

# BIRD <sup>1913</sup>to<sup>2013</sup> PRECISION

100 YEARS OF PRECISION

## CUP JEWEL BEARING

Bird Precision cup Jewel bearings are available primarily in Hard Pyrex glass, and Synthetic sapphire materials. Ruby material is also possible. But special applications may warrant Tungsten Carbide for more rugged performance. Bird Precision cups have been found in compasses for the American cup races. Pocket and lensatic hand held type compass. Geologic water turbine flow meters, water meters, hot air motor mechanisms, deep hole drilling directional instrumentation, and a host of marine navigational equipment.

Fire polished Pyrex cups prove to be the lowest frictional type, but are limited to low load under 200 milligrams as a general rule when matched with pivot points less than .002". Larger radii pivots will support heavier loads. Sapphire cup jewels, are also low friction, but will support higher loads. Sapphire cups typically run dry. Tungsten Carbide will support very heavy loads. ♀

### COMMON TYPES

Three Common Types:



Single Cup

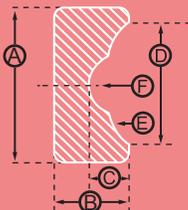


Double Cup



Triple Cup

With the addition of cups the designer adds depth, which will help the pivot point stay engaged and find the center.



- Ⓐ Outside Diameter (OD)
- Ⓑ Thickness (Th)
- Ⓒ Depth of Radius at Lower Cup
- Ⓓ Opening in Large Cup
- Ⓔ Radius of Large Cup
- Ⓕ Radius of Small Cup



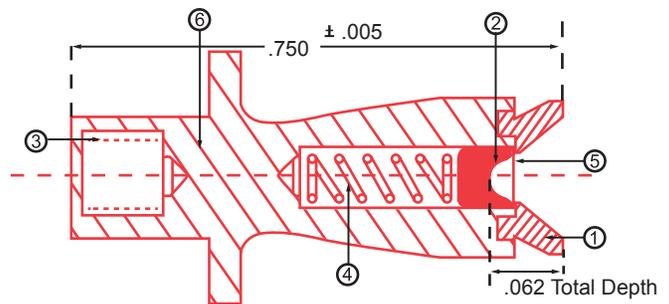
### DESIGN CONSIDERATIONS

Selecting the best ratio of pivot radius to the cup ratio is crucial to most cup designs. For lowest friction the ratio can be 20 to 1 (.001" pivot radius, .020 cup Radius.) But for some applications the card needs to be dampened to avoid excess oscillation, so the ratio is backed down to 10 to 1 with a .002 pivot radius.

For very heavy rugged performance a ball can be matched to run in the cup. Ruby ball, and carbide ball ended shafts are very common. Bird Precision manufactures custom mounts so that the very shallow cups are recessed.

The recess allows the shafts to consistently fall into the cups. Some applications, when running in the horizontal require lubricious materials such as bronze, most common in turbine flow devices to help the balls slide into the cups.

Bird Precision offers a number of mounting options, including spring loaded and cushion loaded designs, to help protect the pivot points and cups in applications withstanding shock and vibration.



- ① Swage Fitting Retaining Washer for Pivot Captivation & Lead in
- ② Super Polished Pyrex Cup Low Friction .012 Radius
- ③ 6-32 UNC-2A Threaded Post Support
- ④ Spring Shock Absorption 50 Gram & .020 Travel
- ⑤ Jewel Bore Held -.0002 & Polished Smooth For Maximum Responsiveness
- ⑥ Black Oxide for Weather Resistance

One Spruce Street  
Waltham, MA 02454

T (800) 454-7369  
F (800) 370-6308

sales@birdprecision.com  
www.birdprecision.com