# FRM

## Medium Pressure Regulator

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Combustion Controls

Medium pressure regulator Type FRM

Direct acting pressure regulator with adjustable setpoint springs and modular mounted safety shutoff valve (SAV)

In compliance with EN 334 and EN 14382

- Inlet pressures up to 25 bar (2 500 kPa)
- High flow rate
- Stable, accurate and sensitive regulation of the outlet pressure
- Admission pressure compensation diaphragm for a high regulation accuracy
- External impulse
- Maintenance-friendly
- Flange connection according to DN 65 - DN 80

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## FRM

Spring-loaded, pressure compensating regulator with adjustable setpoint springs for regulation of the regulator outlet pressure. External impulse of the regulator outlet pressure.

## Application

Pressure regulation of industrial gas burners and gas heating appliances. Also for installation in the municipal and commercial gas supply.

Suitable for gases of gas families 1, 2, 3 and other neutral gases.

## Approval

EC type testing certificate as per:

- EC-Pressure Equipment Directive

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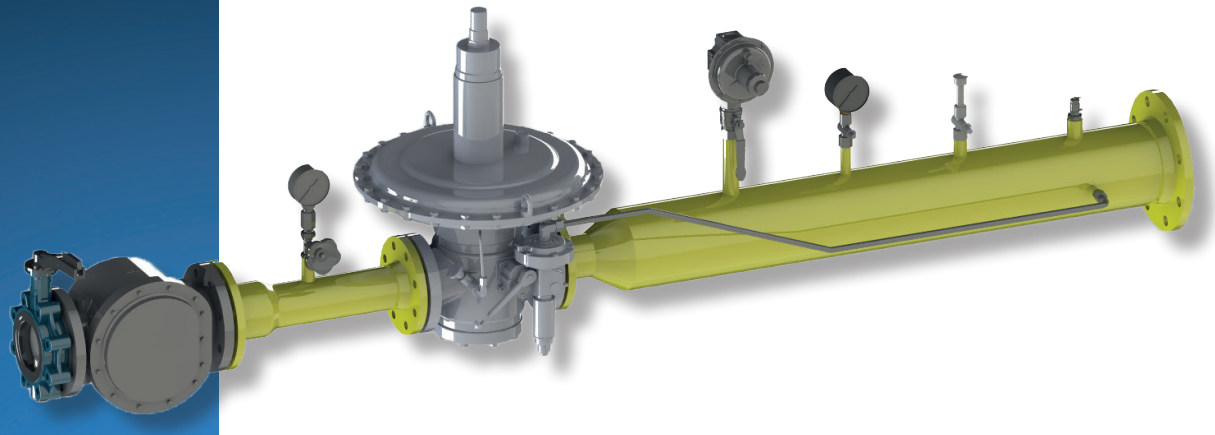

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## Spring-loaded medium pressure regulator in compliance with EN 334

| | |
|---|---|
| Type | FRM 100… IS (integral strength range) / FRM 250… DS (differential strength range) |
| Type of gas | Family 1+2+3 |
| Nominal diameters<br>Flanges | Connecting flange PN 25 according to EN 1092-1or ANSI 150 lbs (B16.5))<br>DN 65 80 |
| Max. inlet pressure | FRM 100… 10 bar (1 000 kPa) / FRM 250… 25 bar (2 500 kPa) |
| Outlet pressure range | 90 mbar to 4 000 mbar (9-400 kPa) |
| Minimum differential pressure (MD) | 350 mbar (35 kPa) |
| Minimum differential pressure (HD/UHD) | 500 mbar (50 kPa) |
| Accuracy class | up to AC 5 (see adjustment range, page 8) |
| Lock-up pressure class | up to SG 10 (see adjustment range, page 8) |
| Failure mode (diaphram rupture) | fail-open |
| Materials | Main body housing: cast iron GGG 50<br>Diaphragm housing: steel<br>Diaphragms: NBR |
| Ambient temperature | -20 °C to +60 °C |

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## Safety shut-off valve in compliance with EN 14382, class A

| | |
|---|---|
| Type | FRM 100… IS (integral strength range) / FRM 250… DS (differential strength range) |
| Response time | < 2 s |
| Lower adjustment range $W_{du}$ | 35 mbar up to 3 000 mbar (3.5-300 kPa) |
| Upper adjustment range $W_{do}$ | 180 mbar bis zu 5 000 mbar (18-500 kPa) |
| Materials | Main body housing: cast iron GGG 50<br>Diaphragm housing: aluminium<br>Diaphragms: NBR |

