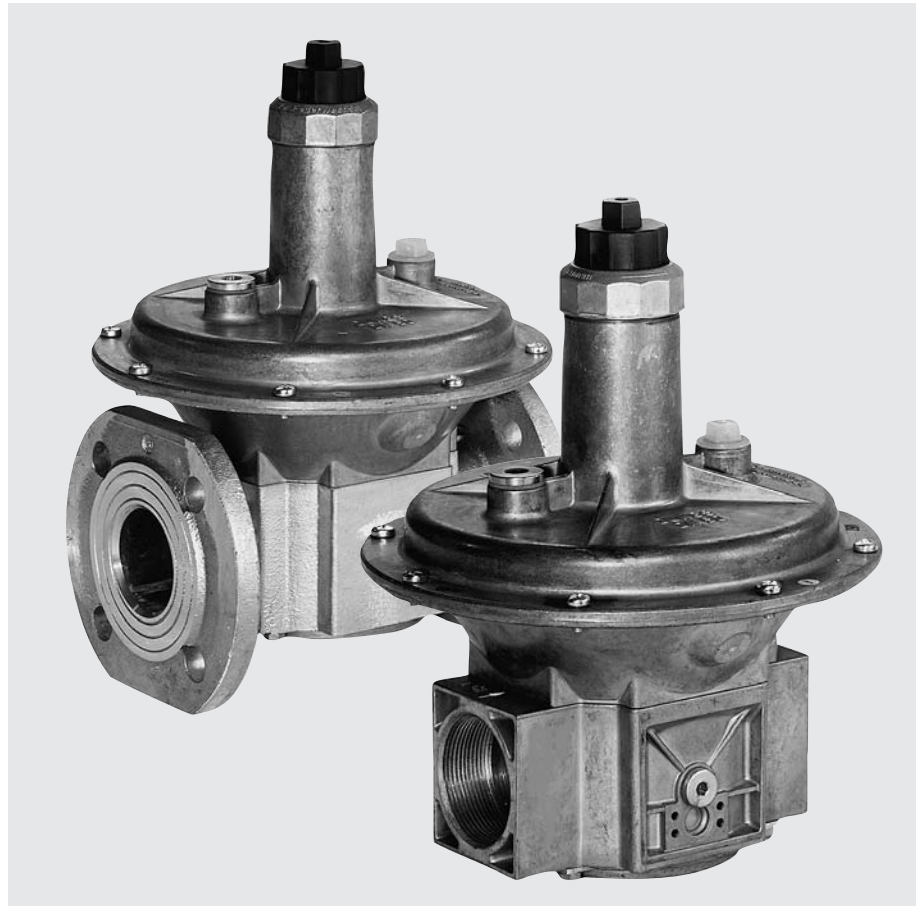


Pressure regulator FRS

4.10

DUNGS[®]
Combustion Controls



Technical description

The DUNGS pressure regulator, type FRS, has an adjustable setpoint spring. The pressure regulator complies with EN 88 and DIN 3380:

- Input pressures up to 500 mbar
- High flow rate
- Sturdy, precise and sensitive regulation of regulator output pressure
- Inlet pressure compensation diaphragms
- Safety diaphragms
- Internal pulse for regulator output pressure as standard, optional external pulse connection optional on both sides
- Rp 3/8 to Rp 2 thread connection
- DN 40 to DN 150 flange connection

Application

Gas pressure regulator for gas burners and gas equipment. It does not contain any non-ferrous metals, suitable for gases of up to max. 0.1 vol.% H₂S, dry. Suitable for gases of families 1, 2, 3 and other neutral gaseous media.

Approval

EC type test approval as per EC Gas Appliance Directive:

FRS ... CE-0085 AQ7126

Approvals in other important gas consuming countries.

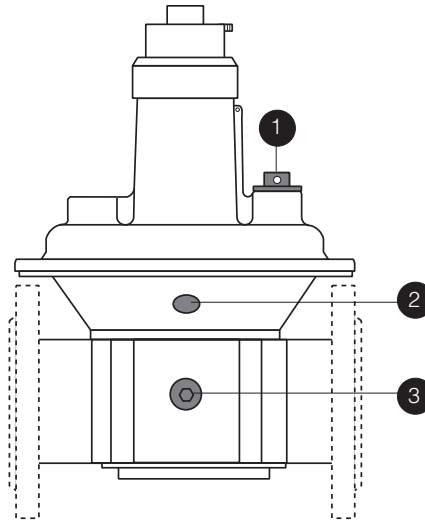
FRS Spring-loaded pressure regulator with adjustable setpoint spring. Internal tap of regulator output pressure. External pulse connections optional, suitable for controlling regulator output pressure.

