

# INSTECH

## STAINLESS STEEL SWIVEL REPAIR MANUAL



For repair of dual channel models 375/D/22,  
375/D/20 and 375/D/22QE (not 375/D/22QM)



For repair of single channel models 375/25,  
375/22, 375/20 and 375/18TW

# INTRODUCTION

This manual provides instructions on repairing Instech dual or single channel stainless steel fluid swivels.

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These instructions assume you have purchased the special tools and parts necessary for the repairs.

Part No.	Description	Tools	Parts
375R/D/xx	Tools and parts to repair one dual channel swivel (xx=gauge)	tweezers, 8ga tube, 12ga tube, bearing removal base, polishing paper	1 center channel seal, 1 sideseal body, 2 bearings, 3x 1/4in and 3x 1/8in clip rings
375R/xx	Tools and parts to repair five single channel swivels (xx=gauge)	8ga tube, polishing paper	5 center channel seals, 10 bearings, 15x 1/8in clip rings
375R/D/TK	Tools to refurbish dual channel swivels	tweezers, 8ga tube, 12ga tube, bearing removal base, polishing paper	
375R/CSxx	Parts to repair center channel on five dual or single channel swivels (xx=gauge)	polishing paper	5 center channel seals
375R/D/SSxx	Parts to repair sideseals on five dual channel swivels (xx=gauge)	polishing paper	5 sideseal bodies, 10x 1/4in clip rings, 15x 1/8in clip rings
375R/BR	Parts to repair bearings on five single or dual channel swivels	polishing paper	10 bearings, 15x 1/8in clip rings

# 1. DUAL CHANNEL SWIVEL REPAIR

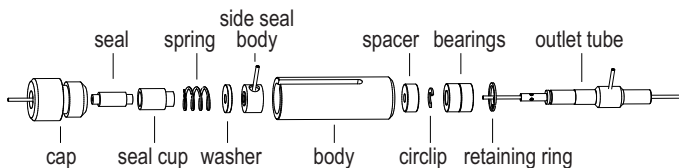
**SIDE SEAL ASSEMBLY.** The side channel seal assembly can be damaged by poor handling or excessive fluid pressure and is the area where most leaks occur. The side seal assembly floats within the swivel body and leaks will occur if excessive upward or downward force is applied to the side outlet tube. Seals can be deformed by excessive pressure or bending of the side outlet seal assembly when attaching tubing to the swivel. The side seals can also be damaged by excessive fluid pressure, although we subject the seal to 60 psi as part of our final inspection. Seals can be damaged when very high pressures are used to flush or preload the fluid lines. You can generate 400 psi of pressure with a 1 ml syringe if a line is blocked. It is safest to pull the flushing solution back through a swivel because you can never exceed 1 atmosphere using this technique. The side seals are delicate and consist of two miniature spring loaded seals mounted in a stainless steel holder. The seals are designed to reseal themselves but due to size limitations we must use a much smaller spring than we use on our more rugged center seal.

**CENTER CHANNEL SEAL ASSEMBLY.** The center channel seal assembly usually does not leak because it is spring loaded and will continue to tighten itself over time. If a leak does occur, it is usually due to autoclaving a disassembled center seal or improper seal reassembly. We have developed a seal tightening procedure since Teflon can cold flow when not installed in the swivel. This procedure will resize your center channel seal and must be used when you get new seals from the factory. The procedure is outlined in these instructions and will usually remedy problems unless the seal has been gouged or internally scraped during reassembly.

If you are reading this document you have probably experienced a leak. If the leak is detected early, the swivel can be ultrasonically cleaned and the bearings may not need to be replaced. They should be blown dry and reoiled with a light machine oil if

reused. While the bearings are stainless steel, they can corrode making them very difficult to remove. We strongly recommend that you follow the bearing removal instructions and use the tools supplied by Instech to remove frozen bearings. If you are totally disassembling the swivel it is prudent to replace all seals.

Take a few minutes to familiarize yourself with the internal parts of a dual channel swivel.



## 1.1 Disassembly and Cleaning

Start disassembly by unscrewing the cap. Then gently push the outlet tube towards the cap end as far as it will allow. This will expose the center Teflon seal inside the seal cup.

Remove the spring and slide the Teflon seal and seal cup assembly out of the cap. The Teflon seal can then be removed from the seal cup. This is the center channel seal.

**⚠** It is not necessary to remove the central outlet tube seal assembly and bearings from the body for a leaking center seal and if the bearings do not need to be lubricated or replaced. If you remove the side seal assembly we strongly recommend you replace it.

If only the center channel seal has leaked and bearings freely move, skip to 1.5 Center Seal Tightening.

## *1.2 Total Disassembly*

Grasp the tube extending from the side seal body and slide it off of the outlet tube out of the open end of the swivel (see fig 1 above). Save the washer and spacer. Note the recessed side of the spacer and remember its orientation. The washer has no special orientation.

