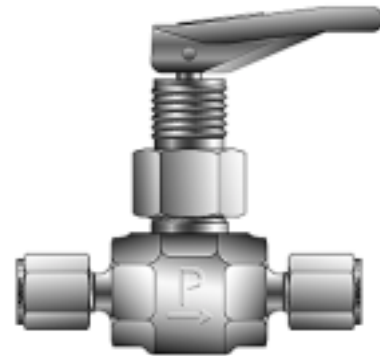


VQ Series Needle Valve



MAXIMUM WORKING PRESSURE AND TEMPERATURE

Valve Size	Max Pressure and Temperature	Max Temperature and Pressure
V4Q	300 Psig at 70 °F 2.1 MPa at 21 °C	300 Psig at 200 °F 2.1 MPa at 93 °C
V6Q	300 Psig at 70 °F 2.1 MPa at 21 °C	300 Psig at 200 °F 2.1 MPa at 93 °C

Always consult your authorized Parker representative if questions arise. The arrow on the Valve Body indicates the normal direction of flow.

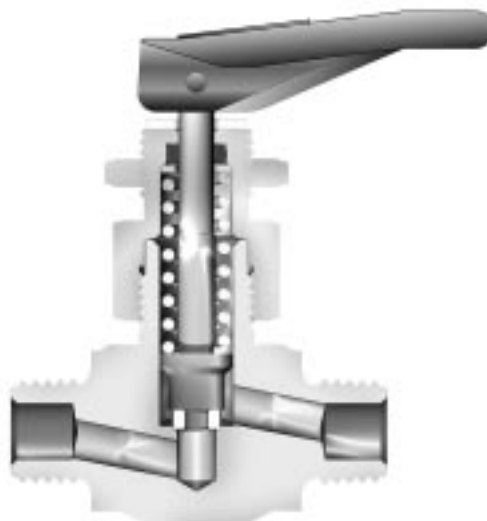


Figure 1: VQ Series Toggle Needle Valve Cross Sectional View

PANEL MOUNTED VALVES

The panel must have a through-hole of the proper diameter as listed below:

V4Q Valves 33/64 inch (13.1 mm)

V6Q Valves 41/64 inch (16.3 mm)

The maximum panel thickness is 1/4 inch (6.4 mm). When the Valve is to be mounted to a thin panel, a spacer (or washer) may be necessary to permit full Panel Nut engagement on the Valve. It is not necessary to disassemble the Valve for panel mounting.

1. Actuate the Handle up to the “open” position, such that it is parallel with the Valve Stem.
2. Insert the Valve through the hole in the panel, and assemble the Panel Nut onto the Cap until the Panel Nut is finger-tight.
3. Tighten the Panel Nut with the correct sized wrench as specified below:
V4Q Valves 11/16 inch hex wrench
V6Q Valves 13/16 inch hex wrench
4. Actuate the Handle back to the “closed” position, such that it is at right-angles with respect to the Valve Stem.

USE OF THE (OPTIONAL) HANDLE POSITIONER

Assemble the positioner in the same manner as the Panel Nut. The positioner intentionally fits tightly on the valve and should be wrench tightened with the proper sized wrench as noted below:

V4Q Valves 5/8 inch hex wrench

V6Q Valves 3/4 inch hex wrench

When using the handle positioner and a panel mounting valve, the maximum panel thickness is 1/8 inch (3.2 mm). Whenever assembling the handle positioner, make certain it is screwed onto the valve far enough to allow the valve to fully close. This is evident by a visible gap between the handle and the slot in the positioner, and the lever handle will feel loose.

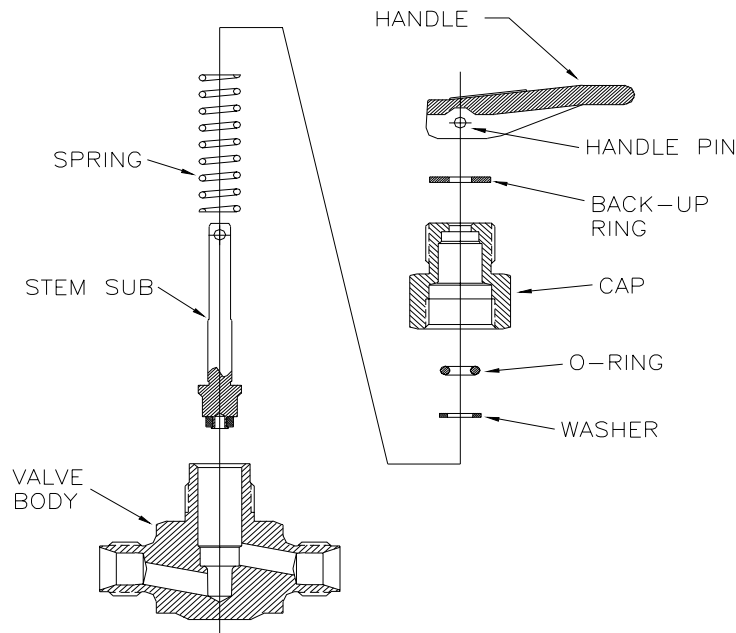


Figure 2: VQ Series Toggle Needle Valve Exploded View

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the Toggle Needle Valve Maintenance Kit being used is appropriate for the Valve's size, Stem Seat, and service requirements. Always contact your authorized Parker representative if any questions arise.
2. Open the Valve by actuating the Handle such that it is parallel to the Valve Stem.
3. Remove the Panel Nut (if applicable) by turning counter-clockwise with the appropriate wrench:
V4Q 11/16 inch hex wrench
V6Q 3/16 inch hex wrench
4. Remove the Valve from its mounting panel (if applicable).
5. Close the valve, then remove and discard the Handle Spring Pin by lightly tapping the Spring Pin with a 3/64 inch diameter punch. Gently remove the Handle by pulling it from the Stem.
6. Refer to Figure 2. Remove the Handle Washer located directly above the Cap. Set this piece aside for later reassembly.
7. Remove the Cap by turning counter-clockwise with the appropriate wrench as noted below:
V4Q 5/8 inch hex wrench
V6Q 3/4 inch hex wrench
8. Gently remove the Stem Sub-Assembly and components from the Cap.
9. Remove the Stem Washer and Spring. Discard the Stem Washer.
10. Remove and discard the Stem O-Ring.
11. Discard the Stem Sub-Assembly.

REASSEMBLY

1. Make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.
 2. Apply a liberal amount of lubricant, as consistent with the valve's service requirements, to the Stem O-Ring. Always contact your authorized Parker representative if questions arise.
 3. Refer to Figure 2. Stack the components listed below on the Stem Sub-Assembly in the following order, with the first item being placed directly above the landing on the Stem.
 - A) Spring
 - B) Stem Washer
 - C) O-Ring, lubricated.
 4. Gently insert the modified Stem Sub-Assembly (from Step 3) through the stem hole in the Cap until the modified Stem Sub-Assembly has bottomed-out in the Cap. **NOTE:** Exercise extreme care not to damage the O-Ring.
 5. Install the Cap on the Body by turning clockwise until two or three threads are engaged, and torque as follows:

Valve Size	Brass Valve Bodies	Stainless Steel Bodies
V4Q	100 in-lbs (11.3 N-m)	175 in-lbs (19.7 N-m)
V6Q	100 in-lbs (11.3 N-m)	300 in-lbs ((33.8 N-m)
 6. Place the Handle Washer over the Stem.
 7. Install the Handle on the Stem at right-angles with respect to the Stem. Align the Handle's pin-attachment hole with the corresponding hole in the Stem.
 8. Gently install the Spring Pin in the Handle's pin-attachment hole.
- NOTE:** A minimum gap of 1/32 inch (0.03125) must exist between the Handle and Handle Washer.
9. Actuate the Toggle Valve Handle through at least one (1) "Open and Close" cycle to verify proper operation of the Handle.
 10. Rebuild the Toggle Valve if it exhibits rough or irregular Handle operation. Always contact your authorized Parker representative if questions arise.
 11. Place the Valve in its mounting panel hole, if applicable, by turning the Panel Nut clockwise with the appropriate wrench.
V4Q 11/16 inch hex wrench
V6Q 13/16 inch hex wrench

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

A -Two ferrule A-LOK®
compression port



Z -Single ferrule CPI™
compression port



F -ANSI/ASME B1.20.1
Internal pipe threads



V -VacuSeal face
seal port



Q -UltraSeal face
seal port



M -ANSI/ASME B1.20.1
External pipe threads



WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

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VQ-11 Series Needle Valve



MAXIMUM ALLOWABLE WORKING PRESSURE AND TEMPERATURE

Valve Size	Specifications	
V4	Normally Open Normally Closed Double Acting	Actuator Pressure: 75 Psig (.52 MPa) 75 Psig (.52 MPa) 55 Psig (.38 MPa)
	Normally Open Normally Closed Double Acting	System Pressure: 450 Psig @ 70 °F (3.1 MPa @ 21 °C) 600 Psig @ 70 °F (4.1 MPa @ 21 °C) 450 Psig @ 70 °F (3.1 MPa @ 21 °C)
V6	Normally Open Normally Closed Double Acting	Actuator Pressure: 75 Psig (.52 MPa) 75 Psig (.52 MPa) 55 Psig (.38 MPa)
	Normally Open Normally Closed Double Acting	System Pressure: 450 Psig @ 70 °F (3.1 MPa @ 21 °C) 500 Psig @ 70 °F (3.4 MPa @ 21 °C) 450 Psig @ 70 °F (3.1 MPa @ 21 °C)

Always consult your authorized Parker representative if questions arise. The arrow on the Valve Body indicates the normal direction of flow.

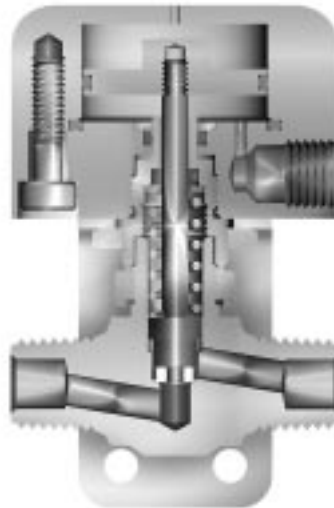


Figure 1: VQ-11AC Series Actuated Valve Cross Sectional View

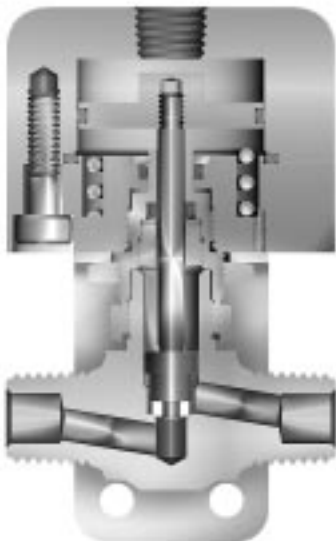


Figure 2: VQ-11AO Series Actuated Valve Cross Sectional View

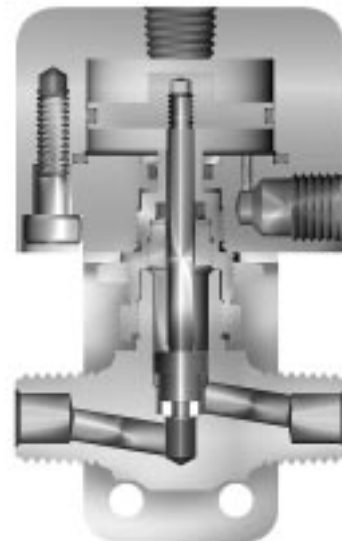


Figure 3: VQ-11AD Series Actuated Valve Cross Sectional View

AIR ACTUATOR CONNECTIONS

1. Air Actuator ports are 1/8-27 NPT internal female pipe threads. When making pipe thread connections to the air actuator, use a high quality pipe joint compound or PTFE tape made for this purpose. PTFE tape should not be overhanging or covering the first external pipe thread.
2. Engage the external pipe connection into the actuator, hand tight.
3. With a proper wrench, continue to tighten the connection to a leak tight joint.
4. It is recommended that no wrenching be applied to the actuator during this make-up but, rather be held firmly by hand. If clamping of the actuator for make-up is unavoidable, be certain the entire actuator length (or height) is supported to avoid crushing.

NOTE: Installation of this 1/8-27 NPT Port may be achieved by loosening the lock-nut located under the actuator with a 1 inch hex wrench. Rotate the actuator by hand in a counter-clockwise direction until the proper port alignment is realized but never more than one full turn; retighten the lock-nut to 25 in-lbs (2.8 N-m).

NORMALLY CLOSED VALVE (11AC) STEM AND O-RING REPLACEMENT

Disassembly

MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURES BEFORE VALVE DISASSEMBLE OR REMOVAL OCCURS.

1. Loosen the Lock Nut with a 1 inch hex wrench and remove the Bracket.
2. Pressurize the Air Actuator with 60 psig to open the valve before disassembling the valve.
3. Remove the Bonnet/Actuator Assembly by unthreading from the Valve Body using the appropriate wrench:
 V4Q 5/8 inch hex wrench
 V6Q 7/8 inch hex wrench
4. Relieve the air pressure from the Air Actuator.
5. Remove the three Socket Head Screws on the Actuator using a 5/32 inch Allen wrench.
6. Remove the Actuator Cap from the Actuator Assembly.
7. Disengage the Piston by unthreading with a 1/4 inch hex wrench on the Piston flats while holding the Stem flats with a 1/4 inch hex wrench.
8. Remove the Stem and Spring from the Bonnet.
9. Remove the Washer and O-Ring from the Bonnet.

Reassembly

MAKE CERTAIN THAT ALL PARTS ARE FREE OF DIRT OR OTHER CONTAMINANTS BEFORE REASSEMBLY.

1. Apply a liberal amount of lubricant, as consistent with the valve's service requirements, to the new O-Ring. Always contact your Parker representative if questions arise.
2. Place the new O-Ring and Washer into the Bonnet
3. Carefully insert the Spring and Bonnet making sure not to damage the O-Ring.
4. Apply a drop of Loctite 222 or equivalent to the Stem threads.
5. Thread the Stem into the Piston and torque to 12 in-lb.
6. Ensure the Piston O-Ring and the Body seal O-Ring are properly installed and lubricated.
7. Carefully install the Actuator Cap to ensure the O-Rings are not damaged. Re-install and torque the three screws to 15 in-lb.
8. Pressurize the Air Actuator with 60 psi before torquing the Bonnet/Actuator Assembly to the body.
9. Apply lubricant to the leading edge and threads of the valve body. Thread the body into the Bonnet/Actuator Assembly and torque accordingly:

Valve Size	Brass Bodies	Stainless Steel Bodies
V4Q	100 in-lbs (11.3 N-m)	175 in-lbs (19.7 N-m)
V6Q	100 in-lbs (11.3 N-m)	300 in-lbs (33.9 N-m)

10. Place the Bracket between the Panel Nut and the Actuator Body.
11. Installation alignment of the 1/8-27 NPT port may be achieved by rotating the Actuator Body by hand in a counter-clockwise direction, but never more than one full turn. Torque the Panel Nut to 25 in-lbs.

NORMALLY OPEN VALVE (11AO) STEM AND O-RING REPLACEMENT

Disassembly

MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURES BEFORE VALVE DISASSEMBLY OR REMOVAL OCCURS.

1. Loosen the Lock Nut with a 1 inch hex wrench and remove the Bracket.
2. Remove the Bonnet/Actuator Assembly by unthreading from the Valve Body using the appropriate wrench:
V4Q 5/8 inch hex wrench
V6Q 7/8 inch hex wrench
3. Remove the three Socket Head Screws on the Actuator using a 5/32 inch Allen wrench.
4. Remove the Actuator Cap from the Actuator Assembly.
5. Disengage the Piston by unthreading with a 1/4 inch hex wrench on the Piston flats while holding the Stem flats with a 1/4 inch hex wrench. **EXERCISE CARE TO AVOID INJURY AND DAMAGE FROM THE COMPRESSED SPRING.**
6. Remove the Stem and Spring from the Bonnet.
7. Remove the Threaded Insert from the Bonnet with a screwdriver.
8. Remove the Washer and O-Ring from the Bonnet.

Reassembly

MAKE CERTAIN THAT ALL PARTS ARE FREE OF DIRT OR OTHER CONTAMINANTS BEFORE REASSEMBLY.

1. Apply a liberal amount of lubricant, as consistent with the valve's service requirements, to the new O-Ring. Always contact your Parker representative if questions arise.
2. Place the new O-Ring and Washer into the Bonnet.
3. Fully engage the Threaded Insert into the bonnet. Carefully insert the Stem into the Bonnet making sure not to damage the O-Ring.
4. Apply a drop of Loctite 222 or equivalent to the Stem threads.
5. Place the Spring into the Actuator Body.
6. Thread the Stem into the Piston and torque to 12 in-lb.
7. Ensure the Piston O-Ring and the Body seal O-Ring are properly installed and lubricated.
8. Carefully install the Actuator Cap to ensure the O-Rings are not damaged. Re-install and torque the three screws to 15 in-lb.
9. Apply lubricant to the leading edge and threads of the valve body. Thread the body into the Bonnet/Actuator Assembly and torque accordingly:

Valve Size	Brass Bodies	Stainless Steel Bodies
V4Q	100 in-lbs (11.3 N-m)	175 in-lbs (19.7 N-m)
V6Q	100 in-lbs (11.3 N-m)	300 in-lbs (33.9 N-m)

10. Place the Bracket between the Panel Nut and the Actuator Body.
11. Ensure the Actuator Body is properly bottomed on the Bonnet and torque the Lock Nut with 25 in-lbs.

DOUBLE ACTING VALVE (11AD) STEM AND O-RING REPLACEMENT

Disassembly

MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURES BEFORE VALVE DISASSEMBLY OR REMOVAL OCCURS.

1. Loosen the Lock Nut with a 1 inch hex wrench and remove the Bracket.
2. Remove the Bonnet/Actuator Assembly by unthreading from the Valve Body using the appropriate wrench:
V4Q 5/8 inch hex wrench
V6Q 7/8 inch hex wrench
3. Remove the three Socket Head Screws on the Actuator using a 5/32 inch Allen wrench.
4. Remove the Actuator Cap from the Actuator Assembly.
5. Disengage the Piston by unthreading with a 1/4 inch hex wrench on the Piston flats while holding the Stem flats with a 1/4 inch hex wrench.
6. Remove the Stem from the Bonnet.
7. Remove the Threaded Insert from the Bonnet with a screwdriver.
8. Remove the Washer and O-Ring from the Bonnet.

Reassembly

MAKE CERTAIN THAT ALL PARTS ARE FREE OF DIRT OR OTHER CONTAMINANTS BEFORE REASSEMBLY.

1. Apply a liberal amount of lubricant, as consistent with the valve's service requirements, to the new O-Ring. Always contact your Parker representative if questions arise.
2. Place the new O-Ring and Washer into the Bonnet.
3. Fully engage the Threaded Insert into the bonnet. Carefully insert the Stem into the Bonnet making sure not to damage the O-Ring.
4. Apply a drop of Loctite 222 or equivalent to the Stem threads.
5. Thread the Stem into the Piston and torque to 12 in-lb.
6. Ensure the Piston O-Ring and the Body seal O-Ring are properly installed and lubricated.
7. Carefully install the Actuator Cap to ensure the O-Rings are not damaged. Re-install and torque the three screws to 15 in-lb.
8. Apply lubricant to the leading edge and threads of the valve body. Thread the body into the Bonnet/Actuator Assembly and torque accordingly:

Valve Size	Brass Bodies	Stainless Steel Bodies
V4Q	100 in-lbs (11.3 N-m)	175 in-lbs (19.7 N-m)
V6Q	100 in-lbs (11.3 N-m)	300 in-lbs (33.9 N-m)

9. Place the Bracket between the Lock Nut and the Actuator Body.
10. Installation alignment of the 1/8-27 NPT Port may be achieved by rotating the Actuator Body by hand in a counter-clockwise direction, but never more than one full turn. Torque the Lock Nut to 25 in-lbs

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

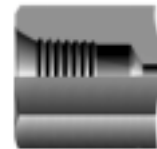
A -Two ferrule A-LOK®
compression port



Z -Single ferrule CPI™
compression port



F -ANSI/ASME B1.20.1
Internal pipe threads



V -VacuSeal face
seal port



Q -UltraSeal face
seal port



M -ANSI/ASME B1.20.1
External pipe threads



WARNING

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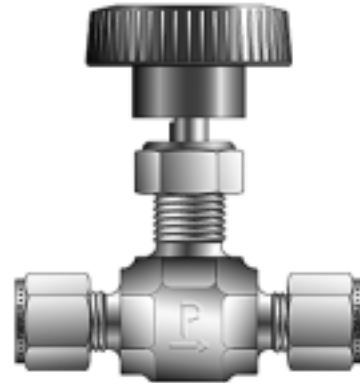
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V Series Needle Valve V4C Series Needle Valve



MAXIMUM WORKING PRESSURE AND TEMPERATURE

BRASS, STEEL, AND ALLOY 400 NEEDLE VALVES

Stem Packing	Stem Type	Maximum Pressure & Temperature	Maximum Temperature & Pressure
PTFE: V2	Metal-to-Metal	3000 psig @ 70 °F (20.7 MPa @ 21 °C)	0 psig @ 450 °F* (0 MPa @ 232 °C)
	PCTFE	3000 psig @ 70 °F (20.7 MPa @ 21 °C)	0 psig @ 350 °F (0 MPa @ 177 °C)
V4, V6, V8, V12	Metal-to-Metal	3000 psig @ 70 °F (20.7 MPa @ 21 °C)	0 psig @ 450 °F* (0 MPa @ 232 °C)
	PCTFE	3000 psig @ 70 °F (20.7 MPa @ 21 °C)	0 psig @ 350 °F (0 MPa @ 177 °C)
O-Ring: V2, V4, V6, V8, V12	Metal-to-Metal	3000 psig @ 70 °F (20.7 MPa @ 21 °C)	0 psig @ 400 °F* (0 MPa @ 204 °C)
	PCTFE	3000 psig @ 70 °F (20.7 MPa @ 21 °C)	0 psig @ 350 °F (0 MPa @ 177 °C)

*Note: Maximum temperature for steel is 350 °F (177 °C)

Always consult your authorized Parker representative if questions arise. The arrow on the Valve Body indicates the normal direction of flow.

MAXIMUM WORKING PRESSURE AND TEMPERATURE

STAINLESS STEEL NEEDLE VALVES

Stem Packing	Stem Type	Maximum Pressure & Temperature	Maximum Temperature & Pressure
PTFE: V2	Metal-to-Metal	5000 psig @ 70 °F (34.5 MPa @ 21 °C)	0 psig @ 450 °F (0 MPa @ 232 °C)
	PCTFE	5000 psig @ 70 °F (34.5 MPa @ 21 °C)	0 psig @ 350 °F (0 MPa @ 177 °C)
V4, V6, V8, V12	Metal-to-Metal	5000 psig @ 70 °F (34.5 MPa @ 21 °C)	0 psig @ 450 °F (0 MPa @ 232 °C)
	PCTFE	5000 psig @ 70 °F (34.5 MPa @ 21 °C)	0 psig @ 350 °F (0 MPa @ 177 °C)
O-Ring: V2, V4, V6, V8, V12	Metal-to-Metal	5000 psig @ 70 °F (34.5 MPa @ 21 °C)	0 psig @ 400 °F (0 MPa @ 204 °C)
	PCTFE	5000 psig @ 70 °F (34.5 MPa @ 21 °C)	0 psig @ 350 °F (0 MPa @ 177 °C)

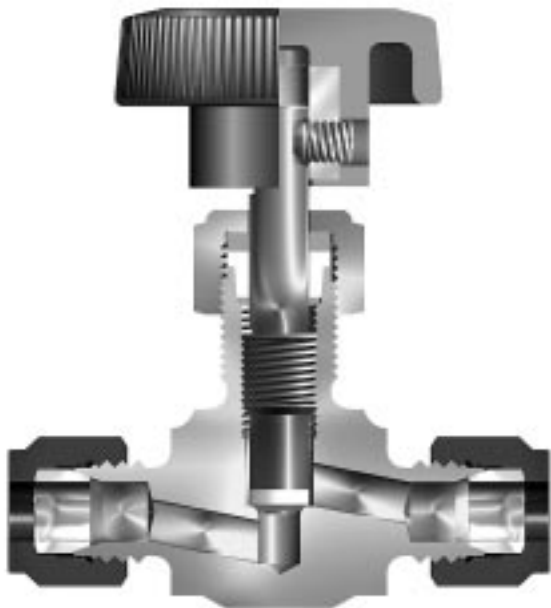


Figure 1: V Series Needle Valve Cross Sectional View (Sizes V4 to V12)

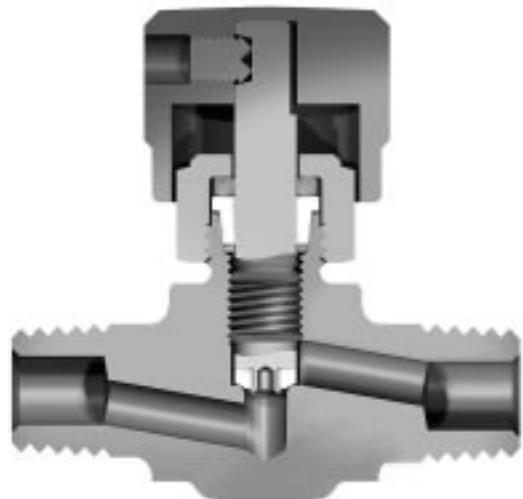


Figure 2: V4C Series Needle Valve Cross Sectional View

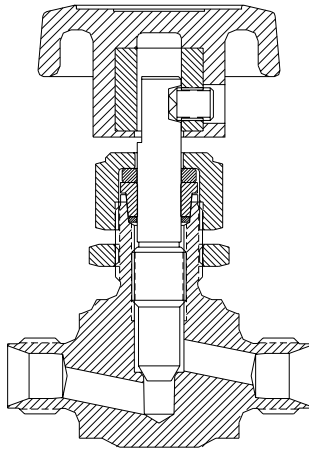


Figure 3:
**Cross Sectional View of Needle Valve
with Tapered Packing**

Note: The tapered PTFE packing is used in V4 thru V12 and V4C Needle Valves.

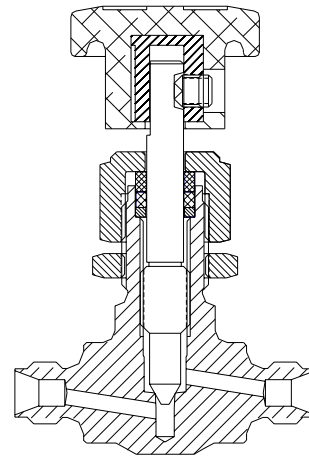


Figure 4:
**Cross Sectional View of Needle Valve
with Parallel PTFE Packing**

Note: The cylindrical PTFE packing is used in the V2 Needle Valve.

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the Needle Valve Maintenance Kit being used is appropriate for the Valve's size, Handle, Stem Seat material, Stem Packing configuration, and service requirements. Always contact your authorized Parker representative if any questions arise.
2. Remove the Handle by turning the Set Screw counter-clockwise with a 5/64 inch allen wrench for the size 2 Needle Valve or a 3/32 inch allen wrench for all other Needle Valves.
3. Remove the Packing Nut, located directly under the Handle, by turning counter-clockwise with the following size hex wrench:

V2	9/16 inch
V4/V4C	5/8 inch
V6	3/4 inch
V8	7/8 inch
V12	7/8 inch

4. Gently remove the Stem assembly from the Body by turning counterclockwise
5. If applicable, remove the Body from its panel mounting hole by turning the Panel Nut counter-clockwise.
6. Discard the old Stem, and either the PTFE Packing or the O-Ring, as applicable for the valve model being serviced.

REASSEMBLY

1. Make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.
2. Secure the Body in an assembly fixture.
3. For Valves with the "K" (soft-seat) option, verify the Soft Seat is securely attached to the Stem.
4. This step assembles the variety of stem packing options. Refer to the specific packing type being assembled. In each instance, stack the packing components on the stem in the order listed with the first item being placed on the landing above the stem threads.

PTFE Stem Packing (standard for V4, V4C, V6, V8 & V12):

1. Lower Packing Washer
2. PTFE Stem Packing
3. Upper Packing Washer

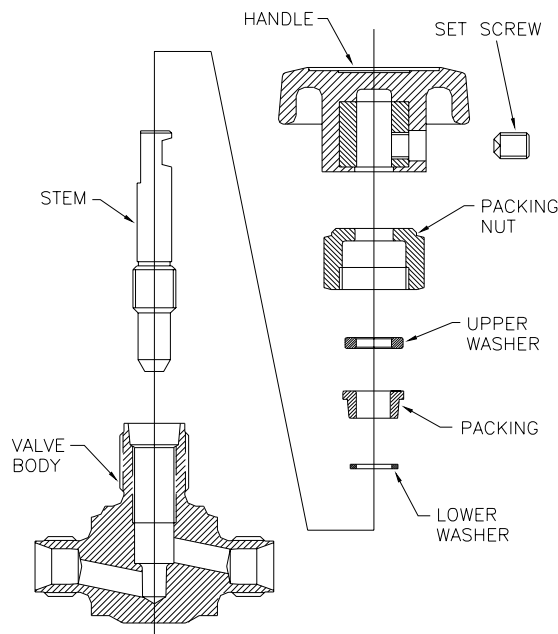
PTFE Stem Packing (standard for V2):

1. Packing Washer
2. PTFE Stem Packing
3. Packing Gland

O-Ring Stem Packing (optional for V4, V4C, V6, V8 & V12):

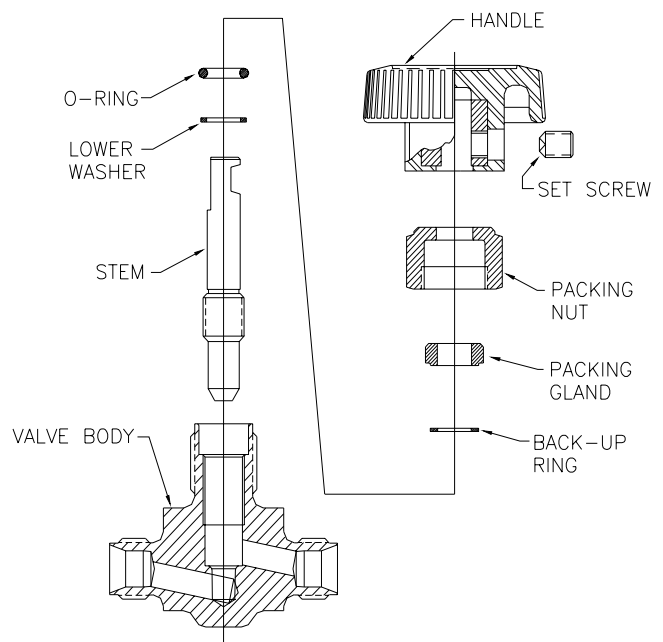
Apply a small amount of lubricant, as consistent with the valve's service requirements, to the O-ring.

1. Lower Packing Washer
2. O-Ring (lubricated)
3. O-Ring Back-up Ring
4. O-Ring Packing Gland



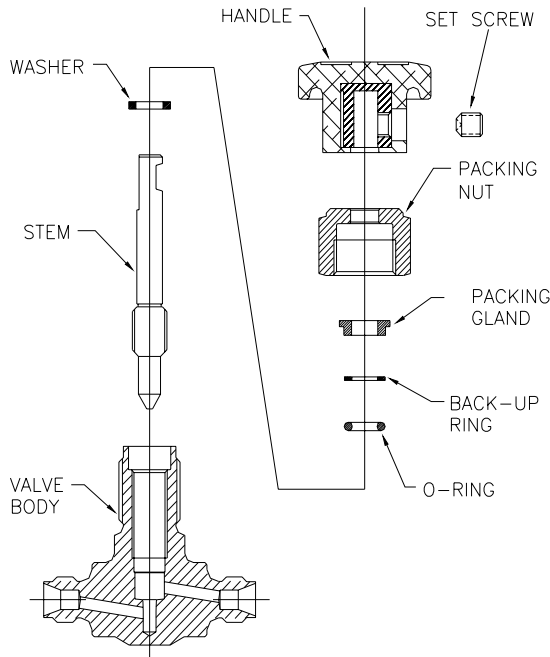
**Figure 5:
Exploded View of Needle Valve
with Tapered Packing**

Note: The tapered PTFE packing is used in V4 thru V12 and V4C Needle Valves.



**Figure 6:
Exploded View of Needle Valve
with O-Ring Packing**

Note: This style of O-ring Packing is used in V4 thru V12 and V4C Needle Valves.



**Figure 7:
Exploded View of Needle Valve
with O-Ring Packing**

Note: This style of O-ring Packing is used the V2 Needle Valve.

Apply a small amount of lubricant, as consistent with the valve’s service requirements, to the O-ring.

1. Packing washer
2. O-Ring (lubricated)
3. O-Ring Packing Gland

5. Apply a liberal amount of lubricant, as consistent with the Valve’s service requirements, to the Stem threads.

Note: Every Power Thread must be covered with lubricant.

6. For valves with an “N” or “R” stem option. Apply a small drop of lubricant, as consistent with the valve’s service requirements, to the Stem cone area.
 7. Insert the Stem Assembly into the Body until it is finger-tight.
 8. If applicable, insert the Valve Body into its panel mounting hole and thread the Panel Nut unto the Valve Body until its secure to the panel.
 9. Apply a liberal amount of lubricant, as consistent with the Valve’s service requirements, to the Packing Nut threads.
 10. Install the Packing Nut onto the Valve Body until finger-tight.
 11. For valves with the “K” (soft seat) stem option, complete the following instructions. Valves with other stem options proceed to step 12.
 - a) Turn the valve to the OPEN position
 - b) Torque the Packing Nut as specified in Table I.
 - c) Turn the stem to the CLOSED position and torque to 5 in-lbs.
 - d) Proceed to step 14.
 12. Turn the “N” or “R” stem to the CLOSED position and torque to 8 in-lbs.
Torque the Packing Nut to the Valve Body as specified in Table I.
 14. Install the proper Handle on to the Stem. Secure the handle with the Handle Set Screw and tighten to 15 in-lbs.
- NOTE: The Bar Handle option must not be used on Valves with the “K” stem/ option.**
15. Turn the Valve Handle through at least one (1) open/close cycle to verify proper operation of the Stem’s threads.

**Table I
Packing Nut Installation Requirements**

Valve Size	Hex Wrench Size	Torque Requirement
V2	9/16 inch	30 In-lbs. (3.4 N-m)
V4/V4C	5/8 inch	40 In-lbs. (4.5 N-m)
V6	3/4 inch	65 In-lbs. (7.3 N-m)
V8	7/8 inch	90 In-lbs. (10.2 N-m)
V12	7/8 inch	90 In-lbs. (10.2 N-m)

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

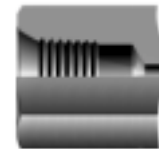
A -Two ferrule A-LOK® compression port



Z -Single ferrule CPI™ compression port



F -ANSI/ASME B1.20.1 Internal pipe threads



V -VacuSeal face seal port



Q -UltraSeal face seal port



M -ANSI/ASME B1.20.1 External pipe threads



WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

ALL PARKER VALVES MUST PASS A RIGID OPERATIONAL AND LEAKAGE TEST BEFORE LEAVING THE FACTORY. IT IS RECOMMENDED AFTER ANY REASSEMBLY, THE VALVE SHOULD BE TESTED BY THE USER FOR OPERATION AND LEAKAGE. IF THESE INSTRUCTIONS ARE NOT FULLY COMPLIED WITH, THE REPAIRED PRODUCT MAY FAIL AND CAUSE DAMAGE TO PROPERTY OR INJURY TO PERSONS. PARKER HANNIFIN CANNOT ASSUME RESPONSIBILITY FOR PERFORMANCE OF A CUSTOMER SERVICED VALVE.



U Series Needle Valve

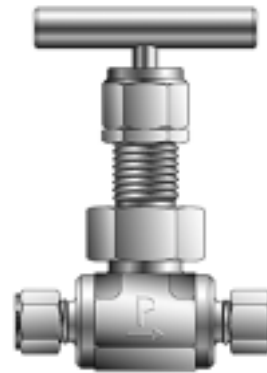


Table I: Maximum Working Pressure and Temperature

Valve Packing	Maximum Pressure and Temperature	Maximum Temperature and Pressure
Grafoil®	6000 psig at 70 °F 41.4 MPa at 21 °C	1545 psig at 1200 °F 10.7 MPa at 649 °C
PTFE	6000 psig at 70 °F 41.4 MPa at 21 °C	4280 psig at 450 °F 29.5 MPa at 204 °C

Always consult your authorized Parker representative if questions arise. The arrow on the Valve Body indicates the normal direction of flow.

**Table II: Packing Nut
Hex Wrench Sizes and Tightening Requirements**

Valve Size	Hex Wrench Size	PTFE Stem Packing	Grafoil® Stem Packing
U6	3/4 inch	125 in-lbs (14.1 N-m)	10.4 ft-lbs (37.3 N-m)
U12	15/16 inch	150 in-lbs (16.8 N-m)	33.3 ft-lbs (44.8 N-m)
U16	1-1/8 inch	50 ft-lbs (67.8 N-m)	50 ft-lbs (67.8 N-m)

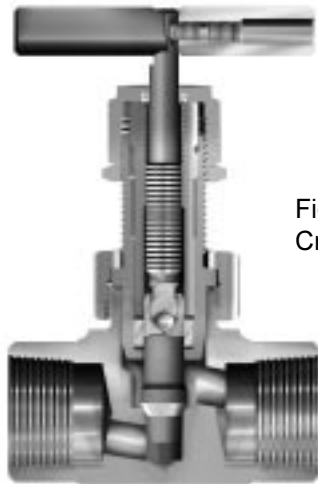


Figure 1: U Series Needle Valve
Cross Sectional View

**Table III: Lock Nut
Hex Wrench Sizes and Tightening Requirements**

Valve Size	Hex Wrench Size	Torque Requirement
U6 model	3/4 inch	125 in-lbs (14.1 N-m)
U12 model	15/16 inch	150 in-lbs (16.8 N-m)
U16 model	1 1/4 inch	150 in-lbs (16.8 N-m)

**Table IV: Bonnet Nut
Hex Wrench Sizes and Tightening Requirements**

Valve Size	Hex Wrench	Torque Requirements
U6 model	15/16 inch	65 ft-lbs. (88 N-m)
U12 model	1-1/4 inch	75 ft-lbs. (101 N-m)
U16 model	1-1/2 inch	100 ft-lbs. (135 N-m)

PANEL MOUNTED VALVES

The panel must have a through-hole diameter of correct diameter. The maximum panel thickness is 1/4 inch (6.4 mm).

U6 model	41/64 inch (16.2 mm)
U12 model	53/64 inch (21.0 mm)
U16 model	1-1/64 inch (25.8 mm)

- Remove the Handle by unthreading the Set Screw in the side of the Handle with the following size allen wrench:

U6 model	3/32 inch
U12 model	3/32 inch
U16 model	1/8 inch
- Grip the Packing Nut with a wrench as listed in Table II. With another wrench (as listed in Table III), loosen the Lock Nut.
- Remove both the Packing Nut and the Lock Nut by unthreading until completely removed.
- Insert the Valve through the hole in the panel and assemble the Panel Nut onto the Bonnet finger-tight. For assembly, grip the large Bonnet Nut with a hex wrench as listed in Table IV and tighten the Panel Nut securely.

CAUTION: Do not grip the Valve Body or loosen the Bonnet Nut.
- Thread the Lock Nut onto the Bonnet. Thread the Packing Nut onto the Bonnet and tighten in accordance with Table II.
- Tighten the Lock Nut against the Packing Nut in accordance with Table III.
- Re-install the Handle with the Set Screw onto the Stem.

DISASSEMBLY

MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURES BEFORE VALVE DISASSEMBLY OR REMOVAL OCCURS.

