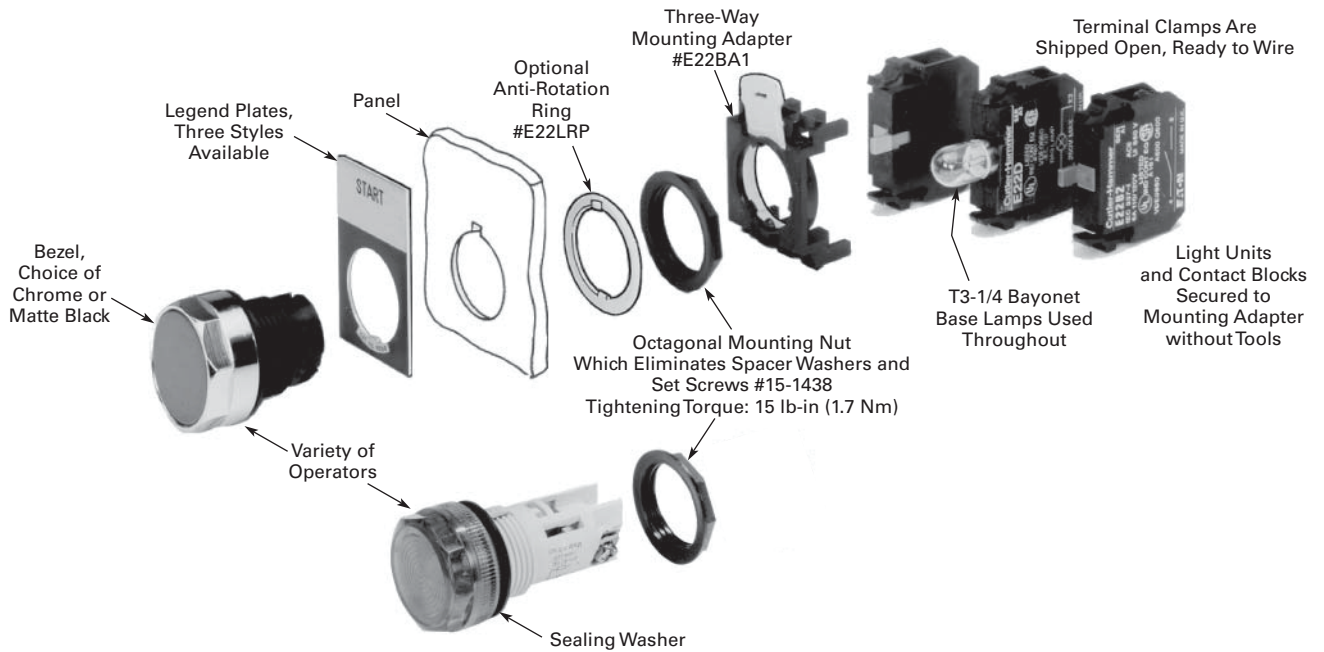


E22 and EM22 series



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 and EM22 Features:

- Reliability nibs on contact blocks
- Plain or notched hole mounting
- Direct opening action \ominus 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



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Contact block operation

Linear make and break. All normally closed (NC) contacts are Direct Opening Action, that is, 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 at 5 Vdc.

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—6000 operations/hr
 - Push-pulls—3000 operations/hr
 - Push-push—1800 cycles/hr
 - Selector switches—3000 operations/hr
 - Trigger-action e-stop—360 cycles/hr
 - Twist-to-release—1200 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
- 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 1000 cycles

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 ft (2000m)
- Pollution degree (IEC 947-1): 3
- Humidity: Maximum 95% RH at 60°C

Terminal markings

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

Table 1. Contact Blocks

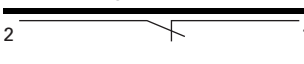
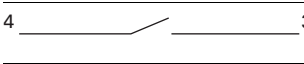
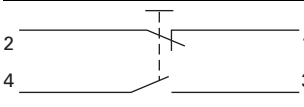
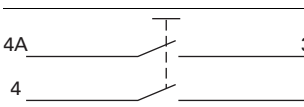

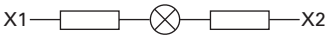
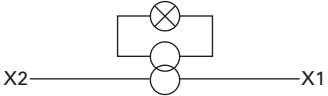
Circuit Configuration	Description	Plunger Color
	1NC	Red
	1NO	Green
	1NO-1NC	White
	2NO	Green

Table 2. Lights Units

Circuit Configuration	Description
	Full voltage
	Resistor
	Transformer

- E22CB1, 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.
- E22CB1 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 (0.75–4.0 mm²)
- Fingerproof protection: IP2X
- Tightening torque: 7 lb-in (0.8 Nm)

Electrical ratings

Table 3. 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.

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

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, 660 Vac, 460 Vdc, BS88-2, IEC 60269-2-1

Electrical life

- AC15 durability
 - 120V, 6A—1 x 10⁶ operations
- DC13 durability
 - 24V, 4A—0.15 x 10⁶ operations
 - 660V, 0.1A—0.5 x 10⁶ 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

Selector switch selection

Cam and contact block selection—For two- and three-position selector switches

1. Develop a line circuit diagram required for each application. Then, by using the symbols “X” for contact closed and “O” for contact open, determine the contact state required in each selector switch position.
2. Visually locate the closure sequence in one of the following Two- or Three-Position Selector Switch Combination tables.
3. Find the contact block(s), their suffix code letter(s) and their mounting location(s) required for that circuit configuration, by referring to the table next to the “X O” closure sequence that was selected.

