WOODWARD

Component Maintenance Manual
Bronze Level

Product Name: Rotary Valve Platform-200 (RVP-200)

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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 of 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 RVP-200.

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 literature referenced within this document.

1.1 Regulatory Compliance

The RVP-200 is subject to safety regulatory certifications. See product manual **26539** for additional details. The service center performing the work on the RVP-200 must not alter the construction such that the certifications are invalidated.

⚠WARNING

Explosion Hazard — Do not remove covers or connect/disconnect electrical connectors unless power has been switched off.

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

High Voltage

Before performing any maintenance, always disconnect power and any hazardous voltages that may be connected. Follow all appropriate lockout/lockdown 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

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.

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.

1. 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.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
   - Do not touch any part of the PCB except the edges.
   - Do not touch the electrical conductors, connectors, or components with conductive devices or with your hands.
   - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately place the old PCB in the antistatic protective bag after removing it from the control cabinet.

1.4 List of Woodward Literature

Required Documents	
Manual **26539** –	Rotary Valve Platform (RVP-200)
Installation Drawing **9999-1731-3 –**	Kit, RVP 200, Position Switch
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*

Woodward software download section website: http://www.woodward.com/publications

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

1.5 List of Required Hardware or Materials

Special Tool(s)	• 1013-2324 - RVP Shaft Seal Installation (Non-IECEX) • 8996-2347 - RVP Shaft Seal Installation (IECEX)
Torque wrench(es)	• Torque wrench(es) to cover 8 – 62 in.-lb. torque range
Wrench(es)	• Flat wrench; size 7/16 in. • Allen hex key; size from 1/16 to ½ in.
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) • Petroleum jelly to O-ring lubrication • Never Seez - Pure Nickel Special Anti-Seize • Loctite 242 (Loctite Threadlocker Blue 242) • Loctite 272 (Loctite Threadlocker Red 272) • PC computer with Woodward PC Service Tool installed • Ohmmeter
Measuring Equipment	• N/A

NOTICE **Please remember to order special tools separately. The tools are not part of the replacement kit.**

1.6 Woodward Required Software

9927-1771 – RVP-200 Monitor Service Tool.

Woodward Website: www.woodward.com/software

1.7 General Instructions

- Lifting:
  - When lifting the RVP-200, use swivel hoist rings in both lifting eye support locations. Do not stand the valve on the bottom cover studs unsupported as the valve could tip over and cause injury and damage to the valve. Lay the valve horizontally to reduce risk of tipping.
- 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 RVP-200 by hand prior to disassembly to prevent dirt and debris from contaminating the interior.
- For pre-formed packing rings (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.
  - On large O-rings, if a cone is not used, use a pick under the O-ring to lift it onto the part until it is in the desired location.
- Helicoils:
  - To prevent damage to mid-grip helicoils, install screws at a slow speed. DO NOT USE A HIGH SPEED TOOL. Lubricate stainless steel screws with an anti-seize lubricant before turning them into mid-grip helicoils or aluminum parts.
- Disassembly:
  - Parts that are removed and will be reused must be inspected closely for damage and replaced if necessary. Parts that are removed should be kept in a 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 proper direction is specified.

2. POSITION SWITCH REPLACEMENT

2.1 Replacement Kit Description

The purpose of this procedure is to show the correct sequence and method of position switch replacement:

Servo Valve Replacement:
- KIT P/N: 8935-1218 – RVP 200, Position Switch

NOTICE

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

2.2 Disassembly Procedure

NOTICE

Before starting any disassembly, connect to the RVP-200 using the PC Service Tool. Download and save a .wset file from the service unit. Store the settings file on the PC in a place where you can find it for later use. The RVP-200 monitor Service Tool does not provide the capability of saving valve changes or calibration settings.

⚠WARNING

Disconnect power supply before performing any maintenance and/or replacement. Always disconnect power and any hazardous voltages that may be connected and follow all lockout/lockdown procedures.

A. Clean and dry the exterior of the actuator by hand to minimize debris intrusion inside the actuator during the disassembly process.
B. Loosen and remove the four screws securing the indicator to the cover.
C. Slowly remove the indicator housing together with the inner indicator and O-ring.

Note: IECEx models have aluminum spacers under the washers. Retain these spacers for use in assembly.

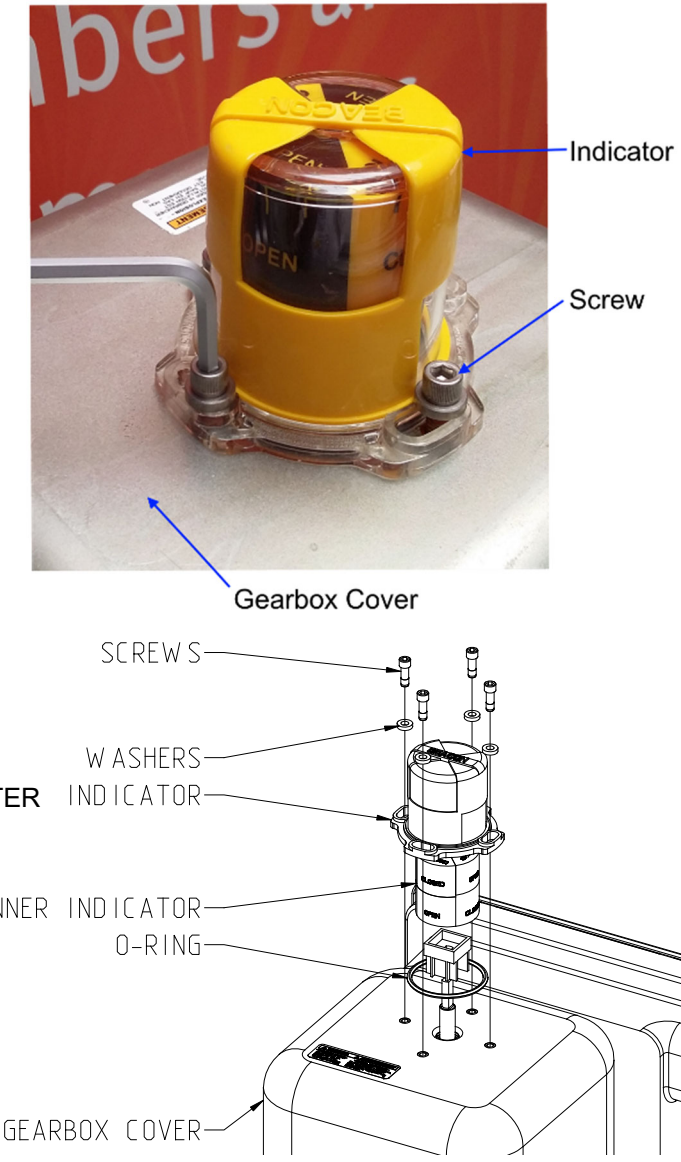


Figure 2-1. Remove Indicator

D. Loosen and remove eight screws from the gearbox cover.
E. Slowly remove the gearbox cover from the valve.

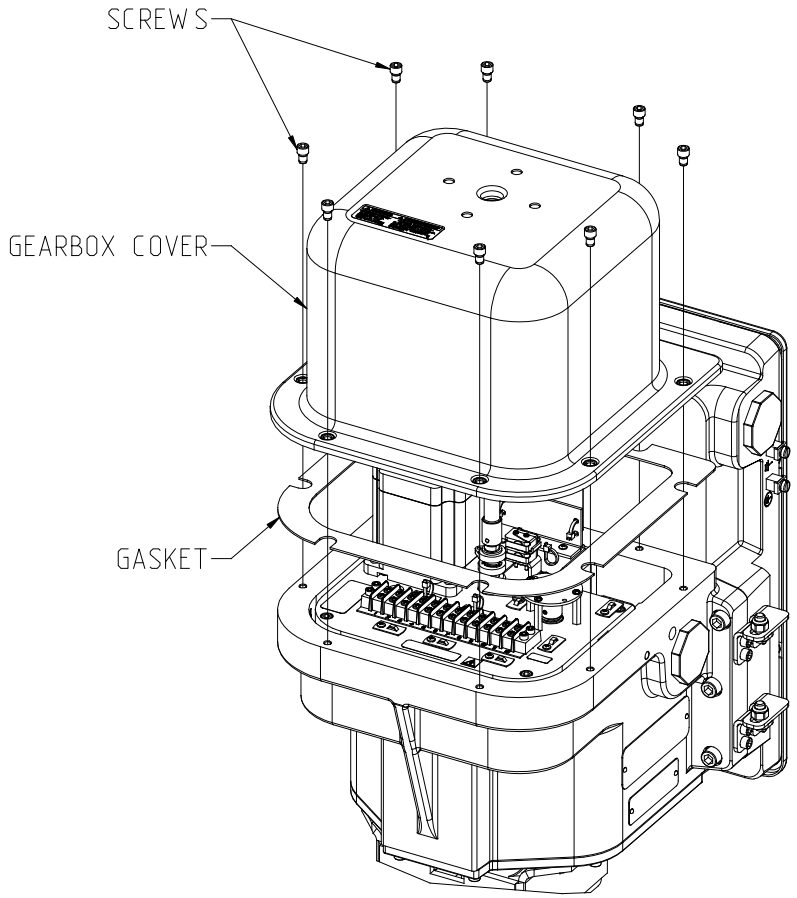
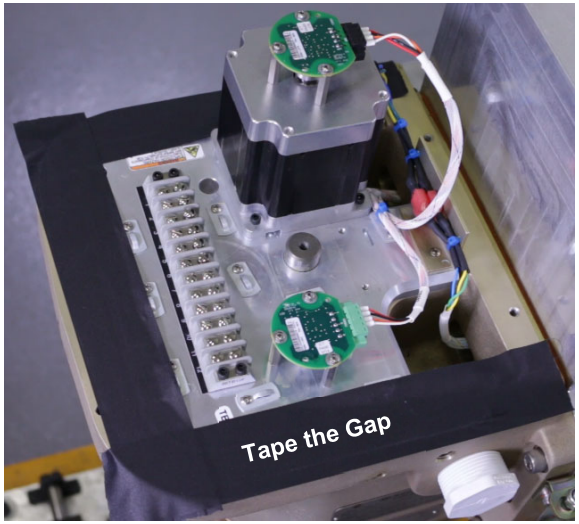


Figure 2-2. Remove Gearbox Cover

F. Loosen the terminal block screws and disconnect the micro switch wires. Cut three cable tie strips.

Note: Apply adhesive tape to cover the gap between the housing and the plate to prevent loss of fasteners and potential damage to the unit.



