SIEMENS

SINAMICS V20

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Protective Devices for SINAMICS V20

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1 Protective devices for 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 installation.

The tables below provide information for each converter 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 converter shall be installed in an outer enclosure or control cabinet which shall meet the minimum enclosure volume requirements.

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, 200 V ... 240 V

Converter			Fuse			Min. enclosure volume	
Frame size	**Rated power**	**Article no.**	**Max. rated current**	**Article no.**	**I_{cc} @ 240 V AC**	**Metric**	**Imperial (USA)**
FSAA	0.12 kW	6SL3210-5BB11-2...	16 A	3NA3805	100 kA	0.01 m³	0.35 ft³
	0.25 kW	6SL3210-5BB12-5...					
	0.37 kW	6SL3210-5BB13-7...					
FSAB	0.55 kW	6SL3210-5BB15-5...					
	0.75 kW	6SL3210-5BB17-5...					
FSAC	1.1 kW	6SL3210-5BB21-1...	20 A	3NA3807	100 kA	0.02 m³	0.71 ft³
	1.5 kW	6SL3210-5BB21-5...	32 A	3NA3812	100 kA		
FSAD	2.2 kW	6SL3210-5BB22-2...	35 A	3NA3814	100 kA	0.06 m³ [1)]	2.12 ft³ [1)]
	3.0 kW	6SL3210-5BB23-0...	50 A	3NA3820	100 kA		

[1)] The minimum enclosure requires additional protection measures, that is, using two safety cabinet locks.

Note: Siemens 3NA low-voltage fuses are recommended.

1.2.2 IEC standard fuses, 380 V ... 480 V

Converter			Fuse			Min. enclosure volume	
Frame size	**Rated power**	**Article no.**	**Max. rated current**	**Article no.**	**I_{cc} @ 400 V AC**	**Metric**	**Imperial (USA)**
FSA	0.37 kW	6SL3210-5BE13-7...	6 A	3NA3801	100 kA	0.02 m³	0.67 ft³
	0.55 kW	6SL3210-5BE15-5...					
	0.75 kW	6SL3210-5BE17-5...					
	0.75 kW [1]	6SL3216-5BE17-5...					
	1.1 kW	6SL3210-5BE21-1...					
	1.5 kW	6SL3210-5BE21-5...	10 A	3NA3803	100 kA		
	2.2 kW	6SL3210-5BE22-2...	16 A	3NA3805	100 kA		
FSB	3.0 kW	6SL3210-5BE23-0...	16 A	3NA3805	100 kA	0.10 m³	3.53 ft³
	4.0 kW	6SL3210-5BE24-0...	20 A	3NA3807	100 kA		
FSC	5.5 kW	6SL3210-5BE25-5...	32 A	3NA3812	100 kA	0.16 m³	5.40 ft³
	7.5 kW	6SL3210-5BE27-5...	63 A	3NA3822	100 kA		
FSD	11 kW	6SL3210-5BE31-1...	63 A	3NA3822	100 kA	0.23 m³	8.12 ft³
	15 kW	6SL3210-5BE31-5...					
FSE	18.5 kW (HO) [2] 22 kW (LO) [2]	6SL3210-5BE31-8...	63 A	3NA3822	100 kA	0.37 m³	13.07 ft³
	22 kW (HO) [2] 30 kW (LO) [2]	6SL3210-5BE32-2...	80 A	3NA3824	100 kA		

[1] This converter refers to the Flat Plate converter with a flat plate heatsink.

[2] "HO" and "LO" indicate high overload and low overload respectively. You can set the HO/LO mode through relevant parameter settings.

Note: Siemens 3NA low-voltage fuses are recommended.

1.3 IEC semiconductor fuses

1.3.1 IEC semiconductor fuses, 200 V ... 240 V

Converter			Fuse			Min. enclosure volume	
Frame size	**Rated power**	**Article no.**	**Max. rated current**	**Article no.**	**I_{cc} @ 240 V AC**	**Metric**	**Imperial (USA)**
FSAA	0.12 kW	6SL3210-5BB11-2...	16 A	3NE1813-0	100 kA	0.01 m³	0.35 ft³
	0.25 kW	6SL3210-5BB12-5...					
	0.37 kW	6SL3210-5BB13-7...					
FSAB	0.55 kW	6SL3210-5BB15-5...					
	0.75 kW	6SL3210-5BB17-5...					
FSAC	1.1 kW	6SL3210-5BB21-1...	25 A	3NE1815-0	100 kA	0.02 m³	0.71 ft³
	1.5 kW	6SL3210-5BB21-5...	35 A	3NE1803-0	100 kA		
FSAD	2.2 kW	6SL3210-5BB22-2...	50 A	3NE1817-0	100 kA	0.06 m³ [1)]	2.12 ft³ [1)]
	3.0 kW	6SL3210-5BB23-0...	50 A	3NE1817-0	100 kA		

[1)] The minimum enclosure requires additional protection measures, that is, using two safety cabinet locks.

