HIWIN®
Motion Control and System Technology

Rotary Motor

Technical Information

HIWIN®
Motion Control and System Technology

High speed | High precision | Multifunctional integration | Ecology first | Humanistic technology

TAIWAN EXCELLENCE 2005
TAIWAN EXCELLENCE
GOLD AWARD 2005

Ballscrew

- For Heavy-Load Drive

TAIWAN EXCELLENCE 2004
TAIWAN EXCELLENCE 2004

Positioning Guideway

TAIWAN EXCELLENCE 2004
TAIWAN EXCELLENCE
GOLD AWARD 2004

Linear Synchronous Motor

- Coreless Type (LMC)

TAIWAN EXCELLENCE 2002
TAIWAN EXCELLENCE 2002

Linear Actuator

- LAN for Hospital
- LAM for Industrial
- LAS Compact Size
- LAK Controller

TAIWAN EXCELLENCE 2003
TAIWAN EXCELLENCE 2010
TAIWAN EXCELLENCE
GOLD AWARD 2003, 2010

Industrial Robot

- For Semiconductor & Electronic (KK Series)
- For Automation (KS, KA Series)

TAIWAN EXCELLENCE 2009
TAIWAN EXCELLENCE
SILVER AWARD 2009

Linear Motor Air Bearing Platform

TAIWAN EXCELLENCE 2008
TAIWAN EXCELLENCE 2007
TAIWAN EXCELLENCE
GOLD AWARD 2008
TAIWAN EXCELLENCE
SILVER AWARD 2007, 2002

Linear Guideway

HG/EG/RG/MG Type

- Ecological & Economical lubrication Module E2
- Low Noise (Q1)
- Air Jet (A1)

Positioning Measurement System

TAIWAN EXCELLENCE 2008
TAIWAN EXCELLENCE 2006
TAIWAN EXCELLENCE
GOLD AWARD 2009, 2008
TAIWAN EXCELLENCE
SILVER AWARD 2006, 2001, 1993

Ballscrews

Ground/Rolled

- High Speed (High Dm-N Value/Super S Series)
- Heavy Load (Cool type II)
- Ecological & Economical lubrication Module E2
- Rotating Nut (R1)

Linear Motor X-Y Robot

TAIWAN EXCELLENCE 2006
TAIWAN EXCELLENCE
SILVER AWARD 2006

TMS Direct-Driver Positioning System

Linear Motor Gantry

AC SERVO MOTOR Safety Precautions

Thank you for purchasing HIWIN's AC servo motor. Installation and operation of the motor must be in accordance with the HIWIN manual. Before using the servo motor, please read these safety instructions and precautions carefully.

★ Unpacking instructions

1. Before using the servo motor, please read these safety instructions and precautions carefully. HIWIN is not responsible for any damage, accident, or injury caused by incorrect handling.
2. Examine the appearance of the motor for any unusual marks or damage from shipment.
3. Inspect the wires for damage.
4. Do not disassemble the motor. Since the product design has been based on structure calculations, computer simulations, and prototype testing, do not disassemble the product without the permission of HIWIN engineers.
5. Supervise children when handling this product.
6. People with psychosomatic illness or insufficient experience should not handle this product, unless under the direct supervision of managers or product narrators.

If any items are damaged or incorrect, please contact your distributor or HIWIN sales representative.

★ Safety instructions

1. The product can only be repaired by HIWIN engineers. Please send the product back to us if there is any unusual phenomenon.
2. Do not hold the motor by its wire harness or shaft.
3. Do not hit the motor or shaft. Shock can damage the encoder inside the motor.
4. Do not apply loads to the motor shaft that are in excess of the specified value.
5. Protect the motor and encoder from high electrical noise, vibration, and unusual temperatures.
6. Do not change the motor parts or disassemble the screws. HIWIN will not be responsible for any damages, injuries, or accidents that may occur.

★ Wiring instructions

1. Ensure the specified power input value before using the product, and verify that the proper power supply is being used.
2. Before operation, please ensure that the motor, brake, and encoder are connected correctly. Incorrect wiring may cause abnormal motor operation or even cause permanent damage to the motor.
3. To avoid voltage coupling and electrical noise on the encoder, ensure adequate separation of the motor power wires and the encoder wires.
4. Ensure that the motor ground wire is connected to the ground terminal on the servo drive.
5. Do not perform a dielectric voltage-withstand test on any encoder terminal. The test may cause damage to the encoder.

★ Operation instructions

1. Higher than maximum specified current may cause demagnetization of magnetic components inside the motor.
2. The AC servo motor is designed to operate through a dedicated servo drive. Do not connect to a commercial power source (100/200V AC, 50/60 HZ). The motor will not operate correctly and may cause permanent damage.
3. The motor must be operated within its specified range.
4. Attention should be given to ensure adequate cooling and ventilation of the motor during operation.
5. For long term use, the motor shaft should be resupplied with proper and sufficient oil during the period of operation.
6. If any abnormal odor, noise, smoke, temperature rise or vibration is detected, stop the motor immediately. Remove power from the servo drive and isolated the motor.