1. Verify that the Union Bonnet Valve Maintenance Kit being used is appropriate for the Valve's size, handle, stem packing configuration and service requirements. Always contact your authorized Parker representative if any questions arise.
 2. Remove the Handle by unthreading the Set Screw in the side of the Handle with the following size allen wrench:

U6 model	3/32 inch
U12 model	3/32 inch
U16 model	1/8 inch
 3. Loosen the Locknut, located directly under the Packing Nut, by turning clockwise with the following size hex wrench:

U6 model	3/4 inch
U12 model	15/16 inch
U16 model	1-1/4 inch
 4. Remove and save the Packing Nut, located directly under the Handle, by turning counter-clockwise with the following size hex wrench:

U6 model	3/4 inch
U12 model	15/16 inch
U16 model	1-1/8 inch
 5. Remove and save the Locknut from the Bonnet
 6. Remove and discard the Lube Seal from within the Packing Nut.
 7. If applicable, remove the Valve Body from its panel mounting hole by turning the Panel Nut counter-clockwise and removing it from the Bonnet.
 8. Remove and save the Bonnet Nut, located directly above the Body, by turning counter-clockwise with the following size hex wrench:

U6 model	15/16 inch
U12 model	1-1/4 inch
U16 model	1-1/2 inch
 9. Remove the Bonnet/Stem Assembly from the Valve Body.
 10. Press the Stem UP to disengage the Stem Guide hex from the Bonnet.
 11. While carefully securing the Valve Stem, remove the Stem Guide from the Bonnet using the following size hex wrench:

U6 model	3/8 inch
U12 model	9/16 inch
U16 model	11/16 inch
 12. Slide the Valve Stem from the Bonnet by applying a minimal amount of force (i.e. hand pressure) on the "Handle end" of the Valve Stem and pushing towards the "seat end".
 13. Remove the Packing Washers and the Packing from within the Bonnet. The Upper Packing Washer should fall out easily. The Packing must be pushed out with a thin probe or wire. After this is removed the lower Packing Washer should also fall out.
- NOTE:** If the valve is Grafoil® packed make certain the entire packing is removed since it may break-up during removal.
14. Discard the appropriate components from the valve consistent with the new components within the Valve Kit.

Additional Step (U16 only)

15. Using a pick or thin flat headed screwdriver remove the metal o-ring from within the Valve Body. Insure care not to damage the o-ring groove.

REASSEMBLY

Make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.

1. Clamp the Body in a vise.
2. **U16 only:** Install the Metal O-Ring into the o-ring groove in the Valve Body
3. Insert the three packing components into the Bonnet in the following order with the first item being placed at the bottom of the Bonnet:
 - Packing Washer
 - Stem Packing
 - Packing Washer
4. Insert the Stem Guide into the Bonnet, use it to push the packing components to the bottom of the Bonnet. Insert the Stem Guide hex into the hex-shaped slot at the top of the Bonnet.
5. Apply a liberal amount of lubricant, as consistent with the Valve's service requirements, to the Stem Sub-Assembly threads. Always contact your authorized Parker representative if questions arise.
NOTE: Every thread must be covered with lubricant.
6. Refer to Figures 2 and 3. Carefully install the Stem Sub-Assembly into the Bonnet from the lower end until hand-tight.
7. Apply a liberal amount of lubricant, as consistent with the Valve's service requirements, to the Body threads, as well as to the surface area where the Bonnet fits up against the interior of the Bonnet Nut. Always contact your authorized Parker representative if questions arise.
8. Place the hand-tight Bonnet and Stem Sub-Assembly from Step 6 into the Body. Torque the Bonnet Nut onto the Body using the hex wrench size and torque specified in Table IV.
9. This Step only applies to Valves with an optional Panel Nut, else proceed to Step 10.
Insert the Body into its panel mounting hole. Thread the Panel Nut clockwise onto the Bonnet until the Valve is secure in the mounting panel.
10. Place the Lube Seal over the Stem to the top of the Stem Guide.
11. Apply a small amount of lubricant, as consistent with the Valve's service requirements, to the Bonnet upper threads and the top of the Stem Guide.
NOTE: A minimum of the upper four (4) Bonnet threads must be covered with lubricant !
12. Place the Locknut on the Bonnet and thread it down near the Panel Nut. Place the Packing Nut over the Bonnet. Tighten in accordance with Table II.
13. Tighten the Locknut against the Packing Nut. Tighten in accordance with Table III.
14. Re-install the Handle with the Set Screw onto the Stem.
15. Install the Handle on the Stem Sub-Assembly. Secure the Handle with the Set Screw, and tighten the Set Screw to 15 In-lbs torque, using a 3/32 inch allen wrench. Verify the Handle is tightly fastened.
16. Turn the Bar Handle through at least one (1) "Open and Close" cycle to verify proper operation of the Stem's threads.
17. Reject and rebuild any Union Bonnet Valve exhibiting rough or irregular Stem operation. Always contact your authorized Parker representative if questions arise.

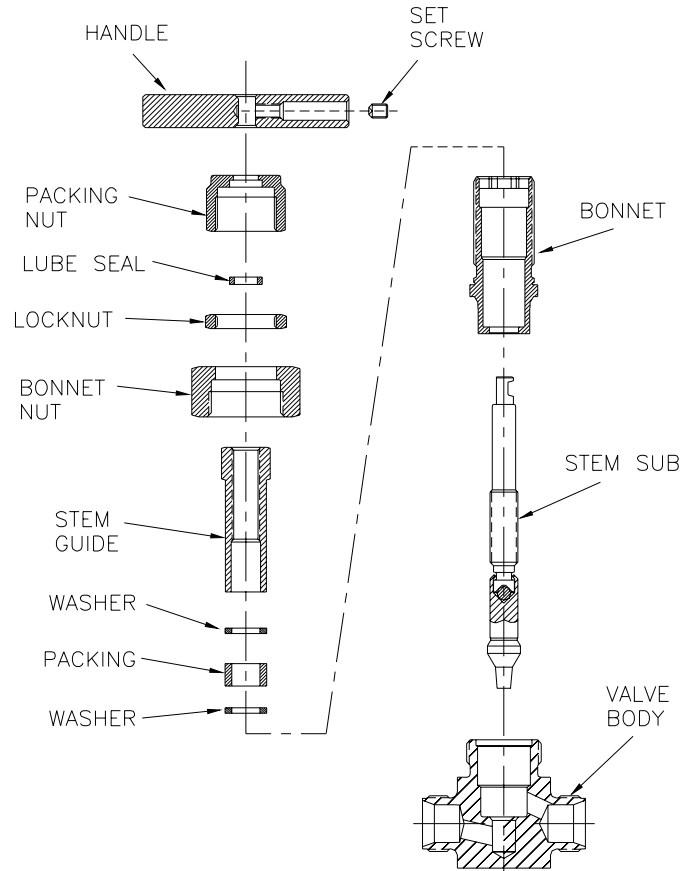


Figure 2: Size 6 & Size 12 Union Bonnet Valve Exploded View

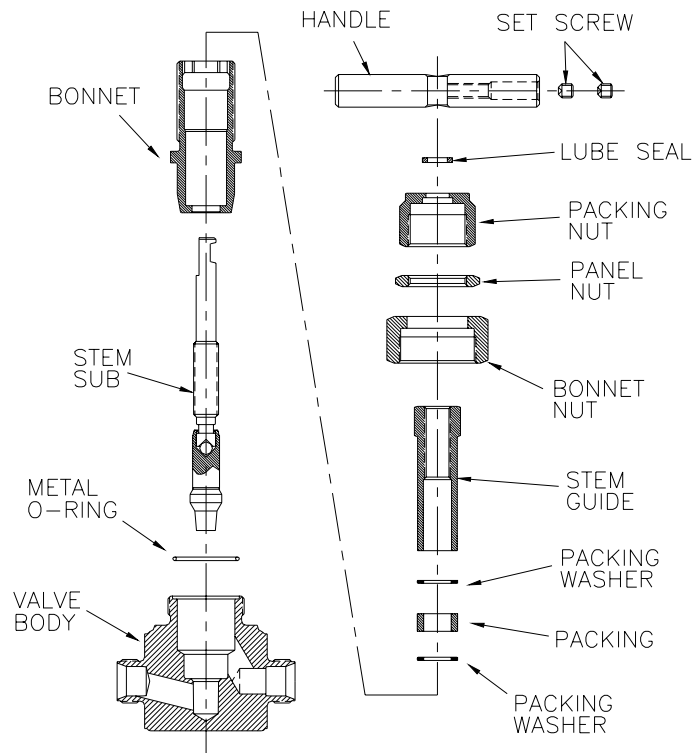


Figure 3: Size 16 Union Bonnet Valve Exploded View

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

A -Two ferrule A-LOK[®] compression port



Z -Single ferrule CPI[™] compression port



F -ANSI/ASME B1.20.1 Internal pipe threads



V -VacuSeal face seal port



Q -UltraSeal face seal port



M -ANSI/ASME B1.20.1 External pipe threads



WARNING

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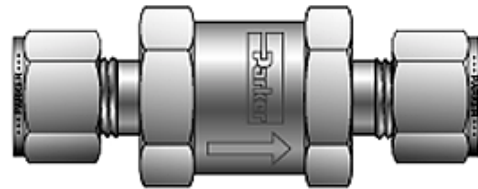
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C Series Check Valve



Maximum Allowable Working Pressure

Valve Model	Brass Check Valves	Stainless Steel Check Valves
C2, C4, C6, C8 & C12	3000 Psig at 70 °F 20.7 MPa at 21 °C	6000 Psig at 70 °F 41.4 MPa at 21 °C
C16	3000 Psig at 70 °F 20.7 MPa at 21 °C	5000 Psig at 70 °F 34.5 MPa at 21 °C

Always consult your authorized Parker representative if questions arise. The arrow on the Valve Body indicates the normal direction of flow.

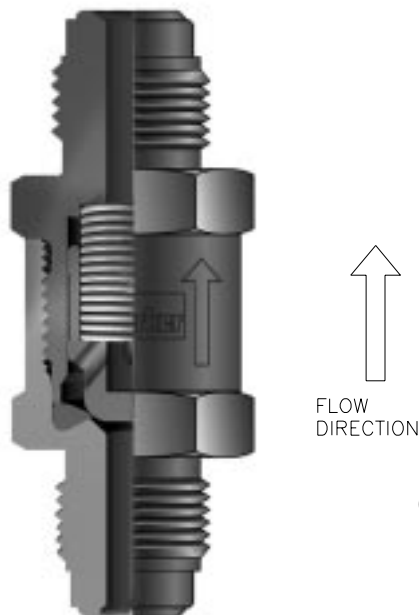


Figure 1: C Series Check Valve Cross Sectional View

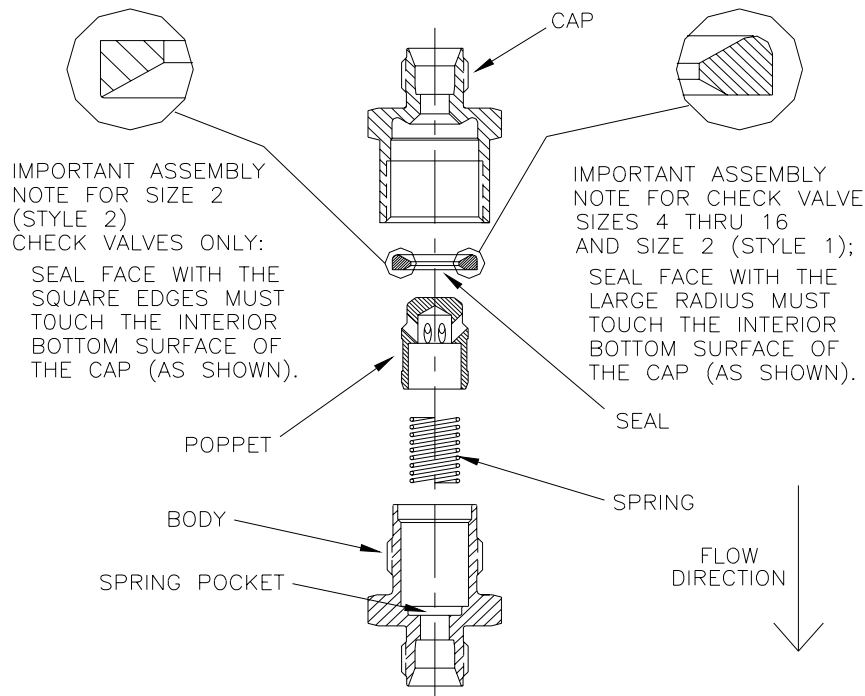


Figure 1: Check Valve Exploded View

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the Check Valve Maintenance Kit being used is appropriate for the valve's size, the Seal material, the Spring's crack pressure rating, and service requirements. Always contact your authorized Parker representative if any questions arise.
2. Clamp the Cap (next to the flow symbol's arrow) at its hex-flats. Vertical orientation of the check valve with the flow arrow pointing UP is recommended.
3. Loosen the Cap from the Body by turning counter-clockwise with the following size hex wrench:

C2 valves	5/8 inch
C4 valves	3/4 inch
C6 valves	1 inch
C8 valves	1-1/4 inch
C12 valves	1-3/8 inch
C16 valves	1-5/8 inch
4. Remove and discard the Spring from the Body. Remove and save the Poppet. Gently remove and discard the elastomeric Seal at the bottom of the Body cavity, exercising care not to damage or scratch the Body's interior.

IMPORTANT NOTICE

C2 Series Check Valve Kits contain two style seats. Inspect your existing components to determine which style seat should be used. Refer to Figure 1.

REASSEMBLY

1. Make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.
2. Apply a moderate amount of lubricant to the Seal, as consistent with the valve's service requirements. Always consult your authorized Parker representative if questions arise.
3. Refer to Figure 1. Place the new Seal in the Cap exercising care not to damage or scratch the Cap's interior.
NOTE: Correct orientation of the Seal per Figure 1 is required for proper Valve operation.
4. While holding the Body upright, place the new Spring in the Body. Ensure the Spring is properly positioned in the pocket per Figure 1.
5. Install the Poppet over the Spring.
6. With the Body sub-assembly still in a vertical position, install the Cap sub-assembly to the Body until finger-tight. Engage by turning clockwise with the hex socket torque wrench and torque requirement specified in the following Table. *DO NOT OVER TORQUE*

Check Valve Torque Requirements

Valve Size	Brass Body	Stainless Steel Body
C2	40 In-lbs 4.5 N-m	60 In-lbs 6.8 N-m
C4	50 In-lbs 5.7 N-m	70 In-lbs 7.9 N-m
C6	55 In-lbs 6.2 N-m	75 In-lbs 8.5 N-m
C8	65 In-lbs 7.3 N-m	90 In-lbs 10.2 N-m
C12	65 In-lbs 7.3 N-m	90 In-lbs 10.2 N-m
C16	65 In-lbs 7.3 N-m	90 In-lbs 10.2 N-m

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

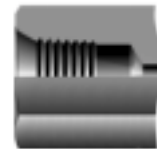
A -Two ferrule A-LOK[®] compression port



Z -Single ferrule CPI[™] compression port



F -ANSI/ASME B1.20.1 Internal pipe threads



V -VacuSeal face seal port



Q -UltraSeal face seal port



M -ANSI/ASME B1.20.1 External pipe threads



WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

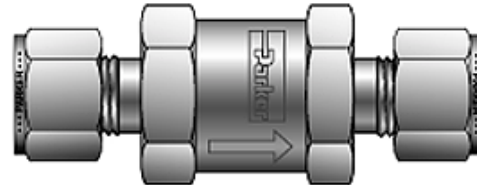
This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

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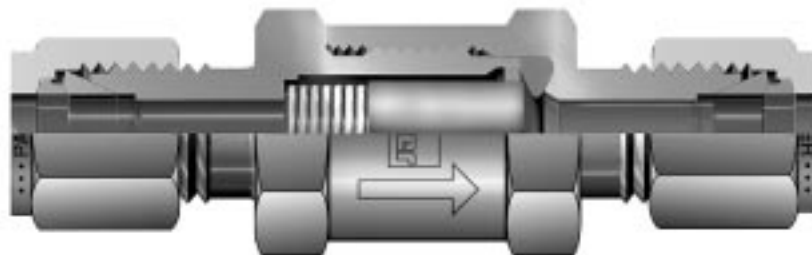
F Series Filter



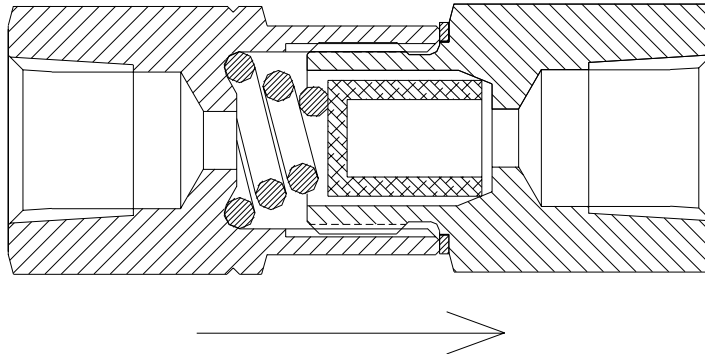
MAXIMUM ALLOWABLE WORKING PRESSURE

Filter Size	Brass Body	Stainless Steel Body
F2, F4, F6, F8 & F12	3000 Psig at 70 °F 20.7 MPa at 21 °C	6000 Psig at 70 °F 41.4 MPa at 21 °C
F16	3000 Psig at 70 °F 20.7 MPa at 21 °C	5000 Psig at 70 °F 34.5 MPa at 21 °C

Always consult your authorized Parker representative if questions arise. The arrow on the Filter Cap indicates the normal direction of flow



F Series Filter Cross Sectional View



**Figure 1: In-line Filter with Sintered Element Cross Sectional View
purchased prior to July 1, 1993**

IMPORTANT NOTICE

To improve the In-line Filter, the components and assembly procedures were changed on July 1, 1993. All In-line Filters assembled prior to July 1, 1993 should use Procedure A for disassembly and re-assembly. These can be identified by an external gasket at the joint between the Cap and Body. All In-line Filters assembled on or after July 1, 1993 should use Procedure B. These can be identified by the absence of an external gasket at the joint between the Cap and Body. F2 Series In-line Filters kits contain two style seats. Inspect your existing components to determine which style seat should be used. Refer to Figure 7.

PROCEDURE A

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE FILTER IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING FILTER REMOVAL OR DISASSEMBLY, FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the In-line Filter Maintenance Kit being used is appropriate for the Filter's size, the filter micron rating, and the service requirements. Always contact your authorized Parker representative if any questions arise.
2. Clamp the In-line Filter Body (next to the flow symbol's arrow) at its hex-flats. Vertical orientation of the In-line Filter in a vise for maintenance or repair (with flow arrow pointing DOWN) is recommended.
3. Loosen the Body from the Cap by turning counterclockwise with the following size hex wrench:

F2 Filters	5/8 inch
F4 Filters	3/4 inch
F6 Filters	1 inch
F8 Filters	1-1/4 inch
4. Remove the Gasket, Filter Element and the Spring. Discard each of these components.

REASSEMBLY

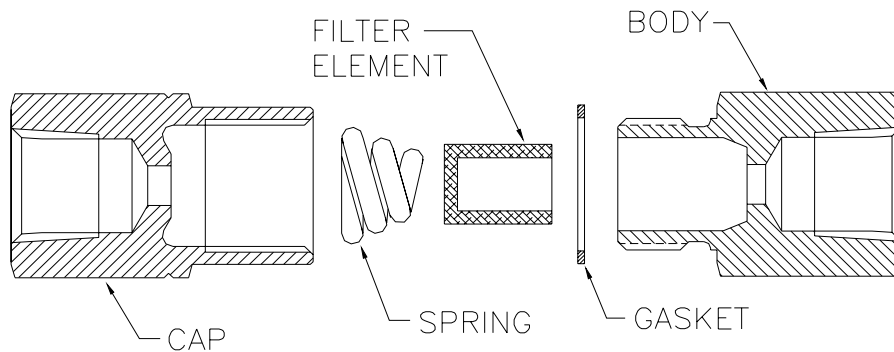
1. Make certain all parts are free of dirt or other contamination before starting reassembly of the Filter.
2. Apply a small amount of lubricant, as consistent with the Filter's service requirements, on both sides of the new Gasket. Always consult your authorized Parker representative if any questions arise.
3. Refer to Figures 1 and 2. Place the Gasket on the outer diameter face of the Body, to allow for the later assembly of the Cap to the Body sub-assembly.

CAUTION: The Gasket must be flush with the entire hex face before tightening.

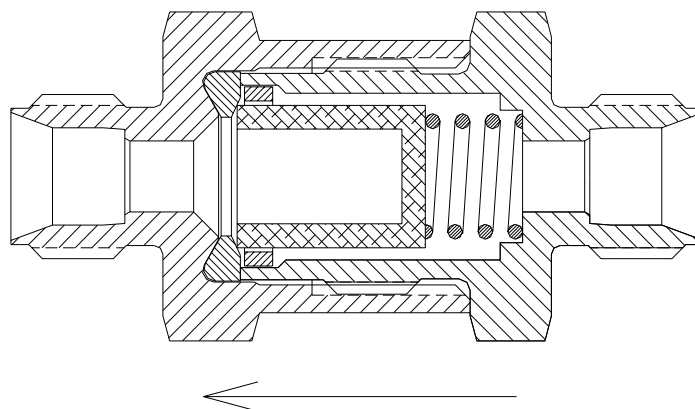
4. Place the new Filter Element inside the Body. The new Filter Element's closed end must be face out.
5. Place the new Spring on top of the Filter. The Spring's "small diameter" end must sit on the Filter.
6. Carefully install the Cap onto the Body Sub-Assembly by turning clockwise with the following size hex wrench to the following specified torque:

**INLINE FILTER TORQUE REQUIREMENTS
-DO NOT OVER TORQUE-**

Filter Size	Wrench	Brass Body	Stainless Steel Body
F2	5/8	13 Ft-lbs. 17.6 N-m	20 Ft-lbs. 27.1 N-m
F4	3/4	17 Ft-lbs. 23.0 N-m	27 Ft-lbs. 36.5 N-m
F6	1	22 Ft-lbs. 29.8 N-m	32 Ft-lbs. 43.3 N-m
F8	1-1/4	55 Ft-lbs. 74.4 N-m	110 Ft-lbs. 148.9 N-m



**Figure 2: Inline Filter with Sintered Element Exploded View
purchased prior to July 1, 1993**



**Figure 3: Inline Filter with Sintered Element Cross Sectional View
purchased after July 1, 1993**

PROCEDURE B

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE FILTER IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING FILTER REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE

1. Verify that the Inline Filter Maintenance Kit being used is appropriate for the Filter's size, the filter micron rating, and the service requirements. Always contact your authorized Parker representative if any questions arise.
2. Clamp the Inline Filter Cap (next to the flow symbol's arrow) at its hex-flats. Vertical orientation of the Inline Filter in a vise for maintenance or repair (with flow arrow pointing DOWN) is recommended.
3. Loosen the Body from the Cap by turning counterclockwise with the following size hex wrench:

F2 Filters	5/8 inch
F4 Filters	3/4 inch
F6 Filters	1 inch
F8 Filters	1-1/4 inch
F12 Filters	1-3/8 inch
F16 Filters	1-5/8 inch
4. Remove and discard the Spring and the Filter Element. Gently remove and discard the elastomeric Seal at the bottom of the Cap cavity, exercising care not to damage or scratch the Cap's interior.

REASSEMBLY

1. Make certain all parts are free of dirt or other contamination before starting reassemble of the Filter.
 2. Apply a moderate amount of lubricant to the face of the Seal, as consistent with the Filter's service requirements. Always consult your authorized Parker representative if any questions arise.
 3. Refer to Figure 3. Place the new Seal in the Cap, exercising care not to damage or scratch the Cap's interior.
- NOTE: Correct orientation of the Seal per Figure 8 is required for proper Filter operation.**
4. While holding the body upright, place the new Spring in the Body. Ensure the Spring is properly positioned in the pocket as shown in Figure 3.
 5. Install the Filter Element over the Spring. The new Filter Element's open end must face out.
 6. Install the Filter's Guide over the Filter Element.
 7. With the body sub-assembly still in the vertical position, install the Cap sub-assembly to the Body until finger tight. Engage by turning clockwise with the following size hex wrench to the following specified torque:

INLINE FILTER TORQUE REQUIREMENTS - DO NOT OVER TORQUE-

Filter Size	Wrench	Brass Body	Stainless Steel Body
F2	5/8	40 in-lbs. 4.5 N-m	60 in-lbs. 6.8 N-m
F4	3/4	50 in-lbs. 5.7 N-m	70 in-lbs. 7.9 N-m
F6	1	55 in-lbs. 6.2 N-m	75 in-lbs. 8.5 N-m
F8	1-1/4	65 in-lbs. 7.3 N-m	90 in-lbs. 10.2 N-m
F12	1-3/8	65 in-lbs. 7.3 N-m	90 in-lbs. 10.2 N-m
F16	1-5/8	65 in-lbs. 7.3 N-m	90 in-lbs. 10.2 N-m

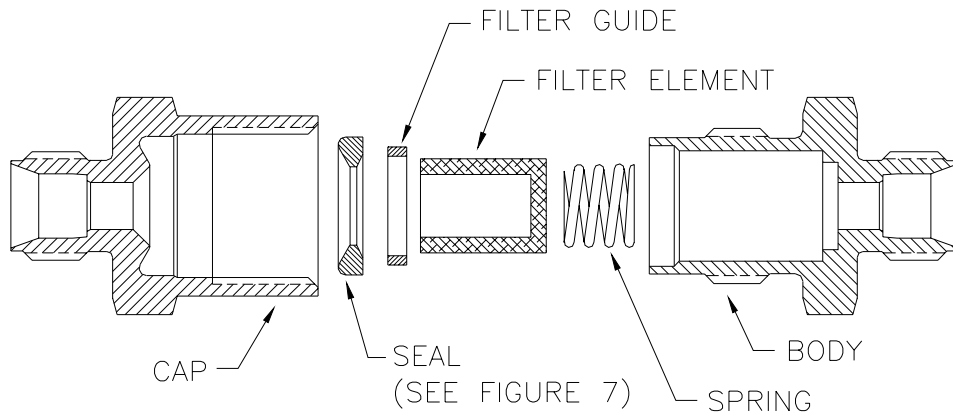


Figure 4: Inline Filter with Sintered Element Exploded View purchased after July 1, 1993

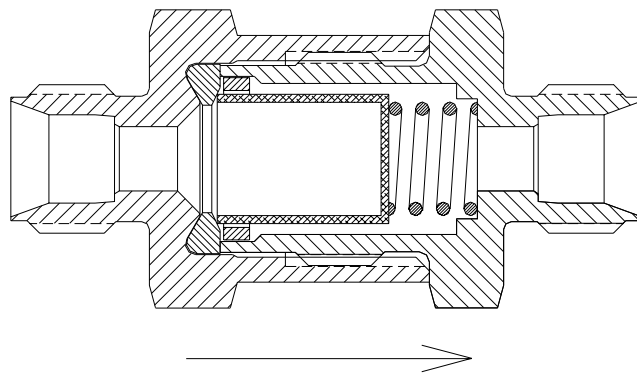


Figure 5: Inline Filter with Wire Cloth Element Cross Sectional View

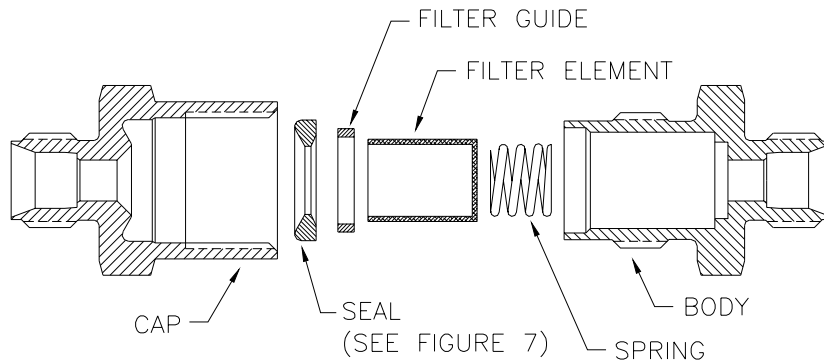


Figure 6: Inline Filter with Wire Cloth Element Exploded View

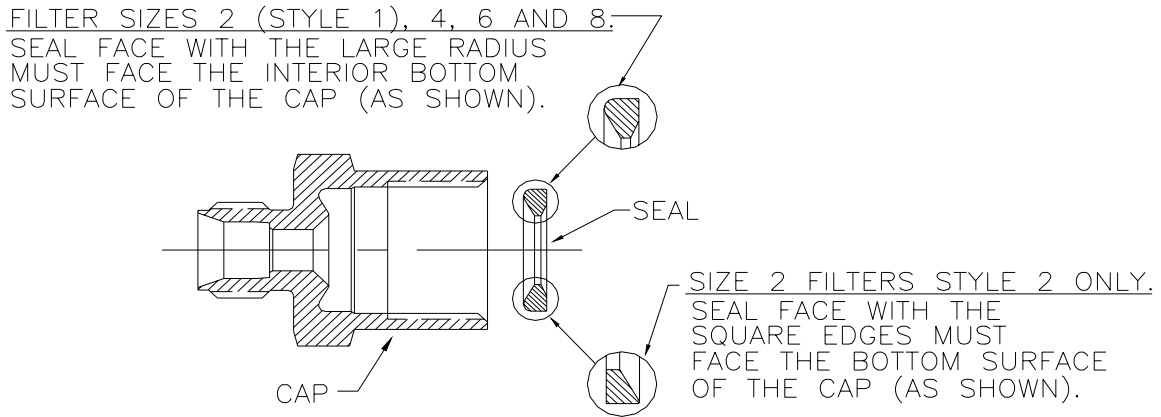


Figure 7: Proper Assembly of Seal in valves purchased after July 1, 1993

WIRE CLOTH FILTER ELEMENTS

The disassembly and reassemble of Filters that have wire cloth elements is the same as valves with the sintered elements. The only difference may be seen in the direction of flow as related to the orientation of the element. This is illustrated in Figures 3 and 5.

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

A -Two ferrule A-LOK[®] compression port



Z -Single ferrule CPI[™] compression port



F -ANSI/ASME B1.20.1 Internal pipe threads



V -VacuSeal face seal port



Q -UltraSeal face seal port



M -ANSI/ASME B1.20.1 External pipe threads



WARNING

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RV Series Rupture Disc Unit



MAXIMUM ALLOWABLE WORKING PRESSURES

The pre-set non-adjustable Rupture Disc burst pressure is indicated on the Disc manufacturer's metal ID tag. The standard Rupture Disc burst pressure is 1800 psig at 70 °F (12.4 MPa at 21 °C).

A stainless steel wire is provided with the Valve for the purpose of attaching the Rupture Disc manufacturer's ID Tag to the Valve,

Always consult your authorized Parker representative if question arise.

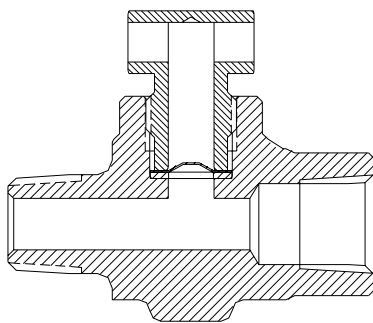


Figure 1: RV Series Rupture Disc Unit Cross Sectional View

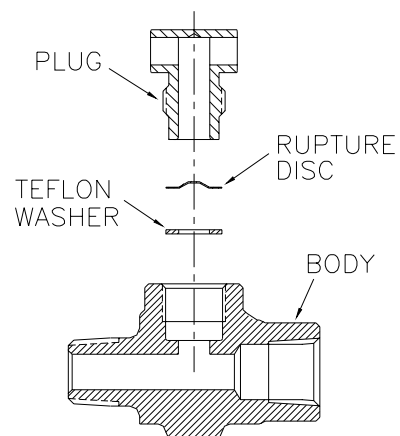


Figure 2: RV Series Rupture Disc Unit Exploded View

RUPTURE DISK USE

USERS SHOULD READ AND THOROUGHLY UNDERSTAND THESE INSTRUCTIONS BEFORE INSTALLING RUPTURE DISCS. THESE INSTRUCTIONS DO NOT PURPORT ALL OF THE SAFETY FACTORS ASSOCIATED WITH THE RUPTURE DISC'S USE IN SERVICE. IT IS THE RESPONSIBILITY OF THE USER TO ESTABLISH APPROPRIATE SAFETY, HEALTH, AND TRAINING MEASURES FOR THEIR PERSONNEL INSTALLING, SERVICING, OR WORKING IN AN AREA WHERE RUPTURE DISC ASSEMBLIES ARE IN USE.

IT IS THE USER'S RESPONSIBILITY FOR DESIGN OF ADEQUATE VENTING AND INSTALLATION OF ADEQUATE VENT PIPING OR DIRECTIONAL FLOW AFTER RUPTURE OCCURS WITH THE RUPTURE DISC AS INTENDED. LOCATE RUPTURE DISC WHERE PEOPLE OR PROPERTY WILL NOT BE EXPOSED TO THE SYSTEM DISCHARGE IN CASE OF RUPTURE. VENT TOXIC OR FLAMMABLE FUMES OR LIQUIDS TO A SAFE LOCATION TO PREVENT PERSONAL INJURY OR PROPERTY DAMAGE.

IT IS THE USER'S RESPONSIBILITY TO SPECIFY THE BURST PRESSURE RATING OF A RUPTURE DISC AT A COINCIDENT TEMPERATURE AT WHICH THE RUPTURE DISC IS TO BE USED. A RUPTURE DISC IS A TEMPERATURE SENSITIVE DEVICE. THE BURST PRESSURE OF THE RUPTURE DISC IS DIRECTLY AFFECTED BY ITS EXPOSURE TO THE COINCIDENT TEMPERATURE. GENERALLY, AS THE TEMPERATURE AT THE RUPTURE DISC INCREASES, THE BURST PRESSURE DECREASES; INVERSELY, AS THE TEMPERATURE AT THE RUPTURE DISC DECREASES, THE BURST PRESSURE MAY INCREASE. FAILURE TO PROPERLY UTILIZE A RUPTURE DISC AT THE SPECIFIED COINCIDENT TEMPERATURE COULD CAUSE PREMATURE OR OVERPRESSURIZATION OF A SYSTEM.

THE INSTANTANEOUS RELEASE OF PRESSURE FROM THE RUPTURE DISC CAN CREATE VIOLENT NOISES DUE TO THE DISCHARGE AT SONIC VELOCITY. IT IS THE USER'S RESPONSIBILITY TO PROTECT AGAINST HEARING DAMAGE TO ANY BYSTANDERS.

PARTICLES MAY BE DISCHARGED WHEN THE RUPTURE DISC RUPTURES. THESE PARTICLES MAY BE PART OF THE RUPTURE DISC ITSELF, OR OTHER ENVIRONMENTAL MATTER IN THE SYSTEM. IT IS THE USER'S RESPONSIBILITY TO ASSURE THAT THESE PARTICLES ARE DIRECTED TO A SAFE AREA TO PREVENT PERSONAL INJURY OR PROPERTY DAMAGE.

THERE IS NO GUARANTEE OF RUPTURE DISC LIFE. SUCH LIFE SPAN IS AFFECTED BY CORROSION, CREEP AND FATIGUE, AND PHYSICAL DAMAGE. THESE CONDITIONS WILL DERATE THE RUPTURE DISC TO A LOWER SET PRESSURE. THE CUSTOMER AND/OR USER SHOULD BE PREPARED TO HANDLE A PREMATURE FAILURE OF THE RUPTURE DISC. THE MEDIA OR OTHER ENVIRONMENTAL CONDITIONS SHOULD NOT ALLOW ANY BUILDUP OR SOLIDIFICATION OF MEDIA TO OCCUR ON A RUPTURE DISC. THIS MAY INCREASE THE PRESSURE SETTING OF THE RUPTURE DISC.

PREVENTATIVE MAINTENANCE

1. REPLACE RUPTURE DISC EVERY YEAR UNDER NORMAL CONDITIONS. A MORE FREQUENT CHANGEOUT MAY BE NECESSARY DUE TO CORROSION, FATIGUE, TEMPERATURE, OR ADVERSE CONDITIONS. THESE FACTORS MUST BE EVALUATED BY THE USER THROUGH ACTUAL SERVICE EXPERIENCE.
2. IF THE RUPTURE DISC IS NOT REPLACED PERIODICALLY WHEN EXPOSED TO THESE CONDITIONS, PREMATURE FAILURE OF THE RUPTURE DISC MAY OCCUR, THEREBY DISCHARGING THE PROCESS MEDIA.
3. TO AVOID EXTENDED DOWNTIME, MAINTAIN THREE SPARE RUPTURE DISCS IN STOCK AT ALL TIMES. THE NUMBER OF SPARES REQUIRED ULTIMATELY WILL BE DETERMINED BY SERVICE CONDITIONS.

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the Rupture Disc Valve Maintenance Kit being used is appropriate for the Rupture Disc pressure rating and service requirements. Always contact your authorized Parker representative if any questions arise.
2. Remove and discard the manufacturer's ID Tag for the Rupture Disc which may be attached to the Valve.
3. Refer to Figure 2. Remove and discard the Rupture Disc Plug by turning counter-clockwise with an 11/16 inch hex wrench.
4. Remove and discard the Rupture Disc and Washer from the Rupture Disc chamber.

REASSEMBLY

1. Make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.
2. Refer to the manufacturer's ID tag which accompanies the new Rupture Disc and PTFE Washer. Verify the burst pressure rating for the new Rupture Disc agrees with the desired burst pressure.
3. Refer to Figure 2. Locate the Rupture Disc chamber. Install the PTFE or optional Metal Washer in the Rupture Disc chamber in the Body.
4. Refer to Figure 1. Install the Rupture Disc in the Rupture Disc chamber in the Body.

NOTE: It is imperative the Washer be positioned flat and level in the Rupture Disc chamber. The Metal Washer must be positioned with the chamfer side down.

CAUTION: It is imperative the Rupture Disc be positioned such that the spherical dome faces outward and lays flat and level in the Rupture Disc chamber.

WARNING: It is recommended that the manufacturer's ID tag stay with the specific Rupture Disc Assembly used in any given Rupture Disc Valve.

5. Gently install the Plug in the Body until the Plug is hand-tight.
6. Secure the Body in an assembly fixture.
7. Torque the Plug in the Body by turning the Plug clockwise with an 11/16 inch hex socket torque wrench to 45 In-lbs.
8. A stainless steel wire is provided with the Valve maintenance kit for the purpose of attaching the Rupture Disc manufacturers' ID Tag to the Valve.

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

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Z -Single ferrule CPI[™] compression port



F -ANSI/ASME B1.20.1 Internal pipe threads



V -VacuSeal face seal port



Q -UltraSeal face seal port



M -ANSI/ASME B1.20.1 External pipe threads



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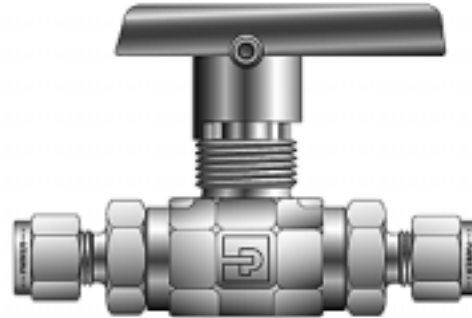
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B Series Ball Valve



Maximum Allowable Working Pressure and Temperature

Seat Material	Valve Body Material	
	Brass or Alloy 400	Stainless Steel
PTFE	1500 psig @ 70 °F 10.40 MPa @ 21 °C	1500 psig at 70 °F 10.40 MPa at 21 °C
PCTFE	3000 psig @ 70 °F 20.70 MPa @ 21 °C	6000 psig @ 70 °F 41.40 MPa @ 21 °C

The arrow on the Valve Handle may be used to indicate the normal direction of flow.

The 3-Way B Series Ball Valves are designed exclusively for directional flow control. The 3-Way B Series Ball Valves are NOT recommend for shutoff service. Always consult your authorized Parker representative if questions arise.

INSTALLATION OF PANEL MOUNTED VALVES

Ball Valve Size	Panel Thickness (max)	Through-Hole Diameter
B2	1/8 inch (3.2 mm)	37/64 inch (14.7 mm)
B6	1/4 inch (6.4 mm)	49/64 inch (19.5 mm)
B8	3/8 inch (9.4 mm)	57/64 inch (22.6 mm)

When the Valve is mounted to a thin panel, a spacer (or washer) may be necessary to permit full Panel Nut engagement on the Valve.

