

# Ball Screw Linear Actuators

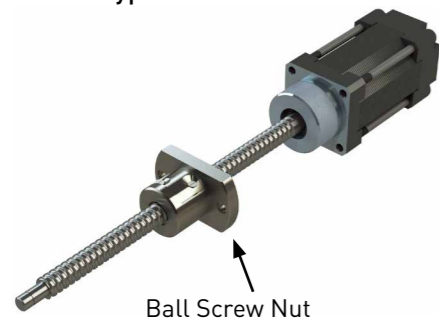
- This is a Ball Screw type Compact Electric Linear Actuators with Stepping Motor.
- 3 types of Linear Actuators, Captive, Non-captive, & External, are provided for customer's usage.
- KSS is only one manufacturer who has all 3-types of Linear Actuators.
- Wide variety of selection of Motor & Ball Screw are available.

### ● Features

- High accuracy & compactness are achieved due to direct drive structure.
- Compact design, to reduce the number of components, to save the labor cost are possible.
- High efficiency, long life & high accuracy can be achieved compared to lead screw type.
- Pick one models that fits your application or specifications among variety of combination, Motor size, Ball screw type & screw lead.

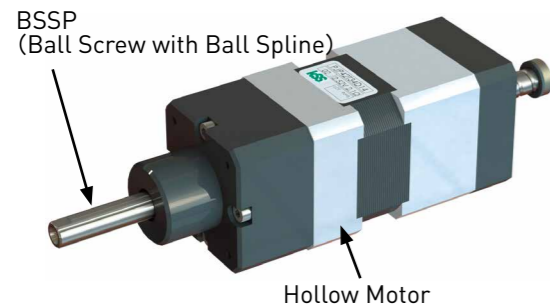
### ● Variation and Structure

#### External type



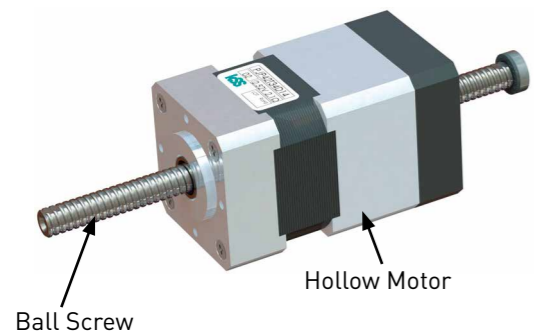
Stepping Motor is directly mounted onto Ball Screw shaft, so that Coupling is not required in this type of Actuator.

#### Captive type



Ball Screw with Ball Spline(BSSP) is built in the Hollow Motor. Ball Spline Nut plays a role of anti-rotating device and slide guide. No need to set up anti-rotating design outside the Actuators.

#### Non-Captive type



This is the simple design Linear Actuator with Ball Screw built in Hollow Motor. Anti-rotating device should be set up outside Actuators when usage.

# Linear Actuator External type



It's a Compact Linear Actuator series, what we call MoBo.

The MoBo is the combined product that Stepping Motor Shaft is directly mounted onto Ball Screw Shaft, and eliminated Coupling accordingly.

In KSS, we always pursue the downsizing of our products that is the mission of the Miniature Ball Screw manufacturer. Linear Actuator External type is one of our representative product, which combines a Motor Shaft and a Ball Screw.

External type can achieve shortening the longitudinal dimension by eliminating the Coupling. Since KSS launched the first version of External type in 2001, we continued to add various type of External type on our line-up and provides the variety of choices to our customer.

Linear Actuator (External type) can offer variety of choices, based on its combination of Stepping Motor type (2-phase or 5-phase) and Ball Screw type (refer to TableP-1, TableP-2). In addition, we can provide Resin (plastic Nut) Lead Screw type as customized product, please ask KSS representative if necessary.

Table P-1 : Combination of Ball Screw and Stepping Motor

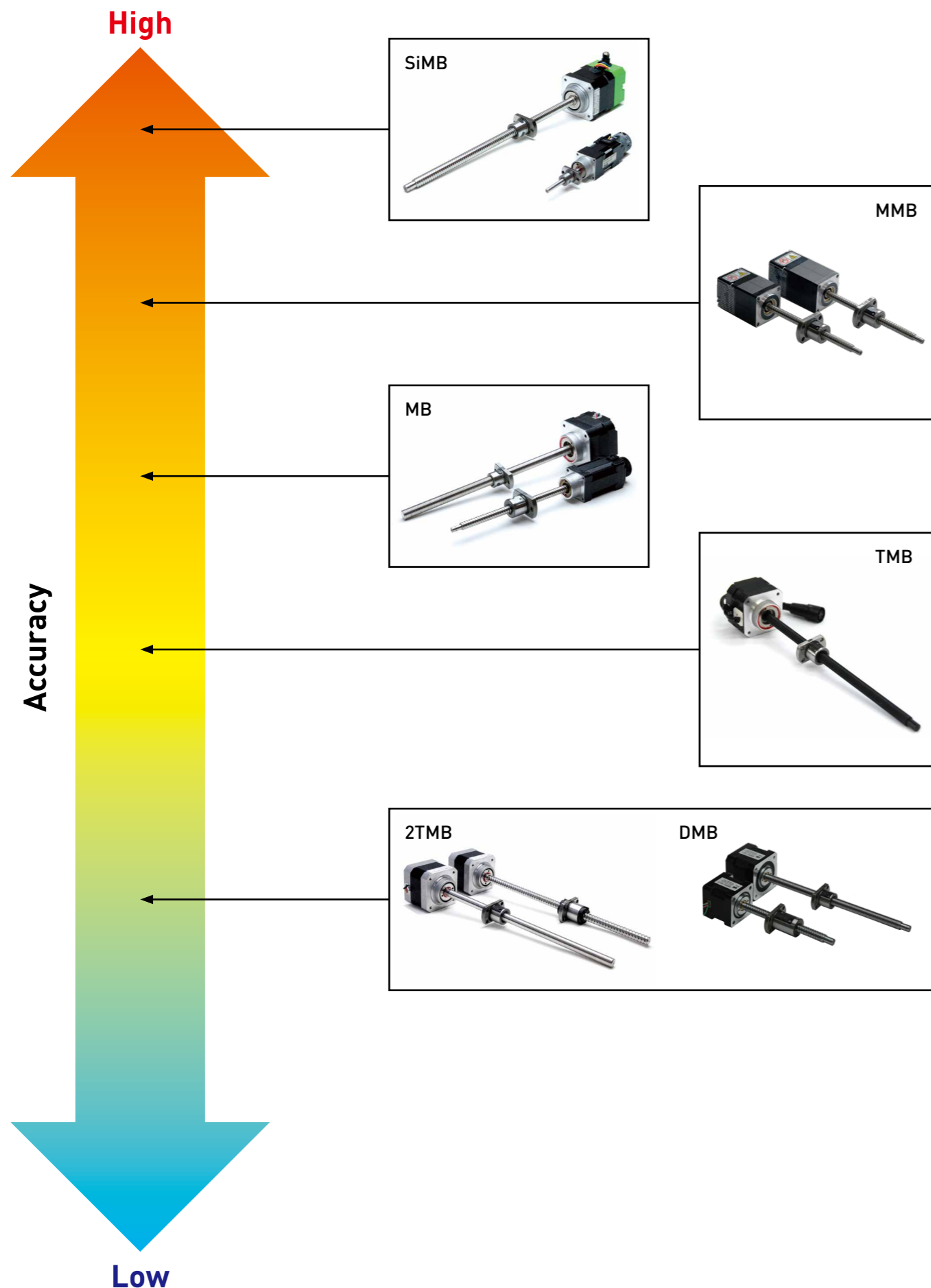
Type	Ball Screw type		Stepping Motor		Additional Function
	Precision type	Rolled type	2-phase	5-phase	
DMB		○ JIS Ct7 equivalent	○		
2TMB		○ JIS Ct7 equivalent	○		
TMB		○ JIS Ct7		○	
MB	○ JIS C3			○	
MMB		○ JIS Ct7 equivalent	○		Encoder / Driver / Controller
SiMB	○ JIS C3		○		Encoder / Memory chip

Table P-2 : Combination of Ball Screw and Stepping Motor

Unit:mm

Shaft Nominal dia.	Lead	0.5	1	2	4	5	6	10	12
		4	MB	DMB TMB MB SiMB	DMB				
5						DMB TMB			
6			DMB TMB MB	DMB TMB MB MMB			TMB	DMB	
8			DMB TMB 2TMB MB SiMB	DMB TMB 2TMB MB SiMB		DMB TMB 2TMB SiMB		DMB	TMB 2TMB

Linear Actuator (External type) provides various types of combination for Ball Screw and Motor ranging from high precision to multi-purpose type depending on the customer requirement.



**[DMB Series]**



Ct7 class Rolled Ball Screw is installed into 2-phase Stepping Motor for multi-purpose use. Variety of Motor size and Ball Screw lead are available.

**[2TMB Series]**



Ct7 class Rolled Ball Screw is installed into 2-phase Stepping Motor for multi-purpose use. Variety of Ball Screw lead are available.

**[TMB Series]**



This series is all-round performance drive unit with Rolled Ball Screw and 5-Phase Stepping Motor. Ct7 class Rolled Ball Screw is built in this series.

**[MB Series]**



This series is high performance, high accurate positioning drive unit with Precision Ball Screw and 5-Phase Stepping Motor. C3 class Precision Ball Screws are adopted for this series.

**[MMB Series]**



Rolled Ball Screw with All-in-One Motor (Encoder, Servo driver and Controller) is to realize high performance and significant saving in wiring. Providing smooth drive and closed loop operation.

**[SiMB Series]**

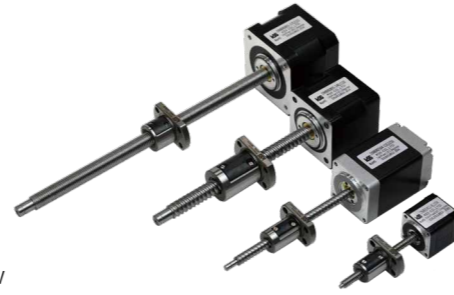


This series have high accurate positioning, ultra smooth drive, torque control drive and closed loop operation by using Precision Ball Screw with C3 accuracy and Si-Servo Motor.

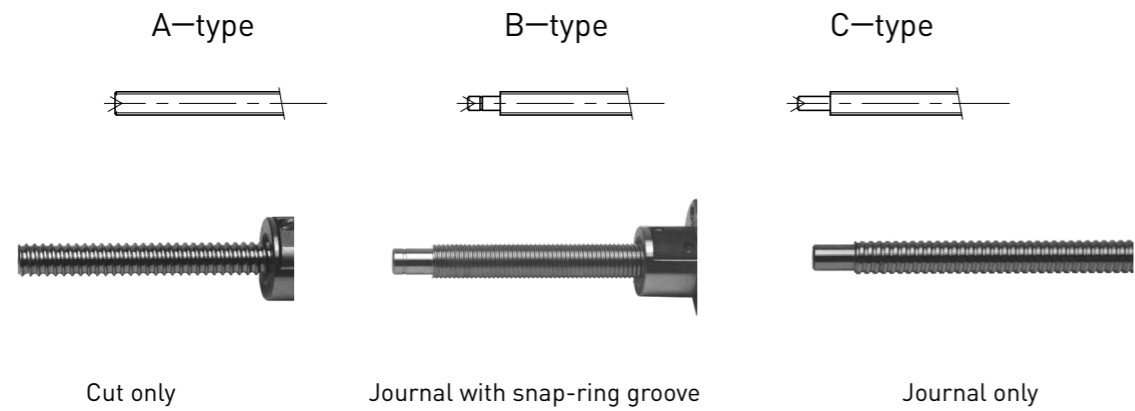
# DMB Series Rolled Ball Screw + 2 Phase Stepping Motor

## ● Features

- Wide variety in Motor size, which are NEMA08(□20), NEMA11(□28), NEMA14(□35) and NEMA17(□42).
- 2-phase Stepping Motor is mounted directly onto the Shaft end of the Ball Screw, which is ideally constructed to form the Motor Rotor Shaft.
- Since combining the Motor Shaft and Ball Screw Shaft, Coupling-less, saving the total length can be achieved.
- High cost performance item is provided by combining Rolled Ball Screw and 2-phase Stepping Motor.
- End journal profiles and travel length can be customized (see photo below).

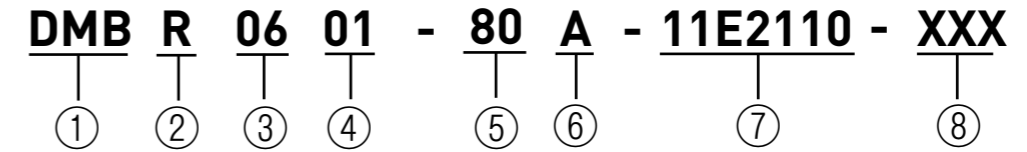


## [End journal variation]



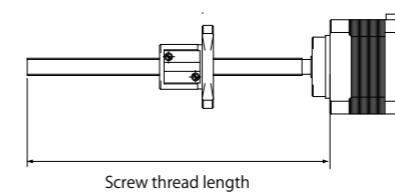
## ● Model number notation

Model number notation for customized DMBR series is as follows.  
In case of standard style, model number is described in catalogue from pageP111 to pageP115.

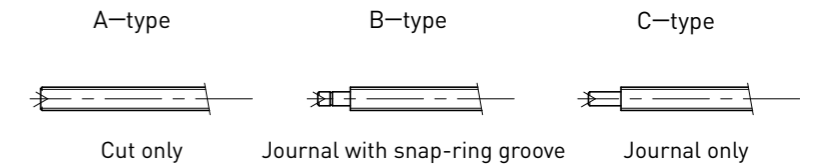


- ① Series No.  
DMB : Linear Actuator Ball Screw External type (2-phase Stepping Motor)
- ② Ball Screw type  
R : Rolled Ball Screw
- ③ Screw Shaft nominal diameter(mm)  
06 means 6mm
- ④ Lead(mm)  
01 means 1mm
- ⑤ Screw thread length(mm)  
Screw length which is exposed from Motor (see below)
- ⑥ End journal profile  
A : Cut only  
B : Journal with snap ring groove (standard)  
C : Journal only
- ⑦ Motor Model  
Refer to table below
- ⑧ Extra notation

## 【⑤Screw thread length】



## 【⑥End journal profile】



Motor Model	Motor size (mm)	Motor length (mm)	Rated current (A/phase)	Holding Torque (Nm)	Applicable Shaft dia. (mm)	Lead (mm)
08E2004	NEMA08(□20)	(22)	0.4	0.003	φ4	1,2
08E2105	NEMA08(□20)	(29)	0.5	0.0035	φ4	1,2
11E2110	NEMA11(□28)	(35)	1.0	0.036	φ5, φ6	1,2,4,10
11E2216	NEMA11(□28)	(47)	1.6	0.052	φ5, φ6	1,2,4,10
14E2110	NEMA14(□35)	(36)	1.0	0.060	φ8	1,2,5,10
14E2215	NEMA14(□35)	(48)	1.5	0.10	φ8	1,2,5,10
17E2115	NEMA17(□42)	(36)	1.5	0.18	φ8	1,2,5,10

## Specifications

Motor Size	Model No.	Motor length	Screw Shaft nominal dia.	Lead	Travel	Travel per pulse	Mass
		(mm)	(mm)	(mm)	(mm)	( $\mu$ m)	(g)
NEMA 08 (□20)	DMBR0401-08E2004	(22)	4	1	23	5	52
	DMBR0402-08E2004	(22)	4	2	21	10	52
	DMBR0401-08E2105	(29)	4	1	23	5	62
	DMBR0402-08E2105	(29)	4	2	21	10	62
NEMA 11 (□28)	DMBR0504-11E2110	(35)	5	4	39	20	140
	DMBR0504-11E2216	(47)	5	4	39	20	194
	DMBR0601-11E2110	(35)	6	1	43	5	140
	DMBR0602-11E2110	(35)	6	2	43	10	148
	DMBR0610-11E2110	(35)	6	10	40	50	146
	DMBR0601-11E2216	(47)	6	1	43	5	194
	DMBR0602-11E2216	(47)	6	2	43	10	202
	DMBR0610-11E2216	(47)	6	10	40	50	198
NEMA 14 (□35)	DMBR0801-14E2110	(36)	8	1	58	5	212
	DMBR0802-14E2110	(36)	8	2	50	10	240
	DMBR0805-14E2110	(36)	8	5	47	25	234
	DMBR0810-14E2110	(36)	8	10	54	50	226
	DMBR0801-14E2215	(48)	8	1	58	5	292
	DMBR0802-14E2215	(48)	8	2	50	10	320
	DMBR0805-14E2215	(48)	8	5	47	25	314
	DMBR0810-14E2215	(48)	8	10	54	50	304
NEMA 17 (□42)	DMBR0801-17E2115	(36)	8	1	118	5	298
	DMBR0802-17E2115	(36)	8	2	110	10	322
	DMBR0805-17E2115	(36)	8	5	107	25	318
	DMBR0810-17E2115	(36)	8	10	114	50	308

Repeatability (reference)	max.±0.01mm (NEMA08/□20:max.±0.02mm)
Lost Motion (reference)	max.0.01mm (NEMA08/□20:max.0.02mm)

※The reference value about Repeatability and Lost Motion represents when the DMB built into KSS original Stage. Please make a contact to KSS for actual value.

Note1) Detail specifications & dimensions are shown in diagram from page P111.

Note2) Travel per pulse represents the value for full step.

Note3) Acceleration & Deceleration Rate should be 50ms/kHz or more.

Note4) For reference thrust, please refer to Force-speed diagram in page109 and page110.

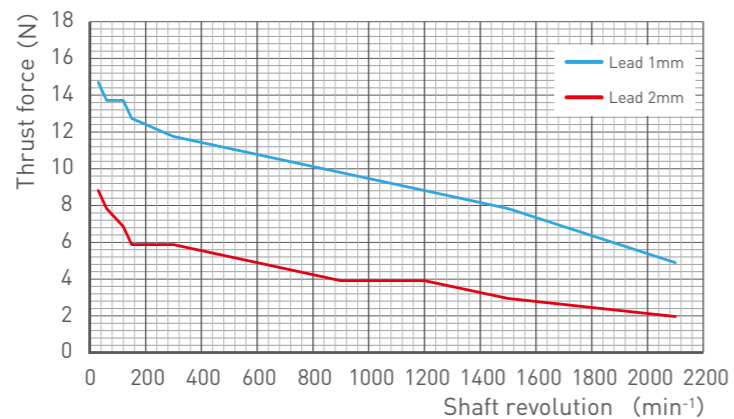
## Motor Specification

Motor size	Motor model	Rated Voltage	Rated current	Winding resistance	Holding Torque	Rotor Inertia	Motor length	Load limit in Vertical Position
		(V)	(A/phase)	( $\Omega$ )	(Nm)	(g · cm <sup>2</sup> )	(mm)	(N)
NEMA 08 (□20)	08E2004	DC3.5	0.4	8.8	0.003	2.4	(22)	43
	08E2105	DC2.6	0.5	5.1	0.0035	2.6	(29)	43
NEMA 11 (□28)	11E2110	DC2.1	1.0	2.1	0.036	$\phi$ 5mm : 6.7 $\phi$ 6mm : 7.2	(35)	150
	11E2216	DC2.4	1.6	1.5	0.052	$\phi$ 5mm : 11.5 $\phi$ 6mm : 12.0	(47)	150
NEMA 14 (□35)	14E2110	DC3.5	1.0	3.5	0.060	21	(36)	230
	14E2215	DC4.0	1.5	2.7	0.10	32	(48)	230
NEMA 17 (□42)	17E2115	DC2.8	1.5	1.85	0.18	36	(36)	230

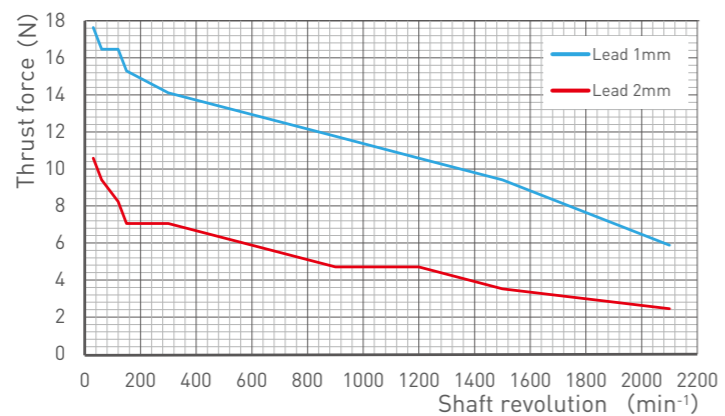
Note) Driving Method is 2-phase Bi-polar, Basic step angle is 1.8 degree.

● Force-speed diagram

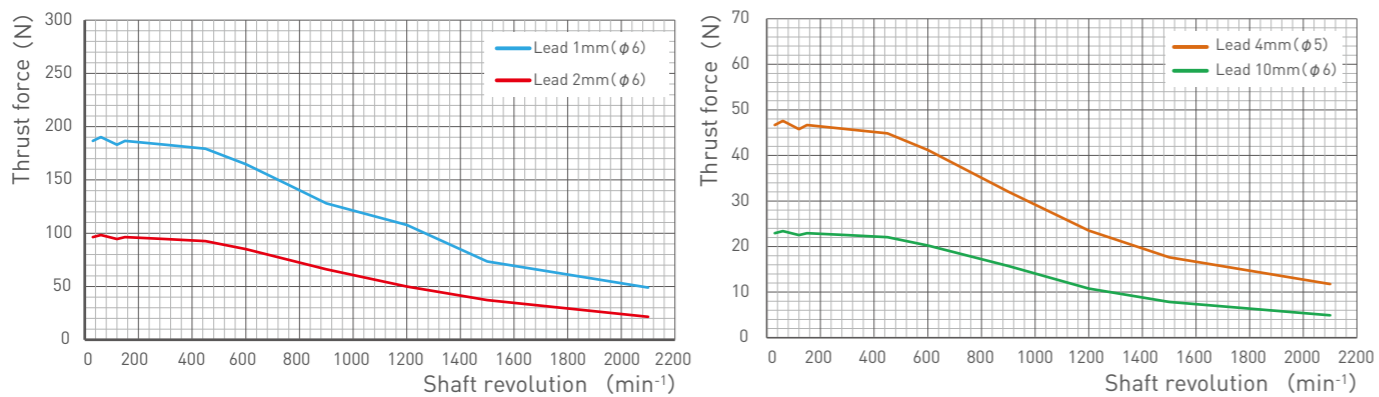
Motor model : 08E2004 (□20)  
 Applicable Actuator : DMBR0401, DMBR0402



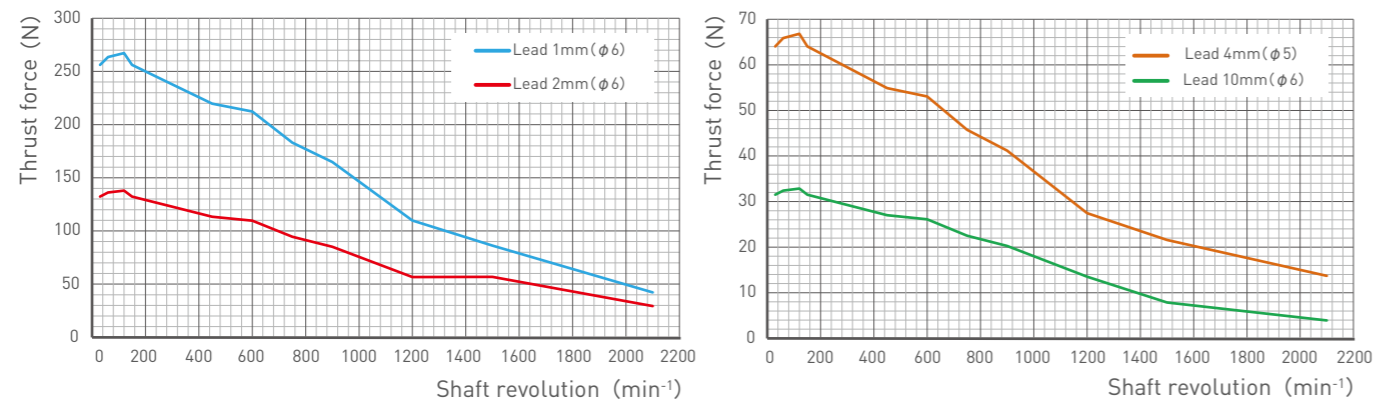
Motor model : 08E2105 (□20)  
 Applicable Actuator : DMBR0401, DMBR0402



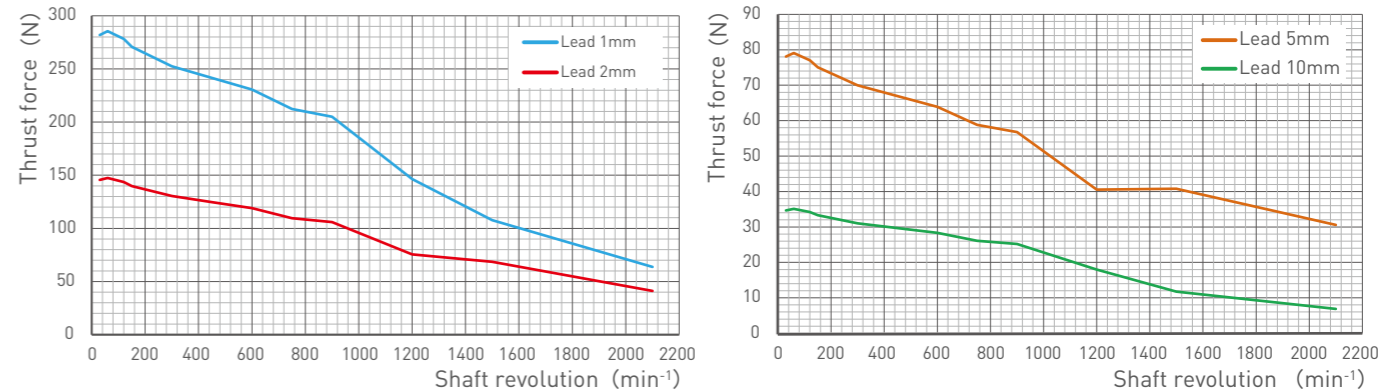
Motor model : 11E2110 (□28)  
 Applicable Actuator : DMBR0504, DMBR0601, DMBR0602, DMBR0610



