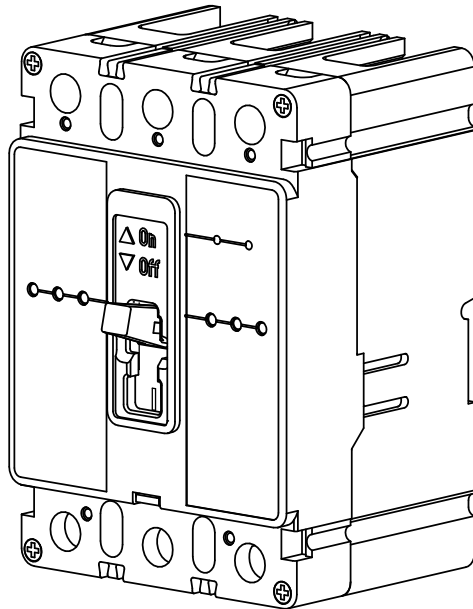


Installation instructions for FWF, HFWF, FWCF, FW, HFW, FWC circuit breakers and molded case switches



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Powering Business Worldwide

⚠ 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.

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1. Introduction

The F-frame Series C circuit breakers (Fig. 1) types FWF, HFWF, FWCF, FW, HFW, and FWC are rated from 16 A to 225 A continuous current and are available as fixed thermal-fixed magnetic, fixed magnetic-adjustable thermal, and adjustable thermal-adjustable magnetic circuit breakers. The HFW is available as a starter protection device (adjustable magnetic only) rated up to 160 A maximum. FW molded case switches are available rated at 100 A, 160 A, and 225 A maximum. These devices are certified to meet the requirements of the International Electrotechnical Commission (IEC) Standard IEC 947-2. For this publication, the term circuit breaker also includes molded case switches and starter protection devices.

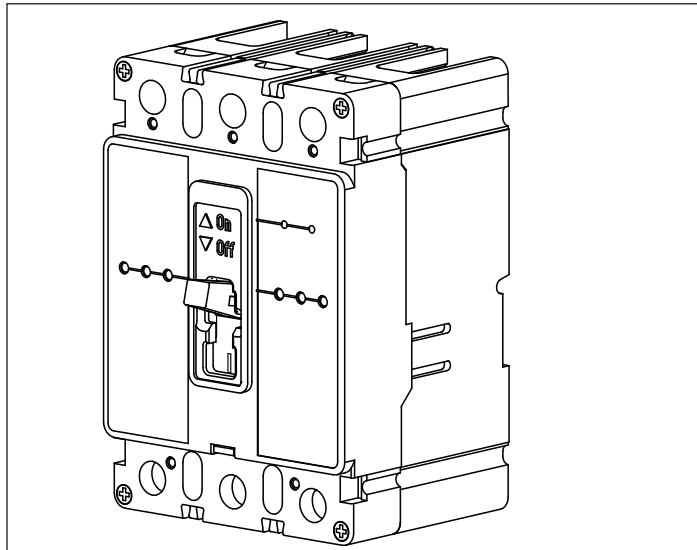


Figure 1. Model W Series C circuit breaker and molded case switches.

2. Installation

The installation procedure consists of inspecting and mounting the circuit breaker, connecting and torquing the line and load terminations, and attaching terminal shields or barriers, when supplied. To install the circuit breaker, perform the following steps.

Note: The FWF, HFWF, FWCF, FW, HFW, and FWC circuit breakers are factory sealed. Accessory installation should be done before the circuit breaker is mounted and connected.

Mounting hardware and mounted terminations are supplied in the breaker package.

1. Make sure that the circuit breaker is suitable for the installation by comparing nameplate data with system requirements. Inspect the circuit breaker for completeness, and check for damage before mounting.

⚠ WARNING

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

2. 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 electrical operator), the instruction leaflet describing the accessory also describes the special mounting arrangements.

Note: Before mounting the circuit breaker, check if the termination devices should be installed first. See terminations instructions.

3. To mount the circuit breaker, perform the following steps.
 - a. For individual mounting panels, make sure that mounting panel is predrilled using the bolt drilling plan (see Fig. 2). For panel board mounting, only load end support mounting holes are required. For deadfront cover applications, make sure panel cover is cut out to correct escutcheon dimensions (see Fig. 3).
 - b. If the circuit breaker includes factory installed internal accessories, make sure accessory wiring can be reached when the circuit breaker is mounted.
 - c. Position the circuit breaker on mounting surface.
 - d. Install the mounting screws, washers and nuts. Tighten the screws firmly, but do not exceed 28 pound-inches (3.16 N•m).

