

MOTION-CONNECT connection systems

Signal cables for SINAMICS S120

Overview



MOTION-CONNECT DRIVE-CLiQ signal cable with IP20/IP67 connector

Signal cables are pre-assembled and are sold by the meter for connecting a variety of components.

The following different types of cable are available:

- DRIVE-CLiQ signal cables
- MOTION-CONNECT DRIVE-CLiQ signal cables
- MOTION-CONNECT pre-assembled signal cables

Type of delivery for pre-assembled signal cables

Pre-assembled signal cables are available in units of 10 m (3.94 in).

The cables are supplied on reels up to 30 kg or 100 m (66.2 lb or 328 ft). Above 30 kg or 100 m (66.2 lb or 328 ft), cable drums are used instead of reels.

Application

DRIVE-CLiQ signal cables without 24 V DC cores

are used to connect components with DRIVE-CLiQ connections which have a separate or external 24 V DC power supply.

MOTION-CONNECT DRIVE-CLiQ signal cables with 24 V DC cores

are used whenever components with DRIVE-CLiQ connections must meet high requirements such as mechanical stress and oil resistance, e.g., where a connection is made outside the cabinet between Power Modules, Motor Modules, and SIMOTICS S-1FK7/SIMOTICS M-1PH8 motors with DRIVE-CLiQ interface.

MOTION-CONNECT pre-assembled signal cables

are used whenever motor encoders on motors without DRIVE-CLiQ interface need to be connected to Sensor Modules.

Design

If pre-assembled signal cables are to be installed in a cable carrier in such a way that the connector would inhibit assembly, pre-assembled cables without assembled connector can also be supplied. In this case, the contacts of the cables are crimped and the connector enclosure is supplied separately. After installing the cables, the customer assembles the connector enclosure.

The 6FX.002-2....-.... signal cables are available with crimped contacts and with the connector enclosure supplied separately (not in the case of DRIVE-CLiQ signal cables and signal cables with exposed core ends).

Signal cables with separately supplied **module-end** connector: in this case, the 6th position of the Article No. must be changed from **0** to **1**:

6FX.012-2C....-.... (not for signal cables for connecting via terminals or 6FX.002-2AH00-...., 6FX.002-2CA12-....).

Signal cables with separately supplied **motor-end** connector: in this case, the 6th position of the Article No. must be changed from **0** to **4**:

6FX.042-2C....-.... (not for signal cables for connecting via terminals or 6FX8002-2BA20-...., 6FX8002-2BA21-....).

Note:

Once the contacts have latched into the insulator, they can no longer be removed.

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Signal cables for SINAMICS S120

Technical specifications

DRIVE-CLiQ signal cables	DRIVE-CLiQ 6FX2...-1DC...-....	DRIVE-CLiQ MOTION-CONNECT 500 6FX5...-..DC...-....	DRIVE-CLiQ MOTION-CONNECT 800PLUS 6FX8...-..DC...-....
Certificate of suitability			
• cURus or UR/CSA	UL STYLE 2502/CSA-N.210.2-M90	UL STYLE 2502/CSA-N.210.2-M90	UL STYLE 2502/CSA-N.210.2-M90
• UR-CSA File No. ¹⁾	Yes	Yes	Yes
• RoHS conformity	Yes	Yes	Yes
Rated voltage according to EN 50395	30 V	30 V	30 V
Test voltage, rms	500 V	500 V	500 V
Operating temperature on the surface			
• Fixed installation	-20 ... +80 °C (-4 ... +176 °F)	-20 ... +80 °C (-4 ... +176 °F)	-20 ... +80 °C (-4 ... +176 °F)
• Flexible installation	–	0 ... 60 °C (32 ... 140 °F)	-20 ... +60 °C (-4 ... +140 °F)
Tensile stress, max.			
• Fixed installation	45 N/mm ² (6526 lb/in ²)	80 N/mm ² (11603 lb/in ²)	50 N/mm ² (7252 lb/in ²)
• Flexible installation	–	30 N/mm ² (4351 lb/in ²)	20 N/mm ² (2901 lb/in ²)
Smallest bending radius			
• Fixed installation	50 mm (1.97 in)	35 mm (1.38 in)	35 mm (1.38 in)
• Flexible installation	–	125 mm (4.92 in)	75 mm (2.95 in)
Torsional stress	–	Absolute 30°/m	Absolute 30°/m
Bending	–	100000	10 million
Traversing velocity	–	30 m/min (98.4 ft/min)	300 m/min (984 ft/min)
Acceleration	–	2 m/s ² (6.56 ft/s ²)	Up to 50 m/s ² (164 ft/s ²), see characteristics on page 12/5
Insulation material, incl. jacket	CFC/silicone-free	CFC/silicone-free	CFC/halogen-free/silicon-free IEC 60754-1/DIN VDE 0472-815
Oil resistance	EN 60811-2-1	EN 60811-2-1 (mineral oil only)	EN 60811-2-1
Outer jacket	PVC	PVC	PUR, HD22.10 S2 (VDE 0282, Part 10)
	Gray RAL 7032	DESINA color green RAL 6018	DESINA color green RAL 6018
Flame-retardant	EN 60332-1-1 to 1-3	EN 60332-1-1 to 1-3	EN 60332-1-1 to 1-3

Degree of protection of the pre-assembled signal cables and their extensions when closed and inserted: IP67.

¹⁾ The File No. is printed on the cable jacket.

MOTION-CONNECT connection systems

Signal cables for SINAMICS S120

DRIVE-CLiQ signal cables without 24 V DC cores

Selection and ordering data

Pre-assembled DRIVE-CLiQ signal cables without 24 V DC cores

Version	Length	$D_{\max}$	Connector/degree of protection, module-end	Connector/degree of protection, motor-end	DRIVE-CLiQ signal cable without 24 V DC cores
	m (ft)	mm (in)			Article No.
Fixed lengths 	0.11 (0.36)		RJ45/IP20	RJ45/IP20	6SL3060-4AB00-0AA0
	0.16 (0.52)				6SL3060-4AD00-0AA0
	0.21 (0.69)				6SL3060-4AF00-0AA0
	0.26 (0.85)				6SL3060-4AH00-0AA0
	0.31 (1.02)				6SL3060-4AK00-0AA0
	0.36 (1.18)				6SL3060-4AM00-0AA0
	0.41 (1.35)				6SL3060-4AP00-0AA0
	0.60 (1.97)				6SL3060-4AU00-0AA0
	0.95 (3.12)				6SL3060-4AA10-0AA0
	1.20 (3.94)				6SL3060-4AW00-0AA0
	1.45 (4.76)				6SL3060-4AF10-0AA0
	2.10 (6.89)				6SL3060-4AB20-0AA0
	2.80 (9.19)				6SL3060-4AJ20-0AA0
	5.00 (16.4)				6SL3060-4AA50-0AA0
To the decimeter 	Max. 70 (230)	7.0 (0.28)	RJ45/IP20	RJ45/IP20	6FX2002-1DC00-....
To the decimeter 	Max. 70 (230)	7.0 (0.28)	RJ45/IP67	RJ45/IP67	6FX2002-1DC20-....
Length code					

