



Installation Instructions for Undervoltage Release Mechanism (Handle Reset) for LDB, LD, LDC, LW, HLW, LWC Circuit Breakers, Series C Molded Case Switches, and Motor Circuit Protectors (HMCP)



**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.**

**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.

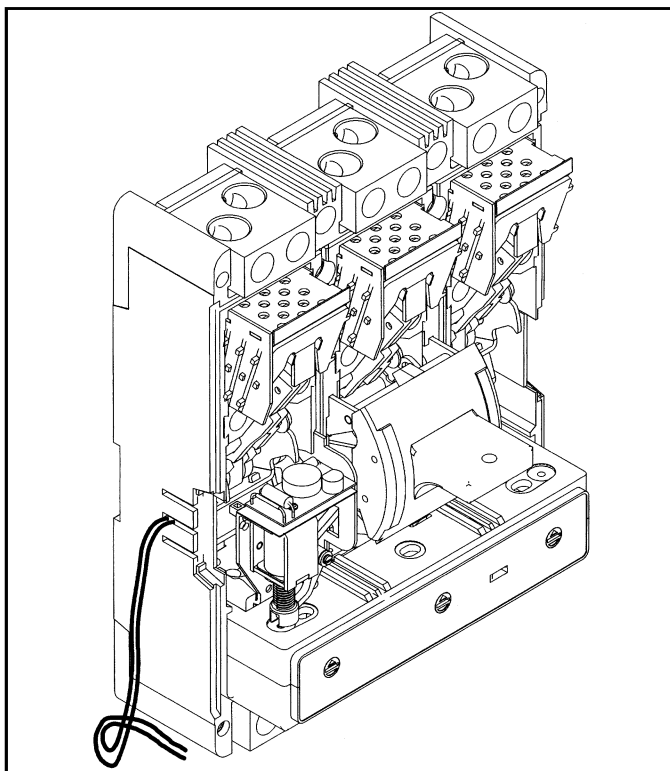


Fig. 1-1 Undervoltage Release Mechanism (Handle Reset) Installed in L-Frame Circuit Breaker

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 Electric Corporation for further information or instructions.

**1. INTRODUCTION**

**General Information**

The undervoltage release mechanism (UVR) (Fig. 1-1) monitors a voltage (typically a line voltage) and trips the circuit breaker when the voltage falls to between 70 and 35 percent of the solenoid coil rating. The UVR consists of a continuous rated solenoid with a plunger and reset lever assembled to a plug-in module. The plug-in module is mounted in slots in the top of the trip unit and occupies the accessory cavity in the circuit breaker frame. The reset lever resets the UVR when normal voltage is restored and the circuit breaker handle is moved to the resets (extreme OFF) position. With no voltage applied to the UVR, the circuit breaker contacts will not touch when a closing operation is attempted.

The UVR is available with several voltage ratings for most AC and DC requirements. Table 1-1 and 1-2 list application and electrical rating data for the UVR.

For this publication, the term circuit breaker shall also include molded case switch and motor circuit protector.

Depending on the model ordered, connections for the UVR are in one of four forms. The standard wiring configuration is pigtail leads exiting the rear of the base directly behind the UVR. Optional configurations include a terminal block mounted on the same side of the base as the accessory, leads exiting the side of the base where the accessory is mounted, and leads exiting the rear of the base on the side opposite the accessory. The 18-inch long pigtail leads are color coded for identification; identification labels are provided for pigtail leads and terminal block points. For allowable locations of all accessories, refer to Frame Book 29-104.

**Note: When the walking beam interlock is used with the circuit breaker, the rear trough cannot be used for accessory pigtail leads.**

This instruction leaflet (IL) gives detailed procedures for installing the UVR.