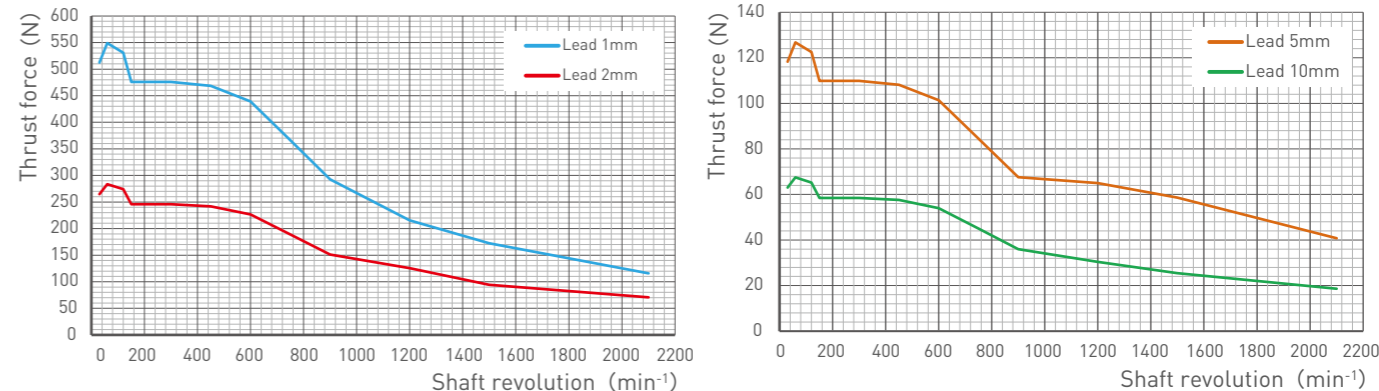
Motor model : 11E2216 (□28)  
 Applicable Actuator : DMBR0504, DMBR0601, DMBR0602, DMBR0610



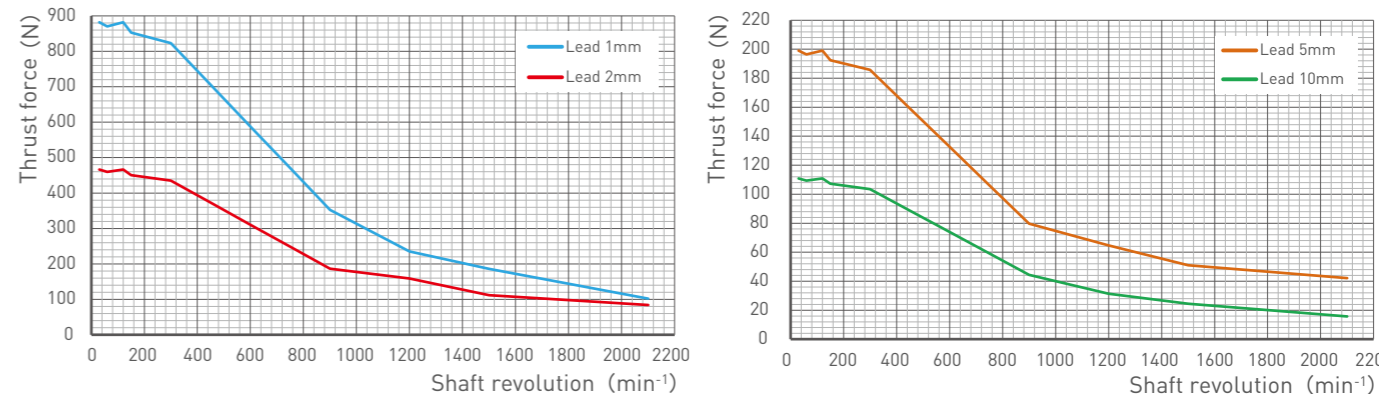
Motor model : 14E2110 (□35)  
 Applicable Actuator : DMBR0801, DMBR0802, DMBR0805, DMBR0810



Motor model : 14E2215 (□35)  
 Applicable Actuator : DMBR0801, DMBR0802, DMBR0805, DMBR0810



Motor model : 17E2115 (□42)  
 Applicable Actuator : DMBR0801, DMBR0802, DMBR0805, DMBR0810



Note) Force-speed diagrams above are measurement data of samples. It may vary depending on each motor's characteristic. Please consider these diagrams as reference data.

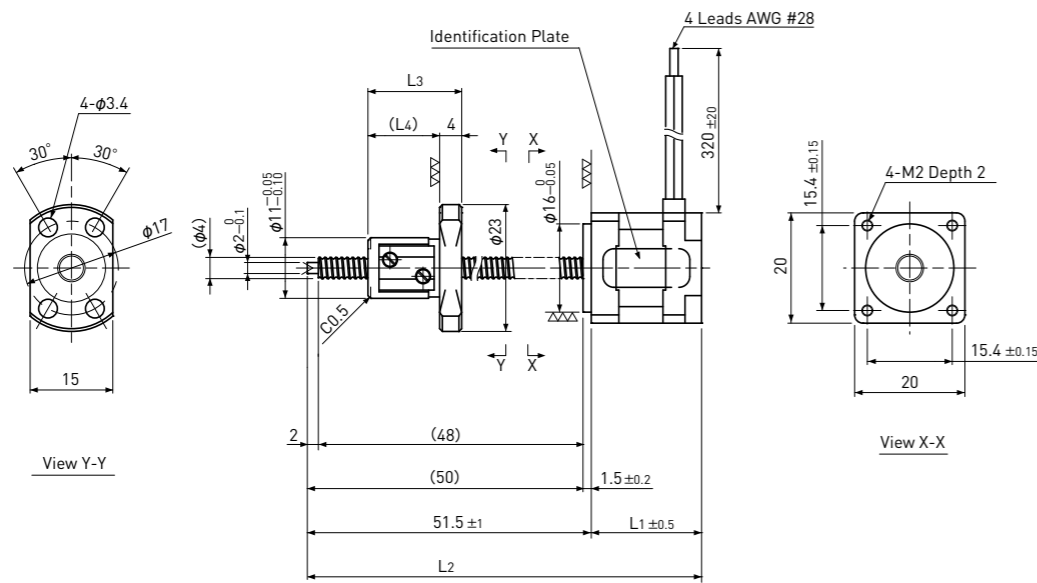
Standard style of DMB series

Dimensions & Specifications

Rolled Ball Screw + 2-phase Stepping Motor

# DMBR □20 / NEMA 08

Shaft dia.  $\phi 4$



Unit:mm

Model	Lead	Travel	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	Mass (g)
DMBR0401-08E2004	1	23	20	71.5	17	13	52
DMBR0402-08E2004	2	21	20	71.5	19	15	52
DMBR0401-08E2105	1	23	27.2	78.7	17	13	62
DMBR0402-08E2105	2	21	27.2	78.7	19	15	62

Motor Wire	
A	Red
$\bar{A}$	Red/White
B	Green
$\bar{B}$	Green/White

Note) Refer to page P161 for connection diagram of recommended Drivers.

Recommended Drivers	SD4015B3
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Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	Max 0.03mm
Ball Screw material	Chrome-molybdenum steel
Surface hardness	Min. HRC58
Lubricant	KSS original grease MSG No.2

Note) Please contact KSS if different journal profile or length from the above is required.

Motor Specifications		
Motor Model	08E2004	08E2105
Basic step angle	1.8°	
Driving method	2-phase Bi-polar	
Rated Voltage	DC 3.5 V	DC 2.6 V
Rated current	DC 0.4A/phase	DC 0.5A/phase
Winding resistance	8.8Ω	5.1Ω
Holding Torque	0.003Nm	0.0035Nm
Rotor inertia	2.4g·cm <sup>2</sup>	2.6g·cm <sup>2</sup>
Operating temperature	-10°C~50°C	

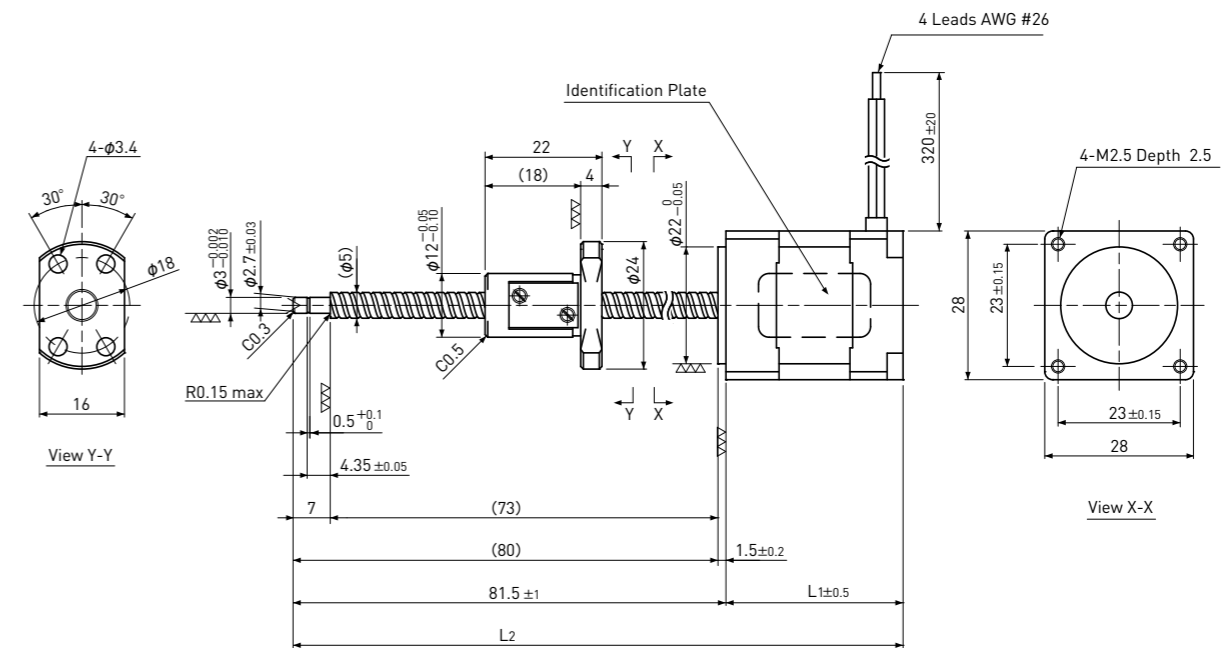
Standard style of DMB series

Dimensions & Specifications

Rolled Ball Screw + 2-phase Stepping Motor

# DMBR □28 / NEMA 11

Shaft dia.  $\phi 5$



Unit:mm

Model	Lead	Travel	L <sub>1</sub>	L <sub>2</sub>	Mass (g)
DMBR0504-11E2110	4	39	33.35	114.85	140
DMBR0504-11E2216	4	39	45	126.5	194

Motor Wire	
A	Red
$\bar{A}$	Red/White
B	Green
$\bar{B}$	Green/White

Note) Refer to page P161 for connection diagram of recommended Drivers.

Recommended Drivers	SD4030B3
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Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	Max 0.03mm
Ball Screw material	Chrome-molybdenum steel
Surface hardness	Min. HRC58
Lubricant	KSS original grease MSG No.2

Note) Please contact KSS if different journal profile or length from the above is required.

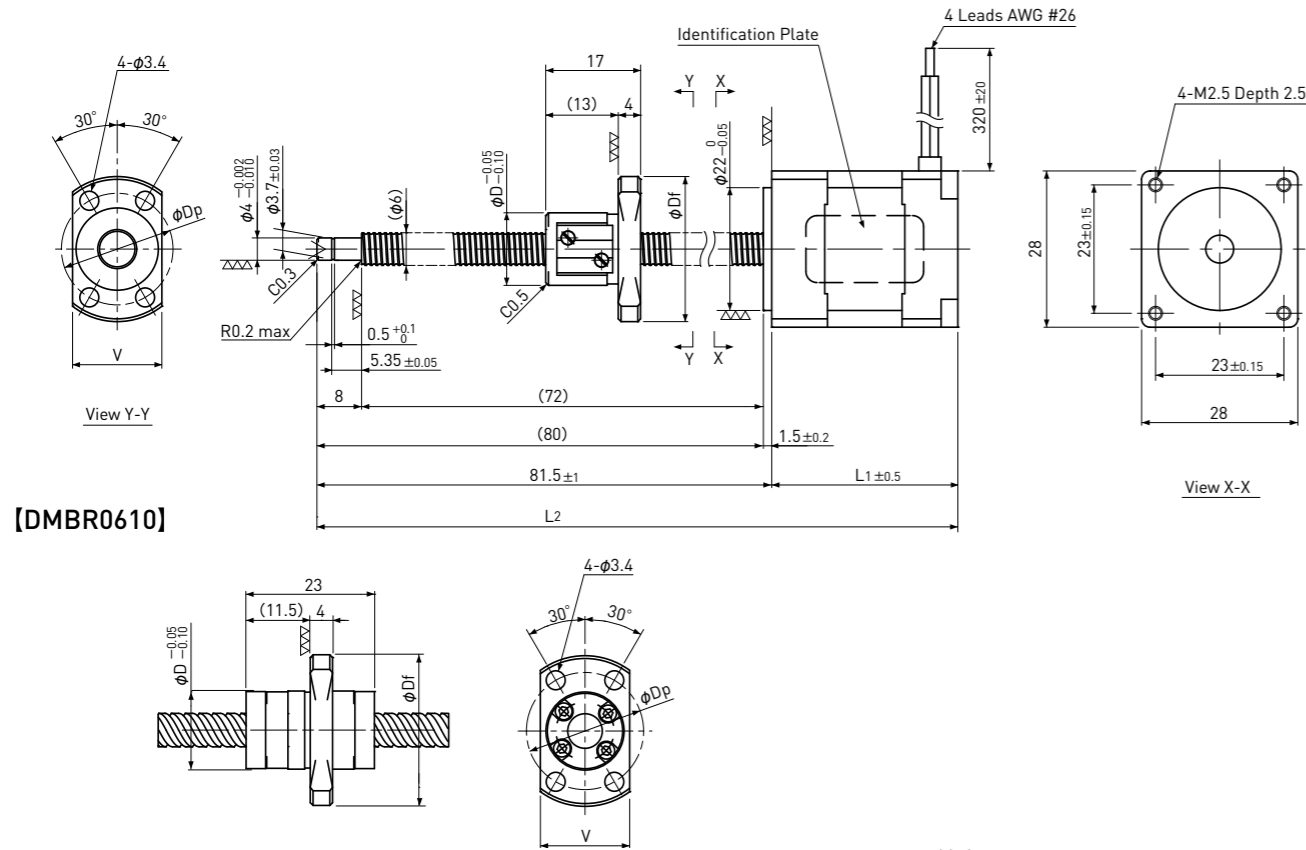
Motor Specifications		
Motor Model	11E2110	11E2216
Basic step angle	1.8°	
Driving method	2-phase Bi-polar	
Rated Voltage	DC 2.1 V	DC 2.4 V
Rated current	DC 1.0A/phase	DC 1.6A/phase
Winding resistance	2.1Ω	1.5Ω
Holding Torque	0.036Nm	0.052Nm
Rotor inertia	6.7g·cm <sup>2</sup>	11.5g·cm <sup>2</sup>
Operating temperature	-10°C~50°C	

Rolled Ball Screw + 2-phase Stepping Motor

# DMBR □28 / NEMA 11

Shaft dia.  $\phi 6$

[DMBR0601 / DMBR0602]



[DMBR0610]

Model	Lead	Travel	L <sub>1</sub>	L <sub>2</sub>	D	D <sub>f</sub>	V	D <sub>p</sub>	Mass (g)
DMBR0601-11E2110	1	43	33.35	114.85	13	26	16	20	140
DMBR0602-11E2110	2	43	33.35	114.85	15	28	19	22	148
DMBR0610-11E2110	10	40	33.35	114.85	14	27	16	21	146
DMBR0601-11E2216	1	43	45	126.5	13	26	16	20	194
DMBR0602-11E2216	2	43	45	126.5	15	28	19	22	202
DMBR0610-11E2216	10	40	45	126.5	14	27	16	21	198

Unit:mm

Motor Wire	
A	Red
$\bar{A}$	Red/White
B	Green
$\bar{B}$	Green/White

Recommended Drivers	SD4030B3
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Note) Refer to page P161 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	Max 0.03mm
Ball Screw material	Chrome-molybdenum steel
Surface hardness	Min. HRC58
Lubricant	KSS original grease MSG No.2

Motor Specifications		
Motor Model	11E2110	11E2216
Basic step angle	1.8°	
Driving method	2-phase Bi-polar	
Rated Voltage	DC 2.1 V	DC 2.4 V
Rated current	DC 1.0A/phase	DC 1.6A/phase
Winding resistance	2.1Ω	1.5Ω
Holding Torque	0.036Nm	0.052Nm
Rotor inertia	7.2g·cm <sup>2</sup>	12.0g·cm <sup>2</sup>
Operating temperature	-10°C~50°C	

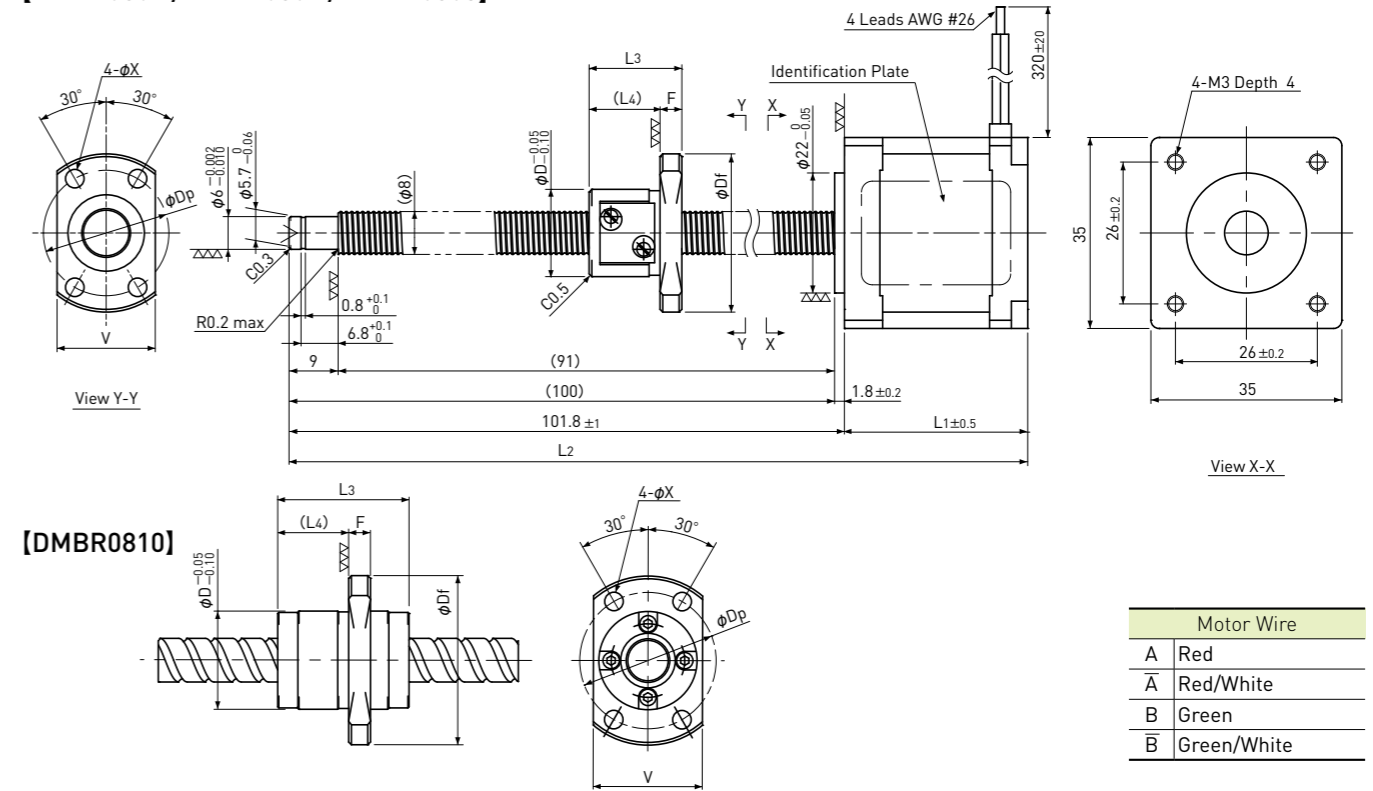
Note) Please contact KSS if different journal profile or length from the above is required.

Rolled Ball Screw + 2-phase Stepping Motor

# DMBR □35 / NEMA 14

Shaft dia.  $\phi 8$

[DMBR0801 / DMBR0802 / DMBR0805]



[DMBR0810]

Model	Lead	Travel	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	D	D <sub>f</sub>	F	V	D <sub>p</sub>	X	Mass (g)
DMBR0801-14E2110	1	58	33.6	135.4	17	13	16	29	4	18	23	3.4	212
DMBR0802-14E2110	2	50	33.6	135.4	24	19	20	37	5	22	29	4.5	240
DMBR0805-14E2110	5	47	33.6	135.4	28	24	18	31	4	20	25	3.4	234
DMBR0810-14E2110	10	54	33.6	135.4	24	13	18	31	4	20	25	3.4	226
DMBR0801-14E2215	1	58	45.6	147.4	17	13	16	29	4	18	23	3.4	292
DMBR0802-14E2215	2	50	45.6	147.4	24	19	20	37	5	22	29	4.5	320
DMBR0805-14E2215	5	47	45.6	147.4	28	24	18	31	4	20	25	3.4	314
DMBR0810-14E2215	10	54	45.6	147.4	24	13	18	31	4	20	25	3.4	304

Unit:mm

Motor Wire	
A	Red
$\bar{A}$	Red/White
B	Green
$\bar{B}$	Green/White

Recommended Drivers	SD4030B3
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Note) Refer to page P161 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	Max 0.03mm
Ball Screw material	Chrome-molybdenum steel
Surface hardness	Min. HRC58
Lubricant	KSS original grease MSG No.2

Motor Specifications		
Motor Model	14E2110	14E2215
Basic step angle	1.8°	
Driving method	2-phase Bi-polar	
Rated Voltage	DC 3.5 V	DC 4.0 V
Rated current	DC 1.0A/phase	DC 1.5A/phase
Winding resistance	3.5Ω	2.7Ω
Holding Torque	0.060Nm	0.10Nm
Rotor inertia	21.0g·cm <sup>2</sup>	32.0g·cm <sup>2</sup>
Operating temperature	-10°C~50°C	

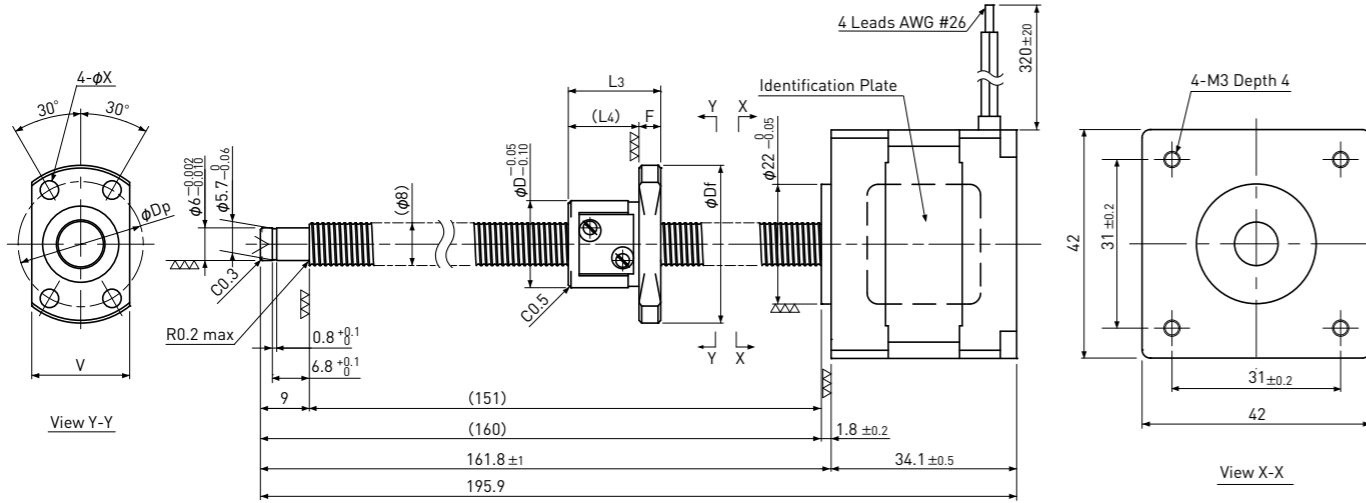
Note) Please contact KSS if different journal profile or length from the above is required.

