Technical Data **TD01211004E**

Effective February 2014
Supersedes October 2013

PVGard 600 and 1000 Vdc solar photovoltaic circuit breakers

Contents

Product description

- Thermal-magnetic circuit breakers
- Designed to meet UL® 489B for solar photovoltaic circuit protection
- Both 100% and 80% rated breakers available
- 50°C calibrated
- Can be applied in grounded, ungrounded, or bipolar systems
- Ability to open on signal from DC arc or ground fault detector
- Two PVGard™ lineups:
  - 600 Vdc per-pole breaker and switch; each pole rated 600 Vdc
  - 1000 Vdc poles-in-series breaker and switch; requires poles in series connection
- UL File EE350638, Category Control Number DIUR

Table 1. PVGard 600 Vdc Current Ratings by Frame

Frame	Ampere Rating
JG PVS	90–250
KD PVS	100–400

Table 2. PVGard 1000 Vdc Current Ratings by Frame

Frame	Ampere Rating
FD PV	30–100
KD PV	125–350
LG PV	250–400
MDL PV	300–600

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PVGard 600 Vdc

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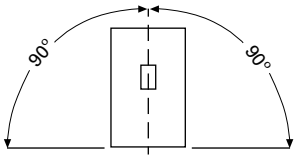
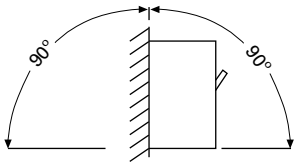
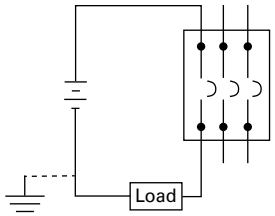
Table 3. Technical Data for PVGard 600 Vdc Per-Pole Solar PV Circuit Breakers

	JG PVS	KD PVS
Number of 600 Vdc circuits	3	3
Maximum voltage rating	600 Vdc	600 Vdc
Ampere range	90–250A	100–400A
Interrupting capacity at 600 Vdc	1.2 kA	3 kA
Time constant	1 ms	1 ms
Trip unit type	Thermal-magnetic	Thermal-magnetic
Rated impulse withstand voltage		
Main conducting paths	8 kV	8 kV
Auxiliary circuits	4 kV	4 kV
Endurance		
Mechanical operations	10,000	6000
Electrical operations	400	400
Maximum switching frequency	240 per hour	240 per hour
Third-party certification	UL 489B	UL 489B
Environment		
Design ambient temperature	50°C	50°C
Maximum current at 60°C, as % of rated current	93%	93%
Maximum current at 70°C, as % of rated current	85%	85%
Operating temperature range	–20°C to +50°C	–20°C to +50°C
Storage temperature range	–20°C to +70°C	–20°C to +70°C
Suitable for freeze temperatures to –40°C	Option	Option
Relative humidity	0 to 95% noncondensing	0 to 95% noncondensing
Suitable for reverse-feed applications	Yes	Yes
Mounting—permissible mounting position		
Connection diagrams	 Suitable for grounded or ungrounded systems Suitable for quantity (3) 600 Vdc circuits	
Terminations		
Al/Cu wire	TA250FJ: (1) #8–350 kcmil	TA300K: (1) #3–350 kcmil
	3TA251FJK1: (2) 2/0–(2) 4/0 ①	TA350K: (1) 250–500 kcmil
	3TA251FJK2: (2) 2/0–(2) 4/0 ②	TA403K: (2) 1/0–400 kcmil
		3TA402K: (1) 500–750 kcmil ③
Cu wire	T250FJ: (1) #4–350 kcmil	T300K: (1) #3–350 kcmil
Dimensions in inches (mm)		
Height	7.00 (177.8)	10.13 (257.3)
Width	4.13 (104.9)	5.50 (139.7)
Depth	3.57 (90.7)	4.10 (104.1)
Weight in lbs	6.6	11.42

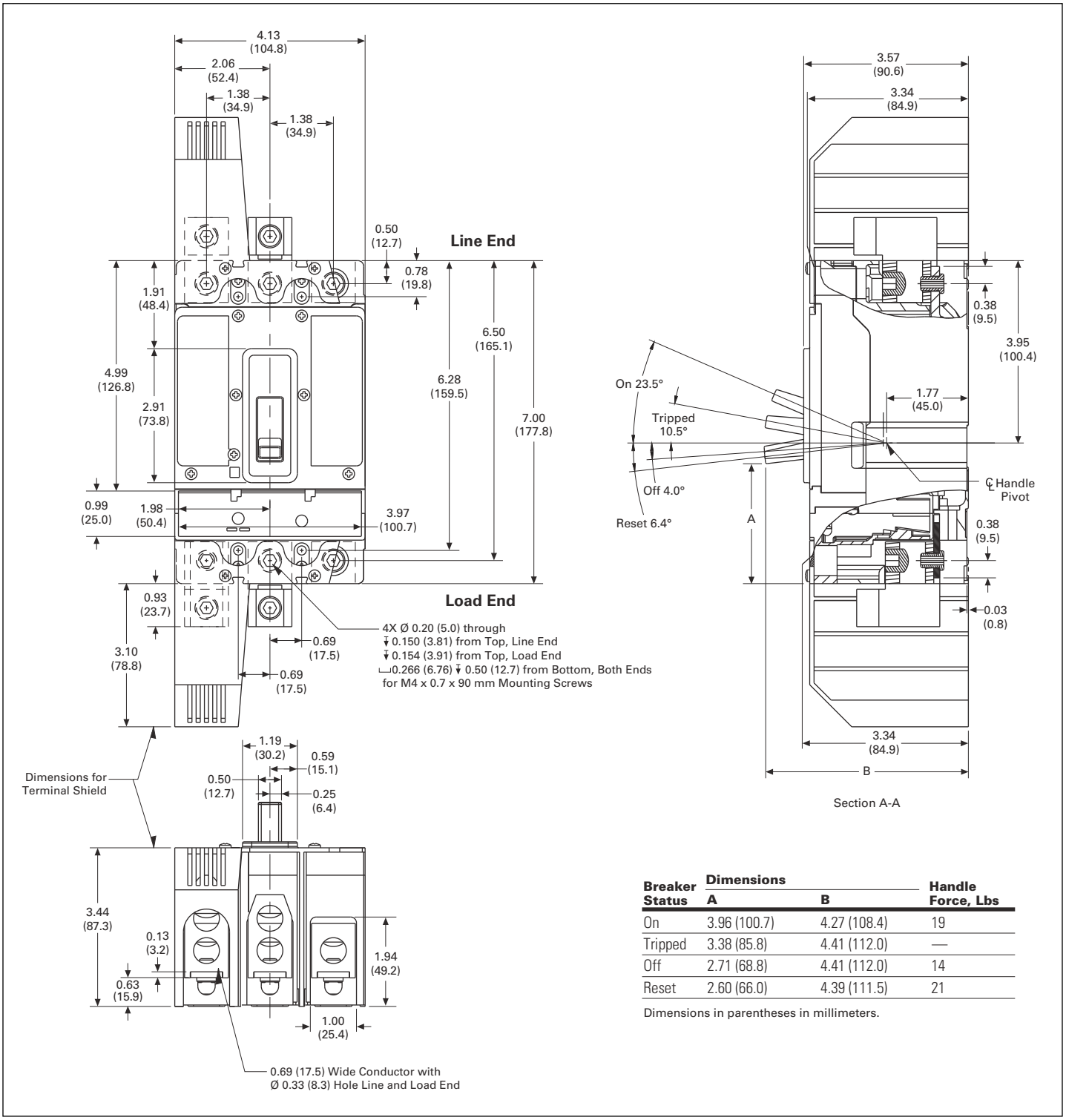
① Three terminals with terminal shield as a kit.

② Three terminals with two interphase barriers as a kit.

③ Not UL 489B recognized size for maximum of 400A breaker.

