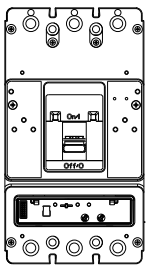
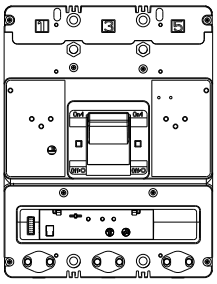
Instruction Leaflet **IL012042EN** Effective October 2014

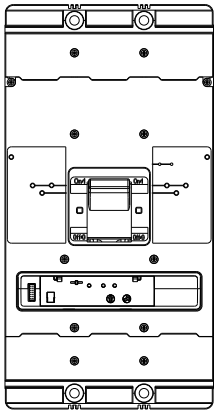
Instruction Leaflet for the K-Frame, L-Frame, M-Frame, N-Frame and R-Frame 310+ Mining Trip Units



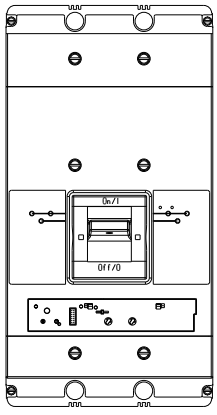
K FRAME



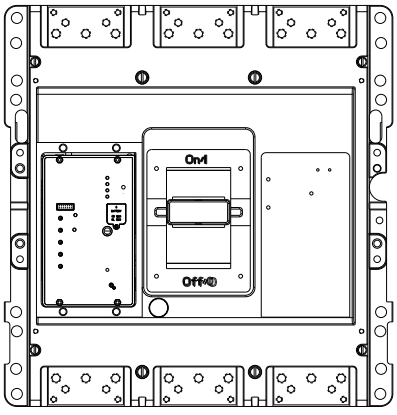
L FRAME



MDL FRAME



N FRAME



R FRAME

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⚠ WARNING

DO NOT ATTEMPT TO INSTALL OR PERFORM MAINTENANCE ON EQUIPMENT WHILE IT IS ENERGIZED. DEATH OR SEVERE PERSONAL INJURY CAN RESULT FROM CONTACT WITH ENERGIZED EQUIPMENT. ALWAYS VERIFY THAT NO VOLTAGE IS PRESENT BEFORE PROCEEDING.