Overview

Data position in Article No.				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
MOTION-CONNECT 500				6	F	X	5	0	■	2	–	2	■	■	■	■	–	.	.	.	
MOTION-CONNECT 800PLUS				6	F	X	8	0	■	2	–	2	■	■	■	■	–	.	.	.	
6FX2 cables				6	F	X	2	0	0	2	–	1	D	C	■	0	–	.	.	.	
Pre-assembled at motor and module ends								0													
Pre-assembled at motor end, connector at module end supplied separately								1													
Connector at motor end supplied separately, pre-assembled at module end								4													
Variant: Signal cables for integrated encoder																					
<u>DRIVE-CLiQ cables between</u>				<u>and</u>																	
Power Module/Motor Module/SMC with IP20 connector				Power Module/Motor Module/SMC with IP20 connector									D	C	0	0					
Power Module/Motor Module/SMC with IP20 connector				Motor/encoder/SME IP67 connector									D	C	1	0					
DME20/cabinet bushing/coupler				Motor/encoder/SME IP67 connector									D	C	2	0					
<u>Basic cable between</u>				<u>and motor with</u>																	
SMC20				Incremental encoder (sin/cos 1 V _{pp}), full-thread connector, M23									C	A	3	1					
SMC30				Incremental encoder (HTL), full-thread connector, M23									A	H	0	0					
CU310-2				Incremental encoder (HTL), full-thread connector, M23									A	H	1	1					
SMC20				Absolute encoder, full-thread connector, M23									E	Q	1	0					
SMC10				Resolver, full-thread connector, M23									C	F	0	2					
SMC20				Incremental encoder (sin/cos 1 V _{pp}), SPEED-CONNECT connector, M23									C	Q	3	1					
SMC20				Incremental encoder, SPEED-CONNECT connector, M17									C	N	2	0					
SMC20				Absolute encoder, SPEED-CONNECT connector, M23									E	Q	3	1					
SMC20				Absolute encoder, SPEED-CONNECT connector, M17									E	N	2	0					
SMC10				Resolver, SPEED-CONNECT connector, M17									F	N	2	0					
<u>Extension between basic cable with connector</u>				<u>and motor connector</u>																	
Full-thread or SPEED-CONNECT				Full-thread or SPEED-CONNECT												4					
Variant: Signal cables for external encoder																					
<u>Basic cable between</u>				<u>and</u>																	
SMC30				Incremental encoder 6FX2001-2 (TTL/supply 5 V), full-thread connector									C	R	0	0					
SMC30				Incremental encoder 1XP8012-2./1XP8032-2. (TTL/supply 24 V), full-thread connector									C	D	2	4					
SMC20				Incremental encoder 6FX2001-3 (sin/cos 1 V _{pp}), full-thread connector									C	G	0	0					
SMC30				Incremental encoder 6FX2001-4 (HTL), full-thread connector									C	A	1	2					
SMC30				Incremental encoder 1XP8012-1./1XP8032-1. (HTL), full-thread connector									C	A	1	2					
SMC30				Absolute encoder with SSI 1XP8014-2./1XP8024-2., full-thread connector									C	C	0	6					
SMC30				Absolute encoder 6FX2001-5.S (SSI), full-thread connector									C	C	1	1					
SMC20				Absolute encoder 6FX2001-5.E (EnDat 2.1), full-thread connector									C	H	0	0					
SMC20				Absolute encoder 1XP8014-10/1XP8024-10 (EnDat 2.1), full-thread connector									C	H	0	0					
SMC10				Resolver 1XP8013-1./1XP8023-1., full-thread connector									C	F	0	6					
<u>Extension between basic cable with connector</u>				<u>and motor connector</u>																	
Full-thread				Full-thread												4					
Variant: Signal cables for temperature sensor																					
<u>Adapter cable with M17 socket on SIMOTICS T-1FW6 terminals</u>				6	F	X	8	0	0	2	–	2	S	L	■	■	–	.	.	.	
<u>Adapter cable with M17 socket on SIMOTICS L-1FN3100/L-1FN3150</u>																0	1				
<u>Adapter cable with M17 socket on SIMOTICS L-1FN3300 ... L-1FN3900</u>																0	2				
<u>Extension to basic cable between SME12x and SIMOTICS L-1FN3/SIMOTICS T-1FW6</u>																1	0				
<u>Basic cable between TM120 and SIMOTICS L-1FN3/SIMOTICS T-1FW6</u>																2	0				
Length code																					
Units of 10 cm (3.94 in) or 1 meter (3.28 ft) or in fixed lengths																					

MOTION-CONNECT connection systems

Article number code

Length code

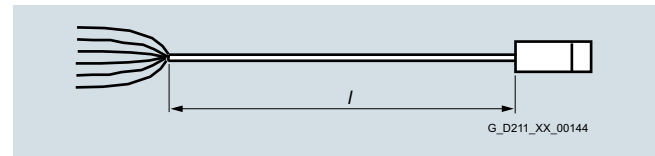
Overview

Description	Article No.	supplement
Length code for pre-assembled cables		
	6FX.0.2-.....-	■ ■ ■ ■
0 m	1	
100 m (328 ft)	2	
200 m (656 ft)	3	
0 m	A	
10 m (32.8 ft)	B	
20 m (65.6 ft)	C	
30 m (98.4 ft)	D	
40 m (131 ft)	E	
50 m (164 ft)	F	
60 m (197 ft)	G	
70 m (230 ft)	H	
80 m (262 ft)	J	
90 m (295 ft)	K	
0 m	A	
1 m (3.28 ft)	B	
2 m (6.56 ft)	C	
3 m (9.84 ft)	D	
4 m (13.1 ft)	E	
5 m (16.4 ft)	F	
6 m (19.7 ft)	G	
7 m (23.0 ft)	H	
8 m (26.2 ft)	J	
9 m (29.5 ft)	K	
0 m	0	
0.1 m (3.94 in)	1	
0.2 m (7.87 in)	2	
0.3 m (11.81 in)	3	
0.4 m (15.75 in)	4	
0.5 m (19.96 in)	5	
0.6 m (23.62 in)	6	
0.7 m (27.56 in)	7	
0.8 m (31.5 in)	8	
Examples:	1.0 m (3.28 ft): 1 A B 0	
	2.2 m (7.22 ft): 1 A C 2	
	8.0 m (26.3 ft): 1 A J 0	
	299.0 m (981 ft): 3 K K 0	

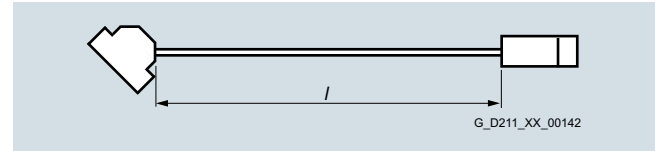
Description	Article No.	supplement
Length code for power and signal cables, sold by the meter ¹⁾		
	6FX.008-.....-	■ ■ ■ A 0
50 m (164 ft)	1	F
100 m (328 ft)	2	A
200 m (656 ft)	3	A
500 m (1641 ft)	6	A

More information

Definition of lengths for pre-assembled cables



Cable with exposed core ends and pre-assembled connector



Cable with pre-assembled connectors at both ends

Tolerance:

- Cable lengths up to 10 m (32.8 ft): $\pm 2\%$
- Cable lengths of 10 m (32.8 ft) and longer: $\pm 1\%$

¹⁾ Note type of delivery. Cables with core cross-section $4 \times 4 \text{ mm}^2$ or $4 \times 4 \text{ mm}^2$ with brake cores can be delivered in units of 1 m (3.28 ft).

