



E6R1PK ChangeDisk Series

Rotating Ring-Disk Working
Electrode Product Guide

Part # Style: AFE6R1YYPK

(accepts any 5 mm OD x 4 mm OD disk insert;
YY = ring electrode material, e.g. AU = gold,
PT = platinum, GC = glassy carbon, etc.)

Warnings



Caution:

Maximum Rotation Rate **3000 RPM**. Use caution when rotating over **2000 RPM**.



Caution:

Ensure all parts of the ChangeDisk are properly assembled prior to use. Follow the instructions and watch the YouTube video for information.



Thermal Stability:

Use electrode from **10°C to 80°C**. Extreme temperatures damage electrode seals.



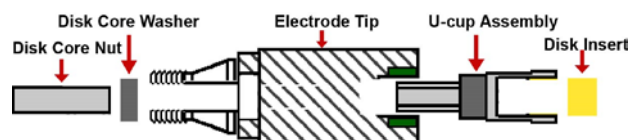
Chemical Compatibility:

The polyether ether ketone (PEEK) shroud will dissolve in concentrated acids.

Description

The E6R1PK ChangeDisk rotating ring-disk electrode (RRDE) tip is designed for use with ASR and MSR model rotators. It has a ring permanently integrated into the electrode tip body. The disk electrode material for these RRDE tips may be ejected from the tip and replaced with a different material, however, the ring electrode cannot be ejected. A wide range of disk inserts are available for use with ChangeDisk RRDE tips.

The complete tip is assembled from five main pieces: the disk core nut, disk core washer, electrode tip, U-cup assembly, and disk insert (see figure below). In addition, a special internal disk contact is installed on the end of the rotator shaft to provide electrical contact to the back side of the disk insert.



The **electrode tip** is made from polyether ether ketone (PEEK), a polymer that is resistant to most organic solvents, but is susceptible to degradation in concentrated sulfuric or nitric acid solutions. The threads at the top of the main body mate with the external 1/4-28 threads on the rotator shaft. It is designed to thread on to a shaft which has both external and internal threads. Shafts are available for the ASR and MSR rotator which have the required threads for use with this series RRDE tip.

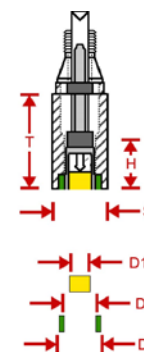
The lower end of the **electrode tip** accepts the **U-cup assembly**. Created from polytetrafluoroethylene (PTFE), a fluoropolymer that is compatible with a wide range of organic solvents, acids, and bases, the **U-Cup** serves to create an insulating seal between the **disk insert** and the ring electrode through a tightly fitting inner recess. Disk inserts may be removed and installed in the U-cup multiple times while still retaining a good seal between the disk holder and the disk insert. After about 3-4 uses, however, the U-cup may show signs of wear. Replacement U-cups are available. The U-cup assembly is fastened into place by the **disk core washer** and **disk core nut**.

The **disk insert** is a cylindrical piece of conductive material (usually glassy carbon or a precious metal) that has been carefully machined to fit precisely within the **U-cup**.

Photograph



Diagram



Tip Shroud Length (T): 25.4 mm

Shroud Diameter (S): 15.0 mm

Maximum Immersion (H): 12.0 mm

Disk Diameter (D1): 5.0 mm

Ring ID (D2): 6.50 mm

Ring OD (D3): 7.50 mm

Additional shaft and tip dimensions are provided on the last page.

Maintenance

Periodically, the electrode surface will need to be polished. It is recommended that the disk insert be ejected from the RRDE tip before polishing (see below). Disk ejection and polishing requires the AFE6K050 toolkit, which contains a mount that can be used to hold the disk insert while it is being polished and an electrode polishing kit which includes various alumina slurries and polishing pads (sold separately).