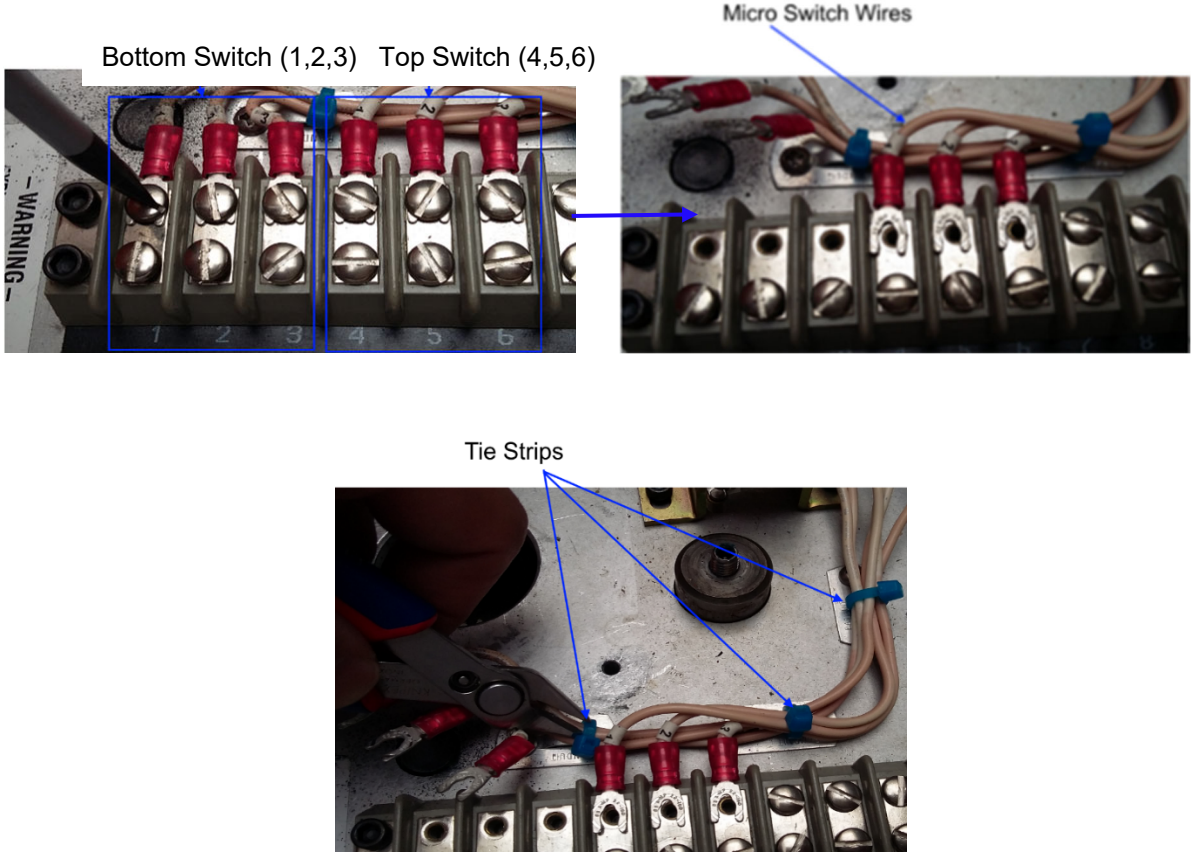


Figure 2-3. Disconnect the Wires of the Micro Switches

G. Loosen and remove two screws that connect the dual micro switch bracket to the upper plate.
H. Remove the micro switch assembly.

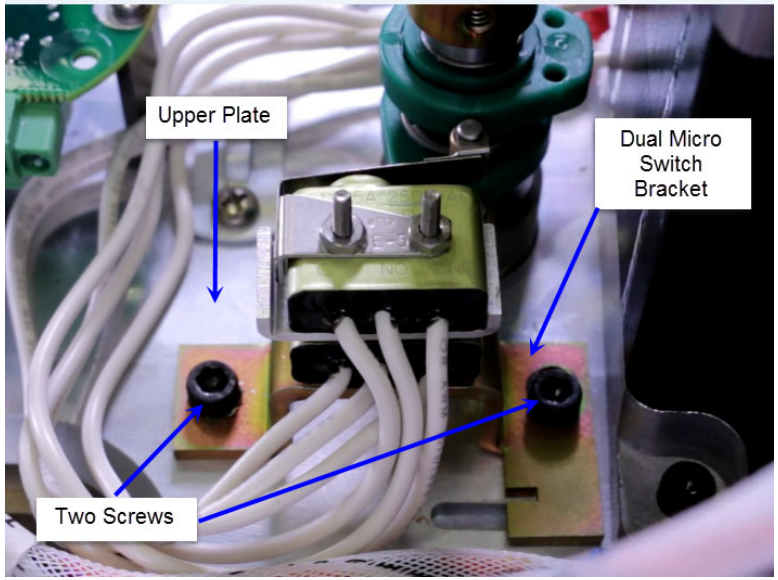


Figure 2-4. Remove the Micro Switch Assembly

I. Loosen setscrew located within the indicator shaft. Remove the indicator shaft.
J. Remove the camshaft assembly from the main shaft (flat wrench 7/16 inch).
K. Clean and inspect the surface of the main shaft.

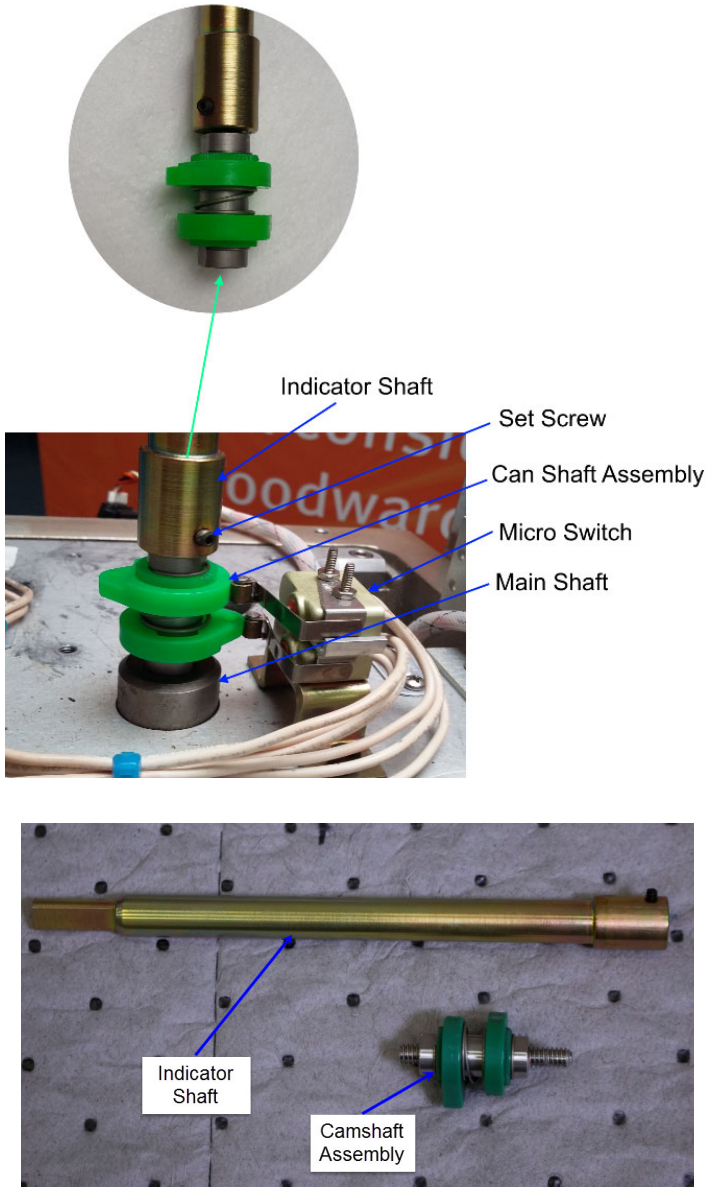


Figure 2-5. Remove the Indicator Shaft with Camshaft Assembly

2.4 Assembly Procedure

A. Check the replacement parts kit to verify all replacement parts listed in the installation drawing are present.
B. Apply Loctite 242 to the end of the main shaft screw and install into the top of the main shaft until the screw bottoms out.
C. Apply a drop of Loctite 242 to the threads of the main shaft screw or the threaded hole on bottom of the cam assembly and install the cam assembly onto the shaft screw. Torque the camshaft to 32.5 ± 2 lb – inch.
D. Apply a drop of Loctite 272 to the indicator shaft screw and install into the top of the cam shaft assembly until the screw bottoms out.
E. Install the indicator shaft onto the indicator shaft screw until the indicator shaft contacts the camshaft.
F. Install the setscrew into the indicator shaft. Install until contact and loosen 1/2 turn. The setscrew will be tightened during the calibration procedure.

