

7.1 Short description

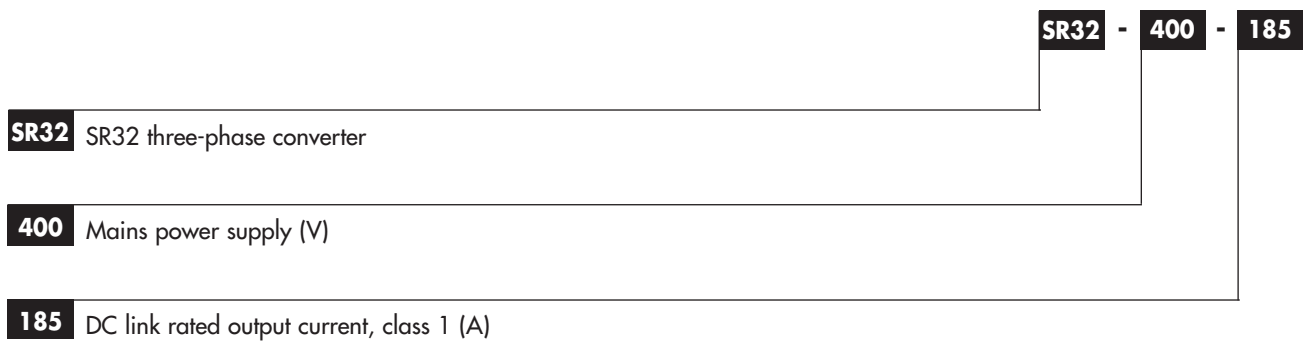


SR32 devices are AC/DC three-phase converters with a full digital control, which are active in the four quadrants to supply constant voltage to the DC link of the AMV32, AMD32, AVy and AFy inverters.

The SR32 converter is suitable to supply power to both single and multiple inverter systems connected to a common DC link. A part of the regenerated power can be exchanged between the monitoring and regenerating drives; the exceeding power is regenerated back to the Mains via the SR32 converter. The output voltage of the SR32 converter is kept constant within a specified range even if the inverter operates in a regenerative mode until it reaches the full current value supplied while functioning in a rectifier mode.

This makes it possible to use a SR32 fed inverter in applications requiring a continuous regeneration.

