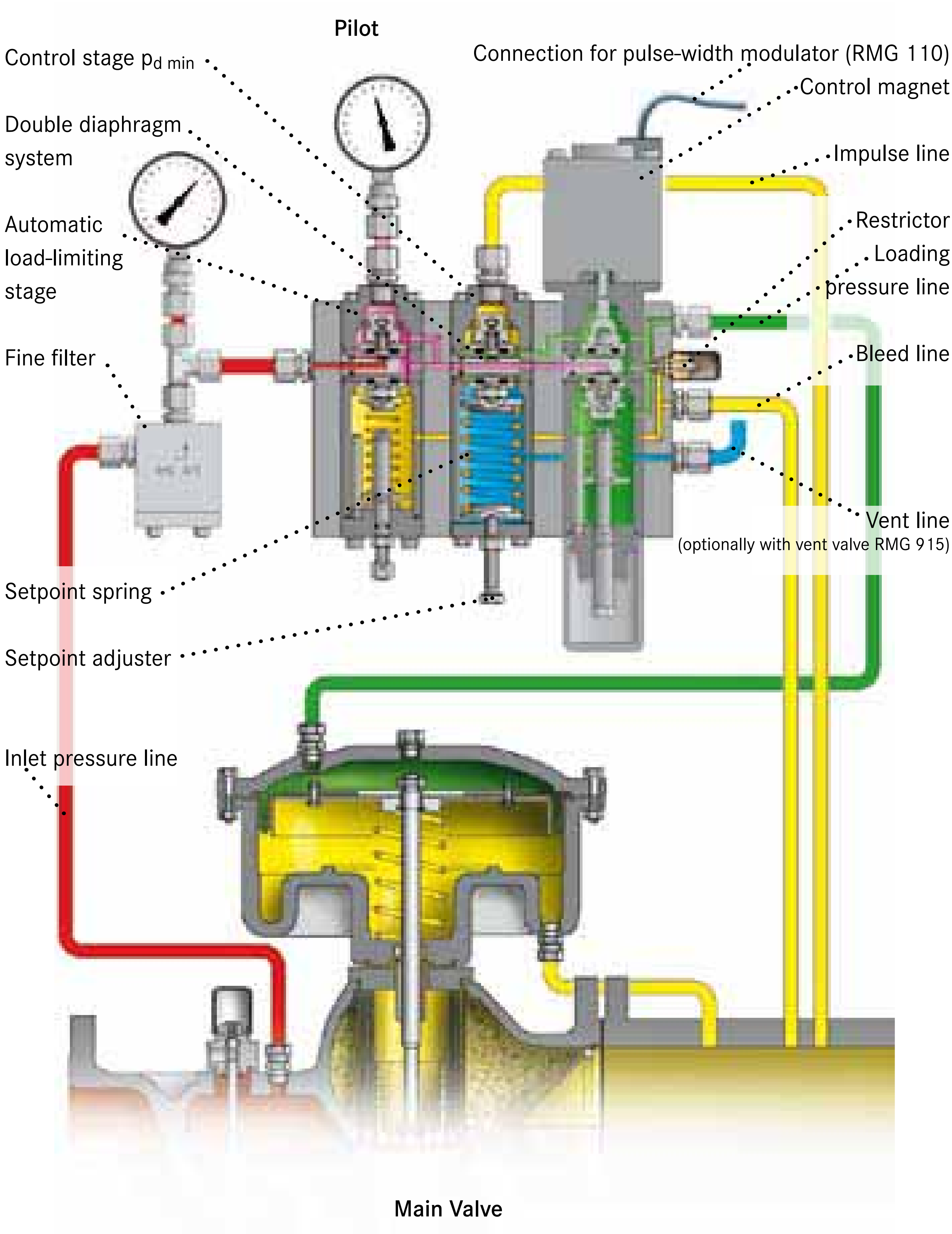
The following operation modes may be realized between the two pressure limits:

- ☐ Remote setpoint adjustment
  - adaption of setpoints due to frequently changing operating conditions
  - integration into process control systems
- ☐ Flow control, optimising efficient gas supply
  - gas storage in networks and tanks
  - meter protection by means of actual flow limitation
- ☐ Pressure control
  - meter protection by means of actual flow limitation
  - acc. to defined pressure curves throughout a day or week
  - to improve regulating accuracy and stability due to electronic PI or PID control

CE registration according to PED in combination with RMG Gas Pressure Regulators
According to DIN EN 334, the pilot is an integral component of this device.

Pulse-width modulator RMG 110a - see p. 144

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.


Pilot
Control stage $p_{d\ min}$
Connection for pulse-width modulator (RMG 110)
Control magnet
Double diaphragm system
Impulse line
Automatic load-limiting stage
Restrictor
Loading pressure line
Fine filter
Bleed line
Vent line
(optionally with vent valve RMG 915)
Setpoint spring
Setpoint adjuster
Inlet pressure line
Main Valve

Standard-design Pneumatic Pilots for Gas Pressure Regulators According to DIN EN 334

- ☐ For **outlet and differential pressure control (for flow restriction by means of orifice plate on downstream site)**
- ☐ Pilot with modular pilot and differential pressure stages
- ☐ With inlet-pressure and loading-pressure gauges and upstream fine-mesh filter RMG 905, also available with outlet pressure gauge (optional)
- ☐ Optionally with vent valve RMG 915
- ☐ Suitable for non-aggressive gases, other gases on enquiry

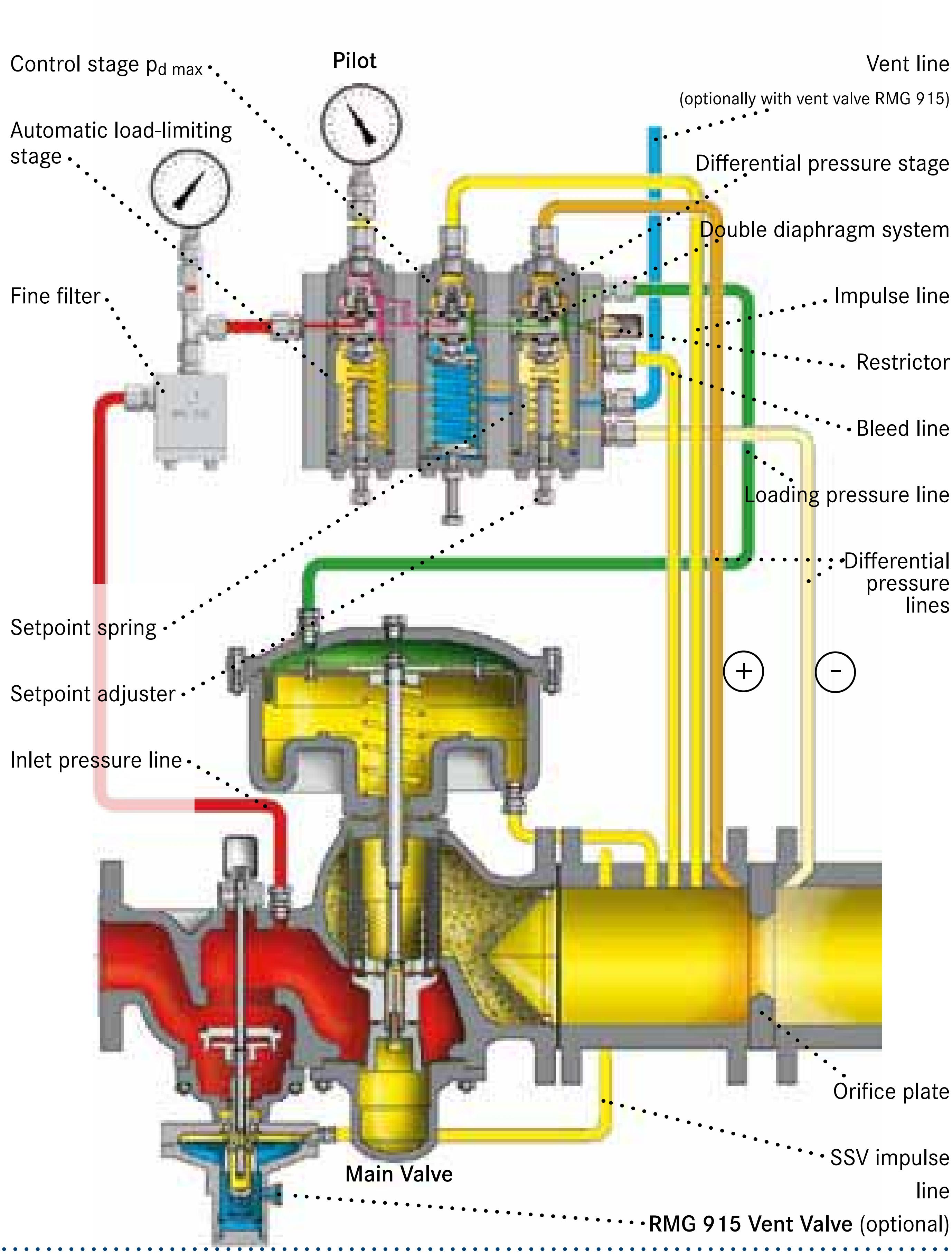
Max. admissible pressure PS = 100 bar
Max. inlet pressure $p_{u\ max}$ up to 100 bar

Outlet pressure range W_d
Outlet pressure 0.3 bar to 90 bar
Differential pressure 0.05 bar to 1.2 bar

RMG CE 0085

CE registration according to PED in combination with RMG Gas Pressure Regulators
According to DIN EN 334, the pilot is an integral component of this device.

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.


Control stage $p_{d\ max}$
Pilot
Vent line
(optionally with vent valve RMG 915)
Automatic load-limiting stage
Differential pressure stage
Double diaphragm system
Fine filter
Impulse line
Restrictor
Bleed line
Loading pressure line
Differential pressure lines
+
–
Setpoint spring
Setpoint adjuster
Inlet pressure line
Orifice plate
SSV impulse line
Main Valve
RMG 915 Vent Valve (optional)

Series 600 – Pilots for Pilot-operated Gas Pressure Regulators

SPECIFIC OUTLET PRESSURE RANGE FOR RMG 655-DP

	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	**Wire Ø** in mm	**Colour coding**	
Control stage with diaphragm measuring unit	0 1 2 3 4 5	4.5 3.6 4.5 5 6.3 7	black blue black grey brown red	0.3 to 1* 0.5 to 2 1 to 5 2 to 10 5 to 20 10 to 40
Control stage with metal-harmonica measuring unit	6 7	☐ 8/7 9	green white	10 to 50 20 to 90
Automatic load-limiting stage		5	green	0.5 to 15 automatic: above p_d
Differential pressure stage		2.25	black	0.05 to 1.2**

*) Type with larger measuring diaphragm

**) The setpoint spring can be released (i.e., the flow rate may be reduced to 0 m^3/h).

Series 600 – Pilots for Pilot-operated Gas Pressure Regulators

Pilot p_d min, $p_{d\ max}$ with Differential Pressure Stage Δp for Standard-type Gas Pressure Regulators According to DIN EN 334

Max. admissible pressure PS = 100 bar

Max. inlet pressure $p_{u\ max}$ up to 100 bar

Outlet pressure range W_d:
Outlet pressure pilot stage 1:
0.3 to 90 bar
Outlet pressure pilot stage 2:
0.3 to 90 bar
Differential pressure stage Δ p:
0.05 bar to 1.2 bar
Load-limiting stage:
0.5 bar to 15 bar above p_d

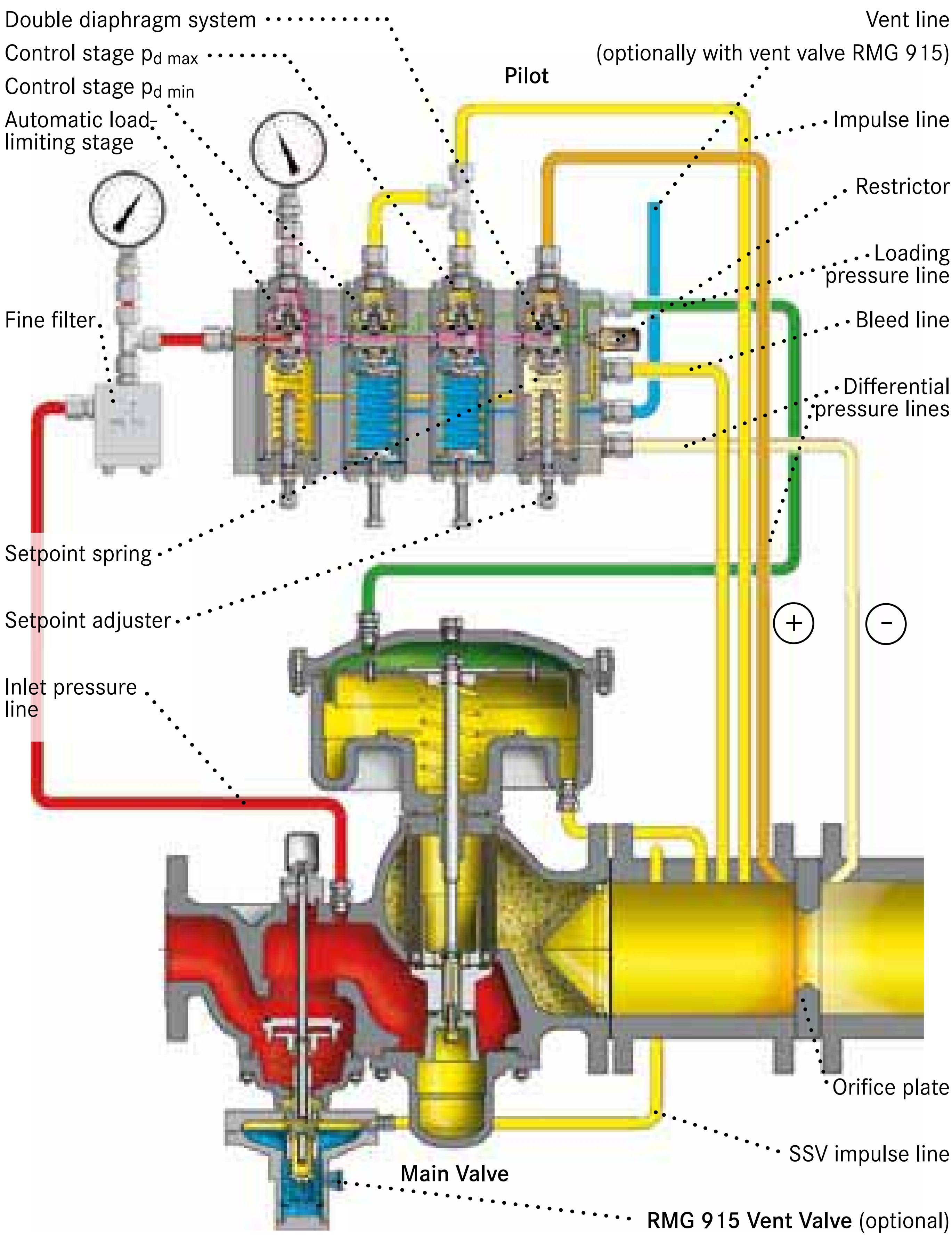
- ☐ For outlet pressure control $p_{d\ min}$, $p_{d\ max}$ and differential pressure control Δp
- ☐ The pilot works with two outlet pressure stages, which may be set independently of each other – one to a lower ($p_{d\ min}$ stage), and the other to an upper ($p_{d\ max}$ stage) limit value. Control tasks between the two limit values will be handled by the differential pressure stage Δp. The transition between the functions of the stages is automatic.
- ☐ Pilot with automatic modular load-limiting stage, pilot stage $p_{d\ min}$, $p_{d\ max}$ and differential pressure stage Δ p
- ☐ With inlet-pressure and loading-pressure gauges and upstream fine-mesh filter RMG 905, also available with outlet pressure gauge (optional)
- ☐ Optionally with vent valve RMG 915
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED in combination with RMG Gas Pressure Regulators
According to DIN EN 334, the pilot is an integral component of this device.

RMG CE 0085

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 600 – Pilots for Pilot-operated Gas Pressure Regulators



SPECIFIC OUTLET PRESSURE RANGE FOR RMG 658-DP				
	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	**Wire Ø** in mm	**Colour coding**	
Control stage with diaphragm measuring unit	0	4.5	black	0.3 to 1*
	1	3.6	blue	0.5 to 2
	2	4.5	black	1 to 5
	3	5	grey	2 to 10
	4	6.3	brown	5 to 20
	5	7	red	10 to 40
Control stage with metal-harmonica measuring unit	6	☐ 8/7	green	10 to 50
	7	9	white	20 to 90
Automatic load-limiting stage		5	green	0.5 to 15 automatic: above p_d
Differential pressure stage		2.25	black	0.05 to 1.2**

*) Type with larger measuring diaphragm

**) The setpoint spring can be released (i.e., the flow rate may be reduced to 0 m^3/h).

Pilot $p_{d\ min}$, $p_{d\ max}$ with Electro-pneumatic Loading Pressure Stage for Standard-design Gas Pressure Regulators According to DIN EN 334

Max. admissible pressure PS = 100 bar

Max. inlet pressure $p_{u\ max}$ up to 100 bar

Pilot RMG 658-EP consists of functional modules on a common base plate:

1st stage	Automatic load-limiting stage
2nd stage	Control stage controlling the lower outlet pressure limit $p_{d\ min}$
3rd stage	Control stage controlling the upper outlet pressure limit $p_{d\ max}$
4th stage	Electro-pneumatic loading pressure stage converting electrical signals of into pneumatic signals

The pneumatic pressure control stages are monitoring the preset limit values.
As soon as outlet pressure gets close to these limits during operation, the pneumatic pressure control stages take over and keeps the pressure constant. Transition from electronic control to pneumatic control is effected automatically and will be operated smoothly in both directions.

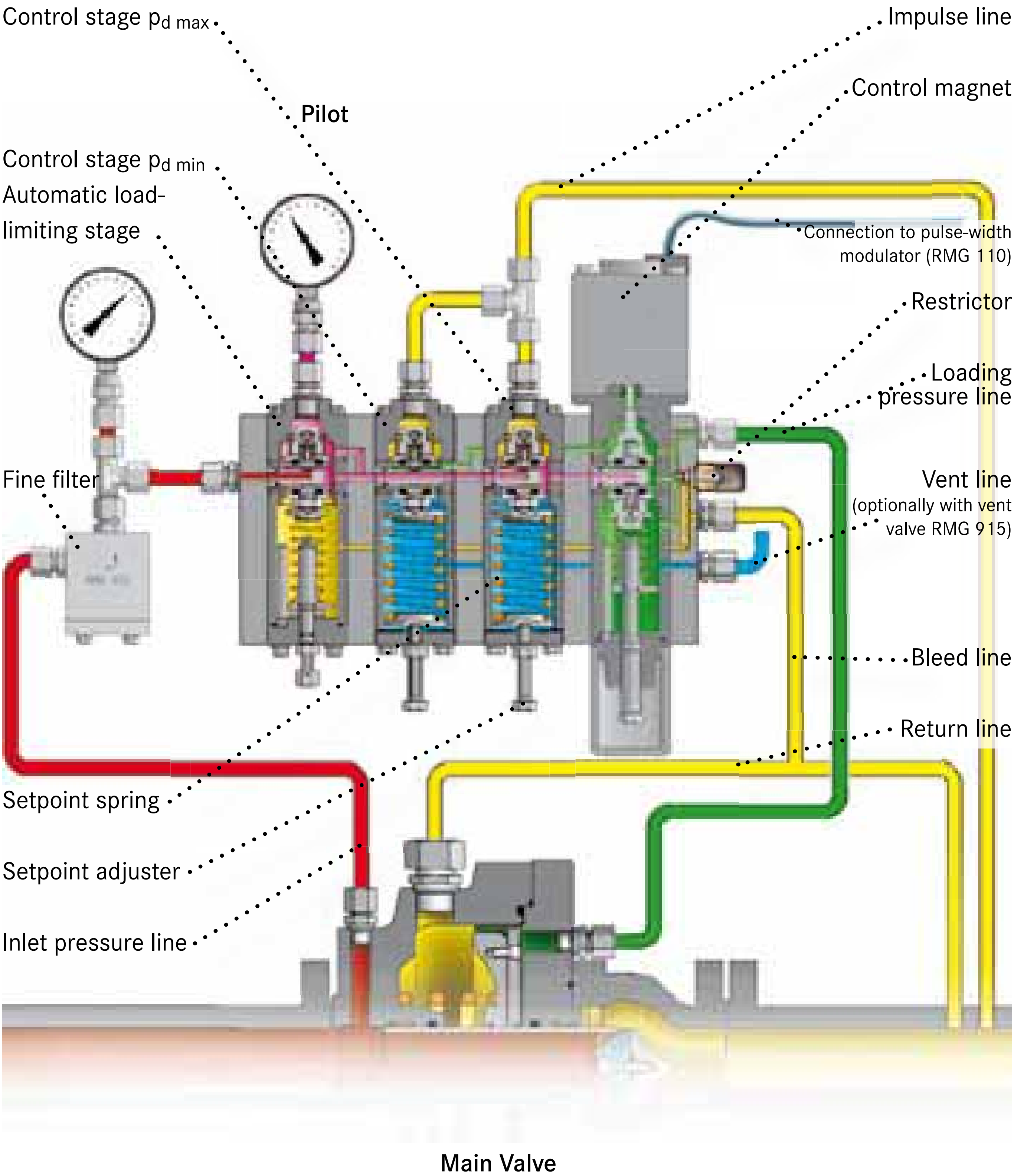
The following operation modes may be realized between the two pressure limits:

- ☐ Remote setpoint adjustment
  - adaption of setpoints due to frequently changing operating conditions
  - integration into process control systems
- ☐ Flow control, optimising efficient gas supply
  - gas storage in networks and tanks
  - meter protection by means of actual flow limitation
- ☐ Pressure control
  - meter protection by means of actual flow limitation
  - acc. to defined pressure curves throughout a day or week
  - to improve regulating accuracy and stability due to electronic PI or PID control

CE registration according to PED in combination with RMG Gas Pressure Regulators
According to DIN EN 334, the pilot is an integral component of this device.

Pulse-width modulator RMG 110a - see p. 144

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.


Control stage $p_{d\ max}$
Pilot
Control stage $p_{d\ min}$
Automatic load-limiting stage
Fine filter
Setpoint spring
Setpoint adjuster
Inlet pressure line
Impulse line
Control magnet
Connection to pulse-width modulator (RMG 110)
Restrictor
Loading pressure line
Vent line (optionally with vent valve RMG 915)
Bleed line
Return line
Main Valve

SPECIFIC OUTLET PRESSURE RANGE FOR RMG 658-EP	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	Wire Ø in mm	Colour coding	
Control stage with diaphragm measuring unit	0 1 2 3 4 5	4.5 3.6 4.5 5 6.3 7	black blue black grey brown red	0.3 to 1* 0.5 to 2 1 to 5 2 to 10 5 to 20 10 to 40
Control stage with metal-harmonica measuring unit	6 7	☐ 8/7 9	green white	10 to 50 20 to 90
Automatic load-limiting stage		5	green	0.5 to 15 automatic: above p_d
Differential pressure stage		2.25	black	0.05 to 1.2**

*) Type with larger measuring diaphragm

**) The setpoint spring can be released (i.e., the flow rate may be reduced to 0 m^3/h).

RMG Station Control System SCS 2001

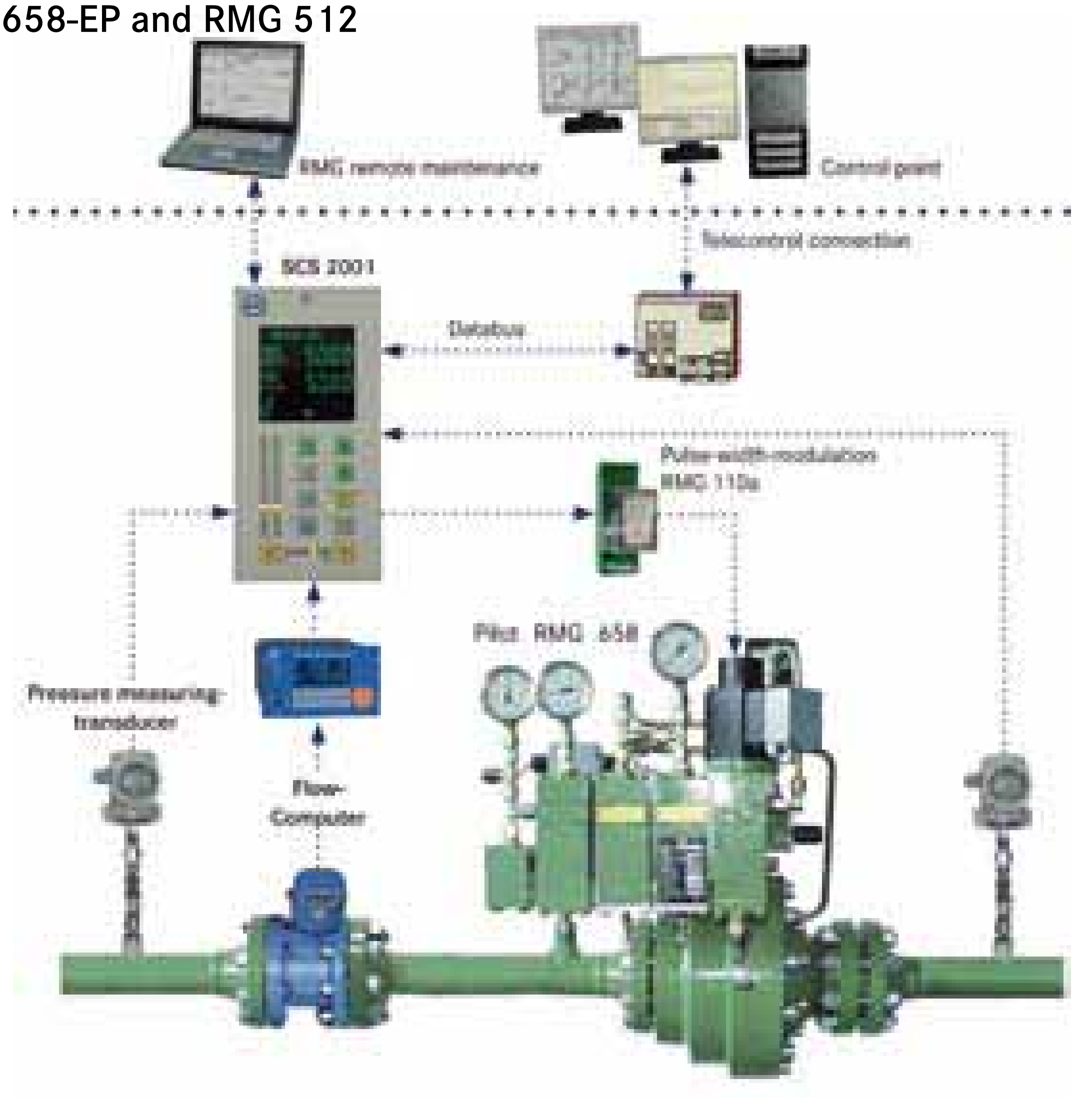
The flexible programming features of the SCS 2001 facilitate the speedy implementation of complex control & regulatory tasks for all gas pressure regulating and/or measuring stations.

Control tasks:

- ☐ Outlet pressure control
- ☐ Inlet pressure control
- ☐ Meter protection
- ☐ Flow control (standard & actual)
- ☐ Position control for electrical and pneumatic valves
- ☐ Caloric and wobbe control
- ☐ Gas mixing control
- ☐ Bypass control, cascade control
- ☐ Gas temperature control
- ☐ Dewpoint control
- ☐ Optimising of gas supply
- ☐ Automatic selection of measuring and control lines
- ☐ Remote connection available with a variety of standard interfaces
- ☐ Remote setpoint adjustment

The SCS 2001 Automation System is a freely programmable modular MSR station using a multitude of I/O and communication modules to solve the most complex control and regulatory tasks.
Programming according to IEC 61131-3.
Easy handling & control and monitoring of the process is ensured due to standard functional keys and a back-lit, clearly laid-out LC display.
The SCS 2001 can display warning, malfunction and status messages (plain text) to facilitate troubleshooting.
Setpoint and actual values as well as other process parameters are displayed complete with their units.
Communication with the superimposed control system, remote regulating station and all other data communication may be handled using either MODBUS or PROFIBUS.

Example of SCS 2001 application: Electronic control by means of Pilot RMG 658-EP and RMG 512



A winning team: SCS 2001 and RMG 638-EP/658-EP

- ☐ All regulatory/control/measurment functions of the line → Control and safeguarding of regulating line
- ☐ Process connection via standard I/O
- ☐ Setpoints can be adjusted at despatching centre
- ☐ High accuracy with pressure and flow rate control
- ☐ Gas temperature controller may be added (optional)
- ☐ Remote maintenance and visualisation by modem
- ☐ In the event of a power blackout, the system will keep on operating pneumatically. Gas supply to downstream consumers is safe.

A reliable partner! Many important gas suppliers already rely on the SCS 2001.
More than **2,000** units operate successfully worldwide.

RMG Station Control System SCS 2010

PLC with touch panel (HMI system) for small and medium applications

The station control system SCS 2010 is particularly well-suited for the control of sophisticated processes in the gas industry. The highlights of the SCS 2010 are its reliability, of course, but also simple and transparent operation due to the 6" touch panel with colour display. It solves complex control tasks, such as pressure, flow rate and temperature control, but also assists with data collection and communication. For customisation, the basic hardware can be easily retrofitted with numerous optional input and output modules. Troubleshooting is made easy due to the transparent display of messages and control-room-type acknowledgement procedures for failure.

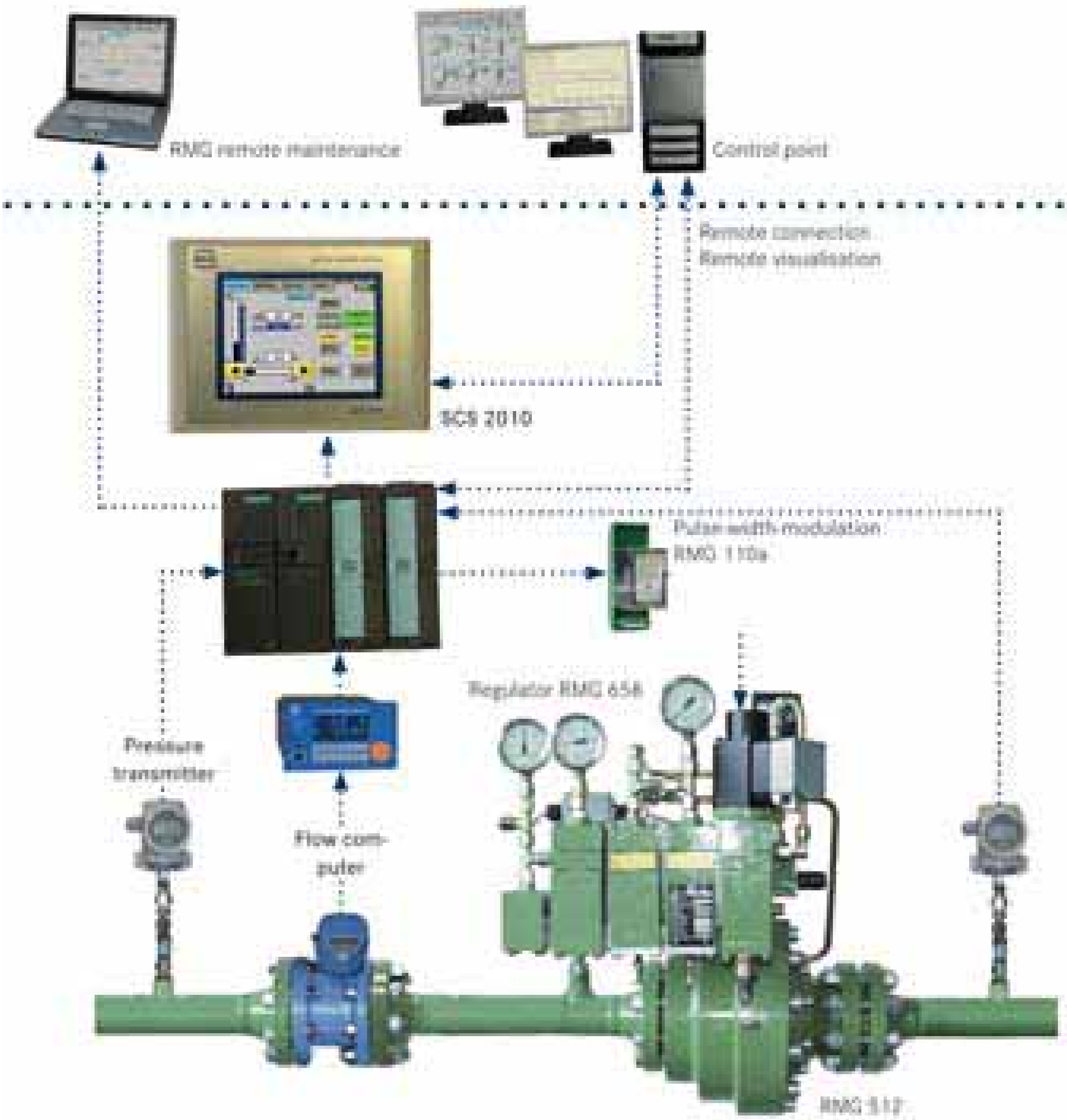
Control tasks:

- ☐ Outlet pressure control
- ☐ Inlet pressure control
- ☐ Meter protection
- ☐ Flow control (standard and actual)
- ☐ Position control for electrical and pneumatic valves
- ☐ Caloric and wobbe control
- ☐ Gas mixing control
- ☐ Bypass control, cascade control
- ☐ Gas temperature control
- ☐ Dewpoint control
- ☐ Optimising of gas supply
- ☐ Automatic selection of measuring and control lines

Features:

- ☐ Operating and monitoring process parameters
- ☐ List of messages indicating station status/conditions
- ☐ Graphs
- ☐ Password protected
- ☐ Web-based remote operation and supervision-based on TCP/IP networks
- ☐ Remote connections using remote protocols IEC 60870-5-104 (101) (or others)
- ☐ Quick RMG customer support via remote maintenance software

Example of SCS 2010 application: Controlling RMG 512 and Pilot RMG 658-EP



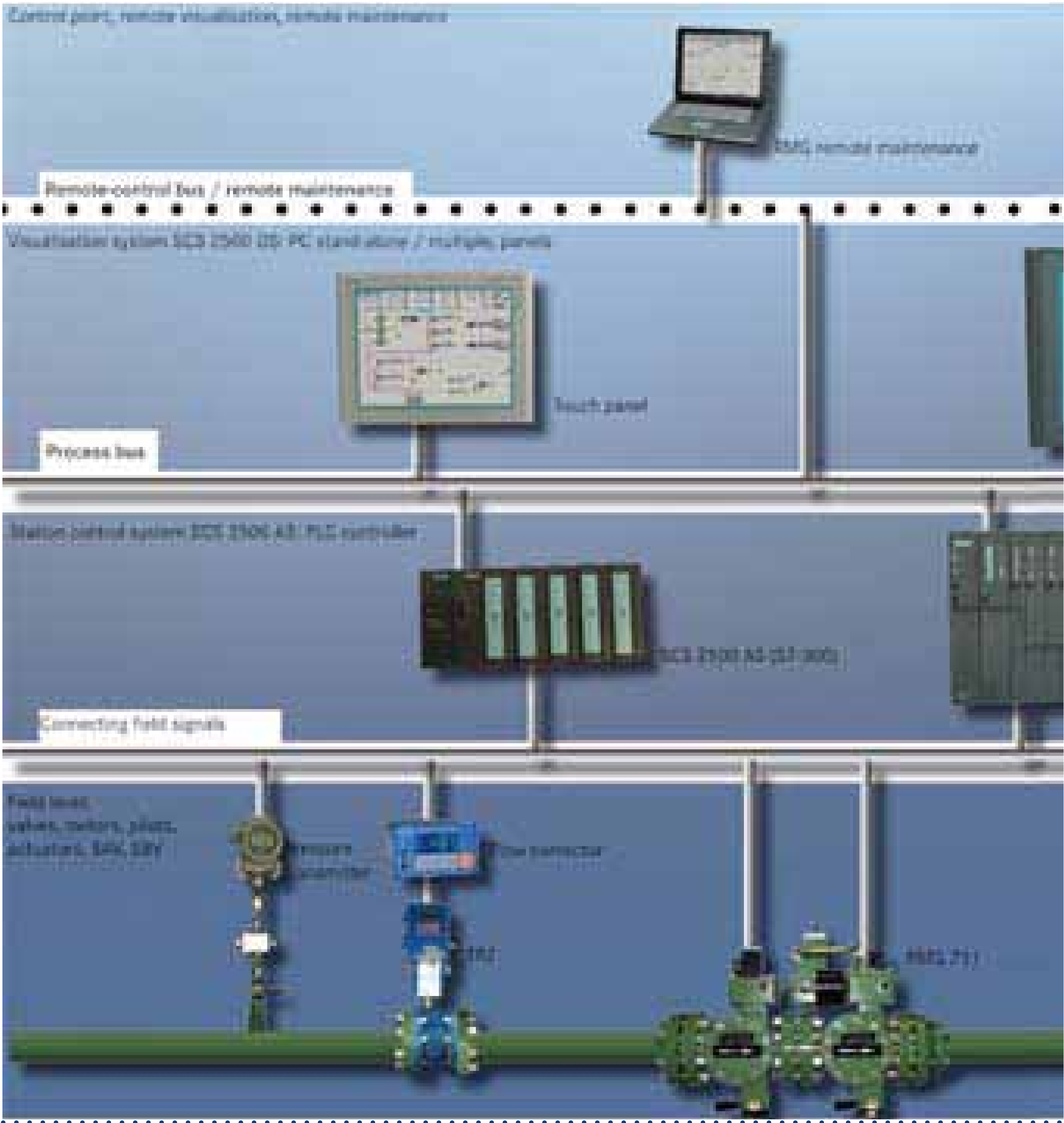
A winning team: SCS 2010 and RMG 638-EP/658-EP

☐ Major benefit: Security of gas supply.
In the event of a power blackout, this system will keep on operating pneumatically.
Gas supply to downstream consumers is safe.

SCS 2010 provides a safe and flexible automation system facilitating easy and simple link-up to all customary communication interfaces.

RMG Station Control System SCS 2500

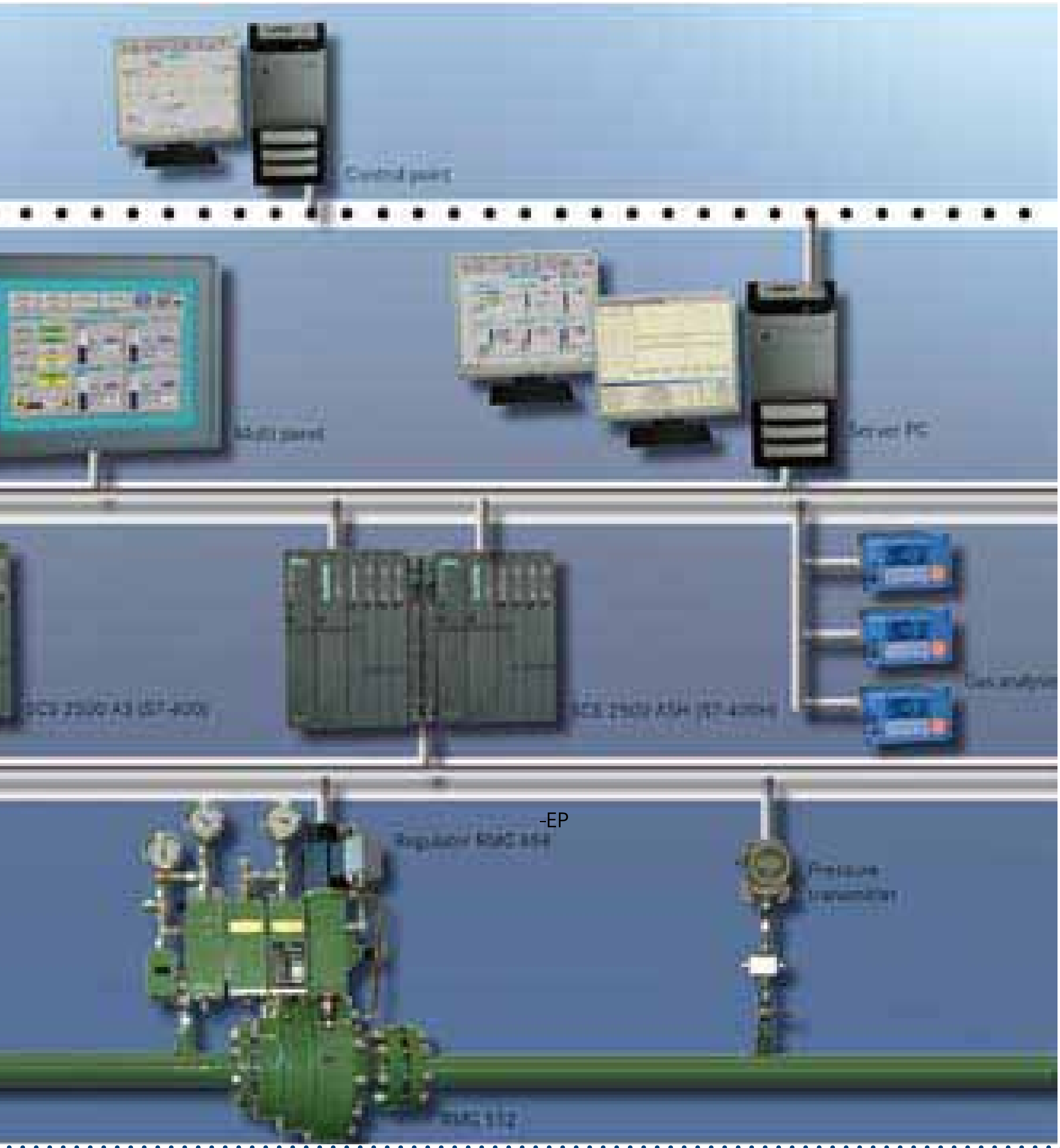
With our station control system SCS 2500, we offer a range of advanced and tested hardware and software components that are finely scalable and capable of handling anything from simple to highly complex control challenges in the most technically and economically possible way. Using a broad variety of hardware and software solutions, the SCS 2500 comprises consistent communication, data management and control functions, and thus constitutes an open platform for the most recent automation solutions in the gas industry. There is only one contact for all matters of individual project consultation and follow-up software maintenance, as well as after-sales for the station control system, remote control and pneumatic equipment, and engineering.



System automation with SCS 2500

Types of control

- ☐ Outlet pressure control
- ☐ Inlet pressure control
- ☐ Meter protection
- ☐ Flow control (standard and actual)
- ☐ Gas mixing control
- ☐ Cascade control (primary and secondary control tasks)
- ☐ Gas temperature control
- ☐ Dewpoint control
- ☐ Optimising of gas supply
- ☐ Storage management
- ☐ Network management



Station control system

PLC with multi panel (HMI system)

Inexpensive automation system for minor and medium tasks in natural gas stations

- ☐ Operating and monitoring process parameters
- ☐ List of messages indicating station status/conditions
- ☐ Graphs
- ☐ Password protection
- ☐ Remote connections using remote protocols IEC 60870-5-104(101) (or others)
- ☐ Quick RMG customer support via remote maintenance software
- ☐ Handling of all control functions in a typical natural gas station

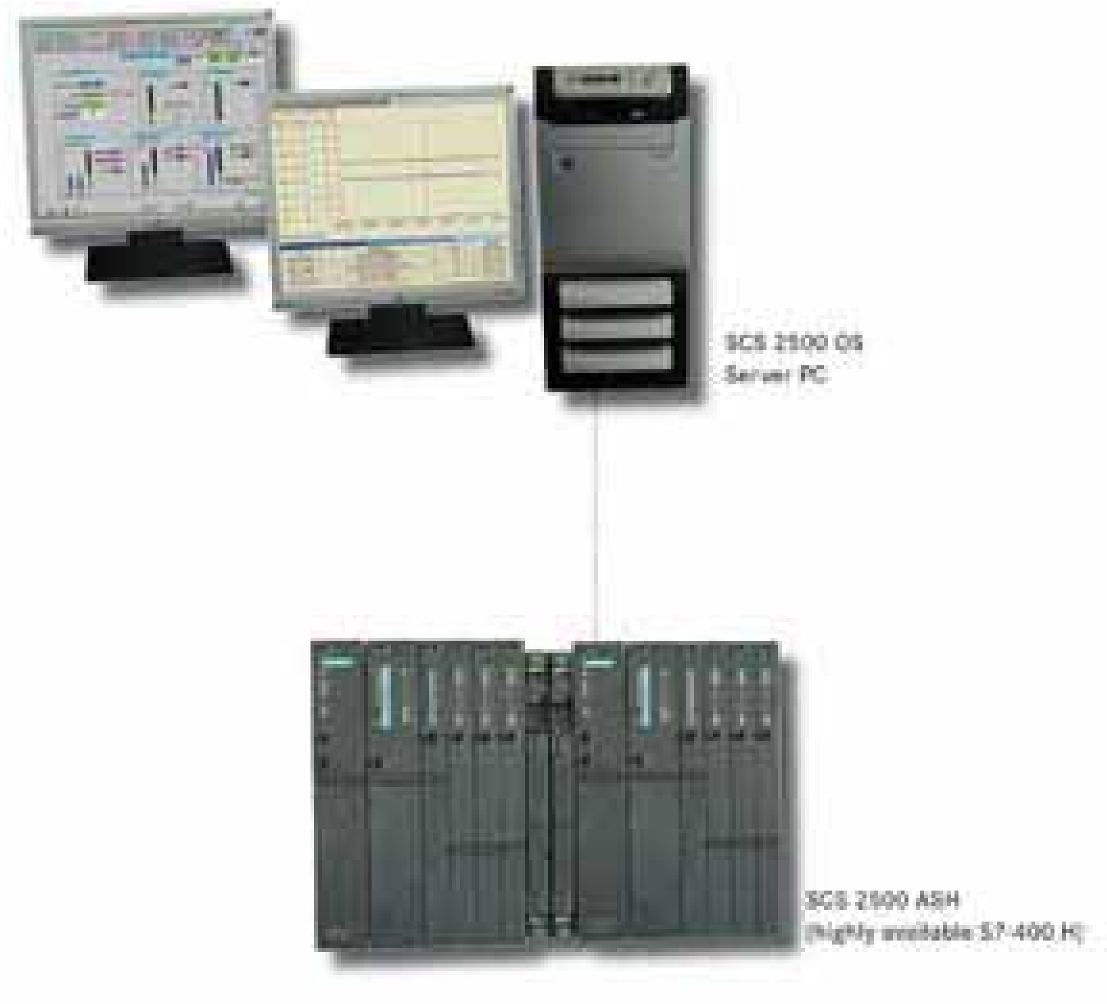
Station control system

PLC with panel PC (SCADA system)

Automation system for medium and major tasks in natural gas stations

- ☐ Operating and monitoring process parameters
- ☐ List of messages indicating station status/conditions
- ☐ Process data collection and storage
- ☐ Graphs with scroll and zoom functions
- ☐ Password protection
- ☐ Remote connections using remote protocols IEC 60870-5-104(101) (or others)
- ☐ Quick RMG customer support via remote maintenance software
- ☐ Handling of all control functions in a typical natural gas station

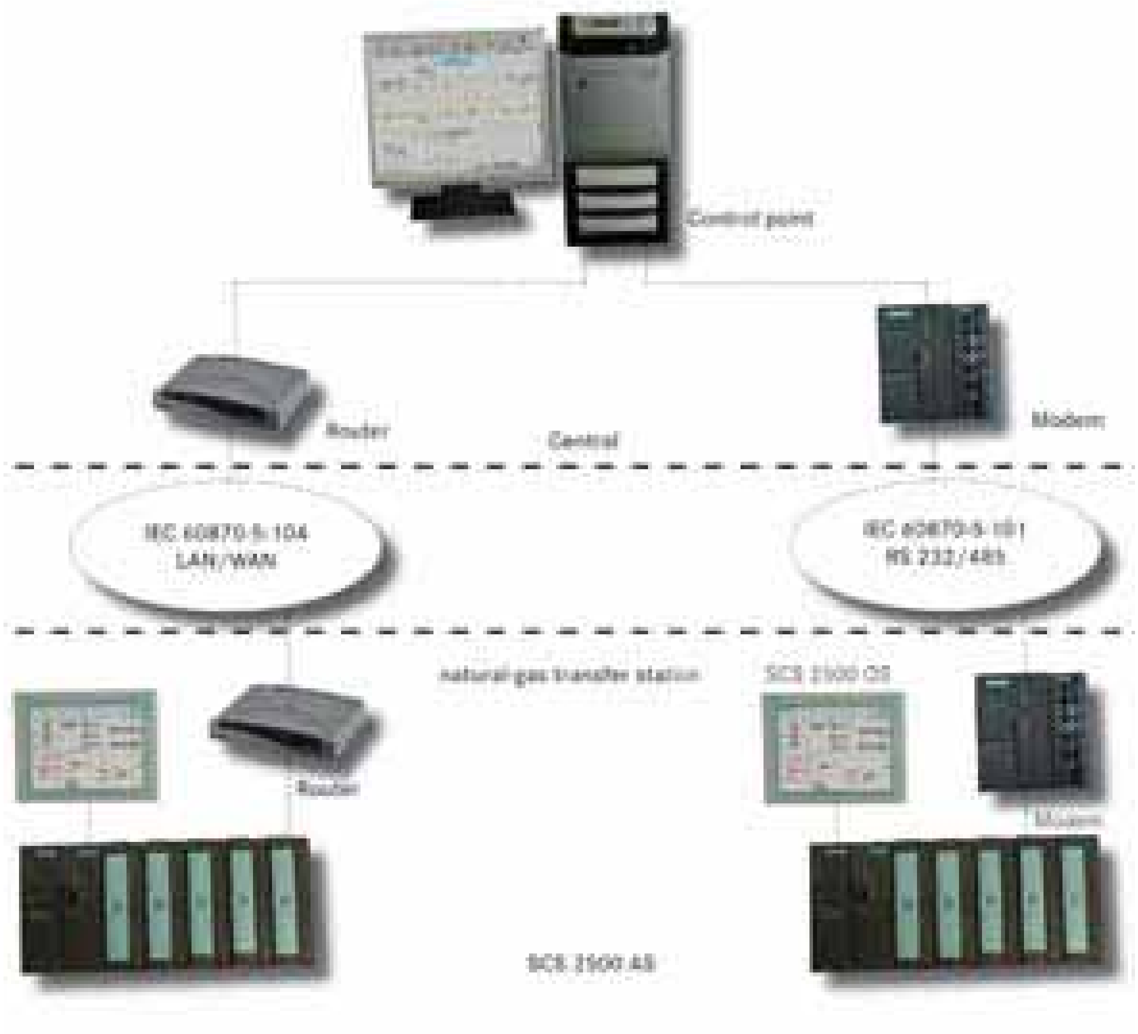
Redundant PLC with PC technology, control system for high-end solutions



Automation system for the highest requirements due to redundant and/or failsafe design

- ☐ Comprehensive process visualisation
- ☐ Message system
- ☐ Convenient handling of graphs using scroll and zoom functions
- ☐ Internet-based plant supervision (webserver – client structure)
- ☐ Fully configurable user/operator management with multiple access right levels
- ☐ Remote connections using remote protocols IEC 60870 – 5 – 104 (101) (or others)
- ☐ Collection and long-term storage of process data complete with backup functions (e.g., external hard disc)
- ☐ Data can be exported to MS Office formats (e.g., Excel)
- ☐ Handling of all control functions in a typical natural gas station

System solution for remote tasks



According to the IEC 60870-5-101 and 104 standards, communication between remote and control equipment & stations from different manufacturers is possible. The variance and variabilities provided by these standards make it possible to synchronise specific profiles from different manufacturers using an interoperability list.

Your benefits:

- ☐ Reduced investment costs with improved performance and safe transfer
- ☐ Compact design
- ☐ Flexible integration of new stations into the existing control system
- ☐ Extension of existing stations with guaranteed transparency due to global standards with the IEC 60870-5-101 and 104 protocols
- ☐ Comprehensive monitoring & control solutions
- ☐ Reduced station complexity

RMG 110a Pulse-width Modulator

- ☐ Amplifier for controlling electro-pneumatic loading pressure stage of pilot RMG 63x and RMG 65x
- ☐ For conversion of electrical standard signal into impulse signal
- ☐ Selection of characteristic curve (up or down) by means of jumper
- ☐ Zero, range and frequency adjustable (basic settings at factory)
- ☐ Snap on to DIN rail

The pulse-width modulator RMG 110a is required to serve as connection piece between the proportional magnet of electro-pneumatic loading pressure stage and control electronics.

RMG 110A		
Technical data:	Auxiliary energy: Current consumption: Input signal: Output signal: Impulse frequency: Protection Class: Transmission characteristic optional:	• 24 VDC • 1.5 A max. • 0/4 – 20mA or 0 – 10 V • Impulse signal 24 V • 50 Hz • IP 20 • up • down
Dimensions:	Height, width, front-to-back	75 x 37 x 108
Miscellaneous:	• Clamp connection • Snap on to DIN rail	

Series 600, Actuator Systems and Tripping Devices for Safety Shut-off Valves (SSV)

The setting ranges indicated are covered by the relevant actuator systems.
For certain types of equipment, the setting ranges may actually be smaller than indicated.
Please always refer to the specific brochures.

OVERVIEW

	Actuator system				Gas pressure regulator with incorporated SSV									Safety Shut-off Valve (SSV)						
	Description	Type	Outlet pressure range: Overpressure Wdo in bar	Outlet pressure range: Underpressure Wdu in bar	RMG 300	RMG 330	RMG 332	RMG 370	RMG 372	RMG 402	RMG 408	RMG 503	RMG 530	RMG 703	RMG 704	RMG 711	RMG 720	RMG 721	RMG 730	RMG 731
Actuator system for **direct acting** SSVs	K 1a	RMG 673	0.05 to 1.5 (2.3)7	0.01 to 0.12 (3)7	●	●3	●3	●	●	●2		●2		●	●		●5			
	K 2a	RMG 673	0.4 to 5.2 (7)7	0.06 to 0.4 (1)7	●	●3	●3	●	●	●2				●	●		●5			
	K 2a/1	RMG 673	0.4 to 5.2	0.06 to 0.4								●2		●	●					
	K 2a/2	RMG 673	2.5 to 8	0.8 to 2.2								●2		●	●					
	K 4	RMG 674	0.04 to 0.5	0.005 to 0.06		●4	●4			●	●						●6			
	K 5	RMG 674	0.2 to 1.5	0.015 to 0.12		●4	●4			●	●						●6			
	K 6	RMG 674	0.6 to 4.5	0.04 to 0.3		●4	●4			●	●						●6			
Actuator system for **indirect acting** SSVs	K 10a	RMG 672	0.05 to 1.5	0.01 to 0.12						●	●	●	●1			●		●		●
	K 11a/1	RMG 672	0.4 to 4.5	0.06 to 1						●		●	●1			●		●		●
	K 11a/2	RMG 672	2.5 to 8	0.8 to 2.2						●		●	●1			●		●		●
	15a	RMG 675	0.03 to 1		○	○	○											○		
	K 16	RMG 670	0.8 to 40						●	●	●	●	●1	●	●	●		●		●
	K 17	RMG 671		2 to 40						●	●	●	●1	●	●	●		●		●
	K 18	RMG 670	20 to 90									●	●1	●	●	●			●	
	K 19	RMG 671		20 to 90								●	●1	●	●	●				

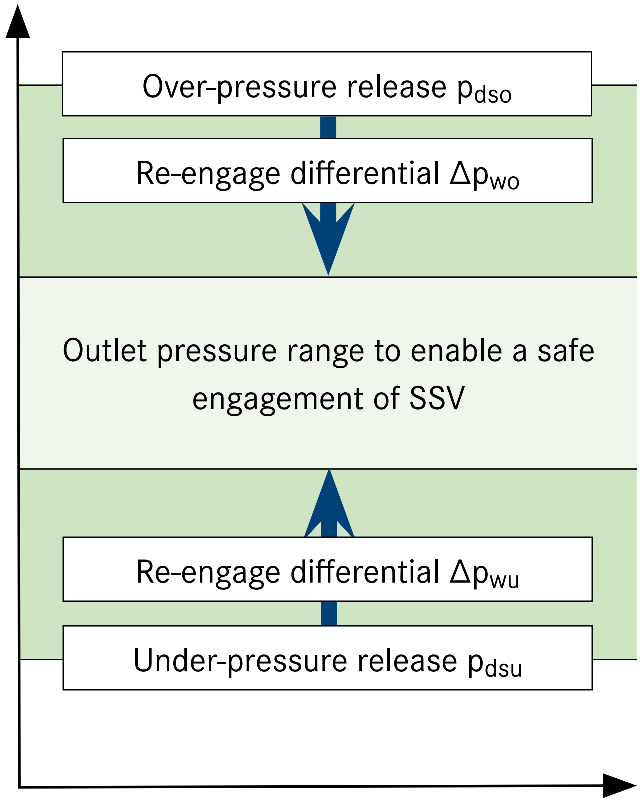
○ Special design, only up to PN 16 (PS = 16 bar) • 1) only for pipe sizes up to DN 150 • 2) only for pipe size DN 25/25
• 3) only for pipe sizes DN 25 and DN 50 • 4) only for pipe sizes DN 80 and DN 100
• 5) only for pipe size DN 25 • 6) for pipe sizes ≥ DN 50 • 7) higher values in brackets for RMG 372 only

Re-engage Differentials Δp_{wo} and Δp_{wu}

The min. re-engagement differential indicates which Δp pressure reduction is required after over-pressure release. After under-pressure release, the downstream pressure needs to be raised by at least the relevant Δp value as started. Otherwise, a safe re-engagement of SSV is not guaranteed. For all min. re-engagement differentials of SSVs, please refer to the relevant brochure or information in this booklet.

Where the SSV control element has been designed for over- and under-pressure protection simultaneously, a minimum outlet pressure range between pdso and pdsu must be maintained which is greater than 10% of the total of the individual values:

$$p_{dso} - p_{dsu} \geq 1{,}1 \cdot (\Delta p_{wo} + \Delta p_{wu})$$



$\Delta p_{wo} \geq P_{dso} - P^*$

$\Delta p_{wu} \geq P^* - P_{dsu}$

* Operating pressure at sensing point.

Series 600, Control Element for Safety Shut-off Valves (SSV)

RMG 670 Actuator Systems K 16 and K 18 for SSV Over-pressure Release
According to DIN EN 14382
RMG 671 Actuator Systems K 17 and K 19 for SSV Under-pressure Release, Pilot-operated
According to DIN EN 14382 for Safety Shut-off Valves (SSV)

Max. admissible pressure PS = 100 bar
Max. inlet pressure $p_{u\ max}$ up to 100 bar
Setting range:
For SSV release
Over-pressure K 16, K 18
W_{do} 0.8 bar to 90 bar
Under-pressure K 17, K 19
W_{du} 2 bar to 90 bar

CE registration according to PED in combination with RMG Gas Pressure Regulators
According to DIN EN 14382, the pilot is an integral component of this device.

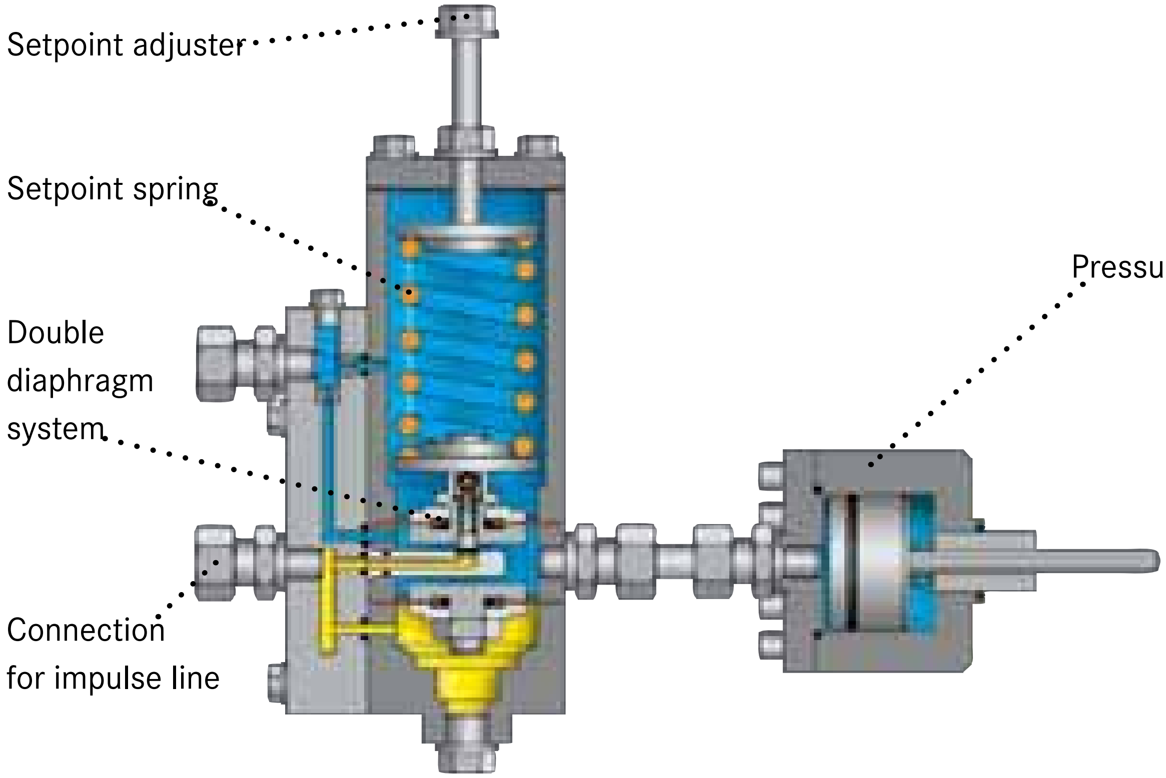
- ☐ Actuators operated by auxilary energy (self supplied by operated gas). According to DIN EN 14382, actuator systems are integral part of SSVs.
- ☐ Function Class A
- ☐ Very high response accuracy
- ☐ Easy operation and maintenance
- ☐ K 18, K 19 with metal-harmonica measuring unit
- ☐ Suitable for non-aggressive gases, other gases on enquiry

ACTUATOR SYSTEM K 16, K 17, K 18, K 19								
	Setpoint spring			Over-pressure (OPCO)		Under-pressure (UPCO)		
	Spring no.	Wire Ø in mm	Colour coding	Specific outlet pressure range W_{dso} in bar	Re-engage differential Δp_{wo} between p_{dso} and standard operating pressure in bar	Specific outlet pressure range W_{dso} in bar	Re-engage differential Δp_{wo} between p_{dso} and standard operating pressure in bar	Accuracy group AG**
K 16	0	3.2*	blue	0.8 to 1.5	0.1			2.5
	1	4.5	black	1 to 5	0.2			2.5/1
	2	5	grey	2 to 10	0.4			1
	3	6.3	brown	5 to 20	0.8			1
	4	7	red	10 to 40	1.2			1
K 17	2	5	grey			2 to 10	0.4	5
	3	6.3	brown			5 to 20	0.8	5
	4	7	red			10 to 40	1.2	5
K 18	1	9		20 to 90	1.5			1
K 19	1	9				20 to 90	1.5	1

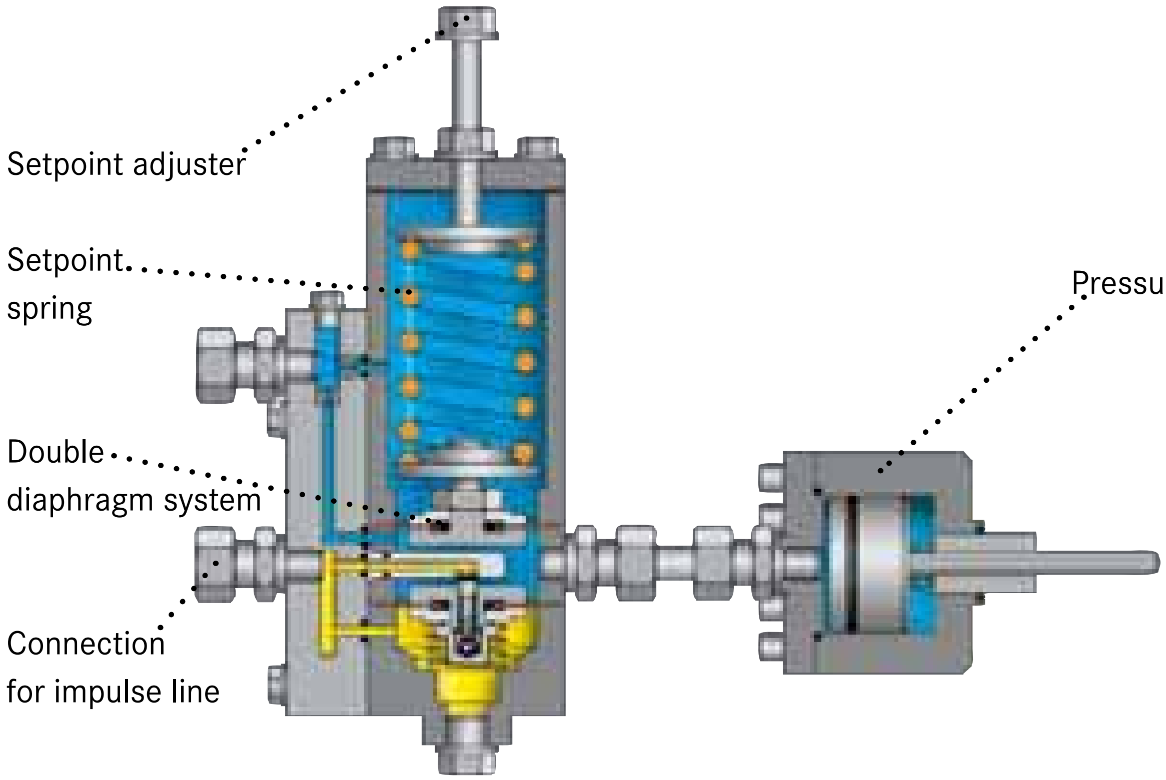
*) Not applicable to SSV RMG 711
**) The better accuracy Class applies to the second half of the setting range.

Series 600 Control Element for Safety Shut-off Valves (SSV)

Sectional Drawing of RMG 670, K 16 for SSV Over-pressure Release (OPCO)
According to DIN EN 14382



Sectional Drawing of RMG 671, K 17 for SSV Under-pressure Release (UPCO)
According to DIN EN 14382



Series 600 Control Element for Safety Shut-off Valves (SSV)

RMG 672 Actuator K 10a, K 11a/1, K 11a/2
According to DIN EN 14382

Max. admissible pressure PS = 100 bar

Max. operating pressure p_{max} up to 100 bar

Setting range:
Over-pressure
W_{dso} 50 mbar up to 8 bar
Under-pressure
W_{dsu} 10 mbar up to 2.2 bar

CE registration according to PED with RMG Gas Pressure Regulators
According to DIN EN 14382, the pilot is an integral component of this device.

- ☐ Actuator systems for Safety Shut-off Valves. According to DIN EN 14382, actuator systems are integral part of SSVs.
- ☐ Function Class A (B)
- ☐ Easy operation and maintenance
- ☐ K 11a/1 with diaphragm measuring unit
- ☐ K 11a/2 with piston measuring unit
- ☐ Suitable for non-aggressive gases, other gases on enquiry

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 600 Control Element for Safety Shut-off Valves (SSV)

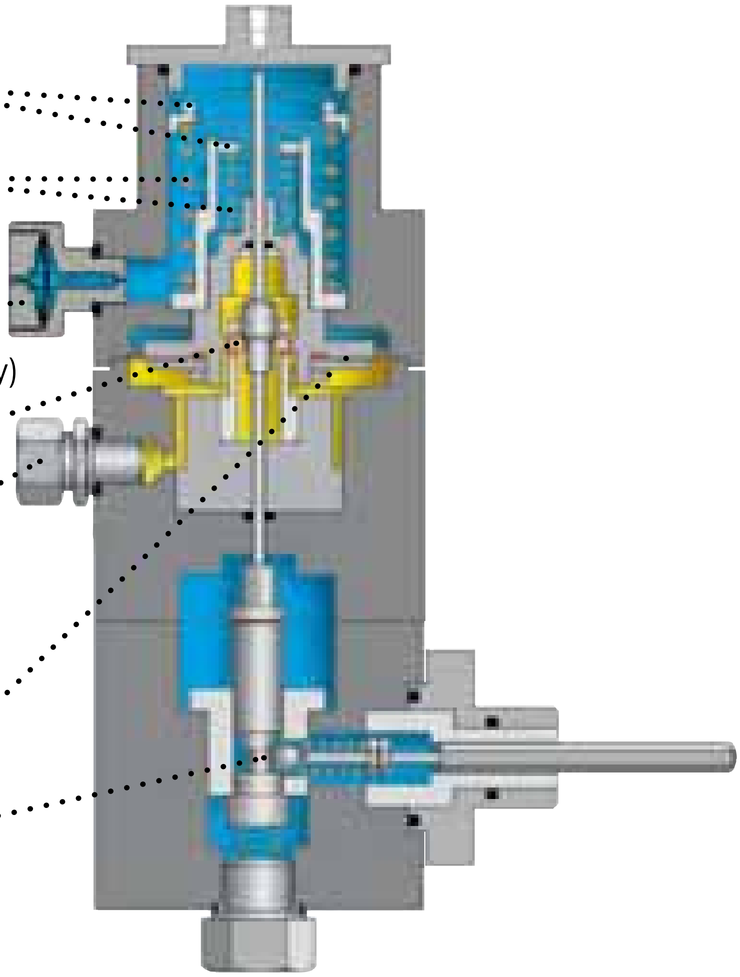
ACTUATOR SYSTEM K 10A, K 11A/1, K 11A/2								
	Setpoint spring			Over-pressure (OPCO)		Under-pressure (UPCO)		
	Spring no.	Wire Ø in mm	Colour coding	Specific outlet pressure range W_{dso}	Re-engage differential Δp_{wo} between p_{dso} and standard operating pressure	Specific outlet pressure range W_{dsu}	Re-Engage differential Δp_{wu} between standard operating pressure and p_{dsu}	Accuracy group AG**
K 10a	1	2.5*	yellow	50 to 100 mbar	30 mbar			10/5
	2	3.2	light red	80 to 250 mbar	50 mbar			10/5
	3	3.6	dark red	200 to 500 mbar	100 mbar			5/2.5
	4	4.75	white	0.4 to 1.5 bar	250 mbar			5/2.5
	5	1.1	light blue			10 to 15 mbar	12 mbar	15
	6	1.2	white			14 to 40 mbar	30 mbar	20/5
	7	1.4	black			35 to 120 mbar	60 mbar	5
K 11a/1	1	3.2	light red	400 to 800 mbar	100 mbar			10/5
	2	3.6	dark red	0.6 to 1.6 bar	200 mbar			10/5
	3	4.75	white	1.5 to 4.5 bar	300 mbar			5/2.5
	4	1.1	light blue			60 to 150 mbar	50 mbar	20/5
	5	1.4	black			120 to 400 mbar	80 mbar	5
	6	2.25	light red			0.35 to 1 bar	100 mbar	5
K 11a/2	3	4.75	white	2.5 to 8 bar	500 mbar			10/5
	6	2.25	light red			0.8 to 2.2 bar	400 mbar	20/5

*) Does not apply to SSV RMG 711

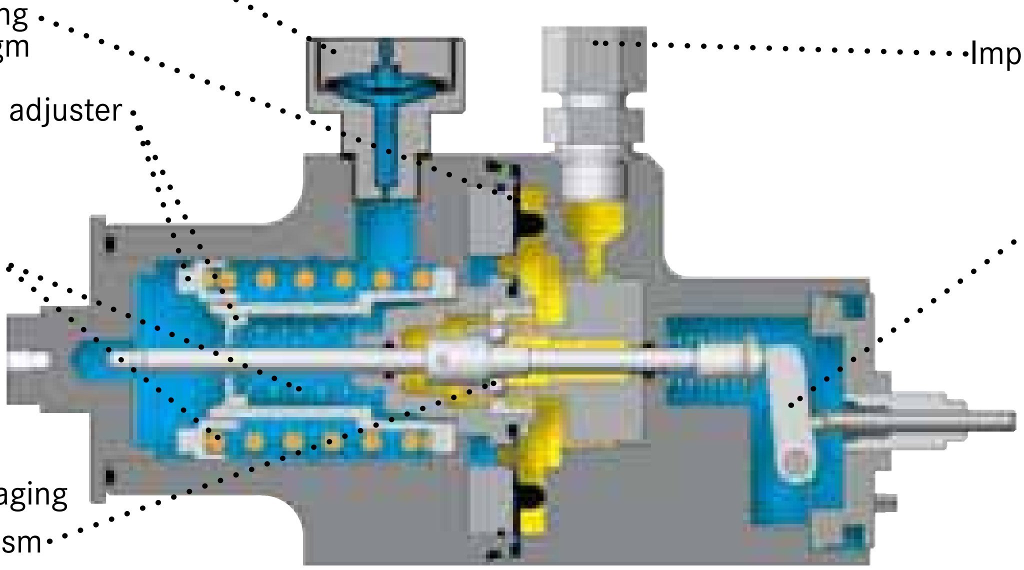
**) The better accuracy Class applies to the second half of the setting range.

Series 600 Control Element for Safety Shut-off Valves (SSV)

Sectional Drawing of RMG 672, (K 10a) for SSV Release (OPCO & UPCO)



Sectional Drawing of RMG 672 K 11a/1 for SSV Release (OPCO & UPCO)



Series 600 Control Element for Safety Shut-off Valves (SSV)

Direct-acting Actuator RMG 673 (K 1a, K 2a, K 2a/1, K 2a/2) According to DIN EN 14382

Max. admissible pressure PS = 16 bar
Max. inlet pressure $p_{u\ max}$ up to 16 bar
Version for SSV RMG 703/704: PS = 100 bar

Setting range:
Over-pressure
W_{dso} 50 mbar up to 8 bar
Under-pressure
W_{dsu} 10 mbar up to 2.2 bar

CE registration according to PED in combination with RMG Gas Pressure Regulators.
According to DIN EN 14382, the pilot is an integral component of this device.

