

# Instructions for Type KT Thermal-Magnetic Trip Unit Installation and Operation with K-Frame Series C Circuit Breakers



## WARNING

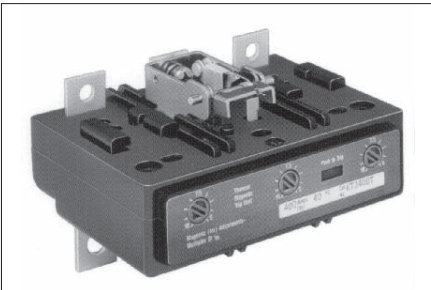
**DO NOT ATTEMPT TO INSTALL OR PERFORM MAINTENANCE ON EQUIPMENT WHILE IT IS ENERGIZED. DEATH, SEVERE PERSONAL INJURY, OR SUBSTANTIAL PROPERTY DAMAGE CAN RESULT FROM CONTACT WITH ENERGIZED EQUIPMENT. ALWAYS VERIFY THAT NO VOLTAGE IS PRESENT BEFORE PROCEEDING WITH THE TASK, AND ALWAYS FOLLOW GENERALLY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

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



**Figure 1-1 K-Frame Series C Circuit Breaker Thermal-Magnetic Trip Unit Type KT**

## General Information

Trip units for K-Frame Series C circuit breakers (Fig. 1-1) are available in two types: Type KT with thermal-magnetic trip functions, described in this instruction leaflet; or Type KS electronic (Seltronic) trip functions, covered in I.L. 29C604. Trip units are listed in accordance with Underwriters Laboratories, Inc. Standard UL489 and satisfy the applicable requirements of the International Electrotechnical Commission Recommendations for molded case circuit breakers.

The trip unit includes either a fixed or an adjustable thermal element for inverse time delay on overload and an adjustable magnetic element for protection against short circuits. In open air at 40°C, a circuit breaker with the trip unit installed will carry continuously a current ( $I_{th}$ ) equal to the ampere rating marked on the trip unit nameplate without exceeding a 50°C rise at the terminals. The National Electrical Code (USA) requirements state that enclosed overcurrent protective devices may be loaded to a maximum of 80 percent of the open air rating ( $I_{th}$ ).

The trip unit cover is factory sealed to prevent tampering with the calibration. Tables 1-1 and 1-2 list catalog numbers and electrical data for trip units.

**Thermal Trip:** In accordance with standards requirements the thermal element trips the circuit breaker within 2 hours for an overload of 135 percent and trips in less time for higher over loads. For all currents in excess of the magnetic setting, the tripping action is instantaneous. In the overload trip region (up to  $5 \times I_{th}$ ) the trip current times are the same for AC or DC.

**Adjustable Thermal:** Trip units having an adjustable thermal element can be adjusted within the range  $(I_{th} \text{ to } 1.35 I_{th})$ , shown in Table 1-2 using a single adjusting button. (See Fig. 2-6.)

**Magnetic Trip:** The magnetic trip on each pole may be adjusted by turning the adjustment button with a screwdriver. (See Fig. 2-5.) Trip units are shipped from the factory with the buttons set in the low position. The magnetic trip ( $I_m$ ) is calibrated at the factory to trip at an rms alternating current. In the magnetic trip region (above  $5 \times I_m$ ), the trip current levels are approximately 40 percent higher for DC than for AC.

## NOTICE

**Trip units are calibrated at 40°C, 50/60 Hz and DC as noted. Consult Cutler-Hammer for derating at other frequencies and ambient conditions.**

**Magnetic Calibration:** The Series C magnetic calibration is performed using a controlled ramp test method that should accurately reflect run-up test methods used in most field test procedures. The calibration is conducted in a fixture essentially free of any magnetic influence. Some minor reductions (up to 10%) in the actual pick-up values could occur for circuit breakers mounted on steel surfaces.

A controlled ramp test method generally produces more consistent results than a pulse test method because of the possible variables in the pulse method.

**Internal Accessories:** The following types of circuit breaker internal accessories, which mount on the Type KT trip unit, are available for use. The number of the Instruction Leaflet covering the installation of each accessory is also shown.

- |   |             |
|---|-------------|
| • Alarm (Signal)/Lockout (ASL) Switch           | I.L. 29C182 |
| • Auxiliary Switch                              | I.L. 29C122 |
| • Shunt Trip                                    | I.L. 29C144 |
| • Low Energy Shunt Trip                         | I.L. 29C145 |
| • Undervoltage Release Mechanism (Handle Reset) | I.L. 29C166 |
| • Undervoltage Release Mechanism (Manual Reset) | I.L. 29C167 |

For further information on the K-frame Series C circuit breaker, refer to I.L. 29C104.

