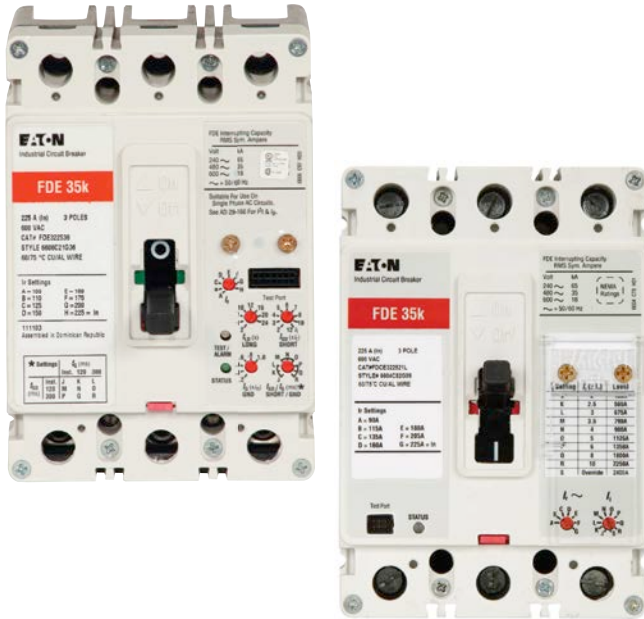


Series C F-frame electronic trip unit (210+ and 310+) molded case circuit breaker FAQs



This document covers commonly asked questions about the Series C® F-frame circuit breaker with electronic trip units. The FDE breaker incorporates the Digitrip™ 310+ and 210+ electronic trip units in the same housing as the standard Series C F-frame breaker.

Q: What amperages are offered for the F-frame electronic breakers?

A: The 310+ and 210+ trip units are each available in three frames, which differ slightly between the two trip units.

Trip Unit	Frame	Adjustability range
310+	80 A	15–80 A
	160 A	60–160 A
	225 A	100–225 A
210+	100 A	40–100 A
	150 A	70–150 A
	225 A	100–225 A

Q: Do the Digitrip 310+ and 210+ trip units require a separate rating plug?

A: No, the Digitrip 310+ and 210+ trip units do not require a separate rating plug. The breakers have selectable dial settings to adjust amperage rating.

Q: What are the amperage settings for each frame?

A: The 310+ trip unit has eight settings per frame, and the 210+ has seven settings per frame. The settings are labeled A–H and A–G, respectively, and correspond to a table located on the breaker's label information.

310+	80 A	160 A	225 A
A =	15 A	60 A	100 A
B =	20 A	70 A	110 A
C =	30 A	80 A	125 A
D =	40 A	90 A	150 A
E =	50 A	100 A	160 A
F =	60 A	125 A	175 A
G =	70 A	150 A	200 A
H = I_n =	80 A	160 A	225 A
210+	100 A	150 A	225 A
A =	40 A	70 A	100 A
B =	50 A	80 A	110 A
C =	60 A	90 A	125 A
D =	70 A	100 A	150 A
E =	80 A	110 A	175 A
F =	90 A	125 A	200 A
G = I_n =	100 A	150 A	225 A

Note: 160 A is not a NEMA® recognized rating.

Q: What short circuit current ratings (kA rms) are available at 240 V, 480 V, and 600 V?

A: Three versions of the breaker are available (both types of trip units) for different short circuit ratings, as follows:

	240 V	480 V	600 V
FDE	65 kAIC	35 kAIC	18 kAIC
HFDE	100 kAIC	65 kAIC	25 kAIC
FDCE	200 kAIC	100 kAIC	25 kAIC

Note: The HFDE 210+ 25 kAIC at 600 V rating and all FDCE 210+ are expected to be released for sale in Q1 2016.



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Q: In what pole configuration are FDE breakers available?

A: FDE / HFDE / FDCE breakers are currently available in three-pole only. For single-phase applications, connect two poles in series as described in the instruction leaflet.

Q: What are the third-party certifications for this breaker?

A: NEMA, UL® 489, and CSA® 22.2 No. 5 ratings.

Q: What protection options are available on 310+ and 210+ trip units for FDE breakers?

A: The F-frame electronic breakers include protection options including long delay, short delay, instantaneous, and ground fault.

	Type	Protection features	Catalog order code
310+	LS	Long / Short	33
	LSI	Long / Short / Instantaneous	32
	LSG	Long / Short / Ground Fault	35
	LSIG	Long / Short / Instantaneous / Ground Fault	36
210+	LI	Long / Instantaneous	21
	LSI	Long / Short / Instantaneous	22

Q: Is the ground fault protection adjustable on 310+ LSG and LSIG trip units?

A: Yes. The ground fault pickup setting contains six settings and can be adjusted from 0.2 to 1.0x the frame rating (I_n , or maximum rating of the frame) of the breaker. For example, on an 80 A breaker, the ground fault pickup setting can be dialed down to 16 A or up to 80 A, regardless of the selected amperage setting (I).

In addition, the time delay for ground fault protection can be set to Instantaneous trip, or to delays of 120 ms or 300 ms.

Q: What type of ground fault protection profile/curve does the FDE 310+ include?

A: The 310+ LSG and LSIG trip units are configured with a flat response ground fault delay with three time settings, Instantaneous, 120 ms, and 300 ms. The fault level pickup contains seven settings, from 0.2x to 1.0x. The ground fault protection cannot be changed to an I²t function response.

Q: What type of short delay profile/curve do the FDE 310+ and 210+ include?

A: The 310+ LS and LSG trip units include an I²t protection profile with nine settings for pickup and no time adjustments. The 310+ LSI and LSIG trip units include a flat response protection profile with nine settings for pickup and three settings for time, Instantaneous, 120 ms, and 300 ms.