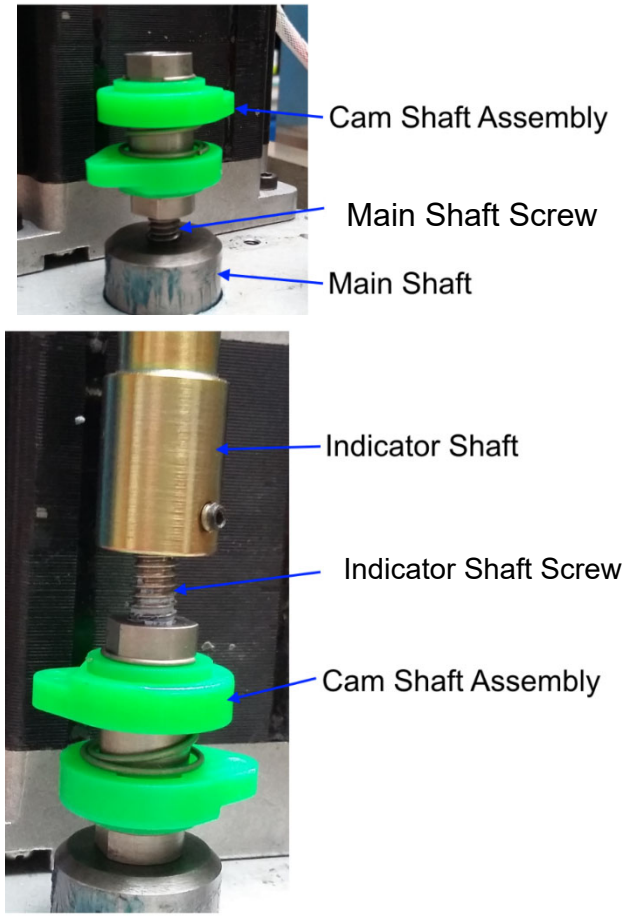


Figure 2-6. Install the Indicator Shaft Together with Camshaft Assembly

G. Orient the dual micro switch assembly with the rollers toward the cams and install the micro switch onto the top plate.

H. Insert the two replacement screws through the micro switch and start the screws into the upper plate.

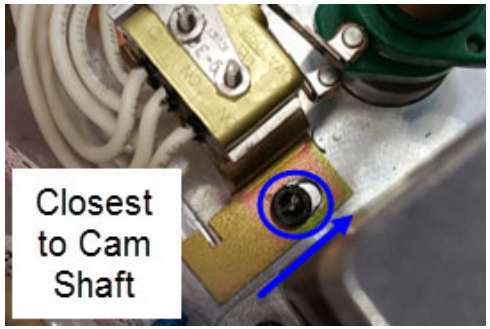
I. Move the micro switch assembly to the position closest to the cam shaft and tighten the two screws. Torque screws to 15-19 in-lb.

J. Route and connect the wires of the micro switches to the appropriate lugs of the terminal strip.

K. Torque the terminal strip screws to 8-10 in-lb.

NOTICE

Do not over-tighten screws on wire terminals. Doing so may result in permanent damage.



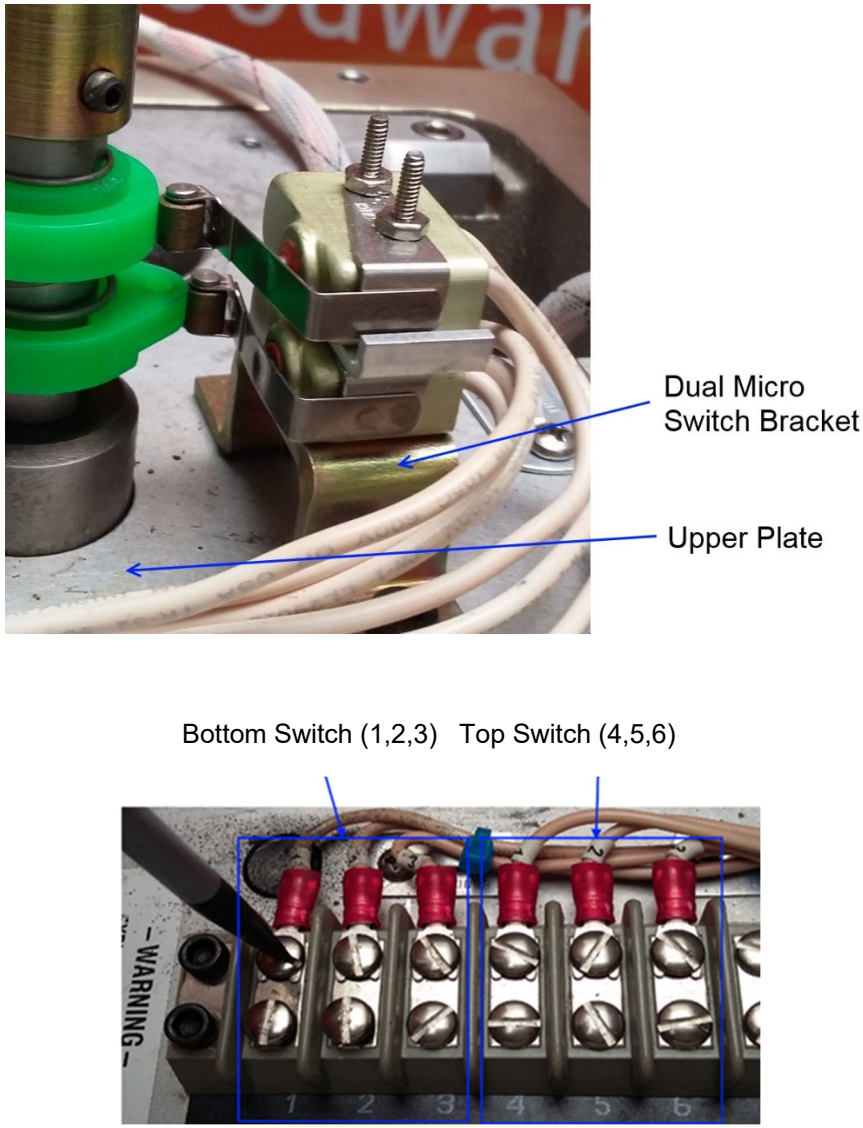


Figure 2-7. Install the Dual Micro Switch Assembly and Wires

L. Secure the wire bundle to the cable mounts with three wire ties.

M. Proceed to **Verification & Calibration** section.

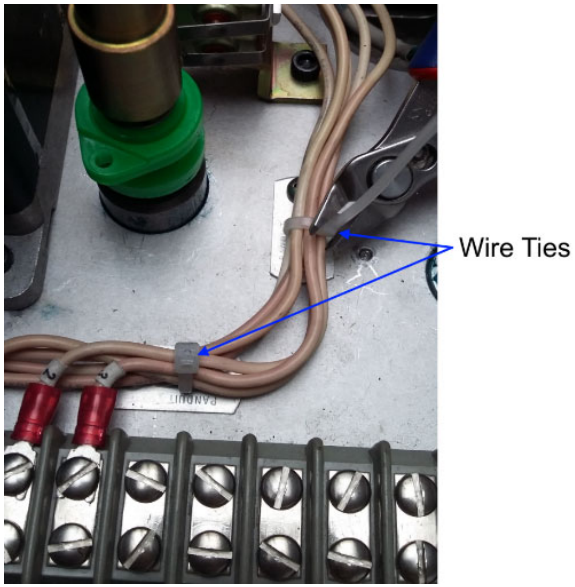


Figure 2-8. Secure the Wire Bundle

2.5 Verification & Calibration

Note: The cams shown in this repair kit may be visually different than the cams in the disassembled unit.

Note: The limit switch cams resist rotation via splines on the camshaft.

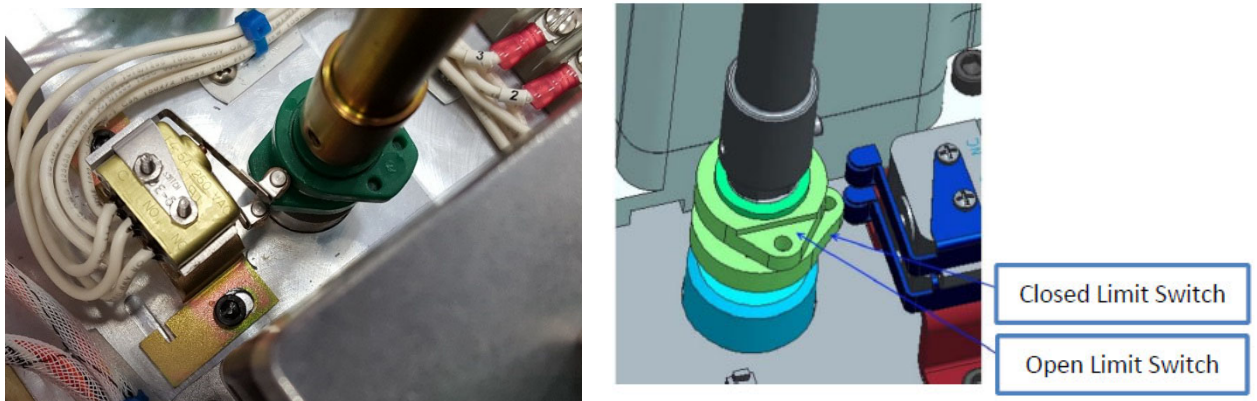
A. To adjust the limit switches position:

- Adjust the fully closed limit switch (bottom location) in the field by pulling up on the cam and rotating.
- Adjust the fully open limit switch (top location) in the field by pushing down on the cam and rotating.

