Instruction Booklet for the Installation, Operation and Maintenance of Type 5-15 kV VCP-WG Vacuum Circuit Breaker 4000A MiniMod

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INTRODUCTION

READ AND UNDERSTAND THESE INSTRUCTIONS BEFORE ATTEMPTING TO USE THIS DEVICE. IMPROPER USE CAN RESULT IN DEATH, BODILY INJURY AND/OR PROPERTY DAMAGE.

SAFETY PRECAUTIONS:

All safety codes, safety standards and/or regulations must be strictly observed in the installation, operation and maintenance of this device.

WARNING

THE WARNINGS AND CAUTIONS INCLUDED AS PART OF THE PROCEDURAL STEPS IN THIS DOCUMENT ARE FOR PERSONNEL SAFETY AND PROTECTION OF EQUIPMENT FROM DAMAGE. AN EXAMPLE OF A TYPICAL WARNING LABEL HEAD-

ING IS SHOWN ABOVE IN REVERSE TYPE TO FAMILIARIZE PERSONNEL WITH THE STYLE OF PRESENTATION. THIS WILL HELP TO INSURE THAT PERSONNEL ARE ALERT TO WARNINGS, WHICH MAY APPEAR THROUGHOUT THE DOCUMENT. IN ADDITION, CAUTIONS ARE ALL UPPER CASE AND BOLDFACE AS SHOWN BELOW.

CAUTION

COMPLETELY READ AND UNDERSTAND THE MATERIAL PRESENTED IN THIS DOCUMENT BEFORE ATTEMPTING INSTALLATION, OPERATION OR APPLICATION OF THE EQUIPMENT. IN ADDITION, ONLY QUALIFIED PERSONS SHOULD BE PERMITTED TO PERFORM ANY WORK ASSOCIATED WITH THE EQUIPMENT. ANY WIRING INSTRUCTIONS PRESENTED IN THIS DOCUMENT MUST BE FOLLOWED PRECISELY. FAILURE TO DO SO COULD CAUSE PERMANENT EQUIPMENT DAMAGE.

WARNING

SATISFACTORY PERFORMANCE OF THESE MINIMOD AND OR BREAKERS IS CONTINGENT UPON PROPER APPLICATION, CORRECT INSTALLATION AND ADEQUATE MAINTENANCE. THIS INSTRUCTION BOOK MUST BE CAREFULLY READ AND FOLLOWED IN ORDER TO OBTAIN OPTIMUM PERFORMANCE FOR LONG USEFUL LIFE OF THE MINIMOD AND OR CIRCUIT BREAKER ELEMENTS.
DESCRIPTION

The Eaton 4000A Mini-Mod is an integrated assembly for drawout vacuum circuit breakers, bus and control devices coordinated electrically and mechanically for medium voltage circuit protection and control. The metal-clad integrity provides maximum circuit separation and safety.

All circuit breakers are equipped with self-aligning and self-coupling primary and secondary disconnecting devices, and arranged with a mechanism for moving it physically between connected and disconnected positions.

All major primary components, such as circuit breaker, voltage transformer, control power transformer and buses are completely enclosed and grounded by metal barriers. A metal barrier in front of the circuit breaker and auxiliary drawer ensures that, when in the connected position, no live parts are exposed by opening the compartment door. Automatic shutters cover primary circuit elements when the removable element is in the disconnected, test or removed position.

All primary bus conductors and connections are insulated with track-resistant fluidized bed epoxy coating for rated maximum voltage of the assembly.

Mechanical interlocks are provided to maintain a proper and safe operating sequence. Instruments, meters, relays, secondary control devices and their wiring are isolated, where necessary, by grounded metal barriers from all primary circuit elements.

Corona emissions within the Mini-mod assemblies have been eliminated or reduced to very low levels by special fabrication and assembly techniques. By making switchgear assemblies corona free, Eaton Corporation has made its switchgear more reliable.

Circuit Breaker Compartment

The mechanism for levering the breaker is a unique cell mounted design. It incorporates all the safety interlocks to render the breaker mechanically and electrically trip free during the levering procedure.

A silver plated copper ground bus provided on the levering pan assembly is engaged by a spring loaded ground contact on the circuit breaker to ensure that the circuit breaker remains grounded throughout its travel.
Figure #1: View of the 4000A MiniMod with part descriptions.
Figure #2: Outline drawing with reference dimensions.
Figure #3 and #4: View of the breaker in the text and connected positions.
Figure #5: View of the breaker on the rails getting ready to be racked in the MiniMod.

Figure #6: View of the breaker racked in the MiniMod.
Figure #7: View inside the MiniMod.
MiniMod Un-Packing and Incoming Inspection:

If the MiniMod is to be placed in storage, maximum protection can be obtained by keeping it packed as shipped. Before placing it in storage, checks should be made to make sure that the unit is free from shipping damage and is in satisfactory operating condition.

The MiniMod is shipped within a wood crate. When it arrives and needs to be unpacked then the top of the crate should be removed first. Then the sides should be removed. The unit should be kept on the bottom pallet temporarily. Inspect the unit for shipping damage and or missing parts. Make sure the red brick colored spouts in the back of the units do not have any significant cracks. If any problems are found then please contact your local Eaton Salesman or EESS for repair / replacement parts. The unit can now be moved around via a pallet jack and or fork lift truck. Eaton suggests moving the unit around attached to the pallet. This is due to the large size of the unit and the unbalanced weight of the unit. Eaton suggests the wood crate be saved in storage as long as possible in case it is needed. The MiniMod is supplied with lifting hooks and or lifting metal strips located on the top of the unit. A large overhead crane can be used to life the unit. These lifting hooks or lifting metal straps can be removed during the installation process.