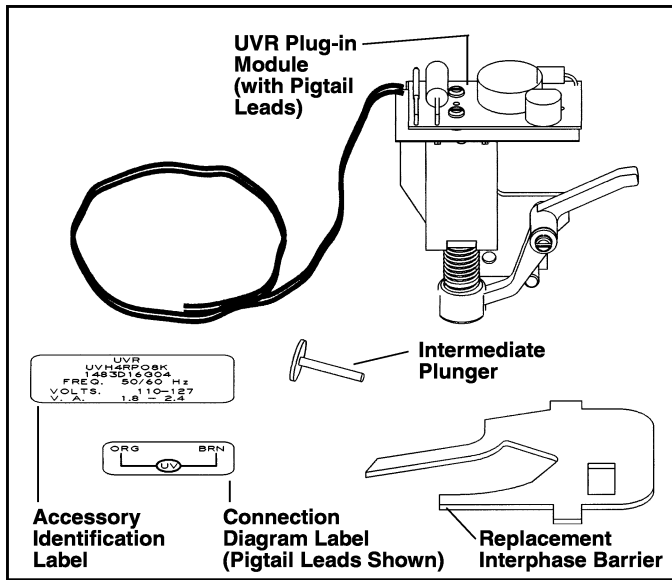


Fig. 2-1 Undervoltage Release Mechanism (Handle Reset) Kit

## 2. INSTALLATION

**Note:** The UVR can be field-installed in LD, HLD, and LDC circuit breakers under UL File E64983.

The UVR can be field-installed in LW, HLW, and LWC circuit breakers.

The UVR is listed for factory installation under UL File E7819.

For sealed circuit breakers (LDB), Underwriters Laboratories Inc. UL 489 requires that internal accessories be installed at the factory. The UVR is listed for factory installation under UL File E7819.

Where local codes and standards permit and UL listing is not required, internal accessories can be field installed in sealed circuit breakers. In this case, UL listing becomes invalid and the label should be removed.

Before attempting to install the UVR, check that the catalog number is correct as ordered and that the rating of the accessory satisfies job requirements.

The UVR, shown in kit form in Fig. 2-1, is installed in the right or left accessory mounting cavity of a 2-, 3-, or 4-pole circuit breaker with an LT (fixed thermal) or LTA (adjustable thermal) trip unit; and, in the left pole only of a circuit breaker with an LS (electronic) trip unit. A UVR must be installed in the circuit breaker before the circuit breaker is mounted in an electrical system. To install the UVR, perform the following procedures:

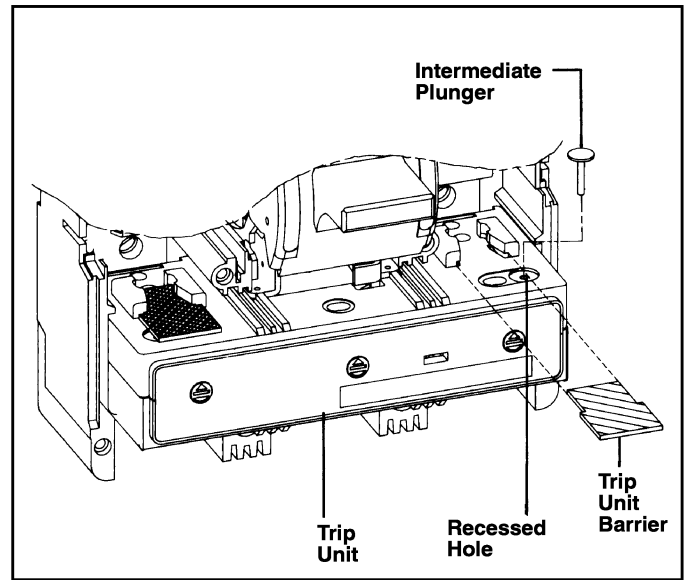


Fig. 2-2 Trip Unit Barrier Removal

**Note:** A circuit breaker that is mounted in an electrical system must be removed to install the accessory. To ensure correct accessory installation, the circuit breaker must be placed on a horizontal surface.



## WARNING

**THE VOLTAGES IN ENERGIZED EQUIPMENT CAN CAUSE DEATH OR SEVERE PERSONAL INJURY. SPECIAL ATTENTION SHOULD BE PAID TO REVERSE FEED APPLICATIONS TO ENSURE NO VOLTAGE IS PRESENT. BEFORE REMOVING A CIRCUIT BREAKER INSTALLED 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.**

**Note:** For new circuit breaker installation, the trip unit must be installed in circuit breaker before attempting to install a UVR. Refer to I.L. 29C607, I.L. 29C608, I.L. 29C609 or I.L. 29C610 for instructions on how to install trip unit.

2-1. Switch circuit breaker to OFF position.

**Note:** To install UVR, circuit breaker operating mechanism must be in tripped position.

Molded case switch trip units are not equipped with a Push-to-Trip button. For molded case switches, omit step 2-3.

