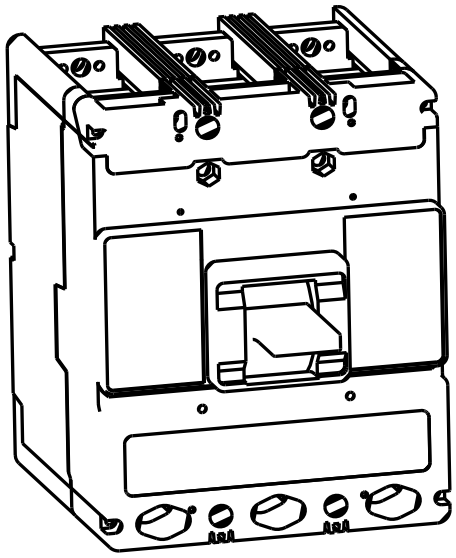
Instruction Leaflet **IL 29C703D**

Effective April 2011
Supersedes IL 29C703C Dated 07/1998

Installation Instructions for Eaton Series C 600 Amp HLD-DC Circuit Breakers, Circuit Breaker Frame and Molded Case Switch



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⚠WARNING

CONTACT WITH ENERGIZED EQUIPMENT CAN RESULT IN DEATH, SEVERE PERSONAL INJURY, OR SUBSTANTIAL PROPERTY DAMAGE. DO NOT ATTEMPT TO INSTALL OR PERFORM MAINTENANCE ON EQUIPMENT WHILE IT IS ENERGIZED. ALWAYS VERIFY THAT NO VOLTAGE IS PRESENT BEFORE PROCEEDING WITH THE TASK, AND ALWAYS FOLLOW GENERALLY ACCEPTED SAFETY PROCEDURES.

EATON IS NOT LIABLE FOR THE MISAPPLICATION OR MISINSTALLATION OF ITS PRODUCTS.

The user is cautioned to observe all recommendations, warnings and cautions relating to the safety of personal and equipment, as well as all general and local health and safety laws, codes and procedures.

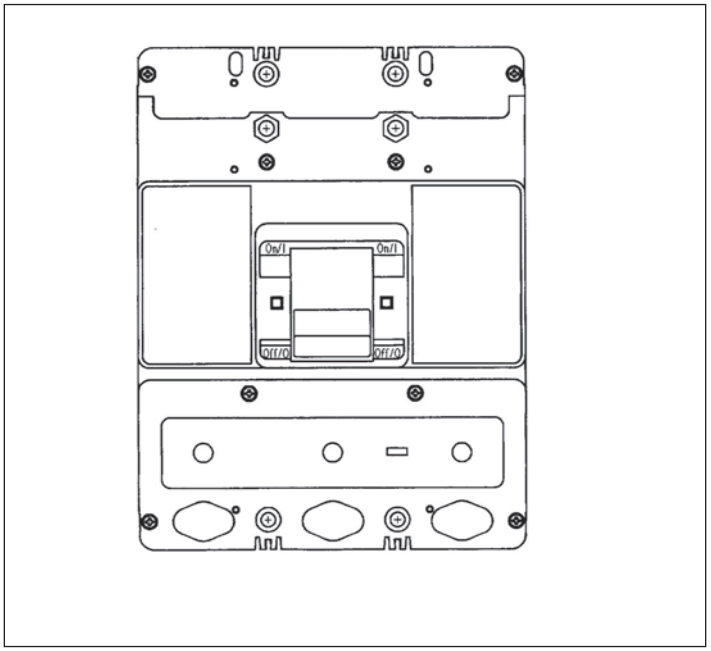

Figure 1. Type HLD-DC Series C DC Circuit Breaker Frame with LT Trip Unit Installed.

The recommendations and information contained herein are based on Eaton experience and judgment, but should not be considered to be all-inclusive or covering every application or circumstance which may arise. Contact Eaton for further information or instructions.

