Flat Sample Holder

Part Number 990-00403

(Patent Pending)

Operator's Manual

April 8, 2016
988-00043
Rev. 1

If You Have Problems

Please visit our service and support page at www.gamry.com/service-support/. This page contains information on installation, software updates, and training. It also contains links to the latest available documentation. If you are unable to locate the information you need from our website, contact us via e-mail using the link provided on our website. Alternatively, you can contact us one of the following ways:

Internet	www.gamry.com/service-support/
Telephone	(215) 682-9330 9:00 AM–5:00 PM US Eastern Standard Time
	(877) 367-4267 Toll-free US & Canada Only

Please have your instrument model and serial numbers available, as well as any applicable software and firmware revisions.

If you have problems in installation or use of a system containing a Flat Sample Holder, please call from a telephone next to your computer, where you can type and read the monitor while talking to us.

We will be happy to provide a reasonable level of free support for registered users of the Flat Sample Holder. Reasonable support includes telephone assistance covering the normal installation, use, and simple customization of a computerized system containing a Flat Sample Holder connected to a Windows®-compatible computer.

A service contract that extends both the hardware warranty and software update period is available at an additional charge. Software updates *do not* include software enhancements offered to our customers at additional cost.

Enhancements to the Flat Sample Holder and Gamry's standard applications software that require significant engineering time on our part can be performed on a contract basis. Contact us with your requirements.

Limited Warranty

Gamry Instruments, Inc. warrants to the original user of this product that in case of any missing parts, Gamry Instruments, Inc. will replace such missing parts within sixty (60) days of shipping the original order to the customer.

Gamry Instruments, Inc. makes no warranties regarding either the satisfactory performance of the Flat Sample Holder including the software provided with this product or the fitness of the product for any particular purpose. The remedy for breach of this Limited Warranty shall be limited solely to repair or replacement, as determined by Gamry Instruments, Inc., and shall not include other damages.

Gamry Instruments, Inc. reserves the right to make revisions to the system at any time without incurring any obligation to install same on systems previously purchased. All system specifications are subject to change without notice.

There are no warranties which extend beyond the description herein. This warranty is in lieu of, and excludes any and all other warranties or representations, expressed, implied or statutory, including merchantability and fitness, as well as any and all other obligations or liabilities of Gamry Instruments, Inc; including but not limited to, special or consequential damages.

This Limited Warranty gives you specific legal rights and you may have others which vary from state to state. Some states do not allow for the exclusion of incidental or consequential damages.

No person, firm or corporation is authorized to assume for Gamry Instruments, Inc., any additional obligation or liability not expressly provided herein except in writing duly executed by an officer of Gamry Instruments, Inc.

Disclaimers

Gamry Instruments, Inc. cannot guarantee that the Flat Sample Holder will work with all computer systems, operating systems, and third-party potentiostat hardware.

The information in this manual has been carefully checked and is believed to be accurate as of the time of printing. However, Gamry Instruments, Inc. assumes no responsibility for errors that might appear.

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Table of Contents

1: Safety Considerations

Your Flat Sample Holder is supplied in a safe condition. This chapter of the Flat Sample Holder Operator's Manual contains some information and warnings that you must follow to insure continued safe operation of the Flat Sample Holder.

Inspection

When you receive your Flat Sample Holder, inspect it for evidence of shipping damage. If you note any damage, please notify Gamry Instruments Inc. and the shipping carrier immediately. Save the shipping container for possible inspection by the carrier.

Defects and Abnormal Stresses

Do not use your Flat Sample Holder or any other apparatus if you think it could be hazardous. Have it checked by qualified service personnel.

There are limit conditions on the storage, shipping and operation of this equipment.

Storage

Ambient Temperature	−20°C to 80°C
Relative Humidity	Maximum 90% non-condensing

Shipping

Same as storage plus	
Acceleration	Maximum 30 G

Operation

Ambient Temperature	−20°C to 80°C
Relative Humidity	Maximum 90% non-condensing

Cleaning

Disconnect the Flat Sample Holder from all power sources prior to cleaning. You may disassemble the Flat Sample Holder (in reverse order from assembly in Chapter 3) to clean all surfaces. Acceptable solvents are acetone, ethanol, isopropanol, and water.