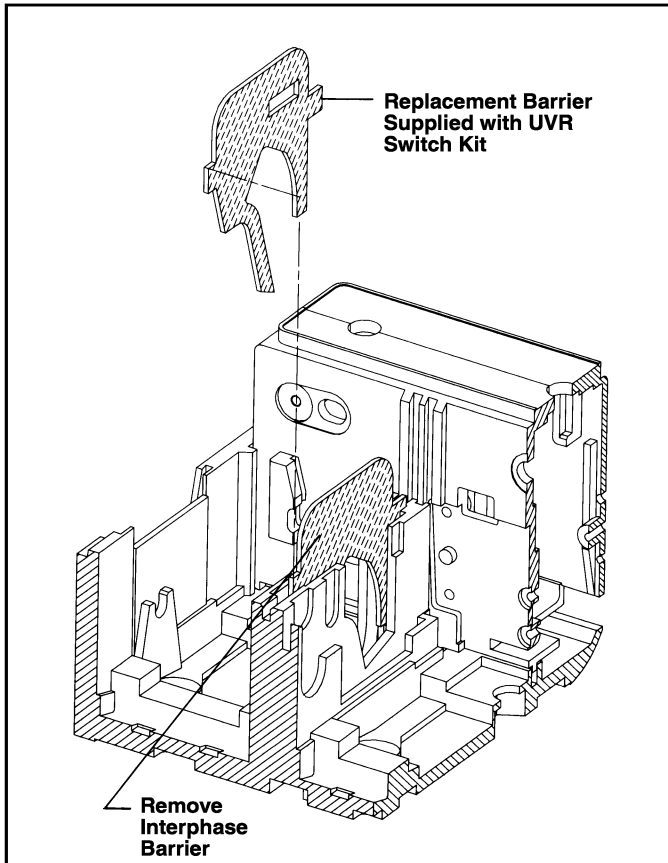


Fig. 2-3 Interphase Barrier Replacement

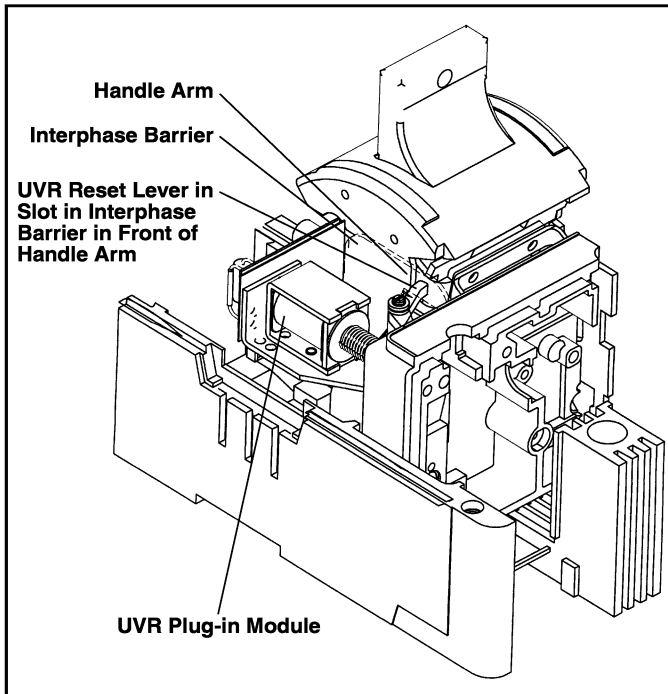


Fig. 2-4 UVR Installation

- 2-2. Disconnect and remove circuit breaker from installation and terminal connections.
- 2-3. Press PUSH-TO-TRIP button to trip operating mechanism, and check handle moves to trip position with white colored indicator visible in escutcheon window.
- 2-4. Remove circuit breaker cover screws and covers.
- 2-5. For high instantaneous trip-type (catalog suffix K designation) molded case switches, find recessed hole in either of the trip unit outer poles (Fig. 2-2). Push intermediate plunger supplied with UVR in one hole to trip the molded case switch. Remove plunger to prevent it falling out of recessed hole in trip unit and into molded case switch mechanism.
- 2-6. Remove interphase barrier between accessory mounting cavity and operating mechanism (see Fig. 2-3).
- 2-7. Install replacement interphase barrier (supplied with kit) in base (see Fig. 2-3).
- 2-8. Install UVR as described in following steps (see Fig. 2-4):