1. Introduction and General Information

The L-frame Series C DC circuit breaker (**Figure 1**) is rated 600 Vdc maximum with interchangeable thermal-magnetic trip units rated 600A maximum continuous current. Refer to **Table 1** for all available trip unit ratings. Model HLD-DC circuit breakers are listed in accordance with Underwriters Laboratories, Inc. Standard UL 489.

Table 1. Available Trip Unit Ratings.

	Trip Unit Types	
	Thermal-Magnetic Amperes I_n	
Circuit Breaker Types	Fixed Thermal	Adjustable Magnetic (Instantaneous) of I_n
HLD-DC	300	5 to 10
	350	
	400	
	500	
	600	

HLD-DC is rated 600 Vdc maximum with interchangeable thermal-magnetic trip units rated 600 A maximum continuous current.

These Circuit Breakers are suitable for use in grounded and ungrounded applications only where multiple poles are connected in series (**Figure 2** through **Figure 5**).

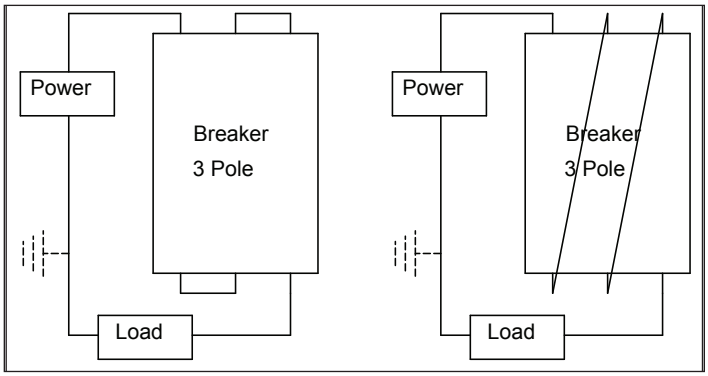

Figure 2. Load Connected to Power Source, Grounded or Ungrounded Systems.

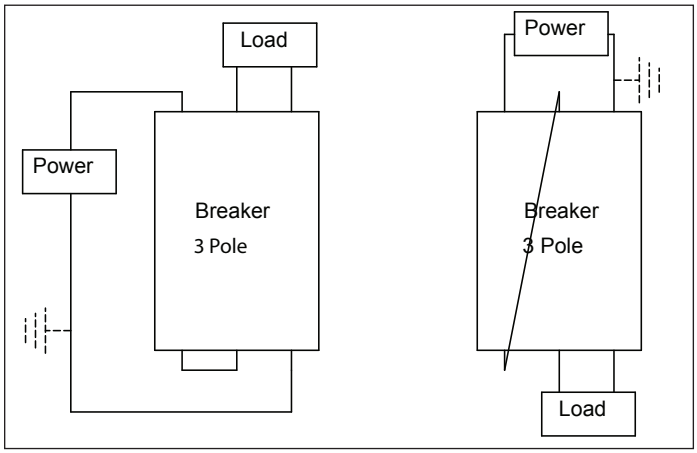

Figure 3. Load Isolated from Power Source. Grounded or Ungrounded Systems. If System Voltage Exceeds 300 Vdc, then Ungrounded Systems Only.

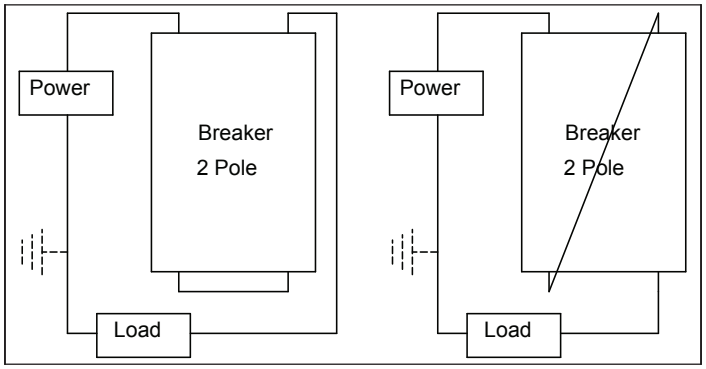

Figure 4. Load Connected to Power Source. Grounded or Ungrounded Systems.

