WISE Servo Driver and Motor

Selection Guide

(8th Edition)

(For WSDV, WSDA Series)

Weihong Electronic Technology Co., Ltd.

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Preface

About This Manual

This manual is to describe the models, specifications, dimensions and other information of MA, MN, ME and MB series motor and Panasonic A5 and A6 series motor. It can be used as the reference by the users for motor selection.

With 8 chapters, this manual can be divided into 6 parts, as follows:

Part 1: preface, this part gives an introduction to general information of this manual, contact information of some manufacturers and the historical colophon of the manual.

Part 2: chapter 1, this part gives an introduction to the naming rules, types, dimensions, specifications and product features of WISE driver.

Part 3: chapter 2, this part gives an introduction to the wiring of driver, motor and control system.

Part 4: chapter 3, this part gives an introduction to how to match different types of motors according to the rated power (capacity) of driver.

Part 5: This part includes chapter 4~chapter 7. Chapter 4 gives an introduction to the specifications and dimensions of WISE MA, MN, MB and ME series motor. Chapter 5 and Chapter 6 give an introduction to the specifications and dimensions of Panasonic A5 and A 6 series motor. Chapter 7 gives an introduction to the definitions of connectors, cables and the color of cable of connection between driver and motor.

Part 6: chapter 8, this part gives an introduction to calculations for motor selection.

Applicable Product Models

This manual is applicable to WISE servo driver. Refer to the table below for details:

Product Model	Remarks
WISE servo driver	Including WSDV and WSDA series.
MA, MN, ME and MB series motor	-
Panasonic A5 series motor	-
Panasonic A6 series motor	-

Contact Us

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Revision History

You can refer to the following table for the revision records of each edition.

Date	Edition	Revision
2016.10	R6	Translated version of Chinese counterpart R6. Compared with English version R2, main revisions are: (1) Contact information updated; (2) Information about MA, MN, ME, MB and MHMJ series servo motor added; (3) Time registration function updated; (4) Information about connectors for encoder, power and brake added; (5) Specification tables for combination of WISE servo driver and Panasonic servo motor added; (6) Information about the driver WSDV-140 (2.0kW) and WSDV-1R2 (0.2kW) added; (7) Introduction to bus-type driver added; (8) Model designation of Panasonic motor updated; (9) Outline dimensional drawings of ME series motor updated; (10) Other revisions.
2017.06	R7	(1) Driver specification, “24-bit 7-wire serial absolute encoder” added; (2) Wiring of M-Ⅱ bus-type driver added; (3) 17-bit absolute encoder of MA/MN/ME/MB series motor(＞200W) deleted; the outline dimensional drawings of MA/MN/ME/MB series motor updated; the protection level of MA/MN/ME/MB series motor (＜1kW) modified to IP67; (4) “KAA encoder”, “DB1 encoder”, “2: Non-standard oil seal”, extended suffix for special model (⑫/⑬ bit) added; (5) List of combination of WISE driver and MA/MN/ME/MB series motor updated; (6) MN130-□060F-F□□□□□ motor added; (7) MB130-□115C-F□□□□□ motor added; (8) MB100-DA4032F-F□□□□□ motor added;

		(9) The windings connector number of ME series motor updated; (10) The dimensional drawing of ME series motor updated; (11) "4-pin aviation connector YD32K4TSL" of MA/MN/ME/MB series motor added; (12) "4-pin aviation connector XS16K4T for power off brake" of MA/MN/ME/MB series motor added; (13) Connectors for encoder, brake and motor of MA/MN/ME series changed to waterproof connector IP67; (14) Encoder connector to motor SM-6P added; (15) Panasonic A6 series motor added.
2017.07	R7.1	(1) Combination of WISE driver and motor updated; (2) ME060 series motor model designation updated.
2018.09	R8	Translated version of Chinese counterpart R10.1. Compared with English version R7.1, main revisions are: (1) Contact information updated; (2) Information about WSDA series driver added; (3) Value of rotor inertia updated; (4) Examples of wiring diagrams of WSDA series added, see section 2.3 and 2.4; (5) Combination of WISE driver and motor updated, see section 3.1. (6) MA/MN/ME/MB series motor model designations updated, see section 4.1. (7) MA/MN series driver model added, see section 4.2 and 4.3; (8) Size of MB130 series motor updated, see section 4.4.2; (9) Size of ME060 series (non-standard oil seal) updated, see section 4.5.2; (10) IP, material No. and SUNCHU connector added, see chapter 7; (11) Information about connectors and cables added, see chapter 7.

Precautions

Precautions can be divided into caution and warning according to the degree of possible loss or injury in case of negligence or omission of precautions stipulated in this manual.

: general info, mainly for informing, such as supplementary instructions and conditions to enable a function. In case of negligence or omission of this kind of precautions, you may not activate a function. Note that in some circumstances, negligence or omission of even this kind of precautions could cause physical injury or machine damage.

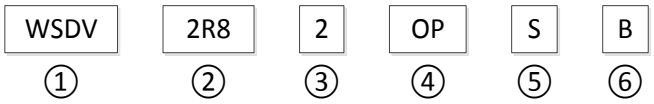
: warning info requiring special attention. In case of negligence or omission of this kind of precautions, you may suffer physical injury, or even death, machine damage or other losses.

Contents

1 WISE Servo Driver

1.1 Model Designation

The model designation of WISE servo driver is shown in Fig. 1-1.



①Product series

Symbol	Spec.
WSDV	V series
WSDA	A series

②Capacity symbol

Symbol	Spec. (kW)
1R2	0.1
2R8	0.4
5R0	0.75
6R8	1.0
110	1.5
140	2.5

③Voltage specification

Symbol	Spec. (V)
2	200

④Interface type

Symbol	Spec.
OP	Pulse train command
AP	Analog voltage-pulse train command
M2	MECHATROLINK-Ⅱ bus communication

⑤Encoder feedback type

Symbol	Spec. (V)
S	Serial communication encoder

⑥Control type

Symbol	Spec.
B	Position control/speed control/torque control
P	Dedicated for position control

Fig. 1-1 Driver model designation、

1.2 Classification

Product Series	Model	Capacity（W）
WSDV Series	WSDV-1R2-□□□□	100
	WSDV-2R8-□□□□	400
	WSDV-5R0-□□□□	750
	WSDV-6R8-□□□□	1000
	WSDV-110-□□□□	1500
	WSDV-140-□□□□	2500
WSDA Series	WSDA-1R2-□□□□	100
	WSDA-2R8-□□□□	400
	WSDA-5R0-□□□□	750
	WSDA-6R8-□□□□	1000
	WSDA-110-□□□□	1500
	WSDA-140-□□□□	2500

CAUTION

For concrete information in symbol "□", please refer to the model designation in section 1.1.

1.3 Product Dimension

The outline dimensional drawings of WSDV series driver (analog•pulse type driver) and WSDA series driver (M-II bus-type driver) are the same. Taking WSDV series driver as an example, this part lists outline dimensional drawing and installation dimensional drawing of drivers of different capacity.

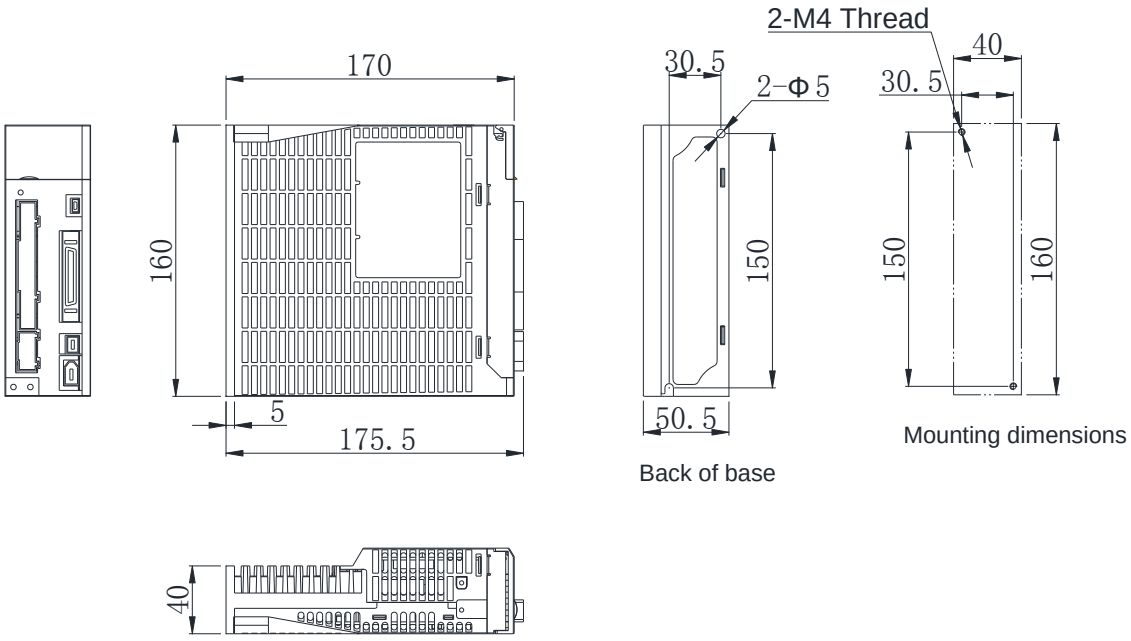


Fig. 1-2 Outline dimensional drawing of WSDV-1R2 and WSDV-2R8

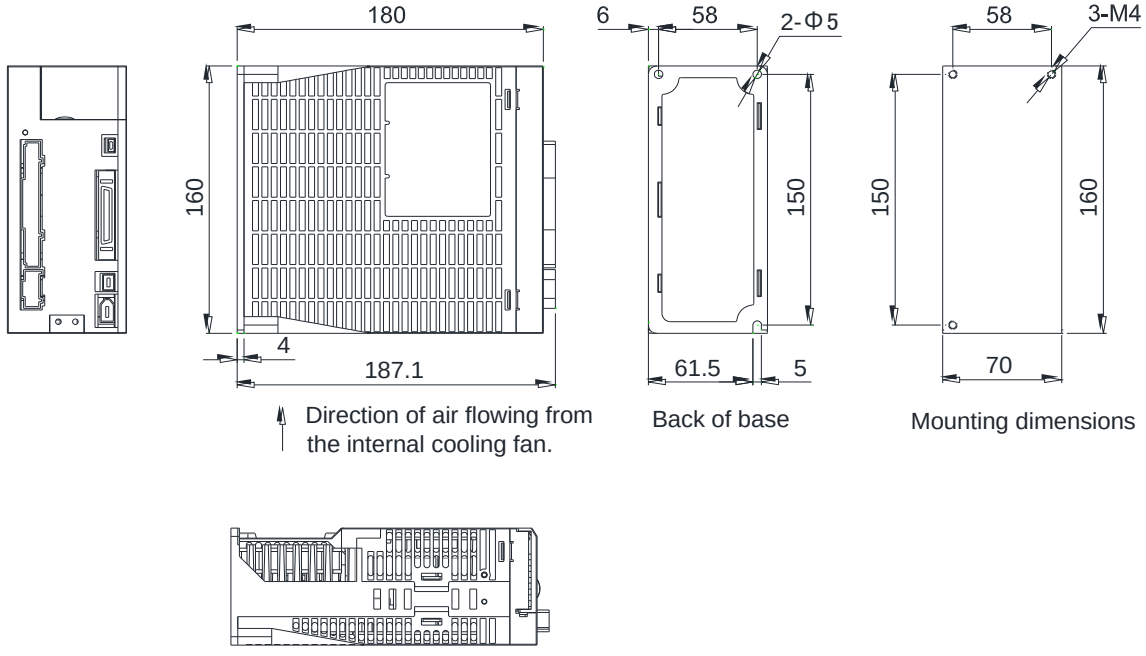


Fig. 1-3 Outline dimensional drawing of WSDV-5R0 and WSDV-6R8

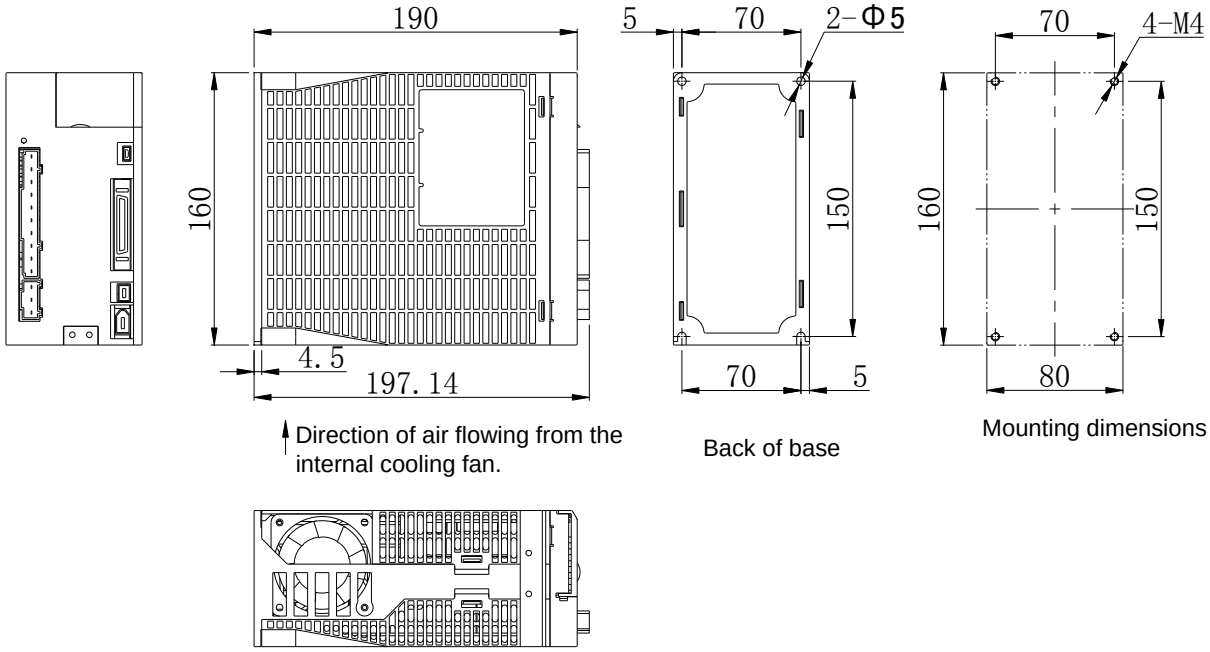


Fig. 1-4 Outline dimensional drawing of WSDV-110 and WSDV-140

1.4 Driver Specifications

◆ **Basic specifications**

Main Circuit Power Supply	WSDV-1R2 WSDV-2R8 WSDV-5R0 WSDV-6R8	WSDA-1R2 WSDA-2R8 WSDA-5R0 WSDA-6R8	single-phase/three-phase 200V~240V $^{+10\%}_{-15\%}$, 50/60Hz
	WSDV-110 WSDV-140	WSDA-110 WSDA-140	three-phase 200V~240V $^{+10\%}_{-15\%}$, 50/60Hz
Control Circuit Power Supply	Single-phase 200V~240V $^{+10\%}_{-15\%}$, 50/60Hz		
Withstand Voltage	AC 1500V or DC 2100V, withstanding voltage for 1min (leakage current should not exceed 10mA).		
Ambient Temperature	0~+55℃ (no freeze and condensation). 0~+45℃ when driver matches some motors, refer to 3.1 for detail.		
Storage Temperature	-20~+65℃ (Max. guarantee: 80℃ for 72h; the relative humidity should not exceed 17%RH)		
IP and Cleanness	IP: IP1X; Cleanness: 2; The environmental requirements are as follows:		

	1) No corrosive gas or combustible gas; 2) No splashing water, oil or drug; 3) Little dust, ash, salt and metal powder.	
Ambient Humidity or Storage Humidity	90%RH or below (No freeze or moisture condensation)	
Control Mode	SVPWM	
Encoder Feedback*1	17-bit 7-wire serial absolute encoder (resolution: 131072); 20-bit 5-wire serial incremental encoder (resolution: 1048576); 23-bit 7-wire serial absolute encoder (resolution: 8388608). 24-bit 7-wire serial absolute encoder (resolution: 16777216).	
Input Pulse Signal Format	Analog•pulse type	2 groups differential inputs (pulse + symbols; CCW pulse + CW pulse; A-phase + B-phase), rate: 1Mpps.
	M-II bus type	Mechatrolink-II high-speed bus
Pulse Output	Feed out encoder feedback pulse (A, B and Z-phase) via line driver.	
Communication Function	1) Connection with PC (iMotion software) via USB.	

Sequence Control Input*2	2) Here are 8 inputs for general purposes (for bus-type, the outputs number is 4). The signals that can be allocated to these 8 inputs are shown as following: 3) Alarm clear A-CLR 4) Internal command speed selection signals INTSPD1, INTSPD2, and INTSPD3 5) Positive direction inhibit signal POT 6) Negative direction inhibit signal NOT 7) Command pulse inhibit INH 8) Servo-on SRV-ON 9) Zero-speed clamp ZEROSPD 10) Gain switching GAIN, etc.	
Sequence Control Output*2	1) 7 outputs for general purposes (for bus-type, the outputs number is 4), among which alarm output ALM is designated to SO3 (for bus-type, ALM is designated to SO1 always), and the rest of 6 outputs are: 2) External brake off BRK-OFF 3) Servo ready output S-RDY 4) In-position INP 5) Zero-speed clamp detection ZSP 6) Torque limit TLC 7) Velocity coincidence V-COIN 8) Arriving at speed AT-SPEED 9) Warning WARN1 10) Velocity limit V-LIMIT, etc.	
Front Panel	5 buttons and 6 LEDs.	
Regenerative Resistor	WSDV-1R2 WSDA-1R2 WSDV-2R8 WSDA-2R8	No internal regenerative resistor (only external type is acceptable)
	WSDV-5R0 WSDA-5R0 WSDV-6R8 WSDA-6R8 WSDV-110 WSDA-110 WSDV-140 WSDA-140	Internal regenerative resistor (external type is also acceptable)
Dynamic Brake	WSDV-1R2 WSDA-1R2 WSDV-2R8 WSDA-2R8	No dynamic brake
	WSDV-5R0 WSDA-5R0 WSDV-6R8 WSDA-6R8 WSDV-110 WSDA-110 WSDV-140 WSDA-140	Internal dynamic brake
Control Mode	Position control; ② Speed control; ③ Torque control.	

1) *1: In WSDA series M-II bus-type driver, there is no 24-bit 7-wire serial absolute encoder.
2) *2: In WSDA series M-II bus-type driver, sequence control input and sequence control output functions are not available.

◆ **Functions**

<table>
<tr><td rowspan="8">Position Control</td><td>Control input</td><td colspan="3">1) Deviation counter clear;
2) Command pulse input inhibition;
3) Command division/multiplication switching;
4) Gain switching input, etc.</td></tr>
<tr><td>Control output</td><td colspan="3">Positioning complete</td></tr>
<tr><td rowspan="5">Pulse input</td><td rowspan="2">Max. pulse input frequency</td><td>Pulse type</td><td>Line drive: 1Mpps
Collector open circuit: 200kpps</td></tr>
<tr><td>Bus type</td><td>16Mpps</td></tr>
<tr><td rowspan="2">Pulse input mode</td><td>Pulse type</td><td>Differential input; Selectable with parameter:
Positive/negative
A and B-phase
Command and direction</td></tr>
<tr><td>Bus type</td><td>Mechatrolink-II high-speed bus</td></tr>
<tr><td colspan="2">Command pulse for de-multiplication and multiplication (electronic gear ratio setup)</td><td>Used within 0.001~32000 multiplication of electronic gear ratio.</td></tr>
<tr><td colspan="2">Filters</td><td>Command smooth filter, FIR type filter and damping filter.</td></tr>
<tr><td>Pulse output</td><td colspan="3">A, B and Z-phase: line driver output.
Division pulse number: 1~1/4 of encoder resolution setup value.</td></tr>
<tr><td rowspan="4">Speed Control</td><td>Control input</td><td colspan="3">1) Internal command velocity selection 1;
2) Internal command velocity selection 2;
3) Internal command velocity selection 3;
4) Zero-speed clamp.</td></tr>
<tr><td>Control output</td><td colspan="3">Speed arrival</td></tr>
<tr><td>Internal speed command</td><td colspan="3">Switching among 8 speeds is enabled by command input.</td></tr>
<tr><td>Speed command Acc./Dec</td><td colspan="3">Individual setup of acceleration and deceleration is enabled. Sigmoid acceleration/deceleration is also enabled.</td></tr>
</table>

	adjustment	
	Zero-speed clamp	Zero speed clamp function only can be available under position control mode or torque control mode.
Torque Control	Control input	Storage input; zero-speed clamp input
	Control output	Speed arrival
	Speed limit	Velocity limit can be set via parameter setting.
	Torque command filters	One first-order low-pass filter and four notch filters

◆ **Protection**

Hardware Protection	Over-voltage, under-voltage, over-current, over-speed, overload, overload of braking resistor, overheat of driver, abnormal encoder, etc.
Software Protection	Storage failure, initial failure, I/O allocation error, excessive position deviation etc.
Failure Logging	Up to 14 failures can be traced.

1.5 Product Features

WISE series servo driver is another expansion in motion control industry chain of Weihong Company. It boasts such functions as auto-gain tuning, auto adaptive mechanical resonance suppression, friction torque compensation, external disturbance observer, gain switching and time register, to name but a few. Thanks to its precise positioning, quick response and ease of use, it has been proven to be an excellent and reliable solution provider when it is used together with Weihong CNC system. Chain-like product combination can effectively reduce components number and type for machine tool builders and facilitate daily maintenance for machines.

◆ **Outstanding positioning precision and low-speed smoothness**

It supports encoder with high resolution, reducing variation of torque, improving positioning precision of motor and enhancing smoothness of low-speed motion. When there is stiffness difference, WISE servo driver can remove oscillation via gain switching function.

◆ **Ease of use**

It features auto calculation of inertia ratio, real-time auto-gain tuning and auto suppression to mechanical resonance.

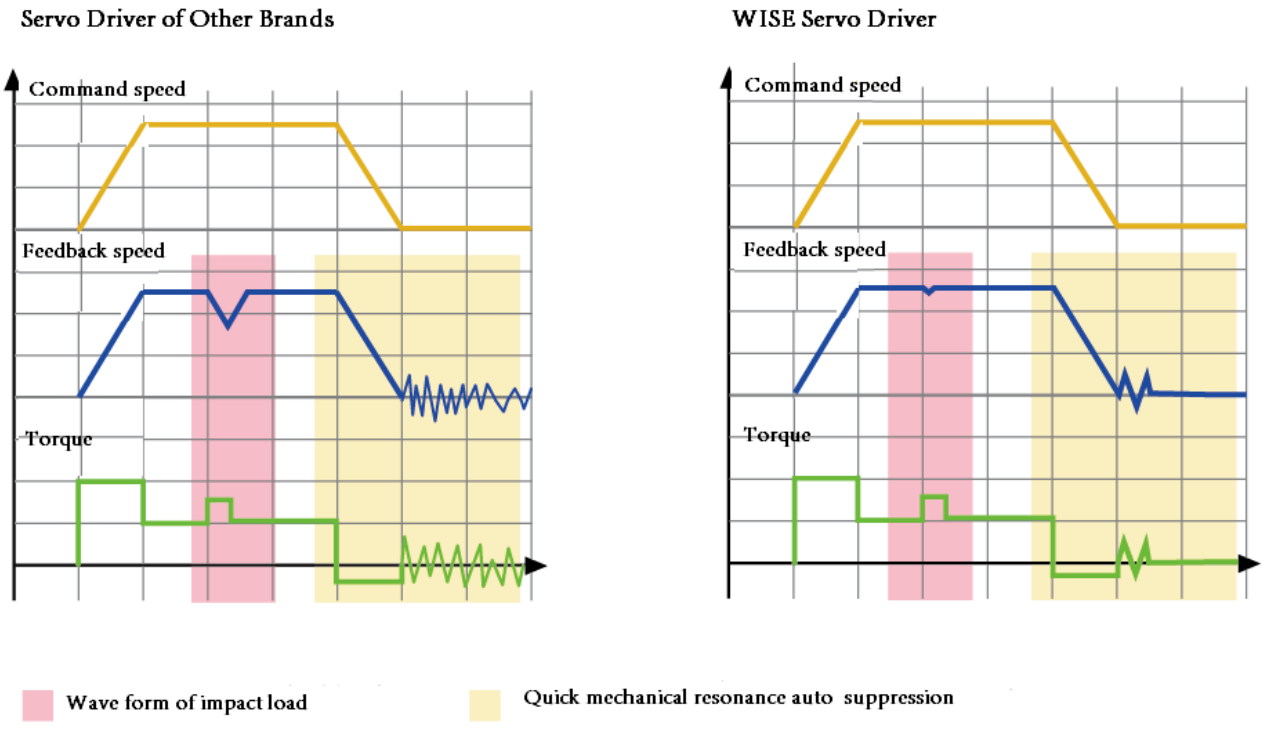


Fig. 1-5 Comparison between counterparts and WISE servo driver

◆ **Powerful support software**

WISE servo driver is user-friendly in HMI, and features functions such as real-time I/O monitoring and auto capture and analysis of waveform.

