



## HIGH PRESSURE MOTOR VALVE

Models HPMV PO, HPMV PC

Instruction Manual: IME1-HPMV



HPMV PO  
Cast Steel  
Normally Closed



HPMV ANGLE BODY  
Cast Steel  
Normally Closed

### SCOPE:

This instruction manual includes installation, operation, and parts information for the 1" and 2" Kimray High Pressure Control Valves. Refer to separate manuals for instructions covering actuators, controllers, maintenance, and accessories.

Only trained and qualified individuals should attempt to install, operate, or maintain any Kimray products or accessories. The following instructions should be reviewed and completely understood before attempting any installation, operation, or maintenance. If you have any concerns or questions about these instructions, contact your Kimray sales office before proceeding.

### AVAILABLE MODELS:

Connection Size: 1", 2"  
Connection Style: NPT, Flanged, and RTJ  
Body Style: Angle or Through  
Actuation: Pressure opening or  
Pressure closing  
Body Material: Cast Steel, ASTM A216WB  
Bonnet Material: Ductile Iron, ASTM A395

### DESCRIPTION:

The High Pressure Motor Valve, Model HPMV, is designed for use in liquid and gas control applications which require modulating (throttling) or on/off service. The HPMV has a single port body and a pneumatic spring actuator.

The actuator is available in either Pressure Opening (normally closed), or Pressure Closing (normally open) configurations. Valve model designations indicate PO for Pressure Opening or PC for pressure closing actuators.

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

The Model HPMV is a diaphragm operated control valve featuring equal percentage, nominal, or on/off trims. Multiple trim sizes are available to accommodate a variety of flow requirements. The trim is a ball and cone style that uses a metal to metal seating surface for a Class IV shut off.

A name tag is attached to the upper bonnet housing on each valve. The name tag lists the serial number, model number, and pressure rating.

When servicing valves, always use only Kimray replacement parts. For specific model numbers, part numbers, and repair kit numbers, refer to the Kimray Catalog, Section E1, or to the packing slip which is enclosed with each valve.



# HIGH PRESSURE MOTOR VALVE

Models HPMV PO, HPMV PC

## SPECIFICATIONS:

**Normal Service:** Liquids or Gas

### Features:

- Equal Percentage trim for throttling service
- Snap Trim for on / off service
- Nominal Trim
- 30 psi maximum diaphragm pressure
- Class IV seat
- Available in Angle or Through body
- Non Lube stem seal
- Multiple trim sizes available
- Available in Pressure Open or Pressure Closing
- Field reversible topworks

### Construction Materials:

Item	Standard	Optional
	A216-WCB	316SS6 Stainless
Cage	AISI 12-L14	316SS6 Stainless
Stem	303 Stainless	316SS6 Stainless
Plug	Chrome alloy	316SS6 Stainless
Seat	Carbide	316SS6 Stainless
Stuffing Box	AISI 12-L4	316SS6 Stainless
Bonnet	ASTM-A395	
Diaphragm	Nitrile/Nylon	Viton
O-rings	Nitrile	
Packing	PTFE	

## Body, Connections & Pressure Ratings

Size				
1"	NPT	4000 psig	96 bar	
		150 RF	285 psig	19 bar
		300 RF	740 psig	51 bar
		600 RF	1480 psig	102 bar
		900 RF	2220 psig	153 bar
		1500 RF	3705 psig	255 bar
		150 RTJ	285 psig	19 bar
		300 RTJ	740 psig	51 bar
		600 RTJ	1480 psig	102 bar
		1500 RTJ	3705 psig	255 bar
2"	NPT	4000 psig	96 bar	
		150 RF	285 psig	19 bar
		300 RF	740 psig	51 bar
		600 RF	1480 psig	102 bar
		900 RF	2220 psig	153 bar
		1500 RF	3705 psig	255 bar
		150 RTJ	285 psig	19 bar
		300 RTJ	740 psig	51 bar
		600 RTJ	1480 psig	102 bar
		1500 RTJ	3705 psig	255 bar

## INSTALLATION:

### BEFORE INSTALLATION:

Be sure you fully understand the application, operation, and connection of the device before installing.

