R - RF

Regulators for gas
with filter and safety diaphragm

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Contents

Description

The R type is a regulator for gas pipelines according to EN 88. It can be equipped with an integrated filter (type RF) according to DIN3386. This device is suitable for supplying clean gas at stable pressure to all the devices downstream.

Features

The regulators are made of aluminum alloy die-cast.

They are equipped with adjustable spring, so that outlet pressure can be precisely adjusted on site.

Regulators can also be equipped with a filter element with a very high holding capacity of dust and impurities (filtration grade<50µm). Filter structure consists of a steel support frame covered with a double-layer high-performance nonwoven made of polyolefin fibers. Thanks to that, moving parts of regulator and other devices downstream are fully protected.

Regulators are equipped with working and safety diaphragms, hence it is not necessary to connect outside the vent line.

The closing plate is balanced with a specific compensating diaphragm, resulting in a very stable outlet pressure.

The impulse line is integrated inside the regulator. Special versions with external impulse line are available on request.

Pipe connections meet group 2.

R - RF regulators have been designed to generate low pressure drop on high flow.

The governors have the ability to lock up when there is no flow.

Suitable for use with air and non-aggressive gases included in the 1, 2 and 3 families (EN 437). Special versions for aggressive gases on request (Biogas, COG).

Provided with pressure test points on two sides in the inlet (after the filter cartridge) and outlet chamber to connect manometers, pressure switches or other gas equipments.

All components are designed to withstand any mechanical, chemical and thermal condition occurring during typical service. Effective impregnation and surface treatments have been used to improve mechanical sturdiness, sealing and resistance to corrosion of components.

Regulators are 100% tested and fully warranted.

Functioning and application

A regulator is a device to maintain a stable pressure at the outlet side, despite of inlet pressure and/or gas flow rate changes. The outlet pressure pushes on the working diaphragm, acting against the spring. The disc moves until force of spring and outlet pressure are equal. If the flow decreases, e. g. because a downstream valve has been closed, a small increase in outlet pressure occurs, so the disc moves to reach a new position, balanced between outlet pressure and spring. If higher outlet pressure is needed, the regulating screw must be tightened, increasing the force of spring. Variation of inlet pressure does not affect outlet pressure because the closing plate is compensated with a compensating diaphragm. If the flow stops, the outlet pressure increases just slightly, as the disc has a gasket and closes perfectly the passage.

