

Stepping Motor & Driver

2-Phase Hybrid Stepping Motor Driver

FSD2U2P14-01



Features

- Ultra-compact driver measuring a mere 2.2 x 2.9 x 1.7 inches.
- Uni-polar constant current driver.
- The micro-stepping feature may be selected from any one of the following settings: 1/1 (full step), 1/2 (micro-step), and 1/4 (micro step).
- Through the use of 3-bit external signals, electric current settings may be specified to any one of 8 different settings from 0.33 - 2.00 A/phase.
- Input commands may be selected from either direction-of-rotation separate serial pulse signals or a combination of directional signals and pulse signals.

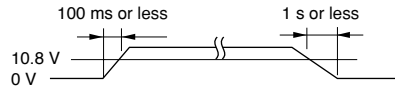
Applicable Motor

KH4234-B901
KH4238-B901
KH4238-B902
KH4242-B901
KH4242-B902
KH4248-B901
KH4254-B901

Power Supply Specifications

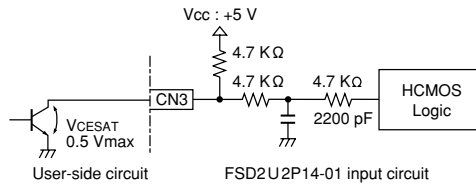
Motor Power Supply Voltage (VM): 10.8 V ~ 33.0 V

Set up time



Motor output current: About 2 A max. (different depending on the drive parameters of the motor being used)

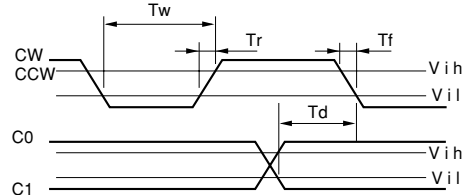
Input Circuit: C0, C1, C2, H-OFF, CW, CCW



Input Signal Specifications

Item	Signal	Specification	
		MIN	MAX
High Level Input Voltage	Vih(V)	3.5	5.3
Low Level Input Voltage	Vil(V)	0	0.8
Rise Time	Tr(μs)	—	25
Fall Time	Tf(μs)	—	15
Input Pulse Range	Twl(μs)	18	—
Direction of Rotation Change Timing	Twh(μs)	10	—

Note: Specified by the voltage waveform between the user circuit ground and the FSD2U2P14-01 terminal



Required Operating Environment Conditions

	In Operation	In Storage	Comments
Ambient Temperature (°C)	0 ~ +50	-20 ~ +60	
Ambient Humidity %	35 ~ 85	35 ~ 85	Non Condensation

Functions, Setting and Connections

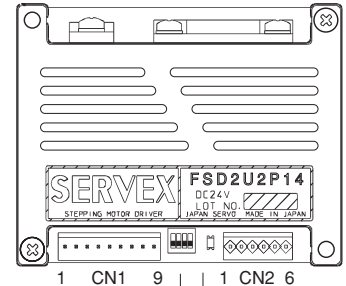
[CN1 Input Signal Connector]

Terminal No.	Signal Name	Function
1 (Red)	VM	Motor power supply (to be connected to 12-30 V power supply)
2 (Black)	P.GND	Motor power supply ground (GND)
3 (Orange)	CW (Note 1)	CW directional drive pulse and serial pulse signal input
4 (Yellow)	CCW (Note 1)	CCW directional drive pulse and direction-of-rotation signal input
(Note 2)	Motor Current (A)	0.33 0.57 0.81 1.09 1.28 1.52 1.76 2.00
7 (Purple)	C0	H L H L L L H L H L
6 (Blue)	C1	H L H L L L H L H L
5 (Green)	C2	H H H H L L L L
	Current (A) (save)	0.25 0.39 0.51 0.70 0.81 0.98 1.12 1.29
8 (Gray)	H.OFF	Motor on/off (H: off)
9 (White)	S.GND	Signal ground (GND)

Note1: The CW or CCW rotation starts at the falling edge of the signal. (Please refer to Table.1)
 Note2: It is defined at the RMS value of each winding when the motor is in holding mode (0 PPS) at full step without current saving stops.

Table.1 Input Signal and Motor Direction Relation

Drive Pulse Format	Terminal No.3	Terminal No.4	Motor Direction
CW/CCW		HIGH	CW
		HIGH	CCW
CLK/DIR		LOW	CW
		HIGH	CCW
	HIGH	X	HOLDING



[Functions Setting Switch] On Name Plate Side

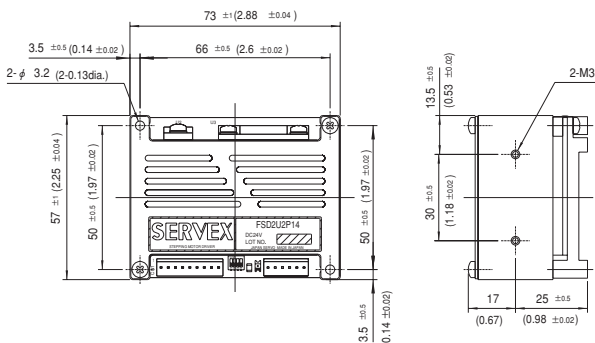
Switch No.	Name	Function	Switch Settings		
			OFF	ON	
1	SEL	Drive Pulse Format	CW/CCW	CLK/DIR	
2	SAVE (Note 3)	Automatic Power Saving	Saving	Not Saving	
			Division of Step Angle	1/2	1/1
3	MS0	ON	OFF	ON	OFF
4	MS1	ON	ON	OFF	OFF

Note3: The motor enters current saving mode about 0.25 sec. after the input pulse signal stops.

[CN2 Motor connector]

Terminal No.	Name	Function
1 (Red)	A	To Motor Phase A
2 (Black)	A.COM	To Motor Phase A Common Line
3 (White/Red)	Ā	To Motor Phase Ā
4 (Green)	B	To Motor Phase B
5 (White)	B.COM	To Motor Phase B Common Line
6 (White/Green)	B̄	To Motor Phase B̄

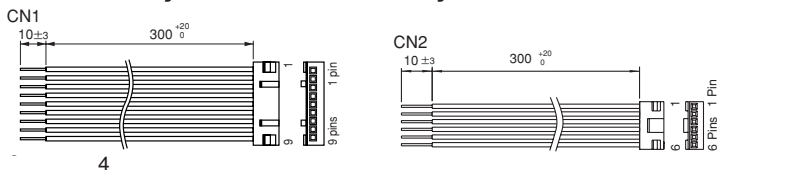
Dimensions Unit: mm (inch)



Connector Specifications

	FSD2U2P14-01 Side Maker Model	Lead Wire	User Side		Maker
			Applicable Housing	Applicable Terminal (reel)	
CN1	IL-G-9P-S3T2-SA	UL3266, AWG22	IL-G-9S-S3C2-SA	IL-G-C2-SC-10000	J. A. E.
CN2	IL-G-6P-S3T2-SA	UL3266, AWG22	IL-G-6S-S3C2-SA	IL-G-C2-SC-10000	J. A. E.

Accessory Leadwire Assembly



3-Phase Hybrid Stepping Motor Driver

HIGH TORQUE, SILENT ROTATION

SERVEX FTD3S2P22-01 DC24V

Features

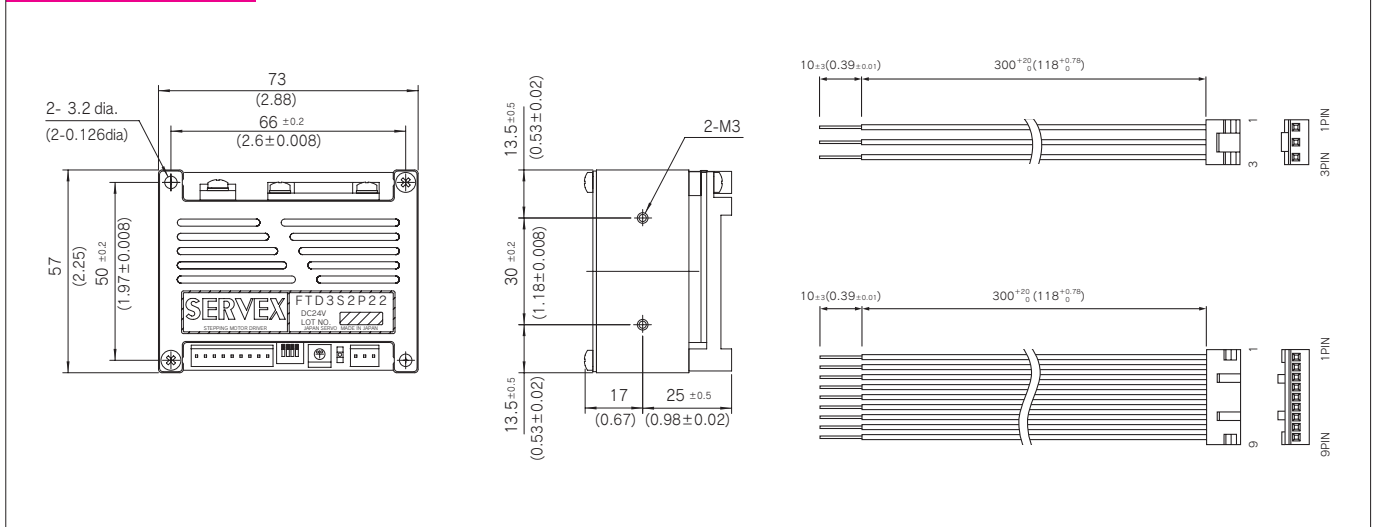
1. The micro step driver operates with low noise.
2. Step angles of 1/8, 1/4, 1/2 and 1/1 can be chosen.
3. High torque and high speed response achieved using constant current driver.
4. Input commands may be selected from either direction-of-rotation separate serial pulse signals or a combination of directional signals and pulse signals.
5. Reduced current (40 to 60%) function to prevent overheating during holding.