7.2 Identification code



7.3 Converter choice

Figure 7.3.1: Main function block diagram

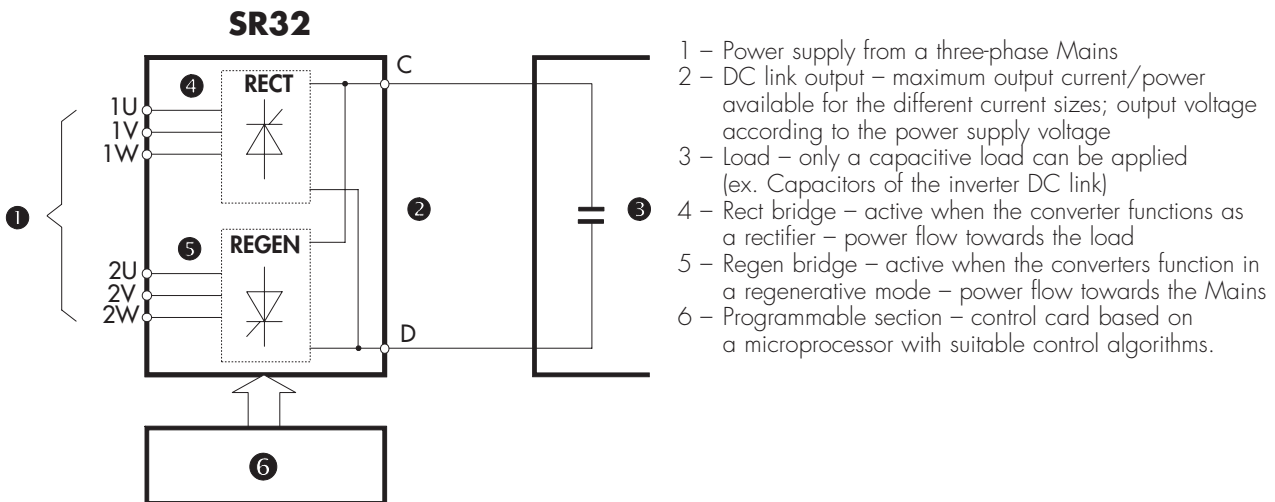


Table 7.3.1: Power supply voltages

Converter Type	SIEI Code	Rect power bridge Terminals 1U/1V/1W 50/60Hz±5%	Regen power bridge Terminals 2U/2V/2W	Maximum voltage 1U/1V/1W e 2U/2V/2W	Terminal regulation power supply U2/2V 50/60Hz±5%
SR32-400-185	S4RR1	3x400 V +10% -15%	1)	500 V ±10%	1x115 V -15% ... 230V+15%
SR32-400-280	S4RR2	3x400 V +10% -15%	1)	500 V ±10%	1x115 V -15% ... 230V+15%
SR32-400-420	S4RR3	3x400 V +10% -15%	1)	500 V ±10%	1x115 V -15% ... 230V+15%
SR32-400-650	S4RR4	3x400 V +10% -15%	1)	500 V ±10%	1x115 V -15% ... 230V+15%
SR32-400-1050	S4RR5	3x400 V +10% -15%	1)	500 V ±10%	1x115 V -15% ... 230V+15%
SR32-480-185	S4RS1	3x480 V +10% -15%	1)	600 V ±10%	1x115 V -15% ... 230V+15%
SR32-480-280	S4RS2	3x480 V +10% -15%	1)	600 V ±10%	1x115 V -15% ... 230V+15%
SR32-480-420	S4RS3	3x480 V +10% -15%	1)	600 V ±10%	1x115 V -15% ... 230V+15%
SR32-480-650	S4RS4	3x480 V +10% -15%	1)	600 V ±10%	1x115 V -15% ... 230V+15%
SR32-480-1050	S4RS5	3x480 V +10% -15%	1)	600 V ±10%	1x115 V -15% ... 230V+15%

1) Autotransformer with the following transforming factors: 1.21.5.

Table 7.3.2: Input side currents, dissipated power and internal fans

Converter Type	Input side current Rect bridge Terminals 1U/1V/1W (A)	Input side current Regen bridge Terminals 2U/2V/2W (A)	Dissipated power P _v (W)	Fans		
				Voltage (V)	Rated current (A)	Air capacity (m ³ /h)
SR32-...-185	159	123	883	Int. supply	Int. supply	160
SR32-...-280	240	185	781	Int. supply	Int. supply	320
SR32-...-420	360	279	1038	Int. supply	Int. supply	320
SR32-...-650	557	432	1693	Int. supply	Int. supply	680
SR32-...-1050	900	697	2590	230	0.75	1050

Table 7.3.3: DC link output current and voltage

Converter Type	SIEI Code	DC link current		DC link output voltage	
		1) (A)	2) (A)	3) (V)	4) (V)
SR32-400-185	S4RR1	185	160	510V	410
SR32-400-280	S4RR2	280	242	510V	410
SR32-400-420	S4RR3	420	364	510V	410
SR32-400-650	S4RR4	650	563	510V	410
SR32-400-1050	S4RR5	1050	910	510V	410
SR32-480-185	S4RS1	185	160	610	490
SR32-480-280	S4RS2	280	242	610	490
SR32-480-420	S4RS3	420	364	610	490
SR32-480-650	S4RS4	650	563	610	490
SR32-480-1050	S4RS5	1050	910	610	490

- 1) Continuous duty, class 1
- 2) Duty with a 150% overload possibility for 60 seconds, class 2
- 3) Mains-connected Rect bridge input, Regen bridge connected to the autotransformer (PCC1 configuration), or the Rect and Regen bridges are parallel connected and power supplied via an autotransformer (PCC2 configuration)
- 4) The Rect and Regen bridges are parallel connected to the Mains without autotransformer (PCC3 configuration).



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Figure 7.3.2: Power circuit with a PCC1 configuration

