

Molded Case Circuit Breakers




UL 489 and UL 60947-4-1 (formerly UL 508) Applications

A molded case circuit breaker can be used to provide overload and short circuit protection for cables, control panels, motors and branch circuits. In addition, the National Electrical Code (NEC) requires the following when controlling a motor:




- A means of disconnecting power from the circuit
- Short circuit protection for the cables
- A way to start and stop the motor (typically a contactor)
- Overload protection for the motor (typically an overload relay)

The molded case circuit breaker can provide the means of disconnecting power and provides short circuit protection under UL 60947-4-1 type C protection. The magnetic only Motor Circuit Protector (MCP) can provide the same function under UL 60947-4-1 type D protection.

TYPE C

Components	Catalog Number	Product
Molded Case Circuit Breaker (MCCB)	M1S	
Contactor	EX9C	
Overload Relay	Ex9R	

TYPE D

Components	Catalog Number	Product
Motor Circuit Protector (MCP)	M1M	
Contactor	EX9C	
Overload Relay	Ex9R	

Note: Please refer to Appendix A (Page 98-103) for series combination ratings for Type C and Type D combination starter types.

Disclaimer: Proper Sizing of an overcurrent protection device is the responsibility of the customer and should be determined using the application standards of the NEC*, CEC**, or other applicable standards.

*NEC-National Electrical Code

** CEC-Canadian Electrical Code

Molded Case Circuit Breakers

Product Overview

Features

Molded Case Circuit Breakers, 15-1200 Amperes

NOARK Electric offers a complete range of Molded Case Circuit Breakers in six frame sizes: M1 - 150A, M2 - 250A, M3 - 400A, M4 - 600A, M5 - 800A, and M6 - 1200A. Each frame size offers a range of interrupting ratings up to 100kA at 480Vac and voltage ratings up to 600Vac and 600Vdc..

- High-breaking capacity and a patented arc extinguishing design
- Bearing-type spindle reduces the operating force required to open and close the operating mechanism
- High quality compact modular design
- Fixed and adjustable trip unit settings
- Line and load lugs installed standard
- 5-Year limited warranty

Wide range of accessories:

- Alarm switch and auxiliary contact
- Shunt and under-voltage trip
- Rotary type handle
- Flange type handle



A



Certifications

- UL489 listed, File No. E355392
- CSA Standards C22.2 No. 5, File No. E355392
- IEC/EN 60947-2
- CE Compliant



Molded Case Circuit Breakers

M1-M6 Product Selection

Ratings Summary		M1						M2						M3			M4			M5			M6			
Rating	Amps @ 40° C	15-150						100-250						225-400			400-600			600-800			800-1200			
	Poles	1	2		3			1	2		3			2*,3			3			3			3			
	Frame Type	N	S	N	H	S	N	H	N	S	N	H	S	N	H	S	N	H	S	N	H	S	N	H	S	N
	Maximum Vac	480	600		600			480	600		600			600			600			600			600			
	Maximum Vdc	250	500		600			250	500		600			500			600			600			-			
Interrupting Capacity (kA rms)	240 Vac	50	50	100	150	50	100	150	50	50	100	150	50	100	150	65	100	150	65	100	150	65	100	150	65	100
	480 Vac	10	35	65	100	35	65	100	10	35	65	100	35	65	100	42	65	100	42	65	100	42	65	100	42	65
	600 Vac	-	14	20	25	14	20	25	-	14	20	25	14	20	25	18	25	30	22	30	50	22	30	50	22	42
	250 Vdc (1P)	25	-						25	-						-			-			-			-	
	500 Vdc (2P**)	-	20	35	50	-	-	-	-	20	35	50	-	-	-	35	50	65	-			-			-	
	600 Vdc (3P**)	-	-			20	35	50	-			20	35	50	35	50	65	35	50	65	35	50	65	35	50	65

*3 Pole Case **Poles Connected in Series



M1H150T3L

Amps	2-Pole 80% Rated		3-Pole 80% Rated	
	Catalog Number	Trip Unit	Catalog Number	Trip Unit
	15	M1S15T22L	FT/FM	M1S15T3L
20	M1S20T22L	M1S20T3L		
25	M1S25T22L	M1S25T3L		
30	M1S30T22L	M1S30T3L		
35	M1S35T22L	M1S35T3L		
40	M1S40T22L	M1S40T3L		
45	M1S45T22L	M1S45T3L		
50	M1S50T22L	AT/FM	M1S50T3L	AT/FM
60	M1S60T22L		M1S60T3L	
70	M1S70T22L		M1S70T3L	
80	M1S80T22L		M1S80T3L	
90	M1S90T22L		M1S90T3L	
100	M1S100T22L		M1S100T3L	
125	M1S125T22L		AT/AM	
150	M1S150T22L	M1S150T3L		

M1S
2 Pole & 3 Pole
(35 kA @ 480 Vac)
(50 kA @ 240 Vac)
(14 kA @ 600 Vac)

A = Adjustable
T = Thermal
F = Fixed
M = Magnetic

Series M1 Line & Load Lugs: 1 Conductor #14 to #3/0 (CU) OR #12 to 3/0 (AL)

Molded Case Circuit Breakers

M1 Product Selection



M1H150T3L

Amps	1-Pole 80% Rated		2-Pole 80% Rated		3-Pole 80% Rated	
	Catalog Number	Trip Unit	Catalog Number	Trip Unit	Catalog Number	Trip Unit
15	M1N15T1L	FT/FM	M1N15T22L	FT/FM	M1N15T3L	FT/FM
20	M1N20T1L		M1N20T22L		M1N20T3L	
25	M1N25T1L		M1N25T22L		M1N25T3L	
30	M1N30T1L		M1N30T22L		M1N30T3L	
35	M1N35T1L		M1N35T22L		M1N35T3L	
40	M1N40T1L		M1N40T22L	M1N40T3L		
45	M1N45T1L		M1N45T22L	M1N45T3L		
50	M1N50T1L		M1N50T22L	M1N50T3L	AT/FM	
60	M1N60T1L		M1N60T22L	M1N60T3L		
70	M1N70T1L		M1N70T22L	M1N70T3L		
80	M1N80T1L		M1N80T22L	M1N80T3L		
90	M1N90T1L		M1N90T22L	M1N90T3L		
100	M1N100T1L		M1N100T22L	M1N100T3L		
125	M1N125T1L		M1N125T22L	M1N125T3L	AT/AM	
150	M1N150T1L		M1N150T22L	M1N150T3L		

M1N
1 Pole
(10 kA @ 480 Vac)
(50 kA @ 240 Vac)
2 Pole & 3 Pole
(65 kA @ 480 Vac)
(100 kA @ 240 Vac)
(20 kA @ 600 Vac)

Amps	2-Pole 80% Rated		3-Pole 80% Rated	
	Catalog Number	Trip Unit	Catalog Number	Trip Unit
15	M1H15T22L	FT/FM	M1H15T3L	FT/FM
20	M1H20T22L		M1H20T3L	
25	M1H25T22L		M1H25T3L	
30	M1H30T22L		M1H30T3L	
35	M1H35T22L		M1H35T3L	
40	M1H40T22L		M1H40T3L	
45	M1H45T22L		M1H45T3L	
50	M1H50T22L	AT/FM	M1H50T3L	AT/FM
60	M1H60T22L		M1H60T3L	
70	M1H70T22L		M1H70T3L	
80	M1H80T22L		M1H80T3L	
90	M1H90T22L		M1H90T3L	
100	M1H100T22L		M1H100T3L	
125	M1H125T22L		M1H125T3L	
150	M1H150T22L	M1H150T3L		

M1H
2 Pole & 3 Pole
(100 kA @ 480 Vac)
(150 kA @ 240 Vac)
(25 kA @ 600 Vac)

