WOODWARD

Component Maintenance Manual
Bronze Level

Product Name: GSxE Rotary Control Valve with Electric Actuation (GSxE, LERA)

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General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.

Revisions

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, check manual *26455*, *Customer Publication Cross Reference and Revision Status & Distribution Restrictions*, on the *publications page* of the Woodward website:

www.woodward.com/publications

The latest version of most publications is available on the *publications page*. If your publication is not there, please contact your customer service representative to get the latest copy.

Proper Use

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty, thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

1. GENERAL INFORMATION

INTRODUCTION

This Component Maintenance Manual is intended to be used by customers and Woodward authorized service centers for repair or service of the GSxE Rotary Control Valve with Electric Actuation.

Bronze level service is preventative and routine maintenance that requires little to no specialized tooling, testing, or calibration procedures to maintain product between normal overhaul intervals. The manual is written with the assumption that the reader has access to the product manual and other Woodward documents referenced within this document.

1.1 Regulatory Compliance

The GSXE is subject to safety regulatory certifications. See product manual 26689 for additional details. The service center performing the work on the GSXE must not alter the construction such that the certifications are invalidated.

In particular, O-rings and seals on the GSXE gearbox are part of ingress protection for Zone 2 protection.

⚠WARNING

Explosion Hazard— Do not remove covers or connect/disconnect electrical connectors unless power has been switched off or area is known to be non-hazardous.

Substitution of components may impair suitability for Class I, Division 2, or Zone 2 applications.

1.2 Warnings and Notices

Important Definitions

This is the safety alert symbol used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER** - Indicates a hazardous situation, which if not avoided, will result in death or serious injury.
- **WARNING** - Indicates a hazardous situation, which if not avoided, could result in death or serious injury.
- **CAUTION** - Indicates a hazardous situation, which if not avoided, could result in minor or moderate injury.
- **NOTICE** - Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT** - Designates an operating tip or maintenance suggestion.

⚠WARNING

Personal Protective Equipment

The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:

- **Eye Protection**
- **Hearing Protection**
- **Hard Hat**
- **Gloves**
- **Safety Boots**
- **Respirator**

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.

⚠WARNING

To prevent possible serious personal injury or damage to equipment, be sure all electric power and gas pressure have been removed from the valve and actuator before beginning this procedure. Follow all lockdown/lockout procedures.

⚠WARNING

Hazards due to insufficiently qualified personnel!

If unqualified personnel perform work on the product, hazards may arise, which can cause serious injury and substantial damage to property. Therefore, all work must be carried out by appropriately qualified personnel.

⚠WARNING

The surface of this product can become hot or cold enough to be a hazard. Use protective gear for product handling in these circumstances. Allow enough time for the valve to return to an adequate handling temperature.

⚠WARNING

Lift or handle the valve only by using the lifting eyes.

1.3 Electrostatic Discharge Awareness

NOTICE

Electrostatic Precautions

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual *82715*, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Follow these precautions when working with or near the control:

Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible as these do not store static electric charges as much as synthetics.

1.4 List of Woodward Literature

Required documents	
Product Manual **26689** –	GSxE Rotary Control Valve with Electric Actuation
Installation Drawing **9999-1749-6** -	Kit, GSx, SHOCK ABSORBER
Installation Drawing **9999-1749-7** -	Kit, GSx, SHOE SEALS (3, 4, AND 6 INCH SIZE)
Installation Drawing **9999-1749-10** -	Kit, GSx, SHOE SEALS (8 INCH SIZE)
Installation Drawing **9999-1749-8** -	KIT, LERA, VISUAL INDICATOR
Reference documents	
Manual **26455** –	Customer Publication Cross Reference and Revision Status & Distribution Restrictions
Manual **82715** –	Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, & Modules
Manual **26912** –	Digital Valve Positioner (DVP) Service Tool Manual

Woodward publication-download section website (www.woodward.com/searchpublications).

If unable to access Woodward documentation, refer to contact list at the end of this manual.

1.5 List of Required Hardware or Materials

Special Tool(s)	**Valve Size**	**Combination Flange Tool**	**Fastener Size***
	3” - 300#	1013-6865	3/4-10 UNC x 2.25”
	3” - 600#	1013-6916	3/4-10 UNC x 3.25”
	4” - 300#	1013-6041	3/4-10 UNC x 2.5”
	4” - 600#	1013-6918	7/8-9 UNC x 3.0”
	6” – 300#	1013-5918	3/4-10 UNC x 3.0”
	6” – 600#	1013-6917	1.0-8 UNC x 4.0”
	8” – 300#	1013-6932	7/8-9 UNC x 3.0”
	8” – 600#	1013-6919	1 1/8-7 UNC x 4.0”
	1014-1879 - GS200 Shoe Installation Press Tool		
Torque wrench(es)	• Torque wrench(es) to cover 20 – 120 in-lbs torque range • Torque wrench(es) to cover 50 - 200 ft lbs torque range		
Wrench(es)	• Flat wrench; Size from 1/8 to 1 ¼ inch • Flat wrench; Size from 6 to 36 mm • Allen hex key; Sizes from 1/8 to ½ inch • Allen hex key; Size 1.5 mm, and sizes from 4 to 12 mm		
Screwdriver(s)	• Type: Phillips; screwdriver sets • Type: slotted; screwdriver sets		
Others	• Lifting strap (minimum capacity 1000 lbs / 455 kg) • Isopropanol cleaning fluid • GN paste (Molykote DX Paste or similar) • NEVER SEEZ - Pure Nickel Special Anti-Seize • Loctite 242 (Loctite Threadlocker Blue 242) • Loctite 2620 (high temperature) • PC computer with Woodward PC Service Tool installed		
Measuring Equipment	• Air/nitrogen source capable of 50 PSI at 200 SCFH • Gas flow meter(s) capable of 0-200 SCFH • Pressure gauge capable of reading between 0-50 psig		

* Fasteners per ASME B16.5

1.6 Woodward Required Software

This valve will operate only with a Woodward Digital Valve Positioner (DVP) and will require access to Service Tool software. If you need an updated version of Service Tool, it is available on the Woodward website (www.woodward.com/software).

1.7 General Instructions

- Review this CMM and the installation drawing before starting the replacement to be sure that all necessary tools are available and instructions are clear.
- Check the replacement parts kit to verify all replacement parts listed in the installation drawing are present. For questions, contact Woodward.
- Sort all parts for easy assembly.
- If all parts are not used, the unit or units must be inspected for completeness.
- Contact Woodward if an error is found during the replacement process.
- Clean the exterior of the GSXE by hand prior to disassembly to prevent dirt and debris from contaminating the interior.
- O-rings:
    - Use the correct tool to install or remove O-rings. If using a protective cone on small O-rings, lubricate the O-ring and slide it onto the part being sure it does not twist.
    - If a cone is not used on large O-rings, use a pick under the O-ring to lift it onto the part until it is in the desired location.
- Retaining Rings:
    - During installation, be careful not to over-extend or over-compress a retaining ring. Install all retaining rings with the sharp edge away from the pressure. Inspect installation of all installed retaining rings to be sure they are properly seated, fit snugly, and do not rotate freely on the parts they are installed on or in.
- Helicoils:
    - To prevent damage to mid-grip helicoils, install and remove screws at a slow speed. DO NOT USE A HIGH-SPEED TOOL. Stainless steel screws MUST be lubricated with an anti-seize lubricant before turning them into mid-grip helicoils or aluminum parts.
- Disassembly:
    - Parts that have been disassembled and will be reused must be inspected closely for damage and replaced if necessary. Parts that have been disassembled should be kept in a clean container such that they can be readily identified against this procedure, reference drawings, or visual aids for proper reassembly.
- Screws:
    - All screws loosen with counterclockwise (CCW) direction. In other situations, the direction will be specified.

2. SHOCK ABSORBER REPLACEMENT

2.1 Replacement Kit Description

The purpose of this procedure is to show the correct sequence and method of shock absorber replacement:

Shock Absorber Replacement:
- KIT P/N: 8935-1236 – GSx, SHOCK ABSORBER

NOTICE **Review this CMM before starting the shock absorber replacement to be sure that all necessary tools are available and instructions are clear. For any questions, contact Woodward.**

WARNING **Wear protective gloves to avoid contact with fluids during the replacement procedure.**

2.2 Disassembly Procedure

⚠WARNING

To prevent possible serious personal injury or damage to equipment, be sure all electric power and gas pressure have been removed from the valve and actuator before beginning any maintenance or repairs.

A. Remove cover screws (3).
B. Remove cover.

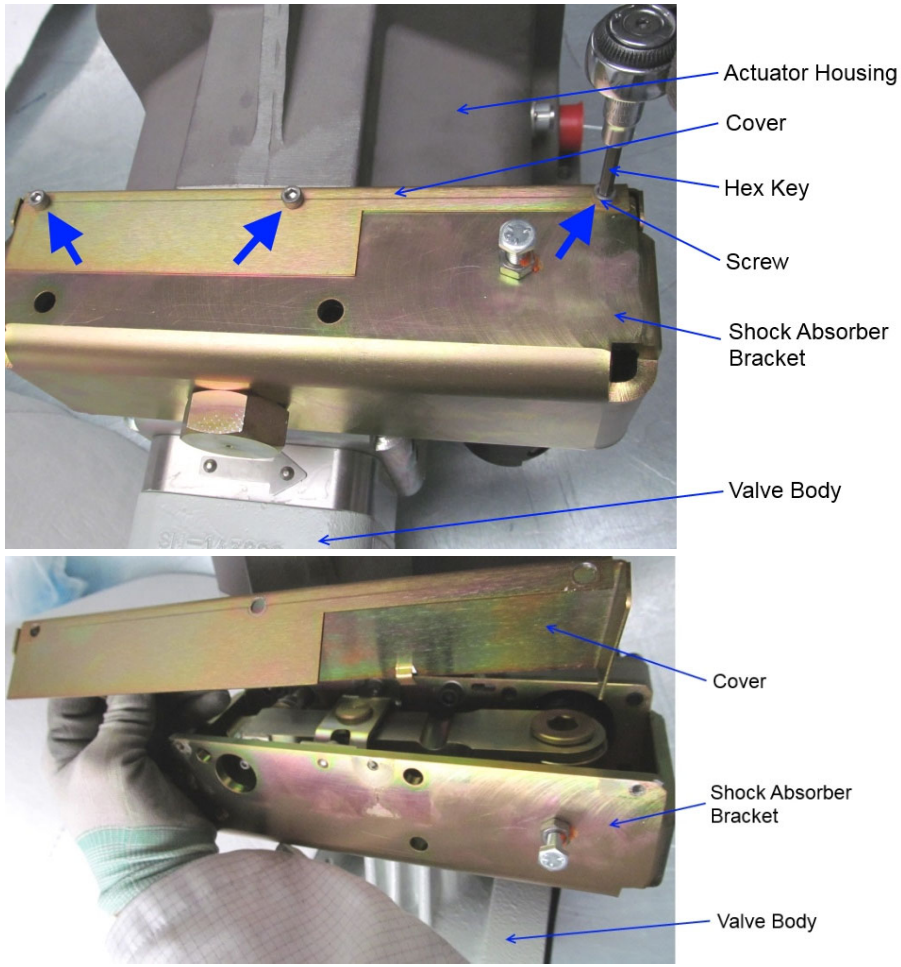
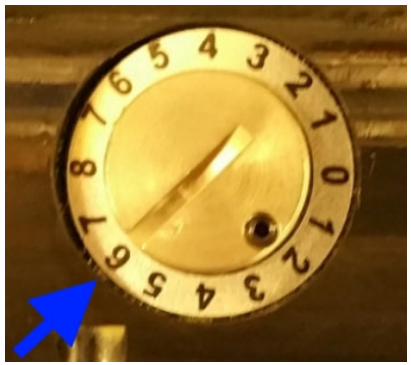


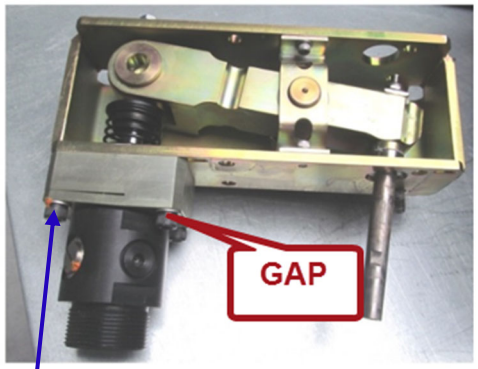
Figure 2-1. Cover and Attachment Hardware

C. Remove four screws with washers. Put Hex key through holes of the bracket.

D. Gently pull the shock absorber push rod off and remove the shock absorber assembly.

E. Write down the position of shock absorber dial and measure the gap between the dampener and the plate. It may be different for each valve.





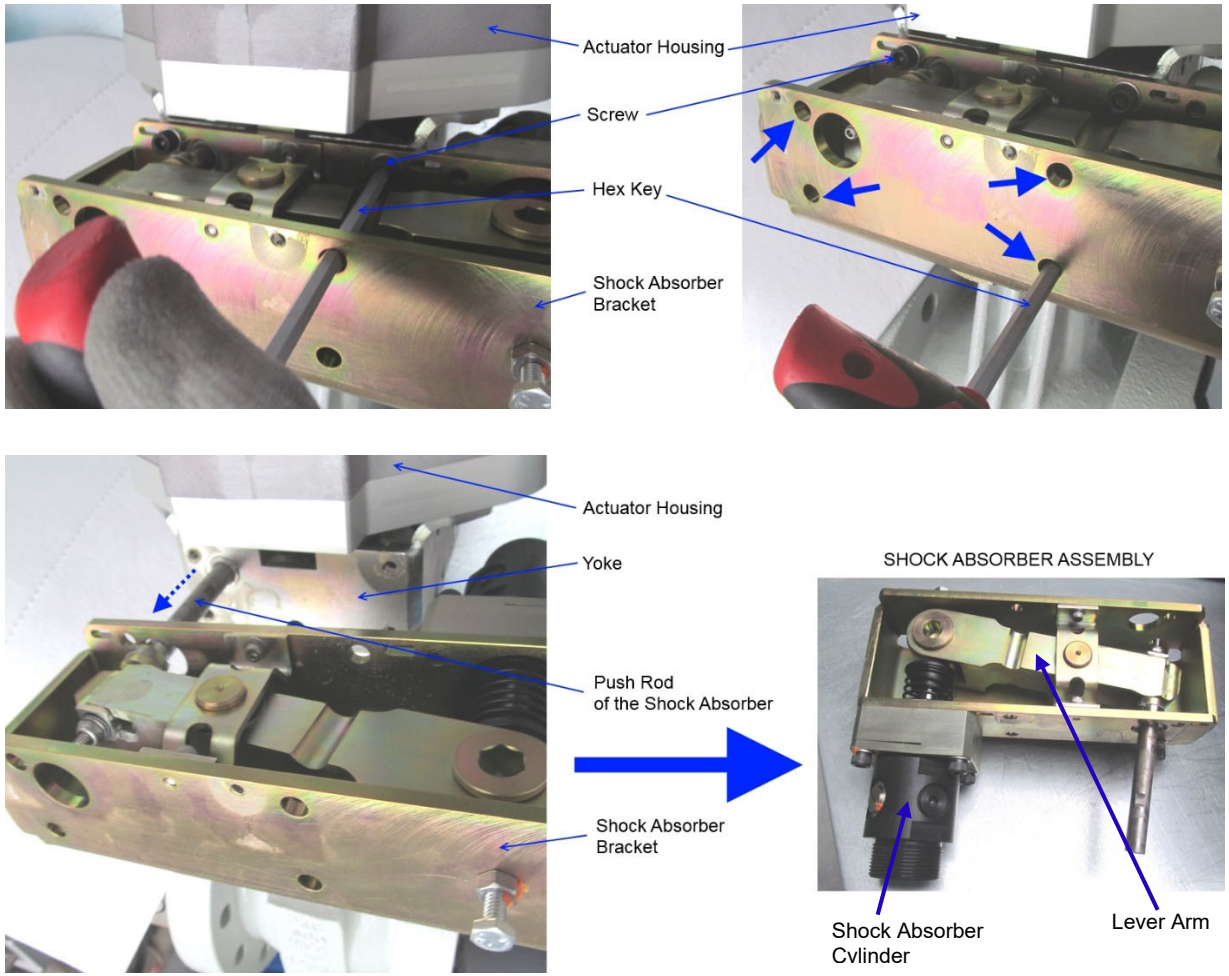
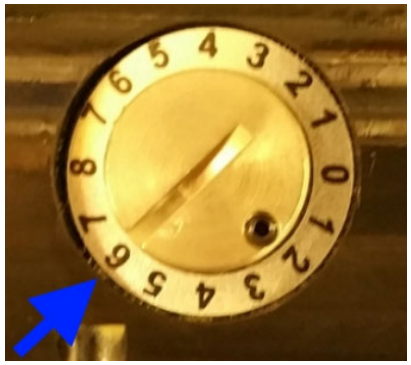


Figure 2-2. Remove Shock Absorber

2.3 Assembly Procedure

A. Check replacement parts kit to verify all replacement parts listed in the Installation Drawing are present.
B. Verify the position of the shock absorber dial is set to ZERO.
C. Verify the shock absorber cylinder is snug against the assembly arm.
D. Set gap between shock absorber cylinder body and plate to match the shock absorber cylinder body assembly that was removed. Keep adjustment dial accessible.
E. Remove the pinch bolt from the pinch block portion of the block; apply Loctite 242 to the end of screw threads and reinsert. Torque to 20 ± 2 ft - lb.
F. Install a washer onto each of the four screws. Apply Loctite to the threads of the four screws.
G. Install the shock absorber assembly onto the yoke by aligning the push rod with the boss of the yoke and align the four screw holes of the shock absorber assembly to the yoke.
H. Secure the shock absorber assembly with four screws. Torque screws to 120 ± 5 lb.- inches.

