

Protective Devices for SINAMICS S220 Line Modules Booksize

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1 IEC applications

1.1 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 converter type and article number on the following items:

- **Suitable protective devices**
The specification includes the type or article number of the overcurrent protective devices (OCPD).
- **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 converter shall be installed in an outer enclosure or control cabinet which shall meet the minimum enclosure volume requirement.
- **Minimum $I_{cp,mr}$** (prospective short-circuit current)
RMS value of a minimum prospective short-circuit current, which shall be available from the source to ensure operation of the specific type of short-circuit protective device.

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 converter and protective device combination.
- The **voltage rating** of the protective device must be at least the voltage rating of the supply circuit.

The converter provides:

- 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 standard fuses

1.2.1 IEC standard fuses 3AC 380...480V

Line Module		Protective Device				Min. enclosure volume	
Prated	Article no.	Irated/ A	Article no. ¹⁾	Icp,mf/ kA	ICC / kA @ 480 V	Metric	Imperial
16 kW	6SL5130-6UE21-6AC0	40	3NA3817	1.0	100	0.17 m ³ ²⁾	6.00 ft ³
	6SL5130-6UE21-6AD0	40	3NA3817	1.0	100		
24 kW	6SL5130-6UE22-4AC0	80	3NA3824	2.0	100		
	6SL5130-6UE22-4AD0	80	3NA3824	2.0	100		
36 kW	6SL5130-6UE23-6AC0	80	3NA3824	2.0	100	1.40 m ³	49.44 ft ³
	6SL5130-6UE23-6AD0	80	3NA3824	2.0	100		
55 kW	6SL5130-6UE25-5AC0	125	3NA3132	3.12	100		
	6SL5130-6UE25-5AD0	125	3NA3132	3.12	100		

¹⁾ Siemens 3NA low-voltage fuses are recommended

²⁾ Minimum enclosure volume when installed in combination with a 200 A Motor Module: 0.42 m³ / 14.8 ft³.

1.3 IEC semiconductor fuses

1.3.1 IEC semiconductor fuses 3AC 380...480V

Line Module		Protective Device				Min. enclosure volume	
Prated	Article no.	Irated/ A	Article no.	Icp,mf/ kA	Icc / kA @ 480 V	Metric	Imperial
16 kW	6SL5130-6UE21-6AC0	40	3NE1802-0	0.6	100	0.17 m ³ ¹⁾	6.00 ft ³
	6SL5130-6UE21-6AD0	40	3NE1802-0	0.6	100		
24 kW	6SL5130-6UE22-4AC0	80	3NE1020-2	0.9	100		
		80	3NE1820-0	1.2	100		
	6SL5130-6UE22-4AD0	80	3NE1020-2	0.9	100		
36 kW	6SL5130-6UE23-6AC0	80	3NE1020-2	0.9	100	1.40 m ³	49.44 ft ³
		80	3NE1820-0	1.2	100		
	6SL5130-6UE23-6AD0	80	3NE1020-2	0.9	100		
		80	3NE1820-0	1.2	100		

Line Module		Protective Device				Min. enclosure volume	
Prated	Article no.	Irated / A	Article no.	Icp,mr / kA	Icc / kA @ 480 V	Metric	Imperial
55 kW	6SL5130-6UE25-5AC0	125	3NE1022-0	1.88	100		
	6SL5130-6UE25-5AD0	125	3NE1022-0	1.88	100		

¹⁾ Minimum enclosure volume when installed in combination with a 200 A Motor Module: 0.42 m³ / 14.8 ft³.

