

Protective Devices for SINAMICS S200 Product Line

Contents

1	IEC applications	2
1.1	IEC general notes	2
1.2	IEC fuses	3
1.2.1	IEC fuses, 1 AC 200 V ... 240 V	3
1.2.2	IEC fuses, 3 AC 200 V ... 240 V	4
1.2.3	IEC fuses, 3 AC 380 V ... 480 V	5
1.3	IEC Motor Starter Protectors	6
1.3.1	IEC Motor Starter Protectors, 1AC 200 V ... 240 V	6
1.3.2	IEC Motor Starter Protectors, 3 AC 200 V ... 240 V	7
1.3.3	IEC Motor Starter Protectors, 3 AC 380 V ... 480 V	8
2	UL/CSA applications	9
2.1	UL/CSA general notes	9
2.2	UL/CSA non-semiconductor fuses	11
2.2.1	UL/CSA non-semiconductor fuses, 1AC 200 V ... 240 V	11
2.2.2	UL/CSA non-semiconductor fuses, 3 AC 200 V ... 240 V	12
2.2.3	UL/CSA non-semiconductor fuses, 3 AC 380 V ... 480 V	13
2.3	UL/CSA Type E Combination Motor Controllers	14
2.3.1	UL/CSA Type E Combination Motor Controllers, 1AC 200 V ... 240 V	14
2.3.2	UL/CSA Type E Combination Motor Controllers, 3 AC 200 V ... 240 V	15
2.3.3	UL/CSA Type E Combination Motor Controllers, 3 AC 380 V ... 480 V	16
3	Further information	17

1 IEC applications

1.1 IEC general notes

Protection for safety must be provided in accordance with

- IEC 60364 standard series
- any additional local standards and regulations for electrical installations.

The tables below provide information for each drive type and article number on the following items:

- Suitable protective devices.
The specification includes the type and the maximum rated current of the branch circuit protective devices.
- Maximum I_{cc} (conditional short circuit current)
This is the maximum RMS value of a prospective short circuit current, available from a supply source.
- Minimum enclosure volume.
In the end application, the drive shall be installed in an outer enclosure or control cabinet which shall meet the minimum enclosure volume requirement.

Notes on the selection of protective devices

- Protective devices of the same type as specified in the tables with a lower ampere rating may be used, if suitable for the application.
- Protective devices of the same type as specified in the tables with a lower interrupting rating may be used, if suitable for the application. In such case, this lower interrupting current rating of a protective device shall be specified as the I_{cc} of a drive and protective device combination.
- The voltage rating of the protective device must be at least the voltage rating of the supply circuit.

The drive modules provide:

- Integral Motor Overload Protection which reduces the output current flow under overload conditions. Refer to manual for adjustments.
- Integral Output Short-Circuit Protection.

1.2 IEC fuses

1.2.1 IEC fuses, 1 AC 200 V ... 240 V

Converter			Fuse			Min. enclosure volume	
Frame size	Rated power	Article no.	Max. rated current	Article no.	I _{cc} @ 1 AC 240 V	Metric	Imperial (USA)
FSA	0.1 kW	6SL5.10-1BB10-1A.0	4 A	3NA3804	100 kA	0.025 m ³	0.88 ft ³
			4 A	3NW6304-1	100 kA		
	0.2 kW	6SL5.10-1BB10-2A.0	4 A	3NA3804	100 kA		
			4 A	3NW6304-1	100 kA		
FSB	0.4 kW	6SL5.10-1BB10-4A.0	6 A	3NA3801	100 kA	0.023 m ³	0.81 ft ³
			6 A	3NW6301-1	100 kA		
FSC	0.75 kW	6SL5.10-1BB10-8A.0	12 A	3NW6006-1	100 kA	0.023 m ³	0.81 ft ³
			16 A	3NA3805	100 kA		
	1.0 kW	6SL5.10-1BB11-0A.0	12 A	3NW6006-1	100 kA		
			16 A	3NA3805	100 kA		

Note:

Siemens 3NA or 3NW low-voltage fuses are recommended.