**CAUTION**

**IF UVR IS REMOVED FROM CIRCUIT BREAKER, INTERMEDIATE PLUNGER MUST ALSO BE REMOVED. FAILURE TO REMOVE THE INTERMEDIATE PLUNGER CAN RESULT IN EQUIPMENT DAMAGE.**

- a. Remove barrier from trip unit accessory mounting slots in pole being used for accessory (Fig. 2-2).
- b. Position intermediate plunger in trip unit (Fig. 2-2).
- c. Press intermediate plunger into recess in trip unit and hold in position.
- d. Push circuit breaker handle towards the ON position and hold while sliding UVR plug-in module into slots in trip unit (Fig. 2-4) until retaining clip snaps into trip unit. For terminal block assemblies, slide terminal block into mounting slot on side of base as plug-in module is being positioned.

**Note: For a UVR having rear or opposite-side exiting pigtail leads, thread leads through center trough in side of base before attempting to insert the mounting bracket. Pigtail leads exiting in this manner should be eased through trough as mounting bracket is inserted into trip unit retaining slots. Use center trough also for leads exiting the side of the circuit breaker.**

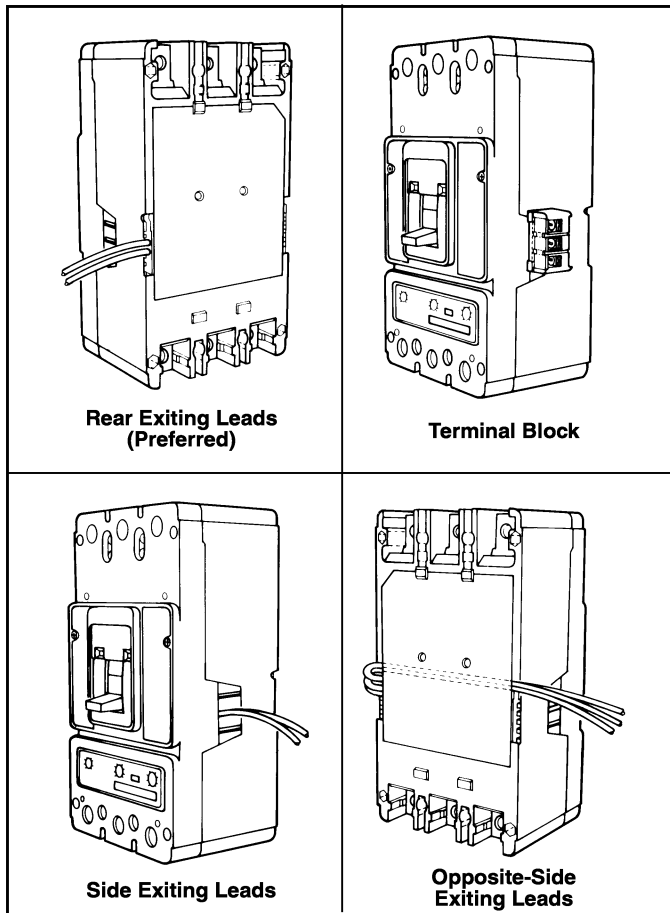


Fig. 2-5 Accessory Wiring Options

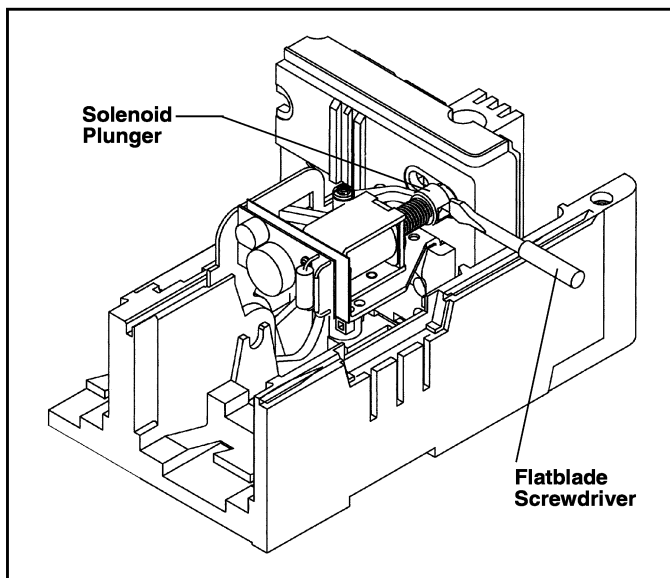


Fig. 2-6 Screwdriver Depressing Undervoltage Release Mechanism Solenoid Plunger



**CAUTION**

**LEADS SHOULD BE FORMED AND ROUTED TO CLEAR ALL MOVING PARTS WHEN ACCESSORY IS PROPERLY INSTALLED. PIGTAIL WIRES COULD BE DAMAGED IF IN CONTACT WITH MOVING PARTS.**