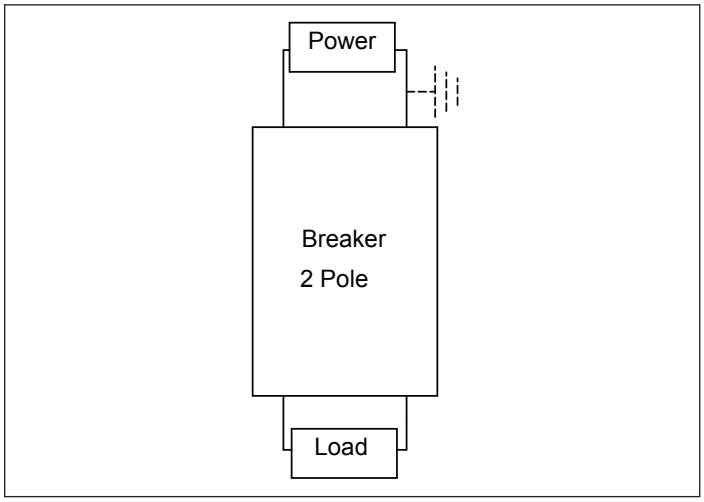

Figure 5. Load Isolated from Power Source. Grounded or Ungrounded Systems. If System Voltage Exceeds 125 Vdc, then Ungrounded Systems Only.

2. Installation

The installation procedure consists of inspecting the circuit breaker and, as applicable, installing the trip unit, accessories, and terminals; mounting the circuit breaker; connecting the line and load conductors; torquing terminals; and attaching terminal shields. Circuit breaker frames, trip units, accessories, mounting hardware, and unmounted terminals may be supplied in separate packages. To install the circuit breaker, perform the following steps.

Note: Internal accessory installation in any type of circuit breaker should be done before the circuit breaker Is mounted and connected. Refer to individual accessory instruction leaflets for specific installation instruction on field installable accessories.

2-1. Compare nameplate data with existing equipment ratings and system requirements to make sure that the circuit breaker is suitable for the intended installation. Prior to mounting, confirm that the circuit breaker has not been damaged during transit or initial handling.

2-2. To install trip unit and any internal accessories, remove installed cover screws and cover.

Note: The circuit breaker handle must be In the tripped or OFF position to remove the cover. Instructions for installing the trip unit and accessories are supplied with the devices.

2-3. If not already installed, mount the trip unit and accessories (if required) in circuit breaker frame.

Note: When required to be removed or replaced, stationary interphase barriers can only be installed or removed with the circuit breaker in the tripped or open position.

2-4. After the trip unit and any internal accessories are installed, and with the circuit breaker in the tripped position, make sure that stationary interphase barriers are properly installed in the base. Install main cover and secure with supplied pan head screws. Torque the screws to 20-22 lb.-in (2.26-2.49 N.m).

2-5. If not already installed, mount wire connecting terminals as shown in **Figure 6**. Secure the terminals to the circuit breaker using two pan-head slotted screws and lock washers. Torque to 6 to 8 lb-ft. (8.14 to 10.85 N.m). With the circuit breaker mounted and before the conductors are installed and conductor clamping screws inserted, the terminal mounting screws may be checked for correct torque.

