General Information

QO® and QOB Circuit Breakers

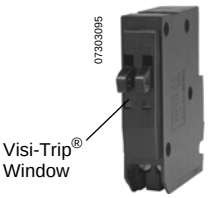
QO® (plug-on) and QOB (bolt-on) one-, two- and three-pole thermal-magnetic circuit breakers provide overcurrent protection and switching on ac and dc systems. Plug-on QO circuit breakers are for use in QO load centers, NQ and NQOD panelboards, OEM mounting bases, and Speed-D® switchboard distribution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

Operating mechanism

QO Circuit Breakers

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 indication 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 indicator 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 to comply with UL Standard 489, CSA 22.2 No. 5, NOM/ANCE and NEMA Standard AB1 and to meet Federal Specification W-C-375B/GEN. QO circuit breakers are UL Listed under UL File E84967 and are CSA Certified under CSA Master Contract 153555.

QO Circuit Breaker	UL Type
QO280–QO210	QOA, QOB
QO2110–QO2125	QOC, QOCB
QO2150–QO2200	QOC (no bolt-on version)

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 for use in the following voltage systems:

- 120 Vac
- 208/120 Vac
- 120/240 Vac
- 240 Vac
- 48 Vdc (10–70 A for 1 and 2 pole circuit breakers, 10–60 A for 3 pole circuit breakers)

Continuous Current Rating

The continuous current rating of a circuit breaker is the maximum current in amperes (dc or rms ac at rated frequency) which a device will carry continuously without exceeding the specified allowable 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 and CSA require 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/CSA Certification. The National Electrical Code (NEC) and the Canadian Electrical Code (CEC) recognize that devices applied in end-use equipment can be affected by heat build up during normal operating conditions. For this reason, the codes require 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).

Frequency Rating

The standard rated frequency for circuit breakers is 60 Hz. Circuit breakers are also rated for dc applications as shown in Table 1. 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. See Data Bulletin 0100DB0101 *Determining Current Carrying Capacity in Special Applications*. Contact the Field Sales office before applying circuit breakers on systems at frequencies other than 50/60 Hz.

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. A circuit breaker 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.

Table 1: Interrupting Ratings

Circuit Breaker Type	Number of Poles	Ampere Rating	UL Listed Interrupting Rating[1]			
			120 Vac	120/240 Vac	240 Vac	48 Vdc[2]
QO	1	10–70 A	10 kA	10 kA	—	5 kA
	2	10–70 A	10 kA	10 kA	10 kA	5 kA
		80–100 A	10 kA	10 kA	10 kA	—
		110—200 A	10 kA	10 kA	—	—
	3	15–60 A	10 kA	10 kA	10 kA	5 kA
		70–100 A	10 kA	10 kA	10 kA	—
QOB	1	10–70 A	10 kA	10 kA	—	5 kA
	2	10–70 A	10 kA	10 kA	10 kA	5 kA
		80–100 A	10 kA	10 kA	10 kA	—
		110—125 A	10 kA	10 kA	—	—
	3	15–60 A	10 kA	10 kA	10 kA	5 kA
		70–100 A	10 kA	10 kA	10 kA	—
QO-H, QOB-H	2	15–100 A	10 kA[3]	10 kA[3]	10 kA[3]	—
QO-VH	1	15–30 A	22 kA	22 kA	—	—
	2	15–200 A	22 kA	22 kA	—	—
	3	15–100 A	22 kA	22 kA	22 kA	—
QOB-VH	1	15–30 A	22 kA	22 kA	—	—
	2	15–125 A	22 kA	22 kA	—	—
	3	15–150 A	22 kA	22 kA	22 kA	—
QOH	1	40–125 A	42 kA	42 kA	—	—
QH, QHB	1	15–30 A	65 kA	65 kA	—	—
	2	15–30 A	65 kA	65 kA	—	—
	3	15–30 A	65 kA	65 kA	65 kA	—
QO-GFI, QOB-GFI	1	15–30 A	10 kA	—	—	—
	2	15–60 A	10 kA	10 kA	—	—
QO-VHGFI, QOB-GFI	1	15–30 A	22 kA	—	—	—
QO-AFI, QOB-AFI	1	15–30 A	10 kA	—	—	—
QO-CAFI, QOB-CAFI	1	15–30 A	10 kA	—	—	—
QO-VHCAFI, QOB-VHCAFI	1	15–30 A	22 kA	—	—	—
QO-EPD, QOB-EPD	1	15–30 A	10 kA	—	—	—
	2	15–60 A	10 kA	10 kA	—	—
QO-PL	1	15–30 A	10 kA	10 kA	10 kA	—
	2	15–30 A	10 kA	10 kA	10 kA	—
	3	15–30 A	10 kA	10 kA	10 kA	—

1 10 kA and 5 kA are 1Ø-3Ø.

2 DC ratings do not apply to circuit breakers rated 10 A.

3 UL Listed 5,000 AIR on 3Ø grounded B-Phase Delta system.

DC Voltage Rating

QO and QOB circuit breakers are available with a UL Listed 48 Vdc rating. See Table 1. Refer to Square D Data Bulletin 0601DB0401 for additional information on dc-rated circuit breakers.