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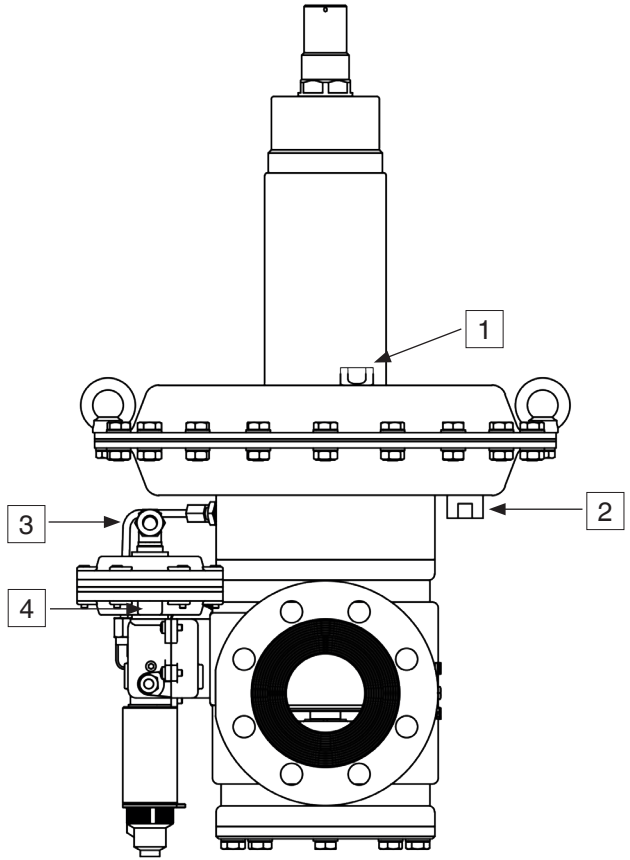


1 Vent line connection of the regulator, G½ ISO 228

2 External impulse line connection of the regulator, Ermeto screw connection GE 12- ½ for tubes 12 x 1,5

3 External impulse line connection of the SAV, Ermeto screw connection GE 12- ¼ for tubes 12 x 1,5

4 Vent line connection SAV, G¼ ISO 228

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| Example FRM 100080 MD / SAV MD | FRM | 100 | 080 | MD | SAV | MD |
|---|---|---|---|---|---|---|
| **Type** | Spring-loaded medium pressure regulator | | | | | |
| **MOP** | **100 … 10 000 mbar**<br>**250 … 25 000 mbar** | | | | | |
| **Nominal diameter** | 065 DN 65<br>080 DN 80 | | | | | |
| **Pressure range, outlet pressure** | MD Medium pressure<br>HD High pressure<br>UHD Ultra high pressure | | | | | |
| **Safety device** | SAV Integrated shut-off valve | | | | | |
| **Pressure range, trip pressure** | MD Medium pressure<br>HD High pressure<br>UHD Ultra high pressure | | | | | |
| **Flange type** | with standard PN 25<br>ANSI with ANSI 150 lbs | | | | | |

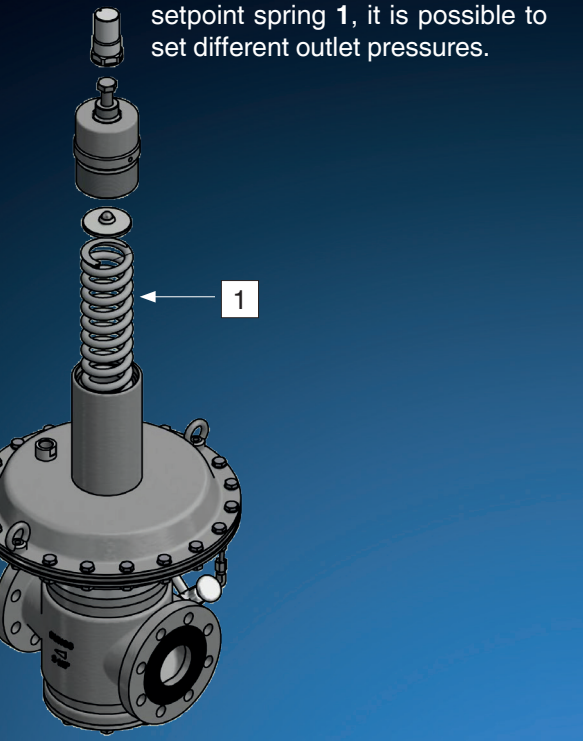
| Type | Con-nection | Ver-sion | Accuracy class* [AC] | Lock-up pressure class* [SG] | Outlet pressure range $W_d$ | Under pressure monitoring SAV | | Over pressure monitoring SAV | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $W_{du}$ | AG | $W_{do}$ | AG |
| FRM 100065 MD | DN 65 | MD | AC 5 / 10** | SG 10 / 20** | 90-420 mbar | | | | |
| FRM 100065 HD | DN 65 | HD | AC 5 | SG 10 | 400-1 500 mbar | | | | |
| FRM 250065 UHD | DN 65 | UHD | AC 5 | SG 10 | 1 000-4 000 mbar | | | | |
| FRM 100065 MD / SAV MD | DN 65 | MD | AC 5 / 10** | SG 10 / 20** | 90-420 mbar | 35-400 mbar | AG 10 | 180-800 mbar | AG 10 |
| FRM 100065 HD / SAV HD | DN 65 | HD | AC 5 | SG 10 | 400-1 500 mbar | 150-1 400 mbar | AG 5 | 500-3 500 mbar | AG 5 |
| FRM 250065 UHD / SAV UHD | DN 65 | UHD | AC 5 | SG 10 | 1 000-4 000 mbar | 150-3 000 mbar | AG 5 | 1 300-5 000 mbar | AG 5 |
| FRM 100080 MD | DN 80 | MD | AC 5 / 10** | SG 10 / 20** | 90-420 mbar | | | | |
| FRM 100080 HD | DN 80 | HD | AC 5 | SG 10 | 400-1 500 mbar | | | | |
| FRM 250080 UHD | DN 80 | UHD | AC 5 | SG 10 | 1000-4 000 mbar | | | | |
| FRM 100080 MD / SAV MD | DN 80 | MD | AC 5 / 10** | SG 10 / 20** | 90-420 mbar | 35-400 mbar | AG 10 | 180-800 mbar | AG 10 |
| FRM 100080 HD / SAV HD | DN 80 | HD | AC 5 | SG 10 | 400-1 500 mbar | 150-1 400 mbar | AG 5 | 500-3 500 mbar | AG 5 |
| FRM 250080 UHD / SAV UHD | DN 80 | UHD | AC 5 | SG 10 | 1000-4 000 mbar | 150-3 000 mbar | Ag 5 | 1 300-5 000 mbar | AG 5 |

