



Short-Circuit Current Rating - SCCR

Watlow Power Controllers

Effective April, 2006 through UL508A, the National Electric Code (NEC[®]) requires that electrical panel assemblies be marked with the available fault current or Short-Circuit Current Rating (SCCR). See Article 409.110 of the 2008 edition of NEC[®]. The SCCR rating must be marked on all industrial electrical panels and will be rated at the level of the lowest SCCR component.

What Is Short-Circuit Current Rating (SCCR)?

SCCR is a safety consideration that gives a rating, that a circuit or piece of equipment will survive without producing a dangerous arc flash. An arc flash results in an explosion caused by an insulation failure or air ionization from an over voltage event. An arc flash with 1,000 amperes or more can cause substantial damage, fire or injury. The massive energy released in the fault rapidly vaporizes the metal conductors involved, blasting molten metal and expanding plasma outward with extreme force. The reason behind the code change is to prevent fire, injury or death.

The SCCR rating represents the maximum level of short-circuit current that the component or assembly can withstand and is used for determining compliance with NEC[®] Article 110.10. Although this rating can be marked on individual components or assemblies the assembly rating takes into account all components contained within the equipment. Do not make the mistake to assume that the interrupting rating of the over current protective device protecting the circuit represents the SCCR for the entire circuit. Interrupting ratings apply solely to the over current protective device and are used for compliance with NEC[®] Article 110.9.

All industrial electrical systems have a known "Fault Current" which is available from the utility that serves the building. If the incoming power and the buss power are rated at 68,000 amps, then any new control panel installed in that area must have a SCCR rating of at least 68,000 amps.

Every component within the power switching circuit must meet or exceed the available fault current where the panel is to be installed. If a device has not been tested for a SCCR, then the generic rating of 5,000 amperes is assigned for a switch (Silicon Controlled Rectifiers are switches). Most installed panel locations will require a higher SCCR rating than 5,000 A.

What does this mean to you?

If on-site power supply available fault current is higher than your SCCR panel rating, additional mitigation measures will be required in order to meet the lower SCCR rating of the electrical panel. See document references listed at the end of this white paper. This may mean installing a transformer on location to limit the available fault current. By selecting power components such as Watlow DIN-A-MITE[®], Power Series and Q-Pac which have been tested to 200,000 A; Aspyre[®] products have been tested to 100,000 A; and EZ-Zone RM, PM and Flex modules have been tested to 10,000 A, the additional mitigation measures may not be required reducing the panel installation cost for you and your customer.

Watlow has tested the following power controls for short-circuit current rating (SCCR). These devices have a rating of 200,000 amperes when used with the listed fuse in each hot leg. SCCR defaults to 5,000 amperes per UL508A guidelines and the United States National Electric Code (NEC[®]) with any other untested combination. Semiconductor fuses do not meet branch circuit requirements per NEC[®]. The combination DFJ fuse does provide branch circuit protection and will protect the semiconductor device. Use either the Watlow Semiconductor Fuse and Semiconductor Fuse holder with branch circuit protection or the Bussmann Combination Fuse and Combination Fuse Holder.



Short-Circuit Current Rating - SCCR

Watlow Power Controllers

SCCR Ratings are not valid at all unit voltages, see tables below for details.

