

AKM-A SERIES

- ▶ Iron core technology
- ▶ Low cogging force
- ▶ Fast response and high bandwidth
- ▶ High force density and low mass
- ▶ High protection level

EN-26.1.1

Introduction

AKM-A series motor provides various sizes and two different cooling systems, water-cooling. It features with compact size, high force density, and quick response, which is suitable for applications with strict requirements of speed, accuracy, and response performance.

Continuous Force $F_{cw} = 959N \sim 12218N$

Peak Force $F_{pk} = 1980N \sim 29381N$

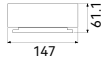
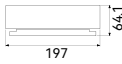
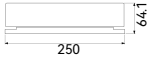
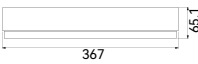
Features

- ▶ Small size and high thrust force
- ▶ High response and bandwidth
- ▶ High motor constants
- ▶ Max bus voltage of 600Vdc
- ▶ IP65 protection level

Applications

Suitable for applications with strict requirements of speed, accuracy, and response performance. Also, applicable to point-to-point micron level positioning with max speed of 5m/s or faster.

Applications & Industries: CNC machines, including laser processing machines, mold machines, lathes, grinders, etc; High-speed positioning system for handling applications; Semiconductor, PV, lithium battery, glass and LCD.

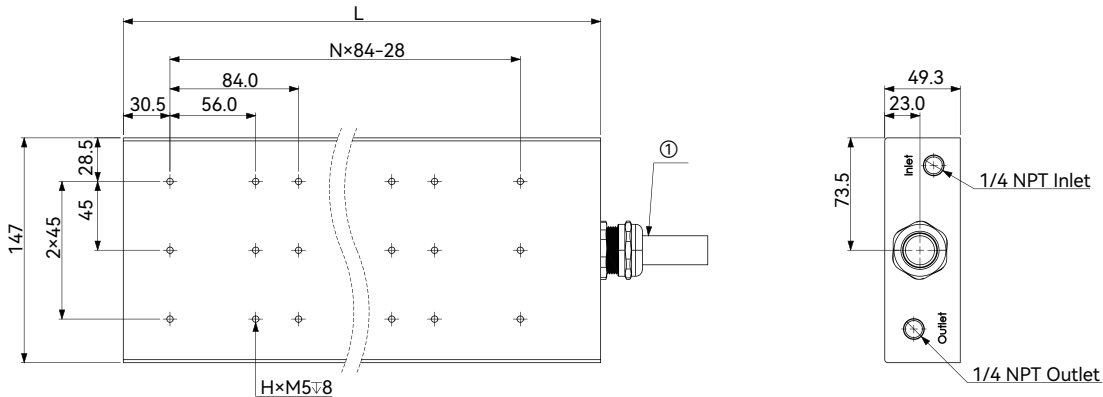
	Series	Coil Length (mm)	● Continuous Force (F_{cw}) / ■ Peak Force (F_{pk})						Unit: N
			1000	3000	5000	7000	9000	11000
	AKM100-A-B2	223	● 959 / ■ 1908						
	AKM100-A-B4	391		● 1919 / ■ 3816					
	AKM100-A-B6	559		● 2878 / ■ 5724					
	AKM150-A-B4	391		● 2726 / ■ 5724					
	AKM150-A-B6	559		● 4088 / ■ 8586					
	AKM150-A-B8	727		● 5451 / ■ 11447					
	AKM150-A-B10	917		● 6814 / ■ 14309					
	AKM200-A-B4	391		● 3489 / ■ 7631					
	AKM200-A-B6	559		● 5233 / ■ 11447					
	AKM200-A-B8	727		● 6977 / ■ 15263					
	AKM200-A-B10	917		● 8722 / ■ 19079					
	AKM320-A-B6	559		● 7333 / ■ 17629					
	AKM320-A-B8	727		● 9778 / ■ 23505					
	AKM320-A-B10	917		● 12218 / ■ 29381					

AKM100-A

Model			AKM100-A-B2		AKM100-A-B4		AKM100-A-B6		
Performance Parameters	Symbol	Unit	A	B	B	D	B	C	F
Continuous Force (WC) @100°C ^{①④}	F _{cw}	N	959	959	1919	1919	2878	2878	2878
Peak Force	F _{pk}	N	1908	1908	3816	3816	5724	5724	5724
Force Constant ±10%	K _f	N/Arms	109	55	109	55	164	109	55
Back EMF Constant ±10%	K _e	Vpeak/(m/s)	89	45	89	45	134	89	45
Motor Constant @25°C	K _m	N/Sqrt(W)	49	49	69	69	85	85	85
Resistance (L-L) @25°C ±10% ^②	R ₂₅	Ω	3.3	0.8	1.7	0.4	2.5	1.1	0.3
Inductance (L-L) ±30% ^③	L	mH	30.0	7.5	15	3.8	22.5	10	2.5
Electrical Time Constant	τ _e	ms	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Continuous Current (WC) @100°C ^{④⑤}	I _{cw}	Arms	8.8	17.6	17.6	35.2	17.6	26.4	52.8
Peak Current	I _{pk}	Arms	25	50	50	100	50	75	150
Continuous Power Dissipation (WC) @100°C ^{④⑤}	P _{cw}	W	494	494	988	988	1482	1482	1482
Max. Coil Temperature	t _{max}	°C	100	100	100	100	100	100	100
Thermal Dissipation Constant (WC) ^{①④}	K _{thw}	W/°C	6.6	6.6	13.2	13.2	19.8	19.8	19.8
Max. Bus Voltage	U _{bus}	Vdc	600	600	600	600	600	600	600
Magnetic Period	T _{NN}	mm	42	42	42	42	42	42	42
Attraction Force	F _a	kN	2.7	2.7	5.4	5.4	8.1	8.1	8.1
Mechanical Parameters									
Coil Mass (WC)	m _{cw}	kg	8.5		16.1		21.5		
Coil Length (WC)	L _{cw}	mm	223		391		559		
Track Mass Per Meter	m _{track}	kg/m	8.6		8.6		8.6		
Other Information									
Insulation Class	Class B (130°C)								
Protection Grade	IP65								
Compliance with Global Standards	RoHS, CE								
Ambient Temperature	Operation	0°C to 40°C (non-freezing)							
	Storage	-15°C to 70°C (non-freezing)							
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)							
	Storage	10%RH to 90%RH (non-condensing)							
Recommended Ambience	Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.								

- ① Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations: WC-Water Cooling.
 - ② Resistance is measured by DC current with standard 0.5m cable.
 - ③ Inductance is measured by current frequency of 1kHz.
 - ④ Water cooling test conditions: The inlet water temperature of the motor is 20°C and the flow rate is 6L/min.
- The contents of datasheet are subject to change without prior notice.

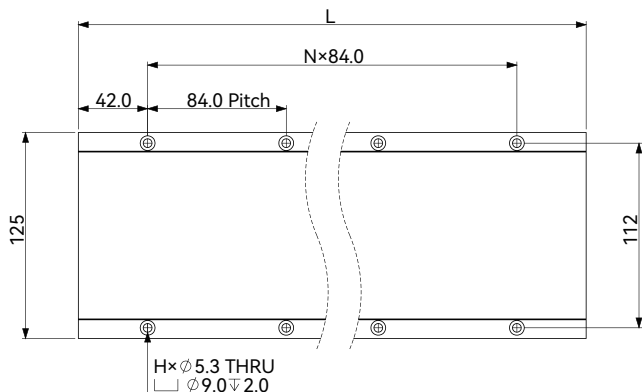
■ Dimensional Drawing



Motor Coil			
Coil Size	L	N	H
AKM100-A-B2	223	2	12
AKM100-A-B4	391	4	24
AKM100-A-B6	559	6	36

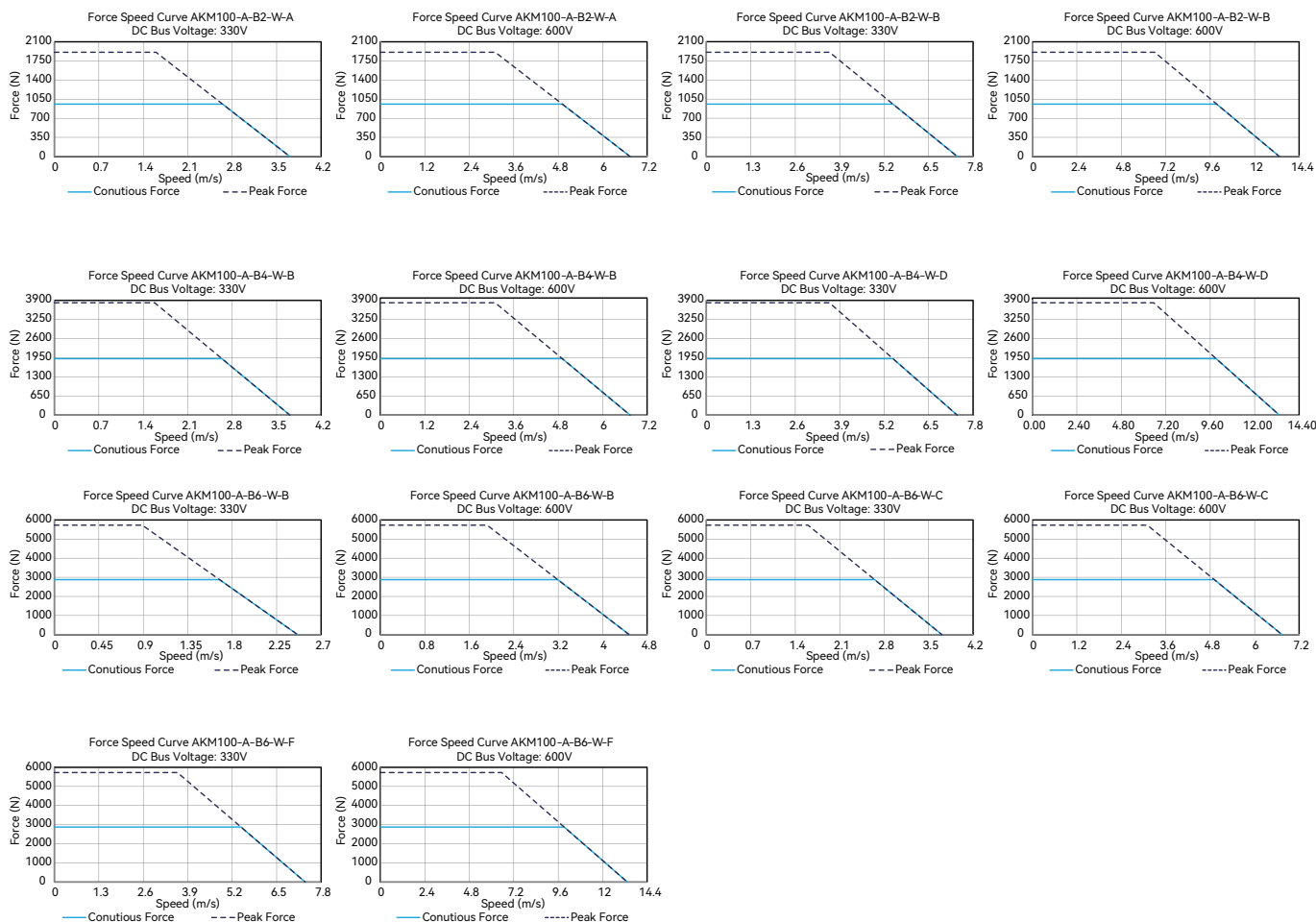
Motor Cable ^①			
Motor Model	Cable SPEC	Outer Diameter	Min. Bend Radius x10
AKM100-A-B2-A	4G2.5+(4x0.25)	11.8	118
AKM100-A-B2-B			
AKM100-A-B4-B			
AKM100-A-B6-B	4G4.0+(4x0.25)	13.6	136
AKM100-A-B6-C			
AKM100-A-B4-D			
AKM100-A-B6-F			
AKM100-A-B6-F	4G10.0+(4x0.5)	19.6	196

AKM100-A Track



Motor Track			
Track Size	L	N	H
AKM100-TL168-E	168	1	4
AKM100-TL252-E	252	2	6
AKM100-TL420-E	420	4	10

