Westinghouse

MCP Motor Circuit Protector

3 to 150 Amperes
600 Volts Ac Max.
3 Poles Only

Interrupting Ratings
Based on NEMA Test Procedures

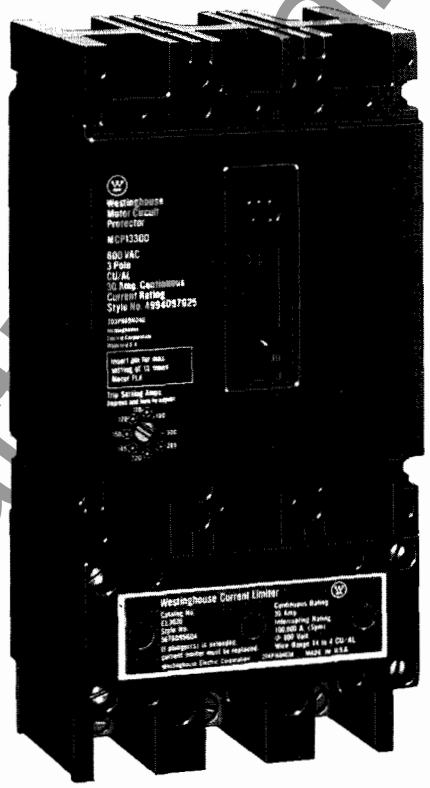
MCP in Typical Motor Starter Circuit
240 Volts Ac: 50,000 Amps. Sym.
480 Volts Ac: 18,000 Amps. Sym.
600 Volts Ac: 14,000 Amps. Sym.

MCP with Current Limiter in Typical Motor Starter Circuit
Up to 600 Volts: 100,000 Amps. Sym.

Application
The MCP motor circuit protector is designed for application to individual motor circuits in combination with a magnetic motor starter. MCP's operate on the magnetic principle with a current sensing coil in each of the 3 poles to provide short circuit protection. The magnetic trip setting is adjusted by a single knob on the front of the device. This adjusting knob has 8 settings and is designed to comply with the National Electric Code by providing a locking pin to limit the max trip setting to 1300% of the motor full load current.

The MCP is shipped with the adjusting knob on the low setting and the pin is to be inserted at the proper setting at time of installation. The pin is removable. MCP's are sized to correspond with NEMA starter sizes, with seven ratings covering all starter sizes thru size 4.

The MCP design permits the fastest tripping time possible on low level faults while offering circuit breaker convenience, quick make-quick break action, dead front safety and protection against single phasing.



MCP With Current Limiter

Ratings and trip settings are as follows:

Motor Full Load Current, Amperes	MCP Continuous Rating	MCP Catalog Number	Use with Starter Size	MCP Trip Settings							
				Min.	Lock Positions 1	2	3	4	5	6	Max.
.62 – 1.8	3	MCP0322	0	7	8	9	11	13	16	19	22
1.5 – 4.9	7	MCP0358	0	18	20	25	30	36	43	51	58
4.2 – 14.0	15	MCP03150	0	50	54	62	75	90	110	130	150
8.5 – 25.5	30	MCP13300	1	100	110	120	150	185	220	265	300
13.8 – 40.6	50	MCP23480	2	160	180	210	250	320	380	430	480
23.0 – 86.5	100	MCP331000	3	275	300	400	500	625	725	875	1000
38.5 – 142.1	150	MCP431550	4	450	500	580	670	825	1000	1250	1550

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New Information
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MCP Application Based on Motor Full Load Current

1. Determine motor full load current from the motor nameplate data. Refer to the table and determine appropriate pin position. Take red pin from envelope and push firmly through the dotted circle on the MCP nameplate corresponding to the position derived from the table. Depress white pointer and turn counterclockwise until the pin stops rotation.

2. No opening appears under the maximum setting. If this position is utilized it is suggested that the pin be retained with the breaker for possible alternate application at a later date.

3. For maximum protection, the pointer should be turned clockwise to successively lower positions until the MCP trips on motor starting. After this position is determined, turn pointer counterclockwise to the next higher setting for normal operations. Intermediate stops between marked positions are available for customer convenience. If MCP does not trip at minimum setting leave pointer at this setting.

