

Products :: Circuit Protection :: Hydraulic/Magnetic Circuit Breakers



Product Type Miniature Hydraulic/Magnetic Circuit Breaker

Product Series M-Series

The M-Series miniature hydraulic/magnetic circuit breakers are designed for those demanding applications where space, aesthetics and snap-in front panel mounting are important. These circuit breakers are available in a choice of rocker actuator

styles and colors, including paddle and baton style handle actuators, push-to-reset and push-pull pushbutton actuators, Visi-Rocker two color actuators as well as non-illuminated or illuminated rocker versions with LED or neon bulbs. The exclusive Rockerguard bezel helps prevent inadvertent actuation. Wiping contact design insures long term reliability. Various styling options allow design flexibility. M Series circuit breakers are offered in 1 & 2 poles, 0.02 to 30 amps, up to 250VAC or 80VDC. They are available with a choice of time delays, terminals, panel hardware, actuator styles, colors, & imprinting.

Series PDF eLibrary	M-Series Cir. Breaker PDF (3.0 MB) Cir. Breaker Time Delays for M-Series (2.3 MB) Cir. Breaker Accessories PDF (49.5 KB)
Certifications	UL recognized, CSA, VDE, TUV, UL489A Listed (Telecom)
Number of Poles	1 & 2 poles
Available Delays	Instant, Short, Medium - AC/DC, Hi-Inrush
Maximum Current and Voltage Ratings	0.02-15FLA, 32VDC, 125VAC, 1 pole 15.1-25GPA, 32VDC, 125VAC, 1- pole 0.02-15FLA, 65VDC, 250VAC, 2- pole 15.1-25GPA, 65VDC, 250VAC, 2- pole 0.02-12FLA, 250VAC, 1-pole 0.02-7.5GPA, 50VDC, 1-pole 0.02-30GPA, 65VDC, 80VDC, 1
Maximum Interrupting Capacity	1,000A @ 65VDC, 2-pole 1,000A @ 32VDC, 1-pole 1,000A @ 250VAC, 2-pole 1,000A @ 125VAC, 1-pole 600A @ 80VDC
Auxiliary Switch Ratings	7A @ 250VAC 0.1A @ 125VAC (gold contacts) 7A (Res.) @ 28VDC 4A (Ind.) @ 28VDC 0.25A @ 80VDC
Available Circuits	Series and Switch Only

Actuator Style	Solid Color Angled Rocker Solid Color Flat Rocker Two Color Visi-Rocker Illuminated Angled Rocker Illuminated Flat Rocker Solid Color Paddle Solid Color Baton Solid Color Push-to-Reset Pushbutton Solid Color Push-Pull Pushbutton
Terminal Options	.250 QC Tabs 8-32 Screw w/ Upturned Lugs 8-32 Screw (Bus Type) Push in Stud Terminals
Mounting Method	Snap-in Front Panel
Value Added	Custom colors Non-standard current ratings Panel hole plug available Amp markings for pushbutton actuators and more



Agency Certifications

UL Recognized

UL Standard 1077

71

Component Recognition Program as Protectors, Supplementary (Guide

UL Listed

UL Standard 489A



CCN/QVNU2, File E75596)

Communications Equipment (Guide CCN/DITT, File E189195)

The low cost M-Series utilizes the hydraulic magnetic principle which provides accurate and reliable circuit protection even when exposed to extremely hot and/or cold application environments.

Available in a choice of rocker actuator styles and colors, push button, push-pull, paddle, and baton style handle actuators, the Visi-Rocker® two-color actuators as well as non-illuminated or illuminated rocker versions with LED or neon bulbs. The exclusive Rockerguard® bezel helps prevent inadvertent actuation. "Wiping" contact design insures long term reliability. Various styling options allow design flexibility.

Typical applications include power supplies, medical equipment, and telecommunications equipment. In addition, these breakers meet CSA Standard 22.2 No. 100 for the Generator & Welder markets.

CSA Accepted



Component Supplementary Protector under Class 3215 30, File 047848 0 000

CSA Standard C22.2 No. 235

VDE Certified



EN60934, VDE 0642 under File

10537

TUV Certified

EN60934, under License No. R9671109

Electrical

Table A: Lists UL Recognized and CSA Accepted configurations & performance capabilities as a Component Supplementary Protector.