★ Maintenance and Storage instructions

1. Do not store the product in an inflammable environment or that with chemical agents.
2. Store the product in a place without humidity, dust, harmful gases, or liquids.
3. The motor shaft opening is neither waterproof nor oil-proof. Do not install the motor in an environment where there is harmful gas, liquid, excessive moisture, or water vapor.
4. Do not store the servo motor where it will be subjected to vibration or shock in excess of the specified limit.
5. The storage and transportation temperature of this product: -10℃~+50℃
6. Clean：Wipe with Alcohol (70%)
7. Before shipping, the motor shaft is coated with antirust oil to protect the motor shaft against rust formation. However, the material of the motor shaft is not entirely rust-proof. When the motor storage time has exceeded six months, please inspect and examine the motor shaft and resupply with proper and sufficient antirust oil at least once every three months thereafter.
8. Product abandoned：Follow the local laws and regulations for recycling.

A one year guarantee is provided from the date of delivery. For product damage caused by improper operation (Please refer to the notes and instructions in this operation manual). HIWIN will not be held responsible for replacing or maintaining the product as a result of any natural disasters that may occur during this period.

⚠ Warning：For the proper use of the HIWIN AC servo motor read these safety precautions carefully before installation, operation, and maintenance.

Caution：Please read these safety precautions before using the product.
Caution：Do not alter the instrument without the permission of the manufacturer.
Caution： Remove the broken power line buckle carefully.
Caution：The product cannot be used in an inflammable environment.
Caution：Remove the power before cleaning.
Caution：Overload use of this product will cause the temperature of the cover to rise.

HIWIN®
Motion Control and System Technology

Rotary Motor

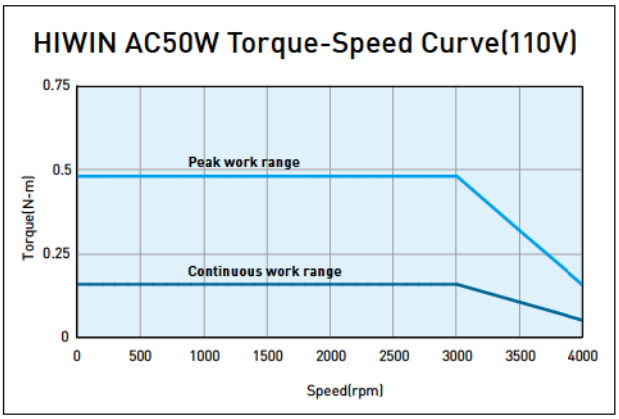
1. AC Servo Motor

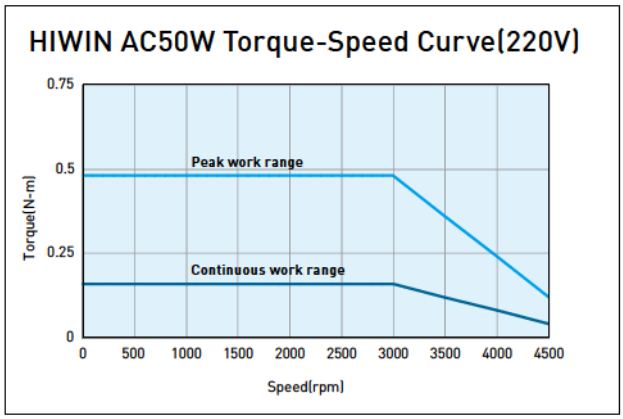
AC Servo Motor Ordering Information

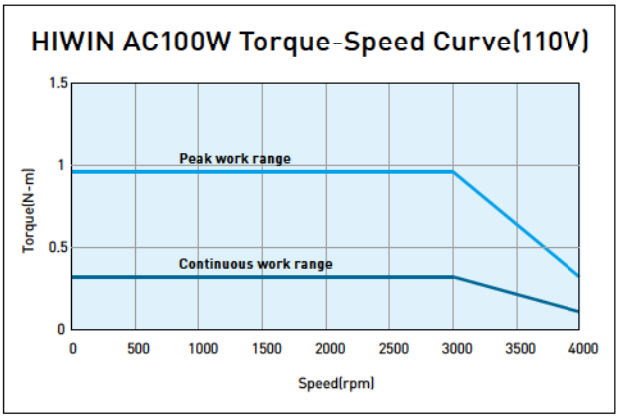
FRAC	1	0	10	11	01
Product	Accessory	Key	Type	Voltage	Serial number
FR:Brushless Motor AC:AC Servo Motor	1:Without Brake B:With Brake	0:Without Key K:With Key	05 : 50W 10 : 100W 20 : 200W 40 : 400W 75 : 750W	11 : 110V 22 : 220V	01~99

