

KIMRAY
INC.®

INSTALLATION
OPERATION &
MAINTENANCE
GUIDE



HIGH PRESSURE CONTROL VALVE
PISTON BALANCED

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HIGH PRESSURE CONTROL VALVE

Model: PB, PO, PC

Installation, Operation & Maintenance Guide



A Before you start

CAUTION:

The instructions provided herein should be completely reviewed and understood before operating or repairing this equipment. All CAUTION and WARNING notes must be strictly observed to prevent personal injury or equipment damage.

A1 Scope

Do not install, operate, or maintain a control valve without being fully trained and qualified with the Kimray installation operation and maintenance manual.

To avoid personal injury or property damage, it is important to carefully read, understand, and follow all the contents of this manual, including all safety CAUTION's and WARNING's.

If you have any questions about this manual, contact your Kimray applications support group before proceeding.

A2 Introduction

This repair manual contains information for the PB, PO, PC, High Pressure Control Valve.

A3 Description

The Kimray High Pressure Control Valve (HPCV) is designed for use in liquid and gas control applications which require modulating (throttling) or on/off service.

The HPCV has a single port body and a pneumatic spring actuator. This actuator is available in either pressure open PO (normally closed), or pressure closing actuators.

Because of the high pressure range, a Packing Box houses a non adjustable spring loaded teflon sleeve around the stem with a wiper felt and buna backups for leak free sealing.

CAUTION:

When ordered, the HPCV configuration and construction materials were selected to meet specific pressure, temperature, pressure drop and fluid conditions. Since some body / trim material combinations are limited in their pressure drop and temperature ranges, do not subject the pressure regulator to any other conditions without first contacting the Kimray Inc, sales office or a sales / applications representative.

WARNING:

DO NOT exceed the maximum pressure specified on the name plate. Under no circumstances should the regulator supply pressure ever exceed the maximum psig.

A4 Maintenance

Maintenance should be performed on a regular basis. Initial intervals of 12 months is recommended. The maintenance interval may increase or decrease depending on changing application environments. The valve can be repaired without being removed from the piping.

Related Publications

See catalog section E1 for product pages.

Abbreviations / Acronyms

The abbreviations that follow are used in this manual.

Term	Definition
PB	Piston Balanced
PO	Pressure Open
PC	Pressure Closed

Commonly Replaced Parts

- Trim Set
- Piston Assembly
- Diaphragm
- O-Ring
- Packing

Occasional Replacement Parts

- Body
- Spring

A5 Changes and Updates

NOTE:

To prevent galling or seizing at assembly level for straight threads Kimray recommends using a nickel impregnated paste. For other threads use a nickel impregnated PTFE thread sealant tape.

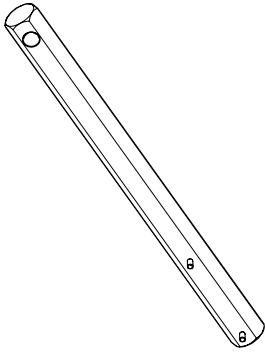
HIGH PRESSURE CONTROL VALVE

Model: PB, PO, PC

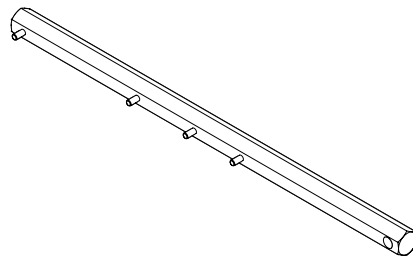
Installation, Operation & Maintenance Guide



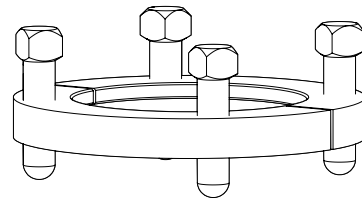
SPECIAL TOOLS AND EQUIPMENT



Seat Installation Tool	
6670	2 in.
6826	3 in.



Seat Installation Tool	
5561	4 in.
	6 in.
	8 in.



Kimray Upper Cage Puller Tool	
5296	2 in.
5297	3 in.
5298	4 in.
6402	6 in.
6651	8 in.

A6



Tip:
Kimray recommends using the above special tools and equipment for disassembly, assembly and new part replacements.