A = Adjustable
T = Thermal
F = Fixed
M = Magnetic

Series M1 Line & Load Lugs: 1 Conductor #14 AWG - #3/0 AWG, (1) Cu wire or #12 AWG - #3/0 AWG, (1) Al wire

Molded Case Circuit Breakers

M2 Product Selection



M2N250T3L

Amps	2-Pole 80% Rated		3-Pole 80% Rated	
	Catalog Number	Trip Unit	Catalog Number	Trip Unit
	100	M2S100T22L	AT/AM	M2S100T3L
125	M2S125T22L	M2S125T3L		
150	M2S150T22L	M2S150T3L		
175	M2S175T22L	M2S175T3L		
200	M2S200T22L	M2S200T3L		
225	M2S225T22L	M2S225T3L		
250	M2S250T22L	M2S250T3L		

Amps	1-Pole 80% Rated		2-Pole 80% Rated		3-Pole 80% Rated	
	Catalog Number	Trip Unit	Catalog Number	Trip Unit	Catalog Number	Trip Unit
	100	M2N100T1L	FT/FM	M2N100T22L	AT/AM	M2N100T3L
125	M2N125T1L	M2N125T22L		M2N125T3L		
150	M2N150T1L	M2N150T22L		M2N150T3L		
175	M2N175T1L	M2N175T22L		M2N175T3L		
200	M2N200T1L	M2N200T22L		M2N200T3L		
225	M2N225T1L	M2N225T22L		M2N225T3L		
250	M2N250T1L	M2N250T22L		M2N250T3L		

Amps	2-Pole*		3-Pole 80% Rated	
	Catalog Number	Trip Unit	Catalog Number	Trip Unit
	100	M2H100T2L	AT/AM	M2H100T3L
125	M2H125T2L	M2H125T3L		
150	M2H150T2L	M2H150T3L		
175	M2H175T2L	M2H175T3L		
200	M2H200T2L	M2H200T3L		
225	M2H225T2L	M2H225T3L		
250	M2H250T2L	M2H250T3L		

A = Adjustable
T = Thermal
F = Fixed
M = Magnetic
*3 Pole Case

Line & Load Lugs: #3 AWG - 300kcmil, (1) Cu or Al wire

Molded Case Circuit Breakers

M3-M4 Product Selection

M3S 2 Pole & 3 Pole (42 kA @ 480 Vac) (65 kA @ 240 Vac) (18 kA @ 600 Vac)	Amps	2-Pole* 80% Rated		3-Pole 80% Rated	
		Catalog Number	Trip Unit	Catalog Number	Trip Unit
	225	M3S225T2L	AT/AM	M3S225T3L	AT/AM
250	M3S250T2L	M3S250T3L			
300	M3S300T2L	M3S300T3L			
350	M3S350T2L	M3S350T3L			
400	M3S400T2L	M3S400T3L			

M4S 3 Pole (42 kA @ 480 Vac) (65 kA @ 240 Vac) (22 kA @ 600 Vac)	Amps	3-Pole 80% Rated	
		Catalog Number	Trip Unit
	400	M4S400T3L	AT/AM
500	M4S500T3L		
600	M4S600T3L		

M3N 2 Pole & 3 Pole (65 kA @ 480 Vac) (100 kA @ 240 Vac) (25 kA @ 600 Vac)	Amps	2-Pole* 80% Rated		3-Pole 80% Rated	
		Catalog Number	Trip Unit	Catalog Number	Trip Unit
	225	M3N225T2L	AT/AM	M3N225T3L	AT/AM
250	M3N250T2L	M3N250T3L			
300	M3N300T2L	M3N300T3L			
350	M3N350T2L	M3N350T3L			
400	M3N400T2L	M3N400T3L			

M4N 3 Pole (65 kA @ 480 Vac) (100 kA @ 240 Vac) (30 kA @ 600 Vac)	Amps	3-Pole 80% Rated	
		Catalog Number	Trip Unit
	400	M4N400T3L	AT/AM
500	M4N500T3L		
600	M4N600T3L		

M3H 2 Pole & 3 Pole (100 kA @ 480 Vac) (150 kA @ 240 Vac) (30 kA @ 600 Vac)	Amps	2-Pole* 80% Rated		3-Pole 80% Rated	
		Catalog Number	Trip Unit	Catalog Number	Trip Unit
	225	M3H225T2L	AT/AM	M3H225T3L	AT/AM
250	M3H250T2L	M3H250T3L			
300	M3H300T2L	M3H300T3L			
350	M3H350T2L	M3H350T3L			
400	M3H400T2L	M3H400T3L			

M4H 3 Pole (100 kA @ 480 Vac) (150 kA @ 240 Vac) (50 kA @ 600 Vac)	Amps	3-Pole 80% Rated	
		Catalog Number	Trip Unit
	400	M4H400T3L	AT/AM
500	M4H500T3L		
600	M4H600T3L		

Line & Load Lugs: #4/0 AWG - 600kcmil,
(1) Cu or Al wire

Line & Load Lugs: #2/0 AWG - 500kcmil, (2) Cu or Al wire

A = Adjustable
T = Thermal
F = Fixed
M = Magnetic
*3 Pole Case

Molded Case Circuit Breakers

M5-M6 Product Selection

M5S 3 Pole (42 kA @ 480 Vac) (65 kA @ 240 Vac) (22 kA @ 600 Vac)	Amps	3-Pole 80% Rated	
		Catalog Number	Trip Unit
		600	M5S600T3L
700	M5S700T3L		
800	M5S800T3L		

M6S* 3 Pole (42 kA @ 480 Vac) (65 kA @ 240 Vac) (22 kA @ 600 Vac)	Amps	3-Pole		
		80% Rated	100% Rated	
		Catalog Number	Catalog Number	Trip Unit
800	M6S800E3W4L	M6S800E3W4LF	ET	
1000	M6S1000E3W4L	M6S1000E3W4LF		
1200	M6S1200E3W4L	M6S1200E3W4LF		

M5N 3 Pole (65 kA @ 480 Vac) (100 kA @ 240 Vac) (30 kA @ 600 Vac)	Amps	3-Pole 80% Rated	
		Catalog Number	Trip Unit
		600	M5N600T3L
700	M5N700T3L		
800	M5N800T3L		

M6N* 3 Pole (65 kA @ 480 Vac) (100 kA @ 240 Vac) (42 kA @ 600 Vac)	Amps	3-Pole		
		80% Rated	100% Rated	
		Catalog Number	Catalog Number	Trip Unit
800	M6N800E3W4L	M6N800E3W4LF	ET	
1000	M6N1000E3W4L	M6N1000E3W4LF		
1200	M6N1200E3W4L	M6N1200E3W4LF		

M5H 3 Pole (100 kA @ 480 Vac) (150 kA @ 240 Vac) (50 kA @ 600 Vac)	Amps	3-Pole 80% Rated	
		Catalog Number	Trip Unit
		600	M5H600T3L
700	M5H700T3L		
800	M5H800T3L		

Series M6 Line & Load Lugs:

- 1000A Max - #3/0 AWG - 750kcmil, (3) Cu or Al wire
- 1200A - #3/0 AWG - 500kcmil, (4) Cu or Al wire

Series M5 Line & Load Lugs:

- 700A Max - 250kcmil - 600kcmil, (2) Cu or Al wire
- 800A - #4/0 AWG - 500kcmil, (3) Cu or Al wire

A = Adjustable
T = Thermal
F = Fixed
M = Magnetic
ET = Electronic

* M6S and M6N offers ground fault protection in 3P-4W system. External neutral current sensor, NCS26N is required for ground fault protection in 3P-4W system. NCS26N is ordered separately. (See page 17 for more information)

