



TECH BRIEF

Short Circuit Ratings

The B225 Starline Busway systems carry a standard short circuit current rating of 22,000 RMS symmetrical amps. These systems include B225, B100A, B160, and all their derivatives. The B400 Busway systems carry a standard short circuit current rating of 35,000 RMS symmetrical amps. Normally the available fault current must be equal to or below the short circuit current rating of the busway at the power feed of the Busway. There are circumstances when the available fault current exceeds short circuit current rating of the busway. This brief gives an overview of applying Starline busway under those conditions, up to fault currents of 50 or 65 kA and the key factors that make this possible. The key takeaway here is that when the busway is protected by a suitable circuit breaker, the system short circuit rating may be increased. Several factors combine to make this possible.

Overcurrent Protection

Circuit Breakers: Placing a circuit breaker “upstream” or as protection to the busway not only insures that the rated current level is protected, but also provides several other defenses that benefit busway systems. If a short circuit fault condition occurs resulting in a sudden large amount of current, the circuit breaker trips in a small fraction of a second, typically less than half a cycle. This limits the time that the busway is exposed to the high current. This *clearing time* is far less than the standard 3 cycles endured by the Busway in order to achieve its 22 kA or 35kA short circuit rating. Another protection is the *current limiting* feature often found in 225A and 400A circuit breakers, resulting in a *let-through* current far less than the available fault currents, thereby protecting the busway from being subjected to the full force of the available short circuit fault event. The upstream circuit breaker may be selected by the end user (following guidelines below), and should be installed as part of the power distribution switchgear. This circuit breaker is not an integral part of the busway system.

Fuses: Use of fuses as overcurrent protection provides a level of protection that is similar if not better than that provided by circuit breakers described above. Fuses may be selected that provide current limiting such that the let through current is below 22kA, and interrupting times that are less than even the ½ cycle typical of circuit breakers. The upstream fuses may be selected by the end user (following guidelines below), and should be installed as part of the power distribution switchgear. Fused end feeds are available for the B250T5 and B400T5 series at 200kA.

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Test Results and Approved Circuit Breakers

B225 Busway

The B225 Busway has been short circuit tested for 50 kA at **240Volts** with a 225A circuit breaker feeding the busway. Three of the most commonly used breakers were tested to insure convenient material availability and allow other coordination efforts. The circuit breaker types and manufacturers follow:

- Square D – JG
- GE – SFH
- Cutler-Hammer – ED

The current let-through on the worst case circuit breaker was 13.3 kA. The B225 passed all test requirements. The complete test results are available upon request. This outcome verifies the expected positive result due to a let-through current under the 22 kA rating of the B225 Busway and limited duration due to the circuit breaker clearing time. As a result, the combination of one of these circuit breakers and a B225 Busway Family may be rated for 50,000 RMS symmetrical amps at 240Volts, witnessed and approved per Underwriters Laboratories (UL). Plug-in units with a 22kA rating should be specified for the system.

B400 Busway:

The B400 Busway has been short circuit tested for 50,000 amps at 240Volts with a 400A circuit breaker feeding the busway. The worst case or *umbrella* breaker (GE: SGHA400) was used to insure the most stringent test. The circuit breaker exhibited a current let-through of 20.5 kA. The B400 passed all test requirements, witnessed and approved by Intertek Testing Labs (ETL). The complete test results are available upon request. This outcome verifies the expected positive result due to a let-through current under the short circuit current rating of the B400 Busway. This test reinforces the general guideline that the combination of a 50 kA minimum 400A circuit breaker and B400 Busway system may be rated for 50 kA at 240Volts, provided that the circuit breakers let-through current is 35 kA RMS symmetrical amps or below. Specific circuit breakers may be selected by the end user according to the let-through curves published by the manufacturer. Plug-in units with a 35kA or 22kA rating should be specified for the system depending on the let-through characteristics of the upstream protective device.

The B400 Busway has also been short circuit tested for 65 kA at 480Volts with a 400A circuit breaker feeding the busway. The following breakers were tested to insure convenient material availability and allow other coordination efforts. The circuit breaker types, let through current test results, and manufacturers follow:

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BREAKERS	LET-THROUGH CURRENT	CLEARING TIME
Square D - (NW)TL8ASF33C9SFFFXXX	64.48 lpk	13.4mS
Square D – DJL36400E53	34.22 lpk	5.6mS
Cutler-Hammer – HKD3400	37.22 lpk	5.6mS

The B400 passed all test requirements. The complete test results are available upon request. This outcome verifies that the circuit breaker provides adequate protection for the B400 Busway. As a result, the combination of one of these circuit breakers and a B400 Busway Family may be rated for 65,000 RMS symmetrical amps at 480Volts, witnessed and approved by Intertek Testing Labs (ETL). Plug-in units with a 22kA rating should be specified for the system.

Fuse Selection:

Selection of fuses for their current limiting properties is standard practice in the engineering community. As such, specific testing was not conducted. A variety of fuses are available that are suitable for this purpose, and may be applied according to the manufacturer's data. In many cases, fuses may be selected for applications with fault currents in excess of 65kA. Suggested fuses for this purpose include Bussmann series JKS, and Littlefuse series JLS, Class J fuses.

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