



## Instruction Leaflet for Installation of Q-Frame Motor Circuit Protector, Type MCP (with Electronic Trip Device)



### 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.**

**ALLEN-BRADLEY 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.

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

### 1. INTRODUCTION

#### General Information

The Q-Frame instantaneous (magnetic-only) Motor Circuit Protector (MCP) (Fig. 1-1) has a rating of 600A. . The MCP is available as Type MCP 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 947-2.

The MCP is a UL-recognized component. 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 Q-frame MCP is a non-sealed device, it is marked LINE and LOAD and is not

suitable for reverse feed applications.

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



Fig. 1-1 Q-frame Type MCP Motor Circuit Protector

### 2. INSTALLATION

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



ual accessory instruction leaflets for specific installation instructions on field installable accessories.

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

2-2. To install internal accessories, remove cover screws and cover.

Note: The MCP handle must be in the tripped or OFF position to remove the cover.

2-3. If not already installed, mount accessories (if required) in MCP.

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

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

2-5. If not already installed, mount wire connecting terminals as shown in Fig. 2-1. Secure the terminals to the MCP using two panhead slotted screws and lockwashers. Torque to 6-8 lb-ft. (8.14-10.85 N.m). With the MCP mounted and before the conductors are installed and conductor clamping screws inserted, the terminal mounting screws may be checked for correct torque.



## 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.

Note: 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 motor 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. 2-2. For panelboard mounting, only load end support mounting holes are required. For dead front cover applications, cut out cover to correct escutcheon dimensions, see Fig. 2-3.
- b. If MCP includes factory or field installed internal accessories, make sure accessory wiring is accessible when the MCP is mounted.

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

- c. Position MCP on mounting surface.

Table 2-1. Terminal Types ①②③④

Terminal Cat. No.	Terminal Material Body	Screw Head Type	AWG Wire Range	Metric Wire Range (MM <sup>2</sup> )	Wire Type	Torque Value lb-in. (N.m)
140U-QTLA2	Aluminum	Socket	250-350 ②	120-150	Cu/Al	275 (31.1)
140U-Q-TLC2	Aluminum	Socket	400-500 ②	185-240	Cu/Al	275 (31.1)
④	Copper	Socket	250-350 ②	120-150	C u	275 (31.1)
④	Aluminum	Socket	4/0-600 ②	120-300	Cu/Al	400 (45.2)
④	Aluminum	Socket	4-4/0 ②	25-120	Cu/Al	275 (31.1)

- ① The maximum width nonstandard 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.
- ④ Contact Allen-Bradley for availability.



- d. Install MCP mounting screws and washers. Tighten screws firmly, but do not exceed 28 lb-in. (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. OVERHEATING CAN CAUSE NUISANCE TRIPPING AND DAMAGE TO THE MCP.

- 2-7. Connect line and load conductors and accessory leads.
- 2-8. 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.
- 2-9. Install line terminal cover on MCP cover with mounting screws provided. Torque to 20-22 lb-in. (2.26-2.49 N.m).
- 2-10. When step-type terminals are used terminal shields (supplied with terminals) must be installed on the MCP (Fig. 2-4) and secured using retainer and screws included with the terminal shield kit. Warning label supplied with the kit must be attached to the MCP cover.