Specifications

| | | | | | | | | |
|------------------------------------|--|-----|-----|-----|----|-------|-----|-------|
| Nominal diameters | DN | 40 | 50 | 65 | 80 | 100 | 125 | 150 |
| Pipe thread as per ISO 7/1 | Rp | 3/8 | 1/2 | 3/4 | 1 | 1 1/2 | 2 | 2 1/2 |
| Flange | Connection flange as per DIN 2501 Part 1, to fit preweld flanges as per DIN 2633 (PN 16) DN 40 to DN 150, ISO 7005-2 (PN 16) | | | | | | | |
| Max. operating pressure | up to 500 mbar (50 kPa) | | | | | | | |
| Pressure regulator | Pressure regulator as per EN 88, Class A, Group 2, DIN 3380, RG 10 | | | | | | | |
| Input pressure range | + 5 mbar or p2 +2.5 mbar up to 500 mbar | | | | | | | |
| Output pressure range | 2.5 mbar to 200 mbar as a factor of adjustable setpoint spring | | | | | | | |
| Materials of gas-conveying parts | Housing: aluminium, steel Seals and diaphragms: NBR | | | | | | | |
| Ambient temperature | -15 °C to + 70 °C | | | | | | | |
| Installation position | Regulator dome from vertically upright to lying horizontally | | | | | | | |
| Measuring/ignition gas connections | G 1/4 ISO 228 on both sides in inlet section | | | | | | | |
| Pulse connection | Internal in outlet section, Optional: external on housing on both sides | | | | | | | |
| Blow-off line | Blow-off line only required in special cases. Safety diaphragms are installed. Connection: G 1/4 ISO 228 to Rp 1; from Rp 1 1/2, DN 40: G 1/2 ISO 228 | | | | | | | |

Pressure taps

- 1 Breathing plug, blow-off line.
- 2 Connection for external pulse
G 1/4 ISO 228 screw plug on both sides, **optional**
- 3 G 1/4 ISO 228 screw plug in input section on both sides



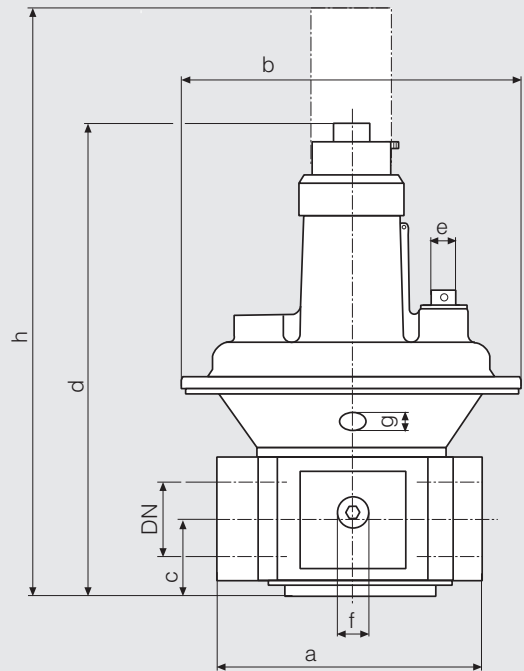
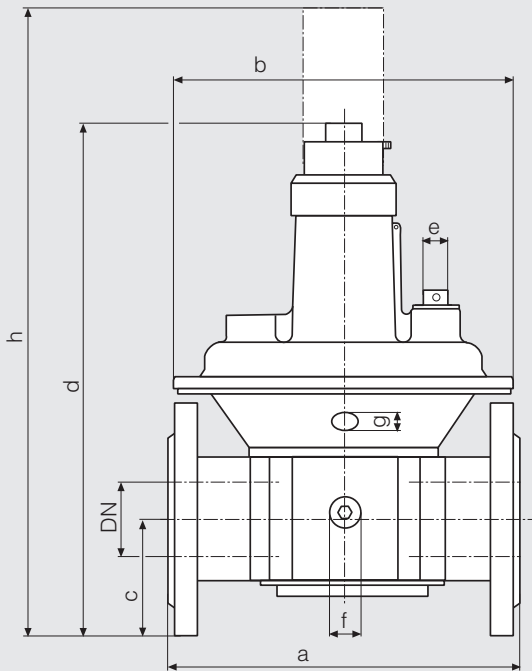
Spring selection

The output pressure is provided by the force of the installed spring and the force due to weight of the moving parts. The pressure regulator is equipped with the blue spring No. 4 as standard. By exchanging the

adjustable spring, other output pressures can be adjusted.

