

Gas Appliance Pressure Regulators with integrated gas filter

FRI/6 Series

DUNGS®
Combustion Controls



CSA Certified

- ANSI Z21.18 / CSA 6.3
- Gas Appliance Pressure Regulator
- File # 1135455

European Community

- EN 88-1 for EN 746-2 applications only

UL Unlisted Component

- File # MH 16727 (sp)

Commonwealth of Massachusetts Approved Product

- Approval code G1-1107-35
- Gas pressure regulator and gas inline filter

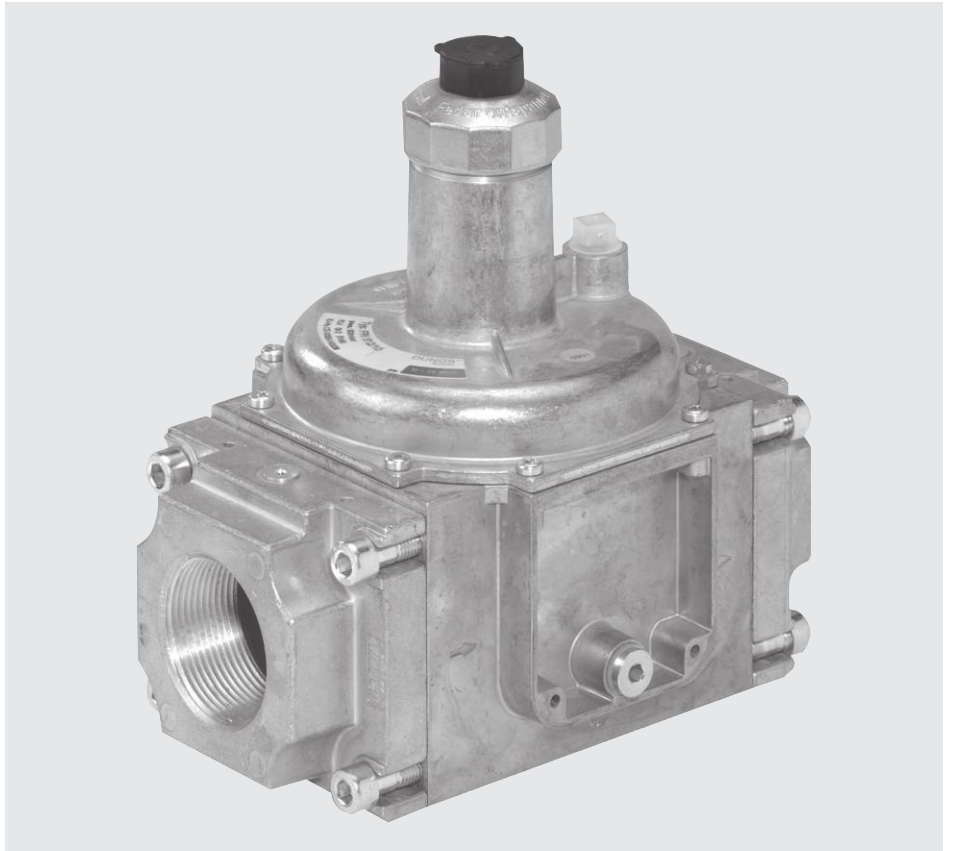
US, Canadian and EU Models

- FRI 705/6
- FRI 707/6
- FRI 710/6
- FRI 712/6
- 1/2 in. NPT - 2 in. NPT
- Rp 1/2 - Rp 2

Codes and Standards

This product is intended for installations covered by but not limited to NFPA 86, NFPA 54, ANSI Z83.4, ANSI Z83.18, ANSI Z21.13, UL 795, CSD-1, CSA B149.1, CSA B149.3 and CSA B149.6.

DUNGS is an ISO 9001 manufacturing facility.



Description

The FRI/6 balancing type pressure regulator combines a pressure regulator and a 50 micron gas filter in one housing. Various combinations are possible using the FRI/6 with the most of the DMV shutoff valves for a compact, modular system:

- Stand-alone pressure regulator and gas filter with threaded flanges, or direct mount to DMV sizes 701, 702 and 703 series safety shutoff valves.
- Regulator output pressure monitored by direct mounting an A2 type pressure switch. Additional ports to sense inlet and outlet pressure are also located on the threaded flanges.
- Heavy duty diaphragm construction for durability and strength.
- Steady, precise and instantaneous regulation of the outlet pressure.