1.3.2 IEC semiconductor fuses, 380 V ... 480 V

Converter			Fuse			Min. enclosure volume	
Frame size	**Rated power**	**Article no.**	**Max. rated current**	**Article no.**	**I_{cc} @ 400 V AC**	**Metric**	**Imperial (USA)**
FSA	0.37 kW	6SL3210-5BE13-7...	16 A	3NE1813-0	100 kA	0.02 m³	0.67 ft³
	0.55 kW	6SL3210-5BE15-5...					
	0.75 kW	6SL3210-5BE17-5...					
	0.75 kW [1]	6SL3216-5BE17-5...					
	1.1 kW	6SL3210-5BE21-1...					
	1.5 kW	6SL3210-5BE21-5...	16 A	3NE1813-0	100 kA		
	2.2 kW	6SL3210-5BE22-2...	16 A	3NE1813-0	100 kA		
FSB	3.0 kW	6SL3210-5BE23-0...	16 A	3NE1813-0	100 kA	0.10 m³	3.53 ft³
	4.0 kW	6SL3210-5BE24-0...	20 A	3NE1814-0	100 kA		
FSC	5.5 kW	6SL3210-5BE25-5...	35 A	3NE1803-0	100 kA	0.16 m³	5.40 ft³
	7.5 kW	6SL3210-5BE27-5...	63 A	3NE1818-0	100 kA		
FSD	11 kW	6SL3210-5BE31-1...	63 A	3NE1818-0	100 kA	0.23 m³	8.12 ft³
	15 kW	6SL3210-5BE31-5...					
FSE	18.5 kW (HO) [2] 22 kW (LO) [2]	6SL3210-5BE31-8...	80 A	3NE1820-0	100 kA	0.37 m³	13.07 ft³
	22 kW (HO) [2] 30 kW (LO) [2]	6SL3210-5BE32-2...	100 A	3NE1021-0	100 kA		

[1] This converter refers to the Flat Plate converter with a flat plate heatsink.

[2] "HO" and "LO" indicate high overload and low overload respectively. You can set the HO/LO mode through relevant parameter settings.

1.4 IEC motor starter protectors

1.4.1 IEC motor starter protectors, 200 V ... 240 V

Converter			**MSP**			**Min. enclosure volume**	
Frame size	**Rated power**	**Article no.**	**Max. rated current**	**Article no.**	**I_{cc} @ 240 V AC**	**Metric**	**Imperial (USA)**
FSAA	0.12 kW	6SL3210-5BB11-2...	3.2 A	3RV2011-1DA..	65 kA	0.01 m³	0.35 ft³
				3RV2021-1DA..			
	0.25 kW	6SL3210-5BB12-5...	5 A	3RV2011-1FA..			
				3RV2021-1FA..			
	0.37 kW	6SL3210-5BB13-7...	8 A	3RV2011-1HA..			
				3RV2021-1HA..			
FSAB	0.55 kW	6SL3210-5BB15-5...	10 A	3RV2011-1JA..			
				3RV2021-1JA..			
	0.75 kW	6SL3210-5BB17-5...	12.5 A	3RV2011-1KA..			
				3RV2021-1KA..			
FSAC	1.1 kW	6SL3210-5BB21-1...	16 A	3RV2011-4AA..		0.02 m³	0.71 ft³
				3RV2021-4AA..			
			20 A	3RV2021-4BA..			
				3RV2031-4BA..			
				3RV2032-4BA..			
	1.5 kW	6SL3210-5BB21-5...	16 A	3RV20.1-4AA..			
			20 A	3RV2031-4BA..			
				3RV2032-4BA..			
			22 A	3RV2021-4CA..			
FSAD	2.2 kW	6SL3210-5BB22-2...	32 A	3RV2021-4EA..		0.06 m³ [1]	2.12 ft³ [1]
				3RV2031-4EA..			
				3RV2032-4EA..			
	3.0 kW	6SL3210-5BB23-0...	40 A	3RV2031-4UA..			
				3RV2032-4UA..			
				3RV2041-4FA..			
				3RV2042-4FA..			

[1] The minimum enclosure requires additional protection measures, that is, using two safety cabinet locks.

Note: Only valid for supply grids with grounded star point (solidly grounded wye TN or TT systems).

