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Application of tap rules to molded case breaker terminals

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Abstract

Often, a molded case circuit breaker is employed as the main overcurrent protective device (OCPD), as well as the main disconnecting means, for an industrial control panel, or as a main or feeder application. If branch circuits must emanate from the main OCPD, means must be available to fan out from its terminals. This paper describes methods to achieve multiple branches from circuit breakers using standard circuit breaker terminals.

Purpose

This paper is intended to serve as an application paper for the use of circuit breaker terminals to tap branch circuits or feeder circuits from higher-ampacity circuit breakers. While the examples are accurate, they are not the only configurations available. Circuit breaker terminal tables should be consulted for other terminals, wire sizes, and quantities of wire.

Notes

1. Wire-size references are for copper wire only.
2. Conductor ampacities are from Table 310.16 in the National Electrical Code® and Table 28.1 in UL® 508A.
3. Ampacities used are from the 75°C temperature column in the wire tables. Though conductors with higher-temperature insulation may be used, the ampacities may not exceed those in the 75°C column.
4. Unless otherwise stated, cable lengths are considered to be 10 feet or less.

Tap rules for National Electrical Code (NEC) and UL 508A feeder circuits

Prior to reading the following discussion, it is wise to review Application Paper AP0120004E, *Application of Multi-Wire Terminals for Molded Case Circuit Breakers*. The Codes and Standards Requirements section outlines the rules for tapping feeder circuits.

In summary, a conductor rated 10% of the ampacity of a feeder conductor may be tapped from the feeder provided it is not greater than 10 feet in length and it terminates in an appropriately sized overcurrent protective device. Also, a conductor rated one-third the ampacity of a feeder conductor may be tapped from the feeder provided its length is not greater than 25 feet and it terminates in an appropriately sized overcurrent protective device.

Addressing the need for branch and feeder circuit taps

While power distribution terminal blocks may be used to distribute branch circuits, an alternative is to distribute branch circuits directly from the breaker's terminals if the terminals have provisions for more than one cable. Terminals for larger breakers may contain one or more conductor openings. The feature is normally used for paralleling cables to feed the full ampacity of the breaker. The multiple terminal openings on the load side of the breaker may also be employed for deriving lower-current branch or feeder circuits from a breaker in accordance with the NEC and UL 508A tap rules.

Short-circuit interrupting ratings

Power terminal blocks serve a purpose for distributing circuits within industrial control panels. Their function is to provide a means to tap smaller conductors from a circuit breaker, provided the tapping rules are followed. Conductors equal to the full ampacity of the circuit breaker must be extended to the power terminal block (PTB). Properly sized taps may extend from the PTB to an overcurrent protective device.

Even though the tapping rules are followed, the short-circuit current rating (SCCR) of the circuit may be limited. UL 508A, Table SB 4.1, assigns an SCCR of 10,000 amperes to an unmarked, untested PTB. This may severely limit the SCCR for an industrial control panel. The use of standard, multiple-conductor terminals for circuit breakers can overcome this limitation. Listed and approved terminals take on the same SCCR as the breaker to which they are connected.

Exclusions

It is important to understand mis-application of the tap rule to avoid design and field errors. **Figure 1** and **Figure 2** illustrate a tap not permitted by the NEC or UL 508A.

Note: The 4/0 cable is a correct cable size based on the tapping rules (minimum 10% of the breaker rating and less than 10 feet in length).

The 4/0 terminates on a PTB. After that, 1 AWG and 10 AWG wires are tapped from the PTB. These latter taps are not allowed.

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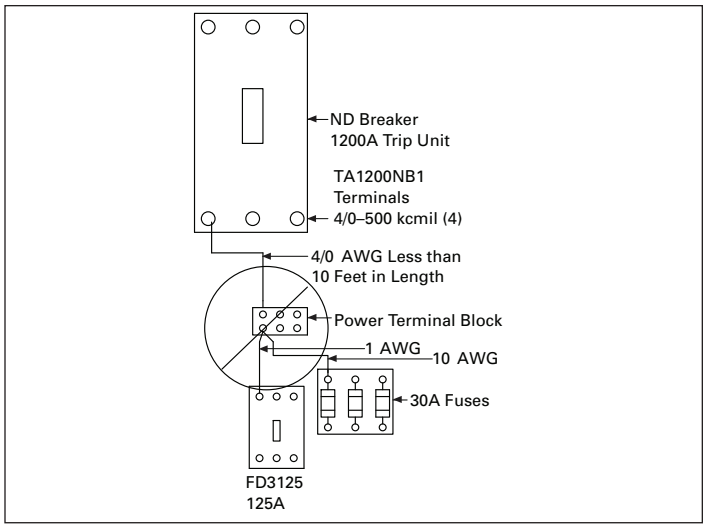

Figure 1. Taps Not Permitted

The 4/0 cable must terminate on a circuit breaker of the correct ampacity, namely 225 amperes or smaller. A tap cannot be made from the 4/0 cable prior to terminating the cable on a properly sized overcurrent protective device.

The argument here regards "tapping a tap." The 4/0 conductor is a tap from the 1200 ampere circuit breaker.