- ☐ Actuator systems for direct-acting Safety Shut-off Valves. According to DIN EN 14382, actuator systems are integral part of SSVs.
- ☐ Function Class A and (B)
- ☐ Easy operation and maintenance
- ☐ Suitable for non-aggressive gases, other gases on enquiry

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

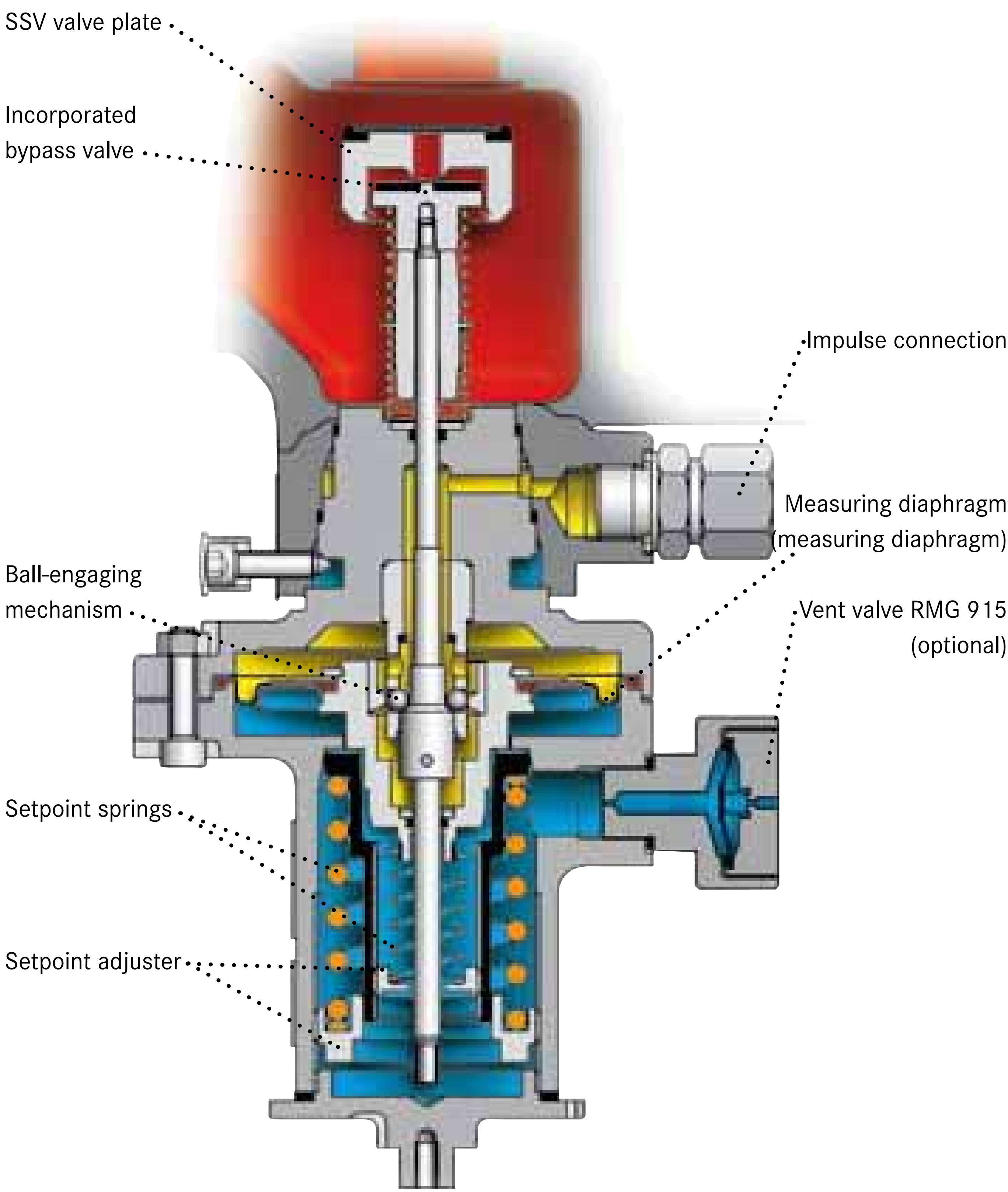
Series 600 Control Element for Safety Shut-off Valves (SSV)

ACTUATOR SYSTEM K 1A, K 2A								
	Setpoint spring			Over-pressure (OPCO)		Under-pressure (UPCO)		
	Spring no.	Wire Ø in mm	Colour coding	Specific outlet pressure range W_{dso}	Re-engage differential Δp_{wo} between p_{dso} and standard operating pressure	Specific outlet pressure range W_{dsu}	Re-engage differential Δp_{wu} between standard operating pressure and p_{dsu}	Accuracy group AG*
K 1a	01**	2.25	green	0.025 to 0.05 mbar	30 mbar			10/5
	1	2.5	yellow	50 to 100 mbar	30 mbar			10/5
	2	3.2	light red	80 to 250 mbar	50 mbar			10/5
	3	3.6	dark red	200 to 500 mbar	100 mbar			5/2.5
	4	4.75	white	0.5 to 1.5 bar	250 mbar			5/2.5
	04**	5	yellow	1.3 to 1.7 bar	300 mbar			5/2.5
	9**	5.3	ivory	1.6 to 2.3 bar	400 mbar			5/2.5
	5	1.1	light blue			10 to 15 mbar	12 mbar	15
	6	1.2	white			14 to 40 mbar	30 mbar	15/5
	7	1.4	black			35 to 120 mbar	60 mbar	5
	8**	2.25	flame red			100 to 300 mbar	100 mbar	5
K 2a	2	3.2	light red	400 to 800 mbar	100 mbar			10/5
	3	3.6	dark red	0.6 to 1.6 bar	200 mbar			10/5
	4	4.75	white	1.5 to 5.2 bar	300 mbar			5/2.5
	04**	5	yellow	4 to 5.2	300 mbar			5/2.5
	9**	5.3	ivory	5 to 7 bar	600 mbar			5/2.5
	5	1.1	light blue			60 to 150 mbar	50 mbar	15/5
	6	1.4	black			120 to 400 mbar	100 mbar	5
	8**	2.25	flame red			350 mbar to 1 bar	150 mbar	5
K 2a/1	1	3.2	light red	400 to 800 mbar	100 mbar			10/5
	2	3.6	dark red	0.6 to 1.6 bar	200 mbar			10/5
	3	4.75	white	1.5 to 4.5 bar	300 mbar			5/2.5
	4	1.1	light blue			60 to 150 mbar	50 mbar	15/5
	5	1.4	black			120 to 400 mbar	100 mbar	5
K 2a/2		4.75	white	2.5 to 8 bar	500 mbar			15/5
		2.25	bright red			0.8 to 2.2 bar	400 mbar	15/5

*) The better accuracy Class applies to the second half of the setting range.

**) Only applicable for RMG 372

Sectional Drawing of RMG 673, K 1a and K 2a for SSV Release (OPCO & UPCO)



Series 600 Control Element for Safety Shut-off Valves (SSV)

Direct-acting Actuator RMG 674 (K 4, K 5, K 6) According to DIN EN 14382

Max. admissible pressure PS = 25 bar

Max. operating pressure p_{max} up to 25 bar

Setting range:
Over-pressure
W_{dso} 40 mbar up to 4.5 bar
Under-pressure
W_{dsu} 5 mbar to 300 mbar

CE registration according to PED in combination with RMG Gas Pressure Regulators

According to DIN EN 14382, the pilot is an integral component of this device.

- Actuator systems for direct-acting Safety Shut-off Valves. According to DIN EN 14382, actuator systems are integral part of SSVs
- Function Class A (B)
- Easy operation and maintenance
- Suitable for non-aggressive gases, other gases on enquiry

- All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

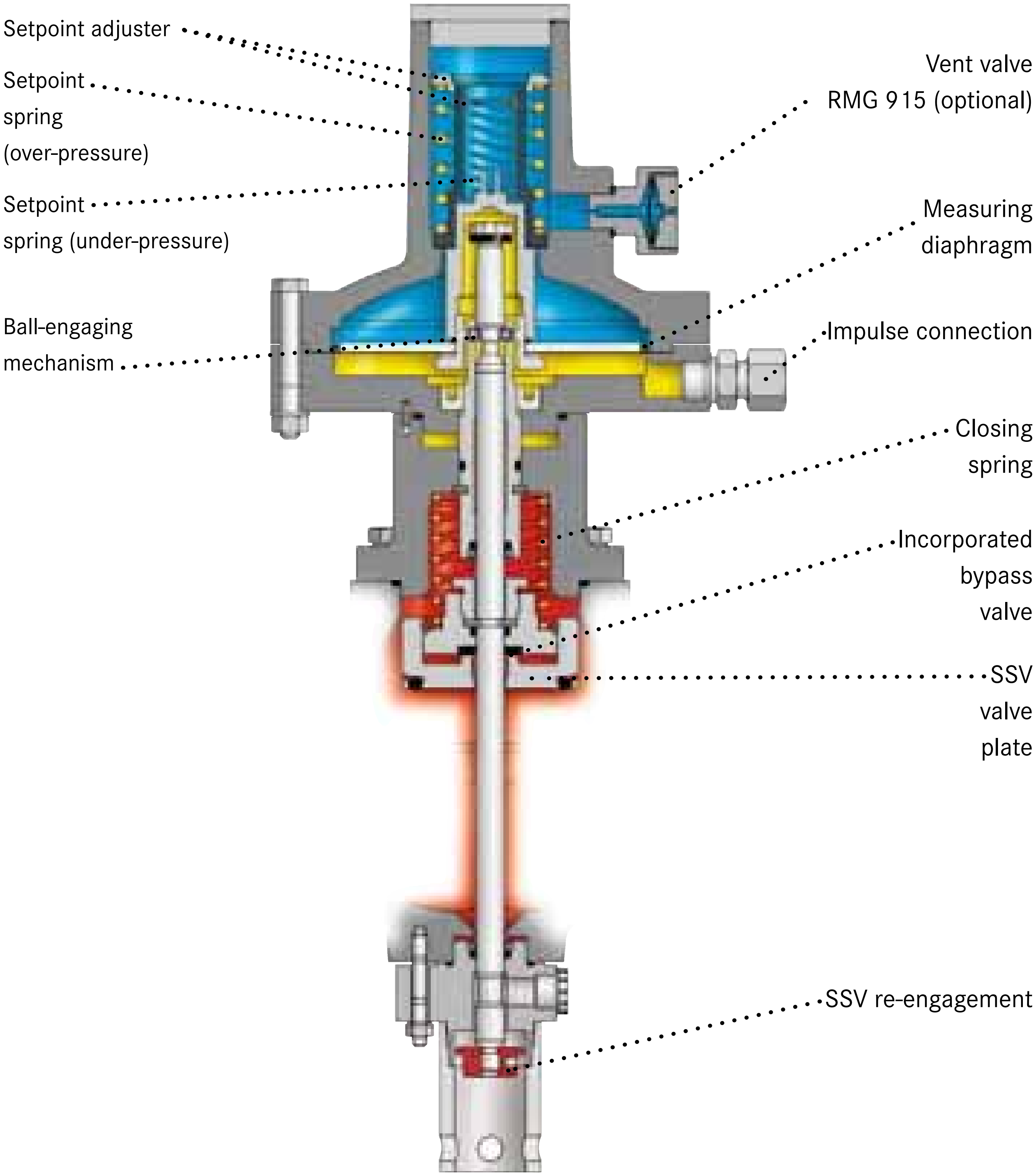
ACTUATORS K 4, K 5, K 6

	Setpoint spring			Over-pressure (OPCO)		Under-pressure (UPCO)		
	Spring no.	Wire Ø in mm	Colour coding	Specific outlet pressure range W_{dso}	Re-engage differential Δp_{wo} between p_{dso} and standard operating pressure	Specific outlet pressure range W_{dsu}	Re-engage differential Δp_{wu} between standard operating pressure and p_{dsu}	Accuracy group AG*
K 4	2	3.2	light red	40 to 100 mbar	20 mbar			5/2.5
	3	3.6	dark red	80 to 250 mbar	30 mbar			2.5
	4	4.5	black	200 to 500 mbar	60 mbar			2.5/1
	5	1.1	light blue			5 to 20 mbar	10 mbar	20/5
	6	1.2	black			15 to 60 mbar	20 mbar	5
K 5	3	3.6	dark red	200 to 800 mbar	100 mbar			2.5
	4	4.5	black	0.6 to 1.5 bar	200 mbar			2.5/1
	5	1.1	light blue			15 to 60 mbar	30 mbar	20/5
	6	1.4	black			40 to 120 mbar	60 mbar	5
K 6	3	3.6	dark red	0.6 to 2 bar	200 mbar			2.5
	4	4.5	black	1.5 to 4.5 bar	400 mbar			2.5/1
	5	1.1	light blue			40 to 120 mbar	60 mbar	20/5
	6	1.4	black			120 to 300 mbar	120 mbar	5

*) The better accuracy Class applies to the second half of the setting range.

Series 600 Control Element for Safety Shut-off Valves (SSV)

Sectional Drawing of RMG 674, K 4 for SSV Release (OPCO & UPCO)



Series 600 Control Element for Safety Shut-off Valves (SSV)

RMG 675 Actuator, K 15a
According to DIN EN 14382

Max. admissible pressure PS = 16 bar

Max. operating pressure p_{max} up to 16 bar

Setting range:

Over-pressure

W_{dso} 30 mbar up to 1 bar

Valve seat diameter 3 mm

Connection:
- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), for pipe diameters 12 mm

CE registration according to PED in combination with RMG Gas Pressure Regulators

According to DIN EN 14382, the pilot is an integral component of this device.

RMG CE 0085

- ☐ Actuator systems for pilot-operated Safety Shut-off Valves. According to DIN EN 14382, actuator systems are integral part of SSVs
- ☐ High response accuracy; low re-engagement differentials
- ☐ Easy operation and maintenance
- ☐ Function Class A (B)
- ☐ Suitable for non-aggressive gases, other gases on enquiry

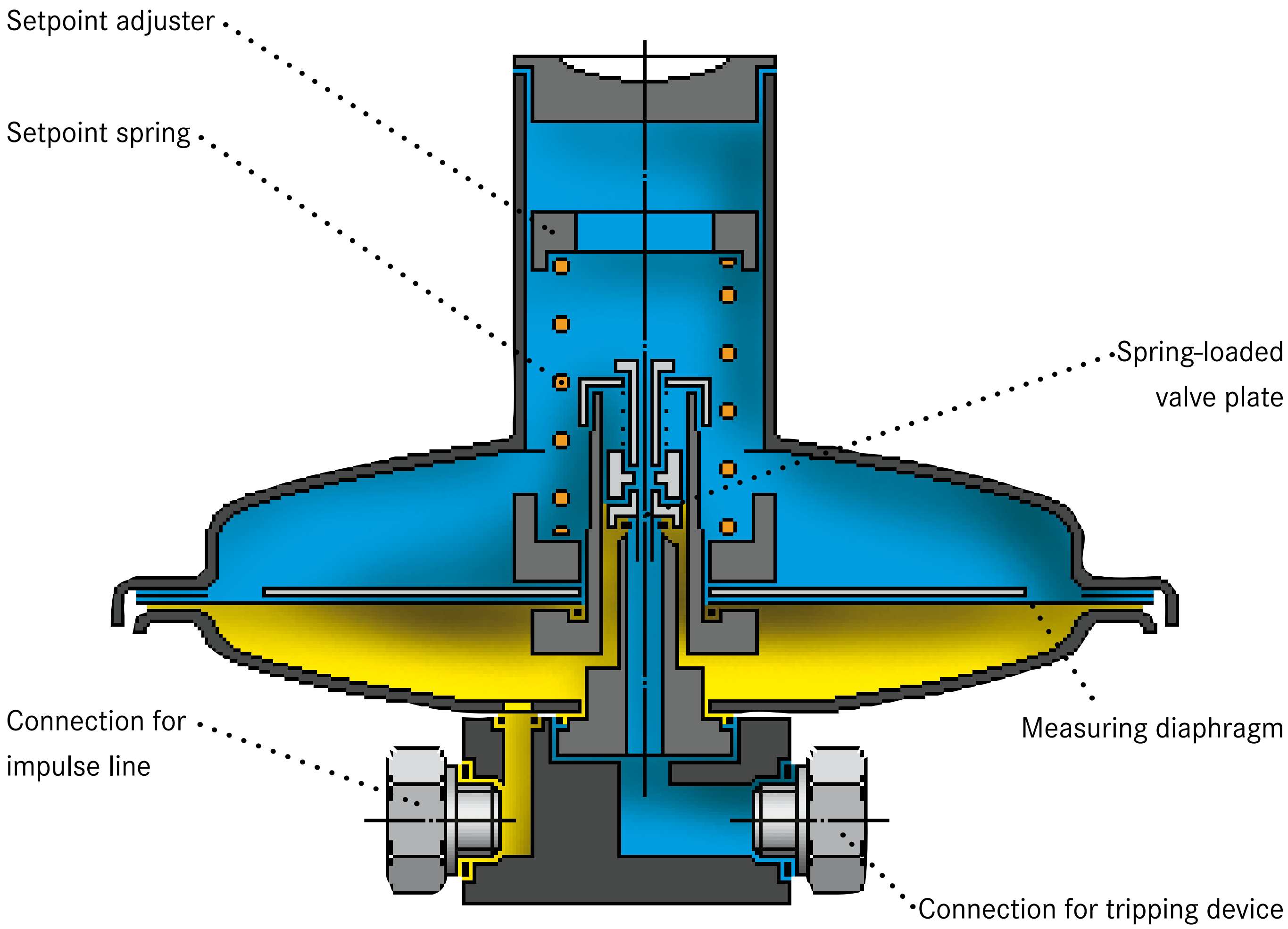
- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

ACTUATOR SYSTEM K 15A

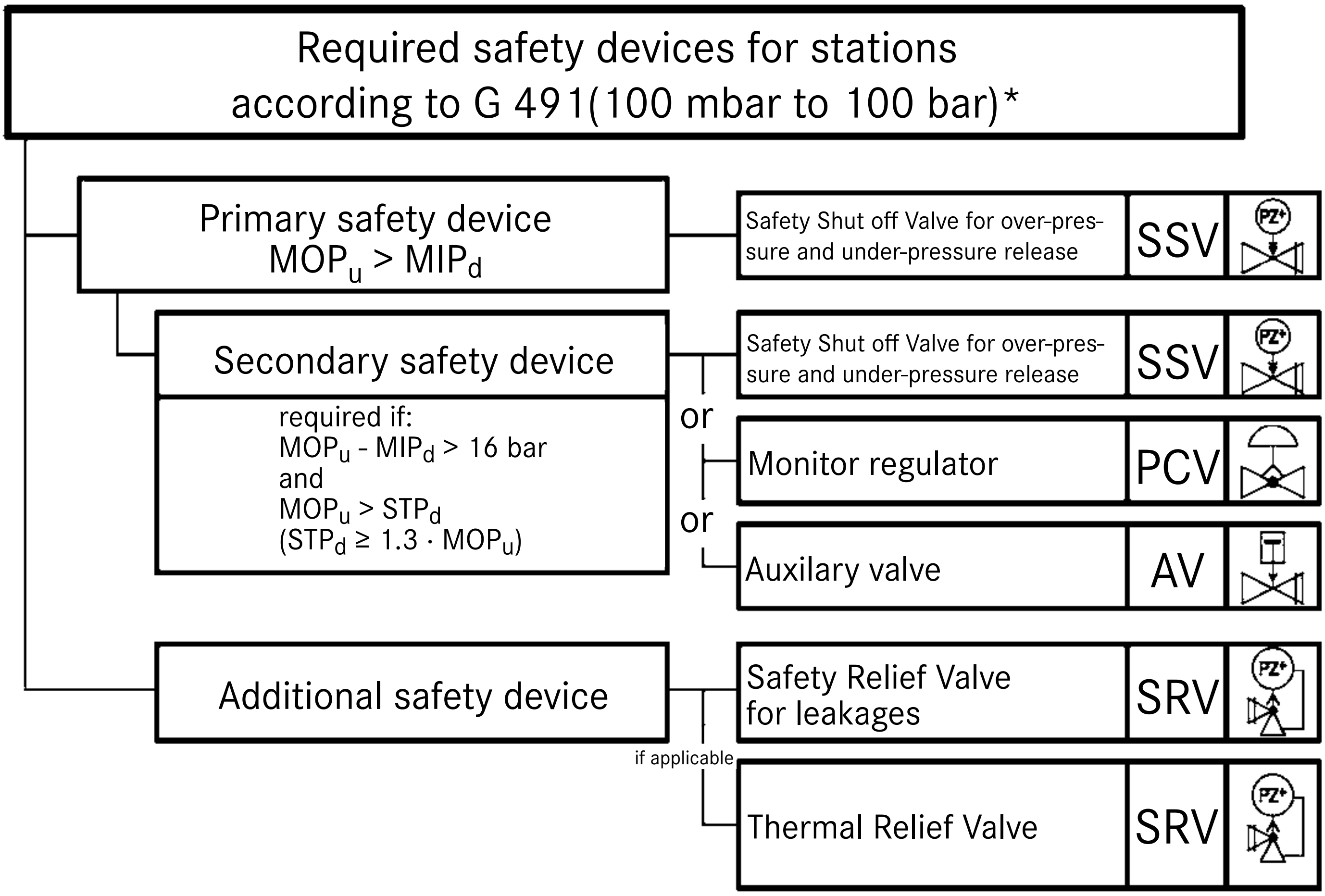
	Setpoint spring			Over-pressure (OPCO)		
	Spring no.	Wire Ø in mm	Colour coding	Specific outlet pressure range W_{dso}	Re-engage differential Δp_{wo} between p_{dso} and normal operating pressure	Accuracy group AG*
K 15a	1	2.5	grey	30 to 45 mbar	5 mbar	5
	2	3	yellow	35 to 100 mbar	10 mbar	5/2.5
	3	3.6	ivory	80 to 200 mbar	20 mbar	2.5/1
	4	4	light red	150 to 300 mbar	30 mbar	1
	5	4	dark red	250 to 400 mbar	40 mbar	1
	6	4.5	light blue	300 to 500 mbar	50 mbar	1
	7	5.3	dark blue	450 to 1,000 mbar	100 mbar	1

*) The better accuracy Class applies to the second half of the setting range.

Sectional Drawing of RMG 675, K 15 for SSV Release (OPCO)



Safety Devices for Gas Pressure Regulating Stations According to G 491



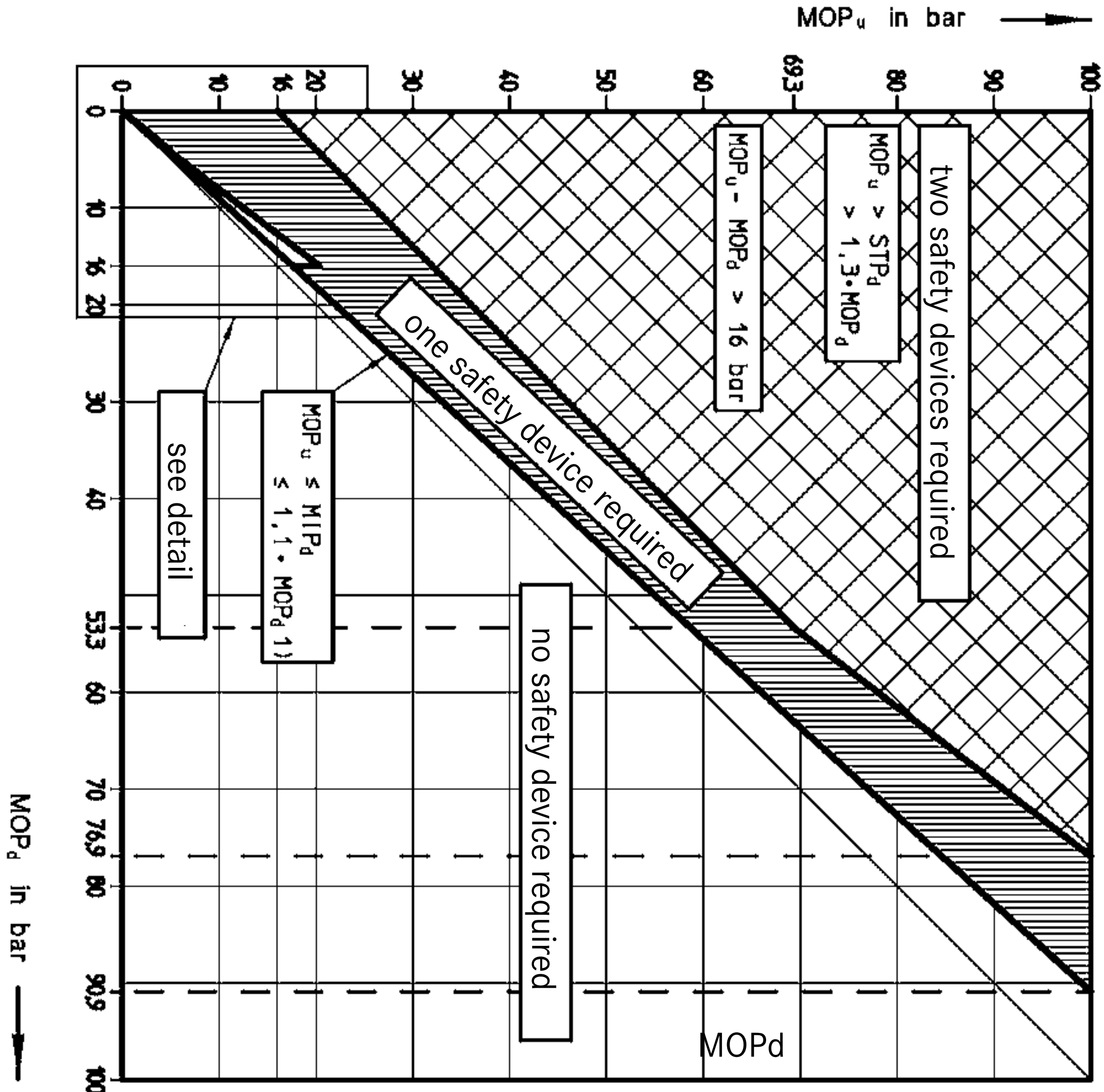
*) NOTE

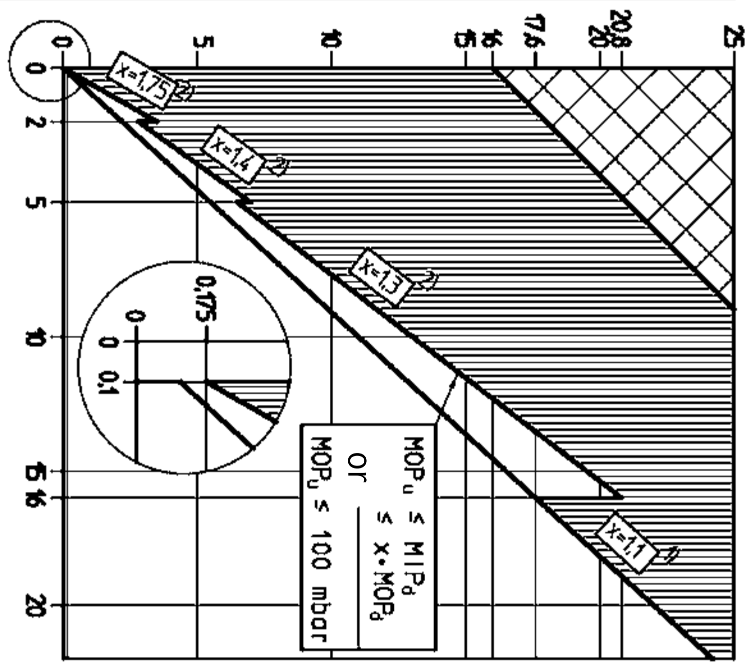
1. If max. upstream operation pressure (MOP_u) is less than max. downstream incidental pressure (MIP_d), a pressure safety system is not needed.

2. Full capacity relief devices are no longer allowed in new stations.

Series 700 Pilot-operated/Direct-acting Safety Shut-off Valves (SSV)

The diagram illustrates the information of the previous page.





1) Stations according to conventional design, if 0.1 bar ≤ MOP_d ≤ 100 bar than $MIP_d \leq 1.1 \cdot MOP_d$

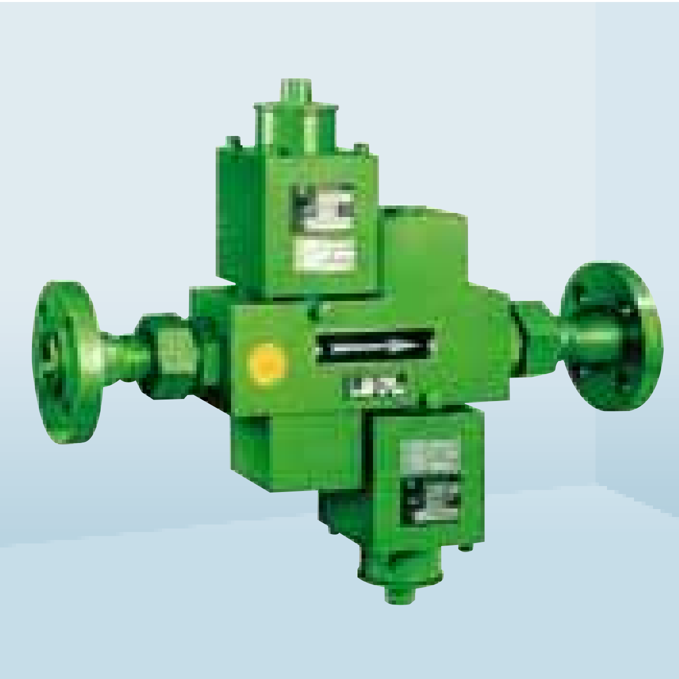
2) Stations according to DIN EN 12186

OVERVIEW

Description	Series	Type	Max. operating pressure p_{max} in bar	Outlet pressure range for: Over-pressure W_{do} in bar	Outlet pressure range for: Under-pressure W_{du} in bar	Pipe size in mm: 25	40	50	80	100	150	200	250	300
Safety Shut-off Valve (SSV)	700	RMG 703	100	0.05 to 90	0.01 to 90	●	○	○						
		RMG 704	100	0.05 to 90	0.01 to 90	●	○	○						
		RMG 711	100	0.08 to 90	0.01 to 90	●		●	●	●	●	●	●	●
		RMG 720	25	0.04 to 4.5	0.005 to 0.4	●		●	●	●	●			
		RMG 721	50	0.05 to 40	0.01 to 40			●	●	●	●			
		RMG 730	250	1 to 90	-								●	●
		RMG 731	100	0.05 to 40	0.01 to 40						●	●		●
		RMG 790 for gas pre-heater	100	2 to 10	-	●		●	●	●	●			
Direct-acting Safety Relief Valve (SRV)	800	RMG 832	100	0.005 to 30	-	Various screw connections < DN 25								
		RMG 835	25	0.005 to 2	-									
		RMG 846	20	0.2 to 7	-									
		RMG 873	100	10 to 100	-									
Pilot-operated Safety Relief Valve (SRV)	800	RMG 850	100	1 to 90	-	- Pipe size $DN_u = DN_d$: DN 25, DN 50, DN 80, DN 100 - Various designs with noise-reducing outlets								

○ with connecting pieces

Twin Safety Shut-off Valve (2 SSV units in one common valve body), Direct-acting or pilot-operated According to DIN EN 14382



- ☐ Device for industrial facilities and individual consumers
- ☐ Also suitable for low-load lines in larger gas pressure regulating stations
- ☐ Easy to maintain due to exchangeable function units (cartridge assembly)
- ☐ Design with actuator systems: K 1a, K 2a/1, K 2a/2, K 16, K 17, K 18, K 19
- ☐ Function Class A (B)
- ☐ Two Safety Shut-off Valves (SSVs) working independently of each other in one common valve body (twin version)
- ☐ Compact and easy-to-use design
- ☐ Optionally with vent valve RMG 915
- ☐ Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 100 bar
Max. operating pressure p_{max} up to 100 bar
Setting range:
For over-pressure
W_{dso} 50 mbar to 90 bar
For under-pressure
W_{dsu} 10 mbar to 90 bar

Connection:
- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), PN 100, for pipe diameters 10 mm thru 42 mm
- DIN flange PN 25, PN 40 and Flange Class 300, Class 600 according to ANSI 16.5 with transition pieces in DN 25, DN 40 and DN 50

Response time t → 0.1 to 0.3 s

CE registration according to PED

RMG CE 0085

Additional features:
(as requested by customer):
- ☐ Electromagnetic release
- ☐ Electric signal sensor for valve position "CLOSED" (proximity switch)
- ☐ Manual release
- ☐ Valve combination available together with RMG 200 and RMG 201

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SETTING RANGE OF SSV ACTUATOR		
Actuator system	Over-pressure (OPCO) W_{dso}	Under-pressure (UPCO) W_{dsu}
K 1a	0.05 to 1.5 bar	10 to 120 mbar
K 2a/1	0.4 to 4.5 bar	60 to 400 mbar
K 2a/2	2.5 to 8 bar	0.8 to 2.2 bar
K 16	0.8 to 40 bar	
K 17		2 to 40 bar
K 18	20 to 90 bar	
K 19		20 to 90 bar

Accuracy groups AG – see actuator systems

Face-to-face dimension: please refer to brochure

Safety Shut-off Valve (SSV), Direct-acting or Pilot-operated, According to EN 14382

- ☐ Device for industrial facilities and individual consumers
- ☐ Also suitable for low-load lines in larger gas pressure regulating stations
- ☐ Compact and simple construction
- ☐ Easy to maintain due to exchangeable function units (cartridge assembly)
- ☐ Design with actuator systems: K 1a, K 2a/1, K 2a/2, K 16, K 17, K 18, K 19
- ☐ Function Class A (B)
- ☐ Optionally with vent valve RMG 915
- ☐ Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 100 bar

Max. operating pressure p_{max} up to 100 bar

Outlet pressure range

For over-pressure

W_{dso} 50 mbar to 90 bar

For under-pressure

W_{dsu} 10 mbar to 90 bar

Connection:
- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), PN 100, for pipe diameters 10 mm thru 42 mm
- DIN flange PN 25, PN 40 and Flange Class 300, Class 600 according to ANSI 16.5 with transition pieces in DN 25, DN 40 and DN 50

CE registration according to PED

RMG CE 0085

Additional features (as requested by customer):
- ☐ Electromagnetic release
- ☐ Electric signal sensor for valve position "CLOSED" (proximity switch)
- ☐ Manual release
- ☐ Valve combination available together with RMG 200 and RMG 201

Response time t → 0.1 to 0.3 s

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SETTING RANGE OF SSV ACTUATOR		
Actuator system	Over-pressure (OPCO) W_{dso}	Under-pressure (UPCO) W_{dsu}
K 1a	0.05 to 1.5 bar	10 to 120 mbar
K 2a/1	0.4 to 4.5 bar	60 to 400 mbar
K 2a/2	2.5 to 8 bar	0.8 to 2.2 bar
K 16	0.8 to 40 bar	
K 17		2 to 40 bar
K 18	20 to 90 bar	
K 19		20 to 90 bar

Accuracy groups AG – see actuator systems

Face-to-face dimension: please refer to brochure

Safety Shut-off Valve (SSV), Direct-acting or Pilot-operated, According to EN 14382

Max. admissible pressure PS = 100 bar

Max. operating pressure p_{max} up to 100 bar

Outlet pressure range

For over-pressure

W_{dso} 50 mbar to 90 bar

For under-pressure

W_{dsu} 10 mbar to 90 bar

Connection:

DIN flange PN 25, PN 40 and
Flange Class 300, Class 600
according to ANSI 16.5 in
DN 25 to DN 150
Flange Class 900 upon request

Response time t → 0.1 to 0.3 s

- ☐ Device for transmission stations in gas networks for power plants and industrial facilities
- ☐ Very low pressure loss due to axial flow
- ☐ Four release options, standard design with manual release
- ☐ High response accuracy
- ☐ Available with actuator systems: K 10a, K 11a/1, K 11a/2, K 16, K 17, K 18, K 19
- ☐ Function Class A (B)
- ☐ Easy maintenance
- ☐ Optionally with vent valve RMG 915
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

RMG
CE 0085

Additional features
(as requested by customer):

- ☐ Electromagnetic release
- ☐ Electric signal sensor for valve position "CLOSED" (proximity switch)

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

FACE-TO-FACE DIMENSION

Pipe sizes DN	Face-to-face dimension in mm			
	DIN flange PN 25/40	Flange according to Class 300 RF	Flange according to Class 300 RJ	Flange according to Class 600
25	170	170	180	180
50	230	230	240	250
80	280	290	300	310
100	320	330	340	350
150	430	440	450	470

SETTING RANGE OF SSV ACTUATOR

Actuator system	Over-pressure (OPCO) W_{dso} in bar	Under-pressure (UPCO) W_{dsu} in bar
K 10a	0.05 to 1.5	0.01 to 0.12
K 11a/1	0.4 to 4.5	0.06 to 1
K 11a/2	2.5 to 8	0.8 to 2.2
K 16	1 to 40	
K 17		2 to 40
K 18	20 to 90	
K 19		20 to 90

Safety Shut-off Valve (SSV), Direct-acting or Pilot-operated, According to DIN EN 14382

- ☐ Device for transmission stations in gas networks for power plants and industrial facilities
- ☐ Very low pressure loss due to axial flow
- ☐ Four release options, standard design with manual release
- ☐ High response accuracy
- ☐ Available with actuator systems: K 10a, K 11a/1, K 11a/2, K 16, K 17, K 18, K 19
- ☐ Function Class A (B)
- ☐ Easy maintenance
- ☐ Optionally with vent valve RMG 915
- ☐ Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 100 bar

Max. operating pressure p_{max} up to 100 bar

Outlet pressure range

For over-pressure

W_{dso} 80 mbar to 90 bar

For under-pressure

W_{dsu} 10 mbar to 90 bar

CE registration according to PED

RMG CE 0085

Connection:
DIN flange PN 25, PN 40 and
Flange Class 300, Class 600
according to ANSI 16.5
in DN 200, DN 250, DN 300

Response time t → 0.1 s to 0.5 s

Additional features
(as requested by customer):
- ☐ Electromagnetic release
- ☐ Electric signal sensor for valve position “CLOSED” (proximity switch)

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

FACE-TO-FACE DIMENSION		
Pipe sizes	Face-to-face dimension in mm	
	DIN flange	Flange according to
DN	PN 25/40	Class 300, Class 600
200	725	725
250	730	775
300	800	800

SETTING RANGE OF SSV ACTUATOR		
Actuator system	Over-pressure (OPCO)	Under-pressure (UPCO)
	W_{dso} in bar	W_{dsu} in bar
K 10a	0.08 to 1.5	0.01 to 0.12
K 11a/1	0.4 to 4.5	0.06 to 1
K 11a/2	2.5 to 8	0.8 to 2.2
K 16	0.8 to 40	
K 17		2 to 40
K 18	20 to 90	
K 19		20 to 90

Safety Shut-off Valve (SSV), Direct-acting According to EN 14382

- ☐ Device for distribution stations as well as commercial and industrial facilities
- ☐ Compact design
- ☐ Easy to maintain due to exchangeable function units (cartridge assembly)
- ☐ Optionally with actuator systems:
  K 1a, K 2a (DN 25) or
  K 4, K 5, K 6 (≥ DN 50)
- ☐ Function Class A (B)
- ☐ Optionally with vent valve RMG 915
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

Max. admissible pressure PS = 25 bar

Max. operating pressure p_{max} up to 25 bar

Max. admissible pressure PS = 16 bar (DN 25)

Max. operating pressure p_{max} up to 16 bar (DN 25)

Outlet pressure range
For over-pressure
W_{dso} 40 mbar to 4.5 bar
For under-pressure
W_{dsu} 5 mbar to 0.4 bar

Connection:
DIN flange PN 16, PN 25 and
Flange Class 150 according to ANSI 16.5
in DN 25, DN 50, DN 80, DN 100

Response time t → 0.1 s to 0.3 s

Additional features
(as requested by customer):
- ☐ Electromagnetic release
  (by current supply)
- ☐ Electric signal sensor for valve position “CLOSED” (proximity switch)

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 700 Safety Shut-off Valve (SSV)

FACE-TO-FACE DIMENSION				
Pipe sizes	DN 25*	DN 50	DN 80	DN 100
Face-to-face dimension in mm	184	254	298	352

*) DN 25 Class 150 only up to PS = 16 bar

SETTING RANGE OF SSV ACTUATOR		
Actuator system	**Over-pressure (OPCO)** W_{dso} in bar	**Under-pressure (UPCO)** W_{dsu} in mbar
K 1a	0.05 to 1.5	10 to 120
K 2a	0.4 to 4.5	60 to 400
K 4	0.04 to 0.5	5 to 60
K 5	0.2 to 1.5	15 to 120
K 6	0.5 to 4.5	40 to 300

Safety Shut-off Valve (SSV), Direct-acting or Pilot-operated, According to EN 14382

Max. admissible pressure PS = 50 bar

Max. operating pressure p_{max} up to 50 bar

Outlet pressure range

For over-pressure

W_{dso} 50 mbar to 40 bar

For under-pressure

W_{dsu} 10 mbar to 40 bar

Connection:

DIN flange PN 16, PN 25, PN 40 and
Flange Class 150 and
Class 300 according to ANSI 16.5
in DN 50 thru DN 150

Response time t → 0.1 s to 0.3 s

- ☐ Device for offtake and distribution stations as well as power plants and industrial facilities
- ☐ Compact design
- ☐ Easy to maintain due to exchangeable functional units (cartridge assembly)
- ☐ Four release options, standard design with manual release
- ☐ Optionally available design with actuator systems:
  K 10a, K 11a/1, K 11a/2, K 16, K 17
- ☐ Function Class A (B)
- ☐ Optionally with vent valve RMG 915
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

Additional features
(as requested by customer):

- ☐ Electromagnetic release (by current supply)
- ☐ Electric signal sensor for valve position “CLOSED” (proximity switch)

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 700 Safety Shut-off Valve (SSV)

FACE-TO-FACE DIMENSION IN mm				
Pipe sizes	DN 50	DN 80	DN 100	DN 150
Face-to-face dimension DIN flange and Class 150	254	298	352	451
Face-to-face dimension for Class 300	254	318	368	473

SETTING RANGE OF SSV ACTUATOR		
Actuator system	**Over-pressure (OPCO)** W_{dso} in bar	**Under-pressure (UPCO)** W_{dsu} in bar
K 10a	0.05 to 1.5	0.01 to 0.12
K 11a/1	0.4 to 4.5	0.06 to 1
K 11a/2	2.5 to 8	0.8 to 2.2
K 16	0.8 to 40	
K 17		2 to 40

Safety Shut-off Valve (SSV) or Auxiliary Valve (AV), Pilot-operated According to DIN EN 14382

- ☐ For transmission stations and gas storage facilities
- ☐ Actuator system, advanced sleeve design
- ☐ Operated by flow medium from pipe system or compressed air
- ☐ High accuracy
- ☐ Multiple release possible (pneumatic and/or electric)
- ☐ Adjustable response time: either SSV or AV mode
- ☐ Function Class A
- ☐ Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 250 bar

Max. operating pressure p_{max} up to 250 bar
Max. admissible pressure PS for tripping device and pneumatic release elements = 100 bar
Over-pressure outlet pressure range W_{dso} 1 bar to 90 bar (OPCO)

Tripping device RMG 680

CE registration according to PED

Connection:
Flange Class 600, Class 900 and Class 1500 according to ANSI 16.5, DN 250 and DN 300

Response time may be adapted to specific requirements: either Safety Shut-off Valve or Auxiliary Valve.

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 700 Safety Shut-off Valve (SSV)

FACE-TO-FACE DIMENSION		
Pipe size*	Face-to-face dimension in mm	Weight in kg (approx.)
DN 250	1,100	2,000
DN 300	1,100	2,200

*) Other pipe sizes on enquiry

SETTING RANGE OF SSV ACTUATOR		
Actuator system	Over-pressure (OPCO) W_{dso} in bar	Smallest pressure deviation between standard op. pressure and p_{do} in bar
K 16 K 18*	1 to 40 20 to 90	depends on spring range depends on spring range

*) Actuator system type RMG 670 with metal harmonica-type measuring unit.

Safety Shut-off Valve (SSV), Direct-acting or Pilot-operated, According to EN 14382

Max. admissible pressure PS = 100 bar

Max. operating pressure p_{max} up to 100 bar

outlet pressure range

For over-pressure
W_{dso} 50 mbar to 40 bar

For under-pressure
W_{dsu} 10 mbar to 40 bar

- ☐ Device for offtake and distribution stations as well as for power plants and industrial facilities
- ☐ Very low pressure loss Δp due to axial flow
- ☐ Four release options, standard design with manual release
- ☐ High response accuracy
- ☐ Optionally available with one of the following actuator systems: K 10a, K 11a/1, K 11a/2, K 16, K 17
- ☐ Function Class A (B)
- ☐ Same Face-to-face dimension as SSV type GSDK and type GSDK-A (easy exchange of existing units)
- ☐ Optionally with vent valve RMG 915
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

Connection:
DIN flange PN 10, PN 16, PN 25, PN 40, PN 100 and Flange Class 150, Class 300, Class 600 according to ANSI 16.5 in DN 150 to DN 300

Response time t → 0.1 s to 0.3 s

Additional features (as requested by customer):

- ☐ Electromagnetic release (by current supply / current loss)
- ☐ Electric signal sensor for valve position “CLOSED” (proximity switch)

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

FACE-TO-FACE DIMENSION		
Face-to-face dimension in mm		
DN 150	DN 200	DN 300
500	580	680

SETTING RANGE OF SSV ACTUATOR		
Actuator system	**Over-pressure (OPCO)** W_{dso} in bar	**Under-pressure (UPCO)** W_{dsu} in bar
K 10a	0.05 to 1.5	0.01 to 0.12
K 11a/1	0.4 to 4.5	0.06 to 1
K 11a/2	2.5 to 8	0.8 to 2.2
K 16	0.8 to 40	
K 17		2 to 40

Direct-acting Water Safety Shut-off Valve (SSV) for Hot Water Circuits of Gas Pre-heaters According to DIN EN 14382

Max. admissible pressure PS up to 160 bar

Max. operating pressure p_{max} up to 160 bar

Connection:
Sandwich design for assembly between DIN flange PN 10/16, PN 25, PN 40 and Flange Class 150, Class 300, Class 600, Class 900 according to ANSI 16.5 in DN 25, DN 50, DN 80, DN 100 and DN 150

- ☐ Device for protecting boilers of heating station gas pre-heaters
- ☐ For assembly in flow and return pipes of heating circuits
- ☐ Simple construction
- ☐ Low pressure loss
- ☐ Easy operation and performance tests
- ☐ Function Class A

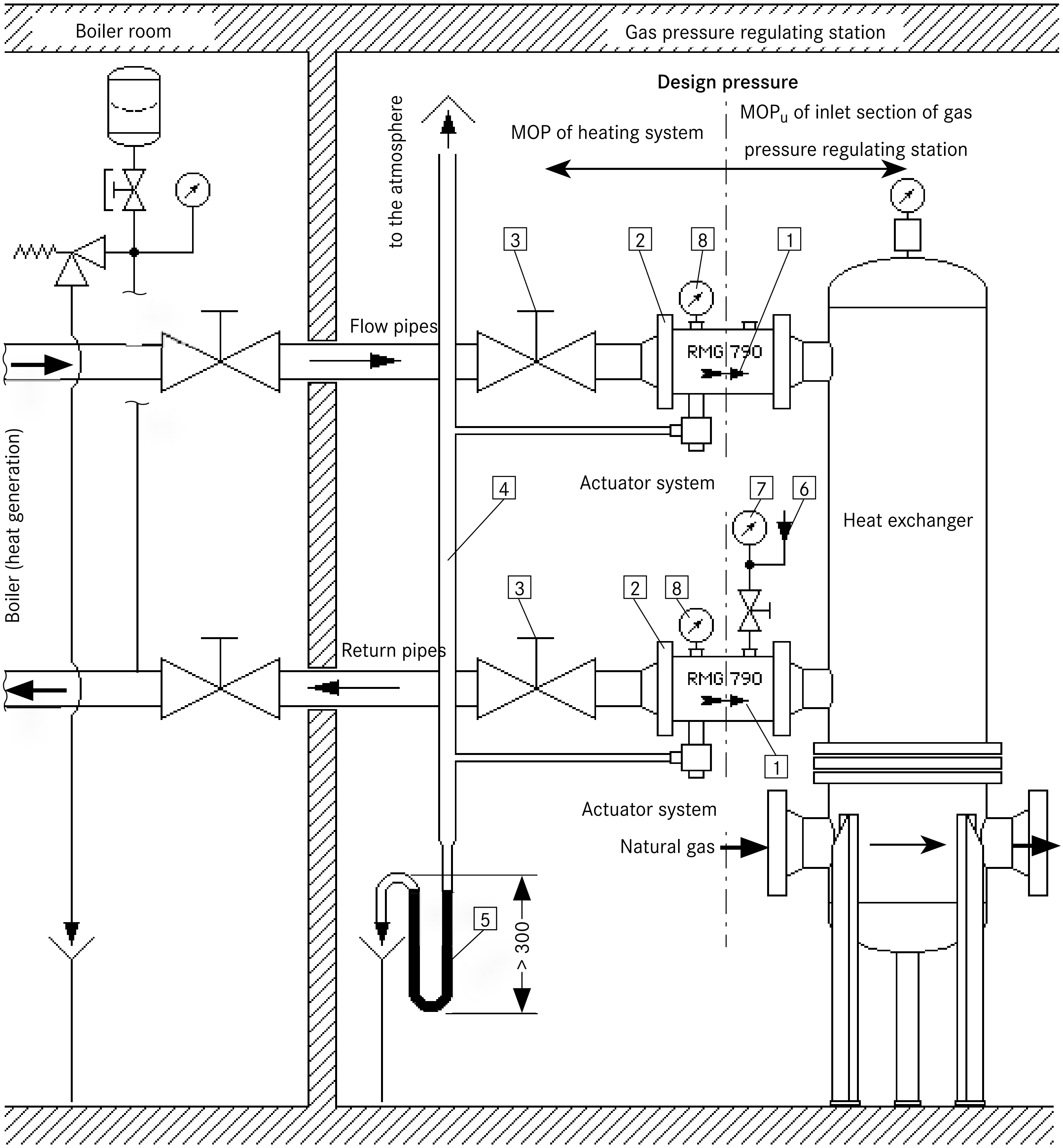
CE registration according to PED

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

OUTLET PRESSURE RANGE W_d		
Actuator system / Setpoint spring	**Outlet pressure range W_d of the SSV in bar**	**Accuracy group AG**
K1 / F1	2 to 2.5	5
K1 / F2	2.5 to 3.5	2.5
K1 / F3	3.5 to 16	2.5

FACE-TO-FACE DIMENSION UP TO CLASS (ANSI) 600, (CLASS (ANSI) 900, CLASS (ANSI) 1500 ON ENQUIRY)						
Pipe sizes		**DN 25**	**DN 50**	DN 80	DN 100	DN 150
Face-to-face dimension in mm		140	160	160	160	240
K_v in m^3/h	**Flow pipes**	10	35	98	134	285
	Return pipes	11	40	113	150	310

Example of installation



1) Arrow indicating mounting position
   (arrow must point towards heat exchanger!)
2) Flange - heat generator side
3) Isolating valve
4) Bleed line (to atmosphere)
5) Sealing liquid
6) Test connection for pressure injection
7) Master pressure gauge I
8) Master pressure gauge II

Series 800 Safety Relief Valve (SRV)

The following is an overview of all RMG devices that can be used as Safety Relief Valves (SRV).

OVERVIEW				
Description	**Type**	**Function classes accor. to DIN 33821**	**Max. operating pressure p_{max} in bar**	**Response pressure range W_h**
Direct-acting Safety Relief Valve (SRV) with spring-loaded measuring unit for protecting stations (Function Class A) or to serve as vent SRV (Function Class B)	RMG 832	B	100	0.5 to 30 bar
	RMG 835		1, 16, 25	5 mbar to 2 bar
	RMG 846		20	0.2 to 7 bar
	RMG 873		100	10 to 100 bar
Pilot-operated Safety Relief Valve (SRV) (operating with auxiliary energy from the inlet pressure range) to protect stations (Function Class A)	RMG 850 withcontrol element RMG 670	A	100	2 to 90 bar

Note: All pilot-operated RMG gas pressure regulators – if equipped with the respective pilots – can be used as inlet gas pressure regulators or Safety Relief Valves (SRV).

Type-B Direct-acting Safety Relief Valve (SRV) According to DIN 33821

Max. admissible pressure PS = 100 bar

Max. operating pressure p_{max} up to 100 bar

Response pressure range W_d 0.5 bar to 30 bar

Valve seat Ø: 8 mm

- ☐ Device for transmission, offtake and distribution stations as well as industrial facilities
- ☐ Primarily used to relief leakage gas in pressure regulators in order to prevent the SSV from being actuated by accident.
  → Function Class B
- ☐ Compact design
- ☐ Installation irrespective of position
- ☐ High response accuracy
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

Connection:

- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), PN 100 for pipe sizes
  Inlet: 12 mm
  Outlet: 16 mm, 20 mm, 25 mm, 28 mm

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

OUTLET PRESSURE RANGE

Setpoint spring			Adjustable response pressure W_d in bar	Accuracy group AG*
Spring no.	Wire Ø in mm	Colour coding		
1	5	grey	0.5 to 2	5/2.5
2	5.6	yellow	1 to 4	2.5/1
3	6.3	brown	2 to 8	2.5/1
4	7	red	4 to 16	2.5/1
5	☐ 8/7	green	12 to 30	2.5/1

*) The better accuracy Class applies to the second half of the setting range.

Type-B Direct-acting Safety Relief Valve (SRV) According to DIN 33821

Max. admissible pressure PS = 25 bar

Max. operating pressure p_{max} up to 25 bar

Outlet pressure range W_d 5 mbar to 2 bar
Valve seat Ø: 3 mm (measuring unit 0)
25 mm (measuring units 1 and 2)

Connection:
Inlet and outlet:
- PN 5: internal thread G 1
- PN 16 and 25: Pipe connections according to DIN EN ISO 8434-1 (DIN 2353) for pipe sizes:
  12 mm (measuring unit 0)
  28 mm (measuring units 1 and 2)

- ☐ Device for distribution and industrial stations
- ☐ Primarily used to relief leakage gas of gas pressure regulators to prevent the SSV from being actuated by accident.
  → Function Class B
- ☐ Simple construction, easy to maintain
- ☐ Installation irrespective of position
- ☐ High response accuracy
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

RMG CE 0085

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Series 800 Safety Relief Valve (SRV)

OUTLET PRESSURE RANGE					
Setpoint spring			**Adjustable response pressure** in mbar		
Spring no.	Wire Ø in mm	Colour coding	Measuring unit 0	Measuring unit 1	Measuring unit 2
1	2.5	grey	20 to 45	5 to 30	-
2	3	yellow	35 to 100	15 to 75	-
3	3.6	ivory	80 to 200	40 to 150	-
4	4	light red	150 to 300	75 to 200	-
5	4	green	250 to 400	100 to 300	200 to 600
6	4.5	light blue	300 to 500	150 to 400	300 to 800
7	5.3	dark blue	450 to 1,000	200 to 1,000	400 to 2,000

ACCURACY GROUP		
Adjustable response pressure in mbar	**Accuracy group AG*** for measuring units 0 and 1	**Accuracy group AG** for measuring unit 2
5 to 50	5/10	
> 50 to 100	2.5/5	
> 100 to 1,000	1/2.5	
> 200 to 400		5
> 400 to 2,000		2.5

*) The better accuracy Class applies to the second half of the setting range.

Direct-acting Safety Relief Valve (SRV)
According to DIN 33821

- ☐ Safety Relief Valve (SRV) for gas pressure regulating stations
- ☐ Simple design and easy mainteneance
- ☐ Can be mounted in any position
- ☐ High response accuracy
- ☐ Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 20 bar
Max. operating pressure p_{max} up to 20 bar

SRV-setting range
W_d 0.2 to 7 bar

Valve seat Ø: 7 mm

Connections:
Inlet: G 1/2 a (male thread)
Outlet: G1/2 i (female thread)

SETTING RANGES

Setpoint spring no.	W_{ds} bar
1	0.2 to 0.5
2	0.4 to 1.5
3	1 to 2.5
4	2 to 4
5	3 to 7

Pilot-operated Safety Relief Valve (SRV), Type A According to DIN 33821

- Device for transmission and offtake stations as well as for power plants and industrial facilities
- Full capacity relief valve
- Axial flow with valve sleeve
- Function Class A
- Installation irrespective of position
- High response accuracy
- Small proportional range
- Short response time
- Optionally with noise-reducing outlet system RMG 512
- With actuator RMG 670-B (K 16, K 18)
- Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 100 bar

Max. operating pressure p_{max} up to 100 bar

Outlet pressure range W_d 2 bar to 90 bar

Valve seat Ø: equals inlet pipe size

Connection:

DN 25, DN 50, DN 80 and DN 100

DIN flange PN 25, PN 40 and Flange Class 300, Class 600 according to ANSI 16.5

Optionally with noise-reducing outlet:

Only available in Class 600 according to ANSI 16.5

CE registration according to PED

RMG CE 0085

- All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

OUTLET PRESSURE RANGE							
Actuator system Type	Setpoint spring				Max. operating pressure of measuring diaphragm	Smallest pressure deviation between response pressure and normal operating pressure	Accuracy group
	Spring no.	Wire Ø in mm	Colour coding	Outlet pressure range W_d in bar	p_{max} in bar	Δp in bar	AG*
RMG 670-B	1	4.5	black	2 to 5	40	0.5	5/2.5
	2	5	grey	2 to 10	40	0.6	2.5/1
	3	6.3	brown	5 to 20	40	1	2.5/1
	4	7	red	10 to 40	50	1.5	2.5/1
	5	☐ 8/7	green	10 to 50**	100	2	2.5/1
	6	9	white	20 to 90**	100	2	2.5/1

*) The better accuracy Class applies to the second half of the setting range.
**) Metal-harmonica measuring unit

FACE-TO-FACE DIMENSION IN mm					
Pipe sizes		Flange PN	Flange according to Class		
Inlet	Outlet	25 and 40	300 RF	300 RJ	600 RF/RJ
DN 25	25	200	197	210	210
	100*	360	359	365	365
	150*	360	359	365	365
DN 50	50	270	267	283	286
	150*	422	421	429	430
	200*	422	421	429	430
DN 80	80	310	318	333	337
	250*	512	516	523	525
DN100	100	370	368	384	394
	300*	548	548	555	560

*) With noise-reducing outlet (outlet flange only Class 600 according to ANSI 16.5).

Direct-acting Safety Relief Valve (SRV)
According to DIN 33821

- ☐ Device for transmission and offtake stations as well as distribution networks for power plants and industrial facilities
- ☐ Function Class B
- ☐ With proportional opening characteristic
- ☐ Small proportional range
- ☐ Easy maintenance
- ☐ Also applicable as thermal relief valve
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

Max. admissible pressure PS = 100 bar
Max. operating pressure p_{max} up to 100 bar
Outlet pressure range W_d 10 bar to 100 bar
Valve seat Ø: 24 mm
Smallest flow diameter: 8 mm

Structural test according to TÜV

Connection:
- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353) for pipe sizes

Inlet: 12 mm
Outlet: 20 mm, 25 mm

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

OUTLET PRESSURE RANGE		
Setpoint spring	Spring wire diameter in mm	Adjustable response pressure W_d in bar
F1 F2	7 ☐ 8/7	10 to 50 40 to 100

ACCURACY GROUP	
Adjustable response pressure in bar	Accuracy group AG
10 to 25 25 to 100	2,5 1

Electric, Explosion-proof Gas Pre-heater

Max. admissible pressure PS = 200 bar
Max. operating pressure p_{max} up to 200 bar
Operating voltage: 230 V/50 Hz
Power consumption 150 W
Max. temperature of aluminium block at room temperature (+21 °C) T_{max} 100 °C approx.

Connection:
- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), PN 200, for pipe diameter 10 mm

Explosion-proof according to
VDE 0171/5.78:
EEx de IIC T3

- ☐ Control-gas pre-heater (e.g., for pneumatic pilots)
- ☐ For heating, the gas flow is led through a steel pipe cast in an aluminium block
- ☐ The heat transmission is triggered by heating the self-regulating electric heater embedded in the aluminium block
- ☐ Can be mounted in any position
- ☐ Suitable for non-aggressive gases, other gases on enquiry

PTB certified

SEP design according to PED

SEP

Pneumatic Gas Pre-heater (Vortex Tube) with Switch Unit

- ☐ Control-gas pre-heater (e.g., for pneumatic pilots)
- ☐ Fully self-sufficient as preheating does not require any additional energy (Ranque-Hilsch effect)
- ☐ Simple construction
- ☐ Vortex tube without any moving interior parts
- ☐ Easy integration into existing gas pressure control systems
- ☐ Little tubing required
- ☐ Optionally with pneumatic control unit. Only required in stations where zero gas consumption is possible
- ☐ Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 100 bar

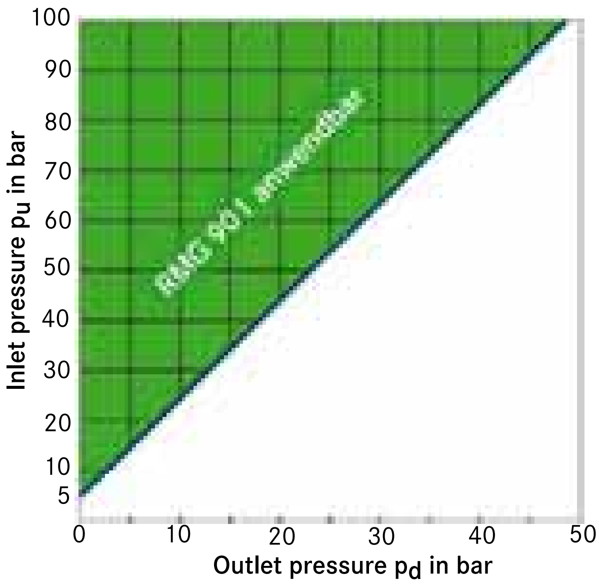
Max. operating pressure p_{max} up to 100 bar

Max. temperature of housing t_{max} approx. 60 °C at room temperature (approx. 20 °C)

SEP design according to PED

The gas pre-heater RMG 901 is applicable with in the range $p_u \geq 2 \cdot p_d + 5$.
p_u = inlet pressure in bar (over-pressure)
p_d = outlet pressure in bar (over-pressure)

Connection:
- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), PN 100, for pipe sizes 10 mm and 12 mm



- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Fine-mesh Filter for Control-gas

Max. admissible pressure PS = 100 (250) bar

Max. operating pressure
p_{max} up to 100 (250) bar

Grade of filtration: approx. 5 µm

Connection:
- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), PN 100, for pipe diameter 10 mm

- ☐ Auxiliary filter (e.g., for pneumatic pilots)
- ☐ For single use and/or as parallel filter blocks (double filter)
- ☐ Large filter area
- ☐ High filtration efficiency
- ☐ Easy maintenance (exchange of filter insert)
- ☐ Small flow resistance
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED in combination with RMG Gas Pressure Regulators
According to DIN EN 334, the push button valve is an integral component of this device.

RMG CE 0085

SEP design according to PED

RMG SEP

Flow rate coefficient
$K_G = 41\ m^3/(h \cdot bar)$

Maximum operating flow rate
$Q_{mmax} = 15\ m^3/h$

New filter insert
Δp 0.1 bar

Soiled filter insert
Δp_{max} 1 bar approx.

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Gas Filter – Cellular Filter According to DIN 3386

- ☐ Filter for distribution stations as well as power plants and industrial facilities
- ☐ Compact design
- ☐ High filtration efficiency
- ☐ Low pressure loss Δp
- ☐ Exchangeable filter insert
- ☐ Easy cleaning and environmentally friendly disposal of filter mesh
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

RMG CE 0035

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

RMG 906

Max. admissible pressure PS = 16 bar

Max. operating pressure p_{max} up to 16 bar

Max. flow velocity for sizing: up to 20 m/s
Max. pressure drop Δp: 50 mbar (for clean filter)

Limit for soiled filter insert: Δp_{max} 500 mbar

Filter material: pleated special paper,
three grades: 10 µm, 4 µm and 2 µm

Connection:

- DIN flange PN 16 (cast aluminium body) in DN 25, DN 50, DN 80 & DN 100
- DIN flange PN 16 (ductile iron body) in DN 150

RMG 906a, 906a a"t"

Same features as RMG 906 – plus:

- ☐ 2-stage dust separation
- ☐ Optional: magnet insert for collection of magnetic parts
- ☐ HTB design (RMG 906a"t")

Max. admissible pressure PS = 25 bar

Max. operating pressure p_{max} up to 25 bar

Filter material: pleated special paper,
three grades: 10 µm, 4 µm and 2 µm

Connection:

- DIN flanges PN 16, PN 25
- Flange Class 150 according to ANSI 16.5 (ductile iron body) in DN 25, DN 50, DN 80, DN 100

FACE-TO-FACE DIMENSION						
Pipe sizes		**DN 25**	**DN 50**	**DN 80**	**DN 100**	**DN 150**
Face-to-face dimension in mm	RMG 906	140	210	268	318	400
	RMG 906a, a"t"	190	260	330	380	-

Gas Filter – Angular Cellular Filter According to DIN 3386

- ☐ Filter for distribution stations as well as power plants and industrial facilities
- ☐ Compact design
- ☐ High filtration efficiency
- ☐ Low pressure loss Δp
- ☐ Exchangeable filter insert
- ☐ Easy cleaning and environmentally friendly disposal of filter mesh
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED

Max. admissible pressure PS = 16 bar

Max. operating pressure p_{max} up to 16 bar

Max. flow velocity for sizing: up to 20 m/s Max. pressure drop Δp: 50 mbar (for clean filter)

Limit for soiled filter insert: Δp_{max} 500 mbar

Filter material: pleated special paper in three grades (10 µm, 4 µm and 2 µm)

Connection:
- DIN flange PN 16
  (cast aluminium body) in
  DN 25, DN 50, DN 80, DN 100

☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

WIDTH ACROSS CORNERS* (FACE-TO-FACE DIMENSION)				
Pipe sizes	DN 25	DN 50	DN 80	DN 100
Width across corners* in mm	78	123	134	159

*) Measurement taken between body centre/outlet flange centre and pipeline connection.

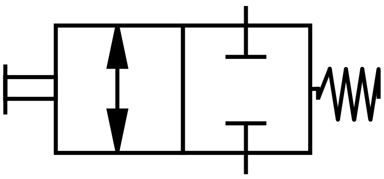
Push-button Valve with Service Position “Closed”

Max. admissible pressure PS = 100 bar

Max. operating pressure p_{max} up to 100 bar

Valve seat diameter 8 mm

Connection:
- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), PN 100, for pipe sizes 10 mm and 12 mm



- ☐ Bypass valve for Safety Shut-off Valves (SSV)
- ☐ Valve for test lines
- ☐ Push the button to open the valve. As soon as the button has been released, the valve is in service position “closed” again
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED in combination with RMG Gas Pressure Regulators/safety devices

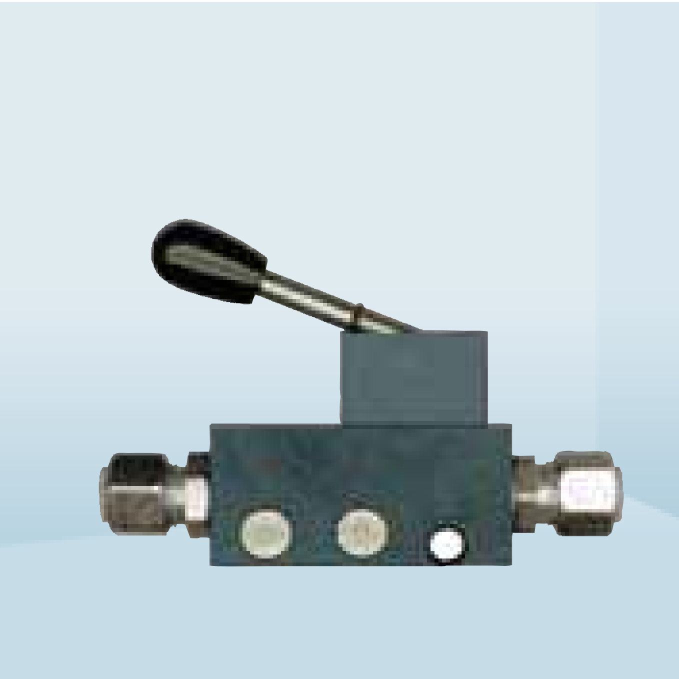
According to DIN EN 334/14382, the push-button valve is an integral component of this device.

RMG CE 0085

SEP design according to PED

RMG SEP

Push-button Valve with Service Position "Open"

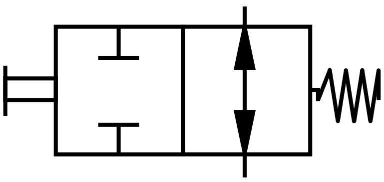


Max. admissible pressure PS = 100 bar

Max. operating pressure p_{max} up to 100 bar

Valve seat diameter 14 mm

Connection:
- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353) for pipe sizes 12 mm



Test connection:
- Two screw couplings type 1215 for high-pressure tube DN 2

Additional features:
- 3-way ball valve with negative lap (no closed position during tripping)

- ☐ Valve for test and measuring lines
- ☐ Push the button to open the valve. As soon as the button has been released, the valve is in it's service position "open"
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED with RMG Gas Pressure Regulators
According to DIN EN 334/14382, the push-button valve is an integral component of this device.

SEP design according to PED

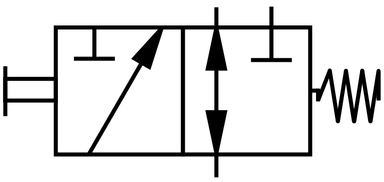
3-way Push-button Valve

Max. admissible pressure PS = 100 bar

Max. operating pressure p_{max} up to 100 bar

Valve seat diameter 14 mm

Connection:
- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), PN 100, for pipe sizes 10 mm and 12 mm



- ☐ Push-button valve for SSV measuring lines, and for manual release function via under-pressure shut-off (e.g., RMG 330 and RMG 408 with SSV system RMG 720)
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED with RMG gas pressure regulators/safety devices

According to DIN EN 334/14382, the push-button valve is an integral component of this device.

SEP design according to PED

Testing Valve

- ☐ For installation in measuring lines of safety devices
- ☐ Guarantees safe SSV/SRV function even during response pressure testing
- ☐ Facilitates simple SSV/SRV testing by means of incorporated screw couplings for pressure injection and pressure measuring
- ☐ Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 100 bar
Max. operating pressure p_{max} up to 100 bar
Response pressure of over-pressure valve
Δp 0.1 bar

Connection:
- Pipe connection according to DIN EN ISO 8434-1 (DIN 2353) for pipe sizes 12 mm

Test connection:
- Two screw couplings type 1215 for high pressure tube (body thread connection M 10 x 1)

Additional features:
- 3-way ball valve with negative lap (during tripping, connections cannot be all in closed position simultaneously)

DVGW registration

SEP design according to PED

SEP

Vent Valve

Max. admissible pressure PS and

Max. operating pressure p_{max} see table

RMG 915 VENT VALVE		
Type of equipment	Flow rate limit air in relation to normal condition in l/h	PS and p_{max}
RMG 915-1	30	25 bar
RMG 915-2	< 70	100 bar
RMG 915-3	< 150	100 bar

Connection G 3/8 or M 16 x 1.5

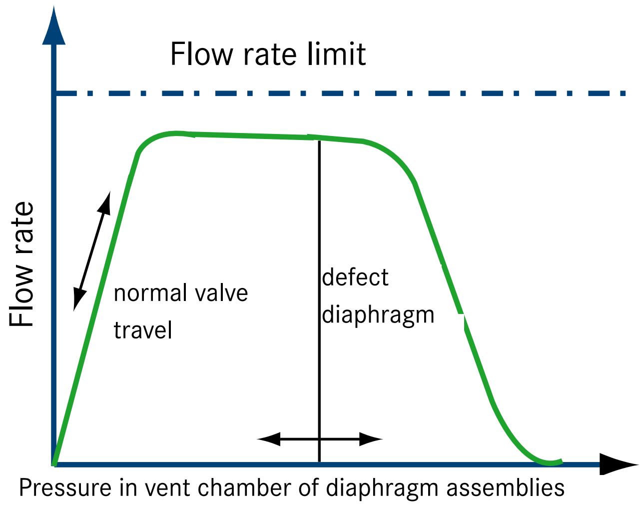
- ☐ Protecting the installation room against inadmissible gas leaks from diaphragm assemblies
- ☐ In case of a defect, it will limit the leakage to the preset limit value (with respect to air in normal condition)
- ☐ No vent lines required
- ☐ Easy installation; simply screw into the vent line connection of the device
- ☐ Suitable for non-aggressive gases, other gases on enquiry

CE registration according to PED in combination with RMG Gas Pressure Regulators.
According to DIN EN 334, the pilot is an integral component of this device.

RMG CE 0085

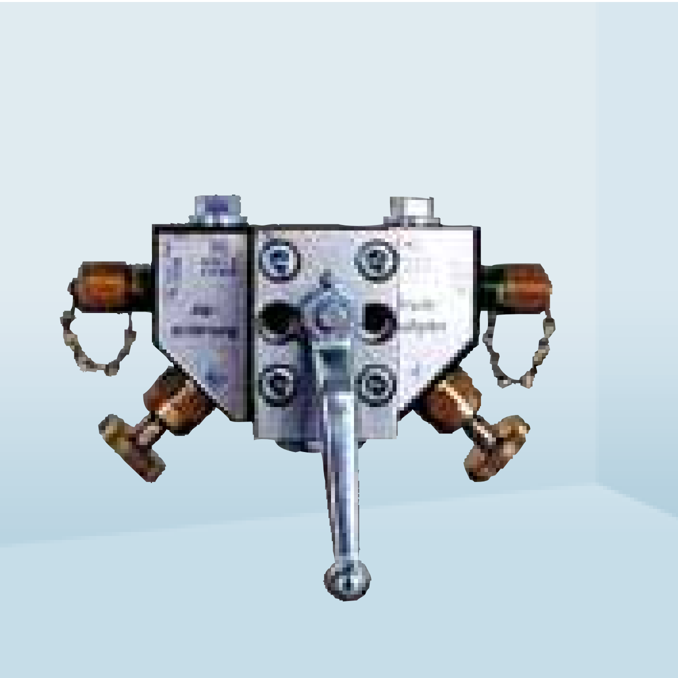
SEP design according to PED

RMG SEP



- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Test Combination



Max. admissible pressure PS = 100 bar

Max. operating pressure p_{max} up to 100 bar

Connection for inlet pressure:
Adapter for screw coupling type 1215 or pipe connection DIN EN ISO 8434-1 (DIN 2353) for pipe sizes 10 mm or 12 mm
Connection for pressure injection and discharge:
Screw coupling type 1215 for high pressure tubes (DVGW certified) or pipe connections DIN EN ISO 8434-1 (DIN 2353) for pipe sizes 10 mm and 12 mm

- ☐ Device for adjusting and testing Safety Shut-off Valves (SSV) and Safety Relief Valves (SRV)
- ☐ Facilitates simple and safe pressure injection and/or pressure release during SSV and/or SRV settings and tests
- ☐ Incorporates stop-ball valve for inlet pressure
- ☐ Suitable for non-aggressive gases, other gases on enquiry

SEP design according to PED

RMG SEP

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Monitoring Device for Leakage Gas Flows

- ☐ Use with Safety Relief Valves (SRV):
- - indicates opening of relief valve
- - simplifies monitoring of SRV response
- - simplifies SRV setpoint adjustment
- ☐ Easy operation
- ☐ Integral over-pressure protection
- ☐ Replaces a vent gas meter
- ☐ Optionally with REED-contact for remote indication
- ☐ Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 100 bar

Max. operating pressure p_{max}
up to 100 bar

Valve seat diameter 28 mm

Response point $Q_l \leq 100$ l/h (air)

DVGW registration

SEP design according to PED

Connection:
Pipe connections
DIN EN ISO 8434-1 (DIN 2353), optionally inlet or outlet, for pipe sizes 10 mm, 12 mm, 16 mm, 20 mm, 22 mm, 25 mm. 28 mm and internal threads DIN EN ISO 228 - G 1

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

FACE-TO-FACE DIMENSION				
Pipe connection for		**Screw connections according to DIN EN ISO 8434-1 (DIN 2353) (PS = 100 bar)** Optionally: inlet or outlet for pipe size Ø in mm	**Width across corners*** in mm	
Direct-acting SRV	SRV control element pilot-operated		A	B
		1" female thread DIN EN ISO 228 -G 1	40	38
RMG 835		28- series L	74	58
		25-series S	87	63
		22- series L	74	58
RMG 873 RMG 832		20-series S	84	63
		16-series S	79	61
		12-series S	86	70
RMG 670	RMG 670	10-series S	84	68

*) A = measure taken between body centre and outer edge of screwed connection or body
B = measure taken between body centre and pipe whip (mounting dimension) or spot face of the body

On/Off Valve

Max. admissible pressure PS = 100 bar

Max. operating pressure p_{max} up to 100 bar

Tripping pressure for closing: 20 mbar approx.