1. Trip Unit Installation

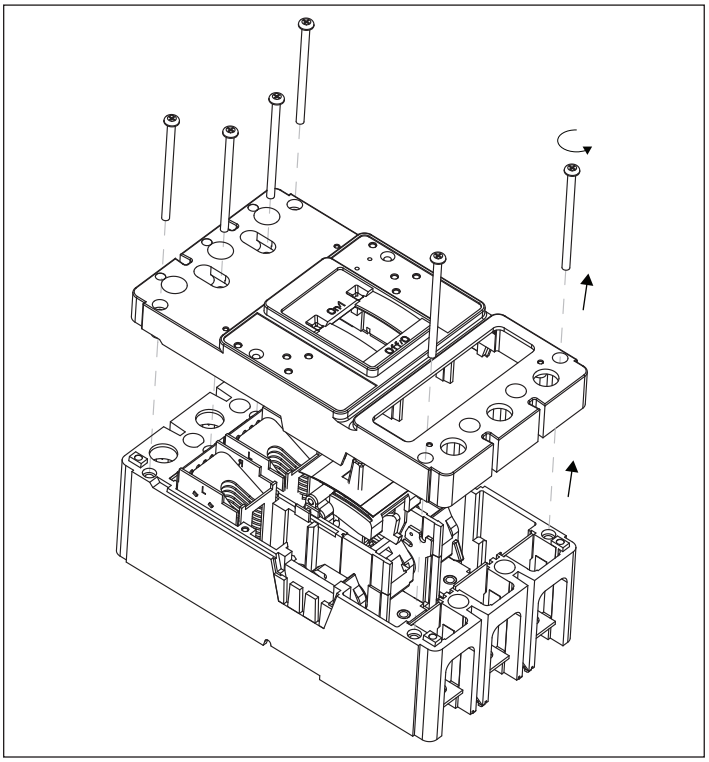


Figure 1. K Frame Installation

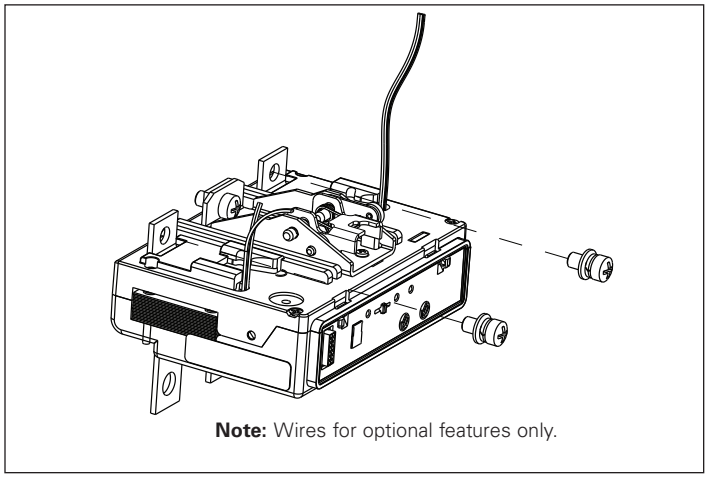


Figure 2. K Frame Installation

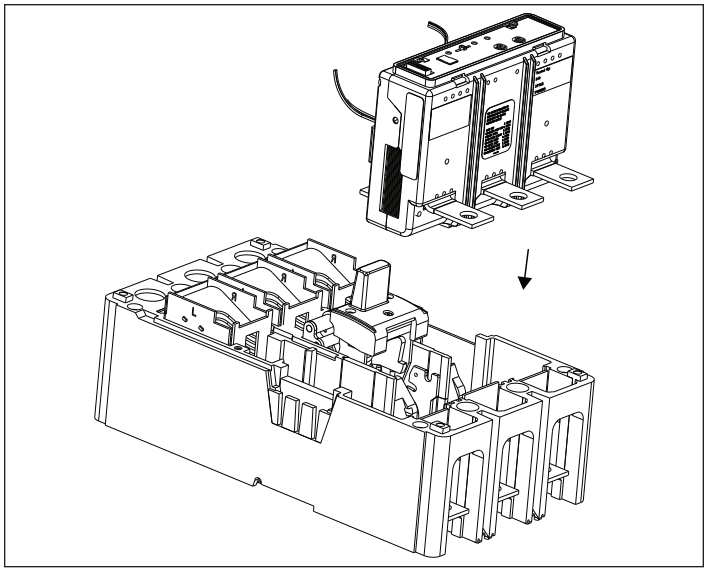
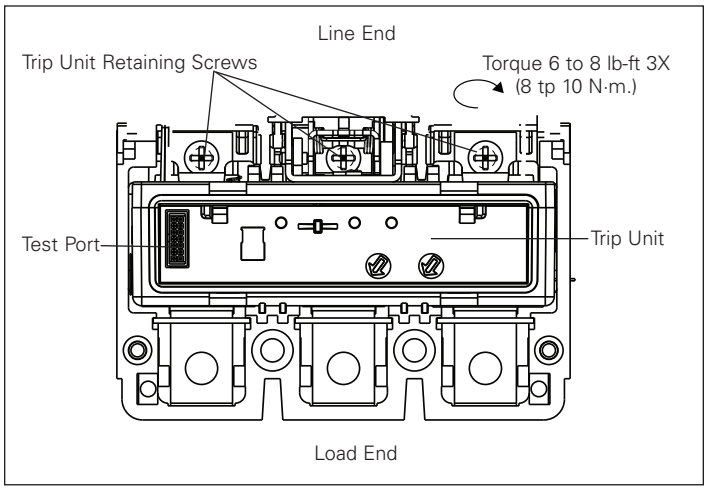


Figure 3. K Frame Installation



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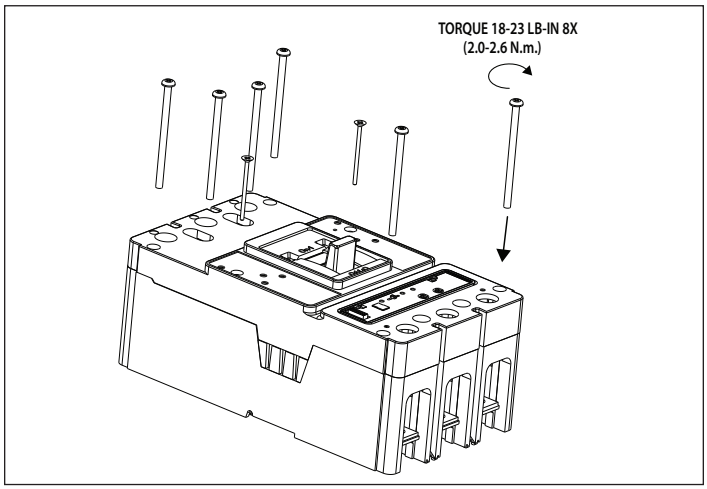


Figure 5. K Frame Installation

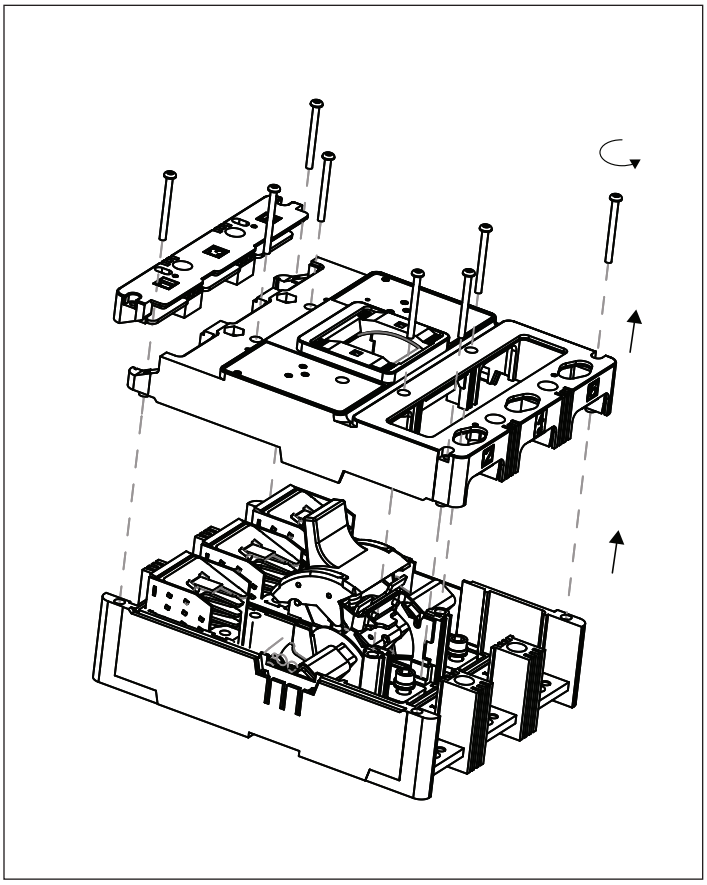
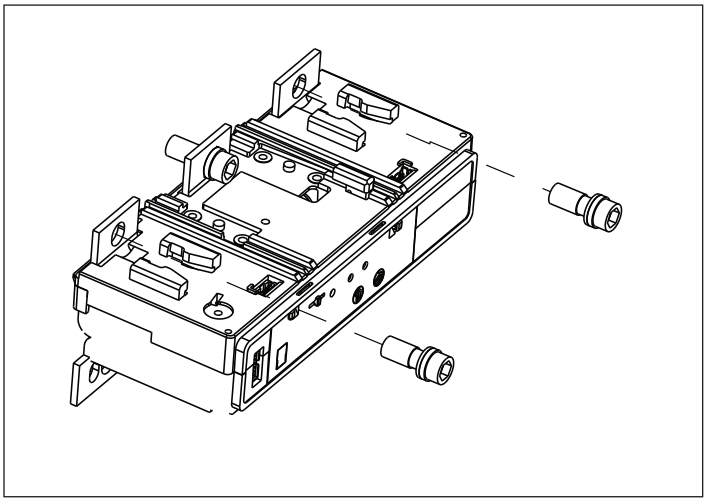