## 2. INSTALLATION

The installation procedure consists of inspecting and installing the trip unit. To install the trip unit, perform the following steps.

## NOTICE

**If required, internal accessory installation should be done before the circuit breaker is mounted and connected. Refer to individual accessory instruction leaflets.**

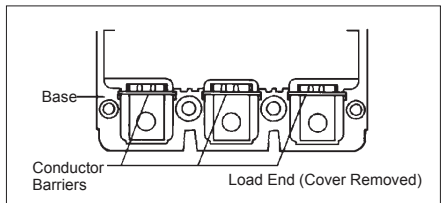
2-1. Make sure that the trip unit is suitable for the intended installation by comparing nameplate data with existing equipment ratings and system requirements. Inspect the trip unit for completeness, and check for damage before installing it in the circuit breaker frame.

## NOTICE

**Trip unit center retaining screw is captive in the conductor; the two outer screws are installed in the circuit breaker frame.**

2-2. Remove circuit breaker cover screws and cover.

2-3. Remove three conductor barriers from base. (See Fig. 2-1.)



*Figure 2-1 Conductor Barriers*

2-4. Make sure circuit breaker base conductors are positioned in slots in base. (See Fig. 2-2.)

2-5. Remove two screws from outer shunt plate inserts. (See Fig. 2-2.) On two pole breakers, remove additional screw from center pole insert and discard.

## NOTICE

**The two trip unit outer screws may be placed in the trip unit conductor holes at this time. If preferred, a magnetic screwdriver may be used to position the screws when the trip unit is in the base.**

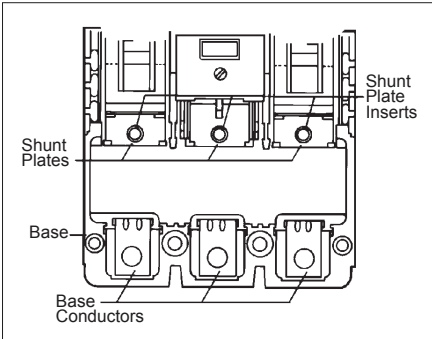
**Make sure shunt plates are centered over shunt plate inserts. (See Fig. 2-2.)**

2-6. Position trip unit in base. Make sure latch bracket pin is properly seated in slots in side plates. (See Fig. 2-3.) If necessary, pull latch towards load end of circuit breaker to help seat trip unit.

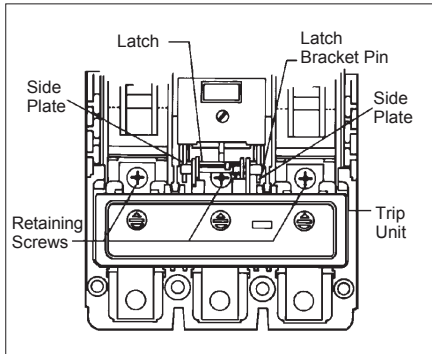
**CAUTION**

DO NOT EXCEED A TORQUE OF 6 TO 8 LB-FT (8 TO 10 N.M.). EXCESSIVE TORQUING WILL SHEAR SCREWS.

FAILURE TO APPLY THE REQUIRED TORQUE MAY LEAD TO EXCESSIVE HEATING AND CAUSE NUISANCE TRIPPING OF THE CIRCUIT BREAKER.



**Figure 2-2 Base Conductors in Position and Shunt Plates Centered over Shunt Plate Inserts**



**Figure 2-3 Trip Unit Installed in Circuit Breaker**

2-7. Screw in and tighten three trip unit retaining screws (center first). Torque the screws to 6 to 8 lb-ft (8 to 10 N.m.). (See Fig. 2-3.)

2-8. Install accessory(ies) if required.

**CAUTION**

WHEN REMOVED AND REINSTALLED, THREAD-FORMING SCREWS TRY TO REFORM THE THREADS IN THE CIRCUIT BREAKER 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 CIRCUIT BREAKER COVER RETENTION.

2-9. Install three conductor barriers in slots in base. (See Fig. 2-1.)

**NOTICE**

When the trip unit is installed in a new circuit breaker frame, the remaining cover mounting hardware is supplied in a plastic bag with the frame.

2-10. Install circuit breaker cover and pan-head screws followed by thread-forming screws as shown in Fig. 2-4. Torque the cover screws to 18-23 lb-in (2-2.6 N.m.).

2-11. Reset circuit breaker by moving handle to the reset position. Move handle to the ON position. Circuit breaker should remain ON.