1.2.2 IEC fuses, 3 AC 200 V ... 240 V

Converter			Fuse			Min. enclosure volume	
Frame size	Rated power	Article no.	Max. rated current	Article no.	I _{cc} @ 3 AC 240 V	Metric	Imperial (USA)
FSA	0.1 kW	6SL5.10-1BB10-1A.0	4 A	3NA3804	100 kA	0.025 m ³	0.88 ft ³
			4 A	3NW6304-1	100 kA		
	0.2 kW	6SL5.10-1BB10-2A.0	4 A	3NA3804	100 kA		
			4 A	3NW6304-1	100 kA		
FSB	0.4 kW	6SL5.10-1BB10-4A.0	6 A	3NA3801	100 kA	0.023 m ³	0.81 ft ³
			6 A	3NW6301-1	100 kA		
FSC	0.75 kW	6SL5.10-1BB10-8A.0	12 A	3NW6006-1	100 kA	0.023 m ³	0.81 ft ³
			16 A	3NA3805	100 kA		
	1.0 kW	6SL5.10-1BB11-0A.0	12 A	3NW6006-1	100 kA		
			16 A	3NA3805	100 kA		

Note:

Siemens 3NA or 3NW low-voltage fuses are recommended.

1.2.3 IEC fuses, 3 AC 380 V ... 480 V

Converter			Fuse			Min. enclosure volume	
Frame size	Rated power	Article no.	Max. rated current	Article no.	I _{cc} @ 3 AC 400 V	Metric	Imperial (USA)
FSA	0.2 kW	6SL5510-1BE10-2A.0	4 A	3NA3804	65 kA	0.023 m ³	0.81 ft ³
			4 A	3NW6304-1	65 kA		
	0.4 kW	6SL5510-1BE10-4A.0	4 A	3NA3804	65 kA		
			4 A	3NW6304-1	65 kA		
FSB	0.75 kW	6SL5510-1BE10-8A.0	10 A	3NA3803	65 kA	0.023 m ³	0.81 ft ³
			10 A	3NW6303-1	65 kA		
	1.0 kW	6SL5510-1BE11-0A.0	10 A	3NA3803	65 kA		
			10 A	3NW6303-1	65 kA		
FSC	1.75 kW	6SL5510-1BE11-5A.0	12 A	3NW6006-1	65 kA	0.023 m ³	0.81 ft ³
			16 A	3NA3805	65 kA		
	2.5 kW	6SL5510-1BE12-5A.0	16 A	3NA3805	65 kA		
			16 A	3NW6305-1	65 kA		
FSD	3.5 kW	6SL5510-1BE13-5A.0	20 A	3NA3807	65 kA	0.08 m ³	2.83 ft ³
			20 A	3NW6307-1	65 kA		
	5.0 kW	6SL5510-1BE15-0A.0	20 A	3NA3807	65 kA		
			20 A	3NW6007-1	65 kA		
	7.0 kW	6SL5510-1BE17-0A.0	25 A	3NA3810	65 kA		
			25 A	3NW6010-1	65 kA		

Note:

Siemens 3NA or 3NW low-voltage fuses are recommended.

1.3 IEC Motor Starter Protectors

1.3.1 IEC Motor Starter Protectors, 1 AC 200 V ... 240 V

Converter			MSP			Min. enclosure volume	
Frame size	Rated power	Article no.	Max. rated current ¹⁾	Article no.	I _{cc} @ 1 AC 240 V	Metric	Imperial (USA)
FSA	0.1 kW	6SL5.10-1BB10-1A.0	4 A	3RV2011-1EA..	100 kA	0.025 m ³	0.88 ft ³
			4 A	3RV2021-1EA..	100 kA		
	0.2 kW	6SL5.10-1BB10-2A.0	4 A	3RV2011-1EA..	100 kA		
			4 A	3RV2021-1EA..	100 kA		
FSB	0.4 kW	6SL5.10-1BB10-4A.0	8 A	3RV2011-1HA..	100 kA	0.023 m ³	0.81 ft ³
			8 A	3RV2021-1HA..	100 kA		
FSC	0.75 kW	6SL5.10-1BB10-8A.0	12.5 A	3RV2011-1KA..	100 kA	0.023 m ³	0.81 ft ³
			12.5 A	3RV2021-1KA..	100 kA		
	1.0 kW	6SL5.10-1BB11-0A.0	12.5 A	3RV2011-1KA..	100 kA		
			12.5 A	3RV2021-1KA..	100 kA		

¹⁾ Protective devices with lower current ratings may be used, if suitable for the application.