Figure 6. L Frame Installation.



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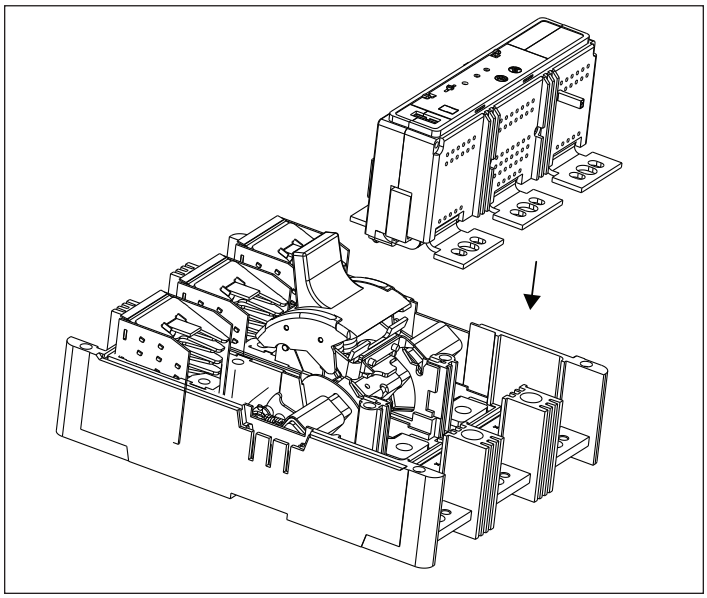

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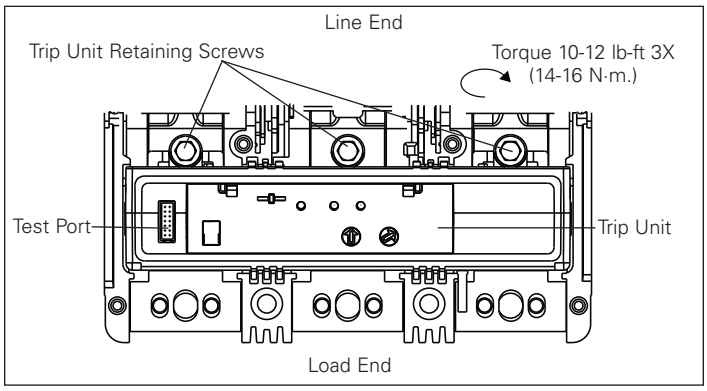
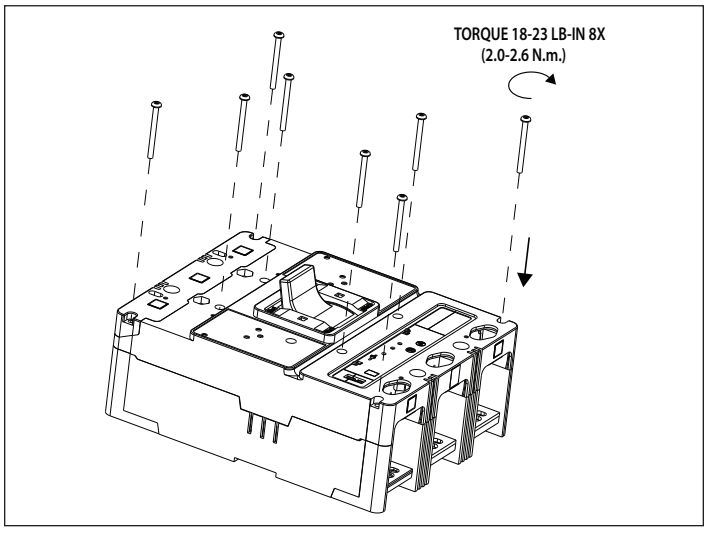