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

Dimensions



| Type | Order No. Internal pulse | Order No. External pulse | p _{max.} [mbar] | Rp / DN | Dimensions [mm] | | | | | | | Weight [kg] | |
|----------|--------------------------|--------------------------|--------------------------|----------|-----------------|-----|-----|-----|-------|-------|-------|-------------|-------|
| | | | | | a | b | c | d | e | f | g | | h |
| FRS 503 | 086 462 | 220 998 | 500 | Rp 3/8 | 75 | 115 | 24 | 143 | G 1/4 | G 1/4 | G 1/8 | 225 | 0.60 |
| FRS 505 | 070 383 | 211 817 | 500 | Rp 1/2 | 75 | 115 | 24 | 143 | G 1/4 | G 1/4 | G 1/8 | 225 | 0.60 |
| FRS 507 | 070 391 | 220 999 | 500 | Rp 3/4 | 100 | 130 | 28 | 165 | G 1/4 | G 1/4 | G 1/8 | 245 | 1.00 |
| FRS 510 | 070 409 | 210 381 | 500 | Rp 1 | 110 | 145 | 33 | 190 | G 1/4 | G 1/4 | G 1/8 | 310 | 1.20 |
| FRS 515 | 058 446 | 221 000 | 500 | Rp 1 1/2 | 150 | 195 | 40 | 250 | G 1/2 | G 1/4 | G 1/4 | 365 | 2.50 |
| FRS 520 | 058 628 | 208 237 | 500 | Rp 2 | 170 | 250 | 47 | 310 | G 1/2 | G 1/4 | G 1/4 | 450 | 3.50 |
| FRS 525 | 083 303 | | 500 | Rp 2 1/2 | 230 | 285 | 60 | 365 | G 1/2 | G 1/4 | G 1/4 | 550 | 6.00 |
| FRS 5040 | 065 144 | 214 474 | 500 | DN 40 | 200 | 195 | 65 | 280 | G 1/2 | G 1/4 | G 1/4 | 395 | 3.50 |
| FRS 5050 | 065 151 | 183 600 | 500 | DN 50 | 230 | 250 | 75 | 340 | G 1/2 | G 1/4 | G 1/4 | 480 | 5.00 |
| FRS 5065 | 058 792 | 183 930 | 500 | DN 65 | 290 | 285 | 95 | 405 | G 1/2 | G 1/4 | G 1/4 | 590 | 7.50 |
| FRS 5080 | 079 681 | 183 940 | 500 | DN 80 | 310 | 285 | 95 | 405 | G 1/2 | G 1/4 | G 1/4 | 590 | 10.00 |
| FRS 5100 | 082 552 | 211 019 | 500 | DN 100 | 350 | 350 | 105 | 495 | G 1/2 | G 1/4 | G 1/4 | 760 | 16.00 |
| FRS 5125 | 013 250 | 208 301 | 500 | DN 125 | 400 | 400 | 135 | 635 | G 1/2 | G 1/4 | G 1/4 | 1000 | 28.00 |
| FRS 5150 | 013 268 | 208 302 | 500 | DN 150 | 480 | 480 | 160 | 780 | G 1/2 | G 1/4 | G 1/4 | 1180 | 38.00 |

Functional description

Functions according to the force comparison principle between the force of:

- the adjustable setpoint spring
- the differential pressure at the working diaphragm
- the force due to weight of the moving parts

The adjustable spring acts with the force due to weight of the moving parts. The output pressure is adjusted depending on the pretension of the adjustable spring and the installation position.