Model	Fuse Rating 125% of load	Watlow Semiconductor Fuse Part No.	Watlow Semiconductor Fuse Holder Part No.	*Bussmann Semiconductor Fuse Part No.	Bussmann/ *Watlow Combination Fuse Part No.	Bussmann/ *Watlow Fuse Holder for Combination Fuse	SCCR in Amperes	SCCR Max Voltage
DIN-A-MITE® A, B, C	20 A	17-8020 or 1107-8964	17-5110 or 1728-3946	FWC-20A10F	DFJ-20 0808-0325-0020 or 1280-8223	CH30J1i 0808-0326-1530 or 1621-9995	200,000	480 Vac~
DIN-A-MITE® A, B, C	25A	17-8025 or 1891-6036		FWC-25A10F	DFJ-25 No Watlow P/N			
DIN-A-MITE® A ¹ , B, C	30 A	17-8030 or 1829-7197	FWP-30A14F	DFJ-30 0808-0325-0030 or 1726-1403				
DIN-A-MITE® A ¹ , B, C	40 A	17-8040 or 1314-4396	17-5114 or 1197-5116	FWP-40A14F	DFJ-40 0808-0325-0040 or 1003-6251	CH60J1i 0808-0326-3560 or 1626-1208		
DIN-A-MITE® B ¹ , C	50 A	17-8050 or 1070-9985		FWP-50A14F	DFJ-50 0808-0325-0050 or 1893-2479			
DIN-A-MITE® B ¹ , C	63 A	17-8063 or 1094-4923		FWP-63A22F	DFJ-60 0808-0325-0060 or 1466-6868			
DIN-A-MITE® C	80 A	17-8080 or 1132-4242	17-5122 or 1133-1542	FWP-80A22F	DFJ-80 0808-0325-0080 or 1749-6622	J601001CR 0808-0326-7010 or 1115-7468		
DIN-A-MITE® C	100 A	17-8100 or 1836-8349		FWP-100A22F	DFJ-100 0808-0325-0100 or 1125-6340			
DIN-A-MITE® D ^{2,3}	65 A x 2	0808-0096-0000 or 1808-8019	Not Applicable	170N3437	Not Applicable	Not Applicable		

¹FPW series can be used up to this rating to protect the SCR. DFJ series cannot as it must follow the Branch circuit 125% rating rule.

²DIN-A_MITE® D uses two 65A fuses in parallel.

³DIN-A_MITE® D, Power Series and QPAC have on board semiconductor fuses.



Short-Circuit Current Rating - SCCR

Watlow Power Controllers

*The Watlow Semiconductor Fuse is equivalent to the Bussmann Semiconductor Fuse Part.

Model	Fuse Rating 125% of load	Watlow Semiconductor Fuse Part No.	Watlow Semiconductor Fuse Holder Part No.	*Bussmann Semiconductor Fuse Part No.	Bussmann/ *Watlow Combination Fuse Part No.	Bussmann/ *Watlow Fuse Holder for Combination Fuse	SCCR in Amperes	SCCR Max Voltage
Power Series ³	100 A	0808-0102-0100 or 1446-4136	Integral to unit	170M1317	Not Applicable	Not Applicable	200,000	480 Vac~
Power Series	125 A	0808-0102-0125 or 1044-8088		170M1318				
Power Series	160 A	0808-0102-0160 or 1870-3730		170M1319				
Power Series	200 A	0808-0102-0200 or 1897-6763		170M1320				
Power Series	250 A	0808-0102-0250 or 1039-3019		170M1321				
Power Series	315 A	0808-0102-0315 or 1203-5406		170M1322				
Qxx-xxx-150-xxx	200 A	17-7053 or 1346-5674	Not Applicable	FWH-200A	Not Applicable	Not Applicable	200,000	480 Vac~
Qxx-xxx-200-xxx	250 A	17-7054 or 1854-6722		FWH-250A				
Qxx-xxx-300-xxx	400 A	17-7056 or 1744-7379		FWH-400A				
Qxx-xxx-400-xxx	500 A	17-7057 or 1252-8027		FWH-500A				
Qxx-xxx-500-xxx	600 A	17-7058 or 1512-7706		FWH-600A				
Qxx-xxx-600-xxx	800 A	17-7059 or 1375-8152		FWH-800A				
Qxx-xxx-800-xxx	1000 A	17-7082 or 1590-0304		170M6714 ⁴				
Qxx-xxx-01K-xxx	1250 A	17-7081 or 1295-9062		170M6766 ⁴				

³ DIN-A_MITE® D, Power Series and QPAC have on board semiconductor fuses.

⁴ 170M6764 indicator version allowed in place of 170M6714, 170M6716 non-indicator version allowed in place of 170M6766.



