



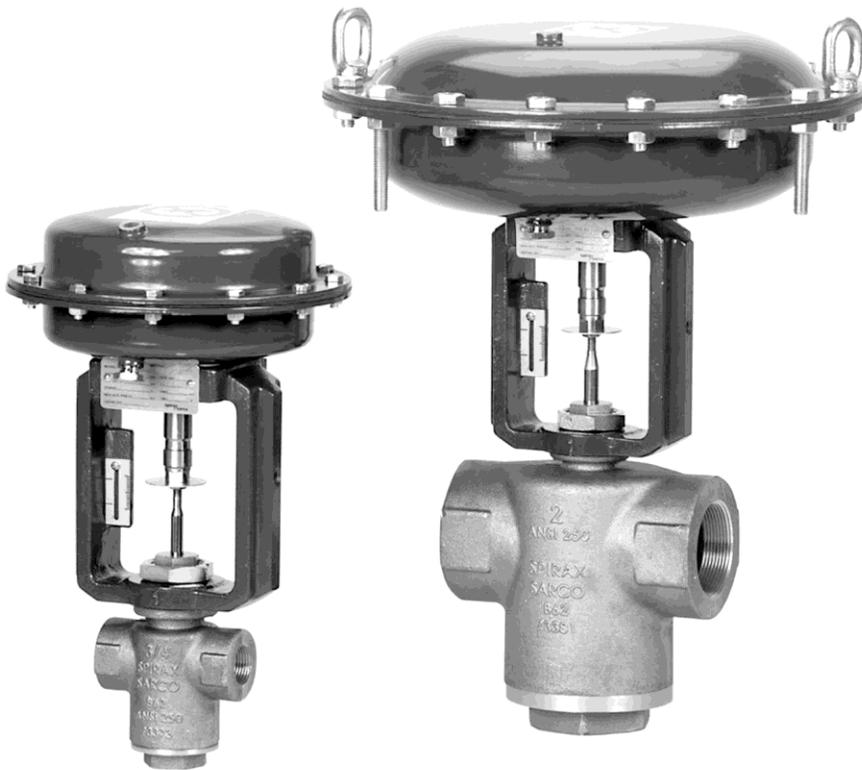
## INSTALLATION AND MAINTENANCE INSTRUCTIONS

