

**Cutler-Hammer**  
Westinghouse &  
Cutler-Hammer Products  
Five Parkway Center  
Pittsburgh, Pennsylvania, U.S.A. 15220

Application Data  
**29-167N**

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October 2006  
Mailed to: E/29-100A

Time/Current Characteristic Curves for  
Westinghouse Series C® N-Frame Circuit  
Breakers with Type NES Digitrip RMS 310  
Trip Units

## Westinghouse AB DE-ION® Circuit Breakers

Breaker Description	Curve No.	Page
<b>Series C Types ND, CND, HND, CHND, NDC, CNDC Circuit Breakers</b>		
<b>Equipped With Type NES Digitrip RMS 310 Trip Units With</b>		
I <sup>2</sup> t Ramp Short Time Delay (Phase Protection) .....	SC-5375-92A	2
Adjustable Short Time Delay (Phase Protection) .....	SC-5376-92A	3
Ground Fault Protection① .....	SC-5377-92A	4
<b>Series C Types ND, HND and NDC Circuit Breakers</b>		
<b>Equipped With Digitrip OPTIM Trip Units</b>		
Long Delay I <sup>2</sup> t, Short Delay I <sup>2</sup> t .....	SC-6331-96	5
Long Delay I <sup>2</sup> t, Short Delay Flat .....	SC-6332-96	6
Long Delay I <sup>4</sup> t, Short Delay Flat .....	SC-6333-96	7
Instantaneous and Override .....	SC-6334-96	8
Ground Fault Protection .....	SC-6335-96	9

Individual oversize copies of curves listed above printed on onion-skin paper are available in limited quantity from:

Cutler-Hammer  
Westinghouse &  
Cutler-Hammer Products  
Five Parkway Center  
Pittsburgh, PA 15220

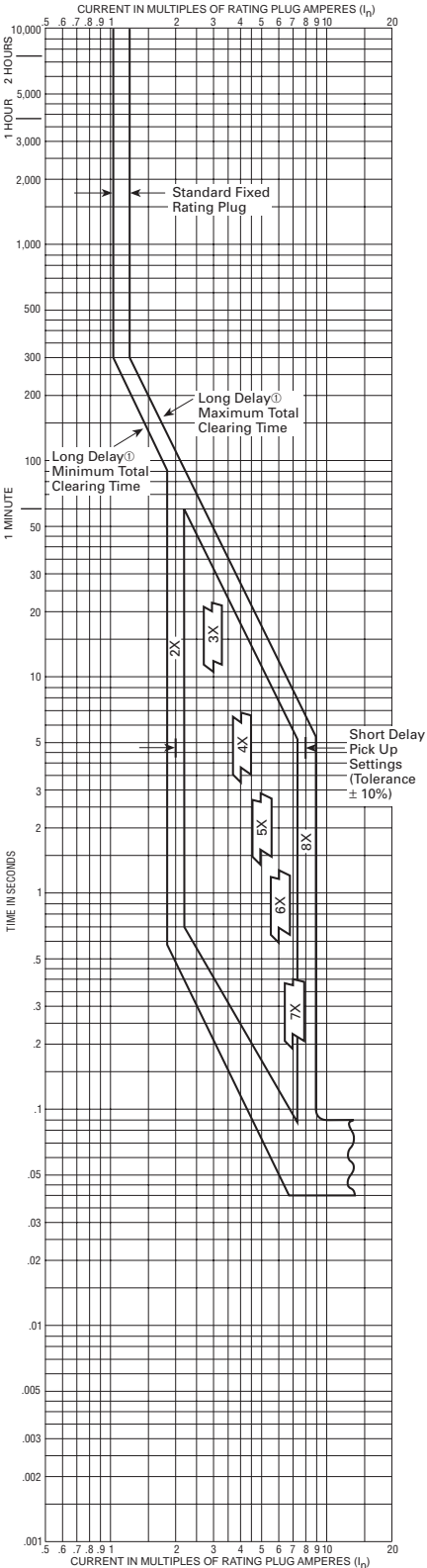
When ordering onion-skin curves, use number at bottom of page where curve appears, i.e., SC-5375-92A. **Requests for full sets of curves will not be honored.**

① Use in conjunction with SC-5375-92A or SC-5376-92A.



AB DE-ION Circuit Breakers

Types ND, CND, HND, CHND, NDC, CND, NDU, NGU Equipped With Type NES Digitrip RMS 310 Trip Units With I<sup>2</sup>t Ramp 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 CND.

