

Installation Instructions for J-Frame Series C Motor Circuit Protector Type HMCP (With Electro-Mechanical Trip Device)



WARNING

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

CUTLER-HAMMER 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 personnel and equipment as well as all general and local health and safety laws, codes, and procedures.



Figure 1-1 J-Frame Series C Type HMCP Motor Circuit Protector

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

1. INTRODUCTION

General Information

The J-frame Series C instantaneous (magnetic)-only motor circuit protector (MCP) (Fig. 1-1) has a rating of 250A for application with NEMA motor starter sizes 4 and 5. The MCP is available as Type HMCP in 3-pole frames only. The MCP is designed to comply with the applicable requirements of Underwriters Laboratories, Inc. Standard UL489 and the International Electrotechnical Commission Recommendations No. IEC 157-1 .

The MCP is a UL-recognized component under file E7819. It is used primarily to provide short-circuit protection as part of a combination controller where other circuit protective functions are performed by other devices within the controller. Since the J-frame MCP is a non-sealed device, it is marked LINE and LOAD and is not suitable for reverse feed applications. The J frame Series C MCP directly replaces existing Cutler-Hammer MCP Size 5 (250A) and JB/KB family of instantaneous (magnetic) only circuit interrupters.

This instruction leaflet (IL) gives procedures for installation, operation, inspection, and field testing of J-frame Series MCPs. For this publication, the term motor circuit protector (MCP) shall also include instantaneous (magnetic)-only circuit interrupters.

2. INSTALLATION

The installation procedure consists of inspecting the MCP and, as applicable, installing accessories, interphase barriers and terminals; mounting the MCP; connecting the line and load conductors; torquing terminals; and attaching terminal shields. The MCPs, accessories, mounting hardware, and unmounted terminals may be supplied in separate packages.

NOTICE

Due to differences in handle location and travel between the J-Frame Series C MCP and existing line 250A MCPs and JB/KB magnetic-only circuit interrupters, special consideration must be given to replacement applications where handle operating accessories are used. Refer to Cutler-Hammer for additional information.

Internally-mounted accessories are listed for field installation under UL File E64983. Accessory installation should be done before the MCP is mounted and connected. Refer to individual accessory instruction leaflets.

To install the MCP, perform the following steps.

2-1. Make sure that the MCP is suitable for the intended installation by comparing nameplate data with existing ratings and system requirements. Inspect the MCP for completeness, and check for damage before mounting.

NOTICE

Perform Steps 2-2, 2-3, and 2-4 only if installation of internal accessories is required.

2-2. Remove cover screws and cover.

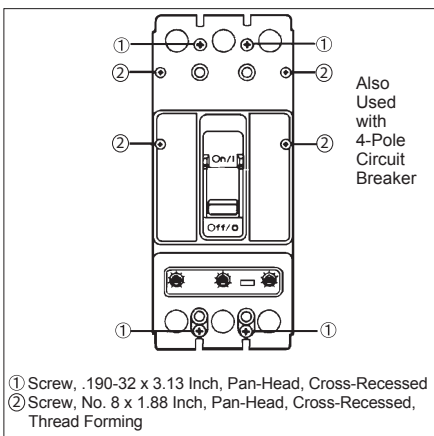


Figure 2-3 Cover Screw Installation Positions

2-3. Install accessories.



CAUTION

WHEN REMOVED AND REINSTALLED, THREAD-FORMING SCREWS WILL TRY TO REFORM THE THREADS IN THE BASE. CARE SHOULD BE TAKEN EVERY TIME A THREAD-FORMING SCREW IS USED TO ENSURE THE SCREW STARTS IN THE ORIGINAL THREADS. DAMAGED THREADS CAN RESULT IN IMPROPER MCP COVER RETENTION.

