Product Description

Eaton's Cutler-Hammer® 22.5 mm Industrial Heavy-Duty Pushbutton line offers a wide array of functional, smartly styled illuminated and non-illuminated pushbuttons, selector switches, push-pulls, alternate action and twist-to-release operators. The complete line also includes transformer, full voltage, resistor, LED or neon light units.

E22 operators are available with either a traditional chrome or matte black front-of-panel appearance. The space-saving design and modular construction of the E22 line makes on-the-job assembly fast and simplifies the stocking of both components and complete devices.

Eaton's Cutler-Hammer EM22 Metal Series is a rugged line of metal construction 22.5 mm pushbutton devices. They are an extension of the industrially proven E22 Heavy-Duty Double Insulated 22.5 mm pushbutton family.

EM22 operators are heavy-duty zinc die-cast construction plated with a corrosion resistant chromate finish. Operators are complete with a very durable chrome plated metal bezel. Indicating light units in the EM22 Series feature smartly styled round lenses that enhance their appearance and brightness.

All EM22 operators are compatible with existing E22 contact blocks, light units, accessories and enclosures.

EM22 metal operators and indicating lights are grounded when mounted to metal panels through the toothed mounting nut. They are not grounded when mounted to plastic panels.

Features

E22 Operators:

- Heavy-duty oiltight construction
- Chrome metal or black nylon bezels
- Snap-lock contact block mounting

EM22 Operators:

- Heavy-duty zinc die-cast construction
- Metal mounting nut doubles as grounding and anti-rotation device
- Chrome-plated metal bezel (matte black not available)

Common E22 & EM22 Features:

- Reliability nibs on contact blocks
- Plain or notched hole mounting
- Direct opening action ⊖ normally closed contacts
- Fingerproof terminals

Benefits

Plastic Devices

- Modular construction makes assembly fast and simplifies stocking of components and complete devices
- Reliability nibs provide positive contact through light, medium or heavy loads
- Chrome finish and plastic construction are corrosion resistant

Metal Devices

- EM22 is backwards compatible with E22 operators
- Metal mounting nut cuts through painted surfaces to provide proper grounding
- Hands-free front of panel mounting reduces installation cost
- Mounting flexibility reduces installation cost, time and inventory
- Stands up well in corrosive environments
- E22 and EM22 compatibility lowers parts count and inventory requirements

Contact Block Operation

Linear make and break. All normally closed (NC) contacts are Direct Opening Action, i.e., NC contacts are physically forced open by direct linkage with the pushbutton operator in the unlikely event of contact weld.

The contact block contacts are provided with "Reliability Nibs." The precisely shaped point of the nib, coined on the silver contact alloy, penetrates dust, film oxide layers and other contaminants. This improves contact reliability even under dry circuit and fine dust conditions.

Logic level contact blocks are available for low power switching — minimum 1 mA @ 5V DC.

Standards and Certifications

- CE EN 60947-5-1
- UL 508 — File No. E131568
- CSA — File No. LR68551

Additional Certifications for Trigger Action E-Stop Devices

- UL Listed E-Stop Device — File No. E217948
- Machinery Safety Directive — EN418
- Semiconductor Manufacturing Equipment — SEMI S2-0200
- DEMKO Third Party Certification — Certificate Nos. 129648-01 and 129648-02

Technical Data and Specifications

Ingress Protection

- UL (NEMA) Type 1, 2, 3, 3R, 4, 4X, 12 and 13
- IEC IP65

Note: Ratings apply when mounted in enclosures with the same ratings.