Note: Start all four screws initially and torque uniformly, tightening each screw no more than one full turn before tightening the other three.



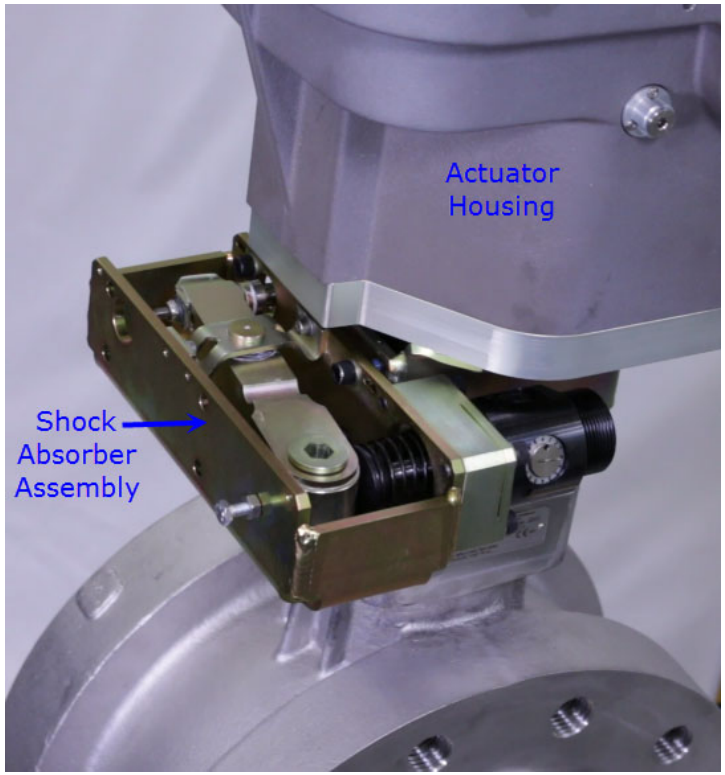


Figure 2-3. Shock Absorber Assembly Installation

I. After shock absorber assembly is attached, set shock absorber position to CLOCKWISE 6.

J. Insert the two tabs of the cover into the two slots of the shock absorber bracket, and install cover onto the bracket.

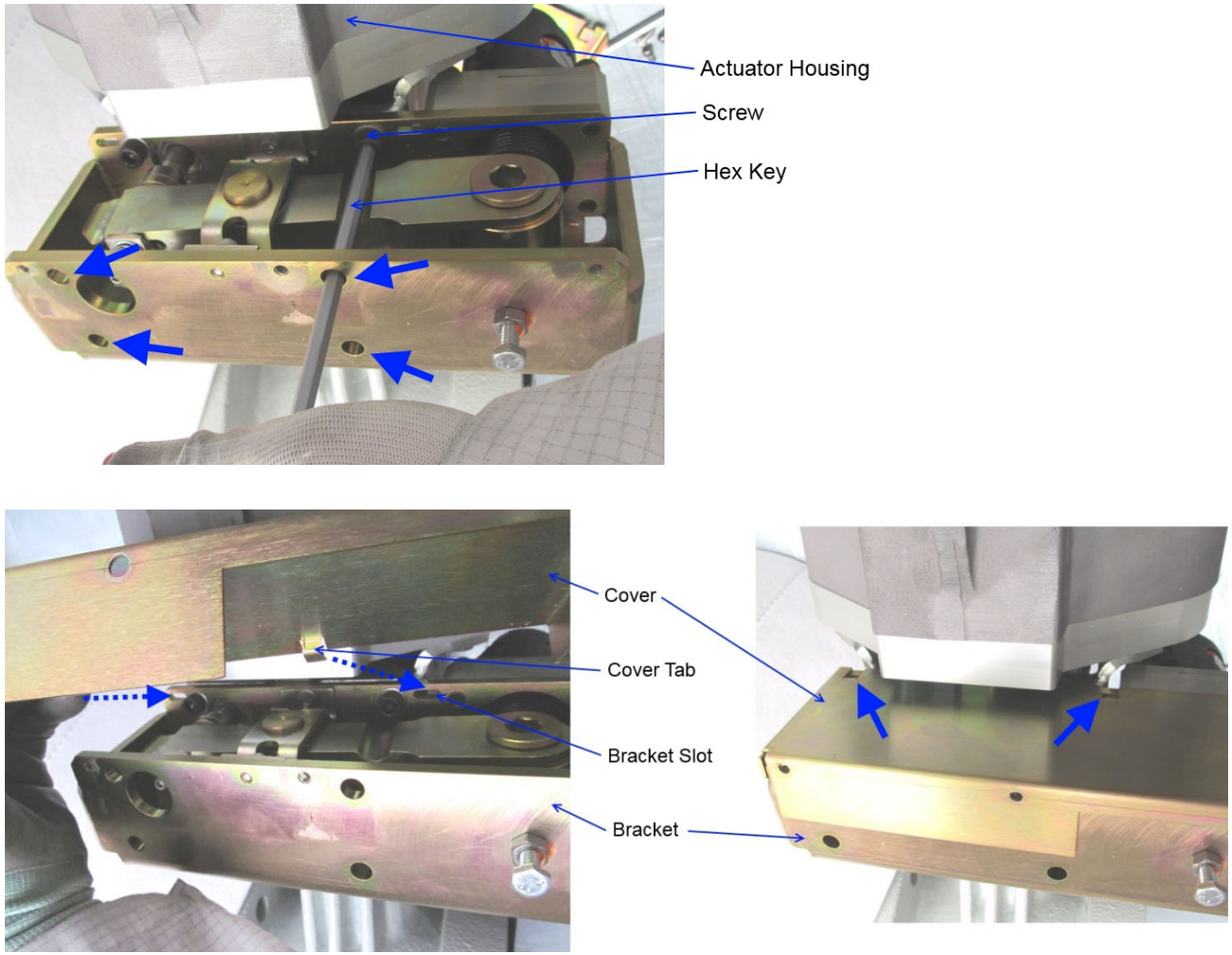


Figure 2-4. Cover Installation

K. Apply medium-strength, 243 Loctite to the threads of three screws. Install screws through the shock absorber assembly cover into the dampener bracket. Torque screws to 28 ± 5 lb.-inches.

L. Go to the **Verification & Calibration** section.

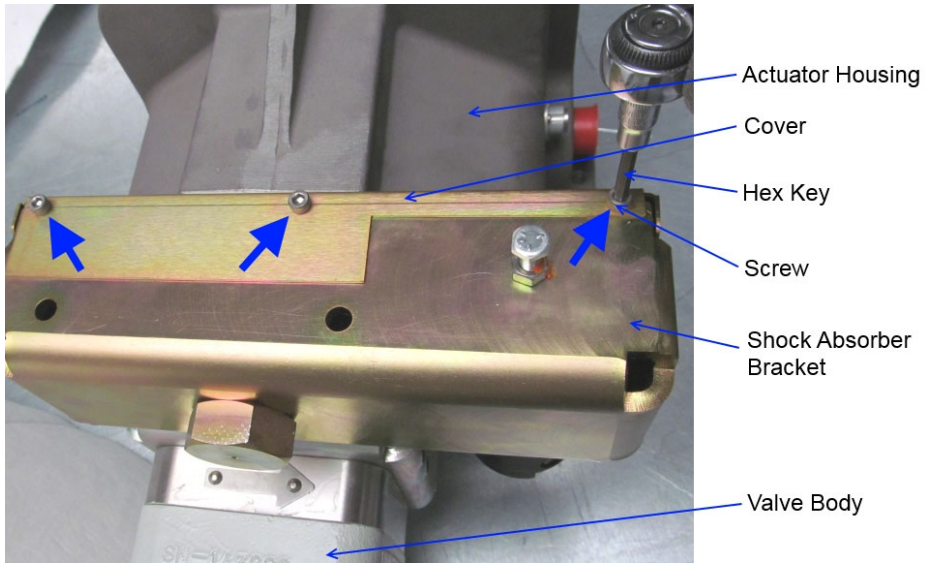


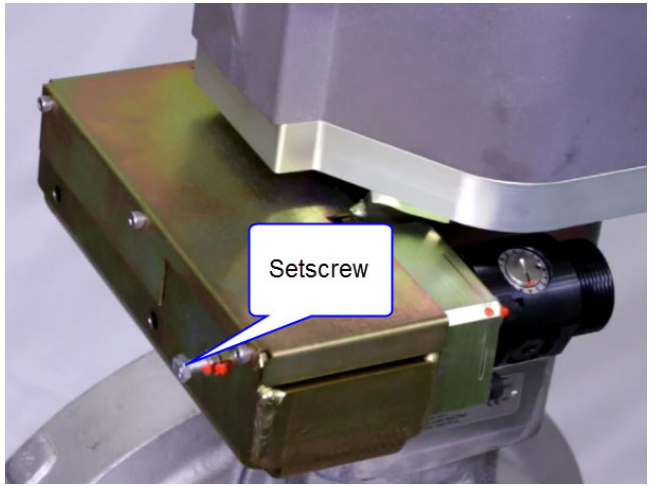
Figure 2-5. Install Cover Screws

2.4 Verification & Calibration

A. Apply electrical power to LERA actuator.
B. Set valve to position 50%.
C. Set the screw on back of shock absorber cylinder assembly to lightly touch lever arm. Torque jam nut to 5 ft-lb.
D. Remove power. Check if the fail-safe spring rotates the valve shaft. A hydraulic shock absorber cylinder cushion is designed to dissipate motor rotor and gear train inertia during fail-safe shutdown to prevent gear and bearing damage.
E. Set valve position to 100%.
F. Trip valve and measure trip time from 100% to 0%.
G. If trip time is too long, then reduce shock absorber cylinder setting to a lower number. If trip time is too fast, then increase shock absorber cylinder setting. Move only by 0.5 increments. If trip time is more than 50 milliseconds below limit, increase shock absorber cylinder setting.
H. Repeat step G until trip time is close to limit.
I. Tighten setscrew with 1.5mm hex key on shock absorber cylinder dial once properly adjusted.

Trip Time Table

Valve	Limit
75	350 msec
100	350 msec
150	350 msec
200	600 msec



⚠WARNING **The valve has a high spring force and sharp elements. To prevent serious injury, DO NOT place hands or fingers inside the valve.**

⚠WARNING **Explosion Hazard —Do not connect/disconnect electrical connectors unless power has been switched off or area is known to be non-hazardous.**

Figure 2-6. Shock Absorber Assembly Setscrew

3. VALVE SHOE SEALS REPLACEMENT (3, 4, and 6 inch)

3.1 Replacement Kit Description

The purpose of this procedure is to show the correct sequence and method of valve shoe replacement:

- KIT P/N: 8935-1238-07 – GSx, SHOE SEALS, 3 inch
- KIT P/N: 8935-1238-10 – GSx, SHOE SEALS, 4 inch
- KIT P/N: 8935-1238-15 – GSx, SHOE SEALS, 6 inch

NOTICE

Review this CMM before starting the shoe seals replacement to be sure that all necessary tools are available and instructions are clear. For any questions, contact Woodward.

3.2 Disassembly Procedure

⚠WARNING

To prevent possible serious personal injury or damage to equipment, be sure all electric power and gas pressure have been removed from the valve and actuator before beginning any maintenance or repairs.

A. Disconnect external interface electrical cables.

B. Disconnect external interface piping installation.

C. Place the valve body onto the assembly bench with the flange plate positioned upwards. Remove four screws with washers from housing.

D. Remove flange plate assembly from the valve housing.

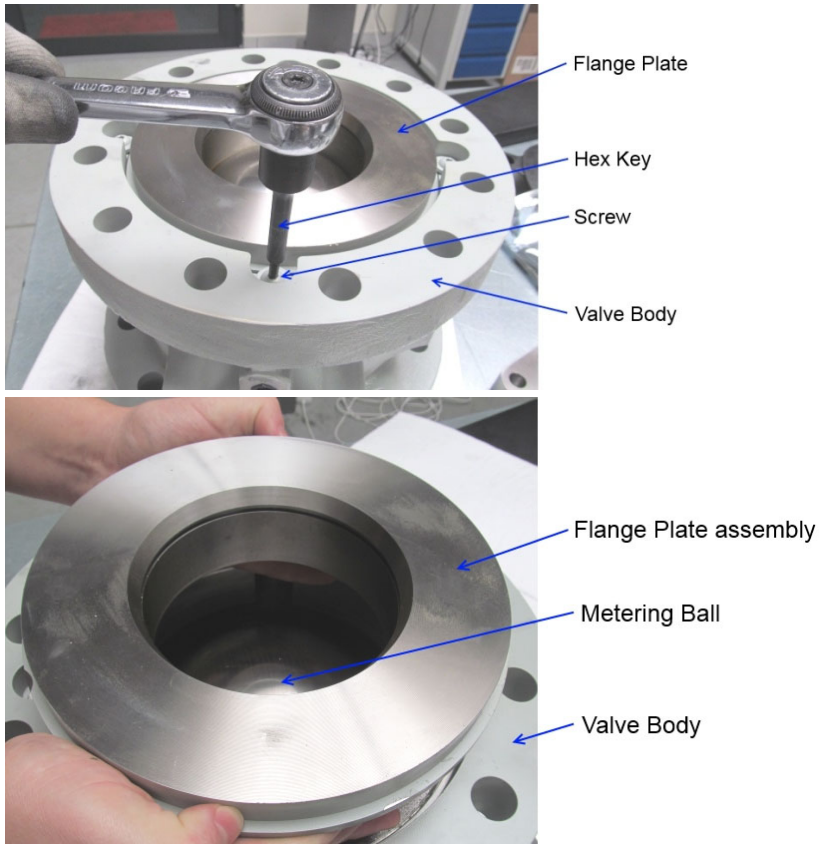


Figure 3-1. Flange Plate Assembly Removal

E. Place the flange plate onto the assembly bench with the shoe positioned upwards. Remove the shoe from the flange plate assembly.
F. Remove wave washer.