- Lock-up type regulator (see page 2 and 3 for details).
- Factory installed vent limiter. Review applicable codes for vent line requirements.

Application

The FRI/6 pressure regulator is recommended for industrial and commercial heating applications and is suitable for natural gas, propane, butane, air and inert gases. Suitable for up to 0.1 % by volume, dry H₂S.

A "dry" gas has a dew point lower than +15 °F and its relative humidity is less than 60 %.

FRI/6 Balancing type, spring-loaded pressure regulator with adjustable setpoint spring. Internal sensor for regulating output pressure. Integrated 50 micron gas filter. Direct mounting of A2 pressure switch possible.

Specifications

Body sizes Flanges	FRI 705/6 - FRI 707/6 1/2" - 1" NPT or Rp	FRI 710/6 - 712/6 1" - 2" NPT or Rp
Max. operating pressure	7 PSI (500 mbar) UL and CE 5 PSI (350 mbar) CSA	
Max. body pressure	15 PSI (1000 mbar)	
Input pressure range	2 in. W.C. to 200 in. W.C. (5 mbar to 500 mbar)	
Output pressure range	1 in. W.C. to 60 in. W.C. (2.5 mbar to 150 mbar); adjustable with different springs Actual outlet pressure is +/- 15 % of set pressure (15 % hysteresis/droop)	
Materials in contact with gas	Housing: Seals and diaphragms:	Aluminium NBR-based rubber
Ambient temperature rating	+5 °F to +150 °F for up to 7 PSI for regulating behavior (+/- 10 % of setpoint). -40 °F to +150 °F: Diaphragms are suitable for the low temperature, but there may be out of range regulating behavior. CSA Certified for -40 °F to +150 °F for up to 5 PSI. -15 °C to +70 °C applies to the CE Marking.	
Installation position	Regulator dome from vertically upright to lying horizontally	
Test ports/ Pressure switch mounting ports	One G 1/8 ISO 228 test ports on each side of regulator, sensing downstream pressure, and one on each inlet and outlet flange (if used as a stand alone regulator).	
Gas filter (standard)	50 micron; replaceable	
Vent line / Back loading port/ Breathing plug	Vent line connection is G 1/4 ISO 228. The FRI also has a factory installed vent limiter, which limits the escape of gas to less than 0.5 CFH @ 5 PSI in case atmospheric diaphragm ruptures. Venting required unless otherwise accepted by the authority having jurisdiction.	
Hysteresis/Droop	Hysteresis is less than 10 % for up to 7 PSI inlet. Average droop at 20:1 turndown is 10 % for up to 7 PSI.	

Lock-up Rating Parameters

Per ANSI Z21.80, lock-up is defined as an outlet pressure not more than 150 % or 5 in. W.C, whichever is greater, above the setpoint after a downstream safety shutoff valve closes with 2 seconds, and the two following conditions exists:

- 1) outlet pressure is set to the highest set point of the spring, and
- 2) the regulator is set to maximum capacity or flow at which the regulator will control lockup pressure within the acceptable limits.

This means that in a given application, a lockup greater than 150 % or 5 in. W.C could occur, depending out the

inlet pressure, the outlet pressure of the regulator, the flow rate of the regulator, and the pipe volume downstream the regulator and upstream the safety shutoff valve.

Per EN 88-1, lock-up is +30 % of the outlet pressure setting after downstream shutoff valve slowly closes within 30 seconds. Therefore, in a given application, a lockup greater than +30 % or 5 in. W.C could occur, depending out the inlet pressure, the outlet pressure of the regulator, the flow rate of the regulator, and the pipe volume downstream the regulator and upstream the safety shutoff valve.

If in a given application the lock-up pressure is too high, employing one or more of the following should reduce the lock-up pressure:

- 1) increase the size of the regulator.
- 2) increase the pipe volume downstream the regulator and upstream the safety shutoff valve.
- 3) decrease the inlet pressure.
- 4) decrease the outlet pressure.
- 5) reduce the flow rate.