1.4.2 IEC motor starter protectors, 380 V ... 480 V

Converter			MSP			Min. enclosure volume	
Frame size	**Rated power**	**Article no.**	**Max. rated current**	**Article no.**	**I_{cc} @ 400 V AC**	**Metric**	**Imperial (USA)**
FSA	0.37 kW	6SL3210-5BE13-7...	2.5 A	3RV2011-1CA..	65 kA	0.02 m³	0.67 ft³
				3RV2021-1CA..			
	0.55 kW	6SL3210-5BE15-5...	3.2 A	3RV2011-1DA..			
				3RV2021-1DA..			
	0.75 kW	6SL3210-5BE17-5...	4 A	3RV2011-1EA..			
				3RV2021-1EA..			
	0.75 kW	6SL3216-5BE17-5...		3RV2011-1EA..			
				3RV2021-1EA..			
	1.1 kW	6SL3210-5BE21-1...	6.3 A	3RV2011-1GA..			
				3RV2021-1GA..			
	1.5 kW	6SL3210-5BE21-5...	8 A	3RV2011-1HA..			
				3RV2021-1HA..			
	2.2 kW	6SL3210-5BE22-2...	10 A	3RV2011-1JA..			
				3RV2021-1JA..			
FSB	3.0 kW	6SL3210-5BE23-0...	12.5 A	3RV2011-1KA..	65 kA	0.10 m³	3.53 ft³
				3RV2021-1KA..			
	4.0 kW	6SL3210-5BE24-0...	14 A	3RV2031-4SA..	65 kA		
				3RV2032-4SA..			
			16 A	3RV2011-4AA..	55 kA		
				3RV2021-4AA..	65 kA		
			17 A	3RV2031-4TA..	65 kA		
				3RV2032-4TA..			
FSC	5.5 kW	6SL3210-5BE25-5...	16 A	3RV2011-4AA..	55 kA	0.16 m³	5.40 ft³
				3RV2021-4AA..	65 kA		
			20 A	3RV2021-4BA..	55 kA		
				3RV2031-4BA..	65 kA		
				3RV2032-4BA..			
	7.5 kW	6SL3210-5BE27-5...	25 A	3RV2021-4DA..	55 kA		
				3RV2031-4DA..	65 kA		
				3RV2032-4DA..			
FSD	11 kW	6SL3210-5BE31-1...	32 A	3RV2021-4EA..	20 kA	0.23 m³	8.12 ft³
			45 A	3RV2031-4VA..	65 kA		
				3RV2032-4VA..			
			50 A	3RV2041-4HA..	65 kA		
				3RV2042-4HA..			
			52 A	3RV2031-4WA..	65 kA		
				3RV2032-4WA..			
	15 kW	6SL3210-5BE31-5...	45 A	3RV2031-4VA..	65 kA		
				3RV2032-4VA..			
			52 A	3RV2031-4WA..	65 kA		
				3RV2032-4WA..			
			63 A	3RV2041-4JA..	65 kA		
				3RV2042-4JA..			
			65 A	3RV2031-4JA..	50 kA		
				3RV2032-4JA..	65 kA		
FSE	18.5 kW (HO) 22 kW (LO)	6SL3210-5BE31-8...	75 A	3RV2041-4KA..	65 kA	0.37 m³	13.07 ft³
				3RV2042-4KA..			
			73 A	3RV2031-4KA..	50 kA		
				3RV2032-4KA..	65 kA		
	22 kW (HO) 30 kW (LO)	6SL3210-5BE32-2...	93 A	3RV2041-4YA..	50 kA		
				3RV2042-4YA..	65 kA		

Note: Only valid for supply grids with grounded star point (solidly grounded wye TN or TT systems).

1.5 IEC circuit breakers

1.5.1 IEC circuit breakers, 200 V ... 240 V

Converter			Circuit breaker			Min. enclosure volume	
Frame size	**Rated power**	**Article no.**	**Max. rated current**	**Type**	**I_{cc} @ 240 V AC**	**Metric**	**Imperial (USA)**
FSAA	0.12 kW	6SL3210-5BB11-2...	15 A	3VA5195-4E...-....	65 kA	0.01 m³	0.35 ft³
				3VA5195-5E...-....			
				3VA5195-6E...-....			
			16 A	3VA1196-4ED1.-....	36 kA		
				3VA1096-4ED3.-....	55 kA		
				3VA1196-6E.3.-....	65 kA		
	0.25 kW	6SL3210-5BB12-5...	15 A	3VA5195-4E...-...	65 kA		
				3VA5195-5E...-....			
				3VA5195-6E...-....			
			16 A	3VA1196-4ED1.-....	36 kA		
				3VA1096-4ED3.-....	55 kA		
				3VA1196-6E.3.-....	65 kA		
	0.37 kW	6SL3210-5BB13-7...	15 A	3VA5195-4E...-...	65 kA		
				3VA5195-5E...-....			
				3VA5195-6E...-....			
			16 A	3VA1196-4ED1.-....	36 kA		
				3VA1096-4ED3.-....	55 kA		
				3VA1196-6E.3.-....	65 kA		
FSAB	0.55 kW	6SL3210-5BB15-5...	15 A	3VA5195-4E...-...	65 kA		
				3VA5195-5E...-....			
				3VA5195-6E...-....			
			16 A	3VA1196-4ED1.-....	36 kA		
				3VA1096-4ED3.-....	55 kA		
				3VA1196-6E.3.-....	65 kA		
	0.75 kW	6SL3210-5BB17-5...	15 A	3VA5195-4E...-....	65 kA		
				3VA5195-5E...-....			
				3VA5195-6E...-....			
			16 A	3VA1196-4ED1.-....	36 kA		
				3VA1096-4ED3.-....	55 kA		
				3VA1196-6E.3.-....	65 kA		
FSAC	1.1 kW	6SL3210-5BB21-1...	20 A	3VA1120-4ED1.-....	36 kA	0.02 m³	0.71 ft³
				3VA1020-4ED3.-....	55 kA		
				3VA1120-6E.3.-....	65 kA		
			30 A	3VA5130-4E...-....	65 kA		
				3VA5130-5E...-....			
				3VA5130-6E...-....			
	1.5 kW	6SL3210-5BB21-5...	25 A	3VA1125-4ED1.-....	36 kA		
				3VA1025-4ED3.-....	55 kA		
				3VA1125-6E.3.-....	65 kA		
			30 A	3VA5130-4E...-....	65 kA		
				3VA5130-5E...-....			
				3VA5130-6E...-....			