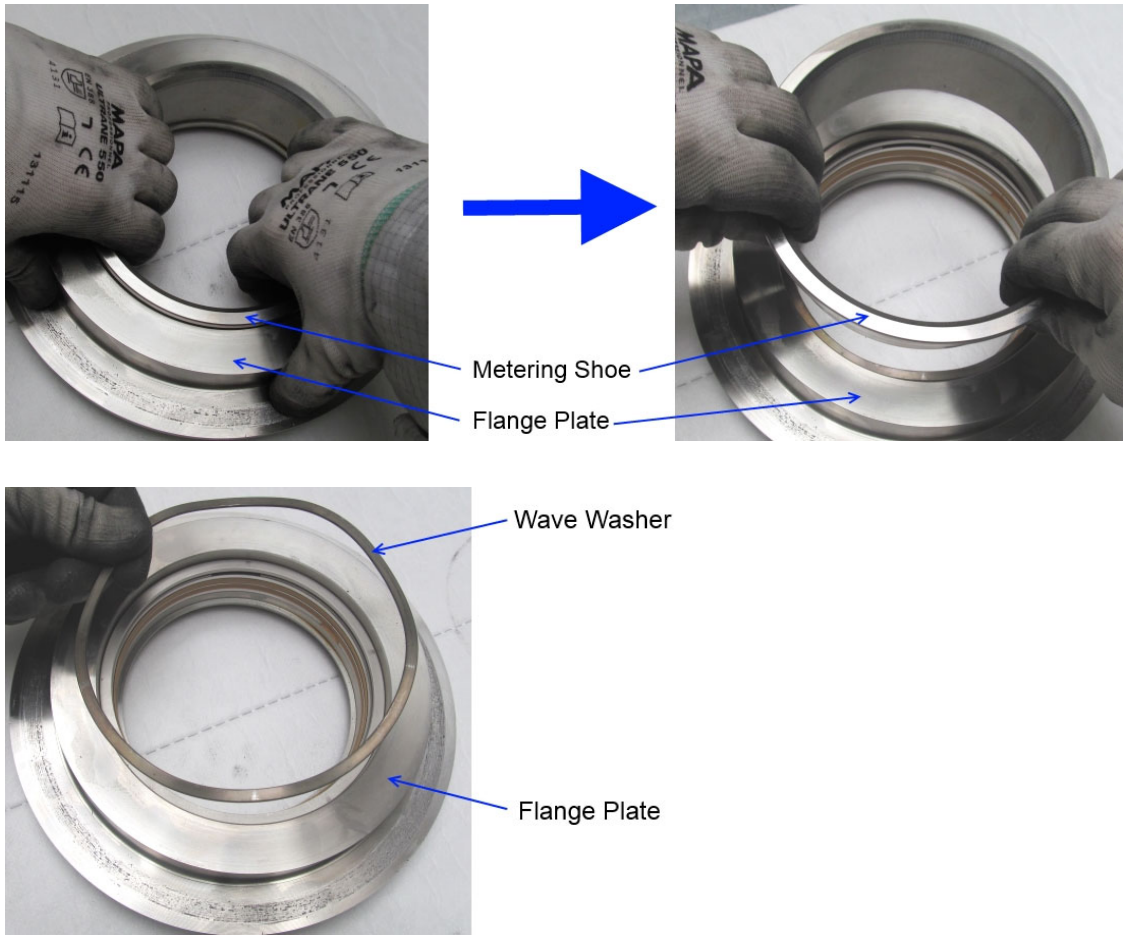


Figure 3-2. Shoe and Wave Washer Removal

G. Remove washer.
H. Remove retaining ring.

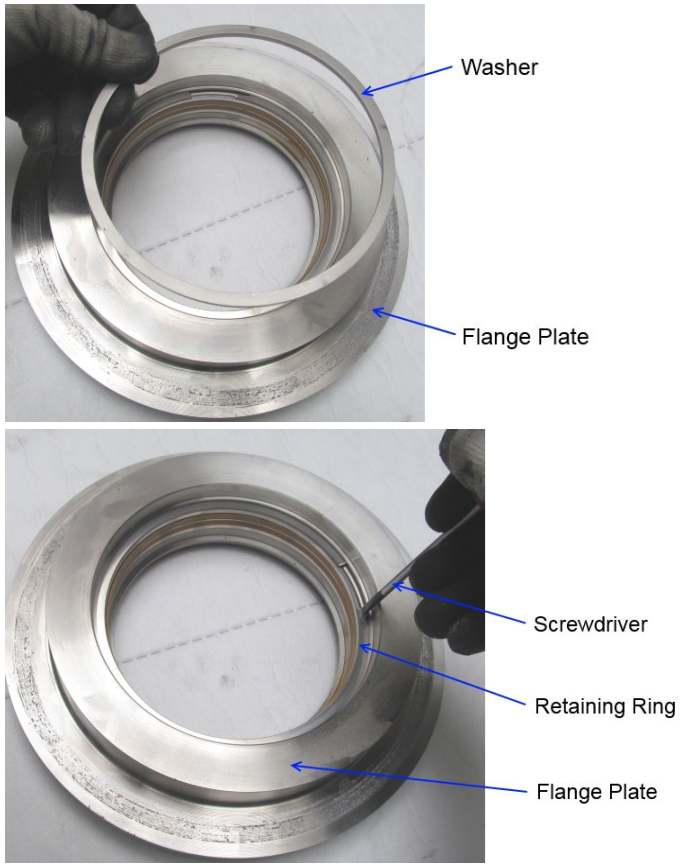


Figure 3-3. Washer and Retaining Ring Removal

I. Remove first seal spacer.
J. Remove first seal.
K. Remove spacer.
L. Remove second seal.

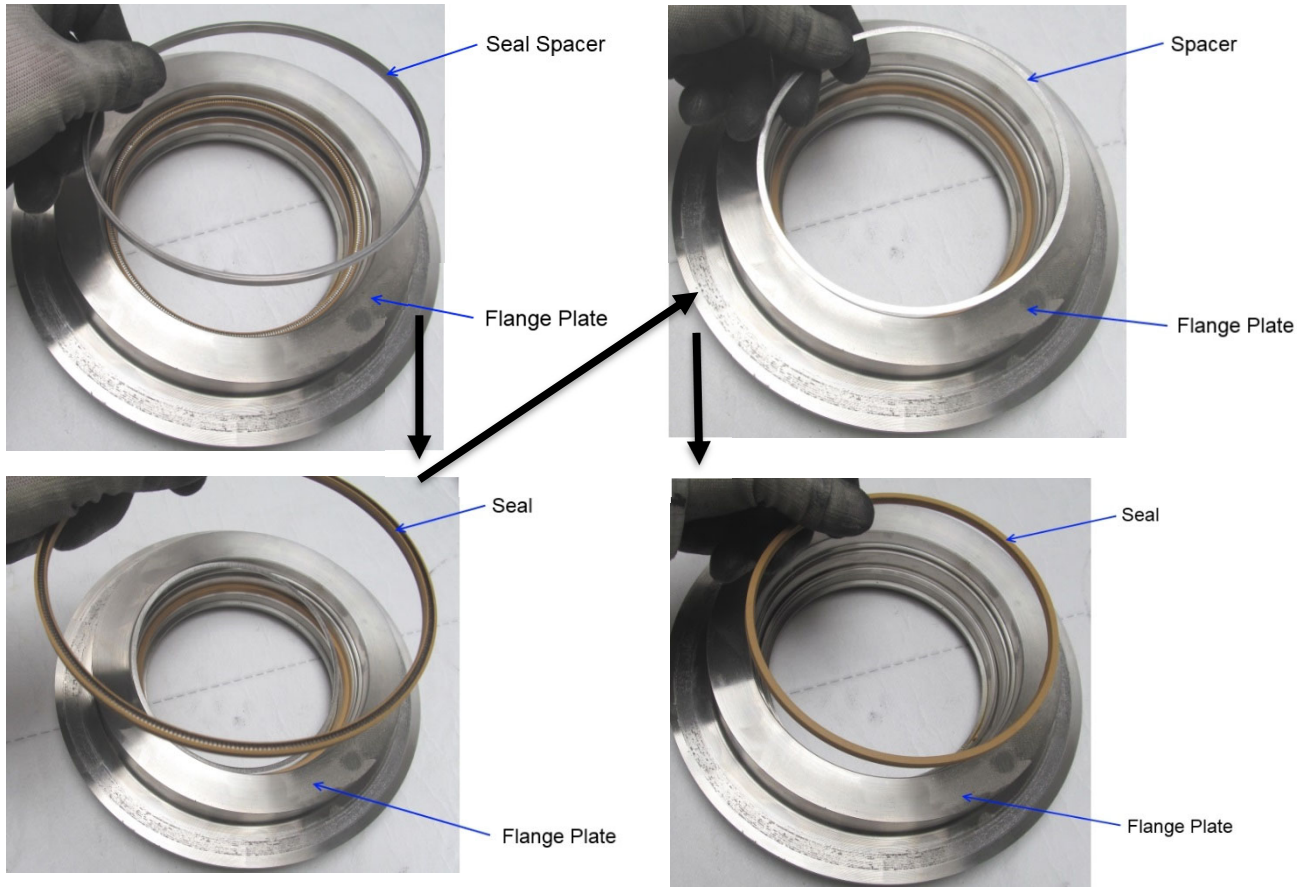


Figure 3-4. Spacer and Seal Removal

M. Remove second seal spacer.
N. Clean all surfaces of flange plate and parts using ISOPROPANOL cleaning fluid and then visually inspect all surfaces.
O. Returning attention to valve body, remove gasket from flange.
P. Clean all surfaces of metering ball and flange of valve body using ISOPROPANOL cleaning fluid and then visually inspect all surfaces.

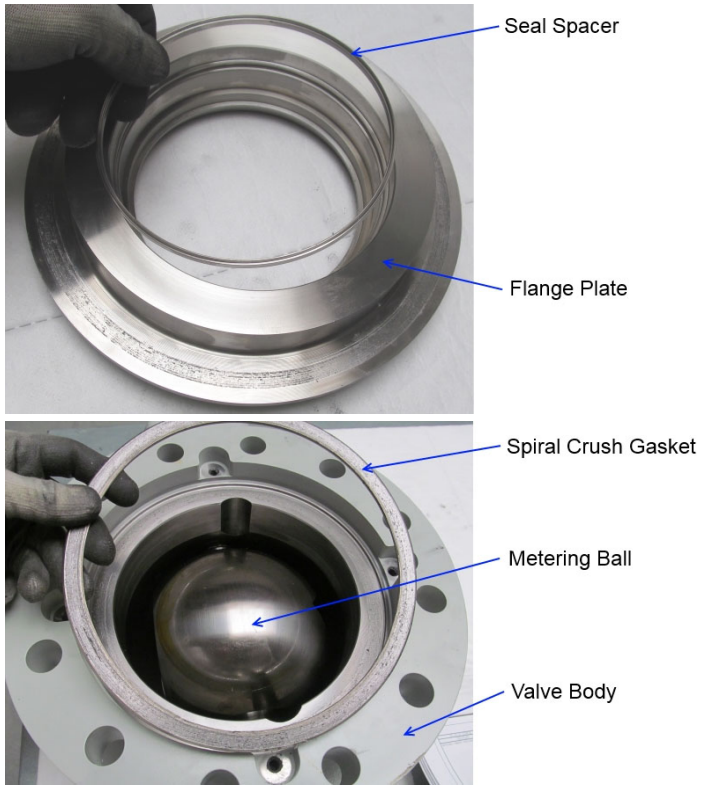


Figure 3-5. Second Spacer Removal

3.3 Assembly Procedure

A. Check replacement parts kit to verify all replacement parts listed in the Installation Drawing are present.
B. Place the flange plate onto the assembly bench with the sealing surfaces positioned upwards.
C. Install seal spacer. Make sure the spacer is installed in the correct direction.