**I<sup>2</sup>t Ramp Short Time Delay**      **Typical Trip Unit Nameplate**

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

**Interrupting Ratings – 50/60 Hz**  
RMS Sym. Amperes (kA)

Breaker Type	UL/CSA	480V	600V	IEC 947-2	220-240V	380-415V
ND, CND	65	50	25	65	50	
HND, CHND	100	65	35	100	65	
NDC, CND	200	100	50	200	100	

I<sub>cs</sub> = .25 I<sub>cu</sub>  
I<sub>cw</sub> = 15 kA @ .5S  
U<sub>imp</sub> = 8kV

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

Digitrip RMS 300 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-4-1991.

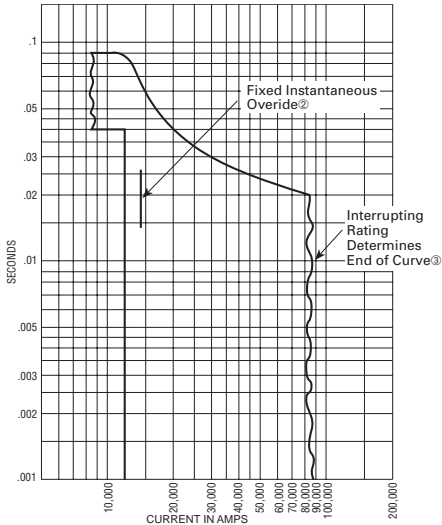
For ground fault time-current curves see SC-5377-92A.

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.

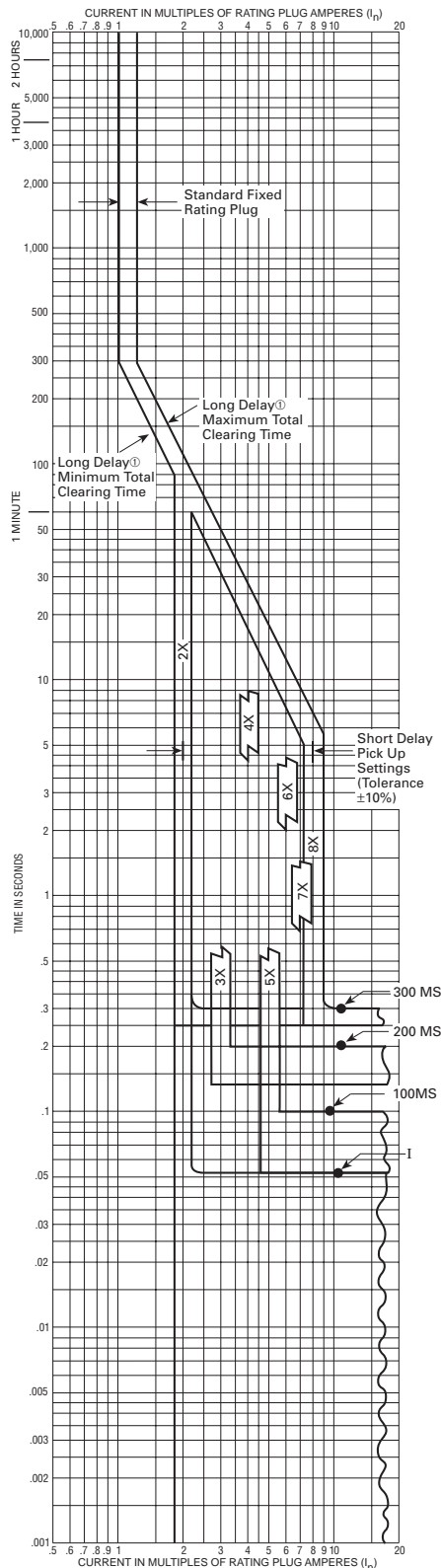
④ Not UL/CSA Listed.





## AB DE-ION Circuit Breakers

### 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)



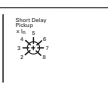
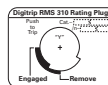
#### Circuit Breaker Time/Current Curves (Phase Current)

##### Series C<sup>®</sup> 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

Digitrip RMS 310  
Trip Unit  
40°C Ambient

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

Interrupting Ratings - 50/60 Hz  
RMS Sym. Amperes (kA)

Breaker Type	UL/CSA 240V	480V	600V	IEC 947-2 220-240V	380-415V
ND, CND	65	50	25	65	50
HND, CHND	100	65	35	100	65
NDC, CNDC	200	100	50	200	100

$I_{CS} = .25 I_{CU}$   
 $I_{CW} = 15 \text{ kA} @ .5S$   
 $I_{imp} = 8 \text{ kV}$

#### Notes

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

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-4-1991.

