

# HARMONIC FILTER RESISTORS INSTALLATION AND MAINTENANCE INSTRUCTIONS



**Post Glover**

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# HARMONIC FILTER RESISTORS INSTALLATION AND MAINTENANCE INSTRUCTIONS

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## Section 1 – Compliance

### 1.1 Compliance with Manual Instructions

It is essential that the Purchaser/User comply with all instructions and information contained in this manual, and that all personnel associated with the apparatus supplied under this contract are thoroughly familiar with the information contained herein.

### 1.2 Compliance with Installation Procedures

It is the Purchaser/User's responsibility to ensure that the apparatus supplied under this contract is correctly installed in a suitable location by technically qualified and competent persons.

Apparatus supplied as loose components, devices or sub-assemblies may, when energized, constitute a safety hazard. The Purchaser/User must ensure that such apparatus is installed in a secure location, and that all necessary safety information about the installation is provided to all personnel associated with it.

### 1.3 Relevant Design Standards

Resistors:	IEEE C57.32-2015
Enclosure:	N.E.M.A., I.E.C.

## Section 2 – Unpacking

### 2.1 Shipping

Post Glover Harmonic Filter Resistor assemblies are placed in their normal mounting position onto a wooden skid and securely fastened to the skid with lag bolts. The units are then covered with plastic to protect the finish and to prevent dirt or moisture buildup that can occur during shipping or storage. Bushings and mounting insulators are normally shipped loose on a separate pallet.

Where extra support is required during shipment, wooden supports are used inside the enclosure to support the resistor banks. Do not remove the temporary wooden shipping braces prior to setting the unit at the permanent installation location.

All units are loaded by forklift into the enclosed van of a common carrier. At that point, it is the responsibility of the carrier to provide proper care in shipping and handling.

### 2.2 Receiving

Once received, the skid-mounted unit should be unloaded and moved by forklift. At this point, a preliminary inspection of the unit should be made to ensure proper handling was practiced during shipment. Any damage should be reported to the carrier immediately. It is recommended that the unit remain on the skid until it reaches the job site to prevent possible damage during transfer.

All skid-mounted resistor assemblies are suitable for prolonged storage. If the unit is to be stored, it should sit horizontally (as shipped) in a dry, enclosed area, or covered with a waterproof cover. Never store the unit on the

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sides or top as this could result in damage to the bushings or insulators. Do not stack. *ALWAYS BE SURE THE UNIT IS DRY AND CLEAN BEFORE USE.*

## Section 3 – Installation

When the unit arrives at the job site, remove the lag bolts which fasten the resistor unit to the skid.

**NOTE:** It is recommended that all packing material within the enclosure remain intact until the unit is installed.

Top-mounted eye-bolts are provided for easy hoisting and placement by crane. A forklift can be used to place the unit providing the extra precaution is taken to ensure the forks rest against the steel angles of the enclosure and not the bottom screening (extended forks may be required for some applications).

The Harmonic Filter Resistor is supplied assembled except for the porcelain entrance/exit bushings and base insulators (if applicable), and enclosure elevating stands (if applicable). Larger resistor enclosures may be shipped in sections, requiring final assembly in the field; please check drawings for instructions. Insulators and bushings should be installed and bolts tightened to torque values appropriate to the hardware used.

Post Glover Harmonic Filter Resistor can be mounted on a concrete pad or support stand, using the base insulators if required on the drawing. It is important that the enclosure be mounted horizontally (as shipped). This keeps the unit drip-proof, allows for adequate cooling, and prevents unnecessary strain on the support insulators. At least 36 inches is required around all removable covers for access. This may be subject to local or site regulations requiring greater clearances. The unit should be bolted to the mounting surface using the holes provided at the bottom of each enclosure leg.

### Ventilation Clearances

A free-air flow environment is required around the resistor enclosure with a recommended minimum of approximately 10 inches. During normal service, either due to steady state current flow (if specified), or a fault condition, both the issuing (exhaust) air temperature and the enclosure surface temperature may exceed 100° C (212°F).

**NOTE:** Most enclosures are tied live at center potential of the resistor assembly. If the enclosure is tied at center potential, do not ground enclosure.