Molded Case Circuit Breakers

M1-M6 Technical Data

Ratings & Specifications		M1						M2							
Amps @ 40° C		15-150						100-250							
Poles		1	2		3			1	2		3				
Frame Type		N	S	N	H	S	N	H	N	S	N	H*	S	N	H
Maximum Vac		480	600		600			480	600		600				
Maximum Vdc		250	500		500			250	500		500				
Interrupting Capacity (kA rms)															
240 Vac		50	50	100	150	50	100	150	50	50	100	150	50	100	150
480 Vac		10	35	65	100	35	65	100	10	35	65	100	35	65	100
600 Vac		-	14	20	25	14	20	25	-	14	20	25	14	20	25
250 Vdc 1 Pole		25	-						25	-					
500 Vdc 2 Poles**		-	20	35	50	20	35	50	-	20	35	50	20	35	50
600 Vdc 3 Poles**		-			20	35	50	-			20	35	50		
*3 Pole Case															
**Poles Connected in Series															
General Specifications															
Insulation Voltage (V)		800 Vac						800 Vac							
Impulse Withstand Voltage (Vimp)		8k Vac						8k Vac							
Operational Voltage (Ve)(IEC)		690 Vac						690 Vac							
Operational Voltage (Ve)(UL)		600 Vac						600 Vac							
Utilization Category		A						A							
Mechanical Operating Cycles		10,000						10,000							
Electrical Operating Cycles		6,000						6,000							
Trip Unit Type		FT/FM	15~45 FT/FM 50~150A AT/FM			15~45A FT/FM 50~100A AT/FM 125~150A AT/AM			FT/ FM	AT/AM					
A=Adjustable / T=Thermal / F=Fixed / M=Magnetic															
Dimensions LxWxD in (mm)		1 Pole	6.46x1.4x3.33 (164x35x84.5)						7.17x1.57x3.47 (182x40x88)						
		2 Pole	6.46x2.44x3.33 (164x62x84.5)						7.17x2.95x3.47 (182x75x88)						
		2 Pole*	6.46x3.54x3.33 (164x90x84.5)						7.17x4.13x3.47 (182x105x88)						
		3 Pole													
		4 Pole													
Weight lb (kg)		1 Pole	1.47 (0.67)						1.76 (0.8)						
		2 Pole	2.53 (1.15)						3.3 (1.5)						
		2 Pole*	3.17 (1.67)						3.75 (1.70)						
		3 Pole	3.68 (1.67)						4.41 (2.00)						
		4 Pole													
Cable Lug Size 75°C Cu or Al Wire Only AWG (mm²)		1-Hole, #14-3/0 (2.5-95) Cu OR 1-Hole, #12-3/0 (2.5-95) Al						1-Hole, #3-300 kcmil (35-150)							
Lug Torque in-lb (Nm)		89 (10)						230 (23)							

A

Molded Case Circuit Breakers

M1-M6 Technical Data

Ratings & Specifications		M3			M4			M5			M6	
Amps @40° C		225-400			400-600			600-800			800-1200	
Poles		2*,3			2*,3			2*,3,4			3,4	
Frame Type		S	N	H	S	N	H	S	N	H	S	N
Maximum Vac		600			600**			600**			600	
Maximum Vdc		600			600**			600**			-	
Interrupting Capacity (kA rms)												
240 Vac		65	100	150	65	100	150	65	100	150	65	100
480 Vac		42	65	100	42	65	100	42	65	100	42	65
600 Vac		18	25	30	22	30	50	22	30	50	22	42
250 Vdc 1 Pole		-			-			-			-	
500 Vdc 2 Poles **		35	50	65	35	50	65	35	50	65	-	
600 Vdc 3 Poles**		35	50	65	35	50	65	35	50	65	-	
*3 Pole Case												
**Poles Connected in Series												
General Specifications												
Insulation Voltage (Vi)		800 Vac			800 Vac			800 Vac			800 Vac	
Impulse Withstand Voltage (Vimp)		8k Vac			8k Vac			8k Vac			8k Vac	
Operational Voltage (Ve) (IEC)		690 Vac			690 Vac			690 Vac			690 Vac	
Operational Voltage (Ve) (UL)		600 Vac			600 Vac			600 Vac			600 Vac	
Utilization Category		A			A			A			A	
Mechanical Operating Cycles		8,000			8,000			3,000			3,000	
Electrical Operating Cycles		5,000			5,000			500			500	
Trip Unit Type		AT/AM			AT/AM			AT/AM			Electronic*	
Dimensions LxWxD in (mm)	2 Pole*	11.22x5.51x4.59 (285x140x116.5)			12.32x7.68x5.43 (313x195x138)			16.18x7.68x7.58 (411x195x192.5)			17.72x8.27x6.6 (450x210x167.6)	
	3 Pole	-			-			16.18x10.2x7.58 (411x260x192.5)			17.72x11.43x6.6 (450x280x167.6)	
	4 Pole	-			-			-			-	
Weight lb (kg)	2 Pole*	8.97 (4.07)			20.94 (9.5)			27.8 (12.5)			-	
	3 Pole	13.45 (6.1)			25.35 (11.5)			33.18 (15.05)			55.56 (25.2)	
	4 Pole	-			-			43.43 (19.7)			69.67 (31.6)	
Cable Lug Size 75°C CU or AL Wire Only AWG (mm ²)		Standard: 1-Hole, #4/0-600 kcmil (95-240)			2-Holes #2/0-500 kcmil (2x 95-185)			2-Holes 250-600 kcmil (120-300)			3-Holes #3/0-750 kcmil (95-300)	
		2-Holes #3-250 kcmil (35-120)			-			3-Holes #4/0-500 kcmil (100-250)			4-Holes #3/0-500 kcmil (95-240)	
Lug Torque in-lb (Nm)		310 (35)			310 (35)			398 (45)			310 (35)	

*Electronic trip units are equipped with LSIG protection

Molded Case Switches

Product Overview

Features

Molded Case Switches, 100-1200 Amperes

NOARK Electric offers a complete range of Molded Case Switches in six frame sizes: M1 - 150A, M2 - 250A, M3 - 400A, M4 - 600A, M5 - 800A, and M6 - 1200A. Each frame size offers a range of interrupting ratings at 240-690 Vac and 250-600 Vdc. Molded Case Switches are only used as disconnect switches.

Features:

- Instantaneous trip ability and a patented arc extinguishing design
- Bearing-type spindle reduces the operating force required to open and close the operating mechanism
- High-quality compact modular design
- 5-Year limited warranty

Wide range of accessories:

- Alarm switch and auxiliary contact
- Shunt and under-voltage trip
- Rotary type handle
- Flange type handle



B



Certifications

- UL489 listed, File No. E355396
- CSA Standards C22.2 No. 5, File No. E355396
- IEC/EN 60947-2
- CE Compliant



Molded Case Switches

Line/Load Lug Connection

- Terminal lugs are provided standard on all NOARK MCCBs.
- Additional terminal lug configurations available. See pages 22-23



Withstand Rating* (kA rms)	Rated Amperes (A)	Line/Load Lug Connection		Lug Configuration
		2-Pole	3-Pole	
		Catalog Number		
M1D (100 kA @ 240 Vac) (65 kA @ 480 Vac) (20 kA @ 600 Vac)	100	M1D1002L	M1D1003L	1 Conductor
	150	M1D1502L	M1D1503L	#14 to #3/0 AWG Cu OR #12 to #3/0 AWG Al
M2D (100 kA @ 240 Vac) (65 kA @ 480 Vac) (20 kA @ 600 Vac)	225	M2D2252L	M2D2253L	1 Conductor
	250	M2D2502L	M2D2503L	#3 AWG to 300kcmil Cu or Al
M3D (100 kA @ 240 Vac) (65 kA @ 480 Vac) (25 kA @ 600 Vac)	400	-	M3D4003L	1 Conductor #4/0 AWG to 600 kcmil Cu or Al
M4D (100 kA @ 240 Vac) (65 kA @ 480 Vac) (30 kA @ 600 Vac)	600	-	M4D6003L	2 Conductor #2/0 AWG to 500 kcmil Cu or Al
M5D (100 kA @ 240 Vac) (65 kA @ 480 Vac) (30 kA @ 600 Vac)	800	-	M5D8003L	3 Conductor #4/0 AWG to 500kcmil Cu or Al
M6D (100 kA @ 240 Vac) (65 kA @ 480 Vac) (42 kA @ 600 Vac)	1000	-	M6D10003LF	3 Conductor #3/0 AWG to 750kcmil Cu or Al
	1200	-	M6D12003LF	4 Conductor #3/0 AWG to 500kcmil Cu or Al