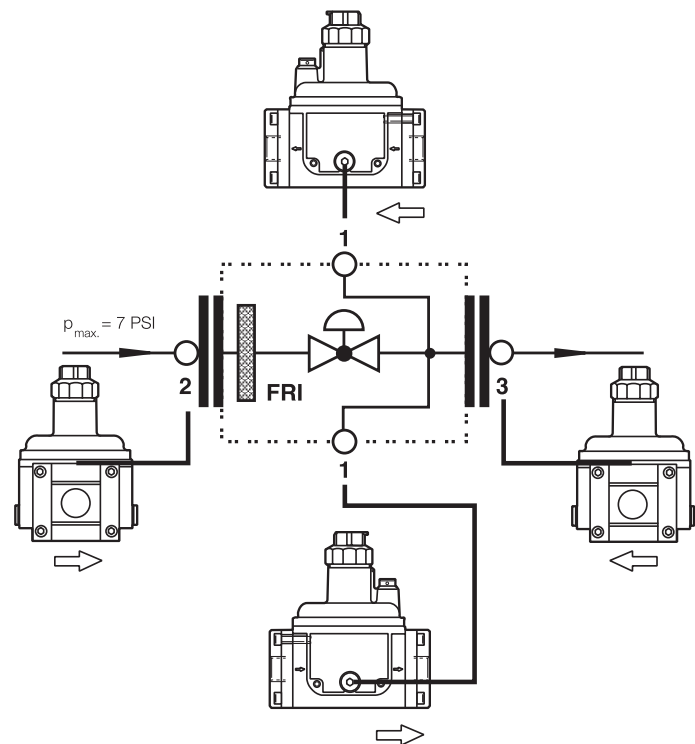
FRI pressure ports

1, 2, 3 (Ports 2 and 3 are located on flange)

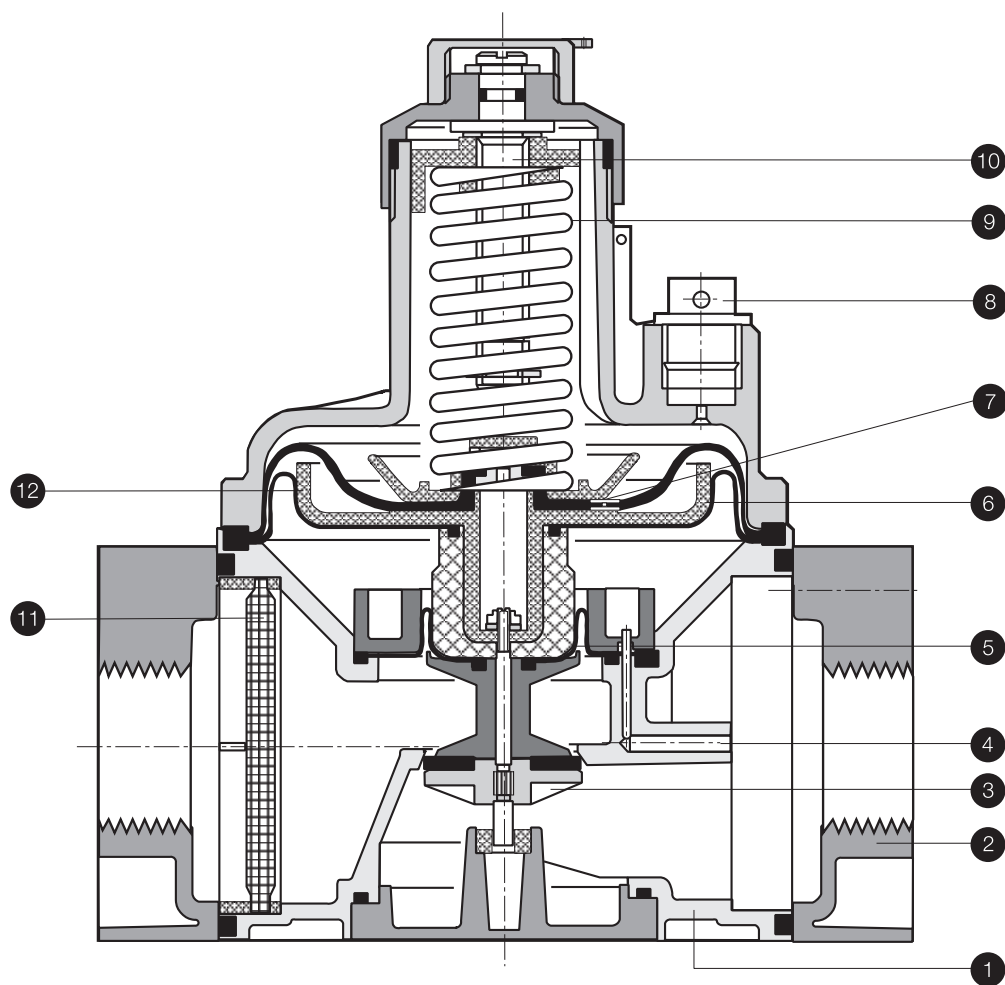
Port 1 is thread type G 1/8 as per DIN ISO 228

