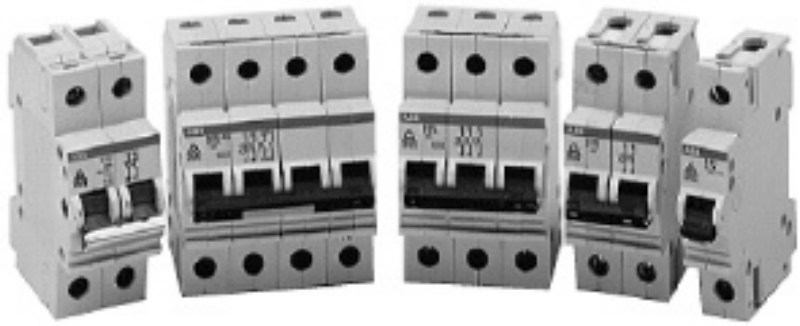
Miniature circuit breakers

UL 1077 Interrupting ratings

Description

Miniature cicuit breakers (MCBs) are used throughtout the world in all types of electrical installations. ABB MCBs are recognized for use by Underwriters Laboratories Standard UL1077 for supplementary circuit protectors in systems rated 240VAC, 480VAC and 600VAC. Devices are certified per CSA C22.2.



Miniature circuit breaker UL 1077 interrupting ratings

Voltage	Rated interrupting capacity	Rated current	Item
120/240 VAC	10kA	6 – 40A	S190-B, C
		6 – 63A	S260-B, C
		0.5 – 63A	S270-K, Z
	18kA	32 – 63A	S500-B, C, D
		26 – 45A	S500-K
	30kA	6 – 25A	S500-B, C, D
		0.15 – 25A	S500-K
240VAC	5kA	40 – 63A	S260-B, C
		40 – 63A	S270-K, Z
	6kA	6 – 32A	S260-B, C
		0.5 – 32A	S270-K, Z
		40 – 63A	S280-K, Z
	10kA	0.2 – 32A	S280-K, Z
	18kA	32 – 63A	S500-B, C, D
		26 – 45A	S500-K
	30kA	6 – 25A	S500-B, C,D
		0.15 – 25A	S500-K
277/480VAC	5kA	40 – 63A	S260-B, C
		40 – 63A	S270-K, Z
	6kA	6 – 32A	S260-B, C
		0.5 – 32A	S270-K, Z
		40 – 63A	S280-K, Z
	10kA	0.2 – 32A	S280-K, Z
	14kA	6 – 63A	S500-B, C, D
		0.15 – 45A	S500-K
600VAC	6kA	6 – 63A	S500-B, C, D
		0.15 – 45A	S500-K

Technical data S260, S270, & S280

Item	S260-B	S270-K	S280-K	S280UC-K
Approvals:				
UL	1077	1077	1077	1077
CSA	C22.2 - No.235	C22.2 - No. 235	C22.2 - No. 235	C22.2 - No. 235
VDE	0641, 0660	0660	0660	0660
IEC	898, 947	898, 947	898, 947	898, 947
No.of poles:	1,2,3,4 1+N,3+N	1,2,3,4, 1+N,3+N	1,2,3,4,1+N,3+N	1,2,3
Tripping characteristic:	B	K	K	K
Rated currents:	6 to 63A	0.5 to 63A	0.2 to 63A	0.2 to 63A
Rated voltage:				
UL/CSA single pole	277VAC	277VAC, 60VDC	277VAC	277VAC, 250VDC
UL/CSA multi pole	480VAC / 125VDC	480VAC, 125VDC	480VAC	480VAC, 500VDC
IEC single pole	240/415VAC 60VDC	240/415VAC 60VDC	240/415VAC 60VDC	240/415VAC 220VDC
IEC multi-pole	415VAC 110VDC	415VAC 110VDC	415VAC 110VDC	415VAC 440VDC
Minimum operating voltage:	12V	12V	12V	12V
Rated interrupting capacity:	10 kA IC at up to 240VAC 6kA IC at 480VAC (6 to 32A) 5kA IC at 480VAC (40 to 63A)	10 kA IC at up to 240VAC/125VDC 6kA IC at 480VAC (0.5 to 32A) 5kA IC at 480VAC (40 to 63A)	Up to 32A - 10kA IC at 277/480VAC 40-63A - 6kA IC at 480VAC	Up to 32A - 6 kA IC at 277/480VAC 4.5kA IC at 250/500VDC 40-63A - 6kA IC at 480VAC
Frequency:	50/60Hz (See pg. 1.22)	50/60Hz (see pg. 1.22)	50/60Hz (see pg.1.22)	50/60Hz (see pg.1.22)
Protection category:	IP20	IP20	IP20	IP20
Depth of unit per DIN 43880:	68mm	68mm	68mm	68mm
Mounting position:	optional	optional	optional	optional
Standard mounting:	35mm DIN rail	35mm DIN rail	35mm DIN rail	35mm DIN rail
Terminals:	Conductors from 18-4AWG (0.75-25sq mm)	Conductors from 18-4AWG (0.75-25sq mm)	Conductors from 18-4AWG (0.75-25sq mm)	Conductors from 18-4AWG (0.75-25sq mm)
	50A and above Conductors from 18-2AWG (0.75-35sq mm)	50A and above Conductors from 18-2AWG (0.75-35sq mm)	50A and above Conductors from 18-2AWG (0.75-35sq mm)	50A and above Conductors from 18-2AWG (0.75-35sq mm)
Service life at rated load:	20,000 operations	20,000 operations	20,000 operations	20,000 operations
Ambient temperatures:	-25°C to +55°C	-25°C to +55°C	-25°C to +55°C	-25°C to +55°C
Shock resistance:	10g minimum of 20 impacts, shock duration of 13ms	10g minimum of 20 impacts, shock duration of 13ms	10g minimum of 20 impacts, shock duration of 13ms	10g minimum of 20 impacts, shock duration of 13ms
Vibration resistance:	5g, minimum of 30 minutes	5g, minimum of 30 minutes	5g, minimum of 30 minutes	5g, minimum of 30 minutes
Disconnecting neutral rating:	6kA switching	6kA switching	—	—

MCBs are approved per IEC-898 and VDE 0641, and certified under IEC-947 and VDE 0660 standards for use in systems rated 415VAC or 690VAC (S500 series).

MCBs can be applied to 50Hz – 400Hz and DC power systems.

Special direct current version MCBs include a permanent magnet for DC fault current interruption. These "UC" versions are rated 250/500VDC under UL1077/CSA 22.2 No. 235.

Continuous current ratings are as low as 0.2 amperes and up to 125 amperes maximum.

MCBs are of compact size and can be quickly mounted on standard 35mm DIN rail or can be front mounted by use of a front mounting kit.

MCB breakers include line and load side terminals for conductors from 18 through 4AWG (0.75 – 25mm²) for 40 amperes; up to 2AWG for 50 and 63 amperes.

MCBs can also be connected via busbar conductors which can be either upper or lower mounted. Dual function terminals allow busbars to be connected with main incoming line conductors without separate lugs.

Accessories

Auxiliary devices that can be added to S260, S270 and S280 series MCBs include:

- Shunt trips
- Auxiliary contacts
- Trip contacts
- Aux/trip contacts
- Undervoltage release

Accessory device modules can be field mounted to all above listed ABB MCBs. Auxiliary contacts are also available for the S500 series MCB.

Applications

MCBs can be used for equipment protection, in commercial appliances, protection of control circuits against overcurrent faults, computer equipment and other computer peripheral devices.

UL 1077

MCBs are recognized as supplementary protectors and are intended for use as overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided or not required. MCBs and accessories are recognized under UL File E76126.

CSA C22.2

MCBs and accessories are certified under CSA C22.2 No. 235 per File LR98793.

Technical data S280-Z, S280UC-Z, S290-C

Item	S280-Z	S280UC-Z	S290-C
Approvals:			
UL	1077	1077	—
CSA	C22.2 - No.235	C22.2 - No. 235	—
VDE	0660	0660	0660
IEC	898, 947	898, 947	898
No.of poles:	1,2,3,4	1,2,3	1,2,3,4
Tripping characteristic:	Z	Z	C
Rated currents:	0.5 to 63A	0.5 to 63A	80 to 125A
Rated voltage:			
UL/CSA single pole	277VAC	277VAC, 250VDC	①
UL/CSA multi pole	480VAC	480VAC, 500VDC	①
IEC single pole	240/415VAC 60VDC	240/415VAC 220VDC	230/440VAC 60VDC
IEC multi-pole	415VAC 110VDC	415VAC 440VDC	440VAC 110VDC
Minimum operating voltage:	12V	12V	12V
Rated interrupting capacity:	Up to 32A - 10kA IC at 480VAC 40-63A - 6kA IC at 480VAC	Up to 32A - 6kA IC at 480VAC 40-63A - 5kA IC at 480VAC 0.2-63A - 4.5kA IC at 250/500VDC	10kA IC at 440 VAC
Frequency:	50/60 Hz (See pg. 1.22)	50/60Hz (see pg. 1.22)	50/60Hz
Protection category:	IP20	IP20	IP20
Depth of unit per DIN 43880:	68mm	68mm	70mm
Mounting position:	optional	optional	optional
Standard mounting:	35mm DIN rail	35mm DIN-rail	35mm DIN-rail
Terminals:	Conductors from 18-4AWG (0.75-25sq mm)	Conductors from 18-4AWG (0.75-25sq mm)	Conductors from 14-1/0AWG (1.5-50sq mm)
	50A and above Conductors from 18-2AWG (0.75-35sq mm)	50A and above Conductors from 18-2AWG (0.75-35sq mm)	— — —
Service life at rated load:	20,000 operations	20,000 operations	10,000 operations
Ambient temperatures:	-25°C to +55°C	-25°C to +55°C	-5°C to +45°C
Shock resistance:	10g minimum of 20 impacts, shock duration of 13ms	10g minimum of 20 impacts, shock duration of 13ms	30g minimum of 20 impacts, shock duration of 13ms
Vibration resistance:	5g, minimum of 30 minutes	5g, minimum of 30 minutes	60m/s^2,

① For UL and 480VAC ratings, consult Relay Specialties technical sales department.

Tripping characteristics

Time-current curves

ABB miniature circuit breakers are available with different trip characteristics, allowing for maximum system protection.

The "B" trip designation is offered with the S260 series and is specifically designed for control circuit conductor protection. The "K" trip designation, offered with the S270, S280 and S500 covers a much broader range of applications including equipment, motor and cable protection. The "Z" trip designation offered in both AC and DC versions with the S280 is intended for applications where very low instantaneous trip times are required such as for SCR (rectifier) protection.

B Characteristic

Available with the S260 series has rated currents of 6 through 63 amperes in 10 steps. The "B" time-current curve is designed primarily for use in cable protection applications. Instantaneous tripping occurs between approximately 3 to 5 times rated current in 50/60Hz systems. This quick trip curve maximizes protection of control circuits under low short circuit fault levels that could damage control wiring.

C Characteristic

Available with the S290 series has rated currents of 80, 100 and 125 amperes. The "C" time-current curve is designed for high magnetic start-up currents. Instantaneous tripping occurs between 5 and 10 times rated current in 50/60 Hz systems. The "C" characteristic is also available in other S2 Series MCBs.

K Characteristic

The "K" time-current characteristic considers high magnetic start-up currents from motors, transformers and other equipment. Instantaneous tripping occurs between 8 and 12 times rated current in 50/60Hz systems. The "K" characteristic is available up through 63 amperes.

The "K" curve offers the best protection for the broadest range of electrical systems. The higher magnetic trip settings maximizes protection while allowing for higher in-rush currents during system start-up.

Z Characteristic

Also available up through 63 amperes, the "Z" characteristic offers instantaneous tripping between 2 and 3 times rated current in 50/60Hz systems. This trip characteristic is available in the S280 series with both the 480VAC and 250/500VDC ratings.

Many applications require a very low short circuit trip settings in order to protect semiconductor or other sensitive devices and the "Z" trip characteristic may provide

Technical data
Time current trip curves

Description
Many different time-current trip characteristics are available from ABB in the various versions of miniature circuit breakers. These various trip characteristics may meet the special electrical standards of specific countries and agencies or be specially suited for application oriented protection systems.

The three most common and UL approved trip curves are the types "B", "K"and "Z". These are shown below for a typical 16 through 25 ampere rated breaker. Curves apply to both AC and DC versions.

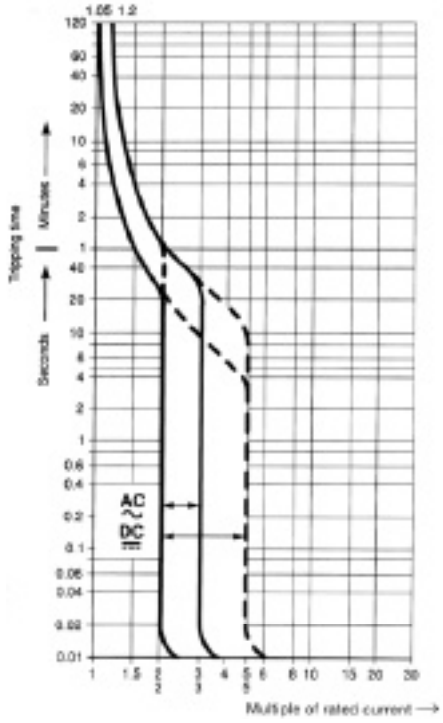
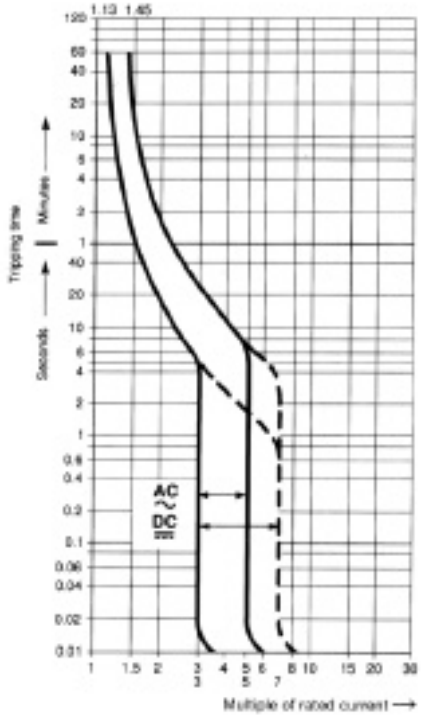
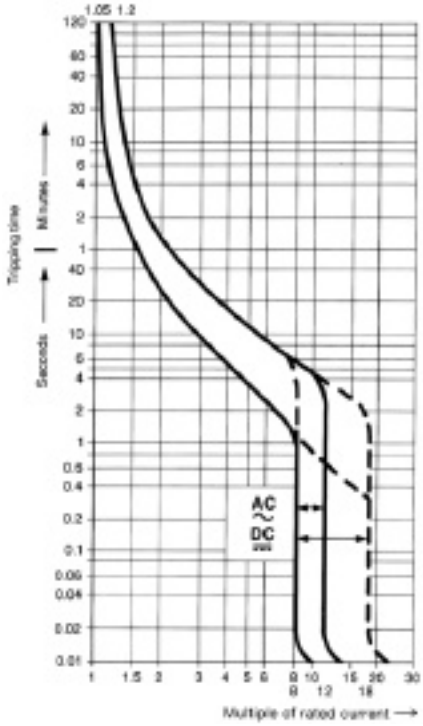
The "B"curve is for cable protection, with an instantaneous trip point of approximately 3.3 to 5 times breaker continuous rating.

The "K"curve is cable and equipment protection including motors, transformers and other inductive loads where significant levels of in-rush current are possible. Most industrial applications are best protected with the "K" type trip characteristic. The instantaneous trip point is approximately 8 to 12 times the continuous rating of the breaker.

The "Z"curve is designed for the protection of semi-conductors or other devices where a low instantaneous trip characteristic is desired. The instantaneous trip point is approximately 2 to 3 times the continuous rating of the breaker.
For full size time-current trip characterisitic curves, please contact ABB Control.

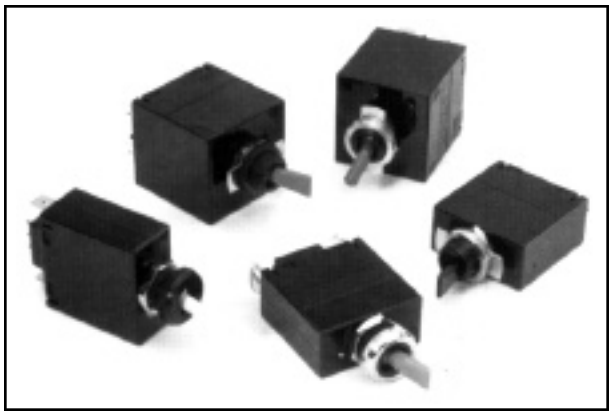
Version	Ratings	Trip Curve
S270K 10-40A 50-63A	0.5-8A TD9706 TD9707	TD9705
S280K 10-40A 50-63A	0.2-8A TD9709 TD9710	TD9708
S280Z	0.5-63A	TD9711
S260B	6-63A	TD9723

Time-current trip curves

Type Z	Type B	Type K
		
Trip characteristic Type "Z" I = 0.5...63A	Trip characteristic Type "B" I = 6...63A	Trip characteristic Type"K" I = 0.5...63A

M-Series Handle

Ordering Scheme



PROD CODE
M

POLES
1 One
2 Two

FREQUENCY & DELAY
03[5] No Delay Applicable DC, 50/60Hz "Switch Only" circuit option
30 DC, 50/60Hz Instantaneous
32 DC, 50/60Hz Short
34 DC, 50/60Hz Medium
92 DC, 50/60Hz Short, High Inrush
94 DC, 50/60Hz Medium, High Inrush

M M 2 – B – 34 –

ACTUATOR[1]
M Paddle
N Baton

CIRCUIT

WITHOUT AUXILIARY SWITCH

A[5]	Switch Only (No Coil)/Maintained Contacts	
B	Series Trip (Current Coil)	
	Circuit	**Aux. Switch Term. Type**
	WITH AUXILIARY SWITCH - SILVER CONTACTS[2]	
P[5]	Switch Only (Maintained Contacts)	.060 Dia. Dbl. Solder Turret
Q[5]	Switch Only (Maintained Contacts)	.058 Dia. Round Q.C.[6]
S	Series Trip (Current Coil)	.060 Dia. Dbl. Solder Turret
T	Series Trip (Current Coil)	.058 Dia. Round Q.C.[6]
	WITH AUXILIARY SWITCH - GOLD CONTACTS[2]	
2[5]	Switch Only (Maintained Contacts)	.058 Dia. Round Q.C.[6]
4	Series Trip (Current Coil)	.058 Dia. Round Q.C.[6]

NOTES
1. Paddle:  Baton:  One handle per unit is provided in center of cover. Unless otherwise specified, all actuator styles have gloss finish.
2. One Auxiliary Switch is supplied when specified. In two pole units, auxiliary switch is mounted in pole 1.
3. This is only a partial listing of the many ratings available. For other ratings, please consult factory.
5. For "Switch Only" (no coil) versions, select Current Rating Code from the following chart (Consult factory for special catalog number.)

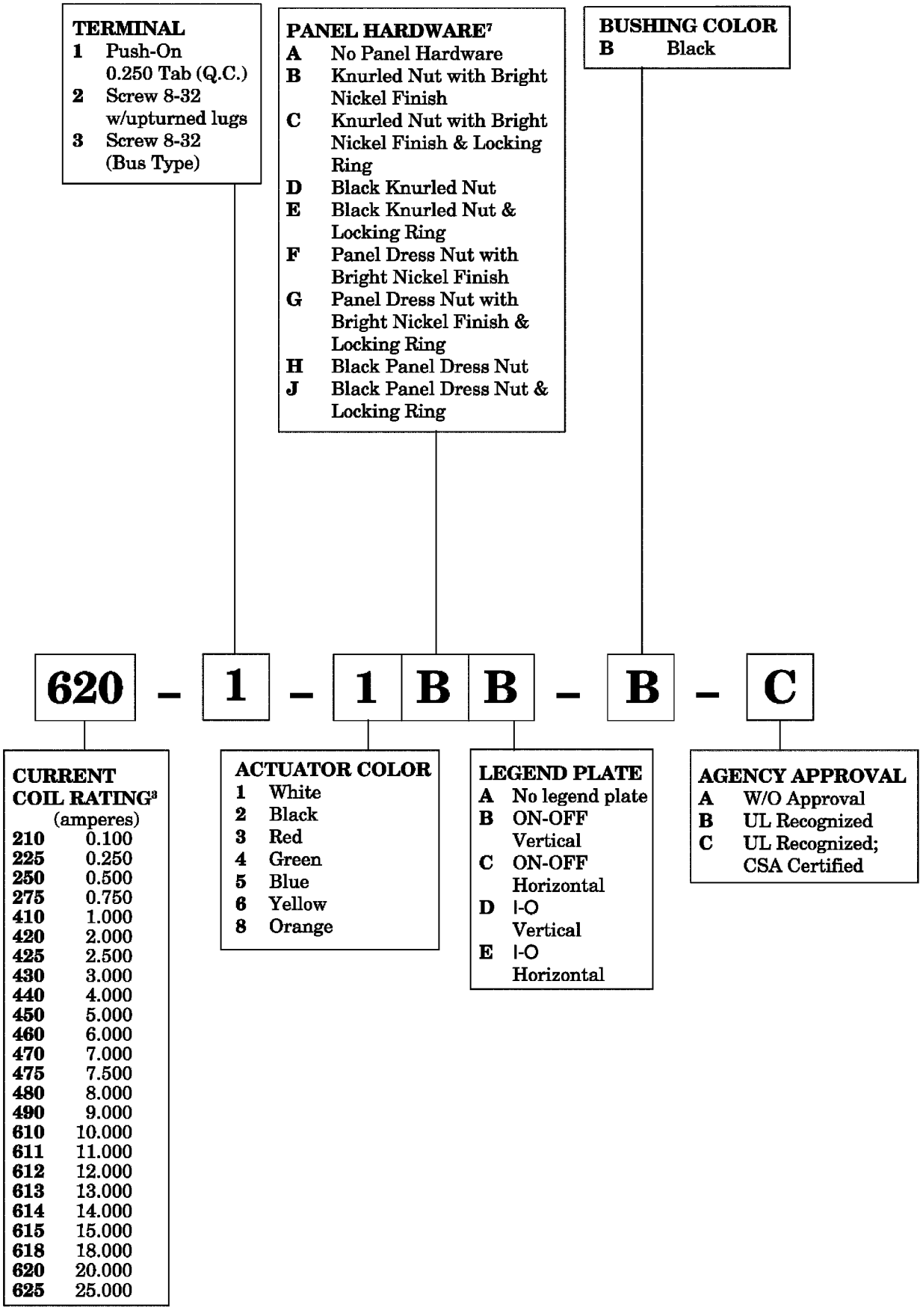
VOLTAGE			FULL LOAD AMP RATING		GENERAL PURPOSE AMP RATING		TUNGSTEN LAMP RATING		
MAX. RATING	FREQUENCY	PHASE	MAX. AMPS	CHOOSE CURRENT COIL RATING CODE:	MAX. AMPS	CHOOSE CURRENT COIL RATING CODE:	MAX. AMPS	CHOOSE CURRENT COIL RATING CODE:	POLES BREAKING
32	DC	-	15	615	25	625	-	-	1
69	DC	-	-	-	7.5		-	-	1
65	DC	-	15	615	25	625	-	-	2
125	50/60 HZ	1	15	615	25	625	15	615	1
250	50/60 HZ	1	12	612	-	622	-	-	1
250	50/60 HZ	1	15	615	25	625	-	-	2

6. Mates with AMP: .058 inch Dia. Pin Receptacles; P/N's 60983-1 (gold plated) and 60983-2 (tin plated).
7. All units have 1 hex nut installed on bushing for use behind panel. Front panel hardware may be selected. If no front panel hardware is desired, select Panel Hardware Type Code 1.

