

SINAMICS S120 drive system

SINAMICS S120 Combi

Power Modules

Overview



SINAMICS S120 Combi Power Module

SINAMICS S120 Combi is a very compact and rugged drive concept tailored for compact turning and milling machines. SINAMICS S120 Combi integrates a line infeed with regenerative feedback capability, power units for spindle and feed motors as well as a TTL encoder interface into a single Power Module. The SINAMICS S120 Combi Power Modules are optimized as a drive for machine tools with 3 to 6 axes. The Power Modules are available with external air cooling. SINAMICS Motor Modules in booksize compact format are used as expansion axes.

Benefits

- Compact multi-axis module with line infeed with regenerative feedback capability and power units for 3 or 4 axes
- Customized drive system for compact standard turning and milling machines
- Requires very little mounting space in control cabinet incl. fan unit, shield terminals and ventilation clearances
- Optimized for weak supply networks with frequent under-voltage, network imbalances and large frequency fluctuations
- Optimized for harsh operating conditions with increased cabinet temperature and increased humidity
- Rugged Power Modules resistant to short circuits, overvoltage and ground faults
- Rugged and easy-to-fit screw-type terminals with integrated shield connection for the power cables
- Perfectly designed for expansion using additional Motor Modules in booksize compact format
- Low energy consumption thanks to state-of-the-art 400-V technology
- Excellent dynamic response and machining precision thanks to Dynamic Servo Control (DSC)
- Simple cabling due to intelligent DRIVE-CLiQ interface
- Very simple commissioning thanks to predefined topologies

Function

- Power Module with 3 or 4 integrated power units
- Integrated line infeed with regenerative feedback capability
- Integrated TTL encoder interface
- Integrated motor brake control for one axis
- Integrated fan power supply
- Line supply voltage 380 to 480 V 3 AC
- Supply types TT, TN and IT
- Integrated shield terminals
- Heat dissipation concept with external heatsink for extremely low power losses in the control cabinet
- Easy-to-mount fan module optimized for harsh environments
- Increased availability thanks to fan monitoring
- Derating only from 45 °C cabinet temperature
- Power cables are connected by means of screw-type terminals

Integration

The following components can be connected to the SINAMICS S120 Combi drive system:

- SINUMERIK 828D BASIC
- SINUMERIK 828D
- 3 or 4 spindle/feed motors
- 3 or 4 motor encoders
- 3 or 4 direct encoders via DMC20
- Direct spindle encoder directly to TTL or sin/cos via SMC20
- External fan module
- Up to two additional SINAMICS S120 Motor Modules in booksize compact format via DC link connection and 24 V DC busbars
- Braking Module with braking resistor via DC link connection
- Control Supply Module via DC link connection and 24 V DC busbars
- One safe motor brake control
- 5 or 6 DRIVE-CLiQ sockets
- 24 V electronics power supply via connector
- 1 safe standstill input for the infeed (Enable Pulses)
- 1 safe standstill input for the spindle and feeds (Enable Pulses)
- 1 temperature sensor input for the spindle
- PE connections

The scope of supply of the SINAMICS S120 Combi Power Modules includes:

- SINAMICS S120 Combi Power Module
- Accessories pack consisting of:
 - 4 DRIVE-CLiQ dust-proof blanking plugs
 - Connector X224 for the electronics power supply
 - Connector X11 for motor brake control
 - Connector X21 Enable Pulses infeed
 - Connector X22 Enable Pulses temperature sensor – axes
 - 5 shield terminals for power cables
 - Shield terminal for signal cable

Selection and ordering data
SINAMICS S120 Combi Power Module with external air cooling

Rated power Infeed kW	Rated output current Spindle A	Rated output current Feedrate 1 A	Rated output current Feedrate 2 A	Rated output current Feedrate 3 A	Article No.
3-axis Power Module					
16	18	5	5	–	6SL3111-3VE21-6FA0
16	24	9	9	–	6SL3111-3VE21-6EA0
20	30	9	9	–	6SL3111-3VE22-0HA0
4-axis Power Module					
10	24 ¹⁾	12	12	12	6SL3111-4VE21-0EA0
16	18	9	5	5	6SL3111-4VE21-6FA0
16	24	9	9	9	6SL3111-4VE21-6EA0
20	30	12	9	9	6SL3111-4VE22-0HA0

