

Series C® M-Frame



Typical Series C M-Frame Circuit Breaker

- All Series C M-frame circuit breakers are HACR rated.
- MDL-frame circuit breakers are available as individual components (Frame, Trip Unit, Terminals), or factory assembled complete breakers.
- M-frame circuit breakers with non-interchangeable trip units are suitable for reverse feed use.

Interrupting Capacity Ratings

UL489/CSA Interrupting Capacity Ratings<sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (Symmetrical Amperes) (kA)				Page Number
		Volts Ac (50/60 Hz)			Volts Dc <sup>②③</sup>	
		240	480	600		
MDL	2, 3	65	50	25	22	69, 70
CMDL	2, 3	65	50	25	22	70
HMDL	2, 3	100	65	35	25	69, 70
CHMDL	2, 3	100	65	35	25	70



IEC 947-2 Interrupting Capacity Ratings<sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity – RMS Symmetrical Amperes (kA) $I_{CU} = I_{CS}$				Page Number
		Volts Ac (50/60 Hz)			Volts Dc <sup>②③</sup>	
		240	480	600		
MDL	2, 3	85	50	20	20	69, 70
CMDL	2, 3	85	50	20	20	70
HMDL	2, 3	100	65	25	20	69, 70
CHMDL	2, 3	100	65	25	20	70

① Utilization category A circuit breakers.  
 ② Two poles or two poles of 3-pole circuit breaker. Thermal-magnetic trip units only, MDL, HMDL breakers with electronic trip unit are not DC rated.  
 ③ Time constant is 3 milliseconds minimum at 10 kA and 8 milliseconds at 22 kA.

## Series C® M-Frame

## MDL-Frame Digitrip Selection Guide

Trip Unit Type	Digitrip RMS 310	
RMS Sensing	Yes	
<b>Breaker Type</b>		
Frame	MDL	
Ampere Range	400-800A	
Interrupting Rating @ 480V	50, 65 (kA)	
<b>Protection</b>		
Ordering Options	LS, LSG	LSI, LSIG
Fixed Rated Plug ( $I_n$ )	Yes	Yes
Overtemperature Trip	Yes	Yes
<b>Long Delay Protection (L)</b>		
Adjustable Rating Plug ( $I_n$ )	Yes	Yes
Long Delay Pickup	0.5-1.0 ( $I_n$ ) ①	0.5-1.0 ( $I_n$ ) ①
Long Delay Time $I^2T$	12 Seconds	12 Seconds
Long Delay Time $I^4T$	No	No
Long Delay Thermal Memory	Yes	Yes
High Load Alarm	No	No
<b>Short Delay Protection (S)</b>		
Short Delay Pickup	200-800% x ( $I_n$ )	200-800% x ( $I_n$ )
Short Delay Time $I^2T$	100 ms	No
Short Delay Time Flat	No	Inst-300 ms
Short Delay Time Zone Selective Interlocking	No	No
<b>Instantaneous Protection (I)</b>		
Instantaneous Pickup	No	200-800% x ( $I_n$ )
Discriminator	No	No
Instantaneous Override	Yes	Yes
<b>Ground Fault Protection (G)</b>		
Ground Fault Alarm	No	No
Ground Fault Pickup	Varies by Frame	Varies by Frame
Ground Fault Delay $I^2T$	No	No
Ground Fault Delay Flat	Inst-500 ms	Inst-500 ms
Ground Fault Zone Selective Interlocking	No	No
Ground Fault Thermal Memory	Yes	Yes
<b>System Diagnostics</b>		
Status LEDs	Yes	Yes
Cause of Trip LEDs	No	No
Magnitude of Trip Information	No	No
Remote Signal Contacts – Ground Alarm	Yes	Yes
<b>System Monitoring</b>		
Digital Display	No	No
Current	No	No
Power and Energy	No	No
Power Quality – Harmonics	No	No
Power Factor	No	No
<b>Communications</b>		
Cutler-Hammer PowerNet	No	No
<b>Testing</b>		
Testing Method	Test Set	

① Adjust by rating plug.

 $I_n$  = Rating Plug

## Series C® M-Frame

### Types MDL and HMDL Electronic Circuit Breakers with Interchangeable Trip Units

Order as Individual Components: Breaker Frame, Trip Unit, Rating Plug, Terminals.