B. Position the cams to be slightly more than 90° apart, as shown in the pictures. This is an initial position only and will be fine-tuned in later steps.

- When closed, the fully closed limit switch cam (bottom location) should contact the bottom roller on the left-most corner.
- When open, the fully open limit switch cam (top location) should contact the top roller on the right-most corner.

Valve Normally Closed (Fail-Closed)



Valve Normally Open (Fail-Open)

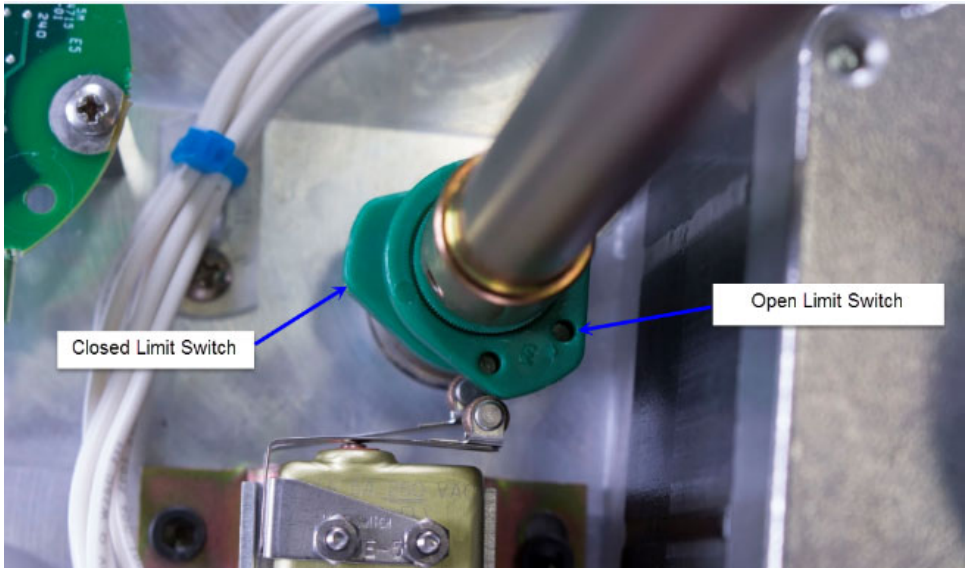


Figure 2-9. Adjust the Limit Switches Position

C. Remove service port cover and connect your PC with the Service Tool installed. Connect unit to a power supply.

WARNING

ELECTRIC SHOCK HAZARD

To reduce the risk of electrical shock, Protective Earth (PE) must be connected to the termination point on the enclosure identified with the symbol.

The conductor providing the connection must have a properly sized ring lug and wire gauge larger than or equal to 12 AWG (4 mm²). The ring lug should be placed between the screw head and star washer on the PE Connection on the housing of the control.

The calibration and checkout procedure should only be performed by authorized personnel. To be authorized, personnel must be knowledgeable of the risks posed by live electrical equipment.

D. Use the Service Tool to position the valve at specific positions during calibration. Refer to the Service Tool product manual for correct operating instructions.

E. Calibrate the fully closed limit switch (bottom location).
   1. Use an ohmmeter or control system between terminals 1 and 2 to verify the state of the closed position limit switch.
   2. Within the close state limits, the meter must show a resistance, signifying that the fully closed limit switch is closed. If it does not, adjust the lower cam counterclockwise one spline at a time until the meter shows a resistance.
   3. Within the open state limits, the meter must show an open circuit, signifying that the fully closed limit switch is open. If it does not, adjust the lower cam clockwise one spline at a time until the meter shows an open circuit.

F. Calibrate the fully open limit switch (top location).
   1. Use an ohmmeter between terminals 4 and 5 to verify the state of the open position limit switch.
   2. Within the close state limits, the meter must show an open circuit, signifying that the fully closed limit switch is open. If it does not, adjust the lower cam clockwise one spline at a time until the meter shows an open circuit.
   3. Within the open state limits, the meter must show a resistance, signifying that the fully closed limit switch is closed. If it does not, adjust the lower cam counterclockwise one spline at a time until the meter shows a resistance.

Note: Reinstall the service port cover after calibration is complete.

Close and open the **closed** position limit switch (lower) within the following positional ranges:

Close Position Limit Switch State	Min Valve Position (%)	Max Valve Position (%)
Close	0	10
Open	10	15

Close and open the **open** position limit switch (upper) within the following positional ranges:

Open Position Limit Switch State	Min Valve Position (%)	Max Valve Position (%)
Close	90	100
Open	85	90

WARNING

The RVP-200 covers must be replaced and the screws torqued to 3.4 to 4.0 N-m / 30 to 35 lb-in to prevent moisture or dust ingress following any maintenance, adjustments, or hardware replacement.

Depending on the valve version, replace the shaft seal according to the following instructions:

Non-IECEx Assembly:

G. Remove the shaft seal from the gearbox cover.

H. Install the shaft seal into the counterbore of the top of the gearbox cover using tool 1013-2324.

Note: Install the seal with the open end oriented up away from the gearbox.

IECEx Assembly:

I. Remove the shaft seal from the gearbox cover.

J. Retain the washer within the counterbore of the top of the gearbox cover.

K. Install the shaft seal into the counterbore of the top of the gearbox cover using tool 8996-2347.

Note: Install the seal with the open end oriented down towards the gearbox.

For both Non-IECEx and IECEx assemblies:

L. Remove the adhesive gasket completely from the gearbox cover. Clean the surface using the Isopropanol cleaning fluid.

M. Carefully install the new gasket. Make sure that the gasket adheres to the entire surface of the gearbox cover.

⚠WARNING

Do not damage seals during installation. Shaft seals and cover gasket provide protection from dust and water ingress for IECEx/ATEX Zone 2 Certification.

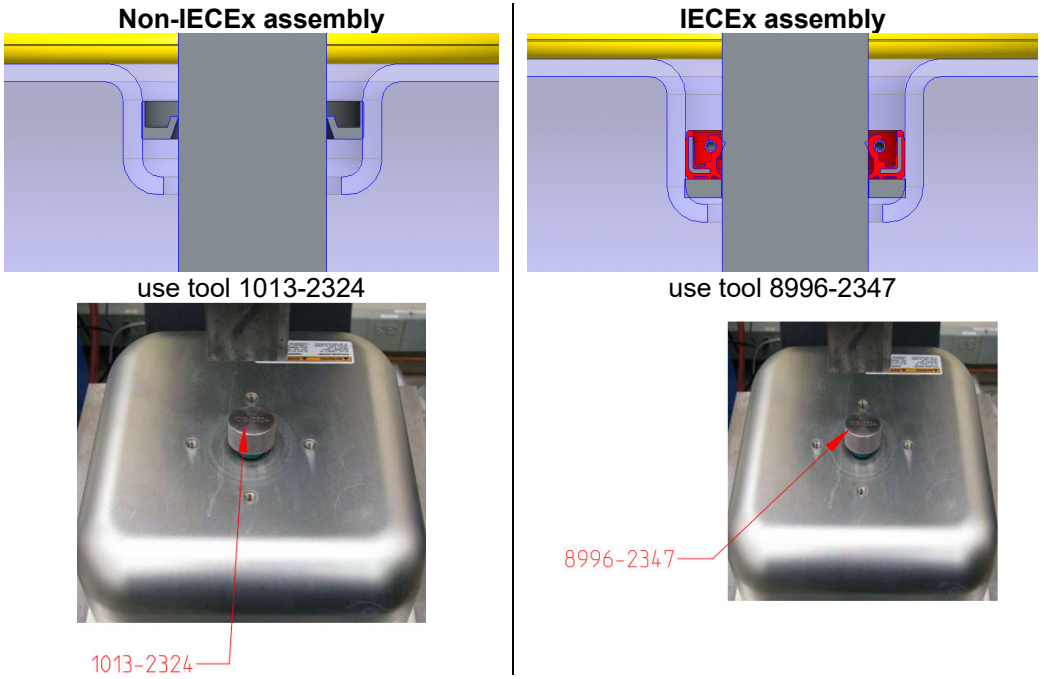


Figure 2-10. Gasket and Shaft Seal Replacement

N. Remove the adhesive tape from the case. Place the gearbox cover on the case, but do not install the eight screws.

O. Place the inner indicator on the shaft, then place the outer indicator so that the inner and outer indicator cover screw holes align with the attachment slots in the indicator. Ensure valve is in closed position.

P. Note the position of outer indicator and then remove outer indicator.

Q. Rotate the inner indicator and shaft until the position reads closed.

R. Carefully remove inner indicator so that the shaft position does not change and remove gearbox cover.

S. Tighten the indicator shaft setscrew and torque to 8-10 lb. – in.

T. Install the gearbox cover and secure it with eight screws. Torque screws to 32.5 ± 2.5 lb. – inch.

U. Reinstall the inner indicator.

V. Install the O-ring into the counterbore of the base of the outer indicator assembly.

W. Orient the outer indicator for “fail open” or “fail closed” per the assembly being built and install the outer indicator over the inner indicator down to the gearbox cover.

X. **For Non IECEx models:** Install washers and four screws through the flange of the indicator into the gearbox cover. Torque screws to 9 ±1 lb – in.

Y. **For IECEX models:** Install aluminum spacers, washers, and four screws through the flange of the indicator into the gearbox cover. Torque screws to 58-62 lb – in.