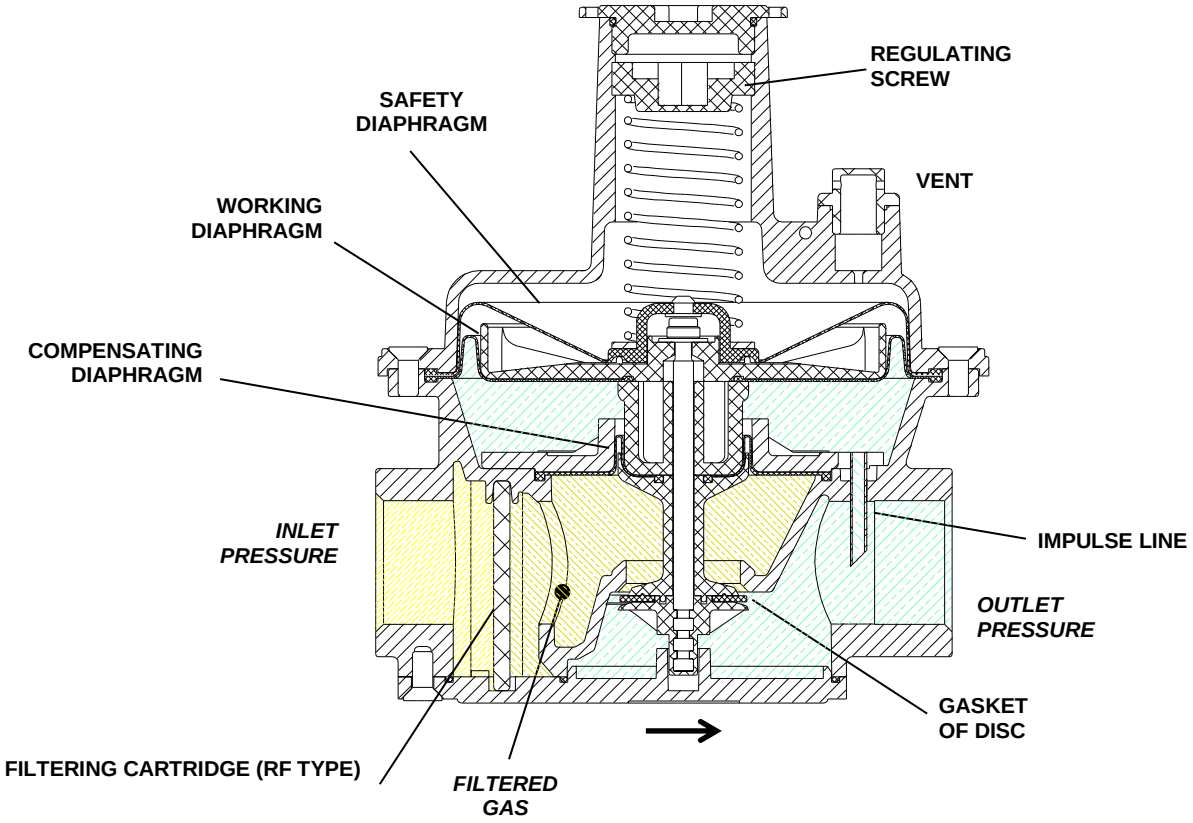


Fig.1

This device is normally installed in gas trains, industrial applications and gas firing systems.

Figure 2 shows an example of installation with other Elektrogas devices.

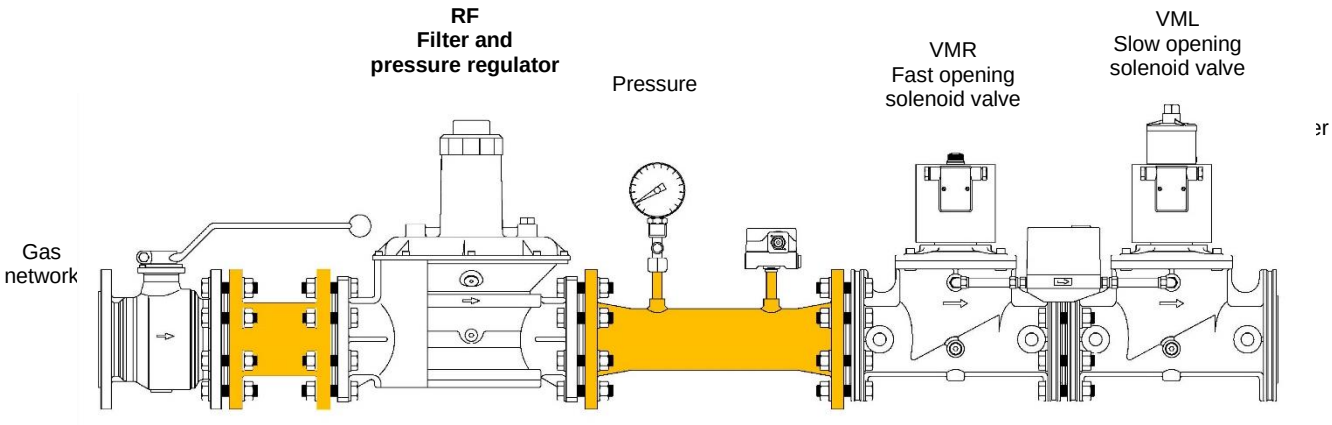


Fig.2

Technical specifications

Tab. 1

Connections	Gas threaded F/F ISO 7-1 from Rp1/2 to Rp2 or ANSI-ASME B1.20 from 3/4"NPT to 2"NPT Flanged PN16 – ISO 7005 DN40 – DN100
Ambient temperature	-15°C ... +60°C
Inlet-Outlet pressure	**R or RF models** Inlet pressure: Max 500mbar (50 KPa) or P(out) + 5mbar Testing pressure: max 750 mbar – outlet 500mbar **Regulating class:** Class A - EN88 (±1mbar or ±15% of set value) **For Outlet pressure see Tab. 2**
Lock up pressure	SG30 for lock-up (+7.5mbar or +30% of set value)
Flow capacity	see charts
Filtration grade	RF (filtering cartridge): ≤50 µm
Installation	1/2"-2": horizontal (with settable spring upward) or vertical in pipeline. 2 1/2"-3"-4": only horizontal in pipeline (with settable spring upward).
Gas type	Air, natural gas, town gas, LPG (gaseous), gases of families 1,2,3 (EN437).
Materials in contact with gas	Aluminum alloy, Brass, Stainless steel, Plated steel, Polyamide, Anaerobic adhesive Nitrile rubber (NBR), Fluor elastomer (FPM), Polytetrafluoroethylene (PTFE)
Specifications of J version for biogas or COG	Seals made of Fluor elastomer (FPM) instead of NBR

OUTLET PRESSURE RANGE (mbar):