Force-Speed Curve

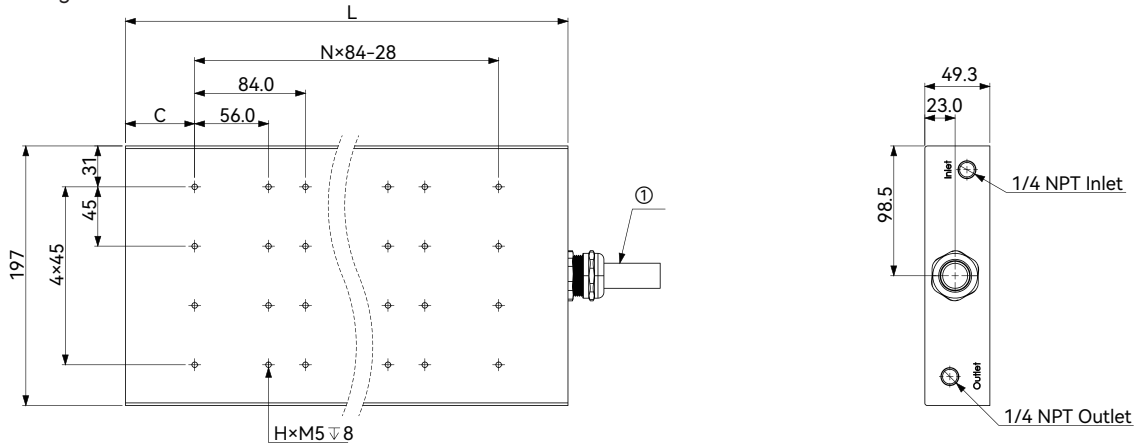


AKM150-A

Model			AKM150-A-B4		AKM150-A-B6			AKM150-A-B8			AKM150-A-B10	
Performance Parameters	Symbol	Unit	B	D	B	C	F	B	D	H	B	E
Continuous Force (WC) @100°C ^{①④}	F _{cw}	N	2726	2726	4088	4088	4088	5451	5451	5451	6814	6814
Peak Force	F _{pk}	N	5724	5724	8586	8586	8586	11447	11447	11447	14309	14309
Force Constant ±10%	K _f	N/Arms	163.5	81.8	245.3	163.5	81.8	327.1	164	82	409	164
Back EMF Constant ±10%	K _e	Vpeak/(m/s)	133.5	66.8	200.3	133.5	66.8	267	134	67	334	134
Motor Constant @25°C	K _m	N/Sqrt(W)	89	89	109	109	109	125.9	125.9	125.9	140.7	140.7
Resistance (L-L) @25°C ±10% ^②	R ₂₅	Ω	2.3	0.6	3.4	1.5	0.4	4.5	1.1	0.3	5.6	0.9
Inductance (L-L) ±30% ^③	L	mH	22.5	5.6	33.8	15	3.8	45	11.3	2.8	56.3	9
Electrical Time Constant	τ _e	ms	10	10	10	10	10	10	10	10	10	10
Continuous Current (WC) @100°C ^{④④}	I _{cw}	Arms	16.7	33.3	16.7	25	50	16.7	33.3	66.7	16.7	41.7
Peak Current	I _{pk}	Arms	50	100	50	75	150	50	100	200	50	125
Continuous Power Dissipation (WC) @100°C ^{④④}	P _{cw}	W	1208.3	1208.3	1812.4	1812.4	1812.4	2416.6	2416.6	2416.6	3020.7	3020.7
Max. Coil Temperature	t _{max}	°C	100	100	100	100	100	100	100	100	100	100
Thermal Dissipation Constant (WC) ^{④④}	K _{thw}	W/°C	16.1	16.1	24.2	24.2	24.2	32.2	32.2	32.2	40.3	40.3
Max. Bus Voltage	U _{bus}	Vdc	600	600	600	600	600	600	600	600	600	600
Magnetic Period	T _{NN}	mm	42	42	42	42	42	42	42	42	42	42
Attraction Force	F _a	kN	8.1	8.1	12.2	12.2	12.2	16.2	16.2	16.2	20.3	20.3
Mechanical Parameters												
Coil Mass (WC)	m _{cw}	kg	22.5		31			40.5			49.5	
Coil Length (WC)	L _{cw}	mm	391		559			727			917	
Track Mass Per Meter	m _{track}	kg/m	15.2		15.2			15.2			15.2	
Other Information												
Insulation Class	Class B (130°C)											
Protection Grade	IP65											
Compliance with Global Standards	RoHS, CE											
Ambient Temperature	Operation	0°C to 40°C (non-freezing)										
	Storage	-15°C to 70°C (non-freezing)										
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)										
	Storage	10%RH to 90%RH (non-condensing)										
Recommended Ambience	Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.											

- ① Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: WC-Water Cooling.
- ② Resistance is measured by DC current with standard 0.5m cable.
- ③ Inductance is measured by current frequency of 1kHz.
- ④ Water cooling test conditions: The inlet water temperature of the motor is 20°C and the flow rate is 6L/min. The contents of datasheet are subject to change without prior notice.

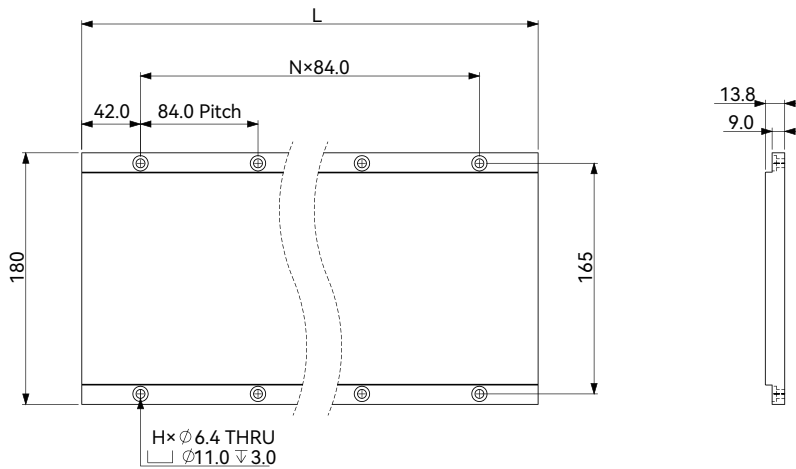
Dimensional Drawing



Motor Coil				
Coil Size	L	C	N	H
AKM150-A-B4	391	30.5	4	32
AKM150-A-B6	559		6	48
AKM150-A-B8	727		8	64
AKM150-A-B10	917	52.5	10	80