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IM-1-620-US

November 2015

# B Series 1/2" to 2" 2-Way and 3-Way Bronze Control Valves



1. Safety
  2. Technical details
  3. Installation and Commissioning
  4. Maintenance
  5. Spares
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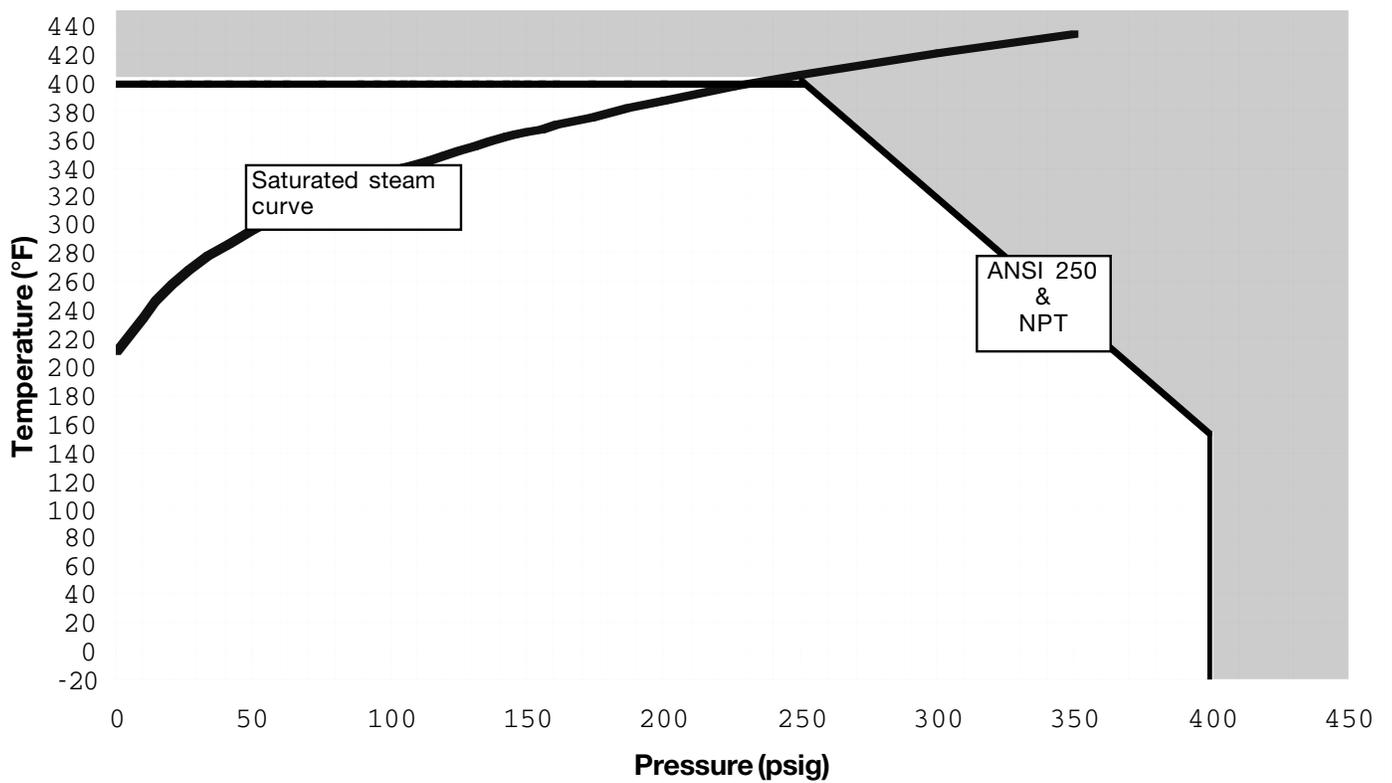
# 1. Safety

## 1.1 PTFE

Within its working temperature range PTFE is a completely inert material, but when heated to its sintering temperature it gives rise to gaseous decomposition products or fumes which can produce unpleasant effects if inhaled. The inhalation of these fumes is easily prevented by applying local exhaust ventilation to atmosphere as near to their source as possible.

Smoking should be prohibited in workshops where PTFE is handled because tobacco contaminated with PTFE will during burning give rise to polymer fumes. It is therefore important to avoid contamination of clothing, especially the pockets, with PTFE and to maintain a reasonable standard of personal cleanliness by washing hands and removing any PTFE particles lodged under the fingernails.

## 1.2 Limiting Conditions



 Do not use product in this area.

## 2. Technical details

### 2.1 Description

The B Series is a light industrial bronze valve range for pressure, flow and temperature control of steam, gases and liquids. Available in 2-Way and 3-Way body configuration for modulating control with PM Series pneumatic actuators (electric actuation available on request). For enhanced control, any of the extensive range of Spirax Sarco positioners may be fitted.

### 2.2 Valve Specifications

Body sizes	1/2", 3/4", 1", 1-1/4", 1-1/2", 2"		
Body material	ASTM B62		
Connection	Screwed NPT		
Body rating	400 psig @ 150°F/250 psig @ 400°F (ASME B16. 15 Class 250)		
Characteristic	2-Way	Equal Percentage or Linear	
	3-Way	Linear	
Rangeability	50:1		
Temperature Range	-20° to 400°F		
Seat Leakage	2-Way Valves	Metal Seating (standard)	ANSI/FCI70-2 Class IV
		PTFE Soft Seating (optional)	ANSI/FCI70-2 Class VI
	3-Way Valves	Metal Seating	ANSI/FCI70-2 Class III