### WARNING:

Only trained personnel should install or service a control valve. Control valves and other control devices should be installed, operated, and maintained in accordance with international codes and regulations, manufacturer's instructions, and proven best practices.

Personal injury, equipment damage, property damage, leakage, or bursting of pressure-containing parts may result if the valve is over-pressured or installed where service conditions could exceed the limits given in the SPECIFICATIONS section.

Overpressure protection should also be provided if the valve inlet pressure may exceed the safe working pressure of the equipment downstream.

To avoid injury or damage, install pressure-relieving or pressure limiting devices to prevent service conditions from exceeding those limits. Consult the appropriate code, regulations, or standards.

Consideration should be given to the potential risk of injury or property damage due to escaping fluid. To avoid such risks, install the regulator in a safe location.

1. Inspect the openings in the valve for foreign material and clean the pipe lines to remove scale, chips, and debris.
2. Install the valve with the arrow on the body pointing in the direction of flow. The arrow signifies that the device will operate properly in the direction of flow indicated and will not necessarily prevent flow in the opposite direction.

The flow direction of the HPMV with ball and cone trim is DOWN through the valve. If conditions indicate the possibility of backward flow you may wish to install check valves.

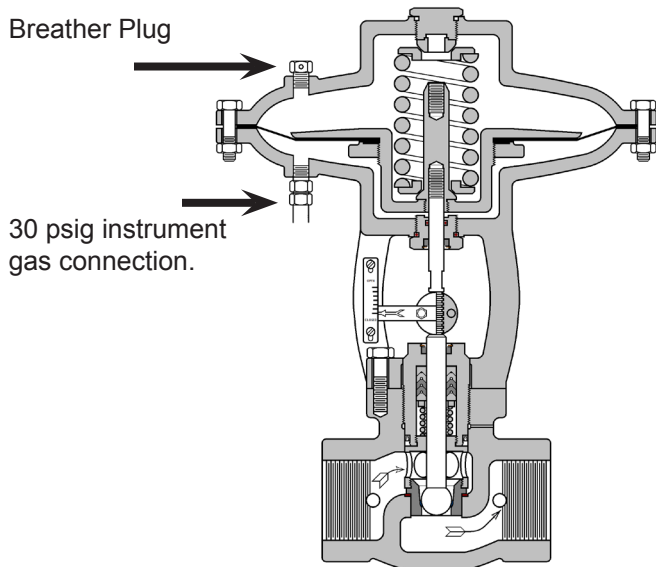
A person should never stand directly over or in front of a valve when the system is pressurized. Never look directly into a valve in a pressurized system. The valve could suddenly open, blowing gas, dirt, metal particles, or other debris into the person's face and eyes.

3. 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.

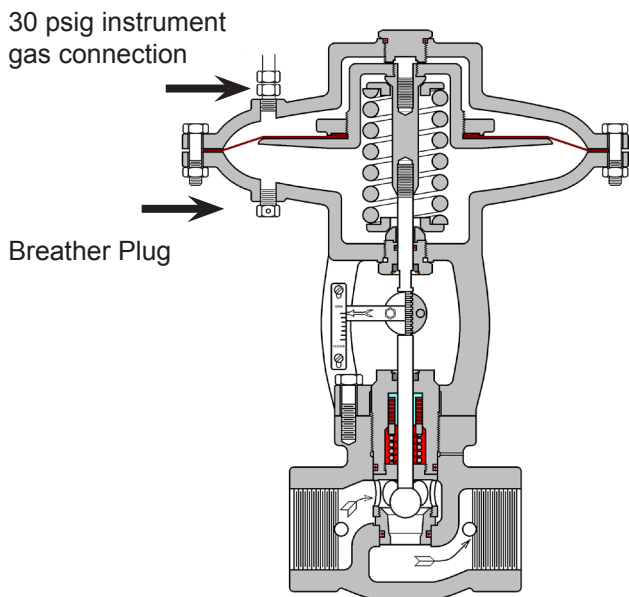
The flange bodies are rated ANSI class. Do not install the valve in a system where the working pressure can exceed ANSI class rating.

4. Connect instrument gas to the actuator connection. The maximum required instrument gas pressure is 30 psig (2bar); 45 psig (3bar) is permissible.