Short-Circuit Current Rating - SCCR

Watlow Power Controllers

Model	Fuse Rating 125% of load	Watlow Semiconductor Fuse Part No.	Watlow Semiconductor Fuse Holder Part No.	*Bussmann Semiconductor Fuse Part No.	Bussmann/ *Watlow Combination Fuse Part No.	Bussmann/ *Watlow Fuse Holder for Combination Fuse	SCCR in Amperes	SCCR Max Voltage
EZ-ZONE® ST ≤ 25A	30 A	17-8030 or 1829-7197	17-5114 or 1197-5116	FWP-30A14F	DFJ-30 0808-0325-0030 or 1726-1403	CH30J1i 0808-0326-1530 or 1621-9995	200,000	480 Vac~
EZ-ZONE® ST ≤ 25A	40 A ¹	17-8040 or 1314-4396		FWP-40A14F	DFJ-30 is max size 125% rating			480 Vac~
EZ-ZONE® ST ≤ 50A	50 A	17-8050 or 1070-9985	17-5122 or 1133-1542	FWP-50A22F	DFJ-50 0808-0325-0050 or 1893-2479	CH60J1i 0808-0326-3560 or 1626-1208		480 Vac~
EZ-ZONE® ST ≤ 50A	63 A	17-8063 or 1094-4923		FWP-63A22F	DFJ-50 is max size for I ² T at 480V			480 Vac~
EZ-ZONE® ST ≤ 50A				DFJ-60 0808-0325-0060 or 1466-6868	CH60J1i 0808-0326-3560 or 1626-1208	DFJ fuse 240 Vac~ FWP fuse 480 Vac~		
EZ-ZONE® ST ≤ 75A	80 A	17-8080 or 1132-4242		FWP-80A22F	DFJ-80 0808-0325-0080 or 1749-6622	J60100-1CR 0808-0326-7010 or 1115-7468		480 Vac~
EZ-ZONE® ST ≤ 75A	90 A	Not available	Not available	No FWP-90 available	DFJ-90 No Watlow P/N			480 Vac~
EZ-ZONE® ST ≤ 75A	100 A	17-8100 or 1836-8349	17-5122 or 1133-1542	FWP-100A22F	DFJ-100 0808-0325-0100 or 1125-6340			DFJ fuse 240 Vac~ FWP fuse 480 Vac~

¹FPW series can be used up to this rating to protect the SCR. DFJ series cannot as it must follow the Branch circuit 125% rating rule.

Definitions from EN 60947-4-3
Type 1 Protection - Coordination requires that, under short-circuit conditions, the device shall cause no danger to persons or to the installation and may not be suitable for further service without repair and replacement of parts.
Type 2 Protection - Coordination requires that, under short-circuit conditions, the device shall cause no danger to persons or to the installation and shall be suitable for further use.

When fused per the combinations listed above, products comply with Type 2 Protection.



Short-Circuit Current Rating - SCCR

Watlow Power Controllers

Model	Fuse Rating 125% of max load	Watlow Semiconductor Fuse Part No.	Watlow Semiconductor Fuse Holder Part No.	*Bussmann Semiconductor Fuse Part No.	*Bussmann Branch Fuse Part No.	Watlow Branch Fuse Holder Part No.	SCCR in Amperes	SCCR Max Voltage
EZ-Zone RM Dual 10A SSR RMEx-KAKA-xxxx FMHA-KAAA-xxxx	12.5A	17-8012 or 1801-2596	17-5110 or 1728-3946	FWC12A10F		0808-0235-0000 or 1263-5521	10,000	240 Vac

When the Semiconductor fuse is used, complies with Type 2 Protection. When the Branch circuit fuse is used units comply with Type 1 Protection.

Model	Fuse Rating 125% of max load	Semiconductor fuse.	*Bussmann Branch Fuse Part No.	Watlow Branch Fuse Holder Part No.	SCCR in Amperes	SCCR Max Voltage
EZ-Zone RM, PM No-arc 15A relay RMC outputs D,J or Y RMC-X_X_X_X-XXXX PMXXXXH-XXXHXXX FMMA-XXHX-XXXX	20A	Not tested with this output				
EZ-Zone RM, PM 5A Mechanical Relay PMXXEJ-XXEJXXX RMC outputs B,F,G,H,J,K,L,M, or R RMC-X_X_X_X-XXXX RMEX-JJX-XXXX RMHX-XXJ-XXXX RMSX-XXJ(J,B)-XXXX RMLX-XXJ(J,B)-XXXX FM(M,L)A-XEJX-XXXX FMHA-JAAA-XXXX	7A	Not tested with this output		0808-0235-0000 or 1263-5521	10,000	240 Vac
EZ-Zone RM Quad 2A SSR output RMEX-LLLL-XXXX RMHX-XXLL-XXXX FMHA-LAAA-XXXX	2.5A	Not tested with this output				