	M-SERIES TABLE A: COMPONENT SUPPLEMENTARY PROTECTORS									
CIRCUIT	VOLTAGE			CURRENT RATING		POLES	SHORT CIRCUIT CAPACITY (AMPS)		APPLICATION CODES	
CONFIGURATION	MAX. RATING	FREQUENCY	PHASE	FULL LOAD AMPS	GENERAL PURPOSE AMPS	BREAKING	U L/ WITH BACKUP FUSE	CSA WITHOUT BACKUP FUSE	UL	CSA
	-00			0.02 - 15	_	1		1000	TC1,2, OL1, U1	TC1,2, OL1, U1
	32	DC			15.1 - 25	1		1000	TC1,2, OL0, U1	TC1,2, OL0, U1
	50 ²	DC		0.02 - 7.5	_	1		1000	TC1,2, OL0, U1	TC1,2, OL0, U1
	65	DC		0.02 - 15	_	2		1000	TC1,2, OL1, U1	TC1,2, OL1, U1
					15.1 - 25	2		1000	TC1,2, OL0, U1	TC1,2, OL0, U1
	65 ^{1,2}	DC		0.02 - 15	_	1		1000	TC1,2, OL1, U1	TC1,2, OL1, U1
					15.1 - 30	1	-	1000	TC1,2, OL0, U1	TC1,2, OL0, U1
	65	DC		0.02 - 15	ı	2	5000 ³	_	TC1,2, OL1, C1	TC1,2, OL1,C1
				-	15.1 - 25	2	5000 ³	_	TC1,2, OL0, C1	TC1,2, OL0, C1
SERIES	80 ¹	80 DC	-	0.02 - 15	ı	1	i	600	TC1,2, OL1, U1	TC1,2, OL1, U1
		DC			15.1 - 30	1	-	600	TC1,2, OL0, U1	TC1,2, OL0, U1
			1	0.02 - 15	1	1	-	1000	TC1,2, OL1, U1	TC1,2, OL1, U1
	125	50 / 60		-	15.1 - 30	1	i	1000	TC1,2, OL0, U1	TC1,2, OL0, U1
				1 - 30	ı	1	1	360	TC1,OL1,U2	TC3, OL1, U3
	250	50 / 60	1	0.02 - 12	ı	1	ì	1000	TC1,2, OL1, U1	TC1,2, OL1, U1
	250 ²	50 / 60	1	-	12.1 - 18	1	1000 ⁴	_	TC1,2, OL0, C1	TC1,2, OL0, C1
				0.02 - 15	-	2	-	1000	TC1,2, OL1, U1	TC1,2, OL1, U1
	250	50 / 60	1		15.1 - 30	2		1000	TC1,2, OL0, U1	TC1,2, OL0, U1
				1 - 30	_	1		360	TC1,OL1,U2	TC3, OL1, U3

NOTES FOR TABLE A

- Available only with Special Catalog Number. Consult Factory.
- Requires Branch Circuit Backup with a UL Listed type K-5 or RK-5 fuse rated 30 Amps maximum Requires Branch Circuit Backup with a UL Listed type K-5 or RK-5 fuse rated 60 Amps maximum

Electrical

Maximum Voltage 125/250 VAC 50/60 Hz, 80 VDC

(See Rating Tables.)

Current Ratings Standard current coils: 0.100, 0.250,

0.500, 0.750, 1.00 thru 15.0 in 1

amp increments, 18.0,

20.0, 25.0, 30.0. Other ratings avail-

able - see Ordering Scheme. SPDT; 7A 250VAC, 7A (Res)

28VDC, 4A (Ind.) 28VDC, 0.25A 80VDC (Res) (silver contacts), 0.1A

125VAC (gold contacts).

Insulation Resistance Minimum of 100 Megohms at 500

VDC.

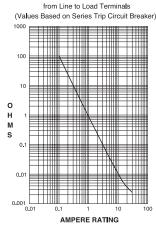
Dielectric Strength UL, CSA 1500V, 50/60 Hz for one

minute between all electrically isolated terminals. M-Series Circuit
Breakers comply with the 8mm
spacing and 3750 V 50/60Hz dielectric requirements from hazardous
voltage to operator accessible surfaces, per Publications IEC 380,
435, 950, EN 60950 and VDE 0805.
Values from Line to Load Terminal -

Resistance, Impedance

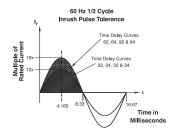
Auxiliary Switch Rating

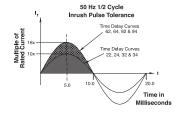
based on Series Trip Circuit Breaker.