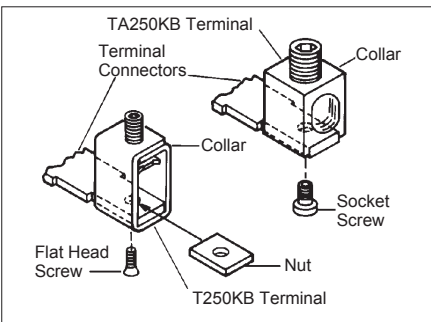


Figure 2-2 Terminal Installation

2-4. Install cover and secure with pan-head screws, followed by thread-forming screws, as shown in Fig. 2-1. Torque the cover screws to 18-23 lb-in (2-2.6 N.m.).

2-5. If not already installed, mount terminals as shown in Fig. 2-2. When using aluminum body terminal (Catalog No. TA250KB), secure the terminal to the MCP using a 1/8-inch socket wrench, and torque to 6-8 lb-ft (8-11 N.m). After mounting the MCP and before installation of the conductors, check or retighten the terminal mounting screw through the terminal. Conductor securing screw must be removed for this check. When using non-aluminum body terminal (Catalog No. T250KB), secure the terminal to the MCP using screw and flat nut. Torque the screw to 7-9 lb-in (0.8-2 N.m.).



WARNING

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

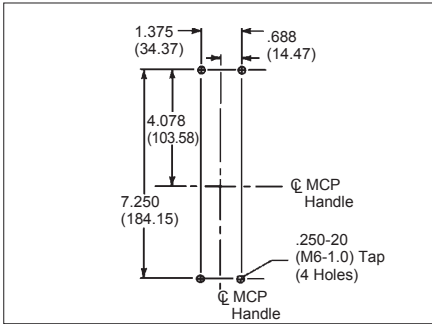


Figure 2-3 MCP Mounting Bolt Drilling Plan

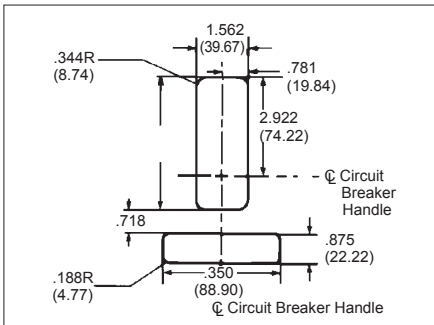


Figure 2-4 MCP Escutcheon Dimensions

NOTICE

Depending on the equipment configuration, the MCP can be mounted using different styles of hardware. The following steps describe how to mount the MCP using standard hardware. When special hardware is needed (for example, with the electrical operator), the instruction leaflet describing the accessory also describes the special mounting arrangements.

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

a. For individual surface mounting, drill mounting panel using the drilling plan shown in Fig. 2-3. For deadfront cover applications, cut out cover to correct escutcheon dimensions. (See Fig. 2-4.)

b. If MCP includes factory- or field-installed internal accessories, make sure that accessory wiring can be reached with the MCP mounted.

NOTICE

Labels with accessory connection schematic diagrams are provided on the side of the MCP. A note should be made of the diagrams if the labels cannot be seen when the MCP is mounted.

c. Position MCP on mounting surface.

d. Install MCP mounting screws and washers. Tighten screws firmly, but do not exceed 28 pound-inches (3 N.m).

CAUTION

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

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

2-8. If required, install interphase barriers.

2-9. If required, install terminal shield on MCP cover with mounting screws provided.

2-10. After the MCP is installed, check all mounting hardware and terminal connecting hardware for correct torque loading. Torque values for line/load terminals are given in Table 2-1 and on the MCP nameplate.

3. MANUAL OPERATION AND TRIP DEVICE ADJUSTMENT

Manual Operation

Manual operation of the MCP is controlled by the MCP handle and the PUSH-TO-TRIP button in the trip device. The MCP handle has three positions, two of which are shown on the cover with the international symbols 1/0 and raised lettering to indicate ON and OFF. On the sliding handle barrier, ON, OFF, and trip are also shown

by a color-coded strip for each MCP handle position: red for ON, white for tripped, and green for OFF. (See Fig. 3-1.)