Molded Case Switches

M1D - M6D Technical Data

		M1D	M2D	M3D	M4D	M5D	M6D
Rated Current (A)		100 - 150	225 - 250	400	600	800	1000 - 1200
Number of Poles		2, 3		3			
Switch Type		M1D	M2D	M3D	M4D	M5D	M6D
Rated Voltage 50/60 Hz	Vac	600					
	Vdc	600					-
Withstand Rating* (kA rms)							
Circuit Breaker Ratings UL 489- -C-SA C22.2 (kA rms) Vac 50/60 Hz	240 Vac	100	100	100	100	100	100
	480 Vac	65	65	65	65	65	65
	600 Vac	20	20	25	30	30	42
	500 Vdc 2-Pole	35	35	50	50	50	-
	600 Vdc 3-Pole	35	35	50	50	50	-
Circuit Breaker Ratings IEC 60947-2	220 / 240 Vac	100	100	100	100	100	85 (60) Icu/Ics
	380 / 415 Vac						
Ultimate Breaking Capacity (Icu = 100% Ics) (kA rms)	660 / 690 Vac	8	10	15	15	15	30
	500 Vdc 3-Pole	35	35	50	50	-	-
	500 Vdc 2-Pole	35	35	50	50	50	-
Trip Current (A)		15xIn	12xIn	12xIn	10xIn	10xIn	15xIn
Connection							
Line/Load Lug Connection		■					
Insulation Voltage (Vi)		800 Vac					
Impulse Withstand Voltage (Vimp)		8 kVac					
Operational Voltage (Ve)	UL	600 Vac					
Mechanical Operating Cycles		10,000		8,000		3,000	
Electrical Operating Cycles		6,000		5,000		500	
Dimensions LxWxD in		6.46 x 3.54 x 3.33	7.17 x 4.13 x 3.47	11.22 x 5.51 x 4.59	12.32 x 7.68 x 5.43	16.18 x 7.68 x 7.58	17.72x8.27x6.6
Weight of Unit lb	2-Pole	3.17	3.75	-	-	-	-
	3-Pole	3.68	4.41	13.45	25.35	33.18	55.56
Lugs lb-in (N.m)		89 (10)	230 (23)	310 (35)		398 (45)	310 (35)

*NOTE: Molded Case Switches do not provide branch circuit protection and must be protected by an upstream OCPD (fuse or circuit breaker). The withstand rating is provided for coordination purposes and refers to the fault, at rated voltage, that the molded case switch can withstand without damage when protected by a circuit breaker or fuse with an equal continuous current rating

B

Molded Case Motor Circuit Protectors

Product Overview

Features

Molded Case Motor Circuit Protectors, 3-1200 Amperes

NOARK Electric offers a complete range of 3 pole Molded Case Motor Circuit Protectors (MCPs, magnetic or short circuit protection only) which are used to protect the cables feeding three phase motors in six frame sizes: M1M - 150A, M2M - 250A, M3M - 400A, M4M - 600A, M5M - 800A, and M6M - 1200A. Each frame size offers a range of interrupting ratings at 240-690 Vac and 250-600 Vdc.

The National Electrical Code (NEC) requires the following when controlling a motor:

- A means of disconnecting power from the circuit
- Short circuit protection for the cables
- A way to start and stop the motor (typically a contactor)
- Overload protection for the motor (typically an overload relay)

A motor circuit protector serves as means of disconnecting power and short circuit protection for the cables.



Certifications

- UL489 Recognized Component, File No. E355392
- CSA Standard C22.2 No. 5, File No. E355392
- IEC/EN 60947-2
- CE Compliant



Molded Case Motor Circuit Protectors

Line/Load Lug Connection

- Additional terminal lug configurations available. See pages 22-23
- Terminal lugs are provided standard on all NOARK MCCBs.



Rated Amperage (A)	Magnetic Trip Setting Range	Line/Load Lug Connection		Lug Configuration
		S Interrupting	N Interrupting	
		50kA @ 240 Vac 35kA @ 480 Vac 14kA @ 600 Vac	100kA @ 240 Vac 65kA @ 480 Vac 20kA @ 600 Vac	
Catalog Number				
3	7x-11x	M1MS03T3L	M1MN03T3L	1 Conductor #14 to #3/0 AWG Cu OR #12 to #3/0 AWG Al
7	5x-10x	M1MS07T3L	M1MN07T3L	
15	5x-10x	M1MS15T3L	M1MN15T3L	
30	5x-11x	M1MS30T3L	M1MN30T3L	
50	5x-11x	M1MS50T3L	M1MN50T3L	
70	5x-11x	M1MS70T3L	M1MN70T3L	
100	5x-11x	M1MS100T3L	M1MN100T3L	
150	5x-11x	M1MS150T3L	M1MN150T3L	1 Conductor #3 AWG to 300kcmil Cu or Al
250	5x-11x	M2MS250T3L	M2MN250T3L	

Rated Amperage (A)	Magnetic Trip Setting Range	Line/Load Lug Connection		Lug Configuration
		S Interrupting	N Interrupting	
		65kA @ 240 Vac 42kA @ 480 Vac 18kA @ 600 Vac	100kA @ 240 Vac 65kA @ 480 Vac 25kA @ 600 Vac	
Catalog Number				
400	5x-11x	M3MS400T3L	M3MN400T3L	1 Conductor #4/0 AWG to 600kcmil Cu or Al

Rated Amperage (A)	Magnetic Trip Setting Range	Line/Load Lug Connection			Lug Configuration
		S Interrupting	N Interrupting	N Interrupting	
		65kA @ 240 Vac 42kA @ 480 Vac 22kA @ 600 Vac	100kA @ 240 Vac 65kA @ 480 Vac 30kA @ 600 Vac	100kA @ 240 Vac 65kA @ 480 Vac 42kA @ 600 Vac	
Catalog Number					
600	5x-11x	M4MS600T3L	M4MN600T3L	-	2 Conductor #2/0 AWG to 500kcmil Cu or Al
800	5x-11x	M5MS800T3L	M5MN800T3L	-	3 Conductor #4/0 AWG to 500kcmil Cu or Al
1200	2x-12x	M6MS1200E3LF	-	M6MN1200E3LF	4 Conductor #3/0 AWG to 500kcmil Cu or Al

