

# INSTRUCTION MANUAL

FOR

Pressure Regulators

Pump Governors

Pressure Relief Valves

RP-1070-C and RP-1073-C Series

**Note to installer:** After installing the regulator, give this instruction manual to operating personnel or see that it is filed for future reference.



Industrial Products Division  
1602 Mustang Drive  
Maryville, Tennessee 37801  
Phone: (865) 981-3100 Fax: (865) 981-3168

INSTRUCTION MANUAL NUMBER

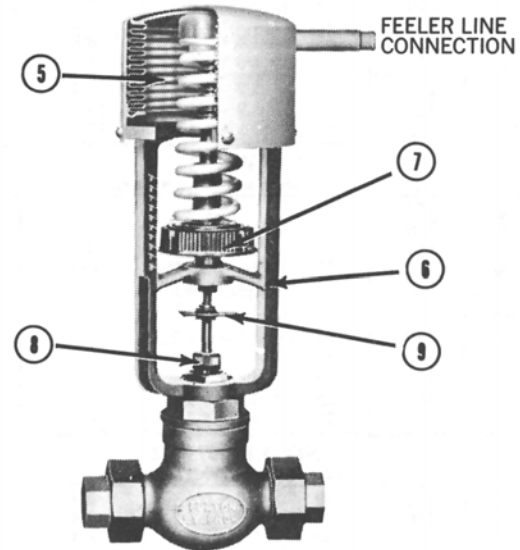
**P-2065**

Rev. C

**FEATURES:**

1. Sizes 1/4" through 4" for inlet pressures up to 100-250 psi.
2. Selection of three range spans topped at 25, 40 and 55 psi
3. All-metal construction.
4. High quality components.
5. Large two-ply seamless Robertshaw long life bellows.
6. Heavy-duty construction with cast iron frame.
7. Setpoint adjustment wheel.
8. Teflon\* chevron "Lifetime" stem packing.
9. Quick-disconnect valve stem.

\*Registered trade name of DuPont Company.



*All metal construction  
For Modulating Control of Pressure*

**DESCRIPTION OF CATALOGED REGULATORS**

Regulator Number		RP-1070-C1 Pressure Regulator	RP-1070-C2 Pressure Relief Valve	RP-1073-C1, C2 Pressure Regulator	RP-1073-C3, C4 Pressure Relief Valve
Valve See Valve Spec Sheet for Further description	Action	Direct-acting - closes on rising pressure.	Reverse-acting - opens on rising pressure	Direct-acting - closes on rising pressure	Reverse-acting -opens on rising Pressure
	Sizes	1/4" through 1-1/2"	1/4" through 1-1/2"	1/4" through 4"	1/4" through 4"
	Type*	1/4", 3/8", 1/2" single-seated type "A;" 3/4" thru 1-1/2", single-seated type "MA"	Same as RP-1070-C1 except size 3/4" thru 1-1/2" have double-seated type "FA"	1/4", 3/8", 1/2" single-seated type "A;" 3/4" thru 2", single-seated type "MA;" 2-1/2" thru 4" , double-seated type "FA."	Same as RP-1073-C1, C2 accept sizes 3/4" thru 4" have double-sated type "FA."
	Ends*	1/2" thru 1-1/2" screwed unions	1/2" 1-1/2" screwed unions	1/2" thru 1-1/2" screwed unions 2" thru 4", 125 lbs. ANSI flanges	1/2" thru 1-1/2" screwed unions 2" thru 4", 125 lbs. ANSI flanges
	Trim	All sizes, stainless steel	1/4" thru 1/2", stainless steel; 3/4" thru 1-1/2", Monel	1/4" thru 4", stainless steel	1/4" thru 1/2", stainless steel; 3/4" thru 1-1/2", Monel; 2" - 4", stainless steel.
	Stem	Stainless Steel. Quick-detach type	Stainless Steel Quick-detach type	Stainless Steel Quick-detach type	Stainless Steel Quick-detach type
	Stem Packing	Teflon chevrons, spring loaded	Rubber U-Cup	Teflon chevrons, spring loaded	Rubber U-Cup
	Body	Bronze	Bronze	1/4" thru 1-1/2", Bronze; 2" thru 4", Cast Iron	1/4" thru 1-1/2", Bronze; 2" thru 4", Cast Iron
	Body Rating	250 psi	250 psi	1/4" thru 1-1/2", 250 psi; 2" thru 4", 125 psi	1/4" thru 1-1/2", 250 psi; 2" thru 4", 125 psi
<b>Materials</b> For parts other than listed above.	Frame	Cast Iron	Cast Iron	Cast Iron	Cast Iron
	Adj. Spring	Steel	Steel	Steel	Steel
	Other Parts	Non-ferrous metals	Non-ferrous metals	Non-ferrous metals	Non-ferrous metals
<b>Pressure Connection</b>	Location	Top of head	Top of head	Side of Head	Side of head.
	Size	1/4" NPT	1/4" NPT	1/4" NPT	1/4" NPT