M-Series Handle

6

CIRCUIT BREAKERS & FUSES



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M-Series Rocker

Ordering Scheme

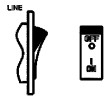
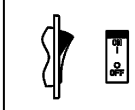
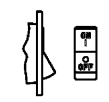
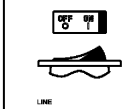
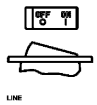
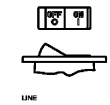
PROD CODE
M

POLES
1 One
2 Two

FREQUENCY & DELAY
03[8] No Delay Applicable DC, 50/60Hz "Switch Only" circuit option
30 DC, 50/60Hz Instant
32 DC, 50/60Hz Short
34 DC, 50/60Hz Medium
92 DC, 50/60Hz Short, High Inrush
94 DC, 50/60Hz Medium, High Inrush

Figure G

ROCKER STYLE DESCRIPTION
(DUAL LEGEND SHOWN)

STYLE	INDICATE - "ON" (CODE-D)	INDICATE - "OFF" (CODE-E)	FLAT (CODES-B & G)	ANGLED (CODES-A & F)
VERTICAL				
HORIZONTAL				

M G 2 – B – 34 –

ACTUATOR[1]
NON-ILLUMINATED ROCKER
SINGLE COLOR
A Angled
B Flat
VISI-ROCKER
D Indicate ON
E Indicate OFF
ILLUMINATED ROCKER
F Angled
G Flat

CIRCUIT
WITHOUT AUXILIARY SWITCH
A[8] Switch Only (No Coil)/Maintained Contacts
B Series Trip (Current Coil)

Circuit		Aux. Switch Term. Type
	WITH AUXILIARY SWITCH - SILVER CONTACTS[2]	
P[8]	Switch Only (Maintained Contacts)	.060 Dia. Dbl. Solder Turret
Q[8]	Switch Only (Maintained Contacts)	.058 Dia. Round Q.C.[9]
S	Series Trip (Current Coil)	.060 Dia. Dbl. Solder Turret
T	Series Trip (Current Coil)	.058 Dia. Round Q.C.[9]
	WITH AUXILIARY SWITCH - GOLD CONTACTS[2]	
2[8]	Switch Only (Maintained Contacts)	.058 Dia. Round Q.C.[9]
4	Series Trip (Current Coil)	.058 Dia. Round Q.C.[9]

NOTES
1 Angled Rocker Style: Flat Rocker Style: Visi-Rocker Style:
One rocker per unit is provided in center of bezel. Unless otherwise specified, all rocker styles have matte finish.
2. Auxiliary Switch is not available on single pole illuminated styles.
3. This is only a partial listing of the many amp ratings available. For other ratings, please consult factory.
4. For neon bulb applications at 120VAC, a 47K, 1/4 WATT, external resistor must be supplied by customer. For 250 VAC applications, a 150K 1/4 WATT, external resistor must be supplied by customer.
5. For LED (DC or rectified AC) applications the LED is supplied mounted in the center of the rocker actuator with electrical characteristics as follows: 100 millicandela at 20 mA; Maximum power dissipation = 75 mW at 25°C; Typical forward voltage = 2.1V at 20mA; Typical reverse current = 100 uA at 3V; Note: Customer is required to supply the proper external resistor limiting current to above values.
6. When visi-rocker is specified, the visi portion of the rocker can not be the same color as the bezel. The remainder of the rocker, however, will be the same color as the bezel. A legend is mandatory on all visi-rockers.
7. If legend not desired, choose Rocker Legend Type Code 1.
8. For "switch only" (no coil) version, select Current Coil Rating Code from table B from page 16.
9. Mates with AMP: .058 inch Dia. Pin Receptacles; P/N's 61983-1 (gold plated) and 61986-1 (tin plated).
10. Rocker color for LED's and green neon lamp must be clear, smoke gray, white translucent, or match color of LED or lamp.
11. Dual = I-O / ON-OFF combination.
12. Screw Terminals are VDE certified only with use of ring terminal attached to wire.
13. Consult factory for VDE certified constructions.

M-Series Rocker

TERMINAL
- **1** Push-On 0.250 Tab (Q.C.)
- **2**[12] Screw 8-32 w/upturned lugs
- **3**[12] Screw 8-32 (Bus Type)

ROCKER & LEGEND COLORS

ILLUMINATED ROCKER[10]

	ROCKER	LEGEND[7]
A	Clear	White
B	Red Transparent	White
C	Green Transparent	White
D	Amber Transparent	White
E	Smoke Gray Transparent	White
F	White Translucent	Black

NON-ILLUMINATED ROCKER
SINGLE COLOR

	ROCKER	LEGEND[7]
1	White	Black
2	Black	White
3	Red	White
8	Orange	Black

VISI-ROCKER

	VISI[6] & LEGEND	ROCKER[6]
1	White	Remainder of rocker same color as bezel
2	Black	
3	Red	
4	Green	

BEZEL COLOR/STYLE[6]

WITHOUT ROCKERGUARD
- **A** White
- **B** Black
- **G** Gray

WITH ROCKERGUARD
- **1** White
- **2** Black
- **7** Gray

620 – 1 – H C 6 – 7 – C

CURRENT COIL RATING[3] (amperes)

210	0.100
225	0.250
250	0.500
275	0.750
410	1.000
420	2.000
425	2.500
430	3.000
440	4.000
450	5.000
460	6.000
470	7.000
475	7.500
480	8.000
490	9.000
610	10.000
611	11.000
612	12.000
613	13.000
614	14.000
615	15.000
618	18.000
620	20.000
625	25.000

ROCKER ILLUMINATION
- **A** NON-ILLUMINATED (single color & Visi-Rocker options only)
- **B**[4] Neon (w/o resistor) 120VAC/250VAC
- **C**[4,10] Green Glow Neon (w/o resistor) 120VAC/250VAC
- **D**[5,10] Red LED (w/o resistor)
- **E**[10] Red LED (w/ resistor) 4-8 VDC
- **F**[10] Red LED (w/ resistor) 9-16 VDC
- **G**[5,10] Green LED (w/o resistor)
- **H**[10] Green LED (w/ resistor) 4-8 VDC
- **J**[10] Green LED (w/ resistor) 9-16 VDC
- **K**[5,10] Amber LED (w/o resistor)
- **L**[10] Amber LED (w/ resistor) 4-8 VDC
- **M**[10] Amber LED (w/ resistor) 9-16 VDC

ROCKER LEGEND[11]
- **1** No legend (Single color or illuminated rocker options only)
- **2** ON-OFF Vertical
- **3** ON-OFF Horizontal
- **4** I-O Vertical
- **5** I-O Horizontal
- **6** Dual Vertical
- **7** Dual Horizontal

AGENCY APPROVAL[13]
- **A** W/O Approval
- **B** UL Recognized
- **C** UL Recognized; CSA Certified
- **D** UL Recognized; CSA and VDE Certified

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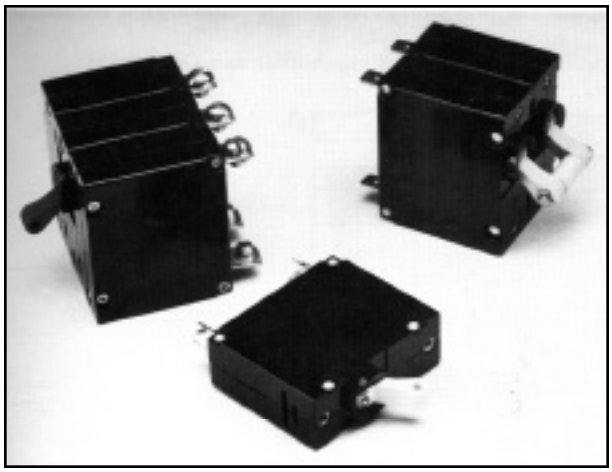
A-Series Handle

Ordering Scheme



PROD CODE
A

POLES[2]	
1	One
2	Two
3	Three
4	Four
5	Five
6	Six

AUXILIARY SWITCH[4]	
0	w/o Aux Switch
1	0.093 Q.C. Term.
2	0.110 Q.C. Term.
3	0.139 Solder Lug
4	0.093 Q.C. Term. w/ Gold Contacts

A A 3 – B 0 –

ACTUATOR	
A[1a]	Handle, one per pole
B[1b]	Handle, one per multipole unit
S[1c]	Mid-Trip Handle, one per pole
T[1c]	Mid-Trip Handle, one per pole and alarm switch

CIRCUIT	
A[3a]	Switch Only (No Coil)
B	Series Trip (Current)
C	Series Trip (Voltage)
D[3b]	Shunt Trip (Current)
E[3b]	Shunt Trip (Voltage)
F[3b]	Relay Trip (Current)
G[3b]	Relay Trip (Voltage)

NOTES
1a. Actuator Option A: (One-Six Poles) Handle tie pin, spacer(s) and retainers provided unassembled with multipole units.
1b. Actuator Option B: Handle location as viewed from front of panel: 2 pole - left pole; 3 pole - center pole; 4 pole - two handles at center poles; 5 pole - three handles at center poles; 6 pole - four handles at center poles.
1c. Handle moves to mid-position only upon electrical trip of circuit breaker. Actuator code S available with circuit codes B, C, D, E, F, G, H & K. When actuator code T is specified, handle moves to mid-position and alarm switch activates only upon electrical trip of circuit breaker. Available with circuit codes B &C only.
2. Standard multipole units have all poles identical except when specifying auxiliary switch - (see Note 4 and Fig. A) and/or mixed poles (consult factory).
3a. "Switch Only" available to 50 amps and six poles. For 30 amps and less, select Current Rating Code 630. For 31-50 amps, select Current Rating Code 650.
3b. Available with Terminal Codes 1 and 2 only. Current type limited to 30 amps maximum.
4. Auxiliary switch available on Series Trip and Switch Only circuits to 30 amps. On multipole units, only one auxiliary switch is normally supplied, mounted in extreme right pole per Fig. A.
5a. Voltage coils not rated for continuous duty. Available only with Delay Codes 10 and 20.
5b. Available to 50 amps max. and with Circuit Codes B & D only.
6. For non-standard voltage or current ratings consult factory.
7. Series Trip current ratings of 35, 40 and 50 amps limited to a maximum of two poles.
8. Screw terminals are recommended on current ratings greater than 20 amps. Ratings 35, 40 and 50 amps available with Terminal Code 5 only.
9. Standard actuator colors are black and white.
10. Terminal barriers available, consult factory.

A-Series Handle

6

CIRCUIT BREAKERS & FUSES

COIL RATING[6]

CURRENT COIL AMPERES — SELECT ONE

210	0.100
225	0.250
250	0.500
275	0.750
410	1.000
425	2.500
450	5.000
475	7.500
610	10.000
615	15.000
620	20.000
625	25.000
630	30.000
635[7]	35.000
640[7]	40.000
650[7]	50.000

VOLTAGE COIL[5a]

	RATED VOLTS	MIN. TRIP VOLTS
A06	6 DC	5 DC
A12	12 DC	10 DC
K20	120 AC	65 AC

ACTUATOR COLOR[9]

	COLOR	LEGEND
B	White	ON-OFF (Black)
D	Black	ON-OFF (White)
G	Red	ON-OFF (White)
N	Yellow	ON-OFF (Black)

AGENCY APPROVAL

A	W/O Approval
B	UL Recognized
C	UL Recognized; CSA Certified
I	UL Recognized Standard 1077; UL Recognized Standard 1500 Ignition protected; CSA Certified

10 – 450 – 1 B 1 – C

FREQUENCY AND DELAY

03	DC, 50/60Hz When Delay is not applicable, i.e. Switch Only circuit option.
10[5a]	DC Instantaneous
11	DC Ultra Short
12	DC Short
14	DC Medium
16	DC Long
20[5a]	50/60Hz Instantaneous
21	50/60Hz Ultra Short
22	50/60Hz Short
24	50/60Hz Medium
26	50/60Hz Long
32	DC, 50/60Hz Short
34	DC, 50/60Hz Medium
36	DC, 50/60Hz Long
42[5b]	50/60Hz Short (Hi-Inrush)
44[5b]	50/60Hz Medium (Hi-Inrush)
46[5b]	50/60Hz Long (Hi-Inrush)
52[5b]	DC Short (Hi-Inrush)
54[5b]	DC Medium (Hi-Inrush)
56[5b]	DC Long (Hi-Inrush)

TERMINAL[8, 10]

1	Push-On; 0.250 Tab (Q.C.)
2	Screw 8-32 w/Upturned Lugs
3	Screw 8-32 (Bus Type)
4	Screw 10-32 w/Upturned Lugs
5	Screw 10-32 (Bus Type)

PRINTED CIRCUIT BOARD TERMINAL AVAILABLE; CONSULT FACTORY

MOUNTING

1	Threaded insert 6-32 x 0.195 inches deep 2/pole
2[10]	Threaded insert ISO M3 x 5mm deep 2/pole
5	Front panel Snap-in, 0.75 inch wide bezel/pole
7[10]	Front panel Snap-in, 0.96 inch wide bezel on single pole units. .105 inch bezel overhang/side on multi-pole units

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A-Series Rocker

Ordering Scheme

PROD CODE
A

POLES[2]	
1	One
2	Two
3	Three

AUXILIARY SWITCH[4]	
0	w/o Aux Switch
1	0.093 Q.C. Term.
2	0.110 Q.C. Term.
3	0.139 Solder Lug
4	0.093 Q.C. Term. w/ Gold Contacts

Figure B

ROCKER STYLE DESCRIPTIONS

	INDICATE "ON"	INDICATE "OFF"	SINGLE COLOR
VERTICAL STYLE	CODE "C"	CODE "F"	CODE "J"
HORIZONTAL STYLE	CODE "D"	CODE "G"	CODE "K"

SHADED AREAS IDENTIFY INDICATE COLOR LOCATION

A	F	1	–	B	0	–

ACTUATOR[1]	
	VISI-ROCKER[10]
C	Indicate ON, Vertical Legends
D	Indicate ON, Horizontal Legends
F	Indicate OFF, Vertical legends
G	Indicate OFF, Horizontal Legends
	SINGLE COLOR ROCKER[10]
J	Vertical Legends
K	Horizontal Legends
	PUSH TO RESET (VISI-ROCKER)[9E]
N	Indicate Off, Vertical Legends
O	Indicate Off, Horizontal Legends
	SINGLE COLOR ROCKER[9E]
R	Vertical Legends
U	Horizontal Legends

CIRCUIT	
A[3a]	Switch Only (No Coil)
B	Series Trip (Current)
C	Series Trip (Voltage)
D[3b]	Shunt Trip (Current)
E[3b]	Shunt Trip (Voltage)
F[3b]	Relay Trip (Current)
G[3b]	Relay Trip (Voltage)

Dual coil construction available - consult factory.

NOTES
1. For description of actuator styles and legend positions refer to Figure B. Push to Reset actuators have Off portion of rocker shrouded.
2. Multipole units have one rocker per unit. Rocker location as viewed from front of panel as follows: 2 pole - left pole; 3 pole - center pole. Standard multipole units have all poles identical except when specifying auxiliary switch (See note 4 and Fig A) and/or mixed poles.
3a. "Switch Only" available to 50 amps and three poles. For 30 amps and less, select Current Rating Code 630. For 31- 50 amps, select Current Rating Code 650.
3b. Available with Terminal Codes 1 and 2 only. Current type limited to 30 amps maximum.
4. Auxiliary switch available on Series Trip and Switch Only circuits to 30 amps. On multipole units, only one auxiliary switch is normally supplied, mounted in extreme right pole per Fig. A.
5a. Voltage coils can be used on Series, Shunt, or Relay trip Dump circuit applications. These voltage coils are rated for intermittent pulse duty and are only available with delay codes 10 & 20.
5b. Available to 50A (UL/CSA), 30A (VDE) and Circuit Codes B & D only.
6. For other voltage or current ratings consult factory.
7. Screw terminals are recommended by Carlingswitch and are required by VDE on current ratings greater than 20 amps.
8. Ratings 35, 40 & 50 amps available with Terminal Code 5 only.
9a. Color shown is Visi and Legend color with remainder of rocker black.
9b. DUAL=ON-OFF/I-O legend.
9c. Legend on Push-To-Reset Bezel/Shroud is white when single color rocker type is ordered. When visi-rocker types are ordered, the legend matches the visi-color.
9d. Rockerguard available with actuator codes: C,D,F,G,J, and K.
9e. Push-To-Reset available with actuator codes: N,O,R and U.
10. Consult factory for VDE certified 2495 constructions.
11. Terminal Barrier available; consult factory.

COIL RATING[6]

CURRENT COIL AMPERES — SELECT ONE

210	0.100
225	0.250
250	0.500
275	0.750
410	1.000
425	2.500
450	5.000
475	7.500
610	10.000
615	15.000
620	20.000
625[7]	25.000
630[7]	30.000
635[7,8]	35.000
640[7,8]	40.000
650[7,8]	50.000

VOLTAGE COIL[5a]

	VOLTS	MIN. TRIP VOLTS
A06	6 DC	5 DC
A12	12 DC	10 DC
K20	120 AC	65 AC
L40	240 AC	130 AC

ACTUATOR COLOR[1] — SELECT ONE

SINGLE COLOR ROCKER			VISI-ROCKER		
	ROCKER COLOR	LEGEND[9b]		VISI COLOR[9a]	LEGEND[9b]
C	Black	I-O (White)	A	White	I-O (White)
D	Black	ON-OFF (White)	B	White	ON-OFF (White)
2	Black	Dual (White)	1	White	Dual (White)
F	Red	I-O (White)	F	Red	I-O (Red)
G	Red	ON-OFF (White)	G	Red	ON-OFF (Red)
3	Red	Dual (White)	3	Red	Dual (Red)
H	Green	I-O (White)	H	Green	I-O (Green)
J	Green	ON-OFF (White)	J	Green	ON-OFF (Green)
4	Green	Dual (White)	4	Green	Dual (Green)
K	Blue	I-O (White)			
L	Blue	ON-OFF (White)			
5	Blue	Dual (White)			
M	Yellow	I-O (Black)			
N	Yellow	ON-OFF (Black)			
6	Yellow	Dual (Black)			
P	Gray	I-O (Black)			
Q	Gray	ON-OFF (Black)			
7	Gray	Dual (Black)			
R	Orange	I-O (Black)			
S	Orange	ON-OFF (Black)			
8	Orange	Dual (Black)			

AGENCY APPROVAL

A	W/O Approval
B	UL Recognized
C	UL Recognized; CSA Certified
D[10]	UL Recognized; CSA & VDE Certified
I	UL 1500 Ignition Protected; UL Recognized; CSA Certified

24 _ 630 _ 2 3 1 _ D

FREQUENCY AND DELAY

03	DC, 50/60Hz When Delay is not applicable, i.e. Switch Only circuit option.
10[5a]	DC Instantaneous
11	DC Ultra Short
12	DC Short
14	DC Medium
16	DC Long
20[5a]	50/60Hz Instantaneous
21	50/60Hz Ultra Short
22	50/60Hz Short
24	50/60Hz Medium
26	50/60Hz Long
32	DC, 50/60Hz Short
34	DC, 50/60Hz Medium
36	DC, 50/60Hz Long
42[5b]	50/60Hz Short (Hi-Inrush)
44[5b]	50/60Hz Medium (Hi-Inrush)
46[5b]	50/60Hz Long (Hi-Inrush)
52[5b]	DC Short (Hi-Inrush)
54[5b]	DC Medium (Hi-Inrush)
56[5b]	DC Long (Hi-Inrush)

TERMINAL[7,11]

1	Push-On 0.250 Tab (Q.C.)
2	Screw 8-32 w/ Upturned Lugs
3	Screw 8-32 (Bus Type)
4	Screw 10-32 w/ Upturned Lugs
5[8]	Screw 10-32 (Bus Type)

PRINTED CIRCUIT BOARD TERMINAL AVAILABLE; CONSULT FACTORY

MOUNTING[11]

STANDARD ROCKER BEZEL

1	Threaded insert 6-32x0.195 in. deep
2	Threaded insert ISO M3x5mm deep

ROCKERGUARD BEZEL[9D] or PUSH-TO-RESET BEZEL[9C,9E]

3	Threaded insert 6-32 x0.195 in. deep
4	Threaded insert ISO M3x5mm deep

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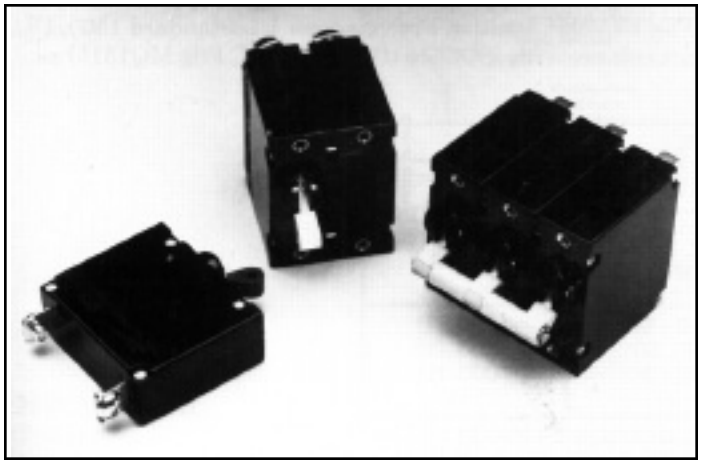
B-Series

Ordering Scheme



PROD CODE
B

POLES[2]
1 One
2 Two
3 Three
4 Four
5 Five
6 Six

AUXILIARY SWITCH[4]
0 w/o Aux Switch
2 0.110 Q.C. Term.
3 0.139 Solder Lug

B A 2 – B 0 –

ACTUATOR
A[1a] Handle, one per pole
B[1b] Handle, one per multipole unit
S[1c] Mid-Trip Handle, one per pole
T[1c] Mid-Trip Handle, one per multipole unit

CIRCUIT
A[3a] Switch Only (No Coil)
B Series Trip (Current)
C Series Trip (Voltage)
D[3b] Shunt Trip (Current)
E[3b] Shunt Trip (Voltage)
F[3b] Relay Trip (Current)
G[3b] Relay Trip (Voltage)

DUAL COIL AVAILABLE
CONSULT FACTORY

NOTES
1a. Actuator Option A: Handle tie pin, spacer(s) and retainers provided unassembled with multipole units.
1b. Actuator Option B: Handle location as viewed from front of panel:
2 pole - left pole; 3 pole - center pole; 4 pole - two handles at center poles; 5 pole - three handles at center poles; 6 pole - four handles at center poles.
1c. Handle moves to mid-position only upon electrical trip of the circuit breaker. Actuator code S available with circuit codes B,C,D,E,F & G. When actuator code T is specified: Handle moves to mid-position and alarm switch activates only upon electrical trip of the circuit breaker, available with circuit codes B & C.
2. Standard multipole units have all poles identical except when specifying auxiliary switch - (see Note 4 and Fig. A) and/or mixed poles (consult factory).
3a. Switch Only available to 50 amps and six poles. For 30 amps and less, select Current Rating Code 630. For 31-50 amps, select Current Rating Code 650.
3b. Available with Terminal Codes 1 and 2 only. Current type limited to 30 amps maximum.
4. Auxiliary switch available on Series Trip and Switch Only circuits to 50 amps. On multipole units, only one auxiliary switch is normally supplied, mounted in extreme right pole per Figure A.
5a. Voltage coils not rated for continuous duty. Available only with Delay Codes 10 and 20 and Circuit Codes C, E & G..
5b. Available to 50 amp maximum and Circuit Codes B & D only.
6. For other voltage or current ratings consult factory.
7. Series Trip current ratings of 35, 40 and 50 amps limited to a maximum of two poles.
8. Screw terminals are recommended on current ratings greater than 20 amps. Ratings 35, 40 and 50 amps available with Terminal Code 5 only.
9. Standard actuator colors are black and white. DUAL = I - O /ON-OFF combination.
10. Terminal barriers available, consult factory.
11. Consult factory for VDE certified 2495 constructions.