Note: Connecting the conductor to one terminal of a multi-equipped breaker terminal is the same electrically as if four 350 kcmil conductors were extended from the circuit breaker and the 4/0 cable tapped from those.

The 4/0 cable is required to terminate at a 225 ampere or smaller circuit breaker in order for the wire to be considered as being protected. In the example, instead, the 4/0 cable is further tapped with a conductor as small as 10 AWG. Though the 1 AWG conductor can be tapped from the 1200 ampere circuit breaker, the 10 AWG conductor cannot. Neither conductor can be tapped from the 1200 ampere circuit breaker through the use of a PTB. In both of these scenarios, 1 AWG and 10 AWG conductors are not considered to be properly protected.

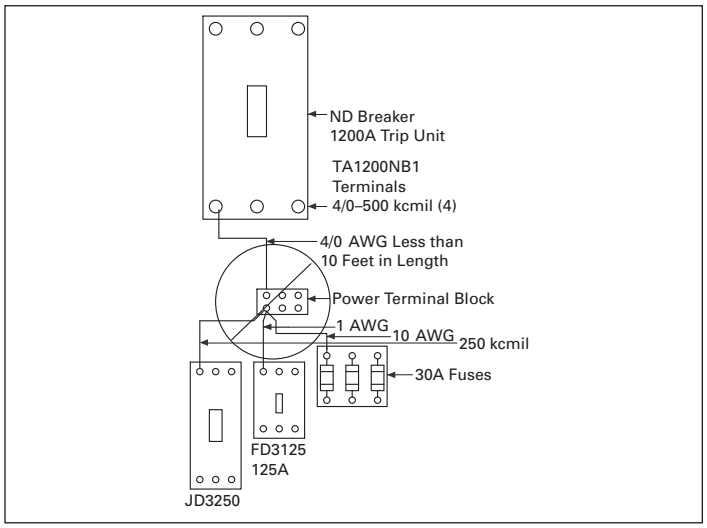

Figure 2. Taps Not Permitted

Figure 2 illustrates the example in **Figure 1** taken to the extreme. In **Figure 2**, one sees that the 4/0 conductor can now be overloaded by the addition of the JD3250 breaker. The total load that may be imposed on the 4/0 conductor can be 405 amperes, causing failure of the 4/0 conductor, while not tripping the 1200 ampere circuit breaker.

Creating branch or feeder circuit taps from circuit breakers using circuit breaker terminals

We now consider branch circuits or feeder circuits derived from larger circuit breakers. Often, an industrial control panel or NEC installation requires a circuit breaker 800 amperes or above to be used as a main device, with lower-ampacity circuits tapped from it. Below are several examples illustrating the correct use of this practice.

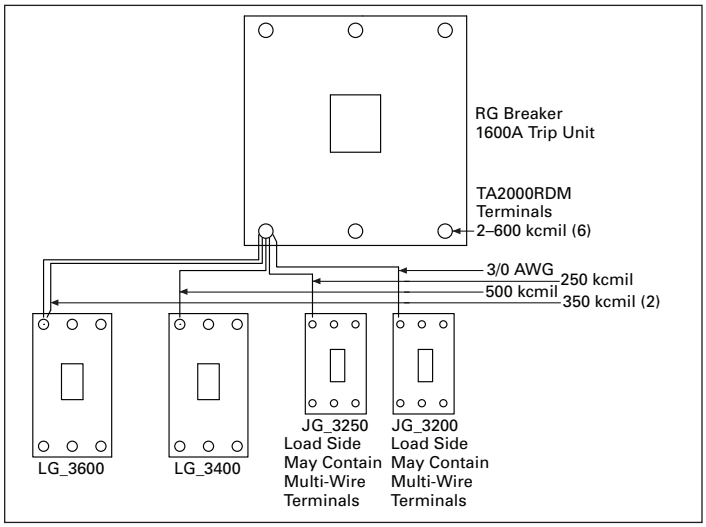

Figure 3. RG Breaker

Figure 3 illustrates an RG frame with 1600 ampere trip unit (higher-ampacity trip units are available). Various breaker sizes are tapped from the RG breaker. While breakers with smaller trip units may be used, cable sizes 2/0 AWG and larger must be used to tap from the RG breaker.

Notes: The terminals shown for the RG are 2000 ampere terminals because provision is available to terminate six cables. Terminals for 1600 amperes could be used, saving some cost, but they allow termination of only four cables.

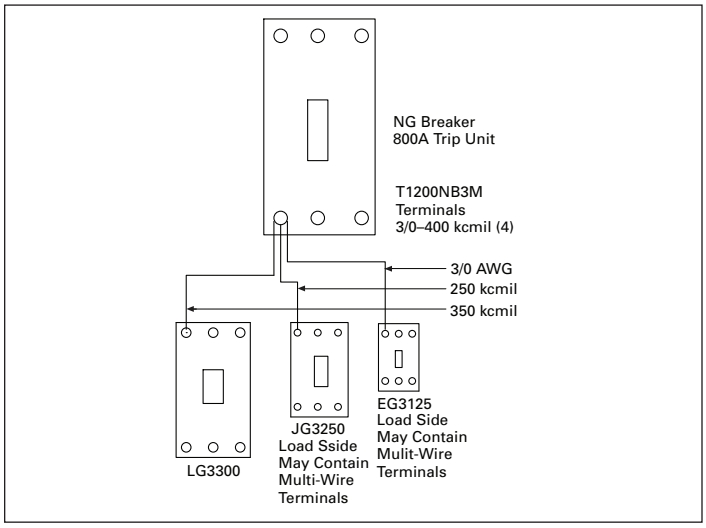

Figure 4. NG Breaker

Figure 4 illustrates an NG breaker with an 800 ampere trip unit. The drawing is intended to depict the range of breakers that may be used. Because the minimum cable size for the NG frame is 3/0, the EG breaker is fed with 3/0 AWG, though the trip unit required may be smaller.