Motor Full Load Current, Amperes	NEMA Starter Size	MCP Catalog Number	MCP Trip Setting Pin Position②
.62 – .68			8
.69 – .84			9
.85 – .99			11
1.0 – 1.1	0	MCP0322	13
1.2 – 1.4			16
1.5 – 1.6			19
1.7 – 1.8			22
1.5 – 1.8			20
1.9 – 2.2			25
2.3 – 2.7			30
2.8 – 3.2	0	MCP0358	36
3.3 – 3.8			43
3.9 – 4.4			51
4.5 – 4.9			58
4.2 – 4.7			54
4.8 – 5.7			62
5.8 – 6.8			75
6.9 – 8.4	0	MCP03150	90
8.5 – 9.9			110
10.0 – 11.4			130
11.5 – 14.0			150
8.5 – 9.1			110
9.2 – 11.4			120
11.5 – 14.1			150
14.2 – 16.8	1	MCP13300	185
16.9 – 20.3			220
20.4 – 22.9			265
23.0 – 25.5			300
13.8 – 16.1			180
16.2 – 19.1			210
19.2 – 24.5			250
24.6 – 29.1	2	MCP23480	320
29.2 – 33.0			380
33.1 – 36.8			430
36.9 – 40.6			480
23.0 – 30.7			300
30.8 – 38.3			400
38.4 – 47.9			500
48.0 – 55.7	3	MCP331000	625
55.8 – 67.3			725
67.4 – 76.9			875
77.0 – 86.5			1000
38.5 – 44.5			500
44.6 – 51.4			580
51.5 – 63.4			670
63.5 – 76.8	4	MCP431550	825
76.9 – 96.1			1000
96.2 – 119.1			1250
119.2 – 142.1			1550

Terminals

Terminals are included with both the MCP and Current Limiter. Standard terminals are aluminum alloy, with non-aluminum terminals optional for use with only the MCP. Both standard and optional terminals are suitable for aluminum or copper conductors. When using aluminum conductors, use of joint compound is recommended. Wire ranges are listed below.

MCP or Limiter	Terminals	
	Standard Alum.	Optional Non-Alum.
Size 0	#14-4	#14-10
Size 1, 2	#14-4	#14-3/0
Size 3, 4	#6-3/0	#14-3/0
Limiters to 50 amp.	#14-4	. . . .
Limiters above 50 amp.	#6-3/0	. . . .

Current Limiter Attachment

The current limiter attachment for the MCP is designed to provide 100,000 amps sym. interrupting capacity at up to 600 V Ac making the MCP suitable for use in network distribution systems or other applications where unusually high fault currents are available. The current limiters bolt to the load end of the MCP and are provided with terminals suitable for copper or aluminum conductors.

Limiters are coordinated with the MCP so that normal fault currents up to 50 or more times the continuous rating of the MCP will be interrupted automatically by the MCP without any damage to the limiter. Only the rare very high fault will be interrupted by the limiter. Faults that are interrupted by the limiter will also magnetically trip the MCP, opening all 3 poles, preventing single phase operation.

Each of the 3 poles of the limiter is equipped with an indicator that will extend when a fault is interrupted by the limiter quickly identifying the fault circuit.

For proper protection and coordination, MCP's and limiters must be applied as follows:

Current Limiter Cat. No.	MCP Used With	MCP Continuous Current
EL3003	MCP0322	3
EL3007	MCP0358	7
EL3015	MCP03150	15
EL3030	MCP13300	30
EL3050	MCP23480	50
EL3100	MCP331000	100
EL3150	MCP431550	150

Accessories and Modifications

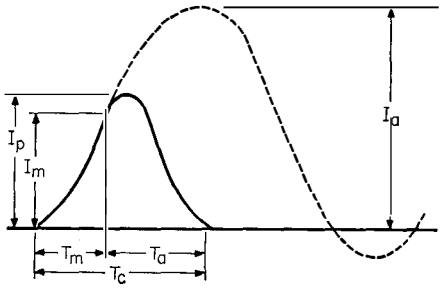
Accessories and modifications for the MCP include shunt trip, auxiliary switch, undervoltage release, handle locks, line terminal shield, motor operator and fungus treatment.