MiniMod Operational Inspection:

It is best to perform this testing with the MiniMod on the pallet outside of the switchgear. We do not suggest you mount the MiniMod in the switchgear and then perform these tests. Testing with just the breaker and MiniMod allows for the user to see the operation from all sides and avoid any damage to the breaker and or MiniMod.

Test the operation of the left hand and right hand shutter drivers by pushing them by hand forward and backwards. If binding is found then try to remove the foreign item causing the binding. If required grease the parts to improve the operation.

Frequency of Inspection and Maintenance:

Periodic inspections and associated maintenance are essential to the safe and reliable operation of the MiniMod and VCP-WG Vacuum Circuit Breaker Elements. The inspection frequency and associated maintenance recommended are intended to insure the best possible ongoing service. It is imperative that an established schedule be followed. To establish an exact schedule for a specific installation, use the following guidelines:

1. Customers such as Utilities having extensive experience with Power Distribution components should schedule their inspection and maintenance intervals using well established best practices in their industry.
2. All other customers should use the following guidelines as good conservative practice:
   a. In a clean, non-corrosive environment, inspect and maintain each MiniMod annually or after every 100 levering in operations, whichever comes first.
b. For special conditions such as frequent levering in operations, contaminated environments, and high temperature/humidity conditions, the inspection frequency should be a minimum of twice per year.

3. Fault interruptions have the greatest impact on the MiniMod. MiniMod that have been subjected to 15 full rated fault interruptions should be immediately inspected and the schedule for inspection and maintenance should be re-evaluated based upon the inspection results. Additionally, because of the variability of system fault characteristics, if there are any customer uncertainties in the records of the magnitude, duration, or other fault details, increased inspection frequency should be considered.

4. The unit should be visually examined to make sure there is no cracking of the insulation parts and damage done to the internal components.

5. Create and maintain a dated permanent record of all inspections, maintenance performed, actions taken, observations made, and measurements taken. Not only will this provide valuable historical information, it can help to establish whether or not the present schedule needs to be adjusted.

6. Perform ongoing visual inspections, when possible, of all equipment on a regular basis. Be alert for an accumulation of dirt in and around the primary contacts, loose hardware and discolored insulation.

For assistance in establishing or updating a detailed Inspection and Maintenance schedule for a specific application, please contact your local Eaton representative.

**General Torque Guidelines:**

Bolts and screws must be properly torqued. This is especially true if part and/or accessories are added or replaced. The table below provides guidelines on torque levels. The table is intended as a general guideline and should be applied in conjunction with the experience and good judgment of the individual performing the work.

<table>
<thead>
<tr>
<th>Bolt Size</th>
<th>Torque (LB-IN)</th>
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<tbody>
<tr>
<td>8 - 32</td>
<td>24</td>
</tr>
<tr>
<td>10 - 32</td>
<td>36</td>
</tr>
<tr>
<td>1/4 - 20</td>
<td>72</td>
</tr>
<tr>
<td>5/16 - 18</td>
<td>144 (12 lb-ft)</td>
</tr>
<tr>
<td>3/8 - 16</td>
<td>300 (25 lb-ft)</td>
</tr>
<tr>
<td>1/2 - 13</td>
<td>540 (45 lb-ft)</td>
</tr>
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Troubleshooting:

a) Insulation: Visually inspect the insulators, barriers, spouts, boots,… for dirt, dust, and cracking. If problems are identified then clean and or replace the components are required.

b) Corona: Visually inspect the insulators, barriers, spouts, boots,… for signs of corona discharge. This can normally be identified by holes in the insulation, white powder like substance on the insulation, burn marks,… If problems are identified then clean and or replace the components are required. Adjust the design to improve the corona performance by contacting your local Eaton Salesman and or use switchgear common best practices.

c) Insulation Integrity: Insulation integrity should be checked on a yearly basis via performing a standard industry HiPot test via a HiPot test machine.

d) Control Circuit Wiring: Visually inspect all secondary control voltage wiring. Make sure the components work correctly and operate smoothly. Replace any worn or defective wiring.

e) Shutter operating mechanism: Visually inspect the proper operation of the shutter drivers. If binding is found then remove the foreign elements causing the binding. If parts are found bent or damaged then replace the damaged parts. If required grease the moving components.

f) Levering In operating mechanism: Visually inspect the proper operation of the levering in system. If binding is found then remove the foreign elements causing the binding. If parts are found bent or damaged then replace the damaged parts. If required grease the moving components.

Quality Test:

In order to perform a quality test of the MiniMod a standard 31” frame VCP-WG breaker should be racked in and out of the MiniMod. Perform this test five times. After the end of the fifth operation the testing is complete. The unit can then be mounted into the switchgear.

Check to make sure the breaker can successfully be racked in and out of the MiniMod without any of the components binding, rubbing, and or breaking. If problems are identified then contact your local Eaton Salesman or EESS for repair / replacement parts.
This instruction booklet is published solely for information purposes and should not be considered all inclusive. If further information is required, you should consult Eaton.

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