Only if the enclosure is not tied to center potential should the enclosure be grounded (to prevent a shock hazard to personnel or wildlife). The product specific drawing will state whether the enclosure is tied live.

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## Section 4 – Inspection

After the unit has been securely mounted and grounded, remove the front panel to allow inspection and wiring. The front panel can be identified by the Post Glover nameplate.

**NOTE:** It is important that all packing material used to protect the insulators and/or resistor banks be removed from within the enclosure before energizing. *FAILURE TO REMOVE THIS MATERIAL MAY RESULT IN FIRE HAZARD.*

With all packing material removed, carefully inspect the inside of the unit for broken insulators and other parts that may have been damaged during shipment.

**NOTE:** If any damaged parts are found, contact the carrier immediately. *ENERGIZING THE UNIT WITH DEFECTIVE PARTS MAY DAMAGE THE RESISTOR AND CREATE A SHOCK HAZARD TO PERSONNEL.*

*CHECK ALL ELECTRICAL CONNECTIONS TO ENSURE THAT THEY ARE TIGHT.*

Check the resistance value using suitable low-resistance ohmmeter. It must match the value stamped on the nameplate ( $\pm 5\%$  or  $\pm 10\%$  per the drawing).

## Section 5 – Installation of Bushings

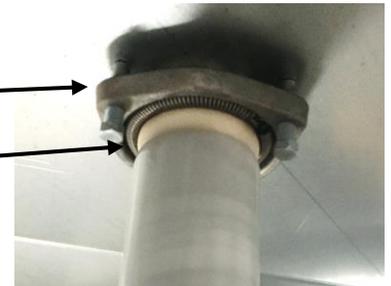
**NOTE:** Follow all applicable safety procedures including those concerning appropriate PPE when installing any electrical equipment.

Unpack the bushings and visually inspect for damage. If there is no damage, place the bushing in the enclosure hole from the outside (supporting as necessary).

Slide Casting Ring onto Bushing

Add Spring to bushing ensuring the spring locates into groove

Tighten bolts on Casting Ring.



## Section 6 – Connection of Phase Leads

The phase or line leads from/to the filter components are connected directly to the side mounted bushings: two per single phase resistor enclosure, and six per three phase enclosure. The bushings typically have a NEMA two-hole pad-type connector. See Figure 1 for an example

Customer requested options and/or physical configurations may require unique termination methods; consult the factory drawings for job-specific details.

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In all cases, the terminals are tagged for easy identification and the proper connection is shown schematically on the drawing. *CHECK TO SEE THAT ALL CONNECTIONS ARE FIRMLY TIGHTENED.*

*\* CONSULT THE APPROPRIATE ELECTRICAL CODES FOR THE INSTALLATION LOCATION AND FOR PROPER CABLE SIZING.*

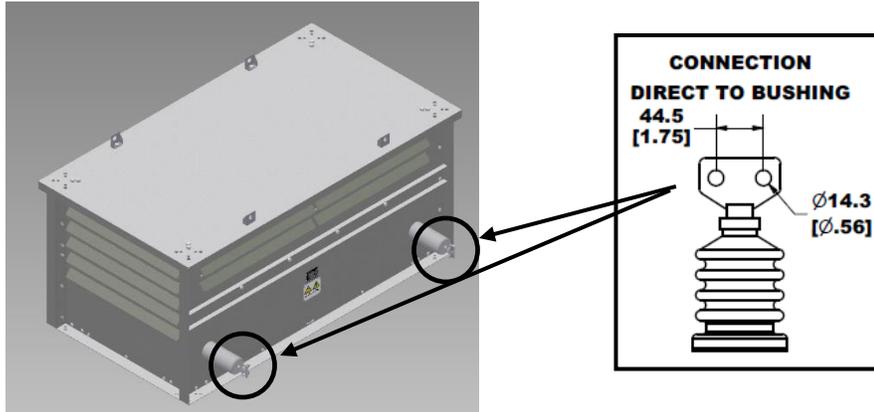


Figure 1. Bushing connections

## Section 7 – Operation Procedures

### 7.1 Personnel Safety

The rules in this section must be followed to ensure the safety of personnel associated with this apparatus.