Note: Contact blocks must be mounted in position indicated. Selector switches will not accept a contact block in position three of the mounting adapter.

Example: HAND-OFF-AUTO function, two circuits are required—

Circuit #1—X O O

This can be achieved using cam 1 with an E22B2 contact block mounted in the left (1-) position.

Circuit #2—O O X

This can be achieved using cam 1 with an E22B2 block mounted in the right (2-) position.

Order a three-position selector switch with cam #1—

Example: E22VG1, along with 2 E22B2 contact blocks.

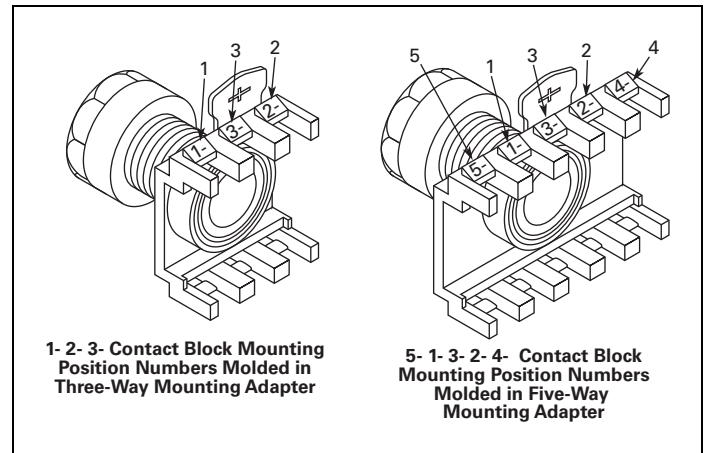


Figure 1. Contact Block Mounting

Cam and contact block selection

Table 4. Two-Position Switches

Circuit		Cam	Catalog Number of Contact Block(s)/Mounting Position	
↖	↗		1 and 5	2 and 4
0	X	2	E22B2 or E22B2	E22B2 or E22B2
X	0	2	E22B1 or E22B1	E22B1 or E22B1
0	X	2	E22B11	—
X	0	2	E22B2	E22B1
0	X	2	E22B20	—
0	X	2	E22B2	E22B2
0	X	2	E22B2	E22B2
X	0	2	E22B1	E22B1
X	0	2	E22B1	E22B1
0	X	2	E22B20	E22B2
0	X	2	E22B20	E22B2
0	X	2	E22B20	E22B2
0	X	2	E22B20	E22B2
0	X	2	E22B20	E22B11
0	X	2	E22B20	E22B11
0	X	2	E22B20	E22B11
0	X	2	E22B20	E22B11
0	X	2	E22B11	E22B11
X	0	2	E22B11	E22B11
0	X	2	E22B11	E22B11
X	0	2	E22B11	E22B11

Dimensions

Approximate dimensions in Inches (mm)