Caution: Always read and follow safety warnings in your MSDS when using a particular solvent for cleaning.

If you notice leakage of electrolyte into your Flat Sample Holder, check all mechanical connections. Recoat the rod with Teflon® tape and reattach the rod to the holder.

2: Introduction

Purpose

The Flat Sample Holder is used largely for corrosion measurements. Metal samples can be put into the holder and the cell can be then immersed into the electrolyte, where various electrochemical measurements are performed. The metal samples can be thin foils or thicker plates up to a thickness of 7 mm.

In addition, the cell design allows a reproducible setup, for the active electrode surface is always the same. The complete cell holder may be used in standard beakers but also *in situ*, e.g., open sea, lakes, large industrial containers, cans, etc.

Materials

The whole cell can be completely disassembled for thorough cleaning of each piece. The cell material is PEEK (polyetheretherketone), a highly stable plastic which can withstand most common chemicals.

A reference electrode is not included in the cell kit. Requirements for this electrode vary too much user-to-user to make its inclusion in the standard kit practical. Gamry Instruments sells three types of reference electrodes (SCE, Ag/AgCl, and Hg/Hg_2SO_4) that are suitable for use. Order your reference electrode separately.

The components in the Flat Sample Holder were selected to be as chemically inert as possible. In normal use the only materials in contact with the test solution are:

- The corrosion sample,
- Buna-N,
- PTFE (Teflon®),
- PEEK
- Gold-plated metal
- Stainless steel
- Viton® (on the 24/40 adapter)

Chemical resistance tables for most of these materials are available (try searching the Internet).

3: Assembly

This chapter of the Flat Sample Holder Operator's Manual covers assembly.

Initial Visual Inspection

After you remove the parts for the Flat Sample Holder from the shipping carton, check for any signs of shipping damage. If you note any damage, please notify Gamry Instruments, Inc. and the shipping carrier immediately. Save the shipping container for possible inspection by the carrier.

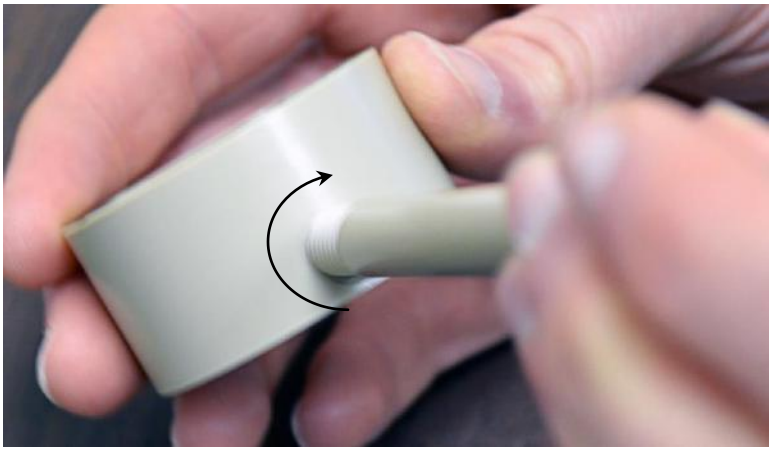
List of parts

Quantity	Part Number	Description
1	820-00095	Rod
1	820-00108	Cell body
1	820-00109	Stopper plate
1	820-00110	Compression plate
1	820-00111	Sealing lid
1	820-00112	Contact ring
12	700-00156	Gold-plated pogo pin (including 6 spare pins)
2	832-00030	M2.5 × 2 mm set screw (including 1 spare set screw)
2	935-00108	O-ring, 43 mm dia. (including 1 spare O-ring)
2	935-00109	O-ring, 12.1 mm dia. (including 1 spare O-ring)
4	935-00110	O-ring, 6 mm dia. (including 2 spare O-rings)
1	985-00164	Connector cable
1	985-00128	eQCM WE/WS cable
1	821-00006	3/64″ × 1″ slotted screwdriver
1	821-00007	5/16″ × 1¾″ slotted screwdriver
1	955-00009	Tweezers
1	935-00113	PTFE tape
1	935-00116	24/40 tubing adapter, 10 mm dia. hole
1	935-00111	O-ring, 9.5 mm dia.