HIGH PRESSURE CONTROL VALVE

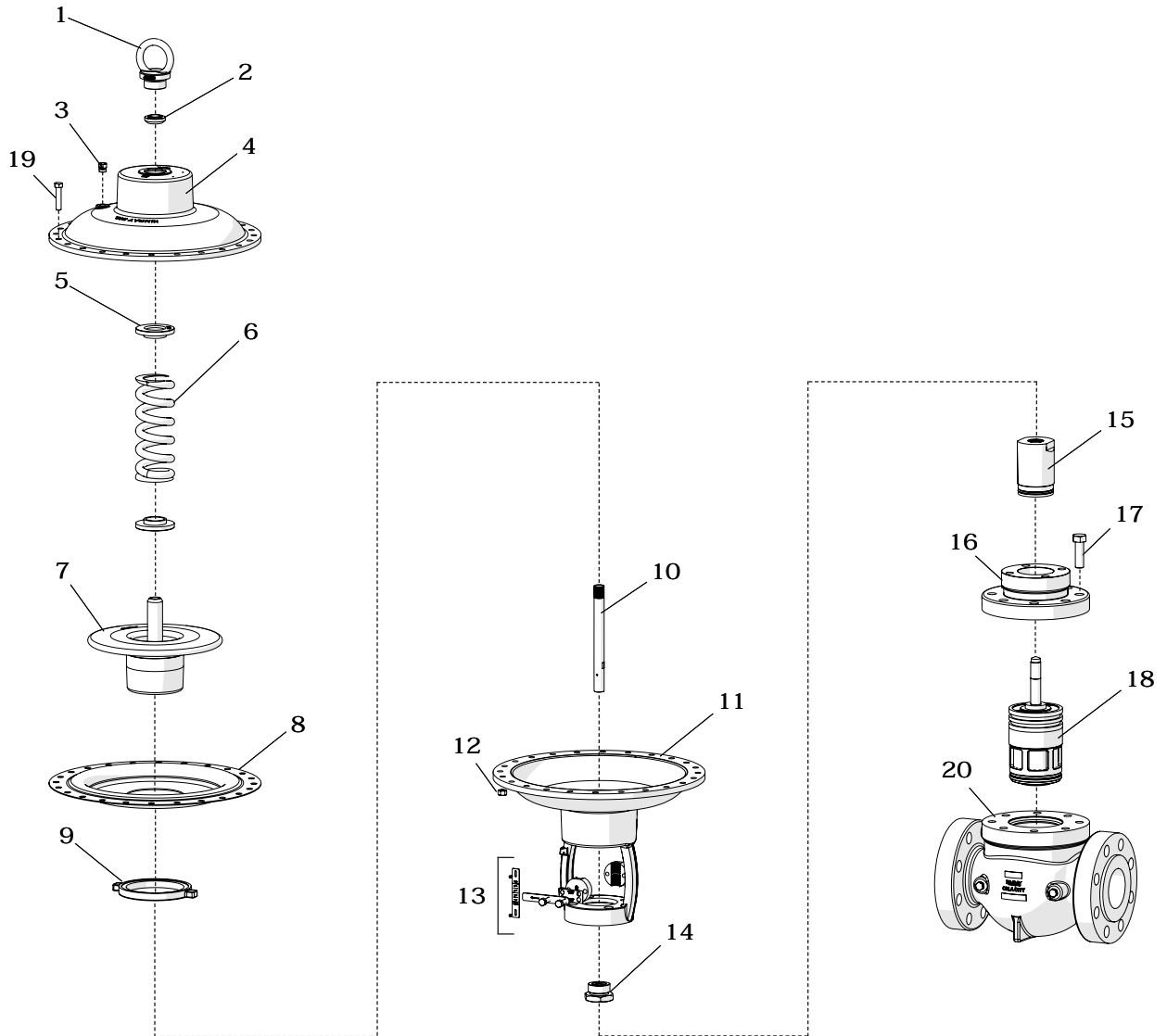
Model: PB, PO, PC

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ORIENTATION

Piston Balanced



A7

See catalog section E1 for additional information

1	Adjusting Screw	1
2	Pivot	1
3	Breather Plug	1
4	Bonnet	1
5	Spring Plate	2
6	Spring	1
7	Plate Assembly	1
8	Diaphragm	1
9	Ring	1
10	Upper Stem	1

11	Yoke	1
12	Nut	24
13	Travel Indicator Assembly	1
14	Lower Adjusting Screw	1
15	Packing Box	1
16	Upper Housing	1
17	Screw	8
18	Piston Assembly	1
19	Ring	24
20	Body	1

Kimray reserves the right to modify or improve the designs or specifications of such products at anytime without notice.

Model: **PB, PO, PC**

Installation, Operation & Maintenance Guide

1 Installation

Before installing the control valve, inspect it for shipment damage and for foreign material that may have collected during shipment. Inspect the openings in the valve and clean the pipe lines to remove scale, chips and debris.

1. Install the valve with the arrow on the body pointing in the direction of flow. The arrow indicates the direction of flow and will not necessarily prevent flow in the opposite direction.

The flow direction of the HPCV PB is up through the valve. The stem guided trim is down through the valve. If conditions indicate the possibility of back word flow, you may wish to install check valves.

2. Install the valve using good piping practice. For flanged bodies use a suitable gasket between the body and the pipeline flanges. For threaded (NPT) bodies, use TFE Tape or pipe thread sealant on external pipe threads.
3. Connect instrument gas to the actuator connection. The maximum required instrument gas pressure is 30 psig (2 bar); 45 psig (3 bar) is permissible.

CAUTION:

When ordered, the high pressure valve configuration and construction materials were selected to meet specific pressure, temperature, pressure drop and fluid conditions. Since some body/trim material combinations are limited in their pressure drop and temperature ranges, **DO NOT** subject the high pressure valve to any other conditions without first contacting the Kimray Inc, sales office or a sales/applications representative.

WARNING:

DO NOT exceed the maximum supply pressure specified on the HPCV nameplate. Under no circumstances should the HPCV supply pressure ever exceed the maximum psig.

Pressure Opening Valve

Remove the plastic stopper from the tapped hole in the underside of the bonnet. Install a 1/4" or 3/8" tube fitting (not provided). The tubing must be installed from your source of instrument gas. *The fitting at the top of the bonnet is a Breather Plug.*

Pressure Closing Valve

Remove the plastic stopper from the tapped hole in the top side of the bonnet. Install a 1/4" or 3/8" tube fitting (not provided).

The tubing must be installed from your source of instrument gas. The fitting in the lower half of the bonnet is a Breather Plug.

NOTE:

Never stand directly over or in front of a valve when the system is pressurized. The valve could suddenly open, blowing debris into the person's face and eyes.

2 Start-up and Test

With the installation completed and appropriate relief and check valves installed and set, slowly open the upstream and downstream shutoff valves. In order to test the function of the valve, allow only a small amount of upstream fluid to flow through the upstream shutoff valve. Check for proper valve operation by cycling the actuator arm several times.

WARNING:

Before any service, be certain that the valve is fully isolated and that all pressure upstream and downstream has been relieved. Use bypass valves or fully shut off the process. Be sure that any operating or instrument gas lines has been disconnected. Never assume that a check valve is fully blocking the downstream line. Never tighten any fitting or the main connections to the regulator while there is pressure on the line. A leaking valve indicates that service is required. Failure to take the valve out of service immediately may create a hazardous condition.

Verify all pressure connections are tight before pressurizing the system.

NOTE:

When a gasket seat is disturbed during disassembly a new gasket should be installed during re-assembly to ensure proper sealing.

Repair kits are available. See section E of catalog or the packing slip which is enclosed with each valve for the correct repair kit number.

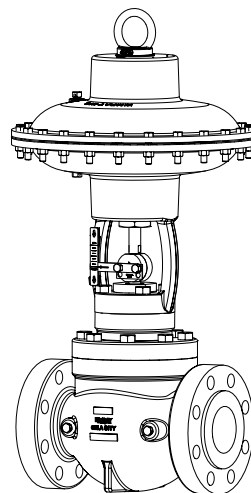


Fig. 2-1

DISASSEMBLY

3 Adjusting Screw, Pivot, Breather Plug, Bonnet

Use a wrench to remove the Adjusting Screw on top of the bonnet. See Fig. 3-1

Remove Pivot from Adjusting Screw. See Fig. 3-2



NOTE:
Sometimes the Pivot will separate from the Adjusting Screw and sit on top of the Spring Plate.