MCP Motor Circuit Protector

Operating Data for MCP With Current Limiter

Although greatly restraining the magnitude of fault currents, the current limiters must necessarily allow some current to pass for a short period of time in order to cause it to function. Figure A illustrates the operating characteristic of the current limiter used with the MCP.

Figure A



I_a: Available Peak Current
T_m: Melting Time
I_m: Current at Melting time
I_p: Peak Let-thru Current
T_a: Arcing time
T_c: Total Interrupting (Clearing) time

Tables I thru VI have been prepared from actual test data of bolted faults on the load side of MCP's with current limiters. Installations made on basis of these tables allow a margin of safety because any additional apparatus inserted into the system further limits the short circuit current.

It can be seen from the tables that with a current limiter in the system, fault currents are limited before reaching possible peak currents. This action reduces the let-through currents and thus reduces substantially the thermal and magnetic stresses.

Under short circuit conditions, any failure of apparatus will be due to excessive magnetic or thermal stresses. Maximum magmetic stress is proportional to the product of the peak currents in two adjacent conductors; in addition, forces at the contact surface of connected contactors are also proportional to current squared thus limiting this value reduces the possibility of having to replace contacts. Thermal stress is proportional to the square of the rms let-through current multiplied by time (I^2t). When the thermal and magnetic capabilities of the connected apparatus are known, then the data in the tables can be used in designing complete systems.

Table I: MCP0322 With Limiter EL3003 or MCP0358 With Limiter EL3007

Available System Currents			MCP with Limiter Operational Data	
Average 3 Phase Sym-metrical RMS Amps	Power Factor, %	Max. Peak Amps	I^2t of Max. Phase x 10^6	Max. Peak Let-thru Amps
10,000	25	20,400	.002	1000
20,000	25	40,800	.01	2000
30,000	15	68,700	.01	2500
40,000	15	91,600	.01	3000
50,000	15	114,500	.01	3300
60,000	8.5	150,000	.01	3800
70,000	8.5	175,000	.01	4200
80,000	8.5	200,000	.02	4500
90,000	8.5	225,000	.02	4700
100,000	8.5	250,000	.02	5000

Table II: MCP03150 With Limiter EL3015

Available System Currents			MCP with Limiter Operational Data	
Average 3 Phase Sym-metrical RMS Amps	Power Factor, %	Max. Peak Amps	I^2t of Max. Phase x 10^6	Max. Peak Let-thru Amps
10,000	25	20,400	.007	1500
20,000	25	40,800	.02	4000
30,000	15	68,700	.02	4500
40,000	15	91,600	.02	5000
50,000	15	114,500	.02	5400
60,000	8.5	150,000	.02	5800
70,000	8.5	175,000	.03	6200
80,000	8.5	200,000	.03	6500
90,000	8.5	225,000	.03	6800
100,000	8.5	250,000	.03	7000

Table III: MCP13300 With Limiter EL3030

Available System Currents			MCP with Limiter Operational Data	
Average 3 Phase Sym-metrical RMS Amps	Power Factor, %	Max. Peak Amps	I^2t of Max. Phase x 10^6	Max. Peak Let-thru Amps
10,000	25	20,400	.01	2000
20,000	25	40,800	.02	4000
30,000	15	68,700	.025	5000
40,000	15	91,600	.03	6000
50,000	15	114,500	.03	7000
60,000	8.5	150,000	.035	7500
70,000	8.5	175,000	.040	8000
80,000	8.5	200,000	.044	8800
90,000	8.5	225,000	.048	9500
100,000	8.5	250,000	.050	10,000

Table IV: MCP23480 With Limiter EL3050

Available System Currents			MCP with Limiter Operational Data	
Average 3 Phase Sym-metrical RMS Amps	Power Factor, %	Max. Peak Amps	I^2t of Max. Phase x 10^6	Max. Peak Let-thru Amps
10,000	25	20,400	.02	2,800
20,000	25	40,800	.05	10,000
30,000	15	68,700	.07	12,000
40,000	15	91,600	.08	14,000
50,000	15	114,500	.10	15,000
60,000	8.5	150,000	.11	15,800
70,000	8.5	175,000	.12	16,500
80,000	8.5	200,000	.13	17,300
90,000	8.5	225,000	.14	18,100
100,000	8.5	250,000	.15	18,800

