

SAFETY SHUT-OFF VALVE RMG 703/704



PRODUCT INFORMATION

**Serving the Gas Industry
Worldwide**

Safety Shut-off Valve RMG 703 / RMG 704

Application, Features, Technical specifications

Application

- Main safety device in gas pressure control systems for municipal supply, industrial plants and individual consumers
- Also for low-load rails in larger gas pressure control systems
- Suitable for natural gas and all non-aggressive gas media

Features

- RMG 703: Two independent safety shut-off valves in a single main valve body (Tandem SAV)
- RMG 704: single SAV
- compact design, simple construction
- Easy to maintain through exchangeable functional assemblies (plug-in system)
- Optionally fitted with control devices K 1a, K 2a, K 16, K17, K 18
- Pressure compensation through ball valve or push button valve RMG 913

TECHNICAL SPECIFICATIONS									
max. operating pressure p _{max}	up to 100 bar (depending on connection type)								
valve seat diameter	25 mm								
connection type	inlet/outlet: solderless pipe connections to DIN 2353, PN 100 for external pipe diameter 10, 12, 16, 18, 22, 25, 28, 38 and 42 mm Flanges to DIN PN 25 and PN 40, ANSI 300 and 600 with taper pieces size DN 25, 40, and 50								
material	<table border="0"> <tr> <td>main valve body</td> <td>wrought aluminium alloy or steel</td> </tr> <tr> <td>control unit housing</td> <td>wrought aluminium alloy or steel</td> </tr> <tr> <td>internal components</td> <td>stainless steel, brass, steel</td> </tr> <tr> <td>diaphragms, seals</td> <td>NBR (rubbery plastic)</td> </tr> </table>	main valve body	wrought aluminium alloy or steel	control unit housing	wrought aluminium alloy or steel	internal components	stainless steel, brass, steel	diaphragms, seals	NBR (rubbery plastic)
main valve body	wrought aluminium alloy or steel								
control unit housing	wrought aluminium alloy or steel								
internal components	stainless steel, brass, steel								
diaphragms, seals	NBR (rubbery plastic)								
temperature range	-20 °C to +60 °C								
response time	0,1 ... 0,3 sec								
accessories	<ul style="list-style-type: none"> - electric release on current supply - electric position indication - manual release - screw-in connections for combination with RMG 200 (E 42) and RMG 201 (E 18) 								
function and strength	DIN EN 14382 (DIN 3381)								
DIN DVGW reg. no.	RMG 703: NG-4303AN0197, RMG 704: NG-4303AN0196								

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Setting range of the SAV control units								
control unit	setpoint spring			overpressure		underpressure	response	
	no..	colour	wire dia. in mm	setting range W_{dso} (bar)	smallest difference between response pressure and normal operating pressure* Δp_{WO} (bar)	setting. range W_{dsu} (bar)	smallest difference between response pressure and normal operating pressure * Δp_{WU} (bar)	pressure category** AG
K1a	1	yellow	2.5	0.050 ... 0.100	0.030			10/5
	2	light red	3.2	0.100 ... 0.250	0.050			10/5
	3	dark red	3.6	0.200 ... 0.500	0.100			5/2,5
	4	white	4.75	0.400 ... 1.500	0.250			5/2,5
	5	light blue	1.1			0.010 ... 0.015	0.012	15
	6	white	1.2			0.014 ... 0.040	0.030	15/5
	7	black	1.4			0.035 ... 0.120	0.060	5
K2a	1	light red	3.2	0.400 ... 0.800	0.100			10/5
	2	dark red	3.6	0.800 ... 1.600	0.200			10/5
	3	white	4.75	1.500 ... 4.500	0.300			5/2,5
	4	light blue	1.1			0.060 ... 0.150	0.050	15/5
	5	black	1.4			0.120 ... 0.400	0.080	5
K16	0	blue	3.2	0.800 ... 1.500	0.100			2,5
	1	black	4.5	1.000 ... 5.000	0.200			2,5/1
	2	grey	5.0	2.000 ... 10.00	0.400			1
	3	brown	6.3	5.000 ... 20.00	0.800			1
	4	red	7.0	10.00 ... 40.00	1.200			1
K17	2	grey	5.0			2.000 ... 10.00	0.400	5
	3	brown	6.3			5.000 ... 20.00	0.800	5
	4	red	7.0			10.00 ... 40.00	1.200	5
K18	1		9.0	20.00 ... 90.00	1.500			1

*) Please note: Where control units are being used simultaneously for upper and lower response pressure, the difference between the two setpoint values p_{SO} and p_{SU} must be at least 10% greater than the sum of the values Δp_{WO} and Δp_{WU} .

