Series C F-frame circuit breaker time current curves

Contents

Powering Business Worldwide

Contents (continued)

Note:
Time/current characteristic curves for Series C® F-frame circuit breakers—voltages shown in curve headings are maximum at which the breaker may be applied. Interrupting capacity of individual breaker is tabulated on each curve.

Time Current Curves are engineering reference documents for application and coordination purposes only. For field testing molded case circuit breakers, refer to NEMA AB 4 guidelines.

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

Revision	Curve Number	Page	Date

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. FD-Frame Circuit Breakers with 310+ Electronic Trip Unit Technology

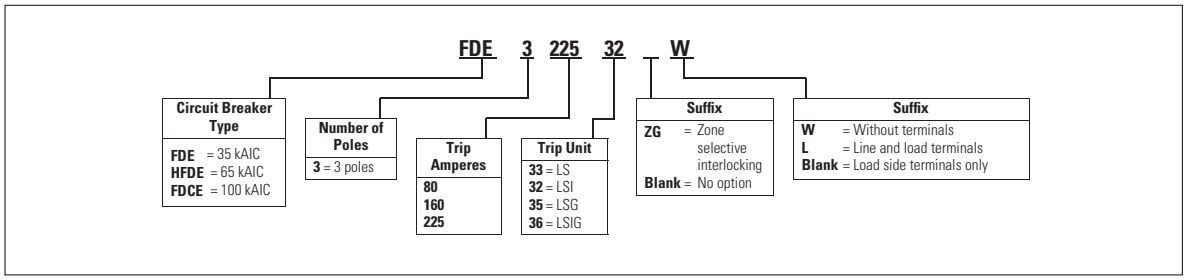


Table 2. FD-Frame Circuit Breakers with 210+ Electronic Trip Unit Technology

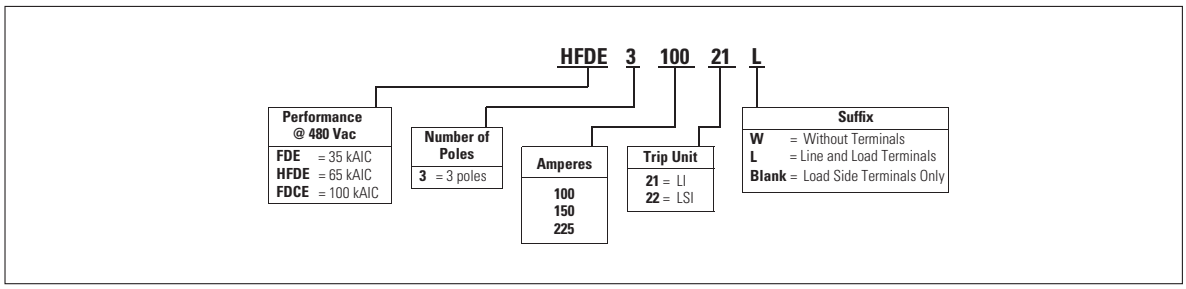
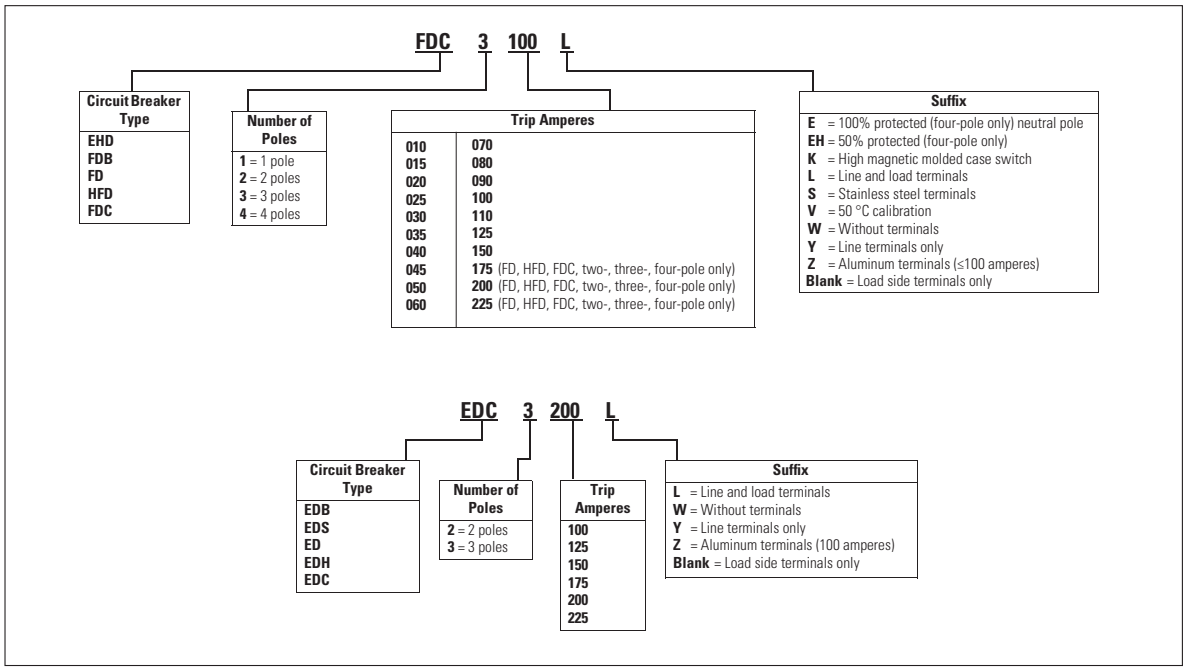


Table3. FD-Frame Circuit Breakers with Thermal-Magnetic Trip Unit Technology



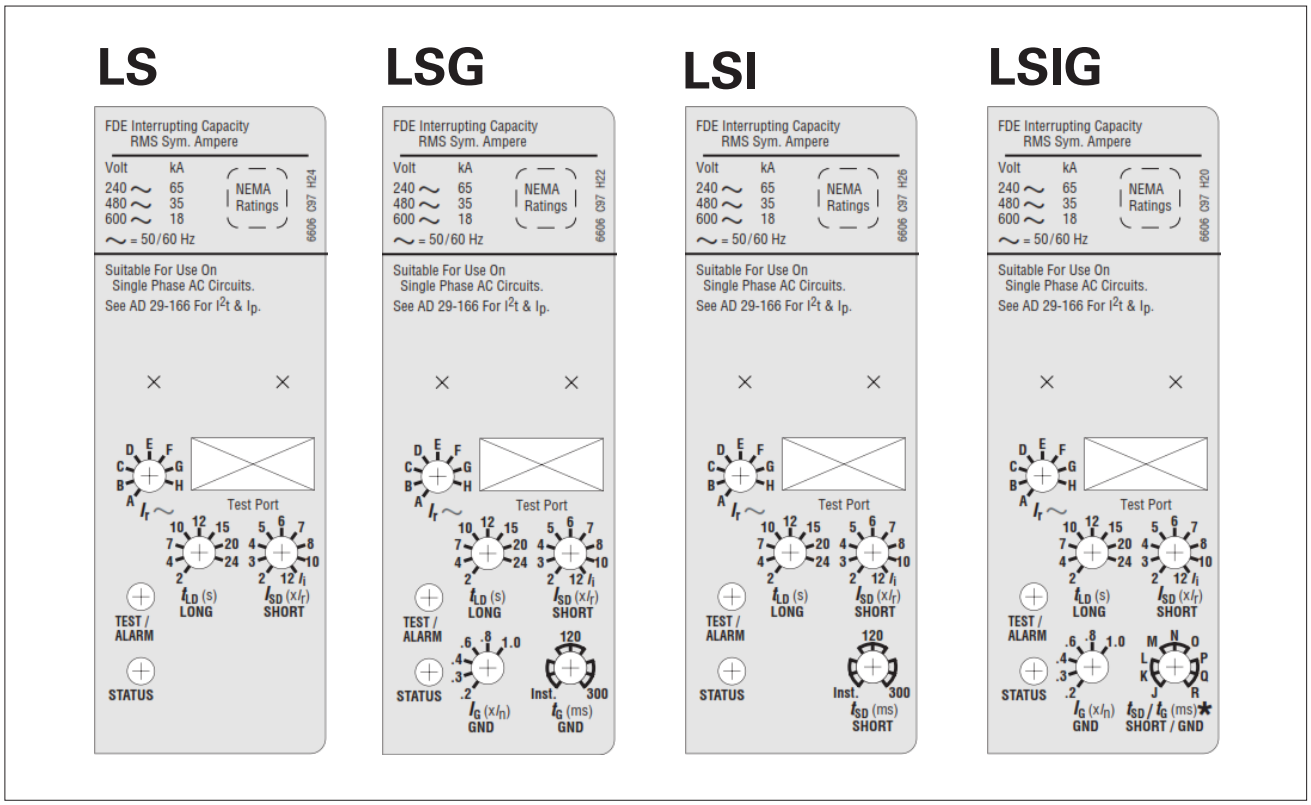


Figure 1. Digitrip 310+ Nameplates

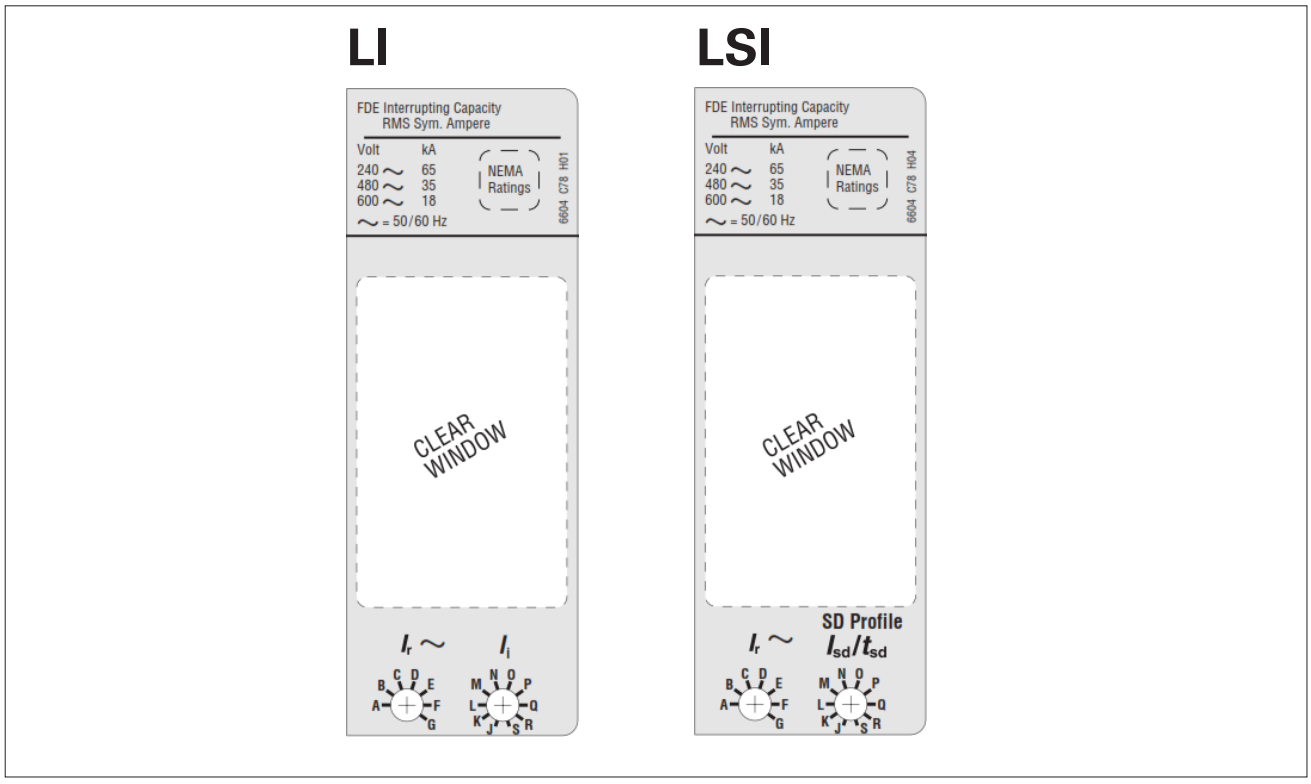
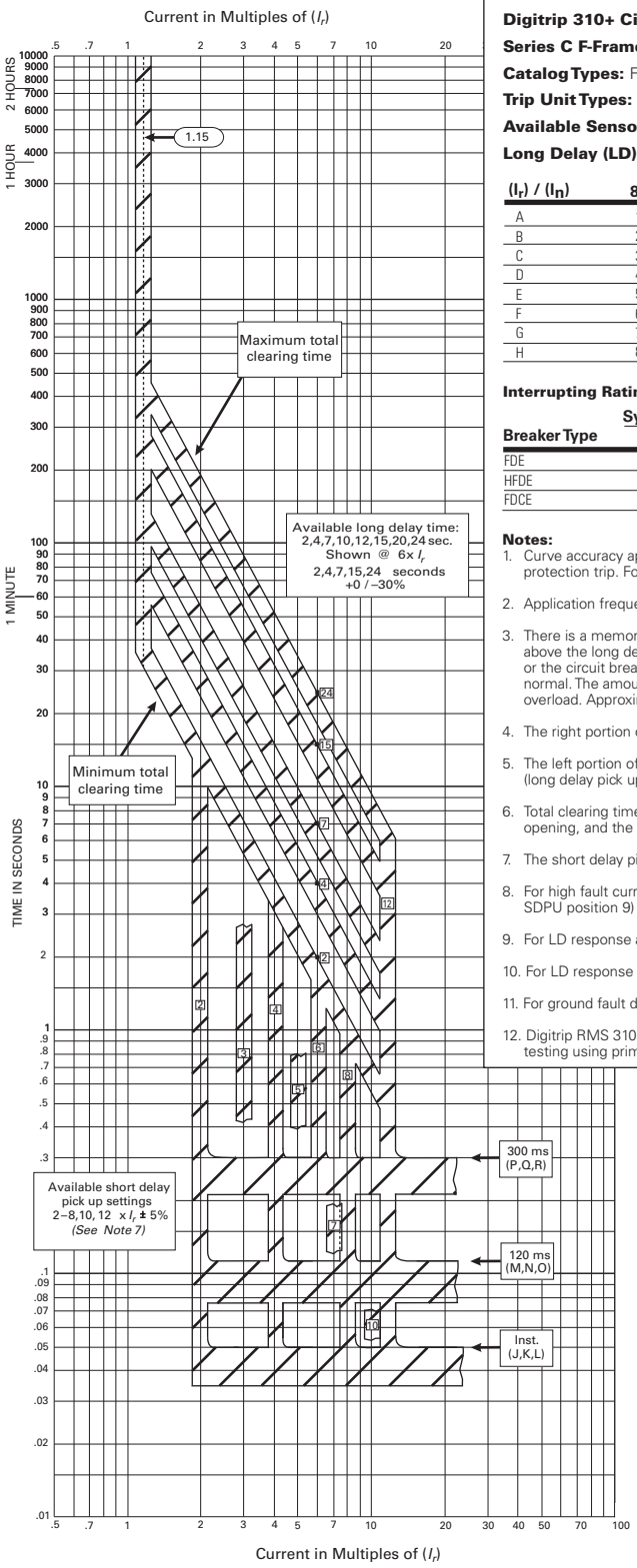
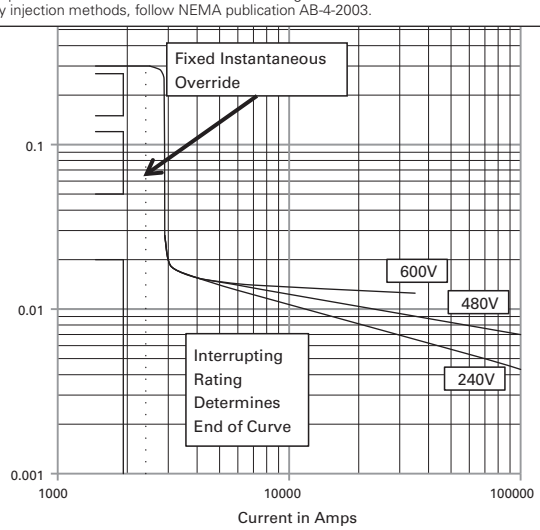


Figure 2. Digitrip 210+ Nameplates





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

Series C F-Frame Circuit Breakers

Catalog Types: FDE, HFDE, FDCE

Trip Unit Types: 32 (LSI), 36 (LSIG)

Available Sensors (I_n): 80A, 160A, 225A

Long Delay (LD) and Short Delay (SD) with Flat Response

(I_r) / (I_n)	80A	160A	225A
A	15A	60A	100A
B	20A	70A	110A
C	30A	80A	125A
D	40A	90A	150A
E	50A	100A	160A
F	60A	125A	175A
G	70A	150A	200A
H	80A	160A	225A

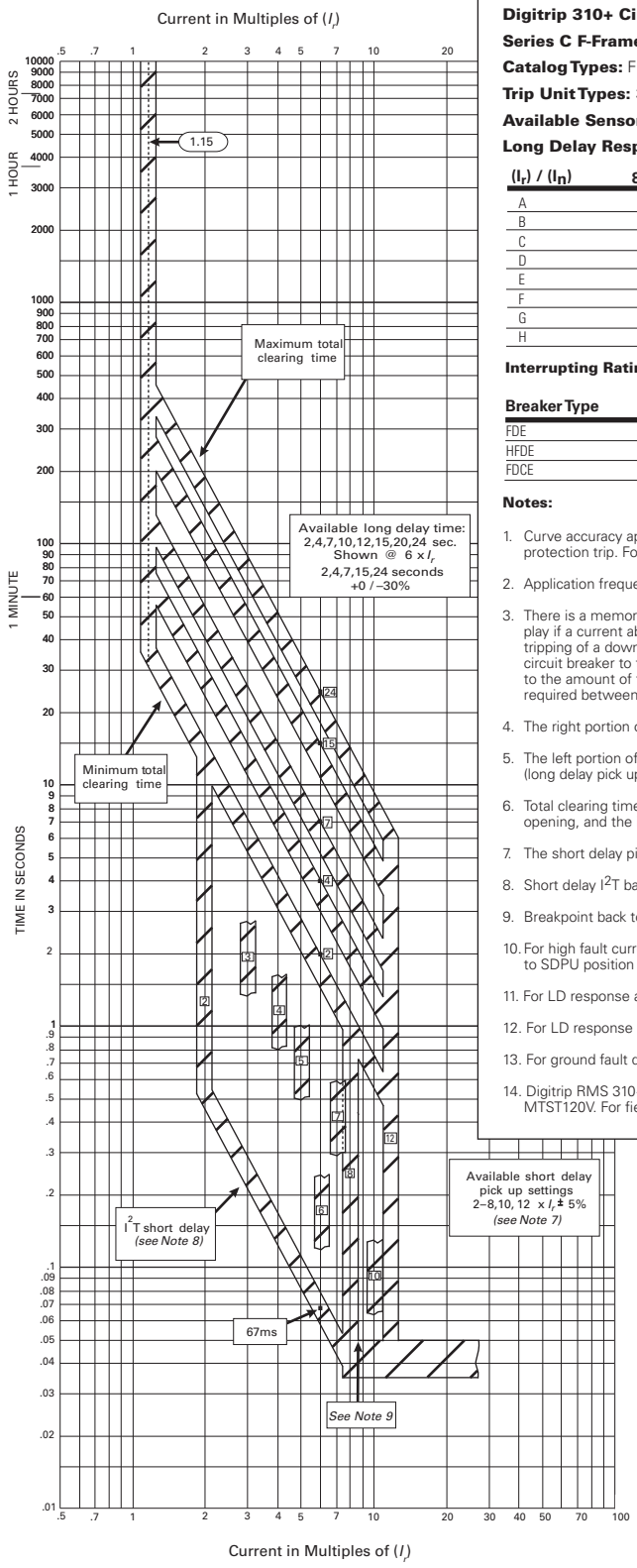
Interrupting Rating—50/60 Hz

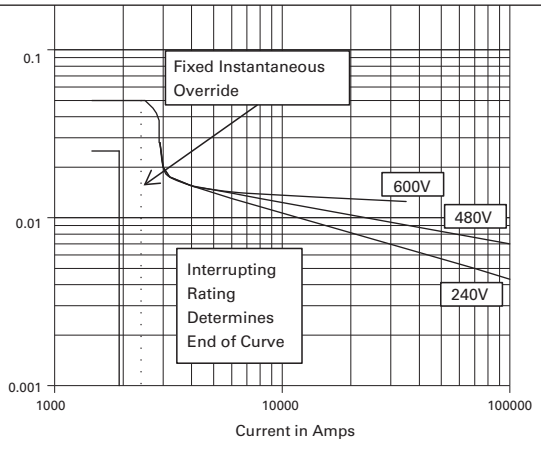
	Symmetrical RMS amperes (kAS) UL/CSA		
Breaker Type	**240V**	**480V**	**600V**
FDE	65	35	18
HFDE	100	65	25
FDCE	200	100	35

Notes:

1. Curve accuracy applies from –20C to +55C ambient. Temperatures above +85C cause an overtemperature protection trip. For possible continuous ampere derating for ambient above 40C, refer to Eaton.
2. Application frequency is 50/60 Hz.
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 pick up value exists for a time and then is cleared by the tripping of a down stream 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 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 pick up = 115% of I_n). 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 pick up has nine settings/positions, 2–8, 10, 12.
8. For high fault current levels an additional fixed instantaneous hardware override is provided (corresponding to SDPU position 9) at 12x (I_n) and designated as 12I_i. Instantaneous tolerance is +/–20%.
9. For LD response and SD with flat response (this curve): TC01203015E.
10. For LD response and SD with I^2T response curve, see: TC01203016E.
11. For ground fault delay response curve, see: TC01203017E.
12. Digitrip RMS 310+ trip units are suitable for functional field testing with test kit Cat. No. MTS120V. For field testing using primary injection methods, follow NEMA publication AB-4-2003.

Figure 3. Types FDE, HFDE, and FDCE 225A—Long/Short Delay—Curve Number TC01203015E





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

Series C F-Frame Circuit Breakers

Catalog Types: FDE, HFDE, FDCE

Trip Unit Types: 32 (LS), 5 (LSG)

Available Sensors (I_n): 80A, 160A, 225A

Long Delay Response (I_r) and Short Delay with I^2T Response Curve

(I_r) / (I_n)	80A	160A	225A
A	15A	60A	100A
B	20A	70A	110A
C	30A	80A	125A
D	40A	90A	150A
E	50A	100A	160A
F	60A	125A	175A
G	70A	150A	200A
H	80A	160A	225A

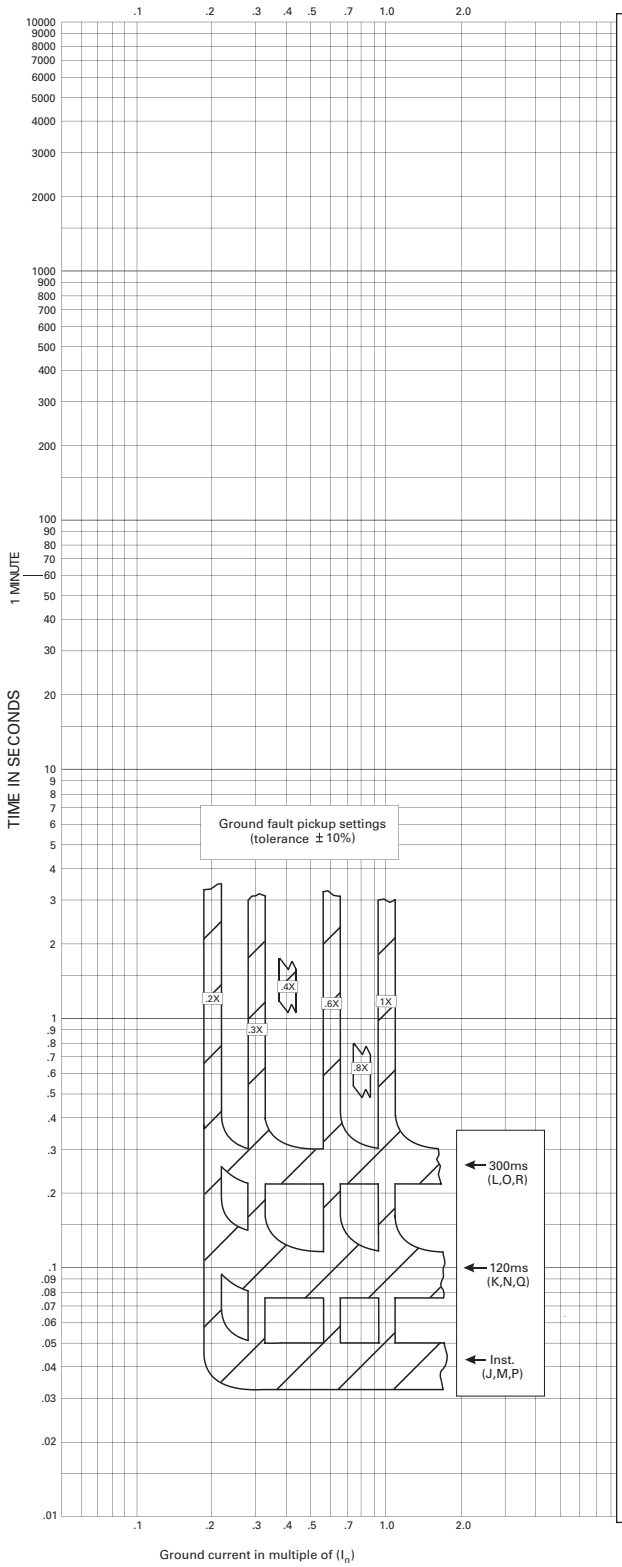
Interrupting Rating

	UL/CSA rms Sym. kA, 50/60 Hz		
Breaker Type	**240V**	**480V**	**600V**
FDE	65	35	18
HFDE	100	65	25
FDCE	200	100	35

Notes:

1. Curve accuracy applies from –20C to +55C ambient. Temperatures above +85C cause an overtemperature protection trip. For possible continuous ampere derating for ambient above 40C, refer to Eaton.
2. Application frequency is 50/60 Hz.
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 pick up value exists for a time and then is cleared by the tripping of a down stream 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 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 pick up = 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 pick up has nine settings/positions, 2–8, 10, 12.
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 (corresponding to SDPU position nine) at 12x (I_n) and designated as I_i. Instantaneous tolerance is +/–20%.
11. For LD response and SD with flat response curve, see: TC01203015E.
12. For LD response and SD with I2T response (this curve): TC01203016E.
13. For ground fault delay response curve, see: TC01203017E.
14. Digitrip RMS 310+ trip units are suitable for functional field testing with test kit Cat. No MTST120V. For field testing using primary injection methods, follow NEMA publication AB 4-2003.

Figure 4. Types FDE, HFDE, and FDCE 225A—Long Short Delay and I^2T—Curve Number TC01203016E

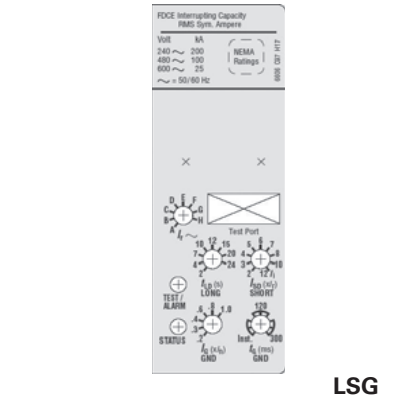


Digitrip 310+ Circuit breaker time/current curves (ground current)

Series C F-Frame Circuit Breakers

Catalog Types: FDE, HFDE, FDCE, industrail circuit breakers

Ground fault delay response



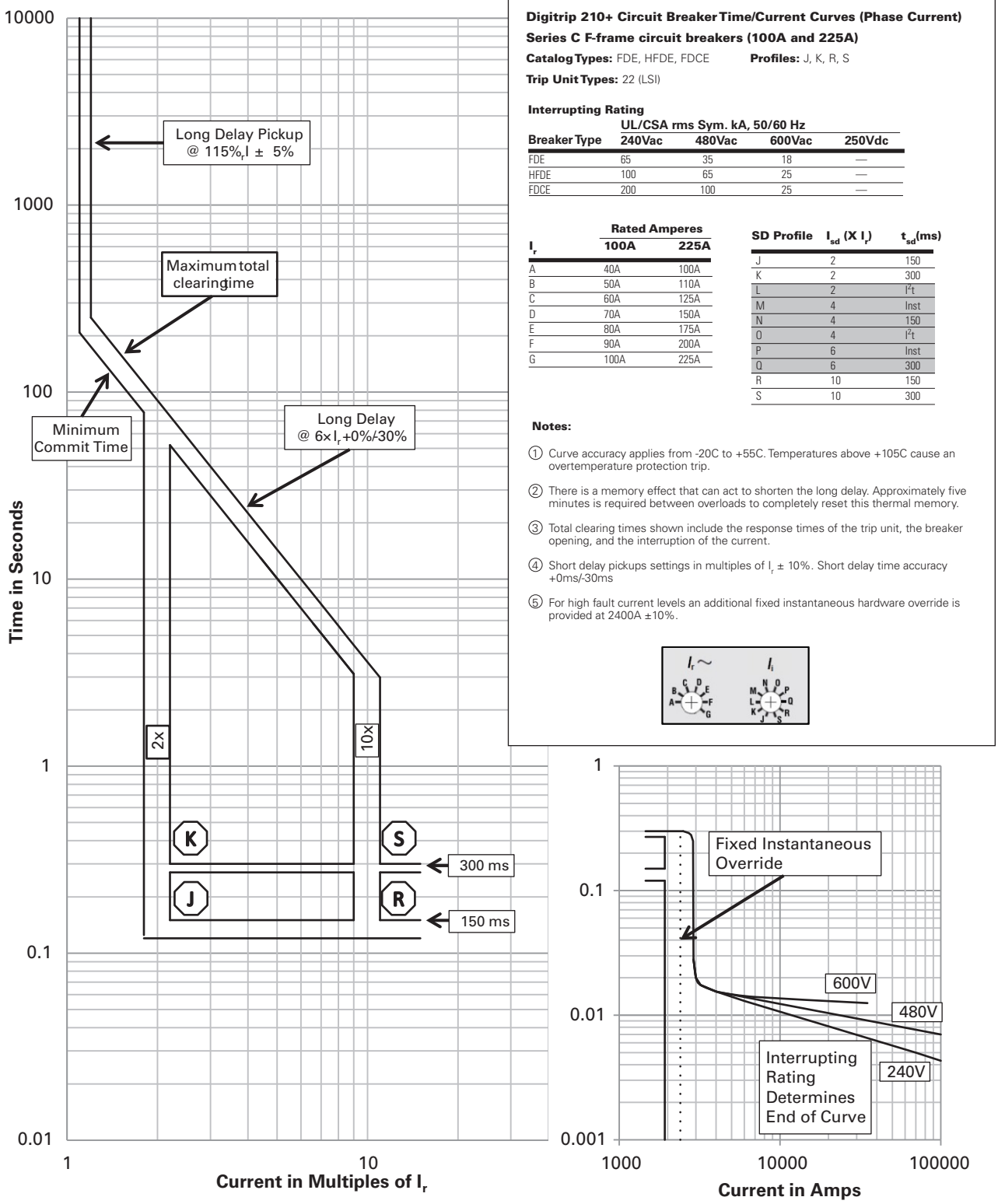
Switch Setting	t_{SD}	t_{GF}
J	Inst.	Inst.
K	Inst.	120
L	Inst.	300
M	120	Inst.
N	120	120
O	120	300
P	300	Inst.
Q	300	120
R	300	300

(I_r) / (I_n)	80A	160A	225A
A	15A	60A	100A
B	20A	70A	110A
C	30A	80A	125A
D	40A	90A	150A
E	50A	100A	160A
F	60A	125A	175A
G	70A	150A	200A
H	80A	160A	225A

Notes:

1. Curve accuracy applies from –20C to +55C ambient. Temperatures above +85C cause an overtemperature protection trip. For possible continuous ampere derating for ambient above 40C, refer to Eaton.
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 response curve, see: TC01203015E.
5. For LD response and SD with I^2T response curve, see: TC01203016E.
4. For ground fault delay response (this curve): TC01203017E.

Figure 5. Types FDE, HFDE, and FDCE 225A—LSIG—Curve Number TC01203017E



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Digitrip 210+ Circuit Breaker Time/Current Curves (Phase Current)
Series C F-frame circuit breakers (100A and 225A)

Catalog Types: FDE, HFDE, FDCE **Profiles:** J, K, R, S

Trip Unit Types: 22 (LSI)

Interrupting Rating

	UL/CSA rms Sym. kA, 50/60 Hz			
Breaker Type	**240Vac**	**480Vac**	**600Vac**	**250Vdc**
FDE	65	35	18	—
HFDE	100	65	25	—
FDCE	200	100	25	—

	Rated Amperes	
I_r	**100A**	**225A**
A	40A	100A
B	50A	110A
C	60A	125A
D	70A	150A
E	80A	175A
F	90A	200A
G	100A	225A

SD Profile	**I_{sd} (X I_r)**	**t_{sd}(ms)**
J	2	150
K	2	300
L	2	I^2t
M	4	Inst
N	4	150
O	4	I^2t
P	6	Inst
Q	6	300
R	10	150
S	10	300

Notes:

① Curve accuracy applies from -20C to +55C. Temperatures above +105C cause an overtemperature protection trip.