Converter			Circuit breaker			Min. enclosure volume	
Frame size	**Rated power**	**Article no.**	**Max. rated current**	**Type**	**I_{cc} @ 240 V AC**	**Metric**	**Imperial (USA)**
FSAD	2.2 kW	6SL3210-5BB22-2...	32 A	3VA1132-4ED1.-....	36 kA	0.06 m^3 1)	2.12 ft^3 1)
				3VA1032-4ED3.-....	55 kA		
				3VA1132-6E.3.-....	65 kA		
			40 A	3VA5140-4E...-....	25kA		
				3VA5140-5E...-....	36kA		
				3VA5140-6E...-....	55kA		
	3.0 kW	6SL3210-5BB23-0...	40 A	3VA1140-4ED1.-....	36 kA		
				3VA1040-4ED3.-....	55 kA		
				3VA1140-6E.3.-....	65 kA		
			50 A	3VL2505-1KN..-....	65 kA		
				3VL2505-2KN..-....	65 kA		
				3VL2505-3KN..-....	65 kA		
				3VA5150-4ED..-....	25kA		
				3VA5150-5E...-....	36kA		
				3VA5150-6E...-....	55kA		
				3VA5150-4E...-....	55kA		

1) The minimum enclosure requires additional protection measures, that is, using two safety cabinet locks.

1.5.2 IEC circuit breakers, 380 V ... 480 V

Converter			Circuit breaker			Min. enclosure volume	
Frame size	**Rated power**	**Article no.**	**Max. rated current**	**Type**	**I_{cc} @ 400 V AC**	**Metric**	**Imperial (USA)**
FSA	0.37 kW	6SL3210-5BE13-7...	16 A	3VA1096-4ED3.-....	36 kA	0.47 (0.33 [1]) m³	16.60 (11.65 [1]) ft³
				3VA1196-6E.3.-....	65 kA		
	0.55 kW	6SL3210-5BE15-5...	16 A	3VA1096-4ED3.-....	36 kA		
				3VA1196-6E.3.-....	65 kA		
	0.75 kW	6SL3210-5BE17-5...	16 A	3VA1096-4ED3.-....	36 kA		
				3VA1196-6E.3.-....	65 kA		
	0.75 kW	6SL3216-5BE17-5...	16 A	3VA1096-4ED3.-....	36 kA		
				3VA1196-6E.3.-....	65 kA		
	1.1 kW	6SL3210-5BE21-1...	16 A	3VA1096-4ED3.-....	36 kA		
				3VA1196-6E.3.-....	65 kA		
	1.5 kW	6SL3210-5BE21-5...	16 A	3VA1096-4ED3.-....	36 kA		
				3VA1196-6E.3.-....	65 kA		
	2.2 kW	6SL3210-5BE22-2...	16 A	3VA1096-4ED3.-....	36 kA		
				3VA1196-6E.3.-....	65 kA		
FSB	3.0 kW	6SL3210-5BE23-0...	16 A	3VA1096-4ED3.-....	36 kA	0.8 m³	28.25 ft³
				3VA1196-6E.3.-....	65 kA		
	4.0 kW	6SL3210-5BE24-0...	16 A	3VA1096-4ED3.-....	36 kA		
				3VA1196-6E.3.-....	65 kA		
			20 A	3VA5120-4E...-....	25 kA		
				3VA5120-5E...-....	35 kA		
				3VA5120-6E...-....	65 kA		
FSC	5.5 kW	6SL3210-5BE25-5...	20 A	3VA1020-4ED3.-....	36 kA	1.22 m³	43.08 ft³
				3VA5120-5E...-....			
				3VA5120-4E...-....	25 kA		
				3VA1120-6E.3.-....	65 kA		
				3VA5120-6E...-....			
	7.5 kW	6SL3210-5BE27-5...	25 A	3VA1025-4ED3.-....	36 kA		
				3VA1125-6E.3.-....	65 kA		
			30 A	3VA5130-4E..-....	25 kA		
				3VA5130-5E..-....	35 kA		
				3VA5130-6E...-....	65 kA		
FSD	11 kW	6SL3210-5BE31-1...	40 A	3VA1040-4ED3.-....	36 kA	1.85 m³	65.33 ft³
				3VA1140-6E.3.-....	65 kA		
	15 kW	6SL3210-5BE31-5...	50 A	3VA1050-4ED3.-....	36 kA		
				3VA1150-6E.3.-....	65 kA		
			60 A	3VA5160-4E...-....	25 kA		
				3VA5160-5E...-....	35 kA		
				3VA5160-6E...-....	65 kA		
FSE	18.5 kW (HO) 22 kW (LO)	6SL3210-5BE31-8...	63 A	3VA1063-4ED..-....	36 kA	2.93 m³	103.47 ft³
				3VA1163-6E...-....	65 kA		
	22 kW (HO) 30 kW (LO)	6SL3210-5BE32-2...	80 A	3VA1080-4ED3.-....	36 kA		
				3VA1180-6E.3.-....	65 kA		

[1] This value is for the Flat Plate converter with a flat plate heatsink.

