

SINAMICS S120 drive system

Booksized format for Line and Motor Modules

Smart Line Modules in booksized format

Overview



Smart Line Modules are unregulated feed/feedback units (diode bridge for the infeed; stable, line-commutated feedback via IGBTs) with 100% regenerative feedback power. The regenerative feedback capability of the modules can be deactivated via a digital input (Smart Line Modules 5 kW and 10 kW) or by parameter setting (Smart Line Module 16 kW and 36 kW). Smart Line Modules are designed for connection to grounded-neutral (TN, TT) and non-grounded (IT) supply systems.

The DC link is pre-charged via integrated precharging resistors.

Design

Smart Line Modules in booksized format feature the following interfaces as standard:

- 1 power connection via screw-type terminals
- 1 connection for the 24 V DC electronics power supply via the 24 V terminal adapter included in the scope of supply
- 1 DC link connection via integrated DC link busbars
- 2 PE (protective earth) connections
- 2 digital inputs (5 kW (5 HP) and 10 kW (10 HP) Smart Line Modules only)
- 1 digital output (5 kW (5 HP) and 10 kW (10 HP) Smart Line Modules only)
- 3 DRIVE-CLiQ sockets (16 kW (18 HP) and 36 kW (40 HP) Smart Line Modules only)

The status of the Smart Line Modules is indicated via two multi-color LEDs.

The signal cable shield can be connected to the Line Module by means of a shield connection terminal, e.g. type KLBÜ 3-8 SC by Weidmüller.

The scope of supply of the Smart Line Modules includes:

- DRIVE-CLiQ cable for connection to the Control Unit on the immediate left for drive control (on 16 kW (18 HP) and 36 kW (40 HP) Smart Line Modules only)
- 2 blanking plugs for sealing unused DRIVE-CLiQ sockets (on 16 kW (18 HP) and 36 kW (40 HP) Smart Line Modules only)
- DRIVE-CLiQ cable (length depends on module width) to connect Smart Line Modules to adjacent Motor Module

Design (continued)

- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- 24 V terminal adapter
- Connector X21 for digital inputs/outputs
- Connector X22 for digital inputs and outputs (on 5 kW (5 HP) and 10 kW (10 HP) Smart Line Modules only)
- Connector X1 for line supply connection (on 5 kW (5 HP) and 10 kW (10 HP) Smart Line Modules only)
- 1 set of warning signs in foreign languages

Technical specifications

General technical specifications

Line connection voltage Up to 2000 m (6562 ft) above sea level	380 ... 480 V 3 AC $\pm 10\%$ (-15% < 1 min)
Line frequency	47 ... 63 Hz
Line power factor at rated power	
• Fundamental power factor (cos ϕ 1)	> 0.96
• Total (λ)	0.65 ... 0.90
Overvoltage category	Class III to EN 60664-1
DC link voltage, approx.	1.35 x line voltage ¹⁾
Electronics power supply	24 V DC, -15%/+20%
Radio interference suppression	
• Standard	no radio interference suppression
• With line filter	Class A1 to EN 55011 and Category C2 to EN 61800-3
Type of cooling	Internal air cooling, power sections with increased air cooling by built-in fans Cold-plate cooling on request (5 kW (5 HP) and 10 kW (10 HP))
Permissible ambient or coolant temperature (air) in operation for line-side components, Line Modules and Motor Modules	0 ... 40 °C (32 ... 104 °F) without derating, > 40 ... 55 °C (104 ... 131 °F), see derating characteristics
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) above sea level, see derating characteristics
Conformity	CE (low-voltage and EMC directives)
Approvals	cULus (File No.: E192450)

¹⁾ The DC link voltage is regulated to the mean rectified line voltage value. See system description on the CD-ROM supplied for further information.

SINAMICS S120 drive system

Booksize format for Line and Motor Modules

Smart Line Modules in booksize format
Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC

Order No.