Molded Case Motor Circuit Protectors

M1M - M6M Technical Data

		M1M		M2M		M3M		M4M		M5M		M6M	
Current Range (A)		3-150		250		400		600		800		1200	
Number of Poles		3											
Breaker Type		S	N	S	N	S	N	S	N	S	N	S	N
Rated Voltage 50/60 Hz Vac		600											
Interrupting Capacity (kA)													
Circuit Breaker Ratings	240 Vac	50	100	50	100	65	100	65	100	65	100	65	100
	480 Vac	35	65	35	65	42	65	42	65	42	65	42	65
	600 Vac	14	20	14	20	18	25	22	30	22	30	22	42
Magnetic Trip Units	A = Adjustable M = Magnetic	AM											
Accessories													
Alarm Switch													
Auxiliary Contact													
Shunt Trip													
Under-Voltage Trip													
Handle Lock													
Flange Type Handle													
Rotary Type Handle													
Connection													
Line/Load Lug Connection													
Dimensions In (mm)		6.46x3.54x3.33 (164x90x34.5)	7.17x4.13x3.47 (182x105x38)	11.22x5.51x4.59 (285x140x116.5)	12.32x7.68x5.43 (313x195x138)	16.18x7.68x7.58 (411x195x192.5)	17.72x8.27x6.6 (450x210x167.6)						
Weight Lb (kg)		3.68 (1.67)	4.41 (2)	13.45 (6.1)	25.35 (11.5)	33.18 (15.05)	55.56 (25.2)						

Molded Case Circuit Breakers

Temperature & Altitude Compensation

Rated Current	Temperature	+40°C	+50°C	+60°C	+70°C
M1	15A	15	14.3	12.9	12
	20A	20	19	17.2	16
	25A	25	24	21.5	20
	30A	30	28.1	25.8	24
	35A	35	32.8	30.1	28
	40A	40	38	34.4	32
	45A	45	42.5	48.7	36
	50A	50	47.5	43	40
	60A	60	57	51.6	48
	70A	70	66.5	60.2	56
	80A	80	76	68.8	64
	90A	90	85.5	77.4	72
	100A	100	95	86	80
	125A	125	112.5	107.5	100
150A	150	135	129	120	
M2	125A	125	112.5	100	87.5
	150A	150	135	120	105
	175A	175	166.2	157.5	148.7
	200A	200	190	180	170
	225A	225	202.5	184.5	168
	250A	250	237.5	225	195
M3	250A	250	237.5	212.5	187.5
	300A	300	285	255	225
	350A	350	332.5	297.5	262.5
	400A	400	380	340	300
M4	400A	400	380	360	340
	500A	500	465	430	400
	600A	600	558	516	480
M5	600A	600	558	516	480
	700A	700	644	595	546
	800A	800	736	680	624
M6	800A	800	800	800	800
	1000A	1000	1000	1000	900
	1200A	1200	1080	1080	960

Altitude m		2000m	3000m	4000m	5000m
I _n		1×I _n	0.96×I _n	0.93×I _n	0.9×I _n
U _e (V)	AC/DC	600	480	420	360
Dielectric properties (V)	AC/DC	2400	2000	1680	1440
Rated insulation impulse voltage U _{imp} (kV)		8	8	8	8

Accessories For MCCB/MCP/MCS

Internal Accessories

Alarm Switch (AL)



Function:

- Sends a signal when the circuit breaker trips
- UL File Number E355392

1

Auxiliary Contact (AX)



Function:

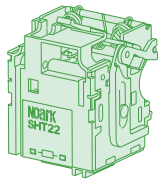
- Indicates the state of a circuit breaker (on/off)
- UL File Number E355392

2

Accessory Description	Rated Operational Voltage	Rated Operational Current	Catalog Number
Alarm Switch 1NO / 1NC	240/480 Vac, 110/220 Vdc	0.25A @ 110 Vdc	AL/AX21P*
Auxiliary Contact 1NO / 1NC		0.25A @ 220 Vdc 5A @ 240 Vac 2A @ 480 Vac*	

*AL/AX21P is an Alarm switch when inserted in position '1' on the breaker and Auxiliary contact when inserted in position '2' on the breaker

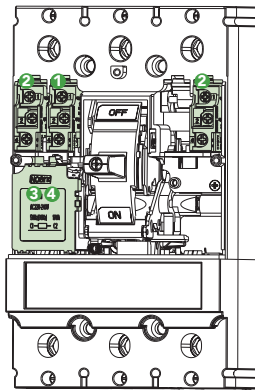
Shunt Release (SHT)



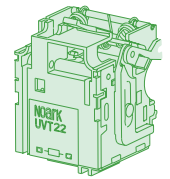
Function:

- Allows circuit breaker to be remotely operated
- Response Voltage, Pick-Up: Us 70-110%
- Opening Time: Interrupts Automatically ≥ 10 ms, ≤ 60 ms
- UL File Number E355392

3



Under-Voltage Trip (UVT)



Function:

- Prevents circuit breaker from closing during an under-voltage situation
- Response Voltage, Drop: Ue 35-70%
- Response Voltage, Pick-Up: Ue 85-110%
- Opening Time: Interrupts Automatically ≥ 10 ms, ≤ 60 ms
- UL File Number E355392

4

Accessory Description	Frame Size	Voltage	Catalog Number
Shunt Trip	M1	100-130 Vac	SHT21NA
		220-240 Vac	SHT21NB
		12 Vdc	SHT21ND
		24 Vdc	SHT21NI
	110 - 125 Vdc	SHT21NG	
	M2-M3	100-130 Vac	SHT22NA
		220-240 Vac	SHT22NB
		12 Vdc	SHT22NI
		24 Vdc	SHT22NE
	110 - 125 Vdc	SHT22NG	
	M4-M5	100-130 Vac	SHT24NA
		220-240 Vac	SHT24NB
		12 Vdc	SHT24NI
		24 Vdc	SHT24NE
	110 - 125 Vdc	SHT24NG	
	M6	100 - 130 Vac	SHT26NA
220-240 Vac		SHT26NB	
480-500 Vac		SHT26ND	
24-30 Vdc		SHT26NE	
110 - 125 Vdc	SHT26NG		

Accessory Description	Frame Size	Voltage	Catalog Number
Under-Voltage Trip	M1	110-127 Vac	UVT21NA
		220-240 Vac	UVT21NB
		24-30 Vdc	UVT21ND
	M2-M3	110-127 Vac	UVT22NA
		220-240 Vac	UVT22NB
		24-30 Vdc	UVT22ND
	M4-M5	110-127 Vac	UVT24NA
		220-240 Vac	UVT24NB
	M6	24-30 Vdc	UVT24ND
		110-127 Vac	UVT26NA
		220-240 Vac	UVT26NB
	480-500 Vac	UVT26NC1	

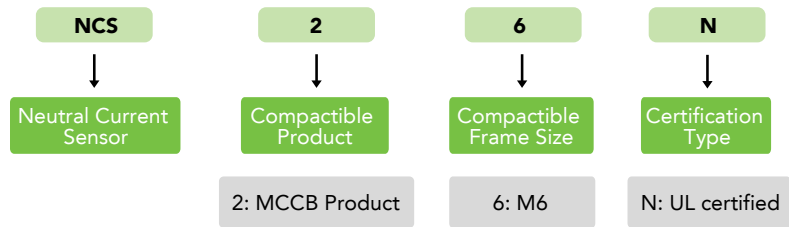
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Accessories For MCCB

External Accessories: Neutral Current Sensor

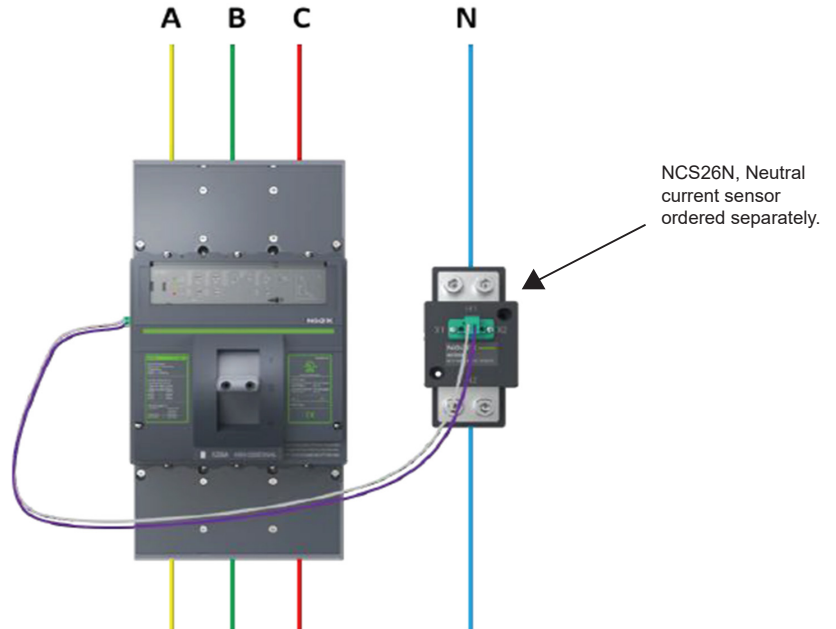


NCS26N is required for ground fault protection in 3P-4W system. NCS26N is ordered separately.