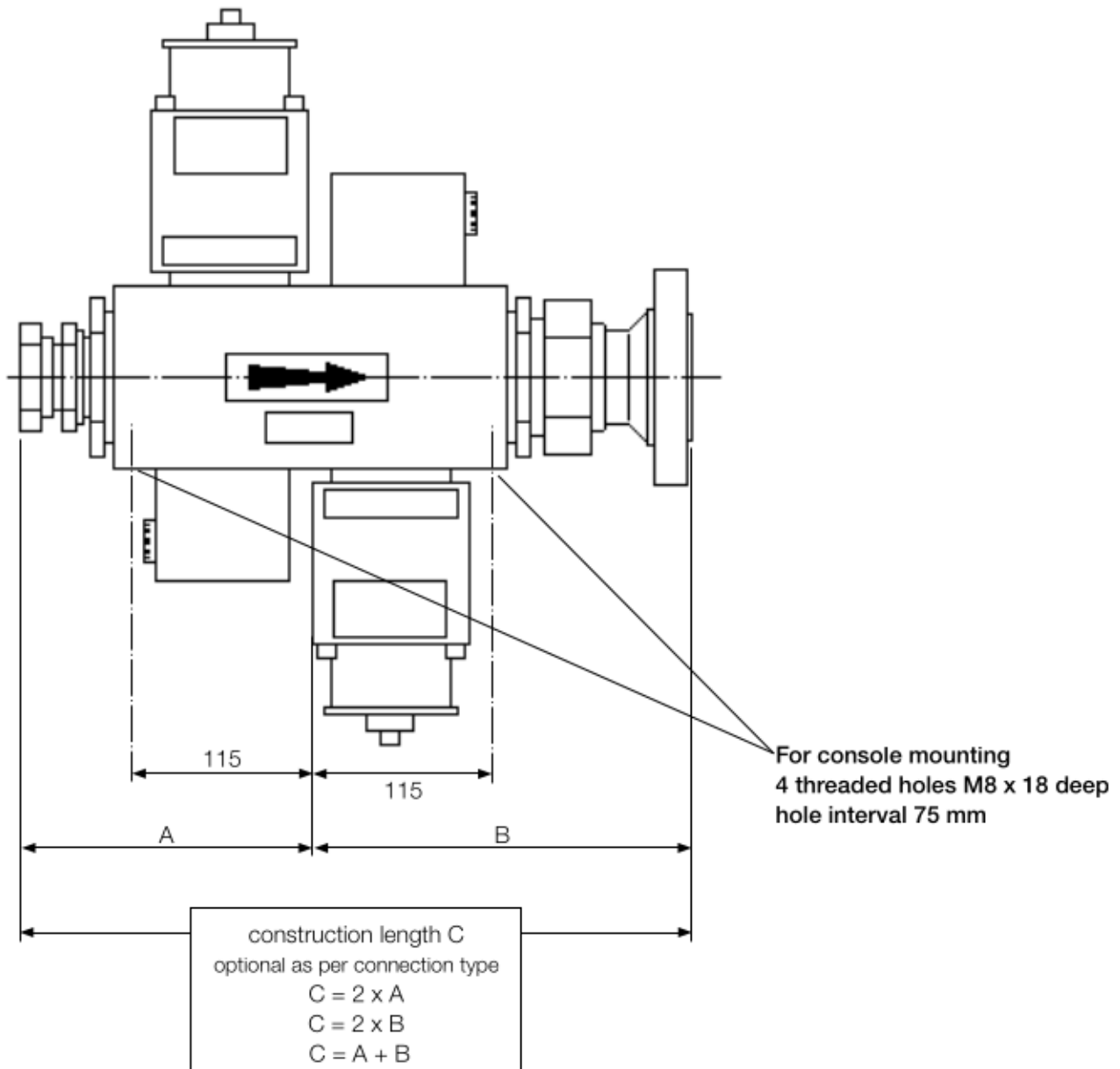
$$p_{dso} - p_{dsu} \geq 1,1 (\Delta p_{WO} + \Delta p_{WU})$$

**) The higher AG category applies to the first half, the lower AG category to the second half of the setting range.

Safety Shut-off Valve RMG 703 / RMG 704

Dimensions

Dimensions RMG 703



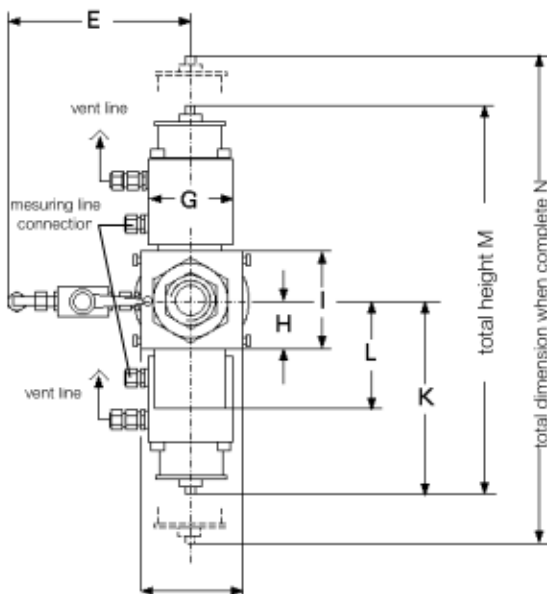
CONNECTION						
pipe connection A*			pipe connection B			
designation	pipe size	A in mm	pressure rating	B in mm		
				DN 25	DN 40	DN 50
E 10	10 x 1,5	168	PN 25 and PN 40	236	236	236
E 12	12 x 1,5	164				
E 16	16 x 1,5	174				
E 18	18 x 1,5	168	ANSI 300 RF / RJ	261	260	266
E 22	22 x 2	170				
E 25	25 x 3	184				
E 28	28 x 2	171	ANSI 600 RF / RJ	261	266	266
E 38	38 x 5	178				
E 42	42 x 3	163				

* Solderless pipe connection with cutting ring to DIN 2353

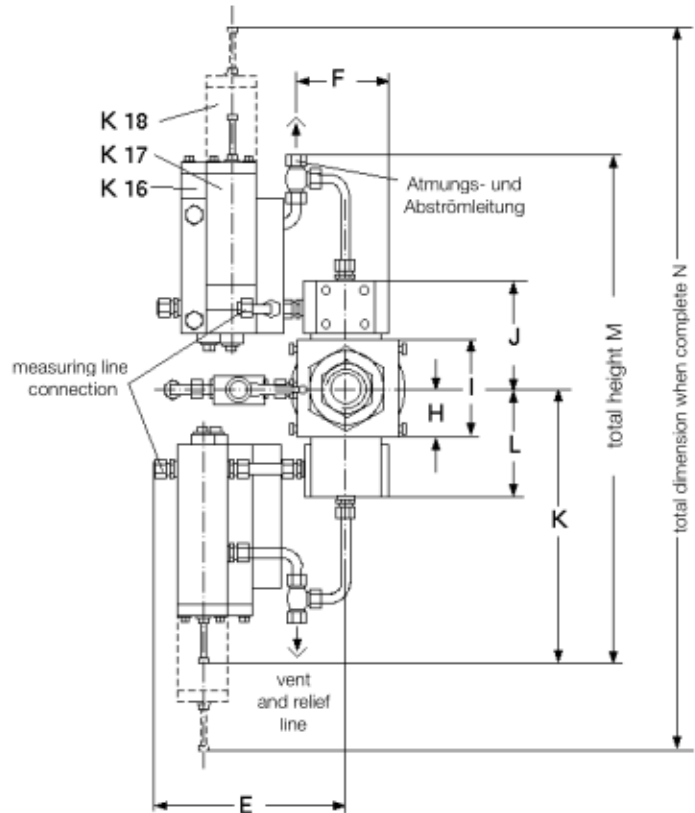
Safety Shut-off Valve RMG 703 / RMG 704

Dimensions

design with control unit K 1a, K 2a



design with control unit K 16, K 17, K 18



DIMENSIONS										
SAV design with control unit	device dimensions in mm									
	E	F	G	H	I	J	K	L	M	N
K1a / K2a	215	90	100	40	90	-	215	105	430	460
K16 / K17	215	90	-	40	90	110	265	105	490	520
K18	260	90	-	40	90	110	430	105	860	890