Rolled Ball Screw + 2-phase Stepping Motor

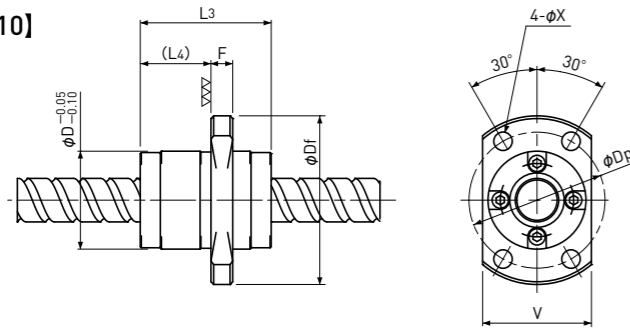
# DMBR □42 / NEMA 17

Shaft dia.  $\phi 8$

[DMBR0801 / DMBR0802 / DMBR0805]



[DMBR0810]



Unit:mm

Model	Lead	Travel	L <sub>3</sub>	L <sub>4</sub>	D	D <sub>f</sub>	F	V	D <sub>p</sub>	X	Mass (g)	Motor Wire	
												A	B
DMBR0801-17E2115	1	118	17	13	16	29	4	18	23	3.4	298	A	Red
DMBR0802-17E2115	2	110	24	19	20	37	5	22	29	4.5	322	A	Red/White
DMBR0805-17E2115	5	107	28	24	18	31	4	20	25	3.4	318	B	Green
DMBR0810-17E2115	10	114	24	13	18	31	4	20	25	3.4	308	B	Green/White

Recommended Drivers

SD4030B3

Note) Refer to page P161 for connection diagram of recommended Drivers.

### Ball Screw Specifications

Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	Max 0.03mm
Ball Screw material	Chrome-molybdenum steel
Surface hardness	Min. HRC58
Lubricant	KSS original grease MSG No.2

### Motor Specifications

Motor Model	17E2115
Basic step angle	1.8°
Driving method	2-phase Bi-polar
Rated Voltage	DC 2.8 V
Rated current	DC 1.5A/phase
Winding resistance	1.85Ω
Holding Torque	0.18Nm
Rotor inertia	36.0g·cm <sup>2</sup>
Operating temperature	-10°C~50°C

Note) Please contact KSS if different journal profile or length from the above is required.



# 2TMB Series Rolled Ball Screw + 2 Phase Stepping Motor



### ●Features

- A 2-phase Stepping Motor is mounted directly onto the shaft end of a Ct7 grade Rolled Ball Screw, which means compact and multipurpose type product.
- Ball Screw Shaft is ideally constructed to form the Motor Rotor Shaft.
- Since combining the Motor Shaft and Ball Screw Shaft, Coupling-less, saving total length, and reducing labor cost can be achieved.
- Recommended Driver for 2-phase Stepping Motor is available.
- Flexible length can be provided by the end journal turning.
- Stable mounting is secured by the exclusive Support Unit.



### ●Specifications

Model	Shaft Nominal Dia. (mm)	Lead (mm)	Travel (mm)	Travel per pulse ( $\mu$ m)	Reference Thrust (N)	Mass (g)
2TMB0801	$\phi$ 8	1	150	5	75	350
2TMB0802	$\phi$ 8	2	150	10	100	400
2TMB0805	$\phi$ 8	5	150	25	50	400
2TMB0812	$\phi$ 8	12	150	60	25	400

Repeatability(reference)	max. $\pm$ 0.01mm
Lost Motion(reference)	max. 0.01mm

※The reference value about Repeatability and Lost Motion represents when the 2TMB built into KSS original Stage. Please make a contact to KSS for actual value.

Note1) Detail specifications & dimensions are shown in drawings from page P120.

Note2) Travel per pulse represents the value for full step.

Note3) Acceleration & Deceleration Rate should be 50ms/kHz or more.

Note4) Reference Thrust may vary depending on the operating condition, please ask KSS for more detail.

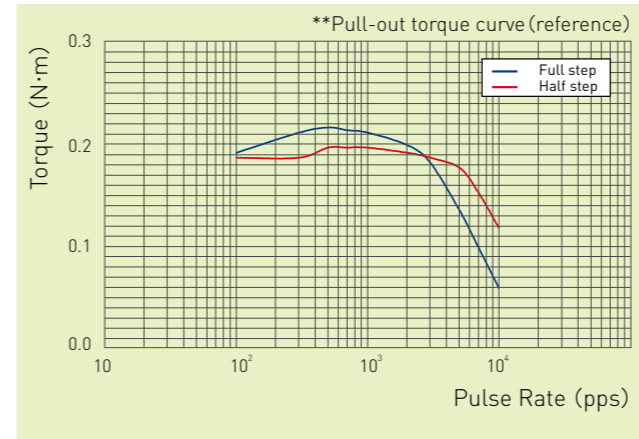
### ●Motor Specifications

Model	Motor size	Rated voltage (V)	Rated current (A/phase)	Winding resistance ( $\Omega$ )	Holding torque (Nm)	Rotor Inertia ( $g \cdot cm^2$ )	Load limit in Vertical Position (N)
2TMB0801	NEMA 17 ( $\square$ 42)	DC 2.2	2.0	1.1	0.24	42	300
2TMB0802	NEMA 17 ( $\square$ 42)	DC 2.2	2.0	1.1	0.24	42	300
2TMB0805	NEMA 17 ( $\square$ 42)	DC 2.2	2.0	1.1	0.24	42	300
2TMB0812	NEMA 17 ( $\square$ 42)	DC 2.2	2.0	1.1	0.24	42	300

Driving method	2-phase Bi-polar
Basic step angle	1.8°

Note ) Rotor Inertia includes Ball Screw Shaft.

### ●Motor Characteristic

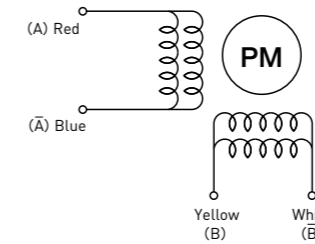


### ■Test condition

Driver : Maker Standard  
Input Voltage : DC24V  
Phase Currnt : 2.0A

Note) Motor characteristic will vary depending on Driver type, opeating conditions.

### ●結線図 / Schematic



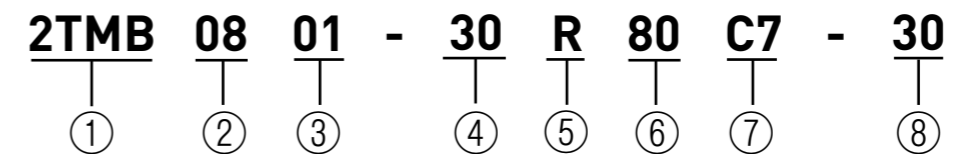
Swiching sequence for CW rotation viewed from shaft end.

STEP	Red (A)	Yellow (B)	Blue (A)	White (B)
0	+	+	-	-
1	-	+	+	-
2	-	-	+	+
3	+	-	-	+
0	+	+	-	-

### ●Model number notation

Model number notation for customized 2TMB series is as follows.

In case of standard style, model number is described in catalogue in page P120.



①Series No.

2TMB : Rolled Ball Screw+2-phase Stepping Motor

②Screw Shaft nominal diameter(mm)

③Lead(mm)

01 means 1mm

④Screw thread length(mm)

L<sub>1</sub> : See below

⑤Thread direction (R=Right-hand)

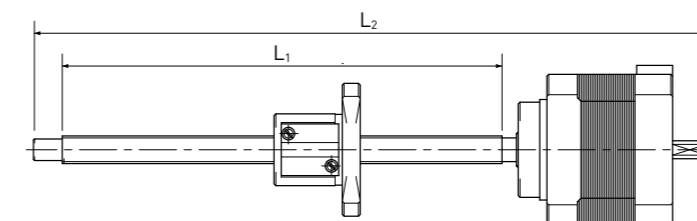
⑥Screw Shaft total length(mm)

L<sub>2</sub> : See below

⑦Accuracy grade

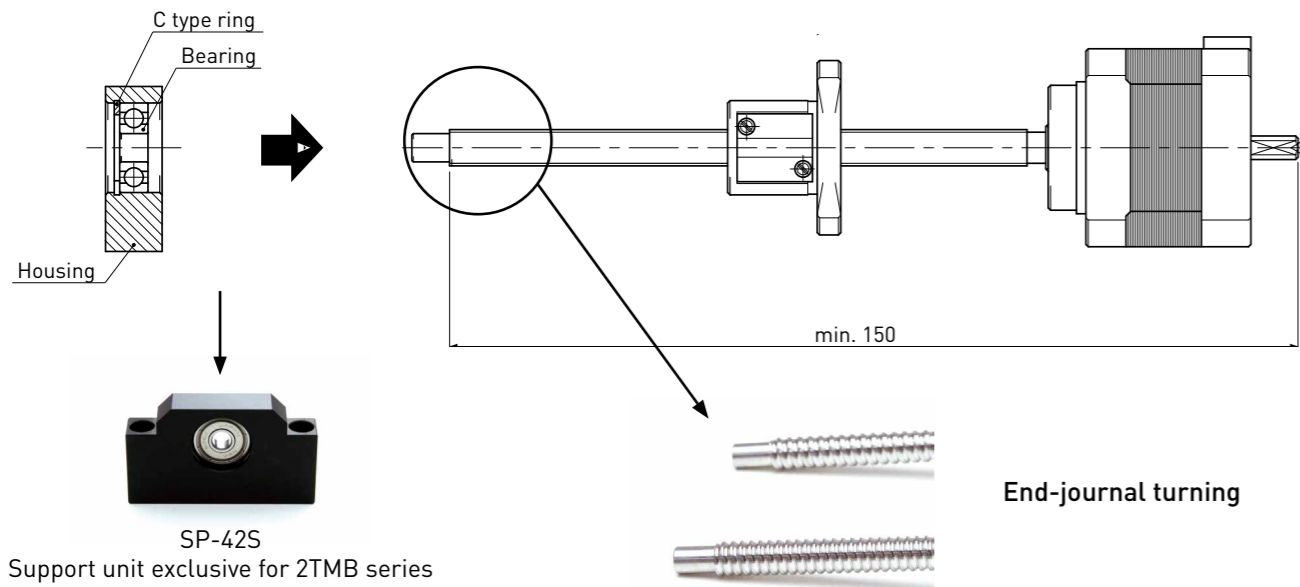
⑧Axial play( $\mu$ m)

### 【④⑥Definition of Screw length】



● End-journal turning & Exclusive Support Unit

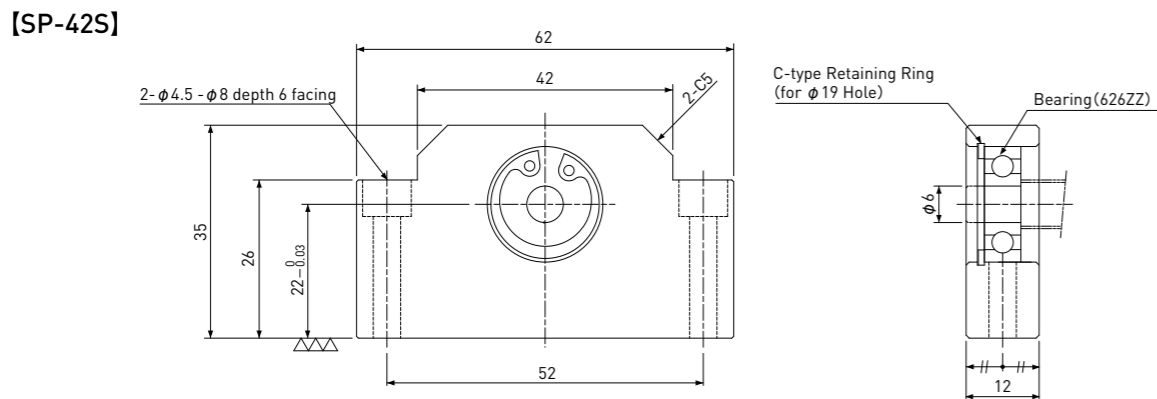
All of 2TMB series are in stock. In order to meet the request of flexible length, Shaft end journal turning is available. Please note that re-work is only for cutting and turning down (see photo below). KSS does not process Ring groove machining on the end of Shaft. Exclusive Support Unit with Brg. & Retaining ring for hole is provided by KSS.



SP-42S  
Support unit exclusive for 2TMB series

Please note that minimum re-work length is 150mm (except re-work portion) as shown in figure above. Total length shorter than 150mm (except re-work portion) should be used as cantilever. If supported journal with ring groove or total length of less than 150mm is required, it will be available as a customized order.

Regarding the profile and dimension of KSS Exclusive Support Unit (SP-42S) for 2TMB series, please see below.  
Special profile of Support Unit is required, please ask KSS representative.



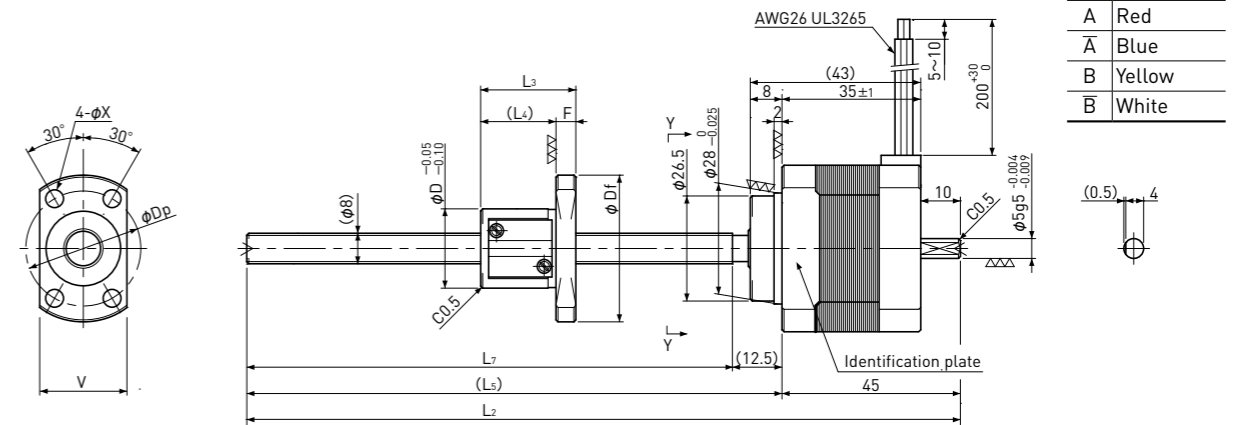
Standard products in stock 2TMB series

Rolled Ball Screw + 2-Phase Stepping Motor

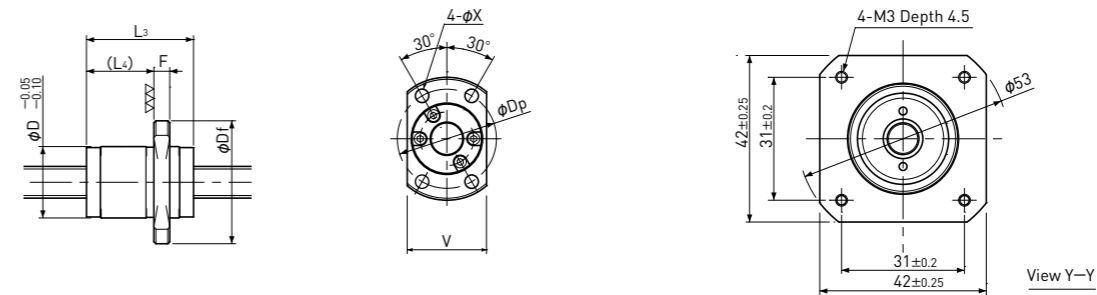
2TMB □42 / NEMA 17

Shaft dia.  $\phi 8$

[2TMB0801 / 2TMB0802 / 2TMB0805]



[2TMB0812]



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	L <sub>2</sub>	L <sub>5</sub>	L <sub>7</sub>	D	D <sub>f</sub>	F	L <sub>3</sub>	L <sub>4</sub>	V	D <sub>p</sub>	X	Mass (g)
2TMB0801	1	150	75	240	195	182.5	16	29	4	17	13	18	23	3.4	350
2TMB0802	2	150	100	250	205	192.5	20	37	5	24	19	22	29	4.5	400
2TMB0805	5	150	50	250	205	192.5	18	31	4	28	24	20	25	3.4	400
2TMB0812	12	150	25	250	205	192.5	18	31	4	27	17	20	25	3.4	400

Recommended Drivers	SD4030B3
---------------------	----------

Note) Refer to page P162 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	Equivalent to JIS Ct7
Thread direction	Right
Axial play	0.03mm or less
Shaft material	Stainless steel
Nut material	Chrome - molybdenum steel
Surface hardness	Min. HRC55 (Thread area)
Lubricant	KSS original grease MSG No.2

Note) Please refer to page P119 for about end-journal turning.

Motor Specifications	
Basic step angle	1.8°
Driving method	2-phase Bi-polar
Rated Voltage	DC 2.2 V
Rated current	DC 2.0 A/phase
Winding resistance	1.1 $\Omega$
Holding Torque	0.24 Nm
Rotor inertia	42 g · cm <sup>2</sup>
Operating temperature	-20°C ~ 50°C

# TMB Series Rolled Ball Screw + 5 Phase Stepping Motor



## ●Features

- A 5-phase Stepping Motor is mounted directly onto the shaft end of a Ct7 grade Rolled Ball Screw, which is all-round performance drive unit.
- Ball Screw Shaft is ideally constructed to form the Motor Rotor Shaft.
- Since combining the Motor Shaft and Ball Screw Shaft, Coupling-less, saving total length, and reducing labor cost can be achieved.
- Recommended Driver for 5-phase Stepping Motor is available.



## ●Specifications

Model	Shaft Nominal Dia. (mm)	Lead (mm)	Travel (mm)	Travel per pules ( $\mu$ m)	Reference Thrust (N)	Mass (g)
TMB0401	$\phi$ 4	1	30	2	50	100
TMB0504	$\phi$ 5	4	75	8	25	180
TMB0601	$\phi$ 6	1	75	2	100	180
TMB0602	$\phi$ 6	2	75	4	50	180
TMB0606	$\phi$ 6	6	75	12	15	180
TMB0801	$\phi$ 8	1	150	2	300	320
TMB0802	$\phi$ 8	2	150	4	150	320
TMB0805	$\phi$ 8	5	150	10	120	450
TMB0812	$\phi$ 8	12	150	24	50	450

Repeatability(reference)	max. $\pm$ 0.01mm
Lost Motion(reference)	max. 0.01mm

※The reference value about Repeatability and Lost Motion represents when the TMB built into KSS original Stage. Please make a contact to KSS for actual value.

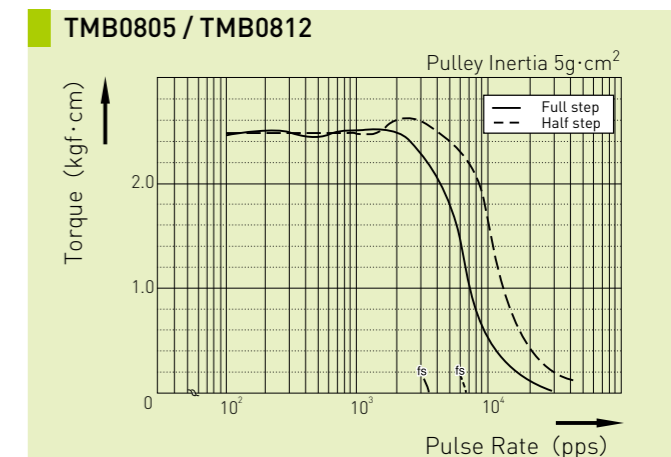
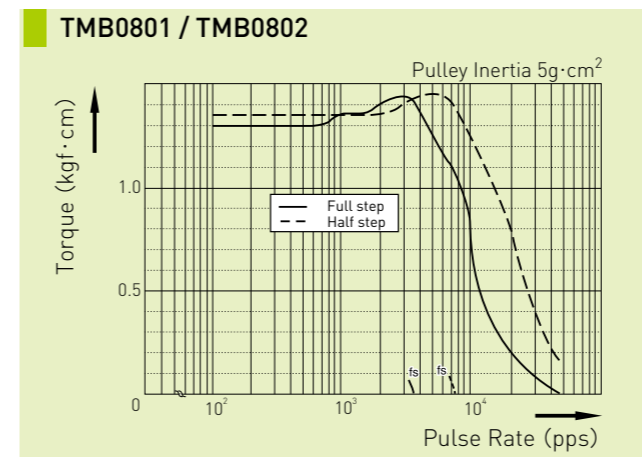
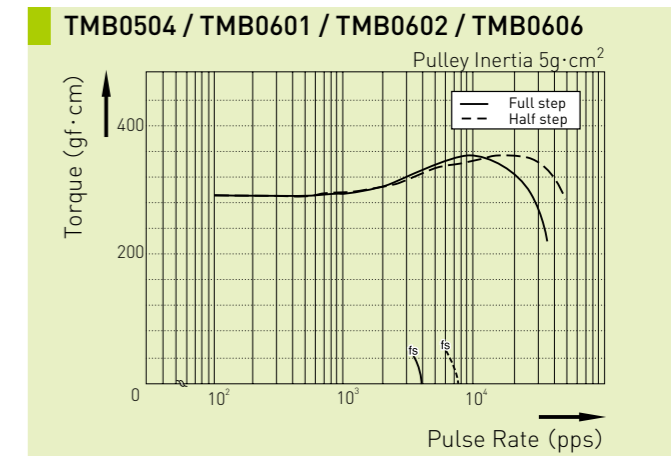
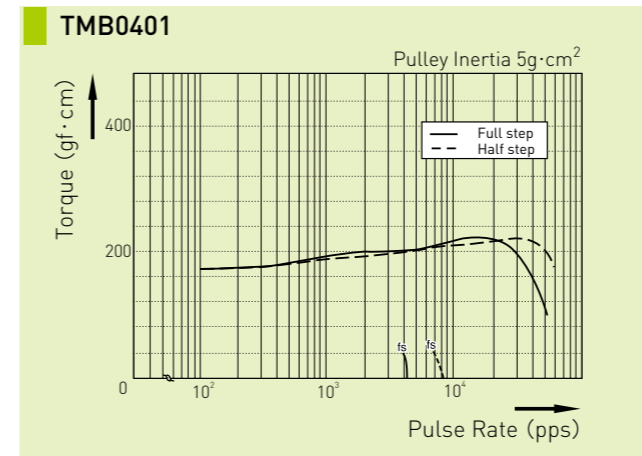
- Note 1) Detail specifications & dimensions are shown in drawings from page P124.  
 Note 2) Travel per pulse represents the value for full step.  
 Note 3) Acceleration & Deceleration Rate should be 20ms/kHz or more.  
 Note 4) Reference Thrust may vary depending on the operating condition, please ask KSS for more detail.

## ●Motor Specifications

Model	Motor size (mm)	Rated voltage (V)	Rated current (A/phase)	Winding resistance ( $\Omega$ )	Holding torque (Nm)	Rotor Inertia ( $g \cdot cm^2$ )	Load limit in Vertical Position (N)
TMB0401	NEMA 10 ( $\square$ 24)	DC 0.83	0.75	1.1	0.018	4.2	230
TMB0504	NEMA 10 ( $\square$ 24)	DC 1.28	0.75	1.7	0.028	8.3	230
TMB0601	NEMA 10 ( $\square$ 24)	DC 1.28	0.75	1.7	0.028	8.8	230
TMB0602	NEMA 10 ( $\square$ 24)	DC 1.28	0.75	1.7	0.028	8.7	230
TMB0606	NEMA 10 ( $\square$ 24)	DC 1.28	0.75	1.7	0.028	8.8	230
TMB0801	NEMA 17 ( $\square$ 42)	DC 1.28	0.75	1.7	0.128	40	300
TMB0802	NEMA 17 ( $\square$ 42)	DC 1.28	0.75	1.7	0.128	40	300
TMB0805	NEMA 17 ( $\square$ 42)	DC 1.65	0.75	2.2	0.236	74	300
TMB0812	NEMA 17 ( $\square$ 42)	DC 1.65	0.75	2.2	0.236	74	300

Note 1) Basic step angle is  $0.72^\circ$   
 Note 2) Rotor Inertia includes Ball Screw Shaft.

## ●Motor Characteristic



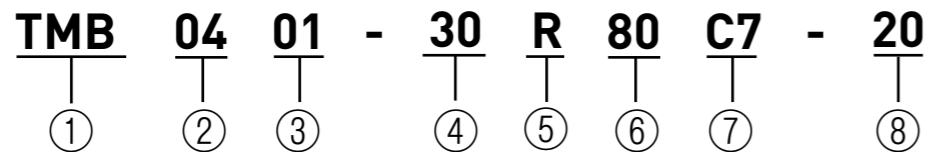
## ■Test condition

Driver: Maker Standard  
 Input Voltage : DC24V  
 Phase Currnt : 0.75A

Note) Motor characteristic will vary depending on Driver type, opeating conditions.

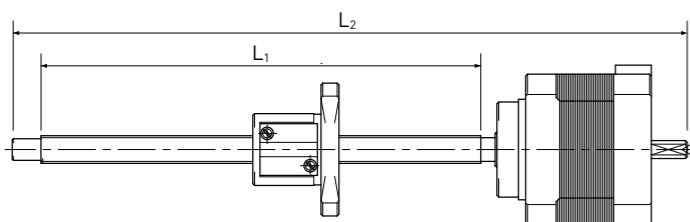
● Model number notation

Model number notation for customized TMB series is as follows.  
In case of standard style, model number is described in catalogue from page P124 to page P128.