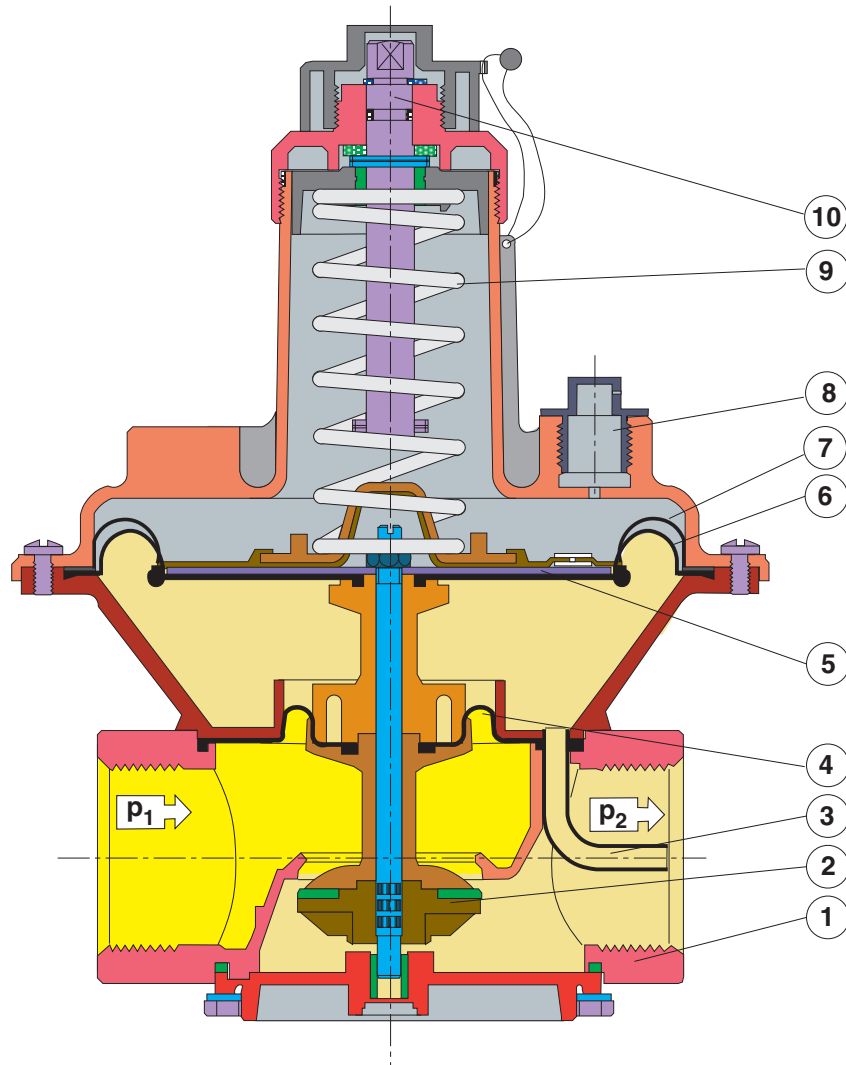
Instructions

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 resistant to deformation and cracks.

! Do not route condensate from lines into the pressure regulator.
Protect the pressure regulator from fouling by means of a suitable dirt trap.

! Do not apply combustion gas or combustion gas air mixtures to the installation chamber of the adjustable spring. Pressure regulators for this application on request only.

FRS 515 sectional drawing
Pressure regulator in operating position



- | | | | | | |
|---|---------------------|---|------------------------|----|-------------------|
| 1 | Housing | 4 | Compensation diaphragm | 7 | Safety diaphragm |
| 2 | Regulating cup | 5 | Diaphragm disk | 8 | Breathing plug |
| 3 | Pulse tap, internal | 6 | Working diaphragm | 9 | Setpoint spring |
| | | | | 10 | Adjustment device |

