

# Gas Appliance Pressure Regulators with integrated gas filter

## FRI/6 Series

**DUNGS**<sup>®</sup>  
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 H<sub>2</sub>S.

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                                       | FRI 705/6 - FRI 707/6   | FRI 710/6 - 712/6             |
| Flanges  | 1/2" - 1" NPT or Rp   | 1" - 2" NPT or Rp             |
| Max. operating pressure                          | 7 PSI (500 mbar) UL and CE<br>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);<br>adjustable with different springs<br>Actual outlet pressure is +/- 15 % of set pressure (15 % hysteresis/droop)  |                               |
| Materials in contact with gas                    | Housing:<br>Seals and diaphragms:   | Aluminium<br>NBR-based rubber |
| Ambient temperature rating                       | +5 °F to +150 °F for up to 7 PSI for regulating behavior (+/- 10 % of setpoint).<br>-40 °F to +150 °F: Diaphragms are suitable for the low temperature, but there may be out of range regulating behavior.<br>CSA Certified for -40 °F to +150 °F for up to 5 PSI.<br>-15 °C to +70 °C applies to the CE Marking. |                               |
| Installation position                            | Regulator dome from vertically upright to lying horizontally  |                               |
| Test ports/<br>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/<br>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.<br>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.

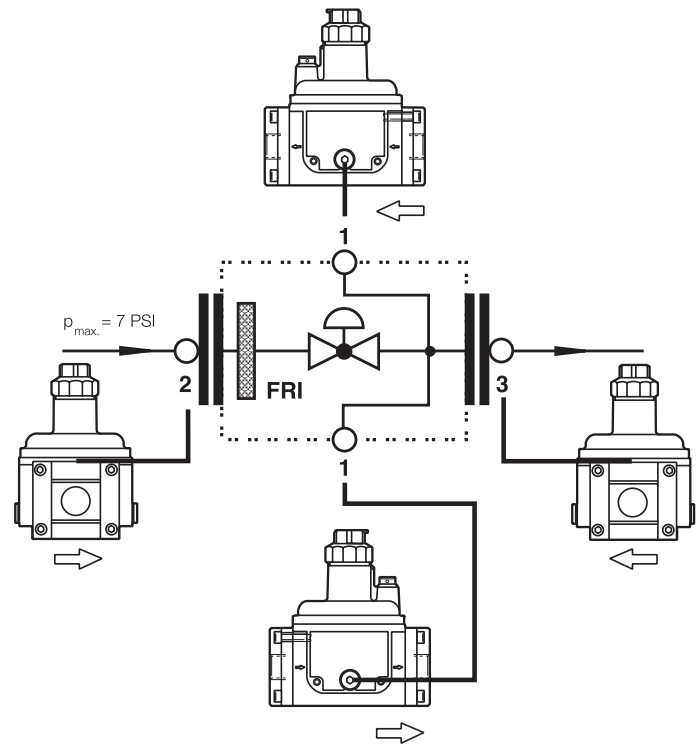
### FRI pressure ports

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

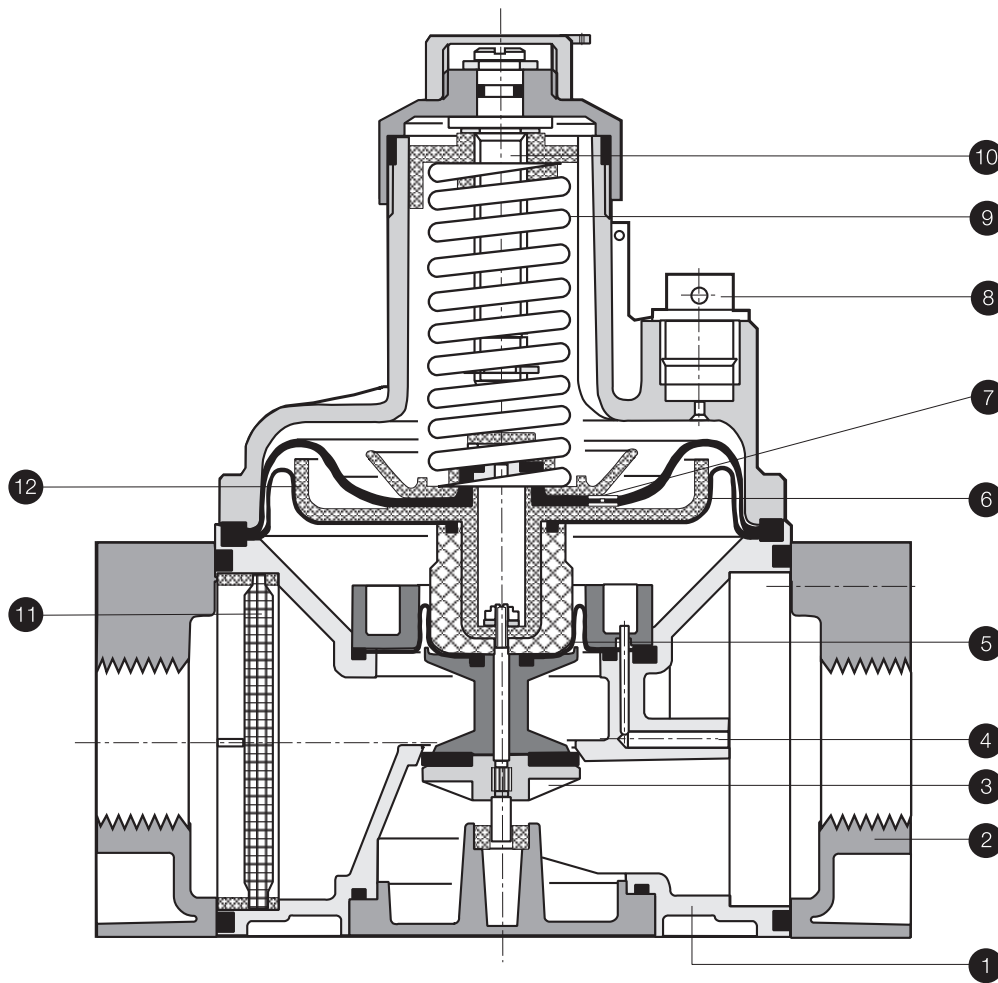
Port 1 is thread type G 1/8 as per DIN ISO 228

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.



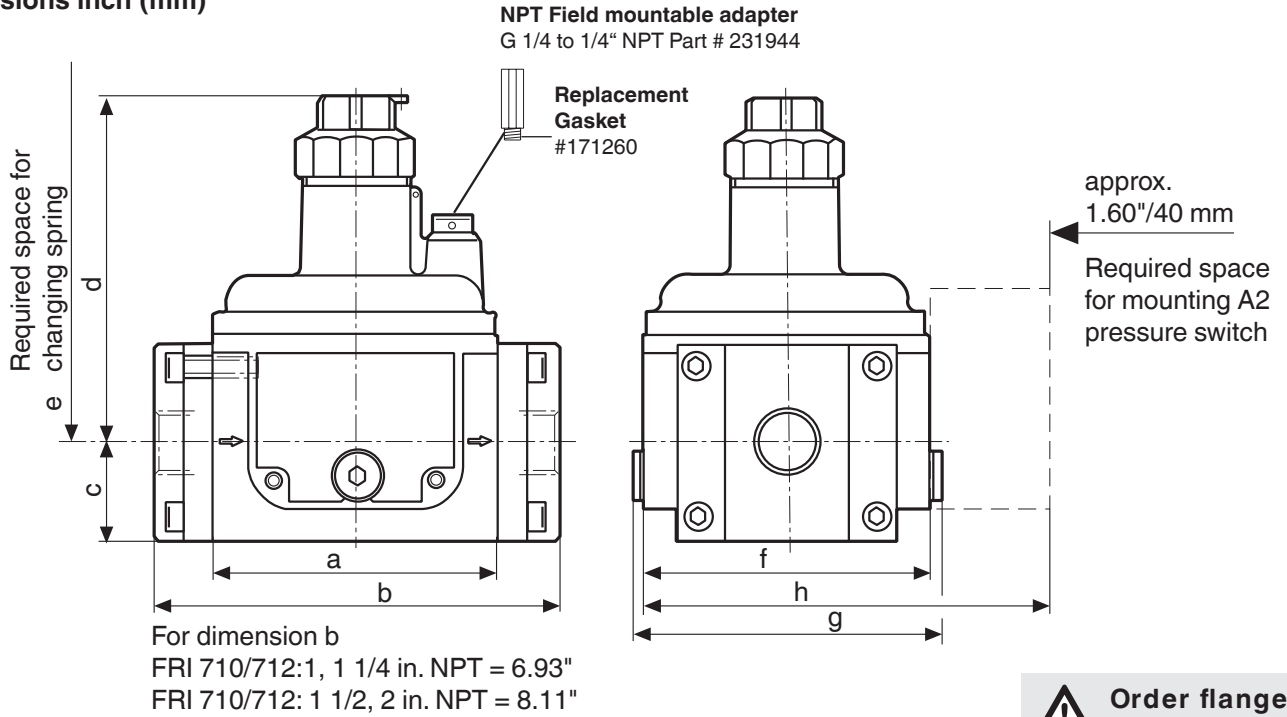
**FRI sectional drawing**  
**Shown in closed position**