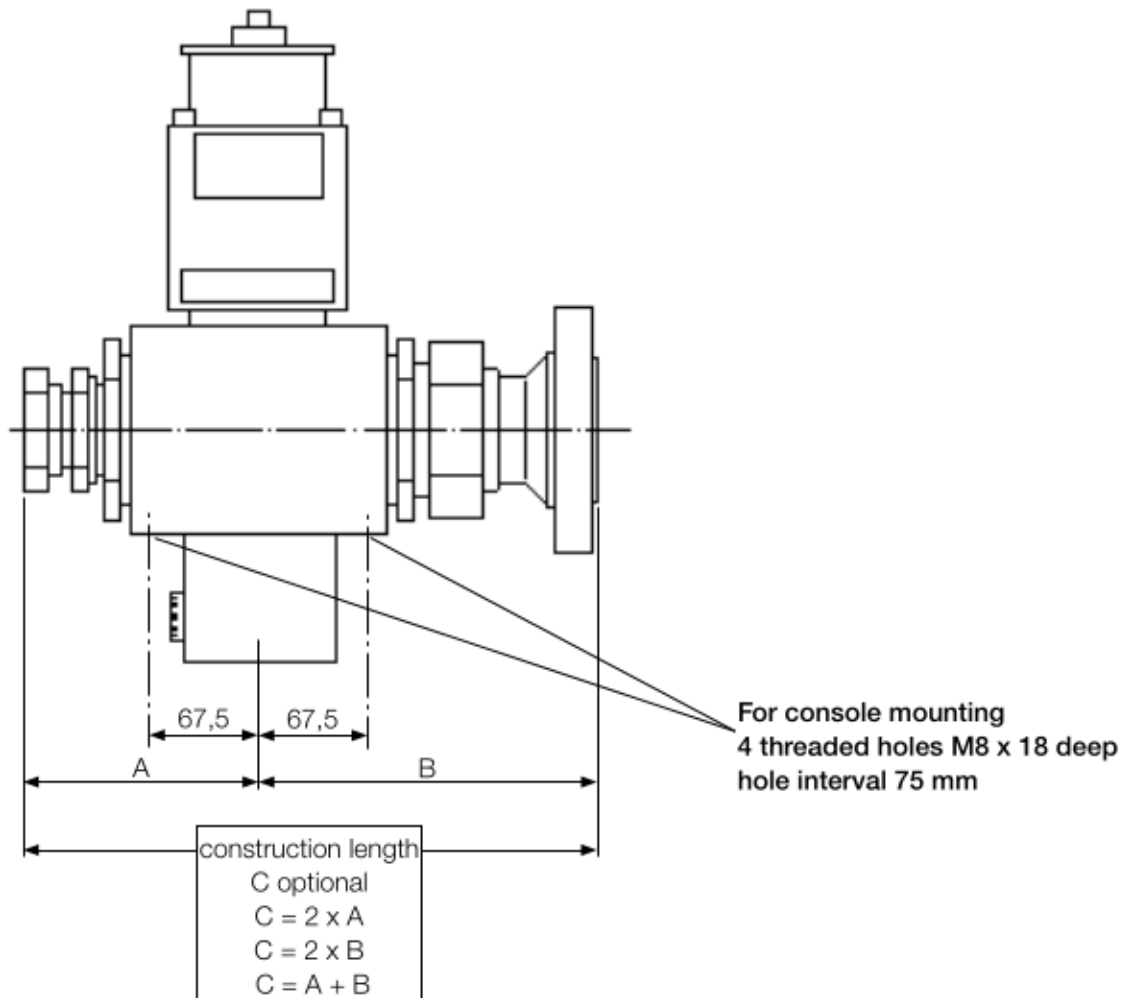
CONNECTION LINES	
measuring, vent, and relief lines	screw connections* for pipe 12 x 1.5

* Solderless connections with cutting ring to DIN 2353

Safety Shut-off Valve RMG 703 / RMG 704

Dimensions

Dimensions RMG 704



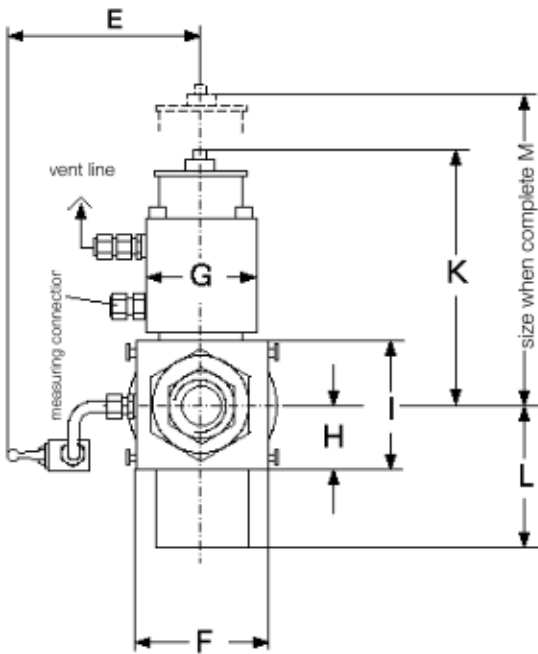
CONNECTIONS						
pipe connection A*			flange connection B			
designation	pipe size	A in mm	pressure rating	B in mm		
				DN 25	DN 40	DN 50
E 10	10 x 1,5	120	PN 25 and PN 40	188	188	188
E 12	12 x 1,5	116				
E 16	16 x 1,5	126				
E 18	18 x 1,5	120	ANSI 300 RF / RJ	213	212	218
E 22	22 x 2	122				
E 25	25 x 3	136				
E 28	28 x 2	123	ANSI 600 RF / RJ	213	218	218
E 38	38 x 5	130				
E 42	42 x 3	115				