### 2.3 Actuator Specifications

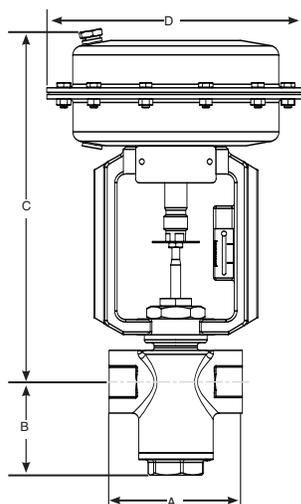
Type	Multi-Spring Diaphragm (Single Acting)		
Air Failure	PM200R, PM300R, PM700R: Stem Retract	PM200E, PM300E, PM700E: Stem Extend	
Travel	3/4"		
Ambient Temperature Range	-4 to 212°F		
Maximum Air Pressure	60 psig		
Diaphragm Material	Nitrile, Fabric Reinforced		
Spring Cases	Steel, Powder Epoxy-Coated with Stainless Steel Fasteners		
Yoke	Cast Iron, Epoxy-Coated		
Positioner Mounting	Namur / IEC 60534-6-1		
Air Capacity (scf)	PM200		0.016
	PM300		0.026
	PM700		0.048

## 2.4 Spring Identification (inches)

Actuator	Spring Quantity	Inside Diameter	Length	ID Stripe Color
PM220	6	1.34	2.87	Green
PM320	6	1.22	4.76	Blue
PM720	4	1.24	4.13	Blue with Yellow stripe

## 2.5 Dimensions and Weights (inches and pounds)

Size	Actuator Type	A End to End	B Bottom to Centerline	C Centerline to Top	D Actuator Diameter	Weight
1/2"	PM220	3.5	2.5	12	9.3	24
3/4"	PM220	3.5	2.5	12	9.3	24
1"	PM220	4.25	3	12	9.3	25
	PM320	4.25	3	13.9	11.2	34.5
1-1/4"	PM220	5.3	3.8	12.4	9.3	30
	PM320	5.3	3.8	14.4	11.2	40
1-1/2"	PM220	5.3	3.8	12.4	9.3	30
	PM320	5.3	3.8	14.4	11.2	40
	PM720	5.3	3.8	16.3	15.5	72
2"	PM220	6.6	4.5	12.7	9.3	37
	PM320	6.6	4.5	14.7	11.2	47
	PM720	6.6	4.5	16.6	15.5	79



## 3. Installation and commissioning

### 3.1 General

Valves should ideally be installed in a horizontal pipeline and should be connected in the orientation shown below.

A suitable strainer should always be fitted upstream of the valve. Additionally on steam installations a separator should be fitted before the valve, plus a steam trap set on applications where condensate may accumulate upstream of the valve.

### 3.2 Bypass arrangements

It is recommended that isolating valves be fitted upstream and downstream of the control valve together with a manual regulating valve to bypass the group. The process may then be controlled by the bypass valve while the control valve is isolated for maintenance purposes.

### 3.3 Actuator bench setting

B Series valves and PM Series pneumatic actuators are normally supplied fully assembled and bench set.

### 3.4 Adjusting Spring

The actuator spring range and lift off pressure will be indicated on the nameplate. Should it be necessary to check or adjust the lift off pressure the procedure is described in paragraphs 3.5 and 3.6.

#### Important

To prevent damage to the valve seat, please ensure the plug does not turn while pressing on the seat during assembling or adjustment.

**To prevent damage to the diaphragm ensure the actuator spindle is not allowed to rotate when the diaphragm is assembled within its housing.**

**Note:** Adjustment of the spring will only alter the pressure of the control signal air at which the valve commences to move off its seat (bench setting) and will not alter the spring pressure range required to move the valve through its full travel.