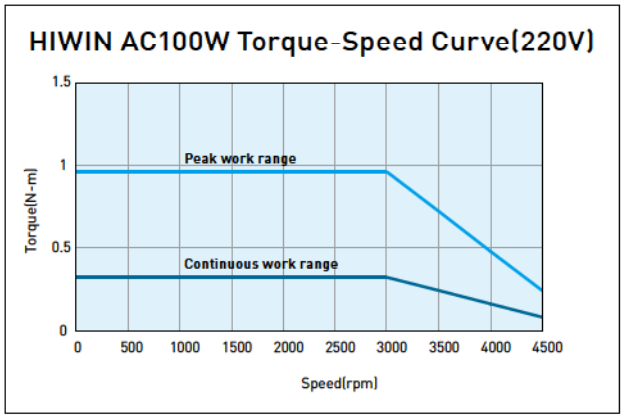
AC Servo Motor Features

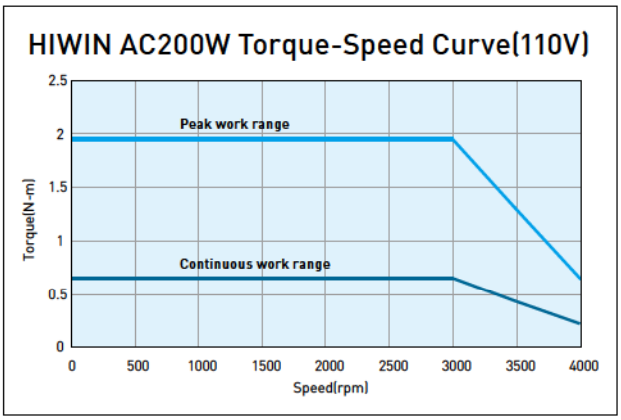
- Output Power [W] : The power of motor is working at rated torque and rated speed.
- Rated Torque [Tc] : Motor is working at rated current.
- Rated speed [ωc] : Motor is working at rated power.
- Peak Max. Torque [Tp] : Momentary output torque and It is 3 times of rated torque.
- No Load Max. speed [ωp] : Motor max speed when no load.
- Peak Max. current [Ip] : The current when Peak torque occur and It is 3 times of rated current.

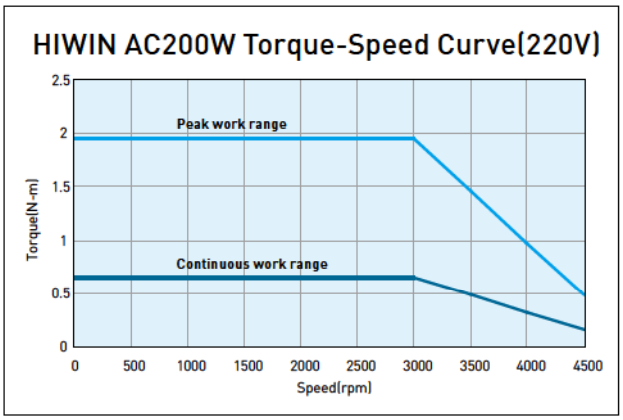


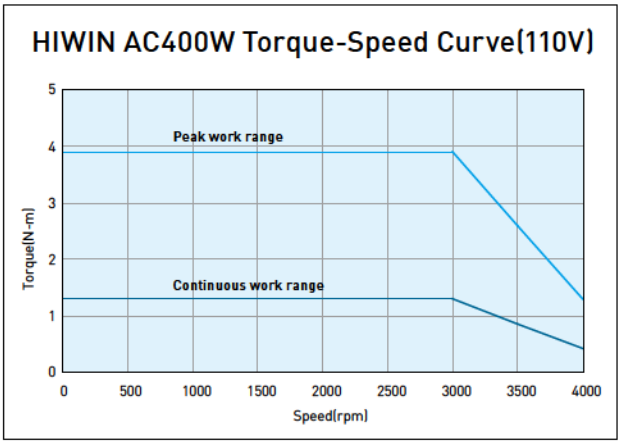


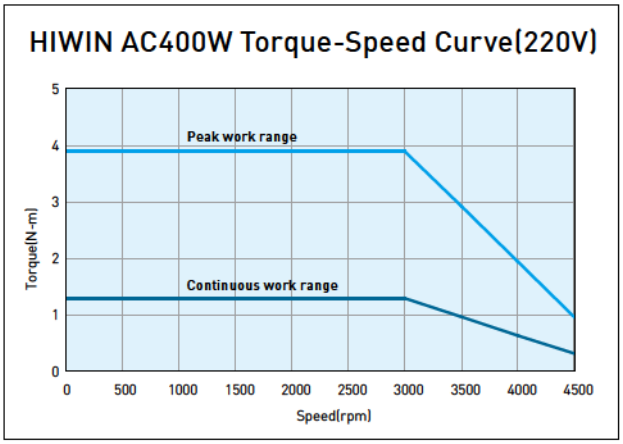


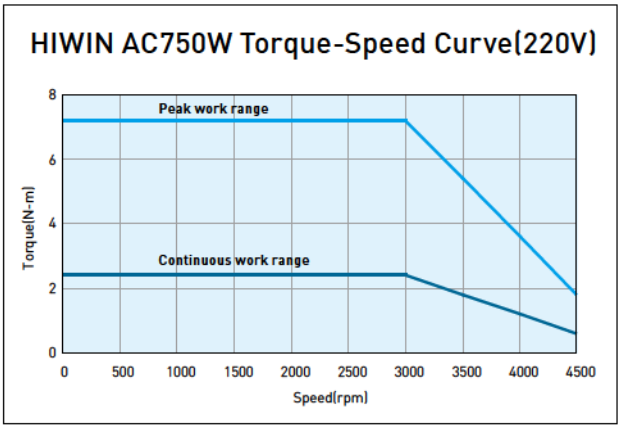



HIWIN AC200W Torque-Speed Curve(110V)
Peak work range
Continuous work range
Torque(N-m)
Speed(rpm)
0
0.5
1
1.5
2
2.5
0
500
1000
1500
2000
2500
3000
3500
4000