* Solderless pipe connections with cutting ring to DIN 2353

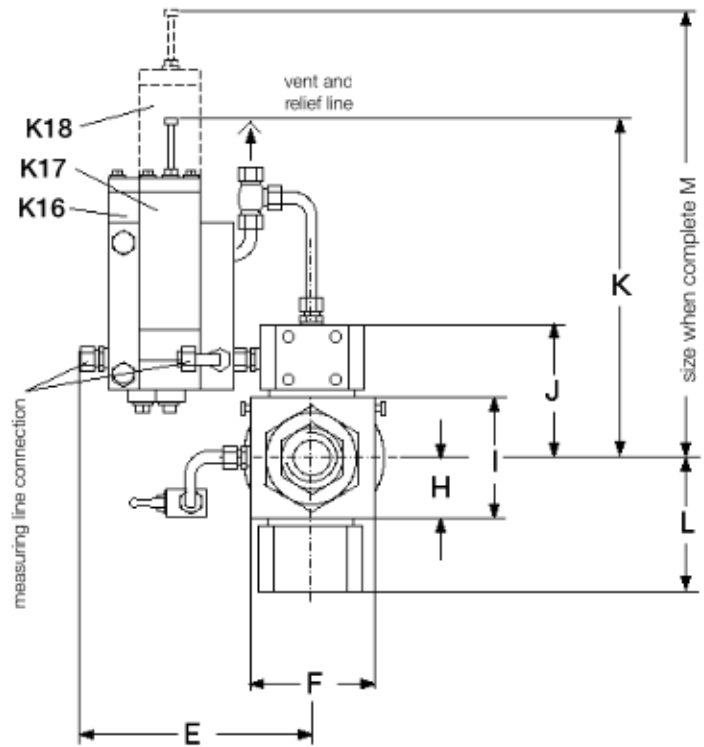
Safety Shut-off Valve RMG 703 / RMG 704

Dimensions

design with control unit K1a or K2a



design with control unit K16, K17 or K18



DIMENSIONS										
SAV design with control unit	device dimensions in mm									
	E	F	G	H	I	J	K	L	M	N
K1a / K2a	215	90	100	40	90	-	215	105	230	460
K16 / K17	215	90	-	40	90	110	245	105	265	520
K18	260	90	-	40	90	110	430	105	445	890
CONNECTION LINES										
measuring, vent, and relief lines					connections* for pipe 12 x 1.5					

* Solderless pipe connections with cutting ring to DIN 2353

Safety Shut-off Valve RMG 703 / RMG 704

Design and operation

The safety shut-off valves RMG 703/704 are designed to automatically shut off the flow in gas pressure control systems when the pressure in the system to be protected reaches an upper (overpressure) or lower (underpressure) response pressure value. The double safety shut-off device RMG 703 consists of two independently operating functional assemblies. This fulfils the requirements of DVGW work sheet 491 that gas pressure control systems with a pressure relation $p_{\text{emax}} - p_{\text{azul}} > 16 \text{ bar}$ and $p_{\text{emax}}/p_{\text{azul}} > 1,6$ must have two independently operating SAVs installed. The design of the safety shut-off valve RMG 704 is similar to the SAV RMG 703, except that it is designed as single SAV.

The safety shut-off valves RMG 703/704 consist mainly of the components main valve body, switching gear, control unit and bypass valve. Both devices are constructed particularly maintenance-friendly. Each functional assembly can be removed by unscrewing whilst the main valve body remains in the line.

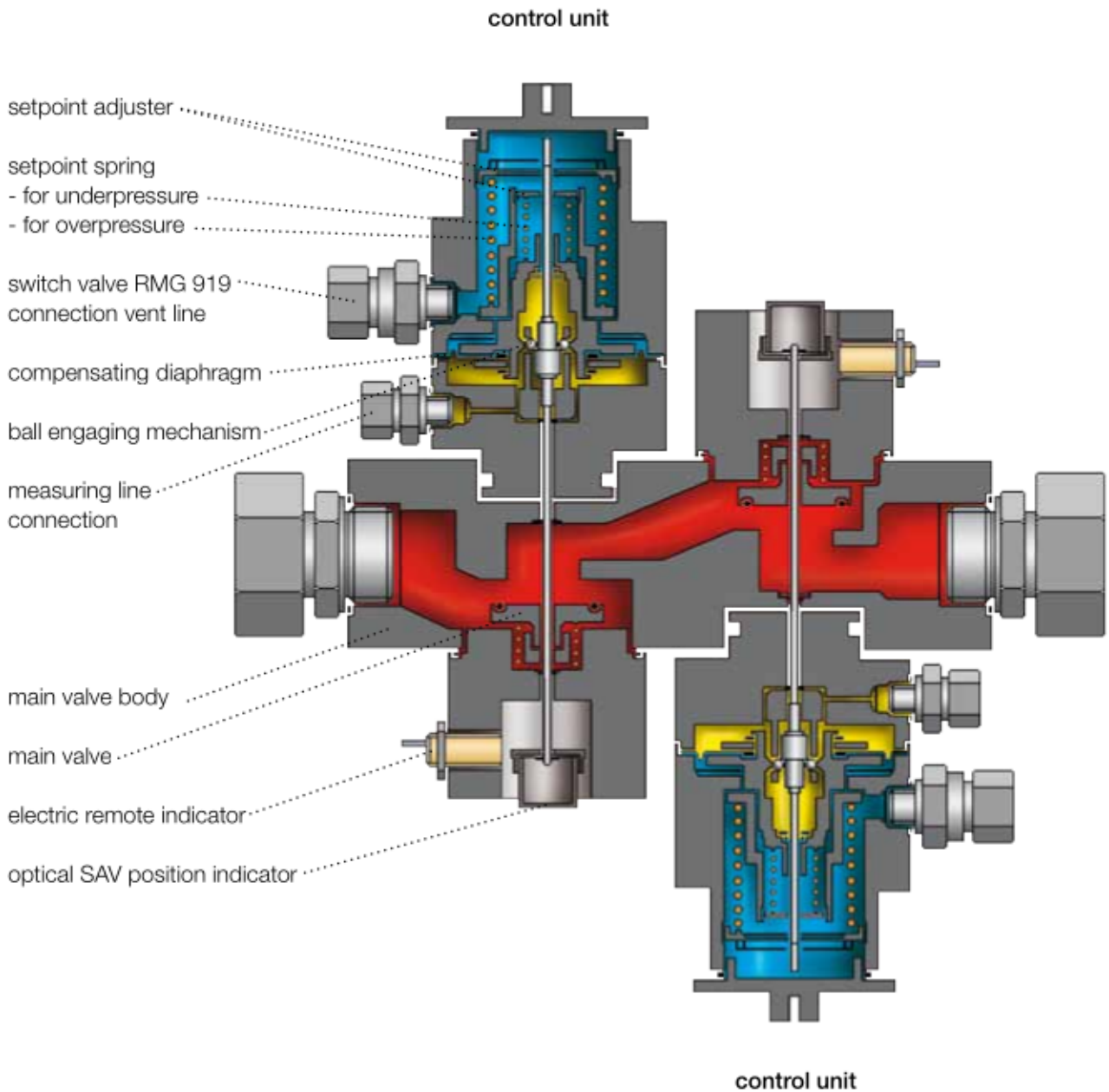
Operation with control unit RMG 673 (K 1a, K 2a)