An NG breaker with a trip unit equal to 1200 amperes can be provided. Because the terminals are the same for either trip unit, the same cable-size limitations apply.

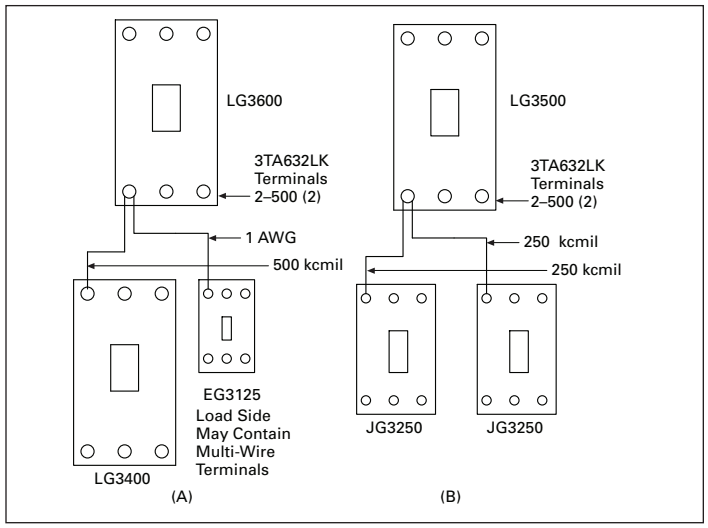

Figure 5. LG Breaker

The LG3600 circuit breaker contains terminals capable of handling two wires, each for sizes 2 AWG to 500 kcmil. **Figure 5** illustrates an LG3400 breaker, as well as an EG3125 tapped from the LG3600. Taps are shown at full-capacity for each breaker. While trip units could be smaller, the smallest cable size that may be used is 2 AWG due to the lower limit of the upstream or main breaker terminals; here,cable-size is the limiting feature. In practice, the LG3600 may contain a lower-ampacity trip unit to avoid the necessity to oversize the incoming cable.

Figure 5 illustrates two JG3250 breakers tapped from the LG3500. In practice, the LG3500 is used to avoid the necessity to oversize the incoming cable.

Additional Examples

Figure 6, **Figure 7**, and **Figure 8** provide additional examples of taps to serve lower-ampacity loads from higher-ampacity circuit breakers, only from a different series of circuit breakers, the Series C®. The rules remain the same as for any other tap.

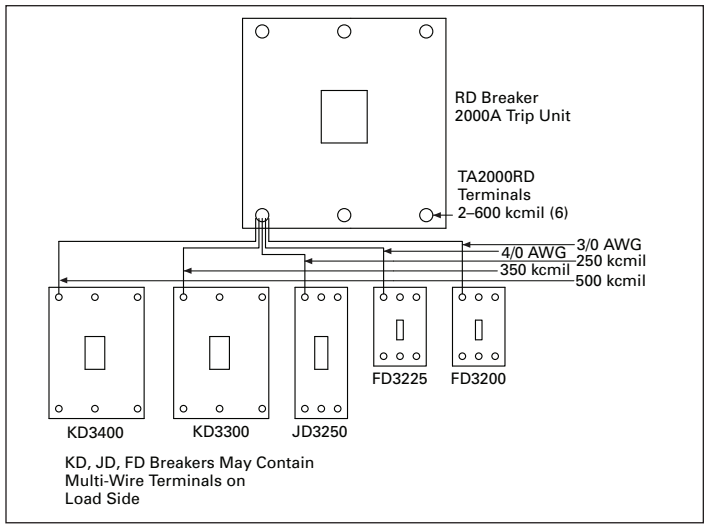

Figure 6. RD Breaker

The RD circuit breaker in **Figure 6** has five smaller breakers tapped from its terminals. One may actually tap six breakers because the terminals for the RD breaker will accept six conductors. The terminal capacity is for 6–2 AWG to 600 kcmil. Consequently, a circuit breaker as large as 450 amperes can be tapped from the RD breaker using a single, 600 kcmil conductor. NEC 240.4 (B) permits sizing to the next higher standard rating shown in 240.6 if the conductor rating is not equal to a standard rating; the maximum OCPD cannot exceed 800 amperes. UL 508A does not offer a similar exemption.

