Balance Systems

SERVOMOTORE TRIFASE - SIEMENS

THREE-PHASE SERVOMOTOR - SIEMENS

Modello 1FK7**
1FK7 *Model***

Documento Nr. / Document Nr. Z00000000148

Synchronous Servo Motors

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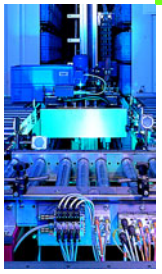
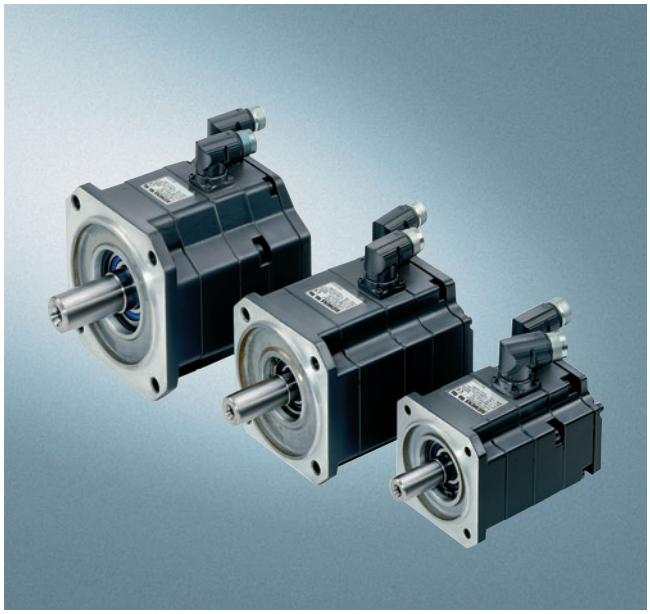
1FK7 Motors



Synchronous Servo Motors

1FK7 Motors
Natural cooling

Overview



1FK7 Synchronous Servo Motors

The 1FK7 motors are extremely compact, permanent-magnet synchronous motors. The available options, gear units, and encoders, together with the expanded product range, mean that the 1FK7 motors can be optimally adapted to any application. They therefore also satisfy the ever-increasing demands of state-of-the-art machine generations.

Combined with the SIMOVERT MASTERDRIVES Motion Control drive system, 1FK7 motors form a powerful high-performance system. The built-in encoder systems for speed and position control can be selected specifically for the application.

These motors are designed for operation without external cooling whereby generated heat is dissipated through the motor surface. The 1FK7 motors have a high overload capability.

Benefits

Features of 1FK7 Compact Motors:

- Space-saving installation due to their extremely high power density (unit volume as much as 25 % less than 1FK6)
- Mechanical compatibility with 1FK6 (shaft, flange and connector)
- Expanded power spectrum

Features of 1FK7 High Dynamic Motors:

- Extremely high dynamic response due to low rotor moment of inertia
- Mechanical compatibility with 1FK6 (shaft, flange and connector)
- High short-term overload capacity (250 ms) $M_{max} = 3 \cdot M_0$ (100 K)

Application

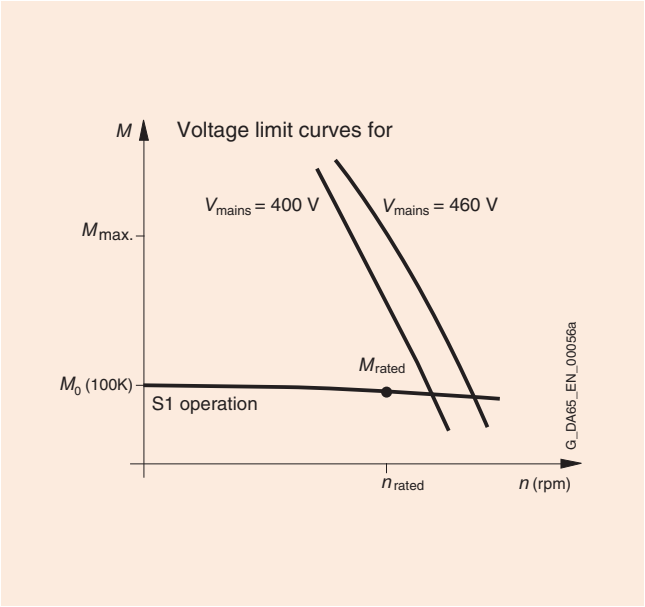
- Machine tools
- Robots and handling systems
- Woodworking, glass machining, ceramics, and stoneworking
- Packaging, plastics, and textile machines
- Auxiliary axes