Technical specifications

Article No.	6SL3111-3VE2-..... 6SL3111-4VE2-.....
Product brand name	SINAMICS
Product type designation	S120 Combi
Product designation	Power Module
DC link voltage ²⁾	1.35 × line voltage
Output voltage	0 ... 0.7 × DC link voltage
Line power factor at rated power	
• Fundamental $\cos \varphi_1$	> 0.96
• Total λ	0.65 ... 0.90
Radio interference suppression	
• Standard	No radio interference suppression
• With line filter	Category C2 to EN 61800-3
Degree of protection	IP20
Installation altitude	Up to 1000 m above sea level without derating > 1000 ... 4000 m with derating
Certificate of suitability	CE, cURus
Safety Integrated	Safety Integrity Level 2 (SIL 2) according to IEC 61508 Performance Level d (PLd) according to ISO 13849-1 Control Category 3 according to ISO 13849-1

¹⁾ Pulse frequency 4 kHz/8 kHz.

²⁾ The DC link voltage adjusts itself to the mean value of the rectified line voltage.

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Technical specifications (continued)

Article No.		6SL3111-3VE21-6FA0	6SL3111-3VE21-6EA0	6SL3111-3VE22-0HA0
Product brand name		SINAMICS		
Product type designation		S120 Combi		
Product designation		3-axis Power Module with <u>external</u> air cooling		
Infeed				
• Rated power P_{rated} (S1)	kW	16	16	20
• Infeed power P_{S6} (40 %)	kW	21	21	26.5
• Peak infeed power P_{max}	kW	35	35	40
Regenerative feedback				
• Rated power P_{rated} (S1)	kW	16	16	20
• Peak regenerative feedback power P_{max}	kW	35	35	40
Supply voltages				
• Line voltage 3 AC	V	380 ... 480 ±10 %		
• Line frequency	Hz	45 ... 66		
• Electronics power supply DC	V	24 (20.4 ... 28.8)		
Rated input current				
• At 400 V 3 AC	A	28	28	34
• At 380 V/480 V 3 AC	A	29/25	29/25	35/30
• At 400 V 3 AC I_{S6} (40 %)	A	35.5	35.5	44
• At 400 V 3 AC peak current	A	56	56	63.5
Pulse frequency	kHz	4	4	4
Output voltage AC	V	0 ... 0.7 × DC link voltage		
Spindle				
• Rated output current AC I_{rated}	A	18	24	30
• Base-load current AC I_{H}	A	15.3	20.4	25.5
• Intermittent-duty operating current AC I_{S6} (40 %)	A	24	32	40
• Peak current AC I_{max}	A	36	48	56
Rated power				
• At 540 V DC link voltage	kW	8.7	11.7	14.4
• At 600 V DC link voltage	kW	9.7	13	16
Vorschub 1/Vorschub 2				
• Rated output current AC I_{rated}	A	5	9	9
• Base-load current AC I_{H}	A	4.3	7.7	7.7
• Intermittent-duty operating current AC I_{S6} (40 %)	A	6.5	12	12
• Peak current AC I_{max}	A	10	18	18
Rated power				
• At 540 V DC link voltage	kW	2.4	4.3	4.3
• At 600 V DC link voltage	kW	2.7	4.8	4.8
Output for expansion axis				
• DC link output current DC I_{rated}	A	40	40	40
• DC link voltage DC	V	460 ... 720	460 ... 720	460 ... 720
• Electronics output current for expansion axis 24 V DC	A	20	20	20
Electronics current consumption at 24 V DC				
• Without external fan module	A	1.5	1.5	1.5
• With external fan module	A	2.3	2.3	2.3
Total power loss, incl. electronics losses				
• Internal	W	81	91	102
• External	W	344	446	532

Technical specifications (continued)