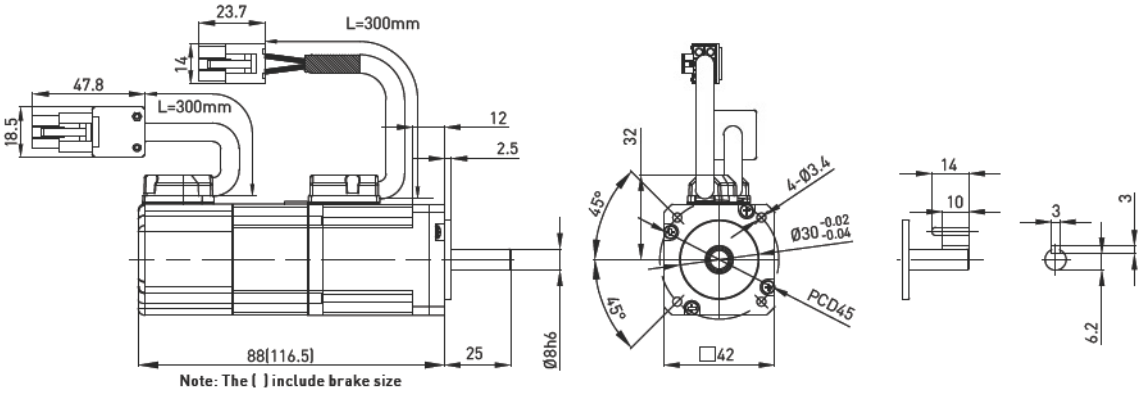

HIWIN AC200W Torque-Speed Curve(220V)
Peak work range
Continuous work range
Torque(N-m)
Speed(rpm)
0
0.5
1
1.5
2
2.5
0
500
1000
1500
2000
2500
3000
3500
4000
4500


HIWIN AC400W Torque-Speed Curve(110V)
Peak work range
Continuous work range
Torque(N-m)
Speed(rpm)
0
1
2
3
4
5
0
500
1000
1500
2000
2500
3000
3500
4000


HIWIN AC400W Torque-Speed Curve(220V)
Peak work range
Continuous work range
Torque(N-m)
Speed(rpm)
0
1
2
3
4
5
0
500
1000
1500
2000
2500
3000
3500
4000
4500


HIWIN AC750W Torque-Speed Curve(220V)
Peak work range
Continuous work range
Torque(N-m)
Speed(rpm)
0
2
4
6
8
0
500
1000
1500
2000
2500
3000
3500
4000
4500

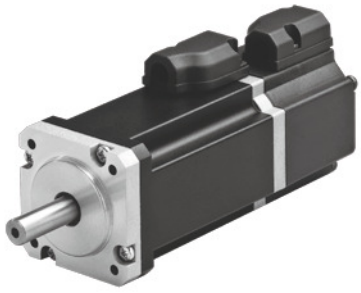
AC Servo Motor 50W Model

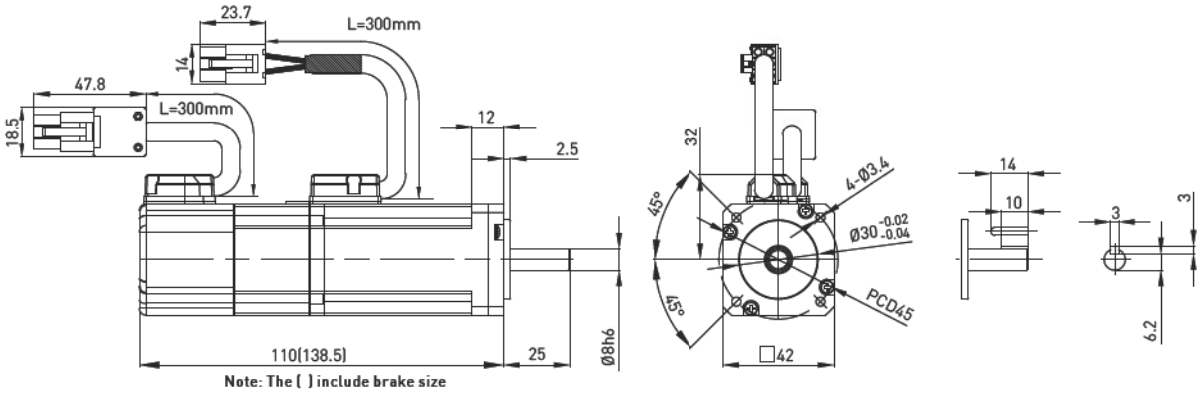


Note: The ( ) include brake size

		Symbol	Unit	FRAC□□0511□□	FRAC□□0522□□
Input Voltage		V	V	AC110	AC220
Rated Power		W	W	50	
Rated Torque		Tc	N.m	0.16	
Rated Current		Ic	A(rms)	0.9	
Peak Max. Torque		Tp	N.m	0.48	
Peak Max. Current		Ip	A(rms)	2.7	
Rated Speed		ωc	rpm	3000	
No Load Max. Speed		ωp	rpm	4000	4500
Torque Constant		Kt	N-m / Arms	0.178	
Back EMF Constant		Ke	Vrms / krpm	10.74	
Resistance (line to line)		R	Ω	4.7	
Inductance (line to line)		L	mH	4.7	
Number of poles		P	-	8	
Inertia of Rotating Parts (with brake)		J	kg-m^2	0.02*10^{-4}(0.022*10^{-4})	
Weight (with brake)		M	kg	0.45(0.58)	
Encoder Resolution		CPR	pulse	2500	
Brake Keep Torque		Tb	N-m	0.32	
Brake Voltage		V	V	DC24±10%	
Motor Insulation grade		Class B			
Environment	Work temperature	0°C~40°C			
	Preserve temperature	-15°C~70°C			
	Work Humidity	80%RH down			
	Preserve Humidity	80%RH down			
	Preserve Environment	Indoor & keep off causticity gas, inflammable gas, oil and dust.			
	Elevation	1000m down			
	Vibration	49m/s^2 down			