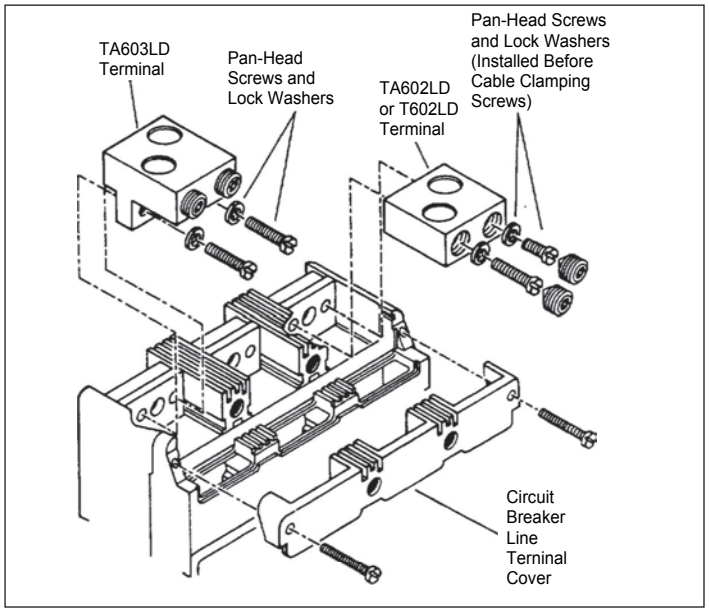

Figure 6. Terminal Installation.

⚠WARNING

THE VOLTAGES IN ENERGIZED EQUIPMENT CAN CAUSE DEATH OR SEVERE PERSONAL INJURY. BEFORE MOUNTING THE CIRCUIT BREAKER IN AN ELECTRICAL SYSTEM, MAKE SURE THERE IS NO VOLTAGE PRESENT WHERE WORK IS TO BE PERFORMED.

Note: Depending on the equipment configuration, the circuit breaker can be mounted using different styles of hardware. The following steps describe how to mount the circuit breaker using standard hardware. When special hardware is needed (for example, with the motor operator), the Instruction Leaflet describing the accessory also describes the special mounting arrangements.

2-6. To mount the circuit breaker, perform the following steps:

a. For individual surface mounting, drill the mounting panel using the drilling plan shown in **Figure 7**. For panelboard mounting, only load end support mounting holes are required. For Deadfront cover applications, cut out cover to correct escutcheon dimensions, see **Figure 8**.

b. If the circuit breaker includes factory or field installed internal accessories, make sure accessory wire is accessible when the circuit breaker is mounted.

Note: Labels with accessory connection schematic diagrams are provided on the side of the circuit breaker.

c. Position the circuit breaker on the mounting surface.

d. Install circuit breaker mounting screws and washers. Tighten screws firmly, but do not exceed 28 lb.-in. (3 N.m).

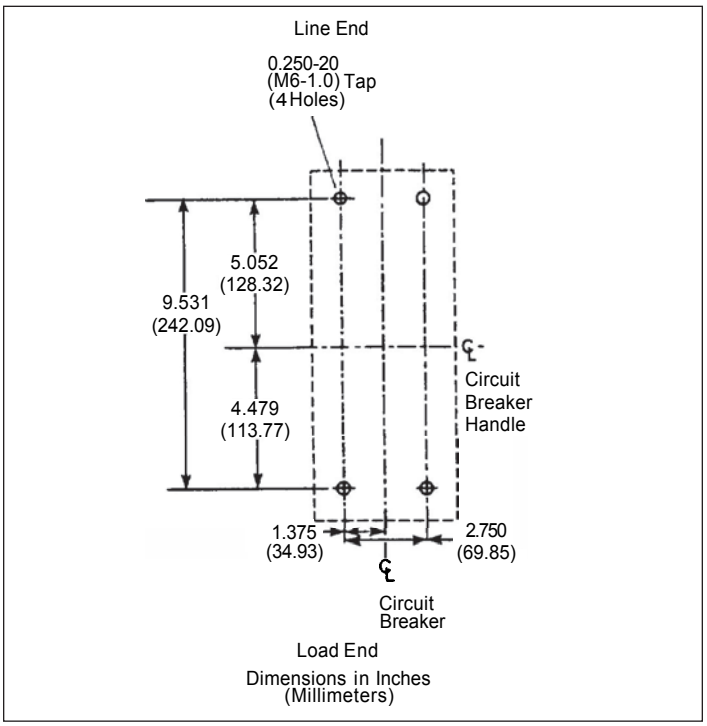

Figure 7. 3-Pole Circuit Breaker Mounting Bolt Drilling Plans.