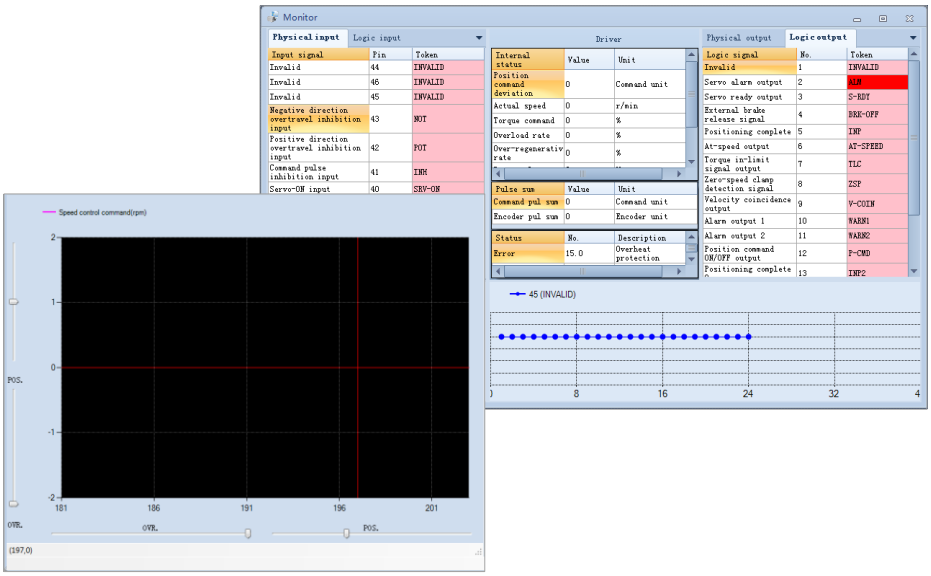


Fig. 1-6 Example of iMotion software

With the “iMotion”, you can execute the following operations.

- Parameters management

Editing, transmission, receipt, import, export and initialization of parameters can be realized, which is very convenient for operators.

- Real-time monitoring

Monitoring of I/O, existing alarms and history alarms, as well as system running status.

- Real-time/Triggered sampling

Main data waves in running will be captured with real-time/triggered sampling function, for debugging and analysis.

- Debugging

Rapidly adjust the servo driver stiffness, automatic calculation of inertia ratio.

- Mechanical analysis

Through FFT algorithm, quickly analyze and find the mechanical resonance point, and automatically setup notch filter to suppress vibration.

- Trial run

With versatile Trial Run interfaces, various application situations in real practices can be simulated.

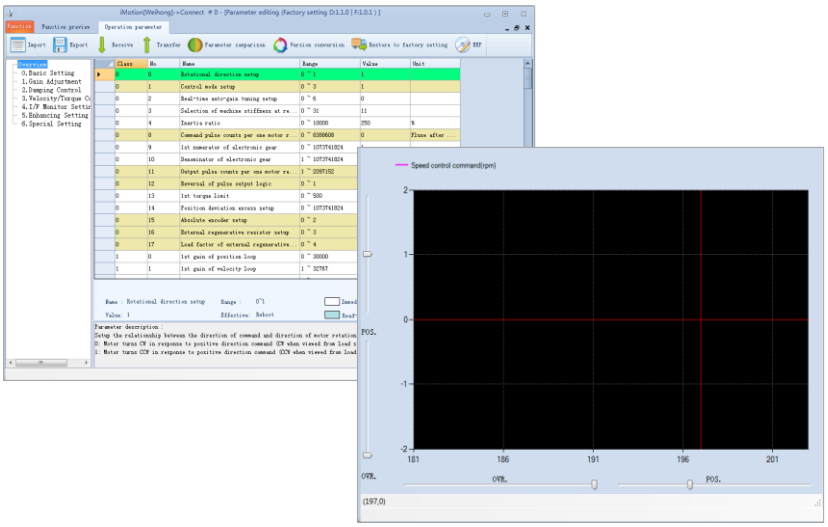


Fig. 1-7 Parameter interface (left) and real-time sampling interface (right)

◆ **Time registration function**

Double encryption for CNC system and servo driver is supported, which will limit the working time of the driver and safeguard manufacturers' legal rights to the greatest degree.

Fig. 1-8 Time registration function

◆ **Wide applications in various industries**

WISE servo driver adopts advanced control algorithms and can realize digital control of torque, rotational speed and position with the help of IPM intelligent module. It features excellent positioning precision and low-speed smoothness, on-line/off-line inertia recognition and real-time auto-gain tuning. Operations are easy. It can be widely applied in industries including milling and engraving, water jet cutting, laser cutting, glass cutting, metal cutting, robot manipulator and textile industry, etc.

Fig. 1-9 Examples of applicable industries

2 Typical Examples of Wiring Diagram

Before wiring, please note the following:

1) When externally wiring to a regenerative resistor, over-temperature protection MUST be provided.
2) Install over-temperature protection fuse and thermostat in the regenerative resistor. And once fuse action occurs, it cannot restore to previous state.
3) Please install the regenerative resistor on non-combustion substances.

2.1 WSDV Series (Analog•pulse Type)

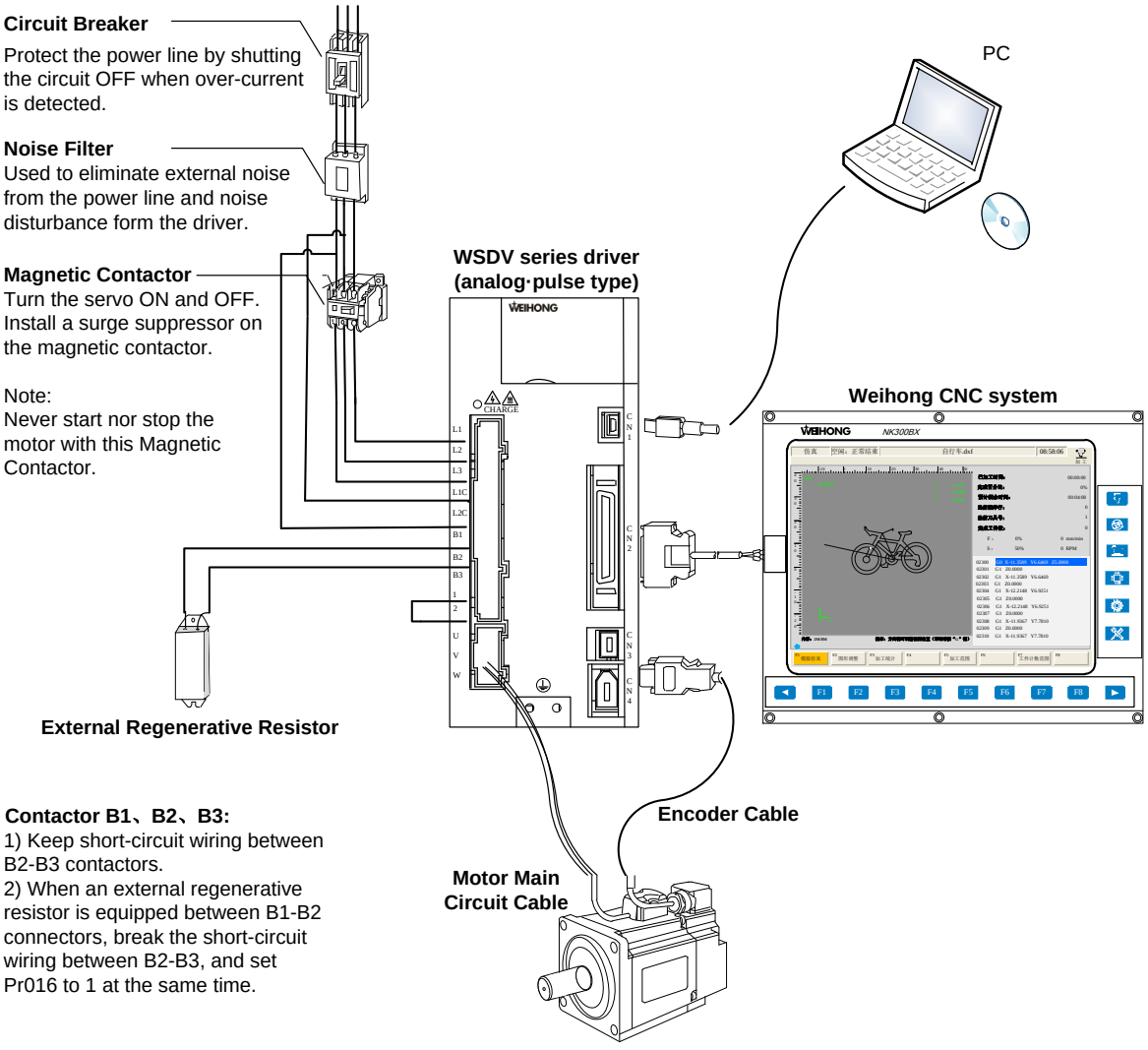


Fig. 2-1 Wiring diagram of WSDV series analog pulse-type driver

2.2 WSDV Series (M-II Bus Type)

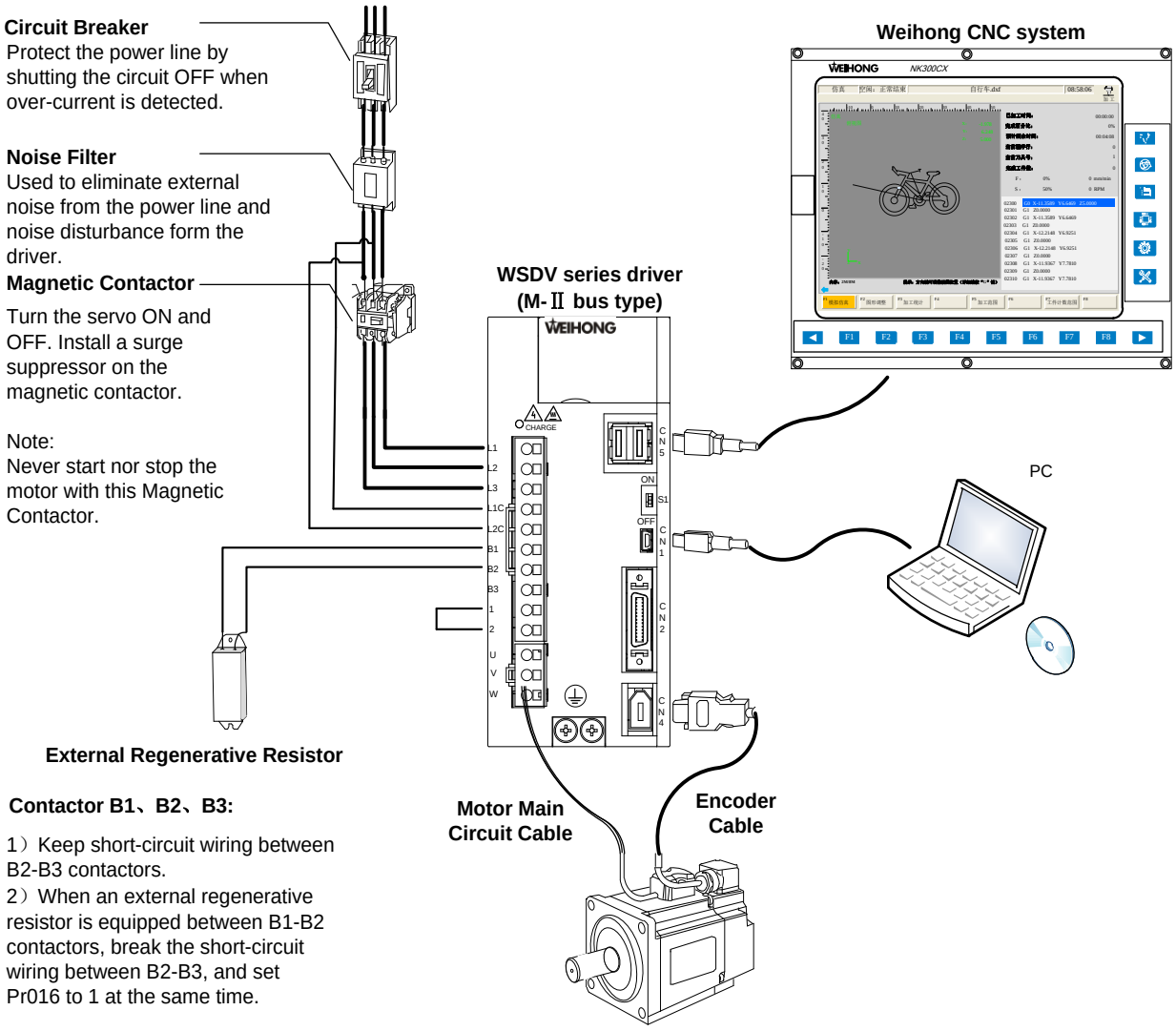


Fig. 2-2 Wiring diagram of WSDV series M-II bus-type driver

2.3 WSDA Series (Analog•pulse Type)

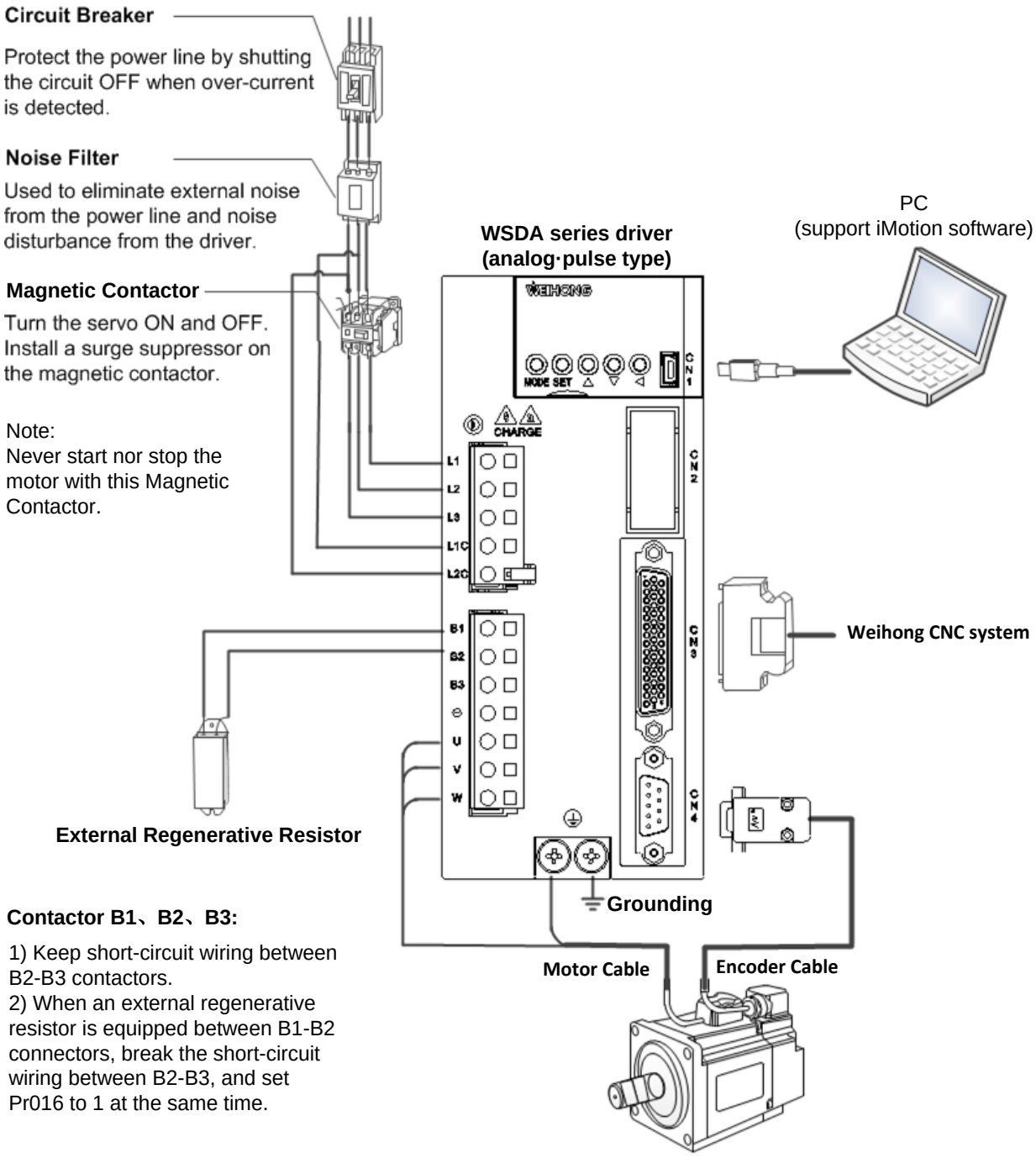


Fig. 2-3 Wiring diagram of WSDA series analog pulse-type driver

2.4 WSDA Series (M-II Bus Type)

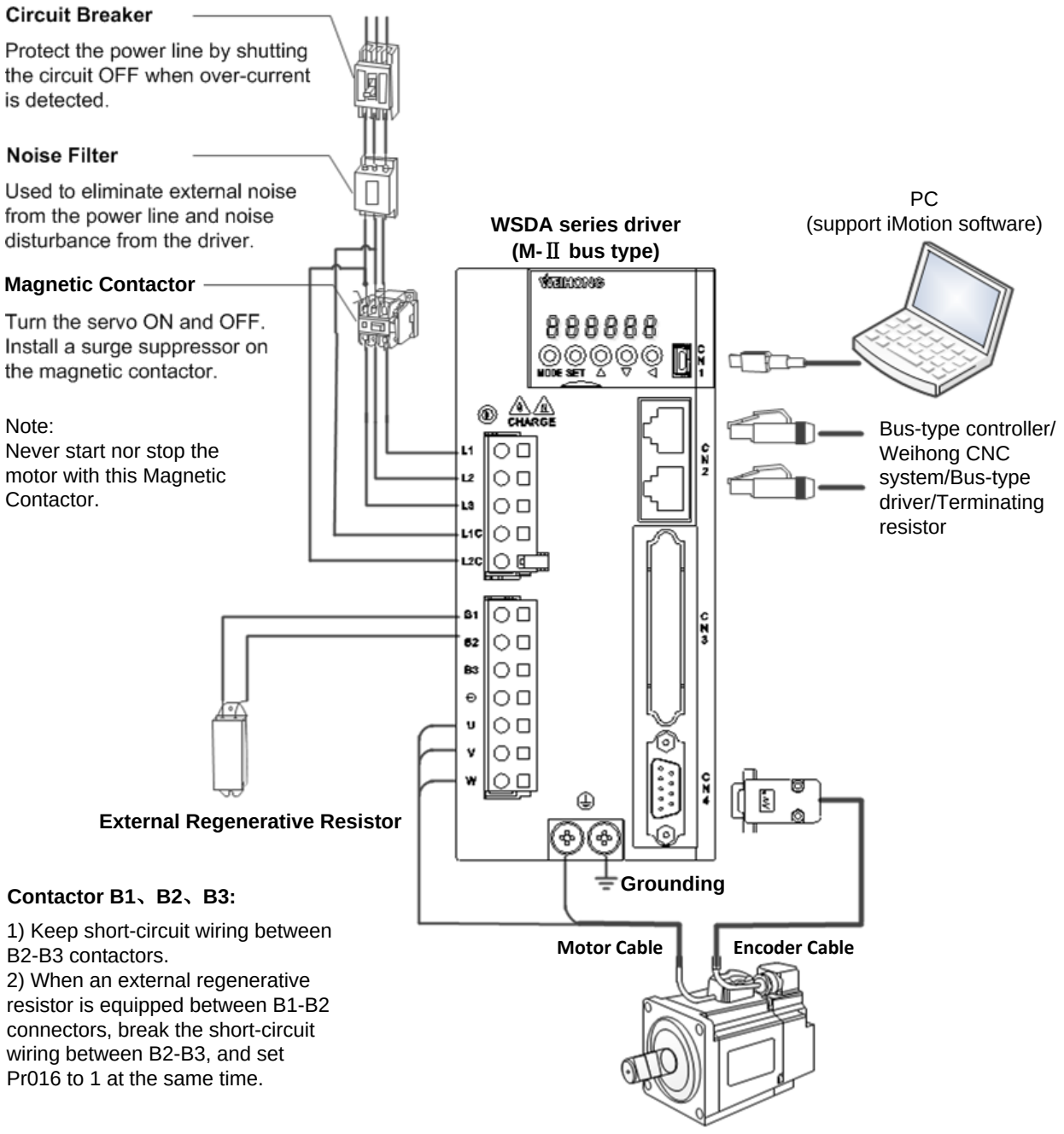


Fig. 2-4 Wiring diagram of WSDV series M-II bus-type driver

3 Combination of WISE Driver and Motor

3.1 Combination of WISE Driver and MA/MN/ME/MB Series

Driver Model	Applicable Motor Model	Rated Current (A)	Rated Power（kW）	Inertia
WSDV-1R2 WSDA-1R2	MA040-□P32F-F□□□□□	0.6	0.1	Low inertia
	ME040-□P32F-F□□□□□	1.1		
	MA060-□P64F-F□□□□□	1.2	0.2	
WSDV-2R8 WSDA-2R8	MA060-□013F-F□□□□□	2.8	0.4	Low inertia
	ME060-□013F-F□□□□□	3.3		
	ME060-□P64F-F□□□□□	1.7	0.2	
WSDV-5R0 WSDA-5R0	MA080-□024F-F□□□□□	3.4	0.75	Low inertia
	ME080-□024F-F□□□□□	5.0		Middle inertia
	MN080-□024F-F□□□□□	3.0		High inertia

Driver Model	Applicable Motor Model	Rated Current (A)	Rated Power（kW）	Inertia
WSDV-6R8 WSDA-6R8	MB130-□054C-F□□□□□	6.9	0.85	Middle inertia
	MB100-DA4032F-F□□□□□	5.0	1.0	Low inertia
	MN080-□035F-F□□□□□*1	4.5		Low inertia
	MN130-□050D-F□□□□□	7.0		High inertia
	MN130-□050E-F□□□□□*1	5.0	1.3	High inertia
WSDV-110 WSDA-110	MB130-□083C-F□□□□□	10.7	1.3	Middle inertia
	MN110-□050F-F□□□□□	6.0	1.5	High inertia
	MN130-□060E-F□□□□□*1			Middle inertia
	MN130-□100C-F□□□□□*1			High inertia
	MN130-□060D-F□□□□□	9.0	1.2	High inertia
	MN130-□060F-F□□□□□*1		1.9	Middle inertia
WSDV-140 WSDA-140	MB130-□115C-F□□□□□	16.7	1.8	Middle inertia
	MN130-□077E-F□□□□□*1	7.5	2.0	High inertia
	MN130-□150C-F□□□□□*1	9.5	2.3	
	MN180-□190C-F1□□□□*1	12	3.0	

CAUTION

1) For concrete information in symbol "□", please refer to the model designations in section 4.1.
2) *1: Ambient temperature is 0～+45℃.

3.2 Combination of WISE Driver and Panasonic A5 Series

Driver	Applicable Motor Model	Rated Power (kW)	Inertia
WSDV-2R8 WSDA-2R8	MHMD042□1□	0.4	High inertia
	MHMJ042□1□		
WSDV-5R0 WSDA-5R0	MHMD082□1□	0.75	High inertia
	MHMJ082□1□		
WSDV-6R8 WSDA-6R8	MDME102□C□M	1.0	Middle/High inertia
	MHME102□C□M		
WSDV-110 WSDA-110	MDME152□C□M	1.5	Middle/High inertia
	MHME152□C□M		

CAUTION

Symbol "□" represents the motor structure. Refer to Section 5.1 for details.

3.3 Combination of WISE Driver and Panasonic A6 Series

Driver	Applicable Motor Model	Rated Power (kW)	Inertia
WSDV-2R8 WSDA-2R8	MHMF022L1U2M	0.2	High inertia
	MHMF042L1U2M	0.4	High inertia
	MHMF042L1V2M		
WSDV-5R0 WSDA-5R0	MHMF082L1U2M	0.75	High inertia
	MHMF082L1V2M		
WSDV-6R8 WSDA-6R8	MDMF102L1G6M	1.0	Middle inertia
WSDV-110 WSDA-110	MDMF152L1G6M	1.5	Middle inertia
	MSMF152L1G6M		Low inertia
WSDV-140 WSDA-140	MDMF202L1G6M	2.0	Middle inertia
	MSMF202L1G6M		Low inertia

4 MA/MN/ME/MB Series

4.1 Model Designation

The model specifications of MA/MN/ME/MB series motor are as shown in Fig. 4-1.

MA	060	–	DA1	013	F	–	F	0	B	1	D0	0	–	01
①	②		③	④	⑤		⑥	⑦	⑧	⑨	⑩	⑪		⑫

①Product series

Symbol	Spec.
MN	Standard
MA	Low inertia
ME	Compact series
MB	Middle inertia,10P

②Flange spec.

Symbol	Spec.
040	40 flange
060	60 flange
080	80 flange
…	…
xxx	xxx flange

③Encoder spec.

Symbol	Spec.
DA1	17-bit photo electronic multi-turn absolute value (integral type)
DB1	17-bit photo electronic multi-turn absolute value (split type)
DA4	23-bit photo electronic multi-turn absolute value (integral type)
KAA	20-bit photo electronic multi-turn absolute value (integral type)
DA6	17-bit photo electronic single-turn absolute value (integral type)

④Torque spec.

Symbol	Spec.(N·m)
P32	0.32
P64	0.64
013	1.3
024	2.4
032	3.2
035	3.5
050	5.0
054	5.39
060	6.0
077	7.7
083	8.34
100	10.0
115	11.5
150	15.0
190	19.0

⑤Rated speed

Symbol	Spec.(r/min)
C	1500
D	2000
E	2500
F	3000

⑥Voltage spec.