Connection:
Inlet:
- External thread M 16 x 1.5 or G 1/2"

Outlet:
Connection:
- Pipe connections according to DIN EN ISO 8434-1 (DIN 2353), PN 100, for pipe diameters 10 mm

- ☐ Diaphragm break safety device for actuator systems K 1a, K 2a, K 2a/1, K 2a/2, K 4, K 5, K 6, K 10a, K 11a/1, K 11a/2
- ☐ Component of a Safety Shut-off Valve equipped with a diaphragm break safety device
- ☐ Installed on the vent line of SSV actuator
- ☐ Suitable for non-aggressive gases, other gases on enquiry

SEP design according to PED

Noise-reducing Outlet Duct for Gas Pressure Regulators

- Silencer for downstream installation right behind the gas pressure regulator (e.g., RMG 320, RMG 322, RMG 332, etc.)
- Compact design
- Low pressure loss Δp
- Integral noise-reducing measures consisting of a perforated cone, filling material and perforated plates. Body with extra thick walls.
- Available with various outlet sizes
- Helps to shorten the flow-stabilising line sections leading up to measuring impulse connections
- Noise attenuation up to 20 dB (A)
- Suitable for non-aggressive gases, other gases on enquiry

Max. admissible pressure PS = 20 bar (50 bar)
Max. operating pressure p_{max} up to 20 bar (40 bar)

Connection:
DIN flange PN 16 (PN 40),
Class 300 according to ANSI 16.5
in DN_u 25 to 200
DN_d select from table

SEP design according to PED

RMG SEP

CE registration according to PED for p · V > 25 bar · litre, V > 1 litre respectively p > 200 bar

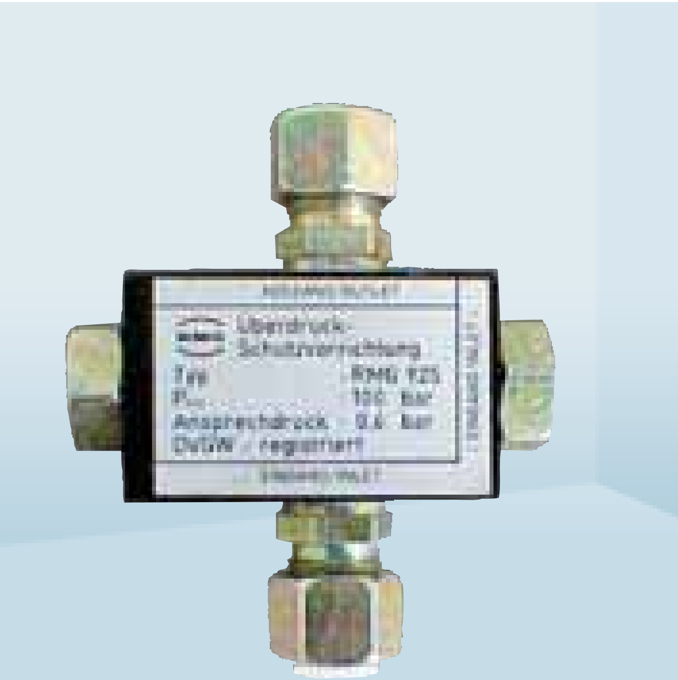
RMG CE 0085

- All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

FACE-TO-FACE DIMENSION		
Inlet DN_u	Outlet DN_d	Face-to-face dimension in mm
DN 25	DN 50 DN 80	140 140
DN 50	DN 100 DN 150 DN 200	160 200 260
DN 80	DN 150 DN 200	200 240
DN 100	DN 150 DN 200 DN 250 DN 300	200 240 300 400
DN 150	DN 250 DN 300 DN 400	300 450 500
DN 200	DN 300 DN 400	450 500

Other DN_u/DN_d combinations on enquiry

Over-pressure Protection



Max. admissible pressure PS = 100 bar

Max. operating pressure p_{max} up to 100 bar

Response pressure (fixed setting) optionally:
0.6 bar / 1 bar / 1.6 bar / 2.5 bar /
4 bar / 6 bar / 10 bar / 16 bar /
25 bar / 40 bar – more on enquiry

Connection:

Inlet:

- Pipe connection DIN EN ISO 8434-1 (DIN 2353) for pipe sizes 10 mm, 12 mm

Outlet:

- Gauge connection according to DIN EN ISO 228 G 1/4 – or similar to pipe connection

- ☐ Fulfils the requirements of DVGW work-sheet G 491
- ☐ Compact design
- ☐ Various fixed response pressures available
- ☐ With additional connection for pilot measuring/impulse line
- ☐ Suitable for non-aggressive gases, other gases on enquiry

DVGW registration

SEP design according to PED

- ☐ All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Special Devices and Supplemental Fixtures, Most Recent Products

- ☐ Supplemental fixture for pneumatic pressure adjustment in 2 or 3 pressure stages on pilot RMG 610 (RS 10 d)
- ☐ Flow-rate pilot stage (orifice plate for differential pressure control)

  Control of operating/standard flow rate
- ☐ Special designs of Pilot Models RMG 610 (RS 10d), RMG 620, RMG 630 and RMG 650
- ☐ Special designs of actuator models (e.g., RMG 670, RMG 671 and others)
- ☐ Travel indicators for the final control elements of gas pressure regulators without/with electrical signal sensor
- ☐ SSV position indicators OPEN/CLOSED
- ☐ Vent valve inserts RMG 915
- ☐ Elements for gas pressure control, mixing of gases and power adjustment (throttles) on gas engines
- ☐ Pneumatic pressure intensifiers
- ☐ Gas pressure regulators for vehicles powered by natural gas or methanol

Furthermore, we supply a vast range of switching devices, monitoring and control systems as well as automation systems for special applications for our Gas Pressure Regulators, Safety Shut-off Valves (SSV) and Safety Relief Valves (SRV). Contact us for more information.

Gas Regulating Line for Zero Pressure Control

For several decades, now, RMG has been actively involved in the construction of gas regulating lines for gas engines powered by natural gas, waste dump gas, sewage gas, propane and other combustible gases.

RMG's regulating lines are designed and built according to customer specifications. For a number of gas engines, we also produce in series. If desired, we install our devices and train the customer‘s service staff.

Components of various sizes are also individually available, (see Devices Section):

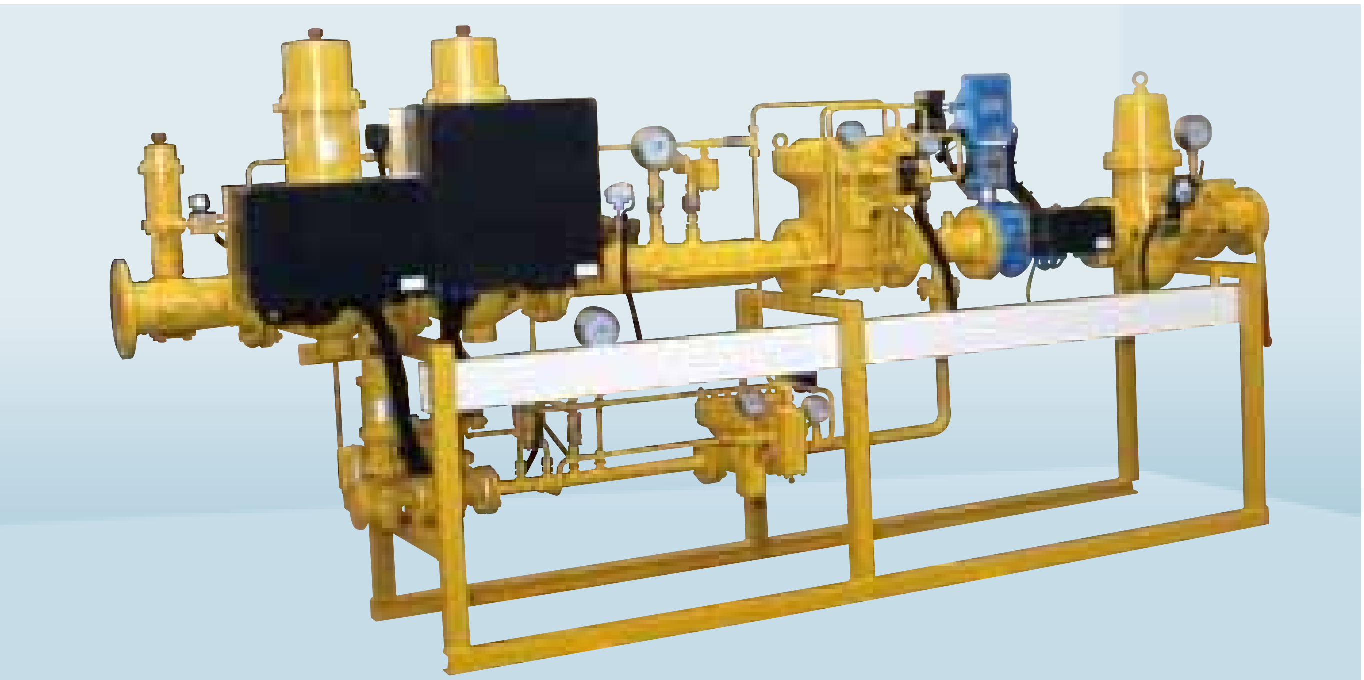
- ☐ Gas pressure regulators with pneumatic resultant value control
- ☐ Filters
- ☐ Solenoid valves
- ☐ Flame arresters
- ☐ Gas meters
- ☐ Correctors
- ☐ Safety Shut-off Valves (SSV)
- ☐ Safety Relief Valves (SRV)

All mechanical components of the gas regulating line are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used on regulating lines fulfil ATEX requirements, of course, wherever necessary.

RMG gas regulating lines fulfil all pertinent international standards, directives, regulations, etc. and can be customised to specific customer specifications.

Gas Regulating Line for Gas Engines

Gas Regulating Line with Resultant Value Control



Throttle Valve for Gas Engine

- Control element for adjusting gas engine power
- Designs come with round or oval flaps

Round-flap design

Sizes:

70/45, 100/68, 140/85, 140/96, 200/135

Oval-flap design

Sizes:

200-180/88, 235-180/88, 250-200/108

SEP design according to PED

On a gas engine, the throttle valve controls the speed of the generator (i.e., power generation) by adjusting the flow of the mixed gases. The actuator adjusts the position of the throttle as needed. We also offer throttle valves for very high temperatures (e.g., for turbochargers).

- All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC).

Gas Mixers with Adjustable Mixing Gaps for Gas Engines

- ☐ For adding fuel gas to the intake air
- ☐ Mixing ratio may be adjusted by adjusting the mixing gap (mechanical adjustment)
- ☐ Applicable for natural gas according to DVGW G 260 and low calorific value gases (e.g., waste dump gas, sewage gas, mine gas, etc.)

Sizes:

70/35, 100/50, 140/65, 200/100, and 300/150

SEP registration according to PED

SEP

The design of the gas mixer is based on the operational data (which has been previously determined) and the type of gas engine (which is known). This includes, the design of the mixing gap, which is mechanically adjustable, so that it can be easily adjusted after installation.

The gas mixer uses the Venturi effect. That means fuel gas is added to the air flow always at the same time, irrespective of the load. The effect is that the mixing ratio always stays the same, and the set value is always respected (even in case of very dynamic events and load changes).
A lambda control loop will take care of fine adjustment (in the range of ppms).

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC).

Gas Mixers with Electrically Adjustable Mixing Gap (for Gas Engines)

- ☐ For adding fuel gas to the intake air
- ☐ Mixing ratios can be perfectly adjusted across the entire power range in the range of ppms
- ☐ Mixing ratio may be adjusted by electrically adjusting the mixing gap
- ☐ Sensitive stepper motors provide for precise adjustment of mixing gap.
- ☐ Can handle multiple gas types (qualities) simultaneously – simply switch to the corresponding setting (e.g., sewage gas, natural gas or waste dump gas operation; also propane operation)
- ☐ Suitable for various types of control loops (e.g., λ1 control loop, standard λ control loop, lean-burn engines etc.)
- ☐ Applicable for natural gas according to DVGW G 260 and low-calorific value gases (e.g., waste dump gas, sewage gas, mine gas, etc.)

Sizes:

70/35, 100/50, 140/65, 200/100, 250/125, 300/150, 350/200

SEP registration according to PED

The design of the gas mixer is based on the operational data (which has been previously determined) and the type of gas engine (which is known). The mixing gap (and thus the mixing ratio) is set by means of a stepper motor. All control loops are suitable (e.g., λ1 control loops or standard λ control loops for lean-burn engines, etc.)
Once the mixing gap has been adjusted, fuel gas is added to the airflow, always at the same time, irrespective of the load. The mixing ratio always stays the same, and the set value is always respected, even in case of very dynamic events and load changes. All that remains to be done during operation are fine adjustments of the ratio (in the range of ppms) using a λ control loop. However, the stepper motor can also quickly switch to other settings, such as when changing from waste dump gas to natural gas without stopping the gas engine. There are two limit switches: (L)ean and (R)ich. It is always possible to use the limit switch (L)ean to switch to the start position of the gas mixing gap (which depends on the gas quality) by pre-defining a number of steps and re-launching the gas engine.

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Gas Pressure Regulator with Spring-loaded Measuring Unit

Max. inlet pressure $p_{u\ max}$ up to 68 bar

Outlet pressure range W_d 0.21 to 10.2 bar

SSV setting range:
(see SSV BD RMG 309)

SRV setting range W_d:
0.88 to 11.9 bar

Connection:
Pipe screw connection
R ¾", R 1"

Temperature range: –40 °C to +60 °C

- ☐ Device for offtake stations in gas transmission as well as commercial and industrial facilities
- ☐ Primary applications in agricultural enterprises and installations in rural areas (e.g., as a bypass for high-pressure regulating stations)
- ☐ Modified types for specific applications are also available
- ☐ High inlet pressure range
- ☐ Incorporated filter optional
- ☐ Incorporated Safety Relief Valve
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases on enquiry

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Gas Pressure Regulator

OUTLET PRESSURE RANGE / SPECIFIC OUTLET PRESSURE RANGE		
Spring no.	**Spring colour coding**	**Specific outlet pressure range** W_{ds} in bar
1030	brown	0.21 to 0.7
1031	green	0.56 to 1.4
1032	blue	1 to 1.7
1033	silver	1.4 to 2.7
1036	red	2 to 5.1
1037	white	3.4 to 6.8
1034	yellow	5.4 to 10.2

SPECIFIC OUTLET PRESSURE RANGE OF INCORPORATED SAFETY RELIEF VALVE		
Spring no.	**Spring colour coding**	**Specific setting range** W_{ds} in bar
1030	brown	0.88 to 1.5
1031	green	1.2 to 2.2
1032	blue	1.9 to 2.7
1033	silver	2.4 to 13.9
1036	red	3.1 to 28.3
1037	white	4.4 to 8.2
1034	yellow	6.8 to 11.9

WEIGHT		
	Screwed connection	
Size	R ¾"	R 1"
Weight in kg	6.4	6.4

Gas Pressure Regulator

Gas Pressure Regulator with Spring-loaded Measuring Unit and Reversing Lever

Max. inlet pressure $p_{u\ max}$ up to 69 bar
(depends on valve seat diameter and optional SSV)
Outlet pressure range W_d 0.21 bar to 13.8 bar

SSV -setting ranges
W_{do} OPCO 0.5 to 14 bar
W_{du} UPCO 0.05 to 3.5 bar

Connection:
R ½", R ¾", R 1"

Temperature range: –20 °C to +60 °C

- ☐ Device for offtake stations in gas transmission as well as commercial and industrial facilities
- ☐ Specially designed for safe, accurate first stage reduction on high-pressure gas systems
- ☐ Wide operational outlet pressure range
- ☐ Precise and positive operation
- ☐ Wide range of interchangeable orifices, without removing the body from the pipeline
- ☐ Regulator can be installed in any position
- ☐ Can be fitted with a over-pressure cut-off valve (OPCO) or under-/over-pressure (UPCO/OPCO)
- ☐ Cartridge design allows easy removal of diaphragm/valve assembly from body for simple maintenance
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

RMG CE 0038

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Gas Pressure Regulator

SPECIFIC OUTLET PRESSURE RANGE		
Specific outlet pressure range W_{ds} in bar	Spring no.	Colour coding
0.21 to 0.82	261	yellow
0.69 to 1.72	262	metal
1.38 to 4.13	263	white
3.45 to 8.6	264	beige
6.9 to 13.8	265	grey
0.69 to 6.9	266	dark green

SETTING RANGES OF SAFETY CUT-OFF VALVES		
Model	Operation mode	Cut-off setting range in bar
S309 MP2	OPCO only	W_{do} 0,500 to 2,900
	OPCO on UPCO/OPCO	W_{do} 0,500 to 2,900
	UPCO	W_{du} 0,050 to 0,150
S309 MP4	OPCO only	W_{do} 2,000 to 4,000
	OPCO on UPCO/OPCO	W_{do} 2,000 to 4,000
	UPCO	Wdu 0,050 to 0,150
S315 MP2	OPCO	W_{do} 0,500 to 2,900
	UPCO	W_{du} 0,050 to 1,600
S315 MP4	OPCO	W_{do} 2,000 to 4,000
	UPCO	W_{du} 0,050 to 0,160
S315 HP	OPCO	W_{do} 3,000 to 14,000
	UPCO	W_{du} 0,120 to 3,500

Notes: The cut-off ranges shown require spring changes (contact sales for details).
The S309 SCOV is limited to 10 bar inlet pressure

DIMENSIONS AND WEIGHTS	
Face-to-face dimension in mm	102
weight with S309 MP 2 (MP 4) SCOV in kg	9 (9.2)
weight with S315 SCOV in kg	15
weight without SCOV in kg	7

Gas Pressure Regulator with Spring-loaded Measuring Unit

Max. inlet pressure $p_{u\,max}$ up to 0.2 bar (¾" and 1")
Max. inlet pressure $p_{u\,max}$ up to 0.35 bar (>1 ¼") (depends on valve seat diameter and optional SSV)
Outlet pressure range W_d 0.0037 bar to 0.15 bar

Temperature range: –20 °C to +60 °C

Connection:
- R ¾", R 1", R 1 ¼", R 1 ½", R 2"

Pipe sizes:
- DN 50, DN 65, DN 80, DN 100 and DN 150

- ☐ Device for offtake stations in gas distribution as well as commercial and industrial facilities
- ☐ Lightweight body
- ☐ High capacity, compact design
- ☐ Optional with internal or external measuring impulse connection (external impulse sensing available for all sizes except R 3\4” and 1”)
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to GAD

Special design of Gas Pressure Regulator Series BD-RMG 226
- Zero-pressure gas regulator
- ZSO-type zero-pressure regulator

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Gas Pressure Regulator

INLET PRESSURE RANGE / SPECIFIC OUTLET PRESSURE RANGE					
Pipe sizes	¾", 1"	1 ¼", 1 ½", 2"	DN 65 and 80	DN 100	DN 150
Max. inlet pressure $p_{u\ max}$ in bar	0.20	0.35	0.35	0.35	0.35
Specific outlet pressure range W_{ds} in bar	0.0037 up to 0.075	0.0037 up to 0.08	0.0037 up to 0.08	0.0075 up to 0.15	0.0125 up to 0.15

DIMENSIONS AND WEIGHTS								
Pipe screw connection without brazing				**Flange connection**				
Pipe sizes	¾", 1"	1 ¼", 1 ½"	2"	DN 50	DN 65	DN 80	DN 100	DN 150
Face-to-face dimension in mm	103	163.5	210	210	318	318	369	473
Weight in kg	0.7	1.6	3	5	16	16.4	63.5	115

SPECIFIC OUTLET PRESSURE RANGE PART 1									
Specific outlet pressure range W_{ds} in bar	Setpoint spring colour coding	Setpoint spring no.							
		Pipe screw connection			Flange connection				
		R ¾" / R 1"	R 1¼" / R 1½"	R 2"	DN 50	DN 65	DN 80	DN 100	DN 150
0.0037 to 0.0075	red	397			292	545	545		
0.0037 to 0.01	white		1153	1154					
0.0075 to 0.015	blue	398			293	547	547		
	white / golden							409	
0.008 to 0.014	red		1067	1072					
0.012 to 0.025	green		1068	1073					
	metallic	399			283	548	548		
	black / golden							410	
	dark green / light blue								419
0.021 to 0.035	blue		1069	1074					
0.023 to 0.037	green				284	549	549		
	yellow / golden							412	
	green/red								429
0.024 to 0.037	green	1045							

SPECIFIC OUTLET PRESSURE RANGE PART 2									
Specific outlet pressure range W_{ds} in bar	Setpoint spring colour coding	Setpoint spring no.							
		Pipe screw connection			Flange connection				
		R ¾" / R 1"	R 1¼" / R 1½"	R 2"	DN 50	DN 65	DN 80	DN 100	DN 150
0.033 to 0.055	yellow		1070	1075					
0.035 to 0.06	black					550	550		
	brown / light green								430
0.035 to 0.075	yellow	805							
0.035 to 0.08	yellow				285				
	brown / golden							414	
0.05 to 0.08	black		1071	1076					
0.055 to 0.08	grey					598	598		
0.055 to 0.112	grey / light green								431
0.07 to 0.15	grey / light green							407	
0.1 to 0.15	metallic								617

Gas Pressure Regulator with Spring-loaded Measuring Unit

- Device for offtake stations in gas distribution as well as commercial and industrial facilities
- High-capacity compact body, high flow rate value
- Internal measuring impulse connection (external impulse sensing available upon request)
- Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases on enquiry

CE registration according to GAD

Max. inlet pressure $p_{u\,max}$ up to 0.35 bar
Outlet pressure range W_d 0.07 bar to 0.15 bar

Temperature range: –20 °C to +60 °C

Connection:
- Flanges DN 50, DN 65, DN 80

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE			
Specific outlet pressure range W_{ds} in bar	**Setpoint spring colour coding**	**Setpoint spring no.**	
		DN 50	DN 65, DN 80
0.070 to 0.112	brown	772	774
0.100 to 0.150	orange	773	775

DIMENSIONS AND WEIGHTS			
	Flange connection		
Pipe sizes	DN 50	DN 65	DN 80
Face-to-face dimension in mm	210	318	318
Weight in kg	5	19	19

Gas Pressure Regulator with Spring-loaded Measuring Unit

- ☐ Device for offtake stations in gas distribution as well as commercial and industrial facilities
- ☐ Light-weight body (not DN100 & DN150)
- ☐ High-capacity compact body
- ☐ Optional with internal or external measuring impulse connection
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to GAD

Max. inlet pressure $p_{u\ max}$ up to 0.2 bar
Outlet pressure range W_d 0.011 to 0.15 bar

Temperature range between –20 °C and +60 °C

Connection:
R ¾", R 1", R 1 ¼", R 1 ½", R 2",
flanged DN50, DN65, DN80, DN100 and DN150

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE

Size	R ¾” & R 1”	R 1 ¼”, R 1 ½” & R 2”	DN 65 & DN 80	DN 100	DN 150
Specific outlet pressure range W_{ds} in bar	0.011 to 0.08	0.011 to 0.08	0.011 to 0.08	0.011 to 0.15	0.0125 to 0.15

DIMENSIONS AND WEIGHTS

Pipe screw connection without brazing				Flange connection				
Pipe sizes	R ¾” & R 1”	R 1 ¼” & R 1 ½”	R 2”	DN 50	DN 65	DN 80	DN 100	DN 150
Face-to-face dimension in mm	103	163.5	210	210	318	318	369	473
Weight in kg	0.8	1.8	3.3	5.3	16.5	16.9	65	117

Gas Pressure Regulator with Spring-loaded Measuring Unit

Max. inlet pressure $p_{u\,max}$ up to 0.5 bar

Outlet pressure range W_d –0.002 to +0.002 bar

Connection:
DIN flange PN16 for pipe size:
DN 50, DN 65, DN 80, DN 100, DN 150

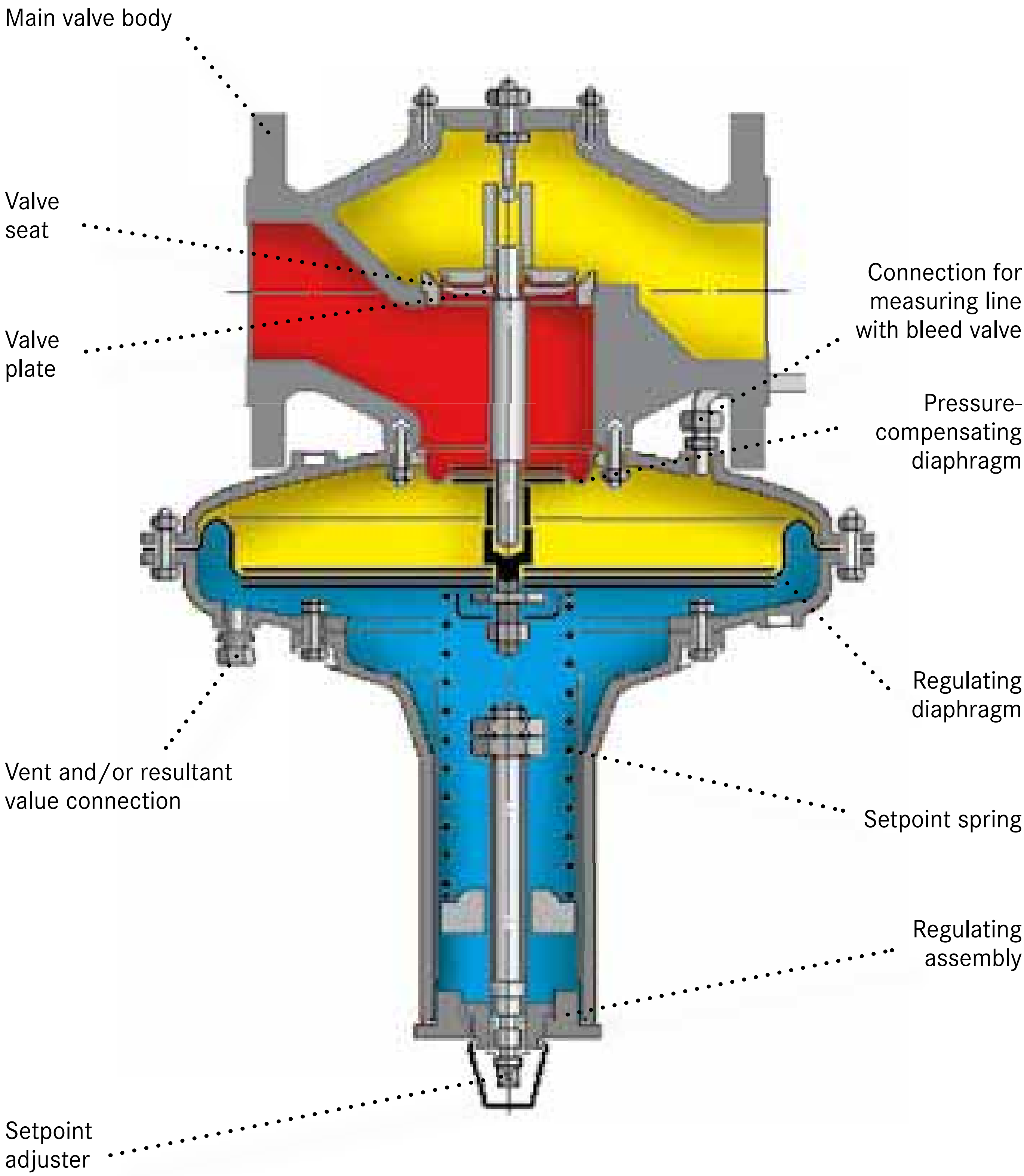
Temperature range: –20 °C to +60 °C

- ☐ Device for maintaining zero pressure in gas regulating lines (e.g., for installation before gas mixers for gas engines)
- ☐ Bubble-tight shut-off
- ☐ Inlet pressure compensation
- ☐ High regulating accuracy
- ☐ Optional internal and external measuring impulse connections
- ☐ Horizontal mounting position with spring-loaded pin downwards
- ☐ Setpoint may be adjusted from external device
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

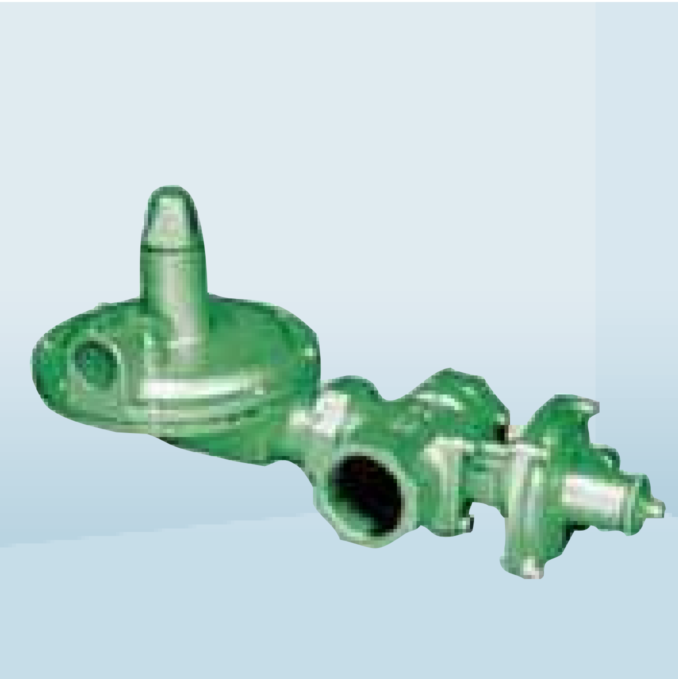
CE registration according to GAD

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Gas Pressure Regulator



Gas Pressure Regulator with Spring-loaded Measuring Unit and Reversing Lever



Max. inlet pressure $p_{u\,max}$ up to 10.3 bar

Outlet pressure range W_d 0.01 to 0.21 bar

SSV setting range
W_{do} 0.035 to 0.26 bar
W_{du} 0.01 to 0.03 bar

Connection:
Pipe screw connection R ¾", R 1"

Temperature range: –40°C to +60°C

Type:
P – without internal Safety Relief Valve (SRV)
R – with internal Safety Relief Valve (SRV)
LR – internal SRV
SD - safety diaphragm/vent less

- ☐ Device for offtake stations in gas distribution as well as commercial and industrial facilities
- ☐ Diaphragm casing can be rotated through 360° relative to regulator body
- ☐ Rapid response to load changes
- ☐ Wide range of interchangeable orifices
- ☐ Regulator can be installed in any position
- ☐ Can be fitted with integral over-pressure (OPCO) or under-/over-pressure cut-off valve (UPCO/OPCO)
- ☐ Cartridge-type diaphragm and valve assembly for ease of maintenance
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Gas Pressure Regulator

OUTLET PRESSURE RANGE / SPECIFIC OUTLET PRESSURE RANGE		
Spring no.	Spring colour coding	Specific outlet pressure range W_{ds} in bar
126	red	0.01 to 0.02 (0.017 to 0.032)
131	metal	0.015 to 0.035
127	green	0.025 to 0.043 (0.03 to 0.058)
128	orange	0.038 to 0.067
392	white	0.04 to 0.075
393	blue	0.07 to 0.14
394	grey	0.14 to 0.21

SETTING RANGE OF SAFETY SHUT-OFF VALVE MK2		
Spring no.	Spring colour coding	Over-pressure (OPCO) setting range W_{do} in bar
861	brown	0.035 to 0.07 (0.05 to 0.1)
868	green	0.06 to 0.175 (0.09 to 0.175)
869	silver	0.16 to 0.26

SETTING RANGE OF SAFETY SHUT-OFF VALVE SERIES 309 LP UPCO/OPCO		
Spring no.	Spring colour coding	Over-pressure (OPCO) setting range W_{do} in bar
1109	brown	0.04 to 0.055
1110	green	0.05 to 0.11
1111	silver	0.15 to 0.2
1140	silver / red	0.15 to 0.25
Spring no.	Spring colour coding	Under-pressure (UPCO) setting range W_{du} in bar
1138	blue / green	0.01 to 0.03

DIMENSIONS AND WEIGHTS		
Pipe sizes	R ¾"	R 1“
Face-to-face dimension in mm	102	102
Weight (w/o SSV OPCO) in kg	2.5	2.5
Weight (with SSV OPCO) in kg	3.2	3.2

Gas Pressure Regulator with Spring-loaded Measuring Unit

- ☐ Device for offtake stations in gas systems as well as commercial and industrial facilities
- ☐ Modified types for specific applications are also available
- ☐ High inlet pressure range
- ☐ Incorporated filter optional
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

Max. inlet pressure $p_{u\ max}$ up to 19 bar
(10 bar with Safety Shut-off Valve)

Outlet pressure range W_d 0.14 to 4 bar

SSV setting range:
(see SSV BD RMG 309)

Connection:
R ¾", R 1", R 1 ¼", R 1 ½"
Flange connection:
- 1" (inlet/outlet)
- ANSI 150RF, ANSI 150FF, PN 16RF and PN 16FF

Temperature range: –40 °C to +60 °C

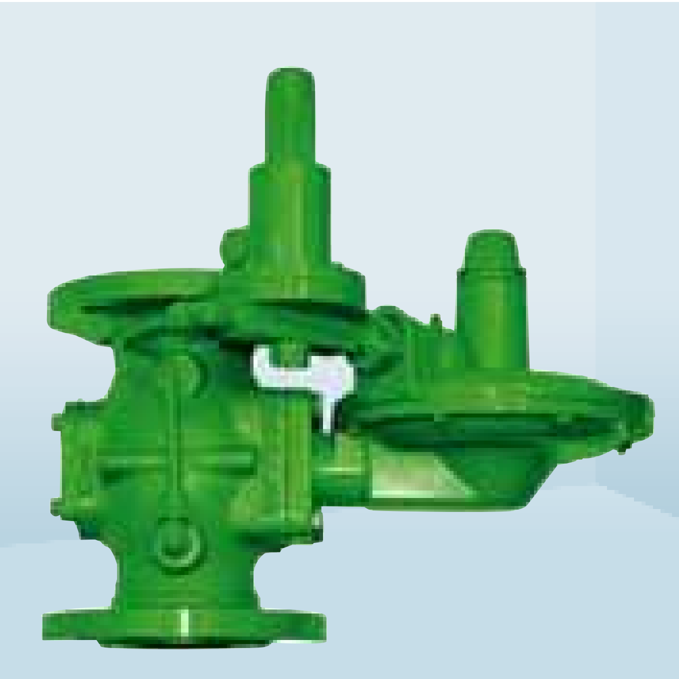
All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Gas Pressure Regulator

OUTLET PRESSURE RANGE / SPECIFIC OUTLET PRESSURE RANGE		
Spring no.	**Spring colour coding**	**Specific outlet pressure range** W_{ds} in bar
1047	purple	0.14 to 0.35
TX/002	silver	0.35 to 2
TX/003	blue	2 to 4

WEIGHT					
	Screwed connection				**Flange**
Size	R ¾"	R 1"	R 1 ¼"	R 1 ½"	1"
Weight in kg	2.8	2.8	3.9	3.9	4.4

Gas Pressure Regulator with Spring-loaded Measuring Unit



- ☐ Device for offtake stations in gas systems as well as commercial and industrial facilities
- ☐ Modified types for specific applications are also available
- ☐ High inlet pressure range
- ☐ Incorporated filter optional
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

Max. inlet pressure $p_{u\,max}$ up to 15 bar
(10 bar with Safety Shut-off Valve)
Outlet pressure range W_d 0.14 to 4 bar
SSV setting range:
(see SSV BD RMG 309)

Connection:
R 1¼", R 1½", R 2"
Flange connection:
- 2" (inlet/outlet)
- ANSI 150RF, ANSI 150FF, PN 16RF and PN 16FF

Temperature range: –40 °C to +60 °C

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

OUTLET PRESSURE RANGE / SPECIFIC OUTLET PRESSURE RANGE		
Spring no.	**Spring colour coding**	**Specific outlet pressure range** W_{ds} in bar
1047	purple	0.14 to 0.35
TX/002	silver	0.35 to 2
TX/003	blue	2 to 4

WEIGHT				
	Screwed connection			**Flange**
Size	R 1 ¼"	R 1 ½"	R 2"	2"
Weight in kg	8.4	8.4	8.4	12.5

Gas Pressure Regulator with Spring-loaded Measuring Unit and Reversing Lever

Max. inlet pressure $p_{u\ max}$ up to 10 bar

Outlet pressure range W_d 0.01 to 0.385 bar

Connection:

Angular type:
- Inlet: ½", ¾", 1"
- Outlet: 1"

Straight type:
- Inlet: ½", ¾", 1"
- Outlet: ½", ¾", 1"

Type:

F – with incorporated filter

Temperature range: –40 °C to +60 °C

- ☐ Device for offtake stations in gas systems as well as commercial and industrial facilities
- ☐ Diaphragm housing may be turned 180 degrees with respect to main valve body
- ☐ Fast reactivity
- ☐ Installation of different valve seat diameters possible
- ☐ Mounting position as required
- ☐ May be optionally fitted with a Safety Relief Valve for over-pressure (OPCO) or over-pressure / under-pressure release (UPCO/OPCO)
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

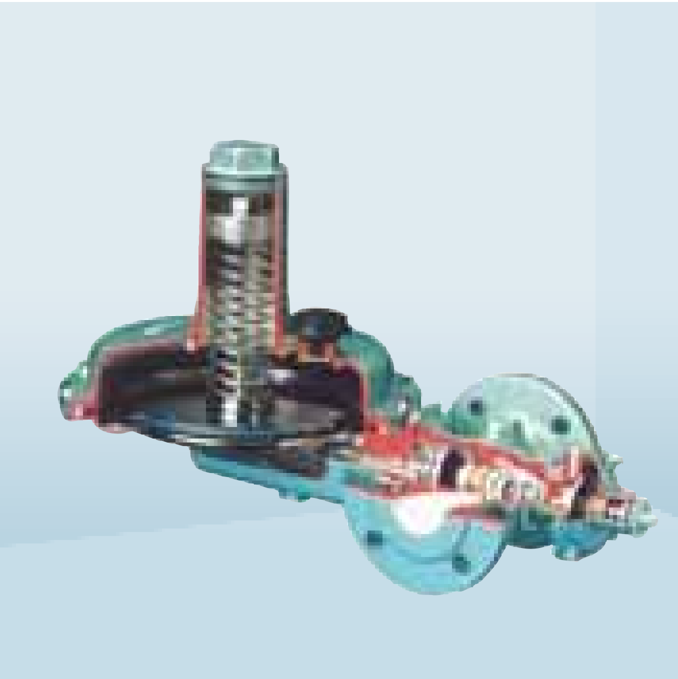
Gas Pressure Regulator

OUTLET PRESSURE RANGE / SPECIFIC OUTLET PRESSURE RANGE		
Spring no.	**Spring colour coding**	**Specific outlet pressure range** W_{ds} in bar
121	red	0.01 to 0.014
1001	silver	0.013 to 0.023
1235	dark green	0.02 to 0.03
307	light green	0.023 to 0.045
1021	metallic	0.043 to 0.075
1047	purple	0.07 to 0.14
LX/001	yellow	0.21 to 0.385

SPECIFIC OUTLET PRESSURE RANGE OF INCORPORATED SAFETY RELIEF VALVE		
Spring no.	**Spring colour coding**	**Setting range** W_{ds} in bar
121	red	0.015 to 0.02
1001	silver	0.02 to 0.04
1235	dark green	0.027 to 0.05
307	light green	0.04 to 0.07
1021	metallic	0.062 to 0.105
1047	purple	0.105 to 0.21
LX/001	yellow	0.315 to 0.56

WEIGHT		
	Angular type	**In-line flow type**
Size	all	all
Weight in kg	1.36	1.82

Gas Pressure Regulator with Spring-loaded Measuring Unit and Reversing Lever



- ☐ Device for offtake stations in gas distribution as well as commercial and industrial facilities
- ☐ Diaphragm casing can be rotated through increments of 45° relative to body
- ☐ Rapid response to load changes
- ☐ Regulator can be installed in any position
- ☐ Can be fitted with over-pressure cut-off valve (OPCO) or under-/over-pressure (UPCO/OPCO)
- ☐ Cartridge design allows easy removal of diaphragm/valve assembly from body for simple maintenance
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

Max. inlet pressure $p_{u\,max}$ up to 10.3 bar
Outlet pressure range W_d 0.01 to 0.5 bar
SSV setting range:
  W_{dso} 0.035 to 0.6 bar
  W_{dsu} 0.01 to 0.03 bar
Connection:
- Pipe screw connection 40 mm, 50 mm
- Flange DN 50
Type:
P – without internal Safety Relief Valve (SRV)
R – with internal Safety Relief Valve (SRV)

CE registration according to PED

RMG CE 0085

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

DIMENSIONS AND WEIGHTS			
Pipe sizes	R 1 ½"	R 2"	DN 50
Face-to-face dimension in mm	168	168	190
Weight (w/o SSV OPCO) in kg (270H)	12 (13)	12 (13)	16 (17)
Weight (with SSV OPCO) in kg (270H)	12.5 (13.5)	12.5 (13.5)	16.5 (17.5)

OUTLET PRESSURE RANGE / SPECIFIC OUTLET PRESSURE RANGE		
Spring no.	**Spring colour coding**	**Specific outlet pressure range** W_{ds} in bar
1244	red	0.01 to 0.015
1245	grey	0.015 to 0.02
1299	purple	0.018 to 0.035
1246	green	0.02 to 0.028
1247	yellow	0.028 to 0.045
1248	black	0.045 to 0.075
1249	white	0.075 to 0.11
1250	orange	0.095 to 0.15
1251	blue	0.14 to 0.225
1252	silver	0.2 to 0.35
1263*	brown	0.32 to 0.5

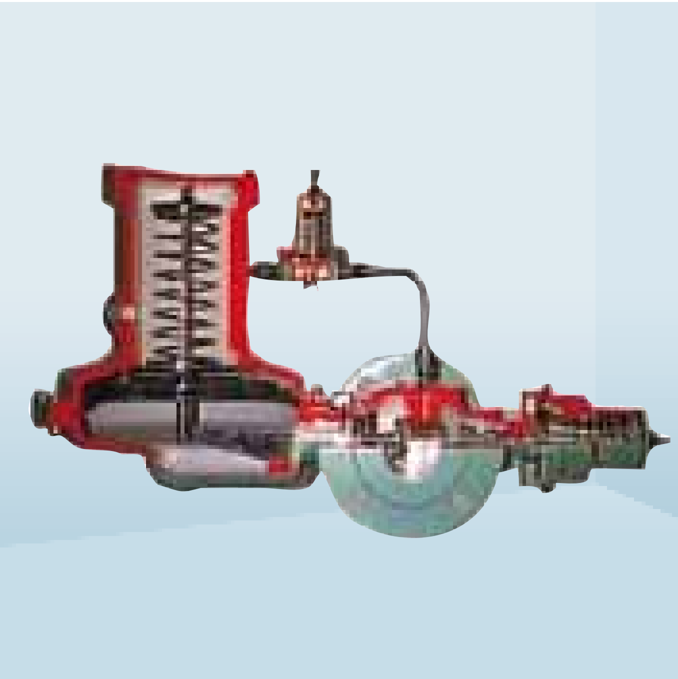
*) Only series 270H

SETTING RANGE OF SAFETY SHUT-OFF VALVE SERIES 309 LP OPCO		
Spring no.	**Spring colour coding**	**Over-pressure (OPCO)** Setting range W_{do} in bar
861	brown	0.035 to 0.09
1103	golden	0.08 to 0.13
1104	violet	0.12 to 0.25
1105	black	0.2 to 0.35
1254**	red	0.34 to 0.5
1255**	green	0.45 to 0.6

**) Special spacer required

SETTING RANGE OF SAFETY SHUT-OFF VALVE SERIES 309 LP UPCO/OPCO		
Spring no.	**Spring colour coding**	**Over-pressure (OPCO)** Setting range W_{do} in bar
1109	grey	0.04 to 0.055
1110	green	0.05 to 0.11
1111	silver	0.11 to 0.2
1140	silver / red	0.15 to 0.25
Spring no.	**Spring colour coding**	**Under-pressure (UPCO)** Setting range W_{du} in bar
1138	blue / green	0.01 to 0.03

Gas Pressure Regulator with Spring-loaded Measuring Unit and Fail-closed Function



Max. inlet pressure $p_{u\ max}$ up to 19 bar
(depends on size of orifice and type of pilot)

Outlet pressure range W_d 0.14 to 8.62 bar

SSV setting range:
W_{do} OPCO 0,175* to 14 bar
W_{du} UPCO 0,010 to 3.5 bar

*lowest possible outlet pressure +0.035 bar min. differential

Connection:
- Flange DN 50 (PN16, Class (ANSI) 150)

Temperature range: –40 °C to +60 °C

- ☐ Device for offtake stations in gas distribution and transmission, as well as commercial and industrial facilities
- ☐ Fail-closed type regulator
- ☐ Regulator can be installed in any position
- ☐ Easy to maintain
- ☐ Can be fitted with an over-pressure cut-off valve (OPCO) or combined under-/over-pressure cut-off valve (UPCO/OPCO)
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

OUTLET PRESSURE RANGE/SPECIFIC SET RANGES	
Pilot spring colour	Outlet pressure range W_{ds} in bar
green	0,138 to 1,380
silver	0,345 to 1,724
blue	2,069 to 4,137
red	2,414 to 8,620

SETTING RANGES OF THE SAFETY CUT-OFF VALVES		
Model	Operation mode	Cut-off setting range in bar
S309 LP	OPCO only	W_{do} 0,175* to 0,600
	OPCO on UPCO/OPCO	W_{do} 0,175* to 0,250
	UPCO	W_{du} 0,010 to 0,030
S309 MP1	OPCO on UPCO/OPCO	W_{do} 0,175* to 0,600
	UPCO	W_{du} 0,050 to 0,150
S309 MP2	OPCO only	W_{do} 0,500 to 2,900
	OPCO on UPCO/OPCO	W_{do} 0,500 to 2,900
	UPCO	W_{du} 0,050 to 0,150
S309 MP4	OPCO only	W_{do} 2,000 to 4,000
	OPCO on UPCO/OPCO	W_{do} 2,000 to 4,000
	UPCO	W_{du} 0,050 to 0,150
S315 LP	OPCO	W_{do} 0,175* to 0,600
	UPCO	W_{du} 0,035 to 2,000
S315 MP2	OPCO	W_{do} 0,500 to 2,900
	UPCO	W_{du} 0,050 to 1,600
S315 MP4	OPCO	W_{do} 2,000 to 4,000
	UPCO	W_{du} 0,050 to 0,160
S315 HP	OPCO	W_{do} 3,000 to 14,000
	UPCO	W_{du} 0,120 to 3,500

*lowest possible outlet pressure +0.035 bar min. differential.
Notes: The cut-off ranges shown require spring changes. Contact Sales for details. The S309 SCOV is limited to 10 bar inlet pressure

DIMENSIONS AND WEIGHTS	
Face-to-face dimension in mm	190
weight with S309 SCOV in kg	34
weight with S315 SCOV in kg	39.5
weight without SCOV in kg	32

Gas Pressure Regulator with Spring-loaded Measuring Unit

Max. inlet pressure $p_{u\ max}$ up to 19 bar

Outlet pressure range W_d 0.14 to 2 bar

SSV setting range:
(see SSV BD RMG 309)

Connection:
Flange connection:
- DN 50 (inlet/outlet)
- Class (ANSI) 150RF, Class (ANSI) 150FF, PN 16RF and PN 16FF

Temperature range: –40 °C to +60 °C

- ☐ Device for offtake stations in gas transmission and distribution, as well as commercial and industrial facilities
- ☐ “Fail-closed“ operation
- ☐ Installation of different valve seat diameters is available
- ☐ Can be fitted with an over-pressure cut-off valve (OPCO) or an under-/over-pressure cut-off valve (UPCO/OPCO)
- ☐ Pilot-operated for superior accuracy
- ☐ PFM application version available (+/- 1% abs.)
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Gas Pressure Regulator

OUTLET PRESSURE RANGE / SPECIFIC OUTLET PRESSURE RANGE		
Spring no.	**Spring colour coding**	**Specific outlet pressure range** W_{ds} in bar
1047	purple	0.14 to 0.35
TX/002	silver	0.35 to 2
TX/003	blue	2 to 4

WEIGHT	
	Flange
Size	**DN 50**
Weight in kg	15.9

Gas Pressure Regulator with Spring-loaded Measuring Unit

Max. inlet pressure $p_{u\ max}$ up to 19 bar
(10 bar with Safety Shut-off Valve)

Outlet pressure range W_d 0.14 to 2 bar

SSV setting range:
(see SSV BD RMG 309)

Connection:
R 1 ¼", R 1 ½", R 2"
Flange connection:
- DN 50 (inlet/outlet)
- Class (ANSI) 150RF, Class (ANSI) 150FF, PN 16RF and PN 16FF

Temperature range: –20 °C to +60 °C

- ☐ Device for offtake stations in gas transmission, and distribution, as well as commercial and industrial facilities
- ☐ "Fail-closed" operation
- ☐ Installation of different valve seat diameters is available
- ☐ Can be fitted with an over-pressure cut-off valve (OPCO) or an under-/over-pressure cut-off valve (UPCO/OPCO)
- ☐ Pilot-operated for superior accuracy
- ☐ PFM application version available (+/- 1% abs.)
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

OUTLET PRESSURE RANGE / SPECIFIC OUTLET PRESSURE RANGE		
Spring no.	**Spring colour coding**	**Specific outlet pressure range** W_{ds} in bar
1047	purple	0.14 to 0.35
TX/002	silver	0.35 to 2
TX/003	blue	2 to 4

WEIGHT				
	Screwed connection			**Flange**
Size	R 1 ¼"	R 1 ½"	R 2"	DN 50
Weight in kg	10	10	10	13.6 – 17.3*

*) Depends on type of material used

Gas Pressure Regulator with Spring-loaded Measuring Unit and Reversing Lever

Max. inlet pressure $p_{u\ max}$ up to 10 bar

Outlet pressure range W_d 0.015 to 0.42 bar

Connection:
R 1 ¼", R 1 ½", R 2"
Flange connection:
- DN 50 (inlet/outlet)

Type:
P – without internal Safety Relief Valve (SRV)
R – with internal Safety Relief Valve (SRV)
LR – internal SRV
Optional safety diaphragm
ECL – external measuring line
ICL – internal measuring line

Temperature range: –40 °C to +60 °C

- ☐ Device for commercial and industrial facilities
- ☐ Installation of different valve seat diameters possible
- ☐ Diaphragm housing may be turned 180 degrees with respect to main valve body
- ☐ Mounting position as required
- ☐ May be optionally fitted with overpressure or temperature Safety Shut-off Valves
- ☐ Easy to maintain
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

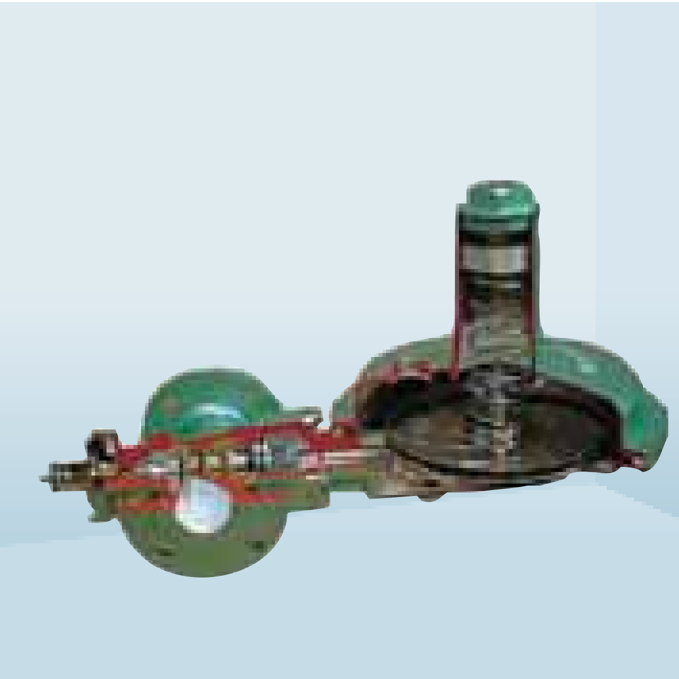
OUTLET PRESSURE RANGE / SPECIFIC OUTLET PRESSURE RANGE		
Spring no.	**Spring colour coding**	**Specific outlet pressure range** W_{ds} in bar
960	grey	0.015 to 0.035
961	yellow	0.03 to 0.055
962	brown	0.05 to 0.1
963	orange	0.069 to 0.209
964	blue	0.138 to 0.414

SPECIFIC OUTLET PRESSURE RANGE OF SAFETY RELIEF VALVE		
Spring no.	**Spring colour coding**	**Specific setting range** W_{ds} in bar
960	grey	0.03 to 0.085
961	yellow	0.055 to 0.125
962	brown	0.085 to 0.17
963	orange	0.14 to 0.35
964	blue	0.21 to 0.63

WEIGHT				
	Screwed connection			**Flange**
Size	R 1 ¼"	R 1 ½"	R 2"	DN 50
Weight in kg	8.2	8.2	8.2	12.75 to 16.4*

*) Depends on material used for body

Gas Pressure Regulator with Spring-loaded Measuring Unit and Reversing Lever



Max. inlet pressure $p_{u\ max}$ up to 10 bar

Outlet pressure range W_d 0.01 to 0.5 bar

SSV setting range:
W_{dso} 0.35 to 0.6 bar
W_{dsu} 0.01 to 0.03 bar

Connection:
- Flange DN 50

Type:
P – without internal Safety Relief Valve (SRV)
R – with internal Safety Relief Valve (SRV)

Temperature range: –20 °C to +60 °C

- ☐ Device for offtake stations in gas distribution as well as commercial and industrial facilities
- ☐ Diaphragm casing can be rotated through increments of 45° relative to body
- ☐ Rapid response to load changes
- ☐ Regulator can be installed in any position
- ☐ Can be fitted with a over-pressure cut-off valve (OPCO) or combined under-/over-pressure cut-off valve (UPCO/OPCO)
- ☐ Easy to maintain
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Gas Pressure Regulator

DIMENSIONS AND WEIGHTS	
	DN 50
Face-to-face dimension in mm	190
Weight (without SSV OPCO) in kg (277H)	17.5 (18.5)
Weight (with SSV OPCO) in kg (277H)	18 (19)

OUTLET PRESSURE RANGE / SPECIFIC OUTLET PRESSURE RANGE		
Spring no.	**Spring colour coding**	**Specific outlet pressure range** W_{ds} in bar
1244	red	0.01 to 0.015
1245	grey	0.015 to 0.02
1299	purple	0.018 to 0.035
1246	green	0.02 to 0.028
1247	yellow	0.028 to 0.045
1248	black	0.045 to 0.075
1249	white	0.075 to 0.11
1250	orange	0.095 to 0.15
1251	blue	0.14 to 0.225
1252	silver	0.2 to 0.35
1263*	brown	0.32 to 0.5

SETTING RANGE OF SAFETY SHUT-OFF VALVE FOR SERIES 309 LP OPCO		
Spring no.	**Spring colour coding**	**Over-pressure (OPCO only)** Setting range W_{do} in bar
861	brown	0.035 to 0.09
1103	golden	0.08 to 0.13
1104	violet	0.12 to 0.25
1105	black	0.2 to 0.35
1254**	red	0.34 to 0.5
1255**	green	0.45 to 0.6
SAFETY SHUT-OFF VALVE FOR OVER-/ UNDER-PRESSURE (OPCO / UPCO)		
OPCO		
1109	grey	0.04 to 0.055
1110	green	0.05 to 0.11
1111	silver	0.15 to 0.2
1140	silver/red	0.15 to 0.25
UPCO		
1,138	blue/green	0.01 to 0.03

*) Series 277H only

**) Special spacer required

Gas Pressure Regulator

Self-operated Medium Pressure Regulator

Max. inlet pressure $p_{u\ max}$ up to 10 bar

Outlet pressure range W_d 0.01 to 0.7 bar
(over various spring ranges)

Capacity:
K_G = 1,275 $m^3/(h \cdot bar)$

Connection:
- 1½", 2" screwed (NPT, Rc, Rp)
- 2" flanged (PN 16 or ANSI 150)

- ☐ Primarily utilized for light to medium commercial/industrial applications
- ☐ Large internal relief valve assembly and 2" vent connection for superior relief gas discharge capabilities
- ☐ Aluminium die-cast diaphragm casing; cast iron, ductile iron or cast steel body; interchangeable orifices
- ☐ None, SD (indoor/vent less), limited or full internal relief valve
- ☐ Available with integral Safety Slam-shut Valve (refer to Model 290/309 S.S.V.)
- ☐ Internal or external impulse
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; other gases upon enquiry

Self-operated Medium Pressure Regulator

Max. inlet pressure $p_{u\ max}$ up to 10.2 bar

Outlet pressure range W_d 0.01 to 0.7 bar
(over various spring ranges)

Capacity:
K_G = 8,500 $m^3/(h \cdot bar)$

Connection:
- 1½", 2" screwed (NPT, Rc, Rp)
- 2" flanged (PN 16 or ANSI 150)

- ☐ Primarily utilized for commercial/industrial applications and combustion controls
- ☐ Balanced, single-ported valve in conjunction with streamlined body for high flow capacities
- ☐ Ported valve for superior control throughout working range
- ☐ Aluminium die-cast diaphragm casing; cast iron, ductile iron or cast steel bodies available; 2" vent connection
- ☐ External impulse
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; other gases upon enquiry

Gas Pressure Regulator with Spring-loaded Measuring Unit and Pressure Compensating Valve

Max. inlet pressure $p_{u\ max}$ up to 4.5 bar

Outlet pressure range W_d 0.01 to 0.225 bar
(depends on size)

Connection:
- Flanges DN 50, DN 80 and DN 100

Temperature range: –20 °C to +60 °C

- ☐ Device for distribution, commercial and industrial facilities
- ☐ Simple servicing by removable cartridge (main valve body remains in line)
- ☐ Balanced valve provides excellent control over full inlet pressure and working pressure range
- ☐ Valve travel indicator
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Gas Pressure Regulator

OUTLET PRESSURE RANGE / SPECIFIC OUTLET PRESSURE RANGE					
Pipe sizes DN	**Max. inlet pressure** $p_{u\,max}$ in bar	**Specific outlet pressure range** W_{ds} in bar		**Spring no.**	**Spring colour coding**
		BD-RMG 280	BD-RMG 280H		
DN 50, DN 80	4.5		0.01 to 0.02	548	self
			0.018 to 0.035	824	light green
			0.025 to 0.05	938	light blue
			0.03 to 0.07	546	grey
			0.066 to 0.104	774	brown
			0.096 to 0.138	775	orange
			0.112 to 0.225	778*	dark blue
DN 100	4.5	0.01 to 0.02		378	white / maroon
		0.018 to 0.03		402	black / maroon
		0.018 to 0.037		1007	blue / maroon
		0.028 to 0.04		403	green / maroon
		0.038 to 0.06		405	red / maroon
		0.055 to 0.08		406	brown / maroon
		0.075 to 0.14		407	grey / maroon
		0.112 to 0.2		857	stone coloured / maroon

*) Special setpoint adjuster required

DIMENSIONS AND WEIGHTS		
BD-RMG 280	**Face-to-face dimension** in mm	**Weight** in kg
DN 100	352	68.4
BD-RMG 280H	**Face-to-face dimension** in mm	**Weight** in kg
DN 50	254	25
DN 80	298	35.3

Gas Pressure Regulator with Spring-loaded Measuring Unit and Pressure Compensating Valve

Max. inlet pressure $p_{u\ max}$ up to 4.5 bar

Outlet pressure range W_d 0.01 to 0.225 bar (depends on model)

SSV setting range:
W_{dso} 0.035 to 0.25 bar
W_{dsu} 0.01 to 0.03 bar

Connection:
- Flange DN 50

Temperature range: –20 °C to +60 °C

- ☐ Device for distribution, commercial and industrial facilities
- ☐ Integrated safety shut-off valve for overpressure and under-/over-pressure release
- ☐ Simple servicing by removable cartridge. The main valve body remains in the regulating line
- ☐ Balanced valve gives excellent control over full inlet pressure and working pressure range
- ☐ Valve travel indicator
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

OUTLET PRESSURE RANGE / SPECIFIC OUTLET PRESSURE RANGE

Specific outlet pressure range W_{ds} in bar	Spring no.	Spring colour coding
BD-RMG 280H-309		
0.01 to 0.02	548	self
0.018 to 0.035	824	light green
0.025 to 0.05	938	light blue
0.03 to 0.07	546	grey
0.066 to 0.104	774	brown
0.096 to 0.138	775	orange
0.112 to 0.225	778*	dark blue

*) Special setpoint adjuster required

309 LP – SSV – SETTING RANGE

Type	Setting range		Spring no.	Spring colour coding
	Over-pressure W_{do} in bar	Under-pressure W_{du} in bar		
BD-RMG 309 LP (OPCO only)	0.035 to 0.09		861	brown
	0.08 to 0.13		1103	golden
	0.12 to 0.25		1104	violet
	0.34 to 0.5		1254	red
	0.45 to 0.6		1255	green

OPCO/UPCO version available on request

DIMENSIONS AND WEIGHTS

Face-to-face dimension in mm	405
Weight in kg	33

Gas Pressure Regulator with Spring-loaded Measuring Unit and Pressure Compensating Valve

Max. inlet pressure $p_{u\,max}$ up to 8 bar
(10 bar with auxiliary control system)

Outlet pressure range W_d 0.01 to 0.225 bar
(depends on model)

Connection:
- Flange DN 50

Temperature range: –20 °C to +60 °C

- ☐ Device for distribution, commercial and industrial facilities
- ☐ Simple servicing by removable cartridge; the main valve body remains in line
- ☐ Balanced valve provides excellent control over full inlet and working pressure range
- ☐ Valve position indicator
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

RMG
CE 0038

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Gas Pressure Regulator

OUTLET PRESSURE RANGE/SPECIFIC OUTLET PRESSURE RANGE				
Pipe sizes DN	**Max. inlet pressure** $p_{u\ max}$ in bar	**Specific outlet pressure range** W_{ds} in bar **BD-RMG 282H**	**Spring no.**	**Spring colour coding**
DN 50	8*	0.01 to 0.02	548	self
		0.018 to 0.035	824	light green
		0.025 to 0.05	938	light blue
		0.03 to 0.07	546	grey
		0.066 to 0.104	774	brown
		0.096 to 0.138	775	orange
		0.112 to 0.225	778**	dark blue

*) 10 bar with auxiliary control system
**) Special setpoint adjuster required

DIMENSIONS AND WEIGHTS		
BD-RMG 282H	**Face-to-face dimension** in mm	**Weight** in kg
DN 50	254	25

Gas Pressure Regulator with Spring-loaded Measuring Unit and Pressure Compensating Valve

Max. inlet pressure $p_{u\ max}$ up to 4.5 bar

Outlet pressure range W_d 0.14 to 1 bar
(depends on pipe size)

Connection:
- Flanges DN 50, DN 80

Temperature range: –20 °C to +60 °C

- ☐ Device for distribution, commercial and industrial facilities
- ☐ Easy to maintain thanks to removable actuator. No need to remove main valve body from the regulating line
- ☐ Excellent control of inlet and outlet pressure thanks to compensating valve
- ☐ Valve position indicator
- ☐ Bubble-tight sealing at zero flow
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

OUTLET PRESSURE RANGE/SPECIFIC OUTLET PRESSURE RANGE				
Pipe size DN	**Max. inlet pressure** $p_{u\ max}$ in bar	**Specific outlet pressure range** W_{ds} in bar	**Spring no.**	**Spring colour coding**
DN 50	4.5	0.14 to 0.26	849/848	red & black
		0.23 to 0.5	851/850	green & white
		0.46 to 1	853/852	yellow & blue
DN 80	4.5	0.2 to 0.4	1167	grey
		0.4 to 0.725	1168	brown
		0.675 to 1	1169/1168	orange & brown

DIMENSIONS AND WEIGHTS		
BD-RMG 284	**Face-to-face dimension** in mm	**Weight** in kg
DN 50	254	23.7
DN 80	298	44

Gas Pressure Regulator with Spring-loaded Measuring Unit and Double Seat Valve

Max. inlet pressure $p_{u\ max}$ up to 2 bar

Outlet pressure range W_d 0.015 to 0.21 bar

Series 680 MK 1
For all valve seat sizes PS = 7 bar

Series 680 MK 2-EVA
DN 50, DN 80 for valve seat diameter = pipe size and for DN 80 reduced valve seat PS = 4.5 bar
DN 100 for reduced bore for 4.5 bar

Pipe sizes:
DN 50, DN 80, DN 100, DN 150, DN 200

Temperature range: –20 °C to +60 °C

- ☐ Device for offtake stations in gas distribution as well as commercial and industrial facilities
- ☐ Suitable for use on industrial feeds to burners, heater units, boilers, etc.
- ☐ Fully-balanced, internal double-valve assembly
- ☐ Extremely high flow capacities
- ☐ High regulating accuracy
- ☐ External valve adjustment (MK2 EVA model only)
- ☐ Can be fitted with full- or reduced-size valves
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

RMG CE 0085

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE

Specific outlet pressure range W_{ds} in bar	size DN			
	DN 50	DN 80	DN 100	DN 150 and DN 200
	Spring no. and colour coding	Spring no. and colour coding	Spring no. and colour coding	Spring no. and colour coding
0.015 to 0.02	368 white / orange	378 white / maroon	409 white / golden	417 white / light blue
0.02 to 0.03	369 black / orange	402 black / maroon	410 black / golden	418 black / light blue
0.03 to 0.04	370 dark green / orange	403 dark green / maroon	411 dark green / golden	419 dark green / light blue
0.04 to 0.05	371 yellow / orange	404 yellow / maroon	412 yellow / golden	420 yellow / light blue
0.05 to 0.06	374 red / orange	405 red / maroon	413 red / golden	421 red / light blue
0.06 to 0.09	375 brown / orange	406 brown / red brown	414 brown / golden	422 brown / light blue
0.09 to 0.14	376 grey / orange	407 grey / red brown	415 grey / golden	423 grey / light blue
0.1 to 0.21	857 stone / maroon	857 stone / maroon	857 stone / maroon	856 purple / light blue

DIMENSIONS AND WEIGHTS

Type 680 MK1 & 680 MK2-EVA	**Face-to-face dimension** in mm	**Weight** in kg
DN 50	267	80
DN 80	318	98
DN 100	369	133
DN 150	473	268
DN 200	569	350

Gas Pressure Regulator with Spring-loaded Measuring Unit and Double Seat Valve

Max. inlet pressure $p_{u\,max}$ up to 2 bar

Outlet pressure range W_d 0.125 to 0.35 bar

Pipe sizes:

DN 50, DN 80, DN 100, DN 150, DN 200

Using an auxiliary control system, the following max. inlet pressure $p_{u\,max}$ is possible:

Series 680 MK 1

For all valve seat sizes $p_{u\,max}$ up to 7 bar

Series 680 MK 2-EVA

DN 50 and DN 80 for valve-seat diameter = pipe size and for DN 80 reduced valve-seat $p_{u\,max}$ up to 4.5 bar

DN 100 for reduced bore for 4.5 bar

Temperature range: –20 °C to +60 °C

- ☐ Device for offtake stations in gas distribution as well as commercial and industrial facilities
- ☐ Suitable for use on industrial feeds to burners, heater units, boilers, etc.
- ☐ Fully-balanced, internal double-valve assembly
- ☐ Extremely high flow capacities
- ☐ High regulating accuracy
- ☐ External valve adjustment (MK2 EVA model only)
- ☐ Can be fitted with full- or reduced-size valves
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE				
Specific outlet pressure range W_{ds} in bar	**Pipe size DN**			
	DN 50	DN 80	DN 100	DN 150 and DN 200
	Spring no. and colour coding	Spring no. and colour coding	Spring no. and colour coding	Spring no. and colour coding
0.125 to 0.205	523 mauve / orange	523 mauve / orange	523 mauve / orange	2 x 520 mauve / light blue
0.185 to 0.275	525 pink / orange	525 pink / orange	525 pink / orange	2 x 521 pink / light blue
0.255 to 0.35	522 stone / orange	522 stone / orange	522 stone / orange	2 x 544 stone / light blue
0.330 to 0.415				2 x 1006 self
0.345 to 0.415	935 blue / orange	935 blue / orange	935 blue / orange	

Outlet pressure range with respect to the vertical position of the regulator

DIMENSIONS AND WEIGHTS		
Type 680H MK1 & 680H MK2-EVA	**Face-to-face dimension** in mm	**Weight** in kg
DN 50	267	97
DN 80	318	111
DN 100	369	151
DN 150	473	305
DN 200	569	388

Auxiliary Controlled, Spring Loaded Gas Pressure Regulator with Double-seat Valves

Max. inlet pressure $p_{u\ max}$ up to:

MK 1: 7 bar

MK 2: 4.5 bar

up to 2 bar for DN 100 (full-bore valves), DN 150 and DN 200, 4.5 bar DN 100 reduced-bore valves

For these regulators, user will need an auxiliary control system

Outlet pressure range W_d 0.015 to 0.07 bar

Pipe sizes:

- 682 MK 1:

DN 50, DN 80, DN 100, DN 150, DN 200

- 682 MK 2:

DN 50, DN 80, DN 100

Temperature range: –20 °C to +60 °C

- ☐ Device for offtake stations in gas distribution
- ☐ Fully-balanced, internal double-valve assembly
- ☐ Extremely high flow capacities
- ☐ High regulating accuracy
- ☐ High regulating accuracy
- ☐ External valve adjustment - (MK2 EVA model only)
- ☐ Can be fitted with full- or reduced-size valves
- ☐ Must be installed with an auxiliary control system
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

DIMENSIONS AND WEIGHTS		
Type 682 MK1 & 682 MK2-EVA	**Face-to-face dimension** in mm	**Weight** in kg
DN 50	267	80
DN 80	318	98
DN 100	369	133
DN 150	473	268
DN 200	569	350

Pilot-operated Gas Pressure Regulator (Fail-safe to Close)

Max. inlet pressure $p_{u\ max}$ up to 16 bar

- ☐ Device for transmission, distribution and industrial facilities
- ☐ Fully-balanced, internal double-valves assembly
- ☐ Very high flow rates
- ☐ Extremely high flow capacities
- ☐ High regulating accuracy
- ☐ Can be fitted with full- or reduced- size valves
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

Outlet pressure range W_d: 0.015 to 15 bar

Min. operating differential 0.48 bar

Pipe sizes:
DN 150 and DN 200

Temperature range: –20 °C to +60 °C

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

DIMENSIONS AND WEIGHTS

BD-RMG 683	**Face-to-face dimension** in mm	**Weight** in kg
DN 150	473	336
DN 200	569	431

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 610 (RS 10D)

Load-limiting stage			Control stage			
Measuring unit	Wire Ø in mm	Specific outlet pressure range W_{ds} in bar	Measuring unit	Wire Ø in mm	Colour coding	Specific outlet pressure range W_{ds}
M	3.3 (green)	0.1 to 1.5	N	2.5 3 3.5 4 5	white yellow green red blue	10 mbar to 40 mbar 20 mbar to 60 mbar 40 mbar to 120 mbar 80 mbar to 200 mbar 100 mbar to 500 mbar
	5 (silver)	0.5 to 5	M	3.3 4 4.7	green blue brown	300 mbar to 1.5 bar 1 to 2.5 bar 2 to 3.5 bar

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 650

	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	Wire Ø in mm	Colour coding	
Pilot stage with diaphragm measuring unit	0 1 2 3 4 5	4.5 3.6 4.5 5 6.3 7	black blue black grey brown red	0.3 to 1* 0.5 to 2 1 to 5 2 to 10 5 to 20 10 to 40
Pilot stage with metal-harmonica measuring unit	6 7	☐ 8/7 9	green white	10 to 50 20 to 90
Automatic load-limiting stage		5	green	0.5 to 10 automatic: above p_d

ACCURACY CLASS AND LOCK-UP PRESSURE CLASS

Outlet pressure range (p_d range in bar)	Accuracy Class AC	Lock-up pressure Class SG
0.01 to 0.02	5	50
> 0.02 to 0.05	5	30
> 0.05 to 0.5	5	10
> 0.5 to 2.5	2.5	10
> 2.5 to 5	1	10
> 5 to 15	1	5

Direct-acting Pressure Control Regulator with Double-seat Valve

Max. inlet pressure $p_{u\ max}$ up to 12 bar

Outlet pressure range W_d 0.207 to 6.9 bar

Pipe sizes:
DN 50, DN 80, DN 100,
DN 150 (reduced-bore only)

Temperature range: –20 °C to +60 °C

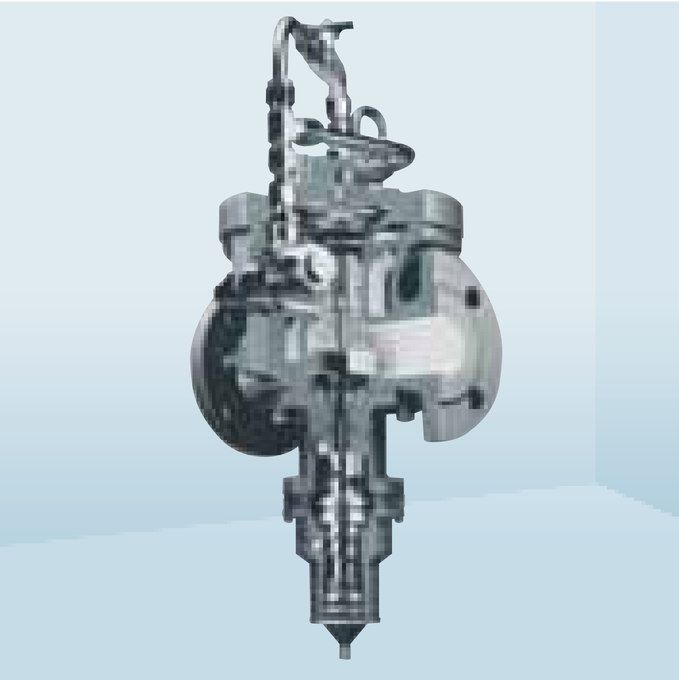
- ☐ Device for transmission, distribution and industrial facilities
- ☐ Fully-balanced, internal double-valve assembly
- ☐ Extremely high flow capacities
- ☐ Can be fitted with full- or reduced- size valves
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

DIMENSIONS AND WEIGHTS		
Type 684	**Face-to-face dimension** in mm	**Weight** in kg
DN 50	267	49
DN 80	318	68
DN 100	369	102
DN 150	473	193

OUTLET PRESSURE RANGE/SPECIFIC OUTLET PRESSURE RANGE		
Spring no.	**Spring colour coding**	**Specific outlet pressure range** W_{ds} in bar
655	yellow	0.207 to 0.414
656	grey	0.414 to 0.621
657	blue	0.621 to 1.034
658	red	1.034 to 2.068
659	brown	2.068 to 3.793
660	black	3.793 to 5.172
659 and 661	brown/white	4.827 to 6.896

Pilot-operated Gas Pressure Regulator



- Device for offtake stations in gas transmission and distribution, as well as power plants and industrial facilities
- Wide range of operating conditions, including high pressure
- High regulating accuracy
- Diaphragm valve/grid plate design
- Few parts, easy to maintain, quiet operation
- Pilot options including RMG 620 (integrated in top cover), RMG 630 and RMG 640a
- Can be fitted with an over-pressure cut-off valve (OPCO) or a combined under-/over-pressure cut-off valve (UPCO/OPCO)
- Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

Connection (optional):
- Output DN = Input DN
  - DN 25 to DN 100: DIN flange PN 16, PN 25 and flange according to Class (ANSI) 150 RF
- Output DN = 2 x Input DN
  DN 50/100, DN 80/150, and DN 100/200
  - DIN flange PN 16, PN 25 and PN 40, flange according to Class (ANSI) 150 and Class (ANSI) 300 RF

Max. inlet pressure $p_{u\,max}$ up to 25 bar

Outlet pressure range:
W_d 0.02 bar to 25 bar

Minimum pressure drop 0.5 bar

Class of lock-up pressure zone SZ 2.5

SSV setting range:
W_{do} 0.055 bar to 14 bar
W_{du} 0.03 bar to 3.5 bar

Temperature range: –20 to +60 °C

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 620				
Pilot	Setpoint spring			Specific set range W_d in bar
	No.	Colour	Wire Ø in mm	
RMG 620 ($p_{u\ max}$ 25 bar) (Integral)	2 3 4 5 6	blue yellow brown red green	3.6 5.6 6.3 7 8	0.02 to 0.2 0.1 to 0.5 0.2 to 1 0.5 to 2 1 to 4
RMG 630 ($p_{u\ max}$ 100 bar)	2 3 4 5	yellow brown red green	5.6 6.3 7 8	1 to 5 2 to 10 5 to 20 10 to 40
Load-limiting stage (RMG 630 only)		green	5	5 to 15 automatic: above p_d
RMG 640a ($p_{u\ max}$ 100 bar)	2 3 4 5	yellow brown red green	5.6 6.3 7 8	1 to 5 2 to 10 5 to 20 10 to 40