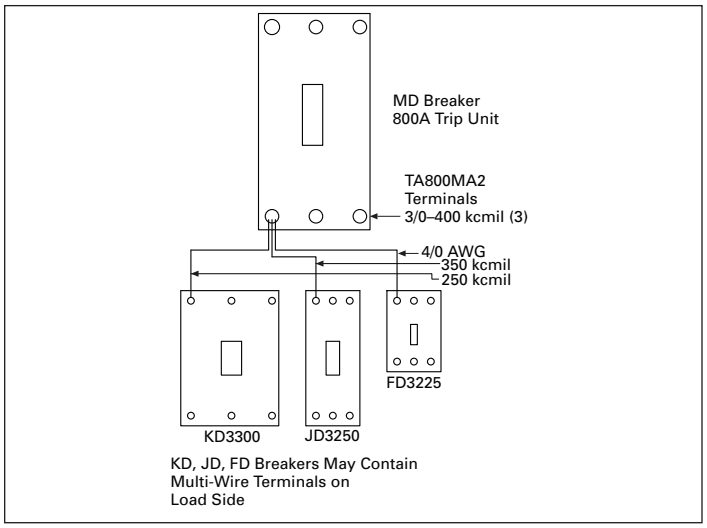

Figure 7. MD Breaker

Taps as small as 80 amperes can be made from the MD breaker in **Figure 7** when an 800 ampere trip unit is used; however, the smallest conductor is limited to 3/0 AWG due to the lower size limit for the terminals. By changing the trip unit to 600 amperes, conductors as small as 1 AWG can be tapped from the breaker.

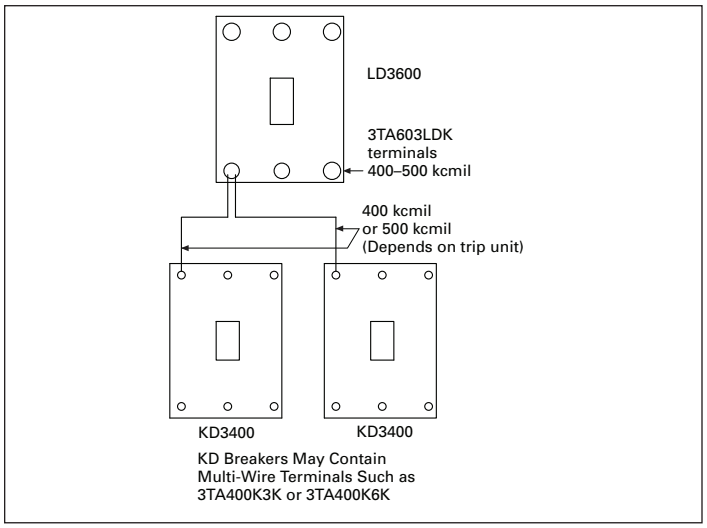

Figure 8. LD Breaker

Figure 8 illustrates an LD breaker used as a main or feeder. As was true in **Figure 6** for the RD breaker, a circuit breaker with a 450 ampere trip unit can be tapped from the LD circuit breaker by using a single, 500 kcmil conductor. UL 508A does not offer a similar exemption.

Summary

Power terminal blocks are often used in UL 508A-listed industrial control panels and NEC installations for tapping circuits. However, economies can be gained, and higher short-circuit ratings achieved, through the use of standard, multiple-conductor terminals on circuit breakers.