COIL RATING[6]

SELECT ONE

CURRENT COIL

	AMPERES
210	0.100
225	0.250
250	0.500
275	0.750
410	1.000
425	2.500
450	5.000
475	7.500
610	10.000
615	15.000
620	20.000
625	25.000
630	30.000
635[7]	35.000
640[7]	40.000
650[7]	50.000

VOLTAGE COIL[5a]

	RATING	MIN. TRIP VOLTS
A06	6 DC	5 DC
A12	12 DC	10 DC
K20	120 AC	65 AC
L40	240 AC	130 AC

ACTUATOR COLOR[9]

	COLOR	LEGEND
1	White	Dual (Black)
2	Black	Dual (White)
3	Red	Dual (White)
6	Yellow	Dual (Black)

AGENCY APPROVAL

A	W/O Approval
B	UL Recognized
C	UL Recognized CSA Certified
D[11]	UL Recognized CSA & VDE Certified
I[11]	UL Recognized Std 1077 UL Recognized Std 1500 (Ignition Protection) CSA Certified

10 – 450 – 1 2 1 – D

FREQUENCY AND DELAY

03	DC, 50/60Hz When Delay is not applicable, i.e. Switch Only circuit option.
10[5a]	DC Instantaneous
11	DC Ultra Short
12	DC Short
14	DC Medium
16	DC Long
20[5a]	50/60Hz Instantaneous
21	50/60Hz Ultra Short
22	50/60Hz Short
24	50/60Hz Medium
26	50/60Hz Long
32	DC, 50/60Hz Short
34	DC, 50/60Hz Medium
36	DC, 50/60Hz Long
42[5b]	50/60Hz Short (Hi-Inrush)
44[5b]	50/60Hz Medium (Hi-Inrush)
46[5b]	50/60Hz Long (Hi-Inrush)
52[5b]	DC Short (Hi-Inrush)
54[5b]	DC Medium (Hi-Inrush)
56[5b]	DC Long (Hi-Inrush)

TERMINAL[8]

1	Push-On 0.250 Tab (Q.C.)
2	Screw 8-32 w/ Upturned Lugs
3	Screw 8-32 (Bus Type)
4	Screw 10-32 w/ Upturned Lugs
5	Screw 10-32 (Bus Type)

PRINTED CIRCUIT BOARD TERMINAL AVAILABLE; CONSULT FACTORY

MOUNTING

1[10]	Threaded insert, 6-32 x 0.195 inches deep - 2/pole
2	Threaded insert, ISO M3 x 5mm deep - 2/pole
5[10]	Front Panel Snap-In, 0.75 inch wide Bezel/Pole
7[10]	Front Panel Snap-In, 0.96 inch wide Bezel on Single Pole units. .105 inch Bezel Overhang Per Side on Multi-Pole units.

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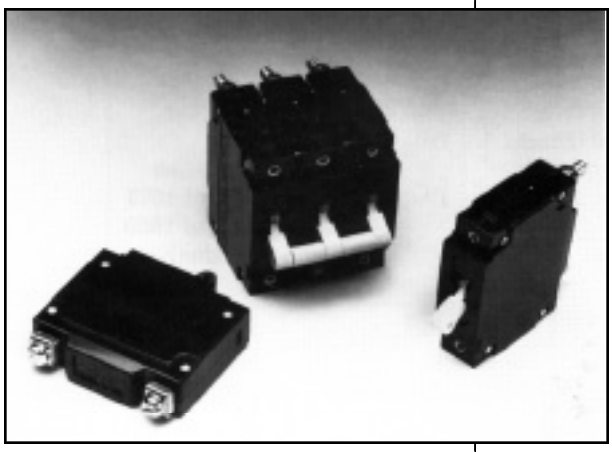
C-Series Handle

Ordering Scheme

PROD CODE
C

POLES[2]
1 One
2 Two
3 Three
4 Four
5 Five
6 Six

AUXILIARY/ALARM SWITCH[4]
0 w/o Aux Switch
2 S.P.D.T., 0.110 Q.C. Term.
3 S.P.D.T., 0.139 Solder Lug
4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)
8 S.P.S.T., (N.O.) 0.187 Q.C. Term.



C	A	3	–	B	0	–	10	–

ACTUATOR
A[1a] Handle, one per pole
B[1b] Handle, one per multipole unit
S[1c] Mid-Trip Handle, one per pole
T[1c] Mid-Trip Handle and Alarm Switch (Handle, one per pole)

CIRCUIT
A[3] Switch Only (No Coil)
B Series Trip (Current)
C Series Trip (Voltage)
D Shunt Trip (Current)
E Shunt Trip (Voltage)
F Relay Trip (Current)
G Relay Trip (Voltage)

DUAL COIL AVAILABLE
CONSULT FACTORY

FREQUENCY AND DELAY
03 DC, 50/60Hz When Delay is not applicable, i.e. Switch Only circuit option.
10[5a] DC Instantaneous
11 DC Ultra Short
12 DC Short
14 DC Medium
16 DC Long
20[5a] 50/60Hz Instantaneous
21 50/60Hz Ultra Short
22 50/60Hz Short
24 50/60Hz Medium
26 50/60Hz Long
32 DC, 50/60Hz Short
34 DC, 50/60Hz Medium
36 DC, 50/60Hz Long
42[5b] 50/60Hz Short, Hi-Inrush
44[5b] 50/60Hz Medium, Hi-Inrush
46[5b] 50/60Hz Long, Hi-Inrush
52[5b] DC, Short,Hi-Inrush
54[5b] DC,Medium, Hi-Inrush
56[5b] DC, Long, Hi-Inrush

– COIL RATING[6] –

CURRENT COIL AMPERES		VOLTAGE COIL[5a]		
			RATING	MIN. TRIP VOLTS
210	0.100	**A06**	6 DC	5 DC
225	0.250	**A12**	12 DC	10 DC
250	0.500	**K20**	120 AC	65 AC
275	0.750			
410	1.000			
425	2.500			
450	5.000			
475	7.500			
610	10.000			
615	15.000			
620	20.000			
625	25.000			
630	30.000			
635	35.000			
640	40.000			
650	50.000			
660[7]	60.000			
670[7]	70.000			
680[7]	80.000			
690[7]	90.000			
810[7]	100.000			

SELECT ONE

ACTUATOR COLOR[9]

	COLOR	LEGEND
1	White	Dual (Black)
2	Black	Dual (White)
3	Red	Dual (White)
6	Yellow	Dual (Black)

AGENCY APPROVAL

A	W/O Approval
C	UL Recognized CSA Certified
D[10]	UL Recognized CSA & VDE Certified
E[10]	UL Recognized CSA & TUV Certified
I	UL 1500 Ignition Protected UL Recognized CSA Certified

450 – 1 2 1 – C

TERMINAL[8a]

1	10-32 THD. Stud, .625 long
2	10-32 Screw with washer and saddle clamp
3	1/4-20 THD. Stud, .675 long
4	M5 THD. Stud, 16mm long
6	M6 THD. Stud, 17mm long
7[8b]	0.250 Inch Double Quick Connect

MOUNTING/BARRIERS/VOLTAGE

	MOUNTING INSERT	BARRIERS	VOLTAGE
1	6-32 x 0.195 inches	none	<300
A	6-32 X 0.195 inches	yes	<300
C	6-32 x 0.195 inches	mandatory	≥300
2	ISO M3 x 5mm	none	<300
B	ISO M3 x 5mm	yes	<300
D	ISO M3 x 5mm	mandatory	≥300

NOTES
1a. Actuator Option A: Multipole units are assembled at factory with common handle tie.
1b. Actuator Option B: Handle location as viewed from front of panel:
2 pole - left pole; 3 pole - center pole; 4 pole - two handles at center poles; 5 pole - three handles at center poles;
6 pole - four handles at center poles.
1c. Handle moves to Mid-Position only upon electrical trip of circuit breaker. Actuator Code S available with Circuit Codes B,C,D,E,F and G. When Actuator Code T is specified, handle moves to Mid Position and Alarm Switch actuates only upon electrical trip of circuit breaker, available with Circuit Codes B & C only.
2. Standard multipole units have all poles identical except when specifying auxiliary switch - (see Note 4 and Fig. A) and/or mixed poles (consult factory).
3 30 amps and less, select Current Rating Code 630. For 31-50 amps, select Current Rating Code 650. For 51-70 amps, select Current Rating Code 670. For 71-100amps, select Current Rating Code 810.
4. Auxiliary switch available on Series Trip and Switch Only circuits. On multipole units, only one auxiliary switch is normally supplied, mounted in extreme right pole per Fig. A.
5a. Voltage coils not rated for continuous duty. Available only with Delay Codes 10 and 20.
5b. Available to 50 amp maximum and Circuit Codes B & D only.
6. For other voltage or current ratings consult factory.
7. Current rating Codes 660 thru 810 are available with Circuit Codes A & B only. Current ratings 60 thru 70 are available up to 4 poles maximum. Ratings 71 thru 100 are available up to 2 poles maximum, and with Frequency and Delay Codes 10 thru 14, 20 thru 24 and 30 thru 34 only.
8a. Terminal Codes 1 & 2 are available to 50 amps maximum. Terminal Code 3 available to 100 amps maximum and is required on all ratings greater than 50 amps.
8b. Terminal Code 7 available to 25 amps only.
9. Standard actuator colors are black and white. DUAL = I - O /ON-OFF combination.
10. Consult factory for TUV and VDE Certified versions.
11. 2, 3 and 4 pole versions only. (See specifications page.)

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C-Series Rocker

Ordering Scheme

PROD CODE
C

POLES
1 One
2[2] Two
3[2] Three

AUXILIARY SWITCH[4]
0 w/o Aux Switch
2 S.P.D.T., 0.110 Q.C. Term.
3 S.P.D.T., 0.139 Solder Lug
4 S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)
8 S.P.S.T., 0.187 Q.C. Term.

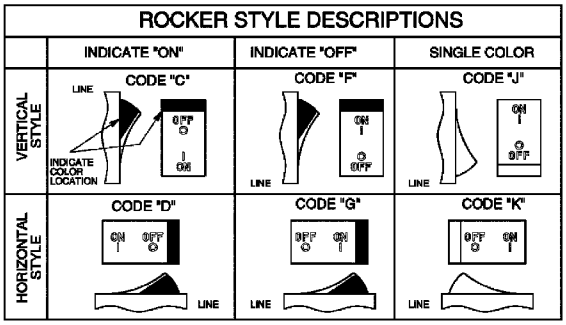

FIG. A

C F 1 – B 0 – 24 –

ACTUATOR[1]
VISI-ROCKER
C Indicate ON;Vertical Legend
D Indicate ON;Horizontal Legend
F Indicate OFF;Vertical Legend
G Indicate OFF;Horizontal Legend
SINGLE COLOR ROCKER
J Vertical Legend
K Horizontal Legend
PUSH-TO-RESET (VISI-ROCKER)
N Indicate OFF;Vertical Legend
O Indicate OFF;Horizontal Legend
PUSH-TO-RESET (SINGLE COLOR ROCKER)
R Vertical Legend
U Horizontal Legend

CIRCUIT
A[3] Switch Only (No Coil)
B Series Trip (Current)
C Series Trip (Voltage)
D Shunt Trip (Current)
E Shunt Trip (Voltage)
F Relay Trip (Current)
G Relay Trip (Voltage)

DUAL COIL AVAILABLE; CONSULT FACTORY.

FREQUENCY AND DELAY
03 DC 50/60 Hz. When delay is not applicable, i.e. switch only circuit option.
10[5a] DC Instantaneous
11 DC Ultra Short
12 DC Short
14 DC Medium
16 DC Long
20[5a] 50/60Hz Instantaneous
21 50/60Hz Ultra Short
22 50/60Hz Short
24 50/60Hz Medium
26 50/60Hz Long
32 DC, 50/60Hz Short
34 DC, 50/60Hz Medium
36 DC, 50/60Hz Long
42[5b] 50/60Hz Short (Hi-Inrush)
44[5b] 50/60Hz Medium (Hi-Inrush)
46[5b] 50/60Hz Long (Hi-Inrush)
52[5b] DC Short, Hi-Inrush
54[5b] DC Medium, Hi-Inrush
56[5b] DC Long, Hi-Inrush

COIL RATING[6]
CURRENT COIL AMPERES

SELECT ONE

210	0.100
225	0.250
250	0.500
275	0.750
410	1.000
425	2.500
450	5.000
475	7.500
610	10.000
615	15.000
620	20.000
625	25.000
630	30.000
635	35.000
640	40.000
650	50.000
660[7]	60.000
670[7]	70.000
680[7]	80.000
690[7]	90.000
810[7]	100.000

VOLTAGE COIL[5a]

	RATED VOLTS	MIN. TRIP VOLTS
A06	6 DC	5 DC
A12	12 DC	10 DC
K20	120 AC	65 AC

ACTUATOR STYLE & COLOR
VISI-ROCKER [1, 9a, 9b]

	VISI-COLOR	LEGEND
1	White	Dual (Black)
3	Red	Dual (White)
4	Green	Dual (Black)

SINGLE COLOR ROCKER[1, 9b]

	ROCKER	LEGEND
2	Black	Dual (White)
3	Red	Dual (White)
4	Green	Dual (White)
5	Blue	Dual (White)
6	Yellow	Dual (Black)
7	Gray	Dual (Black)
8	Orange	Dual (Black)

AGENCY APPROVAL

A	W/O Approval
C	UL Recognized CSA Certified
D	UL Recognized CSA & VDE Certified

650 – 1 3 1 – C

TERMINAL[8a]

1	10-32 THD. Stud, .625 long
2	10-32 Screw
3	1/4-20 THD. Stud, .675 long
4	M5 x THD. Stud, 16mm long
6	M6 x THD Stud 17mm long
7[8b]	0.250 Inch Double Quick Connect

MOUNTING/BARRIERS/VOLTAGE

	INSERTS	BEZEL	BARRIER	VOLTAGE
1	6-32 X 0.195 inches	Standard	None	<300
A[9c]	6-32 X 0.195 inches	Rockerguard	None	<300
B[9c]	6-32 X 0.195 inches	Push-to-reset	None	<300
2	6-32 X 0.195 inches	Standard	Yes	<300
C[9c]	6-32 X 0.195 inches	Rockerguard	Yes	<300
D[9c]	6-32 X 0.195 inches	Push-to-reset	Yes	<300
3	6-32 X 0.195 inches	Standard	Mandatory	≥300
E[9c]	6-32 X 0.195 inches	Rockerguard	Mandatory	≥300
F[9c]	6-32 X 0.195 inches	Push-to-reset	Mandatory	≥300
4	ISO M3 x 5mm deep	Standard	None	<300
G[9c]	ISO M3 x 5mm deep	Rockerguard	None	<300
H[9c]	ISO M3 x 5mm deep	Push-to-reset	None	<300
5	ISO M3 x 5mm deep	Standard	Yes	<300
J[9c]	ISO M3 x 5mm deep	Rockerguard	Yes	<300
K[9c]	ISO M3 x 5mm deep	Push-to-reset	Yes	<300
6	ISO M3 x 5mm deep	Standard	Mandatory	≥300
L[9c]	ISO M3 x 5mm deep	Rockerguard	Mandatory	≥300
M[9c]	ISO M3 x 5mm deep	Push-to-reset	Mandatory	≥300

NOTES
1. For description of Rocker styles and Legend positions, refer to Fig. B. Push-To-Reset actuators have OFF portion of rocker shrouded.
2. Multipole units have one rocker per unit. Rocker location as viewed from front panel as follows: 2 pole unit - left pole.; 3 pole unit - center pole. Standard multipole units have all poles identical except when specifying Auxiliary/Alarm note 4 and figure A) mixed poles. (Consult factory.)
3. 30 amps and less, select current rating code 630; for 31-50 amps, select current rating code 650; 51-70 amps, select current rating code 670; 71-100 amps, select current rating code 810.
4. Auxiliary switch available on Series Trip and Switch Only circuits. On multipole units, only one auxiliary switch is normally supplied, mounted in extreme right pole per figure A.
5a. Voltage coils not rated for continuous duty. Available only with Delay Codes 10 and 20.
5b. Available to 50 amp maximum and circuit codes B and D only.
6. For other Voltage and Current ratings, consult factory.
7. Current Rating Codes 660 thru 810 are available with Circuit Codes A and B only. Current Ratings 60 thru 70 are available up to 3 poles maximum. Ratings 71 thru 100 are available up to 2 poles maximum, and with Frequency and Delay Codes 10 thru 14, 20 thru 24 and 30 thru 34 only.
8a. Terminal Codes 1, 2 and 4 are available to 50 amps maximum. Terminal Codes 3 and 6 are available to 100 amps maximum and are required on all ratings greater than 50 amps.
8b. Terminal Code 7 available to 25 amps max.
9a. Color shown is Visi and Legend Color with remainder of Rocker black.
5b. Dual Markings = I - O /ON-OFF combination.
9c. OFF legend on Push-To-Reset Bezel/Shroud is white when ordering single color rocker types. When ordering visi-rocker types the legend matches the visi color. Rockerguard available with actuator codes C thru K. Push-To-Reset available with actuator codes N, O, R, U.

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C-Series UL489

Ordering Scheme

PROD CODE
C

POLES[2a]	
1	One
2[2b]	Two
3[2b, 2c]	Three

AUXILIARY SWITCH[3]	
0	w/o Aux Switch
2	S.P.D.T., 0.110 Q.C. Term.
3	S.P.D.T., 0.139 Solder Lug
4	S.P.D.T., 0.110 Q.C. Term. (Gold Contacts)
8	S.P.S.T., 0.187 Q.C. Term.

C A 1 – B 0 – 24 –

ACTUATOR	
HANDLE, ONE PER POLE	
A[1a]	Handle
S[1b]	Mid-Trip
T[1b]	Mid-Trip and Alarm Switch
VISI-ROCKER	
C[1c]	Indicate ON, Vertical Legend
D[1c]	Indicate ON, Horizontal Legend
F[1c]	Indicate OFF, Vertical Legend
G[1c]	Indicate OFF, Horizontal Legend
SINGLE COLOR ROCKER	
J[1c]	Vertical Legend
K[1c]	Horizontal Legend

CIRCUIT	
B	Series Trip (Current)

FREQUENCY AND DELAY	
11	DC Ultra Short
12	DC Short
14	DC Medium
16	DC Long
21	50/60Hz Ultra Short
22	50/60Hz Short
24	50/60Hz Medium
26	50/60Hz Long
42[4]	50/60Hz Short (Hi-Inrush)
44[4]	50/60Hz Medium (Hi-Inrush)
46[4]	50/60Hz Long (Hi-Inrush)

NOTES
1a. Actuator Option A: Multipole units are assembled at factory with common handle tie.
1b. Handle moves to Mid-Position only upon electrical trip of circuit breaker. when Actuator Code S is specified. When Actuator Code T is specified, handle moves to Mid-Position and Alarm Switch actuates only upon electrical trip of circuit breaker.
1c. For description of Rocker styles and Legend positions, refer to Fig. A. Rocker actuated circuit breakers are available as single pole only.
2a. Rocker Actuated circuit breakers are available as a single pole only.
2b. 2 and 3 pole circuit breakers required for 120/240 VAC (maximum application rating code C.) applications, have all poles identical except when specifying Auxiliary/Alarm switch which is normally supplied in extreme right pole per Fig. B. These units are available with one Handle per pole only & terminal Barrier is mandatory.
2c. Third pole is for 120/240 VAC applications requiring Neutral Disconnect. The third pole has the same construction as poles 1 & 2.
3. Auxiliary/Alarm switch with independent Circuit i.e. separate from Breaker Circuit, only available with Circuit Breakers rated 50 amps maximum at 80 VDC, 125 VDC and 120 VAC. Auxiliary/Alarm Switch with Dependent Circuit, i.e. same as Breaker Circuit, is supplied from factory with Common Terminal of Auxiliary/Alarm Switch connected to Line Terminal on 120/240 and 240 VAC Ratings. Circuit Breakers rated 120 VAC 50 AMPS maximum, can be supplied with Auxiliary/Alarm Switch Common Terminal connected to Breaker Line Terminal. Consult factory for special Catalog Number.
4. Available to 50 amp maximum with circuit codes B and D only.
5a. Terminal Codes 1 & 2 are available to 50 amps maximum. Terminal Code 3 available to 100 amps maximum and is required on all ratings greater than 50 amps.
5b. Color shown is Visi and Legend Color with remainder of Rocker black.
5c. Dual Markings = I - O /ON-OFF combination.
6. For other current ratings, consult factory.
7. Refer to Table A for agency approved voltage and current ratings.

