PowerPact® H- and J-Frame Circuit Breakers

Catalog
0611CT0401R06/10
2010
Class 0611

CONTENTS

SQUARE D
by Schneider Electric

Section 1—General Information

Introduction

H-frame and J-frame molded case circuit breakers are designed to protect electrical systems from damage caused by overloads and short circuits. All circuit breakers are designed to open and close a circuit by nonautomatic means and to open the circuit automatically on a predetermined overcurrent.

Features and Benefits

The H- and J-frame modular platform provides many options for accessories, configurations, and actuation. H- and J-frame circuit breakers (15–250 A) and motor-circuit protectors (30–250 A) are designed to use common accessories. Some of the key features are defined below:

Common Design Envelope

Both the H-frame and J-frame circuit breakers feature common mounting holes, handle locations and trim dimensions.

Figure 1: Common Design for H- and J-Frame Circuit Breakers

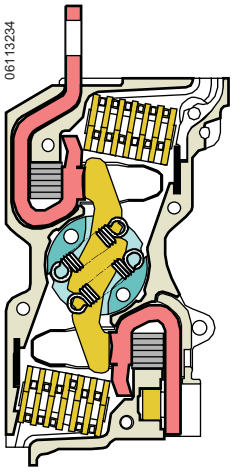
High Ampere Interrupting Ratings (AIR)

Circuit breakers are available with interrupting ratings up to:

- 125 kA at 240 Vac delta
- 100 kA at 480 Vac delta
- 50 kA at 600 Vac delta.

See Table 9 for additional interruption ratings.

Dual-Break Rotating Contacts



All PowerPact® H-frame and J-frame circuit breakers are equipped with dual-break rotating contacts that reduce the amount of peak current during a short circuit fault. This reduces the let-through currents and enhances equipment protection.

Reduced Let-Through Currents

The moving contact has the shape of an elongated “S” and rotates around an floating axis. The shape of the fixed and moving contacts are such that the repelling forces appear as soon as the circuit reaches approximately 15 times I_n.

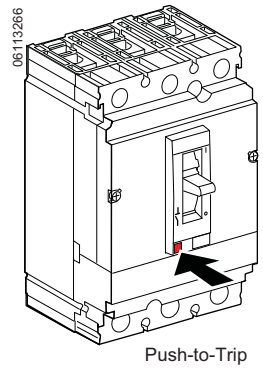
Due to the rotating movement, repulsion is rapid and the device greatly limits short-circuit currents, whatever the interrupting level of the unit (D, G, J or L). The fault current is extinguished before it can fully develop. Lower let-through currents provide less peak energy, reducing the required bus bar bracing, lowering enclosure pressure, and delivering improved series or combination ratings. See page 13 for UL Current Limiting labels.

Internal Operating Mechanism

H-frame and J-frame circuit breakers have an over-center toggle mechanism providing quick-make, quick-break operation. The operating mechanism is also trip-free, which allows tripping even when the circuit breaker handle is held in the “ON” position.

Internal cross-bars provide common opening and closing of all poles with a single operating handle.

All H-frame and J-frame circuit breakers have an integral push-to-trip button in the cover to manually trip the circuit breaker. This should be used as part of a regular preventive maintenance program.

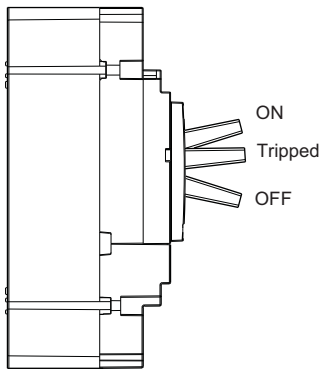


Push-to-Trip

Handle Position Indication

The H-frame and J-frame circuit breaker handle can assume any of three positions, ON, tripped or OFF as shown. The center tripped position provides positive visual indication that the circuit breaker has tripped.

The circuit breaker can be reset by first pushing the handle to the extreme “OFF” position. Power can then be restored to the load by pushing the handle to the “ON” position.

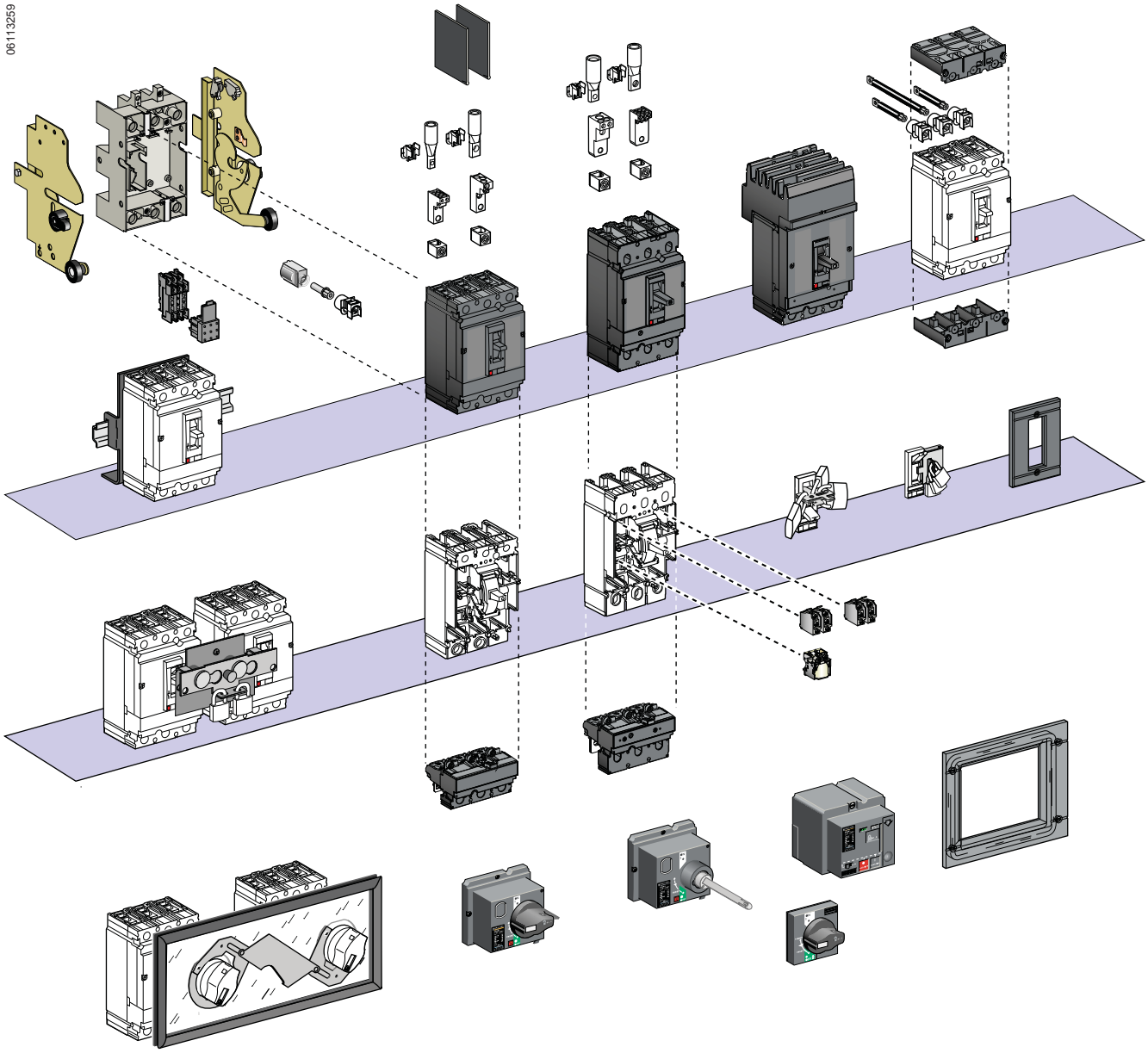


Flexible Configurations

The PowerPact H- and J-frame circuit breakers may be configured with lugs, bus bar connections, rear connections, I-Line®, drawout cradle, or plug-in base.

Field Installable Accessories and Trip Units

Figure 2: Field Installable Accessories and Trip Units



Catalog Numbering

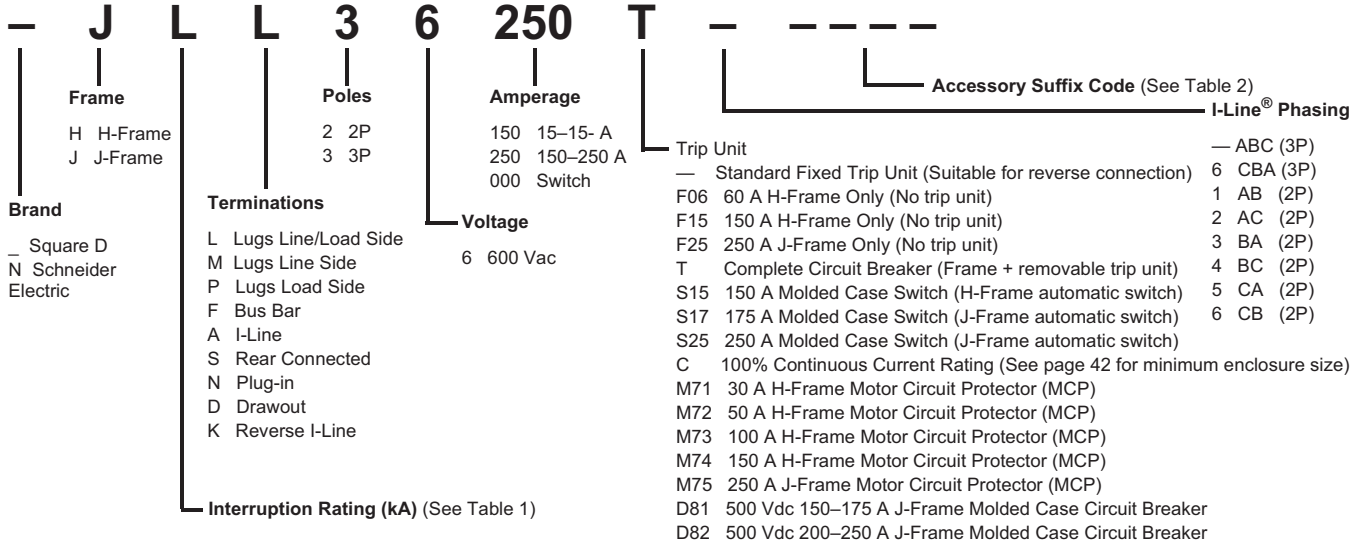


Table 1: Interrupting Rating

	UL/CSA/NOM					IEC 647-2 Icu/Ics				
	240 Vac	480 Vac	600 Vac	250 Vdc	500 Vdc[1]	220/240 Vac	380/440/415 Vac	500/525 Vac	250 Vdc	500 Vdc
D	25 kA	18 kA	14 kA	20 kA	—	25/25 kA	18/18 kA	14/14 kA	20 kA	20 kA
G	65 kA	35 kA	18 kA	20 kA	20 kA	65/65 kA	35/35 kA	18/18 kA	20 kA	20 kA
J	100 kA	65 kA	25 kA	20 kA	—	100/100 kA	65/65 kA	25/25 kA	20 kA	20 kA
L	125 kA	100 kA	50 kA	20 kA	—	125/125 kA	100/100 kA	50/50 kA	20 kA	20 kA

[1] Special DC J-frame circuit breakers only.

Table 2: Accessory Suffix Codes (Building Sequence as Listed)

(1) Auxiliary Switch

Suffix	Contacts	Kit Number
AA	1A/1B Standard	**S29450**
AB	2A/2B Standard	**S29450 (2)**
AE	1A/1B Gold	**S29482**
AF	2A/2B Gold	**S29482 (2)**

(2) Alarm/Overcurrent Trip Switch

Suffix	Switch	Kit Number
BC	Alarm Switch (SD)	**S29450**
BH	Alarm Switch (SD) Low-level	**S29452**
BD	SDE Standard	**S29450 + S29451**
BJ	SDE Low-level	**S29452 + S29451**
BE	SD and SDE Standard	**S29450 (2) + S29451**
BK	SD and SDE Low-level	**S29452 (2) + S29451**

(3) Shunt Trip / (4) Undervoltage Release UVR / Voltage

Suffix	Kit Number	Suffix	Kit Number	Voltage
SK	**S29384**	UK	**S29404**	24 Vac
SL	**S29385**	UL	**S29405**	48 Vac
SA	**S29386**	UA	**S29406**	120 Vac
SD	**S29387**	UD	**S29407**	208–277 Vac
SH	**S29388**	UH	**S29408**	380–480 Vac
SJ	**S29389**	UJ	**S29409**	525–600 Vac
SN	**S29382**	UN	**S29402**	12 Vdc
SO	**S29390**	UO	**S29410**	24 Vdc
SU	**S29391**	UU	**S29411**	30 Vdc
SP	**S29392**	UP	**S29412**	48 Vdc
SV	**S29383**	UV	**S29403**	60 Vdc
SR	**S29393**	UR	**S29413**	125 Vdc
SS	**S29394**	US	**S29414**	250 Vdc

(5) Motor Operator

Suffix	Voltage	H-Frame	J-Frame
ML	48/60 Vac	**S29440**	**S31548**
MA	120 Vac	**S29433**	**S31540**
MD	277 Vac	**S29434**	**S31541**
MH	380/480 Vac	**S29435**	**S31542**
MO	24/30 Vdc	**S29436**	**S31543**
MP	48/60 Vdc	**S29437**	**S31544**
MR	110/130 Vdc	**S29438**	**S31545**
MS	250 Vdc	**S29439**	**S31546**

(6) IEC Style Rotary Handle

Suffix	Handle Type (color)	Kit Number
RD10	Direct Mount (black)	**S29337**
RE10	Extended Door Mount (black)	**S29338**
RT10	Telescoping (black)	**S29343**
RD20	Direct Mount (red)	**S29339**
RE20	Extended Door Mount (red)	**S29340**

Trip System (Trip Units)

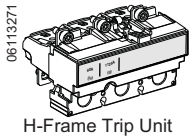
The H-frame and J-frame circuit breakers are equipped with a thermal-magnetic trip system designed to open automatically under overload or short circuit. H-frame and J-frame circuit breakers contain individual thermal (overload) and magnetic (short circuit) sensing elements in each pole.

The amperage ratings of the thermal trip elements are calibrated at 104°F (40°C) free air ambient temperature. Per the National Electric Code® (NEC®), circuit breakers may only be applied continuously at up to 80% of their rating.

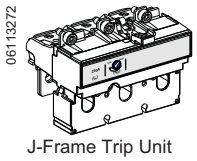
100% Rated

Some models of the H- and J-frame circuit breakers are UL Listed to be applied at up to 100% of their current rating. Because of the additional heat generated, the use of specially-designed enclosures (defined on page 42) and 90°C rated wire is required when applying circuit breakers at 100% of continuous current rating. Markings on the circuit breaker indicate the minimum enclosure size and ventilation required. The 90°C wire must be sized according to the ampacities of the 75°C wire column in the NEC. Circuit breakers with 100% rating can also be used in applications requiring only 80% continuous loading.

Field-Installable Trip Units



H-Frame Trip Unit

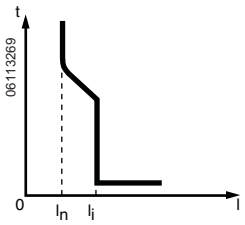


J-Frame Trip Unit

Table 3: H-Frame and J-Frame 3P Field-Installable Thermal-Magnetic Trip Unit

15–60 A H-Frame		70–150 A H-Frame		150–250 A J-Frame	
Amperage	**Cat. No.**	**Amperage**	**Cat. No.**	**Amperage**	**Cat. No.**
15 A	**HT3015**	70 A	**HT3070**	150 A	**JT3150**
20 A	**HT3020**	80 A	**HT3080**	175 A	**JT3175**
25 A	**HT3025**	90 A	**HT3090**	200 A	**JT3200**
30 A	**HT3030**	100 A	**HT3100**	225 A	**JT3225**
35 A	**HT3035**	110 A	**HT3110**	250 A	**JT3250**
40 A	**HT3040**	125 A	**HT3125**	—	—
45 A	**HT3045**	150 A	**HT3150**	—	—
50 A	**HT3050**	—	—	—	—
60 A	**HT3060**	—	—	—	—

H-Frame Trip Units



H-Frame Trip Curve

(I_n) Fixed threshold thermal protection against overload

(I_i) **Fixed** threshold magnetic protection against short circuits

Table 4: Temperature Rerating (H-Frame Trip Unit Thermal Protection—Long-Time)

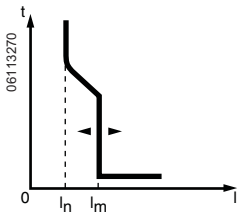
Temperature[1]		Rating (A) I_n															
°C	°F																
-10	14	23	30	38	46	53	60	68	76	88	103	112	123	137	160	180	221
0	32	21	28	36	43	49	56	63	71	83	97	107	117	131	151	171	207
10	50	20	26	33	40	46	52	59	66	77	90	101	111	126	141	161	194
20	68	18	24	31	37	42	48	54	62	72	84	96	105	120	132	152	180
30	86	17	22	28	34	39	44	50	56	66	77	88	98	110	121	139	165
40	104	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**125**	**150**
50	122	12	17	21	25	30	34	38	43	53	62	72	80	86	95	109	131
60	140	9	14	17	20	24	28	31	35	46	53	63	70	72	80	93	111

[1] Shaded areas indicate temperature rerated values, non-shaded areas are standard circuit breaker ampere ratings at 40° C (104° F).

Table 5: H-Frame Trip Unit Short Circuit Protection (Fixed) I_i

Ampere Rating	15–30 A	35–50 A	60–90 A	100–150 A
Hold (A)	350	400	800	900
Trip (A)	750	850	1450	1700

J-Frame Trip Units



J-Frame Trip Unit

(I_n) Fixed threshold thermal protection against overload

(I_m) Adjustable magnetic protection against short circuits

Table 6: Temperature Rerating (J-Frame Trip Unit Thermal Protection—Long-Time)

Temperature[1]		Rating (A) I_n				
°C	°F					
-10	14	221	264	289	330	377
0	32	207	247	273	310	354
10	50	194	230	256	290	330
20	68	180	213	240	270	307
30	86	165	194	220	248	279
40	104	**150**	**175**	**200**	**225**	**250**
50	122	131	150	176	193	214
60	140	111	124	151	160	177

1 Shaded areas indicate temperature rerated values, non-shaded areas are standard circuit breaker ampere ratings at 40° C (104° F).

Table 7: J-Frame Trip Unit Short Circuit Protection (Adjustable) I_m

Ampere Rating[1]	150 A	175 A	200 A	225 A	250 A
Low (A)	750	875	1000	1125	1250
High (A)	1500	1750	2000	2250	2500

1 UL magnetic trip setting tolerances are -20% +30% from nominal values shown.

Codes and Standards

H- and J-frame circuit breakers, automatic switches and electronic motor circuit protectors are manufactured and tested in accordance with the following standards:

Table 8: Codes and Standards (Domestic)

NOTE: Apply circuit breakers according to guidelines detailed in the National Electric Code (NEC) and other local wiring codes.

PowerPact H- and J-Frame Circuit Breakers	H- and J-Frame Switches	PowerPact H- and J-Frame Motor Circuit Protectors
UL 489[1]	UL 489[3]	UL 489[1]
IEC Standard 60947-2	IEC Standard 60947-3	IEC Standard 60947-2
CSA 22.2 No. 5-02[2]	CSA 22.2 No. 5-02[4]	CSA 22.2 No. 5-02[2]
Federal Specification W-C-375B/GEN	Federal Specification W-C-375B/GEN	NEMA AB1
NEMA AB1	NEMA AB1	CCC
NMX J-266	NMX J-266	CE Mark
CCC	CCC	
CE Mark	CE Mark	

1 PowerPact H- and J-frame circuit breakers and motor circuit protectors are in UL File E10027

2 PowerPact H- and J-frame circuit breakers and motor circuit protectors are in CSA File LR40970

3 PowerPact H- and J-frame switches are in UL File E87159

4 PowerPact H- and J-frame switches are in CSA File LR32390

Special Ratings

The H-frame and J-frame circuit breakers also comply with the following special ratings:

- HACR rating
- SWD switch duty rating (applies only to 15 and 20 A / 277 Vac or less, 2P and 3P)
- HID high intensity discharge lighting rating (15–50 A)

Suitable for Isolation (Positive Contact Indication)

All PowerPact H-frame and J-frame circuit breakers and switches are suitable for isolation as defined in the IEC 60947-2 standard.

- The isolation position corresponds to the O (OFF position)
- The operating handle cannot indicate the OFF position unless the contacts are open
- Padlocks may not be installed unless the contacts are open

NOTE: Installation of a rotary handle or a motor mechanism does not alter the functionality of the position indication system.

The isolation function is certified by tests of:

- the mechanical reliability of the position indication system
- the absence of leakage currents
- the overvoltage withstand capacity between upstream and downstream connections.

Molded Case Circuit Breakers

Circuit Breaker Ratings

The interrupting rating is the highest current at rated voltage the circuit breaker is designed to safely interrupt under standard test conditions. Circuit breakers must be selected with interrupting ratings equal to or greater than the available short-circuit current at the point where the circuit breaker is applied to the system (unless it is a branch device in a series rated combination). Interrupting ratings are shown on the front of the circuit breaker.

Table 9: UL 489 Circuit Breaker Ratings

		150 A H-Frame				250 A J-Frame			
Circuit Breaker Type		HD	HG	HJ	HL	JD	JG	JJ	JL
Number of Poles		2, 3	2, 3	2, 3	2, 3	2, 3	2, 3	2, 3	2, 3
Amperage Range (A)		15–150	15–150	15–150	15–150	150–250	150–250	150–250	150–250
UL/CSA/NOM (kA)	240 Vac	25	65	100	125	25	65	100	125
	480 Vac	18	35	65	100	18	35	65	100
	600 Vac	14	18	25	50	14	18	25	50
	250 Vdc	20	20	20	20	20	20	20	20
	500 Vdc[1]	—	—	—	—	20	20	20	20

1 500 Vdc rating applies only to catalog numbers with suffix D81 or D82, meeting UL489SC (Supplement C).

Table 10: IEC 60947-2 Circuit Breaker Ratings

			150 A H-Frame				250 A J-Frame			
Circuit Breaker Type			HD	HG	HJ	HL	JD	JG	JJ	JL
Number of Poles			2, 3	2, 3	2, 3	2, 3	2, 3	2, 3	2, 3	2, 3
Amperage Range (A)			15–150	15–150	15–150	15–150	150–250	150–250	150–250	150–250
IEC 60947-2 I_{cu}/I_{cs} (kA)	220/240 Vac		25/25	65/65	100/100	125/125	25/25	65/65	100/100	125/125
	380/440/415 Vac		18/18	35/35	65/65	100/100	18/18	35/35	65/65	100/100
	500/525 Vac		14/14	18/18	25/25	50/50	14/14	18/18	25/25	50/50
	250 Vdc		20	20	20	20	20	20	20	20
	500 Vdc[1, 2]		20	20	20	20	20	20	20	20
Insulation Voltage		U_i	750 Vac				750 Vac			
Impulse Withstand Voltage		U_{imp}	8 kVac				8 kVac			
Operational Voltage		U_e	525 Vac				525 Vac			
Rated Current		I_n	150 A				250 A			
Utilization Category		—	A				A			

1 2P in series

2 500 Vdc rating applies only to catalog numbers with suffix D81 or D82, meeting UL489SC (Supplement C).

Marine Ratings

UL Marine Listed Circuit Breakers (UL489SA)

A standard for molded case circuit breakers which are intended to be installed and used aboard a boat or vessel is included in Supplement SA SB to UL 489, “Standard for Molded Case Circuit Breakers and Circuit Breaker Enclosures’’ (also referred to as UL product category DKTY). This UL Standard was established in accordance with U.S. Coast Guard regulations, applicable American Boat and Yacht Council Inc. publications, and NFPA® 302 “Standard for Motor Craft (Pleasure and Commercial)’’. In order to be UL Listed for marine use, circuit breakers must not use aluminum or aluminum alloys for terminal connections and must be calibrated at an ambient temperature of 40°C. Standard circuit breakers should not be specified or used in place of marine circuit breakers.

The PowerPact H and J-frame circuit breakers are UL 489 SA and SB Marine Listed for use on vessels over 65 ft. (19.8 m) in length and under 65 ft. [19.8 m] in length.) Order marine circuit breakers by adding the suffix “YA” for marine listing and the suffix “LC” for the required copper lugs to the catalog number.

UL Naval Listed Circuit Breakers (UL 489 SB)

The standard for molded case circuit breakers which are intended or use aboard non-combatant and auxiliary naval ships is included in Supplement SB to UL 489, “Standard for Molded Case Circuit Breakers and Circuit Breaker Enclosures’’. The PowerPact H and J-frame circuit breakers are UL 489 SB are UL Naval Listed for use on vessels over 65 ft. (19.8 m) in length and under 65 feet (19.8 m) in length. Order marine circuit breakers adding the suffix “YA” for marine listing and the suffix “LC” for the required copper lugs to the catalog number.

American Bureau of Shipping (ABS)

The PowerPact H- and J-Frame circuit breakers are certified to ABSNVR (American Bureau of Shipping - Naval Vessel Rules), for use on Naval vessels.

400 Hz Derating

Application of thermal-magnetic circuit breakers at frequencies above 60 Hz requires that special consideration be given to the effects of high frequency on the circuit breaker characteristics. Thermal and magnetic operations must be treated separately.

At frequencies below 60 Hz, the thermal rerating of thermal-magnetic circuit breakers is negligible. However, at frequencies above 60 Hz, thermal rerating is required.

One of the most common high frequency applications is at 400 Hz.

Table 11: 400 Hz Derating

Circuit Breaker	400 Hz Derating Multiplier
H-Frame	0.95
J-Frame	0.90

For more information, refer to Data Bulletin 0100DB0101, *Determining Current Carrying Capacity in Special Applications*.

Reverse Feeding of Circuit Breakers

The standard unit-mount H- and J-frame circuit breakers have sealed trip units and may be reverse fed. See Tables 15–18 for catalog numbers.

Circuit breakers with field-interchangeable trip units (designated by the suffix T and labeled “LINE” and “LOAD”) cannot be reverse fed. Neither can circuit breaker frames without terminations or trip units. See Tables 19–21.

Now UL Listed as Current Limiting

The current limiting attributes of PowerPact H- and J-frame circuit breakers provide greater protection for downstream devices by limiting the let-throught current in the event of a fault. The current-limiting capabilities of HJ/HL and JJ/JL frame circuit breakers are documented with Underwriters Laboratories and Canadian Standards Association. These current-limiting circuit breaker ship with a label that identifies them as UL/CSA Current Limiting CIrcuit Breakers. (The HD/HG and JD/JG circuit breakers do not carry the UL Current Limiting label)

The trip curves with let-through data are available for these circuit breakers. The trip curves are identified by a label on the side of the circuit breaker.

Curve No. 50-10 PowerPact HJ and HL 150 A Frame Peak Let-Through Current Ip (see page 68)
Curve No. 50-11 PowerPact HJ and HL 150 A Frame Let-Through I^2t (see page 69)
Curve No. 50-12 PowerPact JJ and JL 150 A Frame Peak Let-Through Current Ip (see page 70)
Curve No. 50-13 PowerPact JJ and JL 150 A Frame Let-Through I^2t (see page 71)

Please note that as let-through curves for UL Listed Current-Limiting Circuit Breakers, these curves are maximum let-through values. The let-through curves in Figures 44 and 45 are typical, and therefore lower, values.

Operating Conditions

Temperature

To meet the requirements of the UL489 Standard, molded case circuit breakers are designed, built and calibrated for use on 50/60 Hz ac systems in a 40°C (104°F) ambient environment. The thermal-magnetic system is affected by changes in ambient temperature and the circuit breaker may require re-rating to suit the environment it operates within. The circuit breaker may be operated at temperatures between -25°C (-13°F) and +70°C (158° F). For temperature rerating tables, see Table 4 and Table 6.

NOTE: A special 50°C (122° F) Rating is available for special high ambient conditions (not UL listed). Order by adding CA suffix to catalog number.

Altitude

Circuit breakers are suitable for use at altitudes up to 13,100 ft. (4000 m). For altitudes higher than 6560 ft. (2000 m), circuit breakers must be rerated as shown.

Table 12: Altitude Rerating Values per ANSI C37.20.1 (table 10)

Altitude	≤ 6,600 ft. (≤ 2,000 m)	8,500 ft. (2,600 m)	13,000 ft. (3,900 m)
Voltage	1.00	0.95	0.80
Current	1.00	0.99	0.96

Tropicalization

The materials used in PowerPact circuit breakers will not support the growth of fungus and mold.

Vibration

PowerPact H- and J-frame circuit breakers meet IEC 60068-2-6 Standards for vibration:

- 2.0 Hz to 25 Hz - amplitude +/- 1.6 mm
- 25.0 Hz to 100 Hz - acceleration +/- 4.0 g

Circuit Breaker Endurance

Table 13: Operations (Open-Close Cycles)

Frame	Number of Operations	
	With Current	Without Current
150 A H-Frame	4000	4000
250 A J-Frame	1000	5000

Corner Grounded Delta Ratings (1Ø-3Ø)

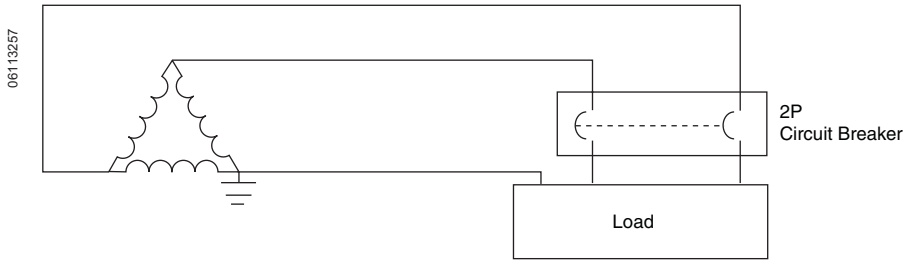
Circuit breakers suitable for corner-grounded circuits are marked 1Ø-3Ø. For additional information, refer to data bulletin 2700DB0202R2/09.

Table 14: Corner Grounded Delta Ratings (1Ø-3Ø)

	2P H-Frame				2P J-Frame				3P H-Frame				3P J-Frame			
	HD	HG	HJ[1]	HL[1]	JD[1]	JG[1]	JJ[1]	JL[1]	HD	HG	HJ	HL	JD	JG	JJ	JL
Ampere Rating (A)	15–150				150–250				15–150				150–250			
Voltage Rating (Vac)	240				240				480				480			
UL Interrupting Rating (kA)	42	42	65	100	42	42	65	100	18	35	65	100	18	35	65	100

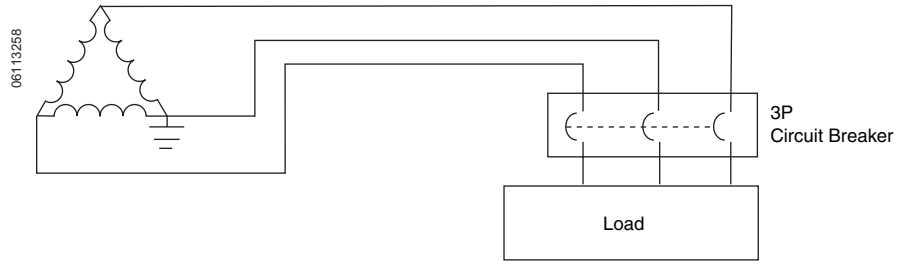
1 Built using 3P module

Figure 3: Three-Phase 240 Vac Corner-Grounded Delta System



NOTE: Three-pole circuit breakers must be used on three-phase 480 Vac corner-grounded delta systems. See Figure 2. The outside poles are to be connected to the ungrounded phases and the grounded conductor connected to the center poles. Connecting the circuit breaker in a manner other than that described or shown may result in an unsafe application of the circuit breaker.

Figure 4: Three-Phase 480 Vac Corner-Grounded Delta System



Environment

RoHS Compliant

The PowerPact H- and J-frame circuit breakers (except MCP) conform to the European environmental directive EC/2002/95 concerning the restriction of hazardous substances (RoHS).