Indicating light units—One-piece LED

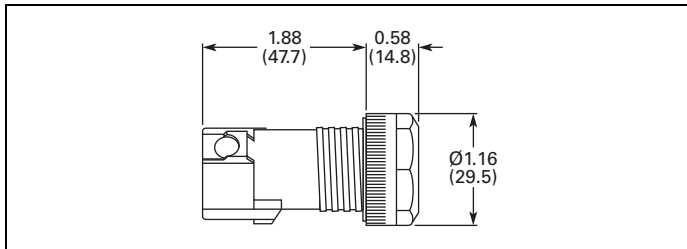


Figure 2. Cluster LED Type Indicating Lights

Indicating light units—One-piece incandescent

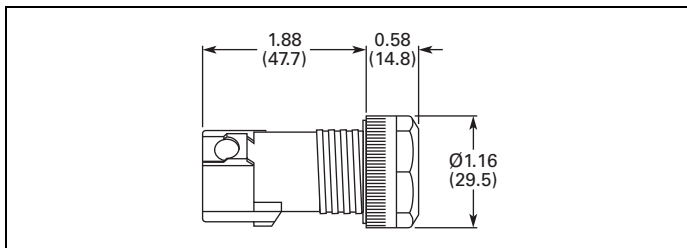


Figure 3. Incandescent Standard Lens Type Indicating Lights

Contact blocks

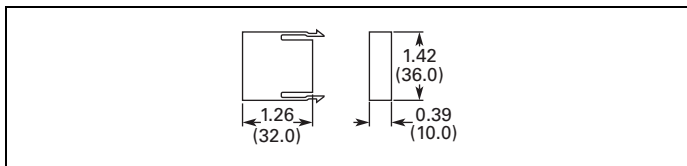


Figure 4. Contact Blocks—Single Circuit

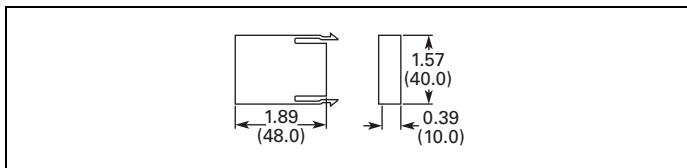


Figure 5. Contact Blocks—Dual Circuit

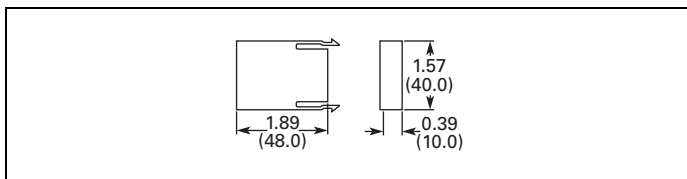


Figure 6. Contact Blocks—One Self Monitoring

Non-illuminated pushbutton components

Note: For rear of panel extensions. See Table 8 on page 10.

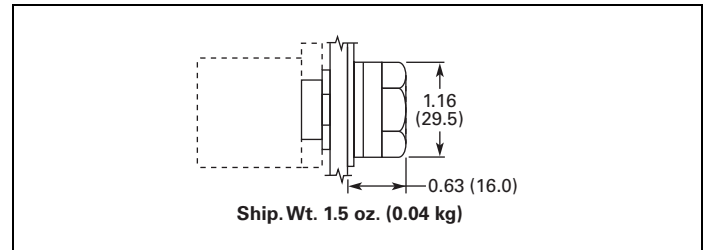


Figure 7. E22/EM22 Series 25 mm Dia. Flush Button

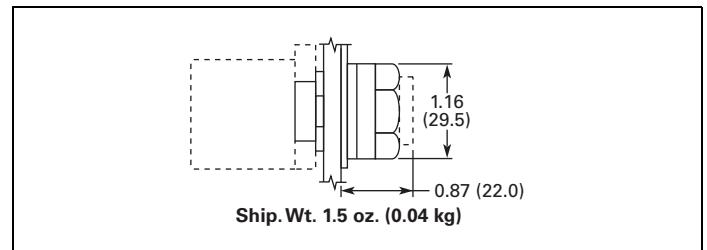


Figure 8. E22/EM22 Series 25 mm Dia. Extended Button

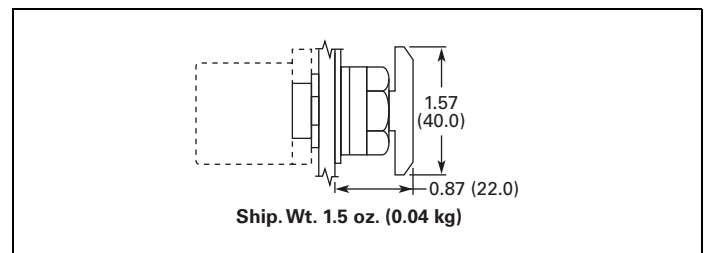


Figure 9. E22/EM22 Series 40 mm Dia. Mushroom Head Button

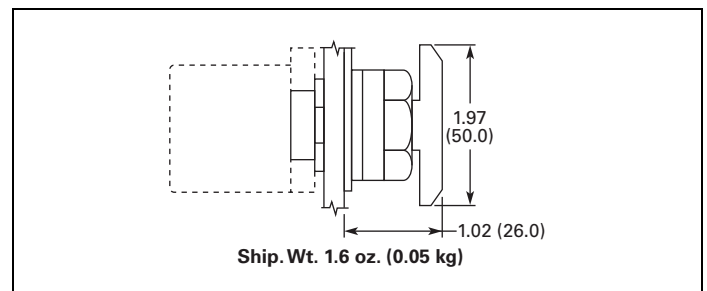


Figure 10. E22/EM22 Series 50 mm Dia. Mushroom Head Button

Approximate dimensions in Inches (mm)