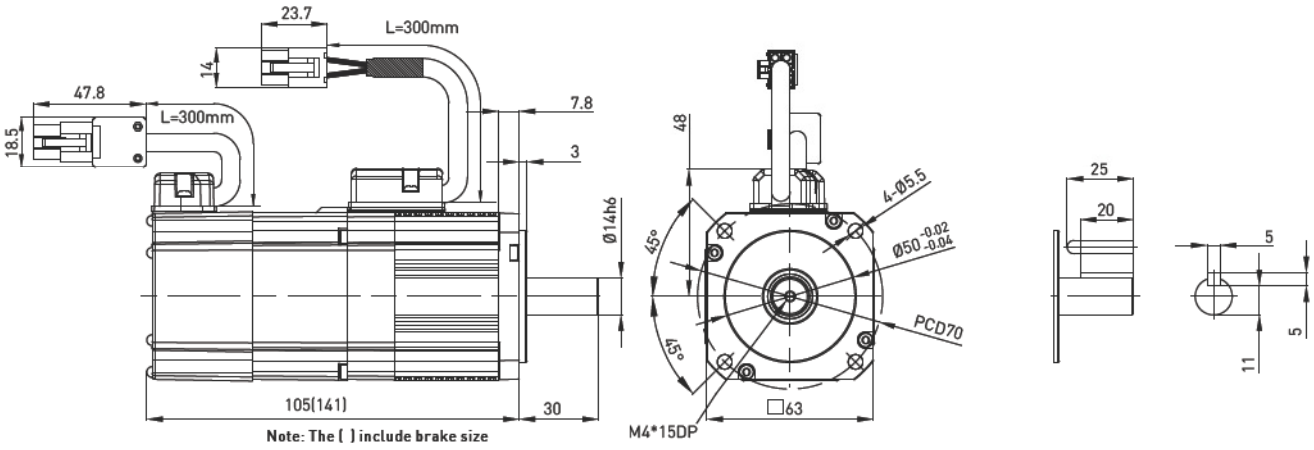
AC Servo Motor 100W Model





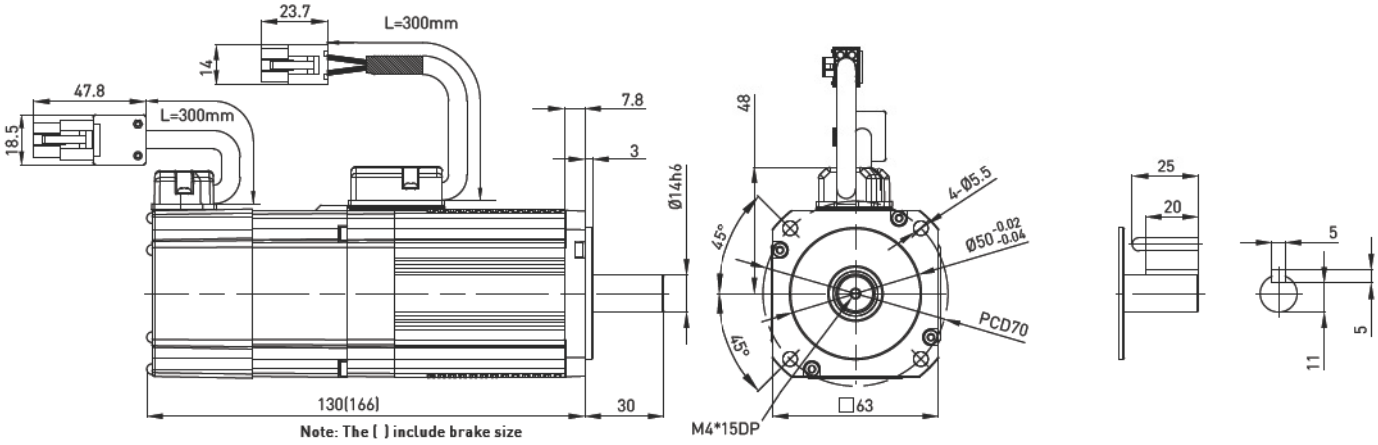
	Symbol	Unit	FRAC□□1011□□	FRAC□□1022□□
Input Voltage	V	V	AC110	AC220
Rated Power	W	W	100	
Rated Torque	Tc	N.m	0.32	
Rated Current	Ic	A(rms)	0.9	
Peak Max. Torque	Tp	N.m	0.96	
Peak Max. Current	Ip	A(rms)	2.7	
Rated Speed	ωc	rpm	3000	
No Load Max. Speed	ωp	rpm	4000	4500
Torque Constant	Kt	N-m / Arms	0.356	
Back EMF Constant	Ke	Vrms / krpm	21.98	
Resistance (line to line)	R	Ω	8	
Inductance (line to line)	L	mH	8.45	
Number of poles	P	-	8	
Inertia of Rotating Parts (with brake)	J	kg-m^2	$0.036*10^{-4}(0.038*10^{-4})$	
Weight (with brake)	M	kg	0.63(0.76)	
Encoder Resolution	CPR	pulse	2500	
Brake Keep Torque	Tb	N-m	0.32	
Brake Voltage	V	V	DC24±10%	
Motor Insulation grade			Claess B	
Environment	Work temperature		0℃~40℃	
	Preserve temperature		-15℃~70℃	
	Work Humidity		80%RH down	
	Preserve Humidity		80%RH down	
	Preserve Environment		Indoor & keep off causticity gas, inflammable gas, oil and dust.	
	Elevation		1000m down	
	Vibration		49m/s^2 down	