Figure 9. L Frame Installation



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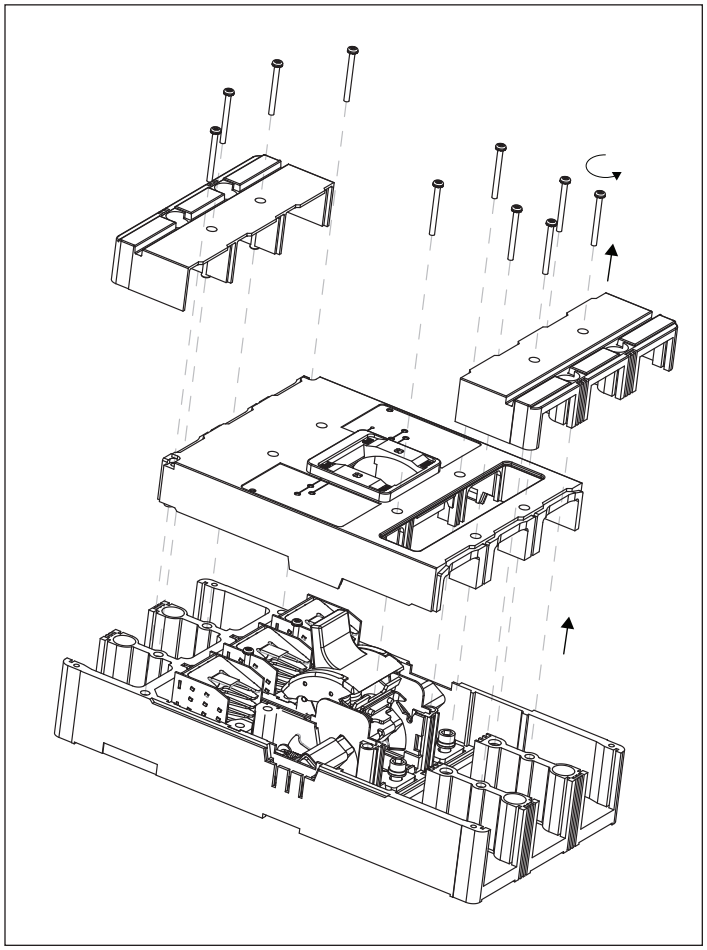


Figure 11. M Frame Installation

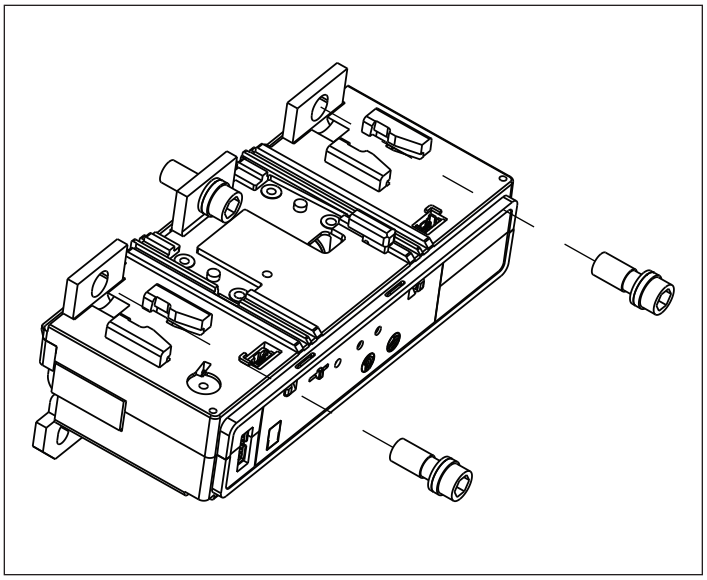
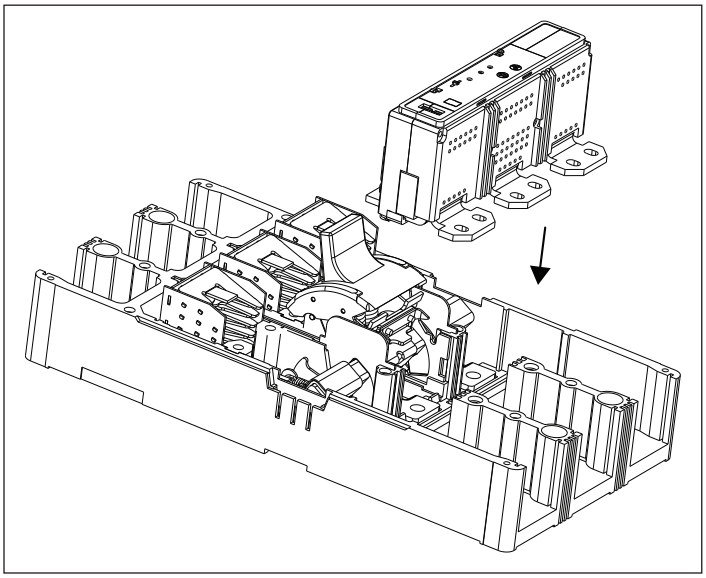


Figure 12. M Frame Installation



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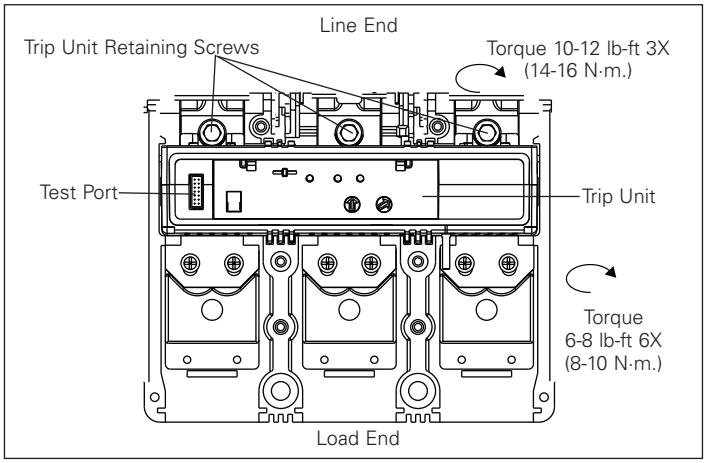