CURRENT RATING[6] AMPERES	
210	0.100
225	0.250
250	0.500
275	0.750
410	1.000
425	2.500
450	5.000
475	7.500
610	10.000
615	15.000
620	20.000
625	25.000
630	30.000
635	35.000
640	40.000
650	50.000
660	60.000
670	70.000
680	80.000
690	90.000
695	95.000
810	100.000

ACTUATOR STYLE & COLOR

HANDLE[5c]

	HANDLE	LEGEND
1	White	Dual (Black)
2	Black	Dual (White)
3	Red	Dual (White)
6	Yellow	Dual (Black)

VISI-ROCKER[1c, 5b, 5c]

	VISI-COLOR	LEGEND
1	White	Dual (White)
3	Red	Dual (Red)
4	Green	Dual (Green)

SINGLE COLOR ROCKER[1c, 5c]

	ROCKER	LEGEND
2	Black	Dual (White)
3	Red	Dual (White)
4	Green	Dual (White)
5	Blue	Dual (White)
6	Yellow	Dual (Black)
7	Gray	Dual (Black)
8	Orange	Dual (Black)

MAXIMUM APP. RATING	
B	125 DC
C[2b]	120/240 AC
D[2b]	240 AC
K	120 AC
M	80 DC

620 – 1 2 1 – K G

TERMINAL[5a]	
1	10-32 THD. Stud, .625 long
2	10-32 Screw
3	1/4-20 THD. Stud, .675 long

MOUNTING/BARRIERS/VOLTAGE	MOUNTING INSERT	ACTUATOR
1	6-32 x 0.195 inches	Handle
2	ISO M3 x 5mm	Handle
A	6-32 X 0.195 inches	Rocker w/ standard bezel
D	ISO M3 x 5mm	Rocker with Rockerguard
C	ISO M3 x 5mm	Rocker w/ standard bezel
B	6-32 x 0.195 inches	Rocker with Rockerguard

AGENCY APPROVAL[7]	
A	W/O Approval
G	UL489 Listed CSA Certified

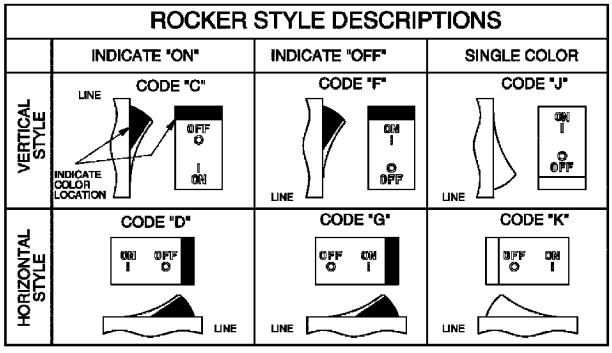

FIG. A

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E-Series – Branch Circuit Breaker

Ordering Scheme

PROD CODE[1]
E

POLES[1]
1 One
2 Two
3 Three
4 Four
5 Five
6 Six

AUXILIARY SWITCH[3]
0 w/o Aux Switch
2 0.110 Q.C. Term.
3 Solder Lug
4 0.110 Q.C. Term. w/ Gold Contacts

E A 2 – B 0 – 24 –

ACTUATOR
A Handle, one per pole

CIRCUIT
B Series Trip

FREQUENCY AND DELAY
12 DC Short
14 DC Medium
16 DC Long
22 50/60Hz Short
24 50/60Hz Medium
26 50/60Hz Long

NOTES
1 E-Series circuit breakers on this page are LISTED under UL Standard #489 (General and Special Purpose) and are Certified under CSA Standard #C22.2 No. 5.
2. Standard multi-pole units have all poles identical except when specifying auxiliary switch - (see Note 3 and Fig. A).
3. On multi-pole units, only one auxiliary switch is normally supplied mounted in the extreme right pole per Fig. A. Back mounted units require special mounting provisions when auxiliary switch is specified.
4. A terminal barrier is supplied between poles on multi-pole units with 10-32 stud (Terminal Code 1) and 1/4-20 stud (Terminal Code 2) per UL requirement.
5a. Box Wire Connector will accept #14 through 0 AWG. copper wire or #12 through 0 AWG. aluminum wire.
5b. Box Wire Connector with Pressure Plate for stranded wire, consult factory for details.
6. Standard handle colors are white and black with ON-OFF & dual; I-O/ON-OFF legends.
7. Back Mounted breakers can also be front mounted by utilizing the proper front panel mounting inserts normally supplied. However, terminal connections must be made prior to mounting.
8. Line Terminals must be same polarity.

E-Series – Branch Circuit Breaker

6

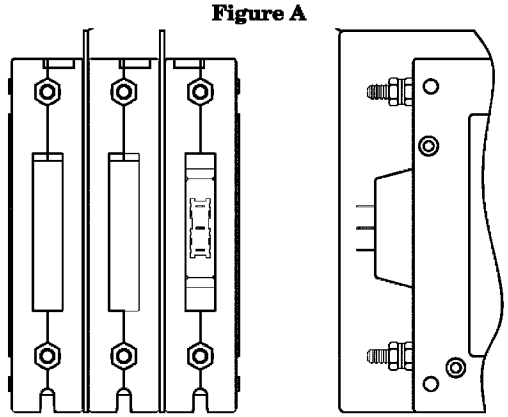
CIRCUIT BREAKERS & FUSES

COIL RATING CURRENT COIL	AMPERES
210	0.100
225	0.250
250	0.500
410	1.000
425	2.500
450	5.000
475	7.500
610	10.000
615	15.000
620	20.000
625	25.000
630	30.000
650	50.000
660	60.000
670	70.000
810	100.000

ACTUATOR COLOR	COLOR	LEGEND
B[6]	White	On-Off (Black)
1[6]	White	Dual (Black)
D[6]	Black	On-Off (White)
2[6]	Black	Dual (White)
G	Red	On-Off (White)
3	Red	Dual (White)
N	Yellow	On-Off (Black)
6	Yellow	Dual (Black)

MAXIMUM APPLICATION RATING	VOLTAGE	CURRENT
B	125 VDC	100 Amps
C	120/240 VAC	100 Amps
D	240 VAC	100 Amps

Figure A



MULTI-POLE IDENTIFICATION SCHEME

AGENCY APPROVAL	
A	W/O Approval
C	UL 489 LISTED and CSA Certified (Branch Circuit Breaker)

450 – 12A – CC

TERMINAL		MAX. RATING
BACK CONNECTED (Front Mounted Only)		
1[4]	10-32 studs (all terminals)	50A
2[4]	1/4-20 studs (all terminals)	100A
FRONT CONNECTED (Back Mounted Only)		
3[5a]	Box Wire Connector (line & load)	100A
C[5b]	Box Wire Connector w/ pressure plate (line & load)	100A
4	10-32 screw (line & load)	50A
5[8]	10-32 "Bus-type" screw (line), 10-32 screw (load)	50A
6[5a,8]	10-32 "Bus-type" screw (line), Box Wire Connector (load)	100A
F[5b,8]	10-32 "Bus-type" screw (line), Box Wire Connector w/ pressure plate (load)	100A
7	1/4-20 screw (line & load)	100A
8[8]	1/4-20 "Bus-type" screw (line), 1/4-20 screw (load)	100A
9[5a,8]	1/4-20 "Bus-type" screw (line), Box Wire Connector (load)	100A
J[5b,8]	1/4-20 "Bus-type" screw (line), Box Wire Connector w/ pressure plate (load)	100A

MOUNTING		
FRONT (Back Connected Only) Mounting inserts		
A	6-32	
B	ISO M3	
BACK (Front Connected Only)[7]	Back mounting foot type	Front mounting insert (for opt. use)
C	Short	6-32
D	Short	ISO M3
E	Long	6-32
F	Long	ISO M3

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E-Series – Supp. Protectors/Manual Motor Controllers

Ordering Scheme

PROD CODE[1]
E

POLES[2]
1 One
2 Two
3 Three
4 Four
5 Five
6 Six

AUXILIARY SWITCH[4]
0 w/o Aux Switch
2 0.110 Q.C. Term.
3 Solder Lug
4 0.110 Q.C. Term. w/ Gold Contacts

E A 2 – B 0 – 24 –

ACTUATOR
A Handle, one per pole

CIRCUIT[3b]
A[3a] Switch Only (No Coil)
B Series Trip (Current)
D Shunt Trip (Current)

FREQUENCY AND DELAY
03 DC, 50/60Hz When delay is not applicable, i.e. Switch Only circuit option.
10 DC Instantaneous
12 DC Short
14 DC Medium
16 DC Long
20 50/60Hz Instantaneous
22 50/60Hz Short
24 50/60Hz Medium
26 50/60Hz Long

NOTES
1 E-Series circuit breakers on this page are UL Recognized under the Component Recognition Program as Supplementary Protectors, (UL Standard #1077) and Manual Motor Controllers. (UL Standard #508) and are also Certified to CSA Standard C22.2 No. 235 as Supplementary Protectors.
2. Standard multi-pole units have all poles identical except when specifying auxiliary switch - (see Note 4 and Figure A). For mixed ratings, consult factory.
3a. Switch Only construction: 30 amps or less select Current Rating Code 630; 31-70 amps, select Current Rating code 670; 71-100 amps, select Current Rating Code 810.
3b. Switch Only and Series Trip construction available with either front or back connected terminals. Shunt construction available with back connected terminals, (Terminal Codes 1 & 2) only.
4. Auxiliary Switch available on Switch Only and Series Trip units. On multi-pole units, only one auxiliary switch is normally supplied mounted in the extreme right pole per Figure A. Back mounted units require special mounting provisions when auxiliary switch is specified.
5. A terminal barrier is supplied between poles on multi-pole units with 10-32 stud (Terminal Code 1) and 1/4-20 stud (Terminal Code 2) per UL requirement.
6a. Box Wire Connector will accept #14 through 0 AWG. copper wire or #12 through 0 AWG. aluminum wire.
6b. Box Wire Connector with Pressure Plate for stranded wire, consult factory for details.
7. Standard handle colors are white and black with I-O, ON-OFF and DUAL ON-OFF/I-O legends.
8. Back Mounted breakers can also be front mounted by utilizing the proper front panel mounting inserts normally supplied. However, terminal connections must be made prior to mounting.
9. 480V and 600V ratings require 3 or 4 pole break 3Ø and 2 pole break 1Ø.
10. Line Terminals must be same polarity, rated 300V max.

COIL RATING

	CURRENT COIL AMPERES
210	0.100
225	0.250
250	0.500
410	1.000
425	2.500
450	5.000
475	7.500
610	10.000
615	15.000
620	20.000
625	25.000
630	30.000
650	50.000
660	60.000
670	70.000
810	100.000

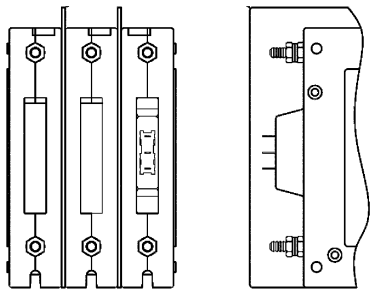
ACTUATOR COLOR

	COLOR	LEGEND
A[7]	White	I-O (Black)
B[7]	White	On-Off (Black)
1[7]	White	Dual (Black)
C[7]	Black	I-O (White)
D[7]	Black	On-Off (White)
2[7]	Black	Dual (White)
F	Red	I-O (White)
G	Red	On-Off (White)
3	Red	Dual (White)
M	Yellow	I-O (Black)
N	Yellow	On-Off (Black)
6	Yellow	Dual (Black)

MAXIMUM APPLICATION RATING

	VOLTAGE	CURRENT
B	125 VDC	100 Amps
C	120/240 VAC	100 Amps
D	240 VAC	100 Amps
E[9]	277/480 VAC	100 Amps
F	277 VAC	100 Amps
G[9]	600 VAC	100 Amps
H[9]	480 VAC	100 Amps
U	125 VDC/277 VAC	100 Amps
V[9]	125 VDC/600 VAC	100 Amps

Figure A



MULTI-POLE IDENTIFICATION SCHEME

450 – 1 2 A – C B

TERMINAL

		MAX. RATING
BACK CONNECTED (Front Mounted Only)		
1[5]	10-32 studs (all terminals)	50A
2[5]	1/4-20 studs (all terminals)	100A
FRONT CONNECTED (Back Mounted Only)		
3[6a]	Box Wire Connector (line & load)	100A
C[6b]	Box Wire Connector w/ pressure plate (line & load)	100A
4	10-32 screw (line & load)	50A
5[10]	10-32 "Bus-type" screw (line), 10-32 screw (load)	50A
6[6a,10]	10-32 "Bus-type" screw (line), Box Wire Connector (load)	100A
F[6b,10]	10-32 "Bus-type" screw (line), Box Wire Connector w/ pressure plate (load)	100A
7	1/4-20 screw (line & load)	100A
8[10]	1/4-20 "Bus-type" screw (line), 1/4-20 screw (load)	100A
9[6a,10]	1/4-20 "Bus-type" screw (line), Box Wire Connector (load)	100A
J[6b,10]	1/4-20 "Bus-type" screw (line), Box Wire Connector w/ pressure plate (load)	100A

MOUNTING

FRONT (Back Connected Only)
Mounting inserts

A	6-32
B	ISO M3

BACK (Front Connected Only)[8]

	Back mounting foot type	Front mounting insert (for opt. use)
C	Short	6-32
D	Short	ISO M3
E	Long	6-32
F	Long	ISO 32

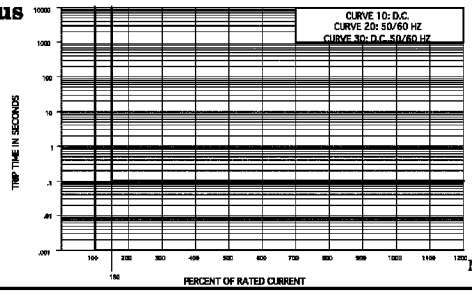
AGENCY APPROVAL

A	W/O Approval
B	UL 1077 RECOGNIZED & CSA CERTIFIED (Supplementary Protector); UL 508 RECOGNIZED (Manual Motor Controller)

Time Delay Values (M and Q Series)

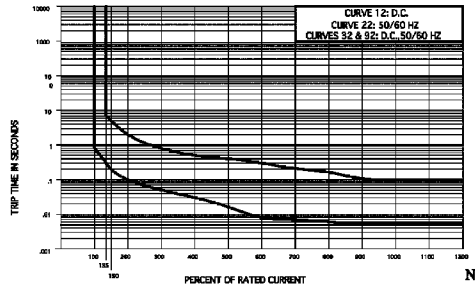
Dual Rated AC/DC

Instantaneous



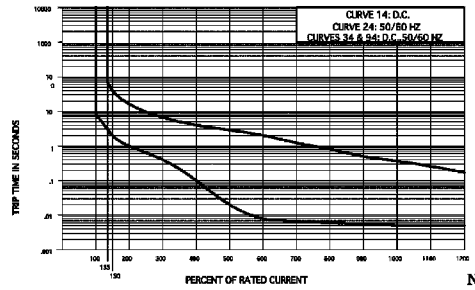
NOTE 1,3

Short



NOTE 2, 3, 4

Medium



NOTE 2, 3, 4

PERCENT OF RATED CURRENT										
TRIP TIME (SECONDS)	DELAY	100%	135%	150%	200%	400%	600%	800%	1000%	1200%
	10, 20 & 30	NO TRIP	MAY TRIP	.100 MAX.	.100 MAX.	.100 MAX.	.100 MAX.	.100 MAX.	.100 MAX.	.100 MAX.
	12, 22, 32 & 92	NO TRIP	.300 - 7.00	.200 - 5.00	.100 - 2.00	.030 - .500	.008 - .300	.006 - .150	.005 - .100	.005 - .100
	14, 24, 34 & 94	NO TRIP	3.00 - 70.0	2.00 - 40.0	1.00 - 15.0	.100 - 4.00	.008 - 2.00	.006 - .800	.005 - .350	.005 - .160

NOTES

1 Breakers to hold 100% and must trip at 150% of rated current and greater within the time limit shown in this curve.

2 Breakers to hold 100% and must trip at 135% of rated current and greater within the time limits shown in this curve.

3 Curve data shown represents breaker response at ambient temperature of 77°F (25°C) with no preloading. Breakers are mounted in standard wall mount position.

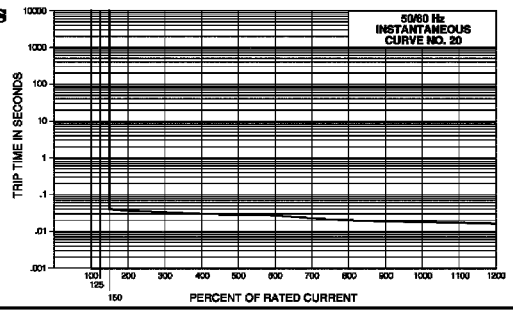
4 The minimum inrush pulse tolerance handling capacity on the above standard delays is 12 times rated current based on a 60 Hz, 1/2 cycle 8 ms pulse for delay curves 22, 24, 32 and 34 and is 18 times rated current up to 20 amps; 14 times rated current up to 25 amps based on a 60Hz, 1/2 cycle 8 ms pulse for delay curves 92 and 94.

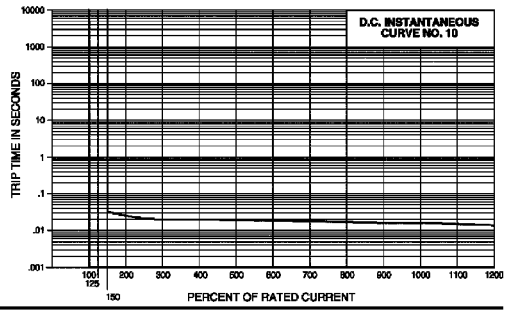
Time Delay Values (A, B, C & D-Series)

AC

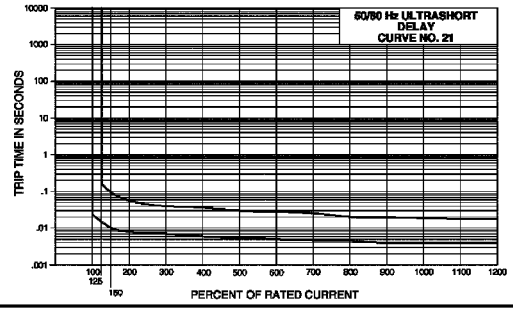
DC

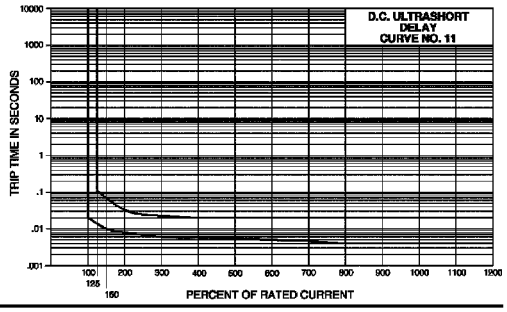
Instantaneous



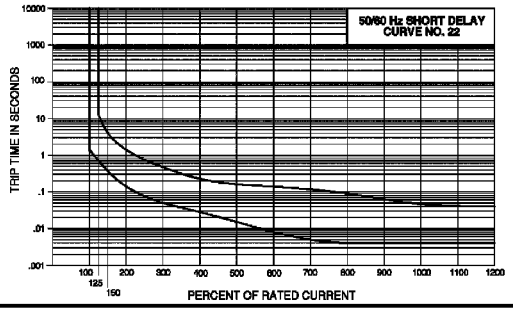


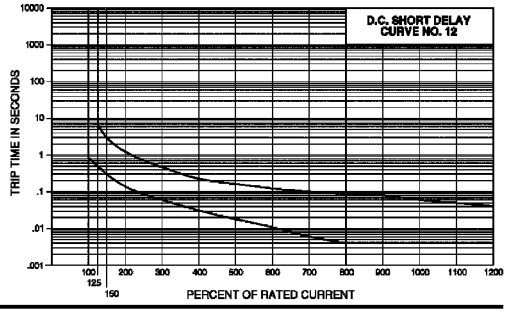
Ultrashort



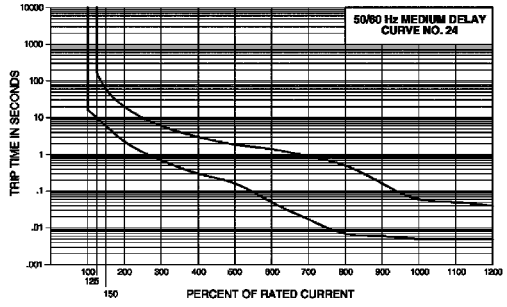


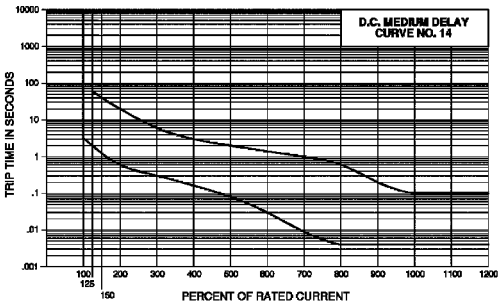
Short



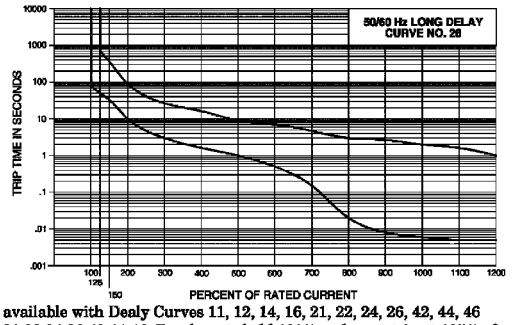


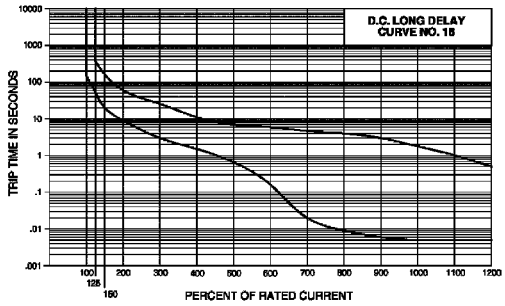
Medium





Long





NOTES

UL489 C-Series Breakers available with Dealy Curves 11, 12, 14, 16, 21, 22, 24, 26, 42, 44, 46

Delay Curves 11,12,14,16,21,22,24,26,42,44,46: Breakers to hold 100% and must trip at 125% of rated current and greater within the time limit shown in this curve.

Delay Curves 32,34,36: Breakers to hold 100% and must trip at 135% of rated current and greater within the time limit shown in this curve.

Delay Curves 10,20: Breakers to hold 100% and must trip at 150% of rated current and greater within the time limit shown in this curve.

All Curves: Curve data shown represents breaker response at ambient temperature of 77°F (25°C) with no preloading. Breakers are mounted in standard wall-mount position.