AC Servo Motor 200W Model



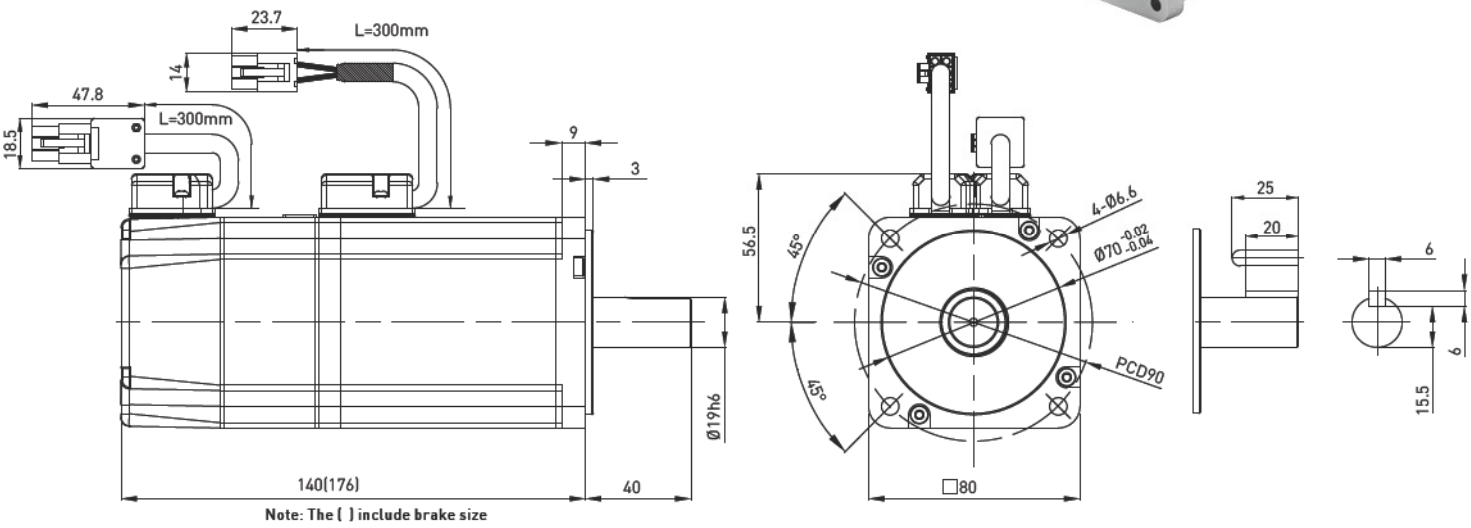
	Symbol	Unit	FRAC□□2011□□	FRAC□□2022□□
Input Voltage	V	V	AC110	AC220
Rated Power	W	W	200	
Rated Torque	Tc	N.m	0.65	
Rated Current	Ic	A(rms)	3.2	2
Peak Max. Torque	Tp	N.m	1.95	
Peak Max. Current	Ip	A(rms)	9.6	6
Rated Speed	ωc	rpm	3000	
No Load Max. Speed	ωp	rpm	4000	4500
Torque Constant	Kt	N-m / Arms	0.2	0.325
Back EMF Constant	Ke	Vrms / krpm	12.275	19.64
Resistance (line to line)	R	Ω	1	2.7
Inductance (line to line)	L	mH	1.5	4.5
Number of poles	P	-	8	8
Inertia of Rotating Parts (with brake)	J	kg-m^2	0.26*10^{-4}(0.3*10^{-4})	
Weight (with brake)	M	kg	1.04(1.85)	
Encoder Resolution	CPR	pulse	2500	
Brake Keep Torque	Tb	N-m	1.3	
Brake Voltage	V	V	DC24±10%	
Motor Insulation grade			Class B	
Environment	Work temperature		0°C~40°C	
	Preserve temperature		-15°C~70°C	
	Work Humidity		80%RH down	
	Preserve Humidity		80%RH down	
	Preserve Environment		Indoor & keep off causticity gas, inflammable gas, oil and dust.	
	Elevation		1000m down	
	Vibration		49m/s^2 down	

