

3000 Series Swivel Manual

1) Tight Seals

- O-Rings provide a tight seal without hindering swivel action
- Accurately machined and micro-finished grooves provide for minimal seal wear
- Available in Buna-N, Fluorocarbon, PTFE Encapsulated Silicone, EPDM, Neoprene, Kalrez[®] and other seal materials as required

2) True Ball Bearing Race Alignment

- Body and tail sections are locked together by a double row of ball bearings
- Raceways are machined to precise tolerances
- Double raceway design assures proper alignment and prevents binding caused by temperature changes and heavy radial loads
- Carbon steel swivels have hardened races to maximize load-carrying capability

3) Protected Bearing Chamber

- Protective inner O-ring seal prevents product from entering bearing chamber
- Outer seal keeps rain, dirt, and other contaminants out
- Both seals hold in lubrication

4) Long-Life Bearings

- Ball bearings are hardened, precision-ground steel
- Stainless steel swivels have stainless steel bearings
- All OPW swivels are available with stainless steel bearings on special order

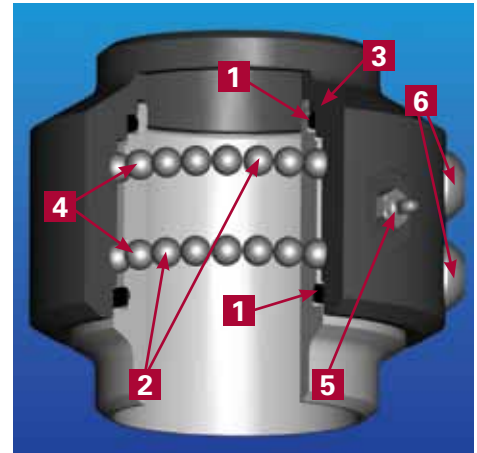
5) Easy Lubrication

- All OPW swivels are pre-lubricated at the factory
- All 3/4", 1", and submerged swivels are permanently lubricated

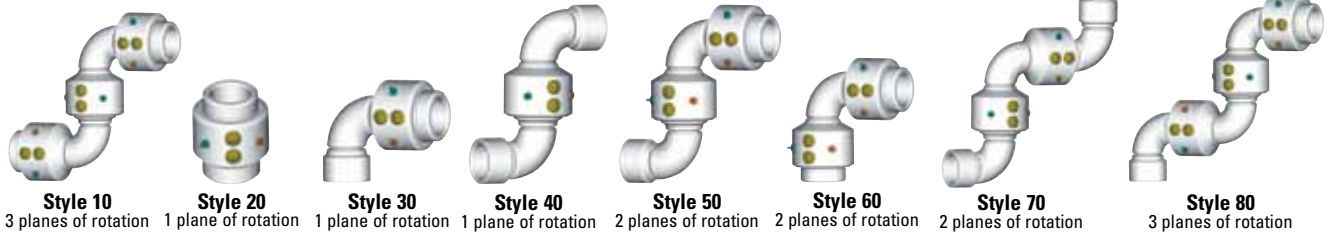
- A grease fitting between races that accepts a standard grease gun is available for swivels that require field lubrication
- Non-lubricating swivels are available on special order
- Most styles come with a grease relief to prevent over-greasing

6) No Field Adjustment Necessary

- Balls are held in place by factory-installed plugs that never need to be adjusted to maintain bearing performance



ORDERING GUIDE



Style (Planes of Rotation)

Construction

| | |
|---|-------------------------------------|
| Conventional Hose Reel Swivels | 26 - Aluminum Hose Reel |
| | 28 - Ductile Iron Hose Reel |
| Conventional Swivels | 32 - Steel, High Pressure Cast |
| | 33 - Bronze |
| | 34 - Steel, Fabricated |
| | 36 - Aluminum |
| | 37 - 316 Stainless Steel, Cast |
| | 38 - Ductile Iron |
| Endura Split Flange Swivels | 39 - 316 Stainless Steel, Fab. |
| | 74 - Steel Endura LPG Hose Reel |
| | 79 - 316 SST Endura LPG Hose Reel |
| | 82 - Steel Endura DSF Single Race |
| | 84 - Steel Endura DSF Dual Race |
| | 87 - 316 SST Endura DSF Single Race |
| 89 - 316 SST Endura DSF Dual Race Alloy 20, Hastelloy [®] , Monel [®] , Duplex, and other materials available | |

Style 44 is drop tube swivel w/handle. Styles 35, 45, 55 have threaded boss. Styles 56, 58 76, 78 have spring balance attachment lugs.