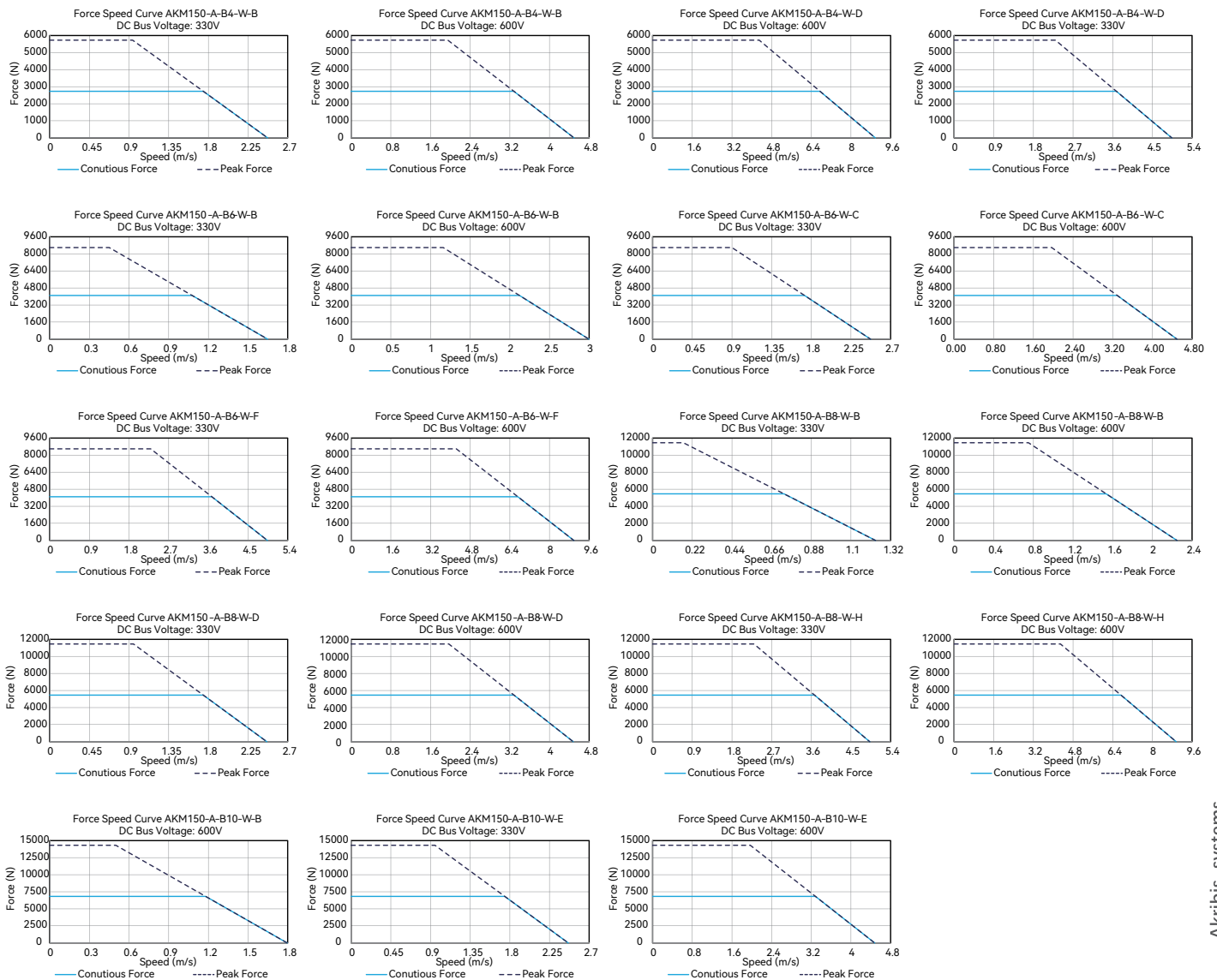
Motor Cable ^①			
Motor Model	Cable SPEC	Outer Diameter	Min. Bend Radius ×10
AKM150-A-B4-B	4G2.5+(4×0.25)	11.8	118
AKM150-A-B6-B			
AKM150-A-B8-B			
AKM150-A-B10-B			
AKM150-A-B6-C	4G4.0+(4×0.25)	13.6	136
AKM150-A-B4-D	4G6.0+(4×0.5)	16.6	166
AKM150-A-B8-D			
AKM150-A-B10-E	4G10.0+(4×0.5)	19.6	196
AKM150-A-B6-F			
AKM150-A-B8-H	4G16.0+(4×0.5)	25	250

AKM150-A Track



Motor Track			
Track Size	L	N	H
AKM150-TL168-E	168	1	4
AKM150-TL252-E	252	2	6
AKM150-TL420-E	420	4	10