Storage

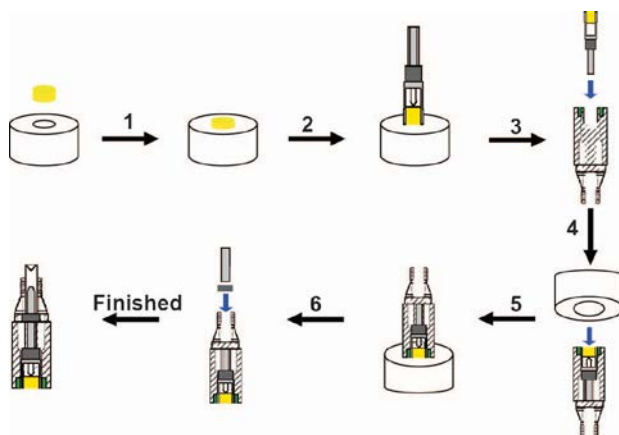
After using the electrode, clean it with distilled water and replace the protective cover to prevent the electrode surface from being scratched. It is acceptable to store the electrode with a disk insert installed; however the best practice is to store the tip without a disk insert installed.

Assembling the RRDE Tip

A special toolkit (part number AFE6K050) is required to disassemble and reassemble the RRDE tip. The kit includes a mounting block which is required when assembling the RRDE tip (see photo below). The mounting block has a large bore on the top side and a small bore on the bottom side.



Care should be taken when handling the disk insert so that the front (polished) side of the disk is not scratched or damaged. Wear disposable gloves when working with the disk insert (to avoid contamination of the disk insert with skin oils). To use the mounting block to install the disk insert in the disk holder, use the illustration and steps listed below.



1. Set the mounting block on a flat surface with the small bore facing upwards. Carefully drop the disk insert into the mounting block. The polished surface of the disk insert should face downwards. The disk insert should be centered and should rest in a shallow well located within the small bore.

2. Tighten the U-cup nut against the U-cup by tightening the threading on the disk core. Hold the disk core at its threaded end. Place the U-cup end down into the mounting block. Gently apply pressure until the U-cup assembly is stopped by the mounting block.
3. Remove the disk core assembly from the mounting block. Insert the U-cup assembly into the electrode tip by dropping the metal shaft of the internal hardware into the shroud end of the electrode tip. **If the disk falls out, the U-cup is damaged and needs to be replaced. It is recommended to replace U-cups every 3-4 ChangeDisk Operations.**
4. Cap the tip assembly with the large bore side of the mounting block (the large bore hole should match the diameter of the E6R1PK ChangeDisk RRDE tip, 15 mm).
5. Invert the mounting block assembly so that it rests on a solid and flat surface with the small bore facing downward. Press the tip assembly slowly but firmly until stopped by the mounting block. The disk surface should be flush with the tip surface.
6. Insert the disk core washer and tighten the disk core nut using finger tight torque.

Mounting the RRDE Tip

Before mounting the RRDE tip on to the rotator shaft, make certain that the shaft is securely mounted in the rotator. For the MSR rotator, the appropriate shaft should be securely mounted into the MSR motor coupling. For the ASR rotator, the appropriate shaft should be securely mounted using the ASR draw bar.

The electrode is narrow enough to fit through a 24/25 center port on an electrochemical cell. Care should be taken to prevent the rotating electrode from rubbing against surfaces (such as the inner wall of the cell). When threading the RRDE tip on to the shaft, do not apply excessive force to the shroud as this may damage the seal between the shroud and the electrode surface. A properly mounted tip will have a small gap (~1.3 mm) between the shaft and tip.

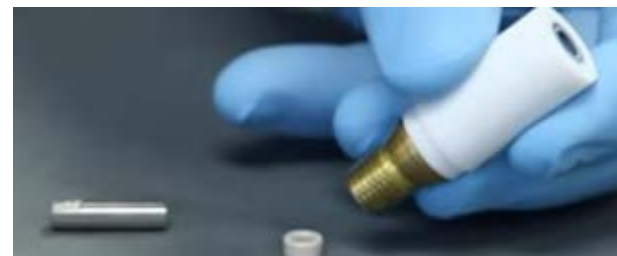
When the rotating electrode tip is placed in a solution, the electrode surface should be approximately 5 to 12 mm below the solution level. The gap between the shaft and the tip should never be immersed in the solution because the solution may enter the gap and cause corrosion of the metal threads and inner parts of the tip.