3420F - 0403

End Connections

| | |
|------------|---|
| F | - 150 lb. ANSI flange both ends |
| F3 | - 300 lb. ANSI flange both ends |
| FFT | - 150 lb. ANSI flanged inlet x TTMA tank truck flange outlet |
| FJ | - For submerged use, 150 Lb. ANSI flange both ends |
| FO | - 150 lb. flange x female NPT threads |
| FSB | - 150 lb. flange both ends, with spring balance attachment lugs |
| FT | - TTMA tank truck flange both ends |
| FTH | - TTMA tank truck flange both ends, with handle |
| VO | - Victaulic [®] x female NPT threads |
| FTO | - TTMA tank truck flange inlet x female NPT threaded outlet |
| J | - For submerged use |
| LFT | - Long swivel joint with TTMA tank truck flanges |
| TFT | - Female NPT threaded inlet x TTMA tank truck flange outlet |
| VOG | - Female NPT threads x Victaulic [®] groove, hard coat anodized aluminum |
| W | - Beveled for welding both ends |

NO SUFFIX LETTER indicates Female NPT threads both ends. 300 lb. flanges available on some models. BSPT threads available.

Seal Materials

| | |
|---|--------------------------------|
| 1 | - Buna-N (Standard) |
| 2 | - Fluorocarbon |
| 3 | - PTFE Silicone (FDA Approved) |
| 4 | - EPDM |
| 9 | - Kalrez [®] |

Kalrez[®], Chemraz[®] and other seal materials available

Size

| | |
|-----|----------|
| 007 | - 3/4" |
| 010 | - 1" |
| 012 | - 1-1/4" |
| 015 | - 1-1/2" |
| 020 | - 2" |
| 030 | - 3" |
| 040 | - 4" |
| 060 | - 6" |
| 080 | - 8" |
| 100 | - 10" |
| 120 | - 12" |

Availability of styles, sizes and materials may vary depending upon swivel configuration. Consult OPW Customer Service regarding your exact requirements.

MATERIALS

(unless listed below, see seal material for temperature ranges)

| | Aluminum 3600 | Bronze 3300 | Cast HP 3700 | CST 3400 | Ductile Iron 3800 | SST 3900 |
|----------------------|---------------------|----------------|-------------------------|---------------------|----------------------|-------------------------|
| Body and Tail | ASTM B26 A356 T6 | ASTM B62-83600 | ASTM A351- CF3M/CF8M | ASTM A105 | ASTM A-536 | ASTM A351- CF3M/CF8M |
| Seals | See Chart | See Chart | See Chart | See Chart | See Chart | See Chart |
| Balls | Grade 200 CST | Grade 200 CST | Grade 200 CST | Grade 200 CST | Grade 200 CST | Grade 400 SST |
| Flanges (150/300 lb) | 6061-T6 | N/A | N/A | ASTM A105 | N/A | B16 A182 316/316L |
| Elbows | 6061-T6 | N/A | N/A | ASTM A234 WPB | N/A | ASTM A351-CF3M |
| Piping | 6061-T6 | N/A | N/A | ASTM A53 Grade B | N/A | ASTM A312 TP 316L |

| Seal Material | Min Temp C | Max Temp C | Min Temp F | Max Temp F |
|--|------------|------------|------------|------------|
| Buna | -29 | 100 | -20 | 212 |
| Fluorocarbon | -29 | 204 | -20 | 400 |
| (PFA) PTFE/Silicone (standard) (FDA Approved) | -46 | 260 | -50 | 500 |
| EPDM | -46 | 121 | -50 | 250 |
| (PFA) PTFE/Fluorocarbon (special order) (FDA Approved) | -18 | 204 | 0 | 400 |
| Kalrez® | -18 | 260 | 0 | 500 |