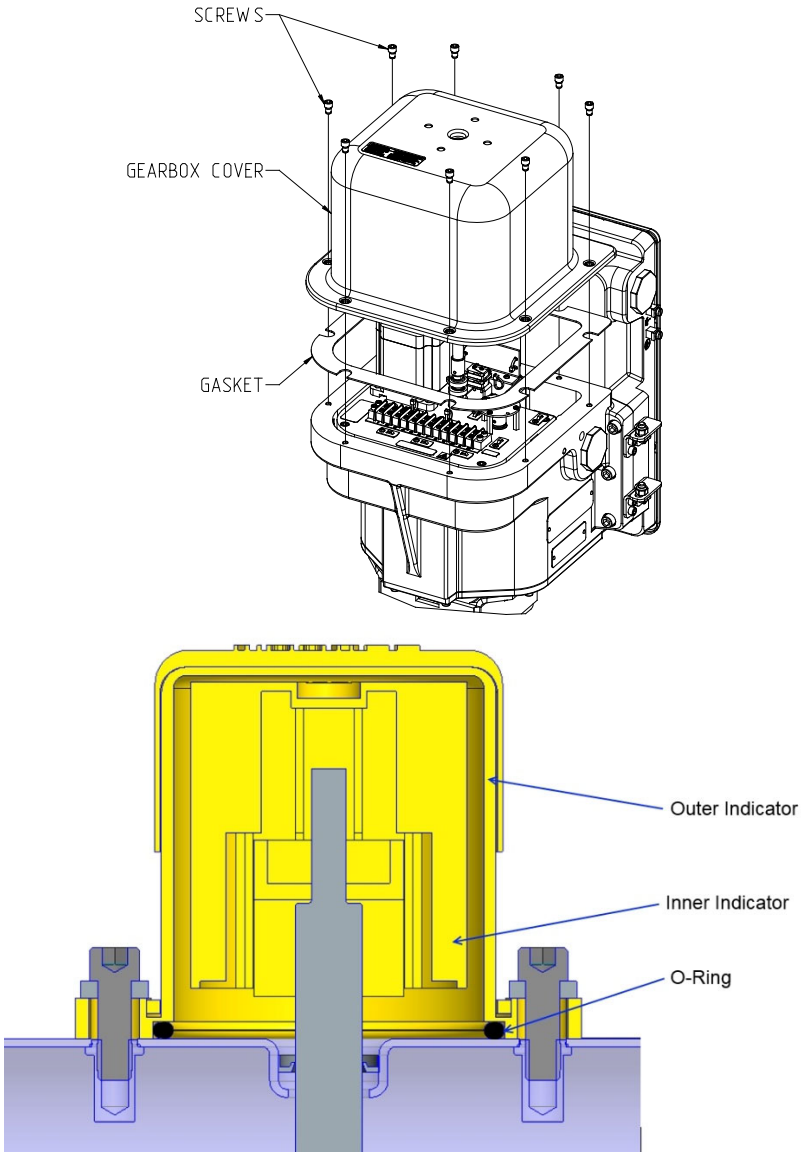


Figure 2-11. Install Gearbox Cover and Position Indicator

3. SLEEVE AND SEAT REPLACEMENT

3.1 Replacement Kit Description

The purpose of this procedure is to show the correct sequence and method of sleeve and seat replacement with the actuator still attached.

Sleeve and Seat Replacement:
- KIT P/N: 8935-1021– RVP 200, VALVE SEAT, 3 INCH
- KIT P/N: 8935-1019 – RVP 200, VALVE SEAT, 4 INCH
- KIT P/N: 8935-1023 – RVP 200, VALVE SEAT, 6 INCH

Valve Service Tool:
- P/N: 9927-1772 RVP 200, Configuration Service Tool

Review the installation drawing before starting the replacement (Chapter 1.5).
Follow all steps in this procedure. Please contact Woodward if there are any questions.

3.2 List of Required Hardware or Materials

Special Tool(s):	• 8923-3144 RVP Seat Leakage Test Kit • 8923-3142 Crush Flange Tool, 300 class • 8923-3143 Crush Flange Tool, 600 class
Torque Wrench(es):	• Torque wrench(es) to cover 30 lb-in – 1800 lb-in (150 lb-ft) torque range
Wrench(es):	• Flat wrench; size from 1/8 to 1 ¼ inch • Allen hex key; size from 1/8 to ½ inch • Socket wrench; size from 1/2 to 1-1/2 inch
Others:	• Lifting strap (minimum capacity 1000 lb / 455 kg) • Isopropanol cleaning fluid • Petroleum jelly for O-ring lubrication • Never-Seez - Pure Nickel Special Anti-Seize • Penetrating oil (PB Blaster recommended) • Power supply for RVP • RS232 serial cable

3.3 Disassembly Procedure

NOTICE

Before starting disassembly, connect to the RVP-200 using the Configuration Service Tool. Download and save a .wset file from the service unit. Store the settings file on the PC in a place where you can find it for later use. Woodward always recommends taking an initial seat leakage measurement before disassembling the valve. See steps O-Q.

⚠CAUTION

Valve elements can move suddenly. Keep hands clear at all times.

A. Use penetrating oil per the manufacturer's recommendations on the carrier seat plate screw, sleeve screws, and radial jam screws.

B. Remove the eight socket head cap screws that retain the driver cover.

C. Position valve assembly so that both inlet and outlet are accessible.

Note: Valve must be powered with control software connected (PN#: 9927-1772).

⚠WARNING

Ensure the valve is securely positioned to avoid any accidents.

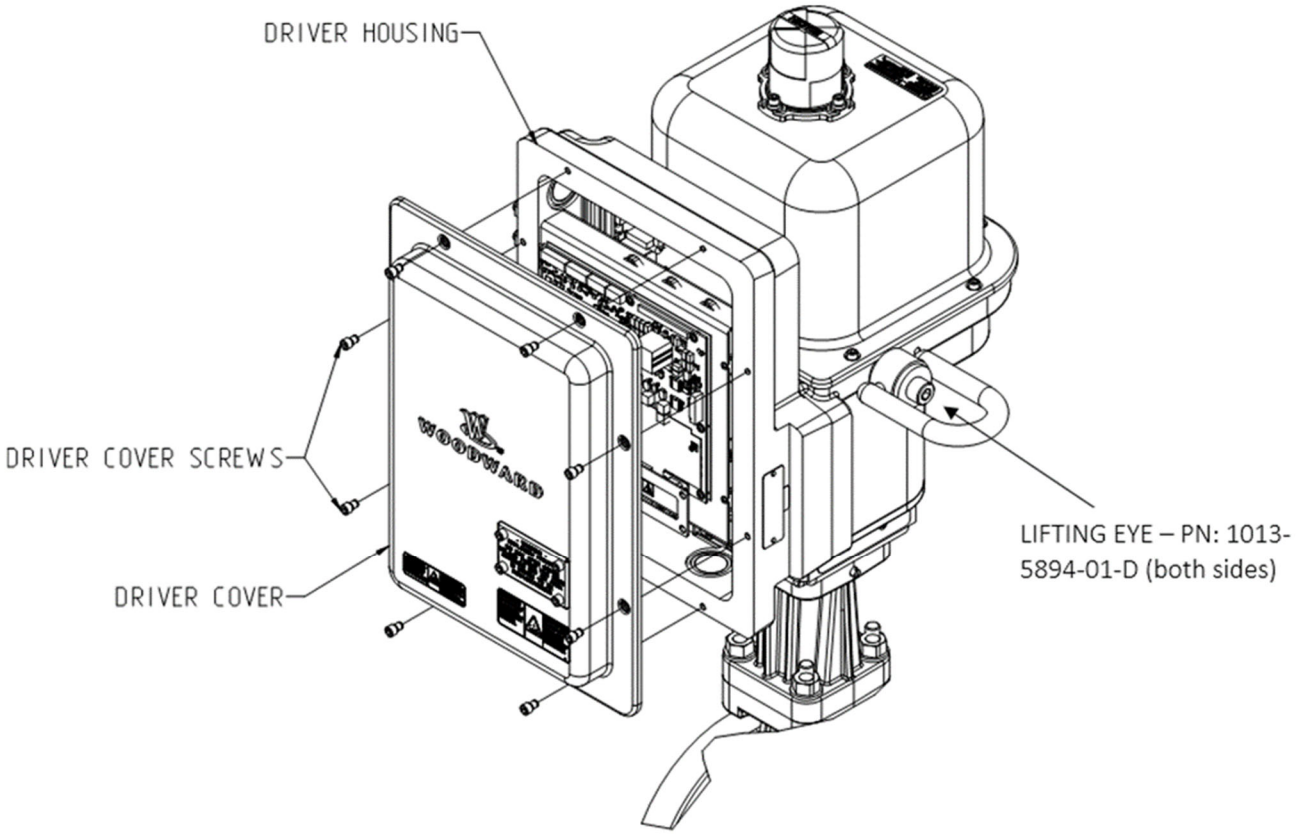


Figure 3-1. Remove Driver Cover

D. Loosen the carrier seat plate screw from the seat plate nut by a half turn. The screw is located inside the carrier.

Note: The screw can be very difficult to remove due to use at high temperatures. Use an impact driver to loosen the screw initially. An effective alternative method is to strike difficult screws with a bronze punch.

E. Command the valve fully open.

F. Remove the sleeve screws and washers from each of the four holes of the valve housing radially around the outside flange of the sleeve.
   a. Some RVP models have both axial and radial sleeve retaining screws.
      1. Backup radial jam screws must be removed; dog point radial screws must be loosened, but do not have to be removed.
      2. Sleeve screws and washers must be removed.

Note: Do not force screws. Re-lubricate if difficult to remove or if squeaking occurs.

G. Remove the sleeve and spiral gasket from the inlet bore of the valve housing.

H. Command valve shut.

I. Remove the carrier seat plate screw from the seat plate nut. Then remove the seat plate nut and seat plate.

Note: When removing the carrier seat plate screw, hold the nut firmly against the seat plate to prevent shearing the locating pin.