- Internal air cooling
- External air cooling

6SL3130-6AE15-0AB0
6SL3131-6AE15-0AA0
6SL3130-6AE21-0AB0
6SL3131-6AE21-0AA0
6SL3130-6TE21-6AA3
–
6SL3130-6TE23-6AA3
–
Product name

Smart Line Modules in booksize format

Feed/feedback power

- Rated power P_{rated}
 - with 380 V 3 AC
 - with 460 V 3 AC³⁾
- for S6 duty (40%) P_{S6}
- P_{max}

		5 (5)	10 (10)	16 (18)	36 (40)
kW		5	10	16	36
(HP)		(5)	(10)	(18)	(40)
kW		6.5	13	21	47
kW		10	20	35	70

DC link current

- with 600 V DC
- for S6 duty (40%)
- Maximum

		8.3	16.6	27	60
A		8.3	16.6	27	60
A		11	22	35	79
A		16.6	33.2	59	117

Input current

- Rated current with 380 V 3 AC
- for S6 duty (40%)
- Maximum

		12	24	26	60
A		12	24	26	60
A		15.6	31.2	35	79
A		22	44	59	117

Current requirement

24 V DC electronics power supply, max.

		1.0	1.3	1.1	1.5
A		1.0	1.3	1.1	1.5

Current capacity

- 24 V DC busbars
- DC link busbars

		20	20	20	20
A		20	20	20	20
A		100	100	100	200

DC link capacitance

- Smart Line Module
- Drive group, max.

		220	330	710	1410
μF		220	330	710	1410
μF		6000	6000	20000	20000

Efficiency η

		0.98	0.98	0.99	0.99
		0.98	0.98	0.99	0.99

Power loss

- with internal air cooling
- with external air cooling int./ext.

		0.09	0.17	0.17	0.37
kW		0.09	0.17	0.17	0.37
kW		0.04/0.05	0.065/0.105	–	–

Cooling air requirement

		0.008 (0.283)	0.008 (0.283)	0.016 (0.565)	0.031 (1.095)
m^3/s (ft^3/s)		0.008 (0.283)	0.008 (0.283)	0.016 (0.565)	0.031 (1.095)

Sound pressure level

		< 60	< 60	< 60	< 60
dB (A)		< 60	< 60	< 60	< 60

Line connection

U1, V1, W1

- Conductor cross-section

		Screw-type terminals (X1)	Screw-type terminals (X1)	Screw-type terminals (X1)	Screw studs for ring terminal ends, M6 (X1)
mm^2		2.5 ... 6	2.5 ... 10	2.5 ... 10	2.5 ... 50

Shield connection

Cable shield connection plate integrated into the connector

Cable shield connection plate integrated into the connector

Cable shield connection plate integrated into the connector

See Accessories

PE connection

On housing with M5 screw

On housing with M5 screw

On housing with M5 screw

On housing with M6 screw

Cable length, max.(total of all motor cables and DC link)²⁾

- Shielded
- Unshielded

		350 (1150)	350 (1150)	350 (1150)	350 (1150)
m (ft)		350 (1150)	350 (1150)	350 (1150)	350 (1150)
m (ft)		560 (1838)	560 (1838)	560 (1838)	560 (1838)

Degree of protection

		IP20	IP20	IP20	IP20
		IP20	IP20	IP20	IP20

Dimensions

- Width
- Height
- Depth
 - with internal air cooling
 - with external air cooling on/behind mounting surface

		50 (1.97)	50 (1.97)	100 (3.94)	150 (5.91)
mm (in)		50 (1.97)	50 (1.97)	100 (3.94)	150 (5.91)
mm (in)		380 (14.96)	380 (14.96)	380 (14.96)	380 (14.96)
mm (in)		270 (10.63)	270 (10.63)	270 (10.63)	270 (10.63)
mm (in)		226/66.5 (8.9/2.6)	226/66.5 (8.9/2.6)	–	–

Weight

- with internal air cooling
- with external air cooling

		4.7 (11)	4.8 (11)	7 (15)	10.3 (23)
kg (lb)		4.7 (11)	4.8 (11)	7 (15)	10.3 (23)
kg (lb)		5.3 (12)	5.4 (12)	–	–

¹⁾ Power loss of Smart Line Module at rated power without losses of 24 V DC electronics power supply.

²⁾ Max. cable lengths in conjunction with HFD line reactors, see derating characteristics.

³⁾ Nominal HP ratings are provided for ease of assigning components only. The Line Module power is dependent on the Motor Module loading and is to be dimensioned accordingly.