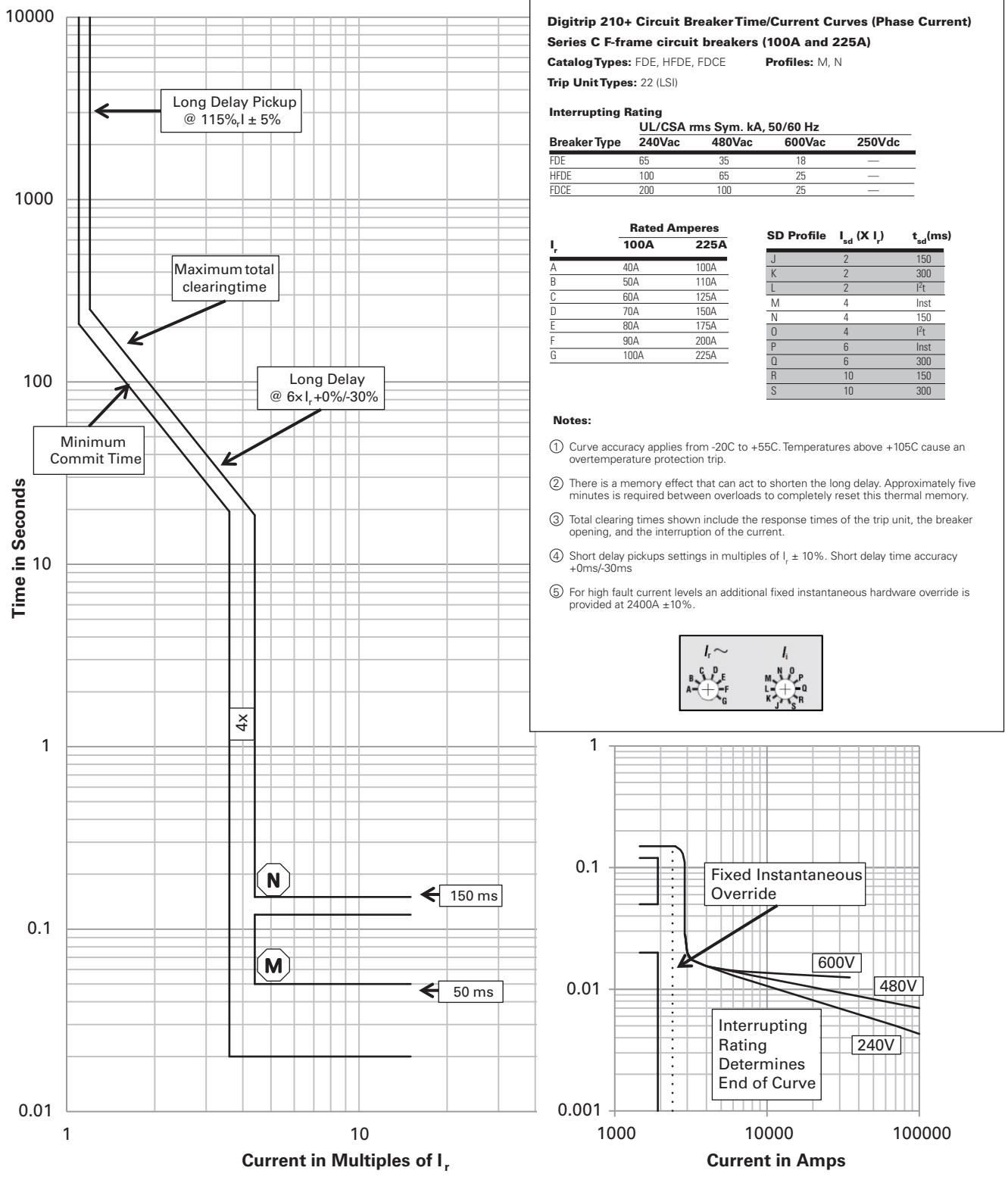
② There is a memory effect that can act to shorten the long delay. Approximately five minutes is required between overloads to completely reset this thermal memory.

③ Total clearing times shown include the response times of the trip unit, the breaker opening, and the interruption of the current.

④ Short delay pickups settings in multiples of I_r ± 10%. Short delay time accuracy +0ms/-30ms

⑤ For high fault current levels an additional fixed instantaneous hardware override is provided at 2400A ±10%.

Figure 6. Digitrip 210+ Trip Units (100 & 225A), Long Delay and Short Delay with Flat Response and Override (LSI, Profiles K, J, S, R) Curve Number TD012001EN, June 2015



Digitrip 210+ Circuit Breaker Time/Current Curves (Phase Current)
Series C F-frame circuit breakers (100A and 225A)

Catalog Types: FDE, HFDE, FDCE **Profiles:** M, N

Trip Unit Types: 22 (LSI)

Interrupting Rating

	UL/CSA rms Sym. kA, 50/60 Hz			
Breaker Type	**240Vac**	**480Vac**	**600Vac**	**250Vdc**
FDE	65	35	18	—
HFDE	100	65	25	—
FDCE	200	100	25	—

I_r	Rated Amperes 100A	225A
A	40A	100A
B	50A	110A
C	60A	125A
D	70A	150A
E	80A	175A
F	90A	200A
G	100A	225A

SD Profile	I_{sd} (X I_r)	t_{sd}(ms)
J	2	150
K	2	300
L	2	I^2t
M	4	Inst
N	4	150
O	4	I^2t
P	6	Inst
Q	6	300
R	10	150
S	10	300

Notes:

① Curve accuracy applies from -20C to +55C. Temperatures above +105C cause an overtemperature protection trip.

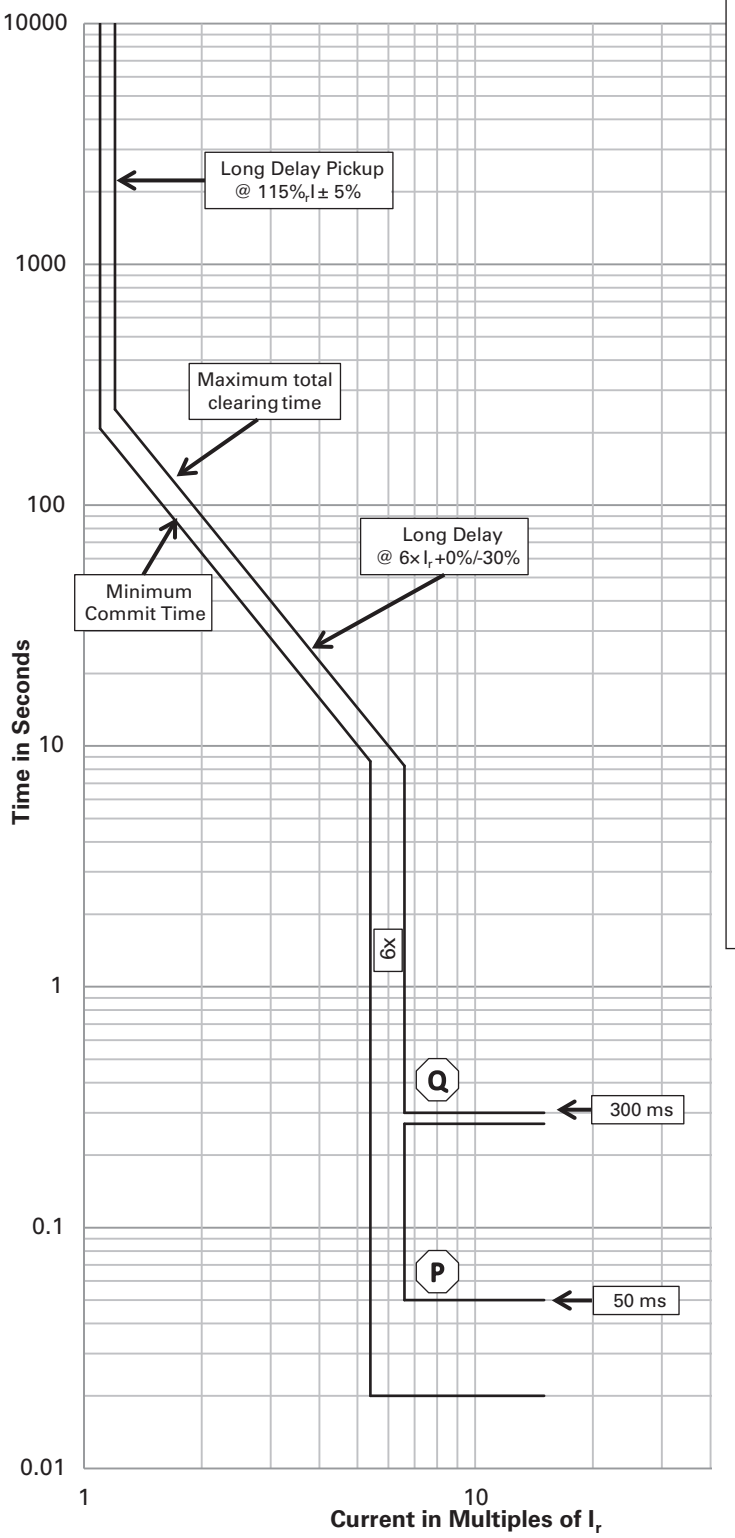
② There is a memory effect that can act to shorten the long delay. Approximately five minutes is required between overloads to completely reset this thermal memory.

③ Total clearing times shown include the response times of the trip unit, the breaker opening, and the interruption of the current.

④ Short delay pickups settings in multiples of I_r ± 10%. Short delay time accuracy +0ms/-30ms

⑤ For high fault current levels an additional fixed instantaneous hardware override is provided at 2400A ±10%.

Figure 7. Digitrip 210+ Trip Units (100 & 225A), Long Delay and Short Delay with Flat Response and Override (LSI, Profiles N, M)
Curve Number TD012002EN, June 2015



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Digitrip 210+ Circuit Breaker Time/Current Curves (Phase Current)
Series C F-frame circuit breakers (100A and 225A)

Catalog Types: FDE, HFDE, FDCE **Profiles:** P, Q

Trip Unit Types: 22 (LSI)

Interrupting Rating

Breaker Type	UL/CSA rms Sym. kA, 50/60 Hz 240Vac	480Vac	600Vac	250Vdc
FDE	65	35	18	—
HFDE	100	65	25	—
FDCE	200	100	25	—

I_r	Rated Amperes 100A	225A
A	40A	100A
B	50A	110A
C	60A	125A
D	70A	150A
E	80A	175A
F	90A	200A
G	100A	225A

SD Profile	I_{sd} (X I_r)	t_{sd}(ms)
J	2	150
K	2	300
L	2	I^2t
M	4	Inst
N	4	150
O	4	I^2t
P	6	Inst
Q	6	300
R	10	150
S	10	300

Notes:

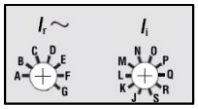
① Curve accuracy applies from -20C to +55C. Temperatures above +105C cause an overtemperature protection trip.

② There is a memory effect that can act to shorten the long delay. Approximately five minutes is required between overloads to completely reset this thermal memory.

③ Total clearing times shown include the response times of the trip unit, the breaker opening, and the interruption of the current.

④ Short delay pickups settings in multiples of I_r ± 10%. Short delay time accuracy +0ms/-30ms

⑤ For high fault current levels an additional fixed instantaneous hardware override is provided at 2400A ±10%.



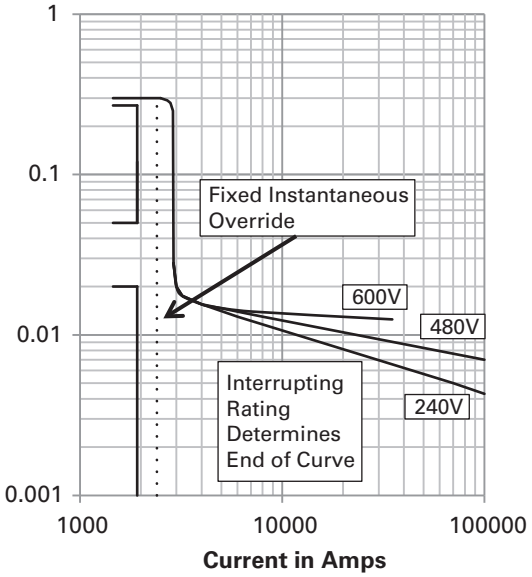
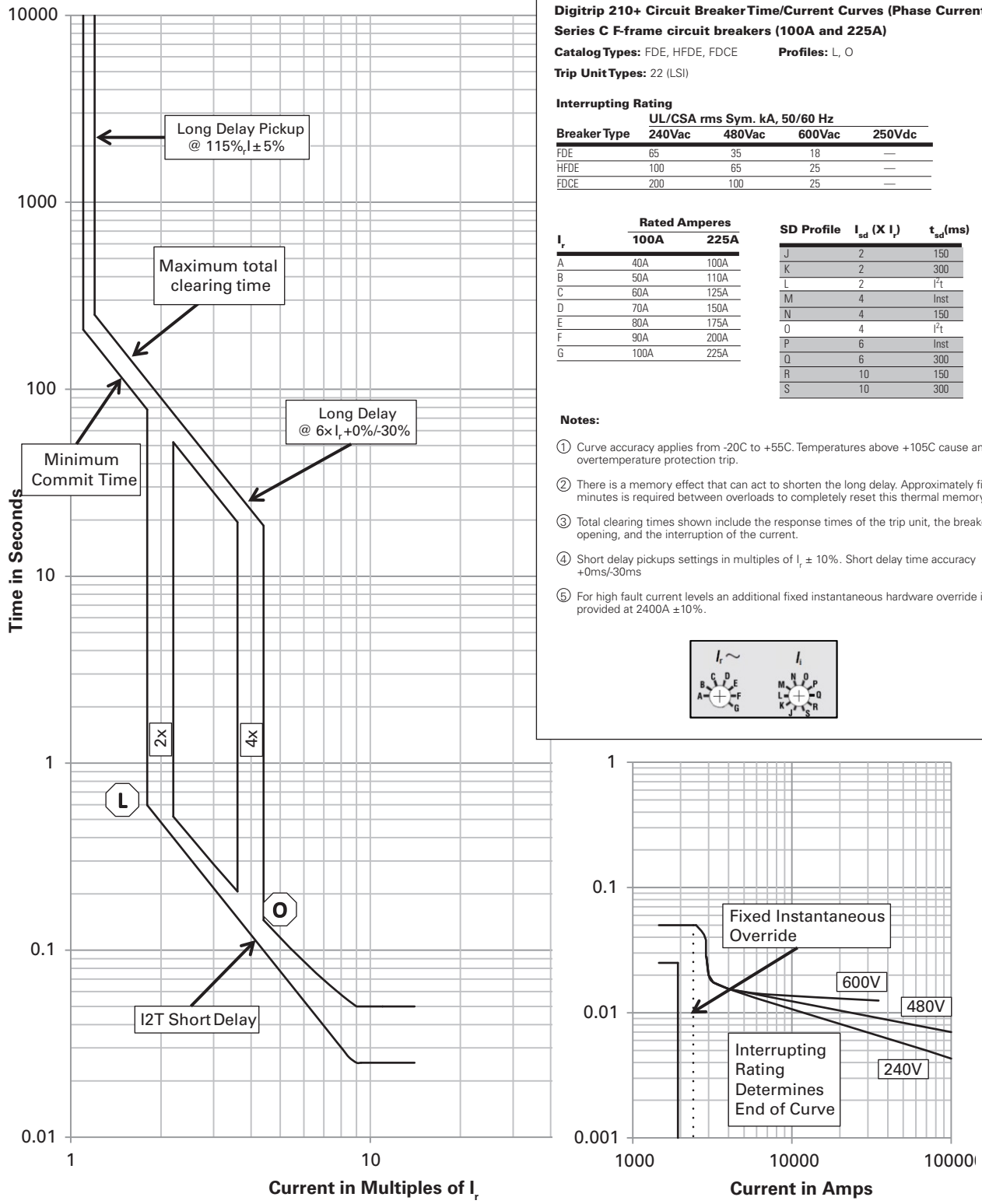


Figure 8. Digitrip 210+ Trip Units (100 & 225A), Long Delay and Short Delay with Flat Response and Override (LSI, Profiles Q, P)
Curve Number TD012003EN, June 2015



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Digitrip 210+ Circuit Breaker Time/Current Curves (Phase Current)
Series C F-frame circuit breakers (100A and 225A)

Catalog Types: FDE, HFDE, FDCE **Profiles:** L, O

Trip Unit Types: 22 (LSI)

Interrupting Rating

Breaker Type	UL/CSA rms Sym. kA, 50/60 Hz 240Vac	480Vac	600Vac	250Vdc
FDE	65	35	18	—
HFDE	100	65	25	—
FDCE	200	100	25	—

I$_r$	Rated Amperes 100A	225A
A	40A	100A
B	50A	110A
C	60A	125A
D	70A	150A
E	80A	175A
F	90A	200A
G	100A	225A

SD Profile	I$_{sd}$ (X I$_r$)	t$_{sd}$(ms)
J	2	150
K	2	300
L	2	I^2t
M	4	Inst
N	4	150
O	4	I^2t
P	6	Inst
Q	6	300
R	10	150
S	10	300

Notes:

① Curve accuracy applies from -20C to +55C. Temperatures above +105C cause an overtemperature protection trip.

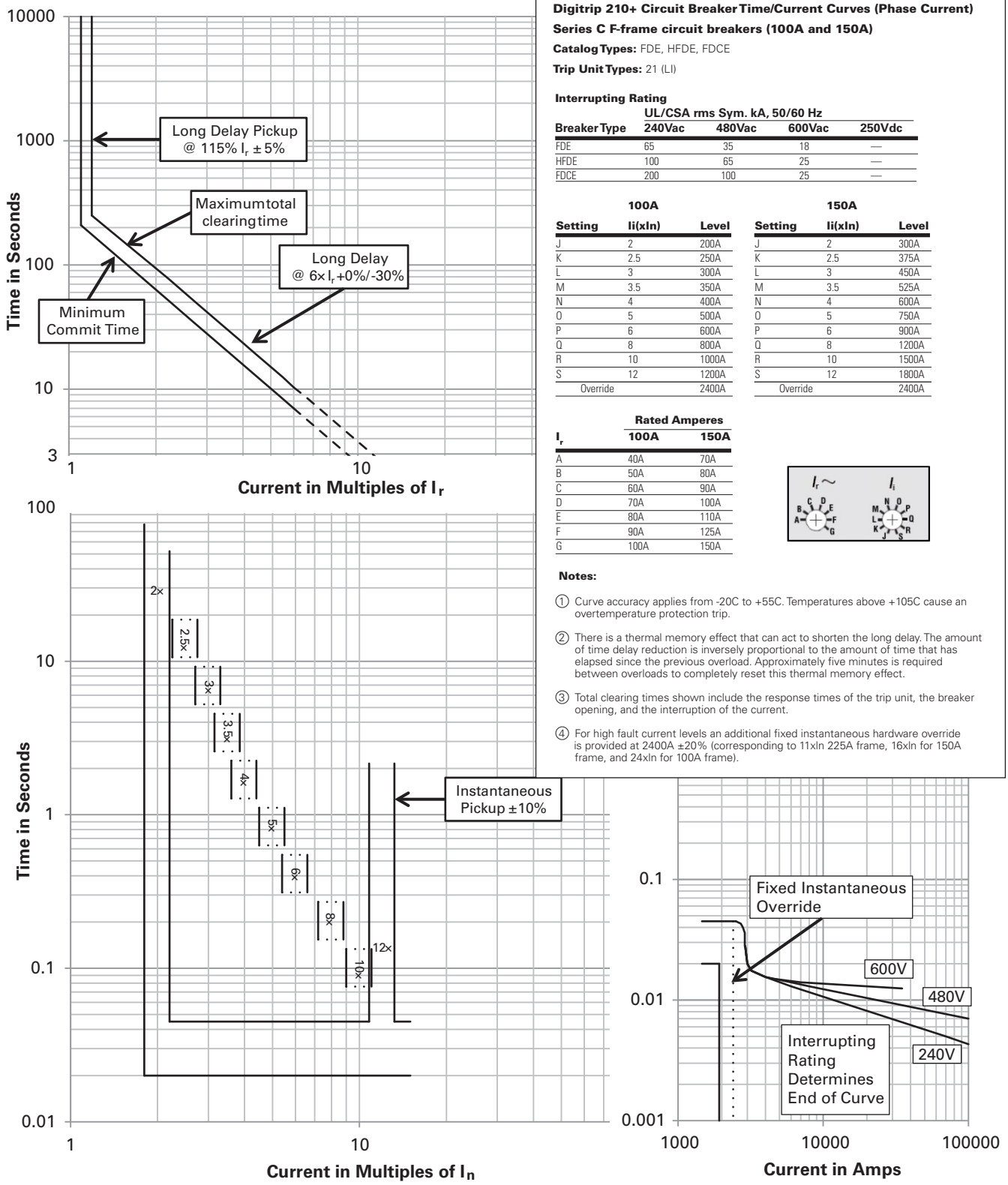
② There is a memory effect that can act to shorten the long delay. Approximately five minutes is required between overloads to completely reset this thermal memory.

③ Total clearing times shown include the response times of the trip unit, the breaker opening, and the interruption of the current.

④ Short delay pickups settings in multiples of I$_r$ ± 10%. Short delay time accuracy +0ms/-30ms

⑤ For high fault current levels an additional fixed instantaneous hardware override is provided at 2400A ±10%.

Figure 9. Digitrip 210+ Trip Units (100 & 225A), Long Delay and Short Delay with I2t Response and Override (LSI, Profiles L, O)
Curve Number TD012004EN, June 2015



Digitrip 210+ Circuit Breaker Time/Current Curves (Phase Current)
Series C F-frame circuit breakers (100A and 150A)

Catalog Types: FDE, HFDE, FDCE

Trip Unit Types: 21 (LI)

Interrupting Rating

	UL/CSA rms Sym. kA, 50/60 Hz			
Breaker Type	**240Vac**	**480Vac**	**600Vac**	**250Vdc**
FDE	65	35	18	—
HFDE	100	65	25	—
FDCE	200	100	25	—

	100A	
Setting	**Ii(xIn)**	**Level**
J	2	200A
K	2.5	250A
L	3	300A
M	3.5	350A
N	4	400A
O	5	500A
P	6	600A
Q	8	800A
R	10	1000A
S	12	1200A
Override		2400A

	150A	
Setting	**Ii(xIn)**	**Level**
J	2	300A
K	2.5	375A
L	3	450A
M	3.5	525A
N	4	600A
O	5	750A
P	6	900A
Q	8	1200A
R	10	1500A
S	12	1800A
Override		2400A

	Rated Amperes	
I_r	**100A**	**150A**
A	40A	70A
B	50A	80A
C	60A	90A
D	70A	100A
E	80A	110A
F	90A	125A
G	100A	150A

Notes:

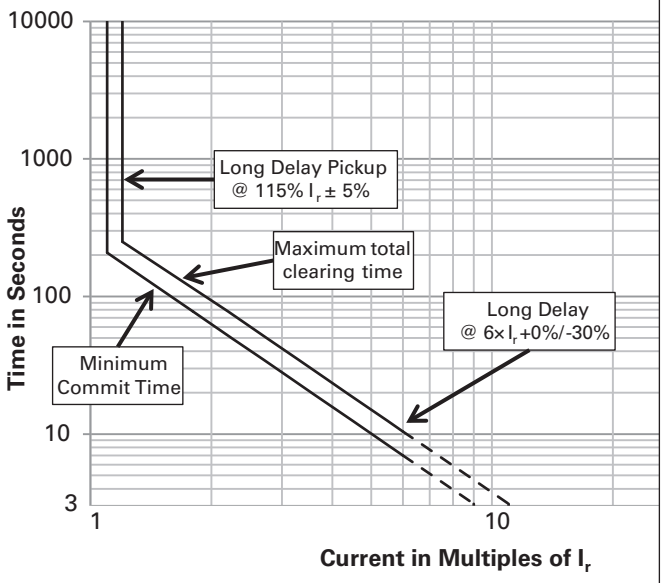
① Curve accuracy applies from -20C to +55C. Temperatures above +105C cause an overtemperature protection trip.

② There is a thermal memory effect that can act to shorten the long delay. The amount of time delay reduction is inversely proportional to the amount of time that has elapsed since the previous overload. Approximately five minutes is required between overloads to completely reset this thermal memory effect.

③ Total clearing times shown include the response times of the trip unit, the breaker opening, and the interruption of the current.

④ For high fault current levels an additional fixed instantaneous hardware override is provided at 2400A ±20% (corresponding to 11xIn 225A frame, 16xIn for 150A frame, and 24xIn for 100A frame).

Figure 10. Digitrip 210+ Trip Units (100 & 150A), Long Delay, Instantaneous Pickups and Override (LI)
Curve Number TD012005EN, June 2015



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Digitrip 210+ Circuit Breaker Time/Current Curves (Phase Current)

Series C F-frame circuit breakers (225A)

Catalog Types: FDE, HFDE, FDCE

Trip Unit Types: 21 (LI)

Interrupting Rating

	UL/CSA rms Sym. kA, 50/60 Hz			
Breaker Type	**240Vac**	**480Vac**	**600Vac**	**250Vdc**
FDE	65	35	18	—
HFDE	100	65	25	—
FDCE	200	100	25	—

	Rated Amperes
I_r	**225A**
A	100A
B	110A
C	125A
D	150A
E	175A
F	200A
G	225A

Setting	**Ii(xIn)**	**Level**
J	2	450A
K	2.5	565A
L	3	675A
M	3.5	790A
N	4	900A
O	5	1125A
P	6	1350A
Q	8	1800A
R	10	2250A
S	Override	2400A
Override		2400A

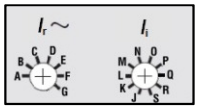
Notes:

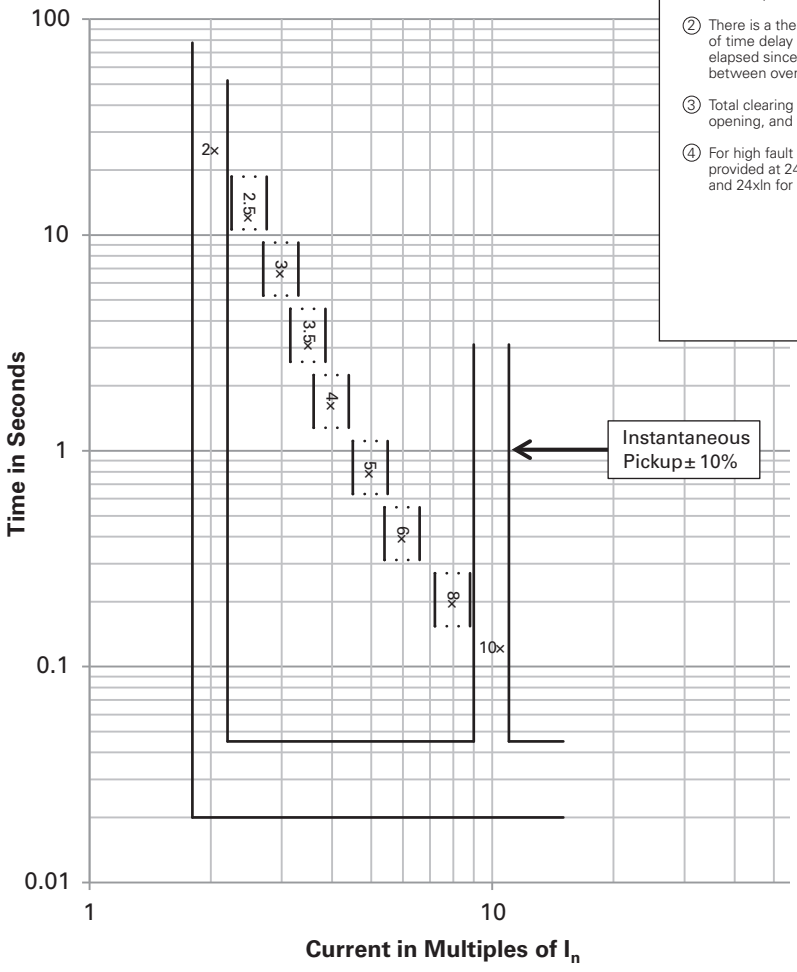
① Curve accuracy applies from -20C to +55C. Temperatures above +105C cause an overtemperature protection trip.

② There is a thermal memory effect that can act to shorten the long delay. The amount of time delay reduction is inversely proportional to the amount of time that has elapsed since the previous overload. Approximately five minutes is required between overloads to completely reset this thermal memory effect.

③ Total clearing times shown include the response times of the trip unit, the breaker opening, and the interruption of the current.

④ For high fault current levels an additional fixed instantaneous hardware override is provided at 2400A ±20% (corresponding to 11xn 225A frame, 16xIn for 150A frame, and 24xIn for 100A frame).





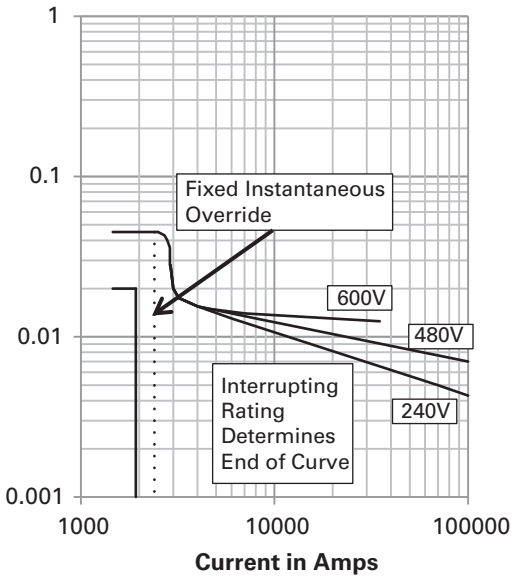


Figure 11. Digitrip 210+ Trip Units (225A), Long Delay, Instantaneous Pickups and Override (LI)
Curve Number TD012006EN, June 2015