On 1/2" size with 1/4" and 3/8" reduced ports, the "A" type valve with threaded unions is cataloged.

**DESCRIPTION**  
**For Pressure Regulation**

Valve Size Inches	Max. Supply Pressure, Lbs.	Max. Setpoint Pressure, Lbs.	Minimum Setpoint Pressure Lbs. (plus or minus % Initial Pressure)	Pressure* Change for Full Valve Stroke, Lbs.	Direct- Acting Valve, Type
----------------------	-------------------------------------	---------------------------------------	--	---	-------------------------------------

**NO. RP-1070-C1**

**Valve closes on rising pressure**

1/4	150	55	2.3 + 1.0%	4.6	A
3/8	150	55	2.9+2.1%	5.7	A
1/2	150	55	3.4 + 3.9%	6.8	A
3/4	250	55	4.6 - 1.5%	9.1	MA
1	250	55	5.7 - 1.5%	11.4	MA
1-1/4	250	55	6.9 - 1.5%	13.7	MA
1-1/2	250	55	8 - 1.5%	16	MA

**NO. RP-1073-C1**

**Valve closes on rising pressure.**

1/4	150	25	1 + 0.4%	2	A
3/8	150	25	1.3 + 0.8%	2.5	A
1/2	150	25	1.5 + 1.5%	3	A
3/4	250	25	2 - 0.6%	4	MA
1	250	25	2.5 - 0.6%	5	MA
1-1/4	250	25	3 - 0.6%	6	MA
1-1/2	250	25	3.5 - 0.6%	7	MA
2	150	25	4.5 - 0.6%	9	MA
2-1/2	100	25	3 + 3.5%	6	FA
3	100	25	3.5 + 4.2%	7	FA
4	100	25	4.5 + 5.7%	9	FA

**NO. RP-1073-C2**

**Valve closes on rising pressure**

1/4	150	40	1.4 + 0.4%	2.7	A
3/8	150	40	1.7 + 0.8%	3.4	A
1/2	150	40	2.1 + 1.5%	4.1	A
3/4	250	40	2.8 - 0.6%	5.5	MA
1	250	40	3.4 - 0.6%	6.8	MA
1-1/4	250	40	4.1 - 0.6%	8.2	MA
1-1/2	250	40	4.8 - 0.6%	9.6	MA
2	150	40	6.2 - 0.6%	12.3	MA
2-1/2	100	40	4.1 + 3.5%	8.2	FA
3	100	40	4.8 + 4.2%	9.6	FA
4	100	40	6.2 + 5.7%	12.3	FA

• Amount of pressure change required at regulator head for valve to go from full open to full closed or vice versa. Control is modulating around setpoint.