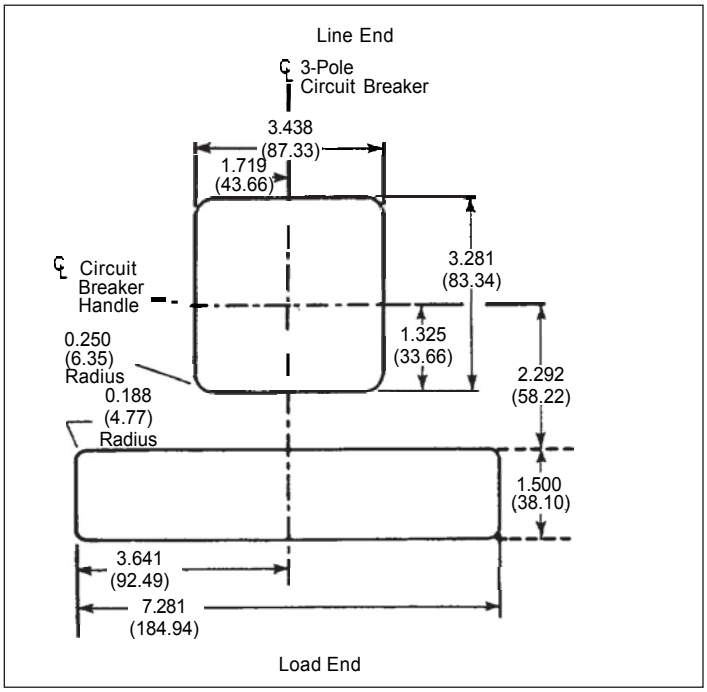

Figure 8. Circuit Breaker Escutcheon Cutout Dimensions for 3-Pole Circuit Breakers.

⚠CAUTION

WHEN ALUMINUM CONDUCTORS ARE USED, THE APPLICATION OF A SUITABLE JOINT COMPOUND IS RECOMMENDED TO REDUCE THE POSSIBILITY OF TERMINAL OVERHEATING. OVERHEATING CAN CAUSE NUISANCE TRIPPING AND DAMAGE TO THE CIRCUIT BREAKER.

2-7. Connect line and load conductors and accessory leads.

2-8. After the circuit breaker is installed, check all mounting hardware and terminal connecting hardware for correct torque loading. Torque values for line/load terminals are given in **Table 2** and on the circuit breaker nameplate.

2-9. Install both the line and load terminal covers on the circuit breaker cover with mounting screws provided. Torque to 20-22 lb. in. (2.26-2.49 N.m).

2-10. When step-type terminals (Cat. No. TA603LD) are used, terminal shields (supplied with terminals) must be installed on the circuit breaker (**Figure 9**) and secured using retainer and screws included with the terminal shield kit. Warning label supplied with the kit must be attached to the circuit breaker cover.

Table 2. Terminal Types. ①②③

Terminal Cat. No.	Terminal Material Body	Screw Head Type	AWG Wire Range	Metric Wire Range (MM^2) ③◆	Wire Type	Torque Value lb-in. (Nm)
TA602LD	Aluminum	Socket	3/0-350 (2)	95-150	Cu/Al	275 (31.1)
TA603LD	Aluminum	Socket	400-500 (2)	185-240	Cu/Al	275 (31.1)
T602LD	Copper	Socket	250-350 (2)	120-150	Cu Only	275 (31.1)
TA450LD	Aluminum	Socket	4-4/0 (2)	25-150	Cu/Al	275 (31.1)
TA401LD	Aluminum	Socket	4/0-600	120-300	Cu/Al	400 (45.2)

① The maximum width non-standard wire connector (tang-type) or bus bar connector that can be used without reducing electrical clearance and creepage distances between phases is 1.690 inches.

② No hardware or connector should be installed in a manner to reduce the electrical clearance between the underneath side of the phase termination (line or load) and ground without the addition of supplementary insulation.

③ The metric conductor sizes indicated are the minimum/maximum sizes that can be inserted in the terminal. Larger size conductors may be required to satisfy ampacity requirements for local installation rules.

⚠WARNING

HAZARDOUS VOLTAGE CONDITIONS CAN CAUSE DEATH OR SEVERE PERSONAL INJURY. MAINTAIN ORIGINAL ELECTRICAL CLEARANCE AND CREEPAGE SPACINGS AT TERMINATIONS.