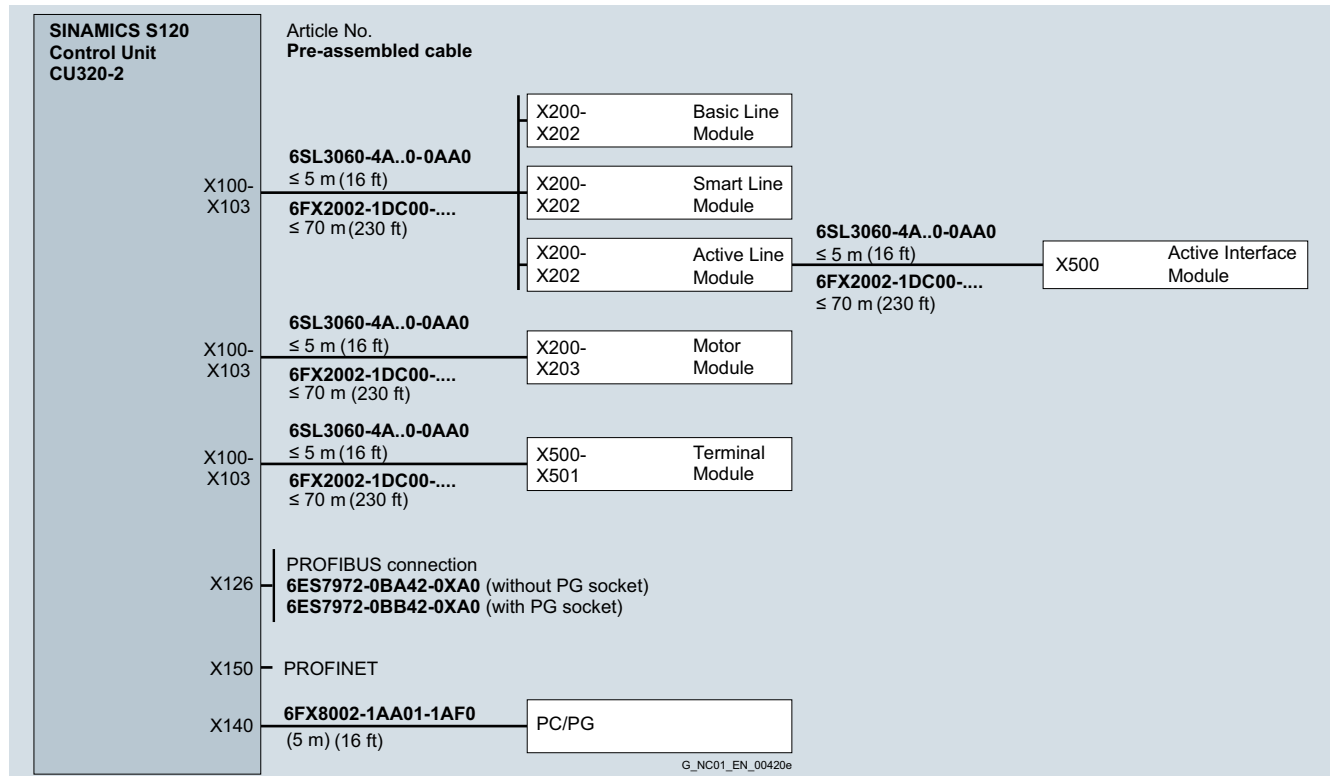
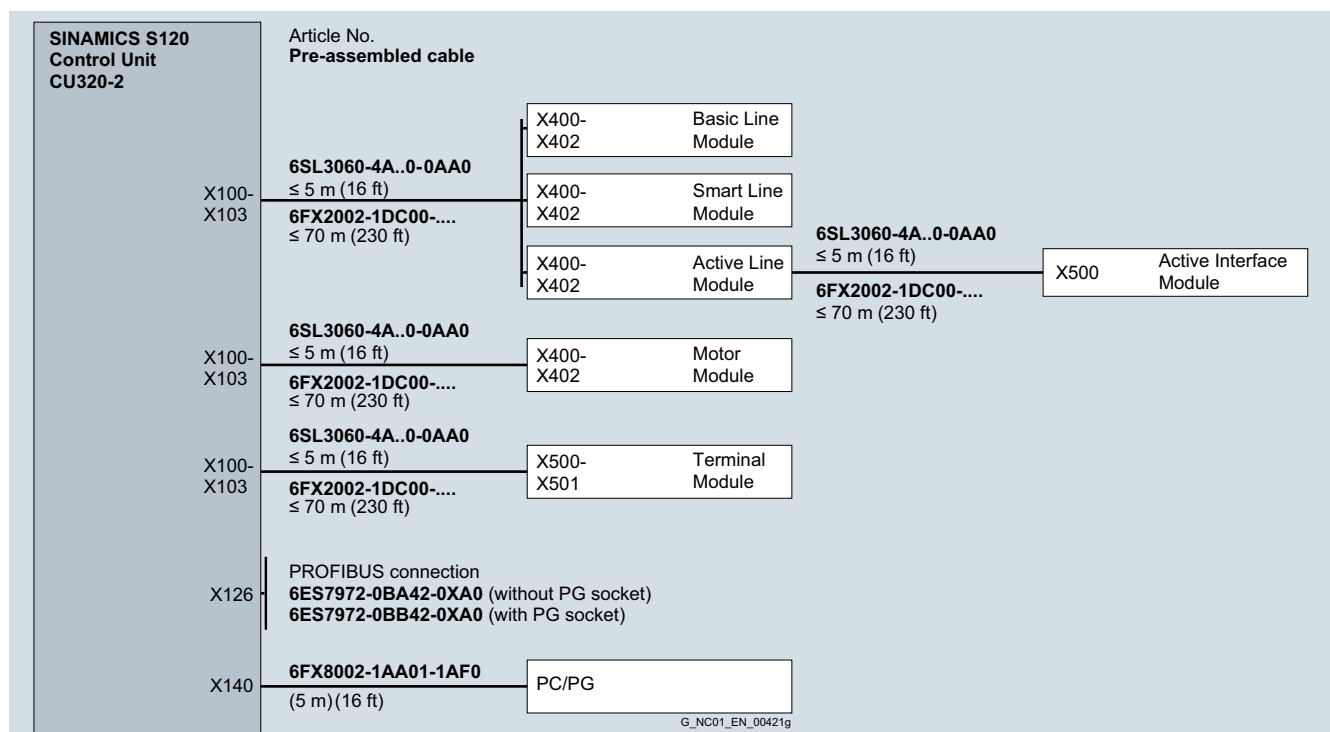
MOTION-CONNECT connection systems

Connection overviews

SINAMICS S120 CU320-2 Control Unit**Integration**

The DRIVE-CLiQ signal cables of type 6SL3060-4A..0-0AA0 required for the standard configuration are part of the scope of supply of the Line Modules and Motor Modules. In this case, the modules must be mounted directly adjacent to one another in a row.

The same components can be connected to the DRIVE-CLiQ interfaces X100-X103 (SIMOTION D425-2, SIMOTION CX32-2) or X100-X105 (SIMOTION D435-2/D445-2/D455-2) as can be connected to the DRIVE-CLiQ interfaces X100-X103 of a CU320-2.

Connection overview of CU320-2 Control Unit with SINAMICS S120 in booksize compact and booksize formats**Connection overview of CU320-2 Control Unit with SINAMICS S120 in chassis format**