2 Protective devices for UL/CSA applications

You may operate the SINAMICS V20 on a branch circuit with the specified short-circuit current rating (SCCR), provided the specified branch-circuit protection device is installed as detailed in the following tables.

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 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 converter 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** 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 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**.
  According to UL 508A Edition 3, components on the load side of a converter with built-in short circuit protection are not required to have a short-circuit current rating.

UL File-Numbers

FSAA, FSAB, FSAC, FSAD	Single phase AC 240 V	UL-File E355661, Vol. 3 Sec. 4
FSA, FSB, FSC, FSD, FSE	Three phase AC 480 V	UL-File E355661, Vol. 3 Sec. 5

Note

The converters are investigated to the US standard UL 61800-5-1. Please note that the FSA-C were previously investigated to the US standard UL 508C, which has meanwhile been withdrawn. This may entail restrictions in terms of suitable protective devices, SCCR and cabinet size data compared to previous protective devices information.

2.2 UL/CSA non-semiconductor fuses

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

Note

The converters protected by the specified branch-circuit protection devices are suitable to be installed in a ventilated enclosure with no special limitation. When an unventilated enclosure is used, observe the minimum volume specified in the following tables.

Converter			Fuse		Min. enclosure volume [1]	
Frame size	**Rated power**	**Article no.**	**Max. rated current**	**SCCR @ 240 V AC**	**Metric**	**Imperial (USA)**
FSAA	0.12 kW	6SL3210-5BB11-2...	15 A	100 kA	0.01 m³	0.35 ft³
	0.25 kW	6SL3210-5BB12-5...				
	0.37 kW	6SL3210-5BB13-7...				
FSAB	0.55 kW	6SL3210-5BB15-5...				
	0.75 kW	6SL3210-5BB17-5...				
FSAC	1.1 kW	6SL3210-5BB21-1...	30 A		0.02 m³	0.71 ft³
	1.5 kW	6SL3210-5BB21-5...				
FSAD	2.2 kW	6SL3210-5BB22-2...	50 A		0.06 m³ [2]	2.12 ft³ [2]
	3.0 kW	6SL3210-5BB23-0...				

[1] An unventilated enclosure of any size without any special limitations can be used when Class J or CC fuses are used as protective devices for SINAMICS V20.

[2] The minimum enclosure requires additional protection measures, that is, using two safety cabinet locks.

Note: Any non-semiconductor fuse of Class J, T, CC, G or CF (JDDZ/JDDZ7) can be used for all frame sizes.

2.2.2 UL/CSA non-semiconductor fuses, 380 V ... 480 V

Note

The converters protected by the specified branch-circuit protection devices are suitable to be installed in a ventilated enclosure with no special limitation. When an unventilated enclosure is used, observe the minimum volume specified in the following tables.

Converter			Fuse		Min. enclosure volume [1]	
Frame size	**Rated power**	**Article no.**	**Max. rated current**	**SCCR @ 480 V AC**	**Metric**	**Imperial (USA)**
FSA	0.37 kW	6SL3210-5BE13-7...	15 A	100 kA	0.02 m³	0.67 ft³
	0.55 kW	6SL3210-5BE15-5...				
	0.75 kW	6SL3210-5BE17-5...				
	0.75 kW	6SL3216-5BE17-5...				
	1.1 kW	6SL3210-5BE21-1...				
	1.5 kW	6SL3210-5BE21-5...				
	2.2 kW	6SL3210-5BE22-2...				
FSB	3.0 kW	6SL3210-5BE23-0...	20 A		0.10 m³	3.53 ft³
	4.0 kW	6SL3210-5BE24-0...				
FSC	5.5 kW	6SL3210-5BE25-5...	20 A		0.16 m³	5.40 ft³
	7.5 kW	6SL3210-5BE27-5...	60 A			
FSD	11 kW	6SL3210-5BE31-1...	60 A		0.23 m³	8.12 ft³
	15 kW	6SL3210-5BE31-5...				
FSE	18.5 kW (HO) 22 kW (LO)	6SL3210-5BE31-8...	80 A		0.37 m³	13.07 ft³
	22 kW (HO) 30 kW (LO)	6SL3210-5BE32-2...	90 A			

[1] An unventilated enclosure of any size without any special limitations can be used when Class J or CC fuses are used as protective devices for SINAMICS V20.

Note: Any non-semiconductor fuse of Class J, T, CC, G or CF (JDDZ/JDDZ7) can be used for all frame sizes.

2.3 UL/CSA type E combination motor controllers

2.3.1 UL/CSA type E combination motor controllers, 200 V ... 240 V

Note

The converters protected by the specified branch-circuit protection devices are suitable to be installed in a ventilated enclosure with no special limitation. When an unventilated enclosure is used, observe the minimum volume specified in the following tables.

