



E4TQ ChangeDisk Series

Rotating Disk Working Electrode Product Guide

Part # Style: AFE4TQ050

(accepts 5 mm OD x 4 mm OD disk inserts)

Warnings



Caution:

Maximum Rotation Rate 2000 RPM.



Warning:

Soft or fragile disk insert materials (e.g., lead, pyrolytic graphite) are INCOMPATIBLE with this series electrode.



Thermal Stability:

Electrode may only be used from 10°C to 25°C. Extreme temperatures will damage the electrode seal.

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Description

The E4TQ ChangeDisk rotating disk electrode (RDE) tip is designed for use with ASR, CPR and MSR model rotators. The disk electrode material for these RDE tips may be ejected from the tip and replaced with a different material. A wide range of disk inserts are available for use with ChangeDisk RDE tips.

The complete tip is assembled from three pieces (the **main body**, the **disk holder**, and the **disk insert**). In addition, there is a special internal disk contact which is installed on the end of the rotator shaft to provide electrical contact to the back side of the disk insert.

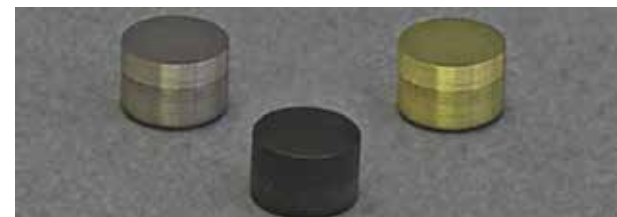
The tip is designed to thread on to a shaft which has both external and internal threads. The internal disk contact mates with the internal threads on the shaft. The main body of the tip mates with the external threads on the shaft. The built-in shaft on the CPR rotator has both required threads, and shafts are available for the ASR and MSR rotator which also have the required threads.

The **internal disk contact** has a spring-loaded pin connector at the bottom end and a set of small threads at the top end. The pin connector is designed to push against the back side of the **disk insert**. The spring must be in good condition to assure reliable electrical contact with the disk.

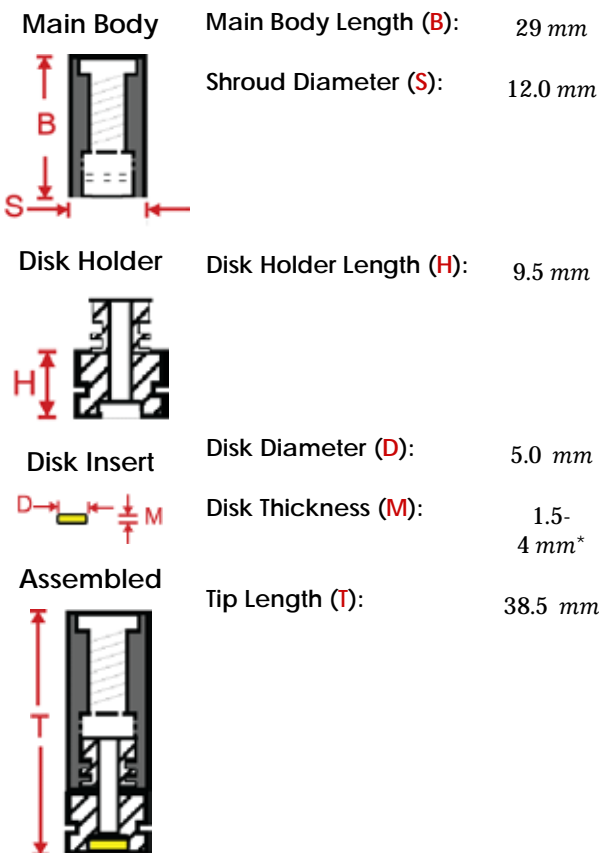
The **main body** of the tip is made from polychlorotrifluoroethylene (PCTFE). The threads at the top of the main body mate with the external 1/4-28 threads on the rotator shaft. The lower end of the main body accepts a **disk holder**. Two small o-rings are used to seal the disk holder into the main body.

