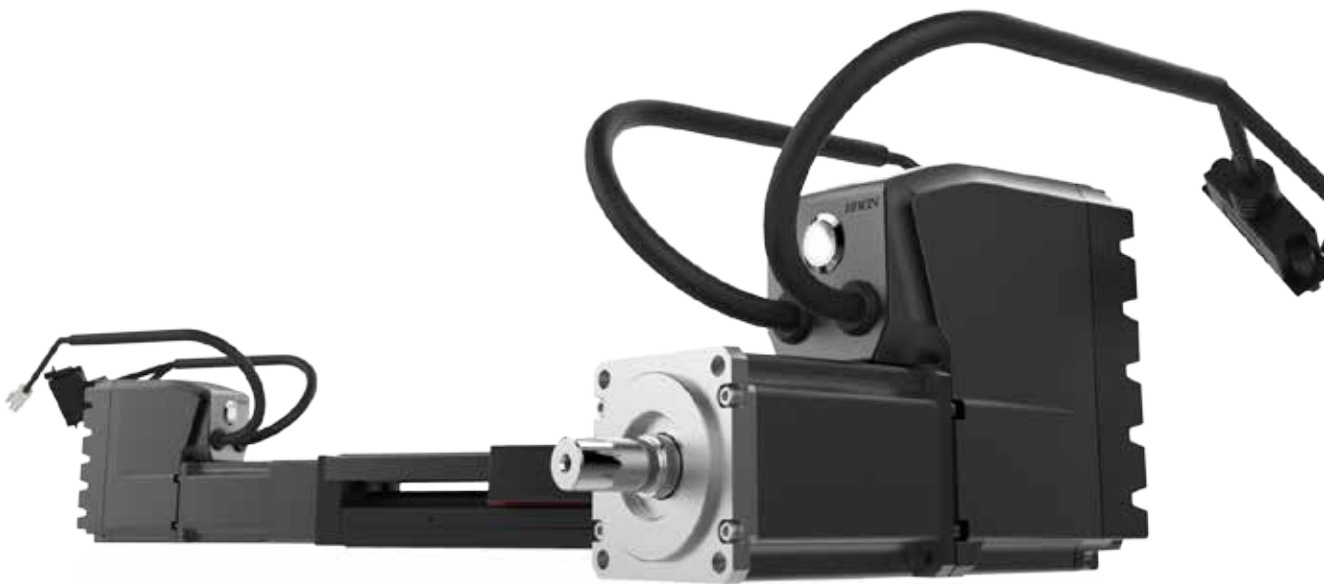


# abilyrobot & abilymotor



Technical Information



**Linear Motor Stage**

Automated transport / AOI application / Precision / Semiconductor

- With Iron-core
- Coreless Type
- Linear Turbo LMT
- Planar Servo Motor
- Air Bearing Platform
- X-Y Stage
- Gantry Systems



**Linear Motor**

Machine tool / Touch panel industry / Semiconductor industry / Laser manufacturing machine / Glass cutting machine

- Ironcore linear motor-LMFA series, LMSA series, LMSC series
- Ironless linear motor-LMC series, LMT series



**Torque Motor (Direct Drive Motor)**

Inspection / Testing equipment / Machine tools / Robot

- Rotary Tables-TMS,TMY,TMN
- TMRW Series
- TMRI Series



**AC Servo Motor & Drive**

Semiconductor / Packaging machine / SMT / Food industry / LCD

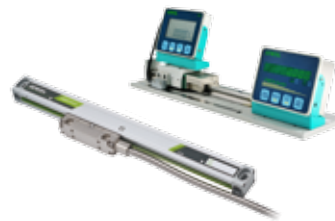
- Drives-D1, D1-N, D2
- Motors-50W-2000W



**Linear Actuator**

Hospital bed / Automatic window / Home care facility / Riveting / Press-fitting / Surface checks / Bending

- Servo Actuator-LAA series
- LAM series
- LAI series
- LAS series
- LAN series
- LAC series



**Positioning Measurement System**

Cutting machines / Traditional gantry milling machines / Programmable drilling machines

- High Resolution
- Signal Translator
- High-precision Enclosed
- High Efficiency Counter



**Multi Axis Robot**

Pick-and-place / Assembly / Array and packaging / Semiconductor / Electro-Optical industry / Automotive industry / Food industry

- Articulated Robot
- Delta Robot
- SCARA Robot
- Wafer Robot
- Electric Gripper
- Integrated Electric Gripper
- Rotary Joint



**Single Axis Robot**

Precision / Semiconductor / Medical / FPD

- KK, SK
- KS, KA
- KU, KE, KC



**Medical Equipment**

Hospital / Rehabilitation centers / Nursing homes

- Robotic Gait Training System
- Hygiene System
- Robotic Endoscope Holder



**Ball Screw**

Precision Ground / Rolled

- Super S series
- Super T series
- Mini Roller
- Ecological & Economical lubrication Module E2
- Rotating Nut (R1)
- Energy-Saving & Thermal-Controlling (C1)
- Heavy Load Series (RD)
- Ball Spline



**Linear Guideway**

Automation / Semiconductor / Medical

- Ball Type--HG, EG, WE, MG, CG
- Quiet Type--QH, QE, QW, QR
- Other--RG, E2, PG, SE, RC

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	1.2 abilyrobot .....	3
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# 1. Characteristics

## 1.1 abilymotor

abilymotor is to integrate AC servo motor, encoder, drive and components interface into an integral servo system, has superior performance in order to satisfy the requirements from general to the high-end application.



Reduce wiring time.



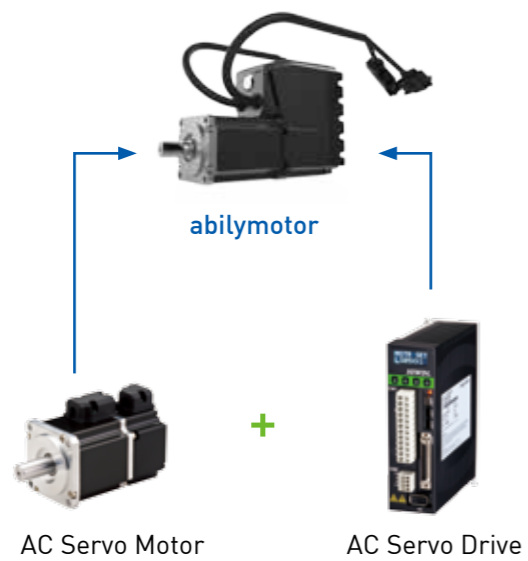
Increase system reliability.



Lower the maintenance time, integrated design is for quick replacement.



Reduce in volume, increase plant utilization.



## 1.2 abilyrobot

abilyrobot integrated the single axis robot, AC servo motor and drive, demonstrate high performance as compared with the conventional industrial robot, and raise the application competitive strength of equipment manufactures up.