Unit-Mount Circuit Breaker Catalog Numbers

Table 15: PowerPact H-Frame 150 A Unit-Mount Thermal-Magnetic Current Limiting Circuit Breakers (600 Vac, 250 Vdc) with Factory Sealed Trip Unit (Suitable for Reverse Connection)

Current Rating @ 40 C	Fixed AC Magnetic Trip		Interrupting Rating								Terminal Wire Range
			D		G		J		L		
	Hold	Trip	80% Rated	100% Rated	80% Rated	100% Rated	80% Rated	100% Rated	80% Rated	100% Rated	
H-Frame, 150 A, 2P, 600 Vac 50/60Hz, 250 Vdc[1]											
15 A	350 A	750 A	HDL26015	HDL26015C	HGL26015	HGL26015C	HJL26015	HJL26015C	HLL26015	HLL26015C	AL150HD 14–3/0 AWG Al or Cu
20 A	350 A	750 A	HDL26020	HDL26020C	HGL26020	HGL26020C	HJL26020	HJL26020C	HLL26020	HLL26020C	
25 A	350 A	750 A	HDL26025	HDL26025C	HGL26025	HGL26025C	HJL26025	HJL26025C	HLL26025	HLL26025C	
30 A	350 A	750 A	HDL26030	HDL26030C	HGL26030	HGL26030C	HJL26030	HJL26030C	HLL26030	HLL26030C	
35 A	400 A	850 A	HDL26035	HDL26035C	HGL26035	HGL26035C	HJL26035	HJL26035C	HLL26035	HLL26035C	
40 A	400 A	850 A	HDL26040	HDL26040C	HGL26040	HGL26040C	HJL26040	HJL26040C	HLL26040	HLL26040C	
45 A	400 A	850 A	HDL26045	HDL26045C	HGL26045	HGL26045C	HJL26045	HJL26045C	HLL26045	HLL26045C	
50 A	400 A	850 A	HDL26050	HDL26050C	HGL26050	HGL26050C	HJL26050	HJL26050C	HLL26050	HLL26050C	
60 A	800 A	1450 A	HDL26060	HDL26060C	HGL26060	HGL26060C	HJL26060	HJL26060C	HLL26060	HLL26060C	
70 A	800 A	1450 A	HDL26070	HDL26070C	HGL26070	HGL26070C	HJL26070	HJL26070C	HLL26070	HLL26070C	
80 A	800 A	1450 A	HDL26080	HDL26080C	HGL26080	HGL26080C	HJL26080	HJL26080C	HLL26080	HLL26080C	
90 A	800 A	1450 A	HDL26090	HDL26090C	HGL26090	HGL26090C	HJL26090	HJL26090C	HLL26090	HLL26090C	
100 A	900 A	1700 A	HDL26100	HDL26100C	HGL26100	HGL26100C	HJL26100	HJL26100C	HLL26100	HLL26100C	
110 A	900 A	1700 A	HDL26110	HDL26110C	HGL26110	HGL26110C	HJL26110	HJL26110C	HLL26110	HLL26110C	
125 A	900 A	1700 A	HDL26125	HDL26125C	HGL26125	HGL26125C	HJL26125	HJL26125C	HLL26125	HLL26125C	
150 A	900 A	1700 A	HDL26150	HDL26150C	HGL26150	HGL26150C	HJL26150	HJL26150C	HLL26150	HLL26150C	
H-Frame, 150 A, 3P, 600 Vac 50/60Hz, 250 Vdc											
15 A	350 A	750 A	HDL36015	HDL36015C	HGL36015	HGL36015C	HJL36015	HJL36015C	HLL36015	HLL36015C	AL150HD 14–3/0 AWG Al or Cu
20 A	350 A	750 A	HDL36020	HDL36020C	HGL36020	HGL36020C	HJL36020	HJL36020C	HLL36020	HLL36020C	
25 A	350 A	750 A	HDL36025	HDL36025C	HGL36025	HGL36025C	HJL36025	HJL36025C	HLL36025	HLL36025C	
30 A	350 A	750 A	HDL36030	HDL36030C	HGL36030	HGL36030C	HJL36030	HJL36030C	HLL36030	HLL36030C	
35 A	400 A	850 A	HDL36035	HDL36035C	HGL36035	HGL36035C	HJL36035	HJL36035C	HLL36035	HLL36035C	
40 A	400 A	850 A	HDL36040	HDL36040C	HGL36040	HGL36040C	HJL36040	HJL36040C	HLL36040	HLL36040C	
45 A	400 A	850 A	HDL36045	HDL36045C	HGL36045	HGL36045C	HJL36045	HJL36045C	HLL36045	HLL36045C	
50 A	400 A	850 A	HDL36050	HDL36050C	HGL36050	HGL36050C	HJL36050	HJL36050C	HLL36050	HLL36050C	
60 A	800 A	1450 A	HDL36060	HDL36060C	HGL36060	HGL36060C	HJL36060	HJL36060C	HLL36060	HLL36060C	
70 A	800 A	1450 A	HDL36070	HDL36070C	HGL36070	HGL36070C	HJL36070	HJL36070C	HLL36070	HLL36070C	
80 A	800 A	1450 A	HDL36080	HDL36080C	HGL36080	HGL36080C	HJL36080	HJL36080C	HLL36080	HLL36080C	
90 A	800 A	1450 A	HDL36090	HDL36090C	HGL36090	HGL36090C	HJL36090	HJL36090C	HLL36090	HLL36090C	
100 A	900 A	1700 A	HDL36100	HDL36100C	HGL36100	HGL36100C	HJL36100	HJL36100C	HLL36100	HLL36100C	
110 A	900 A	1700 A	HDL36110	HDL36110C	HGL36110	HGL36110C	HJL36110	HJL36110C	HLL36110	HLL36110C	
125 A	900 A	1700 A	HDL36125	HDL36125C	HGL36125	HGL36125C	HJL36125	HJL36125C	HLL36125	HLL36125C	
150 A	900 A	1700 A	HDL36150	HDL36150C	HGL36150	HGL36150C	HJL36150	HJL36150C	HLL36150	HLL36150C	

[1] HD and HG circuit breakers are true 2-pole construction.

Table 16: PowerPact J-Frame 250 A Unit-Mount Thermal-Magnetic Current Limiting Circuit Breakers with Factory Sealed Trip Unit (Suitable for Reverse Connection)

Current Rating @ 40 C	Fixed AC Magnetic Trip		Interrupting Rating								Terminal Wire Range
			D		G		J		L		
	Hold	Trip	80% Rated	100% Rated	80% Rated	100% Rated	80% Rated	100% Rated	80% Rated	100% Rated	
J-Frame, 250 A, 2P, 600 Vac 50/60Hz, 250 Vdc											
150 A	750 A	1500 A	**JDL36150**	**JDL36150C**	**JGL36150**	**JGL36150C**	**JJL36150**	**JJL36150C**	**JLL36150**	**JLL36150C**	AL175JD 4–4/0 AWG Al or Cu
175 A	875 A	1750 A	**JDL36175**	**JDL36175C**	**JGL36175**	**JGL36175C**	**JJL36175**	**JJL36175C**	**JLL36175**	**JLL36175C**	
200 A	1000 A	2000 A	**JDL36200**	**JDL36200C**	**JGL36200**	**JGL36200C**	**JJL36200**	**JJL36200C**	**JLL36200**	**JLL36200C**	AL250JD 3/0 AWG–350 kcmil Al or Cu
225 A	1125 A	2250 A	**JDL36225**	**JDL36225C**	**JGL36225**	**JGL36225C**	**JJL36225**	**JJL36225C**	**JLL36225**	**JLL36225C**	
250 A	1250 A	2500 A	**JDL36250**	**JDL36250C**	**JGL36250**	**JGL36250C**	**JJL36250**	**JJL36250C**	**JLL36250**	**JLL36250C**	
J-Frame, 250 A, 3P, 600 Vac 50/60Hz, 250 Vdc											
150 A	750 A	1500 A	**JDL36150**	**JDL36150C**	**JGL36150**	**JGL36150C**	**JJL36150**	**JJL36150C**	**JLL36150**	**JLL36150C**	AL175JD 4–4/0 AWG Al or Cu
175 A	875 A	1750 A	**JDL36175**	**JDL36175C**	**JGL36175**	**JGL36175C**	**JJL36175**	**JJL36175C**	**JLL36175**	**JLL36175C**	
200 A	1000 A	2000 A	**JDL36200**	**JDL36200C**	**JGL36200**	**JGL36200C**	**JJL36200**	**JJL36200C**	**JLL36200**	**JLL36200C**	AL250JD 3/0 AWG–350 kcmil Al or Cu
225 A	1125 A	2250 A	**JDL36225**	**JDL36225C**	**JGL36225**	**JGL36225C**	**JJL36225**	**JJL36225C**	**JLL36225**	**JLL36225C**	
250 A	1250 A	2500 A	**JDL36250**	**JDL36250C**	**JGL36250**	**JGL36250C**	**JJL36250**	**JJL36250C**	**JLL36250**	**JLL36250C**	

I-Line Circuit Breaker Catalog Numbers

Table 17: PowerPact H-Frame 150 A I-Line® Thermal-Magnetic Current Limiting Circuit Breakers with Factory Sealed Trip Unit (Suitable for Reverse Connection)

Current Rating @ 40 C	Fixed AC Magnetic Trip		Interrupting Rating[1]				Terminal Wire Range
			D	G	J	L	
	Hold	Trip	80% Rated	80% Rated	80% Rated	80% Rated	
H-Frame, 150 A, 2P, 600 Vac 50/60Hz, 250 Vdc							
15 A	350 A	750 A	HDA26015( )	HGA26015( )	HJA26015( )	HLA26015( )	AL150HD 14-3/0 AWG Al or Cu
20 A	350 A	750 A	HDA26020( )	HGA26020( )	HJA26020( )	HLA26020( )	
25 A	350 A	750 A	HDA26025( )	HGA26025( )	HJA26025( )	HLA26025( )	
30 A	350 A	750 A	HDA26030( )	HGA26030( )	HJA26030( )	HLA26030( )	
35 A	400 A	850 A	HDA26035( )	HGA26035( )	HJA26035( )	HLA26035( )	
40 A	400 A	850 A	HDA26040( )	HGA26040( )	HJA26040( )	HLA26040( )	
45 A	400 A	850 A	HDA26045( )	HGA26045( )	HJA26045( )	HLA26045( )	
50 A	400 A	850 A	HDA26050( )	HGA26050( )	HJA26050( )	HLA26050( )	
60 A	800 A	1450 A	HDA26060( )	HGA26060( )	HJA26060( )	HLA26060( )	
70 A	800 A	1450 A	HDA26070( )	HGA26070( )	HJA26070( )	HLA26070( )	
80 A	800 A	1450 A	HDA26080( )	HGA26080( )	HJA26080( )	HLA26080( )	
90 A	800 A	1450 A	HDA26090( )	HGA26090( )	HJA26090( )	HLA26090( )	
100 A	900 A	1700 A	HDA26100( )	HGA26100( )	HJA26100( )	HLA26100( )	
110 A	900 A	1700 A	HDA26110( )	HGA26110( )	HJA26110( )	HLA26110( )	
125 A	900 A	1700 A	HDA26125( )	HGA26125( )	HJA26125( )	HLA26125( )	
150 A	900 A	1700 A	HDA26150( )	HGA26150( )	HJA26150( )	HLA26150( )	
H-Frame, 150 A, 3P, 600 Vac 50/60Hz, 250 Vdc							
15 A	350 A	750 A	HDA36015	HGA36015	HJA36015	HLA36015	AL150HD 14-3/0 AWG Al or Cu
20 A	350 A	750 A	HDA36020	HGA36020	HJA36020	HLA36020	
25 A	350 A	750 A	HDA36025	HGA36025	HJA36025	HLA36025	
30 A	350 A	750 A	HDA36030	HGA36030	HJA36030	HLA36030	
35 A	400 A	850 A	HDA36035	HGA36035	HJA36035	HLA36035	
40 A	400 A	850 A	HDA36040	HGA36040	HJA36040	HLA36040	
45 A	400 A	850 A	HDA36045	HGA36045	HJA36045	HLA36045	
50 A	400 A	850 A	HDA36050	HGA36050	HJA36050	HLA36050	
60 A	800 A	1450 A	HDA36060	HGA36060	HJA36060	HLA36060	
70 A	800 A	1450 A	HDA36070	HGA36070	HJA36070	HLA36070	
80 A	800 A	1450 A	HDA36080	HGA36080	HJA36080	HLA36080	
90 A	800 A	1450 A	HDA36090	HGA36090	HJA36090	HLA36090	
100 A	900 A	1700 A	HDA36100	HGA36100	HJA36100	HLA36100	
110 A	900 A	1700 A	HDA36110	HGA36110	HJA36110	HLA36110	
125 A	900 A	1700 A	HDA36125	HGA36125	HJA36125	HLA36125	
150 A	900 A	1700 A	HDA36150	HGA36150	HJA36150	HLA36150	

[1] ( ) Indicate phasing

Table 18: PowerPact J-Frame 250A I-Line Thermal-Magnetic Current Limiting Circuit Breakers with Factory Sealed Trip Unit (Suitable for Reverse Connection)

Current Rating @ 40 C	Fixed AC Magnetic Trip		Interrupting Rating [1]				Terminal Wire Range
			D	G	J	L	
	Hold	Trip	80% Rated	80% Rated	80% Rated	80% Rated	
J-Frame, 250 A, 2P, 600 Vac 50/60Hz, 250 Vdc							
150 A	750 A	1500 A	**JDA36150( )**	**JGA36150( )**	**JJA36150( )**	**JLA36150( )**	AL175JD 4-4/0 AWG Al or Cu
175 A	875 A	1750 A	**JDA36175( )**	**JGA36175( )**	**JJA36175( )**	**JLA36175( )**	
200 A	1000 A	2000 A	**JDA36200( )**	**JGA36200( )**	**JJA36200( )**	**JLA36200( )**	AL250JD 3/0 AWG-350 kcmil Al or Cu
225 A	1125 A	2250 A	**JDA36225( )**	**JGA36225( )**	**JJA36225( )**	**JLA36225( )**	
250 A	1250 A	2500 A	**JDA36250( )**	**JGA36250( )**	**JJA36250( )**	**JLA36250( )**	
J-Frame, 250 A, 3P, 600 Vac 50/60Hz, 250 Vdc							
150 A	750 A	1500 A	**JDA36150**	**JGA36150**	**JJA36150**	**JLA36150**	AL175JD 4-4/0 AWG Al or Cu
175 A	875 A	1750 A	**JDA36175**	**JGA36175**	**JJA36175**	**JLA36175**	
200 A	1000 A	2000 A	**JDA36200**	**JGA36200**	**JJA36200**	**JLA36200**	AL250JD 3/0 AWG-350 kcmil Al or Cu
225 A	1125 A	2250 A	**JDA36225**	**JGA36225**	**JJA36225**	**JLA36225**	
250 A	1250 A	2500 A	**JDA36250**	**JGA36250**	**JJA36250**	**JLA36250**	

[1] ( ) Indicate phasing

Circuit Breakers with Field-Interchangeable Trip Units

Table 19: H-Frame 150 A Current-Limiting Circuit Breaker Frame with Field-Interchangeable Thermal-Magnetic Trip Units[1] (3P, 600 Vac, 250 Vdc)

Ampere Rating	Fixed AC Magnetic Trip		Interrupting Rating				Terminal Wire Range
			D	G	J	L	
	Hold	Trip	Cat. No.	Cat. No.	Cat. No.	Cat. No.	
15 A	350 A	750 A	**HDL36015T**	**HGL36015T**	**HJL36015T**	**HLL36015T**	AL150HD 14–3/0 AWG Al or Cu
20 A	350 A	750 A	**HDL36020T**	**HGL36020T**	**HJL36020T**	**HLL36020T**	
25 A	350 A	750 A	**HDL36025T**	**HGL36025T**	**HJL36025T**	**HLL36025T**	
30 A	350 A	750 A	**HDL36030T**	**HGL36030T**	**HJL36030T**	**HLL36030T**	
35 A	400 A	850 A	**HDL36035T**	**HGL36035T**	**HJL36035T**	**HLL36035T**	
40 A	400 A	850 A	**HDL36040T**	**HGL36040T**	**HJL36040T**	**HLL36040T**	
45 A	400 A	850 A	**HDL36045T**	**HGL36045T**	**HJL36045T**	**HLL36045T**	
50 A	400 A	850 A	**HDL36050T**	**HGL36050T**	**HJL36050T**	**HLL36050T**	
60 A	800 A	1450 A	**HDL36060T**	**HGL36060T**	**HJL36060T**	**HLL36060T**	
70 A	800 A	1450 A	**HDL36070T**	**HGL36070T**	**HJL36070T**	**HLL36070T**	
80 A	800 A	1450 A	**HDL36080T**	**HGL36080T**	**HJL36080T**	**HLL36080T**	
90 A	800 A	1450 A	**HDL36090T**	**HGL36090T**	**HJL36090T**	**HLL36090T**	
100 A	900 A	1700 A	**HDL36100T**	**HGL36100T**	**HJL36100T**	**HLL36100T**	
110 A	900 A	1700 A	**HDL36110T**	**HGL36110T**	**HJL36110T**	**HLL36110T**	
125 A	900 A	1700 A	**HDL36125T**	**HGL36125T**	**HJL36125T**	**HLL36125T**	
150 A	900 A	1700 A	**HDL36150T**	**HGL36150T**	**HJL36150T**	**HLL36150T**	

[1] Circuit breakers will be labeled with Line and Load markings and are not suitable for reverse connections. Only available on standard (80%) rated 3P unit-mount circuit breakers; not available with I-Line® or Plug-In constructions.

Table 20: J-Frame 250 A Current-Limiting Circuit Breaker Frame with Field-Interchangeable Thermal-Magnetic Trip Units[1] (3P, 600 Vac, 250 Vdc)

Ampere Rating	Adjustable AC Magnetic Trip		Interrupting Rating				Terminal Wire Range
			D	G	J	L	
	Low	High	Cat. No.	Cat. No.	Cat. No.	Cat. No.	
150 A	750 A	1500 A	**JDL36150T**	**JGL36150T**	**JJL36150T**	**JLL36150T**	AL175JD
175 A	875 A	1750 A	**JDL36175T**	**JGL36175T**	**JJL36175T**	**JLL36175T**	4--4/0 AWG Al or Cu
200 A	1000 A	2000 A	**JDL36200T**	**JGL36200T**	**JJL36200T**	**JLL36200T**	AL250JD
225 A	1125 A	2250 A	**JDL36225T**	**JGL36225T**	**JJL36225T**	**JLL36225T**	3/0 AWG–350 kcmil
250 A	1250 A	2500 A	**JDL36250T**	**JGL36250T**	**JJL36250T**	**JLL36250T**	Al or Cu

[1] Circuit breakers will be labeled with Line and Load markings and are not suitable for reverse connections. Only available on standard (80%) rated 3P unit-mount circuit breakers; not available with I-Line® or Plug-In constructions.

Table 21: H-Frame 150A and J-Frame 250 A 3P Basic Current-Limiting Circuit Breaker Frame Without Terminations or Trip Unit (600 Vac, 250 Vdc)

Circuit Breaker Frame	Ampere Rating	Interrupting Rating			
		D	G	J	L
		Cat. No.	Cat. No.	Cat. No.	Cat. No.
H-Frame	15–60 A	**HDF36000F06**	**HGF36000F06**	**HJF36000F06**	**HLF36000F06**
	70–150 A	**HDF36000F15**	**HGF36000F15**	**HJF36000F15**	**HLF36000F15**
J-Frame	150–250 A	**JDF36000F25**	**JGF36000F25**	**JJF36000F25**	**JLF36000F25**

H-Frame Trip Unit

Table 22: H-Frame and J-Frame 3P Field-Installable Thermal-Magnetic Trip Unit

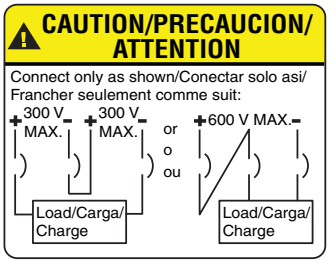
15–60 A H-Frame		70–150 A H-Frame		150–250 A J-Frame	
Amperage	Cat. No.	Amperage	Cat. No.	Amperage	Cat. No.
15 A	**HT3015**	70 A	**HT3070**	150 A	**JT3150**
20 A	**HT3020**	80 A	**HT3080**	175 A	**JT3175**
25 A	**HT3025**	90 A	**HT3090**	200 A	**JT3200**
30 A	**HT3030**	100 A	**HT3100**	225 A	**JT3225**
35 A	**HT3035**	110 A	**HT3110**	250 A	**JT3250**
40 A	**HT3040**	125 A	**HT3125**	—	—
45 A	**HT3045**	150 A	**HT3150**	—	—
50 A	**HT3050**	—	—	—	—
60 A	**HT3060**	—	—	—	—

UL 489 SC Listed 500 Vdc Circuit Breakers

The UL Listed thermal-magnetic molded case circuit breakers are specifically designed for use on ungrounded dc systems having a maximum short-circuit voltage of 500 Vdc or a maximum floating (unloaded) voltage of 600 Vdc. The circuit breakers are suitable for use only with UPS (uninterruptable power supplies) and ungrounded systems. This two-level voltage rating allows these circuit breakers to be applied to battery sources having a short-circuit availability of 20,000 amperes at 500 Vdc.

These circuit breakers are UL Listed for the interrupting ratings shown only if applied with three poles connected in series (series connection is external to circuit breaker). See diagram below.

NOTE: Due to external series connection, I-Line® circuit breakers are not available for this application.



Source = 600 Vdc max. (floating)
500 Vdc max. (loaded)

Table 23: DC Molded Case Circuit Breakers

Ampere Rating	Circuit Breaker Cat. No.	Adjustable Magnetic Trip Range—DC Amperes		Interrupting Rating @ 500 Vdc
		Low	High	
100 A	**JGL37100D81**	400	600	20 k AIR
125 A	**JGL37125D81**	400	600	
150 A	**JGL37150D81**	400	600	
175 A	**JGL37175D81**	400	600	
200 A	**JGL37200D82**	500	850	20 k AIR
225 A	**JGL37225D82**	500	850	
250 A	**JGL37250D82**	500	850	

Electronic Motor Circuit Protectors (AC Only)

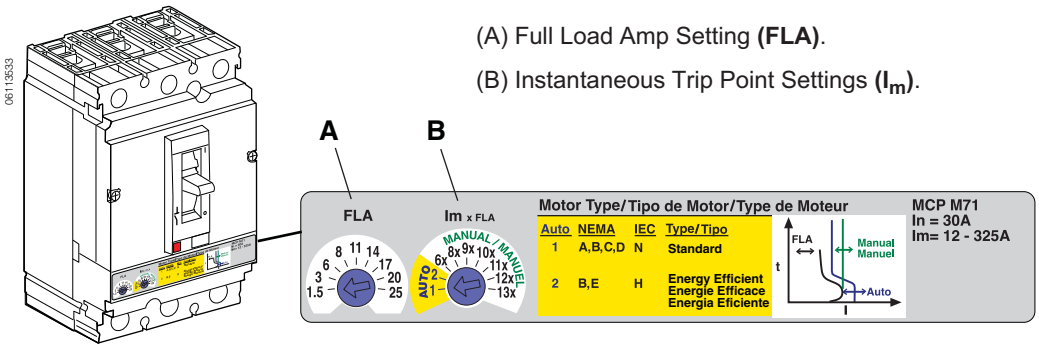
PowerPact H- and J-frame Electronic Motor Circuit Protectors (MCP) are instantaneous-trip circuit breakers. They are designed to offer short circuit protection and are National Electrical Code® (NEC®) compliant when installed as part of a combination controller having motor overload protection. MCP circuit breakers accept the same accessories and terminals as the equivalent thermal-magnetic circuit breakers. (See Section 6, Flgures 46 and 47 for trip curves. See Section 3 for Accessories.)

The unique design of the PowerPact MCPs include two dials to allow quick setting adjustments based on the characteristics of the motor.

The first dial allows for Full Load Amperes (FLA) adjustment across the range of the frame size.

The second dial selects the type of motor protection based on Automatic 1 for Standard Efficiency or Automatic 2 for High Energy Efficient. When using the automatic settings the MCP microprocessor automatically adjusts the trip settings for both current and time to align with the start-up characteristic for the motor type, whether it is a standard or energy-efficient motor. This includes a dampening means to accommodate a transient motor in-rush current without nuisance tripping of the circuit breaker. Dial 2 also allows for traditional motor protection from 8 to 13 times the selected FLA.

The MCP dials are detented and allow the device to be set to specific trip values within a typical accuracy range of +/-5%.



(A) Full Load Amp Setting **(FLA)**.

(B) Instantaneous Trip Point Settings **(I_m)**.

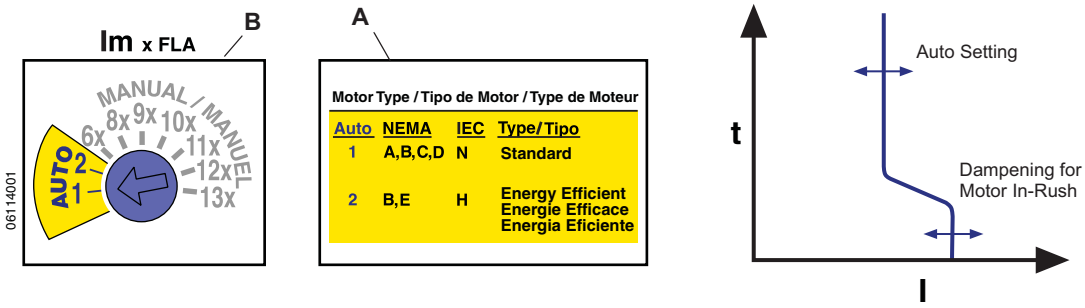
Full Load Amp Settings

1. Determine the motor's full-load current by referring to the nameplate on the motor.
2. Set the trip range by turning the FLA dial to the setting closest to the motor's full load current.

Automatic Protection Settings

The MCP microprocessor automatically adjusts the trip settings for both current and time to align with the start-up characteristics for the motor type selected. This includes a dampening means to accommodate a transient motor in-rush current without nuisance tripping of the circuit breaker.

Figure 5: Automatic Protection Settings

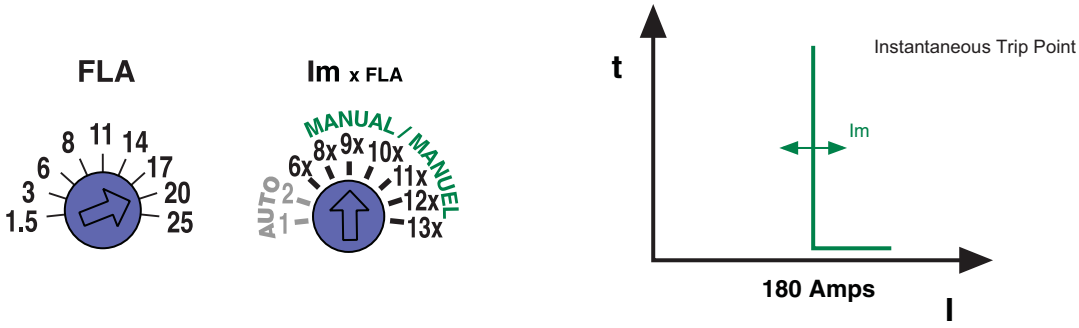


Manual Protection Settings

The manual settings may be adjusted to multiples of current based on the dial setting for motor Full Load Amps (FLA).

$$\text{Instantaneous Trip Point} = (\text{FLA}) \times (I_m)$$

For example, if FLA dial is set to 20 and I_m dial is set to 9x, then the instantaneous trip point will be 180 A.



See Section 7 Tables 64 thru 68 for more information.

Table 24: H- and J-Frame Electronic Motor Circuit Protectors (MCP)

Frame	Current	Full Load Amperes Range	Adjustable Instantaneous Trip Range	Suffix	J Interrupting (See SCCR Table Below)	L Interrupting (See SCCR Table Below)
					Cat. No.	Cat. No.
H-Frame	30 A	1.5–25 A	9–325 A	M71	**HJL36030M71**	**HLL36030M71**
	50 A	14–42 A	84–546 A	M72	**HJL36050M72**	**HLL36050M72**
	100 A	30–80 A	180–1040 A	M73	**HJL36100M73**	**HLL36100M73**
	150 A	58–130 A	348–1690 A	M74	**HJL36150M74**	**HLL36150M74**
J-Frame	250 A	114–217 A	684–2500 A	M75	**JJL36250M75**	**JLL36250M75**

- High Short Circuit Current Ratings (SCCR)

  The PowerPact MCP helps achieve the high UL508A Short Circuit Current Rating (SCCR) needed to meet NEC Article 409 requirements for industrial control panels. They deliver up to 100 kA at 480 Vac SCCR when used in combination with approved Square D® NEMA or Telemecanique® IEC motor starters.

Table 25: Short Circuit Current Ratings (SCCR)

Contactor/Starter	J Interrupting			L Interrupting		
	200–240 Vac	480 Vac	600 Vac	200–240 Vac	480 Vac	600 Vac
Tesys D-line and F-line	100 kA	65 kA	25 kA	100 kA	100 kA	50 kA
NEMA Type S	100 kA	65 kA	25 kA	100 kA	100 kA	50 kA

Table 26: MCP Selection by HP Ratings of Induction-Type Squirrel-Cage and Wound-Rotor Motors

Horsepower Rating of Induction-Type Squirrel-Cage and Wound-Rotor Motors 3Ø 60 Hz					NEC Full Load Amperes	PowerPact H-Frame and J-Frame Electronic MCP	
Starter Size	200 Vac	230 Vac	480 Vac	575 Vac			
00	1/2	1/2	1/2	1/2	0.9 A	HJL36030M71 and HLL36030M71 1/2–10 hp	
					1.1 A		
			3/4	3/4	1.3 A		
			1	1	1.7 A		
					2.1 A		
					2.2 A		
				1-1/2	2.4 A		
					2.5 A		
				2	2.7 A		
			1-1/2		3 A		
		3/4			3.2 A		
			2		3.4 A		
	3/4				3.7 A		
				3	3.9 A		
		1			4.2 A		
	1				4.8 A		
			3		4.8 A		
		1-1/2			6 A		
				5	6.1 A		
	1-1/2	2			6.8 A		
					6.9 A		
			5		7.6 A		
0	2				7.8 A		
				7-1/2	9 A		
		3			9.6 A		
	3		7-1/2		11 A		
			10	10	14 A		HJL36050M72 and HLL36050M72 10–25 hp
1		5			15.2 A		
	5			15	17 A		
			15		17.5 A		
					21 A		
		7-1/2		20	22 A		
	7-1/2				25.3 A		
			20	25	27 A		
2		10			28 A		
				30	32 A	HJL36100M73 and HLL36100M73 15–50 hp	
	10				32.2 A		
			25		34 A		
			30		40 A		
				40	41 A		
		15			42 A		
					48.3 A		HJL36150M74 and HLL36150M74 30–100 hp
3	15		40		52 A		
		20		50	54 A		
	20				62 A		
			50	60	65 A		
		25			68 A		
			60	75	77 A		
	25				78.2 A		
		30			80 A		
4	30		75		92 A		
					96 A		
				100	99 A		
		40			104 A		
	40				120 A	JJL36250M75 and JLL36250M75 50–150 hp	
			100		124 A		
				125	125 A		
		50			130 A		
				150	144 A		
5	50				150 A		
		60			154 A		
			125		156 A		
	60				177.1 A		
			150		180 A		
		75		200	192 A		
	75				221 A		
			200		240 A		
		100			248 A		

Shaded area is not covered by J-frame electronic motor circuit protector.

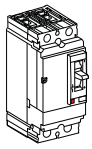
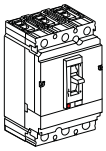
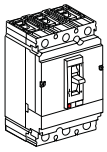
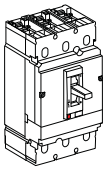
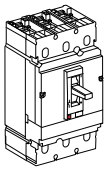
Automatic Molded Case Switches

H-frame and J-frame circuit breakers are also available in automatic molded case switch construction. Automatic switches are similar in construction to circuit breakers, except that the switches open instantaneously at a factory-set non-adjustable trip point calibrated to protect only the molded case switch itself.

Because of their molded case construction, they are more compact than conventional disconnect switches and accept electrical accessories for added flexibility. Molded case switches are intended for use as disconnect devices only.

UL 489 requires molded case switches to be protected by a circuit breaker or fuse of equivalent rating. Molded case switches are labeled with their withstand ratings. The withstand rating of a switch is defined as the maximum current at rated voltage that the molded case switch will withstand without damage when protected by a circuit breaker or fuse with an equal or continuous current rating.

Table 27: Automatic Molded Case Switch Specifications

Frame			H-Frame				J-Frame			
Interrupting Performance			"G"		"L"		"G"		"L"	
										
UL 489	Poles		2P	3P	2P[1]	3P	2P[1]	3P	2P[1]	3P
	Catalog Number	150 A	**HGL26000S15**	**HGL3600S15**	**HLL26000S15**	**HLL36000S15**	—	—	—	—
		175 A	—	—	—	—	**JGL26000S17**	**JGL36000S17**	**JLL26000S17**	**JLL36000S17**
		250 A	—	—	—	—	**JGL26000S25**	**JGL36000S25**	**JLL26000S25**	**JLL36000S25**
	Withstand Ratings	240 Vac	65 kA	65 kA	125 kA	125 kA	65 kA	65 kA	125 kA	125 kA
		480 Vac	35 kA	35 kA	100 kA	100 kA	35 kA	35 kA	100 kA	100 kA
		600 Vac	18 kA	18 kA	50 kA	50 kA	18 kA	18 kA	50 kA	50 kA
		250 Vdc	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA
	AC Trip Point		2250 A	2250 A	2250 A	2250 A	3125 A	3125 A	3125 A	3125 A
IEC 60947-3	Rated Insulation Voltage		750 Vac	750 Vac	750 Vac	750 Vac	750 Vac	750 Vac	750 Vac	750 Vac
	Rated Impulse Withstand Voltage		8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV
	Rated Operational Voltage	ac	525 Vac	525 Vac	525 Vac	525 Vac	525 Vac	525 Vac	525 Vac	525 Vac
		dc	500 Vdc	500 Vdc	500 Vdc	500 Vdc	500 Vdc	500 Vdc	500 Vdc	500 Vdc

[1] 2P devices use a 3P switch frame with the center pole inoperative.