Mechanical Endurance Ratings

- Frequency of operation
  - Pushbuttons – 6,000 operations/hr
  - Push-Pulls – 3,000 operations/hr.
  - Push-Push – 1,800 cycles/hr.
  - Selector Switches – 3,000 operations/hr.
  - Trigger-Action E-Stop – 360 cycles/hr.
  - Twist-to-Release – 1,200 cycles/hr
- Mechanical Life
  - Contact Blocks – 3 million operations
  - Pushbuttons – 5 million operations
  - Push-Pulls – 300,000 operations
  - Push-Push – 300,000 operations
  - Selector Switches – 500,000 operations
  - Trigger-Action E-Stop – 100,000 operations
  - Twist-to-Release – 300,000 operations
  - Joysticks — 500,000 operations
- Vibration (IEC 68-2 [BS 2011])
  - Vibration – 5g/0.7 mm peak to peak, 10 sweeps, 10 – 500 Hz
  - Shock – 30g, 18 ms
  - Bump – 25g, 6 ms for 1,000 cycle

Environmental Conditions

- Operating temperature: -4° to +140°F (-20° to +60°C)
- Storage temperature: -40° to +176°F (-40° to +80°C)
- Altitude: Up to 6562 feet (2000m)
- Pollution degree (IEC 947-1): 3
- Humidity: Maximum 95% RH @ 60°C

Terminal Markings

All rear of panel devices are marked with the circuit configuration per CENELEC 50013 standards.

Table 47-29. Contact Blocks

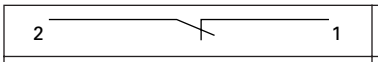
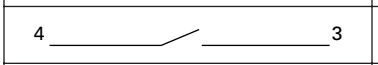
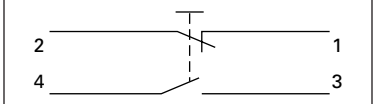
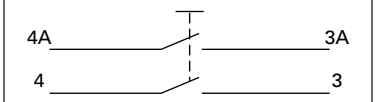
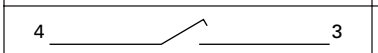
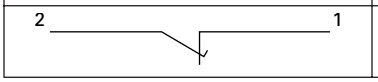
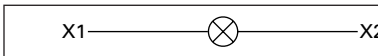
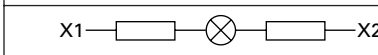
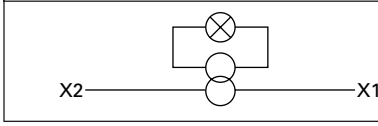
Circuit Configuration	Description	Plunger Color
	1NC	Red
	1NO	Green
	1NO-1NC	White
	2NO	Green
	1NO Early Make	Black
	1NC Late Break	Gray

Table 47-30. Lights Units

Circuit Configuration	Description
	Full Voltage
	Resistor
	Transformer

- E22CB1, E22CB11, E22CB1E, E22B1 and E22B11 contact blocks are marked with Direct Opening Action (DOA) Symbol "⊖" per IEC 60947-5-1, Annex K and NEMA ICS 5, Part 6. For Mechanical Operating Parameters, see **Page 47-69.**
- E22CB1, E22CB11 and E22CB1E contact blocks will be marked as Suitable for Isolation per IEC 60947-5-1.

Contact Block Terminal Clamps

- Clamp type: Self-lifting
- Screw type: Plus/minus, captive
- Wire range: 18 to 12 AWG (0.75 to 4.0 mm^2)
- Fingerproof protection: IP2X
- Tightening torque: 7 lb-in (0.8 Nm)

Electrical Ratings

Table 47-31. Contact Block ①

Meet or Exceed NEMA Contact Rating Designations A600 and Q600								
Description	A600 (AC) Volts				Q600 (DC) Volts			
	120	240	480	600	125	250	440	600
Make and emergency interrupting capacity (Amp)	60	30	15	12	0.55	0.27	0.1	0.1
Normal load break (Amp)	6	3	1.5	1.2	0.55	0.27	0.1	0.1
Thermal current (Amp)	10	10	10	10	2.5	2.5	2.5	2.5

① Ratings do not apply to rotary cam switches, see Ratings **Page 47-95.**

- A600, Q600 per UL 508
- AC15, DC13 per IEC 60947-5-1

Logic level contact blocks are UL A600, Q600 and IEC AC15, DC13 rated and also have a minimum rating of 1 mA @ 5V DC.