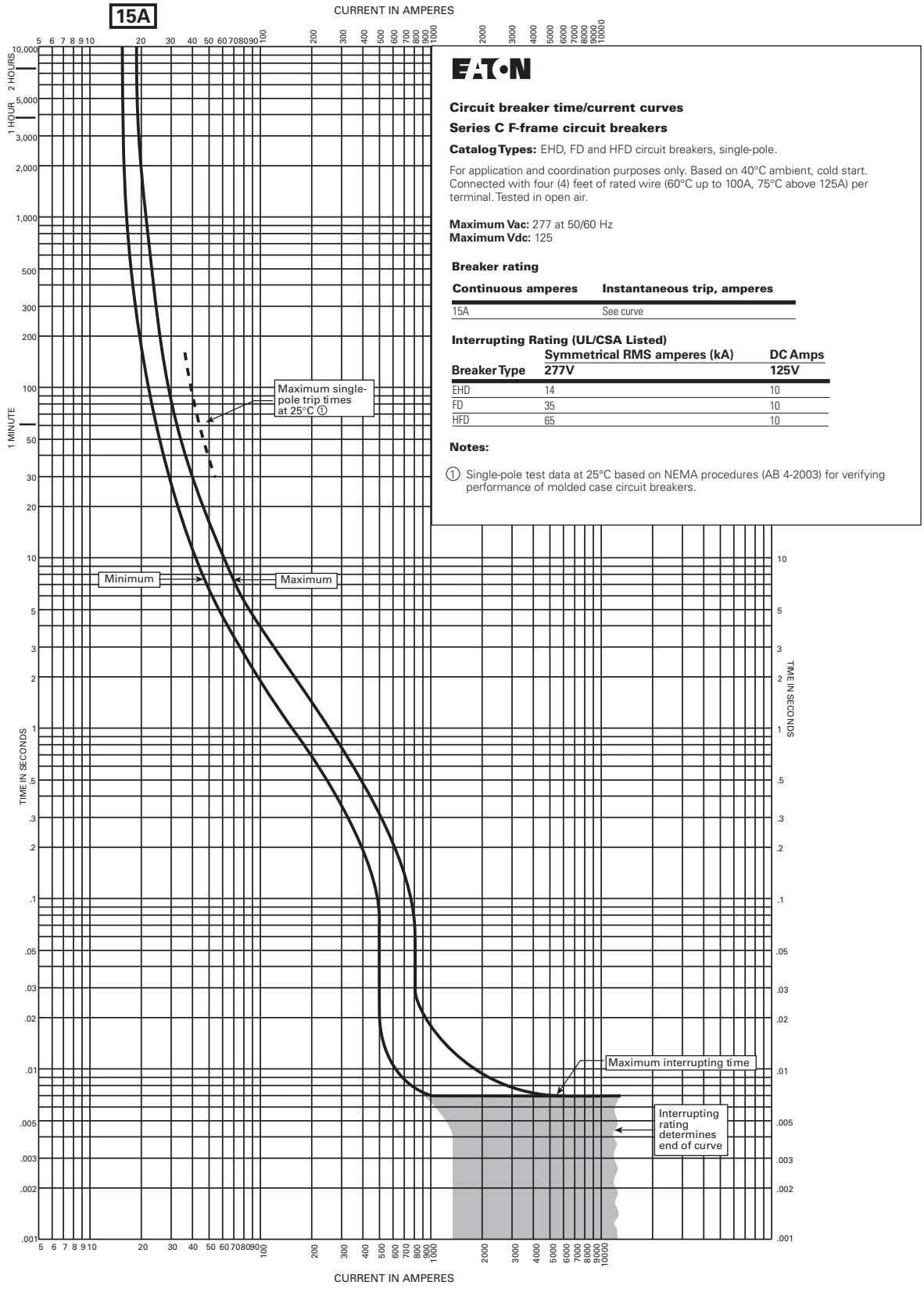


Figure 12. Types EHD, FD, and HFD 15A—Curve Number SC-4423-88A

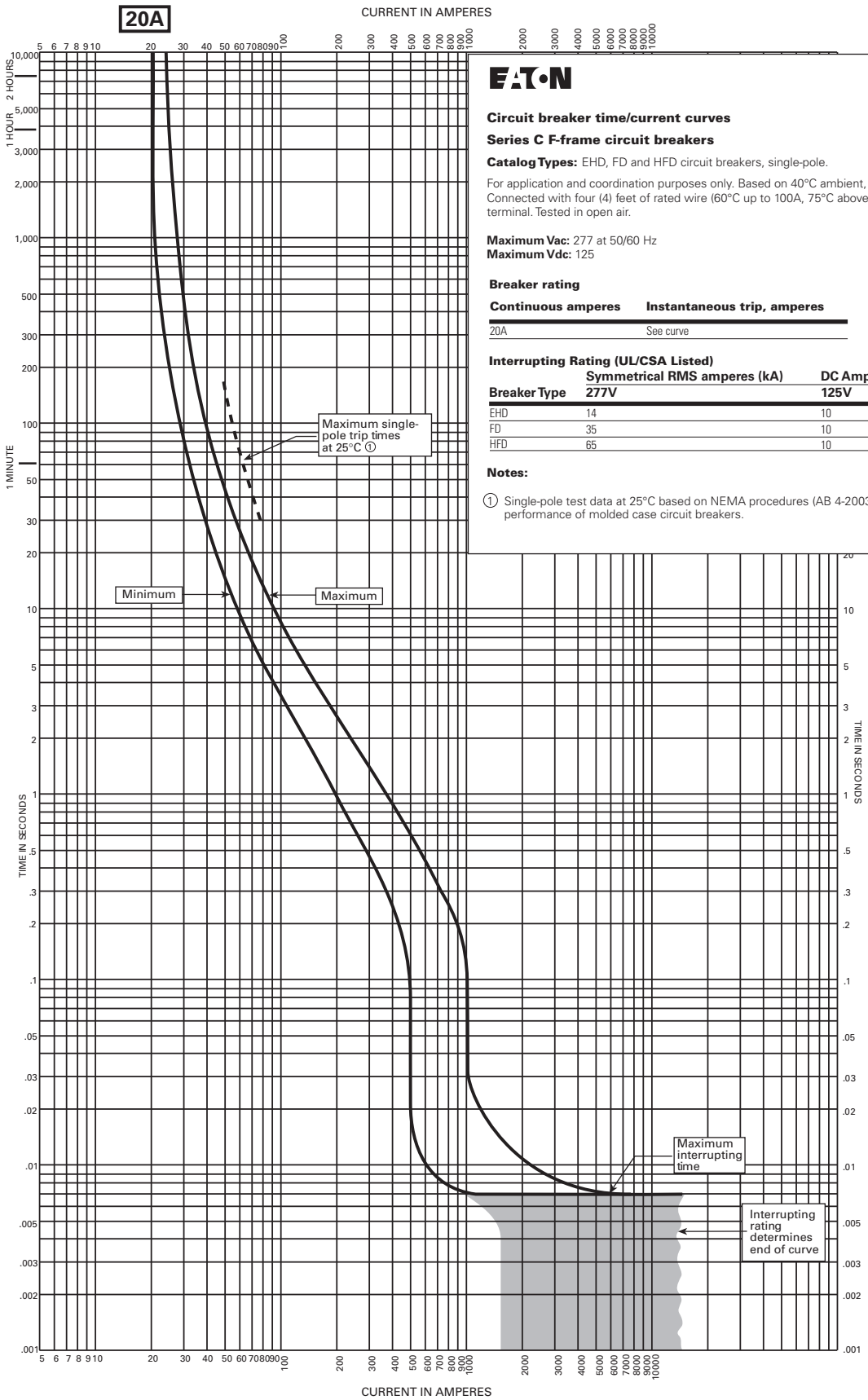


Figure 13. Types EHD, FD, and HFD 20A—Curve Number SC-4424-88A

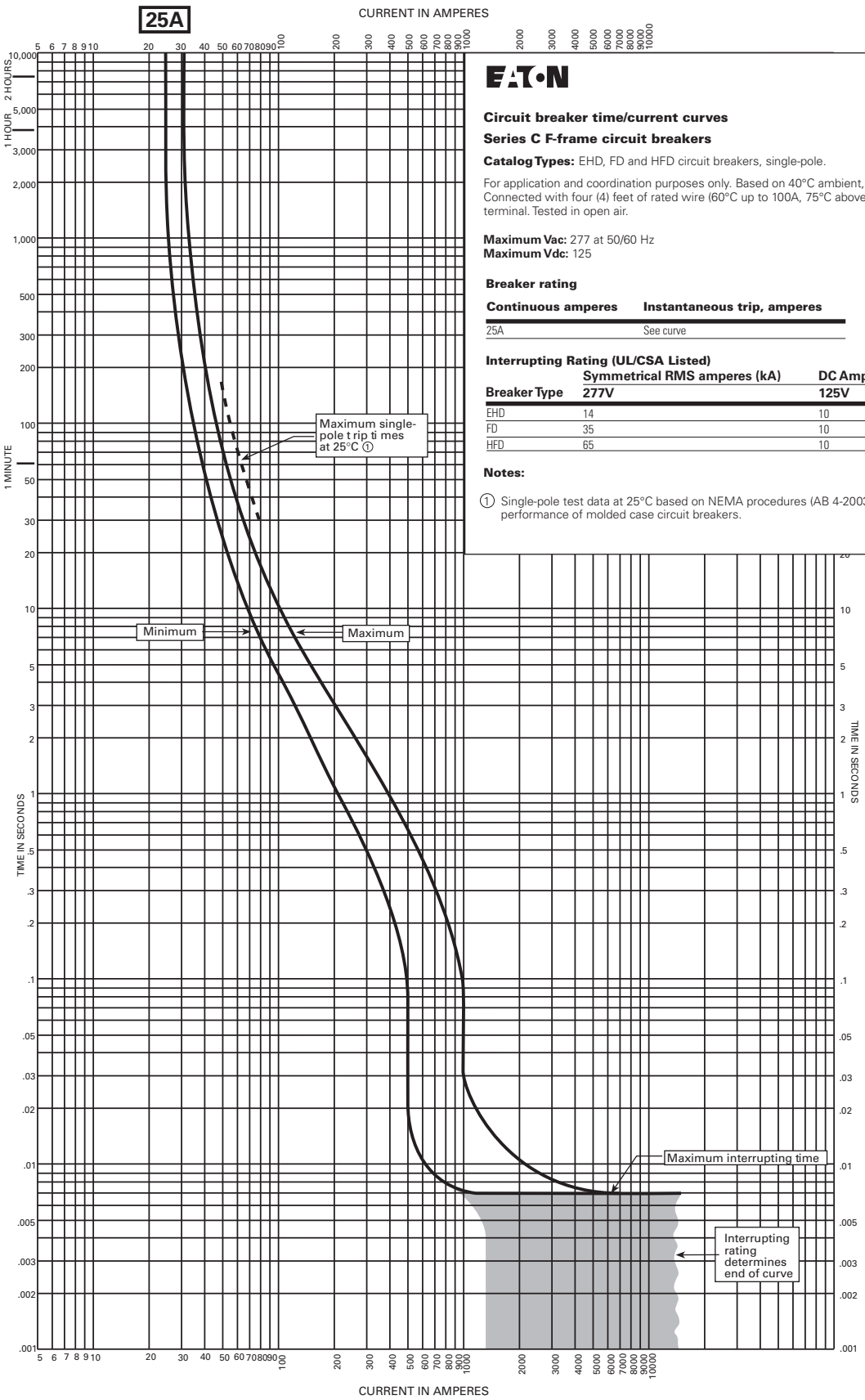


Figure 14. Types EHD, FD, and HFD 25A—Curve No. SC-4425-88A

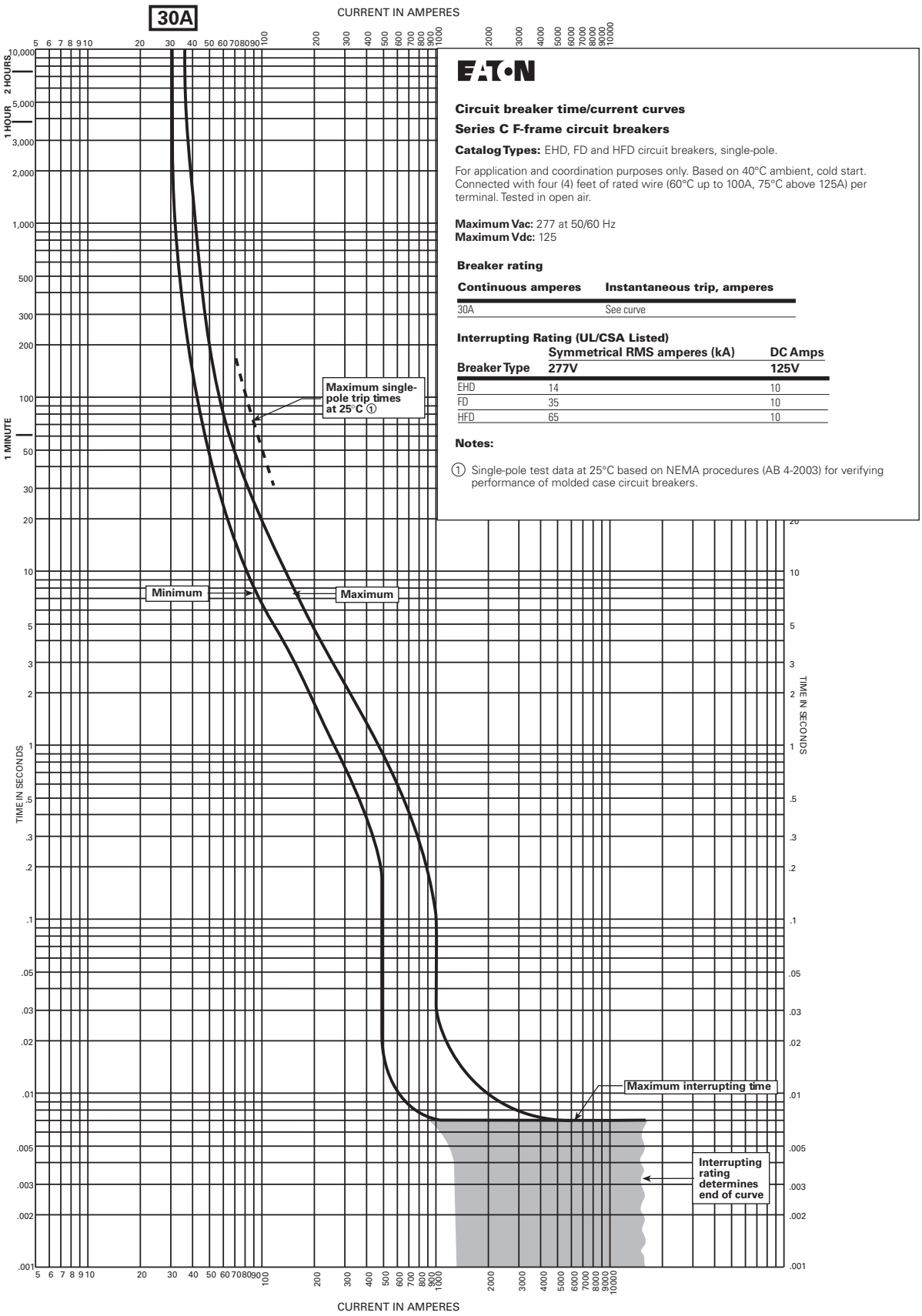


Figure 15. Types EHD, FD, and HFD 30A—Curve Number SC-4426-88A

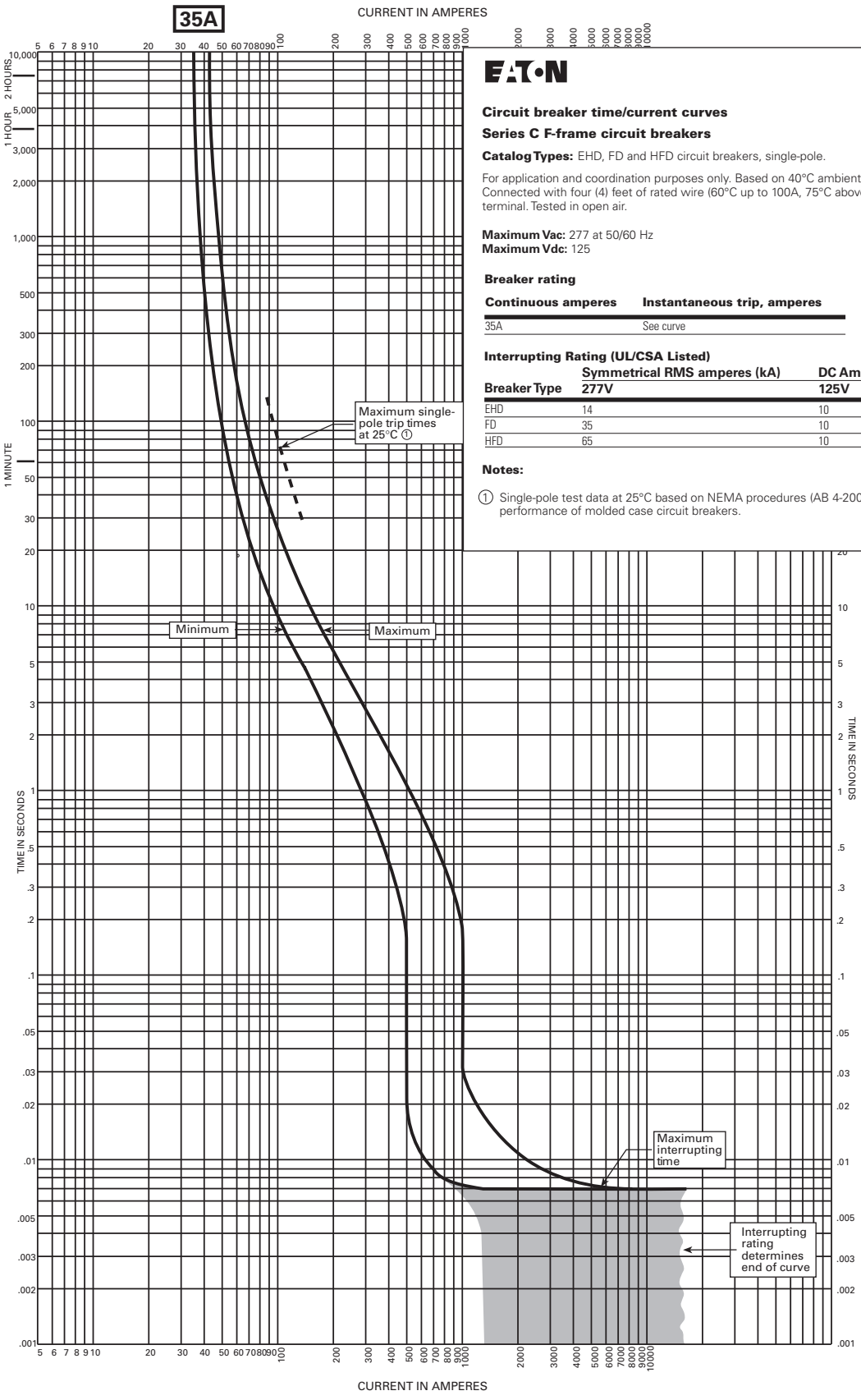


Figure 16. Types EHD, FD, and HFD 35A—Curve Number SC-4427-88A

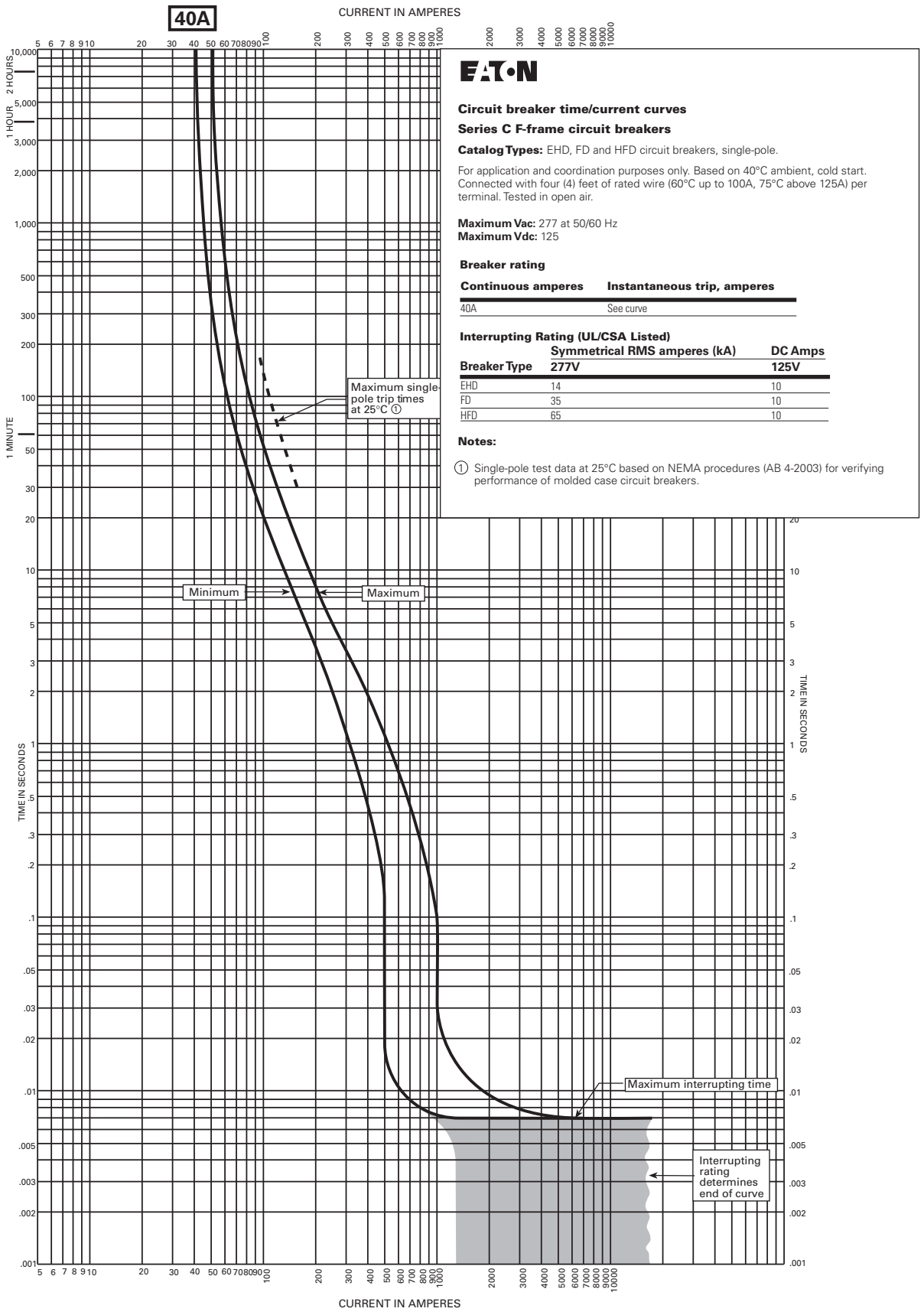


Figure 17. Types EHD, FD, and HFD 40A—Curve Number SC-4428-88A

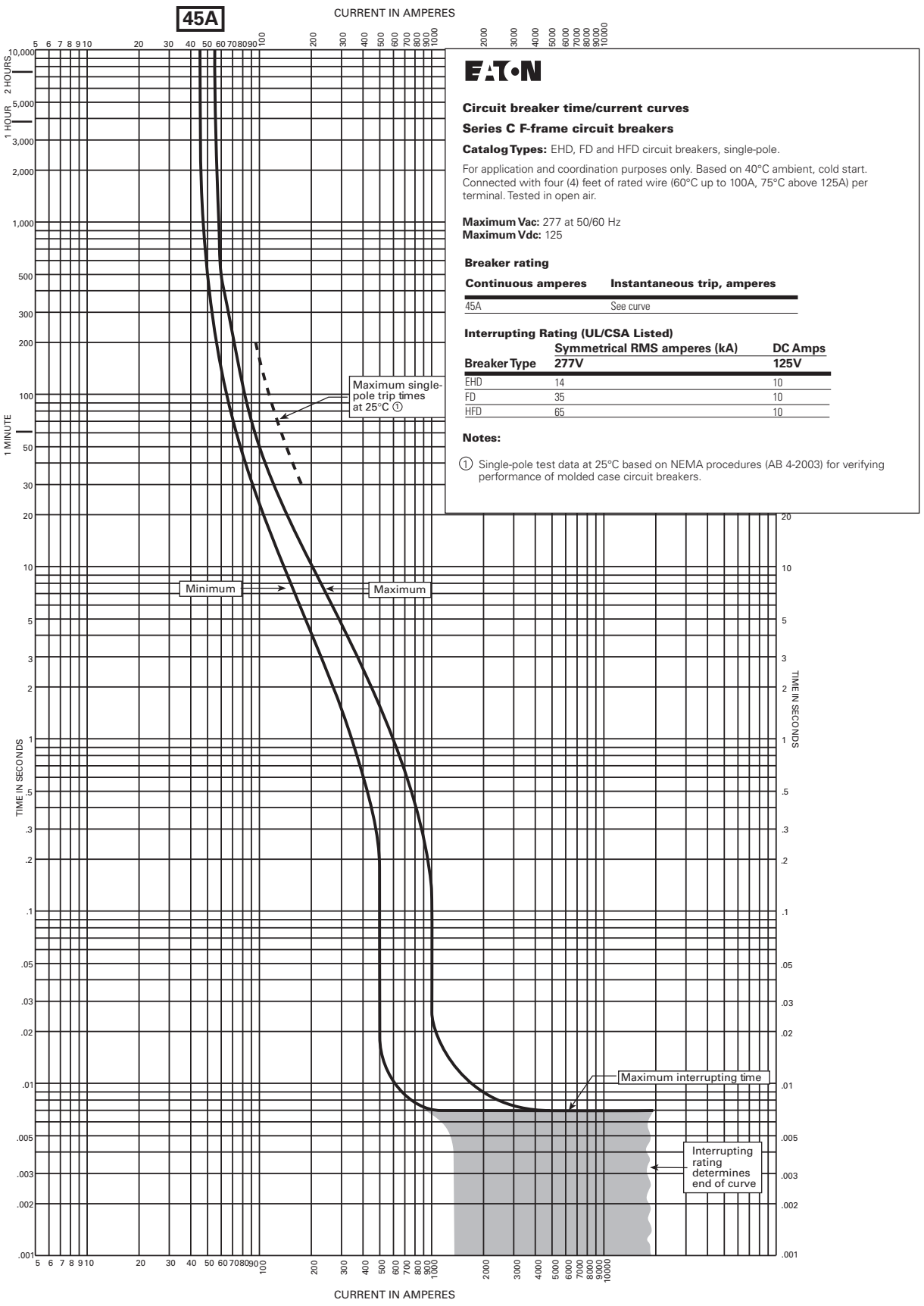


Figure 18. Types EHD, FD, and HFD 45A—Curve No. SC-4429-88A

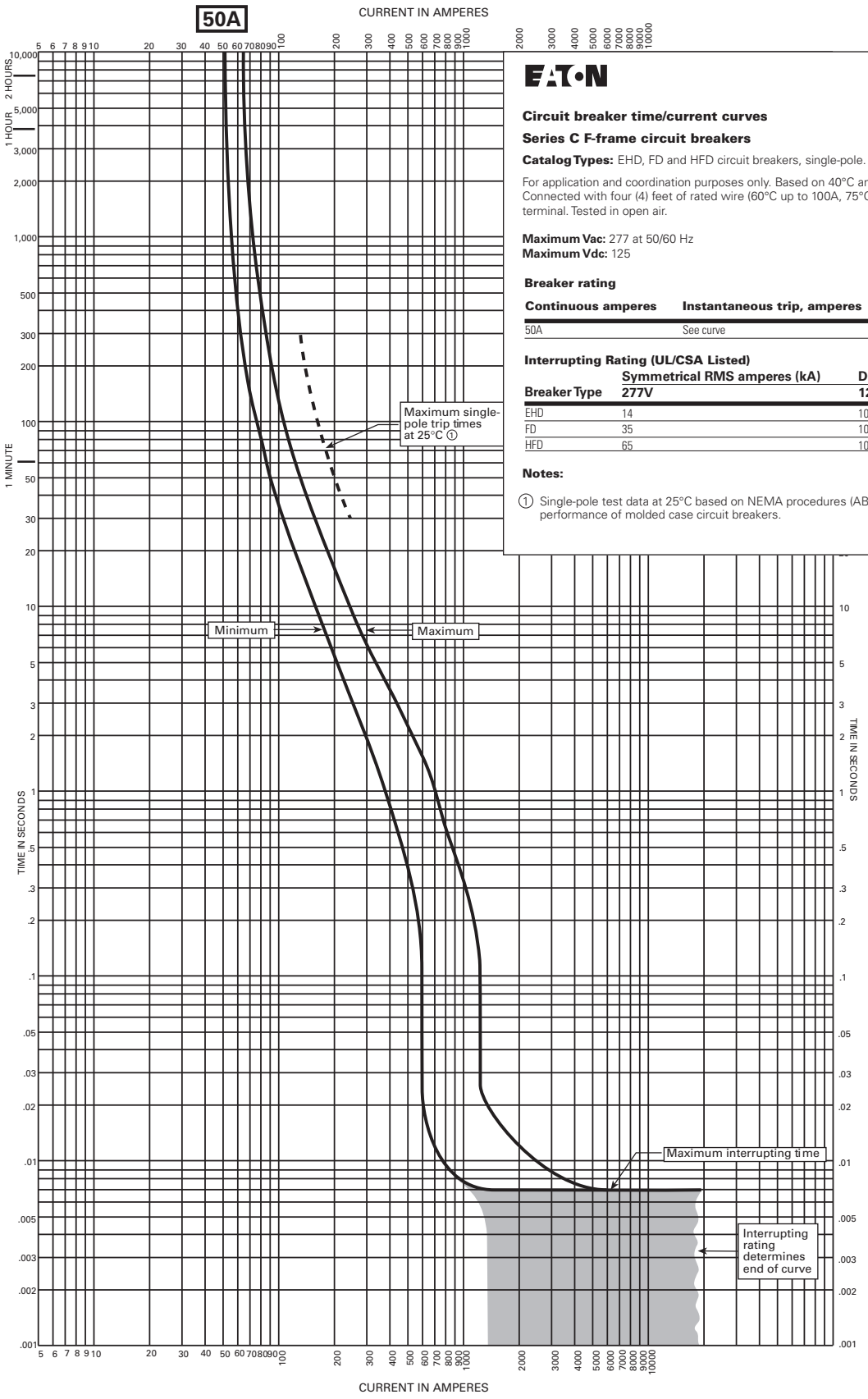


Figure 19. Types EHD, FD, and HFD 50A—Curve Number SC-4430-88A

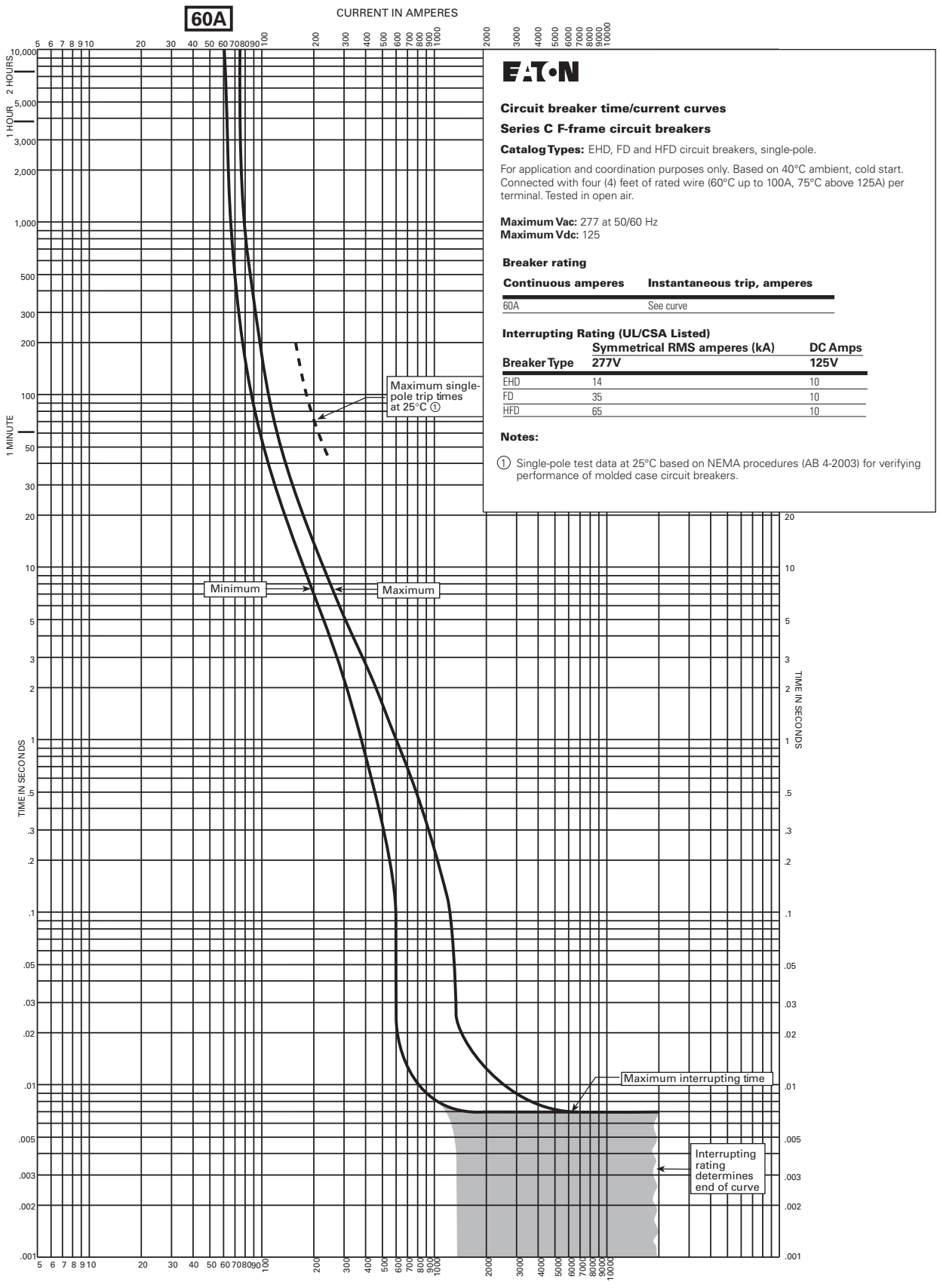
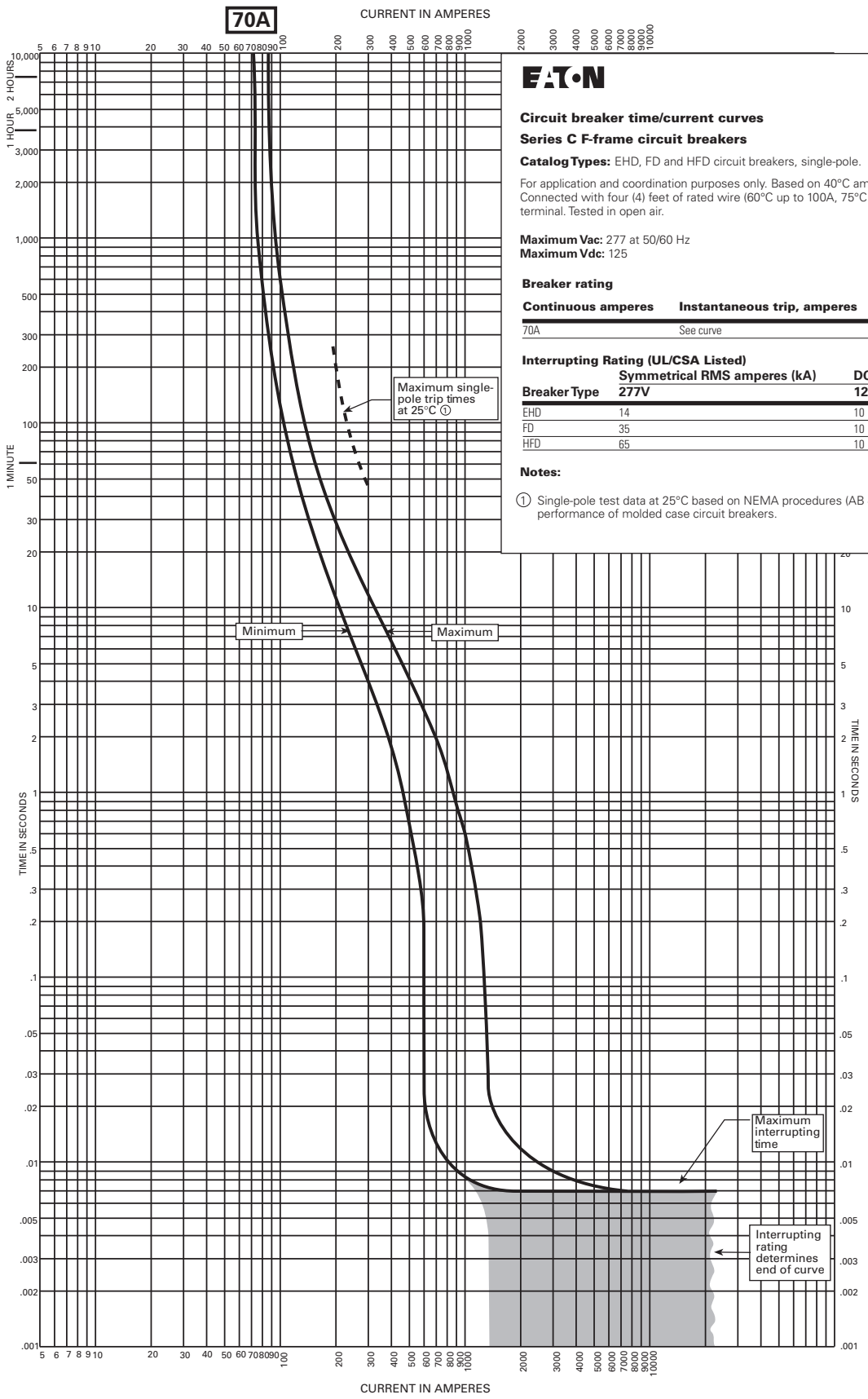