Table 28: PowerPact H-Frame and J-Frame 250 A Unit-Mount Automatic Molded Case Switches, 600 Vac with Factory Sealed Trip Unit (Suitable for Reverse Connection)

Poles	Ampere Rating	G Interrupting		L Interrupting		Terminal	Wire Range
		Cat. No.	Trip Point	Cat. No.	Trip Point		
2	150 A	**HGL26000S15**[1]	2250 A	**HLL26000S15**	2250A	AL150HD	14 AWG–3/0 AWG Al/Cu
	175 A	**JGL26000S17**	3125 A	**JLL26000S17**	3125 A	AL175JD	4–4/0 AWG Al/Cu
	250 A	**JGL26000S25**	3125 A	**JLL26000S25**	3125 A	AL250JD	3/0 AWG–350 kcmil Al/Cu
3	150 A	**HGL36000S15**	2250 A	**HLL36000S15**	2250 A	AL150HD	14 AWG–3/0 AWG Al/Cu
	175 A	**JGL36000S17**	3125A	**JLL36000S17**	3125 A	AL175JD	4–4/0 AWG Al/Cu
	250 A	**JGL36000S25**	3125A	**JLL36000S25**	3125 A	AL250JD	3/0 AWG–350 kcmil Al/Cu

[1] True 2P device. Others are a 2P in a 3P module.

Table 29: PowerPact H-Frame and J-Frame I-Line Automatic Molded Case Switches, 600 Vac with Factory Sealed Trip Unit (Suitable for Reverse Connection)

Ampere Rating	2-pole	3-pole	Withstand Rating [1]			Trip Point	Terminal Wire Range
	Cat. No.	Cat. No.	240 Vac	480 Vac	600 Vac		
G Interrupting							
150 A	**HGA26000S15( )[2]**	**HGA36000S15**	65	35	18	1300 A	AL150HD #14–#3/0 AWG Al or Cu
175 A	**JGA26000S17( )**	**JGA36000S17**	65	35	18	2500 A	AL250JD #3/0–350 kcmil Al or Cu
250 A	**JGA26000S25( )**	**JGA36000S25**					
L Interrupting							
150 A	**HLA26000S15( )**	**HLA36000S15**	125	100	50	1300 A	AL150HD #14–#3/0 AWG Al or Cu
175 A	**HLA26000S17( )**	**JLA36000S17**	125	100	50	1300 A	AL250JD
250 A	**JLA26000S25( )**	**JLA36000S25**				2500 A	#3/0–350 kcmil Al or Cu

[1] The withstand rating is the fault current, at rated voltage, that the molded case switch will withstand without damage when protected by a circuit breaker or fuse with an equal continuous current rating.

[2] 2-pole device with 3 in. (76 mm) mounting height, all other 2-pole circuit breakers use 3-pole module 4.5 in. (114 mm) mounting height.

Section 2—Mounting and Connections

Table 30: Circuit Breaker Mounting and Connections

Circuit Breaker Construction	Unit Mount[1]			I-Line®	Drawout
Connections	Lug-Lug	Rear	Bus Bar		
H-Frame	X	X	X	X	X
J-Frame	X	X	X	X	X

1 Including rail, backplate, and flush mounting

Unit-Mount Circuit Breakers

The standard lugs can be removed for the installation of compression-type lugs or bus connections. All lugs are UL Listed for their proper application and marked for use with aluminum and copper (Al/Cu) or copper only (Cu) conductors. Lugs suitable for copper and aluminum conductors are made of tin-plated aluminum.

Mounting

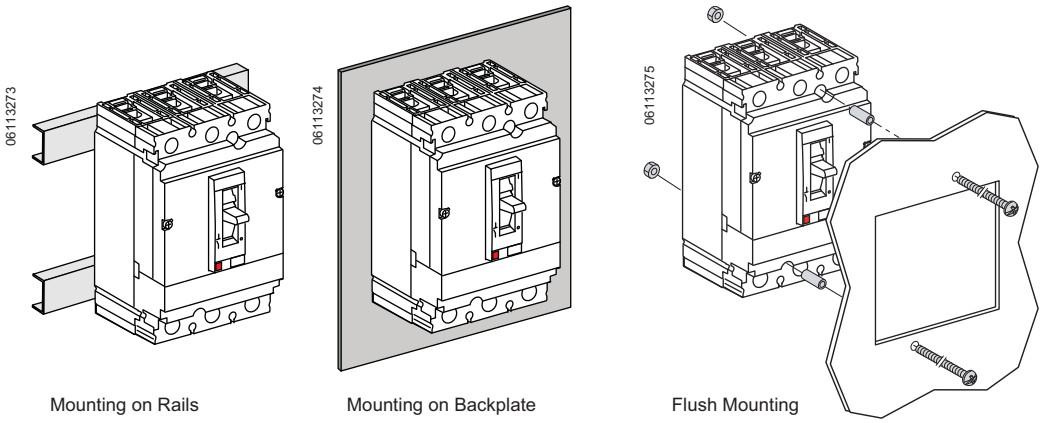
H- and J-frame circuit breakers may be mounted vertically, horizontally or flat on their back without any derating of characteristics.

Fixed-mounted H- and J-frame individually-mounted circuit breakers are supplied with two mounting screws. These mounting screws are inserted through mounting holes molded into the circuit breaker case and threaded into the mounting enclosure, rails or through the panel door for flush mounting.

A DIN rail mounting bracket (catalog no. S29305) is available for the H- and J-frame circuit breakers .

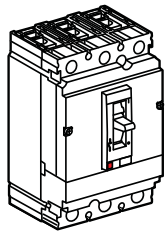
NOTE: DIN rail mounting is not compatible with motor operated applications.

Figure 6: Unit-Mounting Options



Mounting on Rails | Mounting on Backplate | Flush Mounting

Mechanical Lugs

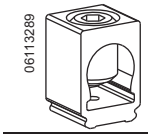
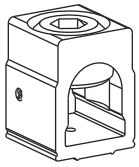


Unit-mount H-frame and J-frame circuit breakers can be ordered with mechanical line and load side lugs. The standard lugs can be removed for the installation of compression-type lugs or bus connections. All lugs are UL Listed for their proper application and marked for use with aluminum and copper (Al/Cu) or copper only (Cu) conductors. Lugs suitable for copper and aluminum conductors are made of tin-plated aluminum. Lugs suitable for use with copper conductors only are made of copper.

Mechanical Lugs for the H- and J-frame circuit breakers lay on top of the circuit breaker terminals and can be installed without the use of any tools. The lugs are held in place with snap features built into the insulative retainer and are secured with the clamp force applied to the wire binding screw.

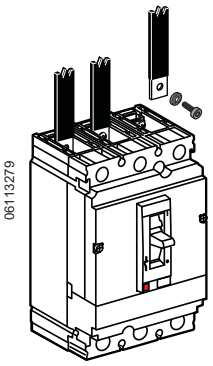
Mechanical lugs come in both aluminum and copper versions and are sold either factory installed or as field installable kits.

Table 31: Mechanical Lugs for H- and J-Frame Circuit Breakers

	Catalog Number	Frame	Ampere Range	Conductor	Wires Per Lug	Temp.	Strip Length	Wire Binding Screw Torque
 06113289	**AL150HD**	HD/HG/HJ/HL	15–150	Al/Cu	(1) 14–10 AWG (2.5–6 mm^2)	75°C	0.65 in. (16 mm)	50 lb-in (5 N•m)
					(1) 8–3/0 AWG (10–95 mm^2)	75°C	0.65 in. (16 mm)	120 lb-in (14 N•m)
 06113290	**CU150HD**	HD/HG/HJ/HL	15–150	Cu	(1) 14–2/0 AWG (2.5–70 mm^2)	75°C	0.65 in. (16 mm)	120 lb-in (14 N•m)
 06113291	**AL175JD**	JD/JG/JJ/JL	150–175	Al/Cu	(1)4–4/0 AWG (20–95 mm^2)	75°C	1.0 in. (25 mm)	225 lb-in (26 N•m)
 06113292	**AL250JD**[1]	JD/JG/JJ/JL	200–250	Al/Cu	(1) #3/0–350 kcmil (120–185 mm^2)	75°C	1.0 in. (25 mm)	225 lb-in (26 N•m)
 06113293	**CU250JD**	JD/JG/JJ/JL	150–250	Cu	(1) 1/0 AWG–300 kcmil (50–185 mm^2)	75°C	1.0 in. (25 mm)	250 lb-in (28 N•m)

1 AL250JD lugs are required for 250–350 kcmil wire range.

Bus-Bar Connections

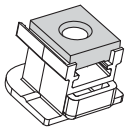


Both H-frame and J-frame circuit breakers may be equipped with captive nuts and screws for direct connection to bars.

Terminal nut inserts are needed for replacement of lug connections with bus bar connections.

Table 32: Terminal Nuts for Bus Bar Connection of H-Frame and J-Frame Circuit Breakers

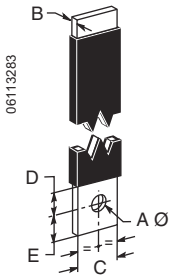
Description	Frame	Tap	Cat. No.	Qty Per Kit	Torque
H-Frame Terminal Nut Insert–English	HD/HG/HJ/HL	1/4-20	**S37425**	2	80–90 lb-in (9–10.2 N•m)
H-Frame Terminal Nut Insert–English	HD/HG/HJ/HL	1/4-20	**S37444**	3	
H-Frame Terminal Nut Insert–Metric	HD/HG/HJ/HL	M6	**S37426**	2	
J-Frame Terminal Nut Insert–English	JD/JG/JJ/JL	1/4-20	**S37427**	2	80–90 lb-in (9–10.2 N•m)
J-Frame Terminal Nut Insert–English	JD/JG/JJ/JL	1/4-20	**S37445**	3	
J-Frame Terminal Nut Insert–Metric	JD/JG/JJ/JL	M8	**S37428**	2	



Terminal Nut Insert

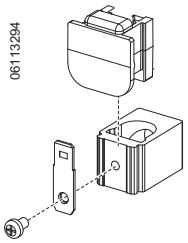
Table 33: Bar Dimensions

Dimension	H-Frame	J-Frame
A	0.250 in. (6.4 mm)	0.3125 in. (7.9 mm)
B	0.125–0.375 in. (3.2–9.5 mm)	0.125–0.375 in. (3.2–.5 mm)
C	0.50 in. (12.7 mm)	0.50–0.75 in. (12.7–1.1 mm)
D	0.3 in. (7.6 mm)	0.625 in. (15.9 mm)
E	0.3 in. (7.6 mm)	0.375 in. (9.5 mm)

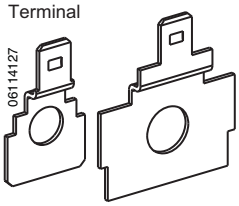


Voltage Takeoff (Control Wire Terminals) for Mechanical Lugs and Terminal Nuts

Mechanical Lug Control Wire Terminal



Bussbar Control Wire Terminal



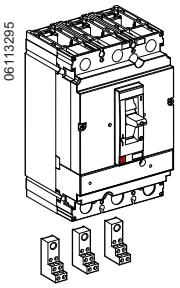
Mechanical lugs may be equipped with a separate control wire termination. The kit is available factory installed or as a field installable kit. The adaptor is secured underneath the lug and has a tab extension suitable for attachment of a .250 inch slip-on connector.

Fully insulated type connectors must be used to prevent live parts from extending into the wiring gutter area.

Table 34: Control Wire Terminals

Description	Frame	Cat. No.	Qty Per Kit
Mechanical Lugs			
Control Wire Terminal for H-Frame Lugs	HD/HG/HJ/HL	**S37423**	2
Control Wire Terminal for J-Frame Lugs	JD/JG/JJ/JL	**S37424**	2
Bussbar Connection			
Control Wire Terminal for H-Frame Terminal Nut	HD/HG/HJ/HL	**S37429**	2
Control Wire Terminal for J-Frame Terminal Nut	JD/JG/JJ/JL	**S37430**	2

Power Distribution Connectors



The power distribution connectors (PDC) can be used for multiple load wire connections on one circuit breaker. Use in place of standard distribution blocks to save space and time. Field installable kit includes tin-plated aluminum lug, connectors, and required mounting hardware.

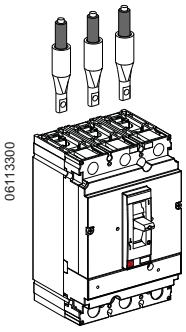
- For use on load end of circuit breaker only
- For use in UL 508 Industrial Control applications only
- For use in UL 1995/CSA C22.2 No. 236 heating and cooling equipment
- For copper wire only

Table 35: Power Distribution Connectors

	Frame	Kit Number	Number of Wires	Wire Range	Wire Binding Screw Torque
06113296 	H-Frame	**PDC6HD6**	6	8–6 AWG (10—16 mm^2)	25 lb-in (2.8 N•m)
				14–10 AWG (2.5—6 mm^2)	20 lb-in (2.3 N•m)
06113297 	H-Frame	**PDC3HD2**	3	2 AWG (35 mm^2)	40 lb-in (4.5 N•m)
				14–3 AWG (2.5—16 mm^2)	35 lb-in (4.0 N•m)
06113298 	J-Frame	**PDC6JD4**	6	6–4 AWG (16—25 mm^2)	35 lb-in (4.0 N•m)
				8 AWG (10 mm^2)	25 lb-in (2.8 N•m)
				14–10 AWG (2.5—6 mm^2)	20 lb-in (2.3 N•m)
06113299 	J-Frame	**PDC3JD20**	2 and 1	14–6 AWG Cu (2.5–16 mm^2)	35 lb-in (4.0 N•m)
				3–2/0 AWG Cu (35–70 mm^2)	50 lb-in (5.6 N•m)
			2 and 1	4–1 AWG Cu (25–70 mm^2)	40 lb-in (4.5 N•m)
				3–2/0 AWG Cu (35–70 mm^2)	50 lb-in (5.6 N•m)

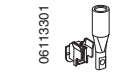
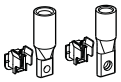
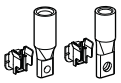
See Table 37 for the phase barriers for PDCs.

Compression Lugs

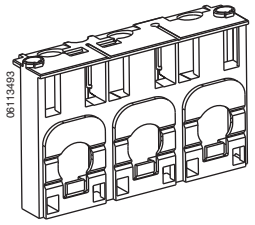


Both copper and aluminum compression lug kits are available for the H-frame and J-frame circuit breakers. Each kit contains required insulators and all mounting hardware.

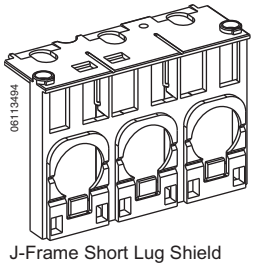
Table 36: Compression Lug Kits

Lug Type		Frame	Kit Number	Wire Range	Ampere Rating	Lugs Per Kit	Mounting Screw Torque
Aluminum	 06113301	H-Frame	**YA060HD**	6–2 AWG Cu or Al (16–35 mm^2)	≤ 60 A	3	80–90 lb-in (9.0–10.2 N•m)
			YA150HD	1/0–4/0 AWG Cu or Al (50–95 mm^2)	≤ 150 A	3	80–90 lb-in (9.0–10.2 N•m)
	 06113302	J-Frame	**YA150JD**	1–3/0 AWG Cu or Al (50–95 mm^2)	≤ 200 A	3	130–140 lb-in (14.7–15.8 N•m)
			YA250J35	3/0 AWG–350 kcmil Cu or Al (95–185 mm^2)	≤ 250 A	3	130–140 lb-in (14.7–15.8 N•m)
Copper	 06113303	H-Frame	**CYA060HD**	6–1/0 AWG Cu (16–50 mm^2)	≤ 60 A	3	80–90 lb-in (9.0–10.2 N•m)
			CYA150HD	4–2/0 AWG Cu (25–70 mm^2)	≤ 150 A	3	80–90 lb-in (9.0–10.2 N•m)
	 06113304	J-Frame	**CYA150JD**	4–2/0 AWG Cu (25–70 mm^2)	≤ 150 A	3	130–140 lb-in (14.7–15.8 N•m)
			CYA250J3	2/0 AWG–300 kcmil Cu (70–185 mm^2)	≤ 250 A	3	130–140 lb-in (14.7–15.8 N•m)

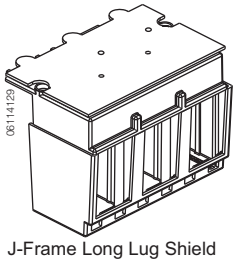
Terminal Shields



H-Frame Short Lug Shield



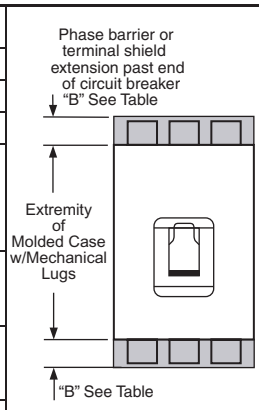
J-Frame Short Lug Shield



J-Frame Long Lug Shield

Table 37: Terminal Shields and Phase Barriers

Used With	Description				Cat. No.	Qty Per Kit	Dimension B (in.)
Mechanical Lugs	Short Lug Shield[1]	Frame	Max. Wire Size				
		H-Frame 60 A	3 AWG		**S37446**	1	0.50
		H-Frame 150 A	3/0 AWG		**S37447**	1	0.50
		J-Frame	350 kcmil		**S37448**	1	0.24
Power Distribution Connectors and Compression Lugs		Compatible with:					
		PDC	Compression Lugs				
			Aluminum	Copper			
	H-Frame Long Lug Shield	PDC6HD6	YA060HD	CYA060HD	**S37449**[2]	1	2.24
		PDC3HD2	YA150HD	CYA150HD			
	J-Frame Long Lug Shield	PDC6JD4	YA150JD	CYA150JD	**S37450**[2]	1	1.68
		PDC3JD2	[2]	CYA250J3			
Phase Barriers					**29329**	6	3.13



1 Short lug shields provide IP20 protection for mechanical lugs and are compatible with control wire terminals.

2 J-frame terminal shield is not compatible with the YA250J35 compression terminal.

Rear Connections

Rear connections are easily installed on the circuit breaker terminals. The same connection may be installed flat, vertical or at a 45° angle with all combinations possible. The circuit breaker is mounted on a backplate.

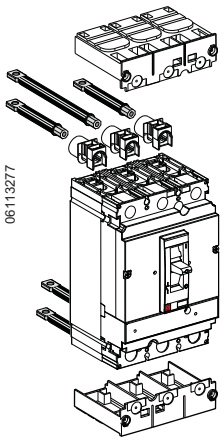


Figure 7: Four Positions Possible for Each Connector

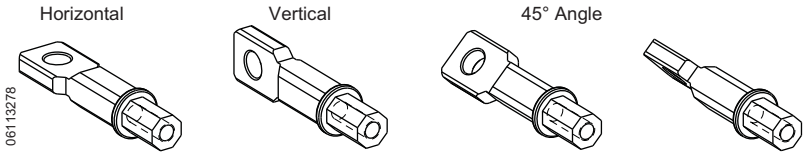
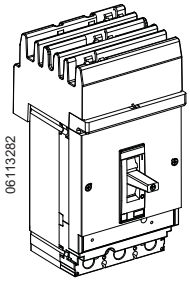


Table 38: Rear Connections

Device	Description	Poles	H-Frame		J-Frame	
			Factory-Installed Termination No.	Field-Installable Catalog Number	Factory-Installed Termination No.	Field-Installable Catalog Number
Mixed Rear Connection Kit		2	S	—	S	—
		3	S	**S37432**	S	**S37437**
Consisting of:	Short Rear Connections (Set of 2)	2 or 3	—	2x **S37433**[1]	—	2x **S37438**[1]
	Long Rear Connections (Set of 2)	2 or 3	—	**S37434**	—	**S37439**
	Short Terminal Cover (3P)	3	—	**S37436**	—	**S37440**

[1] For use with 3P circuit breakers only.

I-Line® Circuit breakers



H- and J-frame circuit breakers are available in I-Line construction for easy installation and removal in I-Line panelboards and switchboards.

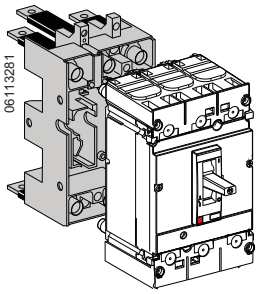
I-Line circuit breakers use “blow-on” type line side connectors. In case of a short circuit, increased magnetic flux causes the plug-on connectors of the circuit breaker to tighten their grasp on the panelboard or switchboard bus bars. The I-Line connectors and circuit breaker mounting bracket are integral parts of I-Line circuit breakers and cannot be removed or replaced. I-Line circuit breakers come with mechanical load side lugs.

Table 39: Phase Options—Example HDA36150( )

Phase Option Number	Phase Connection	2P Example	3P Example
1	AB	**HDA261501**	—
2	AC	**HDA261502**	—
3	BA	**HDA261503**	—
4	BC	**HDA261504**	—
5	CA	**HDA261505**	—
6	CB	**HDA261506**	—
Standard	ABC	—	**HDA36150**
6	CBA	—	**HDA361506**

Plug-In and Drawout Circuit Breakers

H- and J-frame circuit breakers are available in a plug-in and drawout construction.



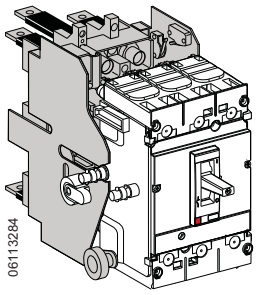
Plug-In Mounting

Plug-In Circuit Breaker Mounting

The plug-in base is mounted through a front panel. The plug-in configuration makes it possible to:

- Extract and/or rapidly replace the circuit breaker without having to touch connections
- Allow for addition of future circuits at a later date

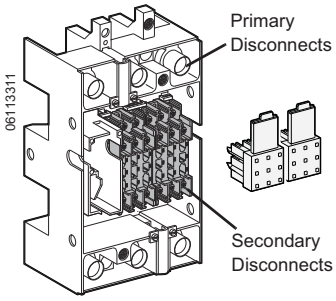
When the circuit breaker is in the connected position, the primary voltage is fed through the circuit breaker by means of multiple finger disconnects. Control voltage of internal accessories is provided through secondary disconnects.



Drawout Mounting

Parts of a Plug-In Configuration

- Disconnects: Provides both primary and secondary disconnect to the circuit breaker.
- Safety Trip Interlock: The safety trip causes automatic tripping if the circuit breaker is ON before engaging or withdrawing it; the safety trip does not prevent the circuit breaker operation, even when the circuit breaker is disconnected.
- Plug-in Base: The plug-in base provides mounting through a front panel or mounting on rails.



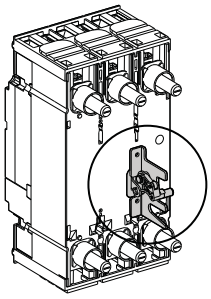
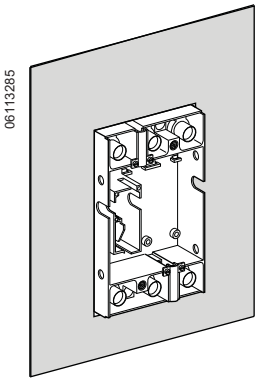

Safety Trip Interlock Mounted on Back of Circuit Breaker

Figure 8: Plug-In Base (Mounting Options)



Mounting Through a Front Panel

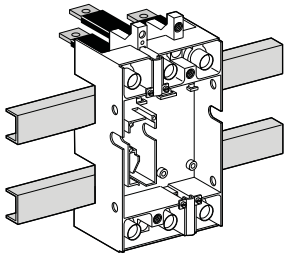

Mounting on Rails

Table 40: Plug-In Mounting

Description		Suffix	Catalog No.
Kit for H- and J-Frame Circuit Breakers (Stationary and Moving Part)		N	**29293**
Consisting of:	Stationary Part	—	—
	Plug-In Base	—	**29278**
	Moving Part	HJ00	—
	Short Terminal Covers	—	**29321**
	Safety Trip Interlock	—	**29270**
	Power Connections	—	**29268** (3)

Drawout Circuit Breaker Mounting

The drawout-mounted chassis is Listed under UL file E113555 and Certified under CSA file LR69561. The chassis is made up of two side plates installed on the base and two other plates mounted on the circuit breaker.

Figure 9: Drawout Mounting Positions

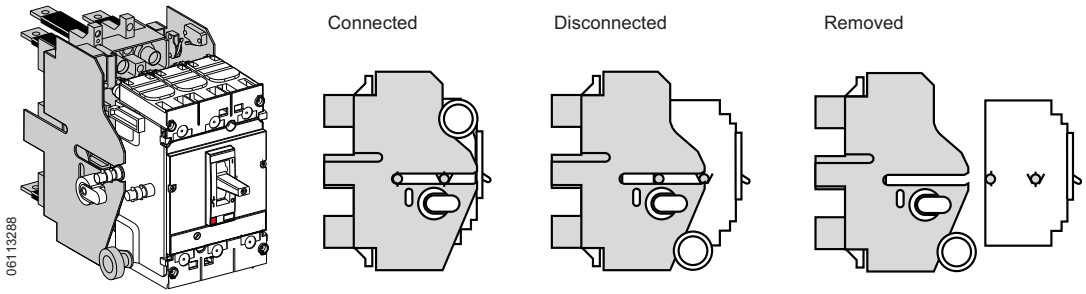


Table 41: Drawout Mounting

Description		Suffix	Catalog No.
Kit for PowerPact J- and H-Frame Circuit Breaker (Stationary and Moving Part)		N	29303
Consisting of:	Stationary Part	—	—
	Plug-In Base	—	29278
	Fixed Part of Chassis		29282
	Moving Part	HJ00	—
	Moving Part of Chassis		29283
	Short Terminal Covers	—	29321
	Safety Trip Interlock	—	29270
	Power Connections	—	29268 (3)

Toggle Escutcheon

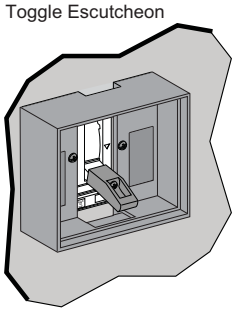


Table 42: Plug-In and Drawout Accessories

Description			Catalog No.
Secondary Disconnecting Blocks	Fixed Part	9-Wire Connector	**29273**
	Moving Part	9-Wire Connector	**29274**
		Support for 2 Moving Connectors	**29275**
Shutters	Two Shutters for Plug-In Base		**29271**
Chassis Accessories	Extended Escutcheon for Toggle (For circuit breakers with toggle through front panel, intended to maintain the degree of protection whatever the position of the circuit breaker. Supplied with a toggle extension.)		**29284**
	Locking Device (Key Lock is Not Included)		**29286**
	Two Position Indicating Switches (Connected/Disconnected) (Circuit breaker position switches may be applied on the fixed part of the chassis, indicating the “connected” and “disconnected” positions.)		**29287**

Chassis Functions

All functions of the plug-in base, plus:

- Disconnected position: the power circuit is disconnected, the circuit breaker is simply “withdrawn” and may still be operated (ON (I), OFF (O), push-to-trip)
- Circuit breaker may be locked using one to three padlocks–padlock diameters 0.19–0.31 in. (5–8 mm)

Section 3—Accessories

Internal Accessories

Field-installable accessories provide flexibility for installation at point of use.

Auxiliary switches and the shunt trip or undervoltage release are easy to install, reliable and common to many PowerPact® circuit breakers.

Figure 10: Accessory Locations

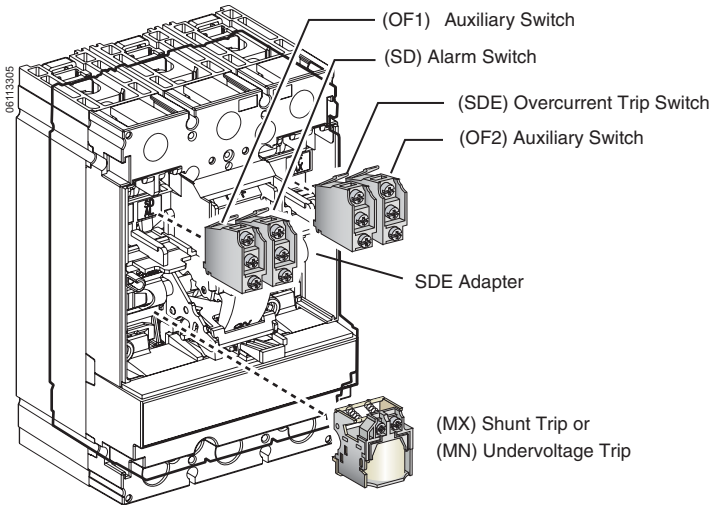


Table 43: Maximum Accessory Combinations

Poles	Device	Combination
2P (HD + HG)[1]	Shunt trip or UVR (Undervoltage Release)	1A/1B + Alarm (SD)
3P	Shunt trip or UVR (Undervoltage Release)	2A/2B + Alarm (SD) + Overcurrent Trip (SDE)

1 All other 2P devices are 2P in a 3P module

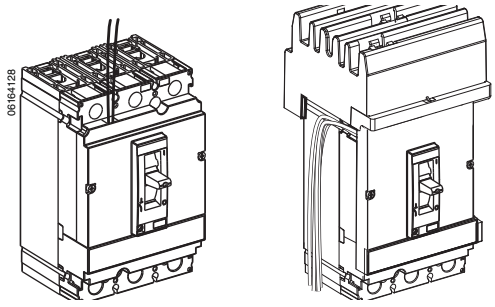
Accessory Connections

Electrical accessories are fitted with numbered terminal blocks for wires with the following maximum size:

- 16 AWG (1.5 mm^2) for auxiliary switches (OF1 or OF2), and shunt trip (MX) or undervoltage trip (MN)
- 14 AWG (2.5 mm^2) for the motor operator

Auxiliary circuit wiring exits fixed mounted devices through a knock-out in the front cover.

Figure 11: Accessory Connections

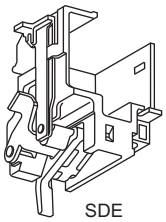


NOTE: See page 32 for plug-in and drawout options.

Auxiliary and Alarm Switches

Auxiliary switches provide remote information of the circuit breaker status and can thus be used for indications, electrical locking, relays, etc.


OF/SD Switch


SDE

Applications	**Open/Closed (OF) Auxiliary Switch** • Indicates the position of the circuit breaker contacts **Trip Indication (SD) Switch** • Bell alarm indicates that the circuit breaker has tripped due to an overload, short circuit or ground fault, the operation of a shunt trip or undervoltage trip or the "push-to-trip" button • Resets when the circuit breaker is reset **Overcurrent Trip Switch (SDE)** • Indicates that the circuit breaker has tripped due to an overload, short circuit or ground fault • Resets when the circuit breaker is reset The above auxiliary switches are also available in low-level versions capable of switching very low loads (e.g., for controlling PLCs or electronic circuits).
Installation & Connection	• The OF, SD and SDE switches snap into cavities behind the front accessory cover of the circuit breaker • One model serves for all indication functions depending on where it is fitted in the circuit breaker • The SDE function of a circuit breaker equipped with a thermal-magnetic trip unit requires the SDE adapter
Standards	• The internal accessories comply with requirements of Underwriters Laboratories® Inc. (UL®) • UL 489 and Canadian Standard Association C22.2 No. 5-02 Standards • All internal accessories are Listed for fixed installation per UL file E103955 and Certified under CSA file LR 69561 • Auxiliary switches comply with UL 489, CSA C22.2 No. 5-02 and IEC 60947-5 Standards • "Low-level" switches are not UL Recognized

Table 44: Electrical Characteristics

Characteristic	Voltage		Standard (Silver Contacts)	Low-Level (Gold Contacts)
Supplied as Standard (Form C)			4	4
Maximum Number of Contacts			4	4
Breaking Capacity at a Power Factor (p.f.) of 0.3	Standard (100 mA/24 V minimum load)			
	Vac	240/380	6 A	5 A
		480	6 A	5 A
		600/690	6 A	—
	Vdc	24/48	2.5 A	2.5 A
		240	0.5 A	0.8 A
		380	0.3 A	0.3 A
	Low-level (1 mA/4 V minimum load with a maximum current and voltage of 100 mA 10 V.			
	NOTE: NOTE: If the maximum voltage and current is exceeded, the low-level function of the switch will be lost but the switch will continue to function as a standard switch with the following specifications.			
	Vac	24/48	5 A	—
		240	5 A	—
		380	5 A	—
	Vdc	24/48	5/2.5 A	—
		125	0.5 A	—
		250	0.3 A	—

Table 45: Switch Catalog Numbers

Alarm/Overcurrent Trip Switch

Switch	Factory-Installed Suffix	Field-Installable Kit No.
Alarm Switch (SD)	BC	**S29450**
Alarm Switch (SD) Low-level	BH	**S29452**
SDE Standard[1]	BD	**S29450 + S29451**
SDE Low-level[1]	BJ	**S29452 + S29451**
SD and SDE Standard[1]	BE	**S29450 (2) + S29451**
SD and SDE Low-level[1]	BK	**S29452 (2) + S29451**

Auxiliary Switch

Contacts	Factory-Installed Suffix	Field-Installable Kit No.	
1A/1B Standard	AA	**S29450**	
2A/2B Standard	AB	**S29450**	**(2)**
1A/1B Gold	AE	**S29482**	
2A/2B Gold	AF	**S29482**	**(2)**

[1] Includes SDE Adapter S29451.