Figure 14. M Frame Installation

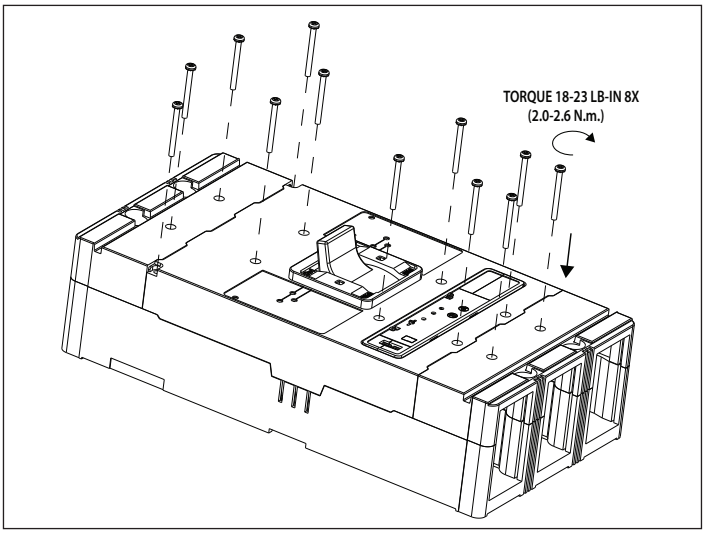

Figure 15. M Frame Installation

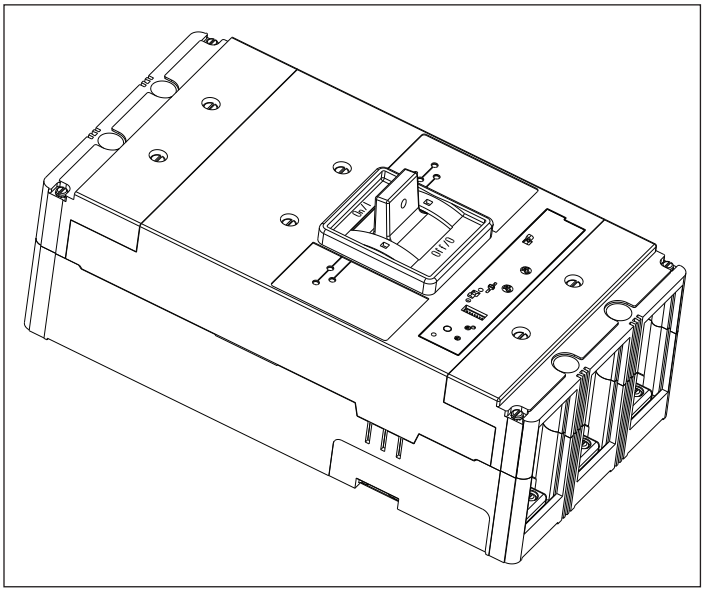

Figure 16. N Frame

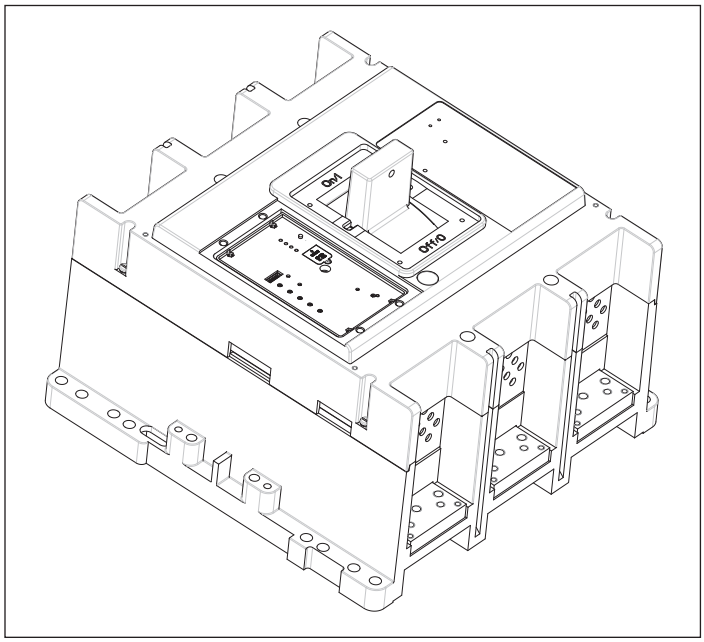

Figure 17. R Frame

Table 1. Parts List

K Mining Trip Unit
IL FOR 310+ MINING TRIP UNITS
310+ MINING NOTIFICATION DATA SHEET
KIT, 310+ MINING K-FRAME SCREW & INSTRUCTION TAG

