

**FRI 7../6 Gas Pressure Regulator  
Installation Instructions**

**SPECIFICATIONS**

**FRI/6** Gas pressure regulator (lock-up type) with integrated gas filter in one housing. The FRI/6 series regulator mounts directly to the DMV 701, 702, and 703 series valves. Suitable as stand-alone when using two flanges.

<b>Body size</b>	<b>Flange Size Available</b>
FRI 705/6 & 707/6	1/2" - 1" NPT
FRI 710/6 & 712/6	1" - 2" NPT

**Gases**  
Natural gas, propane, butane; & non-corrosive gases

**Maximum Operating Pressure**  
7 PSI (500 mbar) UL & CE  
5 PSI (350 mbar) CSA

**Maximum Body Pressure**  
15 PSI (1 Bar)

- Ambient / Fluid Temperature**
- +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.

**Materials in contact with Gas**  
Housing: Aluminum  
Sealings on valve seats: NBR-based rubber

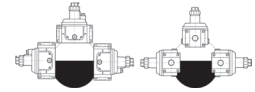
**Strainer**  
23 Mesh, installed in the housing

**Filter**  
Mesh <0.05mm, installed in the housing

**Test Ports**  
G 1/8 ISO 228 pressure taps available

**Vent Limiter**  
The FRI/6 has a factory installed, internal vent limiter, which limits the escape of gas to less than 0.5 CFH in case atmospheric diaphragm ruptures. No venting is required when accepted by the authority having jurisdiction.

**Mounting Position**  
Regulator dome vertically upright  
to lying horizontal



**Hysteresis and Droop**  
Hysteresis/repeatability 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**
- The FRI meets the ANSI Z.21.80/CSA 6.22 as Class I, which allows lockup rating not more than 150% or 5 in. W.C, whichever is greater.
  - The FRI meets EN 88 as SG30, which allows lock-up as high as +30% of the outlet pressure.
  - See lock-up Pressure Parameters on page 2 for more details.

- Approvals**
- UL Unlisted Component: File No. MH16727 (sp).
  - CSA Certified to ANSI Z21.18/CSA 6.3: File No. 1135455
  - Commonwealth of Massachusetts Approved Product Approval code G1-1107-35.



**ATTENTION**

- Read these instructions carefully.
- Failure to follow them and/or improper installation may cause explosion, property damage and injuries.
- Installation must be done with the supervision of a licensed burner technician.
- The system must meet all applicable national and local code requirements such as but not limited to NFPA 86, CSD-1, ANSI Z21.13, UL 795, NFPA 85, or CSA B149.3.
- Check the ratings in the specifications to make sure that they are suitable for your application.
- Never perform work if gas pressure or power is applied, or in the presence of an open flame.
- Once installed, perform a complete checkout including leak testing.
- Verify proper operation after servicing.

## LOCK-UP PRESSURE 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 DUNGS, 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% could occur, depending out the inlet pressure, the outlet pressure of the regulator, the flow rate of the regulator, the pipe volume downstream the regulator and upstream the safety shutoff valve, and the closing time of the downstream safety shutoff valve.

If in a given application the Lock-up pressure is too high, implying 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.

## REGULATOR ORIFICE DIAMETERS

Regulator Type	Orifice Diameter (mm)
FRI 705/6	17.0
FRI 707/6	24.0
FRI 710/6	29.0
FRI 712/6	37.5

# INSTALLATION

## Installation

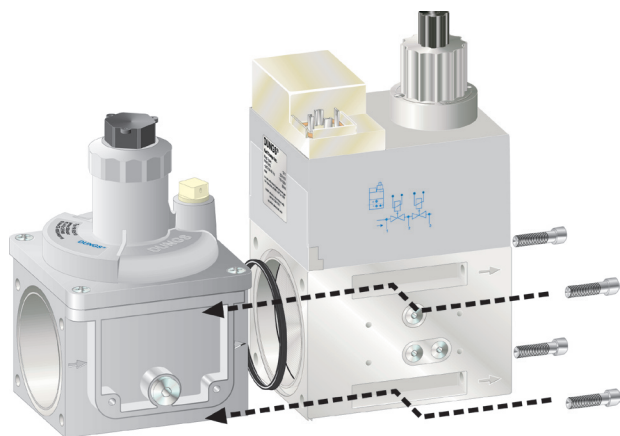
- The regulator can be mounted either upstream or downstream of the DMV. It can also be mounted as a stand alone regulator using two flanges and the flange mounting kit.
- The main gas supply must be shut off before starting the installation.
- Examine the regulator for shipping damages.
- The inside of the regulator and piping must be clean and free of dirt.