Shunt Trip (MX) and Undervoltage Trip (MN) Switches

A voltage release can be used to trip the circuit breaker via a control signal.

Applications	**Shunt trip (MX)** • Trips the circuit breaker when the control voltage rises above 70% of its rated voltage • Impulse type ≥ 20 ms or maintained control signals • AC shunt trips are suitable for ground fault protection when combined with a Class I ground fault sensing element **Undervoltage trip (MN)** • Trips the circuit breaker when the control voltage drops below a tripping threshold • Drops out between 35% and 70% of the rated voltage • Circuit breaker closing is possible only if the voltage exceeds 85% of the rated voltage • Permanent type • If an undervoltage condition exists, operation of the closing mechanism of the circuit breaker will not permit the main contacts to touch, even momentarily. This is commonly called “Kiss Free”
Installation and Connection	• Accessories are common to H- and J-frame circuit breakers and snap into cavities under the front accessory cover of the circuit breaker • Each terminal may be connected by one #18–#14 AWG (1.0–2.5 mm^2) stranded copper wire
Operation	• The circuit breaker must be reset locally after being tripped by shunt trip or undervoltage trip (MN or MX) • MN or MX tripping has priority over manual (or motor operator) closing; in the presence of a standing trip order such an action does not result in any closing, even temporarily, of the main contacts • Endurance: 50% of the rated mechanical endurance of the circuit breaker for circuit breakers

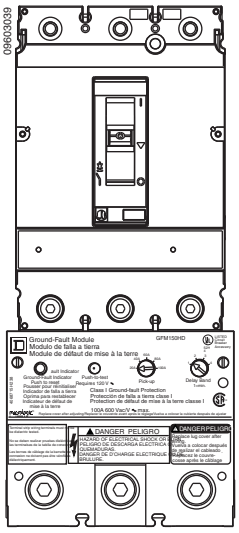
Table 46: Electrical Characteristics

Description		AC	DC
Rated Voltage (V)		24, 48, 110.130, 208.277, 380.480, 525, 600	12, 24, 30, 48, 60, 125, 250
Consumption	Pickup (MX)	< 10 VA	< 5 W
	Seal-in (MN)	< 5 VA	< 5 W
Clearing Time (ms)		< 50	< 50

Table 47: Shunt Trip and Undervoltage Trip Suffix Codes and Kit Numbers

Voltage	Shunt Trip		Undervoltage Release UVR	
	Factory-Installed Suffix	Field-Installable Kit No.	Factory-Installed Suffix	Field-Installable Kit No.
24 Vac	SK	**S29384**	UK	**S29404**
48 Vac	SL	**S29385**	UL	**S29405**
120 Vac	SA	**S29386**	UA	**S29406**
208-277 Vac	SD	**S29387**	UD	**S29407**
380-480 Vac	SH	**S29388**	UH	**S29408**
525-600 Vac	SJ	**S29389**	UJ	**S29409**
12 Vdc	SN	**S29382**	UN	**S29402**
24 Vdc	SO	**S29390**	UO	**S29410**
30 Vdc	SU	**S29391**	UU	**S29411**
48 Vdc	SP	**S29392**	UP	**S29412**
60 Vdc	SV	**S29383**	UV	**S29403**
125 Vdc	SR	**S29393**	UR	**S29413**
250 Vdc	SS	**S29394**	US	**S29414**

Add-On Ground-Fault Module (GFM)



J-Frame Circuit Breaker with GFM Installed

The Micrologic® Ground-Fault Moduel (GFM) is a UL Listed circuit breaker accessory which protects equipment from damage caused by ground faults. It is an add-on module which, when connected to a PowerPact H- or J-frame circuit breaker, provides ground-fault sensing and ground-fault relay functions.

HD/JD ground-fault modules feature:

- Adjustable ground-fault pickup levels.
- Adjustable ground-fault time delays.
- Integral ground-fault push-to-test feature.
- Ground-fault indicator (mechanical for local, contacts for remote).
- All GFMs are supplied for I-Line® mounting as standard, easily convertible to unit mount by removing the I-Line bracket.
- Fault-powered (via the sensing current transformer) for electronics, shunt trip, and integral test feature. Meets NEC 230-95(c).
- A 12 Vdc shunt trip module (Catalog No. S29382) is required in the circuit breaker. This may be field installed or factory installed when the circuit breaker is ordered with an -SN suffix.

The GFM system requires the following:

- H-frame (15–150 A) or J-frame (150–250 A) molded case circuit breaker.
- Shunt trip for circuit breaker (may be factory-installed or field-installed).
- Bus bar connection (terminal nut inserts) for OFF end of circuit breaker.
- Optional neutral current transformer, catalog number GFM25CT (must be ordered for 4-wire applications).

Table 48: Ground-Fault Module

Catalog No.	Rating	Sensitivity	Time Delay (Approximate)
GFM150HD	150 A	20, 40, 60, 80, 100 A	0.2, 0.3, 0.4, 0.6 sec
GFM250JD	250 A	40, 80, 120, 160, 200 A	0.2, 0.3, 0.4, 0.6 sec

See Section 6, Figure 52–53 for GFM trip curves.

Earth Leakage Module (ELM) for PowerPact H- and J-Frame MCCBs

J-Frame Circuit Breaker with ELM Installed

The Earth Leakage Module (ELM) is an add-on module which, when connected to a PowerPact H- or J-frame MCCB, provides low-level ground-fault sensing and ground-fault relay functions.

Because these ELMs are highly sensitive (30 mA to 3 A), they provide much greater protection than GFMs (20 Amps to 200 Amps sensitivity). The ELMs provide greater protection of control circuits and other sensitive equipment. The associated circuit breaker must have a 48 Vdc shunt trip), which may be field-installed (kit S29392) or factory-installed (suffix –SP) in the H- or J-Frame circuit breaker.

The add-on Earth Leakage Module (ELM) features:

- Adjustable ground-fault pickup levels as low as 30 mA
- Adjustable ground-fault time delays from instantaneous to 500 msec (time delay can be applied to any setting)
- Integral ground fault push-to-test feature
- Ground-fault indicator; pop-up button for local status and contacts for remote indication (to be used only with the tripping option)
- All ELMs are supplied for I-Line® mounting and are easily convertible to unit-mount by removing the I-Line mounting feet
- Three poles; 240 to 600 Vac maximum: 3-phase, 3-wire (no neutral) and 1-phase, 2-wire applications
- Line-power obtained through internal bus to provide power for electronics, shunt trip, and integral test feature.
- A shunt trip is required in the circuit breaker; it may be field-installed or factory-installed in the PowerPact H and J circuit breakers.
- UL 1053 – Ground-fault Sensing and Relaying Equipment

Table 49: ELM Selection Chart [1]

Companion Circuit Breaker		Enclosure Space Required I-Line Switchboard	Catalog No.	Pick-Up Adjustments	Ground-Fault Time Delay Adjustments
Prefix	Size				
HD, HG, HJ, HL	15–150 A	LA	**ELM150HD**	30 mA 100 mA 300 mA 1A 3A	Instantaneous 60 ms 100 ms 500 msec
JD, JG, JJ, JL	150–250 A	LA	**ELM250JD**		

[1] At 250 A, the ELM250JD can be used with 80% rated circuit breakers only.

Factory-Installed ELMs

The catalog number for circuit breakers with factory-installed ELM should include the special suffixes SP and VL or VM:

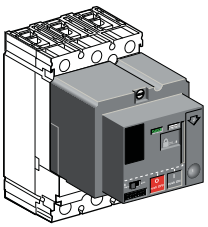
H D M 3 6 150 SP VL

where

- H = H-fame (or J = J-frame)
- D = D interruption level (or G, J or L)
- M = Lugs on ON end and terminal nuts on OFF end (required)
- SP = Factory-installed 48 Vdc shunt trip (S29392, required)
- VL= Earth Leakage Module (ELM) <150 A (H-frame) or
  VM = Earth Leakage Module (ELM) <250 A (4-frame)

See Section 6, Figure 54 for ELM Trip Curves.

Motor Operator



The motor operator remotely operates the circuit breaker featuring easy and sure operation:

- All circuit breaker indications and information remain visible and accessible, including trip unit settings and circuit breaker connection
- Suitability for isolation is maintained and padlocking remains possible
- Double insulation front face

Applications	• Local motor-driven operation, centralized operation, automatic distribution control • Normal/standby source changeover or switching to a replacement source to optimize energy costs • Load shedding and reconnection to optimize energy costs • Synchrocoupling—less than five cycle closing time
Installation and Connection	• All installation (fixed, plug-in/drawout mounting) and connection capabilities are maintained • Connections of the motor operator module are to a built-in terminal block behind its front cover • Stranded copper wire 14 AWG (2.5 mm^2)
Automatic Operation	The motor operator is connected in series with the overcurrent (SDE) trip switch. (The SDE adapter is included with the motor operator.) See wiring diagrams on page 44. • ON (I) and OFF (O) by two impulse type or continuous control signals • Depending on the wiring, resetting can be done locally, remotely or automatically • Optional manual reset if tripping due to an electrical fault (with SDE) • Anti-pumping feature.
Manual Operation	• Transfer to manual mode with possibility of remote mode indication • ON (I) and OFF (O) by two push buttons • Recharging of stored-energy system by pumping the lever nine times • Padlocking in off position

Table 50: Motor Operator Characteristics

Response Time (ms)	Opening		< 500
	Closing		< 80
Maximum Cycles Per Minute			4
Control Voltage	AC 50/60 Hz		48–60
			110–130
			208–277
			380–480
	DC		24–30
			48–60
			110–130
			250
Consumption	AC (VA)	Opening/Closing	500
	DC (W)	Opening/Closing	500
Minimum Operating Order (ms)			700
Operating Voltage			85–110% rated

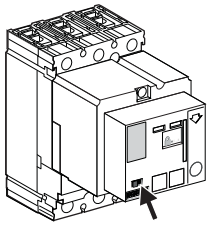
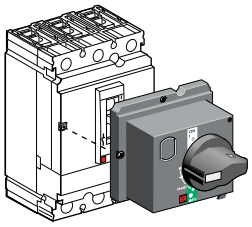


Table 51: Motor Operator Accessory Suffix Codes and Catalog Numbers

Voltage	Factory-Installed Suffix	Field-Installable Catalog No.	
		H-Frame	J-Frame
48/60 Vac	ML	**S29440**	**S31548**
120 Vac	MA	**S29433**	**S31540**
277 Vac	MD	**S29434**	**S31541**
380/480 Vac	MH	**S29435**	**S31542**
24/30 Vdc	MO	**S29436**	**S31543**
48/60 Vdc	MP	**S29437**	**S31544**
110/130 Vdc	MR	**S29438**	**S31545**
250 Vdc	MS	**S29439**	**S31546**

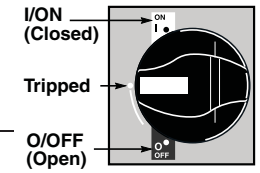
Rotary Operating Handles

Directly-Mounted Rotary Operating Handles

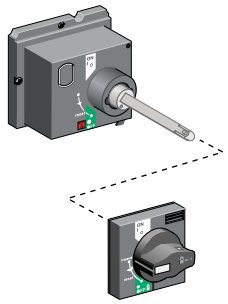


Directly Mounted Rotary Operating Handle

Installation	The directly mounted rotary operating handle replaces the circuit breaker front accessory cover (secured by screws).
Operation	The direct rotary handle maintains: • Suitability for isolation • Indication of three positions: ON (I), Tripped and OFF (O) • Access to the "push-to-trip" button • Visibility of, and access to, trip unit settings • The circuit breaker may be locked in the OFF position by using one to three padlocks (not supplied), padlock shackle diameter 0.19–0.31 in. (5–8 mm)
Models	• Standard with black handle • VDE type with red handle and yellow bezel for machine tool control
Variations	Accessories transform the standard direct rotary handle for the following situations: • Motor control centers (MCCs): – Opening of door prevented when circuit breaker is on – Closing of circuit breaker inhibited when door is open • Machine tool control; complies with CNOMO E03.81.501N; degree of protection IP54 • Early make or early break contacts may be installed into direct mount rotary handle
Standards	The directly-mounted rotary operating handle is UL Listed under file E103955 and CSA Certified under file LR 69561



IEC-Style Door-Mounted Rotary Operating Handle



Door Mounted Rotary Operating Handle

Installation	The extended rotary operating handle is made up of: • A unit that replaces the front accessory cover of the circuit breaker (secured by screws) • An assembly (handle and front plate) on the door that is always secured in the same position, whether the circuit breaker is installed vertically or horizontally • An adjustable extension shaft • The handle mechanism can be used in NEMA 3R and 12 enclosure applications
Operation	The door mounted operating handle makes it possible to operate circuit breakers installed in enclosure from the front. The door mounted operating handle maintains: • Suitability for isolation • Indication of the three positions OFF (O), ON (I) and tripped • Visibility of and access to trip unit settings when the door is open • Degree of protection: IP40 as per IEC 529 Defeatable interlock prevents opening of door when circuit breaker is on The circuit breaker may be locked in the off position by using one to three padlocks, padlock shackle diameter 0.19–0.31 in. (5–8 mm); padlocks are not supplied; locking prevents opening of the switchboard door
Shaft Length	The shaft length is the distance between the back of the circuit breaker and the door: • Minimum shaft length is 7.4 (185 mm) • Maximum shaft length is 24 in. (600 mm) • Extended shaft length must be adjusted
Models	• Standard with black handle • VDE type with red handle and yellow bezel for machine tool control
Variations	For withdrawable configurations, the extended rotary handle is also available with a telescopic shaft containing two stable positions
Standards	The extended rotary operating handle is UL Listed under file E103955 and CSA Certified under file LR 69561

Table 52: Rotary Operating Handle Suffix Codes and Kit Numbers

Handle Type (color)	Factory-Installed Suffix	Field-Installable Kit No.
Direct Mount (black)	RD10	**S29337**
Extended Door Mount (black)	RE10	**S29338**
Telescoping (black)	RT10	**S29343**
Direct Mount (red)	RD20	**S29339**
Extended Door Mount (red)	RE20	**S29340**

Class 9421 NEMA Door Mounted Rotary Operating Handles

Installation	The extended rotary operating handle is made up of: • A mounting plate that provides a rotary actuator for a standard toggle circuit breaker • Handle assemblies available for NEMA 3, 3R, 4, and 4X • Available in standard or short (3 in.) handle assemblies
Operation	The door mounted operating handle makes it possible to operate circuit breakers installed in enclosure from the front. Provides ON (I) and OFF (O) indication The circuit breaker may be locked in the off position
Shaft Length	The shaft length is the distance between the back of the circuit breaker and the door: • Minimum mounting depth is 5.5 in. (138 mm) • Maximum mounting depth is 10.75 in. (273 mm) with standard shaft • Maximum mounting depth is 21.3 in. (543 mm) with long shaft

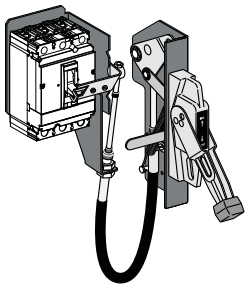
Table 53: Class 9421 Door-Mounted Operating Mechanism

Description	Catalog No.
Standard Shaft Kit	**9421LJ1**
Long Shaft Kit	**9421LJ4**

Table 54: Component Parts

Description		Catalog No.
Standard Handle Assembly	Type 1, 3R, 12	**9421LH6**
	NEMA Type 3 and 4, Painted	**9421LH48**
	NEMA Type 3 and 4, Chrome Plated	**9421LC48**
Operating Mechanism	Includes Lockout	**9421LJ7**
Standard Shaft	Support Bracket Not Required	**9421LS8**
Long Shaft	Support Bracket Included	**9421LS10**

Class 9422 Cable Operating Handle

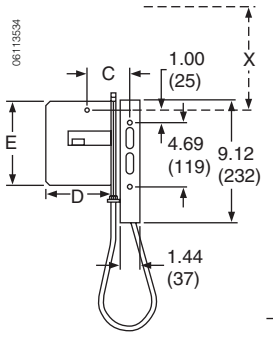


Flange-mounted handle cable operating mechanism is for use with Class 9422 Type A handle operators especially designed for tall, deep enclosures where placement flexibility is required.

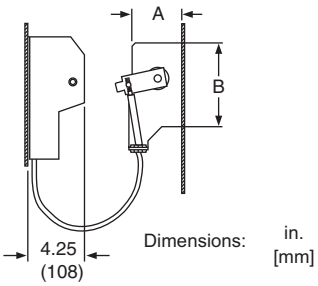
Applications	• The cable operator maintains: Suitability for isolation Indication of three positions: O (OFF), I (ON) and tripped Access to push-to-test • The circuit breaker may be locked in the off position by one to three padlocks • Door can be locked closed due to interlocking features of the handle operator
Installation	• Handle is mounted on flange of enclosure using specified mounting dimensions while circuit breaker and operating mechanism are mounted to inside of enclosure using two screws • Cable lengths available in 3-, 5- or 10-foot lengths to accommodate a variety of mounting locations Handles are available in painted Nema 1, 3, 3R, 4 (sheet steel) and 12 ratings or chrome (Nema 4, 4x)

Table 55: Class 9422 Cable Mechanisms

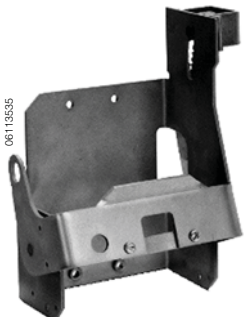
Cable Mechanism Length	Catalog No.
36 in.	**9422CSF30**
60 in.	**9422CSF50**
84 in.	**9422CSF70**
120 in.	**9422CSF10**



Refer to NEC Article 430-10 for minimum dimension X from circuit breaker top mounting hole to wall or barrier to ensure adequate wire bending space.



Note: Bend radius in cable must never be less than 6 in. (152 mm). Electrical clearances must be maintained between cable and live electrical parts.



Variable Depth Mechanisms

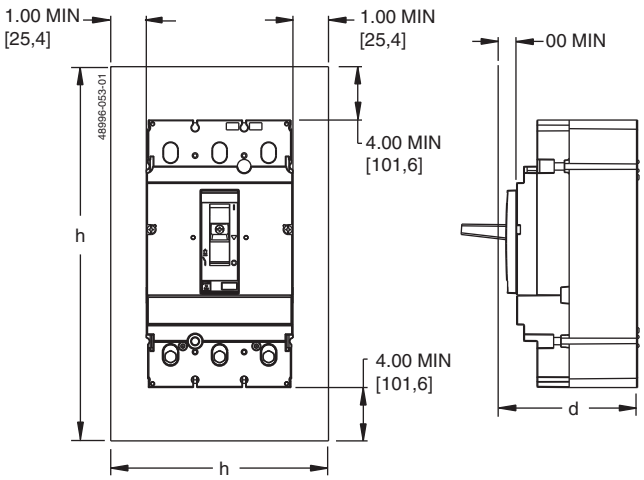
Designed for installation in custom built control enclosures where main or branch circuit protective devices are required.

- All circuit breaker operating mechanisms are suitable for either right- or left-hand flange mounting, convertible on the job.
- Variable mounting depth range: 5.88–17.75 in. (149–451 mm).
- Operating mechanism 9422RQ1 (does not include handle mechanism).

Circuit Breaker Enclosures and Enclosure Accessories

- Square D circuit breaker enclosures are UL Listed, CSA Certified and are suitable for use as service entrance equipment, except as footnoted.
- The short circuit rating of an enclosed circuit breaker is equal to the rating of the circuit breaker installed, except as footnoted.
- Circuit breakers are ordered and shipped separately for field installation.

Table 56: Enclosure Dimensions



Circuit Breaker	Amperage	Enclosure Dimensions (h x w x d)	
		80%	100%
H-Frame	15–150 A	18.13 x 8.63 x 4.13 in. (461 x 219 x 105 mm)	62 x 14 x 22.5 in. (572 x 356 x 1575 mm)
J-Frame	150–250 A	28.5 x 12.38 x 5.38 in. (724 x 314 x 137 mm)	62 x 14 x 22.6 in. (572 x 356 x 1575 mm)

Table 57: Circuit Breaker Enclosure Catalog Numbers

Circuit Breaker			Enclosure Cat. No.				
Cat. No. Prefix	Rating	Poles	NEMA 1 Flush	NEMA 1 Surface	NEMA 3R[1]	NEMA 4, 4X, 5, 3, 3R Stainless Steel	NEMA 12/3R, 5 (Without Knockouts)[2]
HDL,HGL,HJL,HLL	15–150 A	2, 3	J250F	J250S	J250R	J250DS	J250AWK
JDL,JGL,JJL,JLL	150–250 A	2, 3					
HDL	15–100 A	3	—	HD100S[3, 4, 5]	—	—	—
JDL	150–250 A	3	—	JD250S[3, 5, 6]	—	—	—

1 Enclosures with NRB or RB suffix have provisions for 3/4 in. through 2-1/2 in. bolt-on hubs in top endwall. Enclosures with R suffix have blank endwalls and require field cut opening. For details and hub catalog numbers see Digest 174 page 3-9.

2 Suitable for rainproof NEMA 3R application by removing drain screw from bottom endwall.

3 Copper wire only

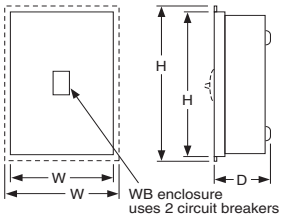
4 Maximum short circuit rating is 25 kAIR, 240 Vac

5 Order service ground kit PKOGTA2 if required.

6 Maximum short circuit rating is 18 kAIR, 480 Vac.

Table 58: Dimensions

Cat. No.	Approximate Dimension						
	Series	H		W		D	
HD100S	A01	17.00 in.	431.8 mm	7.90 in.	200.7 mm	4.75 in.	120.7 mm
J250F	A01	32.40 in.	823 mm	15.40 in.	391 mm	6.00 in.	152 mm
J250S	A01	31.36 in.	797 mm	14.36 in.	365 mm	6.00 in.	152 mm
J250R	A01	31.05 in.	789 mm	14.47 in.	368 mm	6.28 in.	160 mm
J250DS	A01	32.26 in.	819 mm	9.72 in.	247 mm	7.94 in.	202 mm
J250AWK	A01	32.26 in.	819 mm	9.72 in.	247 mm	7.94 in.	202 mm



NEMA Type 1

Table 59: Insulated Groundable Neutral Assembly

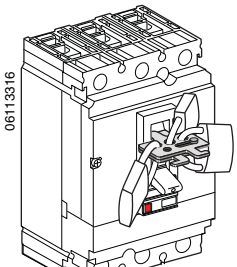
Circuit Breaker		Neutral Assembly For Use With		Terminal Lug Data—Total Available (Line plus Load) AWG/kcmil
Cat. No. Prefix	Ampere Rating	NEMA 1 & 3R	NEMA 4, 4X, 5, 12 & 12K	
		Cat. No.	Cat. No.	
HDL,HGL,HJL,HLL	15–100 A	**SN100FA**	**SN100FA**	(4) 14–1/0 Cu or (4) 12–1/0 Al
HDL,HGL,HJL,HLL	125–150 A	**SN400LA**	**SN400LA**	(2) 1–600 or (4) 1–250 Al/Cu, plus (2) 4–300 Al/Cu
JDL,JGL,JJL,JLL	150–250 A	**SN400LA**	**SN400LA**	(2) 1–600 or (4) 1–250 Al/Cu, plus (2) 4–300 Al/Cu

Table 60: Service Ground Kits

Circuit Breaker Cat. No. Prefix	Ground Bar Cat. No.	Number of Terminals	Conductors Per Terminal	Wire Range
HDL,HGL,HJL,HLL, JDL,JGL,JJL,JLL	PKOGTJ250	2	1	6 AWG–300 kcmil Al/Cu

Locking Systems

Padlocking systems can receive up to three padlocks with diameters of 0.19–0.31 in. (5–8 mm); padlocks not supplied.



Removable Attachment*

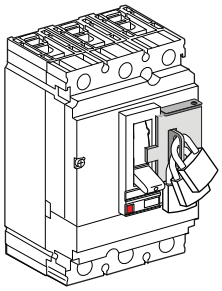

Fixed Padlock Attachment

Table 61: Device Locking Options

Control Device	Function	Type	Accessories Required	Kit Catalog No.
Toggle	Lock in OFF (O) Position	Padlock	Removable Device	**S29370**
	Lock in OFF (O) or ON (I) Position	Padlock	Fixed Device[1]	**S29371**
	Lock in OFF (O) Position	Padlock	Stationary Device	**S37422**
Direct Rotary Handle	Lock in OFF (O) Position	Padlock	None	—
Extended Rotary Operating Handle	Lock in OFF (O) Position, Door Opening Prevented	Padlock	None	—
Motor Operator	Lock in OFF (O) Position, Motor	Padlock	None	—

[1] Not available for 2P HD and HG devices

Interlocking Systems

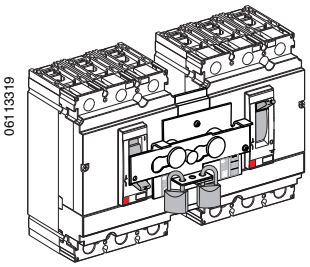
Interlocking of Circuit Breakers With Toggle Control

The toggle interlock system can receive one or two padlocks with diameters of 0.19–0.31 in. (5–8 mm). Both interlocked circuit breakers must be fixed or both plug-in. Two sliding interlocking bars can be used to interlock three circuit breakers installed side-by-side, in which case one circuit breaker is in the ON (I) position and the two others in the OFF (O) position. (Kit S29354. Not available for 2P HD and HG devices.)

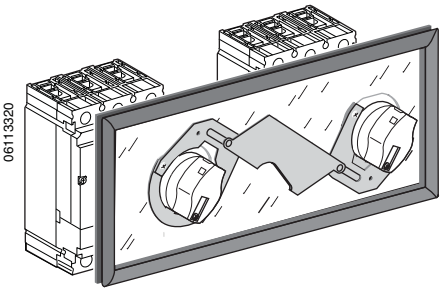
Interlocking Two Circuit Breakers with Rotary Handles

The rotary handles are padlocked with the devices in the OFF (I) position. The interlock mechanism inhibits the two devices from being closed (ON/I) at the same time, but allows for both devices to be open (OFF/O) simultaneously. (Kit S29369. Not available for 2P HD and HG devices.)

Figure 12: Interlocking Systems

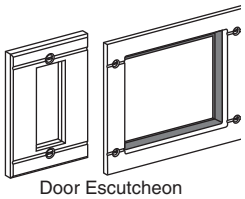


Interlocking with Toggle Control (S29354)

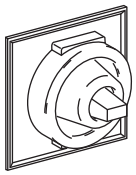


Interlocking with Rotary Handles (S29369)

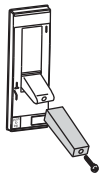
Installation Accessories



Door Escutcheon



Handle Rubber Boot



Toggle Extension

Table 62: Installation Accessories

Description	Factory-Installed Suffix	Field-Installable Cat. No.
Front Panel Escutcheon for Toggle Breakers	—	**S29315**
Front Panel Escutcheon for Rotary Handle, Motor Operator, or extended escutcheon	—	**S29317**
Handle Rubber Boot[1]	—	**S29319**
Sealing Accessories	—	**29375**
Toggle Extensions (set of 10)	YE	**S29313**

[1] Not available in HD and HG 2P modules.

Section 4—Wiring Diagrams

Table 63: Connector Descriptions

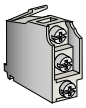
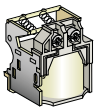
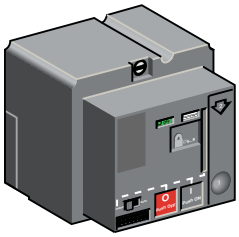
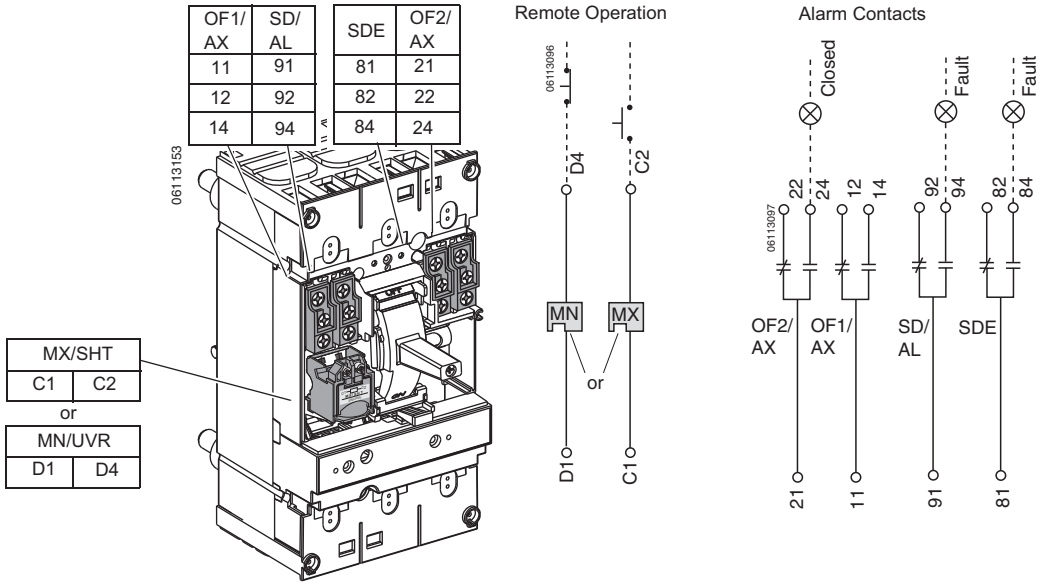
	Function	Description	Connector
	Auxiliary Contacts	Open/Closed circuit breaker or switch position contacts	OF/AX
		Bell alarm	SD/AL
	Remote Operation	Undervoltage trip device	MN/UVR
		Shunt trip	MX/SHT
	Remote Operation	Motor operator	MCH

Figure 13: Control Wiring Diagrams

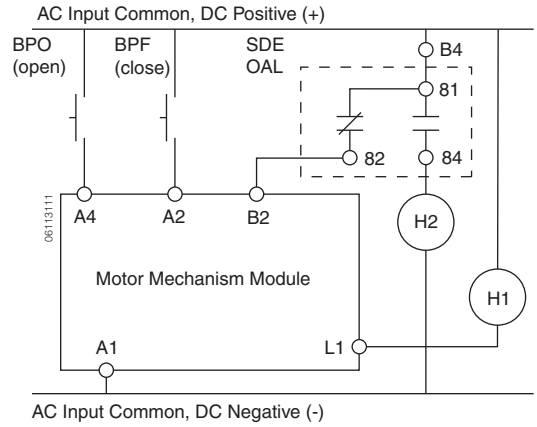
Function	Connector	Description
Auxiliary Contacts	OF/AX	Open/Closed circuit breaker or switch position contacts
	SD/AL	Bell alarm
Remote Operation	MN/UVR	Undervoltage trip device
	MX/SHT	Shunt trip
	MCH	Motor operator



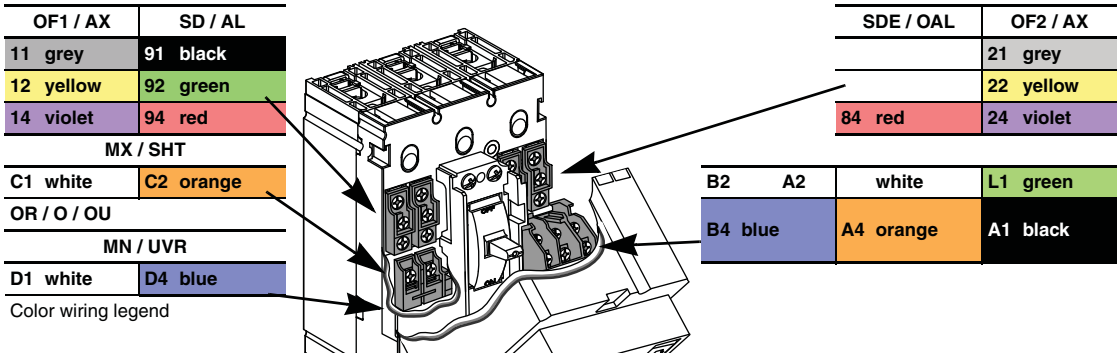
Standard Motor Operator Wiring (Factory Wiring Configuration)

A circuit breaker may be configured for remote operations. Remotely operated circuit breakers are factory wired for the power supply to the motor being switched by the overcurrent trip switch. This prevents the circuit breaker from being remotely reset after an overload fault as a precaution against closing on a fault.