- Remove the Handle by turning the Set Screw counter-clockwise with the following size hex-socket wrench:

B2 valves	5/64 inch
B6 valves	3/32 inch
B8 valves	1/8 inch
- Insert the Valve through the panel hole and assemble the Panel Nut. Snug the Panel Nut finger-tight, followed by proper tightening.
- Adjust the Stem packing as explained below (except for Valves with an O-Ring Stem packing), and re-install the Handle.

PACKING ADJUSTMENT (For B-Series Ball Valves with PTFE Stem Packing)

Packing adjustment may be occasionally necessary depending on the many and varied uses for the Valve. It is recommended an adjustment be made shortly after initial installation and just prior to flow start-up. Always consult your authorized Parker representative if questions arise.

1. Remove the Handle by turning the Set Screw counter-clockwise with the following size hex-socket wrench:

B2 valves	5/64 inch
B6 valves	3/32 inch
B8 valves	1/8 inch

2. Tighten the Packing Nut 1/8 to 1/4 turn or to the following torque using the specified hex wrench size.

Ball Valve Size	Hex Wrench Size	Tightening Torque
B2	5/16 inch	30 In-lbs (3.3 N-m)
B6	7/16 inch	70 In-lbs (7.8 N-m)
B8	1/2 inch	90 In-lbs (10 N-m)

3. Re-install the Handle and secure by turning the Set-Screw clockwise and torque to 15 In-lbs.

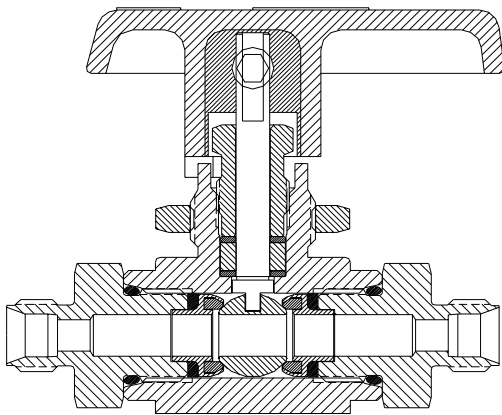


Figure 1: Two-Way B Series Ball Valve with PTFE Packing Cross Sectional View

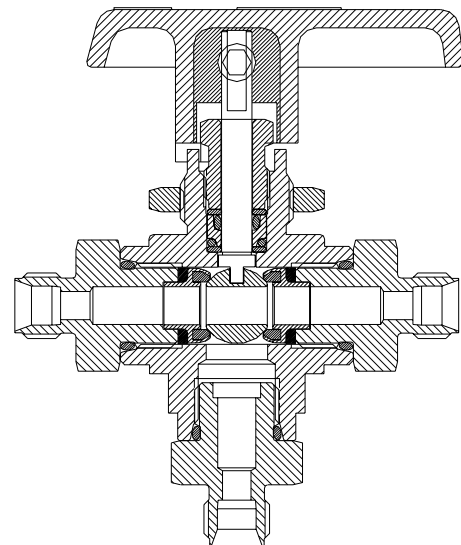


Figure 2: Three-Way B Series Ball Valve with O-Ring Packing Cross Sectional View

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL. CYCLE THE VALVE TWICE TO REMOVE ANY ENTRAPPED PRESSURE. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the Ball Valve Maintenance Kit being used is appropriate for the Valve's size and service requirements. Always contact your authorized Parker representative if any questions arise.
2. Remove the Handle by turning the Set Screw counter-clockwise with the following size hex socket wrench.

B2 valves	5/64 wrench
B6 valves	3/32 wrench
B8 valves	1/8 wrench
3. Remove the Ball Valve Body from its mounting panel hole, if applicable, by turning the Panel Nut counter-clockwise.
4. Remove the Packing Nut (located directly under the handle) by turning counter-clockwise with the following size hex wrench.

B2 valves	5/16 wrench
B6 valves	7/16 wrench
B8 valves	1/2 wrench
5. To perform Packing maintenance, remove the stem assembly from the Body. Discard the two Stem Packing Washers and the Packing.
6. To access the Seats and the Ball, secure the Body at the wrench flats and remove the two port End Connectors, using the appropriate hex wrench.

NOTE: For O-ring Stem Packing models discard the two Stem O-Rings and the Stem Packing Washers. Do not discard the Packing Gland.

B2 valves	9/16 wrench
B6 valves	3/4 wrench
B8 valves	1-1/16 wrench

- CAUTION:** Hold the Valve Body by using a finger tip on each End Connector opening to prevent the interior Ball and the Seat components from falling out.
7. Gently remove and discard the two internal Seals and Seats, exercising care not to damage or scratch the Body's interior sealing surfaces or the threads. Remove and save the Ball.
 8. Remove and discard the O-Ring located on each End Connector, exercising care not to damage or scratch the Connectors' sealing surfaces or the threads.

REASSEMBLY OF BALL VALVES WITH PTFE PACKING

1. Make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.
2. Refer to Figures 1 thru 3, as applicable for the Valve's configuration. Place an O-Ring on each End Connector as illustrated in Figure 5, exercise care not to damage or scratch the O-Rings.

NOTE: Mandrels are provided for valves with PTFE end connector seals. For valves with elastomeric end connector seals, a mandrel is not needed.

3. Lightly apply an appropriate lubricant to the End Connectors' threads as consistent with the Valve's service requirements. Always consult your authorized Parker representative if questions arise.
4. Place a Retainer Seal on each of the two Ball Seat Sub-Assemblies which have Seats crimped into their reverse face.
5. Position the End Connectors upright so their O-ring installed end is facing up. Place a Ball Seat Sub-Assembly with Retainer Seal into the boss at the top of each End Connector so the Seat is facing up.
6. For all valve seats except PTFE, apply a small amount of lubricant to the Seat as consistent with the Valve's service requirements. Always contact your authorized Parker representative if questions arise.
7. Apply a small amount of an appropriate lubricant to the Packing Nut and End Connector threads, as consistent with the Valve's service requirements. Always contact your authorized Parker representative if questions arise.
8. Refer to Figure 3. Stack the three Stem Packing components on the Stem in the following order, with the first item being placed at the bottom of the Stem: Packing Washer / Stem Packing / Packing Washer.

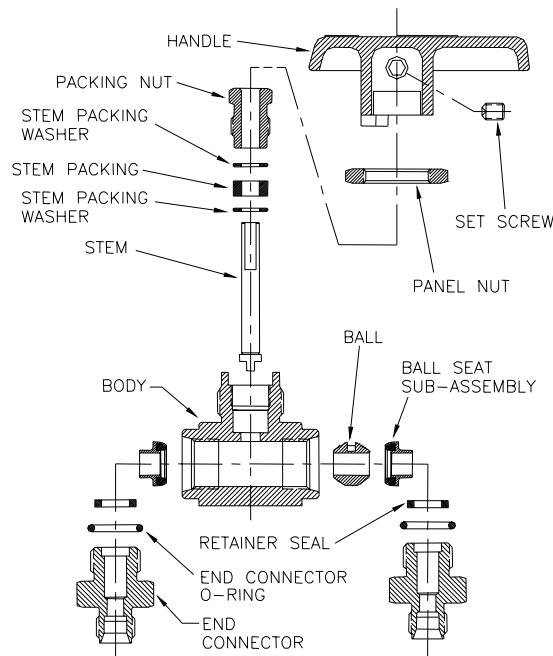


Figure 3: Ball Valve Assembly with PTFE Packing Exploded View

9. While holding the Body in one hand, with the ports vertical, carefully place one End Connector / Seat Retainer Sub-Assembly into the lower Valve body port. Engage this Sub-Assembly in the Body until it is finger tight.
10. Insert the Ball inside the Body, with the slot facing toward the Stem, using a clean wooden dowel of the following diameter:

B2 valves	9/64 inch
B6 valves	3/16 inch
B8 valves	3/8 inch

Leave the wooden dowel in the Body to temporarily hold the Ball inside the Seating area.

11. Place the keyed end of the Stem Sub-Assembly through the stem port into the corresponding slot in the Ball. Rotate the wooden dowel to move the Ball slot so it is at the Stem position.
12. Install the lubricated Packing Nut on the Body until it is finger-tight.
13. Secure the Body so that the Stem is vertical.
14. Complete the installation by turning the Packing Nut on the Body clockwise and tightening using the size hex socket torque wrench and torque level specified in the following table.

Packing Nut Tightening Specifications

Ball Valve Size	Hex Socket Wrench	Torque Level
B2	5/16 inch	30 In-lbs (3.4 N-m)
B6	7/16 inch	70 In-lbs (7.9 N-m)
B8	1/2 inch	90 In-lbs (10.2 N-m)

15. Remove the wooden dowel (if applicable) from the Body after the Packing Nut is properly tightened on the Body.
 16. While holding the Body in one hand, with the ports vertical, carefully place the other End Connector / Seat Retainer Sub-Assembly into the lower Valve body port. Engage this Sub-Assembly in the Body until it is finger tight.
- NOTE:** On 3-way Ball Valves, the bottom port End Connector is assembled just as the two (primary) End Connectors, except no Ball Seat mounting elements are involved. Refer to Figure 2.
17. Close the Valve. This is required to avoid Seat damage during the following tightening of the End Connectors.

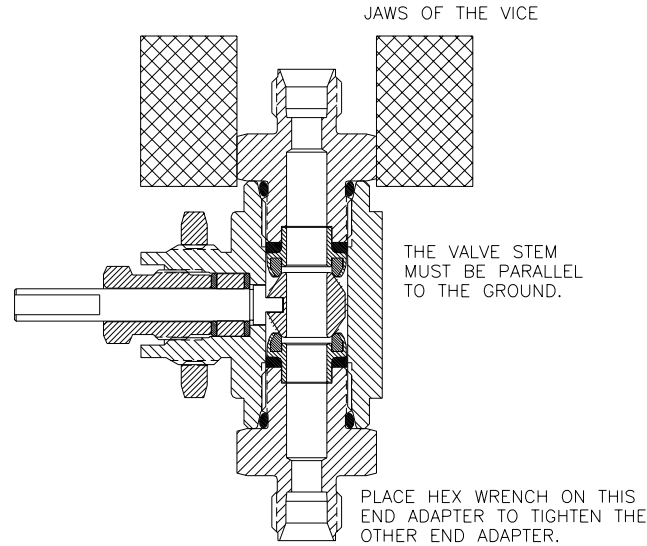


Figure 4: Position of Valve Body during tightening of End Connectors

18. Secure one End Connector (not the Valve Body) of the Ball Valve so that the Stem is horizontal, as illustrated in Figure 4.

WARNING: It is IMPERATIVE that two (2) conditions exist during the tightening of the End Connectors. Failure to adhere to these two conditions may result in damaging the Valve during tightening of the End Connectors.

- 1) The Stem **MUST NOT** move.
- 2) The Ball **MUST** be capable of limited **FREE MOVEMENT** while inside the Body.

19. Tighten the End Connectors in accordance with the specifications in the following table using the following size hex socket torque wrench.

B2 valves	9/16 inch
B6 valves	3/4 inch
B8 valves	1-1/16 inch

NOTE: The bottom port End Connector on Three-Way Ball Valves is also torqued as instructed.

Ball Valve Port End Connector Torque Requirements

Valve Size	Valve Body Material	
	Brass or Alloy 400	Stainless Steel or Hastelloy
B2	75 In-lbs (8.5 N-m) 6.3 Ft-lbs (8.5 N-m)	100 In-lbs (11.3 N-m) 8.3 Ft-lbs (11.3 N-m)
B6	204 In-lbs (23.1 N-m) 17 Ft-lbs (23.1 N-m)	348 In-lbs (39.3 N-m) 29 Ft-lbs (39.3 N-m)
B8	456 In-lbs (51.5 N-m) 38 Ft-lbs (51.5 N-m)	660 Ft-lbs (74.6 N-m) 55 Ft-lbs (74.6 N-m)

20. Turn the Stem through at least one (1) "Close and Open" cycle to verify proper operation of the Stem.

CAUTION: Rebuild any Valve exhibiting rough or irregular Stem operation. Always consult your authorized Parker representative if questions arise.

21. Install the Ball Valve Body in its panel mounting hole, if applicable, by turning the Panel Nut clockwise.

22. Re-install the Handle. Secure by turning the Set-Screw clockwise and tightening to 15 In-lbs (1.7 N-m).
GENTLY SLIDE THE O-RING OVER THE MANDREL IN THIS DIRECTION

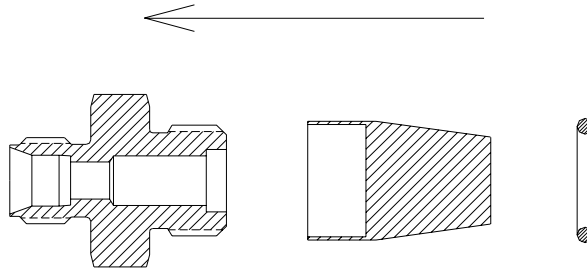


Figure 5: Installing an O-Ring on an End Connector

1. PLACE THE MANDREL OVER THE END CONNECTOR THREAD (ONLY IF O-RING IS PTFE).
2. SLIDE THE O-RING SLOWLY AND GENTLY OVER THE THREADS/MANDREL.
3. PLACE THE O-RING UP AGAINST THE END CONNECTOR'S HEX FACE SECTION.
4. IN THE CASE OF A TEFLON O-RING, PULLING THE MANDREL AWAY FROM THE END CONNECTOR WILL ALLOW THE O-RING TO FALL IN THE SEALING SLOT NEXT TO THE END CONNECTOR'S HEX SECTION.

REASSEMBLY OF BALL VALVES WITH O-RING STEM PACKING

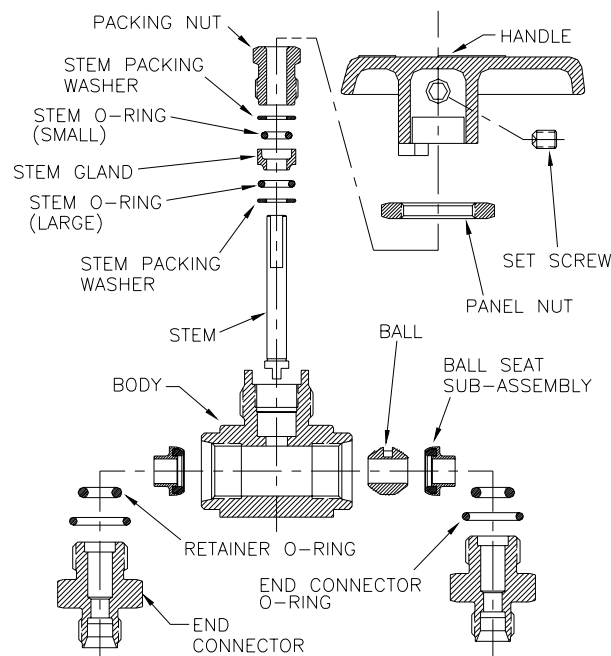


Figure 6: Ball Valve with O-Ring Stem Packing Assembly Exploded View

1. Perform steps 1 thru 7 of the standard PTFE Packing Ball Valve Reassembly instructions.
2. Lightly apply an appropriate lubricant on the two new Stem Packing O-Rings, as consistent with the Valve's service requirements. Always consult your authorized Parker representative if questions arise.
3. Refer to Figure 6. Stack the five Stem Packing components on the Stem in the following order, with the first item being placed at the bottom of the Stem:
 - new Packing Washer
 - new (large) O-Ring (lubricated)
 - Stem Packing Gland, with the raised nipple section facing down toward the bottom of the Stem.
 - new (small) O-Ring (lubricated)
 - new Packing Washer.
4. Perform steps 9 thru 22 of the standard PTFE Packing Ball Valve Reassembly instructions.

REASSEMBLY OF BALL VALVES WITH LIVE LOADED PTFE PACKING

1. Perform steps 1 thru 7 of the standard PTFE Packing Ball Valve Reassembly instructions.
2. Refer to Figure 7, 8 or 9 Stack the five Stem Packing components on the Stem in the following order, with the first item being placed at the bottom of the Stem:

- new Packing Washer
- new Packing (Bevel Down)
- new Packing Washer
- new Live Loaded Washer(Bevel Up)
- new Live Loaded Washer(Bevel Down)
- new Packing Washer

For B2 (Figure 7)

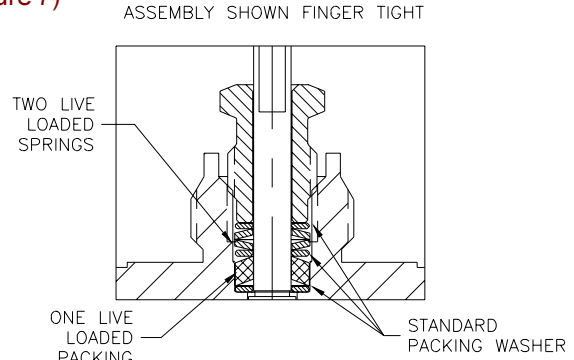


Figure 7

For B6 (Figure 8)

- new Packing Washer
- new Packing (Bevel Down)
- new Packing (Bevel Down)
- new Packing Washer
- new Live Loaded Washer(Bevel Up)
- new Live Loaded Washer(Bevel Down)
- new Packing Washer

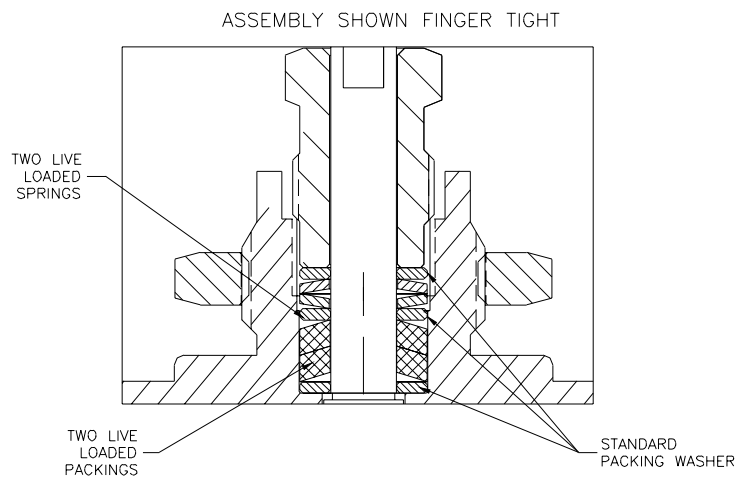


Figure 8

For B8 (Figure 9)

- new Packing Washer
- new Packing (Bevel Down)
- new Packing (Bevel Down)
- new Packing Washer
- new Live Loaded Washer(Bevel Up)
- new Live Loaded Washer(Bevel Down)
- new Live Loaded Washer(Bevel Up)
- new Live Loaded Washer(Bevel Down)
- new Packing Washer

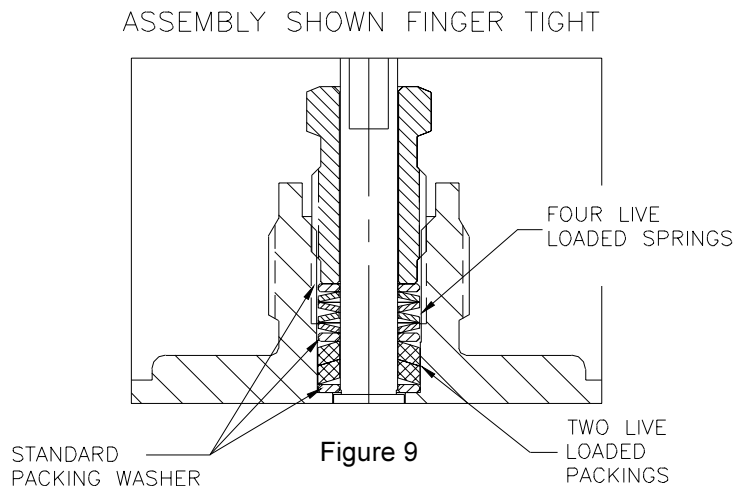


Figure 9

3. Perform steps 9 thru 22 of the standard PTFE Packing Ball Valve Reassembly instructions.

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

A -Two ferrule A-LOK®
compression port



Z -Single ferrule CPI™
compression port



F -ANSI/ASME B1.20.1
Internal pipe threads



V -VacuSeal face
seal port



Q -UltraSeal face
seal port



M -ANSI/ASME B1.20.1
External pipe threads



WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

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Sample Cylinders



Stainless Steel Cylinders Pressure and Temperature Ratings

1800 psig (124 bar)
-58 °F to 450 °F (-50 °C to 232 °C)

- DOT-3E 1800:
75, 150, 300, and 500cc with 1/4" NPT threads
- DOT-3A 1800:
1000 and 2250cc with 1/4" NPT threads
- DOT-3A 1800:
3785cc (1 gallon) with 1/2" NPT threads

Aluminum Cylinders Pressure and Temperature Rating

1800 psig (124 bar)
0 °F to 120 °F (-18 °C to 49 °C)

- DOT-E 7737 1800:
150, 300, and 500cc with 1/4" NPT threads

Cylinder Design, Production and Testing

The design, manufacture and testing of steel sample cylinders is regulated by the US government in 49 CFR, Paragraphs 178.36 *Specification 3A; seamless steel cylinders* and 178.42 *Specification 3E; seamless steel cylinders*. Aluminum sample cylinders are governed by the same paragraphs, supplemented by Exemption DOT-E 7737. Specification 3A deals with cylinders not over 1,000 pounds (455 kg) water capacity and Specification 3E is for cylinders having an outside diameter no greater than 2 inches (51 mm), with a length less than 2 feet (61 cm). Service pressure is limited to 1,800 psi (124 bar) for Parker Sample Cylinders.

The above regulations control all aspects of the design and production of sample cylinders. Material physical properties and chemical characteristics are controlled. Each cylinder must be hydrostatically tested between 3,000 and 4,500 psi (207 and 310 bar). In addition, one cylinder out of each lot of 500 or less must be subjected to a burst test and result in a safety factor on burst pressure of 3.3 minimum.

All cylinder tests must be inspected and verified by an independent inspection agency, and all test reports must be maintained for fifteen years. Each cylinder must also be marked and packaged in accordance with 49 CFR.

DOT Cylinder Retesting Requirements
(Per 49 CFR, Paragraph 173.34)

DOT Rating	Minimum Retest Pressure	Retest Period (Years)
3E 1800	Retest not required	N/A
3A 1800	3000 psig (207 bar)	5
E 7737 1800	Retest not required	N/A

DOT Approved Materials for use in Aluminum Sample Cylinders

Air, Compressed	Ethane	Methane
Ammonia, anhydrous	Ethylene	Methylamine, anhydrous
Argon	Ethylene oxide	Methyl butene
Boron trichloride	Flammable liquid, n.o.s.	Monoethylamine
Butadiene, inhibited	(Dimethylpropane)	Neon
Butane	Refrigerant gas (Freon)	Nitrogen
Carbon Dioxide, liquefied	Helium	Nitrous oxide
Compressed gas, n.o.s.	Hydrocarbon gas, non-liquefied	Oxygen*
(Bromotrifluorethylene)	(Coal gas)	Pentane
Compressed gas, n.os.	Hydrogen	Propane
(Deuterium)	Hydrogen sulphide	Sulphur dioxide
Compressed gas, n.o.s.	Isobutane	Sulphur hexafluoride
(Difluoroethylene)	Isobutylene	Trimethylamine, anhydrous
Compressed gas, n.o.s. (Krypton)	Liquefied petroleum gas (Butene)	Vinyl chloride
Compressed gas, n.o.s. (Ozone)	Liquefied petroleum gas	Vinyl fluoride, inhibited
Cyclopropane	(Cyclobutane)	Xenon
Dimethylamine, anhydrous	Liquefied petroleum gas	*Note: Oxygen is only acceptable if
Dimethyl ether	(Propylene)	the cylinder has straight threads

Aluminum Sample Cylinders

This cylinder is produced from a high strength aluminum alloy designated by the Aluminum Association as 6061 and heat treated to T6 temper. It should be noted that this cylinder is manufactured under Department of Transportation Exemption Number DOT-E 7737-1800 and is the aluminum equivalent of DOT-3E 1800 cylinder. The cylinder has been inspected by and testing has been witnessed by an independent inspection agency.

It is important that the user respect the fact that this is an aluminum cylinder. If this cylinder is exposed to fire, it should not be refilled and the cylinder should be properly disposed.

In some cases, the user may evacuate or clean the cylinder by heating in an oven; and in this case the cylinder should not be exposed to temperature above 350 °F.

This cylinder is approved for any hazardous material for which the DOT specification 3AL cylinder is prescribed or authorized in 49 CFR Part 173, classed as flammable gas, non-flammable gas, flammable liquid, or Poison A. The gases listed above are generally those that are approved.

Oxygen Service

For aluminum sample cylinders to be charged with oxygen, the following applies: Straight threads only. (Since this cylinder has tapered threads it cannot be used for oxygen service.)

Nitrous Oxide & Oxygen Service

Each cylinder requires special cleaning in compliance with Federal Specification RR-C-901b dated August 1, 1967, paragraph 3.8.2 This aluminum sample cylinder has not been processed by this special cleaning and therefore should not be used for oxygen service.

Valve Insertion Procedure for Sample Cylinders

1. It is recommended that new valves be used. If a valve has been used in a steel cylinder, the threads may be distorted and possibly would not produce a proper seal.
2. Valve and cylinder threads should be clean. Examine the valve and cylinder for damaged threads, and reject or repair those containing defects such as burrs, dings, nicks, gouges, etc.
3. Apply 1-1/2 wraps of PTFE tape on the valve threads, leaving the first lead thread exposed. Apply a PTFE paste to the first lead thread and over the tape, evenly but sparingly. For stainless steel valves, PTFE paste is suggested for proper sealing.
4. Assemble the lubricated valve to the cylinder by inserting and hand tightening to engage a minimum of 2 to 3 threads. If the valve fails to start easily, recheck the valve to make sure it is to gauge. Also, check the valve and cylinder for damaged threads.
5. Place the valved cylinder in a holding device providing protective material around the cylinder to prevent gouging of the side walls with the vice holding jaws. Using a torque wrench with an adapter to fit the wrench flats on the valve, tighten the valve to **8 to 10 foot pounds maximum**. This torque should yield another 2 to 3 threads engagement, giving a total engagement of 5 to 6 threads. If a problem develops, please contact the Instrumentation Valve Division or Parker Distributor for assistance.

Caution

Aluminum cylinders require care in the assembly of valves with tapered threads. The aluminum cylinder is of the same relative hardness as a brass valve and does not reshape or rethread the valve during insertion as does a steel cylinder. Therefore, an interface problem could be created by damaged threads or excessive valve torque preventing a gas-tight connection.

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

F -ANSI/ASME B1.20.1
Internal pipe threads



M -ANSI/ASME B1.20.1
External pipe threads



WARNING

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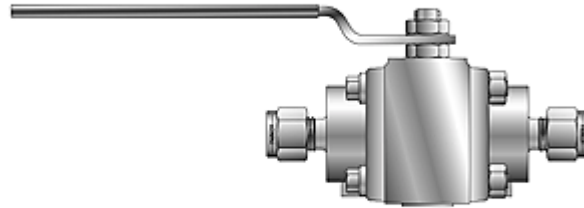
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SWB Series Swing-Out Ball Valve



MAXIMUM WORKING PRESSURE AND TEMPERATURE

Valve Size	Maximum Pressure and Temperature	Maximum Temperature and Pressure
SWB4	2500 psig at 70 °F 17.2 MPa at 21 °C	0 psig at 450 °F 0 MPa at 232°C

Always consult your authorized Parker representative if questions arise.

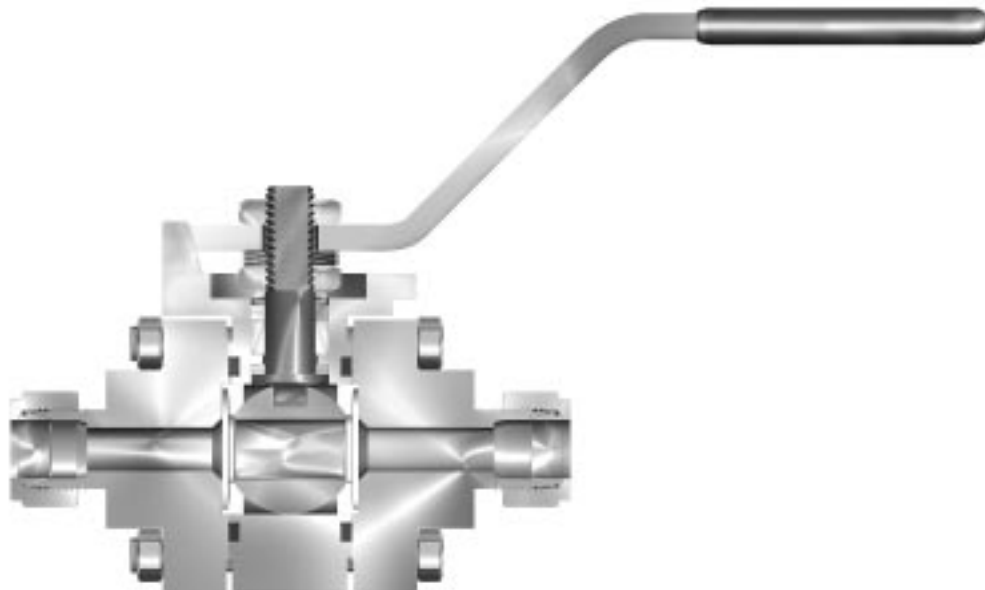


Figure 1: SWB Series Swing-Out Ball Valve Cross Sectional View

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EX-HAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

Verify that the Maintenance Kit being used is appropriate for the Valve's service requirements. Always contact your authorized Parker representative if any questions arise.

1. Turn the Valve handle to place the Valve in the open position.
2. Remove three (3) flange bolts and hex nuts. Loosen the fourth. Swing the body from between the end flanges.
3. Turn the Valve handle to place the ball in the closed position. Remove the seats, seat springs, o-rings and ball.
4. Remove the upper stem hex nut handle, ground spring and stem springs.
5. Remove the lower stem hex nut. Then remove the stem and thrust washers through the body cavity.
6. Remove the lower packing, upper packing, packing support, packing gland and stem springs from the packing cavity of the body.

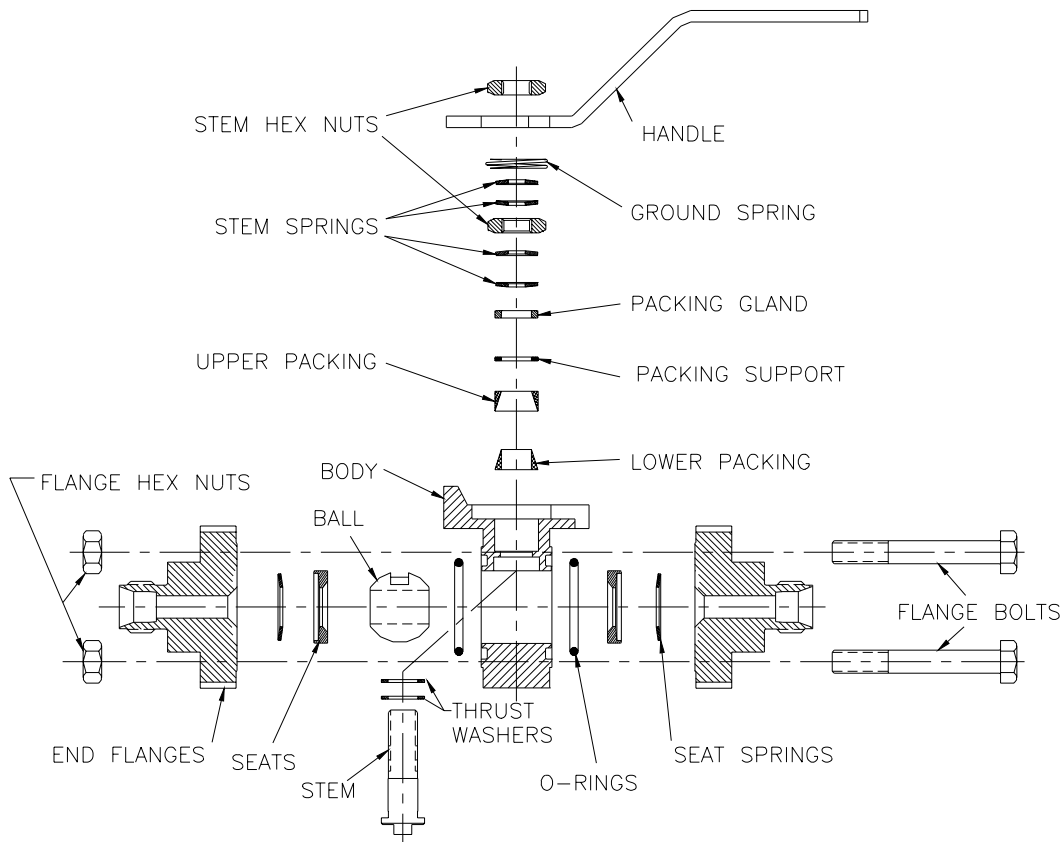


Figure 2: Exploded View of the SB Series Ball Valve

REASSEMBLY

1. Make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.
2. Lubricate the seats, o-rings, lower and upper packings and hex nut threads with an appropriate lubricant. Always consult your authorized Parker representative if questions arise.
3. Install two (2) packing thrust washers on the stem.
4. Insert the stem with the two (2) thrust washers through the body hole and into the lower body cavity.
5. While holding the stem firmly in place in the body place the following new components onto the stem in the order shown:

- Lower Packing
- Upper Packing
- Packing Support
- Packing Gland
- Two (2) Stem Springs (concave side facing each other)

6. Thread a Stem Hex Nut onto the stem and torque the stem hex nut to:

SWB4	20 In-lbs +2/-2 In-lbs (2.2 N-m +.23/- .23 N-m)
------	--

7. Place two (2) new Stem Springs (concave side facing each other) onto the stem, followed by ground spring and handle
8. Thread a Stem Hex Nut onto the stem and torque the stem hex nut to:

SWB4	37 In-lbs +3/-3 In-lbs (4.17 N-m +.34/- .34 N-m)
------	---

9. Turn the Handle fully clockwise and insert the ball into the body assuring that the slot on the top of the ball is aligned with the tang on the stem. Turn the Handle fully counter-clockwise.
10. Place the two (2) o-rings into the o-ring grooves of the body.
11. Place the seats against the ball with the countersinks which fit the seat springs facing out.
12. Place the seat springs against the seats and into the seat countersink with the concave face of the springs facing out.
13. Swing the flanges into alignment with the body and insert the three (3) flange bolts, which had been removed, through the flanges and body.
14. Thread the three (3) flange hex nuts, which had been removed, onto the flange bolts. Torque all four (4) flange bolts and flange hex nuts to:

SWB4	106 In-lbs +10/-10 In-lbs (12.0 N-m +1.13/-1.13 N-m)
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VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

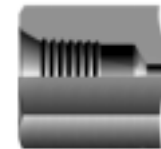
A -Two ferrule A-LOK[®] compression port



Z -Single ferrule CPI[™] compression port



F -ANSI/ASME B1.20.1 Internal pipe threads



V -VacuSeal face seal port



Q -UltraSeal face seal port



M -ANSI/ASME B1.20.1 External pipe threads



WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

ALL PARKER VALVES MUST PASS A RIGID OPERATIONAL AND LEAKAGE TEST BEFORE LEAVING THE FACTORY. IT IS RECOMMENDED AFTER ANY REASSEMBLY, THE VALVE SHOULD BE TESTED BY THE USER FOR OPERATION AND LEAKAGE. IF THESE INSTRUCTIONS ARE NOT FULLY COMPLIED WITH, THE REPAIRED PRODUCT MAY FAIL AND CAUSE DAMAGE TO PROPERTY OR INJURY TO PERSONS. PARKER HANNIFIN CANNOT ASSUME RESPONSIBILITY FOR PERFORMANCE OF A CUSTOMER SERVICED VALVE.



SN Series Needle Valve



MAXIMUM WORKING PRESSURE AND TEMPERATURE "R" Stem

Stem Packing	Maximum Pressure and Temperature	Maximum Pressure and Temperature
PTFE	6000 psig at 70 °F 41.4 MPa at 21 °C	0 psig at 450 °F 0 MPa at 232 °C
O-Ring	6000 psig at 70 °F 41.4 MPa at 21 °C	0 psig at 400 °F 0 MPa at 204 °C
Grafoil®	6000 psig at 70 °F 41.4 MPa at 21 °C	3930 psig at 700 °F 27.1 MPa at 371 °C

"K" Stem

Stem Packing	Maximum Pressure and Temperature	Maximum Pressure and Temperature
PTFE	3000 psig at 70 °F 20.7 MPa at 21 °C	0 psig at 350 °F 0 MPa at 176 °C
O-Ring	3000 psig at 70 °F 20.7 MPa at 21 °C	0 psig at 350 °F 0 MPa at 176 °C
Grafoil®	3000 psig at 70 °F 20.7 MPa at 21 °C	0 psig at 350 °F 0 MPa at 176 °C

Always consult your authorized Parker representative if questions arise. The arrow on the valve Body indicates the normal direction of flow.

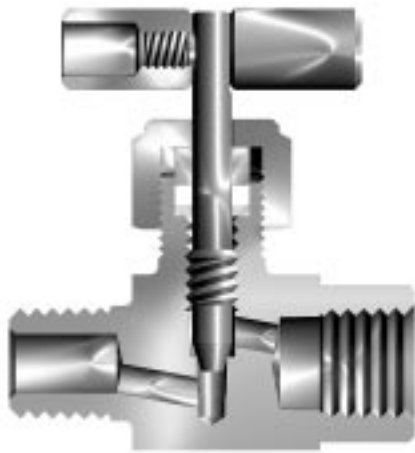


Figure 1: SN Series Needle Valve
Cross Sectional View

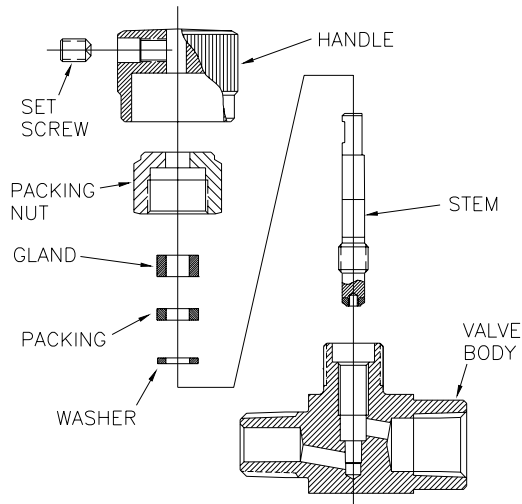


Figure 2: Bar Stock Needle Valve
w/PTFE Packing Exploded View

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the Bar Stock Needle Valve Maintenance Kit being used is appropriate for the Valve's size, Handle type, Stem Seat, Stem Packing configuration, and the service requirements
2. Remove the Handle by turning the Set Screw counter-clockwise with a 3/32 inch allen wrench.
3. Refer to Figure 2. Remove the Packing nut (located directly under the Handle) by turning counter-clockwise with an 5/8 inch size hex wrench.
4. Gently remove the Valve Stem Sub-Assembly from the Body with counter-clockwise rotation.
5. Discard the Stem, Packing Gland, Packing Washer, and Packing (either PTFE Grafoil® or O-Ring).

REASSEMBLY

1. Make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.
 2. Secure the Body in an assembly fixture.
 3. This step only applies to Valves with the "K" (soft-seat) option. Proceed to step 4 for Valves with other stem options. Verify the Soft Seat is properly attached to the "K" Stem.
 4. Apply a liberal amount of lubricant, as consistent with the valve's service requirements, to the Stem threads.
- NOTE:** Every Power Thread must be covered with lubricant !
5. This step only applies to Valves with the "R" (blunt stem) option. Proceed to step 6 for Valves with other stem options. Apply a small drop of lubricant, as consistent with the valve's service requirements, to the Stem seat cone area.
 6. Gently install the Stem into the Body. Tighten the Stem until finger-tight.

CAUTION: Do not over tighten the Stem in the Body.