Dimensions

JG PVS 90–250A breaker outlines and drilling plans



Breaker Status	Dimensions A	B	Handle Force, Lbs
On	3.96 (100.7)	4.27 (108.4)	19
Tripped	3.38 (85.8)	4.41 (112.0)	—
Off	2.71 (68.8)	4.41 (112.0)	14
Reset	2.60 (66.0)	4.39 (111.5)	21

Dimensions in parentheses in millimeters.

Figure 1. Type JG PVS 90–250A Outline

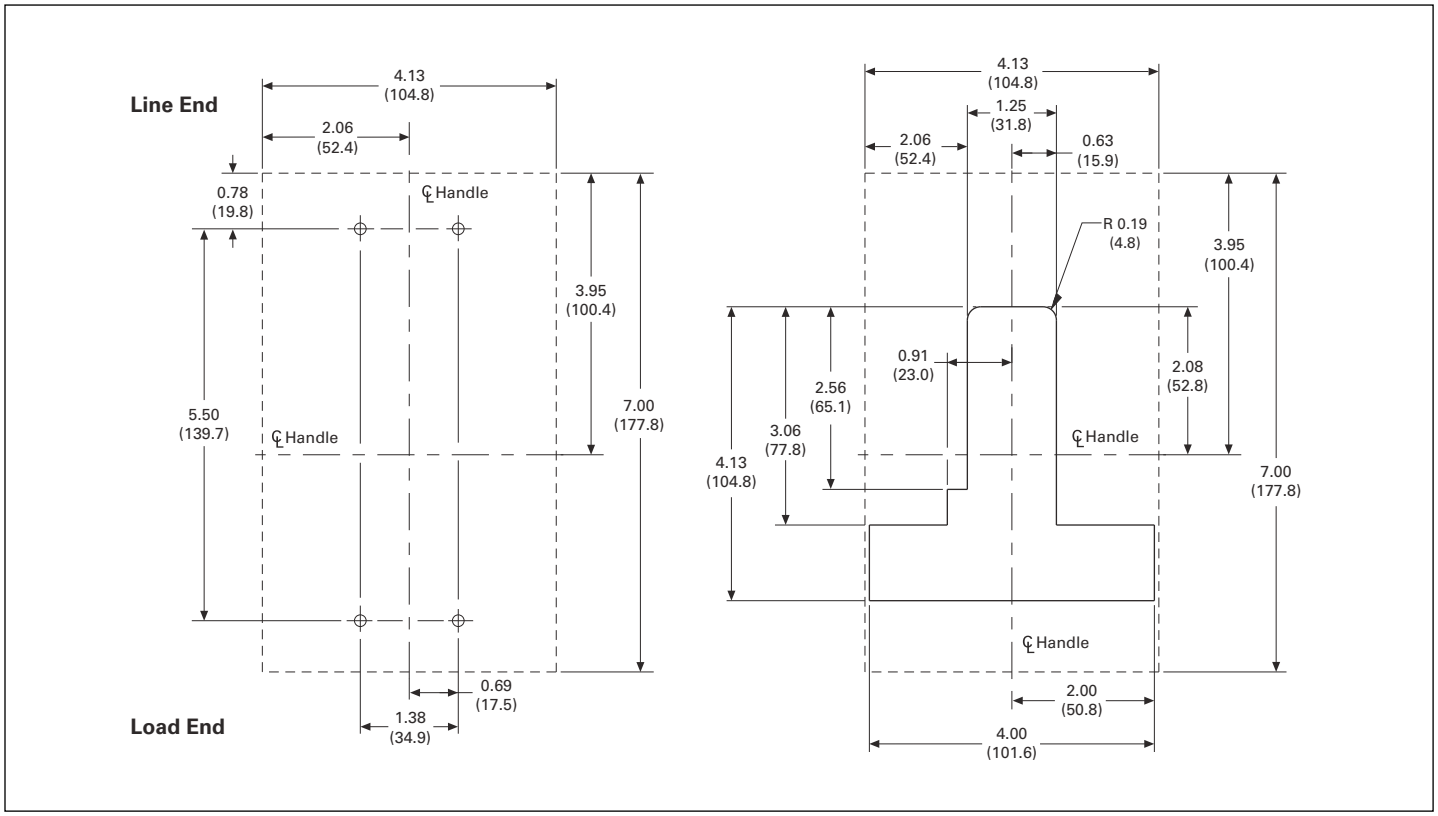


Figure 2. Type JG PVS 90–250A Drilling Plans

Time/current curves

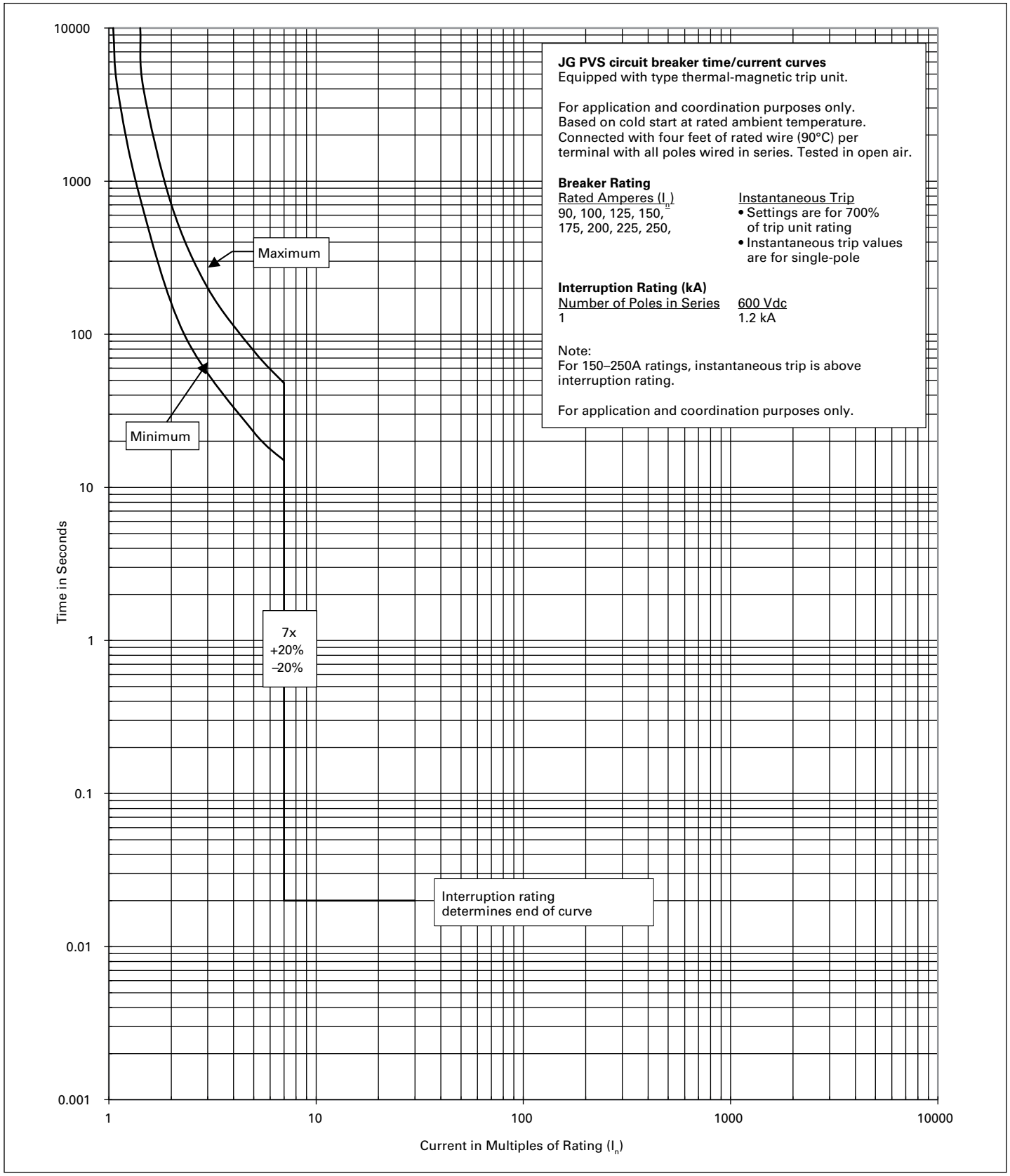
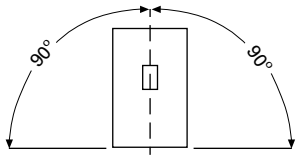
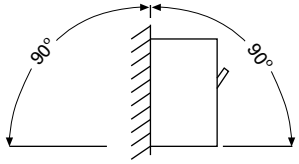
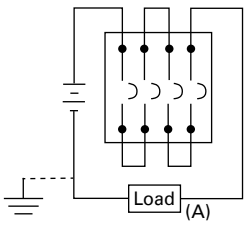
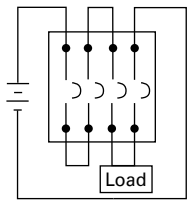