Ejecting the Disk Insert

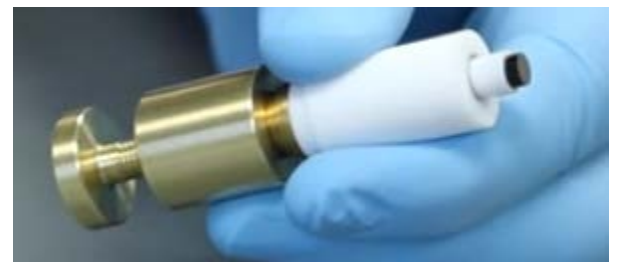
The toolkit includes a special disk ejection block that can be used to remove the disk insert from the disk core assembly. The ejection block consists of a large cylinder with female threads and a smaller cylinder attached to a screw (see figure below).



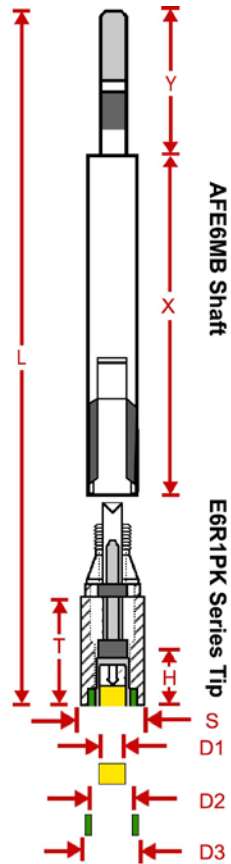
To eject the disk insert, remove the disk core nut from the electrode tip and invert the electrode tip so that the disk core washer falls out.



Fully loosen the screw on the disk core ejector. Mount the disk core ejector by threading the big cylinder over the matching male threading on the electrode tip. Advance the big cylinder forward until stopped by the tip. Turn the disk core ejector screw slowly until the disk core assembly is completely pushed out of the tip body. Remove the disk assembly carefully, making sure not to scratch the disk. The disk can now be safely removed from the assembly.

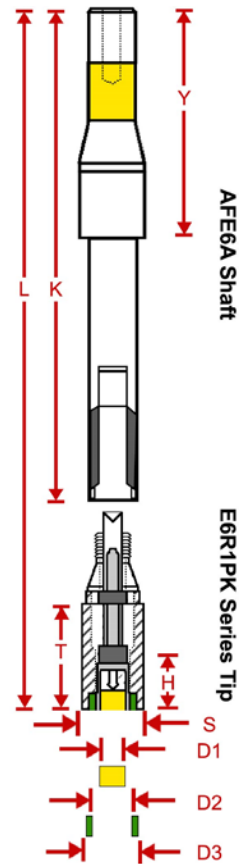


MSR Rotator Shaft with Tip



Disk Diameter (D1):	5.0 mm
Ring ID (D2):	6.50 mm
Ring OD (D3):	7.50 mm
Shroud Diameter (S):	15.0 mm
Tip Shroud Length (T):	25.4 mm
Overall Length (L):	196.9 mm
Upper Shaft Length (Y):	69.9 mm
Lower Shaft Length (X):	100.8 mm
Max. Immersion (H):	12.0 mm
Collection Efficiency:	26%

ASR Rotator Shaft with Tip




Disk Diameter (D):	5.0 mm
Ring ID (D2):	6.50 mm
Ring OD (D3):	7.50 mm
Shroud Diameter (S):	15.0 mm
Tip Shroud Length (T):	25.4 mm
Overall Length (L):	184.2 mm
Shaft Length (K):	158.0 mm
Upper Shaft Length (Y):	100.8 mm
Max. Immersion (H):	12.0 mm
Collection Efficiency:	26%

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