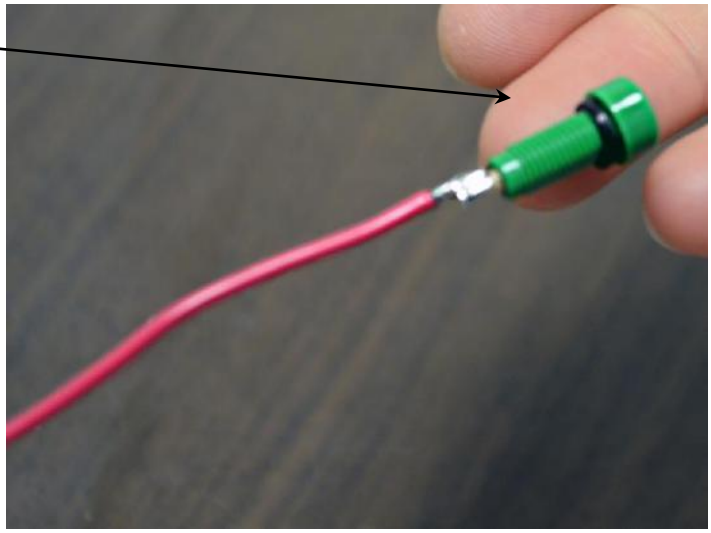
Pay careful attention to cleanliness of the cell. In most electrochemical testing situations, contaminants in the cell and test solution can lead to poorly reproducible results.

Putting the unit together

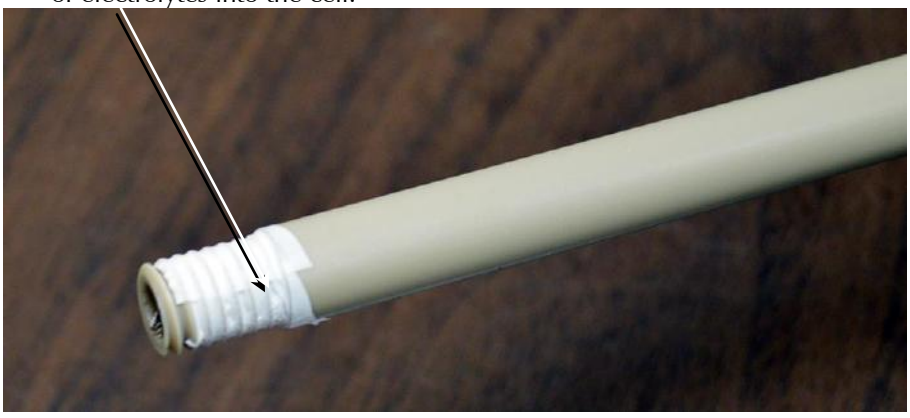
1. Compare all the parts to the Parts List. Confirm that you have all parts. There are some extras included in case of loss.
2. Take a small O-ring (6 mm dia.) with a square cross-section, and load it onto the rod.
   You may have to thread the rod into the cell body to seat the O-ring properly on the rod. (If you do, remove the rod after the O-ring is corrected seated.)



3. Seat a second O-ring (6 mm dia.) on the green end of the cell cable.



4. Wrap one or two layers of Teflon® tape onto the threaded end of the rod. This offers the best seal against leakage of electrolytes into the cell.