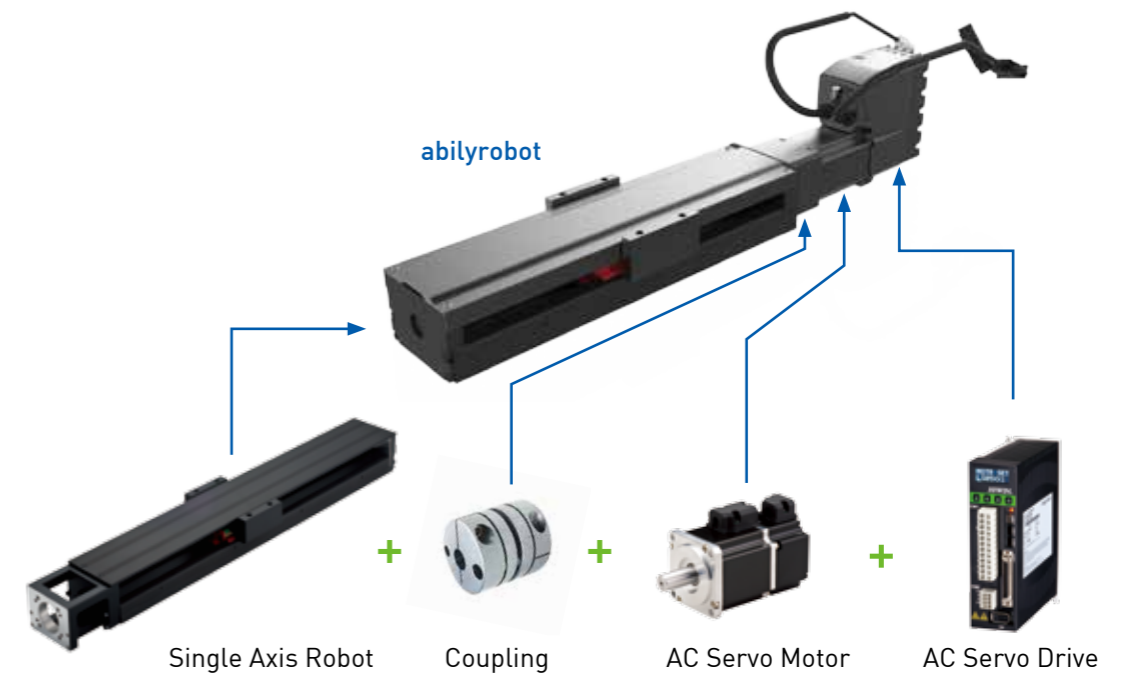
Decrease 40% setting time, raise up productivity.



Decrease 75% installation time.



Reduce 27% in volume, increase plant utilization.



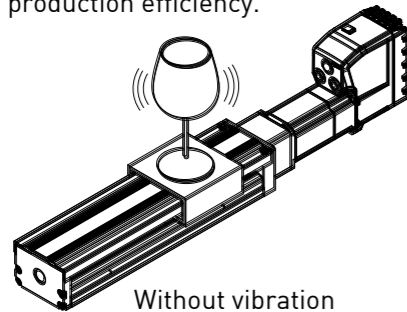
## 2. abilyrobot / abilymotor Common Features



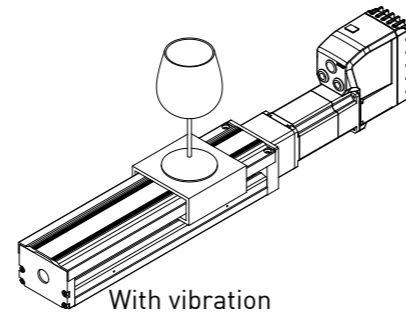
### Vibration Suppression Feature

The drive can remove vibration frequency that occurs during movement.

It reduces vibrations caused by system's structure and improves the machine's production efficiency.



Without vibration suppression feature

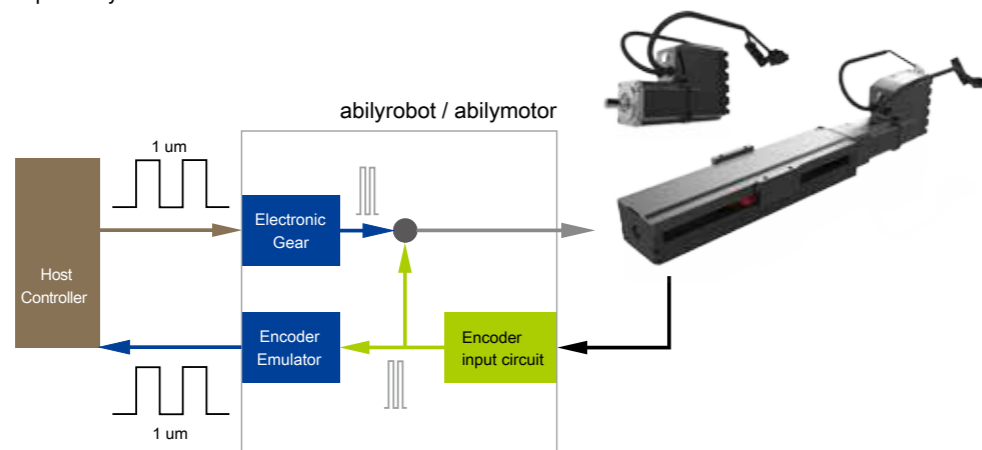


With vibration suppression feature



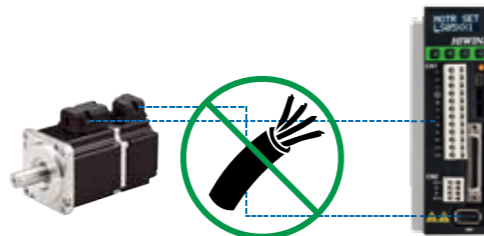
### Electronic gear ratio and Encoder Emulator

The drive can help users adjust pulse resolution for the host controller, and to work with a variety of position encoders with different resolutions; it can also adjust analog position encoder output resolution to the host controller and meet the pulse receiving capability of different host controllers.



### Quality Optimization

Reduce the external noise interference, eliminate the wiring of drive end and actuation end, lower the noise interference.



### High-speed Network Communication Interface

Equip with the Ethernet communication interface (EtherCAT), and support the servo drive protocol of CoE (CANopen over EtherCAT), provide the simplified wiring, low cost, anti-interference, remote and distributed control requirement for the application of multi-axis control.



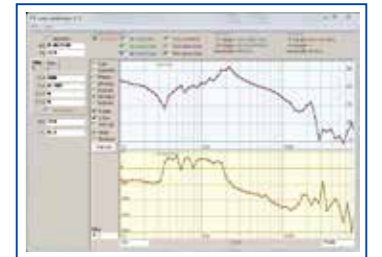
### Complete tool sets

Real-time scope, accuracy enhancement function, frequency analysis tools, gain scheduling tool, analysis tool, I/O setting functions, encoder output ratio adjustment function, Z phase signal width adjustment function, PDL and filter.