NCS26N	
Rated Operational Current (A)	800 - 1200
Induction Ratio (A-mV)	1000 : 137.5
Operational Temperature	-40°C ~ +70°C
Cable size	14 AWG ~ 24 AWG
Standards	UL489, UL1998 (Software)
Weight (kg)	1.6

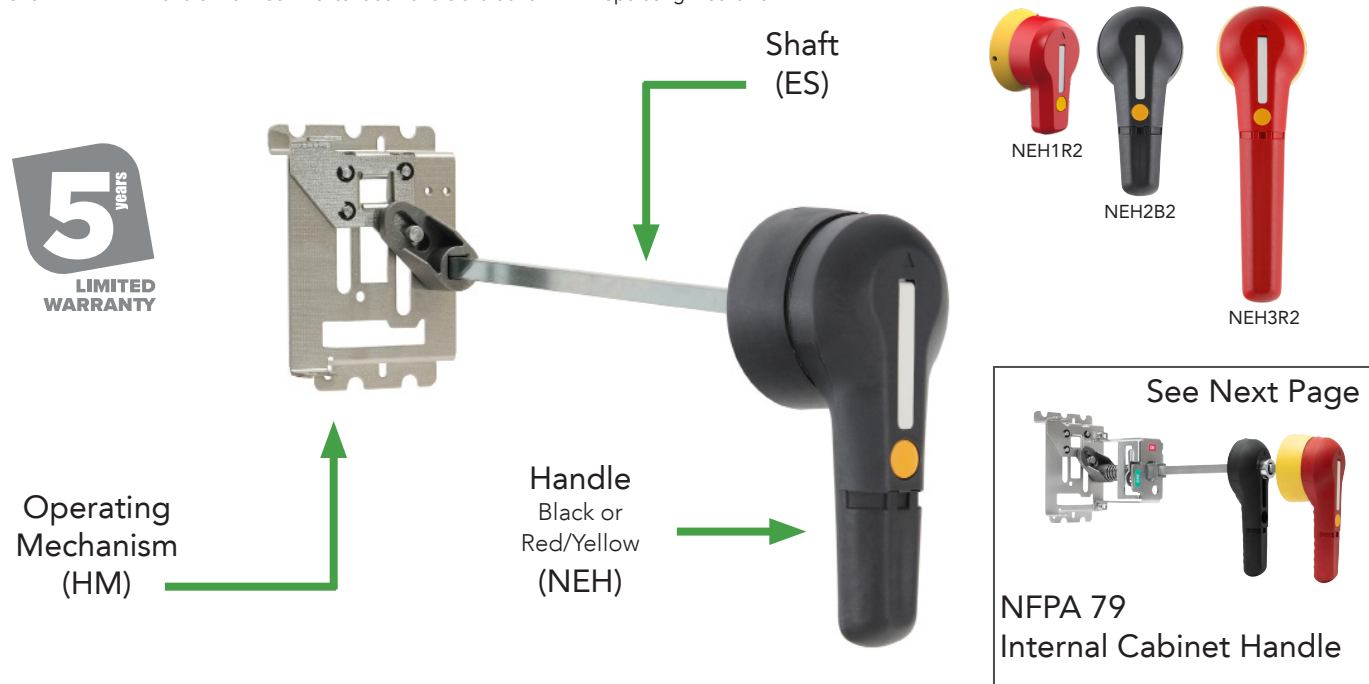
M6 3P4W protects circuit from ground fault, without cutting off the circuit due to faults on neutral. According to NEC Article 250.20(D) - "In three-phase, four-wire power systems, the neutral point shall not be required to be connected to an overcurrent device, but measures shall be taken to ensure that the neutral point is connected to the grounding system in a manner that establishes reliable fault current path."



Accessories For MCCB/MCP/MCS

External Accessories: Extended Rotary Handle

Shown: NEH2R2 handle with ES32A extended handle shaft and HM1A operating mechanism.



NEMA extended rotary handle mechanism selection consists of 3 components (sold separately): operating mechanism (HM), shaft (ES), and rotary handle (NEH).

- UL File Numbers E484125 and E355392

Selection Process

- Step 1. Identify breaker frame size to select corresponding operating mechanism (HM).
- Step 2. Select shaft (ES) based on the length needed and diameter required.
- Step 3. Select handle (NEH) with the matching shaft diameter based on desired color combination and UL rating.

Step 1

Operating Mechanism Select One			
No of Poles	Frame Size	Use Shaft Diameter	Catalog Number
2	M1 / M2	10mm ²	HMD1A / HMD2A
	M1 / M2	10mm ²	HMD1A / HMD2A
3	M1	10mm ²	HM1A
	M2	10mm ²	HM2A
	M1	10mm ²	HM1A
	M2	10mm ²	HM2A
	M3	12mm ²	HM3B
	M4 / M5 / M6	12mm ²	HOM6B

Step 2

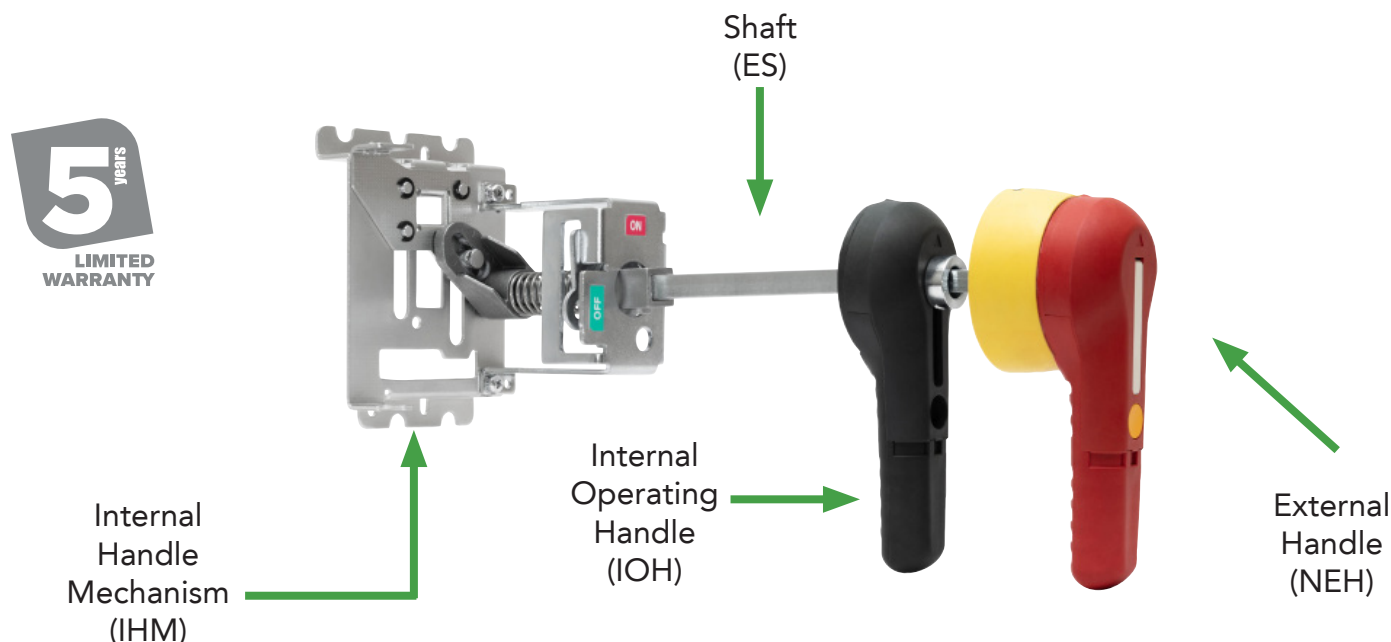
Shaft Select One		
Shaft Diameter	Length	Catalog Number
10mm ² M1 / M2	7.9 inch (200mm)	ES20C
	12.6 inch (320mm)	ES32C
	19.7 inch (500mm)	ES50C
10mm ² M1 / M2	7.9 inch (200mm)	ES20A
	12.6 inch (320mm)	ES32A
	19.7 inch (500mm)	ES50A
10mm ² M1 / M2	7.9 inch (200mm)	ES20C
	12.6 inch (320mm)	ES32C
	19.7 inch (500mm)	ES50C
10mm ² M1 / M2	7.9 inch (200mm)	ES20A
	12.6 inch (320mm)	ES32A
	19.7 inch (500mm)	ES50A
12mm ² M3 / M4 / M5 / M6	7.9 inch (200mm)	ES20B
	12.6 inch (320mm)	ES32B
	19.7 inch (500mm)	ES50B

