Technical Data **TD012066EN**

Effective November 2019
Supersedes November 2018

Time current curves Power Defense MCCB Frame 4 thermal-magnetic and PXR electronic trip units Standards: UL, CSA, IEC, CCC

Contents

Powering Business Worldwide

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Table 1. Revision notes

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

Revision	Curve number	Page	Date
1 Power Defense frame 4 initial release			
2 Short delay tolerances adjusted for phase and ground on I^2t slopes.			11/2019

This information is provided only as an aid to understand the catalog numbers.

It is not to be used to build catalog numbers for circuit breakers or trip units as all combinations may not be available.

Table 2. Catalog number convention

PDG4 3 M 0800 P2M J

Breaker family
PDG4 = Frame 4 global UL / CSA / IEC / GB
PDF4 = Frame 4 global-100% UL / CSA / IEC / GB (uses PDG trip units)
PDC4 = Frame 4 IEC / GB

Poles
3 = 3 pole
4 = 4 pole with 100% neutral protection
6 = 4 pole with 60% neutral protection
0 = 4 pole with 0% neutral protection

Interrupting rating designator	
kA at 480 V (UL)	Icu/cs (kA) at 415 V (IEC)
G = 35	36/36
K = 50	50/50
M = 65	70/53
N = -	70/70

Continuous current rating
0300 = 300 A
0350 = 350 A
0400 = 400 A
0500 = 500 A
0600 = 600 A
0630 = 630 A
0700 = 700 A
0800 = 800 A
1000 = 1000 A

Trip unit type
T## = Thermal magnetic trip unit (1)
V## = 50°C calibrated thermal magnetic trip unit (1)
B## = PXR 10 (1)
E## = PXR 20 (1)
D## = PXR 20D (1)
P## = PXR 25 (1)
KNS = Molded case switch
SNN = Switch disconnector

Terminals included
N = No terminals
J = Line and load terminals
K = Line only terminals
L = Load only terminals

Note: 1 See catalog for ## (protection type and available configured options).

Table 3. Electronic trip unit catalog number convention

PDG4 x PXR 3 0800 D 2 W

Style family
PDG4 = Frame 4 global UL / CSA / IEC / GB for PDG and PDF breakers
PDC4 = Frame 4 IEC / GB for PDC and PDF breakers

Accessories
x = Breaker accessory

Trip unit
PXR = Electronic trip unit

Poles
3 = 3 poles
4 = 4 poles with programmable neutral protection

Ampere frame rating
0800 = 800 A frame
1000 = 1000 A frame

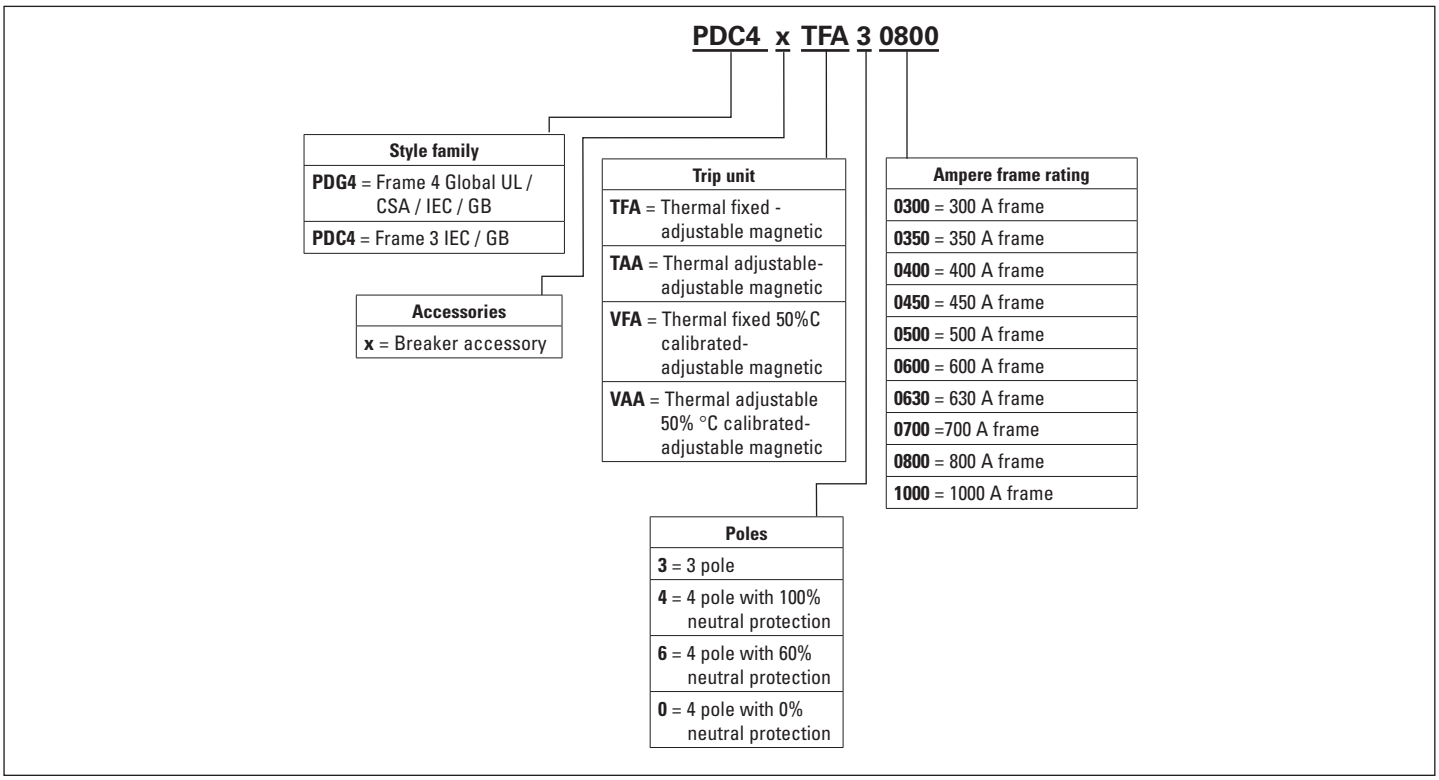
ETU trip unit style
B = PXR 10
E = PXR 20
D = PXR 20D
P = PXR 25

Features
N = None
R = Relays
Z = ZSI, relays
M = Modbus, relays
C = CAM interface, relays
D = Modbus, CAM interface, relays
W = ZSI & Modbus
X = ZSI, CAM interface, relays
Y = ZSI, Modbus, CAM interface, relays

ETU protection style
1 = LI (PXR10 IEC only)
2 = LSI
3 = LSIG
4 = LSI ARMS
5 = LSIG ARMS

Note: IEC standard breakers include the CE mark; GB standard breakers include the CCC mark.

Table 4. Magnetic trip unit thermal catalog number convention



Note: IEC standard breakers include the CE mark; GB standard breakers include the CCC mark.

Table 5. Symmetrical RMS interruption ratings (kA) for each breaker frame

	Voltage / Frame*	240V	480V	600V	240V	415V	440V	480V	525V	690V	125Vdc	250Vdc
Globally rated	**PDG4xG**	65	35	18	55	36	30	25	20	8	-	22
	PDG4xK	85	50	25	85	50	35	35	25	10	-	22
	PDG4xM	100	65	35	100	70	50	50	30	15	-	25
Globally rated (UL 100%)	**PDF4xG**	65	35	18	55	36	30	25	20	8	-	22
	PDF4xK	85	50	25	85	50	35	35	25	10	-	22
	PDF4xM	100	65	35	100	70	50	50	30	15	-	25
IEC / GB only	**PDC4xG**	-	-	-	55	36	30	25	20	8	-	22
	PDC4xK	-	-	-	85	50	35	35	25	10	-	22
	PDC4xM	-	-	-	100	70	50	50	30	15	-	25
	PDC4xN	-	-	-	100	70	65	65	35	20	-	25
	PDC4xN (1000A)	-	-	-	100	70	-	65	35	-	-	-

*800A frame unless noted

Table 6. Curve notes

1.	These curves apply for 50Hz and 60Hz applications
2.	The maximum voltage rating for the frame style is stated in Table 5.
3.	These curves are comprehensive for Power Defense style circuit breakers including frame sizes, ratings and constructions stated.
4.	The total clearing times shown include the response time for the trip unit, the breaker opening and the interruption of the current. The bottom of the time band is the minimum commit to trip time.
5.	The end of the curve is determined by the application or the interrupting rating of the circuit breaker.
6.	Thermal magnetic trip unit calibration based on 40ºC ambient, cold start. Tested with 4 feet of rated wire (75ºC) per terminal. Tested in open air with current in all poles.
7.	Thermal magnetic trip unit instantaneous calibration based on single pole testing.
8.	All electronic trip units have an over temperature protection feature that will trip the breaker when the internal temperature of the ETU is over 105ºC
9	All time current data for PXR is based on 3 phase testing.

Labels

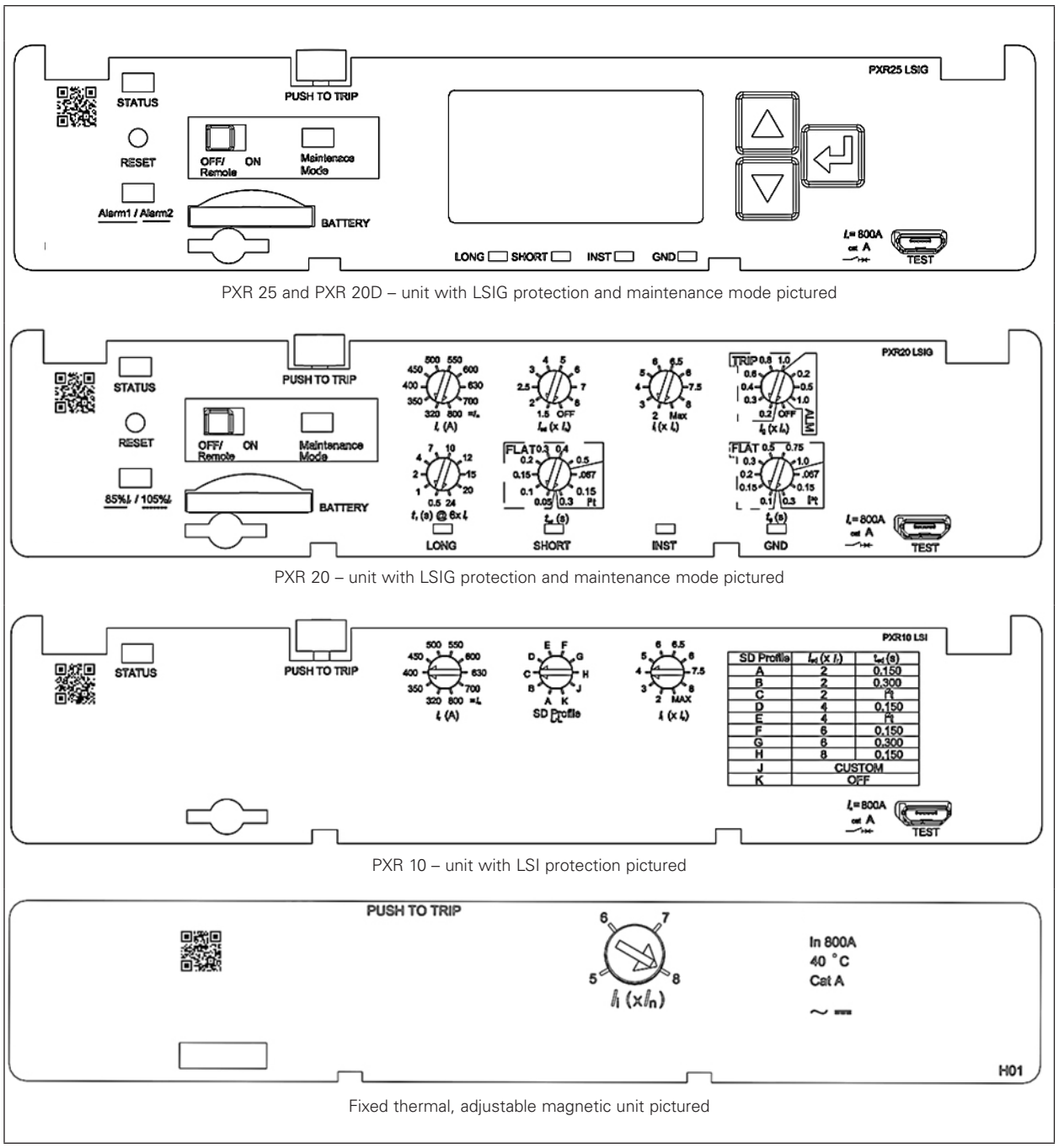
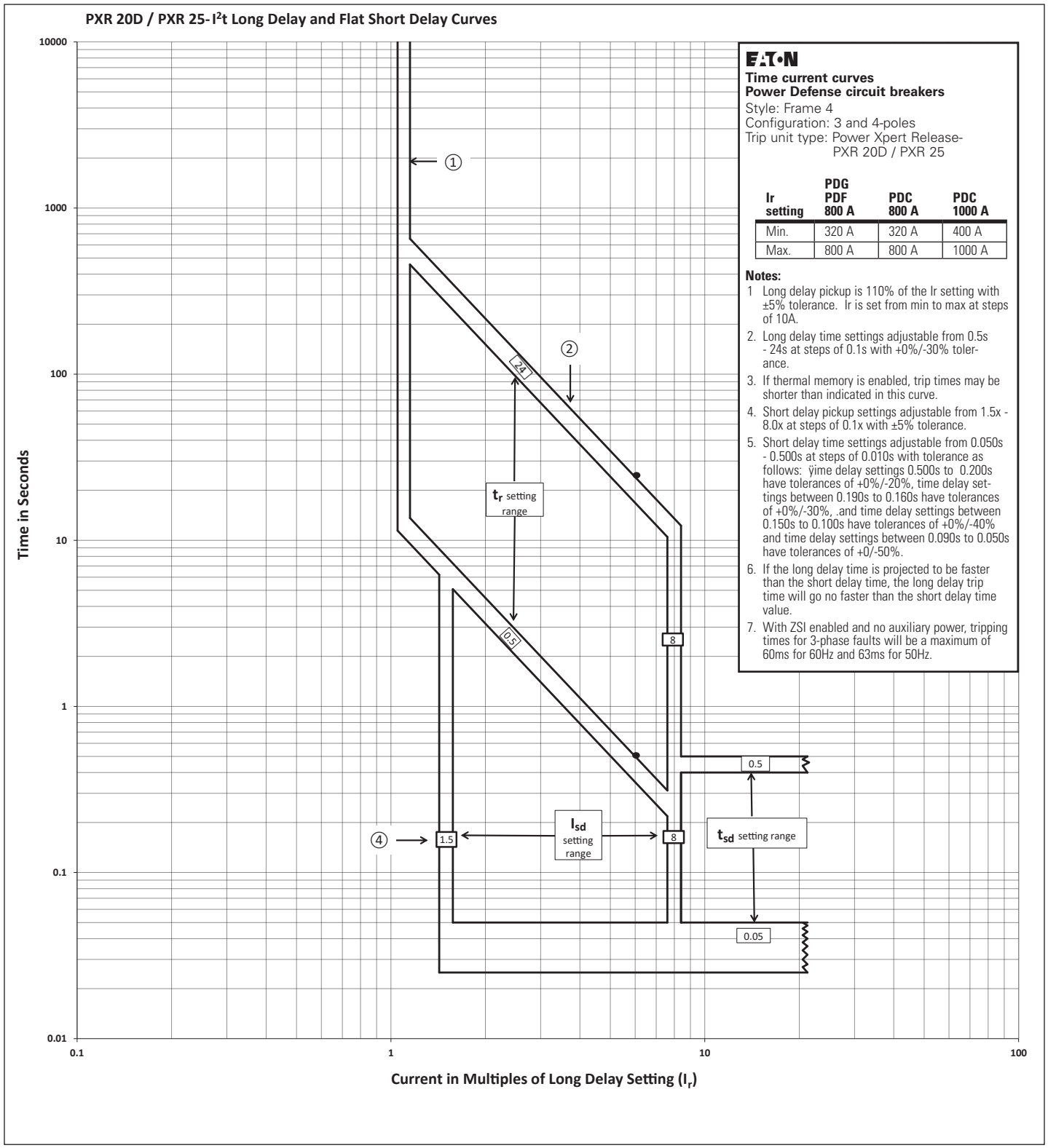


Figure 1. Power Defense frame 4 trip unit front labels

Note: Trip unit drawings in Figure 1 are representative of the face plates provided. Values on the trip unit dials will change based upon the specific breaker and trip unit. Refer to the time current curve of the breaker or the PXR User Guide for the specific settings.