Remove the Breather Plug from Bonnet. See Fig. 3-3

Loosen the Bolts to remove the Bonnet. See Fig. 3-4

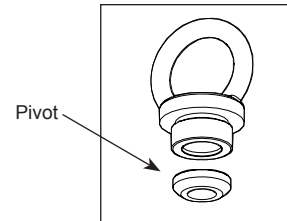


Fig. 3-2

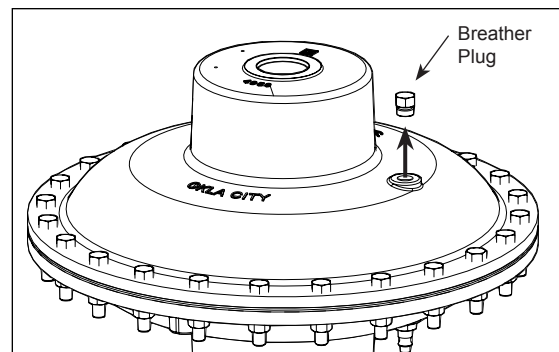


Fig. 3-3

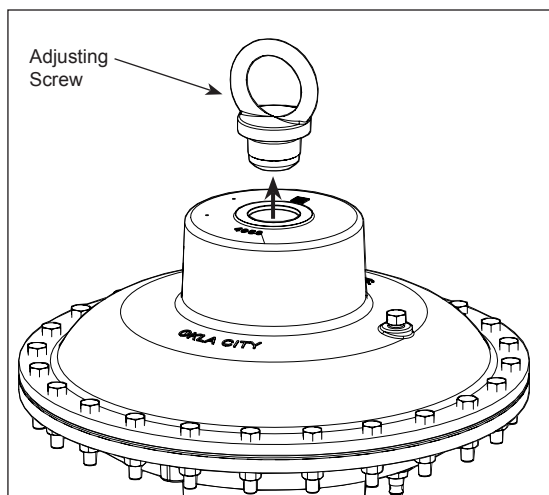


Fig. 3-1

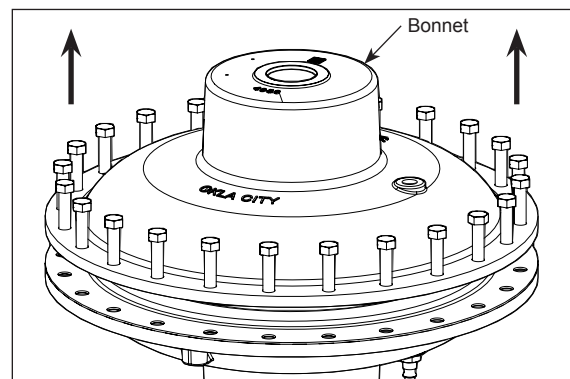


Fig. 3-4

Model: **PB, PO, PC**

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DISASSEMBLY

4 Travel Indicator

Remove the bolts from the Travel Indicator Block.
See Fig. 4-1

Remove the Block from the Stem.

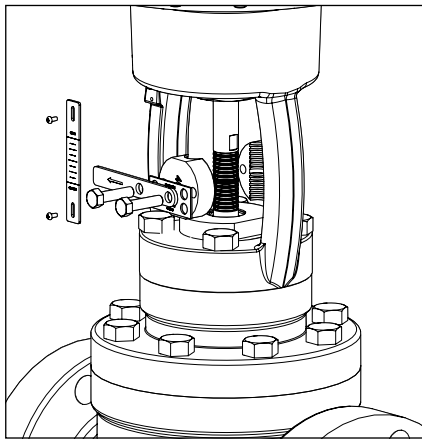


Fig. 4-1

5 Pivot, Spring Plate, Spring



NOTE:

Again sometimes the Pivot will separate from the Adjusting Screw and sit on top of the Spring Plate.

Remove Pivot from top of Spring Plate.

Remove Spring Plate.

Remove the Spring from the Pivot Sleeve. See Fig. 5-1

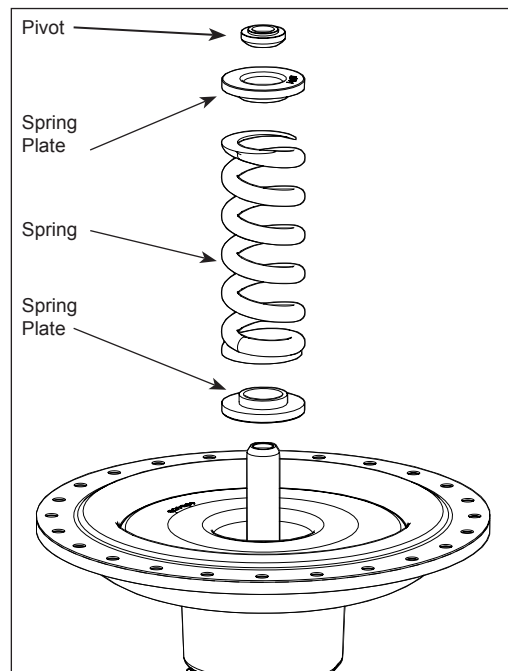


Fig. 5-1

DISASSEMBLY

6 Pivot Sleeve, Diaphragm Plate, Diaphragm Nut

Use a small adjustable wrench to hold the Upper Stem in place by the flats and spin the Diaphragm Plate in a counter clock wise direction loosening it from the Upper Stem. See Fig. 6-1



NOTE:

Peel the Diaphragm edge away from the Yoke, rotate the Diaphragm Assembly off the Upper Stem inside the Yoke See Fig. 6-1

Flip the Diaphragm Assembly over and remove the Diaphragm Nut, use a hammer and punch. See Fig. 6-2

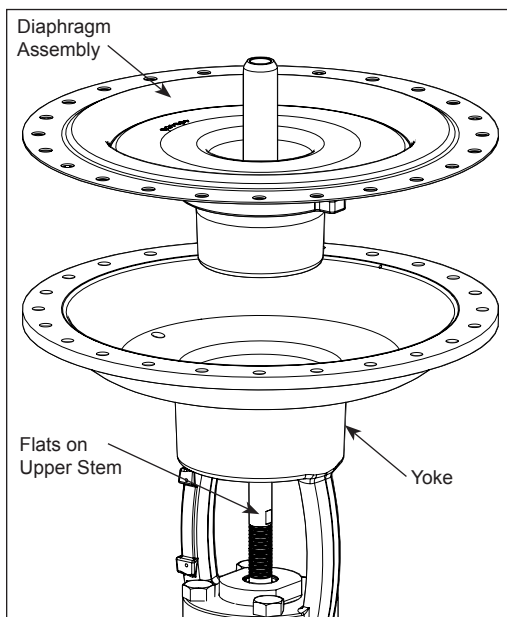


Fig. 6-1

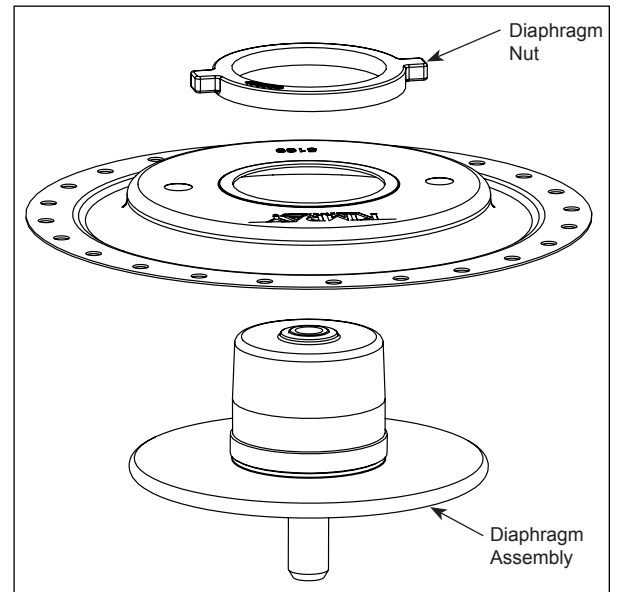


Fig. 6-2

Model: PB, PO, PC

Installation, Operation & Maintenance Guide

DISASSEMBLY

7 Yoke Assembly

Use a wrench to remove the Bolts from the Yoke base.

Slide Yoke up from the Upper Housing. See Fig. 7-1

Flip the Yoke upside down, then use a socket wrench to remove the Lower Adjusting Screw.

See Fig. 7-2

Slide out the Upper Stem from the Lower Adjusting Screw and remove the outside O-Ring from the Lower Adjusting Screw.

