

QO® and QOB Miniature Circuit Breakers

Class 730



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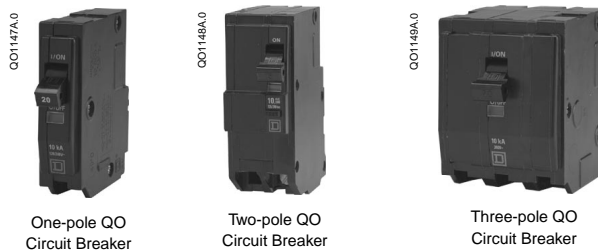
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GROUPE SCHNEIDER

GENERAL DESCRIPTION

Underwriters Laboratories Inc. (UL), the National Electrical Manufacturers Association (NEMA) and the National Electrical Code (NEC) define a circuit breaker as "A device designed to open and close a circuit by non-automatic means, and to open the circuit automatically at a predetermined overcurrent without injury to itself when properly applied within its rating."

QO® and QOB Circuit Breakers

QO® (plug-on) and QOB (bolt-on) one-, two- and three-pole thermal-magnetic circuit breakers provide overcurrent protection and switching on ac and dc systems. Plug-on QO circuit breakers are for use in QO load centers, NQOD panelboards or SPEED-D® switchboard distribution panels. Bolt-on QOB circuit breakers are for use in NQOD panelboards.



Operating Mechanism

QO and QOB circuit breakers have an overcenter, trip-free toggle mechanism with quick-make, quick-break action and positive handle indication. The tripping mechanisms in two- and three-pole circuit breakers operate such that an overcurrent on any pole of the circuit breaker will cause all poles of the circuit breaker to open simultaneously. Each pole has an individual thermal-magnetic trip element calibrated for 40°C ambient temperature.

Trip Indication

QO and QOB circuit breakers have VISI-TRIP® trip indication which provides a visual identification that the circuit breaker has tripped and interrupted the circuit. When the circuit breaker has tripped, the handle assumes a center position and the red VISI-TRIP indicator appears in a window in the circuit breaker case. The VISI-TRIP is only visible when the circuit breaker has tripped. Trip indication immediately distinguishes the circuit from any other circuit which is merely in the on or off position. The circuit breaker can be reset by pushing the handle to OFF and then to ON.



Construction Standards

QO and QOB circuit breakers are built in accordance with UL Standard 489, CSA 22, NOM/ANCE and NEMA Standard AB1. They also meet Federal Specification W-C-375B/GEN. The 10–70 ampere circuit breakers are UL Listed as Type QO or Type QOB under UL File E84967 and are CSA Certified under File LR92886. The 80–100 ampere circuit breakers are UL Listed as Type QO or Type QOB under UL File E84967 and CSA Certified under File LR92886.



General Description and Ratings

RATINGS

When designing an electrical distribution system, overcurrent protective devices are generally selected based on performance requirements. Factors influencing this selection include system voltage, continuous current, interrupting rating and frequency.

Voltage Rating

The circuit breaker must have a voltage rating greater than, or equal to, the system voltage. When a circuit breaker clears an overcurrent, it is done in two steps. First, the current sensing system identifies the overcurrent and releases the tripping mechanism. This results in a parting of the contacts. The circuit breaker must then extinguish the voltage arc across the contacts. If the circuit breaker has the correct voltage rating, it can efficiently extinguish this voltage arc. QO and QOB circuit breakers are rated in the following UL Standard 489 voltages:

- 120 Vac
- 208/120 Vac
- 120/240 Vac
- 240 Vac
- 48 Vdc (10-70 A circuit breakers only)

Continuous Current Rating

The continuous current rating of a circuit breaker is defined by the National Electrical Manufacturers Association (NEMA) as: "The maximum direct current or rms current in amperes at rated frequency which a device or assembly will carry continuously without exceeding the specified limits of observable temperature rise." Sometimes referred to as the ampere rating or handle rating of the circuit breaker, the continuous current rating relates to the system current flow under normal conditions.

UL requires that circuit breakers must be able to carry their continuous current rating indefinitely at 40°C in free air in order to achieve a UL Listing. The NEC recognizes that devices applied in end-use equipment can be affected by heat build up during normal operating conditions. For this reason, NEC 220-10(b), below, requires that circuit breakers be selected based on the characteristics of the load (particularly, the portion of the load which will be on continuously for three hours or more at a time).

"(b) Continuous and Noncontinuous loads. Where a feeder supplies a continuous load or any combination of continuous or noncontinuous loads, the rating of the overcurrent device shall not be less than the noncontinuous load plus 125 percent of the continuous load. The minimum feeder circuit conductor size, without the application of any adjustment or correction factors, shall have an allowable ampacity equal or greater than the noncontinuous load plus 125 percent of the continuous load.

NOTE: Exception: Where the assembly including the overcurrent devices protecting the feeder(s) are listed for operation at 100 percent of their rating, neither the ampere rating of the overcurrent device nor the ampacity of the feeder conductors shall be less than the sum of the continuous load plus the noncontinuous load."

Interrupting Rating

The interrupting rating of a circuit breaker is the highest current at rated voltage that the circuit breaker is intended to interrupt under standard test conditions. Circuit breakers must be chosen so that the interrupting rating is equal to or greater than the maximum available short-circuit current at the point where the circuit breaker is applied in the system. See the table on the following page.



Interrupting Rating

Circuit Breaker Type	Number of Poles	Ampere Rating	UL Listed Interrupting Rating—RMS Sym. Amperes			
			AC Volts			DC Volts*
			120 Vac	120/240 Vac	240 Vac	48 Vdc
QO QOB	1	10–70	10 kA	10 kA	NA	5 kA
		80–100	10 kA	10 kA	NA	NA
	2	10–70	10 kA	10 kA	NA	5 kA
		80–100	10 kA	10 kA	NA	NA
	3	15–60	10 kA	10 kA	10 kA	5 kA
		70–100	10 kA	10 kA	10 kA	NA
QO-H▼ QOB-H▼	2	15–100	10 kA	10 kA	10 kA	NA
QO-VH QOB-VH	1	15–30	22 kA	22 kA	NA	NA
	2	15–100	22 kA	22 kA	NA	NA
	3	15–100	22 kA	22 kA	22 kA	NA
QOH	2	40–125	42 kA	42 kA	NA	NA
QH QHB	1	15–30	65 kA	65 kA	NA	NA
	2	15–30	65 kA	65 kA	NA	NA
	3	15–30	65 kA	65 kA	65 kA	NA
QO-GFI QOB-GFI	1	15–30	10 kA	NA	NA	NA
	2	15–60	10 kA	10 kA	NA	NA
QO-AFI	1	15–20	10 kA	NA	NA	NA
QO-EPD QOB-EPD	1	15–30	10 kA	NA	NA	NA
	2	15–30	10 kA	10 kA	NA	NA
QO-VHGFI QOB-GFI	1	15–30	22 kA	NA	NA	NA
QO-PL	1	15–30	10 kA	10 kA	NA	NA
	2	15–30	10 kA	10 kA	NA	NA
	3	15–30	10kA	10 kA	10 kA	NA

*DC ratings do not apply to circuit breakers rated 10 amperes.

NA = Not applicable.

10,000 A and 5,000 A are 1Ø–3Ø.

▼ UL Listed 5,000 AIR on three-phase grounded B-phase.

DC Voltage Rating

QO and QOB circuit breakers are available with a UL Listed 48 Vdc rating. See the table above. Refer to Square D Application Guide SD361R1 and Square D Product Data Bulletin D-453 for additional information on dc-rated circuit breakers.

Frequency Rating

The standard rated frequency for circuit breakers is 60 Hz. Circuit breakers are also rated for dc applications as in the table above. Many Square D circuit breakers can also be applied on 50 Hz systems without derating. GFCI, AFCI and EPD devices are rated for 60 Hz operation only. Frequencies can affect the thermal, magnetic and short-circuit characteristics of circuit breakers. Refer to Square D Application Guide SD361R1 before applying circuit breakers on systems at frequencies other than 50/60 Hz.

IEC Rating

IEC rated QO circuit breakers are available. For further information contact a Square D Field Sales Office.



General Description and Ratings

TERMINOLOGY

HACR

HACR is a term used to designate circuit breakers which have been certified to be used on heating, air conditioning and refrigeration loads. QO Type circuit breakers meet the requirements of Paragraph 7.7 in the 9th edition of the UL Standard and are suitable for group motor applications requiring HACR listing.

This means these circuit breakers can be used to meet the requirements of Article 430 of the NEC. This article indicates that each circuit breaker must be of the inverse time type and be approved for group installation.

QO and QOB circuit breakers, except GFI, AFI and EPD, are Listed with UL as HACR Type and are labeled accordingly.

Other 120/240 and 240 Vac circuit breakers which can be supplied with the HACR label are:

- QO-HM and QOB-HM
- QO-VH and QOB-VH
- QO-H and QOB-H
- QOH
- QH and QHB
- QO-PL and QOB-PL

Switching Duty (SWD) Circuit Breakers

QO and QOB SWD circuit breakers are suitable for switching 120 Vac fluorescent lighting loads. The switching duty (SWD) listing applies only to one-pole 15 and 20 ampere circuit breakers rated at 347 volts or less. The circuit breakers are subjected to specified temperature rise tests at predetermined periods during the endurance operations.

Terminations

The 10–30 ampere circuit breakers have pressure plate terminals suitable for two-wire copper terminations. QO-GFI 15–30 ampere and QO-AFI circuit breakers have pressure plate terminals suitable for single-wire terminations. These circuit breakers are suitable for use with 60°C or 75° C conductors.

The QO-PL and 35–150 ampere circuit breakers have box-type lugs suitable for single-wire terminations. These circuit breakers are suitable for use with 75°C conductors. See table below.

Circuit Breaker Types	Ampere Rating	Wire Size (AWG/kcmil)	
		Aluminum	Copper
QO	10, 25, 30 15, 20 35–70 80–125	#12–#8 (4–6 mm ²) #12–#8 (4–6 mm ²) #8–#2 (10–25 mm ²) #12–#2/0 (4–50 mm ²)	#14–#8 (2.5–5 mm ²) (2) #14–#10 (2.5–4 mm ²) #8–#2 (10–25 mm ²) #12–#2/0 (4–50 mm ²)
QO-VH	110–125	#12–#2/0 (4–50 mm ²)	#12–#2/0 (4–50 mm ²)
QOB-VH	110–150	#4–300 (25–150 mm ²)	#4–300 (25–150 mm ²)
QOT, QO-AFI	15–20	#12–#8 (4–6 mm ²)	#14–#8 (2.5–5 mm ²)
QO-GFI	15–30 40, 50, 60	#12–#8 (4–6 mm ²) -----	#14–#8 (2.5–5 mm ²) #8–#4 (10–mm ²)
QO-PL	15–30	#12–#2 (4–25 mm ²)	#14–#2 (2.5–25 mm ²)
QOH, QOVH, QO-H	40–100 80–125	#12–#2/0 (4–50 mm ²)	#12–#2/0 (4–50 mm ²)



SPECIAL APPLICATION CIRCUIT BREAKERS

There are several special application circuit breakers in the QO family. This section describes them and provides application information for their use. The following list includes the circuit breakers discussed in this section.

- QO-HM and QOB-HM High-magnetic Circuit Breakers
- QO-HID and QOB-HID Circuit Breakers
- QO and QOB Miniature Switches
- QOK and QOBK Key-operated Circuit Breakers
- QO-GFI and QOB-GFI QWIK-GARD® Circuit Breakers
- QO-EPD and QOB-EPD Equipment Protection Devices
- QO-SWN and QOB-SWN Switch Neutral Circuit Breakers
- QOT Tandem Circuit Breakers
- QO-PL and QOB-PL POWERLINK® Circuit Breakers
- QO-AFI Arc-D-tect™ Circuit Breakers

QO-HM and QOB-HM High Magnetic Circuit Breakers

QO-HM and QOB-HM high-magnetic circuit breakers are recommended for area lighting (athletic fields, parking lots, outdoor signs, etc.) when using lamps of inherent high inrush current, individual dimmer applications or other applications where high inrush current exceeds standard tripping conditions. These circuit breakers are available in one-pole 15 and 20 amperes only. QO-HM and QOB-HM circuit breakers are physically interchangeable with standard QO and QOB circuit breakers and accommodate the complete range of QO accessories.

QO-HM and QOB-HM Circuit Breaker Magnetic Hold Levels

One-pole QO-HM and QOB-HM Circuit Breakers	Maximum Full Cycle Magnetic Hold Level
15 amperes	315 to 525 amperes
20 amperes	322 to 537 amperes

QO-HM and QOB-HM circuit breakers are manufactured with the magnetic trip point calibrated at a much higher level than standard QO and QOB circuit breakers. The table above lists the magnetic trip levels to which high-magnetic circuit breakers are calibrated.

QO-HID and QOB-HID Circuit Breakers

QO-HID and QOB-HID circuit breakers are for use in high intensity discharge (HID) lighting systems, such as mercury vapor, metal halide or high-pressure sodium. These circuit breakers are specially designed to handle the high inductive loads, harmonic currents and cycling which are inherent in HID lighting systems. QO-HID and QOB-HID circuit breakers are physically interchangeable with standard QO and QOB circuit breakers and accommodate the complete range of QO accessories.

QO-HID and QOB-HID circuit breakers are manufactured with larger contacts than standard QO and QOB circuit breakers to allow for switching high inductive loads. They also have magnetic characteristics similar to high-magnetic (HM suffix) circuit breakers to allow the circuit breaker to hold-in during the starting inrush of load current.

QO and QOB Miniature Switches

Miniature switches are intended for use as disconnect devices only. They provide no overcurrent protection. UL Standard 1087 and CSA C22.2 #4 requires miniature switches to be protected by a thermal-magnetic circuit breaker (or fuse) of equivalent rating. QO and QOB switches are UL Listed for use on circuits capable of delivering not more than 10,000 amperes when protected by an equivalent rated circuit breaker or fuse. These switches are available in 60 and 100 ampere ratings.



Special Application Circuit Breakers

QO and QOB switches are available with auxiliary switches only. No shunt trip or bell alarm electrical accessories are available. QO and QOB switches are available with the complete range of handle accessories.



One-pole QOK
Circuit Breaker

QOK and QOBK Key-operated Circuit Breakers

Key-operated circuit breakers provide a greater measure of security than handle lock-off attachments. The circuit breaker is turned on, off, or reset with a special key included with the circuit breaker. Key-operated circuit breakers are available in one-pole construction and can be mounted in any one-pole space which will accept a standard QO circuit breaker. These circuit breakers are available in 10–30 ampere ratings, with interrupting ratings of 10,000 amperes at 120 Vac.

Replacement keys are available separately. No factory-installed or field-installable accessories are available on key-operated circuit breakers.

QO-GFI and QOB-GFI QWIK-GARD® Circuit Breakers

QWIK-GARD® circuit breakers offer a means of providing ground-fault protection for people. “People protector” devices are built as Class A devices in accordance with UL Standard 943 and CSA C22.2 #144 for ground-fault circuit interrupters (GFCIs). UL defines a Class A device as one that “will trip when a fault current to ground is six milliamperes or more.” The tripping time of such devices cannot exceed the value obtained by the equation: $T = (20/I)^{1.43}$ where T is time in seconds and I is the ground-fault current in milliamperes. Class A devices must trip at 6 milliamperes of ground-fault current and above, and hold below 4 milliamperes of ground-fault current.

Class A GFCIs include a self-contained means of testing the ground-fault circuitry, as required by UL. The GFCI is tested by pushing the test button causing the device to trip the circuit breaker and show a trip indication. The circuit breaker must be connected correctly, with the pigtail connected to the neutral assembly in the load center or panelboard, in order for the test function to operate. UL requires that GFCIs must be operational at 85% of the rated voltage.

QWIK-GARD circuit breakers require the same mounting space and provide the same branch circuit protection as standard QO circuit breakers. Shunt trip accessories are not available on QWIK-GARD circuit breakers. All other QO electrical and mechanical accessories are available for QO-GFI and QOB-GFI circuit breakers.

QWIK-GARD circuit breakers are UL Listed and CSA Certified and available in both one- and two-pole construction. See the tables on pages 10 and 11 for a list of available catalog numbers.