Figure 14: Standard Motor Operator Control Wiring



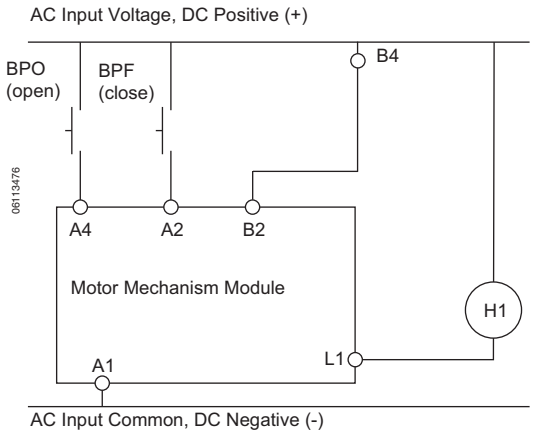
		Description
Connector	A4	Electrical opening (positive DC)
	A2	Electrical closing (positive DC)
	B4	Power supply connection (positive DC)
	A1	Power supply connection (negative DC)
	L1	Automatic position indicator
	84	Overcurrent trip indicator
Indicator	H1	Lamp signal indicating MCH in automatic position
	H2	Lamp signal indicating overcurrent trip condition



Remote Reset Wiring Without Overcurrent Trip Switch Protection

To configure circuit breaker for remote operation without overcurrent switch protection, follow the wiring diagram below.

Figure 15: Motor Operator Without Overcurrent Switch Protection



Section 5—Dimensions

H-Frame Dimensional Drawings

Figure 16: 15–150 A Bus Bar H-Frame 2P HD/HG Circuit Breaker

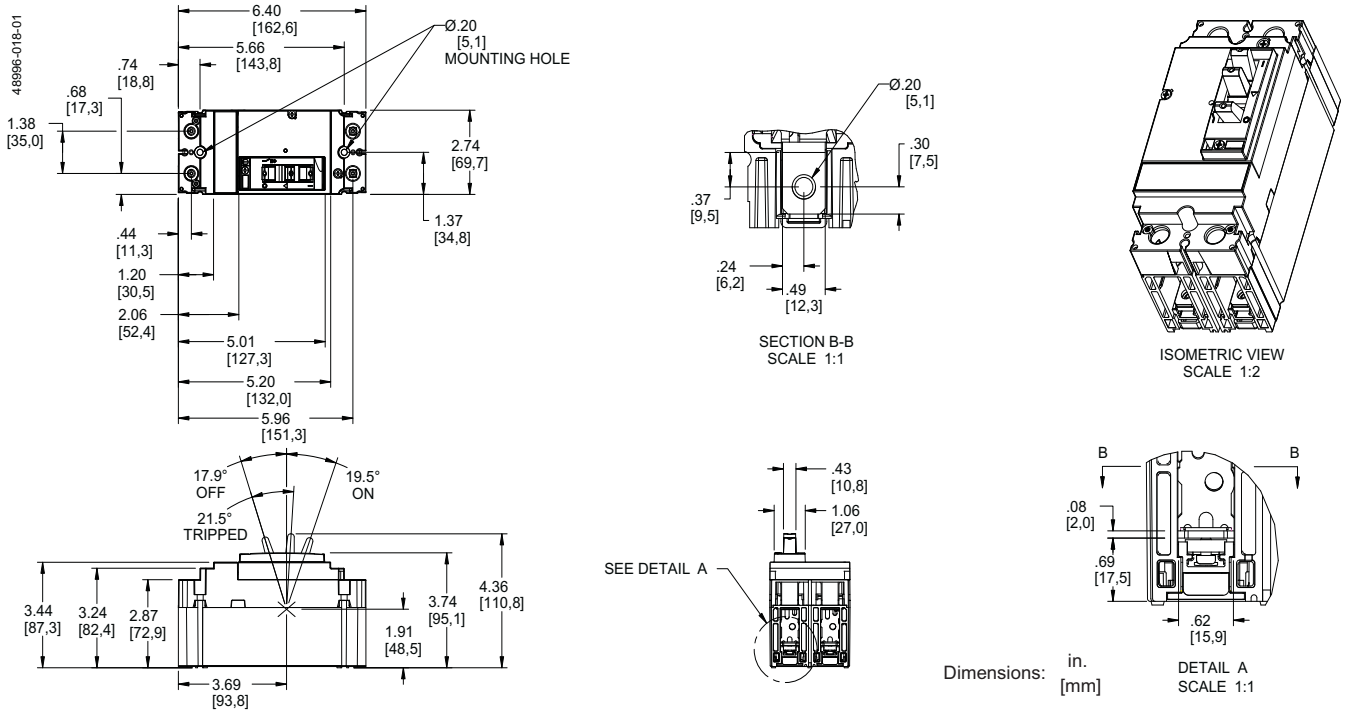


Figure 17: 15–150 A Unit Mount H-Frame 2P HD/HG Circuit Breaker

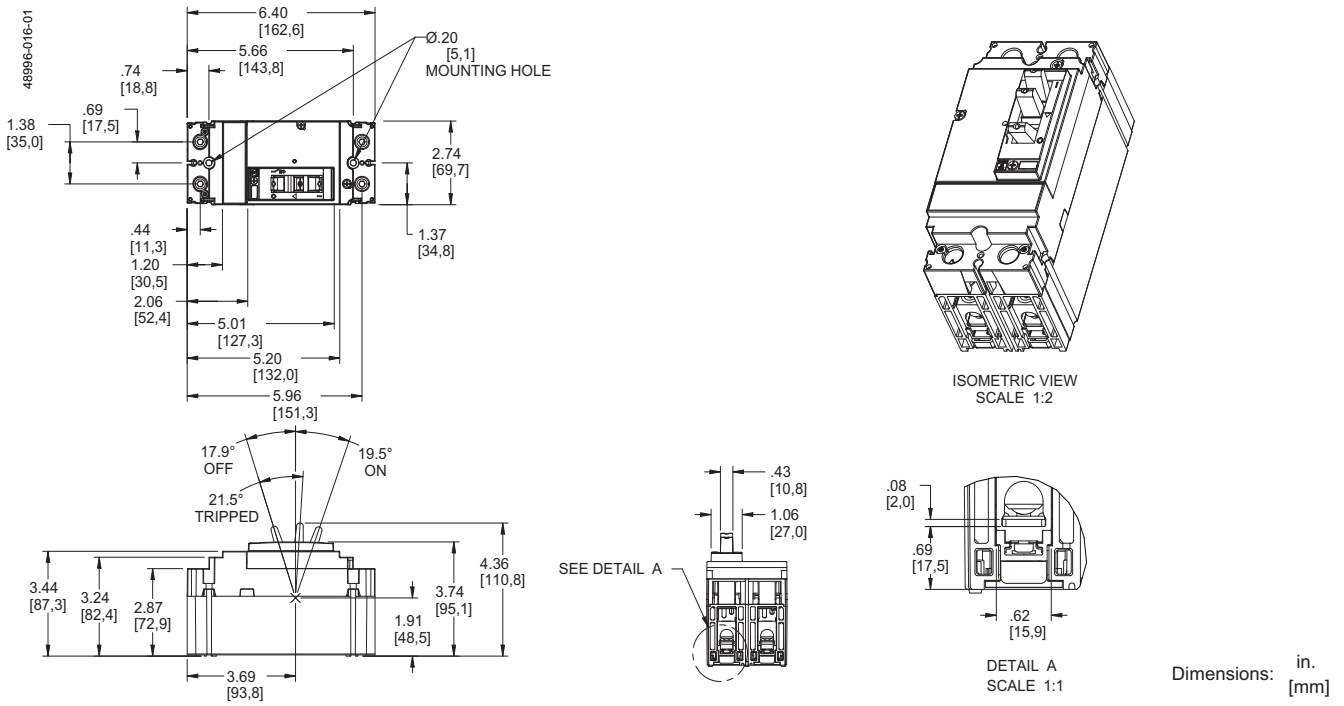


Figure 18: 15–150 A Bus Bar H-Frame 3P Circuit Breaker

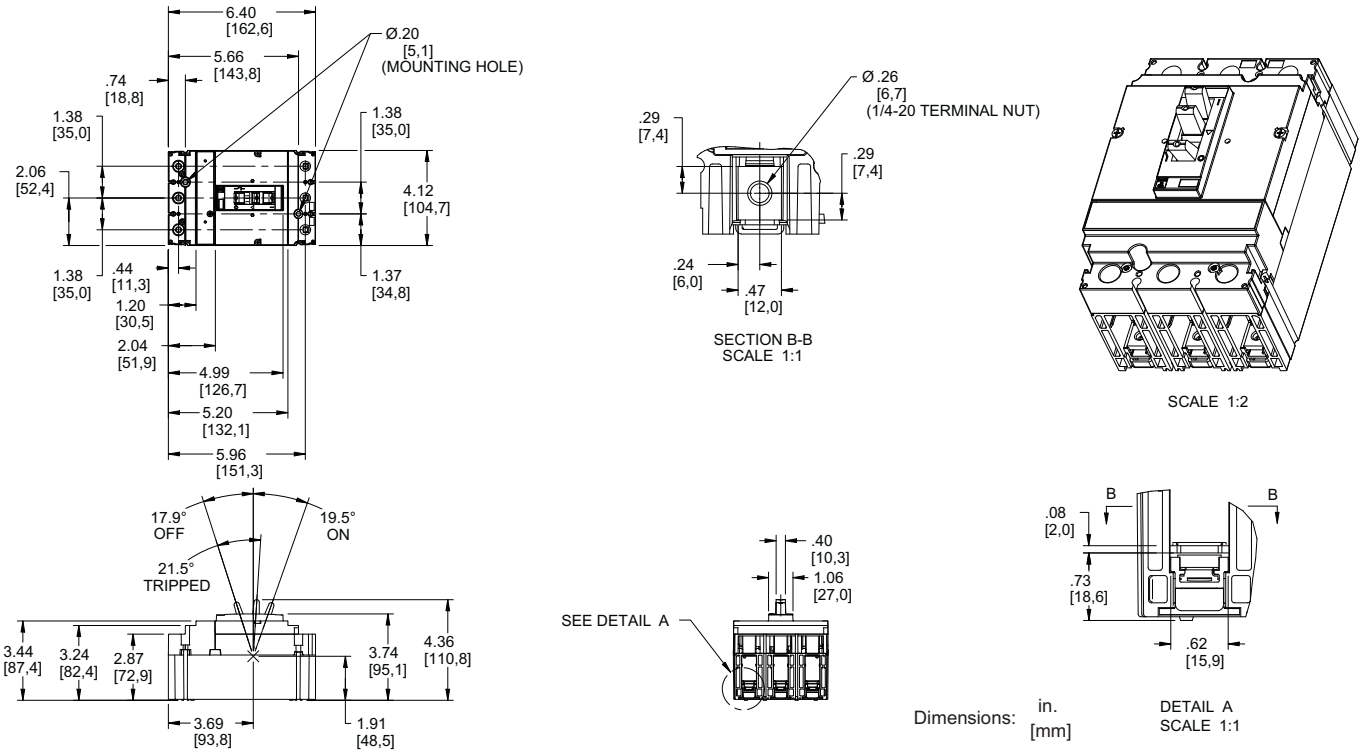


Figure 19: 15–150 A Lug-Lug H-Frame 3P Circuit Breaker

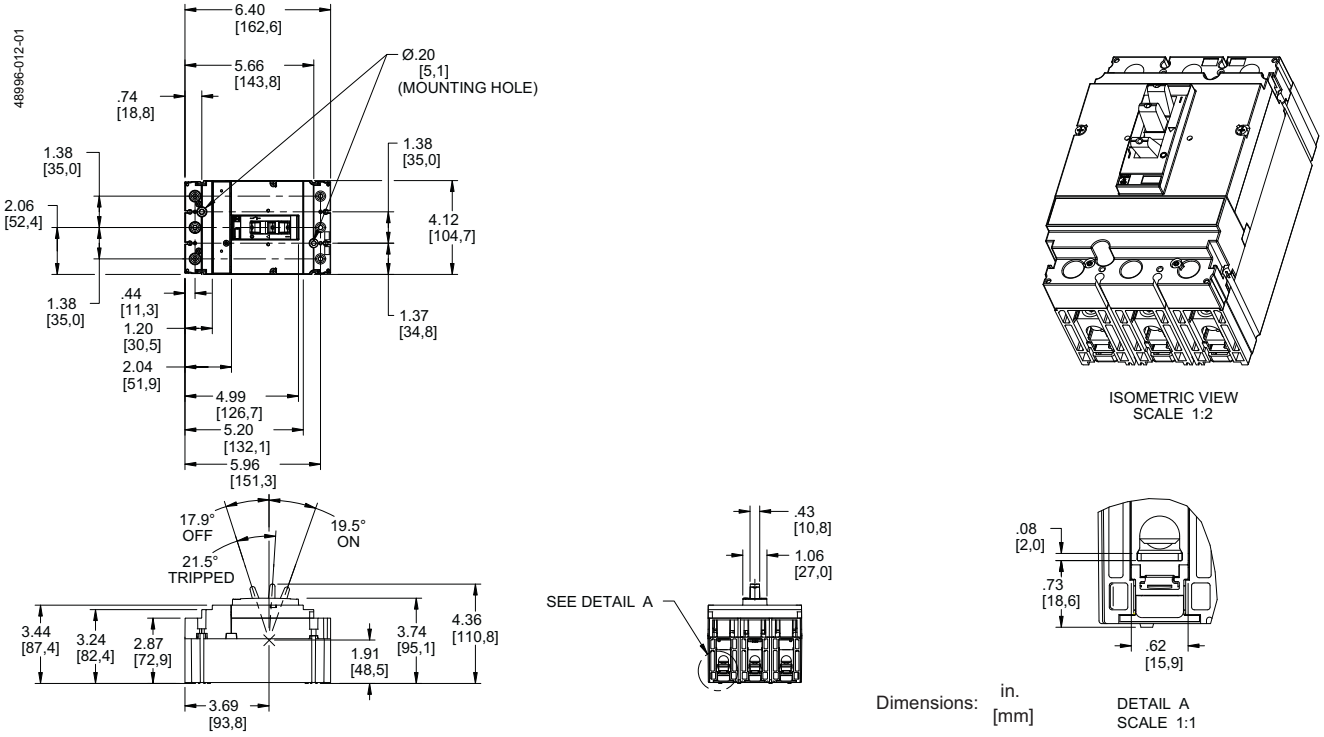


Figure 20: 15–150 A Rear Connected H-Frame 3P Circuit Breaker

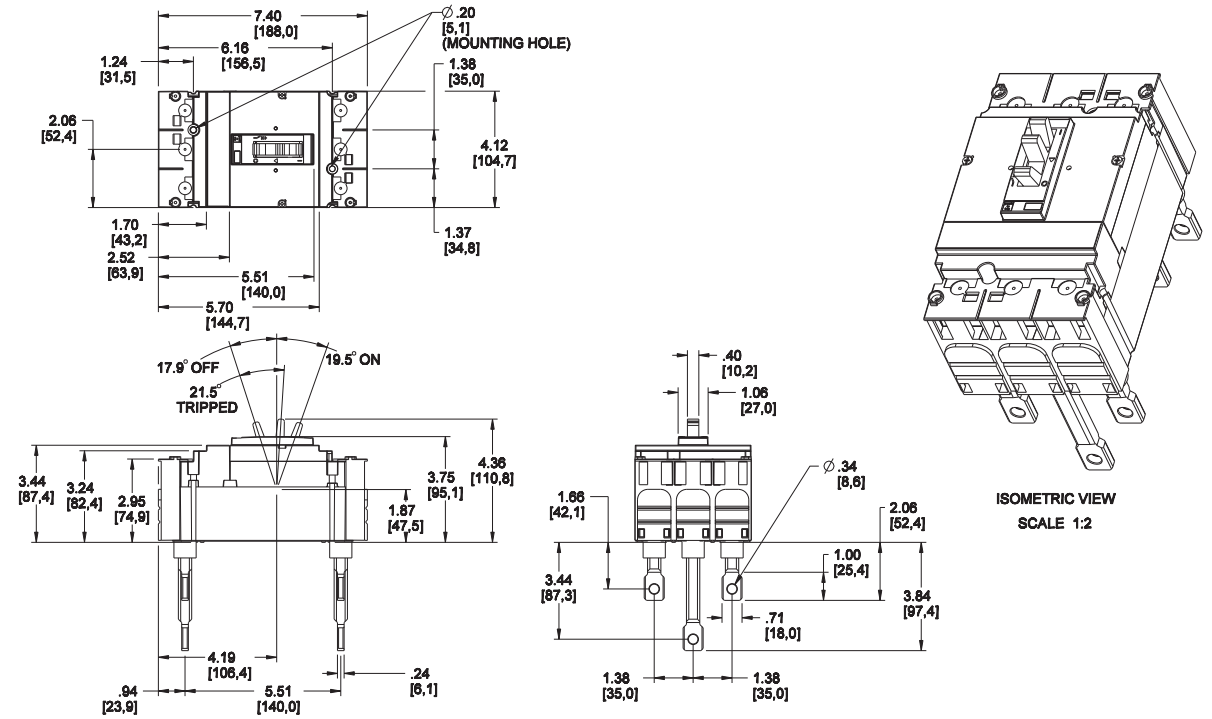


Figure 21: Motor Operator Detail (H-Frame)

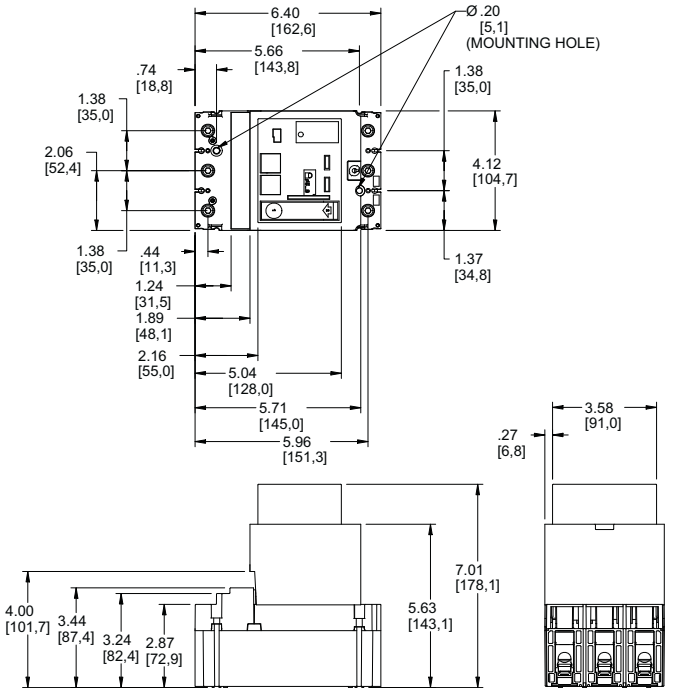
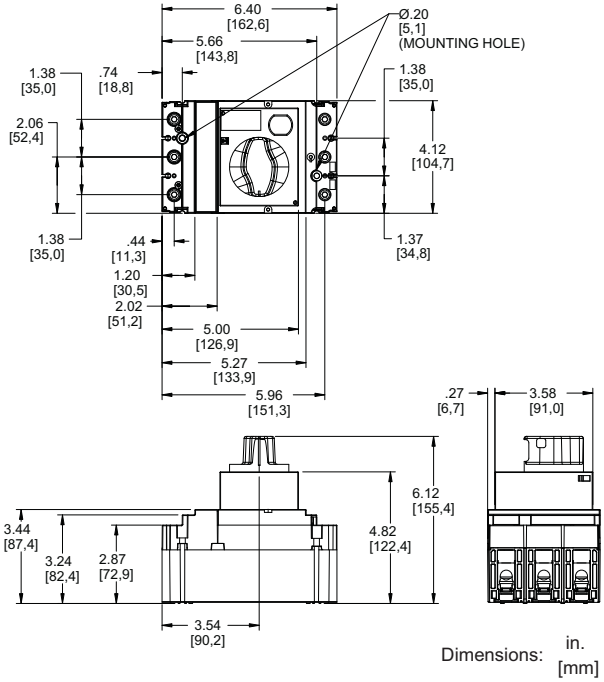


Figure 22: Rotary Handle Detail (H-Frame)



J-Frame Dimensional Drawings

Figure 23: 150–250 A Bus Bar J-Frame 3P Circuit Breaker

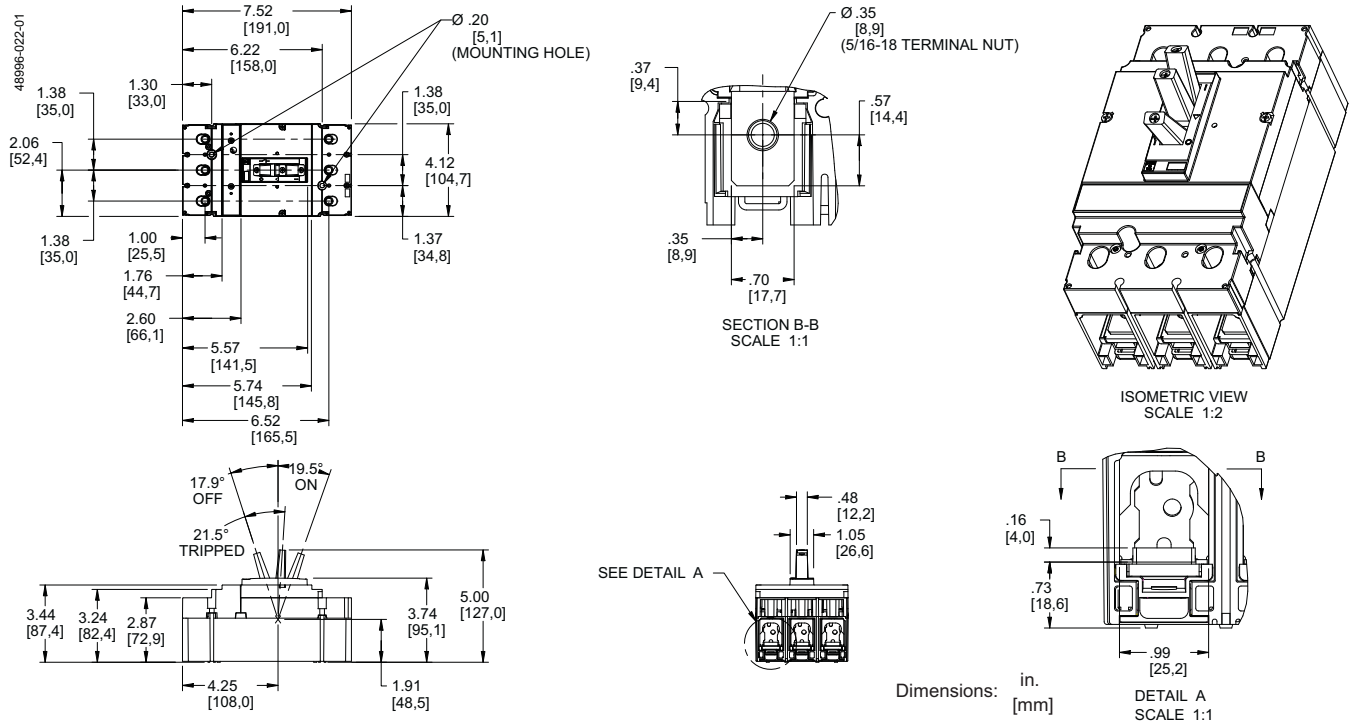


Figure 24: 150–250 A Lug-Lug J-Frame 3P Circuit Breaker

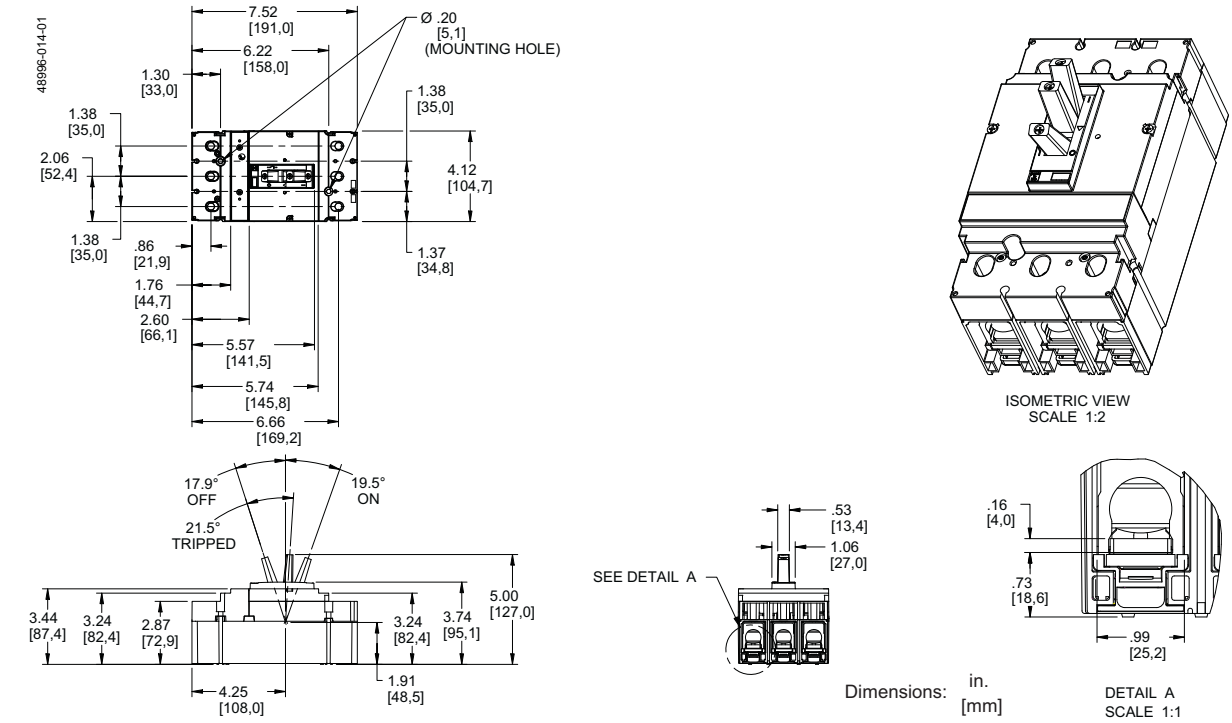


Figure 25: 150–250 A Rear Connected J-Frame 3P Circuit Breaker

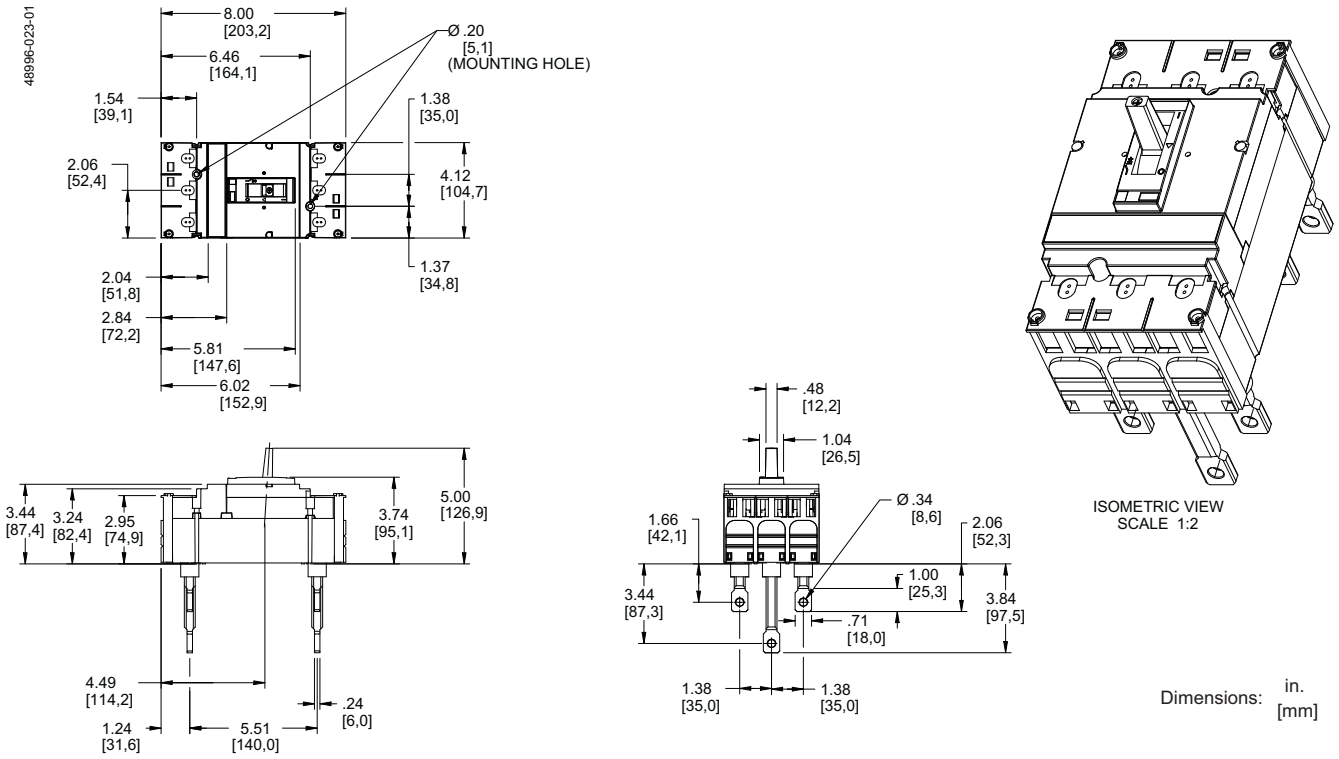


Figure 26: J-Frame Motor Operator Detail

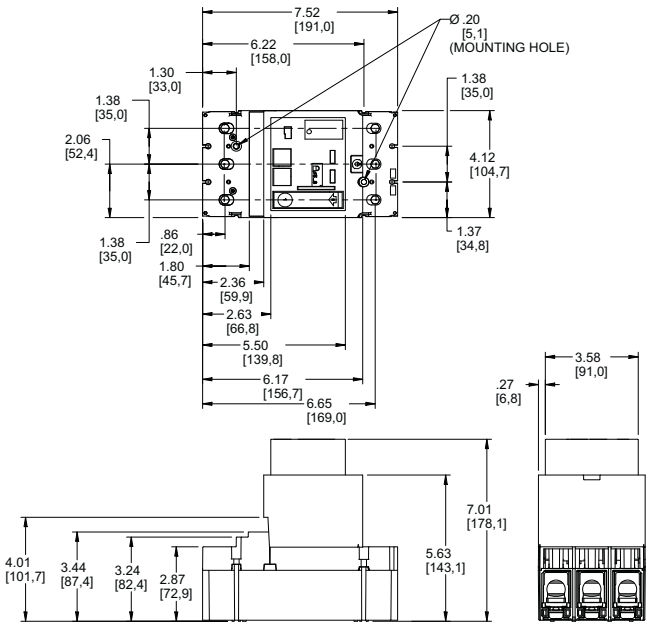
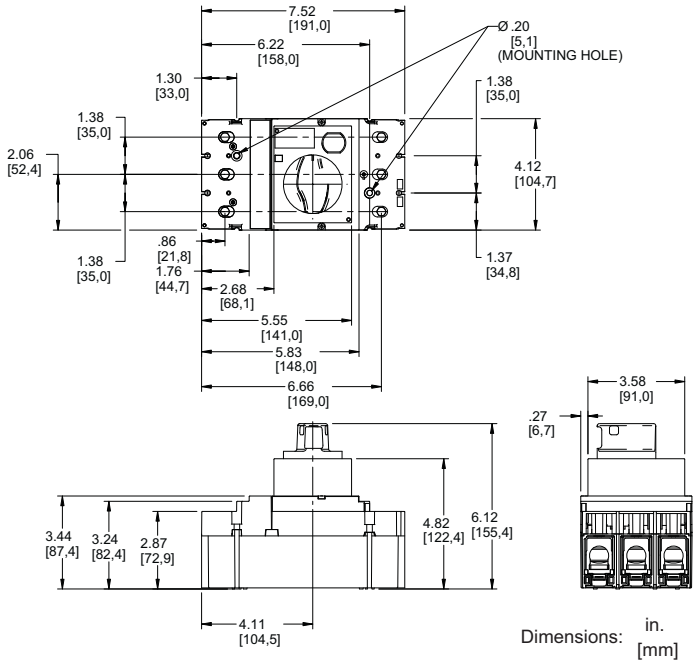