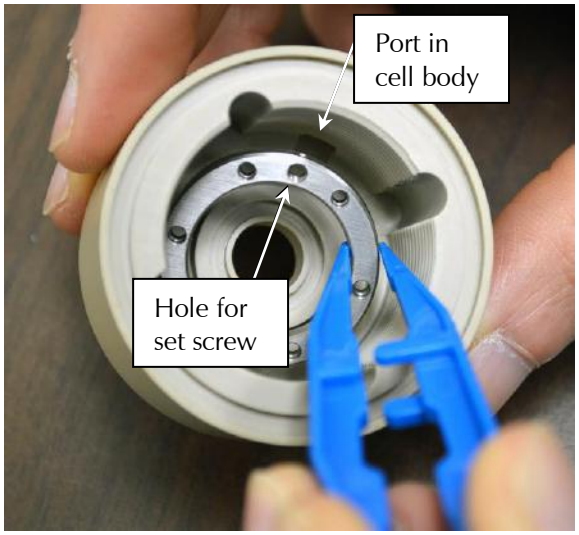


5. Screw the rod into the cell body.

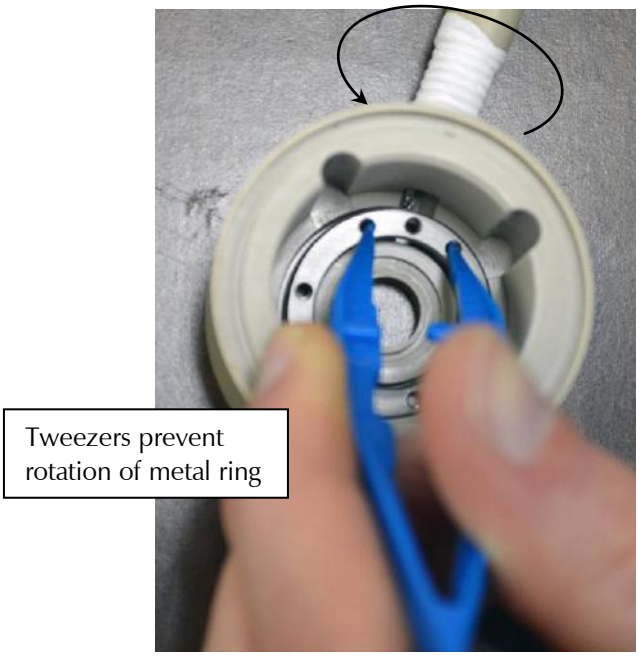
6. Screw the small green cap onto the cell cable.

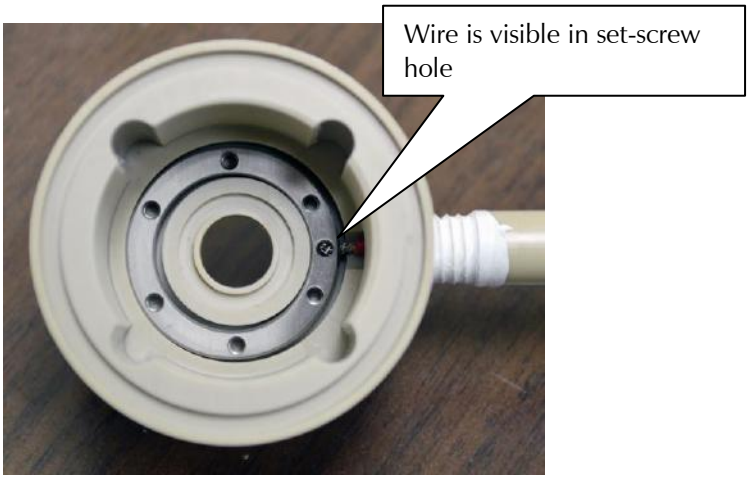
7. Thread the wire through the rod's core, so that the wire extends out of the other end about 1 cm. (Photo below shows the wire extending, with the rod removed from the cell body for clarity)