How QWIK-GARD Circuit Breakers Operate

The GFCI sensor in a one-pole QWIK-GARD circuit breaker continuously monitors the current flow in the ungrounded “hot” load conductor and the neutral load conductor. The sensor compares the current flow in all directions. In one-pole applications, the current flows out to the load on the “hot” load conductor and back to the source on the neutral load conductor. If the current flowing back to the source is less than the current flowing out to the load, a ground fault exists. When the difference in current flow exceeds 6 milliamperes, the sensor sends a signal to the solid state circuitry which activates the ground-trip solenoid mechanism and trips the circuit breaker. The trip will be indicated by the VISI-TRIP® indicator and the operating handle will move to the center tripped position.



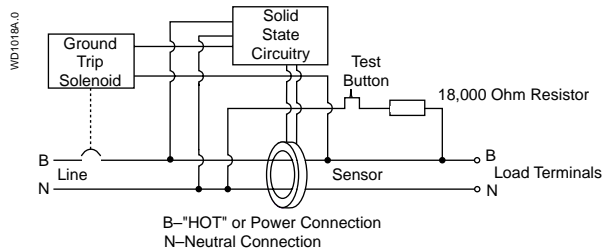
One-pole QO-GFI
Circuit Breaker



Two-pole QO-GFI
Circuit Breaker

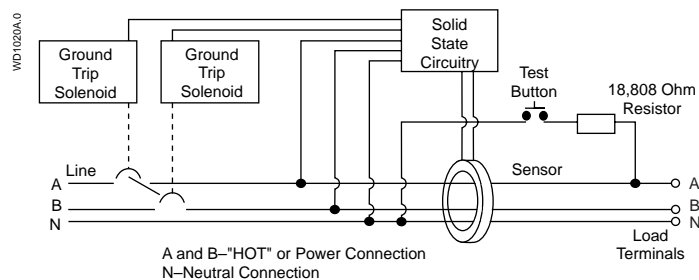


Special Application Circuit Breakers



One-pole QWIK-GARD Circuit Breaker

The GFCI sensor in a two-pole QWIK-GARD circuit breaker continuously monitors the current flow in the two ungrounded “hot” load conductors and the neutral conductor. The sensor compares the current flow in all directions. In two-pole applications, the current flows out to the load on the “hot” load conductors and back to the source on the neutral load conductor or one of the “hot” load conductors. If the current flowing back to the source is less than the current flowing out to the load, a ground fault exists. When the difference in current flow exceeds 6 milliamperes, the sensor sends a signal to the solid state circuitry which activates the ground-trip solenoid mechanism and trips the circuit breaker. The trip will be indicated by the VISI-TRIP indicator and the operating handle will move to the center tripped position.



Two-pole QWIK-GARD Circuit Breaker

One-pole QWIK-GARD Circuit Breakers

A one-pole QWIK-GARD circuit breaker has two load lugs and a white wire “pigtail” in addition to the line side plug-on or bolt-on connector. The line side “hot” connection is made the same as any QO or QOB circuit breaker.

The white wire “pigtail” must be connected to the panel neutral (S/N) assembly. The GFCI push-to-trip button requires the 120 Vac power to operate. Both the neutral and “hot” wires of the branch circuit being protected are terminated in the QWIK-GARD circuit breaker. The two load lugs are clearly marked LOAD POWER or LOAD \ominus and LOAD NEUTRAL or LOAD N by molded lettering on the circuit breaker case. Also molded into the case is PANEL NEUTRAL or PANEL N , the marking for the “pigtail” connection.

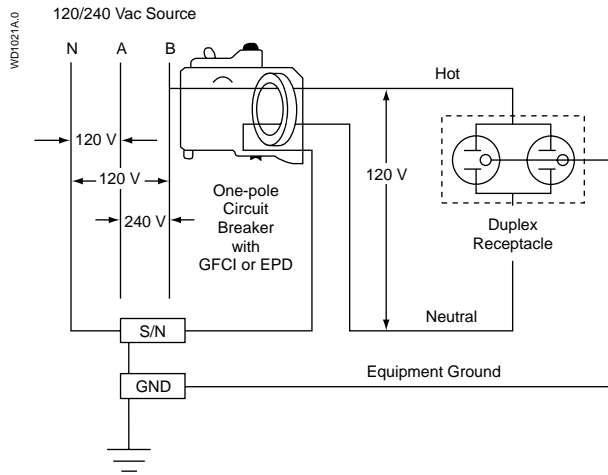
One-pole QWIK-GARD circuit breakers must be installed on independent circuits. Circuits which have a neutral common to more than one panel circuit conductor cannot be protected against ground faults by a one-pole circuit breaker because the current returning to the source through the neutral cannot be effectively split to prevent the QWIK-GARD circuit breaker from tripping under normal use.

When installing QWIK-GARD circuit breakers in existing panels, it is necessary that the neutral wire for the branch circuit corresponds with the “hot” wire of the same circuit.

It is important to remember that the QWIK-GARD circuit breaker compares the current flowing back to the source with the current flowing out to the load. If these currents are not equal to within 6 milliamperes, the circuit breaker senses a ground fault and trips.



Special Application Circuit Breakers



One-pole QWIK-GARD Connections

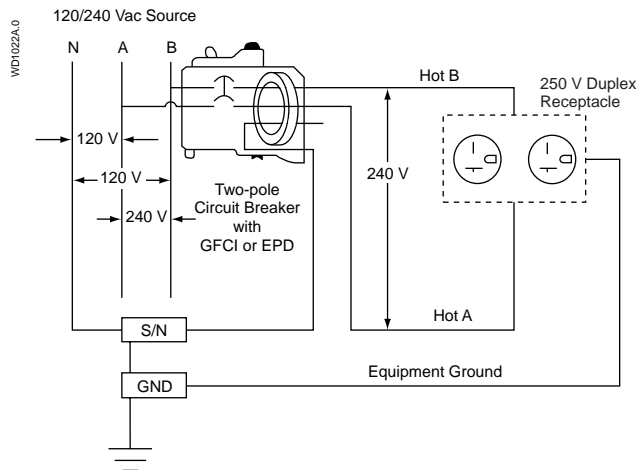
One-pole QWIK-GARD Circuit Breaker Catalog Numbers

One-pole, 120 Vac QWIK-GARD Circuit Breakers		
Ampere Rating	10,000 A Interrupting Rating, One Space Required	22,000 A Interrupting Rating, One Space Required
	Catalog Number*	Catalog Number*
15	QO115GFI	QO115VHGFI
20	QO120GFI	QO120VHGFI
25	QO125GFI	QO125VHGFI
30	QO130GFI	QO130VHGFI

*For bolt-on circuit breakers, add B to catalog number (QOB115GFI).

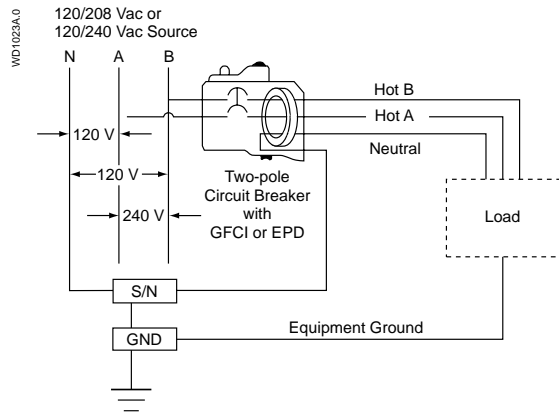
Two-pole QWIK-GARD Circuit Breakers

Two-pole QWIK-GARD circuit breakers can be installed on a 120/240 Vac single-phase three-wire system, the 120/240 Vac portion of a 120/240 Vac three-phase four-wire system, or two phases and neutral of a 208Y/120 Vac three-phase four-wire system. Regardless of the application, the installation of the circuit breaker is the same. Connections must be made to two "hot" busses and the panel neutral assembly. When installed on these systems, protection is provided for two-wire 240 Vac or 208 Vac circuits, three-wire 120/240 Vac or 208Y/120 Vac circuits and 120 Vac multiwire circuits. See wiring diagrams below.

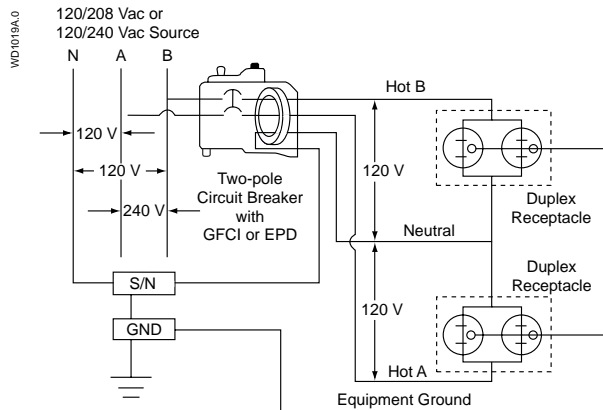


Two-wire 240 Vac or 208 Vac

Special Application Circuit Breakers



Three-wire 120/240 Vac or 208Y/120 Vac Circuits



120 Vac Multiwire Circuits

Two-pole QWIK-GARD Circuit Breaker Catalog Numbers

Two-pole Common Trip, 120/240 Vac QWIK-GARD Circuit Breakers	
Ampere Rating	10,000 A Interrupting Rating, Two Spaces Required
	Catalog Number*
15	QO215GFI
20	QO220GFI
25	QO225GFI
30	QO230GFI
40	QO240GFI
50	QO250GFI
60	QO260GFI*

*For bolt-on circuit breakers, add B to catalog number (QOB215GFI).

*Suitable only for feeding 240 Vac and 208 Vac two-wire loads. Does not contain a load neutral connection.

Two-pole 60 A GFCI Circuit Breakers

QO260GFI and QOB260GFI circuit breakers do not have a LOAD NEUTRAL or LOAD N connection. These 60-ampere, two-pole circuit breakers are limited for use on 208 Vac and 240 Vac two-wire systems. See the Two-wire 240 Vac or 208 Vac Circuits wiring diagram on page 10. The two "hot" conductors are connected to the lugs marked LOAD POWER or LOAD ~ and the white "pigtail" is connected to the panel neutral assembly. The "pigtail" (panel) neutral connection is required to provide the 120 Vac power necessary for testing the ground-fault circuitry. The wiring diagram is the same as shown above for two-wire 240 Vac or 208 Vac circuits.



Special Application Circuit Breakers

Information to Minimize False Tripping and Damage to QWIK-GARD Circuit Breakers

1. QWIK-GARD circuit breakers must not be connected to swimming pool equipment installed before adoption of the 1965 National Electric Code.
2. QWIK-GARD circuit breakers must not be connected to electric ranges or clothes dryers whose frames are grounded by a connection to the grounded circuit conductor.
3. QWIK-GARD circuit breakers cannot be used as a main circuit breaker in a panelboard or be reverse connected (backfed).
4. QWIK-GARD circuit breakers must not be subjected to a megger, high-voltage or hi-pot test. Any voltage in excess of 240 Vac will damage the GFCI electronics so that the circuit breaker will not protect against low-level ground faults. Before any such tests are performed, refer to the instruction bulletins for information on proper testing procedure.
5. QWIK-GARD circuit breakers must be located no more than 250 feet (76 m) from the load being served.

QO-EPD and QOB-EPD Equipment Protection Devices

QO-EPD and QOB-EPD circuit breakers are one- or two-pole thermal-magnetic circuit breakers with integral equipment ground-fault protection. These circuit breakers are rated for use on 120/240 Vac and 120/208 Vac electrical systems to provide overcurrent protection, short-circuit protection and equipment ground-fault protection. QO-EPD and QOB-EPD circuit breakers are not designed to protect people from the hazards of electrical shock. The ground-fault protection level is 30 milliamperes to protect electrical equipment such as heat trace tape.

EPD circuit breakers are built as Class B devices in accordance with UL Standard 943. UL defines a Class B device as one that “will trip when a fault current to ground is 20 milliamperes or more.” The tripping time of such devices cannot exceed the value obtained by the equation: $T = (80/I)^{1.43}$ where T is time in seconds and I is the ground-fault current in milliamperes.

EPD circuit breakers include a self-contained means of testing the ground-fault circuitry as required by UL. The EPD circuit breaker can be tested by pushing the test button causing the device to trip the circuit breaker and show a trip indication. The circuit breaker must be connected correctly, with the pigtail connected to the neutral assembly in the load center or panelboard, in order for the test function to operate. EPD circuit breakers must be operational at 85% of the rated voltage.

See the diagrams on pages 10 and 11 for wiring information.

EPD circuit breakers require the same mounting space and provide the same branch circuit protection as standard QO and QOB circuit breakers. Shunt trip accessories are not available on EPD circuit breakers. All other QO electrical accessories are available for QO-EPD and QOB-EPD circuit breakers.

See the chart below for available catalog numbers.

QO-EPD and QOB-EPD Circuit Breaker Catalog Numbers

Ampere Rating	One-pole* 120 Vac 10,000 A Interrupting Rating	Two-pole* 120/240 Vac 10,000 A Interrupting Rating
15	QO115EPD	QO215EPD
20	QO120EPD	QO220EPD
25	QO125EPD	QO225EPD
30	QO130EPD	QO230EPD

*For bolt-on circuit breakers, add B to catalog number (QOB115EPD).



QO-SWN and QOB-SWN Switch Neutral Circuit Breakers



Two-wire and Three-wire QO-SWN Circuit Breakers

The QO-SWN and QOB-SWN switch neutral circuit breakers are designed to protect gas pump assemblies. These circuit breakers have provisions for switching the grounded conductor which meet the requirements for circuit protection as outlined in the National Electric Code Article 514-5.

The QO-SWN and QOB-SWN circuit breakers are designed to simultaneously open all grounded or ungrounded conductors. All branch circuit wiring is terminated on the load side of the circuit breaker. The panel neutral connection is made using the pigtail lead built into the circuit breaker. Two-wire circuit breakers require two pole spaces; three-wire circuit breakers require three pole spaces.

QO-SWN and QOB-SWN circuit breakers are available with the complete range of QO accessories.

QOT Tandem Circuit Breakers



One-pole QOT Tandem Circuit Breaker

Tandem circuit breakers are used in applications where circuit loading is light and/or noncontinuous as in residential applications. Two one-pole, thermal-magnetic circuit breakers are manufactured to occupy only one QO pole space. Square D offers QOT circuit breakers in 15/15 ampere, 15/20 ampere and 20/20 ampere constructions.

QOT circuit breakers have a mounting cam to limit their installation in QO load centers to only those positions having a mounting rail slot. UL has regulations on size and physical limitation features for connecting such circuit breakers to the panelboard bus. These regulations are based on heat rise limitations of the panelboard assembly and actually limit the total number of circuit breakers permitted in the panelboard for safe operation.

Each one-pole QOT circuit breaker provides individual switching and tripping action. Individual trip, two-pole circuits with common switching may be assembled by using a handle tie (catalog number QOTHT) between the adjacent poles of two QOT circuit breakers.

QO-PL and QOB-PL POWERLINK® Remotely Operated Circuit Breakers



One-pole QO-PL Circuit Breaker

QO-PL and QOB-PL circuit breakers combine overcurrent and short-circuit protection with remote switching. These circuit breakers are ideal for lighting loads or wherever power switching is required.

These circuit breakers are designed to be used with many types of control devices, from simple push buttons to programmable controllers and energy management systems. QO-PL and QOB-PL circuit breakers have all the features of standard QO circuit breakers including VISI-TRIP, plus the added ability to be remotely switched on and off. They are rated for a minimum of 30,000 remote operations.

Remote switching is accomplished using a 24 Vdc power supply. Square D offers QOPLPS and QOBPLPS power supplies. These power supplies mount directly in any QO load center or NQOD panelboard just like a QO circuit breaker. They provide power to switch up to three QO-PL or QOB-PL circuit breakers simultaneously.



QOPLPS Power Supply

The table below gives the recommended number of QO-PL or QOB-PL circuit breakers that can be operated simultaneously while being supplied by one QOPLPS power supply. The table is based on available voltage and ambient temperature of -25°C to 40°C. A minimum of two seconds recharge time must be allowed between operations for non-simultaneous operations of circuit breakers being supplied by a QOPLPS power supply.