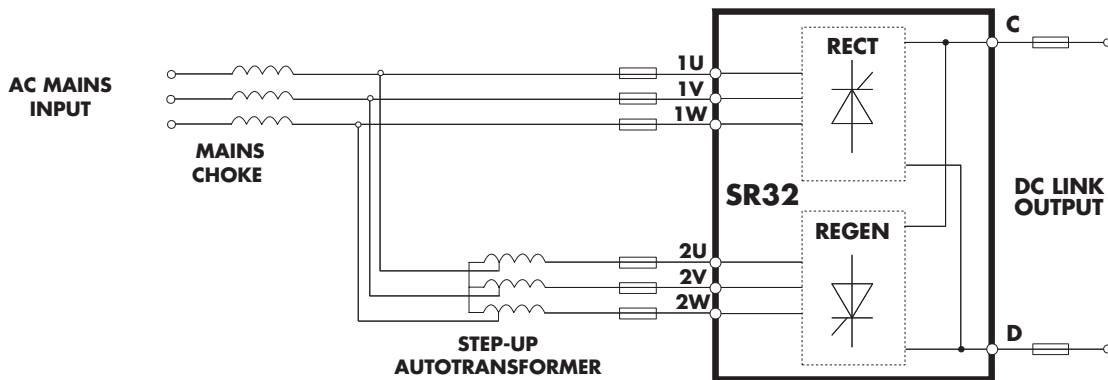


Figure 7.3.3: Power circuit with a PCC2 configuration

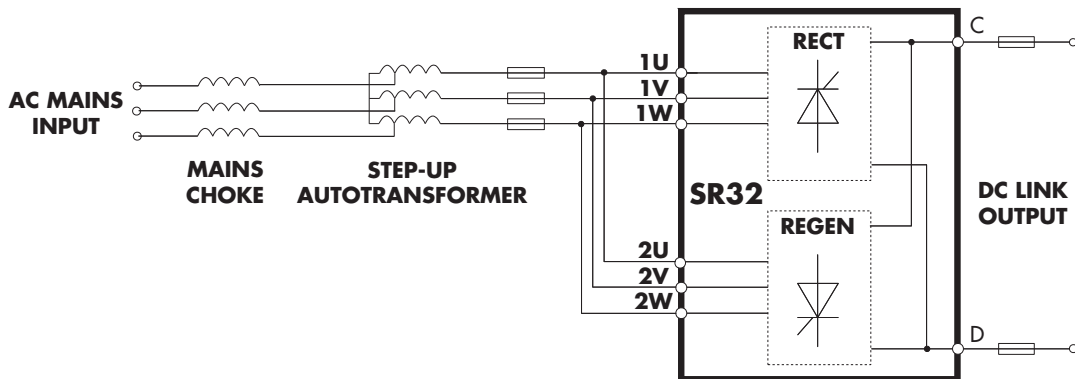
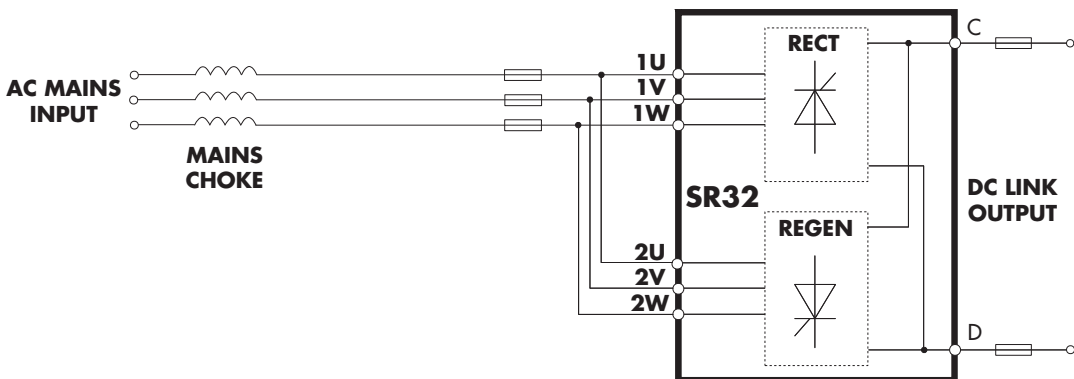