L Mining Trip Unit
IL FOR 310+ MINING TRIP UNITS
310+ MINING NOTIFICATION DATA SHEET

M Mining Trip Unit
IL FOR 310+ MINING TRIP UNITS
310+ MINING NOTIFICATION DATA SHEET

2. Trip Unit Controls and Functions

K Nameplate

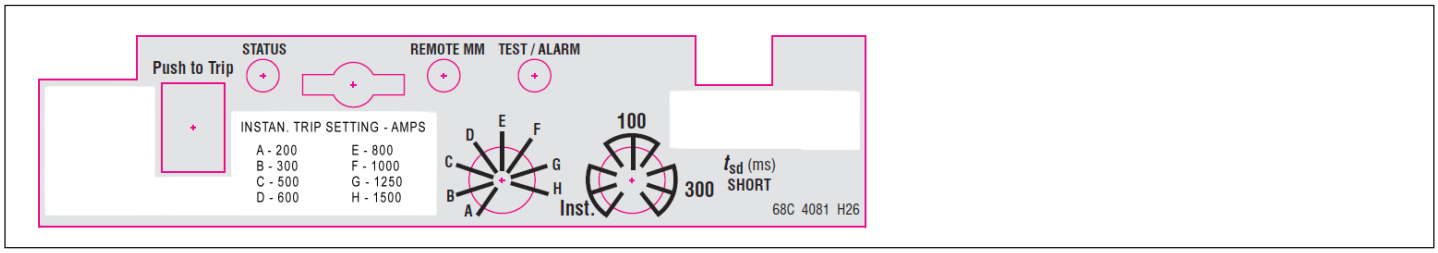

Figure 18. K Nameplate

CAT	KEM 3100T	KEM 3125T	KEM 3150TM	KEM 3150T	KEM 3200T	KEM 3225T2	KEM 3225TM	KEM 3225T	KEM 3225TM2	KEM 3400T2	KEM 3400T	KEM 3400TM	KEM 3400TM2
RANGE	1	1	1	1	2	3	2	2	3	3	2	2	3

POSITION	A	B	C	D	E	F	G	H
RANGE 1	50	75	150	200	300	500	600	800
RANGE 2	200	300	500	600	800	1000	1250	1500
RANGE 3	500	600	800	1000	1250	1500	2000	2500

The K Mining trip units have thirteen styles as shown in the CAT row above. The suffixes describe Long delay and Instantaneous functionality.

L/M Nameplate

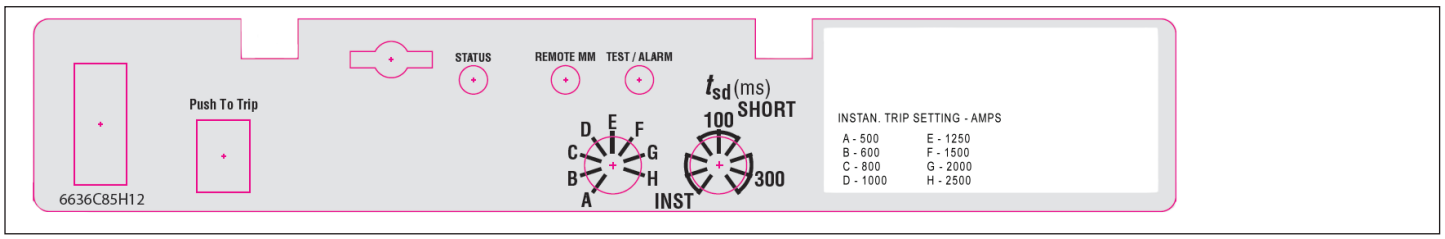

Figure 19. L/M Nameplate

CAT	LEM 400TM	LEM 3400T	LEM 3350T	LEM 3300T	LEM 3500T	LEM 3600T	LEM 3400TM2	LEM 3400T2	LEM 3600TM	LEM 3600T2	LEM 3600TM2	LEM 3450T	MEM 3800T	MEM 3800T2	MEM 3800TM	MEM 3800TM2
RANGE	1	1	1	1	1	1	2	3	4	5	5	1	1	3	1	3

POSITION	A	B	C	D	E	F	G	H
RANGE 1	500	600	800	1000	1250	1500	2000	2500
RANGE 2	666	800	1066	1333	1666	2000	2666	3333
RANGE 3	1000	1250	1500	2000	2500	3000	3500	4000
RANGE 4	750	900	1200	1500	1862	2250	3000	3750
RANGE 5	2500	3000	3500	4000	5000	2500	2500	2500

The L Mining trip units have sixteen styles as shown in the CAT row above. The suffixes describe Long delay and Instantaneous functionality.

N Nameplate

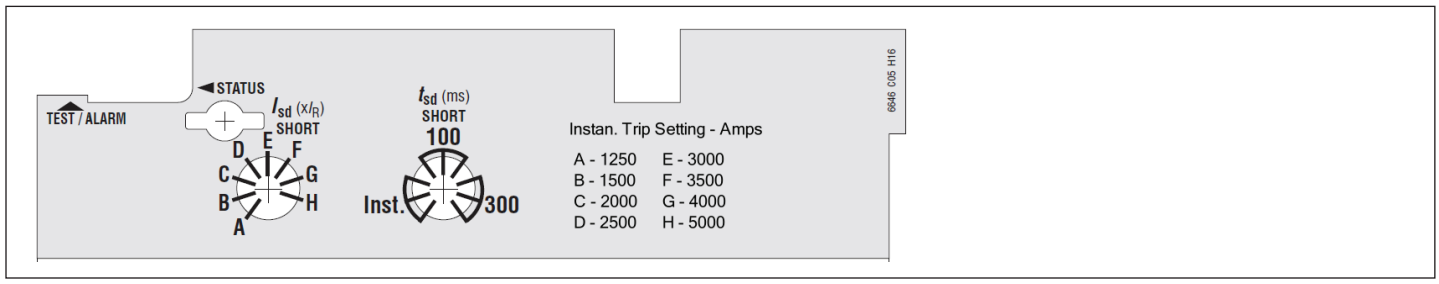

Figure 20. N Nameplate

CAT	E2NM3400	E2NM3500	E2NM3600	E2NM3700	E2NM3800	E2NM3900	E2NM310	E2NM312
RANGE	1	1	1	1	1	2	2	2

POSITION	A	B	C	D	E	F	G	H
RANGE 1	500	600	800	1000	1250	1500	2000	2500
RANGE 2	1250	1500	2000	2500	3000	3500	4000	5000

The N Mining trip units have EIGHT styles as shown in the CAT row above. The suffixes describe Long delay and Instantaneous functionality.