QO-PL and QOB-PL Circuit Breakers Recommended per Each QOPLPS Power Supply

Voltage	Number of QO-PL and QOB-PL Circuit Breakers Recommended per QOPLPS
208Y/120 Vac	2
240 Vac	3



Two-pole QO-PL Circuit Breaker



Special Application Circuit Breakers



One-pole QO-AFI
Circuit Breaker

QO-AFI Arc-D-tect™ Circuit Breakers

The Arc-D-tect™ circuit interrupter quickly detects a wide range of arc-fault conditions. The Arc-D-tect circuit breaker recognizes the nature and specific wave-form of an arc fault and trips the circuit breaker. Traditional circuit breakers and fuses are designed to detect overloads and short circuits. GFCIs (ground-fault circuit interruptors) detect overloads, short circuits and ground faults. Arc-D-tect (AFCI) circuit breakers are specifically designed to detect overloads, short circuits and arc faults. The Arc-D-tect circuit breaker opens the circuit and stops the arcing and high intensity heat before a fire is likely to ignite. It is also designed with the same quick-open and VISI-TRIP features and reliability of other QO circuit breaker products.

QO-AFI Circuit Breaker Catalog Numbers

Ampere Rating	One-pole, 120 Vac, 10,000 A Interrupting Rating
15	QO115AFI
20	QO120AFI

How Arc-D-tect Circuit Breakers Operate

There are many potential ways arc faults can occur throughout the home. A few of the typical conditions where arc faults may occur include:

- Damaged wires
- Worn electrical insulation
- Loose electrical connections
- Wires or cords in contact with vibrating metal
- Overheated or stressed electrical cords and wires
- Misapplied or damaged electrical appliances

Arc-D-tect circuit breakers must differentiate true arc faults from chopped wave-forms associated with switched-mode power supplies on electrical appliances, computers and lamp dimmers. They must also be able to differentiate true arc faults from necessary operational arcs associated with electrical motors, switches and receptacles.

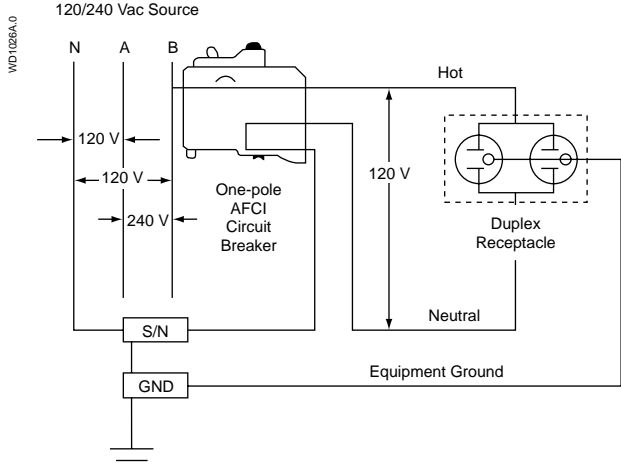
Arc-D-tect circuit breakers have special microprocessor-based arc identification to differentiate operational (good) arcs from actual arc faults which can cause damage and fires.

Arc-D-tect circuit breakers are designed to fit into most existing Square D load centers and can generally be used as a direct replacement for a standard Square D circuit breaker. The overall size is slightly larger than a Square D QWIK-GARD GFCI. The Arc-D-tect circuit breaker has a blue test button to provide a quick and easy method to check its function.

The Arc-D-tect circuit breaker has two load connections and a white “pigtail” in addition to the line side plug-on connector. The line side “hot” connection uses the standard QO plug-on configuration.

The white pigtail must be connected to the panel neutral (S/N) assembly. The blue test button requires the connection of the pigtail to operate. Both the neutral and the “hot” wires of the branch circuit being protected are terminated in the Arc-D-tect circuit breaker. The two load connections are clearly marked LOAD/CARGA/CHARGE Ⓞ and LOAD/CARGA/CHARGE Ⓟ by molded lettering on the circuit breaker case. Also molded into the case is a marking for PANEL/PANNEAU Ⓟ, which is the pigtail connection. See the following diagram for installing the Arc-D-tect circuit breaker.





AFCI Arc-D-tect Circuit Breaker Installation

ACCESSORIES

Most QO and QOB circuit breakers can be supplied with electrical accessories factory-installed on one-, two- or three-pole circuit breakers. Field-installed handle accessories are available as shown in the table on page 17. See the Special Application Circuit Breakers section for information on accessory availability. Electrical accessories are not available on AFCI circuit breakers.

Only one electrical accessory can be installed per circuit breaker. Electrical accessories are factory-installed only. No field modification is possible. All electrical accessories occupy one additional pole space. The proper suffix number must be added to the circuit breaker catalog number to order an accessory. See the table below for available suffix numbers.

Field-installed accessories are also available for QO and QOB circuit breakers. All field-installed accessories must be ordered separately. See the table on page 17 for field-installed accessory part numbers.

Factory-installed Electrical Accessories

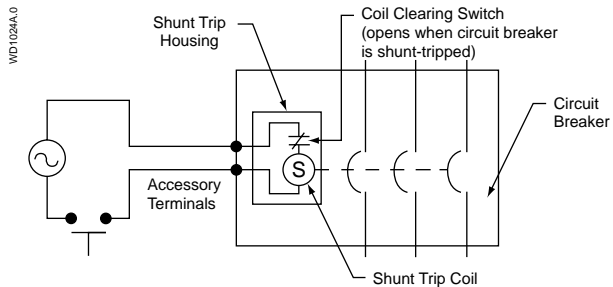
Accessory	Description	Volts	Coil Burden VA	Catalog Suffix
Shunt Trip	Used for tripping the circuit breaker electrically using a remote control source, dc and/or 50/60 Hz Vac as indicated. Includes coil clearing switch.	12 ac/dc 24 ac/dc	60 168	1042
		120 Vac 208 Vac 240 Vac	72 228 288	1021
		277 Vac	416	1082
Auxiliary Switch "A" Contact	Circuit breaker open.	One contact only, opens when circuit breaker is off or tripped. 5 A max. at 120 Vac, 50/60 Hz.		1200
Auxiliary Switch "B" Contact	Circuit breaker open.	One contact only, closed when circuit breaker is off or tripped. 5 A max. at 120 Vac, 50/60 Hz.		1201
Alarm Switch	Circuit breaker tripped.	One contact only, closed when circuit breaker is tripped. 5 A max. at 120 Vac, 50/50 Hz.		2100
	Circuit breaker open or closed.	One contact only, open when circuit breaker is on or off. 5 A max. at 120 Vac, 50/50 Hz.		



Shunt Trip

The shunt trip accessory is used to trip the circuit breaker from a remote location by using a trip coil energized from a separate circuit. When energized by a push button or other pilot device, the shunt trip causes the circuit breaker to trip. The handle moves to the tripped position and the VISI-TRIP indicator appears. The trip coil has a coil clearing contact to break the coil circuit when the circuit breaker trips.

Shunt trips are available for QO and QOB circuit breakers only (not for miniature switches, QO-GFCI products or QO-EPD products) with standard control voltage ratings up to 277 Vac or 24 Vdc. A 120 Vac shunt trip operates at 55% or more of rated voltage and all other shunt trips operate at 75% or more of rated voltage. See the following wiring diagram.

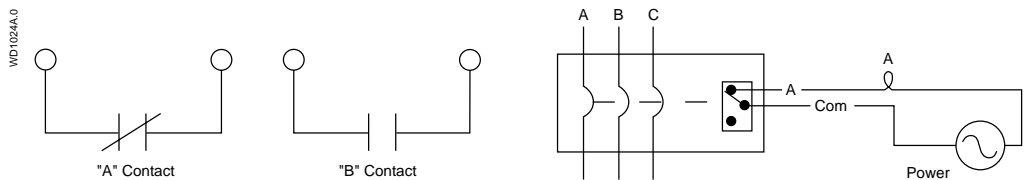


Shunt Trip Wiring Diagram

Auxiliary Switch

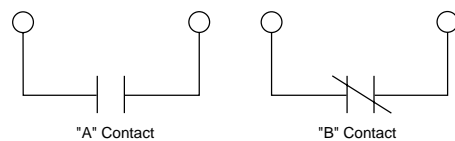
The auxiliary switch accessory monitors the circuit breaker contact status and provides a remote signal indicating whether the circuit breaker contacts are open or closed. When the circuit breaker is off or tripped, the auxiliary switch with an “A” contact is open and the auxiliary switch with a “B” contact is closed. When the circuit breaker is on, the auxiliary switch with an “A” contact is closed and the auxiliary switch with a “B” contact is open.

Auxiliary switches are available for QO and QOB circuit breakers and miniature switches. See the following wiring diagrams.



Circuit Breaker ON

Circuit Breaker ON—Light A “On”



Circuit Breaker OFF or Tripped

Circuit Breaker OFF or Tripped—Light B “On”



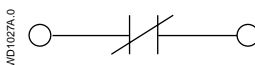
Alarm Switch

The alarm switch accessory monitors the circuit breaker trip status and is used to provide a remote warning signal indicating that the circuit breaker has tripped. This signal can be used in conjunction with a horn, pilot light or some other indicator.

The contact on the standard alarm switch is open when the circuit breaker is in the off or on position and is closed when the circuit breaker is in the tripped position.

Alarm switches are actuated when the circuit breaker has tripped as a result of an overload, short circuit or shunt trip operation.

Alarm switches are available for QO and QOB circuit breakers and miniature switches. See the wiring diagram below.



Normally-open Alarm Switch Circuit Breaker Tripped



Circuit Breaker OFF or ON

Field-installed Accessories

Accessory	Description	Catalog Number
Handle Tie	Ties 2 one-pole circuit breakers together. Ties 2 one-pole side-by-side QOT circuit breakers together. Ties 3 one-pole circuit breakers together, includes lock-off for California Title 24.	QO1HT QOTHT QO3HT
Handle Lock-off (Clamp)	Attaches to one-pole circuit breaker handles. Attaches to one-, two- or three-pole circuit breaker handles.	QO1LO HLO1
Handle Padlock Attachment	One-pole circuit breakers (all). Attaches to circuit breaker escutcheon—fixed. One-pole QOT circuit breakers. Attaches to circuit breaker escutcheon—fixed. Two-pole and three-pole circuit breakers (except GFI, EPD, AFI). Attaches to circuit breaker escutcheon—fixed. One-pole circuit breakers (except GFI, EPD, AFI). Attaches to circuit breaker handle—removable. Two-pole and three-pole circuit breakers (except GFI, EPD, AFI). Attaches to circuit breaker handle—removable. Two-pole QO-GFI, QO-EPD, QO-AFI only.	QO1PA QOTHPA QO1PL QOHPL QO1HPL GFI2PA
Mechanical Interlock	Interlocks 2 two-pole or 1 two-pole and 1 one-pole QO circuit breakers.	QO2DTI
Mechanical Interlock with Retaining Kit	For interlocking two adjacent back-fed circuit breakers in dual power supply applications. Interlocks 2 two-pole or 1 two-pole and 1 one-pole QO circuit breakers.	QO2DTIM
Rainproof Cover	Vertical cover for two-pole circuit breakers. Horizontal cover for two-pole circuit breakers.	BCV BCH

Handle Tie

The handle tie accessory converts any adjacent one-pole QO circuit breakers to one independent trip multi-pole circuit breaker.

Handle Lock-off (Clamp)

The handle lock-off accessories fasten the handle in the on or off position. These handle lock-offs cannot be padlocked.

Handle Padlock Attachment

The handle padlock attachment allows padlocking the circuit breaker handles in on or off position.

Handle padlock attachments are available in two styles: removable and fixed. The removable style is intended to be a temporary device. Once work on the circuit has been completed, the attachment can



Trip Curves

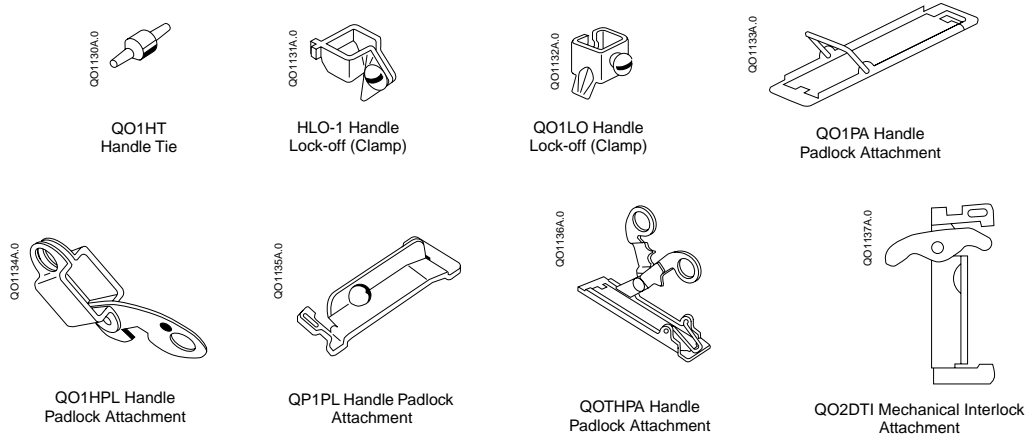
be removed for the circuit breaker to resume normal operation. The fixed style is intended to be a permanent device. Once the work on the circuit has been completed, the padlock can be removed for the circuit breaker to resume normal operation, but the attachment stays in place.

Mechanical Interlock Attachment

The mechanical interlock attachment locks the handles of two adjacent circuit breakers to prevent both circuit breakers from being on at the same time. Both circuit breakers may be switched to the off position with the mechanical interlock in place.

Mechanical Interlock Attachment with Retaining Kit

The mechanical interlock attachment locks the handles of two adjacent back-fed circuit breakers in dual power supply applications.



TRIP CURVES

The tripping characteristics of molded case circuit breakers can be represented by a characteristic tripping curve that plots tripping time versus current level. The curve shows the amount of time required for a circuit breaker to trip at a given overcurrent level. Manufacturing tolerances result in a curve that is a band bound by minimum and maximum values of total clearing time. Total clearing time is the sum of the sensing time, unlatching time, mechanical operating time and arcing time of the circuit breaker. For currents in excess of 135% of the circuit breaker rating at rated ambient temperature (40°C), the circuit breaker will automatically open the circuit within limits specified by the band.

Thermal Tripping Characteristics

The upper left portion of each trip curve displays the thermal response of the circuit breaker. On low-fault current levels, up to the magnetic tripping level, thermal tripping occurs when a bimetal in the circuit breaker responds to heat associated with the overcurrent. The bimetal deflects, unlatching the mechanism and mechanically causing the circuit breaker to trip and open the circuit. The larger the overload, the faster the circuit breaker will operate to clear the circuit.

Magnetic Tripping Characteristics

The lower right portion of each trip curve displays the magnetic tripping response of the circuit breaker. This takes place when overcurrents of sufficient magnitude operate an internal magnetic armature which unlatches the mechanism. Magnetic tripping occurs with no intentional time delay.