Tab. 2

Spring color	*Model*	R..1	R..2 R..3	R..35	R..4 R..6	R..7 R..8 R..9
Green	**…A..**	5-13	9-16	5-13	9-18	5-13
Red	**…B..**	7-20	13-26	7-20	15-30	7-20
Neutral	**…C..**	10-30	20-40	10-30	25,60	10-30
Yellow	**…D..**	25-70	30-60	25-70	50-120	25-70
Violet	**…E..**	60-150	50-100	60-150	100-250	60-150
Orange	**…F..**	-	80-160	140-300		140-300
Blue	**…G..**	-	125-250		-	-

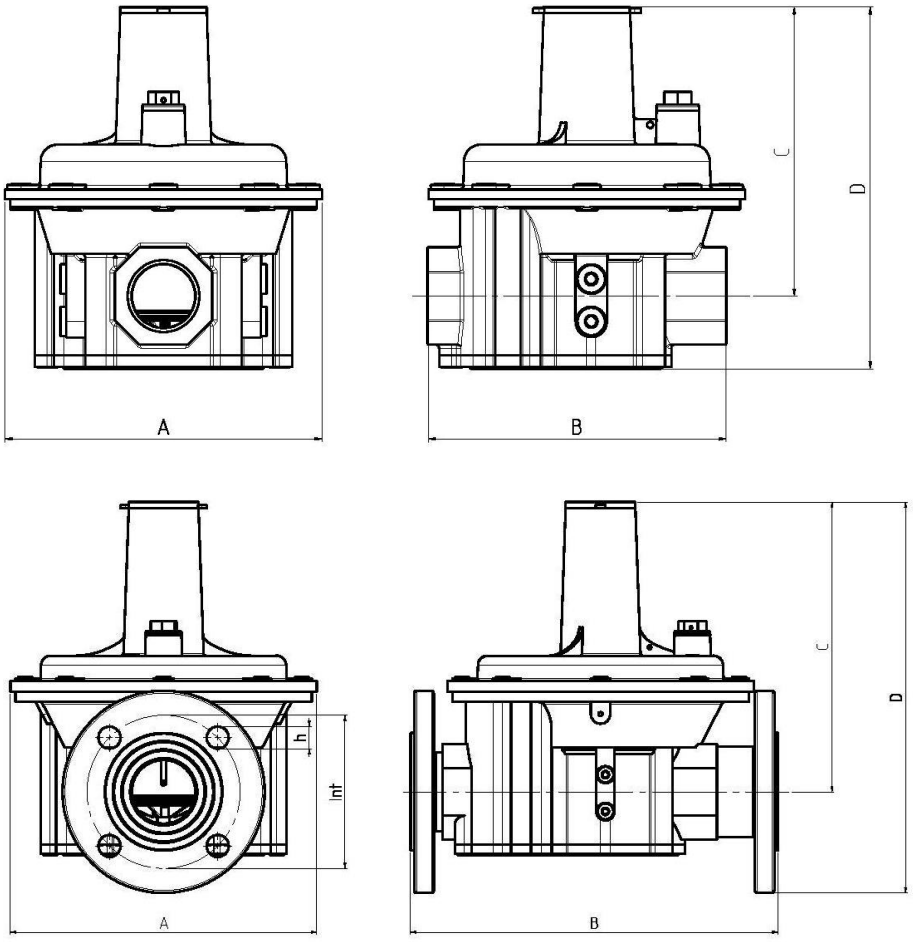


Fig.3

Tab. 3

Model	Connection	Overall dimensions [mm]						Weight (Kg)
		A	B	C	D	Int	h	
R..1	Rp ½”	96	105	111	142	-	-	0,70
R..2	Rp ¾”	150	141.5	137	171	-	-	1,45
R..3	Rp 1”	150	141.5	137	171	-	-	1,44
R..35	Rp 1 ¼”	192	194	214	255	-	-	3,10
R..4	Rp 1 ½”	250	236	267	316	-	-	5,00
R..6	Rp 2”	250	236	267	316	-	-	5,00
R..4F[1]	DN40	250	311	214	285	110	4x18	7,30
R..6F[1]	DN50	250	352	267	350	125	4x18	7,50
R..7	DN65	325	430	335	430	145	4x18	12,5
R..8	DN80	325	430	335	430	160	8x18	12,5
R..9	DN100	325	430	335	430	180	8x18	12,5

