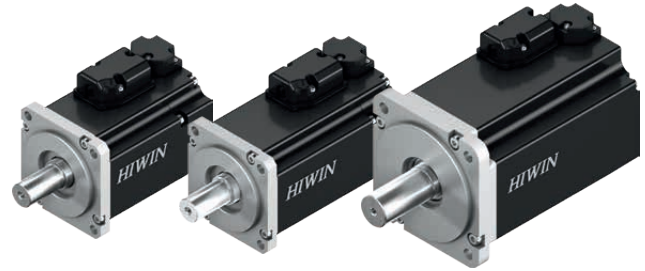


Servo Motors

AC servo motors EM1

2. AC servo motors EM1

HIWIN EM1 highly dynamic AC synchronous servo motors deliver high torques across the entire speed range. They are suitable for demanding dynamic drive tasks such as high-frequency reversing. The special stator/rotor structure of the EM1 series achieves very low torque ripple and high power density in a compact form.



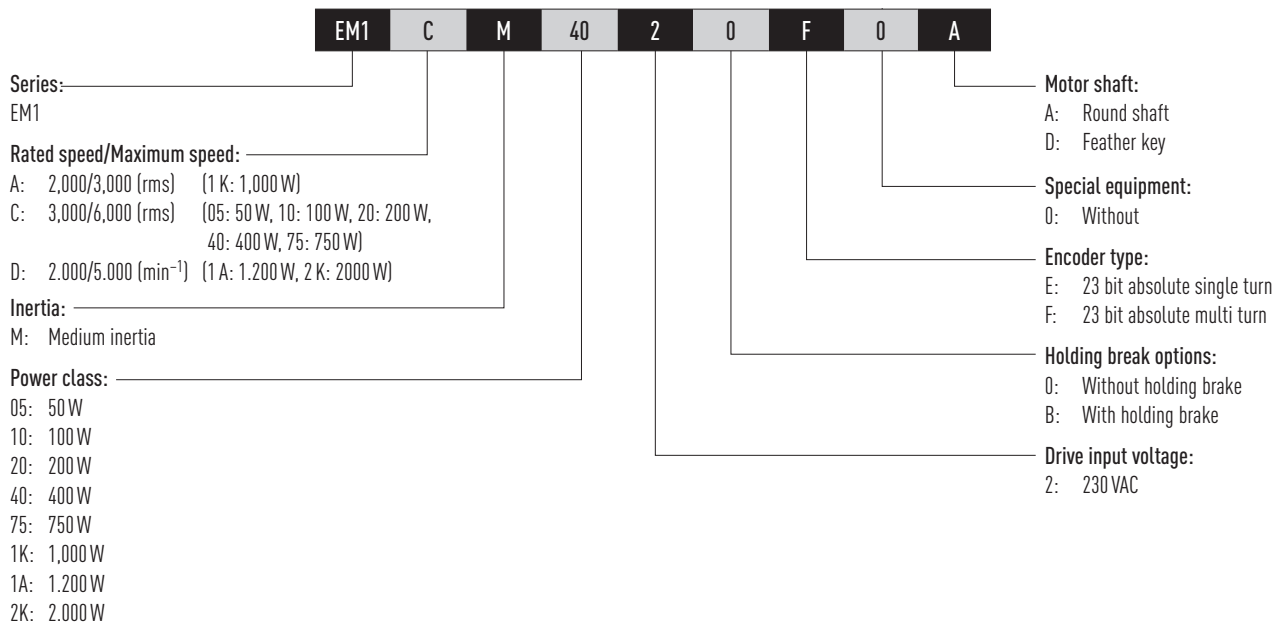
3. Characteristics

Table 3.1 General characteristics AC servo motors EM1								
Size	50 W	100 W	200 W	400 W	750 W	1.000 W	1.200 W	2.000 W
Motor type	Permanently excited synchronous servo motor							
Magnets	Neodymium iron boron magnets							
Housing	Aluminium							
Colour	Black							
Motor protection class	IP65							
Connector protection class	IP20					IP65		
Motor shaft protection class	IP40 (optional IP65)							
Insulation class	Class F							
Shaft end	Keyway with threaded bore or as solid shaft with centred bore							
Peak torque	3 × nominal torque							
Service life	> 20,000 h (at nominal load)							
Motor connection	Cable (300 mm) with ready-assembled connector					Connector		
Encoder connection	Cable (300 mm) with ready-assembled connector					Connector		
Cooling	Convective							
Thermal monitoring	Not available							
Encoder	23-bit absolute (single or multi turn)							
Certification	CE,UL							

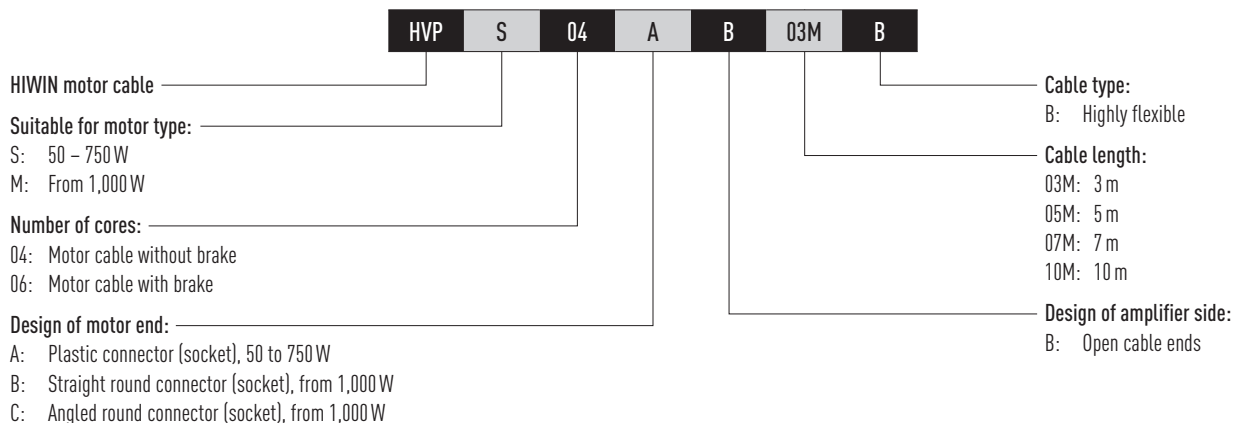
Table 3.2 Ambient conditions AC servo motors EM1								
Size	50 W	100 W	200 W	400 W	750 W	1.000 W	1.200 W	2.000 W
Ambient temperature	0 °C to 50 °C							
Storage temperature	−15 °C to 70 °C							
Air humidity	Up to 80 % relative air humidity							
Max. Max. installation height	1,000 m above sea level							