1.4 IEC motor starter protectors

1.4.1 IEC motor starter protectors 3AC 380...480V

Line Module		Protective Device				Min. enclosure volume	
Prated	Article no.	Irated / A	Article no.	Icp,mr / kA	Icc / kA @ 400 V	Metric	Imperial
16 kW	6SL5130-6UE21-6AC0	40	3RV2031-4U...	0.7	65	0.17 m ³ ¹⁾	6.00 ft ³
		40	3RV2041-4F...	0.62	65		
	6SL5130-6UE21-6AD0	40	3RV2031-4U...	0.7	65		
		40	3RV2041-4F...	0.62	65		
24 kW	6SL5130-6UE22-4AC0	73	3RV2031-4K...	1.14	65	1.40 m ³	49.44 ft ³
		75	3RV2041-4K...	1.17	65		
	6SL5130-6UE22-4AD0	73	3RV2031-4K...	1.14	65		
		75	3RV2041-4K...	1.17	65		
36 kW	6SL5130-6UE23-6AC0	80	3RV2031-4R...	1.25	65	1.40 m ³	49.44 ft ³
		80	3RV2032-4R...	1.25	100		
		84	3RV2041-4R...	1.4	65		
		84	3RV2042-4R...	1.4	100		
	6SL5130-6UE23-6AD0	80	3RV2031-4R...	1.25	65		
		80	3RV2032-4R...	1.25	100		
		84	3RV2041-4R...	1.4	65		
		84	3RV2042-4R...	1.4	100		

¹⁾ Minimum enclosure volume when installed in combination with a 200 A Motor Module: 0.42 m³ / 14.8 ft³.

1.5 IEC circuit breakers

1.5.1 IEC circuit breakers 3AC 380...480V

Line Module		Protective Device				Min. enclosure volume	
I_{rated}	Article no.	I_{rated} / A	Article no. ¹⁾	$I_{cp,mf}$ / kA	I_{cc} / kA @ 400 V	Metric	Imperial
16 kW	6SL5130-6UE21-6ACO	40	3VA1040-3ED..-....	0.48	25	0.17 m ³ ²⁾	6.00 ft ³
		40	3VA1040-4ED..-....	0.48	36		
		40	3VA1140-3E#..-....	0.48	25		
		40	3VA1140-4E#..-....	0.48	36		
		40	3VA1140-5E#..-....	0.48	55		
		40	3VA1140-6E#..-....	0.48	70		
	6SL5130-6UE21-6ADO	40	3VA1040-3ED..-....	0.48	25		
		40	3VA1040-4ED..-....	0.48	36		
		40	3VA1140-3E#..-....	0.48	25		
		40	3VA1140-4E#..-....	0.48	36		
		40	3VA1140-5E#..-....	0.48	55		
		40	3VA1140-6E#..-....	0.48	70		
24 kW	6SL5130-6UE22-4ACO	80	3VA1080-3ED..-....	0.96	25		
		80	3VA1080-4ED..-....	0.96	36		
		80	3VA1180-3E#..-....	0.96	25		
		80	3VA1180-4E#..-....	0.96	36		
		80	3VA1180-5E#..-....	0.96	55		
		80	3VA1180-6E#..-....	0.96	70		
	6SL5130-6UE22-4ADO	80	3VA1080-3ED..-....	0.96	25		
		80	3VA1080-4ED..-....	0.96	36		
		80	3VA1180-3E#..-....	0.96	25		
		80	3VA1180-4E#..-....	0.96	36		
		80	3VA1180-5E#..-....	0.96	55		
		80	3VA1180-6E#..-....	0.96	70		
36 kW	6SL5130-6UE23-6ACO	80	3VA1080-4ED..-....	0.96	36	1.40 m ³	49.44 ft ³
		80	3VA1180-3E#..-....	0.96	25		
		80	3VA1180-4E#..-....	0.96	36		
		80	3VA1180-5E#..-....	0.96	55		