The **disk insert** is a cylindrical piece of conductive material (usually glassy carbon or a precious metal) that has been carefully machined to fit snugly within the **disk holder**. The disk holder is fabricated from polytetrafluoroethylene (PTFE) so that it has an inner recess which fits tightly around the disk insert. Disk inserts may be removed and installed in a disk holder multiple times while still retaining a good seal between the disk holder and the disk insert. After about 10-20 uses, however, the disk holder may show signs of wear. Replacement disk holders are available as well in different sized outer diameters.

Photographs



Diagrams



*Custom Sizes Available

DRP10024 / REV006 (JAN 2018)

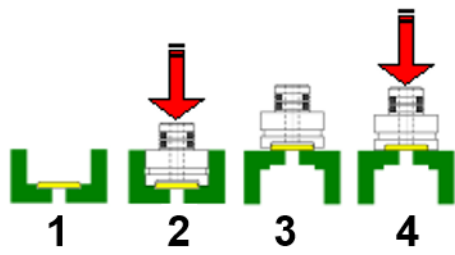
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Assembling the RDE Tip

A special toolkit (part number AFE4K050) is required to take apart and reassemble the RDE tip. The kit includes a mounting block (see photo below) which is required when assembling the RDE tip. 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 large bore facing upwards. Carefully drop the disk material 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 large bore.
2. Place the disk holder down into the mounting block. Gently apply pressure until the disk insert is **partially** inserted into the disk holder. Do not attempt to push the disk insert all the way into the disk holder at this time.
3. Remove the disk holder from the mounting block and then turn the mounting block over. After checking for any debris on the mounting block that might scratch the disk surface, place the disk holder on top of the inverted mounting block.

4. Gently apply pressure to the top of the disk holder until the disk is fully inserted in the disk holder. The surface of the disk material should be flush with the surface of the disk holder.

After the disk insert has been mounted in the disk holder, the disk holder can be pressed into the main holder. Two o-rings form the seal between the disk holder and the main body. At this point, the entire RDE tip is assembled and ready to be mounted in the rotator shaft.

Mounting the RDE Tip

Before mounting the RDE tip, make certain that the shaft is securely mounted in the rotator. For the CPR rotator, the shaft is permanently mounted in the rotator. For the MSR rotator, the appropriate shaft (part number AFE3M) should be securely mounted into the MSR motor coupling. For the ASR rotator, the appropriate shaft (part number AFE3A) should be securely mounted using the ASR draw bar.

First, the internal disk contact should be mounted on the shaft. Screw the internal disk contact into the internal threads at the end of the shaft. When properly mounted, the internal disk contact will extend down from the bottom of the shaft ~20 mm.



Next, the assembled RDE tip can be mounted on the shaft. As the RDE tip is screwed on to the outer threads, tension will be felt as the internal disk contact (which goes down through the center of the tip) makes contact with the back side of the disk insert.

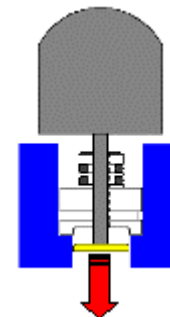
The shaft and tip are narrow enough to fit through a 24/25 center port on an electrochemical cell. Care should be taken to prevent the rotating electrode from rubbing against surfaces (such as the inner wall of the cell). When the rotating electrode is placed in a solution, the electrode surface should be at least 5 mm below the solution level. It is important to prevent the threads on the shaft (and the inner threads within the tip) from coming into contact with the solution. Thus, the RDE tip should be positioned so that no more than half the length of the shroud is below the solution level.

Ejecting the Disk Insert

The toolkit includes a special disk ejection block and a disk pusher that can be used to remove the disk insert from the disk holder. The ejection block looks similar to the mounting block; however, the ejection block is taller than the mounting block. The top end of the ejection block has a large bore, and the bottom end of the block has a smaller bore.



To remove the disk insert from the disk holder, place the disk holder into the ejection block with the disk insert on the bottom.

