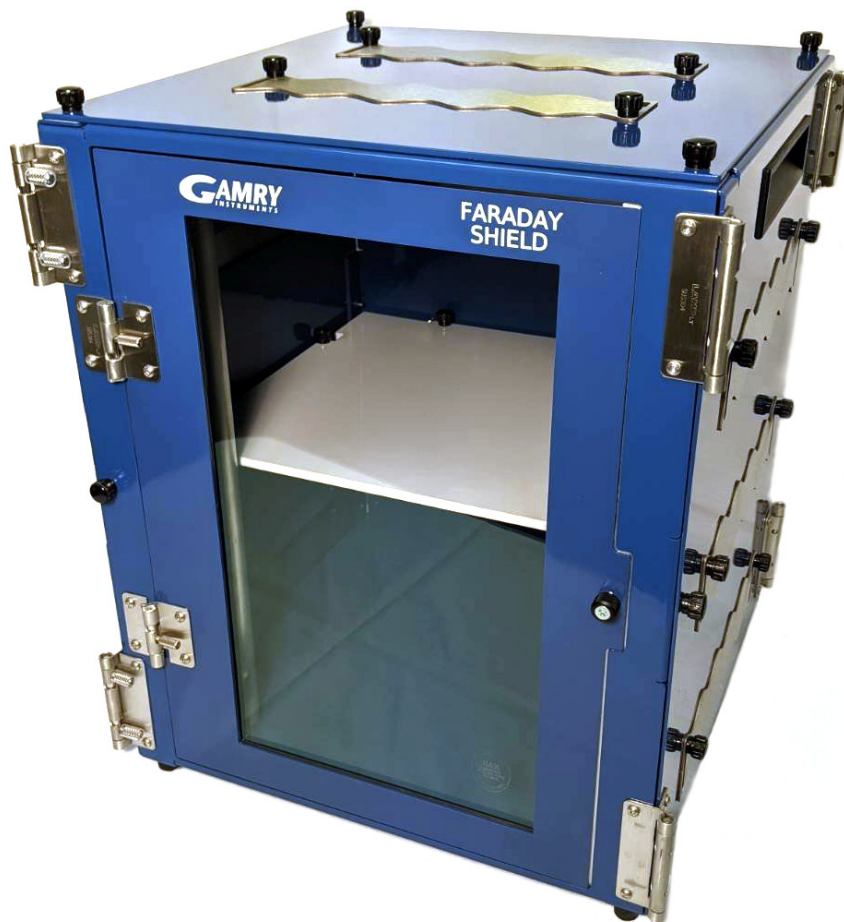




# Faraday Shield™

## Operator's Manual





## If You Have Problems

Please visit our service and support page at [www.gamry.com/service-support/](http://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, you can contact us via email using the link provided on our website. Alternatively, you can contact us one of the following ways:

Internet	<a href="http://www.gamry.com/service-support/">www.gamry.com/service-support/</a>
Telephone	(215) 682-9330 9:00 AM–5:00 PM US Eastern Standard Time (877) 367-4267 Toll Free US & Canada Only

We will be happy to provide a reasonable level of free support for registered users. Reasonable support includes telephone assistance covering the normal installation and use of the Faraday Shield.

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 Gamry's standard applications software that require significant engineering time on our part may 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 it shall be free of defects resulting from faulty manufacture of the product or its components for a period of two years from the original shipment date of your purchase.

Gamry Instruments, Inc. makes no warranties regarding either the satisfactory performance of the Faraday Shield 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 Faraday Shield will work with all computer systems, operating systems, and third-party software applications hardware/software.

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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## Chapter 1: Safety Considerations

Your Faraday Shield has been supplied in a safe condition. This chapter of the Operator's Manual contains some information and warnings that you must follow to insure continued safe operation.