Figure 27: J-Frame Rotary Handle Detail



Plug-In H- and J-Frame Dimensional Drawings

Figure 28: 15–250 A H- and J-Frame Plug-In Base 3P Circuit Breaker

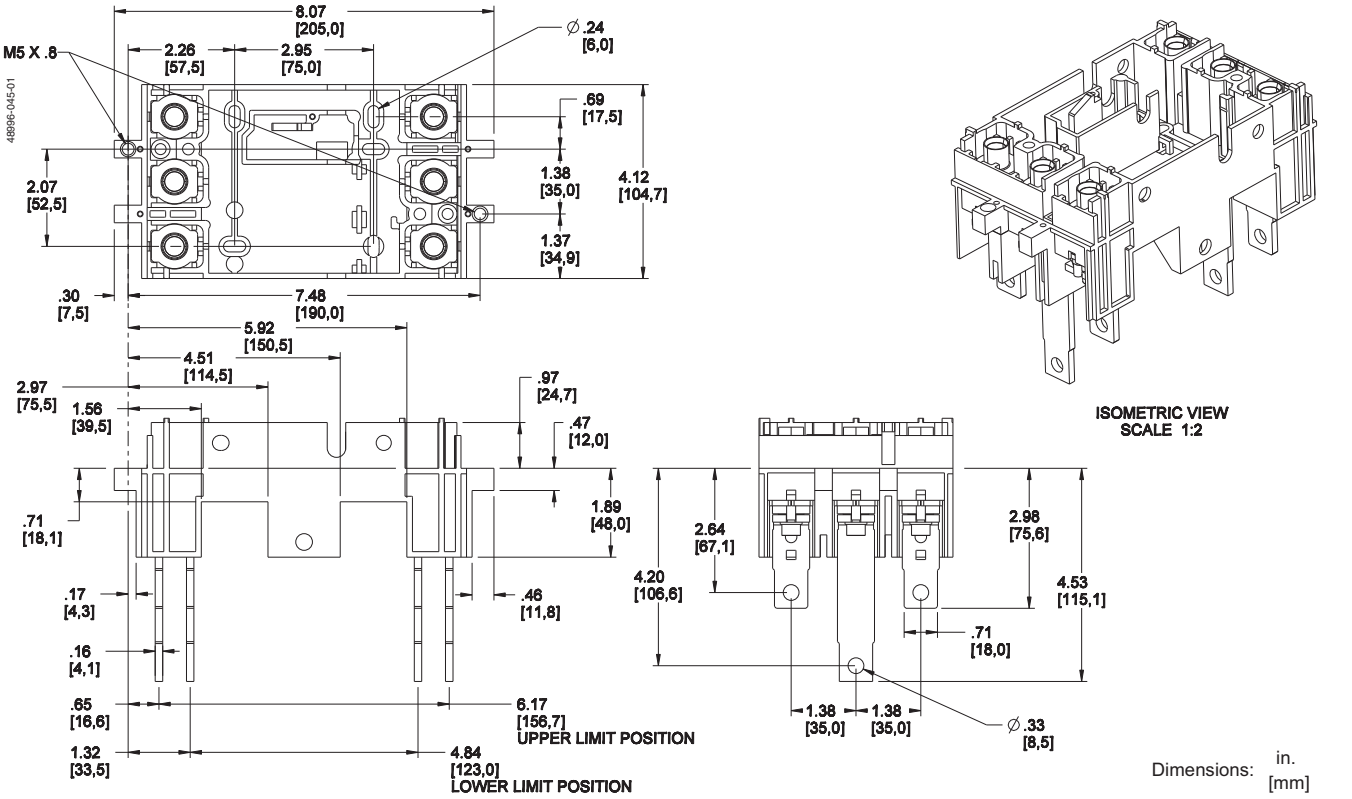
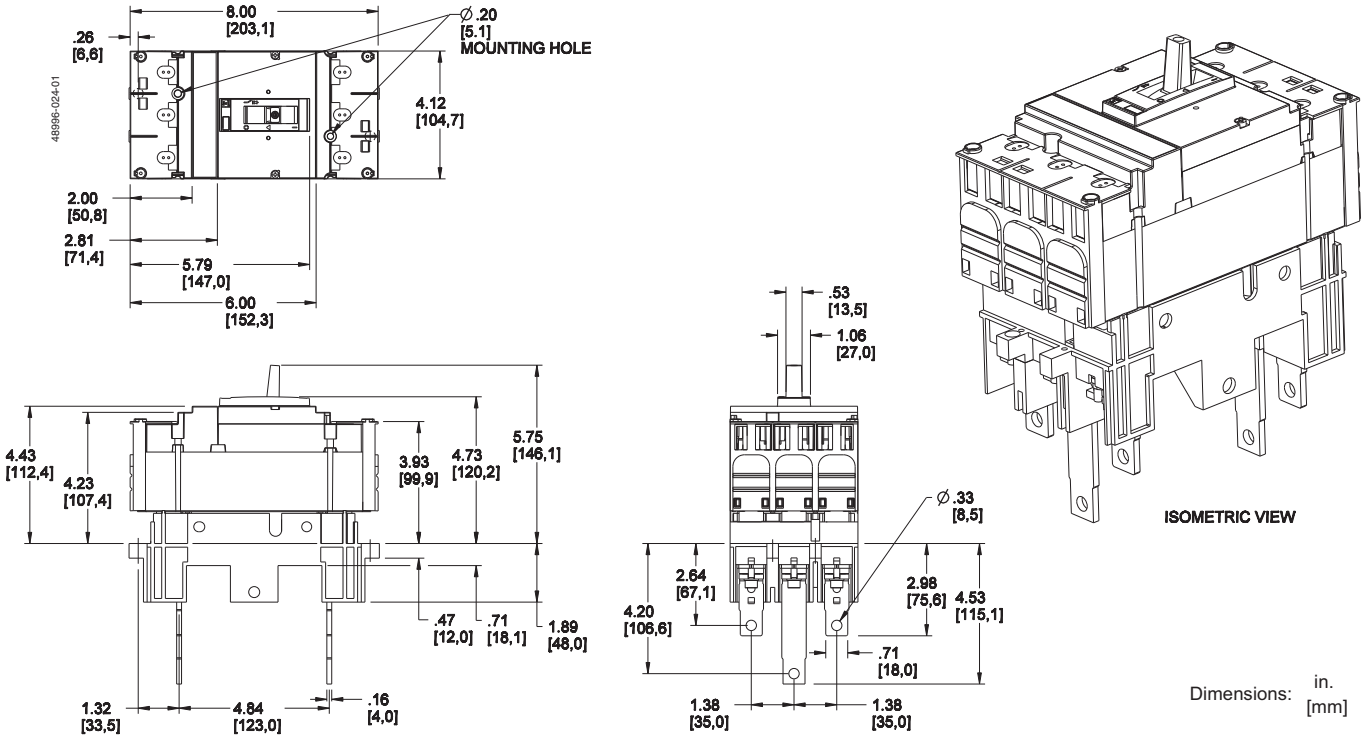


Figure 29: 15–250 A H- and J-Frame Plug-In Circuit Breaker 3P Circuit Breaker



Drawout H- and J-Frame Dimensional Drawings

Figure 30: 15–250 A H and J-Frame Cradle 3P Circuit Breaker

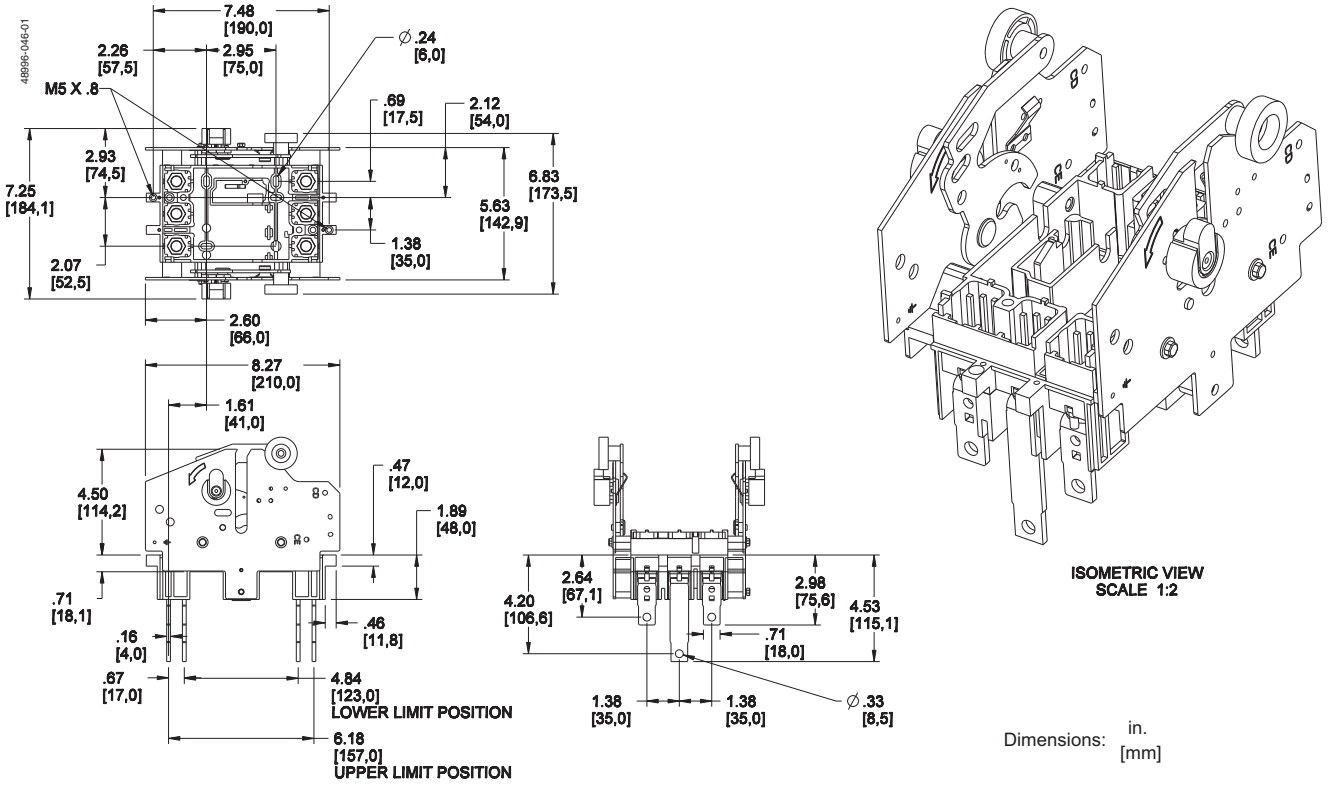
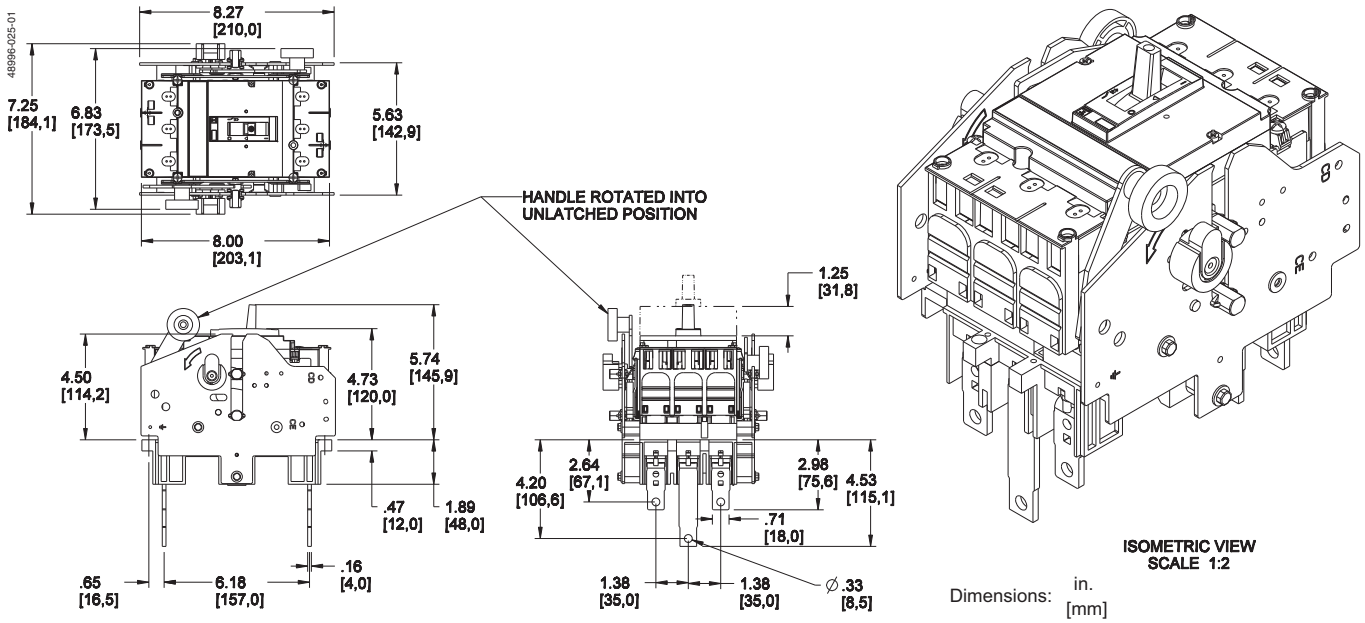
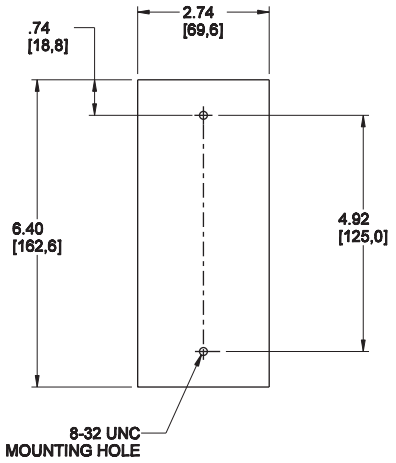


Figure 31: 15–250 A H- and J-Frame Drawout Circuit Breaker 3P Circuit Breaker



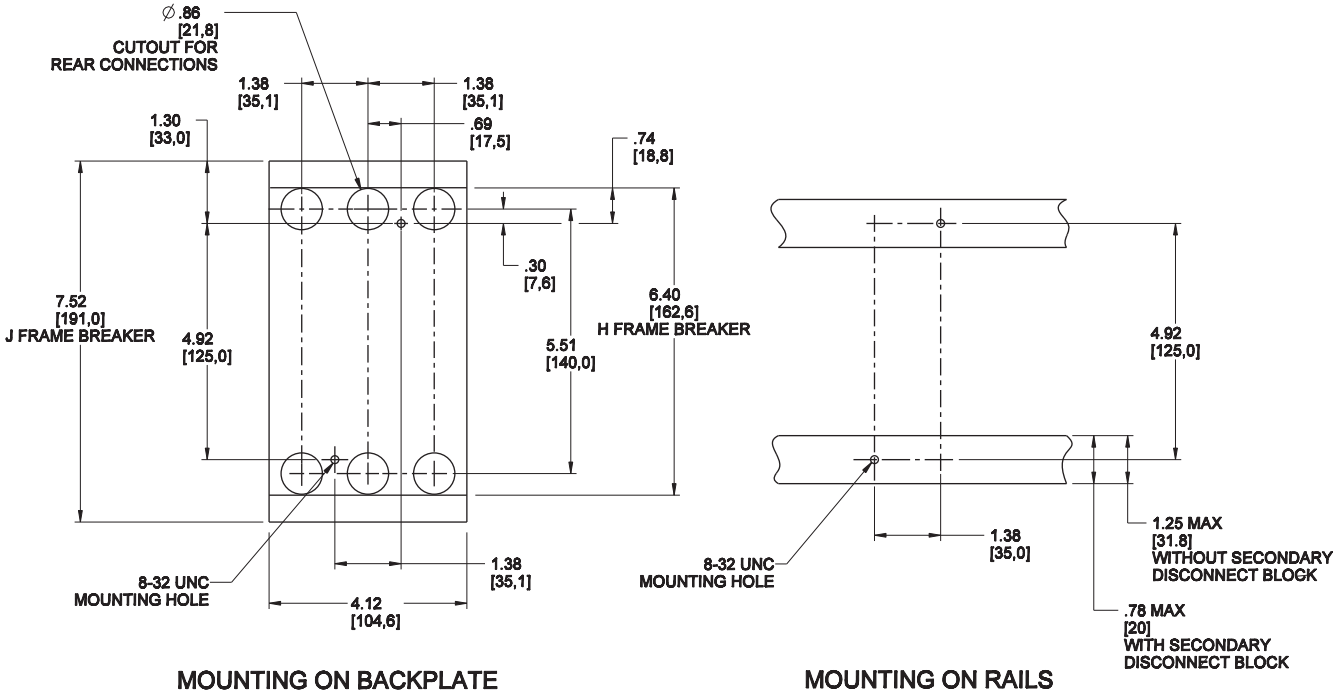
Mounting Dimensional Drawings

Figure 32: H-Frame 2P (HD and HG) Circuit Breaker



Dimensions: in. [mm]

Figure 33: H and J-Frame 3P Circuit Breaker



Dimensions: in. [mm]

H- and J-Frame Door Cutout Dimensional Drawings

Figure 34: H and J-Frame Circuit Breaker Toggle Handle Door Cutout

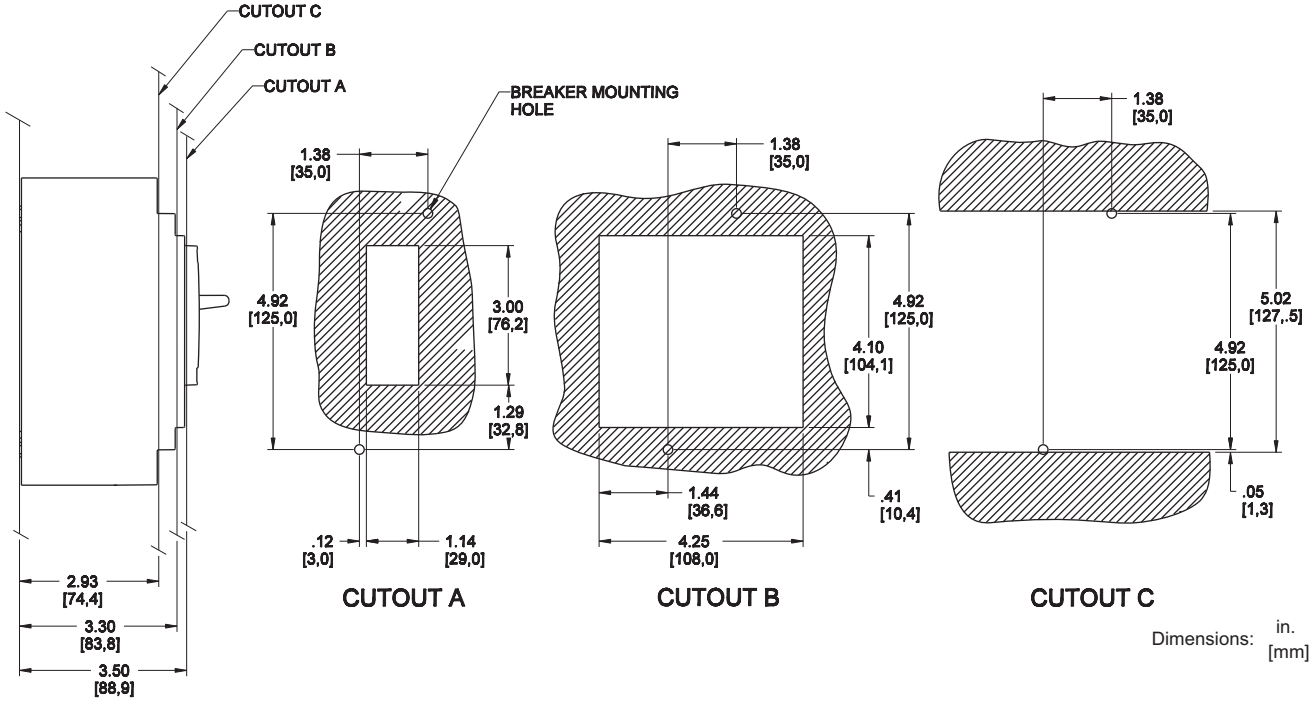


Figure 35: H and J-Frame Circuit Breaker Toggle Handle With Escutcheon Door Cutout

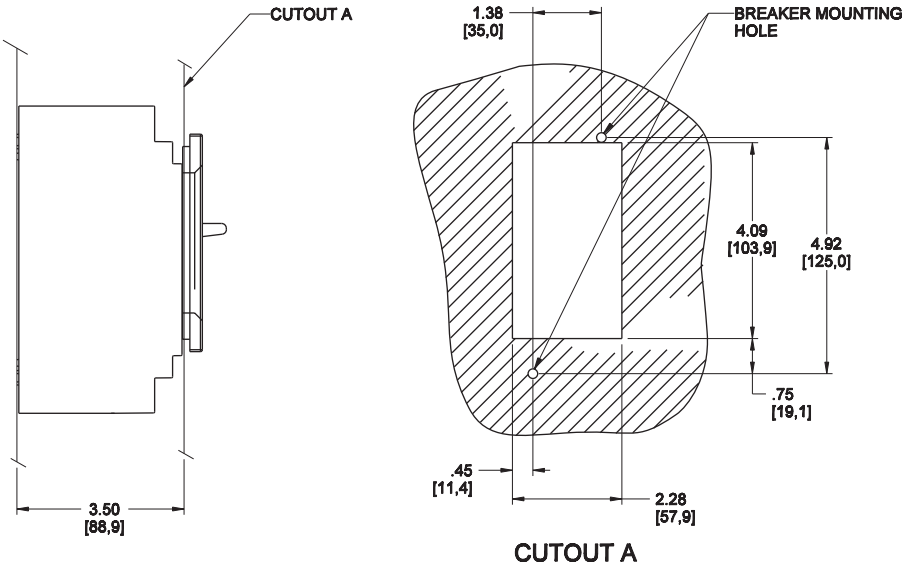


Figure 36: H and J-Frame Circuit Breaker Fixed Rotary Handle Cutout

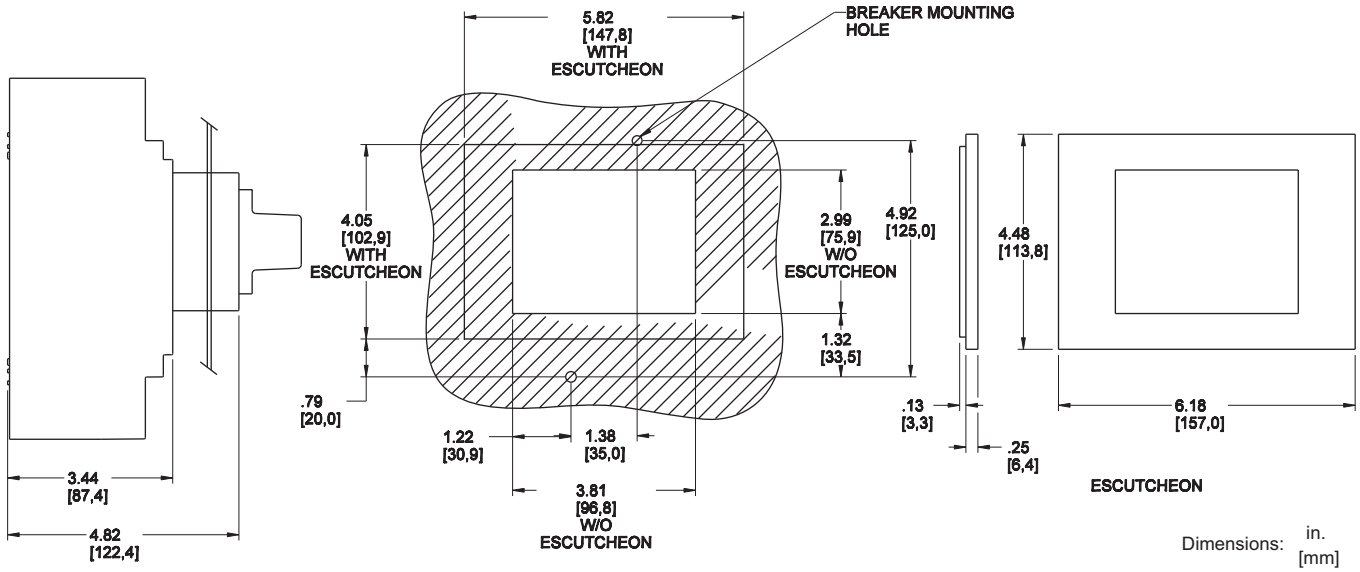


Figure 37: H and J-Frame Circuit Breaker Door Mounted Rotary Handle Cutout

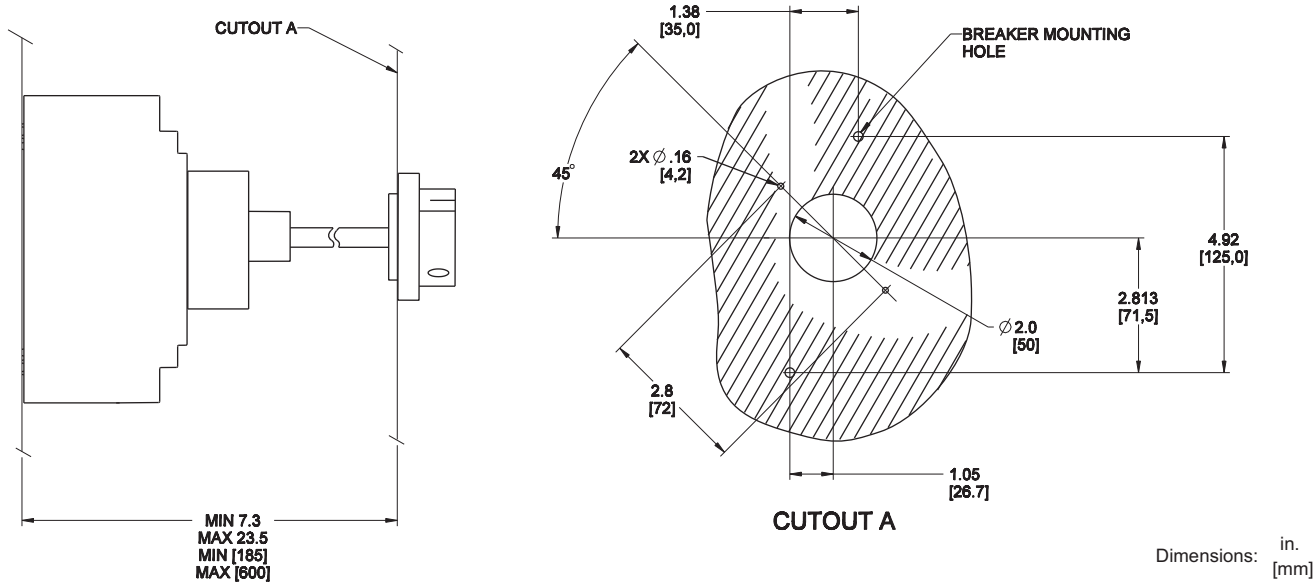
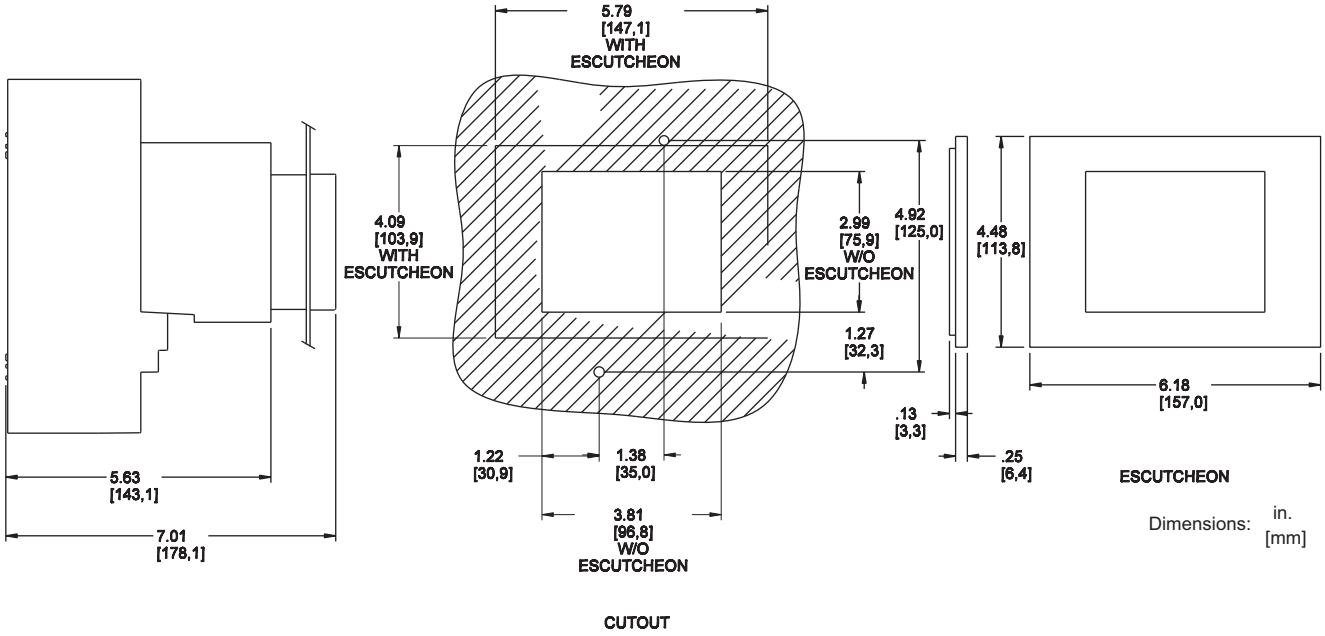