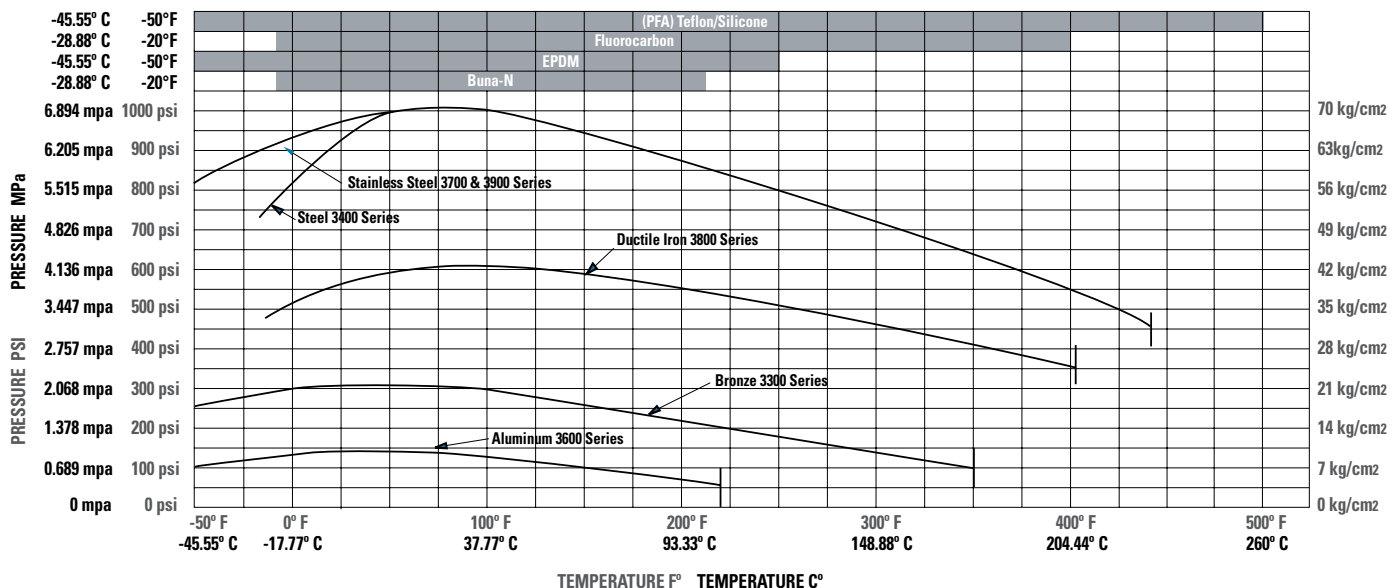
LUBRICATION

OPW swivel joints should be lubricated periodically, depending on service and operating conditions. **For normal operation, annually is sufficient.** Lubricating more frequently may be required when service is severe such as high temperatures, heavy loads, or constant rotation.

| Part # | Description |
|-----------------|---|
| 880-0089 | High Performance Synthetic Lubricant 14 oz. (400 grams) cartridge <ul style="list-style-type: none"> • Specially formulated to reduce friction and wear • Requires only annual lubrication • Not for use with EPT/EPDM seals • Will not drip, melt or carbonize • Complies with FDA regulation 21CFR178.3570 • Temperature range -40°F - 750°F (-40°C - 398.8°C) |
| 885-0085 | High Performance Synthetic Lubricant for EPT Seals <ul style="list-style-type: none"> • High Performance Synthetic Lubricant for EPT Seals |

Warning: EPT/EPDM Seals require the use of a OPW 885-0085 or a non-petroleum based lubricant.