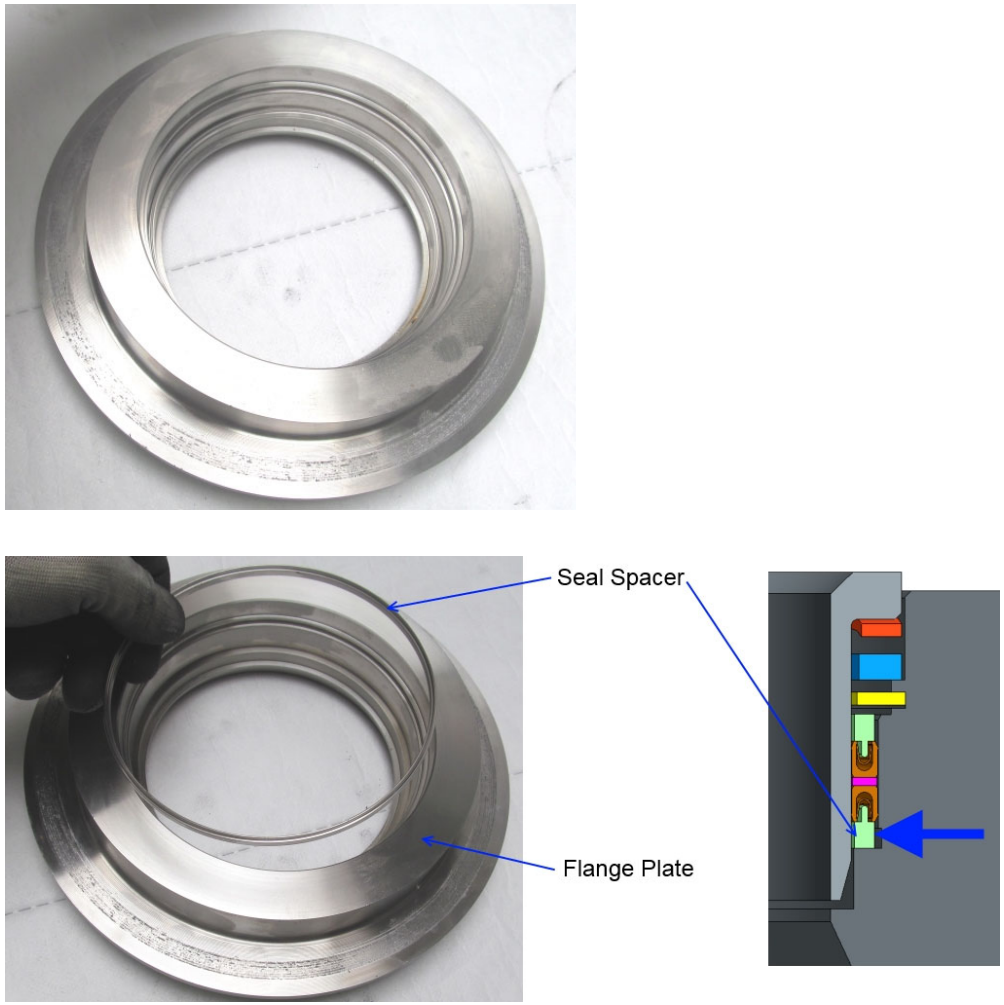


Figure 3-6. Seal Spacer Installation

D. Install the seal, ensuring itis installed in the correct direction.
E. Install spacer.

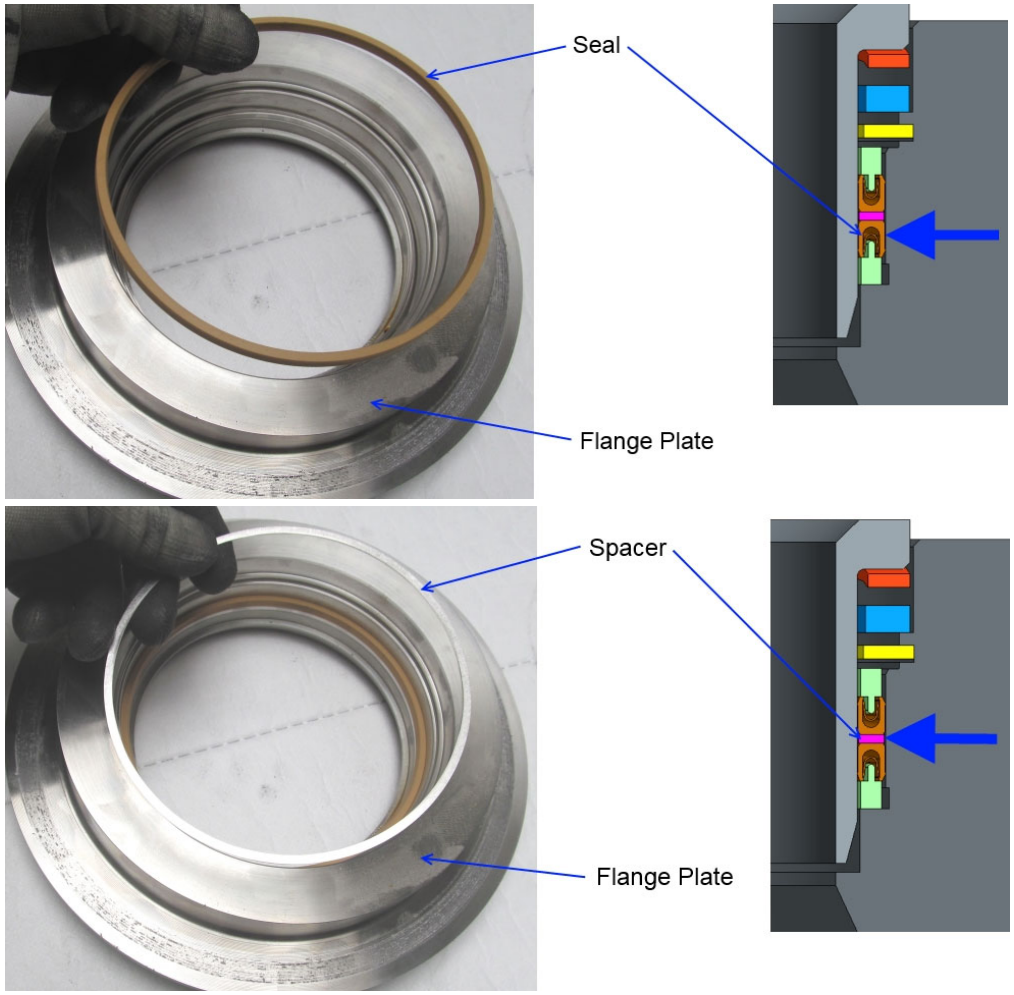


Figure 3-7. Seal and Spacer Installation

F. Install the second seal, ensuring it is installed in the correct direction.
G. Install the second seal spacer, ensuring it is installed in the correct direction.

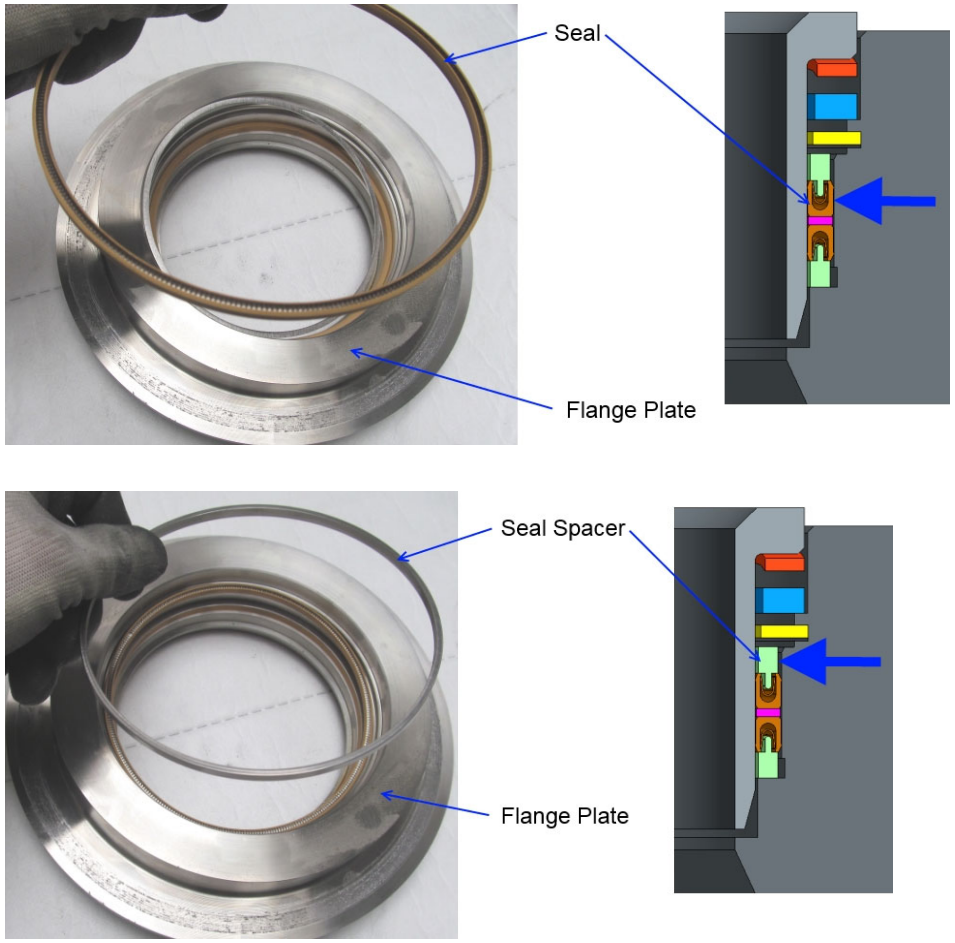


Figure 3-8. Second Seal and Spacer Installation

H. Install retaining ring in the flange plate groove.
I. Install washer.

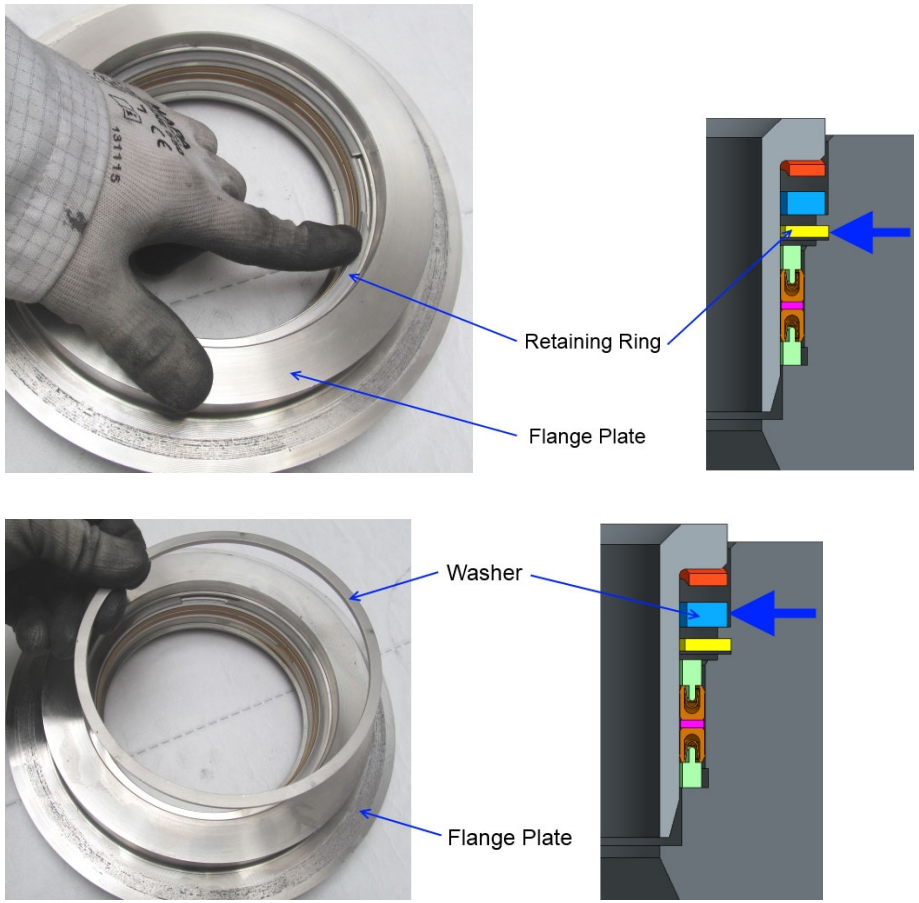


Figure 3-9. Retaining Ring and Washer Installation

J. Install wave washer.
K. Place shoe through counterbore at bottom of flange plate and into seals.
L. Using an arbor press, press the shoe into seals; only a light press should be required.

NOTICE

Shoe must be installed squarely or damage may occur.

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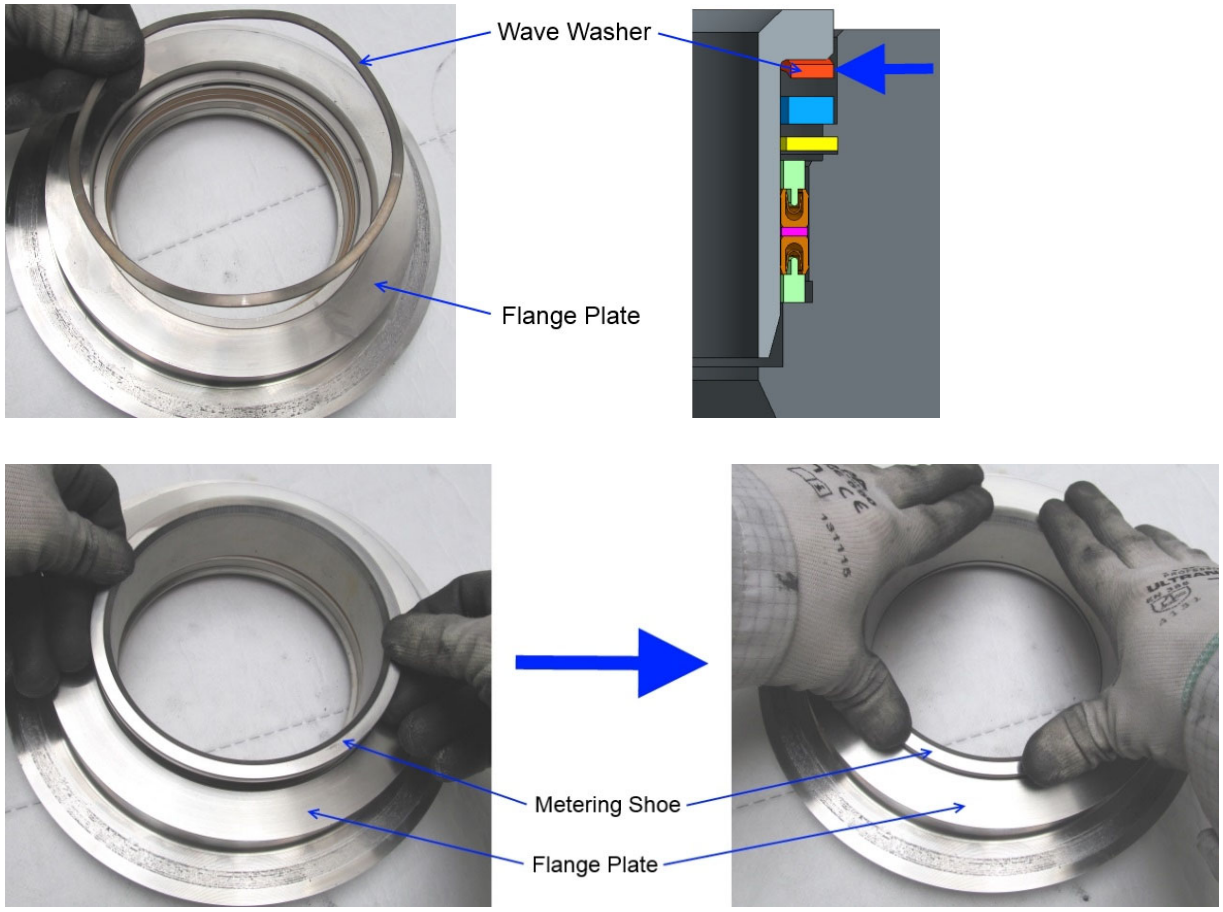


Figure 3-10. Wave Washer and Metering Shoe Installation

M. Install gasket on the flange of valve body.

NOTICE

Gently install flange plate assembly. Do not damage metering ball surface, as this may result in excess leakage. Notify Woodward if any damage occurs.

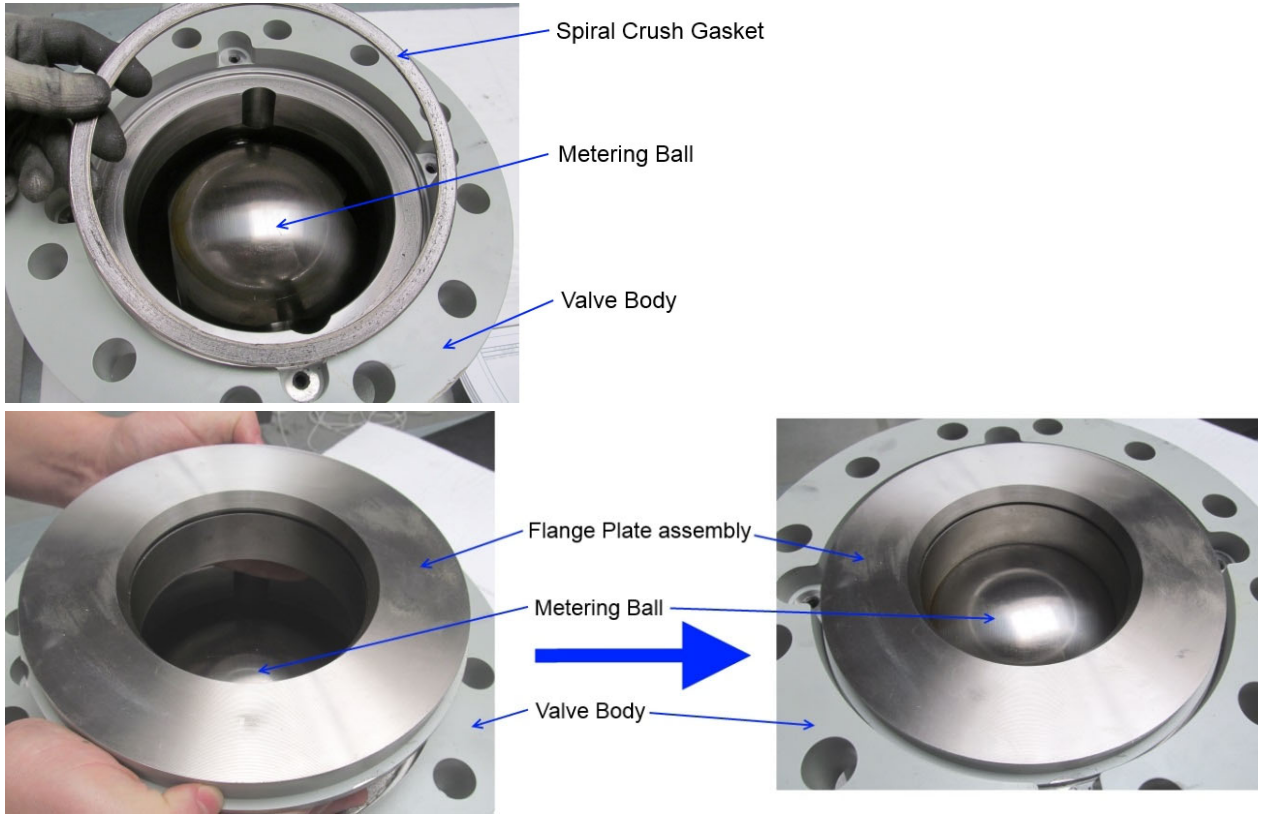


Figure 3-11. Gasket and Flange Plate Assembly Installation

N. Install four screws (apply NEVER SEEZ) with washers into housing flange.
O. Install combination flange tool (insert size table) and appropriate bolts.
P. Torque each flange bolt hand tight in a diamond pattern. Then torque to 50 ft-lbs in a diamond pattern. Then torque to 100 ft-lbs in a diamond pattern. Then torque to 150 ft-lbs in a diamond pattern. Then torque to 200 ft-lbs in diamond pattern.
Q. Torque flange plate screws (through combination flange holes) to value in table below:

Valve Size	Shoe Retaining Bolt Torque
75 mm 3 inch	7.3-8.5 N m 65-75 IN. LB
100 mm 4 inch	7.3-8.5 N m 65-75 IN. LB.
150 mm 6 inch	10.2-11.3 N m 90-100 IN.LB.