- Impulse withstand voltage (Uimp): 4 kV

Short Circuit Coordination to IEC/EN 60947-5-1

- Rated conditional short circuit current: 1 kA
- Fuse type: GE Power Controls TIA 10, Red Spot Type gG, 10A, 660V AC, 460V DC, BS88-2, IEC 60269-2-1

Electrical Life

- AC15 durability
  - 120V, 6A – 1 x 10^6 operations
- DC13 durability
  - 24V, 4A – 0.15 x 10^6 operations
  - 660V, 0.1A – 0.5 x 10^6 operations

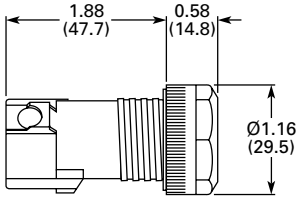
Material

- Housing, bezel, mounting rings: Glass filled nylon
- Metal bezels: Chrome plated brass
- Internal seal: Nitrile rubber
- Panel gasket: Nitrile rubber
- Illuminated lenses: Polycarbonate
- Buttons: Polyester or polycarbonate
- Contacts: Silver
- Terminals: Brass

Indicating Light Units — One-Piece LED

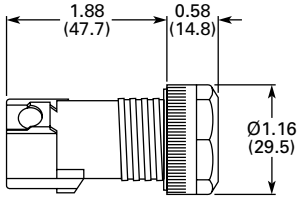
- One-Piece Body Style
- Plastic Operators
- Full Voltage LEDs
- Cluster-Style Integrated LED (non-removable) or
- Standard Bayonet Base LED
- Plastic Lenses

Table 47-48. Cluster LED Type Indicating Lights — Non-removable LEDs — UL (NEMA) Type 3, 3R, 4, 4X, 12, 13

Product Description		Supply Voltage	LED Color	Lamp Life ①	Catalog Number	Price U.S. $	Dimensions in Inches (mm)
	Includes permanently attached lens and board mounted, cluster style LEDs	24V AC/DC	Red Green Amber	100,000	**E22HL2X4** **E22HL3X4** **E22HL9X4**		
		48V AC/DC	Red Green Amber	100,000	**E22HL2X6** **E22HL3X6** **E22HL9X6**		
		110/120V AC/DC	Red Green Amber	100,000	**E22HL2X8** **E22HL3X8** **E22HL9X8**		

① Published theoretical lamp lives are based on ideal laboratory conditions and should be used for comparison only. Actual life may be shorter due to application conditions.

Table 47-49. Standard LED Type Indicating Lights — Replaceable bayonet base LEDs — UL (NEMA) Type 3, 3R, 4, 4X, 12, 13

Product Description		Supply Voltage	Color	Lamp Life ②	Catalog Number	Price U.S. $	Dimensions in Inches (mm)
	Includes lens and T 3-1/4 bayonet base LED	12V AC/DC	Clear Red Green Yellow White Blue Amber	100,000	**E22HV0X89** **E22HV2X37** **E22HV3X38** **E22HV4X39** **E22HV5X89** **E22HV6X51** **E22HV9X94**		
		24V AC/DC	Clear Red Green Yellow White Blue Amber		**E22HV0X90** **E22HV2X40** **E22HV3X41** **E22HV4X42** **E22HV5X90** **E22HV6X52** **E22HV9X95**		
		48V AC/DC	Clear Red Green Yellow White Blue Amber		**E22HV0X91** **E22HV2X53** **E22HV3X54** **E22HV4X55** **E22HV5X91** **E22HV6X56** **E22HV9X87**		
		60V AC/DC	Clear Red Green Yellow White Blue Amber		**E22HV0X97** **E22HV2X57** **E22HV3X58** **E22HV4X59** **E22HV5X97** **E22HV6X60** **E22HV9X98**		
		120V AC	Clear Red Green Yellow White Blue Amber		**E22HV0X92** **E22HV2X43** **E22HV3X44** **E22HV4X45** **E22HV5X92** **E22HV6X61** **E22HV9X96**		

② Published theoretical lamp lives are based on ideal laboratory conditions and should be used for comparison only. Actual life may be shorter due to application conditions.