7. This step assembles the variety of stem packing options for the Bar Stock Needle Valve. Refer to the instructions which apply to the specific Valve model being assembled with these instructions.
 - A) PTFE Stem Packing (standard): Refer to Figure 2. Stack the three packing components on the Stem (either "K" or "R") in the following order, with the first item being placed above the Stem threads. Then proceed to Step 8.
Packing Washer // PTFE Stem Packing // Packing Gland.
 - B) O-Ring Stem Packing (optional): Apply a small amount of lubricant, as consistent with the valve's service requirements, to the Stem O-Ring. Refer to Figure 3. Stack the three packing components on the Lower Stem (either "K" or "R") in the following order, with the first item being placed above the Stem threads. Then proceed to Step 8.
Packing Washer // O-Ring, lubricated // Packing Gland.
 - C) Grafoil® Stem Packing (optional): Refer to Figure 4. Stack the three packing components on the Lower Stem (either "K" or "R") in the following order, with the first item being placed above the Stem threads. Then proceed to Step 8.
Packing Washer // Grafoil® Packing // Packing Gland
8. Apply a liberal amount of lubricant, as consistent with the valve's service requirements, to the threads and to the interior bottom of the Packing Nut.
9. Install the Packing Nut on the Body until hand-tight. Torque the Packing Nut to 75 In-lbs using a 5/8 inch hex torque wrench.

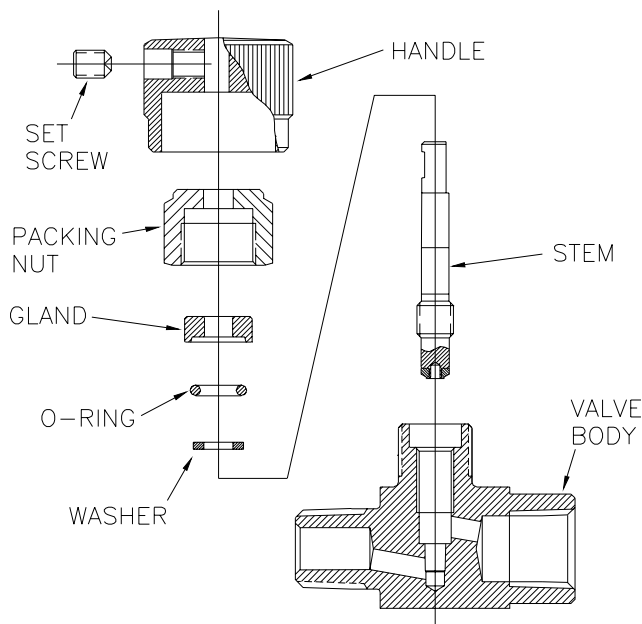


Figure 3: Bar Stock Needle Valve
w/O-Ring Packing Exploded View

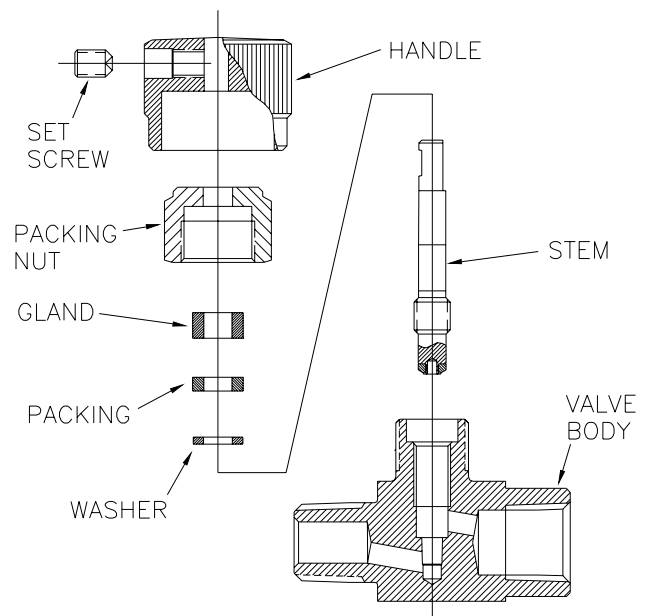


Figure 4: Bar Stock Needle Valve
w/Grafoil® Packing Exploded View

10. Install the proper Handle onto the Stem. Secure the Handle with the proper Set Screw, and tighten to the Set Screw to 15 In-lbs. torque. Verify the Handle is tightly fastened.
NOTE: The Bar Handle option must not be used on "K" Stem models!
11. Turn the Valve Handle through at least one (1) "Open and Close" cycle to verify proper operation of the Stem's threads.
12. Rebuild the Valve if it exhibits rough or irregular Handle operation.

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

A -Two ferrule A-LOK[®] compression port



Z -Single ferrule CPI[™] compression port



F -ANSI/ASME B1.20.1 Internal pipe threads



V -VacuSeal face seal port



Q -UltraSeal face seal port



M -ANSI/ASME B1.20.1 External pipe threads



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NP Series Needle Valve



Allowable Working Pressures and Temperatures “R” Stem

Stem Packing	Maximum Pressure and Temperature	Maximum Temperature and Pressure
PTFE	6000 psig at 70 °F 41.4 MPa at 21 °C	0 psig at 400 °F 0 MPa at 204 °C
O-Ring	6000 psig at 70 °F 41.4 MPa at 21 °C	0 psig at 400 °F 0 MPa at 204 °C
Grafoil®	6000 psig at 70 °F 41.4 MPa at 21 °C	3930 psig at 700 °F 27.1 MPa at 371 °C

Allowable Working Pressures and Temperatures “K” Stem

Stem Packing	Maximum Pressure and Temperature	Maximum Temperature and Pressure
PTFE	6000 psig at 70 °F 41.4 MPa at 21 °C	0 psig at 350 °F 0 MPa at 176 °C
O-Ring	6000 psig at 70 °F 41.4 MPa at 21 °C	0 psig at 350 °F 0 MPa at 176 °C
Grafoil®	6000 psig at 70 °F 41.4 MPa at 21 °C	0 psig at 350 °F 0 MPa at 176 °C

The arrow on the Valve Body indicates the normal direction of flow.

PANEL MOUNTED VALVES

The panel must have a through-hole of 49/64 inch (19.4 mm) diameter. The maximum panel thickness is 1/4 inch (6.4 mm). When the Valve is mounted to a thin panel, a spacer (or washer) may be necessary to permit full Panel Nut engagement on the Valve.

1. Remove the Handle by unthreading the Handle Set Screw in the side of the Handle with a 3/32 inch allen wrench.
2. Remove the Body Set Screw with a 1/16 inch allen wrench.
3. Insert the Valve through the hole in the panel and assemble the Panel Nut, using a 3/4 inch hex wrench.
4. Re-install the Body Set Screw into the Body using a 1/16 inch allen wrench and torque to 6 in-lbs.
5. Re-install the Handle with the Set Screw into the grooved flat on the Stem, using a 3/32 inch allen wrench.

PACKING ADJUSTMENT (Valves With PTFE Packing)

Packing adjustment may be necessary depending on the many and varied uses for the Valve. It is recommended an adjustment be made shortly after the initial installation and just prior to flow start-up.

NOTE: There is no packing adjustment necessary for Valves with an optional O-Ring Stem Packing.

1. Turn the stem to the closed position, finger tight.
2. Tighten the Packing Nut using a 9/16 inch wrench from 1/8 to 1/4 turn, or torque to 75 In-lbs. (8.4 N-m).

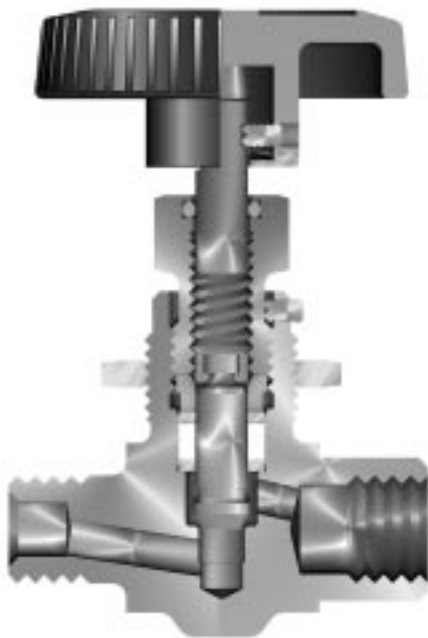


Figure 1: NP Series Needle Valve Cross Sectional View

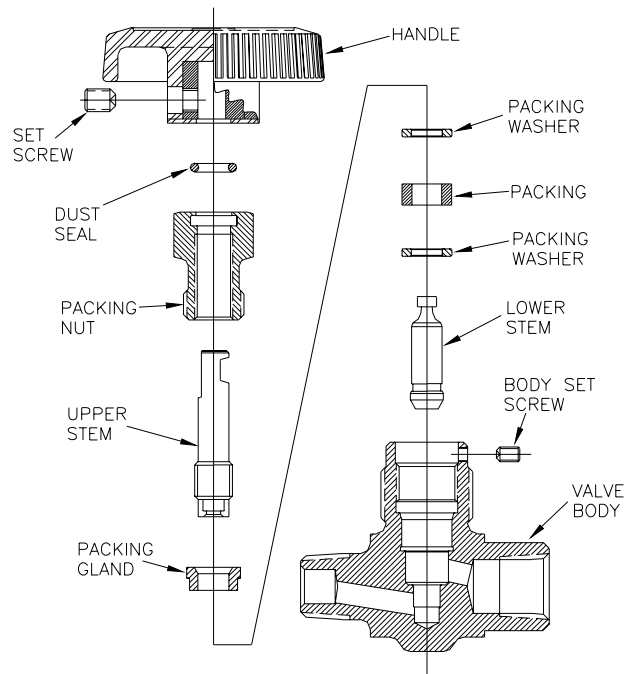


Figure 2: NP Series Needle Valve w/PTFE Packing Exploded View

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the PBT Needle Valve Maintenance Kit being used is appropriate for the Valve's Stem Seat, packing configuration, and service requirements
2. Open the PBT Valve until the Stem is lightly back-stopped.
3. Remove the Handle by turning the Handle Set Screw counter-clockwise with a 3/32 inch allen wrench.
4. Remove the Body Set Screw (located under the Packing Nut) by turning counter-clockwise with a 1/16 allen wrench.
5. Clamp the Body securely in a vise, with the Stem in a vertical position.
6. Remove the Packing Nut (located directly under the Handle) by turning counter-clockwise with an 9/16 inch size hex wrench. Gently pull the Packing Nut (and attached Stem Sub-Assembly) out of the Body.
7. Remove the Stem assembly from the Packing Nut by holding the (upper) Stem in one hand, and rotating the Packing Nut (counter-clockwise) until the Stem Sub-Assembly is disengaged from the Packing Nut.
8. Discard the appropriate (replaceable) components from the Valve Stem Sub-Assembly, as consistent with the new components in the Maintenance Kit.
9. Remove the Valve Body from its mounting panel hole (if applicable) by turning the Panel Nut counter-clockwise.
10. Remove and discard the Dust Seal O-Ring from the Packing Nut.

REASSEMBLY

1. Make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.
2. Secure the Body in an assembly fixture.
3. Apply a small amount of lubricant, as consistent with the valve's service requirements, to the Dust Seal O-Ring.
4. Refer to Figure 2. Carefully install the Dust Seal O-Ring in the Packing Nut interior groove.
5. This step only applies to Valves with the "K" (soft-seat) option. Proceed to step 6 for Valves with other stem options. Verify the Soft Seat is firmly attached onto the Lower "K" Stem.
6. This step assembles the variety of stem packing options for the PBT Needle Valve. Refer to the instructions which apply to the specific Valve model being assembled with these instructions.
 - A) **PTFE Stem Packing** (standard): Refer to Figure 2. Stack the four packing components on the Lower Stem (either "K" or "R") in the following order, with the first item being placed on the landing at the end of the stem. Then proceed to Step 8.
 - 1) Packing Washer
 - 2) PTFE Packing
 - 3) Packing Washer
 - 4) Packing Gland.
 - B) **O-Ring Stem Packing** (optional): Apply a small amount of lubricant, as consistent with the valve's service requirements, to the Stem O-Rings. Refer to Figure 3. Place the Large O-ring in the external groove of the Packing Gland. Place the Small O-ring into the recess of the O-ring Gland. Position the assembled O-ring Gland over the Lower Stem. Place the Washer on the Lower Stem, assuring the internal tapered end is facing up. Then proceed to step 7.
 - C) **Grafoil Stem Packing** (optional): Refer to Figure 4. Stack the four packing components on the Lower Stem (either "K" or "R") in the following order, with the first item being placed on the landing at the end of the stem. Then proceed to Step 7.
 - 1) Packing Washer
 - 2) Grafoil Packing
 - 3) Packing Washer
 - 4) Packing Gland.

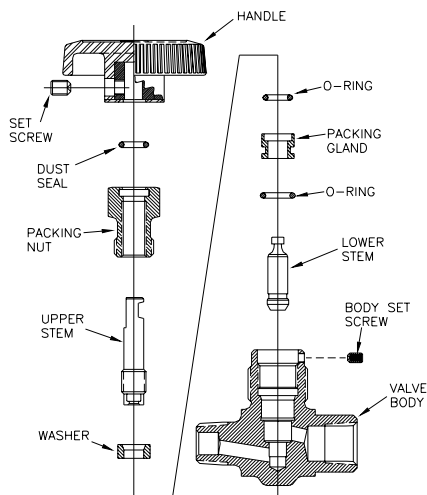


Figure 3: NP6 Needle Valve
w/O-Ring Stem Packing Exploded View

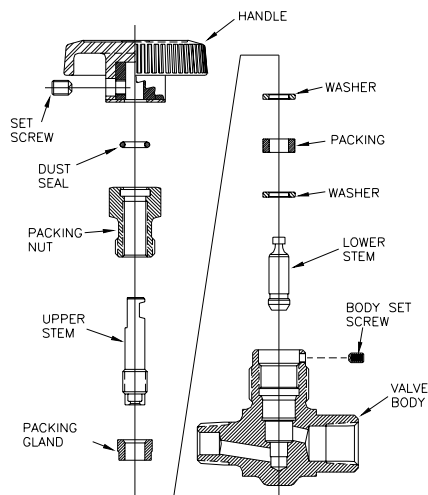


Figure 4: NP6 Needle Valve
w/Grafoil Packing Exploded View

7. Apply a liberal amount of lubricant, as consistent with the valve's service requirements, to the Upper Stem threads and the circular stem attachment slot at the lower end of the Upper Stem.

NOTE: Every Power Thread must be covered with lubricant !

8. Attach the Lower Stem Sub-Assembly to the Upper Stem by "hooking" the two stem elements together inside the circular stem attachment slot.
9. Gently push the top of the Upper Stem through the Dust Seal O-Ring mounted in the Packing Nut, until the Upper Stem threads begin to engage.
10. Complete the assembly of the general Stem Sub-Assembly by turning the Upper Stem counter-clockwise until hand-tight.
11. This step only applies to Valves with the "R" (blunt stem) option. Proceed to step 12 for Valves with other stem options. Apply a small drop of lubricant, as consistent with the valve's service requirements, to the Lower Stem cone seat area.
12. Apply a liberal amount of lubricant, as consistent with the valve's service requirements, to the Packing Nut threads.
13. Install the Packing Nut and Stem Sub-Assembly in the Body until the Packing Nut is hand-tight.
14. This step only applies to Valves with the "Soft-Seat" stem option. Proceed to step 16 for Valves with other stem options.
 - A) Turn the Stem to the OPEN position.
 - B) Torque the Packing Nut in the Body to 75 In-lbs., using a 9/16 inch hex torque wrench.
 - C) Turn the "Soft-Seat" Stem Sub-Assembly to the Closed position and torque to 5 In-Lbs.

15. Install the Body Set Screw in the Body until hand-tight, using a 1/16 inch allen wrench. Torque to 5 In-lbs. Proceed to step 22.
16. Turn the "R" Stem Sub-Assembly to the Closed position and torque to 8 In-Lbs.
17. Torque the Packing Nut in the Body to 75 In-lbs, using a 9/16 inch hex torque wrench.
18. Turn the "R" Stem Sub-Assembly to the Open position.
19. Verify the Packing Nut is still torqued to the Body at 75 In-lbs. If necessary, re-torque the Packing Nut in the Body to 75 In-lbs., using a 9/16 inch hex torque wrench.
20. Re-torque the "R" Stem Sub-Assembly to 8 In-Lbs.
21. Install the Body Set Screw into the Body using a 1/16 hex-socket wrench and torque to 6 in-lbs.
22. Install the Valve in its panel mounting hole, if applicable, by turning the Panel Nut with a 3/4 inch hex wrench.
23. Install the proper Handle onto the Stem. Secure the Handle with the Handle Set Screw, and tighten to 15 In-lbs. torque, using a 3/32 inch allen wrench. Verify the Handle is tightly fastened.

NOTE: The Bar Handle option must not be used on "K" Stem models !

24. Turn the Valve Handle through at least one (1) "Open and Close" cycle to verify proper operation of the Stem's threads.
25. Reject and rebuild any Valve exhibiting rough or irregular Stem operation.

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

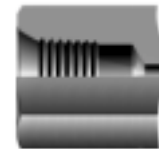
A -Two ferrule A-LOK® compression port



Z -Single ferrule CPI™ compression port



F -ANSI/ASME B1.20.1 Internal pipe threads



V -VacuSeal face seal port



Q -UltraSeal face seal port



M -ANSI/ASME B1.20.1 External pipe threads



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RVCK Series Needle Valve (with Rupture Disc)



MAXIMUM ALLOWABLE WORKING PRESSURES

The Valve's pre-set non-adjustable Rupture Disc burst pressure is indicated on the Disc manufacturer's metal ID tag. The standard Rupture Disc burst pressure is 1800 psig at 70 °F (12.4 MPa at 21 °C). A stainless steel wire is provided with the Valve for the purpose of attaching the Rupture Disc manufacturer's ID Tag to the Valve.

Always consult your authorized Parker representative if questions arise. The arrow on the Valve Body indicates the normal direction of flow.

PACKING ADJUSTMENT (Valves With PTFE Packing)

Packing adjustment may be necessary depending on the many and varied uses for the Valve. It is recommended an adjustment be made shortly after the initial installation and just prior to flow start-up.

NOTE: There is no packing adjustment necessary for Valves with an optional O-Ring Stem Packing.

1. Turn the stem to the closed position, finger tight.
2. Remove the Handle by turning the Set Screw counter-clockwise with a 3/32 inch hex allen wrench.
3. Tighten the Packing Nut using a 9/16 inch wrench from 1/8 to 1/4 turn, or torque to 25 In-lbs. (2.8 N-m).
4. Reinstall the Handle on the Valve by turning the Set Screw clockwise with a 3/32 inch hex allen wrench.

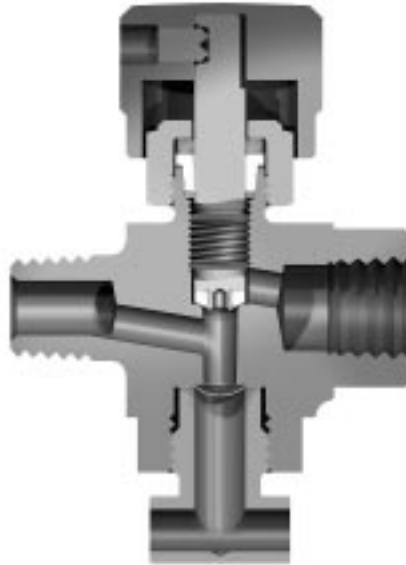


Figure 1: RVCK Series Valve
Cross Sectional View

RUPTURE DISK USE

USER SHOULD READ AND THOROUGHLY UNDERSTAND THESE INSTRUCTIONS BEFORE INSTALLING RUPTURE DISC. THESE INSTRUCTIONS DO NOT PURPORT ALL OF THE SAFETY FACTORS ASSOCIATED WITH THE RUPTURE DISC'S USE IN SERVICE. IT IS THE RESPONSIBILITY OF THE USER TO ESTABLISH APPROPRIATE SAFETY, HEALTH, AND TRAINING MEASURES FOR THEIR PERSONNEL INSTALLING, SERVICING, OR WORKING IN AN AREA WHERE RUPTURE DISC ASSEMBLIES ARE IN USE.

IT IS THE USER'S RESPONSIBILITY FOR DESIGN OF ADEQUATE VENTING AND INSTALLATION OF ADEQUATE VENT PIPING OR DIRECTIONAL FLOW AFTER RUPTURE OCCURS WITH THE RUPTURE DISC AS INTENDED. LOCATE RUPTURE DISC WHERE PEOPLE OR PROPERTY WILL NOT BE EXPOSED TO THE SYSTEM DISCHARGE IN CASE OF RUPTURE. VENT TOXIC OR FLAMMABLE FUMES OR LIQUIDS TO A SAFE LOCATION TO PREVENT PERSONAL INJURY OR PROPERTY DAMAGE.

IT IS THE USER'S RESPONSIBILITY TO SPECIFY THE BURST PRESSURE RATING OF A RUPTURE DISC AT A COINCIDENT TEMPERATURE AT WHICH THE RUPTURE DISC IS TO BE USED. A RUPTURE DISC IS A TEMPERATURE SENSITIVE DEVICE. THE BURST PRESSURE OF THE RUPTURE DISC IS DIRECTLY AFFECTED BY ITS EXPOSURE TO THE COINCIDENT TEMPERATURE. GENERALLY, AS THE TEMPERATURE AT THE RUPTURE DISC INCREASES, THE BURST PRESSURE DECREASES; INVERSELY, AS THE TEMPERATURE AT THE RUPTURE DISC DECREASES, THE BURST PRESSURE MAY INCREASE. FAILURE TO PROPERLY UTILIZE A RUPTURE DISC AT THE SPECIFIED COINCIDENT TEMPERATURE COULD CAUSE PREMATURE OR OVERPRESSURIZATION OF A SYSTEM.

THE INSTANTANEOUS RELEASE OF PRESSURE FROM THE RUPTURE DISC CAN CREATE VIOLENT NOISES DUE TO THE DISCHARGE AT SONIC VELOCITY. IT IS THE USER'S RESPONSIBILITY TO PROTECT AGAINST HEARING DAMAGE TO ANY BYSTANDERS.

PARTICLES MAY BE DISCHARGED WHEN THE RUPTURE DISC RUPTURES. THESE PARTICLES MAY BE PART OF THE RUPTURE DISC ITSELF, OR OTHER ENVIRONMENTAL MATTER IN THE SYSTEM. IT IS THE USER'S RESPONSIBILITY TO ASSURE THAT THESE PARTICLES ARE DIRECTED TO A SAFE AREA TO PREVENT PERSONAL INJURY OR PROPERTY DAMAGE.

THERE IS NO GUARANTEE OF RUPTURE DISC LIFE. SUCH LIFE SPAN IS AFFECTED BY CORROSION, CREEP AND FATIGUE, AND PHYSICAL DAMAGE. THESE CONDITIONS WILL DERATE THE RUPTURE DISC TO A LOWER SET PRESSURE. THE CUSTOMER AND/OR USER SHOULD BE PREPARED TO HANDLE A PREMATURE FAILURE OF THE RUPTURE DISC. THE MEDIA OR OTHER ENVIRONMENTAL CONDITIONS SHOULD NOT ALLOW ANY BUILDUP OR SOLIDIFICATION OF MEDIA TO OCCUR ON A RUPTURE DISC. THIS MAY INCREASE THE PRESSURE SETTING OF THE RUPTURE DISC.

PREVENTATIVE MAINTENANCE

1. REPLACE RUPTURE DISC EVERY YEAR UNDER NORMAL CONDITIONS. A MORE FREQUENT CHANGEOUT MAY BE NECESSARY DUE TO CORROSION, FATIGUE, TEMPERATURE, OR ADVERSE CONDITIONS. THESE FACTORS MUST BE EVALUATED BY THE USER THROUGH ACTUAL SERVICE EXPERIENCE.
2. IF THE RUPTURE DISC IS NOT REPLACED PERIODICALLY WHEN EXPOSED TO THESE CONDITIONS, PREMATURE FAILURE OF THE RUPTURE DISC MAY OCCUR, THEREBY DISCHARGING THE PROCESS MEDIA.
3. TO AVOID EXTENDED DOWNTIME, MAINTAIN THREE SPARE RUPTURE DISCS IN STOCK AT ALL TIMES. THE NUMBER OF SPARES REQUIRED ULTIMATELY WILL BE DETERMINED BY SERVICE CONDITIONS.

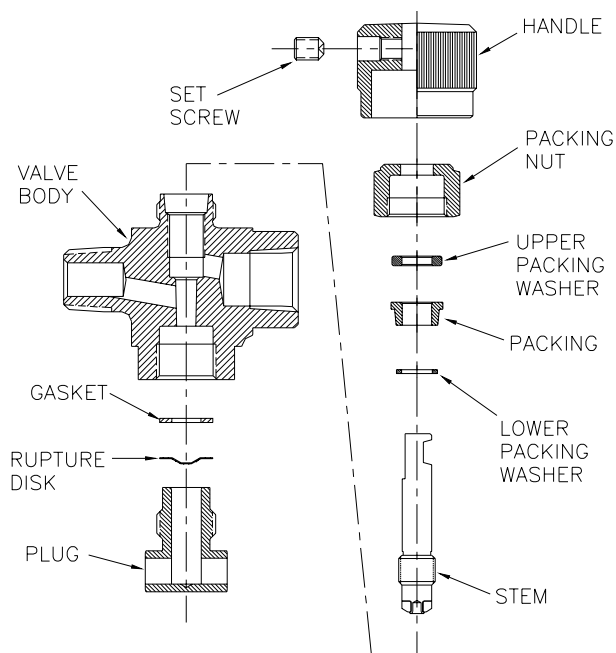


Figure 2: RVCK Series Valve w/ PTFE Packing Exploded View

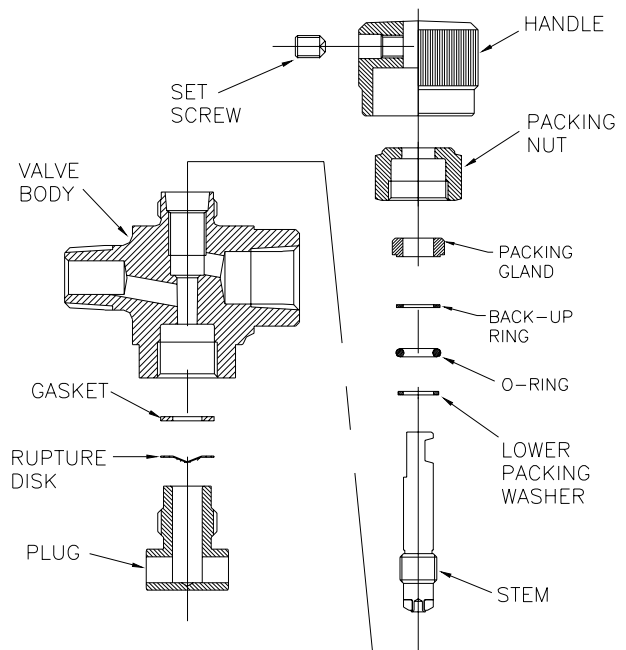


Figure 3: RVCK Series Valve w/ O-Ring Packing Exploded View

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the Combination Needle Rupture Disc Valve Maintenance Kit being used is appropriate for the Valve's size, Handle type, Stem Seat, Stem Packing configuration, Rupture Disc pressure rating and service requirements. Always contact your authorized Parker representative if any questions arise.
2. This Disassembly procedure is divided into two independent sections: Steps 3 thru 5 only apply if the Needle Valve components are being replaced. Proceed to Step 6 if only the Rupture Disc is being serviced.
3. Refer to Figure 2. Remove the Handle by turning the Set Screw counter-clockwise with a 3/32 inch allen wrench.
4. Remove the Packing Nut (located directly under the Handle) by turning counter-clockwise with a 5/8 inch hex wrench.
5. Remove the Stem Sub-Assembly from the Body. Discard the following components, depending on the Valve stem packing configuration:
 - A) O-Ring Stem Packing: Stem, Packing Gland, O-Ring, Back-up Ring, and Packing Washer
 - B) PTFE Stem Packing: Stem, Packing and Packing Washers.
6. Remove the manufacturer's ID Tag for the Rupture Disc which may be attached to the Valve.
7. Remove and discard the Rupture Disc Plug (located directly opposite the Valve stem port) by turning counter-clockwise with an 11/16 inch hex wrench.
8. Remove and discard the Rupture Disc and PTFE Washer from the Rupture Disc chamber.

REASSEMBLY

1. Make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.
2. Steps 3 thru 10 only apply if the Rupture Disc is being replaced. Proceed to Step 11 if only the Needle Valve components are being serviced.
3. Refer to the manufacturer's ID tag which accompanies the new Rupture Disc and PTFE Washer. Verify that the burst pressure rating for the new Rupture Disc agrees with the desired burst pressure rating.
4. Refer to Figure 2. Locate the Rupture Disc chamber. Install the PTFE Washer (which is packaged with the Rupture Disc) in the Rupture Disc chamber in the Body.

NOTE: It is imperative the PTFE Washer be positioned flat and level in the Rupture Disc chamber.

5. Install the Rupture Disc in the Rupture Disc chamber in the Body.

CAUTION: It is imperative the Rupture Disc be positioned such that the spherical dome faces outward and lies flat and level in the Rupture Disc chamber.

WARNING: It is recommended that the manufacturer's ID tag stay with the specific Rupture Disc Assembly used in any given Rupture Disc Valve.

6. Gently install the Plug in the Body until the Plug is hand-tight.
7. Secure the Body in an assembly fixture.
8. Torque the Plug in the Body by turning the Plug clockwise with an 11/16 inch socket torque wrench to 45 In-lbs.
9. A stainless steel wire is provided with the Valve maintenance kit for the purpose of attaching the Rupture Disc manufacturers' ID Tag to the Valve.
10. Reverse the position of the Body in the assembly fixture.
11. Proceed to Step 12 for standard Valves with a "soft-seat" Stem configuration. This step applies to all Valves with an optional "R" Stem configuration. Apply a small drop of lubricant to the new Stem's cone area, consistent with the valve's service requirements.
12. Apply a liberal amount of lubricant, as consistent with the valve's service requirements, to the new Stem's threads. This applies to Valves with both Stainless Steel and Brass Valve bodies.

NOTE: Every Power Thread must be covered with lubricant !

13. Gently install the new Stem Sub-Assembly into the Body and turn clockwise to start the thread engagement.
 14. Tighten the Stem in the Body to the following torque requirements :

“K” Stems	5 In-Lbs
“R” Stems	8 In-Lbs.
 15. The next two steps only apply to Valves with an O-Ring Stem packing. Proceed to step 17 for Valves with the standard PTFE stem packing configuration. Refer to Figure 3. Apply a small amount of lubricant, as consistent with the valve’s service requirements, to the new O-Ring.
 16. Refer to Figure 3. Stack the four packing components on the Stem in the following order, with the first item being placed directly above the Stem threads. Then proceed to Step 18.
 - A) Lower Packing Washer
 - B) O-Ring, lubricated
 - C) Backup Ring.
 - D) Packing Gland.
- NOTE:** Force the packing components into the bottom of the Body packing area.
17. Refer to Figure 2. Stack the three Stem packing components on the Stem in the following order, with the first item being placed directly above the Stem threads:
 - A) Lower Packing Washer
 - B) PTFE Packing.
 - C) Upper Packing Washer.
- NOTE:** Force the packing components into the bottom of the Body packing area.
18. Apply a liberal amount of lubricant, as consistent with the valve’s service requirements, to the Packing Nut threads. Always contact your authorized Parker representative if questions arise.
 19. Install the Packing Nut on the Body by turning clockwise until 2 or 3 threads are engaged. Then torque to 25 In-lbs using a 5/8 inch hex socket torque wrench.
 20. Install the proper Handle onto the Stem. Secure the Handle with the Set Screw using a 3/32 inch allen wrench, and tighten to 15 In-lbs. torque. Verify the Handle is tightly fastened.
 21. Turn the Handle through at least one (1) “Open and Close” cycle to verify proper operation of the Stem’s threads.
 22. Reject and rebuild any Valve exhibiting rough or irregular Stem operation. Always contact your authorized Parker representative if questions arise.

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

A -Two ferrule A-LOK[®] compression port



Z -Single ferrule CPI[™] compression port



F -ANSI/ASME B1.20.1 Internal pipe threads



V -VacuSeal face seal port



Q -UltraSeal face seal port



M -ANSI/ASME B1.20.1 External pipe threads



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CO Series Check Valve



MAXIMUM ALLOWABLE WORKING PRESSURE

Stainless Steel Valves
6000 Psig at 70 °F
41.4 MPa at 21 °C

Always consult your authorized Parker representative if questions arise. The arrow on the Valve Body indicates the normal direction of flow.

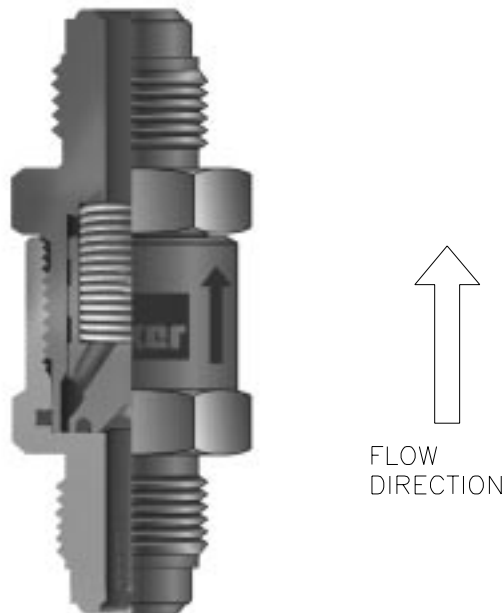


Figure 1: CO Series Check Valve Cross Sectional View

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the Check Valve Maintenance Kit being used is appropriate for the valve's size, the Seal Material, the Spring's crack pressure rating, and service requirements. Always contact your authorized Parker representative if any questions arise.
2. Clamp the Cap (the inlet end of the valve) at its hex-flats. Vertical orientation of the check valve with the flow arrow pointing UP is recommended.
3. Loosen the Cap from the Body by turning counter-clockwise with the following size hex wrench:

CO4 valves	3/4 inch
CO6 valves	1 inch
CO8 valves	1 1/4 inch

Remove and discard the Spring and Poppet from the Body. Gently remove the O-Ring from the O-Ring groove at the bottom of the Cap Cavity, exercising care not to damage or scratch the Cap's interior.

REASSEMBLY

1. Remove the Cap from the clamp and make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.
2. Refer to Figure 1. Insert O-Ring into the O-Ring groove of the Cap, exercising care not to damage the O-Ring and not to damage or scratch the Cap's interior.
3. Apply a light amount of lubricate to the threads and nose OD of the Body, as consistent with valve's service requirements
4. While holding the Body upright, place the new Spring in the Body. Ensure the Spring is properly positioned in the pocket per Figure 1.
5. Install the Poppet over the Spring.
6. With the Body sub-assembly still in a vertical position, install the Cap sub-assembly to the Body until finger tight. Engage by turning clockwise with the hex socket wrench to the torque requirement specified in the following table.

Check Valve Torque Requirements

DO NOT OVER TORQUE

Valve Size	Torque
CO4	15 in-lbs (1.7 N-m)
CO6	25 in-lbs (2.8 N-m)
CO8	25 in-lbs (2.8 N-m)

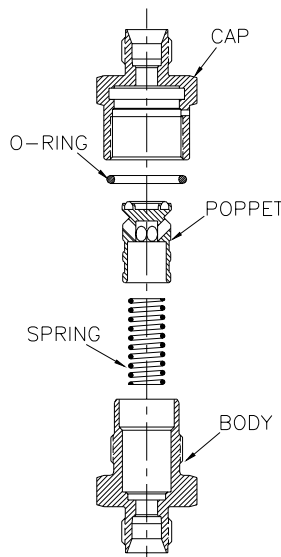


Figure 2: CO Series Check Valve Exploded Assembly

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

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70/70R Series Actuator



Parker's 70 Series Electric Actuators are designed to provide reliable and efficient operation of 2 way and 3 way ball valves. The 70 Series Actuators are available in AC models with a 25% duty cycle and DC models with a 100% duty cycle.

70 Series Information	Pages 2 - 5
70R Series Information	Pages 6 - 9
Options Information	Pages 9 - 11

PARTS LIST

- 1 - Limit Switches
- 2 - Cams
- 3 - O-ring

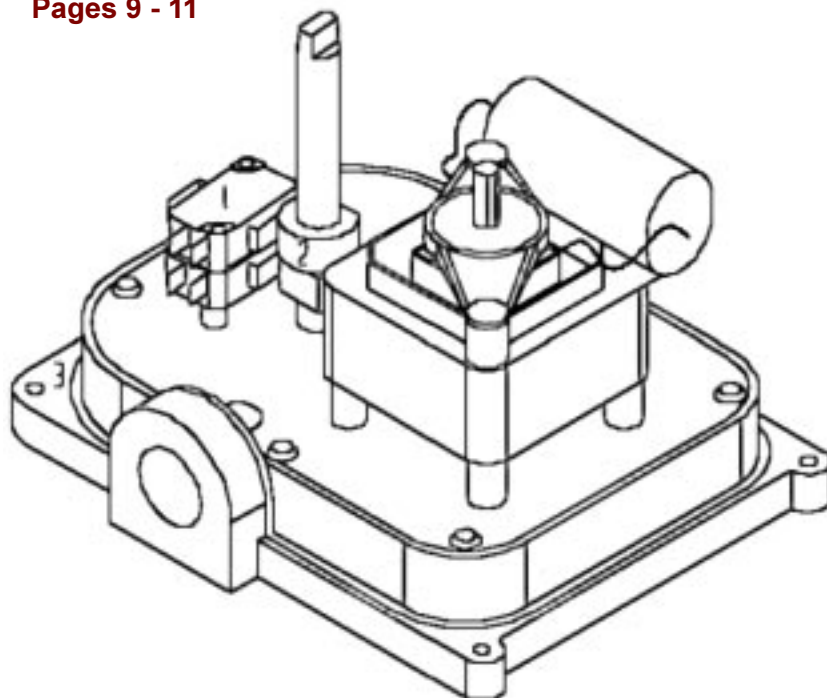


Figure 1: 70 Series Parts Identification

70 SERIES GENERAL TECHNICAL INFORMATION

70 Series AC voltage actuators use a split phase motor which internally steps up the applied 115 AC voltage and feeds it back to the off terminal. For example, when 115 VAC power is applied at terminals 1 and 4, 230 volts will be fed back to terminal 3. This can create a problem for controllers with solid state outputs rated for less than 230 VAC and it is suggested that relay outputs be used. Additionally, due to this feed back, multiple actuators cannot be wired in parallel, and individual leads (isolated contacts) must be run to each actuator. It is important to verify that the output torque of the actuator is appropriate for the torque requirements of the valve and that the actuator duty cycle is appropriate for the intended application.

INSTALLATION

CAUTION: Dangerous voltages are present inside the actuator unless the power supply to the actuator has been shut off or disconnected. Use extreme caution whenever working on the actuator with the cover removed.

Tools Required: Phillips screwdriver, Flat blade screwdriver and 1/16 inch hex wrench.

Temperature Limits

Low ambient temperatures: The minimum recommended ambient temperature without the optional heater and thermostat is approximately 30 °F (-1 °C), although it varies with the frequency of use. With the optional heater and thermostat installed, the recommended minimum ambient temperature is -40 °F (-40 °C).

High ambient temperatures: The maximum recommended ambient temperature is 160 °F (71 °C).

High media temperatures: For media temperatures up to 200 °F (93 °C), additional precautions are not typically required. For media temperatures between 200 °F and 300 °F (93 °C and 148 °C), a shielding plate about one inch larger than the actuator in each dimension should be placed between the actuator and the mounting bracket. In addition, the actuator should be mounted at the 3 o'clock or 9 o'clock position relative to the pipe. For media temperatures above 300 °F (148 °C), a valve with an extended shaft mounting arrangement should be used.

Mounting the Actuator

First, verify that the output torque of the actuator is appropriate for the torque requirements of the valve and that the actuator duty cycle is appropriate for the intended application.

NOTE: A 25% duty cycle means for every operating cycle that the actuator is ON (to open or close the valve), the actuator must be OFF for a time equal to three operating cycles. For example, if the operating cycle time is 5 seconds, for every operating cycle that the actuator is ON, it must be OFF for 15 seconds. Exceeding the actuator's rated duty cycle may cause the thermal overload switch to temporarily shut off power to the motor.

Actuator Drive Output Requirements: Parker's 70 Series actuators have a male square drive output. Two industry standard bolt hole circle configurations are provided (See Figure 2).