R. Proceed to the **Verification & Calibration** section.

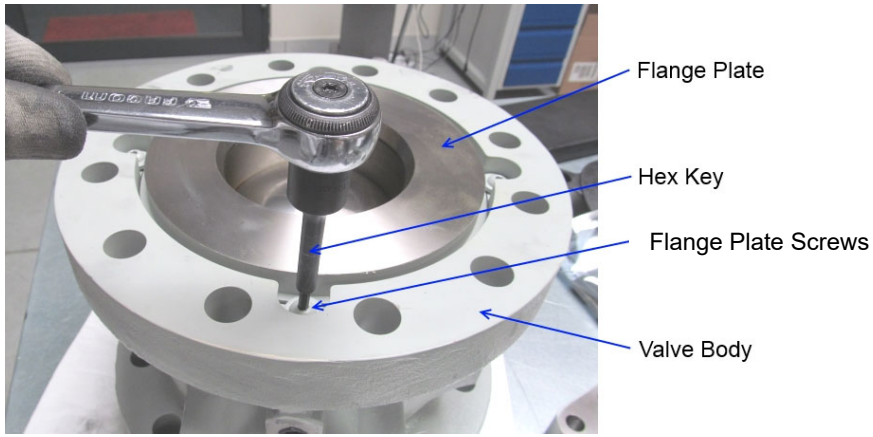


Figure 3-12. Screw Installation

3.4 Verification & Calibration

A. Connect the DVP to the LERA actuator and apply electrical power to the DVP.

B. Open and close the valve several times.

C. Ensure no errors and/or alarms are activated when performing Step B.

⚠WARNING

The valve has a high spring force and sharp elements. To prevent serious injury, DO NOT place hands or fingers inside the valve.

⚠WARNING

EXPLOSION HAZARD

Do not connect/disconnect electrical connectors unless power has been switched off or the area is known to be non-hazardous.

D. Install pressure flange on backside of valve.

⚠CAUTION

Make sure that pressure flanges are correct for the test pressure and temperature. Install flanges appropriate for the valve. Refer to ANSI B16.5 for details of flange, gasket, and bolt types and dimensions.

NOTICE

When installing the pressure flanges on the valve, it is important to properly torque the studs/bolts in the appropriate sequence to keep the flanges of the mating hardware parallel to each other.

E. Connect air supply to inlet flange. Connect flow meter to outlet flange.
F. Apply 50 psi (345 kPa) to inlet allowing 2 minutes to stabilize and read flowmeter.
G. Verify forward seat leakage is below maximum.
H. Reverse connections and conduct reverse seat leakage test.
I. Verify reverse seat leakage is below maximum.
J. Remove combination flange.
K. Connect external interface – piping installation.

Forward and Reverse Seat Leakage Tests

Forward Seat Leakage: Using room temperature air or nitrogen, pressurize the inlet of the valve to 50 +/- 5 psig.

Leakage from the inlet to the outlet of the valve shall not exceed the following limits:

Leakage limit for 3-inch GS75 – 27.87 SCFH (13.15 SLPM)	Record Forward Seat Leakage Limit_____
Leakage limit for 4-inch GS75 – 53.86 SCFH (25.42 SLPM)	Record Forward Seat Leakage Limit_____
Leakage limit for 6-inch GS75 – 109.94 SCFH (51.89 SLPM)	Record Forward Seat Leakage Limit_____

Reverse Seat Leakage: Using room temperature air or nitrogen, pressurize the inlet of the valve to 50 +/- 5 psig.

Leakage from the inlet to the outlet of the valve shall not exceed the following limits:

Leakage limit for 3-inch GS75 – 27.87 SCFH (13.15 SLPM)	Record Reverse Seat Leakage Limit_____
Leakage limit for 4-inch GS75 – 53.86 SCFH (25.42 SLPM)	Record Reverse Seat Leakage Limit_____
Leakage limit for 6-inch GS75 – 109.94 SCFH (51.89 SLPM)	Record Reverse Seat Leakage Limit_____

4. VALVE SHOE SEALS REPLACEMENT (8-inch)

4.1 Replacement Kit Description

The purpose of this procedure is to show the correct sequence and method of valve shoe seals replacement:
- KIT P/N: 8935-1238-20 – GSx, SHOE SEALS, 8 inch,
- UPGRADE KIT: 8935-1238-21 – GSx, SHOE UPGRADE, 8 inch (required for the valves sold before 2017 year)

NOTICE

For the valves sold before 2017 year the shoe design upgrade is required (only for the 8-inch valve). For any questions, contact Woodward.

NOTICE

Review this CMM before starting the shoe seal replacement to be sure that all necessary tools are available and instructions are clear. For any questions, contact Woodward.

4.2 Disassembly Procedure

⚠WARNING

To prevent possible serious personal injury or damage to equipment, be sure all electric power and gas pressure have been removed from the valve and actuator before beginning any maintenance or repairs.

A. Disconnect external interface electrical cables.
B. Disconnect external interface piping installation.
C. Place the valve body onto the assembly bench with the flange plate assembly positioned upwards. Remove four screws with washers from the housing.
D. Remove flange plate assembly from the valve housing.
E. Remove spiral gasket (may be stuck to either flange plate or valve body).

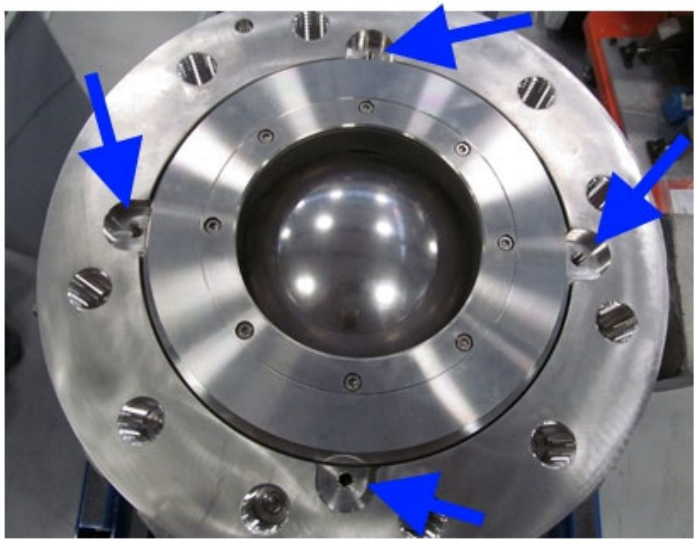


Figure 4-1. Flange Plate Assembly Removal

F. Place the flange plate assembly onto the assembly bench with the shoe positioned upwards. Remove the shoe from the flange plate assembly.
G. Remove wave washer.

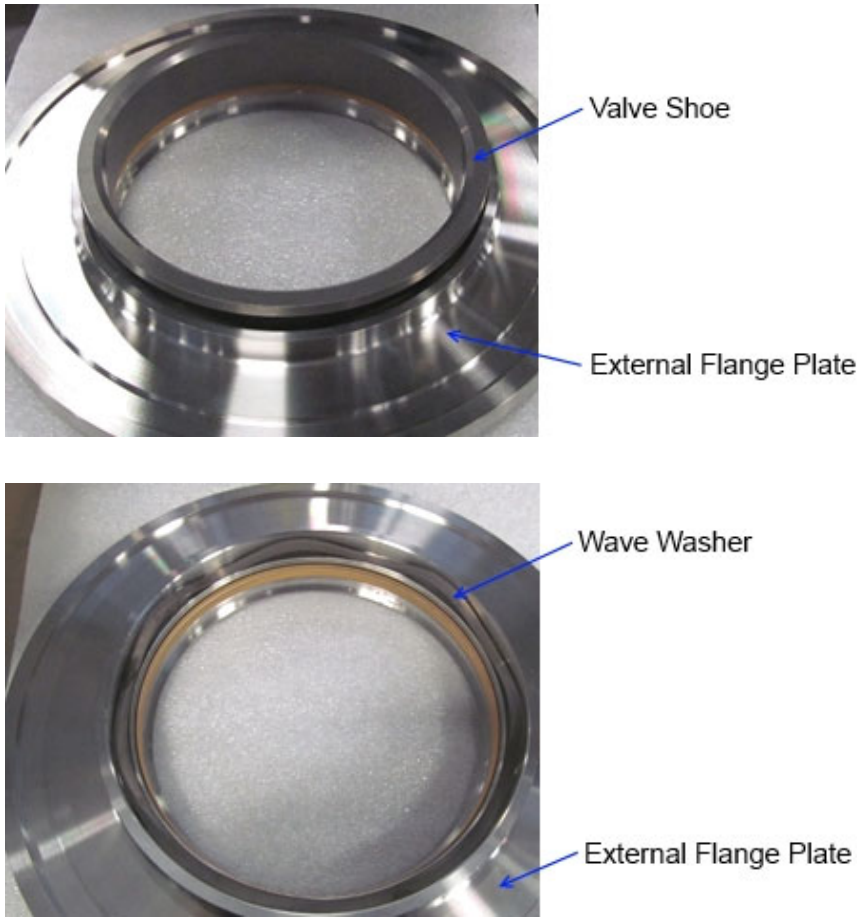


Figure 4-2. Shoe and Wave Washer Removal

H. Rotate the flange plate assembly onto the assembly bench with the flange plate positioned upwards.
I. Remove flange plate bolts.
J. Remove the flange plate.

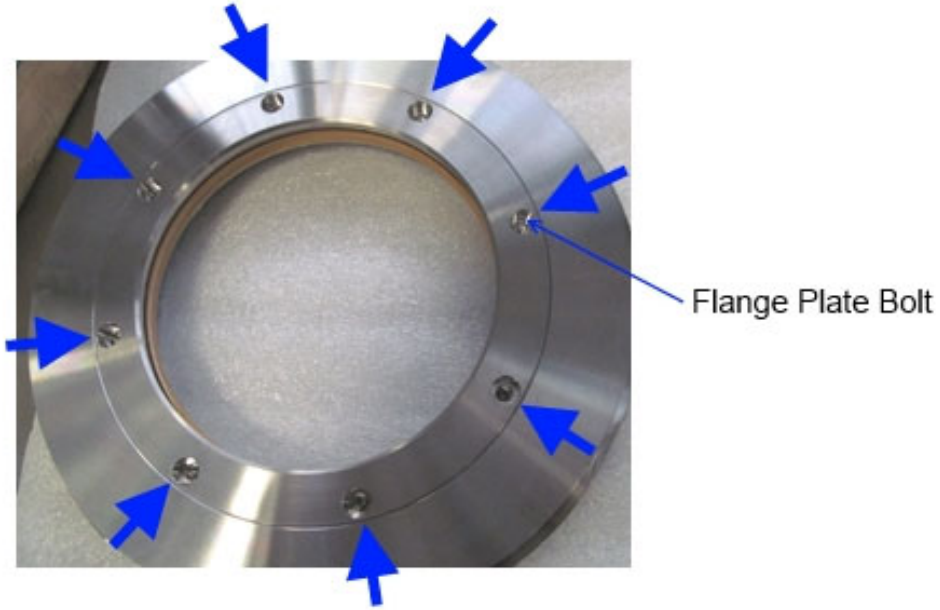


Figure 4-3. Bolt and Flange Plate Removal

K. Remove first seal spacer.
L. Remove first seal.
M. Remove spacer.
N. Remove second seal.
O. Remove second seal spacer.

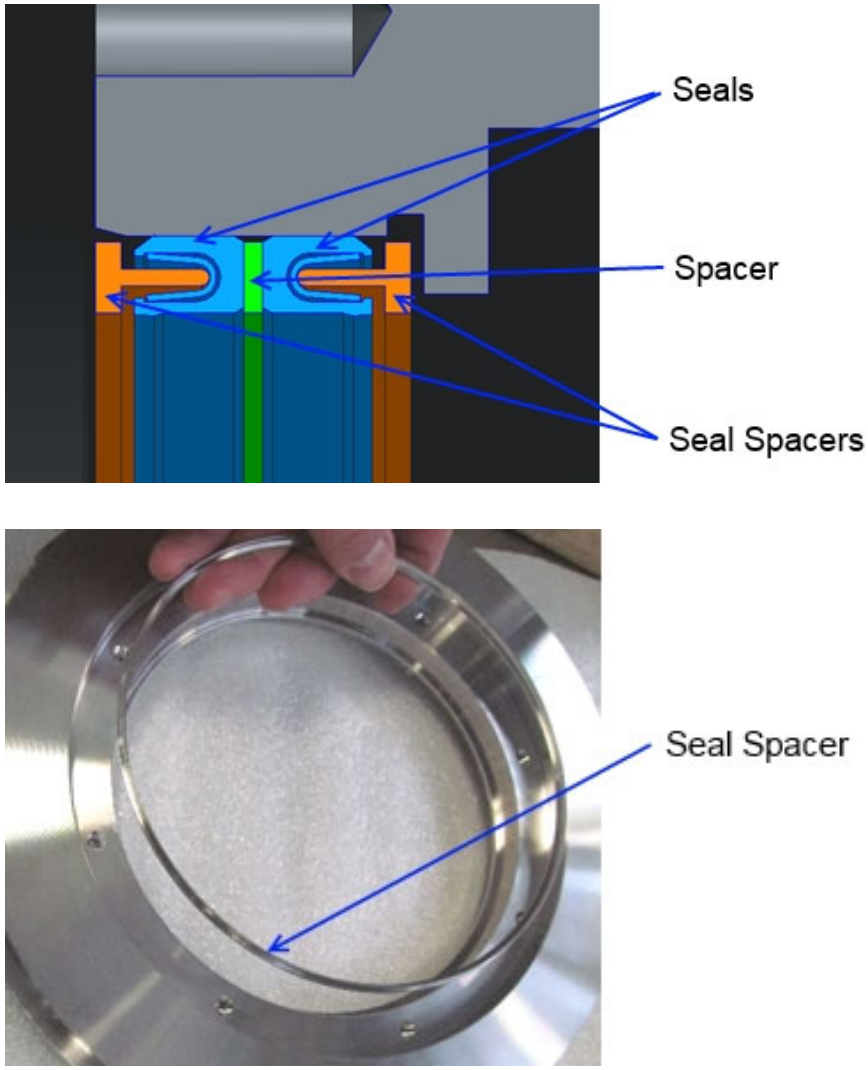


Figure 4-4. Spacer and Seal Removal

P. Clean all surfaces of the flange plate and parts using ISOPROPANOL cleaning fluid and visually inspect all surfaces.
Q. Clean all surfaces of the metering ball and flange of valve body using ISOPROPANOL cleaning fluid and then visually inspect all surfaces.
R. After cleaning, inspect the ball-side of the shoe for excessive wear. Inspect the seal-side of the shoe for burrs. If excessive wear is found, contact Woodward.