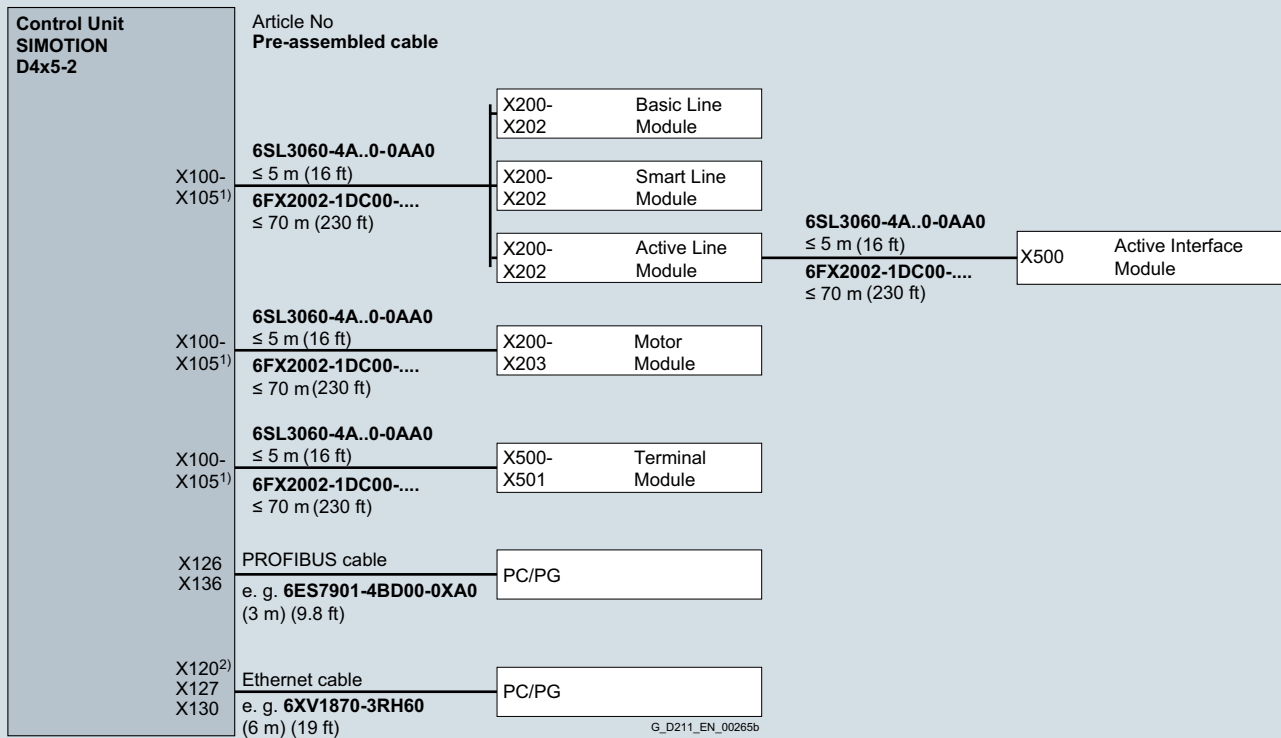
MOTION-CONNECT connection systems

Connection overviews

SIMOTION D4x5-2 Control Unit

Integration

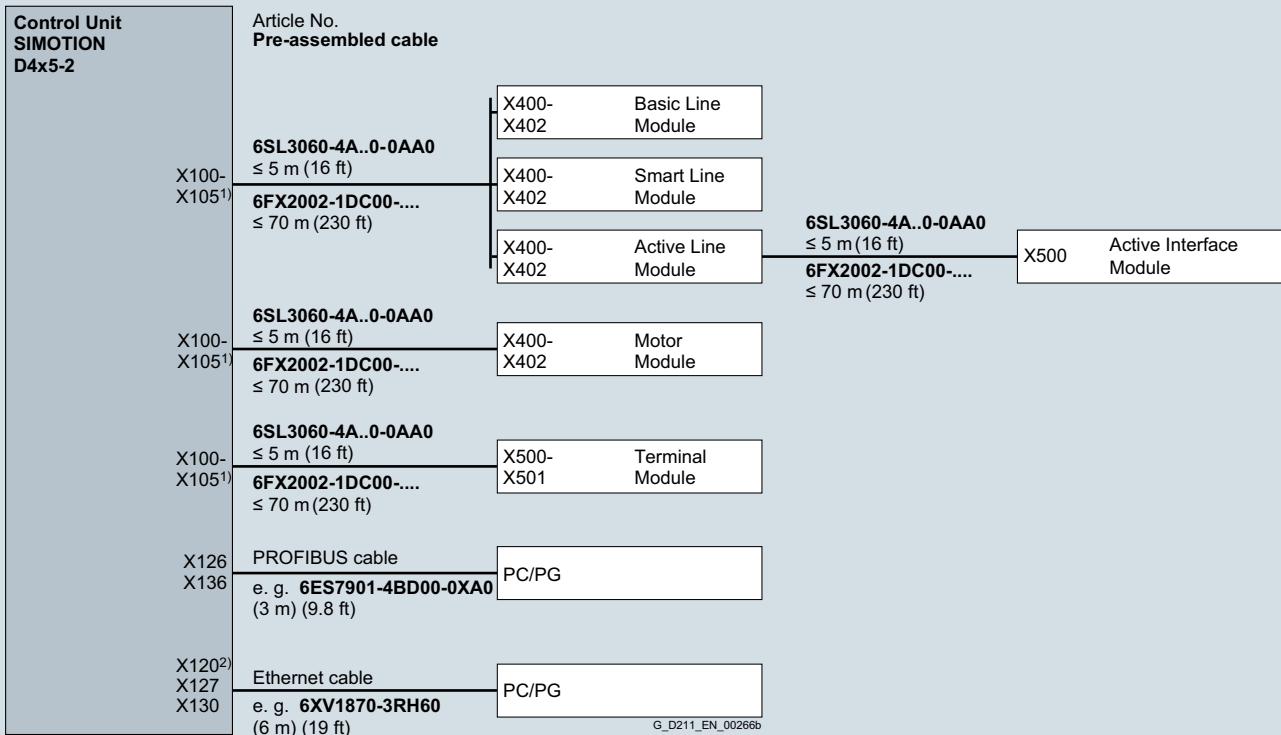
Connection overview of SIMOTION D4x5-2 Control Unit with SINAMICS S120 in booksize format



¹⁾ For SIMOTION D425/SIMOTION D435: X100-X103.
For SIMOTION D445-1: X100-X105.

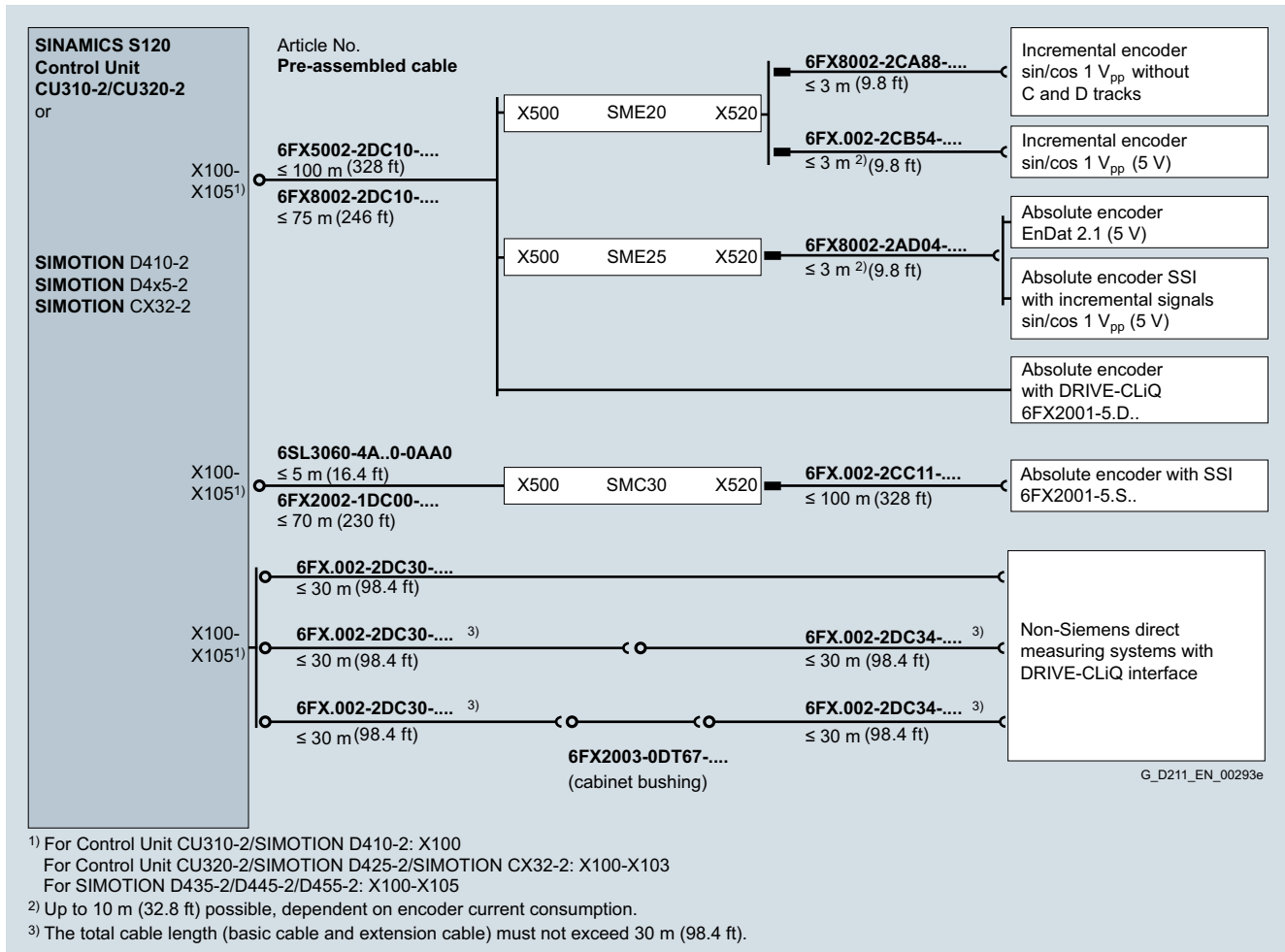
²⁾ X120 for D4x5-2 DP only.

Connection overview of SIMOTION D4x5-2 Control Unit with SINAMICS S120 in chassis format



¹⁾ For SIMOTION D425-2: X100-X103.
For SIMOTION D435-2/D445-2/D455-2: X100-X105.

²⁾ X120 for D4x5-2 DP only.