*Accuracy class / Lock-up pressure class to EN 334

**pd = 90-180 mbar: AC 10, SG 20; pd = 180-420 mbar: AC 5, SG 10

## Selection of regulator springs

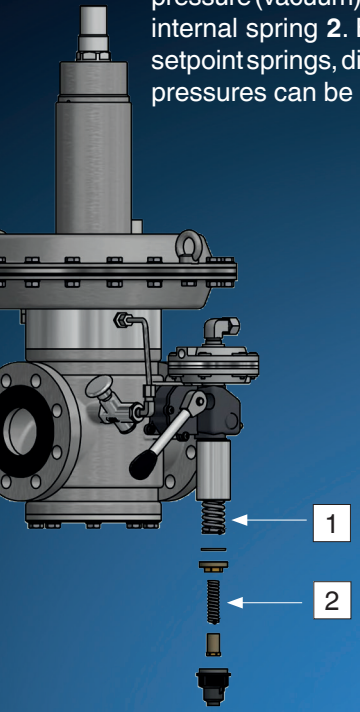
The response pressure results from the force of the installed adjusting spring and the weight force of the movable parts. By changing the setpoint spring **1**, it is possible to set different outlet pressures.




| Specific set range, outlet pressure $W_{ds}$ | | | | | | | |
|---|---|---|---|---|---|---|---|
| Spring colour | Order number | Wire diameter [mm] | Length [mm] | Diameter [mm] | Setpoint range [mbar] | | |
| | | | | | MD | HD | UHD |
| Blue | 270347 | 8.0 | 300 | 65 | 90-140 | | |
| Black | 270348 | 9.0 | 300 | 68 | 120-185 | 400-550 | |
| Purple | 270349 | 10.0 | 300 | 69 | 180-280 | 540-850 | 1 000-1 300 |
| Orange | 270350 | 11.0 | 300 | 71 | 250-420 | 800-1 150 | 1 100-1 800 |
| Pink | 270352 | 12.0 | 300 | 73 | | 1 100-1 500 | 1 600-2 500 |
| Red | 271132 | 14.0 | 300 | 77 | | | 2 400-4 000 |

## Selection of SAV springs

The response pressure results from the force of the installed adjusting spring. The upper response pressure (overpressure) is set on the external spring **1** of the measurement device. The lower response pressure (vacuum) can be set on the internal spring **2**. By changing the setpoint springs, different response pressures can be set.




**Specific set range, underpressure $W_{dsu}$**

| Spring colour | Order number | Wire diameter [mm] | Length [mm] | Diameter [mm] | Setpoint range [mbar] | | |
|---|---|---|---|---|---|---|---|
| | | | | | MD | HD | UHD |
| Blau | 270356 | 2.0 | 55 | 12.3 | 35-110 | | |
| Schwarz | 270357 | 2.3 | 55 | 12.3 | 50-250 | | |
| Lila | 270358 | 2.5 | 55 | 12.3 | 80-400 | 150-500 | 150-500 |
| Orange | 270359 | 2.8 | 55 | 12.3 | | 300-1 000 | 300-1 000 |
| Silber | 270360 | 3.0 | 60 | 15.0 | | 800-1 400 | 800-1 400 |
| Pink | 276126 | 3.5 | 60 | 15.0 | | | 1 200-3 000 |

**Specific set range, overpressure $W_{dso}$**

| Spring colour | Order number | Wire diameter [mm] | Length [mm] | Diameter [mm] | Setpoint range [mbar] | | |
|---|---|---|---|---|---|---|---|
| | | | | | MD | HD | UHD |
| Silver | 270361 | 2.2 | 60 | 30.0 | 180-270 | | |
| Red | 270367 | 2.7 | 60 | 30.0 | 230-370 | | |
| Yellow | 270368 | 3.2 | 60 | 30.0 | 300-500 | | |
| Blue | 270369 | 3.5 | 60 | 30.0 | 400-800 | 500-1 000 | |
| Black | 270370 | 3.7 | 60 | 30.0 | | 700-1 300 | |
| Purple | 270371 | 4.0 | 60 | 30.0 | | 1 000-1 800 | |
| Orange | 270372 | 4.5 | 60 | 30.0 | | 1 300-2 500 | 1 300-2 500 |
| Pink | 270373 | 4.8 | 60 | 30.0 | | 1 800-3 500 | 1 800-3 500 |
| White | 271115 | 5.0 | 60 | 30.0 | | | 2 500-5 000 |