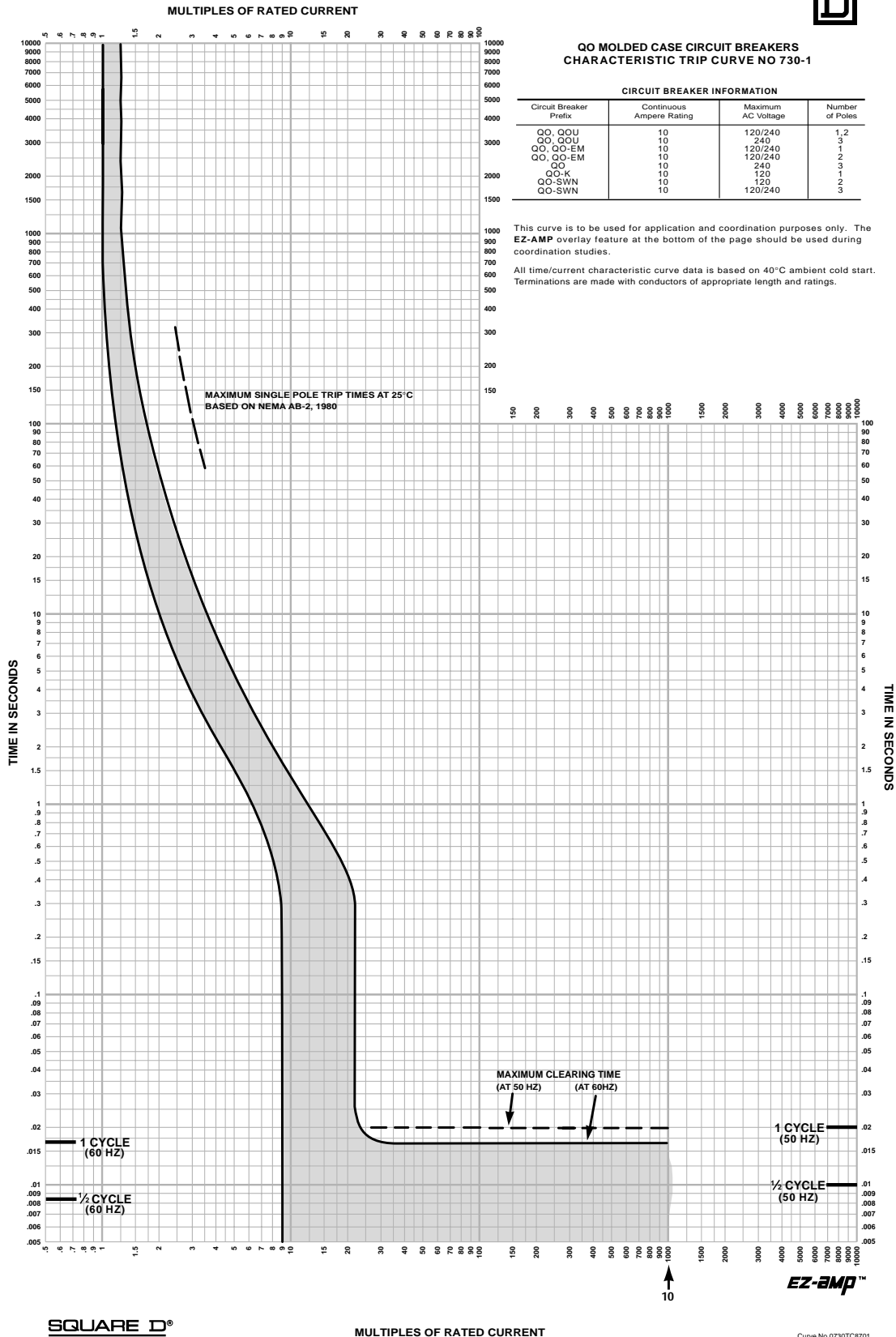
QO MOLDED CASE CIRCUIT BREAKERS CHARACTERISTIC TRIP CURVE NO 730-1

CIRCUIT BREAKER INFORMATION

Circuit Breaker Prefix	Continuous Ampere Rating	Maximum AC Voltage	Number of Poles
QO, QOU	10	120/240	1, 2
QO, QOU	10	240	3
QO, QO-EM	10	120/240	1
QO, QO-EM	10	120/240	2
QO	10	240	3
QO-K	10	120	1
QO-SWN	10	120	2
QO-SWN	10	120/240	2, 3

This curve is to be used for application and coordination purposes only. The **EZ-AMP** overlay feature at the bottom of the page should be used during coordination studies.

All time/current characteristic curve data is based on 40°C ambient cold start. Terminations are made with conductors of appropriate length and ratings.



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MULTIPLES OF RATED CURRENT

Curve No. 0730TC8701
Drawing No. B48095-730-01



Trip Curves



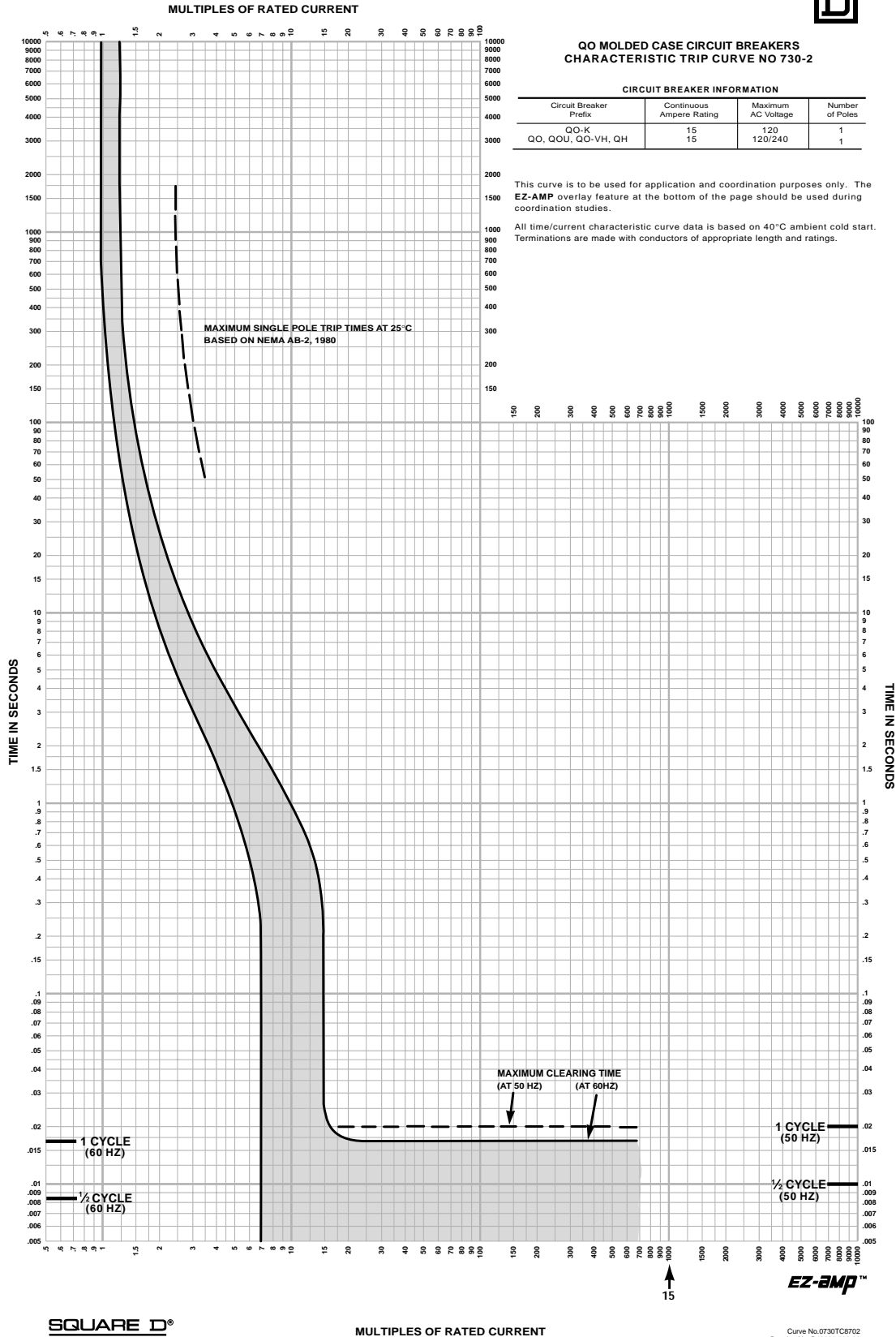
QO MOLDED CASE CIRCUIT BREAKERS CHARACTERISTIC TRIP CURVE NO 730-2

CIRCUIT BREAKER INFORMATION

Circuit Breaker Prefix	Continuous Ampere Rating	Maximum AC Voltage	Number of Poles
QO-K	15	120	1
QO, QOU, QO-VH, QH	15	120/240	1

This curve is to be used for application and coordination purposes only. The **EZ-AMP** overlay feature at the bottom of the page should be used during coordination studies.

All time/current characteristic curve data is based on 40°C ambient cold state. Terminations are made with conductors of appropriate length and ratings.



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Curve No. 0730TC8702
Drawing No. B48095-730-02





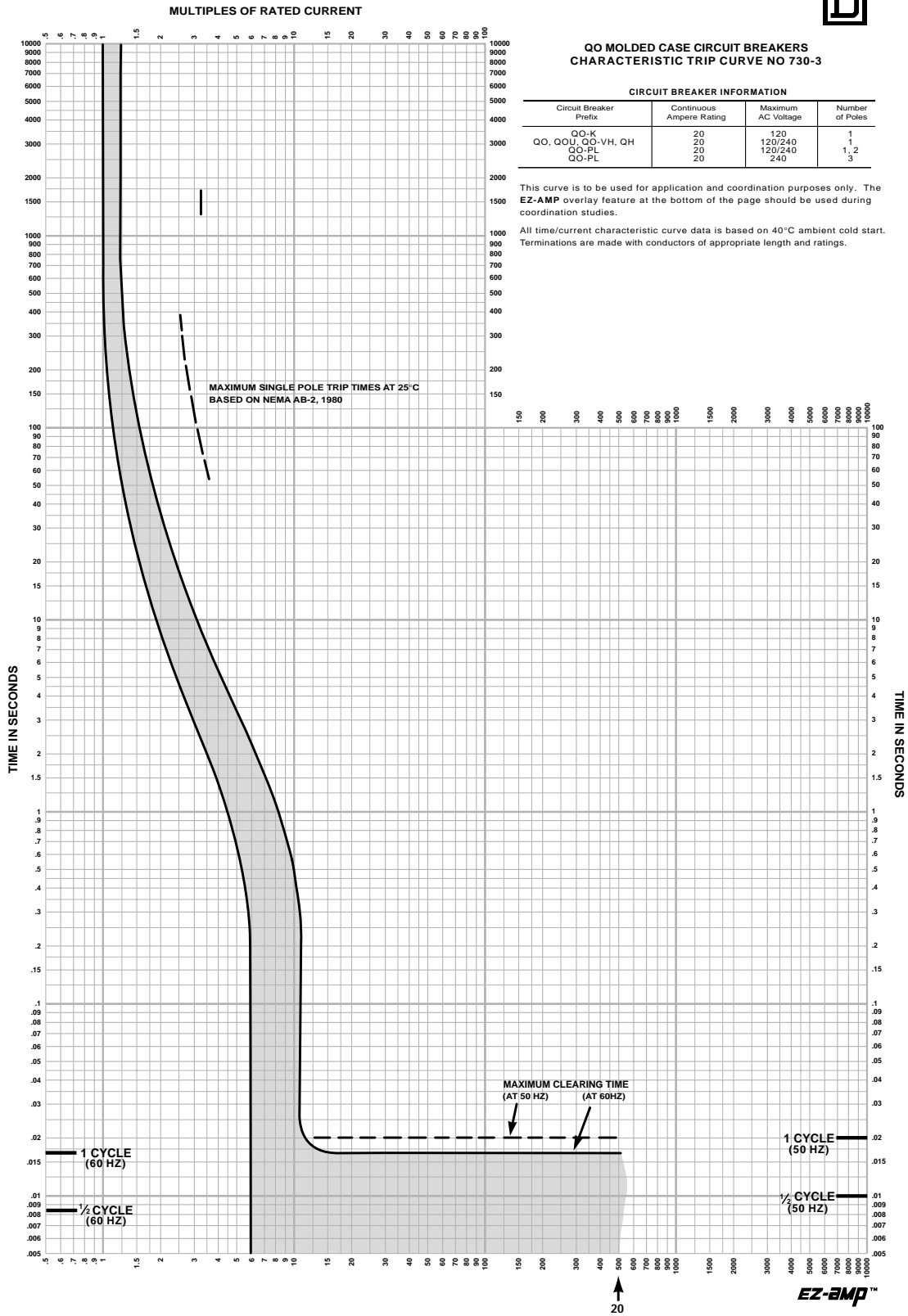
QO MOLDED CASE CIRCUIT BREAKERS CHARACTERISTIC TRIP CURVE NO 730-3

CIRCUIT BREAKER INFORMATION

Circuit Breaker Prefix	Continuous Ampere Rating	Maximum AC Voltage	Number of Poles
QO-K	20	120	1
QO, QOU, QO-VH, QH	20	120/240	1
QO-PL	20	120/240	1, 2
QO-PL	20	240	3

This curve is to be used for application and coordination purposes only. The **EZ-AMP** overlay feature at the bottom of the page should be used during coordination studies.

All time/current characteristic curve data is based on 40°C ambient cold start. Terminations are made with conductors of appropriate length and ratings.



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Drawing No. B48095-730-03

June, 1995

Order No. 0730TC8703R5/95
(Replaces 0730TC8703)



Trip Curves



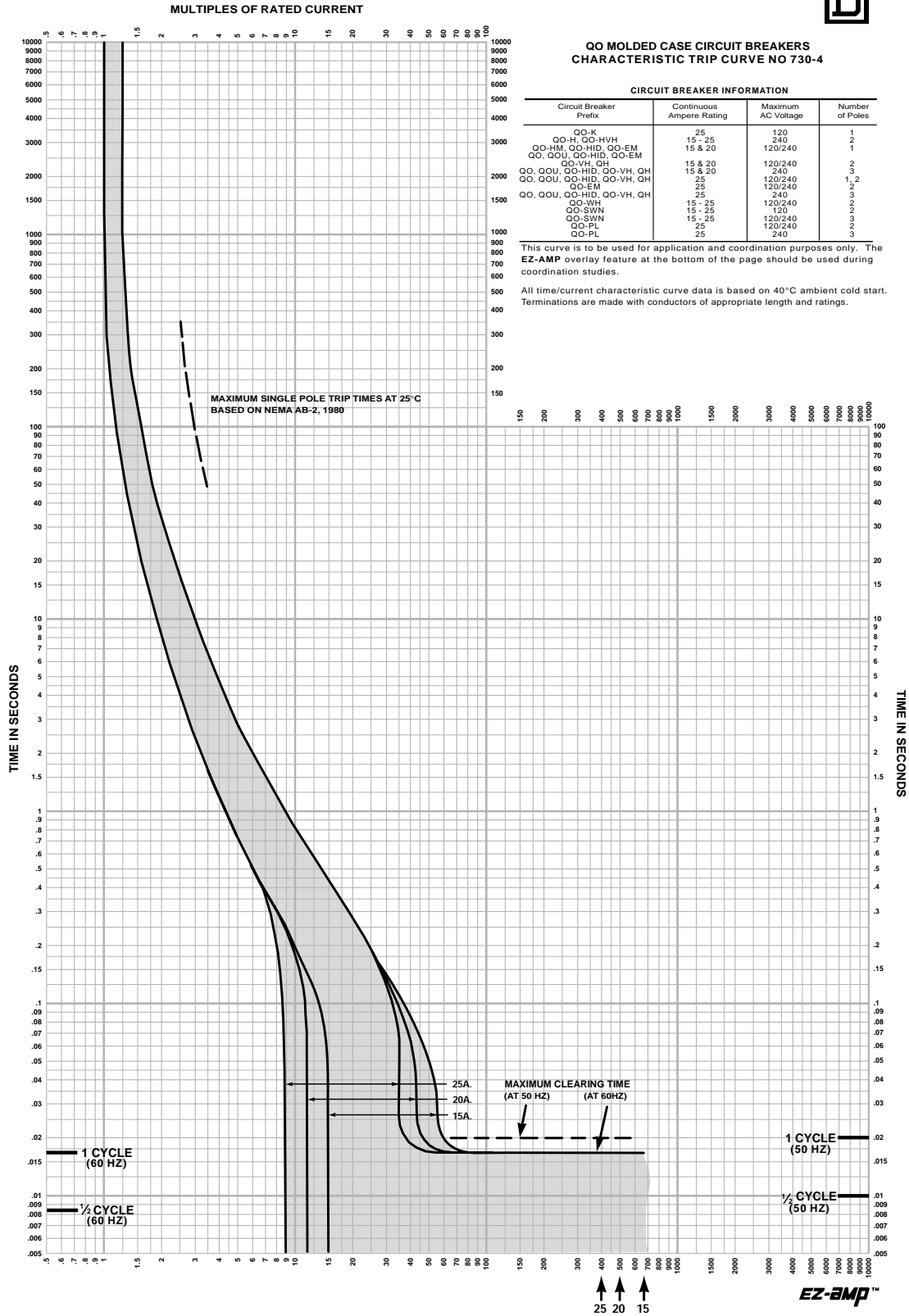
QO MOLDED CASE CIRCUIT BREAKERS CHARACTERISTIC TRIP CURVE NO 730-4

CIRCUIT BREAKER INFORMATION

Circuit Breaker Prefix	Continuous Ampere Rating	Maximum AC Voltage	Number of Poles
QO-K	25	120	1
QO-H, QO-HVH	15 - 25	240	2
QO-HM, QO-HID, QO-EM	15 & 20	120/240	1
QO, QOU, QO-HID, QO-EM	15 & 20	240	2
QO-VH, QH	15 & 20	120/240	2
QO, QOU, QO-HID, QO-VH, QH	15 & 20	240	1, 2
QO, QOU, QO-HID, QO-VH, QH	25	120/240	2
QO-EM	25	240	2
QO, QOU, QO-HID, QO-VH, QH	15 - 25	120/240	2
QO-VH	15 - 25	120	2
QO-SWN	15 - 25	120/240	3
QO-SWN	15 - 25	120/240	3
QO-PL	25	120/240	2
QO-PL	25	240	3

This curve is to be used for application and coordination purposes only. The EZ-AMP overlay feature at the bottom of the page should be used during coordination studies.

