Pressure regulator
FRNG

Zero pressure regulator
Proportional pressure regulator
Compressed air-controlled pressure regulator

Technical description
The DUNGS pressure regulator, type FRNG, has an adjustable setpoint spring and defined counterspring. The pressure regulator complies with EN 88 and DIN 3380:
- Input pressures up to 50 mbar (5 kPa) for zero pressure applications
- Input pressures up to 200 mbar (20 kPa) for proportional pressure applications
- Bypass prepared, Rp 3/8 to Rp 2
- Sturdy, precise and sensitive regulation of regulator output pressure
- Inlet pressure compensation diaphragms
- Safety diaphragms
- Internal pulse for regulator output pressure as standard, external pulse connection prepared

Application
The DUNGS pressure regulator, type FRNG, is suitable for gases of families 1, 2, 3 and other neutral gaseous media. Does not contain any non-ferrous metals, suitable for gases of up to max. 0.1 vol.% H₂S, dry.

Approval
EC type test approval as per EC Gas Appliance Directive:
FRNG 5… CE-0085 AQ7126
Approvals in other important gas consuming countries.
FRNG

Spring-loaded pressure regulator with adjustable setpoint spring and defined counterspring. Internal tap of regulator output pressure, external pulse and blower pressure connections prepared. Suitable for controlling regulator output pressure via a pneumatic command variable.

### Specifications

<table>
<thead>
<tr>
<th>Nominal diameters</th>
<th>DN</th>
<th>40</th>
<th>50</th>
<th>65</th>
<th>80</th>
<th>100</th>
<th>125</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe thread as per ISO 7/1</td>
<td>Rp 3/8</td>
<td>1/2</td>
<td>3/4</td>
<td>1</td>
<td>1 1/2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flange</td>
<td>Connection flange per DIN EN 1092-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Max. operating pressure</th>
<th>up to 500 mbar (50 kPa)</th>
</tr>
</thead>
</table>

**Pressure regulator**

Pressure regulator as per EN 88, Class A, Group 2, DIN 3380 RG 10, EN 12078

### Input pressure range

<table>
<thead>
<tr>
<th>Zero pressure regulator</th>
<th>5 to 50 mbar (0.5 to 5 kPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportional pressure regulator</td>
<td>5 to 200 mbar (0.5 to 20 kPa)</td>
</tr>
<tr>
<td>Compressed air-controlled pressure regulator</td>
<td>to 500 mbar (50 kPa)</td>
</tr>
</tbody>
</table>

### Output pressure range

<table>
<thead>
<tr>
<th>Zero pressure regulator</th>
<th>- 3 to 5 mbar (-0.3 to 0.5 kPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportional pressure regulator</td>
<td>-10 to 150 mbar (-1 to 15 kPa)</td>
</tr>
<tr>
<td>Pressure with compressed air up to max. 350 mbar (35 kPa).</td>
<td></td>
</tr>
</tbody>
</table>

### Materials of gas-conveying parts

Housing: aluminium, steel, no non-ferrous metals
Seals and diaphragms: NBR

### Ambient temperature

-15 °C to +70 °C

### Installation position

Regulator dome from vertically upright to lying horizontally
Rp 1/2 - DN 100
Regulator dome in vertical position
DN 125, DN 150

### Measuring/ignition gas connections

G 1/4 ISO 228 on both sides in inlet section

### Measurement opening

G 1/8 ISO 228 in the baseplate (option DN 125, DN 150)
Reclosable opening for setting system-specific values when the system is put into operation, e.g. gas motor

### Bypass

Bypass prepared: Rp 3/8 to Rp 2 on right of housing

### Pulse connection

Internal in outlet section, externally prepared on housing: Rp 3/8 to Rp 1 left, G 1/8;
on both sides from Rp 1 1/2, DN 40 G 1/4; internal pulse lockable

### Ventilation line / pressure connection for blower pressure

Ventilation line needs no routing, use existing connection as pressure connection for command variable (blower pressure).
Connection: G 1/4 to Rp 1; from Rp 1 1/2, DN 40: G 1/2

### Blower pressure command variable

For proportional pressure applications and gas-air ratio applications at pressure ratio of approx. 1:1 and in compressed-air controlled operation: \( p_{\text{max}} = 150 \text{ mbar} \) (15 kPa)
Spring selection
The output pressure is provided by the force of the installed adjustable spring, the counterspring and the blower pressure applied. The pressure regulator is equipped with the brown spring No. 1 as standard. By exchanging the adjustable spring, it is possible to achieve larger positive zero point shifts (offsets) of the output pressure (refer to Fig. Compressed air-controlled pressure regulator).