([1]) with flanged connection kit mounted

Flow chart with disc blocked in open position

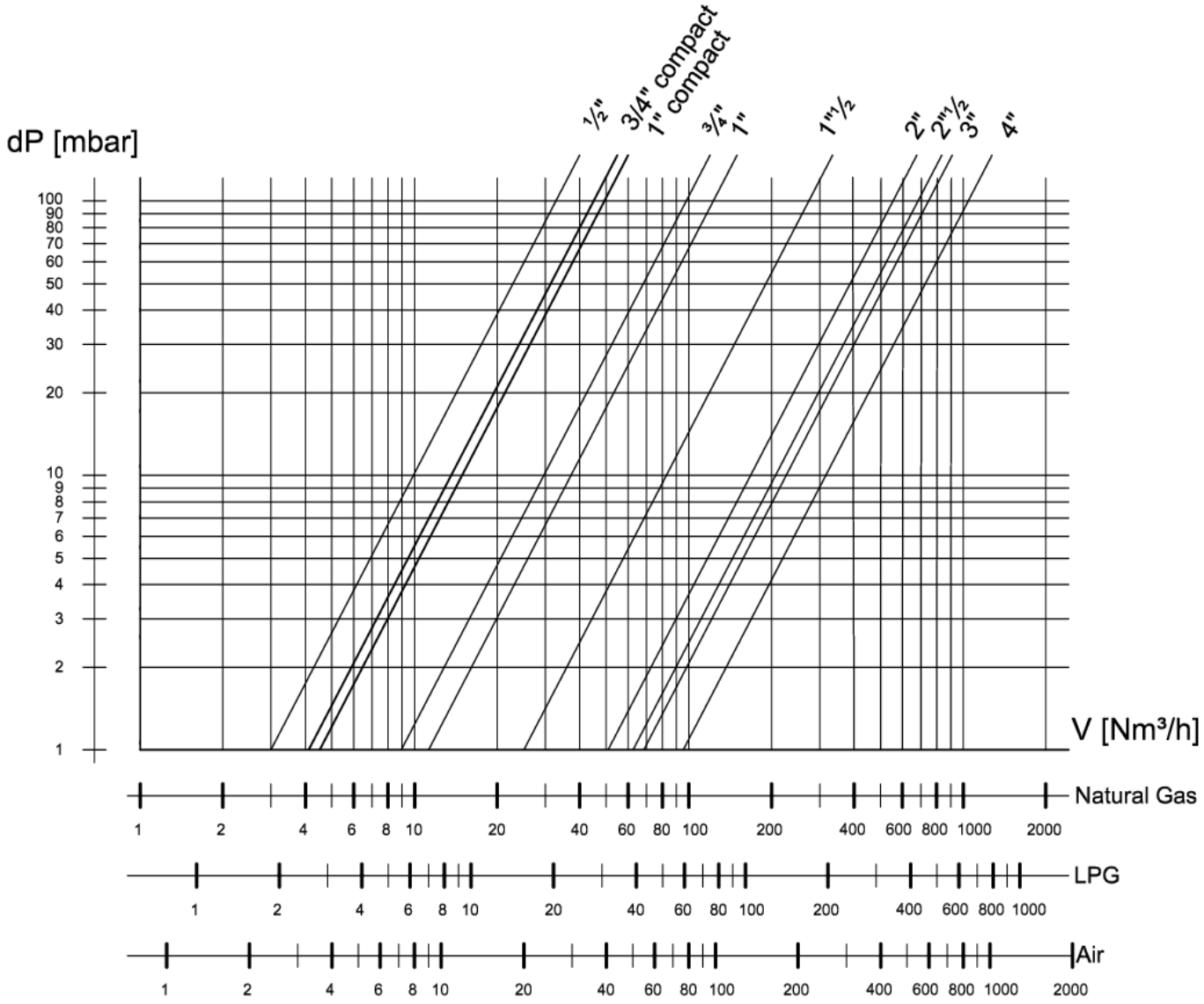


Fig. 4

Conversion of flow from air to other gases

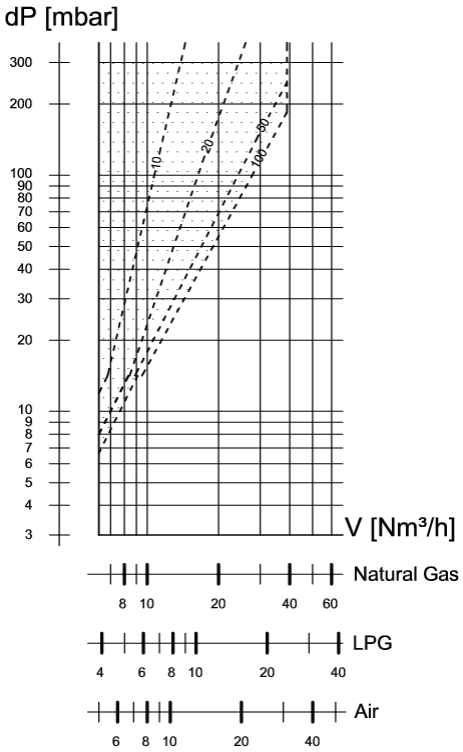
$$V_{GAS} = k \cdot V_{AIR}$$

Tab. 3

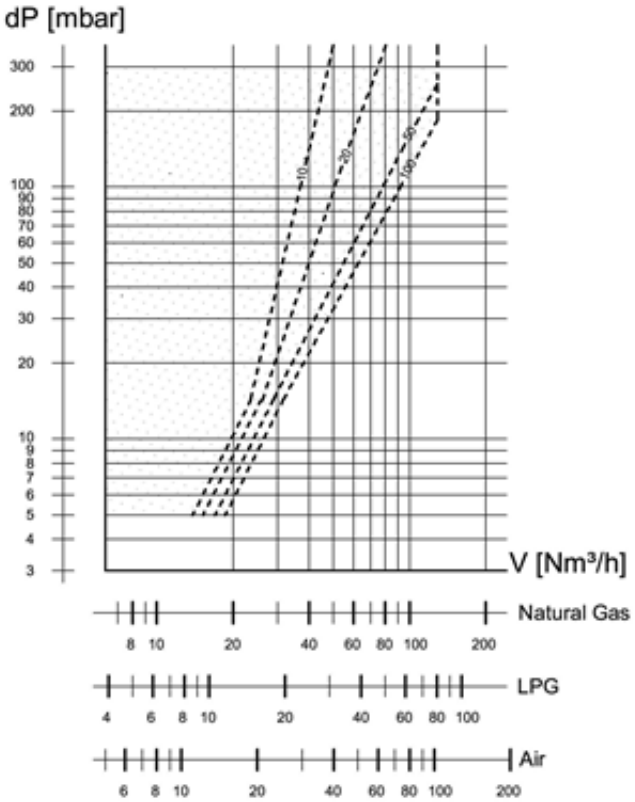