## Recommended Procedure to Mount the FRI/6 regulator to a DMV 701, 702, or 703 series safety shutoff valve.

- Replace the o-ring in the groove on the side of the DMV body with the oval o-ring supplied with the mounting kit.
- Make sure the oval o-ring and the groove are clean and in good condition.
- Install the FRI/6 regulator and DMV series valve with the gas flow matching the direction indicated by the arrows on the body.
- Attach the regulator to the DMV series valve using the socket cap crews supplied in the FRI/DMV mounting kit.
- Use a 5mm Allen wrench for the FRI 705/6 & 707/6.
- Use a 6mm Allen wrench for the FRI 710/6 & 712/6.
- Tighten the screws in crisscross pattern.
- Do not overtighten the screws. Follow the maximum torque values listed below.
- After installation is completed perform a leak test to verify that no leakage occurs.

## Recommended Torque for Mounting Screws

M6	M8	Screw Size
62	134	[lb-in]



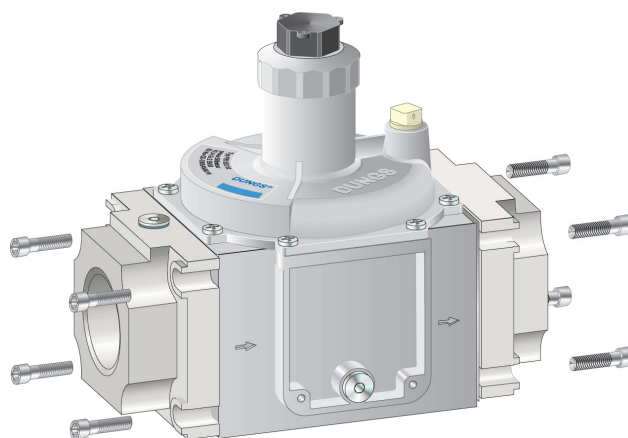
## Recommended Procedure to Mount Flanges

- Make sure the O-rings and the grooves are clean and in good condition.
- Install the FRI/6 with the gas flow matching the direction indicated by the arrows on the casting.
- Mount the FRI/6 vertical upright to horizontal.
- Clean the mounting surface of the flanges. Make sure they are in good condition.
- Attach the FRI/6 to the flanges using the appropriate M6 or M8 socket cap screws supplied.

- Use a 5mm Allen wrench for the FRI 705/6 & 707/6.
- For the FRI 710/6 & 712/6, there two options for bolts:
  - For 1" and 1 1/4" flanges, the M8 X 35 m bolts must be used.**
  - For 1 1/2" and 2" flanges, the M8 X 40 mm bolts must be used.**
- Tighten the screws in a crisscross pattern.
- Do not overtighten the screws. Follow the maximum torque values below.
- After installation is complete, perform a leak test.

## Recommended Torque Screws

M6	M8	Screw Size
62	134	[lb-in]



**CAUTION:** If the flow is not in the same direction of the arrows the regulator will not operate properly.

## Recommended Piping Procedure

- Use new, properly reamed and threaded pipe free of chips.
- Apply good quality pipe sealant, putting a moderate amount on the male threads only. If pipe sealant lodges on the regulator seat, it will prevent proper operation. If using LP gas, use pipe sealant rated for use with LP gas.
- Do not thread pipe too far. Valve distortion and/or malfunction may result from excess pipe in the valve body.
- Apply counter pressure using a parallel jaw wrench only to the flats on the flange when screwing the pipe into the flanges.
- Do not overtighten the pipe. Follow the maximum torque values listed below.
- After installation is complete, perform a leak test.