Illuminated pushbutton components

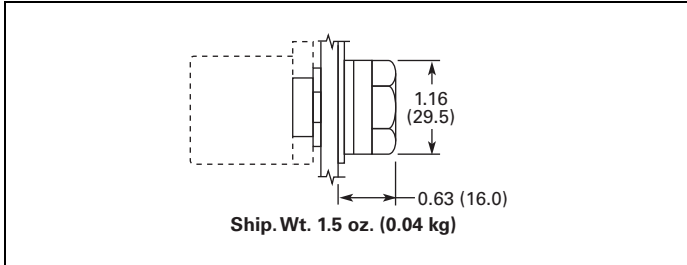


Figure 11. E22/EM22 Series 25 mm Dia. Flush Lens

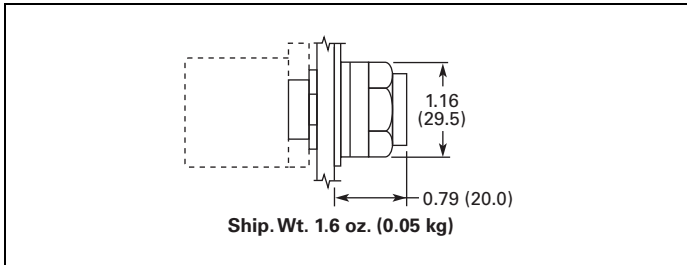


Figure 12. E22/EM22 Series 25 mm Dia. Extended Lens

Alternate action (push-push) components

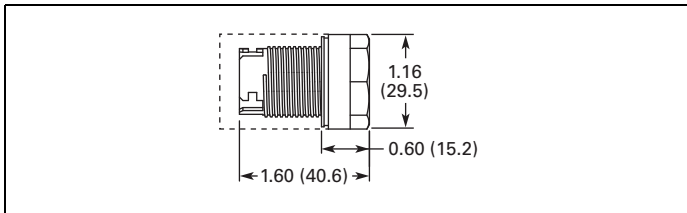


Figure 13. E22 Series Non-Illuminated Flush Operator

Twist-to-release, push-pull and key release components

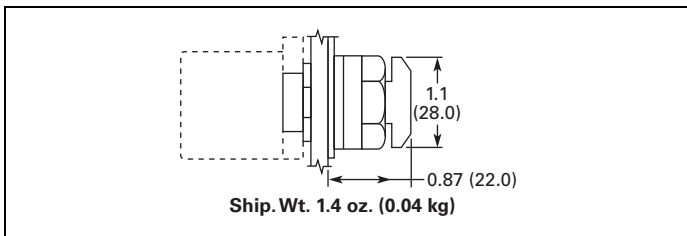


Figure 14. E22/EM22 Series 28 mm Diameter Twist-to-Release Button

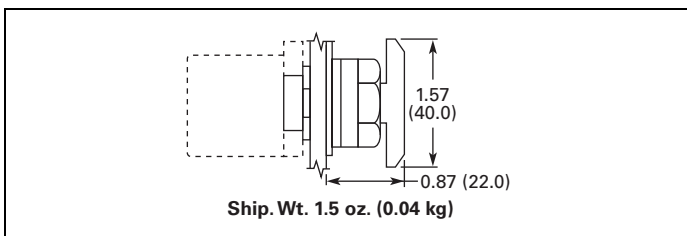


Figure 15. E22/EM22 Series 40 mm Dia. Twist-to-Release Button

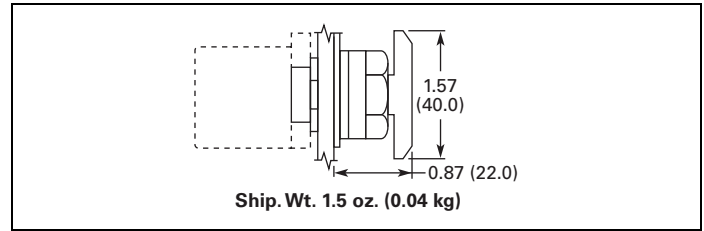


Figure 16. E22/EM22 Series 40 mm Dia. Push-Pull Button

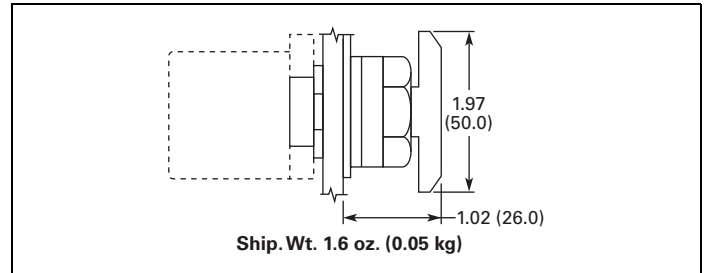


Figure 17. E22/EM22 Series 50 mm Dia. Push-Pull Button

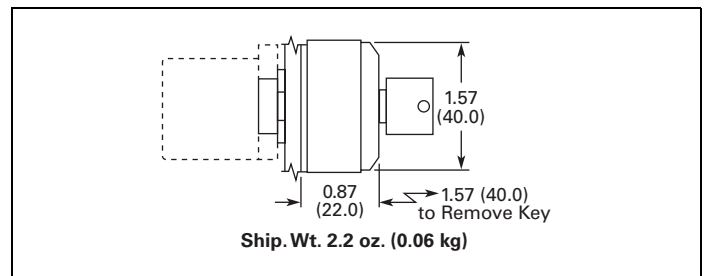


Figure 18. E22/EM22 Series 40 mm Dia. Key Release Button

Indicating light components

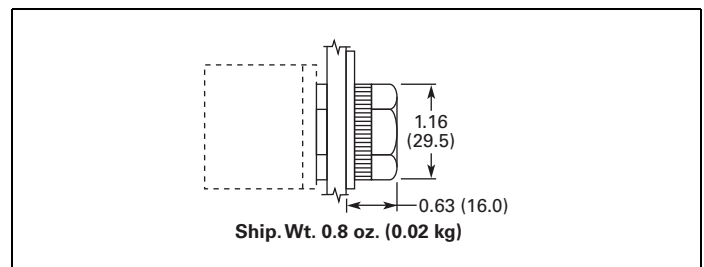


Figure 19. E22/EM22 Series 25 mm Dia. Standard Lens

Approximate dimensions in Inches (mm)