All time/current characteristic curve data is based on 40°C ambient cold start. Terminations are made with conductors of appropriate length and ratings.



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June, 1995

Order No. 0730TC8704R5/95
(Replaces 0730TC8704)

EZ-AMP™





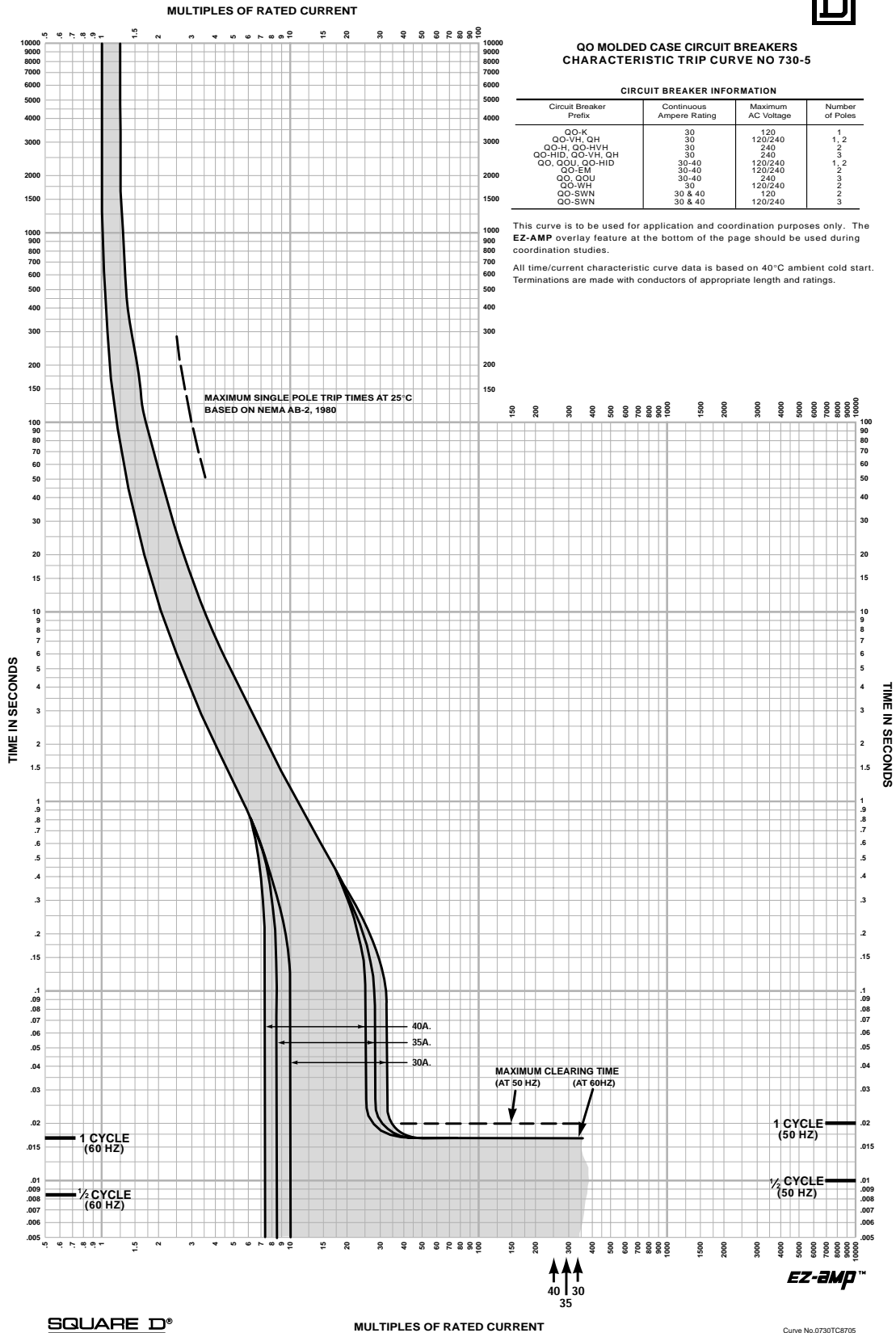
QO MOLDED CASE CIRCUIT BREAKERS CHARACTERISTIC TRIP CURVE NO 730-5

CIRCUIT BREAKER INFORMATION

Circuit Breaker Prefix	Continuous Ampere Rating	Maximum AC Voltage	Number of Poles
QO-K	30	120	1
QO-VH, QH	30	120/240	1, 2
QO-H, QO-HVH	30	240	2
QO-HID, QO-VH, QH	30	240	3
QO, QOU, QO-HID	30-40	120/240	1, 2
QO-EM	30-40	120/240	2
QO, QOU	30-40	240	3
QO-WH	30	120/240	2
QO-SWN	30 & 40	120	2
QO-SWN	30 & 40	120/240	3

This curve is to be used for application and coordination purposes only. The **EZ-AMP** overlay feature at the bottom of the page should be used during coordination studies.

All time/current characteristic curve data is based on 40°C ambient cold start. Terminations are made with conductors of appropriate length and ratings.



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Curve No. 0730TC8705
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Trip Curves



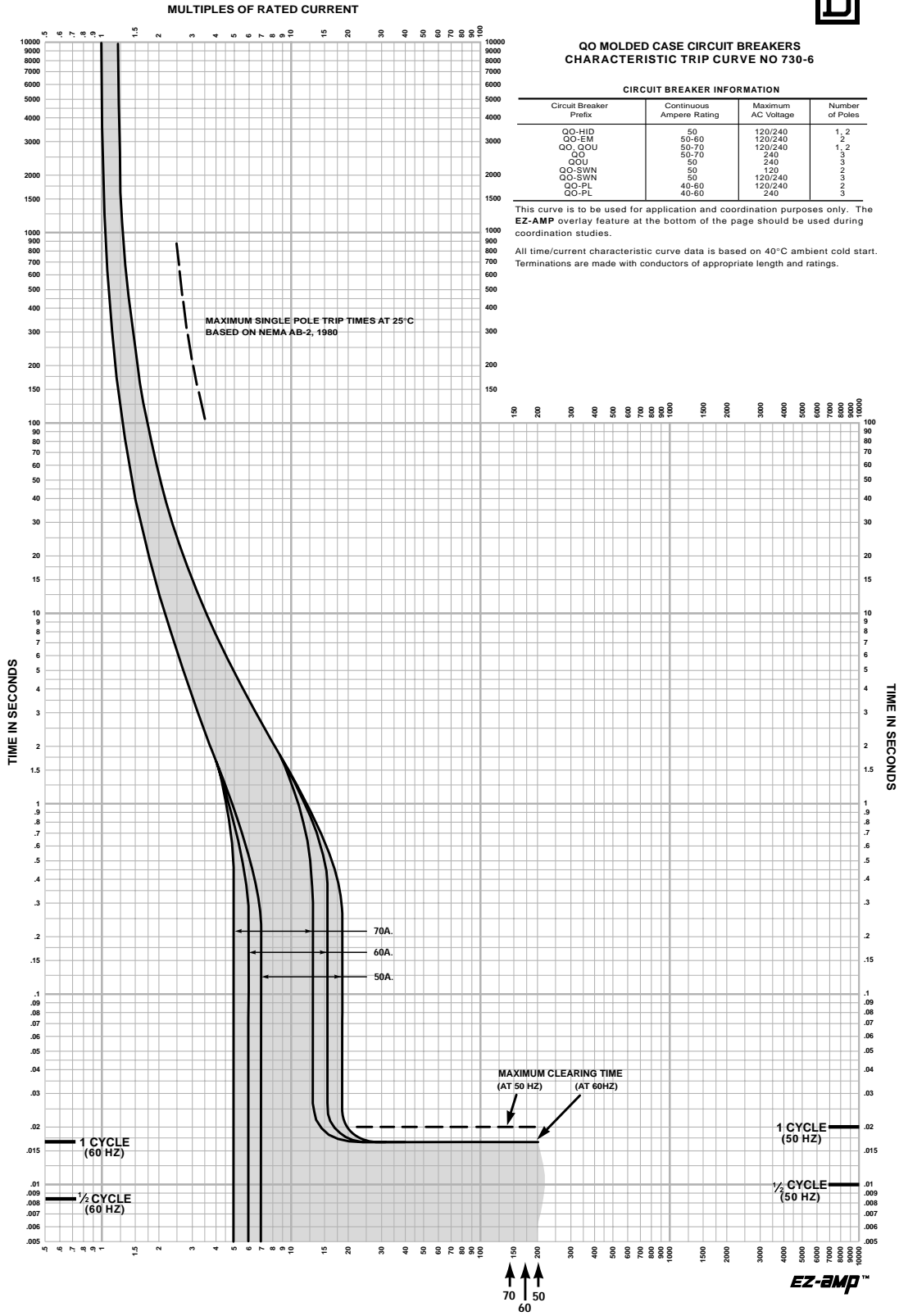
QO MOLDED CASE CIRCUIT BREAKERS CHARACTERISTIC TRIP CURVE NO 730-6

CIRCUIT BREAKER INFORMATION

Circuit Breaker Prefix	Continuous Amperes Rating	Maximum AC Voltage	Number of Poles
QO-HID	50	120/240	1, 2
QO-EM	50-60	120/240	1, 2
QO-QOU	50-70	120/240	1, 2
QO	50-70	240	1, 2, 3
QOU	50	240	3
QO-SWN	50	120	1, 2, 3
QO-SWN	50	120/240	1, 2, 3
QO-PL	40-60	120/240	1, 2, 3
QO-PL	40-60	240	3

This curve is to be used for application and coordination purposes only. The EZ-AMP overlay feature at the bottom of the page should be used during coordination studies.

All time/current characteristic curve data is based on 40°C ambient cold start. Terminations are made with conductors of appropriate length and ratings.



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June, 1995

Order No.0730TC8706R5/95
(Replaces 730-6 dated 5/87)





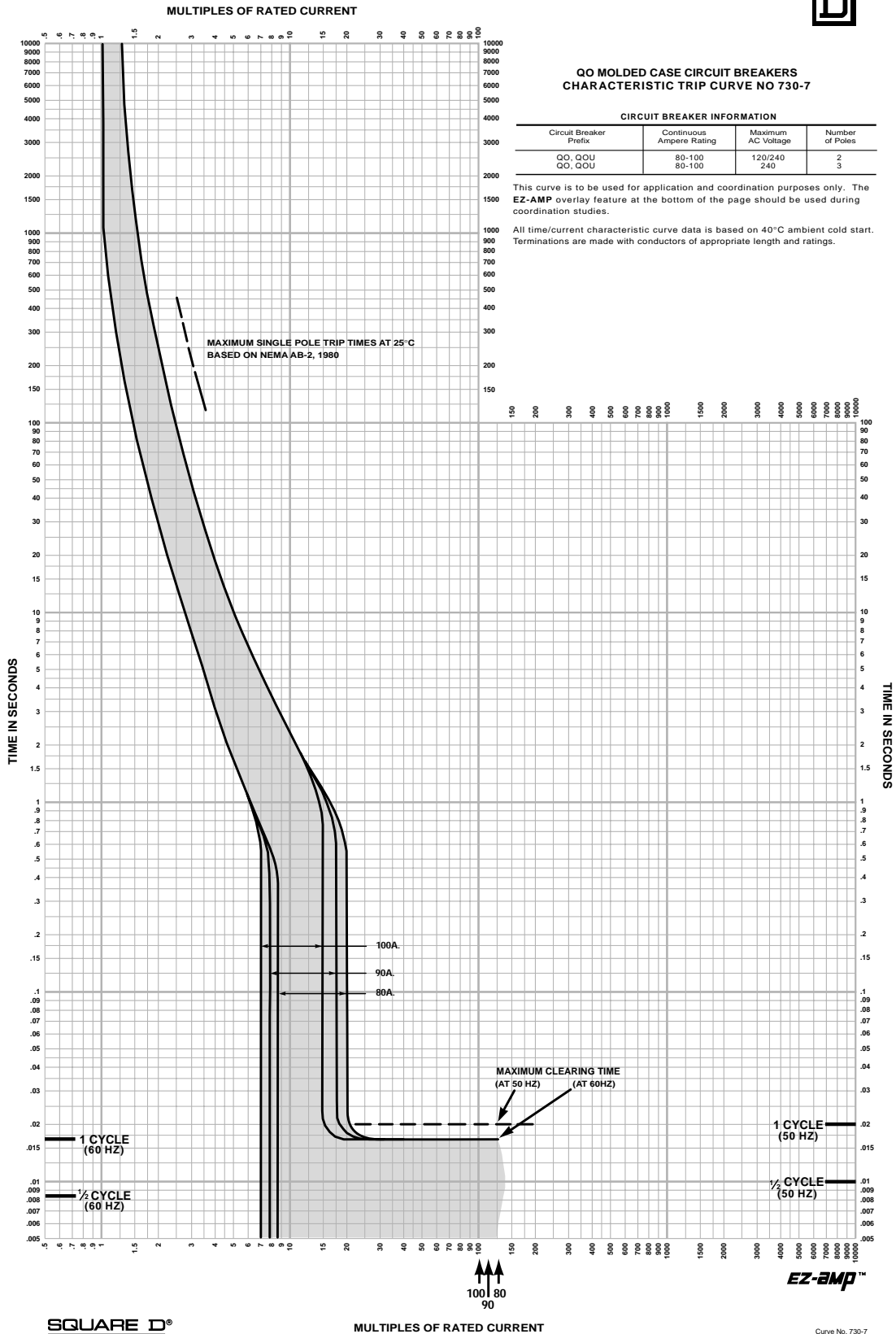
QO MOLDED CASE CIRCUIT BREAKERS CHARACTERISTIC TRIP CURVE NO 730-7

CIRCUIT BREAKER INFORMATION

Circuit Breaker Prefix	Continuous Amperes Rating	Maximum AC Voltage	Number of Poles
QO, QOU	80-100	120/240	2
QQ, QQU	80-100	240	3

This curve is to be used for application and coordination purposes only. The EZ-AMP overlay feature at the bottom of the page should be used during coordination studies.

All time/current characteristic curve data is based on 40°C ambient cold start. Terminations are made with conductors of appropriate length and ratings.