Maximum Continuous Ampere Rating @ 40°C <sup>①</sup>	Circuit Breaker Frame Only		Digitrip RMS 310 Trip Unit Only <sup>②</sup>				Digitrip RMS 310 Rating Plug Only			Terminals
	Standard Interrupting Capacity 600 Vac Rated 35 kAIC @ 480 Vac	High Interrupting Capacity 600 Vac Rated 65 kAIC @ 480 Vac	L – Adjustable Long Delay Pickup (by Adjustable Rating Plug)	S – Adjustable Short Delay Pickup with Fixed Short Delay Time (I <sup>2</sup> t Response) or Adjustable Short Delay Time (Flat Response)	I – Adjustable Instantaneous Pickup by Setting Short Delay Time to Instantaneous	G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Delay (Flat Response)	Ampere Rating	Fixed Rating Plug	Adjustable Rating Plugs Ampere Rating Catalog Number	
Catalog Number										

## 3-Pole

800	MDL3800F	HMDL3800F	MES3800LS MES3800LSI MES3800LSG MES3800LSIG	400 500 600 700 800	8MES400T 8MES500T 8MES600T 8MES700T 8MES800T	400/500/600/800 A8MES800T	See Page 72 for Standard and Optional Terminals
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Instruction Leaflet/FRED Number 29C111 for Breaker; 29C615 for MES Trip Unit


### Types MDLB and HMDLB Electronic Circuit Breakers with Non-Interchangeable Trip Units

Maximum Continuous Ampere Rating @ 40°C <sup>①</sup>	Factory Assembled Circuit Breaker Consisting of Frame and Trip Unit			
	LS	LSI	LSG	LSIG
Catalog Number				

## 3-Pole Standard Interrupting Capacity 600 Vac Rated 50 kAIC @ 480 Vac

800	MDLB3800T33W	MDLB3800T32W	MDLB3800T35W	MDLB3800T36W
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## 3-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC @ 480 Vac

800	 HMDLB3800T33W	HMDLB3800T32W	HMDLB3800T35W	HMDLB3800T36W
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Instruction Leaflet/FRED Number 29C111 for Breaker; 29C615 for MES Trip Unit

### 100% Rated Types CMDL and CHMDL Electronic Circuit Breakers with Non-Interchangeable Trip Units

The NEC allows the breaker to be rated at 100% of its frame size in an assembly, provided that 90°C wire is applied at the 75°C ampacity. All 100% rated circuit breakers have electronic trip units. Order as individual components: breaker frame, trip unit, rating plug and terminals.

Maximum Continuous Ampere Rating @ 40°C <sup>①</sup>	Circuit Breaker Frame Only		Digitrip RMS 310 Trip Unit Only <sup>②</sup>				Digitrip RMS 310 Trip Unit Only			Terminals
	Standard Interrupting Capacity 50 kAIC @ 480 Vac	High Interrupting Capacity 50 kAIC @ 480 Vac	Standard	Options			Ampere Rating	Fixed Rating Plug	Adjustable Rating Plug Ampere Rating Catalog Number	
Catalog Number										

## 3-Pole

800	CMDL3800F	CHMDL3800F	MES3800LS	MES3800LSI	MES3800LSG	MES3800LSIG	400 500 600 700 800	8MES400T 8MES500T 8MES600T 8MES700T 8MES800T	400/500/600/800 A8MES800T	See Page 72 for Standard and Optional Terminals
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Instruction Leaflet/FRED Number 29C111 for Breaker; 29C615 for MES Trip Unit

① Ampere rating is established by rating plug.

② For Ac use only.

## Series C® M-Frame

### Line and Load Terminals

M-Frame circuit breakers use Cu/Al terminals as standard. When optional copper or Cu/Al terminals are required, order by catalog number. Specify if factory installation is required.