## Recommended Torque for Piping

1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	NPT pipe
375	560	750	875	940	1190	[lb-in]

## VENT LIMITER AND VENT LINE CONNECTION

### Vent Limiter

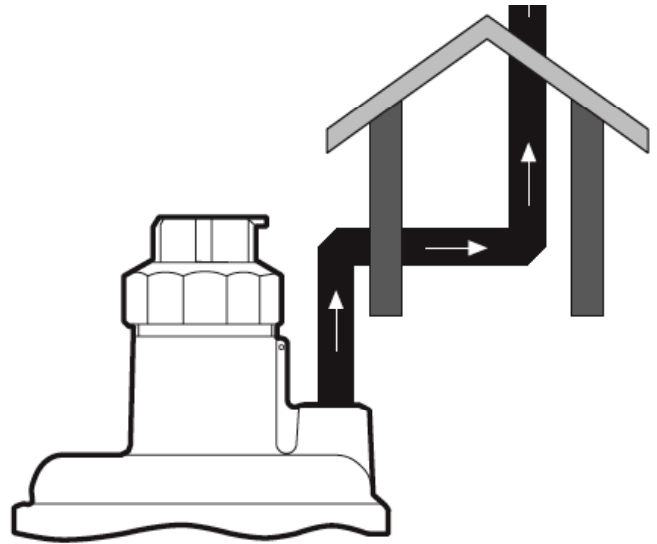
The FRI/6 series regulator contains a factory installed, which limits the escape of gas to less than 0.5 CFH in case atmospheric diaphragm ruptures. No venting is required when accepted by the authority having jurisdiction.

### Vent Line Requirements

- Follow the local code for vent sizing and termination requirements. In the absence of local codes, follow National Fuel Gas Code NFPA 54 or the International Fuel Gas Code for venting requirements.
- Terminate the vent to an approved location.
- At the point of termination, the vent line must be protected from insects and water intrusion. It is highly recommended to install an insect screen and terminate the pipe with the exit facing downwards to prevent rain water from entering.

### Installation Procedure

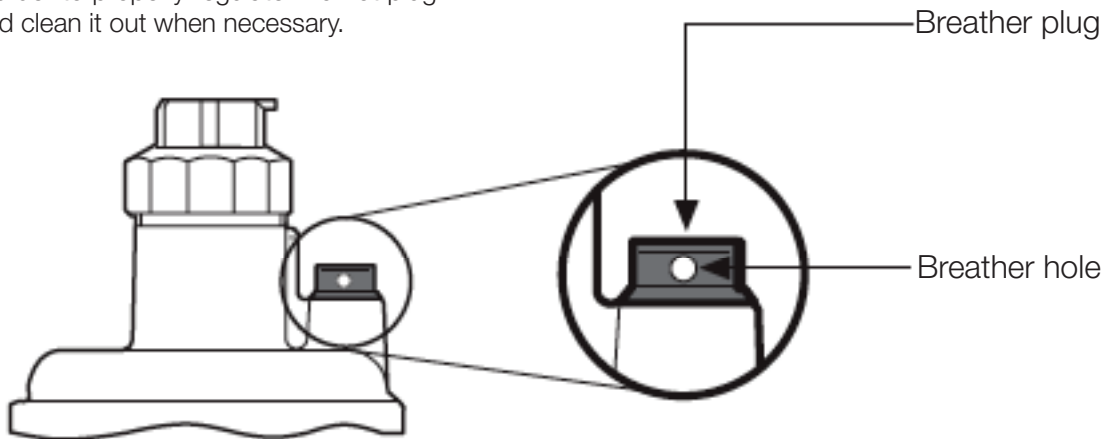
- If venting is required, the vent line is to be connected to the upper dome of the FRI regulator as illustrated.
- Remove the breather plug.
- On indoor installations requiring venting outdoors, run the piping as short and as direct as possible.
- The vent connection is G 1/4. A G1/4 to 1/4 NPT adapter is available using part number 231-944.



**CAUTION:** In the absence of venting codes and when venting is required, each regulator must be vented separately from all other vents.

## BREATHER PLUG

- All FRI's have a breather plug that threads into the regulator's vent connection. **DO NOT REMOVE PLASTIC BREATHER PLUG UNLESS VENTING OUTDOORS IS REQUIRED.** This plug is not the vent limiter, and it prevents debris from entering the upper chamber of the regulator. Debris in the upper chamber of the regulator will adversely affect regulator performance.
- The FRI regulator must also be able to exchange air through the breather hole in order to properly regulate. Do not plug the breather hole, and clean it out when necessary.



## OPERATION AND MAINTENANCE

### Start-Up

- The inlet and outlet shut off valves should both be closed.



Quickly opening the inlet manual shutoff valve can permanently rupture the internal diaphragms.

- Slowly open the inlet manual shutoff valve just enough to allow inlet pressure to gradually build up to the inlet of the regulator until the system is fully pressurized.
- Slowly open the outlet shut off valve(s) to allow a small flow.

