NG/ND-Frames

320-1600A, 240-690V

Contents

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Digitrip 310+ Electronic Trip Unit types NGS, NGH, NGC, NGU **Page**

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NES Digitrip RMS 310 Electronic Trip Unit types ND, CND, HND, CHND, NDC, CNDC

Digitrip OPTIM 550 & 1050 Electronic Trip unit types ND, HND, NDC

Note:
The following curves meet the requirements of UL, CSA, IEC, CCC and CE.
The following circuit breakers are derived from Eaton, Westinghouse, or Cutler-Hammer history.

Time Current Curves are engineering reference documents for application and coordination purposes only.

Powering Business Worldwide

Note: Unless noted below, all curves remain unchanged from their prior revision.

Revision	Curve Number	Page	Date
Changed KAIC from 50 to 65 on page 3			
ZSI times added to short delay curves.		4 & 5	2/2016
Combined NG and ND frames into one document.			

Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers.
It is not to be used to build catalog numbers for circuit breakers or trip units.

Table 1. Series G N–Frame (320-1600A)

NG H 3 080 39 ZG E C

Frame
NG

Performance				
	600	**480**	**415**	**240**
S	25	50	50	85
H	35	65	70	100
C	65	100	100	200
U①	65	150	150	200

Notes
① 800A only.
② Neutral inn left pole on GN; right pole on NG.
③ Breakers do not ship with lugs.
④ IEC Only
Trip units are factory installable only.

Amperes
080 = 800
120 = 120
125 = 1250④
160 = 1600④

Poles
3 = Three
4 = Four; neutral② 0% protected
7 = Four; neutral② 100% protected
9 = Four; neutral② 0/60/100% adjustable protection

Trip Unit
33 = 310+ Electronic LS
32 = 310+ Electronic LSI
35 = 310+ Electronic LSG
35B22 = 310+ Electronic LS(A), GFA, no trip
36 = 310+ Electronic LSIG
36B22 = 310+ Electronic LSI(A), GFA, no trip
38 = 310+ Electronic ALSI with Maintenance Mode
39 = 310+ Electronic ALSIG with Maintenance Mode
39B22 = 310+ Electronic ALSI(A) with Maintenance Mode and GFA, no trip

Terminations③
M = Metric tapped line/load conductors
E = Imperial tapped line/load conductors

Feature
Blank = No feature
B20 = High load alarm
B21 = Ground fault
ZG = Zone selective interlocking

Rating
Blank = 80% rated
C = 100% rated

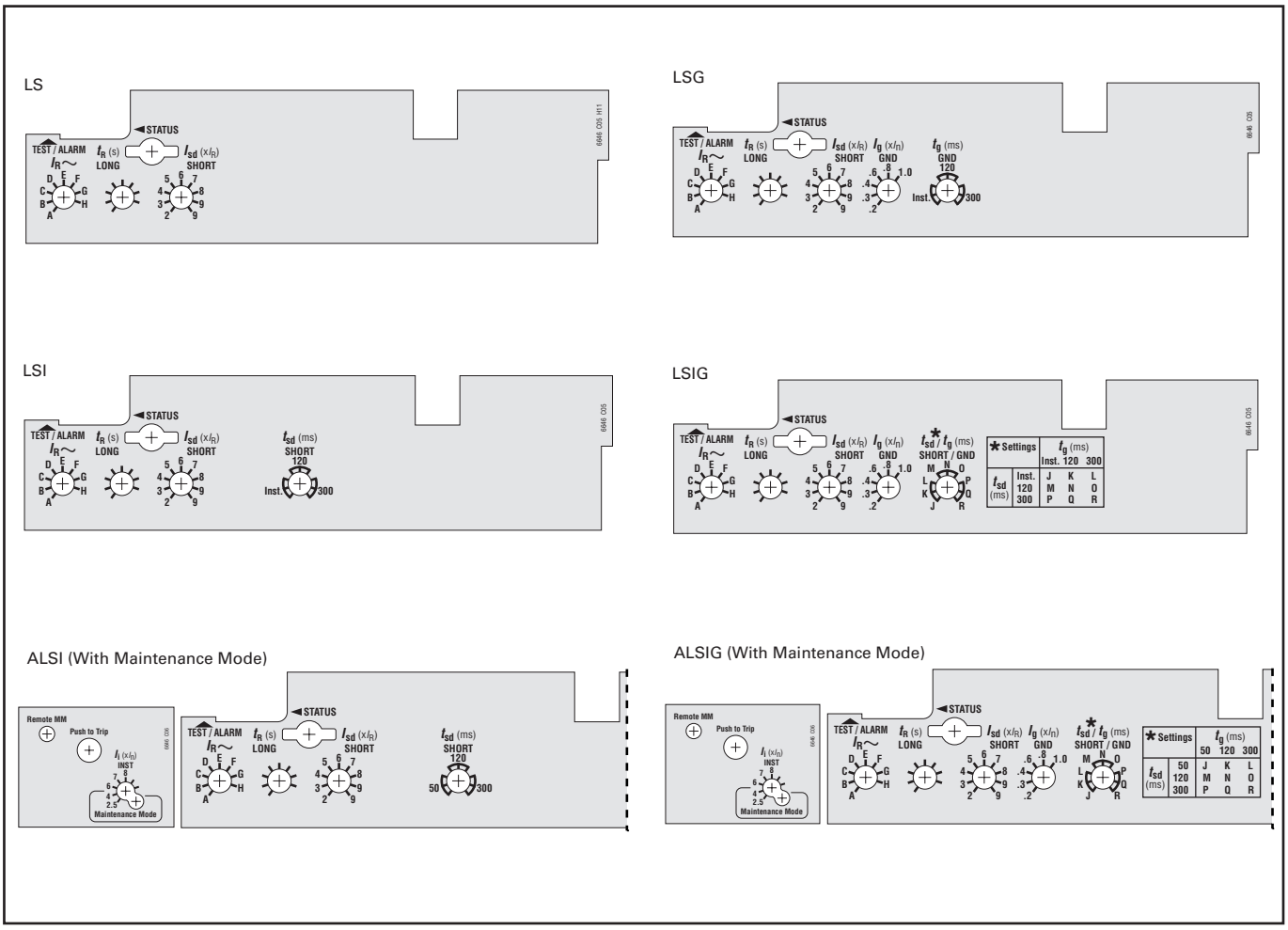


Figure 1. Digitrip 310+ Faceplates

Digitrip 310+ Circuit Breaker Time/Current Curves (Phase Current)

Series G N-Frame Circuit Breakers

Long Delay Response and Short Delay with Flat Response and Override

Catalog Types: NGS, NGH, NGC, NGU, GNS, GNH, GNC, and GNU circuit breakers, three- and four-pole

Trip Unit Type: 32 (LSI), 36 (LSIG), 38 (ALSI), 39 (ALSIG)

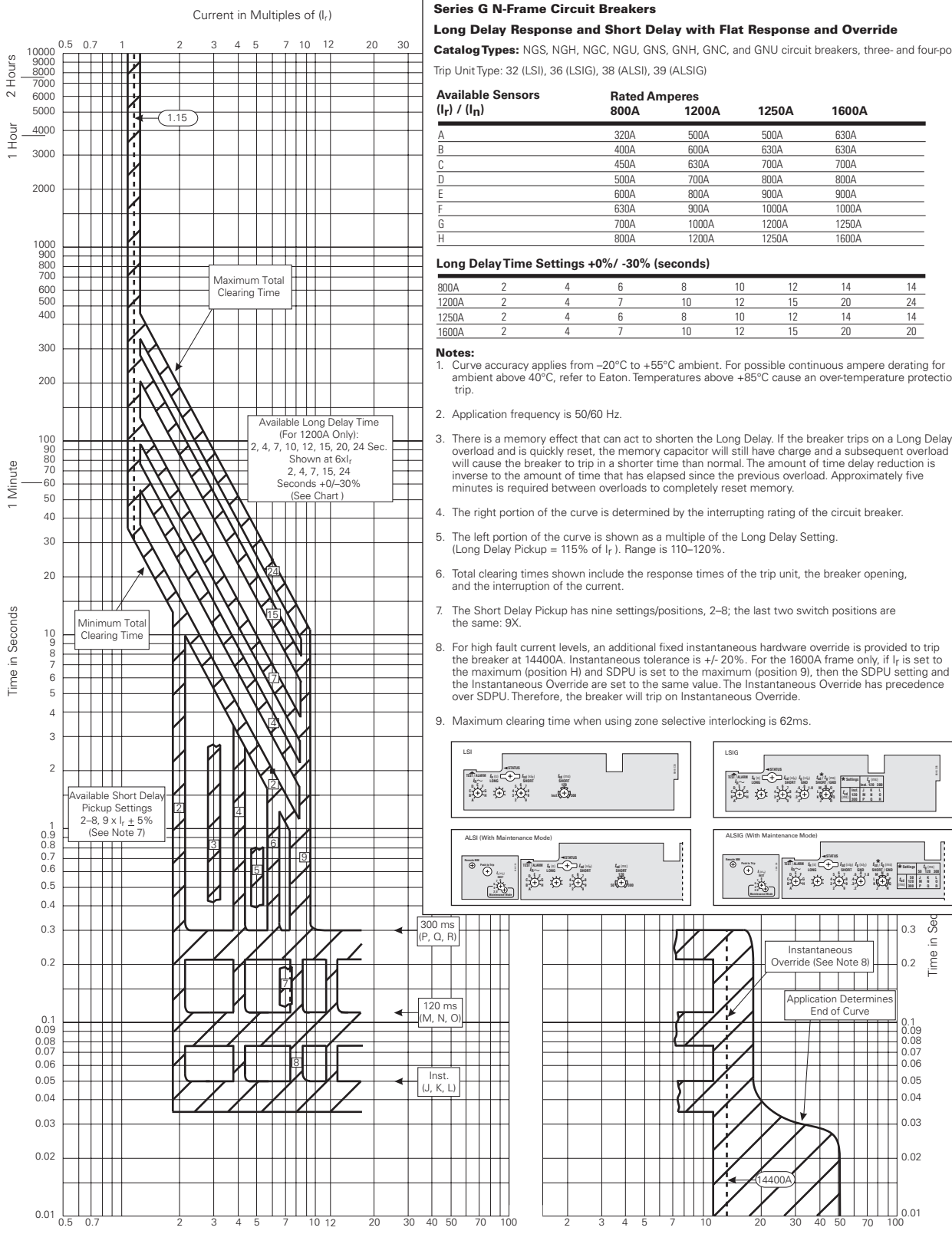
Available Sensors (I_r) / (I_n)	Rated Amperes 800A	1200A	1250A	1600A
A	320A	500A	500A	630A
B	400A	600A	630A	630A
C	450A	630A	700A	700A
D	500A	700A	800A	800A
E	600A	800A	900A	900A
F	630A	900A	1000A	1000A
G	700A	1000A	1200A	1250A
H	800A	1200A	1250A	1600A

Long Delay Time Settings +0%/ -30% (seconds)

800A	2	4	6	8	10	12	14	14
1200A	2	4	7	10	12	15	20	24
1250A	2	4	6	8	10	12	14	14
1600A	2	4	7	10	12	15	20	20

Notes:

1. Curve accuracy applies from –20°C to +55°C ambient. For possible continuous ampere derating for ambient above 40°C, refer to Eaton. Temperatures above +85°C cause an over-temperature protection trip.
2. Application frequency is 50/60 Hz.
3. There is a memory effect that can act to shorten the Long Delay. If the breaker trips on a Long Delay overload and is quickly reset, the memory capacitor will still have charge and a subsequent overload will cause the breaker to trip in a 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 memory.
4. The right portion of the curve is determined by the interrupting rating of the circuit breaker.
5. The left portion of the curve is shown as a multiple of the Long Delay Setting. (Long Delay Pickup = 115% of I_r). Range is 110–120%.
6. Total clearing times shown include the response times of the trip unit, the breaker opening, and the interruption of the current.
7. The Short Delay Pickup has nine settings/positions, 2–8; the last two switch positions are the same: 9X.
8. For high fault current levels, an additional fixed instantaneous hardware override is provided to trip the breaker at 14400A. Instantaneous tolerance is +/- 20%. For the 1600A frame only, if I_r is set to the maximum (position H) and SDPU is set to the maximum (position 9), then the SDPU setting and the Instantaneous Override are set to the same value. The Instantaneous Override has precedence over SDPU. Therefore, the breaker will trip on Instantaneous Override.
9. Maximum clearing time when using zone selective interlocking is 62ms.