Appendices

Table 1. Breaker Terminal Offerings

Breaker Frame	Maximum Breaker Ampacity	Terminal Body Material	Wire Type	AWG Wire Range/Number of Conductors	Metric Wire Range mm²	Number of Terminals Included	Catalog Number	Comments
Series G®								
E-Frame	125	Steel	Cu	#14–3/0 (1)	2.5–95 (1)	3	**3T125EF**	Standard terminal
	125	Aluminum	Cu/Al	#14–1/0 (1)	2.5–50 (1)	3	**3TA125EF**	
	125/160	Aluminum	Cu/Al	#6–3/0 (1)	16–95 (1)	3	**3TA150EF**	160A Frame is not UL Listed
	160	Aluminum	Cu/Al	#3–250 (1)	35–120 (1)	3	**3TA160EFK**	160A Frame is not UL Listed
	160	Aluminum	Cu/Al	#3–250 (1)	35–120 (1)	4	**4TA160EFK**	160A Frame is not UL Listed
J-Frame	250	Aluminum	Cu/Al	4–350 kcmil (1)	25–185 (1)	1	**TA250FJ**	
	250	Stainless steel	Cu	4–350 kcmil (1)	25–185 (1)	1	**T250FJ**	Standard terminal
L-Frame	400	Aluminum	Cu/Al	500–750 kcmil (1)	240–380 (1)	3	**3TA631LK**	Includes three-pole terminal cover
	400	Aluminum	Cu/Al	500–750 kcmil (1)	240–380 (1)	4	**4TA631LK**	Includes four-pole terminal cover
	400	Copper	Cu	500–750 kcmil (1)	240–380 (1)	3	**3T631LK**	Includes three-pole terminal cover
	400	Copper	Cu	500–750 kcmil (1)	240–380 (1)	4	**4T631LK**	Includes four-pole terminal cover
	630	Aluminum	Cu/Al	2–500 kcmil (2)	35–240 (2)	3	**3TA632LK**	Standard terminal. Includes three-pole terminal cover.
	630	Aluminum	Cu/Al	2–500 kcmil (2)	35–240 (2)	4	**4TA632LK**	Standard terminal Includes three-pole terminal cover.
	630	Copper	Cu	2–500 kcmil (2)	35–240 (2)	3	**3T632LK**	Includes three-pole terminal cover
	630	Copper	Cu	2–500 kcmil (2)	35–240 (2)	4	**4T632LK**	
	400	Aluminum	Cu/Al	2–500 (1)	35–240 (1)	1	**TA350LK**	Includes four-pole terminal cover
	400	Copper	Cu	2–500 (1)	35–240 (1)	1	**T350LK**	Standard terminal
N-Frame	1250	Copper	Cu	3/0–400 (4)	95–185 (4)	1	**T1200NB3M**	
R-Frame	1600	Aluminum	Cu	500–1000 (4)	300–500 (4)	1	**TA1600RDM**	
	1600	Copper	Cu/Al	1–600 (4)	50–300 (4)	1	**T1600RDM**	
	2000	Aluminum	Cu	2–600 (6)	35–300 (6)	3	**TA2000RDM**	
Series C								
G-Frame	20	Steel	Cu/Al	#14–10 (1)	2.5–4 (1)	3	—	Standard terminal installed on breaker
	100	Aluminum	Cu/Al	#10–1/0 (1)	4–50 (1)	3	—	Standard terminal installed on breaker
F-Frame	20	Steel	Cu/Al	14–10 (1)	2.5–4 (1)	3	**3T20FB**	Not for use on ED, EDB, EDS, EDH, or EDC breakers
	100	Steel	Cu/Al	14–1/0 (1)	2.5–50 (1)	3	**3T100FB**	
	225	Aluminum	Cu/Al	4–4/0 (1)	25–95 (1)	3	**3TA225FD**	
	50	Aluminum	Cu/Al	14–4 (1)	2.5–25 (1)	3	**3TA50FB**	Not for use on ED, EDB, EDS, EDH, or EDC breakers
	100	Aluminum	Cu/Al	4–1/0 (1)	2.5–50 (1)	3	**3TA100FD**	
	200	Stainless steel	Cu	4–4/0 (1)	25–95 (1)	3	**3T150FB**	
	225	Aluminum	Cu/Al	6–300 kcmil (1)	16–150 (1)	3	**3TA225FDK**	Includes terminal shield kit. Adds 3 inches to breaker height.
J-Frame	250	Aluminum	Cu/Al	4–350 kcmil (1)	25–185 (1)	1	**TA250KB**	
	250	Stainless steel	Cu	4–350 kcmil (1)	25–185 (1)	1	**T250KB**	
K-Frame	225	Aluminum	Cu/Al	3–350 kcmil (1)	35–185 (1)	1	**TA300K**	
	350	Aluminum	Cu/Al	250–500 kcmil (1)	120–240 (1)	1	**TA350K**	
	400	Aluminum	Cu/Al	3/0–250 kcmil (2)	95–120 (1)	2	**2TA400K**	Contains terminal cover
	400	Aluminum	Cu/Al	3/0–250 kcmil (2)	95–120 (1)	3	**3TA400K**	Contains terminal cover
	400	Aluminum	Cu/Al	3/0–250 kcmil (2)	95–120 (1)	4	**4TA400K**	Contains interphase barriers
	225	Copper	Cu	3–350 kcmil (1)	35–185 (1)	1	**T300K**	
	350	Copper	Cu	250–500 kcmil (1)	120–240 (1)	1	**T350K**	
	400	Copper	Cu	3/0–250 kcmil (2)	95–120 (2)	2	**2T400K**	Contains terminal cover
	400	Copper	Cu	3/0–250 kcmil (2)	95–120 (2)	3	**3T400K**	Contains terminal cover
	400	Copper	Cu	3/0–250 kcmil (2)	95–120 (2)	4	**4T400K**	Contains interphase barriers
	400	Aluminum	Cu/Al	2/0–250 kcmil (2) or 2/0–500 kcmil (1)	70–120 (2) or 70–240 (1)	2	**2TA401K**	Contains terminal cover
	400	Aluminum	Cu/Al	2/0–250 kcmil (2) or 2/0–500 kcmil (1)	70–120 (2) or 70–240 (1)	3	**3TA401K**	Contains terminal cover
	400	Aluminum	Cu/Al	2/0–250 kcmil (2) or 2/0–500 kcmil (1)	70–120 (2) or 70–240 (1)	4	**4TA401K**	Contains interphase barriers
	400	Aluminum	Cu/Al	500–750 kcmil (1)	300–400 (1)	2	**2TA402K**	Contains terminal cover
	400	Aluminum	Cu/Al	500–750 kcmil (1)	300–400 (1)	3	**3TA402K**	Contains terminal cover
	400	Aluminum	Cu/Al	500–750 kcmil (1)	300–400 (1)	4	**4TA402K**	Contains interphase barriers

Table 1. Breaker Terminal Offerings (continued)