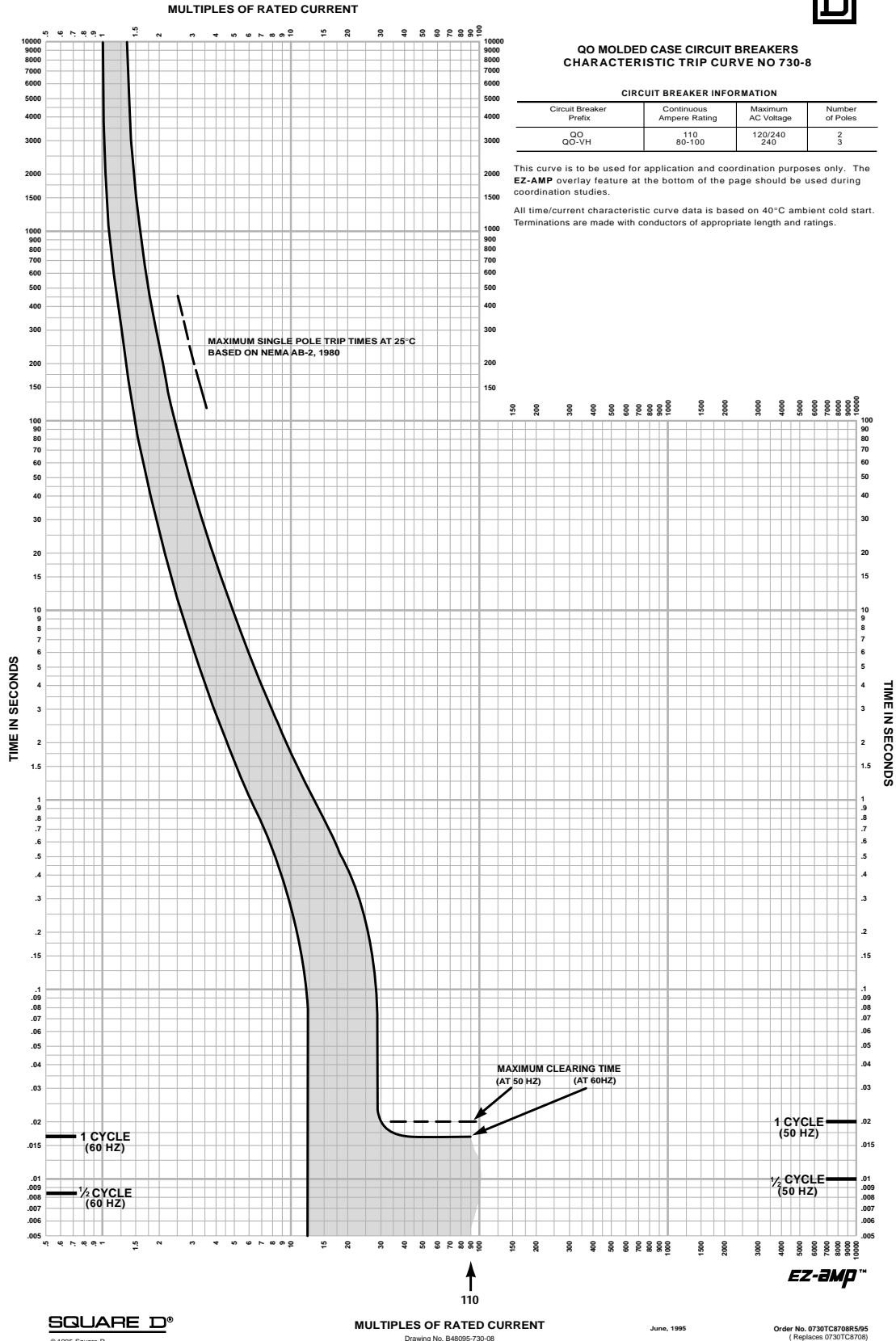
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Curve No. 730-7
5-87 Replaces Curve No. 730-7, dated 5/85



Trip Curves





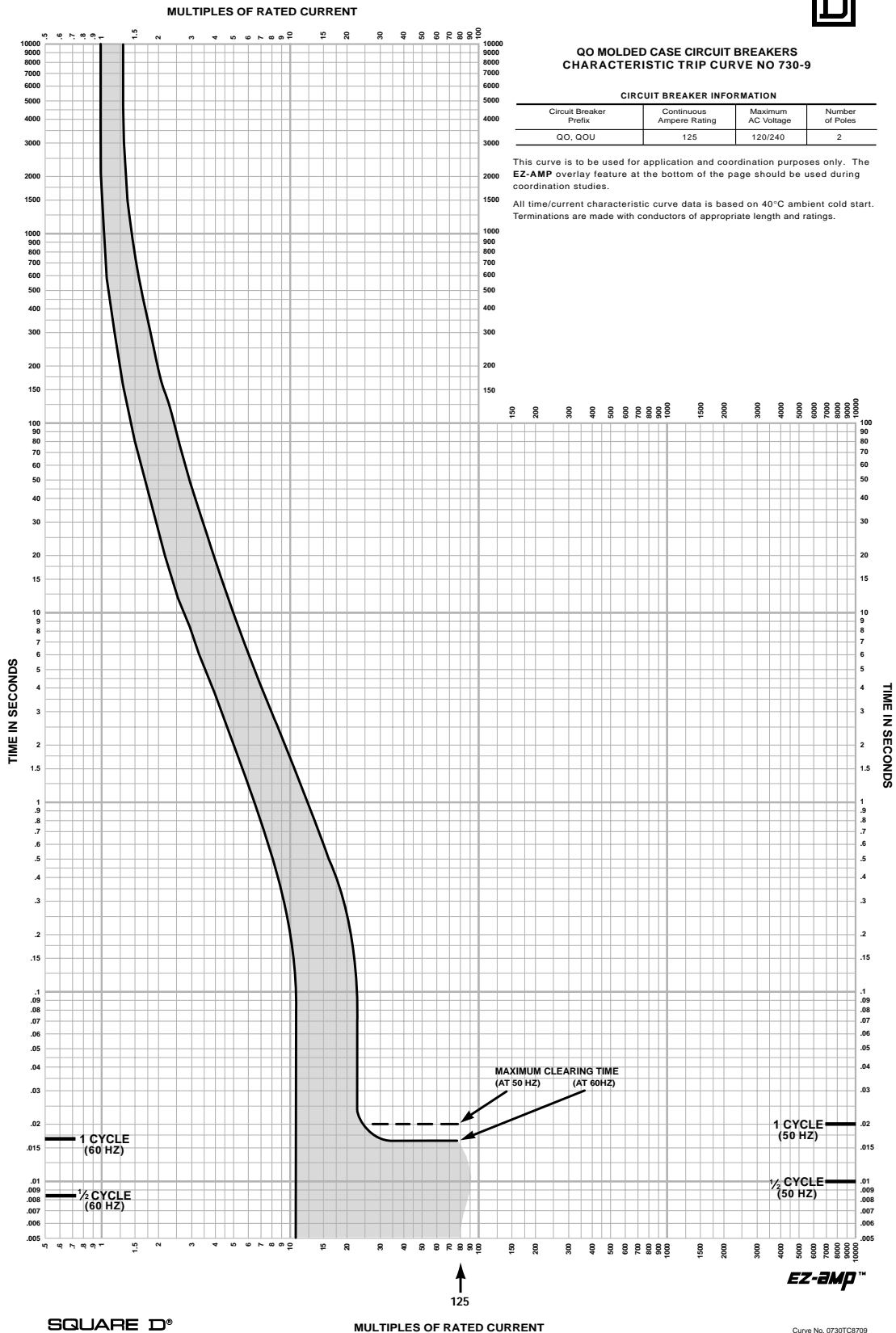
QO MOLDED CASE CIRCUIT BREAKERS CHARACTERISTIC TRIP CURVE NO 730-9

CIRCUIT BREAKER INFORMATION

Circuit Breaker Prefix	Continuous Ampere Rating	Maximum AC Voltage	Number of Poles
QO, QDU	125	120/240	2

This curve is to be used for application and coordination purposes only. The **EZ-AMP** overlay feature at the bottom of the page should be used during coordination studies.

All time/current characteristic curve data is based on 40°C ambient cold start. Terminations are made with conductors of appropriate length and ratings.



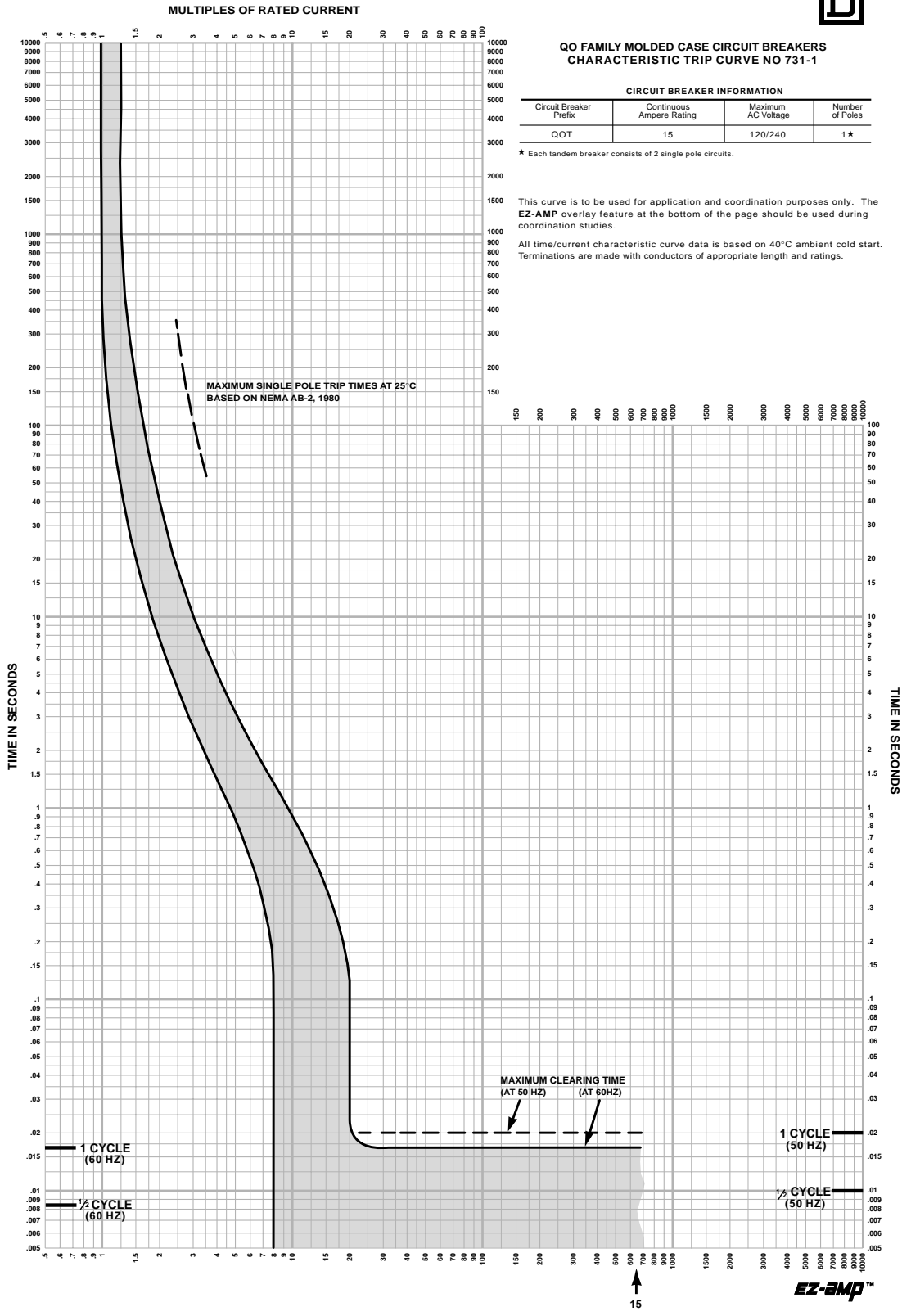
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Curve No. 0730TC8709
Drawing No. B48095-730-09



Trip Curves

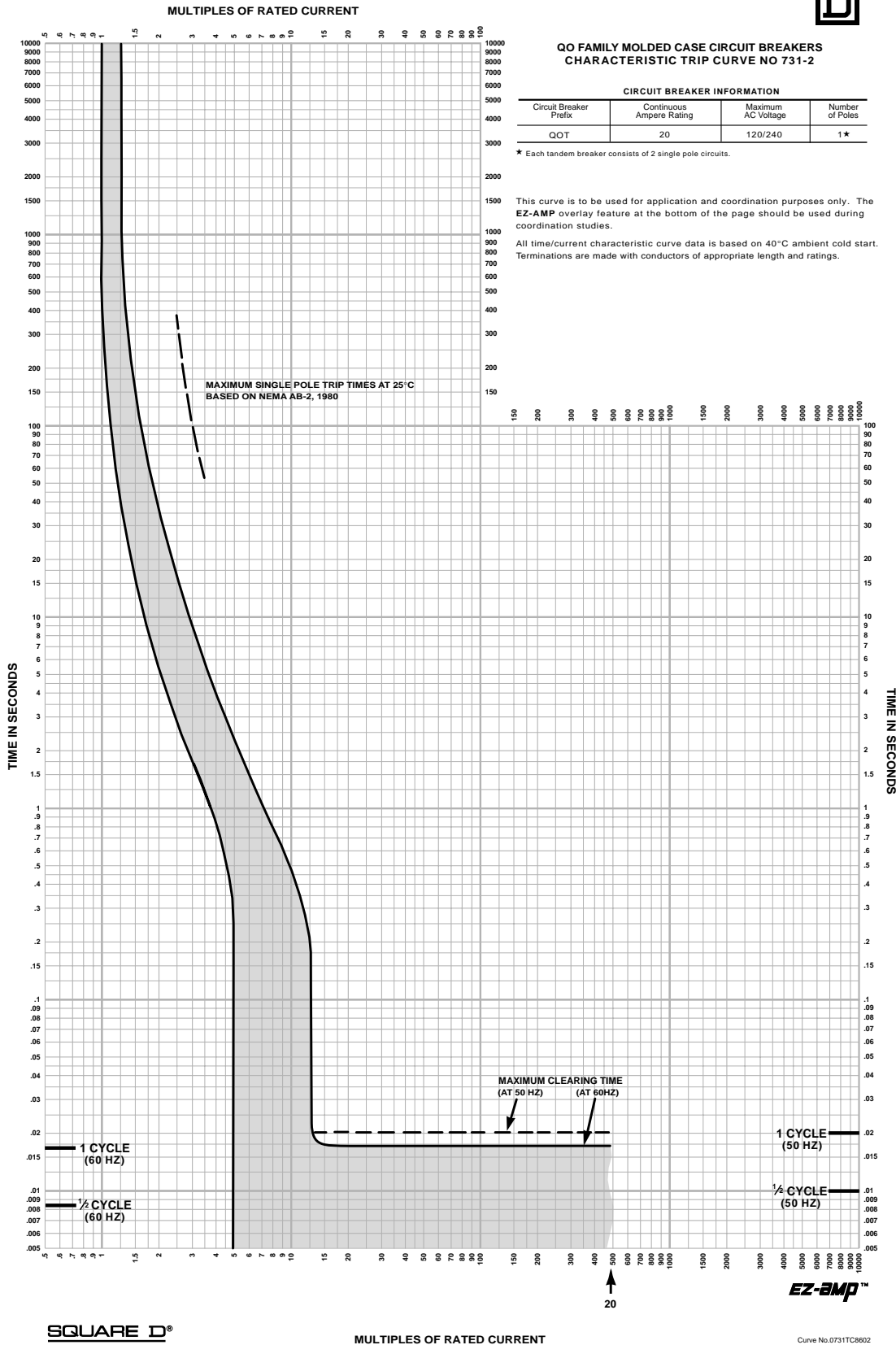


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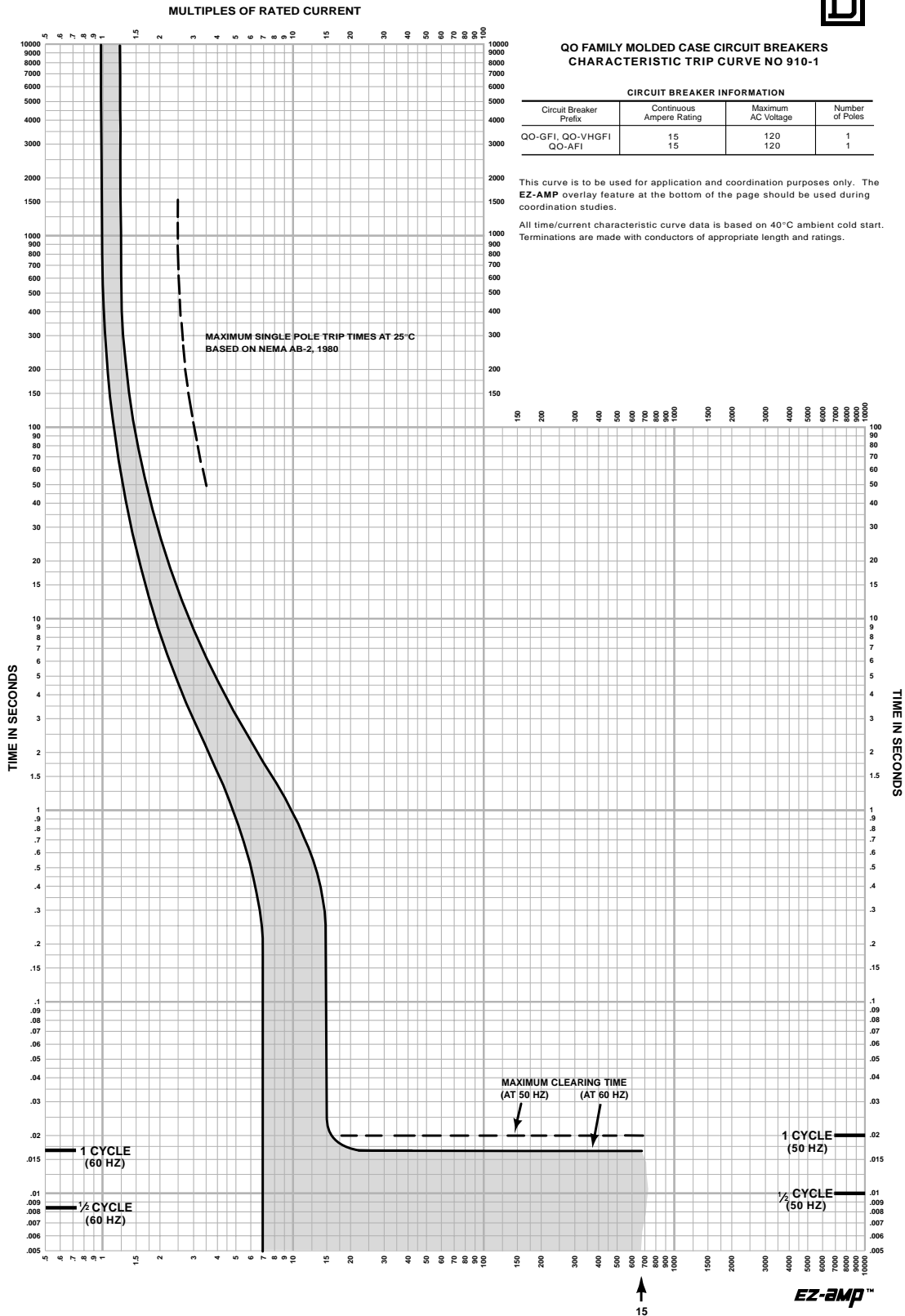
MULTIPLES OF RATED CURRENT