Figure 20. Types EHD, FD, and HFD 60A—Curve Number SC-4431-88A



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: EHD, FD and HFD circuit breakers, single-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 100A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 277 at 50/60 Hz
Maximum Vdc: 125

Breaker rating

Continuous amperes	Instantaneous trip, amperes
70A	See curve

Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)	DC Amps
Breaker Type	277V	125V
EHD	14	10
FD	35	10
HFD	65	10

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 21. Types EHD, FD, and HFD 70A—Curve Number SC-4432-88A

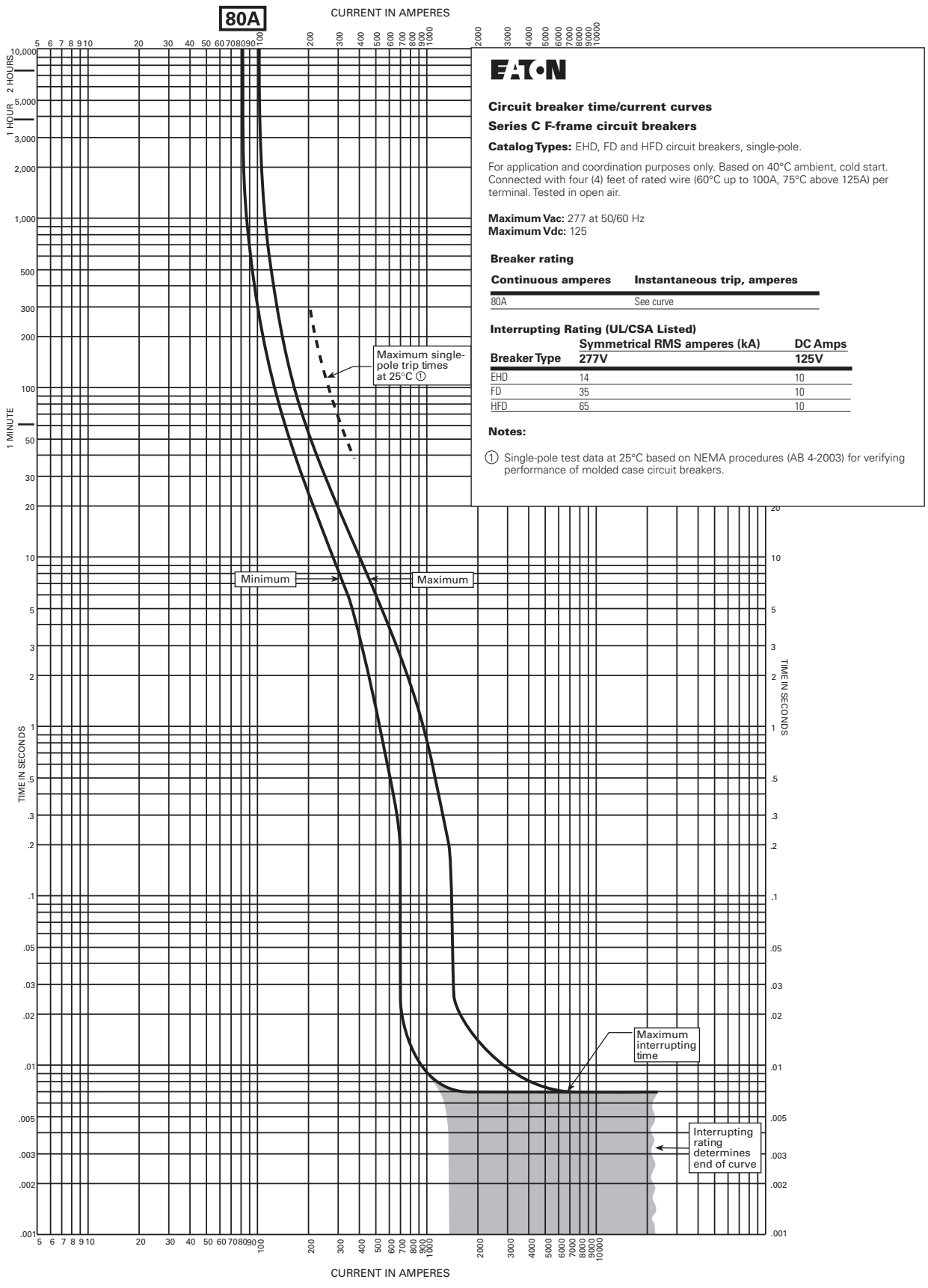
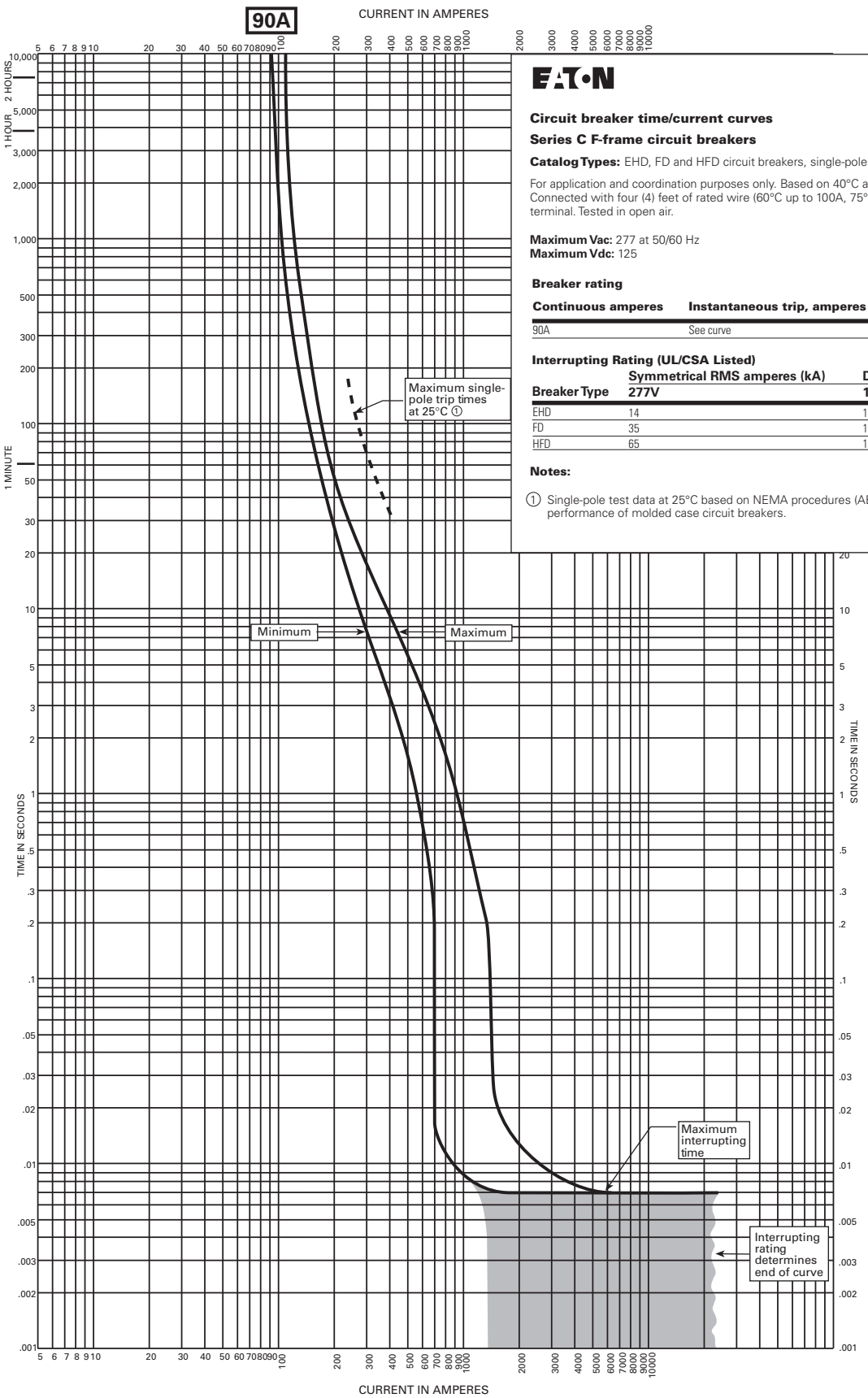


Figure 22. Types EHD, FD, and HFD 80A—Curve Number SC-4433-88A



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: EHD, FD and HFD circuit breakers, single-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 100A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 277 at 50/60 Hz
Maximum Vdc: 125

Breaker rating

Continuous amperes	Instantaneous trip, amperes
90A	See curve

Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)	DC Amps
Breaker Type	277V	125V
EHD	14	10
FD	35	10
HFD	65	10

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 23. Types EHD, FD, and HFD 90A—Curve Number SC-4434-88A

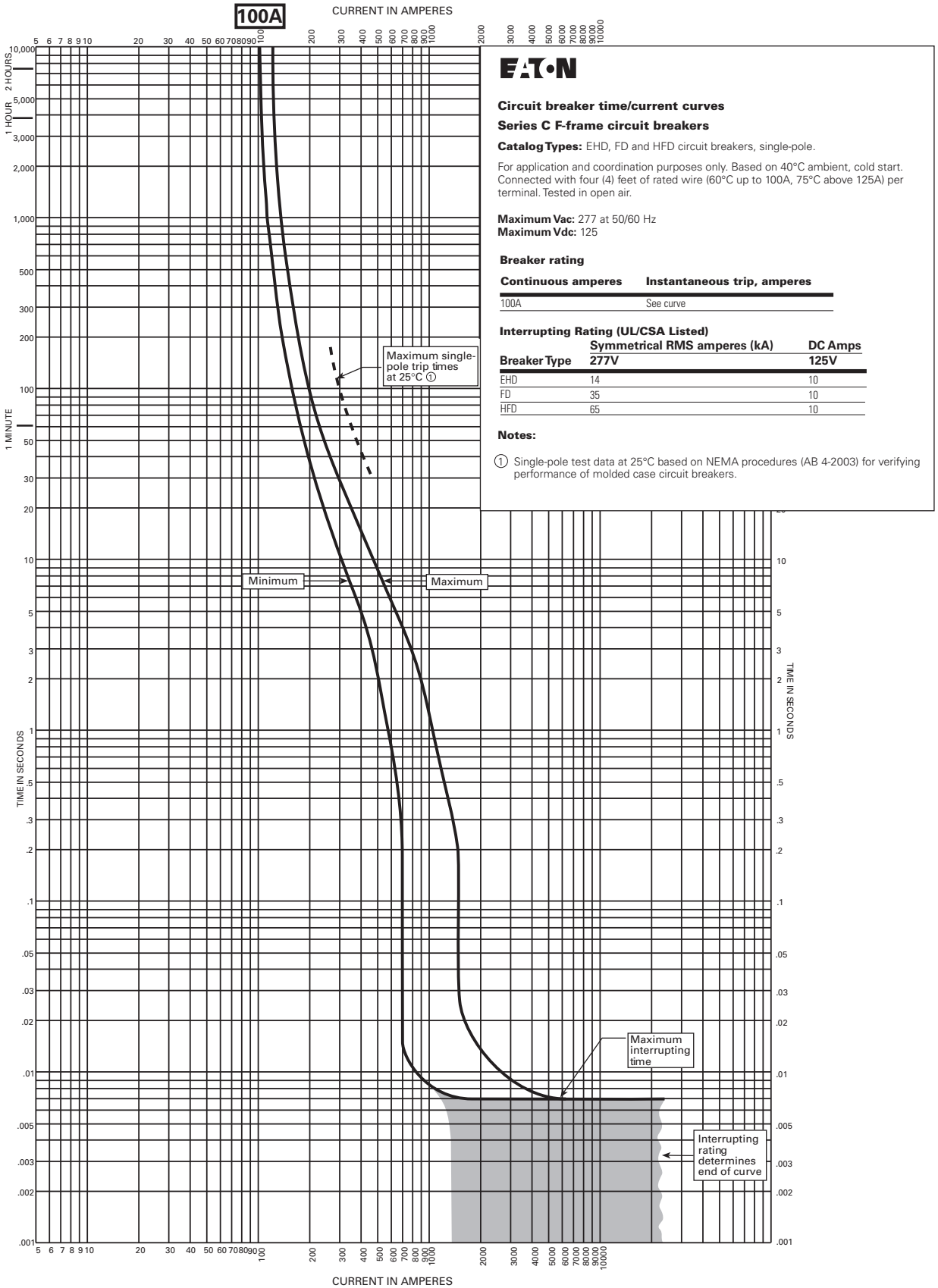


Figure 24. Types EHD, FD, and HFD 100A—Curve Number SC-4435-88A

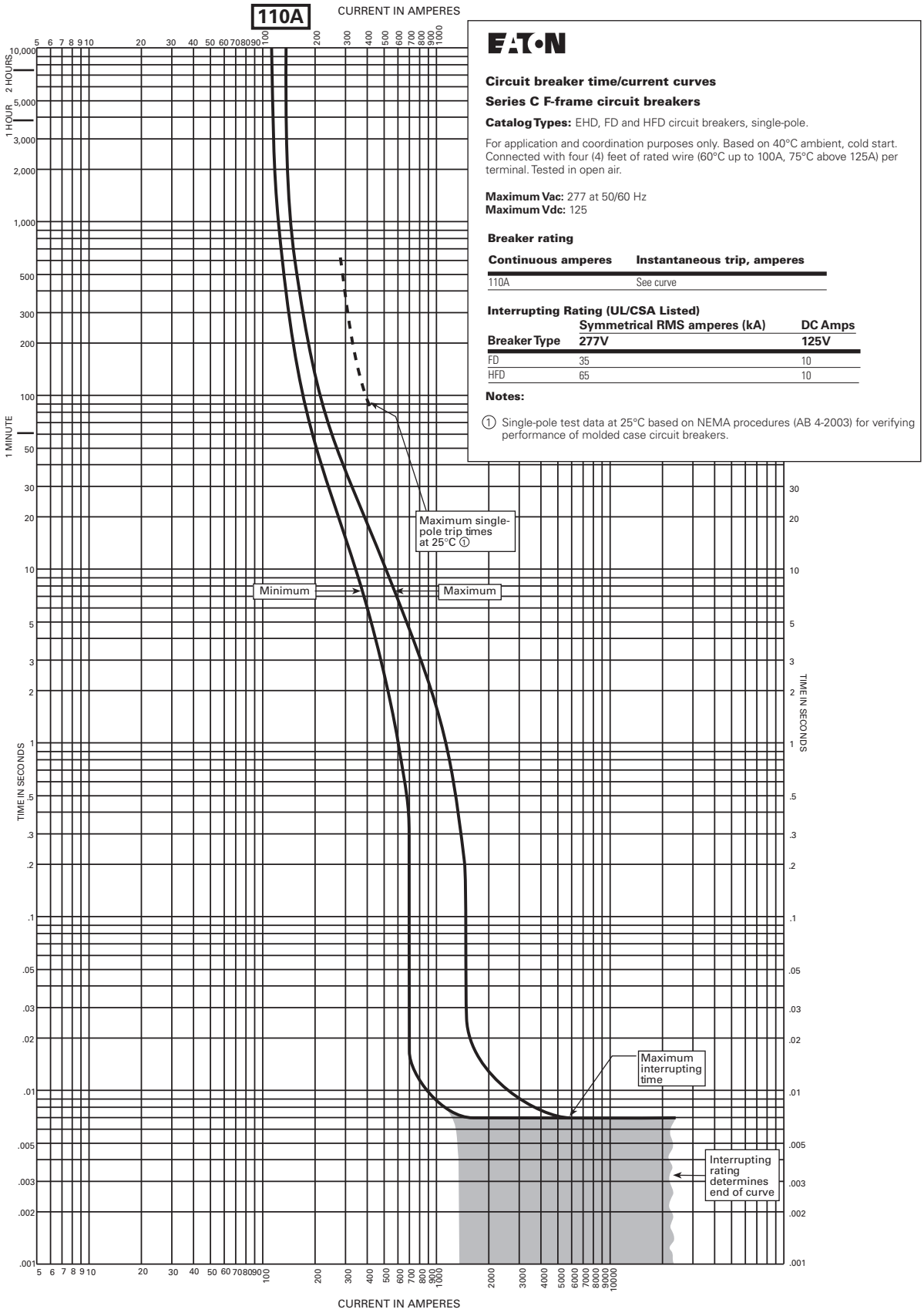
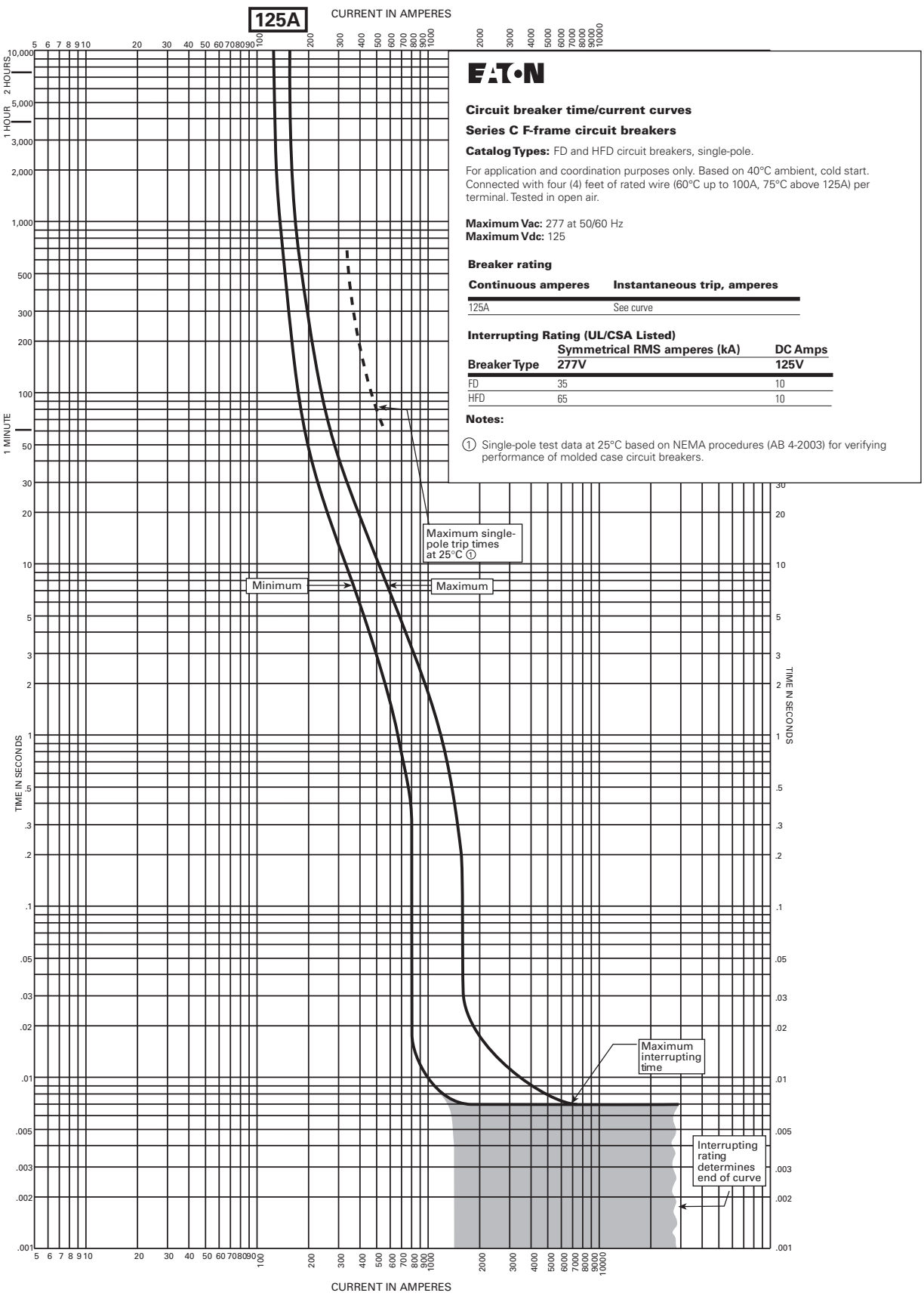


Figure 25. Types FD and HFD 110A—Curve Number SC-4436-88A



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: FD and HFD circuit breakers, single-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 100A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 277 at 50/60 Hz
Maximum Vdc: 125

Breaker rating

Continuous amperes	Instantaneous trip, amperes
125A	See curve

Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)	DC Amps
Breaker Type	277V	125V
FD	35	10
HFD	65	10

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 26. Types FD and HFD 125A—Curve Number SC-4437-88A

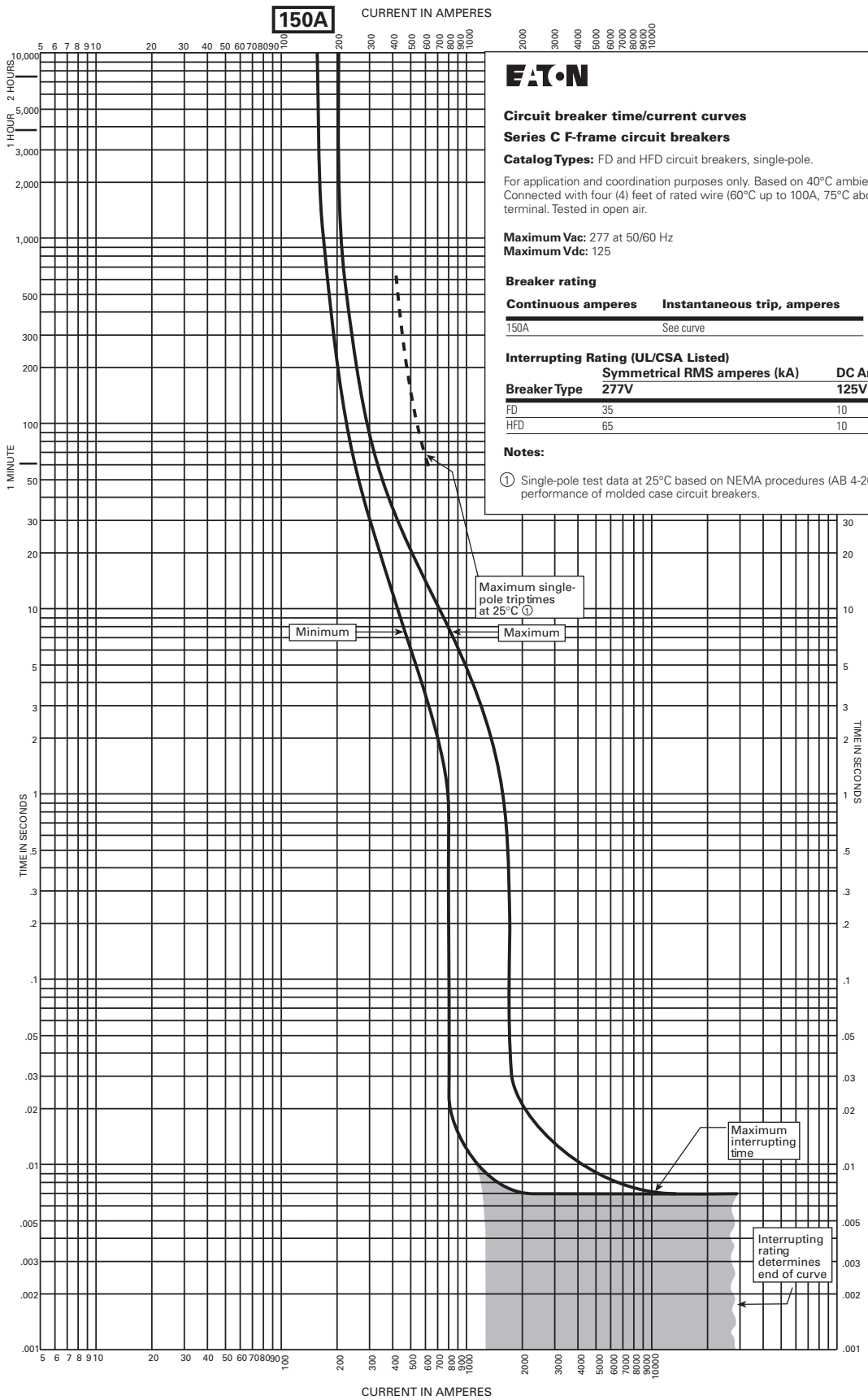
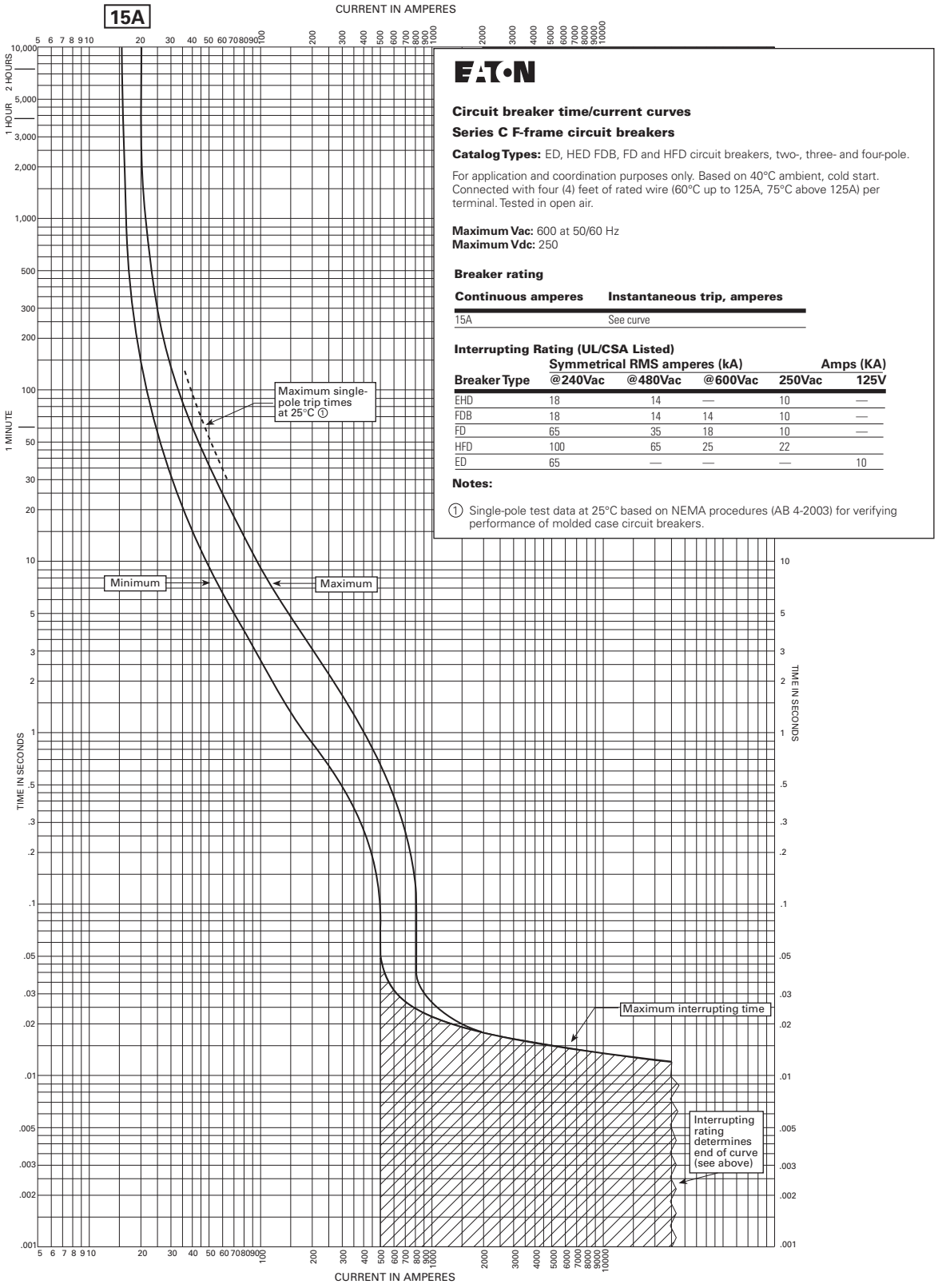


Figure 27. Types FD and HFD 150A—Curve Number SC-4438-88A

AB DE-ION Circuit Breakers—two-, three-, and four-poles



EATON

Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: ED, HED FDB, FD and HFD circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
15A	See curve

Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)				Amps (KA)
Breaker Type	@240Vac	@480Vac	@600Vac	250Vac	125V
EHD	18	14	—	10	—
FDB	18	14	14	10	—
FD	65	35	18	10	—
HFD	100	65	25	22	
ED	65	—	—	—	10

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 28. Types ED, EHD, FDB, FD, and HFD 15A—Curve Number SC-4134-87B

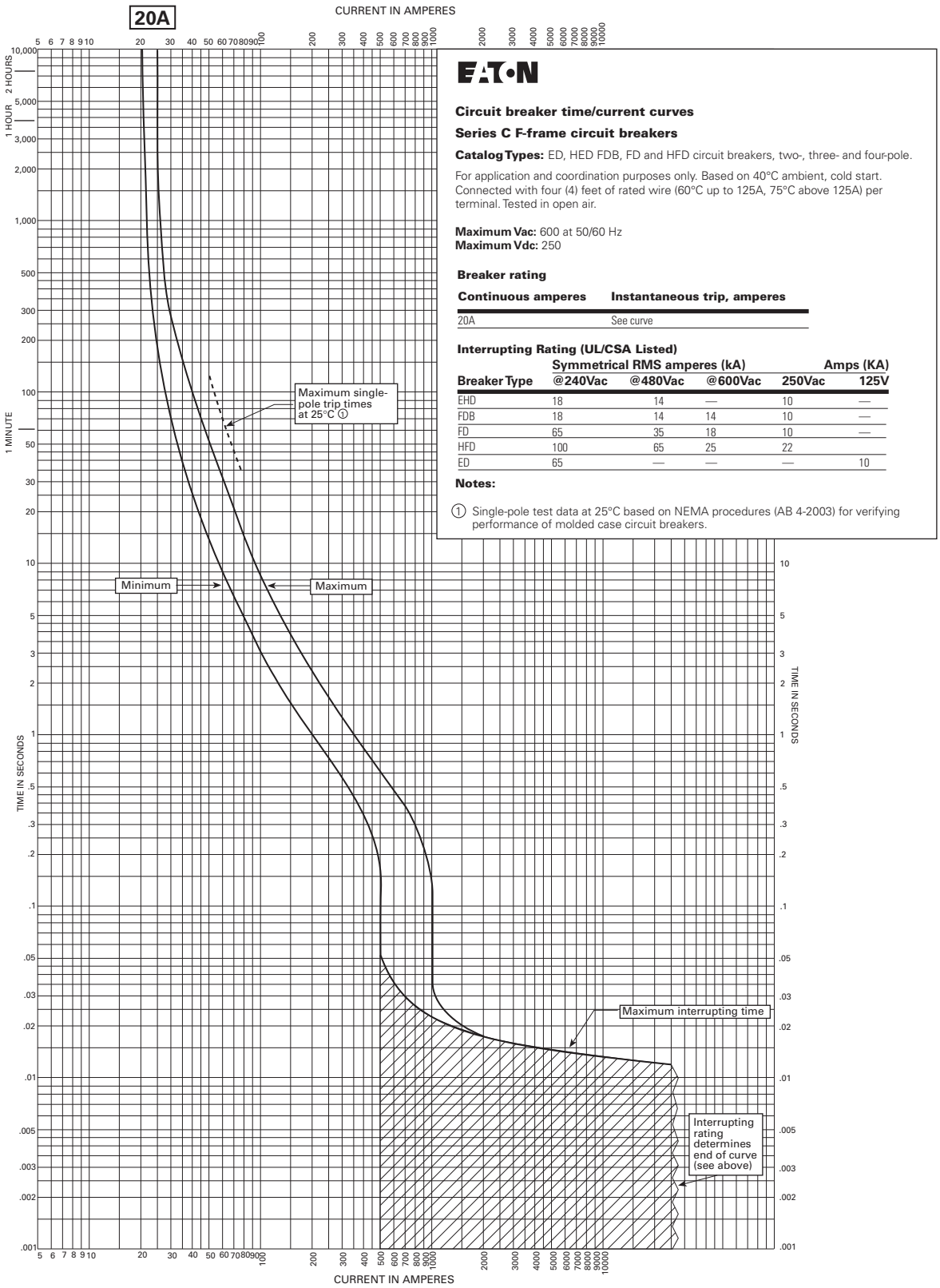
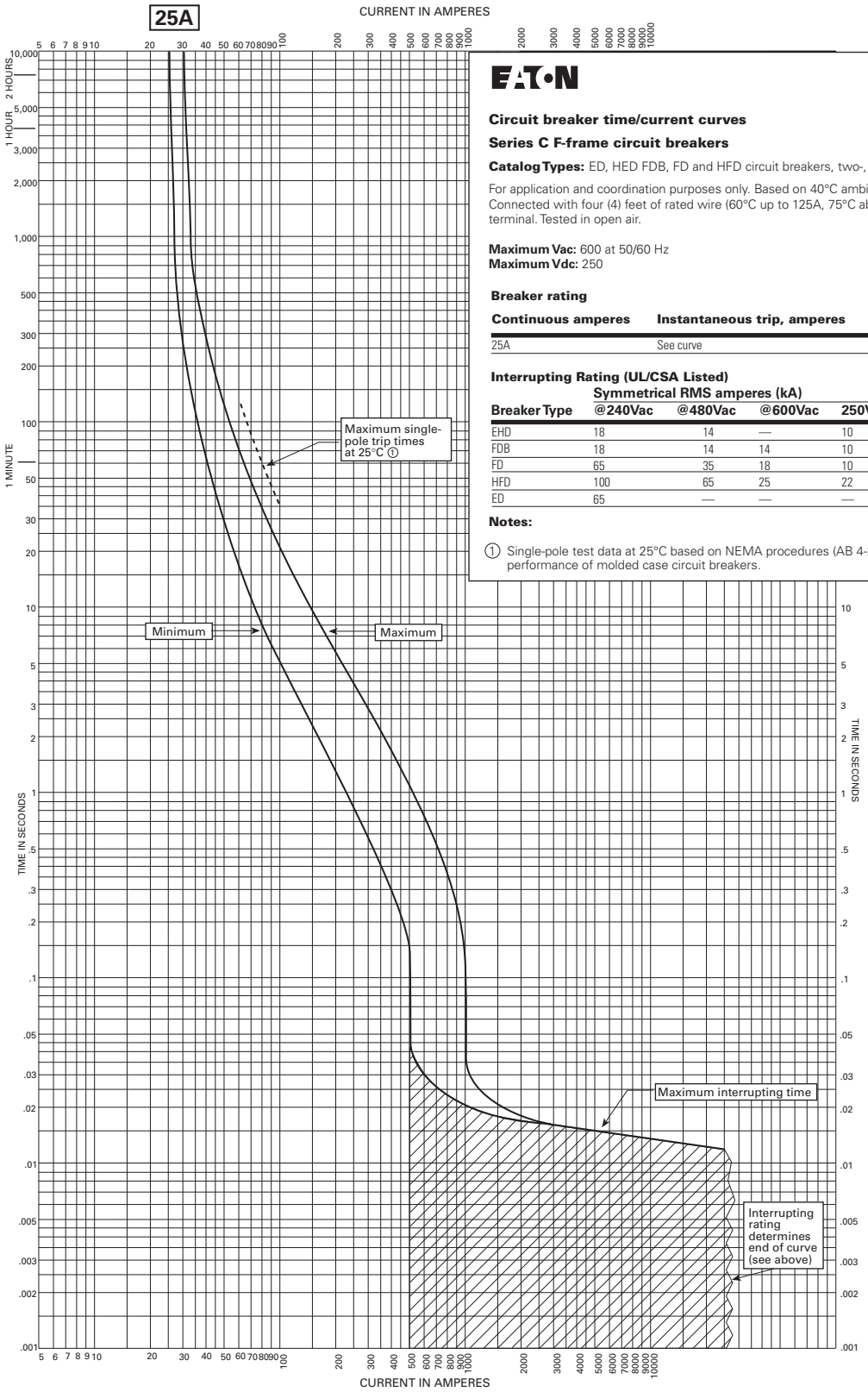