### Frequency analysis tools

A powerful and easy to use tool for frequency analysis is provided. You can use the frequency analysis tools to display the real response in the form of a graph. You can easily set the best gain value for the system based on the real response, even first time users can easily get started.



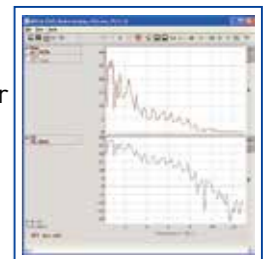
### Variety of I / O functions

To support a number of different functions, you are free to configure the I/O pin functionality and adapt different hardware interface needs. This satisfies diverse requirements for different motion controllers with regards to their pin assignments and hardware interfaces.



### Analysis Tools

To solve a resonance problem, the drive offers a filter design tool for improving the control performance, a Fast Fourier Transform (FFT) and other mathematical operation tools. You can use the functions to calculate the resonant frequency of the system easily, and to make the filter design more accurate.



### PDL (Process Description Language)

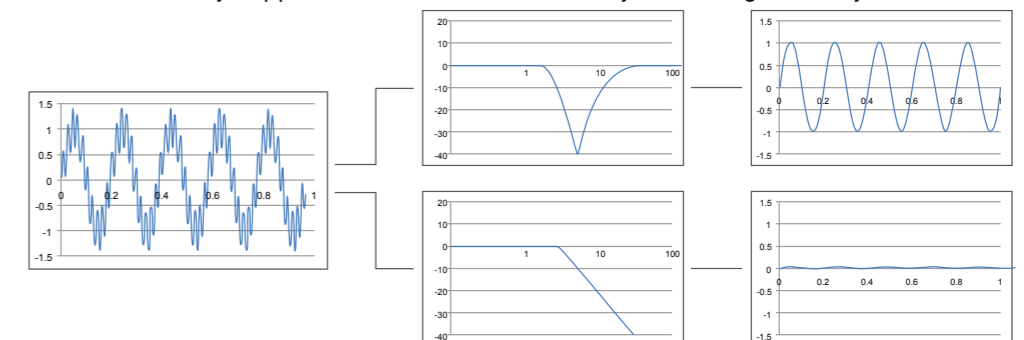
Easy-use process description language is provided. Complex motions can be designated via PDL, such as extrusion process, point-to-point motion, fixed speed control, homing process and so on. PDL gains the advantages of flexibility and programmability. For quick learning, a number of sample programs are provided in the PDL manual.



### Filter

Drive supports two sets of bi-quad filters.

According to filter parameters, the bi-quad filters can be transformed into different filter types, such as low-pass filter, notch filter, ..., etc. Through well-defined filters, stage vibration can be easily suppressed, and control accuracy can be significantly increased.



### 3. Model Descriptions

■ abilyrobot

#### iKM1-KK086-10-C-640-A1- C-S2-040-S520

**Product**  
abilyrobot

**Product series**  
KK : KK Module

**Nominal Width**  
086 : 86

**Ballscrew Lead (Unit: mm)**  
10, 20

**Accuracy Grade**  
C: Normal  
P: Precision

**Rail length (Unit: mm)**  
340, 440, 540, 640, 740, 940

**Rail Special Order**  
A : Normal Type

**Number of Blocks: 1, 2**

**Block Special Order**  
None: Normal Type

**Cover Type**  
C: Aluminum over  
B: Bellows  
None: Normal Type

**Limit Switch**  
S1 : OMRON SX671  
S2 : OMRON SX674  
S3 : SUNX GX-F12A  
S4 : SUNX GX-F12A-P  
None: No Limit Switch and Rail

**Holding Brake Options**  
0: Without holding brake  
B:With holding brake

**Drive Input Voltage**  
2 : Single Phase 220VAC

**Encoder Type**  
5 : 17bit Incremental Type

**Communication Interface**  
S : Standard  
E : EtherCAT(COE)  
F : EtherCAT(mega-ulink)  
M : Modbus

**Motor Output Power**  
020 : 200W  
040 : 400W

■ abilymotor

#### iMM1-040-S5-2-00

**Product**  
abilymotor

**Output Power**  
020 : 200W  
040 : 400W

**Communication Interface**  
S : Standard  
E : EtherCAT(COE)  
F : EtherCAT(mega-ulink)  
M : Modbus

**Encoder Type**  
5 : 17bit Incremental Type

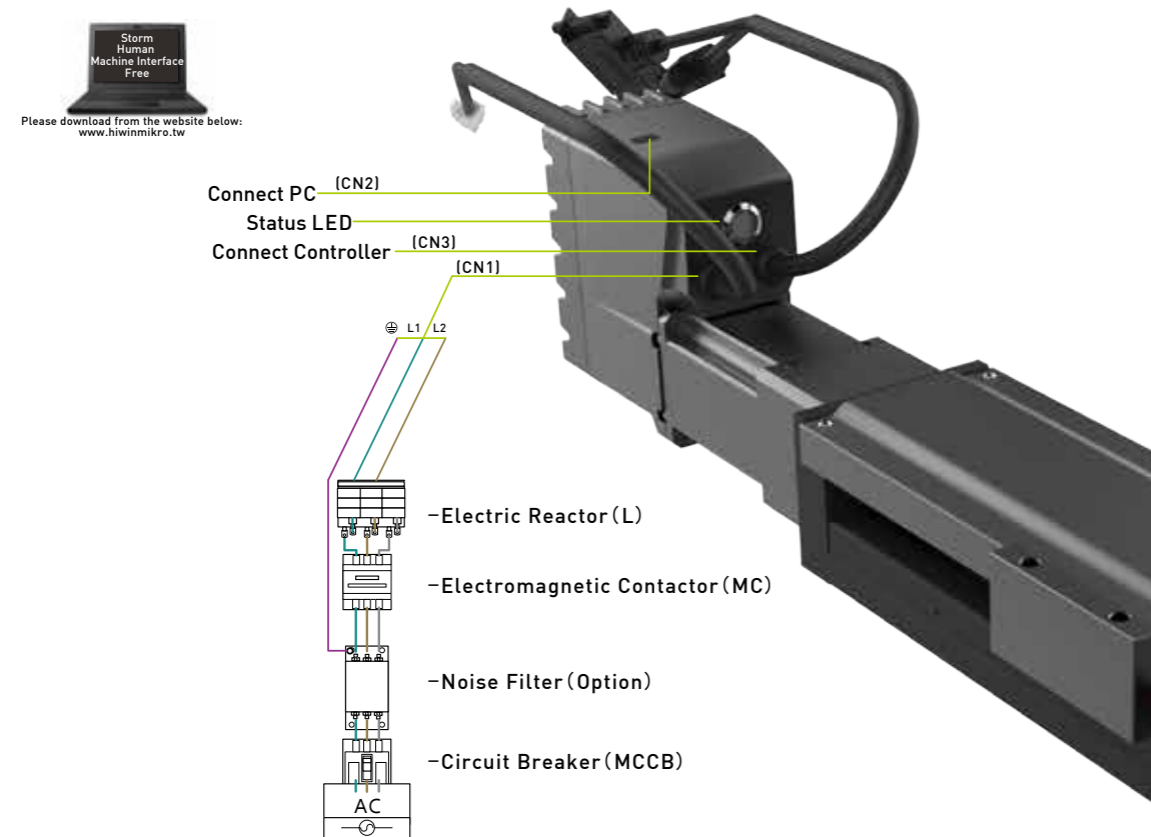
**Drive Input Voltage**  
2 : Single Phase 220VAC