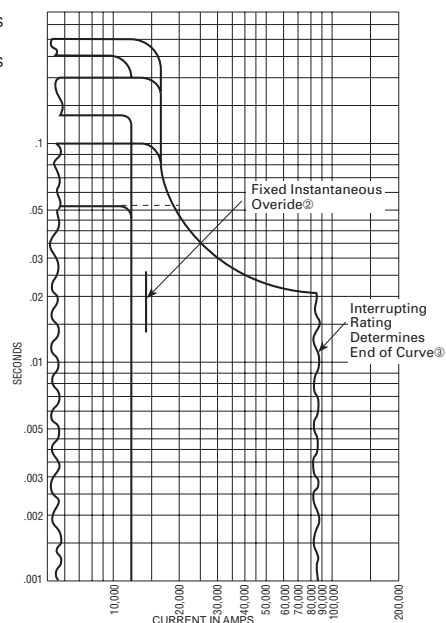
For ground fault time-current curves see SC-5377-92A.

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 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 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.



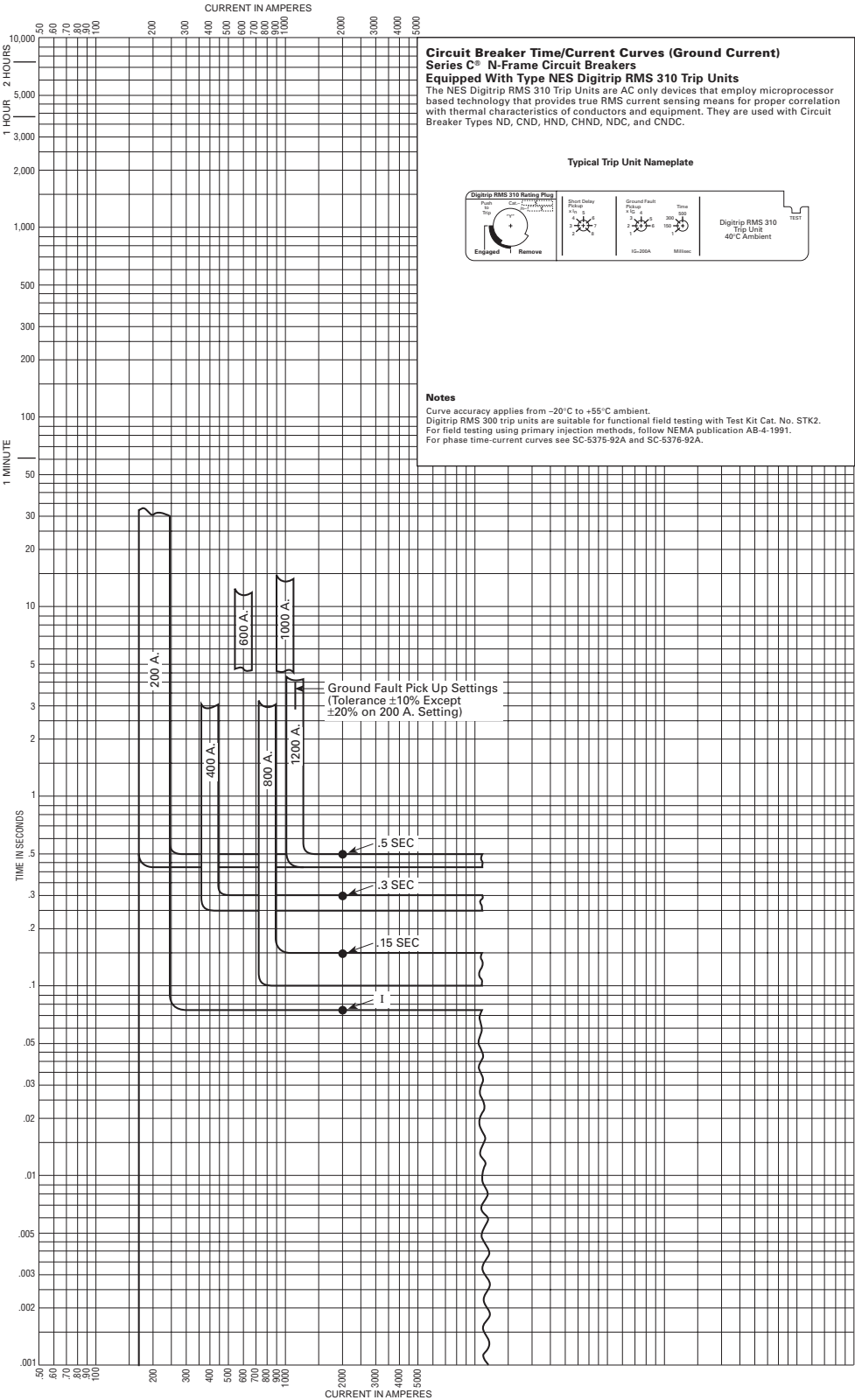