Symbol	Spec. (V)
F	220
G	380

⑦Brake type

Symbol	Spec.
0	No brake
1	Electromaganetic brake
2	Permanent maganetic brake

⑧Axis type

Symbol	Spec.
A	Beam shaft
B	Key
C	Flat shaft
D	Cone shaft

⑨Oil seal type

Symbol	Spec.
0	No oil seal
1	Standard
2	Non-standard

⑩Initial polar angle

Symbol	Spec.
D0	Initial polar angle is 0 degree

⑪Face spec.

Symbol	Spec.
0	Flange
1	Footing

⑫Custom type

Symbol	Spec.
01	Motor cable & Encoder cable (length): 1500mm
02	Amp Suntone connector, lead wire and terminal (length): 250mm
03	Keyway (length and width): 40*8mm
04	Motor cable & Encoder cable (length): 3000mm
…	

CAUTION

11 digits refer to standard specification. 12 digits refer to custom specification.

Fig. 4-1 Model specifications of MA/MN/ME/MB series

4.2 MA Series

4.2.1 MA040 Series

Motor Model	MA040-DB1P32F-F□□□□□						
Applicable Driver Model	WSDV-1R2	WSDA-1R2					
Rated Power (kW)	0.1						
Rated Line Voltage (V)	220						
Rated Line Current (A)	0.6						
Rated Rotational Speed (r/min)	3000						
Max. Rotational Speed (r/min)	6000						
Rated Torque (N•m)	0.32						
Peak Torque (N•m)	0.64						
Counter EMF (V/1000r/min)	32.8						
Torque Coefficient (N•m/A)	0.53						
Rotor Inertia (kg•m2)	0.051×10^{-4}						
Windings Resistance (Ω)	34						
Windings Inductance (mH)	40						
Electrical Time Constant (ms)	1.18						
Mass (kg)	0.47						
Motor Insulation Class	Class B						
IP	IP67						
Encoder	17-bit absolute type						
Recommended Load Moment of Inertia	20 times or less						
Ambient Condition	Ambient temperature: -20℃ ~ +40℃ Ambient humidity: relative humidity＜90% (no moisture condensation)						
Motor Windings Connector	Windings lead wire	⏚		U		V	W
	Pin No.	1		2		3	4
Connector for Absolute Encoder (7-wire)	Signal lead wire	E-	E+	SD-	0V	SD+	+5V	⏚
	Pin No.	2	3	4	5	6	7	1

CAUTION

Please consult with Weihong Company when the load moment of inertia ratio exceeds the value in the table.

◆ **Outline dimensional drawing**

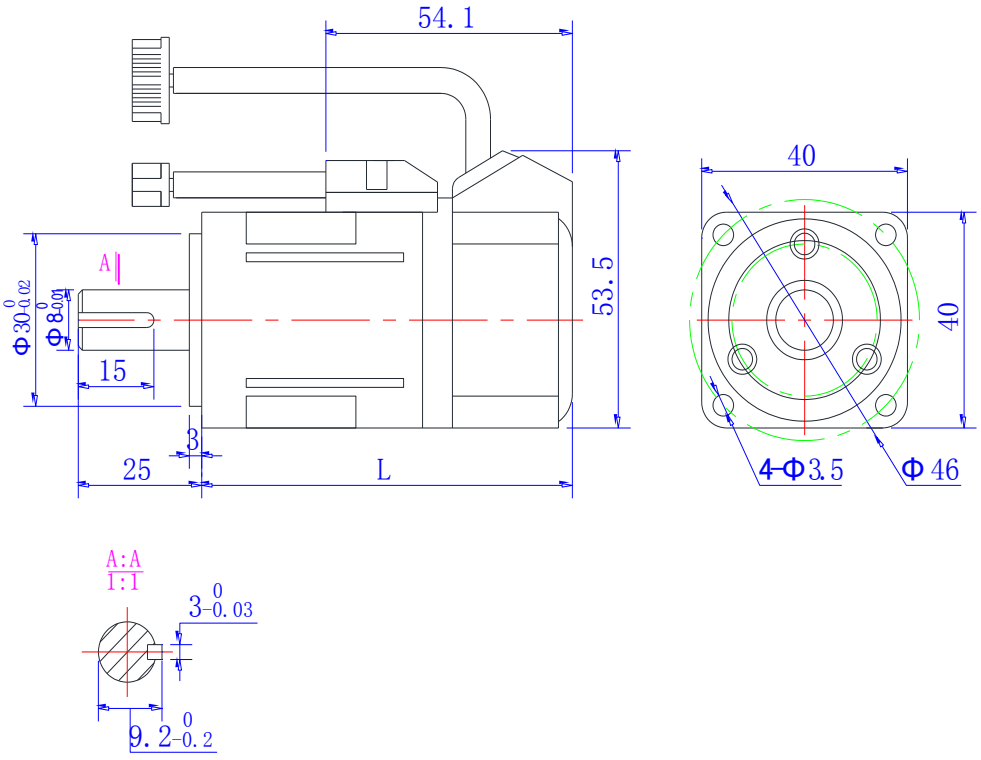


Fig. 4-2 Outline dimensional drawing of MA040 series

Motor Model	Without Brake L (mm)	With Permanent Magnetic Brake L (mm)
MA040-DB1P32F-F□□□□□	90	124

4.2.2 MA060 Series

Motor Model	MA060-□P64F-F□□□□□				MA060-□013F-F□□□□□			
Applicable Driver Model	WSDV-1R2		WSDA-1R2		WSDV-2R8		WSDA-2R8	
Rated Power (kW)	0.2				0.4			
Rated Line Voltage (V)	220				220			
Rated Line Current (A)	1.2				2.8			
Rated Rotational Speed (r/min)	3000				3000			
Max. Rotational Speed (r/min)	6000				6000			
Rated Torque (N•m)	0.637				1.27			
Peak Torque (N•m)	1.91				3.9			
Counter EMF (V/1000r/min)	30.9				29.6			
Torque Coefficient (N•m/A)	0.53				0.45			
Rotor Inertia (kg•m2)	0.175×10^{-4}				0.29×10^{-4}			
Windings Resistance (Ω)	6.18				2.35			
Windings Inductance (mH)	29.3				14.5			
Electrical Time Constant (ms)	4.74				6.17			
Mass (kg)	1.16				1.6			
Motor Insulation Class	Class F				Class F			
IP	IP67				IP67			
Encoder	23-bit/24-bit absolute type				23-bit/24-bit absolute type			
Recommended Load Moment of Inertia	20 times or less							
Ambient Condition	Ambient temperature: -20℃ ~ +40℃ Ambient humidity: relative humidity＜90% (no moisture condensation)							
Motor Windings Connector	Windings lead wire	⏚		U		V		W
	Pin No.	1		2		3		4
Connector for Absolute Encoder (7-wire)	Signal lead wire	E-	E+	SD-	0V	SD+	+5V	⏚
	Pin No.	2	3	4	5	6	7	1

CAUTION

Please consult with Weihong Company when the load moment of inertia ratio exceeds the value in the table.

◆ **Outline dimensional drawing**

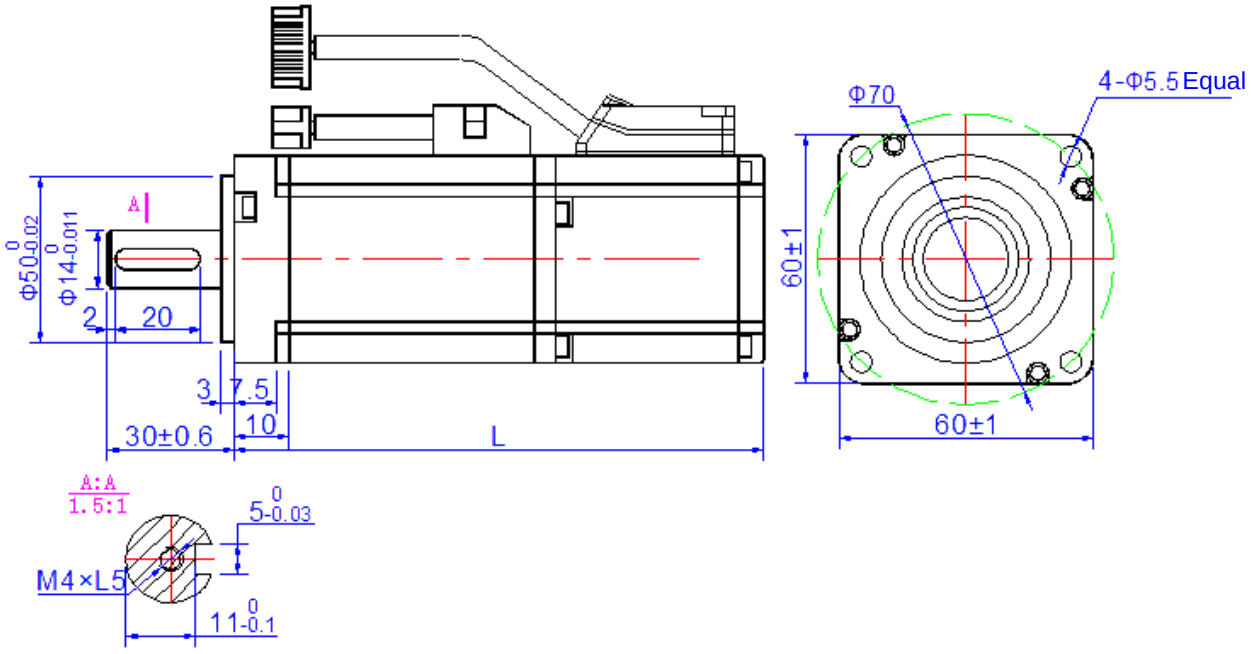


Fig. 4-3 Outline dimensional drawing of MA060 series

Motor Model	Without Brake L (mm)	With Permanent Magnetic Brake L (mm)
MA060-□P64F-F□□□□□	116	164
MA060-□013F-F□□□□□	141	189

4.2.3 MA080 Series

Motor Model	MA080-□024F-F□□□□□							
Applicable Driver Model	WSDV-5R0		WSDA-5R0					
Rated Power (kW)	0.75							
Rated Line Voltage (V)	220							
Rated Line Current (A)	3.4							
Rated Rotational Speed (r/min)	3000							
Max. Rotational Speed (r/min)	4500							
Rated Torque (N•m)	2.4							
Peak Torque (N•m)	7.1							
Counter EMF (V/1000r/min)	56.8							
Torque Coefficient (N•m/A)	0.71							
Rotor Inertia (kg•m2)	0.89×10^{-4}							
Windings Resistance (Ω)	2.93							
Windings Inductance (mH)	20.6							
Electrical Time Constant (ms)	7.03							
Mass (kg)	-							
Motor Insulation Class	Class F							
IP	IP67							
Encoder	23-bit/24-bit absolute type							
Recommended Load Moment of Inertia	20 times or less							
Ambient Condition	Ambient temperature: -20℃ ~ +40℃ Ambient humidity: relative humidity＜90% (no moisture condensation)							
Motor Windings Connector	Windings lead wire	⏚		U		V		W
	Pin No.	1		2		3		4
Connector for Absolute Encoder (7-wire)	Signal lead wire	E-	E+	SD-	0V	SD+	+5V	⏚
	Pin No.	2	3	4	5	6	7	1

CAUTION

Please consult with Weihong Company when the load moment of inertia ratio exceeds the value in the table.

◆ Outline dimensional drawing

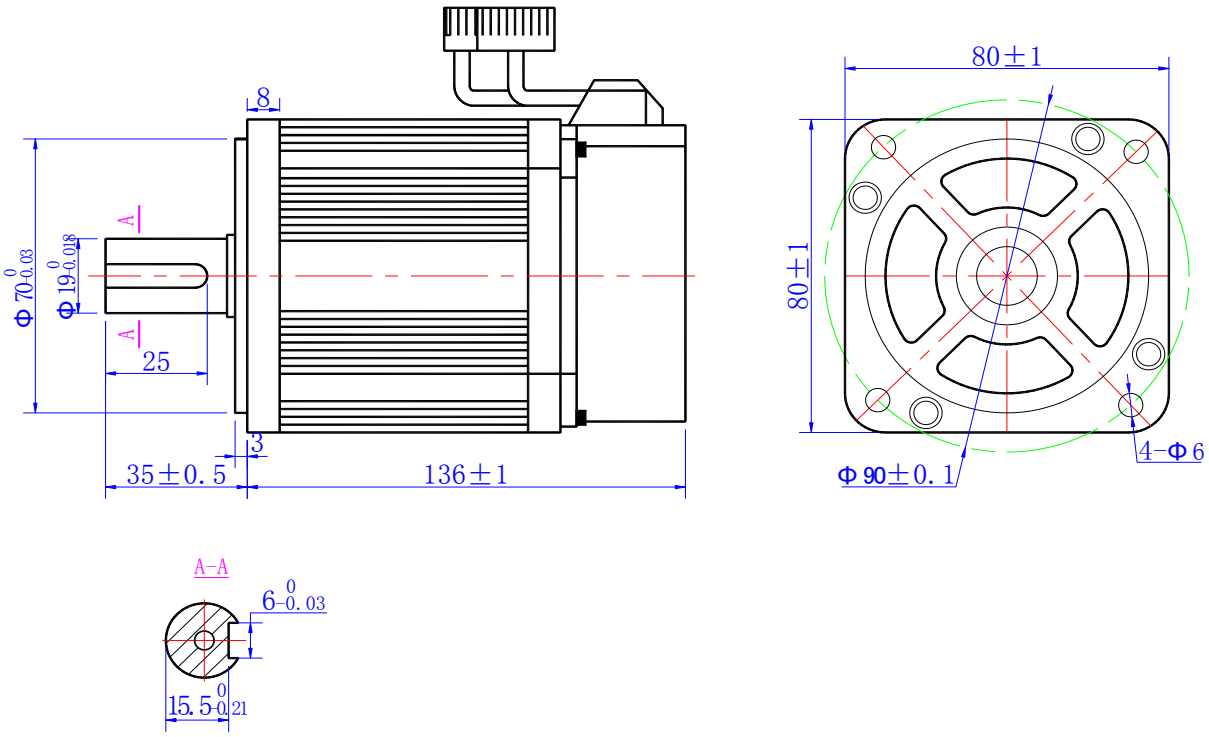


Fig. 4-4 Outline dimensional drawing of MA080 series

4.3 MN Series

4.3.1 MN080 Series

Motor Model	MN080-□024F-F□□□□□				MN080-□035F-F□□□□□			
Applicable Driver Model	WSDV-5R0	WSDA-5R0			WSDV-6R8	WSDA-6R8		
Rated Power (kW)	0.75				1.0			
Rated Line Voltage (V)	220				220			
Rated Line Current (A)	3				4.5			
Rated Rotational Speed (r/min)	3000				3000			
Max. Rotational Speed (r/min)	4000				4000			
Rated Torque (N•m)	2.39				3.5			
Peak Torque (N•m)	7.1				10.5			
Counter EMF (V/1000r/min)	48				46			
Torque Coefficient (N•m/A)	0.8				0.78			
Rotor Inertia (kg•m^2)	1.82×10^{-4}				2.63×10^{-4}			
Windings Resistance (Ω)	2.88				1.7			
Windings Inductance (mH)	6.4				3.76			
Electrical Time Constant (ms)	2.22				2.41			
Mass (kg)	2.9				3.9			
Motor Insulation Class	Class F				Class F			
IP	IP67				IP67			
Encoder	23-bit/24-bit absolute type				23-bit/24-bit absolute type			
Recommended Load Moment of Inertia	10 times or less							
Ambient Condition	Ambient temperature: -20℃ ~ +40℃ Ambient humidity: relative humidity＜90% (no moisture condensation)							
Motor Windings Connector	Windings lead wire	⏚		U		V		W
	Pin No.	1		2		3		4
Connector for Absolute Encoder (7-wire)	Signal lead wire	E-	E+	SD-	0V	SD+	+5V	⏚
	Pin No.	2	3	4	5	6	7	1

CAUTION

Please consult with Weihong Company when the load inertia ratio exceeds the value in the table.

◆ Outline dimensional drawing

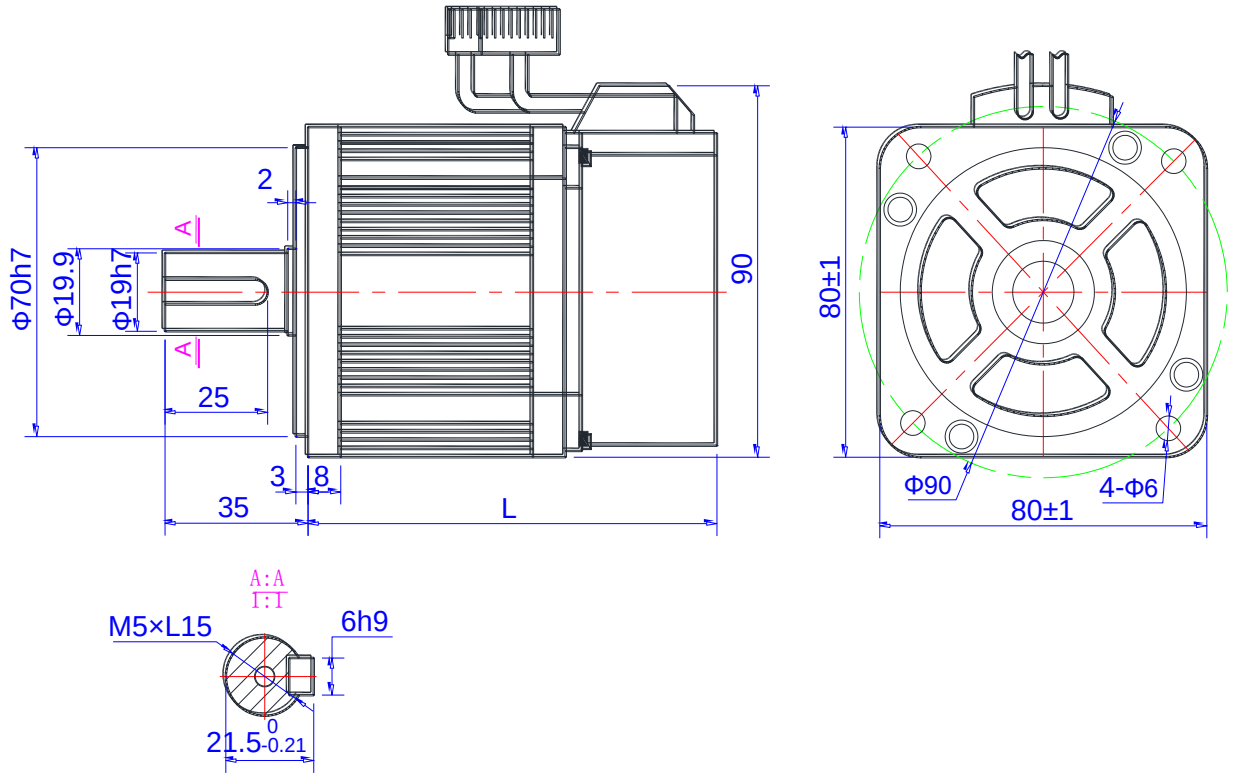


Fig. 4-5 Outline dimensional drawing of MN080 series

Motor Model	Without Brake L (mm)	With Permanent Magnetic Brake L (mm)
MA080-□024F-F□□□□□	151	191
MA080-□035F-F□□□□□	179	219

4.3.2 MN110 Series

Motor Model	MN110-□050F-F□□□□□							
Applicable Driver Model	WSDV-110				WSDA-110			
Rated Power (kW)	1.5							
Rated Line Voltage (V)	220							
Rated Line Current (A)	6.0							
Rated Rotational Speed (r/min)	3000							
Max. Rotational Speed (r/min)	3300							
Rated Torque (N•m)	5							
Peak Torque (N•m)	15							
Counter EMF (V/1000r/min)	62							
Torque Coefficient (N•m/A)	0.83							
Rotor Inertia (kg•m^2)	6.3×10^{-4}							
Windings Resistance (Ω)	1.03							
Windings Inductance (mH)	3.43							
Electrical Time Constant (ms)	3.33							
Mass (kg)	6.8							
Motor Insulation Class	Class F							
IP	IP65							
Encoder	23-bit absolute type							
Recommended Load Moment of Inertia	10 times or less							
Ambient Condition	Ambient temperature: -20℃ ~ +40℃ Ambient humidity: relative humidity＜90% (no moisture condensation)							
Motor Windings Connector	Windings lead wire	⏚		U		V		W
	Pin No.	1		2		3		4
Connector for Absolute Encoder (7-wire)	Signal lead wire	E-	E+	SD-	0V	SD+	+5V	⏚
	Pin No.	2	3	4	5	6	7	1

◆ **Outline dimensional drawing**

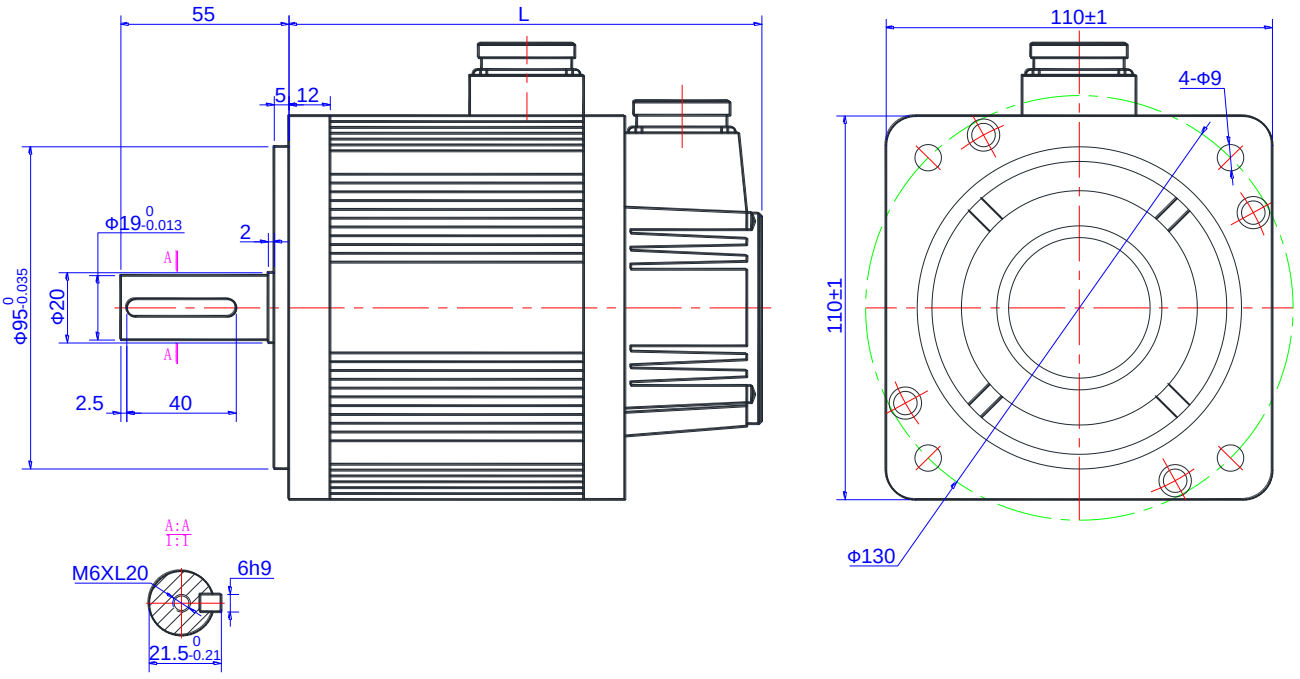


Fig. 4-6 Outline dimensional drawing of MN110 series

Motor Model	Without Brake L (mm)	With Permanent Magnetic Brake L (mm)
MN110-□050F-F□□□□□	204	278

4.3.3 MN130 Series

Motor Model	MA130-□050E-F□□□□□		MA130-□060E-F□□□□□	
Applicable Driver Model	WSDV-6R8	WSDA-6R8	WSDV-110	WSDA-110
Rated Power (kW)	1.3		1.5	
Rated Line Voltage (V)	220		220	
Rated Line Current (A)	5.0		6.0	
Rated Rotational Speed (r/min)	2500		2500	
Max. Rotational Speed (r/min)	2600		2600	
Rated Torque (N•m)	5.0		6.0	
Peak Torque (N•m)	15		18	
Counter EMF (V/1000r/min)	68		65	

Torque Coefficient (N•m/A)	1.0				1.0			
Rotor Inertia (kg•m^2)	10.6×10^{-4}				12.6×10^{-4}			
Windings Resistance (Ω)	1.84				1.21			
Windings Inductance (mH)	4.9				3.87			
Electrical Time Constant (ms)	2.66				3.26			
Mass (kg)	6.6				7.4			
Motor Insulation Class	Class F				Class F			
IP	IP65				IP65			
Encoder	23-bit/24-bit absolute type				23-bit/24-bit absolute type			
Recommended Load Moment of Inertia	5 times or less							
Ambient Condition	Ambient temperature: -20℃ ~ +40℃ Ambient humidity: relative humidity＜90% (no moisture condensation)							
Motor Windings Connector	Windings lead wire	⏚		U		V		W
	Pin No.	1		2		3		4
Connector for Absolute Encoder (7-wire)	Signal lead wire	E-	E+	SD-	0V	SD+	+5V	⏚
	Pin No.	2	3	4	5	6	7	1

Motor Model	MN130-□100C-F□□□□□		MN130-□077E-F□□□□□	
Applicable Driver Model	WSDV-110	WSDA-110	WSDV-140	WSDA-140
Rated Power (kW)	1.5		2.0	
Rated Line Voltage (V)	220		220	
Rated Line Current (A)	6.0		7.5	
Rated Rotational Speed (r/min)	1500		2500	
Max. Rotational Speed (r/min)	1600		2600	
Rated Torque (N•m)	10		7.7	
Peak Torque (N•m)	25		22	
Counter EMF (V/1000r/min)	103		68	
Torque Coefficient (N•m/A)	1.67		1.03	
Rotor Inertia (kg•m^2)	19.4×10^{-4}		15.3×10^{-4}	
Windings Resistance (Ω)	1.5		1.01	
Windings Inductance (mH)	4.37		2.94	

