Characteristic Curves for Series NRX
Type NF and RF Frame with Digitrip 520 and 520M Trip Units

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Definitions

$I_n$ is the maximum value of continuous current for which the trip unit can be set.

$I_n$ is the basis (or reference) for both the Instantaneous and the Ground (Earth) protection current settings. The Ampere value of $I_n$ is printed on the Rating Plug.

$I_r$ is the basis for both the Long Delay Time and Short Delay Pick Up protection current settings. The Ampere value of $I_r$ is the Long Delay Pickup Setting $\times I_n$.

Further information may be obtained from:

Eaton Corporation  
Electrical Group  
1000 Cherrington Parkway  
Moon Township, Pennsylvania 15108-4312  
United States of America  
Telephone: 1-800-525-2000 or  
1-877-ETN-CARE (877-386-2273)

http://www.eaton.com/

Curves can also be found on-line by searching for the curve number.
Circuit Breaker Time / Current Curves (Phase Current)

Series NRX - Type NF or RF Frame Power Circuit Breakers
Response: Long Delay & Short Delay Trip (FLAT & IT)

This curve is for 50Hz or 60Hz applications.

Notes:
1. These curves are comprehensive for the complete family of Series NRX circuit 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 circuit breaker applied, and if any arc reduction settings are employed.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. Curve applies from -20°C to +70°C ambient. Temperatures above +85°C cause automatic trip indicated by the Long Delay (orange) LED.
4. This curve is shown as a multiple of the Long Delay Setting.
5. If Long Delay Thermal Memory is enabled, trip times may be shorter than indicated on this chart.
6. The Long Delay Pickup Point (indicated by rapid flashing of Unit Status LED on the product) occurs at 110%, with a ±10% tolerance. The Short Delay settings have conventional 100% ±10% at the pick up points.
7. Breakpoint back to FLAT response indicated by dots occurs @8x Ir for higher current levels of IT curve.

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Series NRX - Type NF or RF Frame with Digitrip 520(LI) - Long Delay Curves

Available Long Delay Setting
0.5 to 1x $I_r$ = $I_r$

Current in Multiples of Long Delay Setting ($I_r$)

Notes:
1. These curves are comprehensive for the complete family of Series NRX circuit 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 circuit breaker applied, and if any arc reduction settings are employed.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. Curve applies from -20°C to +70°C ambient. Temperatures above +85°C cause automatic trip indicated by the Long Delay (orange) LED.
4. This curve is shown as a multiple of the Long Delay setting.
5. If Long Delay Thermal Memory is enabled, trip times may be shorter than indicated on this chart.
6. The Long Delay Pickup Point (indicated by rapid flashing of Unit Status LED on the product) occurs at 110%, with a ±10% tolerance.

Circuit Breaker Time / Current Curves (Phase Current)
Series NRX - TYPE NF or RF Frame Power Circuit Breakers
Response: Long Delay

This curve is for 50Hz or 60Hz applications.

Available Long Delay Time Shown @ 6x $I_r$
2, 4, 7, 10, 12, 15, 20, 24 Seconds +0/-30%

Minimum Total Clearing Time
Maximum Total Clearing Time

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Circuit Breaker Time / Current Curves
Series NRX - Type NF Frame Circuit Breakers
Response: Adjustable and High Instantaneous Trip
This curve is for 50Hz and 60Hz applications.

Notes:
1. 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 circuit breaker applied, and if any arc reduction settings are employed.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. Curve applies from -20°C to +70°C ambient. Temperatures above +85°C cause automatic trip indicated by the Long Delay (orange) LED.
4. This curve is shown as a multiple of the Rating Plug (Iₚ) for adjustable instantaneous current, and as symmetrical RMS Current for high instantaneous values.
5. The Instantaneous settings have conventional 100% ±10% as the pickup points.
6. One additional OFF setting is available for customer selection, except for the Digitrip 520 (LI) style.
7. On the NF Frame, an additional, fixed High Instantaneous Trip function is provided in the circuit breaker set to pickup at 42kA RMS symmetrical (or 90kA instantaneous peak asymmetrical) current level. This protection is functional even when the Instantaneous is set to the OFF position.

Current in Multiples of Rating (Iₚ)

Symmetrical RMS Current (kA)
Series NRX - Type RF Frame Circuit Breakers

Response: Adjustable and High Instantaneous Trip

This curve is for 50Hz and 60Hz applications.