CURRENT (AMPS)	TOLERANCE (%)
0.10 - 20.0	25%
20.1 - 30.0	35%

Pulse Tolerance Curves





Mechanical

Endurance 10,000 ON-OFF operations @ 6 per

minute with rated Current and

Voltage.

Trip Free All M-Series Circuit Breakers will trip

on overload, even when actuator is forcibly held in the ON position.

Trip Indication The actuator moves positively to the

OFF position when an overload causes the circuit breaker to trip.

Physical

Number of Poles 1 or 2

Internal Circuit Configurations Series with or without Auxiliary

Switch.

Switch Only with or without Auxiliary

Switch.

Weight Approximately 30 grams/pole

(Approximately 1.07 ounces/pole)

Standard Colors See Ordering Scheme.

Environmental

Salt Spray

Designed and tested in accordance with requirements of specifi-

cation MIL-PRF-55629 & MIL-STD-202 as follows:

Shock Withstands 100 Gs, 6ms, sawtooth

while carrying rated current per Method 213, Cond. I. Instantaneous curves tested at 80% of rated current.

Vibration Withstands 0.060" excursion from 10-

55 Hz, and 10 Gs 55-500 Hz, at rated current per Method 204C, Test Condition A. Instantaneous curves tested at 80% of rated current.

Moisture Resistance Method 106D, i.e., ten 24-hour cycles @ + 25°C to +65°C, 80-98% RH.

Method 101, Condition A (90-95% RH @ 5% NaCl Solution, 96 hrs).

Thermal Shock Method 107D, Condition A (Five

cycles @ -55°C to +25°C to +85°C

to +25°C).

Operating Temperature -40° C to +85° C

Chemical Resistance Only the outside surfaces of the case

and the handles may be cleaned with detergents or alcohol. Organic (hydrocarbon based) solvents are not recommended because they attack plastics. Caution should be taken when solvents are used to clean and remove flux from terminals. Lubricants should not be introduced into the han-

dle/bushing openings.



1 SERIES

2 ACTUATOR ¹

Non-Illuminated single color Angled В Flat

Two Color Visi-Rocker Indicate ON Indicate OFF

Illuminated sinale color Angled G Flat

	ROCKER STYLE DESCRIPTION (DUAL LEGEND SHOWN)								
STYLE	INDICATE - "ON"	INDICATE - "OFF"	FLAT (codeses o)	ANGLED (CODES-A & F)					
VERTICAL	UNE T	LINE	LINE T	LINE T					
HORIZONTAL	LINE	LINE	LINE	LINE					

3 POLES 1 One

Two

4 CIRCUIT 2

without Auxiliary Switch

Switch Only (No Coil), Maintained Contacts

Series Trip (Current)

with Auxiliary Switch, Silver Contacts

Switch Only, Maintained Contacts Q^{3, 4} Switch Only, Maintained Contacts R^{3, 16} Switch Only, Maintained Contacts Series Trip (Current) T3, 4 Series Trip (Current)

 $U^{3, 16}$ Series Trip, Maintained Contacts

with Auxiliary Switch, Gold Contacts Switch Only, Maintained Contacts

33, 16 Switch Only, Maintained Contacts 43,4

Series Trip (Current)

53, 16 Series Trip, Maintained Contacts

Terminal Type:

.060 Dia, Round Solder Turret .058 Dia, Round Q.C. .080 Dia x .020 Flat Q.C. .060 Dia, Round Solder Turret .058 Dia, Round Q.C. .080 Dia x .020 Flat Q.C.

.058 Dia, Round Q.C. .080 Dia x .020 Flat Q.C. .058 Dia. Round Q.C. .080 Dia x .020 Flat Q.C.