Applicable motors

See page 29



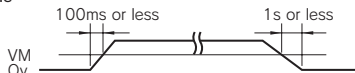
Dimensions Unit = mm(inch)



Power supply specifications

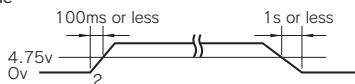
Motor power supply voltage (VM) : 10.8~26.4V

Start up time



Logic power supply voltage (5VDC): 5V ± 5%

Start up time



Motor output current; About 2A max. (different depending on the drive parameters of the motor being used)

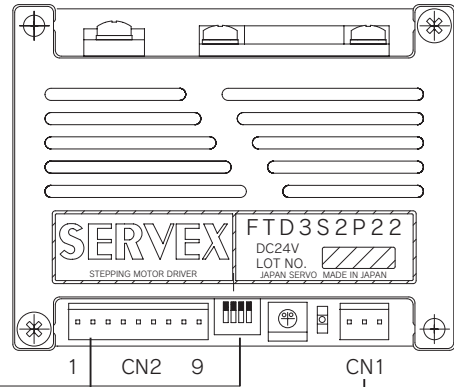
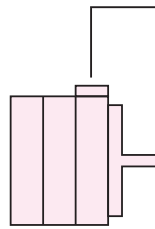
Connector specifications

	FTD3S2P11-01 side		User side	
	Model	Applicable housing	Applicable terminal (real)	Maker
CN ₂	IL-G-9P-S3T2-SA	IL-G-9S-S3C2-SA	IL-G-2C-SC-10000	J·A·E
CN ₁	IL-G-3P-S3T2-SA	IL-G-3S-S3C2-SA	IL-G-2C-SC-10000	J·A·E

Functions, Setting and Connections

Switch No.	Name	Function	Setting and operation					
			OFF	ON	1/8	1/4	1/2	1/1
1	SEL	Drive pulse format	OFF	CW/CCW pulse input				
			ON	Serial pulse/rotational direction CCW terminal= "H," Rotation in CCW direction CCW terminal= "L," Rotation in CW direction				
2	SAVE	Automatic power saving	OFF	ENABLE about 0.28 to 0.39 seconds after input pulses stop, the output current drops to 40-60%				
			ON	NOT ENABLE				
3	MS1	Micro step Number of divisions	Number of divisions	1/8	1/4	1/2	1/1	
			MS1	ON	ON	OFF	OFF	
			MS0	ON	OFF	ON	OFF	
4	MS0							

Motor cable (attached)



Connector No.	Terminal No.	Name	Function
CN1	1	MOTOR W	To Motor phase - W
	2	MOTOR V	To Motor phase - V
	3	MOTOR U	To Motor phase - U

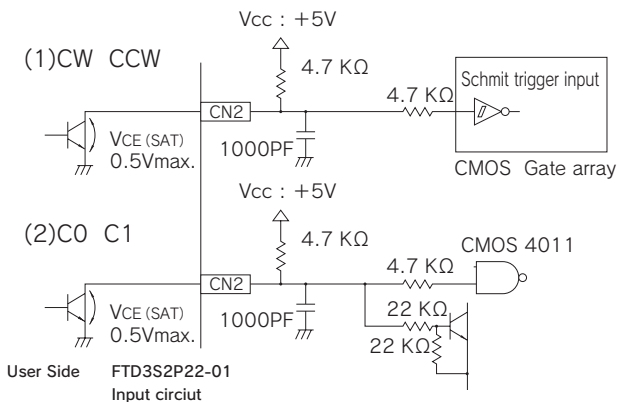
Power source connector

Connector No.	Terminal No.	Name	Function
CN2	1	VM	Motor power supply 12-24 Vdc
	2	COM	Motor power supply GND
	3	5VDC	Logic circuit power supply +5V
	4	GND	Logic circuit GND

Signal input connector

Connector No.	Terminal No.	Name	Function			
CN2	5	CW	The CW direction drive pulse or the serial pulse signal input			
	6	CCW	The CCW direction drive pulse or the direction signal input			
	Current%		120~150	100	50~80	0
	7	C0	L	L	H	H
	8	C1	L	H	L	H
	9	GND	Signal GND			

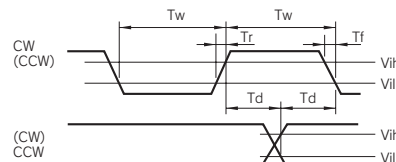
Input circuit



Input signal specifications

Item	Signal	Specification	
		MIN	MAX
High level input voltage	Vih (V)	4.0	Vcc+0.3
Low level input voltage	Vil (V)	-0.3	0.8
Rise time	Tr (μS)	2.0	9.5
Fall time	Tf (μS)	-	2.0
Input pulse range	Tw (μS)	10	-
Direction of rotation change timing	Twh (μS)	3.0	-

Note) Specified the voltage waveform between the user circuit ground and the FTD3S2P22-01 terminal.



Features

1. High torque
2. Low vibration
3. Silent operation
4. High position accuracy

The best magnetic balance is employed in our round type stepping motor. Motor performance is greatly improved using the latest technology of three dimensional magnetic field analysis and robust design.

Features (Compare to our current 42 & 56 square size motors)

Both high torque and low vibration performance were achieved.

- The round core provides the best magnetic balance. High torque performance is also achieved by optimizing the design with three dimensional magnetic field analysis. More than 30% higher holding torque was achieved and pull-out torque was also improved. (Refer to Fig. 1 and 2)

Fig. 1

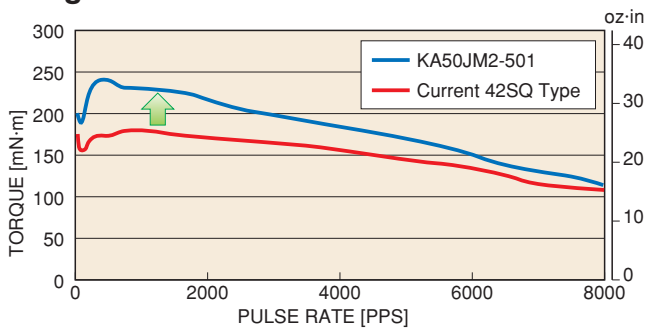
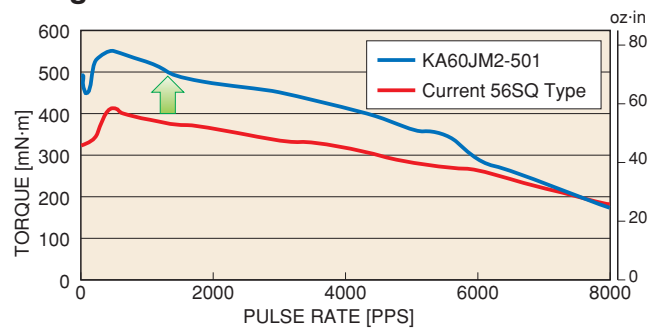
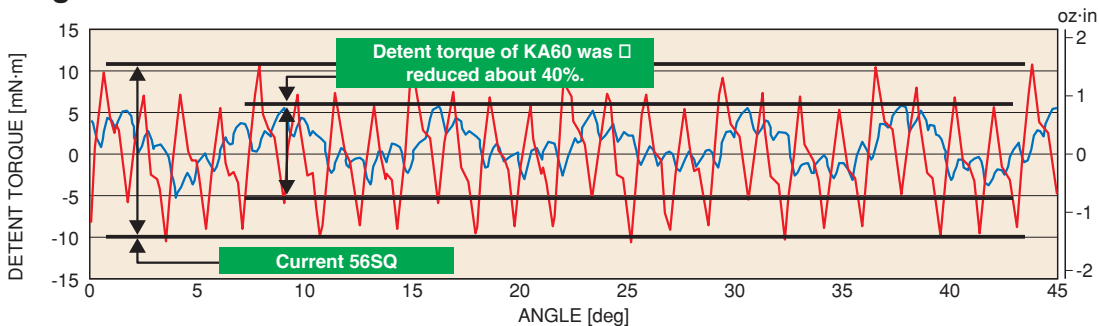