Ports 2 and 3 are thread type G 1/8 as per DIN ISO 228

All ports can be used with accessories or A2 pressure switches.



FRI sectional drawing
Shown in closed position

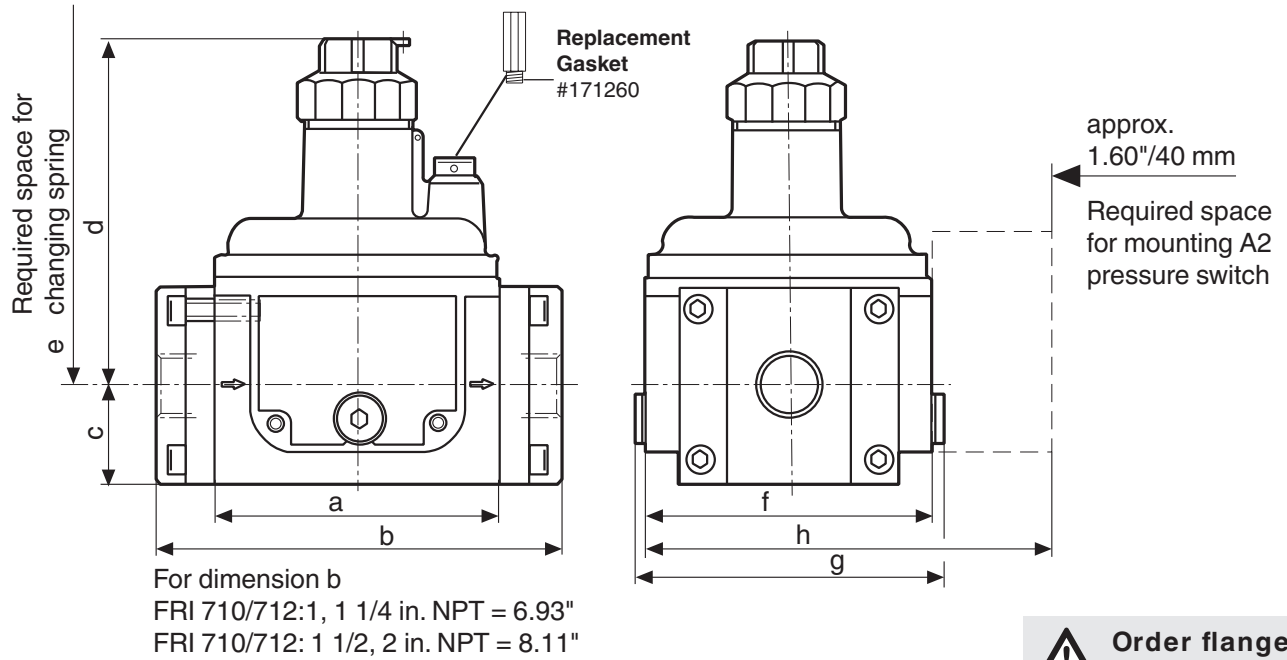


- | | | | | | |
|---|-------------------------|---|-----------------------|----|-------------------------|
| 1 | Housing | 6 | Atmospheric diaphragm | 9 | Setpoint spring |
| 2 | Threaded flange | 7 | Vent limiter | 10 | Setpoint adjuster shaft |
| 3 | Regulating disc. | 8 | Vent line / | 11 | Gas filter |
| 4 | Internal impulse sensor | | Backloading port / | 12 | Diaphragm plate |
| 5 | Balancing diaphragm | | Breathing plug | | |