Electrical Time Constant (ms)	2.91					2.91		
Mass (kg)	10.2					8.3		
Motor Insulation Class	Class F					Class F		
IP	IP65					IP65		
Encoder	23-bit/24-bit absolute type					23-bit/24-bit absolute type		
Recommended Load Moment of Inertia	5 times or less							
Ambient Condition	Ambient temperature: -20℃ ~ +40℃ Ambient humidity: relative humidity＜90% (no moisture condensation)							
Motor Windings Connector	Windings lead wire	⏚		U		V		W
	Pin No.	1		2		3		4
Connector for Absolute Encoder (7-wire)	Signal lead wire	E-	E+	SD-	0V	SD+	+5V	⏚
	Pin No.	2	3	4	5	6	7	1

Motor Model	MN130-□060F-F□□□□□		MN130-□150C-F□□□□□	
Applicable Driver Model	WSDV-110	WSDA-110	WSDV-140	WSDA-140
Rated Power (kW)	1.9		2.3	
Rated Line Voltage (V)	220		220	
Rated Line Current (A)	9.0		9.5	
Rated Rotational Speed (r/min)	3000		1500	
Max. Rotational Speed (r/min)	3200		1600	
Rated Torque (N•m)	6		15	
Peak Torque (N•m)	18		30	
Counter EMF (V/1000r/min)	47		114	
Torque Coefficient (N•m/A)	0.67		1.58	
Rotor Inertia (kg•m^2)	12.6×10^{-4}		27.7×10^{-4}	
Windings Resistance (Ω)	0.52		1.1	
Windings Inductance (mH)	1.72		4.45	
Electrical Time Constant (ms)	3.31		4.05	
Mass (kg)	7.4		12.6	
Motor Insulation Class	Class F		Class F	
IP	IP65		IP65	

Encoder	23-bit/24-bit absolute type							
Recommended Load Moment of Inertia	5 times or less							
Ambient Condition	Ambient temperature: -20℃ ~ +40℃ Ambient humidity: relative humidity＜90% (no moisture condensation)							
Motor Windings Connector	Windings lead wire	⏚		U		V		W
	Pin No.	1		2		3		4
Connector for Absolute Encoder (7-wire)	Signal lead wire	E-	E+	SD-	0V	SD+	+5V	⏚
	Pin No.	2	3	4	5	6	7	1

Motor Model	MN130-□050D-F□□□□□		MN130-□060D-F□□□□□	
Applicable Driver Model	WSDV-6R8	WSDA-6R8	WSDV-110	WSDA-110
Rated Power (kW)	1.0		1.2	
Rated Line Voltage (V)	220		220	
Rated Line Current (A)	7.0		9.0	
Rated Rotational Speed (r/min)	2000		2000	
Max. Rotational Speed (r/min)	4000		4000	
Rated Torque (N•m)	5.0		6.0	
Peak Torque (N•m)	15		18	
Counter EMF (V/1000r/min)	50		44	
Torque Coefficient (N•m/A)	0.71		0.67	
Rotor Inertia (kg•m^2)	10.6×10^{-4}		12.6×10^{-4}	
Windings Resistance (Ω)	1.05		0.58	
Windings Inductance (mH)	2.64		1.72	
Electrical Time Constant (ms)	2.51		2.96	
Mass (kg)	6.6		7.4	
Motor Insulation Class	Class F		Class F	
IP	IP65		IP65	
Encoder	23-bit/24-bit absolute type		23-bit/24-bit absolute type	
Recommended Load Moment of Inertia	5 times or less			

Ambient Condition	Ambient temperature: -20℃ ~ +40℃ Ambient humidity: relative humidity＜90% (no moisture condensation)							
Motor Windings Connector	Windings lead wire	U		V		W		PE
	Pin No.	2		3		4		1
Connector for Absolute Encoder (7-wire)	Signal lead wire	PE	E-	E+	SD-	0V	SD+	+5V
	Pin No.	1	2	3	4	5	6	7

CAUTION

1) Please consult with Weihong Company when the load moment of inertia ratio exceeds the value in the table.
2) For motors of MN130-□100C-F□□□□□ type, the maximum rotational speed cannot exceed 1700r/min.

◆ **Outline dimensional drawing**

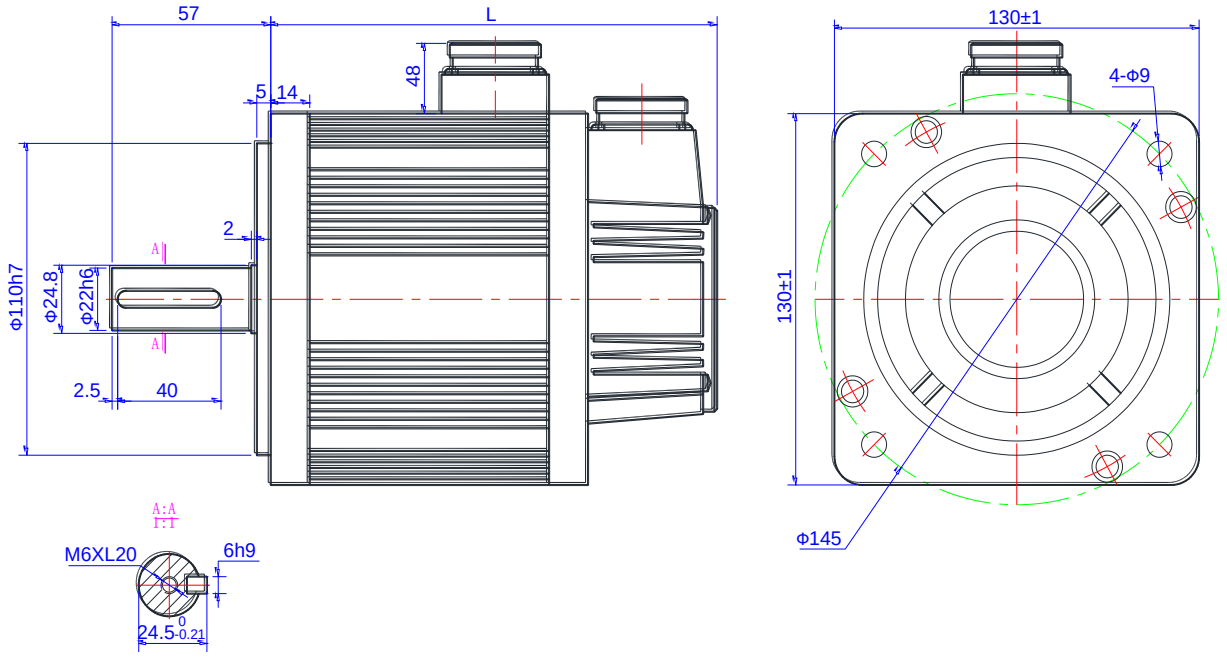


Fig. 4-7 Outline dimensional drawing of MN130 series

Motor Model	Without Brake L (mm)	With Permanent Magnetic Brake L (mm)
MN130-□050E-F□□□□□	171	228
MN130-□060E-F□□□□□	179	236
MN130-□100C-F□□□□□	213	294
MN130-□077E-F□□□□□	192	249
MN130-□060F-F□□□□□	179	-
MN130-□150C-F□□□□□	241	322
MN130-□050D-F□□□□□	171	228
MN130-□060D-F□□□□□	179	236

4.3.4 MN180 Series

Motor Model	MN180-□190C-F1□□□□	
Applicable Driver Model	WSDV-140	WSDA-140
Rated Power (kW)	3.0	
Rated Line Voltage (V)	220	
Rated Line Current (A)	12	
Rated Rotational Speed (r/min)	1500	
Max. Rotational Speed (r/min)	1600	
Rated Torque (N•m)	19	
Peak Torque (N•m)	47	
Counter EMF (V/1000r/min)	97	
Torque Coefficient (N•m/A)	1.58	
Rotor Inertia (kg•m^2)	38×10^{-4}	
Windings Resistance (Ω)	0.4	
Windings Inductance (mH)	2.42	
Electrical Time Constant (ms)	6	
Mass (kg)	20.5	
Motor Insulation Class	Class F	
IP	IP65	
Encoder	23-bit/24-bit absolute type	

Recommended Load Moment of Inertia	5 times or less							
Ambient Condition	Ambient temperature: -20℃ ~ +40℃ Ambient humidity: relative humidity＜90% (no moisture condensation)							
Motor Windings Connector	Windings lead wire	⏚		U		V		W
	Pin No.	1		2		3		4
Connector for Absolute Encoder (7-wire)	Signal lead wire	E-	E+	SD-	0V	SD+	+5V	⏚
	Pin No.	2	3	4	5	6	7	1

CAUTION

Please consult with Weihong Company when the load moment of inertia ratio exceeds the value in the table.

◆ **Outline dimensional drawing**

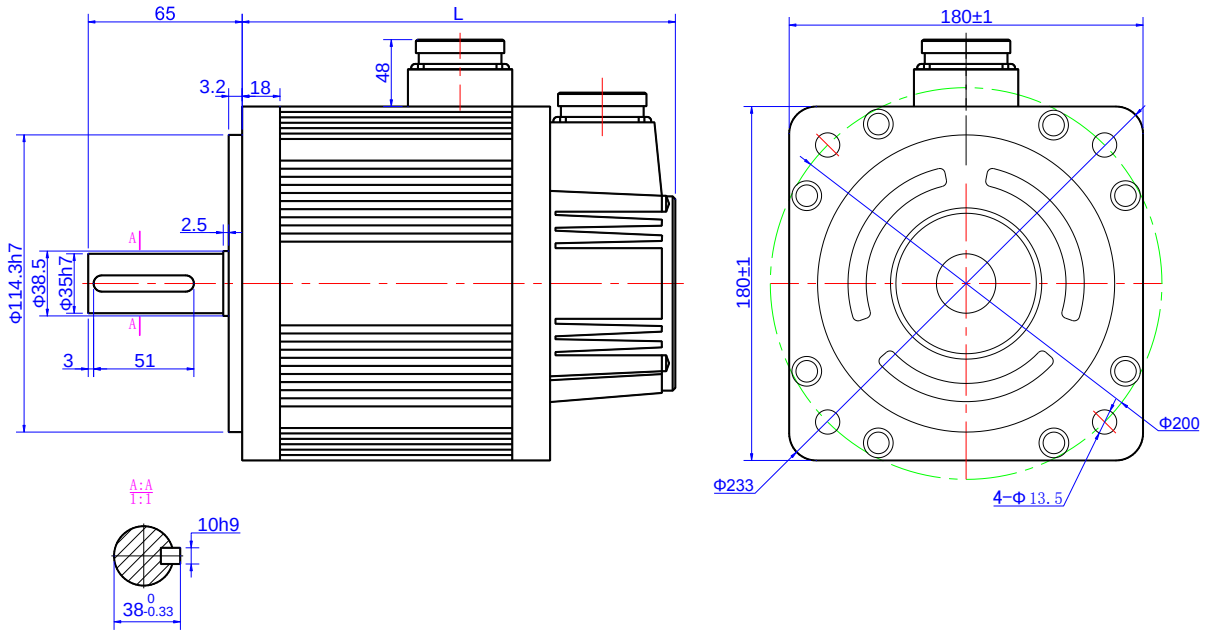


Fig. 4-8 Outline dimensional drawing of MN180 series

Motor Model	Without Brake L (mm)	With Permanent Magnetic Brake L (mm)
MN180-□190C-F1□□□□□	232	304

4.4 MB Series

4.4.1 MB100 Series

Motor Model	MB100-DA4032F-F□□□□□							
Applicable Driver Model	WSDV-6R8				WSDA-6R8			
Rated Power (kW)	1.0							
Rated Line Voltage (V)	220							
Rated Line Current (A)	5.0							
Rated Rotational Speed (r/min)	3000							
Max. Rotational Speed (r/min)	5000							
Rated Torque (N•m)	3.2							
Peak Torque (N•m)	9.6							
Counter EMF (V/1000r/min)	39.5							
Torque Coefficient (N•m/A)	0.64							
Rotor Inertia (kg•m^2)	2.458×10^{-4}							
Windings Resistance (Ω)	0.98							
Windings Inductance (mH)	8.91							
Electrical Time Constant (ms)	9.09							
Mass (kg)	4.04							
Motor Insulation Class	Class F							
IP	IP65							
Encoder	23-bit/24-bit absolute type							
Recommended Load Moment of Inertia	30 times or less							
Ambient Condition	Ambient temperature: -20℃ ~ +40℃ Ambient humidity: relative humidity＜90% (no moisture condensation)							
Motor Windings Connector	Windings lead wire	⏚		U		V		W
	Pin No.	1		2		3		4
Connector for Absolute Encoder (7-wire)	Signal lead wire	E-	E+	SD-	0V	SD+	+5V	⏚
	Pin No.	2	3	4	5	6	7	1

◆ Outline dimensional drawing

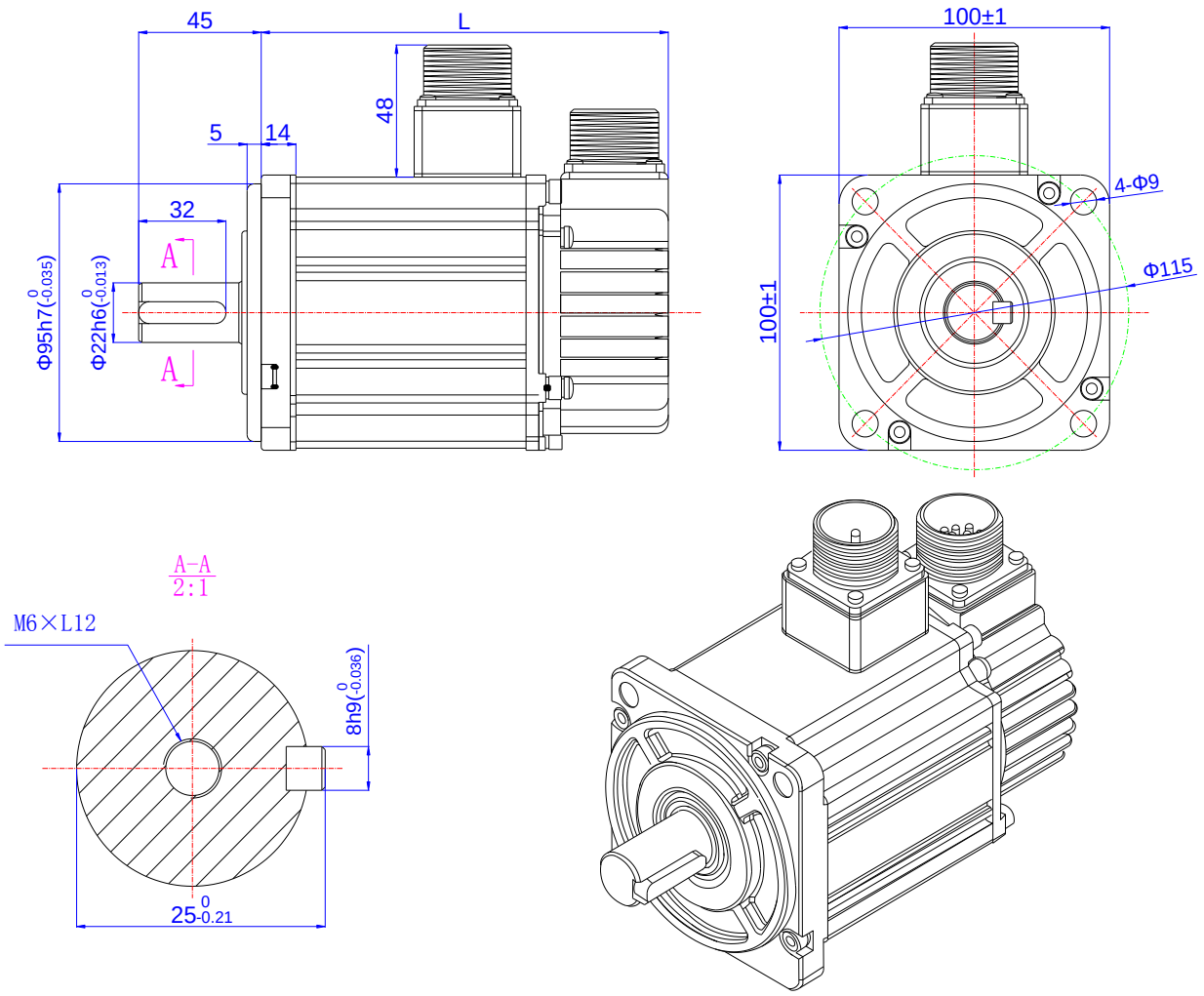


Fig. 4-9 Outline dimensional drawing of MB100-DA4032F-F□□□□□

Motor Model	Without Brake L (mm)	With Permanent Magnetic Brake L (mm)
MB100-DA4032F-F□□□□□	153	194

4.4.2 MB130 Series

Motor Model	MB130-□054C-F□□□□□				MB130-□083C-F□□□□□			
Applicable Driver Model	WSDV-6R8	WSDA-6R8			WSDV-110	WSDA-110		
Rated Power (kW)	0.85				1.3			
Rated Line Voltage (V)	220				220			
Rated Line Current (A)	6.9				10.7			
Rated Rotational Speed (r/min)	1500				1500			
Max. Rotational Speed (r/min)	4000				4000			
Rated Torque (N•m)	5.39				8.34			
Peak Torque (N•m)	13.8				23.3			
Counter EMF (V/1000r/min)	52.9				53.7			
Torque Coefficient (N•m/A)	0.78				0.78			
Rotor Inertia (kg•m^2)	13.9×10^{-4}				19.9×10^{-4}			
Windings Resistance (Ω)	0.96				0.54			
Windings Inductance (mH)	11.1				8.43			
Electrical Time Constant (ms)	11.6				15.6			
Mass (kg)	5.5				7.1			
Motor Insulation Class	Class F				Class F			
IP	IP65				IP65			
Encoder	23-bit/24-bit absolute type				23-bit/24-bit absolute type			
Recommended Load Moment of Inertia	5 times or less							
Ambient Condition	Ambient temperature: -20℃ ~ +40℃ Ambient humidity: relative humidity＜90% (no moisture condensation)							
Motor Windings Connector	Windings lead wire	⏚		U		V		W
	Pin No.	A		B		C		D
Connector for Absolute Encoder (7-wire)	Signal lead wire	E-	E+	SD-	0V	SD+	+5V	⏚
	Pin No.	2	3	4	5	6	7	1

Motor Model	MB130-□115C-F□□□□□							
Applicable Driver Model	WSDV-140				WSDA-140			
Rated Power (kW)	1.8							
Rated Line Voltage (V)	220							
Rated Line Current (A)	16.7							
Rated Rotational Speed (r/min)	1500							
Max. Rotational Speed (r/min)	3600							
Rated Torque (N•m)	11.5							
Peak Torque (N•m)	28.7							
Counter EMF (V/1000r/min)	52							
Torque Coefficient (N•m/A)	0.76							
Rotor Inertia (kg•m^2)	26×10^{-4}							
Windings Resistance (Ω)	0.4							
Windings Inductance (mH)	6.2							
Electrical Time Constant (ms)	14							
Mass (kg)	4.04							
Motor Insulation Class	Class F							
IP	IP65							
Encoder	23-bit/24-bit absolute type							
Recommended Load Moment of Inertia	5 times or less							
Ambient Condition	Ambient temperature: -20℃ ~ +40℃ Ambient humidity: relative humidity＜90% (no moisture condensation)							
Motor Windings Connector	Windings lead wire	⏚		U		V		W
	Pin No.	D		A		B		C
Connector for Absolute Encoder (7-wire)	Signal lead wire	E-	E+	SD-	0V	SD+	+5V	⏚
	Pin No.	2	3	4	5	6	7	1

CAUTION

Please consult with Weihong Company when the load moment of inertia ratio exceeds the value in the table.

◆ Outline dimensional drawing

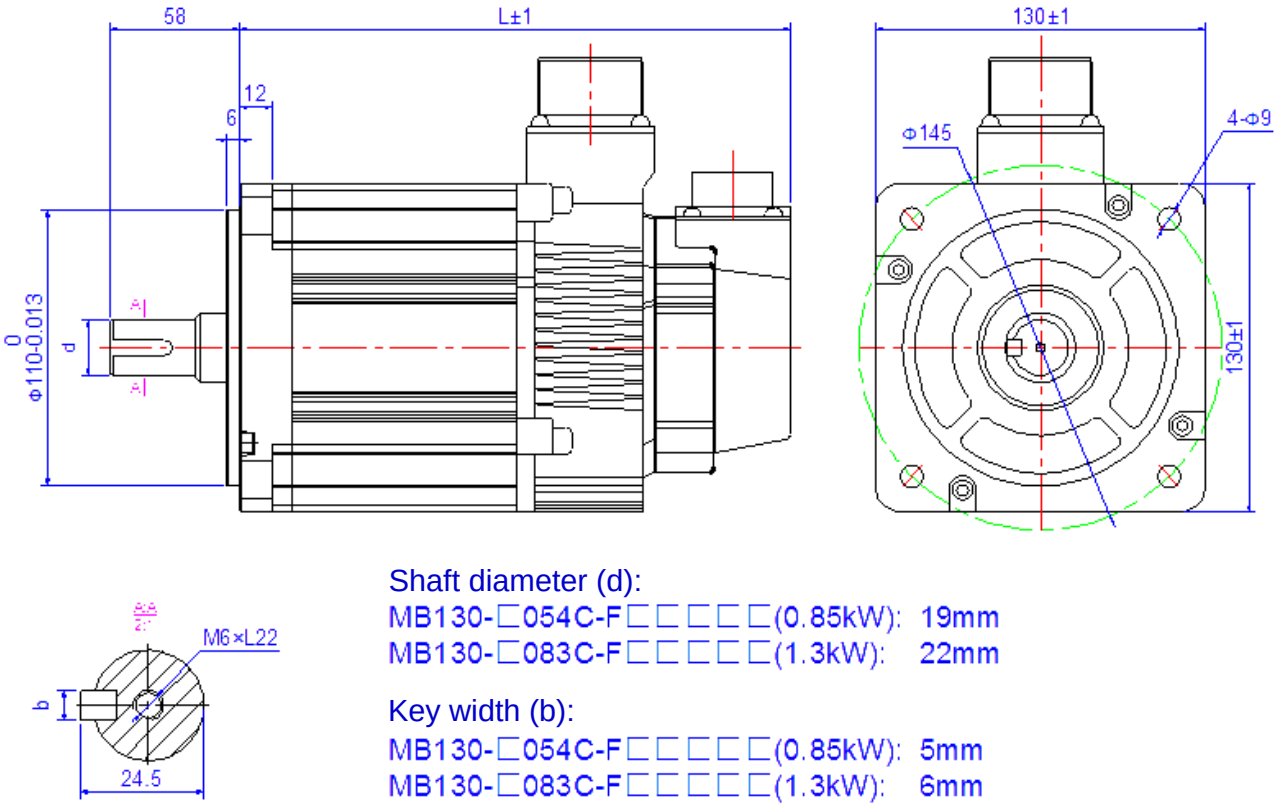


Fig. 4-10 Outline dimensional drawing of MB130 series (0.85kW/1.3kW, without brake)

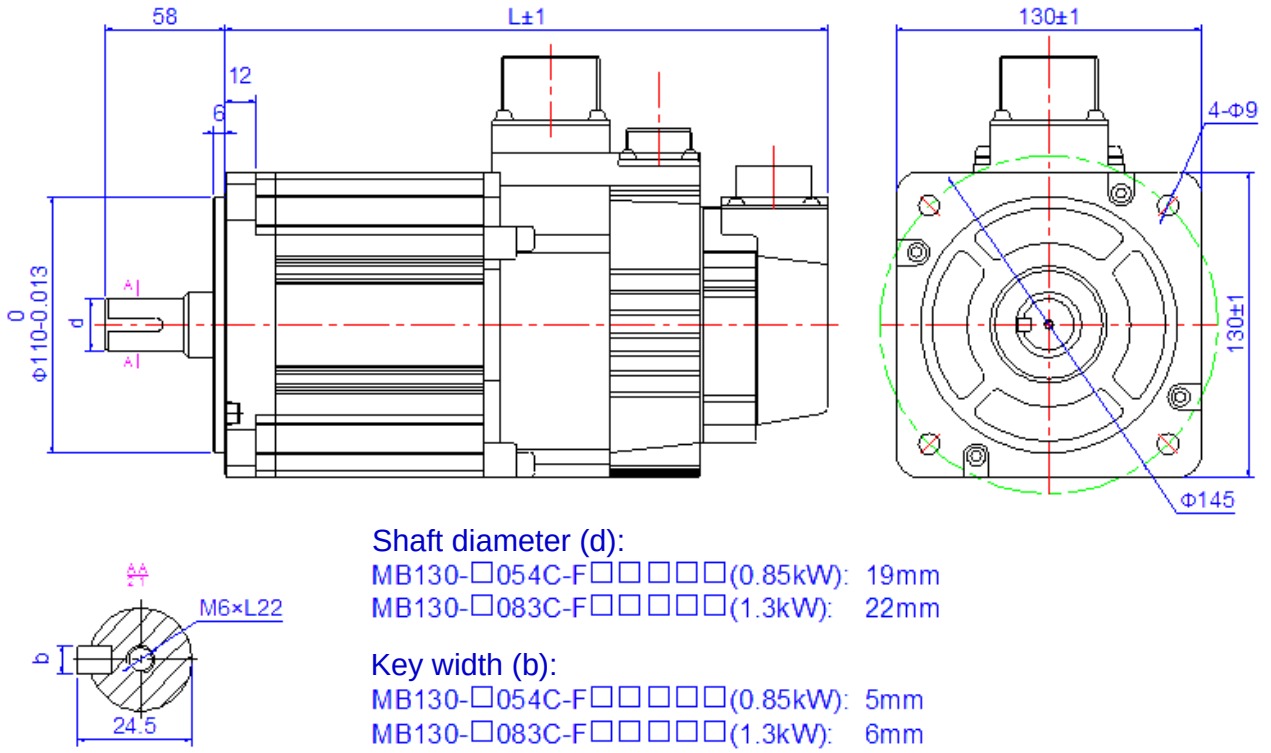


Fig. 4-11 Outline dimensional drawing of MB130 series (0.85kW/1.3kW, with brake)