<table>
<thead>
<tr>
<th>Setpoint spring range [mbar]</th>
<th>2.5...9</th>
<th>5...13</th>
<th>5...20</th>
<th>10...30</th>
<th>25...55</th>
<th>30...70</th>
<th>60...110</th>
<th>100...150</th>
<th>140...200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring colour</td>
<td>Spring 1 brown</td>
<td>Spring 2 white</td>
<td>Spring 3 orange</td>
<td>Spring 4 blue</td>
<td>Spring 5 red</td>
<td>Spring 6 yellow</td>
<td>Spring 7 black</td>
<td>Spring 8 pink</td>
<td>Spring 9 grey</td>
</tr>
<tr>
<td>Nominal diameter Rp/DN</td>
<td>Standard</td>
<td>Spring 2 to 9 for compressed air applications only</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rp 3/8, Rp 1/2</td>
<td>229 817</td>
<td>229 818</td>
<td>229 820</td>
<td>229 821</td>
<td>229 822</td>
<td>229 823</td>
<td>229 824</td>
<td>229 825</td>
<td>229 826</td>
</tr>
<tr>
<td>Rp 3/4</td>
<td>229 833</td>
<td>229 834</td>
<td>229 835</td>
<td>229 836</td>
<td>229 837</td>
<td>229 838</td>
<td>229 839</td>
<td>229 840</td>
<td>229 841</td>
</tr>
<tr>
<td>Rp 1</td>
<td>229 842</td>
<td>229 843</td>
<td>229 844</td>
<td>229 845</td>
<td>229 846</td>
<td>229 847</td>
<td>229 848</td>
<td>229 849</td>
<td>229 850</td>
</tr>
<tr>
<td>Rp 1 1/2, DN 40</td>
<td>229 851</td>
<td>229 852</td>
<td>229 853</td>
<td>229 854</td>
<td>229 869</td>
<td>229 870</td>
<td>229 871</td>
<td>229 872</td>
<td>229 873</td>
</tr>
<tr>
<td>Rp 2, DN 50</td>
<td>229 874</td>
<td>229 875</td>
<td>229 876</td>
<td>229 877</td>
<td>229 878</td>
<td>229 879</td>
<td>229 880</td>
<td>229 881</td>
<td>229 882</td>
</tr>
<tr>
<td>DN 65, 80</td>
<td>229 883</td>
<td>229 884</td>
<td>229 885</td>
<td>229 886</td>
<td>229 887</td>
<td>229 888</td>
<td>229 889</td>
<td>229 890</td>
<td>229 891</td>
</tr>
<tr>
<td>DN 100</td>
<td>229 892</td>
<td>229 893</td>
<td>229 894</td>
<td>229 895</td>
<td>229 896</td>
<td>229 897</td>
<td>229 898</td>
<td>229 899</td>
<td>229 900</td>
</tr>
<tr>
<td>DN 125</td>
<td>229 901</td>
<td>229 902</td>
<td>229 903</td>
<td>229 904</td>
<td>229 905</td>
<td>229 906</td>
<td>229 907</td>
<td>229 908</td>
<td>243 416</td>
</tr>
<tr>
<td>DN 150</td>
<td>229 909</td>
<td>229 910</td>
<td>229 911</td>
<td>229 912</td>
<td>229 913</td>
<td>229 914</td>
<td>229 915</td>
<td>229 916</td>
<td>243 417</td>
</tr>
</tbody>
</table>

Standard Offset ≤ 5 mbar (Closing force of counterspring in closed position)