Certain motors are available in core type versions. Compared to the standard models, these core types have the advantage of faster shipping time and spare part delivery. For this reason, we recommend that you configure core types.

Technical Data

Motor type	Permanent-magnet synchronous motor
Magnet material	Rare-earth magnet material
Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)	Thermal Class F for winding temperature rise of ΔT = 100 K at an ambient temperature of +40 °C (+104 °F)
Construction type in accordance with EN 60034-7 (IEC 60034-7)	IM B5 (IM V1, IM V3)
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	IP64
Cooling	Natural cooling
Temperature monitoring	KTY 84 temperature sensor in the stator winding
Paint finish	Unpainted
2nd rating plate	Attached to end shield
3rd rating plate	Supplied separately packed
Shaft end on the drive end in accordance with DIN 748-3 (IEC 60072-1)	Keyless shaft
Radial eccentricity, concentricity, and axial eccentricity in accordance with DIN 42955 (IEC 60072-1)	Tolerance N (normal)
Vibration severity in accordance with EN 60034-14 (IEC 60034-14)	Grade N (normal)
Maximum sound pressure level in accordance with EN ISO 1680	1FK702: 55 dB (A) 1FK703: 55 dB (A) 1FK704: 55 dB (A) 1FK706: 65 dB (A) 1FK708: 70 dB (A) 1FK710: 70 dB (A)
Encoder systems, integrated	• Incremental encoder sin/cos 1 V_{pp}, 2,048 pulses/revolution • EnDat absolute encoder, 2,048 pulses/revolution for 1FK704 to 1FK710. 512 pulses/revolution for 1FK702 and 1FK703 and traversing range of 4,096 rev • EnDat simple absolute encoder, 32 pulses/revolution for 1FK704 to 1FK710 and traversing range of 4,096 rev • Multipole resolver (number of pole pairs corresponds to number of pole pairs of motor) • Resolver, 2-pole
Connection	Connectors for signals and power; rotatable (270°)
Options	• Shaft end on the drive end with key and keyway (half-key balancing) • Built-in holding brake • Degree of protection IP65, also IP67 for drive-end flange • Planetary gearbox (requires a keyless motor shaft end) • Anthracite gray finish

Characteristics



Torque-speed characteristic

Options

Code	Option description	1FK7 CT	1FK7 HD
M03	Design for Zone 2 hazardous areas (in accordance with EN 50021/ IEC 60079-15)	■	■
M39	Design for Zone 22 hazardous areas (in accordance with EN 50281/ IEC 61241)	■	■
N05	Atypical shaft end (same dimensions as in 1FT5 motors)	■	■
X01	Jet black finish RAL 9005	■	■
X02	Cream finish RAL 9001	■	■
X03	Reseda green finish RAL 6011	■	■
X04	Pebble gray finish RAL 7032	■	■
X05	Sky blue finish RAL 5015	■	■
X06	Light ivory finish RAL 1015	■	■
X08	White aluminum RAL 9006, suitable for use with food	■	■