The pressure to be monitored is applied to the compensating diaphragm in the control unit and compared with the reference values provided by the setpoint spring (response pressure setpoint). Upon reaching the response pressure setpoint by way of overpressure or underpressure, the compensating diaphragm and the engaging mechanism of the switchgear are in the disengaged position and release the locking mechanism. The spring of the actuator then closes the shut-off valve.

Note: Opening the main valve and locking the valve stem is only possible by hand after the outlet pressure at the measuring location is below (after release p_{max}) or above (after release p_{min}) the reengagement difference.

Safety Shut-off Valve RMG 703 / RMG 704

Design and operation



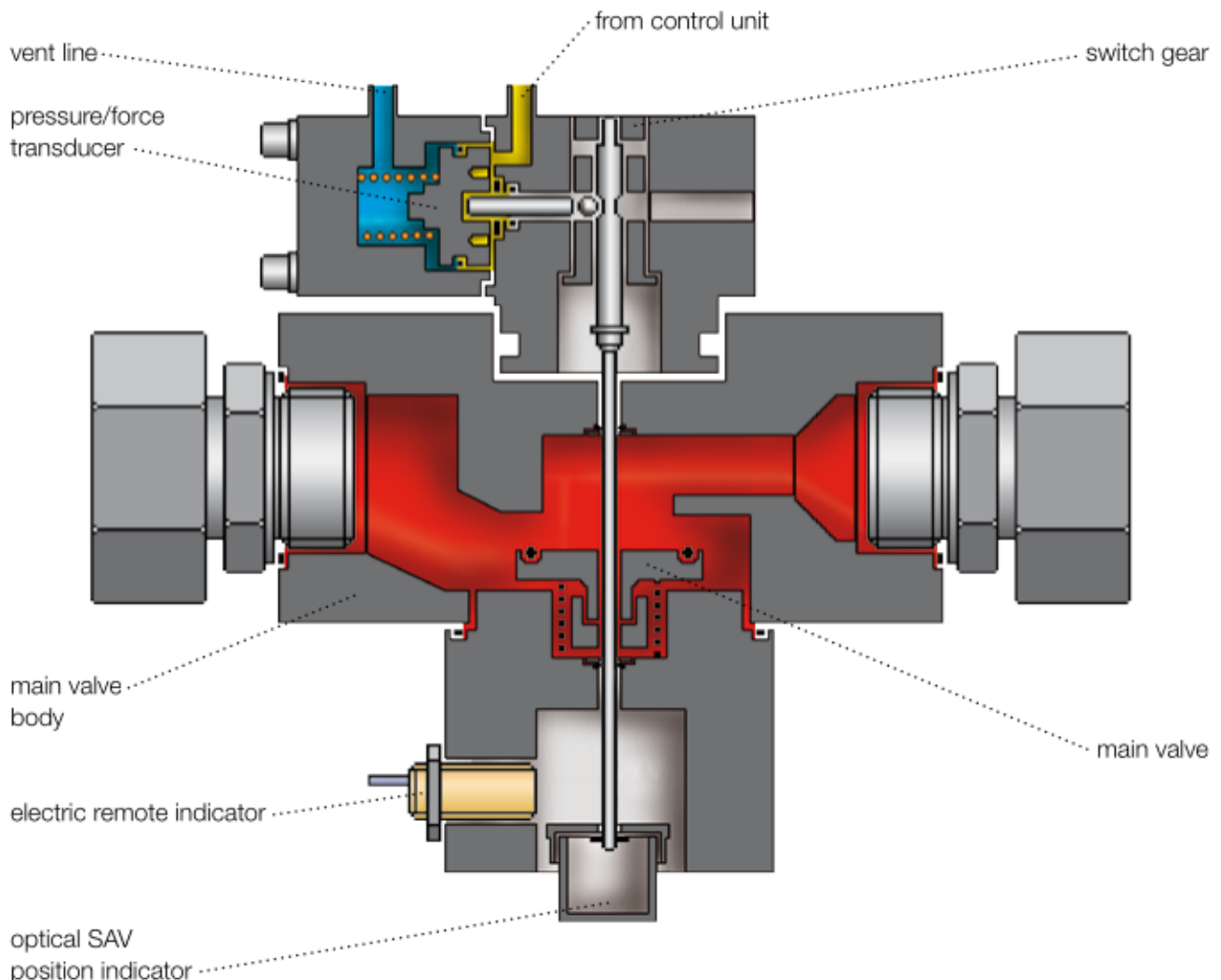
Safety Shut-off Valve RMG 703 / RMG 704

Design and operation

Operation with control unit RMG 670/671 (K16, K17, K 18)