1.3.2 IEC Motor Starter Protectors, 3 AC 200 V ... 240 V

Converter			MSP			Min. enclosure volume	
Frame size	Rated power	Article no.	Max. rated current ¹⁾	Article no.	I _{cc} @ 3 AC 240 V	Metric	Imperial (USA)
FSA	0.1 kW	6SL5.10-1BB10-1A.0	4 A	3RV2011-1EA..	100 kA	0.025 m ³	0.88 ft ³
			4 A	3RV2021-1EA..	100 kA		
	0.2 kW	6SL5.10-1BB10-2A.0	4 A	3RV2011-1EA..	100 kA		
			4 A	3RV2021-1EA..	100 kA		
FSB	0.4 kW	6SL5.10-1BB10-4A.0	4 A	3RV2011-1EA..	100 kA	0.023 m ³	0.81 ft ³
			4 A	3RV2021-1EA..	100 kA		
FSC	0.75 kW	6SL5.10-1BB10-8A.0	8 A	3RV2011-1HA..	100 kA	0.023 m ³	0.81 ft ³
			8 A	3RV2021-1HA..	100 kA		
	1.0 kW	6SL5.10-1BB11-0A.0	10 A	3RV2011-1JA..	100 kA		
			10 A	3RV2021-1JA..	100 kA		

¹⁾ Protective devices with lower current ratings may be used, if suitable for the application.

Note:

I_{cc} values are only valid for supply grids with grounded star point (solidly grounded wye TN or TT systems).

1.3.3 IEC Motor Starter Protectors, 3 AC 380 V ... 480 V

Converter			MSP			Min. enclosure volume	
Frame size	Rated power	Article no.	Max. rated Current ¹⁾	Article no.	I _{cc} @ 3 AC 400 V	Metric	Imperial (USA)
FSA	0.2 kW	6SL5510-1BE10-2A.0	2.5 A	3RV2011-1CA..	65 kA	0.023 m ³	0.81 ft ³
			2.5 A	3RV2021-1CA..	65 kA		
	0.4 kW	6SL5510-1BE10-4A.0	3.2 A	3RV2011-1DA..	65 kA		
			3.2 A	3RV2021-1DA..	65 kA		
FSB	0.75 kW	6SL5510-1BE10-8A.0	4 A	3RV2011-1EA..	65 kA	0.023 m ³	0.81 ft ³
			4 A	3RV2021-1EA..	65 kA		
	1.0 kW	6SL5510-1BE11-0A.0	5 A	3RV2011-1FA..	65 kA		
			5 A	3RV2021-1FA..	65 kA		
FSC	1.75 kW	6SL5510-1BE11-5A.0	16 A	3RV2011-4AA..	65 kA	0.023 m ³	0.81 ft ³
			16 A	3RV2021-4AA..	65 kA		
	2.5 kW	6SL5510-1BE12-5A.0	16 A	3RV2011-4AA..	65 kA		
			16 A	3RV2021-4AA..	65 kA		
FSD	3.5 kW	6SL5510-1BE13-5A.0	20 A	3RV2021-4BA..	65 kA	0.08 m ³	2.83 ft ³
	5.0 kW	6SL5510-1BE15-0A.0	20 A	3RV2021-4BA..	65 kA		
	7.0 kW	6SL5510-1BE17-0A.0	25 A	3RV2021-4DA..	65 kA		

¹⁾ Protective devices with lower current ratings may be used, if suitable for the application.

Note:

I_{cc} values are only valid for supply grids with grounded star point (solidly grounded wye TN or TT systems).