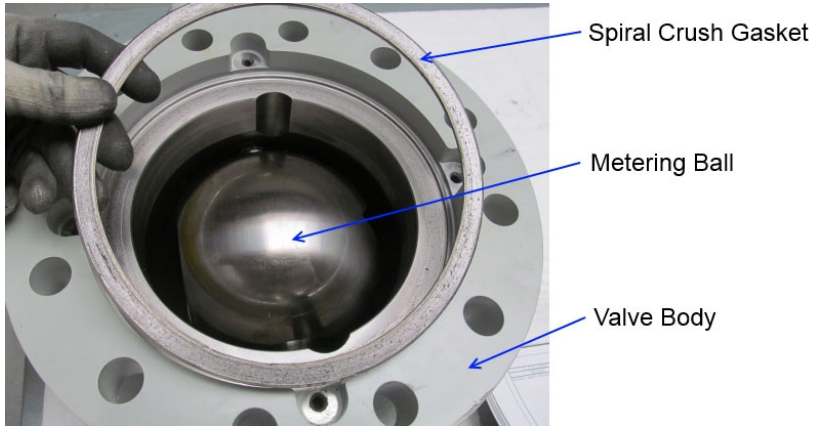


Figure 4-5. Gasket Removal

4.3 Assembly Procedure

A. Check replacement parts kit to verify all replacement parts listed in the Installation Drawing are present.
B. Place the flange plate (external plate) onto the assembly bench with larger counterbore facing up.
C. Install one top hat seal spacer into bore of flange plate with flat side down (see picture).
D. Install seal with cupped side down, ensuring that seal goes into top hat seal spacer.
E. Install spacer into flange plate against back of seal.
F. Install second seal with flat side against spacer, cupped side up.
G. Install second top hat seal spacer into bore of flange plate with flat side up.
H. Seal stack should be flush with top of bore or have a short amount of bore showing above if properly seated.

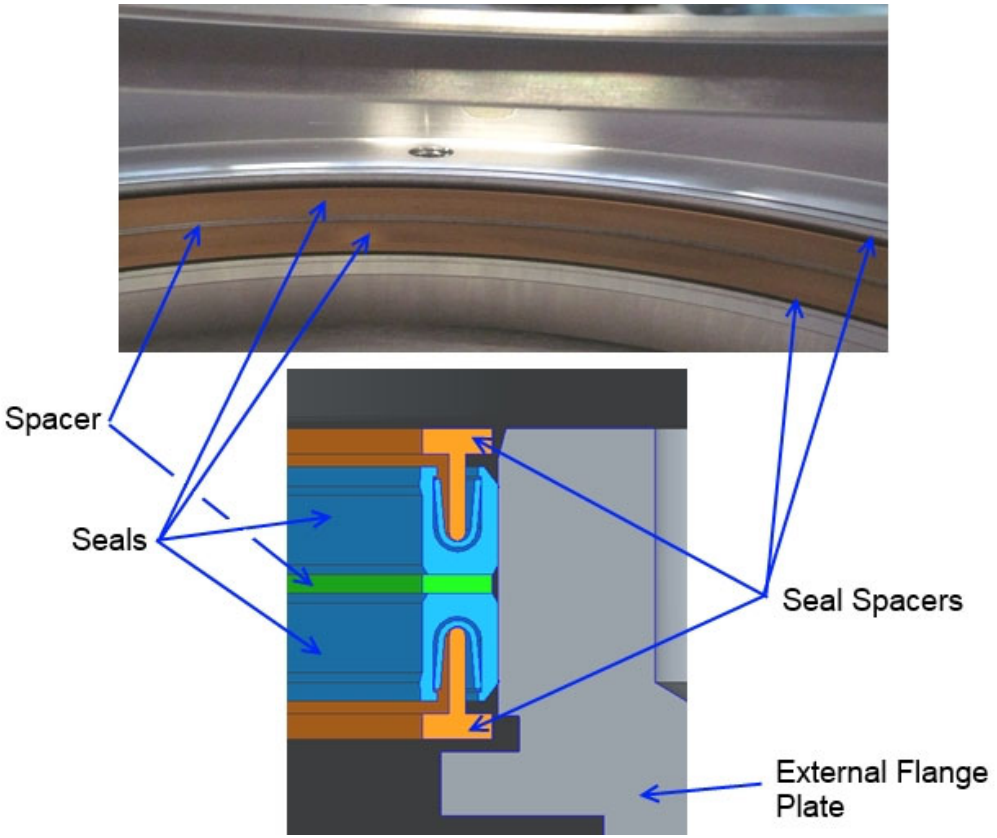


Figure 4-6. Install Seals and Spacers

I. Install flange plate and align bolt holes.
J. Apply Loctite 2620 to 8 screws and install into flange plate.
K. Tighten screws in star pattern. Torque bolts to 2.5 ft - lbs in star pattern, torque in a circle one time after star pattern.
L. Flip flange plate over with seal counter bore facing down.
M. Insert wave washer.

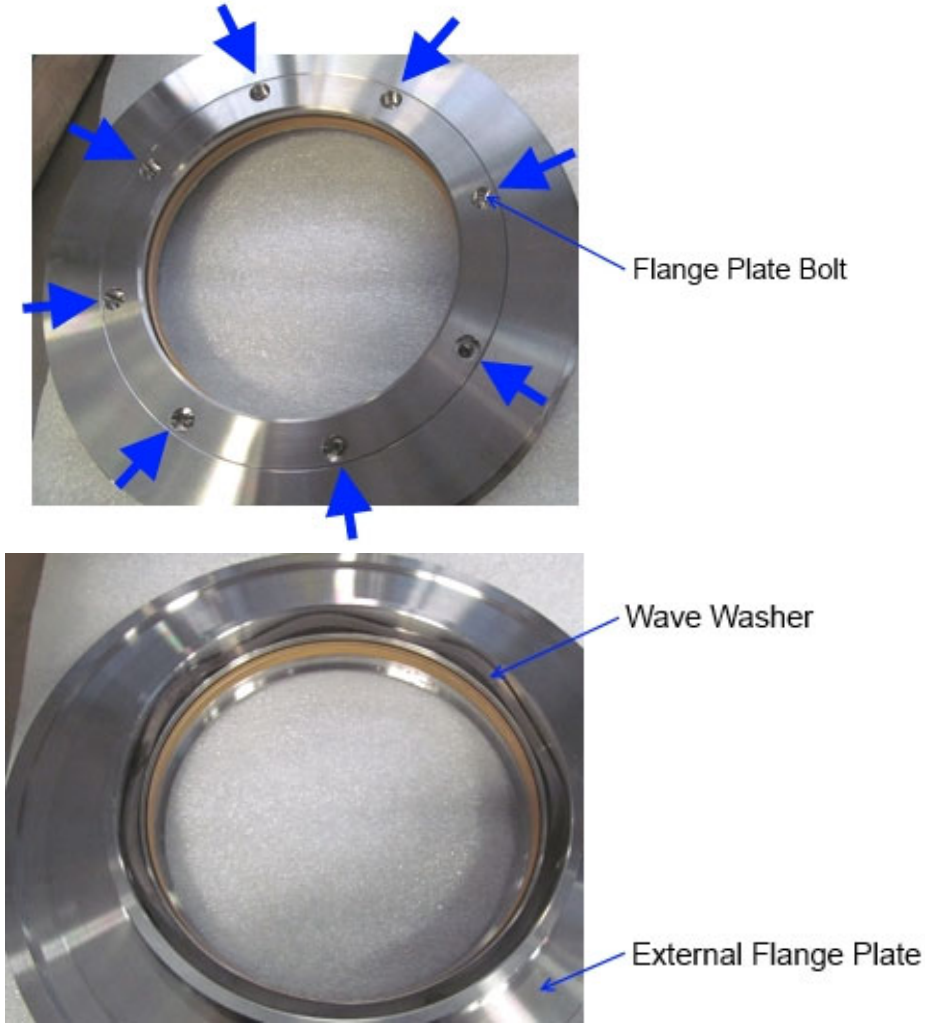
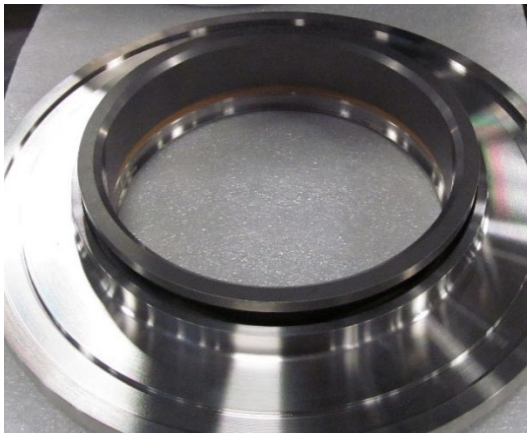


Figure 4-7. Install Flange Plate and Wave Washer

N. Place shoe through counter bore at bottom of flange plate and into seals.
O. Install **tool 1014-1879** and press the shoe into seals.

NOTICE

Ensure shoe is aligned with seals and ensure plates press together evenly. Contact Woodward if there is any damage to the seals during shoe installation.



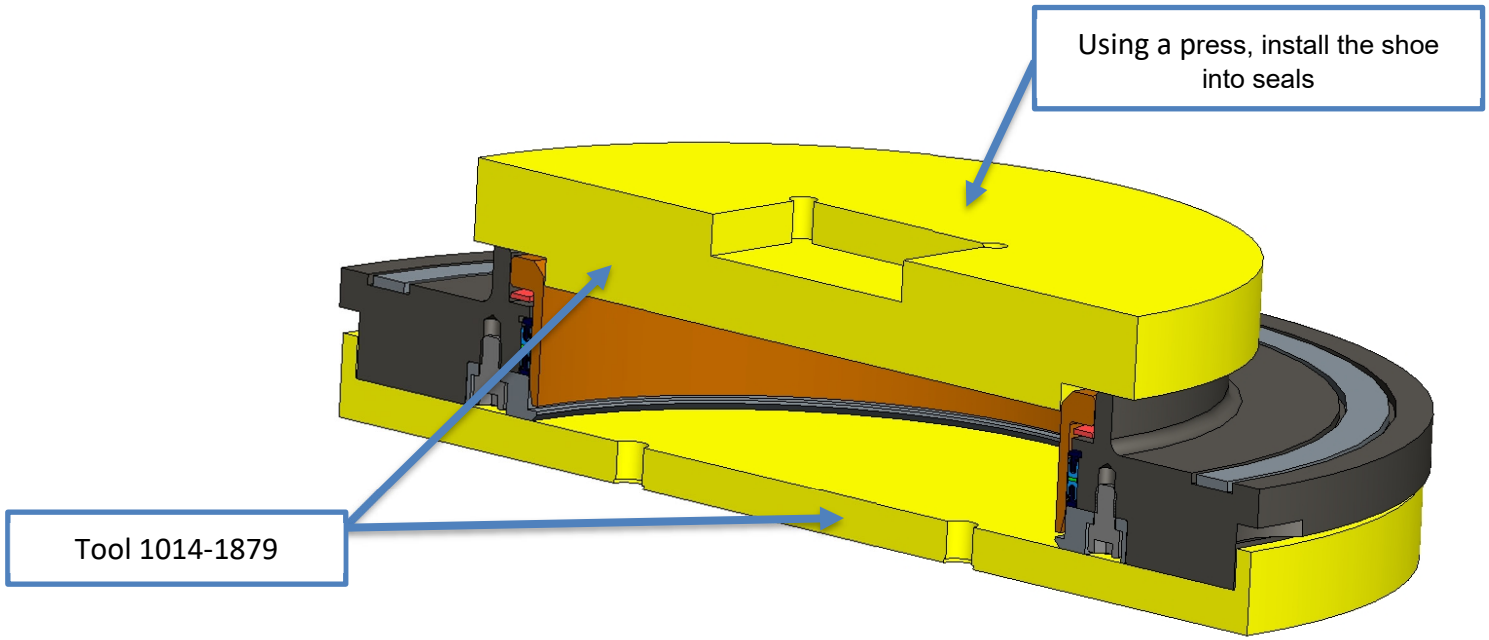


Figure 4-8. Install Shoe

P. Install gasket on the flange plate, using NEVER SEEZ to hold gasket in flange late.

NOTICE

Gently install flange plate assembly. Do not damage metering ball surface. May result in excess leakage. Notify Woodward if any damage occurs.

Q. Install four screws (apply NEVER SEEZ) with washers into housing flange.
R. Install combination flange tool and appropriate bolts.
S. Torque each combination flange bolt hand tight in a diamond pattern. Then torque to 50 ft-lbs in diamond pattern. Then torque to 100 ft-lbs in diamond pattern. Then torque to 150 ft-lbs in diamond pattern. Then torque to 200 ft-lbs in diamond pattern.
T. Torque flange plate screws (through combination flange holes) to value in table below:

Valve Size	Shoe Retaining Bolt Torque
200 mm 8 inch	190-200 IN LB/ 21.5-22.5 N m

U. Go to the **Verification & Calibration** section.

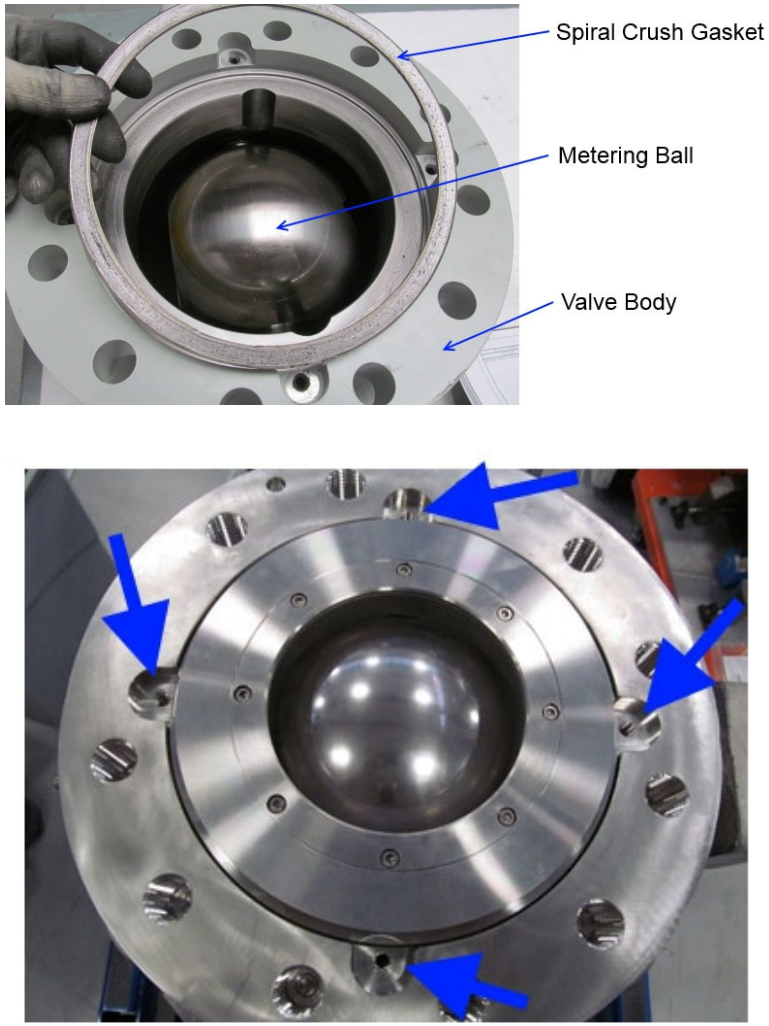


Figure 4-9. Install Gasket and Flange Plate Assembly

4.4 Verification & Calibration

A. Connect the DVP to the LERA actuator and apply electrical power to the DVP.
B. Open and close the valve several times.
C. Ensure no errors and/or alarms are activated when performing Step B.