4. Order code

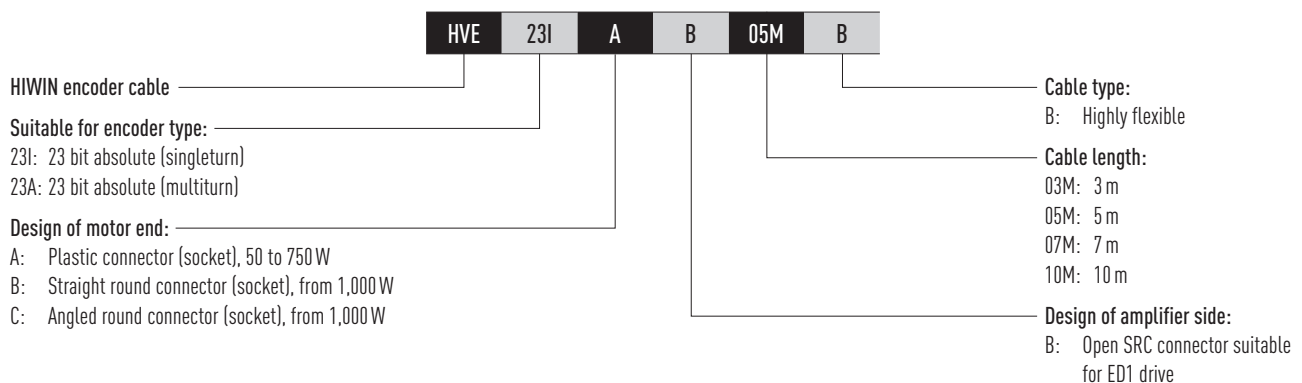
– Motor



– Motor cable



– Encoder cable



Servo Motors

Technical data

5. Technical data

5.1 AC servo motor EM1 – 50 W

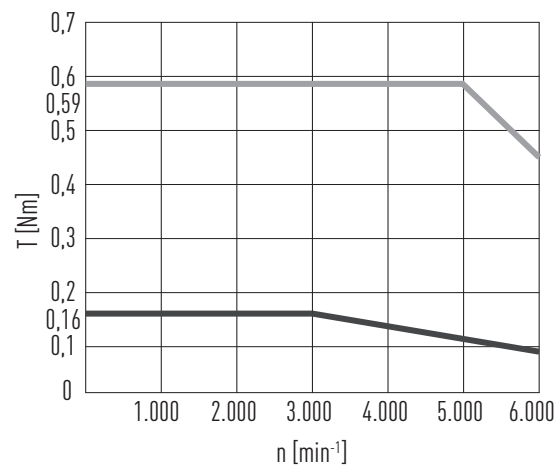
Table 5.1 Technical data EM1 – 50 W			
Motor data	Symbol	Unit	EM1-05
Drive input voltage	V	VAC	230
Rated power	W	W	50
Rated torque	T _C	Nm	0.16
Rated current	I _C	A _{eff}	0.64
Peak max. torque	T _P	Nm	0.59
Peak max. current	I _P	A _{eff}	2.8
Rated speed	n _N	rms	3,000
Peak max. speed	n _{max}	rms	6,000
Torque constant	K _t	Nm/A _{eff}	0.25
Back EMF constant	K _e	V _{eff} /(1,000 rms)	18.526
Resistance ¹⁾	R	Ω	25.24
Inductance ¹⁾	L	mH	13.09
Inertia of rotating parts (with brake)	J	kgm ² (×10 ⁻⁴)	0.0368 (0.0401)
Mass (with brake)	M	kg	0.36 (0.56)
Motor insulation level	Class F (under certification)		
Motor protection level	Total enclosed, self-cooled, IP65 (except for shaft and connector)		
Insulation resistance	10 MΩ, DC 500 V		
Insulation voltage resistance	AC 1500 V, 60 seconds		
Brake specifications ²⁾			
Static friction torque	T _b	Nm	0.32
Enabled current	A _b	A	0.25
Brake input voltage	V	VDC	24 ±10 %
Braking time	t ₀	ms	40
Release time	t _R	ms	20

¹⁾ Line to line

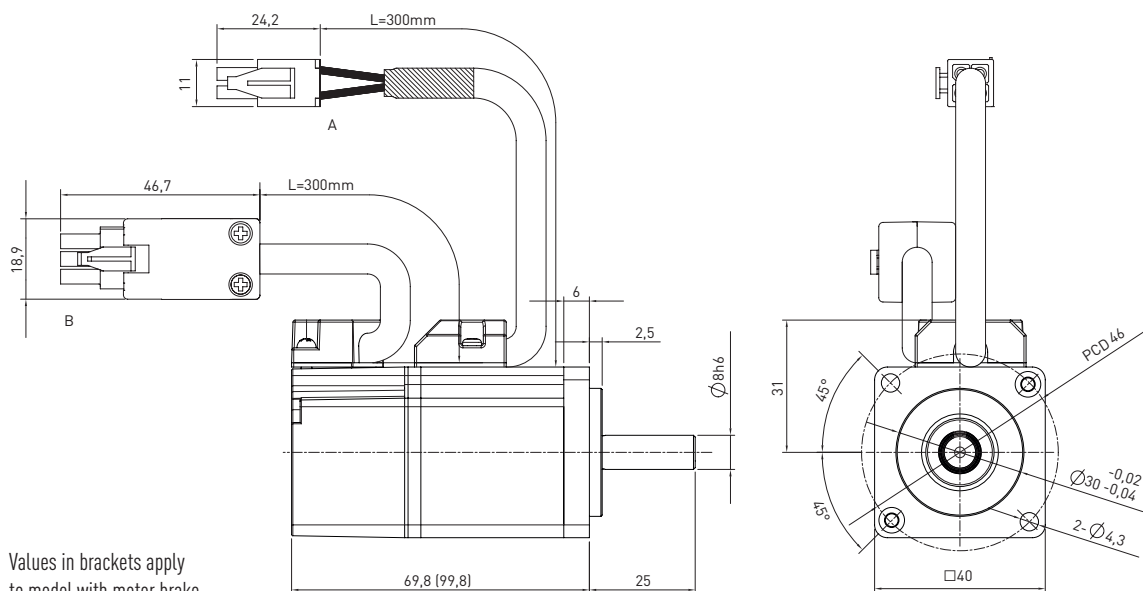
²⁾ The motor brakes are holding brakes only, not operating brakes



Torque-speed curve EM1 – 50 W



Dimensions EM1 – 50 W:



5.2 AC servo motor EM1 – 100 W

Table 5.2 Technical data EM1 – 100 W

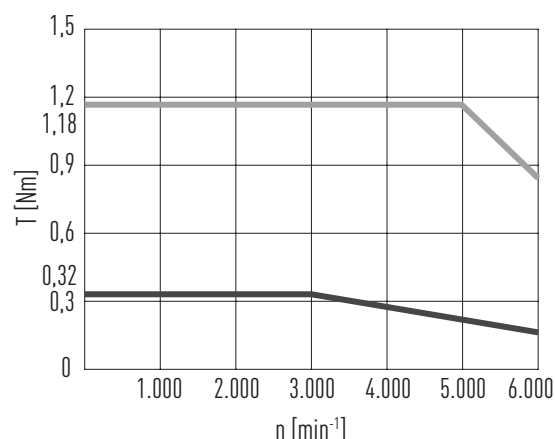
Motor data	Symbol	Unit	EM1-10
Drive input voltage	V	VAC	230
Rated power	W	W	100
Rated torque	T _C	Nm	0.32
Rated current	I _C	A _{eff}	0.78
Peak max. torque	T _P	Nm	1.18
Peak max. current	I _P	A _{eff}	3.45
Rated speed	n _N	rms	3,000
Peak max. speed	n _{max}	rms	6,000
Torque constant	K _t	Nm/A _{eff}	0.41
Back EMF constant	K _e	V _{eff} /(1,000 rms)	28.364
Resistance ¹⁾	R	Ω	22.72
Inductance ¹⁾	L	mH	13.86
Inertia of rotating parts (with brake)	J	kgm ² (×10 ⁻⁴)	0.0620 (0.0653)
Mass (with brake)	M	kg	0.47 (0.67)
Motor insulation level	Class F (under certification)		
Motor protection level	Total enclosed, self-cooled, IP65 (except for shaft and connector)		
Insulation resistance	10 MΩ, DC 500 V		
Insulation voltage resistance	AC 1500 V, 60 seconds		
Brake specifications ²⁾			
Static friction torque	T _b	Nm	0.32
Enabled current	A _b	A	0.25
Brake input voltage	V	VDC	24 ±10 %
Braking time	t ₀	ms	40
Release time	t _R	ms	20

¹⁾ Line to line

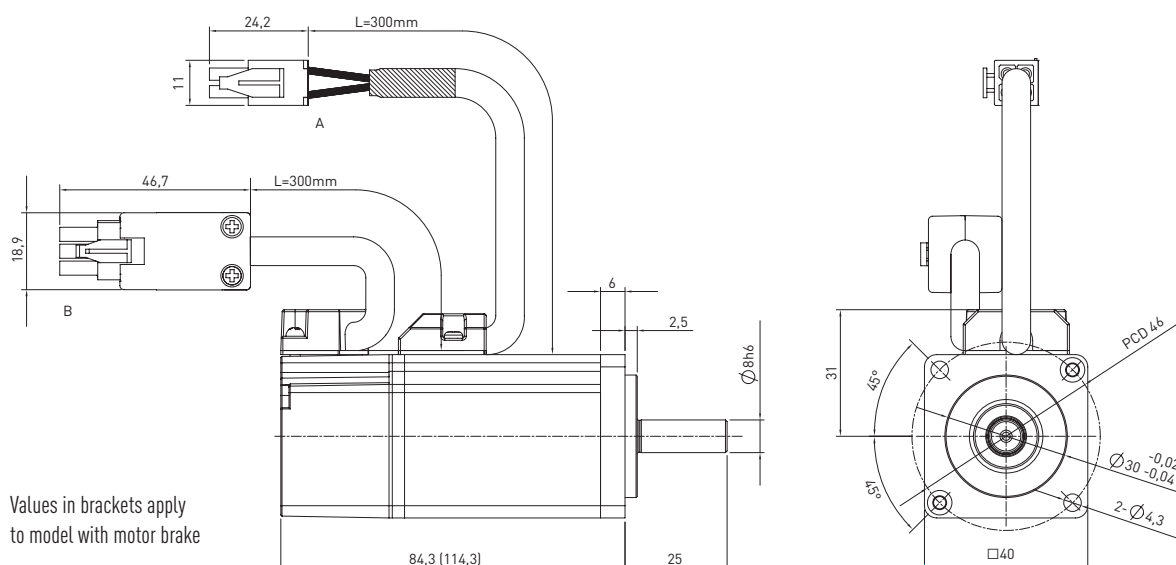
²⁾ The motor brakes are holding brakes only, not operating brakes



Torque-speed curve EM1 – 100 W:



Dimensions EM1 – 100 W:



Servo Motors

Technical data

5.3 AC servo motor EM1 – 200 W

Table 5.3 Technical data EM1 – 200 W

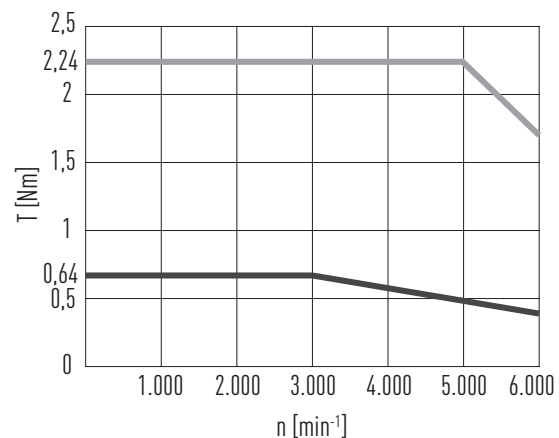
Motor data	Symbol	Unit	EM1-20
Drive input voltage	V	VAC	230
Rated power	W	W	200
Rated torque	T _C	Nm	0.64
Rated current	I _C	A _{eff}	1.6
Peak max. torque	T _P	Nm	2.24
Peak max. current	I _P	A _{eff}	6.4
Rated speed	n _N	rms	3,000
Peak max. speed	n _{max}	rms	6,000
Torque constant	K _t	Nm/A _{eff}	0.4
Back EMF constant	K _e	V _{eff} /(1,000 rms)	27.23
Resistance ¹⁾	R	Ω	5.53
Inductance ¹⁾	L	mH	8.76
Inertia of rotating parts (with brake)	J	kgm ² (×10 ⁻⁴)	0.263 (0.326)
Mass (with brake)	M	kg	0.851 (1.085)
Motor insulation level	Class F (under certification)		
Motor protection level	Total enclosed, self-cooled, IP65 (except for shaft and connector)		
Insulation resistance	10 MΩ, DC 500 V		
Insulation voltage resistance	AC 1500 V, 60 seconds		
Brake specifications ²⁾			
Static friction torque	T _b	Nm	1.3
Enabled current	A _b	A	0.32
Brake input voltage	V	VDC	24 ±10 %
Braking time	t ₀	ms	30
Release time	t _R	ms	20