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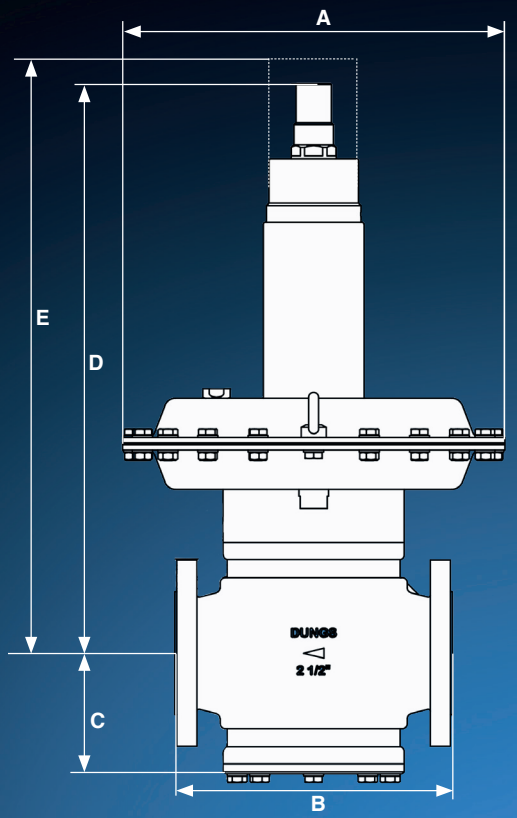


| Type | Order number | p max. [bar / kPa] | DN | Dimensions [mm] | | | | | Weight [kg] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | E | |
| FRM 100065 MD | 277241 | 10 / 1 000 | 65 | 500 | 276 | 120 | 567 | 892 | 56 |
| FRM 100065 HD | 277242 | 10 / 1 000 | 65 | 380 | 276 | 120 | 567 | 892 | 50 |
| FRM 250065 UHD | 277243 | 25 / 2 500 | 65 | 380 | 276 | 120 | 567 | 892 | 52 |
| FRM 100080 MD | 277244 | 10 / 1 000 | 80 | 500 | 298 | 120 | 567 | 892 | 58 |
| FRM 100080 HD | 277245 | 10 / 1 000 | 80 | 380 | 298 | 120 | 567 | 892 | 53 |
| FRM 250080 UHD | 277246 | 25 / 2 500 | 80 | 380 | 298 | 120 | 567 | 892 | 55 |

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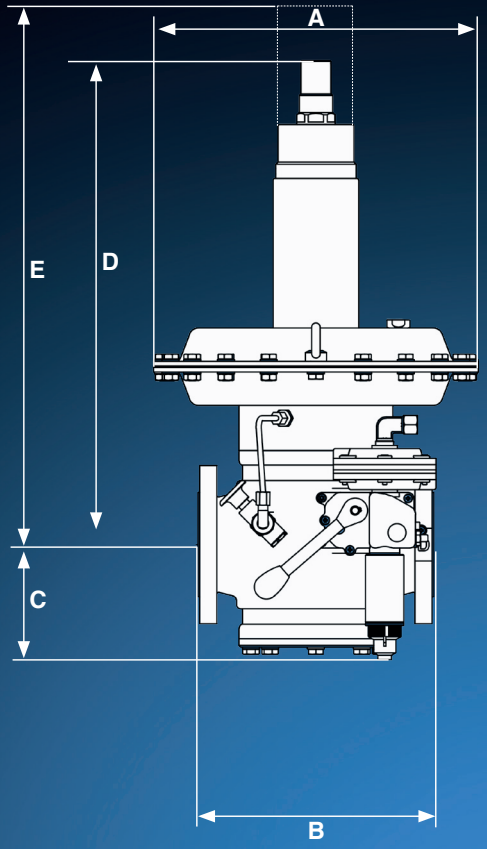



| Type | Order number | $p_{max.}$ [bar / kPa] | DN | Dimensions [mm] | | | | | Weight [kg] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | E | |
| FRM 100065 MD/SAV MD | 273061 | 10 / 1 000 | 65 | 500 | 276 | 135 | 567 | 892 | 71 |
| FRM 100065 HD/SAV HD | 276113 | 10 / 1 000 | 65 | 380 | 276 | 135 | 567 | 892 | 65 |
| FRM 250065 UHD/SAV UHD | 276114 | 25 / 2 500 | 65 | 380 | 276 | 135 | 567 | 892 | 67 |
| FRM 100080 MD/SAV MD | 276115 | 10 / 1 000 | 80 | 500 | 298 | 135 | 567 | 892 | 73 |
| FRM 100080 HD/SAV HD | 276116 | 10 / 1 000 | 80 | 380 | 298 | 135 | 567 | 892 | 68 |
| FRM 250080 UHD/SAV UHD | 276117 | 25 / 2 500 | 80 | 380 | 298 | 135 | 567 | 892 | 70 |

## Function

Mode of operation according to the force comparison principle between the force:

- of the adjustable setpoint spring,
- coming from the differential pressure on the working diaphragm and
- of the weight of the movable parts.