Line Module		Protective Device				Min. enclosure volume	
Prated	Article no.	Irated/ A	Article no. ¹⁾	I _{cp,mf} / kA	I _{cc} / kA @ 400 V	Metric	Imperial
	6SL5130-6UE23-6AD0	80	3VA1180-6E#...-....	0.96	70		
		80	3VA1080-4ED...-....	0.96	36		
		80	3VA1180-3E#...-....	0.96	25		
		80	3VA1180-4E#...-....	0.96	36		
		80	3VA1180-5E#...-....	0.96	55		
		80	3VA1180-6E#...-....	0.96	70		
55 kW	6SL5130-6UE25-5AC0	125	3VA1112-3E#...-....	1.5	25		
		125	3VA1112-4E#...-....	1.5	36		
		125	3VA1112-5E#...-....	1.5	55		
		125	3VA1112-6E#...-....	1.5	70		
	6SL5130-6UE25-5AD0	125	3VA1112-3E#...-....	1.5	25		
		125	3VA1112-4E#...-....	1.5	36		
		125	3VA1112-5E#...-....	1.5	55		
		125	3VA1112-6E#...-....	1.5	70		

¹⁾ # stands for type of release and can be replaced by: D (fixed thermal fixed magnetic trip unit), E (adjustable thermal fixed magnetic trip Unit) or F (adjustable thermal adjustable magnetic Trip unit)

²⁾ Minimum enclosure volume when installed in combination with a 200 A Motor Module: 0.42 m³ / 14.8 ft³.

2 UL/CSA applications

2.1 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 converter type and article number on the following items:

- **Suitable protective devices.**
The specification includes the type or article number of the overcurrent protective devices (OCPD).
- **Maximum SCCR (Short-Circuit Current Rating).**
This is the maximum prospective symmetrical fault current at the specified voltage to which the converter system can be connected without sustaining damage exceeding defined acceptance criteria. The specified SCCR applies to the complete converter including built-in EMI filters and pluggable terminals (where applicable).
- **Minimum enclosure volume.**
In the end application, the converter 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** 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 converter and protective device combination.
- The voltage rating of the protective device must be at least the voltage rating of the supply circuit.
 - 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.
 - 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 converter 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 converter module are not required to have a short-circuit current rating (UL 508A).

UL File-Number: E192450 Vol. 27

2.2 UL/CSA non-semiconductor fuses

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

Line Module		Protective Device		Min. enclosure volume	
Prated	Article no.	I _{rated} / A ¹⁾	SCCR / kA @ 480 V	Metric	Imperial
16 kW	6SL5130-6UE21-6AC0	40	100	0.17 m ³ ²⁾	6.00 ft ³
	6SL5130-6UE21-6AD0	40	100		
24 kW	6SL5130-6UE22-4AC0	80	100		
	6SL5130-6UE22-4AD0	80	100		
36 kW	6SL5130-6UE23-6AC0	90	100	1.40 m ³	49.44 ft ³
	6SL5130-6UE23-6AD0	90	100		
55 kW	6SL5130-6UE25-5AC0	125	100		
	6SL5130-6UE25-5AD0	125	100		

¹⁾ Any non-semiconductor fuse Class J, CF, T, CD, or CA (JDDZ) from any manufacturer can be used for all types.

²⁾ Minimum enclosure volume when installed in combination with a 200 A Motor Module: 0.42 m³ / 14.8 ft³.

2.3 UL/CSA semiconductor fuses

2.3.1 UL/CSA semiconductor fuses 3AC 380...480V

Line Module		Protective Device			Min. enclosure volume	
Prated	Article no.	I _{rated} / A	Article no.	SCCR / kA @ 480 V	Metric	Imperial
16 kW	6SL5130-6UE21-6AC0	40	3NE1802-0	100	0.17 m ³ ¹⁾	6.00 ft ³
	6SL5130-6UE21-6AD0	40	3NE1802-0	100		
24 kW	6SL5130-6UE22-4AC0	80	3NE1020-2	100		
		80	3NE1820-0	100		
	6SL5130-6UE22-4AD0	80	3NE1020-2	100		
36 kW	6SL5130-6UE23-6AC0	80	3NE1020-2	100	1.40 m ³	49.44 ft ³
		80	3NE1820-0	100		
	6SL5130-6UE23-6AD0	80	3NE1020-2	100		