J. Clean and inspect all surfaces of the valve housing, carrier, and seals. Remove corrosion and contamination. Only chemical cleaning is allowed. Use Isopropanol cleaning fluid.

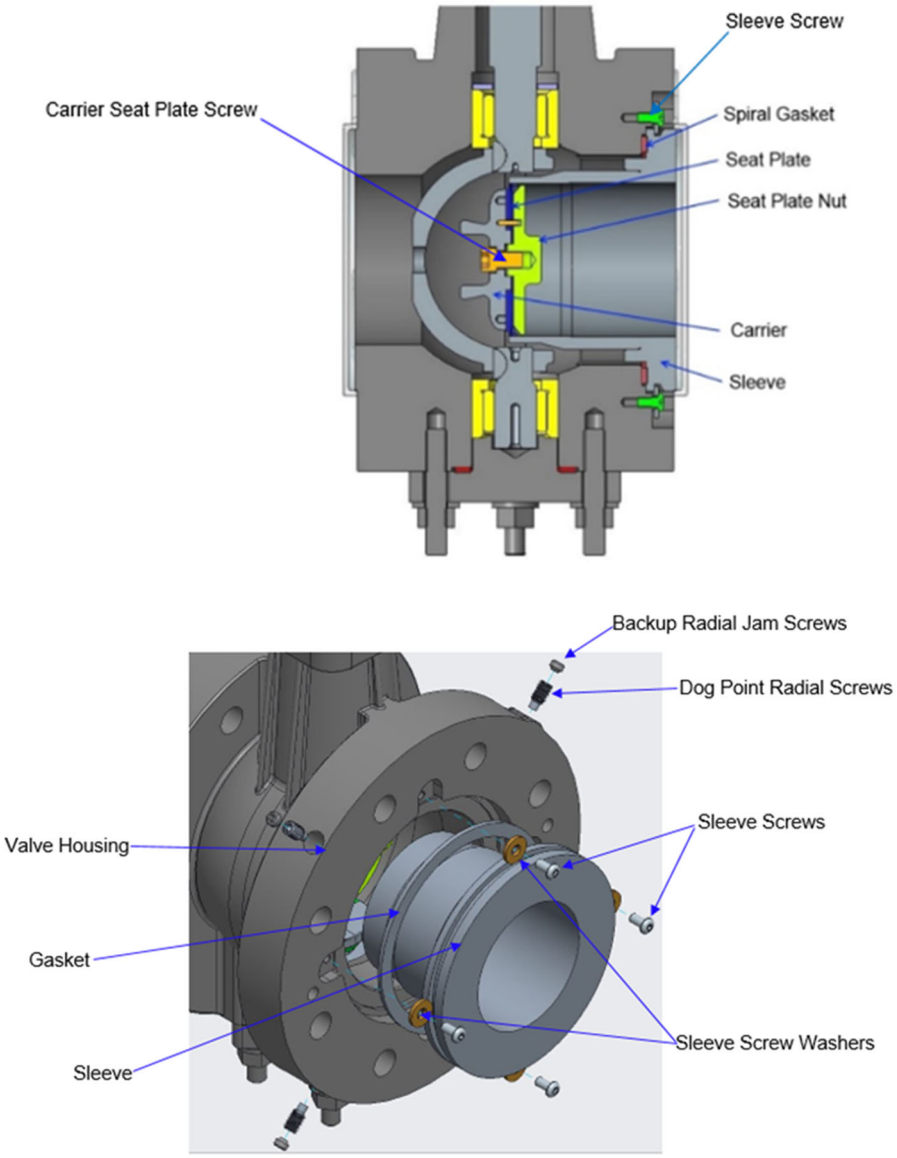


Figure 3-2. Removing the Seat Plate and Sleeve

3.4 Assembly Procedure

Note: Take extra precautions to prevent damage to the serrated flange face.

A. Install the new seat plate onto the carrier, aligning the small anti-rotation hole in the seat plate with the locating pin in the carrier.
B. Orient the seat plate with the lip positioned upwards. Align the locating bore in-line with the locating pin and place onto the carrier.
C. Reinstall the seat plate nut onto the carrier with the locating pin in the bore of the nut.
D. Apply NEVER SEEZ - Pure Nickel Special Anti-Seize or equivalent to the threads of the carrier seat plate screw and install the screw through the carrier into the seat plate nut.
E. Hand-tighten the carrier seat plate screw at this step, then loosen 1/8 of a turn. A later step specifies instructions for when to apply torque.

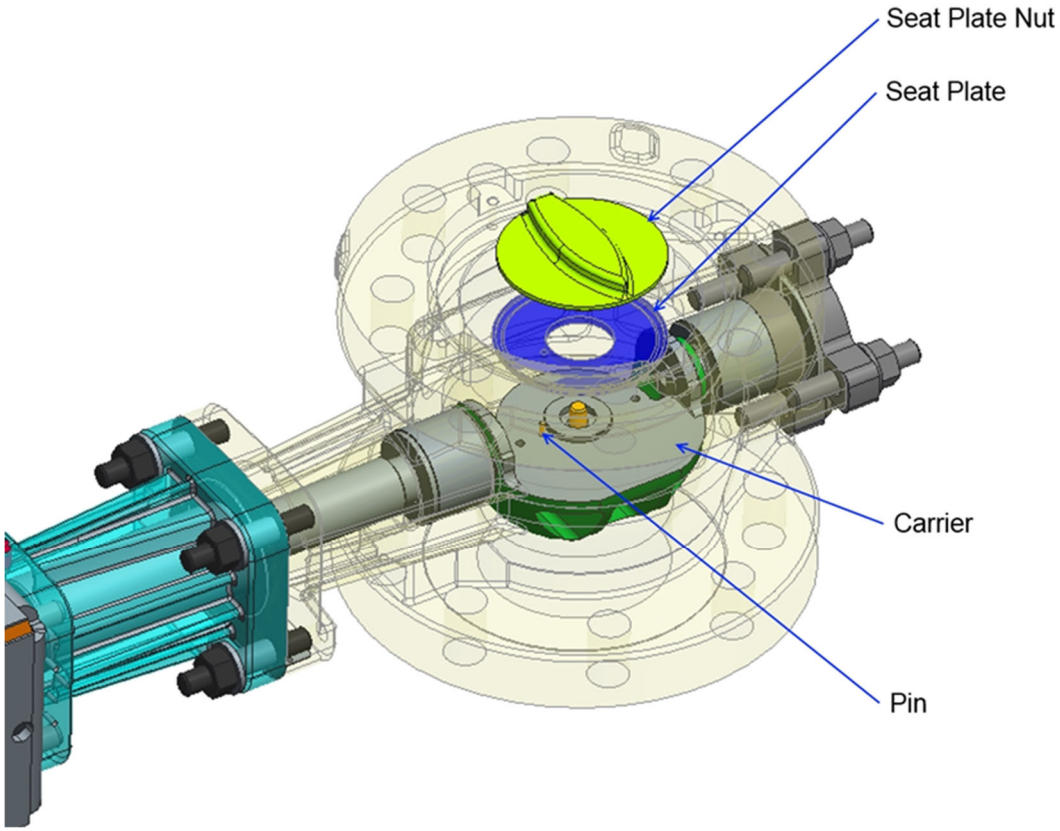


Figure 3-3. Reposition the Valve Assembly, Orient the Seat Plate

F. Reposition the valve assembly to position the inlet bore of the valve housing upwards.

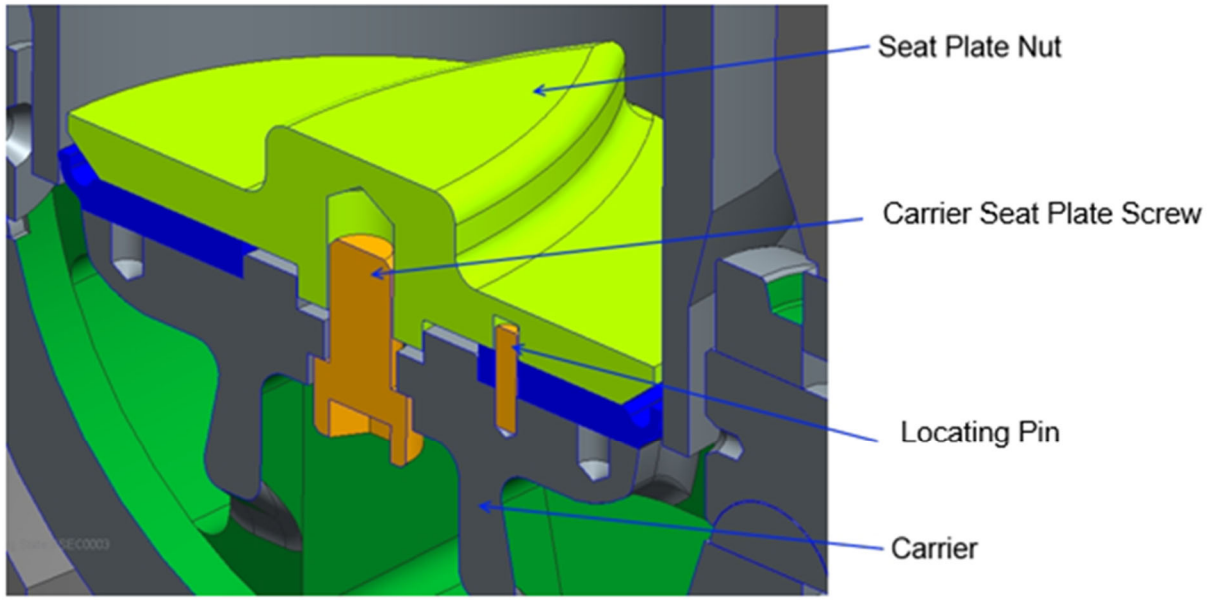


Figure 3-4. Install the Seat Plate and Seat Plate Nut

G. Command valve fully open. Position the valve with sleeve up.

H. Install the spiral gasket in the counter bore of the inlet flange of the valve housing.

I. Install the sleeve into the inlet bore of the valve housing and center it lengthwise along the vertical axis of the valve over the seat plate.