### Inspection

When you receive your Faraday Shield, inspect it for evidence of shipping damage. If any damage is noted, please notify Gamry Instruments Inc. and the shipping carrier immediately. Save the shipping container for possible inspection by the carrier. The Faraday Shield has a conductive coating on the outer side of the glass pane in the door. If the glass is cracked, the conductivity could be broken, compromising the Faraday Shield's ability to function as a Faraday cage.



**Warning! The door of the Faraday Shield contains a large pane of glass with a conductive coating on the outside surface. Chips on the corners, while not affecting performance, can have extremely sharp edges that represent a significant safety hazard. Injuries from broken glass can be quite severe.**

### Grounding in the Faraday Shield

The metal case of the Faraday Shield is **not** connected to an earth ground. Grounding is best accomplished by connecting the ground lead of the potentiostat to the internal ground lug of the Faraday Shield. Proper grounding is required for the Faraday cage to function.

Most electrochemical cells are isolated from earth ground, in which cases isolation of the Faraday Shield from earth is not required. Connection of the Faraday Shield to an earth ground (when allowed) may lower the noise seen in an electrochemical test.



**Sources of earth ground include:**

- most metal water pipes
- the chassis of most electronic apparatus (which are generally earth grounded)
- the protective ground terminal of an AC mains power plug

**We recommend that you discuss grounding with an electrical or electronics professional prior to making this earth ground connection.**

This connection of the Faraday Shield to an earth ground is not a "Protective Earth Ground" as defined in IEC 1010. The Faraday Shield is safe in the absence of this connection, for it does not contain any hazardous voltages.



**Warning! Do not connect the Faraday Shield's ground binding post to any voltage other than a potentiostat's floating or earth ground. An improper connection can create a safety hazard, which could result in personal injury or death.**

### Temperature and ventilation

Your Faraday Shield was designed for indoor use at ambient temperatures between 0°C and 45°C. You may need to ventilate or even cool the Faraday Shield with forced air if the temperature rises excessively.

## Environmental limits

There are environmental limits on the storage, shipping and operation of this equipment. The Faraday Shield has **not** been designed for outdoor use.

### Storage

Ambient Temperature	-40°C to 75°C
Relative Humidity	Maximum 90% non-condensing

### Shipping

Same as storage plus Acceleration	Maximum 30 G
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### Operation

Ambient Temperature	0°C to 45°C
Relative Humidity	Maximum 90% non-condensing



**Caution! The Faraday Shield is not designed for operation in conditions where liquid water may enter the chassis, or water vapor may condense within the chassis.**

## Use with dangerous materials

Do not use the Faraday Shield with hazardous gases or other poisonous or noxious materials.



**Warning! Do not connect the Faraday Shield unit to poisonous, noxious, or explosive materials. Failure to observe this warning could cause injury or property damage. The Faraday Shield is not gas or liquid tight. Use the same precautions as if using an open electrochemical cell on a bench. Operate in a hood (fume cupboard) if dangerous gases are used.**

## Cleaning

When cleaning the Faraday Shield, disconnect any equipment inside from all power sources prior to cleaning.

Use a cloth **lightly** dampened with either clean water or water containing a mild detergent to clean the outside of the enclosure. Alternatively, you can use isopropyl alcohol. Do not use a wet rag or allow fluid to enter the enclosure. Do not immerse the Faraday Shield in any type of cleaning fluid (including water). Do not use any abrasive cleaners.



**Caution! Read and understand the Material Safety Data Sheet (MSDS) for any solvent, such as isopropyl alcohol, before use. Always take appropriate precautions when using these materials.**

## Leakage inside

The Faraday Shield is not sealed to be liquid tight. Avoid spills and promptly clean up any spills that do occur.

## **RoHS Compliance**

The Faraday Shield has been built using lead-free components. This equipment complies with the European RoHS initiative.

## Chapter 2: Introduction

### About this manual

This manual covers the installation, safety, and use of the Gamry Instruments Faraday Shield. Both versions of the Faraday Shield – with and without glass pane – are discussed.