MI-120

Bracket requirements: It is mandatory the actuator be firmly secured to a sturdy mounting bracket. A minimum of four bolts with lockwashers must be used to secure the actuator to the bracket. There can be no flexibility in the bracket, and backlash (“play”) in the coupling should be minimized. In addition, the actuator output shaft must be in line (centered) with the valve shaft. This avoids side-loading the shafts (crossed-slot couplings are more tolerant of misalignment).

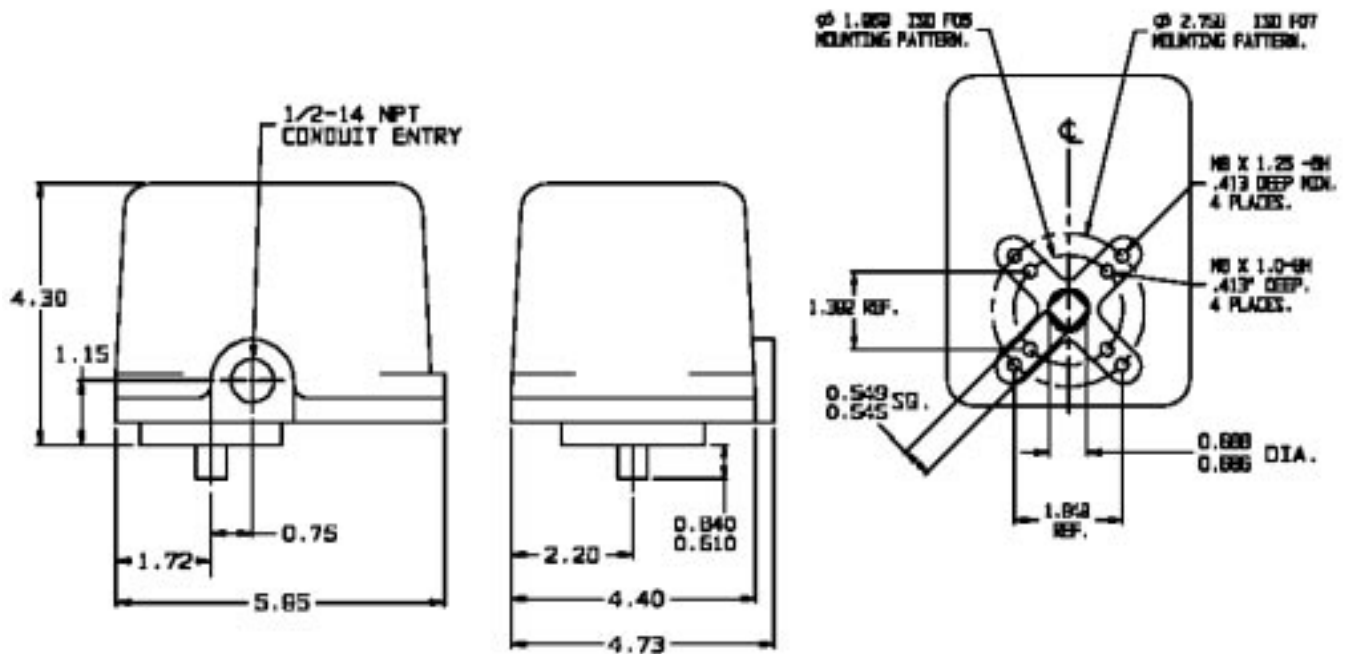


Figure 2: 70 Series Dimensions

Wiring

Adhere to local wiring codes.

The identification label on each actuator specifies the voltage and current requirements for the actuator. For convenience, Figures 3A & 3B show the standard power and control wiring connections for the actuator. The terminal strip is numbered from the bottom to the top. Since all Parker 70 series actuators travel in the clockwise direction in 90° stops, applying power between terminals 1 and 4 will stop the actuator at the 90° or 270° positions (closed) while applying power between terminals 1 and 3 will stop the actuator at the 0° or 180° positions (open)

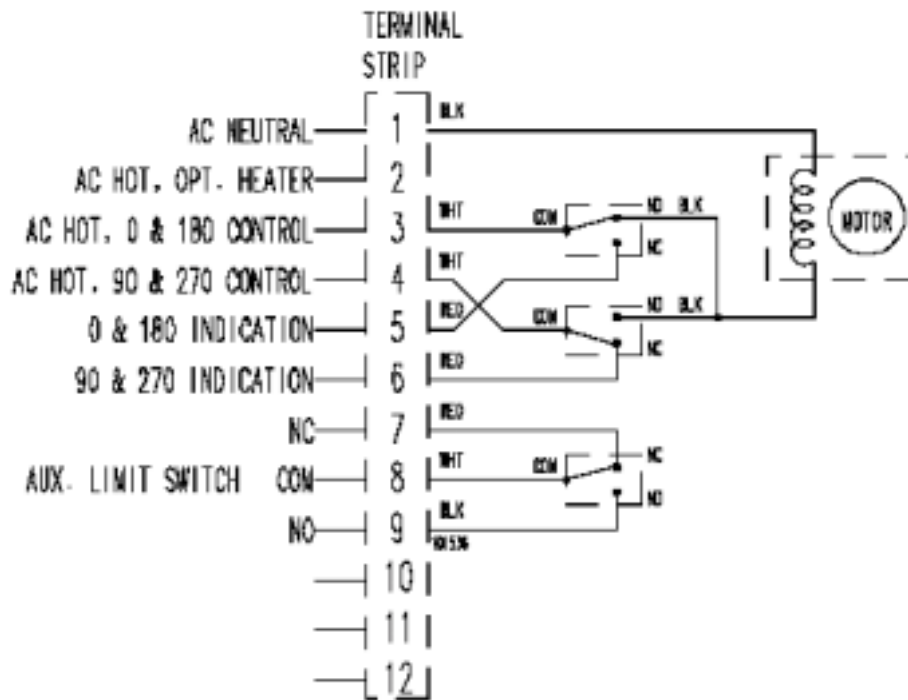


Figure 3A: 70 Series Wiring Diagram, AC Models

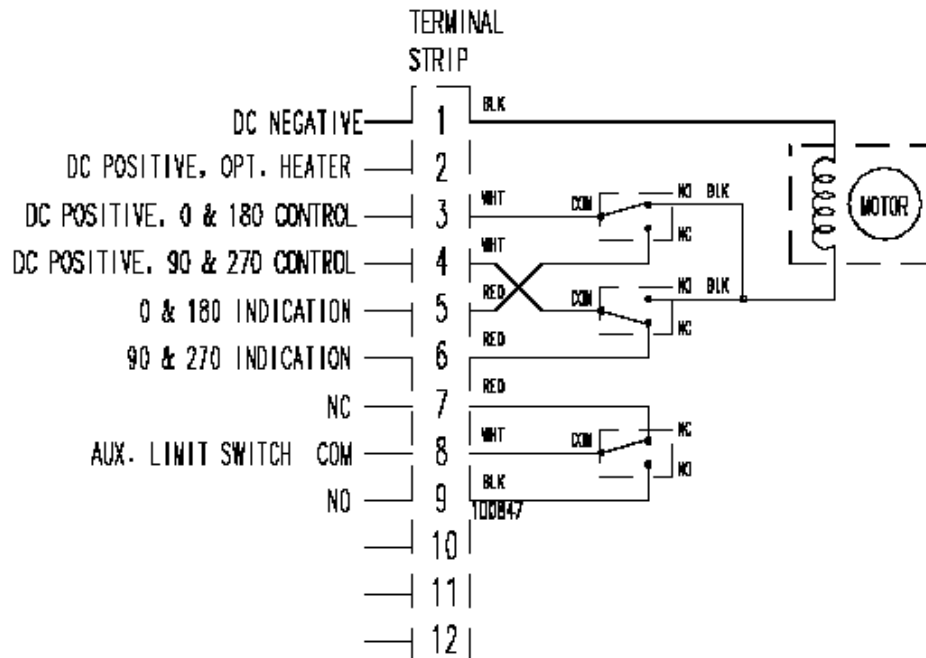


Figure 3B: 70 Series Wiring Diagram, DC Models

ADJUSTMENT OF THE 70 SERIES LIMIT SWITCHES

If adjustment of the open or closed position is required, proceed as follows:

A. Adjust the OPEN limit switch cam

1. Using a hex wrench, loosen the set screw in the OPEN limit switch cam (the second up from the bottom).
2. Apply power to terminals 1 and 3 (See Figures 3) to drive the actuator to the open position (counterclockwise rotation).
3. Remove the power from the actuator.
4. Rotate the cam toward the limit switch arm just until the switch clicks closed.
5. Set the vertical cam position so that the bottom of the cam will be in contact with the limit switch arm. Tighten the Cam set screw to secure the Cam in position. Do not over-tighten the screws (use less than 8 in-lbs of tightening torque). If the cam is not set "high" as described, the cam will become disengaged from the limit switch arm when using the manual override feature.

B. Adjust the CLOSED limit switch cam

1. Using a hex wrench, loosen the set screw in the CLOSED limit switch cam (the bottom one).
2. Apply power to terminals 1 and 4 (See Figures 3) to drive the actuator to the closed position (clockwise rotation).
3. Remove the power from the actuator.
4. Rotate the cam toward the limit switch arm just until the switch clicks closed.
5. Set the vertical cam position so that the bottom of the cam will be in contact with the limit switch arm. Tighten the Cam set screw to secure the Cam in position. Do not over-tighten the screws (use less than 8 in-lbs of tightening torque). If the cam is not set "high" as described, the cam will become disengaged from the limit switch arm when using the manual override feature.

70R SERIES GENERAL TECHNICAL INFORMATION

70R Series AC voltage actuators use a split phase motor which internally steps up the applied 115 AC voltage and feeds it back to the off terminal. For example, when 115 VAC power is applied at terminals 1 and 4, 230 volts will be fed back to terminal 3. This can create a problem for controllers with solid state outputs rated for less than 230 VAC and it is suggested that relay outputs be used. Additionally, due to this feed back, multiple actuators cannot be wired in parallel, and individual leads (isolated contacts) must be run to each actuator. It is important to verify that the output torque of the actuator is appropriate for the torque requirements of the valve and that the actuator duty cycle is appropriate for the intended application.

INSTALLATION

CAUTION: Dangerous voltages are present inside the actuator unless the power supply to the actuator has been shut off or disconnected. Use extreme caution whenever working on the actuator with the cover removed.

Tools Required: Phillips screwdriver, Flat blade screwdriver and 1/16 inch hex wrench.

Temperature Limits

Low ambient temperatures: The minimum recommended ambient temperature without the optional heater and thermostat is approximately 30 °F (-1 °C), although it varies with the frequency of use. With the optional heater and thermostat installed, the recommended minimum ambient temperature is -40 °F (-40 °C).

High ambient temperatures: The maximum recommended ambient temperature is 160 °F (71 °C).

High media temperatures: For media temperatures up to 200 °F (93 °C), additional precautions are not typically required. For media temperatures between 200 °F and 300 °F (93 °C and 148 °C), a shielding plate about one inch larger than the actuator in each dimension should be placed between the actuator and the mounting bracket. In addition, the actuator should be mounted at the 3 o'clock or 9 o'clock position relative to the pipe. For media temperatures above 300 °F (148 °C), a valve with an extended shaft mounting arrangement should be used.

Mounting the Actuator

First verify that the output torque of the actuator is appropriate for the torque requirements of the valve and that the actuator duty cycle is appropriate for the intended application.

NOTE: A 25% duty cycle means for every operating cycle that the actuator is ON (to open or close the valve), the actuator must be OFF for a time equal to three operating cycles. For example, if the operating cycle time is 5 seconds, for every operating cycle that the actuator is ON, it must be OFF for 15 seconds. Exceeding the actuator's rated duty cycle may cause the thermal overload switch to temporarily shut off power to the motor.

Actuator Drive Output Requirements: Parker's 70R Series actuators have a male square drive output. Two industry standard bolt hole circle configurations are provided (See Figure 4).

Bracket requirements: It is mandatory that the actuator be firmly secured to a sturdy mounting bracket. A minimum of four bolts with lockwashers must be used to secure the actuator to the bracket. There can be no flexibility in the bracket, and backlash (“play”) in the coupling should be minimized. In addition, the actuator output shaft must be in line (centered) with the valve shaft. This avoids side-loading the shafts (crossed-slot couplings are more tolerant of misalignment).

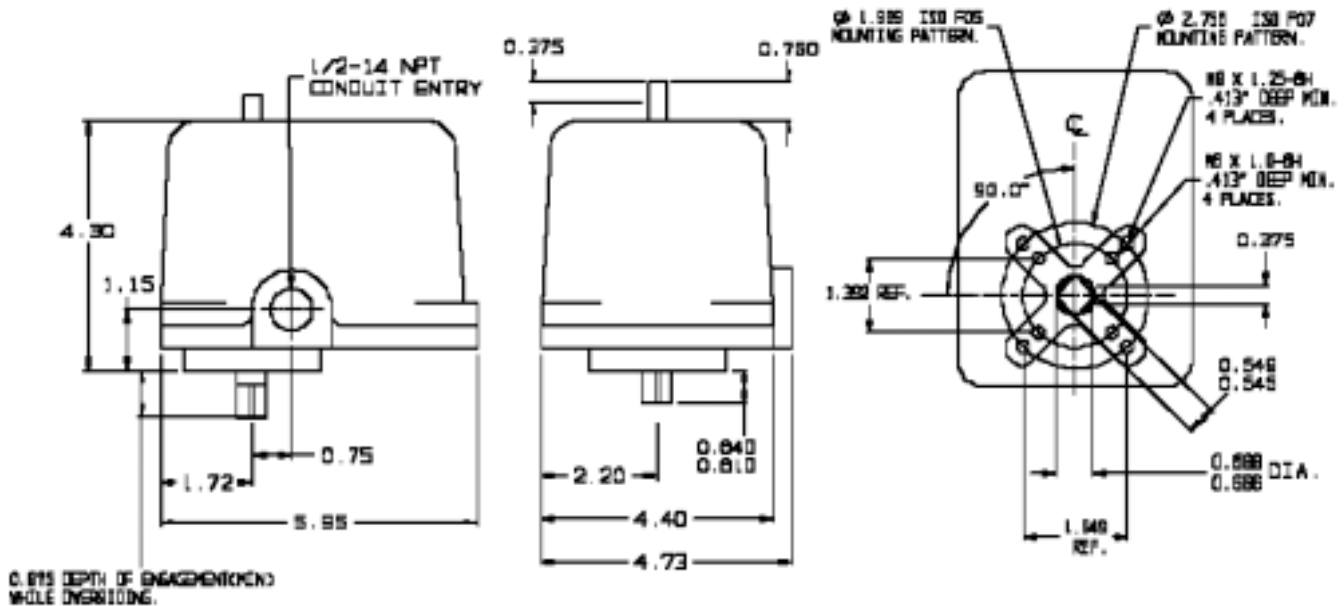


Figure 4: 70R Series Dimensions

Manual Override

To operate the actuator manually, push the override shaft down approximately 1/4 inch and use a wrench on the flats of the shaft to rotate the actuator. As noted in Figure 4, the coupling must be designed to accommodate this shaft movement. The override shaft may also be used to provide visual identification of valve position.

Wiring

Adhere to local wiring codes.

The identification label on each actuator specifies the voltage and current requirements for the actuator. For convenience, Figures 5A & 5B show the standard power and control wiring connections for the actuator. The terminal strip is numbered from the bottom to the top. To operate the 70R Series actuator, the user supplies power to the actuator’s motor through to limit switches. The limit switches control the actuator’s mechanical travel limits and are factory set at 90 degrees.

VAC - To drive the actuator counterclockwise, apply power to terminals 1 and 3. To drive the actuator clockwise, apply power to terminals 1 and 4. The actuator may be driven fully open or closed by maintaining power to the motor until the actuator trips the internal limit switches. Power may be disconnected at any point during the travel to position the actuator.

VDC - The 70R Series actuators require a reversing of the power polarity. To drive the actuator clockwise, apply power so that terminal 1 is negative and terminal 4 is positive. To drive the actuator counterclockwise, apply power so that terminal 1 is positive and terminal 4 is negative.

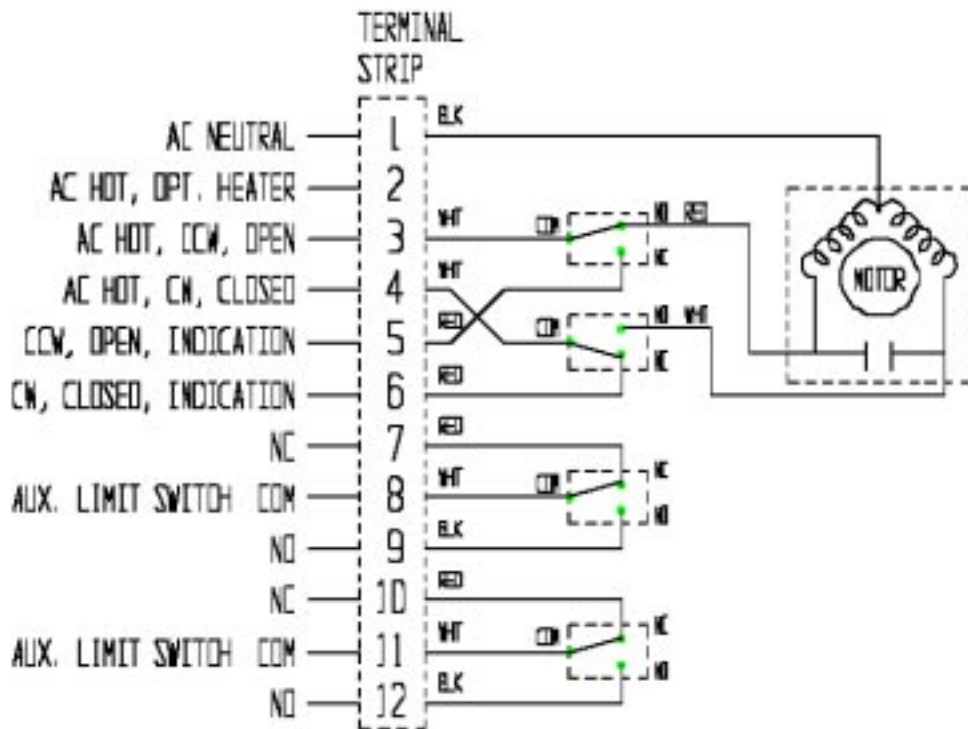


Figure 5A: 70R Series Wiring Diagram, AC Models

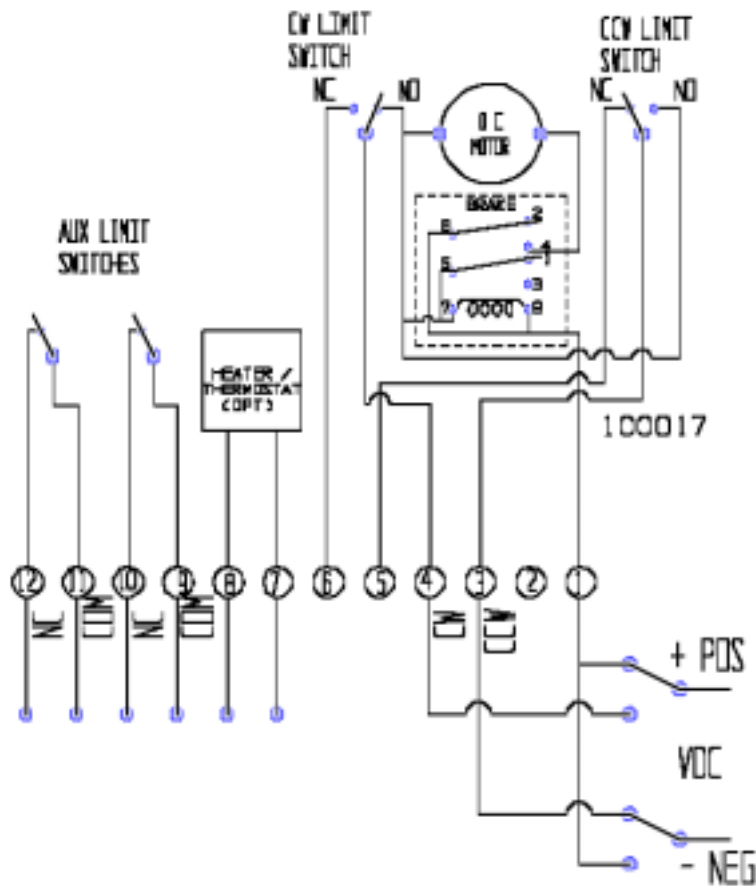


Figure 5B: 70R Series Wiring Diagram, DC Models

ADJUSTMENT OF THE 70R SERIES LIMIT SWITCHES

If adjustment of the open or closed position is required, proceed as follows:

A. Adjust the OPEN limit switch cam

1. Using a hex wrench, loosen the set screw in the OPEN limit switch cam (the second up from the bottom).
2. Apply power to terminals 1 and 3 (See Figures 5) to drive the actuator to the open position (counterclockwise rotation).
3. Remove the power from the actuator.
4. Rotate the cam toward the limit switch arm just until the switch clicks closed.
5. Set the vertical cam position so that the bottom of the cam will be in contact with the limit switch arm. Tighten the Cam set screw to secure the Cam in position. Do not over-tighten the screws (use less than 8 in-lbs of tightening torque). If the cam is not set “high” as described, the cam will become disengaged from the limit switch arm when using the manual override feature.

B. Adjust the CLOSED limit switch cam

1. Using a hex wrench, loosen the set screw in the CLOSED limit switch cam (the bottom one).
2. Apply power to terminals 1 and 4 (See Figures 5) to drive the actuator to the closed position (clockwise rotation).
3. Remove the power from the actuator.
4. Rotate the cam toward the limit switch arm just until the switch clicks closed.
5. Set the vertical cam position so that the bottom of the cam will be in contact with the limit switch arm. Tighten the Cam set screw to secure the Cam in position. Do not over-tighten the screws (use less than 8 in-lbs of tightening torque). If the cam is not set “high” as described, the cam will become disengaged from the limit switch arm when using the manual override feature.

70 SERIES LIMIT SWITCH KIT

70 Series Limit Switch Kits add additional limit switches to an actuator. Standard actuators are shipped from the factory with two limit switches installed—one to operate at the fully open position and one to operate at the fully closed position. Additional limit switches may be installed to operate at any actuator position.

PARTS LIST

Limit Switch kit consists of the following parts:

- 1· Limit Switch(es)
- 2· Cam
- 3· (2) #4-40 Studs
- 4· (2) #4-40 Nuts
- 5· (2) #4 Flat Nylon Washers
- 6· (3) Limit Switch Wires
- 7· Wire Tie

Tools Required: Small flat blade Screwdriver; 1/4 inch nut driver; Small Phillips blade Screwdriver; 1/16 inch hex wrench

CAUTION: Dangerous voltages are present inside the actuator cover unless the power supply to the actuator has been shut off or disconnected. Use extreme caution whenever working on the actuator with the cover removed.

A. Remove Actuator Cover

Remove the actuator cover by removing the screws securing the cover to the base.

B. Install Limit Switch

1. Carefully remove the #4-40 Limit Switch Screws which secure the existing Limit Switches in place.
2. Place one each of the #4 Flat Nylon Washers over each of the mounting holes of the existing upper limit switch.
3. Place the additional Limit Switch on top of the #4 Flat Nylon Washers.
4. Using the supplied #4-40 Studs and #4-40 Nuts, secure the Limit Switches in place. Do not over-tighten the fasteners.

C. Install Wiring Assembly

1. Attach the faston end of the White Wire to the Common (COM) connector on the Limit Switch. Connect the stripped end of the White Wire to terminal number 8 on the terminal strip.
2. Attach the faston end of the Black Wire to the Normally Open (NO) connector on the Limit Switch. Connect the stripped end of the Black Wire to terminal number 9 on the terminal strip.
3. Attach the faston end of the Red Wire to the Normally Closed (NC) connector on the Limit Switch. Connect the stripped end of the Red Wire to terminal number 7 on the terminal strip.
4. Using the supplied Wire Tie, secure the Limit Switch wires to avoid contact with any moving parts.

D. Install Cam

1. Slide the additional Cam down the actuator cam shaft on top of the existing Cams.
2. Drive the actuator to the desired trip point.
3. Rotate the cam counterclockwise until the limit switch lever passes through one of the flats on the cam and operates the limit switch (pushes the lever in). Now rotate the cam clockwise until the limit switch just clicks open.
4. Re-tighten the set screw in the limit switch cam. (Do not over-tighten the screws, use less than 8 in/lbs of tightening torque)
5. Operate the actuator to verify proper setting of the Cam.

D. Replace Actuator Cover

NOTE: When reinstalling the cover, follow the normal practice of tighten the cover screws in a cross pattern to insure that the cover is pulled down flat without over-stressing a corner.

70 SERIES HEATER/THERMOSTAT KIT

This Heater/Thermostat Kit is intended for use with any Parker's 70 Series Electric Actuator equipped with a 115 /230 VAC motor. Parker's Heater/Thermostat Kit is designed to provide a controlled means of heating the actuator motor and gear train in order to allow use of the actuator in environments where the ambient temperature is as low as -40 °F (-40 °C). The thermostat energizes at 40 °F (-40 °C) and de-energizes at 60 °F (15 °C).

INSTALLATION

CAUTION: Dangerous voltages are present inside the actuator cover unless the power supply to the actuator has been shut off or disconnected. Use extreme caution whenever working on the actuator with the cover removed.

Installation of Heater/Thermostat Kit

A. Remove Actuator Cover

Remove the actuator cover by removing the screws securing the cover to the base.

1. Remove the white plastic backing from the heater element to expose the adhesive surface of the heater element.
2. Apply the adhesive surface of the heater element to the motor support plate between the motor and the limit switch posts.
3. Route the lead from the heater strip to the bottom of terminal position one (1).
4. Route the lead from thermostat to the bottom of terminal position two (2).
5. Using the supplied wire ties, secure the thermostat and heater element wires to keep them clear of any moving parts.

B. Wiring

1. Wire terminal 1 to 115 /230 NEUTRAL.
2. Wire terminal 2 to 115 /230 HOT.
3. Depending on the actuator option, AC power may already be connected at terminals 1 and 2. In this case NO additional wiring is required.

WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

ALL PARKER VALVES MUST PASS A RIGID OPERATIONAL AND LEAKAGE TEST BEFORE LEAVING THE FACTORY. IT IS RECOMMENDED AFTER ANY REASSEMBLY, THE VALVE SHOULD BE TESTED BY THE USER FOR OPERATION AND LEAKAGE. IF THESE INSTRUCTIONS ARE NOT FULLY COMPLIED WITH, THE REPAIRED PRODUCT MAY FAIL AND CAUSE DAMAGE TO PROPERTY OR INJURY TO PERSONS. PARKER HANNIFIN CANNOT ASSUME RESPONSIBILITY FOR PERFORMANCE OF A CUSTOMER SERVICED VALVE.



80 Series Actuator



Parker 80 Series Electric Actuators are designed to provide reliable and efficient operation of final control elements, such as 1/4 turn valves, with torque requirements up to 3000 inch pounds. 80 Series actuators are available as AC models with duty cycles of 25% or 75% and DC models with a 100% duty cycle. In addition, a variety of options and accessories are available and use a modular design where all “daughter” boards and actuator accessories plug into the “mother” board. Installation is simple and reliability is very high.

PARTS LIST

- 1 - Cover
- 2 - Cover Screws
- 3 - Gasket
- 4 - Base
- 5 - Output coupling
- 6 - Bull gear
- 7 - Bull gear retaining ring
- 8 - Output shaft / Cam shaft
- 9 - Cams
- 10 - Mother board
- 11 - Mother board bracket
- 12 - Limit switches
- 13 - Override shaft
- 14 - Motor gear box
- 15 - Motor support plate screws
- 16 - Motor support plate
- 17 - Pinion gear

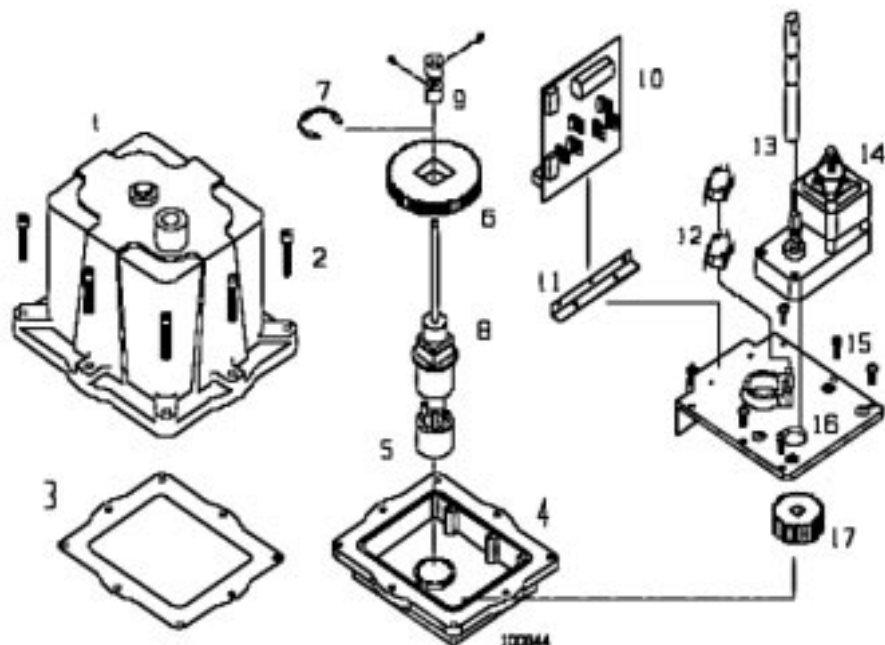


Figure 1: Parts Identification (No options installed)

GENERAL TECHNICAL INFORMATION

Parker 80 Series AC voltage actuators use a split phase motor which internally steps up the applied 115 AC voltage and feeds it back to the off terminal. For example, when 115 VAC power is applied at terminals 1 and 4, 230 volts will be fed back to terminal 3. This can create a problem for controllers with solid state outputs rated for less than 230 VAC and it is suggested that relay outputs be used. Additionally, due to this feed back, multiple actuators cannot be wired in parallel, and individual leads (isolated contacts) must be run to each actuator.

It is important to verify that the output torque of the actuator is appropriate for the torque requirements of the valve and that the actuator duty cycle is appropriate for the intended application.

DUTY CYCLE

Exceeding the actuator's rated duty cycle may cause the thermal overload switch to temporarily shut off power to the motor. A 25% duty cycle means for every operating cycle that the actuator is ON (to open or close the valve), the actuator must be OFF for a time equal to three operating cycles. For example, an operating cycle time of 5 seconds ON, it must be OFF for 15 seconds before it is again operated. A 75% duty cycle means that for every operating cycle that the actuator is ON, the actuator must be OFF for 1/3 of a cycle.

TEMPERATURE LIMITS

Low ambient temperatures: The minimum recommended ambient temperature is 30 °F (-1 °C). With the optional heater and thermostat installed, the recommended minimum ambient temperature can be lowered to -40 °F (-40 °C).

High ambient temperatures: The maximum recommended ambient temperature is 150 °F (65 °C) with the actuator shaded from direct sunlight.

High media temperatures: For media temperatures between 200 °F and 300 °F (93 °C and 148 °C), a shielding plate (about one inch larger than the actuator in each dimension and at least a 1/16 " thick) should be placed between the actuator and the mounting bracket. Additionally, the actuator should be mounted at the 3 o'clock or 9 o'clock position relative to the pipe. For media temperatures above 300 °F (148 °C), a valve with an extended shaft mounting arrangement should be used.

INSTALLATION

CAUTION: Dangerous voltages are present inside the actuator cover unless the power supply to the actuator has been shut off or disconnected. Use extreme caution whenever working on the actuator with the cover removed.

Mounting the Actuator

The actuator may be mounted in any position. In outdoor applications the actuator should not be installed upside down.

Verify that the output torque of the actuator is appropriate for the torque requirements of the valve. 80 Series actuators are furnished with a female drive output. On the 80 Series actuators, the output is 0.75" square by 0.64" deep. Two I.S.O. bolt patterns (ISO 5211) are provided for actuator mounting.

It is mandatory that the actuator be firmly secured to a sturdy mounting bracket. A minimum of four bolts with lockwashers should be used to secure the actuator to the bracket. Flexibility in the bracket is not allowed, and backlash, or "play", in the coupling should be minimized. The actuator output shaft must be in line (centered) with the valve shaft to avoid side-loading the shaft.

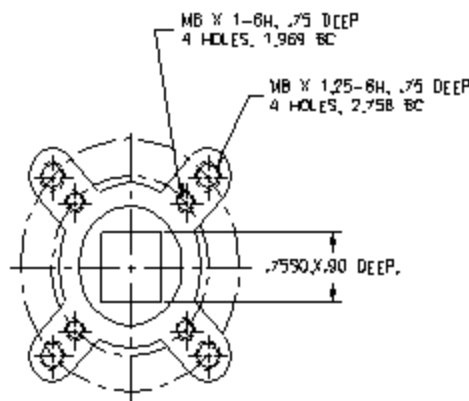


Figure 2: Mounting Pattern

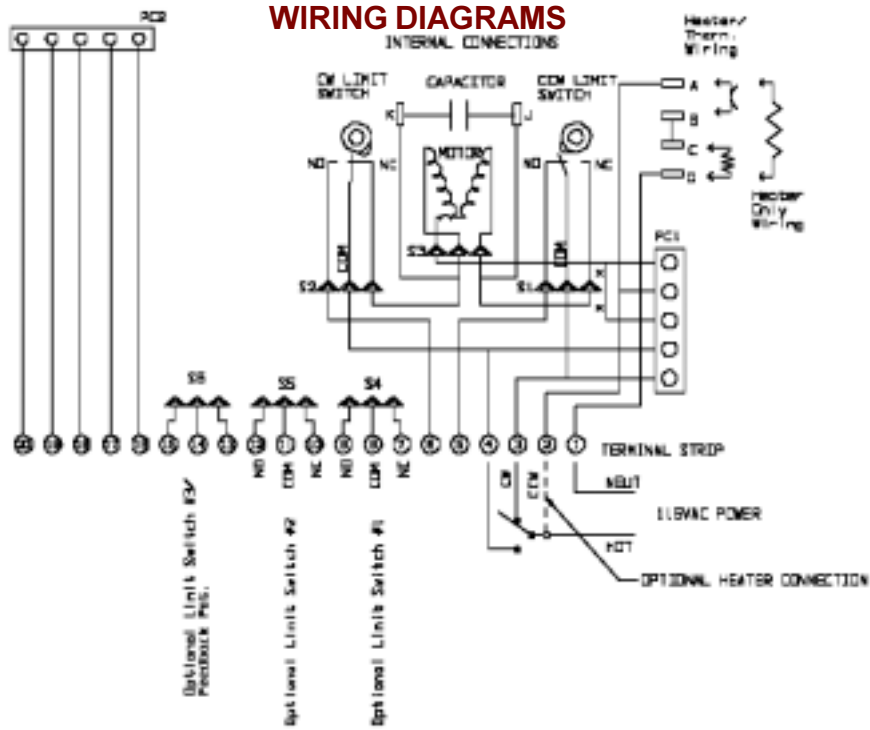
WIRING

For 115 VAC actuators, 18 or 20 gauge wire may be used for short runs. At least 16 gauge wire is recommended for longer runs. Be sure to follow local wiring codes.

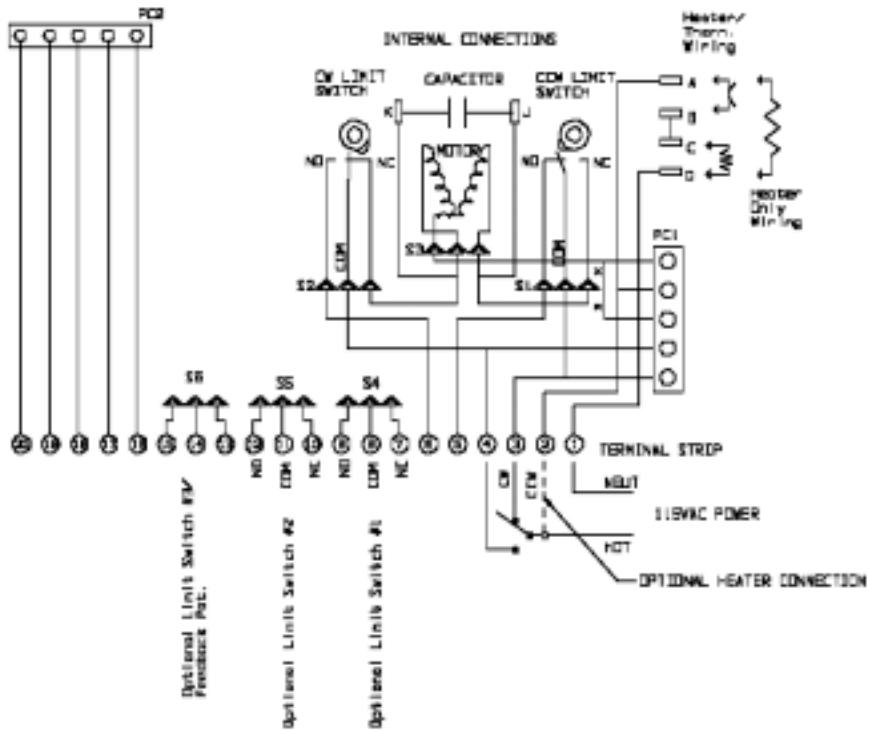
Actuators may run on one of the following voltages: 24VAC, 115VAC, 230 VAC, 12VDC and 24VDC, dependent on the actuator. Please match before wiring as the wrong voltage will destroy the motherboard. Input power is wired directly to the actuator's motor through the motherboard and two limit switches.

A wiring label is affixed to each actuator directly above the terminal strip, specific to the configuration of options included.

To drive the actuator counterclockwise, apply power to terminals 1 and 3. To drive the actuator clockwise, apply power to terminals 1 and 4. The actuator can be driven fully open counterclockwise or closed clockwise by maintaining power to the motor until the actuator trips the internal limit switches. Power can also be disconnected at any point during travel to position the actuator.



STANDARD WIRING - OPEN/CLOSE
Figure 3A: 115 or 24 VAC Actuator Diagram
 INTERNAL CONNECTIONS



STANDARD WIRING - OPEN/CLOSE
Figure 3B: DC Voltage Actuator Diagram

ADJUSTMENT OF LIMIT SWITCHES

The two limit switches operating off the cams on the output shaft determine the exact positions where the actuator will stop at the end of each cycle. The first limit switch (lower) determines the closed position (CW rotation). The second limit switch (upper) determines the open position (CCW rotation). The limit switches can be adjusted from 5 to 320 degrees of actuator rotation. If an adjustment of any of the positions is required, proceed as follows:

A. Remove Actuator Cover

Remove the actuator cover by removing the screws securing the cover to the base.

B. Adjust the OPEN limit switch cam

1. Using a 1/16 hex wrench, loosen the set screw in the OPEN limit switch cam (the second up from the bottom).
2. Apply power to terminals 1 and 3 (See Figures 3) to drive the actuator to the open position (counterclockwise rotation).
3. Remove the power from the actuator.
4. Rotate the cam toward the limit switch arm just until the switch clicks closed.
5. Re-tighten the set screw on the limit switch cam (Be careful not to over-tighten the screw).

C. Adjust the CLOSED limit switch cam

1. Using a 1/16 inch hex wrench, loosen the set screw in the CLOSED limit switch cam (the bottom one).
2. Apply power to terminals 1 and 4 (See Figures 3) to drive the actuator to the closed position (clockwise rotation).
3. Remove the power from the actuator.
4. Rotate the cam toward the limit switch arm just until the switch clicks closed.
5. Re-tighten the set screw on the limit switch cam (Be careful not to over-tighten the screw).

OPTIONAL ADDITIONAL LIMIT SWITCHES

For AC actuators, the two standard limit switches may be used to indicate the open and closed status of the actuator. Power at terminal 3 is switched to terminal 5 when the actuator is fully counterclockwise. Power at terminal 4 is switched to terminal 6 when the actuator is fully clockwise.

MANUAL OVERRIDE FUNCTION

To use the manual override function, push the override shaft down approximately a 1/4 inch to disengage the motor from the gear train. While holding the shaft down, turn the shaft with a wrench to reach the desired position. NOTE: The rotation of the output may not be the same as the rotation of the override shaft! Note which way the output rotates whenever you use the override shaft. Also, be careful not to drive the actuator past the limit switch settings; it is possible to damage installed options.