Push-pull components—illuminated operators

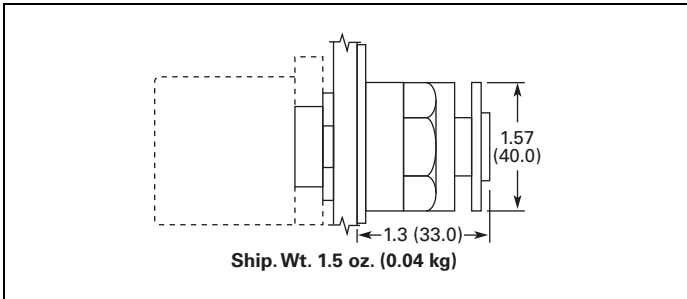


Figure 20. E22/EM22 Series Two-Position 40 mm Dia. Lens (Maintained)

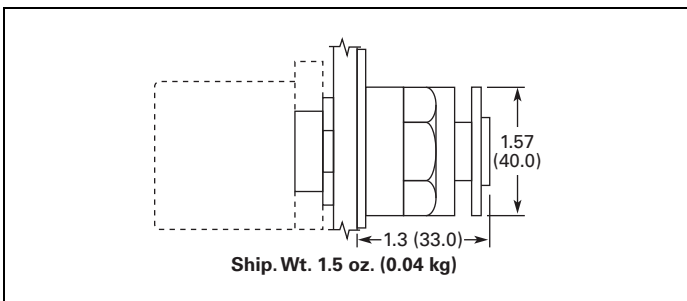


Figure 21. E22/EM22 Series Three-Position 40 mm Dia. Lens (Spring Return to Center)