- |   |                         |   |                       |    |                         |
|---|-------------------------|---|-----------------------|----|-------------------------|
| 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               |
|----------------------------|------------------|--------|----------|------------------|----------|----------|----------|----------|-----------------|
| <b>Spring Range (W.C.)</b> | 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        |
| <b>Spring color</b>        | brown<br>Not CSA | white  | orange   | blue<br>Standard | red      | yellow   | black    | pink     | grey<br>Not CSA |
| <b>FRI 705/6 - 707/6</b>   | 229817           | 229818 | 229820   | 229821           | 229822   | 229823   | 229824   | 229825   | 229826          |
| <b>FRI 710/6 - 712/6</b>   | 229842           | 229843 | 229844   | 229845           | 229846   | 229847   | 229848   | 229849   | 229850          |

**Dimensions inch (mm)**



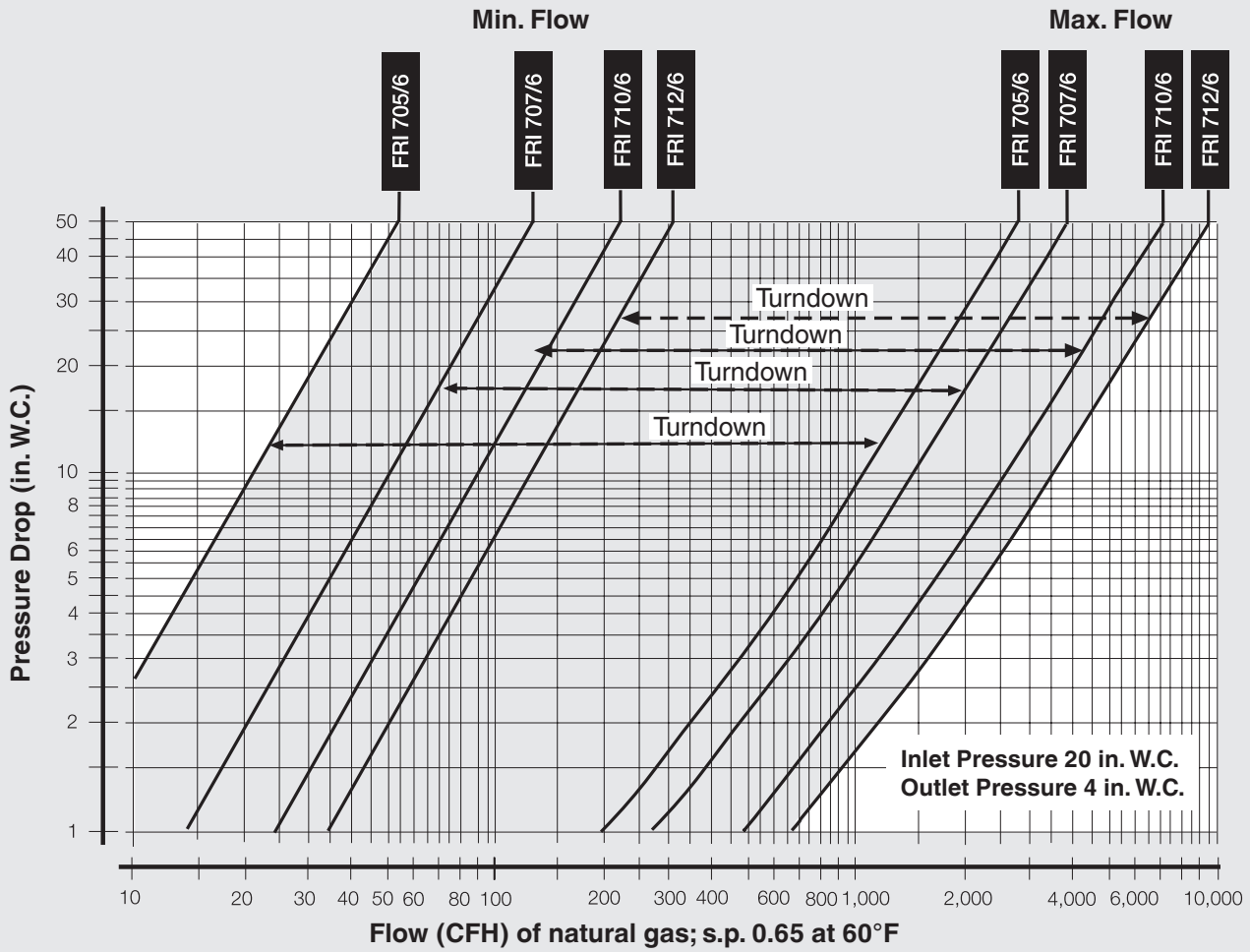
| Type      | Mounts to DMV Type | NPT Flanges | Order No. | Dimensions [inch]<br>Dimensions [mm] |         |     |     |     |     |     |     | Weight [lbs]<br>[kg] |
|-----------|--------------------|-------------|-----------|--------------------------------------|---------|-----|-----|-----|-----|-----|-----|----------------------|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