Curve No. SC-5376-92A

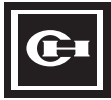




AB DE-ION Circuit Breakers

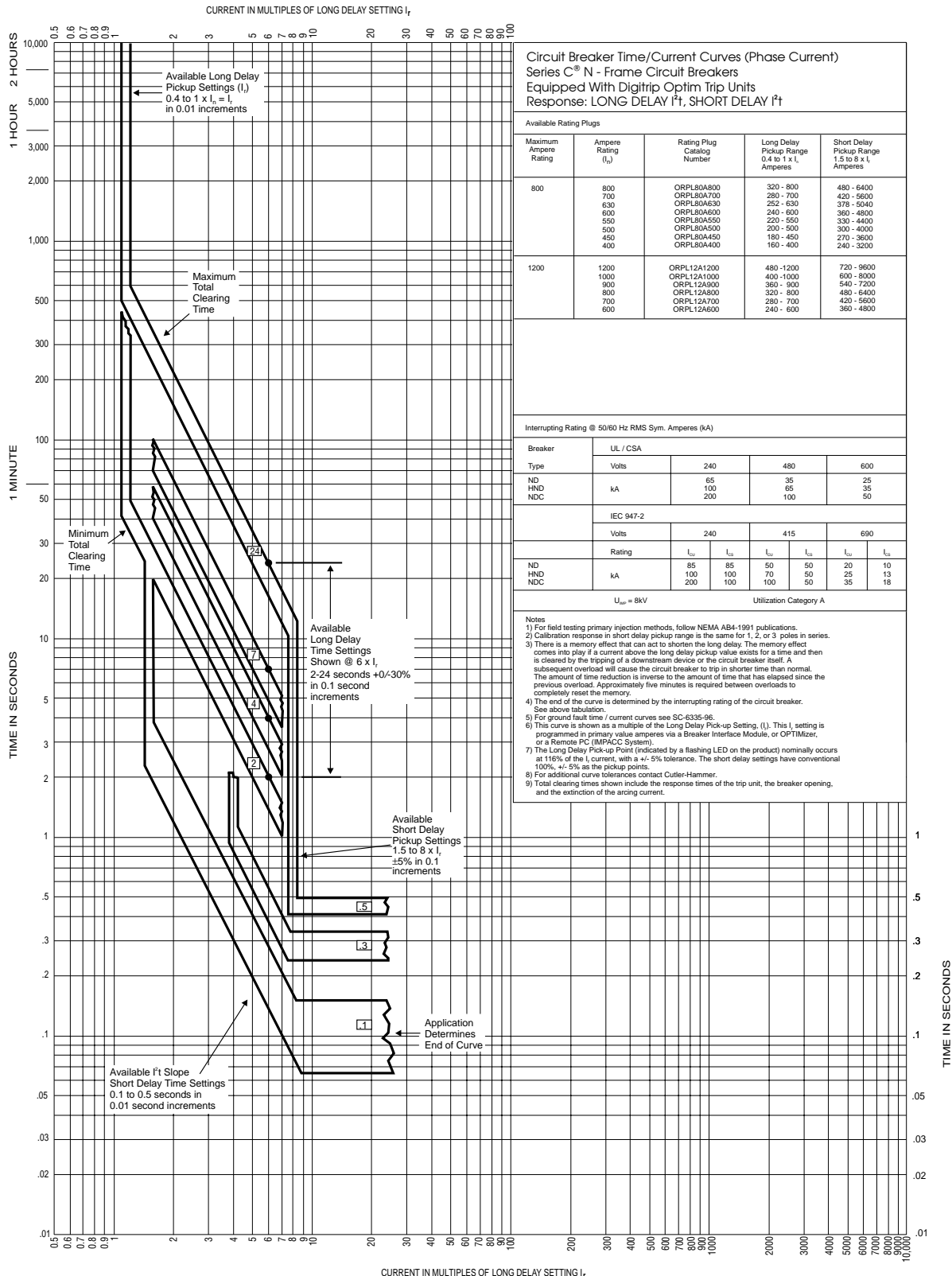
Types ND, CND, HND, CHND, NDC, CNDC, NDU, NGU Equipped With Type NES Digitrip RMS 310 Trip Units With Ground Fault Protection