PRESSURE/TEMPERATURE GUIDE



AVAILABILITY BY MATERIAL, SIZE AND PRESSURE RATING

| Material | 3/4" 20mm | 1" 25mm | 1-1/4" 32mm | 1-1/2" 40mm | 2" 50mm | 3" 80mm | 4" 100mm | 6" 150mm | 8" 200mm | 10" 250mm | Pressure Rating* 8" & 10" 500 psi max |
|---|--------------|------------|----------------|----------------|------------|------------|-------------|-------------|-------------|--------------|---|
| Steel, Cast, High-Pressure 3200 Series | ■ | ■ | ■ | ■ | | | | | | | 3000 psi 210 kg/cm ² 20.68 mpa |
| Steel, Fabricated 3400 Series | | | | | ■ | ■ | ■ | ■ | ■ | ■ | 1000 psi 70 kg/cm ² 6.89 mpa |
| 316 Stainless Steel 3700 & 3900 Series | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 1000 psi 70 kg/cm ² 6.89 mpa |
| Aluminum 3600 Series | | ■ | | ■ | ■ | ■ | ■ | ■ | | | 125 psi 9 kg/cm ² 0.86 mpa |
| Ductile Iron 3800 Series | | ■ | | ■ | ■ | ■ | ■ | | | | 600 psi 42 kg/cm ² 4.13 mpa |
| Bronze 3300 Series | | ■ | | ■ | ■ | ■ | | | | | 300 psi 21 kg/cm ² 2.06 mpa |

*Maximum pressure rating of OPW swivel joints is as shown, or is determined by the flange/end connection rating, whichever is lower. Buna-N seals are standard in all of the above swivel joints, but each is available with seals made of Fluorocarbon GFLT, FEP PTFE/Silicone EPDM, or Kalrez® 6375, depending on the pressures and temperatures of your operation.

SURFACE TREATMENT(S)

| | |
|------------|--|
| Treatments | Carbon Steel, Carburized to Rc 45-60 Anodizing for Aluminum |
| Painting | All Steel and Ductile Iron Swivel Joints are Painted with a Rust-Inhibiting Day Primer Finish Paint (Watson Coatings, Inc. Water Reducible Enamel Coating, Aqua-Shile High Gloss Blue (WAC - 2569) at -6 to 1 mls Dry Film Thickness.) |

MAINTENANCE

Tools Needed:

- Socket Wrench Set
- Degreaser
- Small Magnet
- Manual Grease Gun
- OPW 885 Lubricant
- Hex Key Set



Consider the following when servicing the Swivel:

- When the Swivel is overloaded / installed, it must be inspected thoroughly
- After maintenance is performed, it must be tested before the next use
- Periodic inspection (every 3 months) for leakages (especially with toxic or hazardous mediums)
- Maintenance must be performed by authorized personnel
- Periodic maintenance (once a year) is required according to the maintenance instructions

- In case of (parts of) Swivels being redirected, the initiator must provide information about the mediums, which have been in contact with (parts of) the Swivel
- During maintenance (partial) dismantling could be necessary, the same risks and procedures apply
- Before maintenance the full installation must be shut down/off before proceeding

SEAL KIT PART NUMBERS

| 3001K - 1200 | |
|-------------------|----------------------|
| Seal Materials | Size |
| 1 - Buna-N | 10 - 3/4" & 1" |
| 2 - Fluorocarbon | 15 - 1-1/4" & 1-1/2" |
| 3 - PTFE/Silicone | 24 - 2" |
| 4 - EPDM | 30 - 3" |
| 5 - FDA Nitrile | 40 - 4" |
| 9 - Kalrez® | 60 - 6" |
| | 80 - 8" |

IMPORTANT: OPW products should be used in compliance with applicable federal, state, provincial, and local laws and regulations. Product selection should be based on physical specifications and limitations and compatibility with the environment and materials to be handled. OPW MAKES NO WARRANTY OF FITNESS FOR A PARTICULAR USE. All illustrations and specifications in this literature are based on the latest product information available at the time of publication.

OPW reserves the right to make changes at any time in prices, materials, specifications and models and to discontinue models without notice or obligation.

SEAL REPLACEMENT

Warning: Support outboard weight and relax spring balance (if part of a loading arm) before attempting to do any work.

For replacement of all seals

- Clean area around gap between body and tail to avoid contamination.
- Remove swivel from piping.
- Dismantle swivel.
- Clean and inspect sealing surfaces after removing seals.
- Install new seals and re-assemble swivel
- Re-attach swivel to piping.
- Make sure to use adequate personal protection at all times.
- Relieve all pressure from the system.
- Barricade the surrounding area so no unauthorized people can access the work floor.
- Arrange the necessary permits or paperwork with the plant holder, owners or local authorities, before taking any action.
- **When the swivel is clean and dry and the necessary precautions have been taken, the swivel can be disassembled from whatever device to which it is attached.**

Before dismantling Swivel take necessary precautions.