Non-illuminated selector switches

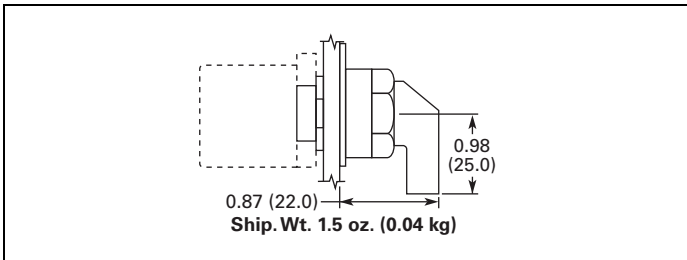


Figure 22. E22 Series Two-Position—45° Throw—Lever

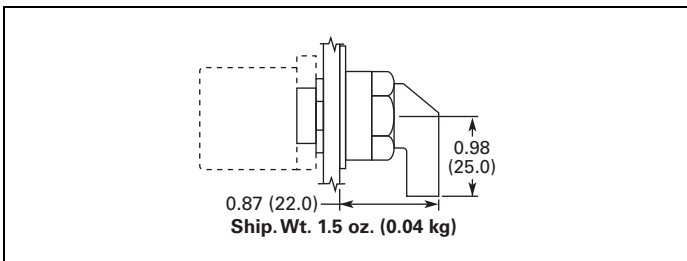


Figure 23. E22 Series Three-Position—45° Throw—Lever

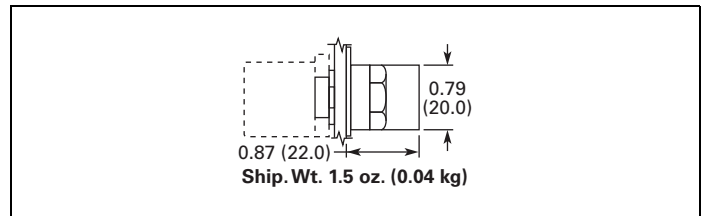


Figure 24. E22 Series Two-Position—45° Throw—Knob

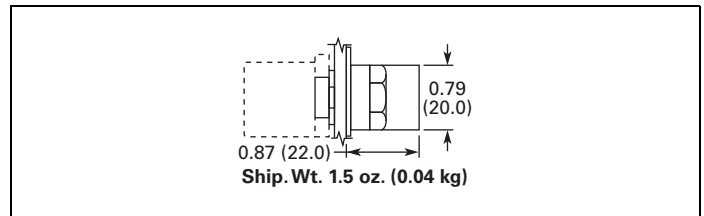


Figure 25. E22 Series Three-Position—45° Throw—Knob

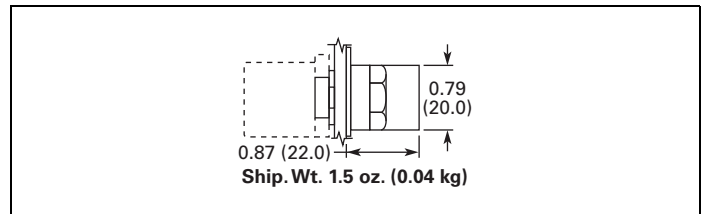


Figure 26. E22/EM22 Series Two-Position—60° Throw—Knob

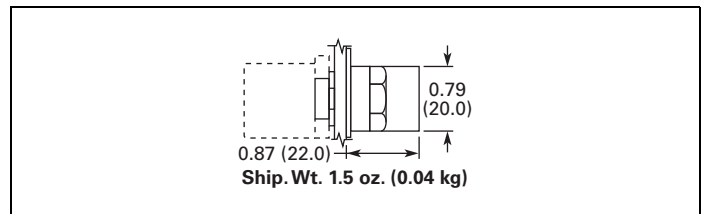


Figure 27. E22/EM22 Series Three-Position—60° Throw—Knob

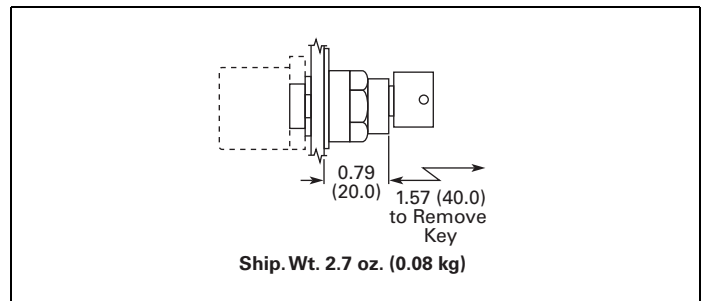


Figure 28. E22/EM22 Series Key Operated

Effective January 2012

Approximate dimensions in Inches (mm)