Force-Speed Curve

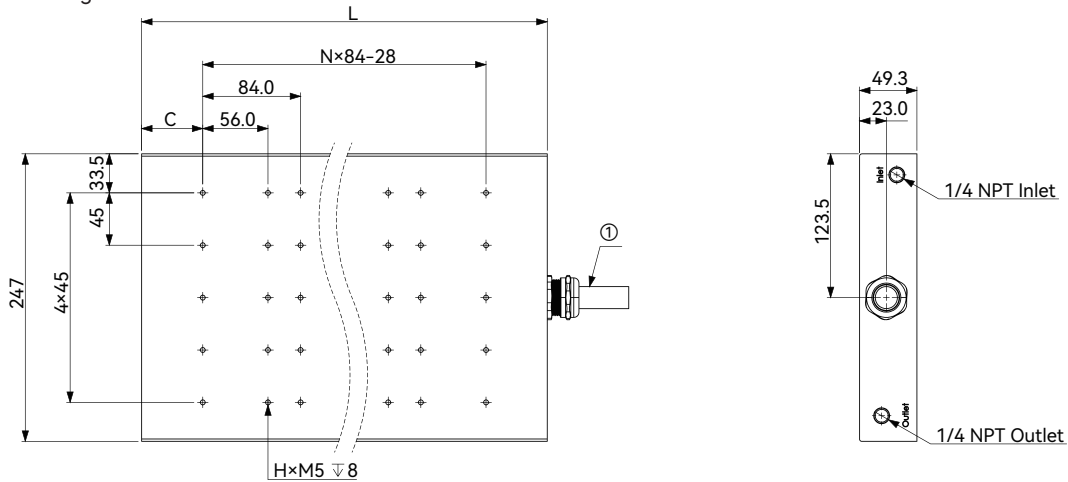


AKM200-A

Model			AKM200-A-B4		AKM200-A-B6			AKM200-A-B8			AKM200-A-B10	
Performance Parameters	Symbol	Unit	B	D	B	C	F	B	D	H	B	E
Continuous Force (WC) @100°C ^①	F _{cw}	N	3489	3489	5233	5233	5233	6977	6977	6977	8722	8722
Peak Force	F _{pk}	N	7631	7631	11447	11447	11447	15263	15263	15263	19079	19079
Force Constant ±10%	K _f	N/Arms	218	109	327	218	109	436	218	109	545	218
Back EMF Constant ±10%	K _e	Vpeak/(m/s)	178	89	267	178	89	356	178	89	445	178
Motor Constant @25°C	K _m	N/Sqrt(W)	103	103	126	126	126	145	145	145	163	163
Resistance (L-L) @25°C ±10% ^②	R ₂₅	Ω	3	0.8	4.5	2	0.5	6	1.5	0.4	7.5	1.2
Inductance (L-L) ±30% ^③	L	mH	30	7.5	45	20	5	60	15	3.8	75	12
Electrical Time Constant	τ _e	ms	10	10	10	10	10	10	10	10	10	10
Continuous Current (WC) @100°C ^①	I _{cw}	Arms	16	32	16	24	48	16	32	64	16	40
Peak Current	I _{pk}	Arms	50	100	50	75	150	50	100	200	50	125
Continuous Power Dissipation (WC) @100°C ^①	P _{cw}	W	1485	1485	2227	2227	2227	2969	2969	2969	3712	3712
Max. Coil Temperature	t _{max}	°C	100	100	100	100	100	100	100	100	100	100
Thermal Dissipation Constant (WC) ^①	K _{thw}	W/°C	19.8	19.8	29.7	29.7	29.7	39.6	39.6	39.6	49.5	49.5
Max. Bus Voltage	U _{bus}	V _{dc}	600	600	600	600	600	600	600	600	600	600
Magnetic Period	T _{NN}	mm	42	42	42	42	42	42	42	42	42	42
Attraction Force	F _a	kN	10.8	10.8	16.2	16.2	16.2	21.6	21.6	21.6	27	27
Mechanical Parameters												
Coil Mass (WC)	m _{cw}	kg	26.5		38.1			52			63.5	
Coil Length (WC)	L _{cw}	mm	391		559			727			917	
Track Mass Per Meter	m _{track}	kg/m	22.4		22.4			22.4			22.4	
Other Information												
Insulation Class	Class B (130°C)											
Protection Grade	IP65											
Compliance with Global Standards	RoHS, CE											
Ambient Temperature	Operation	0°C to 40°C (non-freezing)										
	Storage	-15°C to 70°C (non-freezing)										
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)										
	Storage	10%RH to 90%RH (non-condensing)										
Recommended Ambience	Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.											

- ① Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations: WC=Water Cooling.
 - ② Resistance is measured by DC current with standard 0.5m cable.
 - ③ Inductance is measured by current frequency of 1kHz.
 - ④ Water cooling test conditions: The inlet water temperature of the motor is 20°C and the flow rate is 6L/min.
- The contents of datasheet are subject to change without prior notice.

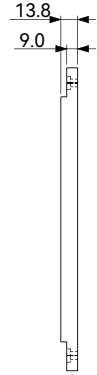
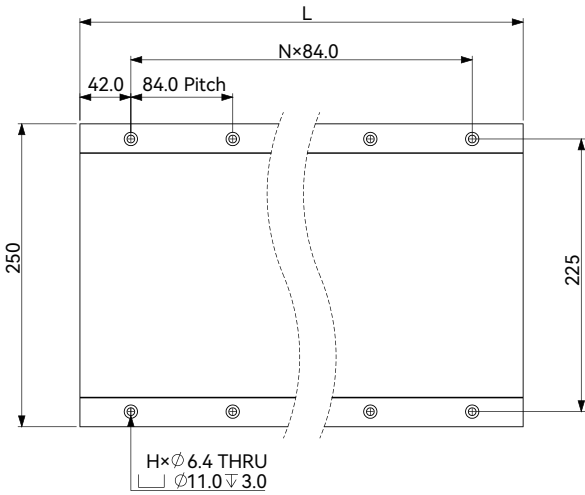
Dimensional Drawing



Motor Coil				
Coil Size	C	N	L	H
AKM200-A-B4	30.5	4	391	40
AKM200-A-B6		6	559	60
AKM200-A-B8		8	727	80
AKM200-A-B10	52.5	10	917	100