8. Drop the metal ring onto the cell body, so the hole for the set screw is next to the port.

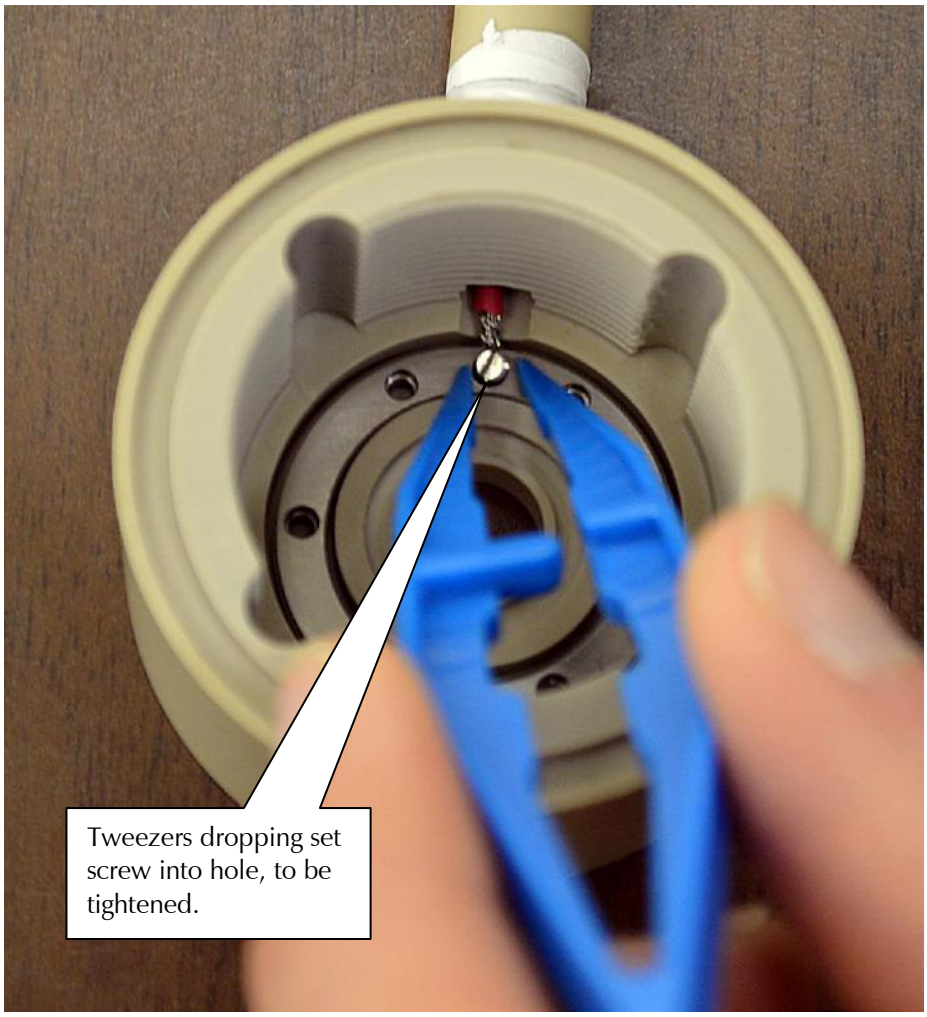


9. Feed the wire through the port and small hole, and screw the rod into the cell body. The metal ring may twist while you do this, so hold the metal ring with the tweezers in two holes.

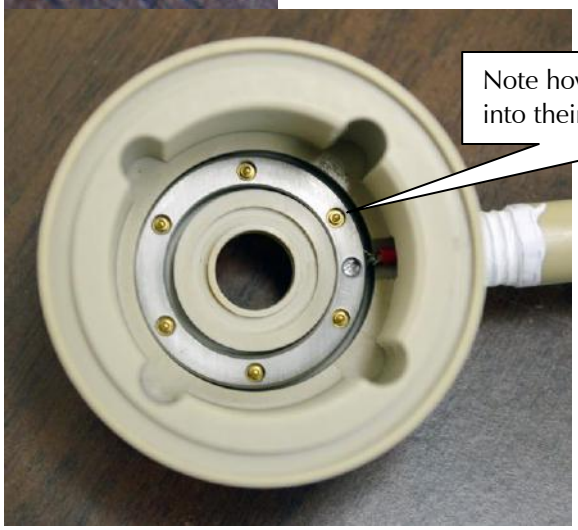




10. Thread the M2.5 set screw into its receptacle, and tighten with the small screwdriver until the top of the set screw is recessed below the metal ring.