¹⁾ Line to line

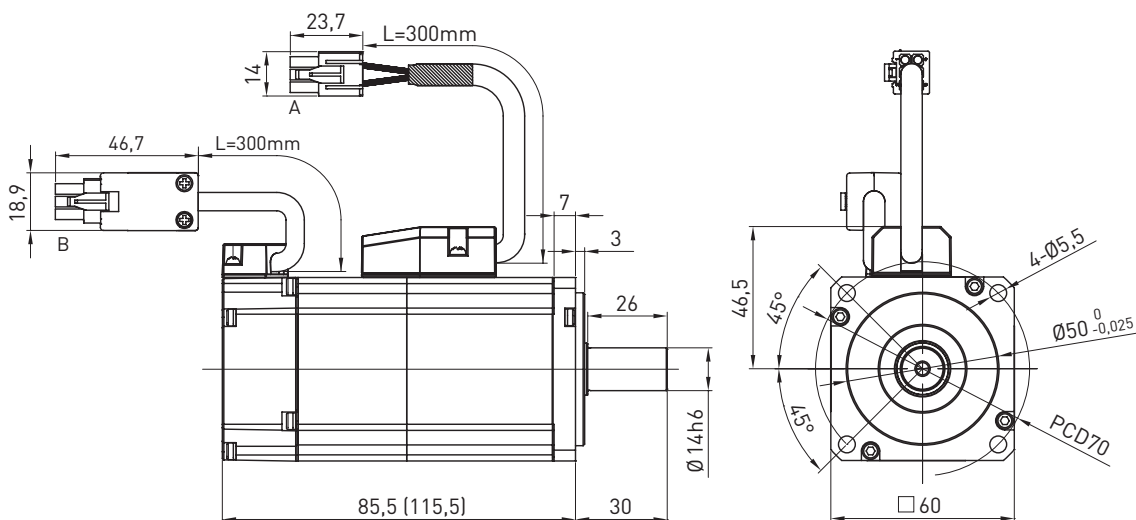
²⁾ The motor brakes are holding brakes only, not operating brakes



Torque-speed curve EM1 – 200 W:



Dimensions EM1 – 200 W:



Values in brackets apply to model with motor brake

5.4 AC servo motor EM1 – 400 W

Table 5.4 Technical data EM1 – 400 W

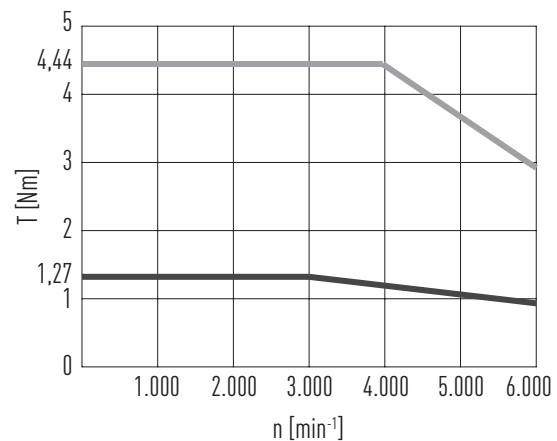
Motor data	Symbol	Unit	EM1-40
Drive input voltage	V	VAC	230
Rated power	W	W	400
Rated torque	T _C	Nm	1.27
Rated current	I _C	A _{eff}	2.5
Peak max. torque	T _P	Nm	4.44
Peak max. current	I _P	A _{eff}	10
Rated speed	n _N	rms	3,000
Peak max. speed	n _{max}	rms	6,000
Torque constant	K _t	Nm/A _{eff}	0.508
Back EMF constant	K _e	V _{eff} /(1,000 rms)	33.87
Resistance ¹⁾	R	Ω	3.59
Inductance ¹⁾	L	mH	7.22
Inertia of rotating parts (with brake)	J	kgm ² (×10 ⁻⁴)	0.48 (0.49)
Mass (with brake)	M	kg	1.25 (1.8)
Motor insulation level	Class F (under certification)		
Motor protection level	Total enclosed, self-cooled, IP65 (except for shaft and connector)		
Insulation resistance	10 MΩ, DC 500 V		
Insulation voltage resistance	AC 1500 V, 60 seconds		
Brake specifications ²⁾			
Static friction torque	T _b	Nm	1.3
Enabled current	A _b	A	0.32
Brake input voltage	V	VDC	24 ±10 %
Braking time	t ₀	ms	30
Release time	t _R	ms	20

¹⁾ Line to line

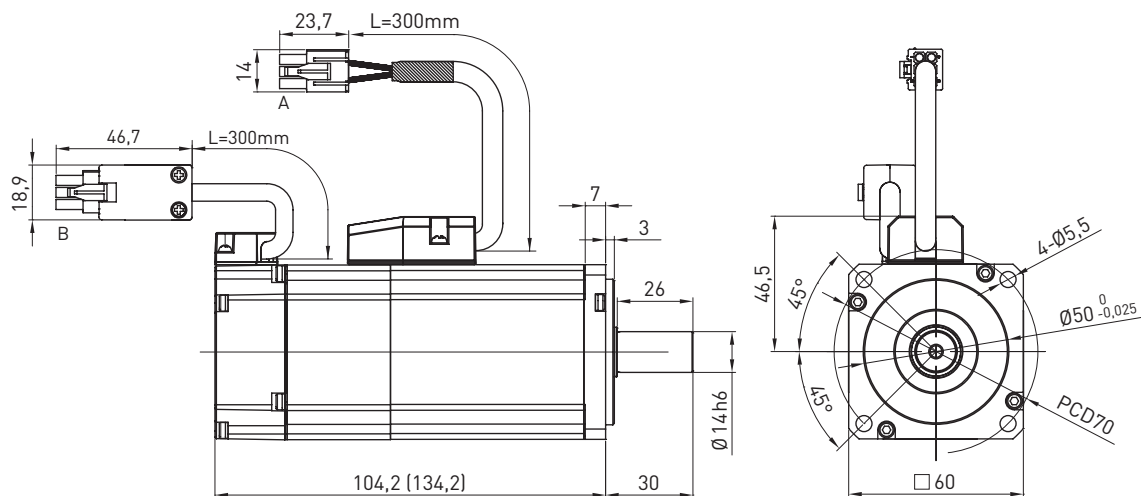
²⁾ The motor brakes are holding brakes only, not operating brakes



Torque-speed curve EM1 – 400 W:



Dimensions EM1 400 – W:



Values in brackets apply to model with motor brake

Servo Motors

Technical data

5.5 AC servo motor EM1 – 750 W

Table 5.5 Technical data EM1 – 750 W

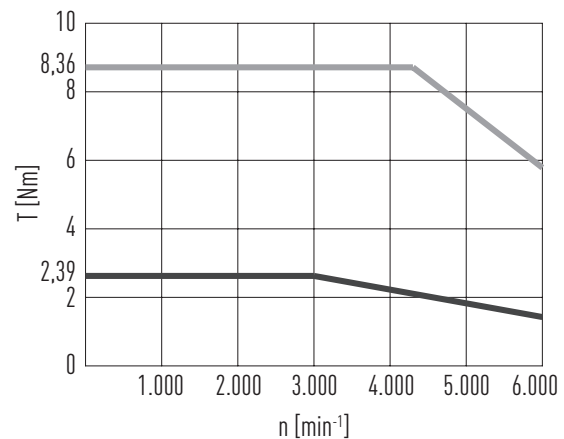
Motor data	Symbol	Unit	EM1-75
Drive input voltage	V	VAC	230
Rated power	W	W	750
Rated torque	T _C	Nm	2.39
Rated current	I _C	A _{eff}	4.65
Peak max. torque	T _P	Nm	8.36
Peak max. current	I _P	A _{eff}	18.6
Rated speed	n _N	rms	3,000
Peak max. speed	n _{max}	rms	6,000
Torque constant	K _t	Nm/A _{eff}	0.514
Back EMF constant	K _e	V _{eff} /(1,000 rms)	33.48
Resistance ¹⁾	R	Ω	1.08
Inductance ¹⁾	L	mH	4.6
Inertia of rotating parts (with brake)	J	kgm ² (×10 ⁻⁴)	1.44 (1.47)
Mass (with brake)	M	kg	2.7 (3.36)
Motor insulation level	Class F (under certification)		
Motor protection level	Total enclosed, self-cooled, IP65 (except for shaft and connector)		
Insulation resistance	10 MΩ, DC 500 V		
Insulation voltage resistance	AC 1500 V, 60 seconds		
Brake specifications ²⁾			
Static friction torque	T _b	Nm	2.4
Enabled current	A _b	A	0.358
Brake input voltage	V	VDC	24 ±10 %
Braking time	t ₀	ms	45
Release time	t _R	ms	10

¹⁾ Line to line

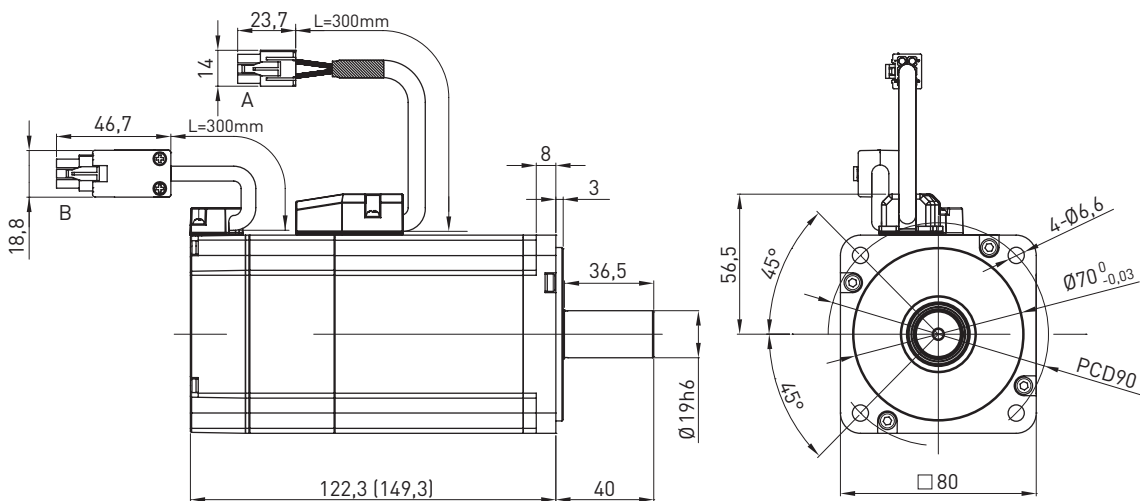
²⁾ The motor brakes are holding brakes only, not operating brakes



Torque-speed curve EM1 – 750 W:



Dimensions EM1 – 750 W:



Values in brackets apply to model with motor brake

5.6 AC servo motor EM1 – 1,000 W

Table 5.6 Technical data EM1 – 1,000 W

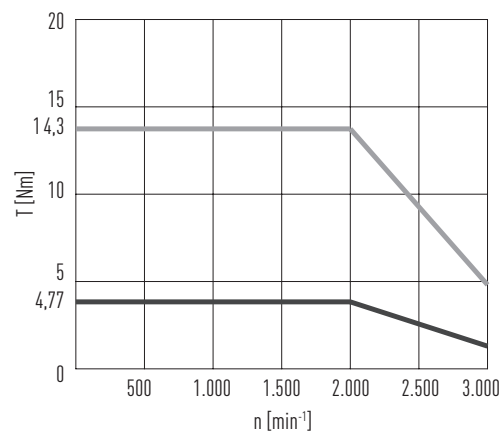
Motor data	Symbol	Unit	EM1-1K
Drive input voltage	V	VAC	230
Rated power	W	W	1,000
Rated torque	T _C	Nm	4.77
Rated current	I _C	A _{eff}	5.1
Peak max. torque	T _P	Nm	14.3
Peak max. current	I _P	A _{eff}	15.3
Rated speed	n _N	rms	2,000
Peak max. speed	n _{max}	rms	3,000
Torque constant	K _t	Nm/A _{eff}	0.935
Back EMF constant	K _e	V _{eff} /(1,000 rms)	54.15
Resistance ¹⁾	R	Ω	0.81
Inductance ¹⁾	L	mH	8
Inertia of rotating parts (with brake)	J	kgm ² {×10 ⁻⁴ }	7.2 {8.0}
Mass (with brake)	M	kg	5.4 {6.2}
Motor insulation level	Class F (under certification)		
Motor protection level	Total enclosed, self-cooled, IP65 (except for shaft and connector)		
Insulation resistance	10 MΩ, DC 500 V		
Insulation voltage resistance	AC 1500 V, 60 seconds		
Brake specifications ²⁾			
Static friction torque	T _b	Nm	10
Enabled current	A _b	A	0.56
Brake input voltage	V	VDC	24 ±10 %
Braking time	t ₀	ms	80
Release time	t _R	ms	30