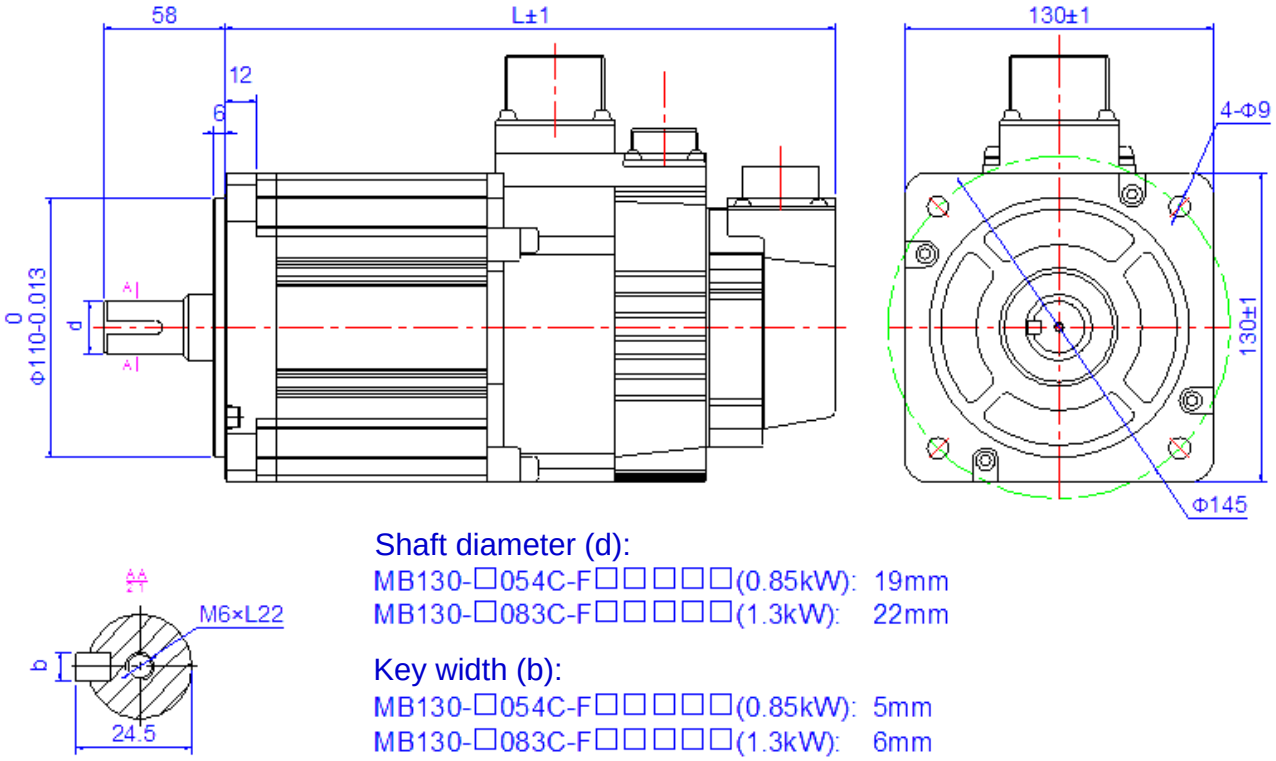


Fig. 4-12 Outline dimensional drawing of MB130 series (1.8kW, with brake)

Motor Model	Without Brake L (mm)	With Permanent Magnetic Brake L (mm)
MB130-□054C-F□□□□□	145	189
MB130-□083C-F□□□□□	161	205
MB130-□115C-F□□□□□	186	211

4.5 ME Series

4.5.1 ME040 Series

Motor Model		ME040-DA1P32F-F□□□□□	
Applicable Driver Model		WSDV-1R2	WSDA-1R2
Rated Power (kW)		0.1	
Rated Line Voltage (V)		220	
Rated Line Current (A)		1.1	
Rated Rotational Speed (r/min)		3000	
Max. Rotational Speed (r/min)		6000	
Rated Torque (N•m)		0.318	
Peak Torque (N•m)		0.95	
Counter EMF (V/1000r/min)		22	
Torque Coefficient (N•m/A)		0.29	
Rotor Inertia ($kg•m^2$)	Without Brake	0.043×10^{-4}	
	Magnetic Brake	0.052×10^{-4}	
Windings Resistance (Ω)		14.2	
Windings Inductance (mH)		46	
Electrical Time Constant (ms)		3.23	
Mass (kg)		0.47	
Motor Insulation Class		Class F	
IP		IP67	
Encoder		17-bit absolute type	
Recommended Load Moment of Inertia		5 times or less	
Ambient Condition		Ambient temperature: -20℃ ~ +40℃	

	Ambient humidity: relative humidity＜90% (no moisture condensation)							
Motor Windings Connector	Windings lead wire	⏚		U		V		W
	Pin No.	1		2		3		4
Connector for Absolute Encoder (7-wire)	Signal lead wire	E-	E+	SD-	0V	SD+	+5V	⏚
	Pin No.	2	3	4	5	6	7	1

CAUTION

Please consult with Weihong Company when the load moment of inertia ratio exceeds the value in the table.

◆ **Outline dimensional drawing**

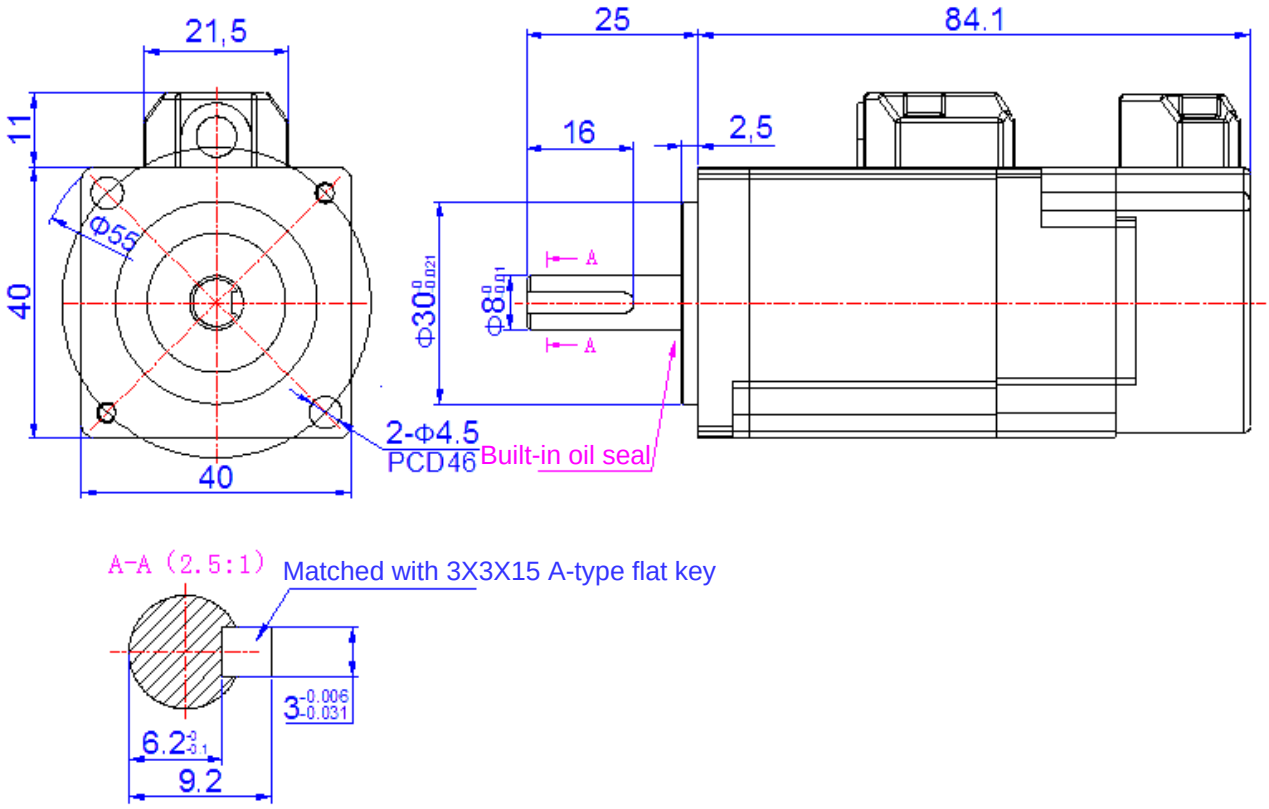


Fig. 4-13 Outline dimensional drawing of ME040 series (without brake)

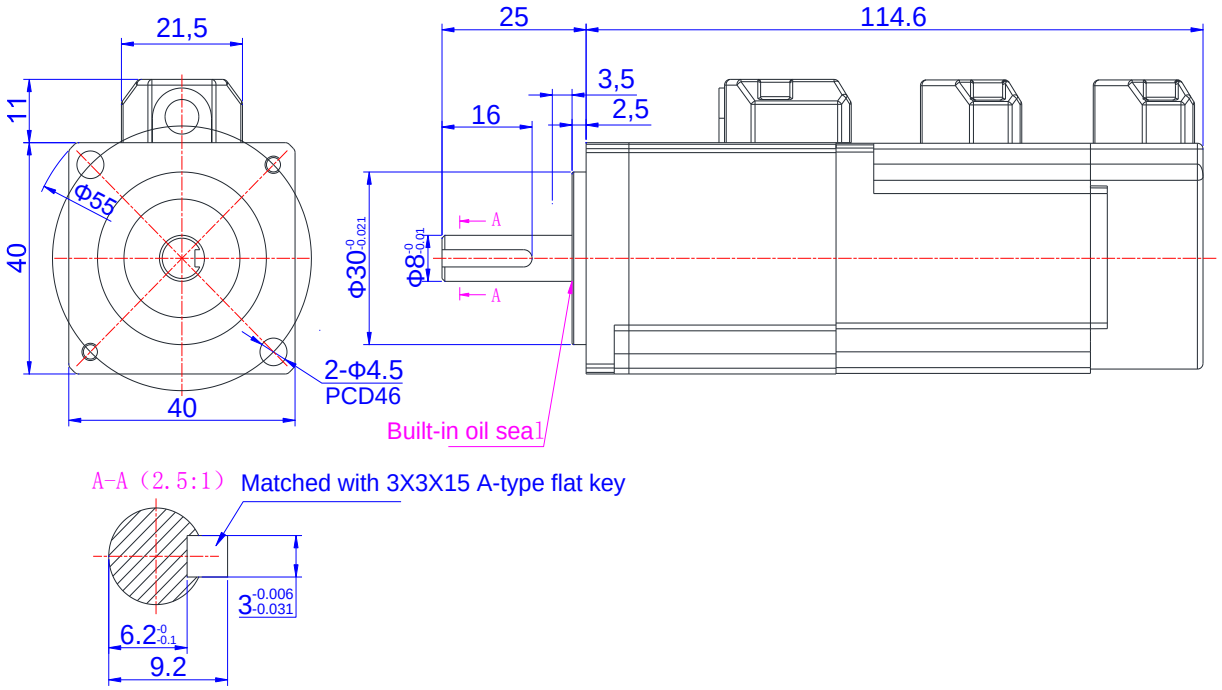


Fig. 4-14 Outline dimensional drawing of ME040 series (with magnetic brake)

4.5.2 ME060 Series

Motor Model		ME060-□P64F-F□□□□□		ME060-□013F-F□□□□□	
Applicable Driver Model		WSDV-2R8	WSDA-2R8	WSDV-2R8	WSDA-2R8
Rated Power (kW)		0.2		0.4	
Rated Line Voltage (V)		220		220	
Rated Line Current (A)		1.7		3.3	
Rated Rotational Speed (r/min)		3000		3000	
Max. Rotational Speed (r/min)		6000		6000	
Rated Torque (N•m)		0.64		1.27	
Peak Torque (N•m)		1.91		3.82	
Counter EMF (V/1000r/min)		27.7		27.7	
Torque Coefficient (N•m/A)		0.38		0.38	
Rotor Inertia ($kg•m^2$)	Without Brake	0.19×10^{-4}		0.34×10^{-4}	
	Magnetic Brake	0.28×10^{-4}		0.44×10^{-4}	
Windings Resistance (Ω)		5.2		1.92	
Windings Inductance (mH)		18.5		5.8	

Electrical Time Constant (ms)		3.5				3.0		
Mass (kg)	**Without Brake**	1.0				1.5		
	Magnetic Brake	1.4				1.9		
Motor Insulation Class		Class F				Class F		
IP		IP67				IP67		
Encoder		23-bit/24-bit absolute type				23-bit/24-bit absolute type		
Recommended Load Moment of Inertia		20 times or less						
Ambient Condition		Ambient temperature: -20℃ ~ +40℃ Ambient humidity: relative humidity＜90% (no moisture condensation)						
Motor Windings Connector	Windings lead wire	⏚		U		V		W
	Pin No.	1		2		3		4
Connector for Absolute Encoder (7-wire)	Signal lead wire	E-	E+	SD-	0V	SD+	+5V	⏚
	Pin No.	2	3	4	5	6	7	1

CAUTION

Please consult with Weihong Company when the load moment of inertia ratio exceeds the value in the table.

◆ Outline dimensional drawing

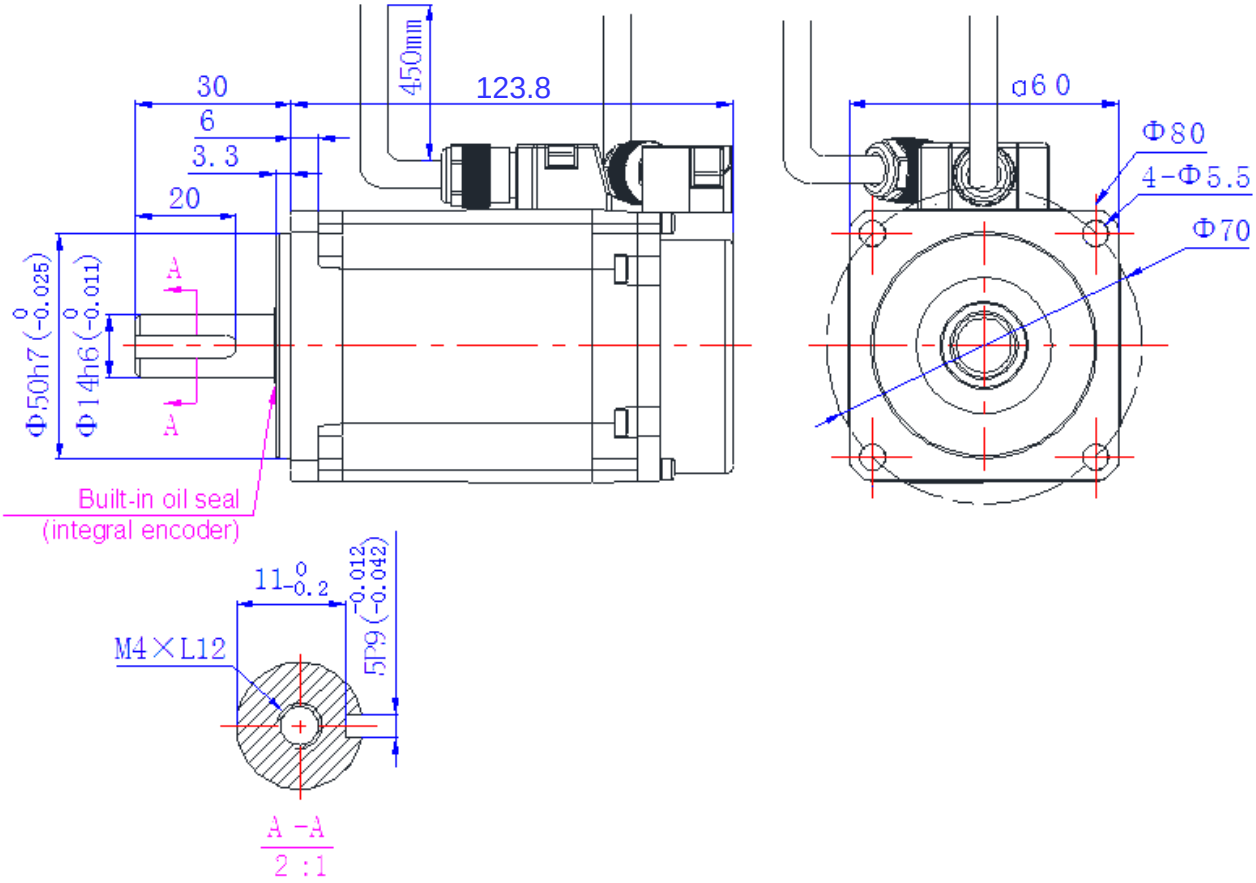


Fig. 4-15 Outline dimensional drawing of ME060 series (without brake)

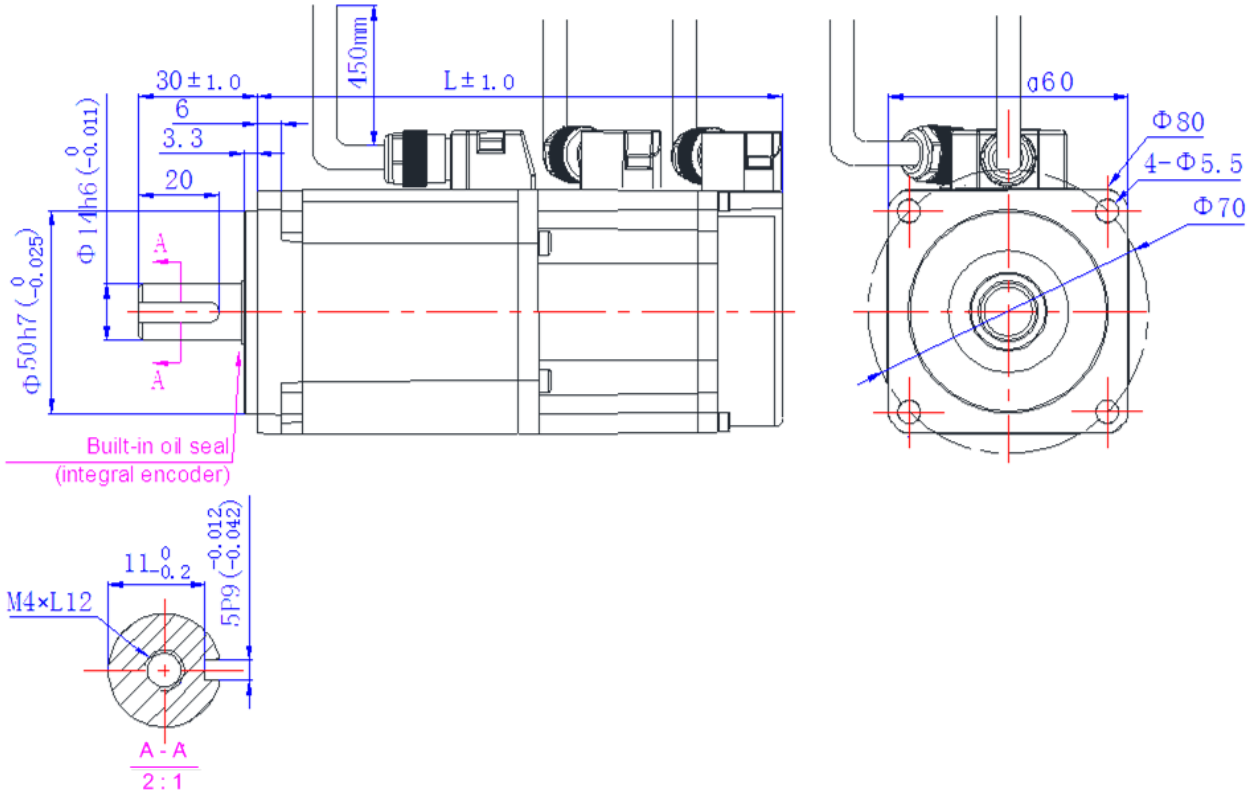


Fig. 4-16 Outline dimensional drawing of ME060 series (magnetic brake)

Motor Model	Without Brake L (mm)	With Permanent Magnetic Brake L (mm)
ME060- □ P64F-F □ □ 2 □ □ （Non-standard oil seal）	101.8	136.4
ME060- □ 013F-F □ □ 2 □ □ （Non-standard oil seal）	123.8	158.4

4.5.3 ME080 Series

Motor Model		ME080-□024F-F□□□□□						
Applicable Driver Model		WSDV-5R0		WSDA-5R0				
Rated Power (kW)		0.75						
Rated Line Voltage (V)		220						
Rated Line Current (A)		5						
Rated Rotational Speed (r/min)		3000						
Max. Rotational Speed (r/min)		6000						
Rated Torque (N•m)		2.39						
Peak Torque (N•m)		7.2						
Counter EMF (V/1000r/min)		34.1						
Torque Coefficient (N•m/A)		0.48						
Rotor Inertia ($kg•m^2$)	**Without Brake**	1.06×10^{-4}						
	Magnetic Brake	1.3×10^{-4}						
Windings Resistance (Ω)		0.92						
Windings Inductance (mH)		8.1						
Electrical Time Constant (ms)		8.8						
Mass (kg)	**Without Brake**	2.63						
	Magnetic Brake	3.42						
Motor Insulation Class		Class F						
IP		IP67						
Encoder		23-bit/24-bit absolute type						
Recommended Load Moment of Inertia		20 times or less						
Ambient Condition		Ambient temperature: -20℃ ~ +40℃ Ambient humidity: relative humidity＜90% (no moisture condensation)						
Motor Windings Connector	Windings lead wire	⏚		U		V		W
	Pin No.	1		2		3		4
Connector for Absolute Encoder (7-wire)	Signal lead wire	E-	E+	SD-	0V	SD+	+5V	⏚
	Pin No.	2	3	4	5	6	7	1

CAUTION

Please consult with Weihong Company when the load moment of inertia ratio exceeds the value in the table.