Article No.		6SL3111-3VE21-6FA0	6SL3111-3VE21-6EA0	6SL3111-3VE22-0HA0
Product brand name		SINAMICS		
Product type designation		S120 Combi		
Product designation		3-axis Power Module with <u>external</u> air cooling		
Ambient temperature, maximum				
• Without derating	°C	45	45	45
• With derating	°C	55	55	55
DC link voltage DC	V	460 ... 720		
• Overvoltage trip DC	V	820 ± 2 %		
• Undervoltage trip DC	V	380 ± 2 %		
DC link capacitance	µF	1645	1880	2115
Circuit breaker (UL)				
• Type		3VL2505-2KN30-....	3VL2505-2KN30-....	3VL2506-2KN30-....
• Rated current	A	35	35	60
• Short-circuit current rating SCCR at 480 V 3 AC, resulting	kA	65	65	65
Safety fuses (UL)				
• Type		AJT35	AJT35	AJT60
• Rated current	A	35	35	60
• Short-circuit current rating SCCR, resulting				
- At 480 V 3 AC	kA	65	65	65
- At 600 V 3 AC	kA	200	200	200
Cooling air requirement	m ³ /h	160	160	160
Width	mm	260	260	260
Height	mm	380	380	380
Depth	mm	304	304	304
Net weight	kg	18.4	18.4	18.5

Overview



Line reactor

SINAMICS S120 Combi Power Modules cannot operate without line reactors.

The use of other makes of line reactor can lead to malfunctions or irreparable damage to equipment.

Selection and ordering data

Suitable for
SINAMICS S120 Combi

Rated power
Infeed

kW

Power Module

Type

SINAMICS line reactor

Rated power

kW

Article No.

16	6SL3111-3VE21-6FA0
16	6SL3111-3VE21-6EA0
10	6SL3111-4VE21-0EA0
16	6SL3111-4VE21-6FA0
16	6SL3111-4VE21-6EA0
20	6SL3111-3VE22-0HA0
20	6SL3111-4VE22-0HA0

16

6SL3100-0EE21-6AA0

20

6SL3100-0EE22-0AA0

Technical specifications

Article No.		6SL3100-0EE21-6AA0	6SL3100-0EE22-0AA0
Product brand name		SINAMICS	SINAMICS
Product designation		Line reactor	Line reactor
Rated power	kW	16	20
Rated current	A	28	33
Power loss	W	75	98
Line/load connection 1U1, 1V1, 1W1/1U2, 1V2, 1W2		Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm ²	4	10
PE connection		Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm ²	4	10
Degree of protection		IP20	IP20
Width	mm	219	219
Height	mm	176	176
Depth	mm	120	130
Net weight	kg	10.7	10.9
Certificate of suitability		cURus	cURus

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Power Modules > Line filters

Overview



Line filter

In plants with strict EMC requirements, line filters work together with line reactors to restrict the conducted interference emanating from the Power Modules to the limit values of Class A1 as defined in EN 55011 and Category C2 as defined in EN 61800-3. Line filters are suitable only for direct connection to TN systems.

The use of other makes of line filter can lead to malfunctions or irreparable damage to equipment.

Note:

According to product standard IEC 61800-3, RFI suppression commensurate with the relevant rated conditions must be provided and is a legal requirement in the EU (EMC Directive). Line filters and line reactors are required for this purpose.

The machine manufacturer must provide verification that the machinery to be operated with the drive products and the installed suppression elements, e.g. line filters, are CE-EMC-compliant.

Technical specifications

Article No.	6SL3000-0BE21-6DA0		
Product brand name	SINAMICS		
Product designation	Line filter		
Rated current	36 A		
Rated infeed power	10 kW	16 kW	20 kW
Power loss in rated operation	12 W	15 W	16 W
Line/load connection L1, L2, L3/U, V, W	Screw-type terminals		
• Conductor cross-section	10 mm ²		
PE connection	M6 screw stud		
Degree of protection	IP20		
Width	50 mm		
Height	429 mm		
Depth	226 mm		
Net weight	5 kg		
Certificate of suitability	cURus		

Selection and ordering data

Suitable for SINAMICS S120 Combi		SINAMICS line filter
Rated power Infeed kW	Power Module Type	
16	6SL3111-3VE21-6FA0	6SL3000-0BE21-6DA0
16	6SL3111-3VE21-6EA0	
20	6SL3111-3VE22-0HA0	
10	6SL3111-4VE21-0EA0	
16	6SL3111-4VE21-6FA0	
16	6SL3111-4VE21-6EA0	
20	6SL3111-4VE22-0HA0	