Step 3

4/4X Handle Select One			
Frame Size	Use Shaft Diameter	Color	Catalog Number
M1 / M2	6mm ²	Black	NEH1B2
		Red / Yellow	NEH1R2
M1 / M2	10mm ²	Black	NEH2B2
		Red / Yellow	NEH2R2
M1 / M2	6mm ²	Black	NEH1B2
		Red / Yellow	NEH1R2
M1 / M2	10mm ²	Black	NEH2B2
		Red / Yellow	NEH2R2
M3 / M4 / M5 / M6	12mm ²	Black	NEH3B2
		Red / Yellow	NEH3R2

Accessories For MCCB/MCP/MCS

External Accessories: NFPA 79 Internal Cabinet Handle



- UL File Numbers E484125 and E355392

Selection Process

- Step 1.** Identify breaker frame size to select corresponding internal handle mechanism (IHM).
- Step 2.** Select shaft (ES) based on the length needed and diameter required.
- Step 3.** Select the internal operating handle (IOH) based on the breaker frame size.
- Step 4.** Select handle (NEH) with the matching shaft diameter based on desired color combination and UL rating.

Step 1

Internal Handle Mechanism		
Select One		
Frame Size	Use Shaft Diameter	Catalog Number
M1	10mm ²	IHM1
M2	10mm ²	IHM2
M3	12mm ²	IHM3
M4 or M5	12mm ²	IHM4

Step 2

Shaft		
Select One		
Shaft Diameter	Length	Catalog Number
10mm ² M1 or M2	7.9 inch (200mm)	ES20A
	12.6 inch (320mm)	ES32A
	19.7 inch (500mm)	ES50A
12mm ² M3, M4 or M5	7.9 inch (200mm)	ES20B
	12.6 inch (320mm)	ES32B
	19.7 inch (500mm)	ES50B

Step 3

Internal Operating Handle		
Select One		
Frame Size	Use Shaft Diameter	Catalog Number
M1 or M2	10mm ²	IOH2
M3, M4 or M5	12mm ²	IOH3

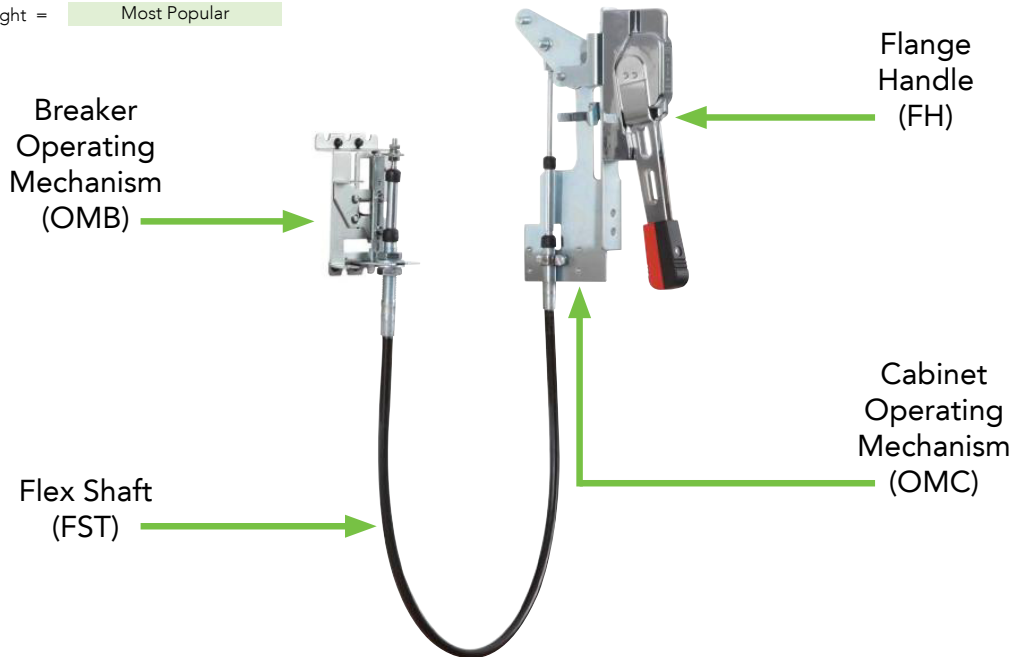
Step 4

4/4X Handle			
Select One			
Frame Size	Use Shaft Diameter	Color	Catalog Number
M1 or M2	10mm ²	Black	NEH2B2
		Red / Yellow	NEH2R2
M3, M4 or M5	12mm ²	Black	NEH3B2
		Red / Yellow	NEH3R2

Accessories For MCCB/MCP/MCS

External Accessories: M1-M6 Flange Handle Mechanism

Green Highlight = Most Popular



M1-M5 Flange handle mechanism selection is separated into 4 components (sold separately): flange handle (FH), flex shaft (FST), cabinet operating mechanism (OMC) and breaker operating mechanism (OMB). NOARK UL MCCB frame size: M1 (15-150A), M2 (175-250A), M3 (300-400A), M4 (500-600A), M5 (700-800A), and M6 (800-1200A).

Selection Process

- UL File Numbers E355392, E484125

- Step 1.** Select desired flange handle.
- Step 2.** Select cabinet operating mechanism.
- Step 3.** Select breaker operating mechanism based on frame size.
- Step 4.** Select flex shaft* based on enclosure requirements.

Step 1			+		Step 2		+		Step 3		+		Step 4		
Flange Handle					Cabinet Operating Mechanism				Breaker Operating Mechanism				Flex Shaft*		
Select One					Select One				Select One				Select One		
Frame Size	Handle Type / Length	Catalog Number			Frame Size	Catalog Number			Frame Size	Catalog Number			Frame Size	Length	Catalog Number
M1 / M2 / M3 / M4 / M5 / M6	Compact fixed length (9.57 in) UL 4, 4X Rated	FH4XC			M1 / M2 / M3 / M4 / M5 / M6	OMC			M1	OMB21			M1 / M2 / M3 / M4 / M5	3 feet	FST3
	Adjustable length (11.81 - 13.62 in) UL 4, 4X Rated	FH4XD					M2	OMB22			4 feet	FST4			
						M3	OMB23			5 feet	FST5				
						M4 / M5	OMB24			6 feet	FST6				
						M6	OMB26			M6	4 feet	FSB4			
											5 feet	FSB5			
											6 feet	FSB6			
											7 feet	FSB7			

* When selecting the length of shaft, ensure minimum bending radius of 6 inches is maintained to operate properly. Contact NOARK if additional lengths are needed.