Use the tweezers provided in the tool kit to remove the retaining ring located just inside the unslotted end of the body. If the clip and bearings are corroded you may not be able to get the tweezers into the hole to remove the clip and it may require forcibly driving the components apart using the tools provided (1.3 Frozen Bearings).

If the retaining ring comes out easily and the bearings are not frozen, remove the outlet tube and bearings by sliding them out of the swivel body, over the ring groove. Skip to 1.4 Cleaning Swivel Parts if bearings are not frozen.


## *1.3 Frozen Bearings*

To remove frozen bearings, use the set of removal tools and tweezers provided.

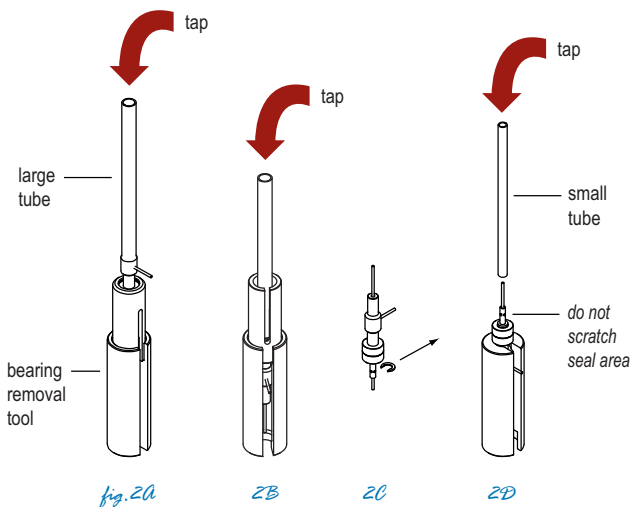
Step A: Place the swivel body, slot side down, into the aluminum bearing removal tool as shown in fig 2A. Using the larger stainless steel tube, gently tap the bearings down about an 1/8 of an inch. (If you go too far you will shear off the outlet tube.) This provides space so that you can use the tweezers to grasp the holes in the retaining ring. Remove the retaining ring.

Step B: Next, turn the swivel over and reinsert into the bearing removal tool, slot side up as shown in fig 2B. Again, using the larger tube, gently tap the outlet assembly out of the swivel body.

Step C: Use the tweezers to push off the circlip (fig 2C).

 Do not apply any pressure or scratch the small diameter side seal area with the holes in it. Bending or scratching this area will cause irreparable damage to the swivel.

Step D: Reposition the bearing removal tool with the unslotted side up as shown in fig 2D. Using the small tube, gently tap the outlet tube through the two bearings.



## 1.4 Cleaning Swivel Parts


Ultrasonically clean all parts. Flush all parts to check for blockages and clear tubes with air. A small diameter wire may be used to unblock clogged tubes (except the quartz-lined center channel of model 375/D/22QE).

Make sure that no hard residue remains on the side seal area. If necessary, polish with the very fine paper provided and reclean

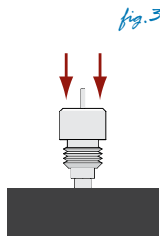
to remove any dirt or particles generated by this process. Make sure slot area is free of any burrs or loose material.

### 1.5 Center Seal Tightening

Place the seal into the retaining cup and gently slide the cup into the cap (exposed seal toward cap).

 Do not force the seal onto the tube since it is easily gouged. Also, be careful not to over compress the seal. Making the seal too tight will increase the torque required to rotate the swivel and make it difficult to assemble.

Holding the cap, firmly press downward against the seal cup. This pressure will force the seal against the inner conical surface of the seal cup thus reducing the diameter of the hole in the open end of the seal. Check for a snug fit by inserting the tubing on the outlet assembly into the open end of the seal. Reverse the seal in the cap and repeat this procedure to tighten the other end of the seal.



Repair kit seals have not been presized at the factory so this must be done for all new seals.

### 1.6 Reassembly

Slide the bearings onto outlet tube, up against the shoulder. New bearings do not require oiling. Install the circlip into the groove to retain the bearings. Place the bearings on a flat surface and use needlenose pliers or the tweezers to push the clip on.

Push the retaining ring over the outlet tube (see fig 2). Place the outlet tube/bearing assembly into the swivel body. Use the tweezers to install the retaining ring located just inside the un-slotted end of the body.

Slip the stainless steel spacer, with recess end facing the bearings, onto the outlet tube assembly inside of the swivel body.

 USE EXTREME CARE IN THE FOLLOWING STEPS!


Take the side seal assembly with the seals installed, and with very light pressure, carefully slide the seal assembly onto the outlet tube assembly. It will come to rest at the joint between the small central tube and the slotted outer tube. Do not push it on yet.

Now put the stainless steel washer onto the outlet tube assembly and slide it up against the side seal assembly.

Place the entire assembly back into the aluminum tool as in Fig 2B, with the bearings resting on the internal retaining ring. Using the larger stainless tube gently press the side seal assembly straight down until it seats.