Converter			CMC				Min. enclosure volume	
Frame size	Rated power	Article no.	Max. rated current	Maximum rated power at 3-ph 460 V/1-ph 230 V	Article no.	SCCR @ 240 V AC	Metric	Imperial (USA)
FSAA	0.12 kW	6SL3210-5BB11-2...	3.2 A	0.25 hp	3RV2011-1DA..	65 kA	0.01 m³	0.35 ft³
					3RV2021-1DA..			
	0.25 kW	6SL3210-5BB12-5...	5.0 A	0.5 hp	3RV2011-1FA..			
					3RV2021-1FA..			
	0.37 kW	6SL3210-5BB13-7...	8.0 A	1 hp	3RV2011-1HA..			
					3RV2021-1HA..			
FSAB	0.55 kW	6SL3210-5BB15-5...	10.0 A	1.5 hp	3RV2011-1JA..			
					3RV2021-1JA..			
	0.75 kW	6SL3210-5BB17-5...	12.5 A	2 hp	3RV2011-1KA..			
					3RV2021-1KA..			
FSAC	1.1 kW	6SL3210-5BB21-1...	16 A	2 hp	3RV2011-4AA..	65kA	0.02 m³	0.71 ft³
					3RV2021-4AA..			
			20 A	3 hp	3RV2021-4BA..			
					3RV2031-4BA..			
					3RV2032-4BA..			
	1.5 kW	6SL3210-5BB21-5...	16 A	2 hp	3RV20.1-4AA..			
			20 A	3 hp	3RV2031-4BA..			
					3RV2032-4BA..			
			22 A	3 hp	3RV2021-4CA..			
FSAD	2.2 kW	6SL3210-5BB22-2...	32 A	5 hp	3RV2021-4EA..	50 kA	0.06 m³ [1)]	2.12 ft³ [1)]
					3RV2031-4EA..	65 kA		
					3RV2032-4EA..			
	3.0 kW	6SL3210-5BB23-0...	40 A	7.5 hp	3RV2031-4UA..	65 kA		
					3RV2032-4UA..			
					3RV2041-4FA..			
					3RV2042-4FA..			

3RV20 motor starter protectors are approved in accordance with UL 508/UL60947-4-1 in combination with the terminal blocks listed below:

- 3RV2011 and 3RV2021 with 3RV2928-1H
- 3RV203. with 3RV2938-1K
- 3RV204. with 3RT2946-4GA07
- 3RV104. with 3RT1946-4GA07

For CSA not necessary.

2.3.2 UL/CSA type E combination motor controllers, 380 V ... 480 V

Note

The converters protected by the specified branch-circuit protection devices are suitable to be installed in a ventilated enclosure with no special limitation. When an unventilated enclosure is used, observe the minimum volume specified in the following tables.

Converter			CMC				Min. enclosure volume	
Frame size	Rated power	Article no.	Max. rated current	Maximum rated power at 3-ph 460 V/1-ph 230 V	Article no.	SCCR @ 480Y/277 V AC	Metric	Imperial (USA)
FSA	0.37 kW	6SL3210-5BE13-7...	2.5 A	1 hp	3RV2011-1CA..	65 kA	0.02 m³	0.67 ft³
					3RV2021-1CA..			
	0.55 kW	6SL3210-5BE15-5...	3.2 A	1.5 hp	3RV2011-1DA..			
					3RV2021-1DA..			
	0.75 kW	6SL3210-5BE17-5...	4.0 A	2 hp	3RV2011-1EA..			
					3RV2021-1EA..			
	0.75 kW	6SL3216-5BE17-5...			3RV2011-1EA..			
					3RV2021-1EA..			
	1.1 kW	6SL3210-5BE21-1...	6.3 A	3 hp	3RV2011-1GA..			
					3RV2021-1GA..			
	1.5 kW	6SL3210-5BE21-5...	8.0 A	5 hp	3RV2011-1HA..			
					3RV2021-1HA..			
	2.2 kW	6SL3210-5BE22-2...	10.0 A	5 hp	3RV2011-1JA..			
					3RV2021-1JA..			
FSB	3.0 kW	6SL3210-5BE23-0...	12.5 A	7.5 hp	3RV2011-1KA..	65 kA	0.10 m³	3.53 ft³
					3RV2021-1KA..			
	4.0 kW	6SL3210-5BE24-0...	14 A	10 hp	3RV2031-4SA..			
					3RV2032-4SA..			
			16 A	10 hp	3RV2011-4AA..			
					3RV2021-4AA..			
			17 A	10 hp	3RV2031-4TA..			
					3RV2032-4TA..			
FSC	5.5 kW	6SL3210-5BE25-5...	16 A	10 hp	3RV2011-4AA..	65 kA	0.16 m³	5.40 ft³
					3RV2021-4AA..			
			20 A	10 hp	3RV2021-4BA..			
			20 A	15 hp	3RV2031-4BA..			
					3RV2032-4BA..			
	7.5 kW	6SL3210-5BE27-5...	25 A	15 hp	3RV2021-4DA..			
			25 A	20 hp	3RV2031-4DA..			
					3RV2032-4DA..			
FSD	11 kW	6SL3210-5BE31-1...	32 A	20 hp	3RV2021-4EA..	50 kA	0.23 m³	8.12 ft³
			45 A	40 hp	3RV2031-4VA..	65 kA		
					3RV2032-4VA..			
			50 A	40 hp	3RV2041-4HA..			
					3RV2042-4HA..			
			52 A	40 hp	3RV2031-4WA..			
					3RV2032-4WA..			
	15 kW	6SL3210-5BE31-5...	45 A	40 hp	3RV2031-4VA..	65 kA		
					3RV2032-4VA..			
			52 A	40 hp	3RV2031-4WA..			
					3RV2032-4WA..			
			63 A	50 hp	3RV2041-4JA..			
					3RV2042-4JA..			
			65 A	50 hp	3RV2031-4JA..			
					3RV2032-4JA..			