2-12. Press PUSH-TO-TRIP button with a small screwdriver to check manual tripping of the circuit breaker. (See Fig. 2-5.)

**Trip Unit Magnetic Adjustment**

The magnetic element of each pole of the trip unit can be adjusted by rotating the adjustment buttons on the front face of the trip unit ampere rating ( $I_{th}$ ) as shown in Fig. 2-5. To adjust the setting, rotate each button clockwise until arrow on button points to desired setting.

2-13. Adjust magnetic pick-up settings as required. (See Fig. 2-5.)

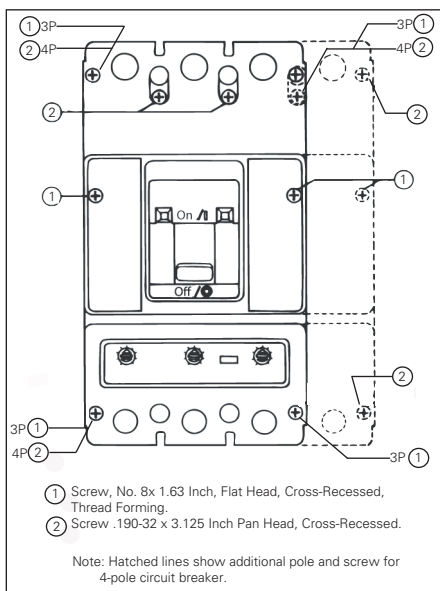


Figure 2-4 Cover Screw Installation Positions

**Trip Unit Thermal Adjustment**

In some trip unit types, the thermal rating ( $I_{th}$ ) of the trip unit can be adjusted by a single button (See Fig. 2-6) within the ranges indicated in Table 1-2. To adjust the setting, rotate the thermal adjustment button until the arrow on the button points to desired setting.

2-14. Adjust thermal setting as required. (See Fig. 2-6.)

**Table 1-1 Trip Unit Catalog Numbers and Electrical Data-Fixed Thermal**

Catalog No. 2-Pole	Catalog No. 3-Pole <sup>①</sup>	Continuous Ampere Rating ( $I_{th}$ ) 40°C	Magnetic Trip Range Ampere <sup>②</sup>
KT2100T	KT3100T	100	500 - 1000
KT2125T	KT3125T	125	625 - 1250
KT2150T	KT3150T	150	750 - 1500
KT2175T	KT3175T	175	875 - 1750
KT2200T	KT3200T	200	1000 - 2000
KT2225T	KT3225T	225	1125 - 2250
KT2250T	KT3250T	250	1250 - 2500
KT2300T	KT3300T	300	1500 - 3000
KT2350T	KT3350T	350	1750 - 3500
KT2400T	KT3400T	400	2000 - 4000

- ① Also used with 4-pole circuit breaker. Load end adapter for neutral pole included in 4-pole frame (overcurrent protection for fourth pole not provided).
- ② Nameplate is marked in multiples of ( $I_{th}$ ), (that is, 5 to 10 times).

**Table 1-2 Trip Unit Catalog Numbers and Electrical Data-Adjustable Thermal<sup>①</sup>**

Catalog No. 2-Pole	Catalog No. 3-Pole <sup>②</sup>	Continuous Ampere Rating ( $I_{th}$ ) 40°C	Thermal Trip Range	Magnetic Trip Range Ampere <sup>③</sup>
KT2200TA	KT3200TA	200	160 - 200	1000 - 2000
KT2250TA	KT3250TA	250	200 - 250	1250 - 2500
KT2315TA	KT3315TA	315	250 - 315	1575 - 3150
KT2400TA	KT3400TA	400	315 - 400	2000 - 4000

- ① Not UL listed
- ② Also used with 4-pole circuit breaker. Load end adapter for neutral pole included in 4-pole frame (overcurrent protection for fourth pole not provided).
- ③ Nameplate is marked in multiples of ( $I_{th}$ ), (that is, 5 to 10 times).

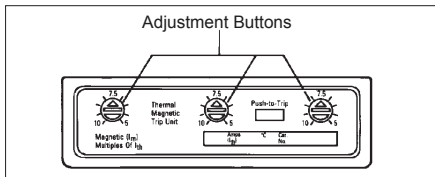


Figure 2-5 Trip Unit Magnetic Adjustment Buttons

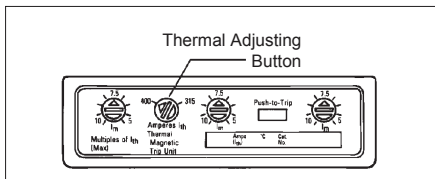


Figure 2-6 Typical Trip Unit With Adjustable Thermal