Figure 7.3.4: Power circuit with a PCC3 configuration



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7.4 Weights and dimensions

Figure 7.4.1: Dimensions

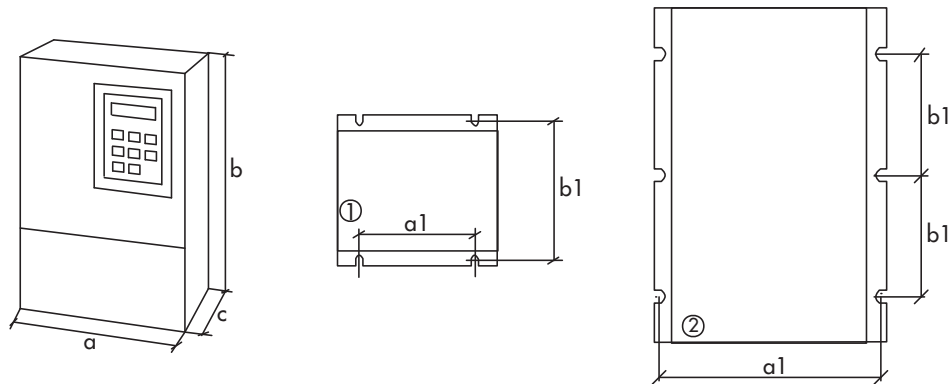


Table 7.4.1: Weights and dimensions

Converter Type	Form	a (mm)	b (mm)	c (mm)	a1 (mm)	b1 (mm)	Ø	Weight (kilos)
SR32-...-185	1	311	361	368	275	375	M6	18
SR32-...-280	1	311	361	368	275	375	M6	26
SR32-...-420	1	311	361	368	275	375	M6	30
SR32-...-650	1	311	391	368	275	375	M6	31
SR32-...-1050	2	525	554	434	500	200	M6	63

7.5 General features

Display configuration for the value reading

Programmable analog outputs to take the value reading signal on an external displaying device.

Identification function for the measurement of the power circuit parameters and automatic calculation of some regulation parameters used for an easier commissioning.

Signal internal conditioning (gains, min/max limits, offset...)

Control of the power Feed Forward for particular applications with high dynamic needs.

Device use:

- via the terminal strip
- via the keypad
- via a PC program
- via a Field Bus connection

Isolation

High impedance galvanic separation between the power and the regulation section.

Galvanic separation between the regulation section and the digital I/O terminals.

Protection functions

High number of protection functions, some with a particular configuration of the converter behavior in case of an alarm condition.

Message storage for the last 10 alarm interventions and indication of the period when the alarm intervened.

Temperature linear sensor for an easy control of the heatsink temperature.

Converter overload control based on the simulation of the I²t function with a warning signal possibility.

Inputs/Outputs

- 2 programmable analog outputs
- 1 dedicated analog input
- 4 dedicated digital inputs
- 4 programmable digital inputs
- 4 programmable digital outputs
- 2 dedicated relay outputs
- 1 programmable relay output

Environmental Conditions:

Enclosure: IP20

Ambient temperature: from 0 to 55°C; if the temperature is higher than 40°C, reduce the current by 1.25% every K.

Humidity: from 5% to 85%, 1 g/m³ up to 25 g/m³ without condensing or icing.

Altitude: up to 1000 meters above sea level; if such value is exceeded, the current has to be reduced by 1.2% every 100-meter increase.