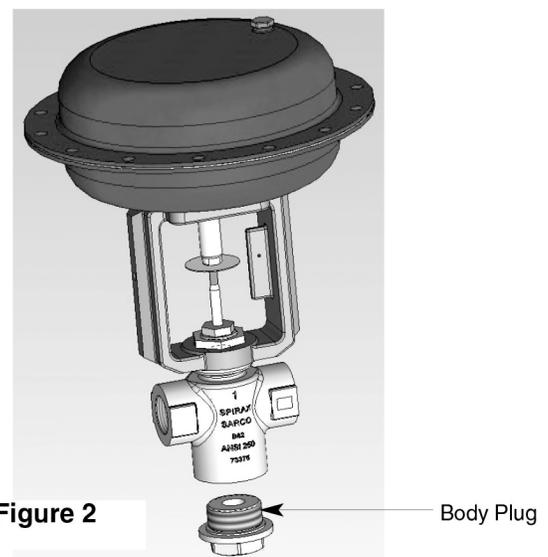
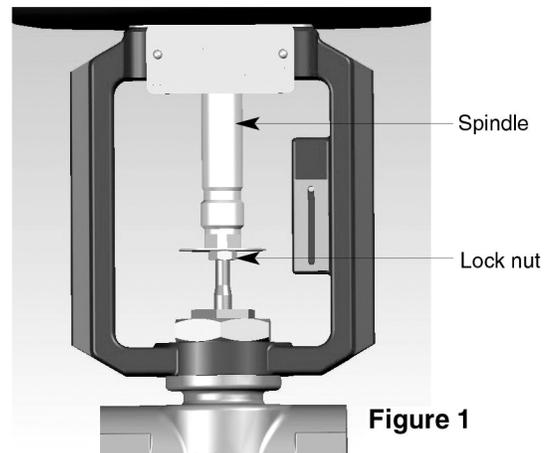
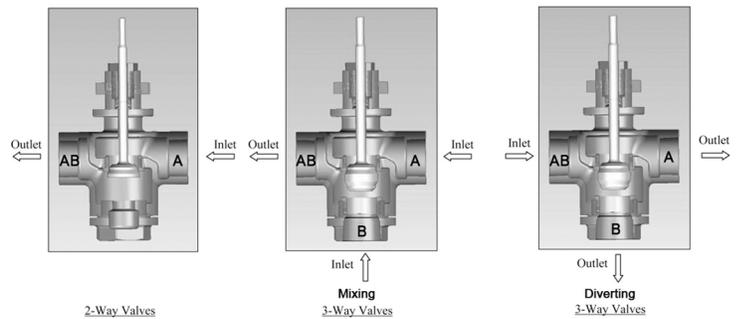
i.e. 3 to 15 psig spring (range 12 psig) set to commence to lift at 6 psig will require an 18 psig air pressure (6 + 12) to obtain valve full travel.

### 3.5 Spring Retract Actuators

To adjust bench setting proceed as follows:

**Ensure the control valve has been isolated and the actuator housing is pressure free.**

- Using two wrenches, while holding actuator spindle, loosen the valve stem locknut. See Figure 1.  
For 2-Way valves, remove the body plug. See Figure 2.
- Apply the control signal pressure to commence lifting the actuator spindle. Insert a large flat headed screwdriver in the underside of the body and engage it in the slot in the valve head. See Figure 3.
- Rotate the valve head until it's seating face just touches the seating face of the valve seat. Release the control air



signal. Using two wrenches, while holding the actuator spindle, tighten the valve stem locknut.

**Check again that the valve just commences to move off its seat at the right spring range minimum pressure and is fully open at the spring range maximum pressure.**

4. If the body plug was removed, apply Loctite 567 to the thread, screw into the body and tighten to a torque of 75-85 ft/lb. If necessary, adjust the travel indicator plate to align with the travel indicator disc as appropriate.

### 3.6 Spring Extend Actuators

To adjust bench setting proceed as follows:

**Ensure the control valve has been isolated and the actuator housing is pressure free.**

1. Loosen the valve stem locknut and remove the body plug (if applicable) as described in 3.5 above.
2. Apply the control signal that will be used to just close the valve. Insert a large flat head screwdriver in the underside of the body and engage it in the slot in the valve head. See Figure 3. Rotate the valve head until its seating face just touches the seating face on the valve seat.
3. Release the control air signal. Using two wrenches, while holding the actuator spindle, tighten the valve stem locknut. **Check again the the valve head moves off its seat at the correct control pressure and that full travel is achieved.**
4. If the body plug was removed, apply Loctite 567 to the thread, screw into the body and tighten to a torque of 75-85 ft/lb. If necessary, adjust the travel indicator plate as appropriate.