Accessories

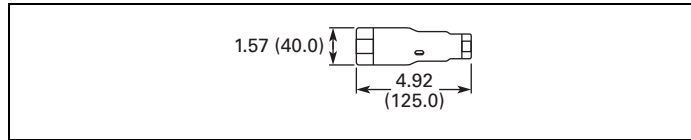


Figure 29. Octagonal Wrench – E22 (Plastic) Operators

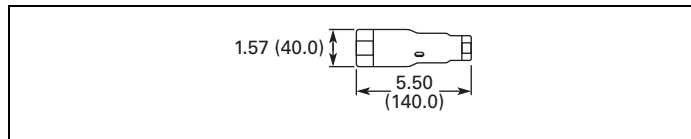


Figure 30. Octagonal Wrench – EM22 (Metal) Operators

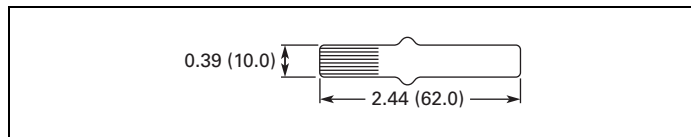


Figure 31. Bulb Removal Tool

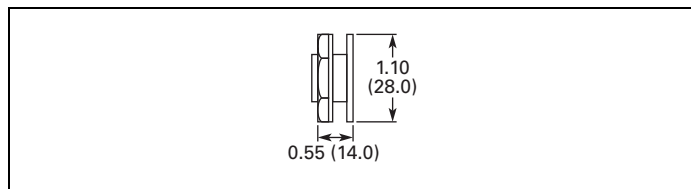


Figure 32. Hole Plug

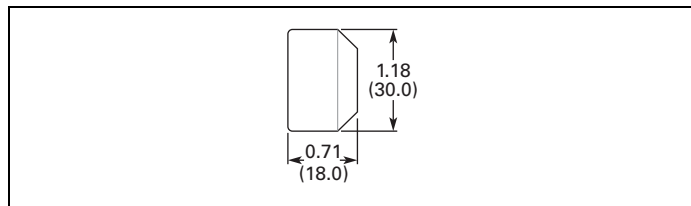


Figure 33. Protective Boot

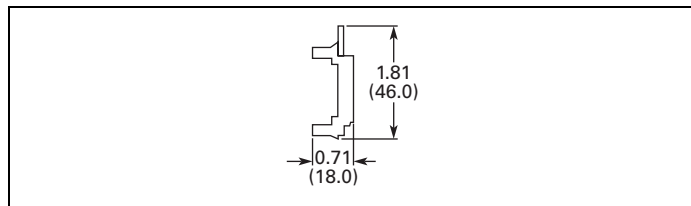


Figure 34. Mounting Adapter

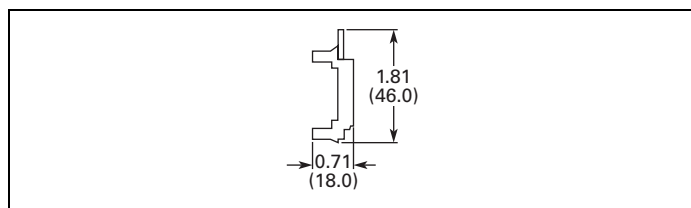


Figure 35. Mounting Adapter with Barrier

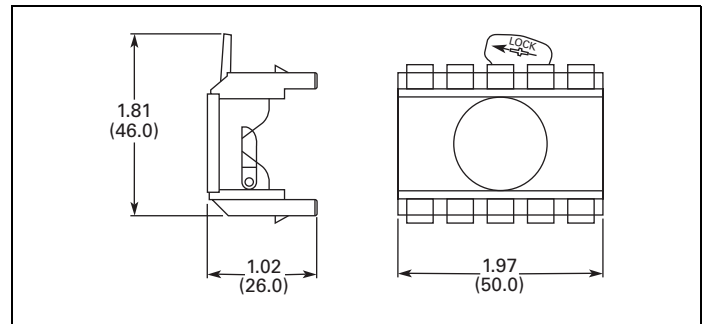


Figure 36. Five-Way Mounting Adapter

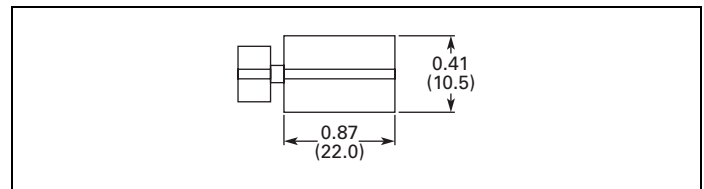


Figure 37. Operator Plug

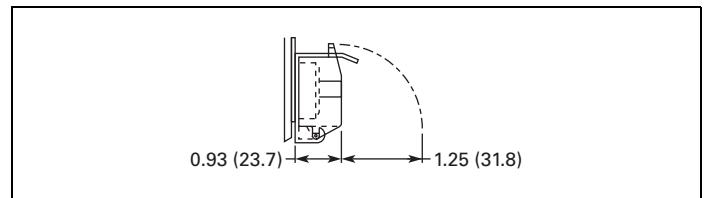


Figure 38. Padlockable Transparent Cover – Use with 25 mm Flush and Extended Pushbutton Operators

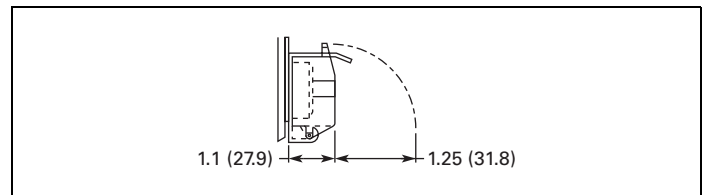


Figure 39. Padlockable Transparent Cover – Use with 28 mm Mushroom Operators

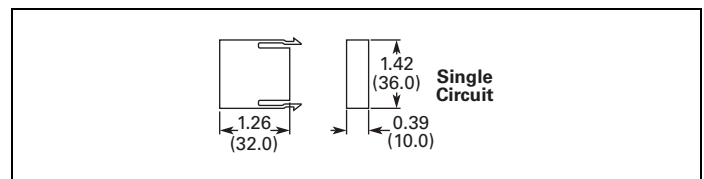


Figure 40. Contact Blocks with Quick Connect Terminal Assembled

Approximate dimensions in Inches (mm)