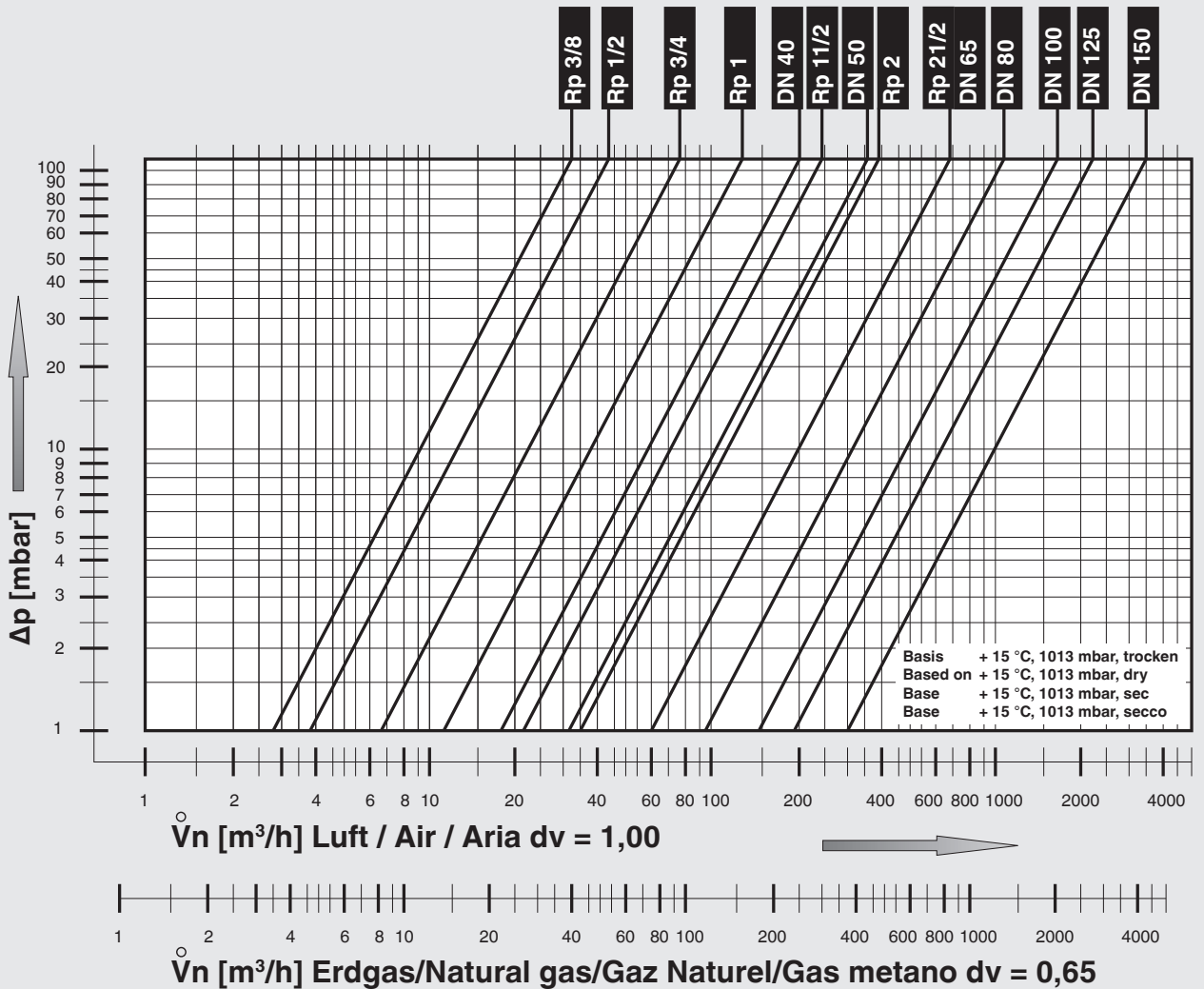
Equipment preselection, blocked pressure regulators

You can **preselect** the nominal diameter using the volumetric flow pressure drop characteristic of the pressure regulators in mechanically open state. The pressure drop between input pres-

sure p_1 and regulator output pressure p_2 in connection with the maximum volumetric flow V_{max} determine the nominal width of the pressure regulator. The operating point described by Δp_{min} and V_{max} is left of the nominal width of the pressure regulator to be selected.

The pressure drop over **blocked pressure regulators** is described by the "mechanically open" characteristic. The final determination is performed according to the dimension specified by the gas appliance manufacturer.