Remove O-Ring from the inside of the Lower Adjusting Screw.

Use a pair of snap ring pliers to remove the Snap Ring.

Remove the Retainer Washer.

Remove the Wiper from the Lower Adjusting Screw.

See Fig. 7-3

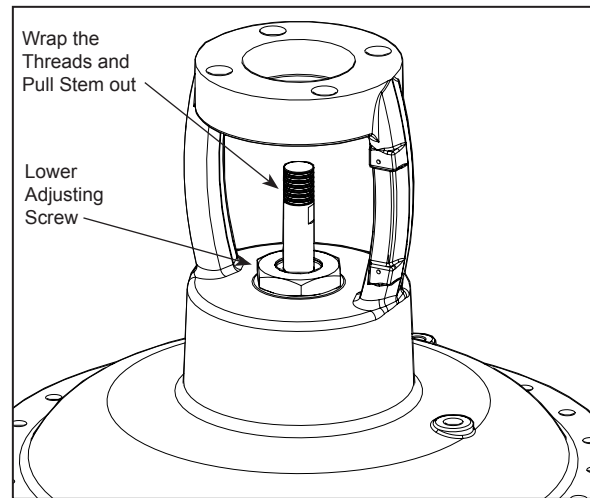


Fig. 7-2

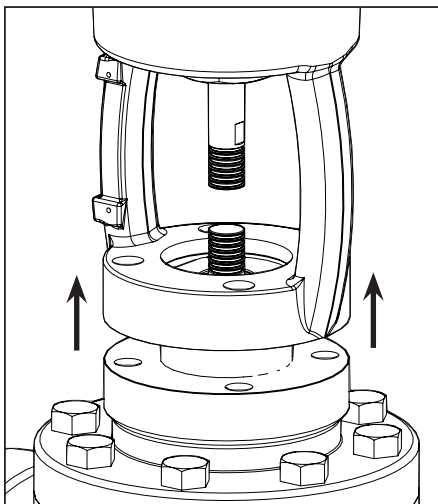


Fig. 7-1

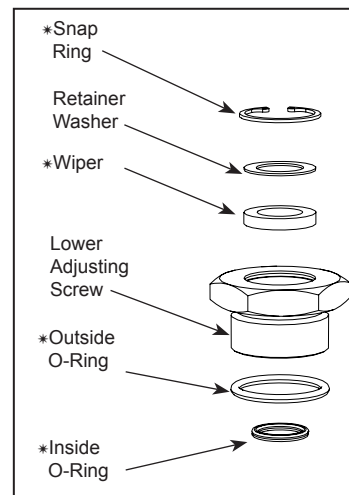


Fig. 7-3

DISASSEMBLY

8 Packing Box Removal

Wrench up on the flats machined into the Packing Box body and remove by turning counter-clockwise.

Remove Packing Box from the Upper Housing.
See Fig. 8-1

⚠ CAUTION:

When removing Packing Box from body, if pressure starts to exit out of weep hole than stop and check on isolation.

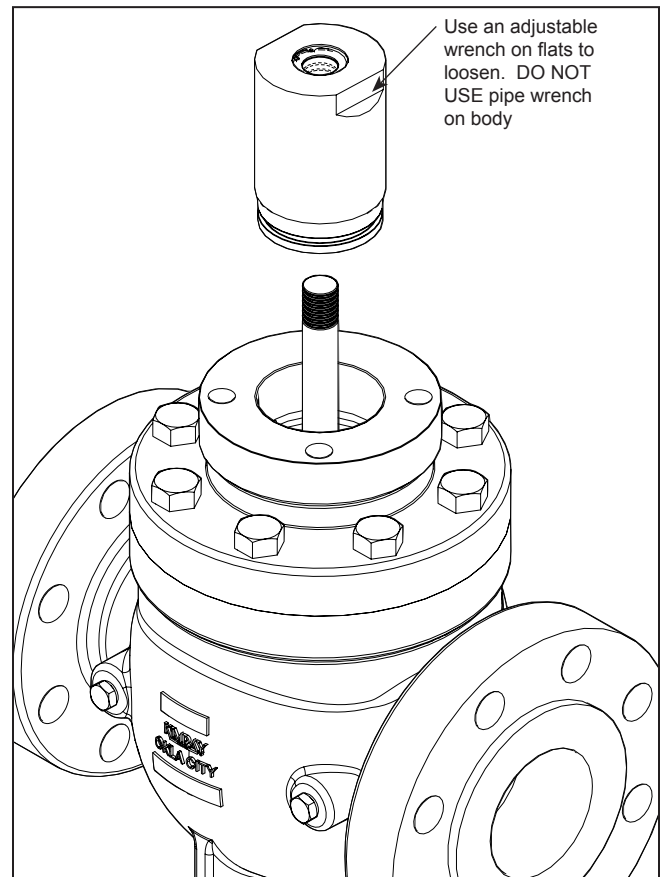


Fig. 8-1

Model: *PB, PO, PC*

Installation, Operation & Maintenance Guide

DISASSEMBLY

9 Packing Box

Disassembly

Remove Snap Ring (Item 1)

Remove Felt Retainer (Item 2)

Remove Felt Wiper (Item 3)

Remove Packing Box and
Packing Ring (Item 6)

Remove Packing Follower (Item 7)

Remove Spring (Item 8)



NOTE:

Using a punch, tap the Packing Rings and Sleeve through the bottom of the Packing Box.

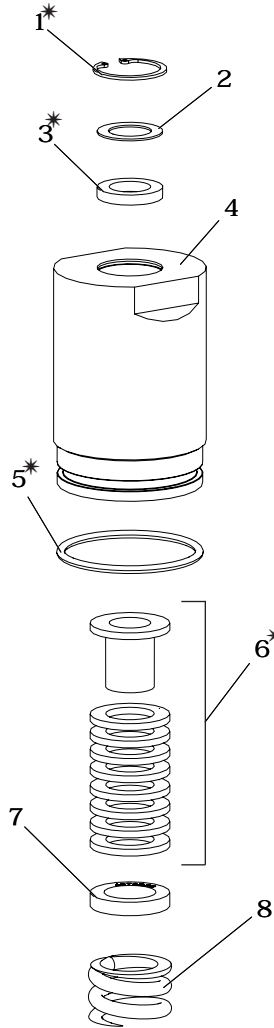


Fig. 9-1

Assembly

Check all parts for damages.



NOTE:

Apply all purpose grease to the inside of the Packing Box before inserting parts.

Insert new Felt Wiper (Item 3)

Insert new Felt Retainer (Item 2)

Insert new Snap Ring (Item 1)

Apply all purpose grease to the Packing Rings on the sides before inserting into the Packing Box (Item 6)

Use a socket to push the packing down.

Insert new Packing Follower (Item 7)

Reuse Spring (Item 8)

Fill the Packing Box with all purpose grease using a brush or grease gun before inserting the spring.



Tip:

Use Kimray replacement parts only.