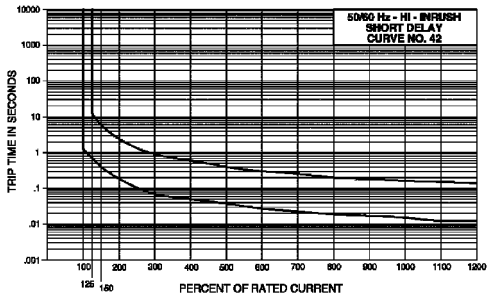
On 50 amp and less current ratings, the minimum inrush pulse tolerance handling capability is 12 times the rated current on standard delays and 25 times the rated current on high inrush delays. These values are based on a 60 Hz 1/2 cycle, 8 ms pulse. High inrush delays should be specified for applications with high initial surge currents of short duration such as switching power supplies, highly capacitive and transformer loads.

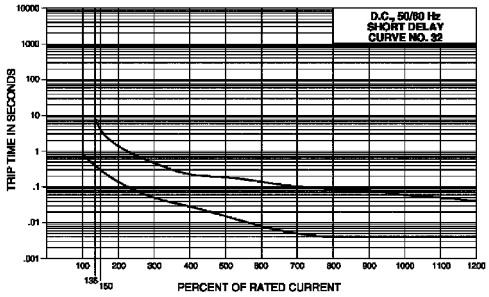
Time Delay Values (A, B, C & D-Series)

HI-INRUSH AC Delay Curves

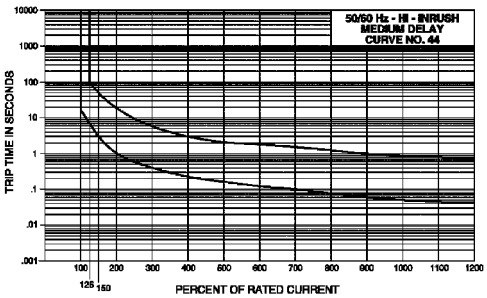
Dual Rated AC/DC Delay Curves

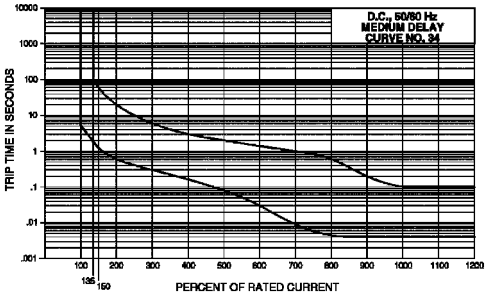
Short



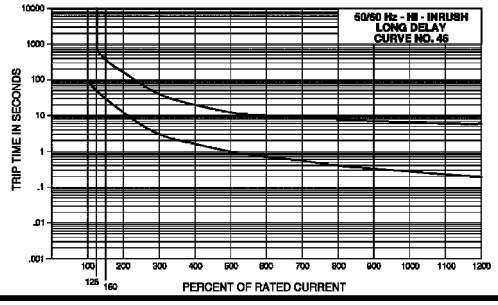


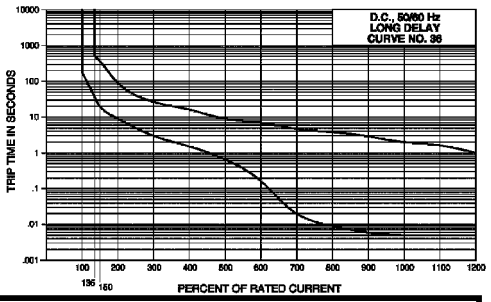
Medium





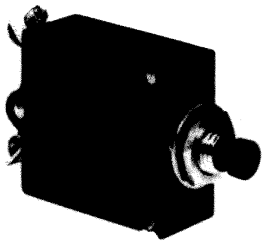
Long



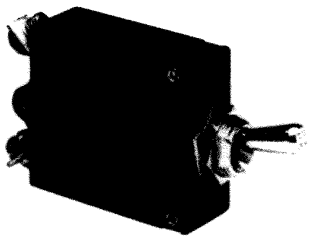


		PERCENT OF RATED CURRENT									
	DELAY	100%	125%	135%	150%	200%	400%	600%	800%	1000%	1200%
	10	NO TRIP	MAY TRIP	---	.032 MAX	.024 MAX	.020 MAX	.018 MAX	.016 MAX	.015 MAX	.013 MAX
	11	NO TRIP	.013 - .125	---	.010 - .070	.008 - .032	.006 - .020	.005 - .020	.004 - .020	.004 - .020	.004 - .020
	12	NO TRIP	.500 - 6.50	---	.300 - 3.00	.130 - 1.20	.031 - .220	.011 - .120	.004 - .090	.004 - .060	.004 - .040
	14	NO TRIP	2.00 - 60.0	---	1.20 - 40.0	.600 - 20.0	.150 - 3.00	.030 - 1.30	.004 - .600	.004 - .100	.004 - .100
TRIP	16	NO TRIP	45.0 - 345	---	20.0 - 150	9.00 - 60.0	1.40 - 11.4	.150 - 5.80	.009 - 3.70	.005 - 1.70	.005 - .500
	20	NO TRIP	MAY TRIP	---	.040 MAX	.035 MAX	.030 MAX	.025 MAX	.020 MAX	.017 MAX	.015 MAX
	21	NO TRIP	.014 - .150	---	.011 - .095	.008 - .055	.006 - .035	.005 - .027	.005 - .021	.004 - .018	.004 - .017
TIME	22	NO TRIP	.700 - 12.0	---	.350 - 4.00	.130 - 1.30	.027 - .220	.008 - .130	.004 - .090	.004 - .045	.004 - .040
	24	NO TRIP	10.0 - 160	---	6.00 - 60.0	2.20 - 20.0	.300 - 3.00	.050 - 1.30	.007 - .500	.005 - .060	.005 - .040
	26	NO TRIP	50.0 - 700	---	32.0 - 350	10.0 - 90.0	1.50 - 15.0	.500 - 7.00	.020 - 3.00	.006 - 2.00	.005 - 1.00
(SECONDS)	32	NO TRIP	MAY TRIP	.400 - 8.00	.300 - 4.00	.130 - 1.30	.027 - .220	.008 - .130	.004 - .090	.004 - .060	.004 - .040
	34	NO TRIP	MAY TRIP	1.80 - 100	1.20 - 60.0	.600 - 20.0	.150 - 3.00	.030 - 1.30	.004 - .600	.004 - .110	.004 - .100
	36	NO TRIP	MAY TRIP	35.0 - 520	20.0 - 350	9.00 - 90.0	1.40 - 15.0	.150 - 7.00	.009 - 3.70	.005 - 2.00	.004 - 1.00
	42	NO TRIP	.700 - 12.0	---	.400 - 6.00	.180 - 2.30	.050 - .600	.026 - .300	.018 - .200	.014 - .150	.012 - .130
	44	NO TRIP	7.00 - 100	---	3.00 - 50.0	1.10 - 18.0	.220 - 3.00	.120 - 1.70	.075 - 1.20	.050 - .850	.042 - .720
	46	NO TRIP	50.0 - 700	---	31.0 - 350	12.0 - 150	1.50 - 20.0	.700 - 10.0	.404 - 7.90	.260 - 6.50	.198 - 5.80
	52	NO TRIP	.500 - 6.50	---	.340 - 4.50	.180 - 2.30	.051 - .600	.030 - .320	.018 - .220	.014 - .200	.012 - .130
	54	NO TRIP	1.50 - 50.0	---	.750 - 35.0	.350 - 18.0	.110 - 3.00	.070 - 1.70	.045 - 1.40	.039 - 1.30	.035 - 1.30
	56	NO TRIP	45.0 - 345	---	19.0 - 170	8.50 - 100	1.24 - 15.0	.410 - 9.00	.256 - 8.00	.210 - 5.50	.198 - 2.90

NOTES
UL489 C-Series Breakers available with Delay Curves 11, 12, 14, 16, 21, 22, 24, 26, 42, 44, 46.
Delay Curves 11,12,14,16,21,22,24,26,42,44,46: Breakers to hold 100% and must trip at 125% of rated current and greater within the time limit shown in this curve.
Delay Curves 32,34,36: Breakers to hold 100% and must trip at 135% of rated current and greater within the time limit shown in this curve.
Delay Curves 10,20: Breakers to hold 100% and must trip at 150% of rated current and greater within the time limit shown in this curve.
All Curves: Curve data shown represents breaker response at ambient temperature of 77°F (25°C) with no preloading. Breakers are mounted in standard wall-mount position.
On 50 amp and less current ratings, the minimum inrush pulse tolerance handling capability is 12 times the rated current on standard delays and 25 times the rated current on high inrush delays. These values are based on a 60 Hz 1/2 cycle, 8 ms pulse. High inrush delays should be specified for applications with high initial surge currents of short duration such as switching power supplies, highly capacitive and transformer loads.



W23



W31

W23/W31 series

TOGGLE OR PUSH/PULL ACTUATOR THERMAL CIRCUIT BREAKER

6

CIRCUIT BREAKERS & FUSES

FEATURES

- 0.5 amp to 50 amp ratings may be used as on/off switch.
- Cannot be reset against overload.
- W23 has visible trip indicator.
- Screw termination.

AGENCY APPROVALS

W23 and W31 are UL 1077 Recognized as Supplementary Protectors. File E69543, and CSA Certified as Appliance Component Protectors, File LR15734.

RESISTANCE CHART

Current Rating In Amps	Maximum Resistance In Ohms ± 30%
1	.61
5	.03
10	.01
15	.006
20	.004
30	.003
40	.002
50	.002

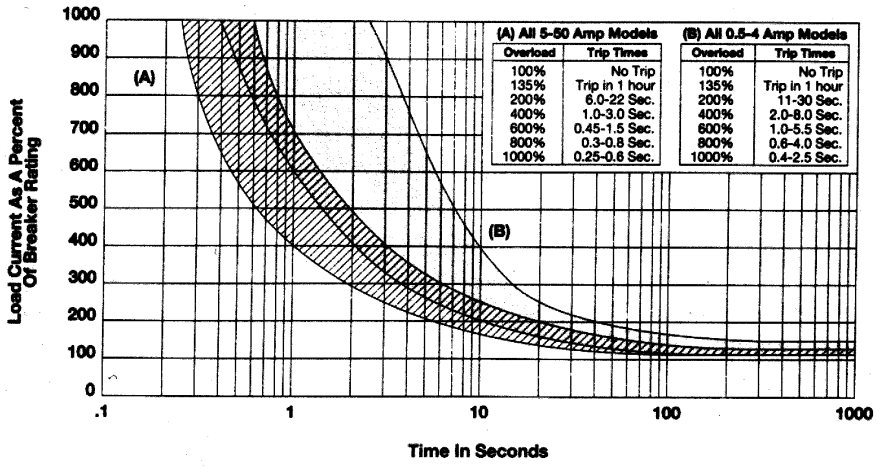
ELECTRICAL DATA @ +25 C

Calibration: Will continuously carry 100% of rating, may trip between 101% and 134% of rating at 25°C. Must trip at 135% in one hour.
Maximum Operating Voltages: 50VDC or 250VAC (to 400 Hz).
Interrupting Capacity: 0.5-25 amp models — 2,500 amps at 50VDC, 1000 amps at 250VAC. 26-50 amp models — 1000 amps at 50VDC or 250VAC.
Resettable Overload Capacity: Ten times rated current.
Dielectric Strength: Over 1,500 volts RMS.

MECHANICAL/ENVIRONMENTAL DATA

Endurance Cycling: More than 6,000 cycles at 100% of ratin or 10,000 mechanical cycles.
Humidity: Will meet requirements of MIL-STD-202, Method 1
Salt Spray: Will meet requirements of MIL-STD-202, Method Test Condition B.
Termination: Two #8-32 screw terminals.
Mounting: W23 — Threaded bushing, 3/8" (9.53 mm) diamet W31 — Threaded bushing, 15/32" (11.91 mm) diameter, with or without anti-rotation flats.
Weight: Less than 2 oz. (57 g).

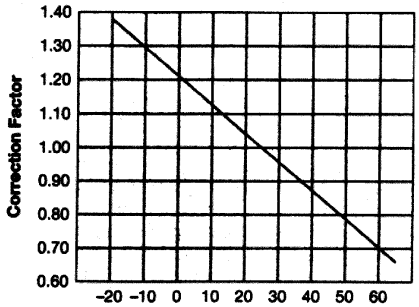
TIME VS. CURRENT TRIP CURVE @ +25 C



(A) All 5-50 Amp Models	
Overload	Trip Times
100%	No Trip
135%	Trip in 1 hour
200%	6.0-22 Sec.
400%	1.0-3.0 Sec.
600%	0.45-1.5 Sec.
800%	0.3-0.8 Sec.
1000%	0.25-0.6 Sec.

(B) All 0.5-4 Amp Models	
Overload	Trip Times
100%	No Trip
135%	Trip in 1 hour
200%	11-30 Sec.
400%	2.0-8.0 Sec.
600%	1.0-5.5 Sec.
800%	0.6-4.0 Sec.
1000%	0.4-2.5 Sec.

AMBIENT COMPENSATION CHART



TO USE THIS CHART: Read up from the ambient temperature to the curve, and across to find a correction factor. Multiply the breaker rating by the correction factor to determine the compensated rating. Calculate the overloads in terms of the compensated rating to use the published trip curve.

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ORDERING INFORMATION

Typical Part No. ➤	W	23	-X	1	A	1	G	-5

1. DESIGNATOR:
W = Circuit breaker

2. SERIES NUMBER:
23 = Single pole, push/pull

3. CIRCUIT FUNCTION:
X = Series trip

4. BUTTON:
1 = Black with white amp rate marking and white trip band.

5. MOUNTING BUSHING:
A = 3/8"-24 threaded bushing .375" (9.53mm) long, silver color

6. TERMINALS (See drawings for relative terminal positions):
1 = Screw terminals situated 90° to each other with #8-32 screws and washers installed.
3 = Screw terminals situtated parallel to each other pointing upward with #8-32 screws and washers installed.

7. MOUNTING HARDWARE:
A = Knurled nut/hex nut installed
G = Two hex nuts/lockwasher installed
Z = No mounting hardware supplied

8. AMP RATING:

0.5	3	7.5	20	35
1	4	10	25	40
2	5	15	30	50

STOCK ITEMS – The following items are normally maintained in stock for immediate delivery

W23-X1A1G-1	W23-X1A1G-7.50	W23-X1A1G-25	W23-X1A1G-50
W23-X1A1G-2	W23-X1A1G-10	W23-X1A1G-30	
W23-X1A1G-3	W23-X1A1G-15	W23-X1A1G-35	
W23-X1A1G-5	W23-X1A1G-20	W23-X1A1G-40	

ORDERING INFORMATION

Typical Part No. ➤	W	31	-X	2	M	1	G	-5

1. DESIGNATOR:
W = Circuit breaker

2. SERIES NUMBER:
31 = Single pole, toggle actuator

3. CIRCUIT FUNCTION:
X = Series trip

4. MOUNTING BUSHING:
1 = 15/32"-32 threaded bushing .320" (8.13 mm) long, round, silver color
2 = 15/32"-32 threaded bushing .320" (8.13 mm) long, double "D", silver color

5. TOGGLE:
M = Silver color metal toggle, round, with amp rate marking on end

6. TERMINALS (See drawing for relative terminal positions):
1 = Screw terminals situated 90° to each other with #8-32 screws and washers installed.
5 = Screw terminals situated parallel to each other pointing downward with #8-32 screws and washers installed.

7. MOUNTING HARDWARE:
A = Knurled nut/hex nut intalled
G = Two hex nuts/lockwasher installed
Z = No mounting hardware supplied

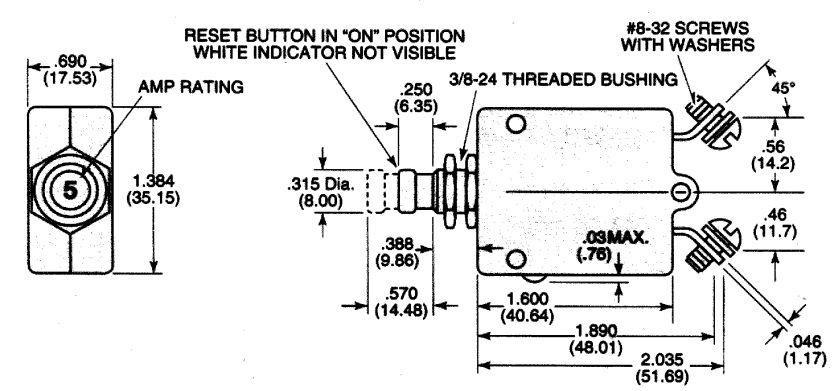
8. AMP RATING:

0.5	3	7.5	20	35
1	4	10	25	40
2	5	15	30	50

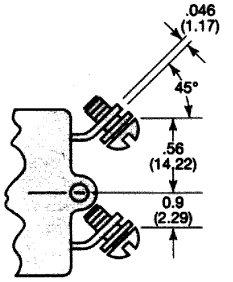
STOCK ITEMS – The following items are normally maintained in stock for immediate delivery

W31-X2M1G-1	W31-X2M1G-7.50	W31-X2M1G-25	W31-X2M1G-50
W31-X2M1G-2	W31-X2M1G-10	W31-X2M1G-30	
W31-X2M1G-3	W31-X2M1G-15	W31-X2M1G-35	
W31-X2M1G-5	W31-X2M1G-20	W31-X2M1G-40	

W23 OUTLINE DIMENSIONS



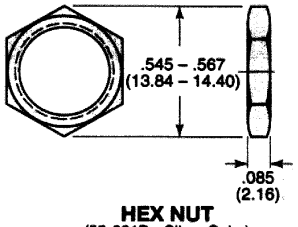
TERMINAL STYLE 1



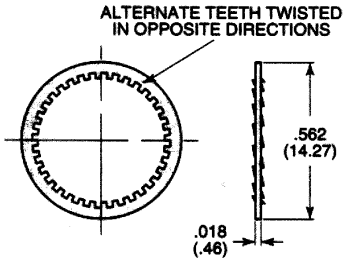
TERMINAL STYLE 3

MOUNTING HARDWARE

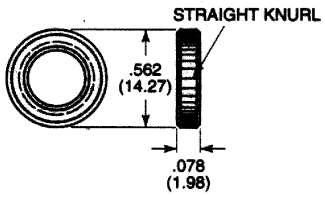
All dimensions are given as inches (mm)



HEX NUT
(55-001D - Silver Color)

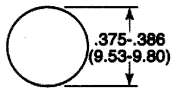


LOCKWASHER
(88-006B - Silver Color)

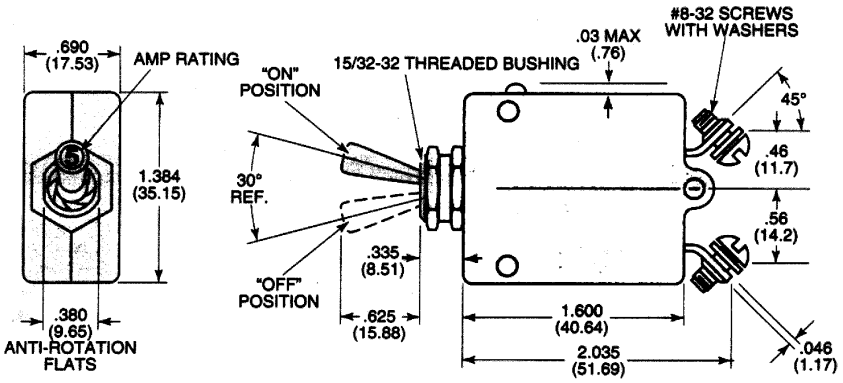


KNURLED NUT
(55-008A - Silver Color)

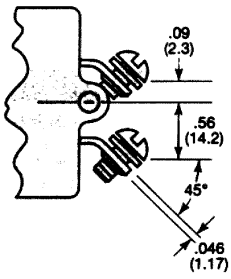
SUGGESTED MOUNTING HOLES



W31 OUTLINE DIMENSIONS

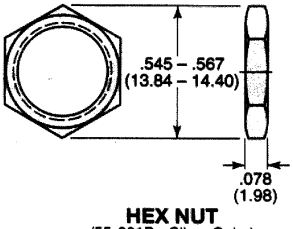


TERMINAL STYLE 1

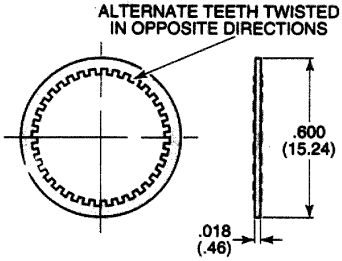


TERMINAL STYLE 5

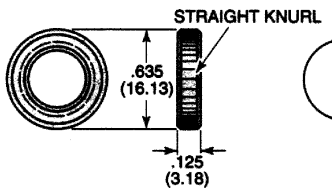
MOUNTING HARDWARE



HEX NUT
(55-001B - Silver Color)

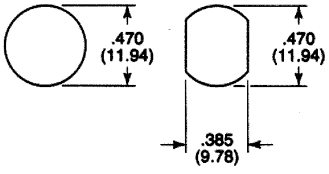


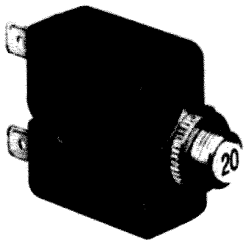
LOCKWASHER
(88-002B - Silver Color)



KNURLED NUT
(55-010B - Silver Color)

SUGGESTED MOUNTING HOLES





W58 series

PUSH TO RESET ONLY THERMAL CIRCUIT BREAKER

FEATURES

- 0.5 amp to 35 amp ratings.
- Cannot be manually tripped.
- Button extends for visual trip indication.
- Push button to reset breaker.
- Termination is screw or .250" QC.

AGENCY APPROVALS

W58 Series is UL 1077 Recognized as Supplementary Protectors, File E69543, and CSA Certified as Appliance Component Protectors, File LR15734.