Adjustable Flat Trip Style (LSI, LSIG, ALSI, ALSIG)

Figure 2. Digitrip 310+ Long Delay Response and Short Delay with Flat Response and Override Curve (LSI, LSIG, ALSI, ALSIG) - Curve Number TC01210010E, March 2012

Digitrip 310+ Circuit Breaker Time/Current Curves (Phase Current)

Series G N-Frame Circuit Breakers

Long Delay Response and Short Delay with I^2T Response Curve and Override

Catalog Types: NGS, NGH, NGC, NGU, GNS, GNH, GNC, and GNU circuit breakers, three- and four-pole

Trip Unit Type: 33 (LS), 35 (LSG)

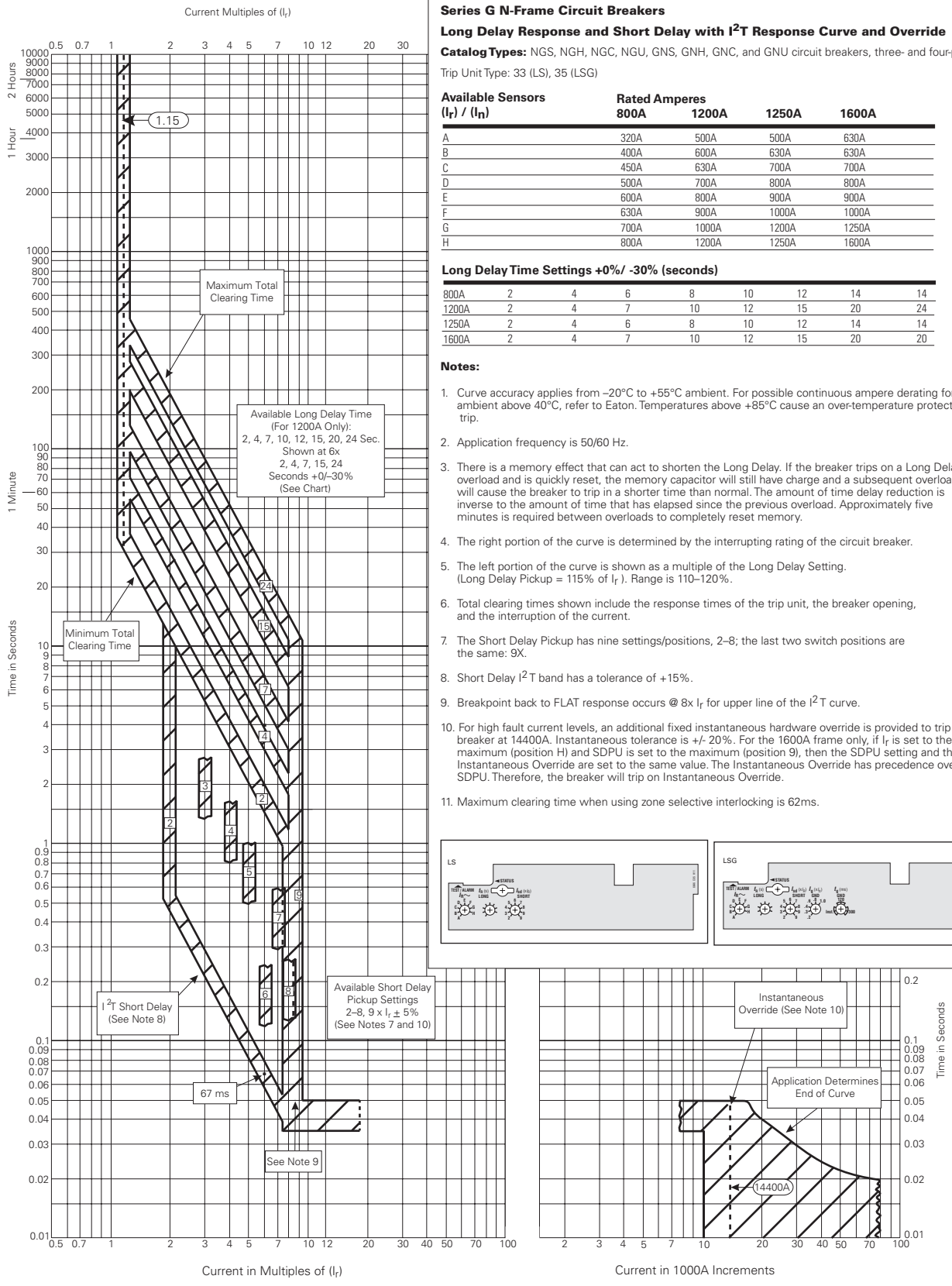
Available Sensors (I_r) / (I_n)	Rated Amperes 800A	1200A	1250A	1600A
A	320A	500A	500A	630A
B	400A	600A	630A	630A
C	450A	630A	700A	700A
D	500A	700A	800A	800A
E	600A	800A	900A	900A
F	630A	900A	1000A	1000A
G	700A	1000A	1200A	1250A
H	800A	1200A	1250A	1600A

Long Delay Time Settings +0%/ -30% (seconds)

800A	2	4	6	8	10	12	14	14
1200A	2	4	7	10	12	15	20	24
1250A	2	4	6	8	10	12	14	14
1600A	2	4	7	10	12	15	20	20

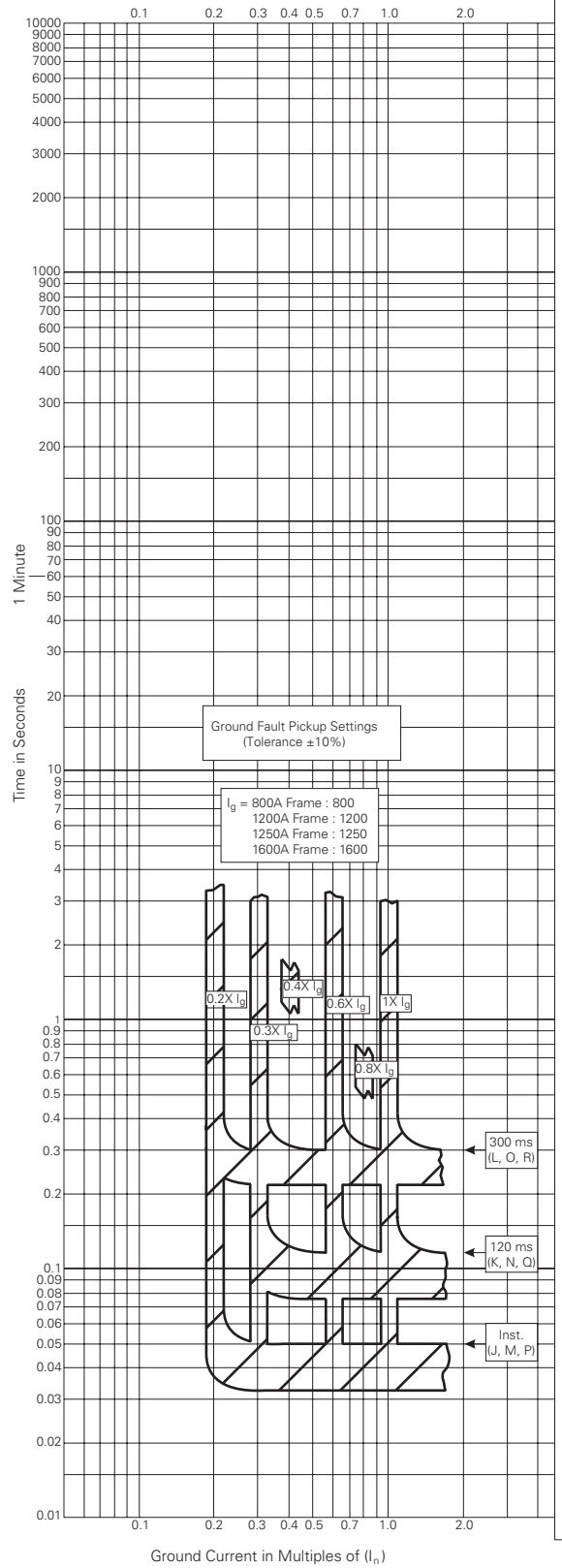
Notes:

1. Curve accuracy applies from –20°C to +55°C ambient. For possible continuous ampere derating for ambient above 40°C, refer to Eaton. Temperatures above +85°C cause an over-temperature protection trip.
2. Application frequency is 50/60 Hz.
3. There is a memory effect that can act to shorten the Long Delay. If the breaker trips on a Long Delay overload and is quickly reset, the memory capacitor will still have charge and a subsequent overload will cause the breaker to trip in a 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 memory.
4. The right portion of the curve is determined by the interrupting rating of the circuit breaker.
5. The left portion of the curve is shown as a multiple of the Long Delay Setting. (Long Delay Pickup = 115% of I_r). Range is 110–120%.
6. Total clearing times shown include the response times of the trip unit, the breaker opening, and the interruption of the current.
7. The Short Delay Pickup has nine settings/positions, 2–8; the last two switch positions are the same: 9X.
8. Short Delay I^2T band has a tolerance of +15%.
9. Breakpoint back to FLAT response occurs @ 8x I_r for upper line of the I^2T curve.
10. For high fault current levels, an additional fixed instantaneous hardware override is provided to trip the breaker at 14400A. Instantaneous tolerance is +/- 20%. For the 1600A frame only, if I_r is set to the maximum (position H) and SDPU is set to the maximum (position 9), then the SDPU setting and the Instantaneous Override are set to the same value. The Instantaneous Override has precedence over SDPU. Therefore, the breaker will trip on Instantaneous Override.
11. Maximum clearing time when using zone selective interlocking is 62ms.



I^2T Trip Style (LS and LSG)

Figure 3. Digitrip 310+ Long Delay Response and Short delay with I^2T Response Curve (LS, LSG) - Curve Number TC01210011E, March 2012

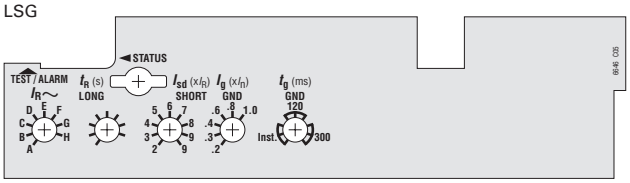


Digitrip 310+ Circuit Breaker Time/Current Curves (Ground Current)
Series G N-Frame Circuit Breakers
Ground Fault Delay Response Curve

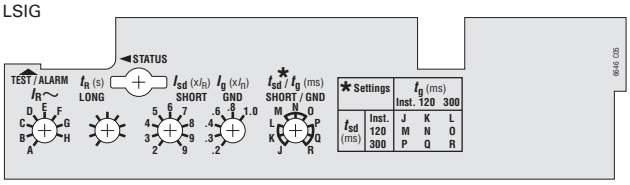
Catalog Types: NGS, NGH, NGC, NGU, GNS, GNH, GNC, and GNU circuit breakers, three- and four-pole

Trip Unit Type: 35 (LSG), 36 (LSIG), 39 (ALSIG)

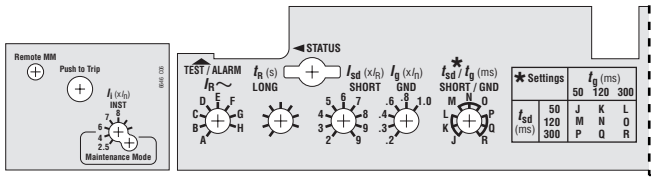
LSG



LSIG



ALSIG (With Maintenance Mode)



Note: Refer to table below for variations.

SD/ GF Delay Settings Table

✱ Settings		t_g (ms)		
		Inst.	120	300
t_{sd} (ms)	Inst.	J	K	L
	120	M	N	O
	300	P	Q	R

Ground Fault Delay Response Notes:

1. Curve accuracy applies from –20°C to +55°C ambient. For possible continuous ampere derating for ambient above 40°C, refer to Eaton. Temperatures about +85°C cause an overtemperature protection trip.
2. Application frequency is 50/60 Hz.
3. Trip units are suitable for functional field testing with test kit style # 70C1056G52.
4. For LD response and SD with flat responses curve, see TC01210010E.
5. For LD responses and SD with I^2T response curve, see TC01210011E.
6. For testing information, please contact Eaton.

Figure 4. Ground Fault Delay Reponse Curve (LSG, LSIG, ALSIG) Curve Number TC01210012E, March 2012

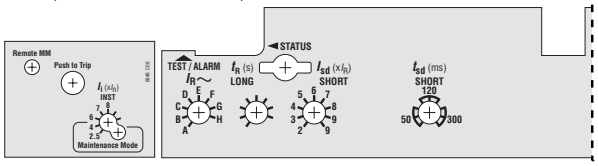
Digitrip 310+ Circuit Breaker Time/Current Curves

Maintenance Mode/Instantaneous Setting

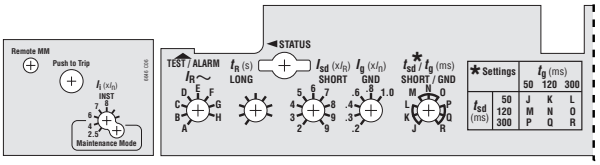
Series G N-Frame Trip Unit Nameplates

Trip Unit Type: 38 (ALSI), 39 (ALSIG)

ALSI (With Maintenance Mode)

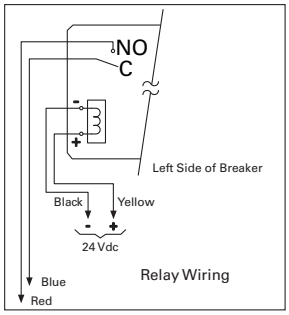


ALSIG (With Maintenance Mode)



Notes:

1. The maintenance mode feature must be ENABLED for these curves to apply. The LED indicator is blue when in maintenance mode.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. Total clearing times shown include the response times of the trip unit, the breaker opening, and the interruption of the current.
4. Available pickup settings (x I_n) (tolerance is ±15%) 2.5, 4, 6, 7, 8, 10.
5. The Maintenance Mode consists of the two lowest settings of the INST switch: 2.5x and 4.0x.
6. The Remote Maintenance Mode is enabled by applying 24 VDC to the two wire cable that exists the left side of the breaker. The wires are color coded as follows: Yellow = +24 V and Black = common ground. A blue colored LED, on the left side of the breaker is the Maintenance Mode section of the trip unit, will light. The lighted blue LED indicates that the lowest setting of the Maintenance Mode is enabled. This setting corresponds to 2.5x of In. Turning the adjustable switch on the trip unit has no affect on either the Maintenance Mode or the INST Mode settings while the blue LED is lit. In addition to the blue colored LED, a relay contact (C, NO) is available. The wires for this contact exit the left hand side of the breaker and are color coded as follows: Blue = C, and Red = NO.
7. Contact Eaton for additional information.