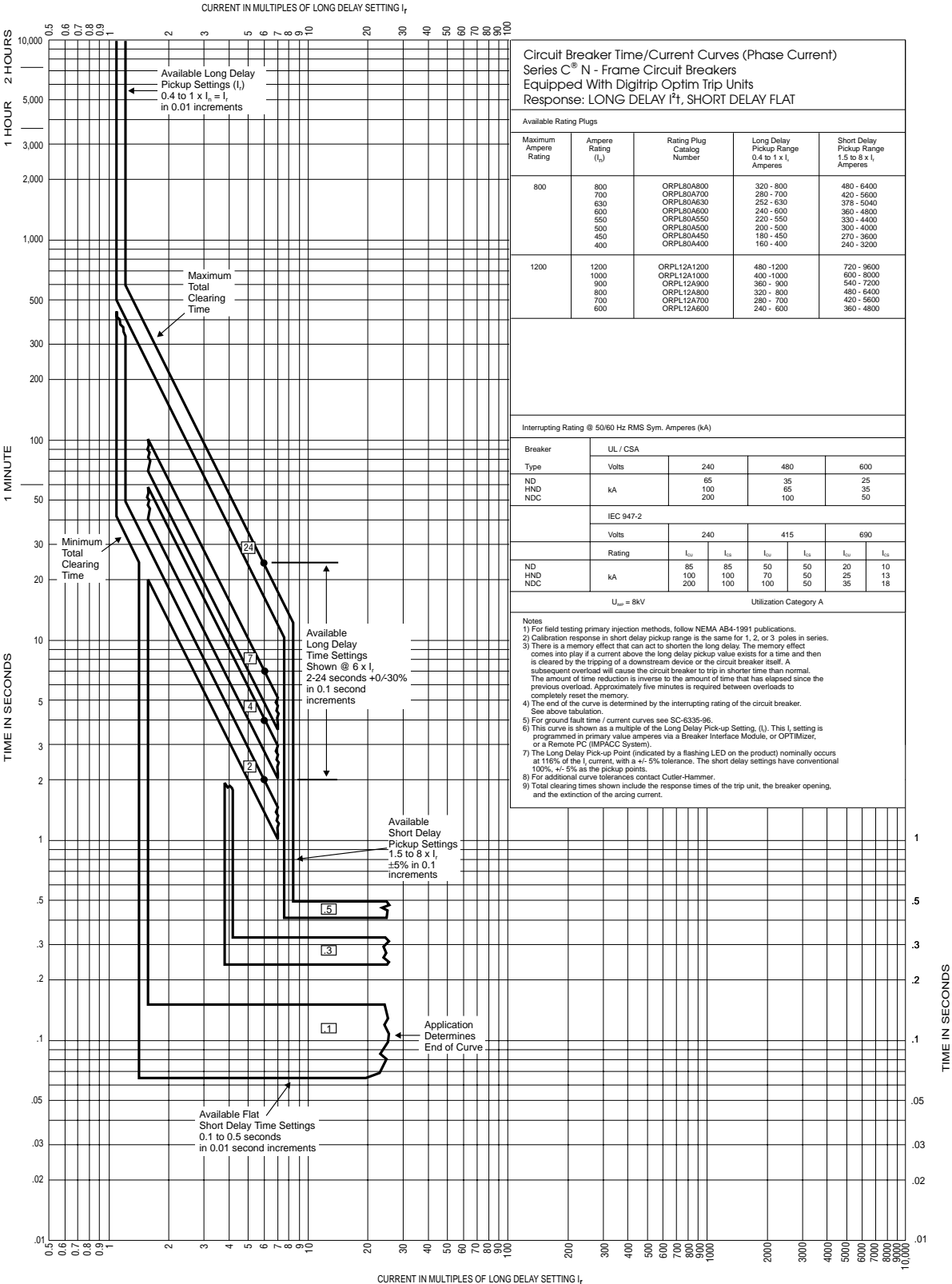
## AB DE-ION Circuit Breakers

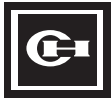
### N-Frame Circuit Breakers Equipped with Digitrip OPTIM Trip Units; Long Delay $I^2t$ , Short Delay $I^2t$