The Instantaneous Trip Setting switch (A -H) allows current selection over the range as shown in the tables above. The SHORT Time switch has three flat time settings: Inst (50ms), 100ms, and 300ms.

Time-Current Trip Curve numbers for the LEM Mining are: TC01217001E and can be found on the Eaton Website at www.eaton.com.

R Nameplate 1600A & 2000A LS, LSI

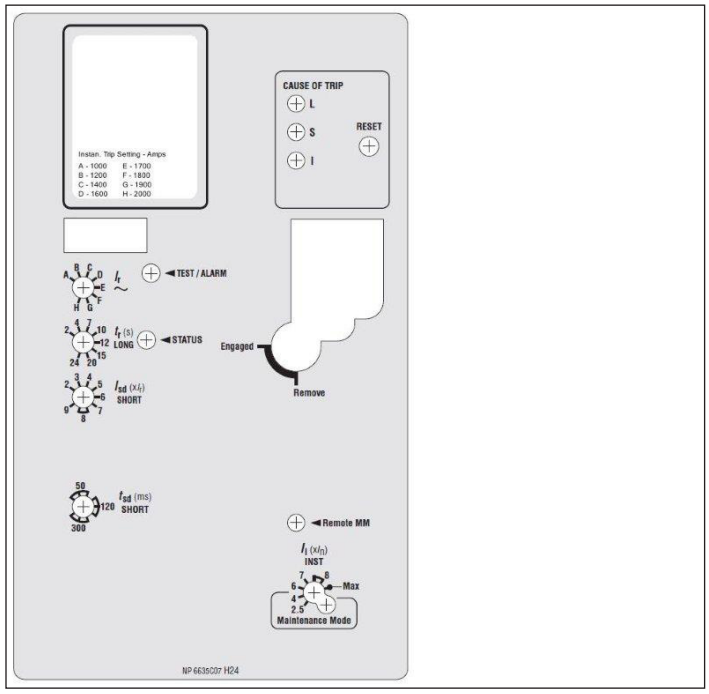

Figure 21. R Frame IL Nameplate

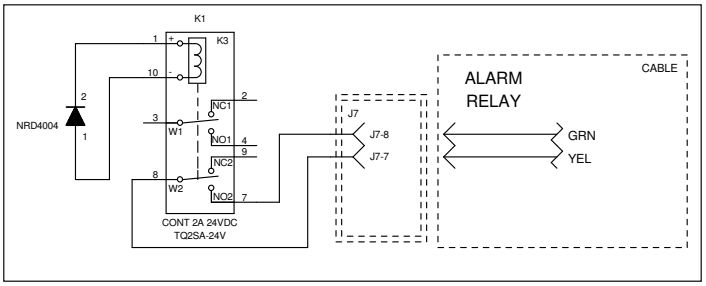

Figure 22. Alarm Relay (L/M Mining Frame)

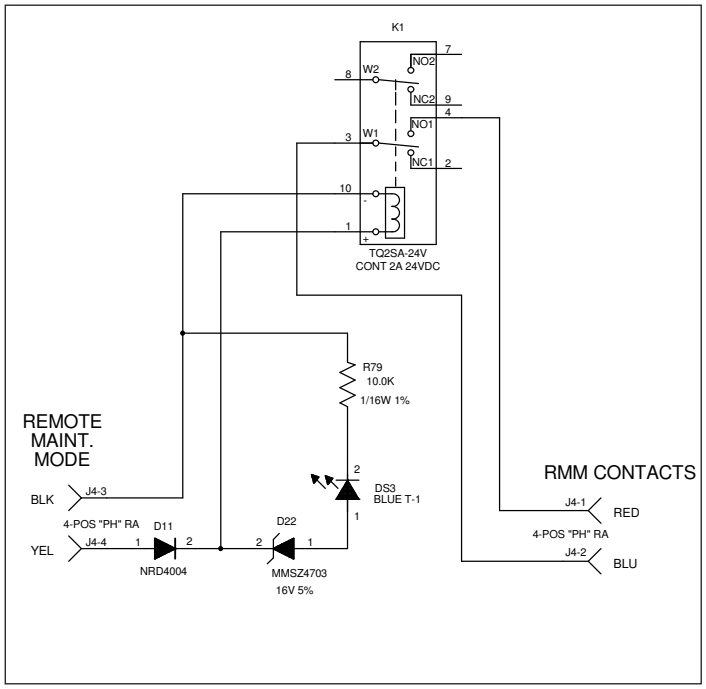

Figure 23. RMM Relay (LM Mining Frame)

Feature Notes

1. Test Port - A test port is built into each trip unit to allow use of a functional test kit. The test kit performs a test of the Long Delay, Short Delay. (Plug-In Test Kit Catalog #MTST230V)
2. Test LED - To be used with a no trip functional test. This LED is a dual function light. The LED is used as a no trip indicator when using the test port. In normal modes, this LED indicates a high load alarm. It will light if the continuous current is 105% of the I_r Setting and must be present for a 38 second duration.
3. The long delay time is based on 6 x (6 I_n) @ 10 seconds. Example: A 400A mining with a current of 6x400 (2400A) will trip in 10 seconds.
4. I_{sd} - For short circuit conditions that exceed the short delay pick-up setting, the trip unit initiates a trip after a predetermined delay. (A-H)

Trip Unit Current Rating (A)	125	250	400	600	800	1200	1600	2000
Override Current Setting (A)	3000	4200	4400	5620	6800	14400	17500	17500

Note: If a fault current exceeds these override values, the breaker will trip instantaneously (in approximately 20 milliseconds or less).