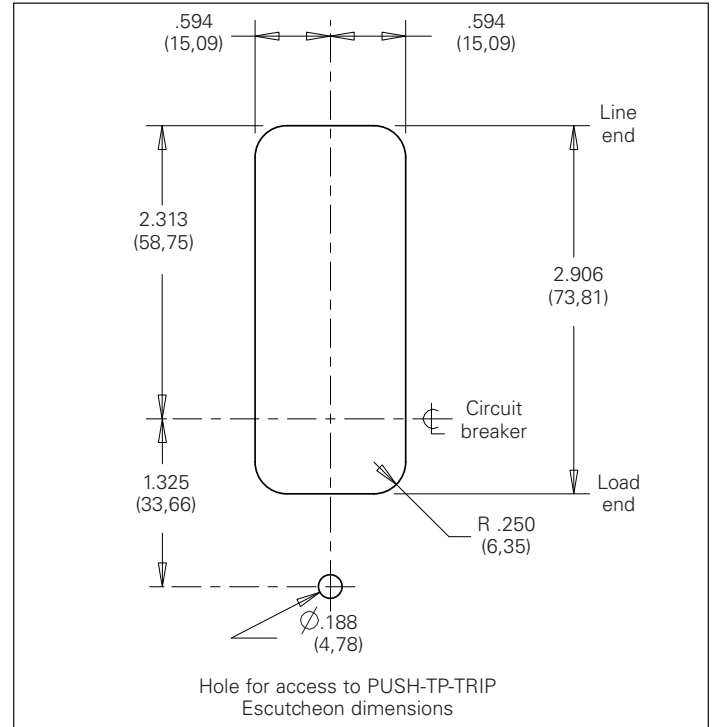


Figure 3. Circuit breaker escutcheon dimensions.

4. If an optional terminal end cover is to be installed with the circuit breaker (usually line end only), it must be positioned before cable is connected to terminals.

⚠ 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 NUISANCE TRIPPING AND DAMAGE TO THE CIRCUIT BREAKER.

5. After mounting the circuit breaker, line and load terminals and accessory leads should be connected. (See accessory schematic diagram on side of circuit breaker.)

Note: If terminal shield or interphase barriers are to be installed on the circuit breaker, install them after the terminals are connected.

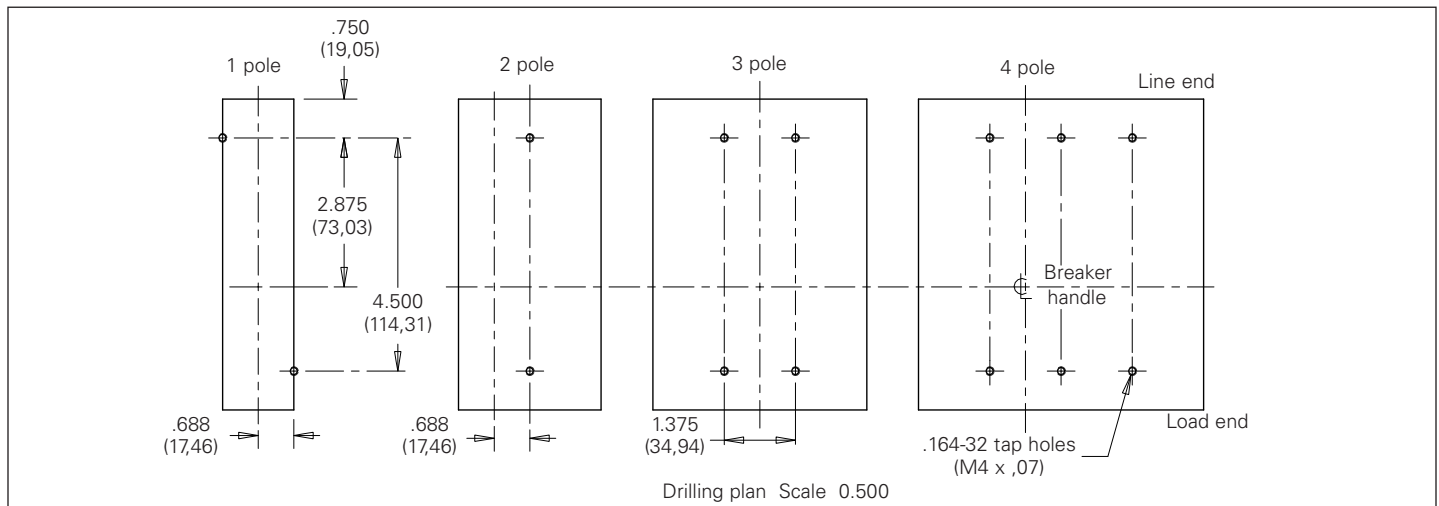


Figure 2. Circuit breaker mounting bolt drilling plans.

6. If required, install the terminal shield on circuit breaker cover with mounting screws provided.
7. If required, install an interphase barrier by sliding barrier into dovetail grooves between terminals.
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 Tables 1 and 2.

Table 1. Terminal Types

Terminal Catalog Number	Terminal Body Material	Screw Head Type	AWG Wire Range	Metric Wire Range	Wire Type	Torque Value, Lb. in.(N.m)
3TA225FD ^①	Aluminum	3/16 Socket Hex	#4-4/0	25-95	Cu/Al	120(13.6)
3TA225FDM ^①	Aluminum	5mm Socket Hex	#4-4/0	25-95	Cu/Al	120(13.6)
3TA225FDK ^{②③}	Aluminum	5/16 Socket Hex	#6-300	16-150	Cu/Al	275(31)
3TA100FD ^①	Aluminum	Slotted	#14-1/0	2.5-5.0	Cu/Al	See Table 2
3TA50FB ^①	Aluminum	Slotted	#14-#4	2.5-16	Cu/Al	See Table 2
3T100FB ^①	Steel	Slotted	#14-1/0	2.5-50	Cu/Al	See Table 2
3T150FB ^①	Stainless Steel	Slotted	#4-4/0	25-95	Cu Only	See Table 2

Note: Terminal wire connectors are UL listed for standard wire sizes as defined in UL 486A and UL486B.