**For Pressure Relief**

Valve Size, Inches	Max. Supply Pressure, Lbs.	Max. Setpoint Pressure, Lbs.	Minimum Setpoint Pressure Lbs. minus % Initial Pressure	Pressure* Change for Full Valve Stroke, Lbs.	Reverse- Acting Valve, Type
--------------------------	-------------------------------------	---------------------------------------	--	---	--------------------------------------

**NO. RP-1070-C2**

**Valve opens on rising pressure**

1/4	150	55	2.3 - 1.0%	4.6	A
3/8	150	55	2.9-2.1%	5.7	A
1/2	150	55	3.4 - 3.9%	6.8	A
3/4	150	55	2.9 - 1.5%	5.7	FA
1	150	55	3.4 - 2.3%	6.8	FA
1-1/4	150	55	4.0 - 2.3%	8	FA
1-1/2	150	55	4.6 - 2/ 9%	9.1	FA

**NO. RP-1073-C3**

**Valve opens on rising pressure**

1/4	150	25	1.0 - 0.4%	2	A
3/8	150	25	1.3 - 0.8%	2.5	A
1/2	150	25	1.5 - 1.5%	3	A
3/4	150	25	1.3 - 0.6%	2.5	FA
1	150	25	1.5 - 0.9%	3	FA
1-1/4	150	25	1.8 - 0.9%	3.5	FA
1-1/2	150	25	2.0 - 1.1%	4	FA
2	100	25	2.5 - 1.4%	5	FA
2-1/2	100	25	3.0 - 3.5%	6	FA
3	100	25	3.5 - 4.2%	7	FA
4	100	25	4.5 - 5.7%	9	FA

**RP-1073-C4**

**Valve opens on rising pressure.**

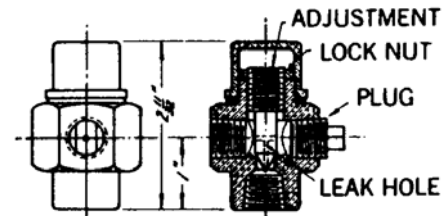
1/4	150	40	1.4 - 0.4%	2.7	A
3/8	150	40	1.7 - 0.8%	3.4	A
1/2	150	40	2.1 - 1.5%	4.1	A
3/4	150	40	1.7 - 0.6%	3.4	F A
1	150	40	2.1 - 0.9%	4.1	FA
1-1/4	150	40	2.4 - 0.9%	4.8	FA
1-1/2	150	40	2.8 - 1.1%	5.5	FA
2	100	40	3.4 - 2.8%	6.8	FA
2-1/2	100	40	4.1 - 3.5%	8.2	FA
3	100	40	4.8 - 4.2%	9.6	FA
4	100	40	6.2 - 5.7%	12.3	FA

\* Amount of pressure change required at regulator head for valve to go from full open to full closed or vice versa. Control is modulating around setpoint.

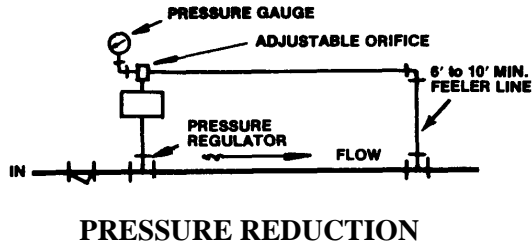
**ADJUSTABLE ORIFICE PART NO. 94204-A1**

Damps out rapid pressure fluctuations in feeler pipe – protects control bellows.

Always recommended but supplied only on order at extra cost.

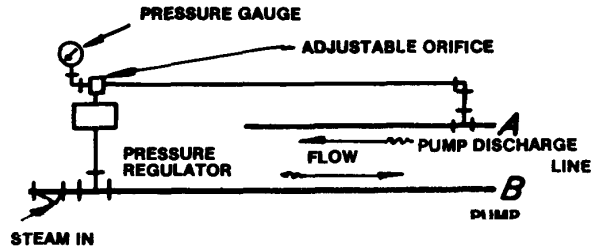


All parts made of brass. 1/4" pipe connections. Pipe plug may be removed for installation of pressure gauge. Part no. 94204-A2 is available without leak hole.