### About the Faraday Shield

The Faraday Shield is a Faraday cage, designed to be as flexible and convenient as possible for a wide range of electrochemical experiments.

Faraday Shield features include:

- Conductive-glass window to allow visual inspection without breaking shielding
- Pass-throughs for cables, feed gas, thermostatic control (water)
- Electrical isolation from earth ground
- Adjustable plastic shelf for reducing capacitive effects
- Ring stand rod for mounting clamps, various connectors, or adapters to hold glassware, cables, or any other laboratory equipment
- Full flexibility with the assembly due to interchangeability of panels

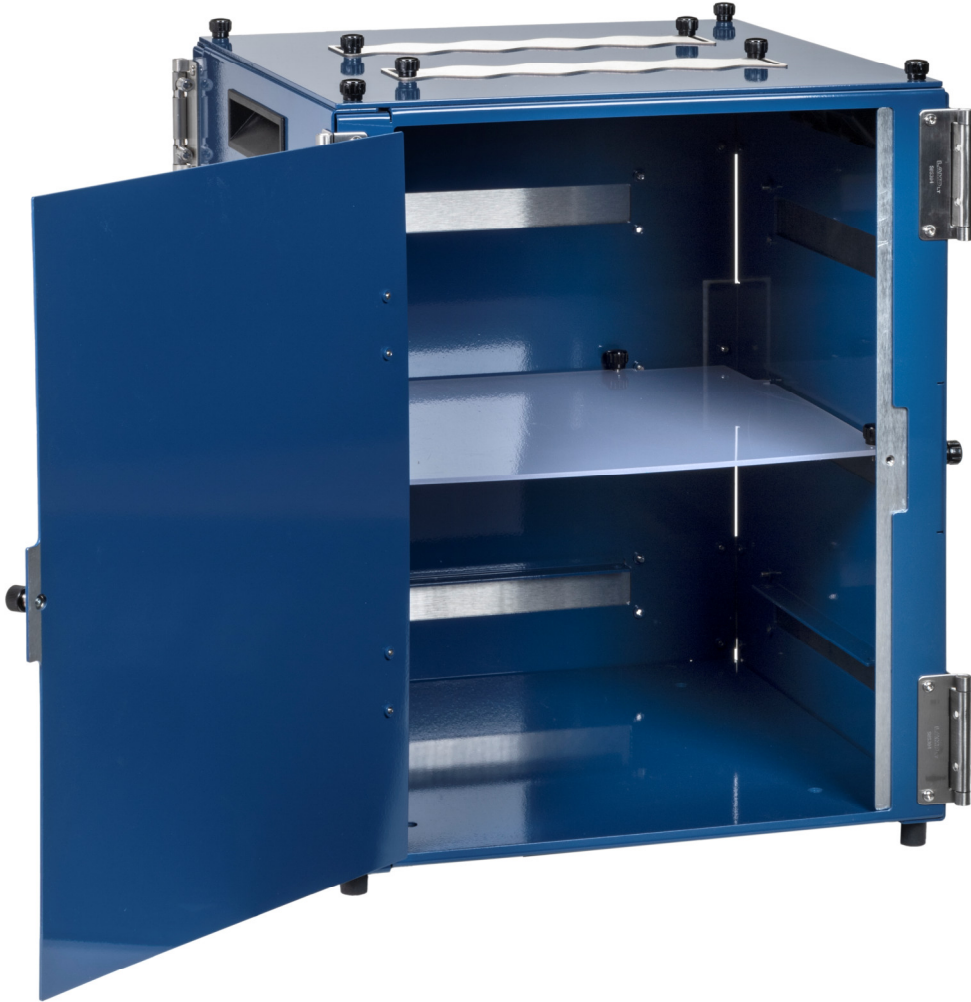
### Notational conventions

To make this manual more readable we have adopted some notational conventions. These are used throughout this manual and all other Gamry Instruments manuals:

- Numbered lists. A numbered list is reserved for step-by-step procedures, with the steps always performed sequentially.
- Bulleted list. The items in a bulleted list, such as this one, are grouped together because they represent similar items. The order of items in the list is not critical.