Dimensions

<table>
<thead>
<tr>
<th>Type</th>
<th>Order No.</th>
<th>( p_{\text{max}} ) [mbar]</th>
<th>Rp / DN</th>
<th>Dimensions [mm]</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRNG 503</td>
<td>220 967</td>
<td>500</td>
<td>Rp 3/8</td>
<td>( 77 \times 115 \times 24</td>
<td>G 1/4 \times G 1/4 \times G 1/8</td>
</tr>
<tr>
<td>FRNG 505</td>
<td>220 968</td>
<td>500</td>
<td>Rp 1/2</td>
<td>( 77 \times 115 \times 24</td>
<td>G 1/4 \times G 1/4 \times G 1/8</td>
</tr>
<tr>
<td>FRNG 507</td>
<td>220 969</td>
<td>500</td>
<td>Rp 3/4</td>
<td>( 100 \times 130 \times 28</td>
<td>G 1/4 \times G 1/4 \times G 1/8</td>
</tr>
<tr>
<td>FRNG 510</td>
<td>220 970</td>
<td>500</td>
<td>Rp 1</td>
<td>( 110 \times 145 \times 33</td>
<td>G 1/4 \times G 1/4 \times G 1/8</td>
</tr>
<tr>
<td>FRNG 515</td>
<td>209 064</td>
<td>500</td>
<td>Rp 1 1/2</td>
<td>( 150 \times 195 \times 40</td>
<td>G 1/2 \times G 1/4 \times G 1/4</td>
</tr>
<tr>
<td>FRNG 520</td>
<td>209 065</td>
<td>500</td>
<td>Rp 2</td>
<td>( 170 \times 250 \times 47</td>
<td>G 1/2 \times G 1/4 \times G 1/4</td>
</tr>
<tr>
<td>FRNG 5040</td>
<td>159 350</td>
<td>500</td>
<td>DN 40</td>
<td>( 200 \times 195 \times 75</td>
<td>G 1/2 \times G 1/4 \times G 1/4</td>
</tr>
<tr>
<td>FRNG 5050</td>
<td>209 067</td>
<td>500</td>
<td>DN 50</td>
<td>( 230 \times 250 \times 82.5</td>
<td>G 1/2 \times G 1/4 \times G 1/4</td>
</tr>
<tr>
<td>FRNG 5065</td>
<td>209 068</td>
<td>500</td>
<td>DN 65</td>
<td>( 290 \times 285 \times 92.5</td>
<td>G 1/2 \times G 1/4 \times G 1/4</td>
</tr>
<tr>
<td>FRNG 5080</td>
<td>209 069</td>
<td>500</td>
<td>DN 80</td>
<td>( 310 \times 285 \times 100</td>
<td>G 1/2 \times G 1/4 \times G 1/4</td>
</tr>
<tr>
<td>FRNG 5100</td>
<td>214 422</td>
<td>500</td>
<td>DN 100</td>
<td>( 350 \times 350 \times 110</td>
<td>G 1/2 \times G 1/4 \times G 1/4</td>
</tr>
<tr>
<td>FRNG 5125</td>
<td>220 758</td>
<td>500</td>
<td>DN 125</td>
<td>( 400 \times 400 \times 125</td>
<td>G 1/2 \times G 1/4 \times G 1/4</td>
</tr>
<tr>
<td>FRNG 5150</td>
<td>224 212</td>
<td>500</td>
<td>DN 150</td>
<td>( 480 \times 480 \times 142.5</td>
<td>G 1/2 \times G 1/4 \times G 1/4</td>
</tr>
</tbody>
</table>

Bypass restrictor Rp 3/8 - Rp2

3 ... 8
Functional description
Functions according to the force comparison principle between the force of:
- the adjustable setpoint spring
- the defined counterspring
- the differential pressure at the working diaphragm
- the force due to weight of the moving parts

The counterspring acts against the adjustable spring and the weight due to force of the moving parts. Depending on the pretension of the adjustable spring and the installation position, the force of the counterspring is compensated. Overcompensation leads to positive regulator output pressures, partial compensation leads to negative regulator output pressures.

Instructions
Gas-conveying lines, pulse and connection lines must be made of steel and at least PN 1, DN 6. The lines must be resistant to thermal, chemical and mechanical loads. The lines must be durable and deformation- and crack-proof.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>Regulating cup</td>
<td>Pulse tap, internal</td>
<td>Compensation diaphragm</td>
<td>External pulse</td>
<td>Diaphragm disk</td>
<td>Working diaphragm</td>
<td>Safety diaphragm</td>
<td>Breathing plug</td>
<td>Setpoint spring</td>
<td>Adjustment device</td>
<td>Counterspring</td>
<td>Option DN 125, DN 150</td>
</tr>
</tbody>
</table>

FRNG 515 sectional drawing
Pressure regulator in closed position

⚠️ Do not route condensate from lines into the pressure regulator.