Volumetric flow pressure drop characteristic mechanically open



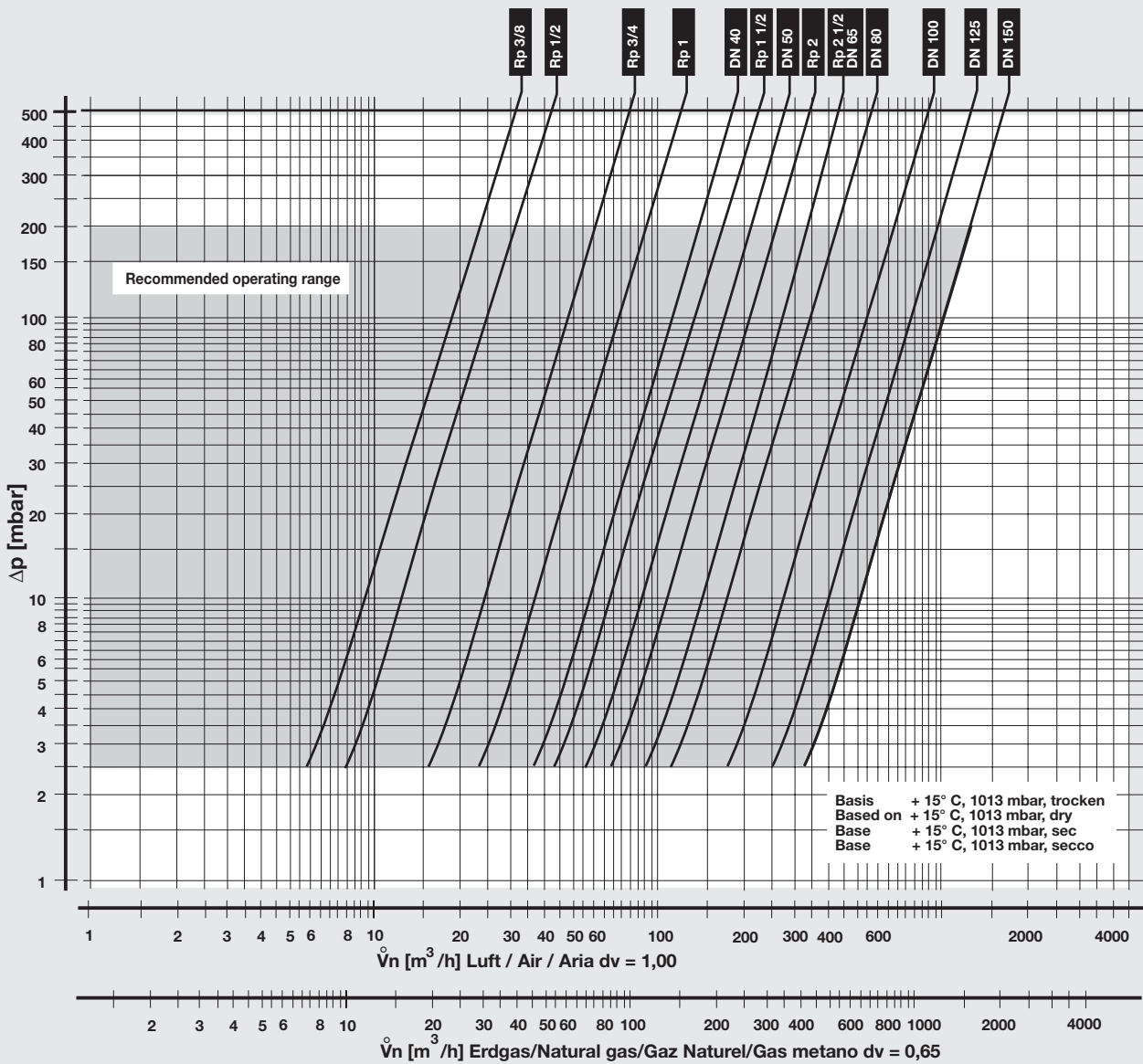
$$\dot{V}_{\text{verwendetes Gas/gas used/ gaz utilisé/gas utilizzato}} = \dot{V}_{\text{Luft/air/air/aria}} \times f$$

$$f = \frac{\text{Dichte Luft / Air density / Densité de l'air / Densità dell'aria}}{\text{spez. Ggewicht des verwendeten Gases / Spec. weight of gas used / poids spécifique du gaz utilisé / peso specifico del gas utilizzato}}$$

| Gasart Type of gas Type de gaz Tipo di gas | Dichte Density Densité Densità [kg/m³] | dv | f |
|---|--|------|------|
| Erdgas/Nat. Gas/ Gaz naturel/Gas metano | 0.81 | 0.65 | 1.24 |
| Stadtgas/City gas/ Gaz de ville/Gas città | 0.58 | 0.47 | 1.46 |
| Flüssiggas/LPG/ Gaz liquide/Gas liquido | 2.08 | 1.67 | 0.77 |
| Luft/Air/ Air/Aria | 1.24 | 1.00 | 1.00 |

Flow diagram in regulated state, where $p_2 = 20$ mbar

$$\dot{V}_{\min} = 0,05 \times \dot{V}_{\max}$$



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

Head Offices and Factory
Karl Dungs GmbH & Co. KG
Siemensstraße 6-10
D-73660 Urbach, Germany
Telephone +49 (0)7181-804-0
Fax +49 (0)7181-804-166

Postal address
Karl Dungs GmbH & Co. KG
Postfach 12 29
D-73602 Schorndorf, Germany
e-mail info@dungs.com
Internet www.dungs.com