Fig. 2



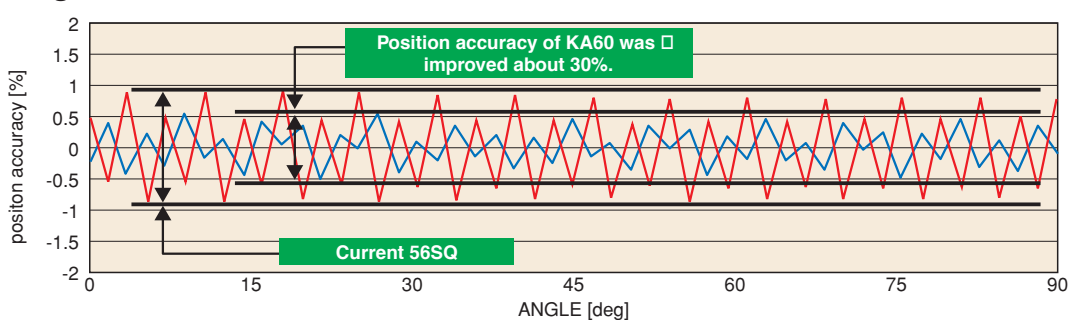
- Low vibration and low rotational fluctuation were realized by reducing the detent torque using three dimensional magnetic field analysis. Rotational fluctuation was reduced about 30%.

Fig. 3



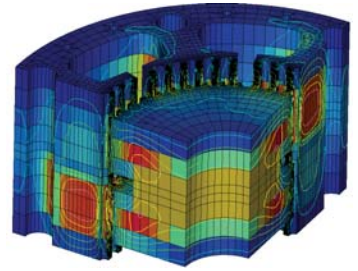
- Position accuracy was improved by minimizing the deviation of induced voltage. Position accuracy was improved about 30%. (Refer to Fig.4)

Fig. 4



- Shaft size and mounting dimension compatibility between the 42sq. & KA50 and the 56sq. & KA60.
- Space Saving: High torque performance with shorter motor.
- All models are RoHS compliant.

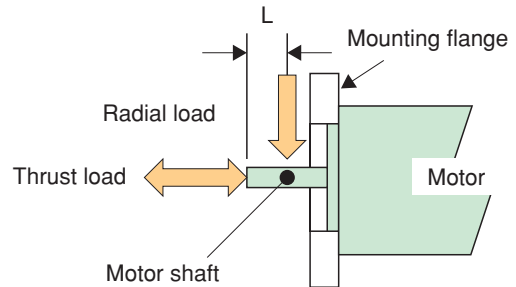
- * Three dimensional magnetic field analysis: The magnetic strength is shown three dimensionally and the highest efficiency core shape is determined.
- * Robust design: A design method that is not influenced by the variation in parts to eliminate product performance variation.



Max. Allowable Load / Runout for Motor Shaft

Load for Motor Shaft

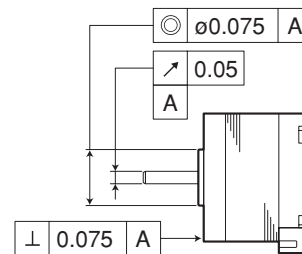
Type	Thrust load	Radial load	
		Load	L
KA50	14.7 N [1.5 kgf] [3.3 lb]	19.6 N [2.0 kgf] [4.4 lb]	10 mm
KA60	40 N [4.1 kgf] [9.0 lb]	70 N [7.1 kgf] [15.8 lb]	



Shaft Run Out

Shaft run out	0.05 T.I.R. [mm]*
Concentricity between shaft and mounting circle	0.075 T.I.R. [mm]*
Perpendicularity between shaft and mounting face	0.075 T.I.R. [mm]*

* T.I.R. (Total Indicator Reading)



Specification

Temperature rise	70 K max (By resistance method)
Insulation class	Class E equivalent
Insulation resistance	100 M Ω min. At 500 V DC (at normal temp. & humidity, between lead and case)
Dielectric strength	500 V AC 50 Hz for 1 minute (at normal temp. & humidity, between lead and case)
Ambient temp. range	-10 °C ~ +50 °C
Storage temperature range	-20 °C ~ +70 °C
Humidity range in operation and storage	5 % ~ 95 % RH (noncondensing)

KA50 Series (1.8 degree/step)

Standard Specifications

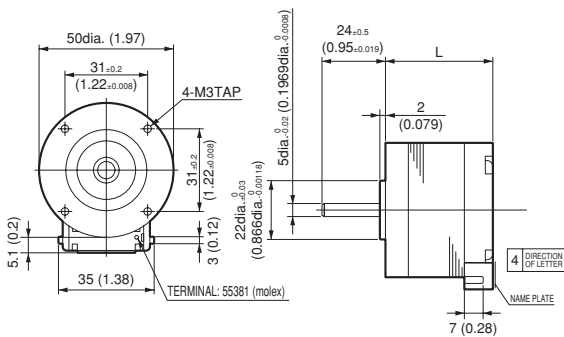
UNIPOLAR

Model	Step angle	Voltage	Current	Resistance	Inductance	Holding torque		Detent torque		Rotor inertia	
Dimension	degree/step	V/∅	A/∅	Ω/∅	mH/∅	mN·m	oz·in	mN·m	oz·in	g·cm ²	oz·in ²
KA50HM2-501	1.8	2.08	2.0	1.04	0.9	216	31	12	1.7	50	0.3
KA50HM2-502		4.20	1.0	4.2	3.8	216	31	12	1.7	50	0.3
KA50JM2-501		2.46	2.0	1.23	1.3	324	46	15	2.1	70	0.4
KA50JM2-502		5.00	1.0	5.0	5.4	324	46	15	2.1	70	0.4
KA50KM2-501		3.20	2.0	1.6	1.8	471	67	20	2.8	100	0.5
KA50KM2-502		6.20	1.0	6.2	6.7	471	67	20	2.8	100	0.5

BIPOLAR

Model	Step angle	Voltage	Current	Resistance	Inductance	Holding torque		Detent torque		Rotor inertia	
Dimension	degree/step	V/∅	A/∅	Ω/∅	mH/∅	mN·m	oz·in	mN·m	oz·in	g·cm ²	oz·in ²
KA50HM2-551	1.8	1.66	2.0	0.83	1.3	231	33	12	1.7	50	0.3
KA50HM2-552		3.20	1.0	3.20	5.1	231	33	12	1.7	50	0.3
KA50JM2-551		1.96	2.0	0.98	1.9	373	53	15	2.1	70	0.4
KA50JM2-552		3.80	1.0	3.8	7.1	373	53	15	2.1	70	0.4
KA50KM2-551		2.60	2.0	1.30	2.5	520	74	20	2.8	100	0.5
KA50KM2-552		5.10	1.0	5.10	10	520	74	20	2.8	100	0.5

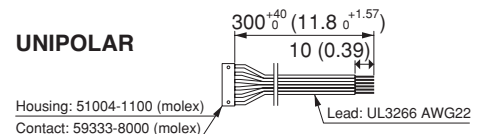
Outline unit = mm (inch)



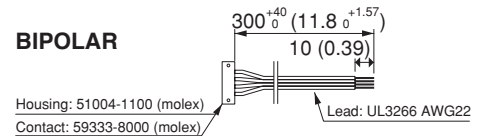
model	L[mm]	L[inch]	mass[g]	weight[lb]
KA50HM2	35	1.38	230	0.5
KA50JM2	40	1.57	300	0.7
KA50KM2	50	1.97	420	0.9

Accessories: Lead assy

UNIPOLAR



BIPOLAR

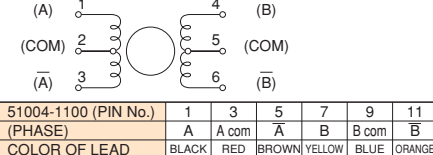


Connection Diagrams

Rotational direction

UNIPOLAR

(PHASE) 55381 PIN No. 55381 (PHASE) CW viewed from rotor shaft when using the following sequence diagram.