Table V: MCP331000 With Limiter EL3100

Available System Currents			MCP with Limiter Operational Data	
Average 3 Phase Sym-metrical RMS Amps	Power Factor, %	Max. Peak Amps	I^2t of Max. Phase x 10^6	Max. Peak Let-thru Amps
10,000	25	20,400	.30	9,900
20,000	25	40,800	.33	16,000
30,000	15	68,700	.37	18,000
40,000	15	91,600	.40	19,500
50,000	15	114,500	.44	21,000
60,000	8.5	150,000	.48	22,000
70,000	8.5	175,000	.51	23,000
80,000	8.5	200,000	.54	24,000
90,000	8.5	225,000	.57	25,500
100,000	8.5	250,000	.60	26,800

Table VI: MCP431550 With Limiter EL3150

Available System Currents			MCP with Limiter Operational Data	
Average 3 Phase Sym-metrical RMS Amps	Power Factor, %	Max. Peak Amps	I^2t of Max. Phase x 10^6	Max. Peak Let-thru Amps
10,000	25	20,400	.32	11,700
20,000	25	40,800	.37	17,000
30,000	15	68,700	.42	20,000
40,000	15	91,600	.46	23,000
50,000	15	114,500	.52	25,000
60,000	8.5	150,000	.56	26,000
70,000	8.5	175,000	.59	27,000
80,000	8.5	200,000	.63	28,000
90,000	8.5	225,000	.68	29,000
100,000	8.5	250,000	.70	30,000

MCP Motor Circuit Protector

Typical Specifications
Electrical circuits shall be protected by a motor circuit protector (MCP) as manufactured by Westinghouse Electric Corporation, or approved equal.

The MCP shall be operated by a toggle type handle and shall have a quick make, quick break overcenter switching mechanism that is mechanically trip free from the handle so that the contacts cannot be held closed against short circuits and abnormal currents. Tripping shall be clearly indicated by the handle automatically assuming a position midway between the manual ON and OFF positions. All latch surfaces shall be ground and polished. All poles shall be so constructed that they open, close and trip simultaneously.

MCP's must be completely enclosed in a molded case. MCP's shall have the trip unit sealed to prevent tampering. Ampere ratings shall be clearly visible. Contacts shall be of non-welding silver alloy. Arc extinction must be accomplished by means of DE-ION arc chutes, consisting of metal grids mounted in an insulating support.

Each pole of these MCP's shall provide instantaneous short circuit protection by means of a single adjustable magnetic only element. The single adjustment screw shall adjust all poles simultaneously.

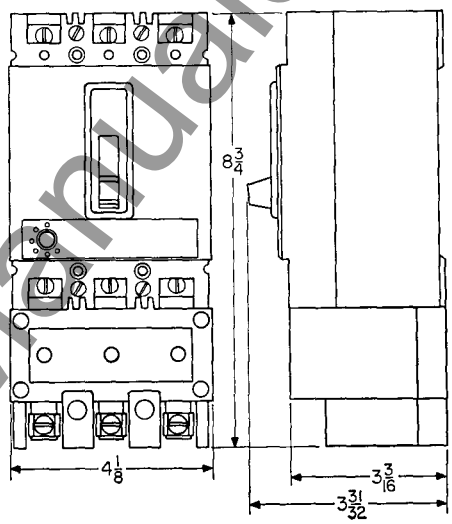
Provision shall be furnished in the MCP for locking the maximum achievable trip setting to values less than maximum obtainable trip setting. Each adjustment shall have 8 main setting points and mid-setting points following a linear scale so that each point has a significant value within calibration tolerances.

MCP's shall be suitable for use with current limiters, having 100,000 ampere interrupting capacity and a built-in trip indicator, that are fully coordinated with the MCP so that the MCP will open all three phases if the limiter operated. Current limiters shall be so constructed that they can only be replaced by an identical or similar limiter having the same interrupting capacity.

The minimum interrupting ratings of the MCP shall be at least equal to the available short circuit at the line terminals.

MCP ratings, modifications, etc. shall be as indicated on the drawings.

Outline Dimensions, Inches
Not to be used for construction purposes unless approved.



Further Information
Prices: Price List 29-320

Characteristic Curves:
Application Data 29-360-A

Dimensions: Dimension Sheet 29-370