MAXIMUM RESISTANCE VS. CURRENT RATING @ +25°C

Current Rating in Amps	Maximum Resistance in Ohms	Current Rating in Amps	Maximum Resistance in Ohms
0.5	5.0	7	0.020
0.75	2.5	8	0.020
1	1.35	9	0.020
1.5	0.75	10	0.014
2	0.32	12	0.010
2.5	0.25	15	0.010
3	0.18	20	0.006
3.5	0.15	25	0.005
4	0.10	30	0.004
5	0.026	35	0.004
6	0.026		

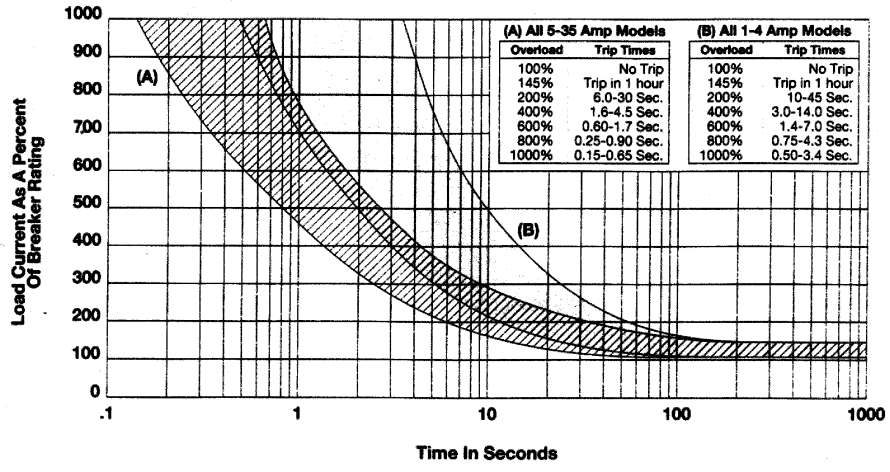
ELECTRICAL DATA @ +25 C

Calibration: Breaker will continuously carry 100% of rated load. It may trip between 101% and 145% of rated load, but must trip at 145% at 25°C.
Dielectric Strength: Over 1,500 volts RMS.
Maximum Operating Voltages: 50VDC; 250VAC.
Interrupt Capacity: 2,000 amps at 50VDC (0.5 - 35 amp models).
1,000 amps at 250VAC (0.5 - 35 amp models).
Note: 30 and 35 amp models not UL or CSA.
Resettable Overload Capacity: Ten times rated current.

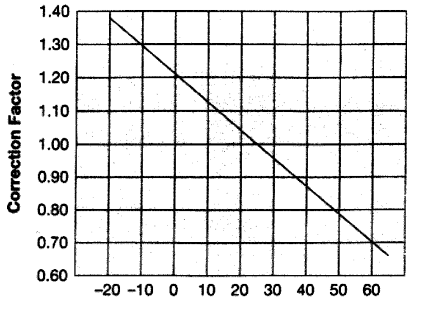
MECHANICAL/ENVIRONMENTAL DATA

Shock: Withstands to 10 g.
Endurance Cycling: Over 1,000 cycles at 200% of rated load.
Vibration: Withstands to 10 g at 10-55 Hz.
Weight: Less than 1 1/2 oz. (42.5 g).

TIME VS. CURRENT TRIP CURVE @ +25 C



AMBIENT COMPENSATION CHART



TO USE THIS CHART: Read up from the ambient temperature to the curve, and across to find a correction factor. Multiply the breaker rating by the correction factor to determine the compensated rating. Calculate the overloads in terms of the compensated rating to use the published trip curve.

ORDERING INFORMATION

Typical Part No. ➤	W	58	-X	B	1	A	4	A	-5

1. DESIGNATOR:
W = Circuit breaker

2. SERIES NUMBER:
58 = Single Pole, Push-to-Reset

3. CIRCUIT FUNCTION:
X = Series Trip

4. BUTTON:
A = White, plain, no rate marking, no trip band
B = White with red rate marking, red trip band
C = White with black rate marking, red trip band
E = White with red rate marking no trip band
F = White with black rate marking, no trip band

5. MOUNTING BUSHING:
1 = 7/16" x .500" (12.70 mm) long
4 = 15/32" x .300" (7.62 mm) long, black
6 = 3/8" x .465" (11.81 mm) long, round

6. TERMINALS:
A = Quick connect .250" (6.35 mm) straight
B = Quick connect .250" (6.35 mm) 90°
C = 6/32 screw 90° (screws installed)
D = 6/32 screw 90° (screws bulk packed)

7. MOUNTING HARDWARE:
4 = Knurled nut/hex nut
6 = Knurled nut/hex nut/lock washer
12 = Knurled nut/lock washer
15 = Two hex nuts/lock washer
99 = No mtg. hardware supplied (Use C, Step #8)

8. MOUNTING HARDWARE PACKAGING:
A = Assembled to bushing
B = Bulk unassembled
C = No mounting hardware

9. SPECIFY AMP RATING:

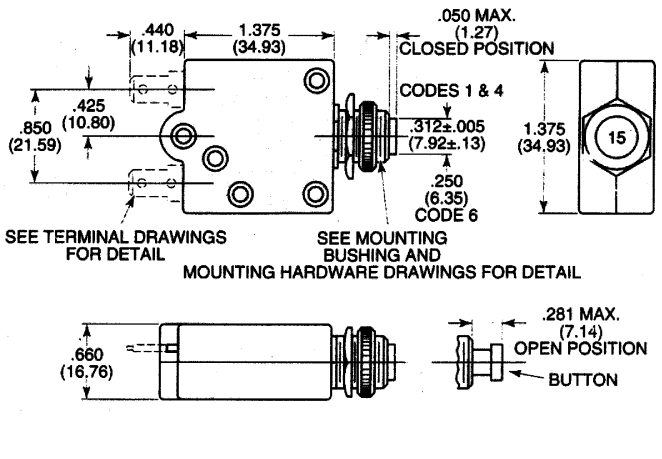
0.5	1.5	3	5	8	12	25
0.75	2	3.5	6	9	15	30*
1	2.5	4	7	10	20	35*

*Not UL or CSA

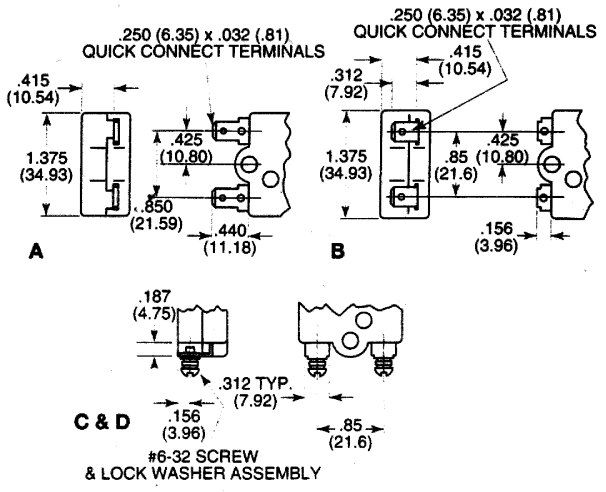
STOCK ITEMS – The following items are normally maintained in stock for immediate delivery.

W58-XB1A4A-1	W58-XB1A4A-6	W58-XB1A4A-15	W58-XC4C12A-1	W58-XC4C12A-10	W58-XC4C12A-35
W58-XB1A4A-2	W58-XB1A4A-7	W58-XB1A4A-20	W58-XC4C12A-2	W58-XC4C12A-15	
W58-XB1A4A-3	W58-XB1A4A-8	W58-XB1A4A-25	W58-XC4C12A-3	W58-XC4C12A-20	
W58-XB1A4A-4	W58-XB1A4A-10	W58-XB1A4A-30	W58-XC4C12A-5	W58-XC4C12A-25	
W58-XB1A4A-5	W58-XB1A4A-12	W58-XB1A4A-35	W58-XC4C12A-7	W58-XC4C12A-30	

OUTLINE DIMENSIONS

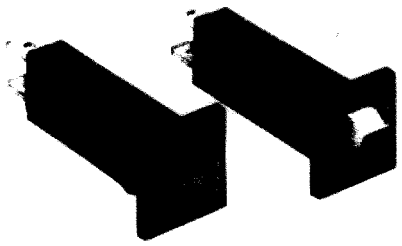


TERMINAL OPTIONS



Toll Free 1-800-526-5376 • 201-337-1000 • Fax 201-337-1862

SWITCHABLE VERSION NOW AVAILABLE



W28 series

SWITCHABLE OR PUSH TO RESET FUSEHOLDER-TYPE THERMAL CIRCUIT BREAKER

Note: Some approvals pending for switchable type.

FEATURES

- Switchable version combines on-off switch and circuit protection in a single unit.
- Approved to many international standards (push to reset type).
- Replaces slow blow glass cartridge fuse.
- Labor-saving snap-in mounting.
- Button extends for visual trip indication on push to reset model.
- Rocker on switchable model moves to "overload" position upon trip.

AGENCY APPROVALS

W28 series is UL 1077 Recognized as Supplementary Protectors, File E69543, and CSA Certified as Appliance Component Protectors, File LR15734. W28 breakers have been issued Certificate of Suitability CS2190N as supplementary Equipment Protectors by the Energy Authority of New South Wales, Australia. W28 breakers are also DEMKO (Denmark) and SEV (Switzerland) approved. VDE approved for use in office equipment and provides 8mm isolation. 20 amp models do not have VDE, DEMKO and SEV approvals at present. W28-S is UL 1077 Recognized, with other approvals pending.

ELECTRICAL DATA @ 25 C

Calibration: Will continuously carry 100% of rating.
3-20 amp models – may trip between 101% and 134%, but must trip at 135% of rating within one hour at +25°C.
0.25-2 amp models – may trip between 101% and 174%, but must trip at 175% of rating within one hour at +25°C.
Dielectric Strength: Over 1,500 volts RMS.
Maximum Operating Voltages: 32VDC; 250VAC, 50/60 Hz.
Interrupt Capacity: 1,000 amps at 250VAC, 50/60 Hz. and 32VDC in accordance with UL standard 1077.

Resettable Overload Capacity: Six times rated current for 0.25 through 2 amp models. Ten times rated current for 3 through 20 amp models.
Reset Time: 180 seconds max. for 0.25 through 2 amp models. 10 to 60 seconds for 3 through 20 amp models.

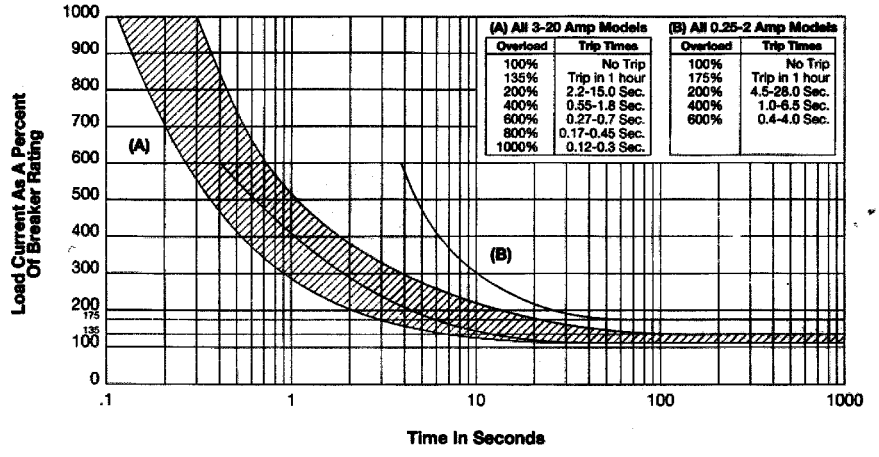
TYPICAL RESISTANCE VS. CURRENT RATING @ +25° C

0.25	14.0	8.0	0.016
0.50	3.55	9.0	0.014
0.75	2.0	10.0	0.011
1.0	0.89	11.0	0.01
2.0	0.17	12.0	0.009
3.0	0.089	13.0	0.009
4.0	0.043	14.0	0.007
5.0	0.030	15.0	0.007
6.0	0.026	16.0	0.007
7.0	0.017	20.0	0.006

MECHANICAL/ENVIRONMENTAL DATA

Endurance Cycling(switchable type): Typically 30,000 operations at 100% of rating.
Termination: .250" (6.35 mm) quick connects. Soldering to terminals is not recommended.
Mounting: Snaps into panel from front. See Recommended Panel Cutouts.
Approximate Weight: 0.35 oz. (10 g).

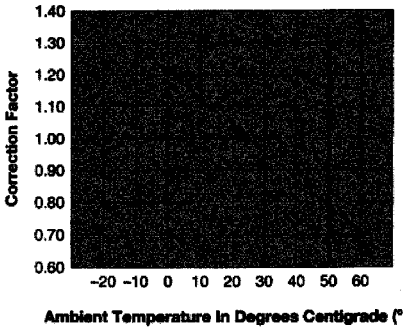
TIME VS. CURRENT TRIP CURVE @ +25 C



(A) All 3-20 Amp Models	
Overload	Trip Times
100%	No Trip
135%	Trip in 1 hour
200%	2.2-15.0 Sec.
400%	0.55-1.8 Sec.
600%	0.27-0.7 Sec.
800%	0.17-0.45 Sec.
1000%	0.12-0.3 Sec.

(B) All 0.25-2 Amp Models	
Overload	Trip Times
100%	No Trip
175%	Trip in 1 hour
200%	4.5-28.0 Sec.
400%	1.0-6.5 Sec.
600%	0.4-4.0 Sec.

AMBIENT COMPENSATION CHART



TO USE THIS CHART: Read up from the ambient temperature to the curve, and across to find a correction factor. Multiply the breaker rating by the correction factor to determine the compensated rating. Calculate the overloads in terms of the compensated rating to use the published trip curve.

ORDERING INFORMATION

Typical Part No. ➤	W	28	-X	Q	1	A	-5

1. DESIGNATOR:
W = Circuit breaker

2. SERIES NUMBER:
28 = Single Pole Fuseholder Type

3. CIRCUIT FUNCTION:
X = Series Trip, Push-to-Reset Button S = Series Trip, Switchable Rocker

4. TERMINAL TYPE AND MOUNTING:
Q = .250" (6.35 mm) Quick Connect will mount in .032"-.062" (.813 mm – 1.574 mm) thick panel.
T = .250" (6.35 mm) Quick Connect will mount in .075"-.105" (1.905 mm – 2.667 mm) thick panel.
For panel thicknesses other than above, order "Q" type and 55-025B Internal Tooth Push-On Lockwasher.

5. BEZEL COLOR:
1 = Black with White Rate Marking † 11 = Black with No Rate Marking
2 = Red with Black Rate Marking † 21 = Red with No Rate Marking † Not available with Circuit Function "S".
B = Black with White "Reset" Marked On Bezel (No Rate Marking) †

6. BUTTON COLOR:
A = Black
B = Red

7. AMP RATING:

0.25†	1†	4	7	10	13	16
0.50†	2†	5	8	11	14	20*
0.75†	3	6	9	12	15	

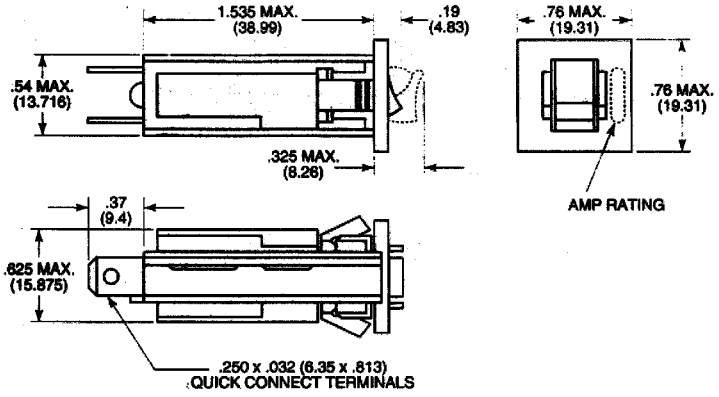
† Not available with Circuit Function "S".

STOCK ITEMS – The following items are normally maintained in stock for immediate delivery.

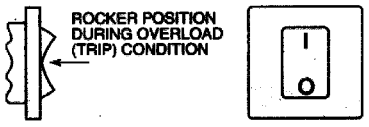
W28-SQ11A-3	W28-SQ11A-12	W28-XQ1A-0.75	W28-XQ1A-4	W28-XQ1A-8	W28-XT1A-10
W28-SQ11A-5	W28-SQ11A-15	W28-XQ1A-1	W28-XQ1A-5	W28-XQ1A-10	W28-XT1A-12
W28-SQ11A-8	W28-XQ1A-0.25	W28-XQ1A-2	W28-XQ1A-6	W28-XQ1A-12	
W28-SQ11A-10	W28-XQ1A-0.50	W28-XQ1A-3	W28-XQ1A-7	W28-XQ1A-15	

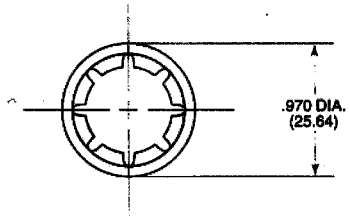
OUTLINE DIMENSIONS

PUSH-TO-RESET TYPE



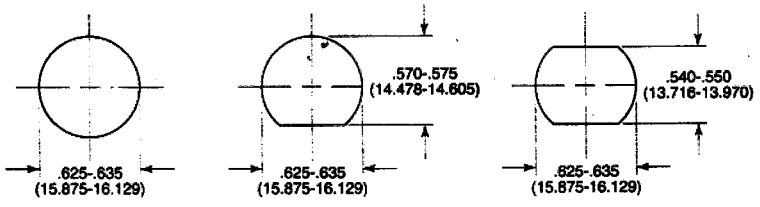
SWITCHABLE TYPE



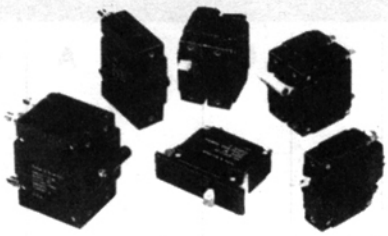


55-025B
INTERNAL TOOTH
PUSH-ON LOCKWASHER
For panels greater than .105" (2.67) thickness

RECOMMENDED PANEL CUTOUTS



Note: 1. Soldering to terminals is not recommended.
2. Recommended Panel Thickness: Style Q: .032" - .062" (.813 mm - 1.574 mm)
Style T: .075" - .105" (1.905 mm - 2.667 mm)
3. Internal tooth push-on washer available for panel thickness not covered above. Part No. 55-025B.



W6/W9 series

MAGNETIC HYDRAULIC CIRCUIT BREAKERS

FEATURES

- Designed for the international market. UL Recognized, CSA Certified, and VDE approved.
- Ratings to 50 amps.
- Heavy duty #10-32 stud connections. (W9)
- Optional 10 amp auxiliary switch.
- Single toggle actuation of multipole units. (W6)
- Optional snap-in mounting. (W6)
- Variety of circuit functions.
- Several delay curve options.

AGENCY APPROVALS

UL: Recognized as Supplementary Protector under UL 1077. File E69543.
CSA: Certified as a Supplementary Protector. File LR15734.
VDE: Approved to VDE 0642/EN 60 934 (Circuit Breakers for Equipment) License No. 73782.

ELECTRICAL DATA

Auxiliary Switch: See Auxiliary Switch Ratings Table 2 for details.
Calibration: Breakers will hold 100% of rated current. Breakers may trip between 101% and 124% of rated load (149% for 400 Hz. units and 134% for AC/DC units). Breakers must trip at 125% of rated load and above (150% for 400 Hz. units and 135% for AC/DC units).
Dielectric Strength: 50/60 or 400 Hz., 1500V: DC, 1100V.
Insulation Resistance: 100 Megohms at 500VDC.
Endurance: 10,000 on/off cycles - 6000 at rated load, 4000 at no load. Units tested at six cycles per minute, 1 second on and 9 seconds off at 25°C ambient.

TYPICAL RESISTANCE AND IMPEDANCE

Current (Amps)	DC Resistance (Ohms)	50/60 Hz. Impedance (Ohms)	400 Hz. Impedance (Ohms)
0.2	90	90	180
1.0	1.2	1.2	2.0
2.0	0.28	0.28	0.50
5.0	0.04	0.04	0.05
10.0	0.013	0.013	0.025
20.0	0.004	0.005	0.0065
30.0	0.0027	0.004	0.004
40.0	0.002	0.002	0.003
50.0	0.0015	0.0015	0.0025

Tolerance: 0.1 - 4.99 ± 15%; 5 - 9.99 ± 20%; 10 - 15 ± 25%; 16 - 30 ± 50%.

MECHANICAL/ENVIRONMENTAL DATA

Operating Temperature: -40°C to +85°C.
Humidity: Meets requirements of Mil-STD-202 method 103.
Shock: Tested per Mil-STD-202, method 213, test condition C (100 g @ 6 ms).
Vibration: Tested per Mil-STD-202, method 201, 10-55 Hz., 0.06" (1.52 mm) total excursion in 2 planes.
Fungus And Moisture Resistance: Special moisture resistant finish applied to all ferrous parts. Plastic parts are made of inherently fungus resistant material.
Marking: W6 units have ON and OFF molded on the rocker of rocker actuated units (rocker actuated VDE units have international "1" and "0"). W9 units have ON and OFF molded into the area at the base of the toggle. International "1" and "0" symbols are marked on the toggle for both W6 and W9.
Mounting: Panel mounted units are mounted with two #6-32 screws from the front of the panel. Metric models for use with M3 x 0.5 screws are available. Units with snap-in mounting option snap through the front of the panel. To maintain published performance specifications, units should not be mounted more than 90° from their normal upright position.
Weight: Approximately 2.5 ounces per pole.

APPROVALS AND RATINGS TABLE 1

W6 Series — **UL/CSA (All Circuit Functions)**

Maximum Voltage	Frequency (Hz)	Phase	Current Rating (Amps)	Interrupting Capacity (Amps)
65	DC	-	0.2 - 50	2,000
277	50/60	1	0.2 - 20	5,000
277	50/60	1	21 - 50	2,500
277/480	50/60	3Ø-Wye	0.2 - 20	5,000
250	400	1	0.2 - 20	2,500
250	400	1	21 - 50	1,250
250	400	3Ø-Wye	0.2 - 20	2,500

W9 Series — **UL/CSA (All Circuit Functions)**

Maximum Voltage	Frequency (Hz)	Phase	Current Rating (Amps)	Interrupting Capacity (Amps)
65	DC	-	0.2 - 50	2,000
277	50/60	1	0.2 - 50	5,000
277/480	50/60	3Ø-Wye	0.2 - 20	5,000
250	400	1	0.2 - 50	2,500
250	400	3Ø-Wye	0.2 - 50	2,500

W6 Series — **VDE (Circuit Functions B, X)**

Maximum Voltage	Frequency (Hz)	Phase	Current Rating (Amps)	Interrupting Capacity (Amps)
65	DC	-	0.2-50	2,000
250	50/60	1	0.2-30	5,000
250	50/60	1	31-50	2,000
415/240	50/60	3Ø	0.2-30	5,000

W9 Series — **VDE(Circuit Functions B, X)**

Maximum Voltage	Frequency (Hz)	Phase	Current Rating (Amps)	Interrupting Capacity (Amps)
65	DC	-	0.2-50	2,000
250	50/60	1	0.2-30	5,000
250	50/60	1	31-50	2,000
415/240	50/60	3Ø	0.2-30	5,000

AUXILIARY SWITCH RATINGS TABLE 2

UL/CSA

Switch Number	Voltage 50/60 Hz.	Current (Amps)	Terminals WxTxL
A	125	10	.093 x .020 x .250 (2.36 x .51 x 6.40)
B	125	10	.110 x .020 x .344 (2.79 x .51 x 8.74)
C	125	10	.187 x .020 x .305 (4.74 x .51 x 7.74)

VDE

Switch Number	Voltage 50/60 Hz.	Current (Amps)	Terminals WxTxL
V1	250	10	.110 x .020 x .280 (2.79 x .51 x 7.11)
V2	250	5	.110 x .020 x .280 (2.79 x .51 x 7.11)
V3	250	0.1	.110 x .020 x .280 (2.79 x .51 x 7.11)

ORDERING INFORMATION

W6 Series

Typical Part No. ➤ | W | 67- | X | 2 | Q | 1 | 2- | 20

1. CIRCUIT BREAKER MOUNTING:
W = #6-32 mounting threads.
M = M3.0 x 0.5 mounting threads.
X = Snap-in mounting. (Not available in actuator per unit or rocker actuated models.)