**PRESSURE OPENING VALVE:** Remove the plastic stopper from the tapped hole in the under side of the bonnet. Install a tubing fitting ( not provided ). 1/4" or 3/8" tubing ( not provided ) 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 on the top side of the bonnet. Install a tubing fitting ( not provided ). 1/4" or 3/8" tubing ( not provided ) must be installed from your source of instrument gas. The fitting in the lower half of the bonnet is a breather plug.



**START-UP & 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 several times.

**WARNING:**

Before performing any service, be sure 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 have been disconnected.

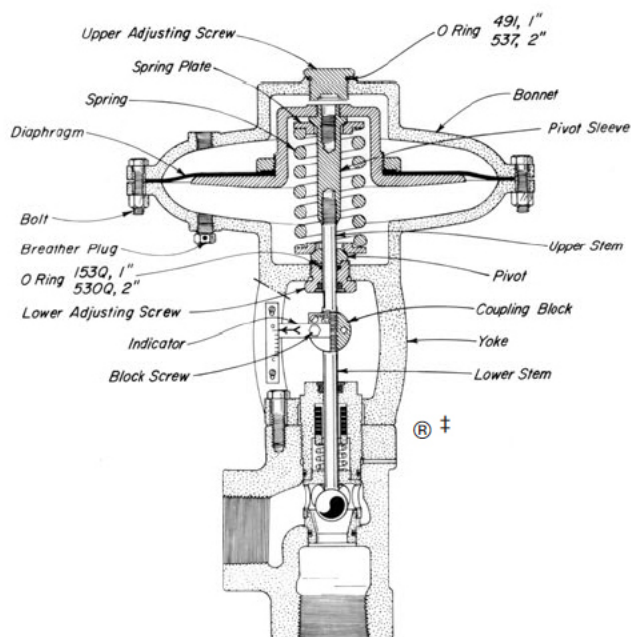
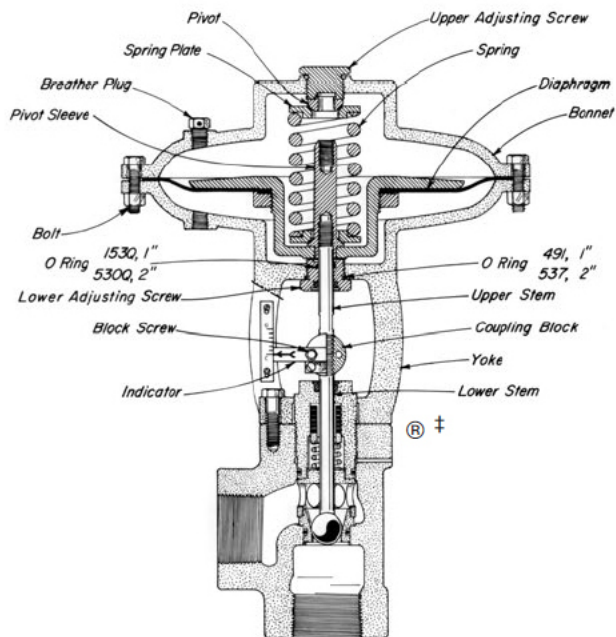
Never assume that a check valve is fully blocking the downstream line.

Never tighten any fitting or the main connections to the valve while there is pressure on the line.

**TROUBLE SHOOTING:**

SYMPTOM	POSSIBLE CAUSE
Fluid leaking from stem	Stem packing or stem itself is worn.
Valve will not cycle when instrument air is applied to actuator	Diaphragm is ruptured or torn. Diaphragm plate is loose. Actuator vent is plugged. Upper stem is loose from sleeve.
Valve leaks when closed	Upper adjustment screw loose. Quad ring around upper stem is rolled. Tape or sealant stuck in valve around cage, seat, or ball. Actuator pressure not vented all the way. Plug and seat contact surfaces may be worn or damaged.
Instrument air leaks from actuator bonnet	Actuator diaphragm is torn or ruptured. Diaphragm nut is loose around diaphragm plate. Bonnet bolts are loose. O-ring around lower adjustment screw is torn on PO valve. O-ring around upper adjustment screw is torn on PC valve.
Valve stem movement is sticky or jerky.	Valve stem could be bent. Quad ring around upper stem is rolled.
Valve does not open all the way.	Actuator has 3 spring options, use 30 psi instrument gas. High pressure drops across valve require more actuator force, increase instrument supply pressure. Do not exceed 45 psi.

