



**Circuit Breaker Time/Current Curves (Phase Current)**

Magnum DS and Magnum SB Circuit Breakers  
Response: Very Inverse & Short Delay Trip  
This curve is for 50Hz or 60Hz applications.

**Notes:**

- This curve is shown as a multiple of the PICKUP setting ( $I_r$ ). The TimeDial setting combined with SHORT PU and SHORT TIME setting (shown in heavy lines) depict the IEEE Very Inverse response. The Instantaneous, shown as a separate response, can be set to OFF.
- Curve Equation:  
Trip = TimeDial \* [19.61/(I<sup>2</sup> - 1) + 0.491], where I is a multiple of  $I_r$ .  
For current > 1.2x  $I_r$ , tolerance is [±15%] or [-15%, +90 ms], whichever is larger.  
TimeDial curve goes to flat response at 14x  $I_r$ , with a shorter time of TimeDial function or SHORT TIME function prevailing if curves overlap. The Short Time function and the TimeDial function act independently and the entire TimeDial curves continue to be active even after the curves intersect.
- With Zone Selective Interlocking enabled, max trip times w/o aux power are as follows:

3 Phase fault	
60 Hz	75ms
50 Hz	85ms

When only one pole is carrying current and a fault occurs, trip times increase to 90ms at 60Hz and 95ms at 50 Hz, however with Aux power these times would be reduced by 10%

- The actual pick up point (indicated by rapid flashing of Unit Status LED on the product) occurs at 110% of the  $I_r$  current, with a ±5% tolerance. The SHORT PU settings have conventional 100% ± 5% as their pick up point.
- SHORT PU also has a M1 setting, which may extend out where the SHORT PU will become active.

	Adjustable Range	M1 setting
<b>Narrow Frame:</b>		
200A through 1250A	1.5 to 14x $I_r$	M1=14x $I_n$
1600A	1.5 to 12x $I_r$	M1=12x $I_n$
2000A (IEC only)	1.5 to 10x $I_r$	M1=12x $I_n$
<b>Standard Frame:</b>		
200A through 1250A	1.5 to 14x $I_r$	M1=14x $I_n$
1600A, 2000A, 2500A	1.5 to 12x $I_r$	M1=12x $I_n$
3000A, 3200A	1.5 to 10x $I_r$	M1=10x $I_n$
<b>Double Wide Frame:</b>		
2000A, 2500A	1.5 to 14x $I_r$	M1=14x $I_n$
3000A, 3200A, 4000A, 5000A	1.5 to 12x $I_r$	M1=12x $I_n$
6000A, 6300A (IEC only)	1.5 to 10x $I_r$	M1=10x $I_n$

- The end of the curve is determined by the interrupting rating of the circuit breaker.
- SHORT TIME: FLAT only  
Tolerance is +0/-80 ms of setting except  
0.10s setting is 0.06 to 0.13  
0.15s setting is 0.10 to 0.17  
0.20s setting is 0.15 to 0.22
- Curve applies from -20°C to +55°C ambient. Temperatures above +85°C cause automatic trip.
- These curves are comprehensive for the complete family of Magnum breakers, including all frame sizes, ratings, and constructions. The total clearing times shown are conservative and consider the maximum response times of the trip unit, the circuit breaker opening, and the interruption of the current under factors that contribute to worst case conditions, like: maximum rated voltages, single phase interruption, and minimum power factor. Faster clearing times are possible depending on the specific system conditions, the type of Magnum Circuit Breaker applied, and if any arc reduction settings are employed. Contact Eaton for additional information.