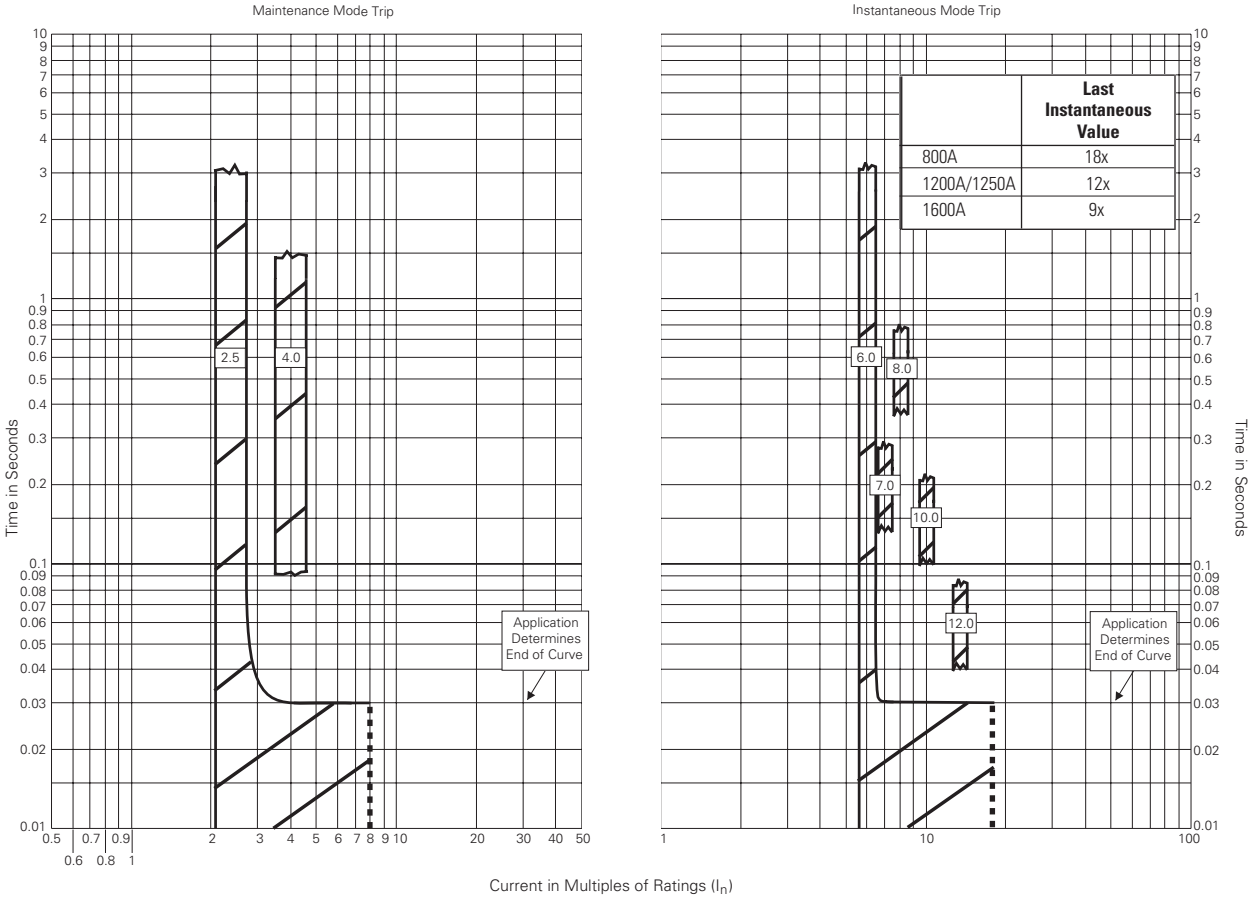
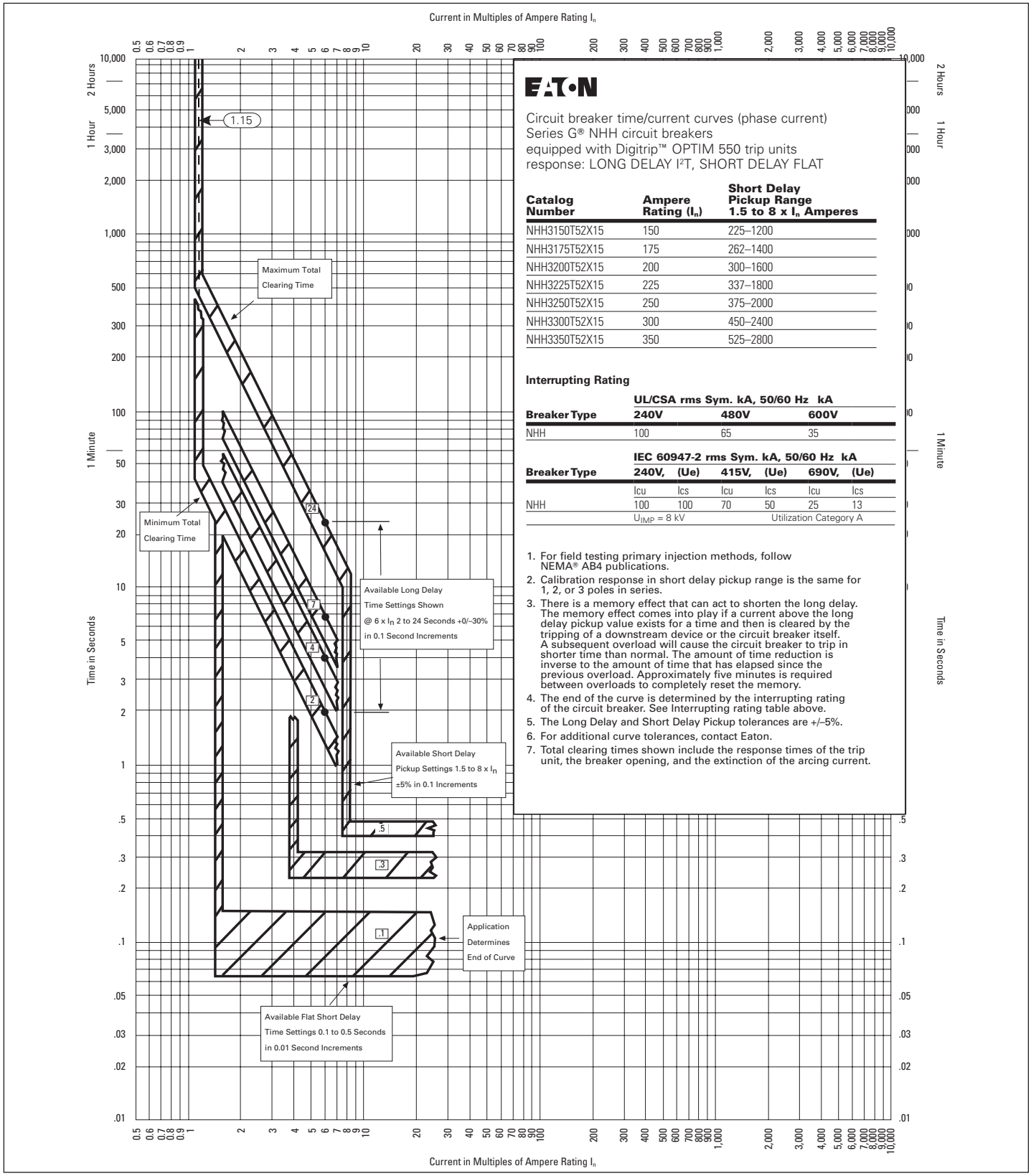


Figure 5. Maintenance Mode/Instantaneous Setting (ALSI, ALSIG) Curve Number TC01210016E ,TC01210017E, and TC 01210018E, March 2012



EATON

Circuit breaker time/current curves (phase current)
Series G® NHH circuit breakers
equipped with Digitrip™ OPTIM 550 trip units
response: LONG DELAY I^2T, SHORT DELAY FLAT

Catalog Number	Ampere Rating (I_n)	Short Delay Pickup Range 1.5 to 8 x I_n Amperes
NHH3150T52X15	150	225–1200
NHH3175T52X15	175	262–1400
NHH3200T52X15	200	300–1600
NHH3225T52X15	225	337–1800
NHH3250T52X15	250	375–2000
NHH3300T52X15	300	450–2400
NHH3350T52X15	350	525–2800

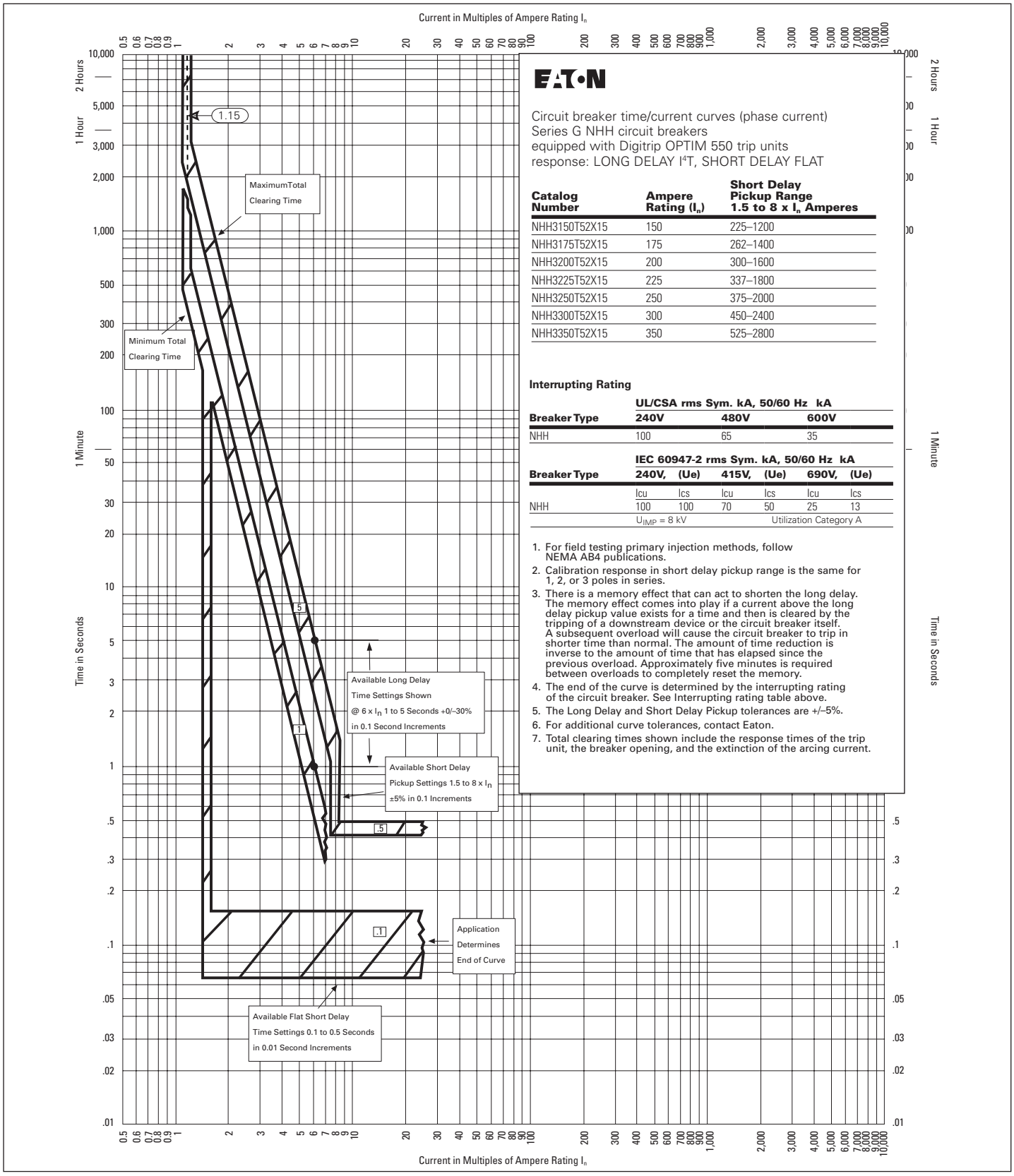
Interrupting Rating

	UL/CSA rms Sym. kA, 50/60 Hz kA		
Breaker Type	**240V**	**480V**	**600V**
NHH	100	65	35

	IEC 60947-2 rms Sym. kA, 50/60 Hz kA					
Breaker Type	**240V,**	**(Ue)**	**415V,**	**(Ue)**	**690V,**	**(Ue)**
	Icu	Ics	Icu	Ics	Icu	Ics
NHH	100	100	70	50	25	13
	U_{IMP} = 8 kV			Utilization Category A		

1. For field testing primary injection methods, follow NEMA® AB4 publications.
2. Calibration response in short delay pickup range is the same for 1, 2, or 3 poles in series.
3. 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 pickup 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 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.
4. The end of the curve is determined by the interrupting rating of the circuit breaker. See Interrupting rating table above.
5. The Long Delay and Short Delay Pickup tolerances are +/–5%.
6. For additional curve tolerances, contact Eaton.
7. Total clearing times shown include the response times of the trip unit, the breaker opening, and the extinction of the arcing current.

Figure 6. Digitrip OPTIM 550 NHH Long Delay I^2T, Short Delay Flat NHH—Curve Number TC01207016E, September 2009



EATON

Circuit breaker time/current curves (phase current)
Series G NHH circuit breakers
equipped with Digitrip OPTIM 550 trip units
response: LONG DELAY I^4T, SHORT DELAY FLAT

Catalog Number	Ampere Rating (I_n)	Short Delay Pickup Range 1.5 to 8 x I_n Amperes
NHH3150T52X15	150	225–1200
NHH3175T52X15	175	262–1400
NHH3200T52X15	200	300–1600
NHH3225T52X15	225	337–1800
NHH3250T52X15	250	375–2000
NHH3300T52X15	300	450–2400
NHH3350T52X15	350	525–2800