- ① Series No.  
TMB : Rolled Ball Screw+5-phase Stepping Motor
- ② Screw Shaft nominal diameter(mm)
- ③ Lead(mm)  
01 means 1mm
- ④ Screw thread length(mm)  
L<sub>1</sub> : See below
- ⑤ Thread direction (R=Right-hand)
- ⑥ Screw Shaft total length(mm)  
L<sub>2</sub> : See below
- ⑦ Accuracy grade
- ⑧ Axial play(μm)

【④⑥Definition of Screw length】

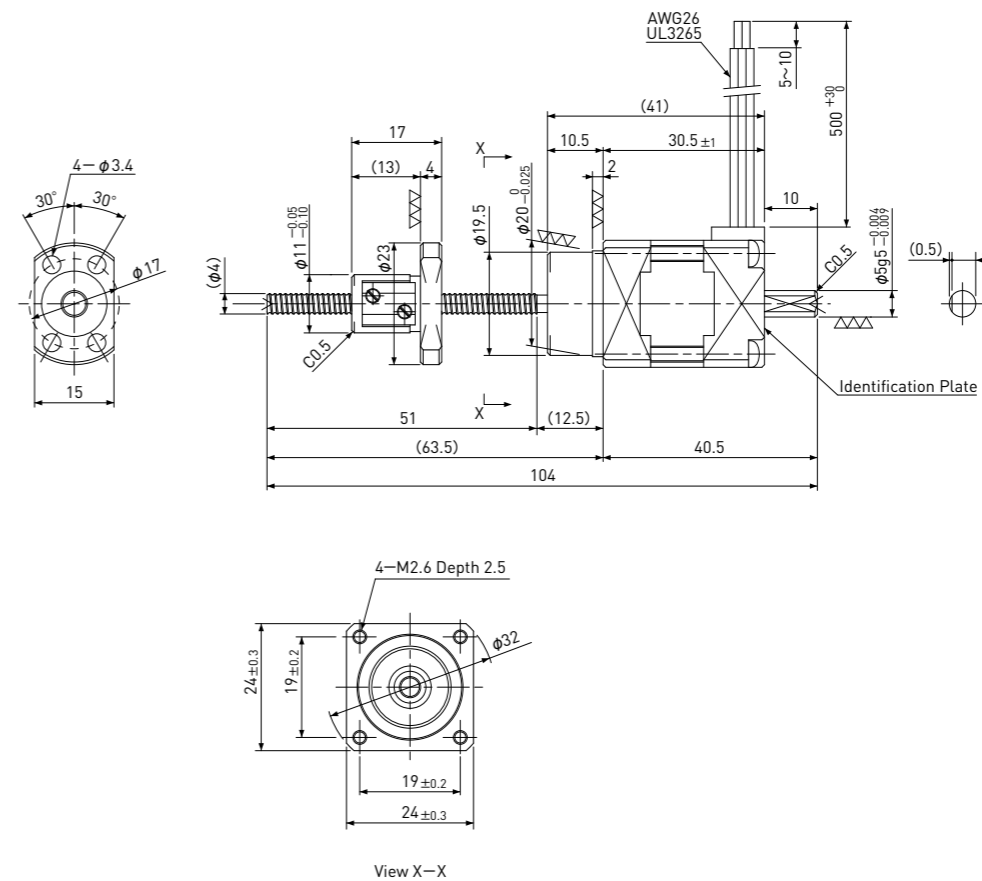


Standard products in stock TMB series

Rolled Ball Screw + 5-Phase Stepping Motor

**TMB □24 / NEMA 10**

Shaft dia. φ4



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	Mass (g)
TMB0401	1	30	50	100

Recommended Drivers	KR-A5CC KR-A55MC (Micro step) KR-A535M (Micro step / AC-100~220V)
---------------------	---

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	0.020mm or less
Shaft & Nut material	Chrome-molybdenum steel
Surface Coating	Black Chrome coating on Shaft
Surface hardness	HRC58~62 (Thread area)
Lubricant	KSS original grease MSG No.1

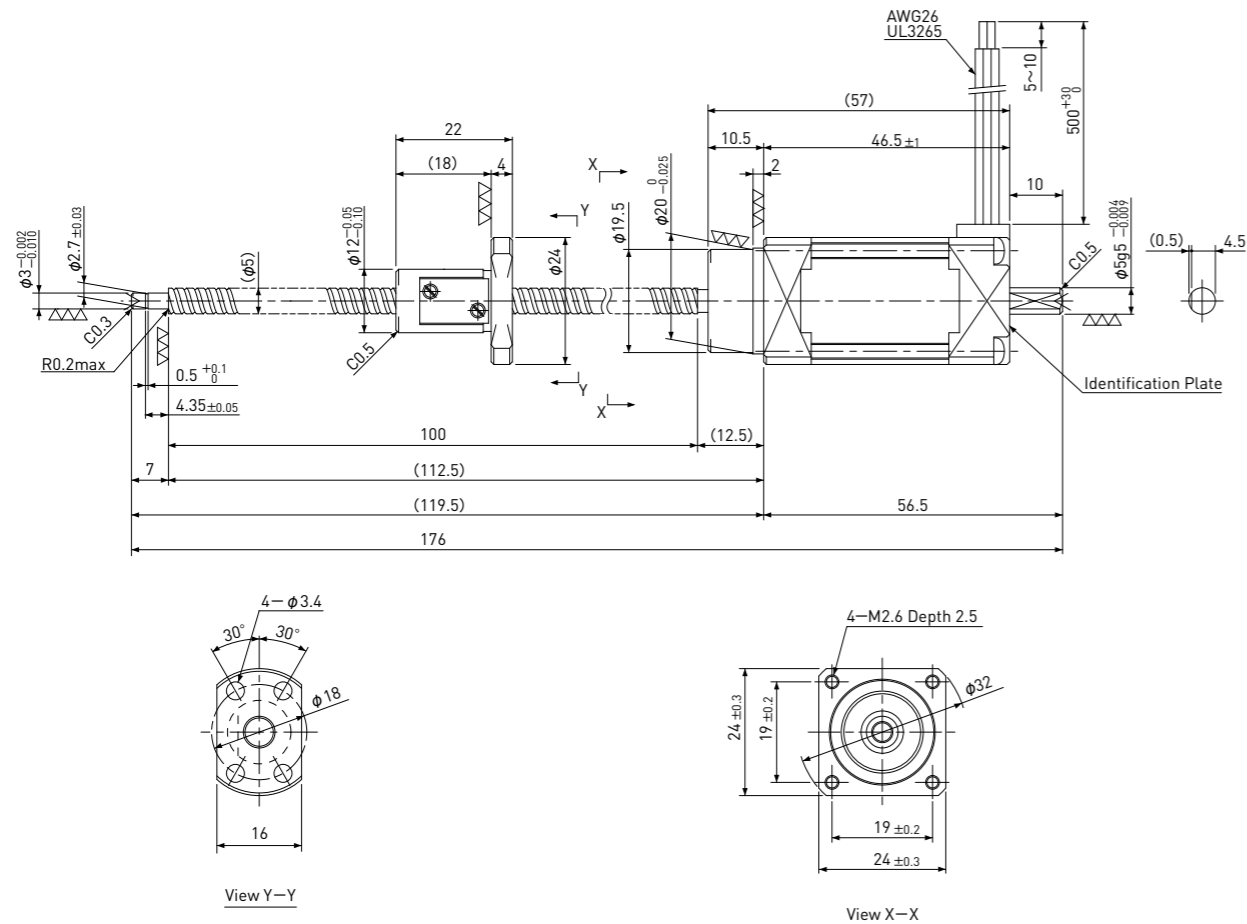
Motor Specifications	
Basic step angle	0.72°
Rated Voltage	DC 0.83 V
Rated current	DC 0.75 A/phase
Winding resistance	1.1Ω
Holding Torque	0.018Nm
Rotor inertia	4.2g·cm <sup>2</sup>
Operating temperature	-20°C~50°C

Note) Only shaft end cutting is available. Other than that, it would be customized order.

Rolled Ball Screw + 5-Phase Stepping Motor

# TMB □24 / NEMA 10

Shaft dia.  $\phi 5$



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	Mass (g)
TMB0504	4	75	25	180

Recommended Drivers	KR-A5CC KR-A55MC(Micro step) KR-A535M(Micro step / AC-100~220V)
---------------------	---

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	0.020mm or less
Shaft & Nut material	Chrome-molybdenum steel
Surface Coating	Black Chrome coating on Shaft
Surface hardness	HRC58~62 (Thread area)
Lubricant	KSS original grease MSG No.1

Motor Specifications	
Basic step angle	0.72°
Rated Voltage	DC 1.28 V
Rated current	DC 0.75 A/phase
Winding resistance	1.7 $\Omega$
Holding Torque	0.028Nm
Rotor inertia	8.3g·cm <sup>2</sup>
Operating temperature	-20°C~50°C

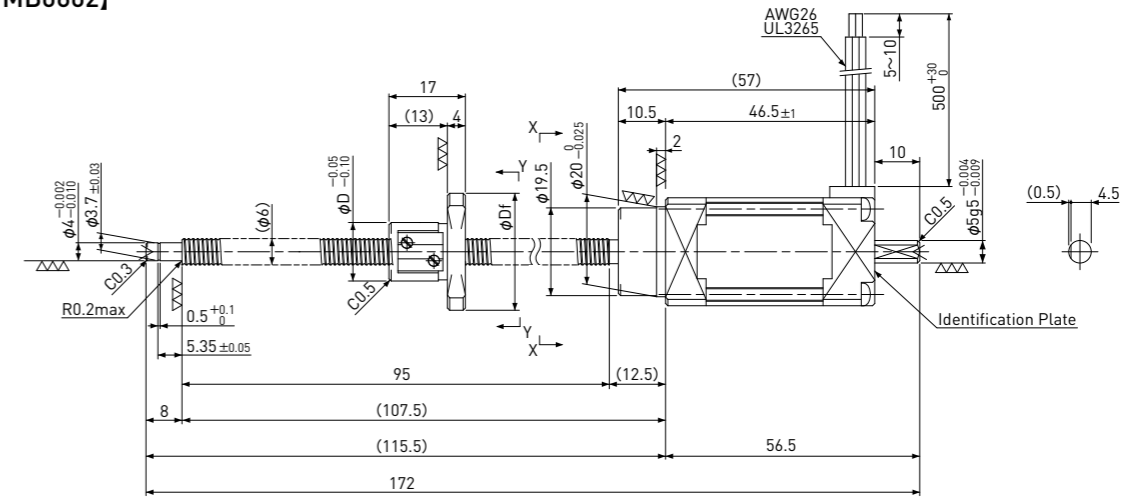
Note) Only shaft end cutting is available. Other than that, it would be customized order.

Rolled Ball Screw + 5-Phase Stepping Motor

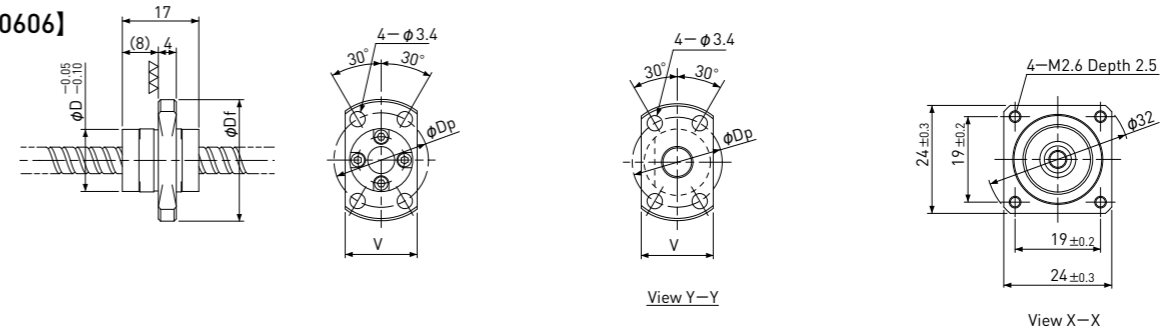
# TMB □24 / NEMA 10

Shaft dia.  $\phi 6$

[TMB0601 / TMB0602]



[TMB0606]



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	D	Df	V	Dp	Mass (g)
TMB0601	1	75	100	13	26	16	20	180
TMB0602	2	75	50	15	28	19	22	180
TMB0606	6	75	15	14	27	16	21	180

Recommended Drivers	KR-A5CC KR-A55MC(Micro step) KR-A535M(Micro step / AC-100~220V)
---------------------	---

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	0.020mm or less
Shaft & Nut material	Chrome-molybdenum steel
Surface Coating	Black Chrome coating on Shaft
Surface hardness	HRC58~62 (Thread area)
Lubricant	KSS original grease MSG No.1

Motor Specifications	
Basic step angle	0.72°
Rated Voltage	DC 1.28 V
Rated current	DC 0.75 A/phase
Winding resistance	1.7 $\Omega$
Holding Torque	0.028Nm
Rotor inertia	TMB0601、TMB0606 : 8.8g·cm <sup>2</sup> TMB0602 : 8.7g·cm <sup>2</sup>
Operating temperature	-20°C~50°C

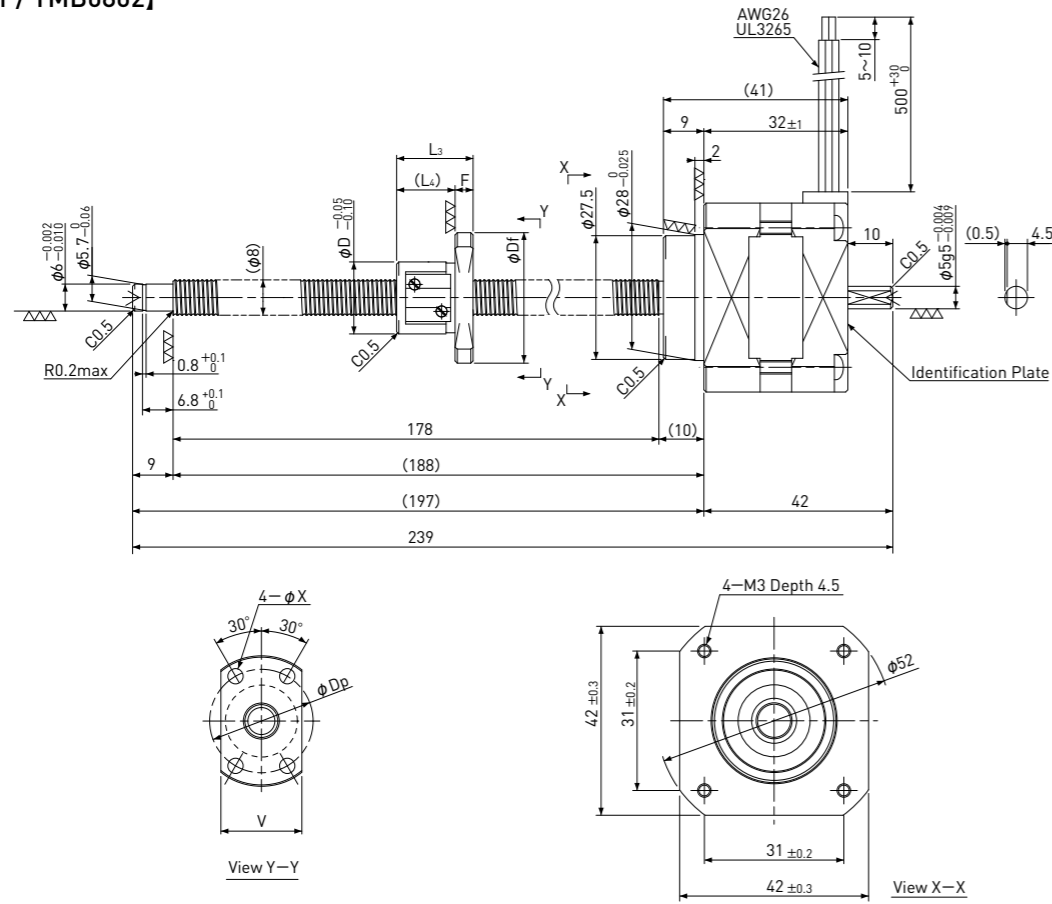
Note) Only shaft end cutting is available. Other than that, it would be customized order.

Rolled Ball Screw + 5-Phase Stepping Motor

# TMB □42 / NEMA 17

Shaft dia.  $\phi 8$

[TMB0801 / TMB0802]



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	D	Df	F	L <sub>3</sub>	L <sub>4</sub>	V	Dp	X	Mass (g)
TMB0801	1	150	300	16	29	4	17	13	18	23	3.4	320
TMB0802	2	150	150	20	37	5	24	19	22	29	4.5	320

Recommended Drivers	KR-A5CC KR-A55MC(Micro step) KR-A535M(Micro step / AC-100~220V)
---------------------	---

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	0.020mm or less
Shaft & Nut material	Chrome-molybdenum steel
Surface Coating	Black Chrome coating on Shaft
Surface hardness	HRC58~62 (Thread area)
Lubricant	KSS original grease MSG No.1

Motor Specifications	
Basic step angle	0.72°
Rated Voltage	DC 1.28 V
Rated current	DC 0.75 A/phase
Winding resistance	1.7Ω
Holding Torque	0.128Nm
Rotor inertia	40g·cm <sup>2</sup>
Operating temperature	-20°C~50°C

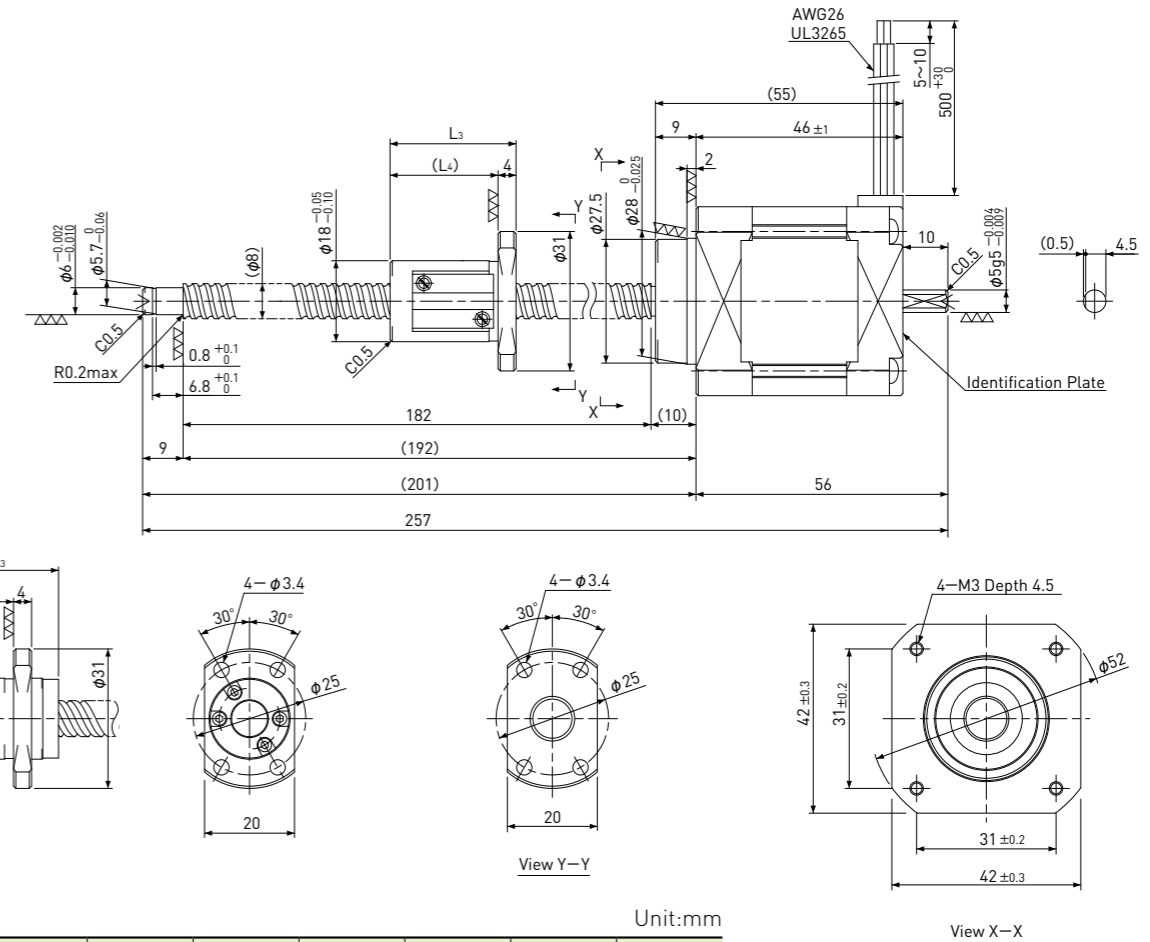
Note) Only shaft end cutting is available. Other than that, it would be customized order.

Rolled Ball Screw + 5-Phase Stepping Motor

# TMB □42 / NEMA 17

Shaft dia.  $\phi 8$

[TMB0805]



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	L <sub>3</sub>	L <sub>4</sub>	Mass (g)
TMB0805	5	150	120	28	24	450
TMB0812	12	150	50	27	17	450

Recommended Drivers	KR-A5CC KR-A55MC(Micro step) KR-A535M(Micro step / AC-100~220V)
---------------------	---

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	0.020mm or less
Shaft & Nut material	Chrome-molybdenum steel
Surface Coating	Black Chrome coating on Shaft
Surface hardness	HRC58~62 (Thread area)
Lubricant	KSS original grease MSG No.1

Motor Specifications	
Basic step angle	0.72°
Rated Voltage	DC 1.65 V
Rated current	DC 0.75 A/phase
Winding resistance	2.0Ω
Holding Torque	0.236Nm
Rotor inertia	74g·cm <sup>2</sup>
Operating temperature	-20°C~50°C

Note) Only shaft end cutting is available. Other than that, it would be customized order.

## MB Series Precision Ball Screw + 5 Phase Stepping Motor

# MoBo

### ●Features

- A 5-phase Stepping Motor is mounted directly onto the shaft end of a C3 grade precision Ball Screw, which is suitable for high accurate positioning system.
- Ball Screw Shaft is ideally constructed to form the Motor Rotor Shaft.
- Since combining the Motor Shaft and Ball Screw Shaft, Coupling-less, saving total length, low lost-motion can be achieved.
- Recommended Driver for 5-phase Stepping Motor is available.



### ●Specifications

Model	Shaft Nominal Dia. (mm)	Lead (mm)	Travel (mm)	Travel per pules ( $\mu\text{m}$ )	Reference Thrust (N)	Mass (g)
MB04005A	$\phi 4$	0.5	20	1	10	84
MB0401A	$\phi 4$	1	30	2	20	84
MB0401	$\phi 4$	1	30	2	50	100
MB0601	$\phi 6$	1	75	2	100	170
MB0602	$\phi 6$	2	75	4	50	180
MB0801	$\phi 8$	1	150	2	300	310
MB0802	$\phi 8$	2	150	4	150	320

Repeatability(reference)	max. $\pm 0.005\text{mm}$
Lost Motion(reference)	max. $0.005\text{mm}$

※The reference value about Repeatability and Lost Motion represents when the MB built into KSS original Stage. Please make a contact to KSS for actual value.

Note 1) Detail specifications & dimensions are shown in drawings from page P132.

Note 2) Travel per pulse represents the value for full step.

Note 3) Acceleration & Deceleration Rate should be 20ms/kHz or more.

Note 4) Reference Thrust may vary depending on the operating condition, please ask KSS for more detail.

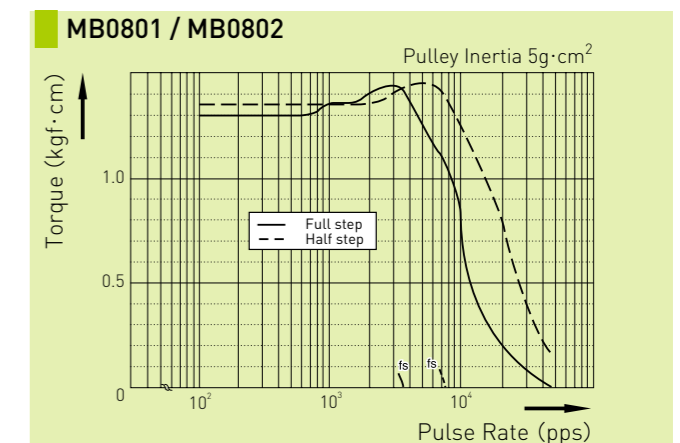
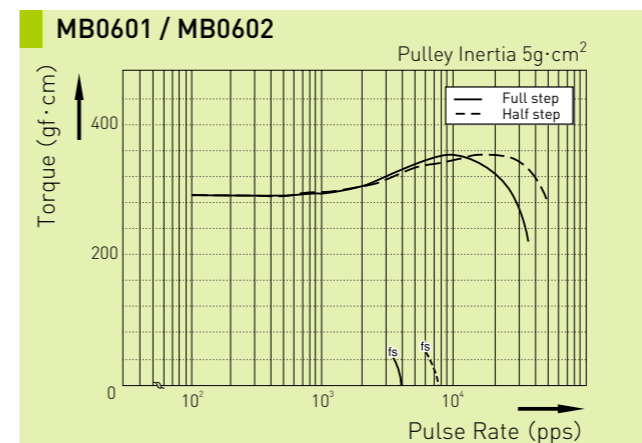
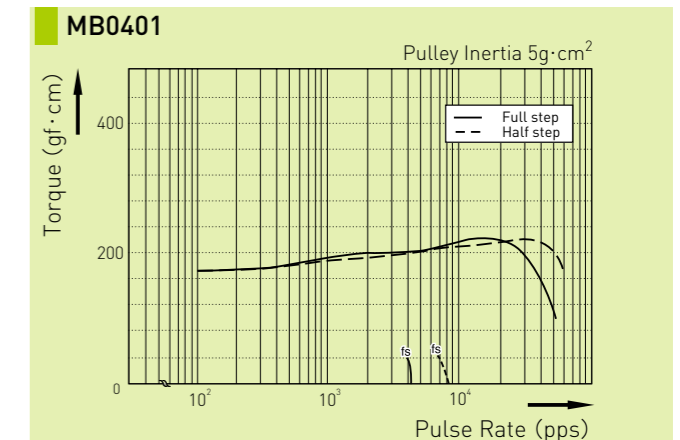
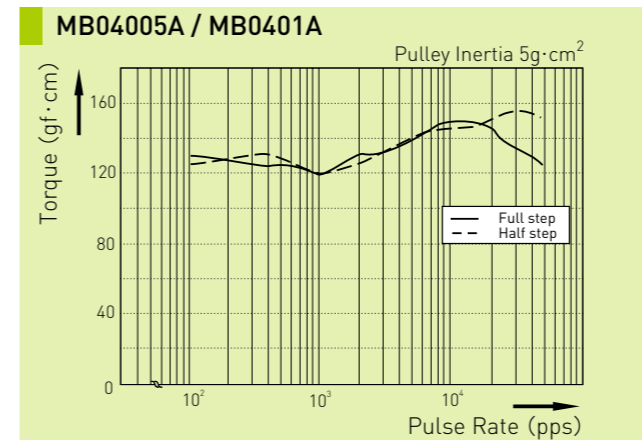
### ●Motor Specifications

Model	Motor size	Rated voltage (V)	Rated current (A/phase)	Winding resistance ( $\Omega$ )	Holding torque (Nm)	Rotor Inertia ( $\text{g}\cdot\text{cm}^2$ )	Load limit in Vertical Position (N)
MB04005A	NEMA 08 ( $\square 20$ )	DC 1.05	0.75	1.4	0.010	3.9	230
MB0401A	NEMA 08 ( $\square 20$ )	DC 1.05	0.75	1.4	0.010	3.9	230
MB0401	NEMA 10 ( $\square 24$ )	DC 0.83	0.75	1.1	0.018	4.2	230
MB0601	NEMA 10 ( $\square 24$ )	DC 1.28	0.75	1.7	0.028	8.9	230
MB0602	NEMA 10 ( $\square 24$ )	DC 1.28	0.75	1.7	0.028	8.9	230
MB0801	NEMA 17 ( $\square 42$ )	DC 1.28	0.75	1.7	0.128	41	300
MB0802	NEMA 17 ( $\square 42$ )	DC 1.28	0.75	1.7	0.128	41	300

Note 1) Basic step angle is  $0.72^\circ$

Note 2) Rotor Inertia includes Ball Screw Shaft.