- 2-9. Route wiring to meet installation requirements (Fig. 2-5). If required, complete routing of leads of opposite side through rear wiring trough.



**WARNING**

**FAILURE TO KEEP FINGERS AWAY FROM MOVING PARTS CAN CAUSE PERSONAL INJURY. WHEN CHECKING ACCESSORY, DO NOT PUT FINGERS NEAR MOVING PARTS INSIDE CIRCUIT BREAKER CASE. SPRINGS CAUSE INTERNAL PARTS TO MOVE QUICKLY AND WITH FORCE.**

- 2-10. Perform mechanical check of UVR after installation:
  - a. With the circuit breaker still electrically isolated, reset the circuit breaker.
  - b. Mechanical check. Using a small flat-blade screwdriver, (Fig. 2-6), push in and hold solenoid plunger. Switch circuit breaker to ON. Release solenoid plunger and check that circuit breaker trips.
  - c. Reset circuit breaker handle and check that handle arm moves reset lever to reset the solenoid plunger.
  - d. If mechanical check does not trip circuit breaker, see if UVR and intermediate plunger are correctly installed. If UVR and intermediate plunger appear to be properly installed and problem persists, contact Cutler-Hammer.



**CAUTION**

**WHEN INSTALLING CIRCUIT BREAKER MAIN COVER, MAKE SURE THAT ALL INTERNAL PARTS ARE IN PLACE:**

- **SLIDING HANDLE BARRIER IS POSITIONED SO THAT THE HANDLE OPENING IS ALIGNED WITH THE HANDLE.**
- **ALL LEADS ARE CLEAR OF THE COVER.**

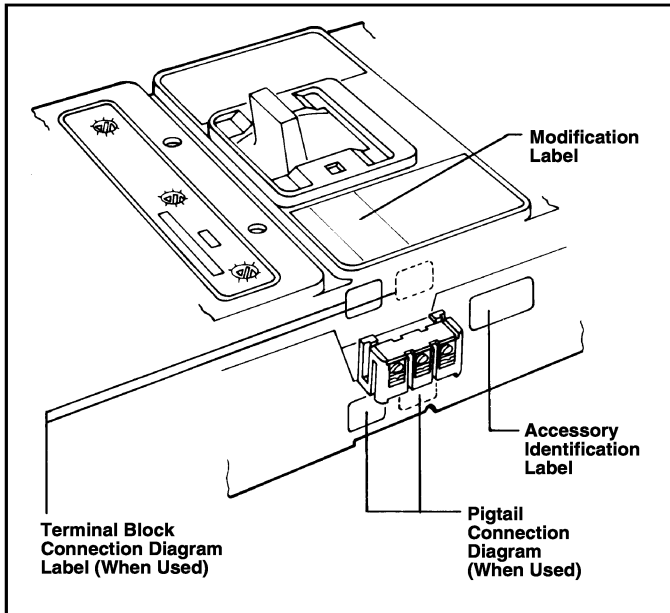


Fig. 2-7 Preferred Mounting Locations for Accessory Nameplate Labels

- 2-11. With circuit breaker handle in the TRIPPED position and accessory pigtail leads (if used) routed as required, install circuit breaker covers. Secure with pan-head screws. Torque to 20-22 lb-in. (2.26-2.49 N.m).
- 2-12. Remove and discard UL listing label on LDB circuit breakers only.
- 2-13. Place accessory labels (supplied with kit) on circuit breaker (see Fig. 2-7).