| DMV mounting kit<br>(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  |

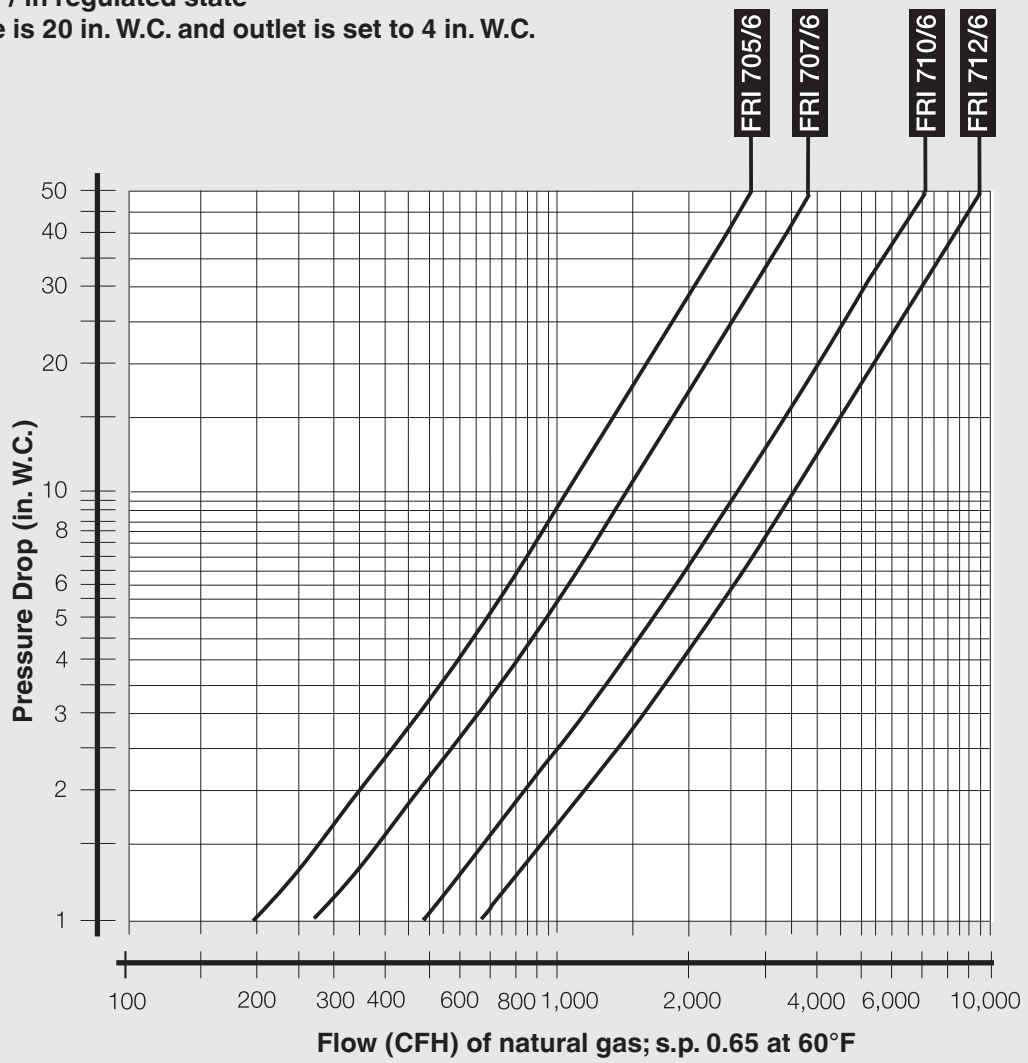
**Determining equivalent flow through valves using another gas**

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

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

| Type of gas | Density [kg/m <sup>3</sup> ] | 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**



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