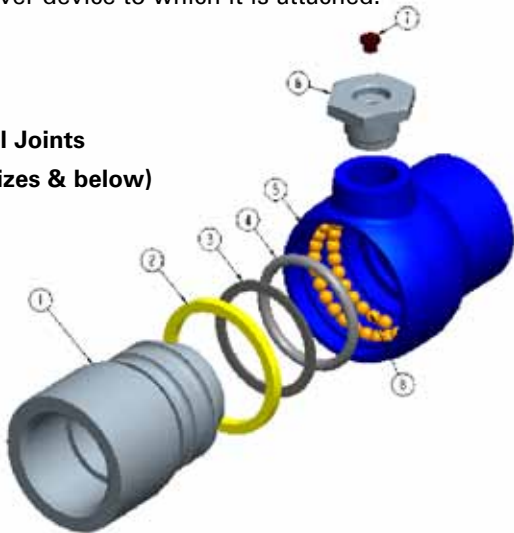
- Secure Swivel to Loading Arm or other loading device.
- Relax the spring balance.
- **Make sure to use adequate personal protection at all times during the operation.**
- Clear the surrounding area and shut off any working devices.
- Relieve all pressure from the system.
- Make sure the surrounding area is clear from obstacles.
- Barricade the surrounding area so no unauthorized people can access the work floor.
- Arrange the necessary permits or paperwork with the plant holder, owners or local authorities, before taking any actions.

When Swivel is clean and dry and the necessary precautions have been taken, the Swivel can be disassembled from whatever device to which it is attached.

Cast

Swivel Joints

(1½" sizes & below)

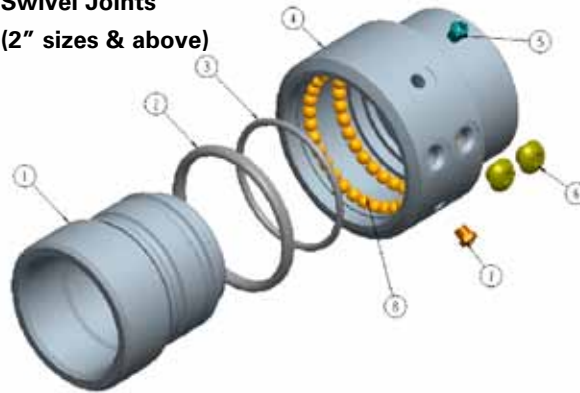


| Item | Description |
|------|---------------------------|
| 1 | Tail |
| 2 | Environmental Seal |
| 3 | Spacer (3200 Series ONLY) |
| 4 | Main Seal |
| 5 | Body |
| 6 | Ball Plug |
| 7 | Pressure Relief |
| 8 | Ball Bearings |

Fabricated

Swivel Joints

(2" sizes & above)



| Item | Description |
|------|--------------------|
| 1 | Tail |
| 2 | Environmental Seal |
| 3 | Main Seal |
| 4 | Body |
| 5 | Grease Fitting |
| 6 | Ball Plug |
| 7 | Pressure Relief |
| 8 | Ball Bearings |

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DETAILED DISASSEMBLY

(for seal replacement)

Attention: Dismantling must be performed by authorized and trained personnel only.

At some time (at the end of its lifetime) it may become necessary to transplant the Loading Arm, which may require removal of Swivel, or possible relocation from one loading mechanism to another.

Swivel removal can be achieved easily when Swivel is attached through flanges welded to the body and tail.

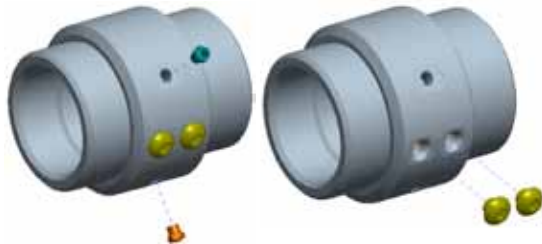
If the Swivel is welded directly to the piping, then the approach would be to disassemble the entire loading assembly.

If the Swivel is connected to the piping through threaded end connectors, a different approach should be taken.

Attention: The same risks and procedures of initial installation apply.