### Set-Point Adjustment

- Remove the black adjustment cover.
- To increase the outlet pressure set point turn the adjustment spindle clockwise with a screw driver.
- To decrease the outlet pressure set point turn the adjustment spindle counterclockwise with a screw driver.
- Always use an accurate pressure gauge connected downstream from the regulator to measure the actual outlet pressure.
- Re-install black adjustment cover.
- After adjusting the set point for normal operation verify that the gas pressure regulator operates as intended.



During start-up a pressure gauge must be used to read the setpoint of the regulator outlet pressure. After the safety shutoff valves closed, the outlet pressure must not exceed the setpoint by more than 30%. If the outlet pressure exceeds 30% of the setpoint, the regulator is not closing properly.



While adjusting the outlet pressure of the regulator, confirm that the adjusting the outlet pressure does not create a hazard to the burner.

### Outlet Pressure Spring Replacement



**HEAD INJURY RISK: Never have head above or near the aluminum cap when removing regulator spring. The spring tension can be high enough to rapidly eject the aluminum cap with a large force.**

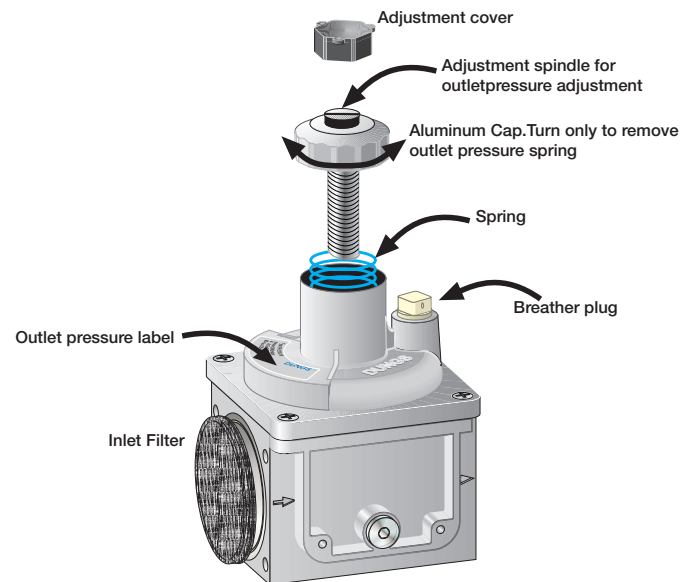
- Remove the black adjustment cover.
- Release spring tension by turning the adjustment spindle completely counterclockwise with a screwdriver.
- Remove the aluminum cap.
- Remove existing spring and insert new spring.
- Re-install adjustment spindle and adjust to desired outlet pressure. Follow the setpoint adjustment instructions.
- Re-install the adjustment cover, and apply the new outlet pressure label provided with new outlet pressure range onto the name plate.

### Filter

- Inspect the filter at least once a year.
- Replace the filter if the pressure drop across the filter is more than 4" W.C.
- Replace the filter if the pressure drop across the filter is more than twice as high as the first installation inspection.

### Filter Change

- Remove the FRI/6 by following the mounting instructions in reverse order.
- Remove the support ring.
- Remove the filter insert.
- Insert a new filter insert.
- Press in the support ring.
- Re-install the FRI/6 following the mounting instructions.
- Perform a function and leak test.