## Chapter 3: Unpacking and Installation

Front view of an open Faraday Shield



## Unpacking

When you receive your Faraday Shield, please verify that you have received the following items. Please refer to the parts list of the system you have:

**Table 1 - Faraday Shield - Rev 1 (992-00164)**

Quantity	Part number	Description
1	730-00119	4 mm female banana socket, M4 male screw, insulated, black
1	810-00121	Faraday Shield - Bottom Panel
1	820-00161	Shelf, polypropylene
1	820-00163	Ring stand rod, 12 mm OD, 400 mm length, M6
14	835-00042	Thumb screw, plastic, M4 x 10 mm, black
4	850-00067	Rubber bumper, 1 5mm OD, 15 mm height, M4
1	966-00012	Door Panel Sub-assembly
3	966-00013	Side Panel Sub-assembly
1	966-00014	Top Panel Sub-assembly
1	988-00078	Operator's Manual

**Table 2 - Faraday Shield with Glass Door - Rev 1 (992-00183)**

Quantity	Part number	Description
1	730-00119	4 mm female banana socket, M4 male screw, insulated, black
1	810-00121	Faraday Shield - Bottom Panel
1	820-00161	Shelf, polypropylene
1	820-00163	Ring stand rod, 12 mm OD, 400 mm length, M6
14	835-00042	Thumb screw, plastic, M4 x 10 mm, black
4	850-00067	Rubber bumper, 1 5mm OD, 15 mm height, M4
3	966-00013	Side Panel Sub-assembly
1	966-00014	Top Panel Sub-assembly
1	966-00037	Door Panel with Glass Window Sub-assembly
1	988-00078	Operator's Manual

All panel sub-assemblies have their cable entry plates (P/N 810-00123) already pre-mounted. Please refer to Appendix B for a list of replacement parts and other optional parts for your Faraday Shield.

## Initial visual inspection

After you remove your Faraday Shield components from its shipping carton, check all parts for any signs of shipping damage. If any damage is noted, please notify Gamry Instruments, Inc. and the shipping carrier immediately. Save the shipping container for possible inspection by the carrier.

## Assembly

Use flat and padded surface (e.g. carpet, cardboard, etc.) for assembling to avoid scratches. No tools are required to assemble or disassemble the Faraday Shield.

### 1. Connect side panel sub-assemblies

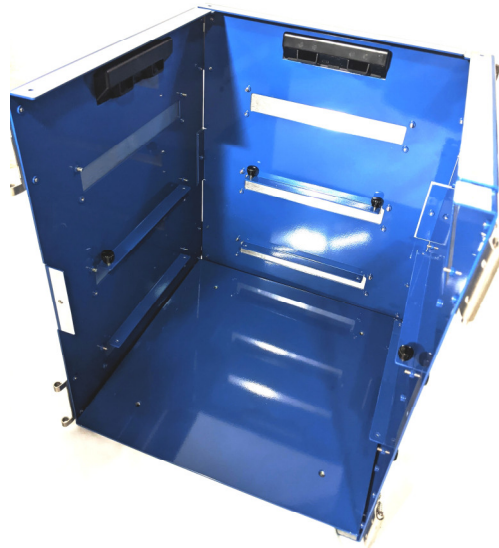
- each side panel has two pairs of quick-release hinges mounted

- snap together corresponding hinges of all three side panel sub-assemblies (966-00013)