### ●Motor Characteristic



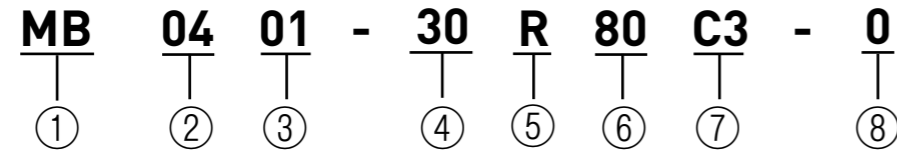
### ■Test Condition

Driver : Maker Standard  
Input Voltage : DC24V  
Phase Current : 0.75A

Note) Motor characteristic will vary depending on Driver type, operating conditions.

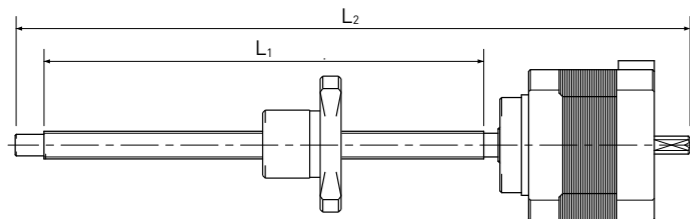
● Model number notation

Model number notation for customized MB series is as follows.  
In case of standard style, model number is described in catalogue from page P132 to page P135.



- ① Series No.  
MB : Precision Ball Screw+5-phase Stepping Motor
- ② Screw Shaft nominal diameter(mm)
- ③ Lead(mm)  
01 means 1mm
- ④ Screw thread length(mm)  
L<sub>1</sub> : See below
- ⑤ Thread direction (R=Right-hand)
- ⑥ Screw Shaft total length(mm)  
L<sub>2</sub> : See below
- ⑦ Accuracy grade
- ⑧ Axial play(μm)

【④⑥ Definition of Screw length】

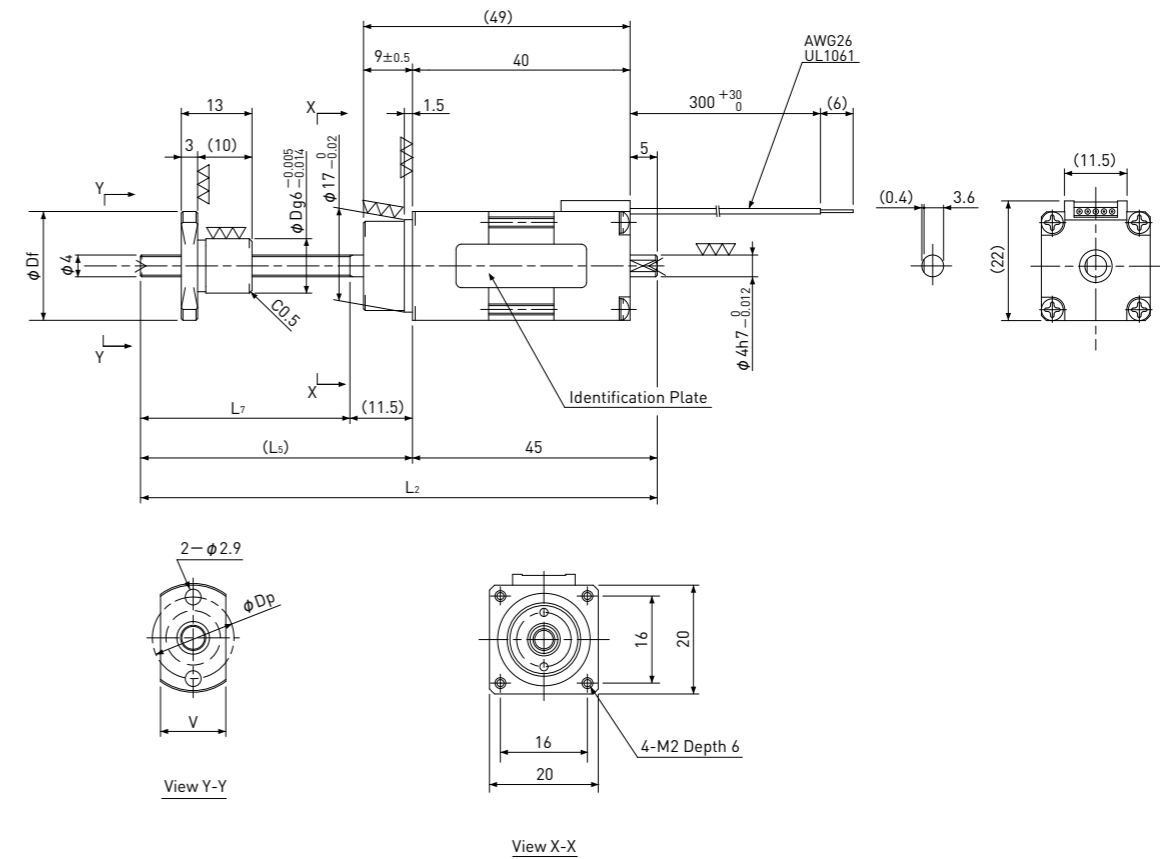


Standard products in stock MB series

Precision Ball Screw + 5-Phase Stepping Motor

# MB □20 / NEMA 08

Shaft dia. φ4



Unit:mm											
Model	Lead	Travel	Reference Thrust (N)	L <sub>2</sub>	L <sub>5</sub>	L <sub>7</sub>	D	Df	V	Dp	Mass (g)
MB04005A	0.5	20	10	95	50	38.5	10	20	12	15	84
MB0401A	1	30	20	105	60	48.5	9	19	11	14	84

Recommended Drivers	KR-A5CC
	KR-A55MC (Micro step)
	KR-A535M (Micro step / AC-100~220V)

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS C3
Thread direction	Right
Axial play	MB04005A:0.005mm or less MB0401A:0mm
Shaft material	Stainless steel
Nut material	Chrome-molybdenum steel
Surface hardness	Min. HRC55 (Thread area)
Lubricant	KSS original grease MSG No.1

Motor Specifications	
Basic step angle	0.72°
Rated Voltage	DC 1.05 V
Rated current	DC 0.75 A/phase
Winding resistance	1.4Ω
Holding Torque	0.010Nm
Rotor inertia	3.9g·cm <sup>2</sup>
Operating temperature	-20°C~50°C

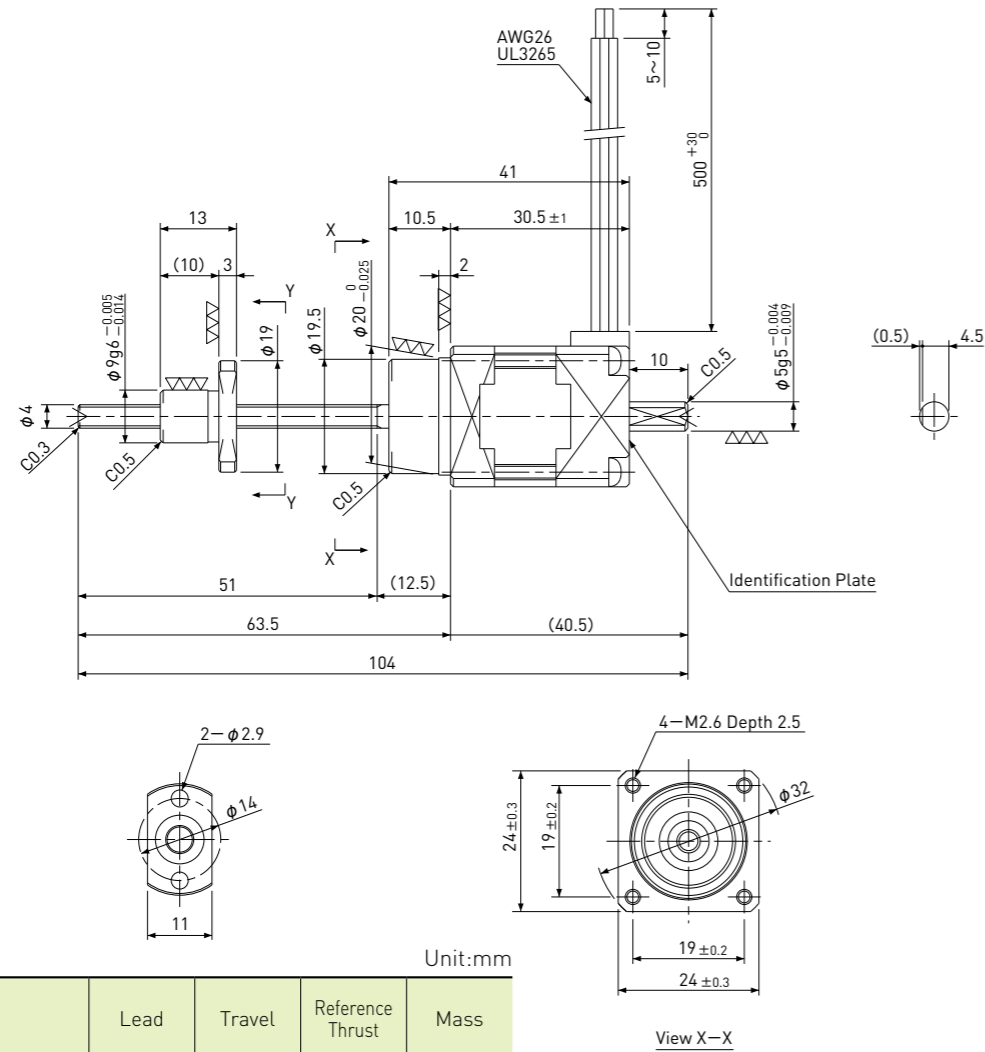
Note) Only shaft end cutting is available.  
Other than that, it would be customized order.



Precision Ball Screw + 5-Phase Stepping Motor

# MB □24 / NEMA 10

Shaft dia.  $\phi 4$



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	Mass (g)
MB0401	1	30	50	100

Recommended Drivers	KR-A5CC KR-A55MC(Micro step) KR-A535M(Micro step / AC-100-220V)
---------------------	---

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS C3
Thread direction	Right
Axial play	0mm
Shaft material	Stainless steel
Nut material	Chrome-molybdenum steel
Surface hardness	Min. HRC55 (Thread area)
Lubricant	KSS original grease MSG No.1

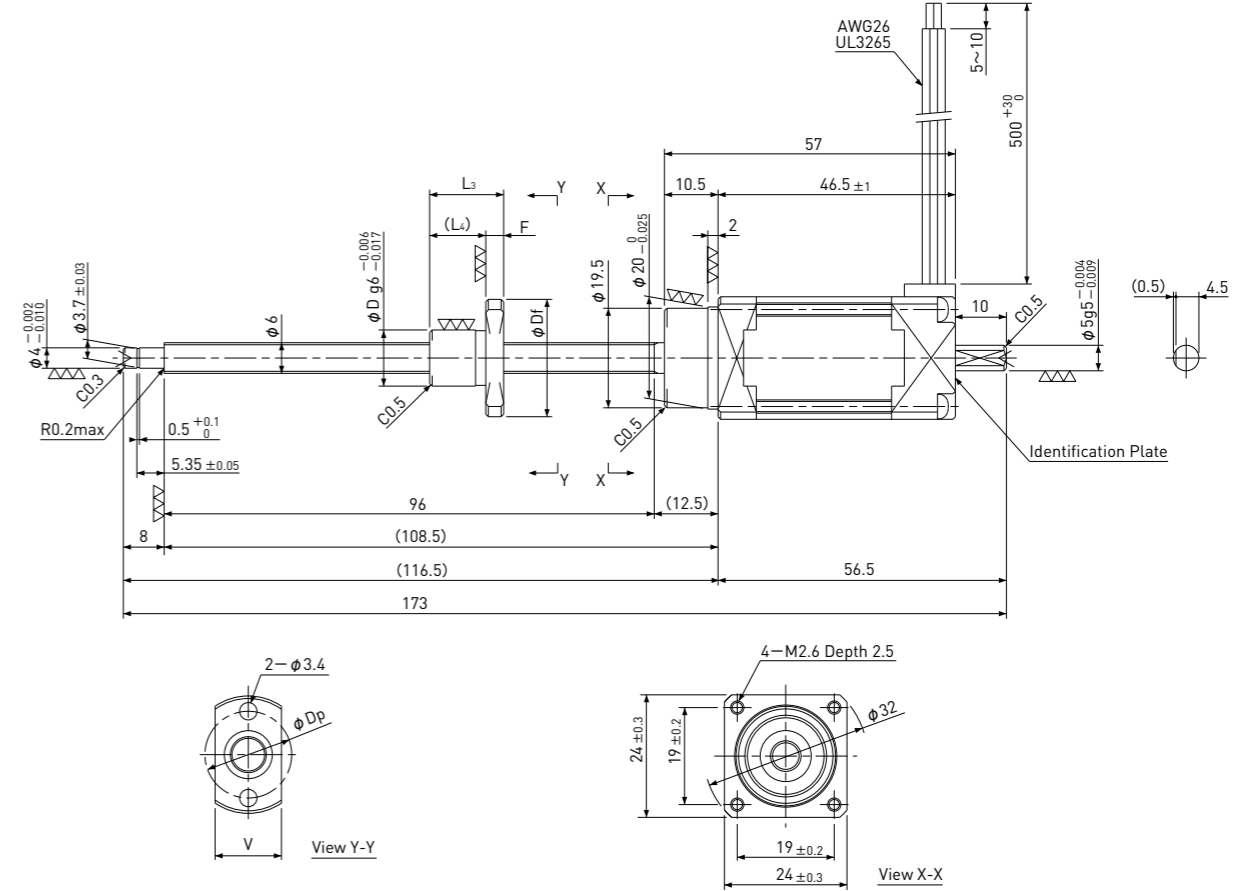
Motor Specifications	
Basic step angl	0.72°
Rated Voltage	DC 0.83 V
Rated current	DC 0.75 A/phase
Winding resistance	1.1Ω
Holding Torque	0.018Nm
Rotor inertia	4.2g·cm <sup>2</sup>
Operating temperature	-20°C~50°C

Note) Only shaft end cutting is available. Other than that, it would be customized order.

Precision Ball Screw + 5-Phase Stepping Motor

# MB □24 / NEMA 10

Shaft dia.  $\phi 6$



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	D	Df	F	L <sub>3</sub>	L <sub>4</sub>	V	Dp	Mass (g)
MB0601	1	75	100	11	23	3.5	14.5	11	13	17	170
MB0602	2	75	50	15	28	4	17	13	17	22	180

Recommended Drivers	KR-A5CC KR-A55MC(Micro step) KR-A535M(Micro step / AC-100-220V)
---------------------	---

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS C3
Thread direction	Right
Axial play	0mm
Shaft material	Stainless steel
Nut material	Chrome-molybdenum steel
Surface hardness	Min. HRC55 (Thread area)
Lubricant	KSS original grease MSG No.1

Motor Specifications	
Basic step angle	0.72°
Rated Voltage	DC 1.28 V
Rated current	DC 0.75 A/phase
Winding resistance	1.7Ω
Holding Torque	0.028Nm
Rotor inertia	8.9g·cm <sup>2</sup>
Operating temperature	-20°C~50°C

Note) Only shaft end cutting is available. Other than that, it would be customized order.

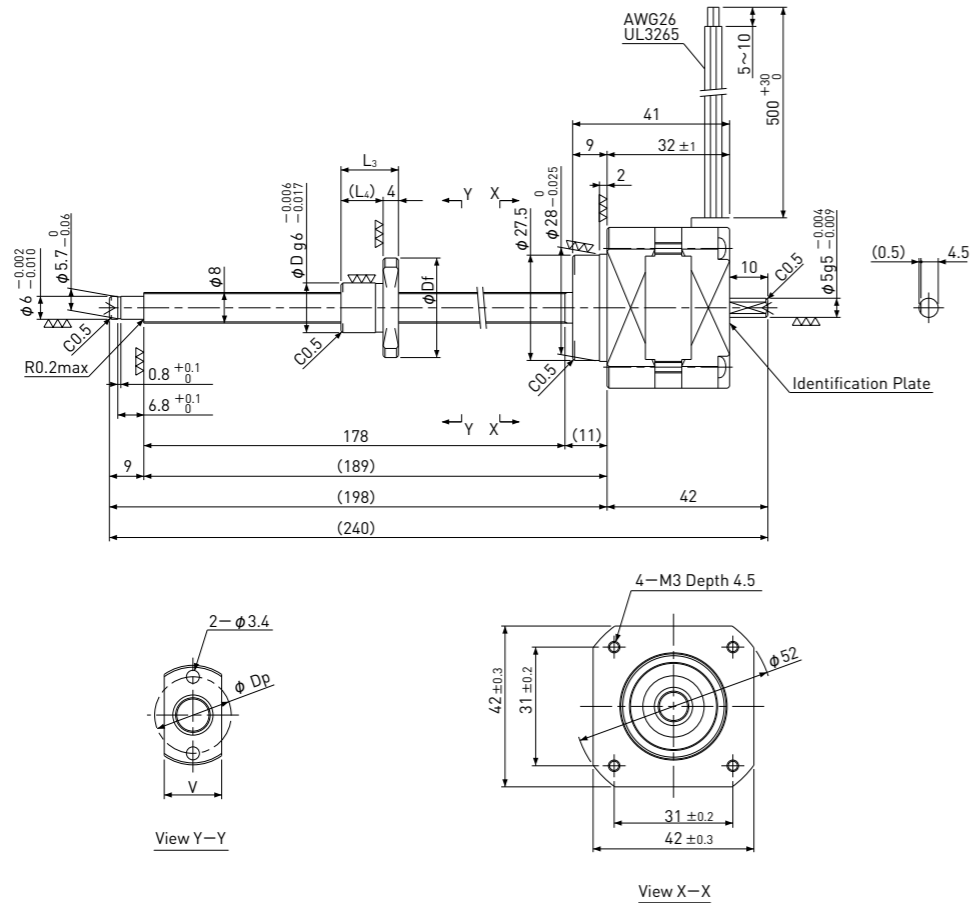
Standard products in stock MB series

Dimensions & Specifications

Precision Ball Screw + 5-Phase Stepping Motor

# MB □42 / NEMA 17

Shaft dia.  $\phi 8$



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	D	Df	L <sub>3</sub>	L <sub>4</sub>	V	Dp	Mass (g)
MB0801	1	150	300	13	26	15	11	15	20	310
MB0802	2	150	150	15	28	18	14	17	22	320

Recommended Drivers	KR-A5CC
	KR-A55MC(Micro step)
	KR-A535M(Micro step / AC-100~220V)

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS C3
Thread direction	Right
Axial play	0mm
Shaft material	Stainless steel
Nut material	Chrome-molybdenum steel
Surface hardness	Min. HRC55 (Thread area)
Lubricant	KSS original grease MSG No.1

Motor Specifications	
Basic step angle	0.72°
Rated Voltage	DC 1.28 V
Rated current	DC 0.75 A/phase
Winding resistance	1.7Ω
Holding Torque	0.128Nm
Rotor inertia	41g·cm <sup>2</sup>
Operating temperature	-20°C~50°C

Note) Only shaft end cutting is available. Other than that, it would be customized order.

## MMB Series Rolled Ball Screw + All in One Stepping Servo Motor

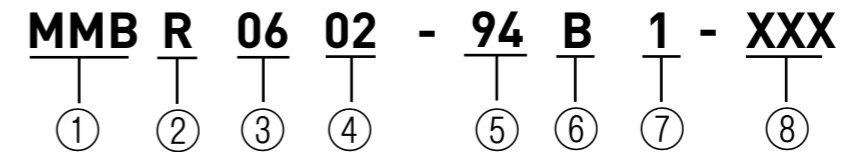
### Features

- Stepping Servo Motor is mounted directly onto the shaft end of a Ct7 grade Rolled Ball Screw, which is the best for space saving & high-speed, non-step-out operation.
- Enables to bind Rotary Encoder, Servo Driver and Controller within the Actuator body by simplified circuits due to high-speed operation processing of Servo and Controller using Digital Signal Processor(DSP).
- Enables to set parameters, servo control or control program through PC(RS-422/485 communication) by using exclusive software.
- The wiring is completed inside the Actuator, enabling significant saving in wiring.



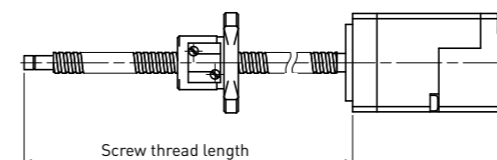
### Model number notation

Model number notation for customized MMB series is as follows. In case of standard style, model number is described in catalogue in page P138.

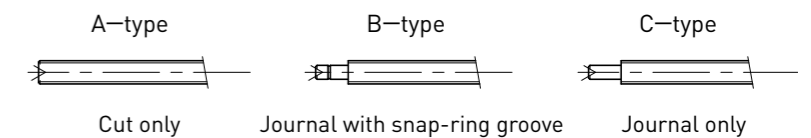


- Series No.  
MMB : Moons type Linear Actuator
- Ball Screw type  
R : Rolled Ball Screw
- Screw Shaft nominal diameter (mm)  
06 means 6mm
- Lead (mm)  
02 means 2mm
- Screw Shaft length (mm)  
Screw length which is exposed from Motor (see below)
- End journal profile (see below)  
A : Cut only  
B : Journal with snap ring groove (standard)  
C : Journal only
- Motor length symbol  
1 : Short type  
2 : Long type
- Extra notation

【⑤Screw thread length】



【⑥End journal profile】





### ● Connector Pin Diagram

Pin No.	Name	Description
1	Y2	Open drain outputs with freewheeling diode (30VDC 100 mA in max.)
2	Y1	
3	X4	Digital inputs (input high voltage 5~24VDC, input low voltage below 1VDC, signal frequency 1MHz in max.)
4	X3	
5	X2	Digital inputs (input high voltage 5~24 VDC, input low voltage below 2VDC, signal frequency 1MHz in max.)
6	X1	
7	RX-	RS-422 / 488 interface differential signals
8	RX+	
9	TX-	
10	TX+	
11	+	V+ Power supply (typ. 24 VDC)
12	-	V- Power ground (GND)



### ● Driver Specification

Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PMW at 20 KHz
Power Supply	External 24VDC power supply required, Current capacity 6.5A
Input Voltage Range	15-30 VDC min/max (nominal 24VDC)
Protection	Over-voltage, under-voltage, over-temperature, internal motor shorts (phase-to-phase, phase-to-ground)
Ambient Temperature	0°C~40°C (32~104°F) when mounted to a suitable heatsink
Humidity	90% non-condensing

### ● Controller Specification

Controller	
Current Control	Advanced digital current control provides excellent high speed torque
Microstep Resolution	Software selectable from 200 to 51200 steps/rev. in increments of 2 steps/rev.
Speed Range	Max.60rps
Distance Range	Over 10,000,000 revolutions (at 200 step/rev.)
Noise Filtering	Programmable hardware digital noise filter. Software noise filter
Serial Commanding	Support Serial Command Language (SCL)
Encoder Feedback	4096 counts/rev. encoder feedback
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
X1/Step	Input:5~24 vdc, single-ended signals, max. pulse frequency 1MHz Functions: Step, CW Step, A Quadrature, CW Limit, CW Jog, Run/Stop, general purpose input. * Adjustable bandwidth digital noise rejection filter * Connect with NPN type output ONLY
X2/Direction	Input:5~24 VDC, signal-ended signals, max. pulse frequency 1MHz Functions: Dir, CCW Step, B Quadrature, CCW Limit, CCW Jog, general purpose input. * Adjustable bandwidth digital noise rejection filter * Connect with NPN type output ONLY
X3/Enable	Inputs:5~24 VDC, single-ended signals, max. pulse frequency 1MHz Functions: Enable, general purpose input. * Connect with NPN type output ONLY
X4/Alarm Reset	Inputs:5~24 VDC, single-ended signals, max. pulse frequency 1MHz Functions: Alarm reset, Change speed, general purpose input. * Connect with NPN type output ONLY
Y1/FAULT	Open drain output: maximum current 100mA with maximum voltage of 30 VDC Functions: Fault detection, general purpose
Y2/BRAKE	Open drain output: maximum current 100mA with maximum voltage of 30 VDC Functions: Brake, In Position, Tach Output, general purpose
Communication Interface	RS - 422/485 Modbus/RTU available to use for TSM 11Q

# SiMB Series Precision Ball Screw + Stepping Servo Motor



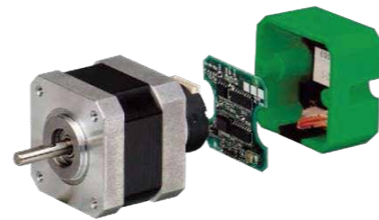
## Features

- A Stepping Servo Motor, what we call Si-servo Motor, is mounted directly onto the Shaft end of a Precision Ball Screw, which is high resolution and precise positioning unit.
- An Encoder and a Memory chip are installed at the end of Motor, high accurate positioning, ultra smooth drive, torque control drive, and closed loop function have been achieved.
- Ball Screw Shaft is ideally constructed to form the Motor Rotor Shaft.
- Since combining the Motor Shaft and Ball Screw Shaft, Coupling-less, saving total length, and reducing labor cost can be achieved.
- Exclusive Driver, and Cable are provided for Si-servo Motor.