Figure 3. JG PVS Circuit Breakers Time/Current Curves

PVGard 1000 Vdc

Technical data

Table 4. Technical Data for PVGard 1000 Vdc Solar PV Circuit Breakers (100% and 80% Rated Frames)

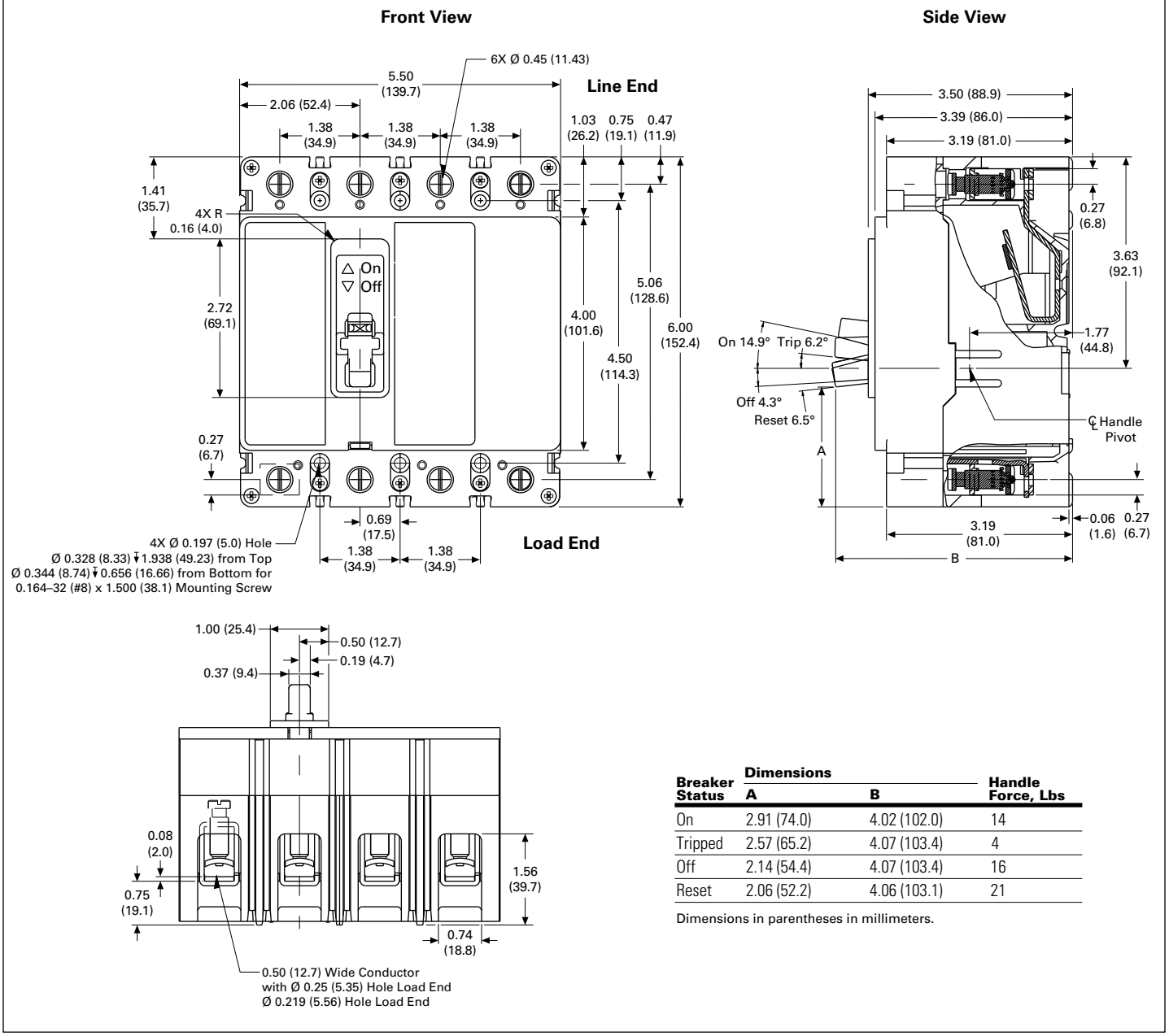
	FD PV	KD PV	LG PV	MDL PV
Number of poles	4	4	4	3
Maximum voltage rating	1000 Vdc	1000 Vdc	1000 Vdc	1000 Vdc
Maximum current rating	100A	350A	400A	600A
Interrupting capacity at 1000 Vdc	3 kA	5 kA	5 kA	7.5 kA
Time constant	1 ms	1 ms	1 ms	1 ms
Ampere range	15–100A	125–350A	250–400A	300–600A
Trip unit type	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic
Rated impulse withstand voltage				
Main conducting paths	8 kV	8 kV	8 kV	8 kV
Auxiliary circuits	4 kV	4 kV	4 kV	4 kV
Endurance				
Mechanical operations	10,000	10,000	8000	8000
Electrical operations	1000	400	400	400
Maximum switching frequency	300 per hour	240 per hour	240 per hour	240 per hour
Third-party certification	UL 489B	UL 489B	UL 489B	UL 489B
Environment				
Design ambient temperature	50°C	50°C	50°C	50°C
Maximum current at 60°C, as % of rated current	91%	91%	93%	93%
Maximum current at 70°C, as % of rated current	88%	88%	88%	88%
Operating temperature range	–20°C to +50°C	–20°C to +50°C	–20°C to +50°C	–20°C to +50°C
Storage temperature range	–20°C to +70°C	–20°C to +70°C	–20°C to +70°C	–20°C to +70°C
Suitable for freeze temperatures to –40°C	Option	Option	Option	Option
Relative humidity	0 to 95% noncondensing	0 to 95% noncondensing	0 to 95% noncondensing	0 to 95% noncondensing
Suitable for reverse-feed applications	Yes	Yes	Yes	Yes
Mounting—permissible mounting position				
Connection diagrams	 ①		 ②	
Terminations				
Al/Cu wire	#6–300 kcmil	(2) 3/0–250 kcmil	(2) #2–500 kcmil	(3) 3/0–400 kcmil
Cu wire	#4–4/0	(2) 3/0–250 kcmil	(2) #2–500 kcmil	(3) 3/0–300 kcmil
Dimensions in inches (mm)				
Height	6.00 (152.4)	10.13 (257.3)	10.13 (257.3)	16.00 (406.4)
Width	5.50 (139.7)	7.22 (183.4)	7.22 (183.4)	8.25 (209.5)
Depth	3.38 (85.9)	4.09 (103.9)	4.09 (103.9)	4.06 (103.1)
Weight in lbs	6	20	20	29

① Suitable for use on ungrounded systems, or grounded systems that have one end of load (A) connected to grounded terminal, opposite poles in series connection.

② Suitable for use on ungrounded systems only.