Figure 29. Types ED, EHD, FDB, FD, and HFD 20A—Curve Number SC-4135-87B



EATON

Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: ED, HED FDB, FD and HFD circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
25A	See curve

Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)				Amps (KA)
Breaker Type	@240Vac	@480Vac	@600Vac	250Vac	125V
EHD	18	14	—	10	—
FDB	18	14	14	10	—
FD	65	35	18	10	—
HFD	100	65	25	22	
ED	65	—	—	—	10

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 30. Types ED, EHD, FDB, FD, and HFD 25A—Curve Number SC-4136-87B

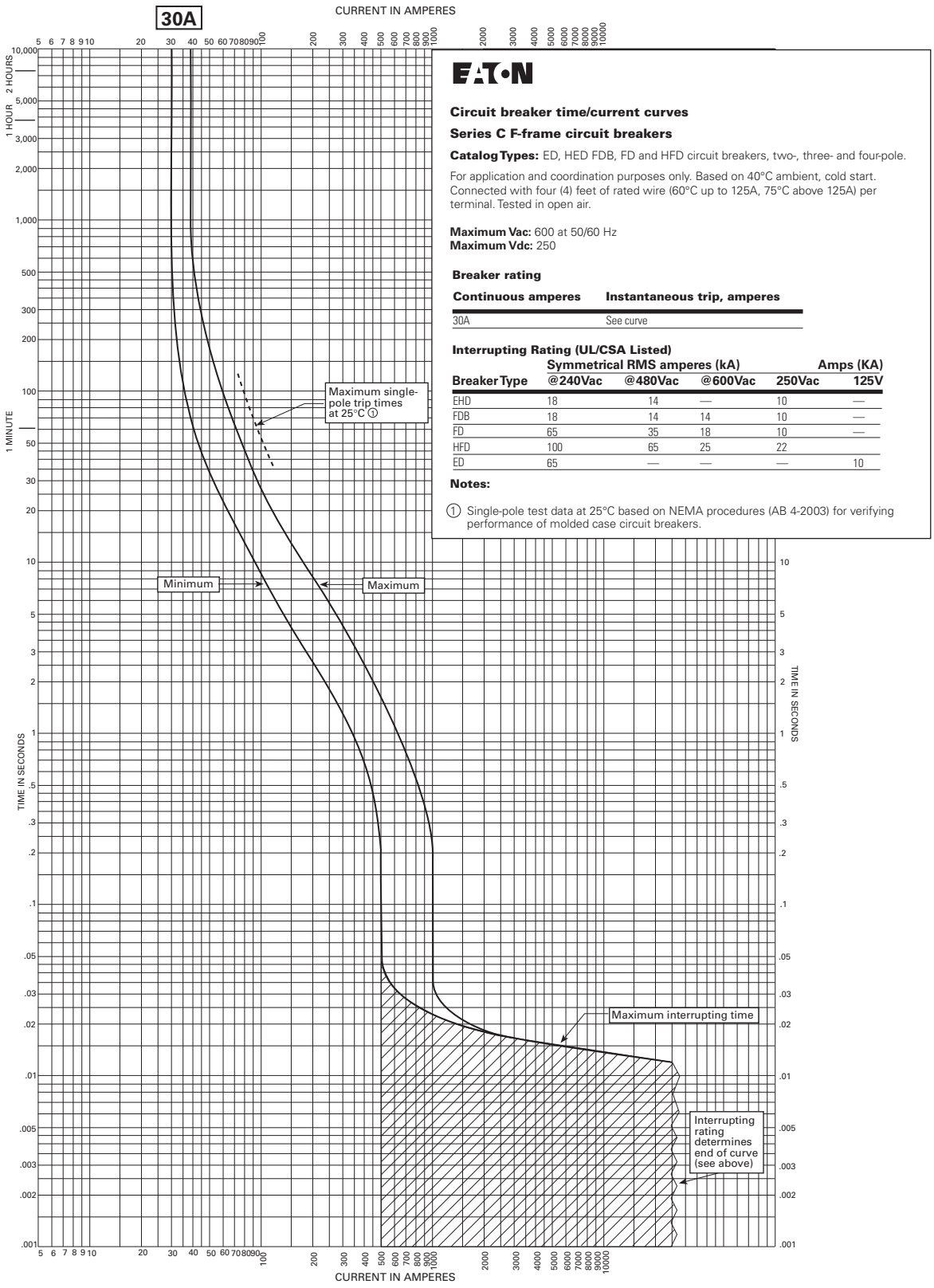
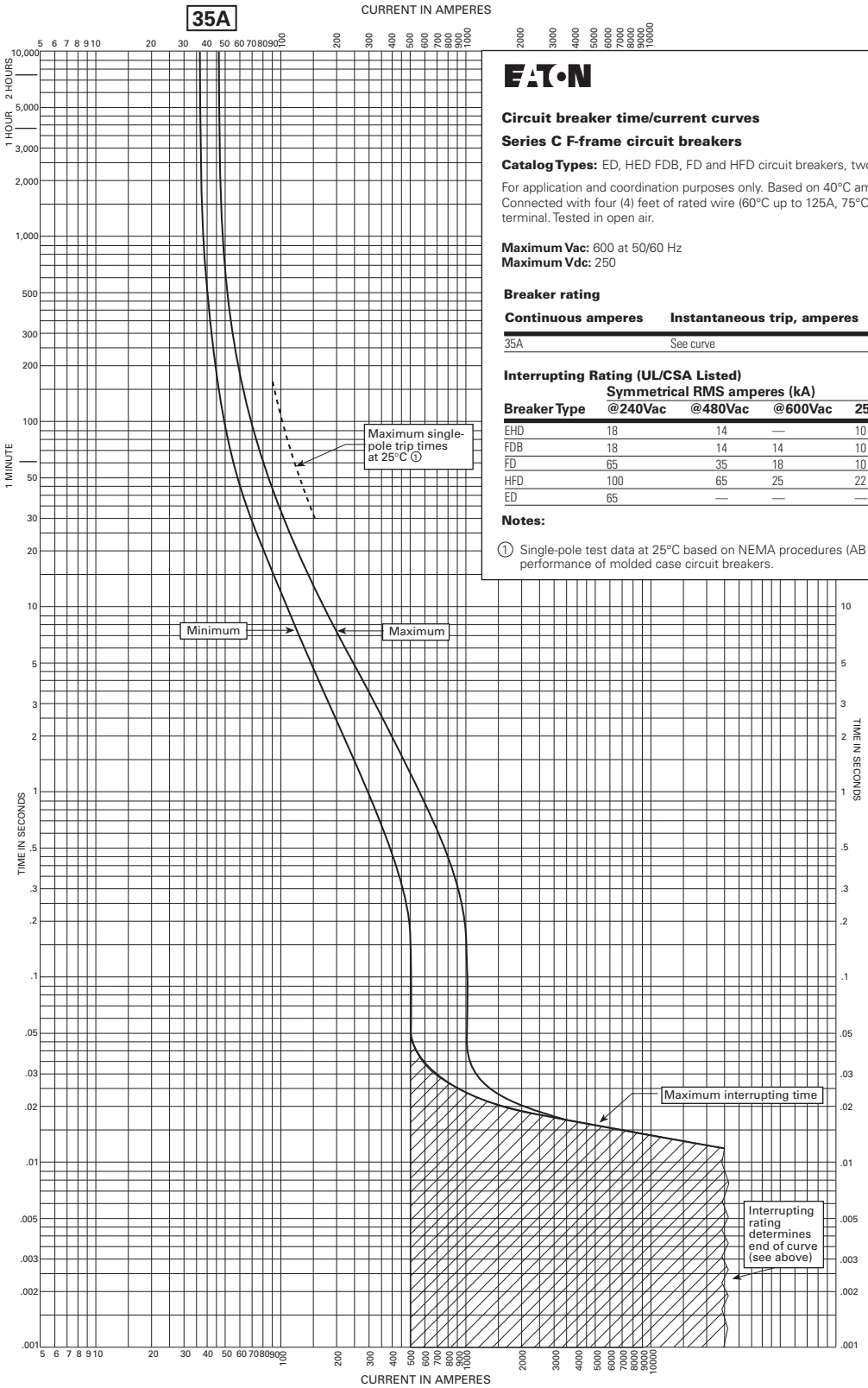


Figure 31. Types ED, EHD, FDB, FD, and HFD 30A—Curve Number SC-4137-87B



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: ED, HED FDB, FD and HFD circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
35A	See curve

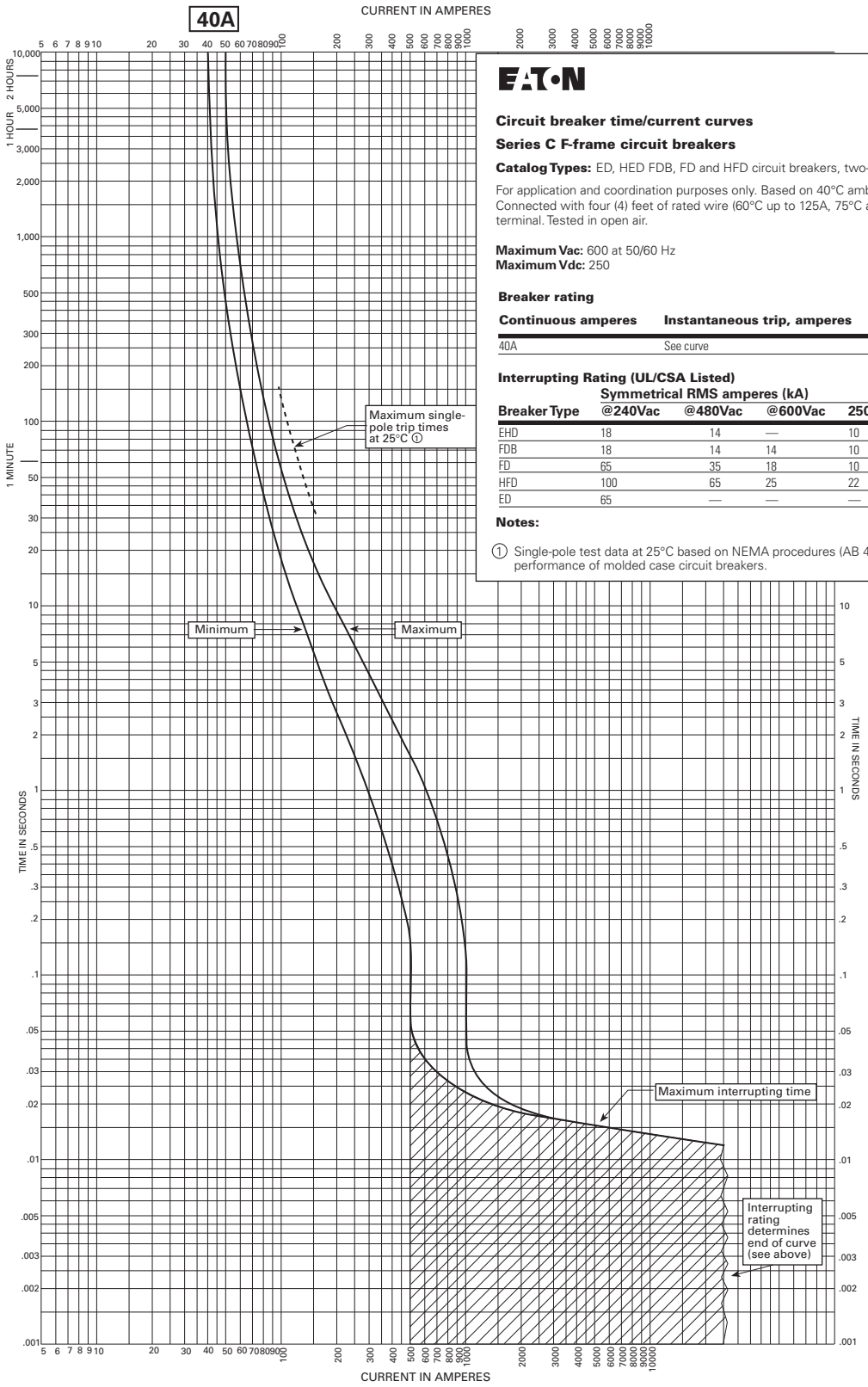
Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)			Amps (KA)	
Breaker Type	@240Vac	@480Vac	@600Vac	250Vac	125V
EHD	18	14	—	10	—
FDB	18	14	14	10	—
FD	65	35	18	10	—
HFD	100	65	25	22	
ED	65	—	—	—	10

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 32. Types ED, EHD, FDB, FD, and HFD 35A—Curve Number SC-4138-87B



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: ED, HED FDB, FD and HFD circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
40A	See curve

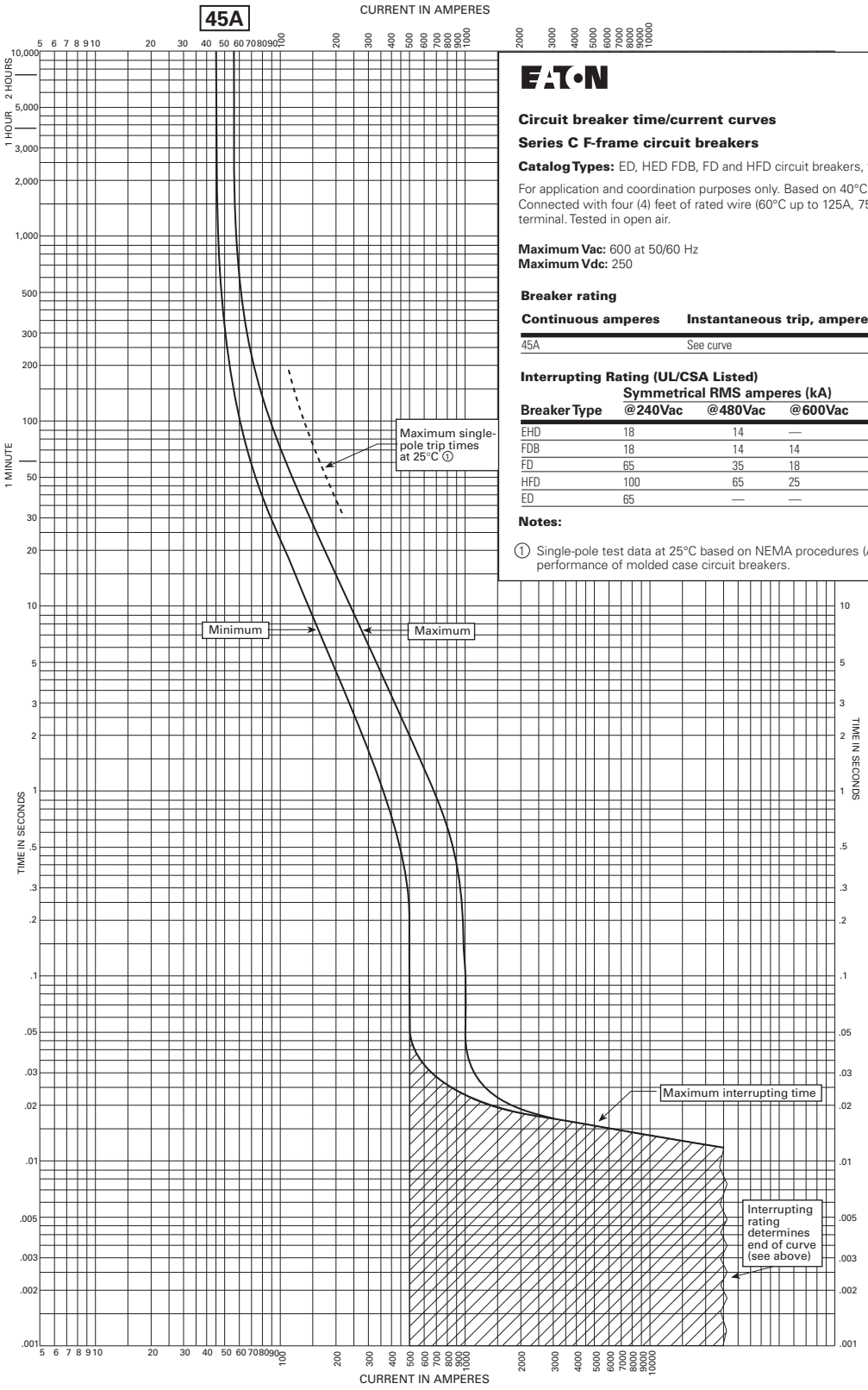
Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)			Amps (KA)	
Breaker Type	@240Vac	@480Vac	@600Vac	250Vac	125V
EHD	18	14	—	10	—
FDB	18	14	14	10	—
FD	65	35	18	10	—
HFD	100	65	25	22	
ED	65	—	—	—	10

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 33. Types ED, EHD, FDB, FD, and HFD 40A—Curve Number SC-4139-87B



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Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: ED, HED FDB, FD and HFD circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
45A	See curve

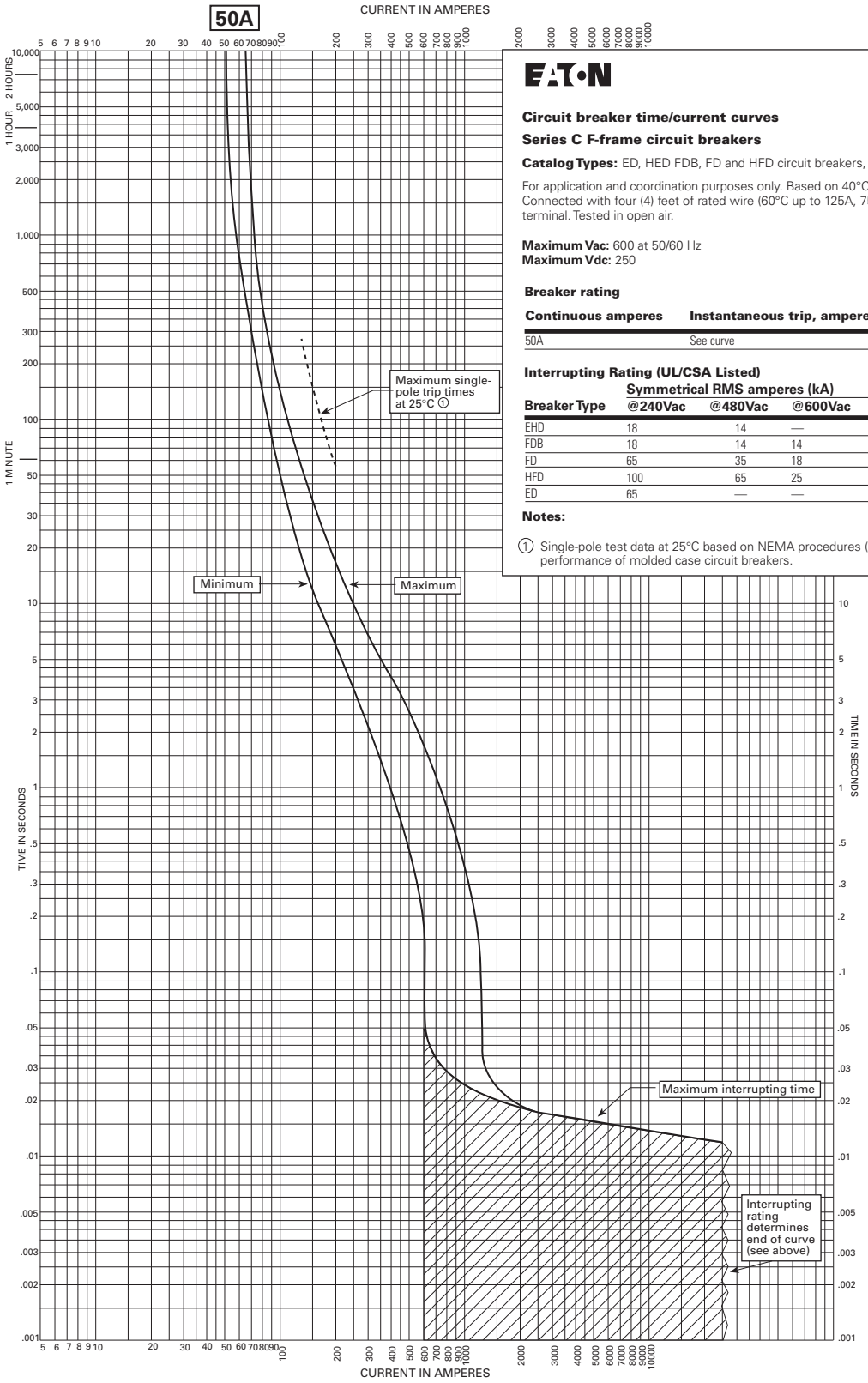
Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)				Amps (KA)
Breaker Type	@240Vac	@480Vac	@600Vac	250Vac	125V
EHD	18	14	—	10	—
FDB	18	14	14	10	—
FD	65	35	18	10	—
HFD	100	65	25	22	
ED	65	—	—	—	10

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 34. Types ED, EHD, FDB, FD, and HFD 45A—Curve Number SC-4140-87B



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: ED, HED FDB, FD and HFD circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
50A	See curve

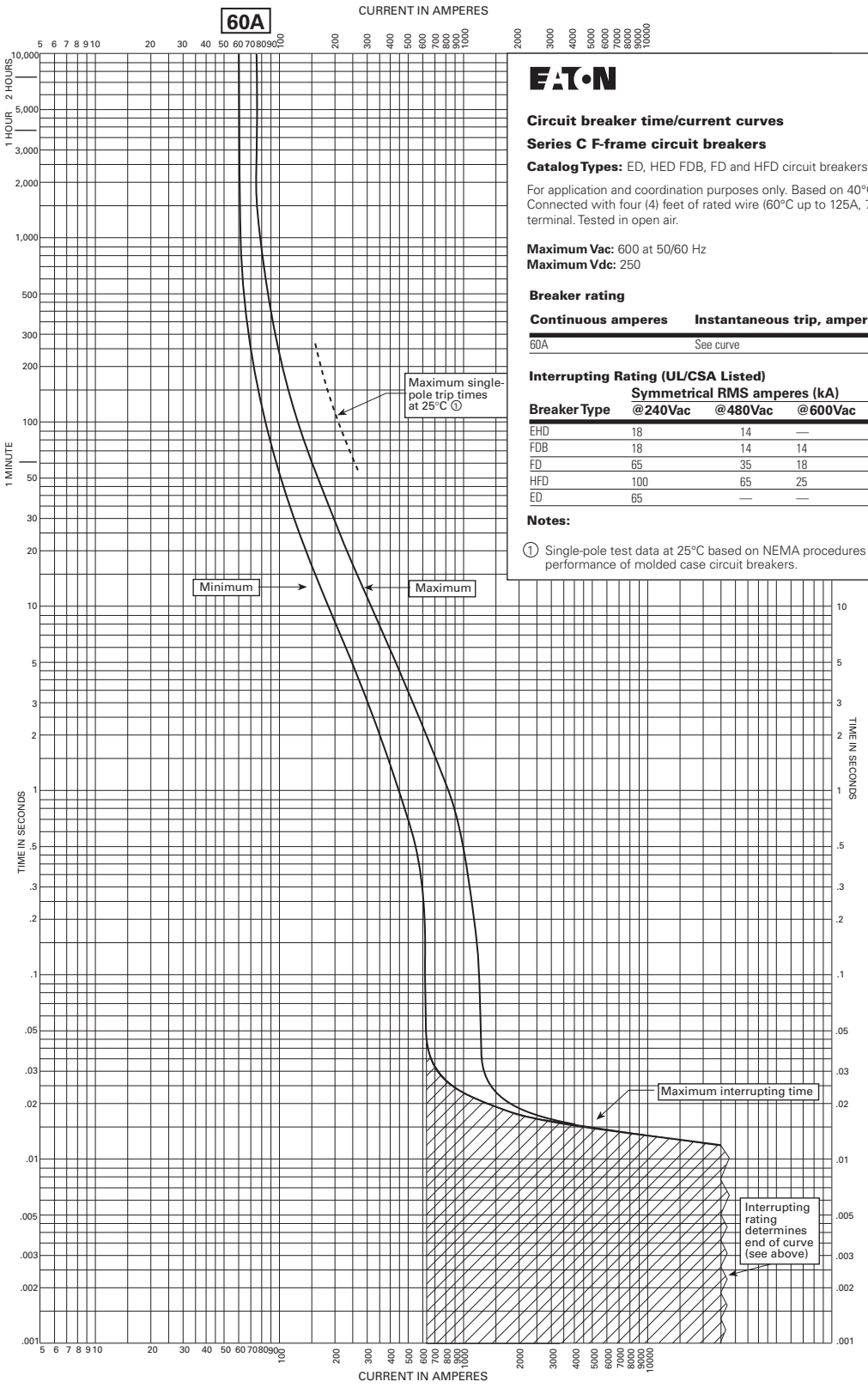
Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)				Amps (KA)
Breaker Type	@240Vac	@480Vac	@600Vac	250Vac	125V
EHD	18	14	—	10	—
FDB	18	14	14	10	—
FD	65	35	18	10	—
HFD	100	65	25	22	
ED	65	—	—	—	10

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 35. Types ED, EHD, FDB, FD, and HFD 50A—Curve Number SC-4141-87B



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: ED, HED FDB, FD and HFD circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
60A	See curve

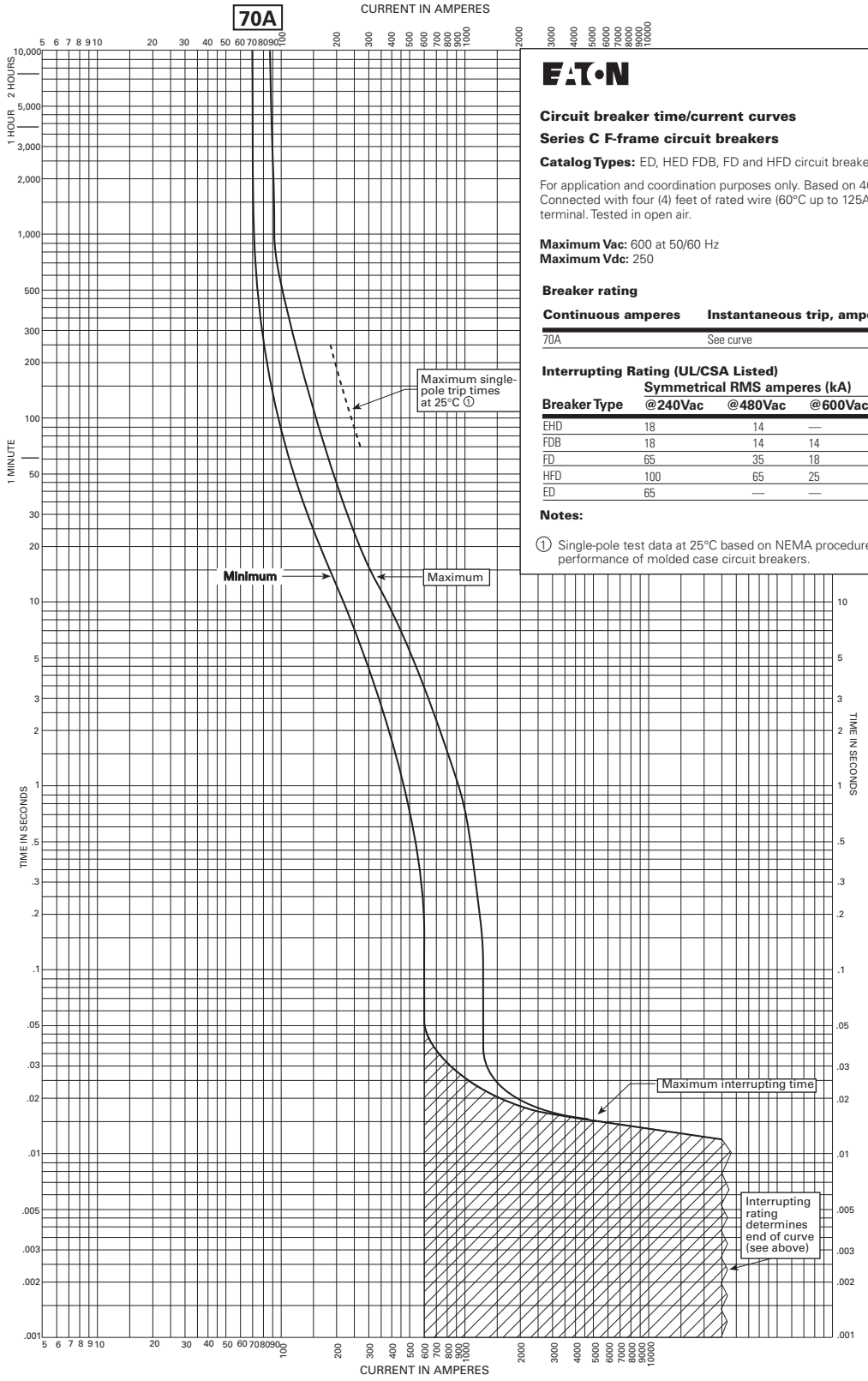
Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)			Amps (KA)	
Breaker Type	@240Vac	@480Vac	@600Vac	250Vac	125V
EHD	18	14	—	10	—
FDB	18	14	14	10	—
FD	65	35	18	10	—
HFD	100	65	25	22	
ED	65	—	—	—	10

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 36. Types ED, EHD, FDB, FD, and HFD 60A—Curve Number SC-4142-87B



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: ED, HED FDB, FD and HFD circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
70A	See curve