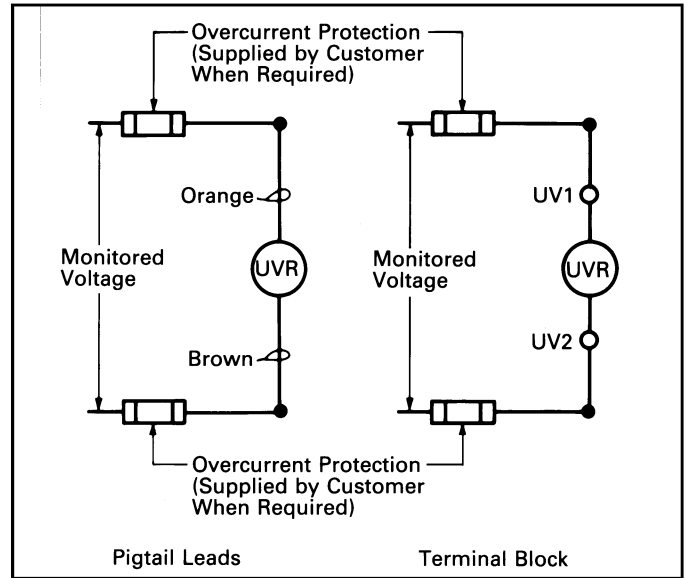


Fig. 2-8 Undervoltage Release Mechanism (Handle Reset) Connection Diagram

- 2-14. Where practical and after taking all necessary safety precautions, apply rated voltage to UVR. Reset and close circuit breaker. Confirm that circuit breaker trips when voltage is removed.
- 2-15. Install circuit breaker.

**Note: Accessory labels show connection diagram for UVR contacts. Pigtail leads are color coded orange and brown.**

- 2-16. Connect UVR as required (see Fig. 2-8).

Cutler-Hammer assumes no responsibility for malfunctioning accessories installed improperly by the customer.

Table 1–1. AC (50/60 Hz) Undervoltage Release Mechanism (Handle Reset) Ratings<sup>①</sup>

Catalog Suffix	Application Ratings	Electrical Operating Ratings				Approximate Operating Time (ms)				
		Voltage (V)	Supply Voltage (V)	Dropout Voltage (V) Min.            Max.	Pickup Voltage (V) Max.	VA	Min.② UVR Response	Initiation③ Circuit Breaker Contact Separation	Maximum Circuit Breaker Contact Opening	Dielectric④ Withstand Voltage (V)
01	9	9	3.2            8.4	7.7	1.9	5	15	25	1018	
02	12	12	4.2            8.4	10.2	1.9	5	15	25	1024	
03	24	24	8.4            16.8	20.4	3.9	5	15	25	1048	
05	48-60	48 60	21            33.6	40.8	2.5 3.8	5 5	15	25	1120	
08	110-127	110 120 127	44.5            77	93.5	1.8 2.1 2.4	5	15 15 15	25	1500	
11	208-240	208 220 240	85            145.6	176.8	2.7 3.1 3.8	5	25 25 25	35	1500	
15	380-480	380 415 440 480	168            266	323	3.4 4.0 4.6 5.4	5	25 25 25 25	35	2500	
18	525-600	525 550 600	210            367	446	4.5 5.0 5.8	5	25 25	35	2500	

Table 1–2. DC Undervoltage Release Mechanism (Handle Reset) Ratings<sup>①</sup>

Catalog Suffix	Application Ratings	Electrical Operating Ratings				Approximate Operating Time (ms)				
		Voltage (V)	Supply Voltage (V)	Dropout Voltage (V) Min.            Max.	Pickup Voltage (V) Max.	VA	Min.② UVR Response	Initiation③ Circuit Breaker Contact Separation	Maximum Circuit Breaker Contact Opening	Dielectric④ Withstand Voltage (V)
20	12	12	4.2            8.4	10.2	1.6	5	15	25	1024	
21	24	24	8.4            16.8	20.4	3.1	5	15	25	1048	
23	48-60	48 60	21            33.6	40.8	2.0 3.1	5 5	13 13	25	1120	
26	110-125	110 120 125	44.5            77	93.5	1.6 1.9 2.2	6	13 13 13	25	1500	
28	220-250	220 250	87.5            154	187	3.1 4.0	Inst.	10 10	35	1500	

① Endurance – 400 electrical operations plus 5600 mechanical operations.

② UVR will override a momentary voltage dip up to the response time shown.

③ Unlatching occurs one millisecond before circuit breaker contacts begin to separate.

④ For one minute.

## Cutler-Hammer

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