Curve No. 0731TC8501
Drawing No. B48095-731-01





Trip Curves



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MULTIPLES OF RATED CURRENT

Curve No. 0910TC8501
Drawing No. B44095-910-01



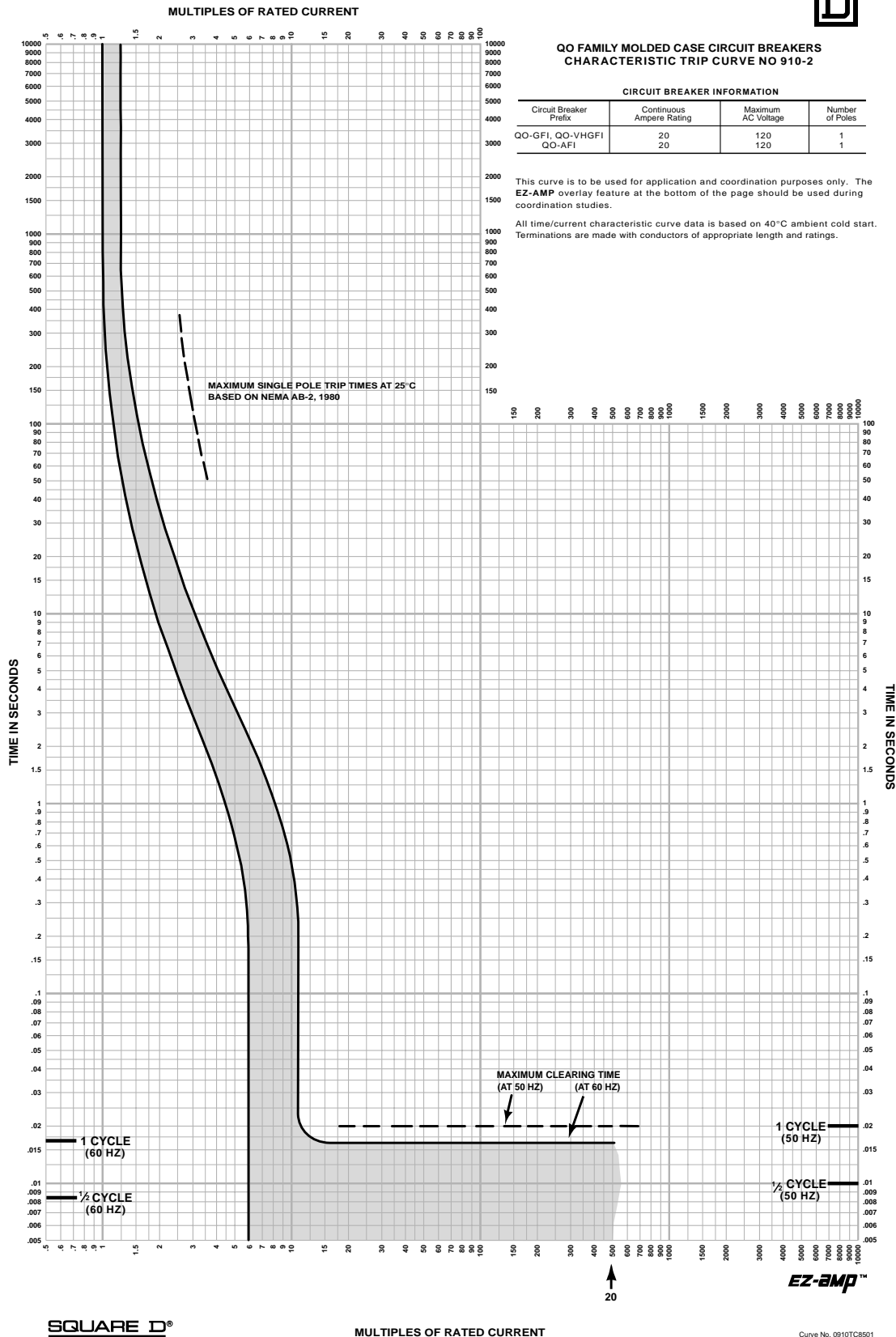


QO FAMILY MOLDED CASE CIRCUIT BREAKERS CHARACTERISTIC TRIP CURVE NO 910-2

CIRCUIT BREAKER INFORMATION			
Circuit Breaker Prefix	Continuous Ampere Rating	Maximum AC Voltage	Number of Poles
QO-GFI, QO-VHGF1	20	120	1
QO-AFI	20	120	1

This curve is to be used for application and coordination purposes only. The EZ-AMP overlay feature at the bottom of the page should be used during coordination studies.

All time/current characteristic curve data is based on 40°C ambient cold start. Terminations are made with conductors of appropriate length and ratings.



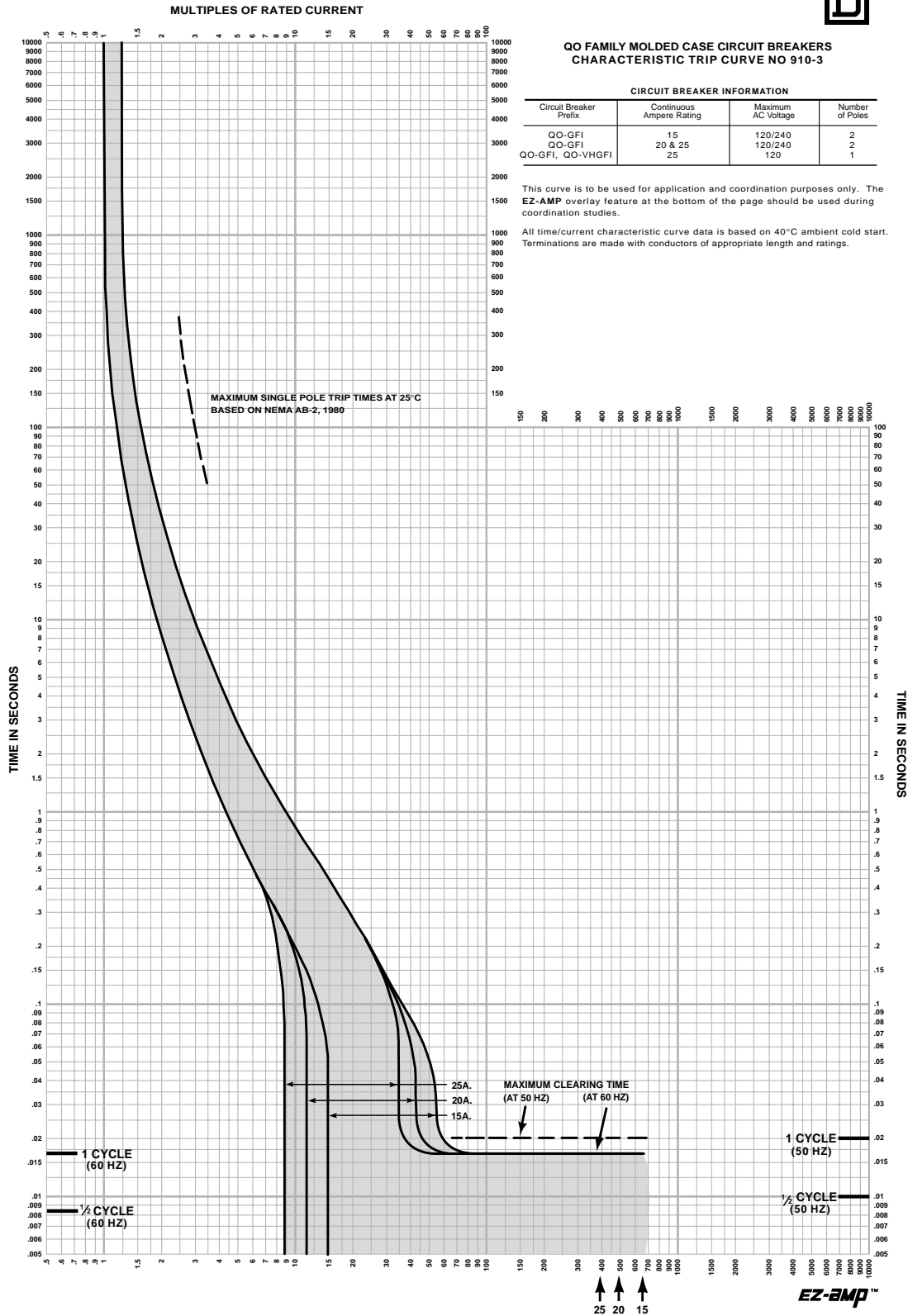
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MULTIPLES OF RATED CURRENT

Curve No. 0910TC8501
Drawing No. B48095-910-02



Trip Curves



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MULTIPLES OF RATED CURRENT

Curve No. 0910TC8503
Drawing No. B48095-910-03





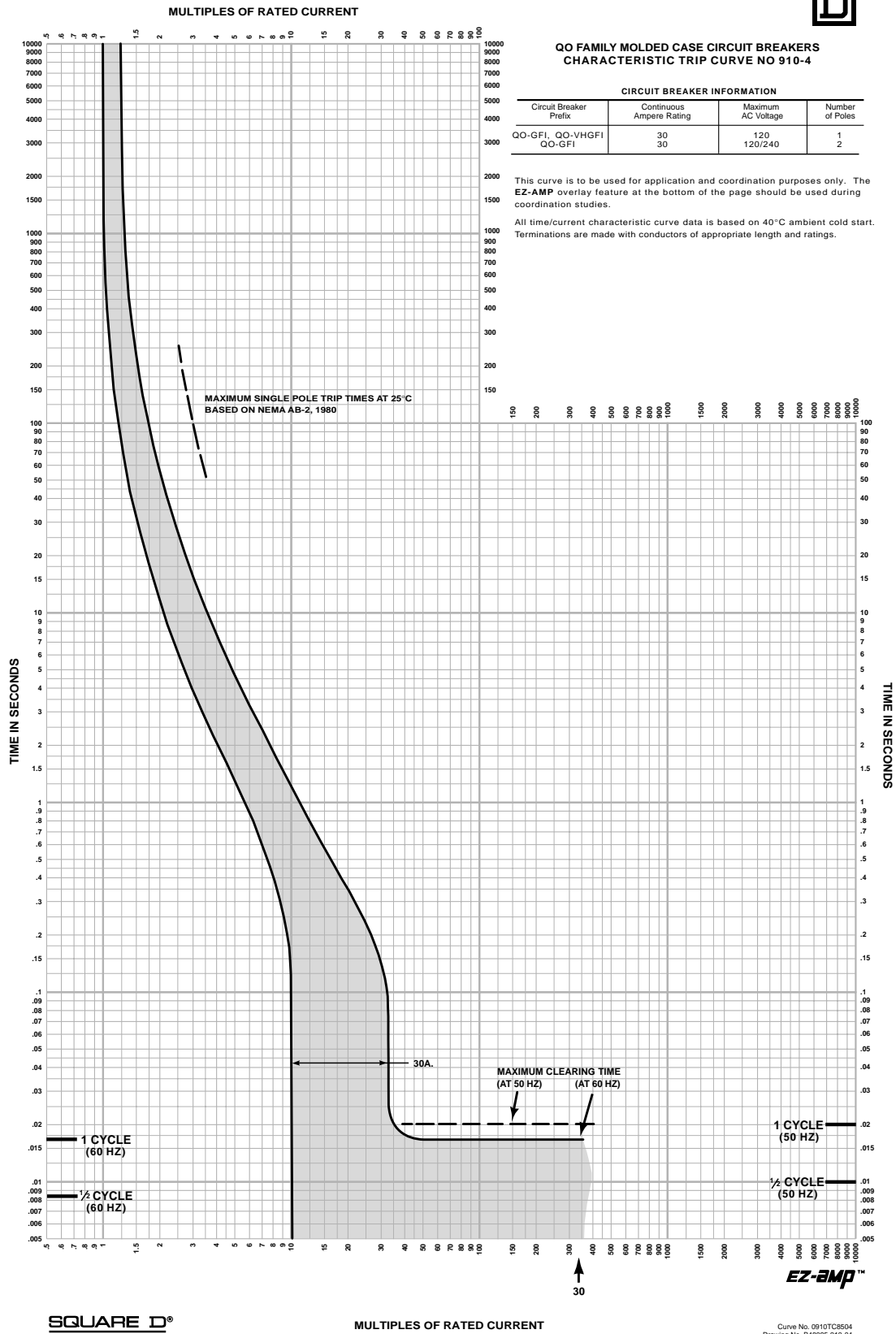
QO FAMILY MOLDED CASE CIRCUIT BREAKERS CHARACTERISTIC TRIP CURVE NO 910-4

CIRCUIT BREAKER INFORMATION

Circuit Breaker Prefix	Continuous Ampere Rating	Maximum AC Voltage	Number of Poles
QO-GFI, QO-VHGF1	30	120	1
QO-GFI	30	120/240	2

This curve is to be used for application and coordination purposes only. The EZ-AMP overlay feature at the bottom of the page should be used during coordination studies.

All time/current characteristic curve data is based on 40°C ambient cold start. Terminations are made with conductors of appropriate length and ratings.