^①Package of Three

^②Individual terminal identified as TA225FD1

Table 2. Terminal Torque Values for Slotted Head

Metric Wire Range	Torque Value N.m	AWG Wire Range	Torque Value, Lb.-In.
2.5-6	3.96	#14-#10	35
10	4.52	#8	40
16-25	5.09	#6-#4	45
35-95	5.65	#3-4/0	50

Table 3. Bolted Connections (Keeper Nut or End Cap)

Termination Catalog Number	Screw Head Type	Nut Thread Size	Torque Value Lb. In. (N.m)
KPR1A/KPR1AM	Upper Supplied	10-32/M5	35(4.0)
KPEKxxx	Slotted	10-32/M5	35(4.0)

3. Manual operation

Manual operation of the circuit breaker is controlled by the circuit breaker handle and the PUSH-TO-TRIP button. The circuit breaker handle has three indicated positions, two of which are shown on the cover with raised lettering to indicate ON and OFF. On the sliding handle barrier, ON, OFF, and Trip are also shown by a color-code strip for each circuit breaker handle position: red for ON, white for tripped, and green for OFF. On the sliding handle barrier, ON/OFF is also shown with the international symbols I/O. (see Fig. 4).

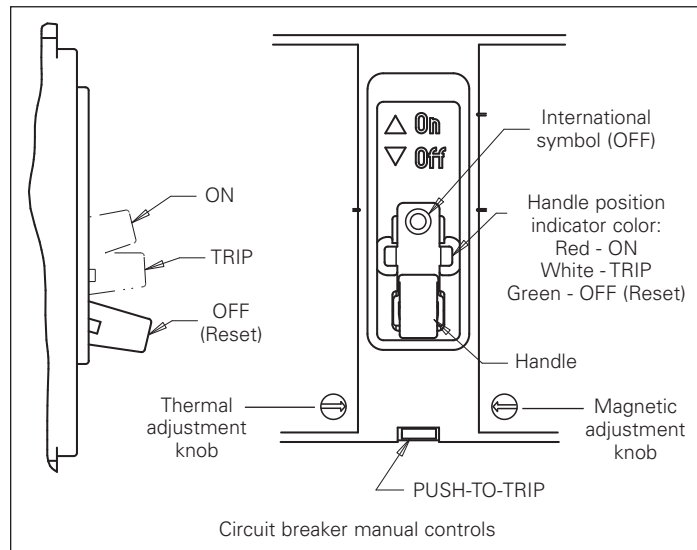


Figure 4. Circuit breaker manual controls.

Thermal trip adjustment

For breakers equipped with a thermal adjusting knob, the breaker handle should be in the tripped position before any adjustment is made to the thermal adjusting knob (see Fig. 4). The breaker can be tripped by pushing the PUSH-TO-TRIP button.

Circuit breaker reset

After tripping, the circuit breaker is reset by moving the circuit breaker handle to the extreme OFF position.

Note: In the event of a thermal trip, the circuit breaker cannot be reset until the thermal element cools.

PUSH-TO-TRIP

The PUSH-TO-TRIP button checks the tripping function and is used to periodically exercise the operating mechanism.

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 inspect and test a circuit breaker in service.

Inspection

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

WARNING

BEFORE INSPECTING THE CIRCUIT BREAKER IN AN ELECTRICAL SYSTEM, MAKE SURE THE CIRCUIT BREAKER IS SWITCHED TO THE OFF POSITION AND THERE IS NO VOLTAGE PRESENT WHERE WORK IS TO BE PERFORMED. SPECIAL ATTENTION SHOULD BE PAID TO REVERSE FEED APPLICATIONS TO ENSURE NO VOLTAGE IS PRESENT. THE VOLTAGES IN ENERGIZED EQUIPMENT CAN CAUSE INJURY OR DEATH.

CAUTION

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

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.
2. Switch the circuit breaker 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 the circuit breaker.
3. Press the PUSH-TO-TRIP button to mechanically trip the circuit breaker. Trip, reset, and switch circuit breaker ON several times. If the mechanism does not reset each time the circuit breaker is tripped, replace the circuit breaker.
4. Check the base, cover, and operating handle for cracks, chipping, and discoloration. Circuit breakers should be replaced if cracks or severe discoloration is found.
5. Check the terminals and 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 cables should be refurbished to the condition when originally installed.
6. Check the circuit breaker mounting hardware. Tighten if necessary.
7. Check the area where the circuit breaker is installed for any safety hazards, including personal safety and fire hazards. Exposure to certain types of chemicals can cause deterioration of electrical connections.

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