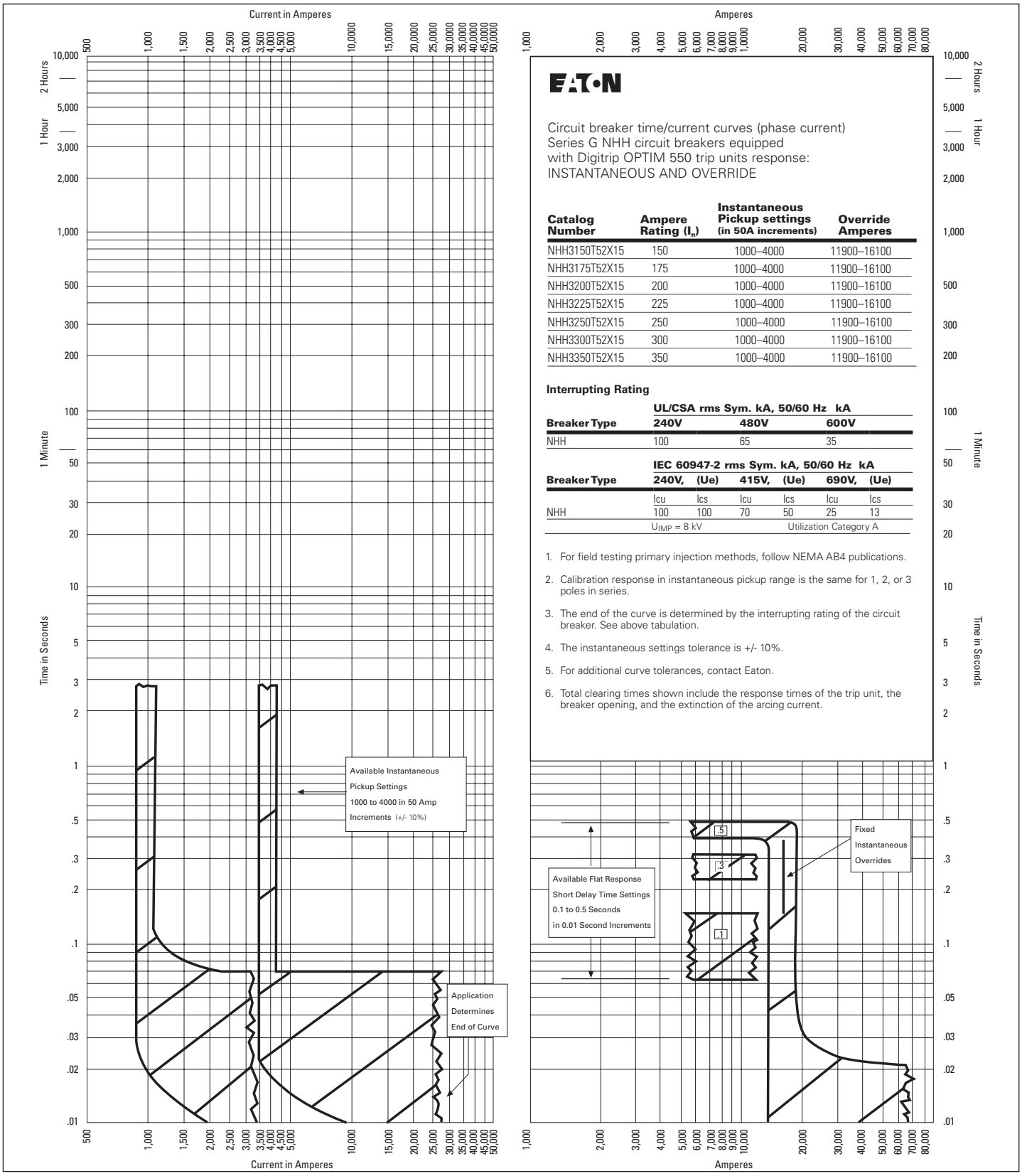
Interrupting Rating

	UL/CSA rms Sym. kA, 50/60 Hz kA		
Breaker Type	**240V**	**480V**	**600V**
NHH	100	65	35

	IEC 60947-2 rms Sym. kA, 50/60 Hz kA					
Breaker Type	**240V, (Ue)**		**415V, (Ue)**		**690V, (Ue)**	
	Icu	Ics	Icu	Ics	Icu	Ics
NHH	100	100	70	50	25	13
	U_{IMP} = 8 kV				Utilization Category A	

1. For field testing primary injection methods, follow NEMA AB4 publications.
2. Calibration response in short delay pickup range is the same for 1, 2, or 3 poles in series.
3. 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 pickup 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 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.
4. The end of the curve is determined by the interrupting rating of the circuit breaker. See Interrupting rating table above.
5. The Long Delay and Short Delay Pickup tolerances are +/–5%.
6. For additional curve tolerances, contact Eaton.
7. Total clearing times shown include the response times of the trip unit, the breaker opening, and the extinction of the arcing current.

Figure 7. Digitrip OPTIM 550 NHH Long Delay I^4T, Short Delay Flat NHH—Curve Number TC01207017E, September 2009



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Circuit breaker time/current curves (phase current)
Series G NHH circuit breakers equipped
with Digitrip OPTIM 550 trip units response:
INSTANTANEOUS AND OVERRIDE

Catalog Number	Ampere Rating (I_n)	Instantaneous Pickup settings (in 50A increments)	Override Amperes
NHH3150T52X15	150	1000–4000	11900–16100
NHH3175T52X15	175	1000–4000	11900–16100
NHH3200T52X15	200	1000–4000	11900–16100
NHH3225T52X15	225	1000–4000	11900–16100
NHH3250T52X15	250	1000–4000	11900–16100
NHH3300T52X15	300	1000–4000	11900–16100
NHH3350T52X15	350	1000–4000	11900–16100

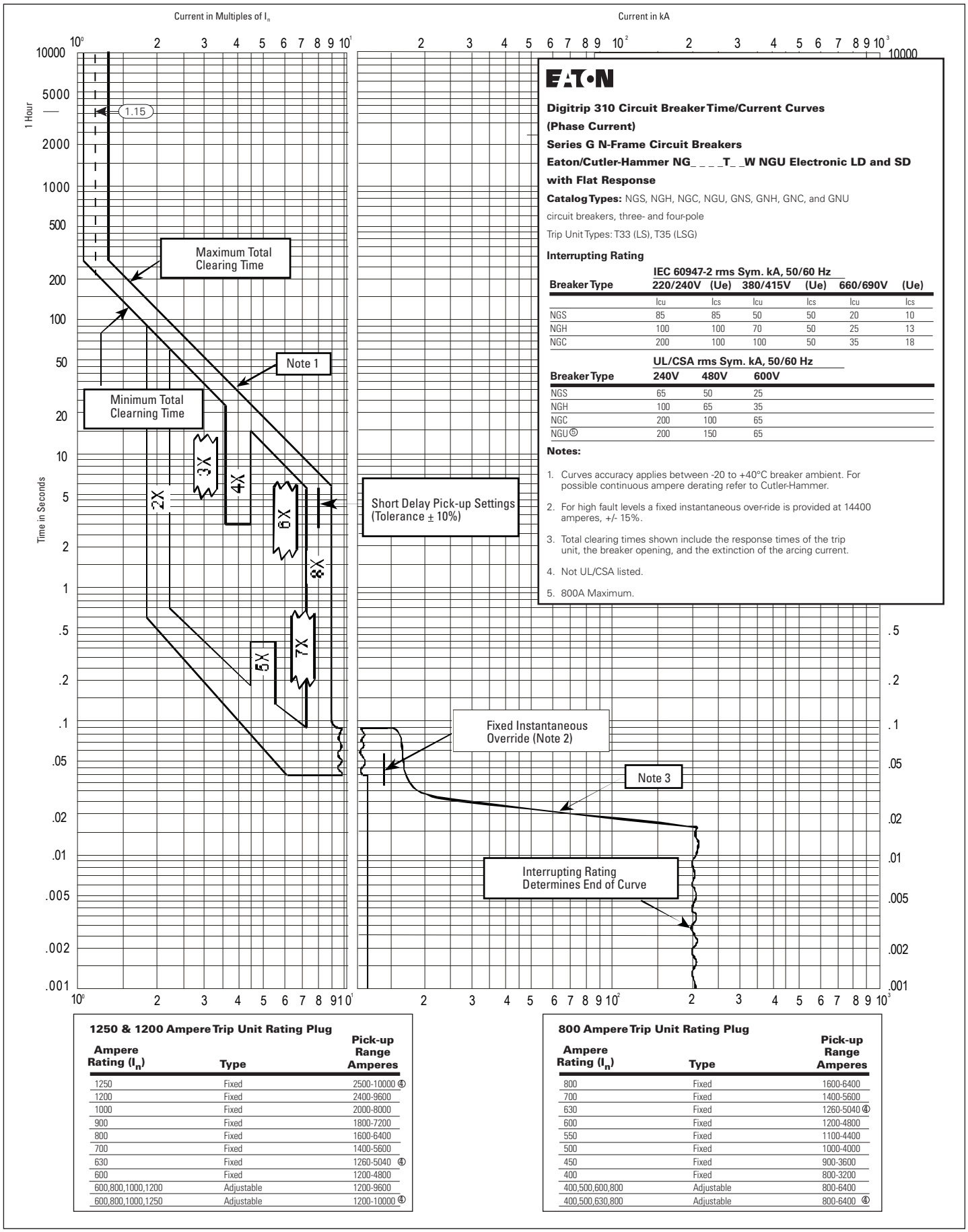
Interrupting Rating

	UL/CSA rms Sym. kA, 50/60 Hz kA		
Breaker Type	**240V**	**480V**	**600V**
NHH	100	65	35

	IEC 60947-2 rms Sym. kA, 50/60 Hz kA					
Breaker Type	**240V, (Ue)**		**415V, (Ue)**		**690V, (Ue)**	
	Icu	Ics	Icu	Ics	Icu	Ics
NHH	100	100	70	50	25	13
	U_{IMP} = 8 kV			Utilization Category A		

1. For field testing primary injection methods, follow NEMA AB4 publications.
2. Calibration response in instantaneous pickup range is the same for 1, 2, or 3 poles in series.
3. The end of the curve is determined by the interrupting rating of the circuit breaker. See above tabulation.
4. The instantaneous settings tolerance is +/- 10%.
5. For additional curve tolerances, contact Eaton.
6. Total clearing times shown include the response times of the trip unit, the breaker opening, and the extinction of the arcing current.

Figure 8. Digitrip OPTIM 550 NHH Instantaneous and Override NHH—Curve Number TC01207018E, September 2009



Digitrip 310 Circuit Breaker Time/Current Curves
(Phase Current)
Series G N-Frame Circuit Breakers
Eaton/Cutler-Hammer NG_ _ _ _T_ _W NGU Electronic LD and SD with Flat Response

Catalog Types: NGS, NGH, NGC, NGU, GNS, GNH, GNC, and GNU circuit breakers, three- and four-pole

Trip Unit Types: T33 (LS), T35 (LSG)

Interrupting Rating

Breaker Type	IEC 60947-2 rms Sym. kA, 50/60 Hz 220/240V (Ue) Icu	Ics	380/415V (Ue) Icu	Ics	660/690V (Ue) Icu	Ics
NGS	85	85	50	50	20	10
NGH	100	100	70	50	25	13
NGC	200	100	100	50	35	18

Breaker Type	UL/CSA rms Sym. kA, 50/60 Hz 240V	480V	600V
NGS	65	50	25
NGH	100	65	35
NGC	200	100	65
NGU ⑤	200	150	65

Notes:

1. Curves accuracy applies between -20 to +40°C breaker ambient. For possible continuous ampere derating refer to Cutler-Hammer.
2. For high fault levels a fixed instantaneous over-ride is provided at 14400 amperes, +/- 15%.
3. Total clearing times shown include the response times of the trip unit, the breaker opening, and the extinction of the arcing current.
4. Not UL/CSA listed.
5. 800A Maximum.

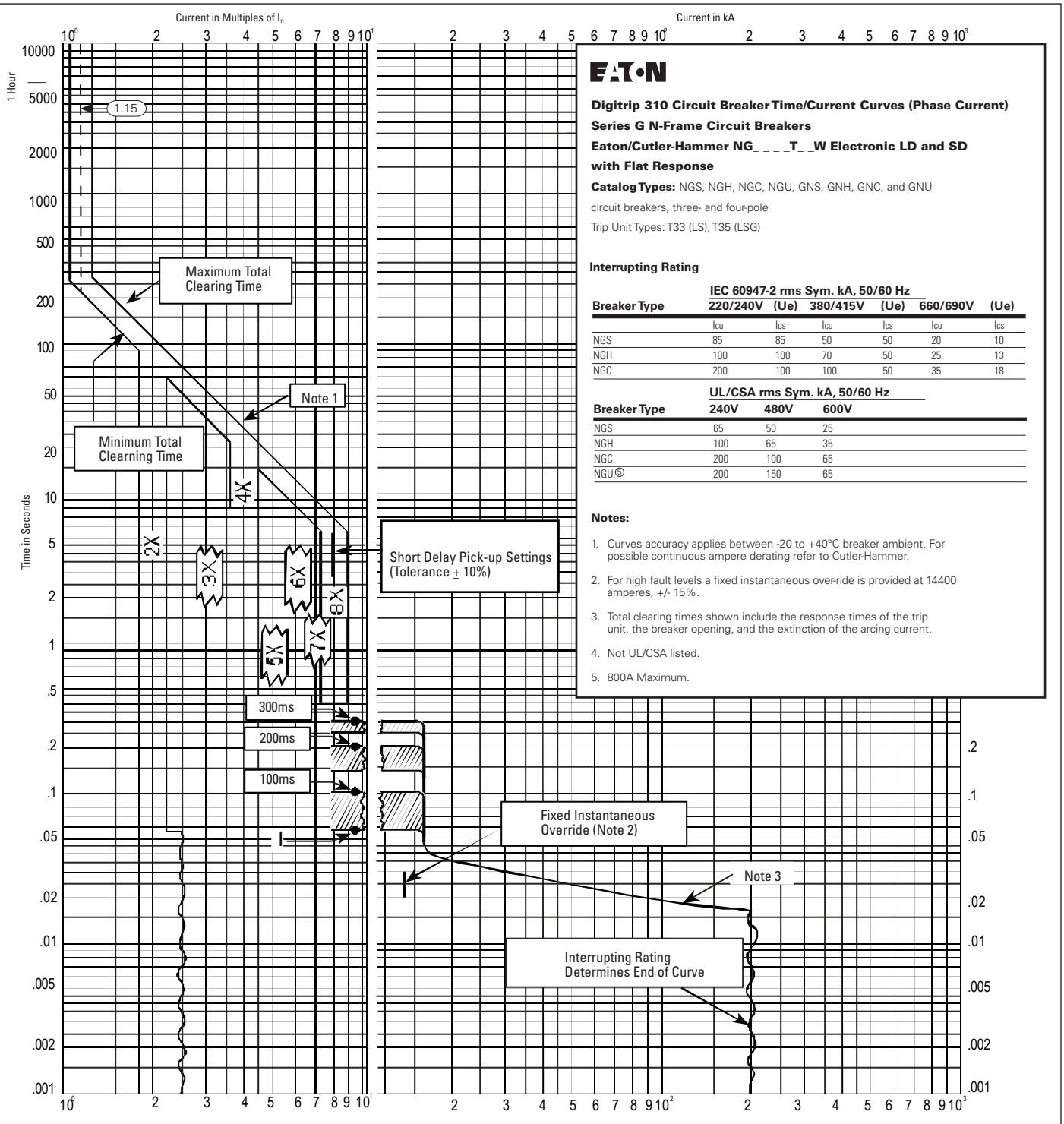
1250 & 1200 Ampere Trip Unit Rating Plug

Ampere Rating (I_n)	Type	Pick-up Range Amperes
1250	Fixed	2500-10000 ④
1200	Fixed	2400-9600
1000	Fixed	2000-8000
900	Fixed	1800-7200
800	Fixed	1600-6400
700	Fixed	1400-5600
630	Fixed	1260-5040 ④
600	Fixed	1200-4800
600,800,1000,1200	Adjustable	1200-9600
600,800,1000,1250	Adjustable	1200-10000 ④

800 Ampere Trip Unit Rating Plug

Ampere Rating (I_n)	Type	Pick-up Range Amperes
800	Fixed	1600-6400
700	Fixed	1400-5600
630	Fixed	1260-5040 ④
600	Fixed	1200-4800
550	Fixed	1100-4400
500	Fixed	1000-4000
450	Fixed	900-3600
400	Fixed	800-3200
400,500,600,800	Adjustable	800-6400
400,500,630,800	Adjustable	800-6400 ④

Figure 9. Digitrip 310 Long Delay and Short Delay with I2T Response (LS, LSG) - Curve Number TC01209003E



EATON

Digitrip 310 Circuit Breaker Time/Current Curves (Phase Current)
Series G N-Frame Circuit Breakers
Eaton/Cutler-Hammer NG_ _ _ _T_ _W Electronic LD and SD with Flat Response

Catalog Types: NGS, NGH, NGC, NGU, GNS, GNH, GNC, and GNU circuit breakers, three- and four-pole

Trip Unit Types: T33 (LS), T35 (LSG)

Interrupting Rating

	IEC 60947-2 rms Sym. kA, 50/60 Hz					
Breaker Type	**220/240V**	**(Ue)**	**380/415V**	**(Ue)**	**660/690V**	**(Ue)**
	Icu	Ics	Icu	Ics	Icu	Ics
NGS	85	85	50	50	20	10
NGH	100	100	70	50	25	13
NGC	200	100	100	50	35	18

	UL/CSA rms Sym. kA, 50/60 Hz		
Breaker Type	**240V**	**480V**	**600V**
NGS	65	50	25
NGH	100	65	35
NGC	200	100	65
NGU ⑤	200	150	65

Notes:

1. Curves accuracy applies between -20 to +40°C breaker ambient. For possible continuous ampere derating refer to Cutler-Hammer.
2. For high fault levels a fixed instantaneous over-ride is provided at 14400 amperes, +/- 15%.
3. Total clearing times shown include the response times of the trip unit, the breaker opening, and the extinction of the arcing current.
4. Not UL/CSA listed.
5. 800A Maximum.