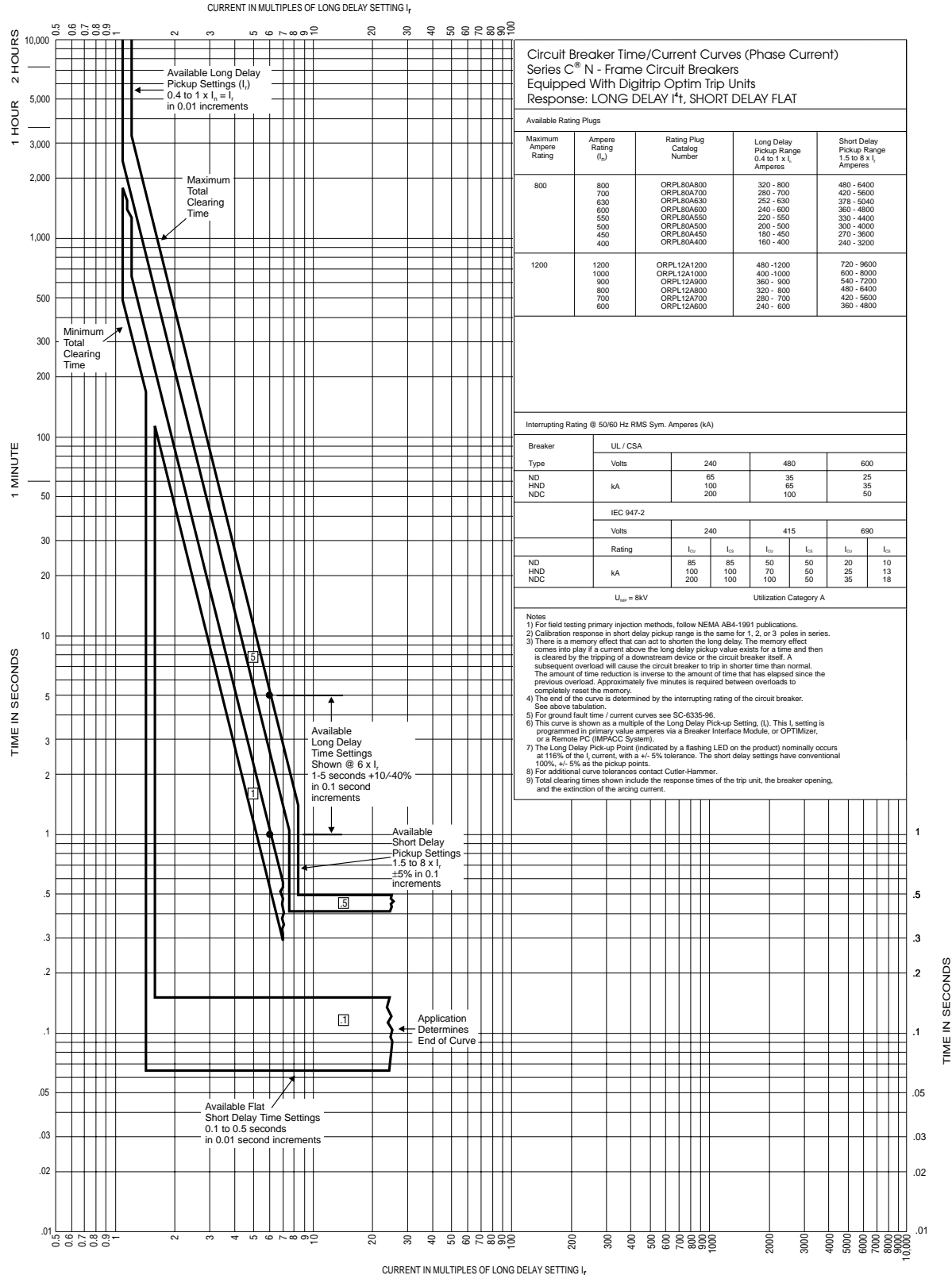
AB DE-ION Circuit Breakers  
N-Frame Circuit Breakers Equipped with Digitrip OPTIM Trip Units; Long Delay I<sup>2</sup>t, Short Delay Flat