To reassemble the cap, place the spring onto the stepped end of the seal cup. Insert the white Teflon center seal, which you have tightened (section 1.5), into the seal cup. Slide this assembly into the cap. The spring end of the cup will protrude from the cap.

Remove the swivel from the tool and slide the outlet tube assembly toward the open end until the side outlet tube touches the body. Take the cap group and insert the center channel tube through the spring and start it into the Teflon seal. Push the entire cap assembly back into the body and tighten the cap one thread. Check that the outlet tube assembly has not jammed into the seal, then finish tightening the cap.


 If any resistance is felt, do not force the swivel together. Unscrew the cap and determine the source of resistance.

Look through the slot in the side of the swivel to ensure that all parts have seated properly and no gaps exist between any components below the spring.

## 1.7 Leak Checking

Connect catheter tubing to a syringe and attach it to the outlet lube of the swivel channel you wish to check (e.g. PE50 for 22ga or PE90 for 20ga). Attach another piece of tubing to the inlet side of the swivel channel and place the end of the tube in a beaker of alcohol or water.

Suck fluid back through the channel to be checked, clearing all or bubbles.

 Sucking liquid back through the swivel can only generate a maximum of 15 psi or one atmosphere of pressure. If you push fluid through the swivel with a syringe you can generate significantly higher pressures which can damage the swivel.

To check for a leaking channel, block the inlet tube and pull back on the syringe. A continuing stream of bubbles in the syringe indicates that a leak is present.

Perform this check on both side and center channels.

## 2. SINGLE CHANNEL SWIVELS

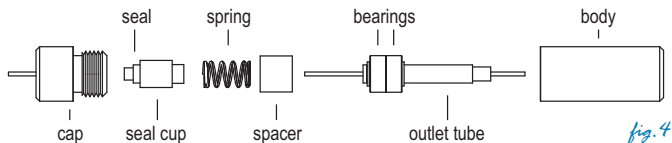
### 2.1 Care and Sterilization

Immediately after each use, the swivel should be flushed out thoroughly by pulling water through it with a syringe, followed by air to dry the channel. In most cases it will not be necessary to totally disassemble the swivel but all salts should be flushed out.

Sterilizing solutions can be passed through the swivel or it can be steam sterilized (autoclaved) or EtO gas sterilized.

### 2.2 Disassembly and Cleaning

Unscrew the swivel cap from the body section and gently separate the two sections.



Holding the swivel body, push the outlet tube and bearing assembly out through the threaded end. Be careful not to push material into or damage the center tube.

All parts may be individually removed for cleaning. The bearings should be left in place and cleaned as an assembly.

Clean parts with hot water and detergent or place them in an ultrasonic bath for a few minutes.

Rinse and dry all parts prior to assembly. The bearings, if washed, should be rinsed, blown dry and oiled with a light machine oil (such as 3-in-1®) and again blown out.

At all times, take care not to scratch or deform the internal surface of the small white Teflon seal.

### 2.3 Reassembly

Check the Teflon seal by sliding each end of it over the tubing protruding from the bearing side of the outlet tube. This should be a gentle slide fit. If it is too loose, see section 1.5 Center Seal Tightening. If it is too tight, place it completely on the outlet tube and let it stand 24 hours. If it does not respond order a new seal.

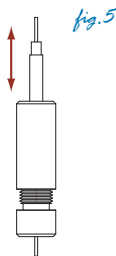
Place the white Teflon seal into the seal cup and slide this assembly into the cap taking care not to damage the seal as it engages the tube inside of the cap. **DO NOT FORCE** this assembly as you will damage the seal and it will leak.

With the cap end down, slide the spring over the reduced diameter side of the seal cup.

Next place the spring spacer with the shouldered side to the spring over the spring. This leaves the tapered side up to mate with the outlet tube.

Carefully insert the tubing extending from the bearing end of the outlet tube, through the spacer, spring, retaining cup and gently into the Teflon seal.

Drop the body over this entire assembly and tighten the body onto the cap about 1 turn. Test the assembly by sliding the outlet tube in and out of the seal (see fig 5). If it moves in and out freely, tighten the cap to tighten both ends of the seal onto the tubing. If after final assembly the swivel rotational torque is too high or the swivel leaks, repeat the assembly sequence.



## *2.4 Center Seal Tightening*

Follow the procedure outlined in the dual channel swivel repair section of this manual (1.5) to tighten the center seal of a single channel swivel. Teflon can undergo cold flow with time, and it may be necessary to tighten the Teflon seal if the swivel starts to leak.

## *2.5 Swivel Testing*

Using a syringe, suck water back through the swivel. Block off inlet tube and draw a vacuum with the syringe. If bubbles are noted, either retighten or replace Teflon seal.

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# **INSTECH**

Instech Laboratories, Inc.  
5209 Militia Hill Road  
Plymouth Meeting PA 19462 USA  
TL (800) 443-4227  
TL 1-610-941-0132  
FX 1-610-941-0134  
[www.instechlabs.com](http://www.instechlabs.com)