3000 Series Swivel Manual

PART #H32153PA
December, 2024

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

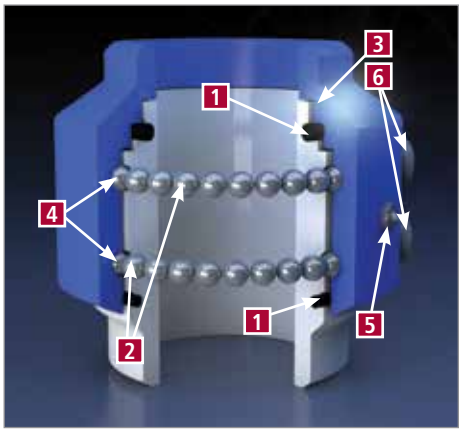
- Body and tail sections are locked together by a double row of ball bearings
- Raceways are machined to precise tolerances
- Double raceway design assures proper alignment and prevents binding caused by temperature changes and heavy radial loads
- Carbon steel swivels have hardened races to maximize 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 10 3 planes of rotation
Style 20 1 plane of rotation
Style 30 1 plane of rotation
Style 40 1 plane of rotation
Style 50 2 planes of rotation
Style 60 2 planes of rotation
Style 70 2 planes of rotation
Style 80 3 planes of rotation

Style (Planes of Rotation)

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

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 **39** - 316 Stainless Steel, Fab.
Endura Split Flange Swivels	**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

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. 150 lb. flanges are flat-faced. Materials are raised face. BSPT threads 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"

Seal Materials

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

Kalrez®, Chemraz® and other seal materials available.

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

OPW ENGINEERED SYSTEMS
a DOVER company

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 A350LF2	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-N	-29	100	-20	212
Fluorocarbon (V1163-75)	-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

*Other seals available on request

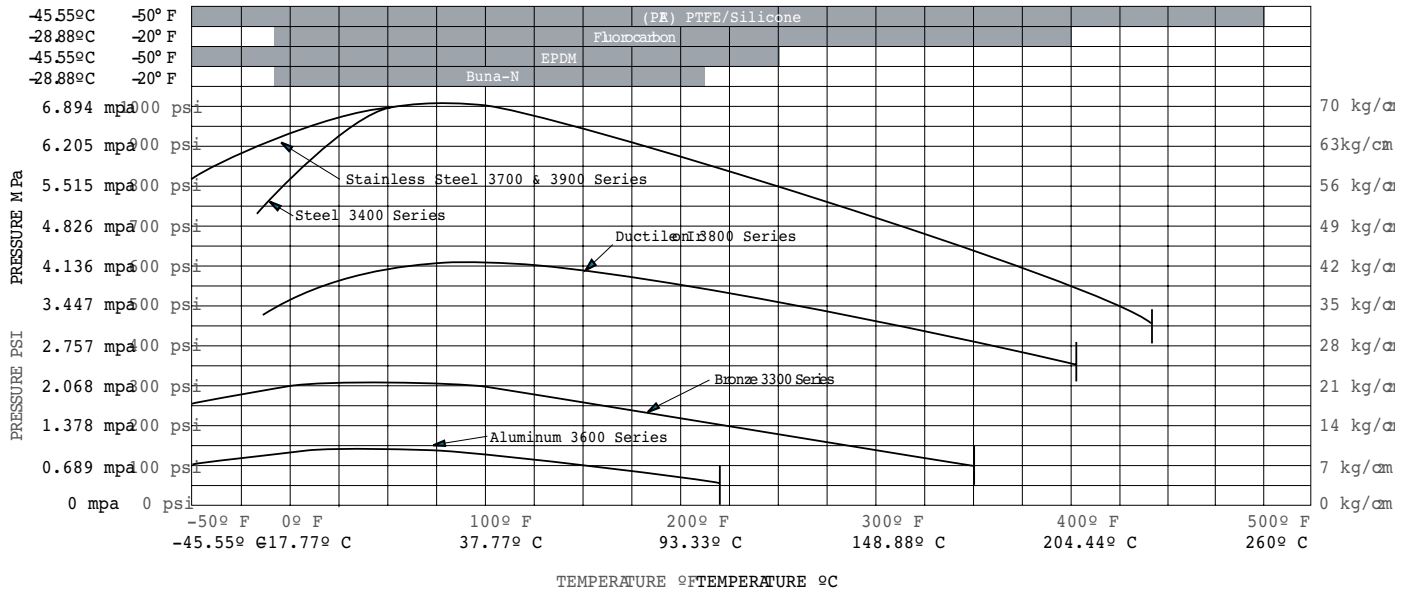
Lubrication

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 • Specially formulated to reduce friction and wear • Requires only annual lubrication • Not for use with 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)
885-0083	• High Performance Synthetic Lubricant for EPDM Seals

⚠ **Warning:** EPDM Seals require the use of a OPW 885-0083 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/cm² 20.68 mpa	8" & 10" 500 psi max
Steel, Fabricated 3400 Series					■	■	■	■	■	■	1000 psi 70 kg/cm² 6.89 mpa	
316 Stainless Steel 3700 & 3900 Series	■	■		■	■	■	■	■	■	■	1000 psi 70 kg/cm2 6.89 mpa	
Aluminum 3600 Series		■		■	■	■	■	■			125 psi 9 kg/cm² 0.86 mpa	
Ductile Iron 3800 Series		■		■	■	■	■				600 psi 42 kg/cm², 4.13 mpa	
Bronze 3300 Series		■		■	■	■					300 psi 21 kg/cm², 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.*

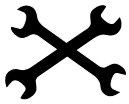
Surface treatment(s)

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



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

3000 RK - 0201

3000 Series

Repair Kit

Size
01 - 3/4" & 1"
015 - 1-1/4" & 1-1/2"
02 - 2"
03 - 3"
04 - 4"
06 - 6"
08 - 8"
10 - 10"
12 - 12"

Seal Materials
1 - Buna-N
2 - Fluorocarbon
3 - PTFE/Silicone
4 - EPDM
5 - FDA Nitrile
9 - Kalrez®

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.