During Normal Use, ensure that the plant operators:

1. Are fully familiar with all controls, particularly those for emergency shutdown.
2. Comply with all safety warning notices and keep all enclosure covers on during operation.
3. Are trained to recognize signs of faulty operation, and know what action to take in the event of trouble.

During Maintenance and Testing, ensure the following:

1. Only technically competent and authorized persons are permitted to carry out work.
2. Personnel comply with all statutory requirements.
3. Personnel are thoroughly familiar with the unit and the system of which it is a part, and can recognize any potential safety hazards.
4. Unit is isolated completely before opening enclosures. Also, make absolutely certain it is de-energized before starting work. All possible precautions, e.g., lockouts, must be taken to ensure that the isolated apparatus cannot become live at any time while it is being worked on.
5. All service personnel comply with all safety procedures for the protection of themselves and of others, including the use of temporary barriers and warning notices.
6. Personnel are completely familiar with all pertinent information provided, particularly on safety matters.
7. Personnel understand the hazards inherent in working on live electrical apparatus and take all necessary precautions.
8. Personnel considers that the unit may have been modified without proper reference to the manufacturer and

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take extreme caution at all times before, during and after any work is carried out.

9. Always thoroughly check and test the unit in accordance with this manual and good working practice before putting the unit back in service.

## 7.2 Skills Required for Specific Tasks

To ensure that the unit is safe for use in normal plant operation it has been designed and tested in accordance with relevant U.S. and International Standards. Information is provided in this manual regarding the conditions necessary for safety against hazards reasonably foreseeable during normal use and the precautions taken to counteract them.

It is the Purchaser/User's responsibility to ensure that the unit is maintained in a safe condition by technically competent and authorized personnel only who act in compliance with all appropriate safety procedures.

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## Section 8 – Maintenance/Inspection

Very little maintenance is necessary on a harmonic filter resistor. However, periodic inspections for damage are needed to ensure that the resistor is still capable of functioning as designed. The frequency of the inspection depends upon site conditions i.e. atmospheric pollution, safe access to the equipment, etc. but initially could be done every 6 months.

Damage may occur from lightening, storms, earthquakes, wildlife, overloads or extended service life. Basically, it is necessary to ensure that the resistive element has not burned open and that the element (including the incoming bushing) is still properly isolated from ground.

The following procedure is recommended for periodic field inspections:

1. De-energize the filter circuit and allow sufficient time for any capacitors to discharge. Follow the filter supplier's guidelines for safe de-energization of the equipment. These precautions are recommended to prevent a shock hazard to maintenance personnel and to prevent the system from being operated without proper grounding.

**WARNING:** *Danger: High Voltage*

2. Remove the front cover (which is on the same side as the nameplate) and the rear cover. This will allow for a visual inspection of all internal components.
3. Carefully check for cracked insulators or bushings. A MEGGER or HI-POT test is the most reliable method of ensuring that the porcelain insulation is still providing the necessary electrical isolation. Be certain to remove any jumpers between the resistor assembly and the enclosure before performing this test, and replace them immediately after testing is complete.
4. Check the resistive elements for continuity. An ohmmeter reading made between the neutral and the ground side of the resistor should be within 10% of the nameplate value. If the resistance of the element is more than 15% off from the nameplate value, the resistors may need to be replaced. Any open resistors should be replaced. *COMPLETE NAMEPLATE DATA WILL BE NECESSARY TO OBTAIN REPLACEMENT PARTS.*
5. Check all internal connections for tightness. Check wiring for signs of damage from heat or overloads.
6. Vacuum any dirt or debris from the inside of the enclosure.
7. Check the enclosure for signs of damage from weather or rodents. Replace all side covers removed during inspection and check the mounting bolts for tightness.
8. Should it be necessary to replace any part of this equipment, the customer should contact the manufacturer. Refer to the drawing number of the equipment (on the nameplate) and give the part number and a description of the part required.

**FOR MORE INFORMATION ABOUT POST GLOVER RESISTORS,  
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