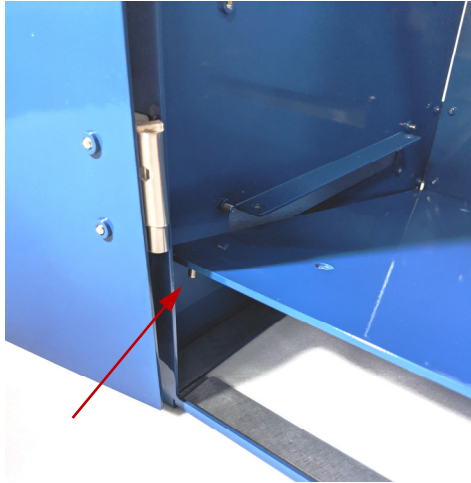
## 2. Insert bottom panel

- slide bottom panel from the lower end inside the side panel assembly
- standoffs of bottom panel don't have to be inserted into clearance holes yet



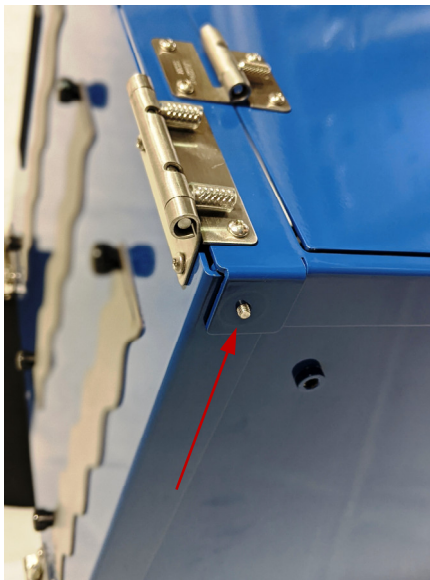
## 3. Connect door panel sub-assembly

- connect front panel sub-assembly to the left side panel using the quick-release hinges
- open the door (either metal or with glass pane) and slightly lift up the front part of the bottom panel with its standoffs
- align front panel and connect other side using the quick-release hinges



**4. Mount bottom panel and feet**

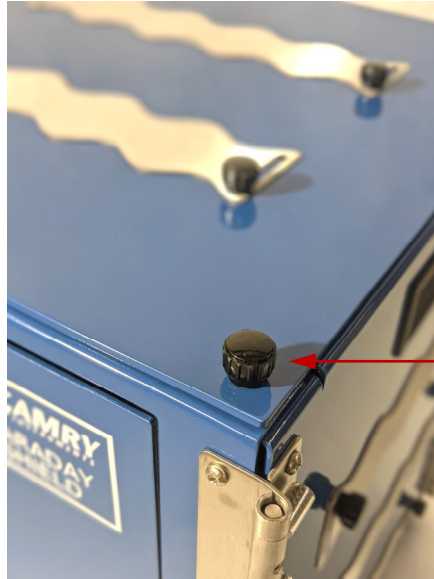
- once the door panel sub-assembly is connected, align all four standoffs of bottom panel with clearance holes and fully insert
- lift the cage assembly and screw rubber bumper onto threaded studs
- verify that the bottom panel is flush mounted



**5. Mount top panel sub-assembly**

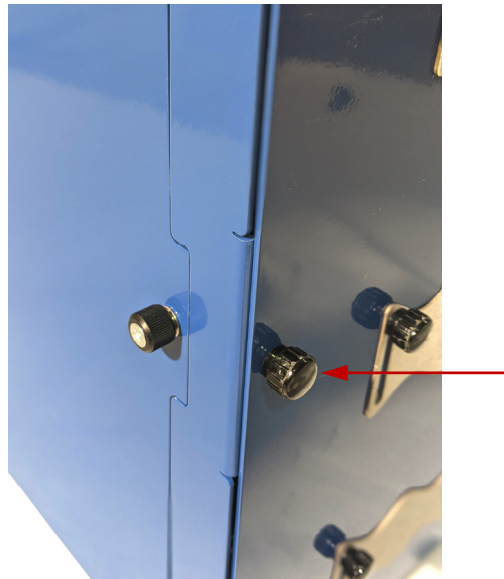
- put top panel sub-assembly on top side of cage
- use four thumb screws to attach