**Holding Brake Options**  
0:Without holding brake  
B:With holding brake

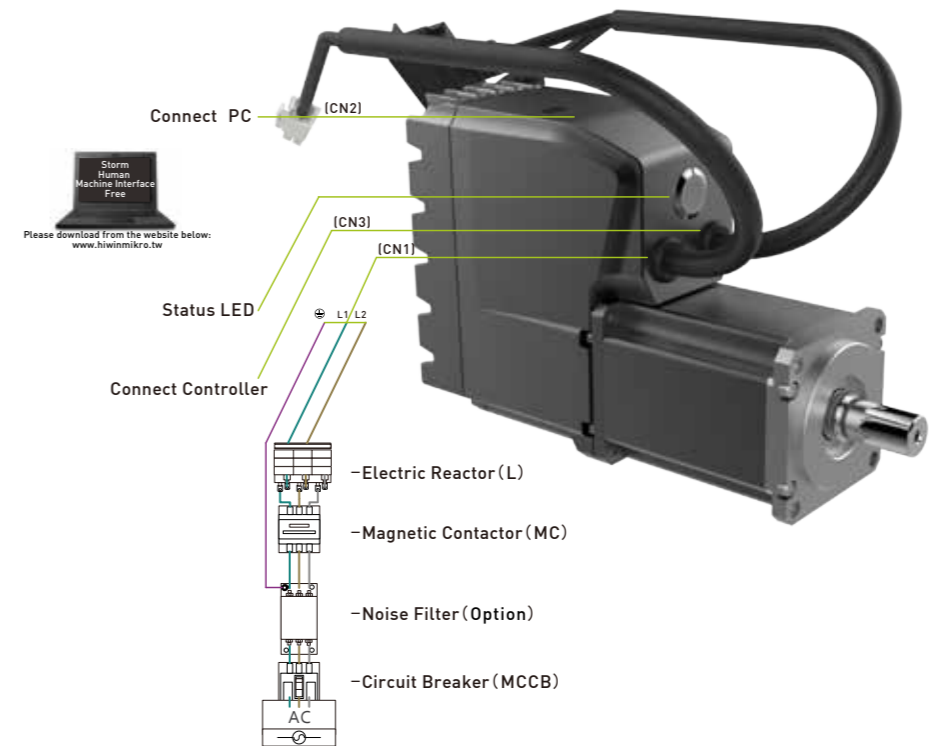
**Motor shaft**  
0: Round shaft / without oil seal  
1: With key and center tap / without oil seal

# 4. Wiring

## abilyrobot



## abilymotor



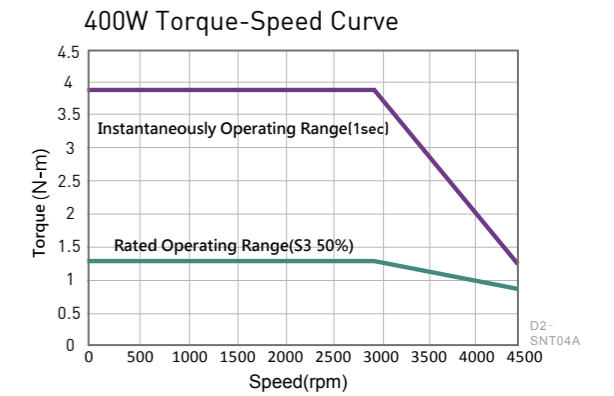
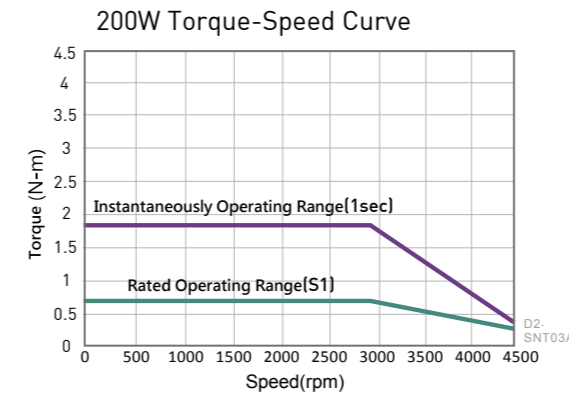
## 5. Specifications

Item	Specification		
Input power	Voltage Range	200VAC~240VAC	
	Frequency Range	50-60 Hz	
	Phase Number	1 Phase	
Environmental	Temperature	Operating Temperature: 0°C ~ 40°C (If the environmental temperature exceeds 40°C, the forced ventilation is needed) Storage Temperature: -20°C ~ 65°C	
	Humidity	0 to 90% RH (No Condensation)	
	Altitude	Under 1000 meters	
	Vibration	1G (10 to 500Hz)	
Output Power	Rated output	200W	400W
	Rated Current	1.7Arms	2.5Arms
	Instantaneous Current	5.1Arms	7.5Arms
	Instantaneous Current Peak Time	Maximum 1 sec	
Motor	Resistance (line to line)	4.3Ω	3.5Ω
	Inductance (line to line)	13 mH	13 mH
	Rated Torque	0.64 N-m	1.27 N-m
	Instantaneous Torque	1.92 N-m	3.81 N-m
	Torque Constant	0.38 N-m/Arms	0.51 N-m/Arms
	Back EMF Constant	23 Vrms/krpm	31.9 Vrms/krpm
	Rated Speed	3000 rpm (abilymotor)	abilyrobot Refer to Table7-2
	Maximum Speed	4500 rpm (abilymotor)	
	Frame	60mm	60mm
Main Circuit Control Mode		IGBT PWM Space vector Modulation	
I/O Signal Connector	Control Signal	Input	General purpose 4 input.
		Output	General purpose 4 output.
	Analog Signal	Input	1 (±10Vdc, 12 bit)
Encoder Resolution	Signal Format	Input	17-bit (131072) serial incremental encoder
		Output	A/B Phase (AqB)
Communication Function		USB	Connect with Computer, 115200bps
LED Indicator		LED Indicator (none, green, red, blinking green, blinking red)	
Control Mode		Stand-alone mode/Position mode/Velociry mode/Torque mode	

Brake Specification	
Static Friction Torque (Minimum)	1.3 N-m
Magnetizing Current	0.32 A
Armature Pullin Time	30 ms
Armature Release Time	20 ms

**Note** The function of brake is used to keep the object stopped, please do not use it for deceleration, dynamic brake or emergency stop. The attract and release time of brake are varied due to different circuit, please pay attention to the delay time of actual movement.