Figure 38: H and J-Frame Circuit Breaker Motor Operator Cutout



Section 6—Trip Curves

Figure 39: 15-35 A — HD, HG, HJ and HL

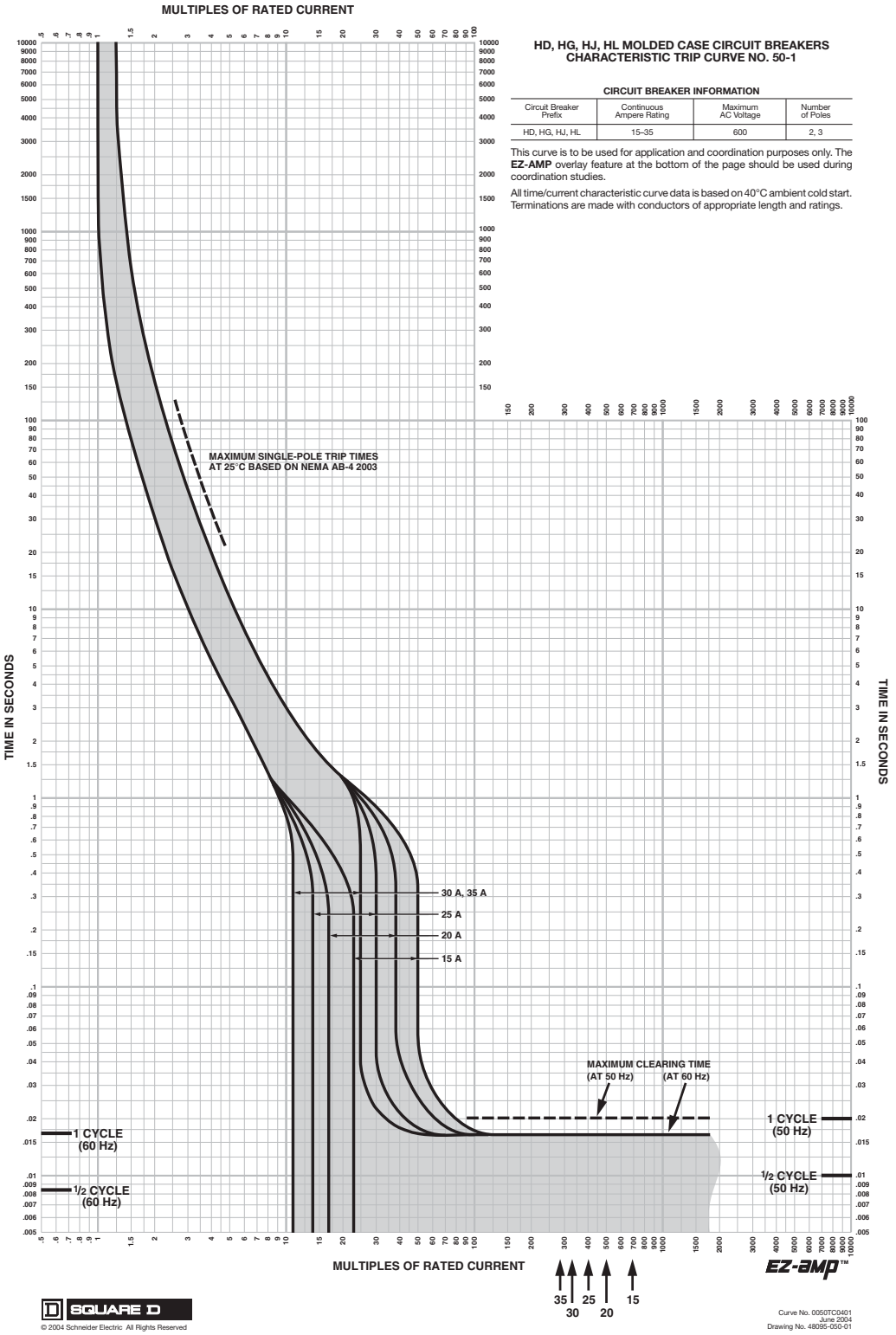


Figure 40: 40-60 A — HD, HG, HJ and HL

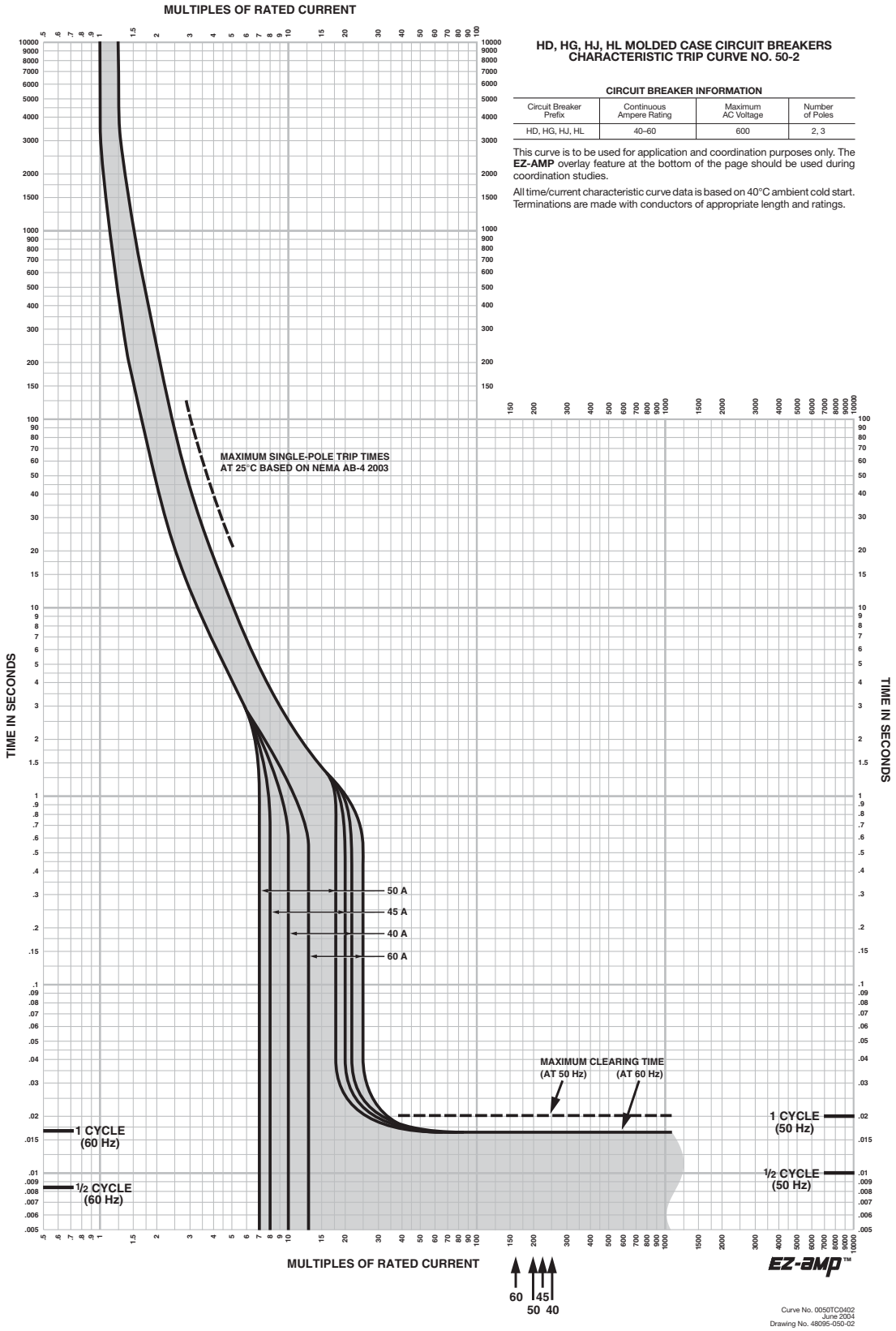


Figure 41: 70-100 A — HD, HG, HJ, and HL

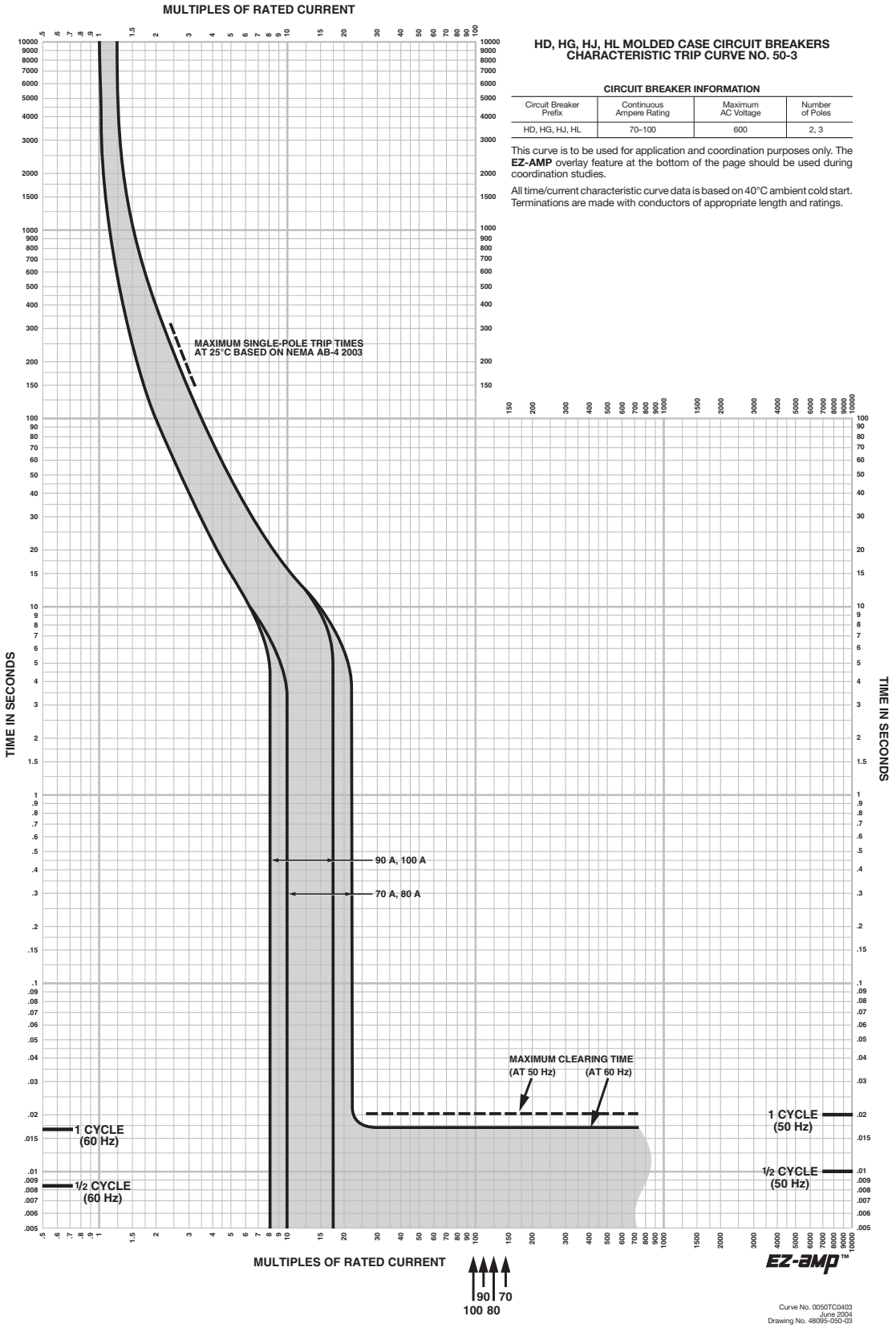


Figure 42: 110-150 A — HD, HG, HJ, and HL

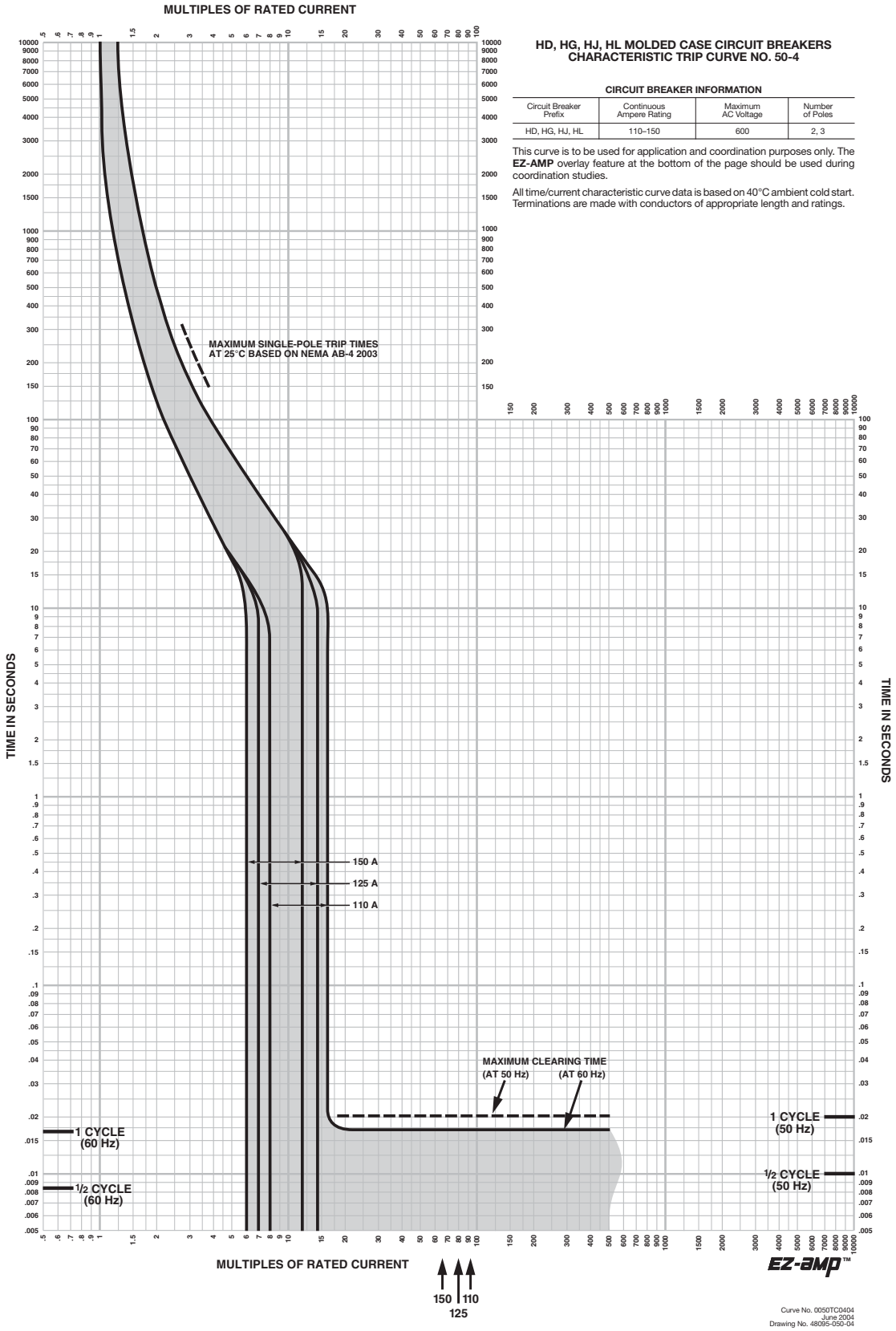


Figure 43: 150-250 A — JD, JG, JJ, and JL

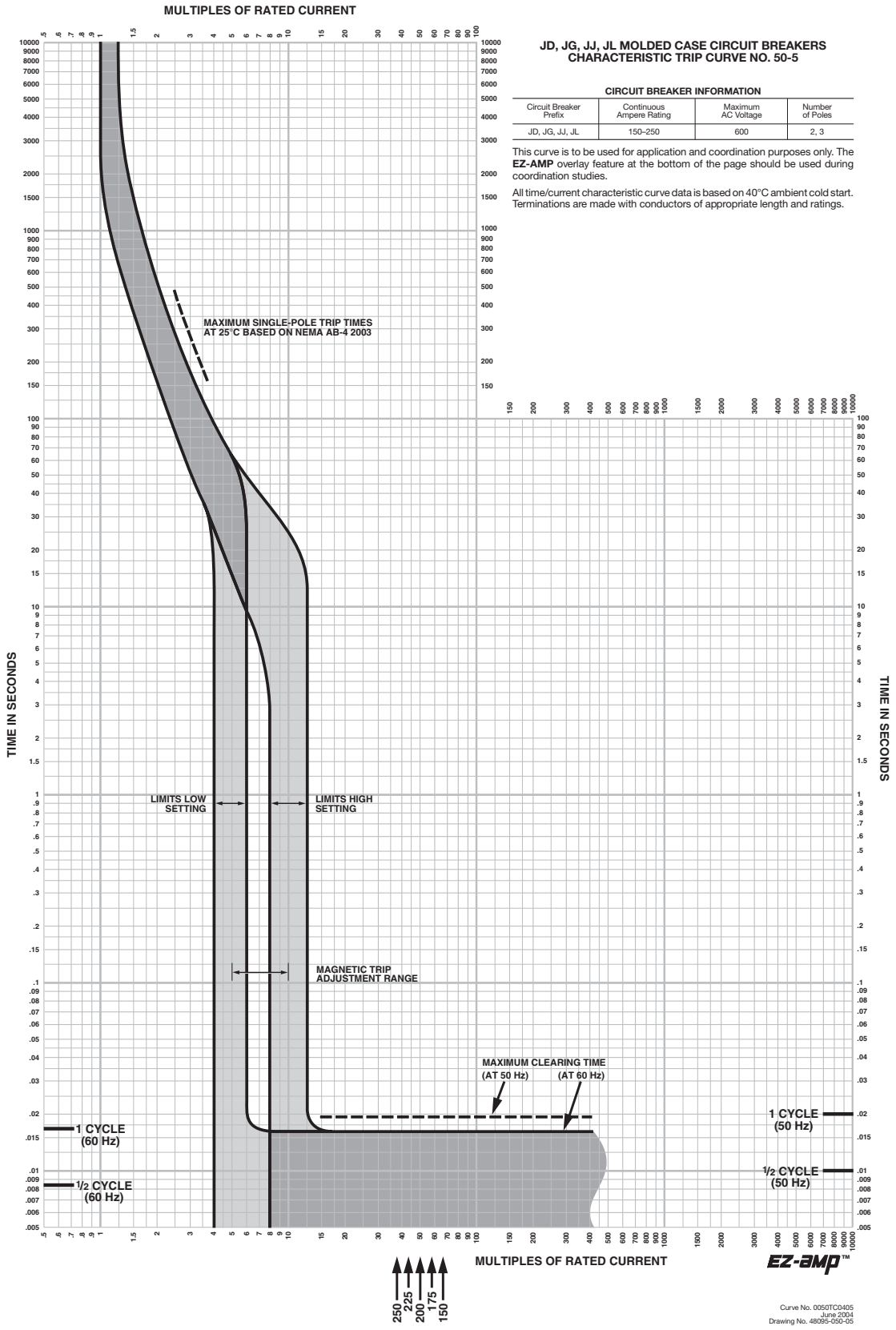
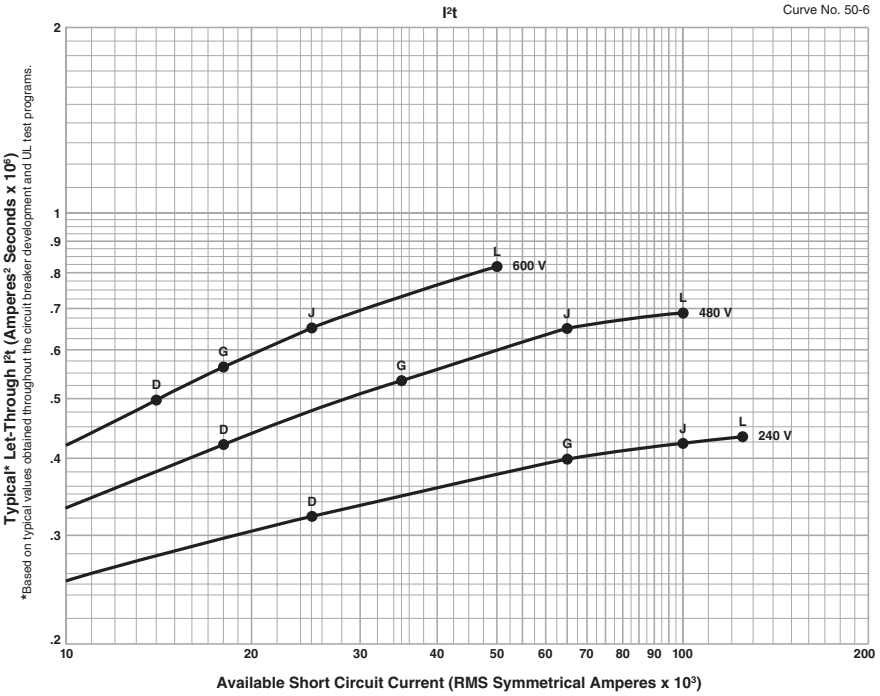


Figure 44: H-Frame 150 A (HD, HG, HJ, and HL)

Curve No. 50-6 Let-Through I^2t and 50-7 Peak Let-Through Current I_p



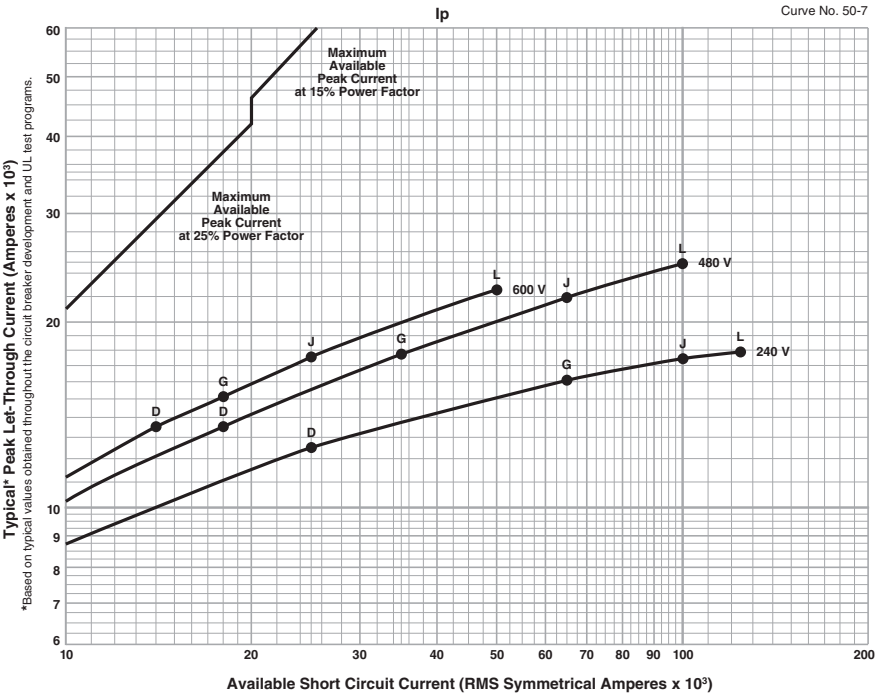
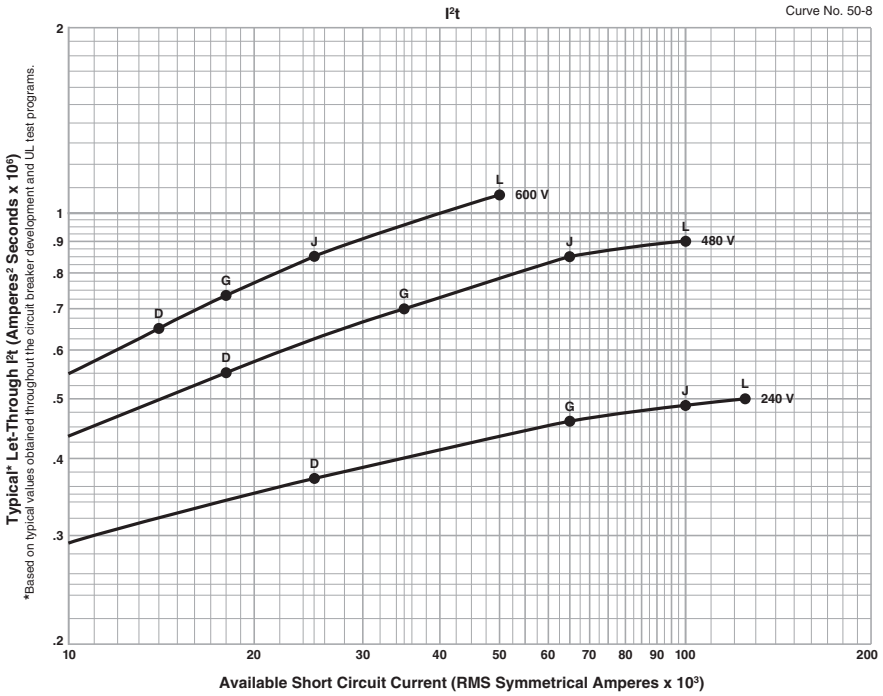


Figure 45: J-Frame 250 A (JD, JG, JJ, and JL)

Curve No. 50-8 Let-Through I^2t and 50-9 Peak Let-Through Current I_p



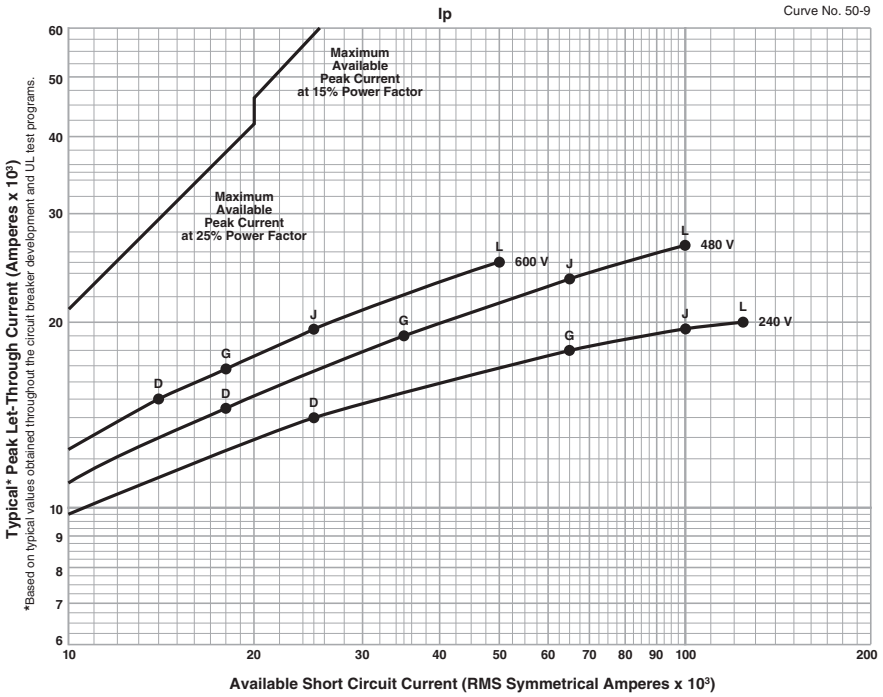
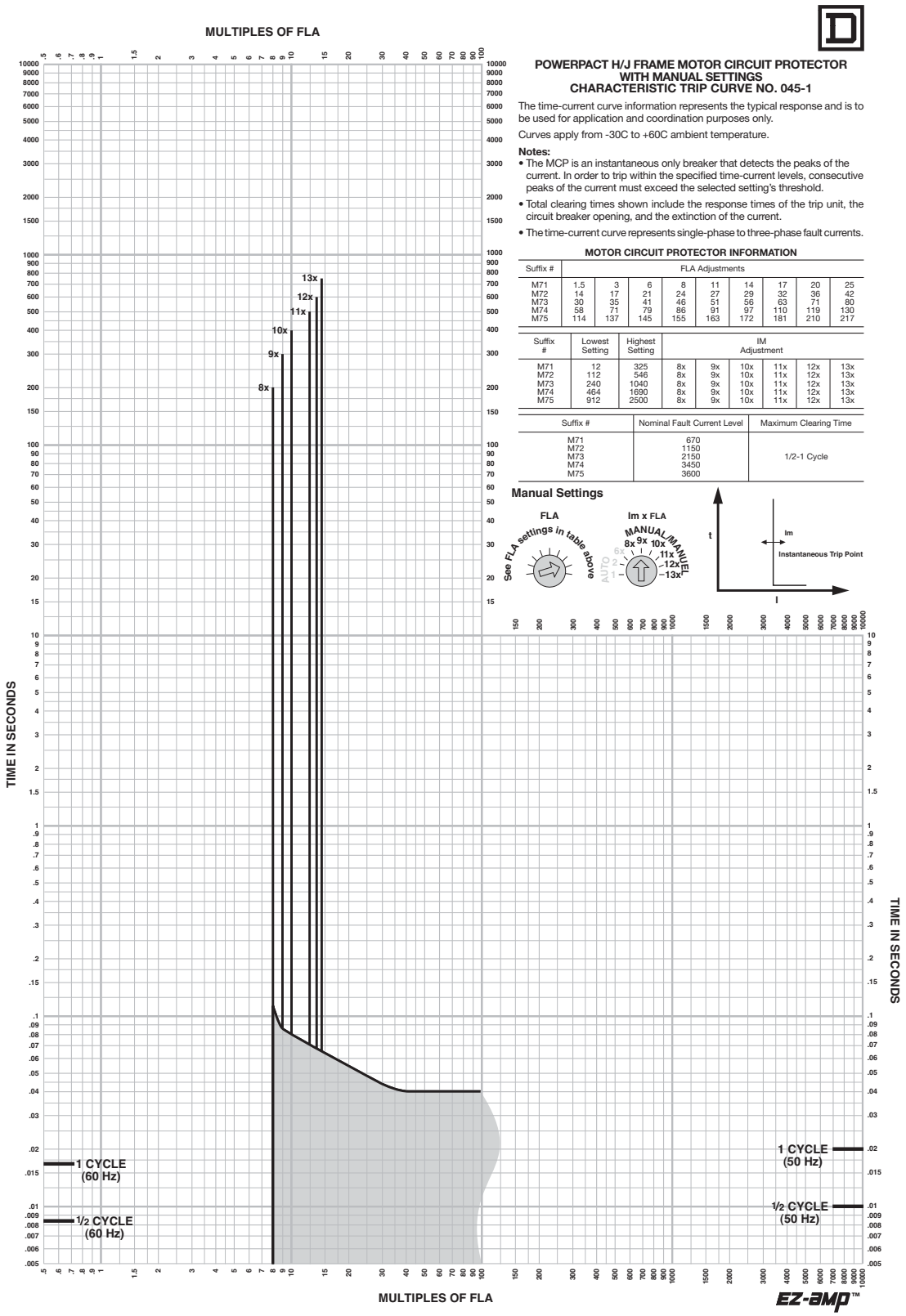


Figure 46: H- and J-Frame Motor Circuit Protector



POWERPACT H/J FRAME MOTOR CIRCUIT PROTECTOR WITH MANUAL SETTINGS CHARACTERISTIC TRIP CURVE NO. 045-1

The time-current curve information represents the typical response and is to be used for application and coordination purposes only.

Curves apply from -30C to +60C ambient temperature.

Notes:

- The MCP is an instantaneous only breaker that detects the peaks of the current. In order to trip within the specified time-current levels, consecutive peaks of the current must exceed the selected setting's threshold.
- Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
- The time-current curve represents single-phase to three-phase fault currents.

MOTOR CIRCUIT PROTECTOR INFORMATION

Suffix #	FLA Adjustments								
M71	1.5	3	6	8	11	14	17	20	25
M72	14	17	21	24	27	29	32	36	42
M73	30	35	41	46	51	56	63	71	80
M74	58	71	79	86	91	97	110	119	130
M75	114	137	145	155	163	172	181	210	217

Suffix #	Lowest Setting	Highest Setting	IM Adjustment					
M71	12	325	8x	9x	10x	11x	12x	13x
M72	112	546	8x	9x	10x	11x	12x	13x
M73	240	1040	8x	9x	10x	11x	12x	13x
M74	464	1690	8x	9x	10x	11x	12x	13x
M75	912	2500	8x	9x	10x	11x	12x	13x

Suffix #	Nominal Fault Current Level	Maximum Clearing Time
M71	670	1/2-1 Cycle
M72	1150	
M73	2150	
M74	3450	
M75	3600	

Manual Settings

FLA — See FLA settings in table above

Im x FLA — MANUAL/MANUEL 8x 9x 10x 11x 12x 13x; AUTO 1 2 6

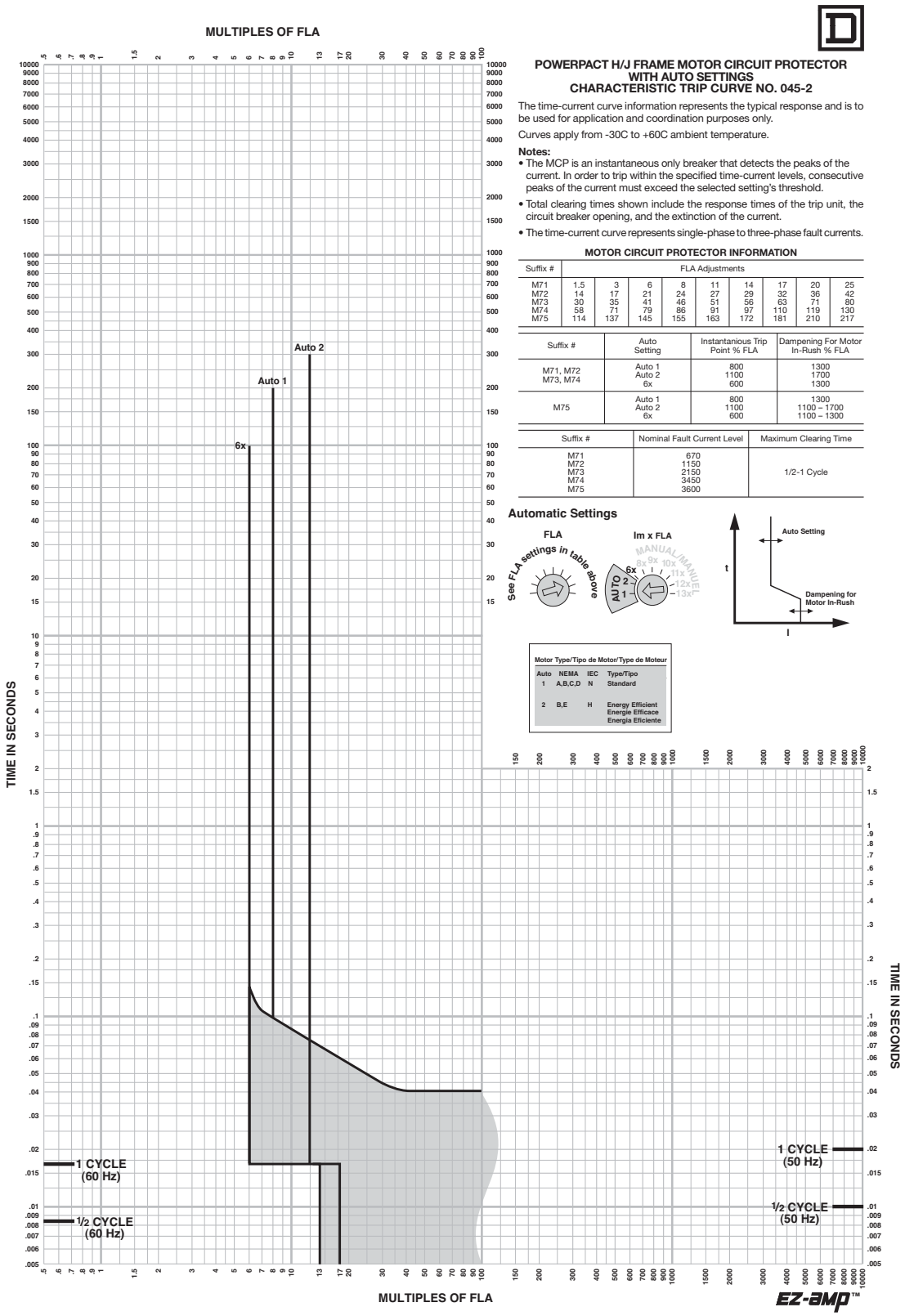
t — Im — Instantaneous Trip Point — I

SQUARE D®

Curve No. 0045TC0601
August 2006
Drawing No. 48095-045-01

by Schneider Electric

Figure 47: H- and J-Frame Motor Circuit Protector



POWERPACT H/J FRAME MOTOR CIRCUIT PROTECTOR WITH AUTO SETTINGS CHARACTERISTIC TRIP CURVE NO. 045-2

The time-current curve information represents the typical response and is to be used for application and coordination purposes only.