■ Option available

1FK7 Motors Compact, Core Type
Natural cooling

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Selection and Ordering Data

Rated Rotational Speed n_{rated} rpm	Shaft Height SH	Rated Output P_{rated} at ΔT=100 K kW (HP)	Rated Torque [1] M_{rated} at ΔT=100 K Nm (lb_f-in)	Rated Current I_{rated} at ΔT=100 K A	Standstill Torque M_0 at ΔT=100 K Nm (lb_f-in)	**1FK7 Synchronous Motors Compact Natural cooling** Order No. **Core Type**	Pole Pair Number	Rotor Moment of Inertia (w/o Brake) J 10^{-4} kgm^2 (lb_f-in-s^2)	Weight (without Brake) kg (lb)
2000	100	7.75 (10.39)	37 (327.5)	16	48 (424.8)	**1FK7 105 – 5AC71 – 1 ■ ■ ■**	4	156 (0.1381)	39 (85)
3000	48	0.82 (1.1)	2.6 (23)	1.95	3 (26.6)	**1FK7 042 – 5AF71 – 1 ■ ■ ■**	4	3.01 (0.0027)	4.9 (10.8)
	63	1.48 (1.98)	4.7 (41.6)	3.7	6 (53.1)	**1FK7 060 – 5AF71 – 1 ■ ■ ■**	4	7.95 (0.0070)	7 (15.4)
		2.29 (3.07)	7.3 (64.6)	5.6	11 (97.4)	**1FK7 063 – 5AF71 – 1 ■ ■ ■**	4	15.1 (0.0134)	11.5 (25.4)
	80	2.14 (2.87)	6.8 (60.2)	4.4	8 (70.8)	**1FK7 080 – 5AF71 – 1 ■ ■ ■**	4	15 (0.0133)	10 (22.1)
		3.3 (4.42)	10.5 (92.9)	7.4	16 (141.6)	**1FK7 083 – 5AF71 – 1 ■ ■ ■**	4	27.3 (0.0242)	14 (30.9)
	100	3.77 (5.05)	12 (106.1)	8	18 (159.3)	**1FK7 100 – 5AF71 – 1 ■ ■ ■**	4	55.3 (0.0489)	19 (41.9)
		4.87 (6.53)	15.5 (137.2)	11.8	27 (238)	**1FK7 101 – 5AF71 – 1 ■ ■ ■**	4	79.9 (0.0707)	21 (46.3)
		5.37 [4] (7.2) [4]	20.5 [4] (181.4) [4]	16.5 [4]	36 (318.6)	**1FK7 103 – 5AF71 – 1 ■ ■ ■**	4	105 (0.0929)	29 (63.9)
		8.17 (10.95)	26 (230.1)	18	48 (424.8)	**1FK7 105 – 5AF71 – 1 ■ ■ ■**	4	156 (0.1381)	39 (85)
4500	63	1.74 (2.33)	3.7 (32.7)	4.1	6 (53.1)	**1FK7 060 – 5AH71 – 1 ■ ■ ■**	4	7.95 (0.0070)	7 (15.4)
		2.09 [5] (2.8) [5]	5 [5] (44.3) [5]	6.1 [5]	11 (97.4)	**1FK7 063 – 5AH71 – 1 ■ ■ ■**	4	15.1 (0.0134)	11.5 (25.4)
	80	2.39 [5] (3.2) [5]	5.7 [5] (50.5) [5]	5.6 [5]	8 (70.8)	**1FK7 080 – 5AH71 – 1 ■ ■ ■**	4	15 (0.0133)	10 (22.1)
		3.04 [6] (4.08) [6]	8.3 [6] (73.5) [6]	9 [6]	16 (141.6)	**1FK7 083 – 5AH71 – 1 ■ ■ ■**	4	27.3 (0.0242)	14 (30.9)
6000	28	0.4 (0.54)	0.6 (5.3)	1.4	0.85 (7.5)	**1FK7 022 – 5AK71 – 1 ■ ■ ■**	3	0.28 (0.0002)	1.8 (4)
	36	0.47 (0.63)	0.8 (7.1)	1.4	1.1 (9.7)	**1FK7 032 – 5AK71 – 1 ■ ■ ■**	3	0.61 (0.0005)	2.7 (6)
	48	0.69 (0.92)	1.1 (9.7)	1.7	1.6 (14.2)	**1FK7 040 – 5AK71 – 1 ■ ■ ■**	4	1.69 (0.0015)	3.5 (7.7)
		1.05 [7] (1.41) [7]	2 [7] (17.7) [7]	3.1 [7]	3 (26.6)	**1FK7 042 – 5AK71 – 1 ■ ■ ■**	4	3.01 (0.0027)	4.9 (10.8)