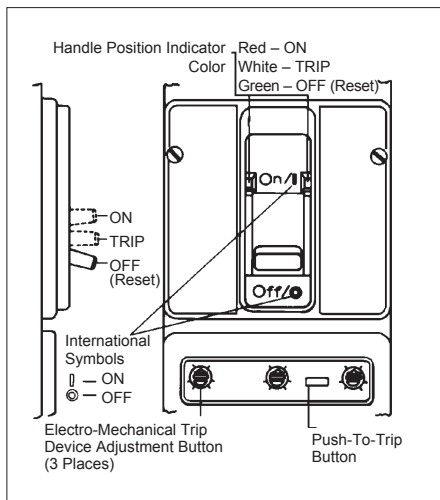


Figure 3-1 MCP Manual Controls

Table 2-1 Terminal Types ①

Terminal Cat. No.	Terminal Material Body	Screw Head Type	AWG Wire Range	Metric Wire Range	Wire Type	Torque Value lb-in (N.m.)
Standard Terminal						
TA250KB	Aluminum	Socket	4-350 MCM	25-185	Cu/Al	275 (31)
Standard Terminal						
T250KB	Stainless Steel	Socket	4-350 MCM	25-185	Cu	180 (20)

① Terminal wire connectors are listed for standard wire sizes as defined in UL486A and UL486B.

Table 3-1 MCP Trip

Cam Settings	Motor Full Load Current Amperes	NEMA Starter Size	Continuous Amps	MCP Catalog Number	MCP Trip Setting
A	27.0 - 30.7	4			350
B	30.8 - 33.8	4			400
C	33.9 - 36.9	4			440
D	37.0 - 40.3	5			480
E	40.4 - 43.8	5	250	HMCP250A5	525
F	43.9 - 46.9	5			570
G	47.0 - 50.7	5			610
H	50.8 - 53.8	5			660
I	53.9 - 57.2	5			400
A	34.7 - 38.8	5			450
B	38.9 - 43.4	5			505
C	43.5 - 47.6	5			565
D	47.7 - 52.2	5			620
E	52.3 - 56.5	5	250	HMCP250C5	680
F	56.6 - 60.7	5			735
G	60.8 - 64.9	5			790
H	65.0 - 69.2	5			845
I	69.3 - 73.5	5			900
A	38.5 - 43.4	5			500
B	43.5 - 48.0	5			565
C	48.1 - 53.0	5			625
D	53.1 - 57.6	5			690
E	57.7 - 62.3	5	250	HMCP250D5	750
F	62.4 - 67.3	5			810
G	67.4 - 71.9	5			875
H	72.0 - 76.9	5			935
I	77.0 - 81.6	5			1000
A	48.1 - 53.8	5			625
B	53.9 - 59.9	5			700
C	60.0 - 66.1	5			780
D	66.2 - 72.3	5			860
E	72.4 - 78.4	5	250	HMCP250F5	940
F	78.5 - 83.8	5			1020
G	83.9 - 89.9	5			1090
H	90.0 - 96.1	5			1170
I	96.2 - 102.0	5			1250
A	57.7 - 64.6	5			750
B	64.7 - 71.9	5			840
C	72.0 - 79.2	5			935
D	79.3 - 86.5	5			1030
E	86.6 - 93.8	5	250	HMCP250G5	1125
F	93.9 - 101.1	5			1220
G	101.2 - 108.4	5			1315
H	108.5 - 115.3	5			1410
I	115.4 - 122.4	5			1500
A	67.4 - 75.3	5			875
B	75.4 - 83.8	5			980
C	83.9 - 92.3	5			1090
D	92.4 - 100.7	5			1200
E	100.8 - 109.2	5	250	HMCP250J5	1310
F	109.3 - 117.6	5			1420
G	117.7 - 126.1	5			1530
H	126.2 - 134.6	5			1640
I	134.7 - 142.8	5			1750

Table 3-1 MCP Trip Settings (Cont.)