Converter			**CMC**				**Min. enclosure volume**	
Frame size	**Rated power**	**Article no.**	**Max. rated current**	**Maximum rated power at 3-ph 460 V/1-ph 230 V**	**Article no.**	**SCCR @ 480Y/277 V AC**	**Metric**	**Imperial (USA)**
FSE	18.5 kW (HO) 22 kW (LO)	6SL3210-5BE31-8...	73 A	60 hp	3RV2031-4KA..	65 kA	0.37 m³	13.07 ft³
					3RV2032-4KA..			
			75 A		3RV2041-4KA..			
					3RV2042-4KA..			
	22 kW (HO) 30 kW (LO)	6SL3210-5BE32-2...	93 A	75 hp	3RV2041-4YA..			
					3RV2042-4YA..			

2.4 UL/CSA circuit breakers

2.4.1 UL/CSA circuit breakers, 200 V ... 240 V

Note

The converters protected by the specified branch-circuit protection devices are suitable to be installed in a ventilated enclosure with no special limitation. When an unventilated enclosure is used, observe the minimum volume specified in the following tables.

Converter			Circuit Breaker				Min. enclosure volume	
Frame size	**Rated power**	**Article no.**	**Max. rated current**	**UL/CSA type**	**Article no. example (European)** [1]	**SCCR @ 240 V AC**	**Metric**	**Imperial (USA)**
FSAA	0.12 kW	6SL3210-5BB11-2...	15 A	3RV2742	3RV2742-5BD..	65 kA	0.01 m^3	0.35 ft^3
				3RV2711	3RV2711-4AD..-....			
				SEAS	3VA5195-4E...-....			
				MEAS	3VA5195-5E...-....			
				HEAS	3VA5195-6E...-....			
	0.25 kW	6SL3210-5BB12-5...		3RV2742	3RV2742-5BD..			
				3RV2711	3RV2711-4AD..-....			
				SEAS	3VA5195-4E...-....			
				MEAS	3VA5195-5E...-....			
				HEAS	3VA5195-6E...-....			
	0.37 kW	6SL3210-5BB13-7...		3RV2742	3RV2742-5BD..			
				3RV2711	3RV2711-4AD..-....			
				SEAS	3VA5195-4E...-....			
				MEAS	3VA5195-5E...-....			
				HEAS	3VA5195-6E...-....			
FSAB	0.55 kW	6SL3210-5BB15-5...		3RV2742	3RV2742-5BD..			
				3RV2711	3RV2711-4AD..-....			
				SEAS	3VA5195-4E...-....			
				MEAS	3VA5195-5E...-....			
				HEAS	3VA5195-6E...-....			
	0.75 kW	6SL3210-5BB17-5...		3RV2742	3RV2742-5BD..			
				3RV2711	3RV2711-4AD..-....			
				SEAS	3VA5195-4E...-....			
				MEAS	3VA5195-5E...-....			
				HEAS	3VA5195-6E...-....			
FSAC	1.1 kW	6SL3210-5BB21-1...	30 A	3RV2742	3RV2742-5ED..	65 kA	0.02 m^3	0.71 ft^3
				SEAS	3VA5130-4E...-....			
				MEAS	3VA5130-5E...-....			
				HEAS	3VA5130-6E...-....			
	1.5 kW	6SL3210-5BB21-5...	30 A	3RV2742	3RV2742-5ED..			
				SEAS	3VA5130-4E...-....			
				MEAS	3VA5130-5E...-....			
				HEAS	3VA5130-6E...-....			

Converter			Circuit Breaker				Min. enclosure volume	
Frame size	**Rated power**	**Article no.**	**Max. rated current**	**UL/CSA type**	**Article no. example (European)** [1]	**SCCR @ 240 V AC**	**Metric**	**Imperial (USA)**
FSAD	2.2 kW	6SL3210-5BB22-2...	40 A	3RV2742	3RV2742-5GD..	65 kA	0.06 m^3 [2]	2.12 ft^3 [2]
				SEAS	3VA5140-4E...			
				MEAS	3VA5140-5E...			
				HEAS	3VA5140-6E...-....			
	3.0 kW	6SL3210-5BB23-0...	50 A	3RV2742	3RV2742-5JD..	65 kA		
				SEAS	3VA5150-4E...			
				MEAS	3VA5150-5E...			
				HEAS	3VA5150-6E...-....			

[1] Use 2-pole or 3-pole circuit breakers.

[2] The minimum enclosure requires additional protection measures, that is, using two safety cabinet locks.

2.4.2 UL/CSA circuit breakers, 380 V ... 480 V

Note

The converters protected by the specified branch-circuit protection devices are suitable to be installed in a ventilated enclosure with no special limitation. When an unventilated enclosure is used, observe the minimum volume specified in the following tables.