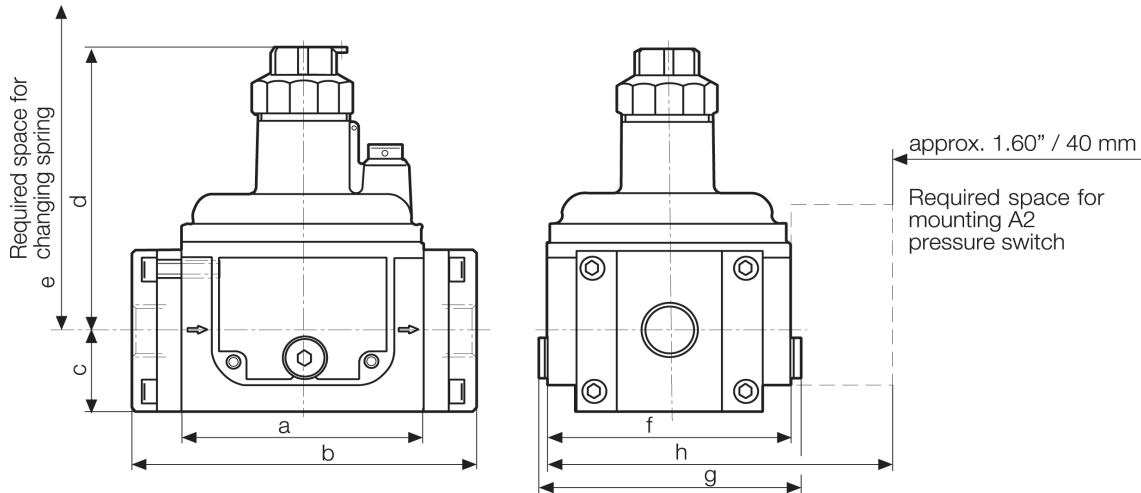
## OUTLET PRESSURE RANGES

Setpoint range [in. W.C.] horizontal mounting	1 to 3.6	2 to 5	2.8 to 8	<b>Standard</b> 4 to 12	10 to 22	12 to 28	24 to 40	40 to 60	60 to 80
Spring color	*brown	white	orange	blue	red	yellow	black	pink	*grey
Order No.									
<b>FRI 705/6 - 707/6</b>	229-817	229-818	229-820	229-821	229-822	229-823	229-824	229-825	229-826
<b>FRI 710/6 - 712/6</b>	229-842	229-843	229-844	229-845	229-846	229-847	229-848	229-849	229-850

**\*Not CSA Certified**

Values apply to horizontal mount. Subtract 1"WC for vertical mount.

## DIMENSIONS AND PART NUMBERS



For dimension b  
 FRI 710/712: 1, 1 1/4 in. NPT = 6.93"  
 FRI 710/712: 1 1/2, 2 in. NPT = 8.11"

Type	Flange Sizes NPT	Order No.	Dimensions [inch]									Weight [lbs]
			a	b	Dimensions [mm]			f	g	h	Weight [kg]	
<b>FRI 705/6</b>	1/2" - 1"	230-472	<b>3.6</b>	<b>5.6</b>	<b>1.3</b>	<b>6.0</b>	<b>7.7</b>	<b>3.8</b>	<b>4.1</b>	<b>5.5</b>	<b>2.0</b>	
			92	141	33	152	195	96	104	139	0,9	
<b>FRI 707/6</b>	1/2" - 1"	230-473	<b>3.6</b>	<b>5.6</b>	<b>1.3</b>	<b>6.0</b>	<b>7.7</b>	<b>3.8</b>	<b>4.1</b>	<b>5.5</b>	<b>2.0</b>	
			92	141	33	152	195	96	104	139	0,9	
<b>FRI 710/6</b>	1" - 2"	230-474	<b>4.9</b>	<b>6.9/8.1</b>	<b>1.8</b>	<b>6.9</b>	<b>9.3</b>	<b>5.0</b>	<b>5.3</b>	<b>6.7</b>	<b>3.5</b>	
			124	176/206	45	175	235	126	135	169	1,6	
<b>FRI 712/6</b>	1" - 2"	230-475	<b>4.9</b>	<b>6.9/8.1</b>	<b>1.8</b>	<b>6.9</b>	<b>9.3</b>	<b>5.0</b>	<b>5.3</b>	<b>6.7</b>	<b>3.5</b>	
			124	176/206	45	175	235	126	135	169	1,6	

## ACCESSORIES

Type	Flange NPT	Order No.	Kit for mounting flanges to FRI/6 regulator	Order No.
FRI 705/6 & FRI 707/6	1/2"	222-371	FRI 705/6 & FRI 707/6	224-093
	3/4"	222-368	FRI 710/6 & FRI 712/6	224-094
	1"	221-999		
FRI 710/6 & FRI 712/6	1"	222-369	<b>Kit for mounting FRI/6 regulator to DMV/6 dual modular valve</b>	<b>Order No.</b>
	1 1/4"	222-370	FRI 705 & 707 to DMV 701	219-967
	1 1/2"	222-003	FRI 710 & 712 to DMV 702 & 703	219-968
	2"	221-997		

## REPLACEMENT PARTS

Type	Mounts to DMV Type	Integral Filter Order No.	Strainer & filter Replacement Order No.
<b>FRI 705/6</b>	DMV 701	214-276	230-440
<b>FRI 707/6</b>	DMV 701	214-276	230-440
<b>FRI 710/6</b>	DMV 702/3	214-52	230-441
<b>FRI 712/6</b>	DMV 702/3	214-525	230-441

## FLOW CURVE