* Recommended spare parts and stocked as repair kits

1	Ring, Snap *	1
2	Felt Retainer	1
3	Wiper, Felt *	1
4	Stuffing Box	1
5	O-Ring Buna-N *	1
6	Packing Rings and Sleeve *	1
7	Packing Follower	1
8	Packing Spring	1

DISASSEMBLY

10 Piston Assembly

Disassembly

Remove O-Rings from the outside Cage grooves (Item 1)

Remove Cage (Item 2) from Piston (Item 5)

Remove Back Up Rings from Cage (2 Req'd), (Item 3).

Remove Quad Ring (Item 4)

Remove Piston Assembly (Item 5)

Remove O-Ring (Item 6)

Remove Seat Disc (Item 7)

Remove O-Ring (Item 8)

Remove Ratio Plug (Item 9)

Remove Screw (Item 10)

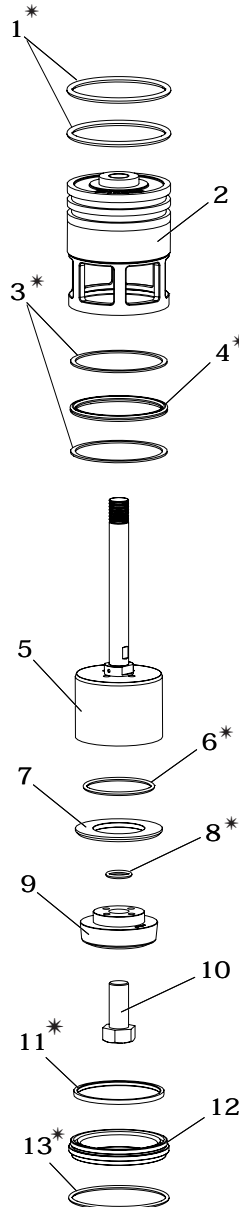
Remove Seal Ring (Item 11)

Remove Seat (Item 12)

Remove O-Ring from Seat (Item 13)



Tip:
Use Kimray replacement parts only.



Assembly

Insert O-Rings into the outside Cage grooves and grease the outside of the O-Rings with a brush. (Item 1)

Install Quad and Back Up Rings into Cage Assembly (Item 4)

Insert (Items 6, 7, 8, 9, 10, 11) into (Item 5)

Slide Cage Assembly onto Piston Assembly.

Place (Item 12) onto the Piston Assembly (Item 5)



NOTE:

Place (Item 13) O-Ring onto (Item 12) Seat, finger tighten into (Item 12) Ratio Plug holding onto Piston Assembly wrench flats.

Use brass jaws to hold the Piston Assembly in vice.

Align holes in Piston with holes in Ratio Plug.

Use a socket to tighten the Ratio Plug Screw.

Use all purpose grease to the outside Piston surface with a brush.

Insert Piston into Cage.

Press Seal Ring (Item 11) into Seat (Item 12)

Screw Seat (Item 12) onto Cage.

Install O-Ring (Item 13) onto Seat (Item 12)

Fig. 10-1

* Recommended spare parts and stocked as repair kits

1	O-Ring *	2
2	Cage Assembly	1
3	Back Up *	2
4	Quad Ring *	1
5	Piston	1
6	O-Ring *	1
7	Seat Disc	1

8	O-Ring *	1
9	Ratio Plug	1
10	Screw	1
11	Seal Ring *	1
12	Seat	1
13	O-Ring *	1

Model: *PB, PO, PC*

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INSPECTION

11 Inspection & Cleaning

NOTE:

This is one of the most affected parts due to the severe impact of the particles that flow through the valve. Most of the time these parts can be repaired by cleaning and wire brushing both the inside and outside threads.

Cage, Piston Rod, Piston See Fig. 11-1

NOTE:

If the valve is improperly disassembled, there is a high possibility that the Cage is out of round.

Replace if the Cage has lost its shape.

Replace the Piston if the parts present corrosion on the outside surface.

Seat

Check for scoring or scratches on the inside diameter. If the seal shows any indication of leakage. See Fig. 11-2

Ratio Plug

Replace if there are scratches, corrosion and wear. See Fig. 11-3

Body

Replace the O-Ring.

Inspect the O.D. threads for nicks, burrs and flats.

Inspect the I.D. threads for nicks, burrs and flats.

A thread repair tool may be used for light damage.

See Fig. 11-4

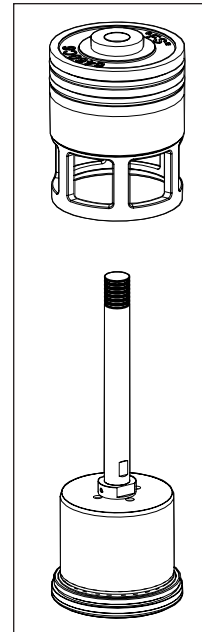


Fig. 11-1

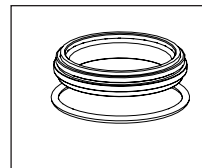


Fig. 11-2

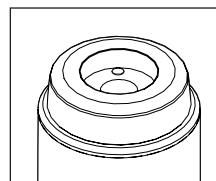


Fig. 11-3

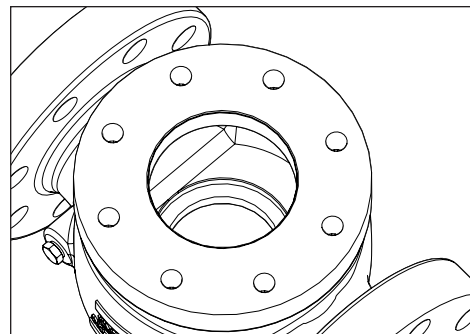


Fig. 11-4

ASSEMBLY**12 Seat Insertion****12-1 Seat**

Use all purpose grease on the seat surface inside the body. See Fig.12-1

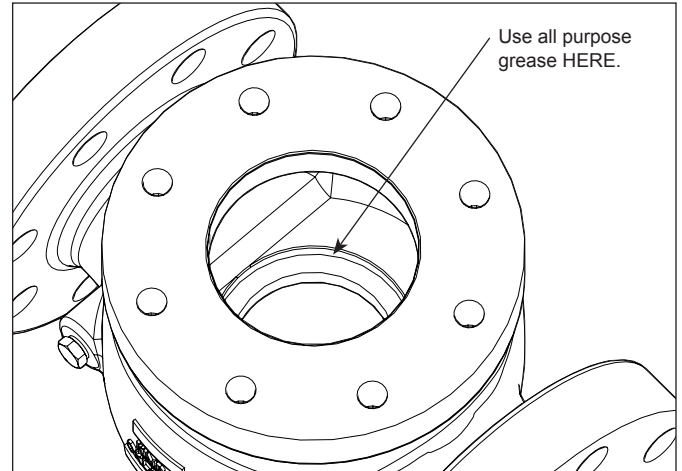


Fig. 12-1

Model: PB, PO, PC

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ASSEMBLY

13 Upper Housing

Place Upper Housing onto Body Fig. 13-1

Make sure the safety relief hole is facing tapped holes on body.