5 FREQUENCY & DELAY

03	DC 50/60Hz, Switch Only	34
10	DC Instantaneous	62
12	DC Short	64
14	DC Medium	72
20	50/60Hz Instantaneous	74
22	50/60Hz Short	92
24	50/60Hz Medium	94
30	DC, 50/60Hz Instantaneous	

DC, 50/60Hz Short DC, 50/60Hz Medium

50/60Hz Short, Hi-Inrush 50/60Hz Medium, Hi-Inrush DC, Short, Hi-Inrush

DC, Medium, Hi-Inrush DC, 50/60Hz Short, Hi-Inrush

DC, 50/60Hz, Medium, Hi-Inrush

6 CURRENT RATING (AMPERES)10

o Cur	KKENI K	ATING (AIVIE	EKES					ш
020	0.020	225	0.250	420	2.000	710	10.500	ı
025	0.025	230	0.300	522	2.250	611	11.000	ı
030	0.030	235	0.350	425	2.500	711	11.500	ı
035	0.035	240	0.400	527	2.750	612	12.000	ı
040	0.040	245	0.450	430	3.000	712	12.500	ı
045	0.045	250	0.500	435	3.500	613	13.000	ı
050	0.050	255	0.550	440	4.000	614	14.000	ı
055	0.055	260	0.600	445	4.500	615	15.000	ı
060	0.060	265	0.650	450	5.000	616	16.000	ı
065	0.065	270	0.700	455	5.500	617	17.000	ı
070	0.070	275	0.750	460	6.000	717	17.500	ı
075	0.075	280	0.800	465	6.500	618	18.000	ı
080	0.080	285	0.850	470	7.000	619	19.000	ı
085	0.085	290	0.900	475	7.500	620	20.000	ı
090	0.090	295	0.950	480	8.000	622	22.000	ı
095	0.095	410	1.000	485	8.500	624	24.000	ı
210	0.100	512	1.250	490	9.000	625	25.000	ı
215	0.150	415	1.500	495	9.500	630 ¹²	30.000	ı
220	0.200	517	1.750	610	10.000			

7 TERMINAL 10

Push-On 0.250 Tab (Q.C.) Screw 8-32 w/upturned lugs

Screw 8-32 (Bus Type)

Push-In Stud

Printed Circuit Board

8 ROCKER ILLUMINATION

Α		
Neon	Green Glow ⁸	
В	С	
Red	Green	Amber
D	G	K
E	Н	L
F	J	M
	В	B C Red Green D G E H

9 ACTUATOR & LEGEND COLOR

Solid Color	Actuator	Legend
1	White	Black
2	Black	White
3	Red	White
4	Green	White
5	Blue	White
6	Yellow	Black
7	Gray	Black
8	Orange	Black
Visi-Rocker ⁶	Visi & Legend (remainder of	rocker same color as bezel)
1	White	
2	Black	
3	Red	
4	Green	
5	Blue	

Yellow Gray Orange Illuminated 8 Legend Actuator Clear White Red Transparent White B C D Green Transparent White Amber Transparent White E Smoke Gray Transparent White White Translucent Black

10 LEGEND¹

1	No Legend	5	I - O Horizontal
2	ON - ŎFF Vertical	6	Dual Vertical
3	ON - OFF Horizontal	7	Dual Horizontal
4	I - O Vertical		

11 BEZEL COLOR / STYLE⁹

Color	without Rockerguard	with Rockerguard
White	Α	1
Black	В	2
Gray	G	7

12 AGENCY APPROVAL¹⁰

UL Recognized & CSA Accepted

D VDE Certified, UL Recognized & CSA Accepted E TUV Certified, UL Recognized & CSA Accepted

3

5 6 7

8

One actuator is located in the center of each multi-pole breaker.

For Switch Only circuits, select Current Coil Rating from the following chart:

	VOLTAGE		FULL LOAD AMP RATING				TUN	GSTEN 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
50	DC	-	-	-	7.5	Consult Factory	-	-	1
65	DC	-	15	615	25	625	-	-	2
125	50/60HZ	1	15	615	25	625	15	615	1
250	50/60HZ	1	12	612	-		-		1
250	50/60HZ	1	15	615	25	625	-	-	2

One Auxiliary Switch is supplied per breaker. On two-pole breakers, standard Auxiliary Switch mounting is in pole one. Auxiliary Switch option limited to Series Trip & Switch Only circuits, & is not available in single pole illuminated breakers, or Back Connected Screw or Push-in Stud terminals. Mates with AMP .058" diameter pin receptacles: 60983-1 (gold plated) & 60983-2 (tin plated). For neon bulb applications at 120VAC @ 47K, 1/4 WATT and for 250VAC applications @ 150K, 1/4 WATT, external resistors must be supplied by customer.