TROUBLESHOOTING

If the actuator fails to operate:

Visually inspect for damage, burn marks, or loose connections.

Check that the proper voltages are present at the actuator's terminal connections.

Check all the plug-in connections to be sure they are properly installed -

- Motor to connector S3

- Bottom limit switch to S2

- Second limit switch to S1

- Motor capacitor to J & K.

If the motor is hot the actuator may have gone in to thermal over load protection (the motors are equipped with internal thermal overload protection). Let the motor cool and try again.

Check the following:

Are the limit switches properly set?

Is the actuator's duty cycle correct for the application?

Is the actuator's output torque within the required range?

If the actuator's motor hums or turns slowly, check the actuator's motor capacitor to see if it is broken or cracked.

Make sure power is applied only to one terminal (either 3 or 4 but not both).

Check for a bad connection at motor socket S3.

Ensure you do not have more than one actuator wired in parallel.

If the motor turns, but the output does not, ensure the manual override has returned to its fully upward position.

80 SERIES LIMIT SWITCH KIT

Parker 80 Series Limit Switch Kits add additional limit switches to an actuator. Standard actuators are shipped from the factory with two limit switches installed—one to operate at the fully open position and one to operate at the fully closed position. Additional limit switches may be installed to operate at any actuator position. This Limit Switch Kit is intended for use with any 80 Series Electric Actuator. The switches are rated for 5 amps at 230VAC.

For “S1”, the additional limit switch will be factory set at the full clockwise position.

For “S2”, the first additional limit switch will be factory set at the full clockwise position, and the second will be set at the full counterclockwise position.

PARTS LIST

- 1 - Limit switch(es)
- 2 - Cam(s)
- 3 - (2) #4-40 Studs
- 4 - (2) #4-40 Nuts
- 5 - Limit switch wiring assembly (not pictured)
- 6 - (2) Wire ties (not pictured)

TOOLS REQUIRED

- 1 - Small flat blade screwdriver
- 2 - 1/4 inch nut driver
- 3 - 1/16 inch hex wrench

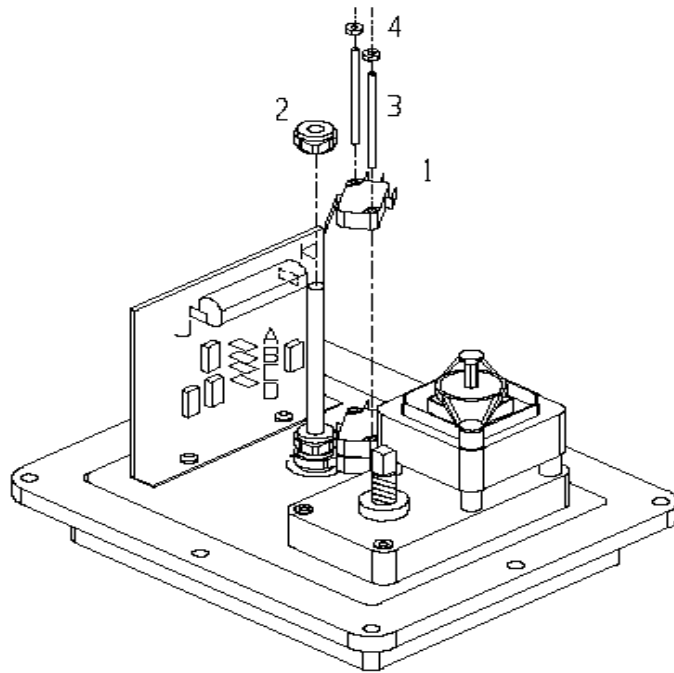


Figure 4: Limit Switch Part Identification

INSTALLATION

CAUTION: Dangerous voltages are present inside the actuator cover unless the power supply to the actuator has been shut off or disconnected. Use extreme caution whenever working on the actuator with the cover removed.

A. Remove the Actuator Cover

- 1) Remove the actuator cover by removing the screws securing the cover to the base.

B. Install the Limit Switch(es)

- 1) Carefully remove the #4-40 Limit Switch screws which secure the existing Limit Switches in place.
- 2) Place the additional Limit Switch(es) on top of the existing Limit Switches.
- 3) Slide the supplied #4-40 Studs (NOTE: The original 4-40 screws may be used if only one (1) limit switch is being installed) through the switch holes and using the 4-40 nuts, secure the Limit Switches in place. Do not over-tighten the fasteners.

C. Install the Wiring Assembly

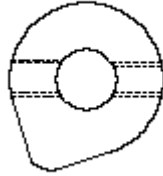
- 1) Attach the White Wire to the Common (COM) spade connector on the new Limit Switch(es).
 - 2) Attach the Black Wire to the Normally Open (NO) spade connector on the new Limit Switch(es).
 - 3) Attach the Red Wire to the Normally Closed (NC) spade connector on the new Limit Switch(es).
 - 4) Attach the three-wire connector to the Mother Board as follows:
 - Extra Limit Switch #1 connects to socket S4.
 - Extra Limit Switch #2 connects to socket S5.
- Note:** Be sure that the locking fingers on the three-wire connector(s) firmly engage the mating fingers on the socket.
- 5) Using the supplied Wire Ties, secure the Limit Switch wires so they avoid contact with any moving parts.

D. Install the Cam(s)

- 1) Place the cam on the shaft. The stainless steel cams which are supplied with each actuator, or as a kit, have two locations where a set screw may be installed. The diagram below shows the installation of the set screw for both clockwise and counterclockwise rotation of the cams. To orient the cam, place on top of the figure.

Lower Cam

Place set screw for
"CW" cam setting



Upper Cam

Place set screw for
"CCW" cam setting

* Note: When installing the cams on the camshaft, ensure that the side with the set screw installed is oriented toward the left (the conduit openings straight ahead) and visible between the motherboard and the motor.

- 2) Drive the actuator to the desired trip point.
- 3) Rotate the Cam slowly to the point where the Limit Switch "clicks" closed. If the Limit Switch is to operate at a given point during the *opening* cycle of the actuator, rotate the Cam *counterclockwise* to set its position. If the Limit Switch is to operate at a given point during the closing cycle of the actuator, rotate the Cam *clockwise* to set its position.
- 4) Tighten the Cam set screw to secure the Cam in position. Do not over-tighten the screws (use less than 8 in/lbs of tightening torque).
- 5) Operate the actuator to verify the proper setting of the Cam(s).

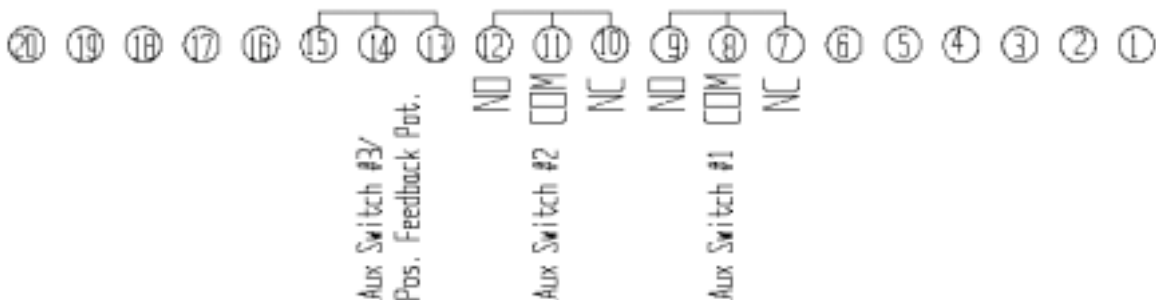


Figure 5: Limit Switch Wiring

80 SERIES HEATER/THERMOSTAT KIT

The 80 Series Heater/Thermostat Kit provides controlled heating of the actuator motor and gear train permitting the actuator to operate in temperatures as low as -40 °F (-40 °C). Separate kits are available for 115 VAC, 230 VAC, 24 VAC, 12 VDC and 24 VDC motor voltages (Note: Be certain the kit voltage matches the motor voltage). The heater is rated at 15 Watts (except for 230 VAC heaters, which are rated at 30 Watts). The thermostat turns the heater on at 40 °F (4 °C) and off at 60 °F (15 °C). The heater may also be installed without a thermostat to assist in humidity control.

PARTS LIST

- 1 - Heater element
- 2 - Thermostat
- 3 - (2) Wire ties (not pictured)

TOOLS REQUIRED

- 1 - 3/16 inch hex wrench

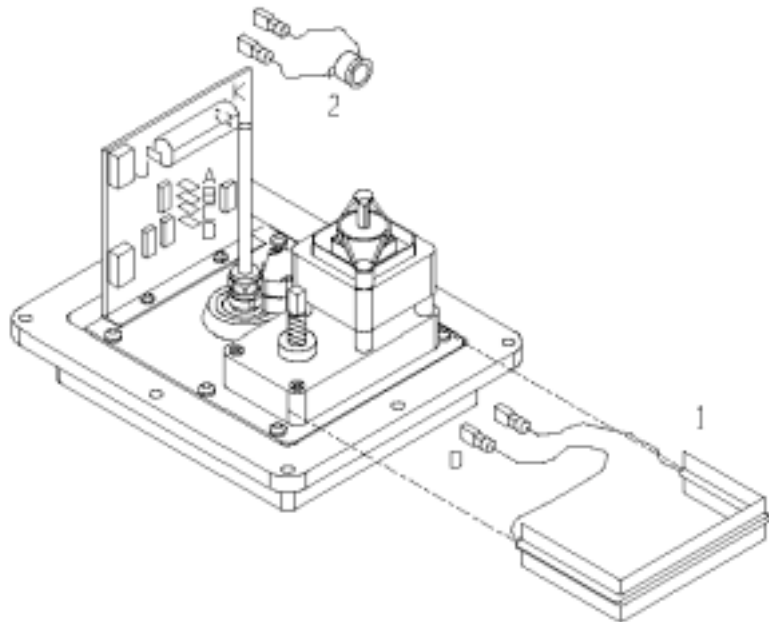


Figure 6: Heater/Thermostat Kit Part Identification

INSTALLATION

CAUTION: Dangerous voltages are present inside the actuator cover unless the power supply to the actuator has been shut off or disconnected. Use extreme caution whenever working on the actuator with the cover removed.

A. Remove the Actuator Cover

- 1) Remove the actuator cover by removing the screws securing the cover to the base.

B. Install the Heater Element

- 1) Remove the white plastic backing from the heater element to expose the adhesive surface of the heater element.
- 2) Locate the longer lead (Figure 6, part D) on the heater element and keep this lead on the left side of the motor gearbox (motor closest to you as indicated in Figure 6). Apply the adhesive surface of the heater element against the motor gearbox, wrap the heater element around both short sides and the backside of the gearbox (the side with the nameplate).
- 3) Route the long heater lead (D) between the gearbox and the limit switches.
- 4) Plug the heater element's leads onto terminals D and C (if using a heater only, plug into terminals A & D).
- 5) Using one of the supplied wire ties, secure the heater element wires to keep them clear of any moving parts.

C. Install Thermostat

- 1) Plug the thermostat leads onto terminals A and B.
- 2) Place the thermostat at the corner of the gearbox under the limit switch wiring.
- 3) Using the supplied wire ties, secure the thermostat to keep it clear of any moving parts.

WIRING

AC WIRING

AC power may already be connected at terminals 1 and 2. In this case, no additional wiring is required. If AC power is not already connected at terminals 1 and 2:

- 1) Wire terminal 1 to VAC Neutral.
- 2) Wire terminal 2 to VAC Hot.

DC WIRING

To wire a heater and thermostat in a DC powered actuator, a jumper must be brought from terminal location 5 to terminal location 2, and another jumper from terminal location 6 to terminal location 2. For other options, contact the factory.

80 SERIES FEEDBACK POTENTIOMETER OPTION

The Feedback Potentiometer provides a variable resistance (0-1000 ohms) to indicate the position of the actuator's output shaft. The signal can be fed at positions 13, 14 and 15 on the terminal strip.

CALIBRATION

The potentiometer has been calibrated at the factory. However, if re-calibration is required, proceed as follows:

- 1) Apply power (or use the manual override) to drive the actuator to its true closed position (clockwise rotation).
- 2) Unplug the potentiometer lead from the back of the motherboard (connection "S6").
- 3) Connect an ohmmeter to the BLACK and GREEN pot leads.
- 4) Loosen the cam shaft gear, raise it up above the pot shaft gear, and gently rotate it clockwise until the feedback pot hits its stop. (**NOT APPLICABLE WITH 360 POT**)
- 5) Gently rotate the cam shaft gear counterclockwise until the ohmmeter reads 50 ohms (+/- 5 ohms). **NOTE:** If you are installing a positioner with the optional 360 degree pot, adjust until the ohmmeter reads 140 ohms (+/- 5 ohms).
- 6) While maintaining this reading, re-engage the two gears and tighten the cam gear set screw.
- 7) Apply power (or use the manual override) to drive the actuator to its true open position.
- 8) Connect the ohmmeter to the BLACK and RED pot leads. The reading should be between 35 and 60 ohms. (or between 120 and 160 ohms for the 360 degree pot). If the reading is not between 35 and 60 ohms, repeat the above steps for calibrating the potentiometer.
- 9) Connect the feedback potentiometer plug to the motherboard connection "S6." Be sure that the locking tab and ramp face each other. Finally, use the wire ties provided to secure the pot wires away from any rotating components in the actuator.

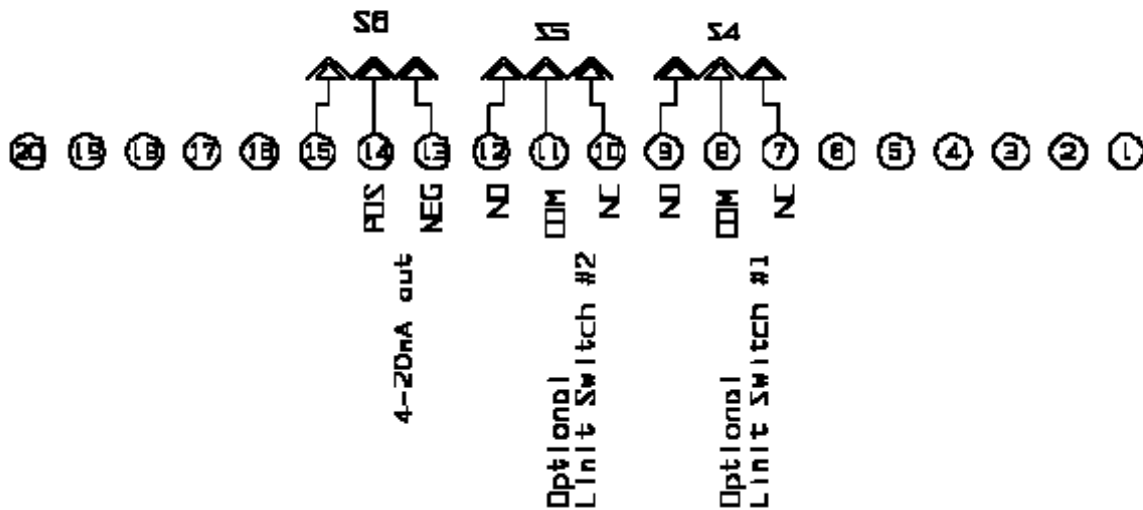


Figure 7: Re-transmit Wiring

WARNING

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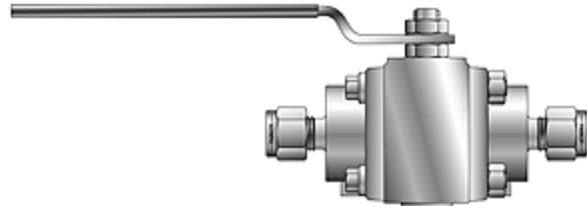
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SB Series Swing-Out Ball Valve



INSTALLATION

1. SB Series Swing-out Ball Valves may be installed for flow in either direction. Use care to exclude pipe sealants from the valve cavity. Valves upstream relief hole in ball (vented option) are one way valves.
2. SBXD Valves (Diverter) may be installed using the bottom port as the inlet port. The flow can then be diverted to either one of the two side ports.
3. SBX Valves (Selector) may be installed using any of the ports as inlet or outlet ports. The source can be selected from either of two sources to be directed toward one outlet. It can be selected from one source to one outlet and then by rotating the valve, use that outlet as an inlet and use the third port as the new outlet. The 3 way valve does not have separate body seats. This function is incorporated into the valve seat. Therefore, more care than normal must be taken to not damage the back face of this seat upon disassembly and reassembly.

CAUTION

Parker recommends that all product which must be stored prior to installation be stored indoors, in an environment suitable for human occupancy. Do not store product in areas where exposure to relative humidity above 85%, acid or alkali fumes, radiation above normal background, ultraviolet light, or temperatures above 120 °F (48 °C) or below 40 °F (4 °C) may occur. Do not store within 50 feet of any source of ozone.

PACKING MAINTENANCE

Tighten the retaining nut if leakage is observed at the stem. For maximum packing life, proper stem seal adjustment procedures must be followed.

1. Tighten the bottom retaining nut until the bellville washers are flat (the nut will bottom).
2. Loosen the retaining nut 1/16 turn. NOTE: Excessive tightening causes higher torque and shorter seal life.
3. Tighten the handle nut securely to lock the retaining nut in place.

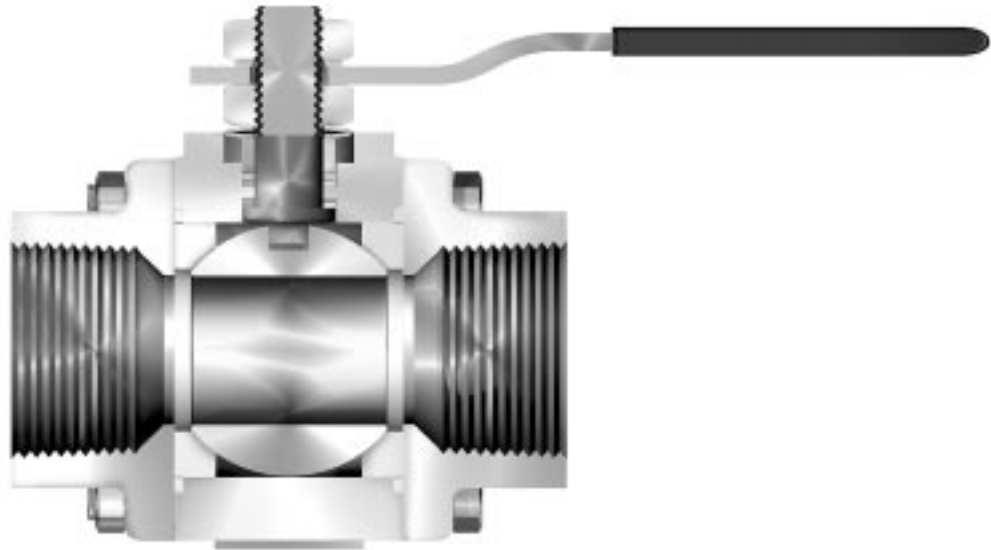


Figure 1: SB Series Swing-Out Ball Valve Cross Sectional View

OPERATION

- a. Operation consists of turning the handle.
- b. These valves will provide bubble-tight shut-off when used in accordance with published pressure versus temperature curves.
- c. It is not good practice to leave a ball valve partly open (throttling operation).
- d. As shipped, valves contain a silicone-based lubricant. This is for break-in, and may be removed if it is objectionable for an application by disassembling and solvent washing.
- e. Media which may solidify, crystallize, or polymerize should not be allowed to stand in the ball valve cavity.

Torque Requirements

Torque requirements are subject to variability depending on the length of time between operations and the media in the valve. All figures below are based on laboratory tests with water as the media. They are measured at rated pressure, 70 °F (21 °C), with clean tap water after 24 hours. Breakaway torque is that force which must be exerted to cause the ball to begin to move.

Valve	Breakaway Torque
SB8	30 inch pounds
SB12	45 inch pounds
SB16	100 inch pounds
SB20	200 inch pounds
SB24	300 inch pounds
SB32	400 inch pounds

BALL VALVE REPAIR KIT INSTRUCTIONS

WARNING: Ball valves can trap fluids in ball cavity when closed.

If the valve has been used to control hazardous media, it must be decontaminated before disassembly. It is recommended the following steps are taken for safe removal and disassembly:

- Relieve the line pressure.
- Place the valve in half-open position and flush the line to remove any hazardous material from valve.
- All persons involved in the removal and disassembly of the valve should wear the proper protective clothing such as face shield, gloves, apron, etc.

NOTE: Repair kits with “SS” gasket body seals **cannot** be used on valves with stainless bodies with cast surfaces or serrations in the body seal area.

DISASSEMBLY

1. Place the valve in open position, remove the three body bolts and nuts and swing out center section from between pipe ends.
2. Close the valve and remove the body seals, seats and ball.
3. Remove the handle nut, lockwasher and handle. Using a wrench to prevent stem from turning, remove the retaining nut, belleville washers and follower. Push the stem into body cavity and remove the thrustbearing, stem seal, and stem seal protector (if any) from body cavity or stem.

VISUAL INSPECTION

1. The ball and the surfaces against which the seats are installed should be free of pit marks and scratches. Light marring from the action of the ball against the seats is normal and will not affect the operation of the valve. Flaws which can be seen but not detected with finger tips are acceptable. The stem surfaces that the thrustbearing and stem seal contact should be free from pit marks and scratches.

CAUTIONS

1. If the seats and seals installed differ from those removed, the valve nameplate **must** be replaced or remarked to indicate the altered materials and ratings.
2. The PTFE and UHMWPE body seals and the coated stainless steel “SS” gasket body seals make an excellent seal. However, some points of caution in their use need emphasizing:
 - a. No PTFE or UHMWPE part (except seals) is reusable. “SS” gasket body seals are also not reusable. Upon disassembly of the valve, they should be discarded and replaced with new parts.
 - b. Care must be taken to avoid scratching the PTFE or UHMWPE body seals, or the coating of the “SS” gaskets during installation.
 - c. The Selector valve (SBX) does not have a separate seat and body seal. This function is incorporated into the 3-way seat. Therefore, more care than normal must be taken to not damage the back face of this seat during disassembly and reassembly.

REASSEMBLY

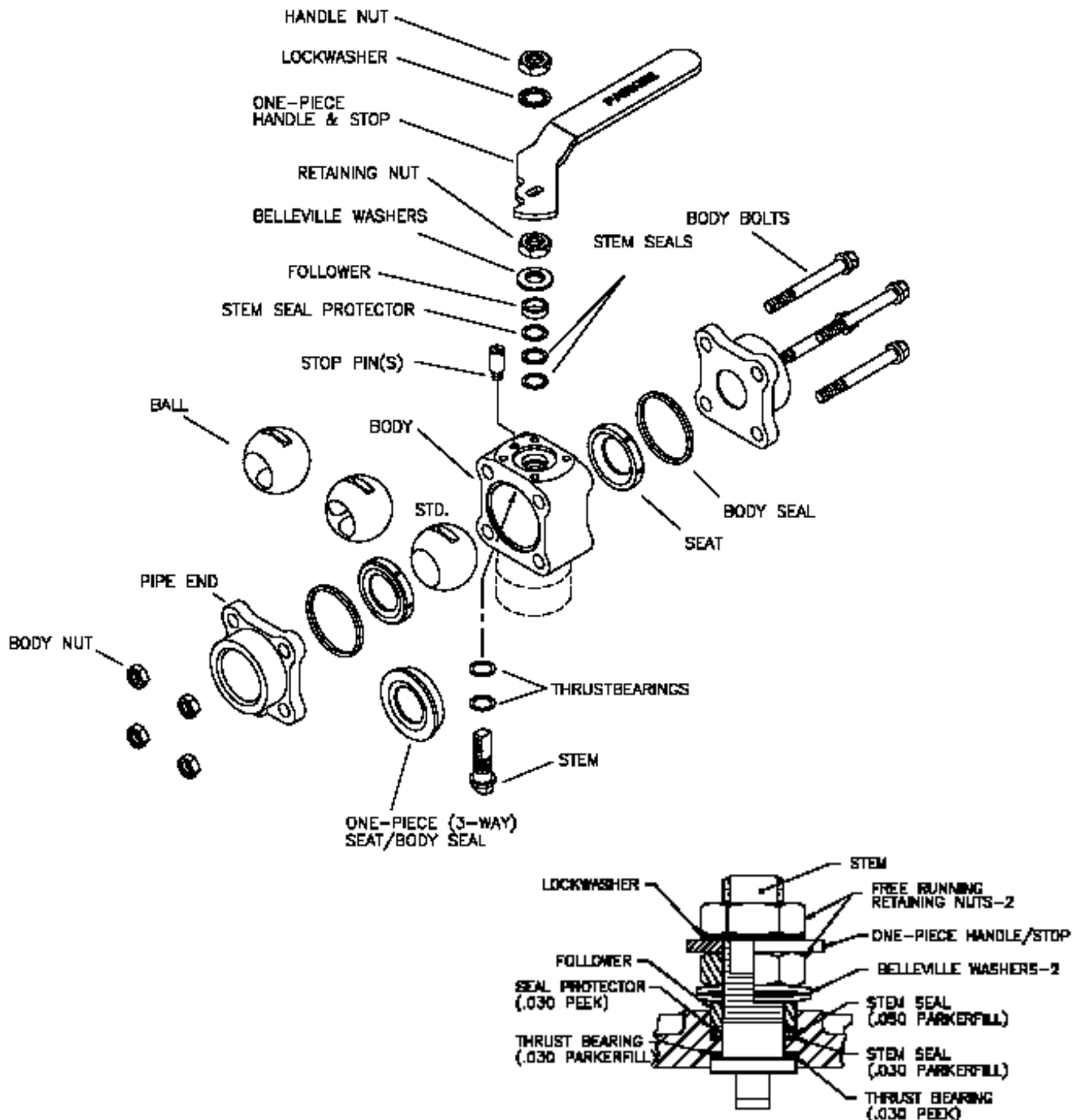
NOTE: Valves with a pressure relief hole in the ball must be reassembled and installed with the hole upstream when valve is closed. Any valve with the pressure relief hole option will have an arrow on the body pointing downstream. This arrow will be stamped on the body or on a separate metal tag.

1. Lightly lubricate the ball, seats, body seals, stem seal, stem seal protector (if any), and thrustbearing with a lubricant compatible with the media being handled. White petroleum jelly is a good general purpose lubricant.
2. Place the new thrustbearing on stem and insert thru body cavity. Thrustbearing is generally thinner than stem seal. Place the new stem seal, stem seal protector, if any (See NOTE), follower, and belleville washers on stem. (The belleville washers must have the larger diameter side touching each other.) Assemble retaining nut and tighten using a wrench to prevent stem from turning. Tighten retaining nut until the belleville washers are flat, then loosen nut 1/6 turn. Excessive tightening only causes higher torque and shorter seal life.

3. Install the stop, handle, lockwasher and handle nut on the stem. Tighten the handle nut securely to lock retaining nut in place. With the stem in the closed position, replace ball and seats. SBX valves have a one-piece seat/seal and it is inserted with valve in closed position. Rotate stem and ball to open position. Insert new body seals and place center section between pipe ends.

NOTE: When replacing the optional stainless steel "SS" gasket body seal, the wide flange is placed against body of the valve.

4. The body bolts of the valve should be tightened evenly. Tighten one side snugly, then the one diagonally across. Repeat for the other bolts bringing them all down tightly in sequence to the torques on Page 5.



WELDED PORT CONNECTIONS

Notes

- a. Always consult your authorized Parker representative if questions arise.
- b. Careful welding procedures are recommended and welding should be performed by trained, qualified personnel. Socket weld ports require the tube be inserted into the socket until bottomed against the stop. The tube is then to be backed out approximately 1/16 of an inch and then welded. This procedure will help in avoiding excessive static stress on the weld.
- c. Prior to Welding or Brazing THOROUGHLY CLEAN ALL JOINT SURFACES to remove surface protective coatings.

Procedure

1. Tack weld the valve in place.
2. Remove all body bolts except one. Open the valve. Loosen the last bolt. Swing the body out. Remove all bolts and spread the flange ends to clear the body seals. Remove the body seals, seats, and ball (turn valve handle to the closed position to remove the ball). Place the body back into the line and tighten diagonally with two body bolts.
3. Finish Welding (If gas welding or brazing, do not place flame directly on valve body.
4. Allow valve to cool, re-assemble the valve. Install new body seals, if they were shipped separately from the valve. Temporary BUNA body seals, found in the valve as received are not to be reused. If "SS" gasket body seals are used, the wide face of the gasket must be the face of the valve body.
5. Note: Care must be taken to avoid scratching the body seats.
6. Tighten the body bolts evenly and diagonally opposite each other, alternating in a criss-cross pattern. Use the torque figures shown in the following tables.

THREE-PIECE VALVES BODY BOLT TORQUE (TORQUE ON NUT SIDE)

SB8- SB32 STANDARD VALVES WITH CARBON STEEL BOLTS

VALVE SIZES	BOLT DIAMETER	IN-LBS	FT-LBS	N-M
SB8-SB12	1/4	96-120	8-10	10.8-13.6
SB16	5/16	156-204	13-17	17.6-23.0
SB20	3/8	216-264	18-22	24.4-29.8
SB24	7/16	480-540	40-45	54.2-61.0
SB32	1/2	720-780	60-65	81.3-88.1

SB8 - SB32 STANDARD VALVES WITH STAINLESS STEEL OR ALLOY 20 BOLTS

VALVE SIZES	BOLT DIAMETER	IN-LBS	FT-LBS	N-M
SB8-SB12	1/4	72-94	6-8	8.1-10.6
SB16	5/16	120-144	10-12	13.6-16.3
SB20	3/8	192-216	16-18	21.7-24.4
SB24	7/16	336-384	28-32	38.0-43.4
SB32	1/2	504-552	42-46	56.9-62.4

NOTE: Stainless steel bolts and nuts are generally used in all 3-piece valves with stainless steel bodies.

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

A -Two ferrule A-LOK®
compression port



Z -Single ferrule CPI™
compression port



F -ANSI/ASME B1.20.1
Internal pipe threads



V -VacuSeal face
seal port



Q -UltraSeal face
seal port



M -ANSI/ASME B1.20.1
External pipe threads



WARNING

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C Series Check Valve with PTFE Seats



Maximum Allowable Working Pressure

Valve Model	Stainless Steel Valves
C2T	4000 psi @ 70 °F (27.6 MPa @ 21 °C)
C4T	
C6T	
C8T	
C12T	
C16T	

Always consult your authorized Parker representative if questions arise. The arrow on the Valve Body indicates the normal direction of flow.

CAUTION: THIS VALVE IS DESIGNED TO HAVE A GAP BELOW THE OUTLET HEX. PROPER VALVE FUNCTION DICTATES THE GAP EXIST.

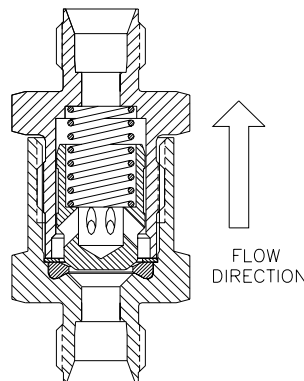


Figure 1: C Series Check Valve with PTFE Seats Cross Sectional View

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the Check Valve Maintenance Kit being used is appropriate for the valve's size, the Seal material, the Spring's crack pressure rating, and service requirements. Always contact your authorized Parker representative if any questions arise.
2. Clamp the Cap (next to the flow symbol's arrow) at its hex-flats. Vertical orientation of the check valve with the flow arrow pointing UP is recommended.
3. Loosen the Cap from the Body by turning counter-clockwise with the following size hex wrench:

C2T valves	5/8 inch
C4T valves	3/4 inch
C6T valves	1 inch
C8T valves	1-1/4 inch
C12T valves	1-3/8 inch
C16T valves	1-5/8 inch
4. Remove and discard the Spring from the Body. Remove and save the Poppet. Gently remove and discard the PTFE Seal and Washer at the bottom of the Body cavity, exercising care not to damage or scratch the Body's interior.

REASSEMBLY

1. Make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.
2. Refer to Figure 1. Place the new Seal in the Cap exercising care not to damage or scratch the Cap's interior.
NOTE: Correct orientation of the Seal per Figure 2 is required for proper Valve operation.
3. While holding the Body upright, place the new Spring in the Body. Ensure the Spring is properly positioned in the pocket per Figure 2.
4. Install the Poppet over the Spring.
5. While holding the Cap upright, place the PTFE Seat into the cavity in the bottom of the cap. Insure it is sitting flat within the cavity.
6. Insert the Washer into the Cap. Insure it is sitting flat within the cavity.
7. With the Cap sub-assembly still in a vertical position, install the Body sub-assembly to the Cap until finger-tight. Engage by turning clockwise with the hex socket torque wrench and torque requirement specified in the following Table. *DO NOT OVER TORQUE*

Valve Size	Stainless Steel Body
C2T	50 ft-lbs (67.8 N-m)
C4T	50 ft-lbs (67.8 N-m)
C6T	60 ft-lbs (81.3 N-m)
C8T	75 ft-lbs (101.7 N-m)
C12T	75 ft-lbs (101.7 N-m)
C16T	75 ft-lbs (101.7 N-m)

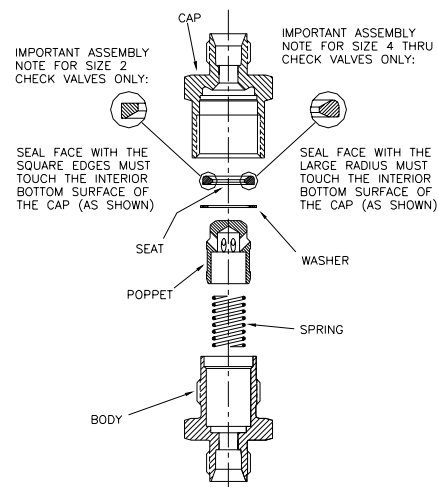


Figure 2: C Series Check Valve with PTFE Seats Exploded View

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

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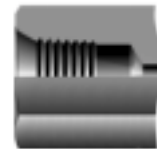
A -Two ferrule A-LOK[®] compression port



Z -Single ferrule CPI[™] compression port



F -ANSI/ASME B1.20.1 Internal pipe threads



V -VacuSeal face seal port



Q -UltraSeal face seal port



M -ANSI/ASME B1.20.1 External pipe threads



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PV Series Rising Stem Plug Valve



Maximum Allowable Working Pressure and Temperature

Valve Seat Material	Maximum Pressure Rating	Maximum Pressure Rating at Maximum Temperature
Acetal	6000 psig at 100 °F 15.2 MPa at 38 °C	1500 psig at 250° F 10.3 MPa at 121 °C
PCTFE	2200 psig at 100° F 15.2 MPa at 381 °C	100 psig at 200 °F 0.68 MPa at 931 °C
PTFE	750 psig at 100 °F 5.17 MPa at 38 °C	100 psig at 400 °F 0.68 MPa at 204 °C
PEEK	6000 psig at 100 °F 41.4 MPa at 38 °C	1000 psig at 400 °F 6.89 MPa at 204 °C

Always consult your authorized Parker representative if questions arise.

Figure 1: PV Series Needle Valve Cross Sectional View

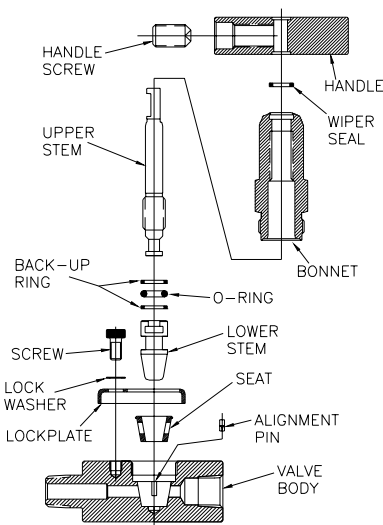


Figure 2: PV Series Needle Valve Exploded View

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the Rising Stem Plug Valve Maintenance Kit being used is appropriate for the valve's size, Seat material, Stem packing configuration, and service requirements. Always contact your authorized Parker representative if any questions arise.
2. Remove the Lockplate by turning the Hex Socket Cap Screw counter-clockwise with a 5/32 inch hex-socket wrench.
3. Remove the Bonnet by turning counter-clockwise with a 3/4 inch hex wrench.
4. Gently remove the Stem assembly from the Bonnet by turning the Stem clockwise, while holding the Bonnet stationary.
5. Disengage the Plug from the Stem. Discard the Plug, O-Ring and the Backup Rings.
6. Carefully remove the Seat using a hex allen wrench. Place the tip of the hex allen wrench into the Valve Seat orifice. Use the hex allen wrench to pry the Seat up from the Valve Body, exercising care not to scratch or damage the tapered sealing surface.
7. The following only applies to if an optional Seat is being replaced by an Acetal Seat. Remove the Seat Alignment Pin from the Body.

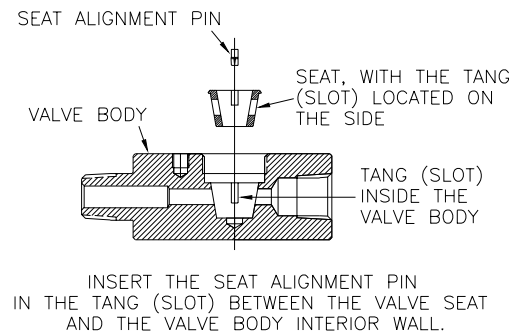


Figure 3: Installation of Seat Alignment Pin
(This operation applies only if an optional Seat is being replaced by a (standard) Acetal seat.)

REASSEMBLY

1. Make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.
2. Apply a moderate amount of lubricant to the Plug O-Ring and the two (2) Backup Rings, as consistent with the valve's service requirements. Always consult your authorized Parker representative if questions arise.
3. The Plug supplied with the Maintenance Kit should have the following three (3) packing components, with the first item located directly above the conical end:
Back-up Ring // O-Ring // Back-up Ring
4. Inspect the replacement Plug to insure the packing components have the proper assembly sequence.
5. Apply a uniform coat of lubricant to both the inside and outside of the Seat, as consistent with the valve's service requirements. Always consult your authorized Parker representative if questions arise.
6. This step applies only if an optional Seat is being installed. Proceed to step 7 for Valves with the (standard) Acetal Seat.
Place the Seat Alignment Pin in the tang slot located in the Body, as illustrated in Figure 3.
7. Properly install the Seat inside the Body.
8. Apply a moderate amount of lubricant to the below listed areas of the following components, as consistent with the valve's service requirements. Always consult your authorized Parker representative if questions arise.
Stem threads // Stem attachment joint // Bonnet exterior threads
9. Join the Stem and Plug by "hooking" the Plug into the Stem attachment joint.
10. Insert the Stem assembly inside the Bonnet, such that the Stem slides through the Bonnet's Wiper Seal. A small amount of hand-applied force may be required to accomplish this.
11. Complete the installation of the Stem inside the Bonnet by rotating the Bonnet counter clockwise until finger-tight, while holding the upper portion of the Stem stationary.
12. Lower the combined Bonnet and Stem assembly into the Body.
13. Secure the Bonnet assembly by turning clockwise using a 3/4 inch hex torque wrench and tightening to 45 Ft-lbs.
14. Place the Lockplate over the Bonnet and Body assembly. Position the Lockplate such that the Hex Socket Cap Screw will pass thru the slot in the Lockplate, and be aligned with the tapped hole in the Body. Center the Lockplate on the Body, and try to minimize the amount of overhang of the Lockplate with respect to the Body.
15. Position the Lockwasher over the Hex Socket Cap Screw and install the Lockplate by turning the Hex Socket Cap Screw clockwise to 40 In-lbs. with a 5/32 inch hex-socket torque wrench.