NOTE:

Make sure you tighten the bolts in a criss-cross pattern to avoid any miss alignment. DO NOT OVER TIGHTEN. For 2in., 3in., 4in., 6in., 8in., and 10in. tighten bolts from 25-30 ft/lbs torque. See Fig. 13-2

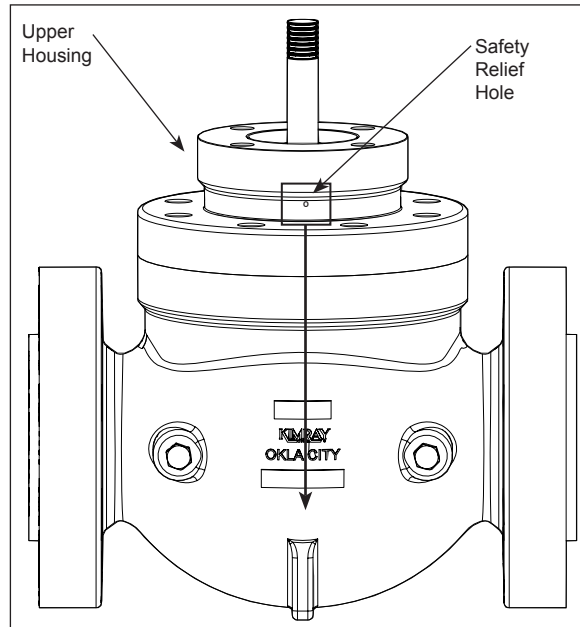


Fig. 13-1

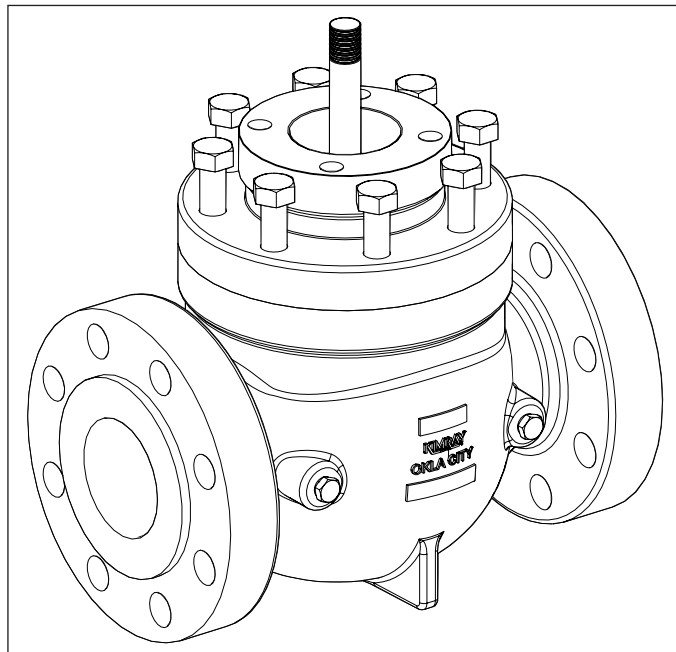


Fig. 13-1

ASSEMBLY

14 Packing Box Assembly

Fill the Packing Box with all purpose grease.

Apply all purpose grease on the outside of the Packing Box. DO NOT apply grease on the outer threads.

Clean male and female threads thoroughly.



NOTE:

To prevent galling or seizing use a nickel impregnated paste on threads. See Fig. 14-1

Insert Packing Box into the Upper Housing. See Fig. 14-1

Use an adjustable wrench on flats for tightening Packing Box. DO NOT use pipe wrench on body. DO NOT OVER TIGHTEN. See Fig. 14-2

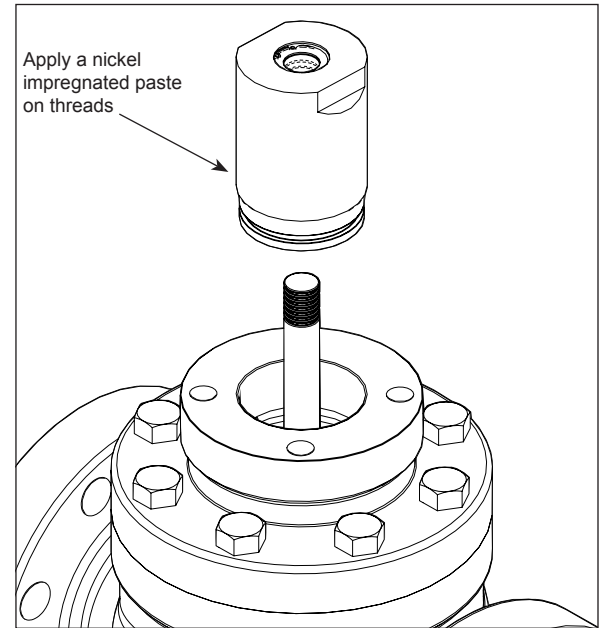


Fig. 14-1

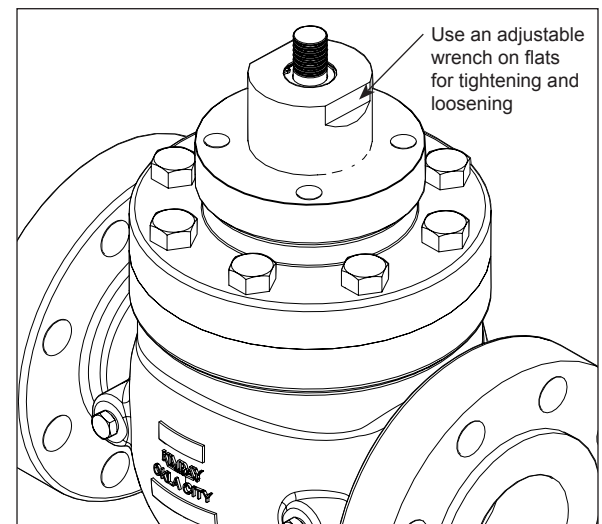


Fig. 14-2

Model: PB, PO, PC

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ASSEMBLY

15 Diaphragm Assembly

Use brass jaws to hold the Diaphragm Plate in a vice.

Place Diaphragm on Diaphragm Plate. See Fig. 15-1

Thread Diaphragm Nut on Diaphragm Plate.



NOTE:

Make sure the Diaphragm does not wrinkle.

Insert Diaphragm Assembly in the center of the Yoke.
See Fig. 15-2

Use an adjustable wrench to hold the Upper Stem while
tightening the Diaphragm Plate.