### Line and Load Terminals

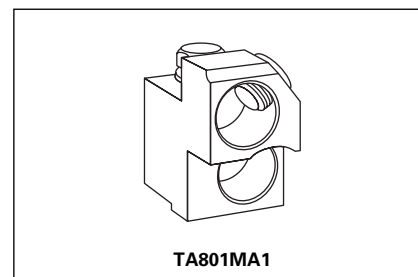
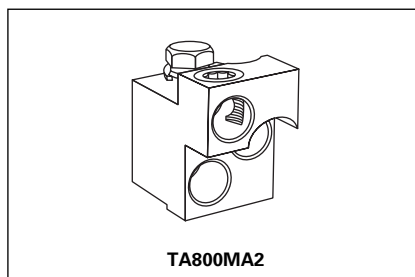
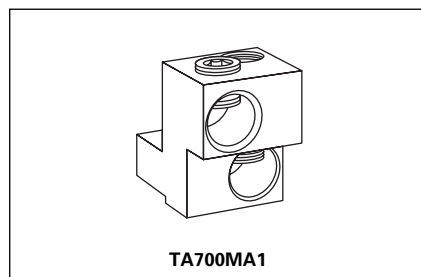
Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range/ No. Conductors	Terminal Catalog Number	Terminals with Control Wire Termination Catalog Number
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#### Standard Cu/Al Pressure Terminals

600	Aluminum	Cu/Al	(2) #1-500 kcmil	<b>TA700MA1</b>	<b>TA700MA1CWT</b>
800	Aluminum	Cu/Al	(3) 3/0-400 kcmil	<b>TA800MA2</b>	<b>TA800MA2CWT</b>
800	Aluminum	Cu/Al	(2) 500-750 kcmil	<b>TA801MA</b>	<b>TA801MACWT</b>

#### Optional Copper and Cu/Al Pressure Type Terminals

600	Copper	Cu	(2) 2/0-500 kcmil	<b>T600MA1</b>	—
800	Copper	Cu	(3) 3/0-300 kcmil	<b>T800MA1</b>	—



## Series C® M-Frame

### Allowable Accessory Combinations

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

	Reference Page	2-Pole <sup>①</sup>		3-Pole			
		Left	Right	Left	Center	Right	
<b>Internal Accessories (Only One Internal Accessory Per Pole)</b>							
Alarm Lockout (Make/Break)	140	■		■		■	
Alarm Lockout (2Make/2Break)	140	■		■		■	
Auxiliary Switch (1A, 1B)	143	■		■		■	
Auxiliary Switch (2A, 2B)	143	■		■		■	
Auxiliary Switch (3A, 3B)	143	■		■		■	
Auxiliary Switch (1A, 1B) and Alarm Switch Combination	146	■		■		■	
Auxiliary Switch (2A, 2B) and Alarm Switch Combination	146	■		■		■	
Shunt Trip – Standard <sup>③</sup>	149	■		■		■	
Shunt Trip – Low Energy <sup>③</sup>	152	■		■		■	
Undervoltage Release Mechanism <sup>③</sup>	157	■		■		■	

#### External Accessories

Base Mounting Hardware	163				●		
Terminal Shields	165				●		
Interphase Barriers	166				●		
Non-Padlockable Handle Block	168				■		
Padlockable Handle Lock Hasp	169	□		□		□	
Key Interlock Kit	170	□		□		□	
Sliding Bar Interlock – Requires Two Breakers	171	●			●		
Walking Beam Interlock – Requires Two Breakers	171	●			●		
Electrical (Motor) Operator	173	●			●		
Plug-in Adapters	174	●			●		
Rear Connecting Studs	176	●			●		
Panelboard Connecting Straps	177	●			●		
Handle Mechanisms	178	●			●		
Door Hardware/Accessories	182	●			●		
Handle Extension	182				●		
Solid-State (Electronic) Portable Test Kit	184	●			●		

#### Modifications (Refer to Cutler-Hammer)

Special Calibration	186	●			●		
Moisture Fungus Treatment	186	●			●		
Freeze-Tested Circuit Breakers	186	●			●		
Marine Application	186	●			●		