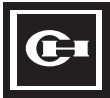




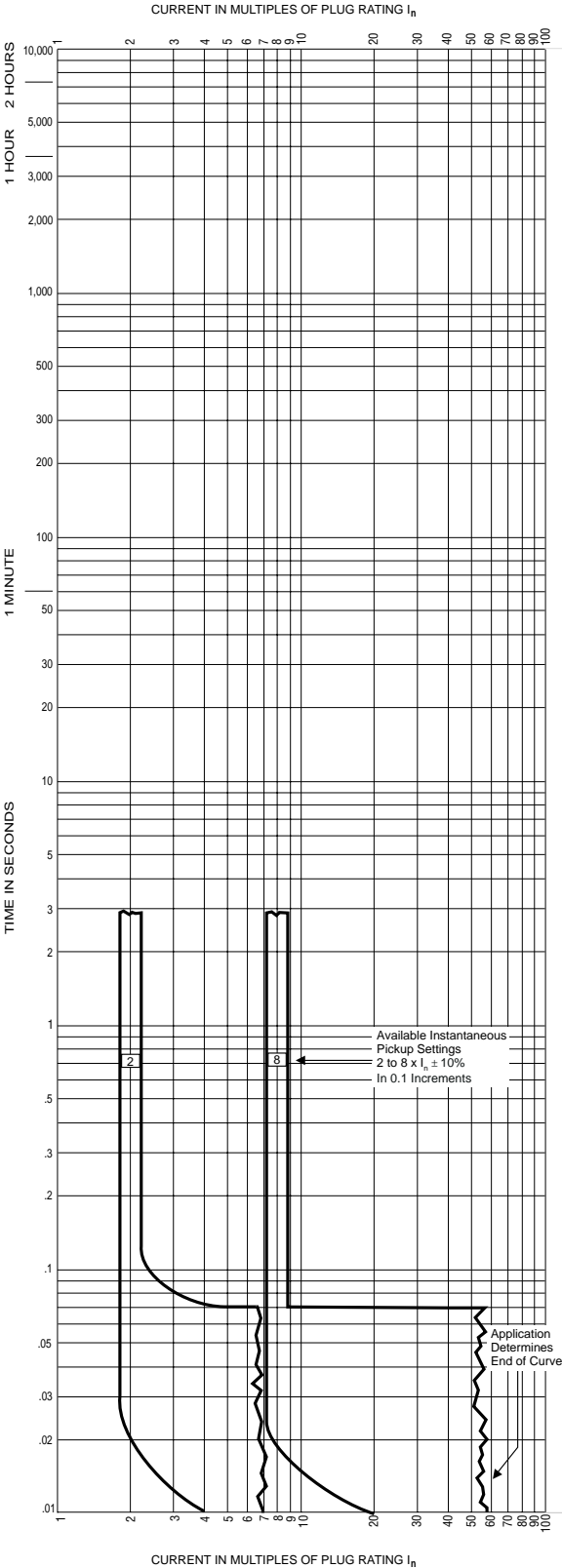
## AB DE-ION Circuit Breakers

### N-Frame Circuit Breakers Equipped with Digitrip OPTIM Trip Units; Long Delay I<sup>t</sup>, Short Delay Flat

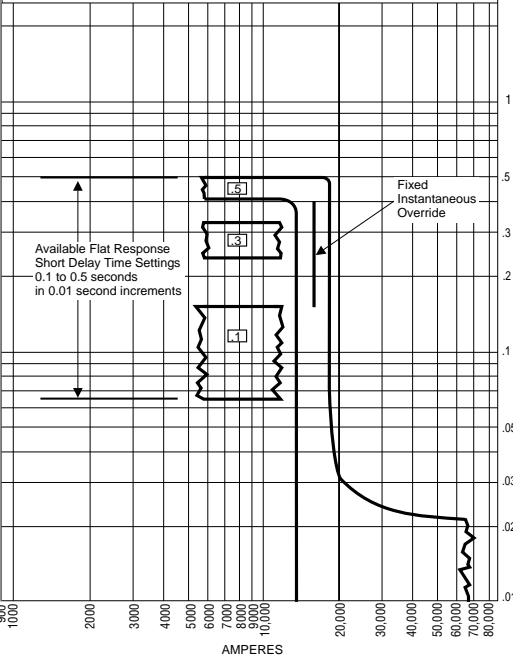




AB DE-ION Circuit Breakers  
N-Frame Circuit Breakers Equipped with Digitrip OPTIM Trip Units; Instantaneous and Override



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 <sub>n</sub> )	Rating Plug Catalog Number	Instantaneous Pickup Range 2 to 8 x I <sub>n</sub> Amperes	Override Amperes		
800	800	ORPL80A800	1600 -6400	11900 -16100		
	700	ORPL80A700	1400 -5600	11900 -16100		
	630	ORPL80A630	1260 -5040	11900 -16100		
	600	ORPL80A600	1200 -4800	11900 -16100		
	550	ORPL80A550	1100 -4400	11900 -16100		
	500	ORPL80A500	1000 -4000	11900 -16100		
	450	ORPL80A450	900 -3600	11900 -16100		
	400	ORPL80A400	800 -3200	11900 -16100		
1200	1200	ORPL12A1200	2400 -9600	11900 -16100		
	1000	ORPL12A1000	2000 -8000	11900 -16100		
	900	ORPL12A900	1800 -7200	11900 -16100		
	800	ORPL12A800	1600 -6400	11900 -16100		
	700	ORPL12A700	1400 -5600	11900 -16100		
	600	ORPL12A600	1200 -4800	11900 -16100		
Interrupting Rating @ 50/60 Hz RMS Sym. Amperes (kA)						
Breaker	UL / CSA					
	Volts	240	480	600		
Type						
ND	kA	65	35	25		
HND	kA	100	65	35		
NDC	kA	200	100	50		
IEC 947-2						
Breaker	Volts		240	415	690	
	Rating	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>
ND	kA	85	85	50	50	20
HND	kA	100	100	70	50	25
NDC	kA	200	100	100	50	35
						18
U <sub>lp</sub> = 8kV Utilization Category A						
Notes						
1) For field testing primary injection methods, follow NEMA AB4-1991 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 above tabulation.						
5) For ground fault time / current curves see SC-6335-96.						
6) The instantaneous settings have conventional 100%, +/- 10% as the pickup points.						
7) For additional curve tolerances contact Cutler-Hammer.						
8) Total clearing times shown include the response times of the trip unit, the breaker opening, and the extinction of the arcing current.						