Gas type	Specific gravity **ρ** (typical value) [Kg/m³]	$k = \sqrt{\frac{125}{\rho_{GAS}}}$
Natural gas	0,80	1,25
LPG	2,08	0,77
Air	1,25	1,00

Maximum Flow chart in operation

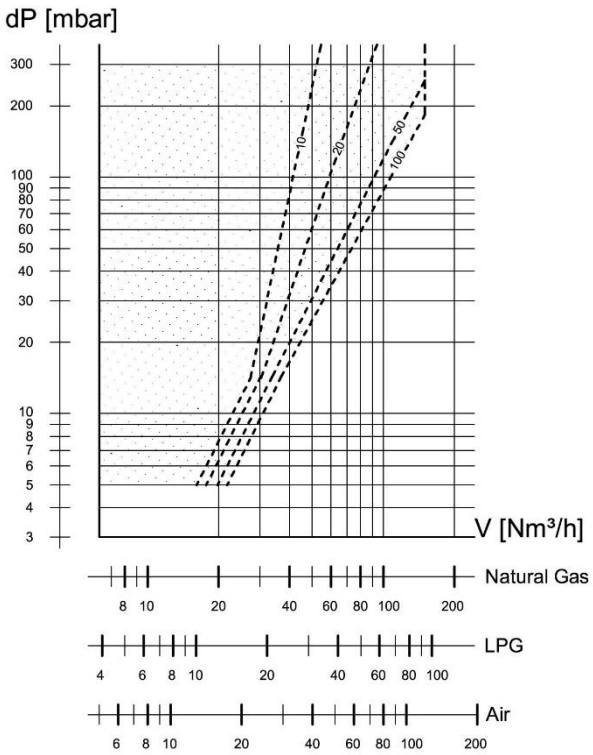
1/2”



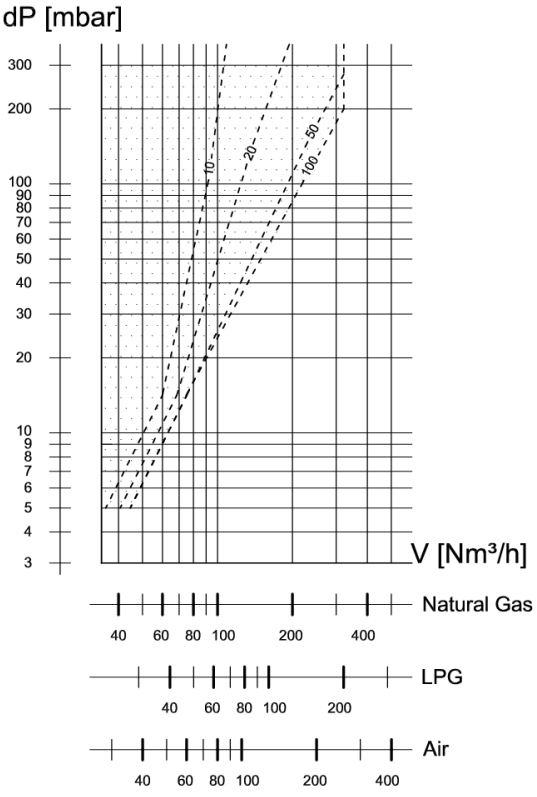
3/4”