■ Applicable in indicated pole position

□ May be mounted on left or right pole – not both

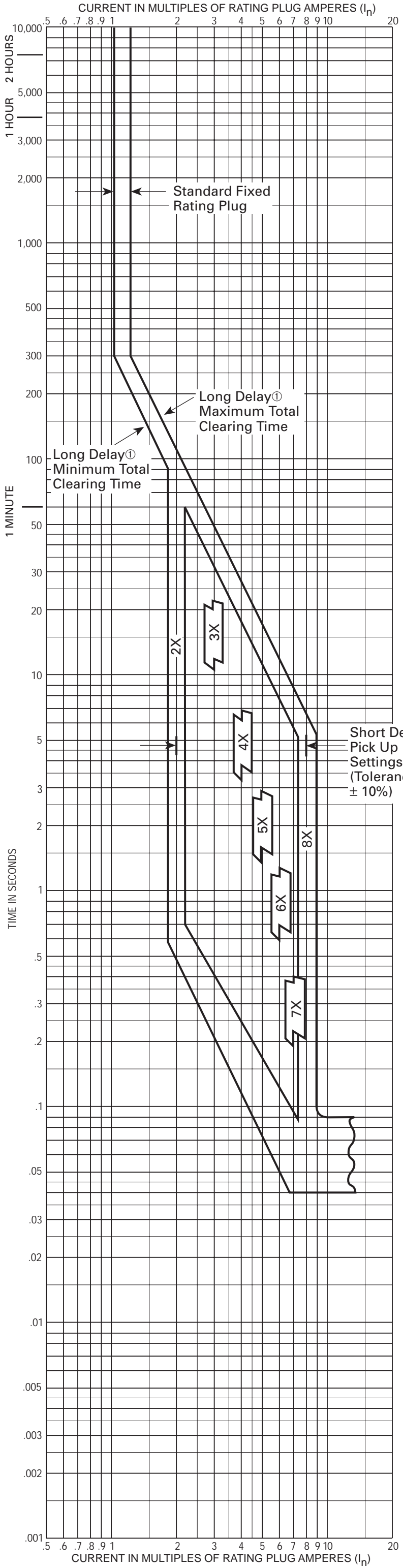
● Accessory available/Modification available

① 2-pole breaker supplied in 3-pole frame. Current carrying parts omitted from center pole.

② Refer to Cutler-Hammer for appropriate neutral pole accessory combinations.

③ Shunt trip and UVR cannot be mounted in right poles on LES trip units.

Cutler-Hammer



Circuit Breaker Time/Current Curves (Phase Current) ④

Series C® M-Frame Circuit Breakers  
Equipped With Type MES Digitrip RMS 310 Trip Units

Catalog Types MES3800LS and MES3800LSG Digitrip RMS 310 Trip Units  
for use with Circuit Breaker Types MDL, HMDL, CMDL and CHMDL  
3 Poles

Fixed Short Delay Time

Typical Trip Unit Nameplate



Available Rating Plugs

Ampere Rating (In)	Type	Rating Plug Catalog Number	Short Delay Pickup Range Amperes
800	Fixed	8MES800T	1600-6400
700	Fixed	8MES700T	1400-5600
600	Fixed	8MES600T	1200-4800
500	Fixed	8MES500T	1000-4000
450	Fixed	8MES450T	900-3600
400	Fixed	8MES400T	800-3200
400/500/600/800	Adjustable	A8MES800T1	800-6400

Interrupting Rating

Breaker Type	UL/CSA RMS Sym. kA, 50/60 Hz		
	240V	480V	600V
MDL, MDLB, CMDL, CMDLB HMDL, HMDLB, CHMDL, CHMDL	65 100	50 65	25 35

Breaker Type	IEC 947-2 RMS Sym. kA, 50/60 Hz					
	240V (U <sub>e</sub> )		380/415V (U <sub>e</sub> )		690V (U <sub>e</sub> )	
	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>
MDL, MDLB, CMDL, CMDLB HMDL, HMDLB, CHMDL, CHMDL	65 100	65 100	50 70	50 50	20 25	10 13

Utilization Category A  
U<sub>imp</sub> = 8kV

Notes

Digitrip RMS 310 trip units are suitable for functional field testing with test kit Cat. No. STK2. For field testing using primary injection methods, follow NEMA AB4-1991 publications.

Calibration response in short delay pick-up range is same for 1, 2 or 3 poles in series.

There is a memory effect that can act to shorten the long delay. The memory effect comes into play if a current above the long delay pick-up value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately five minutes is required between overloads to completely reset the memory.

- ① Curve accuracy applies from -20°C to +55°C ambient. For possible continuous ampere derating for ambient above 40°C, refer to Cutler-Hammer.
- ② For high fault current levels a fixed instantaneous override is provided at 5500A. (Tolerance ±15%).
- ③ The end of the curve is determined by the interrupting rating of the circuit breaker. See above tabulation.
- ④ For ground fault time/current curves see SC-6914-98.