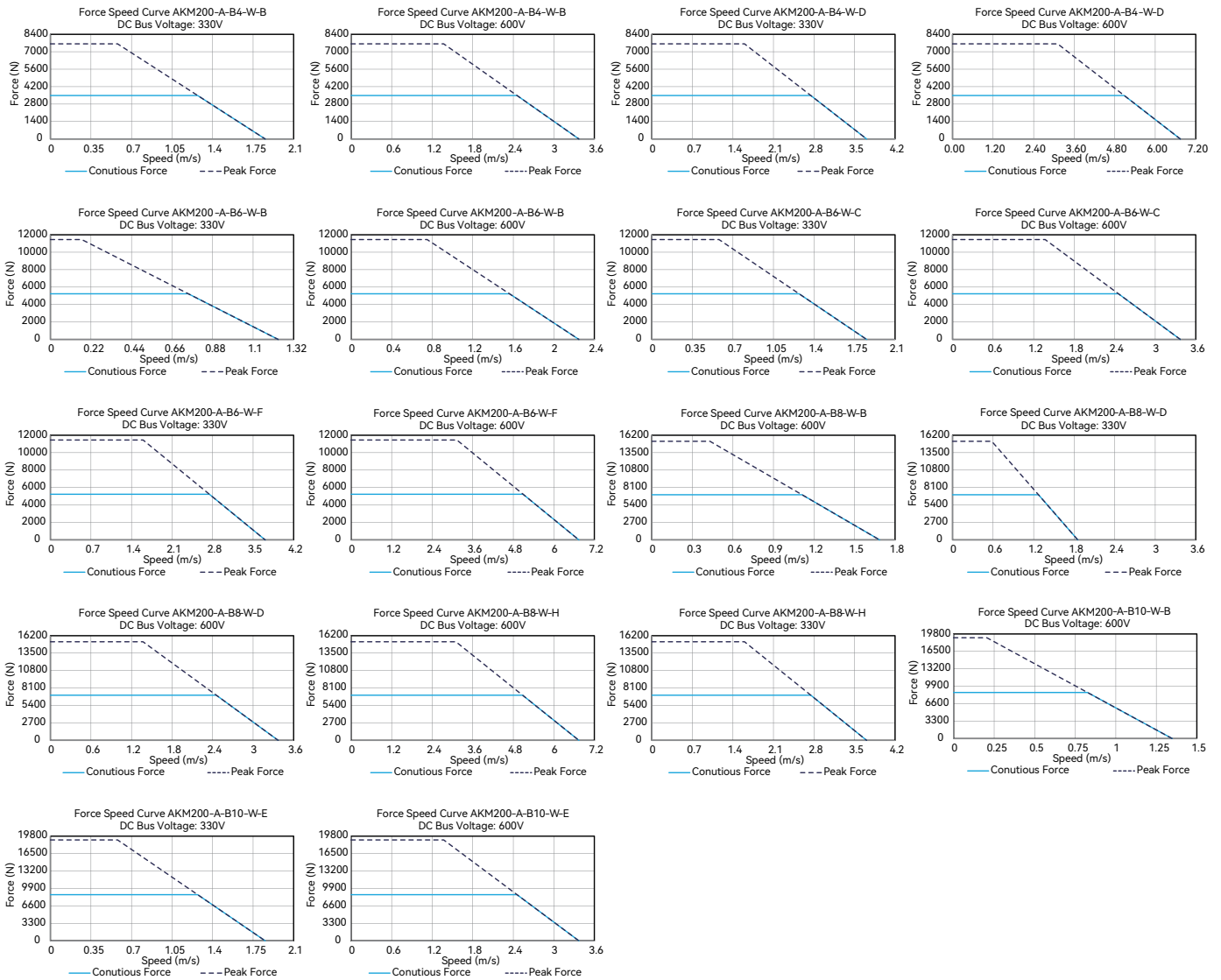
Motor Cable ^①			
Motor Model	Cable SPEC	Outer Diameter	Min. Bend Radius ×10
AKM200-A-B4-B	4G2.5+(4×0.25)	11.8	118
AKM200-A-B6-B			
AKM200-A-B8-B			
AKM200-A-B10-B			
AKM200-A-B6-C	4G4.0+(4×0.25)	13.6	136
AKM200-A-B4-D	4G6.0+(4×0.5)	16.6	166
AKM200-A-B8-D			
AKM200-A-B10-E	4G10.0+(4×0.5)	19.6	196
AKM200-A-B6-F			
AKM200-A-B8-H	4G16.0+(4×0.5)	25	250

AKM200-A Track



Motor Track			
Track Size	L	N	H
AKM200-TL168-E	168	1	4
AKM200-TL252-E	252	2	6
AKM200-TL420-E	420	4	10

Force-Speed Curve

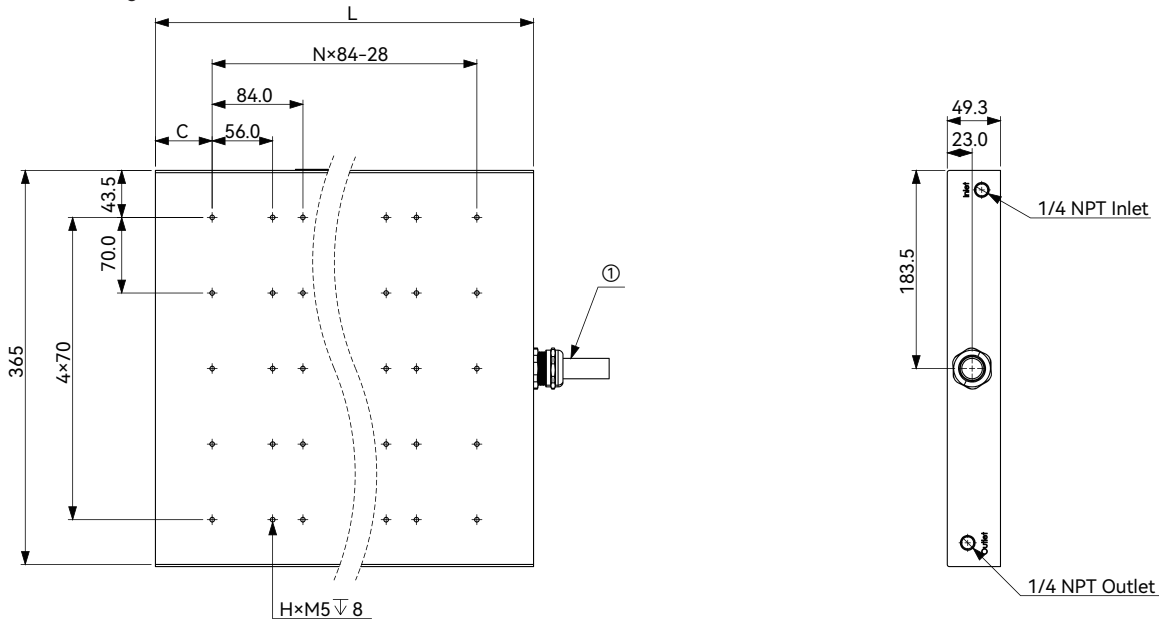


AKM320-A

Model			AKM320-A-B6	AKM320-A-B8	AKM320-A-B10		
Performance Parameters	Symbol	Unit	C	F	D	H	E
Continuous Force (WC) @100°C ^①	F _{cw}	N	7333	7333	9778	9778	12218
Peak Force	F _{pk}	N	17629	17629	23505	23505	29381
Force Constant ±10%	K _f	N/Arms	336	168	336	168	336
Back EMF Constant ±10%	K _e	Vpeak/(m/s)	274	137	274	137	274
Motor Constant @25°C	K _m	N/Sqrt(W)	156	156	180	180	201
Resistance (L-L) @25°C ±10% ^②	R ₂₅	Ω	3.1	0.8	2.3	0.6	1.9
Inductance (L-L) ±30% ^③	L	mH	30	13	22.5	5.6	18
Electrical Time Constant	τ _e	ms	9.7	9.7	9.7	9.7	9.7
Continuous Current (WC) @100°C ^①	I _{cw}	Arms	22	44	29	58	36
Peak Current	I _{pk}	Arms	75	150	100	200	125
Continuous Power Dissipation (WC) @100°C ^①	P _{cw}	W	2858	2858	3811	3811	4764
Max. Coil Temperature	t _{max}	°C	100	100	100	100	100
Thermal Dissipation Constant (WC) ^④	K _{thw}	W/°C	38.1	38.1	50.8	50.8	63.5
Max. Bus Voltage	U _{bus}	Vdc	600	600	600	600	600
Magnetic Period	T _N	mm	42	42	42	42	42
Attraction Force	F _a	kN	25.9	25.9	34.6	34.6	43.2
Mechanical Parameters							
Coil Mass (WC)	m _{cw}	kg	60.8		78.5		94.5
Coil Length (WC)	L _{cw}	mm	559		727		917
Track Mass Per Meter	m _{track}	kg/m	68		68		68
Other Information							
Insulation Class	Class B (130°C)						
Protection Grade	IP65						
Compliance with Global Standards	RoHS, CE						
Ambient Temperature	Operation	0°C to 40°C (non-freezing)					
	Storage	-15°C to 70°C (non-freezing)					
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)					
	Storage	10%RH to 90%RH (non-condensing)					
Recommended Ambience	Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.						

- ① Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations: WC-Water Cooling.
 - ② Resistance is measured by DC current with standard 0.5m cable.
 - ③ Inductance is measured by current frequency of 1kHz.
 - ④ Water cooling test conditions: The inlet water temperature of the motor is 20°C and the flow rate is 6L/min.
- The contents of datasheet are subject to change without prior notice.

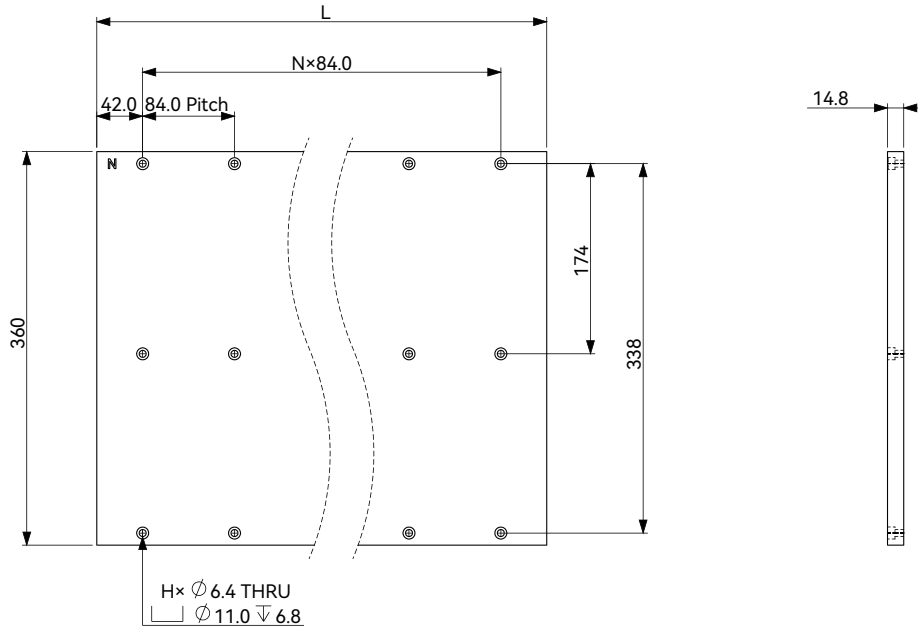
■ Dimensional Drawing



Motor Coil				
Coil Size	C	N	L	H
AKM320-A-B6	30.5	6	559	60
AKM320-A-B8		8	727	80
AKM320-A-B10	52.5	10	917	100

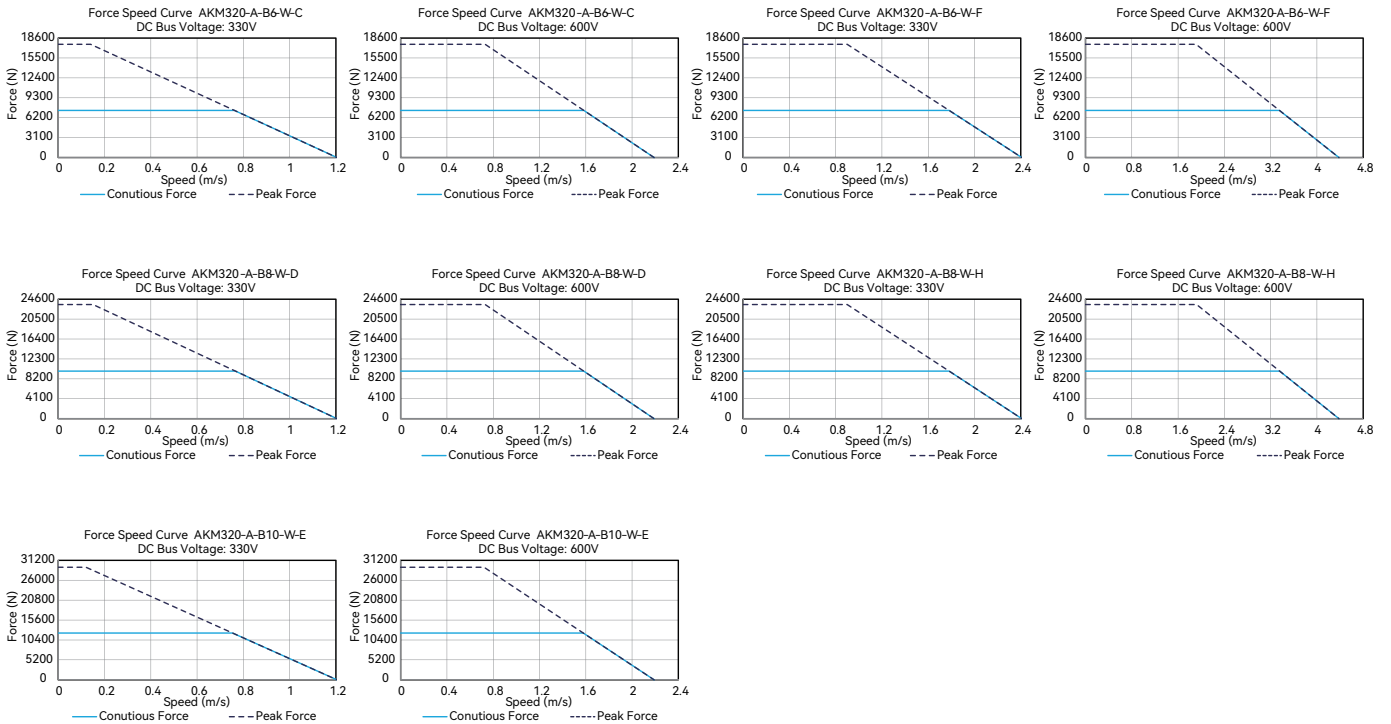
Motor Cable ^①			
Motor Model	Cable SPEC	Outer Diameter	Min. Bend Radius ×10
AKM320-A-B6-C	4G4.0+(4×0.25)	13.6	136
AKM320-A-B8-D	4G6.0+(4×0.5)	16.6	166
AKM320-A-B10-E	4G10.0+(4×0.5)	19.6	196
AKM320-A-B6-F			
AKM320-A-B8-H	4G16.0+(4×0.5)	25	250