Spring #	1	2	3	4	5	6	7	8	9
Spring Range (W.C.)	1 to 3.6	2 to 5	2.8 to 8	4 to 12	10 to 22	12 to 28	24 to 44	40 to 60	60 to 80
Spring color	brown Not CSA	white	orange	blue Standard	red	yellow	black	pink	grey Not CSA
FRI 705/6 - 707/6	229817	229818	229820	229821	229822	229823	229824	229825	229826
FRI 710/6 - 712/6	229842	229843	229844	229845	229846	229847	229848	229849	229850

Dimensions inch (mm)

NPT Field mountable adapter
G 1/4 to 1/4" NPT Part # 231944



Order flanges separately.

Type	Mounts to DMV Type	NPT Flanges	Order No.	Dimensions [inch] Dimensions [mm]								Weight [lbs] [kg]
				a	b	c	d	e	f	g	h	
FRI 705/6	DMV 701	1/2" - 1"	230472	3.6 92	5.6 141	1.3 33	6.0 152	7.7 195	3.8 96	4.1 104	5.5 139	2.0 0,9
FRI 707/6	DMV 701	1/2" - 1"	230473	3.6 92	5.6 141	1.3 33	6.0 152	7.7 195	3.8 96	4.1 104	5.5 139	2.0 0,9
FRI 710/6	DMV 702/3	1" - 2"	230474	4.9 124	6.9/8.1 176/206	1.8 45	6.9 175	9.3 235	5.0 126	5.3 135	6.7 169	3.5 1,6
FRI 712/6	DMV 702/3	1" - 2"	230475	4.9 124	6.9/8.1 176/206	1.8 45	6.9 175	9.3 235	5.0 126	5.3 135	6.7 169	3.5 1,6

Type	Mounts to DMV Type	Flange NPT	Order No.
FRI 705/6 -FRI 707/6	DMV 701	1/2"	222371
FRI 705/6 -FRI 707/6	DMV 701	3/4"	222368
FRI 705/6 -FRI 707/6	DMV 701	1"	221999
FRI 710/6 -FRI 712/6	DMV 702 or DMV 703	1"	222369
FRI 710/6 -FRI 712/6	DMV 702 or DMV 703	1 1/4"	222370
FRI 710/6 -FRI 712/6	DMV 702 or DMV 703	1 1/2"	222003
FRI 710/6 -FRI 712/6	DMV 702 or DMV 703	2"	221997

Stand alone mounting kit (one kit included in each FRI box)

Order No.

Includes

FRI 705/6 & FRI 707/6	224093	Consists of 8 bolts: M6 x 30; 2 x o-rings.
FRI 710/6 & FRI 712/6	224094	Consists of 8 bolts: M8 x 35 for 1" NPT and 1 1/4" NPT, and 8 bolts: M8 x 40 for 1 1/2" NPT and 2". 2 o-rings