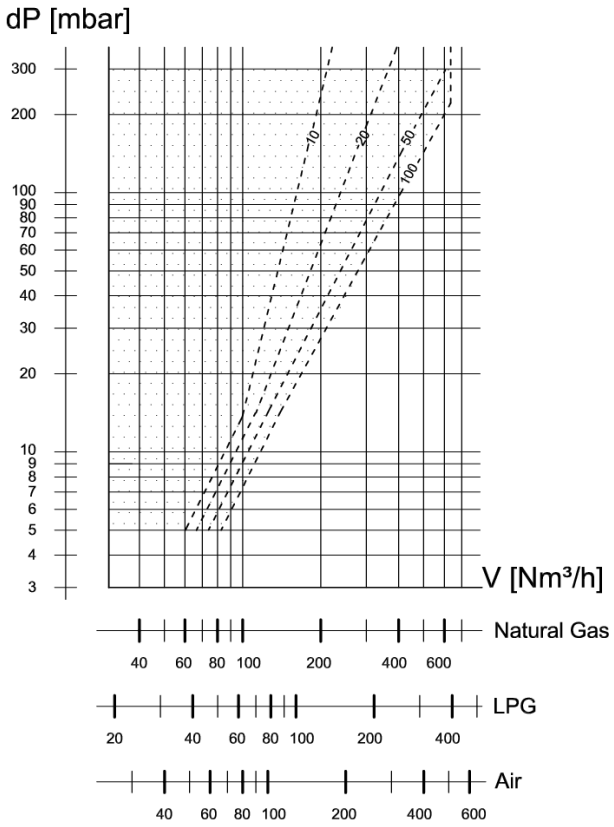
1”



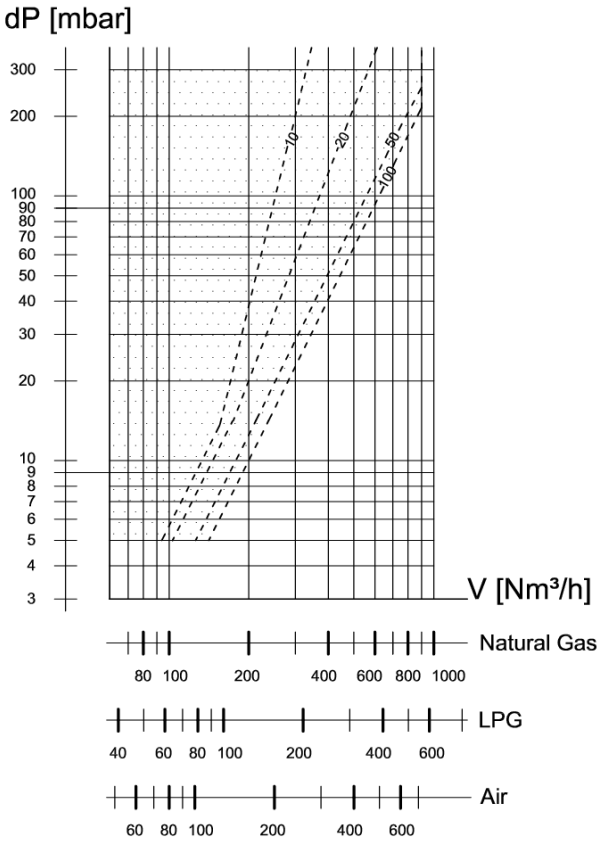
1 1/4”



1 1/2” - 2”



2 1/2” – 3”



4”