Breaker Frame	Maximum Breaker Ampacity	Terminal Body Material	Wire Type	AWG Wire Range/ Number of Conductors	Metric Wire Range mm2	Number of Terminals Included	Catalog Number	Comments
Series C (continued)								
L-Frame	400	Copper	Cu	500–750 kcmil (1)	300–400 (1)	2	**2T402K**	Contains terminal cover
	400	Copper	Cu	500–750 kcmil (1)	300–400 (1)	3	**3T402K**	Contains terminal cover
	400	Copper	Cu	500–750 kcmil (1)	300–400 (1)	4	**4T402K**	Contains interphase barriers
	400	Aluminum	Cu/Al	4/0–600 kcmil (1)	120–300 (1)	2	**2TA401LDK**	Contains terminal cover
	400	Aluminum	Cu/Al	4/0–600 kcmil (1)	120–300 (1)	3	**3TA401LDK**	Contains terminal cover
	400	Aluminum	Cu/Al	4/0–600 kcmil (1)	120–300 (1)	4	**4TA401LDK**	Contains terminal cover
	450	Aluminum	Cu/Al	4–4/0 (2)	25–95 (2)	1	**TA450LD**	
	500	Aluminum	Cu/Al	3/0–350 kcmil (2)	95–150 (2)	1	**TA602LD**	
	600	Aluminum	Cu/Al	400–500 kcmil (2)	185–240 (2)	2	**2TA603LDK**	Contains terminal cover
	600	Aluminum	Cu/Al	400–500 kcmil (2)	185–240 (2)	2	**3TA603LDK**	Contains terminal cover
	600	Aluminum	Cu/Al	400–500 kcmil (2)	185–240 (2)	2	**4TA603LDK**	Contains terminal cover
	600	Copper	Cu	250–350 kcmil (2)	120–250 (2)	1	**T602LD**	
M-Frame	600	Aluminum	Cu/Al	1–500 kcmil (2)		1	**TA700MA1**	
	800	Aluminum	Cu/Al	3/0–400 kcmil (3)		1	**TA800MA2**	Standard terminal
	800	Aluminum	Cu/Al	500–750 kcmil (2)		1	**TA801MA**	
	600	Copper	Cu	2/0–500 kcmil (2)		1	**T600MA1**	
	800	Copper	Cu	3/0–300 kcmil (3)		1	**T800MA1**	
N-Frame	700	Aluminum	Cu/Al	1–500 kcmil (2)	50–240 (2)	1	**TA700NB1**	
	1000	Aluminum	Cu/Al	3/0–400 kcmil (3)	95–185 (3)	1	**TA1000NB1**	
	1200	Aluminum	Cu/Al	4/0–500 kcmil (4)	120–240 (4)	1	**TA1200NB1**	
	1200	Aluminum	Cu/Al	500–750 kcmil (3)	300–400 (3)	1	**TA1201NB1**	
	700	Copper	Cu	2/0–500 kcmil (2)	70–240 (2)	1	**T700NB1**	
	1000	Copper	Cu	3/0–500 kcmil (3)	95–240 (3)	1	**T1000NB1**	
	1200	Copper	Cu	3/0–400 kcmil (4)	95–185 (4)	1	**T1200NB3**	
R-Frame	1600	Aluminum	Cu/Al	500–1000 kcmil (4)	300–500 (4)	1	**TA1600RD**	
	1600	Aluminum	Cu	1–600 kcmil (4)	50–300 (4)	1	**T1600RD**	
	2000	Copper	Cu/Al	2–600 kcmil (6)	35–300 (6)	3	**TA2000RD**	

Table 2. Series C Breakers

Frame	Maximum Amperes	Wire per Terminal	Wire Size Range AWG	Kit Catalog Number
G	100	3	14–2	**3TA100G3K**
G	100	6	14–6	**3TA100G6K**
F	225	3	14–2	**3TA150F3K**
F	225	6	14–6	**3TA150F6K**
J	250	3	14–2	**3TA250J3K**
J	250	6	14–6	**3TA250J6K**
K	400	3	12–2/0	**3TA400K3K**
K	400	6	14–2/0	**3TA400K6K**

Table 3. Series G Breakers

Frame	Maximum Amperes	Wire per Terminal	Wire Size Range AWG	Kit Catalog Number
EG	125	3	14–2	**3TA125E3K**
EG	125	6	14–6	**3TA125E6K**
JG	250	3	14–2	**3TA250FJ3**
JG	250	6	14–6	**3TA250FJ6**