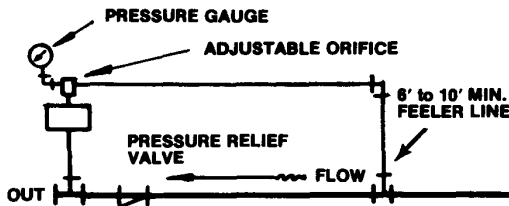
**PRESSURE REDUCTION**

**Figure 1** – Typical installation of a pressure regulator showing feeler pipe connection, adjustable orifice and pressure gauge. Feeler pipe is connected to reduced pressure side of supply line at a point 6 ft. to 10 ft. minimum from regulator valve.



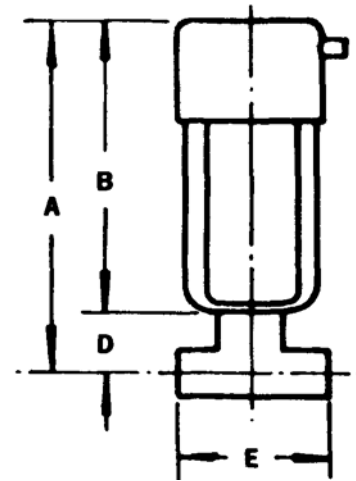
**PUMP GOVERNOR**

**Figure 3** – Regulators can be used to protect a pump on a dual line system as a governor; single line system as a back pressure regulator; or recirculation loop as a downstream pressure relief back to pump intake. Illustrated as a pump governor on a steam-driven pump. Feeler line is connected to pump discharge line “A” so that pumped medium pressure determines the amount of steam supplied to the pump through line “B”.



**MODULATING PRESSURE RELIEF**

**Figure 2** – Typical installation of a pressure relief valve. The feeler pipe is connected to the high pressure or upstream side of the supply line at a point 6 ft. to 10 ft. minimum from the regulator valve.



**DIMENSIONS, SHIPPING WEIGHTS**

End Connections	1/2" Screwed Unions			Screwed Unions				Flanged			
	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
Valve Size, In.	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
Ship. Wt., Lbs.	26	26	26	28	32	36	42	48	95	120	150
Regulator No.	RP-1070-C1, RP-1073-C1, RP-1073-C2										
Direct-Acting Valve, Type	A	A	A	MA	MA	MA	MA	MA	FA	FA	FA
No. RP-1070-C1	A	13-15/16	13-15/16	13-15/16	15-13/16	15-13/16	16	16-1/2	--	--	--
	B	12-3/8	12-3/8	12-3/8	12-3/8	12-3/8	12-3/8	12-3/8			
No. RP-1073-C1	A	12-7/16	12-7/16	12-7/16	14-5/16	14-5/16	14-1/2	15	15-3/16	15-5/8	15-5/8
No. RP-1073-C2	B	10-7/8	10-7/8	10-7/8	10-7/8	10-7/8	10-7/8	10-7/8	10-7/8	10-7/8	10-7/8
	D	1-9/16	1-9/16	1-9/16	3-7/16	3-7/16	3-5/8	4-1/8	4-15/16	4-3/4	4-3/4
	E	4-3/4	4-3/4	4-3/4	6-15/16	7-1/8	7-1/2	8-1/2	7	7-3/4	8-5/8
Regulator No.	RP-1070-C2, RP-1073-C3, RP-1073-C4										
Reverse-Acting Valve, Type	A	A	A	FA	FA	FA	FA	FA	FA	FA	FA
No. RP-1070-C2	A	13-15/16	13-15/16	13-15/16	14-3/8	14-7/8	15	15-7/16	--	--	--
	B	12-3/8	12-3/8	12-3/8	12-3/8	12-3/8	12-3/8	12-3/8			
No. RP-1073-C3	A	12-7/16	12-7/16	12-7/16	12-7/8	12-3/8	13-1/2	13-15/16	14-3/8	14-1/2	14-3/4
No. RP-1073-C4	B	10-7/8	10-7/8	10-7/8	10-7/8	10-7/8	10-7/8	10-7/8	10-7/8	10-7/8	10-7/8
	D	1-9/16	1-9/16	1-9/16	2	2-1/2	2-5/8	3-1/16	3-1/2	3-5/8	3-7/8
	E	4-3/4	4-3/4	4-3/4	6-3/16	7-1/4	7-7/8	8-13/16	7	7-3/4	8-5/8

## OPERATING PRINCIPLE

This regulator automatically controls flow of the medium passing through its valve by responding to pressure changes in the system under control. The pressure generated in the line or vessel is transmitted through the feeler pipe to the bellows in the pressure unit which, in turn, positions valve poppet to control flow of the medium through the valve. Movement of bellows is opposed by a spring to provide means for adjustment.