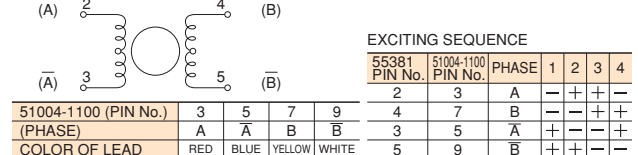


EXCITING SEQUENCE

55381 PIN No.	51004-1100 PIN No.	PHASE	1	2	3	4
1	1	A	-	-	-	-
4	7	A	-	-	-	-
3	5	B	-	-	-	-
6	11	B	-	-	-	-
2	3	A com	+	+	+	+
5	9	B com	+	+	+	+

BIPOLAR

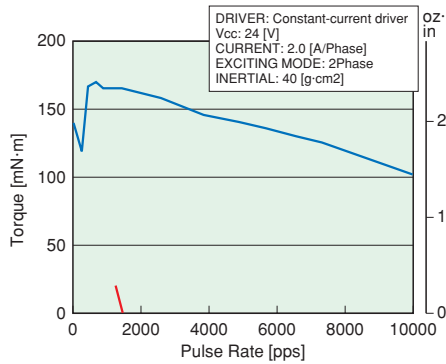
(PHASE) 55381 PIN No. 55381 (PHASE) CW viewed from rotor shaft when using the following sequence diagram.



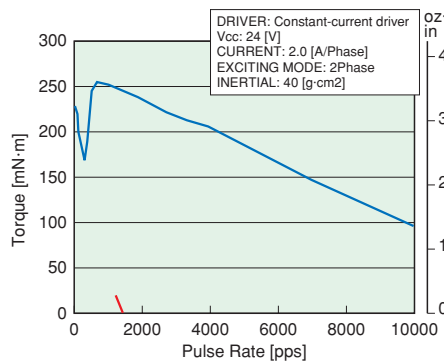
Speed-Torque Characteristics

UNIPOLAR

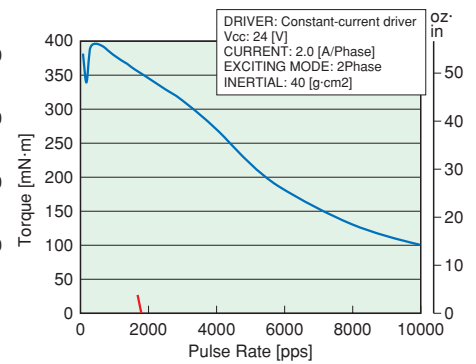
KA50HM2-501



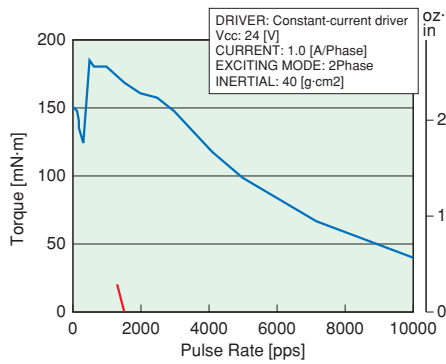
KA50JM2-501



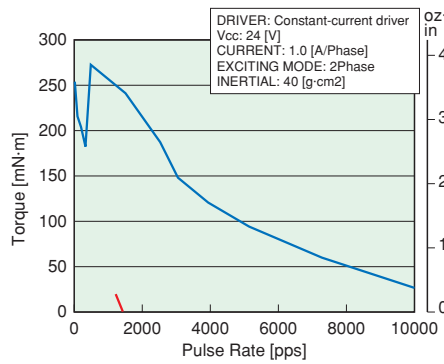
KA50KM2-501



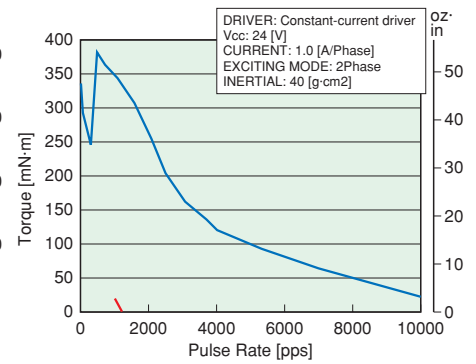
KA50HM2-502



KA50JM2-502

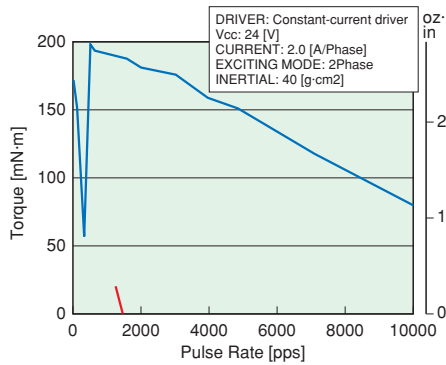


KA50KM2-502

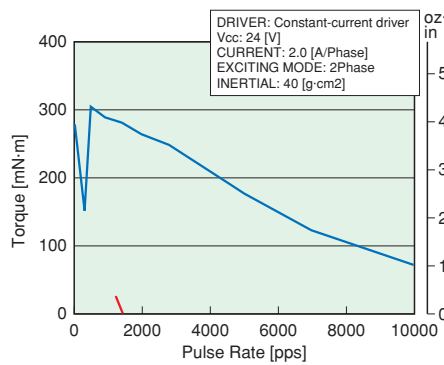


BIPOLAR

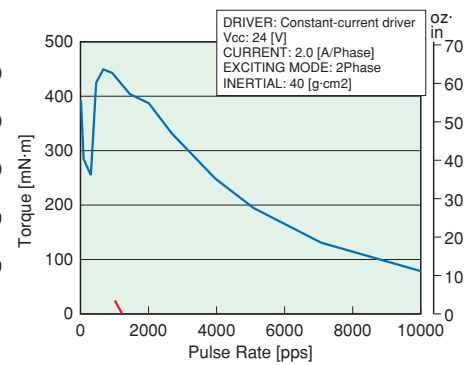
KA50HM2-551



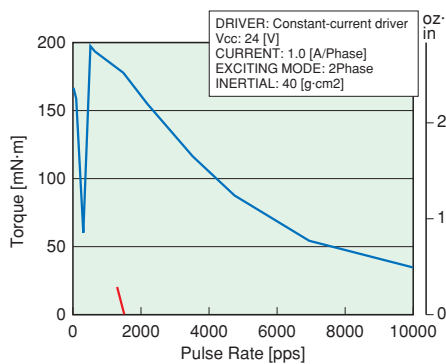
KA50JM2-551



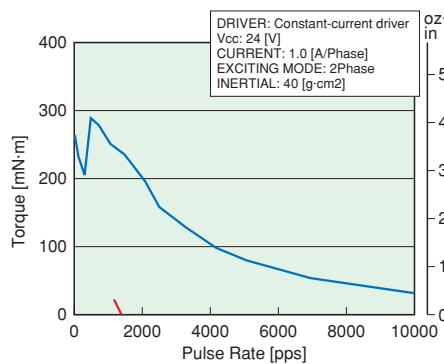
KA50KM2-551



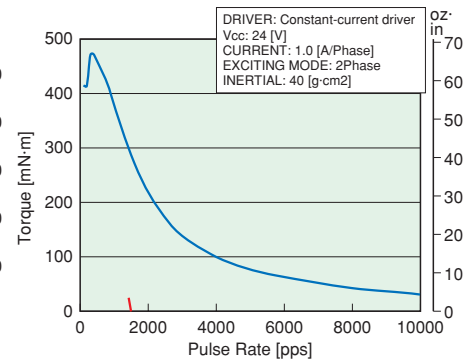
KA50HM2-552



KA50JM2-552



KA50KM2-552



KA Series Semi-Standard

Motor with D-cut Single Shaft

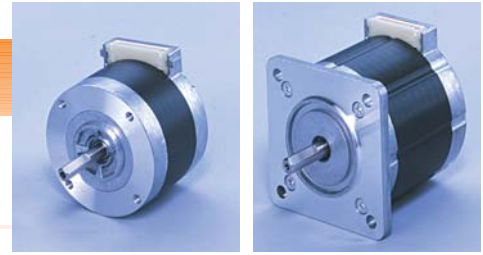
(Model example)

KA50JM2-501 ⇒ KA50JM2-50101

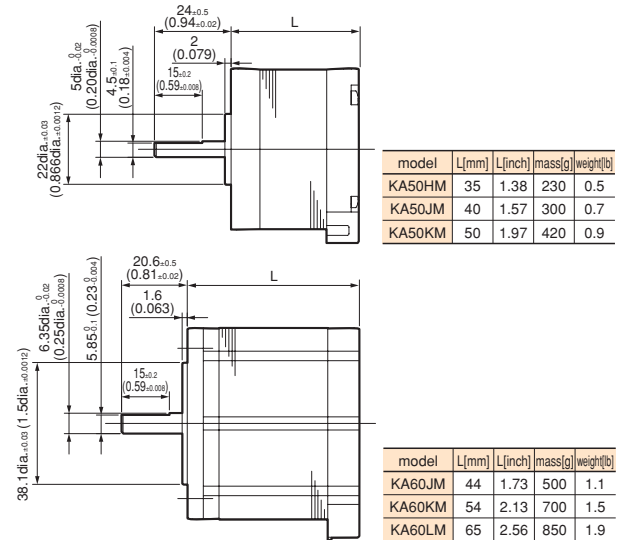
Model List

	KA50 1.8 degree/step	KA60 1.8 degree/step	KA50 0.9 degree/step
UNIPOLAR	KA50HM2-50101	KA60JM2-50101	KA50HM1-50101
	KA50HM2-50201	KA60JM2-50201	KA50HM1-50201
	KA50JM2-50101	KA60KM2-50101	KA50JM1-50101
	KA50JM2-50201	KA60KM2-50201	KA50JM1-50201
	KA50KM2-50101	KA60LM2-50101	KA50KM1-50101
BIPOLAR	KA50HM2-55101	KA60JM2-55101	KA50HM1-55101
	KA50HM2-55201	KA60JM2-55201	KA50HM1-55201
	KA50JM2-55101	KA60KM2-55101	KA50JM1-55101
	KA50JM2-55201	KA60KM2-55201	KA50JM1-55201
	KA50KM2-55101	KA60LM2-55101	KA50KM1-55101

The basic motor characteristics, connection diagrams, and accessories (lead connectors) conform to the standard specifications.