Dimensions

FD PV four-pole breaker outlines and drilling plans



Breaker Status	Dimensions A	Dimensions B	Handle Force, Lbs
On	2.91 (74.0)	4.02 (102.0)	14
Tripped	2.57 (65.2)	4.07 (103.4)	4
Off	2.14 (54.4)	4.07 (103.4)	16
Reset	2.06 (52.2)	4.06 (103.1)	21

Dimensions in parentheses in millimeters.

Figure 4. Type FD PV Four-Pole Outline

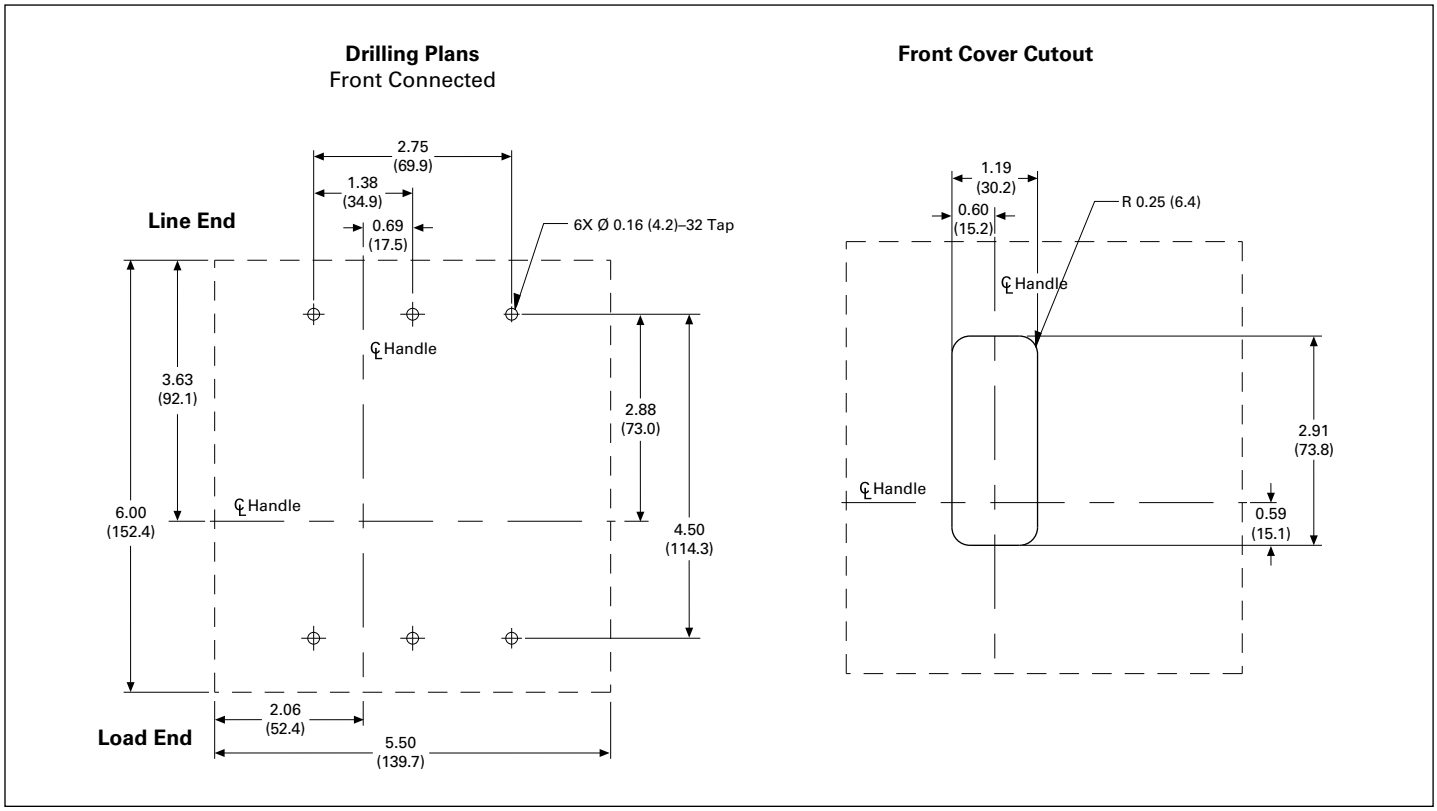
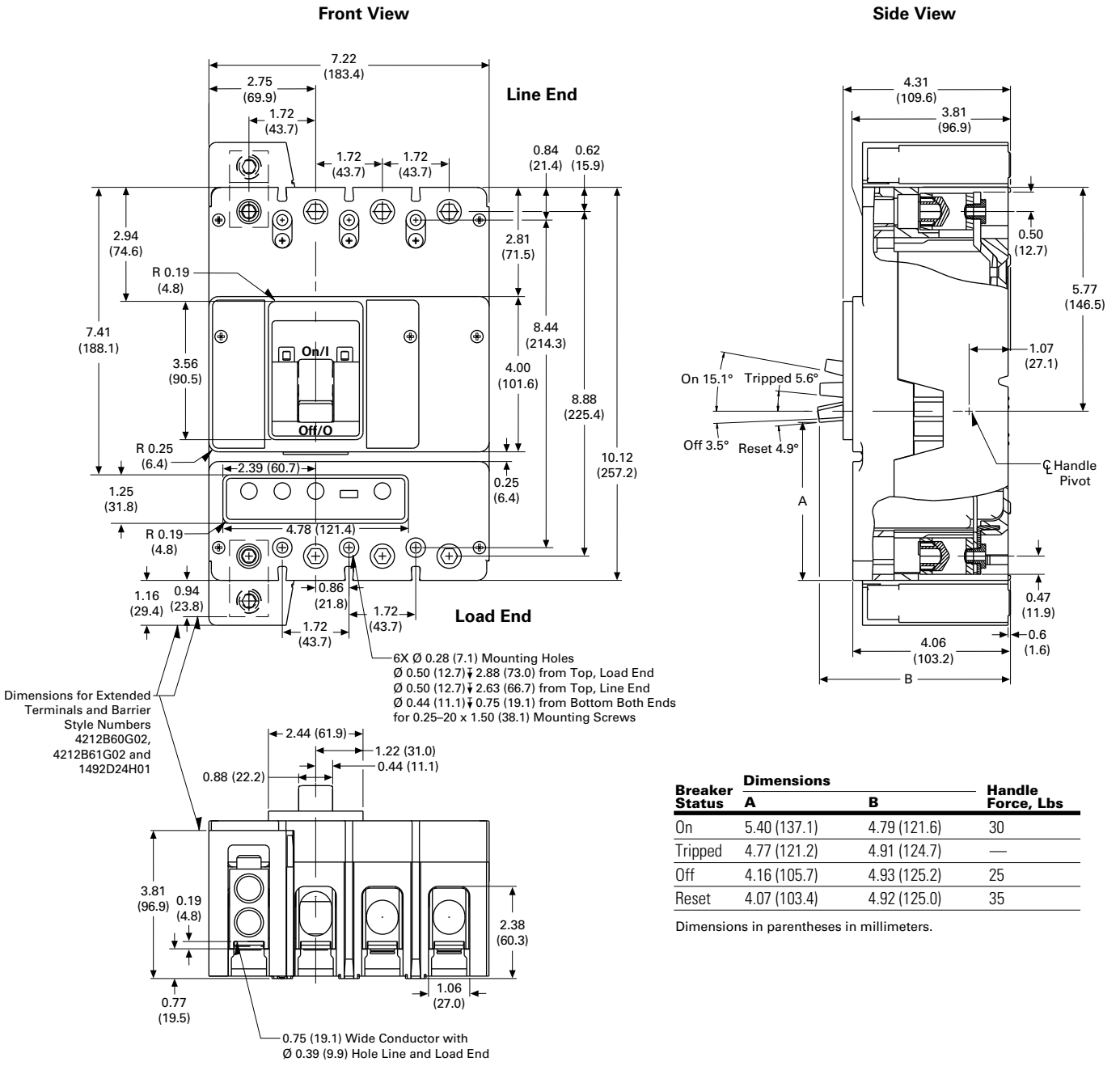


Figure 5. Type FD PV Four-Pole Drilling Plans

KD PV four-pole breaker outlines and drilling plans



Breaker Status	Dimensions A	Dimensions B	Handle Force, Lbs
On	5.40 (137.1)	4.79 (121.6)	30
Tripped	4.77 (121.2)	4.91 (124.7)	—
Off	4.16 (105.7)	4.93 (125.2)	25
Reset	4.07 (103.4)	4.92 (125.0)	35

Dimensions in parentheses in millimeters.