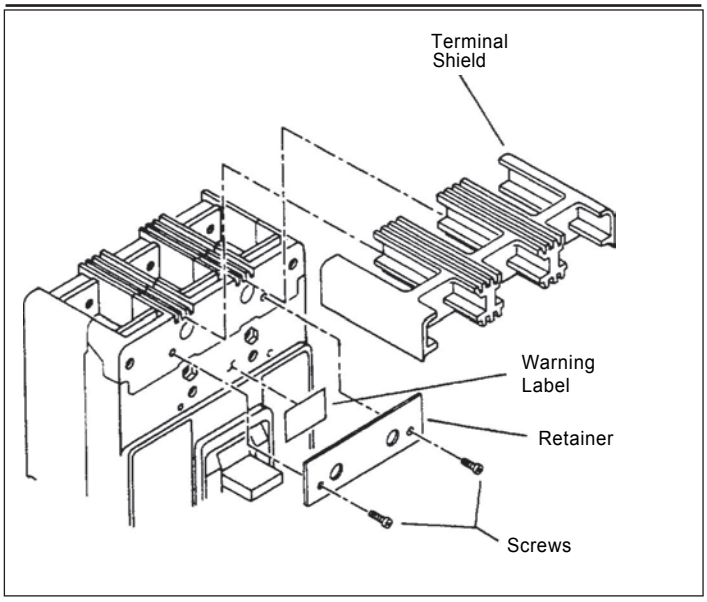

Figure 9. Installation of Terminal Shields and Warning Label.

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3. Manual Operation and Thermal-Magnetic Trip Unit Adjustment

Manual Operation

The circuit breaker handle and the Push-To-Trip button in the trip unit control manual operation of the circuit breaker. The circuit breaker handle has three positions, two of which are shown on the cover with raised lettering to indicate ON and OFF. On the handle, ON, OFF and Trip are also shown by a color-coded strip for each circuit breaker handle position: red for ON, white for Tripped and green for OFF (see **Figure 10**).

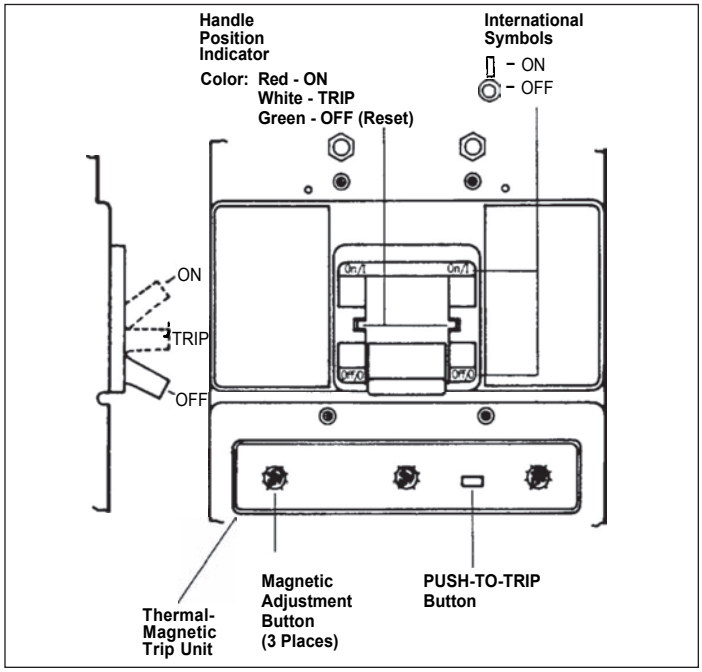

Figure 10. Circuit Breaker Manual Controls.

Circuit Breaker Reset

After a trip operation, moving the circuit breaker handle to the Reset (extreme OFF) position resets the circuit breaker.

Note: In the event of a thermal (overload) trip the circuit breaker cannot be reset immediately. In a breaker with a thermal-magnetic type trip unit the thermal element needs to cool (up to approximately five minutes) before it can be reset.