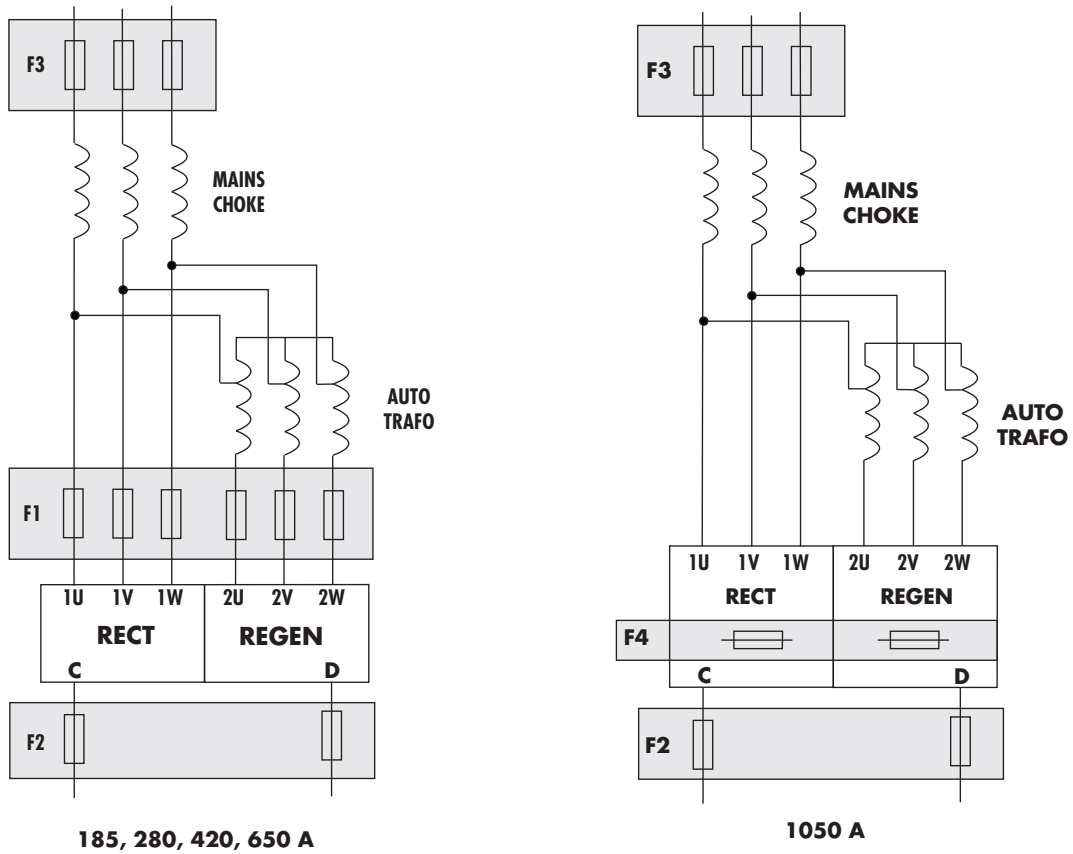
Norms and marks

EC: in compliance with the EEC directive about low-voltage devices

EMC: in compliance with the EEC directive about the electromagnetic compatibility using option filters UL/cUL, UL508C norm.

7.6 Options

Figure 7.6.1: Power section fuses



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Power section fuses

In order to protect the thyristors on both power bridges it is necessary to use super fast fuses. The line and autotransformer protection requires the use of time-delay fuses. The table lists the suggested fuses.

Converter Type	Symbol	Piece number	Suggested fuses				
			EUROPE		USA		
			Type	Code	Type	Code	
SR32-...-185	F1	6	S00üf1/80/200A/660V	F4G23	A70P175	FWP175A	S7G57
	F2	2	S00üf1/80/200A/660V	F4G23	A70P200	FWP200A	S7G58
	F3	3	M1gL 200	F3B63	M1gL 200		F3B63
SR32-...-280	F1	6	S1üf1/110/250A/660V	F4G28	A70P250	FWP250A	S7G59
	F2	2	S1üf1/110/315A/660V	F4G30	A70P300	FWP300A	S7G60
	F3	3	M2gL 250	F3B65	M2gL 250		F3B65
SR32-...-420	F1	6	S2üf1/110/400A/660V	F4G34	A70P400	FWP400A	S7G62
	F2	2	S1üf01/80/450A/660V		A70P500	FWP500A	S7G63
	F3	3	M3gL 400	F3C10	M3gL 400		F3C10
SR32-...-650	F1	6	S2üf1/110/630A/660V	F4E31	A70P600	FWP600A	S7G65
	F2	2	S2üf01/110/710A/660V	F4G85	A70P700	FWP700A	S7G67
	F3	3	M4agL 630		M4agL 630		
SR32-...-1050	F2	2	S3üf01/110/1250A/500V		A70P1200	FWP1200A	
	F3	3	M4agL 1000		M4agL 1000		
	F4	6	170M5466	S827B	170M5466		S827B

- α- F1: External fuses for the Rect and Regen bridges of the input side converter
- F2: External fuses for the DC link output
- F3: External fuses for the line protection
- F4: Internal fuses for the Rect and Regen bridges only for the 1050A size
- When several fuses are listed for the same code, it means that they are interchangeable.
- For SR32-...-1050 sizes the F1 fuses are integrated in the device. They are also supplied with a fuse intervention internal signaling.

The fuse technical data, such as dimensions, weights, dissipated power, fuse blocks etc. can be found in the catalogue of the fuse producer:

Jean Muller, Eltville = types S00... , S1... , S3... , M...
 Gould Shawmut = A70P... , A2...
 Bussmann = FWP..., 170M...

Input choke

The functioning of the SR32 regen converters requires the use of an input choke. The converters can not be connected directly to the Mains without a choke. The suggested choke values have been calculated to ensure 4% of the voltage drop when the converter functions with a rated current.

The choke saturation current corresponds to 150% of the rated one. The stated choke value corresponds to each phase of the three-phase choke.