◆ **Outline dimensional drawing**

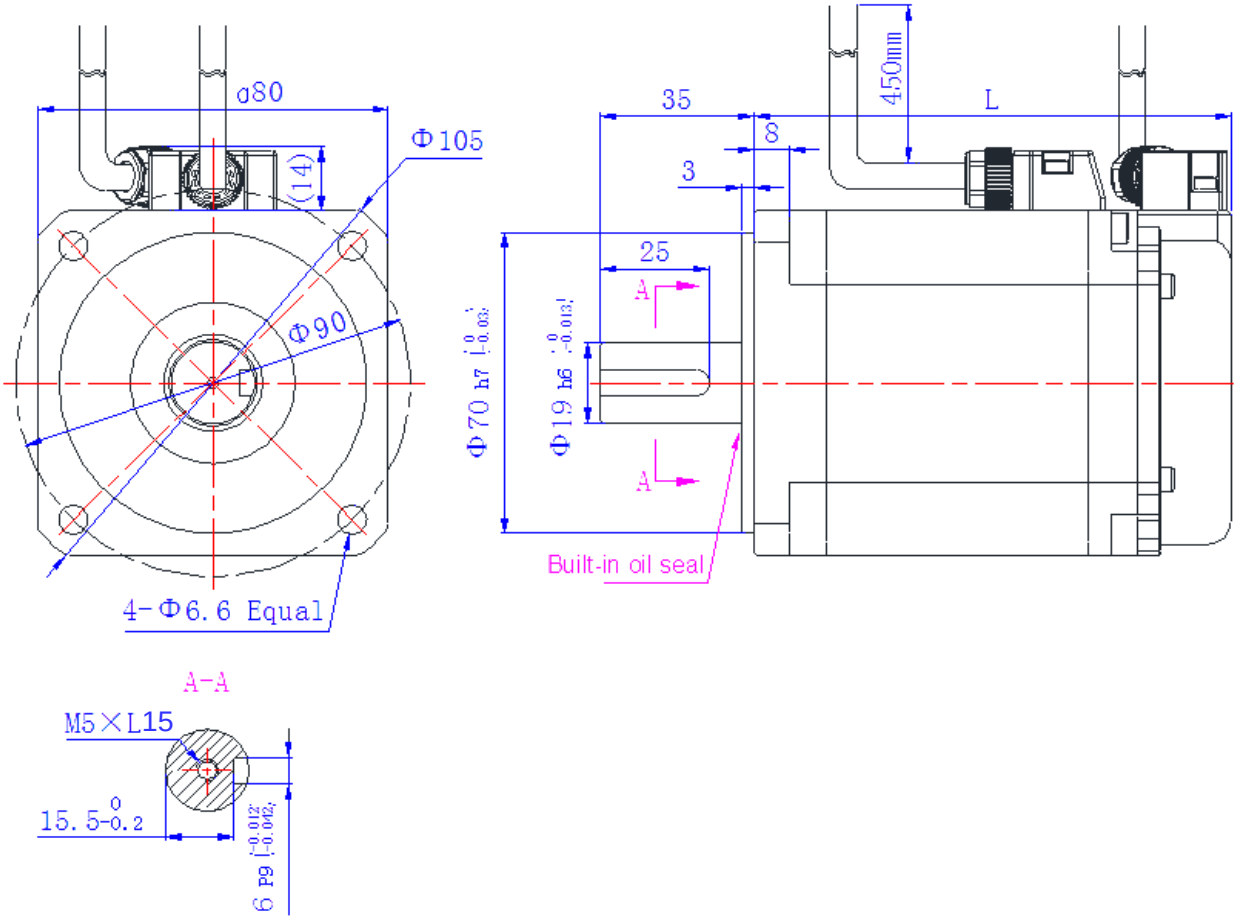


Fig. 4-17 Outline dimensional drawing of ME080 series (without brake)

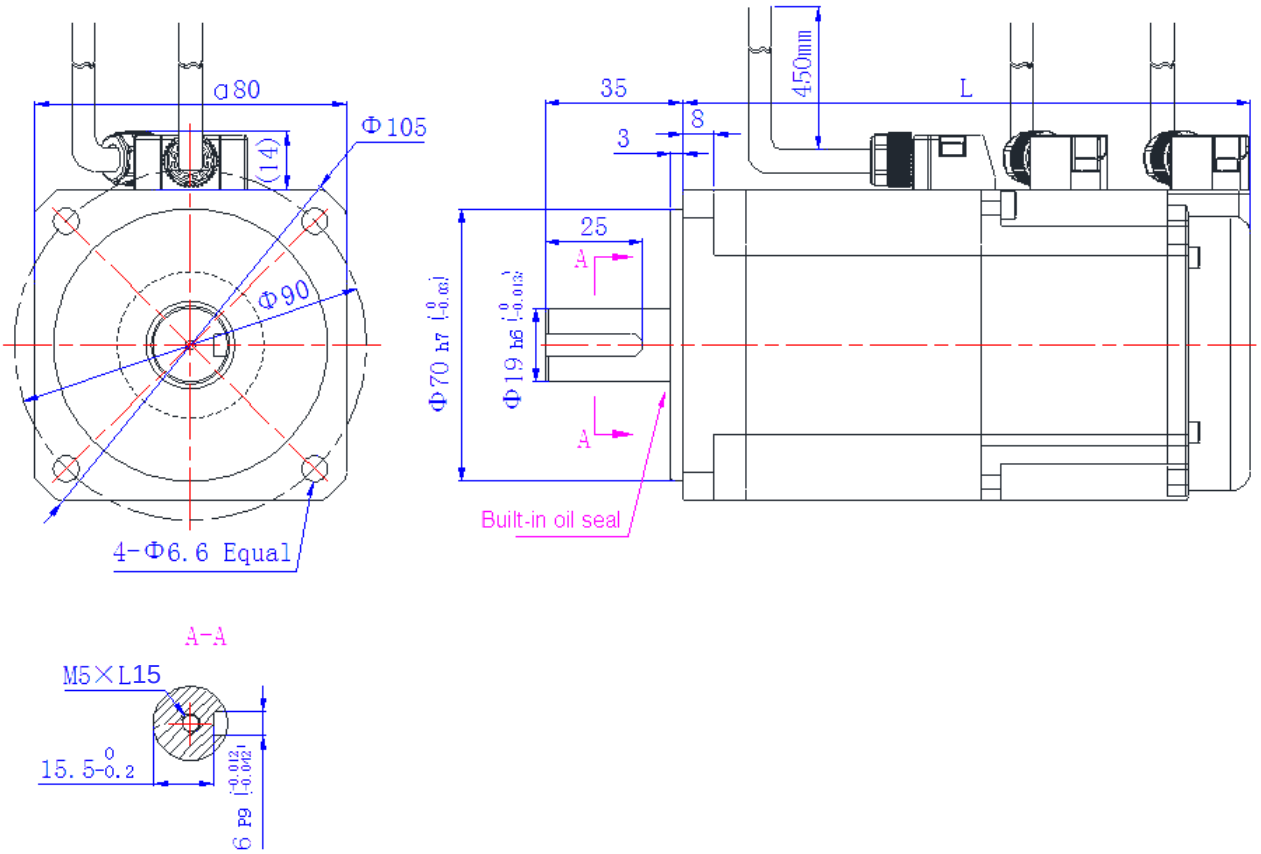


Fig. 4-18 Outline dimensional drawing of ME080 series (magnetic brake)

Motor Model	Without Brake L (mm)	With Permanent Magnetic Brake L (mm)
ME080-□024F-F□□□□□	132.7	169.3

5 Panasonic A5 Series

5.1 Model Designation

MHMD	04	2	G	1	U	*
①	②	③	④	⑤	⑥	⑦

①Product series

Symbol	Spc.
MSME	Low inertia (1.0kW)
MDME	Middle inertia (1.0kW~1.5kW)
MHMD	High inertia (0.4kW~0.75kW)
MHMJ	
MHME	High inertia (1.5kW)

②Motor rated output power

Symbol	Spec. (kW)
04	0.4
08	0.75
10	1.0
15	1.5

③Voltage

Symbol	Spec. (V)
2	200
4	400

⑤Design order

Symbol	Spec.
1	Standard
C	ME spec.

⑦

Special specification

④Rotary encoder spec.

Symbol	Spec.	Pulse Count	Resolution	Wire Count
G	Incremental	20-bit	1048576	5-pin
S	Absolute	17-bit	131072	7-pin

⑥Motor Structure

MHMD/MHMJ

Symbol	Shaft		Brake		Oil seal	
	D-cut	Key-way	W/O	W/	W/O	W/
A	●		●		●	
B	●			●	●	
C	●		●			●
D	●			●		●
S		●	●		●	
T		●		●	●	
U		●	●			●
V		●		●		●

MSME(1.0kW)/MDME/MHME

Symbol	Shaft		Brake		Oil seal	
	D-cut	Key-way	W/O	W/	W/O	W/
C	●		●			●
D	●			●		●
G		●	●			●
H		●		●		●

Fig. 5-1 Model designation of Panasonic A5 series motor

5.2 MHMD/MHMJ Series

◆ **Motor specifications**

Motor Model		MHMD/MHMJ			
Rated Output Power (kW)		0.4		0.75	
Applicable Driver Model		WSDV-2R8	WSDA-2R8	WSDV-5R0	WSDA-5R0
Rated Torque (N•m)		1.3		2.4	
Peak Torque (N•m)		3.8		7.1	
Rated Rotational Speed (r/min)		3000		3000	
Max. Rotational Speed (r/min)		5000		4500	
Transformer Capacity (kVA)		0.9		1.3	
Encoder		20-bit incremental type or 17-bit multi-turn absolute type			
Motor Inertia ($kg•m^2$)	**Without Brake**	0.67×10^{-4}		1.51×10^{-4}	
	With Brake	0.7×10^{-4}		1.61×10^{-4}	
Mass (kg)	**Without Brake**	1.4		2.5	
	With Brake	1.8		3.5	
Recommended Load Moment of Inertia		30 times or less		20 times or less	

CAUTION

Please consult with Weihong Company if the load moment of inertia ratio excceds the value in the table above.

◆ Outline dimensional drawing

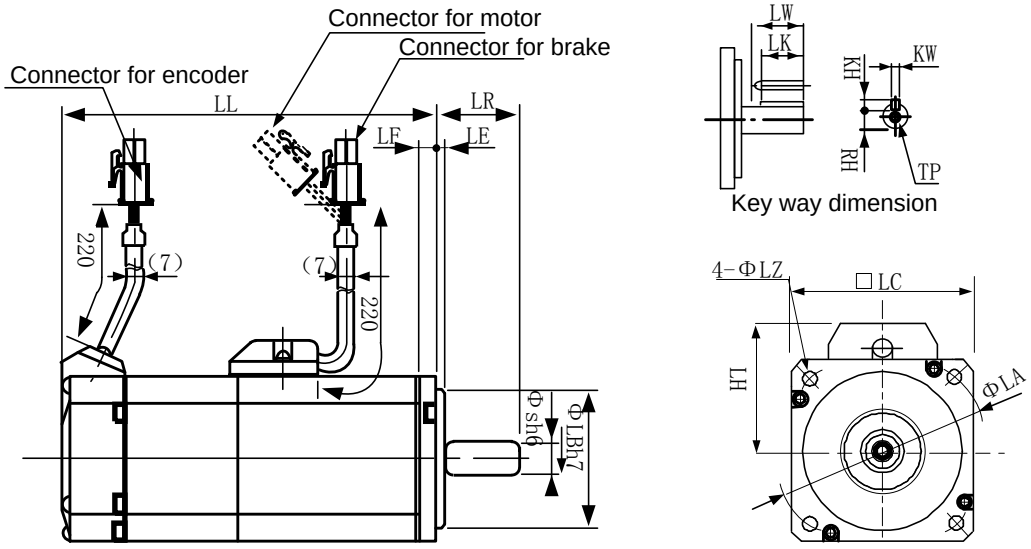


Fig. 5-2 Dimensional drawing of MHMD/MHMJ series

See Fig. 5-2 for dimensions of MHMD/MHMJ series motor. Here is detailed information. (Unit: mm)

Motor Model		MHMD/MHMJ	
Rated Output Power (kW)		0.4	0.75
LL	**Without Brake**	118	127
	With Brake	154.5	164
LR		30	35
S		14	19
LA		70	90
LB		50	70
LC		60	80
LE		3	3
LF		6.5	8
LH		43	53
LZ		4.5	6
LW		25	25
LK		22.5	22
KW		5h9	6h9

KH	5	6
RH	11	15.5
TP	M5×10	M5×10

◆ **Brake specifications**

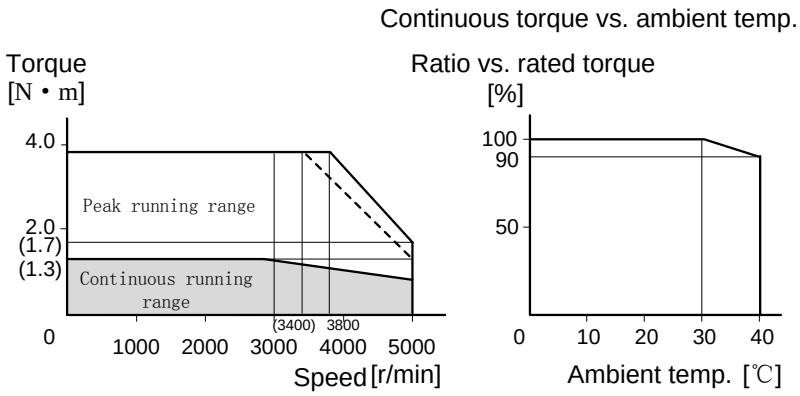
Motor Model	MHMD/MHMJ	
Rated Output Power (kW)	0.4	0.75
Static Friction Torque (N•m)	1.27 or more	2.45 or more
Engaging Time (ms)	50 or less	70 or less
Releasing Time (ms)	15 or less	20 or less
Exciting Current DC (A)	0.36	0.42
Releasing Voltage DC (V)	1 or more	1 or more
Exciting Voltage DC (V)	24±1.2	24±1.2

CAUTION

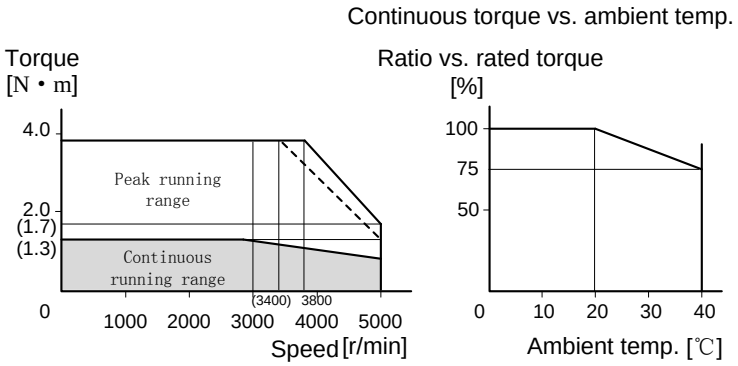
Releasing time values represent the ones with DC-cut off using a varistor.

◆ **Torque characteristics of motor (Dotted line represents torque at 10% less voltage)**

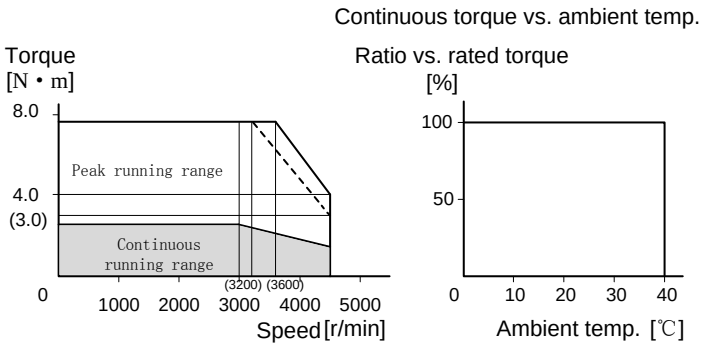
MHMD/MHMJ (0.4kW), without oil seal:



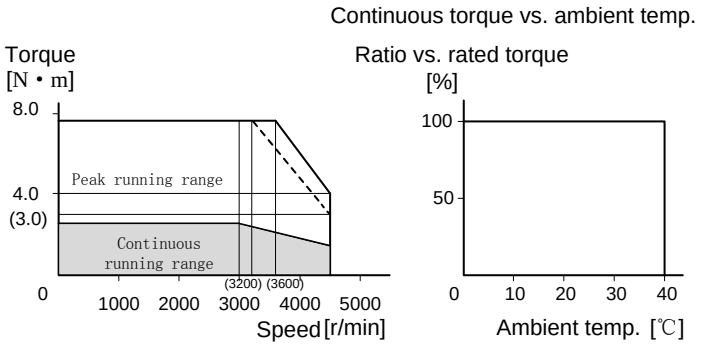
MHMD/MHMJ (0.4kW), with oil seal:



MHMD/MHMJ (0.75kW), without oil seal:



MHMD/MHMJ (0.75kW), with oil seal:



5.3 MDME/MHME Series

◆ **Motor specifications**

Table 5-1 Specification of MDME series

Motor Model		MDME			
Rated Output Power (kW)		1.0		1.5	
Applicable Driver Model		WSDV-6R8	WSDA-6R8	WSDV-110	WSDA-110
Rated Torque (N•m)		4.77		7.16	
Peak Torque (N•m)		14.3		21.5	
Rated Rotational Speed (r/min)		2000		2000	
Max. Rotational Speed(r/min)		3000		3000	
Transformer Capacity (kVA)		1.8		2.3	
Encoder		20-bit incremental type or 17-bit multi-turn absolute type			
Motor Inertia (kg•m^2)	**Without Brake**	4.6×10^{-4}		6.7×10^{-4}	
	With Brake	5.9×10^{-4}		7.99×10^{-4}	
Mass (kg)	**Without Brake**	5.2		6.7	
	With Brake	6.7		8.2	
Recommended Load Moment of Inertia		10 times or less		10 times or less	

Table 5-2 Specification of MHME series

Motor Model		MHME			
Rated Output Power (kW)		1.0		1.5	
Applicable Driver Model		WSDV-6R8	WSDA-6R8	WSDV-110	WSDA-6R8
Rated Torque (N•m)		4.77		7.16	
Peak Torque (N•m)		14.3		21.5	
Rated Rotational Speed (r/min)		2000		2000	
Max. Rotational Speed(r/min)		3000		3000	
Transformer Capacity (kVA)		1.8		2.3	
Encoder		20-bit incremental type or 17-bit multi-turn absolute type			
Motor Inertia ($kg•m^2$)	Without Brake	24.7×10^{-4}		37.1×10^{-4}	
	With Brake	26×10^{-4}		38.4×10^{-4}	
Mass (kg)	Without Brake	6.7		8.6	
	With Brake	8.1		10.1	
Recommended Load Moment of Inertia		5 times or less		5 times or less	

CAUTION

Please consult with Weihong Company when the load moment of inertia exceeds the value in above table.

◆ Outline dimensional drawing

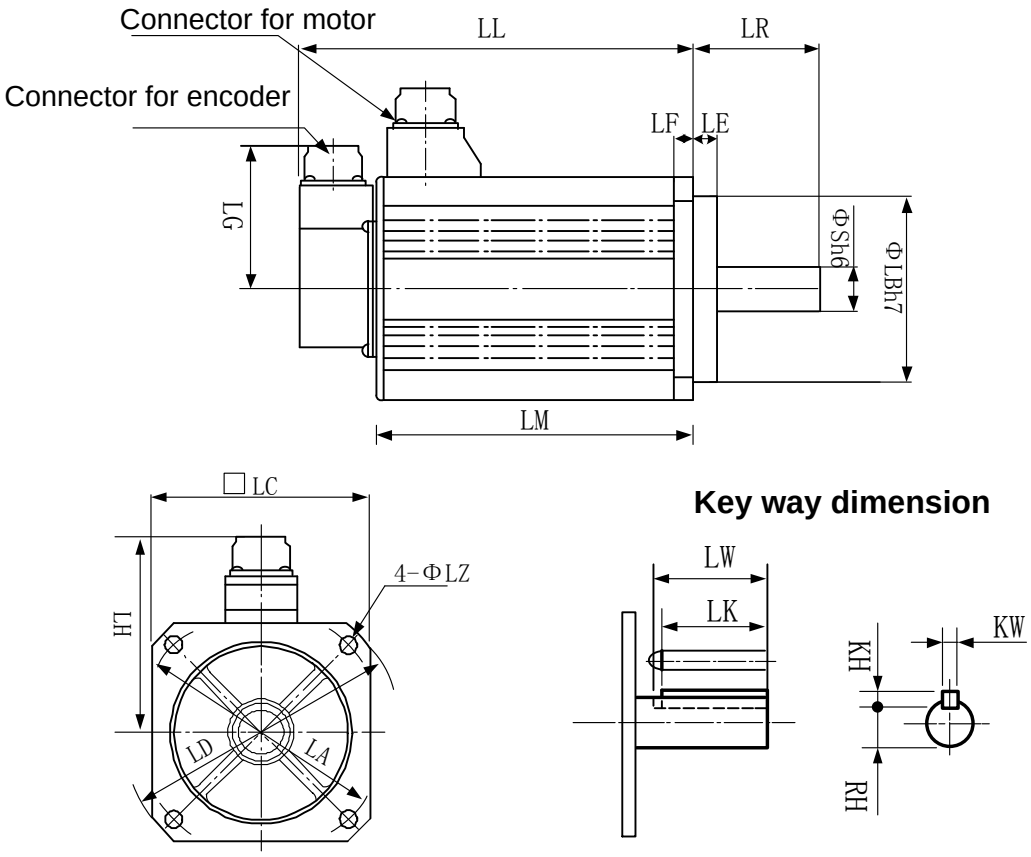


Fig. 5-3 Outline dimensional drawing of MDME/MHME series

See Fig. 5-3 for outline dimensional drawing of MDME and MHME series motor. Here are the detailed dimensions. (Unit: mm)

Table 5-3 Detailed dimensions of MDME/MHME series

Motor Model		MDME		MHME	
Rated Output Power (kW)		1.0	1.5	1.0	1.5
LL	Without Brake	140	157.5	173	192.5
	With Brake	165	182.5	198	217.5
LM	Without Brake	94	111.5	129	146.5
	With Brake	119	136.5	154	171.5
LR		55	55	70	70
S		22	22	22	22
LA		145	145	145	145
LB		110	110	110	110
LC		130	130	130	130
LD		165	165	165	165
LE		6	6	6	6
LF		12	12	12	12
LG		60	60	60	60
LH		116	116	116	116
LZ		9	9	9	9
LW		45	45	45	45
LK		41	41	41	41
KW		8h9	8h9	8h9	8h9
KH		7	7	7	7
RH		18	18	18	18

◆ **Brake specifications**

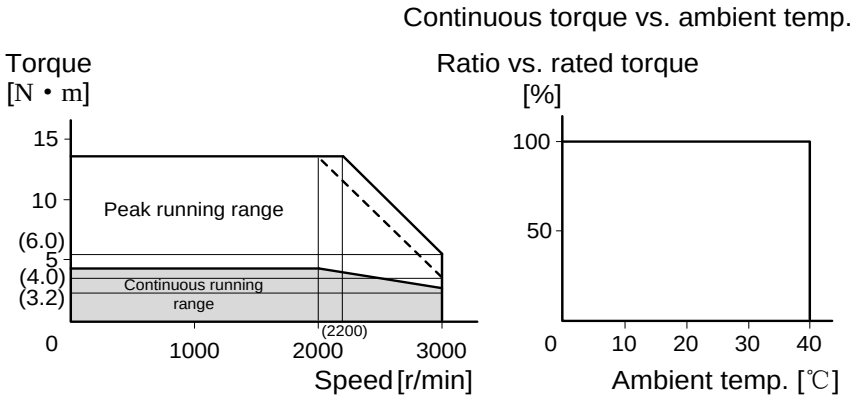
Motor Model	MDME		MHME	
Rated Output Power (kW)	1.0	1.5	1.0	1.5
Static Friction Torque (N•m)	4.9 or more	13.7 or more	4.9 or more	13.7 or more
Engaging Time (ms)	80 or less	100 or less	80 or less	100 or less
Releasing Time (ms)	70 or less	50 or less	70 or less	50 or less
Exciting Current DC (A)	0.59±10%	0.79±10%	0.59±10%	0.79±10%
Releasing Voltage DC (V)	2 or more	2 or more	2 or more	2 or more
Exciting Voltage DC (V)	24±2.4	24±2.4	24±2.4	24±2.4

CAUTION

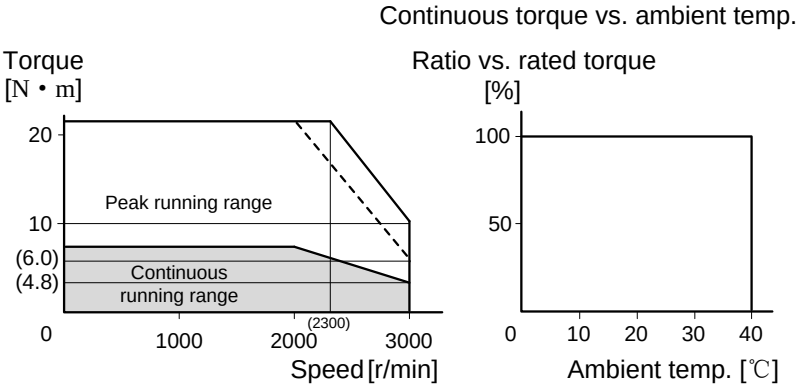
Releasing time values represent the ones with DC-cutoff using a varistor.

◆ **Torque Characteristics of Motor (Dotted line represents torque at 10% less voltage)**

MDME/MHME (1.0kW), with Oil Seal:



MDME/MHME (1.5kW), with Oil Seal:



6 Panasonic A6 Series

6.1 Model Designation

MSMF	15	2	L	1	G6	*
①	②	③	④	⑤	⑥	⑦

①Product series

Symbol	Spec.
MSMF	Low inertia
MDMF	Middle inertia
MHMF	High inertia

②Motor rated output power

Symbol	Spec.(kW)
02	0.2
04	0.4
08	0.75
10	1.0
15	1.5
20	2.0

③Voltage

Symbol	Spec.(V)
2	200

④Rotary encoder spec.

Symbol	Spec.	Pulse Count	Resolution	Wire Count
L	Absolute	23-bit	8388608	7-wire

⑤Design order

Symbol	Spec.
1	Standard

⑦

Customized

⑥Motor structure

MSMF/MHMF (Output: 50W~1.0kW)

Symbol	Shaft		Holding brake		Oil seal			Motor I/F	
	D-cut	Key-way Threaded	W/O	W/	W/O	W/	W/ (Protective lip)	Connector type	Leadwire type
U2		●	●			●			●
V2		●		●		●			●

MSMF/MHMF/MDMF (Output: 850W~5.0kW)

Symbol	Shaft		Holding Brake		Oil seal		Encoder	Connecto
	D-cut	Key-way	W/O	W/	W/	W/ (Protective lip)	JN2*1	JL10*2
G6		●	●			●		●

*1：Manufactured by Japan Aviation Electronics Industry, Ltd. JN2AS10ML3-R
*2：Manufactured by Japan Aviation Electronics Industry, Ltd. JL10-2A20-29P

Fig. 6-1 Model designation of Panasonic A6 series

6.2 MHMF Series

◆ **Motor specifications**

Motor Model		MHMF□2L1□M		
Rated Output Power (kW)		0.2	0.4	0.75
Applicable Driver Model		WSDV-2R8 WSDA-2R8	WSDV-2R8 WSDA-2R8	WSDV-5R0 WSDA-5R0
Rated Torque (N•m)		0.64	1.27	2.39
Peak Torque (N•m)		2.23	4.46	8.36
Rated Rotational Speed (r/min)		3000	3000	3000
Max. Rotational Speed (r/min)		6500	6500	6000
Transformer Capacity (kVA)		0.5	0.9	1.3
Encoder		23-bit absolute type (resolution: 8388608)		
Motor Inertia ($kg•m^2$)	**Without Brake**	0.29	0.56	1.56
	With Brake	0.31	0.58	1.66
Mass (kg)	**Without Brake**	0.76	1.1	2.2
	With Brake	1.2	1.5	2.9
Ambient Condition		Ambient temperature: work temperature 0~40 ℃, storage temperature -20~65℃ Ambient humidity: 20%~85%RH (free from condensation) Altitude: ≤1000m Vibration: ≤49m/s^2 (At stop: ≤24.5 m/s^2)		

◆ Outline dimensional drawing

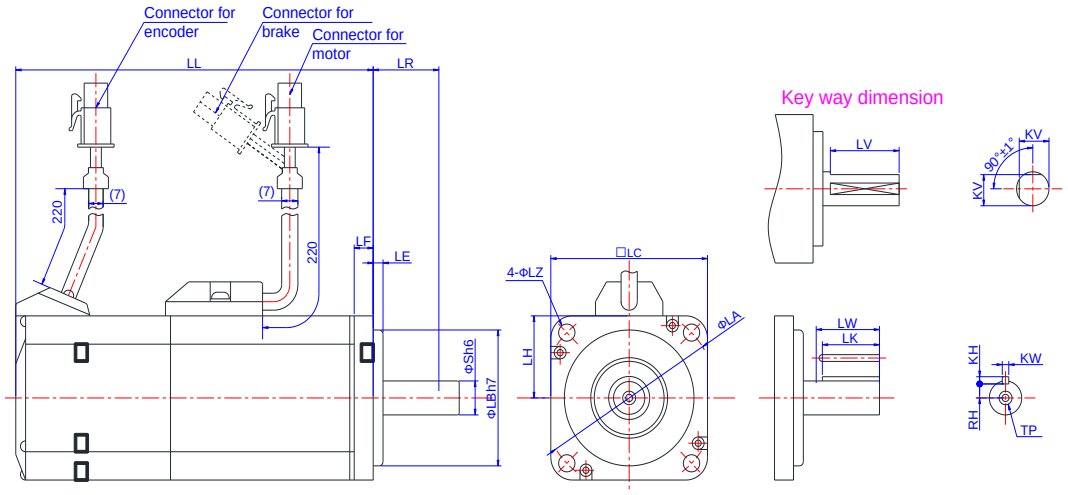


Fig. 6-2 Outline dimensional drawing of MHMF series

See Fig. 6-2 for the outline dimensional drawing of MHMF series motor. The detailed dimensions are shown in the table below (Unit: mm).