• Encoder systems:	Incremental encoder sin/cos 1 V_{pp} Absolute encoder EnDat 2,048 pulses/rev [1] [2] Absolute encoder EnDat 512 pulses/rev [1] [3] Simple absolute encoder EnDat 32 pulses/rev [1] [2] Multipole resolver 2-pole resolver	**A** **E** **H** **G** **S** **T**
• Shaft end: With key and keyway With key and keyway Keyless shaft Keyless shaft	• Radial eccentricity tol.: N N N N	• Holding brake: No Yes No Yes	**A** **B** **G** **H**
• Degree of protection:	IP64 IP65 and also IP67 drive-end flange IP64, anthracite gray finish IP65 and also IP67 drive-end flange, anthracite gray finish	**0** **2** **3** **5**
• **Special models:** Please specify option code; refer to page 2/3.		**–Z**

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Selection and Ordering Data

Motor Type (continued)	Standstill Current	SIMOVERT MASTERDRIVES MC Inverter/Converter Rated Current		Power Cable with Complete Shield Motor Connection (with Brake Connection) via Power Connector		
	I_0 at ΔT=100 K	I_{rated}	Order No. Inverter Converter	Power Connector	Cable Cross-section Motor [8]	Order No. Pre-Assembled Cable
	A	A		Size	mm²	
1FK7 105 – 5AC71 – 1...	20	25.5 20.5	**6SE7 022 – 6TP■ 0** **6SE7 022 – 1EP■ 0**	1.5	4 x 2.5	**6FX■002 – 5■A31 –. . . 0**
1FK7 042 – 5AF71 – 1...	2.2	4.0 3.0	**6SE7 014 – 0TP■ 0** **6SE7 013 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 060 – 5AF71 – 1...	4.5	6.1 5.0	**6SE7 016 – 0TP■ 0** **6SE7 015 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 063 – 5AF71 – 1...	8	10.2 8.0	**6SE7 021 – 0TP■ 0** **6SE7 018 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 080 – 5AF71 – 1...	4.8	6.1 5.0	**6SE7 016 – 0TP■ 0** **6SE7 015 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 083 – 5AF71 – 1...	10.4	13.2 10.0	**6SE7 021 – 3TP■ 0** **6SE7 021 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 100 – 5AF71 – 1...	11.2	13.2 14.0	**6SE7 021 – 3TP■ 0** **6SE7 021 – 4EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 101 – 5AF71 – 1...	19	25.5 20.5	**6SE7 022 – 6TP■ 0** **6SE7 022 – 1EP■ 0**	1.5	4 x 2.5	**6FX■002 – 5■A31 –. . . 0**
1FK7 103 – 5AF71 – 1...	27.5	34.0 34.0	**6SE7 023 – 4TP■ 0** **6SE7 023 – 4EP■ 0**	1.5	4 x 4.0	**6FX■002 – 5■A41 –. . . 0**
1FK7 105 – 5AF71 – 1...	31	34.0 34.0	**6SE7 023 – 4TP■ 0** **6SE7 023 – 4EP■ 0**	1.5	4 x 10	**6FX■002 – 5■A61 –. . . 0**
1FK7 060 – 5AH71 – 1...	6.2	6.1 8.0	**6SE7 016 – 0TP■ 0** **6SE7 018 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 063 – 5AH71 – 1...	12	13.2 14.0	**6SE7 021 – 3TP■ 0** **6SE7 021 – 4EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01–. . . 0**
1FK7 080 – 5AH71 – 1...	7.4	10.2 8.0	**6SE7 021 – 0TP■ 0** **6SE7 018 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 083 – 5AH71 – 1...	15	17.5 20.5	**6SE7 021 – 8TP■ 0** **6SE7 022 – 1EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 022 – 5AK71 – 1...	1.8	2.0 3.0	**6SE7 012 – 0TP■ 0** **6SE7 013 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 032 – 5AK71 – 1...	1.7	2.0 1.5	**6SE7 012 – 0TP■ 0** **6SE7 011 – 5EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 040 – 5AK71 – 1	2.25	4.0 3.0	**6SE7 014 – 0TP■ 0** **6SE7 013 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 042 – 5AK71 – 1...	4.4	6.1 5.0	**6SE7 016 – 0TP■ 0** **6SE7 015 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**