2 UL/CSA applications

2.1 UL/CSA general notes

Branch circuit protection must be provided in accordance with

- the National Electrical Code (NEC) for USA
- the Canadian Electrical Code (CEC) Part I for Canada
- any additional local codes and regulations.

The tables below provide information for each drive type and article number on the following items:

- Suitable protective devices.
The specification includes the type and the maximum rated current of the branch circuit protective devices.
- Maximum SCCR (Short-Circuit Current Rating).
This is the maximum prospective symmetrical fault current at the specified voltage to which the drive system can be connected without sustaining damage exceeding defined acceptance criteria. The specified SCCR applies to the complete drive module including built-in EMI filters and pluggable terminals (where applicable).
- Minimum enclosure volume.
In the end application, the drive shall be installed in an outer enclosure or control cabinet which shall meet the minimum enclosure volume requirement.

Notes on the selection of protective devices (in accordance with NEC and CEC)

- Suitable Protective devices of the same type as specified in the tables with a lower ampere rating as permitted by NEC and/or CEC may be used, if suitable for the application.
- Protective devices of the same type as specified in the tables with a lower interrupting rating than the specified SCCR may be used, if suitable for the application. In such case, this lower interrupting current rating of a protective device shall be specified as the SCCR of a drive and protective device combination.
- The voltage rating of the protective device must be at least the voltage rating of the supply circuit.
 - o Protective devices with a straight voltage rating, such as 480V, are permitted on any supply circuits. The specified SCCR is valid for corner grounded delta and solidly grounded wye systems.
 - o Protective devices with a slash voltage rating, such as 480Y/277V, are permitted only on solidly grounded wye circuits where the nominal voltage of any conductor to ground does not exceed the lower of the two values.

The drive modules provide:

- Integral Motor Overload Protection which reduces the output current flow under overload conditions. Refer to manual for adjustments.
- Integral Output Short-Circuit Protection. Components on the load side of the drive module are not required to have a short-circuit current rating (UL 508A).

UL File-Number

- No. E355661, Vol. 3 Sec. 15

2.2 UL/CSA non-semiconductor fuses

2.2.1 UL/CSA non-semiconductor fuses, 1AC 200 V ... 240 V

Converter			Fuse		Min. enclosure volume	
Frame size	Rated power	Article no.	Max. rated current	SCCR @ 1 AC 240 V	Metric	Imperial (USA)
FSA	0.1 kW	6SL5.10-1BB10-1A.0	3 A	100 kA	0.025 m ³	0.88 ft ³
	0.2 kW	6SL5.10-1BB10-2A.0	3 A	100 kA		
FSB	0.4 kW	6SL5.10-1BB10-4A.0	6 A	100 kA	0.023 m ³	0.81 ft ³
FSC	0.75 kW	6SL5.10-1BB10-8A.0	15 A	100 kA	0.023 m ³	0.81 ft ³
	1.0 kW	6SL5.10-1BB11-0A.0	15 A	100 kA		

Note:

Any non-semiconductor fuse Class J, CF, T CC, G or L (JDDZ/7) of any manufacturer.

2.2.2 UL/CSA non-semiconductor fuses, 3 AC 200 V ... 240 V

Converter			Fuse		Min. enclosure volume	
Frame size	Rated power	Article no.	Max. rated current	SCCR @ 3 AC 240 V	Metric	Imperial (USA)
FSA	0.1 kW	6SL5.10-1BB10-1A.0	3 A	100 kA	0.025 m ³	0.88 ft ³
	0.2 kW	6SL5.10-1BB10-2A.0	3 A	100 kA		
FSB	0.4 kW	6SL5.10-1BB10-4A.0	6 A	100 kA	0.023 m ³	0.81 ft ³
FSC	0.75 kW	6SL5.10-1BB10-8A.0	15 A	100 kA	0.023 m ³	0.81 ft ³
	1.0 kW	6SL5.10-1BB11-0A.0	15 A	100 kA		

Note:

Any non-semiconductor fuse Class J, CF, T CC, G or L (JDDZ/7) of any manufacturer.