CONVERSION INSTRUCTIONS



**PRESSURE CLOSING to PRESSURE OPENING:**

Remove BLOCK SCREWS, TRAVEL INDICATOR and COUPLING BLOCK. Remove UPPER ADJUSTING SCREW, BOLTS, and BONNET. Lift out Diaphragm Assembly (Crosshatched). Remove SPRING, SPRING PLATES and PIVOT. Remove LOWER ADJUSTING SCREW. Remove O RINGS, 491 - 1", 537 - 2", from UPPER ADJUSTING SCREW, and inserting in grooves provided in the LOWER ADJUSTING SCREW. Unscrew UPPER STEM and insert in opposite end of PIVOT SLEEVE.

Replace LOWER ADJUSTING SCREW and tighten against YOKE. O RING 491 - 1", 537 - 2", provides the necessary pressure seal. Invert Diaphragm Assembly and replace. Care should be taken when threading the UPPER STEM through the LOWER ADJUSTING SCREW so as not to damage O RING, 153Q - 1", 530Q - 2". Pour approximately one-eighth pint of light weight motor Oil in housing under DIAPHRAGM to provided lubrication for O RING, 153Q - 1", 530Q - 2". Replace SPRING with a SPRING PLATE in each end. UPPER ADJUSTING SCREW opening Thread UPPER ADJUSTING SCREW into BONNET until contact is made with the PIVOT, then tighten two turns. The UPPER ADJUSTING SCREW now becomes the SPRING adjustment. With BLOCK SCREWS through INDICATOR, replace COUPLING BLOCK matching match marks. Move BREATHER PLUG to BONNET (upper Diaphragm Housing). Connect Diaphragm Pressure from PILOT to YOKE (Lower Diaphragm Housing).

**PRESSURE OPENING to PRESSURE CLOSING:**

Remove BLOCK SCREWS, TRAVEL INDICATOR and COUPLING BLOCK. Remove UPPER ADJUSTING SCREW, BOLTS, and BONNET. Lift out Diaphragm Assembly (Crosshatched). Remove SPRING, SPRING PLATES and PIVOT. lift out the Diaphragm Assembly (Crosshatched). Rotate Diaphragm Assembly when pulling UPPER STEM through LOWER ADJUSTING SCREW so as not to damage O RING, 153Q - 1", and 530Q - 2".

Remove LOWER ADJUSTING SCREW. Remove O RINGS, 491 - 1", 537 - 2", from LOWER ADJUSTING SCREW and insert in grooves provided in UPPER ADJUSTING SCREW. Replace UPPER ADJUSTING SCREW in BONNET and tighten. O RING, 491 - 1", 537 - 2", provides the necessary pressure seal. Unscrew UPPER STEM and replace in opposite end of PIVOT SLEEVE.

Using COUPLING BLOCK, pull LOWER STEM up to open position. Thread LOWER ADJUSTING SCREW in YOKE until end is flush with inside surface of YOKE. Set PIVOT on top of LOWER ADJUSTING SCREW with the beveled surface up. Replace SPRING with a SPRING PLATE in each end.

Invert Diaphragm Assembly from its original position and replace. Be sure UPPER STEM and LOWER STEM meet. With BLOCK SCREWS through INDICATOR, replace COUPLING BLOCK matching match marks. Replace BONNET and BOLTS and INDICATOR is in "Open" position, then tighten one turn. Move BREATHER PLUG to YOKE (Lower Diaphragm Housing). Connect Diaphragm Pressure from PILOT to BONNET (Upper Diaphragm Housing).



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## MAINTENANCE:

Maintenance should be performed on a regular basis. An initial inspection interval of 12 months is recommended. Depending on the service conditions of the valve, the inspection interval may be decreased or increased.

**WARNING:** If the valve leaks fluid, it indicates that service is required. Failure to take the valve out of service immediately may create a hazardous condition.