Outline unit = mm (inch) Single shaft specification



Motor with D-cut Double Shaft

(Model example)

UNIPOLAR KA50JM2-501 ⇒ KA50JM2-511

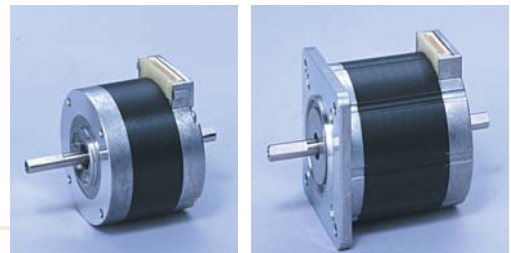
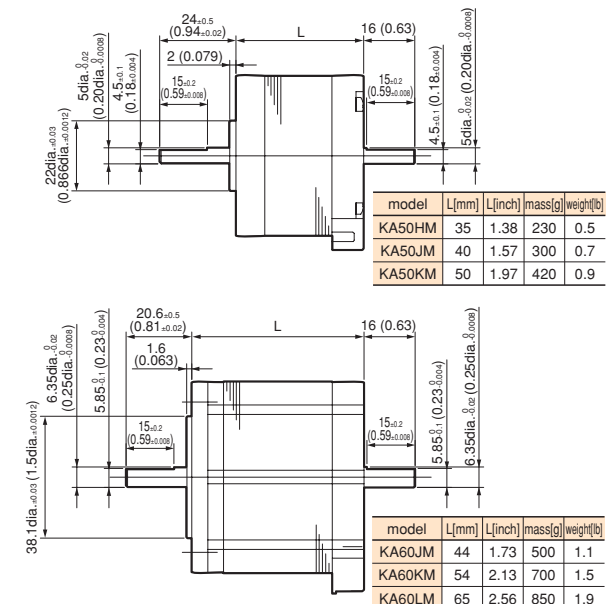
BIPOLAR KA50JM2-551 ⇒ KA50JM2-561

Model List

	KA50 1.8 degree/step	KA60 1.8 degree/step	KA50 0.9 degree/step
UNIPOLAR	KA50HM2-511	KA60JM2-511	KA50HM1-511
	KA50HM2-512	KA60JM2-512	KA50HM1-512
	KA50JM2-511	KA60KM2-511	KA50JM1-511
	KA50JM2-512	KA60KM2-512	KA50JM1-512
	KA50KM2-511	KA60LM2-511	KA50KM1-511
BIPOLAR	KA50HM2-561	KA60JM2-561	KA50HM1-561
	KA50HM2-562	KA60JM2-562	KA50HM1-562
	KA50JM2-561	KA60KM2-561	KA50JM1-561
	KA50JM2-562	KA60KM2-562	KA50JM1-562
	KA50KM2-561	KA60LM2-561	KA50KM1-561

The basic motor characteristics, connection diagrams, and accessories (lead connectors) conform to the standard specifications.

Outline unit = mm (inch) Double shaft specification

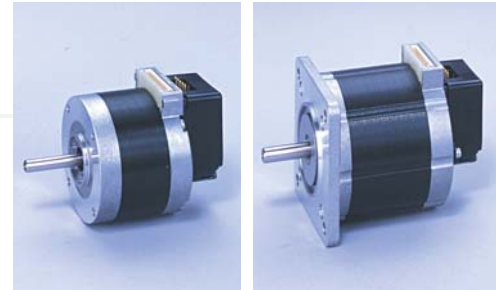


Motor with Encoder

(Model example)

KA50JM2-501 ⇒ 2 Channel KA50JM2E2-501

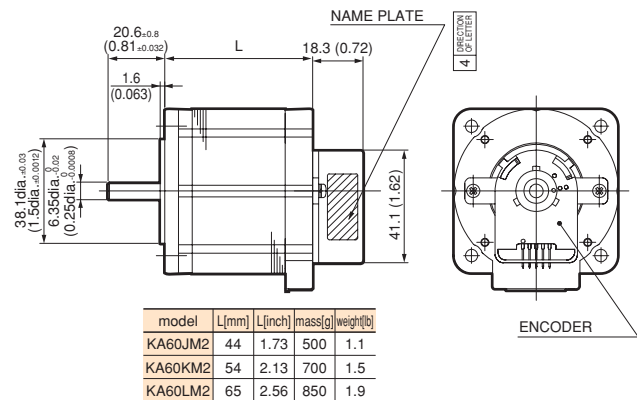
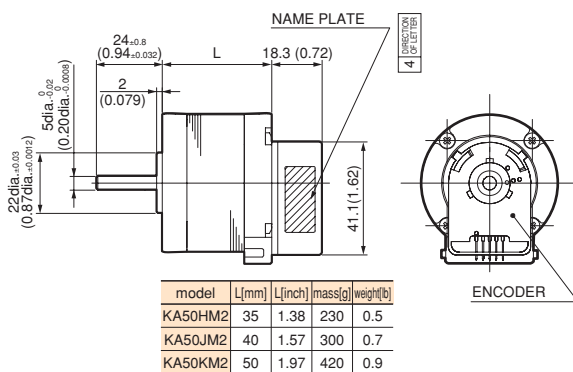
3 Channel KA50JM2E3-501



Model List

	KA50 1.8 degree/step			KA60 1.8 degree/step		
	Base motor	2 Channel	3 Channel	Base motor	2 Channel	3 Channel
UNIPOLAR	KA50HM2-501	KA50HM2E2-501	KA50HM2E3-501	KA60JM2-501	KA60JM2E2-501	KA60JM2E3-501
	KA50HM2-502	KA50HM2E2-502	KA50HM2E3-502	KA60JM2-502	KA60JM2E2-502	KA60JM2E3-502
	KA50JM2-501	KA50JM2E2-501	KA50JM2E3-501	KA60KM2-501	KA60KM2E2-501	KA60KM2E3-501
	KA50JM2-502	KA50JM2E2-502	KA50JM2E3-502	KA60KM2-502	KA60KM2E2-502	KA60KM2E3-502
	KA50KM2-501	KA50KM2E2-501	KA50KM2E3-501	KA60LM2-501	KA60LM2E2-501	KA60LM2E3-501
	KA50KM2-502	KA50KM2E2-502	KA50KM2E3-502	KA60LM2-502	KA60LM2E2-502	KA60LM2E3-502
BIPOLAR	KA50HM2-551	KA50HM2E2-551	KA50HM2E3-551	KA60JM2-551	KA60JM2E2-551	KA60JM2E3-551
	KA50HM2-552	KA50HM2E2-552	KA50HM2E3-552	KA60JM2-552	KA60JM2E2-552	KA60JM2E3-552
	KA50JM2-551	KA50JM2E2-551	KA50JM2E3-551	KA60KM2-551	KA60KM2E2-551	KA60KM2E3-551
	KA50JM2-552	KA50JM2E2-552	KA50JM2E3-552	KA60KM2-552	KA60KM2E2-552	KA60KM2E3-552
	KA50KM2-551	KA50KM2E2-551	KA50KM2E3-551	KA60LM2-551	KA60LM2E2-551	KA60LM2E3-551
	KA50KM2-552	KA50KM2E2-552	KA50KM2E3-552	KA60LM2-552	KA60LM2E2-552	KA60LM2E3-552

Outline unit = mm (inch)



Encoder specification

	KA50, KA60
Resolution [P/R]	400
Power-supply voltage	DC 5V ±0.5 V
Output aspect	2 Channel (A, B aspect) or 3 Channel (A, B, I aspect)
Output wave form	TTL

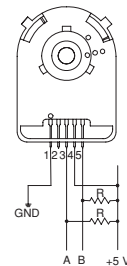
Recommended pull-up resistor value

	2 Channel	3 Channel
R [Ω]	11 k	2.7 k

The basic motor characteristics, connection diagrams, and accessories (lead connectors) conform to the standard specifications.