2.2.3 UL/CSA non-semiconductor fuses, 3 AC 380 V ... 480 V

Converter			Fuse		Min. enclosure volume	
Frame size	Rated power	Article no.	Max. rated current	SCCR @ 3 AC 480 V	Metric	Imperial (USA)
FSA	0.2 kW	6SL5510-1BE10-2A.0	3 A	65 kA	0.023 m ³	0.81 ft ³
	0.4 kW	6SL5510-1BE10-4A.0	3 A	65 kA		
FSB	0.75 kW	6SL5510-1BE10-8A.0	10 A	65 kA	0.023 m ³	0.81 ft ³
	1.0 kW	6SL5510-1BE11-0A.0	10 A	65 kA		
FSC	1.75 kW	6SL5510-1BE11-5A.0	15 A	65 kA	0.023 m ³	0.81 ft ³
	2.5 kW	6SL5510-1BE12-5A.0	20 A	65 kA		
FSD	3.5 kW	6SL5510-1BE13-5A.0	25 A	65 kA	0.08 m ³	2.83 ft ³
	5.0 kW	6SL5510-1BE15-0A.0	25 A	65 kA		
	7.0 kW	6SL5510-1BE17-0A.0	25 A	65 kA		

Note:

Any non-semiconductor fuse Class J, CF, T CC, G or L (JDDZ/7) of any manufacturer.

2.3 UL/CSA Type E Combination Motor Controllers

2.3.1 UL/CSA Type E Combination Motor Controllers, 1AC 200 V ... 240 V

Converter			CMC				Min. enclosure volume	
Frame size	Rated power	Article no.	Max. rated current ¹⁾	Rated power @ 1 AC 240 V	Article no.	SCCR @ 1 AC 240 V	Metric	Imperial (USA)
FSA	0.1 kW	6SL5.10-1BB10-1A.0	4 A	0.5 hp	3RV2011-1EA..	65 kA	0.025 m ³	0.88 ft ³
			4 A	0.5 hp	3RV2021-1EA..	65 kA		
	0.2 kW	6SL5.10-1BB10-2A.0	4 A	0.5 hp	3RV2011-1EA..	65 kA		
			4 A	0.5 hp	3RV2021-1EA..	65 kA		
FSB	0.4 kW	6SL5.10-1BB10-4A.0	8 A	1 hp	3RV2011-1HA..	65 kA	0.023 m ³	0.81 ft ³
			8 A	1 hp	3RV2021-1HA..	65 kA		
FSC	0.75 kW	6SL5.10-1BB10-8A.0	12.5 A	2 hp	3RV2011-1KA..	65 kA	0.023 m ³	0.81 ft ³
			12.5 A	2 hp	3RV2021-1KA..	65 kA		
	1.0 kW	6SL5.10-1BB11-0A.0	12.5 A	2 hp	3RV2011-1KA..	65 kA		
			12.5 A	2 hp	3RV2021-1KA..	65 kA		

¹⁾ Protective devices with lower current ratings may be used, if suitable for the application.

Note:

- SIEMENS Type E combination motor controllers (NKJH/7)
- 3RV20.. are approved in accordance with UL 508/UL60947-4-1 in combination with 3RV2928-1H, 3RV2925-5EB, or 3RV2928-1K. (Not necessary for CSA)