The valve can be repaired without being removed from the piping.

Detailed repair instructions are available for your specific valve.

Repair Kits are available. Consult the Kimray Catalog, Section E1, or the packing slip which is enclosed with each valve for the correct Repair Kit number.

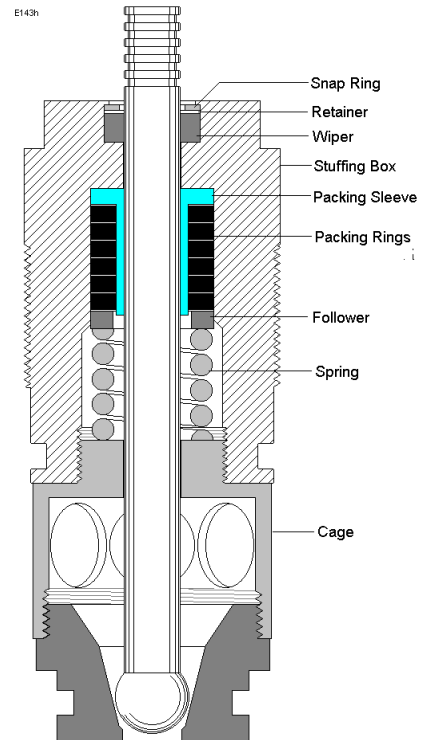
## INSPECTION SCHEDULE:

Valve Trim (Seat, Plug, Cage, and Stuffing Box)	Inspect every 6 months under normal service and conditions. Under severe service conditions such as sand, corrosion, salt, or high pressure drop, inspect every 2 months until a predictable pattern can be established. Check seating surface where ball meets cone seat for erosion. This could cause valve to leak when shut.
Seals	Should be replaced every time valve is disassembled. Check for cracks or if the seals feel hard.
Body	Under normal conditions, the body will last many years. Severe conditions will require inspection more frequently. The body should be inspected every time valve trim is inspected. Valve flow is down. If erosion is bad consider an angle body to prevent wear.
Actuator	Inspect spring, stem, and diaphragm once a year.
Bonnet	Inspect once a year with actuator.

\* Under severe operating conditions the following maintenance schedule will not be adequate and a shorter time schedule may be required.

## STUFFING BOX ASSEMBLY:

The stuffing box assembly is designed to seal around the stem in order to prevent fluids flowing through the valve from leaking to the atmosphere. Periodic maintenance is required depending on wear due to service conditions.



STANDARD STUFFING BOX ASSEMBLY

## Packing Maintenance:

1. If fluids are leaking from around the stem, the packing material should be replaced.
2. Kimray's stuffing box require no adjustment due to the spring providing continuous sealing pressure.
3. Never remove stem from the stuffing box assembly without removing the cage first. This will prevent any scoring or gouging of Teflon seal sleeve.
4. Always check stem for any scratches or marks that could cause leaks and replace as necessary.
5. Always check seating surface of stem to seat and replace when necessary when working on stuffing box.



# HIGH PRESSURE MOTOR VALVE

Models HPMV PO, HPMV PC

## TRIM OPTIONS:

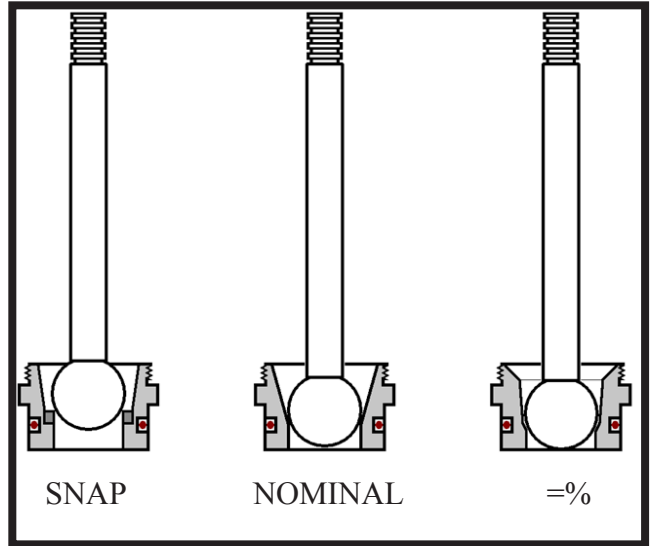
### AVAILABLE INNER VALVE SIZES:

Different trim sizes are available in order to custom tailor the valve to be responsive to flow conditions. It is always recommended to size required flow capacity and select a trim size accordingly.