AKM320-A Track



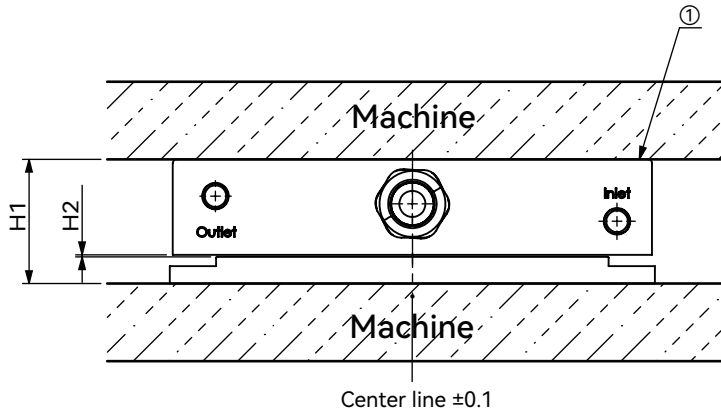
Motor Track			
Track Size	L	N	H
AKM320-TL252-E	252	2	9
AKM320-TL420-E	420	4	15
AKM320-TL588-E	588	6	21

Force-Speed Curve



AKM-A Series

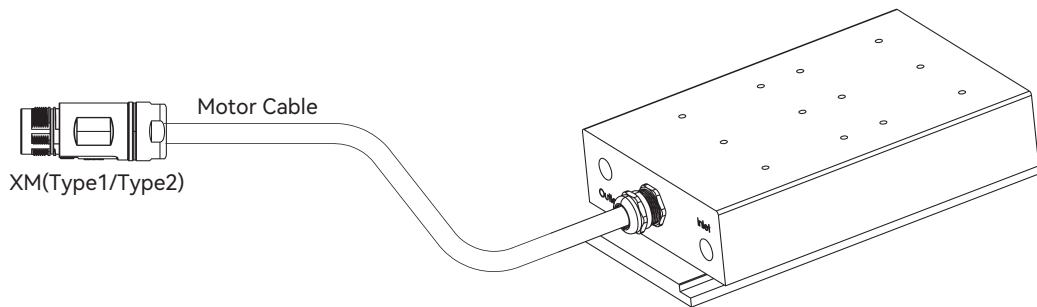
Motor Assembly Diagram



- ① It is recommended to design a transfer plate on the mounting surface of the motor to facilitate adjustment of the gap.
- ② Avoid long-term contact between the motor surface and the cutting fluid.
- ③ Avoid hard objects such as metal particles entering the gap between the coil and the track.

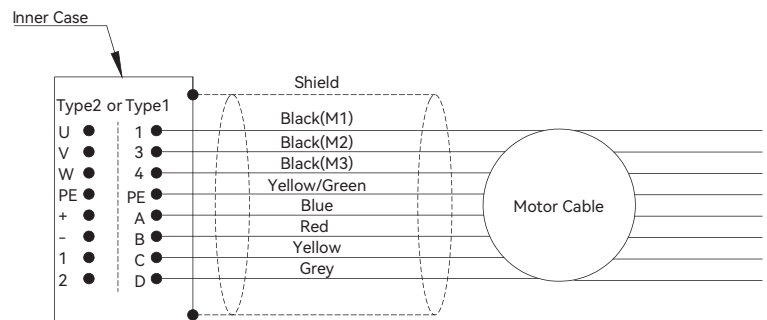
Installation Guide	Adaptive Track	H1	H2
AKM100-A-Bx	AKM100-TLxxx-E	61.1(+0.1,-0.1)	1.0(+0.3,-0.4)
AKM150-A-Bx	AKM150-TLxxx-E	64.1(+0.1,-0.1)	1.0(+0.3,-0.4)
AKM200-A-Bx	AKM200-TLxxx-E	64.1(+0.1,-0.1)	1.0(+0.3,-0.4)
AKM320-A-Bx	AKM320-TLxxx-E	65.1(+0.1,-0.1)	1.0(+0.3,-0.4)

Motor Cable Connection



MOTOR CABLE

(Type1)PIN	(Type2)PIN	DESCRIPTION	COLOR
1	U	M1	BLACK 1
3	V	M2	BLACK 2
4	W	M3	BLACK 3
⏏	⏏	PE	YELLOW / GREEN
A	+	D1	BLUE
B	-	D2	RED
C	1	E1	YELLOW
D	2	E2	GREY



Part Numbering

Motor Coil

AKM100-A-B2-W-DE-H-NF-005-FF-000

Model:

AKM100-A / AKM150-A / AKM200-A / AKM320-A

Coil Length:

B2 / B4 / B6 / B8 / B10

Cooling Type:

W = Water Cooling

Thermal Sensor:

DE / TE

- ① DE = PT100+SNM (PTC)
- ② TE = KTY84+SNM (PTC)
- ③ NF = Without Built-in Hall Sensor C/W Flying Leads
- ④ 005 = Cable Length 0.5m
- ⑤ FF = With Ferrite Bead C/W Flying Leads
- ⑥ XM = Without Ferrite Bead C/W M23 Receptacle
- ⑦ XF = Without Ferrite Bead C/W Flying Leads
- ⑧ 000 = Design Control Code

Design Control Code:

000

Power Cable:

FF / XM / XF

Cable Length(m):

005

Sensor Cable:

NF

Winding Codes:

A / B / C / D / E / F / H

Motor Track

AKM100-A-TL420-TE-000

Model:

AKM100-A / AKM150-A / AKM200-A / AKM320-A

Track Length:

TL168 / TL252 / TL420

Design Control Code:

000

Track Type and Cover:

TE