## Database compensation control

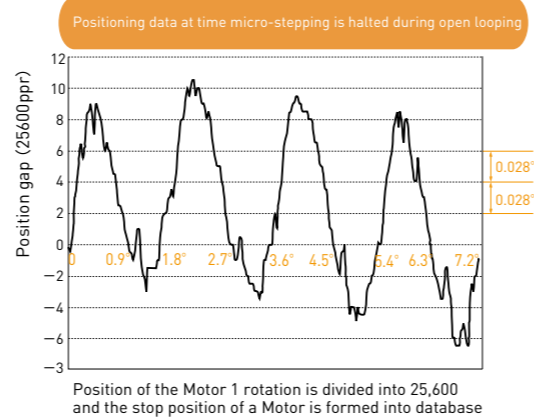
Control mechanism of the Si servo is not simply the micro-step control. Both an Encoder and a Memory chip are installed, and the Encoder position for 400pulse resolution per revolution as well as electrical current feedback are standard. Furthermore, data inherent to the Motor is recorded in the Memory at time of shipping from the factory so that high speed and high precision positioning to designated positions can be realized using a precise database revision control method of compensation and control when the Motor starts.



## Sampling motor characteristics

Cogging Torque and Torque ripples originate from Motor processing and assembly precision, big factors that can hinder a low vibration, high accuracy positioning. The Si servo, by accurately measuring and storing individual Motor characteristics data inherit to the Motor, we can create a database of the optimal electrical current wave forms for the highest possible rotary precision.

### Sampling of Motor's Positioning Characteristic



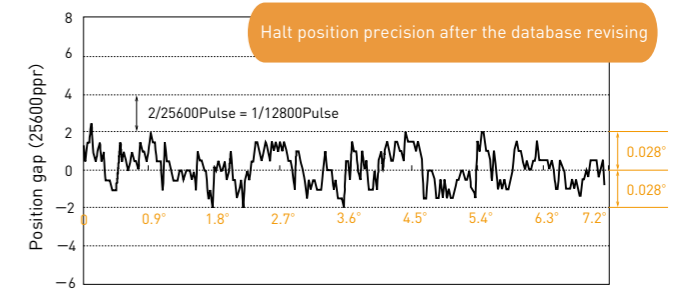
## Storing data in memory

The data gained from sampling is stored in Memory within the Motor, which can be transferred to a Driver by using an Encoder cable at the time power is supplied. This makes it possible for the Driver and the Motor to work as an optimal combination.



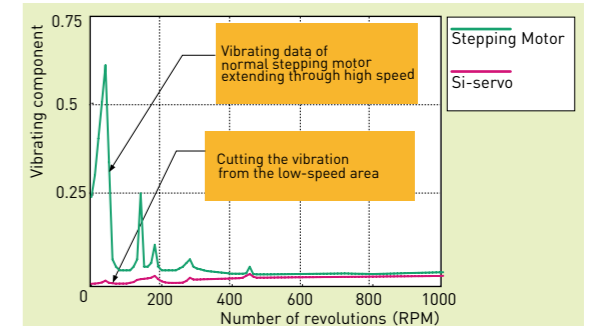
## High precision positioning

This is not just a simple command analysis as with Micro-step controls. It raises the actual precision of halting to a proper 10000 pulse encoder. Furthermore uniform pitch positioning to the pulse, which can not be achieved by Micro-step, has been realized. (\*As one condition, the output Torque of the Motor needs to sufficiently exceed load resistance.)



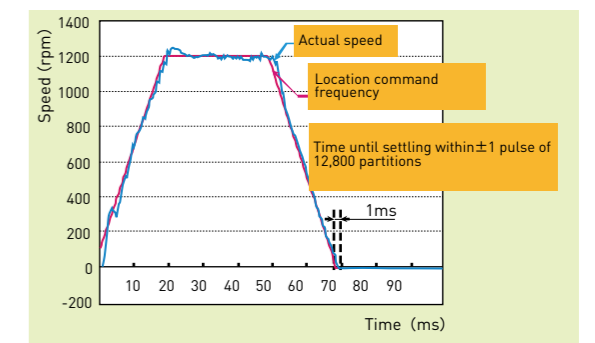
## Low vibrations

Vibrating elements in the Motor have been largely removed thanks to the optimal high-speed revision current commands while the Motor is in operation. Also unlike a standard Servo Motor, there is no searching between Encoder counts when the Motor stops.



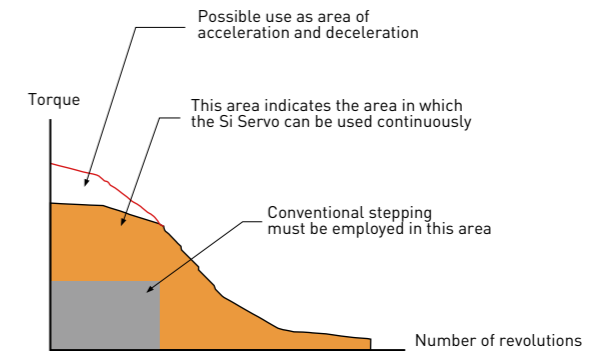
## Settling time

The Si Servo makes the most of the stepping motor's advantages including its ability to closely follow the command pulse train. The amount of time until setting within  $\pm 1$  pulse of 12,800 partitions is only 1ms. Providing superior performance in high response systems.



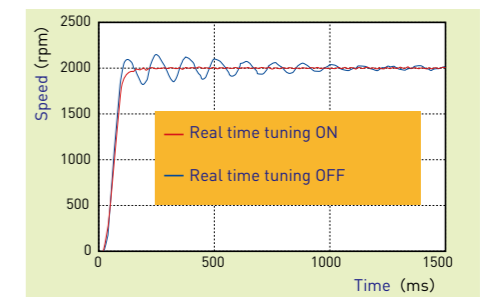
## Surplus Torque

Because the Si Servo is never step out, it is possible to operate continuously at 100% capacity. There is no need to consider the Torque margin as with the Stepping Motor.



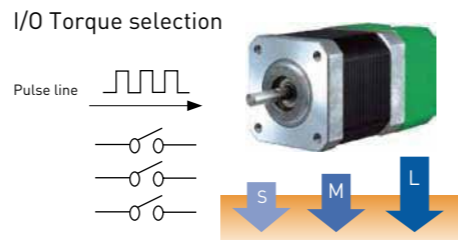
## Real-time auto-tuning

Even machinery that could not operate smoothly with conventional tuning methods will automatically imitate Inertia and Rigidity, always able to realize the optimal responsive and stable tuning.



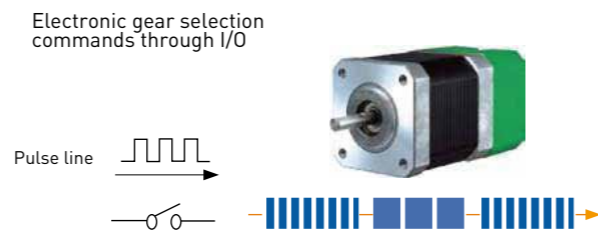
**Torque controls through stepping**

Five steps of Torque control are performed during position control. Optional Torque value settings are possible during the point table operations. A high degree of freedom in control is possible thanks to being able to switch back and forth between position control and torque control. Even during Torque control, differential controls are still being performed internally, so positions will not deviate.



**External electronic gear transfer**

Using external I/O signals and/or communication commands, switching the electronic gear setting in two steps possible. Even controller that cannot output except on command pulses with low frequencies can be highly functional in a wide range from low speed to high speed operations. \*Switching can be performed while the motor is halted.



**!** Depends on the condition, this product will not be suitable for your specifications. Please always consult with KSS regarding your requirement.

**Motor Specifications**

Model		TS3692N61S02(SiMB0401)	TS3617N370S04 (SiMB08xx)
Maximum output torque	N · m	0.017	0.24
Maximum rotating speed	rpm	4500	4500
Rated current	A0-p	0.35	2.0
Rated voltage	V	3.0	2.2
Coil resistance	Ω	8.5±15%	1.1±15%
Rotor inductance	mH	3.4±20%	1.4±20%
Rotor inertia	10 <sup>-7</sup> kg · m <sup>2</sup>	1.9	35
Shaft run out	mm T.I.R	0.05	0.05
Load limit in Vertical Position	N	230	300
Thrust play	mm max.	0.01	0.01
Coil Method	—	2-phase hybrid stepping motor Bipolar coil	
Insulation class	—	CLASS B	
Insulation resistance	MΩ min.	100 (at DC500V)	
Dielectric strength	V	500 (at AC 1MIN)	
Operating temperature range	°C	-20~+50	
Operating humidity range	%RH	5~95	
Storage temperature range	°C	-40~+70	

Note ) Rotor Inertia includes Ball Screw Shaft.

**Specifications**

Model	Shaft Nominal Dia. (mm)	Lead (mm)	Travel (mm)	Travel per pules (μm)	Reference Thrust (N)	Mass (g)
SiMB0401	φ4	1	30	1/25,600	30	114
SiMB0801	φ8	1	100	1/25,600	300	130
SiMB0802	φ8	2	160	2/25,600	150	165
SiMB0805	φ8	5	150	5/25,600	80	200

Repeatability(reference)	max. ±0.001mm
Lost Motion(reference)	max. 0.001mm

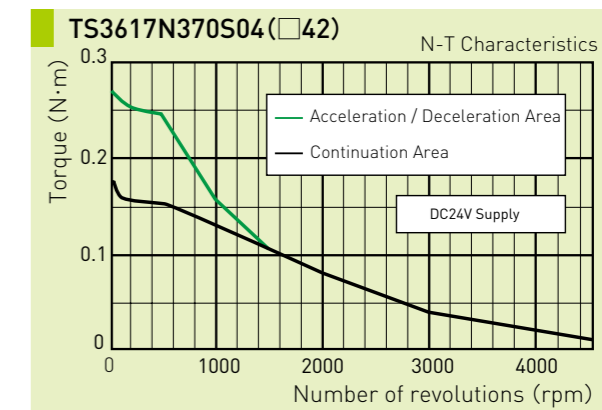
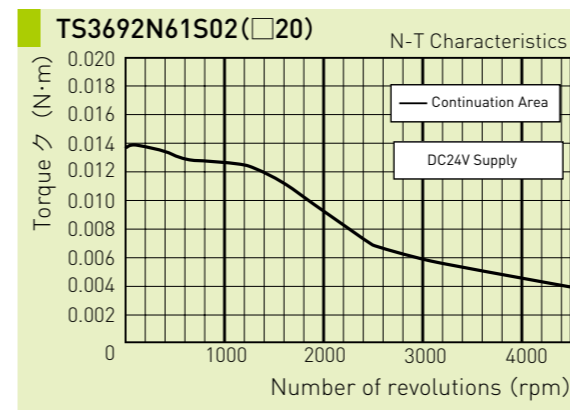
※The reference value about Repeatability and Lost Motion represents when the MoBo built into KSS original Stage. Please make a contact to KSS for actual value.

Note1) Detail specifications & dimensions are shown in drawings from page P149.

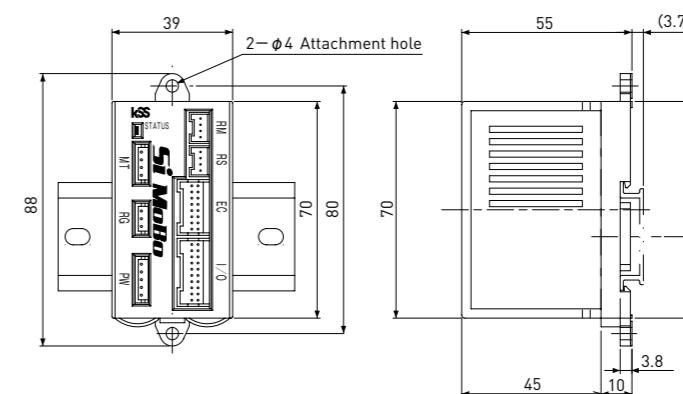
Note2) Acceleration & Deceleration Rate should be recommended by 0.5ms/kHz or more (Ability as a Motor itself) .

Note3) Reference Thrust may vary depending on the operating condition, please ask KSS for more detail.

**Torque Characteristics**



**Driver Outer Dimensions**



## ● ドライバ仕様 / Driver Specifications

Model		Si-02LDE(SiMB0401)	Si-02DE(SiMB08xx)
Applicable Motor Model		TS3692N61S02	TS3617N370S04
Rated Output Current(A0-p)		0.35	2.0
Maximum Output Current(A0-p)		1.0	4.5
Controlling Method		Transistor PWM (Sine Wave Drive)	
Feedback		Incremental Encoder 200 ppr	Increnebtal Encoder 400ppr
Power supply	Voltage (V)	Power supply	DC24V±10% or DC36V±10%
		Control power supply	DC24V±10%
	Power Supply Current(A)	2	
Position Command Method		Communication and Control Input through 3 Mode Pules Lines and RS485	
Conditions for Use	Temperature for Use	0~+50°C	
	Storage Temperature	-20~+85°C	
	Humidity for Use or Storage	Under 90%RH(no condensation)	
	Resistance Vibrations	0.5G	
	Impact Resistance	2G	
Standard Functions	Dynamic Braking	None	
	Regenerative Function	Able to connect to external regeneration processing circuit	
	Over Travle Prevention	Hard OT, Soft OT(Select ON or OFF parameters)	
	Internal Speed Setting	Point Table Transfer Speed, Jog Speed, Reset Speed	
	Display	1- LED(Alarm Display, Servo ON Conditions)	
Input / Output	Input	Control Input	5 points(Select function parameters)
		Command Pulse Input	CW / CCW, PULSE / SIGN, A / B Phase Input(Select parameters) Maximum response waves : 750kpps
	Output	Control output	3 points(Select parameters), Brake Release Signal
Protection Functions		EEPROM abnormalities, Encoder abnormalities, System abnormalities, Over Currents, Driver overheating, Excessive location deviation, Motor current abnormalities, Control Current abnormalities	
Zero Return Mode		Zero LS Signal input or using mechanical stopper(Set parameters of 7 methods)	
Multi-axis		Multi-drops of up to 15 axis with RS485	
Settigs		Parameters are set through use of a computer(RS485 converter required)	
Standard, Environmental, and Protection Grades		UL conformance / CE(self-declaration) / Corresponds to RoHS / IP40	

## ● Model number notation

Model number notation for customized SiMB series is as follows.

In case of standard style, model number is described in catalogue from page P149 to page P150.

**SiMB 08 01 - 50 R 100 C3 - 0**

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①Series No.

SiMB : Precision Ball Screw+Stepping Servo Motor

②Screw Shaft nominal diameter(mm)

③Lead(mm)

01 means 1mm

④Screw thread length(mm)

L<sub>1</sub> : See below

⑤Thread direction (R=Right-hand)

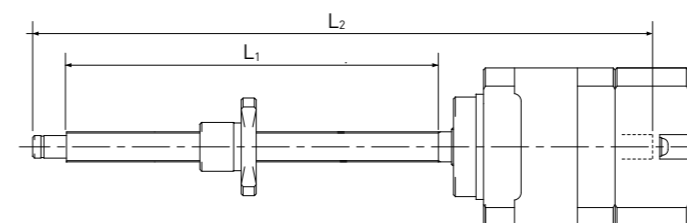
⑥Screw Shaft total length(mm)

L<sub>2</sub> : See below

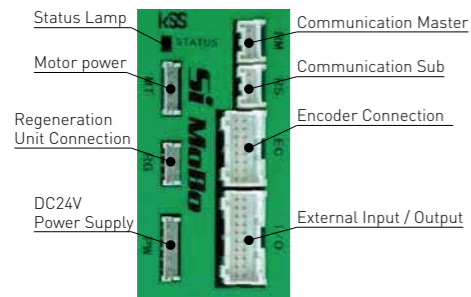
⑦Accuracy grade

⑧Axial play(μm)

## 【④⑥Definition of Screw length】

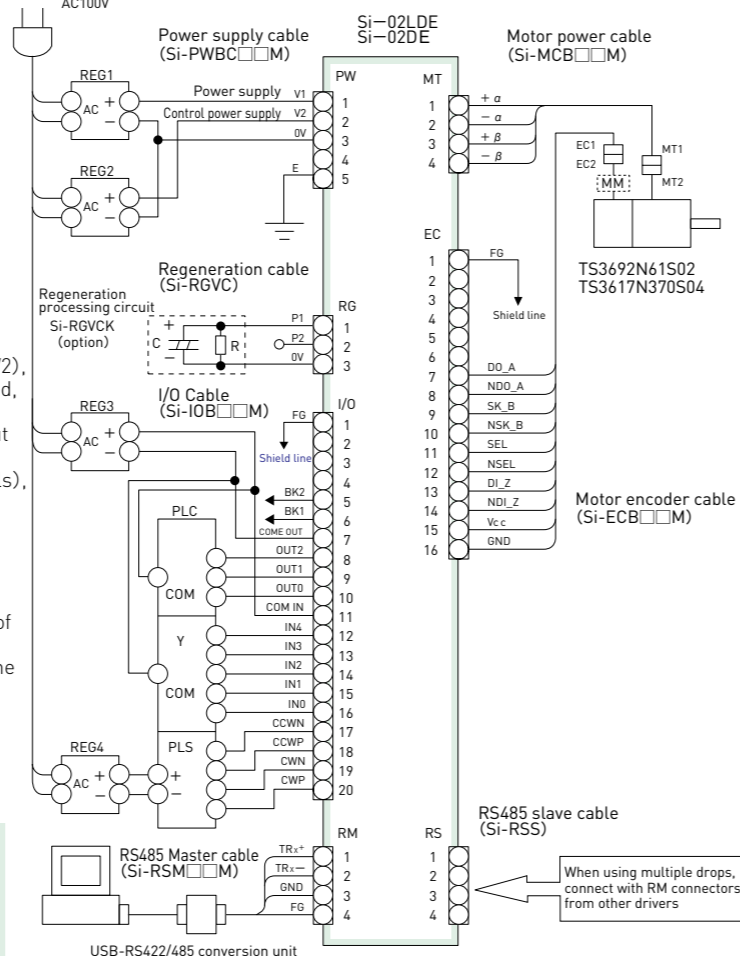
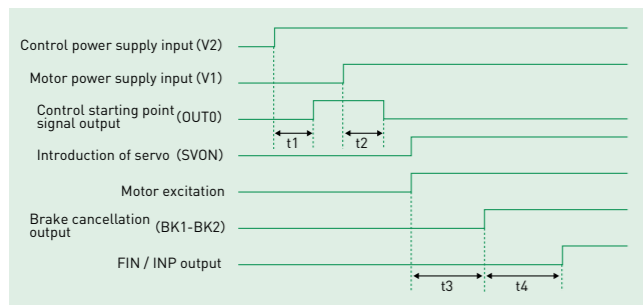


● Connections



**Timing the introduction of activation power supply**  
 If using separate power supplies from activation (V1) and control (V2), introduce the control power supply first. When the control is supplied, the OUT0 signal is turned on as a signal that control has begun. Introduce the activation power supply only after confirming the output from this signal. If using the same power supply for activation and control (connecting the power supply to parallel V1 and V2 terminals), you can introduce them at the same time.

**Initialization action when introducing power supply**  
 Give the command to turn on the servo timed with the introduction of the activation power supply and the OUT0 signal.\*3 When the positioning of the motor excitation starting point (every 7.2° from the machine angle) is complete, the FIN/INP signal will be output and initialization actions are complete.\*2 All pulse line and other commands input before these initialization actions will be ignored. Furthermore, be sure to use non-voltage relay connection output BK1-BK2 on this device, where the brake cancellation signal measures timing with the motor excitation activation.



- \*REG1 uses either DC24V or DC36V for stabilizing power supply to the main circuit power supply. When DC24V is used, REG2 may be shared.
- \*REG2 uses DC24V for stabilizing power supply to the control circuit.
- \*REG3 uses DC24V for stabilizing power supply to I/O.
- \*REG4 uses DC5V (or higher) for stabilizing power supply when the command pulse line outputs an open collector.
- \*BK1 and 2 have no voltage relay connector output.
- \*MM refers to motor memory unit, and is packaged only in cables TS3692N61S02 and TS3617N370S04.

**Power Supply Introduction Timing**  
 (These value do not take into consideration times for starting control and activation power supplies)

Symbol	Meaning	Time	Unit
t1	Introduce control power supply, after t1 OUT0 signal is output.	1000	ms
t2	Introduce control power supply, after t2 conditions are set for motor excitation*3	50	
t3	After the command to turn on servo, motor excitation begins and positioning of the motor excitation starting point (every 7.2° from the machine angle) is performed.*1 The brake cancellation signal is output at the same time.	500	
t4	After the brake cancellation signal is output and t4, the FIN/INP signal is output and initialization actions are complete *2	Value of Parameter 33	

\*1) If the motor rotor cannot accurately position the excitation starting point when the FIN/INP signal is output because it is on the edge of the machine or because the machine has a strong resistance to friction, this is a possibility that vibrations may occur or that the prescribed torque cannot be output. In this case, either set parameter 53, "Time to Hold Excitation at start Time," to an appropriately large value, or set parameter 56, "Machine Edge Detection Sequence," to 1.  
 \*2) If parameter 53, "Machine Edge Detection Sequence," is set to 1 after t4 is completed, machine edge detection activities will begin and the FIN/INP signal will be output upon completion.  
 \*3) If the automatic servo on function is in effect, motor excitation will begin at the same time the control start signal (OUT0) output goes off.

Control Input Selection Table

Selection Function	Code	Contents	Selection Function	Code	Contents
SVON	01	Servo ON	SBK	18	Single block
PJOG	02	CW JOG	EXIN	1C	Input branching
NJOG	03	CCW JOG	EMCE	20	Emergency stop (control movement)
ARST	04	Reset alarm	EMCF	21	Emergen stop (servo-free)
STR	05	Start	EXIN2	23	Input branching 2
ZSTR	06	Zero start	EXIN3	24	Input branching 3
DEC	07	Deceleration	STRP	25	Start (One-shot Input)
HOLD	08	Hold	ZSTRP	26	Zero start (one-shot Input)
PO_IN	09	Point number input	ERST	27	Clear deviation
P1_IN	0A		MFIN	28	M Completion
P2_IN	0B		SENS	29	Sensor positioning
P3_IN	30		STP	2A	Stop
P4_IN	31		RSEL	38	Select resolution function
P5_IN	32		TSEL0	39	Torque selection input
P6_IN	33		TSEL1	3A	
P7_IN	34	TSEL2	3B		
TDIN	0C	Teaching	TSEL3	3C	Input selection for revolution direction
POT	12	CW OT	TSEL4	3D	
NOT	13	CCW OT	VDIR	2E	

Parameters 60 and 61 refer to the above codes.

Parameter 60	IN3	IN2	IN1	IN0
Parameter 61				IN4

Control Output Selection Table

Selection Function	Code	Contents	Selection Function	Code	Contents
RDY	01	Servo ready	P0_OUT	04	Current point output
INP	02	In position	P1_OUT	05	
ALM	03	Alarm	P2_OUT	06	
PRG	11	Program in operation	P3_OUT	20	
FIN	12	Completed	P4_OUT	21	
VCMP	1A	Velocity agreement	P5_OUT	22	
VZR	1B	Zero velocity	P6_OUT	23	
TFIN	1C	Torque completed	P7_OUT	24	Point completion output
FIN+TFIN	1D	Completed and torque completed	P0_FIN	14	
M0	30	M output	P1_FIN	15	
M1	31		P2_FIN	16	
M2	32		P3_FIN	28	
TLMT	38	Torque limit	P4_FIN	29	
SLMT	39	Speed limit	P5_FIN	2A	
POTOUT	3A	Positive drive prohibited	P6_FIN	2B	
NOTOUT	3B	Negative drive prohibited	P7_FIN	2C	
ZFIN	3C	Zero complete	ZPLS	3E	Z phase signal output
ZERO	3D	Zero position output	-	-	-

Parameters 63 refer to the above codes.