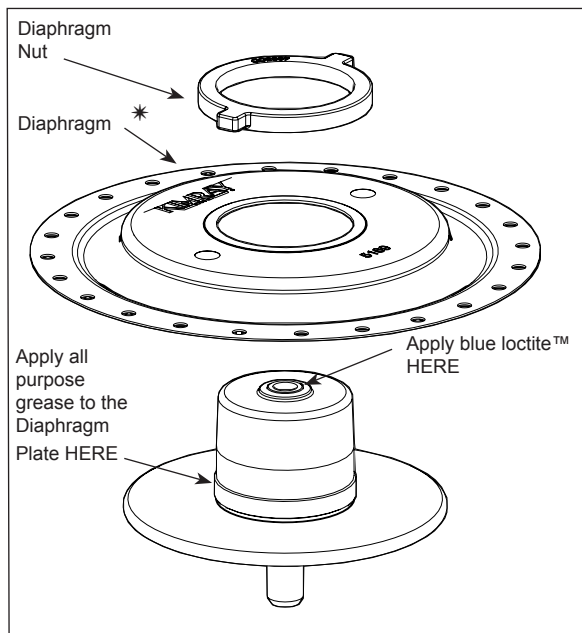


Fig. 15-1

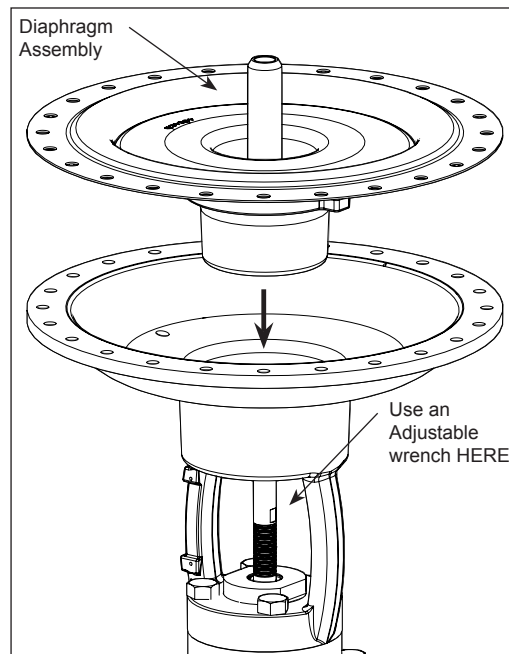


Fig. 15-2

ASSEMBLY

16 Internal Yoke Assembly

Place the Yoke on top of the Body.

Insert bolts and tighten with a wrench.

Use a brush to grease the Upper Stem. See Fig. 16-1

Slide the Spring Plate on the Pivot Sleeve. See Fig. 16-2

Slide the Spring on the Pivot Sleeve.

Place the second Spring Plate on top of the Spring.

Place Bonnet on top of internal Spring Assembly and insert screws. See Fig. 16-3

! NOTE:

Make sure you tighten the bolts in a criss-cross pattern to avoid any miss alignment. DO NOT OVER TIGHTEN. Tighten bolts from 25-30 ft/lbs torque. See Fig. 16-3

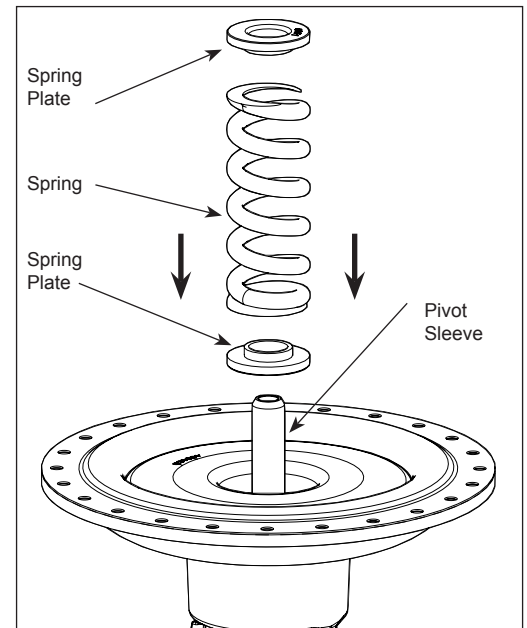


Fig. 16-2

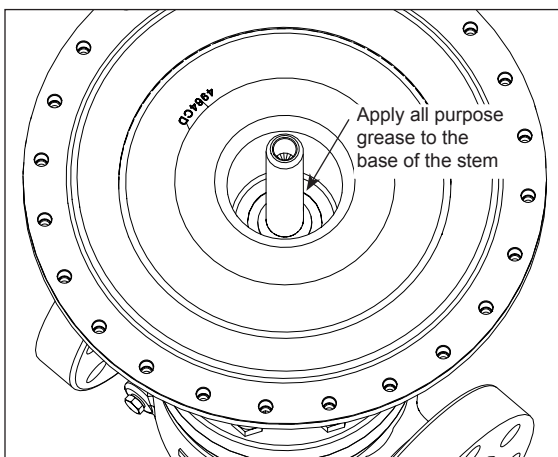


Fig. 16-1

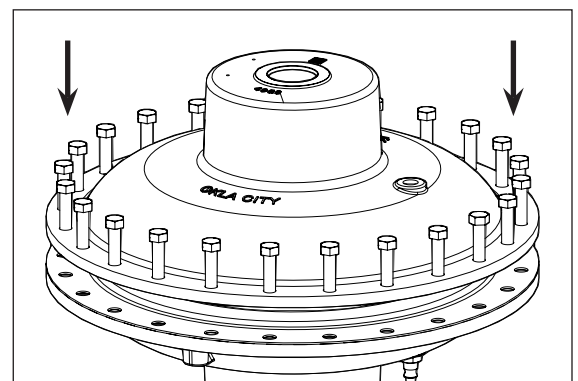


Fig. 16-3

Model: **PB, PO, PC**

Installation, Operation & Maintenance Guide

ASSEMBLY

17 Pressure Closed

NOTE:

For pressure closed, flip Diaphragm Assembly upside down and place onto Yoke. See Fig. 17-4

Insert bolts in Bonnet and tighten.

DO NOT OVER TIGHTEN.

Insert Upper Adjusting Screw on top of Bonnet and tighten. **DO NOT OVER TIGHTEN.** See Fig. 17-5