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MULTIPLES OF RATED CURRENT

Curve No. 0910TC8504
Drawing No. B48095-910-04



Trip Curves



QO FAMILY MOLDED CASE CIRCUIT BREAKERS CHARACTERISTIC TRIP CURVE NO 910-5

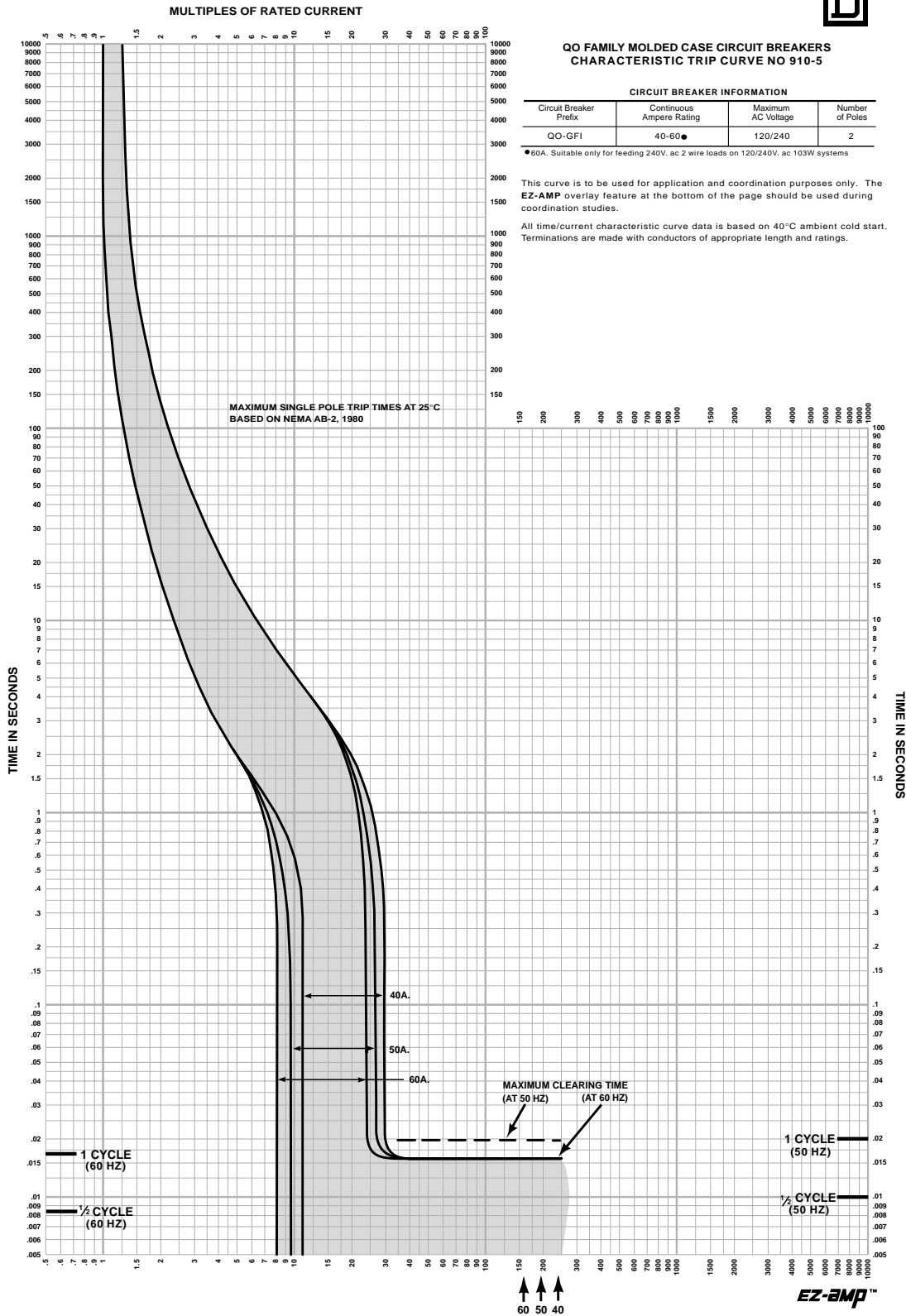
CIRCUIT BREAKER INFORMATION

Circuit Breaker Prefix	Continuous Ampere Rating	Maximum AC Voltage	Number of Poles
QO-GFI	40-60●	120/240	2

●60A. Suitable only for feeding 240V, ac 2 wire loads on 120/240V, ac 103W systems

This curve is to be used for application and coordination purposes only. The EZ-AMP overlay feature at the bottom of the page should be used during coordination studies.

All time/current characteristic curve data is based on 40°C ambient cold start. Terminations are made with conductors of appropriate length and ratings.



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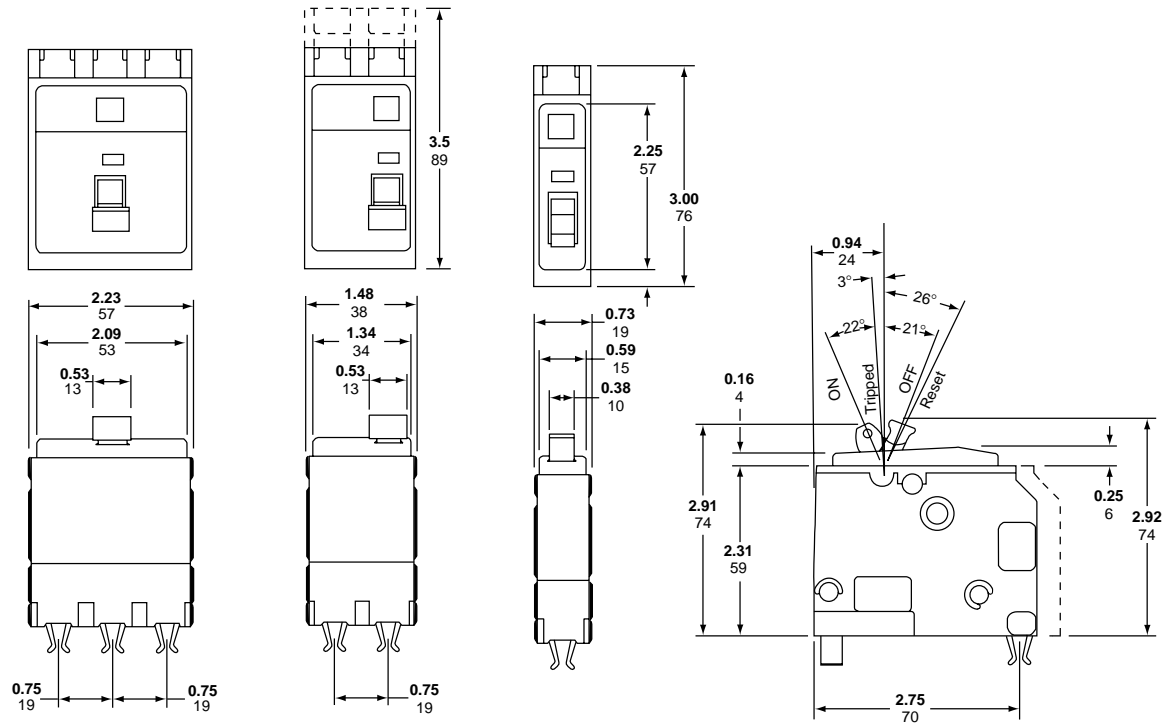
MULTIPLES OF RATED CURRENT
Drawing No. B48095-910-05

Order No. 0910TCR705



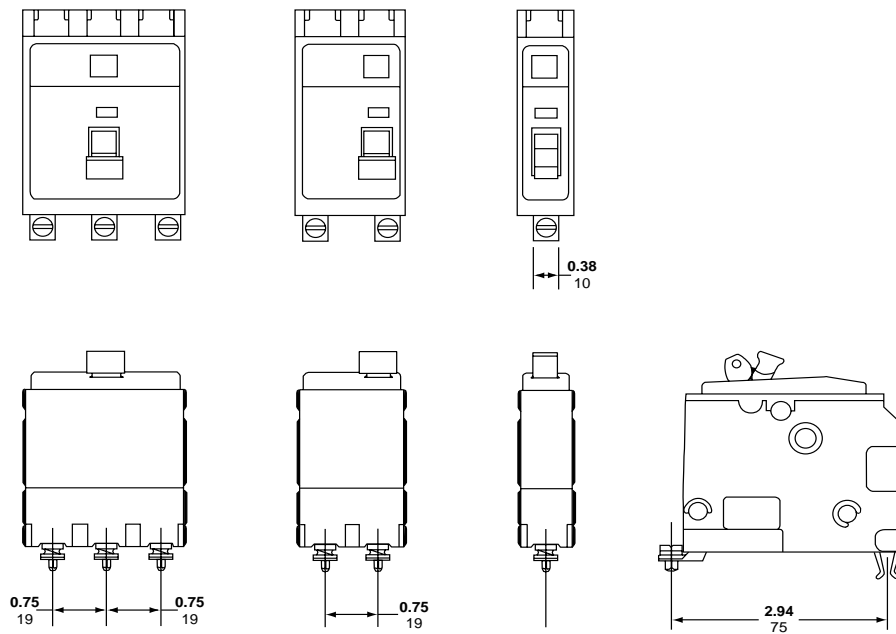
Dimensions

QO1122A.0



Type QO Plug-on Circuit Breaker

QOB1198A.0



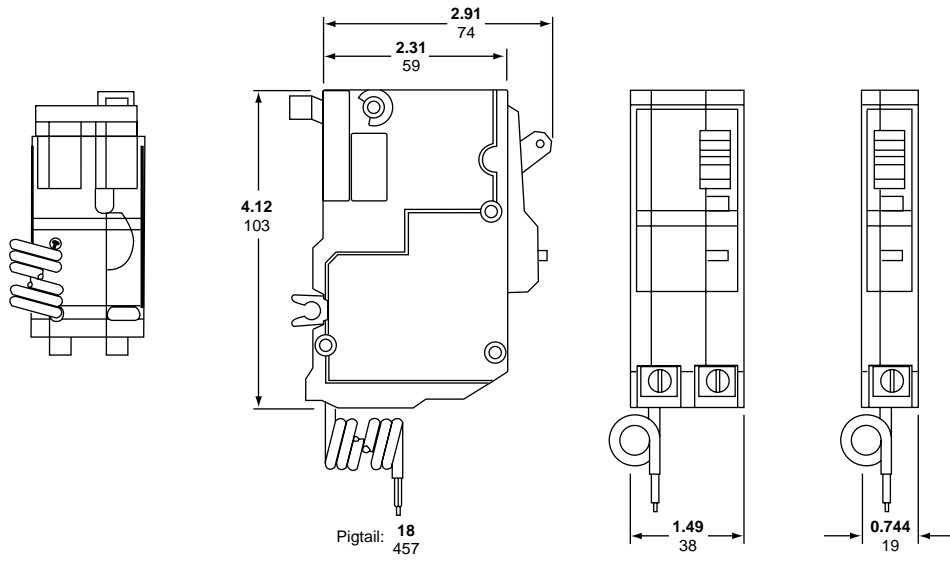
Type QOB Bolt-on Circuit Breaker

Dual Dimensions: **in.**
mm



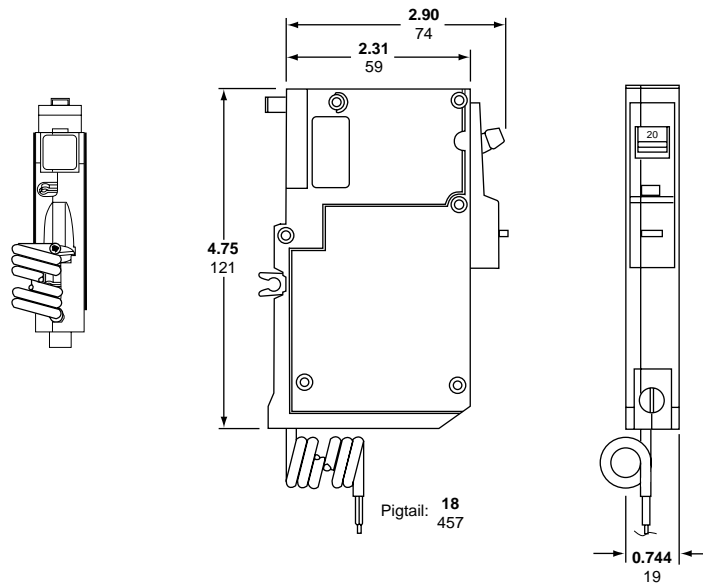
Dimensions

QO1144A.0



Type QO-GFI Circuit Breaker

QO1145A.0

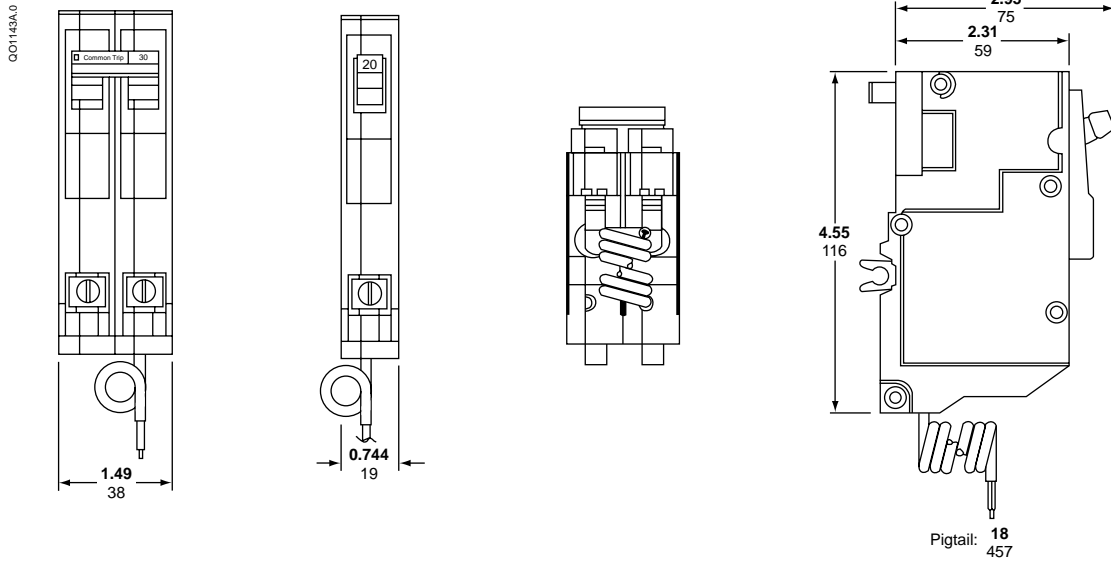


Type QO-AFI Circuit Breaker

Dual Dimensions: in.
mm



Dimensions



Type QO-PL Remote Control Circuit Breaker

Dual Dimensions: in.
mm



GLOSSARY OF TERMS AND ACRONYMS

accessory (device) = an electrical or mechanical device that performs a secondary or minor function apart from overcurrent protection.

AFCI (arc-fault current interrupter) = a circuit interrupter that detects a wide range of arc-fault conditions.

AIR (ampere interrupting rating) = the highest current at rated voltage that an overcurrent protective device is intended to interrupt under specified test conditions (NEC).

alarm switch (bell alarm) = see overcurrent trip switch.

ambient temperature rating = temperature at which the continuous current rating (handle rating) of a circuit breaker is based; the temperature of the air immediately surrounding the circuit breaker which can affect the thermal (overload) tripping characteristics of thermal-magnetic circuit breakers.

ampere rating = see continuous current rating.

auxiliary switch = a switch mechanically operated by the main device for signaling, interlocking, or other purposes.

bell alarm = see overcurrent trip switch.

branch circuit = the circuit conductor between the final overcurrent device protecting the circuit and the outlet(s).

circuit breaker = a device designed to open and close a circuit by non-automatic means and to open the circuit automatically on an overcurrent without damage to itself when properly applied within its rating.

coil clearing switch = a mechanically-operated switch in series with the coil of a shunt trip device which breaks the coil current when the circuit breaker opens.

continuous current rating (handle rating) = the designated rms alternating current in amperes which a device or assembly will carry continuously in free air without tripping or exceeding temperature limits.

continuous load = a load where the maximum current on the circuit is expected to continue for more than 3 hours.

CSA = Canadian Standards Association.

current path (of a circuit breaker) = the current-carrying conductors within a circuit breaker between, and including, line and load terminations.

current rating = see continuous current rating.

frequency = the number of cycles per second for an alternating current system.

frequency rating = the range of frequencies within which a product can be applied.

ground fault = an unintentional current path, through ground, back to the source.

handle rating = continuous current rating.

instantaneous pickup = the current level at which the circuit breaker will trip with no intentional time delay.

integral ground-fault protection = equipment ground-fault protection on grounded neutral systems provided by components internal to the circuit breaker.

interrupting rating = the highest current at rated voltage available at the incoming terminals of the circuit breaker. When the circuit breaker can be used at more than one voltage, the interrupting rating will be shown on the circuit breaker for each voltage level. The interrupting rating of a circuit breaker must be equal to or greater than the available short-circuit current at the point at which the circuit breaker is applied to the system.

inverse time = a qualifying term indicating there is purposely introduced a delay in the tripping action of the circuit breaker, which delay decreases as the magnitude of the current increases.



molded case circuit breaker = a circuit breaker which is assembled as an integral unit in a supportive and enclosed housing of insulating material.

molded case switch = a device designed to open and close a circuit by non-automatic means that is not intended to provide overcurrent protection.

NEMA = National Electrical Manufacturer's Association.

NOM/ANCE = Mexican certification authority.

OTS = overcurrent trip switch (alarm switch, bell alarm).

overcurrent = any current in excess of the rated continuous current of equipment or the ampacity of a conductor.

overcurrent trip element = a device which detects an overcurrent and transmits the energy necessary to open the circuit automatically.

overcurrent trip switch = a mechanically-operated switch which indicates when a circuit breaker has tripped due to overcurrent conditions.

rms = root-mean-square.


shunt trip = an accessory which trips the circuit breaker from a remote location using an external voltage source.

thermal-magnetic circuit breaker = a general purpose term for circuit breakers that use bimetals and electromagnetic assemblies to provide both thermal and magnetic overcurrent protection.

UL = Underwriters Laboratories Inc.



Square D Company
PO Box 3069, 3700 Sixth Street SW
Cedar Rapids, IA 52406-3069 USA
Field Services: 1-800-634-2003
www.squared.com

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