Other pilots available, contact sales for details

Gas Pressure Regulator

SPECIFIC OUTLET PRESSURE RANGE				
Model	**Type**	**Specific outlet pressure range W_{ds} in bar**	**Spring no.**	**Spring colour**
MP1	OPCO	0.055 to 0.09	1158	white
		0.08 to 0.14	1159	golden
		0.13 to 0.25	1160	purple
		0.25 to 0.4	1130	white / yellow
		0.33 to 0.6	1131	white / green
	UPCO	0.03 to 0.4	1104	purple
MP2	OPCO	0.5 to 0.88	1132	white / blue
		0.7 to 1.1	1133	white / red
		1.1 to 1.8	1134	white / grey
		1.5 to 2.9	1135	white / brown
	UPCO	0.03 to 0.4	1104	purple
MP4	OPCO	2 to 4	1192	white / purple
	UPCO	0.03 to 0.4	1104	purple
HP	OPCO	3 to 14	1197	blue
	UPCO	0.055 to 0.4	1104	purple
		0.2 to 0.78	1105	black
		0.75 to 1.5	1255	green
		1 to 3.5	1028	black / white

TECHNICAL SPECIFICATIONS						
Pipe size	**DN 50**	**DN 50/ DN 100**	**DN 80**	**DN 80/ DN 150**	**DN 100**	**DN 100/ DN 200**
K_G value in m³/(h·bar) *)	1300	1500	3500	3800	5200	5500
Face-to-face dimension in mm	254	310	298	400	352	430

*) Flow rate coefficient for natural gas: (ρ_b = 0.83 kg/m³)

Pilot-operated Gas Pressure Regulator

- Primarily utilized for heavy industrial, municipal distribution (district stations), gas transmission and power station applications
- Pilot-operated for superior control of outlet pressure and flow capacity
- For constant load/demand applications
- Cast steel body, cartridge style for ease of maintenance, optional noise reduction, uniquely-designed grid plate
- External impulse
- Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

Max. inlet pressure $p_{u\ max}$ 100 bar

Outlet pressure range:
W_d 0.15 bar to 40 bar
(over 3 pilot regulator spring ranges)

Capacity:
$K_G = 6{,}000\ m^3/(h \cdot bar)$

Connection (optional):
2"x2", 3"x3", 4"x4" flanged (PN16, PN 25, PN 40 or ANSI 150, ANSI 300, ANSI 600)

Pilot-operated Gas Pressure Regulator

- Device for offtake stations in gas transmission, as well as power plants and industrial facilities
- Wide range of operating pressures
- High regulating accuracy
- Diaphragm valve/grid plate design with reduced flow options available
- Few parts, easy to maintain, quiet operation
- Pilot options include RMG 630, RMG 640a and S600
- Optional relief valve version using RMG 642 pilot
- Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

Pipe sizes:
DN 50, DN 80, DN 100

Connection (optional):
DIN flange according to
PN 16, Class (ANSI) 150,
Class (ANSI) 300, Class (ANSI) 600

Max. inlet pressure $p_{u\ max}$ 100 bar

Min. inlet pressure $p_{u\ min}$ 3 bar

Outlet pressure range:
W_d 0.15 bar to 40 bar

Minimum pressure drop 0.5 bar

Class of lock-up pressure zone SZ 2.5

Max. differential pressure:
Class 150: 19 bar
Class 300: 50 bar
Class 600: 70 bar

Temperature range: –20 to +60 °C

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE OF SERIES 600 (SINGLE-STAGE PILOT)				
Pilot	**Max. inlet pressure $p_{u\,max}$ in bar**	**Specific outlet pressure range Wds in bar**	**Spring no.**	**Spring colour**
600 LP	25	0.15 to 0.14	1047	purple
		0.025 to 0.2	TX002	silver
600 MP	25	0.14 to 0.35	1047	purple
		0.35 to 2	TX002	silver
		2 to 4	TX003	light blue
600 PS	25	0.7 to 4	TX002	silver
		4 to 8	TX003	light blue
SPECIFIC OUTLET PRESSURE RANGE OF PILOTS RMG 630/640*				
Pilot stage with diaphragm measuring unit	100	1 to 5	2	yellow
		2 to 10	3	brown
		5 to 20	4	red
		10 to 40	5	green
Automatic load-limiting stage	100	5 to 15 automatic: above p_d		green

*) Pilot RMG 630: two-stage pilot (w/load limiting stage)
Pilot RMG 640: single-stage pilot for inlet pressure fluctuations < 15 bar

DIMENSIONS AND WEIGHTS				
Size	**Face-to-face in mm**			**Weight in kg**
	Class 150	Class 300	Class 600	
DN 50	254	267	286	31
DN 80	298	317	337	60
DN 100	352	368	394	105

Self-acting Offset Disc Check Valve

Max. operating pressure p_{max} up to 19 bar

Max. admissible backward differential pressure: 1 bar

Pipe sizes:
DN 50, DN 80, DN 100, DN 150, DN 200,
DN 250, DN 300

- ☐ Primarily used as an integral part, together with slam-shut and relief valve, of a discrimination system on stations feeding a common gas network. Its purpose is to initiate the isolation of a faulty stream whilst protecting the healthy stream(s) from unacceptable elevated pressures
- ☐ Lightweight door providing very low pressure drop
- ☐ Sandwich waferchek design for installation between two flanges
- ☐ May be used as a non-return valve where small volumes of leakage are tolerable
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

RMG CE 0038

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Self-acting, Non-return Check Valve

Max. operating pressure p_{max} up to 100 bar (dependant upon rating)

Max. admissible backward differential pressure: 7 bar

Pipe size (bore) in mm:

80, 100, 150, 200, 250, 300, 350, 400, 450, 500, 600

Suitable for fitting between flanges: PN16; ANSI Class 150, 300 & 600

Temperature range: –20 °C to +60 °C

- ☐ Primarily used as an integral part, together with slam-shut and relief valve, of a discrimination system on stations feeding a common gas transmission network. Its purpose is to initiate the isolation of a faulty stream whilst protecting the healthy stream(s) from unacceptable elevated pressures
- ☐ Robust steel door design with O-ring seal
- ☐ Sandwich design for installation between two flanges
- ☐ 100% reverse flow shut-off, thus may be used for conventional non-return-valve applications
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Non-return Valve

Max. inlet pressure p_{max} up to 7 bar

Max. admissible backward differential pressure: 7 bar

Pipe sizes:
R 2", 3", DN 80, DN 100, DN 150

Temperature range: –20 °C to +60 °C

- Non-return-valve for preventing gas reverse flow
- Used where air at higher pressure is mixed with fuel gas prior to combustion. Should also be fitted in the corresponding air line where there is a possibility of the pressure falling below that of the gas, to avoid explosive gas/air mixtures from being formed within the pipework
- Easy installation, compact design
- Mounting position: horizontal only
- Easy to maintain – does not require any lubrication
- Valve may be serviced on the spot
- High flow rates
- Absolutely tight against backward differential pressures
- Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

DIMENSIONS AND WEIGHTS

Pipe sizes DN	2"	3"	DN 80	DN 100	DN 150
Face-to-face dimension in mm	195	200	241	292	356
Weight in kg	8.7	13	16	23	43

Safety Shut-off Valve

Max. inlet pressure p_{max} up to 7 bar

Setting range:
- Series 303LP: 0.037 to 0.48 bar
- Series 303MP: 0.42 to 4.5 bar

Pipe sizes:
DN 250, DN 300

Temperature range: –20 °C to +60 °C

- ☐ May be used as a protection system for gas supplies and networks
- ☐ To be installed on the inlet pressure side with an external measuring line leading to the outlet pressure side in order to ensure automatic closing of the station in the event of overpressure
- ☐ Operates with high accuracy and reliability
- ☐ Pushbutton for pressure compensating valve
- ☐ Re-engage by hand
- ☐ Low pressure loss – fully-automatic operation – no external power supply required
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC SETTING RANGE			
Type	**Specific setting range** W_{ds} in bar	**Spring no.**	**Spring colour coding**
Series 303 LP	0.037 to 0.17	879	grey
	0.16 to 0.48	880	brown
Series 303 MP	0.42 to 0.55	756	silver
	0.54 to 0.76	757	orange
	0.75 to 0.97	758	yellow
	0.95 to 1.25	759	black
	1.23 to 1.6	760	white
	1.58 to 2	761	light green
	1.97 to 2.63	762	pink
	2.6 to 3.46	763	light blue
	3.43 to 4.5	764	golden

TECHNICAL SPECIFICATIONS			
Pipe sizes		**DN 250**	**DN 300**
Face-to-face dimension in mm		533	610
Weight in kg	**LP**	158	214
	MP	167	228

Safety Shut-off Valve with Electro-magnetic Release

Max. inlet pressure p_{max} up to 16 bar
(depends on body material and pipe size)

Pipe sizes:
DN 50, DN 80, DN100, DN 150, DN 200, DN 250, DN 300

Power supply:
- 24 VDC

Closing movement: 0.5 s

Temperature range: –5 °C to +50 °C

- May be incorporated into protection systems for gas supplies and for fire safety applications
- To be installed on the inlet pressure side
- Release by interrupting the power supply to the electromagnet
- Operates with high accuracy and reliability
- Pushbutton for pressure compensating valve
- Re-engage by hand
- Low pressure loss
- Flame-proof
- Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

DIMENSIONS AND WEIGHTS							
Pipe sizes	**DN 50**	**DN 80**	**DN 100**	**DN 150**	**DN 200**	**DN 250**	**DN 300**
Face-to-face dimension in mm	230	276	292	381	457	533	610
Weight in kg	28	36	40	82	115	185	250

Safety Shut-off Valve

Max. inlet pressure p_{max} up to 19 bar
(depends on body material and pipe size)

Pipe sizes:
DN 50, DN 80, DN100, DN 150, DN 200

Optional:
Combined over-pressure /
under-pressure release

Temperature range: –20 °C to +60 °C

- ☐ May be used as a protection system for gas supplies and networks
- ☐ To be installed on the inlet pressure side with an external measuring line leading to the outlet pressure side in order to ensure automatic closing of the station in the event of overpressure
- ☐ Valve position indicator as standard, with remote indication available
- ☐ Pushbutton for the pressure compensating valve
- ☐ Re-engage by hand
- ☐ Low pressure loss
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

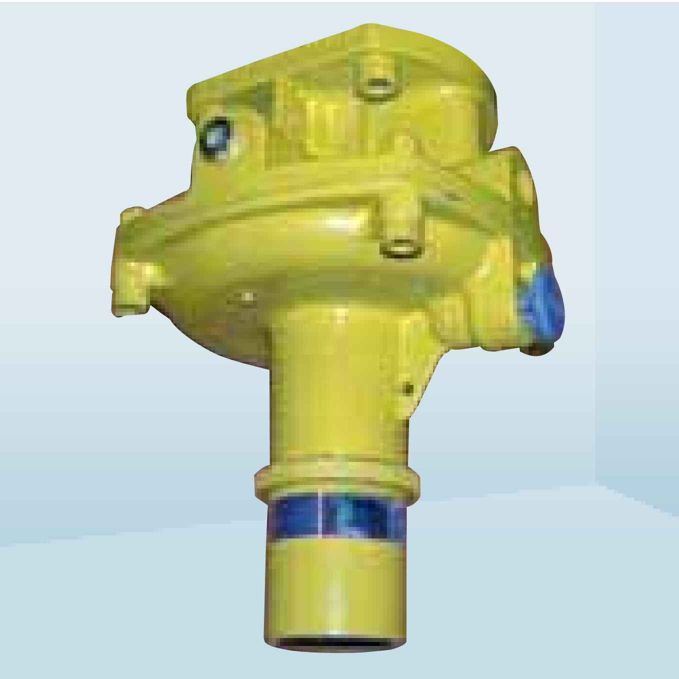
CE registration according to PED

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC SETTING RANGE			
Type	**Specific setting range** W_{ds} in bar	**Spring no.**	**Spring colour coding**
Series 305 LP	0.025 to 0.05	1200	silver
	0.045 to 0.125	495	orange
	0.112 to 0.25	835	blue
	0.235 to 0.35	839	grey
	0.28 to 0.55	1054	red / white
	0.5 to 0.75	1059	red / yellow
Series 305 MP	0.3 to 0.4	495	orange
	0.36 to 0.9	835	blue
	0.8 to 1.35	839	grey
	1.12 to 2.25	1054	red / white
	1.95 to 2.75	1059	red / yellow
Series 305 IP	2.5 to 3.3	1077	yellow
	3.1 to 4	1078	green
	3.8 to 5	1079	white
	4.8 to 6	1080	red
	5.5 to 7	1300	metallic

DIMENSIONS AND WEIGHTS					
Pipe sizes	**DN 50**	**DN 80**	**DN 100**	**DN 150**	**DN 200**
Face-to-face dimension in mm	230	276	292	381	457
Weight in kg	21	29	33	75	108

Incorporated Safety Shut-off Valve



Max. valve chamber pressure

p_{umax} = 11 bar

on UK version approved to GIS/V9

Max. admissible pressure

p_{max} and PS = 19bar

(10 bar for pilot controlled regulator)

Temperature range: –40 °C to +60 °C

- ☐ Functional unit for the following gas pressure regulators:
  - Series BD-RMG 200
  - Series BD-RMG 274
  - Series BD-RMG 240
  - Series BD-RMG 270, 270-3, 277
  - Series BD-RMG 204
  - Series BD-RMG 800 & 280-309, but with different operating parameters. (refer to S800 & 280-309 for details)
- ☐ Standalone SSV Series BD-RMG 291, utilising S240 or S270 bodies
- ☐ Valve position indicator as standard, with remote indication available
- ☐ Over-pressure and under-pressure release
- ☐ Direct acting
- ☐ Re-engage by hand
- ☐ Easy to maintain
- ☐ Fast reactivity
- ☐ Thermal protective "T-type" release available (gas flow is cut off as soon as the max. temperature is exceeded)
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

DIMENSIONS AND WEIGHTS						
Type	309 LP	309 LP 2	309 LP 4	309 MP1	309 MP2	309 MP4
Face-to-face dimension in mm	110	190.5	190.5	110	110	110
Weight in kg	0.6	1	3.2	1.9	2	2.2

Type 309 LP

Over-pressure setting range

W_{do} 0.035 bar to 0.6 bar

For over-pressure and under-pressure

W_{do} 0.04 bar to 0.25 bar

W_{du} 0.01 bar to 0.03 bar

Type 309 LP 2

Over-pressure setting range

W_{do} 0.027 bar to 1.38 bar

For over-pressure and under-pressure

W_{do} 0.415 bar to 1.5 bar

W_{du} 0.02 bar to 0.414 bar

Type 309 LP 4

Over-pressure setting range

W_{do} 1 bar to 4.5 bar

For over-pressure and under-pressure

W_{do} 1 bar to 4.5 bar

W_{du} 0.02 bar to 0.315 bar

Type 309 MP1

Setting range for over-pressure and under-pressure

W_{do} 0.055 bar to 0.6 bar

W_{du} 0.05 bar to 0.15 bar

Type 309 MP2

Over-pressure setting range

W_{do} 0.5 bar to 2.9 bar

For over-pressure and under-pressure

W_{do} 0.5 bar to 2.9 bar

W_{du} 0.05 bar to 0.15 bar

Type 309 MP4

Over-pressure setting range

W_{do} 2 bar to 4 bar

For over-pressure and under-pressure

W_{do} 2 bar to 4 bar

W_{du} 0.05 bar to 0.15 bar

SETTING RANGE				
Type	Setpoint spring no.	Spring colour coding	Over-pressure W_{do} in bar	Under-pressure W_{du} in bar
309 LP OPCO	861	brown	0.035 to 0.09	-
	1103	golden	0.08 to 0.13	-
	1104	purple	0.12 to 0.25	-
	1105	black	0.2 to 0.35	-
	1254*	red	0.34 to 0.5	-
	1255*	green	0.45 to 0.6	-
	1173**	dark blue/grey	0.21 to 0.42	-
	1254**	red	0.49 to 0.56	-
309 LP UPCO/OPCO	1109	grey	0.04 to 0.055	-
	1110	green	0.05 to 0.11	-
	1111	silver	0.11 to 0.2	-
	1140	silver/red	0.15 to 0.25	-
309 LP UPCO	1138	blue/green	-	0.01 to 0.03
309 LP 2 OPCO	1173	dark blue/grey	0.4 to 0.8	-
	1254	red	0.8 to 1.2	-
	1255	green	1.2 to 1.5	-
309 LP 2 UPCO	1138	blue/green	-	0.02 to 0.055
	638	blue	-	0.056 to 0.175
	IA/006	green	-	0.175 to 0.414
309 LP 4 OPCO	1030	brown	1 to 2	-
	1031	green	2 to 3.1	-
	1032	dark blue	3.1 to 4.5	-
309 LP 4 UPCO	1138	blue/green	-	0.02 to 0.055
	638	blue	-	0.056 to 0.175
	IA/006	green	-	0.175 to 0.315

*) Special spacer required
**) Type according to Bryan Donkin, Canada

SETTING RANGE				
Type	Setpoint spring no.	Spring colour coding	Over-pressure W_{do} in bar	Under-pressure W_{du} in bar
309 MP1 UPCO/OPCO	1158	white	0.055 to 0.1	–
	1159	golden	0.1 to 0.14	–
	1160	purple	0.13 to 0.25	–
	1130	white/yellow	0.25 to 0.4	–
	1131	white/green	0.33 to 0.6	–
309 MP1 UPCO	1104	purple	–	0.05 to 0.15
309 MP2 OPCO*	1132	white/blue	0.5 to 0.8	–
	1133	white/red	0.7 to 1.1	–
	1134	white/grey	1 to 1.8	–
	1135	white/brown	1.5 to 2.9	–
309 MP2 UPCO	1104	purple	–	0.05 to 0.15
309 MP4 OPCO*	1192	white/purple	2 to 4	–
309 MP4 UPCO	1104	purple	–	0.05 to 0.15

*) Details also apply to UPCO/OPCO versions

PLEASE NOTE:

The re-engage differential (i.e., the smallest difference between the upper release point and normal operating pressure) should be at least 0.035 bar or 10 % higher than the outlet pressure setpoint (depending upon which value is higher). In the event the gas pressure regulator is equipped with a Safety Relief Valve, the upper release point should be at least 0.055 bar above the outlet pressure setpoint.

Incorporated Safety Shut-off Valve

Max. inlet pressure p_{max} up to 70 bar

Temperature range: –20 °C to +60 °C

5 versions available:
- Series 315 LP OPCO
- Series 315 MP2 OPCO
- Series 315 MP4 OPCO
- Series 315 MP5 OPCO
- Series 315 HP OPCO

- ☐ May be used as an incorporated protection device for the following gas pressure regulators (all body sizes):
  - Series BD-RMG 204
  - BD-RMG 275 where p_{max} > 10bar
- ☐ Valve position indicator as standard, with remote indication available
- ☐ Over-pressure (OPCO) and under-pressure (UPCO) release
- ☐ Does not require any external energy input for operation
- ☐ Re-engage by hand
- ☐ Easy to maintain
- ☐ Fast reaction times in the event of pressure changes
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

DIMENSIONS AND WEIGHTS

Type	Series 315 LP, MP2, MP4, MP5	Series 315 HP
Face-to-face dimension in mm	290	310
Weight in kg	7.5	7.5

Safety Device

SETTING RANGE

Type	Setpoint spring no.	Spring colour coding	Over-pressure W_{do} in bar	Under-pressure W_{du} in bar
315 LP OPCO	1158	white	0.055 to 0.1	-
	1159	golden	0.1 to 0.14	-
	1160	purple	0.13 to 0.25	-
	1130	white / yellow	0.25 to 0.4	-
	1131	white / green	0.33 to 0.6	-
315 LP UPCO	1269	coated Ø 1.27	-	0.035 to 0.15
	1270	coated Ø 1.7	-	0.06 to 0.2
315 MP2 OPCO	1132	white / blue	0.5 to 0.88	-
	1133	white / red	0.7 to 1.1	-
	1134	white / grey	1 to 1.8	-
	1135	white / brown	1.5 to 2.9	-
315 MP4 OPCO	1192	white / purple	2 to 4	-
315 MP2 & 315 MP4 UPCO	1104	purple	-	0.05 to 0.15
	1105	black	-	0.1 to 0.3
	1255	green	-	0.25 to 0.7
	1028	black / white	-	0.64 to 1.6
	1298	blue	-	0.35 to 1.8
315 MP5 OPCO	1192 & 1135	white / purple white / brown	4 to 6	-
315 HP OPCO	1197	blue	3 to 14	-
315 HP UPCO	1104	purple	-	0.12 to 0.47
	1105	black	-	0.45 to 0.82
	1255	green	-	0.6 to 1.8
	1028	black / white	-	2 to 3.5

Safety Relief Valve

Max. inlet pressure p_{max} up to 25.5 bar

Outlet pressure range W_d 0.21 bar to 10 bar

Connection:
R ¾", R 1"

Temperature range: –40 °C to +60 °C

- ☐ Device for offtake stations in gas transmission as well as commercial and industrial facilities
- ☐ A reliable tool for protecting pipe work, pressure vessels, etc., against overpressure
- ☐ Valve for high pressure range
- ☐ Diaphragm housing may be installed in any required position and turned 180 degrees with respect to the main valve body
- ☐ Fast reactivity
- ☐ Easy to maintain
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE		
Setpoint spring no.	**Spring colour coding**	**Specific outlet pressure range** W_{ds} in bar
1,030	brown	0.21 to 0.7
1,031	green	0.5 to 1.4
1,032	blue	1 to 1.7
1,033	silver	1.4 to 2.7
1,036	red	2 to 5.1
1,037	white	3.4 to 6.8
1,034	yellow	5.4 to 10

WEIGHT	
Pipe sizes	**¾" and 1"**
Weight in kg	6,4

Diaphragm-actuated, Lever-operated Relief Valve

Max. inlet pressure p_{max} = 25 bar

Relief pressure range
W_d 0.55 bar to 11.37 bar

Connection:
R ½", R ¾", R 1"

Temperature range: –20 °C to +60 °C

- ☐ Device for offtake stations in gas transmission and distribution, as well as commercial and industrial facilities
- ☐ Reliable device for protecting pipe work, pressure vessels, etc., against excessive pressure
- ☐ Installed downstream of regulator to discharge small amounts of gas in the event of regulator creep, avoiding the tripping closed of the SSV
- ☐ High outlet pressure range
- ☐ Diaphragm housing may be installed in any required position and turned 180 degrees with respect to the main valve body
- ☐ Fast response
- ☐ Valve seat may be replaced without having to remove the body from the regulating line
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

Safety Device

SPECIFIC OUTLET PRESSURE RANGE		
Setpoint spring no.	**Spring colour coding**	**Specific outlet pressure range** W_{ds} in bar
261	yellow	0.55 to 0.83
262	aluminium	0.69 to 1.72
263	white	1.508 to 4.14
264	brown	3.78 to 6.9
265	grey	6.2 to 11.37

DIMENSIONS AND WEIGHTS	
Pipe sizes	**All sizes**
Face-to-face dimension in mm	102
Weight in kg	7

Safety Relief Valve

- ☐ Device for offtake stations in gas transmission as well as commercial and industrial facilities
- ☐ Reliable tool for protecting pipe work, pressure vessels, etc., against overpressure
- ☐ Fast reactivity
- ☐ Easy to maintain
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

Max. inlet pressure p_{max} up to 10 bar
depends on version

Outlet pressure range W_d 0.3 bar to 5.1 bar

Pipe sizes:
Pipe screw connection:
R ¾", R 1", R 1 ¼", R 1 ½", R 2"
Flange connection:
- 2" (only for version 225 LP4)

Temperature range: –40 °C to +60 °C

Versions:

225 LP4:
- Suitable for low pressures
- Setting range W_d: 0.035 to 5.1 bar
- Max. admissible pressure p_{max} up to 10 bar

225LP:
- Suitable for low pressures
- Setting range W_d: 0.03 to 0.35 bar
- Max. admissible pressure p_{max} up to 2 bar

225LP2:
- Suitable for low pressures
- Setting range W_d: 0.035 to 1 bar
- Max. admissible pressure p_{max} up to 2 bar

SPECIFIC OUTLET PRESSURE RANGE		
BD-RMG 225LP		
Setpoint spring no.	**Spring colour coding**	**Specific outlet pressure range** W_{ds} in bar
861	brown	0.03 to 0.1
868	green	0.067 to 0.167
1254	red	0.14 to 0.21
1047	purple	0.21 to 0.28
1255	green	0.28 to 0.35
BD-RMG 225LP2		
Setpoint spring no.	**Spring colour coding**	**Specific outlet pressure range** W_{ds} in bar
1030	brown	0.35 to 1
BD-RMG 225LP4		
Setpoint spring no.	**Spring colour coding**	**Specific outlet pressure range** W_{ds} in bar
1030	brown	0.35 to 2
1031	green	2 to 3
1032	dark blue	3 to 5.1

WEIGHT		
Version	**Pipe sizes**	**Weight** in kg
BD-RMG 225LP	¾" and 1"	0.9
BD-RMG 225LP2	¾" and 1"	2.3
BD-RMG 225LP4 (screw connection)	1 ¼", 1 ½", 2"	8.2
BD-RMG 225LP4 (flange)	2"	11.4

Spring-loaded, Diaphragm-operated Relief Valve

Max. inlet pressure p_{max} = 0.35 bar

Relief pressure range
W_d 0.011 to 0.3 bar
(depends on model)

Connection:
226 MK3: R 1¼", 1½", 2"
226 MK4: R ¾", R 1"

Temperature range: –20 °C to +60 °C

- ☐ Device for offtake stations in gas distribution as well as commercial and industrial facilities
- ☐ Reliable device for protecting pipe work, pressure vessels, etc., against excessive pressure
- ☐ Installed downstream of regulator to discharge small amounts of gas in the event of regulator creep, avoiding the tripping closed of the SSV
- ☐ High actuating accuracy
- ☐ Fitting length as required
- ☐ Mounting position as required
- ☐ Test point connection in inlet
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE

Setpoint spring no.				Spring colour coding	Specific outlet pressure range W_{ds} in bar
¾" & 1"	1 ¼"	1 ½"	2"		
859	-	-	-	red	0.015 to 0.045
861	-	-	-	brown	0.035 to 0.085
1307	-	-	-	blue	0.085 to 0.12
1303	-	-	-	green	0.125 to 0.2
869	-	-	-	silver	0.15 to 0.3
-	1069	1069	1074	blue	0.011 to 0.028
-	1071	1071	1076	black	0.028 to 0.06
-	1156	1156	1157	metallic	0.04 to 0.08
-	1181	1181	1182	orange	0.06 to 0.12

DIMENSIONS AND WEIGHTS

Pipe sizes	¾" & 1"	1 ¼"	1 ½"	2"
Face-to-face dimension in mm	103	164	164	210
Weight in kg	0.63	1.95	1.87	3.91

Spring-loaded, Diaphragm-operated Relief Valve

Max. inlet pressure p_{max} = 0.5 bar

Relief pressure range W_d 0.025 to 0.35 bar

Connection:
R 1¼", R 1½", R 2"

Temperature range: –20 °C to +60 °C

- ☐ Device for offtake stations in gas distribution as well as commercial and industrial facilities
- ☐ Reliable device for protecting pipe work, pressure vessels, etc., against excessive pressure
- ☐ Installed downstream of regulator to discharge small amounts of gas in the event of regulator creep, avoiding the tripping closed of the SSV
- ☐ High actuating accuracy
- ☐ Mounting position as required
- ☐ Test point connection in inlet
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Safety Device

SPECIFIC OUTLET PRESSURE RANGE

Specific outlet pressure range W_{ds} in bar	Spring colour coding	Spring no.		
		1 ¼"	1 ½"	2"
0.025 to 0.08	orange	495	495	497
0.07 to 0.17	blue	835	835	1,183
0.16 to 0.35	grey	1,178	1,178	1,184

DIMENSIONS AND WEIGHTS

Pipe sizes	1 ¼"	1 ½"	2"
Face-to-face dimension in mm	164	164	210
Weight in kg	2.38	2.3	4.7

Spring-loaded, Diaphragm-operated, Relief Valve

Max. inlet pressure p_{max} = 0.2 bar (BD-RMG 226R) and/or 0.5 bar (BD-RMG 226HR)

Max. inlet pressure p_{max}:

BD-RMG 226R	up to 0.2 bar
BD-RMG 226HR	up to 0.5 bar

Relief pressure range W_d:

BD-RMG 226R	0.01 to 0.07 bar
BD-RMG 226HR	0.01 to 0.215 bar

Pipe sizes:
DN 65 und DN 80

Temperature range: –20 °C to +60 °C

- ☐ Device for offtake stations in gas distribution as well as commercial and industrial facilities
- ☐ Reliable device for protecting pipe work, pressure vessels, etc., against excessive pressure
- ☐ Installed downstream of regulator to discharge small amounts of gas in the event of regulator creep, avoiding the tripping closed of the SSV
- ☐ High actuating accuracy
- ☐ Mounting position as required
- ☐ Test point connection in inlet
- ☐ Suitable for natural, non-aggressive and manufactured gases, nitrogen, carbon dioxide and propane, other gases on enquiry

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE			
Specific outlet pressure range W_{ds} in bar	Spring colour coding	Spring no.	
		226 R	226 HR
0.01 to 0.22	metallic	790	790
0.02 to 0.035	grey	791	791
0.03 to 0.07	yellow	799	799
0.062 to 0.12	orange	-	775
0.115 to 0.215	blue	-	778

DIMENSIONS AND WEIGHTS				
Pipe sizes	226 R		226 HR	
	DN 65	DN 80	DN 65	DN 80
Face-to-face dimension in mm	318	318	318	318
Weight in kg	16	16.4	18.7	19.1

Spring-loaded, Diaphragm-operated, Relief Valve

Both models available with max. inlet pressure p_{max} at 7 or 25 bar

Relief pressure range W_d:

BD-RMG 226VR	0.025 to 0.55 bar
BD-RMG 226HVR	0.5 to 3.5 bar

Connection: R 1"

Temperature range: –20 °C to +60 °C

- ☐ Device for offtake stations in gas distribution and transmission, as well as commercial and industrial facilities
- ☐ Reliable device for protecting pipe work, pressure vessels, etc., against excessive pressure
- ☐ Installed downstream of regulator to discharge small amounts of gas in the event of regulator creep, avoiding the tripping closed of the SSV
- ☐ High actuating accuracy
- ☐ Mounting position as required
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Safety Device

SPECIFIC OUTLET PRESSURE RANGE

Specific outlet pressure range W_{ds} in bar	Spring colour coding	Spring no.	
		226 VR	226 HVR
0.025 to 0.042	red	1072 (Ø 2.18 mm)	-
0.04 to 0.06	red	1090 (Ø 2.64 mm)	-
0.055 to 0.085	yellow	1091	-
0.08 to 0.125	green	1092	-
0.125 to 0.21	brown	1093	-
0.2 to 0.325	blue	1094	-
0.32 to 0.55	black	1095	-
0.5 to 0.65	blue	-	1094
0.6 to 1.1	black	-	1095
1 to 2	red / yellow	-	1282
2 to 3.5	red / white	-	1283

DIMENSIONS AND WEIGHTS

Pipe sizes	226 VR	226 HVR
Face-to-face dimension in mm	122	122
Weight in kg	5	5.5

Spring-loaded, Diaphragm-operated Twin-valved Relief Valve

Max. inlet pressure p_{max} = 0.5 bar

Relief pressure range W_d 0.015 to 0.35 bar

Pipe sizes:

DN 50, DN 80, DN 100, DN 150, DN 200

Temperature range: –20 °C to +60 °C

- ☐ Device for offtake stations in gas transmission, landfill applications, and commercial and industrial facilities
- ☐ Reliable device for protecting pipe work, pressure vessels, etc., against excessive pressure
- ☐ Balanced twin-valve construction
- ☐ Very high flow rates
- ☐ High actuating accuracy
- ☐ Reduced bore valves available
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

RMG CE 0085

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Safety Device

SPECIFIC OUTLET PRESSURE RANGE					
Specific outlet pressure range W_{ds} in bar	Pipe size DN				
	DN 50	DN 80	DN 100	DN 150	DN 200
	Spring no. and colour coding	Spring no. and colour coding	Spring no. and colour coding	Spring no. and colour coding	Spring no. and colour coding
0.015 to 0.02	-	-	410 black/golden	-	-
0.015 to 0.04	371 yellow/orange	404 yellow/red brown	-	-	-
0.017 to 0.04	-	-	-	447 silver/light blue	-
0.02 to 0.03	-	-	-	-	428 yellow/light green
0.02 to 0.04	-	-	412 yellow/golden	-	-
0.025 to 0.4	-	-	-	-	456 silver/light green
0.035 to 0.05				421 red/light blue	457 stone coloured/ light green
0.035 to 0.09	415 grey/golden	415 grey/golden	415 grey/golden	-	-
0.06 to 0.09	-	-	-	-	431 grey/light green
0.045 to 0.065	-	-	-	-	430 brown/light green
0.045 to 0.09	-	-	-	423 grey/light blue	-
0.085 to 0.21	454 violet/red brown	454 violet/red brown	454 violet/red brown	446 violet/light blue	446 violet/light blue
0.19 to 0.35	445 stone coloured/ orange	445 stone coloured/ orange	445 stone coloured/ orange	448 stone coloured/ light blue	448 stone coloured/ light blue

DIMENSIONS AND WEIGHTS		
Type 680R	**Face-to-face dimension** in mm	**Weight** in kg
DN 50	267	80
DN 80	318	98
DN 100	369	133
DN 150	473	268
DN 200	569	350

Spring-loaded, Diaphragm-operated Twin-valved Relief Valve

- ☐ Device for transmission, commercial and industrial facilities
- ☐ Reliable device for protecting pipe work, pressure vessels, etc., against excessive pressure
- ☐ Balanced twin-valve construction
- ☐ Very high flow rates
- ☐ High actuating accuracy
- ☐ Reduced bore valves available
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

Max. inlet pressure p_{max} = 8.6 bar

Relief pressure range W_d 0.207 to 6.9 bar

Pipe sizes:

DN 50, DN 80, DN 100, DN 150

Temperature range: –20 °C to +60 °C

Safety Device

OUTLET PRESSURE RANGE/SPECIFIC OUTLET PRESSURE RANGE		
Spring no.	**Spring colour coding**	**Specific outlet pressure range** W_{ds} in bar
655	yellow	0.207 to 0.414
656	grey	0.414 to 0.621
657	blue	0.621 to 1.034
658	red	1.034 to 2.068
659	brown	2.068 to 3.793
660	black	3.793 to 5.172
659 & 661	brown/white	4.827 to 6.896

DIMENSIONS AND WEIGHTS		
Type 684R	**Face-to-face dimension** in mm	**Weight** in kg
DN 50	267	49
DN 80	318	68
DN 100	369	102
DN 150	473	193

Inline Filter

- ☐ Device for offtake stations in gas distribution as well as commercial and industrial facilities
- ☐ Replaceable filter elements
- ☐ Low pressure loss
- ☐ Quick release cover, incorporating an automatic residual pressure safety relief design
- ☐ Locking facility
- ☐ Differential pressure tappings
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

Max. inlet pressure p_{max} = 10.3 bar
Standard element:
50- or 200-micron stainless steel elements, other types on request
Pipe sizes:
DN 80, DN 100, DN 150, DN 200, DN 250, DN 300
Temperature range: –20 °C to +60 °C

CE registration according to PED

Approved to GIS/E13

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

DIMENSIONS AND WEIGHTS

Pipe sizes DN	Inlet	DN 80		DN 100		DN 150		DN 200		DN 250	DN 300
	Outlet	DN 50	DN 80	DN 50	DN 100	DN 80	DN 150	DN 100	DN 200	DN 250	DN 300
Face-to-face dimension in mm		392	304	433	356	576	483	654	559	660	660
Weight in kg		37	36	41	42	54	56	100	111	172	250

Angle-type Filter

Max. inlet pressure p_{max} = 10.3 bar
Standard element:
50- or 200-micron stainless steel elements, other types on request
Pipe sizes:
DN 80, DN 100, DN 150, DN 200, DN 250, DN 300
Temperature range: –20 °C to +60 °C

- ☐ Device for offtake stations in gas distribution as well as commercial and industrial facilities
- ☐ Replaceable filter elements
- ☐ Low pressure loss
- ☐ Quick release cover, incorporating an automatic residual pressure safety relief design
- ☐ Locking facility
- ☐ Differential pressure tappings
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

Approved to GIS/E13

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

DIMENSIONS AND WEIGHTS

Pipe sizes DN	Inlet	DN 80		DN 100			DN 150		DN 200		DN 250	DN 300
	Outlet	DN 50	DN 80	DN 50	DN 80	DN 100	DN 80	DN 150	DN 100	DN 200	DN 250	DN 300
Face-to-face dimension in mm		240	152	255	255	159	335	235	390	311	387	463
Weight in kg		35	34	39	41	40	52	54	98	109	170	248

Angle-type Filter

- ☐ Device for offtake stations in gas distribution as well as commercial and industrial facilities
- ☐ Replaceable filter elements
- ☐ Low pressure loss
- ☐ Quick release cover, incorporating an automatic residual pressure safety relief design
- ☐ Differential pressure tappings
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

Max. inlet pressure p_{max} up to 25 bar, dependant upon material and size

Standard element:

50- or 200-micron stainless steel elements, other types on request

Connection:

R ¾", 1", 1 ½", 2" and DN 50

CE registration according to PED

Temperature range: –20 °C to +60 °C

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

DIMENSIONS AND WEIGHTS					
Pipe sizes DN	¾"	1"	1 ½"	2"	DN 50
Face-to-face dimension in mm	38	50	78	88	110
Weight in kg	0.6	1.2	1.6	7.4	13.7

Y-type Filter

Max. inlet pressure p_{max} up to 19 bar, dependant on material and size

Standard element:
50- or 200-micron stainless steel elements, other types on request

Connection:
R ½", ¾", 1", 1 ½" and DN 50

Temperature range: –20 °C to +60 °C

- ☐ Device for offtake stations in gas distribution as well as commercial and industrial facilities
- ☐ Replaceable filter elements
- ☐ Low pressure loss
- ☐ Quick release screw cover, incorporating an automatic residual pressure safety relief design
- ☐ Differential pressure tappings
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

DIMENSIONS AND WEIGHTS					
Pipe sizes DN	½"	¾"	1"	1 ½"	DN 50
Face-to-face dimension in mm	79	89	110	152	230
Weight in kg	0.5	1	1	2	10.5

Electronic Timer with Solenoid-operated Valve

Max. inlet pressure p_{max} 0.35 bar

Available designs:

185 – Electroclock 2

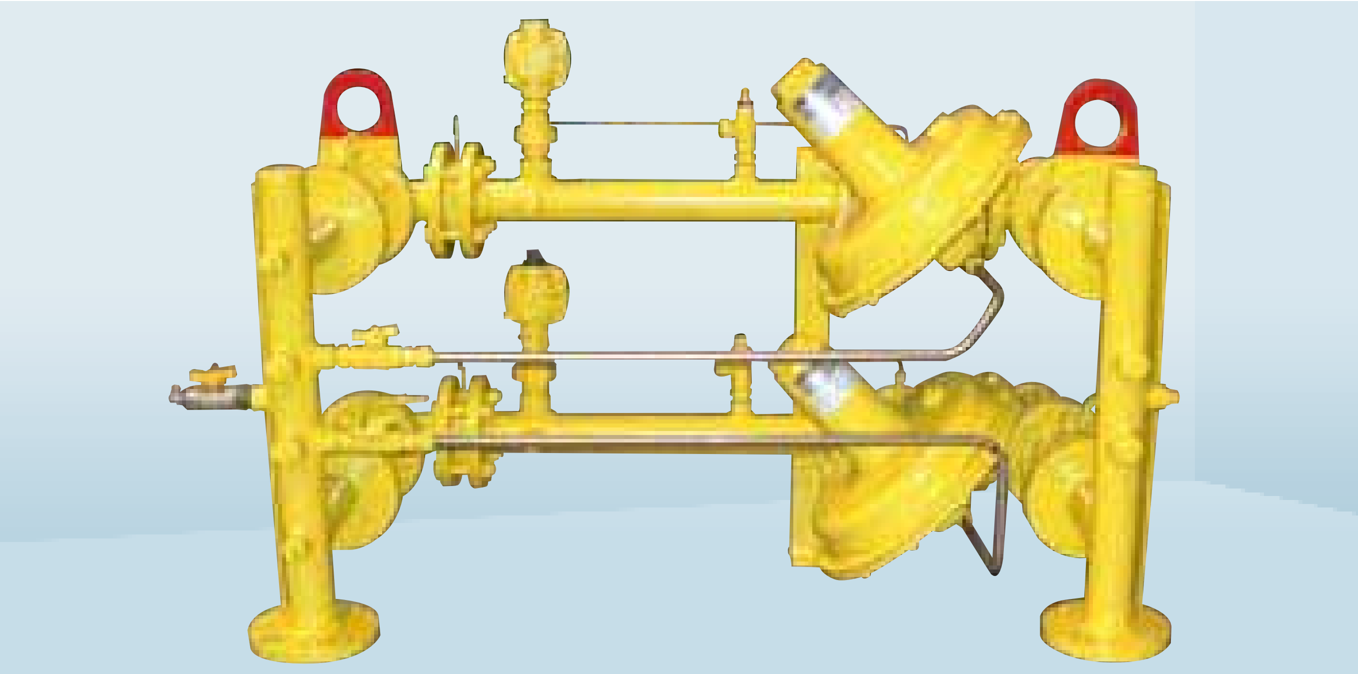
186 – Electroclock 2 VS*

*) Installation on vent lines of below-ground compact modules

Temperature range: –20 °C to +60 °C

- ☐ Primarily used as a pressure management tool programmed to lower the outlet pressure during periods of low demand, thus reducing network leakage
- ☐ Used in an auxiliary controlled system switching K2 pilot on and off at programmed times
- ☐ Programmable with up to six different times (3 high and 3 low settings per day on a 7-day cycle)
- ☐ 2 LEDs for indicating switching positions, and manual push-button override
- ☐ Complete with low-battery warning
- ☐ Via an IS barrier interface, time programming and interrogation can be carried out using a laptop or similar
- ☐ ATEX and EMC approved
- ☐ IS interface box, cables and programming software available
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

BD-RMG Service Governor Modules - SGM



Max. inlet pressure p_{max} up to 7 bar

Outlet pressure range: 0.01 to 0.05 bar

Variants:
Single with bypass option or Twin Stream,
Stream discrimination
Above & Below Ground Options with base &
GRP Kiosk or GRP Pit & Steel Cover
Optional Vent Stack for below-ground
versions

Connection:
Flange to BS EN 1092 PN16 or Screwed to BS21

Sizes:
Inlet: R¾", 32PE, R2", 63PE & DN 50,
Outlet: R¾", 32PE, R2", 63PE & DN 50, DN 80

Size of the gas pressure regulator:

R¾", R1", R2" & DN 50

Temperature range: –20 °C to +60 °C

- ☐ The Service Governor Module (SGM) is a factory-built gas control module with a space-saving range of standard designs for use on District, Industrial and Commercial services, providing flexibility to meet requirements of IGE/TD/13
- ☐ All working elements are easy to exchange
- ☐ Suitable for natural and manufactured gases, including nitrogen, carbon dioxide and propane, other gases upon enquiry
- ☐ Easy installation in a city or rural location
- ☐ Easy maintenance
- ☐ Features:
  - -Inlet & Outlet Isolation Valves
  - -Filter
  - -Regulator
  - -Safety Cut-Off Valve
  - -Creep Relief Valve

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Below-ground Compact Module According to DVGW VP 702 IGEM Recommendations

Features & Benefits of Below-ground Compact Modules

- ☐ RMG's below-ground compact module has all the relevant elements of a conventional gas pressure regulator according to G 491
- ☐ The functional units (filter, SSV, gas pressure regulator and SRV) may be removed and replaced separately
- ☐ Works with RMG's reliable devices
- ☐ Quick-release cover, incorporating an automatic residual pressure safety relief design
- ☐ Easy planning of stations
- ☐ Easy to maintain
- ☐ Suitable for public circulation areas thanks to heavy-load top cover
- ☐ Very convenient when space is tight (e.g., due to public circulation areas or when architecture rules out structures above ground)
- ☐ Stack for vent and discharge lines
- ☐ Improved security
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

Below-ground Compact Module

Max. inlet pressure $p_{u\ max}$ up to 7 bar
K Pilot – set point
0.02 to 0.075 bar
SSV setting range for over-pressure
0.035 to 0.2 bar
SRV setting range for under-pressure
0.03 to 0.12 bar
Connection
Flange PN 16
- Inlet: DN 150
- Outlet: DN 200

Temperature range: −20 °C to +60 °C

- ☐ RMG's Krysalis™ below-ground compact module has the same components as any standard gas pressure regulator and is suitable for distribution networks
- ☐ Easy to install in urban and rural environments
- ☐ Requires minimum amount of space
- ☐ Quiet operation
- ☐ Easy planning of stations
- ☐ Easy to maintain
- ☐ Installation below ground reduces risk of damage and vandalism
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

Optional

Pre-assembled module
SSV actuator systems for over-pressure and under-pressure
Pressure profiling

DIMENSIONS AND WEIGHTS	
Face-to-face dimension in mm	658
Weight in kg	280

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Below-ground Compact Module Type Krysalis 16

Max. inlet pressure $p_{u\ max}$ up to 16 bar
Outlet pressure range:
20 mbar to 4 bar (RMG 402/RMG 620)
Min. pressure drop Δp_{min} 0.5 bar approx.

Slam/Act configuration

SSV setting range W_{do} 40 mbar to 4.5 bar
SSV setting range W_{du} 5 mbar to 0.3 bar
Optional:
SSV setting range (BD-RMG 226 VR or RMG 832) 40 mbar to 8 bar

Flow rate coefficient K_G: 1,500 $m^3/(h \cdot bar)$
Connection:
Flange PN 16 or ANSI Class 150
Pipe sizes:
Inlet: DN 100 Outlet: DN 150
Temperature range: –20 °C to +60 °C

- ☐ RMG's below-ground compact module Krysalis 16 has the same components as any gas pressure regulator system and is suitable for gas networks
- ☐ Very convenient when space is tight (e.g., due to public circulation areas or when architecture rules out structures above ground)
- ☐ Requires minimum amount of space
- ☐ Below-ground installation on the main line
- ☐ Quiet operation
- ☐ Wide outlet pressure range
- ☐ Easy to maintain
- ☐ Installation below ground reduces risk of damage and vandalism
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

DIMENSIONS AND WEIGHTS	
Face-to-face dimension	735 mm
Weight cartridges only	
Regulator	43 kg
Slamshut	30 kg
Filter	3 kg
Weight "All cartridges c/w body"	
	296 kg

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 620				
Pilot	Setpoint spring			Specific outlet pressure range W_{ds} in bar
	Spring no.	Wire Ø in mm	Colour coding	
RMG 620	2 3 4 5 6	3.6 5.6 6.3 7 ☐ 8/7	blue yellow brown red green	0.02 to 0.2 0.1 to 0.5 0.2 to 1 0.5 to 2 1 to 4

ACCURACY CLASS, LOCK-UP PRESSURE CLASS, CLASS OF LOCK-UP PRESSURE ZONE	
Accuracy Class AC	2.5
Lock-up pressure Class SG	10
Class of lock-up pressure zone SZ	2.5

SSV SETTING RANGE		
Actuator system	Over-pressure setting range W_{do}	Setting range for under-pressure W_{du}
K 4	40 mbar to 500 mbar	5 mbar to 60 mbar
K 5	200 mbar to 1.5 bar	15 mbar to 120 mbar
K 6	600 mbar to 4.5 bar	40 mbar to 300 mbar

Below-ground Compact Module Type “Krysalis”

Max. inlet pressure $p_{u\ max}$ up to 19 bar

Outlet pressure range:

up to 7 bar max.

Flow rate coefficient K_G:

3,000 m^3/(h · bar) (Outlet DN 200)

Variant:

Slam/Active, Monitor Active, Slam/Monitor/Active

Connection:

Flange PN 16 or ANSI Class 150

Pipe sizes:

Inlet: DN 100 and DN 200

Outlet: DN 150 and DN 200

Temperature range: –10 °C to +60 °C

- ☐ RMG’s below-ground compact module Krysalis 19™ has the same components as any standard gas pressure regulator and is suitable for distribution/transmission networks
- ☐ All active parts can be easily replaced
- ☐ Easy to install in urban and rural environments
- ☐ Requires minimum amount of space
- ☐ Above-ground stack takes up all vent and discharge lines
- ☐ Filter chamber is a separate unit so that elements can be easily replaced without removing main regulating unit
- ☐ All components sit in a solid steel body
- ☐ Below-ground installation on the main line
- ☐ Quiet operation
- ☐ Wide outlet pressure range
- ☐ Easy to maintain
- ☐ Installation below ground reduces risk of damage and vandalism
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

DIMENSIONS AND WEIGHTS	
Face-to-face dimension	1050 mm
Weight	315 kg

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Below-ground Compact Module Type "mini Krysalis"

Max. inlet pressure $p_{u\ max}$ up to 19 bar

Outlet pressure range:

up to 7 bar max.

Flow rate coefficient K_G with:

Slam/Active = 2,000 m^3 / (h · bar),

Monitor/Active = 1,600 m^3 / (h · bar),

Slam/Monitor/Active = 1,500 m^3 / (h · bar)

Connection:

Flange PN 16 or ANSI Class 150

Pipe sizes:

Inlet: DN 50, DN 80, DN 100 and DN 150

Outlet: DN 100 and DN 150

Temperature range: –10 °C to +60 °C

- ☐ RMG's below-ground compact module mini Krysalis 19™ has the same components as any standard gas pressure regulator and is suitable for distribution/ transmission networks
- ☐ All active parts can be easily replaced
- ☐ Easy to install in urban and rural environments
- ☐ Requires minimum amount of space
- ☐ Above-ground stack takes up all vent and discharge lines
- ☐ Filter chamber is a separate unit so that elements can be easily replaced without removing main regulating unit
- ☐ All components sit in a solid steel body
- ☐ Below-ground installation on the main line
- ☐ Quiet operation
- ☐ Wide outlet pressure range
- ☐ Easy to maintain
- ☐ Installation below ground reduces risk of damage and vandalism
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

DIMENSIONS AND WEIGHTS	
Face-to-face dimension	600 mm
Weight cartridges only	
Slam/Active	23 kg
Monitor/Active	25 kg
Slam/Monitor/Active	31 kg
Weight	
Slam/Mon/Act c/w body	160 kg

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Below-ground Compact Module

Max. inlet pressure $p_{u\ max}$ up to 4 bar

Outlet pressure range:

10 mbar to 138 mbar

(other ranges on request)

Slam/Active configuration

Flows up to 8800 m3/h (AC2.5 DN 150 x 80 x 150)

Connection:

Flange PN 16 or ANSI Class 150

Pipe sizes:

Inlet:	DN 80, DN 100, DN 150
Outlet:	DN 80, DN 100, DN 150

Size of regulator:

50 and 80 mm

Temperature range: –10 °C to +60 °C

- ☐ RMG's below-ground compact module 280 Vector has the same components as any gas pressure regulator system and is suitable for distribution/gas networks
- ☐ Easy to install in urban and rural environments
- ☐ Above-ground stack takes up all vent and discharge lines
- ☐ All components sit in a solid steel body
- ☐ Wide outlet pressure range
- ☐ Easy to maintain
- ☐ Cartridge design makes it easy to maintain
- ☐ Installation below ground reduces risk of damage and vandalism
- ☐ Gas pressure regulator may be either direct-acting or auxiliary-controlled
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

Optional:

- Safety Shut-off Valve for over-pressure
- Safety Shut-off Valve for over-pressure and under-pressure

All mechanical components of this device are without ignition sources. As such,they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Below-ground Compact Module

- ☐ RMG’s below-ground compact module 680 Vector has the same components as any gas pressure regulator system and is suitable for distribution/gas networks
- ☐ Easy to install in urban and rural environments
- ☐ Above-ground stack takes up all vent and discharge lines
- ☐ All components sit in a solid steel body
- ☐ Designed to deliver high flows even at low inlet pressures with very small differential pressures
- ☐ Installation below ground reduces risk of damage and vandalism
- ☐ Applicable for gases according to DVGW Worksheet G 260 and neutral, non-aggressive gases. Other gases up on enquiry

Max. inlet pressure $p_{u\,max}$ up to 7 bar

Outlet pressure range:

18 mbar to 80 mbar

Variant:

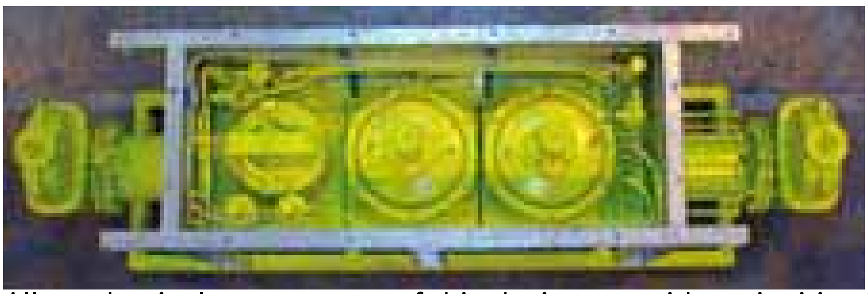
Slam/Active, Monitor Active, Slam/Monitor/Active

Connection:

Flange PN 16

Pipe sizes:

Inlet:	DN 200, DN 250, DN 300
Outlet:	DN 200, DN 250, DN 300
Size of regulator:	150 mm
Temperature range:	–10 °C to +60 °C



All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

Below-ground Module

Below-ground Compact Module

Max. inlet pressure $p_{u\,max}$ up to 16 bar

Outlet pressure range: 20 mbar to 4 bar (RMG 402/620)

SSV setting range W_{do} 50 mbar to 5.2 bar

Connection:

Flange PN 16/Class 150 according to ANSI 16.5

TYPE	Pipe sizes		Flow rate coefficient
	DN inlet	DN outlet	KG
RMG 470-VM-50	50 mm	100 mm	830 $m^3/(h \cdot bar)$
RMG 470-VM-100	150 mm	250 mm	5,300 $m^3/(h \cdot bar)$

Temperature range: –10 °C to +60 °C and –20 °C to +60 °C

- ☐ RMG’s below-ground compact RMG 470 VM “Vector Module” has the same components as any standard gas pressure regulator
- ☐ Very convenient when space is tight (e.g., due to public circulation areas or when architecture rules out structures above ground)
- ☐ Above-ground stack takes up all vent and discharge lines
- ☐ All components sit in a solid steel body
- ☐ Easy to maintain thanks to removable components.
- ☐ Large outlet pressure range
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry

CE registration according to PED

Optional:

- Safety Relief Valves (SRV) RMG 835 or RMG 832

All mechanical components of this device are without ignition sources. As such, they are not subject to ATEX 95 (94/9/EC). All electrical components used with this device fulfil the ATEX requirements.

SPECIFIC OUTLET PRESSURE RANGE WITH PILOT RMG 620			
Pilot	Setpoint spring		Specific outlet pressure range W_{ds} in bar
	Wire Ø in mm	Colour coding	
RMG 620	3.6	blue	0.02 to 0.15
	5.6	yellow	0.1 to 0.5
	6.3	brown	0.2 to 1
	7	red	0.5 to 2
	8	green	1 to 4

ACCURACY CLASS, LOCK-UP PRESSURE CLASS, CLASS OF LOCK-UP PRESSURE ZONE	
Accuracy Class AC	2.5
Lock-up pressure Class SG	10
Class of lock-up pressure zone SZ	2.5

SSV SETTING RANGE			
TYPE	Actuator system	Over-pressure setting range W_{do}	Setting range for under-pressure W_{du}
RMG 470-VM-50	K 1a	50 mbar to 1.5 bar	10 mbar to 120 mbar
	K 2a	400 mbar to 5.2 bar	60 mbar to 400 mbar
RMG 470-VM-100	K 4	40 mbar to 500 mbar	5 mbar to 60 mbar
	K 5	200 mbar to 1.5 bar	15 mbar to 120 mbar
	K 6	600 mbar to 4.5 bar	40 mbar 300 mbar

Meter Design Formula

The design of gas meters is based on the following parameters: min. and max. values for standard flow rate (Q_b), pressure (p) and temperature (T), plus average compressibility (K). These parameters are then used to calculate the limit values for the operating flow rate:

$$Q_{m\,min} = Q_{b\,min} \cdot \frac{p_b \cdot T_{min} \cdot K}{p_{max} \cdot T_b}$$

$$Q_{m\,max} = Q_{b\,max} \cdot \frac{p_b \cdot T_{max} \cdot K}{p_{min} \cdot T_b}$$

where

$Q_{m\,min}$ / $Q_{m\,max}$	Min. / max. flow rate under operating conditions [m^3/h]
$Q_{b\,min}$ / $Q_{b\,max}$	Min. / max. flow rate under standard conditions [m^3/h]
p_{min} / p_{max}	Min. / max. operating pressure [bar]
T_{min} / T_{max}	Min. / max. operating temperature [K]
K	Compressibility [l]
p_b	Standard pressure (1.01325 bar)*
T_b	Standard temperature (273.15 K)*

*) in Germany

Choosing a meter

The limit values so calculated are then used to select a meter with respect to the values stated in the table (see technical data for various types of meters).

The ranges given in the table refer to air at atmospheric pressure.

Other types of gas will usually require different ranges.

In many cases, there will be various meters and sizes that are suitable for a particular range. Bear in mind, however, that smaller sized meters may be more compact and cost-effective but cause higher pressure drops.

Pressure drop

Use the following formula for an approximate calculation of the pressure drop:

$$\Delta p = Z_p \cdot \rho_b \cdot p_m \cdot \frac{Q_m^2}{DN^4}$$

where

Δp	Pressure drop [mbar]
Z_p	Pressure drop coefficient [l]
ρ_b	Standard density [kg/m^3]
p_m	Operating pressure [bar]
Q_m	Operating flow rate [m^3/h]
DN	Pipe size [mm]

Some random values for Z_p:

Turbine gas meter / volumeter	3,000
Vortex meter WBZ 08	2,200
Vortex meter WZ 07	2,000
Sprenkle straightener LP-35 (RMG standard)	1,260
Pipe (1 m long, standard roughness)	80

Values stated are means values across all pipe sizes. For turbine gas meters, for instance, they are between 2,600 (DN 600) and 5,500 (DN 80). When it comes to turbine meters, all brochures contain more precise calculations for each individual pipe size.

Meter Design

Values stated for vortex meters are inclusive of inlet line with tube bundle straighteners. Ultrasonic meters are calculated like tubes.

Influence of gas types

The measuring ranges of a gas meter depend upon the type of gas to be metered. The decisive value is standard density. However, the interdependency varies between different types of meters.

Displacement meters:

No variation for natural gas. For other gases, the min. operating pressure will change:

$$p_{m\,min} = p_b \cdot \frac{\rho_{b,\,air}}{\rho_{b,\,gas}}$$

Turbine gas meter:

The only effect is on the lower flow-rate limit value. $Q_{m\,max}$, on the other hand, stays the same:

$$Q_{m\,min} \approx Q_{min,\,air} \cdot \sqrt{\frac{\rho_{b,\,air}}{p_m \cdot \rho_{b,\,gas}}}$$

Vortex gas meter:

The behaviour of vortex meters depends on standard density (ρ_b) and dynamic viscosity (η):

$$Q_{m\,min} \approx Q_{min,\,air} \cdot \frac{\eta_{gas} \cdot \rho_{b,\,air}}{\eta_{air} \cdot p_m \cdot \rho_{b,\,gas}}$$

Ultrasonic gas meter:

Measuring ranges do not depend on types of gas. However, certain types of gas (e.g., CO_2) may attenuate the ultrasonic impulses to such a degree that proper measuring is no longer possible. Please contact RMG before uses other gases than natural gas or air.

Important parameters:

$\rho_{b,\,air}$	=	$1.293\ kg/m^3$
η_{air}	=	$1.8 \cdot 10^{-5}$ Pa s
$\rho_{b,\,gas}$	≈	$0.84\ kg/m^3$
$\eta_{n,\,gas}$	≈	$1.1 \cdot 10^{-5}$ Pa s

Gas Meter

OVERVIEW

Type	Size (Q_{max} from...to)	Max. measuring range	Max. admissible pressure p_{max} in bar	Pipe sizes DN
Displacement meter RMG 132-A	G 40 to G 160 (60–250 m^3/h)	1 : 160	16	50, 80, 100
Displacement meter DKZ 04	G 40 to G 1000 (65–1,600 m^3/h)	1 : 160	16	50, 80, 100, 150, 200
Turbine gas meter TRZ 03	G 65 to G 16000 (100–25,000 m^3/h)	1 : 50	100	50, 80, 100, 150, 200, 250, 300, 400, 500, 600
Turbine gas meter TRZ 03 L	G 65 to G 10000 (100–16,000 m^3/h)	1 : 50	100	50, 80, 100, 150, 200, 250, 300, 400, 500, 600
Volumeter TRZ 03 K	G 65 to G 16000 (100–25,000 m^3/h)	1 : 16	100	50, 80, 100, 150, 200, 250, 300, 400, 500, 600
Electronic turbine gas meter TERZ 94	G 16 to G 16000 (25–25,000 m^3/h)	1 : 16	100	25, 40, 50, 80, 100, 150, 200, 250, 300, 400, 500, 600
Flow meter WZ 07	G 16 to G 16000 (30–80,000 m^3/h)	1 : 60	100 (300)	25, 40, 50, 80, 100, 150, 200, 250, 300, 400, 500, 600, 750
Vortex gas meter WBZ 08	G 40 to G 25000 (65–40,000 m^3/h)	1 : 50	100 (300)	40, 50, 80, 100, 150, 200, 250, 300, 400, 500, 600
Ultrasonic gas meter USZ 08	G 250 to G 65000 (1,000–110,000 m^3/h)	1 : 120	100 (250)	100, 150, 200, 250, 300, 400, 500, 600, 700, 750, 800, 900, 1000

Device for Custody-transfer Metering

- ☐ Approved for use according to PTB and EEC standards and weights stipulations
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry
- ☐ Mounting position: either horizontal or vertical, both flow directions
- ☐ Large measuring range
- ☐ Suitable for discontinuous measuring conditions
- ☐ No pipe inlet and outlet lines necessary
- ☐ Design according to DIN EN 12480
- ☐ Meter optionally with incorporated LF and/or HF impulse generator
- ☐ Pressure and temperature sensors in meter-body inlets and outlets
- ☐ May be integrated with electronic compact flow correctors

DIN / DVGW-certified – PTB-approved

Max. admissible pressure PS = 16 bar

Max. admissible pressure p_{max} up to 16 bar

Meter sizes G 40 to G 160

(from Q_{max} 65 m^3/h to Q_{max} 250 m^3/h)

Measuring range max. 1 : 160

Body material Al

Connection:

-DIN flange PN 16 and Flange according to ANSI 150 in DN 50, DN 80, DN 100

Gas Meter

SIZES AND TECHNICAL PARAMETERS				
Meter sizes	**Pipe sizes** DN	**Overall length** (flange to flange) in mm	**Max. admissible pressure** p_{max} in bar	**Max. volumetric flow rate** Q_{max} in m^3/h
G 40	50	171	16	65
G 65	50	171	16	100
G 100	80	171	16	160
G 100	80	241*	16	160
G 160	80	241	16	250
G 160	100	241	16	250
G 160	100	300*	16	250

*) Lengenthing with intermediate rings

Device for Custody-transfer Metering

- Approved for use according to PTB and EEC standards and weights stipulations
- Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry
- Mounting position: either horizontal or vertical (optionally for both flow directions)
- No straight pipe inlet and outlet lines necessary
- May be integrated with electronic flow correctors
- Meter with incorporated LF impulse generator
  Mechanical drive shaft (optional)
- Suitable for discontinuous measuring conditions
- Resistant against high temperatures according to EN 12480

Max. admissible pressure PS = 16 bar

Max. admissible pressure p_{max} up to 16 bar

Meter size G 40 to G 1000

(larger sizes on enquiry)

(from Q_{max} 65 m³/h to Q_{max} 1600 m³/h)

Measuring range max. 1:160

Connect using DIN flanges PN 10 and PN 16 in DN 50, DN 80, DN 100, DN 150, DN 200

Device for Custody-transfer Metering

- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry
- ☐ Special design for aggressive gases is available
- ☐ Integrating flow meter with a special counter indicating flowing gas volumes at prevailing pressure and temperature (m^3 at measurement conditions)
- ☐ High measuring accuracy
- ☐ Gas may flow horizontally or vertically
- ☐ Optionally with mechanical drive shaft
- ☐ **TRZ 03E** without mechanical counter – with electronic connection for computers

DIN / DVGW-certified – PTB-approved

Max. admissible pressure PS = 100 bar

Max. admissible pressure p_{max} up to 100 bar

Meter sizes G 65 to G 16000

(from Q_{max} 100 m^3/h to Q_{max} 25,000 m^3/h)

Measuring range max. 1 : 50

Connection:

- DIN flange PN 10, PN 16, PN 25, PN 40, PN 100 and
- Flanges according to ANSI 150, ANSI 300, ANSI 600

in DN 50, DN 80, DN 100, DN 150, DN 200, DN 250, DN 300, DN 400, DN 500, DN 600

SIZES AND TECHNICAL PARAMETERS				
Meter sizes	Pipe sizes DN	Face-to-face dimension (flange to flange) in mm	Max. admissible pressure p_{max} in bar	Max. volumetric flow rate Q_{max} in m^3/h
G 65	50	150	100	100
G 100	80	240	100	160
G 160	80	240	100	250
	100	300		
G 250	80	240	100	400
	100	300		
G 400	100	300	100	650
	150	450		
G 650	150	450	100	1,000
G 1000	150	450	100	1,600
	200	600		
G 1600	200	600	100	2,500
	250	750		
G 2500	250	750	100	4,000
	300	900		
G 4000	300	900	100	6,500
	400	1,200		
G 6500	400	1,200	100	10,000
	500	1,500		
G 10000	500	1,500	100	16,000
	600	1,800		
G 16000	600	1,800	100	25,000

Device for Custody-transfer Metering

- ☐ For measurements subject to national standards & weights legislation
- ☐ With electronic counter (powered by batteries lasting at least 6 years)
- ☐ Measurements carried out using two Wiegand sensors
- ☐ Digital counter readings can be called up via Modbus
- ☐ Explosion protection: II 2 G EEx ib II C T4
- ☐ LF and HF impulse generator in counter head
- ☐ Flow indicator
- ☐ Power output (external power unit required)
- ☐ Design for aggressive media is available (biogas etc.)

DIN / DVGW-certified – PTB-approved

Max. admissible pressure PS = 100 bar
Max. admissible pressure p_{max} up to 100 bar
Meter sizes G 100 to G 16000
(from Q_{max} 160 m^3/h to Q_{max} 25,000 m^3/h)
Measuring range max. 1 : 50

Connection:
- DIN flange PN 10, PN 16, PN 25, PN 40, PN 100 and
- Flanges according to ANSI 150, ANSI 300, ANSI 600

in DN 80, DN 100, DN 150,
DN 200, DN 250, DN 300, DN 400,
DN 500, DN 600

Sizes and technical parameters as for TRZ 03 and TRZ 03L (on enquiry)

Device for Custody-transfer Metering

- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry
- ☐ Tested according to TRG13/OIML
- ☐ Integrating flow meter with a special counter indicating flowing gas volumes at prevailing pressure and temperature (m^3 at measurement conditions)
- ☐ High measuring accuracy
- ☐ Gas may flow horizontally or vertically
- ☐ No additional inlet lines required (even in case of significant turbulences)
- ☐ Special design for aggressive gases is available
- ☐ Optionally with mechanical drive shaft

DIN / DVGW-certified – PTB-approved

Max. admissible pressure PS = 100 bar
Max. admissible pressure p_{max} up to 100 bar
Meter sizes G 65 to G 10000
(from Q_{max} 100 m^3/h to Q_{max} 16,000 m^3/h)
Measuring range max. 1 : 50

Connection:

- DIN flange PN 10, PN 16, PN 25, PN 40, PN 100 and
- Flanges according to ANSI 150, ANSI 300, ANSI 600

in DN 50, DN 80, DN 100, DN 150, DN 200, DN 250, DN 300, DN 400, DN 500, DN 600

SIZES AND TECHNICAL PARAMETERS

Meter sizes	Pipe sizes DN	Face-to-face dimension (flange to flange) in mm	Max. admissible pressure p_{max} in bar	Max. volumetric flow rate Q_{max} in m^3/h
G 65	50	150	100	100
G 100	80	240	100	160
G 160	80	240	100	250
	100	300		
G 250	100	300	100	400
G 400	150	450	100	650
G 650	150	450	100	1,000
G 1000	200	600	100	1,600
	250	750		
G 1600	250	750	100	2,500
G 2500	300	900	100	4,000
G 4000	400	1,200	100	6,500
G 6500	500	1,500	100	10,000
G 10000	600	1,800	100	16,000

Device for Secundary Metering

- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry
- ☐ Integrating flow meter with a special counter indicating flowing gas volumes at prevailing pressure and temperature (m^3 at measurement conditions)
- ☐ High measuring accuracy
- ☐ Gas may flow horizontally or vertically
- ☐ Optionally with mechanical drive shaft
- ☐ Special design for aggressive gases is available

Tested according to DIN-DVGW

Max. admissible pressure PS = 100 bar

Max. admissible pressure p_{max} up to 100 bar

Meter sizes

from Q_{max} 100 m^3/h to Q_{max} 25,000 m^3/h

Measuring range max. 1 : 16

Connection:

- DIN flange PN 10, PN 16, PN 25, PN 40, PN 100 and
- Flanges according to ANSI 150, ANSI 300, ANSI 600

in DN 50, DN 80, DN 100, DN 150,
DN 200, DN 250, DN 300, DN 400,
DN 500, DN 600

or single-flange design for DN 50 to DN 250

SIZES AND TECHNICAL PARAMETERS				
Pipe sizes DN	Face-to-face dimension in mm	Max. admissible pressure p_{max} in bar	Min. volumetric flow rate Q_{min} in m^3/h	Max. volumetric flow rate Q_{max} in m^3/h
50	150 (80**)	100	6	100
80	120	100	13	160
			16	250
			25	400
100	150	100	25	400
			40	650
150	175	100	40	650
			65	1,000
			100	1,600
200	200	100	100	1,600
			160	2,500
250	300 (250**)	100	160	2,500
			250	4,000
300	300 (450*)	100	250	4,000
			400	6,500
400	600	100	400	6,500
			650	10,000
500	750	100	650	10,000
			1,000	16,000
600	900	100	1,000	16,000
			1,600	25,000

*) For high pressure stages
**) Face-to-face dimension for single-flange designs

Device for Secundary Metering

- Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry
- With electronic counter (powered by batteries lasting at least 6 years)
- High measuring accuracy
- Flow indicator
- Low-torque measuring system
- Special design for aggressive gases is available
- LF and HF impulse generator in counter head
- Resettable totalizer
- Electronic suppression of over-travel is possible
- Power output (external power unit required)
- Explosion protection: II 2 G EEx ib [ia] II C T4/T3
- Gas may flow horizontally or vertically
- 2-channel-measurements with pulse comparison (optional)

Connection:

– Standard
Flange bore up to PN 100 and ANSI 600 in DN 50 to DN 600

– Optional
Sandwich design DN 50 to DN 250
Sandwich design with threaded connection DN 25 and DN 40

Tested according to DIN-DVGW

Max. admissible pressure PS = 100 bar
Max. admissible pressure p_{max} up to 100 bar
Meter sizes
from Q_{max} 25 m^3/h to Q_{max} 25,000 m^3/h

SIZES AND TECHNICAL PARAMETERS								
Pipe sizes DN	Sandwich design		Flange housing		Flange housing		Min. volumetric flow rate	Max. volumetric flow rate
	Face-to-face dimension in mm	p_{max} in bar	Face-to-face dimension in mm	p_{max} in bar	Face-to-face dimension in mm	p_{max} in bar	Q_{min} in m^3/h	Q_{max} in m^3/h
25	185*	16*	–	–	–	–	2.5	25
40	140*	16*	–	–	–	–	6	70
50	80	25	150	50	80**	100	6	100
80	120	25	120	40	120**	100	13	250
							25	400
100	150	25	150	40	150**	100	25	400
							40	650
150	175	25	175	40	175**	100	40	650
							100	1,600
200	200	25	200	40	200**	100	100	1,600
							160	2,500
250	250	25	300	25	250**	100	160	2,500
							250	4,000
300			300	25	450	100	250	4,000
							400	6,500
400			600	25	600	100	400	6,500
							650	10,000
500			750	25	750	100	650	10,000
							1,000	16,000
600			900	25	900	100	1,000	16,000
							1,600	25,000

*) Connection with external thread

**) Single-flange design

ENCO Totalizer Index

- For capturing and digitally transmitting original turbine meter readings
- Totalizer can be digitally adjusted
- Custody-transfer transmission of meter readings in accordance with the data protocol as per DSfG-AK “Primary devices with a digital interface”
- Alarm output

ENCO-F

- To be mounted on meter head “F”
- Retrofittable
- Sensors in the meter head are used to obtain the meter readings
- Flow indicator
- Peak flow indication

ENCO-M

- For installation with mechanical drive shaft according to EN 12261
- Direction of mechanical drive shaft can be programmed
- Suitable for third-party products

PTB-approved

Device for Secundary Metering

- ☐ Suitable for nearly any gaseous media, used in gas/process/chemical engineering
- ☐ Vortex meter with complete outlet measuring pipe
- ☐ Large measuring range
- ☐ Meter factor does not depend upon medium
- ☐ Good long-term stability
- ☐ Double sensor can be replaced via fitting unit
- ☐ Accessory devices may be connected as described for WBZ

Tested according to DIN-DVGW

Max. admissible pressure PS = 100 bar
Max. admissible pressure p_{max} up to 100 bar
Meter sizes
from Q_{max} 30 m^3/h to Q_{max} 80,000 m^3/h
Measuring range max. 1 : 60

Connection:
– DIN flange PN 40, PN 100 and
– Flange according to ANSI 300, ANSI 600
in DN 25, DN 40, DN 50, DN 80, DN 100, DN 150, DN 200, DN 250, DN 300, DN 400, DN 500, DN 600, DN 750

SIZES AND TECHNICAL PARAMETERS				
Pipe sizes DN	Face-to-face dimension* in mm	Max. operating pressure p_{max} in bar	Min. volumetric flow rate Q_{min} in m^3/h	Max. volumetric flow rate Q_{max} in m^3/h
25	350	100	1.5	30
40	560	100	2	100
50	700	100	4	200
80	1,120	100	10	600
100	1,400	100	15	1,200
150	2,100	100	30	2,500
200	2,000	100	80	5,000
250	2,500	100	130	8,000
300	3,000	100	200	12,000
400	4,000	100	320	18,000
500	4,000	100	500	30,000
600	4,000	100	800	50,000
750	4,000	100	1,500	80,000

*) Completely with inlet measuring pipe

Device for Custody-transfer Metering

- ☐ Suitable for nearly any gaseous media, used in gas/process/chemical engineering
- ☐ Vortex meter for measuring gas volumes to be used in association with accessory devices for correcting volumes for pressure and temperature or together with a densitometer for determining the mass flow
- ☐ Large measuring range
- ☐ High measuring accuracy
- ☐ High operational safety, full overload capability, insensitive against shocks
- ☐ Mounting position as required
- ☐ Maintenance possible during normal operation
- ☐ Double signalling to serve accessory devices (e.g., devices receiving and treating pulses, electric and electro-mechanical totalizers, and flow computers)

DIN / DVGW-certified – PTB-approved

Max. admissible pressure p_{max} up to 100 bar (300 bar)

Meter sizes G 40 to G 25000

(from Q_{max} 65 m^3/h to Q_{max} 40,000 m^3/h)

Measuring range max. 1 : 50

Connections:

- DIN flanges PN 40, PN 100, PN 160, PN 250 and
- Flange according to ANSI 300, ANSI 600

in DN 40, DN 50, DN 80, DN 100, DN 150, DN 200, DN 250, DN 300, DN 400, DN 500, DN 600

SIZES AND TECHNICAL PARAMETERS*				
Meter sizes	Pipe sizes DN	Face-to-face dimension** in mm	Max. operating pressure p_{max} in bar	Max. volumetric flow rate Q_{max} in m^3/h
G 40	40	120	100	65
G 65	40	120	100	100
G 65	50	150	100	100
G 100	50	150	100	160
G 160	80	240	100	250
G 250				400
G 400	100	300	100	650
G 650				1,000
G 1000	150	450	100	1,600
G 1600				2,500
G 1600	200	600	100	2,500
G 2500				4,000
G 2500	250	750	100	4,000
G 4000				6,500
G 4000	300	900	100	6,500
G 6500				10,000
G 6500	400	1,200	100	10,000
G 10000				16,000
G 10000	500	1,500	100	16,000
G 16000				25,000
G 16000	600	1,800	100	25,000
G 25000				40,000

*) This table contains standard sizes. Special sizes upon enquiry.
**) Measuring lines that are subject to national standards & weights legislation must have inlet and outlet pipes. Complete length of measuring line: 28 x pipe size

Device for Custody-transfer Metering

- ☐ Suitable starting with absolute pressure p_n = 1 bar
- ☐ High stability against turbulences thanks to 6 measuring paths in 3 levels
- ☐ Tested according to TR G13/OIML
- ☐ Air calibration with high pressure test according to TR G7
- ☐ High flow rates (up to 40 m/s) – that means smaller pipe sizes may be used
- ☐ Exchange of sensors without recalibration
- ☐ High measuring accuracy
- ☐ Robust, dirt-repellent titanium sensors
- ☐ Easy operation using control computer with corrector function from flow computer Series ERZ 2000
- ☐ Design with dedicated meter and impulse outputs
- ☐ Diagnostic PC software RMGView

DIN/DVGW-certified – PTB/MID-approved

Max. admissible pressure PS = 100 bar (optionally 250 bar)
Max. admissible pressure p_{max} up to 100 bar (optionally 250 bar)

Meter sizes G 650 to G 25000
(from Q_{max} 1,000 m^3/h to Q_{max} 40,000 m^3/h)
Measuring range max. 1 : 50 to 1 : 125

Connection:
- DIN flanges PN 10/PN 16, PN 100 and
- Flanges according to ANSI 150, ANSI 300, ANSI 600
  (optionally ANSI 900, ANSI 1500)

in DN 100, DN 150, DN 200, DN 250, DN 300, DN 400, DN 500, DN 600, (optionally DN 750, DN 800, DN 900, DN 1000)

SIZES AND TECHNICAL PARAMETERS*				
Pipe sizes DN	Face-to-face dimension** in mm	Min. volumetric flow rate Q_{min} in m^3/h	Max. volumetric flow rate Q_{max} in m^3/h	Meter sizes G
100 (4")	300	13	1,000	250/400/650
150 (6")	450	20	2,500	650/1000/1600
200 (8")	600	40	4,000	1000/1600/2500
250 (10")	750	65	6,500	1600/2500/4000
300 (12")	900	80	10,000	2500/4000/6500
400 (16")	1,200	130	16,000	4000/6500/10000
500 (20")	1,500	200	25,000	6500/10000/16000
600 (24")	1,800	320	40,000	10000/16000/25000
700 (28")	1,900	400	55,000	10000/16000/25000
750 (30")	2,000	500	60,000	10000/16000/25000
800 (32")	2,000	600	70,000	16000/25000/40000
900 (26")	2,400	750	90,000	16000/25000/40000
1,000 (40")	2,800	900	110,000	25000/40000/65000

*) This table contains standard sizes. Special sizes upon enquiry
**) Measuring lines that are subject to national standards & weights legislation must have a straight inlet pipe 10 x DN length or 5 x DN length with a Sprenkle straightener and an outlet pipe 3 x DN length.