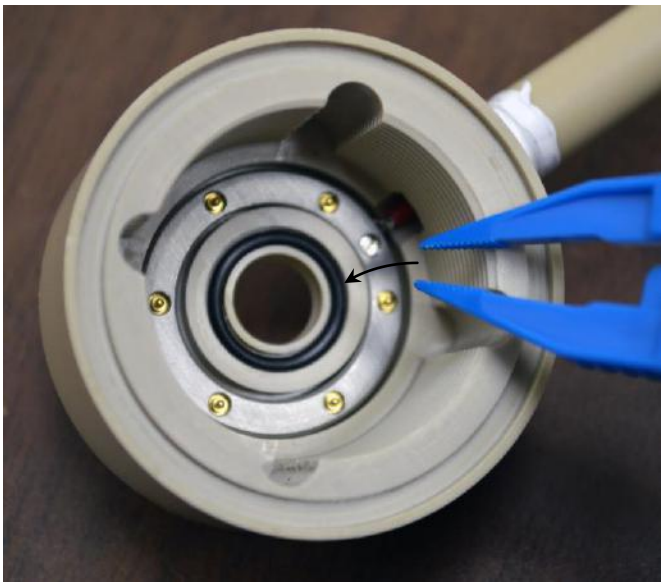


11. Drop the six gold-plated pins into the six holes.

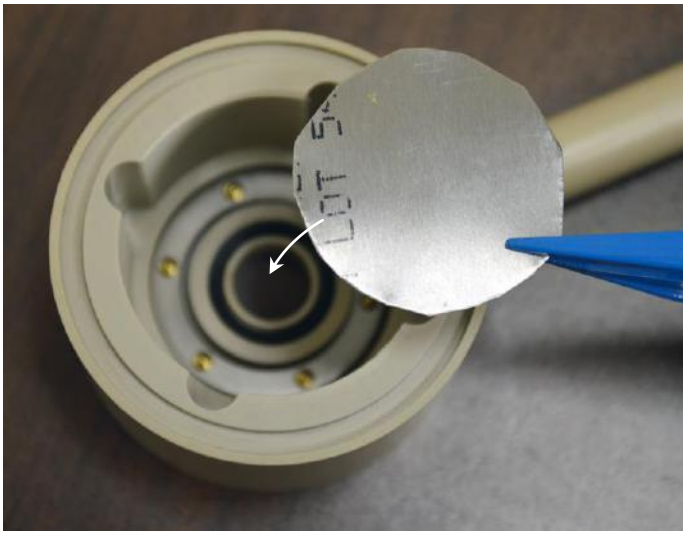


The cylindrical end is inserted downward, and the rounded-pin end is up. Each pin sticks out above the metal ring. You are not required to use all six pins, but the more pins you use, the more stable is the contact to your metal sample.

12. Place the O-ring (12.1 mm dia.) into the center of the cell body.



13. Place your sample electrode metal into the cell body. Its diameter may be between 2.5 and 3 cm; its maximum thickness is 7 mm.

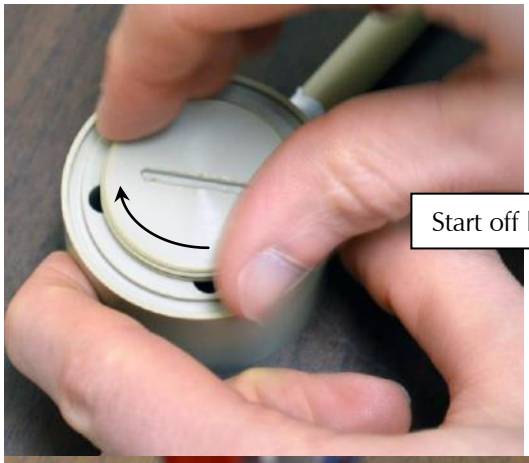


14. Drop the stopper plate into the cell body on top of your sample. Line up the tabs with the recesses in the cell body.