⚠WARNING

The valve has a high spring force and sharp elements. To prevent serious injury, DO NOT place hands or fingers inside the valve.

⚠WARNING

EXPLOSION HAZARD

Do not connect/disconnect electrical connectors unless power has been switched off or the area is known to be non-hazardous.

D. Install pressure flange on backside of valve.

⚠CAUTION

Ensure the pressure flanges are correct for the test pressure and temperature. Install flanges appropriate for the valve. Refer to ANSI B16.5 for details of flange, gasket, and bolt types and dimensions.

NOTICE

When installing the pressure flanges on the valve, it is important to properly torque the studs/bolts in the appropriate sequence in order to keep the flanges of the mating hardware parallel to each other.

E. Connect air supply to inlet flange. Connect flow meter to outlet flange.
F. Apply 50 psi (345 kPa) to inlet allowing 2 minutes to stabilize and read flowmeter.
G. Verify forward seat leakage is below maximum.
H. Reverse connections and conduct reverse seat leakage test.
I. Verify reverse seat leakage is below maximum.
J. Remove combination flange.
K. Connect external interface – piping installation.

Forward and Reverse Seat Leakage Tests

Forward Seat Leakage: Using room temperature air or nitrogen, pressurize the inlet of the valve to 50 +/- 5 psig.

Leakage from the inlet to the outlet of the valve shall not exceed the following limits:

Leakage limit for 8-inch GS75 – 188.14 SCFH (88.79 SLPM) Record Forward Seat Leakage Limit_____

Reverse Seat Leakage: Using room temperature air or nitrogen, pressurize the inlet of the valve to 50 +/- 5 psig.

Leakage from the inlet to the outlet of the valve shall not exceed the following limits:

Leakage limit for 8-inch GS75 – 188.14 SCFH (88.79 SLPM) Record Reverse Seat Leakage Limit_____

5. VISUAL INDICATOR REPLACEMENT

5.1 Replacement Kit Description

The purpose of this procedure is to show the correct sequence and method of visual indicator replacement:

- KIT P/N: 8935-1290 – LERA, VISUAL INDICATOR,

NOTICE

Review this CMM before starting the visual indicator replacement to be sure that all necessary tools are available and instructions are clear. For any questions, contact Woodward.

5.2 Disassembly Procedure

⚠WARNING

To prevent possible serious personal injury or damage to equipment, be sure all electric power and gas pressure have been removed from the valve and actuator before beginning any maintenance or repairs.

A. Before disassembly, mark the appropriate parts for orientation with a permanent marker. This step will allow easier assembling of the new parts in correct position.

B. Remove four indicator screws and washers.

C. Remove indicator body with O-ring.

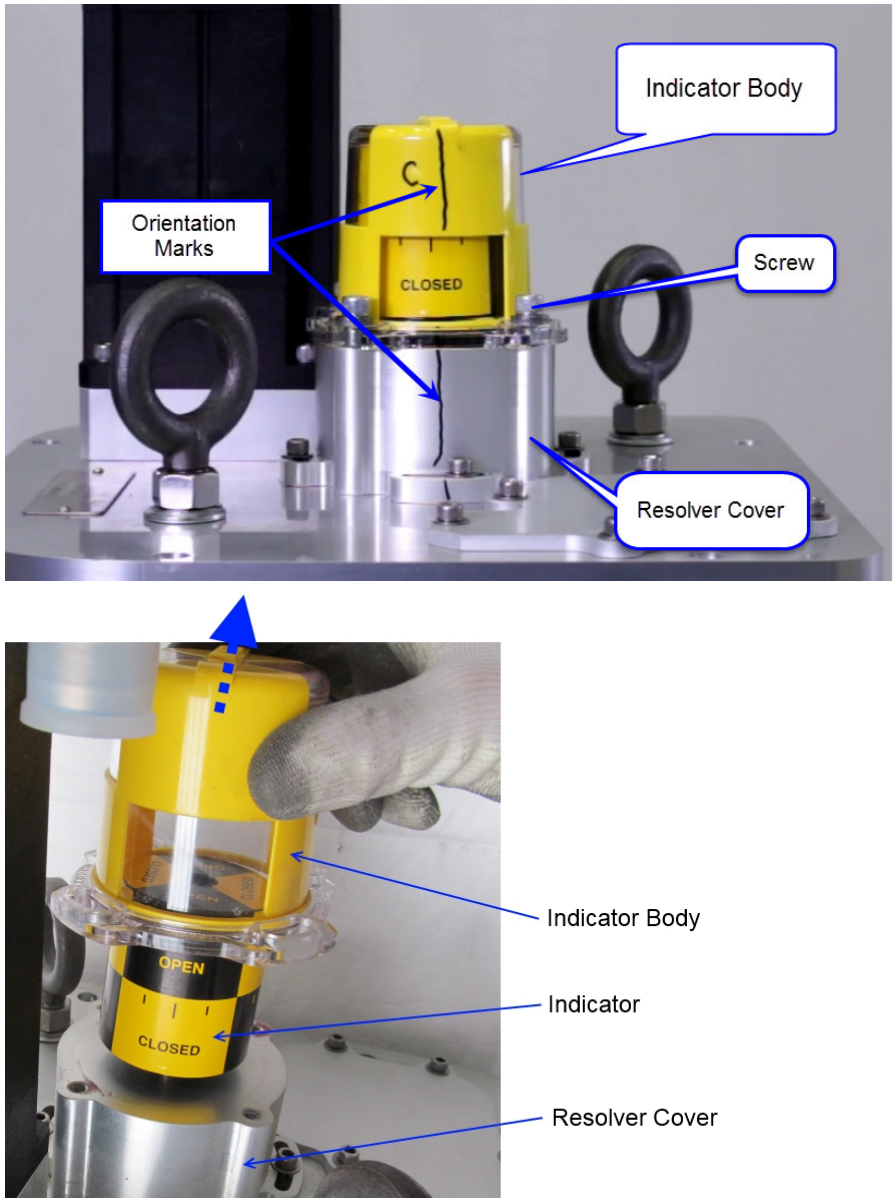


Figure 5-1. Indicator Body Removal

D. Remove O-ring from the indicator body.
E. Remove indicator.

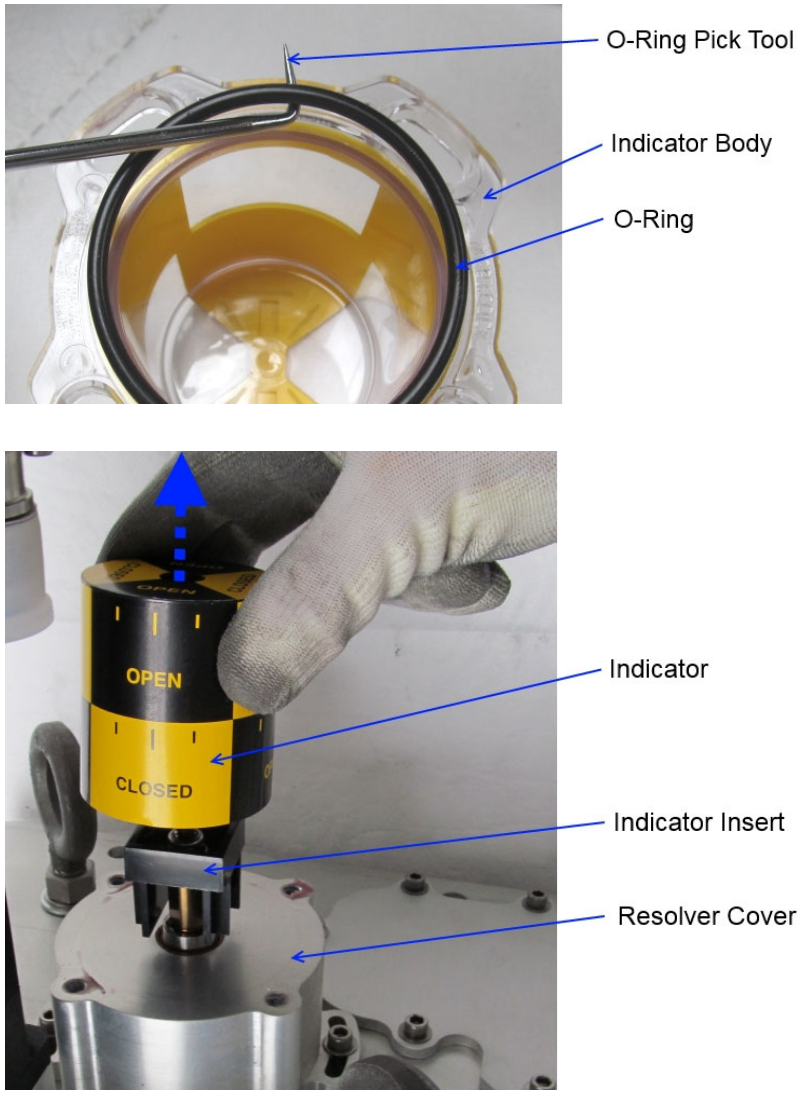


Figure 5-2. O-ring and Indicator Body Removal

F. Remove indicator insert nut.
G. With a marker, mark orientation of the indicator insert. This will aid during installation.
H. Remove indicator insert with washer.

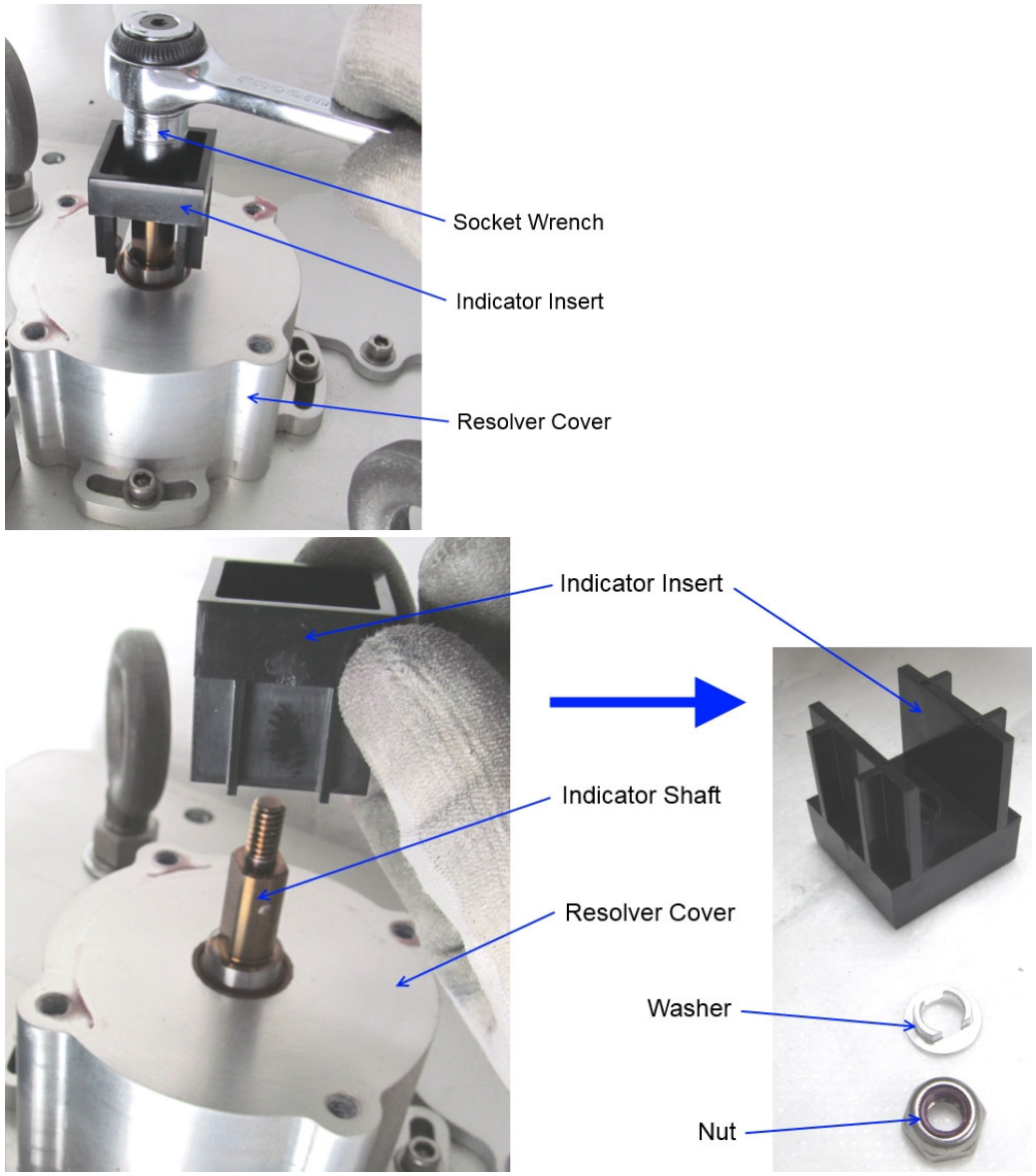


Figure 5-3. Indicator Insert Removal

I. Remove four resolver cover screws with washers.
J. Remove resolver cover with lip seal and O-ring.
K. Remove O-ring seal from resolver cover.
L. Push lip seal from resolver cover using an appropriate sized blunt tool.

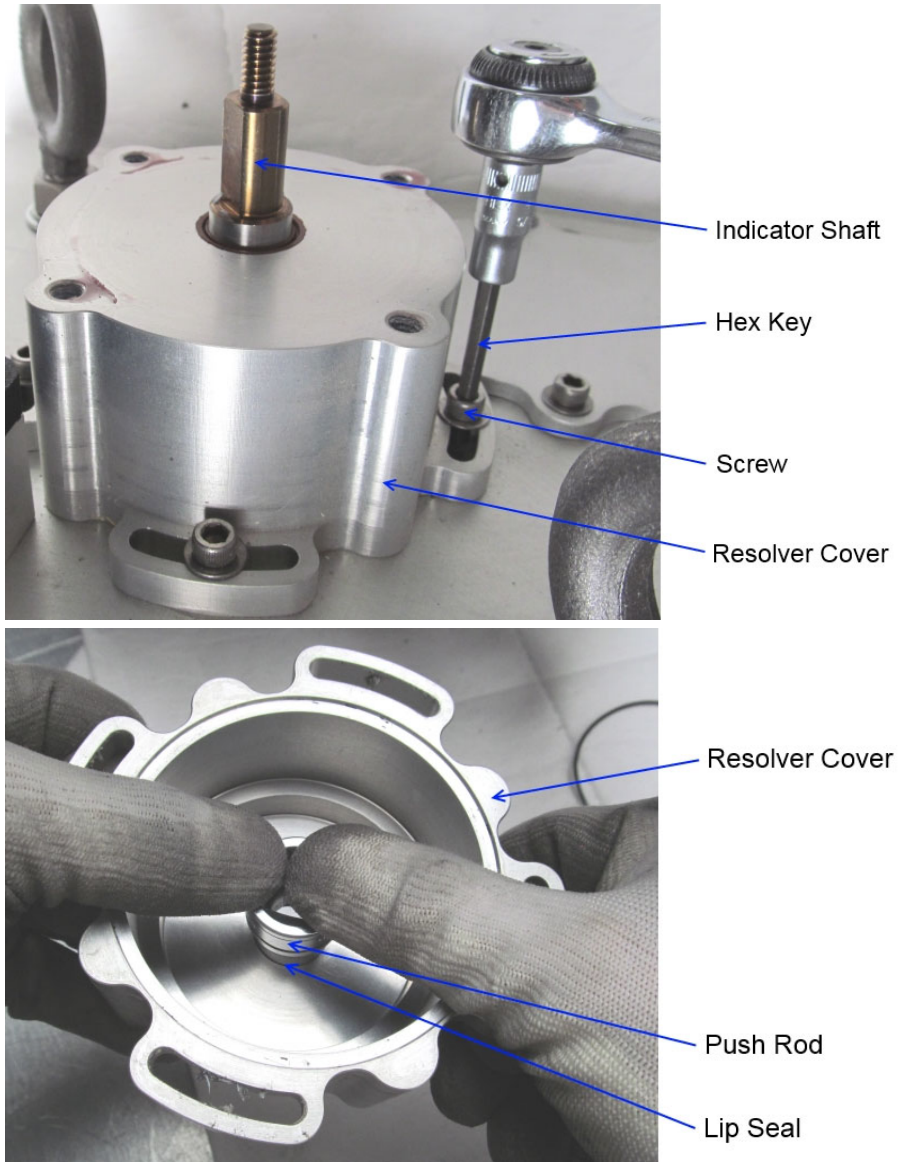


Figure 5-4. Cover Removal

5.3 Assembly Procedure

A. Check replacement parts kit to verify all replacement parts listed in the Installation Drawing are present.

⚠WARNING

Explosion Hazard

The lip seal and O-ring are critical to the ingress protection rating of this product. Ensure careful and proper placement. Contact Woodward if any damage to these seals occurs.