¹⁾ Line to line

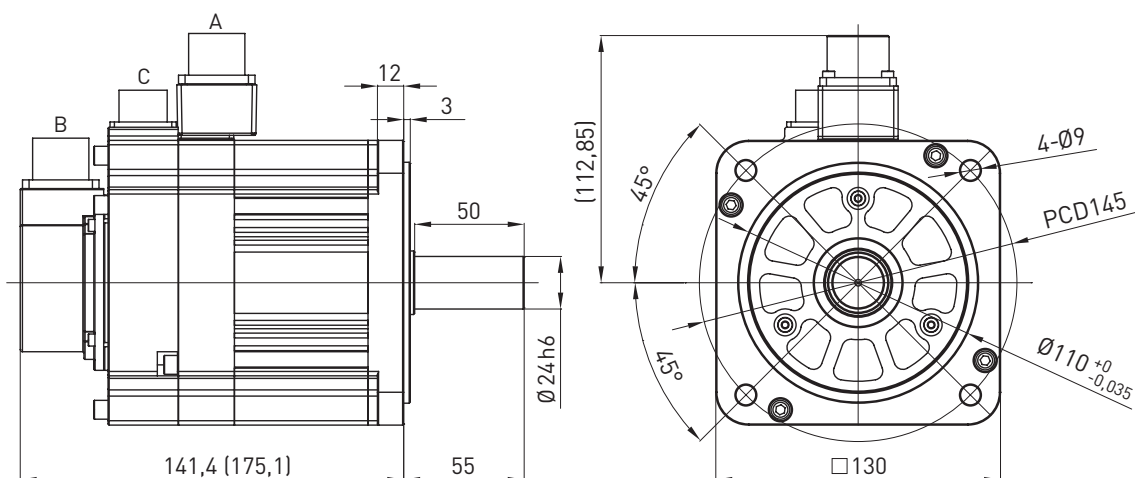
²⁾ The motor brakes are holding brakes only, not operating brakes



Torque-speed curve EM1 – 1,000 W:



Dimensions EM1 – 1,000 W:



Values in brackets apply to model with motor brake

Servo Motors

Technical data

5.7 AC servo motor EM1 – 1,200 W

Table 5.7 Technical data EM1 – 1,200 W

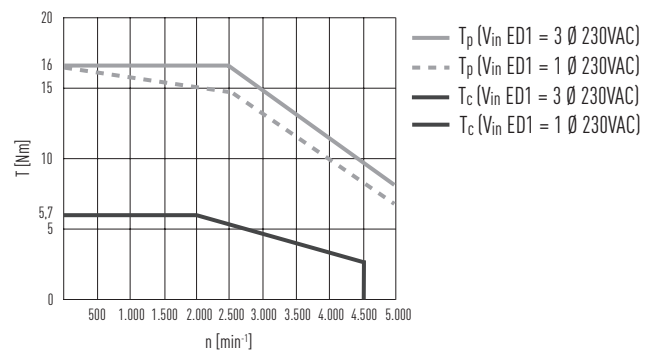
Motor data	Symbol	Unit	EM1-1A
Drive input voltage	V	VAC	230
Rated power	W	W	1,200
Rated torque	T _C	Nm	5.73
Rated current	I _C	A _{eff}	9.1
Peak max. torque	T _P	Nm	16
Peak max. current	I _P	A _{eff}	27
Rated speed	n _N	rms	2,000
Peak max. speed	n _{max}	rms	5,000
Torque constant	K _t	Nm/A _{eff}	0.63
Back EMF constant	K _e	V _{eff} /(1,000 rms)	41.52
Resistance ¹⁾	R	Ω	0.482
Inductance ¹⁾	L	mH	4.54
Inertia of rotating parts (with brake)	J	kgm ² (×10 ⁻⁴)	7.2 (8.0)
Mass (with brake)	M	kg	5.3 (6.1)
Motor insulation level	Class F (under certification)		
Motor protection level	Total enclosed, self-cooled, IP65 (except for shaft and connector)		
Insulation resistance	10 MΩ, DC 500 V		
Insulation voltage resistance	AC 1500 V, 60 seconds		
Brake specifications ²⁾			
Static friction torque	T _b	Nm	10
Enabled current	A _b	A	0.56
Brake input voltage	V	VDC	24 ±10 %
Braking time	t ₀	ms	80
Release time	t _R	ms	30

¹⁾ Line to line

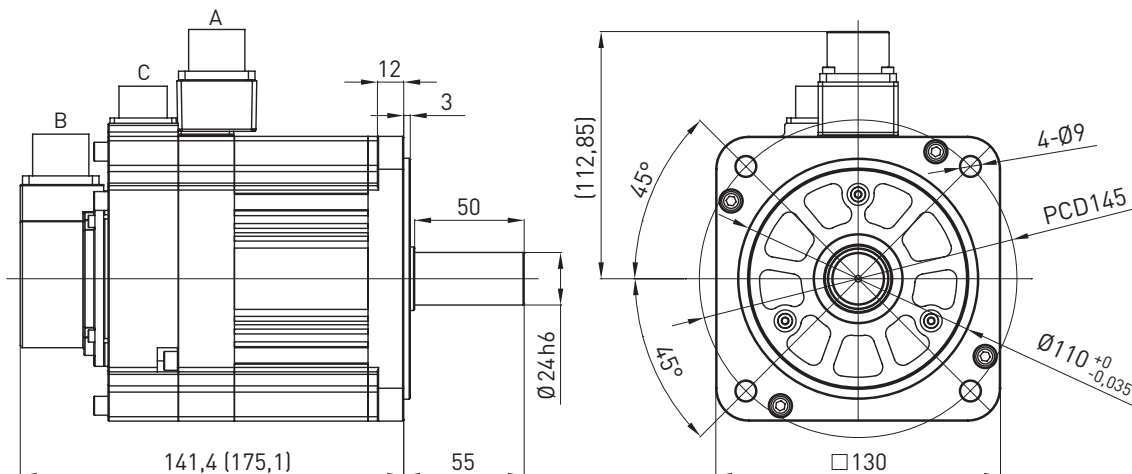
²⁾ The motor brakes are holding brakes only, not operating brakes



Torque-speed curve EM1 – 1,200 W:



Dimensions EM1 – 1,200 W:



Values in brackets apply to model with motor brake

5.8 AC servo motor EM1 – 2,000 W

Table 5.8 Technical data EM1 – 2,000 W

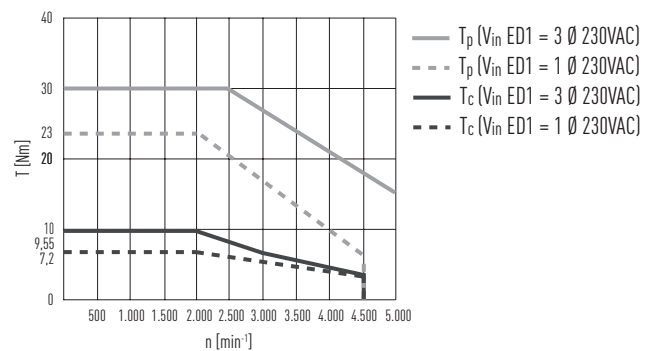
Motor data	Symbol	Unit	EM1-2K
Drive input voltage	V	VAC	230
Rated power	W	W	2,000
Rated torque	T _C	Nm	9.55
Rated current	I _C	A _{eff}	12
Peak max. torque	T _P	Nm	30
Peak max. current	I _P	A _{eff}	42
Rated speed	n _N	rms	2,000
Peak max. speed	n _{max}	rms	5,000
Torque constant	K _t	Nm/A _{eff}	0.796
Back EMF constant	K _e	V _{eff} /(1,000 rms)	50.49
Resistance ¹⁾	R	Ω	0.264
Inductance ¹⁾	L	mH	2.825
Inertia of rotating parts (with brake)	J	kgm ² (×10 ⁻⁴)	12.8 (13.3)
Mass (with brake)	M	kg	7.9 (8.7)
Motor insulation level	Class F (under certification)		
Motor protection level	Total enclosed, self-cooled, IP65 (except for shaft and connector)		
Insulation resistance	10 MΩ, DC 500 V		
Insulation voltage resistance	AC 1500 V, 60 seconds		
Brake specifications ²⁾			
Static friction torque	T _b	Nm	10
Enabled current	A _b	A	0.56
Brake input voltage	V	VDC	24 ±10 %
Braking time	t ₀	ms	80
Release time	t _R	ms	30

¹⁾ Line to line

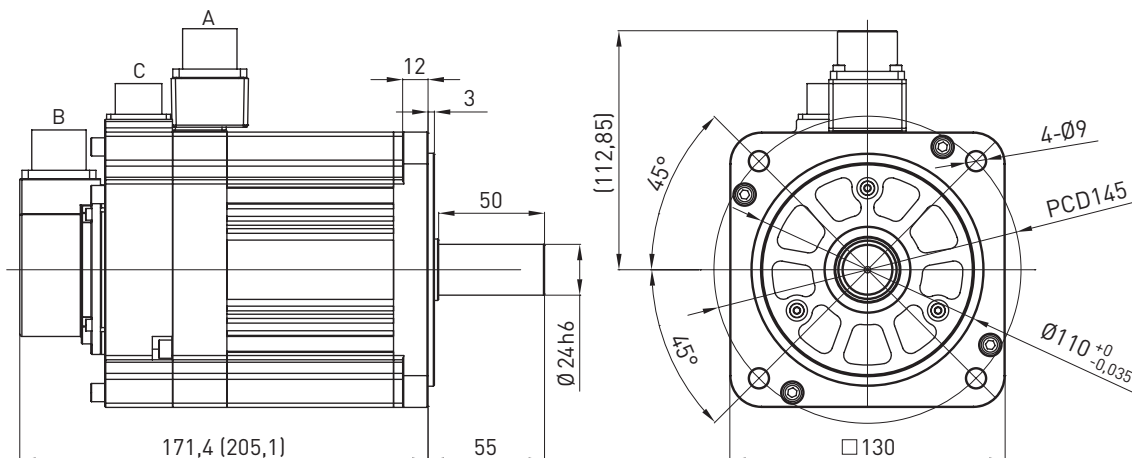
²⁾ The motor brakes are holding brakes only, not operating brakes



Torque-speed curve EM1 – 2,000 W:



Dimensions EM1 – 2,000 W:



Values in brackets apply to model with motor brake

Servo Motors

Options

6. Options

6.1 Motor brake

Table 7.1 Motor brake specifications for HIWIN servo motors									
Motor type	Unit	50 W	100 W	200 W	400 W	750 W	1,000 W	1,200 W	2,000 W
Braking torque (static)	Nm	0.32	0.32	1.3	1.3	2.4	10.0	10.0	10.0
Maximum speed n_{max}	rpm	6,000	6,000	6,000	6,000	6,000	3,000	5,000	5,000
Power supply	VDC	24 $\pm$ 10 %	24 $\pm$ 10 %	24 $\pm$ 10 %	24 $\pm$ 10 %	24 $\pm$ 10 %	24 $\pm$ 10 %	24 $\pm$ 10 %	24 $\pm$ 10 %
Power consumption	A	0.25	0.25	0.32	0.32	0.358	0.56	0.56	0.56
Response time open	ms	40.0	40.0	30.0	30.0	45.0	80.0	80.0	80.0
Response time close	ms	20.0	20.0	20.0	20.0	10.0	30.0	30.0	30.0

Please note: The motor brakes are holding brakes only, not operating brakes

7. Accessories

7.1 Motor and encoder connectors

In HIWIN servo motors rated between 50 W and 750 W, the motor and encoder cables are routed directly out of the motor. For ease of installation the motor and encoder connectors are fitted on the end of the 300 mm cable and ready to connect. As of 1,000 W motors the motor and encoder connectors are fitted on the motor housing, see Fig. 7.1 (motor and encoder connectors).

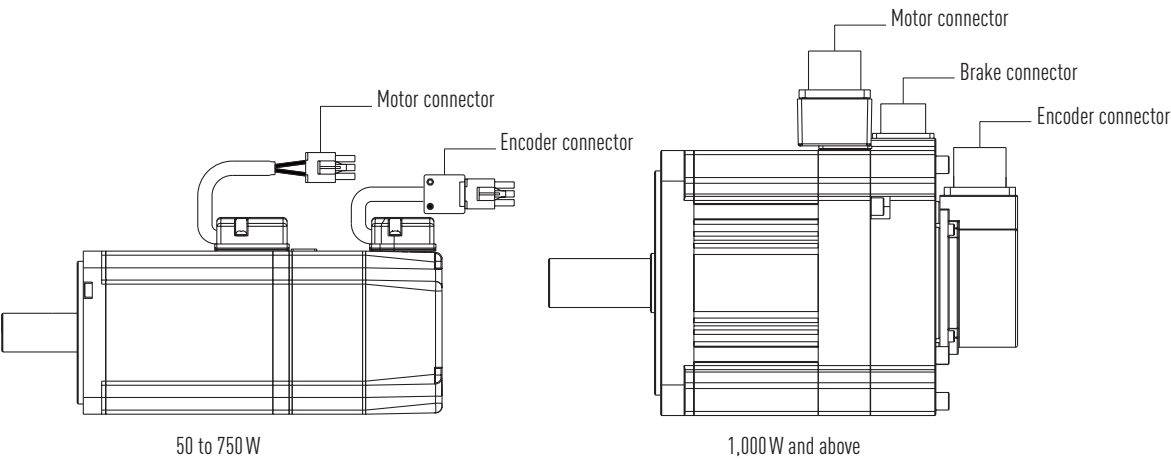


Fig. 7.1 Overview of motor and encoder connectors

Different connectors are used for HIWIN servo motors depending on the size and model. The assignment of individual connectors is described in the tables below.