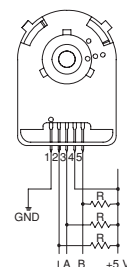
Connection diagrams

2 Channel



PIN No.	1	2	3	4	5
Connection	GND	—	A aspect	+5 V	B aspect

3 Channel



PIN No.	1	2	3	4	5
Connection	GND	I aspect	A aspect	+5 V	B aspect

Features

1. High torque
2. Low vibration
3. Silent operation
4. High position accuracy

The best magnetic balance is employed in our round type stepping motor. Motor performance is greatly improved using the latest technology of three dimensional magnetic field analysis and robust design.

Features (Compare to our current 42 & 56 square size motors)

Both high torque and low vibration performance were achieved.

- The round core provides the best magnetic balance. High torque performance is also achieved by optimizing the design with three dimensional magnetic field analysis. More than 30% higher holding torque was achieved and pull-out torque was also improved. (Refer to Fig. 1 and 2)

Fig. 1

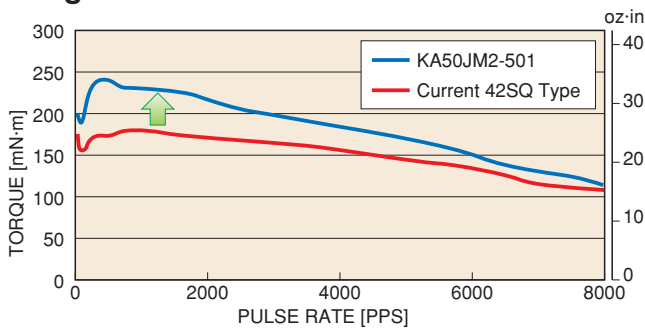
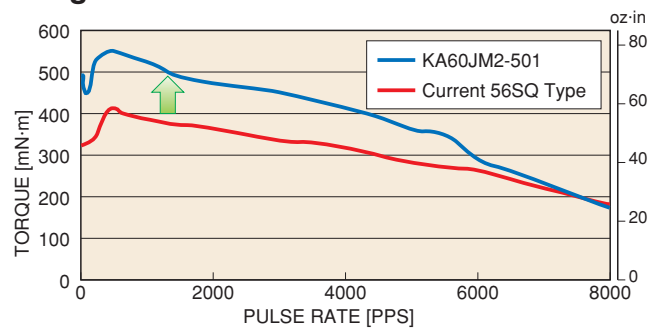
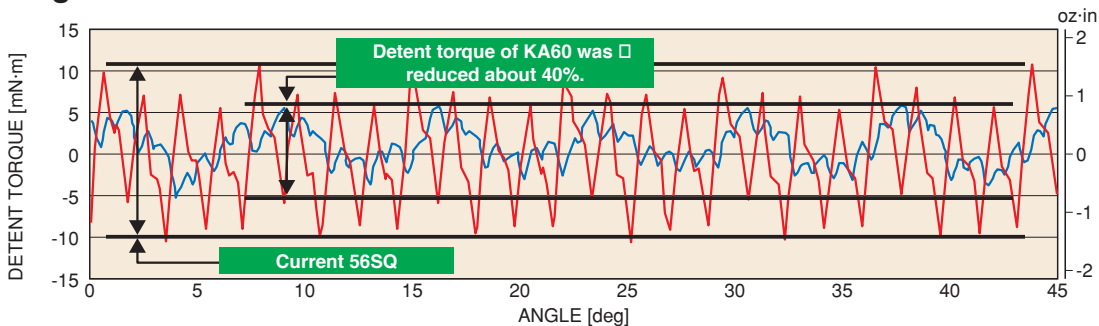


Fig. 2



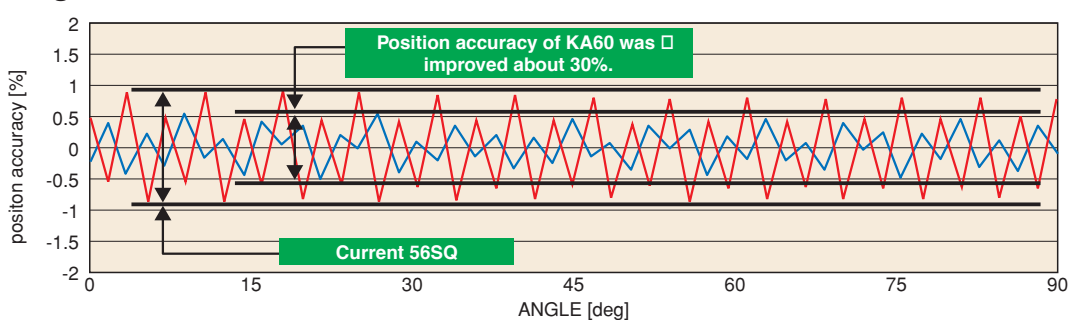
- Low vibration and low rotational fluctuation were realized by reducing the detent torque using three dimensional magnetic field analysis. Rotational fluctuation was reduced about 30%.

Fig. 3



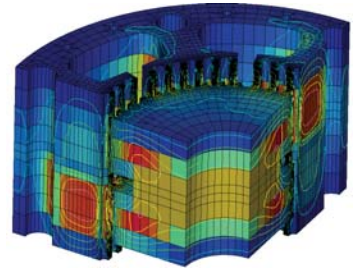
- Position accuracy was improved by minimizing the deviation of induced voltage. Position accuracy was improved about 30%. (Refer to Fig.4)

Fig. 4



- Shaft size and mounting dimension compatibility between the 42sq. & KA50 and the 56sq. & KA60.
- Space Saving: High torque performance with shorter motor.
- All models are RoHS compliant.

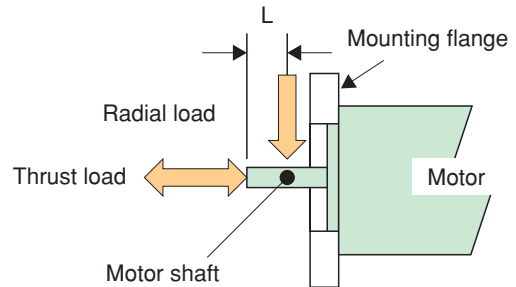
- * Three dimensional magnetic field analysis: The magnetic strength is shown three dimensionally and the highest efficiency core shape is determined.
- * Robust design: A design method that is not influenced by the variation in parts to eliminate product performance variation.



Max. Allowable Load / Runout for Motor Shaft

Load for Motor Shaft

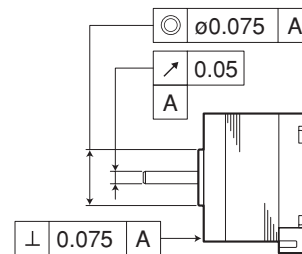
Type	Thrust load	Radial load	
		Load	L
KA50	14.7 N [1.5 kgf] [3.3 lb]	19.6 N [2.0 kgf] [4.4 lb]	10 mm
KA60	40 N [4.1 kgf] [9.0 lb]	70 N [7.1 kgf] [15.8 lb]	



Shaft Run Out

Shaft run out	0.05 T.I.R. [mm]*
Concentricity between shaft and mounting circle	0.075 T.I.R. [mm]*
Perpendicularity between shaft and mounting face	0.075 T.I.R. [mm]*

* T.I.R. (Total Indicator Reading)



Specification

Temperature rise	70 K max (By resistance method)
Insulation class	Class E equivalent
Insulation resistance	100 M Ω min. At 500 V DC (at normal temp. & humidity, between lead and case)
Dielectric strength	500 V AC 50 Hz for 1 minute (at normal temp. & humidity, between lead and case)
Ambient temp. range	-10 °C ~ +50 °C
Storage temperature range	-20 °C ~ +70 °C
Humidity range in operation and storage	5 % ~ 95 % RH (noncondensing)

KA60 Series (1.8 degree/step)

Standard Specifications



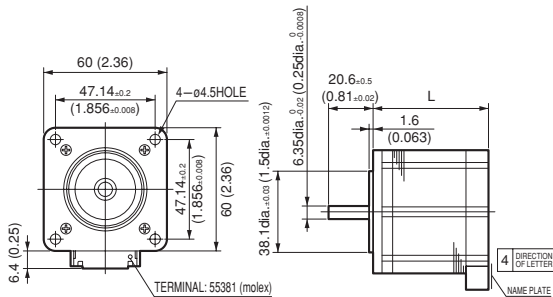
UNIPOLAR

Model	Step angle	Voltage	Current	Resistance	Inductance	Holding torque		Detent torque		Rotor inertia	
Dimension	degree/step	V/∅	A/∅	Ω/∅	mH/∅	mN·m	oz-in	mN·m	oz-in	g·cm ²	oz-in ²
KA60JM2-501	1.8	2.44	3.3	0.74	0.83	707	100	35	5.0	180	1.0
KA60JM2-502		3.41	2.2	1.55	1.8	707	100	35	5.0	180	1.0
KA60KM2-501		2.97	3.3	0.9	1.4	1011	143	50	7.1	270	1.5
KA60KM2-502		4.40	2.2	2.0	3.0	1011	143	50	7.1	270	1.5
KA60LM2-501		3.63	3.3	1.10	1.6	1315	186	60	8.5	360	2.0
KA60LM2-502		5.28	2.2	2.4	3.4	1315	186	60	8.5	360	2.0