Parameter 63		OUT2	OUT1	OUT0
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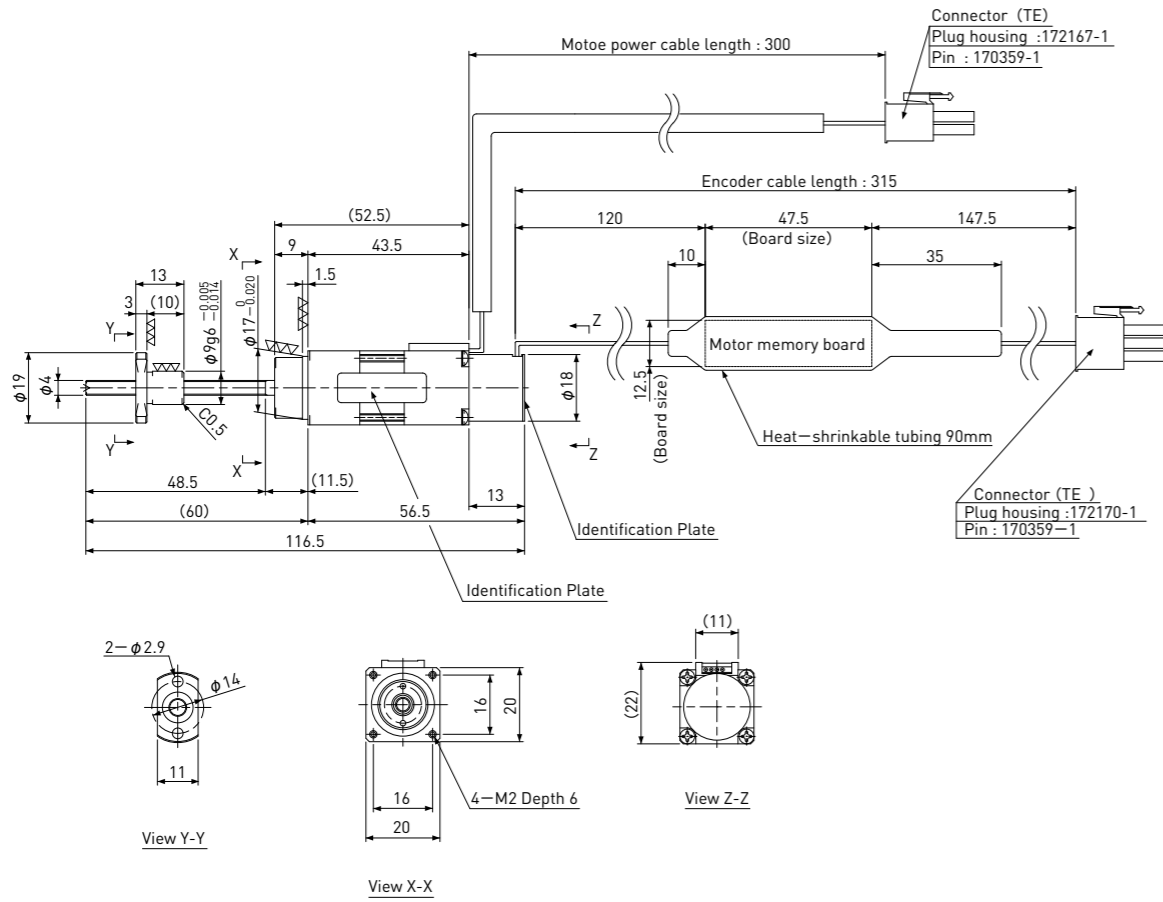
\*Parameter number 60, 61, and 63 are 32-bit hexadecimal data, and are divided into 8 bits each, set through the input and output functions. When functions are set, the corresponding terminals are assigned to the set functions.  
 \*When multiple input terminals are assigned to the same function, the one with input performs that function.  
 \*When multiple output terminals are assigned to the same function, the output from that function will be performed at all assigned terminals.



Precision Ball Screw + Stepping Servo Motor

# SiMB □20 / NEMA 08

Shaft dia.  $\phi 4$



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	Mass (g)
SiMB0401	1	30	30	114

Ball Screw Specifications	
Accuracy grade	JIS C3
Thread direction	Right
Axial play	0
Shaft material	Stainless steel
Nut material	Chrome-molybdenum steel
Surface hardness	Min. HRC55 (Thread area)
Lubricant	KSS original grease MSG No.1

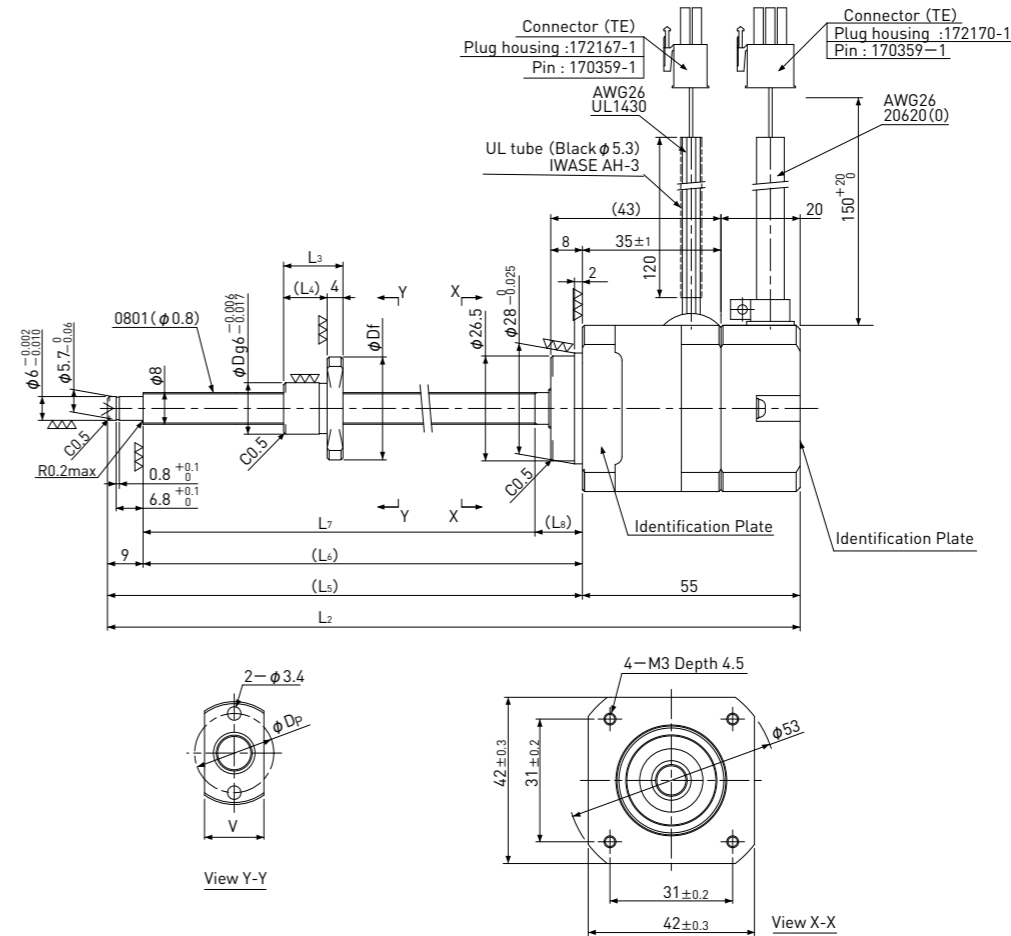
Motor Specifications	
Basic step angle	1.8°
Driving method	2-phase Bi-polar
Rated Voltage	DC 3.0 V
Rated current	DC 0.35 A/phase
Winding resistance	8.5 $\Omega$
Holding Torque	0.017Nm
Rotor inertia	1.9g·cm <sup>2</sup>
Operating temperature	-20°C~50°C
Encoder	Incremental 200ppr

Note1) Exclusive Driver(Si-02LDE)is required this type.  
Note2) Only shaft end cutting is available. Other than that, it would be customized order.

Precision Ball Screw + Stepping Servo Motor

# SiMB □42 / NEMA 17

Shaft dia.  $\phi 8$



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	L <sub>2</sub>	L <sub>5</sub>	L <sub>6</sub>	L <sub>7</sub>	L <sub>8</sub>	D	D <sub>f</sub>	L <sub>3</sub>	L <sub>4</sub>	V	D <sub>p</sub>	Mass (g)
SiMB0801	1	100	300	215	160	151	139	12	13	26	15	11	15	20	130
SiMB0802	2	160	150	265	210	201	189	12	15	28	18	14	17	22	165
SiMB0805	5	150	80	265	210	201	188	13	18	31	28	24	20	25	200

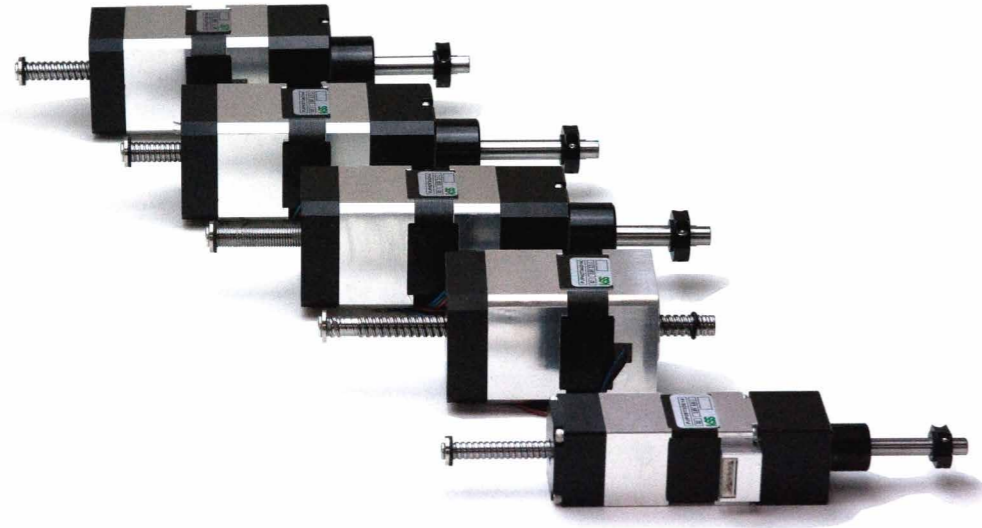
Ball Screw Specifications	
Accuracy grade	JIS C3
Thread direction	Right
Axial play	0
Shaft material	Stainless steel
Nut material	Chrome-molybdenum steel
Surface hardness	Min. HRC55 (Thread area)
Lubricant	Multemp PS-2

Motor Specifications	
Basic step angle	1.8°
Driving method	2-phase Bi-polar
Rated Voltage	DC 2.2 V
Rated current	DC 2.0 A/phase
Winding resistance	1.1 $\Omega$
Holding Torque	0.24Nm
Rotor inertia	35g·cm <sup>2</sup>
Operating temperature	-20°C~50°C
Encoder	Incremental 400ppr

Note1) Exclusive Driver(Si-02DE)is required this type.  
Note2) Only shaft end cutting is available. Other than that, it would be customized order.

# Linear Actuator Captive, Non-Captive Type

Compact type Electric Cylinder with 2-phase Hollow Stepping Motor integrated with Ball Screw or Ball Screw with Ball Spline (BSSP).



### Features

- The new Cylinder type Actuator comes with 2 Motor sizes, NEMA 11 & NEMA 17. Captive type with anti-rotating device or Non-Captive type without anti-rotating device can be selected in each Motor size as standard.
- Variety of Drive Screw, Shaft diameter & Lead combination allows wider selection of Accuracy and Thrust Force.

### Types

#### Captive Type

KSS miniature Ball Screw with Ball Spline(BSSP) is used for an anti-rotating device.

#### Non-Captive Type

Simple combination of the Hollow Motor and the Ball Screw contributes to lightweight and compact body.

### Variation

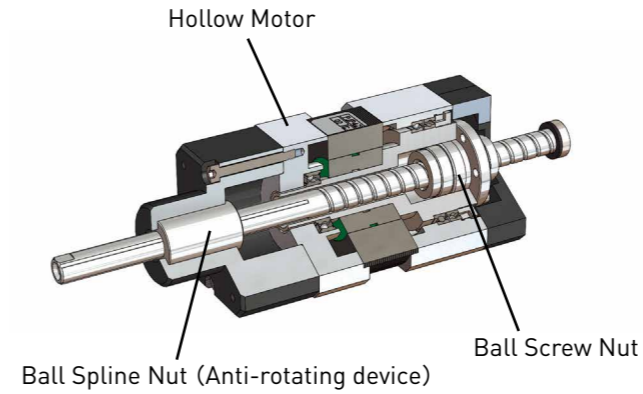
Unit : mm

	Drive Screw	Notation	NEMA 11 (□28)		NEMA 17 (□42)	
			Lead	Travel	Lead	Travel
Captive type	Precision Ball Screw	G	1,2	40	2,5	50
Non-Captive type	Precision Ball Screw	G	1,2	40,80	2,5	50,100
	Rolled Ball Screw	R	1,2	40,80	2,5	50,100

Note) If the Lead other than the above is required, please ask KSS representative.

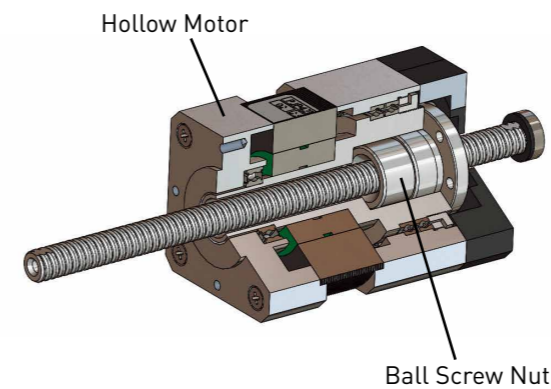
### Internal Structure

#### Captive type



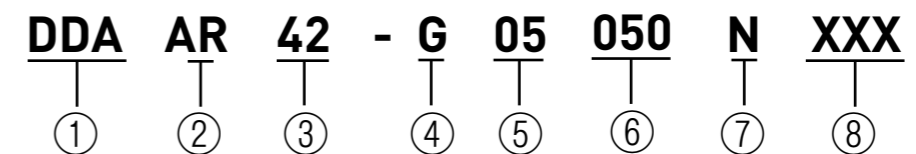
Ball Spline Nut in BSSP plays a role of anti-rotating device. No need to set up anti-rotating design outside the Actuator. Our unique BSSP enable a compact and slim body by using Ball Spline Nut as an anti-rotating device.

#### Non-Captive type



Simple design of Screw Shaft in Hollow Motor. External anti-rotating device should be set up when usage.

### Model number notation



- ①Series No.  
DDA : Direct Drive Actuator Series
- ②Cylinder type  
AR : Captive type  
CL : Non-Captive type
- ③Motor size  
42 : NEMA 17 Stepping Motor  
28 : NEMA 11 Stepping Motor
- ④Lead Screw / Ball Screw type  
G : Precision Ball Screw  
R : Rolled Ball Screw
- ⑤Lead / Pitch (mm) : 05 means 5mm
- ⑥Travel (mm) : 050 means 50mm
- ⑦Connector type  
N : No connector (Bare)  
E : EI connector (TE Connectivity)
- ⑧Extra notation

## Specifications

### [Captive type]

Model	DDAAR28-G01 040	DDAAR28-G02 040	DDAAR42-G02 050	DDAAR42-G05 050
Motor size	NEMA 11 □28		NEMA 17 □42	
Travel	40mm		50mm	
Drive Screw	Precision Ball Screw with Ball Spline			
Screw lead	1mm	2mm	2mm	5mm
Resolution	0.005mm	0.01mm	0.01mm	0.025mm
Repeatability	±0.005mm			
Lost motion	0.010mm			
Thrust force	50N	25N	80N	30N
Permissible speed	20mm/sec	40mm/sec	40mm/sec	100mm/sec
Acceleration & Deceleration time	Min. 0.2 sec			
Operating Temperature	0~40°C (No Condensation)			
Lubrication	KSS original Grease MSG No.2			
Mass	270g		660g	

### [Non-Captive type]

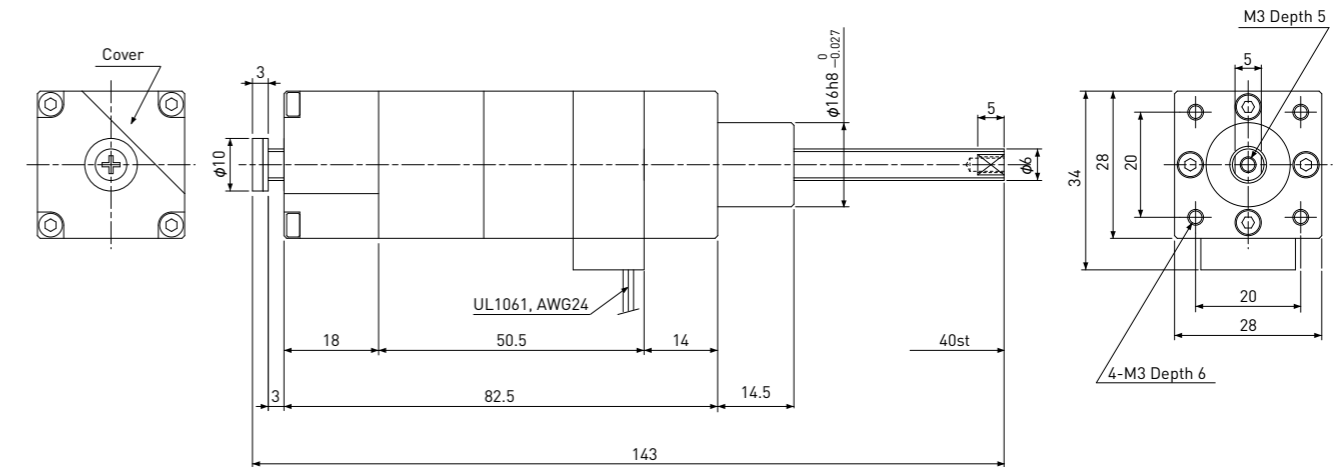
Model	DDACL28-G01 040 / 080	DDACL28-G02 040 / 080	DDACL28-R01 040 / 080	DDACL28-R02 040 / 080	DDACL42-G02 050 / 100	DDACL42-G05 050 / 100	DDACL42-R02 050 / 100	DDACL42-R05 050 / 100
Motor size	NEMA 11 □28				NEMA 17 □42			
Travel	40mm / 80mm				50mm / 100mm			
Drive Screw	Precision Ball Screw		Rolled Ball Screw		Precision Ball Screw		Rolled Ball Screw	
Screw lead	1mm	2mm	1mm	2mm	2mm	5mm	2mm	5mm
Resolution	0.005mm	0.010mm	0.005mm	0.010mm	0.010mm	0.025mm	0.010mm	0.025mm
Repeatability	±0.005mm		±0.010mm		±0.005mm		±0.010mm	
Lost motion	0.010mm		0.020mm		0.010mm		0.020mm	
Thrust force	50N	25N	50N	25N	80N	30N	80N	30N
Permissible speed	20mm/sec	40mm/sec	20mm/sec	40mm/sec	40mm/sec	100mm/sec	40mm/sec	100mm/sec
Acceleration & Deceleration time	Min. 0.2 sec							
Operating Temperature	0~40°C (No Condensation)							
Lubrication	KSS original Grease MSG No.2							
Mass	St 40:230g St 80:240g	St 40:230g St 80:240g	St 40:230g St 80:240g	St 40:230g St 80:240g	St 50:530g St 100:550g	St 50:530g St 100:550g	St 50:530g St 100:550g	St 50:530g St 100:550g

## Standard style of Captive type

Dimensions &amp; Specifications

Anti-rotating device built-in model

# DDAAR □28 / NEMA 11

Shaft dia.  $\phi 6$ 

#### Motor lead wire

A	Black
$\bar{A}$	Green
B	Red
$\bar{B}$	Blue

UL1061, AWG24(310mm)

Recommended Drivers

SD4030B3

Note) Refer to page P164 for connection diagram of recommended Drivers.

	Specifications	
	DDAAR28-G01 040	DDAAR28-G02 040
Drive Screw type	Precision Ball Screw	
Screw lead	1mm	2mm
Travel	40mm	
Repeatability	±0.005mm	
Lost Motion	0.010mm	
Permissible Speed	20mm/sec	40mm/sec
Acceleration & deceleration time	Min. 0.2sec	
Thrust Force	50N	25N
Mass	270g	

#### Precautions

- Radial load can not be applied on Captive type. For more detail, please see page S105.
- Specifications above are reference value measured in vertical position at virgin condition.
- Sensor is not built in this standard design. Please ask KSS if necessary

Motor Specifications	
Basic step angle	1.8°
Driving method	2-phase Bi-polar
Rated Voltage	DC 3.8 V
Rated current	0.67 A/phase
Winding resistance	5.6Ω
Winding inductance	5.3mH
Insulation Class	Class B (130°C)
Operating Temperature	0~40°C (No Condensation)

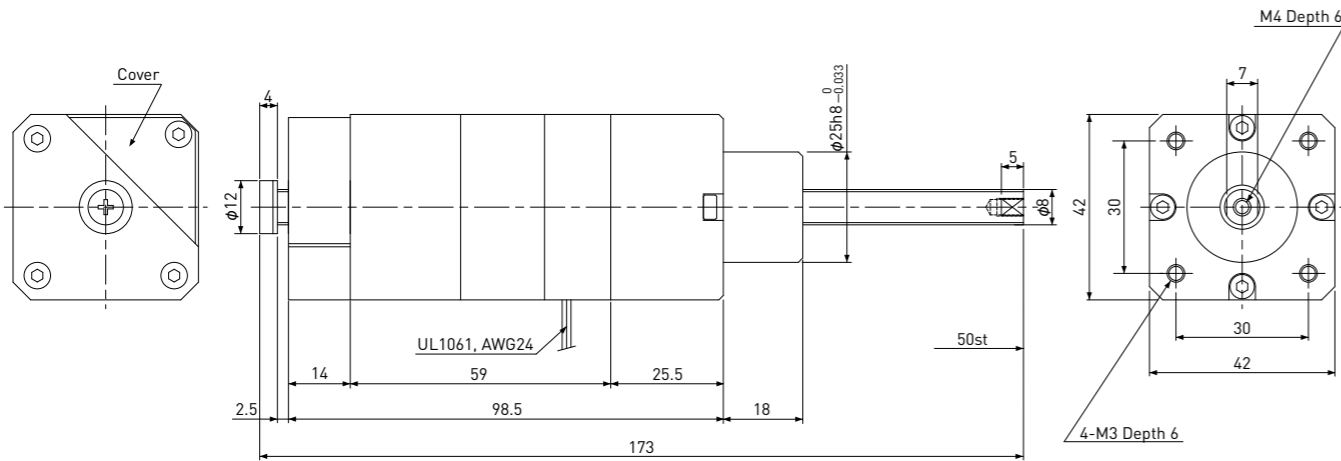
Standard style of Captive type

Dimensions & Specifications

Anti-rotating device built-in model

# DDAAR □42 / NEMA 17

Shaft dia.  $\phi 8$



Motor lead wire

A	Black
$\bar{A}$	Green
B	Red
$\bar{B}$	Blue

UL1061, AWG24(310mm)

Recommended Drivers	SD4030B3
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Note) Refer to page P164 for connection diagram of recommended Drivers.

Specifications	
	DDAAR42-G02 050
Drive Screw type	Precision Ball Screw
Screw lead	2mm / 5mm
Travel	50mm
Repeatability	$\pm 0.005$ mm
Lost Motion	0.010mm
Permissible Speed	40mm/sec / 100mm/sec
Acceleration & deceleration time	Min. 0.2sec
Thrust Force	80N / 30N
Mass	660g

Motor Specifications	
Basic step angle	1.8°
Driving method	2-phase Bi-polar
Rated Voltage	DC 2.5 V
Rated current	1.2 A/phase
Winding resistance	2.1 $\Omega$
Winding inductance	4.0mH
Insulation Class	Class B (130°C)
Operating Temperature	0~40°C (No Condensation)

Precautions

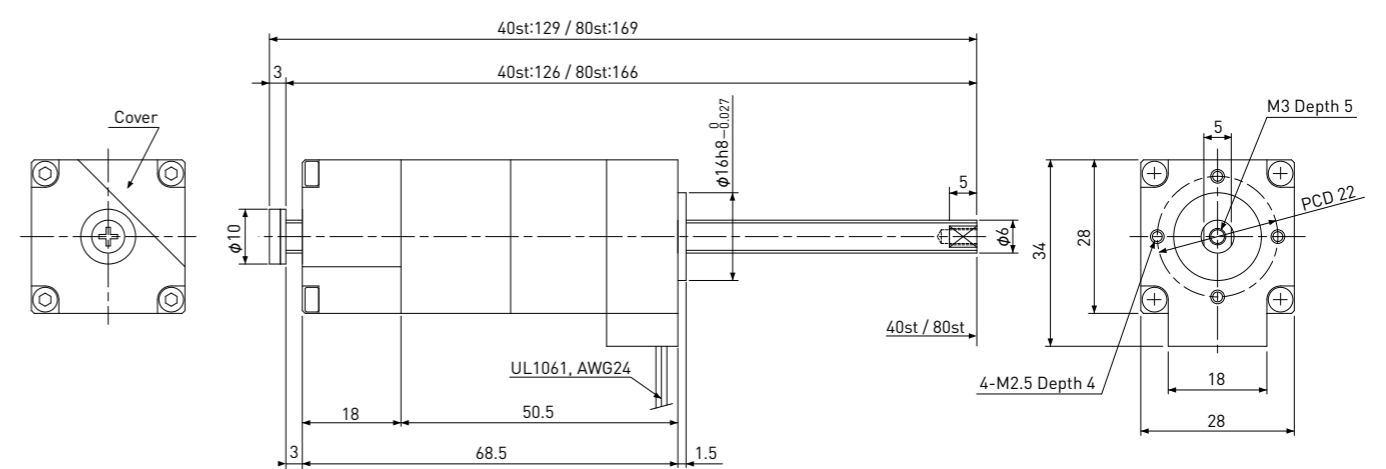
- Radial load can not be applied on Captive type. For more detail, please see page S105.
- Specifications above are reference value measured in vertical position at virgin condition.
- Sensor is not built in this standard design. Please ask KSS if necessary

Standard style of Non-Captive type

Dimensions & Specifications

# DDACL □28 / NEMA 11

Shaft dia.  $\phi 6$



Motor lead wire

A	Black
$\bar{A}$	Green
B	Red
$\bar{B}$	Blue

UL1061, AWG24(310mm)

Recommended Drivers	SD4030B3
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Note) Refer to page P164 for connection diagram of recommended Drivers.