⁵NOTE: Watlow tested worst case 20A umbrella fuse based on wire size typically used in panels. While this fuse will provide the stated Type 1 Protection, it is suggested to use a fuse based on the NEC 125% rating of the load.



Short-Circuit Current Rating - SCCR

Watlow Power Controllers

UL 508 Section 52 High-Available Fault Current Tests

Model ASPYRE®	Fuse Rating	Watlow Semiconductor Fuse Part No.	Semiconductor Fuse Mfg and Part No.	SCCR in Amperes	SCCR Max Voltage
DTxxx-(035 or 040)xx-xxxxx	50A	17-8050 or 1070-9985	Eaton Bussmann FWP-50A14F	100,000 A	600 Vac~
DTxxx-(060 or 090)xx-xxxxx	160A	0808-0363-0160 or 1726-6257	Siba 20 559 20.160		
DTxxx-120xx-xxxxx	180A	0808-0363-0180 or 1018-7683	Siba 20 559 20.180		
DTxxx-150xx-xxxxx	200A	0808-0363-0200 or 1244-1039	Siba 20 559 20.200		
DTxxx-180xx-xxxxx	250A	0808-0363-0250 or 1719-6994	Siba 20 559 20.250		
DTxxx-210xx-xxxxx	315A	0808-0363-0315 or 1035-7646	Siba 20 559 20.315		
DT1xx-300xx-xxxxx	350A	0808-0362-0000 or 1696-7825	Eaton Bussmann 350FM		
DT(2 or 3)xx-300xx-xxxxx	450A	0808-0357-0000 or 1682-4243	Eaton Bussmann 450FMM		
DT3xx-350xx-xxxxx or DTxxx-400xx-xxxxx	550A	0808-0358-0000 or 1076-7589	Eaton Bussmann 550FMM		
DT2xx-(450 or 500)xx-xxxxx	315A (2 per leg)	0808-0360-0000 or 1119-0623	Eaton Bussmann 315FM		
DT3xx-450xx-xxxxx or DT(1 or 3)xx-500xx-xxxxx	700A	0808-0359-0000 or 1278-9993	Eaton Bussmann 700FMM		
DT1xx-(600 or 700)xx-xxxxx	250A (4 per leg)	0808-0363-0250 or 1719-6994	Siba 20 559 20.250		
DT2xx-(600 or 700)xx-xxxxx	450A (2 per leg)	0808-0357-0000 or 1682-4243	Eaton Bussmann 450FMM		

Notes:

- Tests performed with worst case fuse rating of product and smallest SCR module size.
- Fuses designated as Semiconductor only do not have Branch Circuit Ratings and a Separate Branch Circuit Fuse is required in the system.
- The Series DFJ fuse is rated as both a Semiconductor Fuse and Branch Circuit Fuse. UL File E4273 JDDZ, CSA File 53787 Class 1422-02.

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Short-Circuit Current Rating - SCCR

Watlow Power Controllers

- Tests performed with Semiconductor FWP series fuses representative of FWC series fuses.
- Fuses of similar family style (FWP, FWC, FWH, 170M, DFJ) as those tested but of smaller amperage rating are considered compliant.

Document References

NEC® 2008

NFPA 70™ : National Electrical Code®

International Electrical Code® Series

<http://www.nfpa.org>

UL508 – Industrial Control Equipment

UL508A – Industrial Control Panels

UL/EN 60947-4-31 Low-voltage switchgear and controlgear – Part 4-3:

Contactors and motor-starters - AC semiconductor controllers and contactors for non-motor loads

Underwriters Laboratories Inc. (UL)

333 Pfingsten Road

Northbrook, IL 60062-2096