Curves



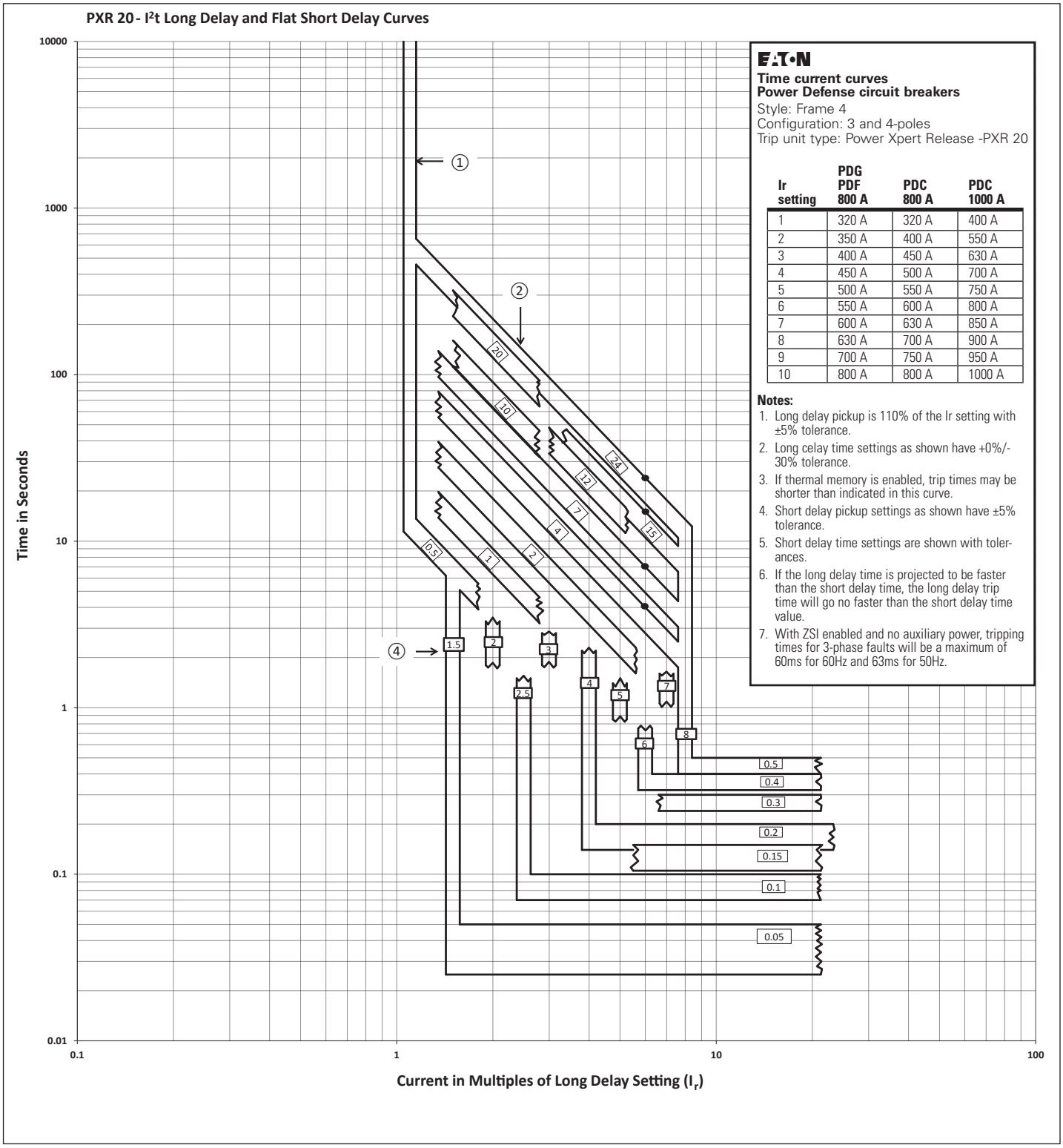
Time current curves
Power Defense circuit breakers
Style: Frame 4
Configuration: 3 and 4-poles
Trip unit type: Power Xpert Release-
PXR 20D / PXR 25

Ir setting	PDG PDF 800 A	PDC 800 A	PDC 1000 A
Min.	320 A	320 A	400 A
Max.	800 A	800 A	1000 A

Notes:

1. Long delay pickup is 110% of the Ir setting with ±5% tolerance. Ir is set from min to max at steps of 10A.
2. Long delay time settings adjustable from 0.5s - 24s at steps of 0.1s with +0%/-30% tolerance.
3. If thermal memory is enabled, trip times may be shorter than indicated in this curve.
4. Short delay pickup settings adjustable from 1.5x - 8.0x at steps of 0.1x with ±5% tolerance.
5. Short delay time settings adjustable from 0.050s - 0.500s at steps of 0.010s with tolerance as follows: ÿime delay settings 0.500s to 0.200s have tolerances of +0%/-20%, time delay settings between 0.190s to 0.160s have tolerances of +0%/-30%, .and time delay settings between 0.150s to 0.100s have tolerances of +0%/-40% and time delay settings between 0.090s to 0.050s have tolerances of +0/-50%.
6. If the long delay time is projected to be faster than the short delay time, the long delay trip time will go no faster than the short delay time value.
7. With ZSI enabled and no auxiliary power, tripping times for 3-phase faults will be a maximum of 60ms for 60Hz and 63ms for 50Hz.

Figure 2. PXR 20D / PXR 25 - I²t long delay and flat short delay **November 2019**



EATON

Time current curves
Power Defense circuit breakers
Style: Frame 4
Configuration: 3 and 4-poles
Trip unit type: Power Xpert Release -PXR 20

Ir setting	PDG PDF 800 A	PDC 800 A	PDC 1000 A
1	320 A	320 A	400 A
2	350 A	400 A	550 A
3	400 A	450 A	630 A
4	450 A	500 A	700 A
5	500 A	550 A	750 A
6	550 A	600 A	800 A
7	600 A	630 A	850 A
8	630 A	700 A	900 A
9	700 A	750 A	950 A
10	800 A	800 A	1000 A

Notes:

1. Long delay pickup is 110% of the Ir setting with ±5% tolerance.
2. Long celay time settings as shown have +0%/-30% tolerance.
3. If thermal memory is enabled, trip times may be shorter than indicated in this curve.
4. Short delay pickup settings as shown have ±5% tolerance.
5. Short delay time settings are shown with tolerances.
6. If the long delay time is projected to be faster than the short delay time, the long delay trip time will go no faster than the short delay time value.
7. With ZSI enabled and no auxiliary power, tripping times for 3-phase faults will be a maximum of 60ms for 60Hz and 63ms for 50Hz.

Figure 3. PXR 20 - I²t long delay and flat short delay **November 2019**

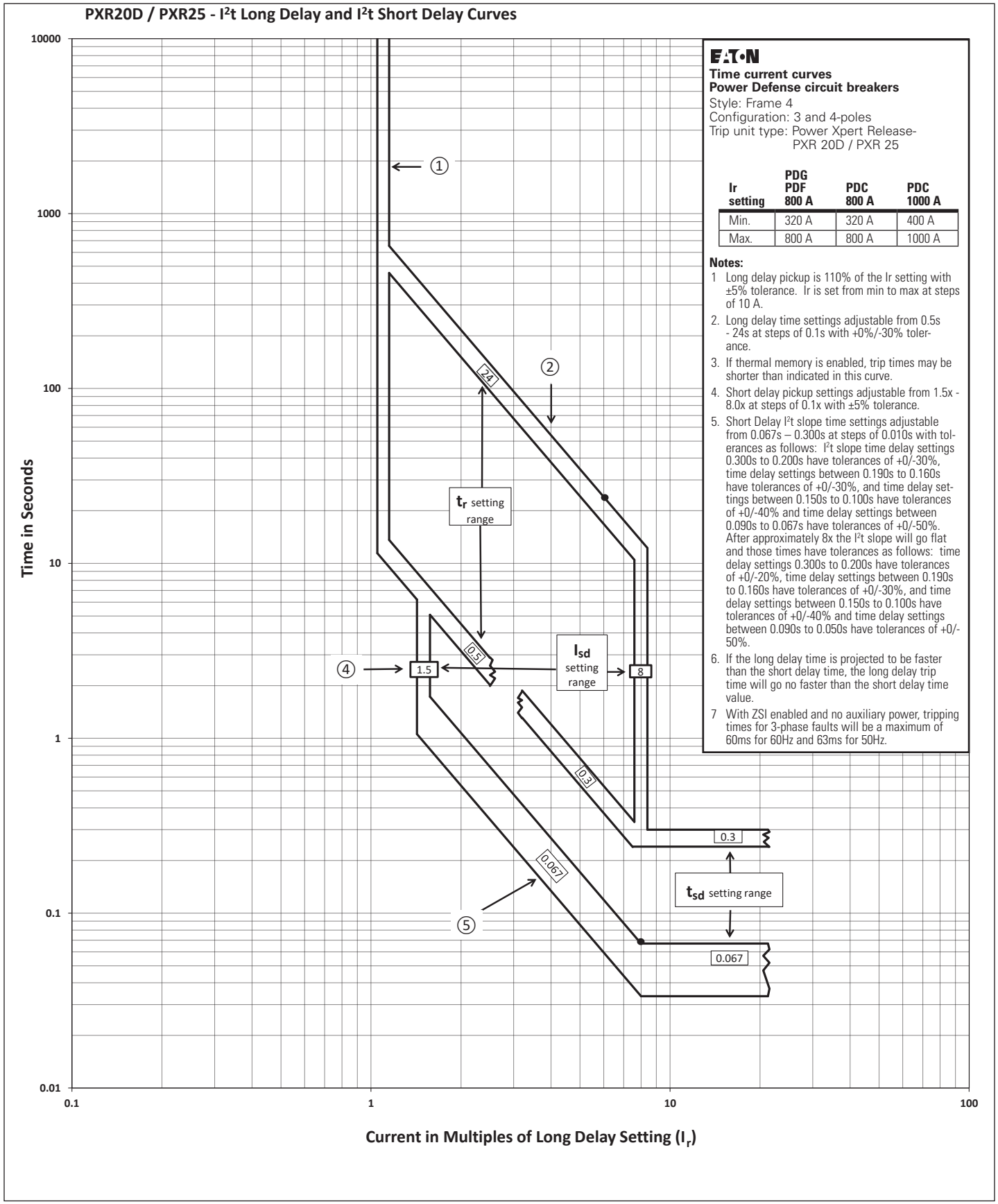
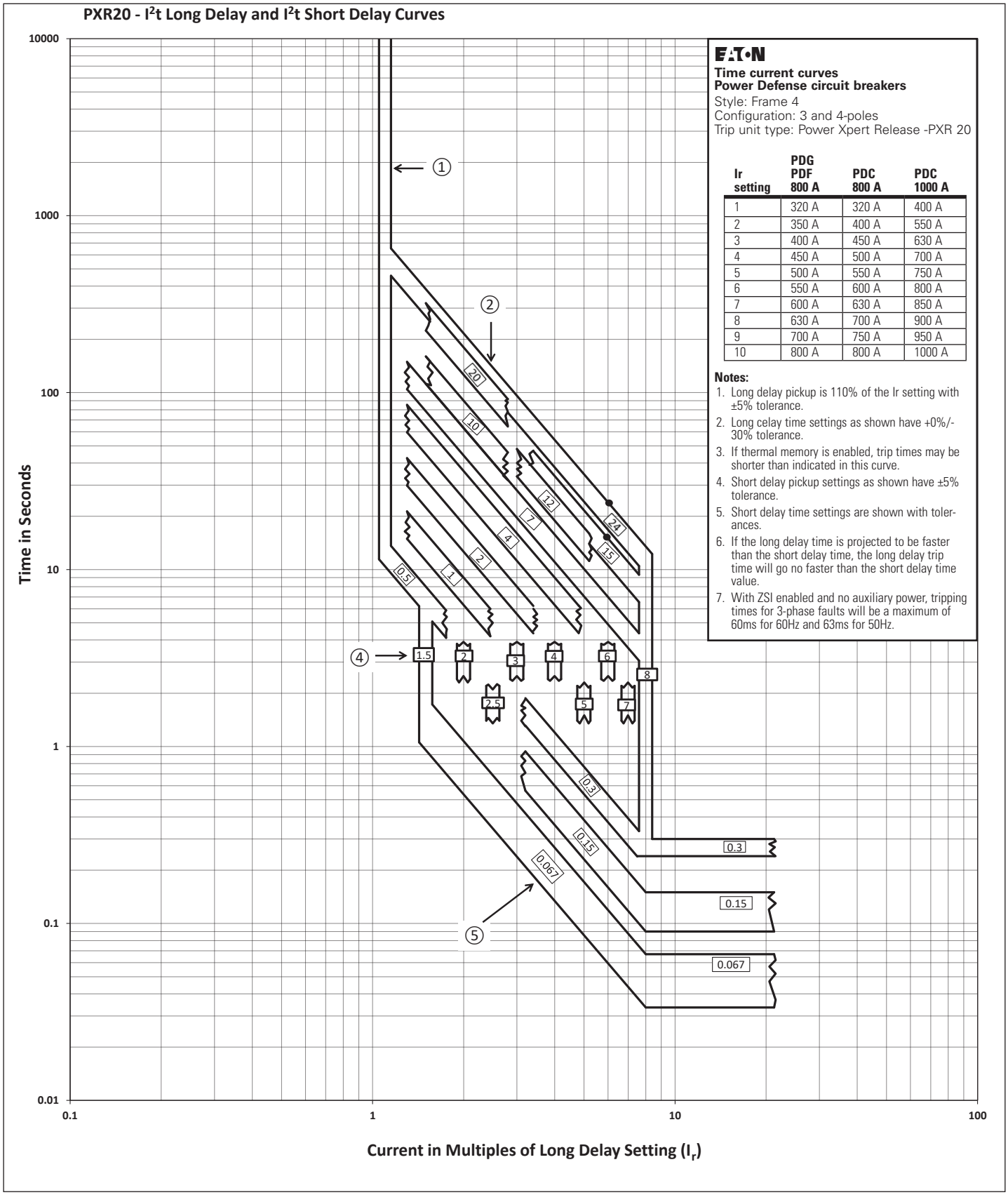


Figure 4. PXR 20D / PXR 25 - I²t long delay and I²t short delay **November 2019**



EATON

Time current curves
Power Defense circuit breakers
Style: Frame 4
Configuration: 3 and 4-poles
Trip unit type: Power Xpert Release -PXR 20

Ir setting	PDG PDF 800 A	PDC 800 A	PDC 1000 A
1	320 A	320 A	400 A
2	350 A	400 A	550 A
3	400 A	450 A	630 A
4	450 A	500 A	700 A
5	500 A	550 A	750 A
6	550 A	600 A	800 A
7	600 A	630 A	850 A
8	630 A	700 A	900 A
9	700 A	750 A	950 A
10	800 A	800 A	1000 A

Notes:
1. Long delay pickup is 110% of the Ir setting with ±5% tolerance.
2. Long celay time settings as shown have +0%/-30% tolerance.
3. If thermal memory is enabled, trip times may be shorter than indicated in this curve.
4. Short delay pickup settings as shown have ±5% tolerance.
5. Short delay time settings are shown with tolerances.
6. If the long delay time is projected to be faster than the short delay time, the long delay trip time will go no faster than the short delay time value.
7. With ZSI enabled and no auxiliary power, tripping times for 3-phase faults will be a maximum of 60ms for 60Hz and 63ms for 50Hz.