• SIMOVERT MASTERDRIVES Motion Control	**5**
• SIMOVERT MASTERDRIVES Motion Control Performance 2	**7**

Power Cable Model	
• MOTION-CONNECT 800	**8**
• MOTION-CONNECT 500	**5**

• Without brake cable	**C**
• With brake cable	**D**

For information about length codes and signal cables, see “MOTION-CONNECT Connection System”, Part 5.

1) If the absolute encoder is used, M_{rated} is reduced by 10%.
2) Not available with 1FK702 and 1FK703
3) Only available with 1FK702 and 1FK703
4) Rated power/current refers to n = 2500 rpm.
5) Rated power/current refers to n = 4000 rpm.
6) Rated power/current refers to n = 3500 rpm.
7) Rated power/current refers to n = 5000 rpm.
8) The current carrying capacity of the power cables corresponds to IEC 60204-1 for Routing Type C under continuous duty conditions at an ambient air temperature of +40 °C (+104 °F), designed for I_0 (100 K) PVC/PUR insulated cable.

1FK7 High Dynamic Motors, Core Type
Natural cooling

Selection and Ordering Data

Rated Rotational Speed n_{rated} rpm	Shaft Height SH	Rated Output P_{rated} at ΔT=100 K kW (HP)	Rated Torque [1] M_{rated} at ΔT=100 K Nm (lb_f-in)	Rated Current I_{rated} at ΔT=100 K A	Standstill Torque M_0 at ΔT=100 K Nm (lb_f-in)	**1FK7 High Dynamic Synchronous Motors Natural cooling** Order No. **Core Type**	Pole Pair Number	Rotor Moment of Inertia (w/o Brake) J 10^{-4} kgm^2 (lb_f-in-s^2)	Weight (without Brake) kg (lb)
3000	48	1.1 (1.47)	3.5 (31)	4	4 (35.4)	**1FK7 044 – 7AF71 – 1■■■**	3	1.28 (0.0011)	7.7 (17)
	63	1.7 (2.29)	5.4 (47.8)	5.3	6.4 (56.6)	**1FK7 061 – 7AF71 – 1■■■**	3	3.4 (0.0030)	10 (22.1)
		2.51 (3.36)	8 (70.8)	7.5	12 (106.2)	**1FK7 064 – 7AF71 – 1■■■**	3	6.5 (0.0058)	15.5 (34.2)
	80	2.51 (3.36)	8 (70.8)	6.7	14 (123.9)	**1FK7 082 – 7AF71 – 1■■■**	4	14 (0.0124)	17.2 (37.9)
		3.14 [2] (4.21) [2]	12 [2] (106.2) [2]	12.5 [2]	22 (194.7)	**1FK7 085 – 7AF71 – 1■■■**	4	23 (0.0204)	23.5 (51.8)
4500	48	1.23 (1.65)	2.6 (23)	4	3.1 (27.4)	**1FK7 043 – 7AH71 – 1■■■**	3	1 (0.0009)	6.7 (14.8)
		1.41 (1.53)	3 (26.6)	4.9	4 (35.4)	**1FK7 044 – 7AH71 – 1■■■**	3	1.28 (0.0011)	7.7 (17)
	63	2.03 (2.72)	4.3 (38.1)	5.9	6.4 (56.6)	**1FK7 061 – 7AH71 – 1■■■**	3	3.4 (0.0030)	10 (22.1)
		2.36 (3.16)	5 (44.3)	7	12 (106.2)	**1FK7 064 – 7AH71 – 1■■■**	3	6.5 (0.0058)	15.5 (34.2)
6000	36	0.57 (0.76)	0.9 (8)	1.5	1.3 (11.5)	**1FK7 033 – 7AK71 – 1■■■**	3	0.27 (0.0002)	3.1 (6.8)
	48	1.26 (1.69)	2 (17.7)	4.4	3.1 (27.4)	**1FK7 043 – 7AK71 – 1■■■**	3	1 (0.0009)	6.3 (13.9)