Line Module		Protective Device			Min. enclosure volume	
Prated	Article no.	Irated/ A	Article no.	SCCR / kA @ 480 V	Metric	Imperial
		80	3NE1820-0	100		
55 kW	6SL5130-6UE25-5AC0	125	3NE1022-0	100		
	6SL5130-6UE25-5AD0	125	3NE1022-0	100		

¹⁾ Minimum enclosure volume when installed in combination with a 200 A Motor Module: 0.42 m³ / 14.8 ft³.

2.4 UL/CSA type E combination motor controllers

2.4.1 UL/CSA type E combination motor controllers 3AC 380...480V

Line Module		Protective Device				Min. enclosure volume	
Prated	Article no.	Irated/ A	Prated @ 3 AC 460 V	Article no.	SCCR / kA @ 480Y/277V AC	Metric	Imperial
16 kW	6SL5130-6UE21-6AC0	40	30 hp	3RV2031-4U...	65.0	0.17 m ³ ¹⁾	6.00 ft ³
		40	30 hp	3RV2041-4F...	65.0		
	6SL5130-6UE21-6AD0	40	30 hp	3RV2031-4U...	65.0		
		40	30 hp	3RV2041-4F...	65.0		
24 kW	6SL5130-6UE22-4AC0	73	60 hp	3RV2031-4K...	65.0	1.40 m ³	49.44 ft ³
		75	60 hp	3RV2041-4K...	65.0		
	6SL5130-6UE22-4AD0	73	60 hp	3RV2031-4K...	65.0		
		75	60 hp	3RV2041-4K...	65.0		
36 kW	6SL5130-6UE23-6AC0	84	60 hp	3RV2041-4R...	65.0	1.40 m ³	49.44 ft ³
		84	60 hp	3RV2042-4R...	65.0		
	6SL5130-6UE23-6AD0	84	60 hp	3RV2041-4R...	65.0		
		84	60 hp	3RV2042-4R...	65.0		

¹⁾ Minimum enclosure volume when installed in combination with a 200 A Motor Module: 0.42 m³ / 14.8 ft³.

2.5 UL/CSA circuit breaker

2.5.1 UL/CSA circuit breaker 3AC 380...480V

Line Module		Protective Device					Min. enclosure volume	
Prated	Article no.	I _{rated} / A	UL/CSA type	Article no. Example (European) ¹⁾	SCCR / kA @ 480 V	SCCR / kA @ 480Y/277V AC	Metric	Imperial
16 kW	6SL5130-6UE21-6AC0	40	3RV	3RV2742-5GD..	-	65	0.17 m ³ ₂₎	6.00 ft ³
		40	CFAS	3VA5240-7E#..-....	100	100		
		40	HEAS	3VA5140-6E#..-....	65	65		
		40	HFAS	3VA5240-6E#..-....	65	65		
		40	MEAS	3VA5140-5E#..-....	35	35		
		40	MFAS	3VA5240-5E#..-....	35	35		
		40	SEAS	3VA5140-4E#..-....	25	25		
	6SL5130-6UE21-6AD0	40	3RV	3RV2742-5GD..	-	65		
		40	CFAS	3VA5240-7E#..-....	100	100		
		40	HEAS	3VA5140-6E#..-....	65	65		
		40	HFAS	3VA5240-6E#..-....	65	65		
		40	MEAS	3VA5140-5E#..-....	35	35		
		40	MFAS	3VA5240-5E#..-....	35	35		
		40	SEAS	3VA5140-4E#..-....	25	25		
24 kW	6SL5130-6UE22-4AC0	70	3RV	3RV2742-5QD..	-	65		
		70	CFAS	3VA5270-7E#..-....	100	100		
		70	HEAS	3VA5170-6E#..-....	65	65		
		70	HFAS	3VA5270-6E#..-....	65	65		
		70	MEAS	3VA5170-5E#..-....	35	35		
		70	MFAS	3VA5270-5E#..-....	35	35		
		70	SEAS	3VA5170-4E#..-....	25	25		
	6SL5130-6UE22-4AD0	70	3RV	3RV2742-5QD..	-	65		
		70	CFAS	3VA5270-7E#..-....	100	100		
		70	HEAS	3VA5170-6E#..-....	65	65		
		70	HFAS	3VA5270-6E#..-....	65	65		
		70	MEAS	3VA5170-5E#..-....	35	35		
		70	MFAS	3VA5270-5E#..-....	35	35		
		70	SEAS	3VA5170-4E#..-....	25	25		