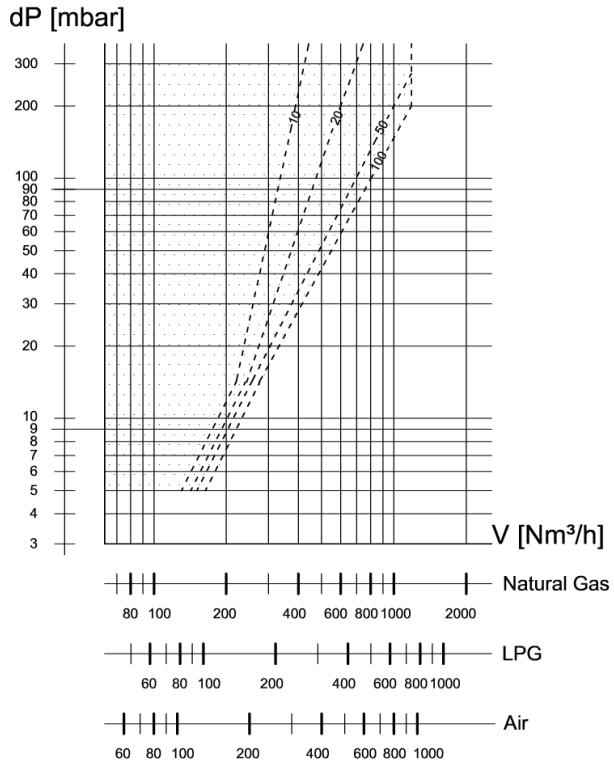


Fig. 5

V_{min} < 10% V_{max}

Selection

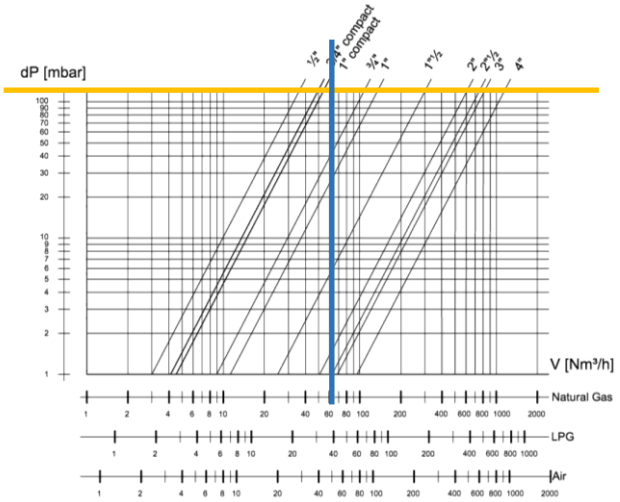
To select a regulator consider:

- **gaseous media (natural gas, LPG,…)**
- **inlet and outlet pressure**
- **maximum flow**

The regulator will work properly, if inlet pressure is higher than outlet pressure and pressure drop in an adequate margin. The pressure drop can be read from maximum flow chart. If desired outlet pressure curve is not present, consider the next lower curve.
To avoid noise and excessive turbulence, gas speed at outlet pipe should be not higher than 30 Nm³/s, otherwise the next bigger size of outlet pipe should be chosen.

Example:

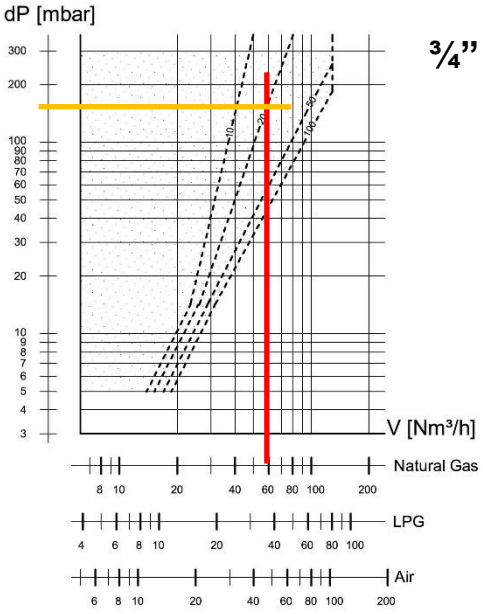
Select a regulator :
- for Natural Gas (CH_4)
- inlet pressure 170mbar
- outlet pressure 40 mbar
- max flow 60 Nm^3/h



Considering inlet and outlet pressure, the available pressure drop is:
170 – 40 = 130mbar.

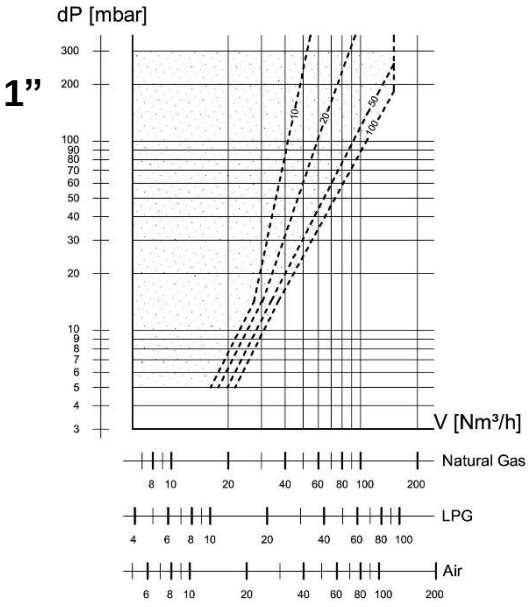
In Flow chart with disc in open position (fig. 4) we see the maximum theoretical flow of a regulator for the available pressure drop, so we can make a first selection: At least we need a regulator ¾" or higher.