1250 & 1200 Ampere Trip Unit Rating Plug

Ampere Rating (I_n)	Type	Pick-up Range Amperes
1250	Fixed	2500-10000 ④
1200	Fixed	2400-9600
1000	Fixed	2000-8000
900	Fixed	1800-7200
800	Fixed	1600-6400
700	Fixed	1400-5600
630	Fixed	1260-5040 ④
600	Fixed	1200-4800
600,800,1000,1200	Adjustable	1200-9600
600,800,1000,1250	Adjustable	1200-10000 ④

800 Ampere Trip Unit Rating Plug

Ampere Rating (I_n)	Type	Pick-up Range Amperes
800	Fixed	1600-6400
700	Fixed	1400-5600
630	Fixed	1260-5040 ④
600	Fixed	1200-4800
550	Fixed	1100-4400
500	Fixed	1000-4000
450	Fixed	900-3600
400	Fixed	800-3200
400,500,600,800	Adjustable	800-6400
400,500,630,800	Adjustable	800-6400 ④

Figure 10. Digitrip 310 Long Delay and Short Delay with Flat Response (LSI, LSIG) - Curve Number TC01209004E

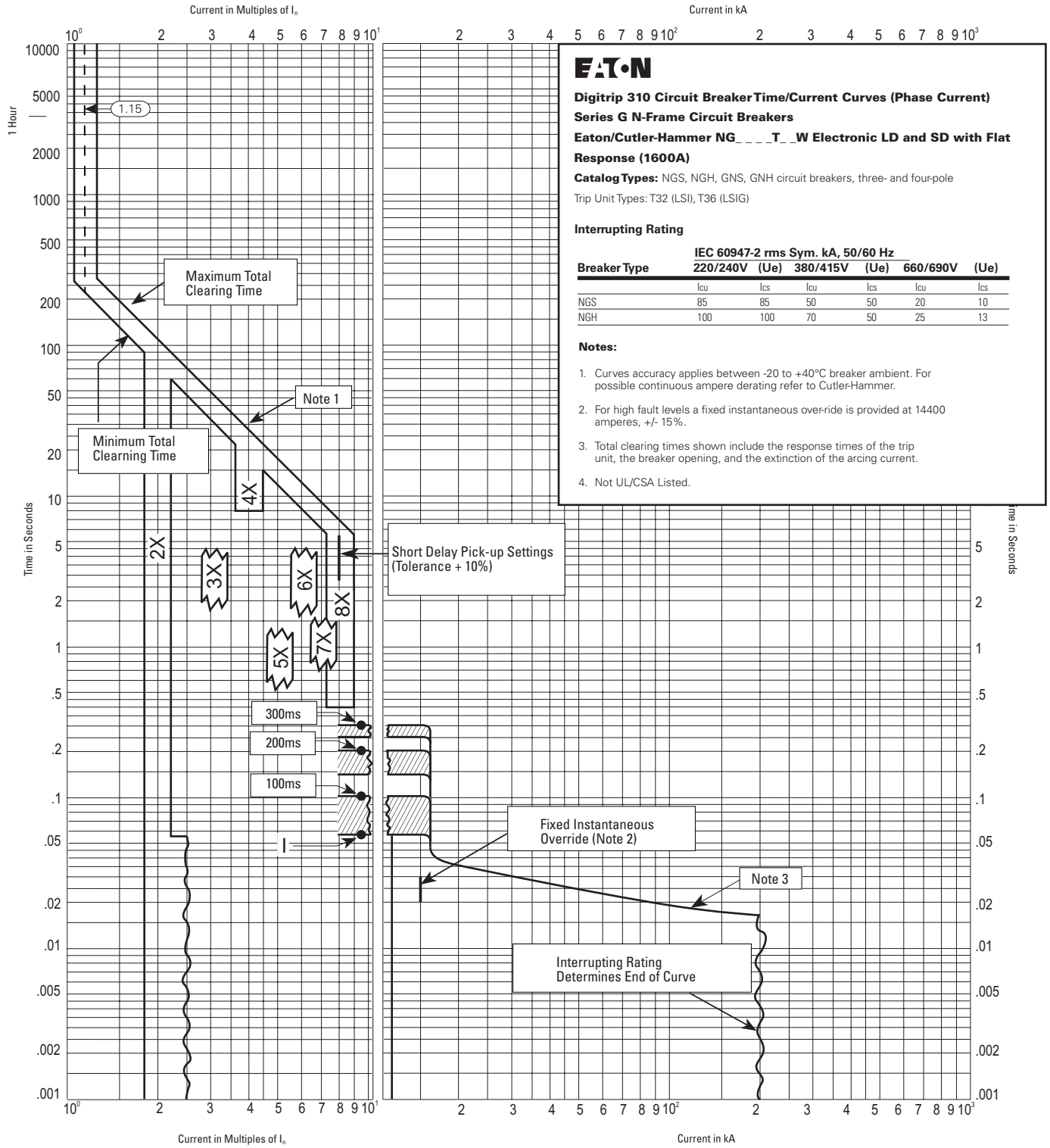
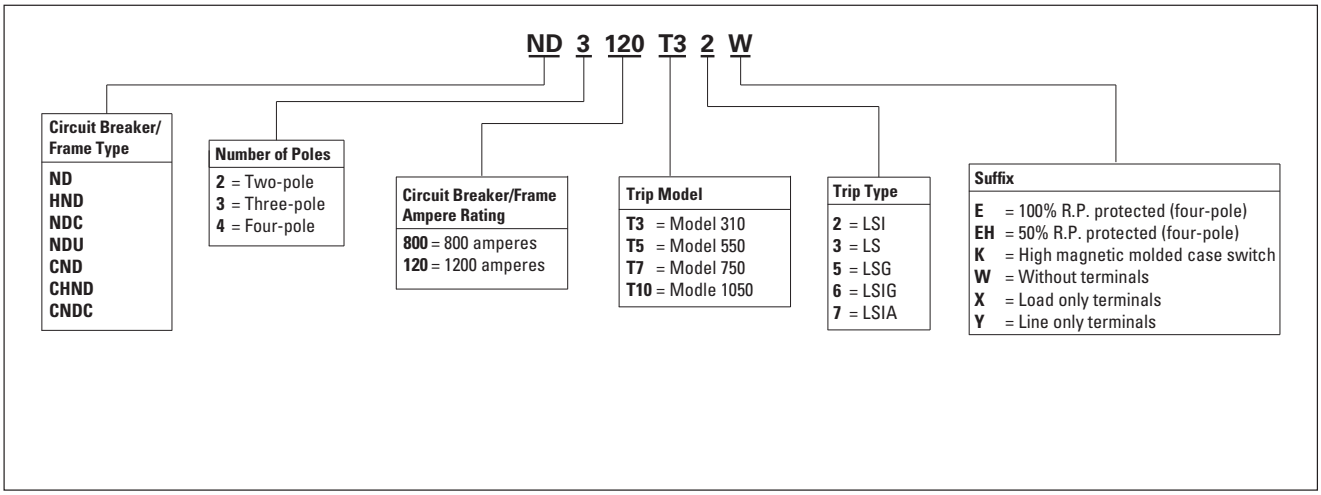


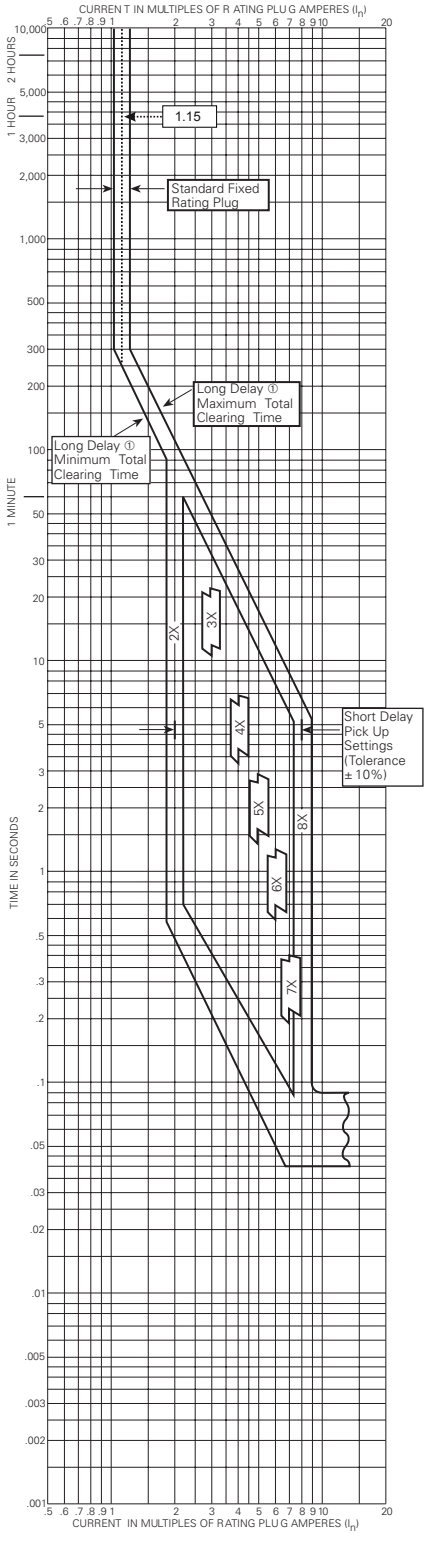
Figure 11. Digitrip 310 Long Delay and Short Delay with Flat Response (1600A) (LSI, LSIG) - Curve Number TC01209006E

Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers.
It is not to be used to build catalog numbers for circuit breakers or trip units.



Types ND, CND, HND, CHND, NDC, CNDC, NDU, NGU Equipped With Type NES Digitrip RMS 310 Trip Units With I^2t Ramp Short Time Delay (Phase Protection)



EATON

Circuit Breaker Time/Current Curves (Phase Current)

Series C N-Frame Circuit Breakers

Equipped With Type NES Digitrip RMS 310 Trip Units

The NES Digitrip RMS 310 Trip Units are AC only devices that employ microprocessor based technology that provides true RMS current sensing means for proper correlation with thermal characteristics of conductors and equipment. They are used with Circuit Breaker Types: ND, CND, HND, CHND, NDC, and CNDC.

I^2t Ramp Short Time Delay

Typical Trip Unit Nameplate

Available Rating Plugs

Frame Rating Amperes (Max.)	Ampere Rating (I_n)	Type	Catalog Number	Short Delay Pickup Range Amperes
800	800	Fixed	8NES800T	1600-6400
800	700	Fixed	8NES700T	1400-5600
800	630	Fixed	8NES630T ④	1260-5040
800	600	Fixed	8NES600T	1200-4800
800	550	Fixed	8NES550T	1100-4400
800	500	Fixed	8NES500T	1000-4000
800	450	Fixed	8NES450T	900-3600
800	400	Fixed	8NES400T	800-3200
1200	400, 500, 600, 800	Adj.	A8NES800T1	800-6400
1200	400, 500, 600, 800	Adj.	A8NES800T2 ④	800-6400
1200	1200	Fixed	12NES1200T	2400-9600
1200	1000	Fixed	12NES1000T	2000-8000
1200	900	Fixed	12NES900T ④	1800-7200
1200	800	Fixed	12NES800T	1600-6400
1200	700	Fixed	12NES700T	1400-5600
1200	630	Fixed	12NES630T ④	1260-5040
1200	600	Fixed	12NES600T	1200-4800
1200	600, 800, 1000, 1200	Adj.	A12NES1200T1	1200-9600

Interrupting Rating

	UL/CSA rms Sym. kA, 50/60 Hz		
Breaker Type	240V	480V	600V
ND, CND	65	50	25
HND, CHND	100	65	35
NDC, CNDC	200	100	50

	IEC 60947-2 rms Sym. kA, 50/60 Hz	
Breaker Type	240/240V	380/415V
ND, CND	65	50
HND, CHND	100	65
NDC, CNDC	200	100

ICS = .25 ICU, ICW = 15 kA @ .5S, U_{imp} = 8kV

Notes:

Curve accuracy applies from -20°C to +55°C ambient. For possible ampere derating for ambient above 40°C, refer to Eaton.

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 publication AB-4.

① 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.

② For high fault current levels a fixed instantaneous override is provided at 14000A (Tolerance ±15%).