⚠️ Do not apply burning gas or combustion gas air mixtures to the installation chamber of the adjustable spring.
Application of zero pressure regulator (standard design)
The FRNG regulates a gas flow proportional to the consumer vacuum for gas motors and self-intaking gas equipment.

The regulator is adjusted within the setting range at the setpoint spring.

\[ \dot{V}_{\text{min}} = \dot{V}_{\text{max}} \times 0.1 \]

For \( \dot{V}_{\text{max}} \), see volumetric flow pressure drop characteristic.

Application with compressed air-controlled pressure regulator (standard design)
For externally controlled gas equipment.

In connection with a selected setpoint spring, the regulator output pressure can be controlled depending on the blower pressure (compressed air). The command variable can be up to +150 mbar.

\[ \dot{V}_{\text{min}} = \dot{V}_{\text{max}} \times 0.05 \]

For \( \dot{V}_{\text{max}} \), see volumetric flow pressure drop characteristic.

Pressure taps
Pulse and blower connection

1 Breathing plug or connection for ventilation line. Only route ventilation line in special cases or connection for air pulse line.

2 Connection for external gas pulse. Internal pulse must be closed.

3 Pressure connection in inlet section G 1/4 ISO 228 screw plug, Rp 3/8 to Rp 2 with bypass cover prepared for mounting adjustable bypass restriction.
Application of proportional pressure regulator (standard design)
As proportional pressure regulator for gas-air ratio regulators with fixed efficiency pressure ratio $V = 1:1$ on gas equipment operated with differential pressure.
The offset range of the counterspring can be set by the setpoint spring. The moving parts are compensated by the force due to weight.
Gas supply or air supply are adjustable at full load and partial load.
Basic load is adjustable via bypass restrictor.
The command variable can be up to +150 mbar.

⚠️ $V_{\text{min}} = V_{\text{max}} \times 0,05$

For $V_{\text{max}}$, see volumetric flow pressure drop characteristic.

- $p_2$ [mbar]
- $p_L$ [mbar]

![Diagram](image)

- Blower
- Air Valve
- Pulse
- Industrial burner
- Adjustable bypass restrictor FRNG 503 - 520

![Diagram](image)

- KH
- GF
- DMV
- FRNG
- Blower
- Pulse
- Burner
- Compressed air regulator
- M

![Diagram](image)

- BH
- GF
- DMV
- FRNG
- Blower
- Pulse
- Burner
- Compressed air regulator
- M

- $p_2$ [mbar]
- $p_L$ [mbar]

![Diagram](image)

- 100 % 95 %
- 0.95 : 1 Actual pressure ratio
- Offset range for regulator characteristic

$V_{\text{min}} = V_{\text{max}} \times 0,05$
Volumetric flow pressure difference characteristic
Bypass restrictor

\[ \Delta p \text{ [mbar]} \]

\( V_n \text{ [m}^3\text{/h]} \text{ Luft / Air / Aria } dv = 1,00 \)

\( V_n \text{ [m}^3\text{/h]} \text{ Erdgas/Natural gas/Gaz Naturel/Gas metano } dv = 0,65 \)

Recommended operating range

Bypass restrictor adjustable for
FRNG 503
FRNG 505
FRNG 507
FRNG 510
FRNG 515
FRNG 520

Order-No. 225 256

Basis + 15° C, 1013 mbar, trocken
Based on + 15° C, 1013 mbar, dry
Base + 15° C, 1013 mbar, secco
Pressure regulator
FRNG

Zero pressure regulator
Proportional pressure regulator
Compressed air-controlled pressure regulator

We reserve the right to make any changes in the interest of technical progress.

Volumetric flow pressure loss characteristic

\[ \dot{V}_n \ [m^3/h] \ Luft / Air / Aria \ \Delta p = 1,00 \]

\[ \dot{V}_n \ [m^3/h] \ Erdgas / Natural gas / Gaz Naturel / Gas metano \ \Delta p = 0,65 \]