Sensors for Measuring Gas Temperature in the Line

- ☐ Optionally with protective sheath
- ☐ Explosion protection

Power connection
PT 100 DIN-4 wire connection
Ex-d connection head

Explosion protection according to
II 2 G EEx d II C T 6

Screw connection
G ¾"

Installation depth
160 (250) mm

Sensor with Transducer for Measuring Absolute Pressure

☐ Measuring range may be freely selected
☐ Explosion protection

– **Measuring Transducer 3051 CA**

Measuring range

0 – 250 bar (adjustable)

– **Measuring Transducer 2088 A**

Measuring range

0 – 50 bar

Power connection

2-wire metering system 4–20 mA or HART – aux. energy from transmitter supply unit or volume corrector

Explosion protection

Pressure-resistant enclosure according to EN

Temperature equalisation

–20 °C to +60 °C (standard)

Basics

Natural gas is usually invoiced on the basis of energy sold as calculated using the calorific value $H_{s,b}$. For industrial gases, it is usually the standard volume V_b. The gas meters measure the volume of the gas at the temperature and pressure currently prevailing inside the pipe (operating volume). For invoicing, the operating volume (compressed at p and T) must then be converted to normal conditions (p_b and T_b). Furthermore, the difference between real and ideal gas must be taken into consideration. This is done using the state-variables factor Z. "Normal conditions" are identified by law defining a standard pressure (p_b) and standard temperature (T_b). The following apply in Germany:
$T_b = 0$ °C and p_b=1.01325 bar.

Volume correction based on gas state variables

Flow correction is carried out using the so-called equation of state for ideal gases:

$p \cdot V = n \cdot R \cdot T$

p Pressure
V Volume
T Temperature
n Amount of substance
R Universal gas constant

"Ideal gas" is a theoretical model assuming that the gas atoms do not interact. In reality, of course, they do. Their interdependency is, in fact, rather complex. The correction between ideal gas and reality is effected using the real gas factor Z:

$p \cdot V = n \cdot R \cdot T \cdot Z$

This leads us to the following formula for the conversion of the standard volume:

$$V_b = V_m \cdot \frac{p_m \cdot T_b}{p_b \cdot T_m} \cdot \frac{1}{K}$$

V_b standard volume,
V_m operating volume

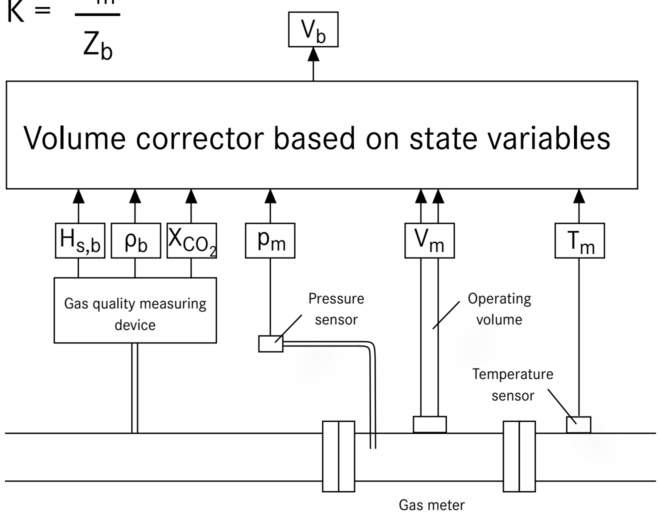
p_m operating pressure,
p_b standard pressure

T_m operating temperature,
T_b standard temperature

K compressibility index

The compressibility index K is the ratio of the two real gas factors at operating condition and standard condition (for ideal gas: K = 1):

$$K = \frac{Z_m}{Z_b}$$



While pressure and temperature are not too complicated to measure, the compressibility index (depending on pressure, temperature and gas composition) has to be calculated based on a rather complicated procedure. Available methods:

GERG 88S

Input parameters required for unaltered natural gases: calorific value, standard density, CO_2 content.

AGA-NX-19

Input parameters required for unaltered natural gases: density ratio*, CO_2 content, nitrogen content.

AGA 8

Input parameters required for unaltered and altered natural gases: content of components in mol%.

Beattie-Bridgeman

For industrial gases (pure gases or air).

For measuring natural gases, German standards & weights legislation accepts two procedures called GERG 88S and AGA 8.

Volume correction based on pressure

This procedure provides an alternative for calculating standard volumes.

The mass M of the gas volume to be measured is independent of the state of the gas. Therefore, the following applies:

$$M = V_m \cdot \rho_m = V_b \cdot \rho_b$$

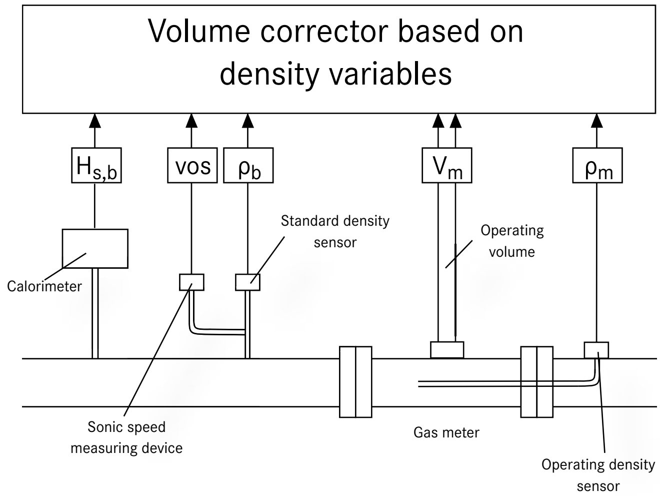
V_m operating volume	V_b standard volume
ρ_m operating density	ρ_b standard density

The corresponding formula is as follows:

$$V_b = V_m \cdot \frac{\rho_m}{\rho_b}$$

Operating density sensors based on the principle of the vibrating fork have a systematic measuring error that depends on the composition of the gas. For correcting this error, the speed of sound must be measured as well.

* Density ratio = standard density / standard density of air



Calculating energy

The energy content E of a gas can be determined using the standard volume V_b and calorific value $H_{s,b}$ and calculating as follows:

$$E = V_b \cdot H_{s,b}$$

The calorific value can be calculated according to ISO 6976 even if only the percentages of the components are available.

For Determining Calorific Value and Standard Density without Burning Samples

- ☐ For determining superior and inferior calorific value, standard density, Wobbe index and CO_2 concentration without burning samples
- ☐ For determining energy content thanks to integrated corrector function (optional)
- ☐ Not influenced by ambient air
- ☐ Accuracy better than ± 0.5%
- ☐ Suitable for natural, non-aggressive and manufactured gases; nitrogen, carbon dioxide and propane; and other gases upon enquiry
- ☐ Works without carrier or aux. gases
- ☐ Measures calorific values of altered natural gases up to 20% added air
- ☐ Determines the methane index (optional)
- ☐ Mobile version available

PTB-approved

Operating pressure

p_{min} 0.5 bar, p_{max} 3.0 bar

Actuating delay

< 60 s

Measuring gas consumption

15 l/h

Electrical connections:

- Supply voltage 230 VAC, 24 VDC
- Output signals 0/4–20 mA
- DSfG interface according to DVGW G 485

Gas Chromatograph for Analysis of 11 Different Components

- ☐ Can analyse 11 different components and calculate calorific values, standard density, Wobbe index and density ratios of natural gases
- ☐ Calculating calorific values according to ISO 6976 or GPA
- ☐ Automatic recalibration
- ☐ Long life expectancy thanks to low column temperature
- ☐ Low investment costs
- ☐ Low maintenance

PTB-certification pending

Components:

Nitrogen
Methane
Carbon dioxide
Ethane
Propane
i-Butane
n-Butane
Neopentane
i-Pentane
n-Pentane
C6+

Time of analysis
< 5 min.

Carrier gas
Helium

Inlet pressure

Carrier gas	4-5 bar
Measuring gas	0.5-5 bar

Analyser ERZ 2000 GC
19" plug-in 3 HE (48 TE)

Output signal
- Serial ports
- DSfG interface according to DVGW G 485
- Analogue signals
- Service interface

Gas Chromatograph for Analysis of 11 Different Components

- ☐ Can analyse 11 different components and calculate calorific values, standard density, Wobbe index and density ratios of natural gases on the basis of standards & weights legislation
- ☐ The analyser system consists of the following components:
  - CP 4002 Readings Recorder
  - GC 2000 Analyser
- ☐ Calculates calorific values according to ISO 6976
- ☐ Automatic recalibration
- ☐ Suitable for pre-treated bio-gas
- ☐ Compact version available
- ☐ Multiple-flow version for up to four different gas flows
- ☐ Determines the methane index (optional)

PTB-approved

(including oxygen measurement)

Components:

Nitrogen
Methane
Carbon dioxide
Ethane
Propane
i-Butane
n-Butane
Neopentane
i-Pentane
n-Pentane
C6+
Oxygen (option, with additional sensor)

Time of analysis
$<$ 180 secs.

Carrier gas
Helium

Inlet pressures
Carrier gas 5.5 bar
Measuring gas 1.5 bar

Analyser GC 2000
19" plug-in 3 HE (48 TE)
(based on ERZ 2000 flow computer)

Output signal
– Serial ports
– DSfG interface according to DVGW G 485
– Analogue signals
– Service interface

Micro-computer for Flow Correction based on Pressure and Temperature

- EC 24 State-variables Flow Computer with measured values for pressure and temperature
- Calculates compressibility according to GERG 88
- Suitable for explosion protection Zone 1
- Data readout and parameterating program

PTB-approved

Max. operating pressure p_{max} up to

70 bar (suitable for rooms according to G 490)

Input signals (volume impulses):

- LF: Reed contact with f_{max} = 2 Hz
- HF: Wiegand sensor with f_{max} = 400 Hz (for installation directly on electronic meters)

Readings recorder:

- Pressure sensor built into body
- Temperature sensor: PT 1000

Output signals

- 2 impulse outputs (LF and HF)
- Alarm
- Analogue output 0/4 – 20 mA (only with external voltage supply)

Interface

- RS 485 (Modbus protocol)

Supply voltage

- 24 VDC or standard lithium batteries

Ambient temperature:

- –20 °C to +60 °C

- For calculating standard volumes according to GERG 88S, AGA-NX-19 or AGA 8 Gross 1
- Types suitable for explosion protection Zones 1 + 2
- May be installed on TRZ or DKZ
- Gas rates function
- Data logger according to standards & weights law
- Optional internal modem or external communication module
- Comfortable user software for on-the-spot or control room operation

MID-approved

Body:

Cast aluminium, protection Class IP 65

Types available both for use in rooms according to G 490 (explosion protection Zone II) and rooms according to G 491 (Zone I)

Max. admissible pressure p_{max} up to 40 bar

Interfaces:

- Optical interface for infrared read-heads
- RS 232/422/485 interface
- Ethernet or USB (instead of modem)

Protocols:

- Modbus ASCII/RTU
- DSfG-B

Micro-computer for Optional Flow Correction

- ☐ PC-based computer
- ☐ Parameters are freely programmable and remote parameterisable
- ☐ Easy to operate using Internet browsers
- ☐ DSfG control point function
- ☐ Optional plug-in Ex-i card for pressure, temperature and volume inputs
- ☐ Gas rates function
- ☐ Correction of meter's performance curve (also using Reynold's index)
- ☐ Parameters, constants, limit values freely programmable
- ☐ Freezing measuring and calculation values
- ☐ Calibration "on the fly"
- ☐ Plug-in modules, 19" plug-in

- ☐ Available as:
  - **Flow corrector based on state variables**
    ERZ 2004
  - **Flow corrector based on density variables**
    ERZ 2002
  - **Flow corrector based on calorific value**
    ERZ 2102, ERZ 2104
  - **Differential pressure calculator**
    ERZ 2112, ERZ 2114
- ☐ Parallel calculation of compressibility according to all established methods, (e.g., GERG 88 S, AGA 8, AGA NX 19 or Beattie-Bridgeman)
- ☐ When carrying out corrections using density and standard density, the speed of sound effect is measured and calculated

PTB-approved

Connections

- ☐ 2-channel volume input
- ☐ Digital and analogue inputs
- ☐ Impulse and analogue outputs
- ☐ DSfG interface according to DVGW G 485
- ☐ Modbus interface (ASCII/RTU/TCP)
- ☐ Ethernet TCP/IP network interface

Display

- ☐ Electronic totalizers

Supply voltage

- ☐ 230/110 VAC, 24 VDC

Ambient temperature

- ☐ –20 °C to +55 °C

Rack/Cabinet

Rack

- ☐ Takes up flow computers, supply modules, ex-protection isolating amplifiers, Euro-boards, etc.
- ☐ 19" plug-in rack
- ☐ Basic design according to DIN 41494
- ☐ Wiring testet and ready for connection
- ☐ Planning, execution, manufacturer's inspection
- ☐ Products come with detailed documentation
- ☐ Includes power pack (24 VDC or 230 VAC) and fuse card
- ☐ Connects via plug-in connectors on the backside

Cabinet

Takes up plug-in racks and other Euro rack 19" plug-ins. Version as a wall element with swivel module and glass door.

Equipment Cabinet

- ☐ Takes up plug-in racks and other Euro rack 19" plug-ins
- ☐ With swivel module and front glass door
- ☐ Customised planning and execution
- ☐ Wiring and tests
- ☐ Complete planning – detailed documentation is part of supply
- ☐ Customers' representatives welcome during manufacturer's inspections
- ☐ Optionally with backup power

Installation of Stations in Buildings with USZ08 Ultrasonic Gas Meter (Measuring Line)

Installation of Stations in Buildings with PGC 9000 VC Process Gas Chromatograph

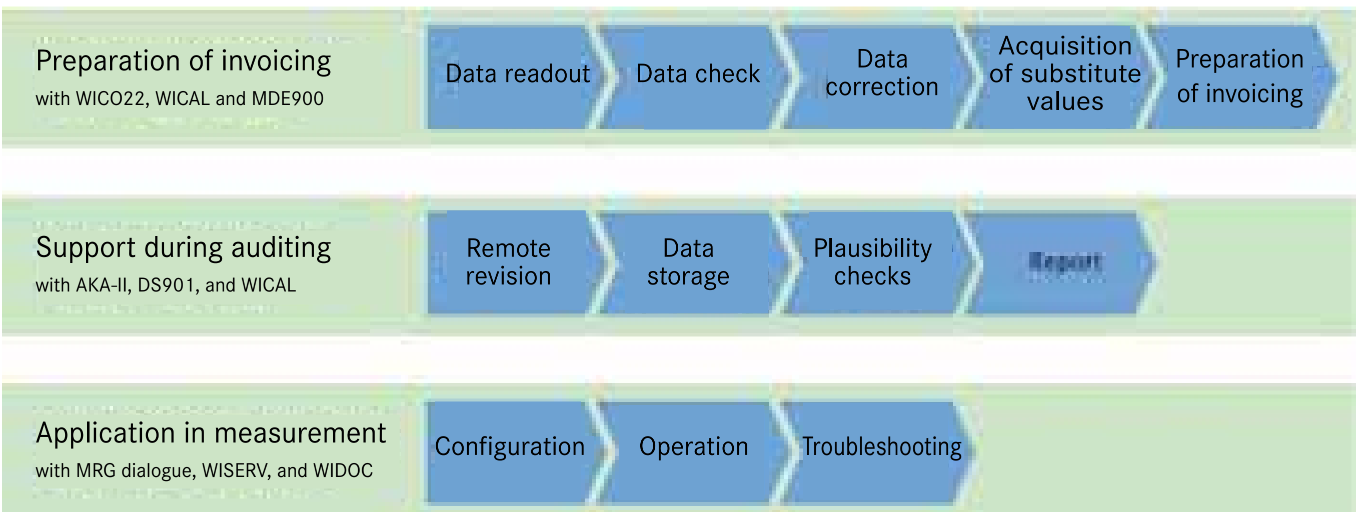
Software Solution for Data Communication and Energy Data Management

The deregulation of energy markets is a challenge for supply companies, carriers and operators. Larger and larger amounts of data need to be handled in less and less time.

With the RMG software portfolio, we offer modern, well-engineered and proven solutions for the acquisition, analysis and distribution of energy measuring data. These solution help in handling data from data loggers, flow correctors and DSfG-compatible measuring devices (i.e., meters, process gas chromatographs, and correlative gas quality measuring devices). The RMG software portfolio comprises:

- ☐ Data remote readout using WICO22
- ☐ Mobile data collection using MDE900
- ☐ Acquisition of measuring data as a service business – using INETDATA
- ☐ Energy data analysis using WICAL
- ☐ Presentation of energy data on the web portal
- ☐ Remote auditing using AKA-II
- ☐ PGC data storage using DS901
- ☐ DSfG configuration using WISERV
- ☐ DSfG documentation using WIDOC

Tasks and targets comprise: invoicing based on actual consumption, support during technical auditing, metrological applications for the supervision of operations and troubleshooting, etc.



Data Remote Read-out using WICO22

The RMG WICO22 Data Remote Read-out Centre can be used to transfer measured data to a central PC for storage. It is designed to retrieve data from data loggers, volume correctors and DSfG-compatible measuring devices.

The software supports a great variety of device drivers. Retrieved energy data is easily and quickly accessible and available for further treatment.

WICO22 is modular and expandable in order to cover any and all fields of application in industry and energy.

Features:

- ☐ Time-controlled and manual remote read-out of gas/electricity/water measurements
- ☐ Multiple possibilities to analyse energy data
- ☐ Easy export of data to invoice/spreadsheet/word processor software (may be automated)
- ☐ Read-out of DSfG devices made by any manufacturer
- ☐ Read-out data of measuring data loggers and flow correctors using proprietary communication interfaces made by RMG and other manufacturers (e.g., Tritschler, Elster etc.)
- ☐ Receipt function to receive messages from stations
- ☐ Visualisation of called-up data
- ☐ Display of current values; remote parameterisation of stations
- ☐ Paradox data base system incorporated
- ☐ Available as a standalone solution or client/server system
- ☐ Optional phone and update support

Mobile Data Collection using MDE900

The MDE900 Mobile Data Acquisition System can be used to read out local data loggers and flow correctors on the spot. Users can read out meter readings, station conditions and filed data manually and/or transfer it to a PDA using a Bluetooth or infrared link. That way, data may be read out and transferred even if remote treatment is out of order or does not exist.

Features:
- ☐ Read-out and transfer procedures and routes may be defined at a central point
- ☐ Read-out intervals may be timed automatically and/or manually
- ☐ Data may be read using Bluetooth or infrared adapters, or manually
- ☐ Store data on PDAs
- ☐ Data may also be transferred to a central data base of the WICO22 system
- ☐ Plausibility checks
- ☐ Display device information
- ☐ Automatic time synchronisation
- ☐ Devices may be RMG or third-party brands

Professional Acquisition of Measuring Data using INETDATA

INETDATA is RMG's service offering for the regular acquisition of measuring data, based on sophisticated technology and market-leading know-how:

- ☐Service consists of cyclical read-out and provision of invoicing and/or process data
- ☐Transfer data from a remote sub-station to a central control system using IEC870-5-104 or Filetransfer
- ☐Cycles may be as short as 1 minute
- ☐Provision of all necessary measuring and communication technology
- ☐Optional provision of data on the web portal
- ☐Optional installation and first start-up of measuring devices
- ☐Data filing

Data retrieval by the latest-generation of WICO software. Read-outs may be defined separately for individual stations:

- ☐Beginning and end date of read-out intervals
- ☐Defined read-out times and cycles
- ☐Data contents to be read-out and/or transferred (e.g., counted measure and measured value, counter readings, events, etc.)
- ☐Data formats (e.g., freely-configurable ASCII format, XML, GAS-X, GAMESS, etc.)
- ☐Technology of data transfer with related information (e.g., e-mail, FTP)

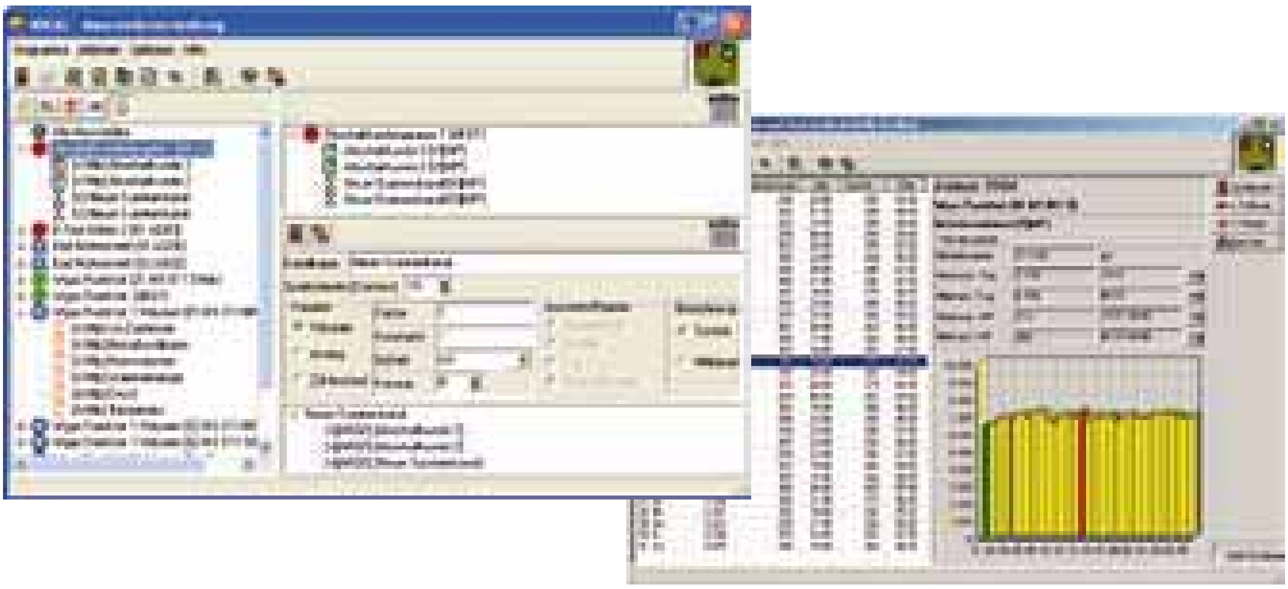
Energy Data Analysis using WICAL

The WICAL Analysis Program can treat, evaluate and analyse energy data from any source. That way, it is easy to use flow, energy, state and quality data even for complex calculations, checks and visualisations.

Results may be summed up in reports or visualised as tables and diagrams. For more possibilities and opportunities, there are interfaces to databases and Microsoft Excel®.

Features:

- ☐ Evaluation of energy data from measuring data loggers, flow correctors and DSfG devices supplied by RMG or third-parties
- ☐ Supports everything from simple to complex calculations, checks and visualisations of volume/energy/state/quality data as well as sonic speed (for ultrasonic meters)
- ☐ Visualisation of results in the form of tables and diagrams
- ☐ Line plots to present hourly and daily values
- ☐ Freely-definable reports to sum up results
- ☐ User-friendly design and layout of reports
- ☐ Daily/monthly/yearly reports and comparisons
- ☐ Any number of different reports
- ☐ Interfaces for databases, spreadsheet applications, word processors, etc.
- ☐ ASCII export interface for hourly/daily/monthly values
- ☐ Entry of correction values based on hours and areas
- ☐ Entry of correction factors
- ☐ Manual entry of measuring points

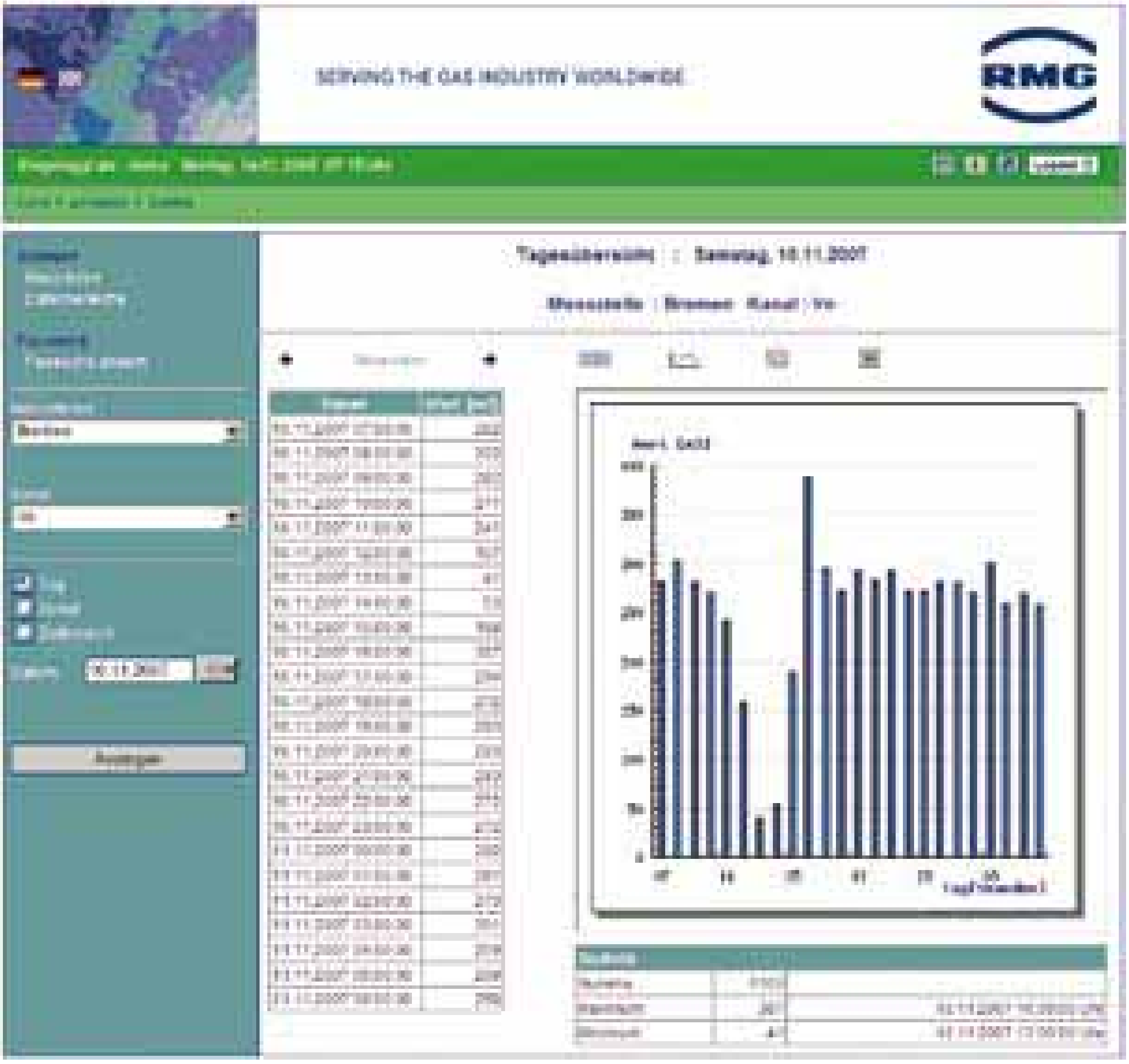


Presentation of Energy Data on the Web Portal

The web portal displays consumption data in the form of tables and diagrams. Portal users, however, see only the data they have access rights to view. The number of clients and users is unlimited.

Features:

- ☐ Visualisation of consumption data in the form of tables and diagrams
- ☐ Intuitive user guidance
- ☐ Data can be exported to MS Excel and PDF
- ☐ Easy, centralised administration of user and client accounts
- ☐ HTML-based web portal can be accessed by clients
- ☐ Compatible with Internet browsers, irrespective of operating system
- ☐ May be operated on customer's server or at RMG's IT centre

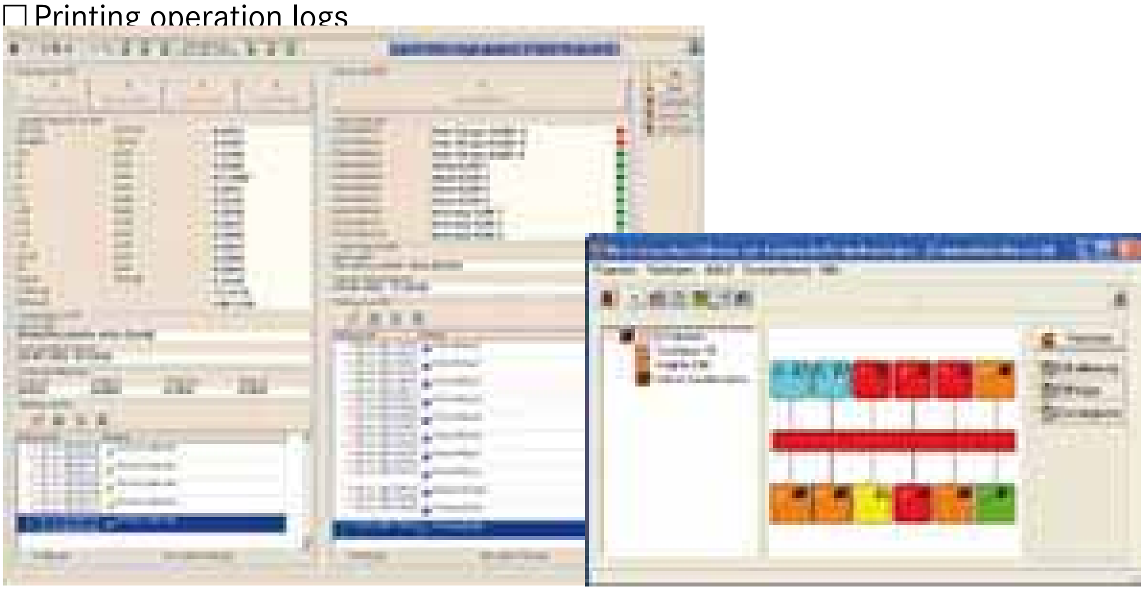


Remote Auditing using AKA-II

AKA-II turns WICO22 into a centre of operations for remote auditing for gas chromatographs and correlative gas quality stations. Gas quality can be evaluated with a minimum of operational steps. Additionally, internal calibration and external test gas can be triggered on the basis of a time schedule. AKA-II visualises history, results and files and (if necessary) exports the data.

Features:

☐ Online presentation of measured values and operational status of PGC/KGM
☐ Starting and monitoring of calibration and test runs
☐ Parameterisation of limit values and setpoints in MRG 2203
☐ Automatic, time-controlled retrieval of data from MRG 2203 files
☐ Visualisation of filed data (e.g., individual analyses, hourly/daily/monthly mean values, response factors) and log entries in the form of tables and diagrams
☐ Export of filed data to Microsoft Excel
☐ Integrated retrieval planner
☐ Integrated interface administration
☐ Local and/or remote operation possible
☐ PC online presentation of all data elements of DSfG bus system
☐ Online parameterisation of all data elements of the bus system
☐ Storage of complete parameter sets on PC
☐ Offline presentation and treatment of device parameters
☐ Resaving complete parameter sets to devices
☐ Export of parameters to Excel
☐ Printing operation logs



DSfG Configuration using WISERV

The WISERV DSfG Service Program is a universal tool for operating DSfG stations. WISERV can control and configure all the devices of a DSfG bus system. The program works for products of any manufacturer.

Features:

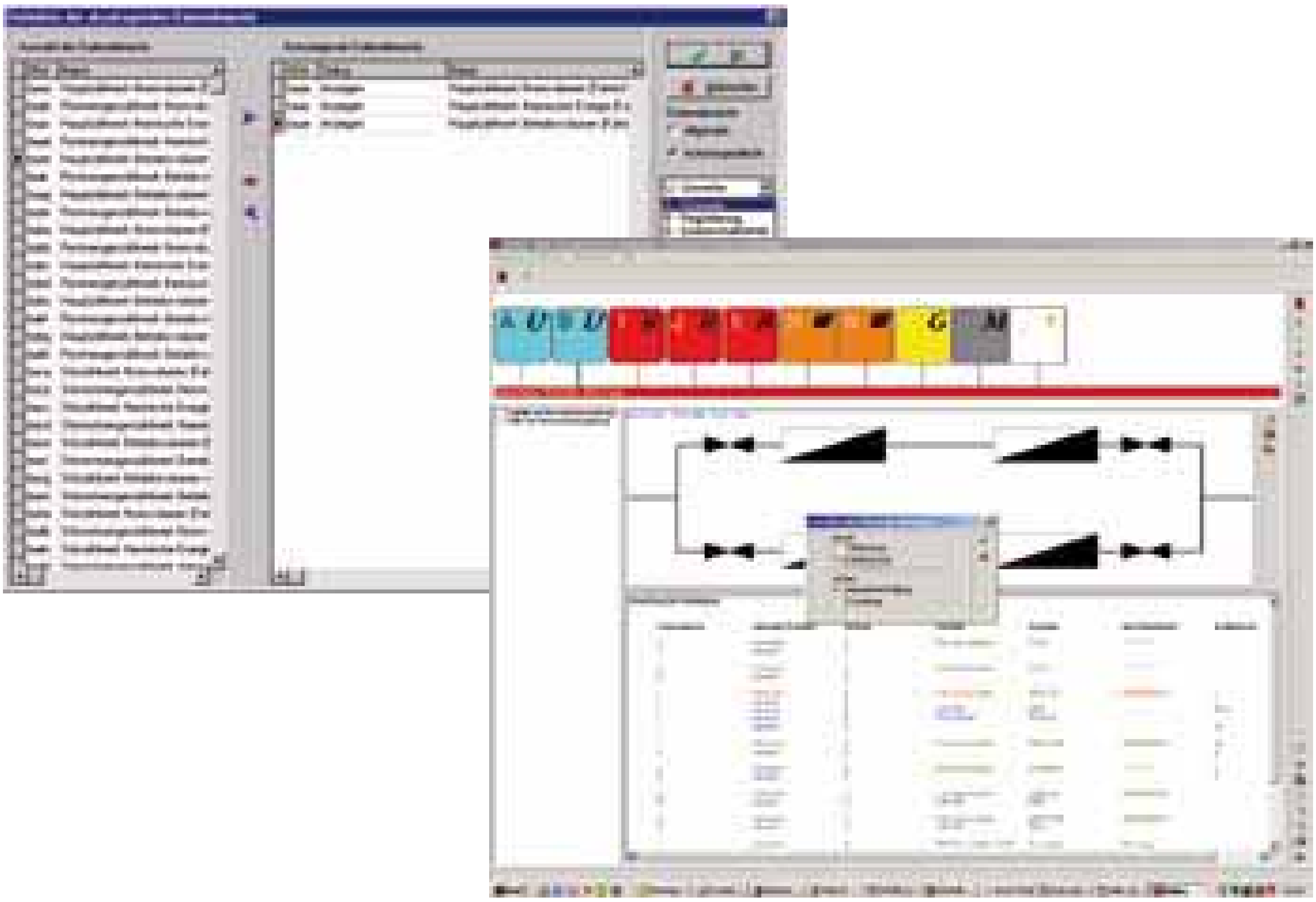
- ☐ Configuration and testing of devices in a DSfG bus system
- ☐ Online presentation and parameterisation of DSfG data elements
- ☐ Presentation and storage of parameters from all connected devices
- ☐ Export of data to MS Excel
- ☐ Resaving of parameter sets to the devices
- ☐ Read-out of archives and logs
- ☐ Suitable for any DSfG devices – locally and/or via remote data transmission
- ☐ Designed for MRG220x via serial interface
- ☐ Fully compatible with WICO22 Data Retrieval System
- ☐ Integrated database

DSfG Documentation using WIDOC

WIDOC documents the current state of a DSfG bus system. Configuring DSfG bus systems using WIDOC is as easy as it gets. All available DSfG data are stored at the push of a button and can be visualised again whenever needed.

Features:

- ☐ Analysis of DSfG bus systems – can be automated
- ☐ Overview of individual instances
- ☐ Control of address assignments and check sums
- ☐ Comparison of bus configuration to a user-defined layout
- ☐ Checks of measured data recording using the freeze function
- ☐ Read-out and filing
- ☐ Storage, visualisation and export of results
- ☐ Suitable for all DSfG devices
- ☐ Integrated database

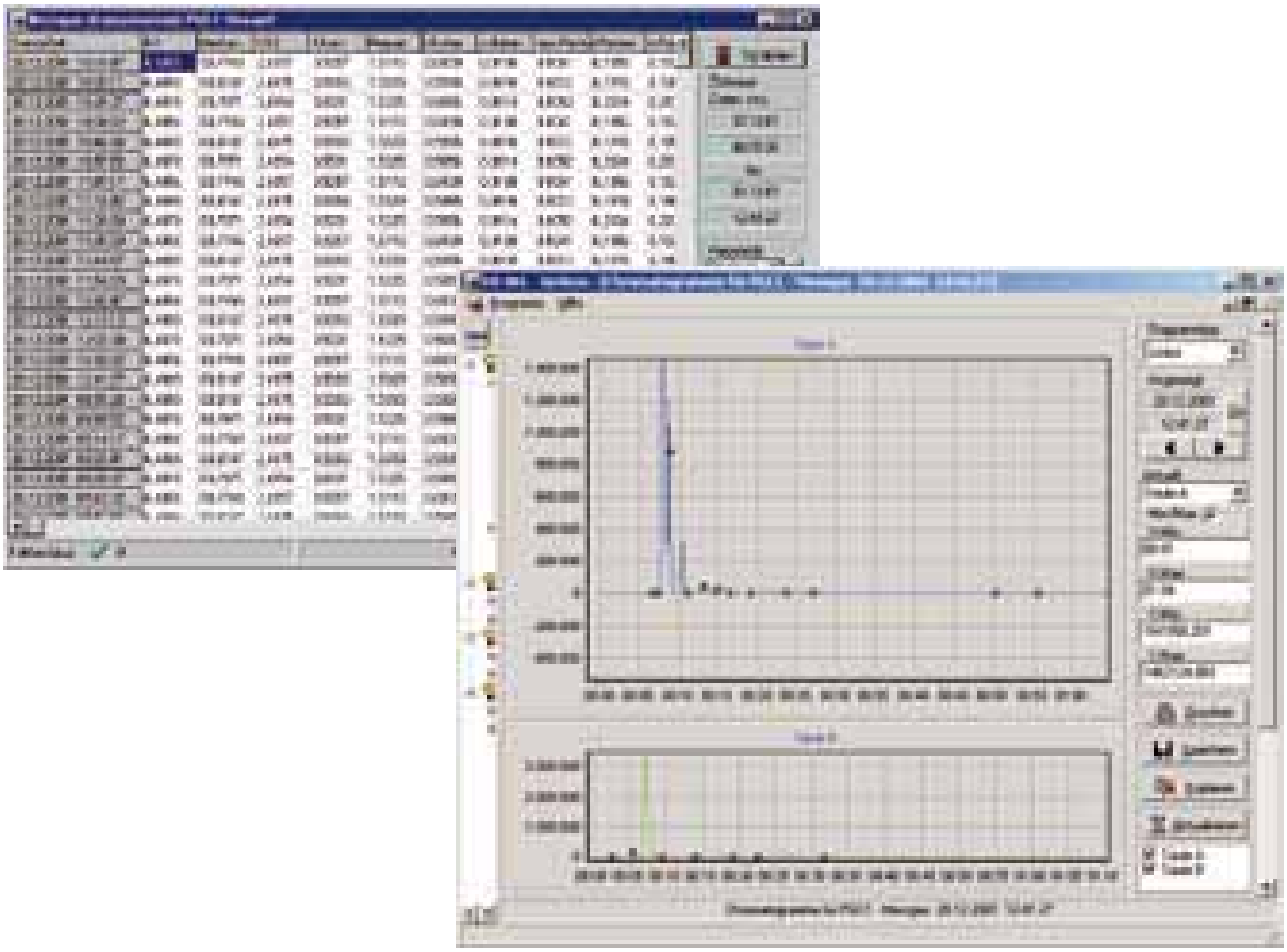


PGC Data Storage using DS901

The DS901 Data Memory stores all data from up to four different PGCs using up to four streams. Data is continuously read-out using the DS901 read-out module, and its status displayed online. The DS901 Visualisation Module allows users to display, analyse and export data.

Features:

- ☐ Read-out of analysis data, chromatograms, statuses and parameters from up to four different process gas chromatographs
- ☐ Storage of data in ASCII format
- ☐ Display features use transparent tree structures and views
- ☐ Optional: DS901 Data Memory pre-installed on an industrial PC



Continuous Analog Signals from TWO Selected Items

Provides two 4-20 milliamp signals from most Mercury electronic instruments.

Mercury Instruments offers its 4-20 milliamp output board to address the need for generating continuous analog signals on a variety of gas flow parameters. The board has two isolated current loops and provides signals proportional to the value of two selected parameters. The board readily interfaces with Mercury Instruments' ECAT, Mini, Mini-AT, Mini-Max and ER products.

Parameters commonly requested to be represented as 4-20 milliamp signals include the following:

- ☐ Average flow rate
- ☐ Instantaneous flow rate
- ☐ Dial rate
- ☐ Gas pressure
- ☐ Gas temperature
- ☐ Case temperature
- ☐ Battery voltage
- ☐ Incremental corrected volume

Specifications

☐ Environment
Designed for Class I, Division 2

☐ Size 2-1/2" 3

☐ Operating temperature
-40 °F to 150 °F (-40 °C to 65.5 °C)

Programmable to Meet Your Field Data Needs

Operation

Users can easily program the parameters they want into onboard memory of the 4-20 milliamp board. Our simple-to-use configuration software allows selection of the following parameters for both output channels:

- ☐ Instrument type - ECAT, Mini, Mini-AT, Mini-Max or ER
- ☐ Instrument access code (default = 33333)
- ☐ Baud rate for serial connection (default = 9600)
- ☐ Instrument item (for example, 208, 209, 008, 026 or 031)
- ☐ 4 milliamp and 20 milliamp scaling values
- ☐ Serial port time delay (default 120 seconds, max = 255 seconds)

Through an internal RS-232 serial port, the 4-20 milliamp board interrogates the instrument, reads the value for both selected items, and scales the value for the 4-20 outputs. The system interrogates and updates the outputs at each Read Interval.

Power Requirements

Successful 4-20 board operation depends on the following power requirements:

- ☐ 4-20 board power 24 VDC at 50 milliamps
- ☐ Loop power
  Each loop is powered by 24 VDC
  from the end-point device
- ☐ Mercury device
  Must be externally powered due to
  the high number of Serial interrogations

Enhanced Instrument Integration with DC2009 Host Software

This upgrade provides new and improved direct communications connectivity to Audit Trail and other Item Code data stored by our family of correctors and recorders. Full access to more data than ever before. Communications devices include Mercury's Messenger modem (or equivalent) or an MI Wireless communications module. Another feature enhancement includes support for our "inbound call scheduling" functionality so that alarms can be reported in real-time.

INETReporter Software

INETReporter is a web-based, application for use with our DC2009 Data Collection Software System. It provides secure, controlled access to data reports and device polling via an intranet or Internet connection. With INETReporter, DC2009 data is accessible using a simple Web browser, greatly extending the accessibility to DC2009 without the training normally required for DC2009 operators. Data is available 24-hours-per-day, accessible from anywhere an Internet connection can be made. Imagine – no more bulletin boards, faxing or e-mailing reports to customers! They can now get their data online, anytime they want.

Alarm Forwarding Software

Alarm Forwarding application provides real-time notification of events occuring at remote sites monitored by our instruments and recorders. With Alarm Forwarding, the proper personnel can be notified of events (e.g., volume alarms, low pressure alarms, etc.) by e-mail, SMS/text message-enabled cell phones, pagers or fax. Alarms (events) are selectable by metering location or alarm type. Alarm Forwarding runs 24-hours-a-day, automatically, so there is no need for an operator to be present. Alarm Forwarding can notify almost any event, anywhere, anytime.

DC2009 Remote Access Software

The DC2009 Remote Access application provides limited DC2009 access by field technicians or installation teams to perform functions such as meter synchronizations, device set-up, address changes, contact changes, alarm and input configuration changes, etc. No need to have dedicated DC2009 operators or administrators available to commission new installations or meter synchronizations.
The browser-based application runs on Windows-based laptops, PDAs or MS Windows Mobile-based Smart phones.

Training Class

One seat at the System Owner or User Administration Training Workshops at no charge. Additional seats available for a fee. Agendas will include:

System Owner Training

- ☐ Overall DC2009 system architecture and configuration
- ☐ Options for data exporting
- ☐ TCPIP/ODBC connectivity to the SQL server database
- ☐ User applications beyond meter reading (leveraging your investment)
- ☐ Review of latest applications – iNETReporter, Alarm Forwarding, DC2009 Remote, TDS

User Administration

- ☐ Clean-up unused/old applications
- ☐ Review File Clear, back-up and self-purging file procedures
- ☐ Review of audit and alarm reports
- ☐ Overview: OS und SQL Error Logs

IMU-II/S (Industrial Metering Unit-II/Serial)

What metering unit offers the most powerful, flexible, and economical remote, solid-state recorder ever available? The answer is Mercury Instrument‘s IMU-II/S. The dual operating system provides twice the performance while reducing costs. The IMU-II/S is designed to collect pulse data from up to two Form A inputs and store it as a function of time (time-tagged interval data or TTI). The pulse data collected on these two channels is also stored in an accumulator register and can be used to track a meter index. In addition the IMU-II/S can serve as a modem to remotely access field devices that have an RS-232 channel. The unit has an auxiliary port with RS-232 interface for alternative communication links, (e.g., modem, RF device, cell phone, pager, etc.). This provides the user with immediate or future flexibility.

IMU-II/S (Specifications)

Features and Benefits:

☐ Two pulse channel inputs with 28K memory store 14,000 records
☐ Serial port allows remote access to electronic correctors and other Data Terminal Equipment (DTE) that have an RS-232 channel
☐ Auxiliary port with RS-232 interface for alternative communication links
☐ Optional dual-DTE port
☐ Remotely programmable
☐ 5-year nominal battery life
☐ Compatible with Mercury's DC2009 Data Collection and management software

Applications:

With the IMU-II/S, pulse-type energy consumption data is collected, stored, and communicated to the Mercury Instruments data management computer using Mercury's high-performance communication protocol and modem. A transparent RS-232 and device serial port provides the freedom to use the built-in modem to connect to any electronic instrument or other data terminal equipment from any compatible host system. Depending upon the application, this can eliminate the need to pay and wait for custom protocol drivers and associated applications to be developed. Immediate or future expansion to two user serial ports is available.

Physical Dimensions:

6.5“ (16.5 cm) Height
6.9“ (17.5 cm) Width
4.3“ (10.9 cm) Depth

Weight:

3.8 lbs. (1.75 kg) AC-powered, including lead acid battery
2.5 lbs. (1.10 kg) lithium battery-powered, including lithium battery

Power:

AC-powered:

AC step-down power pack and AC power board, 4 VDC output
Lead acid battery back-up

Lithium-powered:

Lithium battery, 3.6 VDC output, 11.5 Ahr

IMU-II/S

Customer Inputs:

Serial Inputs:

- ☐ Type: RS-232C Baud rate 300, 1200, 2400, 4800 and 9600 bps
- ☐ Data Bits: 7 or 8 Parity: Even, Odd, or None
- ☐ Stop Bits: 1, 1.5 or 2

Contact Closure Inputs:

- ☐ Type: Tamper Alarm, Data Input 1, Data Input 2, Alarm Input
- ☐ Maximum Drop/Resistance: 0.8 VDC maximum, 1000 ohms maximum
  Active State: Must be active for over 40 ms
- ☐ Data Input Rate: 600 counts/minute maximum
- ☐ Wetting Voltage per Input: 3 to 5 volts (nominal)
- ☐ Wetting Current per Input: 175uA (nominal)

Communications:

FCC Registration No.
BK5UA-24666-D-T-E Modulation Standards:
CCITTV.22bis 2400 bps
Data Output Level: Less than -9dBm (minimum)
Telephone Connector:
4-conductor RJ-11 C Data Storage Capacity:
32K RAM (-28K for Time-Tagged Intervals)

Operational:

Temperature Range: -30 °C to +70 °C

Certifications:

FCC: Part 15 and Part 68 CSA: C22.2 and UL
1459 IC Telecom: CS-3
BART: UK
UL Class 1 Div. 2 rated

InvisiConnect™

Transparent and Secure Connectivity to Telemetry Systems via Cellular IP Service

With InvisiConnect, even most legacy telemetry systems can be converted to operate on today's cellular IP (packet data) services as offered by more than 120 GSM, CDMA and iDEN mobile carriers around the world.

InvisiConnect is a universal connectivity solution comprising software and remote, intelligent, cellular hardware. Simple to set up, (requiring no database) and incorporating Mercury Instrument's exclusive, patented PCT (Programmable Connection TuningTM), the InvisiConnect Server software runs on the WindowsTM NT, 2000 & XP operating systems. The software provides an ultra-secure, transparent connection to application software via IP sockets or PC COM ports. In the field, InvisiConnect CNI Series hardware provides the interface between the cellular network and a remote data acquisition terminal device, via an RS232 connection. No application software, protocol or data structure modifications are necessary.

Features include digital inputs & outputs for added functionality. A second serial port is optional as well, so the CNI can do double-duty at a very low cost.

InvisiConnect Features and Benefits include:

- ☐ Multi-band GSM/GPRS, CDMA/1XRTT and iDEN digital cellular transceiver
- ☐ Supports TCP/IP connectivity
- ☐ RS232 connection to remote data terminal equipment (RS485 optional)
- ☐ AT command support & hardware/software flow control options for both ends
- ☐ Reports event status of up to 5 user-accessed digital inputs
- ☐ Provides up to 2 digital outputs for control
- ☐ DES-based encryption for secure access
- ☐ For maximum security, remote hardware acts as client and not as server
- ☐ Over-the-air programming
- ☐ PCT“ provides transparency by compensating for IP network characteristics
- ☐ Provides portability & overall lower installation costs
- ☐ Provides electrical isolation from network
- ☐ CNI Series hardware available fully packaged or as OEM PCA module
- ☐ Converts many systems: traffic control, SCADA, security, etc.

Specifications:
(Subject to change without notice)
Power Options:
All models require 9-28 VDC at 1 amp which can be sourced by various configurations of AC, battery or solar mains. Please consult factory.
Physical:
Packaged Models:
Enclosure: polycarbonate, designed to meet IP65
Ext. Dimensions:
Approximately 6.5 (16.5) x 9.5 (24) x 1.7 (4.3) in. (cm).
Weight: Approximately 3 lbs. (1.3 Kg)
OEM Model: Dimensions:
Approx. 5 (13) x 5 (13) x 2 (5) in. (cm).
Connections:
Screw-type terminal strips for Input & Outputs.
Dual cable glands w/strain relief.

Environmental:
Operating Temperature Range:
-25 °C to +70 °C
Operating Humidity to 90% non-condensing

Certifications:
PTCRB-approved, fully GSM Phase 2+ compliant.
FCC Part 15 (Class B) and Parts 22, 24
AT&T, Verizon, USCellular, Alltel + associated resellers and roaming partners

InvisiConnect™LEM...

Digital Cellular Connectivity for Devices with Analog Modems & RJ11 Connection

Physical:
Can be packaged inside all InvisiConnect CNI Models: Standard CNI
Enclosure is polycarbonate, meets IP65 with Ext.
Dimensions: Approximately
6.5 (16.5) x 9.5 (24) x 1.7 (4.3) in. (cm)
Weight: Approximately 3 lbs. (1.3 Kg)

Connections: RJ11 or 2-position screw terminal for Tip & Ring 2 position screw terminal for DC power
Data Bit Rates from 300 bps thru 33.6 Kbps
Modulation Standards:
Bell 103 & 212A, V.22, V.22bis, V.32, V.32bis, V.32ter, V.34, V.34bis

Environmental:
Operating Temp Range: -30 °C to +70 °C
Operating Humidity to 90% non-condensing

Mercury Instruments‘ InvisiConnect™ system is more powerful and flexible than ever with the optional LEM (Loop-start Emulator) module. The LEM mounts in combination with any of our digital Cellular Network Interface (CNI) configurations. It provides all the signaling needed to make legacy “RJ11” connected‘ field devices think they are still communicating via the wireless or wired analog phone network.

The LEM will work regardless of whether the CNI is used alone in circuit-switched mode, or as the client in an InvisiConnect™ packet switched application. Dial-tone, RJ11 connection, Ringing, Analog Data Modem and Fax Modem support are all combined in the LEM to easily handle upgrades for applications like Mobile Medicine, Utility Metering, ATM, Credit Card Terminals, Vending Machines, Security, Traffic Control Systems and many, many more.

Now you can retain your investment in field data devices even while upgrading them quickly and easily to utilize the latest in digital cellular service. The InvisiConnect™ system with LEM option makes it happen.

Specifications:
(Subject to change without notice)

Power Options:
All models require 12-28 VDC @350 milliamp, which can be sourced by various configurations of AC, Battery or Solar mains. Please consult factory.

Mercury ERX

Quality Pressure Recording with Expanded Memory and 3-Pressure Capability

Specifications:
For standalone ERX (i.e., w/o communications or additional power supplies)

Gas Temperature:
☐ Live display of input pressures on an optional LCD
☐ Pressure ranges from 0-1 to 0-5000 psig, or 0.07 to 350 Bar
☐ 6' Teflon conductor and a ¼" x 6" stainless steel probe with a range of -40 °F to 150 °F of (-40 °C to 65 °C)
☐ Live display of temperature

Power:
☐ 3.8 to 15 VDC (ERX Main Board)
☐ 4+ years battery life with alkaline batteries
☐ Half-hour operation without main battery source
☐ Two-month low-battery warning
☐ Low-battery alarms on the LCD
☐ Options include Solar, AC and Thermal Electric Charger

A powerful recording instrument with long-term battery operations, remote communications, extended audit trail and various pressure ranges.

Features:
☐ 1, 2 or 3 pressure inputs
☐ Easy two-point calibration
☐ 3 operating modes: Sample mode, pushbutton display mode, and serial communications mode
☐ Modbus or BSAP protocol on an optional translator board
☐ Selectable log intervals
☐ Selectable sample intervals
☐ High/High and Low/Low alarms
☐ RBX alarm notification
☐ Live and audit trail graphing
☐ Integral communications via cellular, radio, satellite and land line

Mercury ERX

Data Logging, Sampling Intervals and Capacity:

- ☐ 10 user selectable items
- ☐ 1-, 5-, 10-, 15-, 30-, 60-second sampling intervals
- ☐ Flash firmware
- ☐ 1-, 5-, 10-, 15-, 30-, 60-minute or 24-hour data logging intervals
- ☐ 10-item storage capacity ranges from 3 days for 1-minute intervals to 5000 days for 24 hour intervals
- ☐ 4-item storage capacity ranges from 7 days for 1-minute intervals to 11,000 days for 24-hour intervals
- ☐ Pressure Transducer accuracy = +/- 0.4% full scale
- ☐ Temperature sensor accuracy = +/- 1.0 °F
- ☐ +/- 0.5% of full scale per year for long-term stability
- ☐ Ambient temperature conditions = -40 °F to 150 °F
- ☐ Ambient humidity = 0 to 100% non-condensing

Enclosure:

- ☐ Aluminum or composite material with hinged door and padlock hasp
- ☐ 13.75” x 10.63” x 5.38” or 6.5” x 6.5” x 4.5”
- ☐ Weight = 13.6 lbs (6.2 kg)

Mounting options:

- ☐ Wall mount, pipe mount, and portable

Certifications:

- ☐ Class I, Division 1 and 2, Group D
- ☐ Class I, Zone 0, Group IIA

Mercury Mini-Max – Mercury Mini-Max AT – Mercury Mini-Max ATX

Mini-Max, PTZ Gas Volume Corrector

Features:

☐ Composite case (no rust or repainting needed)
☐ Hinged door with double-latch bar lock
☐ Configurable CW & CCW mechanical index
☐ Universal meter mounting plate
☐ Integral alphanumeric LCD on door
☐ Programmable scroll list
☐ Integral push button to activate the scroll list
☐ Integral pressure and temperature transducers
☐ Variety of pressure transducers to fit application
☐ Two pulse channels for volume output
☐ Alkaline and lithium power packs available
☐ Telemetry options available

Specifications:

Accuracy

Maximum error at reference conditions including linearity, repeatability and hysteresis

☐ Computation: +/- 0.3% of corrected volume reading
☐ Pressure Transducer: +/- 0.4% of full scale
☐ Temperature Sensor: +/- 1.0°F (+/- 0.56°C)
☐ Combined Computation, Pressure & Temperature: +/- 0.5% of full scale

Ambient Temperature Effects:
From -40 to 160°F (-40 to 70°C)

☐ Computation: +/- 0.3% of corrected volume reading per 100°F (55.56°C)
☐ Pressure Transducer: +/-0.6% of full scale per 100° F
☐ Temperature Sensor: No effect

Long-term Stability

☐ Computation: +/- 0.3% of corrected volume reading per year
☐ Pressure Transducer: +/- 0.5% of full scale per year
☐ Temperature Sensor: +/- 0.4° F (0.22°C) per year

Environmental Conditions

☐ Ambient temperature: -40° to 160°F (-40 to 70°C)
☐ Ambient humidity: 0 to 100% non-condensing

Power

☐ Input voltage: +3.8 to +6.0 VDC
☐ Battery Life: 4 years (w/4 D-cell alkaline battery pack at normal operating conditions)

Certifications

☐ Class 1, Zone 0, Group IIA or Class 1, Zone 2, Group IIA
☐ Class 1, Division 1, Group D or Class 1, Division 2, Group D

Weight and Dimensions

☐ 5.6 lbs. (2.5 kg) meter-mount version

Input Temperature

- ☐ Highly stable solid-state temperature sensor in a 3/16” diameter, 3” long stainless steel probe inserted directly into the meter thermowell
- ☐ Range: -40 °F to 150 °F (-40 °C to 65.5 °C)
- ☐ LCD display of input temperature

Input Pressure

- ☐ Precision strain gauge pressure transducer compensated to minimize ambient temperature effects
- ☐ LCD display of input pressure
- ☐ Standard transducer ranges

  Standard transducer ranges

Enclosure:
Composite case with hinged door and double latch bar; clear LCD viewing, integral push-button for display, mounting plate with gasket for most meters

Certifications:
CSA Class I, Zone 0, Group IIA, or Class I, Zone 2, Group IIA;
Class I, Div 1, Group D or Class I, Div 2, Group D, Zone 1 or 2, Group IIA

Warranty: Four years

Weight and dimensions:
5.6 lbs. or 2.5 kg and 7.36” (18.7 cm) wide,
5.30” (13.5 cm) deep,
10.93” (27.7 cm) high

STANDARD TRANSDUCER RANGES		
Pressure Range psi	Pressure Range Bar	Transducer Type
0-1	0.07	Gauge
0-3	0.2	Gauge
0-6	0.4	Gauge
0-15	1	Gauge
0-30	2	Gauge/Absolute
0-60	4	Gauge/Absolute
0-100	7	Gauge/Absolute
0-150	10	Gauge/Absolute
0-200	14	Gauge/Absolute
0-300	20	Gauge/Absolute
0-600	41	Gauge/Absolute
0-1000	70	Gauge/Absolute
0-1500	100	Gauge/Absolute

Mercury TCI

Temperature-compensating Index for Rotary Meters

Features
- ☐ Adapter plates for most popular rotary meters
- ☐ Numeric LCD with configuration icons
- ☐ LCD characters electronically inverted for left-side or right-side meter mounting
- ☐ Ruggedized push-button for the LCD scroll
- ☐ User-configurable fixed pressure factor
- ☐ Redundant volume inputs from rotary meter
- ☐ Two isolated volume pulse output channels
- ☐ One isolated alarm pulse output channel
- ☐ Compatible with Itron, Sensus, Hexagram, Cellnet and other AMR devices

Specifications

Temperature Measurement System
- ☐ Highly stable, solid-state temperature sensor (thermistor)
- ☐ Range -40 to 170°F (-40 to 70°C)

Temperature Accuracy (reference to absolute temperature)
- ☐ -4 to 104°F (-20 to 40°C) -40 +/- 0.1%
- ☐ -40 to 170°F (-40 to 70°C) +/- 0.25%

Computational Accuracy
- ☐ Computation +/- 0.3% of compensated volume reading

Long-term Stability
- ☐ Total +/- 0.5% reference to absolute temperature

Environmental Conditions
- ☐ Ambient temperature range -40 to 170°F (-40 to 70°C)
- ☐ Ambient humidity range 0 to 100% non-condensing

Ambient Temperature Effects
- ☐ Total +/- 0.1% of compensated volume per 100°F from -40 to 170°F (-40 to 70°C)

Certifications
- ☐ IEC 61000-4-2 (Electrostatic Discharge)
- ☐ IEC 61000-4-3 (Electromagnetic Fields)
- ☐ Measurement Canada
- ☐ CSA – Class 1, Division 1
- ☐ FCC Part 15

Enclosure
- ☐ Polycarbonate with Lexan window over LCD
- ☐ Designed and tested at Mercury Instruments to comply with NEMA 6 and IP-67 ratings
- ☐ Immersion test: immersion under 1 meter of water for duration of 72 hours (no AMR connections)
- ☐ Mounting plate with gasket and bolts to accomodate most rotary meters

- ☐ Redundant input from any rotary meter
- ☐ Back-up memory module contains the last 90 days of time-stamped data
- ☐ LCD characters invert electronically for left-side or right-side mounting
- ☐ Adapter plates for all popular rotary meters
- ☐ Two isolated volume pulse output channels
- ☐ One isolated alarm pulse output channel
- ☐ Integrated infrared communications port

Mercury Model 206 Pulse Transmitter

Meter-mounted Pulse Transmitter with Uncorrected Volume Index

The Model 206 Pulse Transmitter is a self-contained, bi-directional pulse transmitter used to generate volume pulses from a gas meter.

Features:

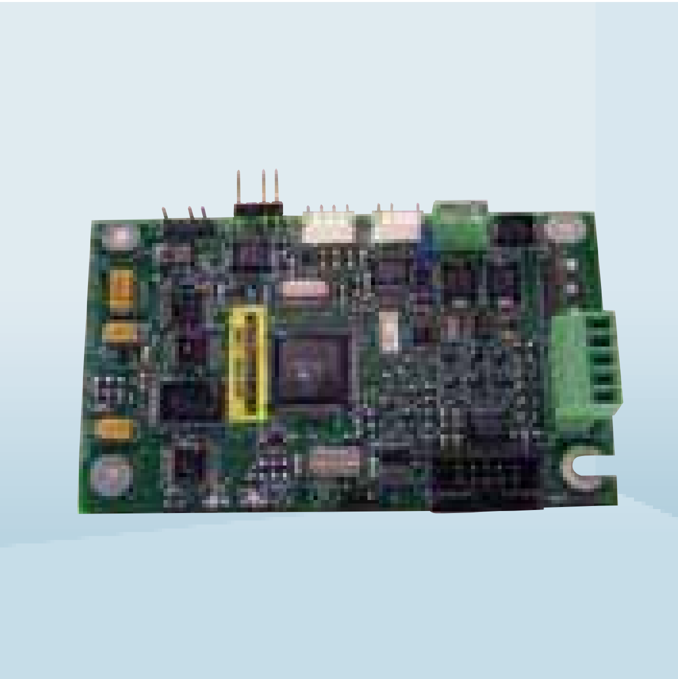
- ☐ Mounts on instrument-drive type turbine, rotary and diaphragm gas meters
- ☐ Reversing gear mechanism permits mounting on either CW or CCW meters
- ☐ Meter torque load: less than 0.5 oz.
- ☐ Bi-directional, eight-digit mechanical counter
- ☐ Transmits uncorrected volume pulses
- ☐ Magnetically operated reed switch: produces one, two, or four evenly-spaced pulses per meter shaft revolution
- ☐ Switch, encapsulated Form-C SPDT dry reed switch
- ☐ Open circuit switch voltage limited to +/- 30 volts DC (21 VAC)
- ☐ Current rating, 25 milliamps (0.025A)

General Specifications:

- ☐ Housing, valox engineered-resin enclosure
- ☐ Convenient terminal strip connection for field wiring
- ☐ Transparent index lens with cross-drilled screws for sealing wire
- ☐ Eight-digit mechanical counter
- ☐ Polycarbonate mounting plate
- ☐ One-piece stainless drive shaft precisely aligned for long-term durability
- ☐ Ultra-low torque

Mercury Protocol Translator

Translate Mercury Protocol to Modbus ASCII, Modbus RTU or BSAP



Features:

- ☐ High-performance microprocessor
- ☐ Low power consumption (designed for battery operation)
- ☐ Three user serial connections (two RS-232 & one RS-485)
- ☐ Configurable for either ASCII or RTU Mode.
- ☐ Two LED status indicators
- ☐ Extensive SRAM memory capacity (over 35 days of hourly and daily Audit Trail data for ASCII mode)
- ☐ FLASH memory for field programmable firmware updates
- ☐ High-speed data transfers (up to 57.6 K baud)
- ☐ Onboard surge and ESD protection
- ☐ Small, compact board size with highly integrated design
- ☐ Operates with any Mercury electronic instrument

General description

The Mercury Protocol Translator (PT board) is an adapter board that connects between the Mercury Instruments device and a host RTU or SCADA system. The PT board allows various asynchronous serial protocols to communicate with all instruments that support Mercury protocol (for example, Mini-AT, ER, ECAT, Mini, and Mini-Max).

The PT board translates the host‘s protocol (such as, Modbus) to Mercury protocol and back again so the host can communicate with a Mercury instrument in its native protocol. The PT board handles communications between the host interface and the Mercury instrument in a master-slave fashion. The PT responds only to commands from the host (master). These commands are translated and sent to the Mercury instrument (slave) as required.

Mini-Max Rotary Corrector

Direct-mount, PTZ Gas Volume Corrector

Mercury Instruments, a name synonymous with quality and reliability in the natural gas industry, offers an affordable integrated volume corrector for most popular rotary meters. Improve the value of your rotary meter operations with electronic precision and reliability – the Mini-Max™ Rotary Corrector. You get the same quality, accuracy and service you expect from all Mercury Instrument products.

Features:

- ☐ Redundant Electronic Index (REI) stores the uncorrected volume counts, independent of the corrector
- ☐ Includes adapter plate to fit most popular rotary meters
- ☐ Composite case (no rust or repainting needed)
- ☐ Hinged door with double-latch bar lock
- ☐ Integral alphanumeric LCD on door
- ☐ Programmable scroll list
- ☐ Integral push-button to activate the scroll list
- ☐ Internal temperature probe for most meters
- ☐ Two pulse channels for volume output
- ☐ Alkaline and lithium power packs available
- ☐ Telemetry options available

Audit Trail Memory Capacity
(includes date & time)

- ☐ Mini-Max™: 41 days of daily data
- ☐ Mini-Max™ AT: 41 days of hourly data
- ☐ Mini-Max™ ATX: 400+ days of hourly data (4-items)
- ☐ Mini-Max™ ATX: 180+ days of hourly data (10-items)

Specifications

Accuracy

Maximum error at reference conditions including linearity, repeatability and hysteresis

- ☐ Computation: +/- 0.3% of corrected volume reading
- ☐ Pressure Transducer: +/- 0.4% of full scale
- ☐ Temperature Sensor: +/- 1.0°F (+/- 0.56°C)
- ☐ Combined Computation, Pressure & Tempe rature: +/- 0.5% of full scale

Ambient Temperature Effects

From -40 to 160°F (-40 to 70°C)

- ☐ Computation: +/- 0.3% of corrected volume reading per 100°F (55.56°C)
- ☐ Pressure Transducer: +/-0.6% of full scale per 100° F
- ☐ Temperature Sensor: No effect

Long-term Stability

- ☐ Computation: +/- 0.3% of corrected volume reading per year
- ☐ Pressure Transducer: +/- 0.5% of full scale per year
- ☐ Temperature Sensor: +/- 0.4° F (0.22°C) per year

Environmental Conditions

- ☐ Ambient temperature: -40° to 160°F (-40 to 70°C)
- ☐ Ambient humidity: 0 to 100% non-condensing

Meter Adapter Plates

- ☐ Dresser®,
- ☐ Romet®
- ☐ American/Elser®

Power

- ☐ Input voltage: +3.8 to 6.0 VDC
- ☐ Battery Life: 4 years (w/ 4 D-cell alkaline battery pack at normal operating conditions)

Certifications

- ☐ Class 1, Zone 0, Group IIA or Class 1, Zone 2, Group IIA
- ☐ Class 1, Division 1, Group D or Class 1, Division 2, Group D

Weight and Dimensions

- ☐ 5.6 lbs. (2.5 kg) meter-mount version

STANDARD TRANSDUCER RANGES

Pressure Range psi	Pressure Range Bar	Transducer Type
0-1	0.07	Gauge
0-3	0.2	Gauge
0-6	0.4	Gauge
0-15	1	Gauge
0-30	2	Gauge/Absolute
0-60	4	Gauge/Absolute
0-100	7	Gauge/Absolute
0-150	10	Gauge/Absolute
0-200	14	Gauge/Absolute
0-300	20	Gauge/Absolute
0-600	41	Gauge/Absolute
0-1000	70	Gauge/Absolute
0-1500	100	Gauge/Absolute

SIP-CB

Low-cost, Battery-operated, 4-channel Pulse Recorder w/Built-In Cellular Transceiver

The SIP-CB is the latest generation of Mercury Instruments' time-tested pulse recorder, with tens of thousands of these units in operation on both gas and electric meters worldwide.

The SIP-CB retains the basic functionality of multi-channel, programmable interval pulse recording, while adding significant value in many areas key to the contemporary needs of those involved in energy measurement for billing, trading, load management, distribution engineering and custody transfer.

With data and alarm inputs, long battery life and the ability to operate on any GSM cellular network with over-the-air programming, the SIP-CB provides the flexibility and functionality to support large deployments and operate them at the absolute lowest long-term cost.

SIP-CB Features and Benefits include:

- ☐ Multi-band GSM/GPRS digital cellular transceiver
- ☐ Packet-switched (IP) or circuit-switched (where available) connections
- ☐ DES-based encryption for secure IP access
- ☐ Over-the-air (OTA) download of operating system and configuration
- ☐ Form A or Form-B interval pulse recording on 4 channels or form C on 2 channels
- ☐ Interval sizes: 1, 5, 15, 30, 60 minute
- ☐ Configurable for more than 120 days of 60 minute non-volatile storage
- ☐ Reports event status of up to 4 user-accessed digital inputs
- ☐ For maximum security, SIP-CB acts only as client and not as server
- ☐ PCT provides reliability by compensating for IP network characteristics. Provides portability & overall lower installation costs
- ☐ Provides electrical isolation from network
- ☐ Requires Release 7.0 of Mercury Instruments DC2009 Data Collection & Management software

SIP-CB

Specifications:
(Subject to change without notice)

Power Options:
Lithium battery standard. Operating life up to 8 years depending on use. Low voltage DC optional. Please consult factory.

Physical:
Enclosure: polycarbonate, protected to IP65
Exterior dimensions: Approximately 6.5 (16.5) x 9.5 (24) x 2.0 (5.0) in. (cm).
Weight: Approximately 3 lbs. (1.3 Kg)

Connections:
Screw-type terminal strips for Input & Outputs.
Dual cable glands w/strain relief.