Line Module		Protective Device					Min. enclosure volume	
Prated	Article no.	Irated/ A	UL/CSA type	Article no. Example (European) ¹⁾	SCCR / kA @ 480 V	SCCR / kA @ 480Y/277V AC	Metric	Imperial
		70	SEAS	3VA5170-4E#...-....	25	25		
36 kW	6SL5130-6UE23-6AC0	90	CFAS	3VA5290-7E#...-....	100	100	1.40 m ³	49.44 ft ³
		90	HEAS	3VA5190-6E#...-....	65	65		
		90	HFAS	3VA5290-6E#...-....	65	65		
		90	MEAS	3VA5190-5E#...-....	35	35		
		90	MFAS	3VA5290-5E#...-....	35	35		
		90	SEAS	3VA5190-4E#...-....	25	25		
	6SL5130-6UE23-6AD0	90	CFAS	3VA5290-7E#...-....	100	100		
		90	HEAS	3VA5190-6E#...-....	65	65		
		90	HFAS	3VA5290-6E#...-....	65	65		
		90	MEAS	3VA5190-5E#...-....	35	35		
		90	MFAS	3VA5290-5E#...-....	35	35		
		90	SEAS	3VA5190-4E#...-....	25	25		
55 kW	6SL5130-6UE25-5AC0	125	CFAS	3VA5212-7E#...-....	100	100		
		125	HEAS	3VA5112-6E#...-....	65	65		
		125	HFAS	3VA5212-6E#...-....	65	65		
		125	MEAS	3VA5112-5E#...-....	35	35		
		125	MFAS	3VA5212-5E#...-....	35	35		
		125	SEAS	3VA5112-4E#...-....	25	25		
	6SL5130-6UE25-5AD0	125	CFAS	3VA5212-7E#...-....	100	100		
		125	HEAS	3VA5112-6E#...-....	65	65		
		125	HFAS	3VA5212-6E#...-....	65	65		
		125	MEAS	3VA5112-5E#...-....	35	35		
		125	MFAS	3VA5212-5E#...-....	35	35		
		125	SEAS	3VA5112-4E#...-....	25	25		

¹⁾ # stands for type of release and can be replaced by: C (fixed thermal adjustable magnetic trip unit), D (fixed thermal fixed magnetic trip unit) or F (adjustable thermal adjustable magnetic trip unit)

²⁾ Minimum enclosure volume when installed in combination with a 200 A Motor Module: 0.42 m³ / 14.8 ft³.

3 Further Information

Further information is available on the internet:

- SENTRON Fuse Systems, configuration manual
<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>
- SIRIUS 3RV Motor Starter Protectors
<https://support.industry.siemens.com/cs/ww/en/view/60279172>
- 3VA molded case circuit breakers with IEC certificate
<https://support.industry.siemens.com/cs/us/en/view/90318775>
- 3VA UL / IEC molded case circuit breakers
<https://support.industry.siemens.com/cs/us/en/view/109758561>
- UL Molded Case Circuit Breakers, SENTRON & VL series, see Siemens SPEEDFAX Product Catalog, Section 7
<https://digitalcontentcenter.compas.siemens-info.com/SF-17-Sect-07-ALL-web.pdf>