For pressure regulating or reducing (or pump governors) the valve closes on rising pressure (type numbers 1070-C1, 1073-C1, 1073-C2). For pressure relief applications, the valve opens on rising pressure (type numbers 1070-C2, 1073-C3, 1073-C4).

## INSTALLATION

When making the installation, do not remove valve from the regulator unless absolutely necessary.

Regulator valves are sized to the demand of the system to be controlled, and are frequently smaller than the supply line size.

All number 1070 and 1073 series regulators require a 1/4" feeler line connected to the pressure element. The number 1070 series has the pressure connection on top of the regulator head and the number 1073 series has the connection on the side of the regulator head. The feeler line should be run to the point in the system (reduced pressure line, vessel, etc.) where the pressure is to be controlled.

For best results, an adjustable orifice (Figure 6, Robertshaw part number 94204) should be installed in the feeler line. Thus, rapid pressure fluctuations will be dampened out and more steady control procured. It will also protect the motor bellows against rapid pressure surges that may otherwise damage the bellows. After the orifice is adjusted for proper flow the adjustment can be locked by tightening a jam nut as shown on drawing, Figure 6. The 1/4" pipe plug may be removed for installation of pressure gauge. See Typical installations on Figures 1, 2 and 3.

The regulator valve should be installed at the most convenient location and preferably not too close to the unit to be controlled. A pipe line strainer should be placed just ahead of the valve. Preferably the regulator should be installed in the vertical position with the valve below the regulator frame. Regulator size 3" and larger, should never be installed in the horizontal position. Install valve so flow is in direction of arrow on valve body.

When controlling steam, the high pressure side should be properly drained and trapped.

## ADJUSTMENT

This regulator can be set to control at any pressure within the limits of the pressure range stamped on its nameplate.

After placing the regulator in service, allow several minutes to reach stable operation, then observe pressure. If not correct, change the pressure setting in manner directed below.

To RAISE pressure setting, turn adjustment wheel to RIGHT (see Arrow "A", Figure 4).

To LOWER pressure setting, turn adjustment wheel to LEFT (see Arrow "B", Figure 4).

Make new settings as necessary until desired pressure is obtained.

The regulator has a scale plate to indicate the position of the adjustment. This feature is helpful in resetting the adjustment when frequent changes are necessary. Scale graduations are not in pounds per square inch.

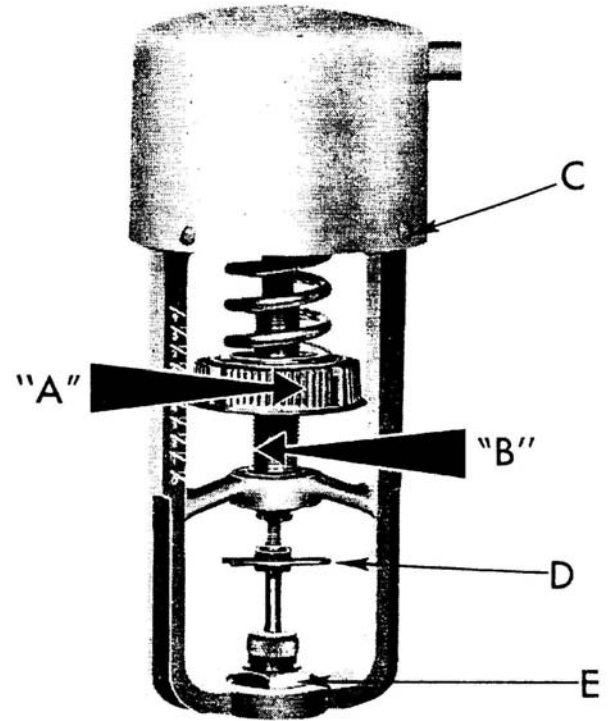


Figure 4

## MAINTENANCE

This regulator, if properly installed and used, should require very little attention or maintenance; however, every piece of mechanical equipment deserves some care.