2. NUMBER OF POLES:
67 = Single pole 68 = Two pole 69 = Three pole 70 = Four pole

3. CIRCUIT FUNCTION: (Only B and X are VDE approved)
A = Series trip with auxiliary switch (.093" QC)
B = Series trip with auxiliary switch (.110" QC)
C = Series trip with auxiliary switch (.187" QC)
M = Dual coil shunt trip
P = Dual coil relay trip (Step 6A required)
R = Relay trip
S = Shunt trip
X = Series trip
Note: Circuit functions A, B, M and P will appear on left pole only of multiple pole units. For switch only units,

4. ACTUATOR:
One actuator per pole:
1 = Black toggle 4 = White rocker 9 = Red toggle
2 = White toggle 5 = Red rocker
3 = Black rocker 6 = Grey rocker
One actuator per unit:
7 = Black toggle J = Black rocker M = Grey rocker
8 = White toggle K = White rocker
A = Red toggle L = Red rocker
Note: Use one actuator per pole for single pole and all snap-in models.

5. TERMINATION:
Q = .250" QC (DIN 46 244) 25A Max. VDE S = #8-32 screw T = #10-32 screw
Note: "T" termination must be used for all ratings of 31 amps or above.

6. MAXIMUM LINE VOLTAGE: (See Table 1 for current ranges)
UL/CSA TYPES
1 = 277VAC, 50/60 Hz.
2 = 277/480
3 = 250VAC, 400 Hz.
5 = 65VDC
7 = AC/DC 277VAC or 65VDC
(Delay curve 34 must be specified.)
VDE TYPES
1 = 250VAC, 415/240VAC
5 = 65VDC
7 = AC/DC 250VAC, 415/240VAC, 65VDC
(Delay curve 34 must be specified.)

6A. VOLTAGE COIL RATINGS FOR CIRCUIT FUNCTION "P" (Step 3) ONLY:
0 = 240VAC, 50/60 Hz. 2 = 48VAC, 50/60 Hz. 4 = 12VAC, 50/60 Hz. 6 = 48VDC 8 = 12VDC
1 = 120VAC, 50/60 Hz. 3 = 24VAC, 50/60 Hz. 5 = 6VAC, 50/60 Hz. 7 = 24VDC 9 = 6VDC

7. TIME DELAY CURVE:
0 = Instantaneous
2 = Standard delay
3 = Short delay
53 = DC high inrush
10 = AC high inrush (Motor start)
12 = AC high inrush version of #2
13 = AC high inrush version of #3
34 = Combination AC/DC standard delay
Notes: Curves may be specified with increased pulse tolerance for 1/2 cycle by adding "P" after curve. See delay curve section for availability and details. Curves 10,12, 13 and 53 not available with circuit functions "M" and "P".

8. AMP RATING:

0.20	0.50	1.0	2.0	3.0	4.0	6.0	7.5	9.0	11.0	15.0	25.0	35.0	45.0
0.25	0.75	1.5	2.5	3.5	5.0	7.0	8.0	10.0	12.0	20.0	30.0	40.0	50.0

Consult factory for other values.

9. VDE APPROVAL: (See Table 2 for auxiliary switch ratings)
Blank = UL/CSA approved breaker
V = VDE approved breaker without auxiliary switch
V1 = VDE approved breaker with 10 amp VDE auxiliary switch
V2 = VDE approved breaker with 5 amp VDE auxiliary switch
V3 = VDE approved breaker with 0.1 amp VDE auxiliary switch

ORDERING INFORMATION

W9 Series

Typical Part No. ➤ | W | 91- | X | 1 | 1 | 2- | 20

1. CIRCUIT BREAKER MOUNTING:
W = #6-32 mounting threads. M = M3.0 x 0.5 mounting threads.

2. NUMBER OF POLES:
91 = Single pole 92 = Two pole 93 = Three pole 94 = Four pole

3. CIRCUIT FUNCTION: (Only B and X are VDE approved)
A = Series trip with auxiliary switch (.093" QC)
B = Series trip with auxiliary switch (.110" QC)
C = Series trip with auxiliary switch (.187" QC)
M = Dual coil shunt trip
P = Dual coil relay trip (Step 5A required)
R = Relay trip
S = Shunt trip
X = Series trip
Note: Circuit functions A, B, M and P will appear on left pole only of multiple units. For switch only units,

4. ACTUATOR: (One actuator per pole):
1 = Black toggle 2 = White toggle

5. MAXIMUM LINE VOLTAGE: (See Table 1 for current ranges)
UL/CSA TYPES
1 = 277VAC, 50/60 Hz.
2 = 277/480
3 = 250VAC, 400 Hz.
5 = 65VDC
7 = AC/DC 277VAC or 65VDC
(Delay curve 34 must be specified.)
VDE TYPES
1 = 250VAC, 415/240VAC
5 = 65VDC
7 = AC/DC 250VAC, 415/240VAC, 65VDC
(Delay curve 34 must be specified.)

5A. VOLTAGE COIL RATINGS FOR CIRCUIT FUNCTION "P" (Step 3) ONLY:
0 = 240VAC, 50/60 Hz. 2 = 48VAC, 50/60 Hz. 4 = 12VAC, 50/60 Hz. 6 = 48VDC 8 = 12VDC
1 = 120VAC, 50/60 Hz. 3 = 24VAC, 50/60 Hz. 5 = 6VAC, 50/60 Hz. 7 = 24VDC 9 = 6VDC

6. TIME DELAY CURVE:
0 = Instantaneous
2 = Standard delay
3 = Short delay
53 = DC high inrush
10 = AC high inrush (Motor start)
12 = AC high inrush version of #2
13 = AC high inrush version of #3
34 = Combination AC/DC standard delay
Notes: Curves may be specified with increased pulse tolerance for 1/2 cycle by adding "P" after curve. See delay curve section for availability and details. Curves 10, 12, 13 and 53 not available with circuit functions "M" and "P".

7. AMP RATING:

0.20	0.75	2.0	3.5	6.0	8.0	11.0	20.0	35.0	50.0
0.25	1.0	2.5	4.0	7.0	9.0	12.0	25.0	40.0	
0.50	1.5	3.0	5.0	7.5	10.0	15.0	30.0	45.0	

8. VDE APPROVAL: (See Table 2 for auxiliary switch ratings)
Blank = UL/CSA approved breaker
V = VDE approved breaker without auxiliary switch
V1 = VDE approved breaker with 10 amp VDE auxiliary switch
V2 = VDE approved breaker with 5 amp VDE auxiliary switch
V3 = VDE approved breaker with 0.1 amp VDE auxiliary switch

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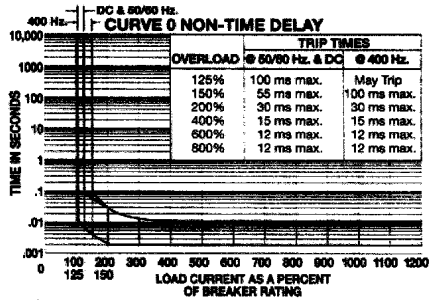
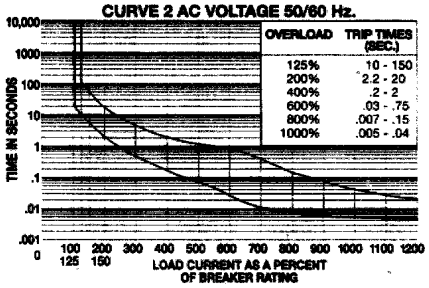
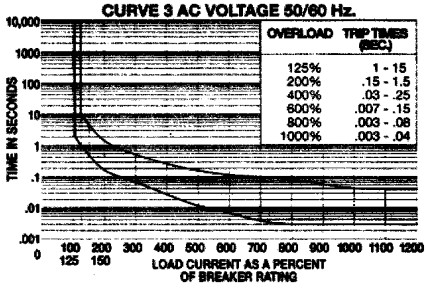
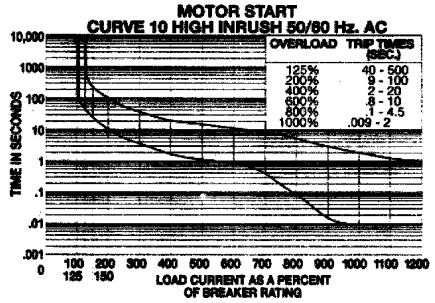
TIME VS. CURRENT TRIP CURVES FOR W6 SERIES AND W9 SERIES

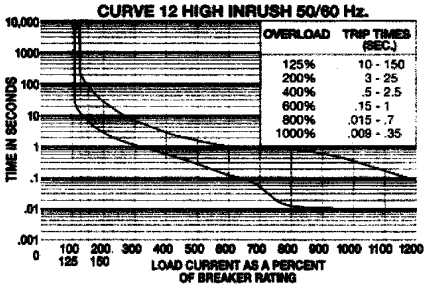
AC 50/60 Hz.

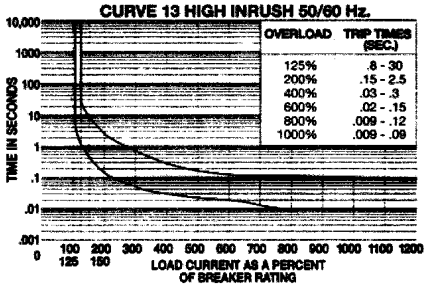




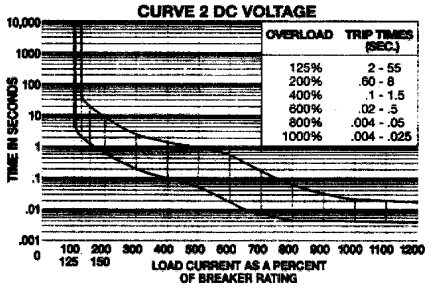


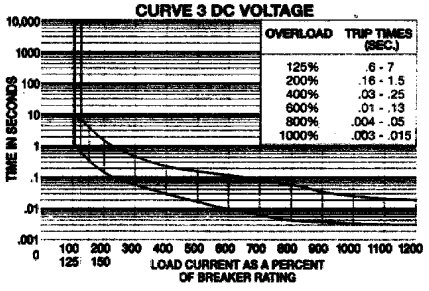


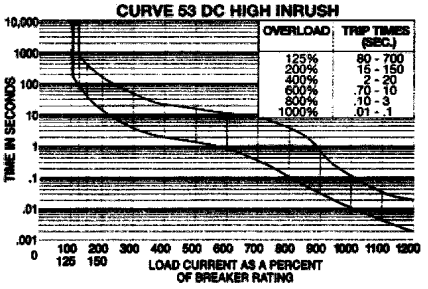




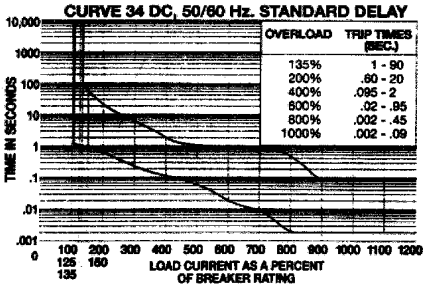
DC



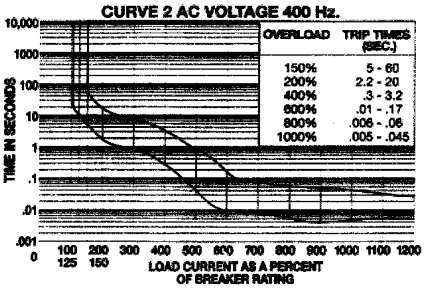


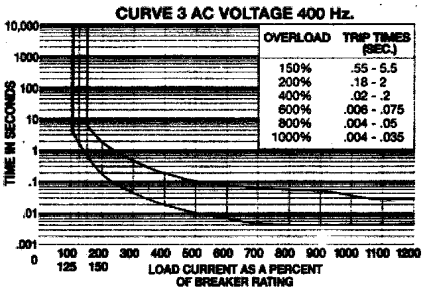


AC/DC



AC 400 Hz.





Note:
For instantaneous curves for all voltages refer to Curve 0 Non-Time Delay under the AC 50/60 Hz. heading.

PULSE TOLERANCE SPECIFICATIONS

Pulse tolerance is defined as a single pulse of a half sine wave (1/2 cycle or 8 milliseconds) that will not trip the breaker. An inertia wheel for increased pulse tolerance is available by specifying "P" after the time delay curve number in the ordering information. The table at right lists pulse tolerance values of standard and inertia delay models.

Voltage	Time Delay Curve	Pulse Tolerance Value	
		Standard	Inertia Delay
AC 50/60 Hz.	2	7.5	18
	3	6	18
	10	18	30
	12	18	30
	13	18	30
AC 400 Hz.	2	6.5	18
	3	5.5	18

To determine pulse tolerance multiply breaker rating by value in table. For example, a 2A breaker with time delay curve 3 has a standard pulse tolerance of 12A (2A x 6). The same breaker with an inertia delay has a pulse tolerance of 36A (2A x 18).

STOCK ITEMS - The following items are normally maintained in stock for immediate delivery.

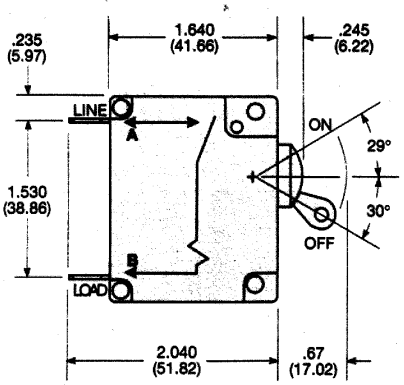
W67-A2Q12-5	W67-X2Q13-1	W67-X2Q52-15	W68-X2Q12-30	W69-X2Q110-30
W67-A2Q12-10	W67-X2Q13-2	W67-X2Q52-20	W68-X2Q13-10	
W67-X2Q10-3	W67-X2Q13-3	W67-X2Q52-30	W68-X2Q13-15	
W67-X2Q10-5	W67-X2Q13-10	W67-X2Q110-15	W68-X2Q110-20	
W67-X2Q12-2	W67-X2Q13-15	W67-X2Q110-20	W68-X2Q110-30	
W67-X2Q12-3	W67-X2Q13-20	W68-X2Q12-3	W69-X2Q12-5	
W67-X2Q12-5	W67-X2Q13-25	W68-X2Q12-5	W69-X2Q12-10	
W67-X2Q12-7	W67-X2Q13-30	W68-X2Q12-7	W69-X2Q12-15	
W67-X2Q12-10	W67-X2Q50-5	W68-X2Q12-10	W69-X2Q12-20	
W67-X2Q12-15	W67-X2Q50-10	W68-X2Q12-15	W69-X2Q12-25	
W67-X2Q12-20	W67-X2Q52-5	W68-X2Q12-20	W69-X2Q12-30	
W67-X2Q12-30	W67-X2Q52-10	W68-X2Q12-25	W69-X2Q110-20	

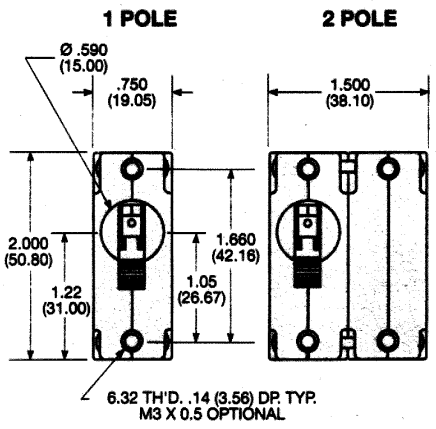
STOCK ITEMS - The following items are normally maintained in stock for immediate delivery.

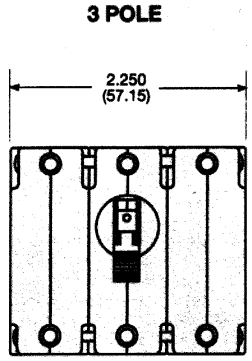
W91-X112-1	W91-X113-5	W91-X1110-20	W92-X112-30	W93-X112-20
W91-X112-2	W91-X113-10	W92-X112-1	W92-X112-40	W93-X112-25
W91-X112-3	W91-X113-15	W92-X112-2	W92-X112-50	W93-X112-30
W91-X112-5	W91-X150-5	W92-X112-3	W92-X113-15	W93-X112-40
W91-X112-7	W91-X152-10	W92-X112-5	W92-X113-20	W93-X112-50
W91-X112-10	W91-X152-15	W92-X112-7	W92-X1110-20	W93-X1110-20
W91-X112-15	W91-X152-20	W92-X112-10	W92-X1110-30	W93-X1110-30
W91-X112-20	W91-X152-30	W92-X112-15	W93-X112-5	
W91-X112-40	W91-X152-40	W92-X112-20	W93-X112-10	
W91-X112-50	W91-X152-50	W92-X112-25	W93-X112-15	

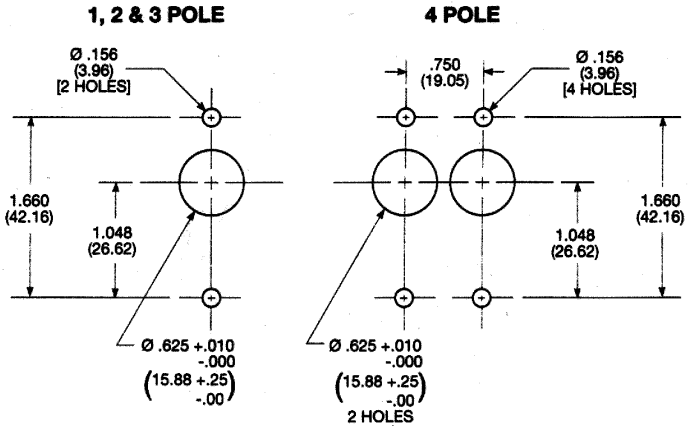
OUTLINE DIMENSIONS - Actuator per unit

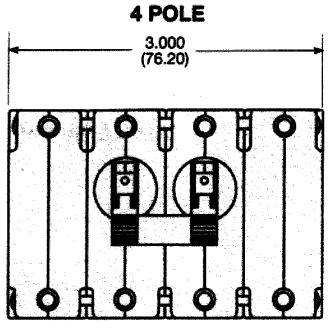
W6 Series







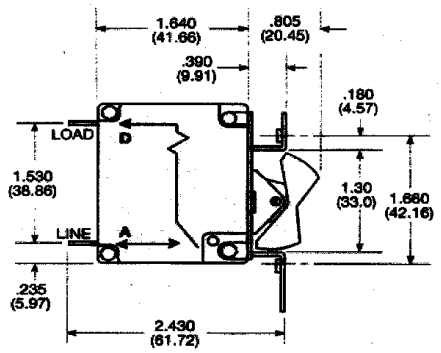




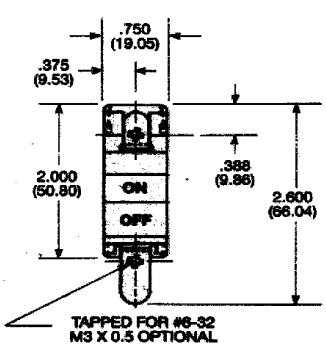
Note:
Multi-Actuator models furnished with separate handle tie hardware.

OUTLINE DIMENSIONS - Toggle Actuator Models

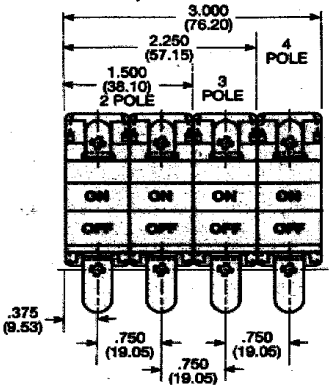
W6 Series



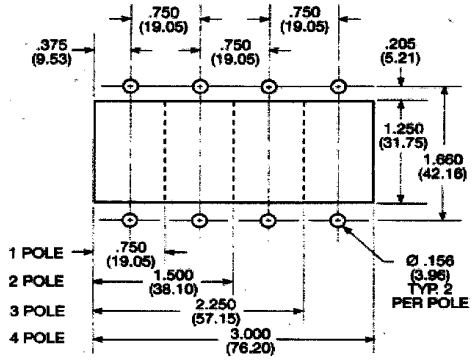
1 POLE



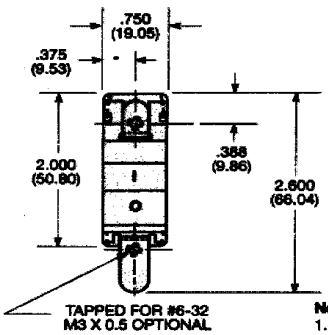
2, 3 & 4 POLE



PANEL MOUNTING CUTOUT



VDE ROCKER MARKING

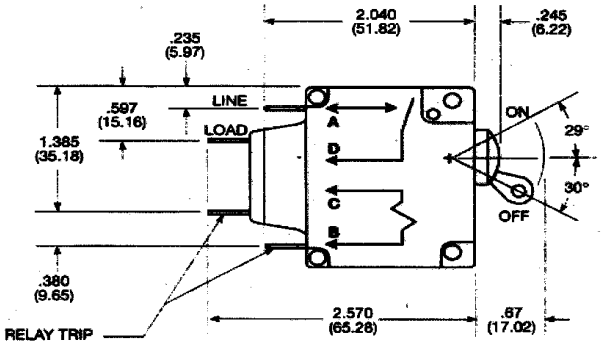


Notes:
1. Outline drawing tolerance ± .015 (.38) unless noted. Dimensions in brackets ( ) are in millimeters.
2. Mounting Detail Tol.: ± .005 (.13) unless noted

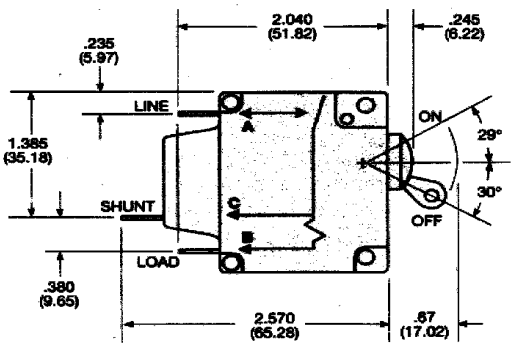
OUTLINE DIMENSIONS - Optional Circuit Configurations

W6 Series

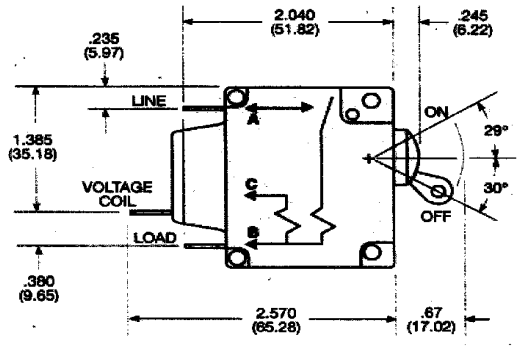
RELAY TRIP MODELS



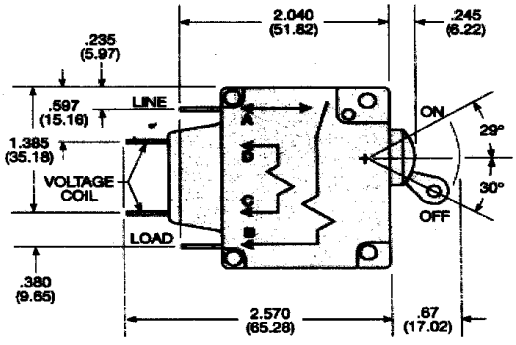
SHUNT TRIP MODELS



DUAL COIL SHUNT TRIP MODELS



DUAL COIL RELAY TRIP MODELS

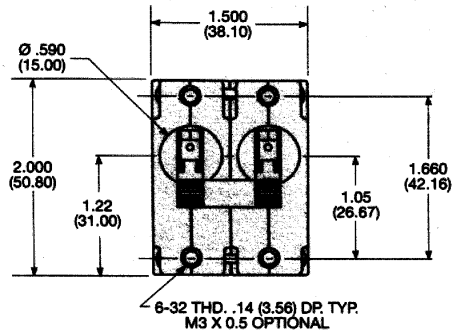


Notes:
1. The voltage coil on dual coil units is rated for intermittent duty. The voltage coil should be energized no longer than 300 milliseconds.
2. Outline drawing tolerance ± .015 (.38) unless noted. Dimensions in brackets ( ) are in millimeters.