NOTICE

Ensure the valve is in the open position during sleeve installation.

⚠WARNING

The RVP-200 contains a mechanical spring under load. Keep clear and use caution.

J. Apply NEVER SEEZ - Pure Nickel Special Anti-Seize or equivalent to the threads of the sleeve screws. Install one washer and screw into each of the holes of the valve housing radially around the outside flange of the sleeve. Hand-tighten the screws until the washers contact the flange of the sleeve and then back off 1/8 of a turn so that the washer moves freely. Ensure the washer is in the groove of the inlet sleeve (Figure 3-6).

Note: Use a small screwdriver or pick to push washers deeper into the groove in the sleeve as needed.

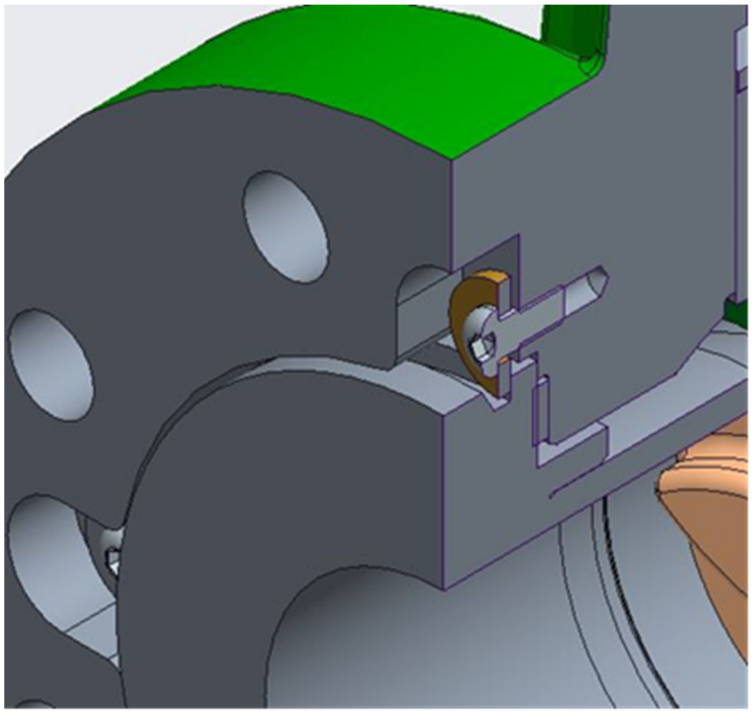


Figure 3-5. Install Spiral Gasket and Sleeve

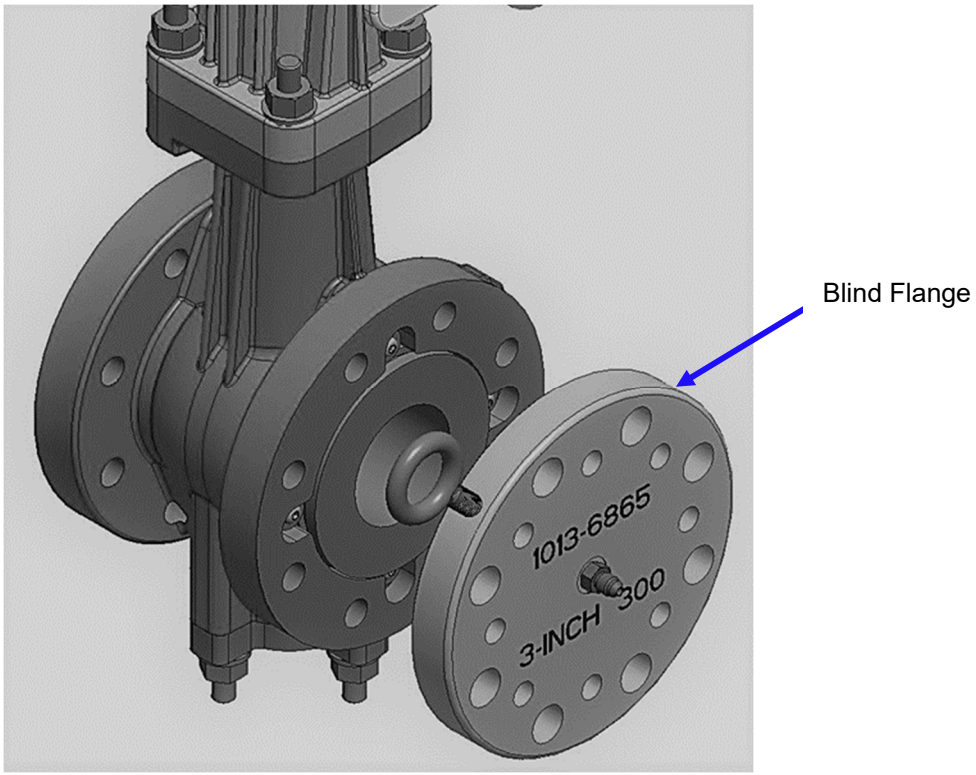
K. Command the valve closed using the Service Tool. This critical step will align the disk and sleeve.

L. Attach the blind flange gasket crushing tool (see table) to the flange of the valve housing. Torque flange screws to the torque specification per the valve size being assembled.

Note: The torque steps up from 50 to 100 to 150. Begin with the diamond pattern, then the circle pattern, and finish with the square pattern (see diagrams and torque values on the next page).

IMPORTANT

For blind flange tool part numbers, refer to the table in Section 3.2.

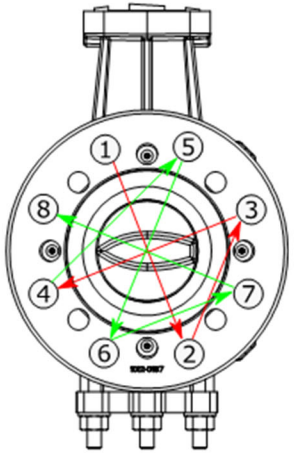


Refer to ASME B16.5 Standard for Proper Screws and Nuts Sizes

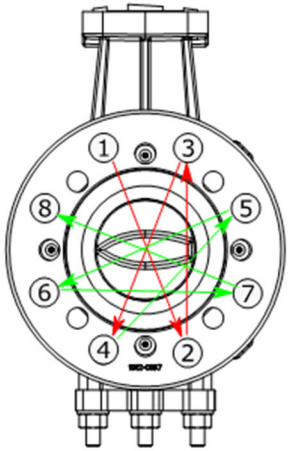
Figure 3-6. Blind Flange Tool

THREE AND FOUR INCH FLANGE TORQUING PATTERNS AND VALUES

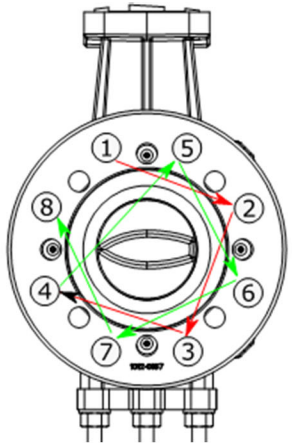
1. DIAMOND PATTERN
50 LB-FT



2. CIRCLE PATTERN
100 LB-FT

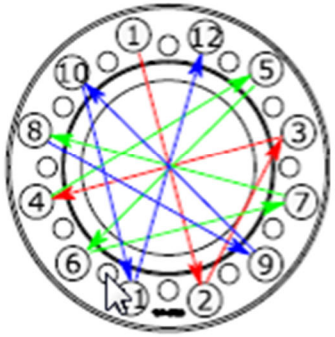


3. SQUARE PATTERN
150 LB-FT

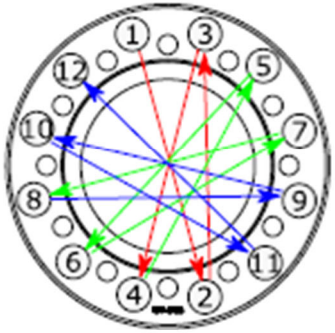


SIX INCH FLANGE TORQUING PATTERNS AND VALUES

1. DIAMOND PATTERN
50 LB-FT



2. CIRCLE PATTERN
100 LB-FT



3. SQUARE PATTERN
150 LB-FT

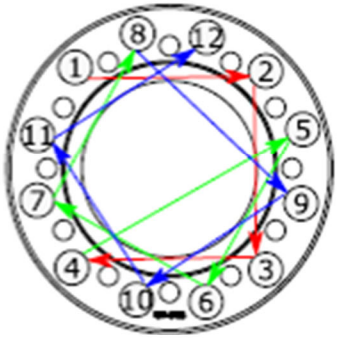


Figure 3-7. Torquing Patterns and Values.

M. Torque the **carrier seat plate screw** (see table).

Carrier Seat Plate Screw Torque Values

Valve Class	Valve Size	Tool P/N
300/600	3 inch	10.5 lb-ft ± 0.5 lb-ft
300/600	4 inch	29.5 lb-ft ± 2.5 lb-ft
300/600	6 inch	75 lb-ft ± 5 lb-ft

N. Torque the **sleeve screws** to the appropriate specification per the valve size (see table).

Sleeve Screw Torque Values

Valve Class	Valve Size	Torque Value
300/600	3 inch	70 lb-in ± 5 lb-in
300/600	4 inch	70 lb-in ± 5 lb-in
300/600	6 inch	95 lb-in ± 5 lb- in

Note: Some RVP models have both sleeve screws and dog point radial screws. Torque the dog point radial screws to 17 lb-ft ±1 lb-ft after leak test is **complete.** Torque the backup jam bolt to 8.5 lb-ft ±0.5 lb-ft after leak test is **complete.**

O. Connect the seat leakage test components as seen in Drawing 9999-3326 below:

Note: The inlet pressure to the leakage test system should be at least 75 PSI.