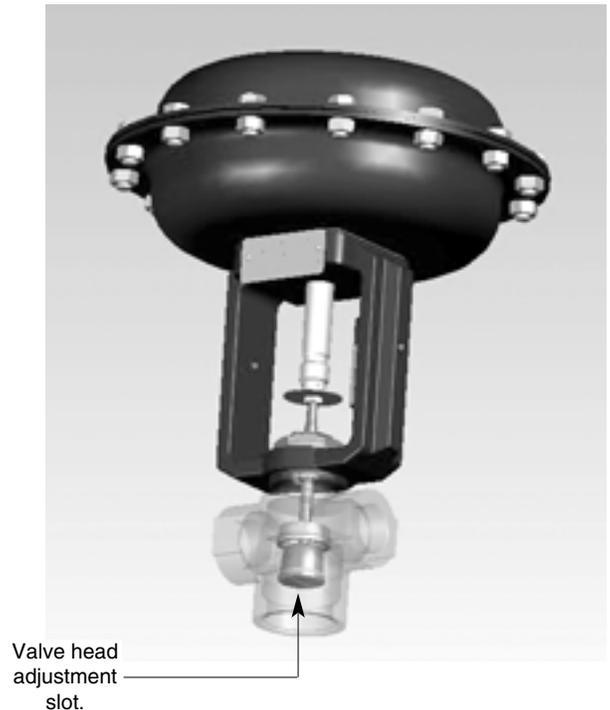


Figure 3

### 3.7 Positioners and Accessories

Please refer to the Installation and Commissioning Instructions supplied with the positioner or accessory, if applicable.

In addition, spindle adaptor #3578000 will be required.

## 4. Maintenance

### 4.1 Routine maintenance procedures

#### 24 hour operation

After 24 hours service check pipework connections and flange bolts for tightness.

#### 3 Month operating intervals

After every three months of normal service, check gland seals for signs of leakage and replace if necessary.

(Refer to Section 4.3, page 7)

#### Annually

The valve should be inspected for wear and tear replacing any worn or damaged parts such as valve plug and stem or gland seals.

Refer to Section 5 for details of available spares.

### 4.2 Removing actuator from valve

1. Isolate the valve on both sides.
2. Using two wrenches, while holding the actuator spindle, loosen the valve stem lock nut (Figure 1).
3. For 2-way valves, remove the body plug (Figure 2).
4. Apply air to the actuator to move the valve head into the mid-travel position approximately.
5. Insert a large, flat headed screwdriver in the underside of the body and engage it in the slot in the valve head (Figure 3). Unscrew the valve head and stem from the actuator spindle until it is fully disengaged.
6. Remove the indicator disc and lock nut from the valve stem and withdraw the valve head and stem from the valve body.
7. Using a 41 mm A/F 'crows foot' type wrench, remove the actuator clamping nut (Figure 4).
8. Remove the actuator from the valve body (Figure 5).

### 4.3 Procedure for renewing gland seals and valve head and stem.

1. Remove the actuator from the valve as described in 4.2.
2. Using a 1" A/F wrench, remove the gland nut from the valve body.
3. Remove and discard the gland seal.
4. Examine parts for signs of damage or deterioration and renew as necessary. Note that score marks or scaly deposits on the valve stem will lead to early failure of the gland seals.
5. Clean parts taking care to avoid scratching the stem or the gland seal housing bore.
6. Remove the grey seal ring and two EPDM o-rings from the gland seal spares pack. Lightly coat the EPDM o-rings with silicon grease and roll them into the two grooves on the seal ring (Figure 6).
7. Insert the seal guide into the valve body, install the gland seal set onto the plunger and liberally apply silicon grease around the 'o' rings. Insert into the valve body (Figures 7 and 8). Withdraw the plunger and seal guide from the valve body and discard.
8. Thread the gland nut into the body and tighten to a torque of 40 ft.lb (Figures 9 and 10).
9. Liberally apply silicon grease to the valve stem. Insert the valve head and stem into the bottom of the body and push the stem up through the gland seal taking care not to damage the gland seal with the threads on the stem.
10. Re-mount the actuator onto the valve and screw the clamping nut onto the valve body but do not tighten it.
11. Engage a flat-headed screwdriver in the valve head slot and rotate it until the valve stem threads engage with the actuator spindle threads. The actuator may be moved a very small amount from side to side to ease alignment. Tighten the clamping nut to a torque of 80 ft.lb (Figure 11).