Accessories, continued

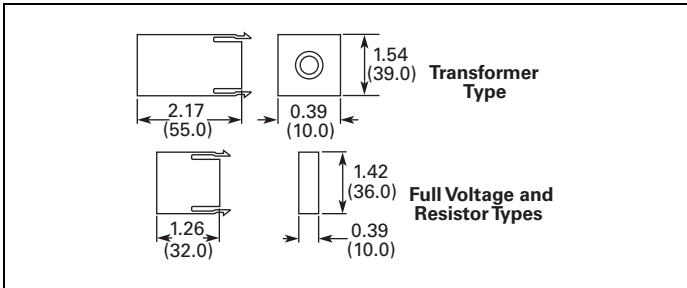


Figure 41. Light Units with Quick Connect Terminals Assembled

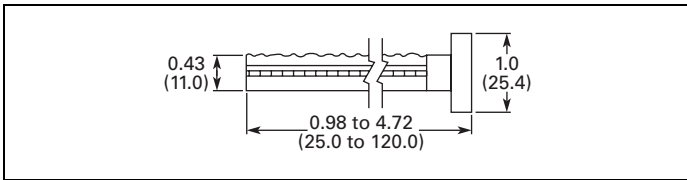


Figure 42. Mechanical Push Rod

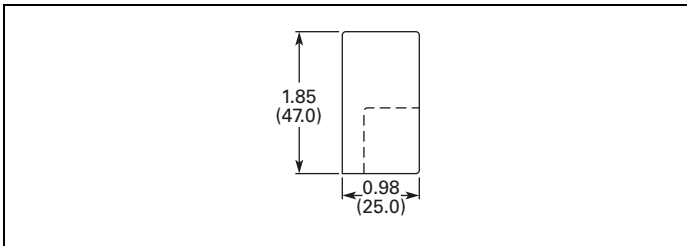


Figure 43. Mushroom Shroud

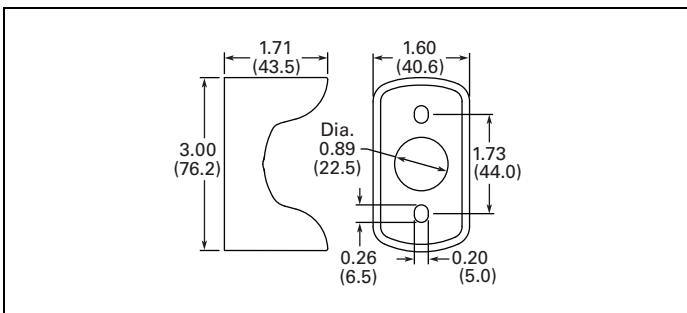


Figure 44. Mushroom Guard

Enclosures

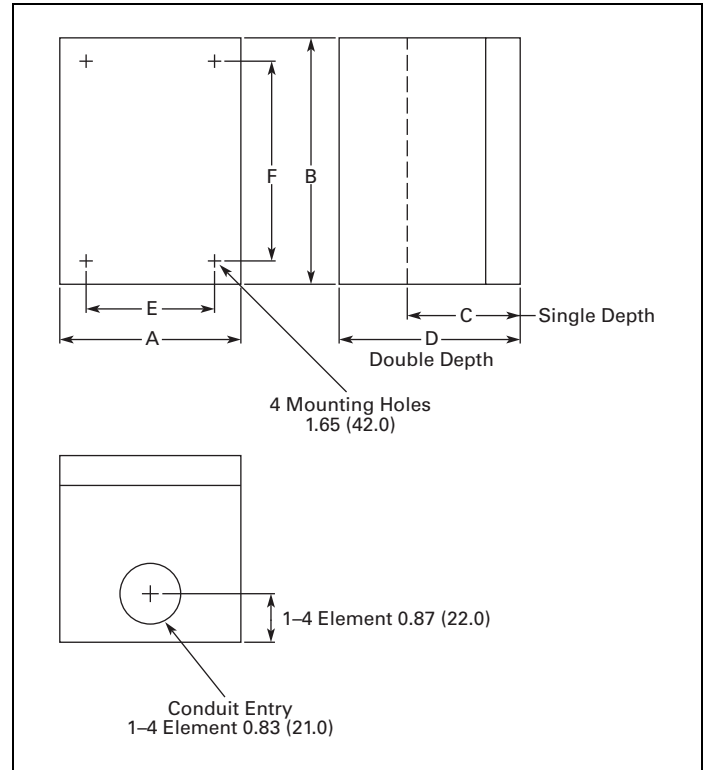


Figure 45. Enclosure

Table 6. Approximate Dimensions

No. of Elements	Outside Dimension				Mounting	
	A	B	C	D	E	F
1	2.68 (68.0)	2.96 (75.0)	2.36 (60.0)	3.54 (90.0)	2.24 (57.0)	1.81 (46.0)
2	3.15 (80.0)	4.72 (120.0)	2.36 (60.0)	3.54 (90.0)	1.97 (50.0)	4.09 (108.0)
4	3.15 (80.0)	6.30 (160.0)	2.36 (60.0)	3.54 (90.0)	1.97 (50.0)	5.82 (148.0)

Effective January 2012

Approximate dimensions in Inches (mm)

Enclosures, continued

Enclosure component application table

Use the table below to determine which operators will or will not fit in a specific enclosure. For example, a 50 mm mushroom head pushbutton operator will only fit in a one-hole enclosure.

Table 7. Enclosure Component Application

	Number of Holes in Enclosure		
	1	2 ^①	4 ^④
Mushroom Head Pushbuttons			
1.14 in (29.0 mm)	Yes	Yes	Yes
1.57 in (40.0 mm)	Yes	Yes ^①	Yes ^①
1.97 in (50.0 mm)	Yes	No	No
Push-Pull Operators			
1.14 in (29.0 mm)	Yes	Yes	Yes
1.57 in (40.0 mm)	Yes	Yes ^①	Yes ^①
Selector Switch Operators			
Knob	Yes	Yes	Yes
Lever—vertical ^③	Yes	Yes ^②	Yes ^②
Lever—horizontal ^③	Yes	Yes ^①	Yes ^①
Key	Yes	Yes	Yes
Illuminated Operators			
With transformer	No	No	No
Five-way adapter	Yes	Yes	Yes
Over-Sized Yellow Legend Plate			
45 mm	Yes	No	No
70 mm	Yes	No	No

- ① When installed next to standard-sized operator only.
- ② When installed in the bottom position only.
- ③ With conduit entrance at bottom.
- ④ With components mounted horizontally.
- ⑤ With components mounted vertically.

Mounting

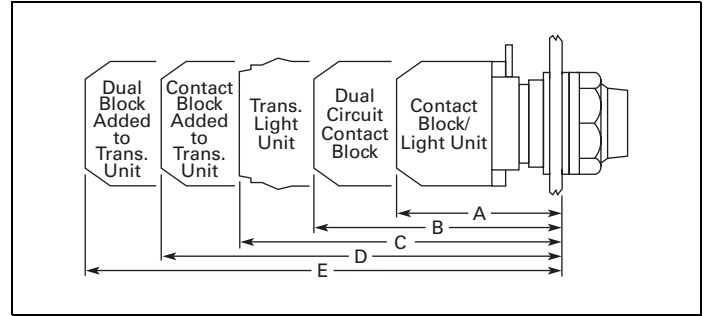


Figure 46. Rear of Panel Extensions

Table 8. Approximate Dimensions

A	B	C	D	E
Single Circuit Block—Full Voltage and Resistor Units	Dual Circuit, Contact Block	Transformer Light Unit	Trans. Light Unit and Single Circuit Contact Block	Trans. Light Unit and Dual Circuit Contact Block
Pushbuttons All Types and Push-Pull				
2.0 (51.0)	2.6 (66.0)	2.91 (74.0)	3.7 (94.0)	4.3 (110.0)
Key, Lever and Knob Selector Switches				
2.22 (57.0)	2.83 (72.0)	3.15 (80.0)	3.9 (99.0)	4.5 (115.0)



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