Figure 6. Type KD PV Four-Pole Outline

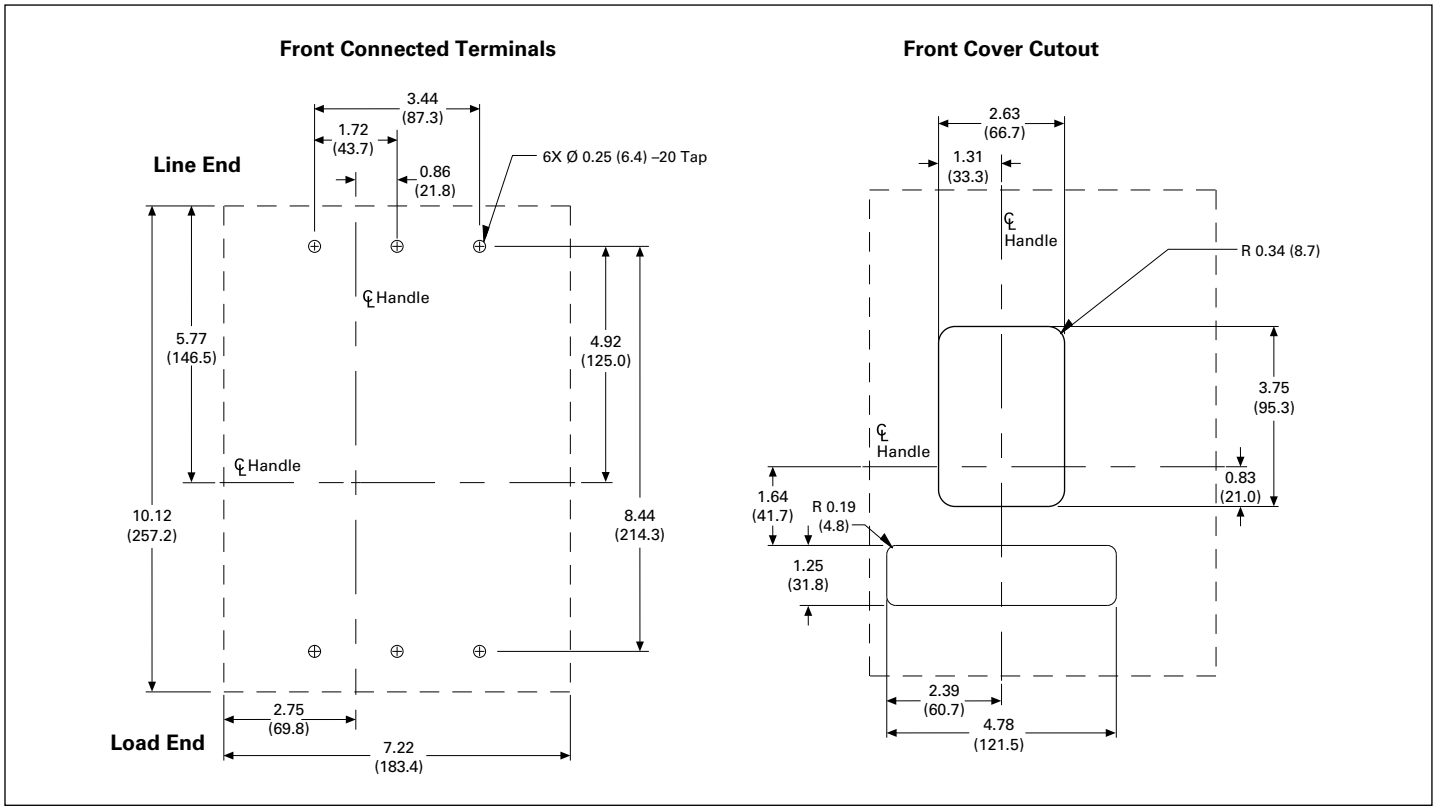
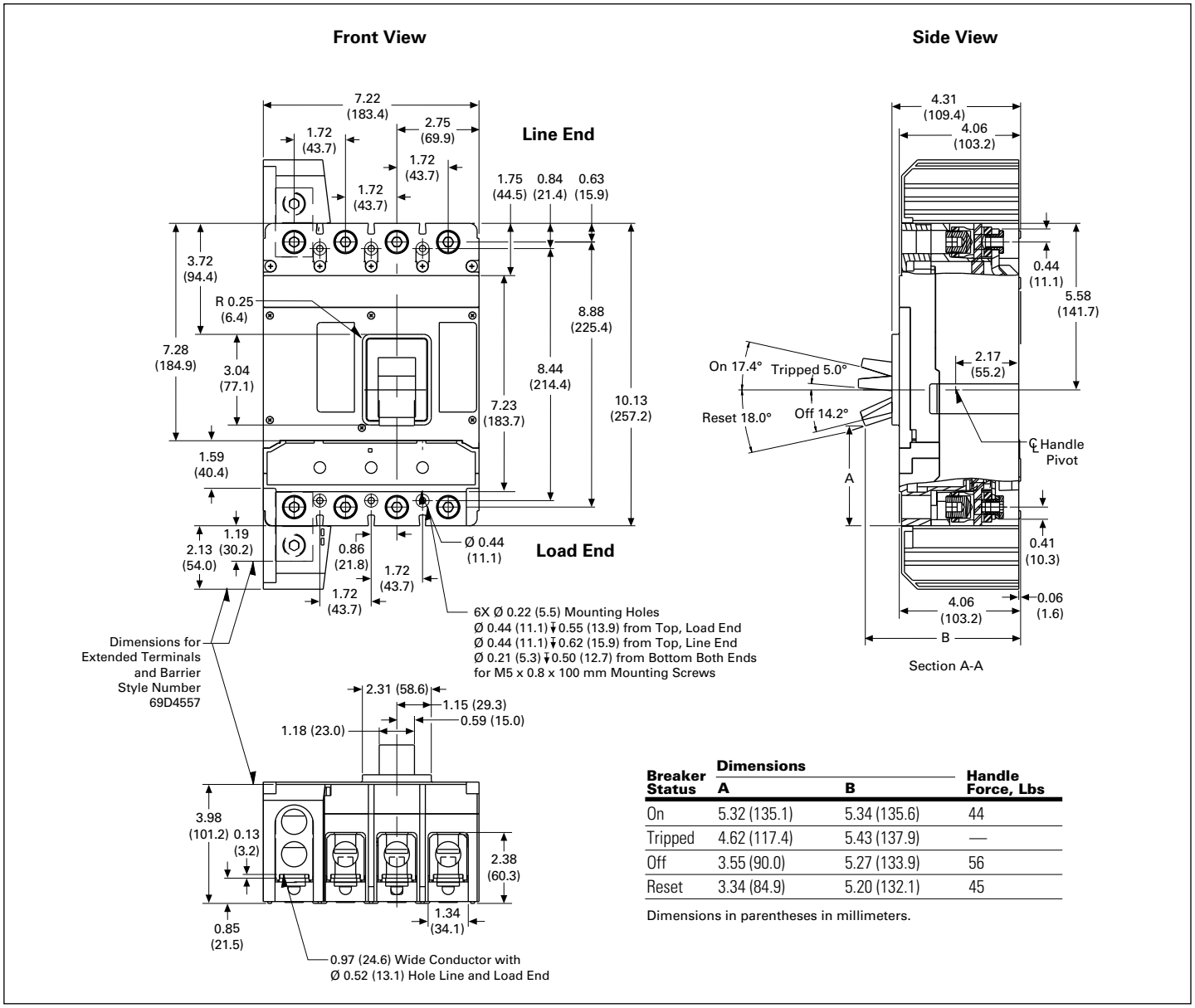


Figure 7. Type KD PV Four-Pole Drilling Plans

LG PV four-pole breaker outlines and drilling plans



Breaker Status	Dimensions A	Dimensions B	Handle Force, Lbs
On	5.32 (135.1)	5.34 (135.6)	44
Tripped	4.62 (117.4)	5.43 (137.9)	—
Off	3.55 (90.0)	5.27 (133.9)	56
Reset	3.34 (84.9)	5.20 (132.1)	45

Dimensions in parentheses in millimeters.