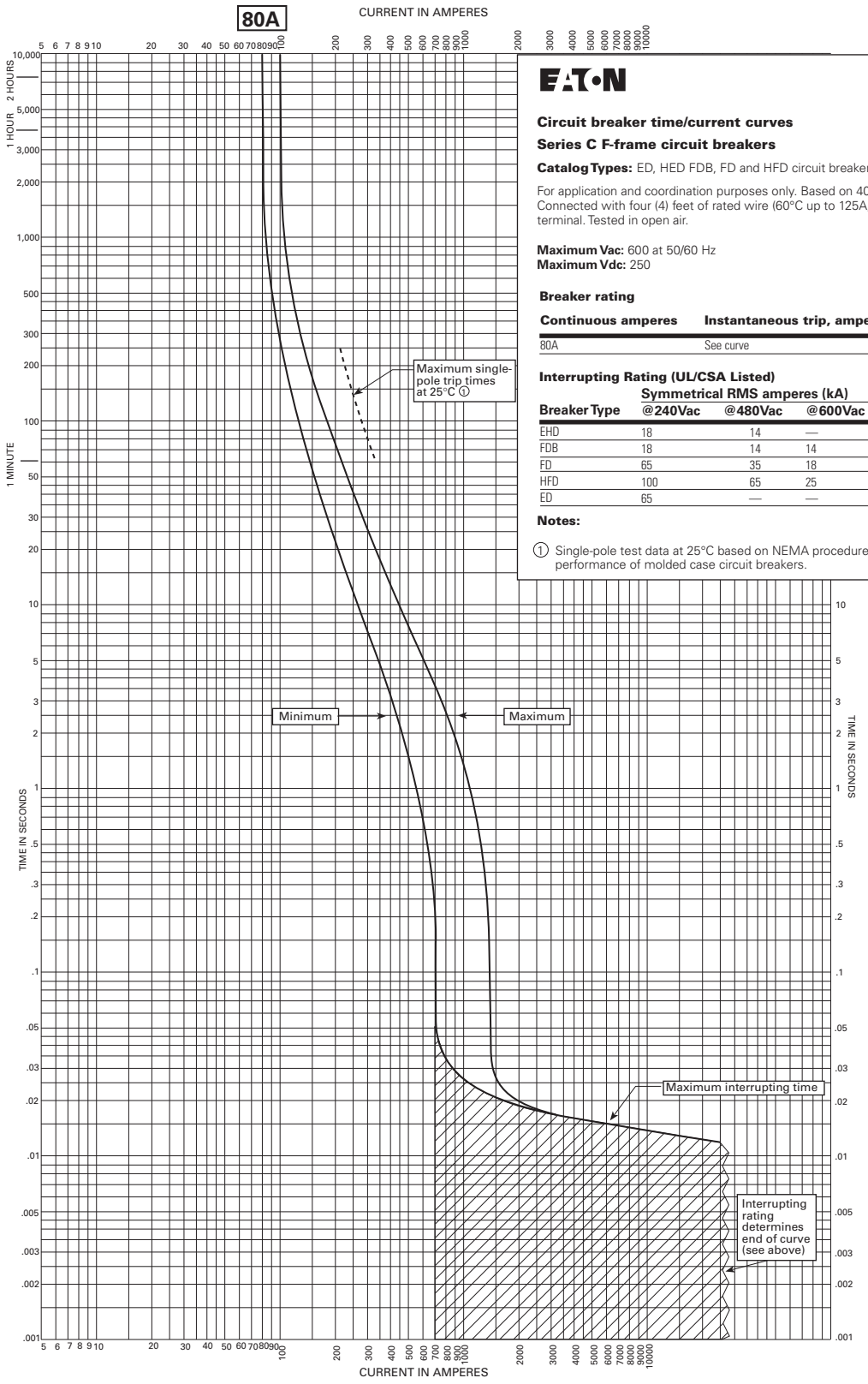
Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)				Amps (KA)
Breaker Type	@240Vac	@480Vac	@600Vac	250Vac	125V
EHD	18	14	—	10	—
FDB	18	14	14	10	—
FD	65	35	18	10	—
HFD	100	65	25	22	
ED	65	—	—	—	10

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 37. Types ED, EHD, FDB, FD, and HFD 70A—Curve Number SC-4143-87B



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: ED, HED FDB, FD and HFD circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
80A	See curve

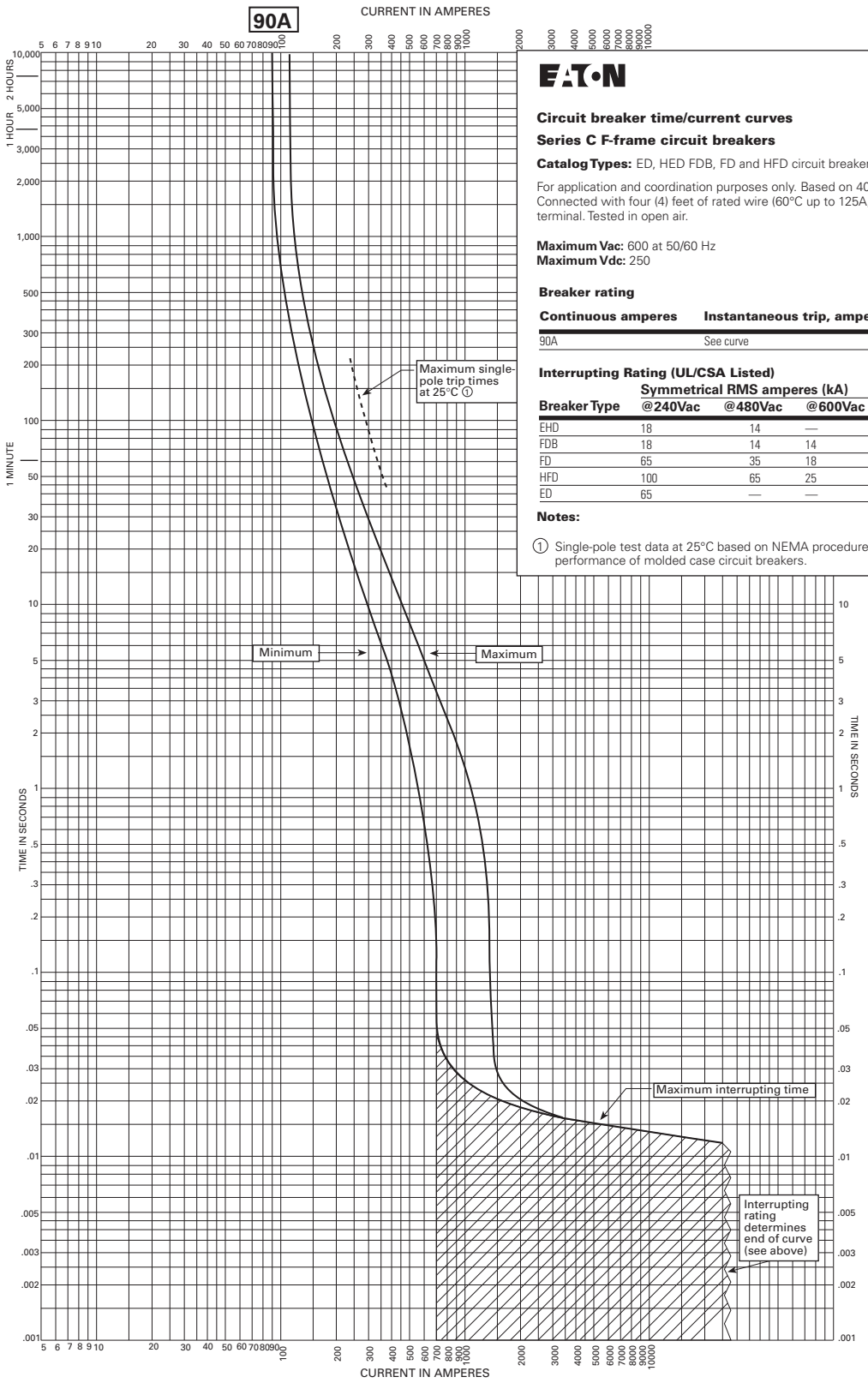
Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)				Amps (KA)
Breaker Type	@240Vac	@480Vac	@600Vac	250Vac	125V
EHD	18	14	—	10	—
FDB	18	14	14	10	—
FD	65	35	18	10	—
HFD	100	65	25	22	
ED	65	—	—	—	10

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 38. Types ED, EHD, FDB, FD, and HFD 80A—Curve Number SC-4144-87B



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: ED, HED FDB, FD and HFD circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
90A	See curve

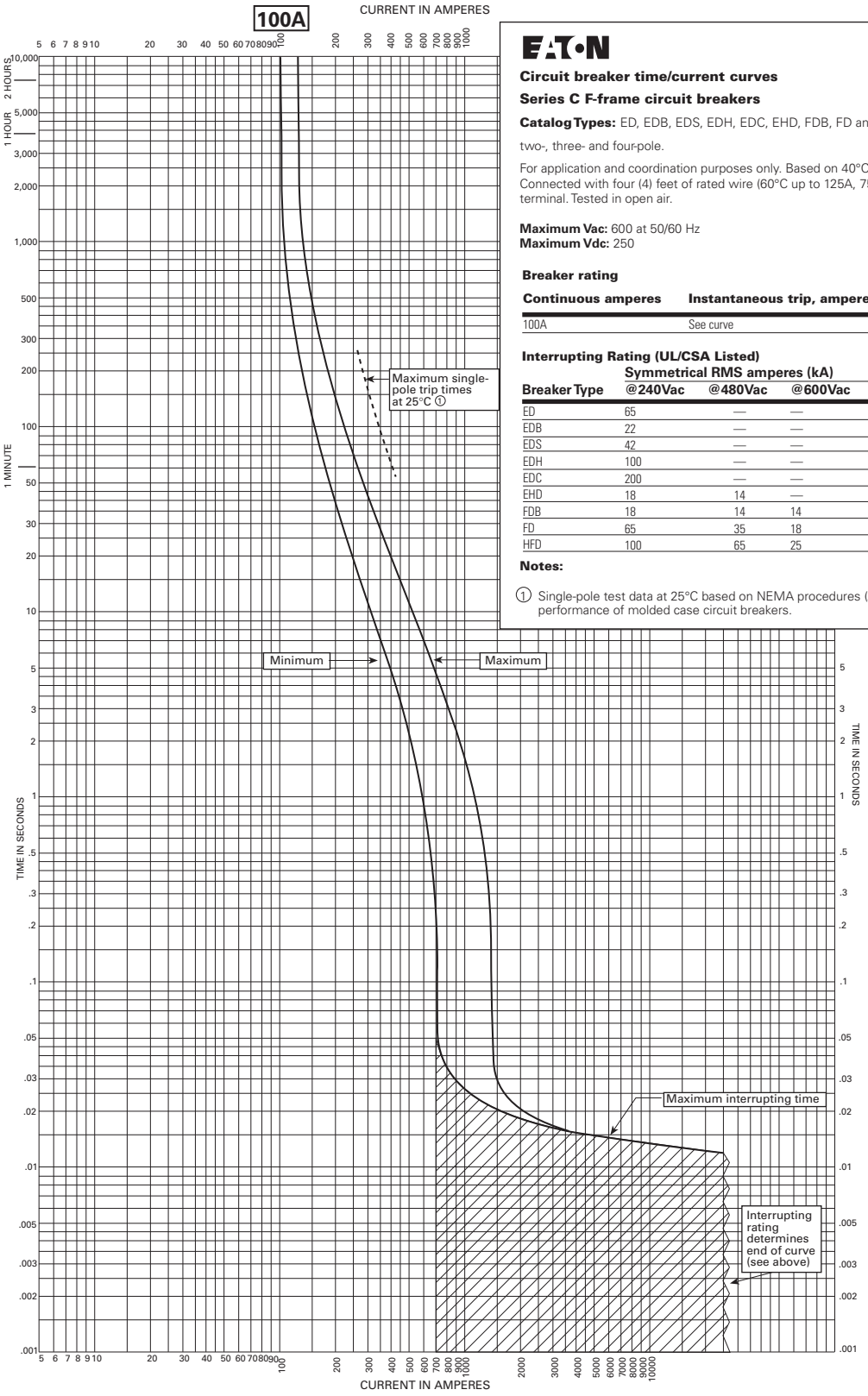
Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)				Amps (KA)
Breaker Type	@240Vac	@480Vac	@600Vac	250Vac	125V
EHD	18	14	—	10	—
FDB	18	14	14	10	—
FD	65	35	18	10	—
HFD	100	65	25	22	
ED	65	—	—	—	10

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 39. Types ED, EHD, FDB, FD, and HFD 90A—Curve Number SC-4145-87B



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: ED, EDB, EDS, EDH, EDC, EHD, FDB, FD and HFD circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
100A	See curve

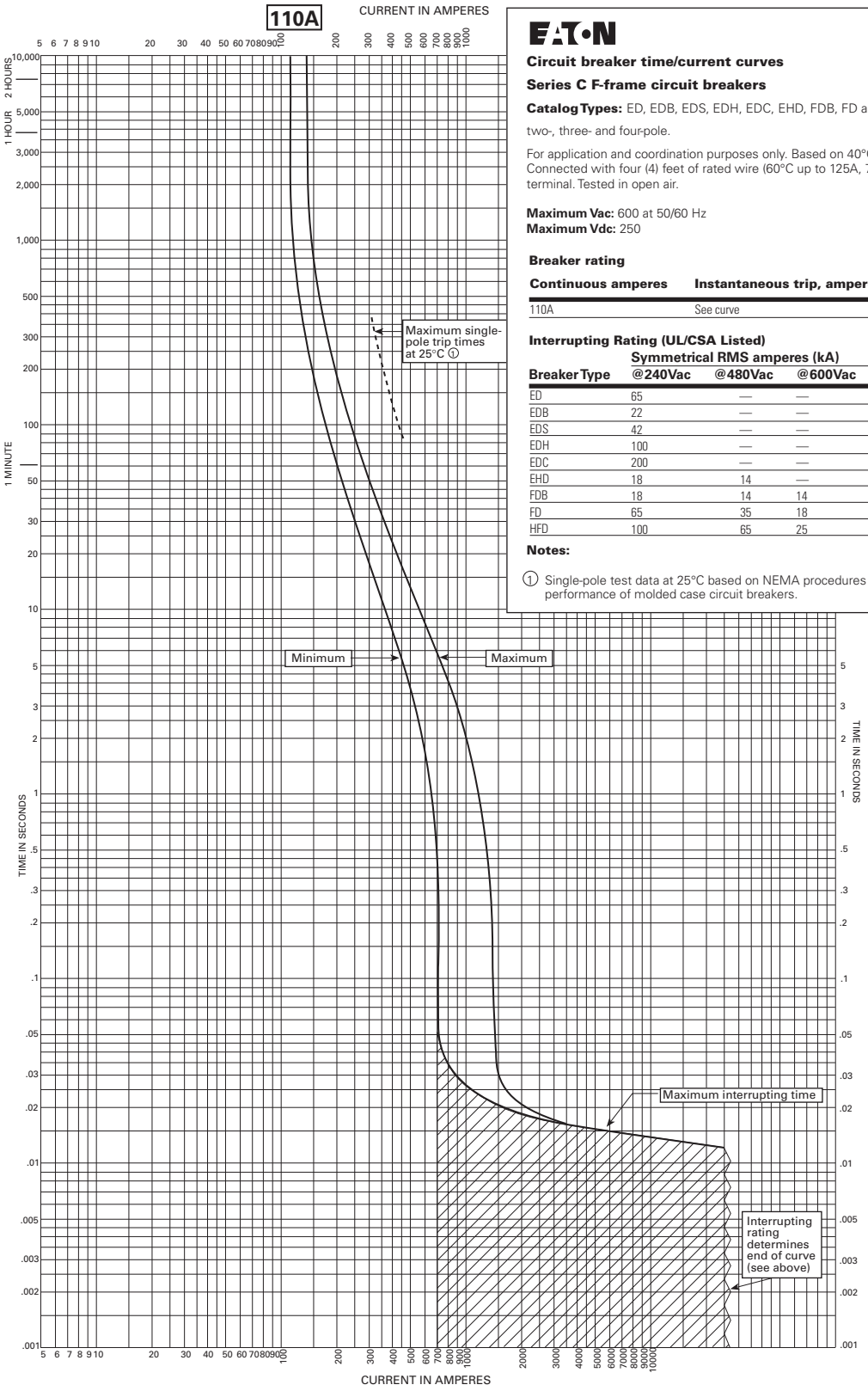
Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)			Amps (KA)	
Breaker Type	@240Vac	@480Vac	@600Vac	250Vac	125V
ED	65	—	—	—	10
EDB	22	—	—	—	10
EDS	42	—	—	—	10
EDH	100	—	—	—	10
EDC	200	—	—	—	10
EHD	18	14	—	10	—
FDB	18	14	14	10	—
FD	65	35	18	10	—
HFD	100	65	25	22	—

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 40. Types ED, EDB, EDS, EDH, EDC, EHD, FDB, FD, and HFD 100A—Curve Number SC-4146-87B



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: ED, EDB, EDS, EDH, EDC, EHD, FDB, FD and HFD circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
110A	See curve

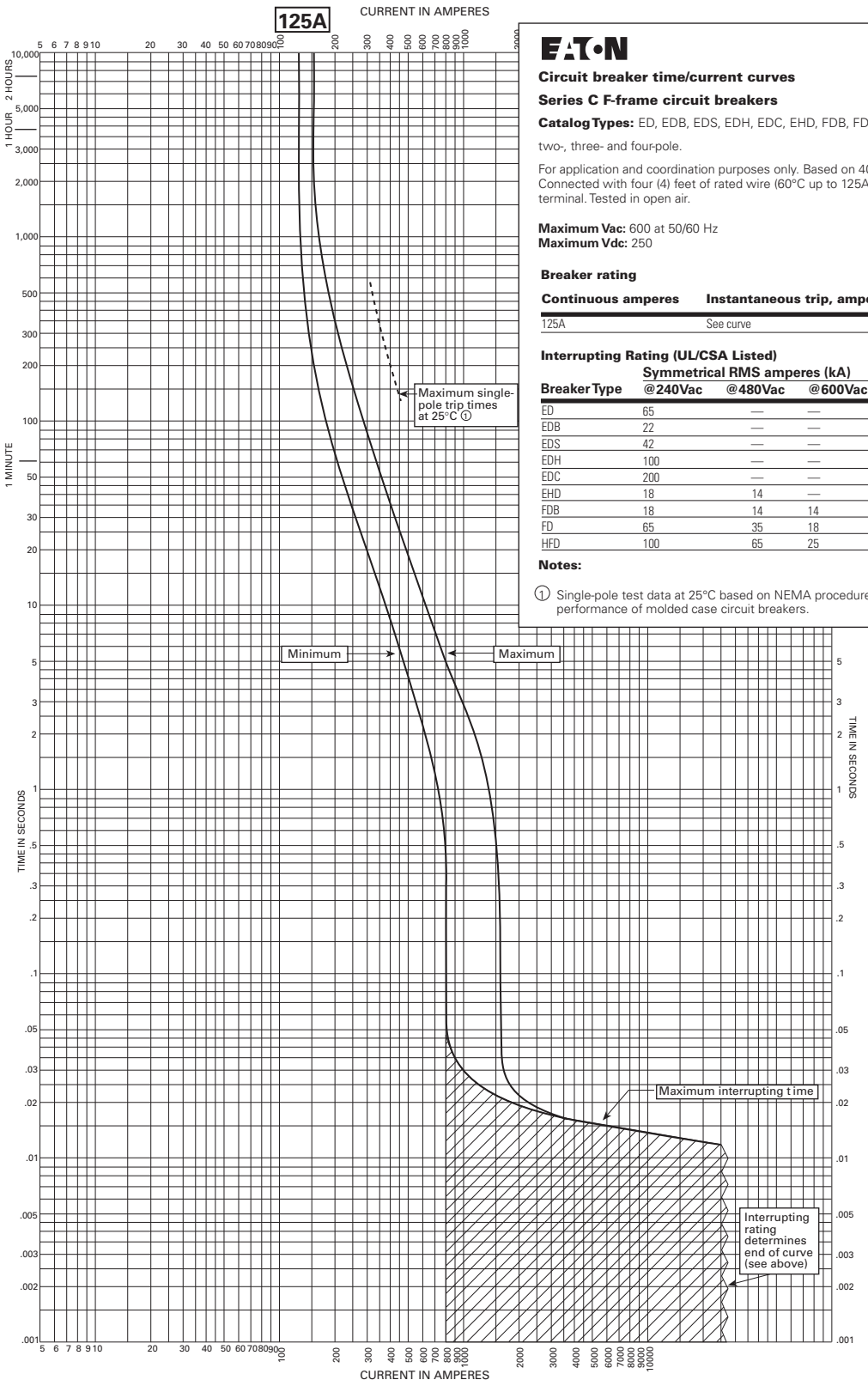
Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)				Amps (KA)
Breaker Type	@240Vac	@480Vac	@600Vac	250Vac	125V
ED	65	—	—	—	10
EDB	22	—	—	—	10
EDS	42	—	—	—	10
EDH	100	—	—	—	10
EDC	200	—	—	—	10
EHD	18	14	—	10	—
FDB	18	14	14	10	—
FD	65	35	18	10	—
HFD	100	65	25	22	—

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 41. Types ED, EDB, EDS, EDH, EDC, FDB, FD, and HFD 110A—Curve Number SC-4147-87B



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: ED, EDB, EDS, EDH, EDC, EHD, FDB, FD and HFD circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
125A	See curve

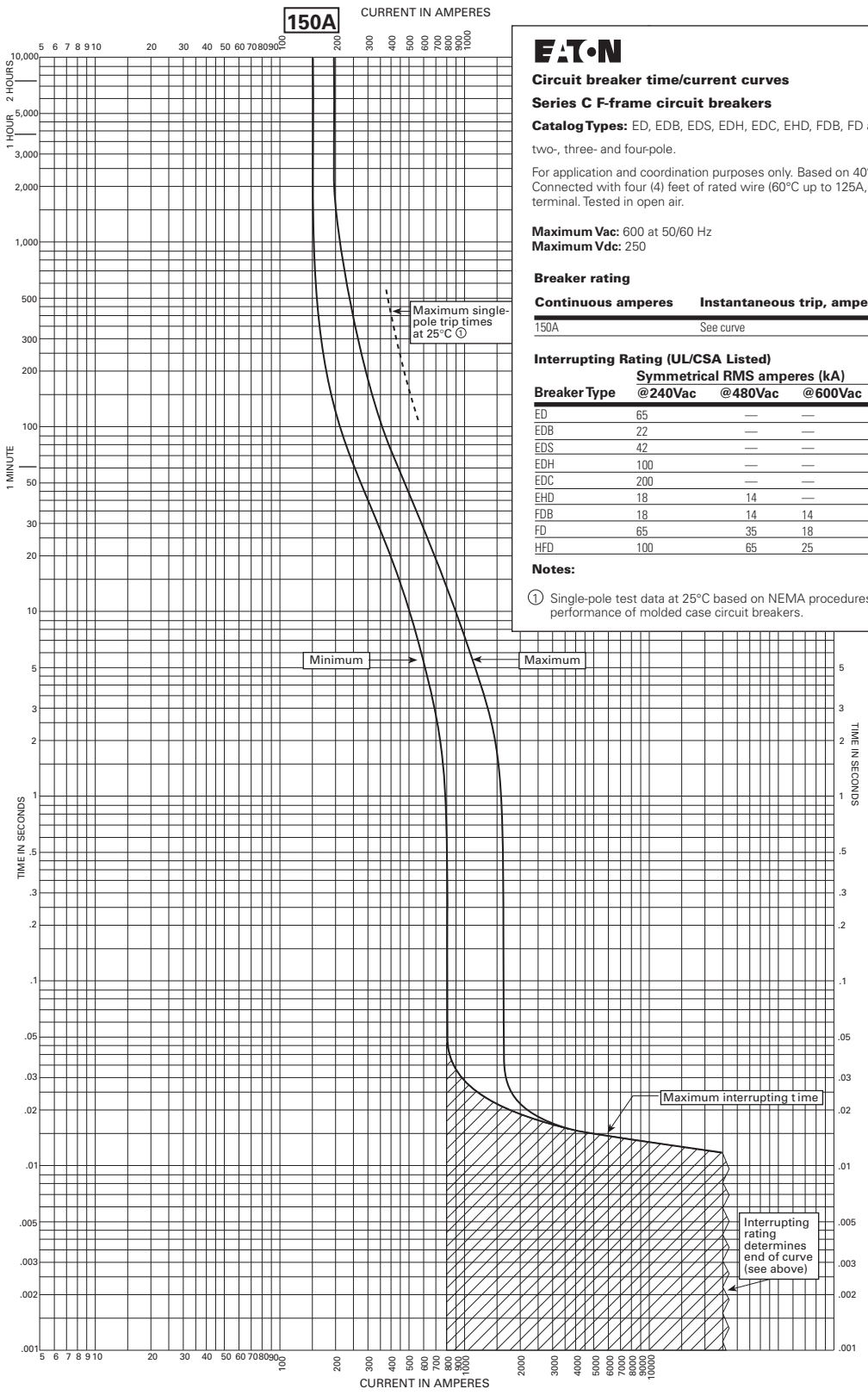
Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)				Amps (KA)
Breaker Type	@240Vac	@480Vac	@600Vac	250Vac	125V
ED	65	—	—	—	10
EDB	22	—	—	—	10
EDS	42	—	—	—	10
EDH	100	—	—	—	10
EDC	200	—	—	—	10
EHD	18	14	—	10	—
FDB	18	14	14	10	—
FD	65	35	18	10	—
HFD	100	65	25	22	—

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 42. Types ED, EDB, EDS, EDH, EDC, FDB, FD, and HFD 125A—Curve Number SC-4148-87B



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: ED, EDB, EDS, EDH, EDC, EHD, FDB, FD and HFD circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
150A	See curve

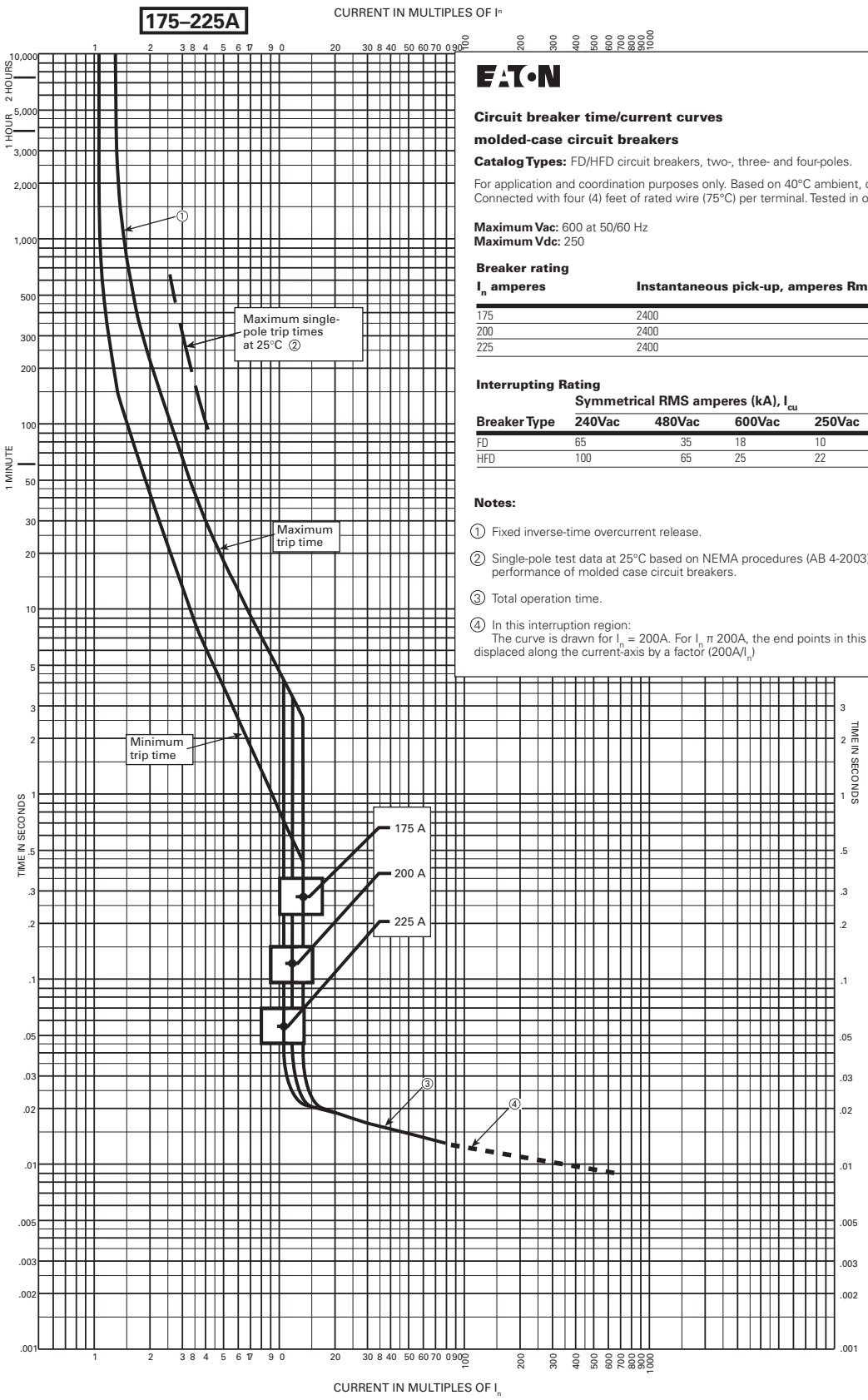
Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)				Amps (KA)
Breaker Type	@240Vac	@480Vac	@600Vac	250Vac	125V
ED	65	—	—	—	10
EDB	22	—	—	—	10
EDS	42	—	—	—	10
EDH	100	—	—	—	10
EDC	200	—	—	—	10
EHD	18	14	—	10	—
FDB	18	14	14	10	—
FD	65	35	18	10	—
HFD	100	65	25	22	—

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 43. Types ED, EDB, EDS, EDH, EDC, FDB, FD, and HFD 150A—Curve Number SC-4149-87B



Circuit breaker time/current curves

molded-case circuit breakers

Catalog Types: FD/HFD circuit breakers, two-, three- and four-poles.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (75°C) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

I_n amperes	Instantaneous pick-up, amperes Rms
175	2400
200	2400
225	2400

Interrupting Rating

	Symmetrical RMS amperes (kA), I_{cu}			
Breaker Type	240Vac	480Vac	600Vac	250Vac
FD	65	35	18	10
HFD	100	65	25	22

Notes:

① Fixed inverse-time overcurrent release.

② Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

③ Total operation time.