Warning: Reading the manuals provided, verify what kind of medium is loaded with this Swivel. When the medium is nuclear, hazardous or toxic, one is obligated to clean parts with the help of specialized personnel, companies or governments.

NOTE: The following procedure applies for both dual (2" and above) and single ball plug units.



Step 1:

Remove the grease fitting and pressure relief plug.
Remove both ball plugs.



Step 2:

Rotate body and tail to cause balls to fall out.
Gaps will develop as more and more balls are removed, making it difficult to remove the last few.

TIP 1: A degreaser may be helpful if balls stick in the races.

TIP 2: A small magnet may help in removing ball bearings.



Step 3:

Once all bearings have been removed, separate tail from body.



Step 4:

Remove seals from tail.

Disassembly Complete

DETAILED REBUILD



Step 1:

Make sure all surfaces of tail are clean. Lightly grease Environmental O-Ring Seal and seat up against shoulder of tail. For units with felt environmental seal, hold dust seal in groove so that it will completely enter environmental seal chamber. For 3200 Series Cast Steel swivels, insert spacer onto nose of tail as shown above.

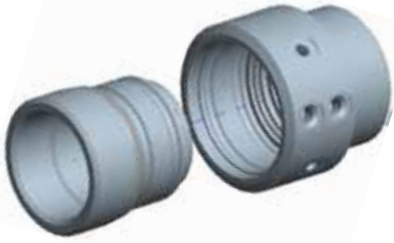


Step 2:

Lightly grease Main O-ring Seal and press into the shoulder inside the body.

DETAILED REBUILD

(continued from page 5)



Step 3:

Insert tail into body, being careful to align swivel tail and body during assembly. Slight rotation may be helpful to facilitate even seal.



Step 4:

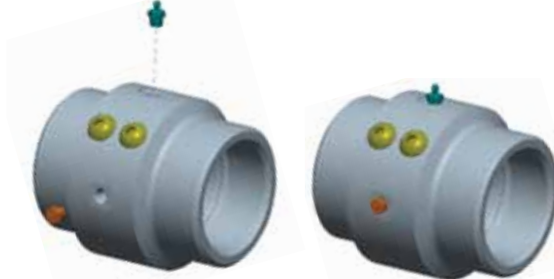
Drop bearings into bearing holes while rotating tail to distribute bearings evenly.

- Gaps will begin to form between bearings. To install the last few, it may require you to rotate the tail and body to find where the gaps exist. **Note:** There should be no gaps when all balls have been installed.



Step 5:

Install bearing port plugs.



Step 6:

Thread grease relief and grease plug into the 2 remaining holes. Fill chamber with appropriate grease using a **manual grease gun**. TIP: Rotating swivel while greasing will help distribute grease.

Assembly Complete

TESTING AFTER SERVICE

When servicing has occurred and parts have been replaced, it is necessary to test the Swivel for a safe and secure use. The test procedure consists of checking to see that full rotation is possible.

Warning: Parts attached to the Swivel can be very heavy, and may cause serious injury or death if improperly installed. While testing mechanism, make sure all personnel are clear.

The OPW Engineered Systems also recommends to check the Swivel periodically for proper functioning.

When any leakages are found, have seals replaced immediately to obtain a safe and correct use of the Swivel. If leakages continue, contact the OPW distributor or **OPW Engineered Systems** for consultation.

For maintenance and adjustment of the individual components, see relevant instruction sheets.

WARNING

Failure to follow these warnings could result in serious personal injury, property damage or product failure.

1) Do not attempt any maintenance service while the equipment is in operation. System pressure must be relieved and the product drained before attempting any service on the unit. The line must be locked out while service is in progress. Proper thermal relief must be provided at all times while equipment is in service.

2) OPW products do not eliminate possible exposure to hazardous substances. The conditions of handling and use are beyond our control, and we make no guarantee and assume no liability for damages or injuries related to the use of our products. Follow the safety precautions outlined in the Material Safety Data Sheets for the material being used. It is the responsibility of the user to comply with all federal, state and local regulations. Always employ proper safety precautions and handling techniques.

3) Proper seal and wetted material part selection are critical for safe operation. To assure maximum life for the service intended, use only those materials compatible with the fluids being handled. Please note material being supplied and make certain that it is suited for the intended service.