Table 4. Breaker SCCR Ratings—Series G

Circuit Breaker Type	Continuous Ampere Rating at 40°C	Number of Poles	Type of Trip	UL Listed Interrupting Ratings (rms Symmetrical Amperes) AC (kV) 240	AC (kV) 480	AC (kV) 600 ①	DC (kV) 125/250 ②
EG-Frame							
EGB	15–125	1	FT-FM, AT-FM	25	—	—	10 ③
EGB	15–125	2, 3, 4	FT-FM, AT-FM	25	18	—	10
EGE	15–125	2, 3, 4	FT-FM, AT-FM	35	25	18	10
EGS	15–125	1	FT-FM, AT-FM	85	—	—	35 ③
EGS	15–125	2, 3, 4	FT-FM, AT-FM	85	35	22	35
EGH	15–125	1	FT-FM, AT-FM	100	—	—	42 ③
EGH	15–126	2, 3, 4	FT-FM, AT-FM	100	65	25	42
EGC	15–125	3, 4	FT-FM, AT-FM	200	100	35	42
JG-Frame							
JGE	20–250	2, 3, 4	FT-AM, AT-AM, electronic	65	25	18	10
JGS	20–250	2, 3, 4	FT-AM, AT-AM, electronic	85	35	18	22
JGH	20–250	2, 3, 4	FT-AM, AT-AM, electronic	100	65	25	22
JGC	20–250	3, 4	FT-AM, AT-AM, electronic	200	100	35	42
JGU	20–250	3, 4	FT-AM, AT-AM, electronic	200	150	50	50
JGX	20–250	3, 4	FT-AM, AT-AM, electronic	200	200	50	50
LG-Frame							
LGE	100–600	3, 4	FT-AM, AT-AM, electronic	65	35	18	22
LGS	100–600	3, 4	FT-AM, AT-AM, electronic	85	50	25	22
LGH	100–600	3, 4	FT-AM, AT-AM, electronic	100	65	35	42
LGC	100–600	3, 4	FT-AM, AT-AM, electronic	200	100	50	42
LGU	100–600	3, 4	FT-AM, AT-AM, electronic	200	150	65	50
LGX	100–600	3, 4	FT-AM, AT-AM, electronic	200	200	65	50
NG-Frame							
NGS	400–1200	2, 3, 4	Electronic	65	50	25	—
NGH	400–1200	2, 3, 4	Electronic	100	65	35	—
NGC	400–1200	2, 3, 4	Electronic	200	100	50	—
NGS	400–1200	3	Electronic	—	—	—	—
NGU	400–800	3	Electronic	300	150	75	—
RG-Frame							
RGH	800–2500	3, 4	Electronic	125	65	50	—
RGC	800–2500	3, 4	Electronic	200	100	65	—

① EG breaker rated 600/347 Vac.

② Two poles in series.

③ 125 Vdc only for single-pole breakers.

Table 5. Breaker SCCR Ratings—Series C

Circuit Breaker Type	Continuous Ampere Rating at 40°C	Number of Poles	Type of Trip ①	UL Listed Interrupting Ratings (rms Symmetrical Amperes) AC (kV) 120	120/240	240	277	480	600	DC (kV) ② 125	250	125/250
G-Frame												
GHB	15–100	1	N.I.T.U.	65	—	—	—	—	—	14	—	—
GHB	15–100	2, 3		—	—	65	—	—	—	—	—	14
GHB	15–100	1		—	—	—	14	—	—	14	—	—
GHB	15–100	2, 3		—	—	—	14	14	—	—	—	14
HGHB	15–30	1		65	—	—	25	—	—	14	—	—
GHQ	15–20	1		65	—	—	14	—	—	—	—	—
GHBS	15–30	1, 2	—	65	65	—	14	—	—	—	—	—
GBHS	15–20	1, 2	N.I.T.U.	—	—	—	—	—	10	—	—	—
GD	15–50	2	N.I.T.U.	—	—	65	—	14	—	—	—	10
GD	15–100	3		—	—	65	—	22	—	—	10	—
GHC	15–100	1	N.I.T.U.	65	—	—	—	—	—	14	—	—
GHC	15–100	2, 3		—	—	65	—	—	—	—	—	14
GHC	15–100	1		—	—	—	14	—	—	14	—	—
GHC	15–100	2, 3		—	—	—	14	14	—	—	—	14
HGHC	15–30	1		65	—	—	25	—	—	14	—	—
F-Frame												
EDB	100–225	2, 3	N.I.T.U.	—	—	22	—	—	—	10	—	—
EDS	100–225	2, 3		—	—	42	—	—	—	10	—	—
ED	100–225	2, 3	N.I.T.U.	—	—	65	—	—	—	10	—	—
EDH	100–225	2, 3		—	—	100	—	—	—	10	—	—
EDC	100–225	2, 3		—	—	200	—	—	—	10	—	—
EHD	15–100	1	N.I.T.U.	—	—	—	14	—	—	10	—	—
EHD	15–100	2, 3		—	—	18	—	14	—	—	10	—
FDB	15–150	2, 3	N.I.T.U.	—	—	18	—	14	14	—	10	—
FDB	15–150	4		—	—	18	—	14	14	—	10	—
FD	15–150	1	N.I.T.U.	—	—	—	35	—	—	10	—	—
FD	15–225	2, 3		—	—	65	—	35	18	—	10	—
FD	15–225	4		—	—	65	—	35	18	—	10	—
HFD	15–150	1	N.I.T.U.	—	—	—	65	—	—	10	—	—
HFD	15–225	2,3		—	—	100	—	65	25	—	22	—
HFD	15–225	4		—	—	100	—	65	25	—	22	—
FDC	15–225	2, 3	N.I.T.U.	—	—	200	—	100	35	—	22	—
FDC	15–225	4		—	—	200	—	100	35	—	22	—
J-Frame												
JDB	70–250	2, 3	N.I.T.U.	—	—	65	—	35	18	—	10	—
JD	70–250	2, 3, 4	I.T.U.	—	—	65	—	35	18	—	10	—
HJD	70–250	2, 3, 4	I.T.U.	—	—	100	—	65	25	—	22	—
JDC	70–250	2, 3, 4	I.T.U.	—	—	200	—	100	35	—	22	—
K-Frame												
DK	250–400	2, 3	N.I.T.U.	—	—	65	—	—	—	—	10	—
KDB	100–400	2, 3	N.I.T.U.	—	—	65	—	35	25	—	10	—
KD	100–400	2, 3, 4	I.T.U.	—	—	65	—	35	25	—	10	—
CKD	100–400	2, 3, 4	I.T.U.	—	—	65	—	35	25	—	—	—
HKD	100–400	2, 3, 4	I.T.U.	—	—	100	—	65	35	—	22	—
CHKD	100–400	2, 3, 4	I.T.U.	—	—	100	—	65	35	—	—	—
KDC	100–400	2, 3, 4	I.T.U.	—	—	200	—	100	50	—	22	—
L-Frame												
LDB	300–600	2, 3	N.I.T.U.	—	—	65	—	35	25	—	22	—
LD	300–600	2, 3, 4	I.T.U.	—	—	65	—	35	25	—	22	—
CLD	300–600	2, 3, 4	I.T.U.	—	—	65	—	35	25	—	—	—
HLD	300–600	2, 3, 4	I.T.U.	—	—	100	—	65	35	—	25	—