Integration**Connection of a machine encoder (direct measuring system)**

MOTION-CONNECT connection systems

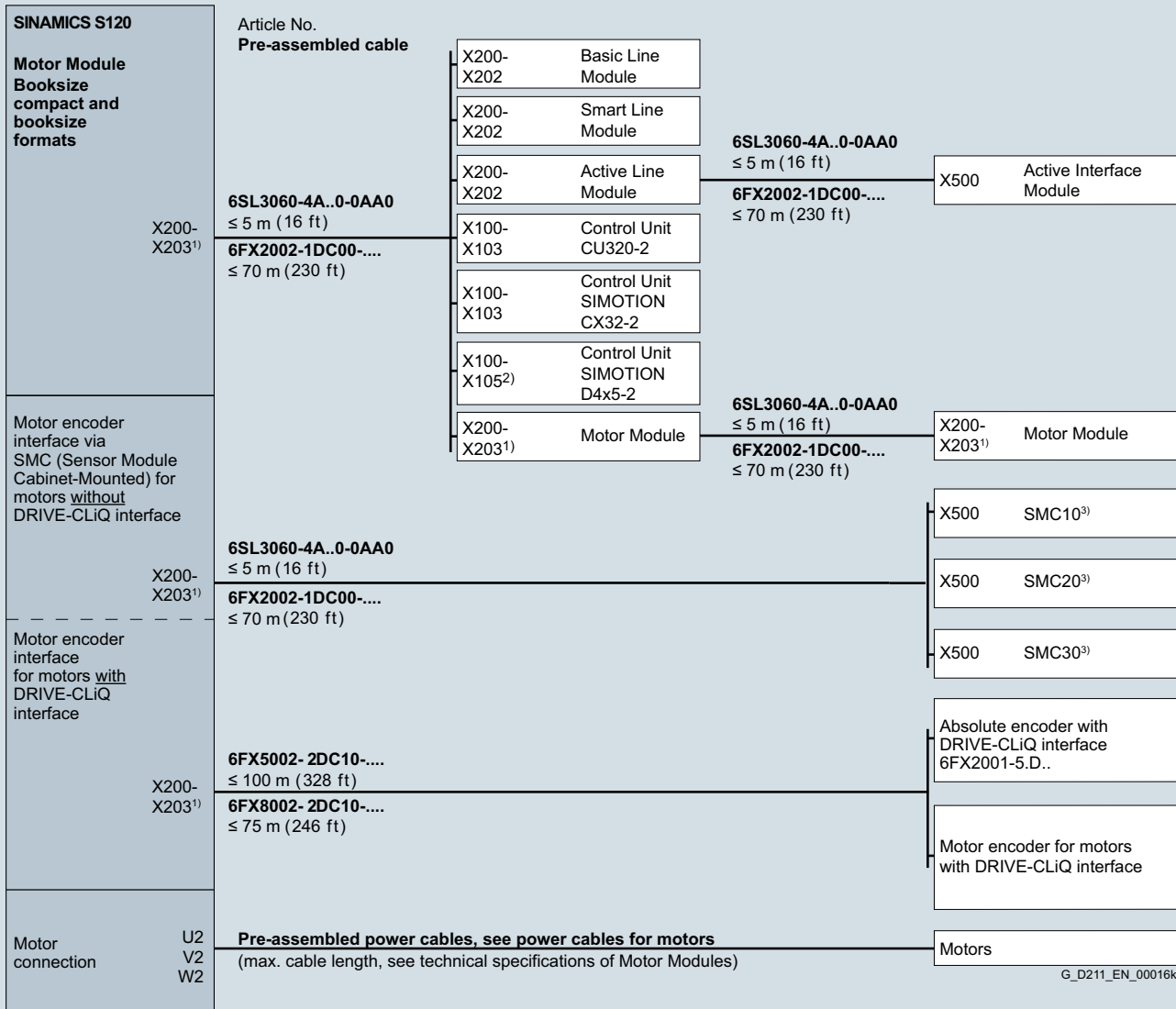
Connection overviews

SINAMICS S120 Motor Modules in booksize format

Integration

Connection overview of SINAMICS S120 Motor Modules in booksize compact and booksize formats for SIMOTICS motors with/without DRIVE-CLiQ interface

The DRIVE-CLiQ signal cables of type 6SL3060-4A..0-0AA0 required for the standard configuration are part of the scope of supply of the Line Modules and Motor Modules. In this case, the modules must be mounted directly adjacent to one another in a row.



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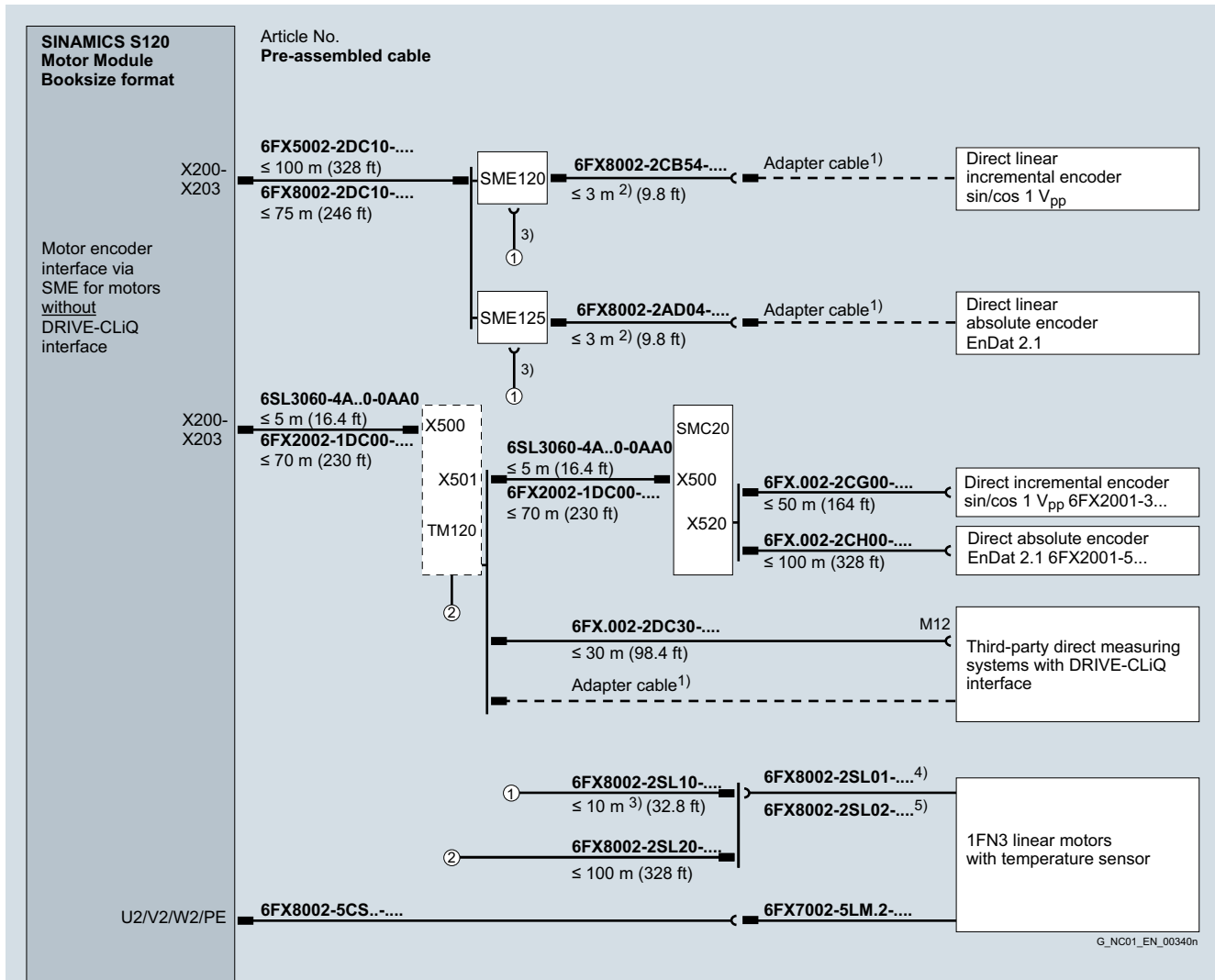
¹⁾ For Single Motor Module: X200-X202.
For Double Motor Module: X200-X203.

²⁾ For SIMOTION D425-2: X100-X103.
For SIMOTION D435-2/D445-2/D455-2: X100-X105.

³⁾ See connection overviews of SMC10/SMC20/SMC30.

Integration (continued)

Connection overview of SINAMICS S120 Motor Modules in booksize format with SME120/SME125 or TM120 with/without SMC20 and SIMOTICS L-1FN3 linear motors



1) Adapter cable available from measuring system manufacturer.

2) Up to 10 m (32.8 ft) possible, depending on encoder current consumption.

3) The total cable length between SME120/SME125 and 1FN3 must not exceed 10 m (32.8 ft).

4) Adapter cable for 1FN3100/1FN3150 motors.

5) Adapter cable for 1FN3300 to 1FN3900 motors.