Cam Setting	Motor Full Load Current Amperes	NEMA Starter Size	Continuous Amps	MCP Catalog Number	MCP Trip Setting
A	77.0 – 86.5	5			1000
B	86.6 – 96.1	5			1125
C	96.2 – 105.7	5			1250
D	105.8 – 115.3	5			1375
E	115.4 – 124.9	5	250	HMCP250K5	1500
F	125.0 – 134.6	5			1625
G	134.7 – 144.2	5			1750
H	144.3 – 153.8	5			1875
I	153.9 – 163.3	5			2000
A	86.6 – 97.3	5			1125
B	97.4 – 108.4	5			1265
C	108.5 – 118.8	5			1410
D	118.9 – 129.9	5			1545
E	130.0 – 140.7	5	250	HMCP250L5	1690
F	140.8 – 151.5	5			1830
G	151.6 – 162.3	5			1970
H	162.4 – 173.0	5			2110
I	173.1 – 183.6	5			2250
A	96.2 – 108.0	5			1250
B	108.1 – 119.9	5			1405
C	120.0 – 132.3	5			1560
D	132.4 – 144.2	5			1720
E	144.3 – 156.1	5	250	HMCP250W5	1875
F	156.2 – 168.0	5			2030
G	168.1 – 179.9	5			2185
H	180.0 – 192.3	5			2340
I	192.4 – 204.0	5			2500

MCP Reset

After an automatic or accessory initiated trip, or a manual Push-to-Trip operation, the MCP is reset by moving the MCP handle to the extreme OFF position.

NOTICE

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

PUSH-TO-TRIP Button

The PUSH-TO-TRIP button checks the MCP tripping function and is used to periodically exercise the operating mechanism. The button is designed to be operated by a small screwdriver.

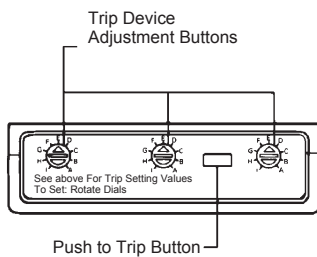


Figure 3-2 Trip Device Adjustment Buttons

Trip Device Adjustment for MCPs

The magnetic element of each pole of the trip device can be adjusted by rotating the adjustment buttons (Fig. 3-2) on the front face of the trip unit with a screwdriver. The buttons have nine settings, which are indicated on the nameplate with letters A through I; The ampere settings are shown on the MCP nameplate and in Table 3-1. To adjust the setting, rotate each button clockwise until arrow on button points to desired setting.

Conforming to NEC requirements, the maximum MCP trip ampere value is set by the motor FLA. Since there are various types and classes of motor designs (based on duty cycle, electrical load, and manufacturer’s discretion) locked rotor currents (and therefore inrush current magnitudes) vary. These are normally identified by NEC codes. The Listed MCP trip ampere value is considered typical but not all inclusive. This is the reason for the adjustable magnetic trip setting; that is, to compensate for different actual motor inrush currents. That adjustments need to be made, is not only normal, but sometimes necessary to enable the motor to start without nuisance tripping, particularly when motor or system conditions induce higher than expected inrush currents. These circumstances could be beyond the control of the MCP so far as its allowable trip setting is concerned and should be treated as a special case, referable to Cutler-Hammer.

4. INSPECTION AND FIELD TESTING

Series C MCPs are designed to provide years of almost maintenance-free operation. The following procedure describes how to inspect and test an MCP in service.

Inspection

MCPs in service should be inspected periodically. The inspection should include the following checks (4-1 through 4-7):



WARNING

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



CAUTION

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

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

4-2. Switch MCP to ON and OFF several times to be sure that the mechanical linkages are free and do not bind. If mechanical linkages are not free, replace MCP.

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

4-4. Check base, cover, and operating handle for cracks, chips, and discoloration. Replace MCPs if cracks or severe discoloration is found.

4-5. Check terminals and connectors for looseness and signs of overheating. Overheating shows 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 reenergizing the MCP, all terminations and cable should be refurbished to the condition when originally installed.

4-6. Check MCP mounting hardware. Tighten if necessary.

4-7. Check area where MCP is installed for any safety hazards, including personal safety and fire hazards. Exposure to certain types of chemicals can cause deterioration of electrical connections.
Field Testing

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

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Printed in Dominican Republic
Publication No. 6632C91H05
July 2015