Converter Type	Mains frequency (Hz)	Mains three-phase choke		Rated choke (mH)	Rated current (A)	Saturation current (A)
		Type	Code			
SR32-400-185	50/60	LR3 160-240-0.186	S7HA0	0.186	160	240
SR32-400-280	50/60	LR3 240-360-0.123	S7HA1	0.123	240	360
SR32-400-420	50/60	LR3 360-540-0.082	S7HA2	0.082	360	540
SR32-400-650	50/60	LR3 560-840-0.053	S7HA3	0.053	560	840
SR32-400-1050	50/60	LR3 900-1350-0.033	S7HA4	0.033	900	1350
SR32-480-185	60	LR3 160-240-0.186	S7HA0	0.186	160	240
SR32-480-280	60	LR3 240-360-0.123	S7HA1	0.123	240	360
SR32-480-420	60	LR3 360-540-0.082	S7HA2	0.082	360	540
SR32-480-650	60	LR3 560-840-0.053	S7HA3	0.053	560	840
SR32-480-1050	60	LR3 900-1350-0.033	S7HA4	0.033	900	1350
SR32-480-185	50	LR3 160-240-0.233	S7HA5	0.233	160	240
SR32-480-280	50	LR3 240-360-0.147	S7HA6	0.147	240	360
SR32-480-420	50	LR3 360-540-0.098	S7HA7	0.098	360	540
SR32-480-650	50	LR3 560-840-0.063	S7HA8	0.063	560	840
SR32-480-1050	50	LR3 900-1350-0.039	S7HA9	0.039	900	1350

See the Appendix for the choke weights and dimensions.

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Autotransformer

A boost autotransformer has to be used in the power circuit for the functioning of the SR32 converters with the PCC1 and PCC2 configurations (see the chapter "Converter choice").

The transformation factor has to be included within 1.2 and 1.25.

The short circuit voltage has to be lower or equal to $u_k < 10\%$.

The autotransformer has to be dimensioned according to the converter rated power.

As for the PCC1 configuration of the power circuit, it is possible to dimension the autotransformer size only on the basis of the regenerated power required by the specific application. The maximum allowed reduction for the autotransformer is equal to 50% of the converter power acting in a rectifier mode.

As for the PCC2 configuration of the power circuit, the autotransformer has to be dimensioned according to the total converter power.

Converter Type	Autotransformer		Power (kVA)	Output rated current (A)	Frequency (Hz)
	Type	Code			
SR32-400-185	AT 5 - 185	S7A31	110	125	50/60
SR32-400-280	AT 5 - 280	S7A32	165	190	50/60
SR32-400-420	AT 5 - 420	S7A33	240	280	50/60
SR32-400-650	AT 5 - 650	S7A34	380	440	50/60
SR32-400-1050	AT 5 - 1050	S7A35	600	700	50/60
SR32-480-185	AT 6 - 185	S7A36	130	125	50/60
SR32-480-280	AT 6 - 280	S7A37	195	190	50/60
SR32-480-420	AT 6 - 420	S7A38	290	280	50/60
SR32-480-650	AT 6 - 650	S7A39	450	440	50/60
SR32-480-1050	AT 6 - 1050	S7A40	720	700	50/60

EMC filters

Converters of the SR32 series have to be externally equipped with an EMI filter in order to limit the radio-frequency emissions towards the Mains. Its selection is determined by the converter size and the installation environment.

Converter Type	EMC Filters for 400-480 V		
	Type	Code	Class
SR32-...-185	EMI 520-210	S7DEI	A
SR32-...-280	EMI 520-280	S7DEL	A
SR32-...-420	EMI 520-450	S7DEM	A
SR32-...-650	EMI 520-600	S7DEN	A
SR32-...-1050	EMI 520-900	S7DEO	A

See the Appendix for the filter weights and dimensions.

Field Bus cards

Allow connections to Field Buses such as Profibus-DP and Interbus-S.

S5H47	SBI-PDP-32	Profibus_DP interface
S5N80	SBI-SL-D32	Interbus_S interface

KB programming keypad

It allows the converter configuration without using a PC. Converter enabling, disabling, start/stop, control and configuration via a keypad with a 2-line display which is backlit by liquid crystals.

S5P2U	KB - SR32	Programming keypad
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Others

S51VV	Kit for remote keypad	Kit for a remotable setting of KB keypads or KC LED modules
S5Z40	A-RS485	External power supply for the RS485 serial line
S546Z	PCI-485	RS232/RS485 serial interface
8S8F59	Shielded cable for PCI 485	RS485 serial interface cable (length: 5 meters)
S5QQ1	RS485 kit Serial Adapter	RS485 serial line kit (PCI 485+connection cable)