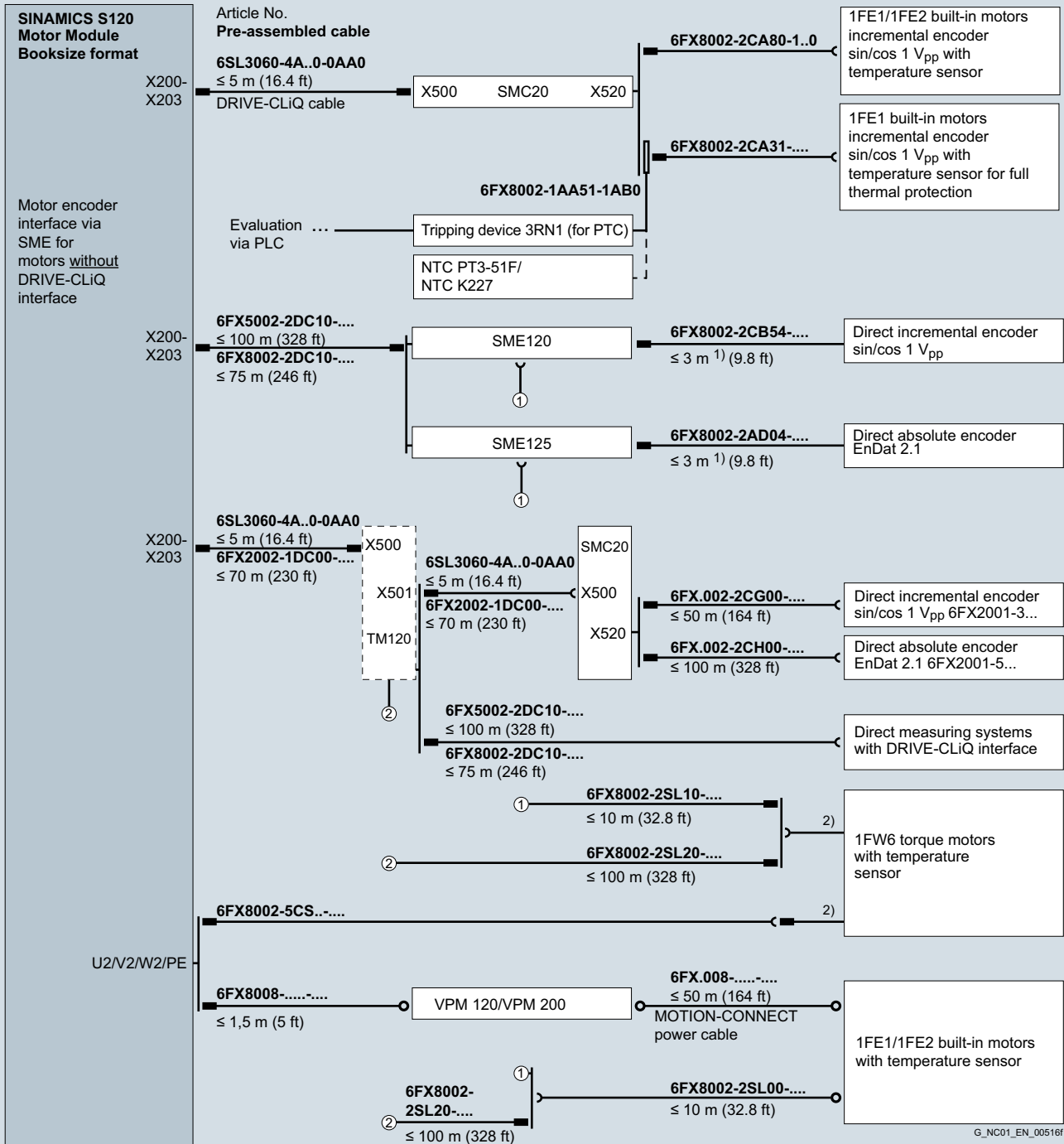
MOTION-CONNECT connection systems

Connection overviews

SINAMICS S120 Motor Modules in booksize format

Integration (continued)

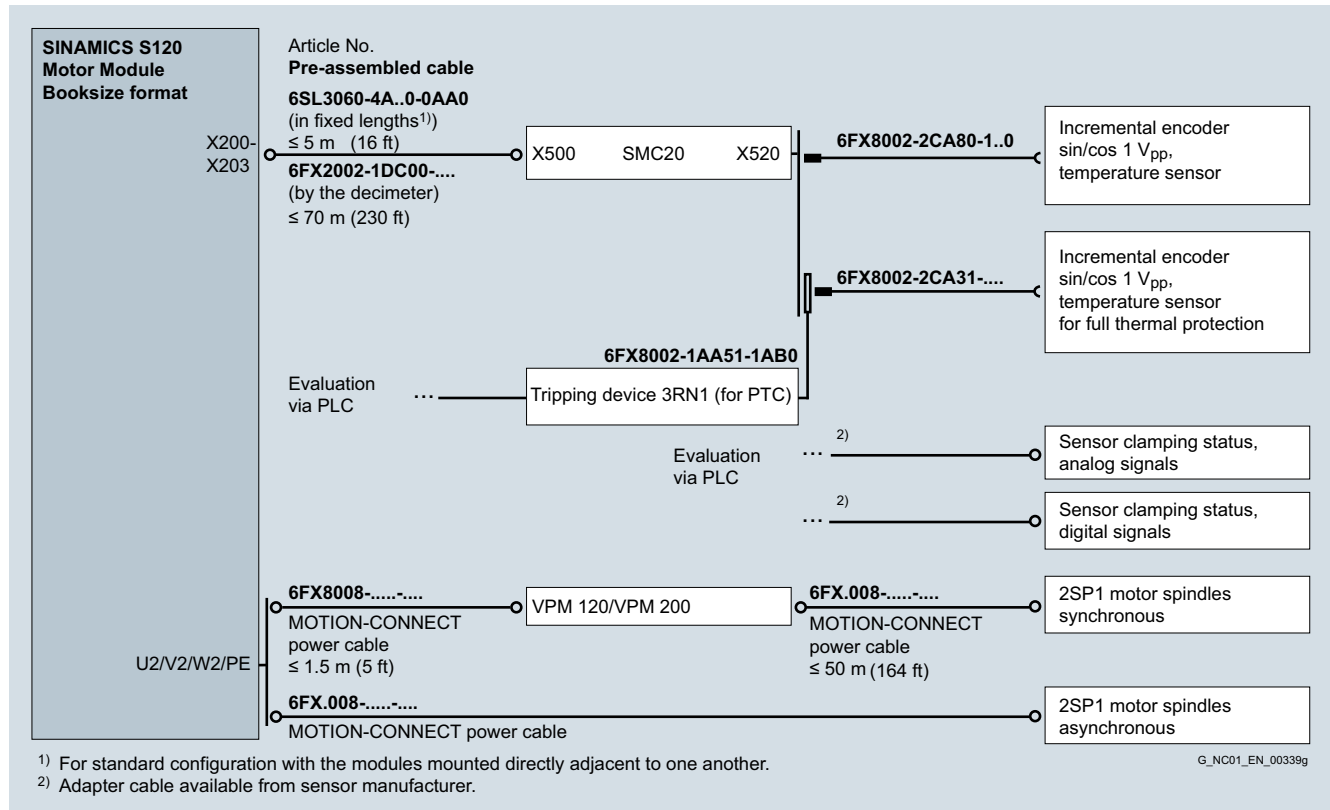
Connection overview of SINAMICS S120 Motor Modules in booksize format with SME120/SME125 or TM120 with/without SMC20 and SIMOTICS T-1FW6 torque motors/SIMOTICS M-1FE1/-1FE2 built-in motors



1) Up to 10 m (32.8 ft) possible, depending on encoder current consumption.

2) For type of connection with exposed core ends, power and signal connectors are not included in the scope of supply of the motor, they must be ordered separately (see Accessories for power and signal cables).

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Integration (continued)**Connection overview of SINAMICS S120 Motor Modules in booksize format and SIMOTICS 2SP1 main spindle motors**