On Visi-Rocker breakers, Visi portion of rocker cannot be the same color as the bezel.

For LED (DC or rectified AC) applications, LED is mounted in the center of the rocker actuator with electrical characteristics: 100 millicandela at 20mA; Maximum power dissipation = 75mW at 25°C; Maximum forward current = 25mA; Typical forward voltage = 2.1V at 20mA; Typical reverse current

= 100uA at 3V. Customer supplies the proper external resistor limiting current to these values. Rocker color for LED's and green neon lamp must be clear, smoke gray, white translucent or match color of LED or neon lamp.

10

match color of LED of neon lamp.
Other colors available. Consult factory.
TUV and VDE Certified to 25 amps. UL Recognized and CSA Accepted to 30 amps. Screw
Terminals or Push-in Stud recommended above 20 amps.
TUV or VDE Certified must have I-O or Dual Legends. Legend required on Visi-Rocker breakers.
30 amp rating not available with delay's 30, 32, 34, 92 or 94.
Screw Terminals are VDE certified only with use of ring terminal attached to wire.

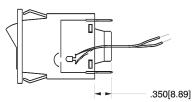
12 13 14 15

Terminal code A available with circuit codes A & B only.

Printed circuit board available with UL recognized approval only.

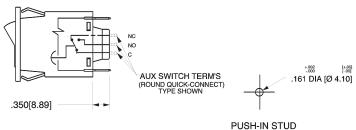
Auxiliary switch (flat Q.C.) available with UL recognized approvals only.

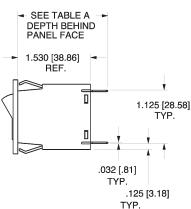
SERIES TRIP SERIES TRIP W/ ILLUMINATED ROCKER MAIN TERM'S. (SEE TABLE A) MAIN TERM'S. (SEE TABLE A) 7.00 [177.8] LONG RED(+), BLACK(-) LEADS SWITCH ONLY W/ ILLUMINATED ROCKER



MATING HOLE

SERIES TRIP W/ AUXILIARY SWITCH





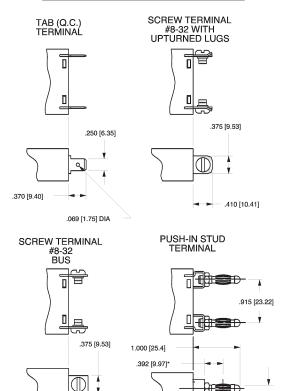
TYP.		
TABLE - A		
TERMINAL DESCRIPTION		DEPTH BEHIND PANEL FACE
MAIN	TAB (Q.C.)	1.900 [48.26]
	SCREW (#8-32)**	1.940 [49.28]
	PUSH-IN STUD	2.530 [64.26]
*AUX. SWITCH	DOUBLE SOLDER TURRET TYPE	2.045 [51.94]
	ROUND Q.C. TYPE	2.035 [51.69]
	FLAT QUICK CONNECT	2.139 [54.33]
	FLAT SOLDER LUG	2.022 [51.36]

^{*} AUX. SWITCH IS NOT AVAILABLE ON SINGLE POLE ILLUMINATED UNITS. WHEN CALLED FOR ON MULTI-POLE UNITS, ONLY ONE AUX. SWITCH IS NORMALLY SUPPLIED, MOUNTED AS SHOWN ON CLA-8003.

Notes:

- All dimensions are in inches [millimeters].
- 2 Tolerance ±.020 [.51] unless otherwise specified.
- 3 Schematic shown represents current trip circuit.