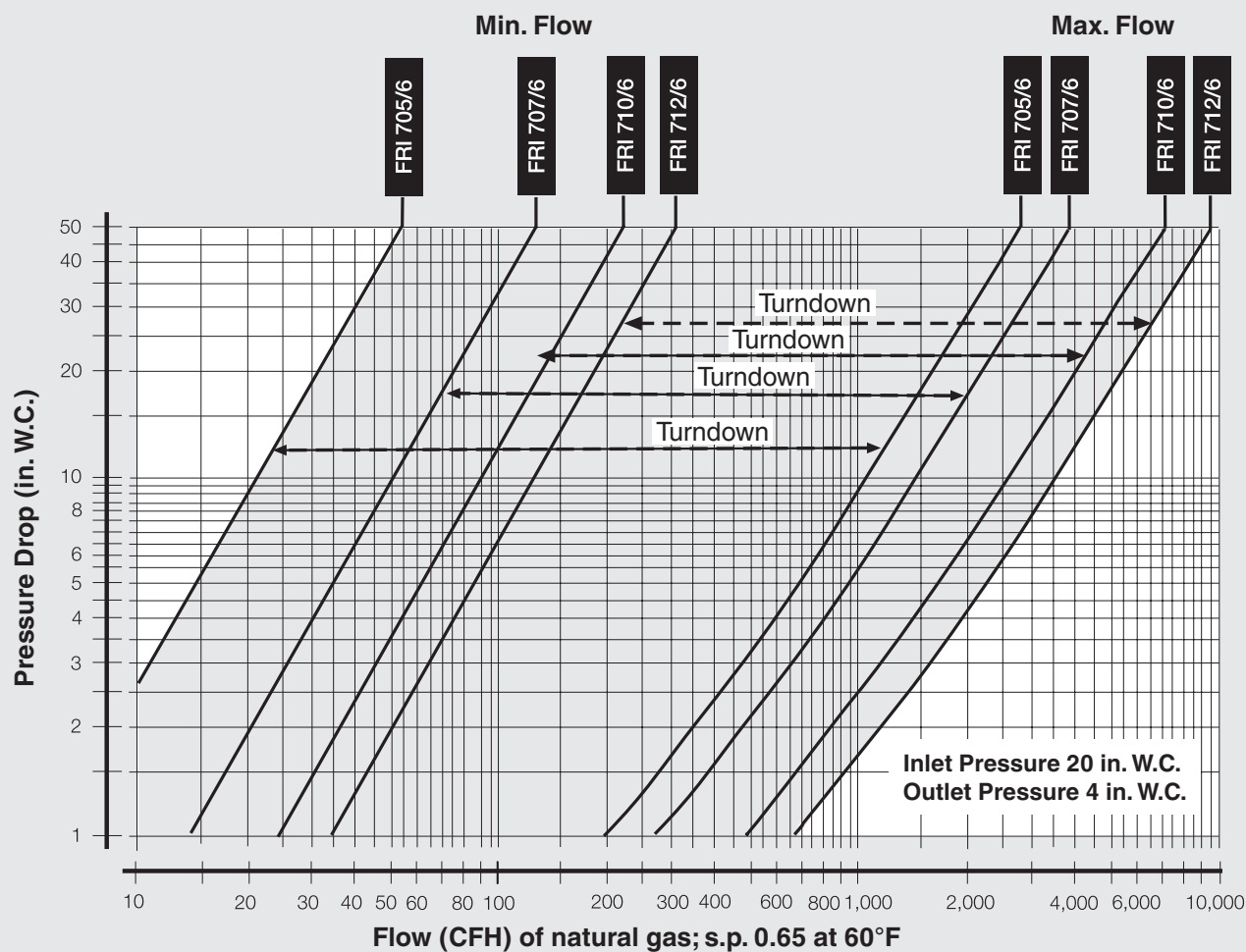
DMV mounting kit (one kit included in each FRI box)

Order No.

Includes

FRI 705/707 on DMV 701	219967	4 bolts: M6 x 30 and 1 o-ring.
FRI 710/6 & FRI 712/6	219968	4 bolts: M8 x 45 and 1 o-ring

Regulator turndown characteristics
with gas filter / in regulated state.
Inlet pressure is 20 in. W.C. and outlet is set to 4 in. W.C.



Approximate flow increase in CFH (natural gas) when removing the integral filter from the FRI.

At a pressure drop of:	FRI 705/6	FRI 707/6	FRI 710/6	FRI 712/6
0.8 in. W.C.	25 CFH	50 CFH	390 CFH	765 CFH
2.0 in. W.C.	35 CFH	70 CFH	480 CFH	940 CFH
4.0 in. W.C.	35 CFH	75 CFH	575 CFH	1180 CFH
8.0 in. W.C.	35 CFH	80 CFH	700 CFH	1510 CFH