Environmental:
Operating Temp Range: -30 °C to +55 °C
Operating Humidity to 90% non-condensing

Certifications:
PTCRB approved, fully GSM Phase 2+ Compliant. FCC Part 15 (Class B) and Parts 22, 24
Certified by AT&T Wireless (Model GSM20)
ATEX certification for use in Zone 0 Hazardous Environments CE mark

Mini-AT, PTZ Gas Volume Corrector

Features
☐ 0.25% measurement accuracy
☐ Hinged door with padlock hasp
☐ Configurable CW & CCW mechanical index
☐ Universal meter mounting plate
☐ 1/2” character LCD
☐ Programmable scroll list
☐ Integral pressure and temperature transducer
☐ Variety of pressure transducers ranges to fit application
☐ Two Form-A pulse channels for volume output
☐ Alkaline and lithium power packs available
☐ Provisions for second pressure transducer (pressure logging)
☐ Event-logging and alarm-logging included
☐ Two independent serial ports
☐ Options for:
- Modbus and BSAP translation
- External low- and high-frequency inputs
- 4-20 mA output (two independent loops)
- Landline and wireless communications
- External power supplies

Specifications:

Accuracy
Maximum error at reference conditions including linearity, repeatability and hysteresis
☐ Computation: +/- 0.1% of corrected volume reading
☐ Pressure Transducer: +/- 0.2% of full scale
☐ Temperature Sensor: +/- 0.5°F (+/- 0.28°C)
☐ Combined Computation, Pressure & Temperature: +/- 0.25% of full scale
Ambient Temperature Effects
From -40 to 170°F (-40 to 76.6°C)
☐ Computation: +/- 0.1% of corrected volume reading per 100°F (55.56°C)
☐ Pressure Transducer: +/-0.3% of full scale per 100° F
☐ Temperature Sensor: No effect

Long Term Stability
☐ Computation: +/- 0.1% of corrected volume reading per year
☐ Pressure Transducer: +/- 0.3% of full scale per year
☐ Temperature Sensor: +/- 0.2° F (0.11°C) per year

Environmental Conditions
☐ Ambient temperature: -40° to 170°F (-40 to 76.6°C)
☐ Ambient humidity: 0 to 100% non-condensing
Power
☐ Input voltage: +5.5 to +9.0 VDC
☐ Battery Life: 3 years (w/6 D-cell alkaline battery pack at normal operating conditions)

Certifications
☐ Class 1, Division 1, Group D
☐ Class 1, Division 2, Group D

Weight and Dimensions
☐ 12.5 lbs. (5.6 kg) meter-mount version

Corrected volume

☐ Corrected to desired base pressure and base temperature
☐ Corrected for super-compressibility (NX-19 or AGA-8)
☐ Selectable (metric and imperial) volume units
☐ Displayed continuously on 8-digit x 1/2-in. LCD

Memory

☐ Audit Trail, 140+ days or hourly
☐ Event Log, 500+ records
☐ Alarm Log, 200+ records
☐ Flash, resident firmware (serially upgradable)
☐ E2PROM, resident pressure compensation coefficients and critical calibration/configuration values

Input temperature

☐ Solid-state temperature sensor in a sealed 1/4-in. diameter, 9-in. long stainless steel probe with 6-ft. armored conductor and 1/2-in. NPT slip-along fitting to match the thermowell
☐ Range: - 40°F to 170°F (-40°C to 76.6°C)

Input pressure

☐ Precision strain gauge pressure transducer compensated to minimize ambient temperature effects
☐ Live LCD display of input pressure

STANDARD TRANSDUCER RANGES

Pressure Range psi	Pressure Range Bar	Transducer Type
0-1	0.07	Gauge
0-3	0.2	Gauge
0-6	0.4	Gauge
0-15	1	Gauge
0-30	2	Gauge/Absolute
0-60	4	Gauge/Absolute
0-100	7	Gauge/Absolute
0-150	10	Gauge/Absolute
0-200	14	Gauge/Absolute
0-300	20	Gauge/Absolute
0-600	41	Gauge/Absolute
0-1000	70	Gauge/Absolute
0-1500	100	Gauge/Absolute

Highlights

☐ 8-inch and 12-inch chart recorders

☐ Up to 3 pens can be installed

☐ Wall, flush, portable or pipestand mounting

Product Information

Each pressure element is manufactured by Mercury Instruments to precise specifications using 316 stainless steel. Each element deflects 22 1/2 degrees for the design range, and is carefully made, heat-treated and cold-worked to remove all hysteresis. The accuracy of each pressure recorder is +/- 1/2 chart graduation.

MODEL NUMBERS AND MOUNTING ARRANGEMENT			
Model Series			
800	1200	700	900
Chart Diameter			
8”	12”	12”	12”
Pen Arc			
6 3/8”	6 3/8”	9 7/16”	9 7/16”
Wall Mount			
801	1201	701	901
Flush Mount			
802	1202	702	902
Portable			
803	1203	703	903
Pipestand Mount			
804	1204	704	904

Highlights

- ☐ 8-inch and 12-inch chart recorders
- ☐ 1 or 2 pens can be installed
- ☐ Wall, flush, portable or pipestand mounting

Product Information

The mercury-filled temperature system features all-welded steel construction with uniform scale deflection and rapid response to temperature changes. The standard case compensated system is used for capillary lengths of up to 25 feet (7.6 meters). A fully-compensated system is a necessary option for greater capillary length. The accuracy of each temperature recorder is +/-1 chart graduation.

MODEL NUMBERS AND MOUNTING ARRANGEMENT			
Model Series			
800	1200	700	900
Chart Diameter			
8”	12”	12”	12”
Pen Arc			
6 3/8”	6 3/8”	9 7/16”	9 7/16”
Wall Mount			
825	1225	725	925
Flush Mount			
826	1226	726	926
Portable			
827	1227	727	927
Pipestand Mount			
828	1228	728	928
Portable Self-contained			
829	1229	729	929
Rigid Stem-mount			
830	1230	730	930

PTZ Gas Volume Corrector for Sensus Auto-Adjust® Turbo-Meters

Mercury Instruments' Mercor Mini-AT Electronic Volume Corrector features the option to compute algorithms for a Sensus Auto-Adjust® Turbo-Meter. This enhanced instrument – named the Turbo Corrector – performs all AAT algorithms, and also computes self-checking and self-adjusting equations. Users can base the corrector volume data on uncorrected volume, unadjusted volume, or adjusted volume.

Additional Features:

- ☐ Two levels of Delta-A adjustment alarms with separate output channels and user-defined alarm limits
- ☐ Pulsating gas alarm and Form-A volume pulse output for adjusted volume pulses
- ☐ 4-20 mA output signal for either Delta-A or adjusted volume rate flow
- ☐ Simultaneous live graphing of main rotor frequency, sense rotor frequency, Delta-A, and adjusted volume flow rate using MasterLink32 software
- ☐ Optional high-frequency output board (0-1000Hz) available
- ☐ 4-year warranty
- ☐ CSA-approved for Class 1, Div-1 and Div-2

General description

The Turbine Interface Board (TIB) provides excitation voltage to the sensors for an Sensus Auto-Adjust Turbo-Meter, inputs the pulses from AAT sensors, computes Sensus AAT algorithms, and provides output-adjusted volume pulses along with a 4-20 mA signal.

The TIB includes several RS-232 ports to allow serial communications to a Mini-AT or host software. It also outputs adjusted volume pulses to an RTU (or pulse accumulator) as well as a 4-20 mA signal (representing either adjusted volume flow rate or Delta-A).

When a TIB is used with a Mercury Instruments Mini-AT, the instrument is called a Turbo Corrector. Users can mount a Turbo Corrector directly on an Auto-Adjust Turbo-Meter, or remotely via wall-mount or pipe-mount brackets.

In addition to the functions described above, the Turbo Corrector provides standard Mini-AT functions to produce fully-corrected volume data by applying pressure, temperature and super factors to uncorrected volume, unadjusted volume, or adjusted volume (user selectable).

Power Supplies

120 VAC PS with alkaline battery (Div-2)
120 VAC PS and I.S. barrier with alkaline battery (Div-1)
Solar panel and rechargeable battery

Unique Parameters

(configured into separate item codes)
AAT serial number
Mechanical output factor (Kmo)
Main rotor factor (Km)
Sense rotor factor (Ks)
Average relative adjustment (Abar)

Computed Parameters

(available as separate item codes)

☐ Adjusted volume
☐ High-resolution adjusted volume
☐ Unadjusted volume
☐ Adjusted volume flow rate
☐ Unadjusted volume dial rate
☐ Instantaneous Delta-A
☐ Average Delta-A
☐ Main rotor frequency
☐ Sense rotor frequency

Alarms

(in addition to standard Mini-AT alarms)

☐ Level 1 Delta-A alarm (Normal Alarm)
☐ Level 2 Delta-A alarm (Abnormal Alarm)
☐ Pulsing gas alarm
☐ Internal fault

Outputs

☐ Adjusted volume
(low-frequency pulses to Mini-AT Board)

☐ Unadjusted volume
(low- frequency pulses to Mini-AT Board)

☐ Adjusted volume pulses
(low-frequency Form-A volume pulses to RTU)

☐ Adjusted volume pulses
(high-frequency Form-A volume pulses to RTU, via Turbo Frequency Board)

☐ 4-20 mA analog output signal
(user-selectable Delta-A or adjusted volume flow rate)

Mini-AT Volume Inputs

(user-selectable via item code)

☐ Uncorrected volume
(from reed switches if meter-mounted)

☐ Unadjusted volume (from TIB)

☐ Adjusted volume (from TIB)

Mercury Turbo Monitor

Computes AAT Algorithms for Sensus Auto-Adjust® Turbo-Meters

Mercury Instruments offers its Turbo Monitor, which interfaces directly to a Sensus Auto-Adjust Turbo-Meter. The Turbo Monitor provides similar features as the Sensus SER (Standard Electronic Readout), meaning it performs all the AAT algorithms required to compute self-checking and self-adjusting equations.

Other features include:

☐ Remotely monitors outputs for adjusted volume
☐ Pulses, volume flow rate or Delta-A
☐ Level I and Level 2 Delta-A alarms with separate Form A output channels User-defined alarm limits
☐ Pulsating gas alarm
☐ 4-20 mA output signal for either Delta A or adjusted volume
☐ Optional High-frequency Output Board (0-10000Hz)
☐ Approved for Class 1, Div-1 and Div-2 (USA)
☐ Mounts to meter's instrument drive to record mechanical uncorrected volume
☐ Mercury MasterLink software
☐ Live graphing of main rotor frequency, senses rotor frequency, Delta-A and adjusted volume flow rate
☐ 4-year warranty
☐ CSA approved for Class 1, Div-2

Power Supplies:

☐ 120 VAC PS with alkaline battery (Div-2)
☐ 120 VAC PS and I.S. batteries with alkaline battery (Div-1)
☐ Solar panel and rechargeable battery

Parameters

(configured into separate item codes)

☐ AAT serial number
☐ Mechanical output factor (Kmo)
☐ Main rotor factor (Km)
☐ Sense rotor factor (Ks)
☐ Average relative adjustment (Abar)

Computed Parameters
(available as separate item codes)

☐ Adjusted volume
☐ High-resolution adjusted volume
☐ Unadjusted volume
☐ Adjusted volume flow rate
☐ Unadjusted volume flow rate
☐ Instantaneous Delta-A
☐ Average Delta-A
☐ Main rotor frequency
☐ Sense rotor frequency Alarms
☐ Level 1 Delta-A alarm
☐ Level 2 Delta-A alarm
☐ Pulsing gas alarm
☐ Internal fault

Outputs
☐ Level 1 Delta-A alarm (Form-A alarm pulse)
☐ Level 2 Delta-A alarm (Form-A alarm pulse)
☐ Adjusted volume (Form-A volume pulse)
☐ Adjusted volume flow rate or Delta-A
(4-to-20mA analog)
☐ Main rotor frequency (buffered)
☐ Sense rotor frequency (buffered)

LCD items
(default display = adjusted volume)

☐ Alarms (if present)
☐ Display test
☐ Adjusted volume
☐ Unadjusted volume
☐ Battery voltage
☐ Live Main Hz

The Turbine Interface Board is the primary component providing excitation voltage to the sensors for the Sensus Turbine Meter.
The TIB board also provides several RS 232 serial data ports for local and remote communications.

GOE 07 Gas Odorising Plant

- Operates on the suction principle
- Diaphragm pump controlled according to flow rate
- Integrated hand pump for trouble-free filling from the interchangeable container
- Interchangeable container according to DIN 30650
- With 5 l – backup container
- Unit on assembly plate

Max. back pressure

- 40 bar

Max. output

- Odorising up to 100,000 Nm^3/h, depending on concentration of odoriser

Options

- Flow monitors
- Type for sulphur-free odoriser
- Odoriser-flow-rate measuring
- High-pressure rinsing and venting device

Special designs

- Odorising plant with backup pump for manual switchover in case of operating pump failure
- Complete odorising plants (odorising plant and controlling device in cabinet) available upon request

GOE 2000 Gas Odorising Plant

- ☐ Operates on the injection principle
- ☐ Diaphragm pump controlled according to flow rate
- ☐ Conveyance of odoriser from interchangeable container on the principle of communicating pipes
- ☐ Interchangeable container according to DIN 30650
- ☐ With 17 or 35 l – backup container
- ☐ Unit on assembly plate

Max. back pressure

- ☐ 80 bar

Max. output

- ☐ Odorising up to 250,000 Nm^3/h, depending on concentration of odoriser

Options

- ☐ Continuous level measuring
- ☐ Flow monitors
- ☐ Odoriser-flow-rate measuring
- ☐ High pressure rinsing and venting device

Special designs

- ☐ Odorising plant with backup pump for manual switchover in case of operating pump failure
- ☐ Complete odorising plants (odorising plant and controlling device in cabinet) available at request

GOE-SO1/GOE-SO1P Gas Odorising Plant

Special designs with stationary odoriser container

- Operates on the injection principle
- Diaphragm pump controlled according to flow rate
- Gravity-assisted conveyance of odoriser from store tank
- Continuous setting of odoriser concentration
- Filling of storage tank without interrupting operation is possible
- Container for odoriser from 200 to 1,200 l
- Can be used for all standard odorisers, (e.g., THT, Mercaptans, etc.)
- Extension of working area with additional pumps
- Low maintenance

Max. back pressure

- 80 bar

Max. output (with pump)

- Odorising up to 250,000 Nm^3/h, depending on concentration of odoriser

Options

- Continuous level measuring
- Type for sulphur-free odoriser
- Odoriser flow rate measuring
- Protection against overfilling

OSG 2000 Odoriser Controller

- ☐ Can be used for all RMG gas odorising plants
- ☐ Based on stored program control
- ☐ Modular design
- ☐ Individual adaptation possible
- ☐ Addition and subtraction of external volume signals
- ☐ Monitoring of conveyance and filling level with alarm
- ☐ 5 relay outputs
- ☐ Internal pulse generator
- ☐ Disconnector input signal (explosion protection)
- ☐ Calculation of odoriser concentration (optional)

Body options

- ☐ Body with walls
- ☐ 19" drawer-type panel
- ☐ Decentralised design with operation and control units at different places

Supply voltage

- ☐ 230 VAC

7 EU-4/7 IG-4 Odoriser Controller

Can be used for gas odorising plants GOE 07

Properties:

- ☐ Integrated pulse divider
- ☐ Internal pulse generator
- ☐ Automatic or manual operation
- ☐ Disconnector input signal (explosion protection)
- ☐ Relay outputs for malfunction messages
- ☐ Extendable with invigilator for:
  - – conveyance of odoriser
  - – filling level of backup container
  - – filling level of interchangeable container
- ☐ Body with walls (7 IG-4) or 19"-plug-in rack (7 EU-4)

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Assessment of Heat Demand for Pre-heater Circuits

When natural gas reduces in pressure (e.g., in gas pressure regulators), the gas also cools down. This drop in temperature is called the“Joule-Thomson effect.”

Under certain conditions (e.g., high inlet pressure or pressure differences), it is necessary to pre-heat the gas by means of a pre-heater.

The following rough calculations are for the required output of the pre-heater or boiler:

$$P = Q_b \cdot \Delta t_{total} \cdot \rho_b \cdot c_p \cdot \frac{1}{3{,}600} \text{ in kW}$$

P	=	Heat demand in kW
Q_b	=	Volume of gas/gas flow rate in m^3/h
Δt_{total}	=	Total temperature = $\Delta t_1 + \Delta t_2$ in K
Δt_1	=	Joule-Thomson effect = $(p_u - p_d) \cdot \mu_{JT,m}$ in K or °C ($\mu_{JT,m} \approx 0.5$)
Δt_2	=	Temperature difference between the desired gas temperature at the outlet after extension and min. inlet temperature in degrees K or C
c_p	=	Specific heat of natural gas is about 2.05 kJ/(kg · K) for high-caloric gas and about 1.86 kJ/(kg · K) for low-caloric gas
ρ_b	=	Standard density of natural gas (0.83 kg/m^3)

Example:

Assumptions:	Volume of the gas	Q_b = 5000 m^3/h (high caloric gas)
	Inlet pressure	p_u = 70 bar
	Outlet pressure	p_d = 4 bar
	Gas inlet temperature	t_u = 0 °C (273.15 K)
	Intended gas temperature at the outlet	t_d = 5 °C (278.15 K)

$\Delta t_1 = (p_u - p_d) \cdot \mu_{JT,m} = (70 - 4) \cdot 0.5 = 33$ K or °C

$\Delta t_2 = t_d - t_u = 5 - 0 = 5$ K or °C

$\Delta\ t_{total} = \Delta t_1 + \Delta t_2 = 33 + 5 = 38$ K or °C

$$P = Q_b \cdot \Delta t_{total} \cdot \rho_b \cdot c_p \cdot \frac{1}{3{,}600} = 5{,}000 \cdot 38 \cdot 0{,}83 \cdot 2{,}05 \cdot \frac{1}{3{,}600} = 90 \text{ kW}$$

Considering a boiler efficiency of η = 0.85 including pre-heater, the **required heat output P** is = 106 kW.

*see “Grundlagen der Gastechnik” by Günter Cerbe

Process Visualisation and Automation:

- ☐ Display of readings
- ☐ Can be combined with a stored program control for automation
- ☐ Creation of user-specific process graphs, etc.
- ☐ Design according to customer specifications
- ☐ Compatible with standard operating systems
- ☐ Can be integrated with existing equipment
- ☐ Can be connected to control devices via Profibus or Modbus

Other devices:

Other devices

- ☐ Oxygen measuring devices
- ☐ Disconnecting switches (explosion protection)
- ☐ Frequency current converter
- ☐ Pulse-adding devices
- ☐ Pulse measuring diaphragm
- ☐ Power supply
- ☐ Current separation transferring device
- ☐ Device for allotment of frequencies
- ☐ Bus coupler

Gas Analysis Container:

- ☐ For measuring and analysis systems EMC 500 and PGC 9000 VC
- ☐ Complete systems with measuring unit, peripheral equipment and electronics
- ☐ For explosion-proof and non-explosion-proof devices
- ☐ Portable systems (e.g., compact design for EMC 500 or installation of analysis system on a trailer)

Weather-resisting Protection Cabinets

- ☐ For gas odorising plants
- ☐ Completely assembled with additional devices (e.g., pressure reducer or heater)

Services

- ☐ Planning of electrical equipment
- ☐ Assembly, commissioning and maintenance of gas measuring devices and odorising plants
- ☐ Inspection services
- ☐ Service
- ☐ Re-calibrations
- ☐ Product trainings

Pipe Protection

Protection System

-Tube protection against deflagration

-Tube protection against detonation

-Protection against continuous fire

Approval

EC-type examination certificate based on to directive 94/9/EC, according to ATEX 95 and EN 12874

Protection

Gas/air or steam/air mixtures of the following explosion groups:

– I (methane)	NSW ≥ 1.14 mm
– IIA (D)	NSW ≥ 0.90 mm

Pipe Sizes

1/2", 3/4", 1", 1 1/4"

Connection Standards

-Rp according to ISO 7-1 (DIN 2999)

-BSP according to BS 21

-NPTF according to ANSI B1.20.3

Materials

Strip protection:

-Stainless steel

Body/cap:

-Stainless steel, carbon steel

Coating

Optional

Pipe Protection

Protection System

-Tube protection against deflagration

-Tube protection against detonation

-Protection against continuous fire

Approval

EC-type examination certificate based on directive 94/9/EC, according to ATEX 95 and EN 12874

Protection

Gas/air or steam/air mixtures of the following explosion groups:

– I (methane) NSW ≥ 1.14 mm

– IIA (D) NSW ≥ 0.90 mm

Pipe Sizes

DN15, DN20, DN25, DN32

1/2", 3/4", 1", 1 1/4"

Connection Standards

-DIN 2501 PN10

-ANSI B16.5 – 150 RF

Materials

Strip protection:

Stainless steel

Body/cap:

Carbon steel, stainless steel

Coating

Optional

Pipe Protection

Protection System

-Tube protection against deflagration

-Tube protection against detonation

Approval

EC-type examination certificate based on directive 94/9/EG, according to ATEX 95 and EN 12874

Protection

Gas/air or steam/air mixtures of the following explosion groups:

– I (methane)	NSW ≥ 1.14 mm
– IIA (D)	NSW ≥ 0.90 mm
– IIB3 (C)	NSW ≥ 0.65 mm
– IIC (B)	NSW ≥ 0.50 mm

Pipe Sizes

1/8", 1/4", 3/8", 1/2"

Connection Standards

-Rp according to ISO 7-1 (DIN 2999)

-BSP according to BS 21

-NPTF according to ANSI B1.20.3

Materials

Strip protection:

Stainless steel, special alloys

Body/cap:

Stainless steel, special alloys

Protection System

Tube protection against deflagration

Approval

EC-type examination certificate based on directive 94/9/EG, according to ATEX 95 and EN 12874

Protection

Gas/air or steam/air mixtures of the following explosion groups:

– I (methane) NSW ≥ 1.14 mm

– IIA (D) NSW ≥ 0.90 mm

Pipe size

11/2“

Connection Standards

-Rp according to ISO 7-1 (DIN 2999)

-BSP according to BS 21

-NPTF according to ANSI B1.20.3

Materials

Strip protection:

Stainless steel

Body/cap:

Carbon steel, stainless steel

Coating: Optional

Temperature Sensor

Resistance thermometer with ignition protection type

– Inherently safe (E Ex i)

– Pressure-resistant enclosure (E Ex d)

Protection System

Tube protection against deflagration

Approval

EC-type-examination certificate based on directive 94/9/EC, according to ATEX 95 and EN 12874

Protection

Gas/air or steam/air mixtures of the explosion groups:

– I (methane) NSW ≥ 1.14 mm

– IIA (D) NSW ≥ 0.90 mm

Pipe Sizes

-DN40

11/2“

Connection Standards

-DIN 2501 PN10

-ANSI B16.5 – 150 RF

Materials

Strip protection:

Stainless steel

Body/cap:

Carbon steel, stainless steel

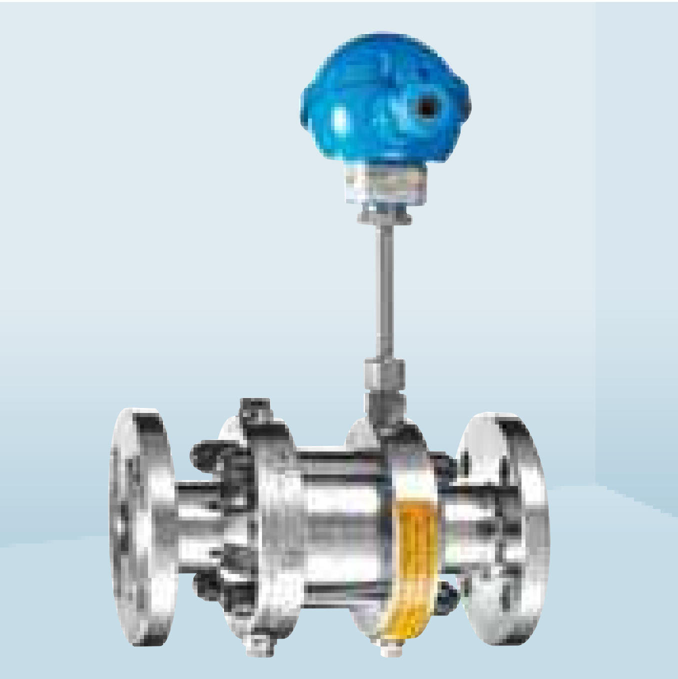
Coating: Optional

Temperature Sensor

Resistance thermometer with ignition protection type

– Inherently safe (E Ex i)

– Pressure-resistant enclosure (E Ex d)



Protection System
-Tube protection against deflagration
-Tube protection against detonation

Approval
EC-type examination certificate based upon Directive 94/9/EG, according to ATEX 95 and EN 12874

Protection
Gas/air or steam/air mixtures of the explosion groups:

– I (methane)	NSW ≥ 1.14 mm
– IIA (D)	NSW ≥ 0.90 mm
– IIB3 (C)	NSW ≥ 0.65 mm
– IIC (B)	NSW ≥ 0.50 mm

Pipe Sizes
DN25, DN32, DN40, DN50, DN65, DN80
1", 1 1/4", 1 1/2", 2", 2 1/2", 3"

Connection Standards
-DIN 2501 PN10
-ANSI B16.5 – 150 RF

Materials
Strip protection:
  Stainless steel, special alloys
Rust cage:
  Stainless steel, special alloys
Body:
  Carbon steel, stainless steel,
  Special alloys

Coating: Optional

Temperature Sensor
Resistance thermometer with ignition protection type
- Inherently safe (E Ex i)
- Pressure-resistant enclosure (E Ex d)

Protection System

-Tube protection against deflagration

-Tube protection against detonation

Approval

EC-type examination certificate based upon Directive 94/9/EG, according to ATEX 95 and EN 12874

Protection

Gas/air or steam/air mixtures of the explosion groups:

– I (methane)	NSW ≥ 1.14 mm
– IIA (D)	NSW ≥ 0.90 mm
– IIB3 (C)	NSW ≥ 0.65 mm
– IIC (B)	NSW ≥ 0.50 mm

Pipe Sizes

1", 1 1⁄4", 1 1⁄2", 2", 2 1⁄2", 3"

Connection Standards

-Rp according to ISO 7-1 (DIN 2999)

-BSP according to BS 21

-NPTF according to ANSI B1.20.3

Materials

Strip protection:
  Stainless steel, special alloys

Rust cage:
  Stainless steel, special alloys

Body:
  Carbon steel, stainless steel, special alloys

Coating: Optional

Temperature Sensor

Resistance thermometer with ignition protection type

– Inherently safe (E Ex i)

– Pressure-resistant enclosure (E Ex d)

Pipe Protection

Protection System

-Tube protection against deflagration

-Tube protection against detonation

Approval

EC-type examination certificate based upon Directive 94/9/EG, according to ATEX 95 and EN 12874

Protection

Gas/air or steam/air mixtures of the following explosion groups:

- I (methane) NSW ≥ 1.14 mm
- IIA (D) NSW ≥ 0.90 mm
- IIB3 (C) NSW ≥ 0.65 mm
- IIC (B) NSW ≥ 0.50 mm

Pipe Sizes

DN50, DN65, DN80, DN100, DN125, DN150, DN200, DN250, DN300, DN350, DN400

2", 2 1/2", 3", 4", 5", 6", 8", 10", 12", 14", 16"

Connection Standards

-ISO 7005 PN10

-ANSI B16.5 – 150 RF

Materials

Strip protection:

Stainless steel, special alloys

Rust cage:

Stainless steel, special alloys

Body:

Ductile iron, carbon steel, stainless steel, special alloys

Coating: Optional

Temperature Sensor

Resistance thermometer with ignition protection type

- Inherently safe (E Ex i)
- Pressure-resistant enclosure (E Ex d)

End-of-line Flame Arrester

Protection

Gas/air or steam/air mixtures of the following explosion groups:

– I (methane) NSW ≥ 1.14 mm

– IIA (D) NSW ≥ 0.90 mm

Pipe Sizes

DN40, DN50, DN65, DN80

1 1/2", 2",2 1/2", 3"

Connection Standards

-ISO 7005 PN10

-ANSI B16.5 - 150 RF

-Rp according to ISO 7-1 (DIN 2999)

-BSP according to BS 21

-NPTF according to ANSI B1.20.3

Materials

Strip protection:
Stainless steel

Body:
Carbon steel, stainless steel

Hood:
Stainless steel

Coating: Optional

Protection system

End-of-line deflagration and continuous burning flame arrester

Approval

EC-type examination certificate based upon Directive 94/9/EG, according to ATEX 95 and EN 12874

End-of-line Flame Arrester

Protection

Gas/air or steam/air mixtures of the following explosion groups:

– I (methane) NSW ≥ 1.14 mm

– IIA (D) NSW ≥ 0.90 mm

Pipe Sizes

DN25, DN32, DN40, DN50

1", 1 1⁄4", 1 1⁄2", 2"

Connection Standards

-ISO 7005 PN10

-ANSI B16.5 – 150 RF

-Rp according to ISO 7-1 (DIN 2999)

-BSP according to BS 21

-NPTF according to ANSI B1.20.3

Materials

Strip protection:
Stainless steel

Body:
Carbon steel, stainless steel

Hood:
Plexiglass

Coating: Optional

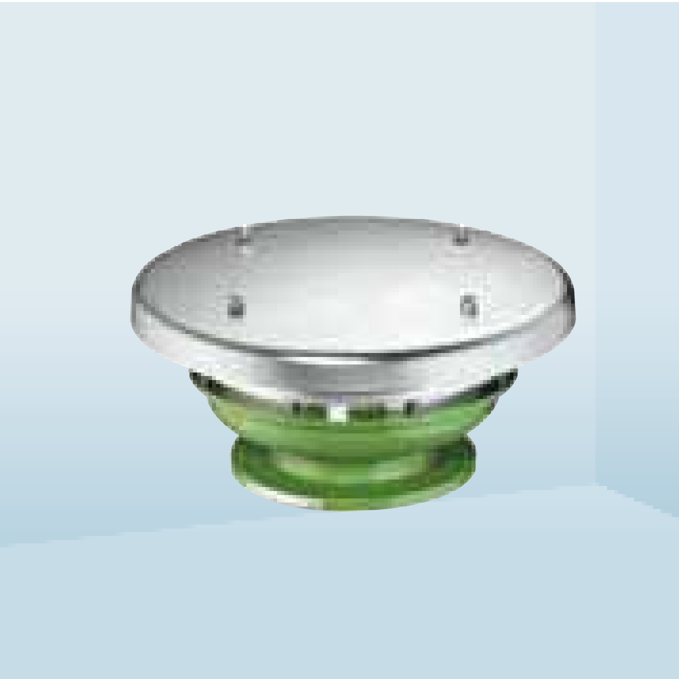
Protection System

End-of-line deflagration and continuous burning flame arrester

Approval

EC-type examination certificate based upon Directive 94/9/EG, according to ATEX 95 and EN 12874

End-of-line Flame Arrester



Protection System
End-of-line deflagration arrester

Approval
EC-type examination certificate based upon Directive 94/9/EG, according to ATEX 95 and EN 12874

Protection
Gas/air or steam/air mixtures of the following explosion groups:

– I (methane)	NSW ≥ 1.14 mm
– IIA (D)	NSW ≥ 0.90 mm
– IIB3 (C)	NSW ≥ 0.65 mm
– IIC (B)	NSW ≥ 0.50 mm

Pipe Sizes
DN25, DN32, DN40, DN50, DN65, DN80, DN100, DN125, DN150, DN200, DN250, DN300, DN350, DN400

1", 1 1⁄4", 1 1⁄2", 2", 2 1⁄2", 3", 4", 5", 6", 8", 10", 12", 14", 16"

Connection Standards
-ISO 7005 PN10

-ANSI B16.5 – 150 RF

Materials
Strip protection:
  Stainless steel, special alloys

Body:
  Carbon steel, stainless steel, special alloys

Hood:
  Stainless steel

Coating: Optional

End-of-line Flame Arrester

Pipe Sizes

DN25, DN32, DN40, DN50, DN65, DN80, DN100, DN125, DN150, DN200, DN250, DN300, DN350, DN 400

1", 1 1/4", 1 1/2", 2", 2 1/2", 3", 4", 5", 6", 8", 10", 12", 14", 16"

Connection Standards

-ISO 7005 PN10

-ANSI B16.5 – 150 RF

Materials

Strip protection:
Stainless steel, special alloys

Body:
Carbon steel, stainless steel, special alloys

Hood:
Stainless steel

Coating: Optional

Temperature Sensor:

Resistance thermometer with ignition protection type

– Inherently safe (E Ex i)

– Pressure-resistant enclosure (E Ex d)

Protection System

End-of-line deflagration and short-time-burning flame arrester

Approval

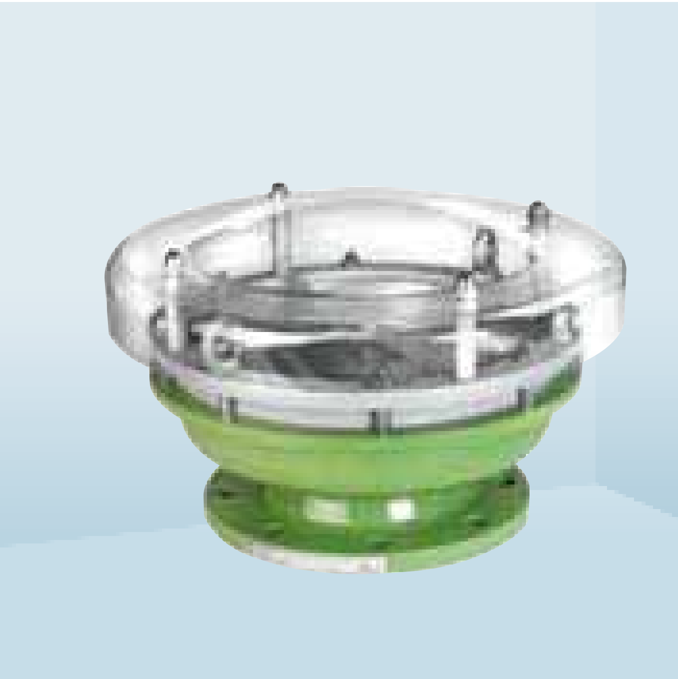
EC-type examination certificate based upon Directive 94/9/EG, according to ATEX 95 and EN 12874

Protection

Gas/air or steam/air mixtures of the following explosion groups:

– I (methane)	NSW ≥ 1.14 mm
– IIA (D)	NSW ≥ 0.90 mm
– IIB3 (C)	NSW ≥ 0.65 mm
– IIC (B)	NSW ≥ 0.50 mm

End-of-line Flame Arrester



Protection

Gas/air or steam/air mixtures of the following explosion groups:

- I (methane) NSW ≥ 1.14 mm
- IIA (D) NSW ≥ 0.90 mm
- IIB3 (C) NSW ≥ 0.65 mm
- IIC (B) NSW ≥ 0.50 mm

Pipe Sizes

DN25, DN32, DN40, DN50, DN65, DN80, DN100, DN125, DN150, DN200

1", 1 1/4", 1 1/2", 2", 2 1/2", 3", 4", 5", 6", 8"

Connection Standards

-ISO 7005 PN10

-ANSI B16.5 – 150 RF

Materials

Strip protection:
 Stainless steel, special alloys

Body:
 Carbon steel, stainless steel, special alloys

Hood:
 Plexiglass

Coating: Optional

Protection System

End-of-line deflagration arrester

Approval

EC-type examination certificate based upon Directive 94/9/EG, according to ATEX 95 and EN 12874

End-of-line Flame Arrester

Pipe Sizes

DN25, DN32, DN40, DN50, DN65, DN80, DN100, DN125, DN150, DN200
1", 1 1/4", 1 1/2", 2", 2 1/2", 3", 4", 5", 6", 8"

Connection Standards

-ISO 7005 PN10
-ANSI B16.5 – 150 RF

Materials

Strip protection:
Stainless steel, special alloys
Body:
Carbon steel, stainless steel, special alloys
Hood:
Plexiglass

Coating: Optional

Temperature Sensor:

Resistance thermometer with ignition protection type
- Inherently safe (E Ex i)
- Pressure-resistant enclosure (E Ex d)

Protection System

End-of-line deflagration and short-time-burning flame arrester

Approval

EC-type examination certificate based upon Directive 94/9/EG, according to ATEX 95 and EN 12874

Protection

Gas/air or steam/air mixtures of the following explosion groups:

– I (methane)	NSW ≥ 1.14 mm
– IIA (D)	NSW ≥ 0.90 mm
– IIB3 (C)	NSW ≥ 0.65 mm
– IIC (B)	NSW ≥ 0.50 mm

Over-pressure Valve

Pipe Sizes

DN50, DN80

2", 3"

Connection Standards

-ISO 7005 PN10

-ANSI B16.5 – 150 RF

Materials

Strip protection:
  Stainless steel, special alloys

Valve insert:
  Stainless steel, special alloys

Valve seat:
  Stainless steel, special alloys

Body:
  Ductile iron, stainless steel

Set Pressure:

Over-pressure +5 mbar to +50 mbar

Protection System

End-of-line deflagration and continuous-burning flame arrester

Approval

EC-type examination certificate based upon Directive 94/9/EG, according to ATEX 95 and EN 12874, EN 13463-1 and EN 13463-5

Protection

Gas/air or steam/air mixtures of the following explosion groups:

– I (methane) NSW ≥ 1.14 mm

– IIA (D) NSW ≥ 0.90 mm

Over-pressure Valve

Pipe Sizes

DN50, DN80

2", 3"

Connection Standards

-ISO 7005 PN10

-ANSI B16.5 – 150 RF

Materials

Strip protection:
  Stainless steel, special alloys

Valve insert:
  Stainless steel, special alloys

Valve seat:
  Stainless steel, special alloys

Body:
  Ductile iron, stainless steel

Protection System

End-of-line deflagration arrester

Set Pressure:

Over-pressure +5 mbar to +50 mbar

Approval

EC-type examination certificate based upon Directive 94/9/EG, according to ATEX 95 and EN 12874, EN 13463-1 and EN 13463-5

Protection

Gas/air or steam/air mixtures of the following explosion groups:

– I (methane)	NSW ≥ 1.14 mm
– IIA (D)	NSW ≥ 0.90 mm
– IIB3 (C)	NSW ≥ 0.65 mm

Under-pressure Valve

Pipe Sizes
DN50, DN80, DN100, DN150, DN200, DN250

2", 3", 4", 6", 8", 10"

Connection Standards
-ISO 7005 PN10

-ANSI B16.5 – 150 RF

Materials
Strip protection:
  Stainless steel, special alloys

Valve insert:
  Stainless steel, special alloys

Valve seat:
  Stainless steel, special alloys

Body:
  Ductile iron, stainless steel

Set Pressure:
Under-pressure -2.5 mbar to -50 mbar

Protection System
End-of-line deflagration arrester

Approval
EC-type examination certificate based upon Directive 94/9/EG, according to ATEX 95 and EN 12874, EN 13463-1 and EN 13463-5

Protection
Gas/air or steam/air mixtures of the following explosion groups:

– I (methane) NSW ≥ 1.14 mm

– IIA (D) NSW ≥ 0.90 mm

– IIB3 (C) NSW ≥ 0.65 mm

Over-pressure and Under-pressure Valves

Protection System
End-of-line deflagration arrester

Approval
EC-type examination certificate based upon Directive 94/9/EG, according to ATEX 95 and EN 12874, EN 13463-1 and EN 13463-5

Protection
Gas/air or steam/air mixtures of the following explosion groups:

– I (methane) NSW ≥ 1.14 mm

– IIA (D) NSW ≥ 0.90 mm

– IIB3 (C) NSW ≥ 0.65 mm

Pipe Sizes
DN50, DN80, DN100, DN150, DN200, DN250

2", 3", 4", 6", 8", 10"

Connection Standards
-ISO 7005 PN10

-ANSI B16.5 - 150 RF

Materials
Strip protection:
Stainless steel, special alloys

Valve insert:
Stainless steel, special alloys

Valve seat:
Stainless steel, special alloys

Body:
Ductile iron, stainless steel

Set Pressure:
Over-pressure +5 mbar to +50 mbar

Under-pressure -2.5 mbar to -50 mbar

Over-pressure and Under-pressure Valves

Pipe Sizes

DN50

2"

Connection Standards

-ISO 7005 PN10

-ANSI B16.5 - 150 RF

Materials

Strip protection:
  Stainless steel, special alloys

Valve insert:
  Stainless steel, special alloys

Valve seat:
  Stainless steel, special alloys

Body:
  Ductile iron, stainless steel

Protection System

End-of-line deflagration and continuous-burning flame arrester

Approval

EC-type examination certificate based upon Directive 94/9/EG, according to ATEX 95 and EN 12874, EN 13463-1 and EN 13463-5

Protection

Gas/air or steam/air mixtures of the following explosion groups:

– I (methane) NSW ≥ 1.14 mm

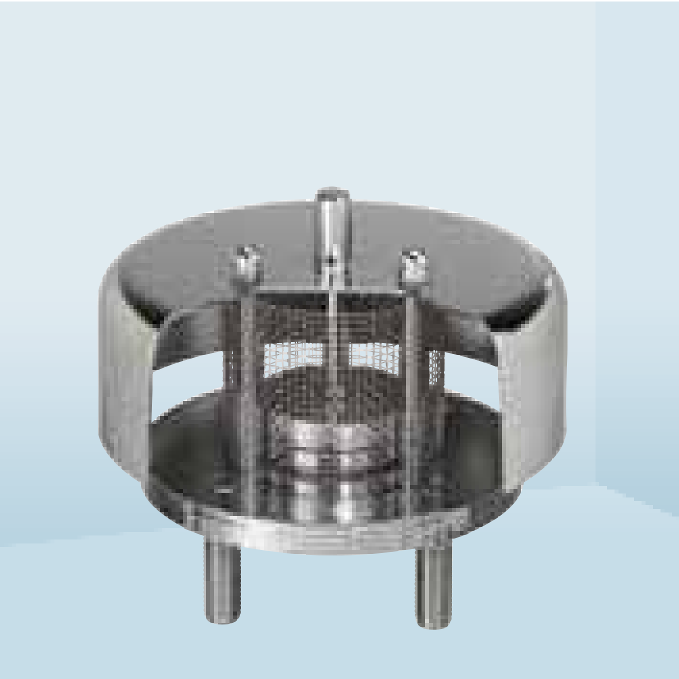
– IIA (D) NSW ≥ 0.90 mm

Set Pressure:

Over-pressure +2.5 mbar to +50 mbar

Under-pressure -3 mbar to -50 mbar

Emergency Vent Valve



Approval

EC-type examination certificate based upon Directive 94/9/EC, according to ATEX 95 and EN 13463-1, EN 13463-5

Protection

Gas/air or steam/air mixtures

II 1/2 G c IIB T X

Pipe Sizes

DN50, DN80, DN100, DN150, DN200, DN250, DN300

2", 3", 4", 6", 8", 10", 12"

Connection Standards

-ISO 7005 PN10

-ANSI B16.5 – 150 RF

Materials

Valve insert:

Stainless steel, special alloys

Valve seat:

Stainless steel, special alloys

Body:

Carbon steel, stainless steel

Set Pressure:

Over-pressure +2.5 mbar to +50 mbar

Under-pressure Valve

Approval

EC-type examination certificate based on Directive 94/9/EC, according to ATEX 95 and EN 13463-1, EN 13463-5

Protection

Gas/air or steam/air mixtures

II 1/2 G c IIB T X

Pipe Sizes

DN50, DN80, DN100, DN150, DN200, DN250

2", 3", 4", 6", 8", 10"

Connection Standards

-ISO 7005 PN10

-ANSI B16.5 – 150 RF

Materials

Valve insert:

Stainless steel, special alloys

Valve seat:

Stainless steel, special alloys

Body:

Ductile iron, stainless steel

Set Pressure:

Under-pressure -2.5 mbar to -50 mbar

Over-pressure and Under-pressure Valves

Approval
EC-type examination certificate based on Directive 94/9/EC, according to ATEX 95 and EN 13463-1, EN 13463-5

Protection
Gas/air or steam/air mixtures

II 1/2 G c IIB T X

Pipe Sizes
DN50, DN80, DN100, DN150, DN200, DN250

2", 3", 4", 6", 8", 10"

Connection Standards
-ISO 7005 PN10

-ANSI B16.5 – 150 RF

Materials
Valve insert:

Stainless steel, special alloys

Valve seat:

Stainless steel, special alloys

Body:

Ductile iron, stainless steel

Set Pressure:
Over-pressure +5 mbar to +50 mbar

Under-pressure -50 mbar to -2.5 mbar

RANGE OF BALL VALVES FOR GAS, CRUDE OIL, WATER AND OTHER MEDIA																					
Class (ANSI)	PN																				
2500	420						NOK			NOK		NOK									
1500	260						NOK NOS			NOK NOS		NOK NOS	NOK NOS								
900	150						NOK			NOK		NOK	NOK		NOK NOS	NOK NOS	NOK NOS			NOK NOS	
600	110						NOK NOS		KDK KDS	KDK KDS KDKa KDSa NOK		KDK KDS	KDK KDS		NOK NOS	NOK NOS	NOK NOS	NOK NOS	NOK NOS	NOK NOS	NOK NOS
	100	KOZ	KOZ	KOC KOK KOZ	KOC KOK KOZ	KOC KOK KOZ	KOC KOK KOZ NOK		KDK KDS	KDK KDKa NOK		KDK	KDK		NOK	NOK	NOK	NOK	NOK	NOK	NOK
	63								KDK	KDK KDKa		KDK	KDK NOK		NOK	NOK	NOK	NOK	NOK	NOK	NOK
	50								KDK	KDK		KDK	KDK								
	40				KOK	KOK	KOK														
	25							BVs BVn	BVs BVn	BVs BVn	BVs BVn	BVs BVn	BVs BVn	BVs BVn	BVs BVn	BVs BVn	NOK NOS	NOK NOS	NOK NOS	NOK NOS	NOK NOS
150	20								BVn	BVn	BVn	BVn	BVn	BVn	BVn	BVn	NOK	NOK	NOK	NOK	NOK
	16			KOM	KOM	KOM	KOM	BVk BVn	BVk BVn	BVk BVn	BVk BVn	BVk BVn	BVk BVn KPK	BVn	BVk BVn	BVn	NOK	NOK	NOK	NOK	NOK
	DN	6	8	10	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	500
		3/4"	5/16"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	20"

Pipe sizes without designation upon enquiry

KDKa, KDSa – ball valves with metal/metal sealing

Use

A. GAZOMET ball valves are predominantly used in the gas and petroleum industries.

Applications:

- for gas distribution
- for gas transport
- in petrochemistry
- for gas exploration
- for below-ground gas storage facilities

B. GAZOMET ball valves are also used in other branches, such as:

- Aggressive media
- Hot water
- Fuels

The current ball valve programme includes diameters from DN6 to DN500 and pressures ranging from PN 6 to PN 420. Standard ball valves can be operated at temperatures ranging from -30 °C to +60 °C. Special designs, on the other hand, can be operated from -50 °C to +150 °C.

Flange

Ball valve flanges are produced, on principle, according to standards PN-EN 1092-1 or ASME B 16.5 (according to PN-ISO 7005-1).

External Corrosion Protection

Above-ground types:

Primary coat of surface

- Blasting and grinding – Class Sa21/2 according to PN-ISO 8501-1
- Rinsing and phosphate coating with fluid SUR-TEC
- Rinsing with alcohol ISOPROPANOL

Basic coating

- Epoxy colour – SEEVENAX primary coat 144 (colour: white), thickness of layer: 40 – 80 µm

Protective coating

- Polyurethane colour – ALEXIT coating 460 – 80 (colour: yellow, RAL 1023), thickness of layer: 80 – 120 µm

Below-ground types - set I:

Primary coat of surface

- Blasting and grinding – Sa21/2 according to PN-ISO 8501-1 isolating coat
- Polyurethane coating – PROTEGOL 32 – 55 (colour: black), coating Class B (thickness of layer: >1.5 mm) according to standards EN 10290 and DIN 30677 T.5

Below-ground types – set II:

Primary coat of surface

- Blasting and grinding – Class Sa21/2 according to PN-ISO 8501-1
- Rinsing with alcohol ISOPROPANOL

Basic coating

- Epoxy colour – SEEVENAX primary coat 144 (colour: white), thickness of layer: 40 – 80 µm

Protective coating

- Polyurethane colour – ALEXIT coating 460 – 80 (colour: yellow, RAL 1023), thickness of layer: 170 – 210 µm

Corrosion protection possible in different paints and colours, if desired.

Tests

Ball valves are tested in comformance with General Specifications worked out according to applicable standards and regulations. However, tests can also be carried out according to American standard API 6D, German standard DIN 3230 T.5, or individual agreement.

The test range of the production series according to RWT includes:

- Strength test – hydraulic test at a pressure of 1.5 x PS*
- External leak test – pneumatic test under pressure
  1.1 x PS*
- Seal test – pneumatic test at a pressure of 0.6 MPa and 1.1 x PS* for each side
- Performance test

Ball valves are manufactured in tightness Class A according to standard PN-EN 12266-1.

Pipeline Test.

Strength and leak tests of integrated ball valves.

Ball Valve in “Open” Position

- Hydraulic test – max. pressure
  1.5 x PS*
- Pneumatic test – max. pressure
  1.25 x PS*

Caution: When filling the pipeline with test medium, the open ball valve has to be closed partly (10°– 20°) so the medium can penetrate the space between the ball and the body. The ball valve must remain in this position during the test.

* PS – max. admissible pressure – specified on the type plate.

Ball Valve in “Closed” Position

- Hydraulic or pneumatic tests – max. pressure PS

Technical Documentation Provided with Delivery

- Technical acceptance certificate 3.1 according to PN-EN 10204
- Declaration of conformity according to 97/23/CE (CE – mark)
- Assembly and operating instructions
- Warranty certificate

Valve Spindle Extension

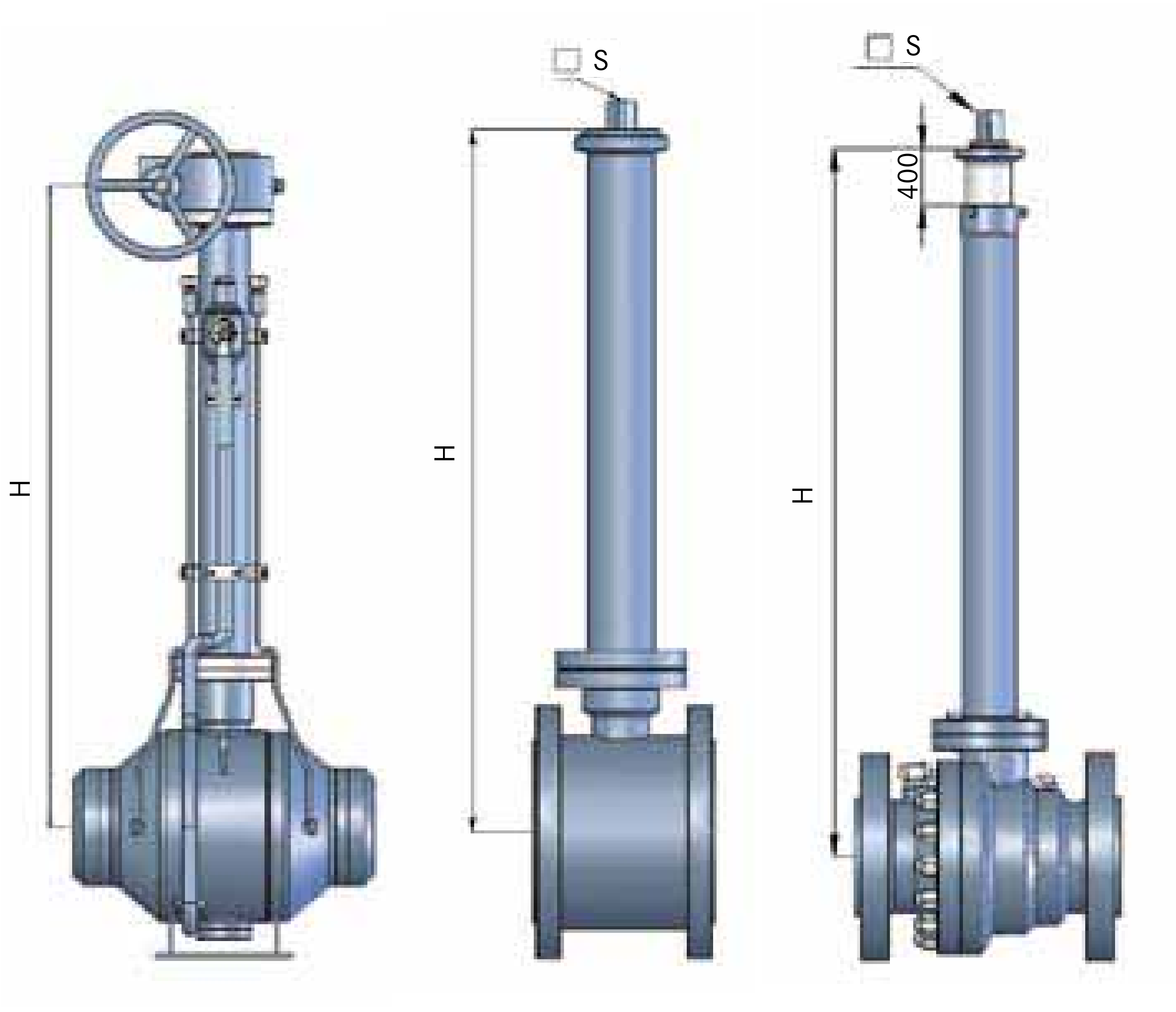
Below-ground ball valves are equipped with extensions. GAZOMET produces two types of extensions:

Rigid Extension (KLo, KL)

This extension has a constant height, which is calculated from the ball valve's axis to the valve spindle or driving axle.

Telescopic Extension (KT)

This extension has a height control (400 mm). The telescopic extension cannot be powered.



KLo KL KT

Valve Spindle Extension

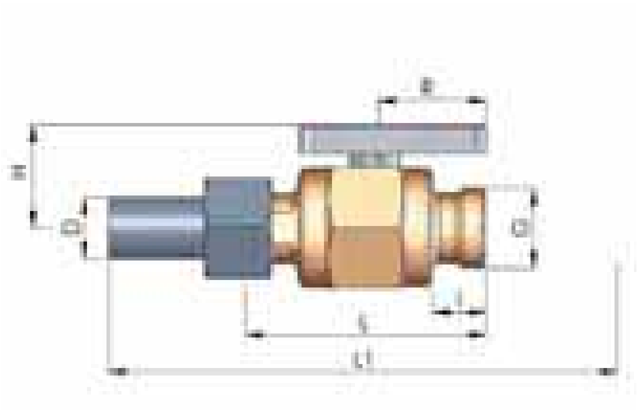
EXTENSION FOR BALL VALVES

Extension	H* in mm	S in mm	Weight in kg	Application with ball valves	
				Type of valve	DN
KT-22-A **KT-22-B** **KT-22-C** KT-22-D	850 to 1,150 1,200 to 1,600 1,600 to 2,000 1,900 to 2,300	22	11.2 14.7 17.5 19.6	BVn, BVs, KDK, KDS	32, 40, 50, 65, 80, 100 40, 50, 80
KT-27-A **KT-27-B** **KT-27-C** KT-27-D	850 to 1,150 1,200 to 1,600 1,600 to 2,000 1,900 to 2,300	27	15.4 to 19.4 19.8 to 23.4 23.4 to 27.4 26.6 to 30.6	BVn, BVs, KDK, KDS	100, 125, 150 100
KL-22	according to agreement	22	-	BVn, BVs, KDK, KDS	32, 40, 50, 65, 80, 100 40, 50, 80
KL-27		27	–	BVn, BVs, KDK, KDS	100, 125, 150
KL-36		36	–	BVn, BVs	200
KL_O		–	–	NOK, NOS	150 – 500

*) Dimensions may vary somewhat, depending on the size and type of valve.

Comments:
1. Dimension H can be changed upon enquiry
2. Valve spindle extensions KL_O are equipped with a plugged block and bleed facility as standard

Threaded Ball Valve



The bi-directional ball valve with full bore can be mounted with the spherical-conical joint in any position. The ball valve body consists of two parts: a body and a screwed connection piece.

The valve spindle meets anti-blow-out requirements and is mounted inside the body with a set of sealings.

The ball is of the "floating" type and sits between the sealing rings, which are located in the body, partially in the connection piece.

Standard Equipment:

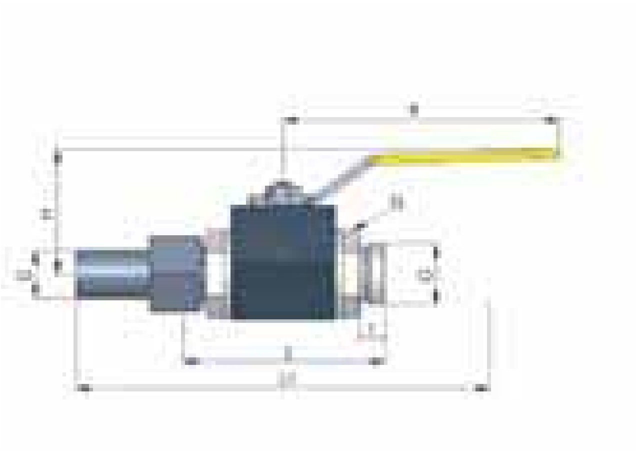
Wrench

Special Equipment:

Connecting elements (muffs)

KOM									
PN	Pipe size DN	Dimensions in mm						Inches	Weight in kg
		L	L_1	H	D	R	l	G	
16	10	52	128	30	14	32	10	G1/2"	0.4
	15	72	158	32	20	38	17	G3/4"	0.6
	20	100	195	43	25.8	45	22	G1"	1.1
	25	130	225	51	32	155	19	G11/4"	2.4

Threaded Ball Valve



The bi-directional ball valve with full bore can be mounted with the spherical-conical joint in any position. The ball valve body consists of a steel body and two screwed connection pieces.

The valve spindle meets anti-blow-out requirements and is mounted inside the body with a set of sealings.

The ball is of the "floating" type and sits between the sealing rings, which are located in the body, partially in the connection piece.

Standard Equipment:

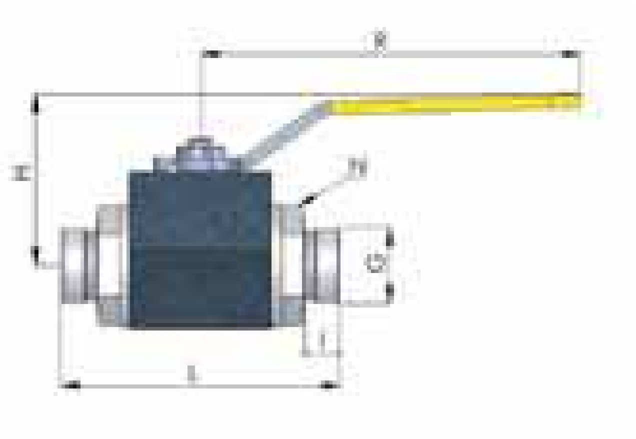
Wrench

Special Equipment:

Connecting elements (muffs)

KOC										
PN	Pipe size DN	Dimensions in mm							Inches	Weight in kg
		L	L1	H	D	R	I	N	G	
100	10	75	150	43	14	94	11	27	G1/2"	0.6
	15	100	185	45	20	94	16	32	G3/4"	0.8
	20	130	225	65	25.8	150	23	41	G1"	1.6
	25	130	225	67	32	150	20	50	G11/4"	2.3

Threaded Ball Valve



The bi-directional ball valve with full bore can be mounted with the tension rings in any position according to standard PN-ISO 8434-1. The ball valve body consists of a steel body and two screwed connection pieces.

The valve spindle meets anti-blow-out requirements and is mounted inside the body, with a set of sealings.

The ball is of the "floating" type and sits between the sealing rings in the connection pieces.

Standard Equipment:

Wrench

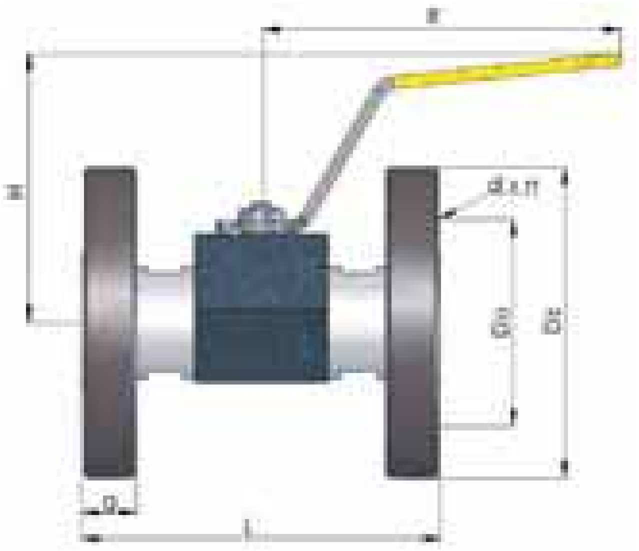
Special Equipment:

Connecting elements (muffs)

KOZ									
PN	Pipe size DN	Dimensions in mm						Connecting pipe Ø	Weight in kg
		L	H	R	I	N	G		
100	6	78	37	94	11	22	M14x1.5	8x1	0.4
	8	78	37	94	11	22	M16x1.5	10x1	0.4
	10	80	43	94	11	27	M18x1.5	12x1	0.6
	15	90	45	94	12	32	M27x2*	18x1.5	0.8
	20	110	65	150	14	41	M30x2	22x1.5	1.6
	25	120	67	150	14	50	M36x2	28x1.5	2.2

*) M26x1.5 according to PN-ISO 8434-1 upon enquiry.

Flange Ball Valve



The bi-directional ball valve with full bore can be mounted in any position. The ball valve body comprises a steel body, two screwed connection pieces and two loose flanges.

The valve spindle meets anti-blow-out requirements and is mounted inside the body, with a set of sealings.

The ball is of the "floating" type and sits between the sealing rings in the connection pieces.

Standard Equipment:

Wrench

Special Equipment:

Connecting elements (e.g., flanges, sealings, bolts, nuts)

KOK										
PN	Pipe size DN	Dimensions in mm							Inches	Weight in kg
		L	H	R	D_Z	g	D_O	d	n	
40	15	130	90	125	95	18	65	14	4	2.6
100		130	90	125	105	22	75	14	4	3.4
40	20	150	112	160	105	20	75	14	4	4.1
100		150	112	160	130	24	90	18	4	5.9
40	25	160	115	160	115	20	85	14	4	6.2
100		160	115	160	140	26	100	18	4	7.8

Flange Ball Valve

The bi-directional ball valve with full bore can be mounted in any position. The ball valve body consists of a welded, inseparable steel body. The ball is of the "floating" type and sits between the sealing rings in the compensation rings.

The selector shaft meets anti-blow-out requirements and is mounted in the body with a set of sealings. The ball and the selector shaft in the ball valve are connected to the universal joint coupling. The valve comes with spring compensation.

Standard Equipment:
Wrench or worm gear pair, plugged block and bleed facility

Special Equipment:
Valve spindle extension, drive, anti-static protection and connecting elements (e.g., flanges, sealings, bolts, nuts)

BVn

	DN	Dimensions in mm											Inches	Weight in kg
		L	H	h	s	P	R	D_k	D_Z	g	D_o	d_o	n	
PN 16	32	130	104,5	30	17	-	200	76	140	18	100	18	4	6
PN 16	40	140	108,5	30	17	-	200	82,5	150	18	110	18	4	6.8
PN 16	50	150	116	30	17	-	200	89	165	18	125	18	4	8.3
PN 16	65	170	127	30	17	-	200	115	185	18	145	18	8*	11
PN 16	80	180	145	35	22***	-	300	140	200	20	160	18	8	14.8
PN 16	100	190	160.5	35	22***	-	300	168	220	20	180	18	8	18
PN 16	125	325	200.5	43	27	-	600	219	250	22	210	18	8	44
PN 16	150	350	220.5	43	27	-	600	273	285	22	240	22	8	59
PN 16	200	400	235	**	**	230	**	324	340	24	295	22	12	90

*) Number of bore holes should be individually adapted (8 or 4)
**) Ball valve with gear
***) For ball valves meant to go with lever button SK s = 17

Flange Ball Valve

BVn														
	DN	Dimensions in mm											Inches	Weight in kg
		L	H	h	s	P	R	D_k	D_Z	g	D_o	d_o	n	
PN 25	32	130	104.5	30	17	-	200	76	140	18	100	18	4	6
	40	140	108.5	30	17	-	200	82.5	150	20	110	18	4	6.8
	50	150	116	30	17	-	200	89	165	20	125	18	4	8.3
	65	170	127	30	17	-	200	115	185	22	145	18	8	11
	80	180	145	35	22***	-	300	140	200	24	160	18	8	14.8
	100	190	160.5	35	22***	-	300	168	235	24	190	22	8	18
	125	325	200.5	43	27	-	600	219	270	26	220	26	8	44
	150	350	220.5	43	27	-	600	273	300	26	250	28	8	59
	200	400	235	**	**	230	**	324	360	30	310	26	12	90
Class (ANSI) 150	32	-	-	-	-	-	-	-	-	-	-	-	-	-
	40	140	108.5	30	17	-	200	82.5	127	19.1	98.4	15.9	4	6.8
	50	150	116	30	17	-	200	89	152	20.6	120.6	19	4	8.3
	65	170	127	30	17	-	200	115	178	23.8	139.7	19	4	11
	80	180	145	35	22**	-	300	140	190	24	152.4	19	8	14
	100	190	160.5	35	22**	-	300	168	229	25.4	190.5	19	8	18
	125	325	200.5	43	27	-	600	219	254	25.4	215.9	22.2	8	44
	150	350	220.5	43	27	-	600	273	279	27	541.3	22.2	8	59
	200	400	235	**	**	230	**	324	343	30.2	298.4	22.2	8	90

*) Number of bore holes should be individually adapted (8 or 4)
**) Ball valve with gear
***) For ball valves meant to go with lever button SK s = 17

Flange Ball Valve

The bi-directional ball valve with full bore can be mounted in any position. The ball valve body consists of a welded, inseparable steel body.

The ball is of the "floating" type and sits between the sealing rings in the compensation rings. The valve spindle meets anti-blow-out requirements and is mounted inside the body, with a set of sealings. The ball and the valve spindle in the ball valve are connected to the universal joint coupling. The valve comes with spring compensation.

Standard Equipment:

Wrench or worm gear pair, plugged block and bleed facility

Special Equipment:

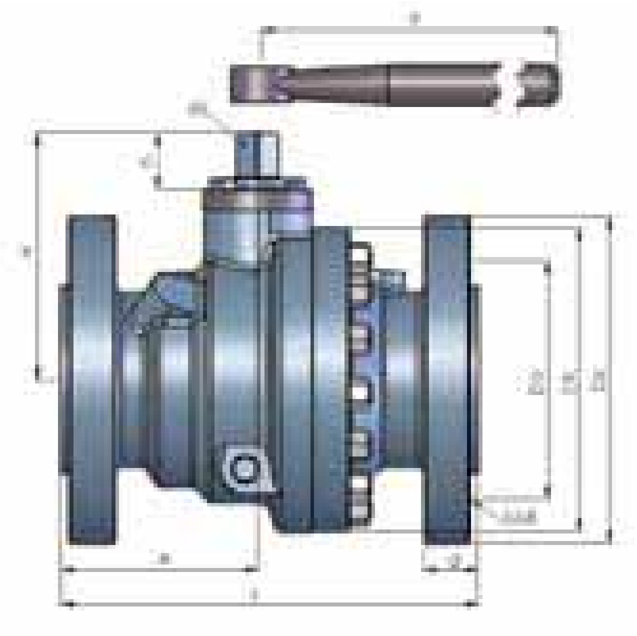
Valve spindle extension, drive, anti-static protection and connecting elements (e.g., flanges, sealings, bolts, nuts)

Flange Ball Valve

BVK	DN	Dimensions in mm										Inches	Weight in kg
		L	H	h***	s	R	D_k	D_Z	g	D_o	d_o	n	
PN 16	**32**	90	104.5	30	17	200	76	140	18	100	M 16	4	5
	40	100	108.5	30	17	200	82.5	150	18	110	M 16	4	6
	50	110	116	30	17	200	89	165	18	125	M 16	4	7
	65	130	127	30	17	200	115	185	18	145	M 16	8*	9.5
	80	140	145	35	22**	300	140	200	20	160	M 16	8	12.8
	100	160	160.5	35	22**	300	168	220	20	180	M 16	8	16
	150	240	220.5	43	27	600	273	285	-	240	M 20	8	44.5

*) Number of bore holes should be individually adapted (8 or 4)
**) For ball valves meant to go with lever button SK s = 17
***) For ball valves, only for lever button SK

Flange Ball Valve



The bi-directional ball valve with full bore can be mounted in any position. The ball valve body consists of two steel castings connected by bolts. The valve spindle meets anti-blow-out requirements and is mounted inside the body. Furthermore, the valve spindle has a fire-resistant, multi-stage sealing package. It is possible to exchange the upper sealing safely during operation. Ball valves DN 40 and DN 50 have a "floating" type ball. Diameters DN 80 and DN 100, on the other hand, have balls fixed with pins on both sides. The ball and valve spindle are connected by means of a universal joint coupling. In addition, the ball sealing comes with spring compensation.

Standard Equipment:

Wrench, plugged block and bleed facility

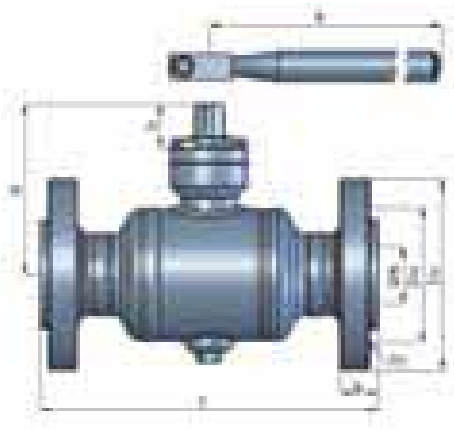
Special Equipment:

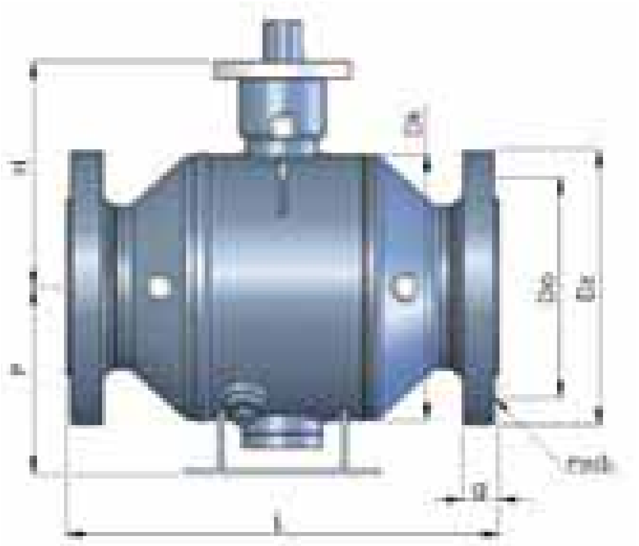
Valve spindle extension, drive, anti-static protection and connecting elements (e.g., flanges, sealings, bolts, nuts)

Flange Ball Valve

KDK/KDKA														
PN	DN	Dimensions in mm											Inches	Weight in kg
		L	A	H	h	s	R	D_k	D_Z	g	D_o	d_o	n	
110	40	241	116	130	32	17	350	142	155	29.5	114.5	22	4	17.4
100	40	241	116	130	32	17	350	142	170	28	125	22	4	20.5
63	40	241	116	130	32	17	350	142	170	28	125	22	4	20.5
50	40	241	116	130	32	17	350	142	155	21	114.5	22	4	16.8
110	50	230	90	148	38	22	500	157	165	32.5	127	18	8	22.3
100	50	230	90	148	38	22	500	157	195	30	145	26	4	26.5
63	50	230	90	148	38	22	500	157	180	26	135	22	4	24.3
50	50	230	90	148	38	22	500	157	165	22.5	127	18	8	20.9
110	80	310	178	178	38	22	500	226	210	39	168.5	22	8	47.7
100	80	310	178	178	38	22	500	226	230	36	180	26	8	52.2
63	80	310	178	178	38	22	500	226	215	28	170	22	8	47.2
50	80	310	178	178	38	22	500	226	210	29	168.5	22	8	46.1
110	100	350	208	208	48	27	600	256	275	45.5	216	26	8	80.3
100	100	350	208	208	48	27	600	256	265	40	210	30	8	77.6
63	100	350	208	208	48	27	600	256	250	30	200	26	8	72.1
50	100	350	208	208	48	27	600	256	255	32	200	22	8	71.7

Flange Ball Valve





The bi-directional ball valve with full bore can be mounted in any position. The ball valve body consists of a welded, inseparable steel body. The valve spindle is protected against blow-out and is mounted on either the inside or outside (and secured with a flange). Moreover, the valve spindle has a fire-resistant, multi-stage sealing package. It is possible to exchange the upper sealing safely during operation. The ball is either mounted "afloat" or fixed with pins on both sides, depending on diameter and pressure. The ball and valve spindle in the ball valve are connected to the universal joint coupling. In addition, the ball sealing comes with spring compensation.

Standard Equipment:

Worm gear pair, wrench, plugged block and bleed facility, anti-static protection

Special Equipment:

Valve spindle extension, drive, air relief cock, additional lubrication/sealing system and connecting elements (e.g., flanges, sealings, bolts, nuts)

Flange Ball Valve

NOK

PN	DN	Dimensions in mm										Inches	Weight in kg
		L	P	R	H	h	D_k	D_Z	D_O	d_O	g	n	
100	25	216	-	200	108	28	76.1	140	100	18	24	4	11
Class (ANSI) 600		216	-	200	108	28	76.1	125	89	18	24.5	4	11
150		254	-	200	108	28	85	150	101.5	26	36	4	13
260		254	-	200	108	28	85	150	101.5	26	36	4	13
420		308	-	400	126	30	115	160	108	26	41.35	4	21
100	50	292	-	500	148	38	114	195	102	26	32	4	23
Class (ANSI) 600		292	-	500	148	38	114	165	127	18	32.5	8	23
150		368	-	500	162	34	150	216	165	26	45.5	8	42
260		368	-	500	162	34	150	215	165	26	45.5	8	45
420		454	-	-	211	47	169	235	171.5	29.5	51	8	63
150	80	470	140	-	202	42	219	240	190.5	26	46.5	8	100
260		470	140	-	202	42	219	265	203	32.5	56	8	105
420		584	180	-	191	-	234	405	228.5	35.5	67	8	152

NOK

PN	DN	Dimensions in mm										Inches	Weight in kg
		L	P	R	H	h	D_k	D_Z	D_O	d_O	g	n	
150	100	546	211	-	252	-	310	290	235	32.5	52.4	8	95
260		546	211	-	252	-	310	310	241.5	35.5	61.9	8	100
63	150	559	210	-	225	-	298	345	280	33	36	8	194
100		559	210	-	225	-	298	355	290	33	44	12	194
Class (ANSI) 600		559	210	-	225	-	298	355	292	29.5	55	12	194
150		610	210	-	225	-	298	380	317.5	32.5	63	12	210
63	200	660	285	-	344	-	406	415	345	36	42	12	340
100		660	285	-	344	-	406	430	360	36	52	12	351
Class (ANSI) 600		660	285	-	344	-	406	420	349	32.5	55.5	12	351
150		740	285	-	344	-	424	470	393.5	39	70.5	12	463
16	250	559	330	-	370	-	475	405	355	26	26	12	315
20		559	330	-	370	-	475	405	362	26	30.5	12	315
25		559	330	-	370	-	475	425	370	30	32	12	315
Class (ANSI) 150		559	330	-	370	-	475	406	362	25.4	31.8	12	315
63		787	330	-	370	-	475	470	400	36	46	12	510
100		787	330	-	370	-	475	505	430	39	60	12	510
Class (ANSI) 600		787	330	-	370	-	475	510	432	35.5	63.5	16	510

Flange Ball Valve

NOK													
PN	DN	Dimensions in mm										Inches	Weight in kg
		L	P	R	H	h	D_k	D_Z	D_O	d_O	g	n	
16		635	380	-	432	-	590	460	410	26	28	12	485
20		635	380	-	432	-	590	485	432	26	32	12	485
25		635	380	-	432	-	590	485	430	30	34	16	485
Class (ANSI) 150	300	635	380	-	432	-	590	483	431.8	25.4	33.4	12	485
63		838	380	-	432	-	590	530	460	36	62	16	754
100		838	380	-	432	-	590	585	500	42	68	16	754
Class (ANSI) 600		838	380	-	432	-	590	560	486	35.5	67	20	754
16		762	420	-	420	-	640	520	470	26	30	16	525
20		762	420	-	420	-	640	535	476	29.5	35	12	525
25		762	420	-	420	-	640	550	490	33	38	16	525
Class (ANSI) 150	350	762	420	-	420	-	640	533	476.2	28.6	36.5	12	525
63		889	420	-	420	-	640	600	525	39	56	16	895
100		889	420	-	420	-	640	655	560	48	74	16	895
Class (ANSI) 600		889	420	-	420	-	640	605	527	39	72	20	895
16		838	465	-	548	-	734	580	525	30	32	16	927
20		838	465	-	548	-	734	600	540	29.5	37	16	927
25		838	465	-	548	-	734	620	550	36	40	16	927
Class (ANSI) 150	400	838	465	-	548	-	734	597	539.8	28.6	38.1	16	927
63		991	465	-	548	-	734	670	585	48	60	16	1420
100		991	465	-	548	-	734	715	620	48	78	16	1420
Class (ANSI) 600		991	465	-	548	-	734	685	603	42	76.5	20	1420
16		991	555	-	680	-	850	715	650	33	44	20	1650
20		991	555	-	680	-	850	700	635	32.5	43	20	1650
25		991	555	-	680	-	850	730	660	36	48	20	1650
Class (ANSI) 150	500	991	555	-	680	-	850	698	635	31.8	44.5	20	1650
63		1194	555	-	680	-	850	800	705	48	68	20	2470
100		1194	555	-	680	-	850	870	760	56	94	20	2470
Class (ANSI) 600		1194	555	-	680	-	850	815	724	45	91	24	2470

Welded Ball Valve

The bi-directional ball valve with full bore can be mounted in any position. The ball valve body consists of a welded, inseparable steel body. The ball is of the "floating" type and sits between the sealing rings in the compensation rings. The valve spindle meets anti-blow-out requirements and is mounted inside the body with a set of sealings. The ball and valve spindle in the ball valve are connected to the universal joint coupling. The valve comes with spring compensation.