BIPOLAR

Model	Step angle	Voltage	Current	Resistance	Inductance	Holding torque		Detent torque		Rotor inertia	
Dimension	degree/step	V/∅	A/∅	Ω/∅	mH/∅	mN·m	oz-in	mN·m	oz-in	g·cm ²	oz-in ²
KA60JM2-551	1.8	2.05	3.3	0.62	1.2	805	114	35	5.0	180	1.0
KA60JM2-552		2.42	2.2	1.10	2.6	805	114	35	5.0	180	1.0
KA60KM2-551		2.41	3.3	0.73	2.1	1207	171	50	7.1	270	1.5
KA60KM2-552		3.01	2.2	1.37	4.5	1207	171	50	7.1	270	1.5
KA60LM2-551		2.97	3.3	0.90	2.2	1600	227	60	8.5	360	2.0
KA60LM2-552		3.74	2.2	1.7	4.9	1600	227	60	8.5	360	2.0

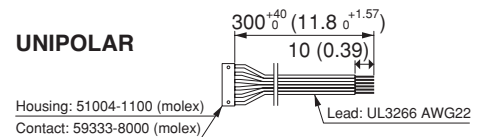
Outline unit = mm (inch)



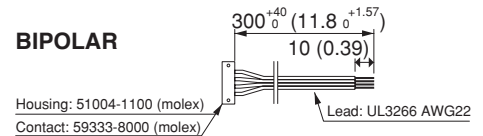
model	L[mm]	L[inch]	mass[g]	weight[lb]
KA60JM2	44	1.73	500	1.1
KA60KM2	54	2.13	700	1.5
KA60LM2	65	2.56	850	1.9

Accessories: Lead assy

UNIPOLAR



BIPOLAR

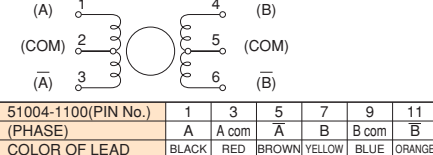


Connection Diagrams

Rotational direction

UNIPOLAR

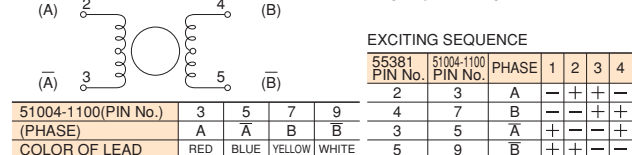
(PHASE) 55381 PIN No. 55381 (PHASE) CW viewed from rotor shaft when using the following sequence diagram.



EXCITING SEQUENCE		PHASE	1	2	3	4
55381 PIN No.	51004-1100 PIN No.	A	-	-	-	-
4	7	B	-	-	-	-
3	5	A	-	-	-	-
6	11	B	-	-	-	-
2	3	A com	+	+	+	+
5	9	B com	+	+	+	+

BIPOLAR

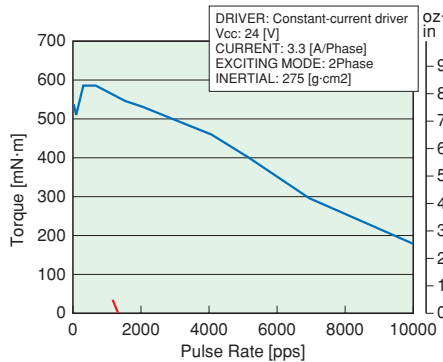
(PHASE) 55381 PIN No. 55381 (PHASE) CW viewed from rotor shaft when using the following sequence diagram.