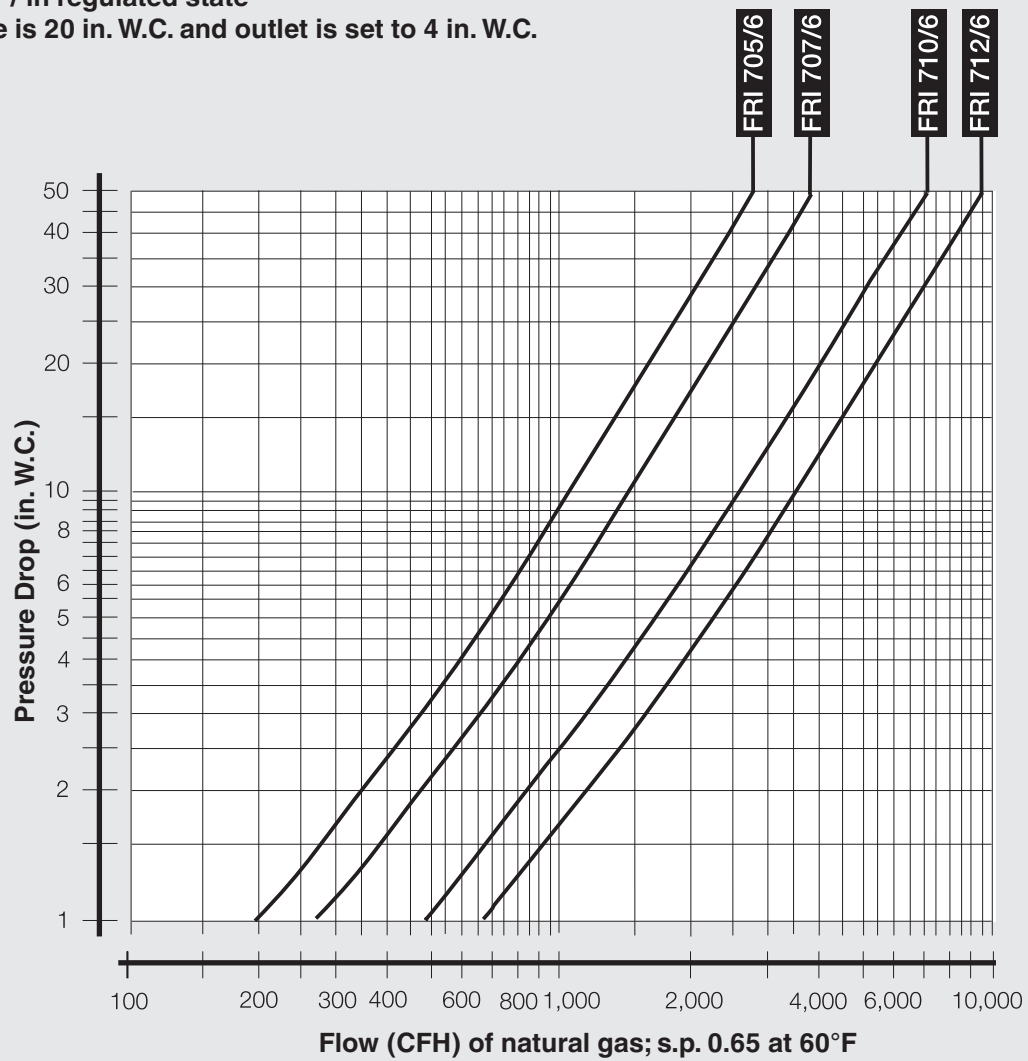
Determining equivalent flow through valves using another gas

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

$$f = \sqrt{\frac{\text{Density of Natural gas}}{\text{Density of gas used}}}$$

Type of gas	Density [kg/m³]	s.g.	f
Natural gas	0.81	0.65	1.00
Butane	2.39	1.95	0.58
Propane	1.86	1.50	0.66
Air	1.24	1.00	0.80

**Flow curve for sizing regulator
with gas filter / in regulated state**
Inlet pressure is 20 in. W.C. and outlet is set to 4 in. W.C.



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

**Gas Appliance Pressure Regulators
with integrated gas filter**

FRI/6 Series



Karl Dungs, Inc.
3890 Pheasant Ridge Drive NE
Suite 150
Blaine, MN 55449, U.S.A.
Phone 763 582-1700
Fax 763 582-1799
e-mail info@karldungsusa.com
Internet <http://www.dungs.com/usa/>

Karl Dungs GmbH & Co. KG
P.O. Box 12 29
D-73602 Schorndorf, Germany
Phone +49 (0)7181-804-0
Fax +49 (0)7181-804-166
e-mail info@dungs.com
Internet <http://www.dungs.com>