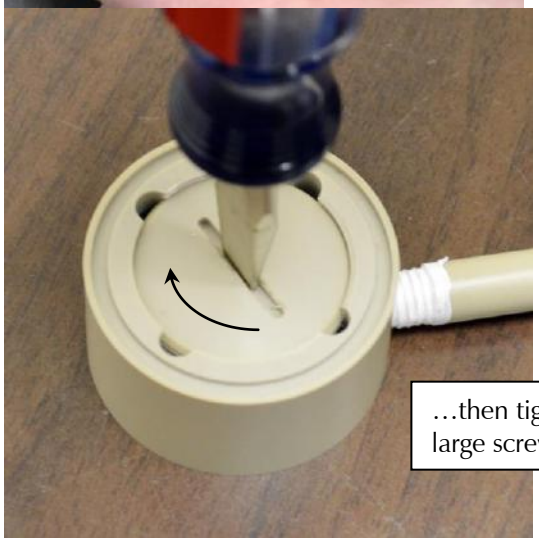
The stopper plate prevents the sample from twisting while you tighten the cell.

15. Screw the compression plate into the cell body, so that it is tight, and as far as it can go, so that the sample contacts the pins reliably.

A thinner metal sample means you must screw the compression plate farther into the cell body.



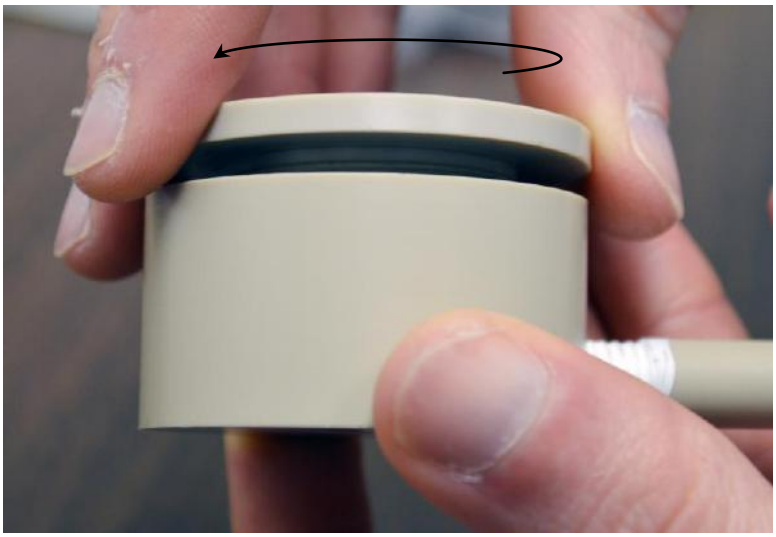
Start off by hand…



…then tighten with the large screwdriver.

16. Add the large O-ring (43 mm dia.).

17. Screw the sealing lid onto the cell body



Completed Flat Sample Holder looks like this:

Connection to Gamry Instruments potentiostats

Insert the Y-cable into the connector at the end of the rod.

Connect the Y-cable to your potentiostat.

Optional use of 24/40 adapter to glassware

1. Remove the cap from the 24/40 adapter.

2. Remove the existing O-ring from the cap.

3. Add the new O-ring (with a slightly smaller inner diameter of 9.5 mm, that comes with the Flat Sample Holder) into the cap.

4. Reattach cap to adapter.

5. Insert the cell's rod through the adapter.

6. Place assembly into the glass lid.

Completed set-up with electrode:

3: Assembly--Optional use of 24/40 adapter to glassware

Appendix A: Specifications

Specifications apply at 25°C, 116 V AC power, and operation with a Gamry Instruments potentiostat unless otherwise noted.

Table of Specifications

Active electrode area		0.785 cm^2
Active electrode diameter		10 mm
Sample characteristics	Maximum thickness	7 mm
	Round sample, max. dia.	33 mm
	Round sample, min. dia.	25 mm
	Square sample, max. length of edge	23 mm
Maximum current		10 A
Maximum temperature		80°C
Minimum temperature		−20°C
Material	External holder	PEEK

Comprehensive Index