• Encoder systems:	Incremental encoder sin/cos 1 V_{pp} Absolute encoder EnDat 2,048 pulses/rev [1] [3] Absolute encoder EnDat 512 pulses/rev [1] [4] Simple absolute encoder EnDat 32 pulses/rev [1] [3] Multipole resolver 2-pole resolver	**A** **E** **H** **G** **S** **T**
• Shaft end: With key and keyway With key and keyway Keyless shaft Keyless shaft	• Tolerance: N N N N	• Holding brake: No Yes No Yes
		A **B** **G** **H**
• Degree of protection:	IP64 IP65 and also IP67 drive-end flange IP64, anthracite gray finish IP65 and also IP67 drive-end flange, anthracite gray finish	**0** **2** **3** **5**
• **Special models:** Please specify option code; refer to page 2/3.		**–Z**

2

Selection and Ordering Data

Motor Type (continued)	Standstill Current	SIMOVERT MASTERDRIVES MC Inverter/Converter Rated Current		Power Cable with Complete Shield Motor Connection (with Brake Connection) via Power Connector		
	I_0 at ΔT=100 K	I_{rated}	Order No. Inverter Converter	Power Connector	Cable Cross-section Motor [5]	Order No. Pre-Assembled Cable
	A	A		Size	mm²	
1FK7 044 – 7AF71 – 1...	4.5	6.1 5.0	**6SE7 016 – 0TP■ 0** **6SE7 015 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 061 – 7AF71 – 1...	6.1	6.1 8.0	**6SE7 016 – 0TP■ 0** **6SE7 018 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 064 – 7AF71 – 1...	11	13.2 14	**6SE7 021 – 3TP■ 0** **6SE7 021 – 4EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 082 – 7AF71 – 1...	10.6	13.2 14	**6SE7 021 – 3TP■ 0** **6SE7 021 – 4EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 085 – 7AF71 – 1...	22.5	25.5 27	**6SE7 022 – 6TP■ 0** **6SE7 022 – 7EP■ 0**	1.5	4 x 4	**6FX■002 – 5■A41 –. . . 0**
1FK7 043 – 7AH71 – 1...	4.5	6.1 5.0	**6SE7 016 – 0TP■ 0** **6SE7 015 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 044 – 7AH71 – 1...	6.3	10.2 8.0	**6SE7 021 – 0TP■ 0** **6SE7 018 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 061 – 7AH71 – 1...	8	10.2 8.0	**6SE7 021 – 0TP■ 0** **6SE7 018 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 064 – 7AH71 – 1...	15	17.5 20.5	**6SE7 021 – 8TP■ 0** **6SE7 022 – 1EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01–. . . 0**
1FK7 033 – 7AK71 – 1...	2.2	4.0 3.0	**6SE7 014 – 0TP■ 0** **6SE7 013 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**
1FK7 043 – 7AK71 – 1...	6.4	10.2 8.0	**6SE7 021 – 0TP■ 0** **6SE7 018 – 0EP■ 0**	1	4 x 1.5	**6FX■002 – 5■A01 –. . . 0**

• SIMOVERT MASTERDRIVES Motion Control	**5**
• SIMOVERT MASTERDRIVES Motion Control Performance 2	**7**
Power Cable Model	
• MOTION-CONNECT 800	**8**
• MOTION-CONNECT 500	**5**
For information about signal cables, see “MOTION-CONNECT connection system.”	
• Without brake cable	**C**
• With brake cable	**D**

For information about length codes and signal cables, see “MOTION-CONNECT Connection System”, Part 5.

1) If the absolute encoder is used, M_{rated} is reduced by 10%.
2) Rated power/current refers to n = 2500 rpm.
3) Not available with1FK703
4) Only available with1FK703

5) The current carrying capacity of the power cables corresponds to IEC 60204-1 for Routing Type C under continuous duty conditions at an ambient air temperature of +40 °C (+104 °F), designed for I_0 (100 K) PVC/PUR insulated cable.