AC Servo Motor 400W Model



	Symbol	Unit	FRAC□□4011□□	FRAC□□4022□□
Input Voltage	V	V	AC110	AC220
Rated Power	W	W	400	
Rated Torque	Tc	N.m	1.3	
Rated Current	Ic	A(rms)	3.2	2
Peak Max. Torque	Tp	N.m	3.9	
Peak Max. Current	Ip	A(rms)	9.6	6
Rated Speed	ωc	rpm	3000	
No Load Max. Speed	ωp	rpm	4000	4500
Torque Constant	Kt	N-m / Arms	0.4	0.65
Back EMF Constant	Ke	Vrms / krpm	24.17	37.96
Resistance (line to line)	R	Ω	1.7	4.6
Inductance (line to line)	L	mH	2.6	7
Number of poles	P	-	8	8
Inertia of Rotating Parts (with brake)	J	kg-m^2	0.44*10^{-4}(0.48*10^{-4})	
Weight (with brake)	M	kg	1.52(2.06)	
Encoder Resolution	CPR	pulse	2500	
Brake Keep Torque	Tb	N-m	1.3	
Brake Voltage	V	V	DC24±10%	
Motor Insulation grade			Class B	
Environment	Work temperature		0℃~40℃	
	Preserve temperature		-15℃~70℃	
	Work Humidity		80%RH down	
	Preserve Humidity		80%RH down	
	Preserve Environment		Indoor & keep off causticity gas, inflammable gas, oil and dust.	
	Elevation		1000m down	
	Vibration		49m/s^2 down	

AC Servo Motor 750W Model



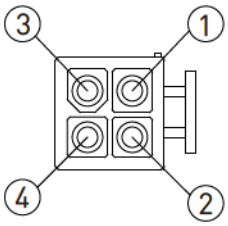
Note: The ( ) include brake size

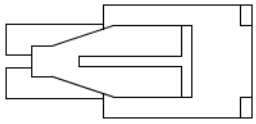
		Symbol	Unit	FRAC□□7522□□
Input Voltage		V	V	AC220
Rated Power		W	W	750
Rated Torque		Tc	N.m	2.4
Rated Current		Ic	A(rms)	5.1
Peak Max. Torque		Tp	N.m	7.2
Peak Max. Current		Ip	A(rms)	15.3
Rated Speed		ωc	rpm	3000
No Load Max. Speed		ωp	rpm	4500
Torque Constant		Kt	N-m / Arms	0.47
Back EMF Constant		Ke	Vrms / krpm	28.4
Resistance (line to line)		R	Ω	0.813
Inductance (line to line)		L	mH	3.4
Number of poles		P	-	8
Inertia of Rotating Parts (with brake)		J	kg-m^2	1.4*10^{-4}(1.46*10^{-4})
Weight (with brake)		M	kg	2.66(3.32)
Encoder Resolution		CPR	pulse	2500
Brake Keep Torque		Tb	N-m	2.4
Brake Voltage		V	V	DC24±10%
Motor Insulation grade		Class B		
Environment	Work temperature	0°C~40°C		
	Preserve temperature	-15°C~70°C		
	Work Humidity	80%RH down		
	Preserve Humidity	80%RH down		
	Preserve Environment	Indoor & keep off causticity gas, inflammable gas, oil and dust.		
	Elevation	1000m down		
	Vibration	49m/s^2 down		

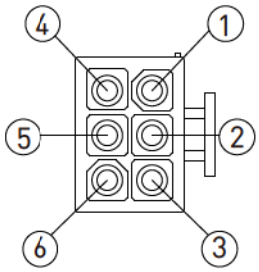
Motor Power Cable

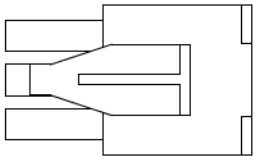
Single	Color	AMP-4PIN(M)	AMP-6PIN(M)
U	Red	3	3
V	White	2	2
W	Black	1	1
GND	Green	4	4
B+	Black	--	5
B-	Black	--	6

Connect Pins Position Definition







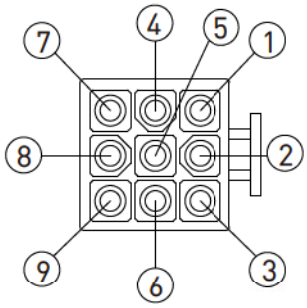


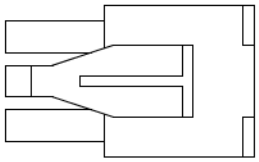
Encoder Cable

Encoder Specifications

- A/B/Z phase output , Line Driver differential output signal
- 2500 resolution
- Work temperature for -20˚C~+85˚C.
- 200KHz frequency response
- Work voltage DC +5V±5%
- RoHS