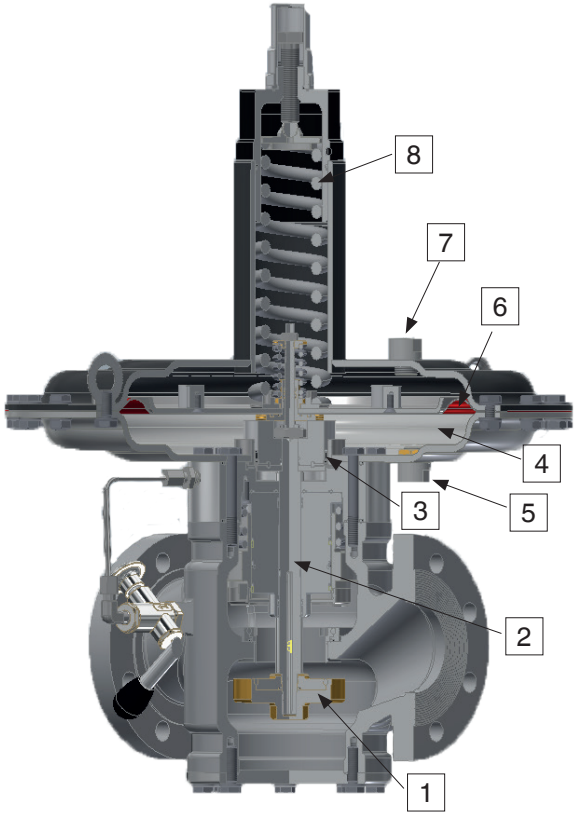
The setting spring acts independently of the weight of the movable parts. The outlet pressure is set depending on the preload of the setting spring.

**Information**
gas carrying and impulse lines and connecting lines must be resistant to thermal, chemical and mechanical stresses. They must also be durable and resistant to deformation and cracks.

**Any condensate from impulse lines must not flow into the pressure regulator.**

**Combustible gas and gas/air mixtures must not enter the installation space of the adjusting spring.**

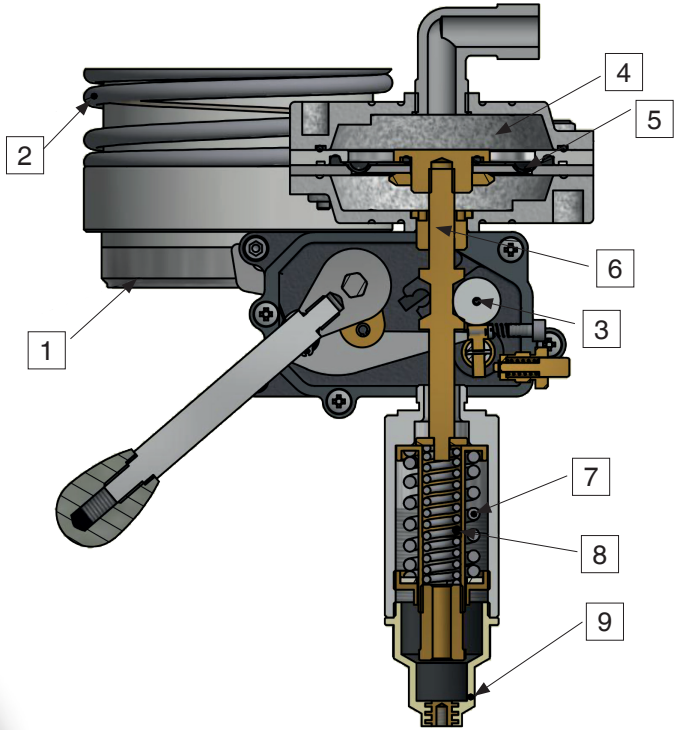
## Sectional drawing FRM
## Pressure regulator in open position




As the output pressure increases, the force in the lower diaphragm shell **4** increases to the working diaphragm **6**.
The working diaphram **6** is pushed upwards, until the force of the setpoint spring **8** is equal to that of the outlet pressure. The upward movement of the working diaphragm **6** causes the working plate shaft **2** to be pulled upwards. In this way, the control plate **1** is then pushed upwards and the valve gap is reduced.
The flow volume decreased in this way reduces the outlet pressure until the set nominal value (outlet pressure) is reached and a balance of forces at the working diaphragm **6** is established.

| | |
|---|---|
| 1 | Control plate |
| 2 | Control plate shaft |
| 3 | Inlet pressure compensation diaphragm |
| 4 | Lower diaphragm shell |
| 5 | Impulse connection for the outlet pressure |
| 6 | Working diaphragm |
| 7 | Vent connection |
| 8 | Setpoint spring |

## Sectional drawing SAV
## Device in the closed position




Chamber **4** is connected to the outlet pressure via an impulse line. The pressure being monitored acts on the working diaphragm **5**. The force of the setpoint springs **7** and **8** acts as counterforce. In case of an unbalance of forces (overpressure or underpressure), the SAV is actuated and the gas supply is blocked.

| | |
|---|---|
| 1 | Valve disc |
| 2 | Closing spring |
| 3 | Ball catch / trigger mechanism |
| 4 | Chamber with the pressure to be monitored |
| 5 | Working diaphragm |
| 6 | Push rod |
| 7 | Setpoint spring for $pd_o$ |
| 8 | Setpoint spring for $pd_u$ |
| 9 | Protective cap |

The following flow rate tables can be used to select the device. The maximum indicated volume flow refers to the natural gas with a standard density of 0.81 kg/m³ at a temperature of 15 °C. In case of different types of gases, a conversion of the volume flow according to the equation on page 18 is carried out. It is possible to determine the maximum flow volume of the corresponding regulator at the operating point defined using $p_d$ and $p_u$.