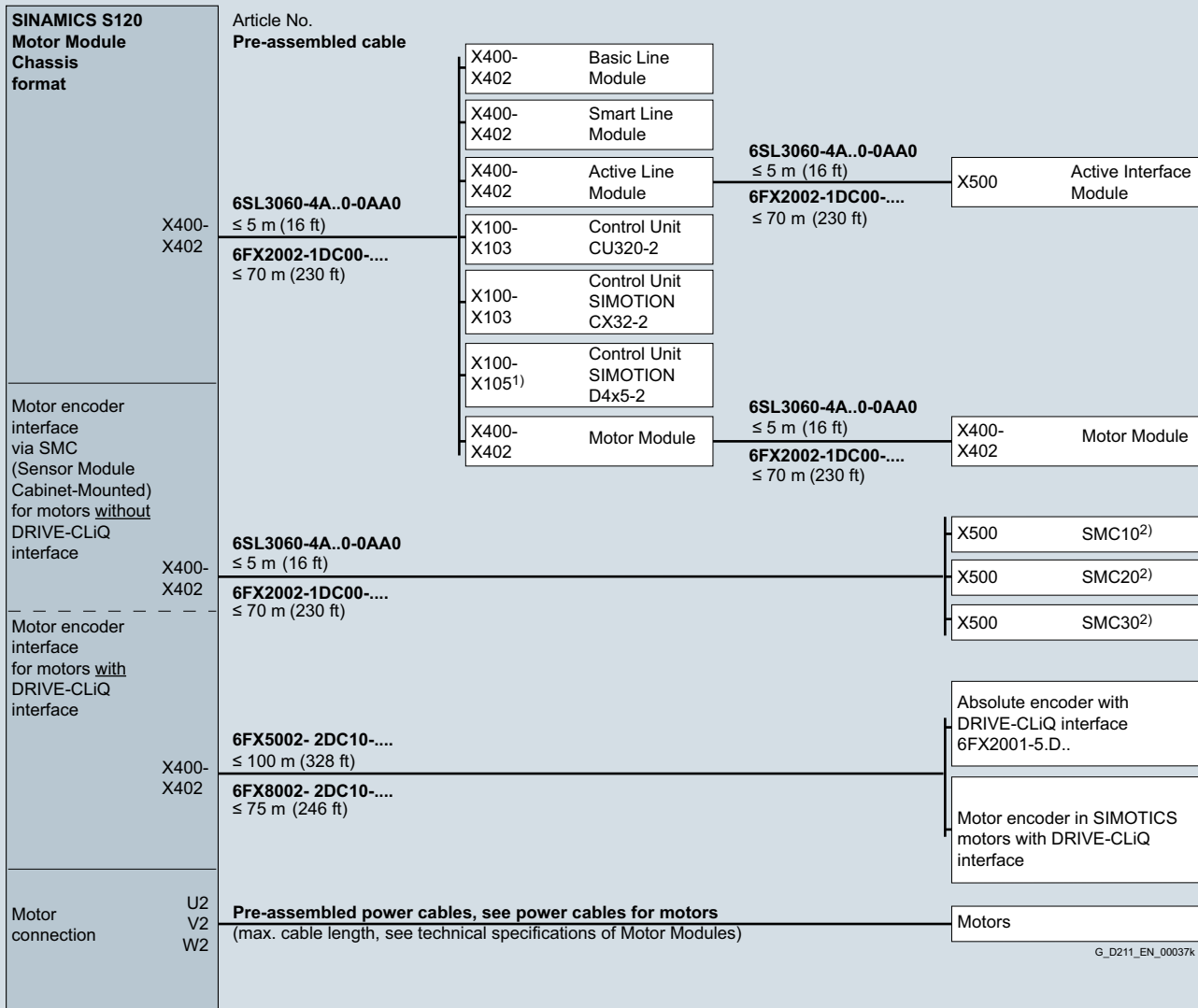
MOTION-CONNECT connection systems

Connection overviews

SINAMICS S120 Motor Modules in chassis format

Integration

Connection overview of SINAMICS S120 Motor Modules and Line Modules in chassis format for SIMOTICS motors with/without DRIVE-CLiQ interface



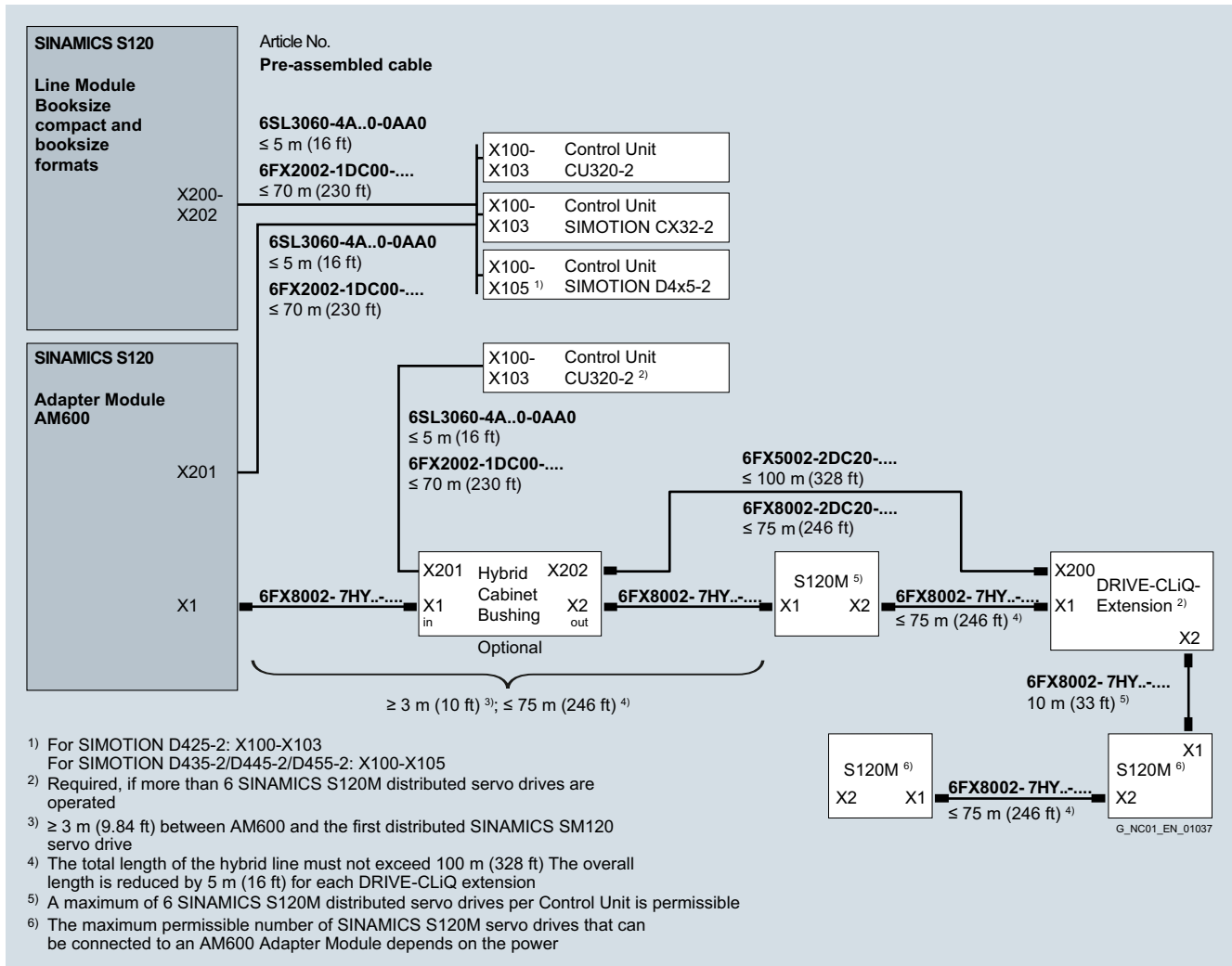
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¹⁾ For SIMOTION D425-2: X100-X103
For SIMOTION D435-2/D445-2/D455-2: X100-X105