## WARNING

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

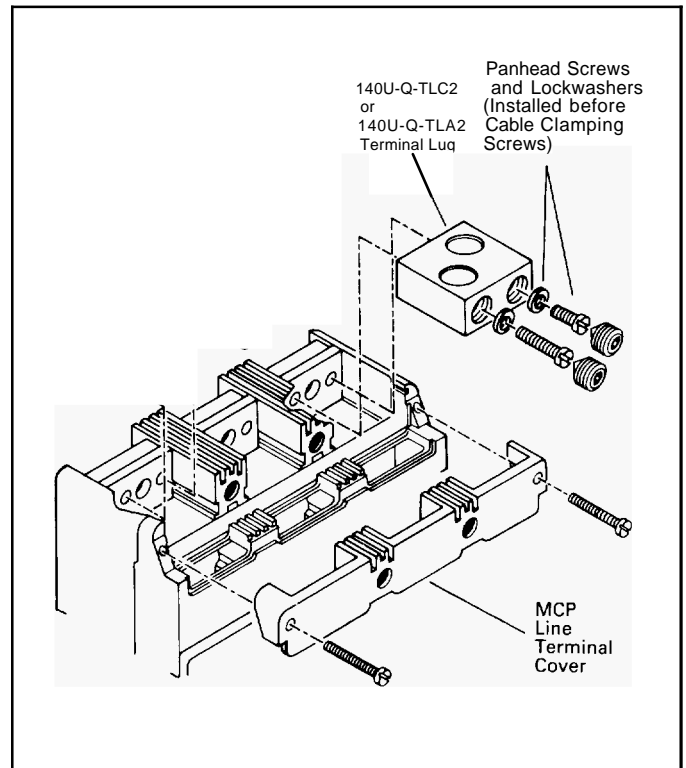


Fig. 2-1 Terminal Installation

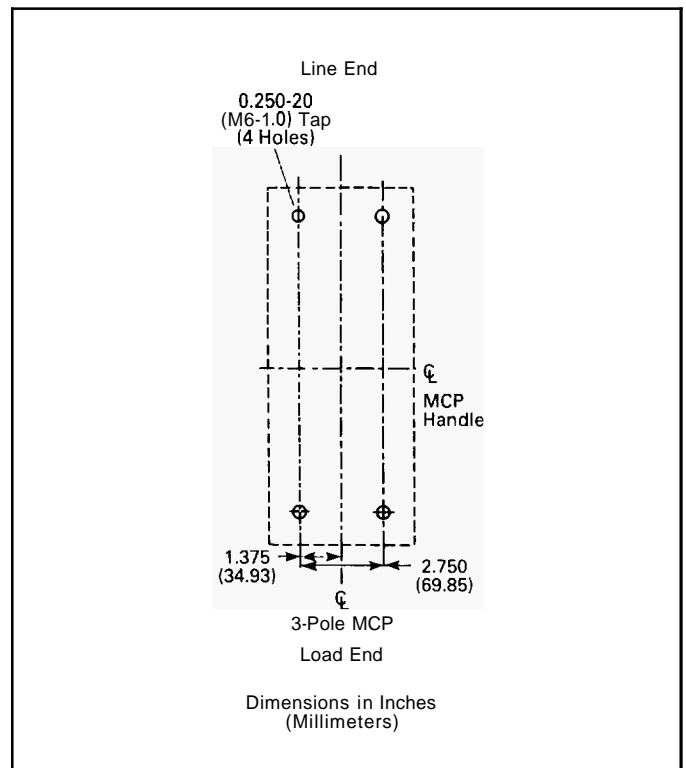


Fig. 2-2 3-Pole MCP Mounting Bolt Drilling Plans

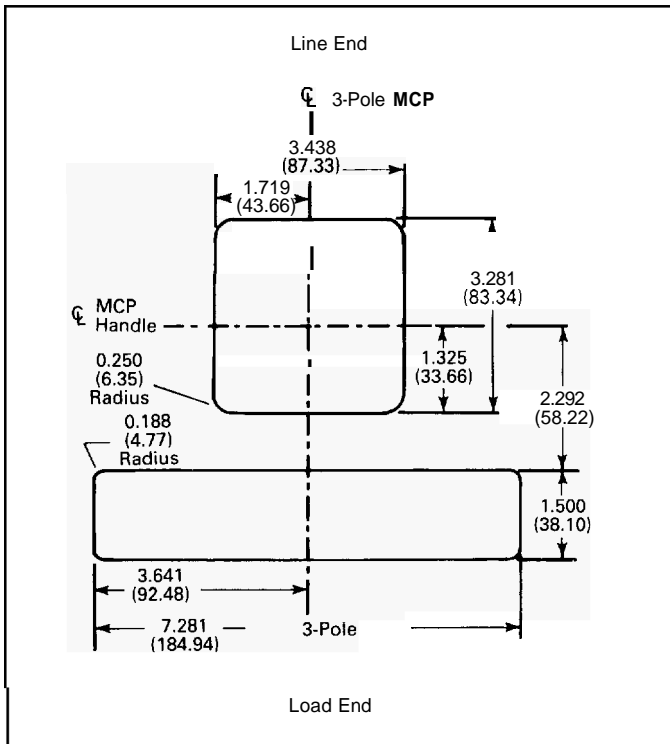


Fig. 2-3 MCP Escutcheon Cutout Dimensions for 3-pole MCP

### 3. REPLACEMENT OF EXISTING MOTOR CIRCUIT PROTECTORS

- Panel Escutcheon Cutout Sizes**  
 Existing cutouts must be modified to agree with requirements shown in Fig. 2-3.
- Handle Throw Positions**  
 Existing handle mechanisms may need to be modified or replaced. Consult Allen-Bradley for additional information.
- Internal Accessories**  
 Only Q-Frame accessories may be used.
- External Accessories**  
 Motor operators must be replaced.  
 Key interlock mounting brackets must be replaced.  
 Consult Allen-Bradley for replacement styles.
- Terminal Wire Connectors**  
 Terminals must be replaced, see Table 2-1 for replacement types.
- Other**  
 Unless noted above, all other physical characteristics are the same.