5. For the LSI style, the short delay time is a flat response determined by the t_{sd} switch settings of INST 100ms, or 300ms.
6. Status LED - A green status light indicates the operational status of the trip unit. If the breaker is operating correctly, the LED will blink on for one second and off for one second.
7. The High Load Alarm Relay option will provide a SPST contact closure when the trip unit current equals or is greater than 105% of I_n for a period of 38 seconds. At this point the alarm will be triggered, illuminating the Red LED on the trip unit face. If the current drops below the 105% value, the contact will open. The yellow and green wires that exit the right side of the breaker are the common (C) and normally open (NO) of this relay.

   Note: The contact ratings of the relay are: 2A at 30 VDC and 0.5 A at 125 VAC.

8. Remote Maintenance Mode (RMM) places the trip unit in the 2.5x instantaneous mode. For example, a 400 A (I_n) KD breaker with the switch set to 2.5x would trip instantaneously when the current exceeded 1000 A.

   The Remote Maintenance Mode is enabled by applying 24VDC to the two wire cable that exits the left side of the breaker. The wires are color coded as follows:

   Yellow=+24V and Black=common ground. A blue colored LED, on the trip unit lights when the breaker is the Remote Maintenance Mode.

   The lighted blue LED indicates that the instantaneous setting of the Maintenance Mode is enabled. This setting corresponds to 2.5x of I_n. Turning the I_{sd} switch on the trip unit has no effect on either the Maintenance Mode or the t_{sd} settings while the blue LED is lit.

   Also, a relay contact closure indicates that the Maintenance Mode has been enabled. The blue and red wires are the C and NO contacts of this relay. The relay has a dual function: 1) enable RMM and 2) provide a contact closure indication that RMM is enabled.

   Both the yellow and black set of wires and the red and blue set of wires exit the left side of the breaker.

   Note: The RMM and High Load Alarm contacts are rated at 2A at 30 VDC and 0.5A at 125 VAC.

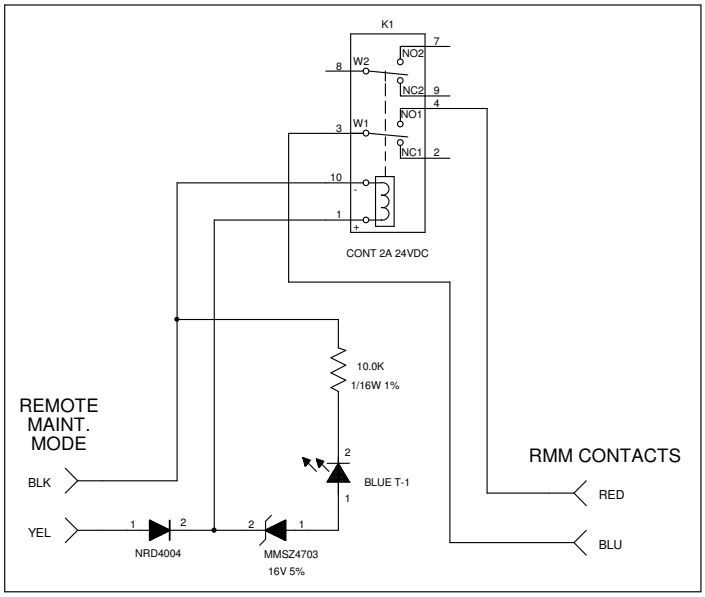

Figure 24. N Mining Frame Remote Maintenance Mode Wiring Diagram

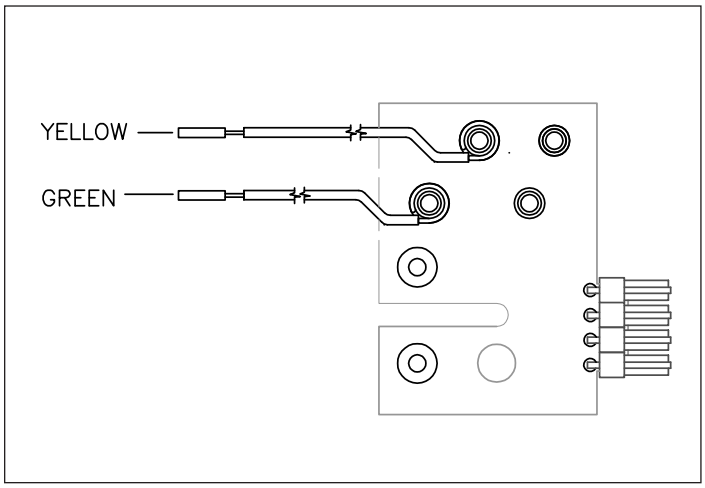

Figure 25. K Alarm Relay

Notes:

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Instruction Leaflet for the K-Frame, L-Frame, M-Frame, N-Frame and R-Frame 310+ Mining Trip Units

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. IL012042EN / TBG1159
Part Number: IL012042ENH01
October 2014

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