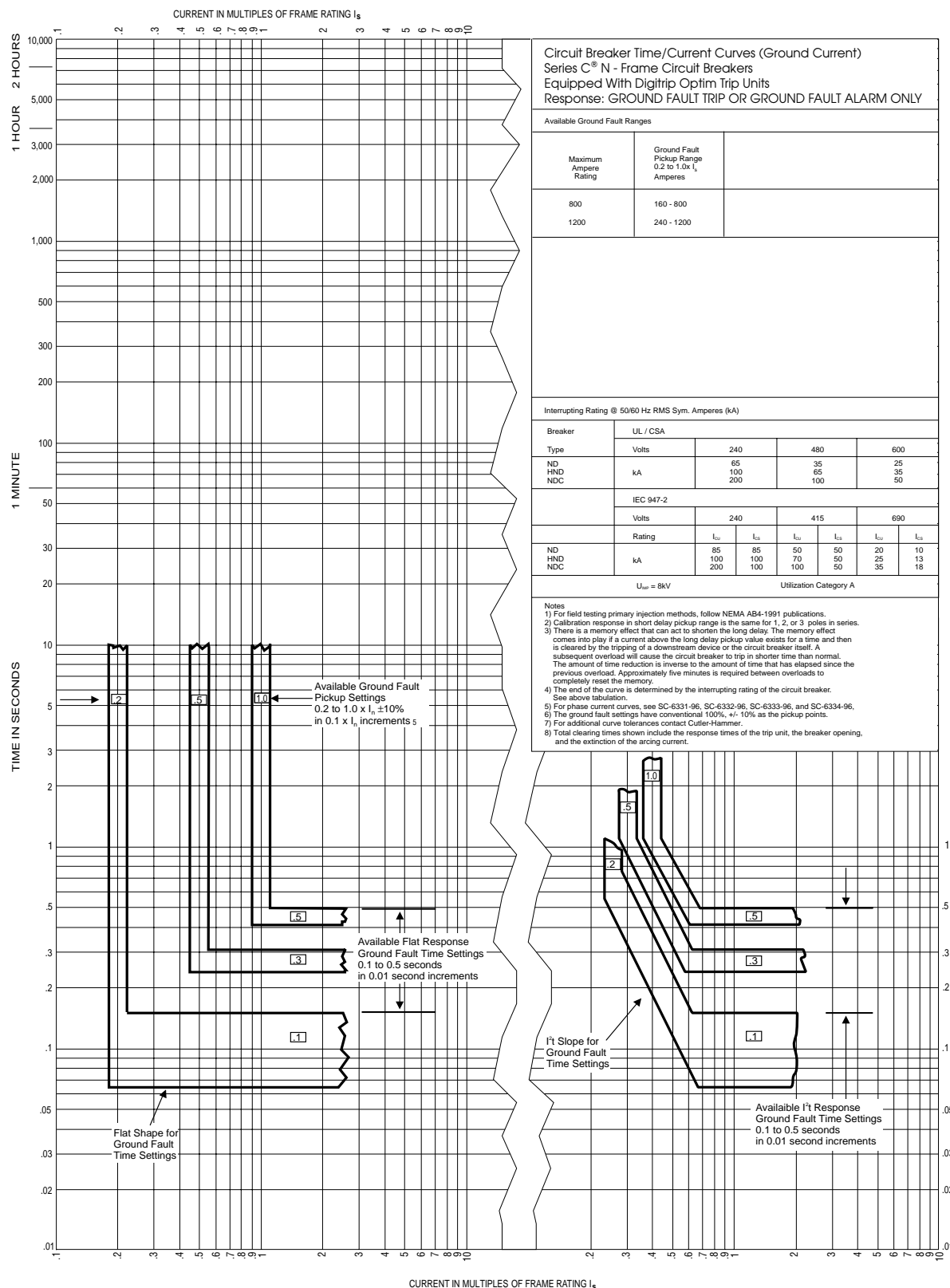






## AB DE-ION Circuit Breakers

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





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## **Cutler-Hammer**

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Five Parkway Center  
Pittsburgh, Pennsylvania, U.S.A. 15220