③ The end of the curve is determined by the interrupting rating of the circuit breaker. See above tabulation.

④ Not UL/CSA Listed.

⑤ Long Delay Pickup is 115% of In, +/- 5%.

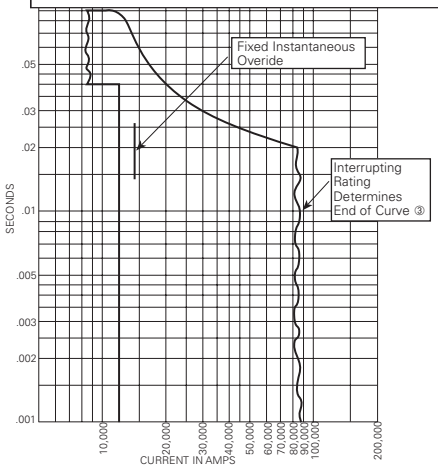


Figure 12. I^2T Ramp Short Time Delay (Phase Protection) - Curve Number SC-5375-92A, October 2006

Types ND, CND, HND, CHND, NDC, CNDC, NDU, NGU Equipped With Type NES Digitrip RMS 310 Trip Units With Adjustable Short Time Delay (Phase Protection)

Circuit Breaker Time/Current Curves (Phase Current)

Series C N-Frame Circuit Breakers

Equipped With Type NES Digitrip RMS 310 Trip Units

The NES Digitrip RMS 310 Trip Units are AC only devices that employ microprocessor based technology that provides true RMS current sensing means for proper correlation with thermal characteristics of conductors and equipment. They are used with Circuit Breaker Types: ND, CND, HND, CHND, NDC, and CNDC.

Adjustable Short Time Delay **Typical Trip Unit Nameplate**

Available Rating Plugs

Frame Rating Amperes (Max.)	Ampere Rating (I_n)	Type	Catalog Number	Short Delay Pickup Range Amperes
800	800	Fixed	8NES800T	1600-6400
800	700	Fixed	8NES700T	1400-5600
800	630	Fixed	8NES630T ④	1260-5040
800	600	Fixed	8NES600T	1200-4800
800	550	Fixed	8NES550T	1100-4400
800	500	Fixed	8NES500T	1000-4000
800	450	Fixed	8NES450T	900-3600
800	400	Fixed	8NES400T	800-3200
1200	400, 500, 600, 800	Adj.	A8NES800T1	800-6400
1200	400, 500, 600, 800	Adj.	A8NES800T2 ④	800-6400
1200	1200	Fixed	12NES1200T	2400-9600
1200	1000	Fixed	12NES1000T	2000-8000
1200	900	Fixed	12NES900T ④	1800-7200
1200	800	Fixed	12NES800T	1600-6400
1200	700	Fixed	12NES700T	1400-5600
1200	630	Fixed	12NES630T ④	1260-5040
1200	600	Fixed	12NES600T	1200-4800
1200	600, 800, 1000, 1200	Adj.	A12NES1200T1	1200-9600

Interrupting Rating

Breaker Type	UL/CSA rms Sym. kA, 50/60 Hz 240V	480V	600V
ND, CND	65	50	25
HND, CHND	100	65	35
NDC, CNDC	200	100	50

Breaker Type	IEC 60947-2 rms Sym. kA, 50/60 Hz 240/240V	380/415V
ND, CND	65	50
HND, CHND	100	65
NDC, CNDC	200	100

ICS = .25 ICU, ICW = 15 kA @ .5S, U_{imp} = 8kV

Notes:

Curve accuracy applies from -20°C to +55°C ambient. For possible ampere derating for ambient above 40°C, refer to Eaton.

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 publication AB-4.

① 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.

② For high fault current levels a fixed instantaneous override is provided at 14000A (Tolerance ±15%).

③ The end of the curve is determined by the interrupting rating of the circuit breaker. See above tabulation.

④ Not UL/CSA Listed.

⑤ Long Delay Pickup is 115% of In, +/- 5%.

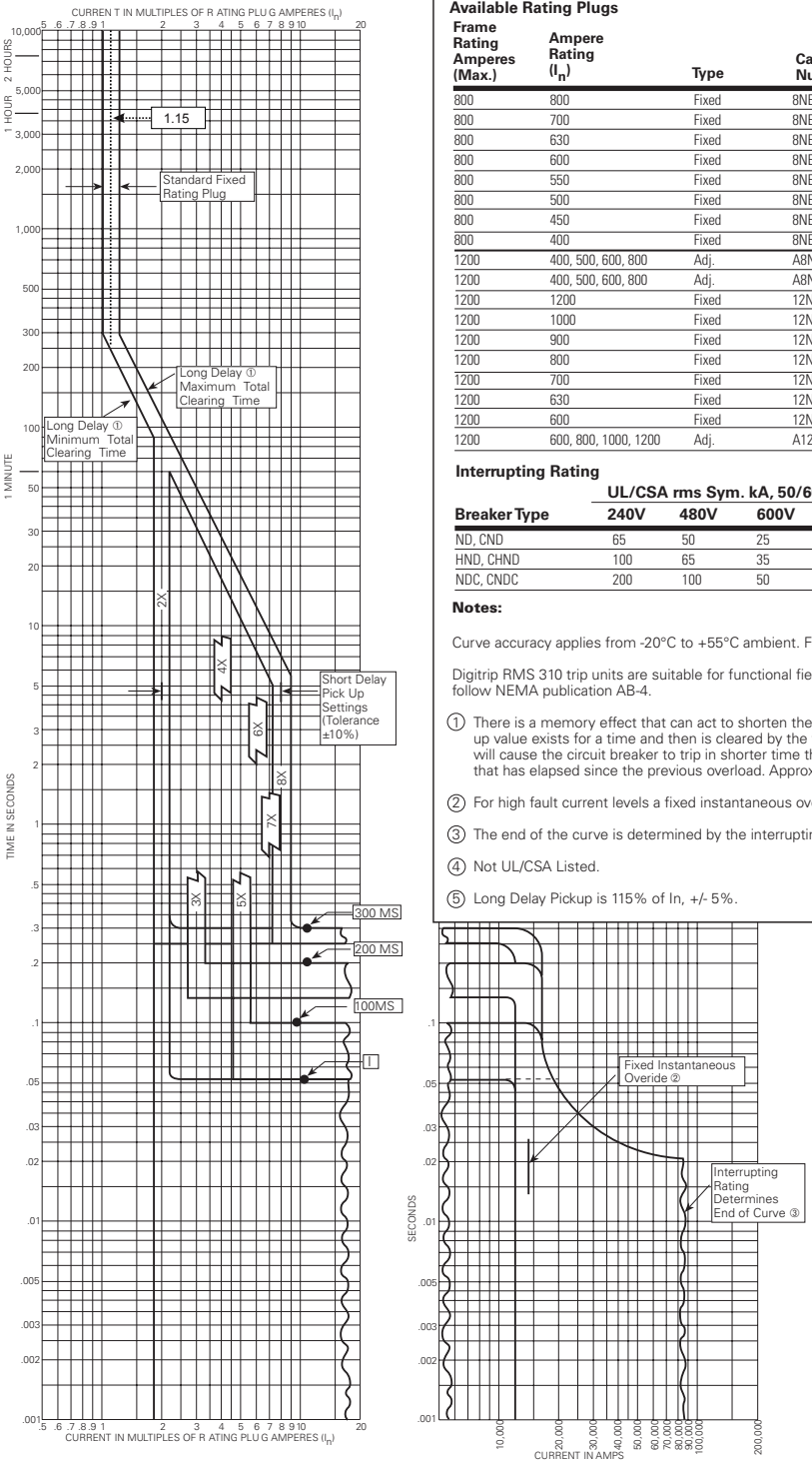


Figure 13. Adjustable Short Time Delay (Phase Protection) - Curve Number SC-5376-92A, October 2006

Types ND, CND, HND, CHND, NDC, CNDC, NDU, Equipped With Type NES Digitrip RMS 310 Trip Units With Ground Fault Protection

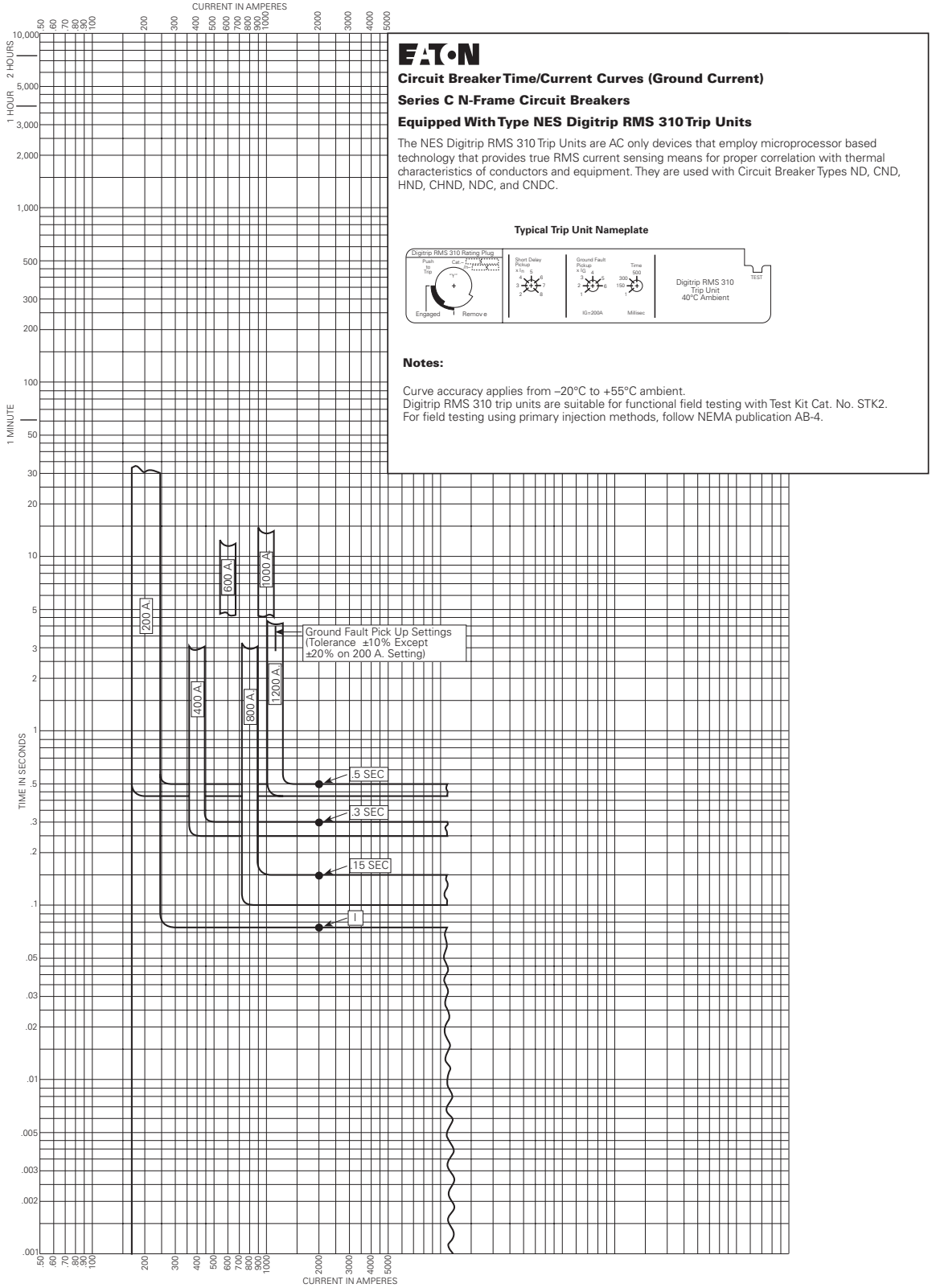
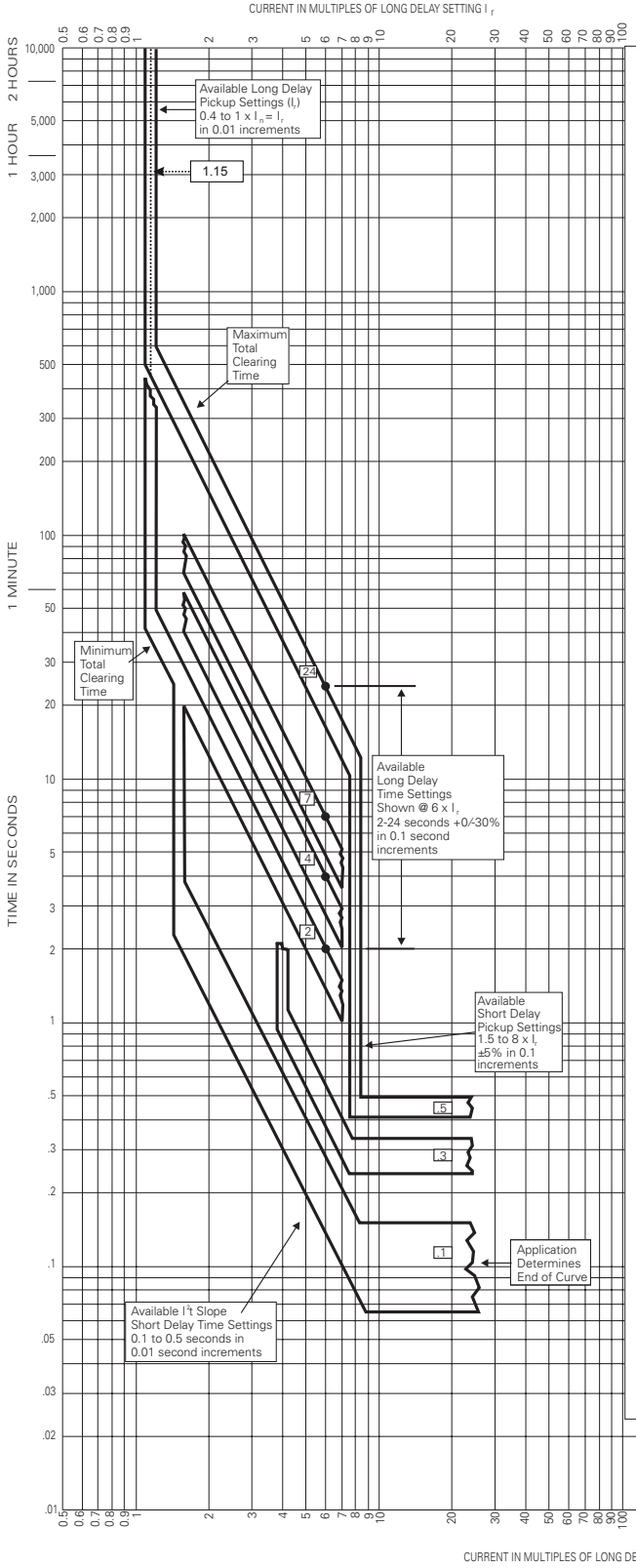