Now we consider the maximum flow of a regulator ¾" in operation (Fig.5 - ¾").



As the graph with outlet pressure 40mbar is not present, we consider the lower one, 20mbar curve.

Considering the curve for ¾", we read a requested pressure drop of approximately 150mbar. As the available pressure drop is lower, we need a bigger regulator.



Making similar consideration with maximum flow chart of a regulator 1", we read a pressure drop of 100mbar. It is recommended to consider a working margin of at least 20%:
So available pressure drop must be higher than:
100 x 120%= 120mbar

With 1", maximum pressure drop is higher so the regulator will work properly (tolerances prescribed by EN 88-class A).

Finally we calculate the gas speed at outlet to avoid noise:
Pipe 1", internal diameter 28mm, speed 25 Nm/s
The regulator will work well.

Ordering information

	RF	3	B	-

Regulator type
R = regulator
RF = regulator with filter

Connections size

1	Rp 1/2
2	Rp 3/4
2N	3/4” NPT
3	Rp 1
3N	1” NPT
35	Rp 1 1/4
4	Rp 1 1/2
4N	1 1/2” NPT
6	Rp 2
6N	2” NPT
4F	DN40
6F	DN50
7	DN65
8	DN80
9	DN100

Outlet pressure (mbar)

	R..1	R..2-3	R..35	R..4-6 4F-6F	R..7-8-9
A	5-13	9-16	5–13	9-18	5–13
B	7-20	13-26	7–20	15-30	7–20
C	10-30	20-40	10–30	25-60	10–30
D	25-70	30-60	25–70	50-120	25–70
E	60-150	50-100	60–150	100-250	60–150
F		80-160	140–300		140–300
G		125-250			

Special Version

-	standard
.J	version for bio and coke gas

Example: **RF3B**: regulator with connection Rp1, filtering cartridge and outlet pressure 13-26mbar

Special versions

Regulators can be supplied in special versions for aggressive gases such as Biogas and COG (version J), see Tab. 2 for technical features. It is recommended to check compatibility of gas contents and regulator materials before installation.

Regulators can be supplied in special versions for higher inlet pressure (1 bar or 2 bar), contact our sales office for further details.

Design, installation and service

To assure a proper and safe operation, as well as a long operating life of the regulator, consider the following recommendations:

- ✓ Ensure that all the features of your system comply with the specifications of the regulator (gas type, operating pressure, flow rate, ambient temperature, etc.).
- ✓ Up to size 2" the regulator may be mounted with spring in horizontal or vertical position (dome upward). In the event of vertical pipe, the flow direction should be from bottom to top. **Regulators larger than 2" can be mounted only with spring in vertical position** (horizontal pipe) and dome upward.
- ✓ Make sure all operations are performed by qualified technicians only and in compliance with local and national codes.
- ✓ After removing the end caps, make sure no foreign objects will enter the regulator during handling or installation (e. g. chips or excessive sealing agent). Handle the device with proper tools.
- ✓ Perform leak and functional tests after mounting (see Tab. 1 for max. testing pressure).
- ✓ To adjust the spring, remove the protection cap and turn the adjusting screw with an Allen key. Turning clockwise the outlet pressure will increase, counterclockwise it will decrease. After adjustment is finished, re-mount the protection cap.
- ✓ To change the spring: Remove the protective cap and the adjusting screw, remove the original spring and put in the new one, reassemble in reverse order and set the new spring. Stick on the label with the new outlet pressure.
- ✓ The regulator needs no maintenance, only the filter can be cleaned or replaced. An external and functional check at least once a year is recommended, twice in case of biogas or COG.
- ✓ To clean or replace the filter:
    - Shut off the gas.
    - decompress the spring, turning counter-clockwise the adjusting screw to the minimum position.
    - open the inferior cover using an Allen key.
    - extract the filtering cartridge or the metallic filter. Pay attention to possible dirt before the filter, it must be removed before removing the cartridge.
    - clean the cartridge with compressed air or replace it with a new identical one. Due to the features of the filtering cartridge material, compressed air cannot clean it perfectly. As dirt is blocked inside fibbers, only a new cartridge can give optimal performance.
    - remount every part in reverse order. Pay attention to insert the rod of the closing element into the hole of the cover during reassembly.
    - Perform leak test.
    - set the outlet pressure to the correct value and perform a functional test
- ✓ Due to rubber seals aging and to ensure safe operation, we recommend the replacement of the device after 10 years from the date of manufacture printed on the product.
- ✓ This device must be installed in compliance with the rules in force.

For more details see the Installation and Service Instructions.

Standards and approvals

The regulators are designed and manufactured according to European standard EN 88-1.

Quality Management System is certified according to UNI EN ISO 9001.

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