### Torque-Speed Curve





## 6. Functions

Position Control Mode	Control Input		(1) Axis enable, (2) Left Limit Switch, (3) Right Limit Switch, (4) Clear error...etc.
	Control Output		(1) Servo Reay, (2) Errors, (3) In-position...etc.
	Pulse Input	Maximum Input Pulse Frequency	Dedicated for Optocoupler (Single-end Input): 12V~24V, 500 kpps, 2M cnt/s, Dedicated for Line Drive Interface (Differential Input): 5V, 4M pps, 16M cnt/sec
		Input Pulse Signal Format	(1) Pulse/direction (Pulse/Dir); (2) Pulse up/pulse down (CW/CCW); (3) Quadrature (AqB).
		Electronic Gear [ Division / Multiplication of Command Pulse ]	Gear Ratio: pulses/counts pulse: 1~2147483647, counts: 1~2147483647
Smoothing Filter		Smoothing Filter Coefficient: 1~500	
Vibration suppression filter (VSF)		VSF can remove the vibration frequency that occurs during movement. It can reduce the vibration caused by the system's structure and improve the machine's productivity.	
Speed Control Mode	Control Input		(1) Axis enable, (2) Left Limit Switch, (3) Right Limit Switch, (4) Clear error...etc.
	Control Output		(1) Servo Reay, (2) Errors, (3) In-position...etc.
	Analog Input	Velocity Command Input	Velocity command input can be set with analog voltage method, parameters can set ratio and direction +/- 10v.
Torque Control Mode	Control Input		(1) Axis enable, (2) Left Limit Switch, (3) Right Limit Switch, (4) Clear error...etc.
	Control Output		(1) Servo Reay, (2) Errors, (3) In-position...etc.
	Analog Input	Torque Command Input	Torque command input can be provided by means of analog voltage. The parameter for speed limit can be set.
	Speed Limit Function		Speed limit value with parameter is possible.
Common	Auto tune		The procedure is able to adjust the gain automatically, and optimize the servo response performance, no need to spend too much time by the user to adjust the machine by using the trial and error method.
	Emulated encoder feedback output		Setup up of any value is possible (frequency up to 9M cnt/s)
	Protective Function		(1) Motor short detection (2) Over voltage (3) Position error too big(4) Encoder error (5) Soft thermal threshold reached (6) Motor maybe disconnect(7) Amplifier over temperature (8) Under voltage (9) 5 v for encoder card fail...etc
	Error log		Errors and warnings are save in non-volatile memory.
	Other		Backlash Compensation

## 7. abilyrobot module Specification

Table7-1 Ball Screw & Guideway Specification (I)

Model Number	Ball Screw				Guideway								
	Nominal Diameter (mm)	Lead (mm)	Basic Dynamic Load (N)	Basic Static Load (N)	Basic Dynamic Load Rating(N)	Basic Dynamic Load Rating(N)	Static Rated Moment						
							Allowable Static Moment M <sub>p</sub> (N-m) (pitching)		Allowable Static Moment M <sub>y</sub> (N-m) (yawing)		Allowable Static Moment M <sub>r</sub> (N-m) (rolling)		
Block A	Block A	Block A1	Block A2	Block A1	Block A2	Block A1	Block A2						
KK86	Precision	15	10	7144	12642	31458	50764	622	3050	622	3050	1507	3014
	Normal			6429	11387								
KK86	Precision	15	20	4645	7655	31458	50764	622	3050	622	3050	1507	3014
	Normal			4175	6889								

Table 7-2 Ballscrew & Guideway Specification (II)

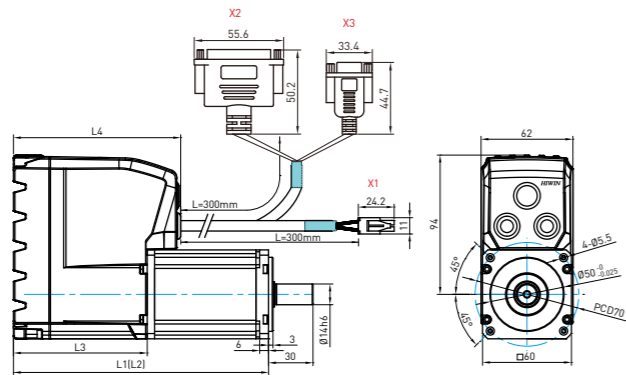
Model Number	Ballscrew Lead	Rail Length	Speed	
			Precision	Normal
	mm	mm	mm/sec	
iKM1-KK086-10-□-340-□	10	340	740	520
iKM1-KK086-10-□-440-□		440	740	520
iKM1-KK086-10-□-540-□		540	740	520
iKM1-KK086-10-□-640-□		640	740	520
iKM1-KK086-10-□-740-□		740	740	520
iKM1-KK086-10-□-940-□		940	610	340
iKM1-KK086-20-□-340-□	20	340	1480	1050
iKM1-KK086-20-□-440-□		440	1480	1050
iKM1-KK086-20-□-540-□		540	1480	1050
iKM1-KK086-20-□-640-□		640	1480	1050
iKM1-KK086-20-□-740-□		740	1480	1050
iKM1-KK086-20-□-940-□		940	1220	870