The pressure of the system to be protected is directed via a measuring line on top of the sensitive double diaphragm system and compared with the reference values given by the setpoint adjustment screw (setpoint spring force). Under normal operating conditions the amplifier valve remains closed. Should the upper response pressure for RMG 670 or the lower response pressure for RMG 671 be reached, the amplifier valve opens. Gas will flow from the system to be monitored into the pressure/force transducer. The piston in the pressure/force transducer moves and actuates the switchgear of the SAV via the piston rod, thus closing the safety shut-off valve. Once the cause for the release of the SAV has been removed and the monitored pressure is again below the preset setpoint (for overpressure release with RMG 670) or above (for underpressure release with RMG 671), the amplifier valve closes. The pressure at the piston of the main valve dissipates via the throttle integrated in the control unit, and the safety shut-off valve can be opened again. The control unit RMG 670 also meets the requirement that the safety shut-off valve must release when the measuring diaphragm breaks. The monitored outlet pressure is present at the upper side of the double diaphragm system. Should this upper diaphragm of the double diaphragm system be faulty, the outlet pressure will be directed directly to the pressure/force transducer and cause the SAV to release.

SAV RMG 704 with switch gear

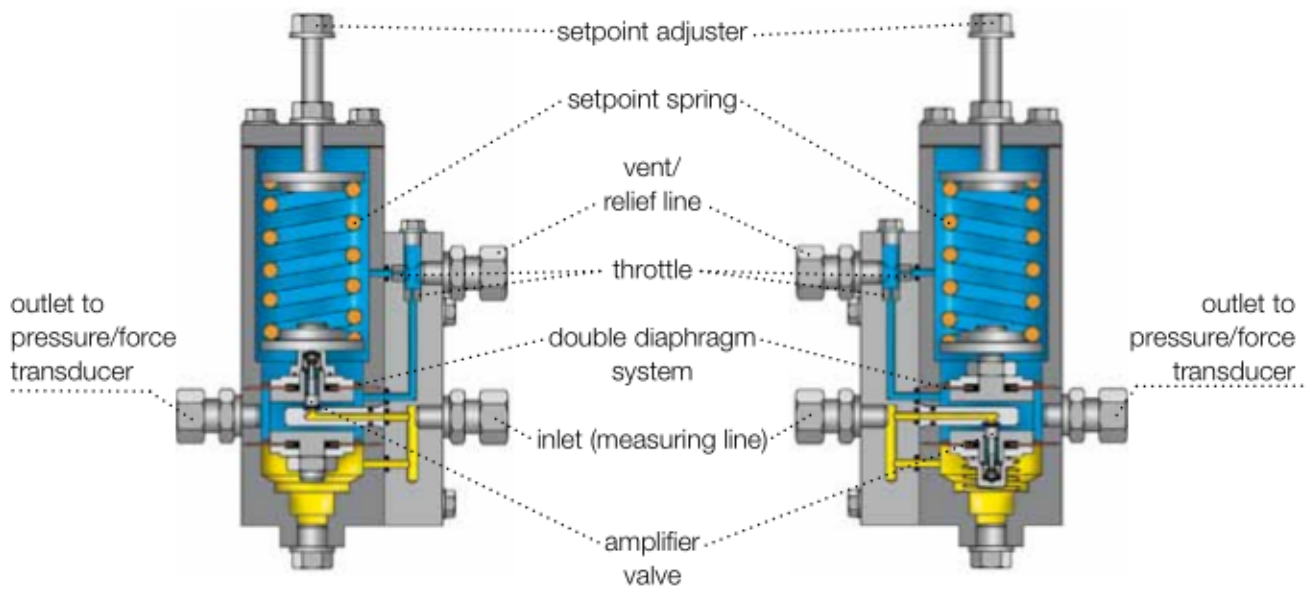


Safety Shut-off Valve RMG 703 / RMG 704

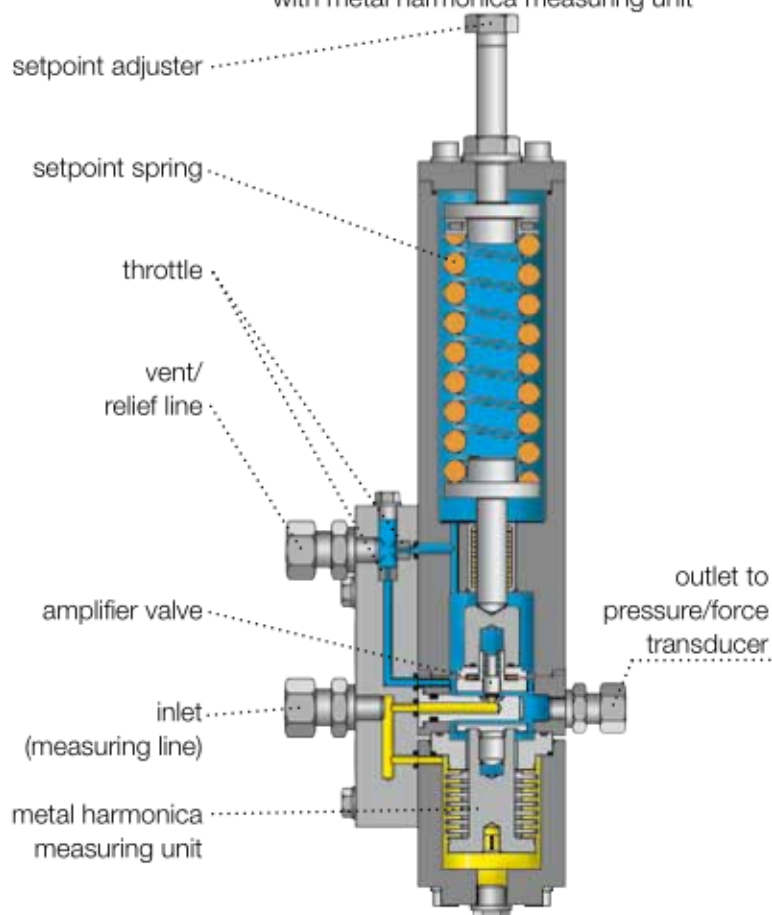
Design and operation

control unit RMG 670-K16
for upper setting range

control unit RMG 670-K17
for lower setting range



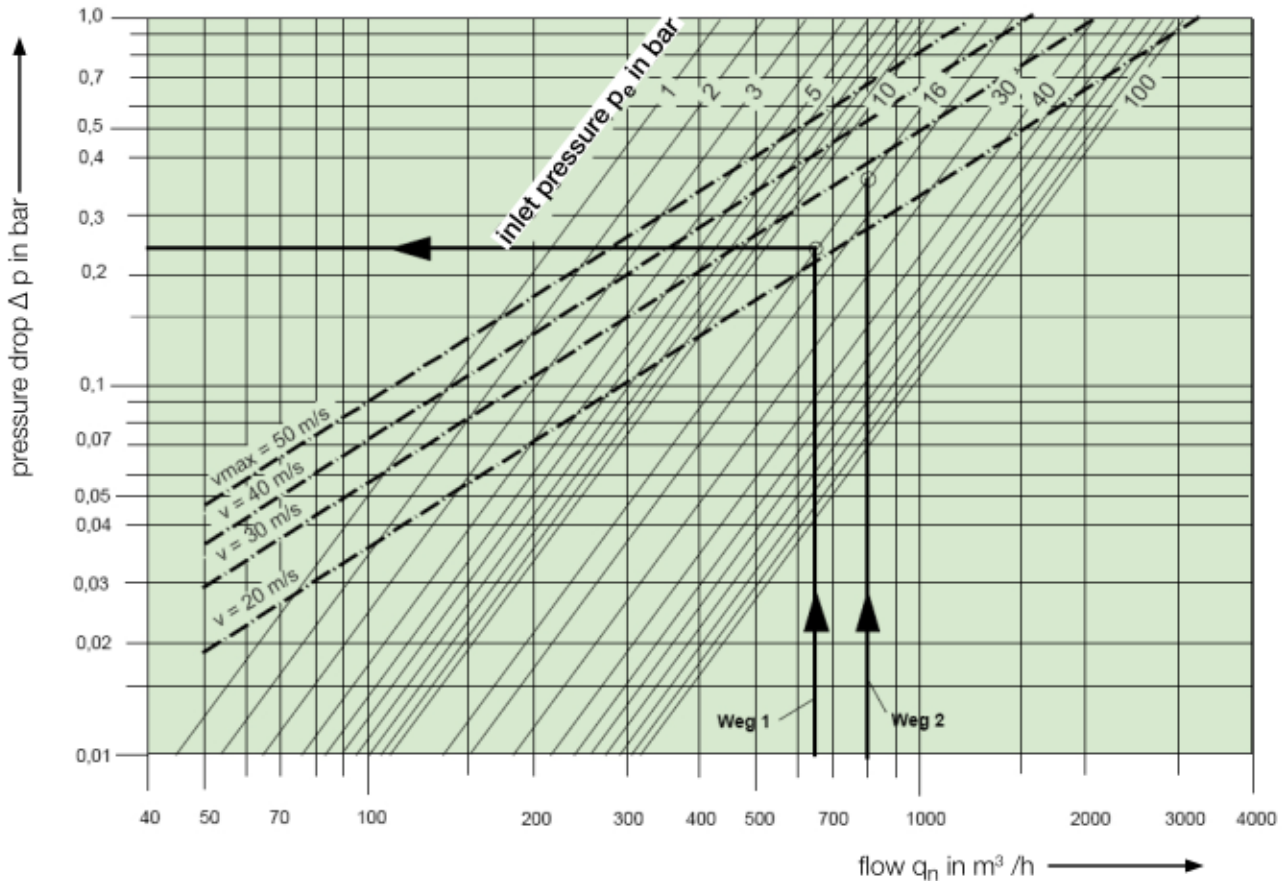
control unit RMG 670-K18
for upper setting range
with metal harmonica measuring unit



Safety Shut-off Valve RMG 703 / RMG 704

Design and operation

Diagram for determining the pressure drop and flow rate for RMG 703



The natural gas flow should be used to determine the pressure drop. When using other gas media, the equivalent of the natural gas flow should be used in calculations

$$q_n \text{ Erdgas} = \frac{q_n \text{ Gas}}{f}$$

$$\text{conversion factor } f = \sqrt{0,83 / \rho_n \text{ gas}}$$

standard gas (city gas)	1,23
air	0,80
nitrogen	0,81
oxygen	0,76
hydrogen	3,04

example 1

operating data: $p_e = 16 \text{ bar}$
 $q_n = 800 \text{ m}^3 / \text{h}$ (city gas)

calculation of pressure drop Δp (method 1)
equivalent natural gas flow

$$q_n \text{ Erdgas} = \frac{q_n \text{ Gas}}{f} = \frac{800}{1,23} = 650 \text{ m}^3 / \text{h}$$

result (method 1): pressure drop $\Delta p \approx 0.27 \text{ bar}$

example 2

operating data: $p_e = 16 \text{ bar}$
 $q_n = 800 \text{ m}^3 / \text{h}$ (city gas)

calculation of flow rate v (method 2)