B. Press the lip seal dry into the counter bore of the top of the resolver cover. Install seal with the cupped side of the seal oriented up. If excessive friction is experienced, add a small amount of petroleum jelly.

C. Lubricate O-ring with petroleum jelly and install into the face groove of the lower surface of the cover.

D. Orient and align the screw slots of the cover with the threaded holes of the top plate. Install the resolver cover over the output shaft making sure seal remains in the face groove of the cover. Align the resolver cover according to the marks made earlier.

E. Install washer onto each of four screws. Apply Loctite 242 to the threads of the four screws and install through the slot of the cover into the top plate.

F. Install screws snug, but do not torque.

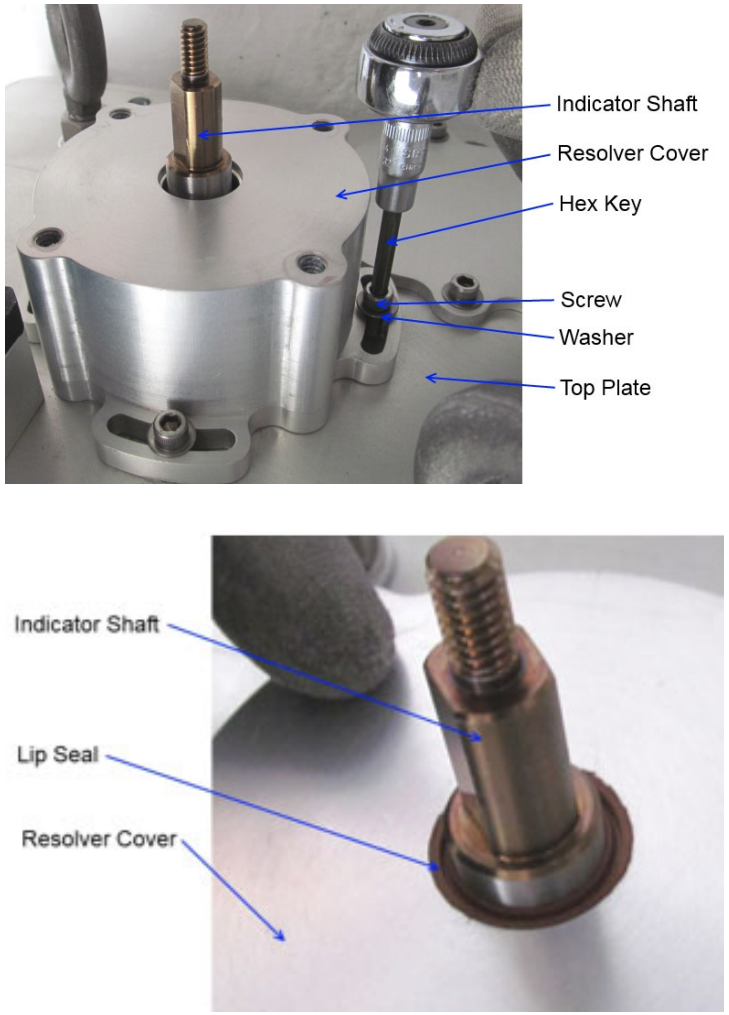


Figure 5-5. Install Cover

G. Install the indicator insert onto the indicator shaft. Orient the indicator insert according to the marks on the resolver cover made earlier.

H. Install indicator shaft washer onto the indicator shaft until it is in contact with the top surface of the indicator insert.

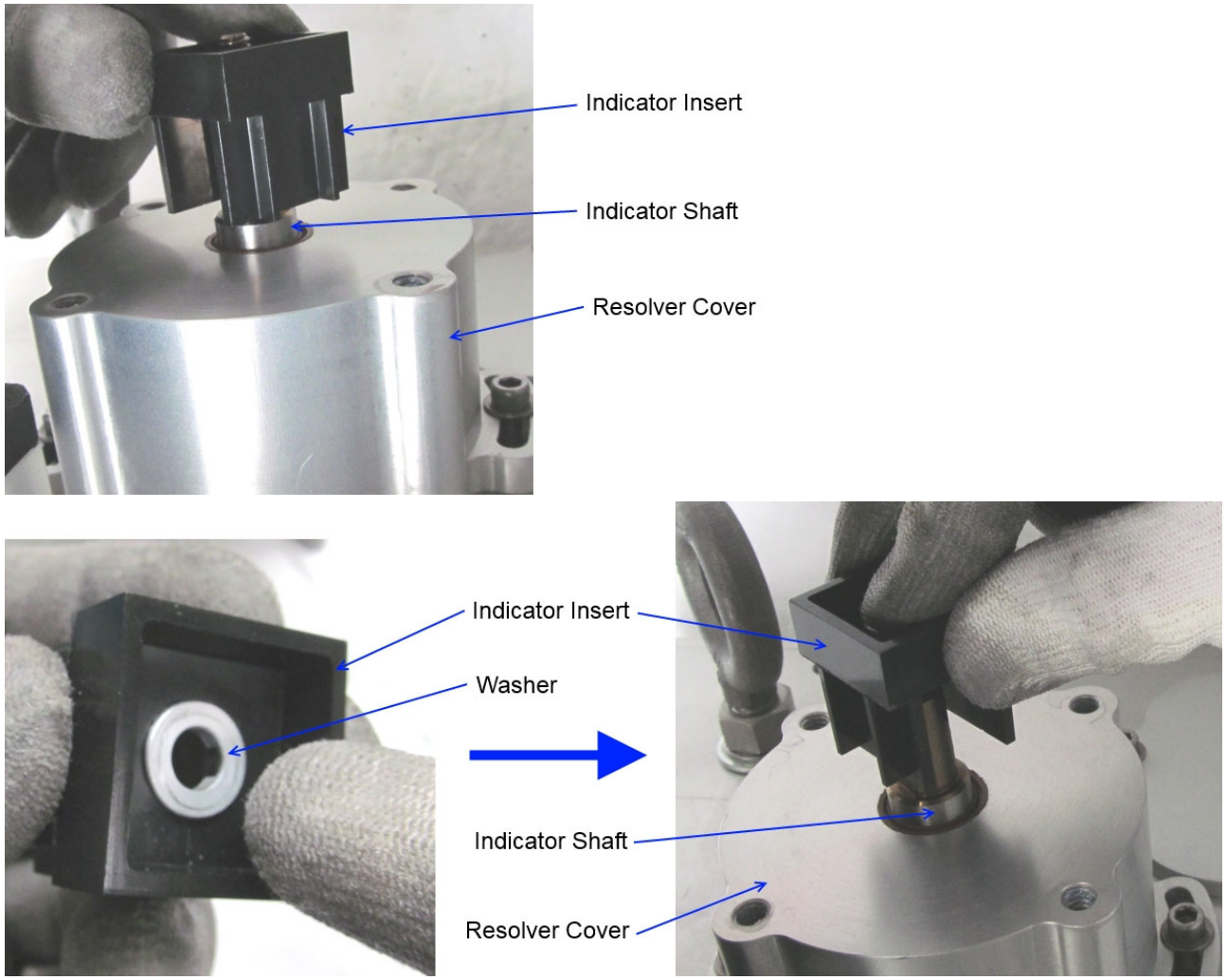


Figure 5-6. Install Indicator Insert

I. Apply Loctite 242 to the threads of nut and install the nut onto the indicator shaft until snug with the washer. Torque nut to 50 lb.- inches, ± 10 lb.- inches.
J. Install indicator on the indicator insert.

Note: Indicator must show the same position orientation as indicator which was removed.

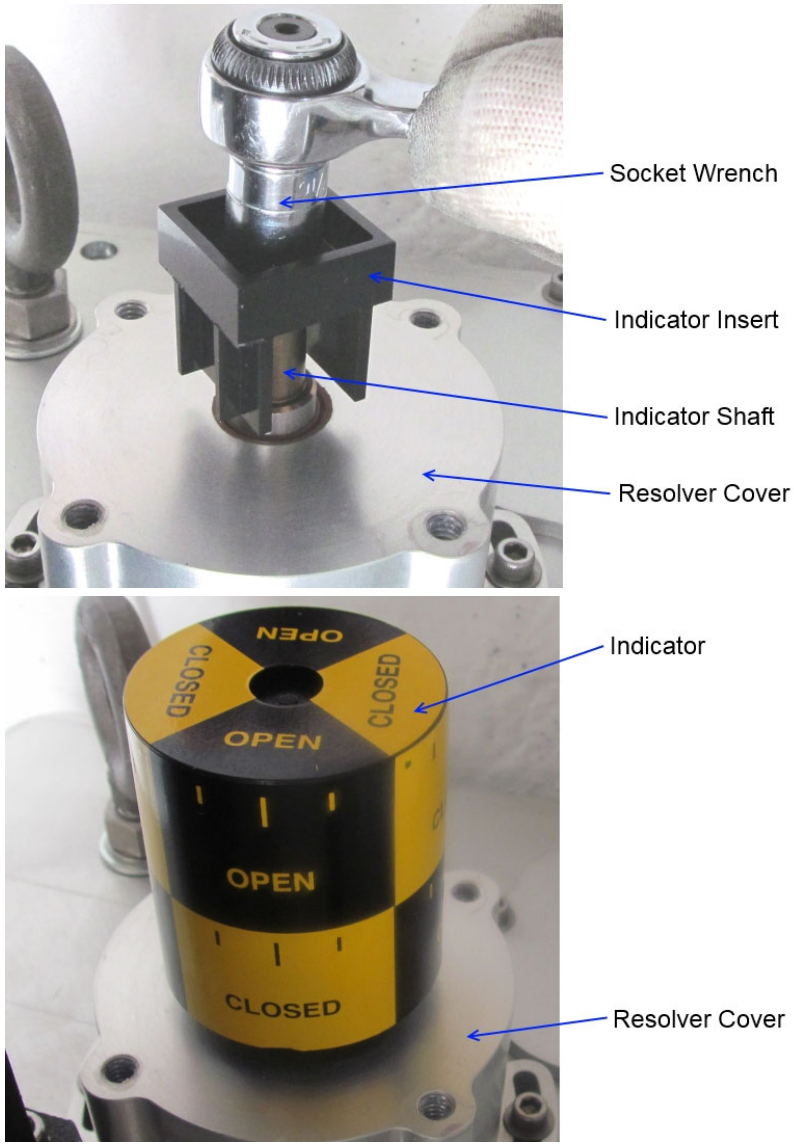


Figure 5-7. Install Indicator on the Indicator Insert

K. Lubricate O-ring with petroleum jelly and install into the face groove of the lower surface of the indicator body.

L. Orient the slots of the indicator body to the threaded holes of the resolver cover and install the body onto the indicator until snug with the resolver cover. Orient the lens of the beacon to display the same position (the fully closed position [as shown]).

M. Install washers onto each of the four screws. Apply Loctite 243 to the threads of screws and install screws through the slots of the beacon into the resolver cover. Torque screws to 9 lb.- inches, ± 1 lb.- inch.

N. After adjustments are complete, torque resolver cover screws to 17.5 lb – in, ± 2.5 lb.- inch.

Note: Indicator must show the same position orientation as indicator which was removed.

⚠WARNING

The resolver cover screws must be properly torqued to prevent moisture or dust ingress following any maintenance, adjustments, or hardware replacement.

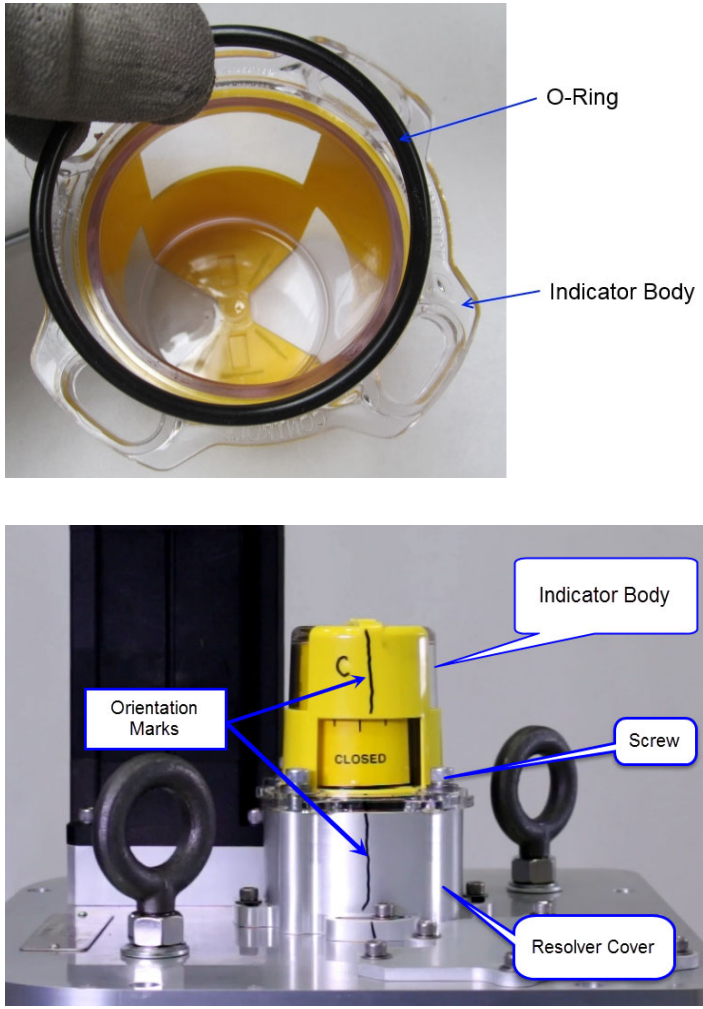


Figure 5-8. Install the Indicator Body

5.4 Verification & Calibration

A. Connect the DVP to the LERA actuator and apply electrical power to the DVP.

B. Open and close the valve several times.

C. Ensure no errors and/or alarms are activated when performing Step B.

D. Verify that the indications "Open" and "Closed" are displaying correctly.

⚠WARNING

The valve has a high spring force and sharp elements. To prevent serious injury, DO NOT place hands or fingers inside the valve.

⚠WARNING

EXPLOSION HAZARD

Do not connect/disconnect electrical connectors unless power has been switched off or the area is known to be non-hazardous.

6. REVISION HISTORY

REVISION DATE	REVISION LETTER	DESCRIPTION OF CHANGE	PAGE #
01/2022	B	Updated the introduction section	6

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