**Design a straight stabilisation section with the equal diameter.**

**Impulse connection at a distance of > 5 x DN.**

**Maximum flow velocity in the stabilisation section of ≤ 30 m/s.**

## FRM 100065... DN 65 – max. flow volume [Nm³/h] natural gas of density 0.81 kg/m³ ($K_G$)

| FRM ... | MD | | | | | | | HD | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $p_d$ [bar] / $p_u$ [bar] | 0.1 | 0.15 | 0.2 | 0.25 | 0.3 | 0.35 | 0.4 | 0.45 | 0.5 | 0.75 | 1 | 1.25 | 1.5 |
| 0.5 | 1 493 | 1 427 | 1 350 | 1 257 | 1 146 | 1 012 | 841 | 605 | | | | | |
| 0.75 | 1 903 | 1 869 | 1 827 | 1 778 | 1 720 | 1 652 | 1 573 | 1 482 | 1 376 | | | | |
| 1 | 2 239 | 2 224 | 2 204 | 2 177 | 2 145 | 2 106 | 2 060 | 2 007 | 1 946 | 1 485 | | | |
| 1.5 | 2 811 | 2 811 | 2 811 | 2 811 | 2 811 | 2 801 | 2 789 | 2 773 | 2 752 | 2 572 | 2 244 | 1 683 | |
| 2 | 3 370 | 3 370 | 3 370 | 3 370 | 3 370 | 3 370 | 3 370 | 3 370 | 3 370 | 3 321 | 3 174 | 2 914 | 2 508 |
| 2.5 | 3 929 | 3 929 | 3 929 | 3 929 | 3 929 | 3 929 | 3 929 | 3 929 | 3 929 | 3 929 | 3 887 | 3 763 | 3 546 |
| 3 | 4 489 | 4 489 | 4 489 | 4 489 | 4 489 | 4 489 | 4 489 | 4 489 | 4 489 | 4 489 | 4 489 | 4 452 | 4 343 |
| 3.5 | 5 048 | 5 048 | 5 048 | 5 048 | 5 048 | 5 048 | 5 048 | 5 048 | 5 048 | 5 048 | 5 048 | 5 048 | 5 015 |
| 4 | 5 607 | 5 607 | 5 607 | 5 607 | 5 607 | 5 607 | 5 607 | 5 607 | 5 607 | 5 607 | 5 607 | 5 607 | 5 607 |
| 4.5 | 6 167 | 6 167 | 6 167 | 6 167 | 6 167 | 6 167 | 6 167 | 6 167 | 6 167 | 6 167 | 6 167 | 6 167 | 6 167 |
| 5 | 6 726 | 6 726 | 6 726 | 6 726 | 6 726 | 6 726 | 6 726 | 6 726 | 6 726 | 6 726 | 6 726 | 6 726 | 6 726 |
| 6 | 7 844 | 7 844 | 7 844 | 7 844 | 7 844 | 7 844 | 7 844 | 7 844 | 7 844 | 7 844 | 7 844 | 7 844 | 7 844 |
| 7 | 8 963 | 8 963 | 8 963 | 8 963 | 8 963 | 8 963 | 8 963 | 8 963 | 8 963 | 8 963 | 8 963 | 8 963 | 8 963 |
| 8 | 10 082 | 10 082 | 10 082 | 10 082 | 10 082 | 10 082 | 10 082 | 10 082 | 10 082 | 10 082 | 10 082 | 10 082 | 10 082 |
| 9 | 11 200 | 11 200 | 11 200 | 11 200 | 11 200 | 11 200 | 11 200 | 11 200 | 11 200 | 11 200 | 11 200 | 11 200 | 11 200 |
| 10 | 12 319 | 12 319 | 12 319 | 12 319 | 12 319 | 12 319 | 12 319 | 12 319 | 12 319 | 12 319 | 12 319 | 12 319 | 12 319 |