Figure 5. PXR 20 I²t long delay and I²t short delay

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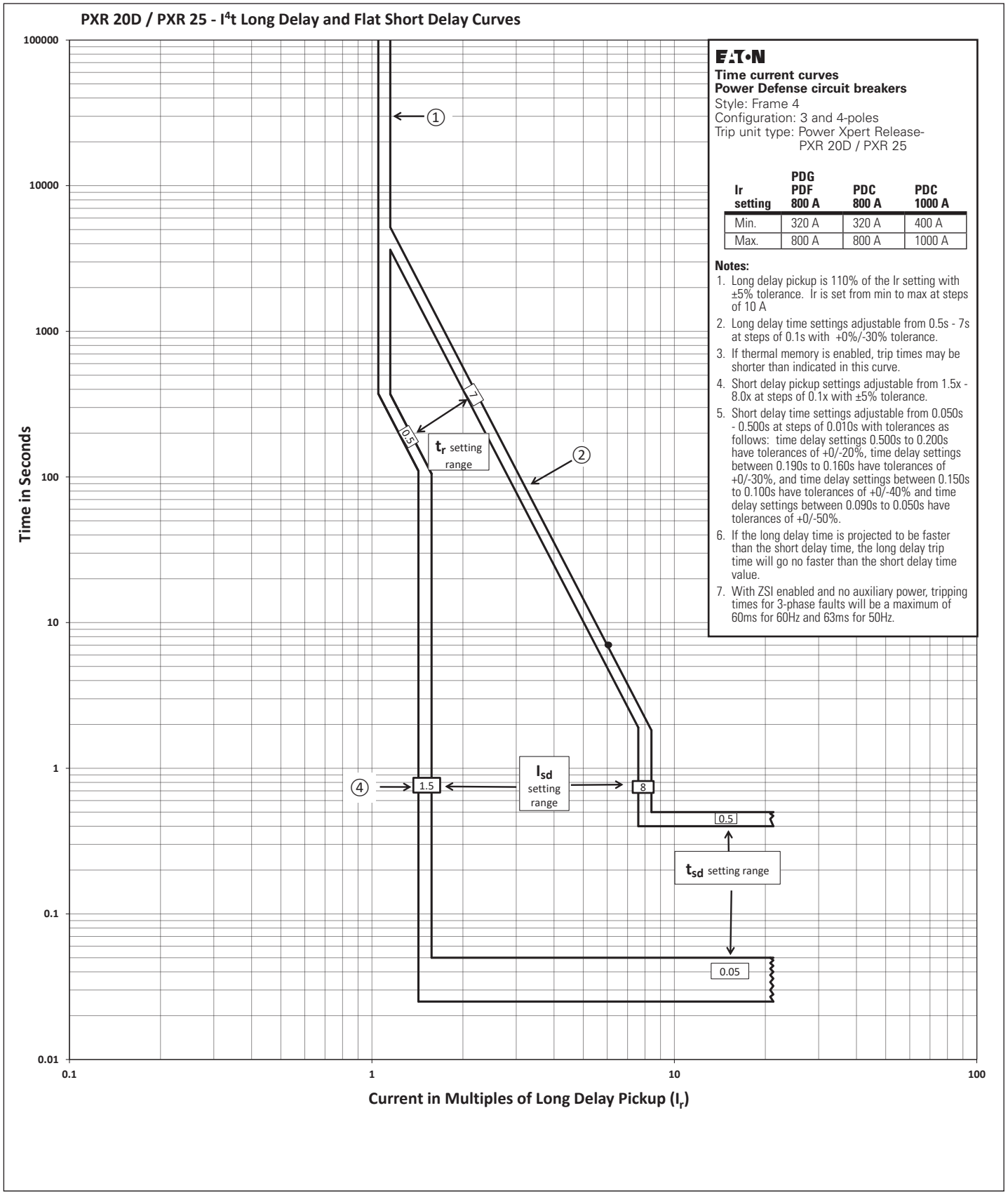

Figure 6. PXR 20D / PXR 25 - I4t long delay and flat short delay **November 2019**

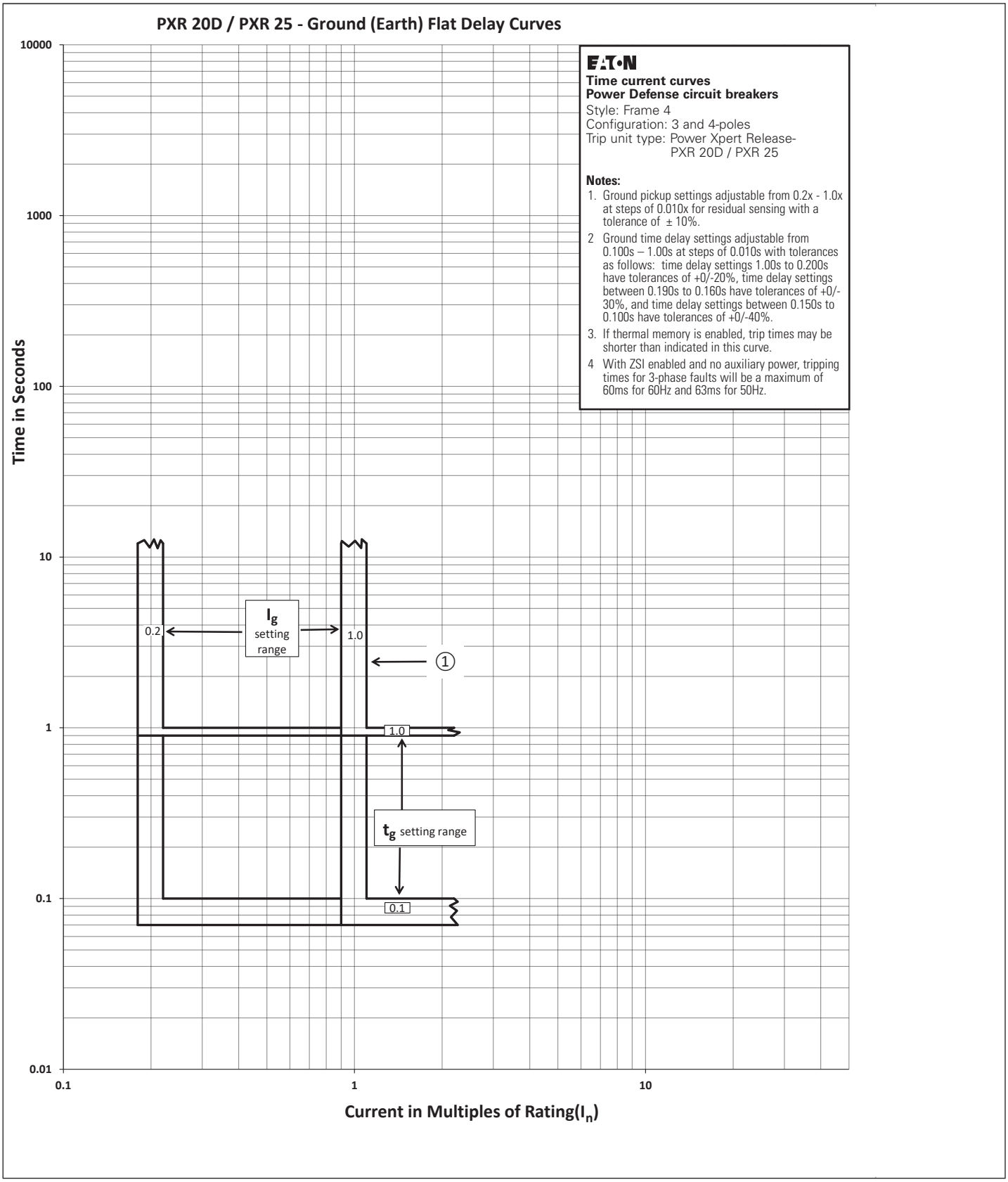

Figure 7. PXR 20D / PXR 25 ground (earth) flat delay

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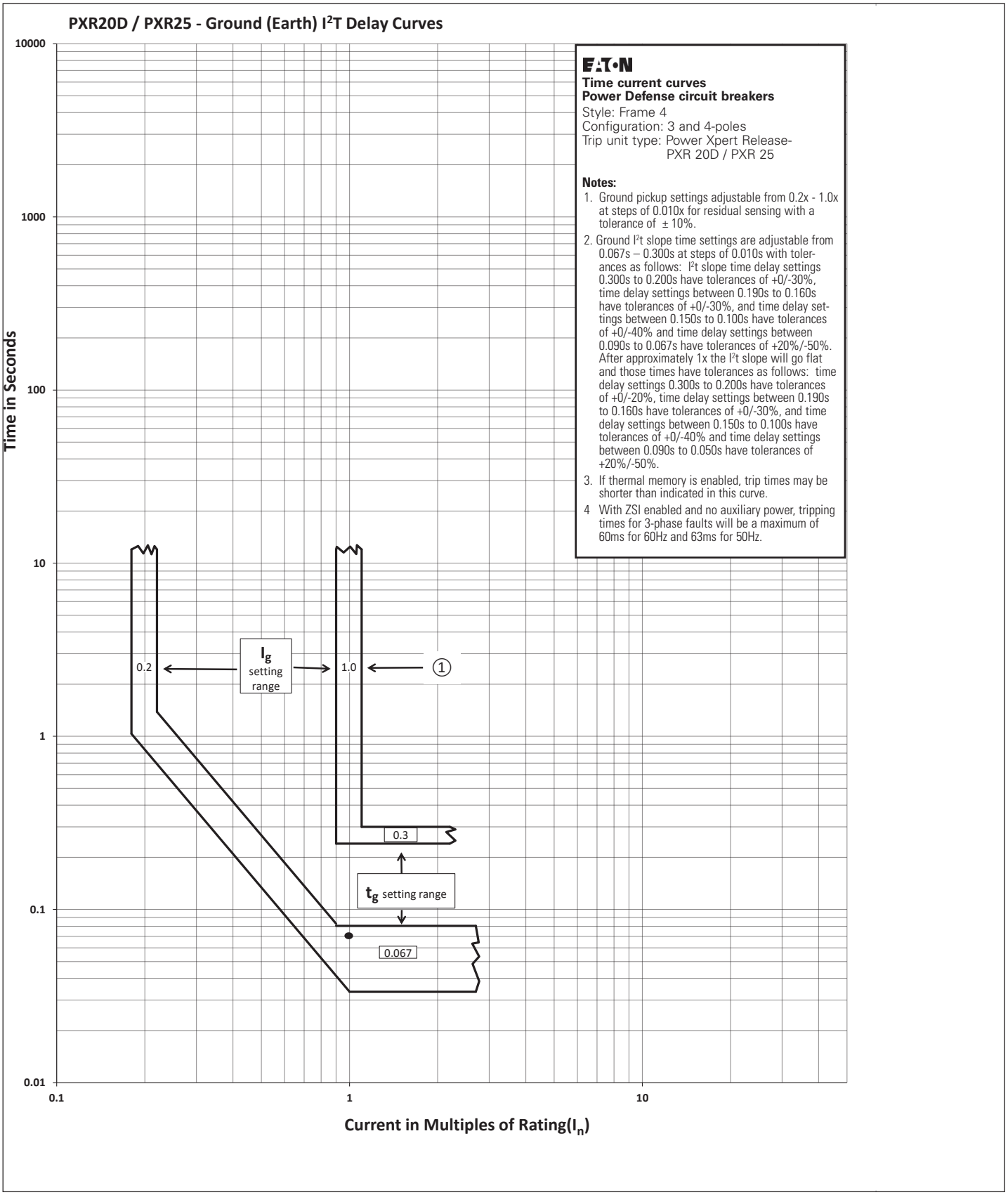

Figure 8. PXR 20D / PXR 25 - ground (earth) I²t delay

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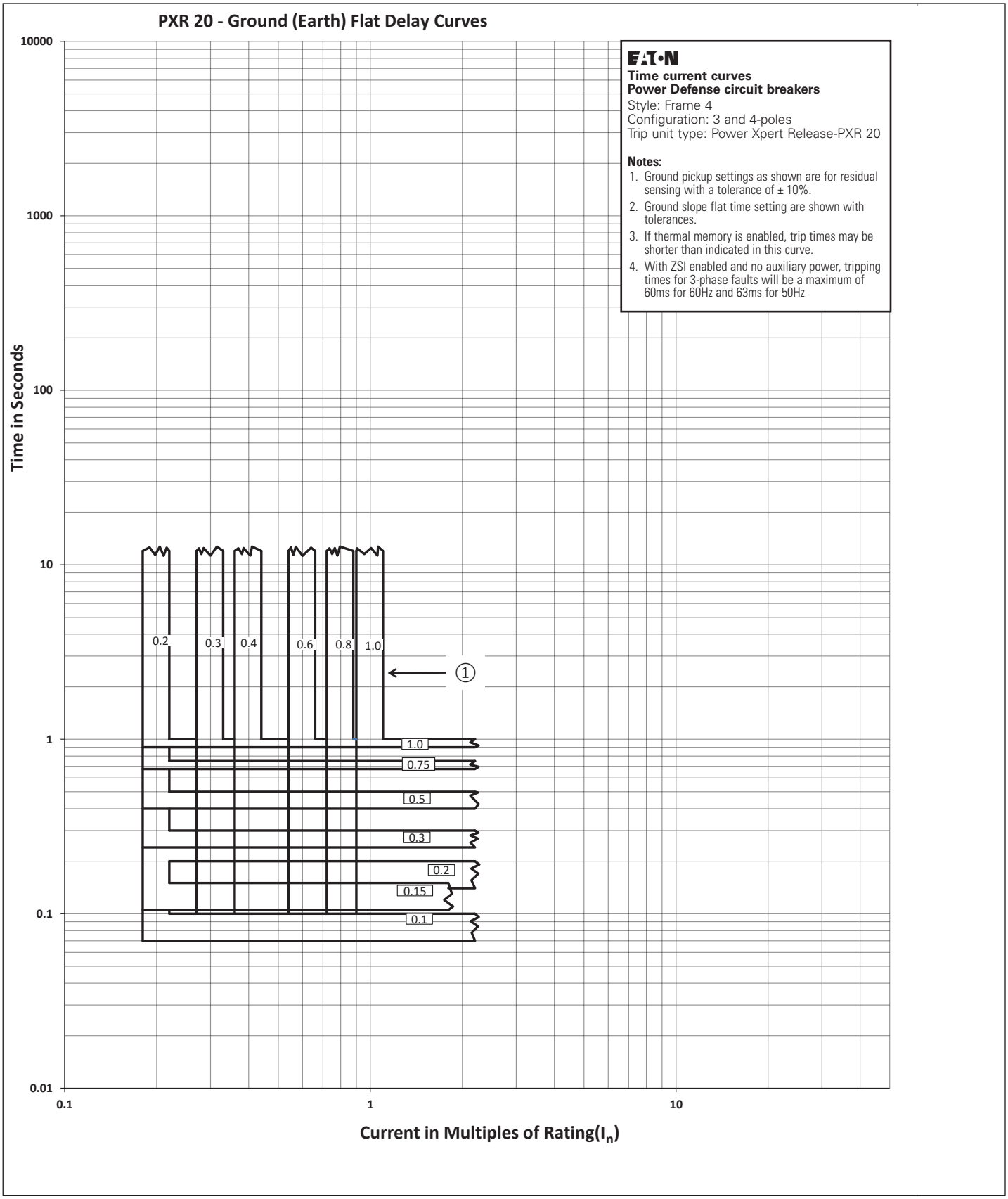