Curves apply from -30C to +60C ambient temperature.

Notes:

- The MCP is an instantaneous only breaker that detects the peaks of the current. In order to trip within the specified time-current levels, consecutive peaks of the current must exceed the selected setting's threshold.
- Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
- The time-current curve represents single-phase to three-phase fault currents.

MOTOR CIRCUIT PROTECTOR INFORMATION

Suffix #	FLA Adjustments								
M71	1.5	3	6	8	11	14	17	20	25
M72	14	17	21	24	27	29	32	36	42
M73	30	35	41	46	51	56	63	71	80
M74	58	71	79	86	91	97	110	119	130
M75	114	137	145	155	163	172	181	210	217

Suffix #	Auto Setting	Instantanious Trip Point % FLA	Dampening For Motor In-Rush % FLA
M71, M72 M73, M74	Auto 1 Auto 2 6x	800 1100 600	1300 1700 1300
M75	Auto 1 Auto 2 6x	800 1100 600	1300 1100 – 1700 1100 – 1300

Suffix #	Nominal Fault Current Level	Maximum Clearing Time
M71 M72 M73 M74 M75	670 1150 2150 3450 3600	1/2-1 Cycle

Automatic Settings

Motor Type/Tipo de Motor/Type de Moteur			
Auto	NEMA	IEC	Type/Tipo
1	A,B,C,D	N	Standard
2	B,E	H	Energy Efficient Energie Efficace Energia Eficiente

SQUARE D®

Curve No. 0045TC0602
August 2006
Drawing No. 48095-045-02

Figure 48: H-Frame Current-Limiting Circuit Breaker

H 150 A FRAME AT 240, 480 AND 600 V, 3Ø
HJ & HL 15-150 A

CURVE NO. 50-10 PEAK LET-THROUGH CURRENT Ip

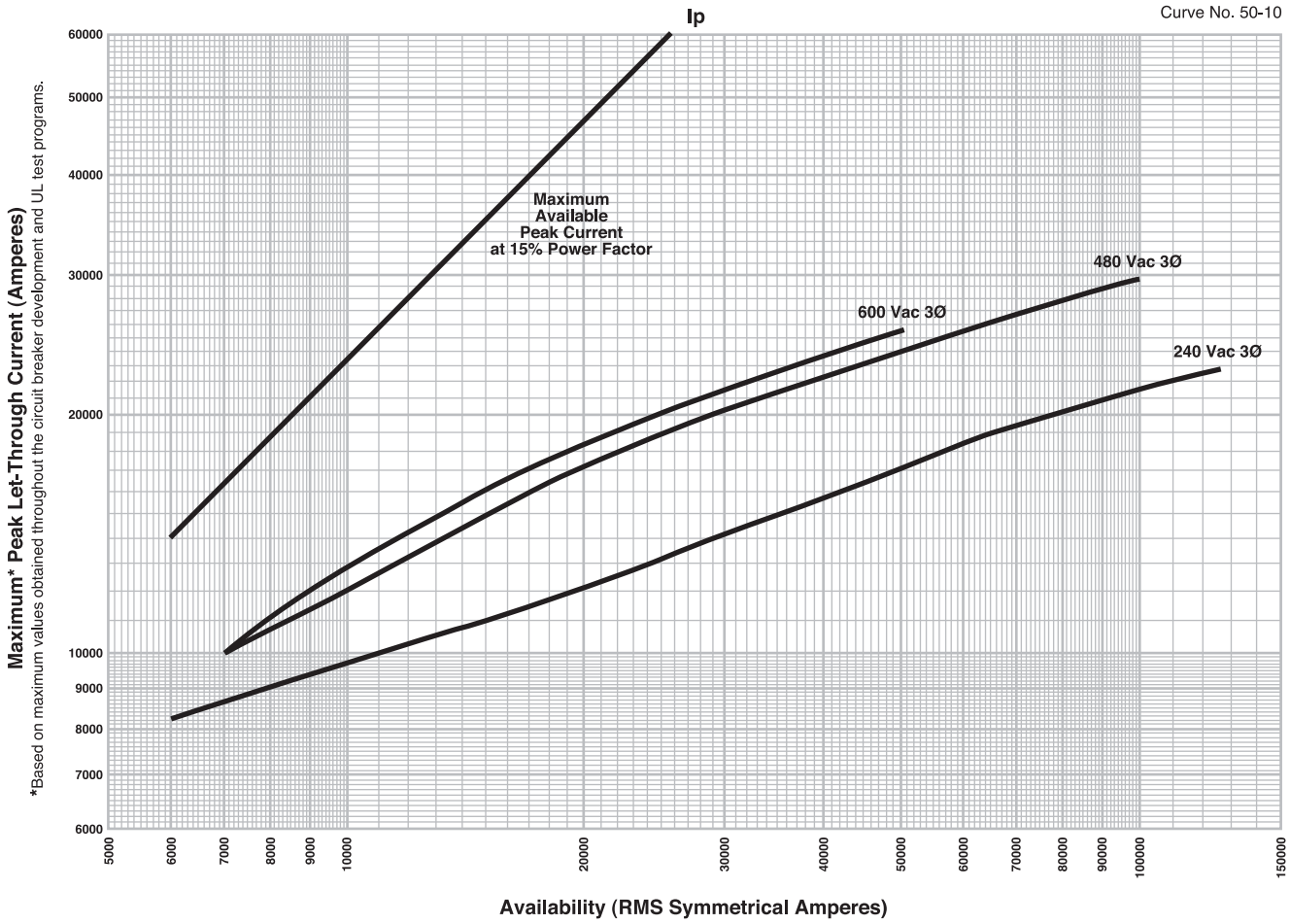


Figure 49: H-Frame Current-Limiting Circuit Breaker

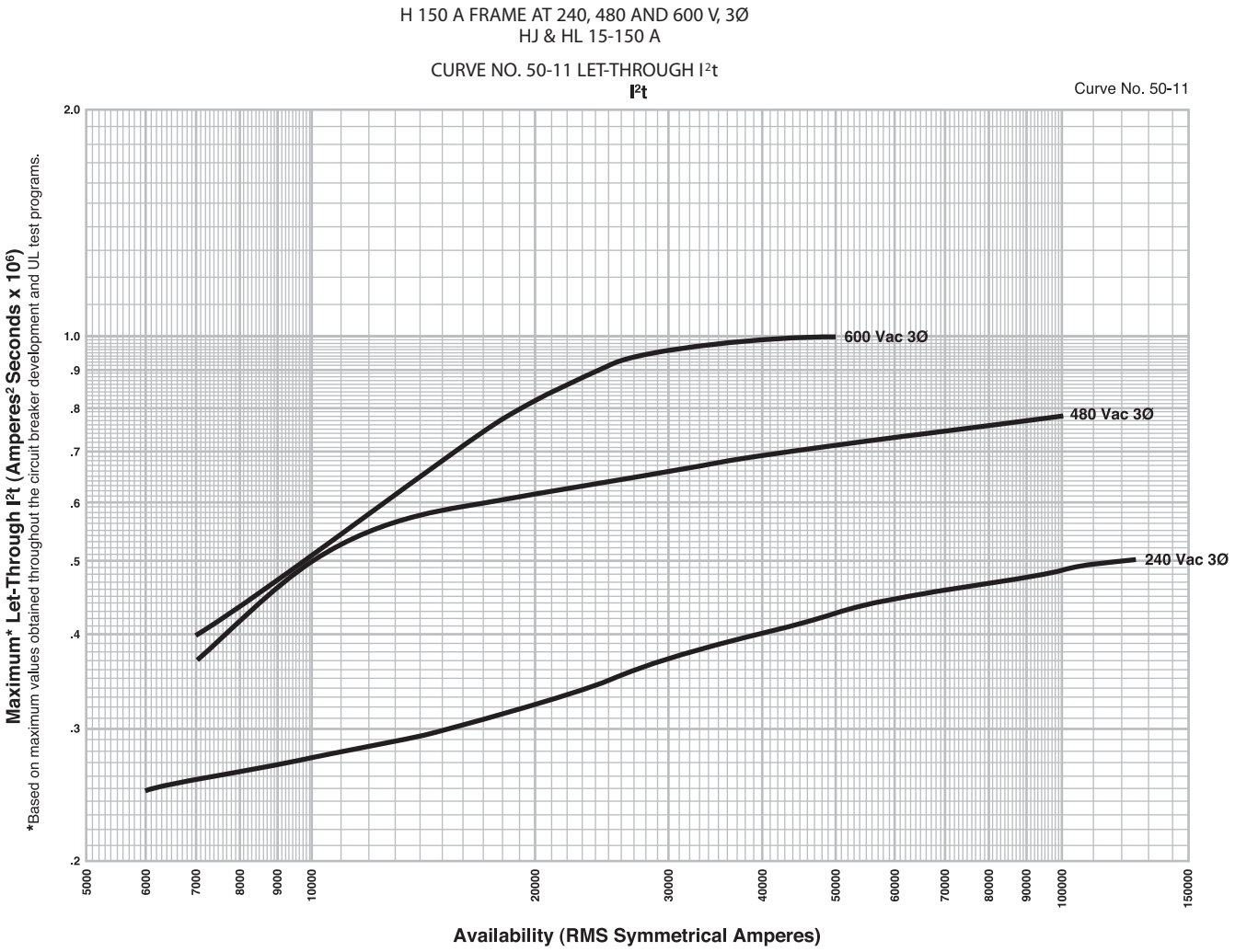


Figure 50: J-Frame Current -Limiting Circuit Breaker

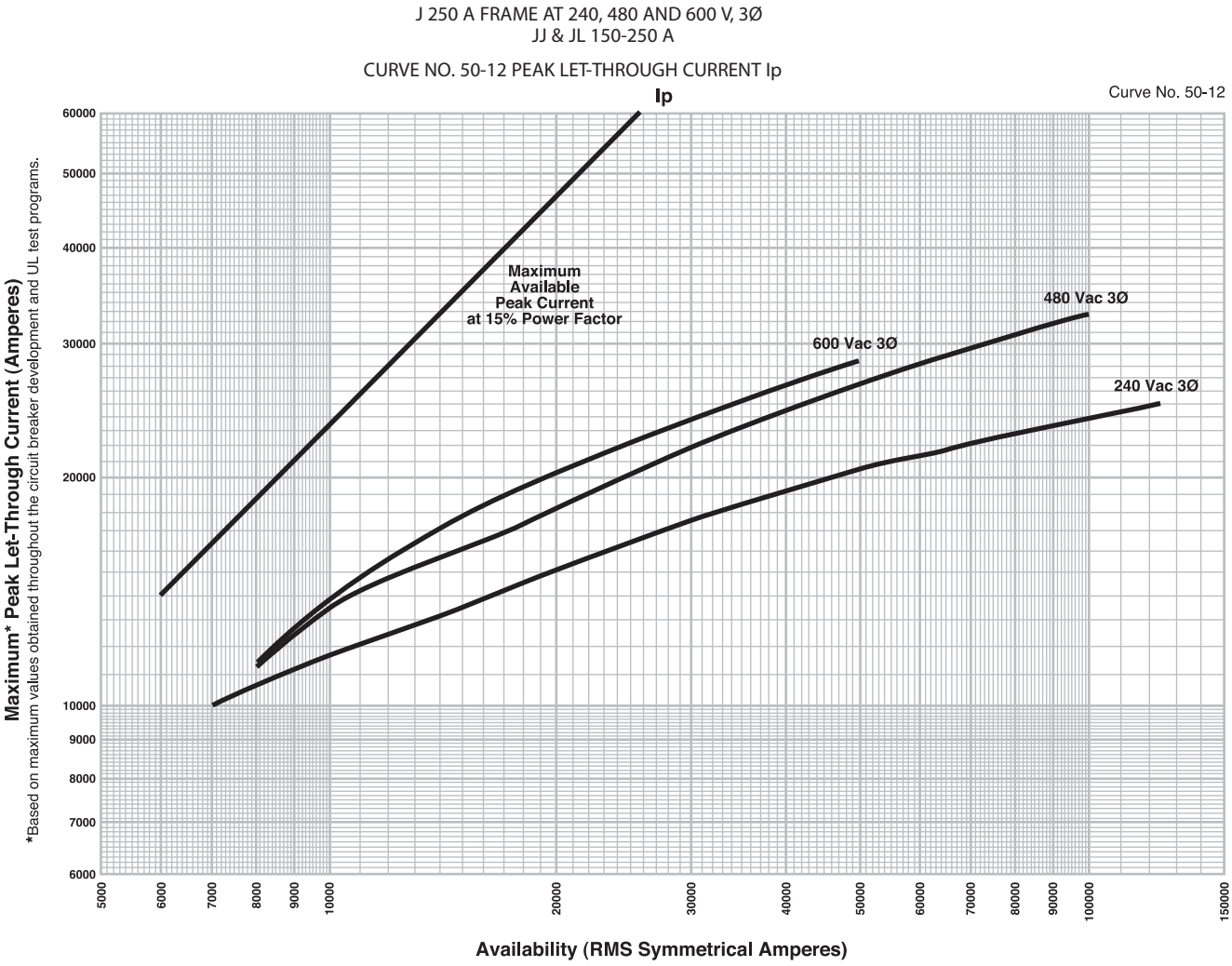


Figure 51: J-Frame Current-Limiting Circuit Breaker

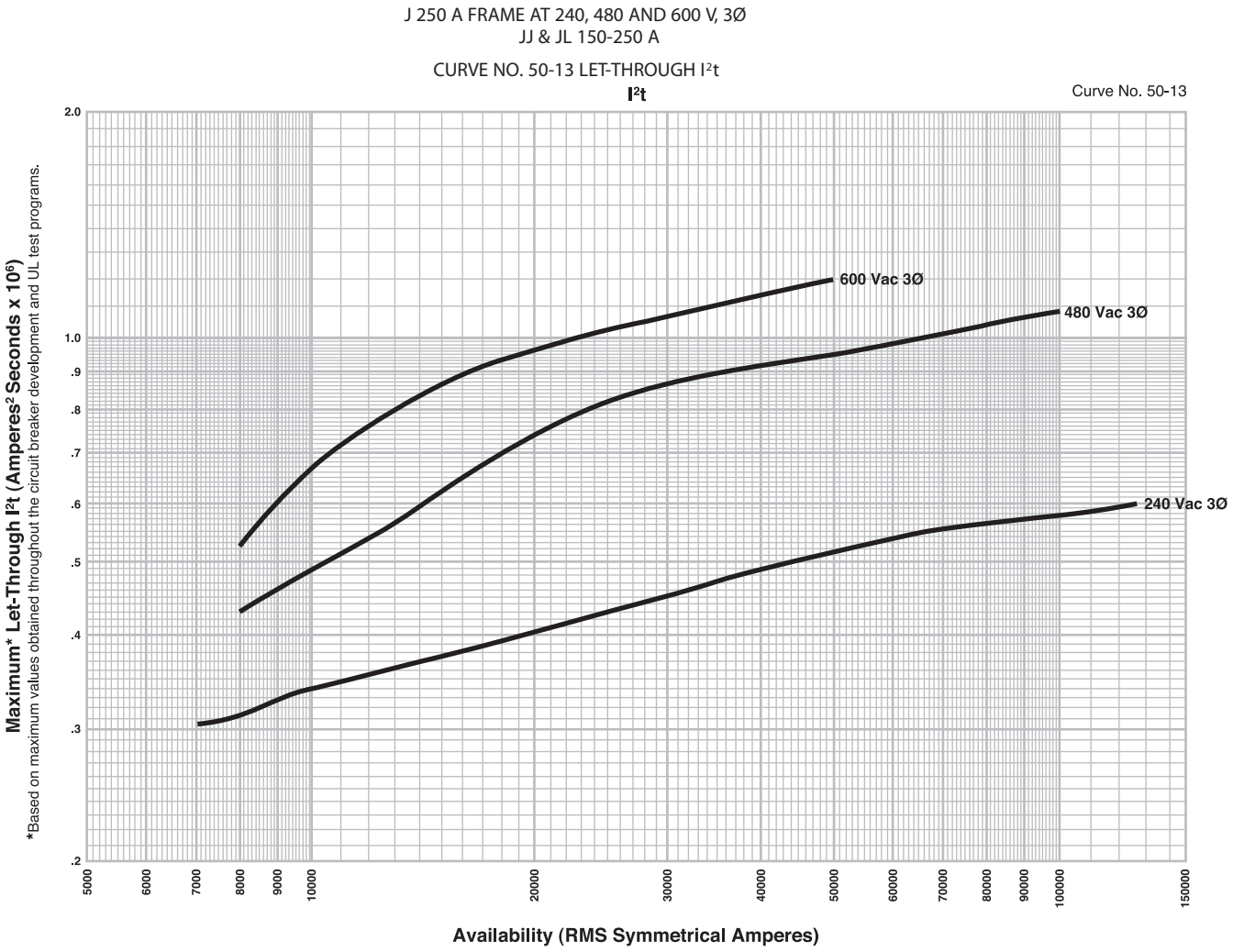


Figure 52: Ground Fault Module GFM150HD Trip Curve

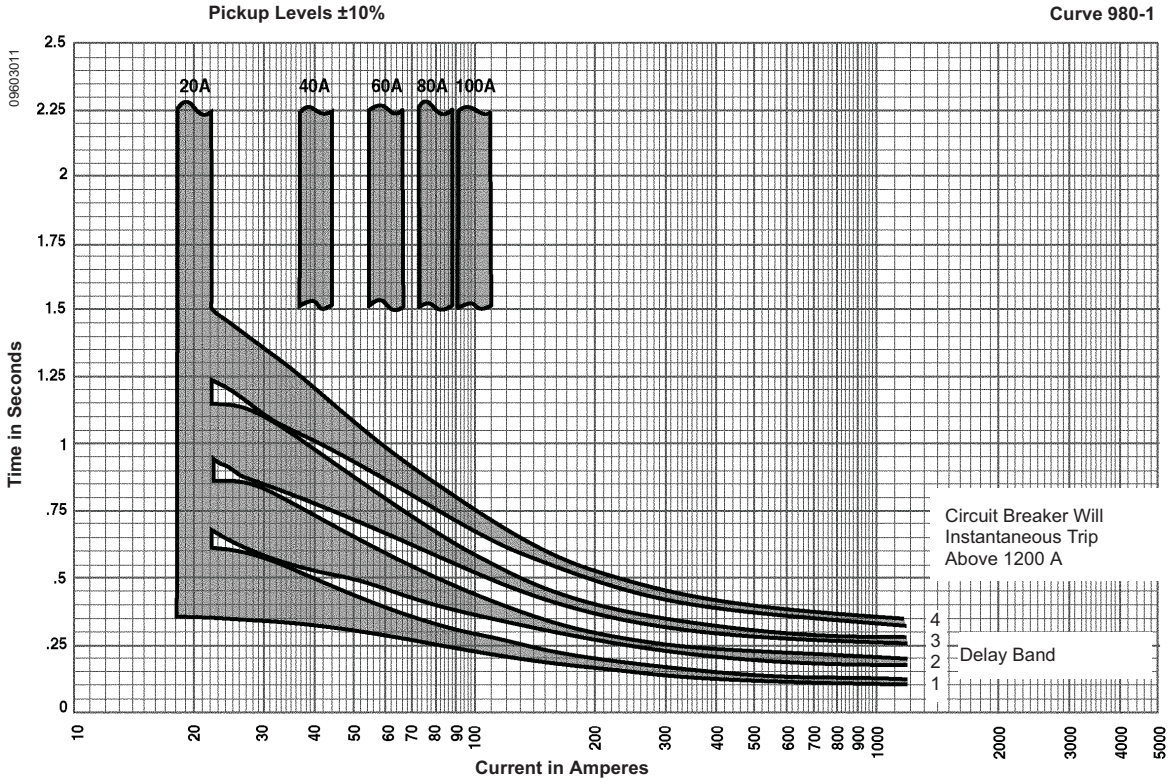


Figure 53: Ground Fault Module GFM250JD Trip Curve

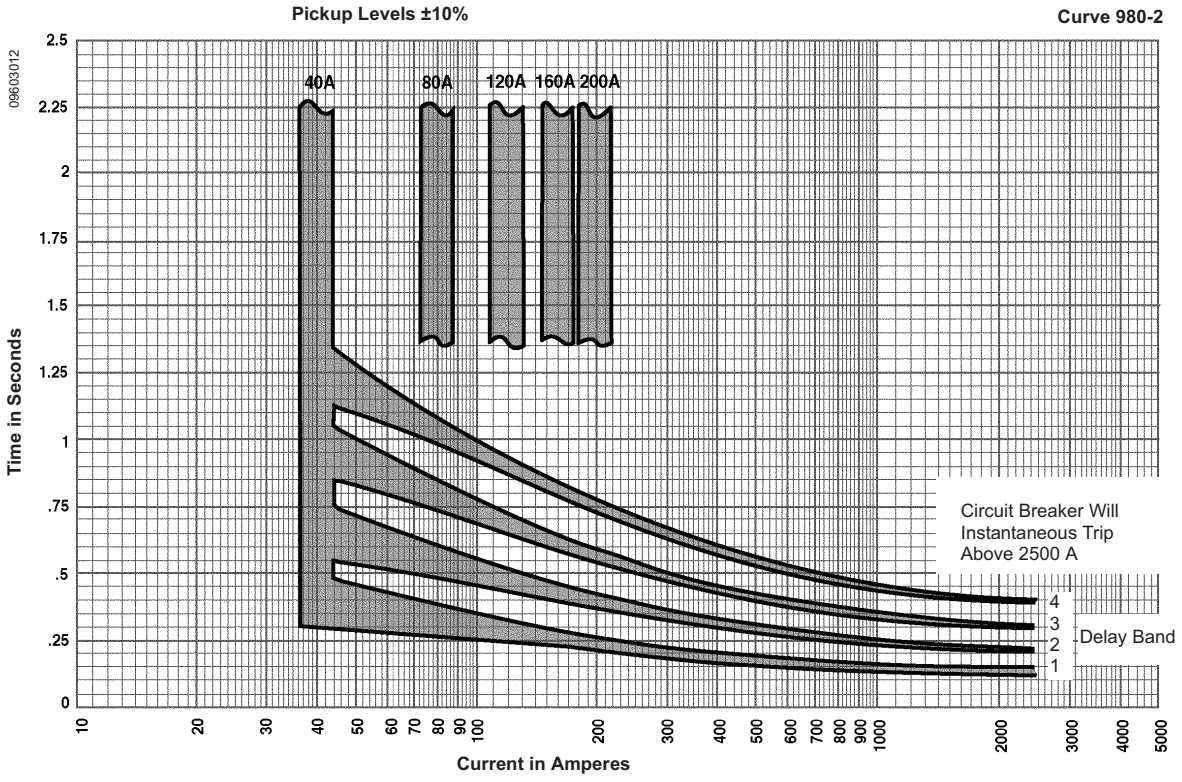
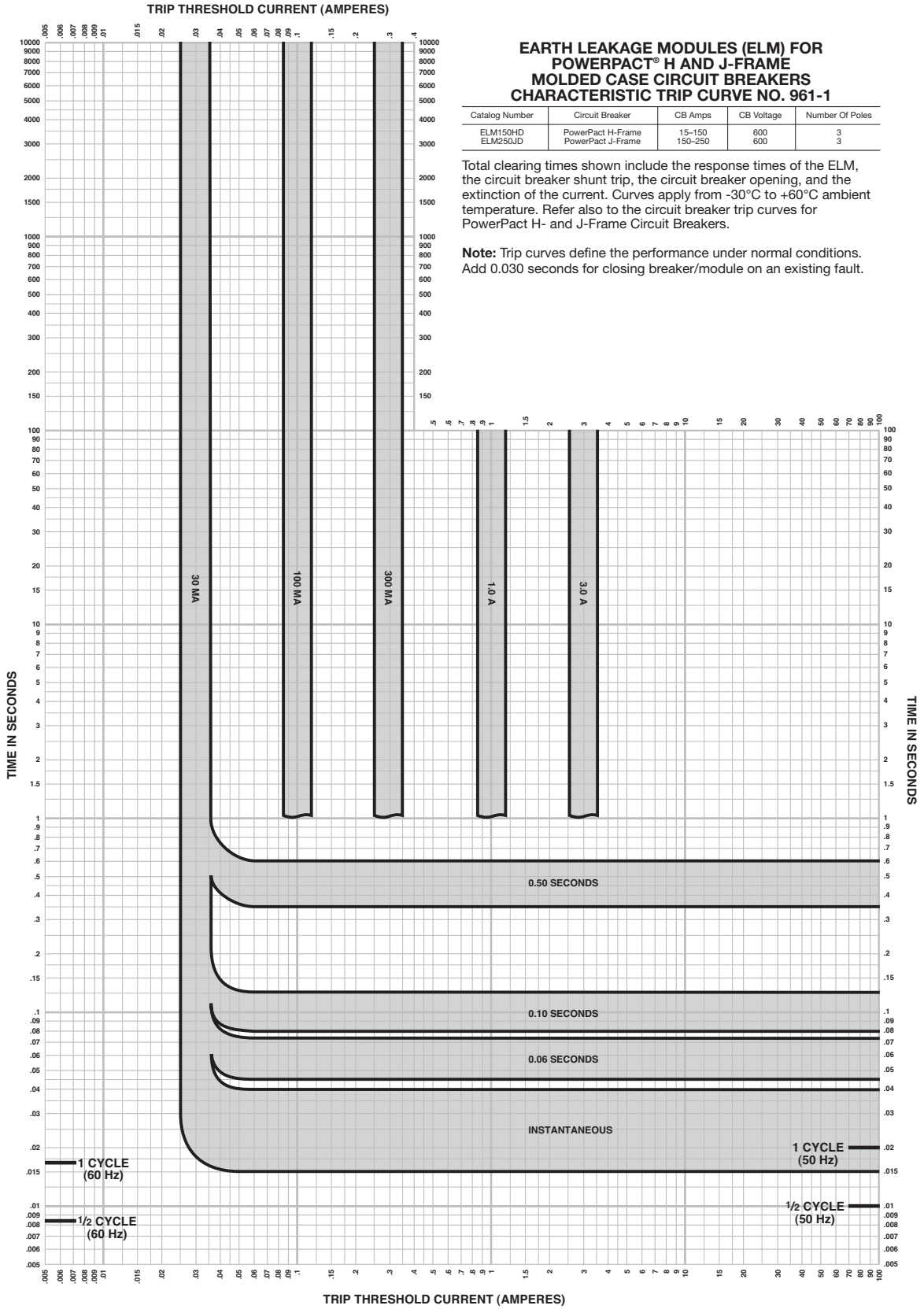


Figure 54: Earth Leakage Module Trip Curve



EARTH LEAKAGE MODULES (ELM) FOR POWERPACT® H AND J-FRAME MOLDED CASE CIRCUIT BREAKERS CHARACTERISTIC TRIP CURVE NO. 961-1

Catalog Number	Circuit Breaker	CB Amps	CB Voltage	Number Of Poles
ELM150HD ELM250JD	PowerPact H-Frame PowerPact J-Frame	15–150 150–250	600 600	3 3

Total clearing times shown include the response times of the ELM, the circuit breaker shunt trip, the circuit breaker opening, and the extinction of the current. Curves apply from -30°C to +60°C ambient temperature. Refer also to the circuit breaker trip curves for PowerPact H- and J-Frame Circuit Breakers.

Note: Trip curves define the performance under normal conditions. Add 0.030 seconds for closing breaker/module on an existing fault.

Section 7—MCP Instantaneous Trip Points

Table 64: M71 Instantaneous Trip Points

		Automatic Setting (A)		Manual Adjustment (A)						
	I_m Setting	1	2	6x	8x	9x	10x	11x	12x	13x
Motor Type	NEMA	A, B, C, D	B, E	(FLA) x (I_m)						
	IEC	N	H							
FLA	1.5	12	16.5	9	12	13.5	15	16.5	18	19.5
	3	24	33	18	24	27	30	33	36	39
	6	48	66	36	48	54	60	66	72	78
	8	64	88	48	64	72	80	88	96	104
	11	88	121	66	88	99	110	121	132	143
	14	112	154	84	112	126	140	154	168	182
	17	136	187	102	136	153	170	187	204	221
	20	160	220	120	160	180	200	220	240	260
	25	200	275	150	200	225	250	275	300	325
Dampening for motor in-rush (% FLA)		1300%	1700%	1300%	—					

Table 65: M72 Instantaneous Trip Points

		Automatic Setting (A)[1]		Manual Adjustment (A)[1]						
	I_m Setting	1	2	6x	8x	9x	10x	11x	12x	13x
Motor Type	NEMA	A, B, C, D	B, E	(FLA) x (I_m)						
	IEC	N	H							
FLA	14	112	154	84	112	126	140	154	168	182
	17	136	187	102	136	153	170	187	204	221
	21	168	231	126	168	189	210	231	252	273
	24	192	264	144	192	216	240	264	288	312
	27	216	297	162	216	243	270	297	324	351
	29	232	319	174	232	261	290	319	348	377
	32	256	352	192	256	288	320	352	384	416
	36	288	396	216	288	324	360	396	432	468
	42	336	462	252	336	378	420	462	504	546
Dampening for motor in-rush (% FLA)		1300%	1700%	1300%	—					

[1] ± 5% of nominal amperage shown above

Table 66: M73 Instantaneous Trip Points

		Automatic Setting (A)[1]		Manual Adjustment (A)[1]						
	I_m Setting	1	2	6x	8x	9x	10x	11x	12x	13x
Motor Type	NEMA	A, B, C, D	B, E	(FLA) x (I_m)						
	IEC	N	H							
FLA	30	240	330	180	240	270	300	330	360	390
	35	280	385	210	280	315	350	385	420	455
	41	328	451	246	328	369	410	451	492	533
	46	368	506	276	368	414	460	506	552	598
	51	408	561	306	408	459	510	561	612	663
	56	448	616	336	448	504	560	616	672	728
	63	504	693	378	504	567	630	693	756	819
	71	568	781	426	568	639	710	781	852	923
	80	640	880	480	640	720	800	880	960	1040
Dampening for motor in-rush (% FLA)		1300%	1700%	1300%	—					

1 ± 5% of nominal amperage shown above

Table 67: M74 Instantaneous Trip Points

		Automatic Setting (A)[1]		Manual Adjustment (A)[1]						
	I_m Setting	1	2	6x	8x	9x	10x	11x	12x	13x
Motor Type	NEMA	A, B, C, D	B, E	(FLA) x (I_m)						
	IEC	N	H							
FLA	58	464	638	348	464	522	580	638	696	754
	71	568	781	426	568	639	710	781	852	923
	79	632	869	474	632	711	790	869	948	1027
	86	688	946	516	688	774	860	946	1032	1118
	91	728	1001	546	728	819	910	1001	1092	1183
	97	776	1067	582	776	873	970	1067	1164	1261
	110	880	1210	660	880	990	1100	1210	1320	1430
	119	952	1309	714	952	1071	1190	1309	1428	1547
	130	1040	1430	780	1040	1170	1300	1430	1560	1690
Dampening for motor in-rush (% FLA)		1300%	1700%	1300%	—					

1 ± 5% of nominal amperage shown above

Table 68: M75 Instantaneous Trip Points

		Automatic Setting (A)[1]		Manual Adjustment (A)[1]						
	I_m Setting	1	2	6x	8x	9x	10x	11x	12x	13x
Motor Type	NEMA	A, B, C, D	B, E	(FLA) x (I_m)						
	IEC	N	H							
FLA	114	912	1254	684	912	1026	1140	1254	1368	1482
	137	1096	1507	822	1096	1233	1370	1507	1644	1781
	145	1160	1595	870	1160	1305	1450	1595	1740	1885
	155	1240	1705	930	1240	1395	1550	1705	1860	2015
	163	1304	1793	978	1304	1467	1630	1793	1956	2119
	172	1376	1892	1032	1376	1548	1720	1892	2064	2236
	181	1448	1991	1086	1448	1629	1810	1991	2172	2353
	210	1680	2310	1260	1680	1890	2100	2310	2500 [2]	2500 [2]
	217	1736	2387	1302	1736	1953	2170	2387	2500 [2]	2500 [2]
Dampening for motor in-rush (% FLA)		1100–1300%	1100–1700%	1100–1300%	—					

[1] ± 5% of nominal amperage shown above

[2] 2500 A maximum instantaneous trip point

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Catalog Numbers

Schneider Electric USA, Inc.
3700 Sixth St. SW
Cedar Rapids, IA 52404 USA
1-888-Square D
1-888-778-2733
www.schneider-electric.us

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