① N.I.T.U. is non-interchangeable trip unit and I.T.U. is interchangeable trip unit.

② Two-pole circuit breaker, or two poles of three-pole circuit breaker at 250 Vdc.

Table 5. Breaker SCCR Ratings—Series C (continued)

Circuit Breaker Type	Continuous Ampere Rating at 40°C	Number of Poles	Type of Trip ①	UL Listed Interrupting Ratings (rms Symmetrical Amperes)								
				AC (kV)						DC (kV) ②		
				120	120/240	240	277	480	600	125	250	125/250
L-Frame (continued)												
CHLD	300–600	2, 3, 4	I.T.U.	—	—	100	—	65	35	—	—	—
LDC	300–600	2, 3, 4	I.T.U.	—	—	200	—	100	50	—	30	—
CLDC	300–600	2, 3, 4	I.T.U.	—	—	200	—	100	50	—	30	—
M-Frame												
MDL	300–800	2, 3	I.T.U.	—	—	65	—	50	25	—	22	—
CMDL	300–800	2, 3	I.T.U.	—	—	65	—	50	25	—	—	—
HMDL	300–800	2, 3	I.T.U.	—	—	100	—	65	35	—	25	—
CHMDL	300–800	2, 3	I.T.U.	—	—	100	—	65	35	—	—	—
N-Frame												
ND	600–1200	3, 4	N.I.T.U.	—	—	65	—	50	25	—	—	—
CND	600–1200	3, 4	N.I.T.U.	—	—	65	—	50	25	—	—	—
HND	600–1200	3, 4	N.I.T.U.	—	—	100	—	65	35	—	—	—
CHND	600–1200	3, 4	N.I.T.U.	—	—	100	—	65	35	—	—	—
NDC	600–1200	3, 4	N.I.T.U.	—	—	200	—	100	50	—	—	—
CNDC	600–1200	3, 4	N.I.T.U.	—	—	200	—	100	50	—	—	—
R-Frame												
RD 1600	800–1600	3, 4	N.I.T.U.	—	—	125	—	65	50	—	—	—
CRD 1600	800–1600	3, 4	N.I.T.U.	—	—	125	—	65	50	—	—	—
RD 2000	1000–2000	3, 4	N.I.T.U.	—	—	125	—	65	50	—	—	—
RD 2500	1000–2500	3, 4	N.I.T.U.	—	—	200	—	65	50	—	—	—
CRD 2000	1000–2000	3, 4	N.I.T.U.	—	—	125	—	65	50	—	—	—
RDC 1600	800–1600	3, 4	N.I.T.U.	—	—	200	—	100	65	—	—	—
CRDC 1600	800–1600	3, 4	N.I.T.U.	—	—	200	—	100	65	—	—	—
RDC 2000	1000–2000	3, 4	N.I.T.U.	—	—	200	—	100	65	—	—	—
RDC 2500	1000–2500	3, 4	N.I.T.U.	—	—	200	—	100	65	—	—	—
CRDC 2000	1000–2000	3, 4	N.I.T.U.	—	—	200	—	100	65	—	—	—
Current Limit-R® Current Limiting Circuit Breakers—Non-Fused Type												
FCL	15–100	2, 3	N.I.T.U.	—	—	200	—	150	—	—	—	—
LCL	125–400	2, 3	N.I.T.U.	—	—	200	—	200	100	—	—	—
TRI-PAC® Current Limiting Circuit Breakers—Fused Type												
FB	15–100	2, 3	N.I.T.U.	—	—	200	—	200	200	—	—	100
LA	70–400	2, 3	I.T.U.	—	—	200	—	200	200	—	—	100
NB	300–800	2, 3	I.T.U.	—	—	200	—	200	200	—	—	100
PB	600–1600	2, 3	I.T.U.	—	—	200	—	200	200	—	—	100

① N.I.T.U. is non-interchangeable trip unit and I.T.U. is interchangeable trip unit.

① Two-pole circuit breaker, or two poles of three-pole circuit breaker at 250 Vdc.

References

- NFPA 70, The National Electrical Code, 2008
- UL 508A, Standard for Industrial Control Panels

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