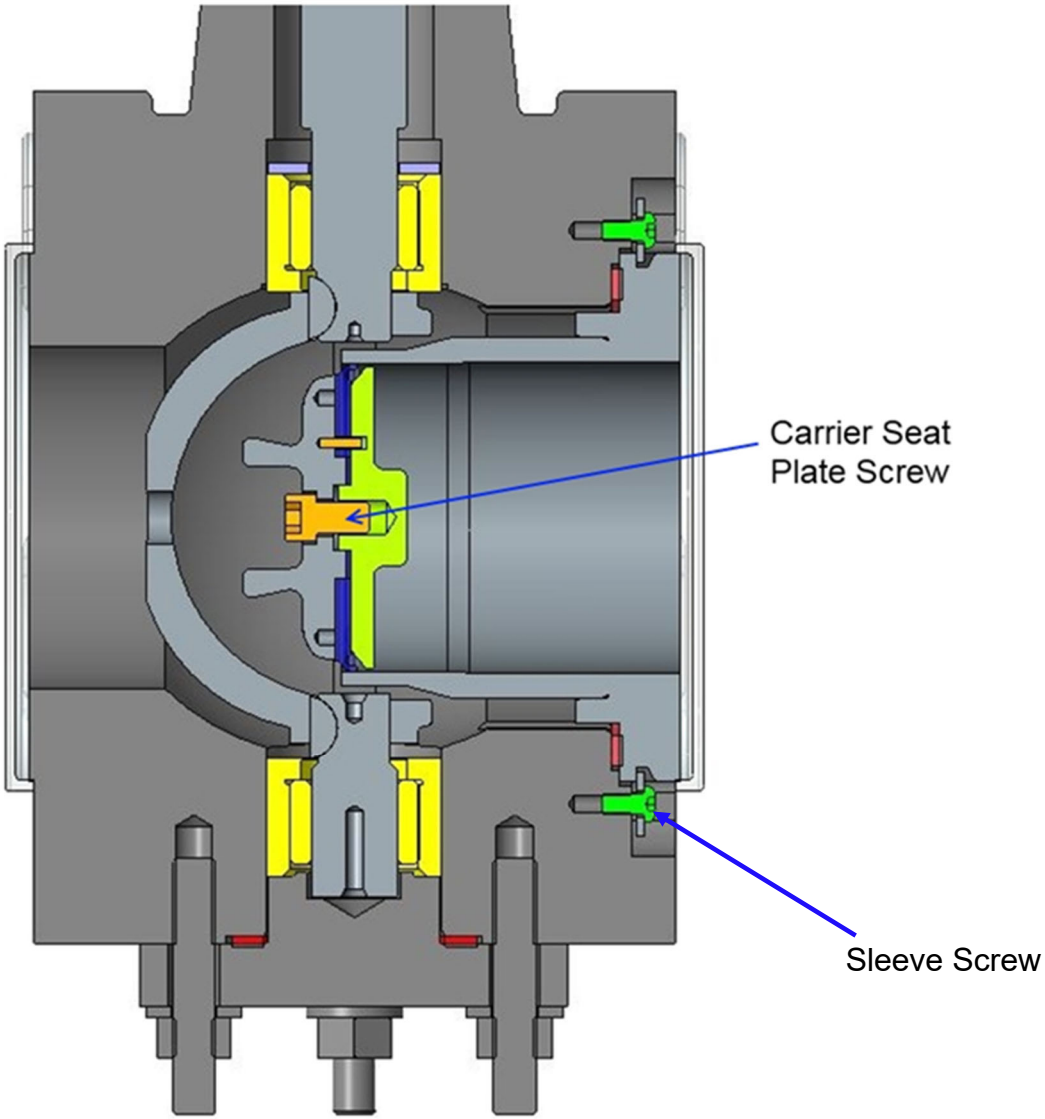


Figure 3-8. Torque the Carrier Seat Plate Screw and Sleeve Screw

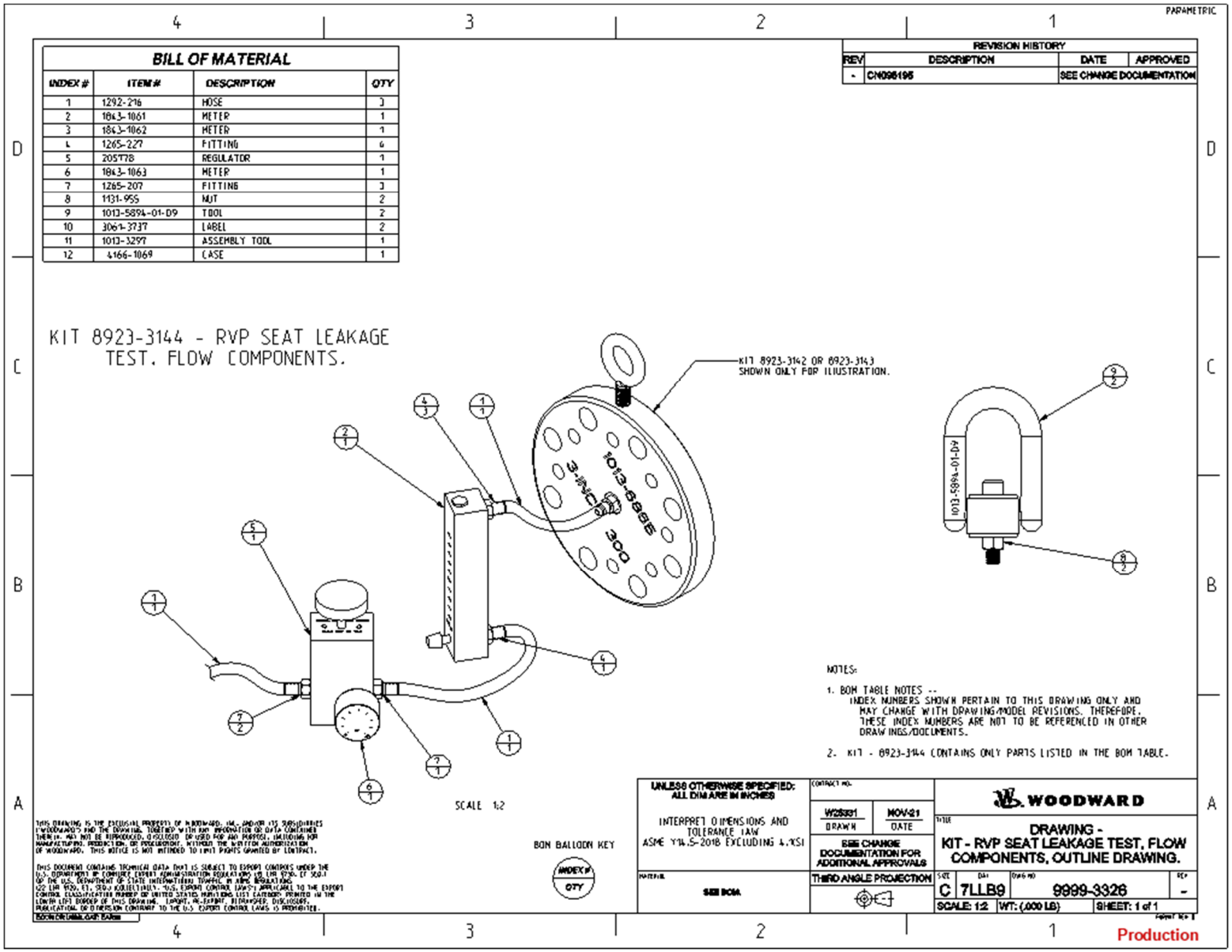


Figure 3-9. Connect Seat Leakage Test Components

P. Configure pressure regulator to output 50 PSI. Ensure leakage is under the allowable tolerances seen in the table below:

RVP	SCFH	SLPM	SCCM
3 inch	25.83	12.19	12192.04
4 inch	50.47	23.82	23821.00
6 inch	91.86	43.35	43354.86

Standard Cubic Feet Per Hour (SCFH)= SCCM/471.947

Standard Litre Per Minute (SLPM)= SCCM/1000

Standard Cubic Centimeters Per Minute (SCCM)= (SCFH*(30.48^3))/60

Note: Use sticker on meter to read correct values when reading on the same side as pressurization.

Q. If leakage does not meet the required maximums, loosen the carrier seat plate screw and the sleeve screws. Open and close the valve to reposition the carrier and sleeve. Retorque per manual above. Repeat as needed (up to 5 times).

Note: If the valve refuses to pass leakage test, contact Woodward for further assistance.

R. When the valve passes leakage test, install and torque dog pint radial screws and backup radial jam screws.

S. Remove leakage test kit and blind flange tool. Take care not to mar the crushed gasket and serrate flange face.

T. When installing valve into pipe, follow the torquing instructions laid out in step L.

Woodward provides training on the usage of this kit. For more information, please reach out to industrialsupport@woodward.com

4. REVISION HISTORY

REVISION DATE	REVISION LETTER	DESCRIPTION OF CHANGE	PAGE #
12/2021	A	Revised Figure 2-3	13
5/2022	B	Added Chapter 3 “Sleeve and Seat Replacement”	24-37

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PO Box 1519, Fort Collins CO 80522-1519, USA
1041 Woodward Way, Fort Collins CO 80524, USA
Phone +1 (970) 482-5811
Email and Website—www.woodward.com

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