Connect Pins Position Definition

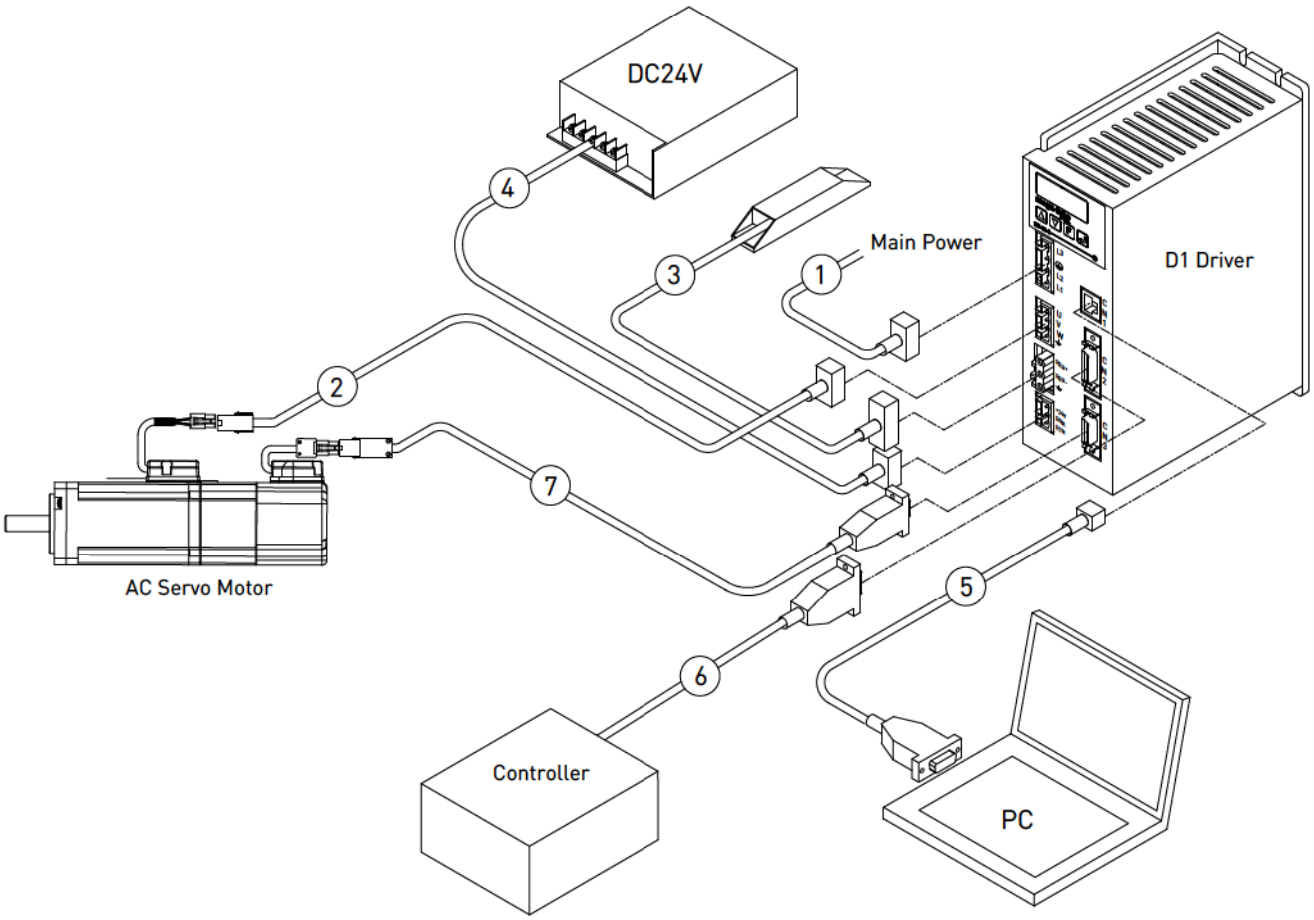




Incremental Encoder

Function	Signal		Color	AMP-9PIN(M)
Power	5V±5%		Red	1
	0V		Black	2
Incremental signal	A	+	Blue	3
	A	-	Blue/Black	4
	B	+	Green	5
	B	-	Green/Black	6
Reference signal	Z	+	Yellow	7
	Z	-	Yellow/Black	8
Shielding	Shielding		Black	9

AC Servo Motor and Driver Wiring



Number	Name	Description
1	AC Main Power	Connected single-phase、three-phase AC power
2	Motor Power Connect	Connected to motor three-phase power source
3	Regenerative resistor	Connected to regenerative resistor(Option)
4	24Vdc Control Power	24Vdc source used for control and I/O
5	RS232 Connect(CN1)	Connected to PC
6	Control signal Connect(CN2)	Connected to controller
7	Feedback Signal Connect(CN3)	Connected to encoder

2. mega-fabs Israel Driver

Application for AC Servo Motor、Linear Motor Instruct Control Model

- Position, Speed, Torque

Input Tpye

- ±10V analogy instruct (Position /Speed/Torque)
- PWM instruct (Speed/Torque)
- Pulse model has electronic gear function
- I/O Digital signal

Drive Series

MD 36 S

Driver Type	Peak Output Current	Encoder
	36A	S : Digital Quad A/B Encoder Analog Sine-Cosine Encoder Digital Hall Sensor R : Resolver

Application industry

- Faceplate Industry
- Semiconductor equipment
- PCB.AOI equipment
- Automation Industry

Specifications

Item	Driver	Specifications
Max pulse command bandwidth	Pulse Input	2M Pulse/s max.
	Quad A/B	8M Count/s max.
Encoder Signal	Digital	5V±5% RS422
	Analog	1Vp-p (Sin/Cos)
DC power input (Control loop power)		24Vdc±10%/1A
AC power output (Motor drive power)		100~240VAC±10%, 50~60Hz/1&3 Phase
Digital input point		10 inputs(5Vdc)
Digital output point (Open Drain)		3 outputs(24VDC)
Dynamic brake output signal		DC 24V / 0.5A max.
Weight		1,250 g
Work temperature		0℃ ~ 45℃
Store temperature		-20℃~ +85℃