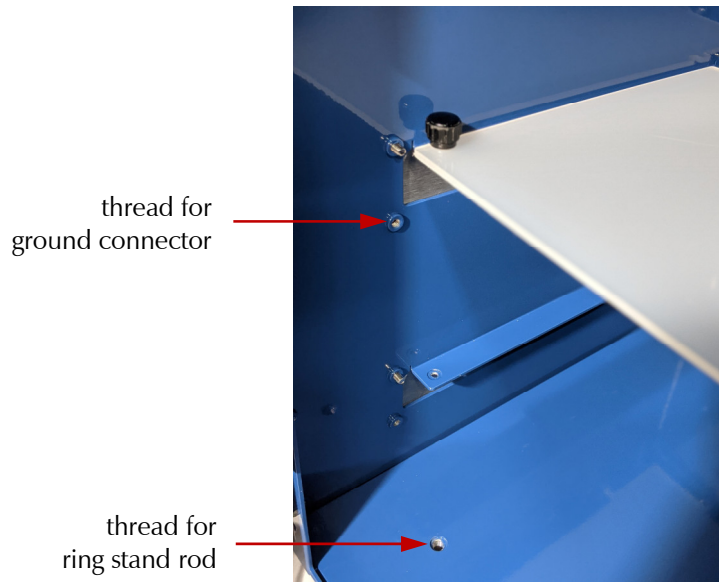
**6. Interconnect side panels**

- use four thumbs screws to connect all side panels



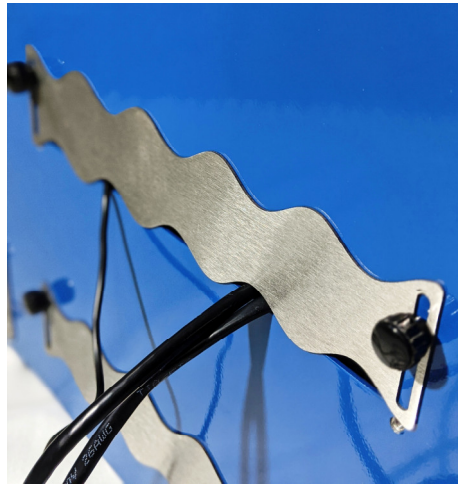
**7. Mount ground connector, ring stand rod, and shelf**

- a 4 mm ground jack is provided which can be screwed into any open M4 thread on each side panel inside the Faraday cage
- screw ring stand rod in any of the four M6 threads at the bottom panel
- the shelf can be mounted on flanges of side panels at two different heights
  - place shelf on flanges (upper or lower level) and attach with six thumb screws
  - slightly open thumb screws and slide shelf to remove it



**8. Adjust cable entry plates for cables**

- all cable entry plates are pre-mounted; two are located at the top and three on each side panel
  - slightly unscrew thumb screws of cable entry plate and guide cable through the opening
  - tighten thumbs screws again to hold both cable entry plate and cables in position