④ In this interruption region:
The curve is drawn for I_n = 200A. For I_n π 200A, the end points in this region are displaced along the current-axis by a factor (200A/I_n)

Figure 44. Types FD and HFD 175–225A—Curve Number SC-6970-98

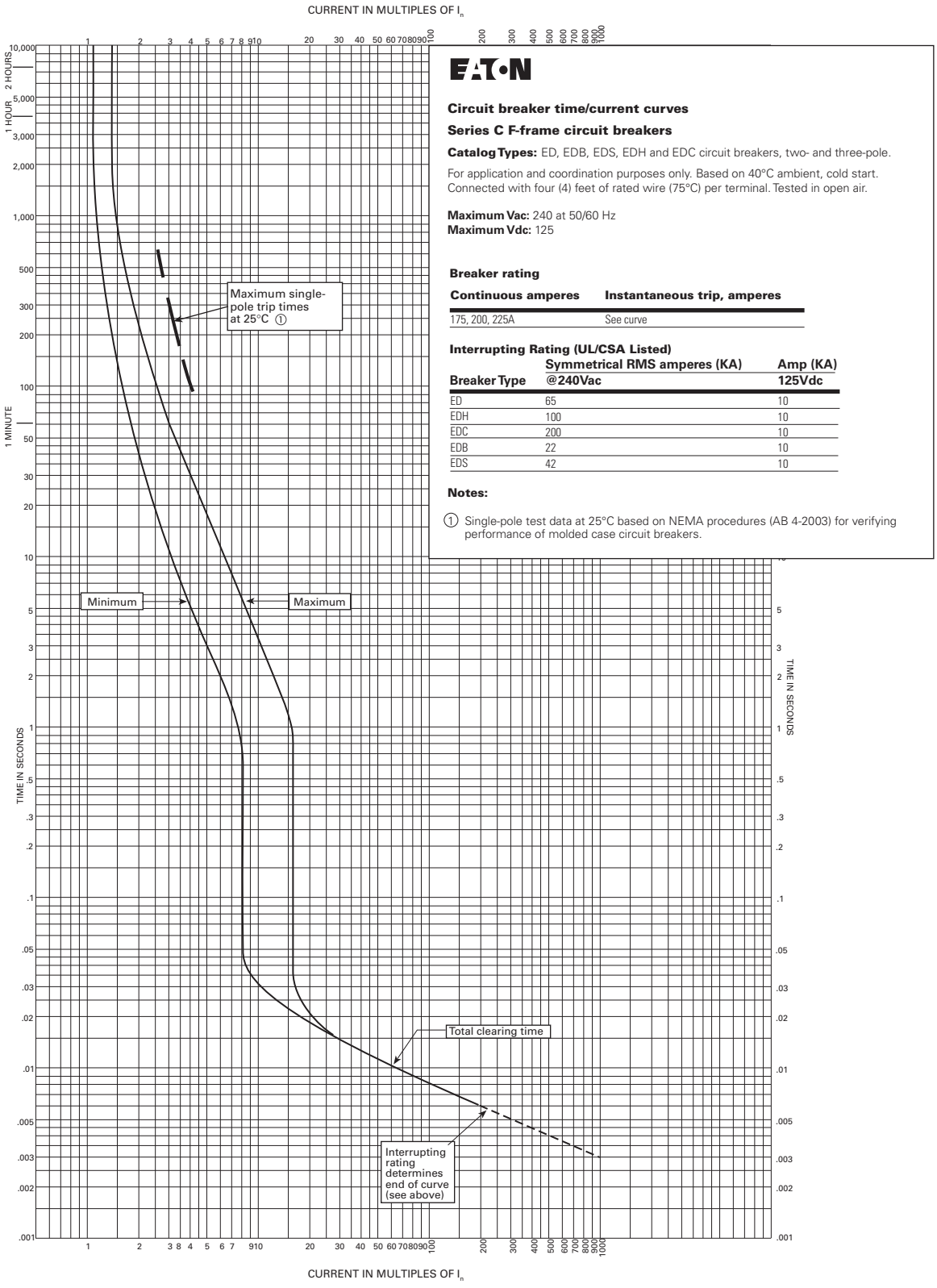
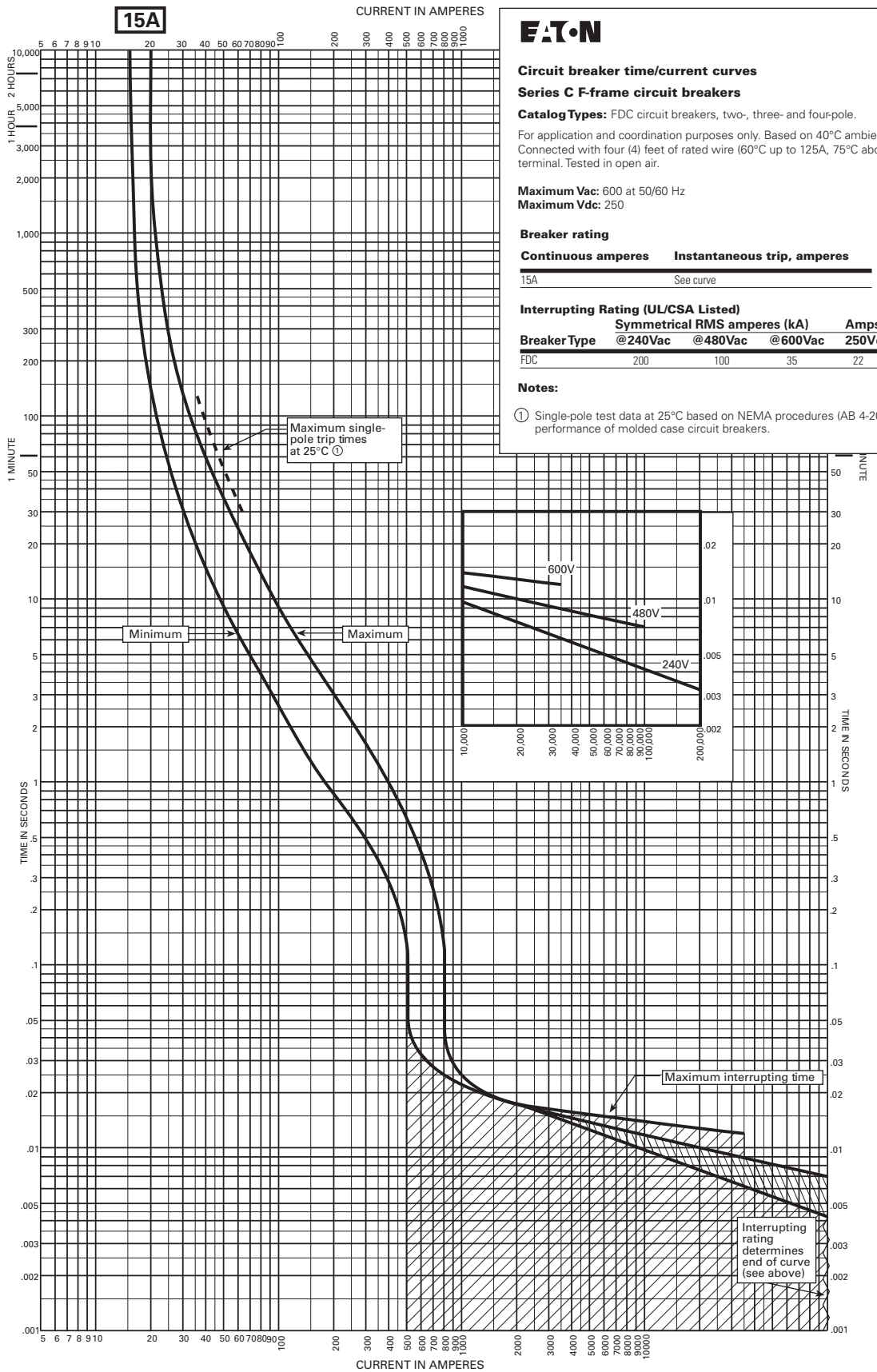


Figure 45. Types ED, EDH, EDC, EDB, and EDS 175–225A—Curve Number SC-5805-94A



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: FDC circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
15A	See curve

Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)			Amps (KA)
Breaker Type	@240Vac	@480Vac	@600Vac	250Vdc
FDC	200	100	35	22

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 46. Type FDC 15A—Curve Number SC-5516-93A

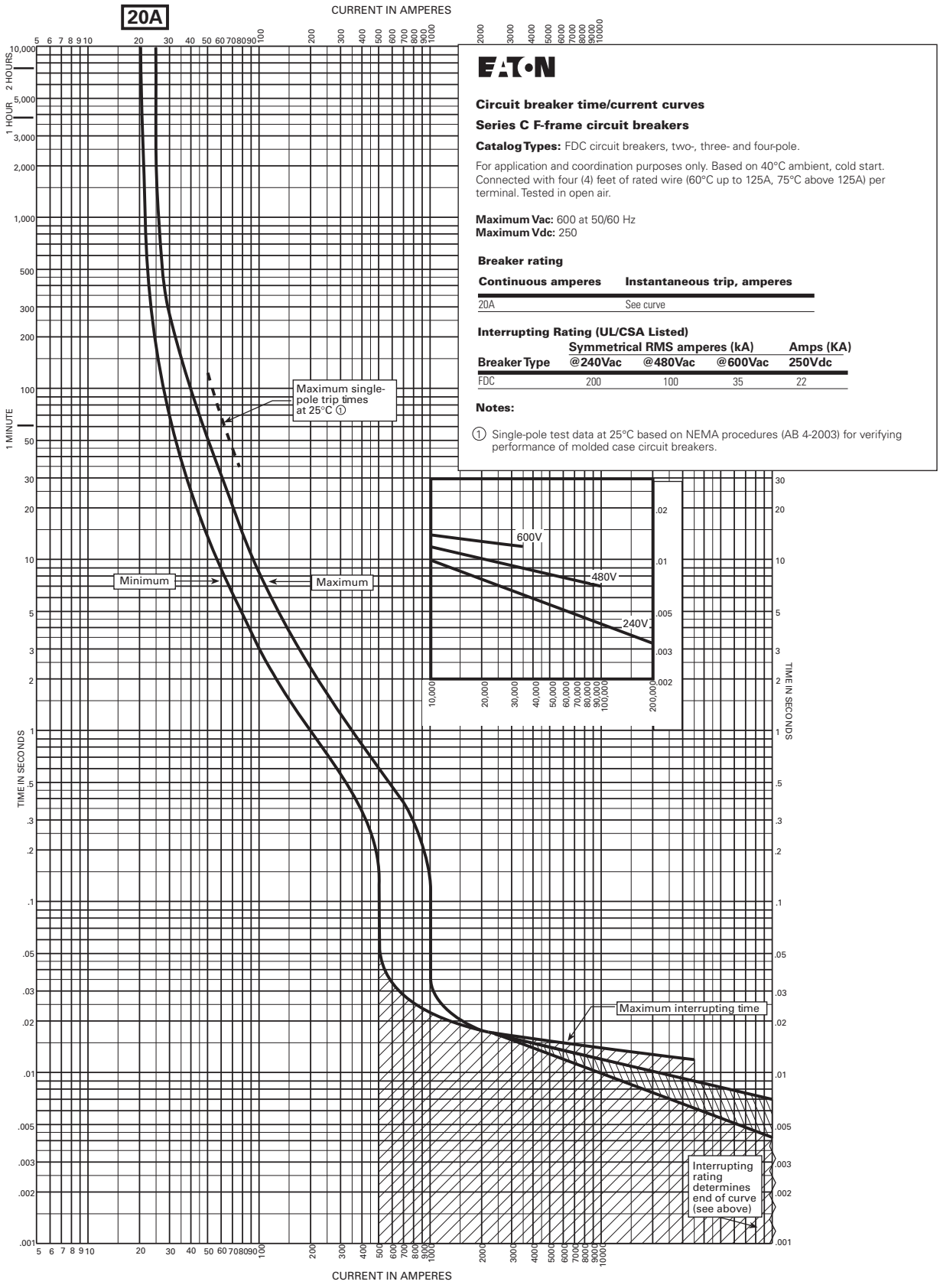


Figure 47. Type FDC 20A—Curve Number SC-5517-93A

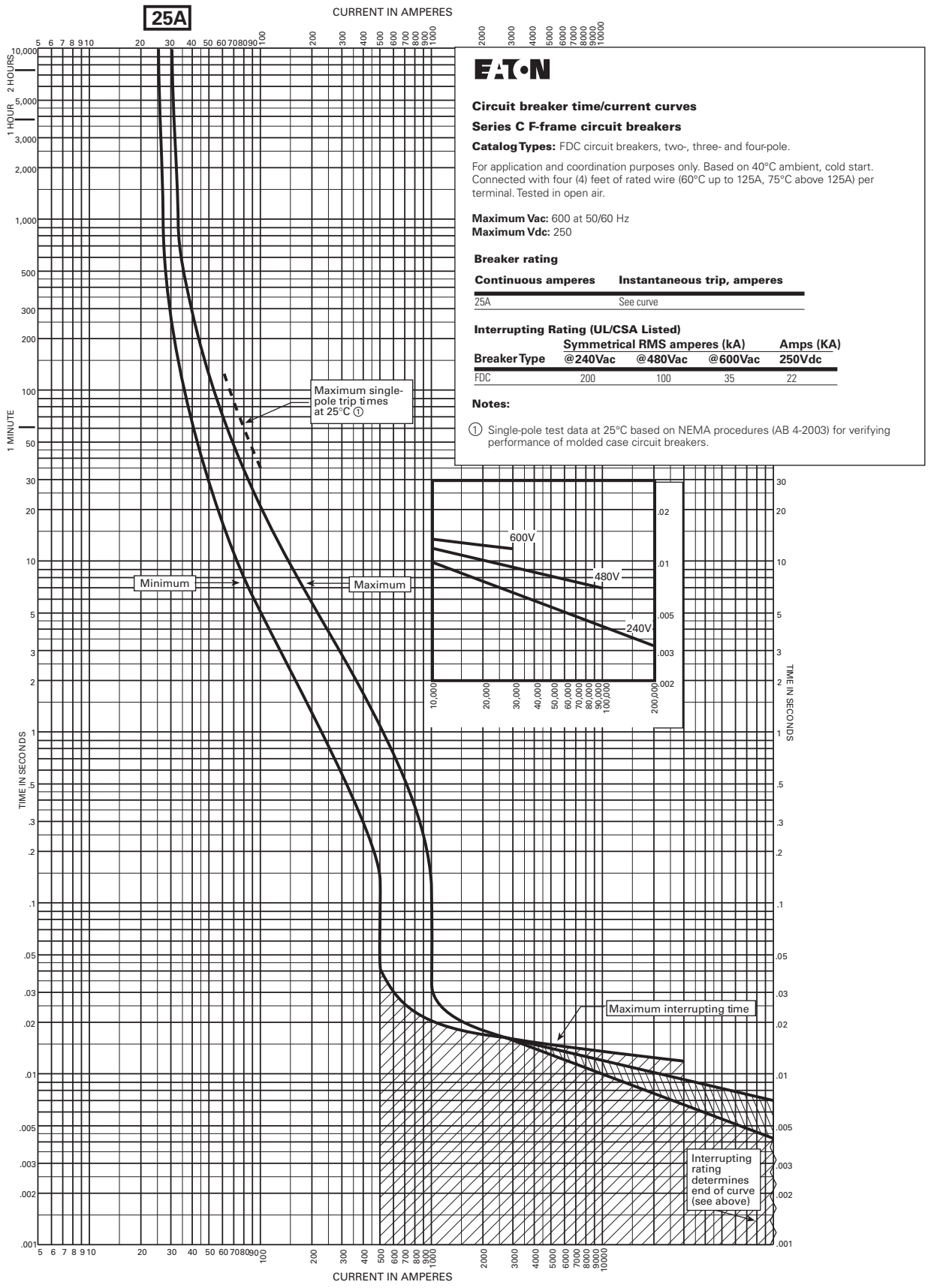
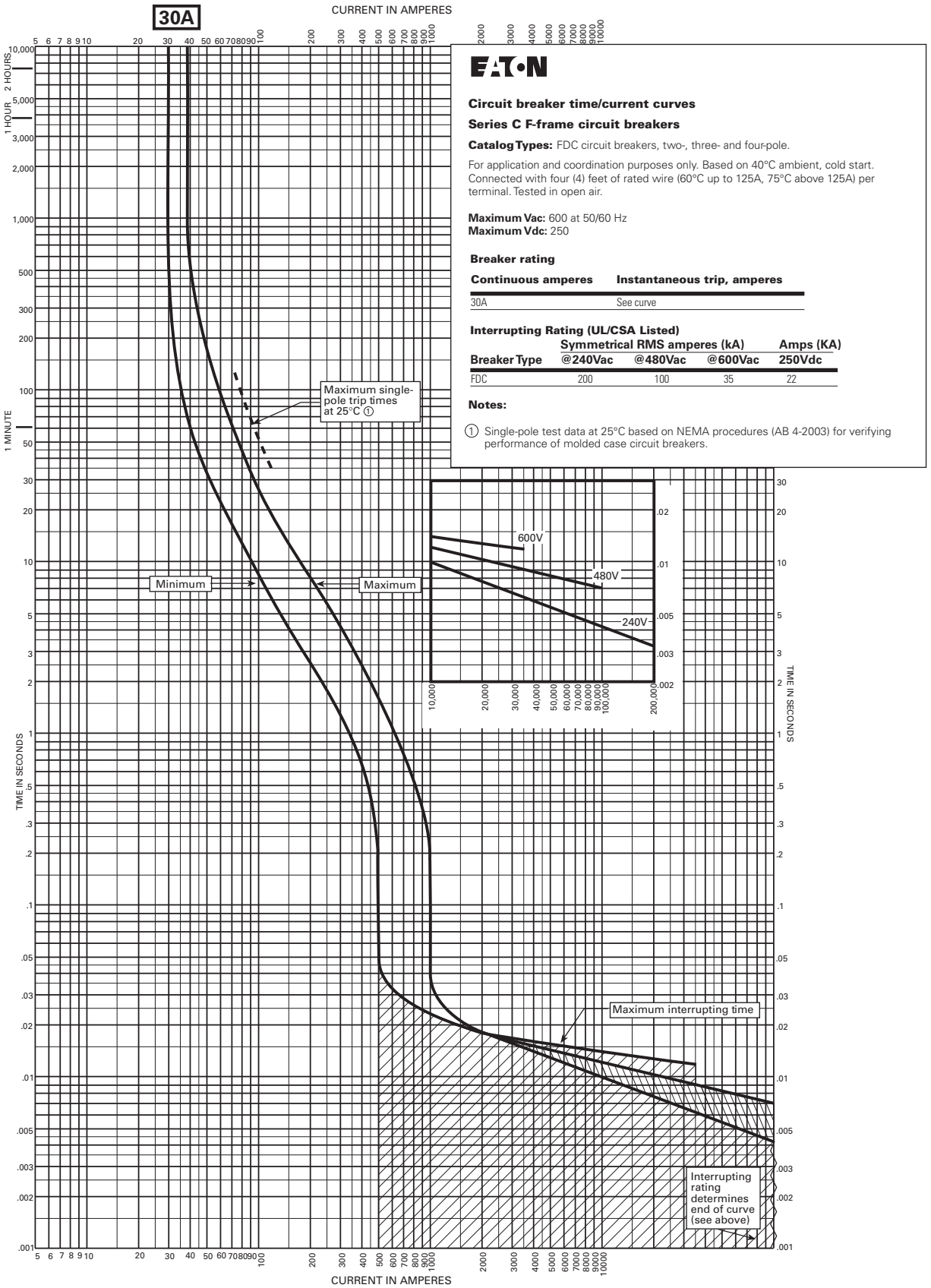


Figure 48. Type FDC 25A—Curve Number SC-5518-93A



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Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: FDC circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
30A	See curve

Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)			Amps (KA)
Breaker Type	@240Vac	@480Vac	@600Vac	250Vdc
FDC	200	100	35	22

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 49. Type FDC 30A—Curve Number SC-5519-93A