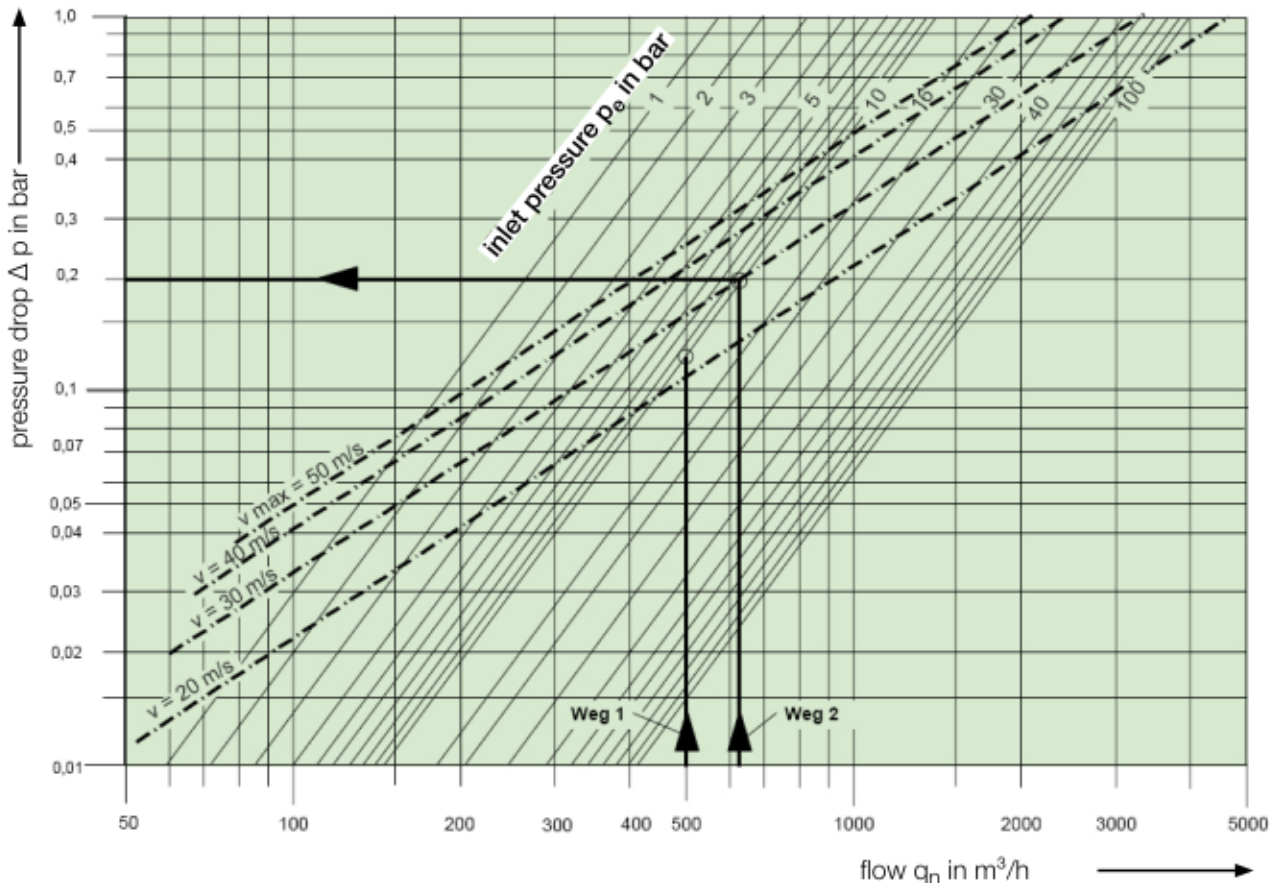
flow rate value of gas medium

$$q_n = 800 \text{ m}^3 / \text{h}$$

$$p_e = 16 \text{ bar}$$

result (method 2): flow rate $v \approx 27 \text{ m/s}$

Diagram for determining the pressure drop and flow rate for RMG 704



The natural gas flow should be used to determine the pressure drop. When using other gas media, the equivalent of the natural gas flow should be used in calculations

$$q_n \text{ Erdgas} = \frac{q_n \text{ Gas}}{f}$$

conversion factor $f = \sqrt{0,83 / \rho_n \text{ gas}}$	
standard gas (city gas)	1,23
air	0,80
nitrogen	0,81
oxygen	0,76
hydrogen	3,04

example 1

operating data: $p_e = 10 \text{ bar}$
 $q_n = 500 \text{ m}^3 / \text{h}$ (nitrogen)

calculation of pressure drop Δp (method 2)
equivalent natural gas flow

$$q_n \text{ Erdgas} = \frac{q_n \text{ Gas}}{f} = \frac{500}{0,81} = 617 \text{ m}^3 / \text{h}$$

result (method 2):
pressure drop $\Delta p \approx 0.2 \text{ bar}$

example 2:

operating data: $p_e = 10 \text{ bar}$
 $q_n = 500 \text{ m}^3 / \text{h}$ (nitrogen)

calculation of pressure drop Δp (method 1)
flow-through value of gas medium
 $q_n = 500 \text{ m}^3 / \text{h}$
 $p_e = 10 \text{ bar}$

result (method 1):
flow rate $v \approx 26 \text{ m/s}$

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Safety Shut-off Valve RMG 703 / RMG 704

Device designation

Example

RMG 703 - E18 / DN 25 - K 16 - HA - E1 - F - So

DEVICE TYPE		type
tandem SAV	RMG 703	
single SAV	RMG 704	
INLET AND OUTLET CONNECTIONS		inlet connection
pipe connection	E 10	
	E 12	
	E 16	
	E 18	
	E 22	
	E 25	
	E 28	
flange connection	E 38	
	E 42	
	DN 25	
DN 40	outlet connection	
DN 50		
SAV SETTING RANGE		
upper setting range	lower setting range	
W_{ho} [bar]	W_{hu} [bar]	
0,05 ... 1,5	0,01 ... 0,12	K 1a
0,40 ... 4,5	0,60 ... 0,40	K 2a
0,80 ... 40		K 16
		K 17
0,80 ... 40	2,00 ... 40,0	K 16/K 17
20,0 ... 90	2,00 ... 40,0	K 18
ACCESSORIES		
electric release on current supply	E1	accessories
manual release	HA	
electric position indication	F	remote transfer
special design (to be specified)	So	
		special design (to be specified)

Note:

For tandem safety shut-off valve RMG 703 note that both SAV main valves are normally fitted with the same control units and accessories. Variations available as special design.