Standard Equipment:

Wrench or worm gear pair, plugged block and bleed facility

Special Equipment:

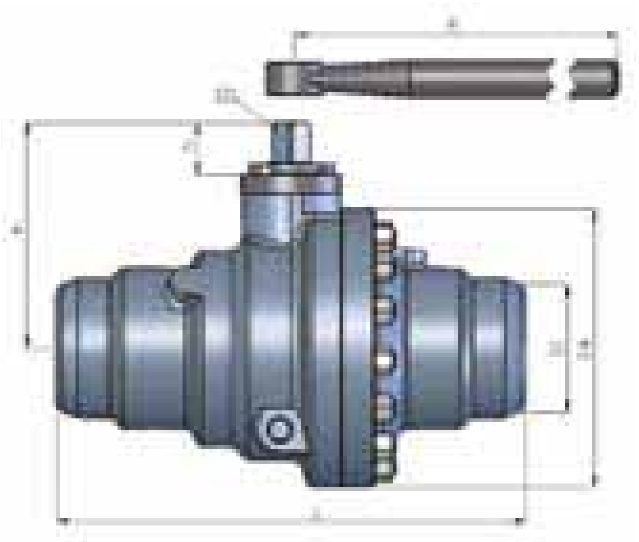
Valve spindle extension, drive, anti-static protection

BVs

PN	DN	Dimensions in mm								Weight in kg
		L	H	h	s	P	R	D_k	D	
25	32	178	104.5	30	17	-	200	76	42.4	3.5
	40	190	108.5	30	17	-	200	82.5	48.3	4.2
	50	216	116	30	17	-	200	89	60.3	4.6
	65	241	127	30	17	-	200	115	76.1	7.8
	80	283	145	35	22**	-	300	140	88.9	13.5
	100	305	160.5	35	22**	-	300	168	114.3	19.5
	125	381	200.5	43	27	-	600	219	139.7	41.2
	150	457	220.5	43	27	-	600	273	168.3	69
	200	600	235	*	*	230	*	324	219.1	127

*) Ball valve with gear
**) For ball valves meant to go with lever button SK s = 17

Welded Ball Valve



The bi-directional ball valve with full bore can be mounted in any position. The ball valve body consists of two steel castings connected by bolts. The valve spindle meets anti-blow-out requirements and is mounted inside the body. Moreover, the valve spindle has a fire-resistant, multi-stage sealing package. It is possible to exchange the upper sealing safely during operation. Diameters DN 40 and DN 50 come with a "floating" ball. Diameters DN 80 and DN 100 come with a ball that is fixed on both sides with a pin. The ball and valve spindle in the ball valve are connected to the universal joint coupling. In addition, the ball sealing comes with spring compensation.

Standard Equipment:

Wrench, plugged block and bleed facility

Special Equipment:

Valve spindle extension, drive, anti-static protection

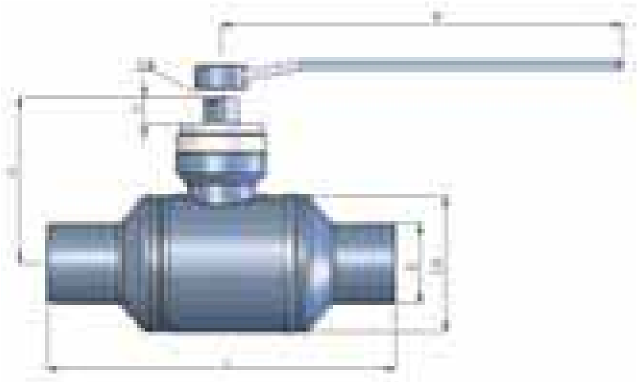
Special Design:

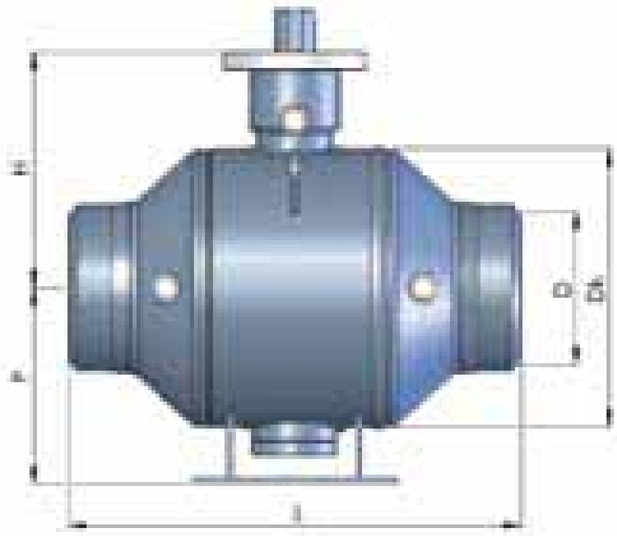
KDSa-DN 50 – fire resistant ball valve with metal/metal sealing

KDS/KDSa

PN	DN	Dimensions in mm						Inches	Weight in kg
		L	H	h	s	R	D_k	D	
110	40	241	130	32	17	350	142	48.3	10.5
	50	292	148	38	22	500	157	60.3	15.5
	80	356	178	38	22	500	226	88.9	38.0
	100	432	208	48	27	600	256	114.3	60.0

Welded Ball Valve





The bi-directional ball valve with full bore can be mounted in any position. The ball valve body consists of a welded, inseparable steel body. The valve spindle meets anti-blow-out requirements and is mounted inside the body. Moreover, the valve spindle has a fire-resistant, multi-stage sealing package. It is possible to exchange the upper sealing safely during operation. The ball is either mounted "afloat" or fixed with pins on both sides, depending on diameter and pressure. The ball and valve spindle in the ball valve are connected to the universal joint coupling. In addition, the ball sealing comes with spring compensation.

Standard Equipment:

Worm gear pair, hand lever, plugged block and bleed facility, anti-static protection

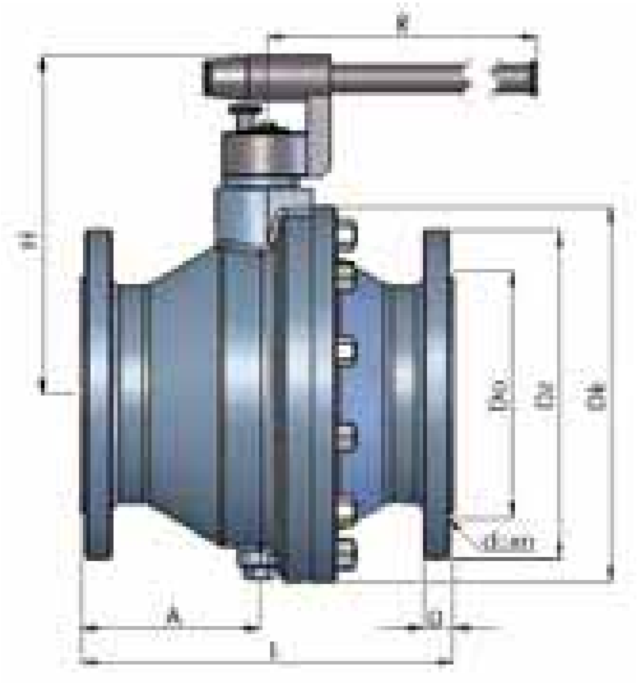
Special Equipment:

Valve spindle extension, drive, air relief cock, additional lubrication and sealing system

Welded Ball Valve

NOS										
PN	DN	Dimensions in mm								Weight in kg
		L	P	R	H	s	h	D_k	D	
110	25	216	-	200	108	17	28	76.1	33.7	4.7
260		254	-	200	108	17	28	85	33.7	6.5
260	50	368	-	500	162	22	34	150	60.3	28
260	80	470	140	-	202	27	42	219	88.9	72
260	100	546	211	-	252	-	-	310	114.3	93
110	150	559	210	-	225	-	-	298	168.3	144
150		610	210	-	225	-	-	298	168.3	210
110	200	660	285	-	344	-	-	406	219.1	288
150		737	285	-	344	-	-	424	219.1	350
25	250	559	330	-	370	-	-	406	273.0	285
110		787	330	-	370	-	-	475	273.0	420
25	300	635	380	-	432	-	-	590	323.9	445
110		838	380	-	432	-	-	590	323.9	638
25	350	762	420	-	420	-	-	640	355.6	510
110		889	420	-	420	-	-	640	355.6	715
25	400	838	465	-	548	-	-	734	406.4	904
110		991	465	-	548	-	-	734	406.4	1150
25	500	991	555	-	680	-	-	850	508.5	1540
110		1,194	555	-	680	-	-	850	508.0	2145

Flange Ball Valve with Two-stage Opening Process



The bi-directional ball valve with full bore can be mounted in any position. The ball valve body consists of two steel castings connected by bolts. The valve spindle meets anti blow-out requirements and is mounted inside the body, with a set of sealings.
The ball is of the "floating" type and sits between the sealing rings in the connection pieces. The ball and valve spindle in the ball valve are connected to the universal joint coupling. In addition, the ball sealing comes with spring compensation. This ball valve includes a newly developed ball with bypass openings that can adopt the function of a "bypass" during opening. In order to ensure a correct, two-stage opening process, a special hand lever with adjustable arm and safety catch is used.

Standard Equipment:

Hand lever, plugged block and bleed facility

Special Equipment:

Valve spindle extension, drive, anti-static protection, lubrication and sealing system and connecting elements (e.g., flanges, sealing, bolts, nuts)

KPK

PN	DN	Dimensions in mm											Inches	Weight in kg
		L	H	A	D_k	s	D_z	g	D_o	d_o	f	R	n	
16	100	250	170	125	252	22	220	20	180	18	3	400	8	40

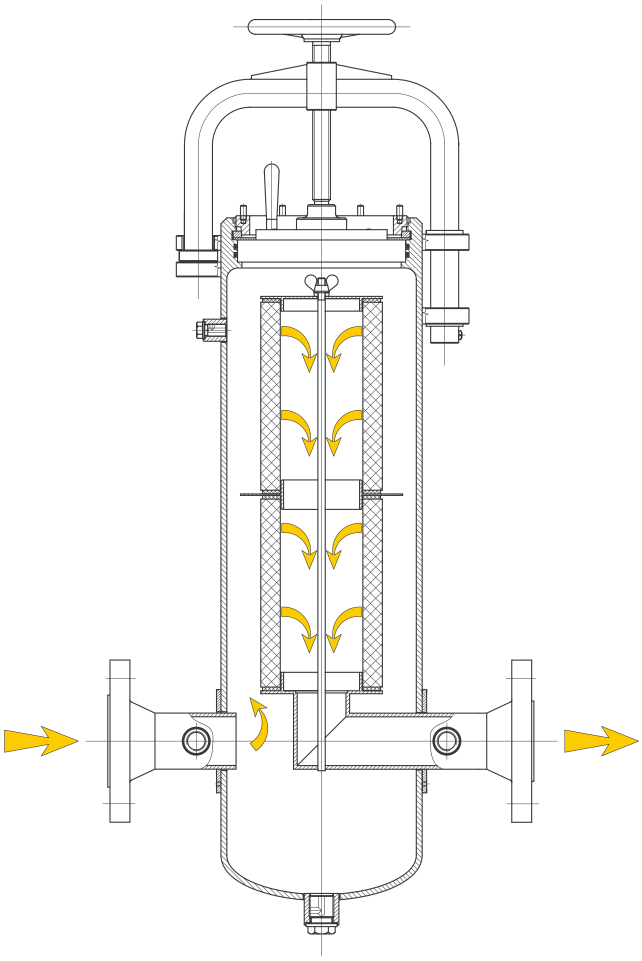
Filter Elements

The standard version has gas filters (high and medium pressure) with cellulose filter elements, type GD, which use a star-shaped cellulose paper impregnated with resol. The insert is resistant against humidity and mechanical damages (e.g. breaking). The filter elements made from star-shaped paper have an active filtration surface that is 4.5 times larger than that of standard types. The filtration material is protected with a perforated plate on the inside and outside. The figure shows elements with galvanised plates.

Filter elements of this type are not sufficiently resistant to aggressive substances, such as bio-gas. Filtering of aggressive or caustic gases requires filter elements protected with a protective net made of stainless steel. Both bases of the filter insert are equipped with felt rings that make sure the contaminated gas on the inlet side is separated from the "clean" area. The measurements of the elements are listed in the table. Standard elements can reach a cleaning precision of up to 5 µm. Upon enquiry, we supply optional elements ensuring up to 0.5 µm at 99 %.

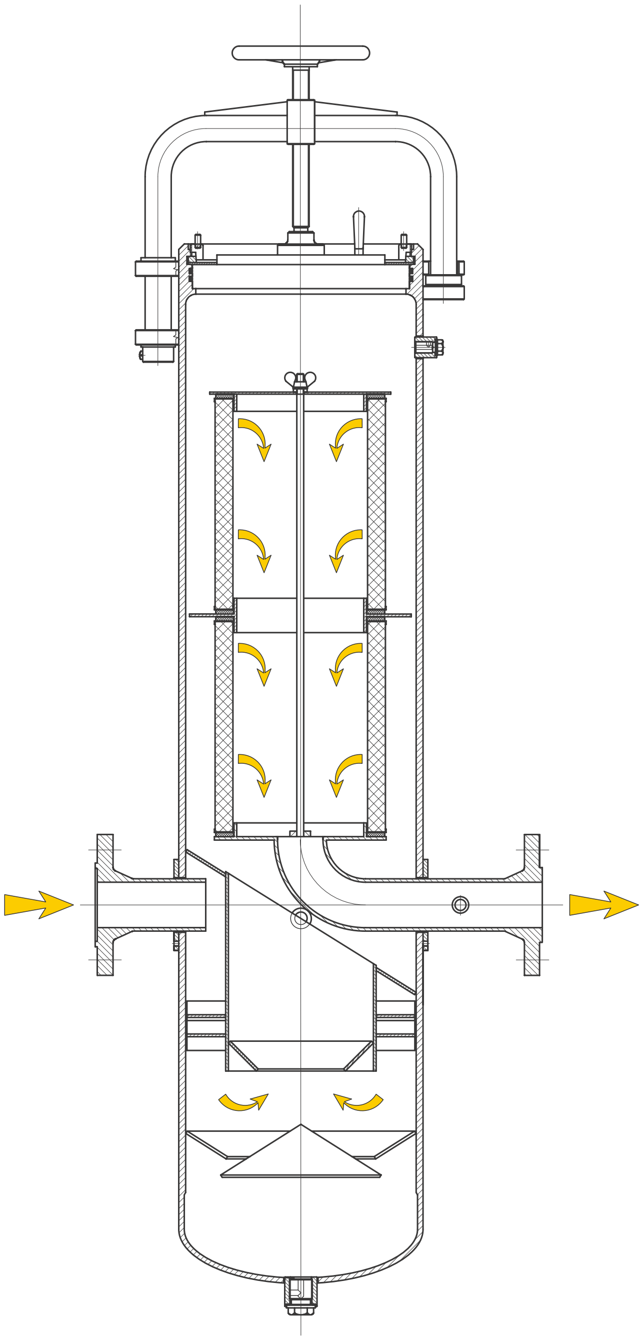
FILTER ELEMENT

Type	Filtration surface in m^2	Dimensions in mm		
		D	d	H
GD 0.1	0.2	62	42.5	108
GD 1	0.8	98	46	180
GD 1.5	1.1	122	62	220
GD 2	1.4	165	114	260
GD 3	3	250	194	320



Construction and Function

Gas filters of the types F, FG and FGP with cellulose elements are made from steel and welded. Observation of all pertinent pressure-vessel regulations and directives required by UDT and ASME is ensured during planning and static calculations. The cross-section shows how the filter works. The contaminated gas enters the body of the filter through the inlet. The design of the filter ensures the heaviest solid contaminants are precipitated first. They sink to the bottom when the velocity of the gas has been reduced and then accumulate in the lowest part of the filter. The remaining contaminants accumulate on the surface of the filter insert. The perme-abilities of the filters are designed so that the velocity of the gas in the insert does not exceed 2 m/s. At the inlet and outlet, 25 m/s should not be exceeded. The recommended max. velocity is 20 m/s.



Construction and Function

The separators for dust and fluids are of the vertical type. Their function is to separate solid and liquid contaminants from the gas flow using the kinetic energy of the gas flow.

The separator is a welded steel construction (see drawing). Observation of UDT guidelines and pressure-vessel directive 97/23/CE as well as ASME requirements is guaranteed during planning and calculation of the equipment. Separation of fluids happens in the "wet" part (e.g., axis cyclone), where the gas flows through the inlet. The gas then enters the "dry" part where it is filtered.

In the inlet, the gas should have a speed of at least 10 m/s. At the entrance to the fluid separation part, there is a baffle that rotates the gas forcefully. A vortex develops where the velocity increases towards the middle. (Not unlike what happens when water drains from a bath tub). The centrifugal forces acting on the particles of dusts and fluids are many times stronger than gravity.

Due to the aforementioned effect, contaminants are thrown against the outer wall of the separator body. As the speed of the gas is lower at the wall, the centrifugal forces there are reduced. The pressure distribution inside the vortex (with higher pressures at the edges) causes a secondary gas flow in the middle of the vortex. This flow carries the contaminants away and prevents them from accumulating on the walls of the body. The contaminants follow the main gas flow until the force of gravity acting upon them, and the force resulting from the pressure difference within the vortex, cancel each other out. In the end, it is gravity that prevails and the contaminants fall to the bottom of the separator.

The separating wall in the middle of the separator makes sure the accumulated contaminants are not carried away by the gas flow again. Next, the gas flows into the upper part of the filter, where it undergoes additional cleaning thanks to the insert. After the gas has passed the insert, it leaves the gas filter and the separator through the outlet.

Efficiency of the Separator

FGWS Filter Separators are highly effective for cleaning gas and combine the properties of filter inserts and cyclones.

Efficiencies:

Liquids:

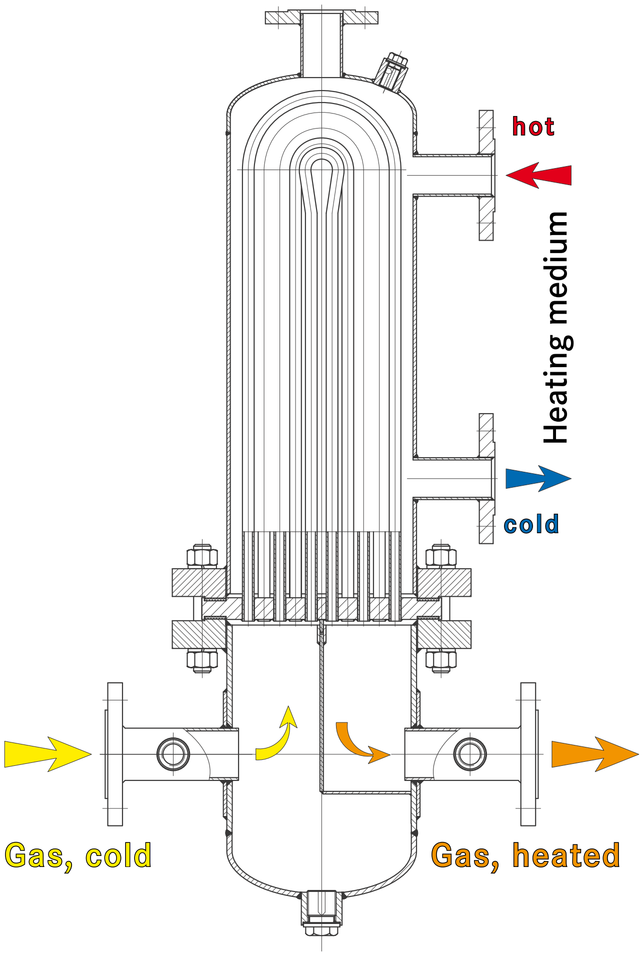
- 99.5 % for particles > 10 – 12 μm

Solid particles:

- 99.8 % for particles > 5 – 12 μm

The indicated efficiency for liquids is reached with a gas velocity of at least 10 m/s in the inlet. With a lower velocity, the separation efficiency (e.g., liquids from gas) is significantly lower. This task is then taken over by the insert. The downside, however, is a significantly faster contamination or conglutination of the insert with high viscosity liquids (such as oils, grease, etc.). The efficiency of solid particles separation, on the other hand, is independent of the gas velocity in the inlet.

Gas Pre-heaters



Background

When the gas pressure goes down, the temperature of the gas drops significantly, too. Such a temperature drop may actually cause white frost or even freeze the controllers, in particular, the devices controlling the gas pressure regulators installed on gas pressure regulating stations (high pressure). In order to ensure troublefree operation of the gas pressure regulating stations, the gas has to be heated before expansion so that the temperature remains between +5 and +10 °C after the regulators. One of the most frequent methods is to use continuous flow heaters employing a liquid as heat transfer medium.

Pre-heating of the Gas

Gas is pre-heated by means of heat exchange between the heating medium and gas, which flows through pipes immersed in the heating water. The temperature of the heating medium is controlled in consideration of the gas temperature behind the pressure reducer. A pump will improve heat transmission and regulating accuracy. A circulating pump allows for a better use of the available heat exchange surface and a significant reduction of the pipe diameters for the heating medium.

Gas Pre-heaters

Operational Parameters of the Pre-heaters

Inlet gas pressure (calculated):

As standard:

16 - 20 - 25 - 70 - 110 bar

Heating medium:

- Water
- Rated pressure of the heating part: as standard 6 - 70 bar
- Inlet temperature: +90 °C
- Outlet temperature: +70 °C

Safety appliances:

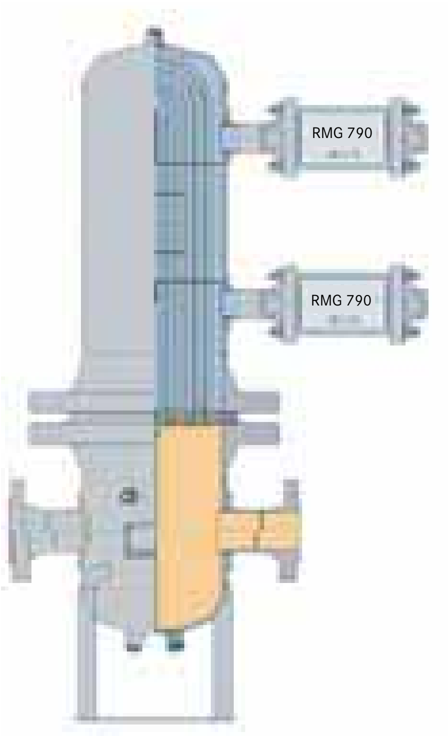
The heat exchangers have a connecting piece on the water cooling jacket for connecting a safety fitting. In case of a crack in one of the gas-bearing heating tubes, the escaping gas can be led into the atmosphere via the bonnet or safety valve. The standard connecting piece is made for a pressure of PN 16. It has a plain flange.

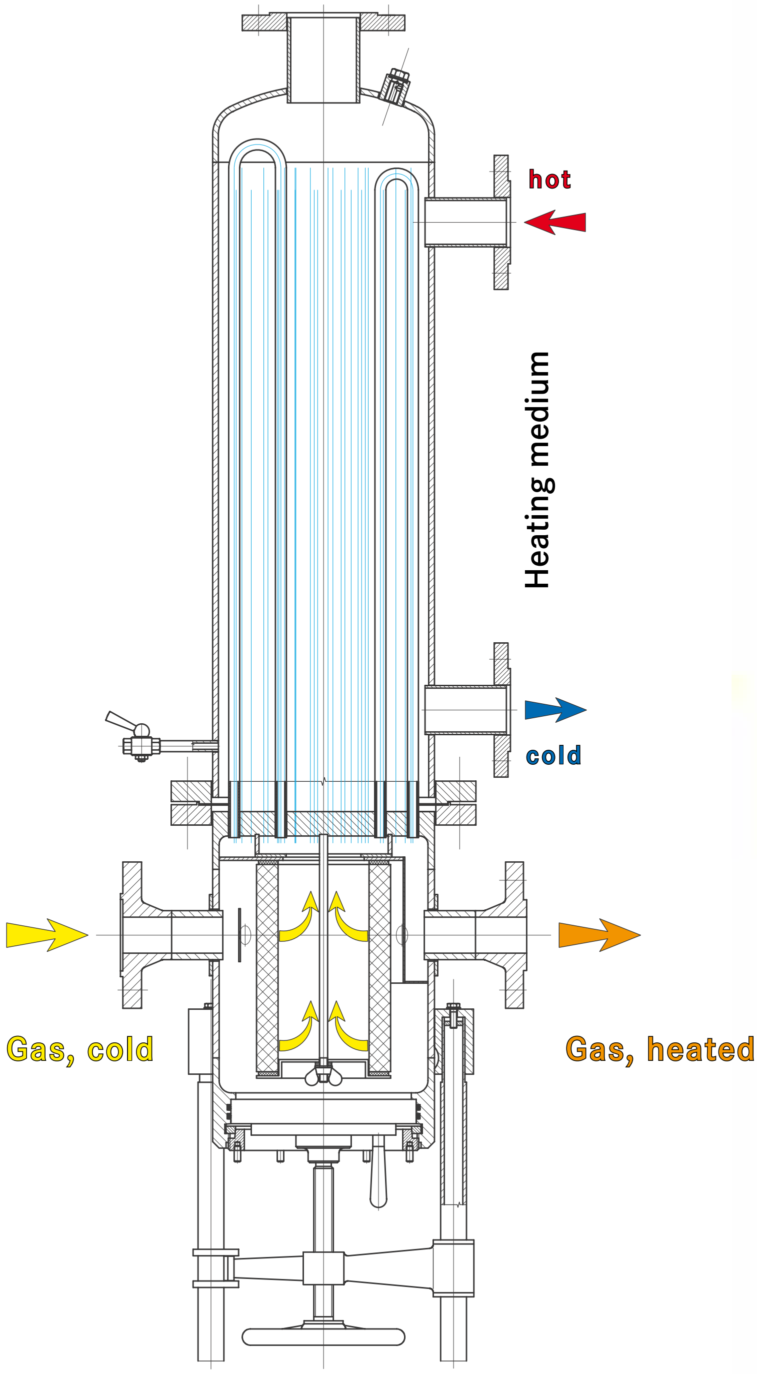
The water section is equipped with the RMG 790 Safety Shut-off Valve (SSV), which is adjusted to the max. pressure of the heating medium. This offers protection against the gas pressure in the boiler. Any gas that might escape is caught in the water section of the pre-heater.

Construction and Function

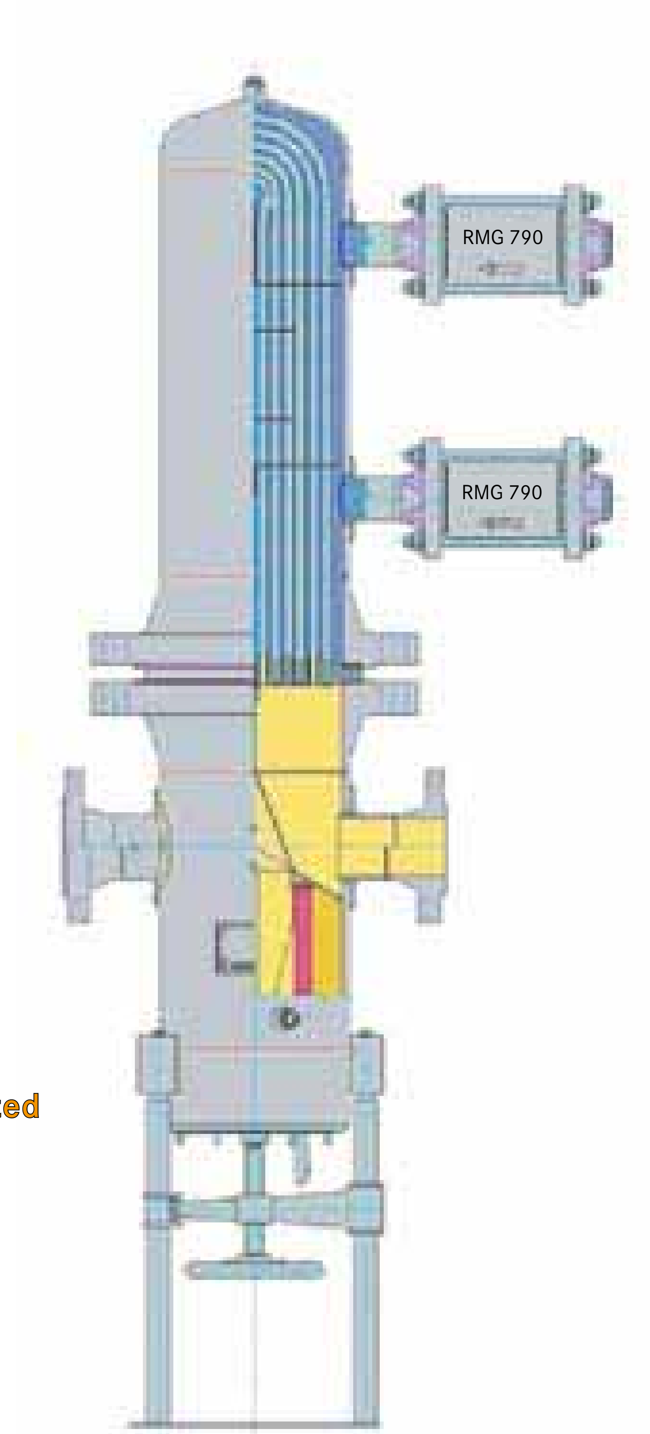
The standard gas pre-heaters have heating pipes, which are welded to the sieve bottom and placed between the flange of the gas chamber and the flange of the heating medium. These components can be exchanged separately at any time. Cold gas flows through the inlet and the inlet chamber into the heating pipes. After heating, the gas flows through the chamber and the outlet into the pipework system. The heating medium flows through several guiding walls around the heating tubes (seamless heating pipe-dimensions: 13.5 x 2 mm). They are welded to the sieve bottom. The sieve bottom must be adapted to the gas pressure. All heating pipes have a wall thickness of 2 mm. They are coated with a 1 mm-thick corrosion protection layer.

The gas chamber of the heat exchanger is equipped with a condensate discharging nozzle. The sieve bottom is equipped with a discharge valve in order to blow off the rest of the heating medium from the space below the outlet.





Open heating system.
Design for the right side.



Closed heating system
protected by safety valves RMG 790.
Design for the right side.

Construction and Function

The FGWC Gas Filter and Pre-heater are devices performing the functions of cellulose filters and pre-heaters at the same time. They are of the welded steel construction type. The cross-section shows how the filter and pre-heater work. Contaminated gas flows through the inlet into the body of the pre-heater. Due to the change of flow speed, coarse contaminants fall to the bottom of the gas section of the device. The remaining contaminants accumulate at the top, on the outer surface of the filter insert while the gas flows through the device. From inside of the insert, the gas is lead through the pipe system immersed in a hot-water bath (where it is heated) and then into the outlet.

Safety Appliances

The heat exchangers have a nozzle on the body of the water-cooling jacket for connecting a safety fitting. In case of a crack in one of the gas-bearing heating tubes, the escaping gas can be led into the atmosphere via the bonnet or the safety valve. The standard connecting piece is made for a pressure of PN 16. It has a plain flange.

The water section is equipped with the RMG 790 Safety Shut-off Valve (SSV), which is adjusted to the max. pressure of the heating medium. This offers protection against the gas pressure in the boiler. Any gas that might escape is caught in the water section of the pre-heater.

TECHNICAL SPECIFICATIONS								
Type		Unit	22	23	24	25	26	27
Inlet pipe size DN		mm	25	50	80	50	80	100
Inlet pressure stage PN		bar	16	16	16	16	16	16
Outlet pipe size DN		mm	50	80	100	100	100	150
Outlet pressure stage PN		bar	16	16	16	16	16	16
Design with one rail			M	M	M			
Design with two rails						M	M	M
Insulation sets			M	M	M	M	M	M
Cellular filter DN		mm	25	50	80	50	50	100
Safety relief valve and monitoring facility 917				F*	M	M	M	M
Gas pressure regulator with safety shut-off valve			RMG 300	RMG 330	RMG 330	RMG 402	RMG 402	RMG 402
DN		mm	25	50	50	25	50/100	50/150
Natural gas flow rate K_G		$m^3/(h \cdot bar)$	65	200	500	350	1,500	1,500
Max. flow rate at 25 mbar outlet pressure		$m^3/(h \cdot bar)$	90	370	570	200	570	1,300
Max. flow rate at 1 bar outlet pressure		$m^3/(h \cdot bar)$		700	1,100	400	1,100	2,500
Cabinet (polyester)			M					
Cabinet (exposed aggregate concrete)				F	F	M	F	M
Cabinet (aluminium)				M	M	F	M	F
Dimensions	Length	mm	765	950	1,800	1,860	1,600	2,900
	Height	mm	1,220	1,470	1,670	1,770	1,770	2,370
	Depth	mm	310	450	600	1,060	850	1,100

M = in series/standard F = optional F*= at a premium

Station System Made by RMG GROUP

Small Cabinet Plant with RMG 300

- ☐ For the gas supply of single-family homes and blocks of flats up to a max. natural gas consumption of $Q_{b\ max}$ 90 m^3/h
- ☐ With inlet and outlet ball valves, angular cellular flow filter RMG 907 (optional), gas pressure regulator RMG 300 with integrated Safety Shut-off Valve (SSV) and inlet and outlet pressure gauges
- ☐ Connecting line

  Inlet: DN 25

  Outlet: DN 50
- ☐ Maintenance-free cabinet made of glass fibre reinforced polyester, self-supporting, complete with base

  Length (width): 0.64 m
  Height: 0.82 m
  + Base (embedded in the ground): 0.9 m
  Depth: 0.31 m

System Plant with Easy-to-maintain Gas Pressure Regulator RMG 402

- ☐ For gas supply in municipal and industrial areas
- ☐ With ball valves at the inlet and outlet, cellular filter RMG 906, gas pressure regulators RMG 402 with integrated Safety Shut-off Valves, inlet and outlet pressure gauges, Safety Relief Valve RMG 835
- ☐ Connecting lines

  Type 26:

  Inlet: DN 50

  Outlet: DN 100

  Type 27:

  Inlet: DN 80

  Outlet: DN 150
- ☐ Maintenance-free aluminium cabinet

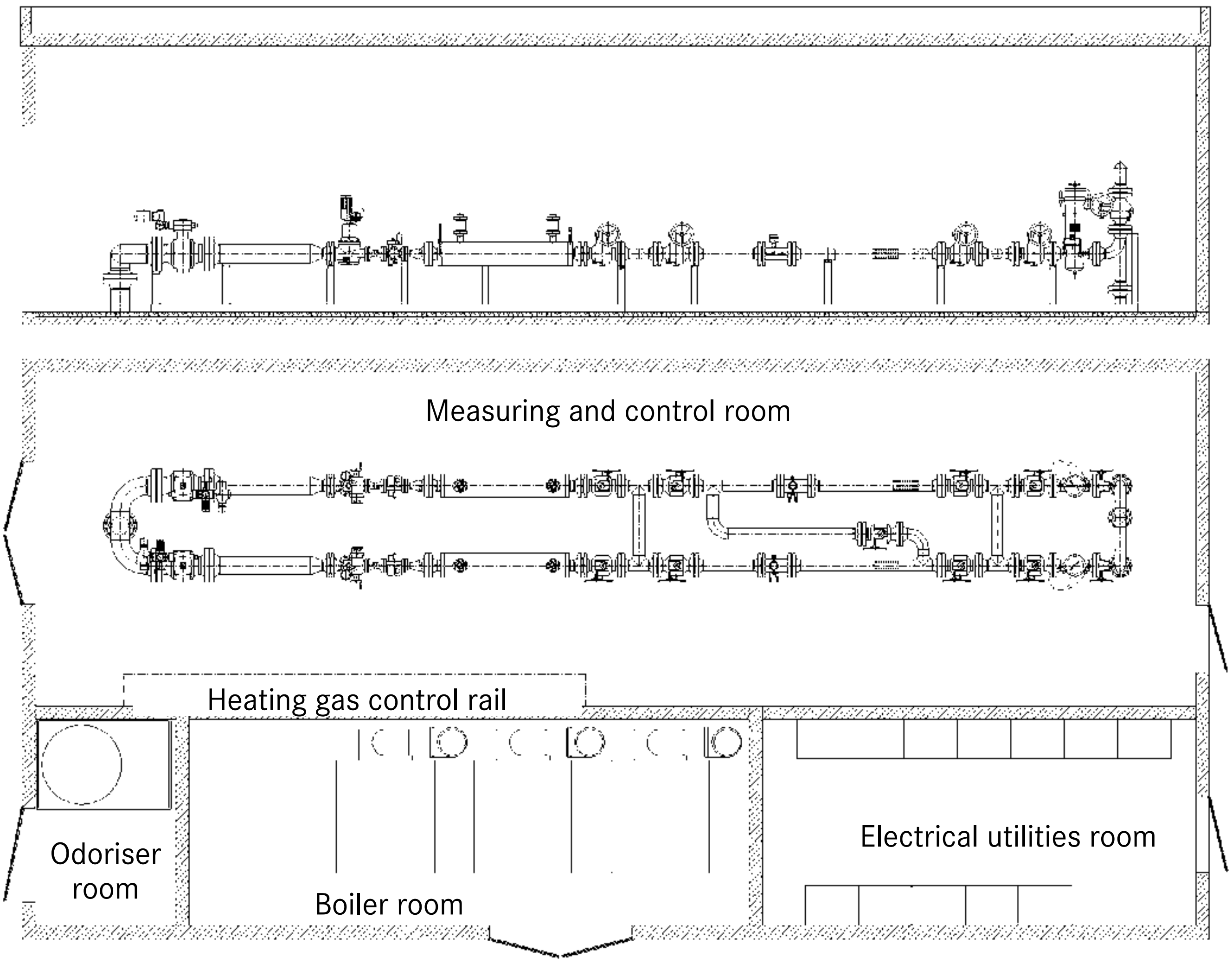
  Length and height: 1.6 m

  Depth: 0.8 m

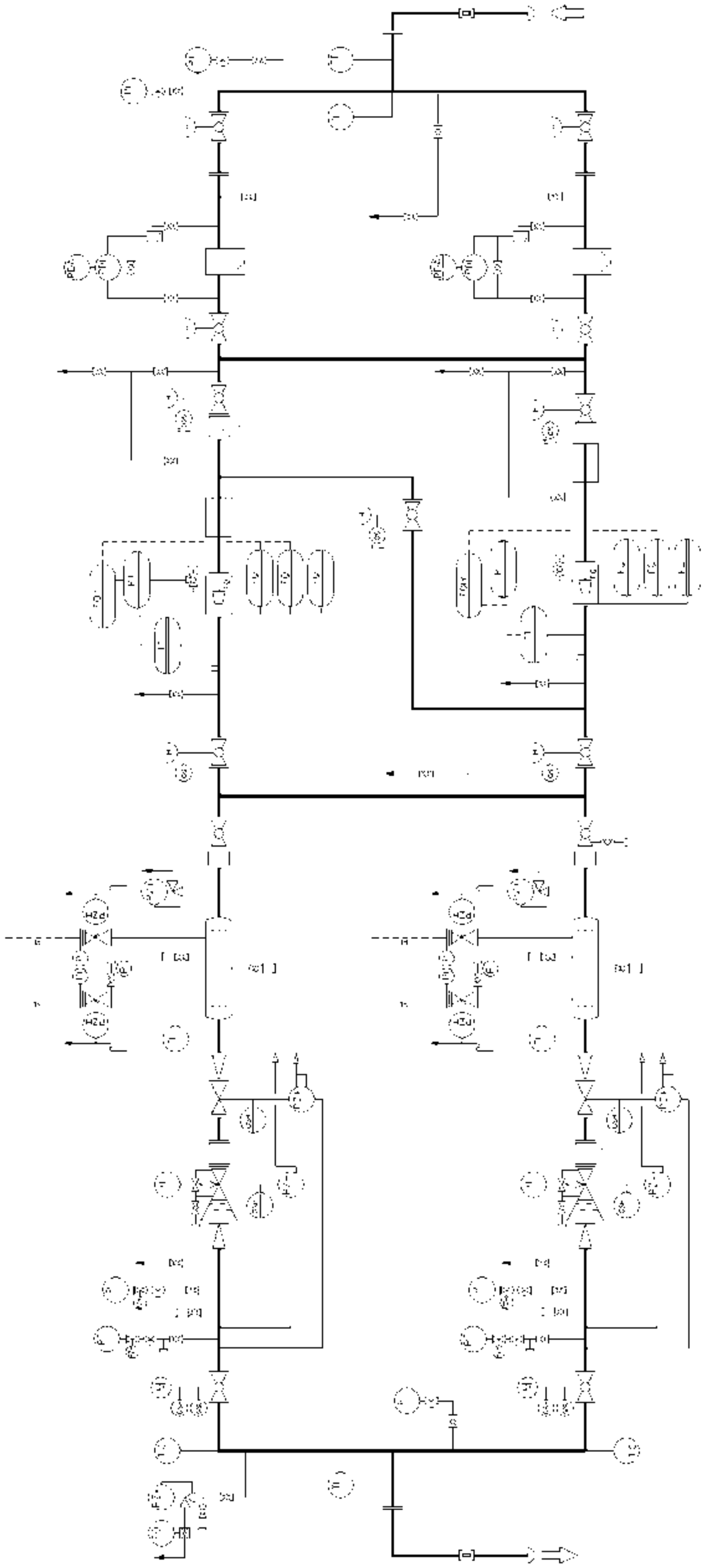
Station System Made by RMG GROUP

Combinations of Building Types

– Gas pressure control room
– Boiler room, odoriser room and electrical utilities room

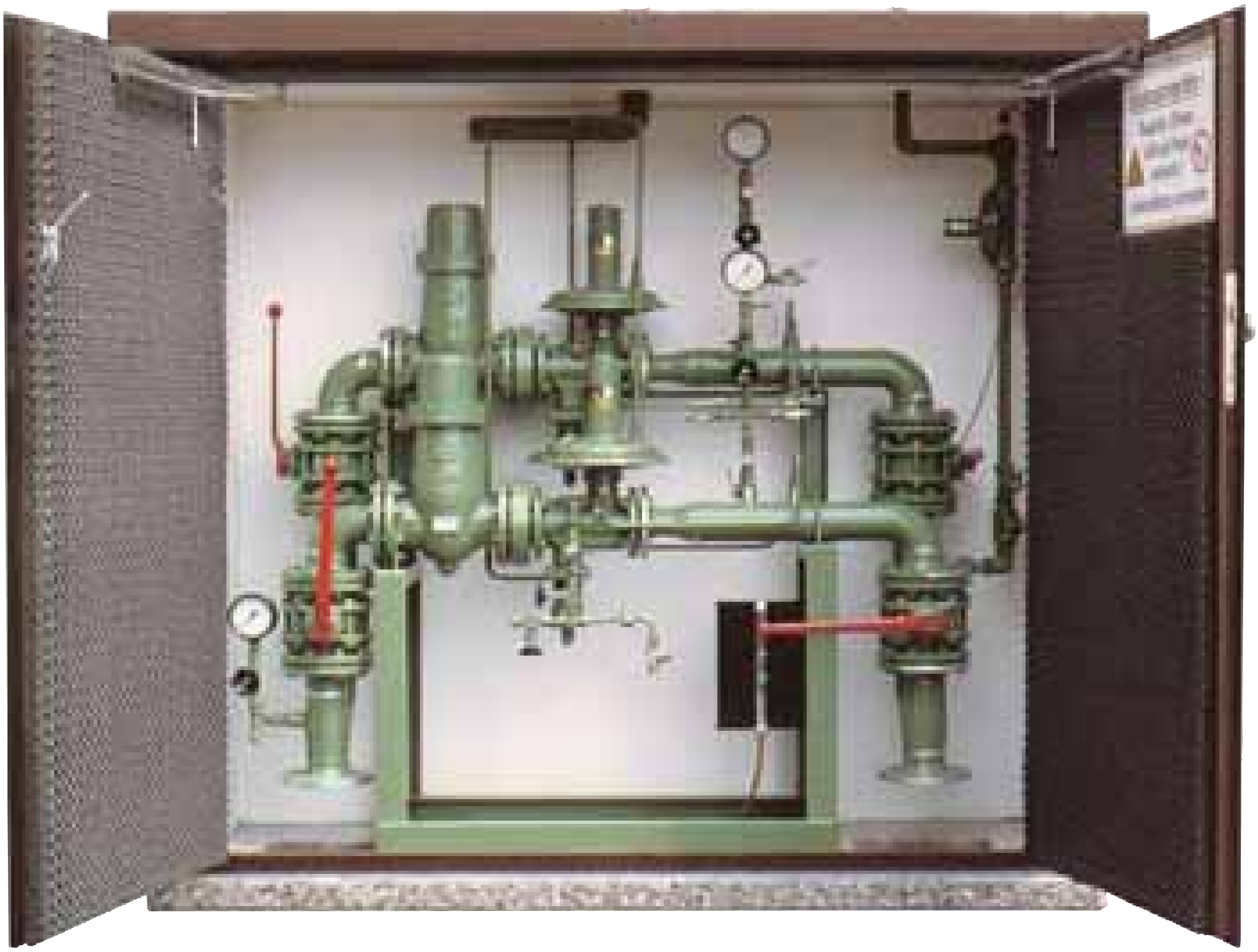


Facility with Two Rails and Bypass Line



Station System Made by RMG GROUP

Cabinet Plant with RMG 330 Gas Pressure Regulator



Cabinet Plant with RMG 402 Gas Pressure Regulator

Station Example

Cabinet Plant with RMG 332 Gas Pressure Regulator

Prefabricated Building with Gas Pressure Control and Measuring Plant

Station Example

Installation in a Solid Building (Regulating Line)

Station Example

Roofed-over Open-air Station

Installation in a Solid Building (Measuring Line)

Roofed-over Installation

Station Example

Open-air Station

Installation in a Solid Building

CHP Turbine

Natural Gas Filling Station

RMG started producing natural gas filling stations in 2005. This new and innovative product area is in the hands of our plant construction company, WÄGA Wärme-Gastechnik GmbH. WÄGA is a member of the RMG group.

Range of Products and Services:

☐ Consulting and planning of complete projects
☐ Working out performance specifications
☐ Implementation and coordination of complete projects
☐ Acceptance procedure in cooperation with ZÜS
☐ Link-up to cashier/accounting systems (POS or automatic dispenser)
☐ Turn-key delivery of plants to customers

Technical Specifications

☐ PLC control with (colour) display
☐ Remote service adapter for transferring data to customer PCs and to our premises
☐ Troubleshooting by service engineers on the phone via online connection
☐ No blow-down container, thus less space required
☐ Permanent dewpoint measuring including transfer
☐ Oil separator downstream of compressor (DIN 51624)
☐ Standard building size: 6.0 m
☐ Installation of components carried out with easy service in mind
☐ Big dryers on suction side
☐ Upright installation of storage containers
☐ Storage volume (3,200 l) in the compressor room
☐ Suction pressures from 100 mbar to 250 bar
☐ Outputs from 100 to 9,500 Nm^3/h
☐ Connected loads from 22 to 400 kW
☐ Water-cooled compressors only
☐ Water cooling for gas, oil and cylinder jacket
☐ Explosion-protection monitoring of compressor room
☐ Gas-tight lead-throughs in building walls – no hazard zones around the building
☐ Temperature monitoring of compressor room
☐ Temperature monitoring at compressor outlet
☐ Forced ventilation (fan) of compressor room (during summer)
☐ Connections to all existing POS systems

The technology offered is characterised by a multitude of versions. All existing mains pressures can be processed without reduction or control. The result is a very high energetic efficiency.

MTG Radial Turbine
Natural Gas Expansion Machine for Transforming the Energy Potential of Natural Gas Flow into Electrical Energy.

Main Features:

- ☐ High energetic efficiency of the transformation of thermal energy – up to 95 %
- ☐ Type of machine: radial turbine with directly-coupled synchronous generator
- ☐ Adjustable vane (possible control of pressure and volume)
- ☐ Rotor with magnetic bearing, almost frictionless, with low-wear and low maintenance construction
- ☐ No additional lubricant circuits and seal-gas systems necessary
- ☐ Extremely smooth operation – no oscillations, special foundation or bedding required
- ☐ High speeds facilitate high performance, even at small dimensions
- ☐ Closed, encapsulated system can be used in Zone 2 hazard areas (Ex-RL)
- ☐ Innovative frequency converter technology provides 400 V/50 Hz AC just like mains
- ☐ Adaptation to gas procurement conditions by means of parallel and serial connection of MTG machines
- ☐ Can be used in parallel operation with gas pressure regulating stations
- ☐ Suitable for remote control
- ☐ PLC-based control (Type Siemens S7), easy implementation with automation concepts
- ☐ Applicable for gases according to DVGW working instructions G 260 and neutral, non-aggressive gases. Other gases upon enquiry.

MTG Radial Turbine
Natural Gas Expansion Machine for Transforming the Energy Potential of Natural Gas Flow into Electrical Energy.

TECHNICAL DATA		
Type	**MTG 160**	**MTG 550**
Electrical ratings	160 kW	550 kW
Max. admissible pressure PS	70 bar	70 bar
Max. inlet pressure[1] $p_{u\ max}$	50 bar	63 bar
Max. outlet pressure[1] pd max	11 bar	23 bar
Standard flow rate Q_b at rated load[2]	7,000 – 12,000 m^3/h	18,000 - 35,000 m^3/h
Max. pressure ratio	3.8 approx.	4.5 approx.
Rotor speed	41,500 rpm	31,000 rpm
Output voltage U	400 V	400 V
Output frequency f	50 Hz	50 Hz

[1] Operating pressure limit values according to state-of-the-art.
We reserve the right to introduce changes due to technical progress.

[2] The volumetric flow rates at rated load depend strongly on the pressure ratio as well as inlet and outlet pressures.

Scope of Delivery and Performance:
The RMG GROUP offers turnkey delivery of gas expansion plants from a single source:

- ☐ Engineering: Design of equipment, determination of input (heat) and output (electrical energy), efficiency analysis
- ☐ Gas expansion machines MTG 160 and 550
- ☐ Electro-technical facilities: control system, frequency converter technology, safety engineering
- ☐ Solutions for automation
- ☐ Plant construction: planning complete tubing/equipment for a ready-to-operation station
- ☐ Accommodation in containers or concrete building
- ☐ Heat concepts: planning and realisation of concepts for the use of unused heat energy in order to include it in the expansion process – supply of CHP and boilers to provide heat
- ☐ Integration: on either the gas or heat side
- ☐ Start-ups
- ☐ Training
- ☐ Maintenance of expansion plants

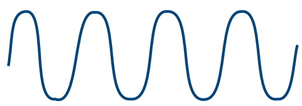
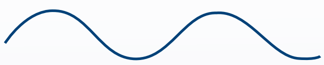
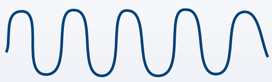
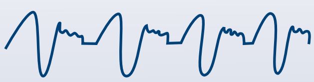
In order to determine the feasibility of a gas expansion machine of the MTG type and the yield of electrical energy that may be expected, it is necessary to know the exact gas procurement data.
For more details, please refer to http://www.rmg.com/turboexpander-mtg160-entspannungsturbine.html and/or http://www.rmg.com/turboexpander-mtg550-entspannungsturbine.htm

SOUND LEVELS TO EVERY-DAY NOISE			
	Decibels		Typical PRS
	130	Low-flying jet aircraft.	
	120	Threshold of thunder, artillery.	
Deafening			
	110	Jack hammer, riveter.	
	100	Loud street noises.	
Very loud	90	Noisy factory, trucks.	HP.
Above this threshold limit exposure times	80	Whistle, noisy office.	MP district.
	75		MP dist. in kiosk
	70	Average street noise.	
	60	Average factory.	Acoustic kiosk
Moderate	50	Average office, normal conversation.	
	40	Quiet radio/tv, quiet home, private office.	
Faint	30	Quiet conversation.	
	20	Whisper, rustle of leaves.	
Very faint	10	Soundproof room, threshold of audibility.	
	0		

1. Acoustics vs. Noise?

“Acoustics” is the science of sound.
“Acoustical Engineering” is a branch of acoustics that deals with reducing the noise of machines.
“Sound” refers to the pressure changes in an elastic (e.g., solid, liquid or gaseous) medium overriding a static pressure.

The human ear receives sound pressure waves via pressure changes in the surrounding atmosphere. When excited, the air molecules swing in the direction of propagation (longitudinal waves). The propagation of sound is accomplished by transferring oscillations from one molecule to the next. Each molecule swings around its position of rest. That means sound doesn’t propagate by transport of matter, but by transport of energy. Most humans can perceive pressure changes between 16 and 16,000 Hz (approx). Sound pressure is determined by the type of oscillation. The following interrelations must be taken into account:

Oscillation		Sound impression
	large amplitude	high volume
	small amplitude	low volume
	high frequency	sharp tone
	low frequency	deep tone
	oscillation mode	pure tone
	oscillation mode	sound

“Noise” is any kind of sound that disturbs or annoys a person, or even damages the person’s health.

2. Size of the Sound Field

2.1 Sound Pressure p and Sound Pressure Level L

Sound pressure p is the actual pressure change caused by sound oscillations in the medium. At a frequency of 1,000 Hz, the threshold of audibility is at a sound pressure of about $20 \cdot 10^{-6}$ N/m^2; pain perception occurs at about 20 N/m^2 (20 Pa or 0.2 mbar). The sound pressure p, which occurs between the threshold of audibility and the threshold of pain at 1,000 Hz, thus comprises a field of 6 powers of ten. Specifying the sound pressure p to indicate a noise is, therefore, somewhat awkward due to this large field. Furthermore, there should be a reference to human perception. We know that the perception of irritation increases with the logarithm of the intensity of the irritation (i.e., Weber-Fechner law). Therefore, the sound pressure level L is used to indicate the sound:

$$L = 10 \lg \left(\frac{p}{p_0}\right)^2 = 20 \lg \left(\frac{p}{p_0}\right)$$

L Sound pressure level in dB
p Sound pressure in N/m^2
p_0 Reference sound pressure $20 \cdot 10^{-6}$ N/m^2 = $200 \cdot 10^{-6}$ µbar = 20 Pa = 0.2 mbar

2.2 Sound Intensity (Acoustical Power) J

Sound intensity J is the sound energy, which traverses an area located at a right angle to the direction of propagation per unit of time.

$$J = \frac{p^2}{(\rho \cdot c)}$$

J Sound intensity in W/m^2
p Sound pressure in N/mm^2
ρ Density of medium in kg/m^3
c Sound velocity in m/s

2.3 Acoustical Power W and Acoustical Power Level L_W

Acoustical Power W is the acoustic performance that an acoustical transmitter delivers in the form of airborne sound. Acoustical Power can't be measured directly. Instead, it is derived from the sound pressure p and the measuring area A.
The Acoustical Power Level L_W indicates (in logarithmic measure) the total acoustical power W arriving from an acoustical emitter, with reference to the reference value W_0.

L_W	Acoustical power level in dB
W	Acoustical power in W
W_0	Reference acoustical power $1 \cdot 10^{-12}$ W

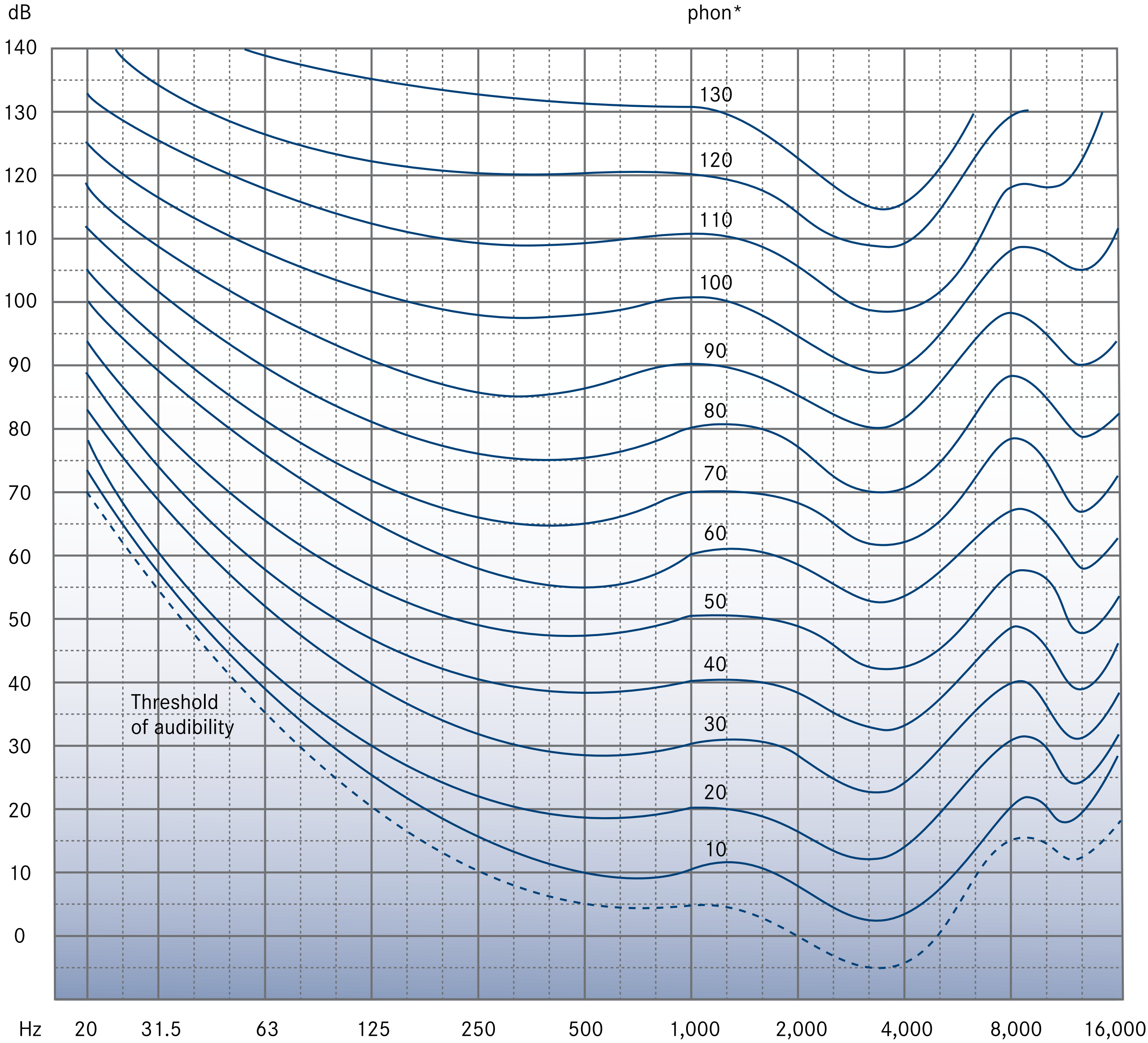
For a propagation of sound at the outlet of a gas pressure regulator under normal circumstances, the following correlations exist between the sound pressure level L measured 1 m from the valve body or from the tube and the acoustical power level L_W:

$$L_W \approx L + 12 \text{ dB}$$

2.4 Loudness Level L_S

Sound Pressure and Sound Pressure Level can describe a sound process physically, but they are not a valid scale for the human perception of sound. For that purpose, the so-called "loudness level" L_S was introduced, which is a scale for the subjective perception of the human ear. The unit of this perceived loudness level is "phon." At 1,000 Hz, the (subjective) phon scale is in step with the (objective) decibel scale. Therefore, the reference frequency is 1,000 Hz. The value of the loudness level L_S at any frequency is determined by a subjective comparison (comparison by hearing) with the sound pressure level at the reference frequency of 1,000 Hz. So, we may also say that the phon is a frequency-weighted decibel.

Threshold of audibility and same level graphs for pure tones inside free sound field / binaural hearing



* Sound pressure level based on 20 μN/m² (= 2 × 10^{-4} μ bar)

3. Sound Pressure Level Benchmarking

Benchmarking of sound pressure level is a correction of measured values (ruled by standards) in order to take due account of the hearing sensation, which depends on the frequency, intensity and duration.

3.1 Sound Pressure Level L_A

The A-scale Sound Pressure Level L_A is a reasonably good indicator of the disturbing effect or the perceived noisiness (loudness) of a sound.
Today, it is used almost exclusively for the determination of limit values in standards and directives for the marking of sounds in technical applications.
The guidelines for A-scale are determined by DIN EN 61672-1.

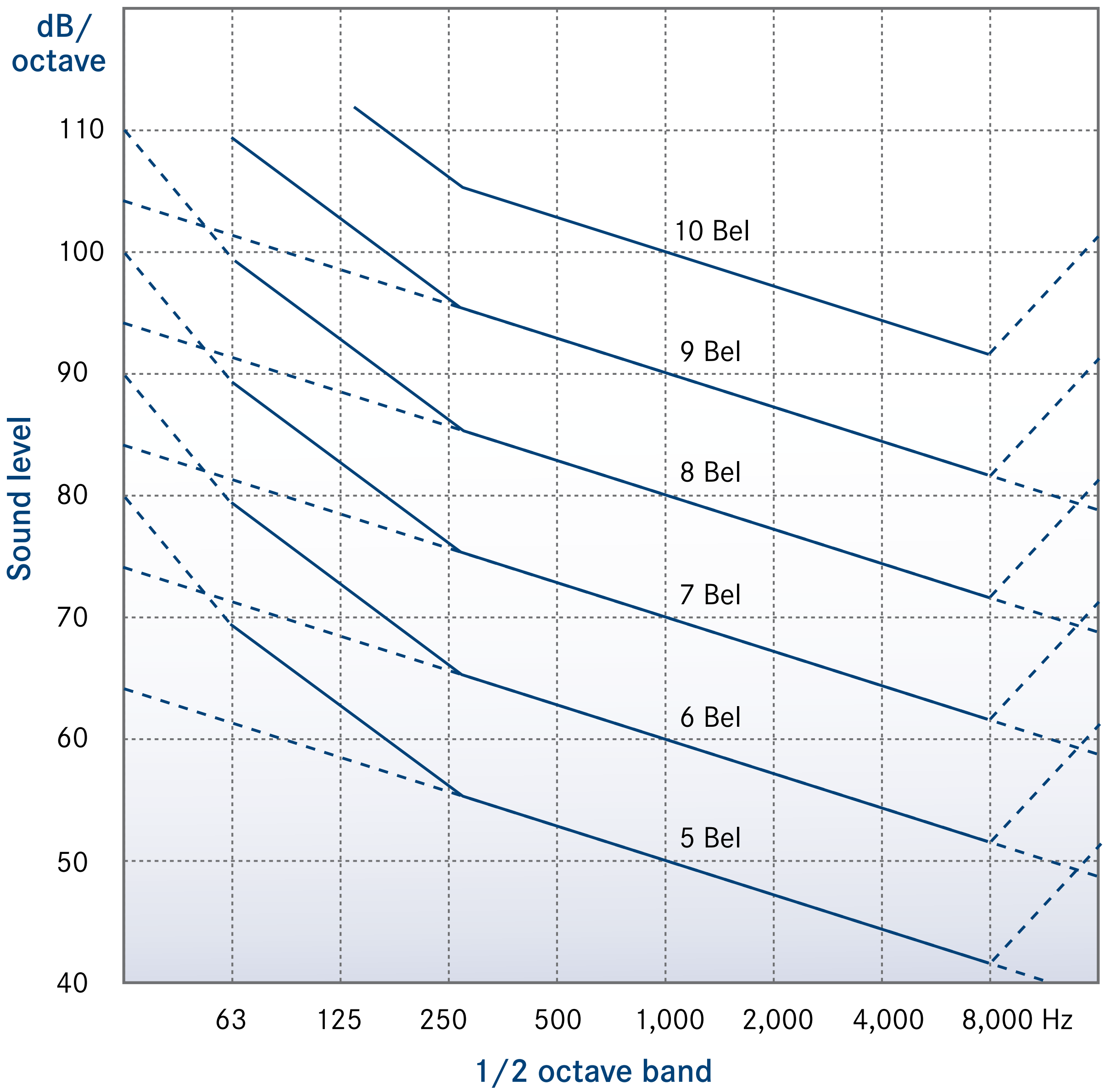
3.2 Assessment Level L_R

The Assessment Level L_R is the level of a temporal constant noise, which is equated with the temporally-oscillating level of a sound in its effect on people (TA Lärm; DIN 45641; DIN 45645 and others). It is used to assess noises from a specific source and their effect on a workplace or the neighbourhood.

3.3 Lübcke's Binodal Curve

Lübcke's Binodal Curves are assessment curves in the sound pressure level frequency diagram for noise, referred to the octave level. Between 300 Hz and 8,000 Hz, they decrease about 3 dB per octave towards the higher frequencies.
These assessment curves consider the fact that people perceive the same sound pressure level at higher frequencies as more annoying. The binodal curves are named after their Bel value (1 Bel = 10 dB) at 1,000 Hz.
When third levels are compared to the assessment curves, equal numerical values correspond to approximately 5 dB lower requirements.
A direct comparison of the A-scale sound pressure level with a Lübcke curve is not possible.

Lübcke and Cremer-Lübcke curves for octave level limit values



4. Physical Laws of Sound

4.1 General

A change of the sound pressure level by 1 dB is at the limit of audibility for human beings.
A change of the sound pressure level by 6 dB corresponds to a bi-section or duplication of the sound pressure.
A reduction of the sound pressure level by 10 dB is perceived by most humans as "reducing the loudness by half."
In order to achieve a reduction of 20 dB, the sound pressure has to be reduced to 1/10 of the initial value or by 9/10 of the initial value.

4.2 Sound Propagation

4.2.1 Spherical Radiator

In a circular area (unimpeded sound propagation), the sound pressure level L of a Spherical Radiator decreases proportionally 1/r. Here, r is the distance between the source and the enveloping surface.

$$\Delta L = 20 \log \left(\frac{r_2}{r_1}\right)$$

ΔL Decrease of sound pressure level in dB
r_1 Distance of the first enveloping surface in m
r_2 Distance of the 2nd enveloping surface in m

That means each doubling of the distance leads to a drop in sound pressure level of
$\Delta L = 20 \log 2 \approx 6$ dB.

Inside rooms, the drop in sound pressure level is less pronounced due to reflections. We generally expect a reduction of 3 to 4 dB per doubling of the distance, depending on the liveness of the room.

4.2.2 Linear Source (Pipework)

The sound energy of a Linear Source flows $r < l$ through a cylinder jacket $(2 \cdot r \cdot \pi \cdot l)$. Thus the sound intensity decreases $1/r$ and the sound pressure level L decreases $1/\sqrt{r}$.

$$\Delta L = 10 \log \left(\frac{r_2}{r_1}\right)$$

ΔL Decrease of sound pressure level in dB
r_1 Distance of the first enveloping surface in m
r_2 Distance of the second enveloping surface in m
That means for a linear source, the sound pressure level L decreases by ≈ 3 dB per doubling of the distance.

4.3 Addition of Several Sound Sources

4.3.1 Addition of Sound Sources with Equal Noise Levels

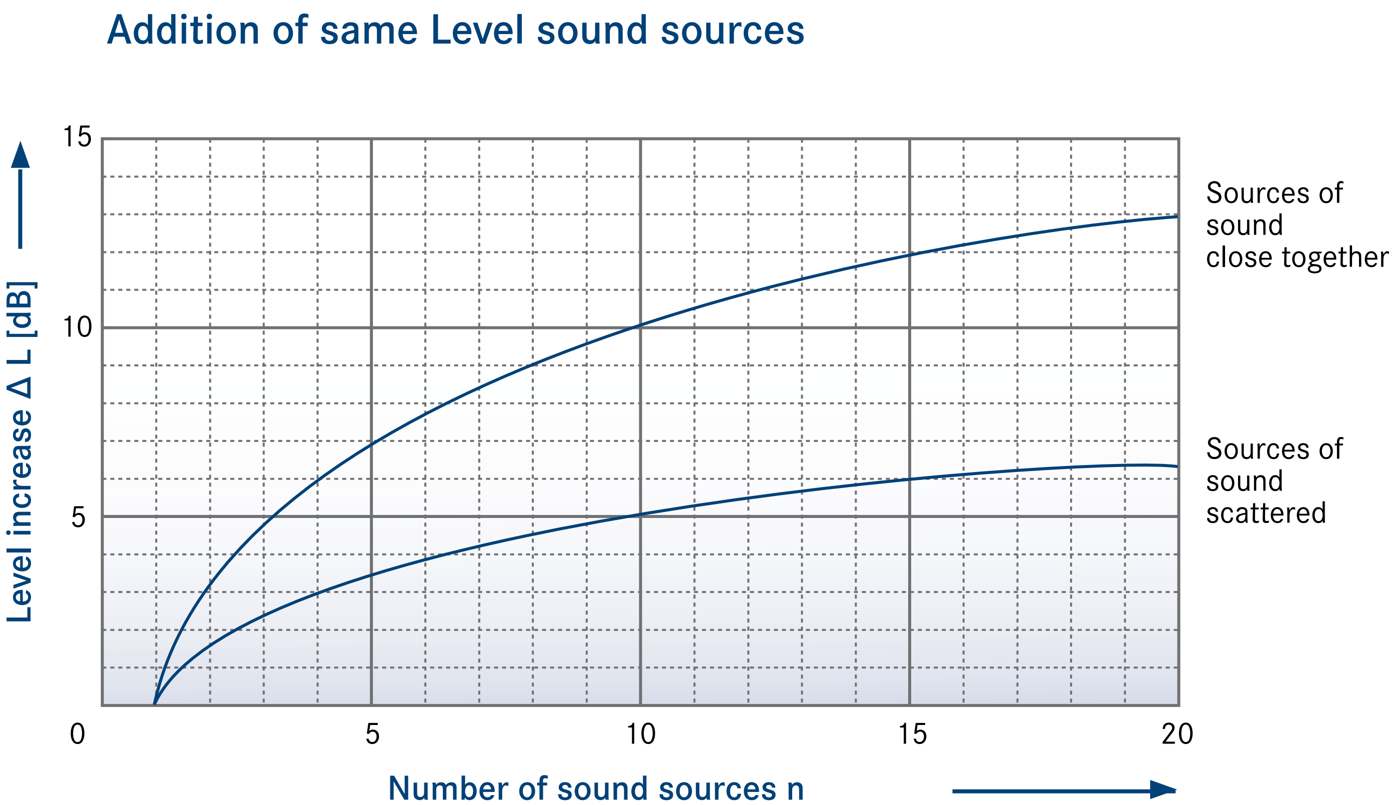
In the event of several sound sources having the same level, the sound level L_1 for sound sources located close to each other increases by

$\Delta L = 10 \log (n)$

for sound sources distributed across the room, the value increases by

$\Delta L = 5 \log (n)$

The diagram below illustrates the spatial correlation between an increase in the sound pressure level ΔL and the number of sound sources of the same level.



The total sound pressure level is

$L = L_1 + \Delta L$

L	Total sound pressure level in dB
L_1	Sound pressure level of a source in dB
ΔL	Sound pressure level increase in dB
n	Number of sound sources

Conclusion:

- Two sound sources of the same level, located close to each other, are only louder by about 3 dB.
- That means the sound levels of sources with the same level must BOTH be reduced.

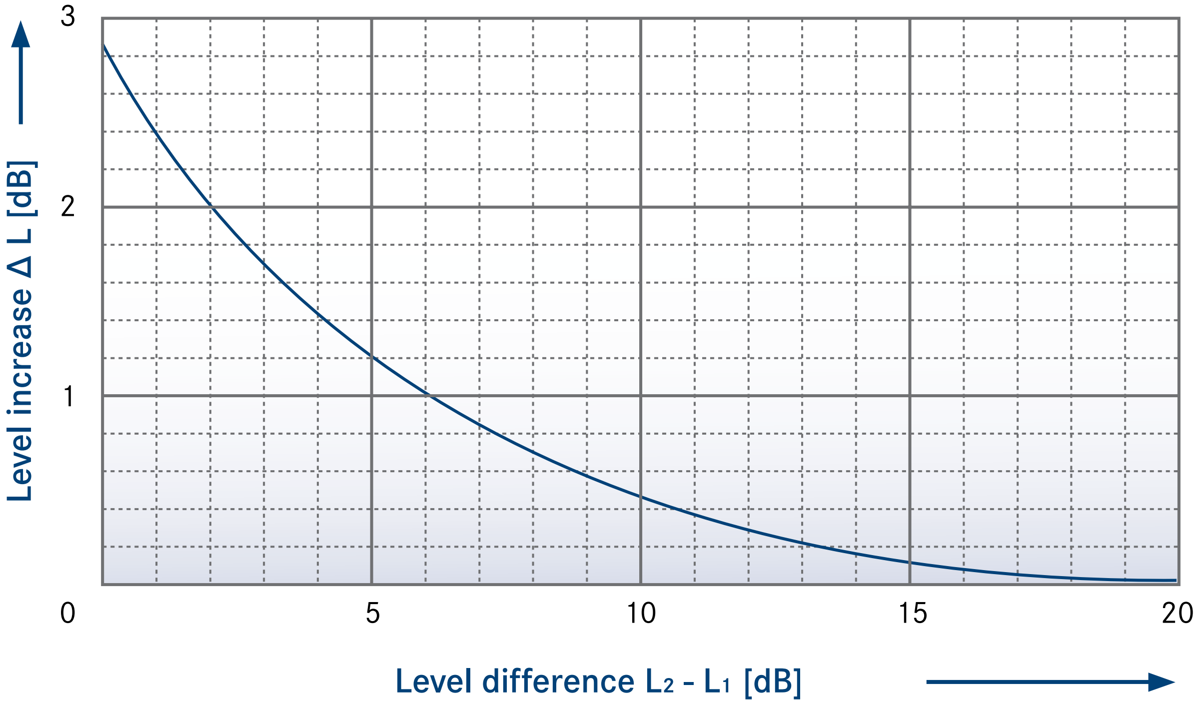
4.3.2 Addition of Sound Sources of Different Levels

In case there are two sound sources with different levels, the higher sound pressure level increases by:

$$\Delta L = 10 \log \left(1 + 10^{\left(\frac{L_2 - L_1}{10}\right)}\right)$$

The following diagram shows the mathematical correlation between an increase in the sound pressure level ΔL and the difference of the sound pressure level $L_2 - L_1$.