! Model number refers to: 3. Model Description

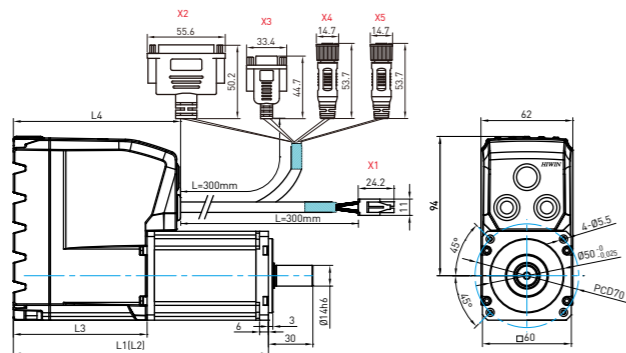
# 8. abilyrobot / abilymotor Dimensions

## 8.1 abilymotor

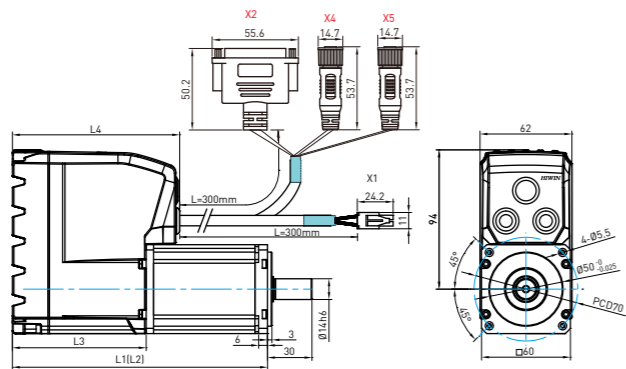
Standard



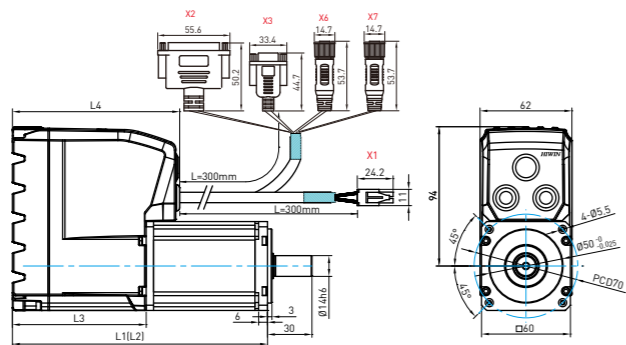
mega-ulink



EtherCAT



Modbus

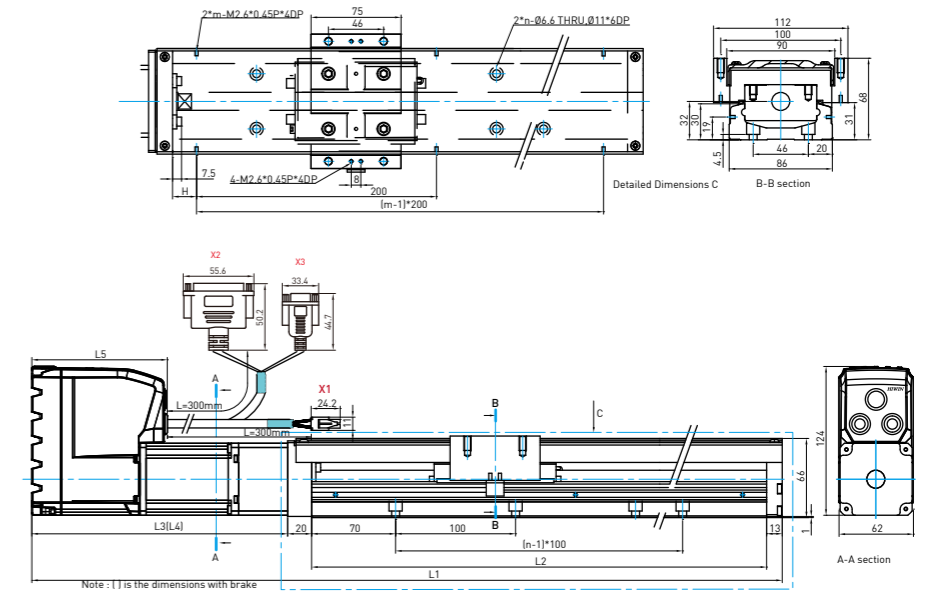


### ■ abilymotor Motor Specification

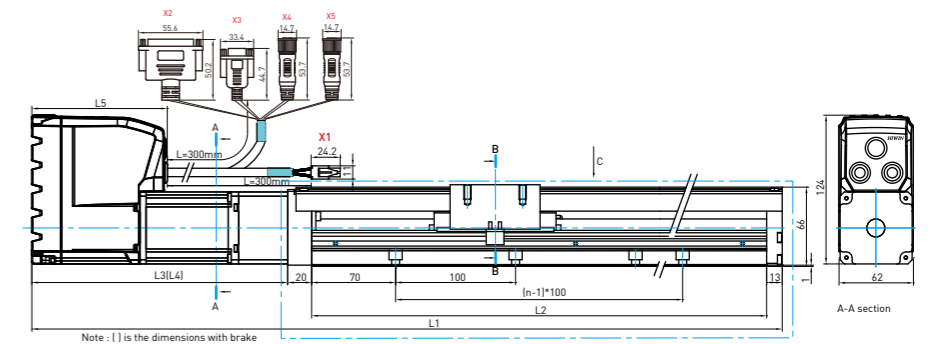
馬達規格	L1 (L2)	L3	L4
iMM1-020-□	145.7 (178.7)	85.3	107.9
iMM1-040-□	172.2 (205.2)	90.3	112.9