– Motor connector for 50 W – 750 W motors

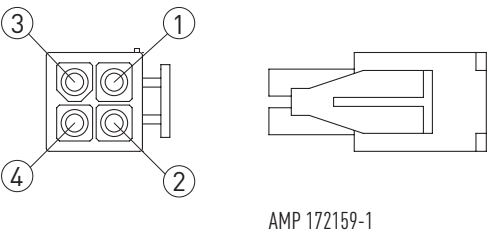


Fig. 7.2 Connector assignment without brake, motor connector for 50 W – 750 W motors

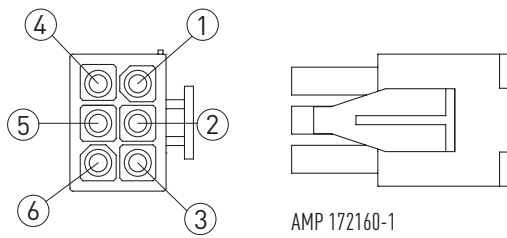


Fig. 7.3 Connector assignment with brake, motor connector for 50 W – 750 W motors

Table 7.2 Assignment of motor connector for 50 W – 750 W motors		
Signal	AMP 172159-1 (without brake)	AMP 172160-1 (with brake)
U	3	3
V	2	2
W	1	1
GND	4	4
B+	—	5
B–	—	6

– Motor connector, 1,000 W and above

Motors of 1,000 W and above with a motor brake have an additional, separate brake connector (see Fig. 7.5).

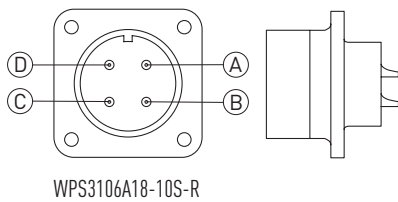


Fig. 7.4 Assignment of motor connector, 1,000 W and above

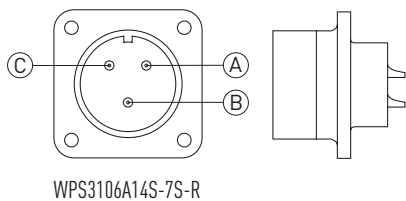


Fig. 7.5 Connector assignment for brake, 1,000 W and above

Table 7.3 Assignment of motor connector, 1,000 W and above		
Signal	WPS3106A18-10S-R	WPS3106A14S-7S-R
U	A	—
V	B	—
W	C	—
GND	D	—
B+	—	A
B–	—	C

Servo Motors

Options

– Encoder connector, 50 W – 750 W

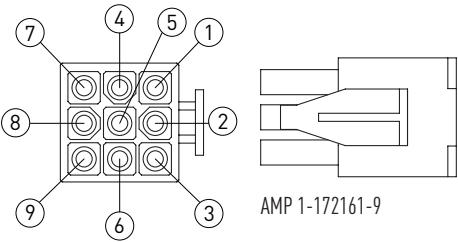


Fig. 7.6 Encoder connector, 50 W – 750 W

Table 7.4 Assignment of encoder connector, 50 W – 750 W			
Function	23 bit absolute (singleturn)	23 bit absolute (multiturn)	AMP 1-172161-9
Power supply	5 V $\pm$ 5 %		1
	0 V		2
Data	SC+	—	3
	SC–	—	4
	—	VB (battery)	5
	—	GND (battery)	6
	MA+	SD+	7
	MA–	SD–	8
Shielding	Shielding		9

– Encoder connector, 1,000 W and above

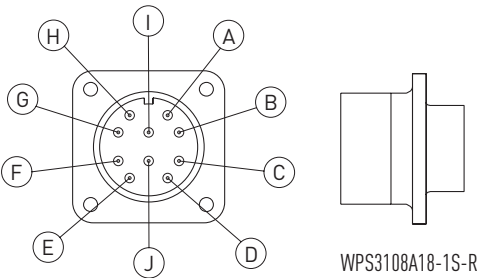


Fig. 7.7 Encoder connector, 1,000 W and above

Table 7.5 Assignment of encoder connector, 1,000 W and above			
Function	23 bit absolute (singleturn)	23 bit absolute (multiturn)	WPS3108A18-1S-R
Power supply	5 V $\pm$ 5 %		A
	0 V		B
Data	SC+	—	C
	SC–	—	D
	—	VB (battery)	E
	—	GND (battery)	F
	MA+	SD+	G
	MA–	SD–	H
Shielding	Shielding		I

7.2 Motor and encoder cables

– Motor cables

Table 7.6 Motor cables for 50 W – 750 W motors without brake

Article number	Order code	Length	
8-10-1800	HVPS04AB03MB	3 m	
8-10-1801	HVPS04AB05MB	5 m	
8-10-1802	HVPS04AB07MB	7 m	
8-10-1803	HVPS04AB10MB	10 m	

Table 7.7 Motor cables for 50 W – 750 W motors with brake

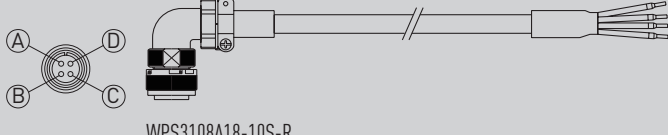
Article number	Order code	Length	
8-10-1804	HVPS06AB03MB	3 m	
8-10-1805	HVPS06AB05MB	5 m	
8-10-1806	HVPS06AB07MB	7 m	
8-10-1807	HVPS06AB10MB	10 m	

Table 7.8 Motor cables for 1,000 W motors and above without brake

Article number	Order code	Length	
80032333	HVPM04CB03MB	3 m	
80032352	HVPM04CB05MB	5 m	
80032354	HVPM04CB07MB	7 m	
80032355	HVPM04CB10MB	10 m	

Motor cables with straight connector on request

Table 7.9 Motor cables for 1,000 W motors and above with brake

Article number	Order code	Length	
80032356	HVPM06CB03MB	3 m	
80032357	HVPM06CB05MB	5 m	
80032358	HVPM06CB07MB	7 m	
80032359	HVPM06CB10MB	10 m	

Motor cables with straight connector on request