No circuit breaker should be reclosed until the cause of trip is known and the situation rectified.

PUSH-TO-TRIP Button

The PUSH-TO-TRIP button operates the circuit breaker tripping function and may be periodically used to exercise the operating mechanism. In thermal magnetic trip units, the button is designed to be operated by a small screw- driver.

Thermal-Magnetic Trip Unit Adjustment

The magnetic element of each pole of the trip unit is adjusted by rotating the adjustment buttons on the front of the trip unit with a screwdriver. The buttons have several settings as indicated on the nameplate with values in multiples of the trip unit ampere rating (I_n). To adjust the setting, rotate each button clockwise until arrow on button points to desired setting. The molded case switch is set at the factory (at 8X) and is not field adjustable.

Interchangeable Trip Units

For additional information on thermal-magnetic trip units, refer to I.L. 29C607 (3-pole).

4. Inspection and Field Testing

Series C molded case circuit breakers are designed to provide years of almost maintenance-free operation. The following procedure describes how to do a limited amount of field inspection and testing of a circuit breaker.

Inspection

Circuit breakers in service should be inspected periodically. The inspection should include the following checks: 4-1 through 4-7.

⚠WARNING

THE VOLTAGES IN ENERGIZED EQUIPMENT CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. BEFORE INSPECTING THE CIRCUIT BREAKER IN AN ELECTRICAL SYSTEM, MAKE SURE THE CIRCUIT BREAKER IS SWITCHED TO THE OFF POSITION AND THAT THERE IS NO VOLTAGE PRESENT WHERE WORK IS TO BE PERFORMED.

⚠CAUTION

SOME COMMERCIAL CLEANING AGENTS WILL DAMAGE THE NAMEPLATES OR MOLDED PARTS. MAKE SURE THAT CLEANING AGENTS OR SOLVENTS USED TO CLEAN THE CIRCUIT BREAKER ARE SUITABLE FOR THE JOB.

4-1. Remove dust, dirt, soot, grease or moisture from the surface of the circuit breaker using a lint-free dry cloth, brush or vacuum cleaner. Do not blow debris into circuit breaker. If contamination is found, look for the source and eliminate the problem.

4-2. Switch the circuit breaker to ON and OFF several times to be sure that the mechanical linkages operate freely and do not bind. If mechanical linkages do not operate freely, replace circuit breaker.

4-3. With the circuit breaker in the ON position, press the PUSH-TO-TRIP button to mechanically trip the circuit beaker. Trip, reset and switch the circuit breaker ON several times. If the mechanism does not reset each time the circuit breaker is tripped, replace the circuit breaker.

4-4. Check base, cover, operating handle and the handle barrier for cracks, chipping and discoloration. Circuit breakers should be replaced if cracks or severe discoloration is found.

4-5. Check wire connecting terminals and other type bus bar connectors for looseness or signs of overheating. Overheating will show as discoloration, melting or blistering of conductor insulation, or as pitting or melting of conductor surfaces due to arcing. If there is no evidence of overheating or looseness do not disturb or tighten the connections. If there is evidence of overheating, terminations should be cleaned or replaced. Before re-energizing the circuit breaker, all terminations and cable should be refurbished to the original installed condition.

4-6. Check circuit breaker mounting hardware and tighten if necessary.

4-7. Exposure to certain types of chemicals can lead to deterioration of electrical connections. Check area where circuit breaker is installed for any safety hazards, including personal safety and fire hazards and take required precautionary actions.

Field Testing

Any field-testing should be done in accordance with applicable NEMA Standard.

Notes:

Installation Instructions for Eaton Series C 600 Amp HLD-DC Circuit Breakers, Circuit Breaker Frame and Molded Case Switch

The instructions for installation, testing, maintenance, or repair herein are provided for the use of the product in general commercial applications and may not be appropriate for use in nuclear applications. Additional instructions may be available upon specific request to replace, amend, or supplement these instructions to qualify them for use with the product in safety-related applications in a nuclear facility.

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Printed in USA
Publication No. IL 29C703D / TBG000582
Part No. 6633C94H05
April 2011

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