## 8.2 abilyrobot - With Cover

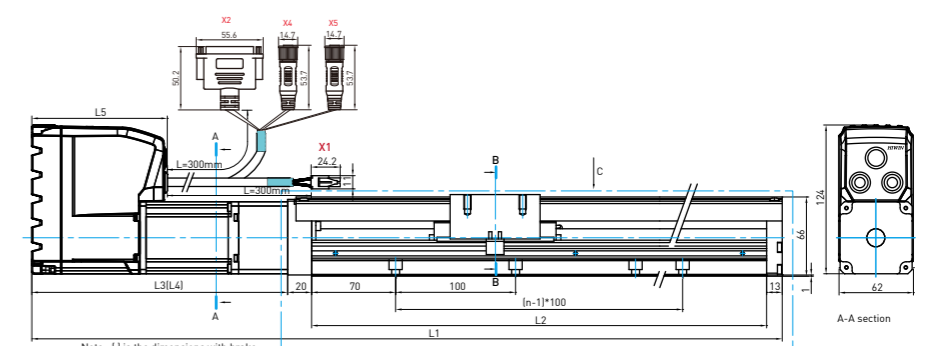
Standard



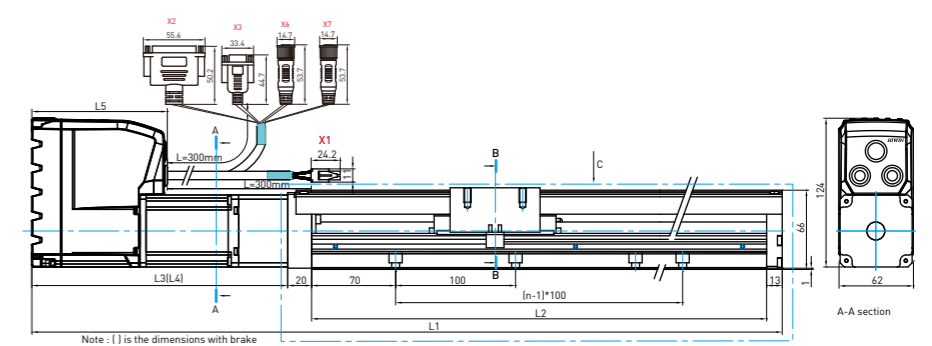
mega-ulink



EtherCAT

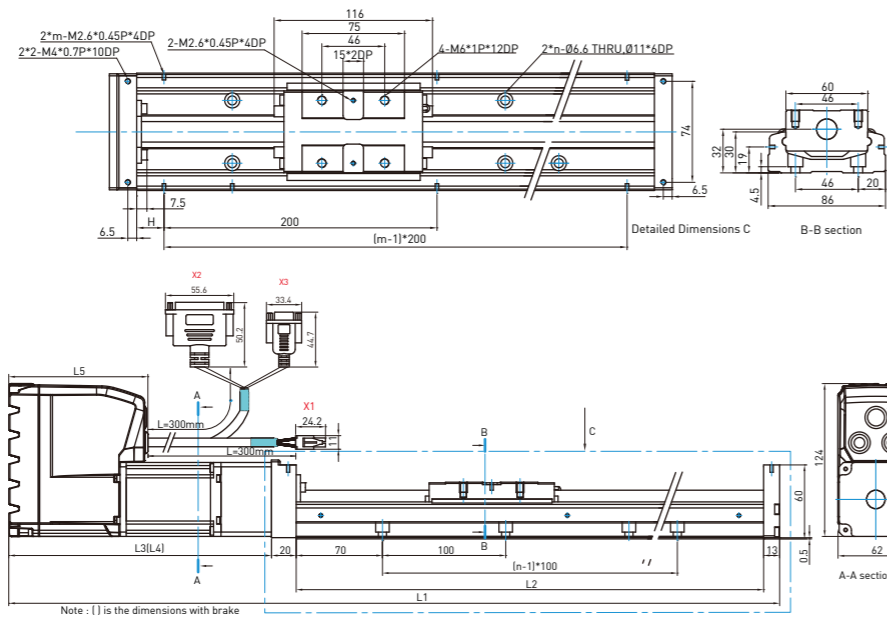


Modbus

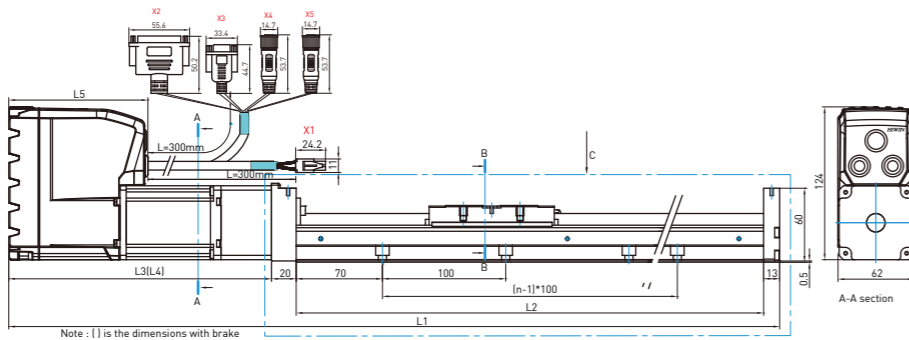


### 8.3 abilyrobot - Without Cover

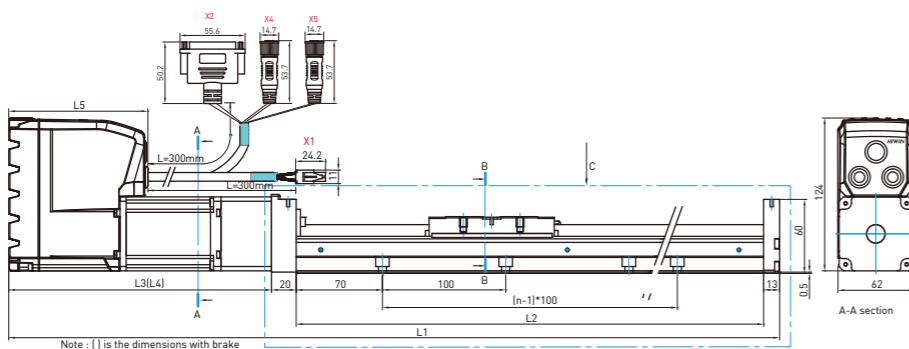
Standard



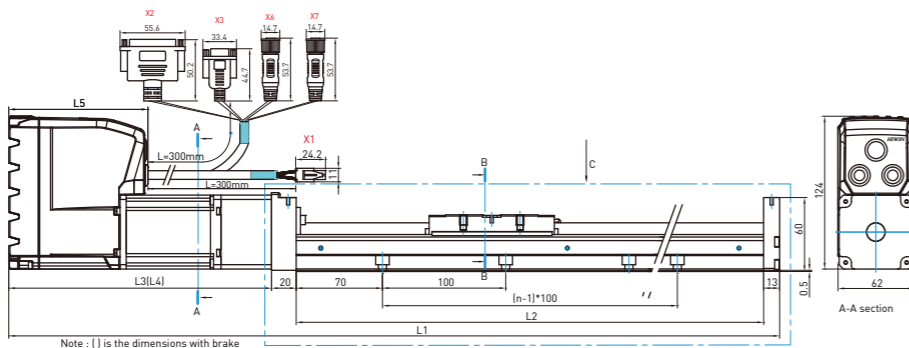
mega-ulink



EtherCAT



Modbus


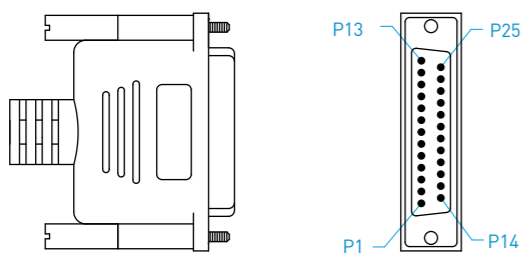
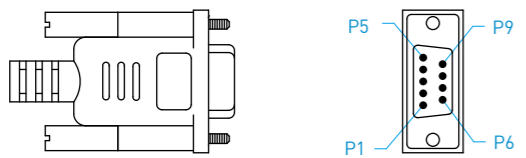




### ■ abilyrobot Specification

Module Specification	L3 (L4)	L5	Rail Length L2	Total Length L1	Maximum Stroke	H	n	m
iKM1-□-020-□	186.7 (219.7)	107.9	340	559.7 (592.7)	210	70	3	2
			440	659.7 (692.7)	310	20	4	3
			540	759.7 (792.7)	410	70	5	3
			640	859.7 (892.7)	510	20	6	4
			740	959.7 (992.7)	610	70	7	4
iKM1-□-040-□	213.2 (246.2)	112.9	340	586.2 (619.2)	210	70	3	2
			440	686.2 (719.2)	310	20	4	3
			540	786.2 (819.2)	410	70	5	3
			640	886.2 (919.2)	510	20	6	4
			740	986.2 (1019.2)	610	70	7	4
			940	1186.2 (1219.2)	810	70	9	5

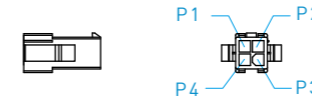
# 9. Cable and Connector

## 9.1 Extension Cable Connector

Icon	Connector Specification	Function
	172159-1 (AMP)	Power
	D-Sub 25 Pin(Male)	I/O
	D-Sub 9(Male)	Pulse
	M12 3pin (Male)	Modbus Communication
	M12 8pin (Male)	EtherCAT/mega-ulink Communication