2.3.2 UL/CSA Type E Combination Motor Controllers, 3 AC 200 V ... 240 V

Converter			CMC				Min. enclosure volume	
Frame size	Rated power	Article no.	Max. rated current ¹⁾	Rated power @ 3 AC 240 V	Article no.	SCCR @ 3 AC 240 V	Metric	Imperial (USA)
FSA	0.1 kW	6SL5.10-1BB10-1A.0	4 A	1 hp	3RV2011-1EA..	65 kA	0.025 m ³	0.88 ft ³
			4 A	1 hp	3RV2021-1EA..	65 kA		
	0.2 kW	6SL5.10-1BB10-2A.0	4 A	1 hp	3RV2011-1EA..	65 kA		
			4 A	1 hp	3RV2021-1EA..	65 kA		
FSB	0.4 kW	6SL5.10-1BB10-4A.0	4 A	1 hp	3RV2011-1EA..	65 kA	0.023 m ³	0.81 ft ³
			4 A	1 hp	3RV2021-1EA..	65 kA		
FSC	0.75 kW	6SL5.10-1BB10-8A.0	8 A	3 hp	3RV2011-1HA..	65 kA	0.023 m ³	0.81 ft ³
			8 A	3 hp	3RV2021-1HA..	65 kA		
	1.0 kW	6SL5.10-1BB11-0A.0	10 A	3 hp	3RV2011-1JA..	65 kA		
			10 A	3 hp	3RV2021-1JA..	65 kA		

¹⁾ Protective devices with lower current ratings may be used, if suitable for the application.

Note:

- SIEMENS Type E combination motor controllers (NKJH/7)
- 3RV20.. are approved in accordance with UL 508/UL60947-4-1 in combination with 3RV2928-1H, 3RV2925-5EB, or 3RV2928-1K. (Not necessary for CSA)

2.3.3 UL/CSA Type E Combination Motor Controllers, 3 AC 380 V ... 480 V

Converter			CMC				Min. enclosure volume	
Frame size	Rated power	Article no.	Max. rated current ¹⁾	Rated power @ 3 AC 480 V	Article no.	SCCR @ 480 Y/277 V	Metric	Imperial (USA)
FSA	0.2 kW	6SL5510-1BE10-2A.0	2.5 A	1.5 hp	3RV2011-1CA..	65 kA	0.023 m ³	0.81 ft ³
			2.5 A	1.5 hp	3RV2021-1CA..	65 kA		
	0.4 kW	6SL5510-1BE10-4A.0	3.2 A	2 hp	3RV2011-1DA..	65 kA		
			3.2 A	2 hp	3RV2021-1DA..	65 kA		
FSB	0.75 kW	6SL5510-1BE10-8A.0	4 A	3 hp	3RV2011-1EA..	65 kA	0.023 m ³	0.81 ft ³
			4 A	3 hp	3RV2021-1EA..	65 kA		
	1.0 kW	6SL5510-1BE11-0A.0	5 A	3 hp	3RV2011-1FA..	65 kA		
			5 A	3 hp	3RV2021-1FA..	65 kA		
FSC	1.75 kW	6SL5510-1BE11-5A.0	16 A	10 hp	3RV2011-4AA..	65 kA	0.023 m ³	0.81 ft ³
			16 A	10 hp	3RV2021-4AA..	65 kA		
	2.5 kW	6SL5510-1BE12-5A.0	16 A	10 hp	3RV2011-4AA..	65 kA		
			16 A	10 hp	3RV2021-4AA..	65 kA		
FSD	3.5 kW	6SL5510-1BE13-5A.0	20 A	15 hp	3RV2021-4BA..	65 kA	0.08 m ³	2.83 ft ³
	5.0 kW	6SL5510-1BE15-0A.0	20 A	15 hp	3RV2021-4BA..	65 kA		
	7.0 kW	6SL5510-1BE17-0A.0	25 A	20 hp	3RV2021-4DA..	65 kA		

¹⁾ Protective devices with lower current ratings may be used, if suitable for the application.

Note:

- SIEMENS Type E combination motor controllers (NKJH/7)
- 3RV20.. are approved in accordance with UL 508/UL60947-4-1 in combination with 3RV2928-1H, 3RV2925-5EB, or 3RV2928-1K. (Not necessary for CSA)

3 Further information



Further information is available on the internet:

- Siemens SENTRON fuses/3NA fuses
<https://support.industry.siemens.com/cs/ww/en/view/45314810>
- Low-Voltage Power Distribution and Electrical Installation Technology
<https://support.industry.siemens.com/cs/ww/en/view/109482234>
- SIRIUS Industrial Controls
<https://support.industry.siemens.com/cs/ww/en/view/109747945>
- Motor starter protectors, 3RV series
<https://support.industry.siemens.com/cs/ww/en/view/60279172>