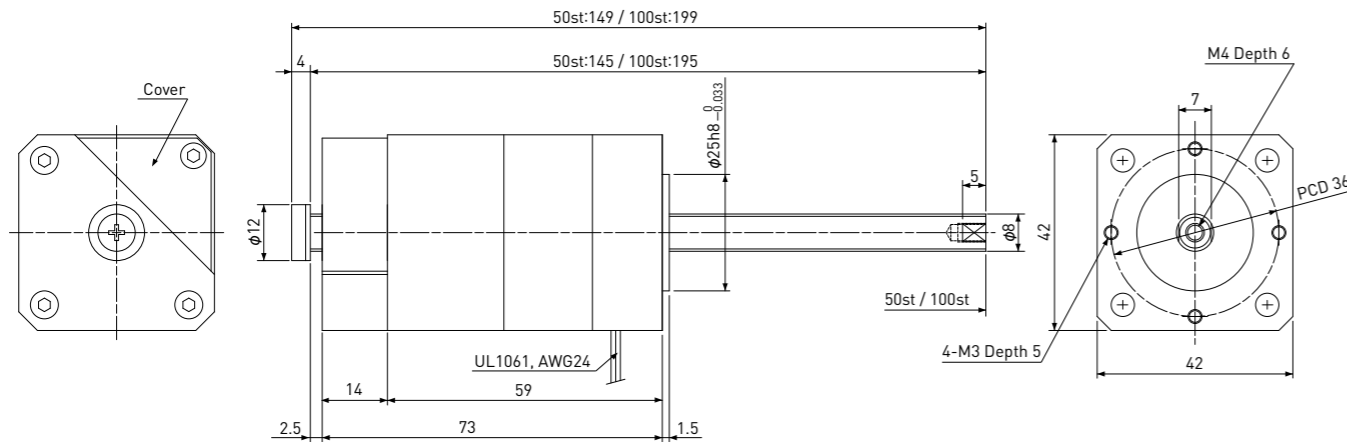
Specifications				
	DDACL28-G01 040/080	DDACL28-G02 040/080	DDACL28-R01 040/080	DDACL28-R02 040/080
Drive Screw type	Precision Ball Screw		Rolled Ball Screw	
Screw lead	1mm	2mm	1mm	2mm
Travel	40mm / 80mm		40mm / 80mm	
Repeatability	$\pm 0.005$ mm		$\pm 0.010$ mm	
Lost Motion	0.010mm		0.020mm	
Permissible Speed	20mm/sec	40mm/sec	20mm/sec	40mm/sec
Acceleration & deceleration time	Min. 0.2sec		Min. 0.2sec	
Thrust Force	50N	25N	50N	25N
Mass	Travel 40mm:230g Travel 80mm:240g		Travel 40mm:230g Travel 80mm:240g	

Motor Specifications	
Basic step angle	1.8°
Driving method	2-phase Bi-polar
Rated Voltage	DC 3.8 V
Rated current	0.67 A/phase
Winding resistance	5.6 $\Omega$
Winding inductance	5.3mH
Insulation Class	Class B (130°C)
Operating Temp.	0~40°C (No Condensation)

Precautions

- Non-Captive type does not have an anti-rotating device. External anti-rotating devices should be set up when usage. Radial load can not be applied on Captive type. For more detail, please see page S105.
- Specifications above are reference value measured in vertical position at virgin condition.
- Sensor is not built in this standard design. Please ask KSS if necessary

## DDACL □42 / NEMA 17

Shaft dia.  $\phi 8$ 

## Motor lead wire

A	Black
Ā	Green
B	Red
B̄	Blue

UL1061, AWG24(310mm)

## Recommended Drivers

SD4030B3

Note) Refer to page P164 for connection diagram of recommended Drivers.

	Specifications			
	DDACL42-G02 050/100	DDACL42-G05 050/100	DDACL42-R02 050/100	DDACL42-R05 050/100
Drive Screw type	Precision Ball Screw		Rolled Ball Screw	
Screw lead	2mm	5mm	2mm	5mm
Travel	50mm / 100mm		50mm / 100mm	
Repeatability	$\pm 0.005\text{mm}$		$\pm 0.010\text{mm}$	
Lost Motion	0.010mm		0.020mm	
Permissible Speed	40mm/sec	100mm/sec	40mm/sec	100mm/sec
Acceleration & deceleration time	Min. 0.2sec		Min. 0.2sec	
Thrust Force	80N	30N	80N	30N
Mass	Travel 50mm : 530g Travel 100mm : 550g		Travel 50mm : 530g Travel 100mm : 550g	

Motor Specifications	
Basic step angle	1.8°
Driving method	2-phase Bi-polar
Rated Voltage	DC 2.5 V
Rated current	1.2 A/phase
Winding resistance	2.1 $\Omega$
Winding inductance	4.0mH
Insulation Class	Class B (130°C)
Operating Temp.	0~40°C (No Condensation)

## Precautions

- Non-Captive type does not have an anti-rotating device. External anti-rotating devices should be set up when usage. Radial load can not be applied on Captive type. For more detail, please see page S105.
- Specifications above are reference value measured in vertical position at virgin condition.
- Sensor is not built in this standard design. Please ask KSS if necessary

## ● Recommended Driver

KSS provides recommended Stepping Motor Driver as an option for Linear Actuator in order to make it easy to use.

## KR-A5CC

This Driver is for 5-phase Stepping Motor operated by DC24V power supply. It has automatic current reduction circuits. You can choose full-step or half step function.



## KR-A55MC

Micro-Step Driver for 5-phase Stepping Motor with DC24V power supply. 16 step angle types can be set up to 250 divisions.



## KR-A535M

Micro-Step Driver for 5-phase Stepping Motor, which can be used with AC100~220V power supply. 16 step angle types can be set up to 250 divisions.



## SD4015B3

This is recommended for Motor model 08E2004 of DMB series. It has automatic current down function and Micro-step function with 8-step angle.



## SD4030B3

This is recommended for 2 phase stepping Motor Linear Actuator. (Motor model: Other than 08E2004) It has automatic current down function and Micro-step function with 8-step angle.



### ● Extension Cable

Extension Cable between Linear Actuator Captive type or Non-Captive type, and KSS recommended Stepping Motor Driver.

Please designate Cable length and Connector type in accordance with the example below.

Please note that one side of Extension Cable is cut end only (no connector).

**EC**   **R**   **—**   **2**   **—**   **E(6)**  
 ①   ②   ③   ④

① Extension Cable

② Cable type

R : Robot cable type

③ Cable length (m)

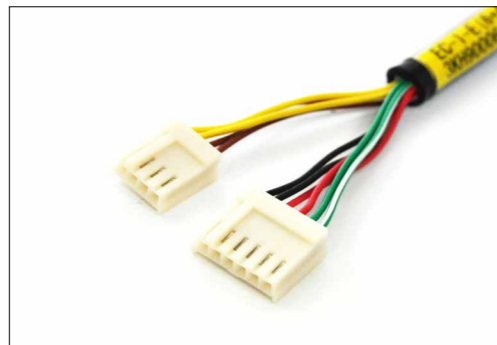
④ Connector type at both end

N : No connector (Cut only)

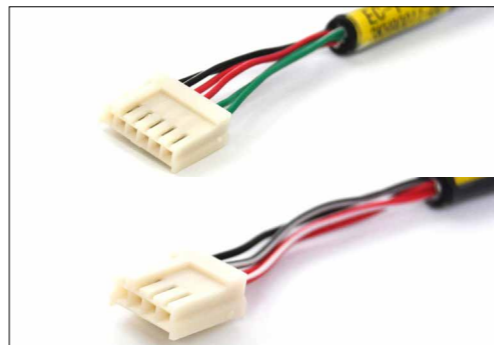
E(6) : El connector 6-pins

E(4) : El connector 4-pins

E(6+4) : El connector 6+4-pins



E(6+4) : El connector 6+4-pins  
(TE Connectivity)



E(6) : El connector 6-pins  
E(4) : El connector 4-pins  
(TE Connectivity)

### ● Linear Actuator Connection diagram

Describe the connection diagram between the KSS Linear Actuator and the recommended driver.

Please check the combination of the Linear Actuator and the driver, then wire according to diagrams as shown below.

Type	Series	Recommended Driver	Output current	Connection diagram
External	DMB (Motor Model : 08E2004)	SD4015B3	0.25 ~ 1.5A/phase	Fig. P-3
	DMB (Motor Model : Other than 08E2004)	SD4030B3	0.5 ~ 3A/phase	Fig. P-4
	2TMB	SD4030B3	0.5 ~ 3A/phase	Fig. P-5
	MB / TMB	KR-A5CC	0.1 ~ 0.9A/phase	Fig. P-6
		KR-A55MC	0.4 ~ 1.4A/phase	Fig. P-7
		KR-A535M	0.4 ~ 1.4A/phase	Fig. P-8
Captive Non-Captive	DDAAR / DDACL	SD4030B3	0.5 ~ 3A/phase	Fig. P-9

## External type

### ■Applicable Product series

DMB series (Motor model : 08E2004)

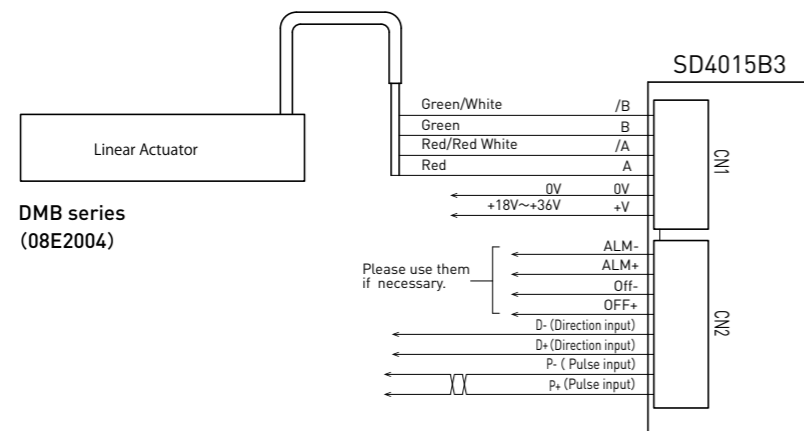
### ■Recommended Driver

SD4015B3 : 2-phase Microstep Driver

\*\*Output current : 0.25~1.5A/Phase

### ※Caution

- The factory setting of SD4015B3 is 1A.
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.
- For the details about current setup, please download the manual from KSS web site.



[Fig.P-3]

### ■Applicable Product series

DMB series (Motor model : Other than 08E2004)

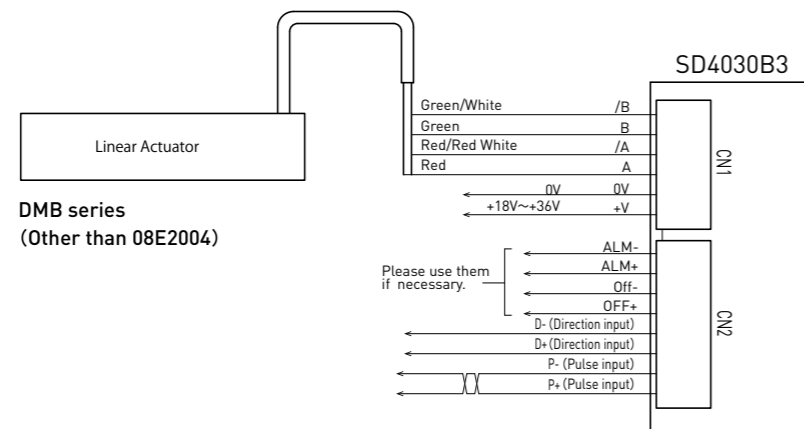
### ■Recommended Driver

SD4030B3 : 2-phase Microstep Driver

\*\*Output current : 0.5~3A/Phase

### ※Caution

- The factory setting of SD4030B3 is 2A.
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.
- For the details about current setup, please download the manual from KSS web site.



[Fig.P-4]

### ■Applicable Product series

2TMB series

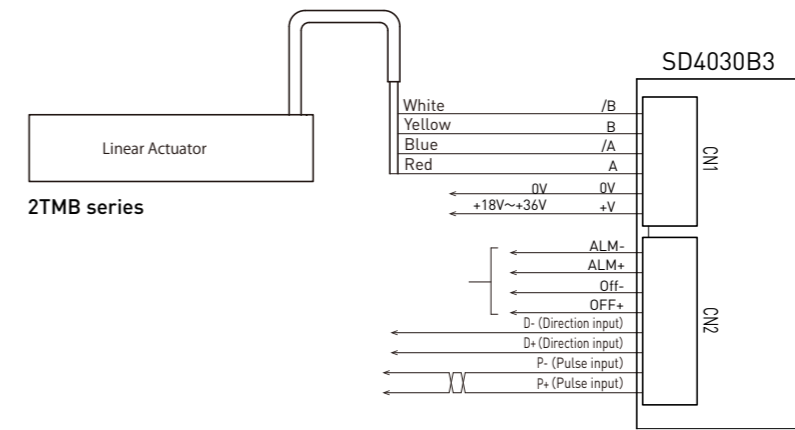
### ■Recommended Driver

SD4030B3 : 2-phase Microstep Driver

\*\*Output current : 0.5~3A/Phase

### ※Caution

- The factory setting of SD4030B3 is 2A.
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.
- For the details about current setup, please download the manual from KSS web site.



[Fig.P-5]

### ■Applicable Product series

MB series

TMB series

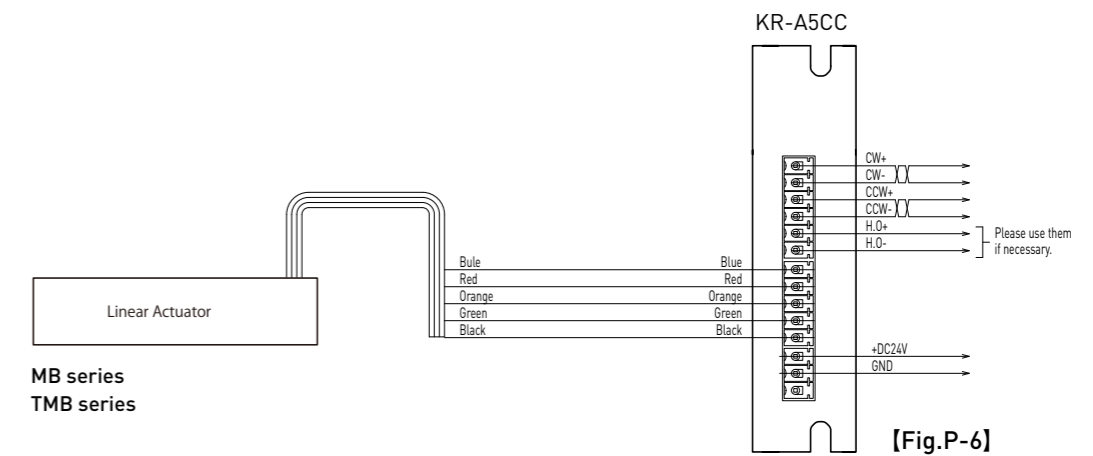
### ■Recommended Driver

KR-A5CC : 5-phase Stepping Motor Driver

\*\*Output current : 0.1~0.9A/Phase

### ※Caution

- The factory setting of KR-A5CC is 0.35A.
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.



[Fig.P-6]

■Applicable Product series

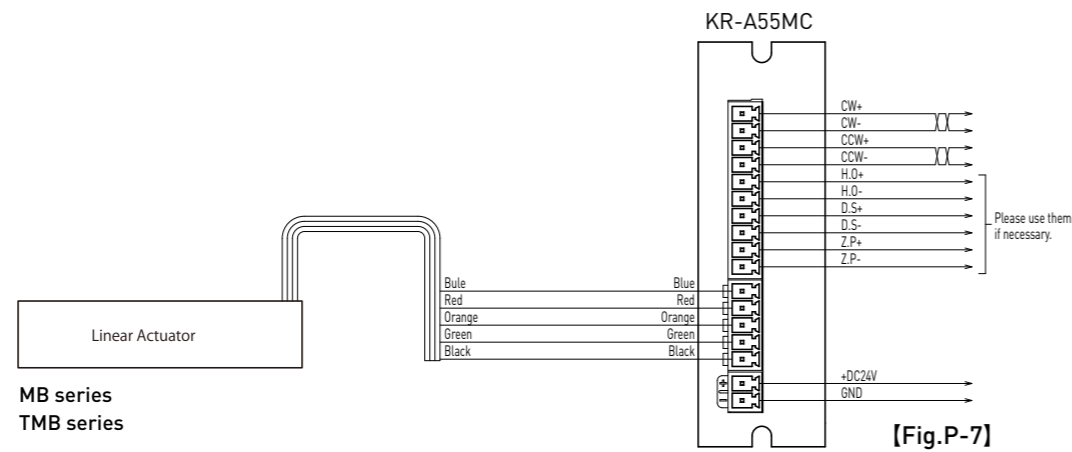
- MB series
- TMB series

■Recommended Driver

- KR-A55MC : 5-phase Microstep Driver  
\*\*Output current : 0.4~1.4A/Phase

※Caution

- The factory setting of KR-A55MC is 0.75A
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.



■Applicable Product series

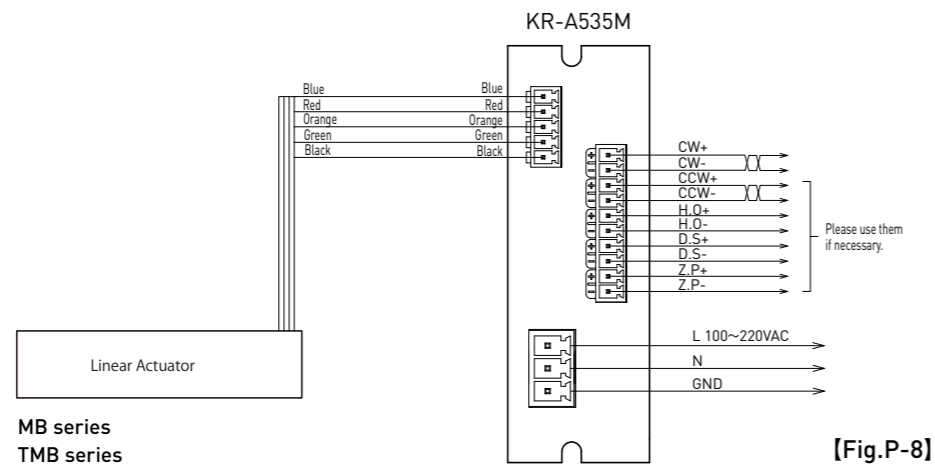
- MB series
- TMB series

■Recommended Driver

- KR-A535M : 5-phase Microstep Driver  
\*\*Output current : 0.4~1.4A/Phase

※Caution

- The factory setting of KR-A535M is 0.75A
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.



## Captive, Non-Captive type

■Applicable Product series

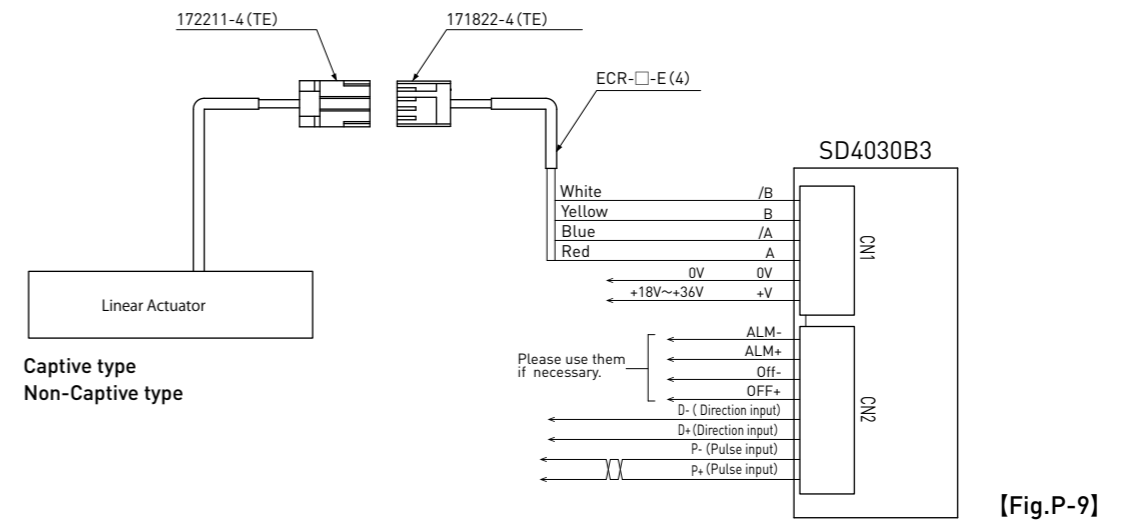
- Captive type, Non-Captive type

■Recommended Driver

- SD4030B3 : 2-phase Microstep Driver  
\*\*Output current : 0.5~3A/Phase

※Caution

- The factory setting of SD4030B3 is 2A.
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.
- For the details about current setup, please download the manual from KSS web site.



Motor cable 172211-4 (male)

1	Stepping Motor /B (Blue)
2	Stepping Motor B (Red)
3	Stepping Motor /A (Green)
4	Stepping Motor A (Black)

Motor Extension cable 171822-4 (female)

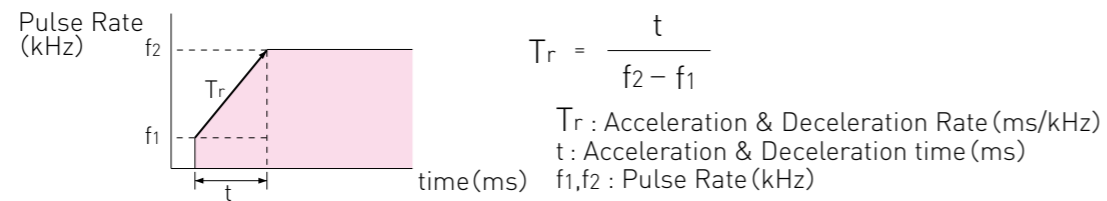
1	Stepping Motor /B (Blue)
2	Stepping Motor B (White)
3	Stepping Motor /A (Yellow)
4	Stepping Motor A (Brown)



## ●Precaution of handling and operating

### ★Precaution for operating

1. Before use, please read instruction manuals and follow the precautions below.  
The instruction manuals are available on KSS web site.
2. Do not hit or drop the Shaft, do not apply Axial load exceeding specifications or Radial load, it may cause malfunction.
3. Before use, please check that the product has no defect, and product is the same as your order.
4. Do not disassemble each component, dust may get inside the product. It may deteriorate accuracy.
5. Please prevent contamination from dust or swarf. Dust or swarf may cause damage to Ball Screw, which lead to deteriorating the function.
6. Motor is not designed to resist water oil. Item cannot be used in direct exposure of water or oil, or environment such as oil bath.
7. Lubrication is required under the Ball Screw operation. Lubricant condition should be checked every 2 to 3 months. If Grease is contaminated, remove old Grease and replace with new one.
8. Do not use the Actuator exceeding our specifications in Load or Speed.
9. Care must be taken not to apply Radial load or Moment load directly on Ball Screw.  
This will lead to shorten the Ball Screw life remarkably. In addition, misalignment between Ball Screw and other components will lead to deterioration of function, such as accuracy, life and so on.
10. Allowing Ball Screw Nut to over-run may result in malfunctioning due to Balls escaping, damage to recirculation parts, and indentation on the raceways. Continued use in this state will lead to rapid wear and damage to recirculation parts. Therefore Ball Screw Nut must never be allowed to over-run. If over-running occurs, contact KSS for an inspection with charge.
11. Acceleration & Deceleration rate should be followed by recommended number described in each series. Do not use Linear Actuator under our recommended Acceleration & Deceleration Rate.



12. Do not hold the Motor lead wire. Motor lead wire is for fixation, do not use the Motor lead wire as movabilities.
13. Keep away from Magnetic memory device.
14. The Motor torque and speed characteristics may vary from the specifications, depending on the load conditions or Driver used.
15. The Motor has a resonant point within the specifications. Please avoid the resonant point when in use.

### ★Precaution for safety

1. If abnormal odor, noise, smoke, overheating, or vibration occurs, stop operation immediately and turn the power off.
2. Do not use the Actuator exceeding rated current.
3. Check and confirm the polarity of the power supply in prior to activate the Motor.
4. The Motor may overheat depending on the load condition or Driver used.  
Make sure that the Motor surface temperature does not exceed 80°C when in use.
5. Check the wire connection type, Drive system, and phase sequence.  
Inappropriate connection leads to malfunction.
6. A ground connection must be used.
7. Do not bend, pull or pinch the Motor lead wire.
8. Do not touch moving parts during operation.
9. Disconnect from the Controller before performing dielectric withstanding voltage test of the Motor or megger test.
10. Please switch off the Driver, when inspection or maintenance.

### ★Operating environment

1. Operating environment should be 0~40°C in temperature and 20~80%RH in humidity.  
Do not use the Actuator under dew condensation, corrosive gas or inflammable gas environment.
2. Do not use the Actuator under strong electric field, strong magnetic field.
3. Please prevent from swarf, oil mist, cutting fluid, water/moisture, salt spray, organic solvent and other contamination.
4. The Actuator cannot be used under the vibration, impact, vacuum, and other special environment.

### ★Precaution for External type

- ※Since External type is the product which integrated the Motor Shaft and the Screw Shaft, repair is not possible, if either Motor or Ball Screw is damaged.