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**Note:** When replacing an existing MCP or circuit breaker of the types listed above, make sure the voltage, continuous current, and interrupting rating of the new MCP are suitable.



## 4. MANUAL OPERATION AND TRIP UNIT ADJUSTMENT

### Manual Operation

Manual operation of the circuit breaker is controlled by the MCP handle and the PUSH-TO-TRIP button in the trip unit. The MCP 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 MCP handle position: red for ON, white for TRIP, and green for OFF (see Fig. 4-1).

### MCP Reset

After a trip operation, the MCP is reset by moving the MCP handle to the Reset (extreme OFF) position.

**Note:** In the event of an automatic tripping operation, 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 operates the MCP tripping function and may be used to periodically exercise the operating mechanism. The rating plug in electronic trip units contains the PUSH-TO-TRIP button which is operated by finger pressure.

### Electronic Trip Unit Adjustment

The instantaneous trip level of the trip unit can be adjusted by rotating the adjustment switch on the front face of the trip unit with a screwdriver. The switch has several settings as indicated on the nameplate with letters A through H (Fig. 4-1). The ampere settings are shown on the MCP nameplate and in Table 4-1. To adjust the setting, rotate the switch clockwise until arrow on switch points to desired setting.

### Trip Units

For additional information on electronic trip units, refer to Instruction Leaflet 40752-072

## 5. INSPECTION AND FIELD TESTING

MCPs 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 an MCP.

### Inspection

MCPs in service should be inspected periodically. The inspection should include the following checks 5-1 through 5-8.



### WARNING

**THE VOLTAGES IN ENERGIZED EQUIPMENT CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. 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.**



### CAUTION

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

- 5-1. 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.
- 5-2. Switch MCP 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 MCP.
- 5-3. With the MCP in the ON position, 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.
- 5-4. Check base, cover, operating handle, and handle barrier for cracks, chipping, and discoloration. MCP should be replaced if cracks or severe discoloration is found.
- 5-5. 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 evi-

dence of overheating, terminations should be cleaned or replaced. Before re-energizing the MCP, all terminations and cables should be refurbished to the originally installed condition.

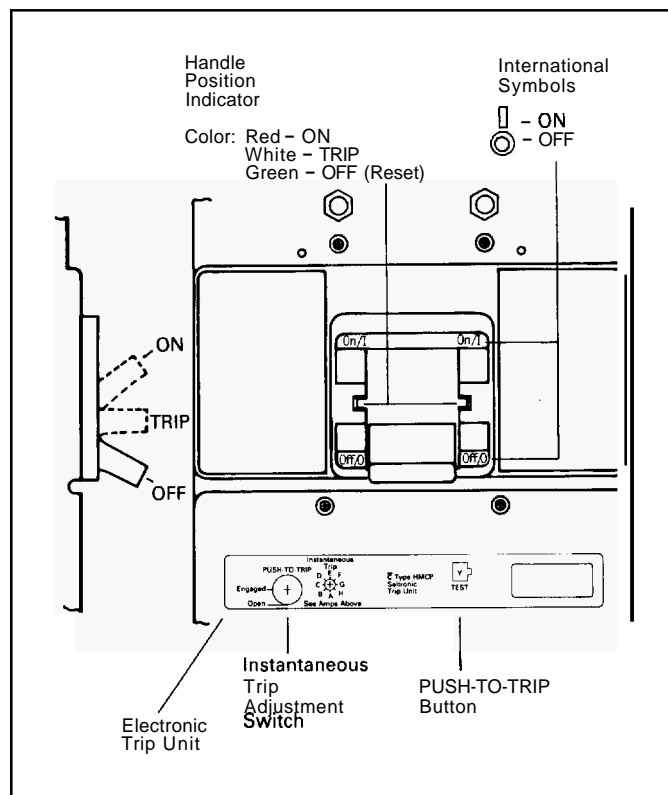
- 5-6. Check MCP mounting hardware, and tighten if necessary.
- 5-7. Exposure to certain types of chemicals can cause deterioration of electrical connections. Check area where MCP is installed for any safety hazards, including personal safety and fire hazards and take required precautionary actions.
- 5-8. The operation of MCPs with electronic trip units can be field tested periodically using the electronic test kit. Contact Allen-Bradley for details.

**Field Testing**

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

**Table 4-1. Instantaneous Trip Settings (Amperes)**

Cam Setting	MCP Catalog Number		
	140M-Q8P-D60	140M-Q8P-D40	140M-Q8P-D25
A	1800	1000	500
B	2400	1250	600
C	3000	1500	800
D	3600	2000	1000
E	4200	2500	1250
F	4800	3000	1500
G	5400	3500	2000
H	6000	4000	2500



*Fig. 4-1 MCP Manual Controls*





**NOTES**