Figure 8. Type LG PV Four-Pole Outline

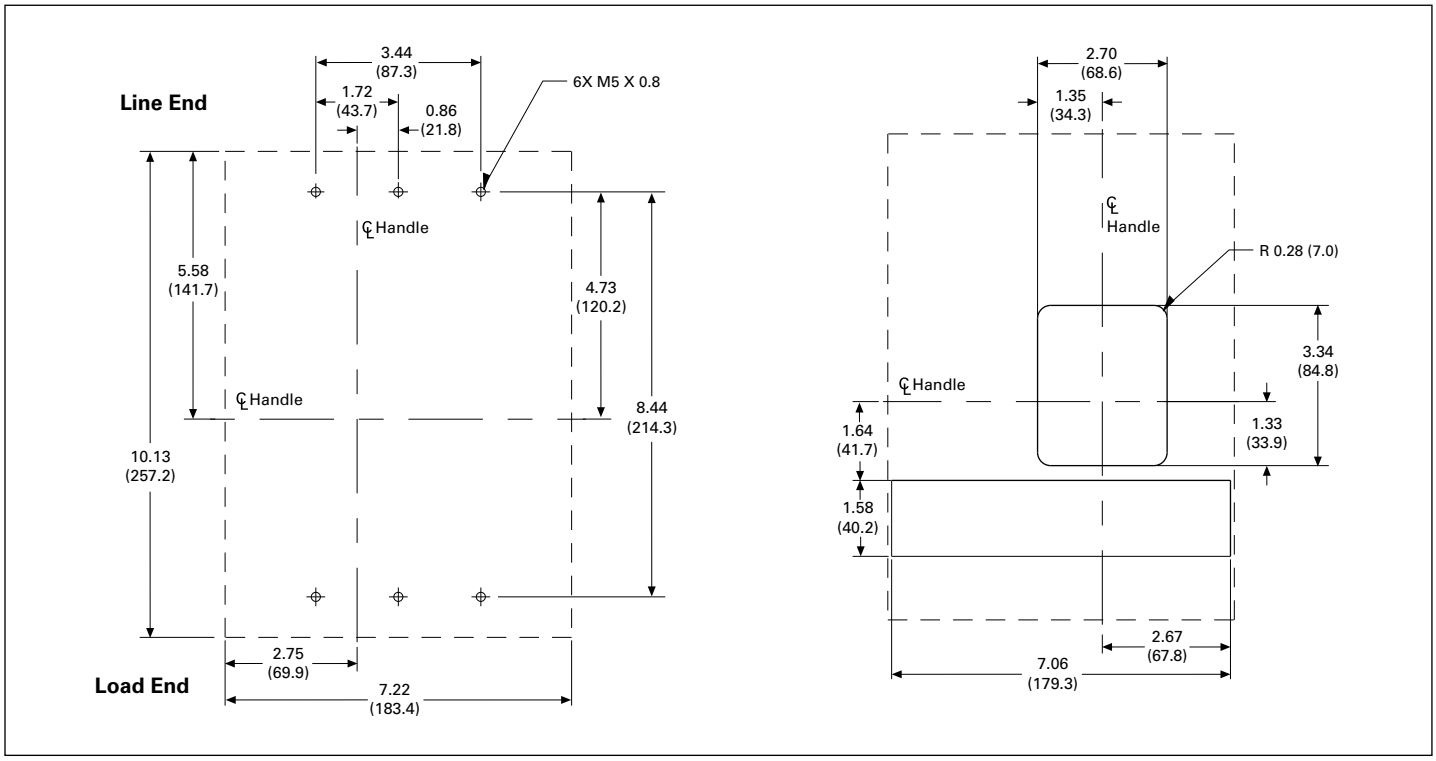
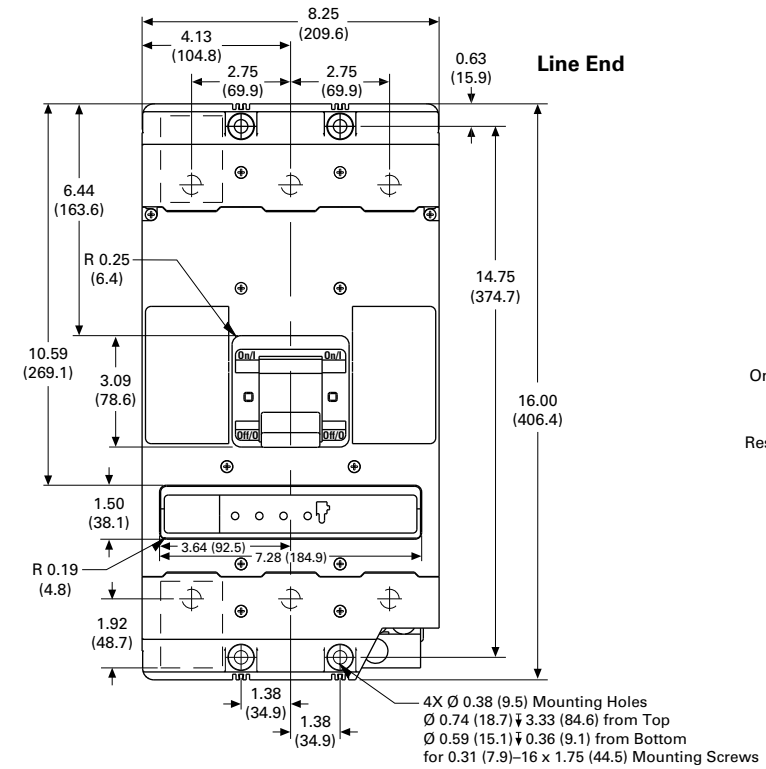
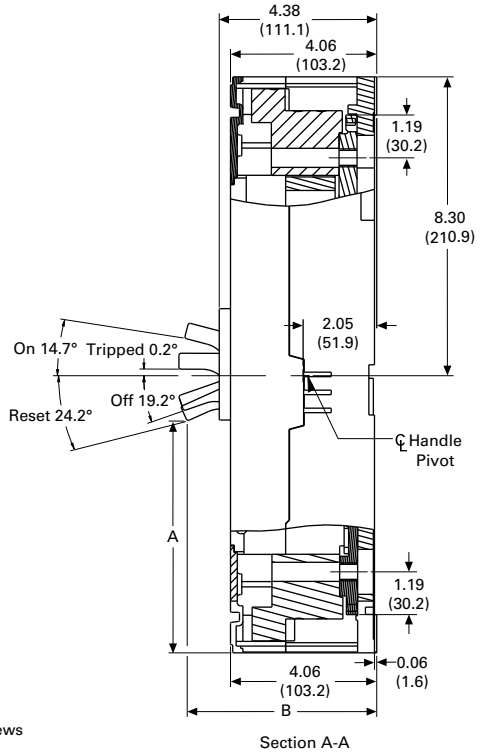


Figure 9. Type LG PV Four-Pole Drilling Plan

MDL PV three-pole breaker outlines and drilling plans





Section A-A

Breaker Status	Dimensions A	Dimensions B	Handle Force, Lbs
On	8.74 (222.0)	5.34 (135.6)	49
Tripped	7.88 (200.2)	5.50 (139.6)	—
Off	6.72 (170.8)	5.36 (136.2)	52
Reset	6.44 (163.5)	5.27 (133.7)	64

Dimensions in parentheses in millimeters.