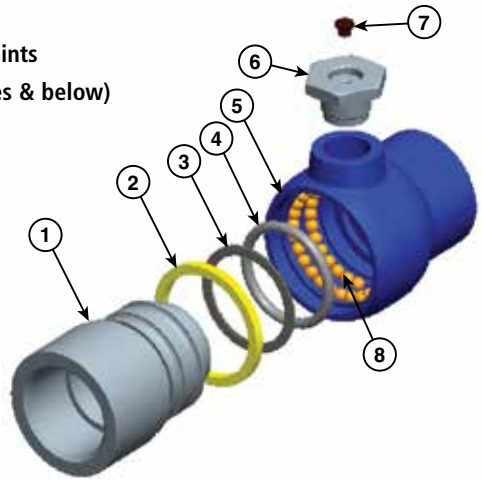
- Secure swivel to loading arm or other loading device.
- Relax the spring balance.
- **Make sure to use adequate personal protection at all times during the operation.**
- Clear the surrounding area and shut off any working devices.
- Relieve all pressure from the system.
- Make sure the surrounding 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)

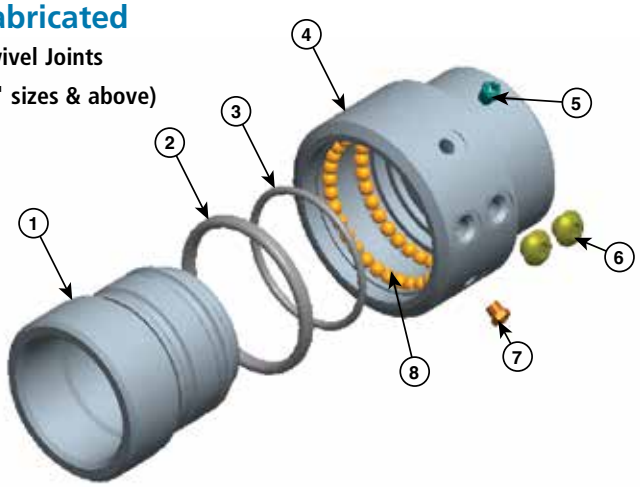


Item	Description
1	Tail
2	Environmental Seal
3	Spacer (3200 Series ONLY)
4	Main Seal
5	Body
6	Ball Plug
7	Pressure Relief
8	Ball Bearings

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

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.

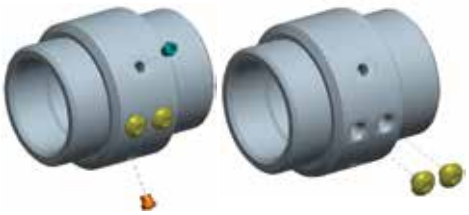
Attention: The same risks and procedures of initial installation apply.

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.

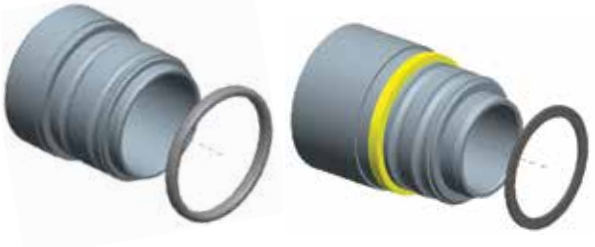
Step 4:

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

Step 3:

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

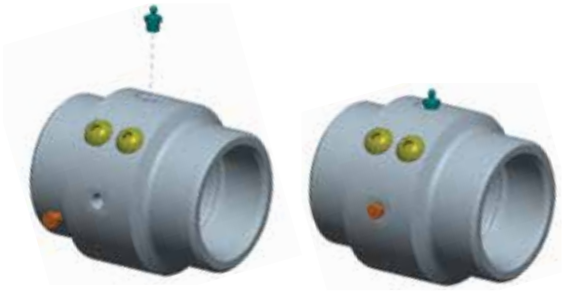
Install bearing port plugs.

Step 6:

Thread grease relief and grease plug into the two 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 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.

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

When any leakages are found, have seals replaced immediately to obtain 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.

Greaseless/Non-Lubricated Applications

OPW Swivels can be specified as greaseless, or non-lubricated, for certain applications. These swivels would typically be supplied as follows:

- Stainless Steel (Grade 440) Ball Bearings would be supplied in lieu of Carbon Steel Balls.
- Grease fitting (p/n H30823M) would be removed and replaced with threaded plug (p/n H03288M).
- A light coating of LPS2 (LPS Labs) shall be applied to seals prior to installation.

Ball Bearings

Both steel and stainless steel ball bearings are available for all OPW swivels. Each plane of rotation has two races; quantities shown below are per pair of races.

Size (inches)	No. Ball Per Pair of Races	Part No. Steel Balls	Par No. Stainless Balls
3/4 & 1	40	H-7063M[1]	H-30035-M
1-1/4 & 1-1/2	56	H-7063M[1]	H-30035-M
2	48	H-6712-M[2]	H-1171-M
3	66	H-6712-M	H-1171-M
4	84	H-6712-M	H-1171-M
6	76	H-6780-M	H-30036-M
8	98	H-6780-M	H-30036-M
10	98	H-30162-M	H-30147-M

[1]3200 Series swivels use H-4577-M balls. [2]3200 Series swivels use H-4576-M balls.

⚠ 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.