### A. UPPER WORKS REMOVAL & INSTALLATION (See Figure 4):

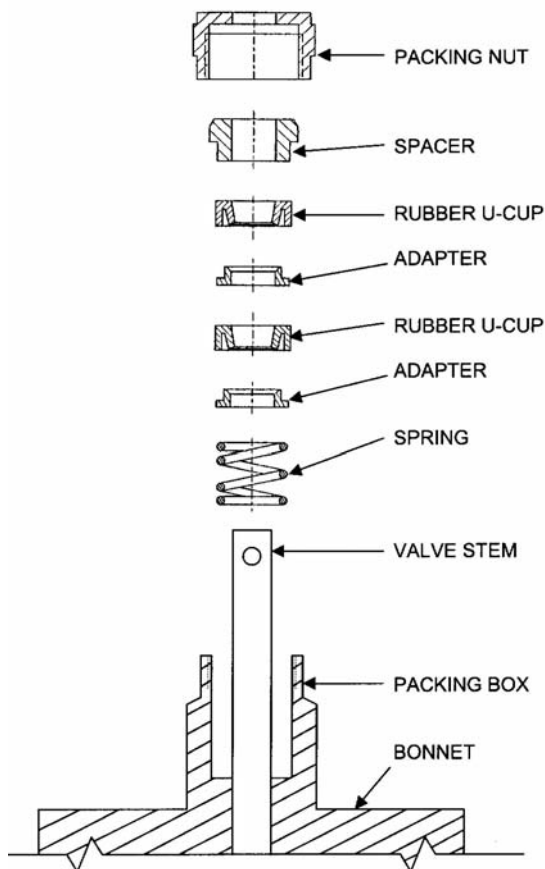
1. Note the position of the handwheel.
2. Turn the handwheel to the left (See arrow "B") to lessen the load on the lock pin (D) and remove the lock pin. Do not disturb the upper works connector.
3. Remove locknut (E) and lift upper works from valve.
4. If reinstalling the original upper works reverse the above procedure.
5. If installing a replacement upper works:
  - a. Place the upper works on the valve and secure with locknut (E).
  - b. Note the position of the handwheel.
  - c. Turn the handwheel to the left (See arrow "B") to align the holes in the upper works connector and the valve stem. Insert the lock pin (D).
  - d. Turn the handwheel to the right (See arrow A) until it is in its original position.

- e. Check for proper operation. Refer to the ADJUSTMENT section and adjust as necessary.

## B. PACKING

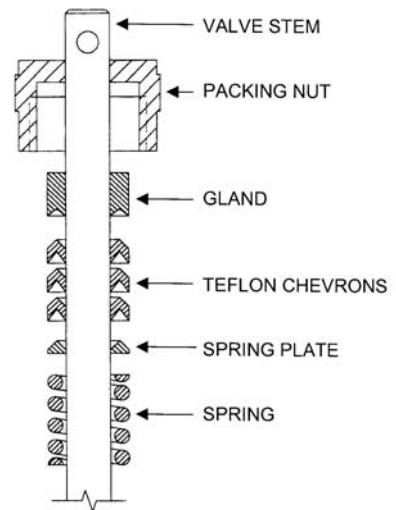
Valve stem packing nut should be kept only **finger-tight**. If valve stem packing must be replaced, follow steps below (See Figures 5 and 6 as applicable).