Figure 10. Type MDL PV Three-Pole Outline

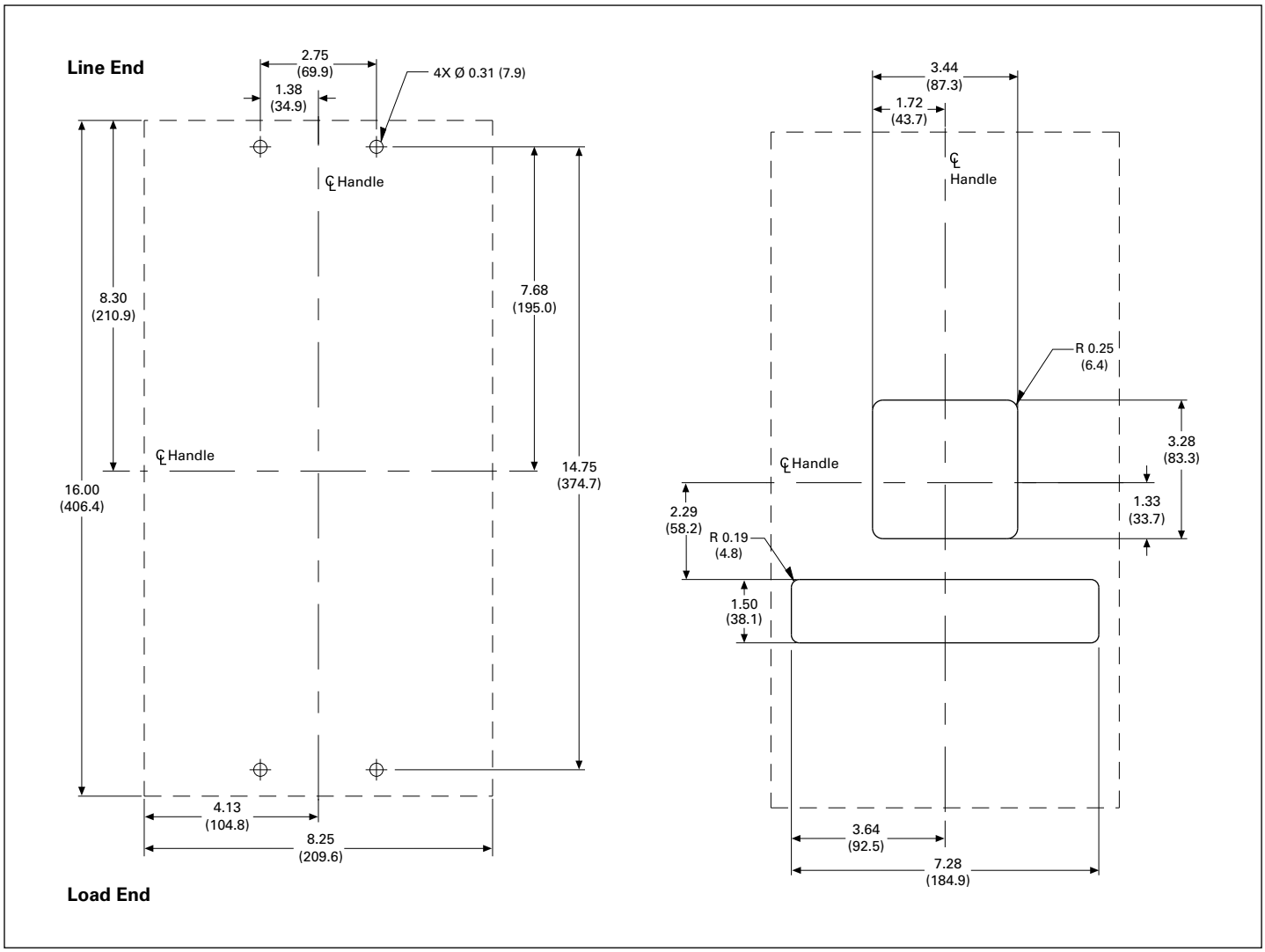


Figure 11. Type MDL PV Three-Pole Drilling Plans

Time/current curves

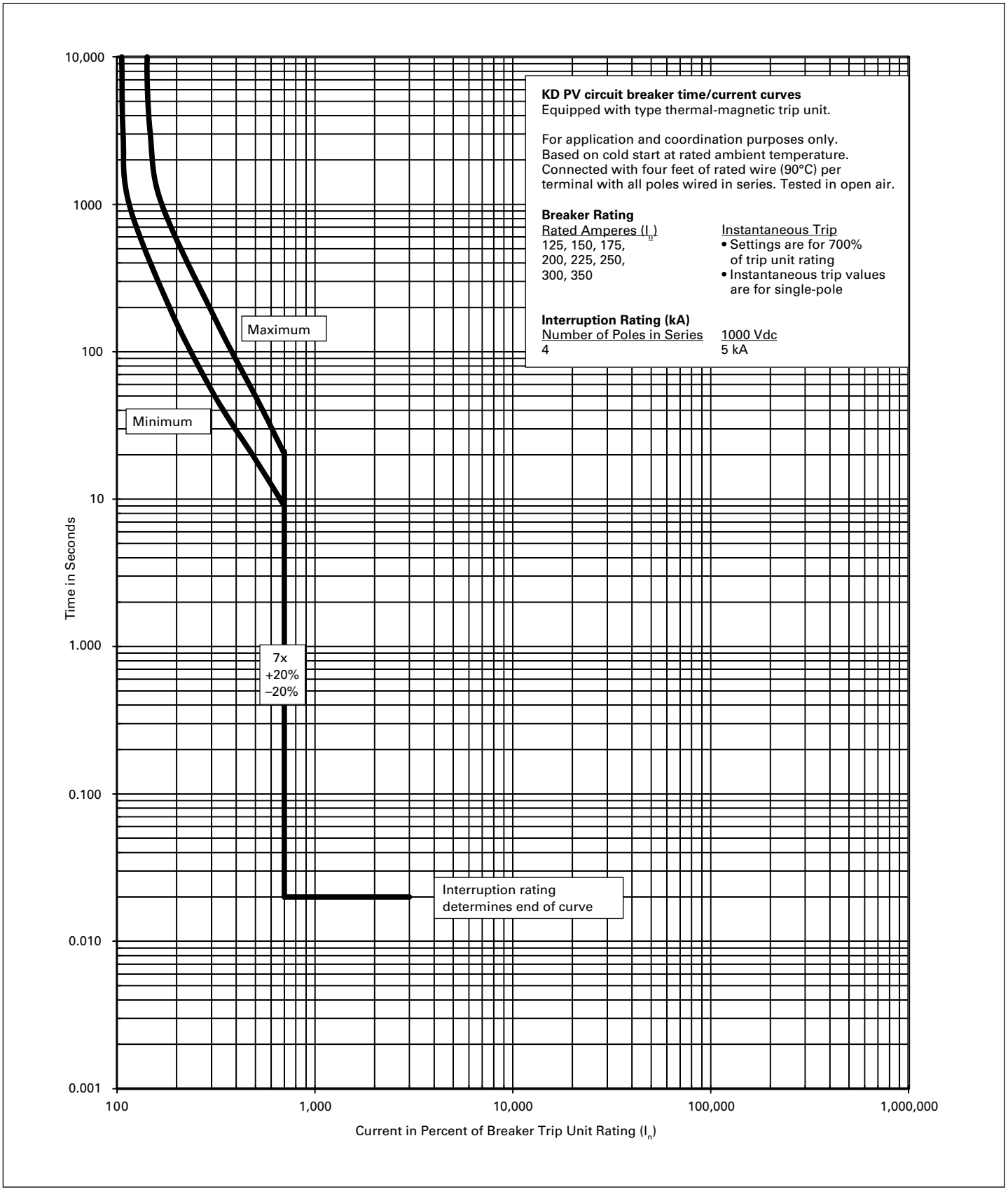


Figure 12. KD PV Circuit Breakers Time/Current Curves