Insert Breather Plug. See Fig. 17-6

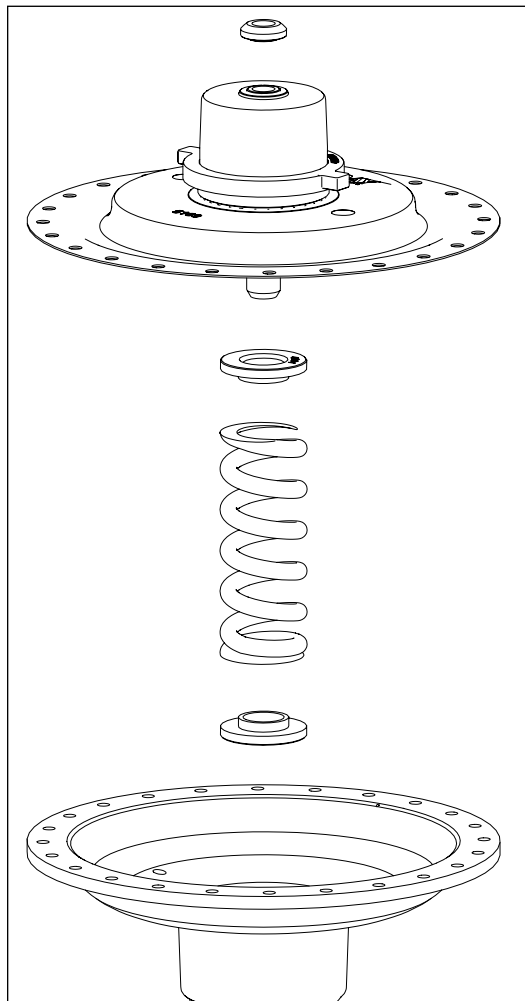


Fig. 17-4

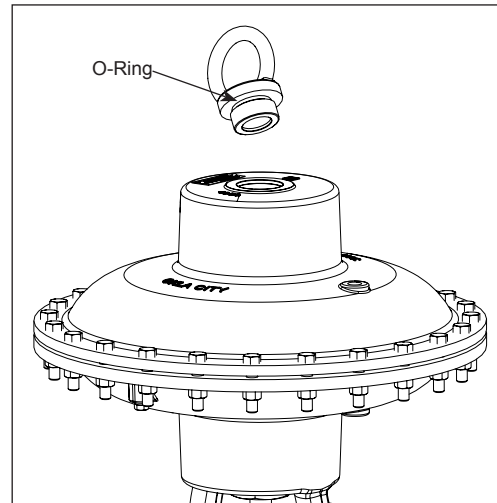


Fig. 17-5

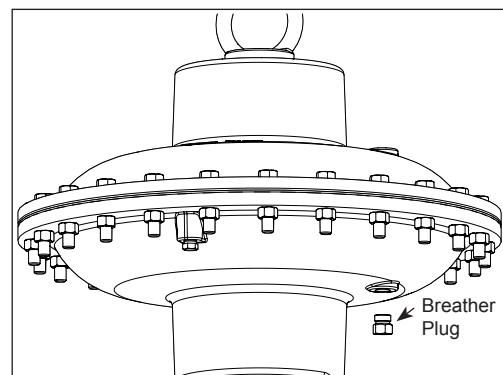


Fig. 17-6

ASSEMBLY

18 Travel Indicator

Forward the Indicator Scale and line up the bottom "closed" line with the arrow on the Indicator. Use two drive screws to install it on the Yoke using a ball peen hammer.



NOTE:

Make sure the Travel Indicator Tag shows the correct operation of the valve either PO or PC.

Insert Breather Plug.

When assembling the Coupling Block, make sure the flats are on top together.

Place the threaded half block on back side.
See Fig. 18-1

Tighten the bolts in the Coupling Block with a socket.

In this case we are converting from pressure opening to pressure close. See Fig. 18-2

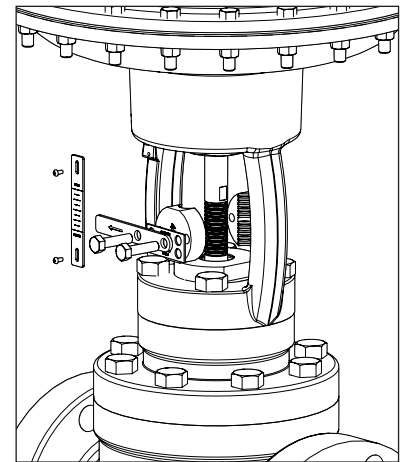


Fig. 18-1

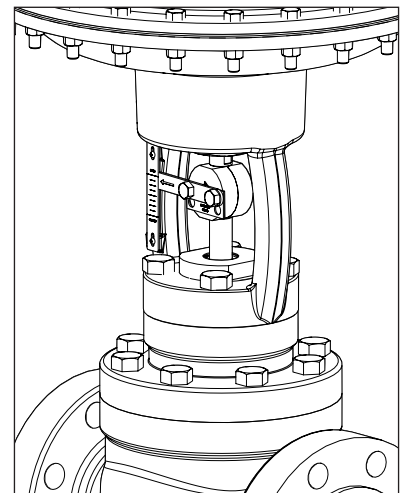


Fig. 18-2

Model: *PB, PO, PC*
 Installation, Operation & Maintenance Guide

TESTING

19 High Pressure Control Valve Testing

Use a Male Nipple and install in the pressure port on the Yoke as shown in Fig. 19-1. Test the valve following assembly test procedure.

Supply Pressure: **30 psi**.

Supply Connection: A device that will reduce your regulator end to any air supply connection.

NOTE:

When testing, it is important to have the test valve fixture screwed onto the valve.

Apply air supply pressure (**do not exceed 45 psi**) on Yoke. This will open the valve and will pressurize to bottom part of the Diaphragm.

Spray a soapy solution on the interface between the Bonnet, Yoke and Lower Adjusting Screw to check for any leakage.

Check Travel Indicator. See Fig. 19-2

Install the Nameplate on top of the Bonnet with two drive screws and a ball peen hammer.

Replace the Male Nipple with a Blue Plug and thread it in the 1/4" NPT of the Yoke. See Fig. 19-3

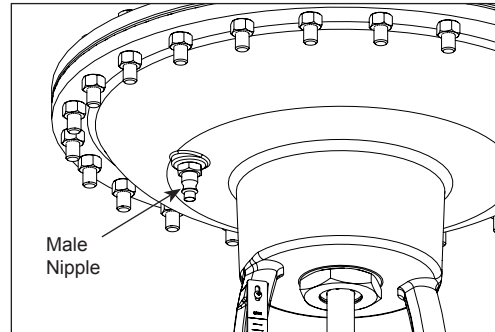


Fig. 19-1

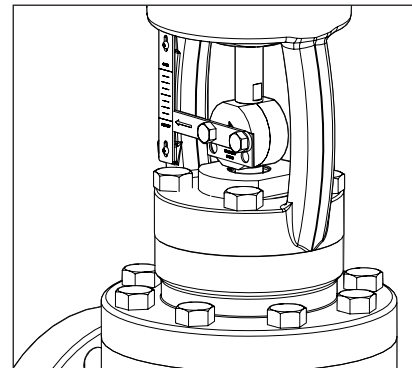


Fig. 19-2

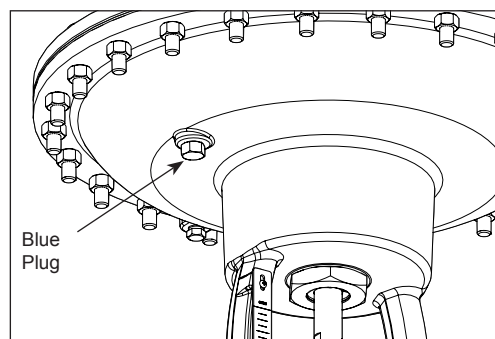


Fig. 19-3

Troubleshooting

Fluid leaking from Packing Box	Packing Box nut loose. Teflon packing worn.	Tighten packing until leaking stops. Replace packing.
Valve leaks when closed	Tape or sealant stuck in valve. Soft seat worn. Removable seat worn.	Disassemble and clean seat & diaphragm. Replace seat. Loosen packing nut to free shaft.
Erratic Operation	Packing Box nut too tight. Soft seat leaking. Diaphragms hardened. Wet supply	Loosen stuffing box nut. Inspect for deformations or obstructions in seat. Replace seat.

Kimray is an ISO 9001- certified manufacturer.
Kimray quality assurance process maintains strict controls
of materials and the certification of parts used in Kimray HPCV.

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