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## FRM 100080... DN 80 – max. flow volume [Nm³/h] natural gas of density 0.81 kg/m³ ($K_G$)

| FRM ... | MD | | | | | | | HD | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $p_d$ [bar] / $p_u$ [bar] | 0.1 | 0.15 | 0.2 | 0.25 | 0.3 | 0.35 | 0.4 | 0.45 | 0.5 | 0.75 | 1 | 1.25 | 1.5 |
| 0.5 | 1 837 | 1 757 | 1 661 | 1 547 | 1 411 | 1 245 | 1 035 | 745 | | | | | |
| 0.75 | 2 342 | 2 300 | 2 249 | 2 188 | 2 116 | 2 033 | 1 936 | 1 824 | 1 693 | | | | |
| 1 | 2 756 | 2 738 | 2 712 | 2 680 | 2 640 | 2 592 | 2 535 | 2 470 | 2 395 | 1 828 | | | |
| 1.5 | 3 460 | 3 460 | 3 460 | 3 460 | 3 460 | 3 447 | 3 433 | 3 413 | 3 387 | 3 166 | 2 762 | 2 071 | |
| 2 | 4 148 | 4 148 | 4 148 | 4 148 | 4 148 | 4 148 | 4 148 | 4 148 | 4 148 | 4 087 | 3 906 | 3 587 | 3 086 |
| 2.5 | 4 836 | 4 836 | 4 836 | 4 836 | 4 836 | 4 836 | 4 836 | 4 836 | 4 836 | 4 836 | 4 784 | 4 631 | 4 365 |
| 3 | 5 525 | 5 525 | 5 525 | 5 525 | 5 525 | 5 525 | 5 525 | 5 525 | 5 525 | 5 525 | 5 525 | 5 479 | 5 346 |
| 3.5 | 6 213 | 6 213 | 6 213 | 6 213 | 6 213 | 6 213 | 6 213 | 6 213 | 6 213 | 6 213 | 6 213 | 6 213 | 6 173 |
| 4 | 6 901 | 6 901 | 6 901 | 6 901 | 6 901 | 6 901 | 6 901 | 6 901 | 6 901 | 6 901 | 6 901 | 6 901 | 6 901 |
| 4.5 | 7 590 | 7 590 | 7 590 | 7 590 | 7 590 | 7 590 | 7 590 | 7 590 | 7 590 | 7 590 | 7 590 | 7 590 | 7 590 |
| 5 | 8 278 | 8 278 | 8 278 | 8 278 | 8 278 | 8 278 | 8 278 | 8 278 | 8 278 | 8 278 | 8 278 | 8 278 | 8 278 |
| 6 | 9 655 | 9 655 | 9 655 | 9 655 | 9 655 | 9 655 | 9 655 | 9 655 | 9 655 | 9 655 | 9 655 | 9 655 | 9 655 |
| 7 | 11 031 | 11 031 | 11 031 | 11 031 | 11 031 | 11 031 | 11 031 | 11 031 | 11 031 | 11 031 | 11 031 | 11 031 | 11 031 |
| 8 | 12 408 | 12 408 | 12 408 | 12 408 | 12 408 | 12 408 | 12 408 | 12 408 | 12 408 | 12 408 | 12 408 | 12 408 | 12 408 |
| 9 | 13 785 | 13 785 | 13 785 | 13 785 | 13 785 | 13 785 | 13 785 | 13 785 | 13 785 | 13 785 | 13 785 | 13 785 | 13 785 |
| 10 | 15 161 | 15 161 | 15 161 | 15 161 | 15 161 | 15 161 | 15 161 | 15 161 | 15 161 | 15 161 | 15 161 | 15 161 | 15 161 |

## FRM 250065 UHD... DN 65 – max. flow volume [Nm³/h] natural gas of density 0.81 kg/m³ ($K_G$)

| FRM ... | UHD | | | | | | |
|---|---|---|---|---|---|---|---|
| $p_d$ [bar] / $p_u$ [bar] | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 |
| 1.5 | 2 244 | | | | | | |
| 2 | 3 174 | 2 508 | | | | | |
| 2.5 | 3 887 | 3 546 | 2 746 | | | | |
| 3 | 4 489 | 4 343 | 3 883 | 2 965 | | | |
| 3.5 | 5 048 | 5 015 | 4 756 | 4 193 | 3 169 | | |
| 4 | 5 607 | 5 607 | 5 492 | 5 135 | 4 481 | 3 361 | |
| 6 | 7 844 | 7 844 | 7 844 | 7 844 | 7 762 | 7 514 | 7 084 |
| 8 | 10 082 | 10 082 | 10 082 | 10 082 | 10 082 | 10 082 | 10 018 |
| 10 | 12 319 | 12 319 | 12 319 | 12 319 | 12 319 | 12 319 | 12 319 |
| 12 | 14 556 | 14 556 | 14 556 | 14 556 | 14 556 | 14 556 | 14 556 |
| 14 | 16 793 | 16 793 | 16 793 | 16 793 | 16 793 | 16 793 | 16 793 |
| 16 | 19 030 | 19 030 | 19 030 | 19 030 | 19 030 | 19 030 | 19 030 |
| 18 | 21 267 | 21 267 | 21 267 | 21 267 | 21 267 | 21 267 | 21 267 |
| 20 | 23 504 | 23 504 | 23 504 | 23 504 | 23 504 | 23 504 | 23 504 |
| 22 | 25 741 | 25 741 | 25 741 | 25 741 | 25 741 | 25 741 | 25 741 |
| 25 | 29 097 | 29 097 | 29 097 | 29 097 | 29 097 | 29 097 | 29 097 |