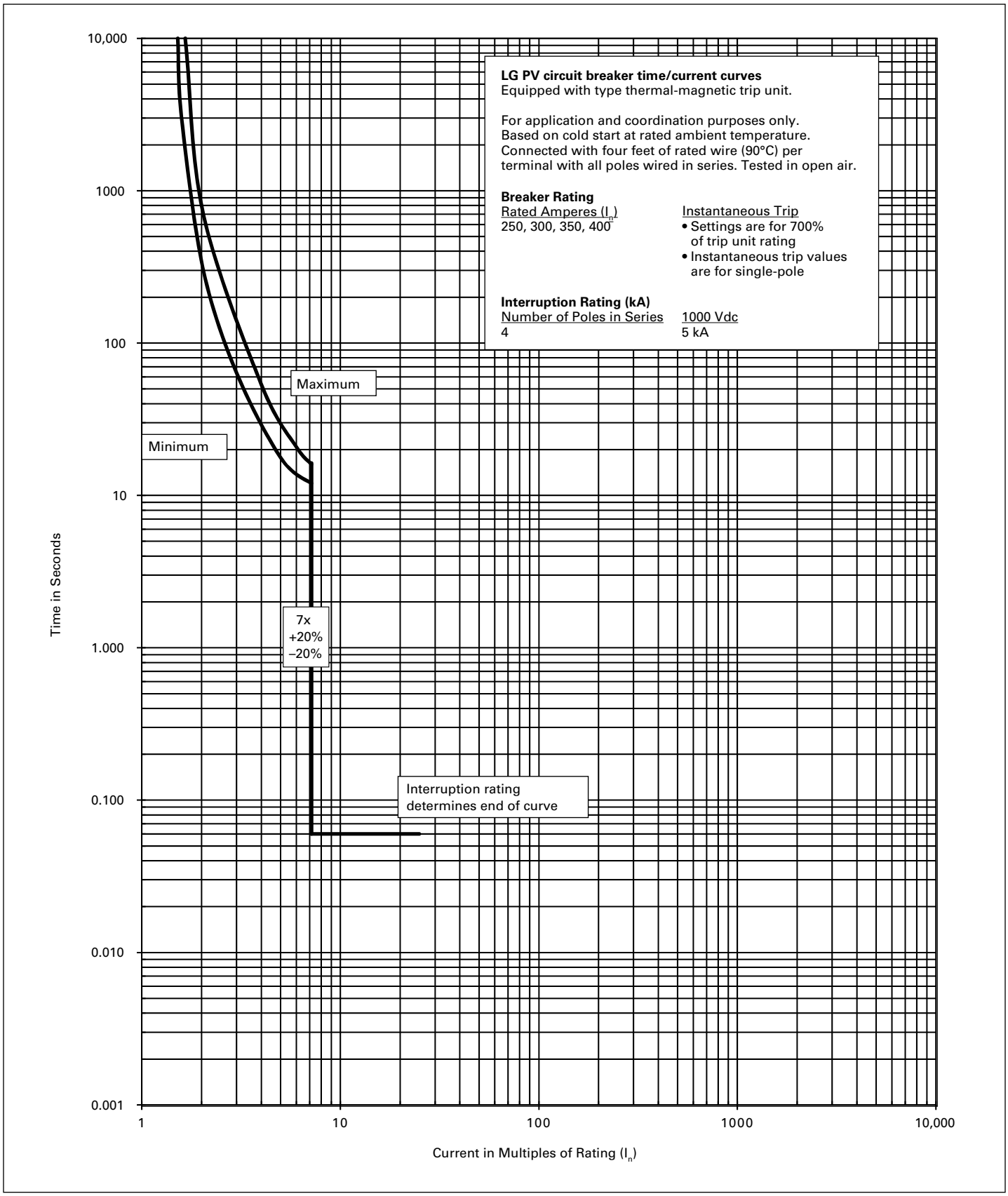


Figure 13. LG PV Circuit Breakers Time/Current Curves

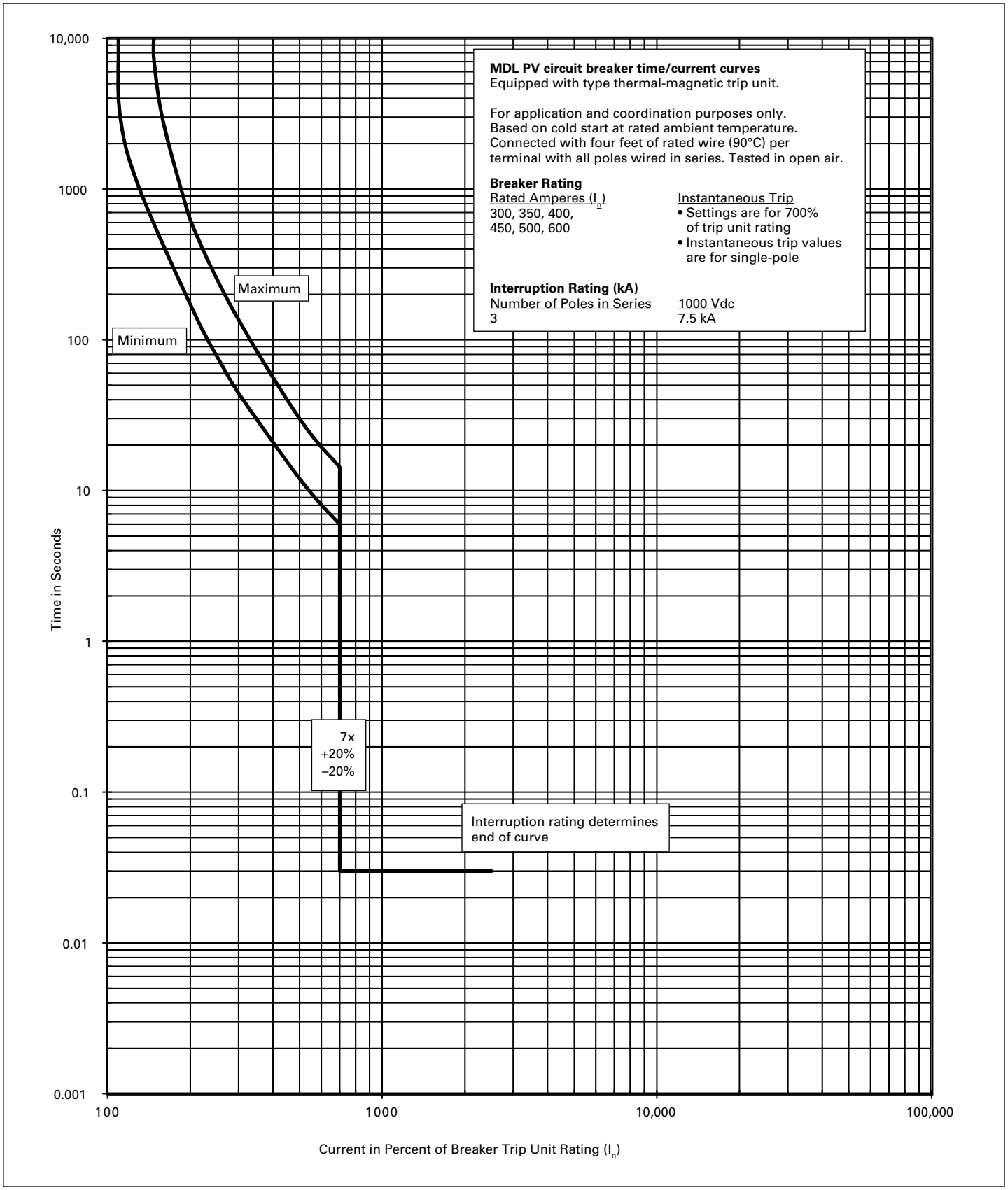


Figure 14. Type MDL PV Circuit Breakers Time/Current Curves

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