Converter			Circuit Breaker					Min. enclosure volume	
Frame size	Rated power	Article no.	Max. rated current	UL/CSA type	Article no. example (European)	SCCR		Metric	Imperial (USA)
						@ 480 V AC	@ 480Y/ 277 V AC		
FSA	0.37 kW	6SL3210-5BE13-7...	15 A	3RV2742	3RV2742-5BD..	65 kA		0.47 (0.33 [1]) m³	16.60 (11.65 [1]) ft³
				3RV2711	3RV2711-4AD..-....		65 kA		
	0.55 kW	6SL3210-5BE15-5...		3RV2742	3RV2742-5BD..	65 kA			
				3RV2711	3RV2711-4AD..-....		65 kA		
	0.75 kW	6SL3210-5BE17-5...		3RV2742	3RV2742-5BD..	65 kA			
				3RV2711	3RV2711-4AD..-....		65 kA		
	0.75 kW	6SL3216-5BE17-5...		3RV2742	3RV2742-5BD..	65 kA			
				3RV2711	3RV2711-4AD..-....		65 kA		
	1.1 kW	6SL3210-5BE21-1...		3RV2742	3RV2742-5BD..	65 kA			
				3RV2711	3RV2711-4AD..-...		65 kA		
	1.5 kW	6SL3210-5BE21-5...		3RV2742	3RV2742-5BD..	65 kA			
				3RV2711	3RV2711-4AD..-....		65 kA		
	2.2 kW	6SL3210-5BE22-2...		3RV2742	3RV2742-5BD..	65 kA			
				3RV2711	3RV2711-4AD..-....		65 kA		
FSB	3.0 kW	6SL3210-5BE23-0...	15 A	3RV2742	3RV2742-5BD..	65 kA		0.80 m³	28.25 ft³
				3RV2711	3RV2711-4AD..-....		65 kA		
	4.0 kW	6SL3210-5BE24-0...	20 A	3RV2742	3RV2742-5CD..	65 kA			
				HEAS	3VA5120-6E...-....				
				3RV2721	3RV2721-4BD..		50 kA		
				MEAS	3VA5120-5E...-....	35 kA			
				SEAS	3VA5120-4E...-....	25 kA			
FSC	5.5 kW	6SL3210-5BE25-5...	20 A	3RV2742	3RV2742-5CD..	65 kA		1.22 m³	43.08 ft³
				HEAS	3VA5120-6E...-....				
				3RV2721	3RV2721-4BD..		50 kA		
				MEAS	3VA5120-5E...-....	35 kA			
				SEAS	3VA5120-4E...-....	25 kA			
	7.5 kW	6SL3210-5BE27-5...	30 A	3RV2742	3RV2742-5ED..	65 kA			
				HEAS	3VA5130-6E...-....				
				MEAS	3VA5130-5E...-....	35 kA			
				SEAS	3VA5130-4E...-....	25 kA			
FSD	11 kW	6SL3210-5BE31-1...	50 A	HEAS	3VA5150-6E...-....	65 kA		1.85 m³	65.33 ft³
				3RV2742	3RV2742-5JD..		65 kA		
				MEAS	3VA5150-5E...-....	35 kA			
				SEAS	3VA5150-4E...-....	25 kA			
	15 kW	6SL3210-5BE31-5...	60 A	HEAS	3VA5160-6E...-....	65 kA			
				3RV2742	3RV2742-5LD..		65 kA		
				MEAS	3VA5160-5E...-....	35 kA			
				SEAS	3VA5160-4E...-....	25 kA			

Converter			Circuit Breaker					Min. enclosure volume	
Frame size	**Rated power**	**Article no.**	**Max. rated current**	**UL/CSA type**	**Article no. example (European)**	**SCCR**		**Metric**	**Imperial (USA)**
						@ 480 V AC	**@ 480Y/ 277 V AC**		
FSE	18.5 kW (HO) 22 kW (LO)	6SL3210-5BE31-8...	70 A	3RV2742	3RV2742-5QD..		65 kA	2.93 m³	103.47 ft³
			80 A	HEAS	3VA5180-6E...-....	65 kA			
				MEAS	3VA5180-5E...-....	35 kA			
				SEAS	3VA5180-4E...-....	25 kA			
	22 kW (HO) 30 kW (LO)	6SL3210-5BE32-2...	90 A	HEAS	3VA5190-6E...-....	65 kA			
				MEAS	3VA5190-5E...-....	35 kA			
				SEAS	3VA5190-4E...-....	25 kA			

1) This value is for the Flat Plate converter with a flat plate heatsink.

3 Further information



Further information is available on the Internet:

- SINAMICS V20 Converter
  https://support.industry.siemens.com/cs/ww/en/ps/13208/man
- 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
- Motor starter protectors, 3RV series
  https://support.industry.siemens.com/cs/ww/en/view/60279172
- SIRIUS Industrial Controls
  https://support.industry.siemens.com/cs/ww/en/view/109747945
- IEC Circuit Breakers, 3VA1 series
  https://support.industry.siemens.com/cs/ww/en/view/90318775
- IEC Circuit Breakers, 3VA5 series
  https://support.industry.siemens.com/cs/ww/en/view/109758561
- UL listed Molded Case Circuit Breakers - 3VA, SENTRON & VL series, see Siemens SPEEDFAX Product Catalog, Section 7
  https://new.siemens.com/us/en/products/energy/low-voltage/speedfax.html