Figure 14. Ground Fault Protection - Curve Number SC-5377-92A, October 2009

N-Frame Circuit Breakers Equipped with Digitrip OPTIM Trip Units; Long Delay I^2t, Short Delay I^2t



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Circuit Breaker Time/Current Curves (Phase Current)
Series C N - Frame Circuit Breakers
Equipped With Digitrip Optim Trip Units
Response: LONG DELAY I^2t, SHORT DELAY I^2t

Available Rating Plugs

Maximum Ampere Rating	Ampere Rating (I_n)	Rating Plug Catalog Number	Long Delay Pickup Range 0.4 to 1 x I_n Amperes	Short Delay Pickup Range 1.5 to 8 x I_r Amperes
800	800	ORPL80A800	320 - 800	480 - 6400
800	700	ORPL80A700	280 - 700	420 - 5600
800	630	ORPL80A630	252 - 630	378 - 5040
800	600	ORPL80A600	240 - 600	360 - 4800
800	550	ORPL80A550	220 - 550	330 - 4400
800	500	ORPL80A500	200 - 500	300 - 4000
800	450	ORPL80A450	180 - 450	270 - 3600
800	400	ORPL80A400	160 - 400	240 - 3200
1200	1200	ORPL12A1200	480 -1200	720 - 9600
1200	1000	ORPL12A1000	400 -1000	600 - 8000
1200	900	ORPL12A900	360 - 900	540 - 7200
1200	800	ORPL12A800	320 - 800	480 - 6400
1200	700	ORPL12A700	280 - 700	420 - 5600
1200	600	ORPL12A600	240 - 600	360 - 4800

Interrupting Rating

	UL/CSA rms Sym. kA, 50/60 Hz		
Breaker Type	**240V**	**480V**	**600V**
ND	65	35	25
HND	100	65	35
NDC	200	100	50

	IEC 60947-2 rms Sym. kA, 50/60 Hz					
Breaker Type	**240V**		**415V**		**690V**	
	Icu	Ics	Icu	Ics	Icu	Ics
ND	85	85	50	50	20	10
HND	100	100	70	50	25	13
NDC	200	100	100	50	35	18
	U = 8kV				Utilization Category A	

Notes:

① For field testing primary injection methods, follow NEMA AB4 guidelines.

② Calibration response in short delay pickup range is the same for 1, 2, or 3 poles in series.

③ 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 pickup 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 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.

④ The end of the curve is determined by the interrupting rating of the circuit breaker. See above tabulation.

⑤ This curve is shown as a multiple of the Long Delay Pick-up Setting, (I_r). This I_r setting is programmed in primary value amperes via a Breaker Interface Module, or OPTIMizer, or a Remote PC (IMPACC System).

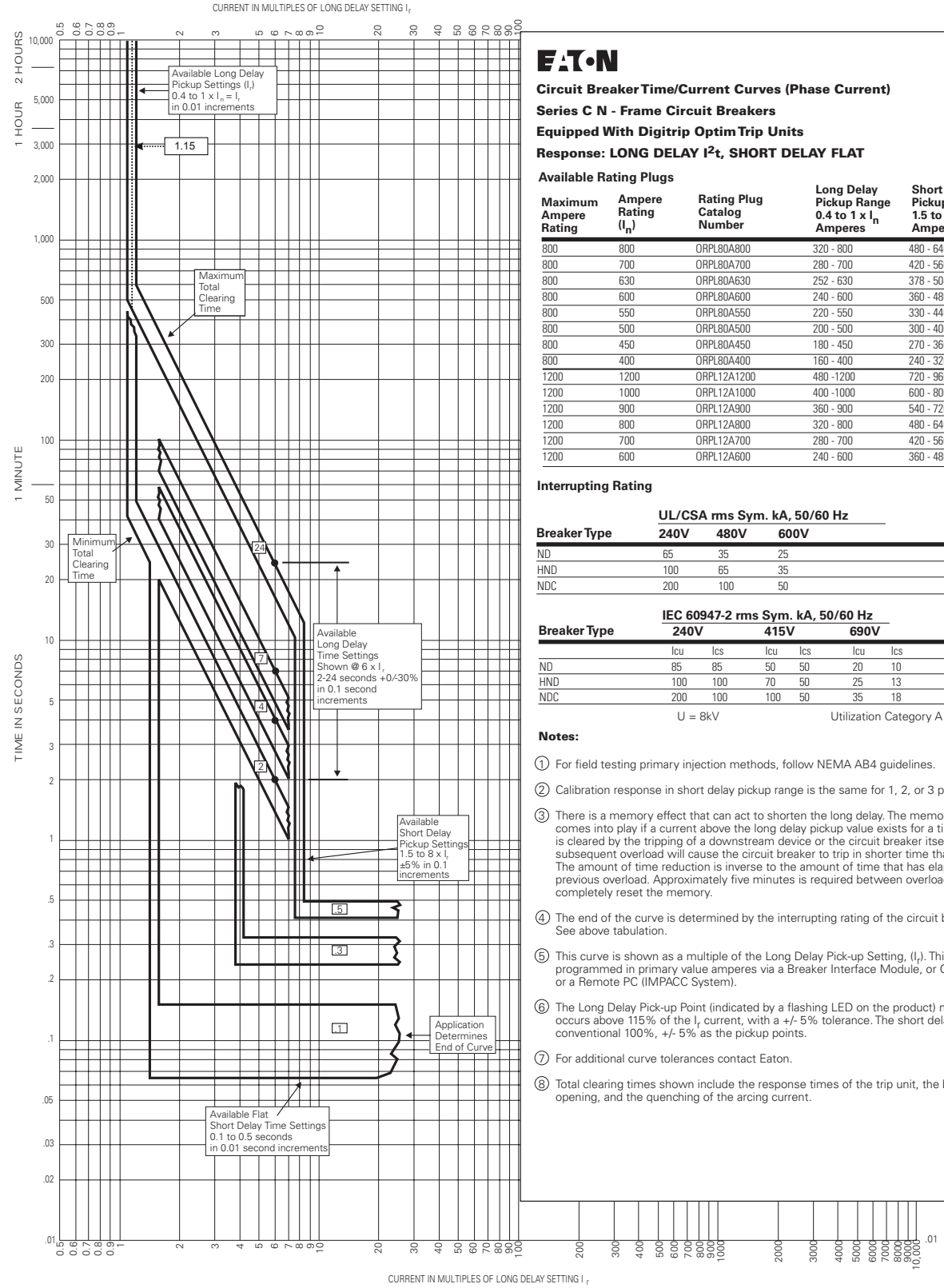
⑥ The Long Delay Pick-up Point (indicated by a flashing LED on the product) nominally occurs above 115% of the I_r current, with a +/- 5% tolerance. The short delay settings have conventional 100%, +/- 5% as the pickup points.

⑦ For additional curve tolerances contact Eaton.

⑧ Total clearing times shown include the response times of the trip unit, the breaker opening, and the quenching of the arcing current.

Figure 15. Long Delay I^2T, Short Delay I^2T - Curver Number SC-6331-96, October 2006

N-Frame Circuit Breakers Equipped with Digitrip OPTIM Trip Units; Long Delay I^2t, Short Delay Flat



Circuit Breaker Time/Current Curves (Phase Current)

Series C N - Frame Circuit Breakers

Equipped With Digitrip Optim Trip Units

Response: LONG DELAY I^2t, SHORT DELAY FLAT

Available Rating Plugs

Maximum Ampere Rating	Ampere Rating (I_n)	Rating Plug Catalog Number	Long Delay Pickup Range 0.4 to 1 x I_n Amperes	Short Delay Pickup Range 1.5 to 8 x I_r Amperes
800	800	ORPL80A800	320 - 800	480 - 6400
800	700	ORPL80A700	280 - 700	420 - 5600
800	630	ORPL80A630	252 - 630	378 - 5040
800	600	ORPL80A600	240 - 600	360 - 4800
800	550	ORPL80A550	220 - 550	330 - 4400
800	500	ORPL80A500	200 - 500	300 - 4000
800	450	ORPL80A450	180 - 450	270 - 3600
800	400	ORPL80A400	160 - 400	240 - 3200
1200	1200	ORPL12A1200	480 -1200	720 - 9600
1200	1000	ORPL12A1000	400 -1000	600 - 8000
1200	900	ORPL12A900	360 - 900	540 - 7200
1200	800	ORPL12A800	320 - 800	480 - 6400
1200	700	ORPL12A700	280 - 700	420 - 5600
1200	600	ORPL12A600	240 - 600	360 - 4800

Interrupting Rating

Breaker Type	UL/CSA rms Sym. kA, 50/60 Hz 240V	480V	600V
ND	65	35	25
HND	100	65	35
NDC	200	100	50

Breaker Type	IEC 60947-2 rms Sym. kA, 50/60 Hz 240V		415V		690V	
	Icu	Ics	Icu	Ics	Icu	Ics
ND	85	85	50	50	20	10
HND	100	100	70	50	25	13
NDC	200	100	100	50	35	18
	U = 8kV				Utilization Category A	

Notes:

① For field testing primary injection methods, follow NEMA AB4 guidelines.

② Calibration response in short delay pickup range is the same for 1, 2, or 3 poles in series.

③ 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 pickup 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 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.

④ The end of the curve is determined by the interrupting rating of the circuit breaker. See above tabulation.

⑤ This curve is shown as a multiple of the Long Delay Pick-up Setting, (I_r). This I_r setting is programmed in primary value amperes via a Breaker Interface Module, or OPTIMizer, or a Remote PC (IMPACC System).

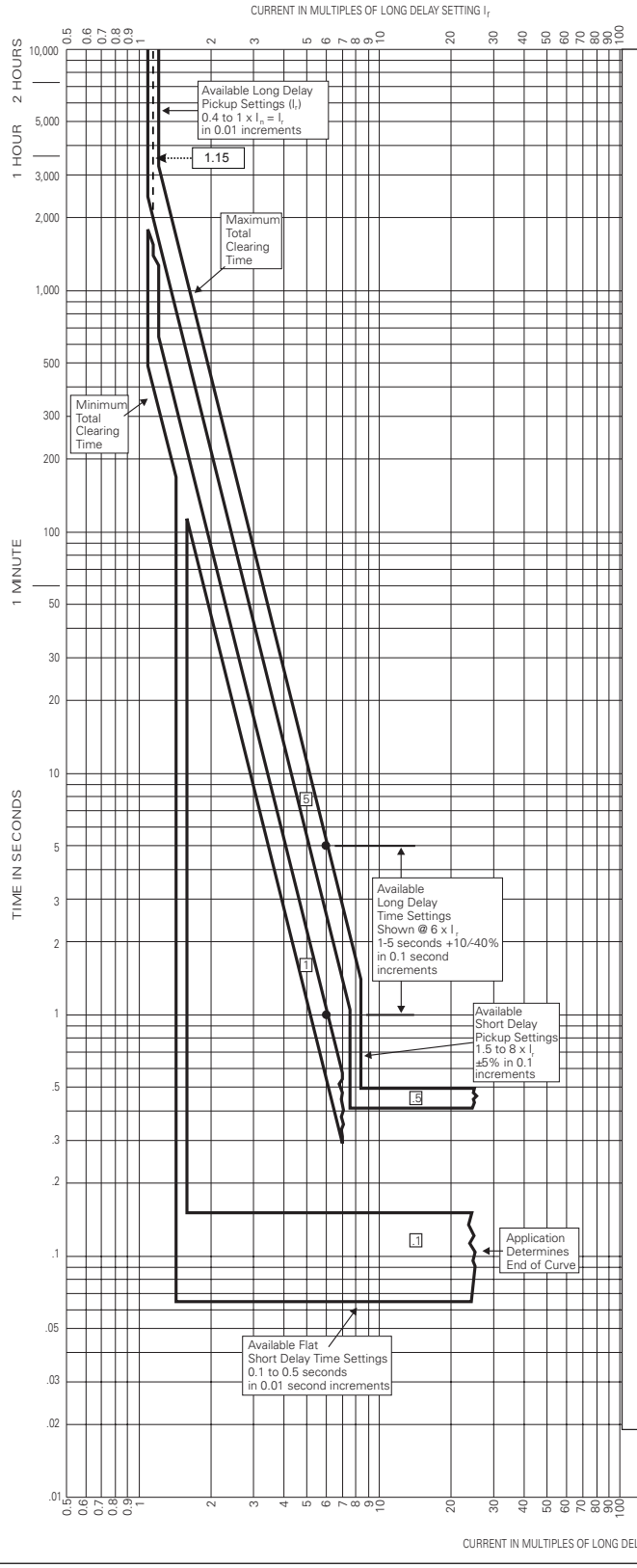
⑥ The Long Delay Pick-up Point (indicated by a flashing LED on the product) nominally occurs above 115% of the I_r current, with a +/- 5% tolerance. The short delay settings have conventional 100%, +/- 5% as the pickup points.

⑦ For additional curve tolerances contact Eaton.

⑧ Total clearing times shown include the response times of the trip unit, the breaker opening, and the quenching of the arcing current.