Figure 9. PXR 20 - ground (earth) flat delay

November 2019

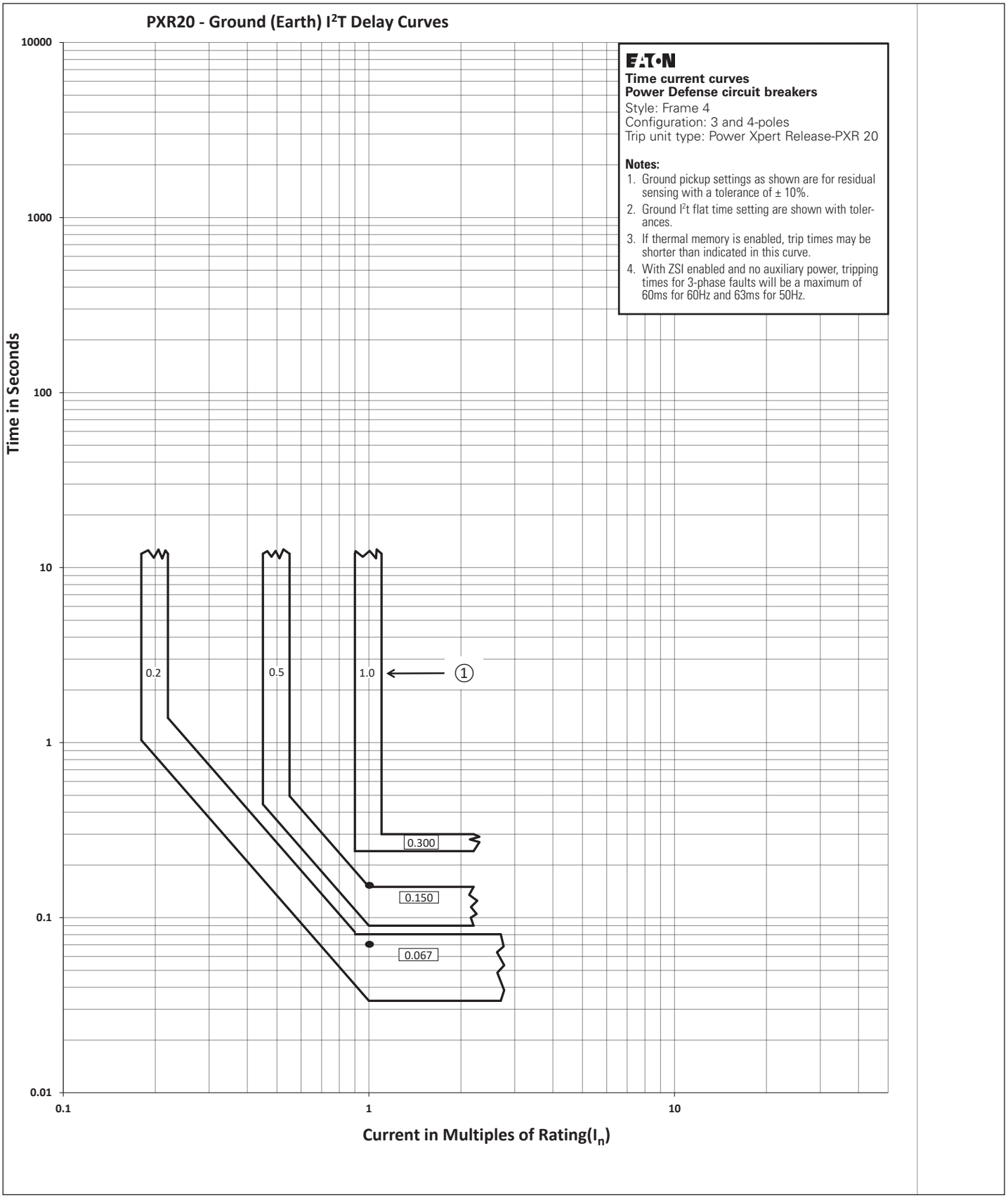

Figure 10. PXR 20 - ground (earth) I²t delay

November 2019

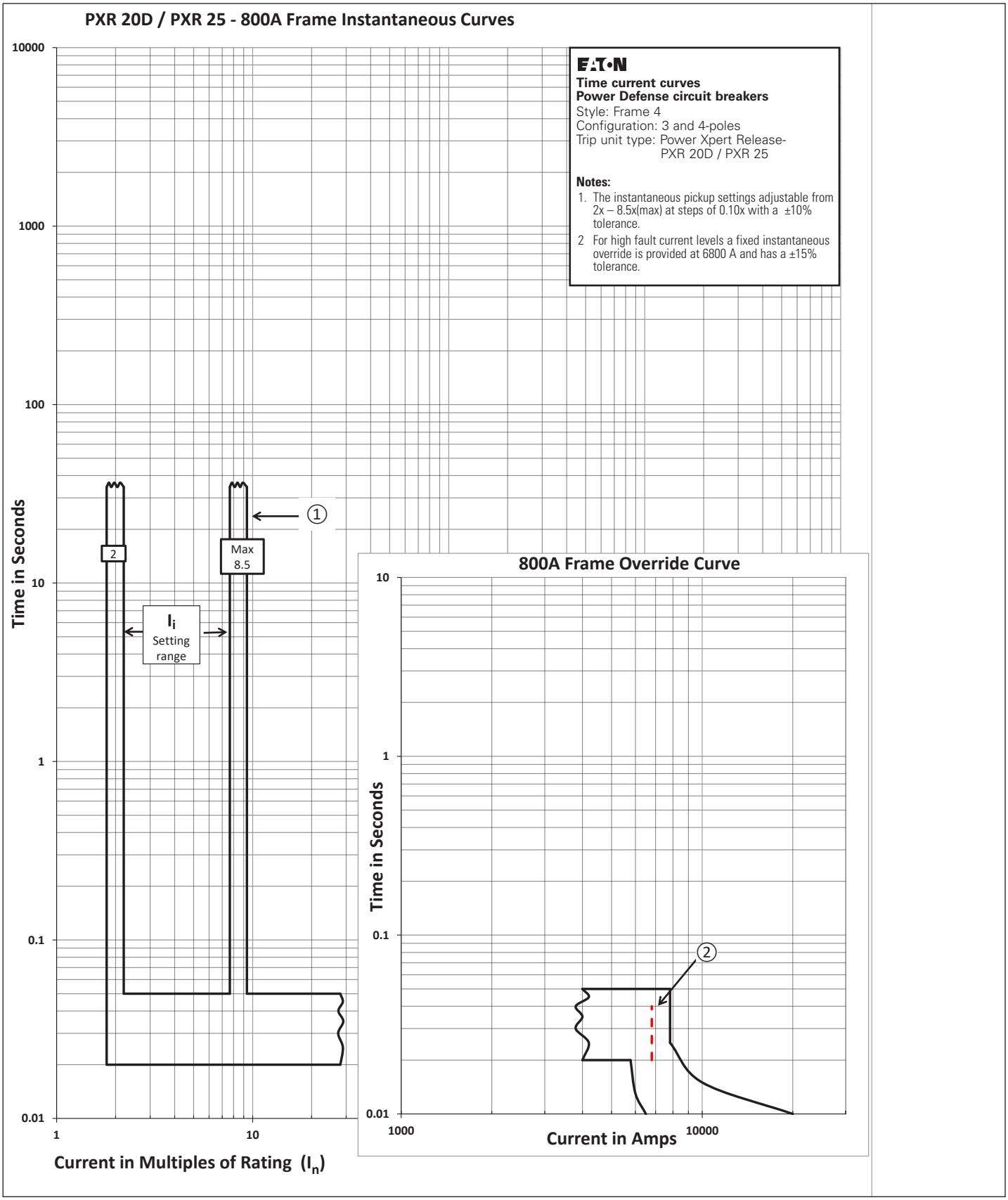

Figure 11. PXR 20D / PXR 25 -instantaneous and override for 800A frame

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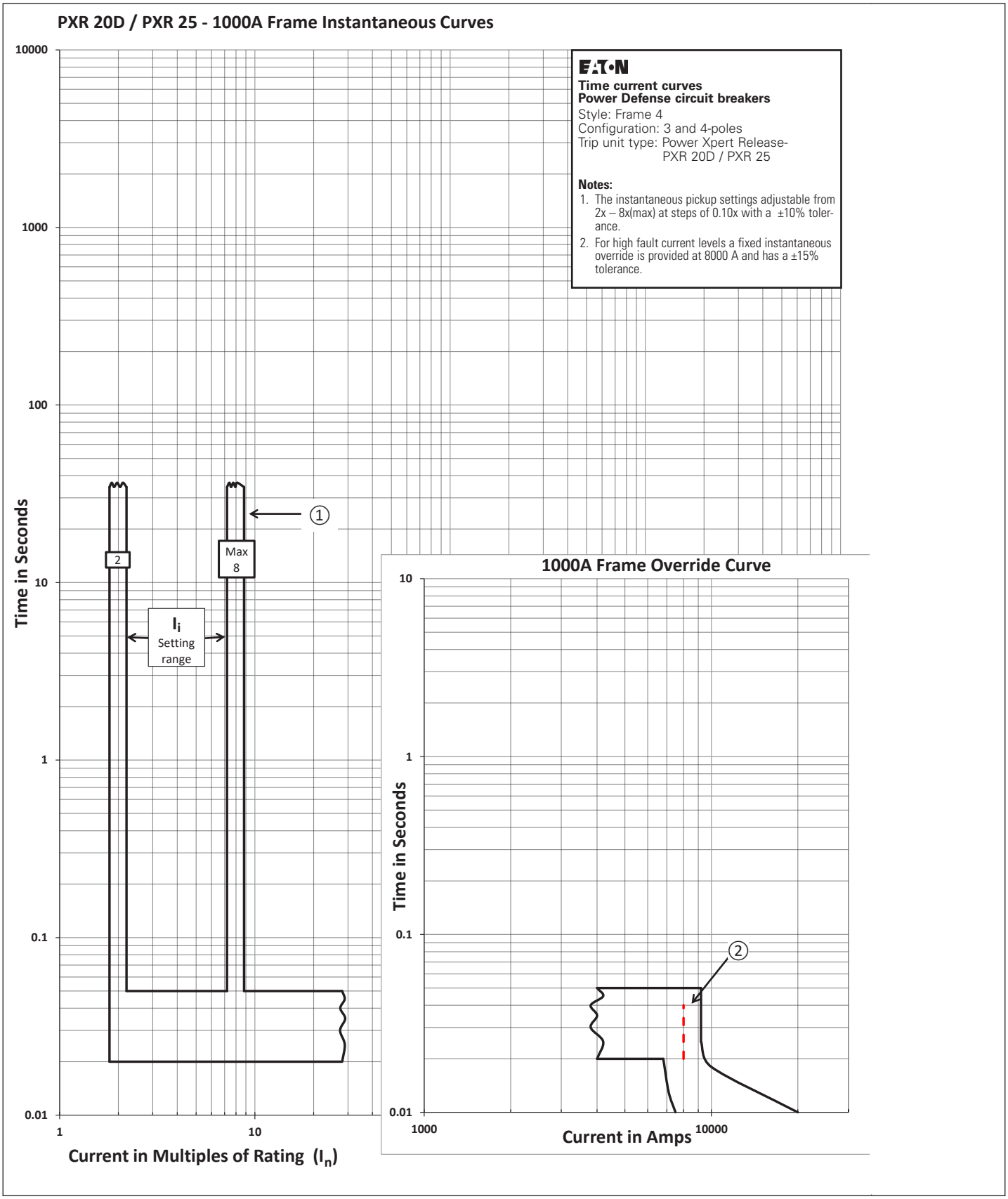

Figure 12. PXR 20D / PXR 25 - instantaneous (1000A)

November 2019

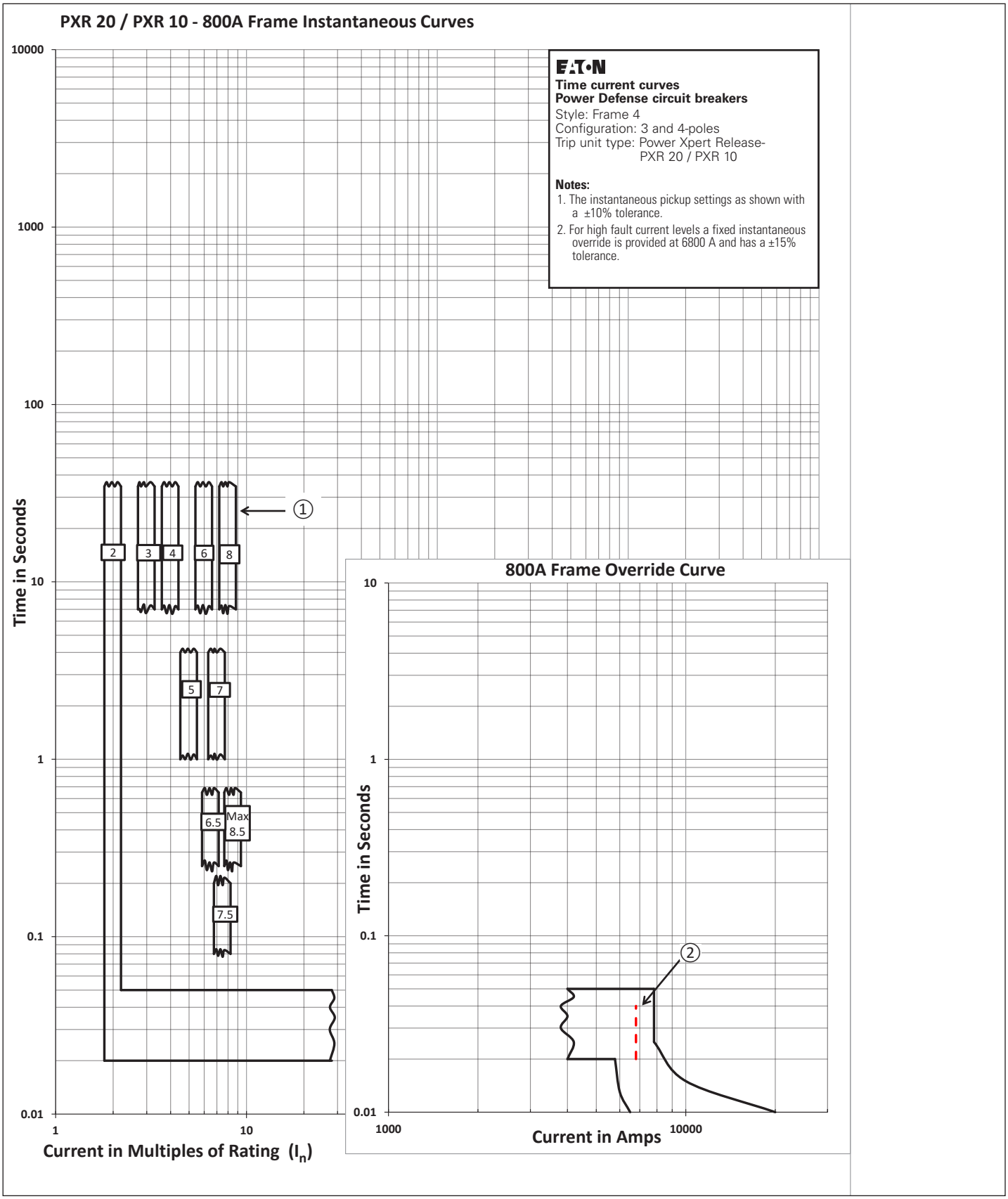

Figure 13. PXR 20 / PXR 10 - instantaneous (800A)