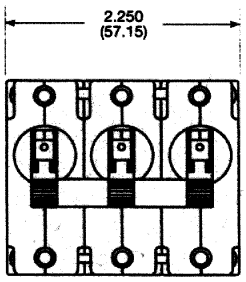
OUTLINE DIMENSIONS - Actuator per pole

W6 Series

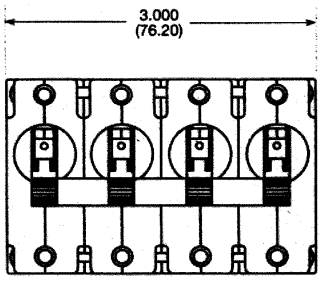
2 POLE



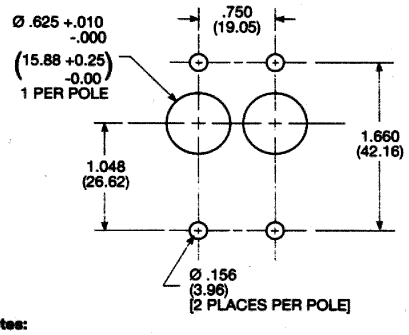
3 POLE



4 POLE

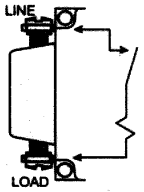


PANEL MOUNTING CUTOUT

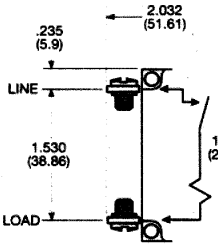


SERIES TRIP

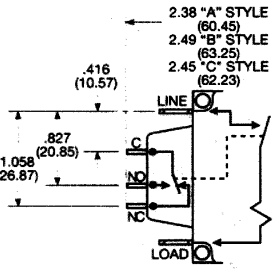
VDE MODELS W/SCREW TERMINALS



UL/CSA MODELS W/SCREW TERMINALS



UL/CSA/VDE MODELS W/AUX. SWITCH

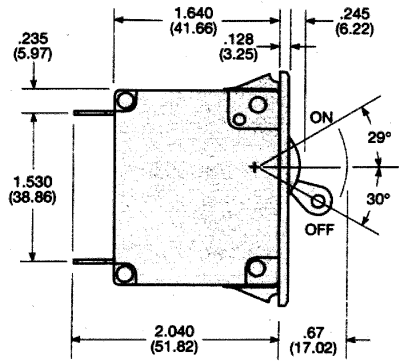


Notes:

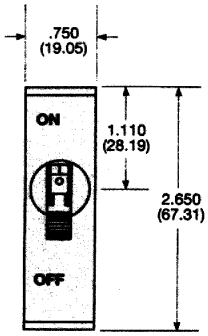
1. Terminal protrusion dimensions are referenced from back of mounting panel.
2. Main terminals are male quick connect type .250 (6.35) wide x .031 (.79) thick x .377 (9.58) long. Optional 8-32 x .250 (6.35) or 10-32 x .250 (6.35) screw type.
3. Panel mounting cutout detail mtg. detail tol.: ± .005 (.13) unless noted. Add additional cutouts to correspond to number of poles. Outline drawing tolerance ± .015 (.38) unless noted. Dimensions in brackets ( ) are in millimeters.

OUTLINE DIMENSIONS - Snap-in Mounted Models

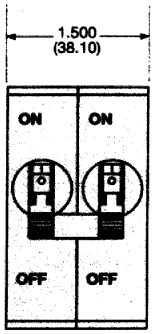
W6 Series



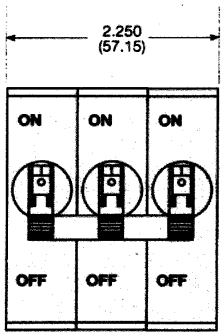
1 POLE



2 POLE

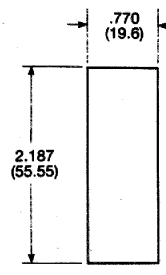


3 POLE

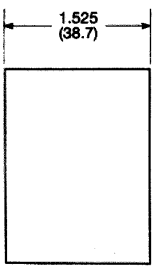


PANEL MOUNTING CUTOUT

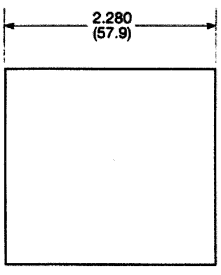
1 POLE



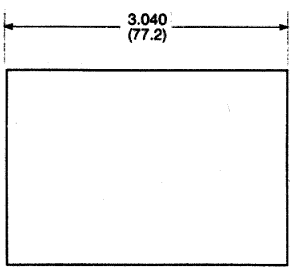
2 POLE



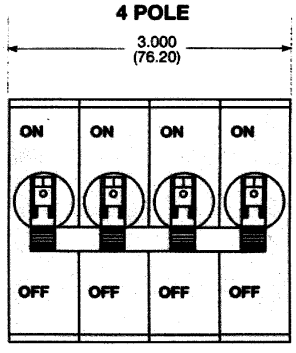
3 POLE



4 POLE



4 POLE



Notes:
Mounting Detail Tol.: ± .005 (.13) unless noted
Panel Thickness: .047 (1.2) to .110 (2.8)

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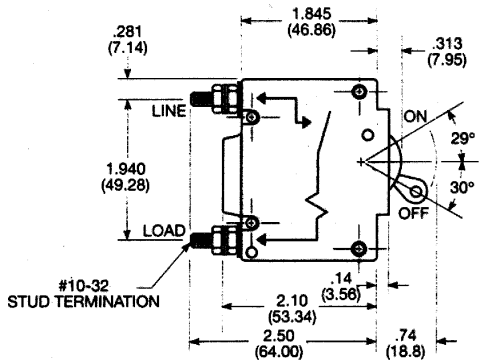
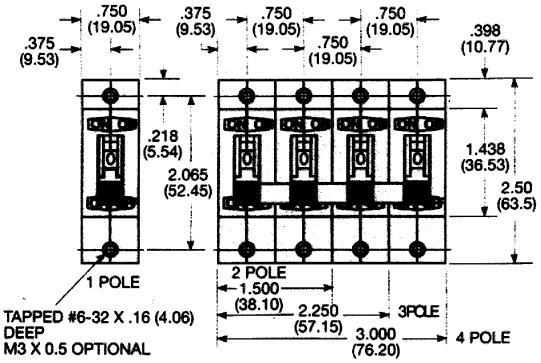
OUTLINE DIMENSIONS

W9 Series

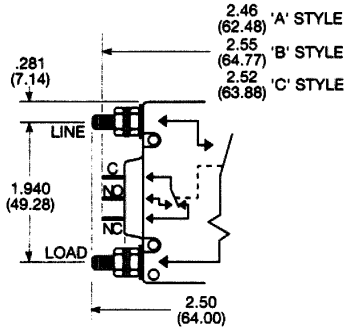
SERIES TRIP MODEL



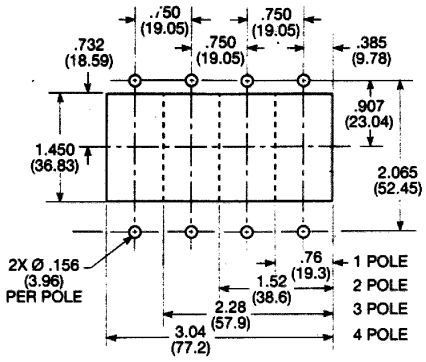
SERIES TRIP MODEL



SERIES TRIP MODEL WITH COMMON ENCLOSED AUXILIARY SWITCH



PANEL MOUNTING CUTOUT DETAIL



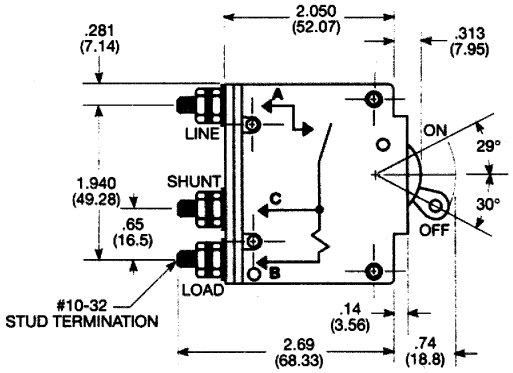
Notes:

1. Terminal protrusion dimensions are referenced from the back of the mounting panel.
2. Mounting detail tolerance ±.005 (13) unless noted.
3. Outline drawing tolerance ± .015 (.38) unless noted. Dimensions in brackets ( ) are in millimeters.

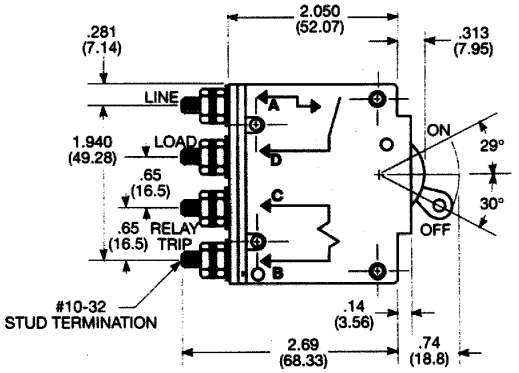
OUTLINE DIMENSIONS – Optional circuit configurations

W9 Series

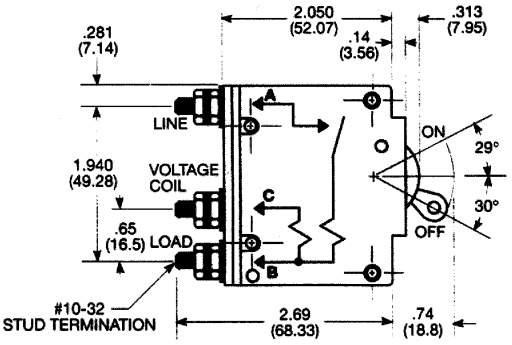
SHUNT TRIP MODELS



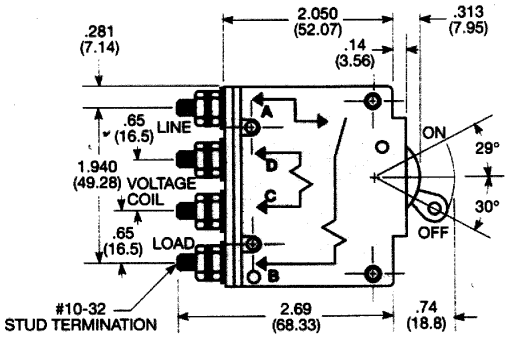
RELAY TRIP MODELS



DUAL COIL SHUNT TRIP MODELS



DUAL COIL RELAY TRIP MODELS

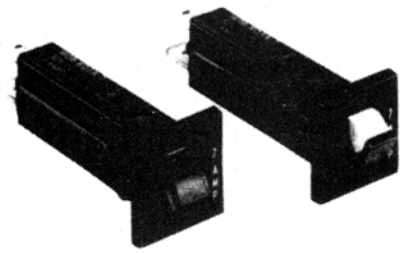


Note:
Outline drawing tolerance ± .015 (.38) unless noted.
Dimensions in brackets ( ) are in millimeters

SWITCHABLE VERSION NOW AVAILABLE

W28 series

SWITCHABLE OR PUSH TO RESET FUSEHOLDER-TYPE THERMAL CIRCUIT BREAKER



Note: Some approvals pending for switchable type.

6 CIRCUIT BREAKERS & FUSES

FEATURES

- Switchable version combines on-off switch and circuit protection in a single unit.
- Approved to many international standards (push to reset type).
- Replaces slow blow glass cartridge fuse.
- Labor-saving snap-in mounting.
- Button extends for visual trip indication on push to reset model.
- Rocker on switchable model moves to "overload" position upon trip.

AGENCY APPROVALS

W28 series is UL 1077 Recognized as Supplementary Protectors, File E69543, and CSA Certified as Appliance Component Protectors, File LR15734. W28 breakers have been issued Certificate of Suitability CS2190N as supplementary Equipment Protectors by the Energy Authority of New South Wales, Australia. W28 breakers are also DEMKO (Denmark) and SEV (Switzerland) approved. VDE approved for use in office equipment and provides 8mm isolation. 20 amp models do not have VDE, DEMKO and SEV approvals at present. W28-S is UL 1077 Recognized, with other approvals pending.

Resettable Overload Capacity: Six times rated current for 0.25 through 2 amp models. Ten times rated current for 3 through 20 amp models.

Reset Time: 180 seconds max. for 0.25 through 2 amp models. 10 to 60 seconds for 3 through 20 amp models.

TYPICAL RESISTANCE VS. CURRENT RATING @ +25° C

Current Rating in Amps	Typical Resistance in Ohms	Current Rating in Amps	Typical Resistance in Ohms
0.25	14.0	8.0	0.016
0.50	3.55	9.0	0.014
0.75	2.0	10.0	0.011
1.0	0.89	11.0	0.01
2.0	0.17	12.0	0.009
3.0	0.069	13.0	0.009
4.0	0.043	14.0	0.007
5.0	0.030	15.0	0.007
6.0	0.026	16.0	0.007
7.0	0.017	20.0	0.006

ELECTRICAL DATA @ 25°C

Calibration: Will continuously carry 100% of rating.
3-20 amp models – may trip between 101% and 134%, but must trip at 135% of rating within one hour at +25°C.
0.25-2 amp models – may trip between 101% and 174%, but must trip at 175% of rating within one hour at +25°C.

Dielectric Strength: Over 1,500 volts RMS.

Maximum Operating Voltages: 32VDC; 250VAC, 50/60 Hz.

Interrupt Capacity: 1,000 amps at 250VAC, 50/60 Hz. and 32VDC in accordance with UL standard 1077.

MECHANICAL/ENVIRONMENTAL DATA

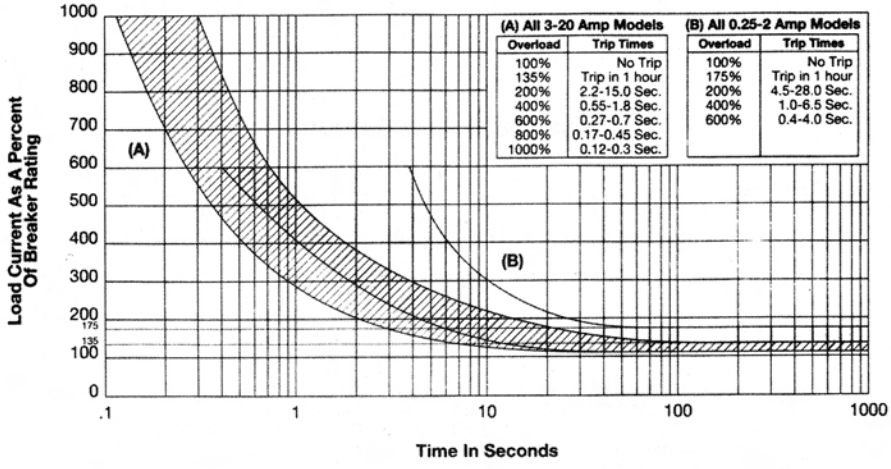
Endurance Cycling(switchable type): Typically 30,000 operations at 100% of rating.

Termination: .250" (6.35 mm) quick connects. Soldering to terminals is not recommended.

Mounting: Snaps into panel from front. See Recommended Panel Cutouts.

Approximate Weight: 0.35 oz. (10 g).

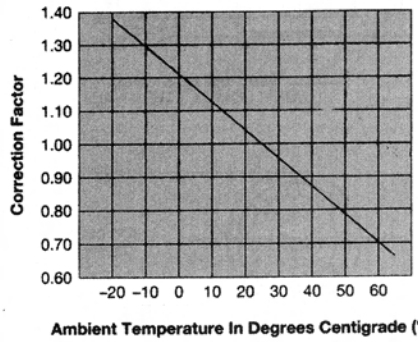
TIME VS. CURRENT TRIP CURVE @ +25°C



(A) All 3-20 Amp Models	
Overload	Trip Times
100%	No Trip
135%	Trip in 1 hour
200%	2.2-15.0 Sec.
400%	0.55-1.8 Sec.
600%	0.27-0.7 Sec.
800%	0.17-0.45 Sec.
1000%	0.12-0.3 Sec.

(B) All 0.25-2 Amp Models	
Overload	Trip Times
100%	No Trip
175%	Trip in 1 hour
200%	4.5-28.0 Sec.
400%	1.0-6.5 Sec.
600%	0.4-4.0 Sec.

AMBIENT COMPENSATION CHART



TO USE THIS CHART: Read up from the ambient temperature to the curve, and across to find a correction factor. Multiply the breaker rating by the correction factor to determine the compensated rating. Calculate the overloads in terms of the compensated rating to use the published trip curve.

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ORDERING INFORMATION

Typical Part No. ➤	W	28	-X	Q	1	A	-5

1. DESIGNATOR:
W = Circuit breaker

2. SERIES NUMBER:
28 = Single Pole Fuseholder Type

3. CIRCUIT FUNCTION:
X = Series Trip, Push-to-Reset Button S = Series Trip, Switchable Rocker

4. TERMINAL TYPE AND MOUNTING:
Q = .250" (6.35 mm) Quick Connect will mount in .032"-.062" (.813 mm – 1.574 mm) thick panel.
T = .250" (6.35 mm) Quick Connect will mount in .075"-.105" (1.905 mm – 2.667 mm) thick panel.
For panel thicknesses other than above, order "Q" type and 55-025B Internal Tooth Push-On Lockwasher.

5. BEZEL COLOR:
1 = Black with White Rate Marking † 11 = Black with No Rate Marking
2 = Red with Black Rate Marking † 21 = Red with No Rate Marking † Not available with Circuit Function "S".
B = Black with White "Reset" Marked On Bezel (No Rate Marking) †

6. BUTTON COLOR:
A = Black
B = Red

7. AMP RATING:

0.25†	1†	4	7	10	13	16
0.50†	2†	5	8	11	14	20*
0.75†	3	6	9	12	15	

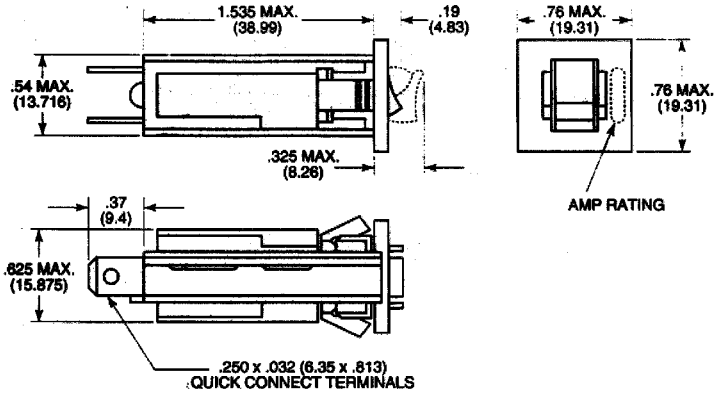
† Not available with Circuit Function "S".

STOCK ITEMS – The following items are normally maintained in stock for immediate delivery.

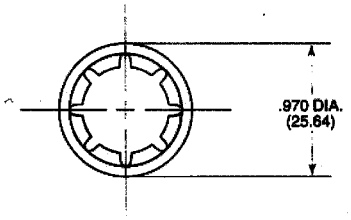
W28-SQ11A-3	W28-SQ11A-12	W28-XQ1A-0.75	W28-XQ1A-4	W28-XQ1A-8	W28-XT1A-10
W28-SQ11A-5	W28-SQ11A-15	W28-XQ1A-1	W28-XQ1A-5	W28-XQ1A-10	W28-XT1A-12
W28-SQ11A-8	W28-XQ1A-0.25	W28-XQ1A-2	W28-XQ1A-6	W28-XQ1A-12	
W28-SQ11A-10	W28-XQ1A-0.50	W28-XQ1A-3	W28-XQ1A-7	W28-XQ1A-15	

OUTLINE DIMENSIONS

PUSH-TO-RESET TYPE

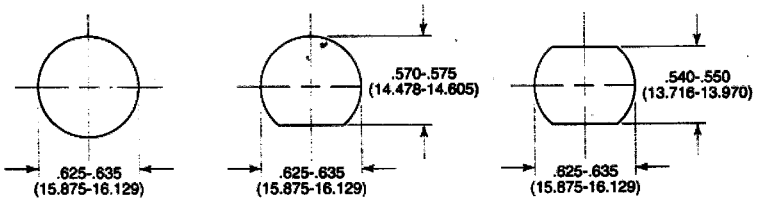


SWITCHABLE TYPE



55-025B
INTERNAL TOOTH
PUSH-ON LOCKWASHER
For panels greater than .105" (2.67) thickness

RECOMMENDED PANEL CUTOUTS



Note: 1. Soldering to terminals is not recommended.
2. Recommended Panel Thickness: Style Q: .032" - .062" (.813 mm - 1.574 mm)
Style T: .075" - .105" (1.905 mm - 2.667 mm)
3. Internal tooth push-on washer available for panel thickness not covered above.
Part No. 55-025B.