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

A -Two ferrule A-LOK® compression port



Z -Single ferrule CPI™ compression port



F -ANSI/ASME B1.20.1 Internal pipe threads



V -VacuSeal face seal port



Q -UltraSeal face seal port



M -ANSI/ASME B1.20.1 External pipe threads



WARNING

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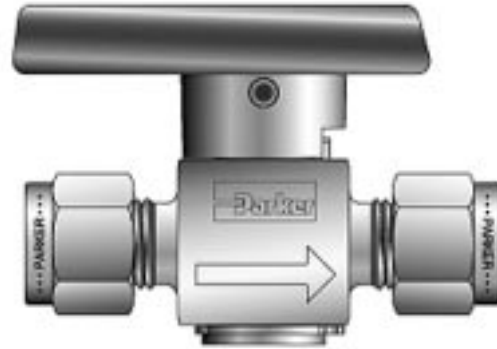
This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

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PR Series Rotary Plug Valve



MAXIMUM WORKING PRESSURE AND TEMPERATURE

Seal Material	Maximum Pressure Rating	Maximum Pressure @ Maximum Temperature
Fluorocarbon	3000 psig at 70 °F 20.7 MPa at 21 °C	2000 psig at 450 °F 13.8 MPa at 232 °C
EPR	3000 psig at 70 °F 20.7 MPa at 21 °C	2500 psig at 275 °F 17.2 MPa at 204 °C
Buna-N	3000 psig at 70 °F 20.7 MPa at 21 °C	2600 psig at 225 °F 17.9 MPa at 107 °C

* For flow in the opposite direction of the normal flow or the By-Pass option, the Maximum Pressure Rating is 250 psig (1.7 MPa).

Always consult your authorized Parker representative if questions arise. The arrow on the Valve Handle indicates the normal direction of flow.



Figure 1: PR Series Rotary Plug Valve Cross Sectional View

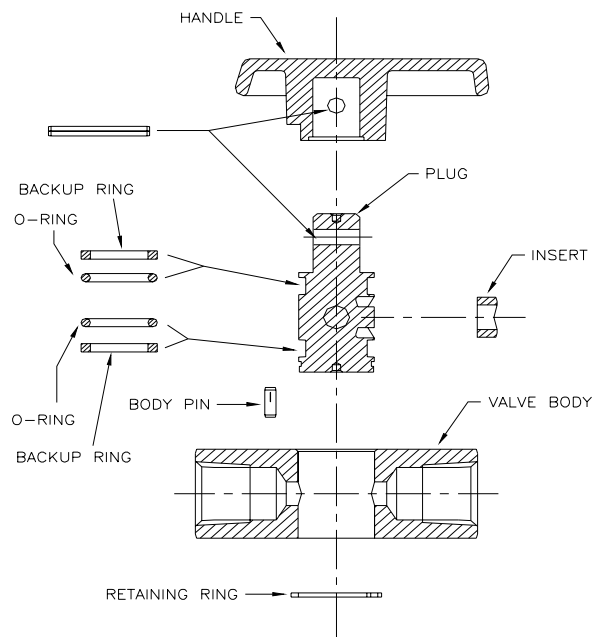


Figure 2: PR Series Rotating Plug Valve Exploded View

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Check that the PR Series Plug Valve Maintenance Kit being used is appropriate for the Valve's handle type, the Plug Insert material, the O-Ring and Backup ring configuration, and service requirements.
2. Remove the Retaining Ring using Industrial Retaining Ring Pliers or equivalent.
Size 4 Valve Pliers # P-120
Size 6 Valve Pliers # P-340
3. Turn the valve to the open position.
4. Gently remove the Plug assembly by grasping the handle and sliding the Plug assembly out the top of the Valve Body.
5. Preferable, wipe the Valve Body's internal areas to remove any contamination. The valve's interior must be completely dry before reassembly.
6. For Seals Only Kits: remove the O-Rings, Backup Rings and Insert from the Plug and discard.

REASSEMBLY

Assembled Plug Kits

1. Refer to Figure 2. Place flat side of the molded Insert into the Plug's insert cavity. Assure the contour of the Insert matches the cylindrical surface of the Plug.
2. Apply a generous amount of lubricant to the Plug, Insert, O-Ring and Backup Rings.
3. With the Plug turned in the open position carefully insert the Plug assembly into the Valve Body until the handle contacts the body.
4. Place the Retaining Ring into the groove on the Plug at the underside of the body.
5. Cycle the valve open and closed to assure the Plug is properly in place.

Seals Only Kits

1. Refer to Figure 2. Assemble one O-Ring into the O-Ring groove at the bottom of the Plug, and push it toward the top of the Plug.
2. Place one Backup ring into the same groove as the previous O-Ring. The Backup ring must be between the O-Ring and the bottom of the Plug.
3. Place the second Backup ring into the O-Ring groove next to the handle, and push toward the top of the Plug.
4. Assemble the second O-Ring into the same groove as the previous Backup ring. The backup ring should be between the O-Ring and the top of the Plug.
5. Place the flat side of the molded Insert into the Plug's insert cavity. Assure the contour of the insert matches the cylinder surface of the Plug.
6. Apply a generous amount of lubricant to the Plug, Insert, O-Ring and Back-up rings. Always consult your authorized Parker representative if questions arise.
7. With the Plug turned in the open position, carefully insert the Plug assembly into the Valve Body until the Handle contacts the body.
8. Place the Retaining ring into the groove on the Plug at the underside of the body.
9. Cycle the valve open and closed to assure the Plug is proper in place

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

A -Two ferrule A-LOK®
compression port



Z -Single ferrule CPI™
compression port



F -ANSI/ASME B1.20.1
Internal pipe threads



V -VacuSeal face
seal port



Q -UltraSeal face
seal port



M -ANSI/ASME B1.20.1
External pipe threads



WARNING

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RH Series Relief Valve



Spring Acquisition

The valve is shipped assembled complete less the adjustment cap and the lock nut. Springs can be acquired by ordering the appropriate kit. Spring kits are as follows:

Spring Pressure Range	Kit Name	Color Code
50-350 psi	KIT-RH4SP-50-350	Gray
350-750 psi	KIT-RH4SP-350-750	Red
750-1500 psi	KIT-RH4SP-750-1500	Orange
1500-2250 psi	KIT-RH4SP-1500-2250	Yellow
2250-3000 psi	KIT-RH4SP-2250-3000	Light Green
3000-4000 psi	KIT-RH4SP-3000-4000	Light Blue
4000-5000 psi	KIT-RH4SP-4000-5000	Burgundy
5000-6000 psi	KIT-RH4SP-5000-6000	Bright Yellow

Each kit includes a Spring, two (2) PTFE washers, a label, locking wire, and a lead tie down disk.

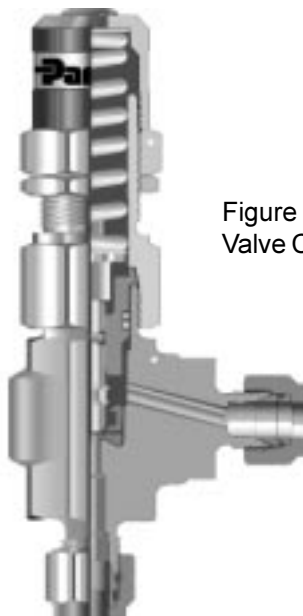


Figure 1: RH Series Relief Valve Cross Sectional View

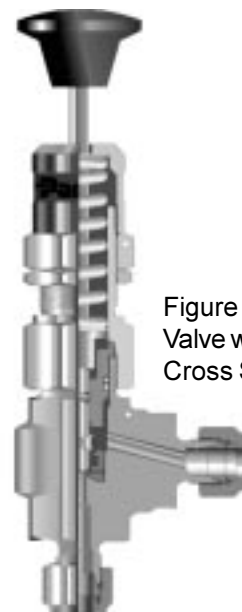


Figure 2: RH Series Relief Valve with Manual Override Cross Sectional View

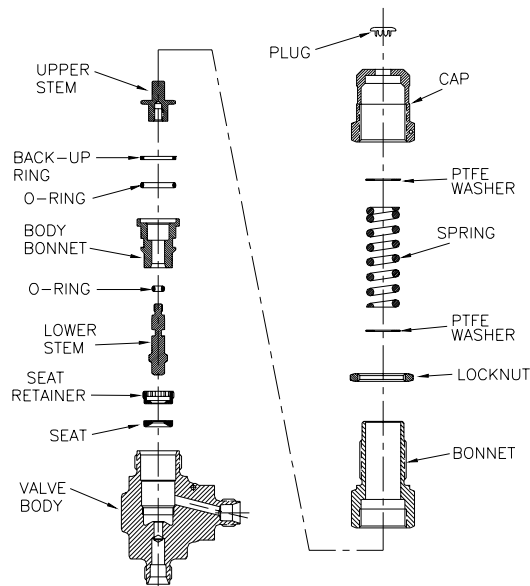


Figure 3: RH Series Relief Valve Exploded View

DISASSEMBLY

MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURES BEFORE VALVE DISASSEMBLY OR REMOVAL OCCURS.

1. If the valve is locked into position, break apart the Locknut and Cap by turning the Locknut clockwise with a 7/8 inch wrench while holding the Cap with another 7/8 inch wrench.
2. If the valve is a manual version, loosen the Set Screw in the Handle by using a 5/64 hex Allen wrench and unthread the Handle from the Manual Upper Stem by holding the stem and rotating the Handle counter-clockwise.
3. Unthread the Cap from the Bonnet by rotating the Cap counter-clockwise.
4. Remove the Spring and PTFE Washers and set them aside for reuse during reassembly. (It is possibly easier to remove the lower PTFE washer after step 5.)
5. Remove the Bonnet from the Valve Body by turning counter-clockwise with a 7/8 inch wrench.
6. Using a pair of pliers, secure a grip onto the Upper Stem/Manual Upper Stem and pull the cartridge assembly from the Valve Body.
7. Disengage the Upper Stem/Manual Upper Stem and the Lower Stem by holding the Lower Stem with a pair of adjustable pliers (Do not clamp over the crimped o-ring if the stem is to be reused.) and unthreading the Upper Stem/Manual Upper Stem with a 7/16 inch wrench.
8. Remove the Lower Stem from the Body Bonnet by grasping the unthreaded end and gently pull it out.
9. Remove the Seat Retainer from the Valve Body by using a 5/16 inch allen wrench and turning counter-clockwise.
10. Gently remove the Seat from within the Valve Body.

REASSEMBLY

MAKE CERTAIN THAT ALL PARTS ARE FREE OF DIRT OR OTHER CONTAMINANTS BEFORE REASSEMBLY.

1. Using the appropriate mandrel, place the PTFE coated O-ring onto the Lower Stem. The mandrel fits over the threaded portion of the Lower Stem.
2. Using the appropriate mandrel, place the O-ring and Back-up ring onto the Body Bonnet. Be careful to insure proper orientation of the seals. Refer to Figure 1 or 2 for proper orientation.

3. Insert the Lower Stem into the Body Bonnet being careful not to damage the O-ring or Back-up Ring.
4. Thread the Upper Stem/ Manual Upper Stem onto the Lower Stem and torque to 12 in-lbs by gripping the Lower Stem with a pair of pliers and rotating the Upper Stem clockwise with a 7/16 inch hex socket torque wrench. (Do not clamp over the sealing surface of the Lower Stem.)
5. Insert the Seat into the Valve Body with its flat side up. Install the Seat Retainer into the Valve Body and torque to 5 in-lbs using a 5/16 inch allen wrench.
6. Insert the assembly from 4 into the Valve Body being careful not to damage the O-ring and Back-up Ring.
7. Apply a liberal amount of lubricant, as consistent with the Valve's service requirements, onto the body stem end threads.
8. Install the Bonnet onto the Valve Body and torque to 30 ft-lbs by turning clockwise with a 7/8 inch hex socket torque wrench.
9. Place a PTFE Washer into the bore of the Bonnet, insure that the washer is lying flat against the face of the Upper Stem.
10. Place the Spring into the bore of the Bonnet.
11. Place the other PTFE Washer onto the top of the Spring.
- NOTE:** If the valve is a Manual Version the a Manual Washer will be included. Insure that the vertical portion fits within the machined hole in the top to the Cap.
12. Place an appropriate lubricant, consistent with the valve's service requirements, on the internal threads of the Cap.
13. Thread the Cap onto the Bonnet. Insure that the washer remains atop the Spring during thread engagement.
14. If your system demands, lock the Cap in place by holding it with a 7/8 inch wrench and turning the Locknut counter-clockwise until it is snug against the Cap.
15. If the valve has a Manual Upper Stem, thread the Handle onto it.

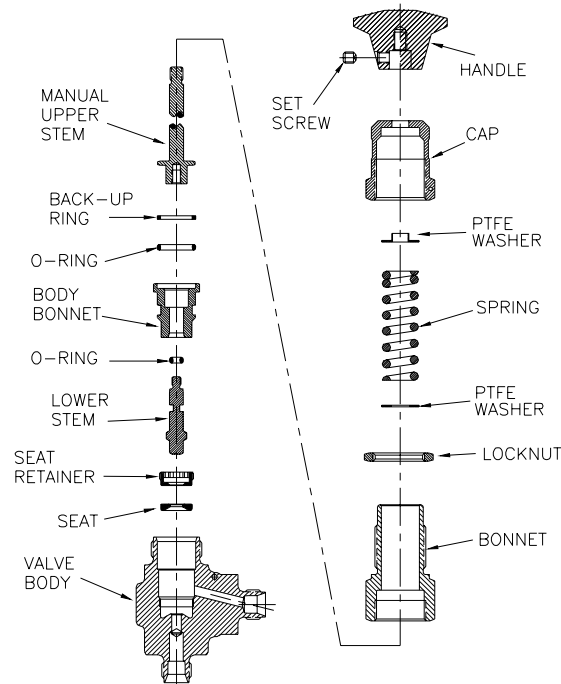


Figure 4: RH Series Relief Valve with Manual Override Exploded View

Setting Desired Cracking Pressure

1. Rotate the **Cap** to set the desired cracking pressure.
2. Tighten the **Lock Nut** against the **Cap**.
3. If required, secure the pressure setting by using the **Lockwire** to fasten the **Cap** and **Valve Body** together.

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

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A -Two ferrule A-LOK®
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FT Series Filter



Maximum Allowable Working Pressure

Seal Material	Brass Filters	Stainless Steel Filters
Elastomeric & Metallic	2000 psig at 70 °F 13.8 MPa at 21 °C	6000 psig at 70 °F 41.4 MPa at 21 °C
PTFE	2000 psig at 70 °F 13.8 MPa at 21 °C	2000 psig at 70 °F 13.8 MPa at 21 °C

Always consult your authorized Parker representative if questions arise. The arrow on the Filter Body indicates the normal direction of flow.

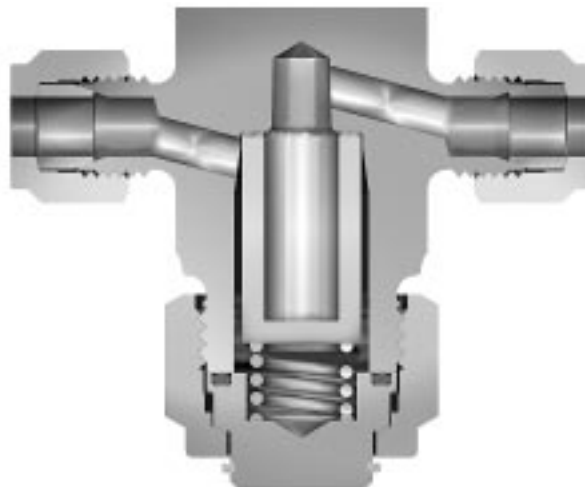
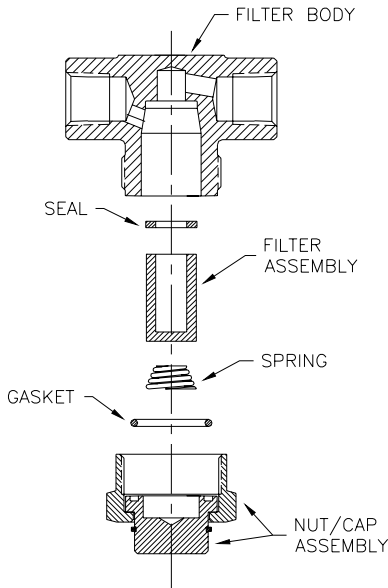


Figure 1: FT Series Filter Cross Sectional View



**Figure 2: FT4 Series Tee Filter Exploded View
purchased after March 2, 1990**

DISASSEMBLY

(For valves purchased after March 2, 1990)

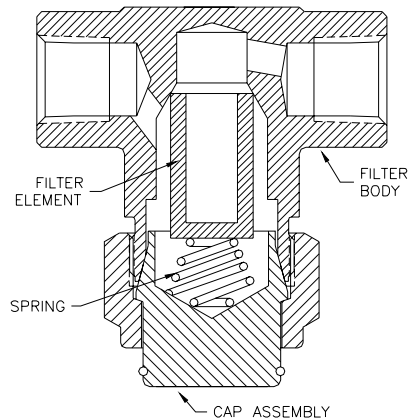
WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE FILTER IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Remove the nut/cap assembly by turning the nut counter-clockwise with a 1 1/8 inch size hex wrench.
2. Carefully remove the nut/cap assembly, gasket, spring, filter element and filter seal.
3. Preferably, wipe the filter body's internal areas to remove any contamination. The filter's interior must be completely dry before reassembly.

REASSEMBLY

1. Refer to Figure 2. Insert the gasket into the groove on the cap. Place the wide end of the spring into the cavity of the cap and set aside.
2. Place the filter seal on the opened end of the filter element. Insert these into the filter body with the filter seal going in first.
3. While holding the filter element in place, move the spring, and nut/cap assembly into place with the small end of the spring contacting the closed end of the filter element.
4. Thread the nut onto the body with a clockwise rotation until finger tight.
5. Securely tighten the nut by turning clockwise, with a 1 1/8 hex (FT4) or 1 1/4 hex (FT8) wrench to the following torque:

Valve Material	Torque
Stainless Steel	15 ft-lbs (20 N-m)
Brass	12 ft-lbs (16 N-m)



**Figure 3: FT4 Series Tee Filter Cross Sectional View
prior to March 2, 1990**

DISASSEMBLY

(For valves purchased prior to March 2, 1990)

WARNING: MAKE CERTAIN THAT SYSTEM IN WHICH FILTER IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURES BEFORE DISASSEMBLY.

1. Remove the nut/cap assembly by turning the nut counter-clockwise with a 1 1/8 inch size hex wrench.
2. Carefully remove the nut/cap assembly, gasket, spring, filter element and filter seal.
3. Preferably, wipe the filter body's internal areas to remove any contamination. The filter's interior must be completely dry before reassembly.

REASSEMBLY

1. Refer to Figure 3. Install the new (or cleaned) filter element and spring into the Filter Body.
2. Thread cap assembly onto body in a clockwise rotation until handtight.
3. Securely tighten the nut by turning clockwise, with a 1 1/8 hex wrench until the nut/cap assembly returns to its original position (usually less than 1/8 turn from handtight). **Do not overtighten cap assembly.** Excessive torque may result in internal body damage or a weakened connection.

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

A -Two ferrule A-LOK[®] compression port



Z -Single ferrule CPI[™] compression port



F -ANSI/ASME B1.20.1 Internal pipe threads



V -VacuSeal face seal port



Q -UltraSeal face seal port



M -ANSI/ASME B1.20.1 External pipe threads



WARNING

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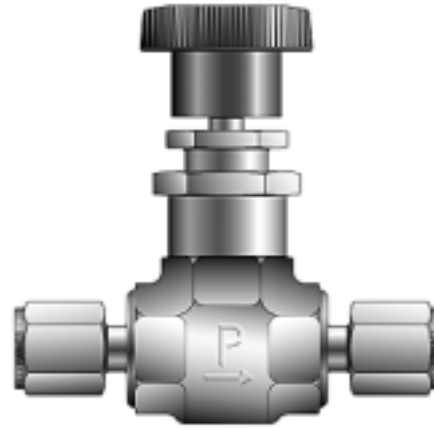
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VL Series Needle Valve



MAXIMUM WORKING PRESSURES AND TEMPERATURE

Maximum Pressure	Maximum Temperature
600 psi at 70 °F 4.1 MPa at 21 °C	600 psi at 300 °F 4.1 MPa at 149 °C

Always consult your authorized Parker representative if questions arise. The arrow on the Valve Body indicates the normal direction of flow.

PACKING ADJUSTMENT

Packing adjustment may be necessary depending on the many varied uses for the Valve. It is recommended an adjustment be made shortly after the initial installation and just prior to flow start-up.

1. Turn the Stem to the full OPEN position, finger-tight.
2. Loosen the Locknut from the Valve Body.
3. Tighten the Bonnet using a 9/16 inch hex wrench to 20 in-lbs.
4. Tighten the Locknut onto the Valve Body approximately 1/8 turn past finger tight.



Figure 1: VL Series Needle Valve Cross Sectional View

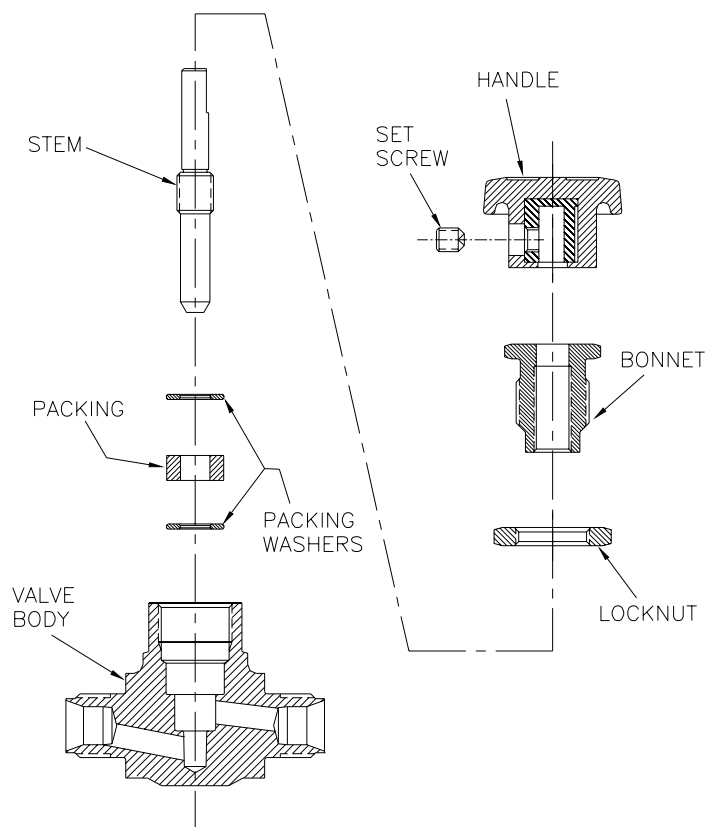


Figure 2: VL Series Needle Valve Exploded View

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the Needle Valve Maintenance Kit being used is appropriate for the Valve's size and service requirements. Always contact your authorized Parker representative if any questions arise.
2. Remove the Handle by turning the Set Screw counter-clockwise with a 5/64 inch allen wrench.
3. Loosen the Locknut from the body by turning counter-clockwise with a 11/16 inch hex wrench.
4. Remove the Bonnet from the Body by turning counter-clockwise with a 9/16 inch hex wrench.
5. When the Bonnet is removed, the Locknut, Stem and possibly packing and packing washers will also disengage from the Valve Body.
6. Remove the Packing and Packing Washers from either the Stem or inside the Valve Body.
7. Unthread the Stem from the Bonnet.

REASSEMBLY

1. Make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.
2. Secure the Body in an assembly fixture.
3. Apply a liberal amount of lubricant, as consistent with the Valve's service requirements, to the Stem and Bonnet threads.

Note: Power threads must be covered with lubricant.

4. Thread the Stem into the Bonnet. This is accomplished by inserting the top of the stem into the bottom of the Bonnet.
5. Place the Packing and Packing Washers into the Valve Body as seen in Figure 2.
6. Thread the Locknut onto the Bonnet.
7. Thread the Bonnet into the Valve Body until hand tight. Insure the Stem is in the complete open position to avoid damage to the seat and that the Locknut is threaded completely onto the Bonnet such that it does not prohibit the insertion of the Bonnet.
8. Torque the Bonnet in the Body by turning the Bonnet clockwise with a 9/16 inch torque wrench to 20 in-lbs.
9. Tighten the Locknut to the Valve Body by turning the Locknut clockwise with a 11/16 inch hex wrench until it is snug.
10. Re-install the Handle by threading the Set Screw clockwise into the Handle with a 5/64 inch hex wrench.
11. Turn the Valve Handle through at least one (1) "Open and Close" cycle to verify proper operation of the Stem's threads.
12. Reject and rebuild any Valve exhibiting rough or irregular stem operation. Always contact your authorized Parker representative if questions arise.

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

A -Two ferrule A-LOK®
compression port



Z -Single ferrule CPI™
compression port



F -ANSI/ASME B1.20.1
Internal pipe threads



V -VacuSeal face
seal port



Q -UltraSeal face
seal port



M -ANSI/ASME B1.20.1
External pipe threads



WARNING

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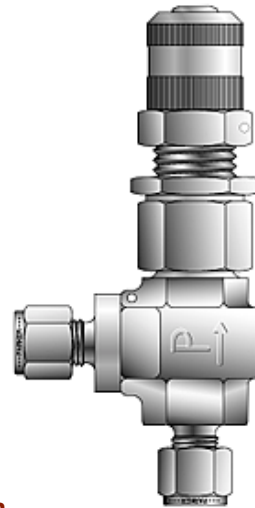
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RL Series Relief Valve



Spring Acquisition

The valve is shipped assembled complete less the adjustment cap and the lock nut. Springs can be acquired by ordering the appropriate kit. Spring kits are as follows:

Spring Pressure Range	Kit Name	Color Code
10-25 psi	KIT-RL4SP-0-25	Magenta
25- 50 psi	KIT-RL4SP-25-50	Brown
50-100 psi	KIT-RL4SP-50-100	Purple
100-150 psi	KIT-RL4SP-100-150	Dark Green
150-225 psi	KIT-RL4SP-150-225	Dark Blue
225-400 psi	KIT-RL4SP-225-400	White
10-225 psi	KIT-RL4SP-10-225	None

Each kit includes a Spring, two (2) PTFE washers, a label, locking wire, and a lead tie down disk.



Figure 1: RL Series Relief Valve Cross Sectional View



Figure 2: RL Series Relief Valve with Manual Override Cross Sectional View

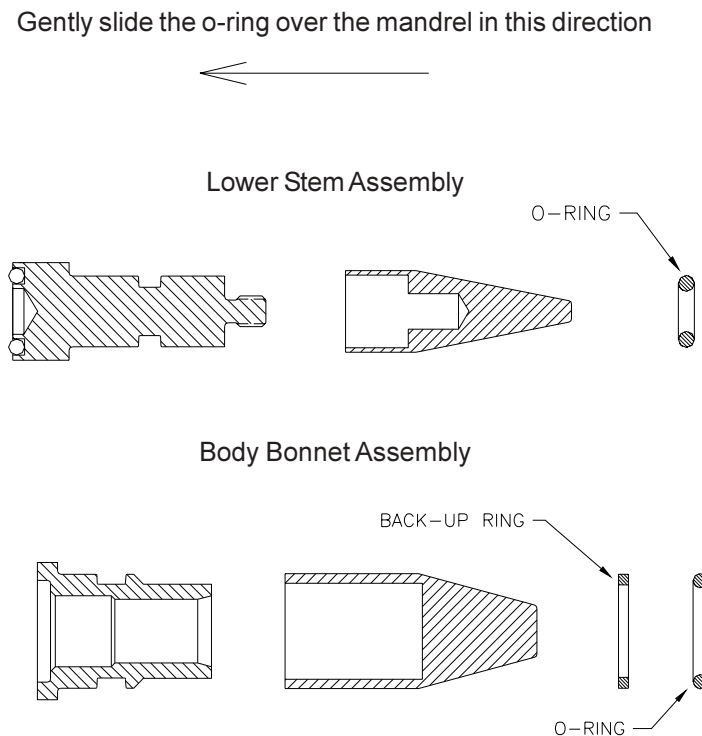
DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURES BEFORE VALVE DISASSEMBLY OR REMOVAL OCCURS.

1. If the valve is locked into position, break apart the Locknut and Cap by turning the Locknut clockwise with a 7/8 inch wrench while holding the Cap with another 7/8 inch wrench.
2. If the valve is a manual version, loosen the Set Screw in the Handle by using a 5/64 hex Allen wrench and unthread the Handle from the Manual Upper Stem by holding the stem and rotating the Handle counter-clockwise.
3. Unthread the Cap from the Bonnet by rotating the Cap counter-clockwise.
4. Remove the Spring and PTFE Washers and set them aside for reuse during reassembly. (It is possibly easier to remove the lower PTFE washer after step 5.)
5. Remove the Bonnet from the Valve Body by turning counter-clockwise with a 7/8 inch wrench.
6. Using a pair of pliers, secure a grip onto the Upper Stem/Manual Upper Stem and pull the cartridge assembly from the Valve Body.
7. Disengage the Upper Stem/Manual Upper Stem and the Lower Stem by holding the Lower Stem with a pair of adjustable pliers (Do not clamp over the crimped o-ring if the stem is to be reused.) and unthreading the Upper Stem/Manual Upper Stem with a 7/16 inch wrench.
8. Remove the Lower Stem from the Body Bonnet by grasping the end that includes the crimped seat and gently pull it out.

O-RING/BACK-UP RING INSERTION

1. Place the mandrel over the appropriate end of the components as seen in the drawing.
2. Slide the O-ring or O-ring/Back-up ring combination slowly and gently over the mandrel (Note the orientation of the O-ring and back-up ring).
3. Place the O-ring or O-ring/Back-up ring into the groove provided for it.



REASSEMBLY

MAKE CERTAIN THAT ALL PARTS ARE FREE OF DIRT OR OTHER CONTAMINANTS BEFORE REASSEMBLY.

1. Place the Teflon coated O-ring onto the Lower Stem and the O-ring and Back-up ring onto the Body Bonnet as shown in the section titled 'O-Ring/Back-up Ring Insertion'.
2. Insert the Lower Stem into the Body Bonnet being careful not to damage the O-ring or Back-up Ring.
3. Thread the Upper Stem/ Manual Upper Stem onto the Lower Stem and torque to 12 in-lbs by gripping the Lower Stem with a pair of pliers and rotating the Upper Stem clockwise with a 7/16 inch hex socket torque wrench. (Do not clamp over the crimped portion of the Lower Stem.)
4. Insert the assembly from 4 into the Valve Body being careful not to damage the O-ring and Back-up Ring.
5. Apply a liberal amount of lubricant, as consistent with the Valve's service requirements, onto the body stem end threads.
6. Install the Bonnet onto the Valve Body and torque to 30 ft-lbs by turning clockwise with a 7/8 inch hex socket torque wrench.
7. Place a PTFE Washer into the bore of the Bonnet, insure that the washer is lying flat against the face of the Upper Stem/Manual Upper Stem.
8. Place the Spring into the bore of the Bonnet.
9. Place the other PTFE Washer onto the top of the Spring.
10. Place an appropriate lubricant, consistent with the valve's service requirements, on the internal threads of the Cap.
11. Thread the Cap onto the Bonnet. Insure that the washer remains atop the Spring during thread engagement.
12. If your system demands, lock the Cap in place by holding it with a 7/8 inch wrench and turning the Locknut counter-clockwise until it is snug against the Cap.
13. If the valve has a Manual Upper Stem, thread the Handle onto it.

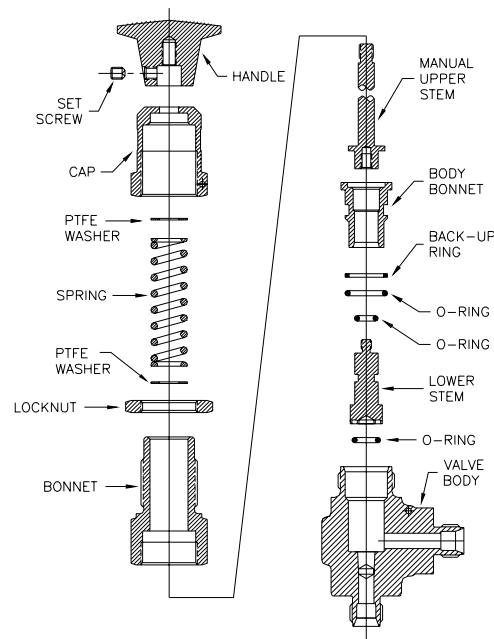


Figure 4: RL Series Relief Valve with Manual Override Exploded View

Setting Desired Cracking Pressure

1. Rotate the **Cap** to set the desired cracking pressure.
2. Tighten the **Lock Nut** against the **Cap**.

If required, secure the pressure setting by using the **Lockwire** to fasten the **Cap** and **Valve Body** together.

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

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A -Two ferrule A-LOK® compression port



Z -Single ferrule CPI™ compression port



F -ANSI/ASME B1.20.1 Internal pipe threads



V -VacuSeal face seal port



Q -UltraSeal face seal port



M -ANSI/ASME B1.20.1 External pipe threads



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NS Series Metering Valve



WORKING PRESSURES AND TEMPERATURES

Elastomer	Working Pressure	Temperature Range
Buna-N	2000 psig @ 70 °F 13.8 MPa @ 21 °C	-10 °F to 250 °F -23 °C to 121 °C
EPR		-40 °F to 250 °F -40 °C to 121 °C
Neoprene		-40 °F to 250 °F -40 °C to 121 °C
Fluorocarbon		-10 °F to 400 °F -23 °C to 204 °C

Always consult your authorized Parker representative if questions arise.

VALVE HANDLE ASSEMBLY AND DISASSEMBLY

WARNING: This valve is not field repairable for seat or seal damage. Removal of the Bonnet from the Valve Body may cause irreparable damage to the valve stem.



Figure 1: NS Series Metering Valve with Knurled Knob Cross Sectional View

KNURLED OR KNURLED SLOTTED HANDLE

1. Close the valve by turning the handle clockwise until it reaches a positive stop against the top of the packing nut threads.
2. Remove the Knurled or Knurled Slotted Handle by loosening the set screw using a 1/16 inch allen wrench.

WARNING: DO NOT TURN THE STEM WHILE THE HANDLE IS OFF THE VALVE.

3. Place the Knurled or Knurled Slotted Handle onto the Valve Stem aligning the handle set screw with the valve stem flat.
4. Tighten the Handle Set Screw using a 1/16 inch allen wrench.

VERNIER HANDLE

NOTE: The vernier handle assembly consists of a graduated collar, stem adapter, and the vernier handle.

1. Close the valve by turning the Vernier handle clockwise until the handle's zero reading aligns with the zero reading on the graduated collar.
2. Remove the vernier handle, stem adapter, and graduated collar by loosening the set screw with a 1/16 inch allen wrench.

WARNING: DO NOT TURN THE STEM WHILE THE HANDLE IS OFF THE VALVE.

1. Place the graduated collar onto the packing nut and butt it against the top of the packing nut threads. Orient the graduations for viewing ease and tighten the collar's set screw using a 1/16 inch allen wrench.
2. Place the stem adapter onto the valve stem, aligning the stem adapter's set screw with the valve stem flat. Position the stem adapter against the top of the packing nut. Tighten the set screw using a 1/16 inch hex wrench.
NOTE: Correct positioning of the stem adapter is important as the stem adapter provides a positive stop ensuring against the over tightening and potential damage to the valve stem.
3. Position the vernier handle onto the stem adapter and align the zero reading on the graduated collar with the zero reading on the vernier handle. Tighten the set screw using a 1/16 inch allen wrench.

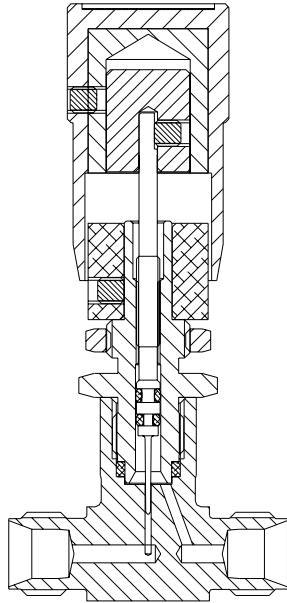


Figure 2: NS Series
Metering Valve with Vernier
Handle Cross Sectional
View

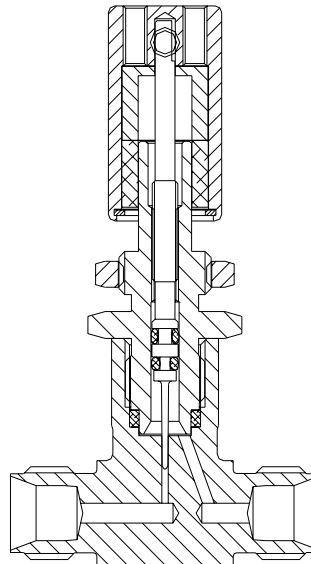


Figure 3: NS Series
Metering Valve with
Precision Adjustment
Handle Cross Sectional
View

PRECISION ADJUSTMENT HANDLE

NOTE: The precision adjustment handle assembly consists of a precision adjustment handle, a handle set screw, and two (2) torque adjustment set screws.

1. Close the valve by turning the handle clockwise until it reaches a positive stop against the top of the packing nut threads.
2. Loosen the torque adjustment (in applicable) using a .050 inch allen wrench and the handle set screw using a 1/16 inch allen wrench and remove the handle assembly.

WARNING: DO NOT TURN THE STEM WHILE THE HANDLE IS OFF THE VALVE.

3. Place the precision adjustment handle assembly onto the valve stem, aligning the handle set screw with the valve stem flat. Position the handle against the top of the packing nut threads.
4. Tighten the handle set screw using a 1/16 inch allen wrench.

NOTE: Correct positioning of the handle is important as it provides a positive stop ensuring against the over tightening and potential damage to the valve stem. Tighten the torque adjustment set screws to give the desired handle torque.

RETROFIT INSTRUCTIONS KNURLED HANDLE TO VERNIER HANDLE

The Vernier Handle Assembly Kit consist of a Graduated Collar, Stem Adapter, Set Screws, and the Vernier Handle.

Required Tools

1/32 inch Hex Wrench (for the Knurled Handle Lock Set Screw)

1/16 inch Hex Wrench (for the Vernier Handle, Graduated Collar, and Stem Adapter Set Screws)

1. If tightened, use a 1/32 inch hex wrench and loosen the Knurled Handle lock screw. Use a 1/16 inch hex wrench and loosen the Knurled Handle set screw. Remove the Knurled Handle from the valve assembly. If the valve is to be panel mounted, mount the valve prior to assembly of the Vernier Handle. Refer to IN-238 for panel mounting procedures.
2. Place the Graduated Collar onto the Packing Nut and butt it against the top of the Packing Nut threads. Orient the graduations for viewing ease and tighten the collar's set screw.
3. Place the Stem Adapter onto the valve stem, aligning the Stem Adapter's set screw with the Valve Stem flat or drill point, and tighten the set screw. Using the Stem Adapter as a valve handle, close the valve. Correct positioning of the Stem Adapter is important as the Stem Adapter provides a positive stop to prevent potential damage.
4. Position the Vernier Handle onto the Stem Adapter and align the zero reading on the Graduated Collar with the zero reading on the Vernier Handle. Tighten the set screw and the retrofit is complete.

RETROFIT INSTRUCTIONS KNURLED HANDLE TO PRECISION HANDLE

The Precision Handle Assembly Kit consist of a Precision Adustment Handle, a Handle Set Screw, and two Torque Adjustment Set Screws.

Required Tools

1/16 inch Hex Wrench (for the Handle Set Screw)

1/16 inch Hex Wrench (for the Torque Adjustment Set Screws)

1. Turn the Knurled Handle clockwise until it reaches a positive stop against the top of the Packing Nut threads. The valve is now in the closed position (as determined during assembly and testing at the factory). **NOTE: Do not turn the valve stem until the remaining steps are completed.**
2. Loosen the Torque Adjustment and Handle Set Screws and remove the Knurled Handle assembly. Remove the Panel Nut. If the valve is to be panel mounted, mount the valve prior to assembly of the Precision Handle. Refer to IN-238 for panel mounting procedures.
3. Place the Precision Adjustment assembly onto the Valve Stem, aligning the Handle Set Screw with the Valve Stem flat. Position the Precision Handle against the top of the Packing Nut threads. Tighten the Handle Set Screw. Correct positioning of the Handle is important as the Handle provides a positive stop to prevent potential damage. Tighten the Torque Adustment Set Screws to provide the desired handle operating torque. The Precision Adjustment Handle retrofit is complete.