**Physical location**

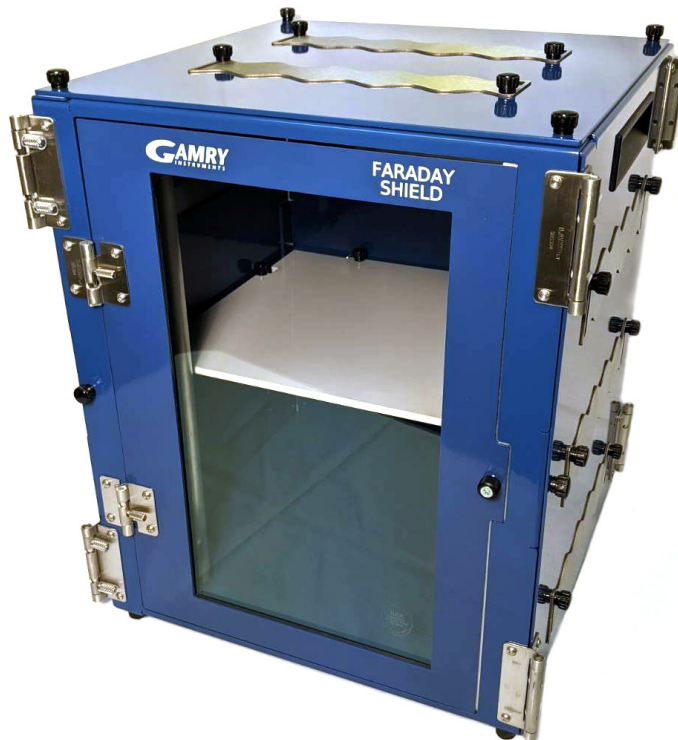
Normally place your Faraday Shield on a flat workbench surface. You need access to the top, rear, left, or right side of the Faraday Shield for cable connections. There are handles on both side and the rear panel to carry the Faraday Shield.

If you place your Faraday Shield within an enclosed space, make sure that the internal temperature within that space does not exceed the 45°C ambient temperature limit of the Faraday Shield. Be particularly careful if a computer or other heat-dissipating equipment is mounted in the same enclosure.



**Caution! If the Faraday Shield is taken from a cold location (for example: outdoors in winter conditions) to a warm, humid location, water vapor could condense on the cold surfaces inside the Faraday Shield. Allow at least one hour for the Faraday Shield to warm to room temperature.**

Faraday Shield fully assembled – 992-00164 (top) and 992-00183 (bottom)



The Faraday Shield is not designed for outdoor use.

## Appendix A: Specifications

All specifications are subject to change without notice.

Description	Dimensions
Exterior dimensions (max.)	width: 38 cm (15 inch) length: 38 cm (15 inch) height: 45.5 cm (18 inch)
Interior dimensions (max.)	width: 35 cm (13.7 inch) length: 35 cm (13.7 inch) height: 41.7 cm (16.4 inch)
Door opening (max.)	width: 28.8 cm (11.3 inch) height: 40.5 cm (16 inch)
Top opening (max.)	width: 30.2 cm (11.8 inch) length: 30.2 cm (11.8 inch)
Cable opening (max.)	width: 21 cm (8.2 inch) height: 2.5 cm (1 inch)
Ring stand rod	length: 40 cm (15.8 inch) diameter: 12 mm (0.5 inch)
Shelf (max.)	width: 34 cm (13.4 inch) length: 27.5 cm (10.8 inch) thickness: 6 mm (1/4 inch)
Glass pane	width: 21.5 cm (0.85 inch) length: 36 cm (1.4 inch) thickness: 4.76 mm (3/16 inch) conductive coating: about 15 ohms/sq. (on one side only)
Weight (approx.)	Faraday Shield: 7 kg (15.4 lbs) shelf: 0.5 kg (1.1 lbs) ring stand rod: 0.12 kg (0.26 lbs) glass pane: 0.9 kg (2 lbs)

## Appendix B: Replacement parts

In the event of losing or breaking any parts of the Faraday Shield, replacement parts can be individually ordered. The list also includes both door variants and door panel assemblies which are mutually interchangeable for more flexibility.

<b>Part number</b>	<b>Description</b>
730-00119	4 mm female banana socket, M4 male screw, insulated, black
810-00123	Cable entry plate
820-00161	Shelf, polypropylene
820-00163	Ring stand rod, 12 mm OD, 400 mm length, M6
835-00042	Thumb screw, plastic, M4 x 10 mm, black
850-00067	Rubber bumper, 1 5mm OD, 15 mm height, M4
810-00119	Door
966-00036	Door with Glass Window

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