Motor Model		MHMF□2L1□M		
Rated Output Power (kW)		0.2	0.4	0.75
LL	**Without Brake**	71	88	95.4
	With Brake	100.3	117.3	129
LR		30	30	35
S		11	14	19
LA		70	70	90
LB		50	50	70
LC		60	60	80
LE		3	3	3
LF		6.5	6.5	8
LH		43	43	53
LZ		4.5	4.5	6

Key	LW	20	25	25
	LK	18	22.5	22
	KW	4h9	5h9	6h9
	KH	4	5	6
	RH	8.5	11	15.5
	TP	M4×8	M5×10	M5×10
	LV	22	22	25
	KV	10	12.5	17.5

6.3 MDMF Series

◆ **Motor specifications**

Motor Model		MDMF□2L1□M		
Rated Output Power (kW)		1.0	1.5	2.0
Applicable Driver Model		WSDV-6R8 WSDA-6R8	WSDV-110 WSDA-110	WSDV-140 WSDA-140
Rated Torque (N•m)		4.77	7.16	9.55
Peak Torque (N•m)		14.3	21.5	28.6
Rated Rotational Speed (r/min)		2000	2000	2000
Max. Rotational Speed (r/min)		3000	3000	3000
Transformer Capacity (kVA)		1.8	2.3	3.8
Encoder		23-bit absolute type (resolution: 8388608)		
Motor Inertia (kg •m^2)	**Without Brake**	6.18	9.16	12.1
	With Brake	7.4	10.4	13.3
Mass(kg)	**Without Brake**	4.6	5.7	6.9
	With Brake	6.1	7.2	8.4
Ambient Condition		Ambient temperature: work temperature 0~40 ℃, storage temperature -20~65℃ Ambient humidity: 20%~85%RH (free from condensation) Altitude: ≤1000m Vibration: ≤49m/s^2 (At stop: ≤24.5 m/s^2)		

◆ Outline dimensional drawing

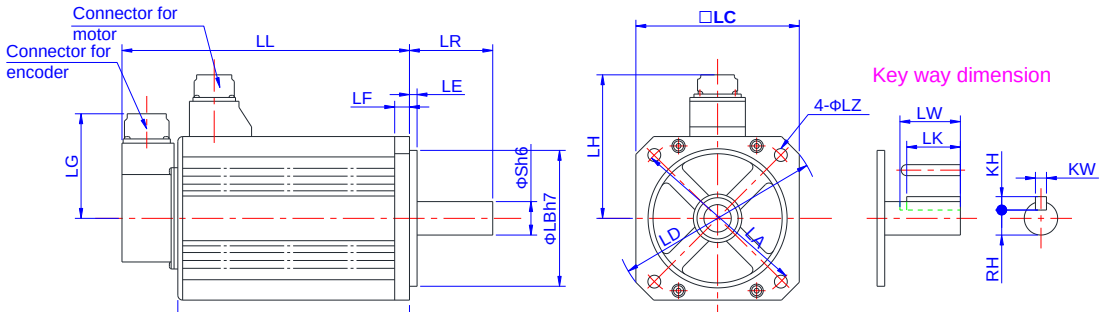


Fig. 6-3 Outline dimensional drawing of MDMF series

See Fig. 6-3 for the outline dimensional drawing of MDMF series motor. The detailed dimensions are shown in the table below (Unit: mm).

Motor Model		MDMF□2L1□M		
Rated Output Power(Kw)		1.0	1.5	2.0
LL	Without Brake	122	136	150
	With Brake	150	164	178
LR		55	55	55
S		22	22	22
LA		145	145	145
LB		110	110	110
LC		130	130	130
LD		165	165	165
LE		6	6	6
LF		12	12	12
LG		84	84	84
LH	Without Brake	105	105	105
	With Brake	116	116	116
LZ		9	9	9
LM	Without Brake	77	91	105
	With Brake	105	119	133
Key	LW	45	45	45
	LK	41	41	41
	KW	8h9	8h9	8h9
	KH	7	7	7
	RH	18	18	18

6.4 MSMF Series

◆ **Motor specifications**

Motor Model		MSMF□2L1□M	
Rated Output Power (kW)		1.5	2.0
Applicable Driver Model		WSDV-110	WSDV-140
Rated Torque (N•m)		4.77	6.37
Peak Torque (N•m)		14.3	19.1
Rated Rotational Speed (r/min)		3000	3000
Max. Rotational Speed (r/min)		5000	5000
Transformer Capacity (kVA)		2.3	3.8
Encoder		23-bit absolute type (resolution: 8388608)	
Motor Inertia (kg •m^2)	**Without Brake**	3.1	4.06
	With Brake	3.45	4.41
Mass(kg)	**Without Brake**	4.6	5.6
	With Brake	5.6	6.6
Ambient Condition		Ambient temperature: work temperature 0~40 ℃, storage temperature -20~65℃ Ambient humidity: 20%~85%RH (free from condensation) Altitude: ≤1000m Vibration: ≤49m/s^2 (At stop: ≤24.5 m/s^2)	

◆ **Outline dimensional drawing**

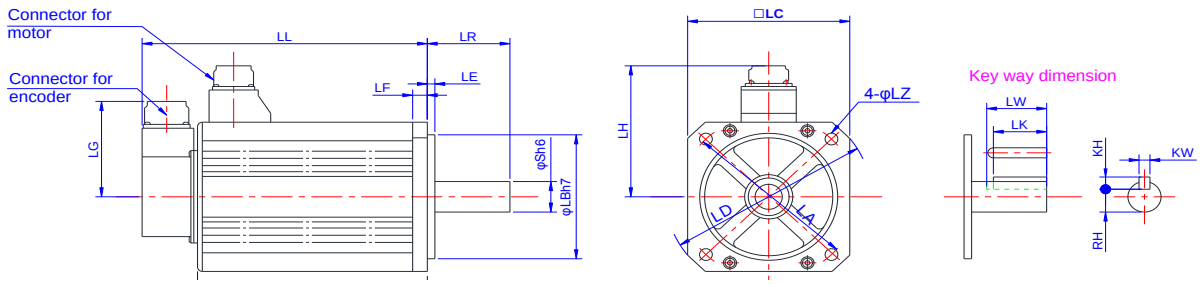


Fig. 6-4 Outline dimension drawing of MSMF series

See Fig. 6-4 for the outline dimensional drawing of MDMF series motor. The detailed dimensions are shown in the table below (Unit: mm).

Motor Model		MSMF□2L1□M	
Rated Power (kW)		1.5	2.0
LL	Without Brake	155.5	174.5
	With Brake	182.5	201.5
LR		55	55
S		19	19
LA		115	115
LB		95	95
LC		100	100
LD		135	135
LE		3	3
LF		10	10
LG		84	84
LH	Without Brake	90	90
	With Brake	101	101
LZ		9	9
LM	Without Brake	110.5	129.5
	With Brake	137.5	156.5
Key	LW	45	45
	LK	42	42
	KW	6h9	6h9
	KH	6	6
	RH	15.5	15.5

7 Connectors and Cables

7.1 Definitions of connectors and cables

See following figures for connectors and connections of encoder cable, motor cable and brake cable.

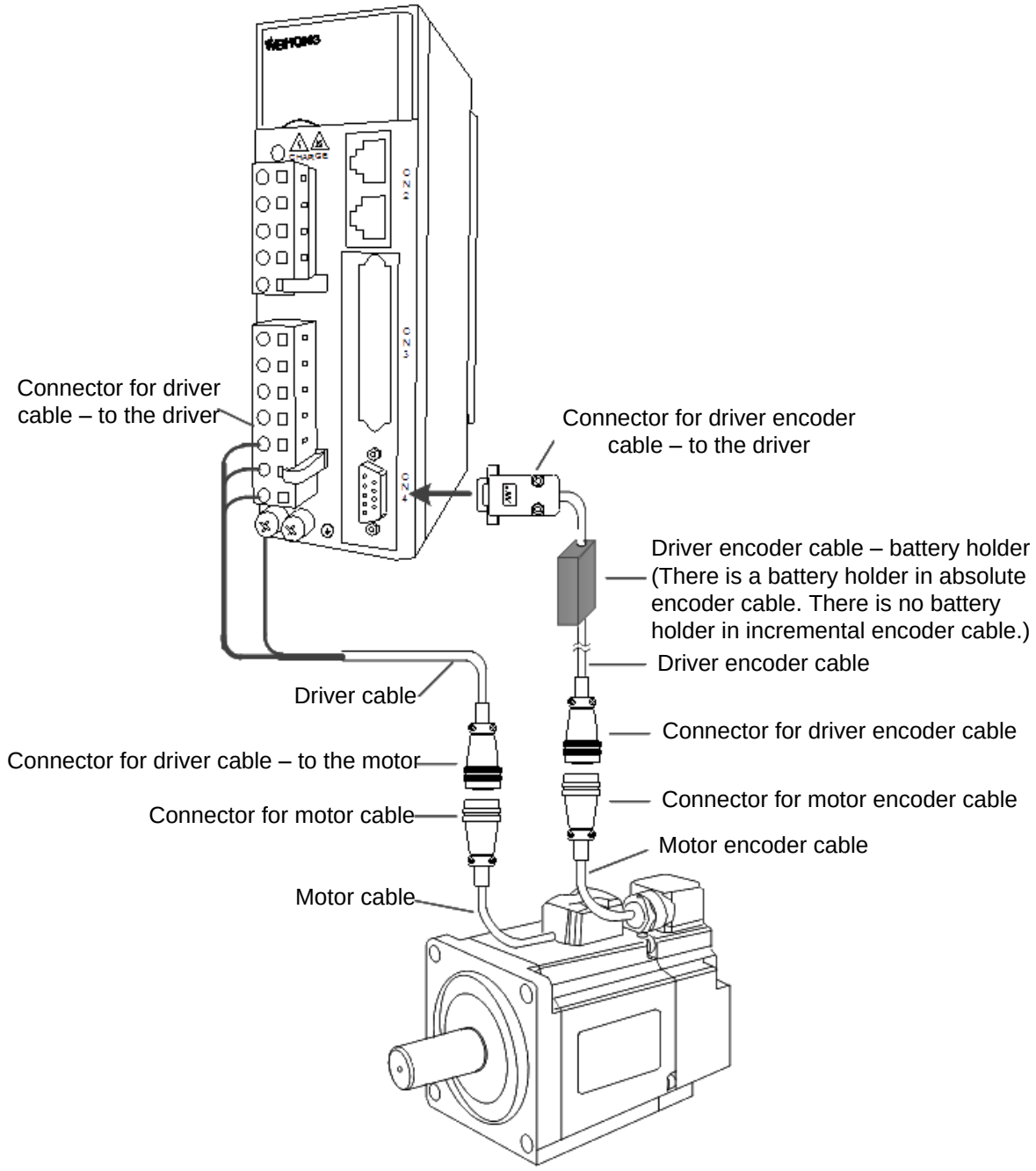


Fig. 7-1 Connection diagram（without brake）

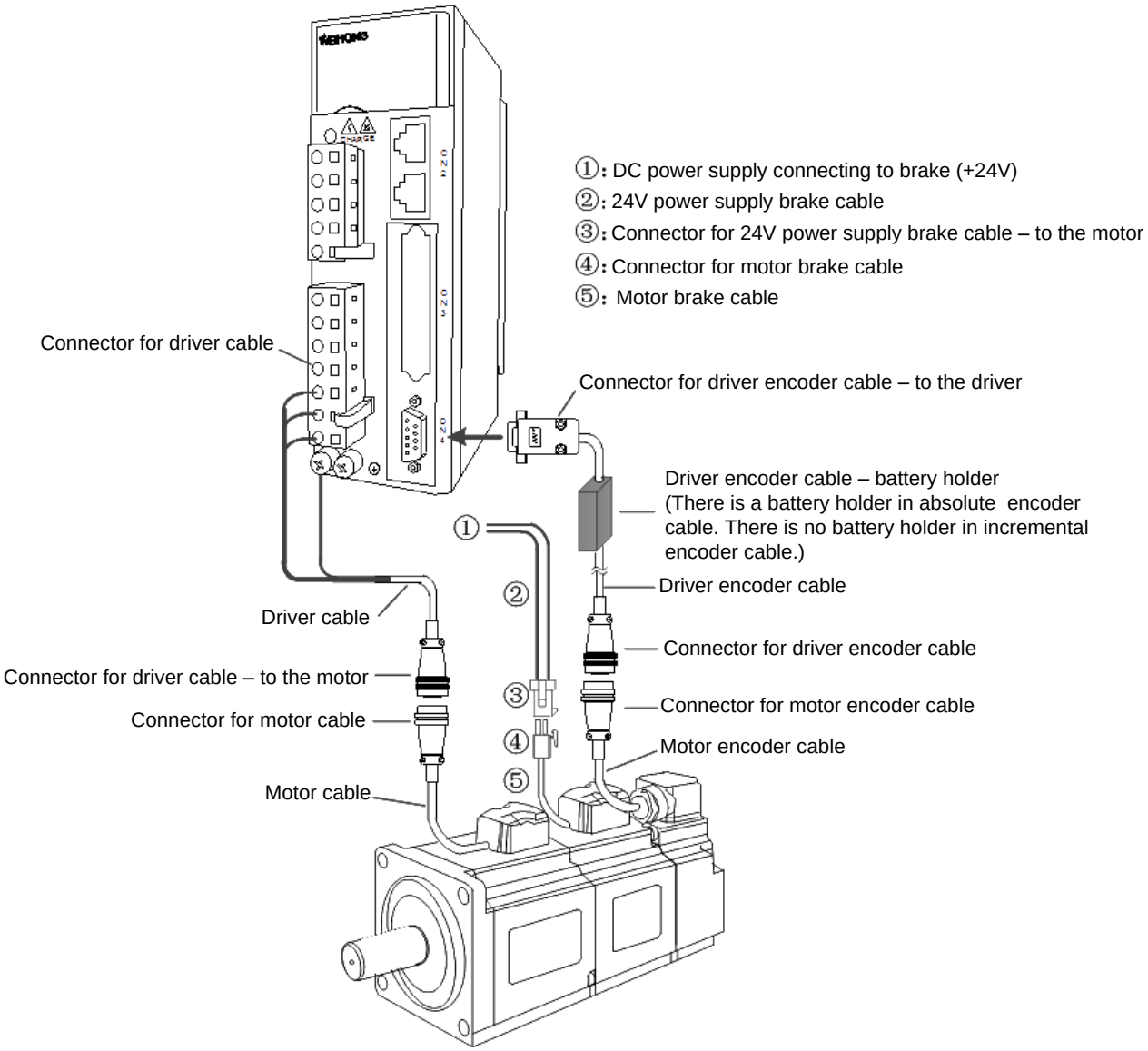
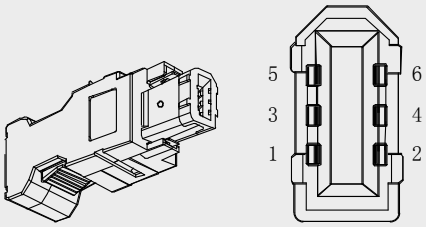
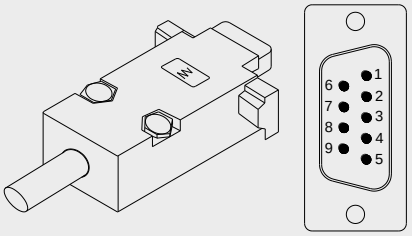


Fig. 7-2 Connection diagram（with brake）

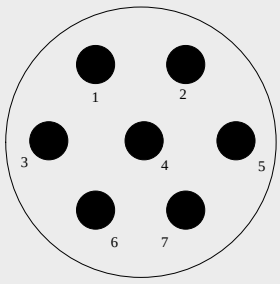
7.2 Connectors

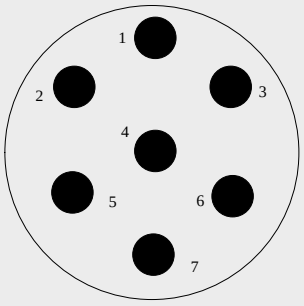
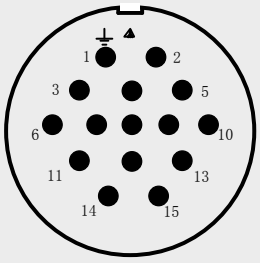
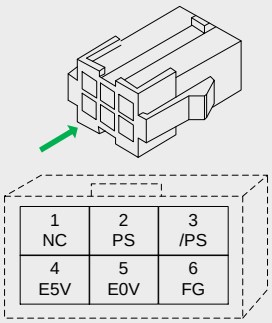
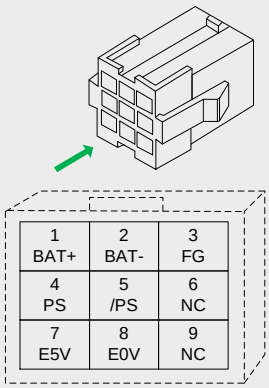
7.2.1 Connectors for Driver Encoder Cable

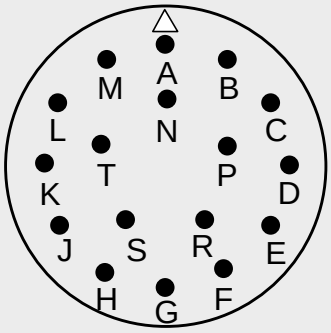
◆ **To the driver**

Name	Applicable Driver	Pin	Signal	Diagram
SM-6P (Suntone) • Material No. : 0.1.24.0006	WSDV series driver	1	+5V	
		2	0V	
		3	-	
		4	-	
		5	PS	
		6	/PS	
DB9M • Material No. : 0.1.01.1032	WSDA series driver	1	PS	
		2	/PS	
		3	BAT+	
		4	BAT -	
		5	-	
		6	-	
		7	+5V	
		8	0V	
		9	-	

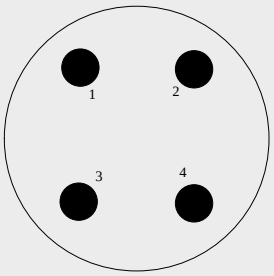
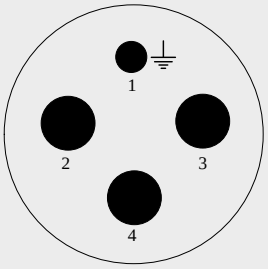
◆ **To the motor**

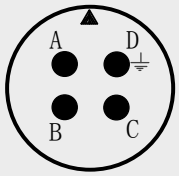
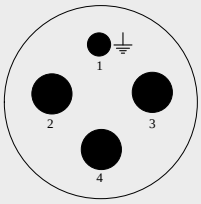
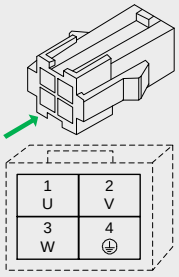
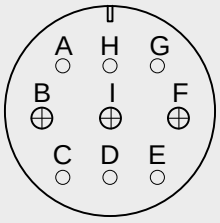
Name	Applicable Motor	Pin	Signal	Diagram
XS16K7TM (Xinfeng) • IP：IP67 • Material No. : 0.1.25.0040	ME040 ME060 ME080 MA040 MA060 MA080 MN080	1	FG (shield ground)	
XS16K7P (HuaLun) • IP：IP65 • Material No. : 0.1.25.0011		2	BAT-	
		3	BAT+	
		4	/PS	
		5	0V	
		6	PS	
		7	+5V	

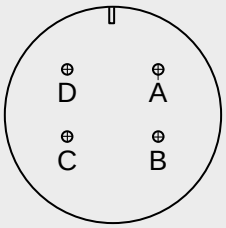
Name	Applicable Motor	Pin	Signal	Diagram
YD28K7TSL (Xinfeng) • IP：IP65 • Material No. ：0.1.25.0015	MN130 MN180	1	FG (shield ground)	
		2	BAT-	
		3	BAT+	
		4	/PS	
		5	0V	
		6	PS	
		7	+5V	
15-pin aviation connector (SUNCHU) • IP：IP65 • Material No. ：0.1.25.0033 • Do not connect anything to NC.	MB100 MB130	1	FG (shield ground)	
		2	BAT-	
		3	BAT+	
		4	/PS	
		5	0V	
		6	PS	
		7	+5V	
		8~15	NC	
172160-1 • IP：IP65 • Material No. ：0.1.03.0030 • Do not connect anything to NC.	Panasonic A5/A5-II series (≤ 750W, incremental type)	1	NC	
		2	PS	
		3	/PS	
		4	+5V	
		5	0V	
		6	FG (shield ground)	
172161-1 • IP：IP65 • Material No. ：0.1.03.0040 • Do not connect anything to NC.	Panasonic A5/A5-II series (≤ 750W, absolute type） Panasonic A6 MHMF series (≤ 750W, absolute type)	1	BAT+	
		2	BAT-	
		3	FG	
		4	PS	
		5	/PS	
		6	NC	
		7	+5V	
		8	0V	
		9	NC	

Name	Applicable Motor	Pin	Signal	Diagram
3108B20-29S • IP：IP65 • Material No. ：0.1.25.0008	Panasonic A5/A5-II（＞750W, incremental type)	A～F	NC	
		G	0V	
		H	+5V	
		J	FG (shield ground)	
		K	PS	
	Panasonic A6 (MHMF/ MSMF/ MDMF) series（＞750W, absolute type)	L	/PS	
		M	NC	
		N	NC	
		P	NC	
		R	NC	
		S	BAT-	
		T	BAT+	

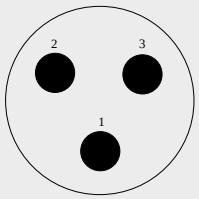
7.2.2 Connectors for Driver Cable – to the Motor

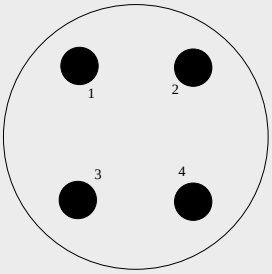
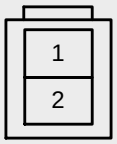
Name	Applicable Motor	Pin	Signal	Diagram
XS16K4TM (Xinfeng) • IP：IP67 • Material No. ：0.1.25.0041	ME040 ME060 ME080 MA040 MA060 MA080 MN080	1	⏚	
XS16K4aP (HuaLun) • IP：IP65 • Material No. ：0.1.25.0012		2	U	
		3	V	
		4	W	
YD28K4TSL (Xinfeng) • IP：IP65 • Material No. ：0.1.25.0016	MN130	1	⏚	
		2	U	
		3	V	
		4	W	

Name	Applicable Motor	Pin	Signal	Diagram
CMS3108A18-10SI（SUNCHU） • IP：IP65 • Material No. ：0.1.25.0032	MB100 MB130	A	U	
		B	V	
		C	W	
		D	⏚	
YD32K4TSL (Xinfeng) • IP：IP65 • Material No. ：0.1.25.0035	MN180	1	⏚	
		2	U	
		3	V	
		4	W	
172159-1 • IP：IP65 • Material No. ：0.1.03.0029	Panasonic A5/A5-II series (≤750W)	1	U	
		2	V	
	Panasonic A6 MHMF series (≤750W)	3	W	
		4	⏚	
3108B20-18S (with brake) • IP：IP65 • Material No. ：0.1.25.0010	Panasonic A5/A5-II series (＞750W)	G	Brake+	
		H	Brake-	
		A	NC	
		F	U	
	Panasonic A6 (MHMF/ MSMF/ MDMF) series (＞750W)	I	V	
		B	W	
		E	⏚	
		D	⏚	
		C	NC	

3108B20-4S (without brake) • IP：IP65 • Material No. ：0.1.25.0031	Panasonic A5/A5-II series (＞750W)	A	U	
		B	V	
	Panasonic A6 (MHMF/ MSMF/ MDMF) series (＞750W)	C	W	
		D	⏚	

7.2.3 Connectors for 24V Power Supply Brake Cable – to the Motor

Name	Applicable Motor	Pin	Signal	Diagram
XS16K3TM（Xinfeng） • IP：IP67 • Material No. ：0.1.25.0042	ME040 ME060 ME080 MA040 MA060 MA080 MN080	1	Brake+	
		2	Brake-	
		3	NC	
XS12K3P（YongFeng） • IP：IP65 • Material No. ：0.1.25.0014	MN130	1	Brake+	
		2	Brake-	
		3	NC	
SC-CMV1-AP02C（SUNCHU） • IP：IP65 • Material No. ：0.1.25.0034	MB100 MB130	1	Brake+	
		2	Brake-	

Name	Applicable Motor	Pin	Signal	Diagram
XS16K4TM（Xinfeng） • IP：IP67 • Material No. ：0.1.25.0041	MN180	1	Brake+	
		2	Brake-	
		3	NC	
		4	NC	
172157-1 • IP：IP65 • Material No. ：0.1.03.0028	Panasonic A5/A5-II series (≤750W)	1	Brake+	
	Panasonic A6 MHMF series (≤750W)	2	Brake-	

7.3 Cable Color

7.3.1 Motor Encoder Cable

◆ **Tamagawa absolute encoder**

No.	Definition	Cable color
1	FG	Shield cable
2	GND	Brown/Black
3	VB	Brown
4	SD—	Blue/Black (Orange/Black)*1
5	0V	Black
6	SD+	Blue (Orange)*1
7	+5V	Red

*1：The cable colors of some motors may be different from those of original lead-out line. The colors in () represent those when the cable is to be else wired.