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

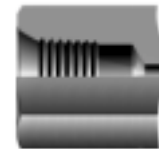
A -Two ferrule A-LOK®
compression port



Z -Single ferrule CPI™
compression port



F -ANSI/ASME B1.20.1
Internal pipe threads



V -VacuSeal face
seal port



Q -UltraSeal face
seal port



M -ANSI/ASME B1.20.1
External pipe threads



WARNING

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NM/NL Series Metering Valve



WORKING PRESSURES AND TEMPERATURES

Elastomer	Working Pressure	Temperature Range
Buna-N	1000 psig @ 70 °F 6.9 MPa @ 21 °C	-10 °F to 250 °F -23 °C to 121 °C
EPR		-40 °F to 250 °F -40 °C to 121 °C
Neoprene		-40 °F to 250 °F -40 °C to 121 °C
Fluorocarbon		-10 °F to 400 °F -23 °C to 204 °C

Always consult your authorized Parker representative if questions arise.



Figure 1: NM/NL Series Metering Valve with Knurled Handle Cross Sectional View

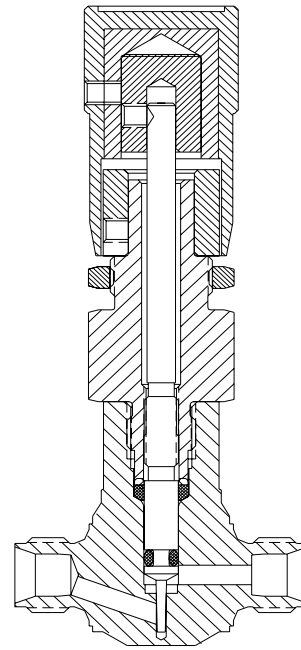


Figure 2: NM/NL Series Metering Valve with Vernier Handle Cross Sectional View

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the Metering Valve Maintenance Kit being used is appropriate for the Valve's size, Handle and service requirements. Always contact your authorized Parker representative if any questions arise.
2. Turn the Valve to its complete open position.
3. Remove the Handle by loosening the Set Screw with a 1/16 inch allen wrench. If necessary, loosen the Lock Screw with a 0.035 inch allen wrench.
4. Remove the Bonnet from the Valve Body by turning counter-clockwise with an 11/16 inch hex wrench.
5. Remove the Stem from the Bonnet by rotating it until the two separate.
6. The Seal Ring within the Valve Body and O-Ring on the Stem can be removed by using a pick or some similar device.

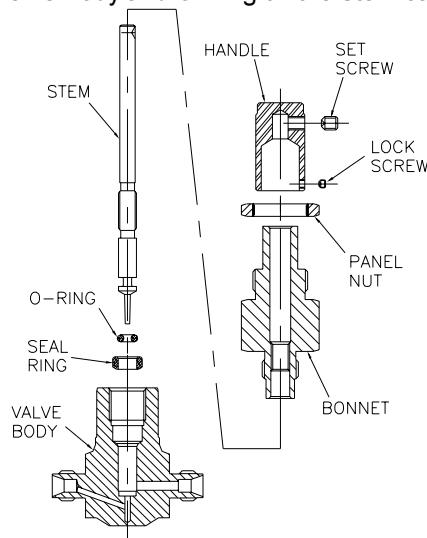


Figure 3: NM/NL Series Metering Valve with Knurled Handle Exploded View

REASSEMBLY

1. Make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.
2. Place an appropriate amount of lubricant as consistent with the valve's service requirements on the Seal Ring and O-Ring.
3. Insure lubricant remains on the Stem threads and on the diameter between the threads and o-ring groove. .
4. Place the O-Ring onto the Stem from the needle end of the stem.
5. Engage the knob end of the Stem into the short end of the Bonnet and rotate until back-stopped.

Note: Insure care not to bend the needle portion of the stem.

6. Engage the Bonnet into the Valve Body and torque to 15 in-lbs using a 1/16 inch hex wrench.
7. Attach the valve to a gaseous pressure source, run the outlet into a liquid test jar and close the valve until leakage reaches approximately five bubbles per second.

NOTE: Rotation beyond this could damage the valve. This valve is not a shut-off valve and contact between the stem and valve seat could damage either or both components.

8. Install the Handle onto the Stem. The Handle should bottom on the Bonnet. Position the Handle so the Set Screw is aligned with the flat on the Stem. Tighten the Handle to 20 in-lbs using a 1/16 inch allen wrench.

RETROFIT INSTRUCTIONS KNURLED HANDLE TO VERNIER HANDLE

The Vernier Handle Assembly Kit consist of a Graduated Collar, Stem Adapter, Set Screws, and the Vernier Handle.

Required Tools

1/32 inch Hex Wrench (for the Knurled Handle Lock Set Screw)

1/16 inch Hex Wrench (for the Vernier Handle, Graduated Collar, and Stem Adapter Set Screws)

1. If tightened, use a 1/32 inch hex wrench and loosen the Knurled Handle lock screw. Use a 1/16 inch hex wrench and loosen the Knurled Handle set screw. Remove the Knurled Handle from the valve assembly. If the valve is to be panel mounted, mount the valve prior to assembly of the Vernier Handle. Refer to IN-239 for panel mounting procedures.
2. Place the Graduated Collar onto the Packing Nut and butt it against the top of the Packing Nut threads. Orient the graduations for viewing ease and tighten the collar's set screw.
3. Place the Stem Adapter onto the valve stem, aligning the Stem Adapter's set screw with the Valve Stem flat or drill point, and tighten the set screw. Using the Stem Adapter as a valve handle, close the valve. Correct positioning of the Stem Adapter is important as the Stem Adapter provides a positive stop to to prevent potential damage.
4. Position the Vernier Handle onto the Stem Adapter and align the zero reading on the Graduated Collar with the zero reading on the Vernier Handle. Tighten the set screw and the retrofit is complete.

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

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A -Two ferrule A-LOK®
compression port



Z -Single ferrule CPI™
compression port



F -ANSI/ASME B1.20.1
Internal pipe threads



V -VacuSeal face
seal port



Q -UltraSeal face
seal port



M -ANSI/ASME B1.20.1
External pipe threads



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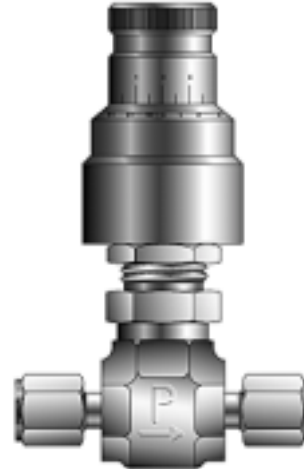
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HR Series Metering Valve



WORKING PRESSURES AND TEMPERATURES

Elastomer	Working Pressure	Temperature Range
Buna-N	250 psig @ 70 °F 1.7 MPa @ 21 °C	-10 °F to 250 °F -23 °C to 121 °C
EPR		-40 °F to 250 °F -40 °C to 121 °C
Neoprene		-40 °F to 250 °F -40 °C to 121 °C
Fluorocarbon		-10 °F to 400 °F -23 °C to 204 °C

Always consult your authorized Parker representative if questions arise.

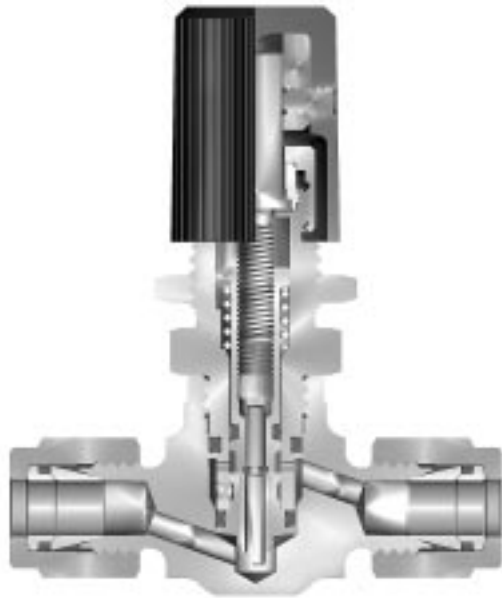


Figure 1: HR Series Metering Valve with Knurled Handle Cross Sectional View

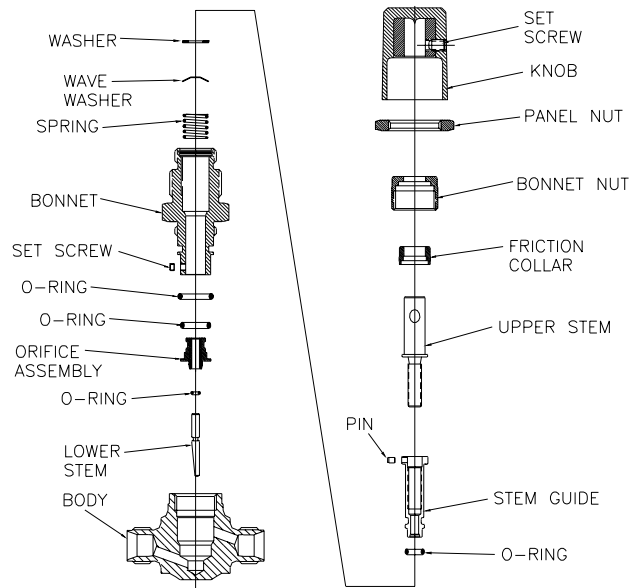


Figure 2: HR Series Metering Valve with Exploded View

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS DRAINED AND/OR EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL OR DISASSEMBLY. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the Metering Valve Maintenance Kit being used is appropriate for the Valve's size, Handle and service requirements. Always contact your authorized Parker representative if any questions arise.
2. Turn the Valve to its complete open position.
3. Remove the Cartridge Assembly (with the handle installed) from the Valve Body by turning the Bonnet counter-clockwise with an 11/16 inch hex wrench.
4. Remove the Orifice Assembly from the Cartridge Assembly by turning the Set Screw counter-clockwise with a 0.035 inch allen wrench.

REASSEMBLY

1. Make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.
2. Place the O-Ring onto the Orifice Assembly.
3. Insert the Orifice Assembly onto the Cartridge Assembly.
4. Remove the Orifice Assembly and insure there isn't any loose or hanging material on the inside of the Orifice Assembly or on the Lower Stem.

NOTE: This step is necessary for proper valve function.

5. Re-insert the Orifice Assembly into the Cartridge Assembly.
6. Thread the Set Screw into the Orifice Assembly using a 0.035 inch allen wrench. **INSURE CARE WHEN INSERTING THIS SCREW, OVERTIGHTENING CAN EASILY STRIP THE THREAD.**
8. Insure the valve is turned to its complete open position.
7. Place the Cartridge Assembly into the valve body and using a 11/16 inch hex wrench torque the Bonnet to 25 in-lbs.

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

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A -Two ferrule A-LOK[®] compression port



Z -Single ferrule CPI[™] compression port



F -ANSI/ASME B1.20.1 Internal pipe threads



V -VacuSeal face seal port



Q -UltraSeal face seal port



M -ANSI/ASME B1.20.1 External pipe threads



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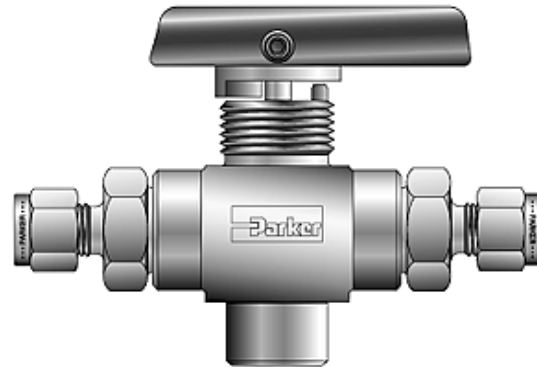
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HB Series Ball Valve



MAXIMUM ALLOWABLE WORKING PRESSURES

Table 1

Maximum Allowable Working Pressure versus Seat Material

Seat Material	Stainless Steel Body Material
PCTFE	6,000 psig at 70 °F 41.4 MPa at 21 °C
PEEK	10,000 psig at 70 °F 68.9 MPa at 21 °C

Table 2

Maximum Allowable Working Pressure versus Port Ends

Port Size	Pressure Rating @100 °F (38 °C)	End Connections	
		Port1	Port2
2F	10,000 psig	1/8" Female NPT	
4F	10,000 psig	1/4" Female NPT	
4FL	10,000 psig	1/4" Female NPT Long	
M6	10,000 psig	6mm CPI™ and ALOK®	
4Z	10,000 psig	1/4" CPI™	
4A	10,000 psig	1/4" ALOK®	
M8	7,975 psig	8mm CPI™ and ALOK®	
M10	6,525 psig	10mm CPI™ and ALOK®	
M12	6,162 psig	12mm CPI and ALOK	
6Z	6,600 psig	3/8" CPI™	
6A	6,600 psig	3/8" ALOK®	
8Z	6,300 psig	1/2" CPI™	
8A	6,300 psig	1/2" ALOK®	



Figure 1: HB Series Ball Valve Cross Sectional View

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS EXHAUSTED OF ALL PRESSURE BEFORE STARTING VALVE REMOVAL. CYCLE THE VALVE TWICE TO REMOVE ANY ENTRAPPED PRESSURE. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the Ball Valve Maintenance Kit being used is appropriate for the Valve's size and service requirements. Always contact your authorized Parker representative if any questions arise.
2. Remove the Handle by turning the Set Screw counter-clockwise with size 3/32 hex socket wrench.
3. Remove the Ball Valve Body from its mounting panel hole, if applicable, by turning the Panel Nut counter-clockwise.
6. To access the Seats and the Ball, secure the Body at the wrench flats and remove the two port End Connectors, using a 7/8 hex wrench.
7. Carefully remove both End Connectors from the Valve Body.
8. Push the Stem and Ball Trunnion out through the bottom port.
9. Examine the Ball Trunnion for damage. If the Ball Trunnion is damaged call your authorized Parker representative for the appropriate kit.
10. Refer to Figure 2: Gently remove all Stem Seals, Seat Assemblies, and Seat Retainer seals (8,9,12,13,14,16,17, and 19)

REASSEMBLY

Note: The port orientation is important when assembling the STEM (4) and BALL TRUNNION (5). Keep the orientation consistent with Figure 1 and Figure 3.

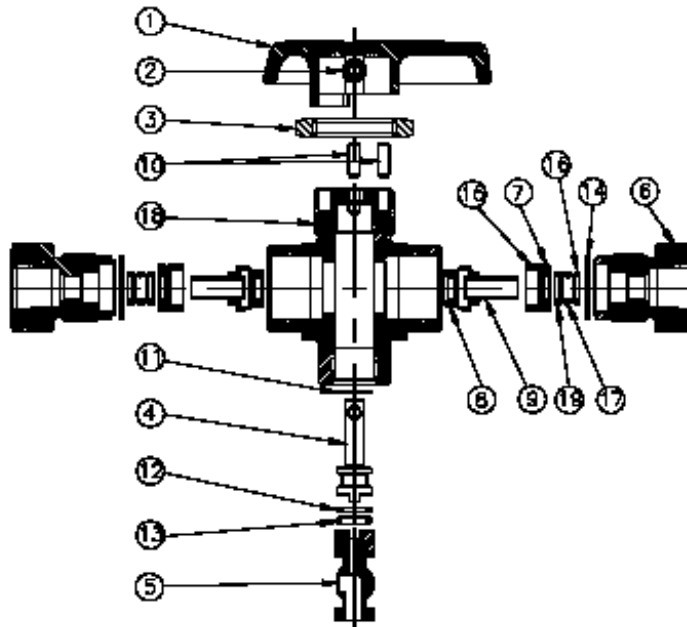


Figure 2: HB Series Ball Valve Exploded View

1. Lubricate each of the PORT END CONNECTOR (6) threads.
2. Refer to Figure 1 and 2. Insert the SEAT RETAINER O-RING BACK-UP (19), SEAT RETAINER O-RING (17) and SEAT RETAINER O-RING BACK-UP (16) slide the components into the PORT END CONNECTOR (6) counter-bore until the SEAT RETAINER O-RING BACK-UP (16) touches the bottom of the counter-bore. Insert the SPRING WASHER (7) into the larger counter-bore of each PORT END CONNECTOR (6). Insert the SPRING (15) into the larger counter-bore of each End Connectors (6).
3. Lubricate the smaller diameter and SEAT (8) of the SEAT RETAINER AND SEAT SUB ASSEMBLY with the same type lubricant as in step 1. Insert the SEAT RETAINER AND SEAT SUB ASSEMBLY from Step 4 into the PORT END CONNECTOR (6) assembly of Step 2. Assure the SEAT RETAINER AND SEAT SUB ASSEMBLY sits firmly against the SPRING (15). Two of these sub-assemblies are required for each valve.
4. Then insert the CONNECTOR END SEAL (14) into the groove of the end opposite the port end of the PORT END CONNECTOR (6).
5. Refer to Figures 1 and 2. Place the STEM WASHER (11) over the shaft of the STEM (4). Slide the STEM WASHER (11) down the shaft of the STEM (4) until it contacts the flange.
6. Refer to Figures 1 and 2. Place the STEM O-RING (13) onto the STEM (4) o-ring groove. Slide a single STEM O-RING BACK-UP (12) onto the STEM (4) o-ring groove next to the STEM O-RING (13).
7. Lubricate the STEM O-RING BACK-UP (12) and STEM O-RING (13) with the same type lubricant as in Step 1. Insert the STEM ASSEMBLY (Handle side first) from Step 6 into the bottom of the VALVE BODY (18) until the STEM (4) drops through the stem hole of the VALVE BODY (18). Insert a pin through the STEM (4) handle screw hole and pull the STEM ASSEMBLY until it bottoms in the VALVE BODY (18) stem bore.
8. Lubricate the BALL TRUNNION (5) with the same type lubricant as in Step 1. Holding the VALVE BODY (18) with the bottom port on top, drop the BALL TRUNNION (5) through the bottom port (slot end first). Turn the STEM ASSEMBLY until the BALL TRUNNION (5) and the STEM ASSEMBLY engage (Refer to Figure 3 for proper orientation).
9. Turn the STEM (4) to assure the side hole is 90° (in the off position) from each of the side ports of the VALVE BODY (18).

10. Insert one of the PORT END CONNECTOR (6) sub-assemblies from step 3 into one port of the BODY (18). Thread the PORT END CONNECTOR (6) into the BODY (18) until it is finger tight against the BALL TRUNNION (5).
11. Insert second of the PORT END CONNECTOR (6) sub-assembly from step 3 into the opposite port of the BODY (18). Thread the PORT END CONNECTOR (6) into the BODY (18) until the it is finger tight against the BALL TRUNNION (5).
12. Torque the two PORT END CONNECTOR (6) in the assembly at the same time to 50 Ft-lbs ± 5 Ft-lbs. (A gap will still be present between the end of the BODY (18) and the PORT END CONNECTOR (6)).

Table 1

Seat Material	Torque (+5/-5 Ft-Lbs)
PCTFE (K)	40
PEEK (PKR)	50

13. Place the HANDLE (1) on to the STEM (4) and orient HANDLE (1) to the mark as shown in Figure 3.
14. Insert SET SCREW (2) through the HANDLE (1) and STEM (4) and tighten to 15 in-lbs ± 2 in-lbs.
15. Turn the stem through at least one full cycle in each direction to verify proper operation of the valve.

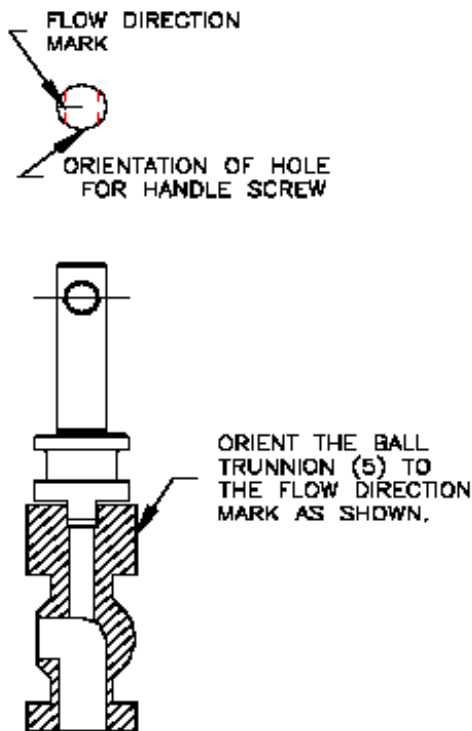


Figure 3: Stem Assembly and Orientation

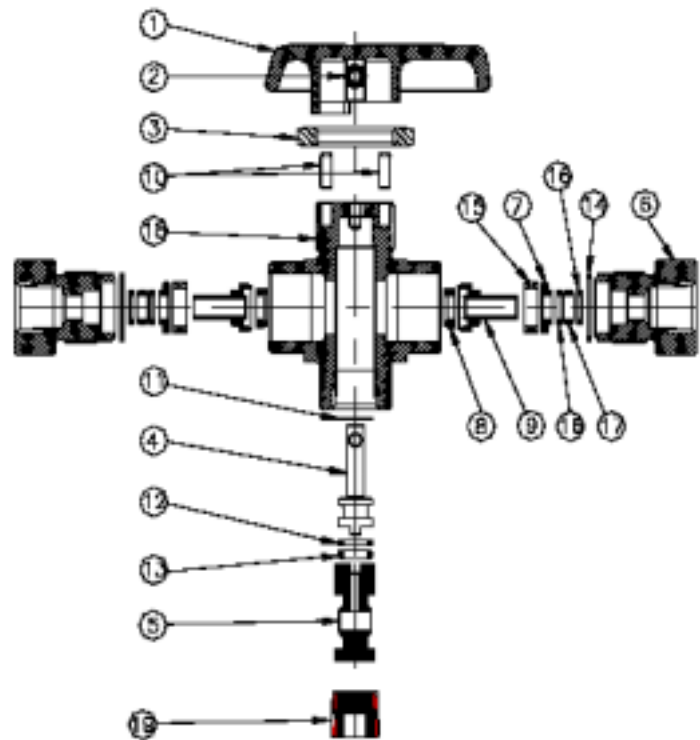


Figure 4:
HB Series Two-Way Ball Valve Exploded View

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

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compression port



Z -Single ferrule CPI™
compression port



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Internal pipe threads



V -VacuSeal face
seal port



Q -UltraSeal face
seal port



M -ANSI/ASME B1.20.1
External pipe threads



WARNING

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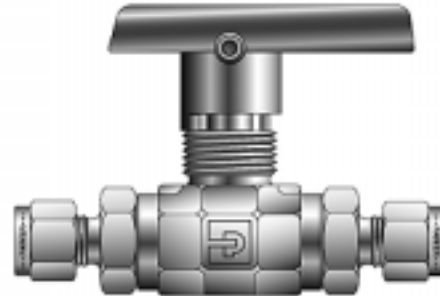
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The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

ALL PARKER VALVES MUST PASS A RIGID OPERATIONAL AND LEAKAGE TEST BEFORE LEAVING THE FACTORY. IT IS RECOMMENDED AFTER ANY REASSEMBLY, THE VALVE SHOULD BE TESTED BY THE USER FOR OPERATION AND LEAKAGE. IF THESE INSTRUCTIONS ARE NOT FULLY COMPLIED WITH, THE REPAIRED PRODUCT MAY FAIL AND CAUSE DAMAGE TO PROPERTY OR INJURY TO PERSONS. PARKER HANNIFIN CANNOT ASSUME RESPONSIBILITY FOR PERFORMANCE OF A CUSTOMER SERVICED VALVE.



BLS/BXS Series Ball Valve



Two-Way Maximum Allowable Working Pressure and Temperature

Seat Material	Valve Body Material	
	Brass	Stainless Steel
PCTFE	3000 psig @ 70 °F 20.7 MPa @ 21°C	6000 psig @ 70 °F 41.4 MPa @ 21 °C

Three-Way Maximum Allowable Working Pressure and Temperature (with bottom port as inlet)

Seat Material	Valve Body Material	
	Brass	Stainless Steel
PCTFE	3000 psig @ 70 °F 20.7 MPa @ 21°C	6000 psig @ 70 °F 41.4 MPa @ 21 °C

Three-Way Maximum Allowable Working Pressure and Temperature (with side ports as inlet)

Seat Material	Valve Body Material	
	Brass	Stainless Steel
PCTFE	3000 psig @ 70 °F 20.7 MPa @ 21°C	3000 psig @ 70 °F 20.7 MPa @ 21 °C

The arrow on the Valve Handle may be used to indicate the normal direction of flow.

The 3-Way Series Ball Valves are designed exclusively for directional flow control. The 3-Way B Series Ball Valves are NOT recommend for shutoff service. Always consult your authorized Parker representative if questions arise.

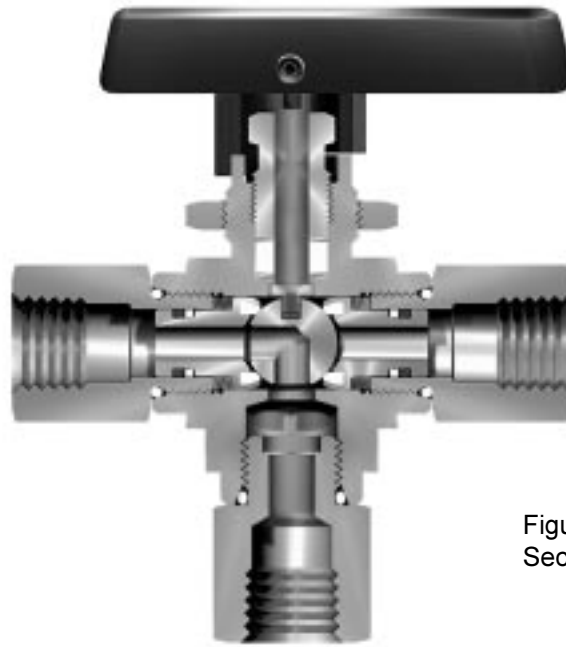


Figure 1: BXS Series Valve Cross Sectional View

DISASSEMBLY

WARNING: MAKE CERTAIN THE SYSTEM IN WHICH THE VALVE IS INSTALLED IS EXHAUSTED OF PRESSURE BEFORE STARTING VALVE REMOVAL. CYCLE THE VALVE TWICE TO REMOVE ANY ENTRAPPED PRESSURE. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

1. Verify that the Ball Valve Maintenance Kit being used is appropriate for the Valve's size and service requirements. Always contact your authorized Parker representative if any questions arise.
2. Remove the Handle by turning the Set Screw counter-clockwise with the following size hex socket wrench.

B2 valves	5/64 wrench
B6 valves	3/32 wrench
B8 valves	1/8 wrench

3. Remove the Ball Valve Body from its mounting panel hole, if applicable, by turning the Panel Nut counter-clockwise.
4. Remove the Packing Nut (located directly under the handle) by turning counter-clockwise with the following size hex wrench.

B2 valves	5/16 wrench
B6 valves	7/16 wrench
B8 valves	1/2 wrench

5. To perform Packing maintenance, remove the stem assembly from the Body. Discard the two Stem Packing Washers and the Packing.

NOTE: For O-ring Stem Packing models discard the two Stem O-Rings and the Stem Packing Washers. Do not discard the Packing Gland.

6. To access the Seats and the Ball, secure the Body at the wrench flats and remove the two port End Connectors, using the appropriate hex wrench.

B2 valves	9/16 wrench
B6 valves	3/4 wrench
B8 valves	1-1/16 wrench

CAUTION: Hold the Valve Body by using a finger tip on each End Connector opening to prevent the interior Ball and the Seat components from falling out.

7. Gently remove and discard the two internal Seats and Seats along with the Springs, Back-up Rings, Retainer O-rings and Retainer Washer. Exercise care not to damage or scratch the Body's interior sealing surfaces or the threads. Remove and save the Ball.
8. Remove and discard the O-Ring located on each End Connector, exercising care not to damage or scratch the Connectors' sealing surfaces or the threads.

REASSEMBLY OF BALL VALVE WITH PTFE PACKING

1. Make certain all parts are free of dirt or other contamination before starting reassembly of the Valve.
2. Refer to Figures 1 thru 3, as applicable for the Valve's configuration. Place an O-Ring on each End Connector and exercise care not to damage or scratch the O-Rings.

NOTE: Mandrels are provided for valves with PTFE end connector seals. For valves with elastomeric end connector seals, a mandrel is not needed.

3. Lightly apply an appropriate lubricant to the End Connectors' threads as consistent with the Valve's service requirements. Always consult your authorized Parker representative if questions arise.
4. Place a Retainer O-ring on each of the two Ball Seat Sub-Assemblies.
5. Position the End Connectors upright so their O-ring installed end is facing up. Place a Ball Seat Sub-Assembly into the boss at the top of each End Connector so the Seat is facing up.
6. Apply a small amount of lubricant to the Seat as consistent with the Valve's service requirements. Always contact your authorized Parker representative if questions arise.
7. Apply a small amount of an appropriate lubricant to the Packing Nut and End Connector threads, as consistent with the Valve's service requirements. Always contact your authorized Parker representative if questions arise.
8. Refer to Figure 2. Stack the three Stem Packing components on the Stem in the following order, with the first item being placed at the bottom of the Stem:

Packing Washer / Stem Packing / Packing Washer.

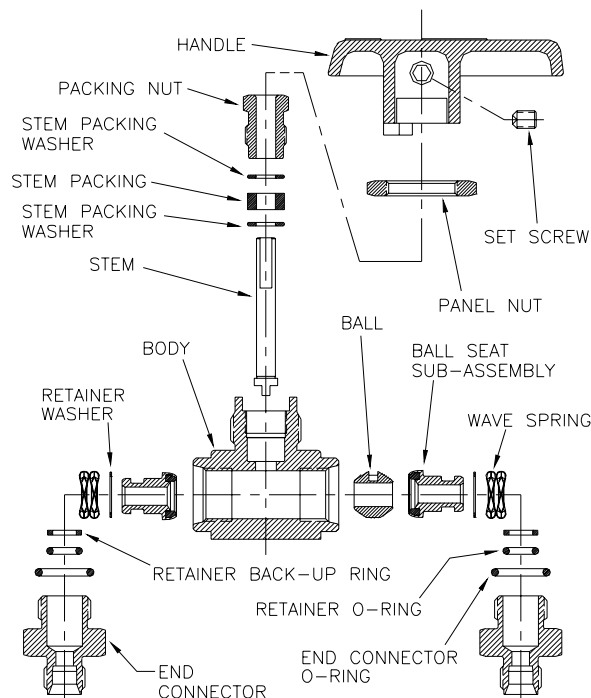


Figure 2: BLS Series Valve with PTFE Packing Exploded View

9. While holding the Body in one hand, with the ports vertical, carefully place one End Connector / Seat Retainer Sub-Assembly into the lower Valve body port. Engage this Sub-Assembly in the Body until it is finger tight.
10. Insert the Ball inside the Body, with the slot facing toward the Stem, using a clean wooden dowel of the following diameter:

B2 valves	9/64 inch
B6 valves	3/16 inch
B8 valves	3/8 inch

Leave the wooden dowel in the Body to temporarily hold the Ball inside the Seating area.

11. Place the keyed end of the Stem Sub-Assembly through the stem port into the corresponding slot in the Ball. Rotate the wooden dowel to move the Ball slot so it is at the Stem position.
12. Install the lubricated Packing Nut on the Body until it is finger-tight.
13. Secure the Body so that the Stem is vertical.
14. Complete the installation by turning the Packing Nut on the Body clockwise and tightening using the size hex socket torque wrench and torque level specified in the following table.

Packing Nut Tightening Specifications

Ball Valve Size	Hex Socket Wrench	Torque Level
B2	5/16 inch	30 In-lbs (3.4 N-m)
B6	7/16 inch	70 In-lbs (7.9 N-m)
B8	1/2 inch	90 In-lbs (10.2 N-m)

15. Remove the wooden dowel (if applicable) from the Body after the Packing Nut is properly tightened on the Body.
16. While holding the Body in one hand, with the ports vertical, carefully place the other End Connector / Seat Retainer Sub-Assembly into the lower Valve body port. Engage this Sub-Assembly in the Body until it is finger tight.

NOTE: On 3-way Ball Valves, the bottom port End Connector is assembled just as the two (primary) End Connectors, except no Ball Seat mounting elements are involved.

17. Close the Valve. This is required to avoid Seat damage during the following tightening of the End Connectors.

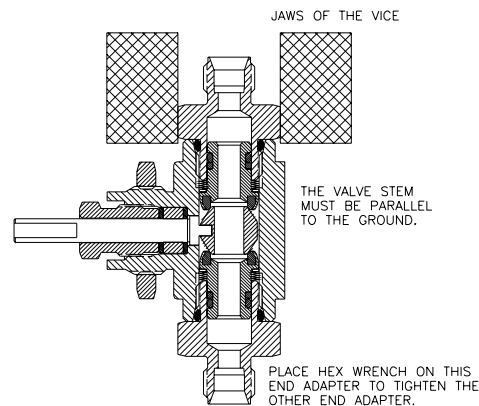


Figure 3: Position of Valve Body during tightening of End Connectors

18. Secure one End Connector (not the Valve Body) of the Ball Valve so that the Stem is horizontal.

WARNING: It is IMPERATIVE that two (2) conditions exist during the tightening of the End Connectors. Failure to adhere to these two conditions may result in damaging the Valve during tightening of the End Connectors.

- 1) The Stem MUST NOT move.
- 2) The Ball MUST be capable of limited FREE MOVEMENT while inside the Body.

19. Tighten the End Connectors in accordance with the specifications in the following table using the following size hex socket torque wrench.

B2 valves	9/16 inch
B6 valves	3/4 inch
B8 valves	1-1/16 inch

NOTE: The bottom port End Connector on Three-Way Ball Valves is also torqued as instructed in the following table.

Ball Valve Port End Connector Torque Requirements

Valve Size	Valve Body Material	
	Brass or Monel	Stainless Steel or Hastelloy
B2	75 In-lbs (8.5 N-m) 6.3 Ft-lbs (8.5 N-m)	100 In-lbs (11.3 N-m) 8.3 Ft-lbs (11.3 N-m)
B6	204 In-lbs (23.1 N-m) 17 Ft-lbs (23.1 N-m)	348 In-lbs (39.3 N-m) 29 Ft-lbs (39.3 N-m)
B8	456 In-lbs (51.5 N-m) 38 Ft-lbs (51.5 N-m)	660 Ft-lbs (74.6 N-m) 55 Ft-lbs (74.6 N-m)

20. Turn the Stem through at least one (1) "Close and Open" cycle to verify proper operation of the Stem.

CAUTION: Rebuild any Valve exhibiting rough or irregular Stem operation. Always consult your authorized Parker representative if questions arise.

21. Install the Ball Valve Body in its panel mounting hole, if applicable, by turning the Panel Nut clockwise.

22. Re-install the Handle. Secure by turning the Set-Screw clockwise and tightening to 15 In-lbs (1.7 N-m).

REASSEMBLY OF BALL VALVE WITH O-RING STEM PACKING

1. Perform steps 1 thru 7 of the standard PTFE Packing Ball Valve Reassembly instructions.
2. Lightly apply an appropriate lubricant on the two new Stem Packing O-Rings, as consistent with the Valve's service requirements. Always consult your authorized Parker representative if questions arise.
3. Refer to Figure 6. Stack the five Stem Packing components on the Stem in the following order, with the first item being placed at the bottom of the Stem:
 - new Packing Washer
 - new (large) O-Ring (lubricated)
 - Stem Packing Gland, with the raised nipple section facing down toward the bottom of the Stem.
 - new (small) O-Ring (lubricated)
 - new Packing Washer.
4. Perform steps 9 thru 22 of the standard PTFE Packing Ball Valve Reassembly instructions.

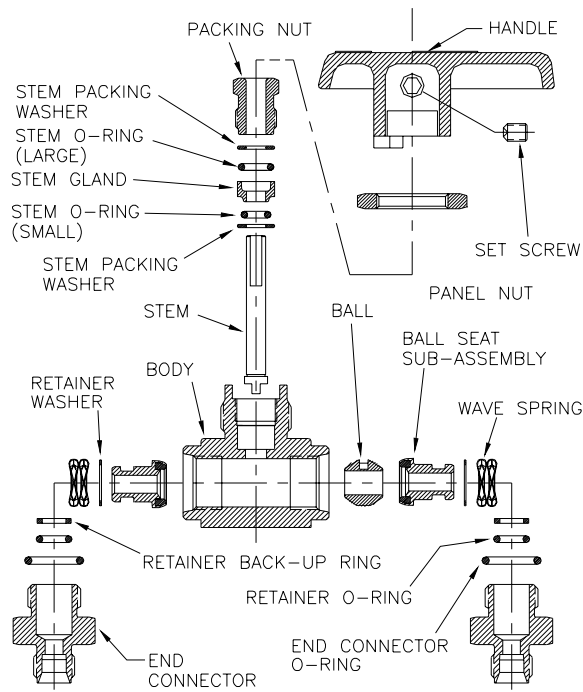


Figure 4: BLS Ball Valve with O-Ring Packing Exploded View

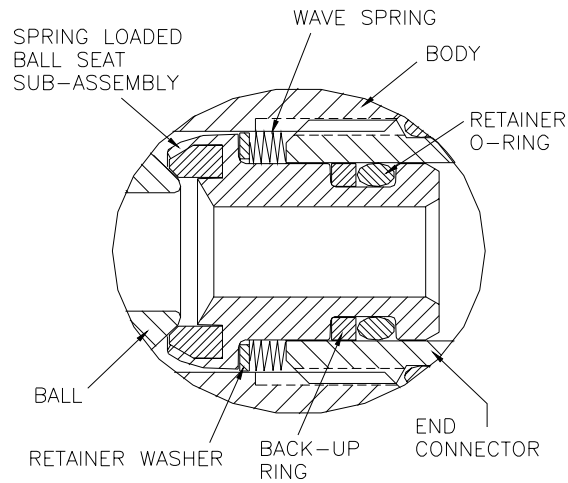


Figure 5: Detailed View of Spring Loaded Seat Assembly

VALVE CONNECTOR MAKE-UP INSTRUCTIONS

MALE AND FEMALE PIPE PORTS

Wrench flats are provided on the Valve Body. It is recommended a smooth-jawed wrench or vise be used to grip the Valve Body.

1. On the male threaded part of the connection, apply a high quality pipe joint compound or PTFE tape made for this purpose. When PTFE tape is used, it is recommended two full turns of tape be applied. PTFE tape should not be overhanging or covering the first thread
2. Engage the Valve and the other component part together, until hand-tight.
3. With a proper wrench, holding both the Valve and the component part, continue to tighten to achieve a leak-tight joint.

ULTRASEAL CONNECTIONS

1. Insert the proper O-Ring into the UltraSeal fitting's O-Ring groove. Position the UltraSeal gland sealing face against the O-Ring, and then advance the Nut to a finger-tight position.
2. A positive seal is obtained by advancing the Nut no less than 1/4 turn from the finger-tight position. Proper UltraSeal make-up is achieved when a sharp rise in required application torque occurs, which indicates proper seal face contact and O-Ring seal compression into the UltraSeal groove.

VACUSEAL CONNECTIONS

1. A positive seal is obtained by advancing the Nut 1/8 turn from the finger-tight position.
2. A new gasket should be installed upon each fitting re-make to insure system pressure integrity.

TUBE FITTING CONNECTIONS

1. Insert the tube into the Valve port until the tube bottoms out in the Valve Body. Care should be exercised to insure the tube is properly aligned with the Valve Body and port.
2. Normal make-up for US Customary port sizes 1 thru 3 (1/16 thru 3/16 inch) and SI port sizes 2 thru 4 (2 thru 4 mm) is 3/4 turn from finger tight. Normal make-up for US Customary port sizes 4 thru 16 (1/4 thru 1 inch) and SI port sizes 5 thru 25 (5 thru 25 mm) is 1 1/4 turn from finger tight. For larger port sizes consult Parker Ferrule Presetting Tool Instructions.

PLEASE FOLLOW THE ABOVE DIRECTIONS FOR COUNTING THE NUMBER OF TURNS FOR PROPER FITTING MAKE-UP. DO NOT MAKE-UP TUBE FITTINGS BY TORQUE OR "FEEL". VARIABLES SUCH AS TUBING AND FITTING TOLERANCES, TUBE WALL THICKNESS, AND THE LUBRICITY OF NUT LUBRICANTS CAN RESULT IN AN IMPROPERLY ASSEMBLED TUBE FITTING CONNECTION.

A -Two ferrule A-LOK®
compression port



Z -Single ferrule CPI™
compression port



F -ANSI/ASME B1.20.1
Internal pipe threads



V -VacuSeal face
seal port



Q -UltraSeal face
seal port



M -ANSI/ASME B1.20.1
External pipe threads



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