November 2019

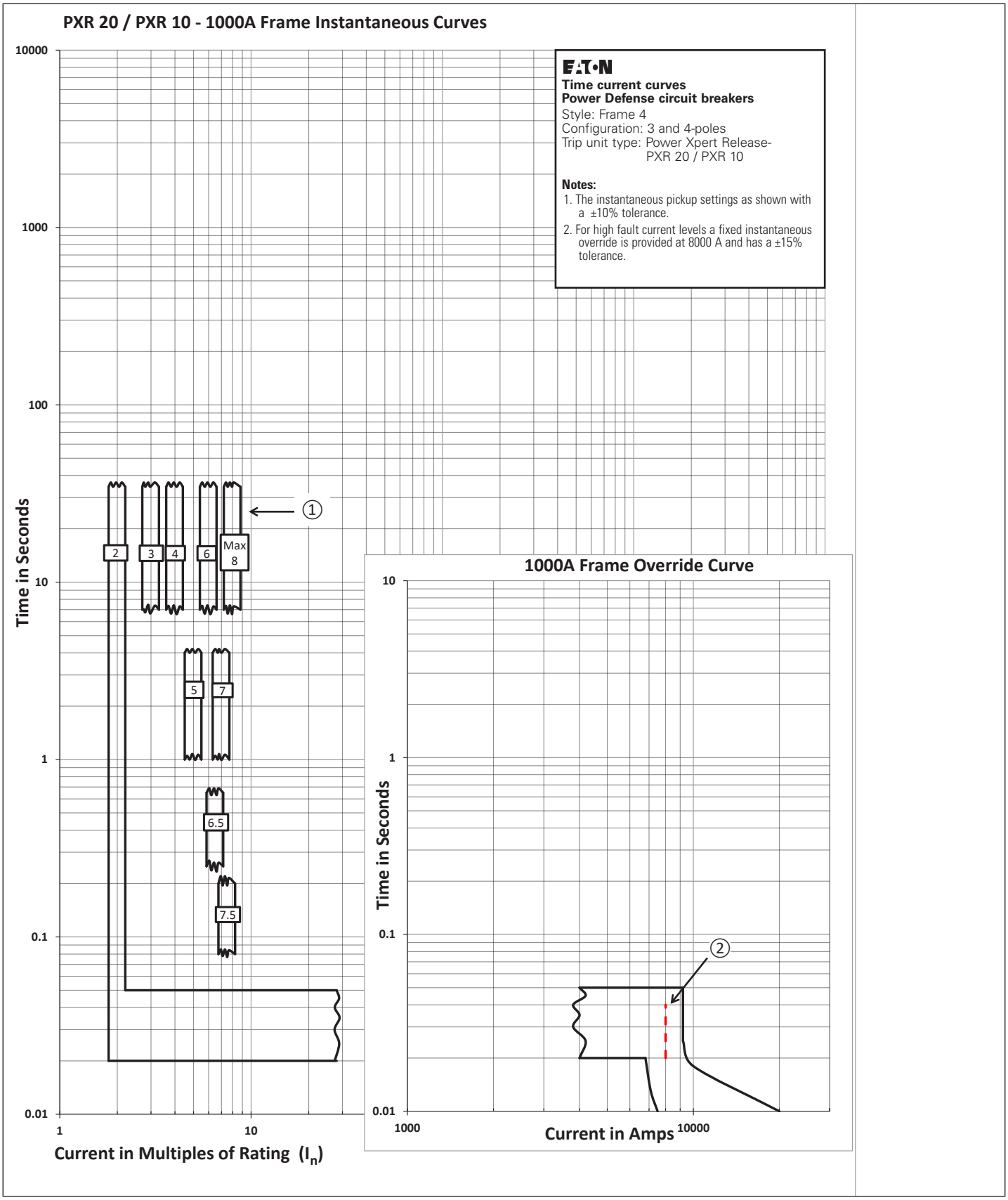

Figure 14. PXR 20 / PXR 10 - instantaneous and override 1000A frame

November 2019

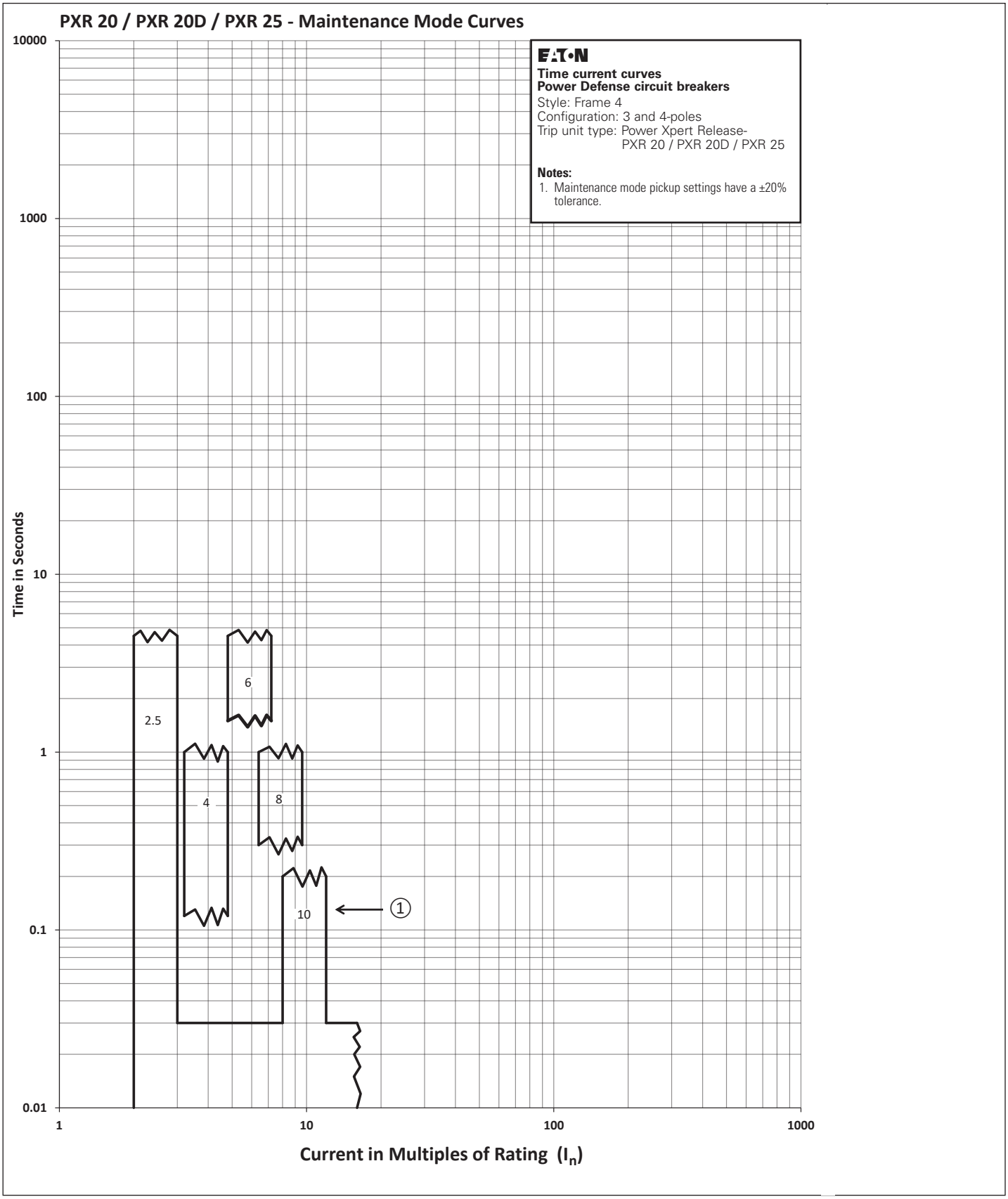

Figure 15. PXR 20 / PXR 20D / PXR 25 - maintenance mode

November 2019

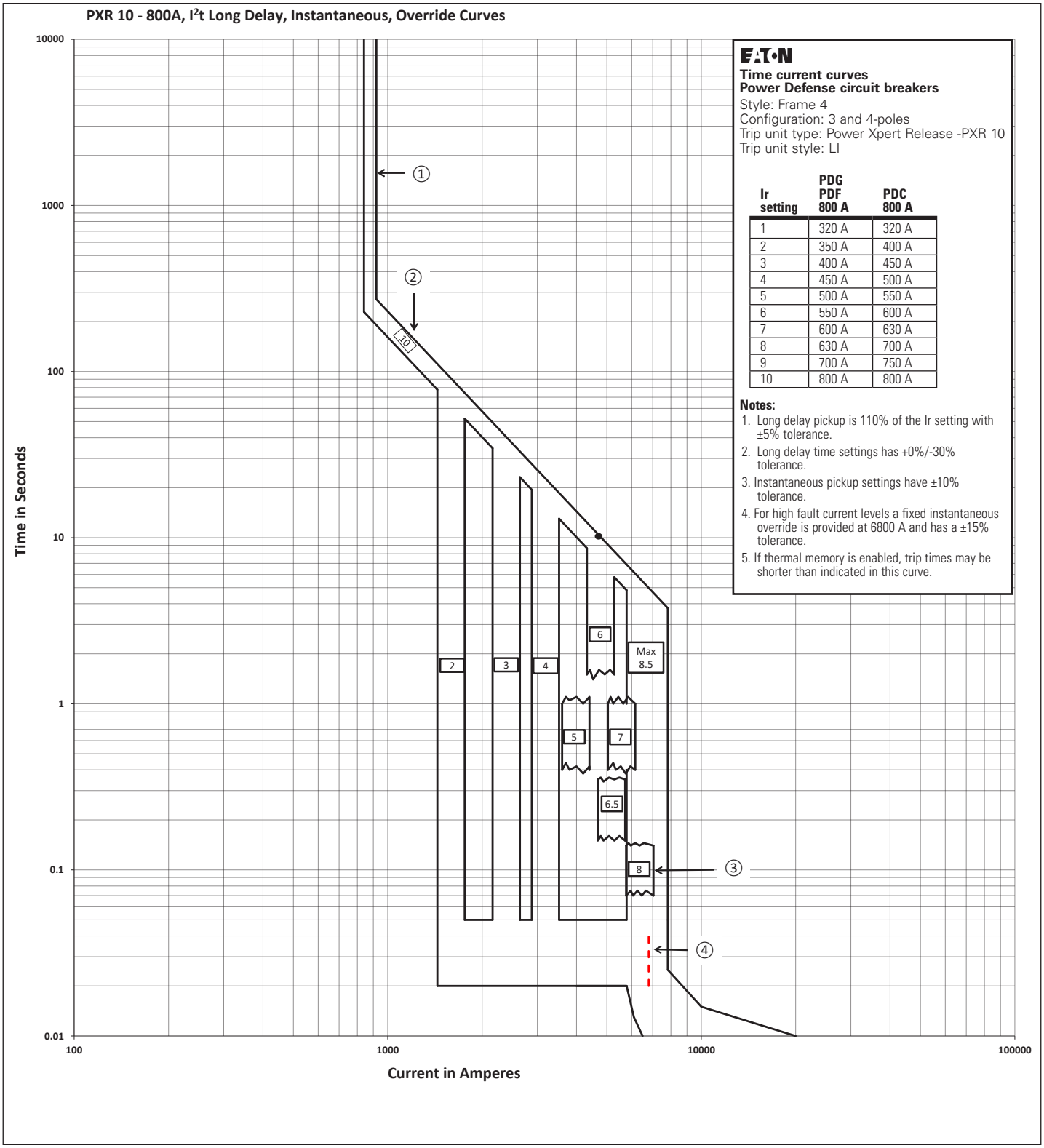

Figure 16. PXR 10 LI 800A frame

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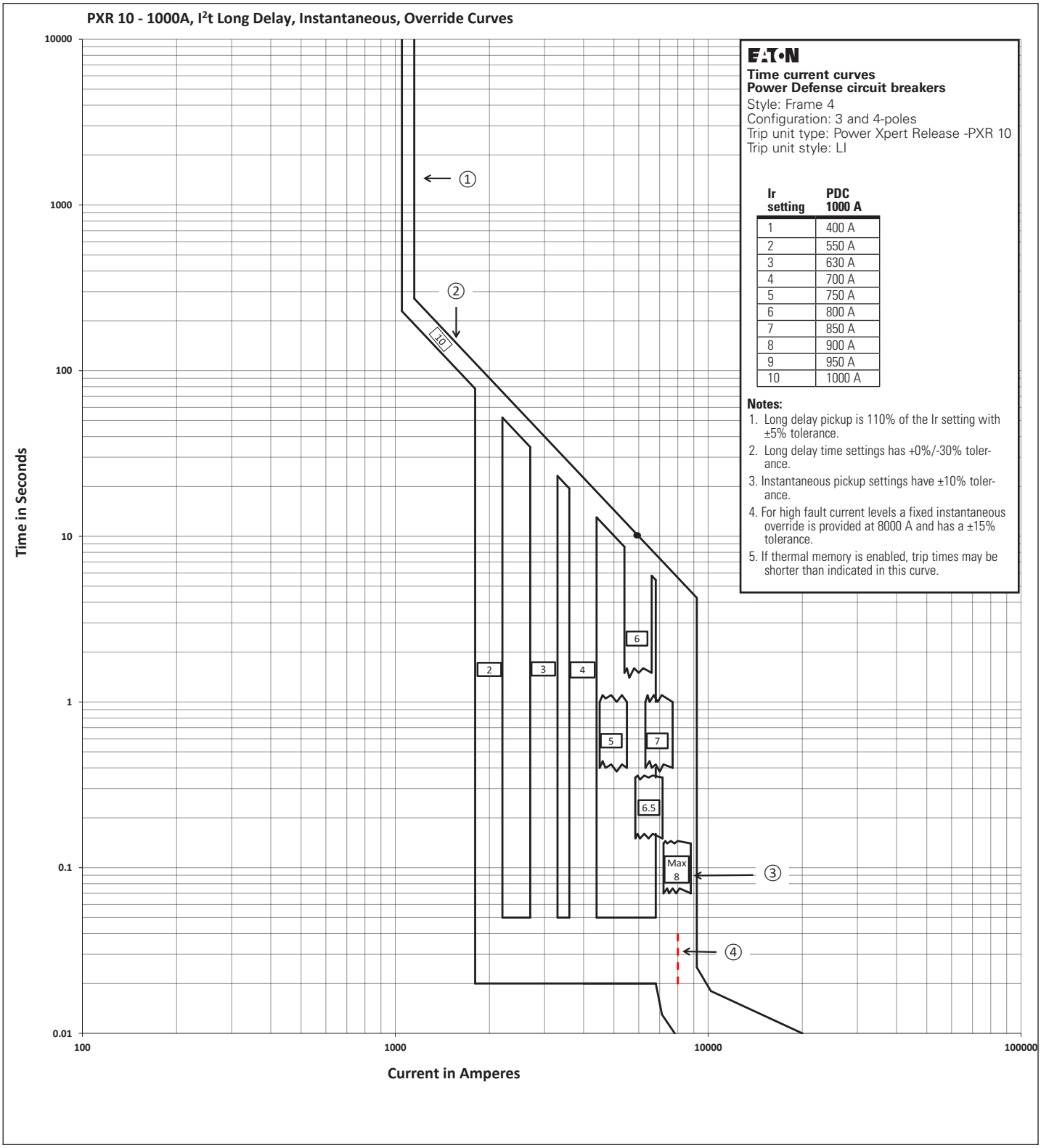
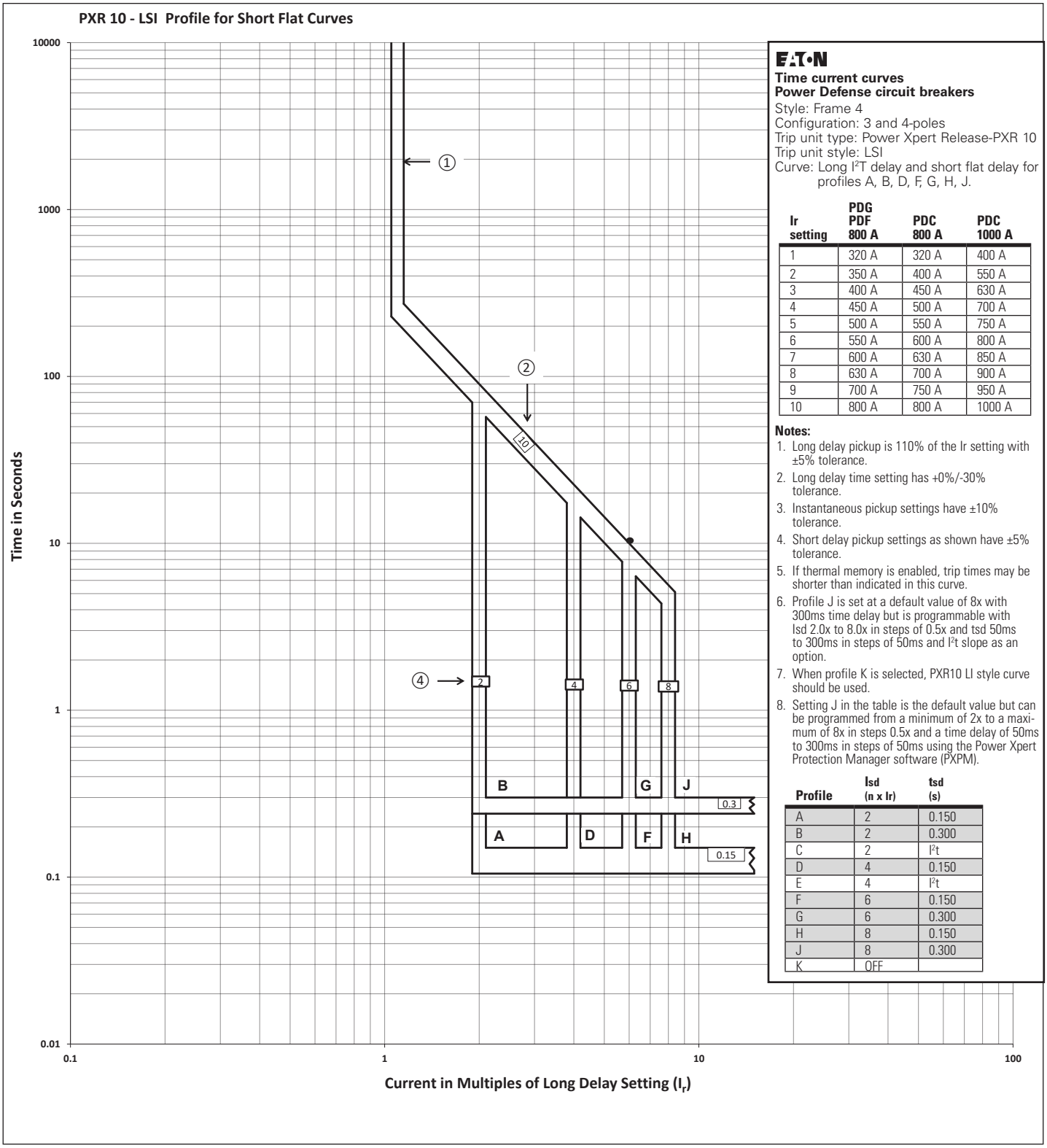


Figure 17. PXR 10 LI 1000A frame

November 2019



Time current curves
Power Defense circuit breakers

Style: Frame 4
Configuration: 3 and 4-poles
Trip unit type: Power Xpert Release-PXR 10
Trip unit style: LSI
Curve: Long I^2T delay and short flat delay for profiles A, B, D, F, G, H, J.

Ir setting	PDG PDF 800 A	PDC 800 A	PDC 1000 A
1	320 A	320 A	400 A
2	350 A	400 A	550 A
3	400 A	450 A	630 A
4	450 A	500 A	700 A
5	500 A	550 A	750 A
6	550 A	600 A	800 A
7	600 A	630 A	850 A
8	630 A	700 A	900 A
9	700 A	750 A	950 A
10	800 A	800 A	1000 A

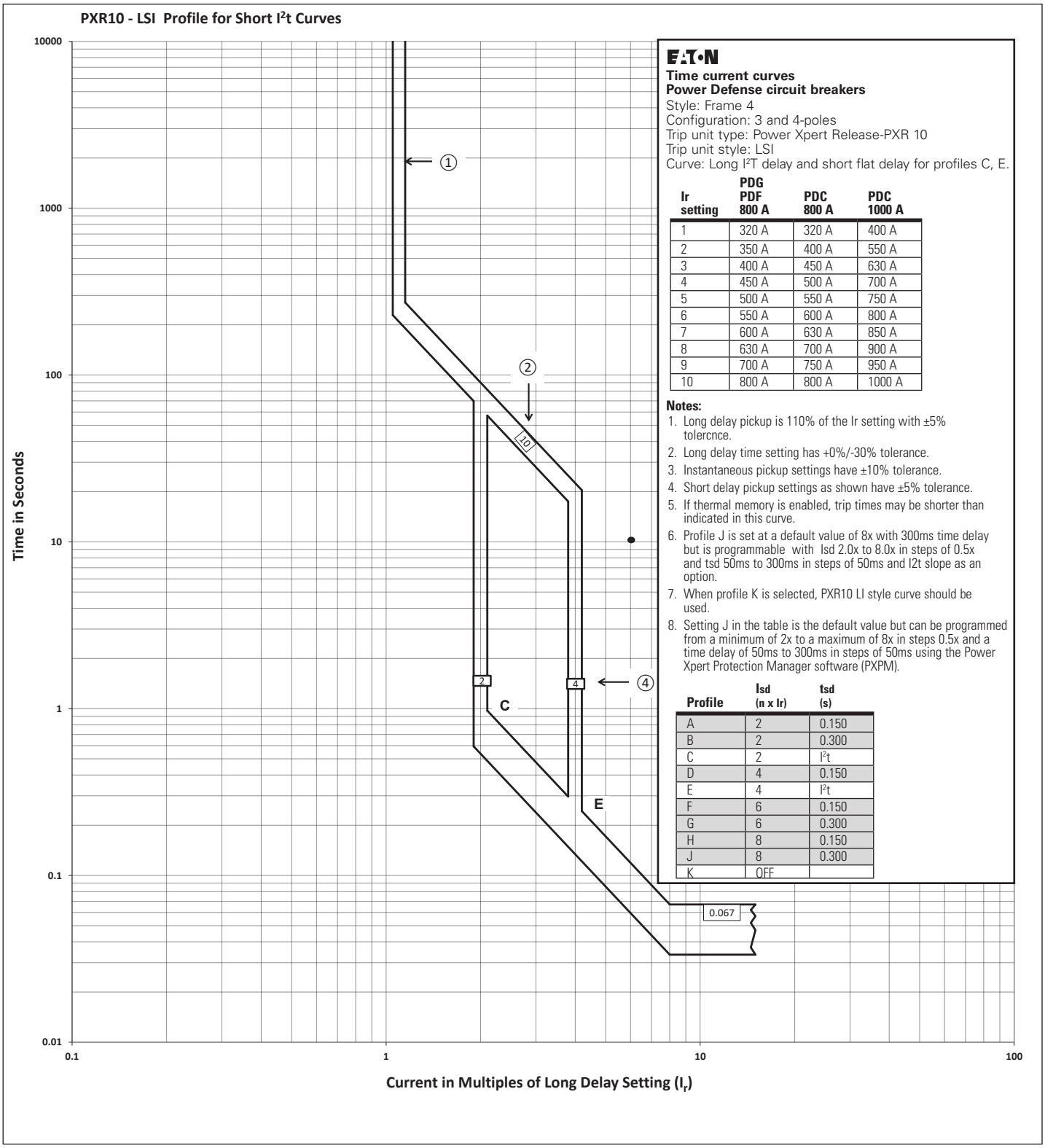
Notes:

1. Long delay pickup is 110% of the Ir setting with ±5% tolerance.
2. Long delay time setting has +0%/-30% tolerance.
3. Instantaneous pickup settings have ±10% tolerance.