The actuator bench setting should now be adjusted in accordance with Section 3.3.

### 4.4 Replacing spring extend actuator diaphragm, springs and spindle seal.

1. Isolate the valve on both sides.
2. If replacing the spindle seal the actuator should be removed from the valve as described in 4.2.
3. Remove the diaphragm case screws and upper diaphragm case (Figure 12).  
*Note: take care as the diaphragm case and screws are loaded by the internal springs.*
4. Remove springs.

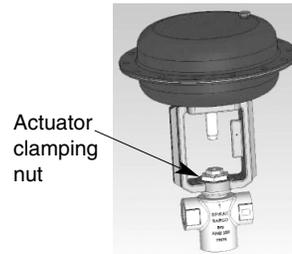


Figure 4



Figure 5



Figure 6

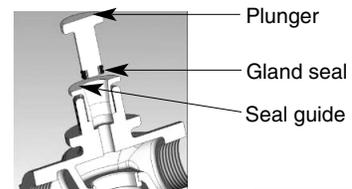


Figure 7

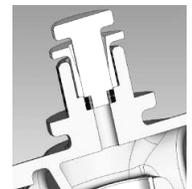


Figure 8



Figure 9

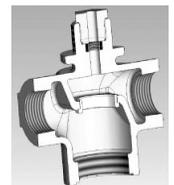


Figure 10

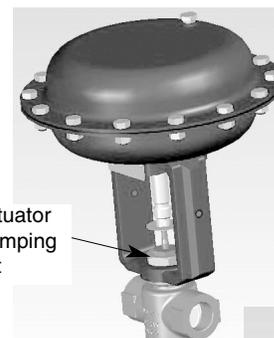


Figure 11



Figure 12

5. Using two wrenches, hold the actuator spindle on the wrench flats and remove the diaphragm clamping nut (Figure 13). Remove diaphragm clamping washers, o-ring and diaphragm.

6. Withdraw the actuator spindle and remove the 'V' ring spindle seal and wiper seal taking care not to damage the spindle bearing (Figure 14). Smear the new 'V' ring and wiper seal with silicon grease and replace.

7. Fit a new diaphragm and reassemble in reverse order. Using two wrenches, hold the actuator spindle on the wrench flats and tighten the diaphragm clamping nut to the torques specified in Table 1.

8. While supporting the actuator spindle so that the diaphragm sits evenly in the lower diaphragm case, replace the springs and upper diaphragm case. Replace the diaphragm case screws and nuts and evenly tighten to the torque specified in Table 1.

9. Re-fit the actuator, if necessary, and bench set in accordance with section 3.3.

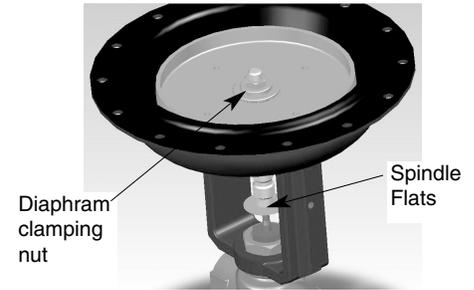


Figure 13

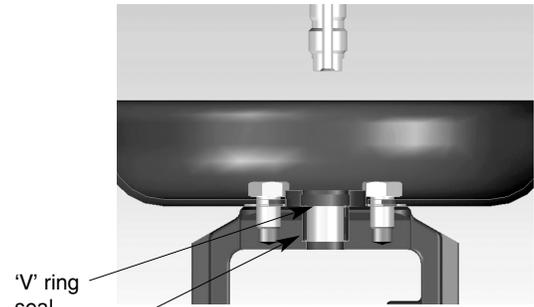


Figure 14

#### 4.4 Replacing spring retract actuator diaphragm, springs and spindle seal.

1. Isolate the valve on both sides.

2. If replacing the spindle seal the actuator should be removed from the valve as described in 4.2.

3. Remove the diaphragm case screws and upper diaphragm case (Figure 15).  
*Note: take care as the diaphragm case and screws are loaded by the internal springs.*

4. Using two wrenches, hold the actuator spindle on the wrench flats and remove the diaphragm clamping nut (Figure 16). Remove diaphragm clamping washers, o-ring and diaphragm.