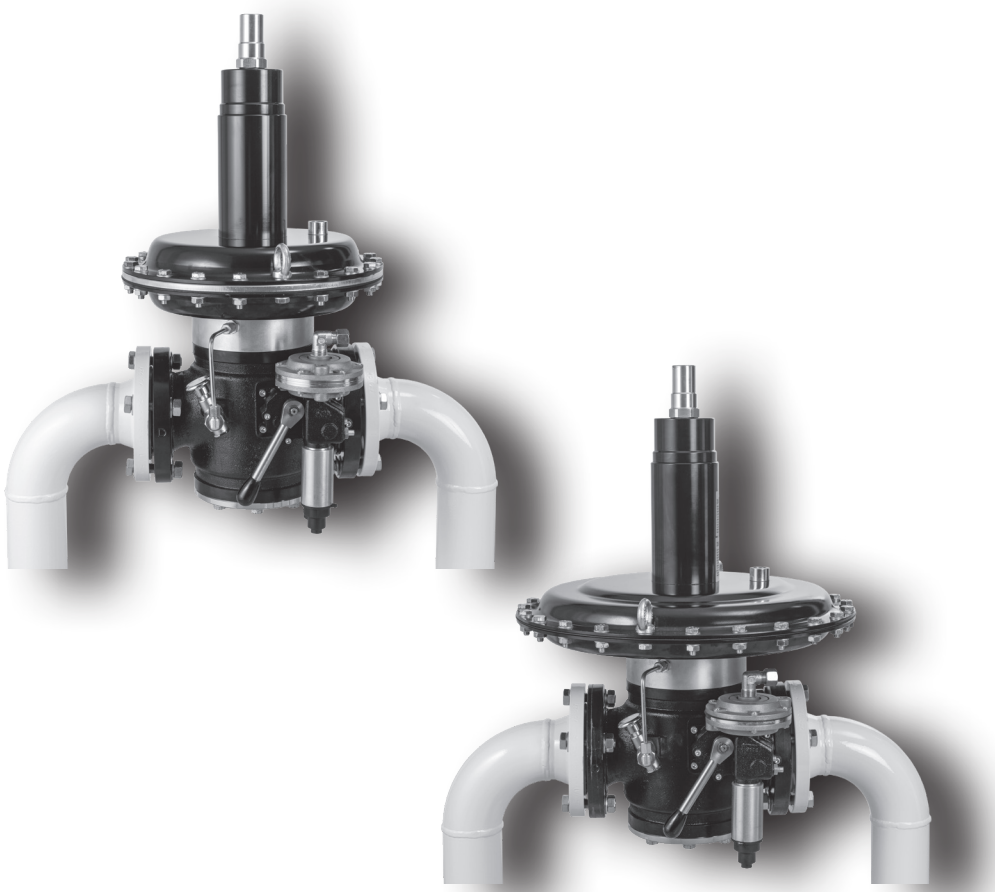
## FRM 250080 UHD... DN 80 – max. flow volume [Nm³/h] natural gas of density 0.81 kg/m³ ($K_G$)

| FRM ... | UHD | | | | | | |
|---|---|---|---|---|---|---|---|
| $p_d$ [bar] / $p_u$ [bar] | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 |
| 1.5 | 2 762 | | | | | | |
| 2 | 3 906 | 3 086 | | | | | |
| 2.5 | 4 784 | 4 365 | 3 379 | | | | |
| 3 | 5 525 | 5 346 | 4 779 | 3 649 | | | |
| 3.5 | 6 213 | 6 173 | 5 853 | 5 161 | 3 900 | | |
| 4 | 6 901 | 6 901 | 6 759 | 6 320 | 5 516 | 4 136 | |
| 6 | 9 655 | 9 655 | 9 655 | 9 655 | 9 553 | 9 248 | 8 718 |
| 8 | 12 408 | 12 408 | 12 408 | 12 408 | 12 408 | 12 408 | 12 329 |
| 10 | 15 161 | 15 161 | 15 161 | 15 161 | 15 161 | 15 161 | 15 161 |
| 12 | 17 915 | 17 915 | 17 915 | 17 915 | 17 915 | 17 915 | 17 915 |
| 14 | 20 668 | 20 668 | 20 668 | 20 668 | 20 668 | 20 668 | 20 668 |
| 16 | 23 422 | 23 422 | 23 422 | 23 422 | 23 422 | 23 422 | 23 422 |
| 18 | 26 175 | 26 175 | 26 175 | 26 175 | 26 175 | 26 175 | 26 175 |
| 20 | 28 928 | 28 928 | 28 928 | 28 928 | 28 928 | 28 928 | 28 928 |
| 22 | 31 682 | 31 682 | 31 682 | 31 682 | 31 682 | 31 682 | 31 682 |
| 25 | 35 812 | 35 812 | 35 812 | 35 812 | 35 812 | 35 812 | 35 812 |

$$\dot{V}_{\text{used gas}} = \dot{V}_{\text{air}} \times f$$

$$f = \sqrt{\frac{\text{air density}}{\text{spec. weight of the gas used}}}$$

| Type of gas | Spec. Wgt. [kg/m³] | dv | f |
|---|---|---|---|
| Natural gas | 0.81 | 0.65 | 1.24 |
| City gas | 0.58 | 0.47 | 1.46 |
| LPG | 2.08 | 1.67 | 0.77 |
| Air | 1.24 | 1.00 | 1.00 |



Subject to technical modification in the interest of technical progress.

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