Figure 16. Long Delay I^2T, Short Delay Flat - Curve Number SC-6332-96, October 2006

N-Frame Circuit Breakers Equipped with Digitrip OPTIM Trip Units; Long Delay I^4t, Short Delay Flat



EATON

Circuit Breaker Time/Current Curves (Phase Current)

Series C N - Frame Circuit Breakers

Equipped With Digitrip Optim Trip Units

Response: LONG DELAY I^4t, SHORT DELAY FLAT

Available Rating Plugs

Maximum Ampere Rating	Ampere Rating (I_n)	Rating Plug Catalog Number	Long Delay Pickup Range 0.4 to 1 x I_n Amperes	Short Delay Pickup Range 1.5 to 8 x I_r Amperes
800	800	ORPL80A800	320 - 800	480 - 6400
800	700	ORPL80A700	280 - 700	420 - 5600
800	630	ORPL80A630	252 - 630	378 - 5040
800	600	ORPL80A600	240 - 600	360 - 4800
800	550	ORPL80A550	220 - 550	330 - 4400
800	500	ORPL80A500	200 - 500	300 - 4000
800	450	ORPL80A450	180 - 450	270 - 3600
800	400	ORPL80A400	160 - 400	240 - 3200
1200	1200	ORPL12A1200	480 -1200	720 - 9600
1200	1000	ORPL12A1000	400 -1000	600 - 8000
1200	900	ORPL12A900	360 - 900	540 - 7200
1200	800	ORPL12A800	320 - 800	480 - 6400
1200	700	ORPL12A700	280 - 700	420 - 5600
1200	600	ORPL12A600	240 - 600	360 - 4800

Interrupting Rating

	UL/CSA rms Sym. kA, 50/60 Hz		
Breaker Type	**240V**	**480V**	**600V**
ND	65	35	25
HND	100	65	35
NDC	200	100	50

	IEC 60947-2 rms Sym. kA, 50/60 Hz					
Breaker Type	**240V**		**415V**		**690V**	
	Icu	Ics	Icu	Ics	Icu	Ics
ND	85	85	50	50	20	10
HND	100	100	70	50	25	13
NDC	200	100	100	50	35	18

U = 8kV Utilization Category A

Notes:

① For field testing primary injection methods, follow NEMA AB4 guidelines.

② Calibration response in short delay pickup range is the same for 1, 2, or 3 poles in series.

③ 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 pickup 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 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.

④ The end of the curve is determined by the interrupting rating of the circuit breaker. See above tabulation.

⑤ This curve is shown as a multiple of the Long Delay Pick-up Setting, (I_r). This I_r setting is programmed in primary value amperes via a Breaker Interface Module, or OPTIMizer, or a Remote PC (IMPACC System).

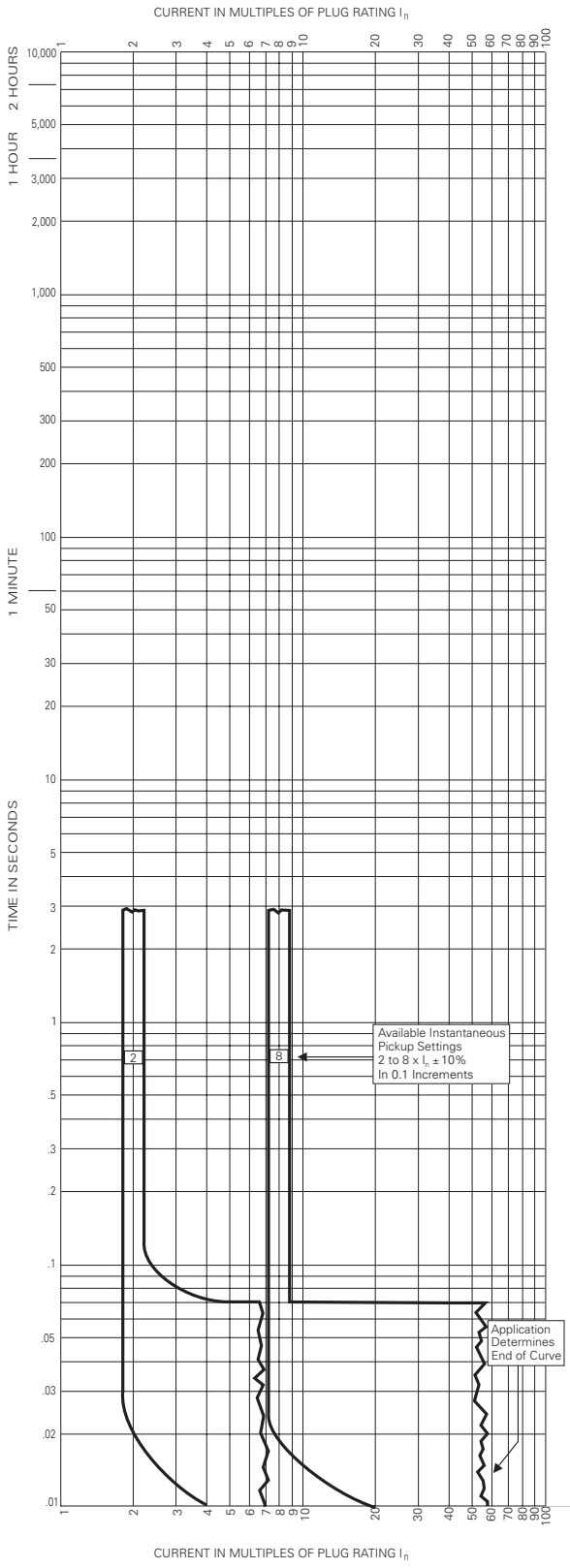
⑥ The Long Delay Pick-up Point (indicated by a flashing LED on the product) nominally occurs above 115% of the I_r current, with a +/- 5% tolerance. The short delay settings have conventional 100%, +/- 5% as the pickup points.

⑦ For additional curve tolerances contact Eaton.

⑧ Total clearing times shown include the response times of the trip unit, the breaker opening, and the quenching of the arcing current.

Figure 17. Long Delay I^4T, Short Delay Flat - Curve Number SC-6333-96, October 2006

N-Frame Circuit Breakers Equipped with Digitrip OPTIM Trip Units; Instantaneous and Override



EATON

Circuit Breaker Time/Current Curves (Phase Current)

Series C N - Frame Circuit Breakers

Equipped With Digitrip Optim Trip Units

Response: INSTANTANEOUS AND OVERRIDE

Available Rating Plugs

Maximum Ampere Rating	Ampere Rating (I_n)	Rating Plug Catalog Number	Long Delay Pickup Range 0.4 to 1 x I_n Amperes	Short Delay Pickup Range 1.5 to 8 x I_r Amperes
800	800	ORPL80A800	320 - 800	480 - 6400
800	700	ORPL80A700	280 - 700	420 - 5600
800	630	ORPL80A630	252 - 630	378 - 5040
800	600	ORPL80A600	240 - 600	360 - 4800
800	550	ORPL80A550	220 - 550	330 - 4400
800	500	ORPL80A500	200 - 500	300 - 4000
800	450	ORPL80A450	180 - 450	270 - 3600
800	400	ORPL80A400	160 - 400	240 - 3200
1200	1200	ORPL12A1200	480 -1200	720 - 9600
1200	1000	ORPL12A1000	400 -1000	600 - 8000
1200	900	ORPL12A900	360 - 900	540 - 7200
1200	800	ORPL12A800	320 - 800	480 - 6400
1200	700	ORPL12A700	280 - 700	420 - 5600
1200	600	ORPL12A600	240 - 600	360 - 4800

Interrupting Rating

	UL/CSA rms Sym. kA, 50/60 Hz		
Breaker Type	**240V**	**480V**	**600V**
ND	65	35	25
HND	100	65	35
NDC	200	100	50

	IEC 60947-2 rms Sym. kA, 50/60 Hz					
Breaker Type	**240V**		**415V**		**690V**	
	Icu	Ics	Icu	Ics	Icu	Ics
ND	85	85	50	50	20	10
HND	100	100	70	50	25	13
NDC	200	100	100	50	35	18
	U = 8kV				Utilization Category A	

Notes:

① For field testing primary injection methods, follow NEMA AB4 guidelines.

② Calibration response in short delay pickup range is the same for 1, 2, or 3 poles in series.

③ 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 pickup 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 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.

④ The end of the curve is determined by the interrupting rating of the circuit breaker. See above tabulation.

⑤ The instantaneous settings have conventional 100%, +/- 10% as the pickup points.

⑥ For additional curve tolerances contact Eaton.

⑦ Total clearing times shown include the response times of the trip unit, the breaker opening, and the quenching of the arcing current.

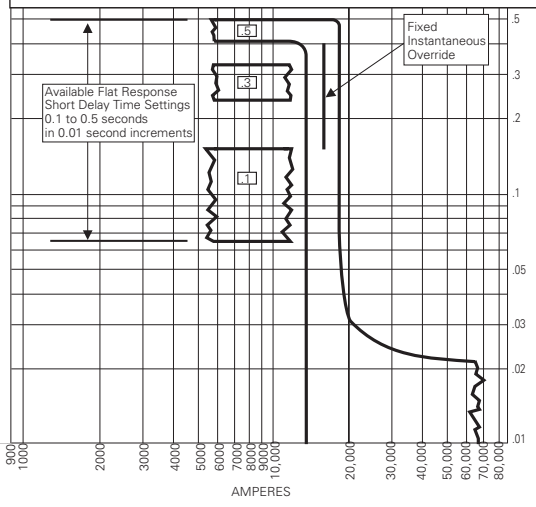
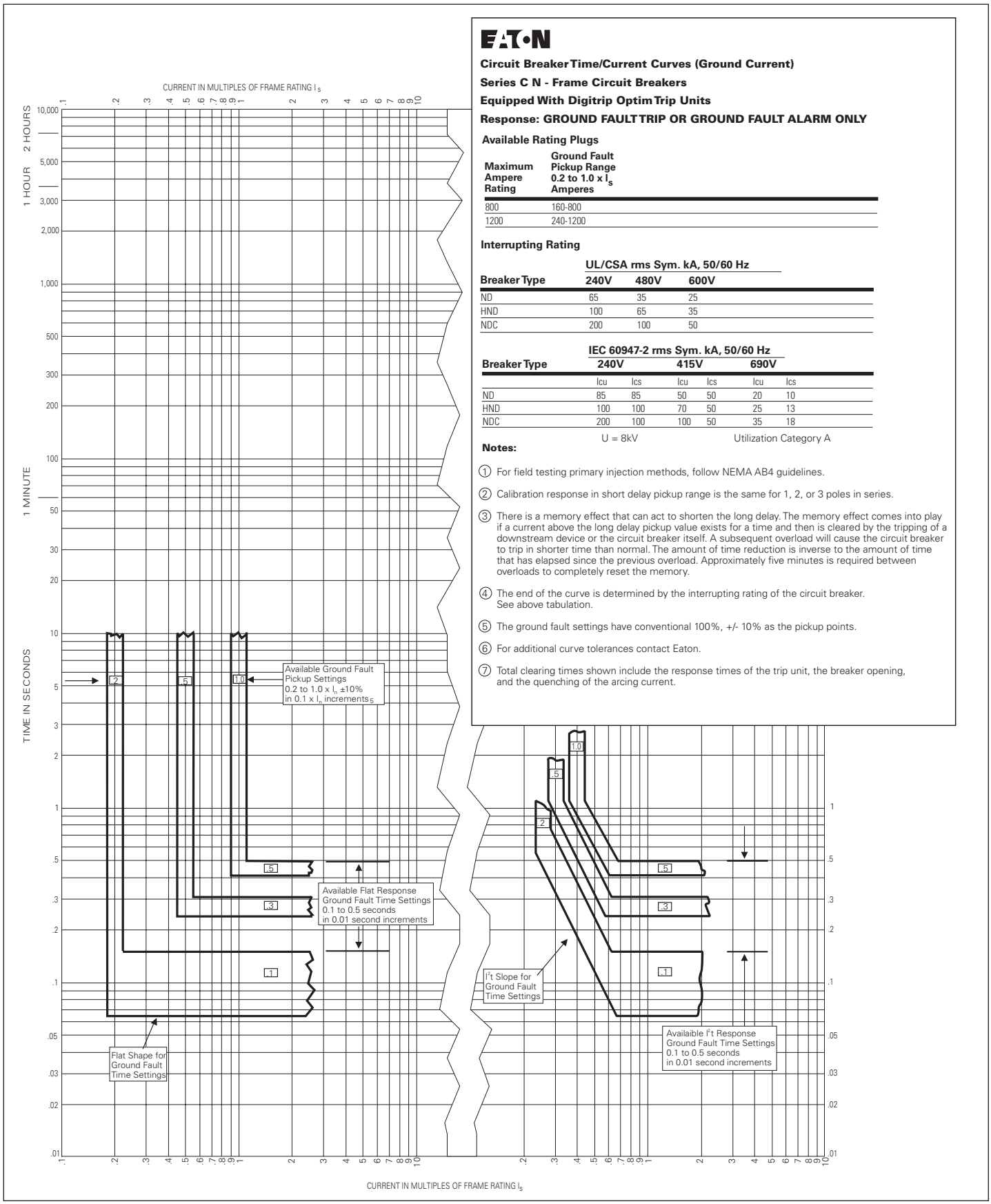


Figure 18. Instantaneous and Override - Curve Number SC-6334-96, October 2006

N-Frame Circuit Breakers Equipped with Digitrip OPTIM Trip Units; Ground Fault or Ground Fault Alarm Only



Circuit Breaker Time/Current Curves (Ground Current)
Series C N - Frame Circuit Breakers
Equipped With Digitrip Optim Trip Units
Response: GROUND FAULT TRIP OR GROUND FAULT ALARM ONLY

Available Rating Plugs

Maximum Ampere Rating	Ground Fault Pickup Range 0.2 to 1.0 x I_s Amperes
800	160-800
1200	240-1200

Interrupting Rating

	UL/CSA rms Sym. kA, 50/60 Hz		
Breaker Type	**240V**	**480V**	**600V**
ND	65	35	25
HND	100	65	35
NDC	200	100	50

	IEC 60947-2 rms Sym. kA, 50/60 Hz					
Breaker Type	**240V**		**415V**		**690V**	
	Icu	Ics	Icu	Ics	Icu	Ics
ND	85	85	50	50	20	10
HND	100	100	70	50	25	13
NDC	200	100	100	50	35	18

U = 8kV Utilization Category A

Notes:

1. For field testing primary injection methods, follow NEMA AB4 guidelines.
2. Calibration response in short delay pickup range is the same for 1, 2, or 3 poles in series.
3. 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 pickup 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 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.
4. The end of the curve is determined by the interrupting rating of the circuit breaker. See above tabulation.
5. The ground fault settings have conventional 100%, +/- 10% as the pickup points.
6. For additional curve tolerances contact Eaton.
7. Total clearing times shown include the response times of the trip unit, the breaker opening, and the quenching of the arcing current.

Figure 19. Ground Fault Protection - Cuver Number SC-6335-96, October 2006

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