²⁾ See connection overviews SMC10/SMC20/SMC30

Integration

Connection overview of SINAMICS S120M distributed servo drive



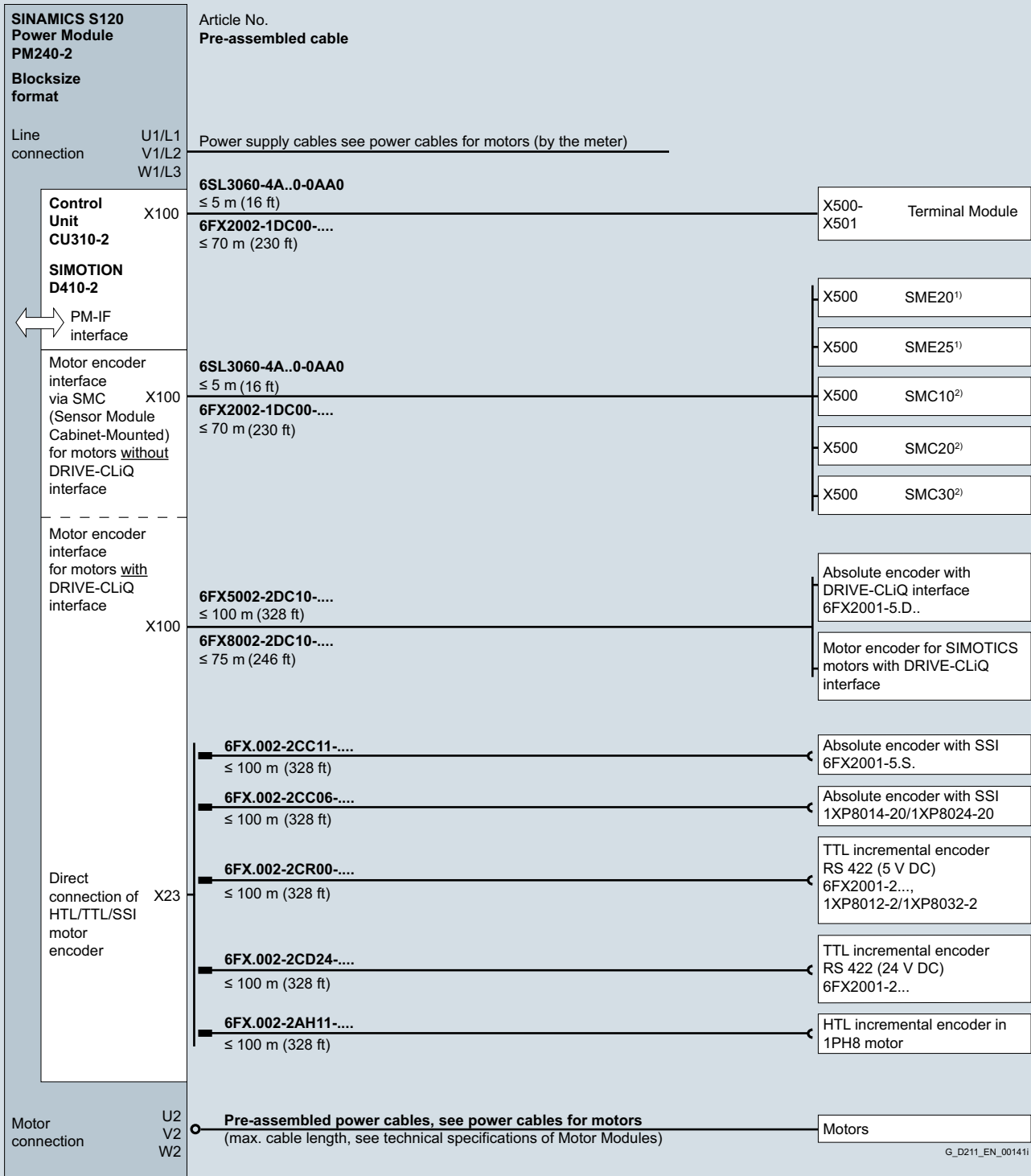
MOTION-CONNECT connection systems

Connection overviews

SINAMICS S120 Power Modules in blocksize format

Integration

Connection overview of SINAMICS S120 Power Modules in blocksize format with CU310-2/SIMOTION D410-2 Control Unit for SIMOTICS motors with/without DRIVE-CLiQ interface

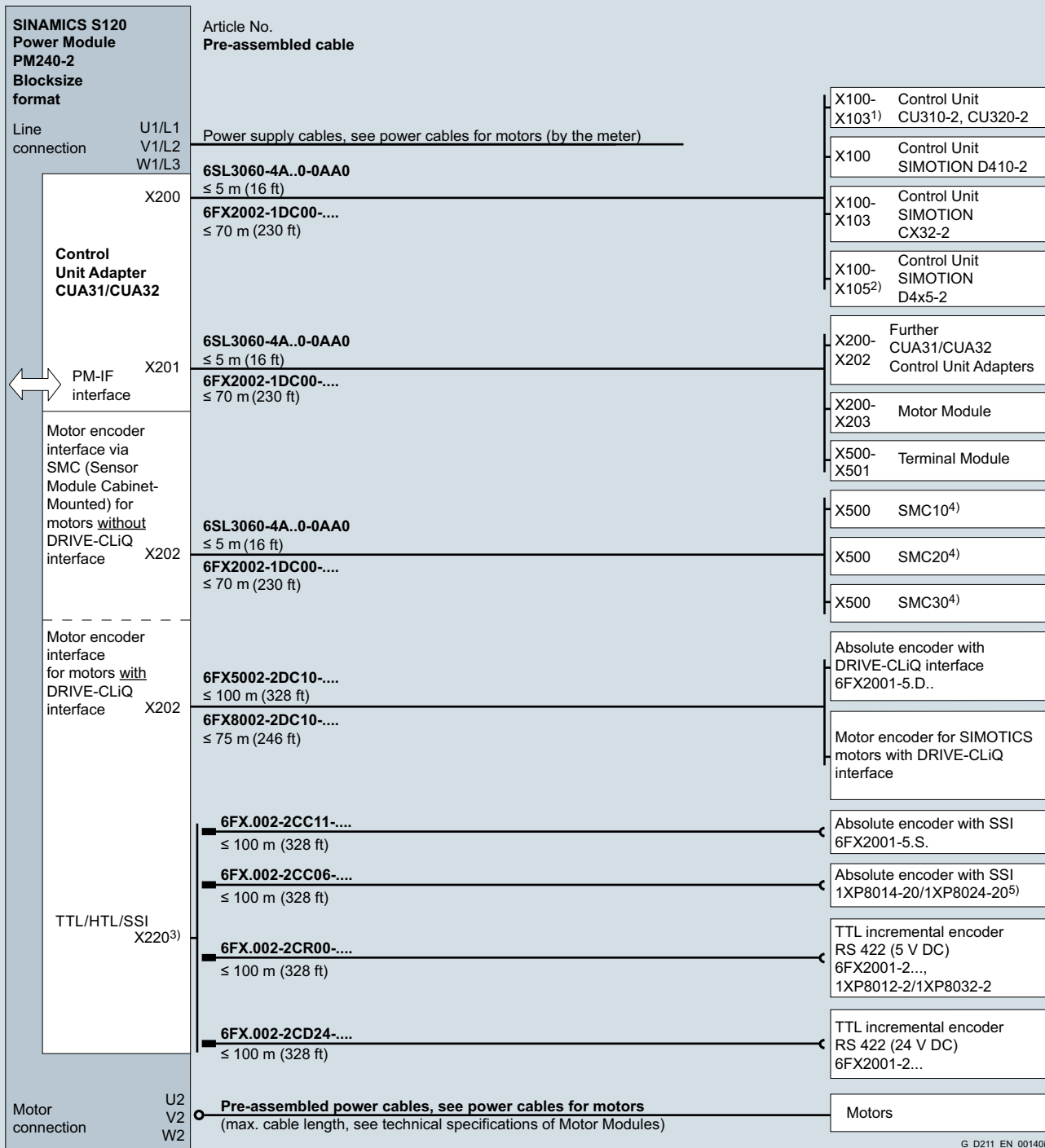


¹⁾ See connection overview for connection of a machine encoder.

²⁾ See connection overviews of SMC10/SMC20/SMC30.

Integration (continued)

Connection overview of SINAMICS S120 Power Modules in blocksize format with CUA31/CUA32 Control Unit Adapter for SIMOTICS motors with/without DRIVE-CLiQ interface



1) For Control Unit CU310-2: X100.
For Control Unit CU320-2: X100-X103.
2) For SIMOTION D425-2: X100-X103.
For SIMOTION D435-2/D445-2/D455-2: X100-X105.

3) Only for CUA32 Control Unit Adapter.
4) See connection overviews of SMC10/SMC20/SMC30.
5) Only for position control

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MOTION-CONNECT connection systems

Connection overviews

SINAMICS S120 Power Modules in chassis format

Integration

Connection overview of SINAMICS S120 Power Modules in chassis format for SIMOTICS motors with/without DRIVE-CLiQ interface

A DRIVE-CLiQ signal cable of type 6SL3060-4A..0-0AA0 for connection to the chassis-mounted CU310-2 Control Unit/ SIMOTION D410-2 Control Unit is already included in the scope of supply.

SINAMICS S120 Power Module		Article No.	Pre-assembled cable	
Chassis format	Line connection	U1/L1 V1/L2 W1/L3	Power supply cables, see power cables for motors (by the meter)	X100 SINAMICS S120 Control Unit CU310-2 X100- X103 SINAMICS S120 Control Unit CU320-2 X100 Control Unit SIMOTION D410-2
	X400- X402		6SL3060-4A..0-0AA0 ≤ 5 m (16 ft) 6FX2002-1DC00-.... ≤ 70 m (230 ft)	X100- X105¹⁾ Control Unit SIMOTION D4x5-2 X100- X103 Control Unit SIMOTION CX32-2 X500- X501 Terminal Module X400- X402 Power Module
Motor encoder interface via SMC (Sensor Module Cabinet-Mounted) for motors <u>without</u> DRIVE-CLiQ interface	X402		6SL3060-4A..0-0AA0 ≤ 5 m (16 ft) 6FX2002-1DC00-.... ≤ 70 m (230 ft)	X500 SMC10²⁾ X500 SMC20²⁾ X500 SMC30²⁾
			6FX5002-2DC10-.... ≤ 100 m (328 ft) 6FX8002-2DC10-.... ≤ 75 m (246 ft)	Absolute encoder with DRIVE-CLiQ interface 6FX2001-5.D.. Motor encoder for SIMOTICS motors with DRIVE-CLiQ interface
Motor connection	U2 V2 W2		Pre-assembled power cables, see power cables for motors (max. cable length, see technical specifications of Motor Modules)	Motors

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¹⁾ For SIMOTION D425-2: X100-X103
For SIMOTION D435-2/D445-2/D455-2: X100-X10⁵

²⁾ See connection overviews SMC10/SMC20/SMC30