4. Short delay pickup settings as shown have ±5% tolerance.
5. If thermal memory is enabled, trip times may be shorter than indicated in this curve.
6. Profile J is set at a default value of 8x with 300ms time delay but is programmable with Isd 2.0x to 8.0x in steps of 0.5x and tsd 50ms to 300ms in steps of 50ms and I^2t slope as an option.
7. When profile K is selected, PXR10 LI style curve should be used.
8. Setting J in the table is the default value but can be programmed from a minimum of 2x to a maximum of 8x in steps 0.5x and a time delay of 50ms to 300ms in steps of 50ms using the Power Xpert Protection Manager software (PXPM).

Profile	Isd (n x Ir)	tsd (s)
A	2	0.150
B	2	0.300
C	2	I^2t
D	4	0.150
E	4	I^2t
F	6	0.150
G	6	0.300
H	8	0.150
J	8	0.300
K	OFF	

Figure 18. PXR 10 LSI profile for short flat curves

November 2019



Ir setting	PDG PDF 800 A	PDC 800 A	PDC 1000 A
1	320 A	320 A	400 A
2	350 A	400 A	550 A
3	400 A	450 A	630 A
4	450 A	500 A	700 A
5	500 A	550 A	750 A
6	550 A	600 A	800 A
7	600 A	630 A	850 A
8	630 A	700 A	900 A
9	700 A	750 A	950 A
10	800 A	800 A	1000 A

Profile	Isd (n x Ir)	tsd (s)
A	2	0.150
B	2	0.300
C	2	I²t
D	4	0.150
E	4	I²t
F	6	0.150
G	6	0.300
H	8	0.150
J	8	0.300
K	OFF	