Addition of two sources having different levels



That means the total sound pressure level L is

$L = L_1 + \Delta L$

L	Total sound pressure level in dB
L_1	Higher sound pressure level in dB
L_2	Lower sound pressure level in dB
ΔL	Sound pressure level increase in dB

Conclusion:

- When two sources differ by 10 dB or more, only the louder sound level source (L_1) has to be reduced (in a first instance)

5. Noise Protection Legislation

5.1.General Information

Standard immission values indicate a reasonable level of noise and oscillation, which (usually) does not cause any disturbance, annoyance and/or hazard or damage.
Standard immission values are normally given as assessment levels L_R.

5.2 Limit Values at the Workplace

Stipulations concerning admissible immission values at workplaces can be found in the following directives and regulations (among others):

- VDI 2058 Sheet 2 "Assessment of noise with regard to the risk of hearing damages"
- German "Health and Safety at Work Act BGIA § 3 Working Conditions Section Punkt 3.7"
- German Provision "Noise" BGV B3" (formerly VBG 121)

According to the German "Health and Safety at Work Act", the assessment level L_R at the workplace may not exceed 85 dB per shift. Since March 2007, the new applicable EU value is 80 dB (A).

TARGET SOUND PRESSURE LEVELS:	
Where concentrated brain work is required	max. 30 to 40 dB (A)
For mainly intellectual activities	max. 55 dB (A)
For easy and/or mainly mechanised office work or comparable activities	max. 70 dB (A)
For all other activities	max. 85 dB (A)[1] 80 dB (A)[2]

[1] In exceptional cases, values may be exceeded up to 5 dB (A). [2] New EU value since March 2007.

5.3 Limit Values Applicable to Work Noise Affecting the Vicinity

The following documents (and others) contain limit values for work noise affecting the vicinity:

- VDI 2058, Sheet 1: "Assessment of Working Noise in the Vicinity"
- German Trade, Commerce and Industry Regulation Act, "General Administrative Regulation on Facilities Requiring Official Approval for Operation" according to § 16 of the German industrial code.
- German "TA Lärm", Technical Instruction on Noise Protection

Depending on the vicinity and time of day, the following standard assessment level values L_R are valid:

STANDARD IMMISSION VALUES		
	by day	by night
Industrial areas without any residential housing	70 dB (A)	
Areas with mainly industrial facilities	65 dB (A)	50 dB (A)
Areas with industrial facilities and residential housing	60 dB (A)	45 dB (A)
Mainly residential areas	55 dB (A)	40 dB (A)
Residential areas, exclusively	50 dB (A)	35 dB (A)
Spa areas, hospitals, etc.	45 dB (A)	35 dB (A)

6. Generation of Noise in Gas Pressure Regulating Stations

In a gas pressure regulating station, we must distinguish between two general causes of noise:

- Noise generated by expansion in the final control element (expansion noise)
- Noise generated by the transport of gas in the lines (flow noise)

Expansion noise and flow noise depend very much on the velocity of the gas (among other things). However, speeds are usually much higher where expansion occurs (and there, again, mainly where supercritical pressure loss occurs). That means expansion noise is primarily responsible for the sound pressure level of a plant.
With regard to sound pressure level data for gas pressure regulators and control valves, flow noise in stations generally makes it impossible to reach sound level values below approx. 75 to 80 dB (A).

6.1 Expansion Noise

Expansion Noise is created in the final control element. However, this noise is transferred via the gas column or the connecting lines and is emitted at a remote location.

6.1.1 Cause

The development of expansion noise can be explained by the processes during a pressure drop: The gas jet (free jet) flowing from the throttling point of the control element into the outlet chamber has a speed that is dependent upon the pressure loss. Under super-critical pressure conditions, it corresponds to the speed of sound (for natural gas, this is approx. 400 m/s).
Thus, there are considerable speed differences between the free jet and its environment (work room). This results in clusters or packs of packs (so-called turbulence elements or eddies) of different sizes being torn out of the free jet. They then dissolve, starting from the edges. The eddies decompose to smaller and smaller units due to inner and outer friction until they have dissolved completely. The decomposition of the free jet causes strong turbulences. Pressure oscillations developing in this process are perceived as so called "jet noise."

Another cause of noise is due to the fact that super-critical pressure ratios in the transition from inlet to outlet pressure cause unsteady and sudden pressure changes (so called "compression waves" or "shockwaves"). The noise caused by this effect is known as shock waves, too.
The compression waves not only cause noise, but they also incite the valves to oscillate and thus emit mechanical vibration noise. Usually this low-frequency noise is secondary, but it must be taken into consideration nevertheless. In case of resonance, the inner parts of the control element might be destroyed.

6.1.2 Calculation

Today, the physical laws of the development of expansion noise are understood well enough to allow an approximate calculation of the noise level that may be expected for a given operating and device data set.
All known calculation methods assume that a certain part of the mechanical performance of the throttling process is transformed into sound output. How much is transformed depends on the acoustical efficiency degree, and this in turn depends (among other things) on the pressure ratio pd/pu and on the type of the valve. Calculations also consider the acoustic insulation of the valve body and, if applicable, the primary noise-reducing installations and pipework geometry of the downstream pipework. The calculation of sound level has been adapted to a lateral distance of 1 m from the outlet of the gas pressure regulator.
For a given set of operational data, the following graph allows the graphic determination of the noise level expected at a lateral distance of 1 m from the outlet of the gas pressure regulator. However, it must be pointed out that this graph can only be used to determine an approximate noise level, as it was made for a "standard device" (i.e., single-stage expansion, no special measures to reduce noise) and a "standard" wall thickness of the downstream pipework.
Depending on the design, control-element body material and kind of downstream pipework (e.g., with outlet expansions), significant deviations from this standardised formula are possible.

Graphical Determination of Noise Pressure Level

As a function - of the inlet pressure p_u in bar
- of the outlet pressure p_d in bar
- of the flow rate Q_b for natural gas

The values of the graph refer to a lateral distance of 1 m from the outlet of the regulator. They are valid for standard valves (e.g., single-stage expansion, no special measures to reduce noise) and a ‘standard’ wall thickness of the downstream pipework. Possible noise development of the upstream and/or downstream components of the station is not taken into consideration.

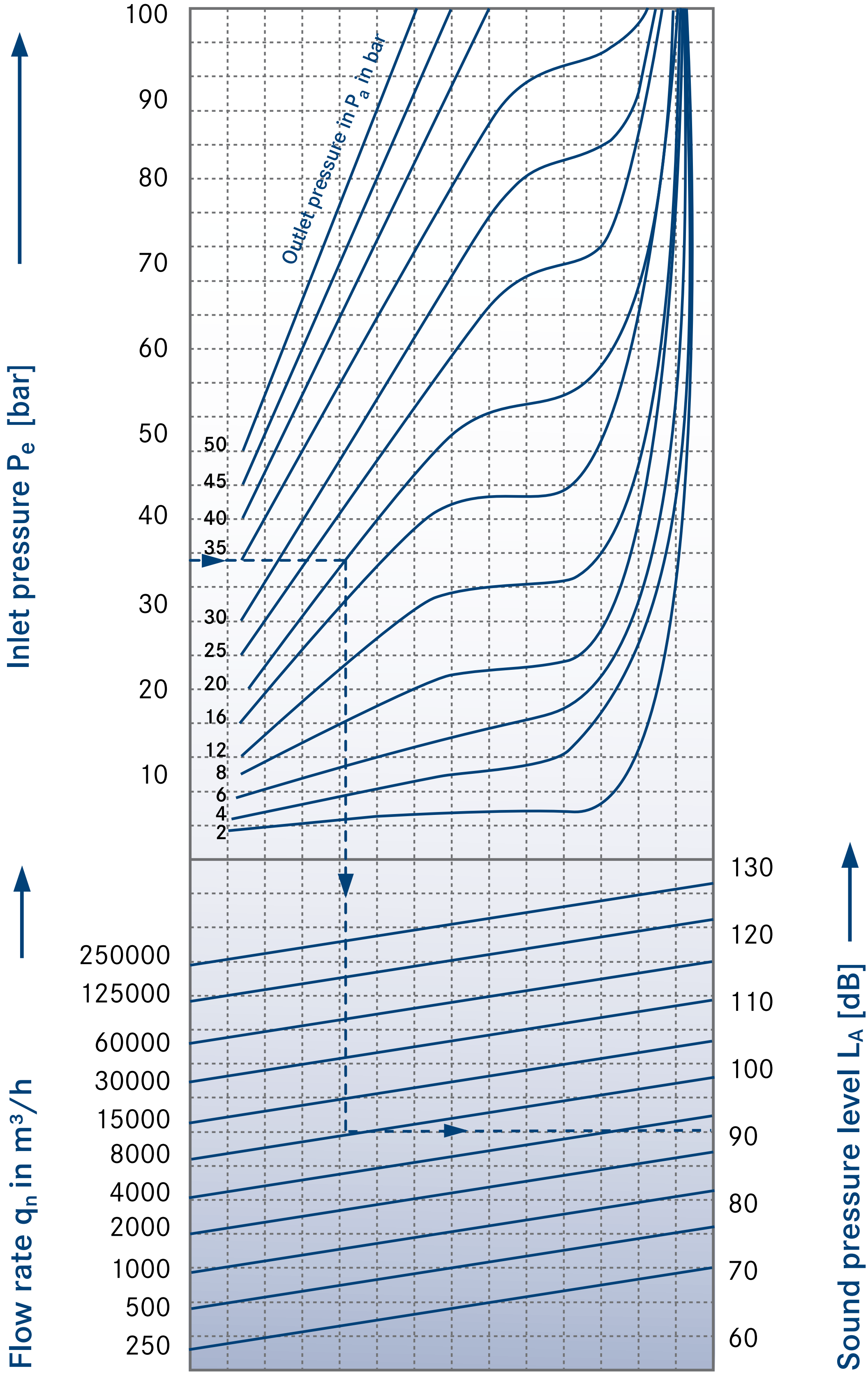
Example: p_u = 34 bar
p_d = 20 bar
Q_b = 8,000 m^3/h natural gas

Result L_A = 91 dB

For other types of gas: use the following correction value ΔL_A.

CORRECTION VALUE FOR SOME GASES AND GAS MIXTURES	
Gas, gas mixture	ΔL_A
	dB
Ammonia	-1
Acetylene	0
Natural gas	0
Helium	-5.5
Carbon dioxide	+2
Carbon monoxide	+1
Air	+1
Methane	0
Propane	+2
Oxygen	+1.5
Nitrogen	+1
Hydrogen	-9

Determination of sound pressure level LA of gas pressure regulators



6.2 Post-expansion

The reduction of pressure is often carried out at significant pressure differences (i.e., large pressure ratios). In such cases, velocities at the outlets of a gas pressure regulator can reach the speed of sound (approx. 400 m/s for natural gas, approx. 1,300 m/s for hydrogen). The next step would be a pressure drop (post-expansion) back to the outlet pressure p_d where the pipe is prepared to accommodate a flow velocity of approx. 20 m/s. More post-expansion pressure reduction may occur in subsequent flared sections of the pipeline. Such post-expansion pressure drops cause very high noise levels in the pipework, and the sound level calculation method presented above does not take account of them.

Whenever the sound level is an issue, users should select gas pressure regulators with outlet expansions. That way, they can be certain the primary noise-protection measures will be less expensive than secondary measures such as pipe insulations or (worst-case scenario) building insulation in order to comply with immission regulations and protect the neighbourhood (see table). Secondary measures may still be necessary to fully comply with applicable limit values.

6.3 Flow Noise

The Flow Noise occurring in straight pipework is secondary for most gas pressure regulating stations, as long as velocity limits for gas transmission in the connecting lines are not exceeded (usually 20 m/s). However, users should bear in mind that levels are 75 to 80 dB (A) or higher in most cases because of the general flow noise of the pipework, expansions and pipe bends.
In case there are higher velocities in a station or sections of a station (e.g., safety fittings), the additional effect they may have on total noise has to be taken into account.

6.3.1 Causes

The primary causes of flow noise are discontinuities of flow. Any and all detours, cross-section increases and decreases and/or devices across the flow pass cause local changes in the flow velocity, as well as flow behaviour in the boundary layers. Local changes in flow velocity can result in instabilities causing emission of noise.

6.3.2 Calculation

Today, there are not only calculation methods to determine expansion noise, but also flow noise. Again, it must be pointed out that the following graph contains only approximate values.

Graphic Determination of Sound Pressure Level of Flow Noise in Pipework

Sound pressure level L_A at 1 m lateral distance from the pipework

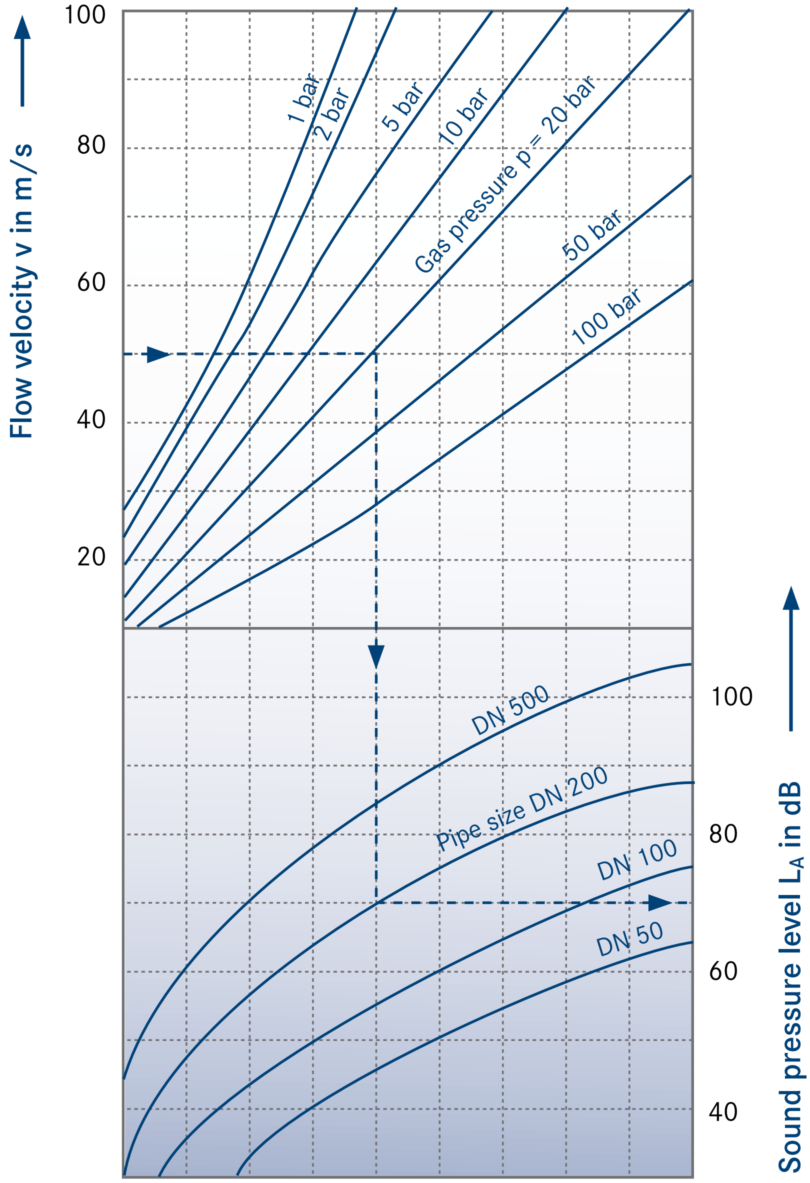
– as a function of flow velocity	w in m/s
– of gas pressure (over-pressure)	p in bar
– of pipe size	DN in mm
– for natural gas	

Values stated in this graph are for flow noise in straight pipework. In case of bends, expansions, reducers, etc., the resultant sound pressure level will be significantly higher. Values have been adapted to a wall thickness of 7.1 mm. The medium is natural gas. Other wall thicknesses: add the following correction value: Δ L

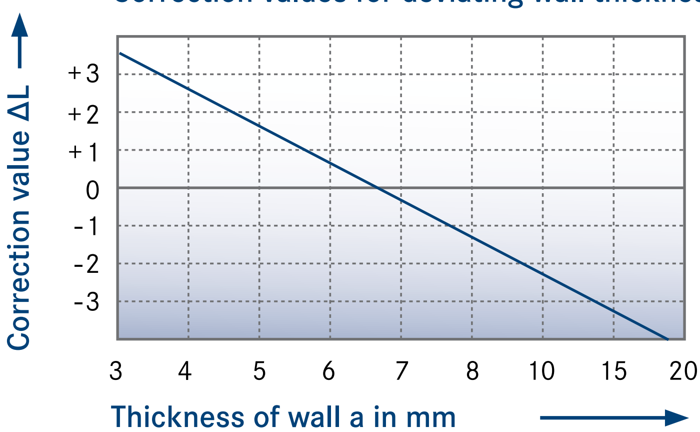
Example: w = 50 m/s
p = 20 bar
DN = 200 mm

$L_A \approx 69$ dB

Calculation of sound pressure level of flow noise



Correction values for deviating wall thicknesses



7. Noise Reduction in Gas Pressure Regulators

When discussing noise reduction measures, we must, first of all, distinguish between primary and secondary sound insulation. Primary sound insulation is meant to avoid the development of sound completely, or at least keep it within reasonable limits. Secondary sound insulation covers all the measures meant to impede the propagation of noise (i.e., the sound level is reduced between the source of the sound and the affected place or person).
The most effective, and thus the most satisfactory, way of reducing noise is to determine the root cause of the problem in order to prevent the initial development of sound-generating oscillations. These tactics are called "primary measures." They can significantly improve the noise behaviour of gas expansion processes in a gas pressure regulator. Primary measures are classified as follows:

Multi-stage expansion

Acoustical power decreases with smaller pressure differences. If you split up a required pressure drop and carry it out in several stages, the overall sound behaviour will be much more adequate.

Jet division

Acoustical power also decreases with a lower flow rate. If we use a perforated plate to split up the gas jet into a large number of smaller flows, the overall noise behaviour will improve as well.

Local limitation of expansion processes

Try to finish (as far as possible) the actual expansion process for a given outlet pressure in the control element, and try to homogenise the flow configuration already in the outlet of the device. Post-expansion processes behind the gas pressure regulator can no longer be monitored, and usually cause more sound in the subsequent parts of the station (e.g., pipework, etc.).
In order to confine the expansion process to a restricted section, dividing the jet is a very useful method as it shortens the length of the turbulent mixing area considerably. The length of the turbulent mixing area can be further reduced by promoting the dissipation (dissolution) of the free jet using turbulence elements. This help to achieve a homogenisation of the flow process.
Today, many RMG devices are equipped with standard elements for noise reduction using the aforementioned principles in order to influence the expansion process. On principle, it is always possible to achieve a significant improvement of noise behaviour using suitable devices and/or downstream elements. Sometimes this is possible even with devices already installed (retrofit).
The best possible design can reduce primary noise by 25 dB (A) or more.

8. German Standards/Guidelines/Directives/Regulations Concerning Noise Protection

1. VDI 2058 Sheet 1 “Assessment of Working Noise in the Vicinity”
2. VDI 2058 Sheet 2 “Assessment of Working Noise with Regard to the Risk of Hearing Damages”
3. “BGIA German Health and Safety at Work Act (Worksheet V) § 3 Working Conditions Section 3.7”
4. “German TA Lärm, Technical Instruction on Noise Protection”
5. “VDMA 24422 Guidelines for the Calculation of Noise”
6. “DVGW Worksheet G 494 Measures of Sound Protection of Devices and Appliances for Gas Pressure Control and Gas Measurement”

Global Operating Instructions for Gas Pressure Regulators and Safety Devices (Excerpt)

1. General information

For the construction and equipment as well as monitoring and maintenance of gas pressure regulating stations, please consult any and all laws, regulations, etc. in force, in particular DVGW Working Instructions G 491 and G 495.

Warnings
Caution: Devices should be started up, put out of operation and maintained by skilled personnel, exclusively.

Danger: Devices and components may be opened only after depressurisation.

– Danger of personal injury and damage to property! –

Caution: Excessive pressure may cause internal and external damage to devices.

Caution: For more information about technical data and specific design particularities, please consult the latest brochures, test and inspection documents as well as all the type plates of the devices.

Do not use spare parts and/or lubricants not expressly listed in the RMG operating and maintenance instructions for spare parts.

In case any parts or lubricants are used that are not explicitly mentioned, RMG shall not be liable in any way whatsoever for defects and consequential damage.

2. Installation

Install gas pressure regulators and safety devices without any pipework bracing. There's an arrow on the control element indicating the mounting position. It must point in the flow direction (exception: RMG 790 in return pipe). When gas flows in the horizontal direction, the usual mounting position of most devices is upright (see examples for installation and specifications in brochures accompanying devices: "Technical Product Information").
Be sure to always install pilots and control devices of pilot-operated devices in the normal position. Mounting positions may influence functionality. Certain technical data, such as outlet pressure range W_d, accuracy Class AC such as lock-up pressure Class SG and accuracy group AG, may be affected. When installing devices in other positions, be sure to read the operating and maintenance instructions.

2.1 Types of outlet measuring pipes

General
When selecting a measuring point, be sure to find a section of pipework with a steady flow. Be sure there are no other devices upstream and downstream of the measuring point (i.e., no orifice plates, expansions, bends, branchings, instrument valves, etc. that may disturb the flow).

RMG recommendations for the outlet measuring pipe
General
- Max. flow velocity at measuring point: up to 25 m/s approx. depending on conditions prevailing at station
- With certain station layouts, such as gas regulating lines for gas engines and gas burners, flow velocities > 25 m/s are possible. Please contact RMG.

- For the low pressure range up to 250 mbar, we recommend max. 15 to 20 m/s approx. In certain cases, even lower flow velocities may be necessary.

Upstream of measuring point
General
Section L_{uR} of the undisturbed part of the pipe line must be about (2.5 to 5) x cross-section of the pipework depending on the type of equipment or gas pressure regulator or downstream pipe expansion, if any.

- If a gas pressure regulator with expansion is used and
  - If the size of the pipe equals the pipe size of the outlet section of the gas pressure regulator → $L_{uR\ min.}$ 2.5 x DN
  - The size of the pipework is the next higher standard size → $L_{uR\ min.}$ 3 x DN
  - The size of the pipe is equal to the double standard pipe expansion → $L_{uR\ min.}$ 4 x DN
  - The size of the pipe is larger than the size of the double standard pipe expansion → $L_{uR\ min.}$ 5 x DN
- If a gas pressure regulator is used having an outlet size equal to the inlet size and
  - The size is the next higher standard pipe size → $L_{uR\ min.}$ 4 x DN
  - The size of the pipe is equal to the double standard pipe expansion → $L_{uR\ min.}$ 5 x DN

Downstream of measuring point
- $L_{uR\ min.}$ 1.5 x DN for thermometer dip coats
- $L_{uR\ min.}$ 1.5 x DN for reducers and expansions (depending on conditions prevailing at the station)
- $L_{uR\ min.}$ 3 x DN for auxiliary valves (e.g., gate valves, flaps and ball valves with reduced opening)
- $L_{uR\ min.}$ 4 x DN for T pieces

Other recommendations
- Auxiliary valves with undisturbed flow (e.g., ball valves with full passage) and bends, if any (depending on type), are not regarded as a problem when it comes to connecting measuring lines.
- For gas meters (turbine meters incl. flow meters, ultrasonic gas meters, vortex meters, but not RPDs), there are no restrictions concerning the layout of measuring lines.
- RPDs: Smallest possible distance between gas pressure regulator/reduction piece/expansion and the gas meter $L_{uR\ min.}$ 3 x DN Distance between meter and measuring line connection downstream at least $L_{uR\ min.}$ 2 x DN
- When using main line valves (reduced opening), we recommend a distance of $L_{uR\ min.}$ 3 x DN downstream of a measuring line connection.
- Pressure losses of gas meters, in any, also have to be considered, depending on conditions prevailing at the station.

<u>All statements are recommendations by RMG!</u>
Furthermore, all recommendations are based on measuring line connections as stated in standards (BS, DIN) EN 334 and (BS, DIN) EN 14382. Any and all liability shall be with the owner/operator of equipment.
The following drawing explains the basic station types.

2.2 Layout of a typical gas pressure regulating station

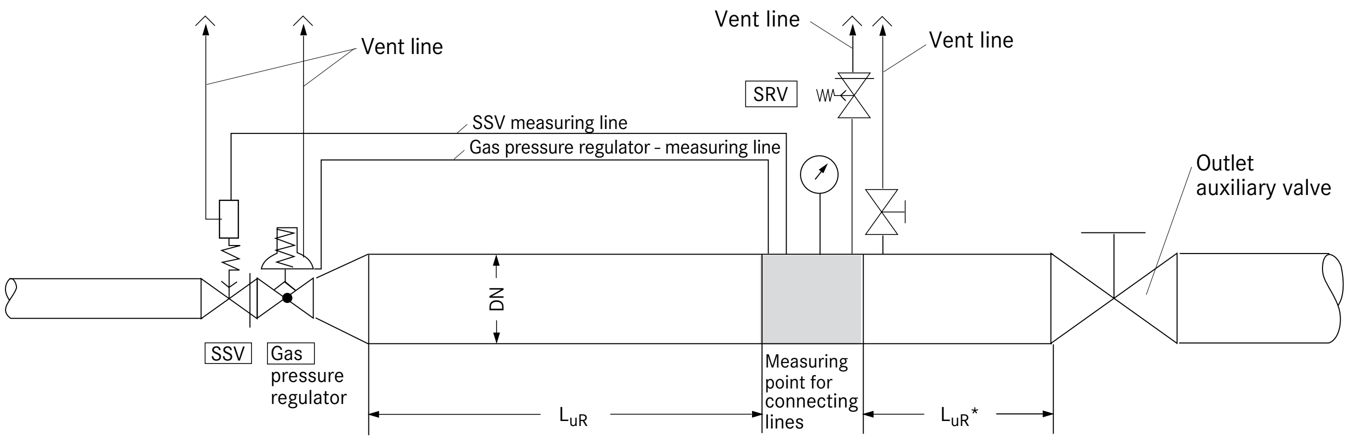


Fig. 1: Gas pressure regulating station – direct-acting gas pressure regulator, outlet expansion without noise attenuation
– with outlet expansion behind the gas pressure regulator

*) Auxiliary valve with undisturbed flow (e.g., ball valve) can be integrated.

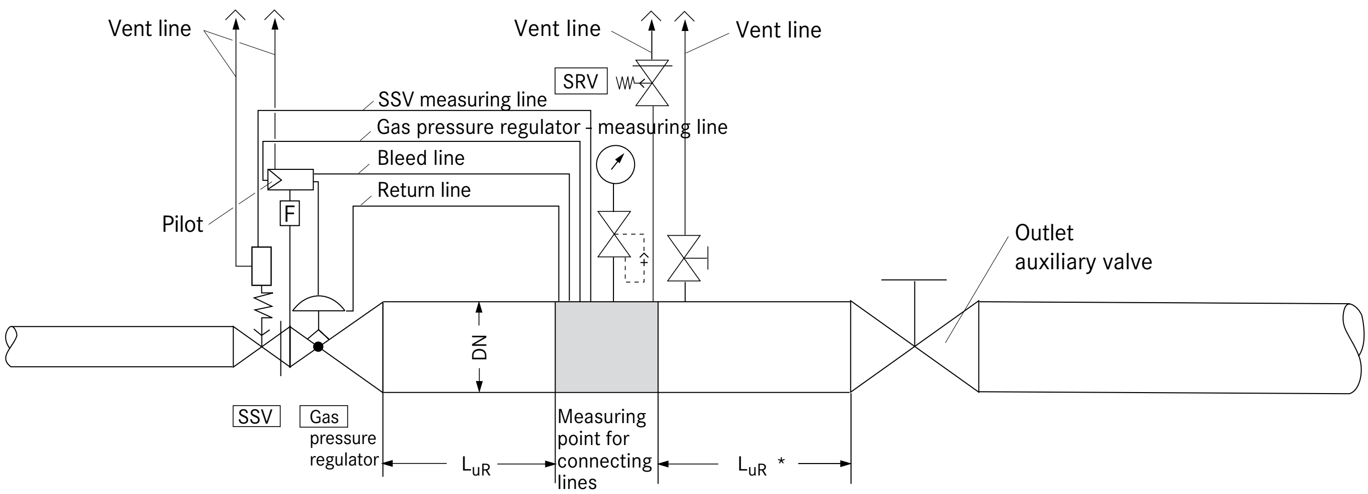


Fig. 2: Gas pressure regulating station – pilot-operated gas pressure regulator, outlet expansion with integrated noise attenuation
– pressure gauge (outlet) with protection against overpressure

*) Auxiliary valve with undisturbed flow (e.g., ball valve) can be integrated.

2.3 Functional lines

Find the sizes of lines and connection threads in brochure “Technical Product Information” accompanying the device.
Lines have to be arranged and dimensioned in such a way that they ensure the function of the device according to its purpose. The **measuring line** transfers the measured value from the measuring point to the measuring diaphragm of a regulating assembly or pilot of a gas pressure regulator or SRV, or to the measuring diaphragm of a control device of an SSV. It has to be connected to each individual device, and also connected on top of or on the side of the pipe. For safety devices, the measuring line must be connected upstream of the first auxiliary valve on the outlet side – and in such a way that it can’t be shut off. In case the measuring line is additionally connected behind the first auxiliary valve on the outlet side, 3-way ball valves with negative overlapping have to be used for switching over. (Such valves have no operating position where both measuring lines are completely shut off at the same time.)

The **vent line** connects the measuring diaphragm to atmosphere. In case a measuring unit is damaged (e.g., rupture of the diaphragm), it blows off gas to atmosphere. Vent lines are not required in purpose-built kiosks or housings, which have adequate ventilation (please refer to relevant documents including IGE/SR/23, IGE/SR/25 and IGE/TD/13). Under certain circumstances, vent lines may not be necessary if vent valves (RMG 915) or types with safety diaphragms can be used instead.
→ Please contact RMG.

The **vent line** of a Safety Relief Valve (SRV) is used to discharge gas (e.g., leak gas) into the atmosphere.

Grouping vent lines to form a single main line is admissible if it doesn’t interfere with individual devices. We recommend designing the cross-section of such a main line at least 5 x as big as the sum of the cross-sections of the individual lines.

For **main** Safety Shut-off Valves (SSV), we recommend laying out the vent lines separately. Vent lines must not be thrown together with bleed lines

Bleed lines of pilot-operated gas pressure regulators are used to blow off the discharge gas of the pilot into the outlet chamber of the station. On certain devices, such a bleed line is combined with the return line.

The **return line** of pilot-operated gas pressure regulators serves to return the outlet pressure to the actuator.

2.4 Leakage tests

Gas Pressure Regulators (GPR) and Safety Shut-off Valves (SSV) are pressure and leak-tested at the manufacturer's premises according to (DIN) EN 334 (GPR,SRV) and (DIN) EN 14382 (SSV) or local equivalent standards and recommendations.
According to DVGW, working instructions G 491, the station must be completely assembled and then leak-tested at the place of assembly. Tests are carried out with air or inert gas at 110 % of the max. admissible operating pressure (MIP_u, MIP_d).
$MIP = 1.1 \cdot MOP_{u,d}$

Inlet chamber
- Chamber up to the main valve of the Gas Pressure Regulator test pressure $MIP_u = 1.1 \cdot MOP_u$

Outlet chamber GPR/fitting
- Chamber between main valve of the Gas Pressure Regulator (GPR) and the first auxiliary valve at the outlet section

  We recommend using 110 % of the upper response pressure p_{dso}, which has been set at the Safety Shut-off Valve (SSV).
  Recommended test pressure
  $MIP_d = 1.1 \cdot p_{dso}$
  (However: max. $MIP_d = 1.1 \cdot MOP_d$.
  Do not exceed MIP_d – even if the accuracy group AG of the SSV is respected.)

Outlet chamber behind the fitting
- Chamber behind the first auxiliary valve downstream of the Gas Pressure Regulator Test pressure $MIP_d = 1.1\ MOP_d$.

Note: Always apply test pressures slowly and smoothly.

Please remember:

Pressure in outlet chamber must be ≤ pressure in inlet chamber
Pressure always starts to build-up from the inlet side (inlet chamber)
Pressure always starts to decrease from the outlet side (outlet chamber)

Caution: Never allow pilot-operated devices to have a pressure acting on the actuator that is more than 0.5 bar higher than the preset value.
Example: Setpoint spring adjustment is 0.2 bar. That means the test pressure in the outlet chamber must not exceed
0.5 + 0.2 = 0.7 bar.

General Conversion Table

LEGAL UNITS IN METROLOGY					
Value		Legal unit			
Name	Formula symbols	SI unit	Example for recommended unit (non coherent units)	Example for common unit	Conversion
Power	F		N	daN, kN, MN	1 kp = 9.81 N 1 N = 0.1019 kp 1 daN = 1.019 kp ≈ 1kp
Pressure	p	N/m^2, Pa (Pascal)	MPa, kPa, bar, mbar	kp/cm^2, at	1 N/m^2 = 1 Pa
Absolute pressure	$p_{(abs.)}$				105 Pa = 0.1 MPa = 1 bar
Over-pressure	$p_{(over)}$				1 kp/cm^2 = 0.981 bar ≈ 1 bar
Differential pressure	Δp				10 mm WS = 0.981 mbar ≈ 1 mbar
Atm. pressure	p_{amb}		mbar	mbar, Torr	1 Torr = 1.333 mbar
Mechanical tension	R	N/m^2	N/mm^2	kp/cm^2 kp/mm^2	1 kp/mm^2 = 9.81 N/mm^2 1 kp/cm^2 = 9.81 N/cm^2 = 0.00981 N/mm2
Work, energy	W,A,E	Nm, J (Joule)	MJ (Megajoule)	kpm, kWh	1 Nm = 1 J = 1 Ws
Amount of heat	Q			kcal	1 kpm = 9.81 J ≈ 10 J 1 kcal = 4186.8 J 1 kWh = 3.6 MJ
Output	P, N	J/s, W (Watt)	kW, MW	kW, PS, kpm/s	1 J/s = 1 W 1 kpm/s = 9.81 J/s ≈ 10 J/s
Heating output	Q_W			kcal/h	1 kcal/h = 1.16 W 1 kW = 1.36 PS 1 PS = 0.7353 kW
Temperature	T, t	K (Kelvin)	°C	K, °C, degrees	
Gas constant	R	J/(kg·K)		kpm/(kg·K)	1 kpm/(kg·K) = 9.81 J/(kg·K)

General Information

UNIT OF LENGTH				
Unit	Name	Legal unit		
		m 1)	cm	mm
1 km	Kilometre	1000	10^5	10^6
1 m	Metre	1	100	1000
1 dm	Decimetre	0.1	10	100
1 cm	Centimetre	0.01	1	10
1 mm	Millimetre	0.001	0.1	1
1 µm	Micron	10^{-6}	10^{-4}	0.001
1 nm	Nanometre	10^{-9}	10^{-7}	10^{-6}
1 pm	Picometre	10^{-12}	10^{-10}	10^{-9}
1 in	Inch 2)	0.0254	2.54	25.4
1 min	Thousandth 2)	$2.54 \cdot 10^{-5}$	0.00254	0.0254
1 µin	Micro inch 2)	$2.54 \cdot 10^{-8}$	$2.54 \cdot 10^{-6}$	$2.54 \cdot 10^{-5}$
1 ft	Foot 2)	0.3048	30.48	304.8
1 yd	Yard 2)	0.9144	91.44	914.4
1 fathom	= 2 yd 2)	1.8288	182.88	1,828.8
1 rod	= 1 pole = 1 perch = 5.5 yd 2)	5.0292	502.92	5,029.2
1 chain	= 22 yd 2)	20.1168	2,011.68	20,116.8
1 furlong	= 220 yd 2)	201.168	2,0116.8	$2.01 \cdot 10^5$
1 mile	statute mile 2)	1,609.34	$1.6 \cdot 10^5$	$1.6 \cdot 10^6$
1 n mile	nautic mile = sm = international nautical mile	1,852	$1.852 \cdot 10^5$	$1.852 \cdot 10^6$

1) SI unit (basic unit)

2) American and British unit of length

UNIT OF AREA					
Unit	Name	Legal units			
		km^2	m^2 1)	cm^2	mm^2
1 km^2	Square kilometre	1	10^6	10^{10}	10^{12}
1 m^2	Square metre	10^{-6}	1	10^4	10^6
1 dm^2	Square decimetre	10^{-8}	0.01	100	10,000
1 cm^2	Square centimetre	10^{-10}	0.0001	1	100
1 mm^2	Square millimetre	10^{-12}	10^{-6}	0.01	1
1 a	Are	0.0001	100	10^6	10^8
1 ha	Hectare	0.01	10^4	10^{10}	10^{12}
1 mg	Acre	$2.5 \cdot 10^{-3}$	2,500	$2.5 \cdot 10^9$	$2.5 \cdot 10^{11}$
1 in^2 (sq in)	Square inch 2)	$6.452 \cdot 10^{-10}$	0.00065	6.452	645.2
1 cir in	Circular inch = $\pi/4$ in^2 2)	$5.067 \cdot 10^{-10}$	$5.067 \cdot 10^{-4}$	5.067	506.7
1 cir mil	Circular mil = $\pi/4$ in^2 2)	$5.067 \cdot 10^{-16}$	$5.067 \cdot 10^{-10}$	$5.067 \cdot 10^{-6}$	0.00051
1 mil^2 (sq mil)	Square mil 2)	$6.452 \cdot 10^{-16}$	$6.452 \cdot 10^{-10}$	$6.452 \cdot 10^{-6}$	0.00065
1 ft^2 (sq ft)	Square foot 2)	$9.29 \cdot 10^{-8}$	0.0929	929	92900
1 yd^2 (sq yd)	Square yard 2)	$83.61 \cdot 10^{-8}$	0.8361	8361	836100
1 rod^2 (sq rd)	= 1 sq pole = 1 sq perch 2)	$25.29 \cdot 10^{-6}$	25.29	$25.29 \cdot 10^4$	$25.29 \cdot 10^6$
1 $chain^2$	Square chain = 16 rod^2 2)	0.004	404.684	$4.04 \cdot 10^6$	$4.04 \cdot 10^8$
1 rood	= 40 rod^2 2)	0.00101	10,011.71	$1.012 \cdot 10^7$	$1.012 \cdot 10^9$
1 acre	= 4 $rood^2$ 2)	0.00405	4046.86	$4.047 \cdot 10^7$	$4.047 \cdot 10^9$
1 $mile^2$	Square mile = 1 section 3)	2.59	$2.59 \cdot 10^6$	$2.59 \cdot 10^{10}$	$2.59 \cdot 10^{12}$
1 township	= 36 $mile^2$ 2)	93.24	$93.24 \cdot 10^6$	$9.24 \cdot 10^{10}$	$93.24 \cdot 10^{12}$

1) SI unit (basic unit)
2) American and British unit of length
3) American unit of area

General Information

UNIT OF VOLUME			
Unit	Name	Legal unit	
		m^3 1)	dm^3 = l
1 m^3	Cubic metre	1	1,000
1 dm^3 = 1 l	Cubic decimetre / litre	0.001	1
1 cm^3	Cubic centimetre	10^{-6}	0.001
1 mm^3	Cubic millimetre	10^{-9}	10^{-6}
1 in^3	Cubic inch (cu in) 2) 3)	$1.64 \cdot 10^{-5}$	0.01639
1 ft^3	Cubic foot (cu ft) 2) 3)	0.02832	28.3168
1 yd^3	Cubic yard (cu yd) 2) 3)	0.76456	764.555
1 gal	Gallon 3)	0.00455	4.54609
1 gal	Gallon 2)	0.00379	3.78541
1 bushel	= 8 gallon 3)	0.03637	36.369
1 bushel	= 4 pecks 2)	0.03524	35.239
1 quart	= 2 pint 3)	0.00114	1.13652
1 pint (pt)	= 4 gills 3)	$5.68 \cdot 10^{-4}$	0.56826
1 liq quart 4)	= 2 liq pt 2)	$9.46 \cdot 10^{-4}$	0.94635
1 liq pt 4)	= 4 gills 2)	$4.73 \cdot 10^{-4}$	0.473
1 RT	Register ton = 100 ft^3 2) 3)	2.832	2832
1 ocean ton	= 40 ft^3 2) 1.1327	1,132.7	-

1) SI unit (basic unit)
2) American unit of volume
3) British unit of volume
4) Not for dry goods

General Information

UNIT OF MASS

Unit	Name	Legal unit		
		t	kg 1)	g
1 t	Ton	1	1,000	10^6
1 kg	Kilogramme	0.001	1	1,000
1 g	Gramme	10^{-6}	0.001	1
1 Kt	Metr. carat	$2 \cdot 10^{-7}$	0.0002	0.2
1 gr	Grain 2) 3)	$6.48 \cdot 10^{-8}$	$6.48 \cdot 10^{-5}$	0.0648
1 dr	Dram 2) 3)	$1.77 \cdot 10^{-6}$	0.00177	1.77184
1 oz	Ounce 2) 3)	$2.835 \cdot 10^{-5}$	0.02835	28.3495
1 lb	Pound 2) 3)	$4.536 \cdot 10^{-4}$	0.45359	453.592
1 long cwt	Long hundredweight	0.0508	50.8023	5,0802.3
1 sh cwt	Short hundredweight	0.04536	45.3592	4,5359.2
1 long tn	Long ton 2) 3)	1.01605	1,016.05	1,016,050
1 sh tn	Short ton 2) 3)	0.90718	907.185	907185
1 slug	– 2) 3)	0.01459	14.5939	14,593.9
1 st	Stone = 14 lb 3)	0.00635	6.35	6,350
1 qr	Quarter = 28 lb 3)	0.0127	12.7006	12,700.6
1 quintal	= 100 lb = 1 sh cwt 3)	0.04536	45.3592	45,359.2
1 tdw	Ton dead weight	1.016	1,016	$1.016 \cdot 10^6$

UNIT OF FORCE

Unit	Name	Legal unit	
		kN	N 1)
1 kN	Kilonewton	1	1,000
1 N = 1 kg · m/s^2	Newton	0.001	1
1 kp	Kilopond 5)	≈ 0.00981	≈ 9.81
1 dyn	Dyn	10^{-8}	10^{-5}
1 lbf 3)	Pound-force 2) 3)	0.0044822	4.44822
1 pdl	Poundal 2) 3)	$1.38255 \cdot 10^{-4}$	0.138255
1 sn	Sthéne 4)	1	10^3

1) SI unit (basic unit)
2) American measuring unit
3) British measuring unit
4) French measuring unit
5) (Standard) force of gravity 9.80655m/s^2 → 9.80665 N ≈ 9.81 N

UNIT OF PRESSURE AND TENSION								
Unit	Name	Legal unit						
		Pa 1)	bar	mbar	µbar	N/mm^2	N/m^2
1 Pa = 1 N/m^2	Pascal	1	10^{-5}	0.01	10	10^6	1
1 bar	Bar	10^5	1	1000	10^6	0.1	10^5
1 mbar	Millibar	100	0.001	1	1,000	0.0001	100
1 µbar	Microbar	0.1	10^{-6}	0.001	1	10^{-7}	0.1
1 N/mm^2	Newton per mm^2 5)	10^6	10	10,000	10^7	1	10^6
1 kp/mm^2	Kilopond per mm^2 5)	$9.81 \cdot 10^6$	98.1	98,100	$9.81 \cdot 10^7$	9.81	$9.81 \cdot 10^6$
1 at	Technical atmosphere = 1 kp/cm^2	98,100	0.981	981	$9.81 \cdot 10^5$	0.0981	98,100
1 kp/m^2	= 1mm WS	9.81	$9.81 \cdot 10^{-5}$	0.0981	98.1	$9.81 \cdot 10^{-6}$	9.81
1 Torr	Torr	133.322	0.00133	1.33322	1,333.22	$1.3 \cdot 10^{-4}$	133.322
1 atm	Physical atmosphere 4)	101325	1.01325	1,013.25	$1.01 \cdot 10^6$	0.10133	101325
1 lbf/in^2	pound-force per square-inch 2)	6,894.76	0.0689	68.948	68,948	0.00689	6,894.76
1 lbf/ft^2	pound-force per square-foot 2)	47.8803	0.00048	0.4788	478.8	$4.7 \cdot 10^{-5}$	47.8803
1 $tonf/in^2$	(long) ton-force per square inch 2)	$1.54 \cdot 10^7$	154.443	154,443	$1.54 \cdot 10^8$	15.4443	$1.54 \cdot 10^7$
1 barye	Barye 3)	0.1	10^{-6}	0.001	1	10^{-7}	0.1
1 pz	piece = 1 sn/m^2 3)	1,000	0.01	10	10,000	0.001	1,000
1 dyn/cm^2	Dyn = Unit in physics	0.1	10^{-6}	0.001	1	10^{-7}	0.1

1) SI unit
2) American and British unit
3) French unit
4) Standard pressure
5) (Standard) force of gravity $9.80655 m/s^2 \rightarrow 9.80665$ N ≈ 9.81 N

UNIT OF ENERGY			
Unit	Name	Legal unit	
		kWh	J [1] = W · s
1 kWh	Kilowatt hour	1	$3.6 \cdot 10^{6}$
1 J=1 Ws=1 Nm	Joule, Watt-second	$277.8 \cdot 10^{-9}$	1
1 hph	Horsepower hour	0.73550	$2.6476 \cdot 10^{6}$
1 kpm	Kilopondmeter [5]	$2.724 \cdot 10^{-6}$	9.81
1 kcal	Kilocalorie	$1.163 \cdot 10^{-3}$	4,186.8
1 ft lbf	Foot pound force [2]	$376.6 \cdot 10^{-9}$	1.3558
1 Btu	British thermal unit [3]	$293.1 \cdot 10^{-6}$	1,055.16
1 in ozf	Inch ounce-force [2]	$1.96 \cdot 10^{-9}$	0.00706
1 ft pdl	Foot poundal [2]	$1.17 \cdot 10^{-8}$	0.04214
1 thermie	= 1000 frigories [4]	1.16273	$4.1855 \cdot 10^{6}$
1 erg	Erg (phys.)	$2.788 \cdot 10^{-13}$	10^{-7}
1 l atm	Litre-atmosphere	$2.815 \cdot 10^{-5}$	101.325
1 SKE	German coal equivalent	8.141	$31.83 \cdot 10^{6}$

UNIT OF OUTPUT			
Unit	Name	Legal unit	
		kW	W [1]
1 kW	Kilowatt	1	1,000
1 W=1 J/s1 Nm/s	Watt	0.001	1
1 hp	Hp	0.7355	735.294
1 kpm/s	Kilopond metre per second [5]	$9.81 \cdot 10^{-3}$	9.81
1 kcal/s	Kilocalorie per second	4.1868	4,186.8
1 hp	Horse power [2]	0.7457	745.7
1 Btu/s	British thermal unit per second [2]	1.05506	1,055.06
1 ft lbf/s	Foot pound force per second [2]	$1.356 \cdot 10^{-3}$	1.35582
1 ch	Cheval vapeur [4] = 1PS	0.7355	735.499
1 poncelet	= 100 kpm/s [5]	0.981	981

1) SI unit

2) American measuring unit

3) British measuring unit

4) French measuring unit

5) (Standard) force of gravity $9.80655 m/s^2 \rightarrow 9.80665\ N \approx 9.81\ N$

TEMPERATURE SCALES - °C - K - °F - °R - °RA

°C	K	°F	°R	°Ra
-273.15	0	-459.67	-218.52	0
-50	223.15	-58	-40	401.68
-40	233.15	-40	-32	419.68
-30	243.15	-22	-24	437.68
-25	248.15	-13	-20	446.68
-20	253.15	-4	-16	455.68
-15	258.15	5	-12	464.68
-10	263.15	14	-8	473.68
-5	268.15	23	-4	482.68
0	273.15	32	0	491.68
5	278.15	41	4	500.68
10	283.15	50	8	509.68
15	288.15	59	12	518.68
20	293.15	68	16	527.68
25	298.15	77	20	536.68
30	303.15	86	24	545.68
35	308.15	95	28	554.68
40	313.15	104	32	563.68
50	323.15	122	40	581.68
60	333.15	140	48	599.68
70	343.15	158	56	617.68
80	353.15	176	64	635.68
90	363.15	194	72	653.68
100	373.15	212	80	671.68

°C = degrees centigrade (Celsius)
K = Kelvin
°F = degrees Fahrenheit
°R = degrees Réaumur
°Ra = degrees Rankine

Zero point:
0 °C = 0 °R = 32 °F
0 °F = -17.78 °C = -14.22 °R

Absolute point-of-zero:
0 K = -273.15 °C = -459.67
= -218.52 °R = 0 °Ra

Conversion equations:
K = °C + 273.15
°C = K - 273.15
°C = $^5/_9$ (°F - 32) = $^5/_4$ °R
°F = $^9/_5$ °C + 32 = $^9/_4$ °R +32
°F = $^4/_9$ (°F-32) = $^4/_5$ °C

PHYSICAL CHARACTERISTICS OF GASES										
Gas Gas mixture	Symbol Formula	Standard density	Density ratio Air = 1	Specific heat at 20° and 1.01325 bar		Isentropic exponent	Useful output	Calorific value	Wobbe index (upper)
		ρ_b	d	c_p	c_v	$\kappa = c_p/c_v$	$H_{s,b}$	$H_{i,n}$	$W_{s,n}$
		kg/m³	-	kJ/(kg·K)	kJ/(kg·K)	-	kWh/m³	kWh/m³	kWh/m³
Ammonia	NH_3	0.771	0.597	2.09	1.72	1.29	4.83	4.00	6.25
Ethyne [1)]	C_2H_2	1.172	0.906	1.67	1.34	1.26	16.25	15.70	17.06
n-Butane	C_4H_{10}	2.708	2.094	1.66	1.456	1.1	37.23	34.32	25.75
Chlorine	Cl_2	3.21	2.482	0.50	0.29	1.37	-	-	-
Natural gas L	-	0.83	0.643	1.86	1.41	1.32	9.77	8.82	12.21
Natural gas H	-	0.783	0.605	2.05	1.57	1.305	11.45	10.34	14.72
Ethane	C_2H_6	1.355	1.048	1.76	1.73	1.22	19.55	17.90	19.08
Helium	He	0.179	0.138	5.23	3.18	1.66	-	-	-
Carbon monoxide	CO	1.251	0.967	1.05	0.75	1.40	3.51	3.51	3.56
Air	-	1.293	1.000	1.00	0.71	1.40	-	-	-
Methane	CH_4	0.718	0.555	2.22	1.72	1.30	11.06	9.97	14.83
Propane	C_3H_8	2.011	1.555	1.549	1.361	1.14	28.03	25.81	22.47
Oxygen	O_2	1.429	1.105	0.92	0.75	1.40	-	-	-
Sulphur dioxide	SO_2	2.931	2.267	0.63	0.5	1.26	-	-	-
Nitrogen	N_2	1.251	0.967	1.05	0.75	1.40	-	-	-
Hydrogen	H_2	0.090	0.070	14.20	10.08	1.41	3.54	2.995	13.427

1) Acetylene

Other gases: See literature (e.g., “Grundlagen der Gastechnik” by Günter Cerbe)

PHYSICAL CHARACTERISTICS OF GASES								
Gas Gas mixture	Symbol Formula	Special gas constant	Methane number	Critical pressure absolute	Critical temperature	Temperature of ebullition at p_b	Vaporisation heat	Min. air requirement
		R_i	MZ	p_k	t_k	t	r	l_{min}
		J/kg·K	-	bar	°C	°C	kJ/kg	m^3_L/m_B^3
Ammonia	NH_3	488.4	-	113	132.4	-33.4	1,369	3.63
Ethyne (Acetylene)	C_2H_2	319.7	15	62.5	36.3	-104	829	11.9
n-Butane	C_4H_{10}	143	10	30	152	-0.5	403.6	30.94
Chlorine	Cl_2	117.3	-	77.1	144	-35	260	-
Natural gas L	-	448.66	90	-	-	-	-	8.41
Natural gas H	-	475.33	82	-	-	-	-	9.85
Ethane	C_2H_6	276.6	43	49.6	32.3	-88.6	540	16.66
Helium	He	2,077	-	2.2	-268	-269	25	-
Carbon monoxide	CO	297.1	75	35	-140.2	-191.5	216	2.38
Air	-	287.3	-	37.7	-140.7	-194	197	-
Methane	CH_4	518.8	100	46.3	82.5	161.7	584	9.53
Propane	C_3H_8	188.7	33	42.5	96.8	-42.6	448	24.23
Oxygen	O_2	259.9	-	50.4	-118.8	-183	214	-
Sulphur dioxide	SO_2	129.8	-	78.9	-10	-10	402	-
Nitrogen	N_2	296.7	-	34	-196	-196	201	-
Hydrogen	H_2	4,124.7	0	12.9	-253	-253	461	2.38

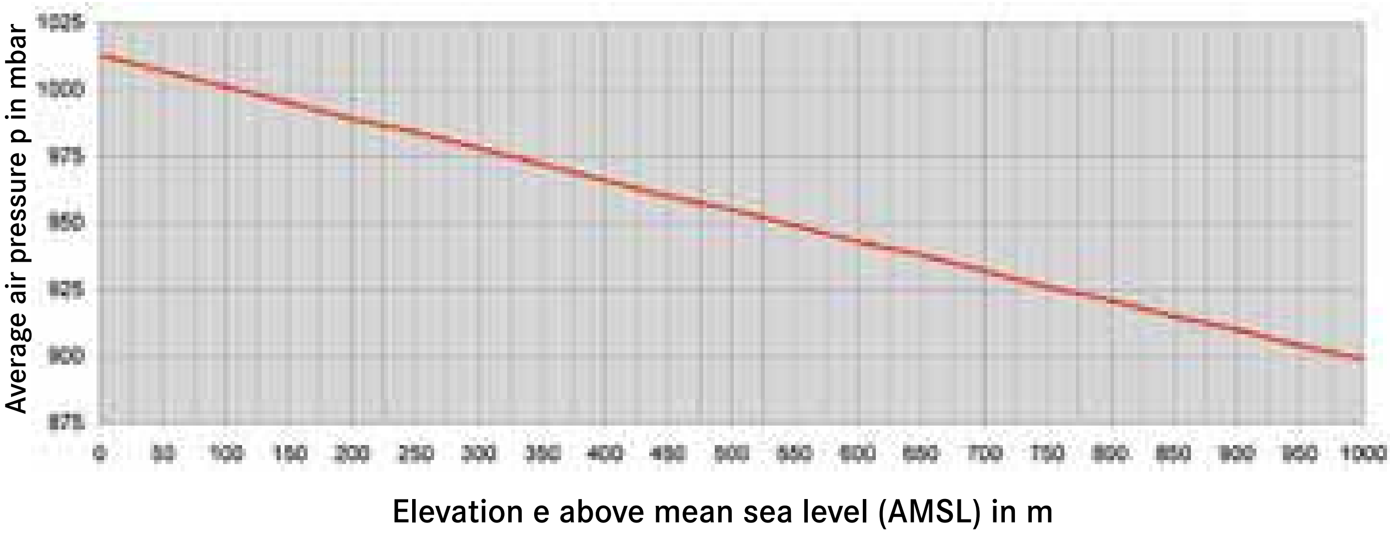
Other gases: See literature (e.g., “Grundlagen der Gastechnik” by Günter Cerbe)

STANDARD ATMOSPHERIC (ACCORDING TO DIN 5450)	Elevation AMSL[1] in m	Temperature	Pressure	Density	Ratio	Saturated vapour pressure	Temperature of ebullition
		t	p	ρ	p/p_b[2]	p_s	t_s
		°C	mbar	kg/m^3	-	mbar	°C
Troposphere	0	15.0	1,013.15	1.226	1.000	17.00	100
	200	13.7	989	1.202	0.981	15.60	99
	500	11.8	955	1.168	0.953	13.70	98
	1,000	8.5	899	1.112	0.907	11.00	97
	2,000	2.0	795	1.007	0.822	7.00	93
	4,000	-11.0	616	0.819	0.669	2.40	87
	6,000	-24.0	472	0.660	0.538	0.66	81
	8,000	-37.0	356	0.525	0.429	0.13	74
	11,000	-56.5	226	0.364	0.297	-	65
Stratosphere	15,000	-56.5	120	0.194	0.158	-	51
	20,000	-56.5	55	0.088	0.072	-	37
	25,000	-56.5	25	0.040	0.030	-	22
	30,000	-56.5	11	0.020	0.010	-	15

[1]) SL = sea level = zero point of the level of Amsterdam (NL)

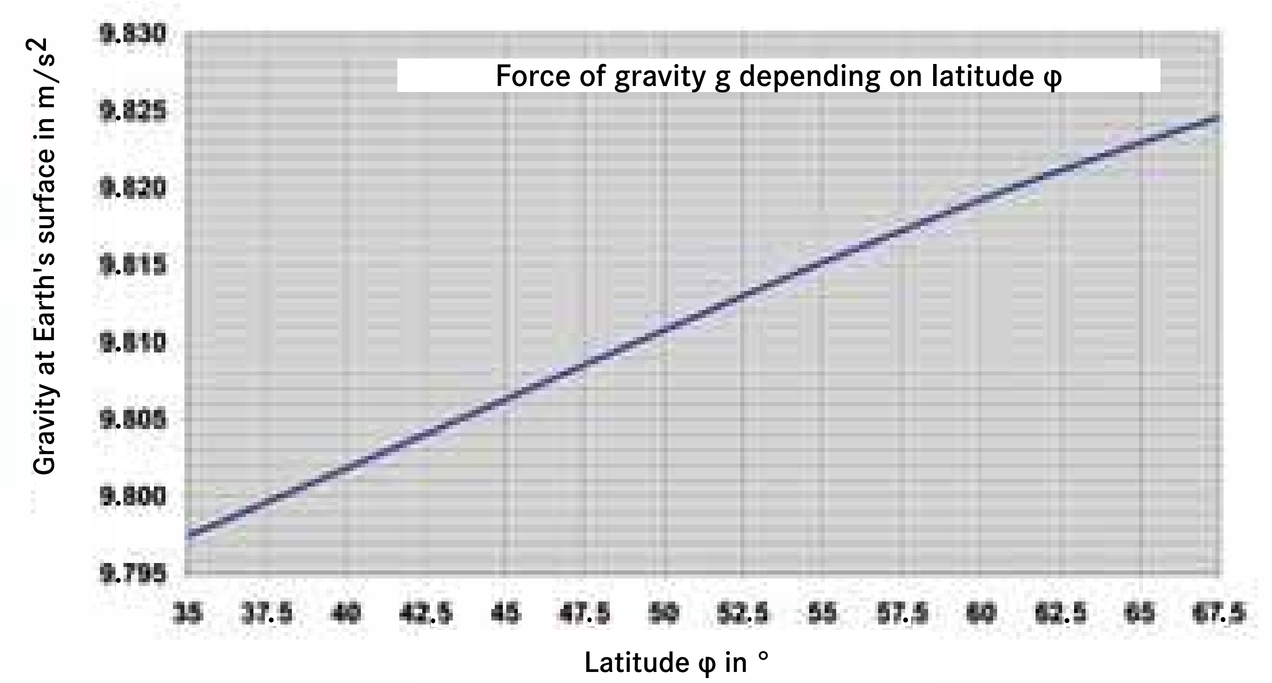
[2]) p_b = 1.01325 bar

Average air pressure p (approx. p_{amb}) at elevation AMSL at t = 15 °C



Force of Gravity and Pressure Stages According to DIN and ANSI

FORCE OF GRAVITY G DEPENDING ON LATITUDE φ												
φ	35	40	45	47.5	50	52.5	55	57.5	60	62.5	65	67.5	°
g	9.797	9.802	9.806	9.809	9.811	9.813	9.815	9.817	9.819	9.821	9.823	9.825	m/s²



PRESSURE STAGE ACCORDING TO DIN														
Rated pressure stage PN														
1	(1.6)	(2.5)	4	5*	6	10	16	25	40	(63)	(100)	(160)	(250)	(400)

* PN 5 is new

Values in ( ) are no longer used by the gas industry.

PRESSURE STAGE ACCORDING TO ANSI						
Class 150	Class 300	Class 400	Class 600	Class 900	Class 1500	Class 2500
20	51	(68)	102	153	255	425

Values in ( ) are not used by the gas industry.

Table of Old and New Formula Symbols

FORMULA SYMBOLS			
Description	Old	New	Unit
Inlet pressure	p_e	p_u	bar
Outlet pressure	p_a	p_d	bar
Differential pressure	Δp	Δp	bar
Loading pressure	p_{st}	p_m	bar
Pressure under standard conditions (standard pressure)	p_b	p_b	bar
Temperature under standard conditions (standard temperature)	T_b	T_b	K (°C)
Standard volumetric flow rate (standard flow rate)	Q_b	Q_b	m^3/h
Operating volumetric flow rate (operating flow rate)	Q_m	Q_m	m^3/h
Valve flow rate factor	K_G	K_G	$m^3/(h \cdot bar)$
Sound pressure level	L_{pa}	L_{pa}	dB
Controlled variable	X	X	-
Disturbance variable	Z	Z	-
Actual outlet pressure (index “i”)	z.B. p_i	z.B. p_i	-
Max. value (index “max”)	z.B. p_{amax}	z.B. p_{dmax}	bar
Min. value (index “min”)	z.B. p_{emin}	z.B. p_{umin}	bar
Setpoint (index “s”)	z.B. p_{ds}	z.B. p_{ds}	bar
Outlet pressure range	W_h	W_d	bar
Specific set range	W_a	W_{ds}	bar
Deviation	X_w	X_w	%
Accuracy Class	RG	AC	(%)
Closing time	t	t_f	s
Lock-up pressure	$p_{Schließ}$	p_f	bar
Lock-up pressure Class	SG	SG	(%)
Class of lock-up pressure zone	-	SZ	(%)
Max. admissible pressure	p_{zul}	PS	bar
Inlet pressure range	b_{pe}	b_{pu}	bar
Max. inlet pressure	p_{emax}	p_{umax}	bar
Max. admissible inlet pressure range	-	Δp_{umax}	bar
Max. outlet pressure	p_{amax}	p_{dmax}	bar
Min. pressure difference	Δp_{min}	Δp_{min}	bar
Rated pressure	PN / ANSI	PN / Class	(bar)
Pipe size	DN	DN	(mm)

Modified control variables are shown in green

Table of Old and New Formula Symbols

FORMULA SYMBOLS			
Description	**Old**	**New**	**Unit**
Upper response pressure	p_o	p_{do}	bar
Lower response pressure	p_u	p_{du}	bar
Actual value of response pressure (upper/lower)	$p_{i\ (o/u)}$	$p_{di\ (o/u)}$	bar
Max. value (index "max")	z. B. p_{omax}	z. B. p_{domax}	-
Min. value (index "min")	z. B. p_{omin}	z. B. p_{domin}	-
Setpoint of response pressure (upper/lower)	$p_{s\ (o/u)}$	$p_{ds\ (o/u)}$	bar
Setting range (upper/lower)	$W_{h\ (o/u)}$	$W_{d\ (o/u)}$	bar
Specific setting range (upper/lower)	$W_{a\ (o/u)}$	$W_{ds\ (o/u)}$	bar
Deviation of response pressure	A_W	A_W	bar
Accuracy group	AG	AG	-
Actuating delay	t_a	t_a	s
Re-engage differential	Δp_W	Δp_W	bar
Operating pressure	p	p	bar
Operating pressure in the station	p	OP	bar
Max. operating pressure in the station	p_{max}	$MOP_{(u,d)}$	bar
Max. incidental pressure in the station	-	$MIP_{(u,d)}$	bar

Modified control variables are shown in green

DENOMINATION ACCORDING TO DVGW G 491	
OP	Operating pressure in the station
$MOP_{u,d}$	Max. operating pressure of station, upstream "u" or downstream "d"
$MIP_{u,d}$	Max. admissible pressure in a station in an accident Pressure for leak tests $MIP_{u,d} = 1.1 \cdot MOP_{u,d}$
TOP	Temporary operating pressure of station of monitor-GPR with active switching/monitor set-up

RMG Publications

Title	Publication/Book	Author
"Gas-Druckregelung und Sicherheit"	"Die Industriefeuerung" Issue 05/75	Dr. G. Weidner
"Geräuschreduzierung bei Gas-Druckregelgeräten"	"Neue Deliwa Zeitung" Issue 11/75	R. Fischer
"Hochdruckregelgeräte für Erdgas"	"Gaswärme International" Issue 03/76	Dr. G. Weidner
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"Maximal möglicher Betriebsdruck in einem Gas-Leitungssystem unter Berücksichti-gung der Druckabsicherung am Eingang"	"3 R international" Issue 04/81	R. Fischer
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Title	Publication/Book	Author
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“Sauerstoffregelung in Gas- und Ölfeuerungsanlagen durch Beeinflussung des Brennstoffdruckes”	“Gaswärme International” Issue 2-3/82	K.-H. Pflüger, J.-P. Arning
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“Neue Geräte für die Gas-Druckregelung”	“3 R international” Issue 08/87	R. Fischer
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RMG Publications

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"Absicherung des Wärmetauschers bei der Erdgas-Vorwärmung"	"gwf-Gas/Erdgas" Issue 05/94	R. Fischer
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"Mengenregelventile"	"gwf-Gas/Erdgas" Issue 02/95	R. Fischer
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"Einrichtungen zur Optimierung von Gas-motorenanlagen bei unterbrechungsfreier Gasartenumschaltung und Gas-Zumisch-betrieb"	"gwf-Gas/Erdgas" Issue 11/96	K.-H. Pflüger, K. Stellwagen
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RMG Publications

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"Elektronisches Multifunktionszählwerk"	"gwf-Gas/Erdgas" 04/2006	Horst Pöppl, Frank Rothermel
"Hochdruckverhalten unter Kontrolle"	"gwf-Gas/Erdgas" 04/2006	Michael Grexa, Hans-Jürgen Kastner, Frank Rothermel
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"Abrechnung von Biogas Eine Herausforderung für die Messtechnik"	"Gaswärme international" 04/2008 "gwf-Gas/Erdgas" 09/2008	Dr. Michael Grexa, Dr. Achim Zajc
"Durchflusscharakteristika von Stellgliedern Teil 1: Grundlagen, Durchflussgleichung, Näherungslösungen"	"gwf-Gas/Erdgas" 03/2009	Prof. Dr. Mischner, FH Erfurt; Prof. Dr. Pan, Hochschule Shanghai; K.-H. Pflüger, RMG Kassel
"Durchflusscharakteristika von Stellgliedern Teil 2: Ventildurchflusskoeffizient, Anwendungen"	"gwf-Gas/Erdgas" 04/2009	Prof. Dr. Mischner, FH Erfurt; Prof. Dr. Pan, Hochschule Shanghai; K.-H. Pflüger, RMG Kassel

What You Should Know

What is fuel gas?

A gas or gas mixture that burns at a certain mixing ratio with oxygen.

Which fuel gases are important?

Natural gas, bio-natural gas, sewage gas, landfill gas, mine gas, liquefied gas.

What is natural gas?

A natural product consisting mainly of methane (CH_4).

Where does natural gas come from?

Natural gas formed from organic matter deposited on the grounds of ancient oceans millions of years ago. The high pressures generated by geological strata transformed those depositions into hydrocarbons.

What does natural gas consist of?

Mainly methane (CH_4), a highly inflammable hydrocarbon compound.

How long have people been using natural gas?

We know that Indo-European peoples of the Caucasus Mountains used it as "eternal lights" 5,000 years ago. Sumerian and Assyrian priests used the gases escaping from the ground for their readings of the future.

When did people use it for "industrial" applications for the first time?

British explorers report the Chinese started using natural gas to dry salt around 900 BC.

When and where was the first natural gas field discovered?

In 1825, in a salt shaft in Charleston, West Virginia (USA).

... and in Germany?

In 1910, during an exploratory boring for water at Neuengamme (near Hamburg).

When was the first gas pipeline built in Germany?

The first German gas pipeline was built from Duisburg-Hamborn to Wuppertal-Barmen in 1910. August Thyssen played an important role in launching the project. In 1964, Germany joined the natural gas grid of the Netherlands. In 1974, a pipeline between Germany and Russia was built. Thus, the basis for a European combined system was created.

What kind of gas pipes are there? What pressures are needed to transport the gas?

Today's international natural gas pipelines work with high pressures up to 80 bar max. The medium- and low-pressure lines of the regional and local gas supply companies ensure transport to the consumers. They operate at min. pressures of 20 mbar (natural gas).

What does the term "transfer station" mean?

It refers to regulating and measuring stations. Their task is to maintain the pressure at a level that is suitable for the gas pipes following them, and to measure the "transferred" amount of gas and the flow rate.

Why do we store natural gas?

Consumption varies strongly from day to day and from season to season. For economic reasons it is necessary to ensure the provision of amounts required during peak times by storing the extra, volumes in times of low demand.

How do we store natural gas?

In gaseous state. Small daily variations are balanced by means of overground reservoirs. Larger amounts of gas are stored in underground porous rock reservoirs or caverns (salt domes).

What kinds of natural gas qualities are there? And what does "qualities" actually mean?

We mainly distinguish between natural gas qualities L and H. "L" stands for "low" and means that this natural gas has a useful output of about 10 kWh/m^3. It comes from German and Dutch sources. "H" stands for "high" and means that this natural gas has a useful output of about 11 to 12 kWh/m^3. It comes mainly from deposits in the North Sea and from the territory of the former USSR.

Where does (crude) bio-gas come from?

This type of natural gas is formed during the decomposition of organic matter at the exclusion of oxygen (anaerobic). It is a mixed gas, the main components of which are methane and CO_2 (fermentation process). It is lighter than air.

What do we mean by "bio-natural gas"

"Bio-natural gas" or “bio-methane” is a processed bio-gas. It has the quality of natural gas and a methane concentration above 96 %. Bio-natural gas is a product/marketing name.

What does "DVGW" stand for?

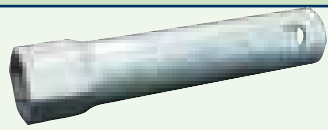
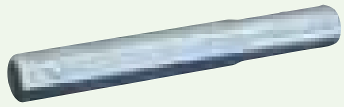
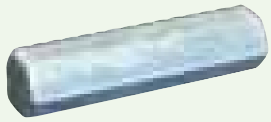
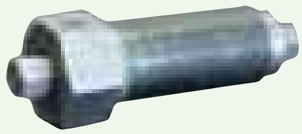
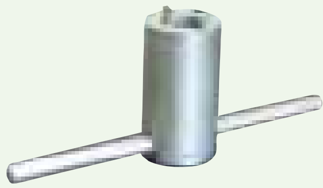
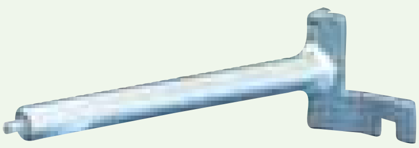
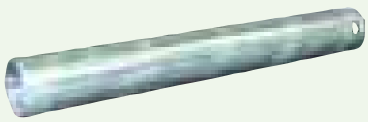
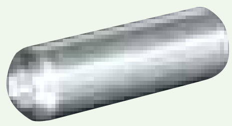
DVGW is the abbreviation of the "Deutscher Verein des Gas- und Wasserfaches." It’s a German professional association of the gas and water industries located at Eschborn (near Frankfurt). DVGW is in charge of technical and scientific issues concerning the gas and water industries.

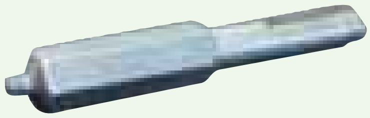
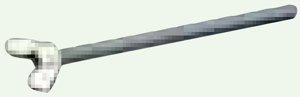
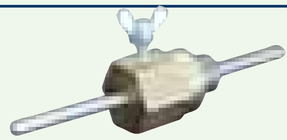
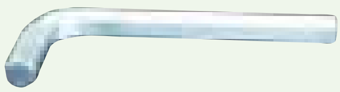
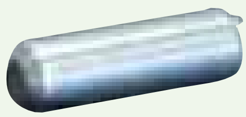
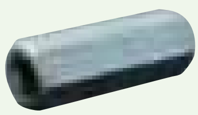
Gas Pressure Regulators, Safety Relief Valves and Safety Shut-off Valves sometimes bear a "CE mark." What does it stand for?

With the CE mark, the manufacturer confirms that a product complies with respective EC directives and fulfils their "essential requirements."

In the natural gas industry, the CE-mark is assigned according to the Pressure Equipment Directive (PED) based on the respective standard (e.g., DIN EN 334 for gas pressure regulators (GPR, SRV) and DIN EN 14382 for Safety Shut-off Valves (SSV).

INSTALLATION TOOLS

Device type	Tool	Stock no.	
RMG 330 Regulating assembly 1 +0 RMG 361 Regulating assembly 1 +0	Outlet pressure adjustment 0.02 to 0.5 bar	00 02 65 02	
	Outlet pressure adjustment 0.5 to 1.0 bar	10 00 49 11	
RMG 300 RMG 835	Outlet pressure adjustment SRV adjustment	10 00 42 54	
RMG 408	Installation tools	10 00 78 95	
Safety shut-off device for RMG 300, RMG 330, RMG 332, RMG 340, RMG 345, RMG 361, RMG 362, RMG 370, RMG 372, RMG 408 Safety shut-off valve (SSV) RMG 720	SSV adjusting wrench	10 00 49 12	
SSV RMG 720 K4, K5, K6	Tee wrench	10 00 85 82	
SSV RMG 720 DN 150 SSV RMG 721 DN 50 - 150	Tee wrench	10 00 87 90	
RMG 361 / RMG 362 RMG 370 / RMG372 DN 25 and DN 50	Bolt + installation tool SSV	15 80 14 21	
RMG 361 / RMG 362/ RMG 370 / RMG 372 DN 80 and DN 100	Bolt + installation tool SSV	15 80 14 22	
RMG 361 Regulating assembly 1 RMG 370 regulating assembly 1	Leakage gas adjusting wrench	15 80 12 46	
RMG 402	Installation tool for SSV o-ring	10 03 00 34	
RMG 512 b	Installation cone DN 25 DN 50 DN 80 DN 100	10 00 22 18 10 01 35 47 19 08 18 43 10 01 36 47	

INSTALLATION TOOLS			
Device type	**Tool**	**Stock no.**	
RMG 265 RMG 267, RMG 268 RMG 630 to RMG 630-1 (640) RMG 650 to RMG 659 RMG 670, RMG 671	Installation tools	19 08 33 19	
RMG 710 DN 25 to DN 150 RMG 711 DN 200 to DN 300 RMG 721 DN 50 to DN 150	Checking device with adapter for manual release adjustment	10 00 19 35	
	Mounting screw M4 (2x)	10 00 07 16	
	Jig for manual release adjustment and solenoid release setting	10 00 19 43	
RMG 672 K10, K10a, K11, K11a K12, K13, K14	Jig for actuators	10 00 19 47	
RMG 672 K12, K13, K14	Allan key for SSV adjustment	00 02 62 66	
RMG 790	Adjusting wrench	10 00 82 99	
	Test vessel	87 90 90 00	
RMG 530 DN 200 to DN 300	Mounting sleeve for sealing ring	10 02 44 34	
RMG 530 DN 50 to DN 300	Slip-on bushing for motor shaft	18 35 71 99	

Note: This list does not claim to be exhaustive!

LUBRICANTS		
Application	**Lubricant**	**Remarks**
O-ring seals stationary or moving	Silicone grease Partsno.: 00 027 081 Tube	Apply sparingly to parts
Diaphragm clamping area		
Screwed connections and fastening screws in the housing		
Sliding surfaces of valve stems, sliding guides, spindle bushes		
Moving parts in SSV actuators and tripping devices, Switching bushes, Switching balls and drums, Ball bearings		
Valve sleeves and valves sleeve seals in Gas Pressure Regulators (GPR)	Unisilicone grease TK 44 N2 Part no.: 00 027 052 Pack	
Setpoint adjustment screws (drive screws) Thread material combination: AL/AL	Anti-seize AS450 Parts no.: 00 027 091 Pack	
Devices for oxygen	Lubricating oil Parts no.: 00 026 562 Lubricating paste Parts no.: 00 026 563	
Devices for ammonia	Fluorosilicone grease Parts no.: 00 027 660	Apply sparingly to parts

Note Please refer to specific details in the maintenance instructions!

Notes

For More Information

To learn more about RMG´s advanced gas solutions, contact your RMG account manager or visit www.rmg.com

RMG by Honeywell