The 210+ LSI trip units include 10 settings that combine short delay pickup and short delay time. The pickup levels range from 2x to 10x. The time settings include a couple of I²t settings, plus flat response at Instantaneous, 150 ms, and 300 ms.

Q: Are neutral CTs provided with a ground fault breaker? Are they required?

A: Neutral CTs are not provided with breakers for FDE. CTs must be ordered separately and are available in 80, 160, and 225 A offerings. For applications in switchboards where the FD 310+ family is offered, the factory will include the sensors with the switchboard.

Neutral CTs are only required for four-wire systems with ground fault applications; three-wire systems do not require a neutral sensor.

For FDE breakers, there are two types of neutral sensors available in each of the frame sizes—one for typical bus connections and a smaller version to accommodate a neutral cable. These are pictured below and may be ordered using the catalog numbers listed for each frame.

Bus version

- 80 A—CTF080
- 160 A—CTF160
- 225 A—CTF225



Cable version

- 80 A—CTFD080
- 160 A—CTFD160
- 225 A—CTFD225



Please note that other Series C breakers with 310+ trip units (KD, LD, and MDL) include the neutral sensor with ground fault trip units, but for Series G® breakers (JG, LG, NG, and RG), like for FD breakers, the neutral sensor must be purchased separately.

Q: Do the Digitrip 310+ and 210+ offer any communication capabilities?

A: The 310+ and 210+ trip units do not offer embedded communication capabilities. However, PM3 metering and communications modules may be attached to FD electronic or thermal-magnetic breakers to meter and communicate current, voltage, and energy data, as well as the status of the breaker (via an auxiliary switch connection). PM3s are available with INCOM™ or Modbus® communication protocols for FD, JG, KD, and LG breakers.

Also, a Digiview display (Catalog No. DIGIVIEW or DIGIVIEWR06) may be used with 310+ trip units for local display of currents or cause-of-trip information. A cause-of-trip module (Catalog No. TRIP-LED) is available to display cause of trip via LEDs. However, these are not available on 210+ trip units.

Q: Can the trip units and frame be ordered separately for FDE?

A: Unfortunately, the F-frame electronic breaker is only available as an assembled unit. Most other 310+ electronic trip units, with the exception of the NG trip unit, may be ordered separate from the frame.

Q: Does the F-frame electronic use the same accessories as the F-frame thermal-magnetic?

A: Yes. As with the F-frame thermal-magnetic breaker, internal accessories must be factory installed to maintain breaker seal and UL label. All accessories will be mounted in the left pole. The only exception would be a special auxiliary switch that can be mounted on the right pole.

Additionally, FDE 310+ breakers with LSI or LSG trip units cannot be configured with a combination Aux / Alarm contacts on the left pole. If auxiliary and alarm contacts are needed, they must use a left pole alarm and a right pole auxiliary. Combination contacts are available for 310+ LS or LSI and for 210+ LI and LSI breakers.

Q: Can these breakers be applied in a panelboard or switchboard in Bid Manager?

A: Yes. FDE 210+ and 310+ breakers can be configured into UL listed PRL1a, PRL2a, PRL3a, PRL3E and PRL4 panelboards and PRLC switchboards including IFS™ (all configurations). For the 210+, the 100 A and 225 A frames have been incorporated into Bid Manager, but not the 150 A frame because all the amperage (I_r) settings from this frame are included in the other two frames.

Q: Can this breaker replace the FD breaker in a panelboard or switchboard? If so, does the panelboard need to be re-listed with UL?

A: Yes. The F-frame electronic breaker has the same footprint, dimensions, and connectors as the FD breaker. The filler plate is different and needs to be replaced. Existing products are not marked for use with the FDE, HFDE, and FDCE as the labeling was created before this breaker became available. Should there be an application within existing product, check with the Authority Having Jurisdiction (AHJ) for a variance under NEC® Article 90.

Q: Are series ratings available?

A: Yes. At this time, series ratings are only available on breaker-to-breaker use by OEMs. Series ratings for the FDE will apply wherever the equivalent thermal-magnetic breaker is used (e.g., the HFDE will have the same series ratings as the equivalent ampacity HFD). The required testing for series ratings is complete. UL is updating their documentation with the additional frames.

Q: Are these available as a 100% rated device?

A: No.

Q: Can the Digiview ammeter/cause-of-trip displays be used with these breaker?

A: The Digiview ammeter and cause-of-trip displays works with all 310+ trip units, including the F-frame. However, they are not compatible with 210+ trip units. In addition, they are not available in Eaton's panelboard or switchboard installations.

Q: Is there a plug-in test kit available?

A: Yes. The functional test kit (Catalog No. MTST230V) is compatible with Digitrip 310+ and 210+ trip units for molded case circuit breakers, as well as for Magnum® and Series NRX® air circuit breakers (Digitrip 520 and 1150). A new test cable was added for the 210+ trip units.

Q: Can electronic FD breakers be reverse fed?

A: Yes. FDE breakers are suitable for reverse-feed applications.

Q: Do these breakers carry any DC ratings?

A: No. FDE electronic breakers do not carry DC ratings. If DC ratings are required, the thermal-magnetic F-frame carries ratings for 250 Vdc. In addition, the HFDDC (600 Vdc), FDPV (1000 Vdc for poles in series), FD-PVS (600 V per pole) breakers carry ratings for higher DC voltages.

Q: Is there a tamperproof cover on these breakers?

A: Yes. All 310+ and 210+ trip units are fitted with a transparent cover that can be fitted with a wire seal. Eaton also has a wire seal available for sale (Catalog No. 5108A03H01).



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