TERMINAL DIMENSIONAL DETAIL



*CENTERLINE OF PUSH-IN STUD CONTACT AREA

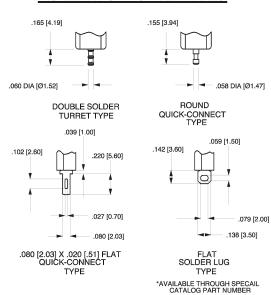
.154 3.91]

AUXILIARY SWITCH TERMINALS

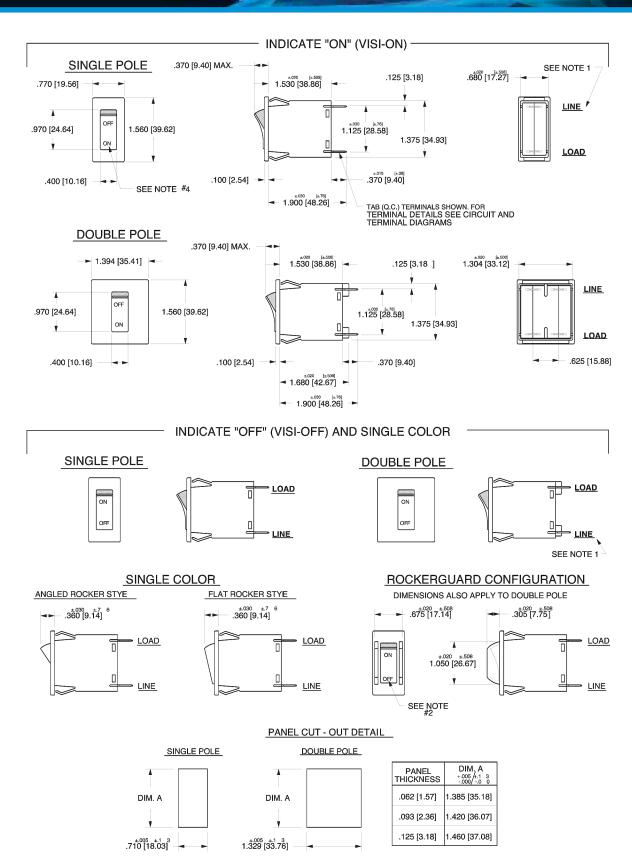
.100 [2.54]

.750 [19.05]

.410 [10.41]



^{**}RECOMMENDED TIGHTENING TORQUE 12-15 IN LBS [1.4-2.7 NM]

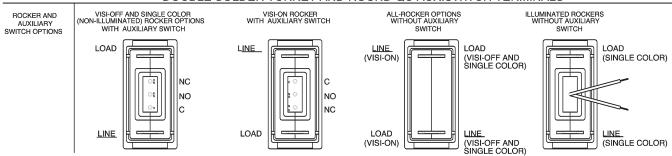


Notes

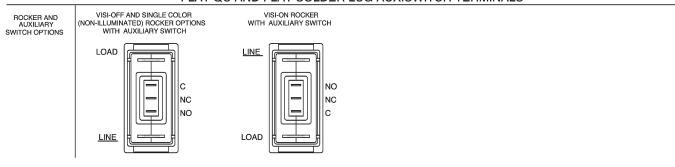
- Dimensions apply to all variations shown. Notice that circuit breaker line & load terminal orientation on indicate OFF is opposite of indicate ON.
- I-O, ON-OFF or dual legends available for vertical or horizontal mounting. For pole orientation with horizontal legend, rotate front view clockwise 90°.
- All dimensions are in inches [millimeters].
 Tolerance ± 0.20 [.51] unless otherwise specified.

ONE POLE

SINGLE POLE / ROCKER BREAKERS SHOWN WITH DOUBLE SOLDER TURRET AND ROUND QC AUX.SWITCH TERMINALS

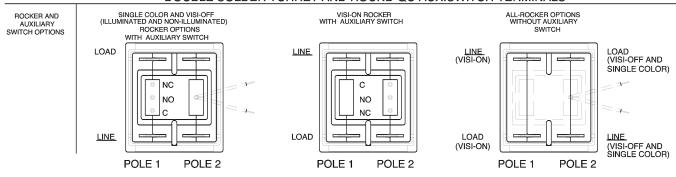


SINGLE POLE / ROCKER BREAKERS SHOWN WITH FLAT QC AND FLAT SOLDER LUG AUX.SWITCH TERMINALS



TWO POLE

DOUBLE POLE / ROCKER BREAKERS SHOWN WITH DOUBLE SOLDER TURRET AND ROUND QC AUX.SWITCH TERMINALS



DOUBLE POLE / ROCKER BREAKERS SHOWN WITH FLAT QC AND FLAT SOLDER LUG AUX.SWITCH TERMINALS