Figure 19. PXR 10 LSI profile for I²t short curves

November 2019

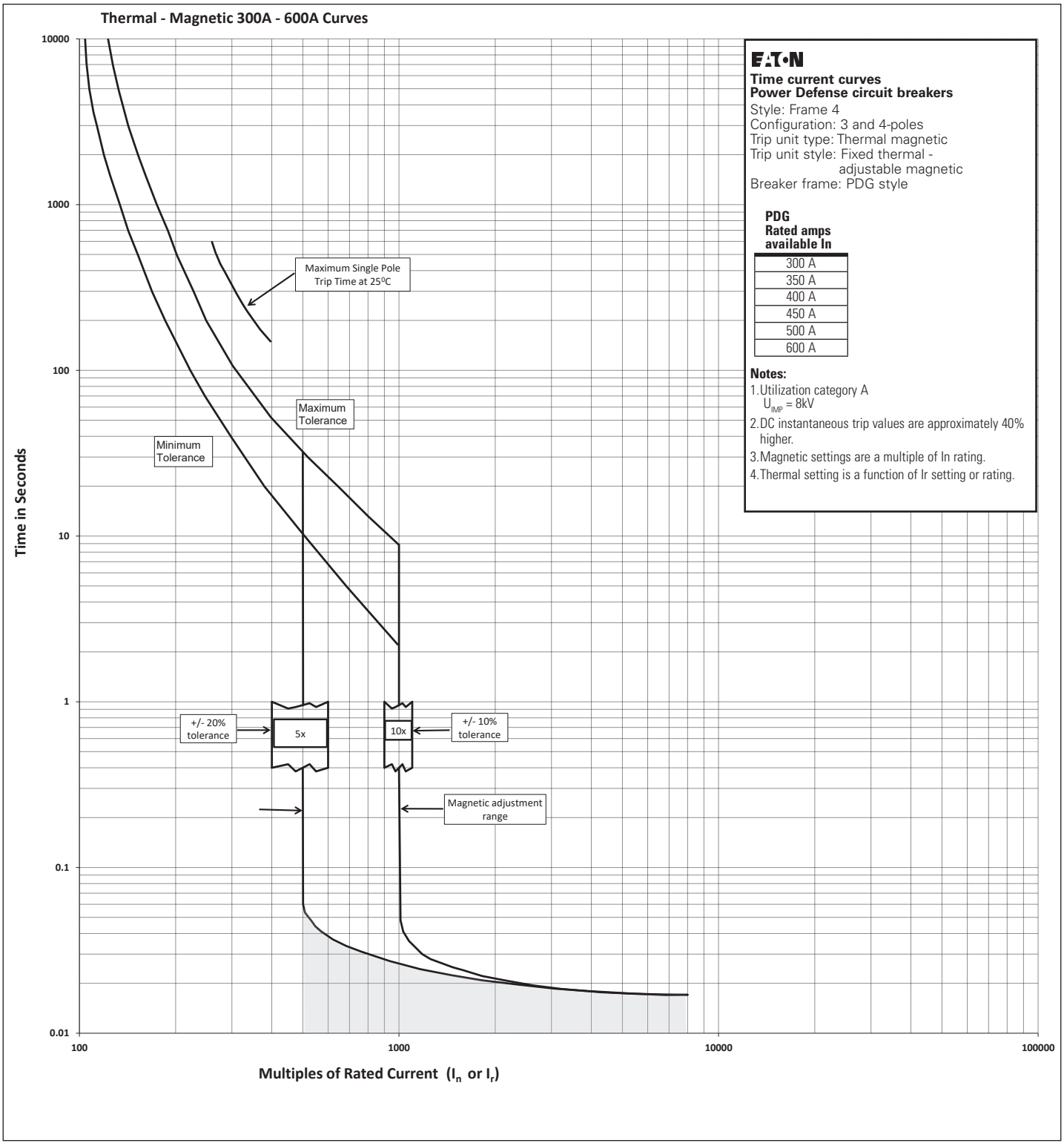


Figure 20. Fixed thermal adjustable magnetic 300A-600A

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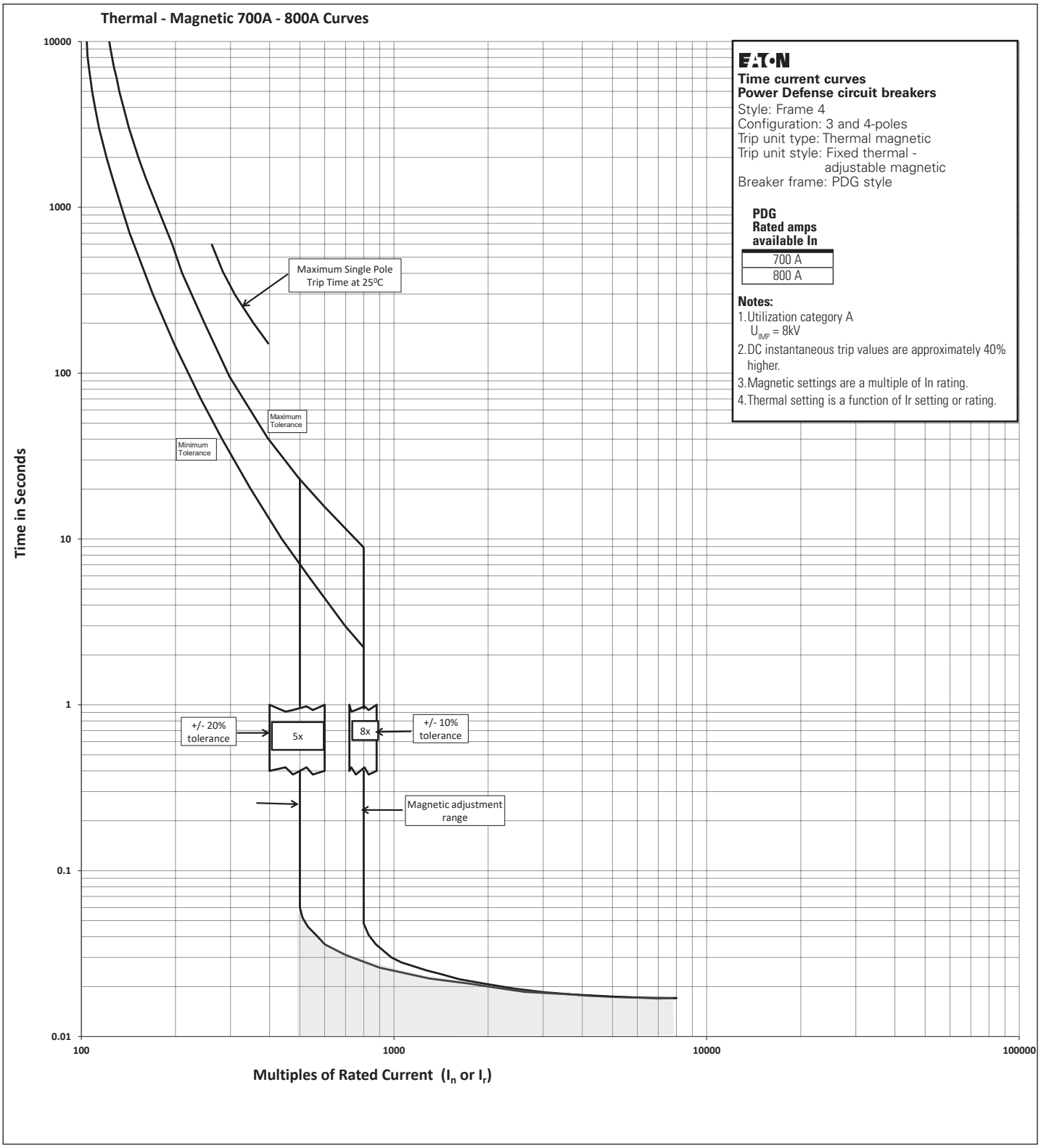

Figure 21. Fixed thermal adjustable magnetic 700A-800A

November 2019

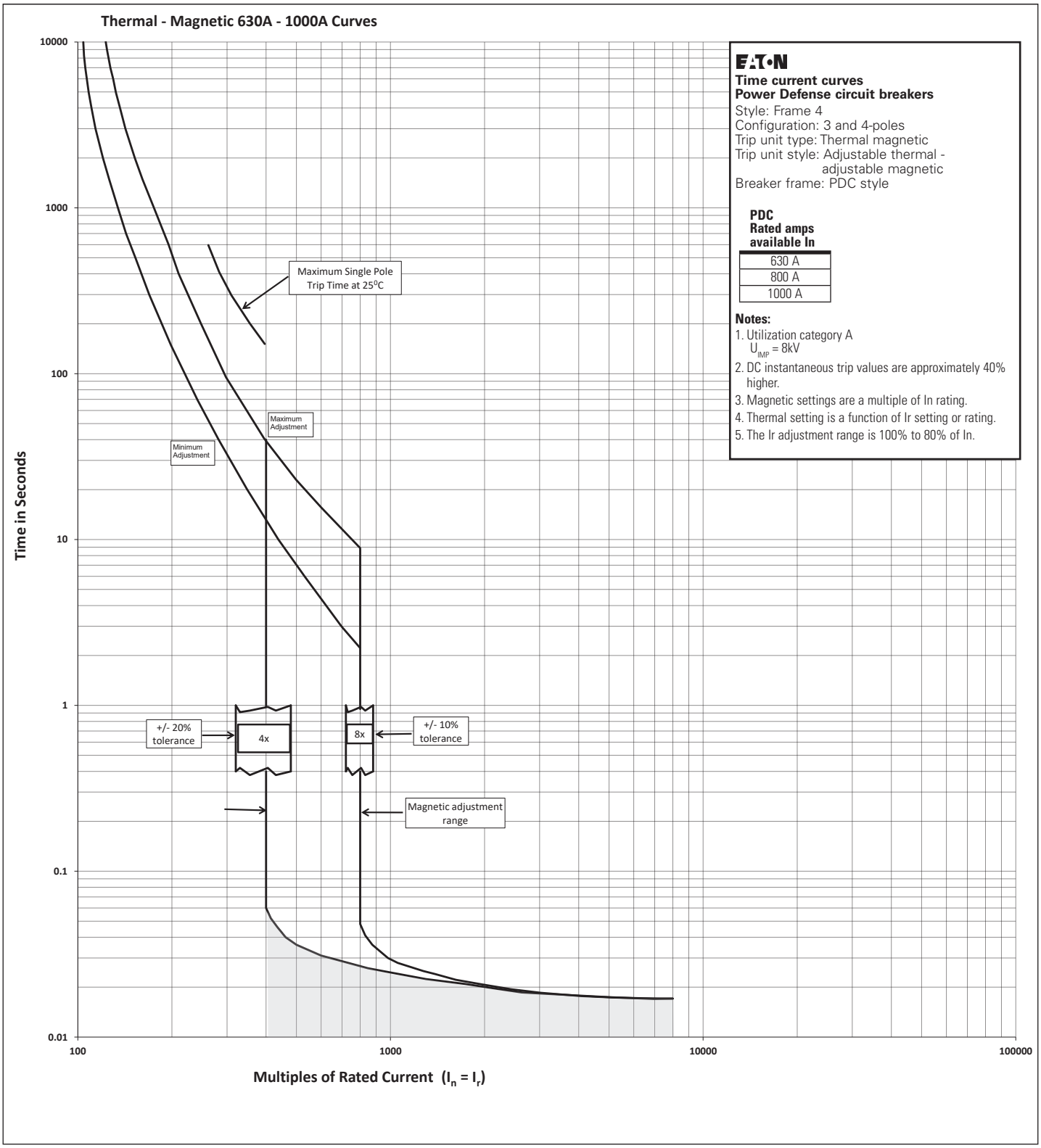

Figure 22. Adjustable thermal adjustable magnetic 630A-1000A

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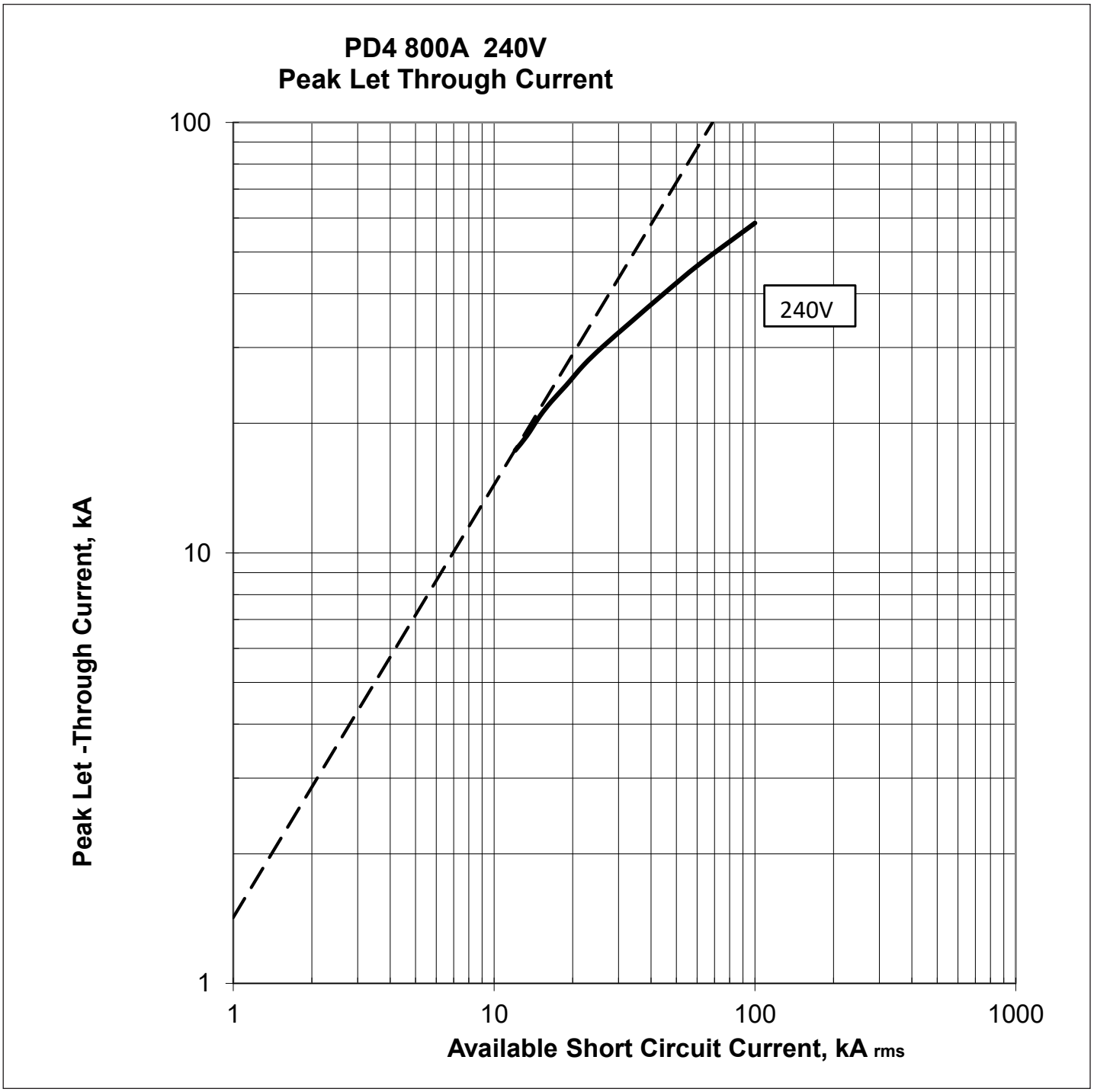