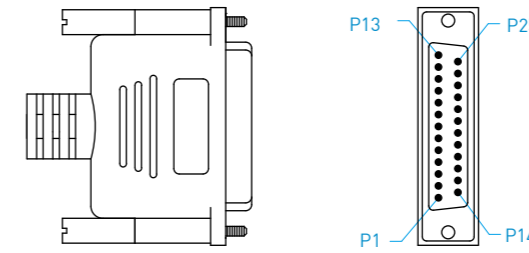
## 9.2 Pin Definition of Extension Cable Connector

### ■ Power Extension Cable Connector



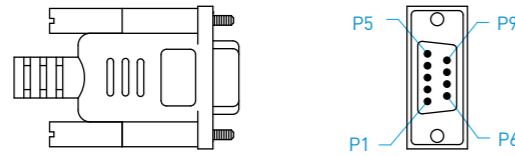
Function	172159-1 (AMP)
N	P1
L	P2
PE	P3
NA	P4

### ■ I/O Extension Cable Connector



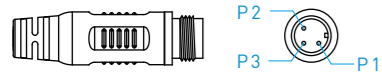
Function	Signal	D-Sub 25 Male	Twisted	Remark
Encoder Output	A	P1	A	MM_ENC_A+
	B	P2	B	MM_ENC_B+
	Z	P3	C	MM_ENC_IND+
	/A	P14	A	MM_ENC_A-
	/B	P15	B	MM_ENC_B-
	/Z	P16	C	MM_ENC_IND-
Input	I1	P4	D	IN-1(Opto-isolated)
	I2	P17	D	IN-2(Opto-isolated)
	I3	P5	E	IN-3(Opto-isolated)
	I4	P18	E	IN-4(Opto-isolated)
Input Common (I1-I4)	ICOM	P6	F	
Output	O1	P7	F	OUT1(Opto-isolated)
	O2	P20	H	OUT2(Opto-isolated)
	O3	P8	H	OUT3(Opto-isolated)
	O4	P21	I	OUT4(Opto-isolated)
Output Common (O1-O4)	OCOM	P19	I	
Power Supply(12V)	+12V	P12	J	
Power Ground (12V)	GND	P13	J	
NA	NA	P9	NA	
NA	NA	P10	NA	
NA	NA	P11	NA	
NA	NA	P22	NA	
NA	NA	P23	NA	
NA	NA	P24	NA	
Frame Ground	FG	P25	NA	

■ Pulse Signal Extension Connector



Function	Signal	D-Sub 9 Male	Twisted	Remark
Single-end Input (12V-24V) Low Speed Pulse Command	CWL	P1	A	PULH1(Opto-isolated)
Differential Input (5V) First Channel: PLS or CW or A phase	CW+	P2	B	
	CW-	P7	B	
Single-end Input (12V-24V) Low Speed Pulse Command	CCWL	P6	A	PULH2(Opto-isolated)
Differential Input (5V) Secondary Channel: DIR or CCW or B phase	CCW+	P3	C	
	CCW-	P8	C	
Analog Input (+/-10V) Velocity or Toqre Command	V_CMD+	P4	D	
	V_CMD-	P9	D	
Frame Ground	FG	P5	NA	

■ Modbus Communication Cable Connector



Function	Signal	Twisted	M12 3PIN (Male)
Modbus Communication Signal	MODBUS_DATA+	A	1
	MODBUS_DATA-	A	2
Modbus Communication Ground	GND	NA	3

■ EtherCAT /megaulink Communication Cable Connector



Function	Signal		Twisted	M12 8PIN(Male)
	X4	X5		
EtherCAT Communication Signal	PHY1_TX+	PHY0_TX+	A	1
	PHY1_TX-	PHY0_TX-	A	2
	PHY1_RX+	PHY0_RX+	B	3
	PHY1_RX-	PHY0_RX-	B	6
EtherCAT Communication Virtual Ground	PHY1_VIRTUAL_GND1	PHY0_VIRTUAL_GND1	C	4
	Virtual Grounding	PHY0_VIRTUAL_GND2	C	7
NA	NA	NA	NA	5
NA	NA	NA	NA	8
NA	NA	NA	NA	Case

9.3 Extension Cable

Product Name	Model Number	Icon
USB Communication Cable	051700800366	
Power Extension Cable	HE00EQHP0300	
I/O Extension Cable	HE00EQHS0300	
Pulse Signal Extension Cable	HE00EQHU0300	
Modbus Communication Extension Cord	HE00EQHM0300	
EtherCAT/mega-ulink Communication Extension Cord	HE00EQHE0300	

9.4 Connection Cable

Product Name	Model Number	Icon
Modbus Communication Connecting Cable	HE00EQHM1300	
EtherCAT/mega-ulink Communication Connecting Cable	HE00EQHE1300	





## **abilyrobot & abilymotor Technical Information**

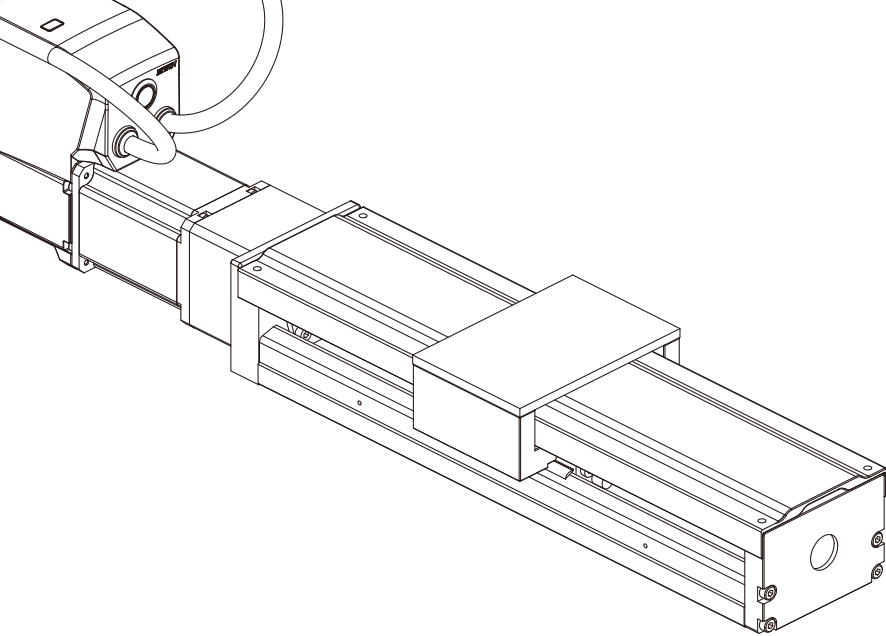
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Motion Control and System Technology

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