Accessories For MCCB/MCP/MCS

Connection Hardware: Terminal Lugs



1-Hole

- Terminal lugs included with molded case circuit breakers standard. Listed individually for replacement purposes only.
- Sold Individually Example: Line / Load Terminal Lugs for 3-pole breaker requires six
- UL File Number E349009

Accessory Description	Frame Size	Configuration	Specifications	Catalog Number
Terminal Lugs	M1 (150A)	1-Hole Standard	75°C #14 AWG~#3/0 AWG* (1) Cu wire #12 AWG~#3/0 AWG (1) Al wire	LTC21NAA
	M2 (250A)	1-Hole Standard	75°C #3 AWG~300kcmil (1) Cu or Al wire	LTC22NAA
	M3 (400A)	1-Hole Standard	75°C #4/0 AWG~750 kcmil (1) Cu or Al wire	LTC23NAA
		2-Hole** Optional	75°C #3 AWG~250 kcmil (2) Cu or Al wire	LTC23NBA
	M4 (600A)	2-Hole Standard	75°C #2/0 AWG~500 kcmil (2) Cu or Al wire	LTC24NBA
	M5 (800A)	2-Hole (700A) Standard	75°C 250kcmil-600kcmil (2) Cu or Al wire	LTC25NBA
		3-Hole (800A) Standard	75°C #4/0 AWG-500kcmil (3) Cu or Al wire	LTC25NCA
	M6 (1200A)	3-Hole (800-1000A) Standard	75°C #3/0 AWG-750kcmil (3) Cu or Al wire	LTC26NCA
		4-Hole (1200A) Standard	75°C #3/0 AWG-500kcmil (4) Cu or Al wire	LTC26NDA

NOTE: At 100% rated breaker, 90°C wire are used with ampacity based on 75°C rating

** Requires external terminal cover part no. TC23NB ordered separately

* AWG = American Wire Gauge



Accessory Description	Type	Configuration	Catalog Number
Terminal Cover	M3	2-Holes	TC23NB

- Required for installation of M3 2-Hole terminal LTC23NB or LTC23NBA

Additional products, accessories and higher ratings available. Contact your NOARK representative or visit na.noark-electric.com for additional information.

Accessories For MCCB/MCP/MCS

Connection Hardware: Multi-wire Terminal Lug Kits



- Multi-wire terminal lug kits include: three terminal lugs and one terminal shield.
- Al/Cu rated
- UL File Number E355392

Accessory Description	Frame Size	Configuration	Specifications	Catalog Number
Multi-wire Terminal Lug Kits	M1 (150A)	3-Hole	167 °F (75 °C) #12 AWG*~#3 AWG* Al wire or #14 AWG*~#3 AWG* Cu wire	LK21NCA
		6-Hole	167 °F (75 °C) #12 AWG*~#6 AWG* Al wire or #14 AWG*~#6 AWG* Cu wire	LK21NFA
	M2 (250A)	3-Hole	167 °F (75 °C) #8 AWG*~#2/0 AWG* Al/Cu wire	LK22NCA
		3-Hole (one large, two small)	167 °F (75 °C) #3 AWG*~#2/0 AWG*, (1) Al/Cu wire and # 12 AWG*~#1 AWG*, (2) Al/Cu wire	LK22NGA
		6-Hole	167 °F (75 °C) #12 AWG*~#6 AWG Al/Cu wire	LK22NFA
	M3 (400A)	2-Hole	167 °F (75 °C) #3AWG*~250 kcmil Al/Cu wire	LK23NBA
		3-Hole	167 °F (75 °C) #3AWG*~250 kcmil Al/Cu wire	LK23NCA
		5-Hole (two large, three small)	167 °F (75 °C) #12 AWG*~#1 AWG*, (3) Al/Cu wire and #3 AWG*~#3/0 AWG*, (2) Al/Cu wire	LK23NEA
		6-Hole	167 °F (75 °C) 12 AWG*~#3 AWG* Al/Cu wire	LK23NFA
	M4 (600A)	3- Hole	167 °F (75 °C) #2/0 AWG*~250 kcmil Al/Cu wire	LK24NCA
		5-Hole	167 °F (75 °C) #12 AWG*~#1 AWG*, (3) Al/Cu wire and #3 AWG*~#3/0 AWG*, (2) Al/Cu wire	LK24NEA

* AWG = American Wire Gauge

Additional products, accessories and higher ratings available. Contact your NOARK representative or visit na.noark-electric.com for additional information.

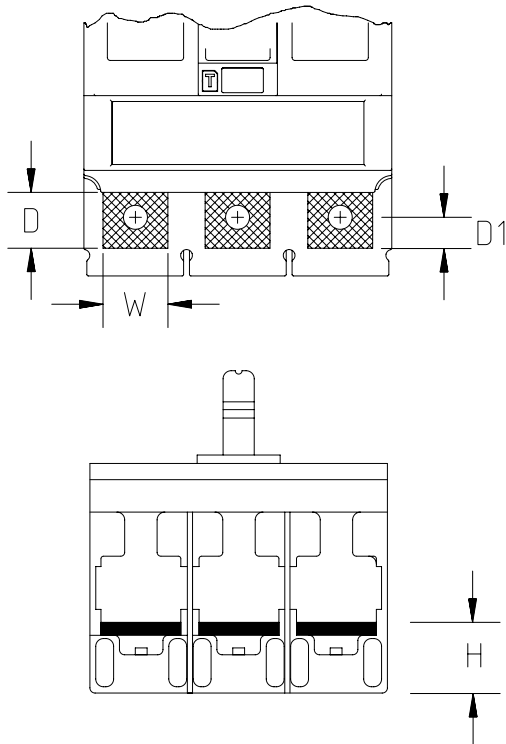
Accessories For MCCB/MCP/MCS

Lugs to Bus Bar Conversion Kits

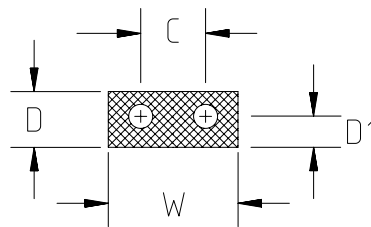
Frame Size	Bus Pad Dimensions (mm)										Bolt Size	Bolt Torque	Conversion Kit Catalog Number
	Line Side (Top)					Load Side (Bottom)							
	W	D	D1	C	H	W	D	D1	C	H			
M1	14.2	14.8	7.3	-	18.5	14.2	16.8	7.3	-	17.5	M6 x 16	10Nm/89 lb in	CKLB21
M2	25	18.5	8.5	-	23	25	18.1	8.5	-	21	M8 x 20	11Nm/97.4 lb in	CKLB22
M3	30	30	13.5	-	27.8	26	27	13.5	-	25.9	M10 x 30	25Nm/222lb-in	Not Required
M4	50	33.3	16.5	-	33.5	50	33	17	-	33.5	M12 x 30	30Nm/265lb-in	Not Required
M5	50	33.4	16.5	-	33.5	50	33	17	-	33.5	M12 x 30	30Nm/265lb-in	Not Required
M6	50	30	12	25	32.6	50	27.5	11.7	25	32.6	M10 x 40(2)	25Nm/222lb-in	Not Required

C

M1-M5 Breaker Bus Pad Dimensions



M6 Breaker Bus Pad Dimensions



CKLB Conversion Kit