Figure 23. 240V let through current

November 2019

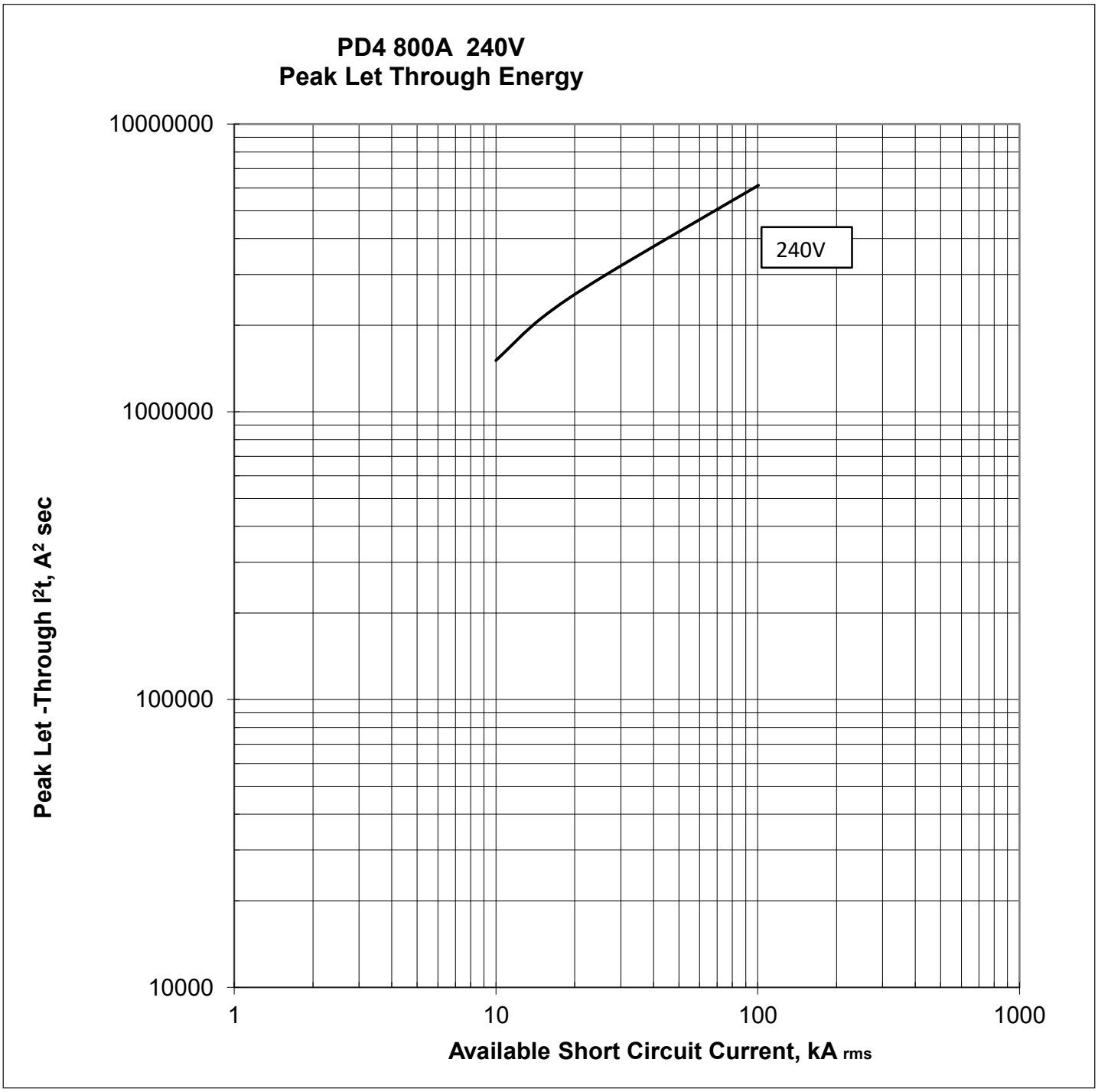

Figure 24. 240V peak let through energy

November 2019

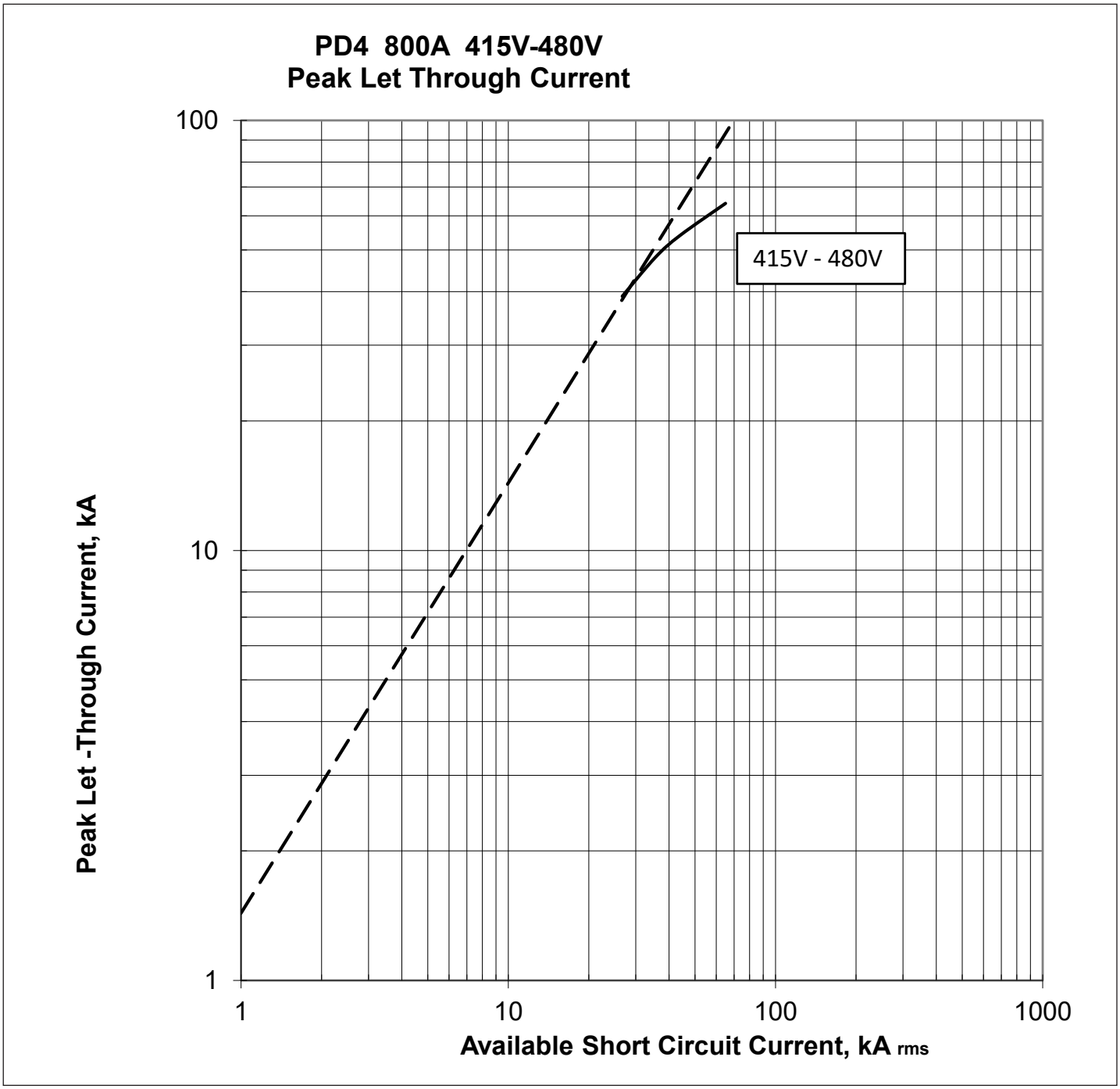

Figure 25. 415V-480V let through current

November 2019

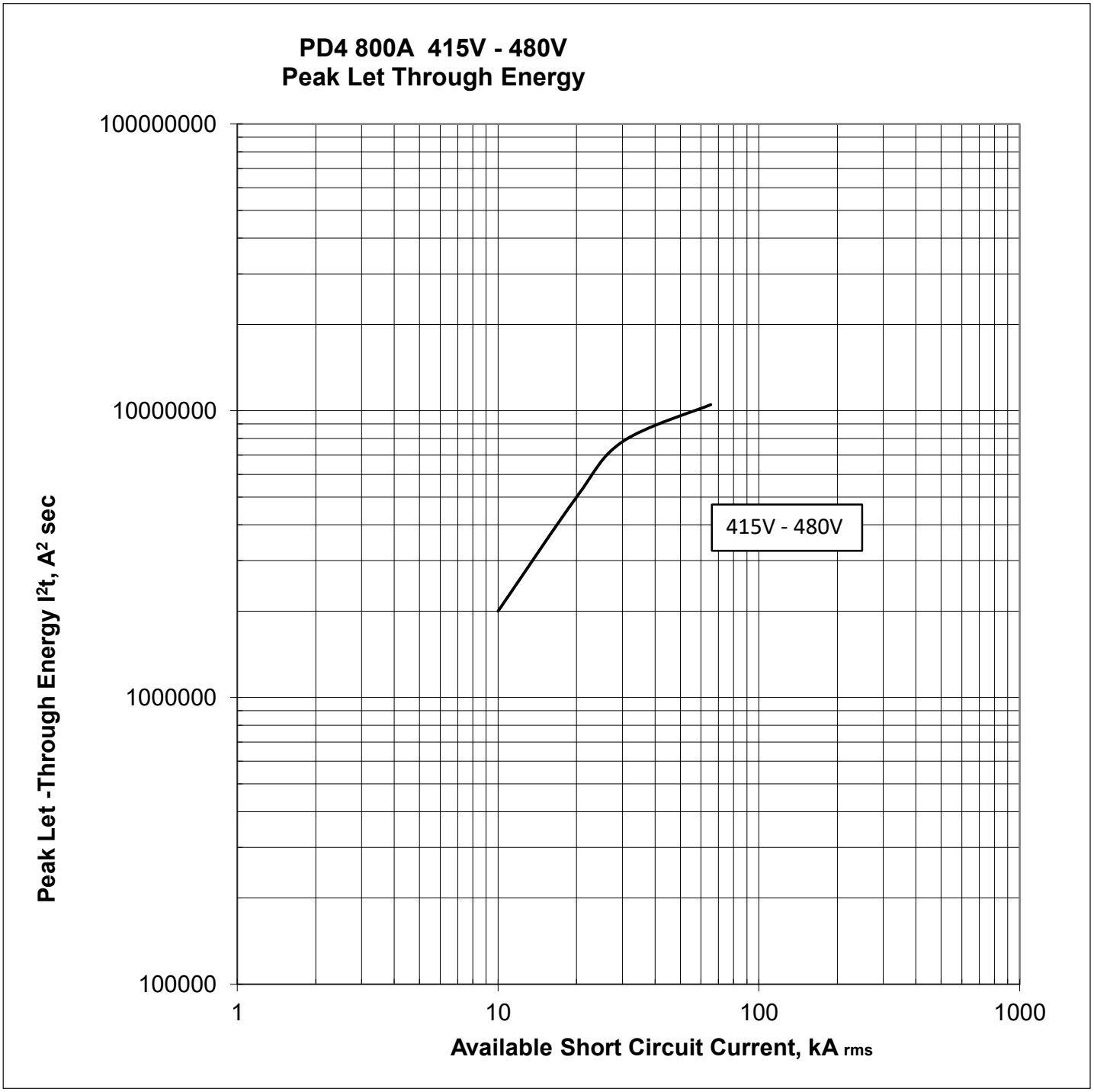

Figure 26. 415V-480V let through energy

November 2019

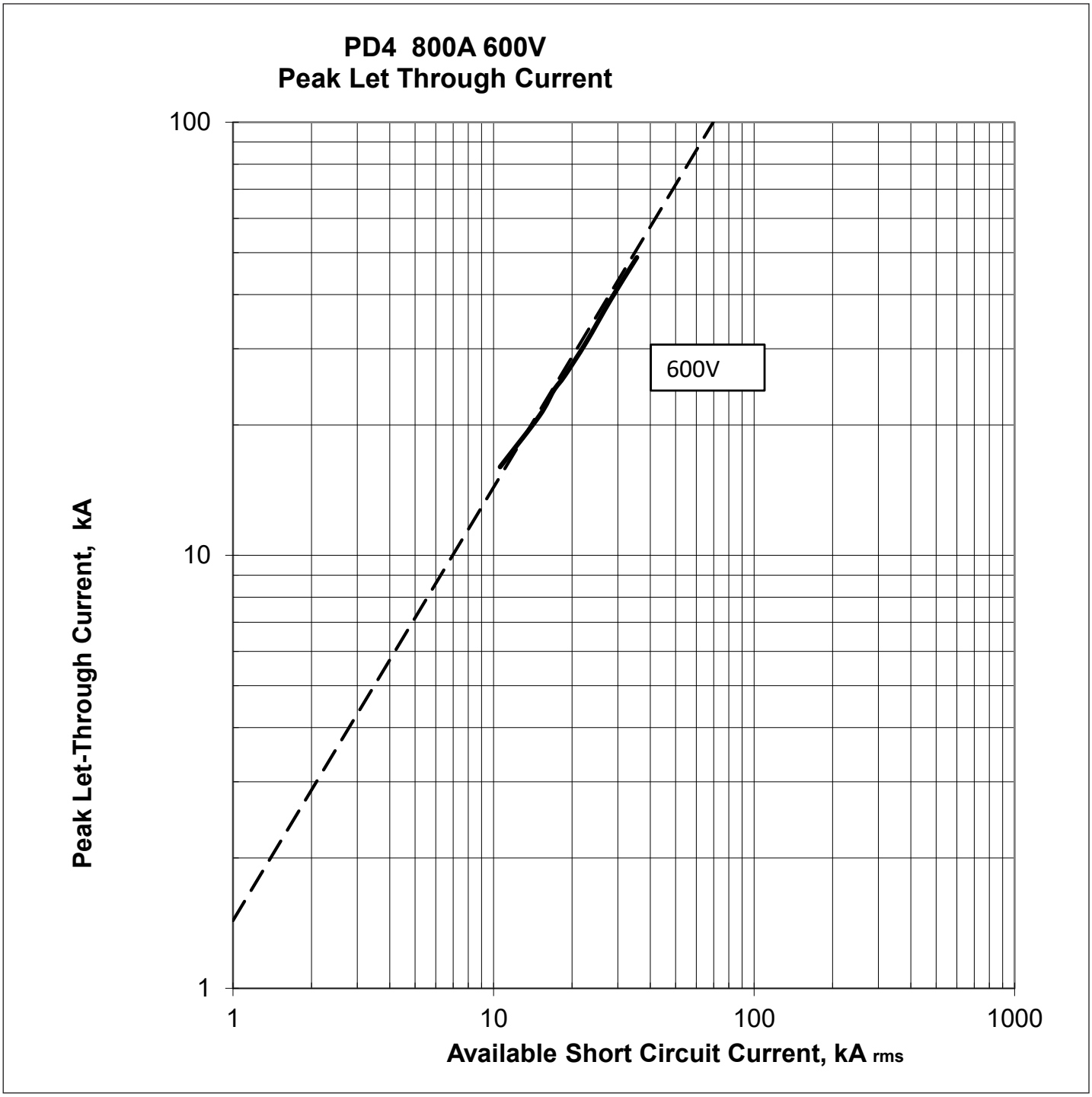

Figure 27. 600V let through current

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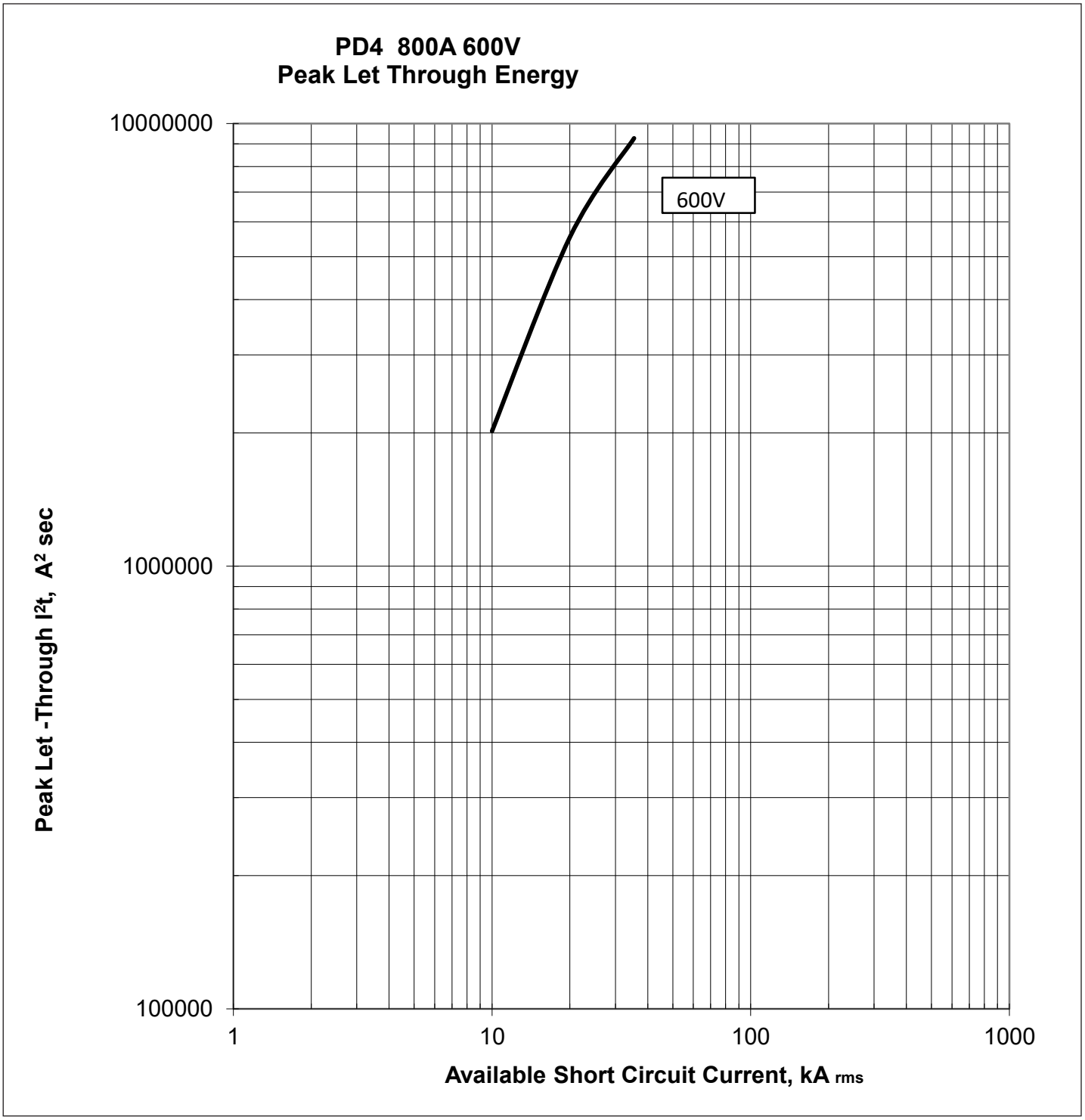

Figure 28. 600V let through energy

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Time current curves Power Defense MCCB
Frame 4 thermal-magnetic and PXR electronic trip units
Standards: UL, CSA, IEC, CCC

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