1" HPMV	1/8", 3/16", 1/4", 3/8", 1/2"
2" HPMV	1/4", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1"

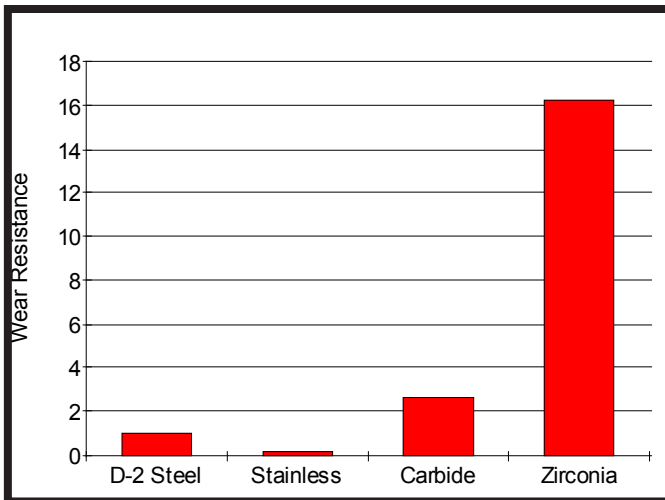
### TRIM MATERIALS:

D-2 (tool steel)	Standard material for all seats
Stainless (316SS6 and 17-4ph)	Used for sour and other corrosive service and special applications that are not erosive or abrasive
Carbide	For snap acting trim only and has very good wear resistance.
Zirconia	For special application in high abrasive and erosive environments. Zirconia is also a great choice for sour and corrosive service.



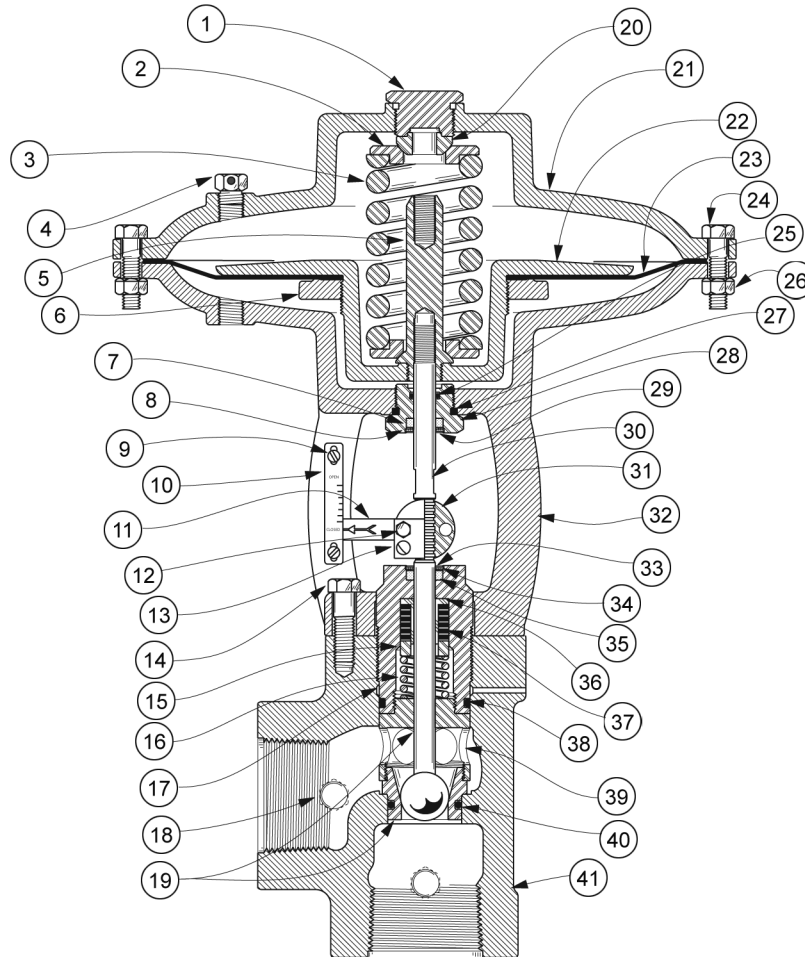
### TRIM CHARACTERISTICS:

<b>Snap (quick opening)</b>	For on/off service, usually liquid dump application. Snap trim will have a carbide ring brazed in the bottom of the seat and the stem ball will have one lapping ring around it.
<b>Nominal</b>	On/off service or regulation. The seat will have one angle and the stem ball will have one lapping ring around it.
<b>Equal Percentage (=%)</b>	For precise control of set pressure. Any valve required to control a set point or is used for a regulator, must have =% trim. Equal percentage trim will have 2 angles in the seat and the stem ball will have 2 lapping rings around it.



### STEM TRAVEL

1" HPMV- 1/2" maximum  
2" HPMV- 3/4" maximum



This is a general representation of a High Pressure Motor Valve including 1" and 2" models. For specific parts and their orientation refer to the Kimray Catalog or the packing slip which is enclosed with each regulator.

Key Description

1. Adjustment screw
2. Spring Plate
3. Spring
4. Breather Plug
5. Pivot Sleeve
6. Diaphragm Nut
7. Wiper
8. Retainer
9. Screw
10. Indicator Scale
11. Travel indicator
12. Screw
13. Tag
14. Screw

Key Description

15. Follower
16. Spring
17. Stuffing Box
18. Plug
19. Inner Valve
20. Pivot
21. Bonnet
22. Plate
23. Diaphragm
24. Screw
25. O Ring
26. Nut
27. O Ring
28. Lower Adjusting Screw

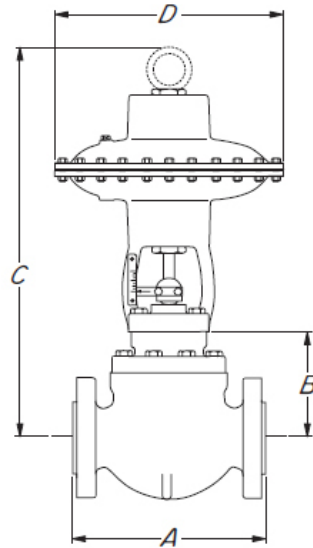
Key Description

29. Snap Ring
30. Upper Stem
31. Block
32. Yoke
33. Snap Ring
34. Retainer
35. Wiper
36. Packing Sleeve
37. Packing Ring
38. O Ring
39. Cage
40. O Ring
41. Body



# HIGH PRESSURE MOTOR VALVE

Models HPMV PO, HPMV PC



STANDARD	SIZE	BODY STYLE	A	B	C	D
	1 "	150RF		8 3/16"	1 15/16"	10 1/2"
150RTJ			8 3/16"	1 15/16"	10 1/2"	9 1/8"
300RF			8 3/4"	1 15/16"	10 1/2"	9 1/8"
300RTJ			8 3/4"	1 15/16"	10 1/2"	9 1/8"
600RF			8 1/2"	1 15/16"	10 1/2"	9 1/8"
600RTJ			8 1/2"	1 15/16"	10 1/2"	9 1/8"
1500RF			9 29/32"	1 15/16"	10 1/2"	9 1/8"
1500RTJ			9 29/32"	1 15/16"	10 1/2"	9 1/8"
2 "	150RF		10 1/4"	3 3/16"	14 1/2"	12 7/8"
	150RTJ		12 3/8"	3 3/16"	14 1/2"	12 7/8"
	300RF		10 1/2"	3 3/16"	14 1/2"	12 7/8"
	300RTJ		11 1/8"	3 3/16"	14 1/2"	12 7/8"
	600RF		11 1/4"	3 3/16"	14 1/2"	12 7/8"
	600RTJ		11 3/8"	3 3/16"	14 1/2"	12 7/8"
	1500RF		12 1/4"	3 3/16"	14 1/2"	12 7/8"
	1500RTJ		12 3/8"	3 3/16"	14 1/2"	12 7/8"