5. Remove springs.

6. Withdraw the actuator spindle and remove the 'V' ring spindle seal and wiper seal taking care not to damage the spindle bearing (Figure 14). Smear the new 'V' ring and wiper seal with silicon grease and replace.

7. Replace springs.

8. Fit a new diaphragm and reassemble in reverse order. Using two wrenches, hold the actuator spindle on the wrench flats and tighten the diaphragm clamping nut to the torques specified in Table 1.

9. While supporting the actuator spindle so that the diaphragm sits evenly in the lower diaphragm case, replace the upper diaphragm case. Replace the diaphragm case screws and nuts and evenly tighten to the torque specified in Table 1.



Figure 15

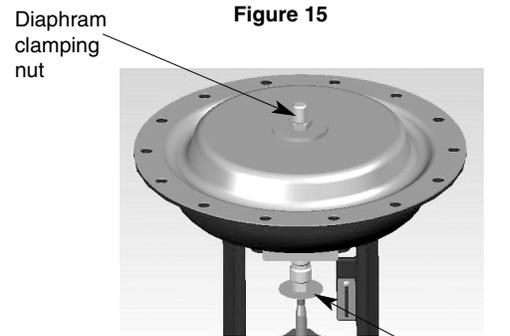


Figure 16

Table 1 Recommended tightening torques (ft/lb)

Actuator Series	Diaphragm Case Screws		Diaphragm clamping nut	
	Size	Torque	Size	Torque
PM200/300	5/16 - 18 UNC	11 ± 1.5	1/2 - 20 UNC	30 ± 2
PM700	3/8 - 16 UNC	20 ± 2.0	M14 x 1.5	30 ± 2

## 4. Spare Parts

The spare parts available are indicated by capital letters.  
The other parts are not supplied as spares.

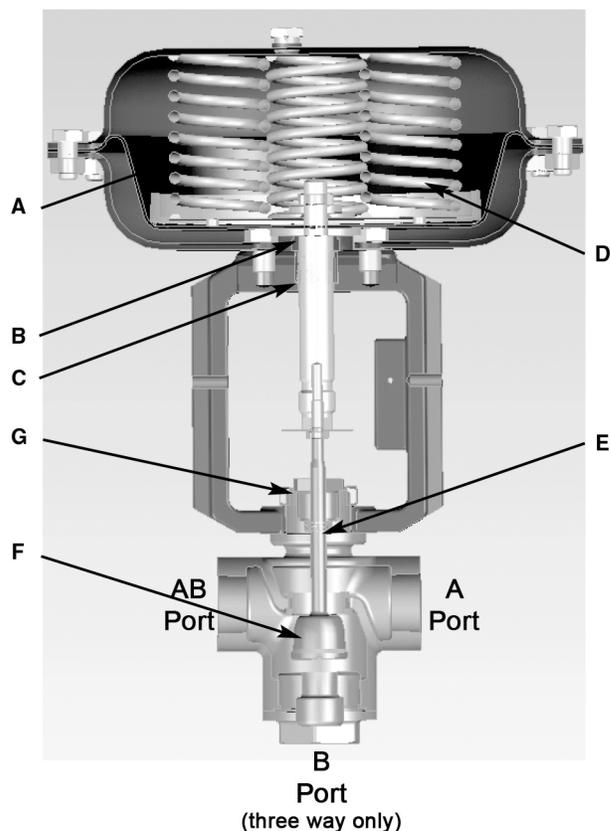
### Available Spares

Spindle seal kit ("V" ring and wiper ring)	B, C
Diaphragm kit	
Spring kit	D
Gland seal kit	E
Valve head and stem kit	F
Actuator clamping nut	G

### How to order

Always order spares according to the description in the column headed 'Available Spares' and stating the full valve and actuator model and date code.

eg. Gland seal kit for 1-1/2" BMA51 Cv28 + PM320E date code B11.



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