1. Remove the upper works per Paragraph A.
2. Remove packing nut and spacer or packing gland.
3. Remove bonnet from valve. Removal of the bonnet is not necessary but removing the bonnet makes it easier to remove the old packing.
4. Remove old packing parts from the packing box.
5. Clean out packing box with a clean rag or soft paper.
6. Wipe off stem with clean rag. DO NOT attempt to polish. If stem is scratched or nicked around packing area, it should be replaced.
7. If valve is supplied with a bonnet gasket inspect the gasket. Replaced if damaged.
8. Replace bonnet on valve.
9. Carefully place new packing in packing box. Put a small amount of good packing lubricant in the packing (stuffing) box while repacking.
10. Replace packing gland.
11. Replace packing nut and finger tighten.
12. Replace upper works per Paragraph A.



**Figure 5**

Rubber U-cup packing used for steam service.  
Packing Kit part number 81900-E1.



**Figure 6**

Teflon\* chevron packing used for water service.  
Packing Kit part number 81900-B3

\* Teflon is a trade name of DuPont Company.

## C. PRESSURE ELEMENT

The pressure element consists of bellows and cup and is not repairable. In the event of damage the complete pressure element must be replaced. To remove pressure element, follow steps listed below (See Figure 4).

1. Turn adjusting wheel to left (See arrow B) until adjusting wheel is all the way down.
2. Remove screws (C) and lift off element.
3. To install element, reverse the above operations.

## D. REFACING VALVE SEAT

Under certain conditions the valve seat may be lapped with the valve poppet. However, this should be done only by an experienced person. If the valve poppet or insert is badly scored it should be replaced. Valve repair kits are available.

If possible, the valve should be returned, freight or express charges prepaid, to the factory for any needed repair or parts. If valve is to be lapped, follow the steps below:

1. Remove the upper works from valve per Paragraph A.
2. Remove the packing and the bonnet per Paragraph B.
3. Apply a small amount of (extremely fine) grinding compound, or a graphited paste made by mixing fine flecks of graphite with engine oil, to the valve insert face.
4. In lapping, every effort should be made to avoid scoring or grooving the contact faces. Wipe poppet and insert thoroughly with a clean rag after each operation. Use light pressure in lapping even to the extent of holding up part of the weight of the poppet as it is rotated. Frequently lift off poppet to check surface. Heavy pressure causes the grains to become embedded in the material and will produce deep grooves or scores.
5. When seating face of poppet is smooth, groove or lapping surfaces in seating face of insert, if not too deep, does not particularly harm and in some cases seems to assist in getting a quick seat. Wipe away compound from the valve poppet and inserts.

## TROUBLE SHOOTING

This regulator has been manufactured to operate within the pressure range stated on the nameplate and the valve has been designed to close against line pressure specified on your order. If the regulator does not function properly immediately after completing the installation and you are unable to correct the trouble, contact the factory and outline your difficulty. When contacting the factory you will need to provide the type of regulator and its serial number, the valve size, and any other pertinent information. Please have this information available when contacting the factory.

If the regulator has been operating satisfactorily for some time and trouble develops, the following information may be of some assistance:

1. Check packing nut (see Figures 5 and 6) to be sure it is only finger-tight and the valve stem is free to move up and down without undue friction. This will require removing the lock pin and possibly the upper works per Paragraph A.
2. The usual cause for poor control over the reduced pressure is collection of scale or other foreign matter on the seats. Such matter may hold the poppet off seat and, in time, cause the seat or poppet to become scored. To inspect seat and poppet, remove valve bonnet.
3. Slightly scored seats or poppets may be refaced per Paragraph D.
4. Valve repair kits and replacement valves are available.



### **U.S.A. & Canada**

**Robertshaw Industrial Products**  
1602 Mustang Drive  
Maryville, Tennessee 37801  
Phone: (865) 981-3100 Fax: (865) 981-3168  
<http://www.robertshawindustrial.com>

### **Exports**

**Invensys Appliance Controls**  
1701 Byrd Avenue  
P.O. Box 26544  
Richmond, Virginia 23261-6544  
Phone: (804) 756-6500 Fax: (804) 756-6561

**Q-2634 (8/04)**

**Printed in U.S.A.**

**Invensys®**