◆ **Nikon absolute encoder**

No.	Definition	Cable color
1	FG	Shield cable
2	GND	Brown
3	VB	Orange
4	SD—	Purple
5	0V	Black
6	SD+	Cyan
7	+5V	White

7.3.2 Motor Cable

◆ **MA040 series (absolute, 4-pin straight connector)**

No.	Definition	Cable color
1	FG	White
2	U	Red
3	V	Green
4	W	Brown

◆ **MA060/MA080, MN080, ME040/ME060/ME080 series (absolute, 4-pin straight connector)**

No.	Definition	Cable color
1	FG	Two-color
2	U	Red
3	V	Blue
4	W	Yellow

◆ **MN130/MN180 series (absolute, 4-pin aviation connector)**

No.	Definition	Cable color
1	FG	Two-color
2	U	Red
3	V	Yellow
4	W	Blue

◆ **MB100/MB130 series (absolute, 4-pin aviation connector)**

No.	Definition	Cable color
D	FG	Two-color
A	U	Red
B	V	Yellow
C	W	Blue

7.3.3 Motor Brake Cable

◆ **MA040/MA060, MB100 series (with permanent magnetic brake)**

No.	Definition	Cable color
1	Brake(+)	Red
2	Brake(-)	Black

◆ **MA080, MB130, ME040/ME060/ME080, MN080/MN130/MN180 series (with magnetic brake, no +/-)**

No.	Definition	Cable color
1	Brake 1	Black, red
2	Brake 2	Black, yellow

8 Calculations for Motor Selection

8.1 How to Select Motor Capacity

(1) Confirm driving system structure

On most occasions, when you want to choose a motor, you need to take the structure of driving system into consideration first. Following are some typical examples of driving system.

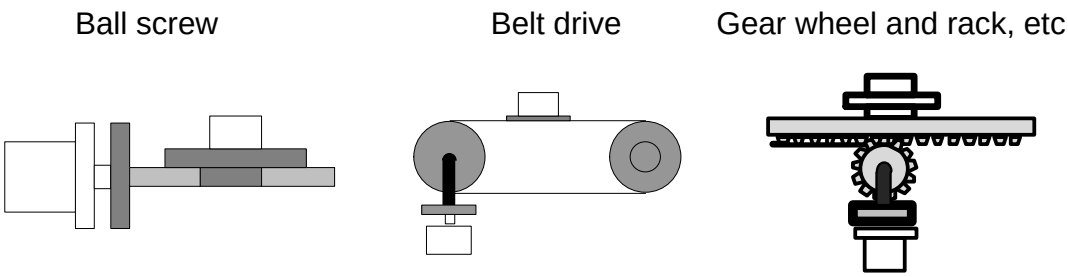


Fig. 8-1 Typical examples of driving system

In addition, you need to confirm some detailed specifications of parts, such as ball screw length, guide travel as well as belt diameter, etc.

(2) Decide the running mode

You need to consider following aspects to decide the motor running mode: acceleration & deceleration time, constant speed time, time for stopping, cycle time and movement distance.

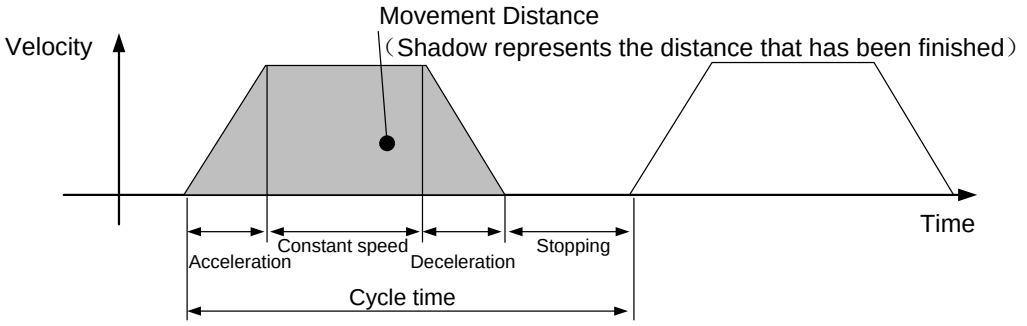


Fig. 8-2 Motor running mode

CAUTION

Running mode affects the selection of motor capacity to a great extent. If there is no demanding requirement on the acceleration/deceleration time and stopping time, you can make them longer as desired, therefore, a motor with relatively small capacity can be chosen.

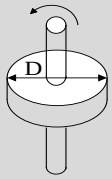
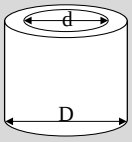
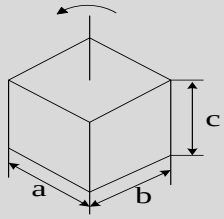
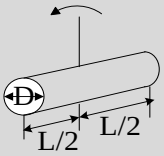
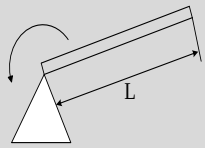
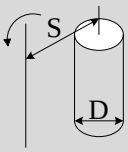
(3) Calculate the load inertia and inertia ratio

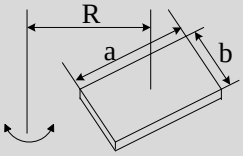
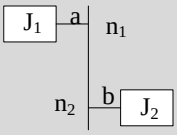
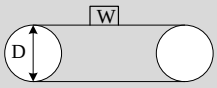
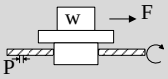
Inertia is the power or force used to maintain a certain motion state.

Inertia ratio (J_L/J_M) is the result of equivalent value of load inertia to servomotor shaft (with symbol "J_L") divided by rotating inertia value of the motor (with symbol "J_M").

The parameter for inertia ratio of WISE driver is Pr004, whose default value is 250, namely, 2.5 times of the value of rotating inertia value of the motor. According to general standards, for motor with 0.75kW less capacity, inertia ratio is 20 times or less, while for ones with 1.0kW less capacity, it is 10 times or less.

If more quick response is required, the inertia ratio should be smaller; on the contrary, if acceleration time can be several seconds, a larger inertia ratio can be enabled. Please note that unit of motor inertia listed on the product catalog is "×10-4kg•m^2".

Shape	Formula for J	Shape	Formula for J
Disc 	$J=\frac{1}{8}WD^2[kg\cdot m^2]$ W: Mass [kg] D: Outer diameter [m]	Hollow cylinder 	$J=\frac{1}{8}W(D^2+d^2)[kg\cdot m^2]$ W: Mass [kg] D: Outer diameter [m] d: Inner diameter [m]
Prism 	$J=\frac{1}{12}W(a^2+b^2)[kg\cdot m^2]$ W: Mass [kg] a,b,c: Lengths of three sides of the prism [m]	Homogeneous cylinder rod 	$J=\frac{1}{48}W(3D^2+4L^2)[kg\cdot m^2]$ W: Mass [kg] D: Outer diameter [m] L: Length [m]
Straight rod 	$J=\frac{1}{3}WL^2[kg\cdot m^2]$ W: Mass [kg] L: Length of rod [m]	Cylinder rod away from the rotating center 	$J=\frac{1}{8}WD^2+WS^2[kg\cdot m^2]$ W: Mass [kg] D: Outer diameter [m] L: Length [m]

Shape	Formula for J	Shape	Formula for J
Rotary axis away from the cube center 	$J = W(\frac{a^2+b^2}{12}+R^2)[kg\cdot m^2]$ W: Mass [kg] a,b: Length/width of cube [m] R: Length [m]	Reducer 	Convert to inertia ratio of a axis. $J = J_1 + (\frac{n_2}{n_1})^2 J_2[kg\cdot m^2]$ n_1: Rotational speed of a axis [r/min] n_2: Rotational speed of b axis [r/min]
Conveyor 	$J = \frac{1}{4}WD^2[kg\cdot m^2]$ W: Mass [kg] D: Outer diameter [m] J of conveyor is excluded.	Ball screw 	$J = J_1 + \frac{W\times P^2}{4\pi^2}[kg\cdot m^2]$ W: Mass [kg] P: Rail travel [m] J_1: J of ball screw [kg•m^2]

If you don't know the mass [kg], calculate it according to the following formula.

Mass W[kg] =Density ρ[kg/m^3] × Volume V[m^3]

Here are density references of some typical substances.

Iron ρ=7.9 ×10^3[kg/m^3]

Aluminum ρ=2.8 ×10^3 [kg/m^3]

Brass ρ=8.5× 10^3 [kg/m^3]

(4) Calculate the torque

◆ **Peak torque**

Peak torque refers to the max. torque required in running, mainly in acceleration and deceleration stages.

The value is approximate 80% less of the max. torque of the motor. If the value is negative, a regenerative resistor may be needed.

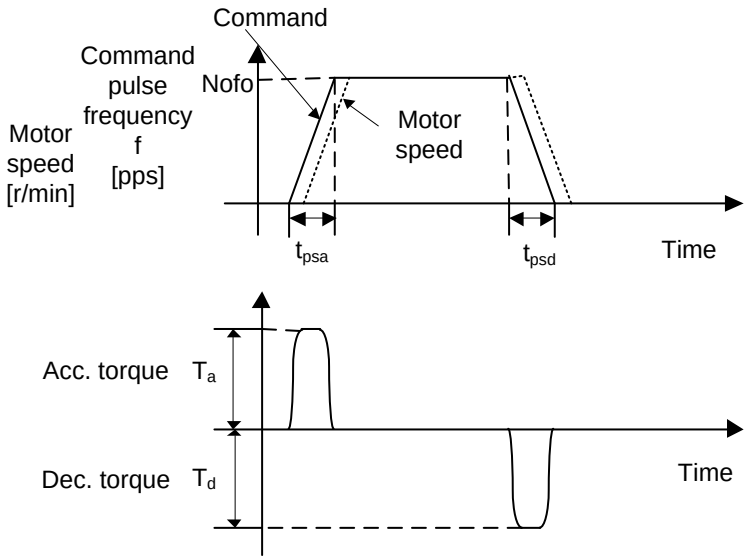


Fig. 8-3 Illustration of peak torque

Acceleration torque: $T_a = \dfrac{(J_L + J_M) \times 2\pi N}{t_{psa}} + \text{Running torque}$ (Unit: N•m)

Deceleration torque: $T_d = \dfrac{(J_L + J_M) \times 2\pi N}{t_{psd}} - \text{Running torque}$ (Unit: N•m)

J_L: Load moment of inertia (unit: kg•m^2)

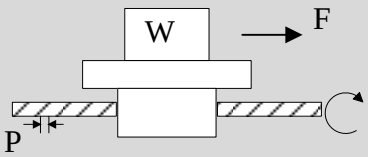
J_M: Rotor moment of inertia (unit: kg•m^2)

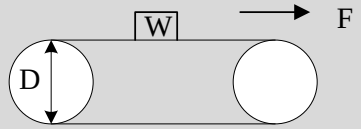
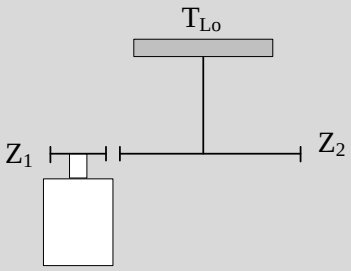
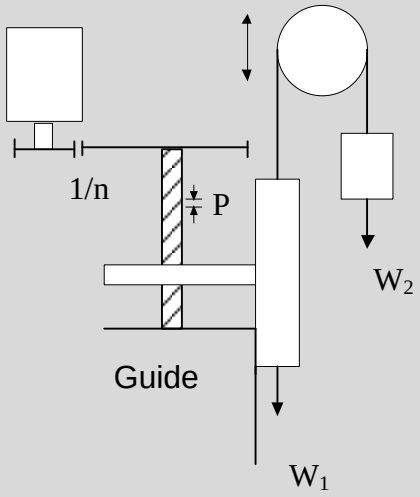
N: Motor rotational speed (unit: r/s)

◆ **Constant torque and holding torque when stopping**

Constant torque and holding torque when stopping are the torque required when motor keeps rotating for a long time, whose value is approximate 80% less of rated torque of the motor. If the value is negative, a regenerative resistor may be needed.

Calculate torques of different driving systems according to the following formulas.

Driving System	Formula for T
Ball screw 	Constant torque $T_f = \dfrac{P}{2\pi\eta}(\mu g W + F)$ W:Mass [kg] η:Mechanical efficiency P:Guide travel [m] μ:Friction coefficient F:External force [N] g:Gravitational acceleration 9.8[m/s^2]

Driving System	Formula for T
Belt driving system 	Constant torque $T_f = \frac{D}{2\pi\eta}(\mu gW+F)$ W:Mass[kg] η:Mechanical efficiency D:Guide travel [m] μ:Friction coefficient F:External force [N] g:Gravitational acceleration 9.8[m/s^2]
Rotating parts 	Constant torque $T_f = \frac{1}{n}\times\frac{1}{\eta}\times T_{L0}+T_F$ T_{L0}: Load torque T_F: Load friction torque 1/n: Electronic gear ratio $n=\frac{Z_2}{Z_1}$ η : Mechanical efficiency
Vertical axis 	Ascending $T_f = T_U+T_F$ Descending $T_f = -T_U\times\eta^2+T_F$ T_F: Friction torque of moving parts $T_U = \frac{(W_1+W_2)}{2\pi\eta}\times g\times P$ $T_F = \frac{\mu(W_1+W_2)}{2\pi\eta}\times g\times P$ W_1: Load mass [kg] W_2: Balancing mass [kg]

◆ **Effective torque**

Effective torque can be figured out according to the formula below, whose value is approximate 80% less of rated torque of the motor.

$$T_{rms} = \sqrt{\frac{T_a^2\times t_a + T_f^2\times t_b + T_d^2\times t_d}{t_c}}$$

T_a: Acceleration torque [N•m] t_a: Acceleration time [s] t_c: Cycle time [s]

T_f: Constant torque [N•m] t_b: Constant speed time [s] (Rotating time + Stopping time)

T_d: Deceleration torque [N•m] t_d: Deceleration time [s]

◆ **Rotational speed of motor**

Max. rotational speed means the permissible max. rotational speed of the motor in running period, whose value is approximate less than rated rotational speed. However, when enabling the max. rotational speed, you should pay special attention to the torque and rising temperature.

$$V_{\max} = \frac{\text{Movement distance}}{\frac{\text{Acc. time}}{2} + \frac{\text{Dec. time}}{2} + \text{Constant speed time}}$$

8.2 Typical Examples of Motor Selection

8.2.1 Examples of Motor Selection for Ball Screw System

(1) Ball screw structure

The structure of ball screw is illustrated as follows:

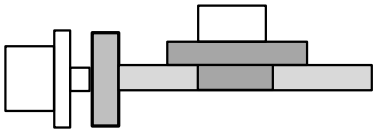


Fig. 8-4 Structure of ball screw

Mass of part W_A=10[kg]　　Ball screw length B_L=0.5[m]

Ball screw diameter B_D=0.02[m]　　Ball screw pitch B_P=0.02[m]

Ball screw efficiency B_η=0.9　　Movement distance 0.3[m]

Coupling inertia $J_C=10\times10^{-6}$[kg•m^2] (you can refer to the value listed in product catalog or use the calculation result.)

(2) Running mode

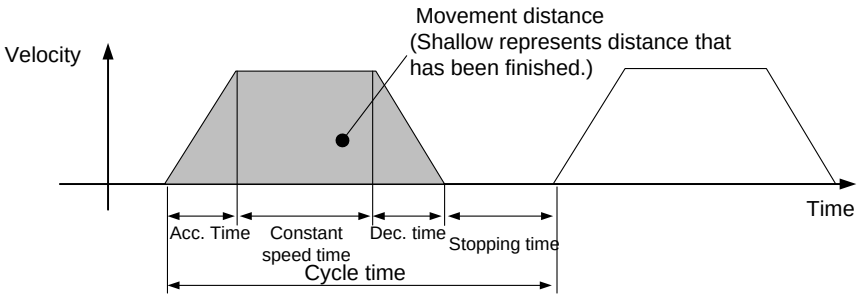


Fig. 8-5 Running mode

Acceleration time	t_a=0.1[s]	Constant speed time	t_b=0.8[s]
Deceleration time	t_d=0.1[s]	Cycle time	t_c=2[s]
Movement distance	0.3[m]		

(3) Mass of ball screw

$$B_W = \rho \times \pi \times \left(\frac{B_D}{2}\right)^2 B_L = 7.9\times10^3 \times \pi \times \left(\frac{0.02}{2}\right)^2 \times 0.5 = 1.24(kg)$$

(4) Load inertia

$$J_L = J_C + J_B = J_C + \frac{1}{8} B_W \times B_D^2 + \frac{W_A \times B_P^2}{4\pi^2}$$

$$= 0.00001 + \left(1.24\times0.02^2\right)/8 + 10\times0.02^2/4\pi^2$$

=1.73×10-4[kg •m^2]

(5) Preselect motor

If a motor with output capacity of 0.2kW is selected, then J_M=0.14×10-4[kg•m^2].

(6) Inertia ratio

J_L/J_M=1.73×10-4/0.14×10-4[kg•m^2]=12.3 times <30 times

If a motor with output capacity of 0.1kW is selected, then J_M=0.051×10^{-4}[kg•m^2]. The result is 33.9 times, larger than 30 times.

(7) Max. velocity (Vmax)

$$V_{\max} = \frac{\text{Movement distance}}{\frac{\text{Acc. times}}{2} + \frac{\text{Dec. time}}{2} + \text{Constant speed time}}$$ =0.3/0.9=0.334[m/s]

(8) Rotational speed

You need to convert it to N[r/min]. The guide travel per revolution of ball screw will be BP=0.02[m]

N=0.334/0.02=16.7[r/s]=16.7×60=1002[r/min]<3000[r/min] (Rated rotational speed of motor (0.2kW)

(9) Calculate the torque

Constant Torque: $T_f = \frac{P}{2\pi\eta}(\mu gW+F) = \frac{0.02}{2\pi\times0.9}\left(0.1\times9.8\times10+0\right)$

=0.035[N•m]

Acceleration torque: $T_a = \frac{(J_L + J_M)\times2\pi N}{t_{psa}} + \text{Running torque}$

$$= \frac{(1.73\times10^{-4} + 0.14\times10^{-4})\times2\pi\times16.7}{0.1} + 0.035$$

=0.196+0.035=0.231[N•m]

Deceleration torque: $T_d = \frac{(J_L + J_M) \times 2\pi N}{t_{psd}}$ −Running torque

=0.196-0.035=0.161[N•m]

(10) Confirm the effective torque

$$T_{rms} = \sqrt{\frac{T_a^2 \times t_a + T_f^2 \times t_b + T_d^2 \times t_d}{t_c}} = \sqrt{\frac{0.231^2 \times 0.1 + 0.035^2 \times 0.8 + 0.161^2 \times 0.1}{2}}$$

=0.067[N•m]<0.64[N•m] (the rated torque of motor (0.2kW))

(11) Confirm motor selection

Taking all calculations above into consideration, you can find that despite there is relatively large torque allowance when choosing motor (0.2kW), it is a suitable choice considering inertia ratio.

8.2.2 Examples of Motor Selection for Belt Driving System

(1) Belt Driving System Structure

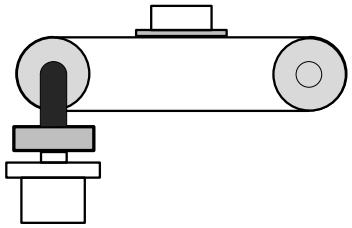


Fig. 8-6 Structure of belt driving system

Mass of part W_A=10[kg]

Belt diameter P_D=0.05[m] (you can refer to the value listed in product catalog or use calculation result.)

Mass of driving wheel W_P=0.5[kg]

Ball screw efficiency B_η=0.8

Coupling inertia J_C=0[kg•m^2](Motor shaft is connected directly.)

(2) Running Mode

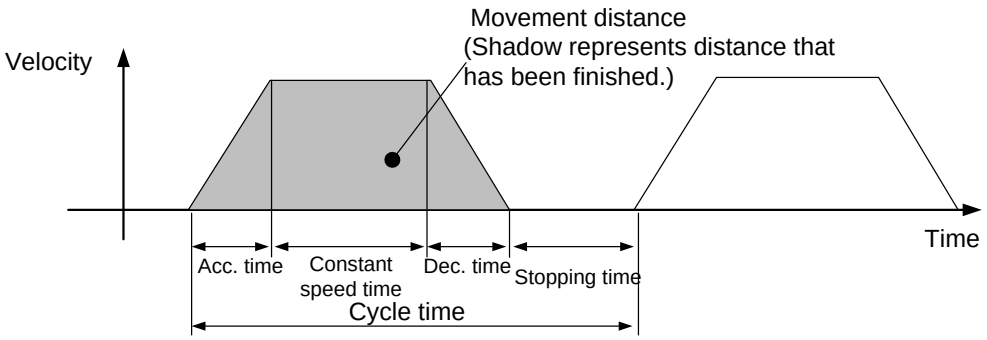


Fig. 8-7 Running mode

Acceleration time t_a=0.1[s]

Constant speed time t_b=0.8[s]

Deceleration time t_d=0.1[s]

Cycle time t_c=2[s]

Movement distance 1[m]

(3) Load Inertia

$$J_L = J_C(\text{Coupling})+J_B(\text{Belt driving application})+J_P(\text{Driving wheel})$$

$$= J_C+\frac{1}{4}W_A\times P_D^2+\frac{1}{8}W_P\times P_D^2\times 2$$

$$=0+\frac{1}{4}2\times 0.05^2+\frac{1}{8}\times 0.5\times 0.05^2\times 2$$

$=0.00156=15.6\times10^{-4}$[kg•m^2]

(4) Preselect Motor

When a motor with output capacity of 0.75kW is selected, then $J_M=0.87\times10^{-4}$[kg•m^2]

(5) Inertia Ratio

J_L/J_M=15.6×10-4/0.87×10-4[kg•m^2]=17.9 times <20 times

(6) Max. Velocity

$$V_{\max}=\frac{\text{Movement distance}}{\frac{\text{Acc. time}}{2}+\frac{\text{Dec. time}}{2}+\text{Constant speed time}}=1/0.9=1.111\text{[m/s]}$$

(7) Rotational Speed

You need to convert it to N [r/min]. Per revolution of driving wheel ×PD=0.157[m]

N=1.111/0.157=7.08[r/s]=7.08×60=424.8[r/min]<3000[r/min]

(8) Calculate the Torque

Constant torque: $T_f=\frac{P}{2\eta}(\mu gW_A+F)=\frac{0.05}{2\times0.8}(0.1\times9.8\times2+0)$

=0.061[N•m]

Acceleration torque: $T_a=\frac{(J_L+J_M)\times2\pi N}{t_{psa}}+\text{Running torque}$

$$=\frac{(15.6\times10^{-4}+0.87\times10^{-4})\times2\pi\times7.08}{0.1}+0.061$$

=0.751+0.061=0.812[N•m]

Deceleration torque: $T_d=\frac{(J_L+J_M)\times2\pi N}{t_{psd}}-\text{Running torque}$

=0.751-0.061=0.69[N•m]

(9) Confirm the Max. Torque

Acceleration torque =Ta=0.812[N•m]<7.1[N•m](the max. torque of motor (0.75kW))

(10) Confirm the Effective Torque

$$T_{rms}=\sqrt{\frac{T_a^2\times t_a+T_f^2\times t_b+T_d^2\times t_d}{t_c}}=\sqrt{\frac{0.812^2\times 0.1+0.061^2\times 0.8+0.69^2\times 0.1}{2}}$$

=0.241[N•m]<2.4[N•m](rated torque of motor (0.75kW))

(11) Confirm Motor Selection

Taking all calculations above into consideration, you will find that despite there is relatively large torque allowance when motor (0.75kW) is selected, it is a suitable choice considering inertia ratio.