Notes:
1. 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 circuit breaker applied, and if any arc reduction settings are employed.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. Curve applies from -20°C to +70°C ambient. Temperatures above +85°C cause automatic trip indicated by the Long Delay (orange) LED.
4. This curve is shown as a multiple of the Rating Plug (Iₚ) for adjustable instantaneous current, and as symmetrical RMS Current for high instantaneous values.
5. The Instantaneous settings have conventional 100% ±10% as the pickup points.
6. One additional OFF setting is available for customer selection, except for the Digitrip 520 (LI) style.
7. On the RF Frame, an additional, fixed High Instantaneous Trip function is provided in the circuit breaker. This protection is functional even when the Instantaneous is set to the OFF position. Contact Eaton Corporation for availability of 85kA and 100kA options.

Available Adjustable Instantaneous Setting 2 to 12x Iₚ ± 10%

Symmetrical RMS Current | Inst Peak Asymmetrical
--- | ---
65kA | 128kA
85kA | 140kA
100kA | 212kA
Series NRX - Type NF or RF Frame with Digitrip 520 / 520M - Ground Curve

Circuit Breaker Time /Current Curves (Ground Current)

Series NRX - Type NF or RF Frame Circuit Breakers

Response: Ground Trip (FLAT & I_T)

This curve is for 50Hz or 60Hz applications.

Notes:
1. These curves are comprehensive for the complete family of Series NRX circuit 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 circuit breaker applied, and if any arc reduction settings are employed.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. Curve applies from -20°C to +70°C ambient. Temperatures above +85°C cause automatic trip indicated by the Long Delay (orange) LED.
4. The curve is shown as a multiple of the Rating Plug (I_n).
5. The ground fault settings have conventional 100% ±10% as the pickup points.
6. The ground fault pick up is limited to 1200A setting for non international styles.
7. Transition point from I_T back to FLAT response indicated by dot occurs @ 0.625x I_n for higher current levels of I_T curve

Available Ground Setting
0.25 to 1.0x I_n ±10%

Available Flat Response Ground Time
0.1 to 0.5 Seconds

Flat Shape for Ground Time

Notes:
1. These curves are comprehensive for the complete family of Series NRX circuit 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 circuit breaker applied, and if any arc reduction settings are employed.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. Curve applies from -20°C to +70°C ambient. Temperatures above +85°C cause automatic trip indicated by the Long Delay (orange) LED.
4. The curve is shown as a multiple of the Rating Plug (I_n).
5. The ground fault settings have conventional 100% ±10% as the pickup points.
6. The ground fault pick up is limited to 1200A setting for non international styles.
7. Transition point from I_T back to FLAT response indicated by dot occurs @ 0.625x I_n for higher current levels of I_T curve

Current in Multiples of Rating (I_n)
Maintenance Mode Characteristic

Series NRX - Type NF Frame Circuit Breakers
Trip Unit - Digitrip 520M with Maintenance Mode

Response: Maintenance Mode Trip
This curve is for 50Hz and 60Hz applications.

Notes:

1. 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 circuit breaker applied, and if any arc reduction settings are employed. Clearing times are shown with auxiliary power present.

2. The end of the curve is determined by the interrupting rating of the circuit breaker.

3. Curve applies from -20°C to +70°C ambient. Temperatures above +85°C cause automatic trip indicated by the Long Delay (orange) LED.

4. The Maintenance Mode feature must be turned ON via switch or Communications for these curves to apply. A blue LED verifies Maintenance Mode setting is active.

5. The Digitrip 520M will light the Instantaneous LED for a Maintenance Mode Trip.

6. Maintenance mode trip setting is fixed at 2000A. Tolerance is ±15%
Maintenance Mode Characteristic

Series NRX - Type RF Frame Circuit Breakers
Trip Unit - Digitrip 520M with Maintenance Mode

Response: Maintenance Mode Trip
This curve is for 50Hz and 60Hz applications.

Notes:

1. 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 circuit breaker applied, and if any arc reduction settings are employed. Clearing times are shown with auxiliary power present.

2. The end of the curve is determined by the interrupting rating of the circuit breaker.

3. Curve applies from -20°C to +70°C ambient. Temperatures above +85°C cause automatic trip indicated by the Long Delay (orange) LED.

4. The Maintenance Mode feature must be turned on via switch or Communications to apply. A blue LED verifies Maintenance Mode setting is active.

5. The Digitrip 520M will light the Instantaneous LED for a Maintenance Mode Trip.

6. Maintenance mode trip setting is fixed at 8000A. Tolerance is ±15%

See Note #6.
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