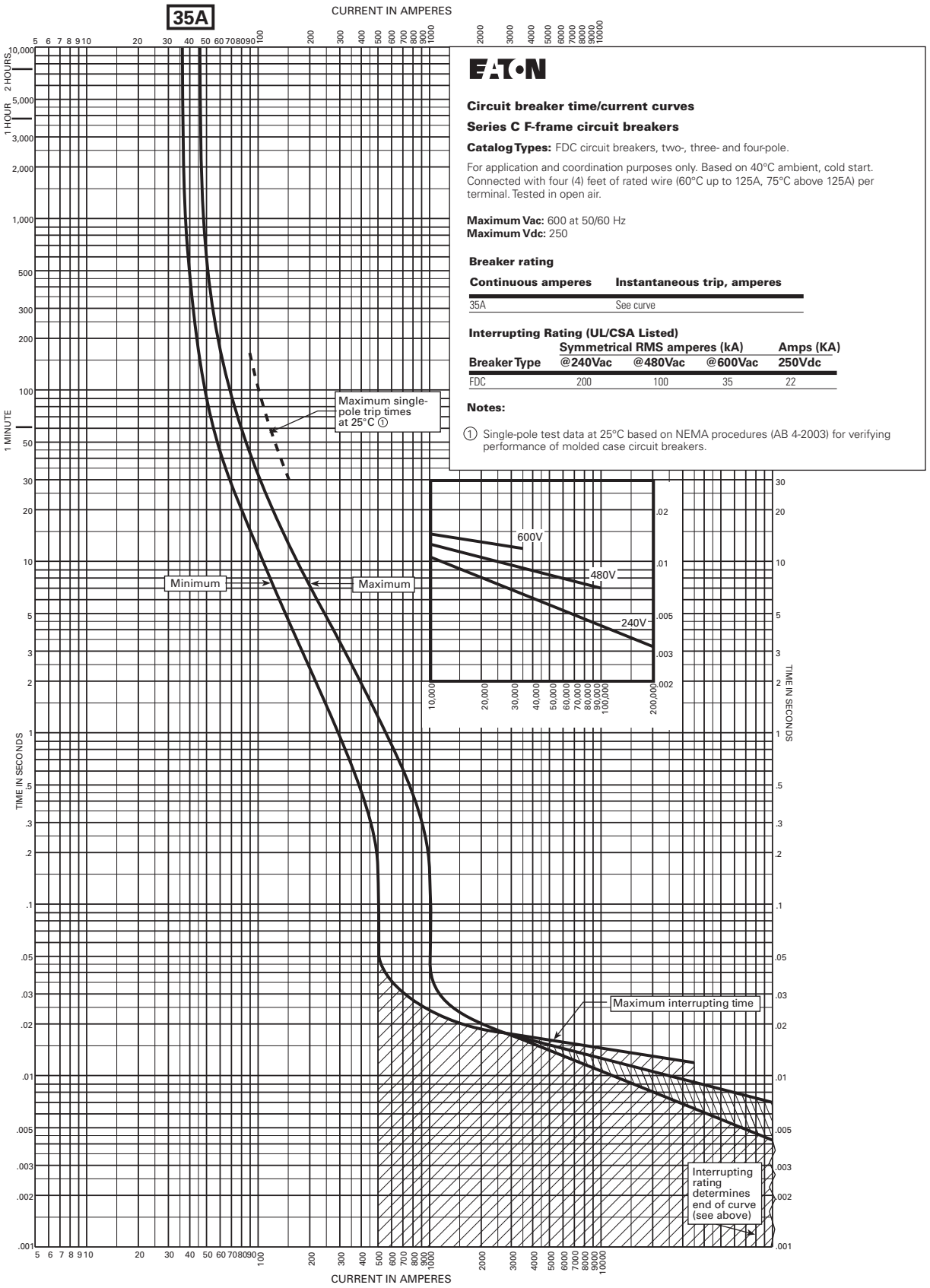


Figure 50. Type FDC 35A—Curve Number SC-5520-93A

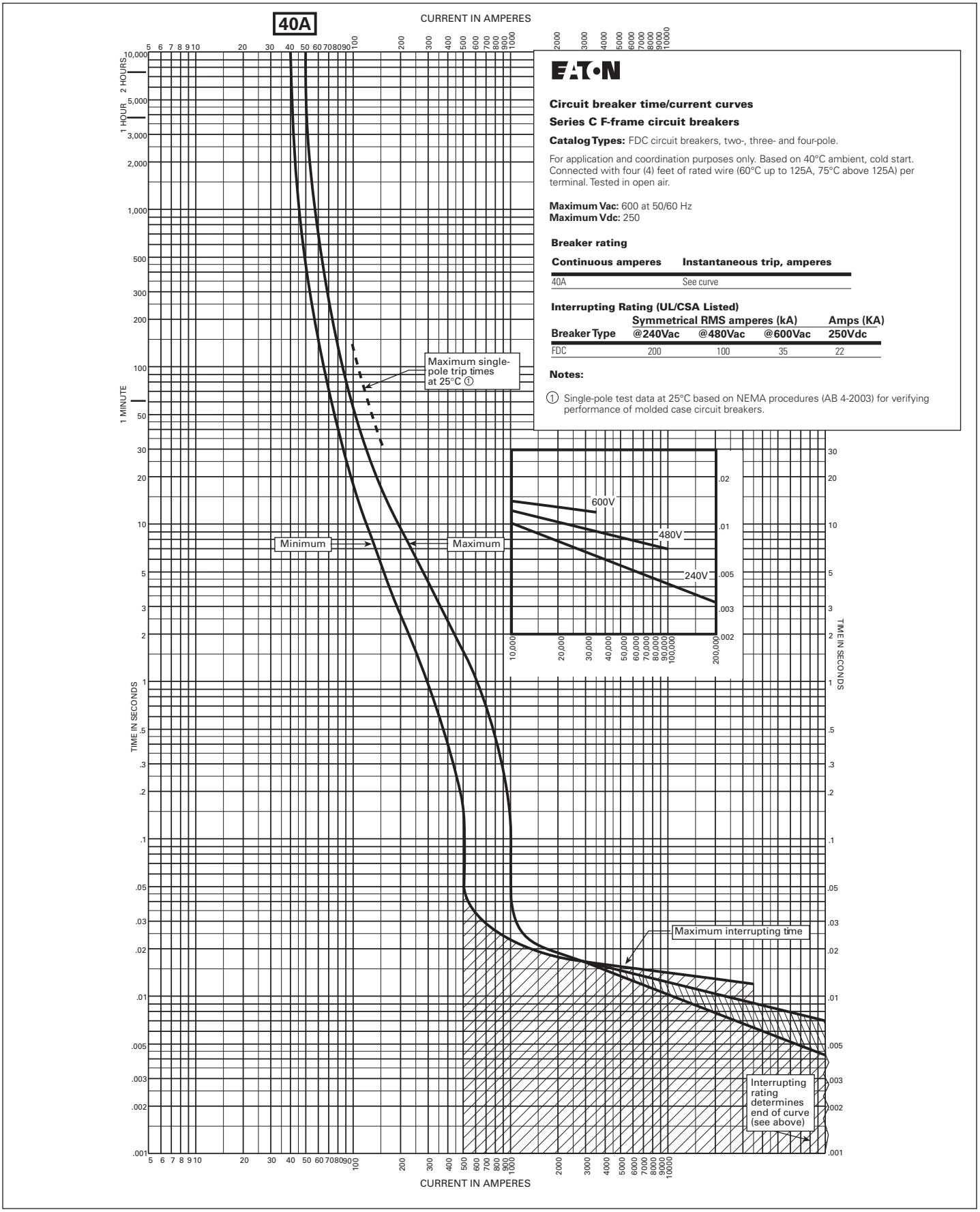


Figure 51.Type FDC 40A—Curve Number SC-5521-93A

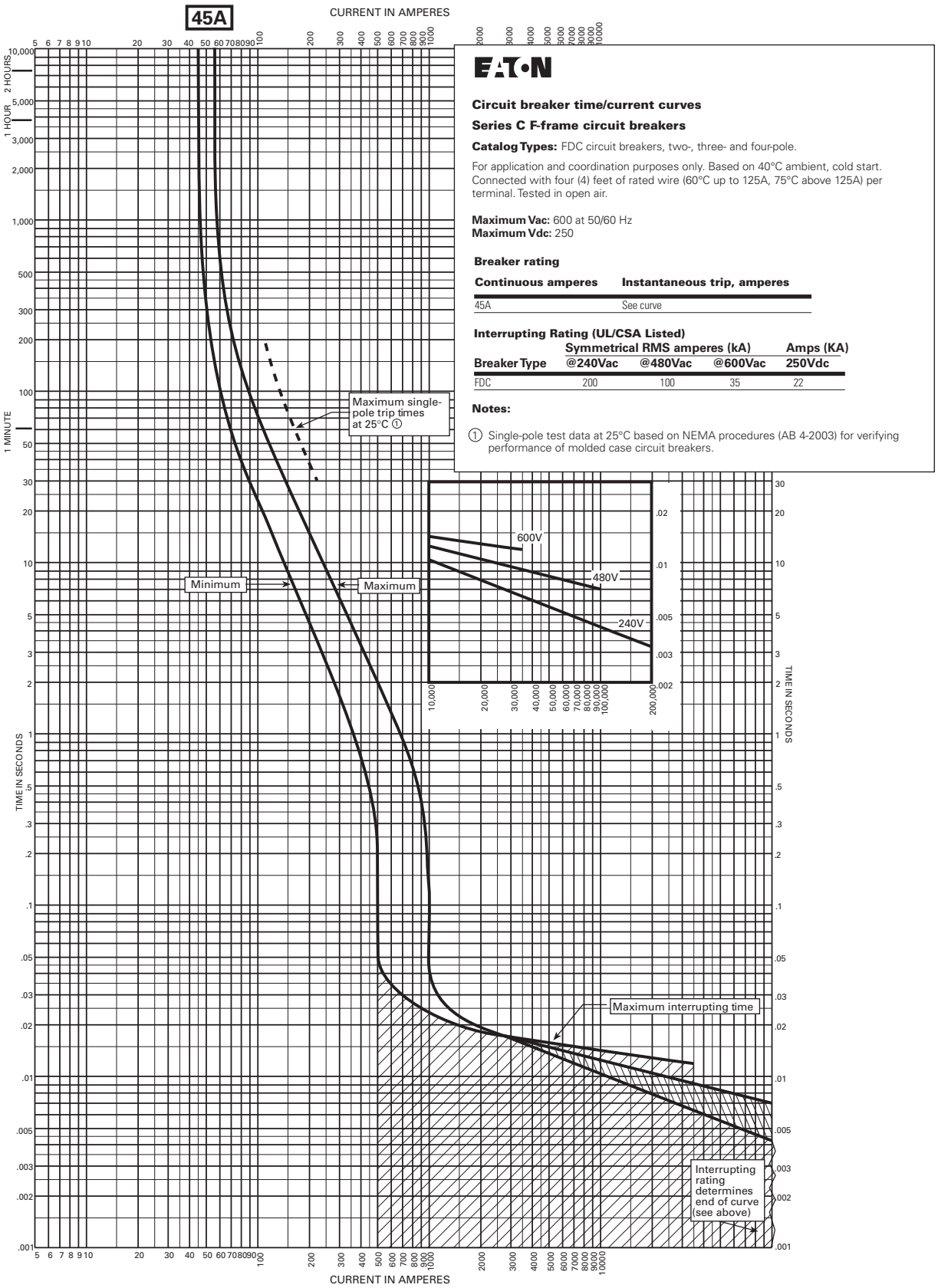


Figure 52. Type FDC 45A—Curve Number SC-5522-93A

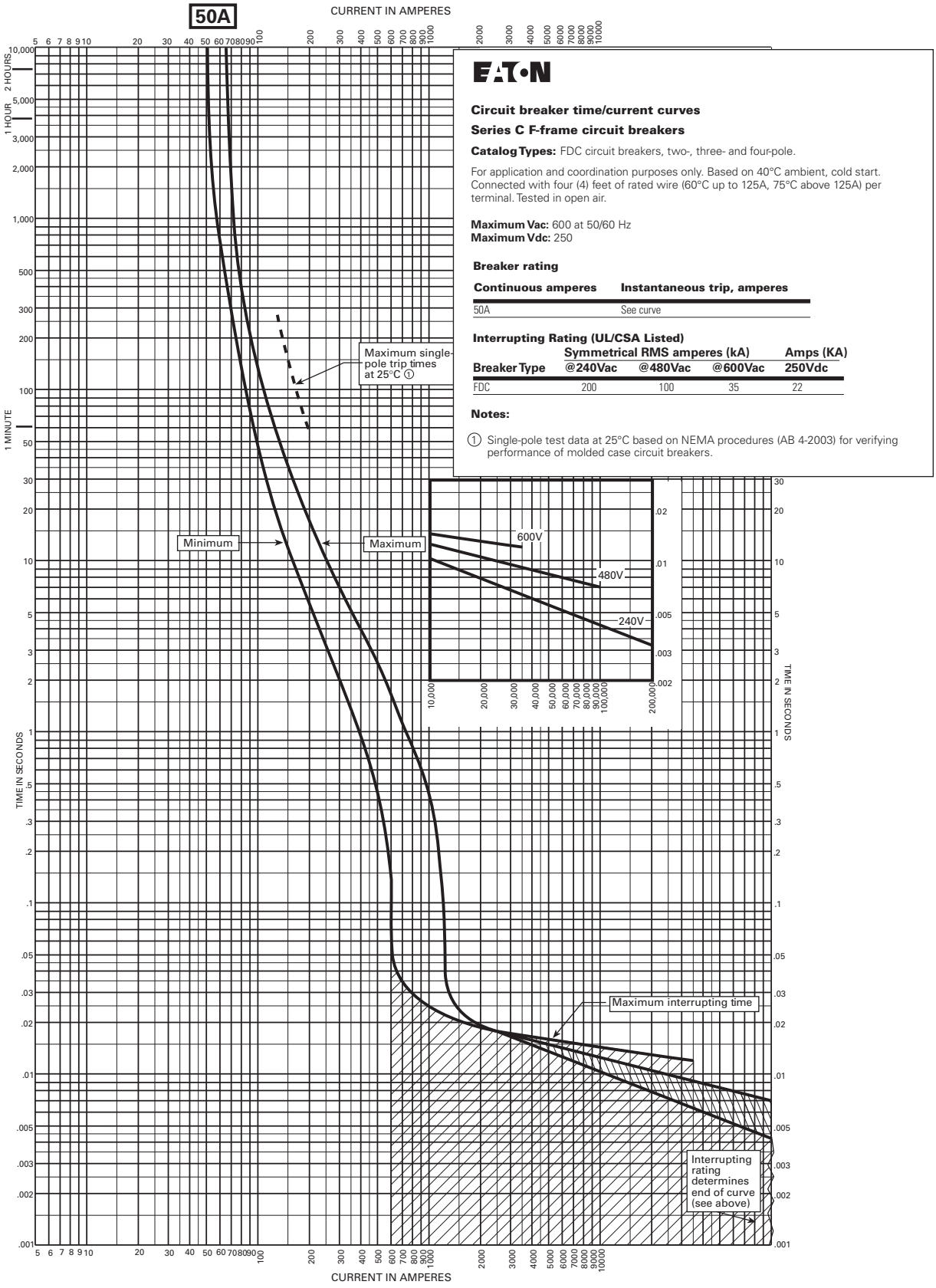


Figure 53. Type FDC 50—Curve Number SC-5523-93A

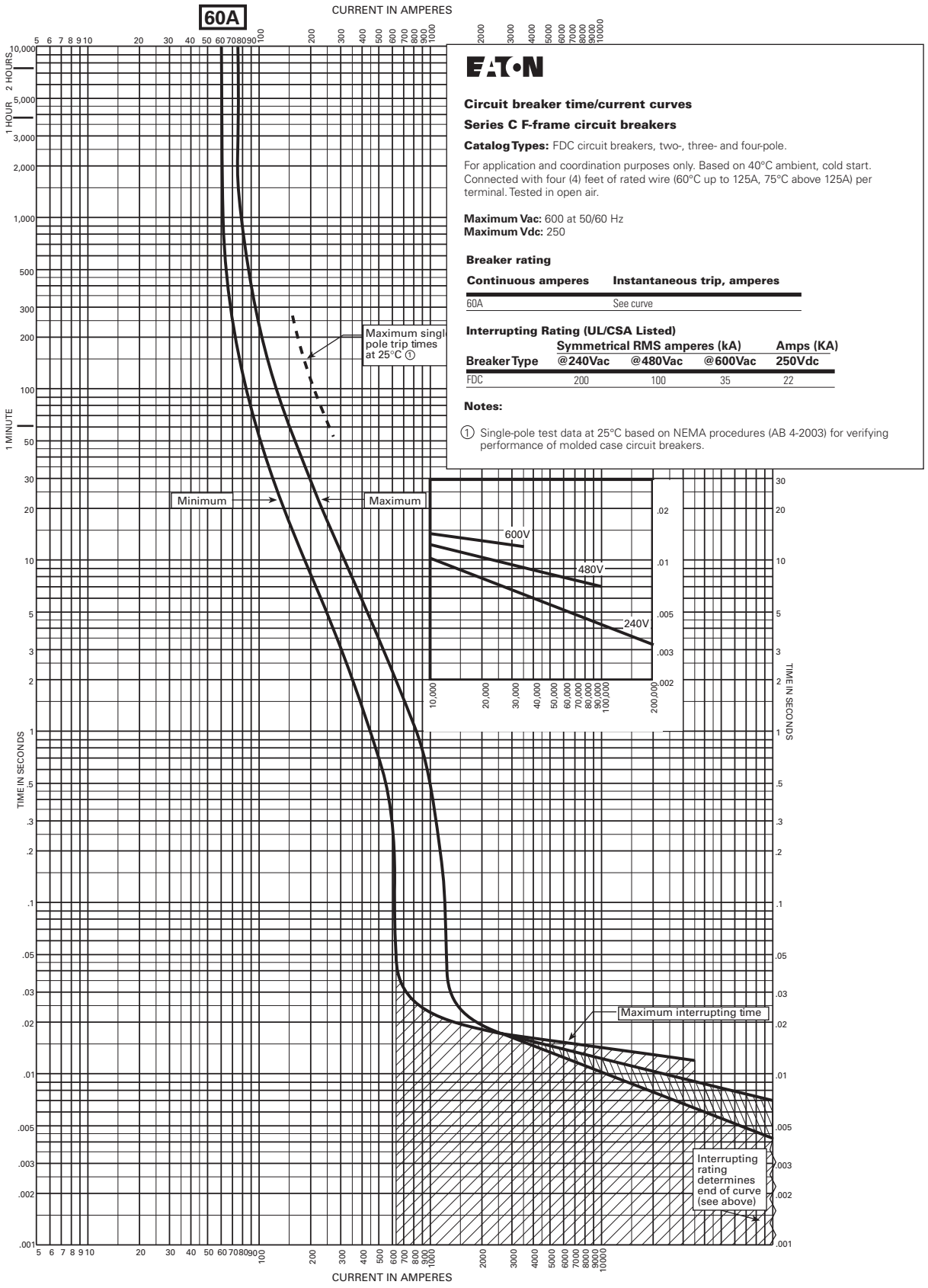


Figure 54. Type FDC 60A—Curve Number SC-5524-93A

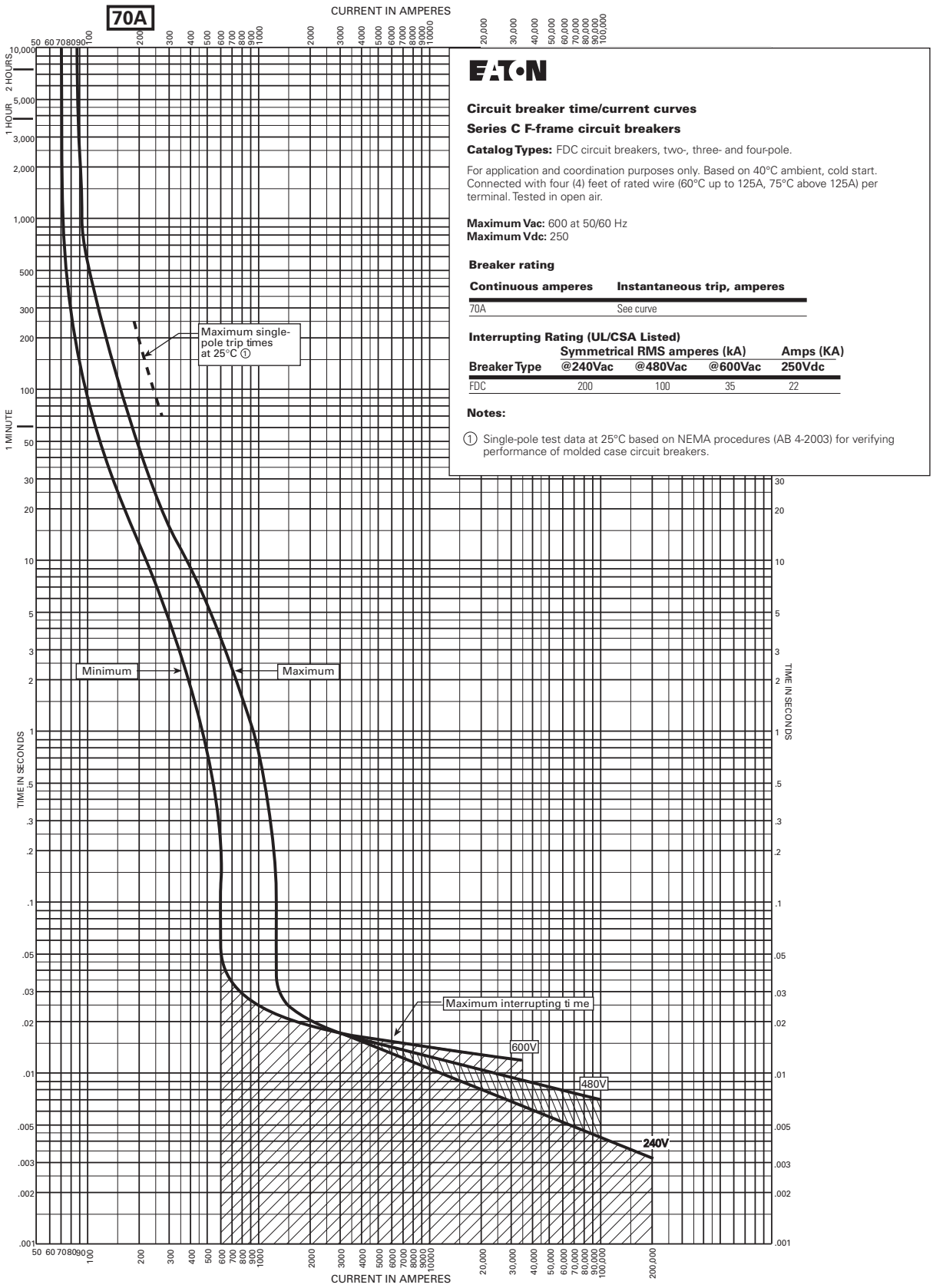
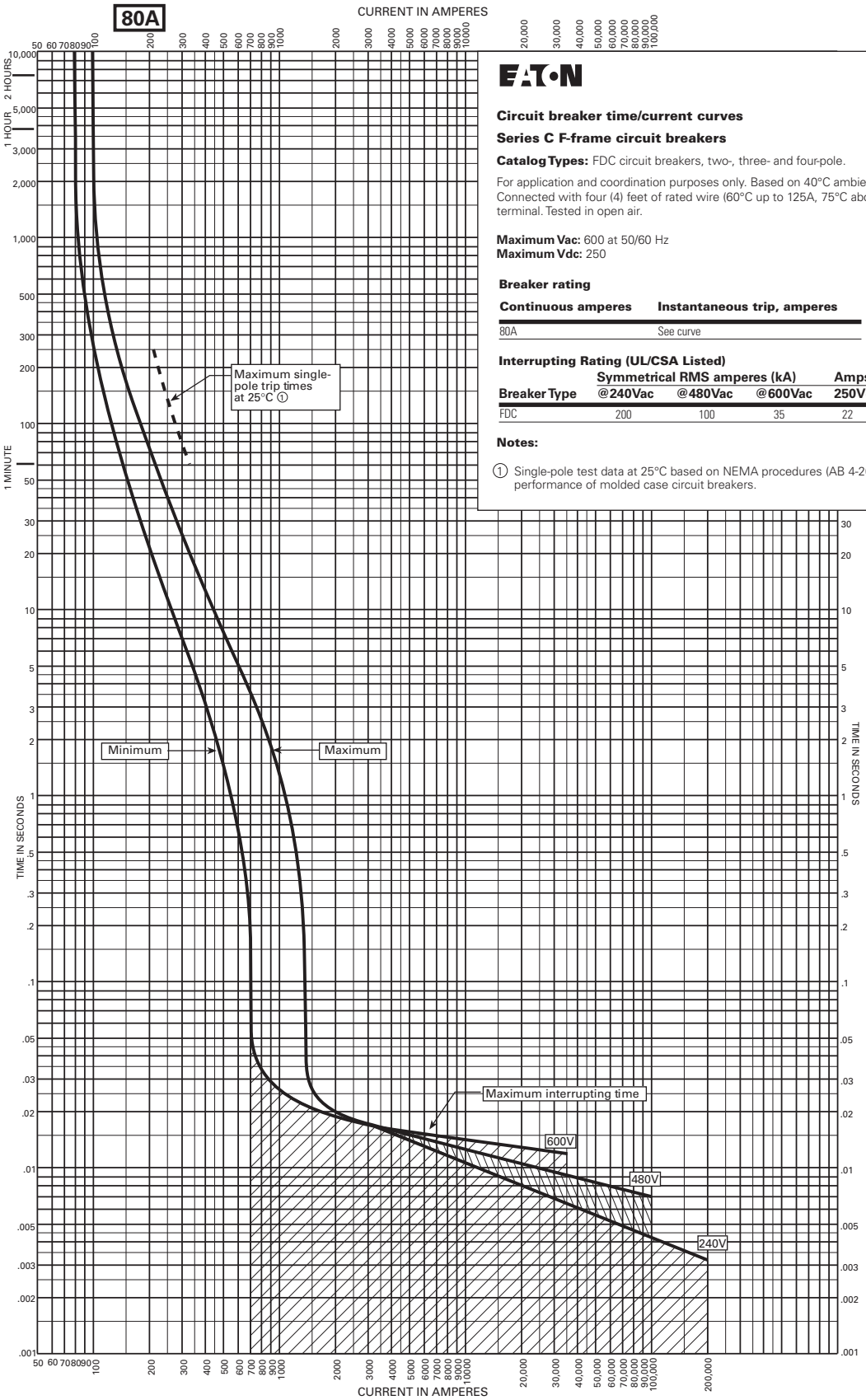


Figure 55. Type FDC 70A—Curve Number SC-5525-93A



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Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: FDC circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
80A	See curve

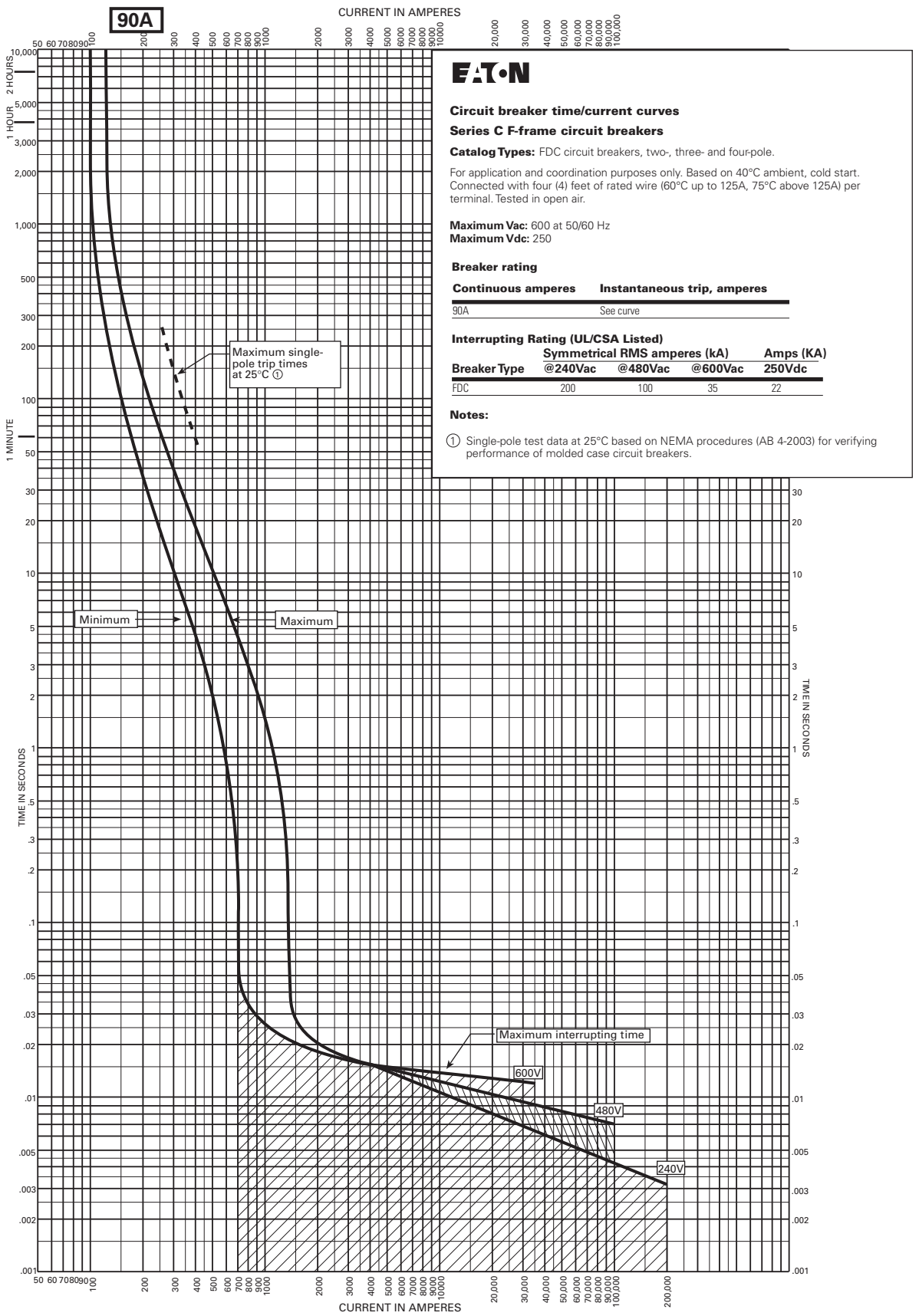
Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)			Amps (KA)
Breaker Type	@240Vac	@480Vac	@600Vac	250Vdc
FDC	200	100	35	22

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 56. Type FDC 80A—Curve Number SC-5526-93A



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: FDC circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
90A	See curve

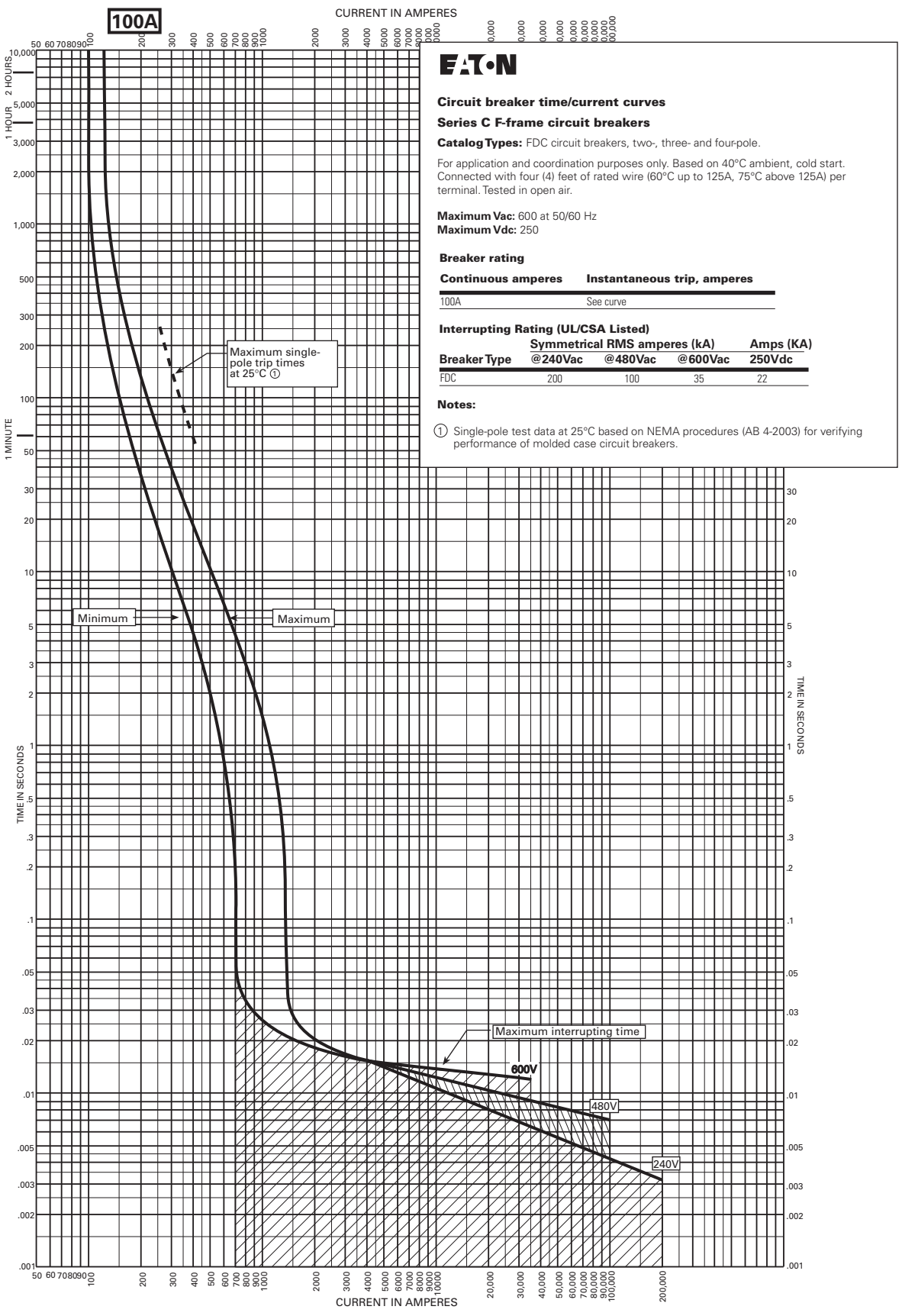
Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)			Amps (KA)
Breaker Type	@240Vac	@480Vac	@600Vac	250Vdc
FDC	200	100	35	22

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 57. Type FDC 90A—Curve Number SC-5527-93A



EATON

Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: FDC circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
100A	See curve

Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)			Amps (KA)
Breaker Type	@240Vac	@480Vac	@600Vac	250Vdc
FDC	200	100	35	22

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 58. Type FDC 100A—Curve Number SC-5528-93A

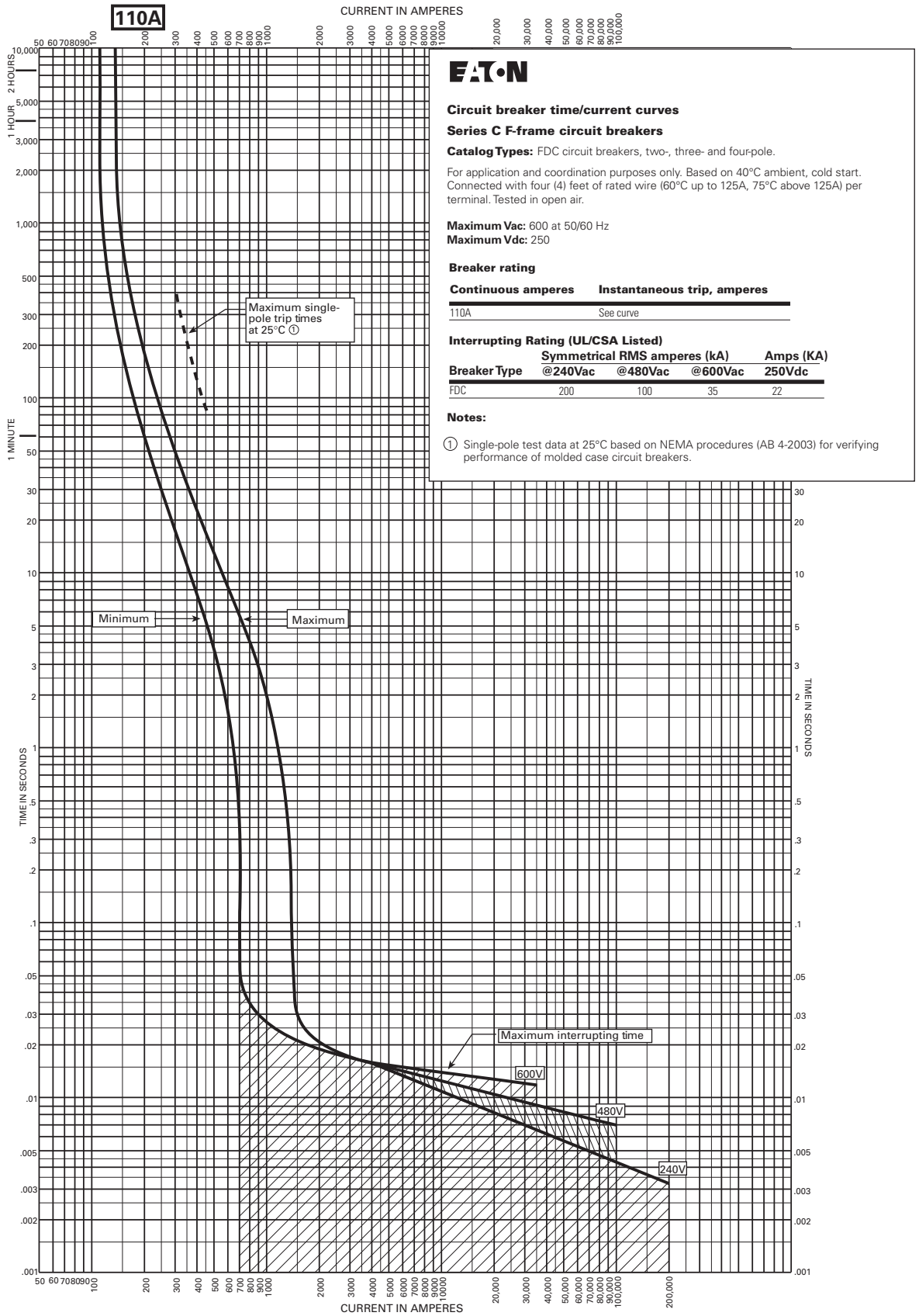
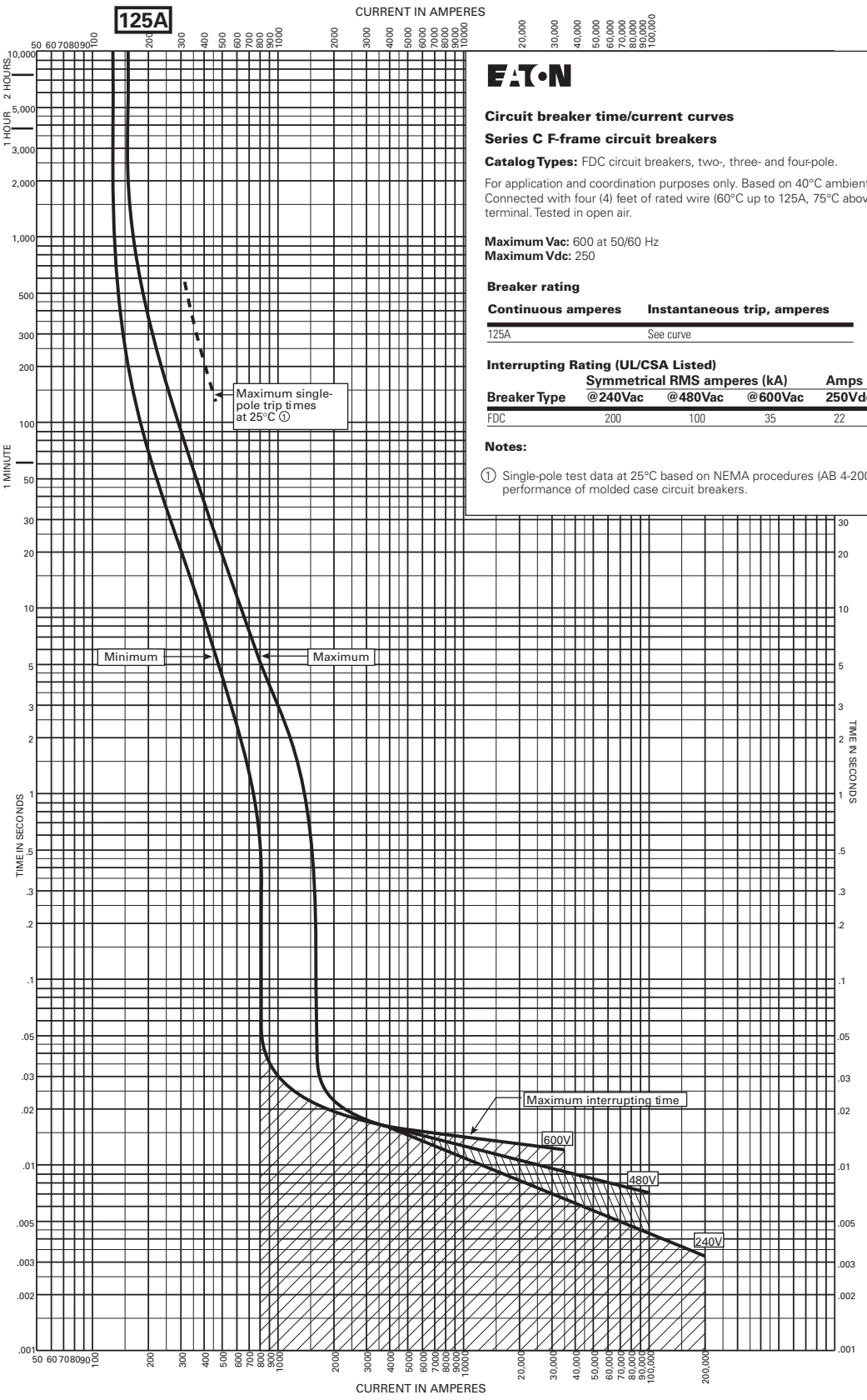


Figure 59. Type FDC 110A—Curve Number SC-5529-93A



Circuit breaker time/current curves

Series C F-frame circuit breakers

Catalog Types: FDC circuit breakers, two-, three- and four-pole.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (60°C up to 125A, 75°C above 125A) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

Continuous amperes	Instantaneous trip, amperes
125A	See curve

Interrupting Rating (UL/CSA Listed)

	Symmetrical RMS amperes (kA)			Amps (KA)
Breaker Type	@240Vac	@480Vac	@600Vac	250Vdc
FDC	200	100	35	22

Notes:

① Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

Figure 60. Type FDC 125A—Curve Number SC-5530-93A

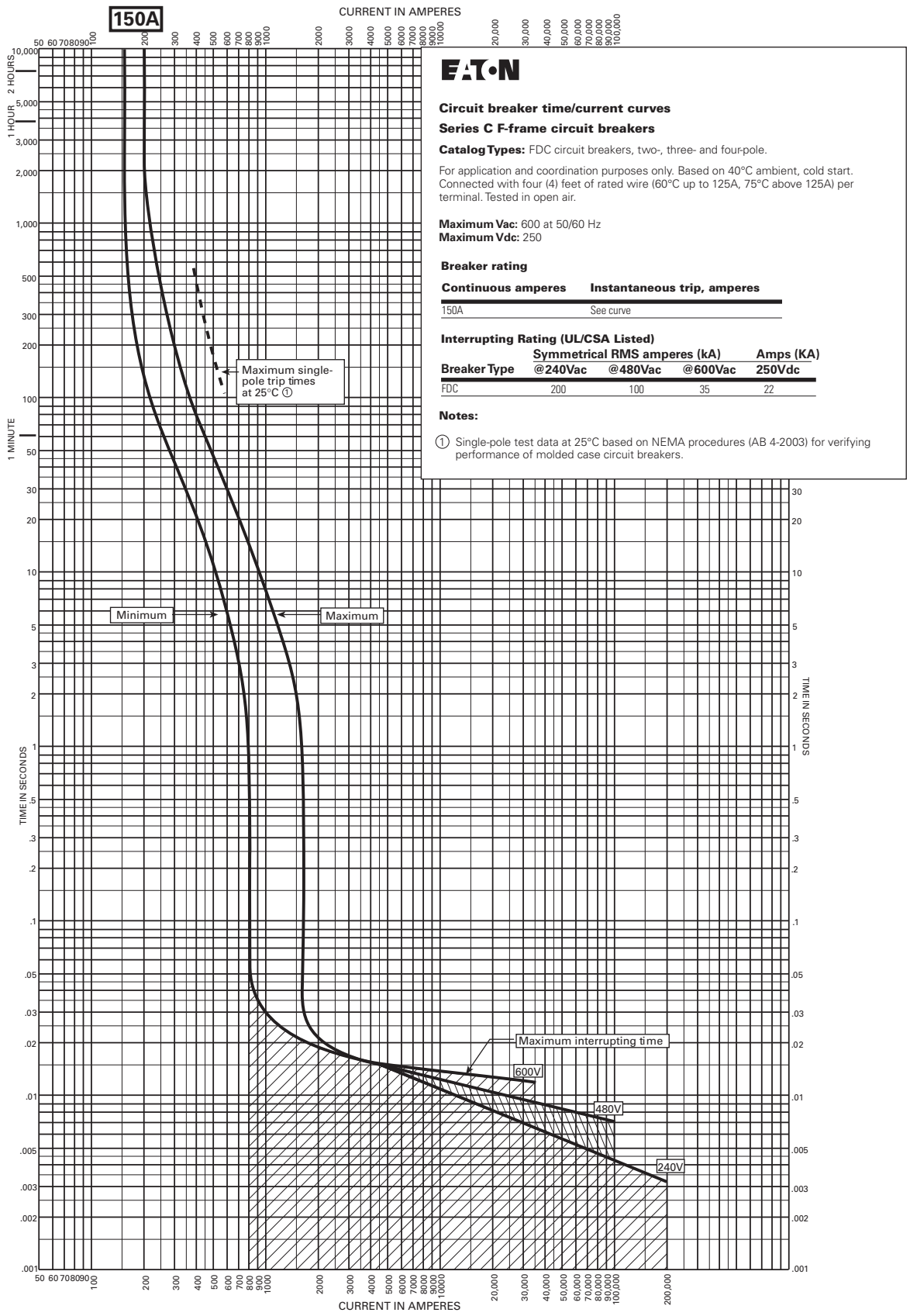
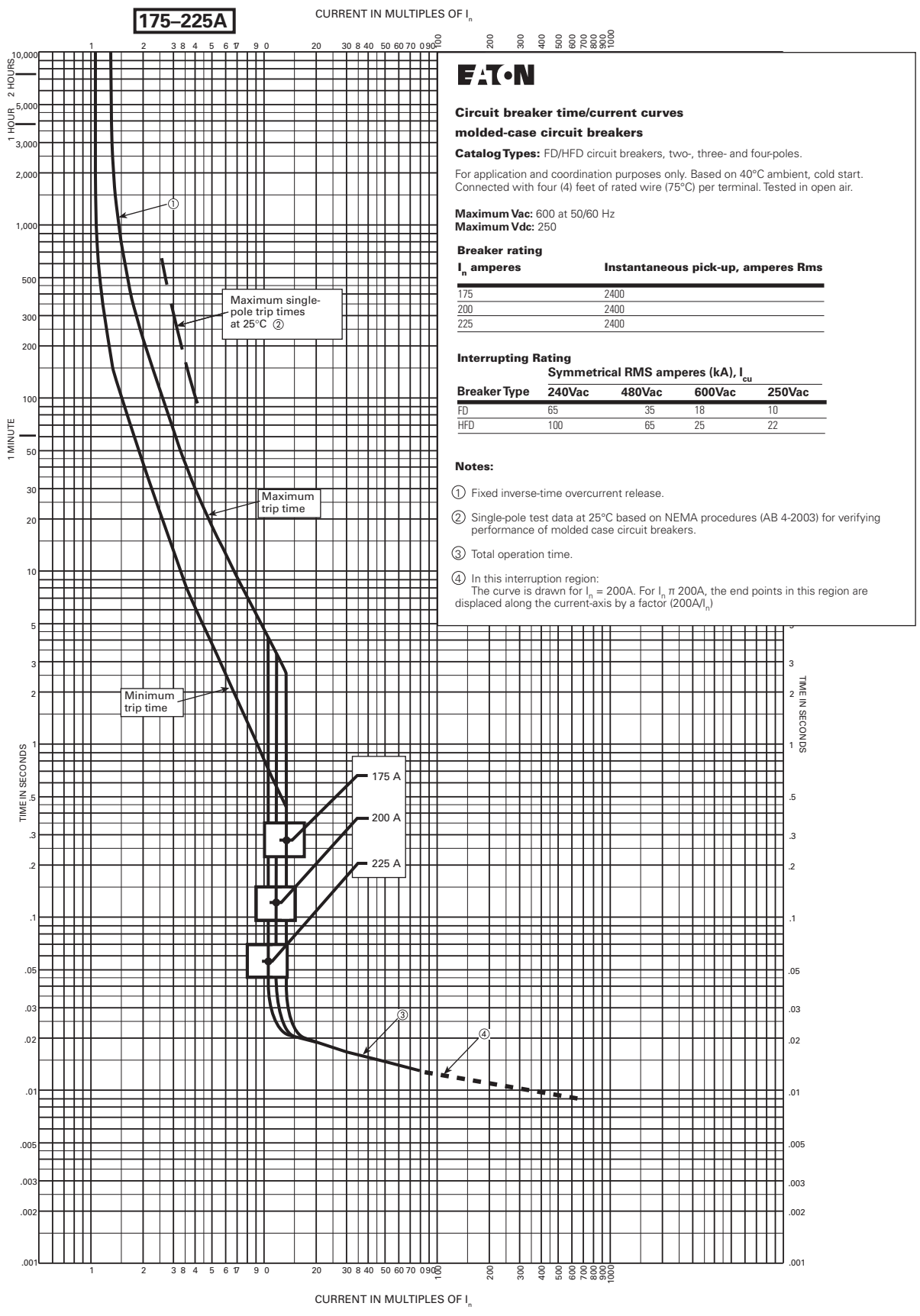


Figure 61. Type FDC 150A—Curve Number SC-5531-93A



Circuit breaker time/current curves

molded-case circuit breakers

Catalog Types: FD/HFD circuit breakers, two-, three- and four-poles.

For application and coordination purposes only. Based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (75°C) per terminal. Tested in open air.

Maximum Vac: 600 at 50/60 Hz
Maximum Vdc: 250

Breaker rating

I_n amperes	Instantaneous pick-up, amperes Rms
175	2400
200	2400
225	2400

Interrupting Rating

	Symmetrical RMS amperes (kA), I_{cu}			
Breaker Type	**240Vac**	**480Vac**	**600Vac**	**250Vac**
FD	65	35	18	10
HFD	100	65	25	22

Notes:

① Fixed inverse-time overcurrent release.

② Single-pole test data at 25°C based on NEMA procedures (AB 4-2003) for verifying performance of molded case circuit breakers.

③ Total operation time.

④ In this interruption region:
The curve is drawn for I_n = 200A. For I_n π 200A, the end points in this region are displaced along the current-axis by a factor (200A/I_n)

Figure 62. Type FDC 175–225A—Curve Number SC-6971-98