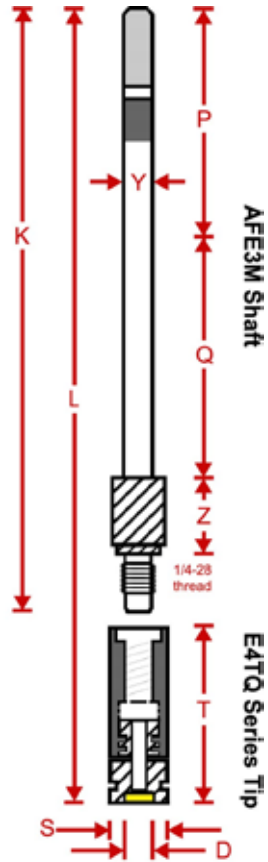


Push the thin rod of the disk pusher through the disk holder and gently apply pressure. Carefully push the disk insert down and out of the disk holder.

Maintenance

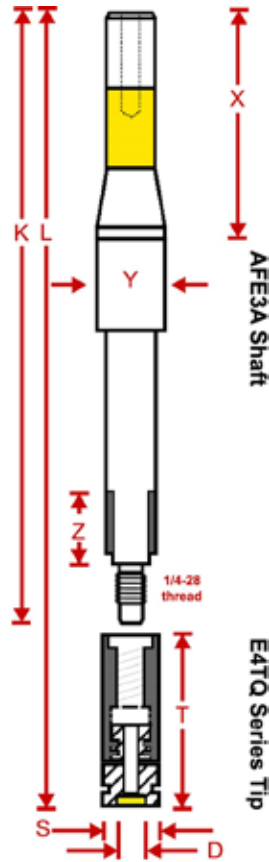
After using the electrode, clean it with distilled water and replace the protective cover to prevent the electrode surface from being scratched. It is recommended that the disk insert be ejected from the RDE tip before polishing. A toolkit that contains a mount that can be used to hold the disk insert while it is being polished and an electrode polishing kit which includes various alumina slurries and polishing pads is available (sold separately).

MSR Rotator Shaft with Tip



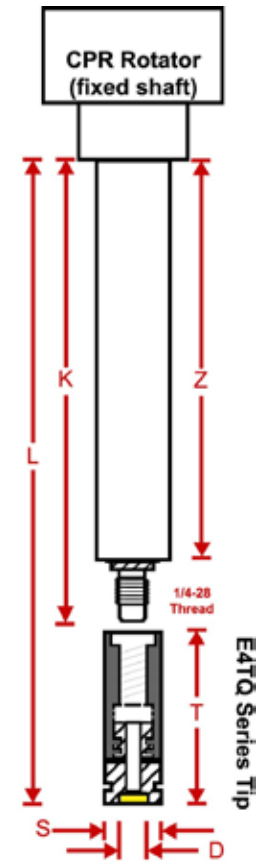
Disk Diameter (D):	5.0 mm
Shroud Diameter (S):	12.0 mm
Tip Shroud Length (T):	38.5 mm
Overall Length (L):	173.7 mm
Shaft Length (K):	151.9 mm
Upper Shaft OD (Y):	6.35 mm
Hidden Length (P):	68 mm
Exposed metal (Q):	50.6 mm
Polymer Sheath (Z):	16.6 mm

ASR Rotator Shaft with Tip



Disk Diameter (D):	5.0 mm
Shroud Diameter (S):	12.0 mm
Tip Shroud Length (T):	38.5 mm
Overall Length (L):	204.4 mm
Shaft Length (K):	182.6 mm
Upper Shaft Length (X):	82.6 mm
Upper Shaft OD (Y):	18.3 mm
Polymer Sheath (Z):	16.6 mm

Stationary Use



Disk Diameter (D):	5.0 mm
Shroud Diameter (S):	12.0 mm
Tip Shroud Length (T):	38.5 mm
Overall Length (L):	102 mm
Shaft Length (K):	79.4 mm
Polymer Sheath (Z):	63.5 mm