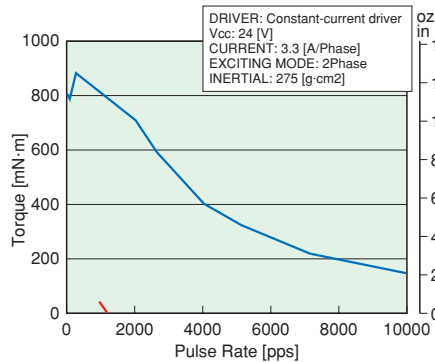
Speed-Torque Characteristics

UNIPOLAR

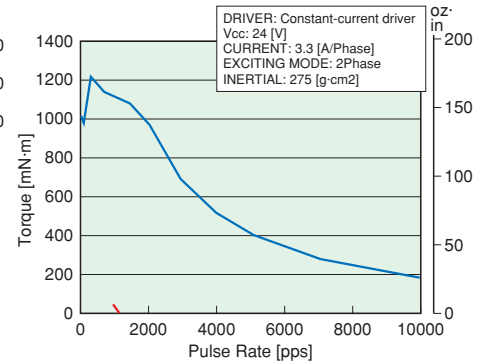
KA60JM2-501



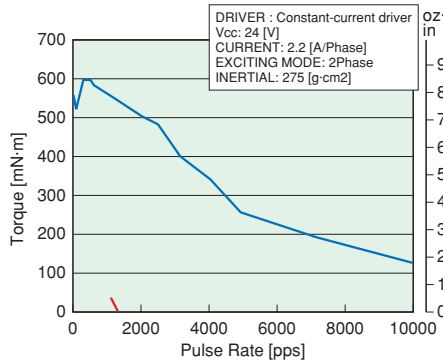
KA60KM2-501



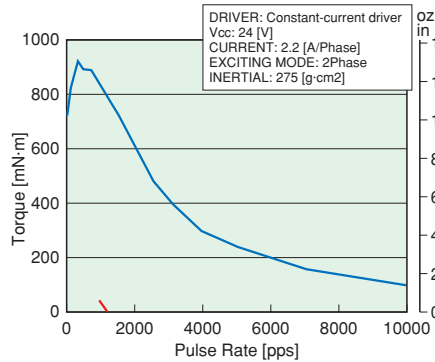
KA60LM2-501



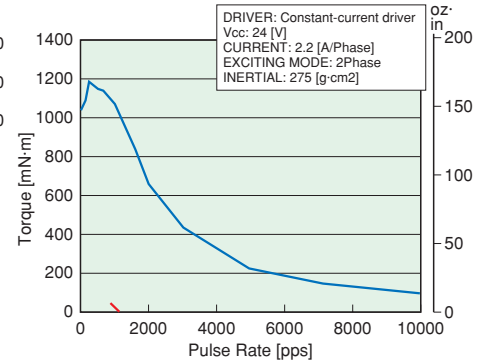
KA60JM2-502



KA60KM2-502

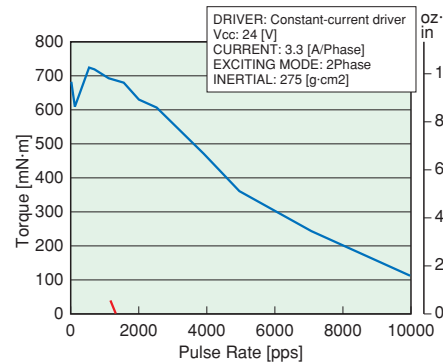


KA60LM2-502

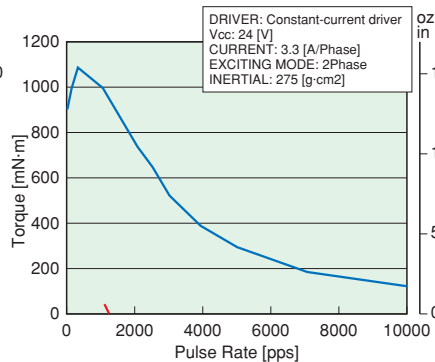


BIPOLAR

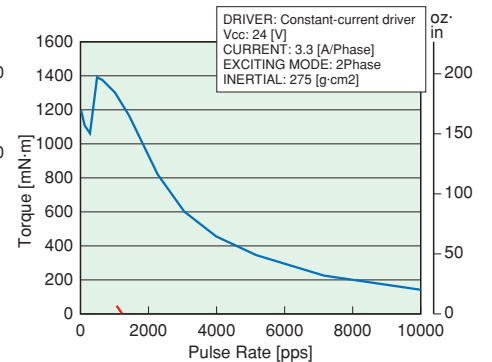
KA60JM2-551



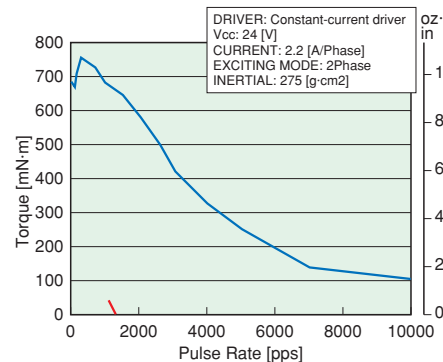
KA60KM2-551



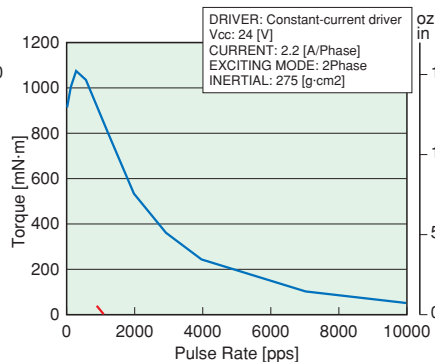
KA60LM2-551



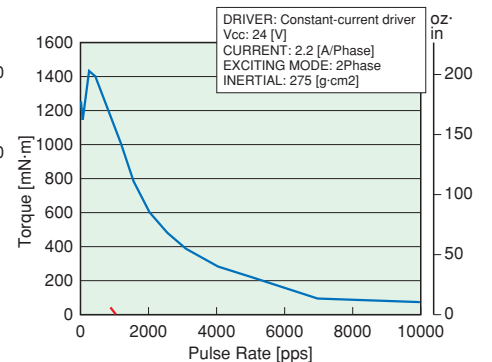
KA60JM2-552



KA60KM2-552



KA60LM2-552



KA Series Semi-Standard

Motor with D-cut Single Shaft

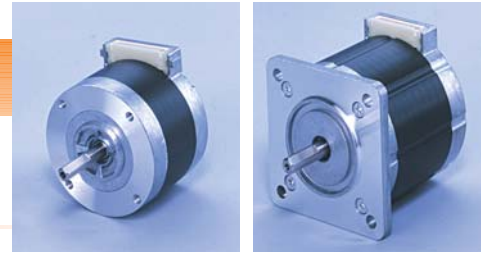
(Model example)

KA50JM2-501 ⇒ KA50JM2-50101

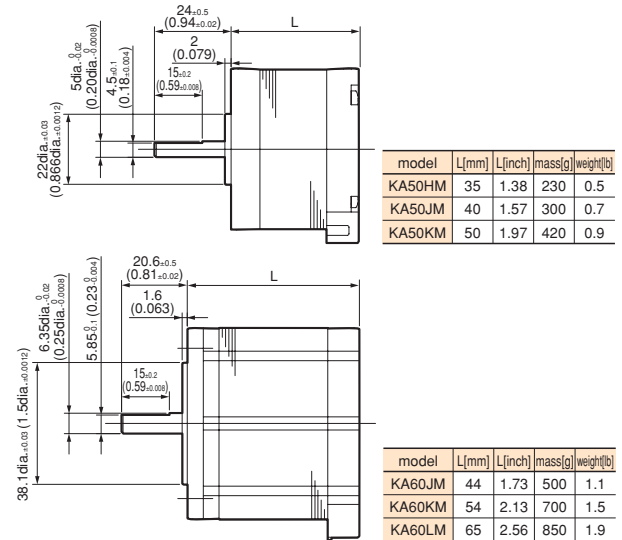
Model List

	KA50 1.8 degree/step	KA60 1.8 degree/step	KA50 0.9 degree/step
UNIPOLAR	KA50HM2-50101	KA60JM2-50101	KA50HM1-50101
	KA50HM2-50201	KA60JM2-50201	KA50HM1-50201
	KA50JM2-50101	KA60KM2-50101	KA50JM1-50101
	KA50JM2-50201	KA60KM2-50201	KA50JM1-50201
	KA50KM2-50101	KA60LM2-50101	KA50KM1-50101
BIPOLAR	KA50HM2-55101	KA60JM2-55101	KA50HM1-55101
	KA50HM2-55201	KA60JM2-55201	KA50HM1-55201
	KA50JM2-55101	KA60KM2-55101	KA50JM1-55101
	KA50JM2-55201	KA60KM2-55201	KA50JM1-55201
	KA50KM2-55101	KA60LM2-55101	KA50KM1-55101

The basic motor characteristics, connection diagrams, and accessories (lead connectors) conform to the standard specifications.



Outline unit = mm (inch) Single shaft specification



Motor with D-cut Double Shaft

(Model example)

UNIPOLAR KA50JM2-501 ⇒ KA50JM2-511

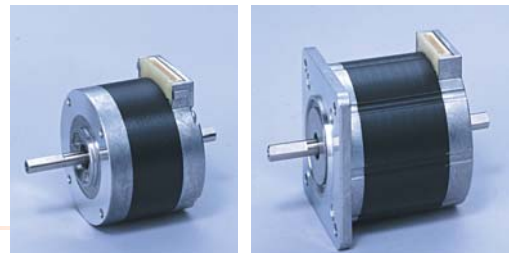
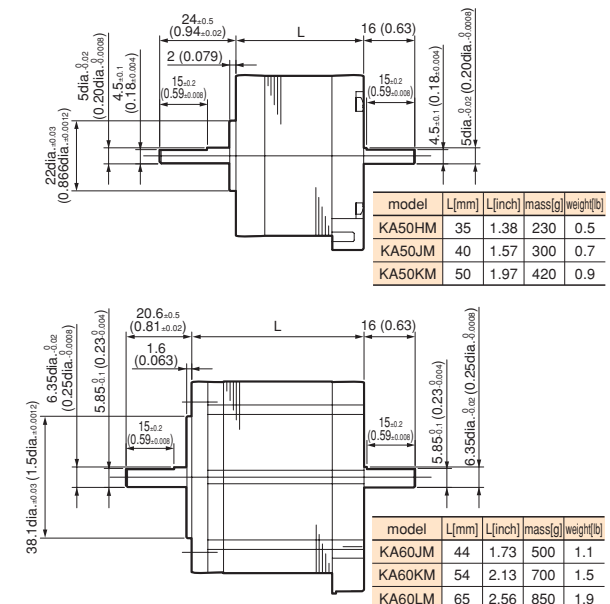
BIPOLAR KA50JM2-551 ⇒ KA50JM2-561

Model List

	KA50 1.8 degree/step	KA60 1.8 degree/step	KA50 0.9 degree/step
UNIPOLAR	KA50HM2-511	KA60JM2-511	KA50HM1-511
	KA50HM2-512	KA60JM2-512	KA50HM1-512
	KA50JM2-511	KA60KM2-511	KA50JM1-511
	KA50JM2-512	KA60KM2-512	KA50JM1-512
	KA50KM2-511	KA60LM2-511	KA50KM1-511
BIPOLAR	KA50HM2-561	KA60JM2-561	KA50HM1-561
	KA50HM2-562	KA60JM2-562	KA50HM1-562
	KA50JM2-561	KA60KM2-561	KA50JM1-561
	KA50JM2-562	KA60KM2-562	KA50JM1-562
	KA50KM2-561	KA60LM2-561	KA50KM1-561

The basic motor characteristics, connection diagrams, and accessories (lead connectors) conform to the standard specifications.

Outline unit = mm (inch) Double shaft specification

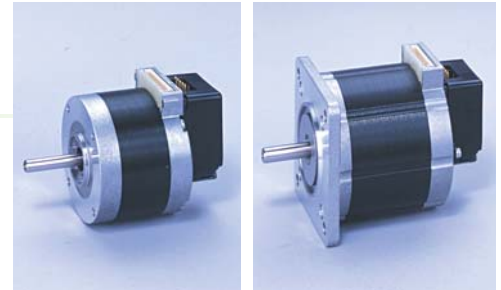


Motor with Encoder

(Model example)

KA50JM2-501 ⇒ 2 Channel KA50JM2E2-501

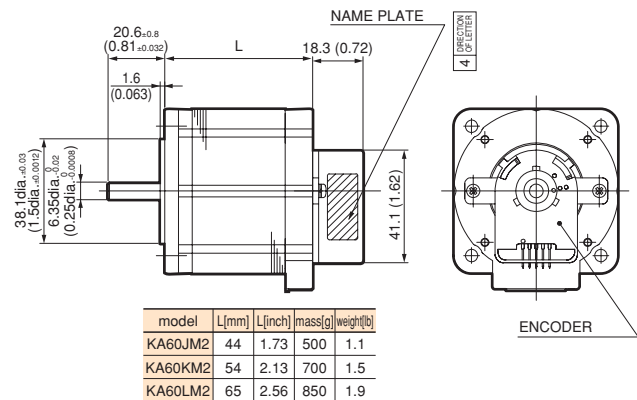
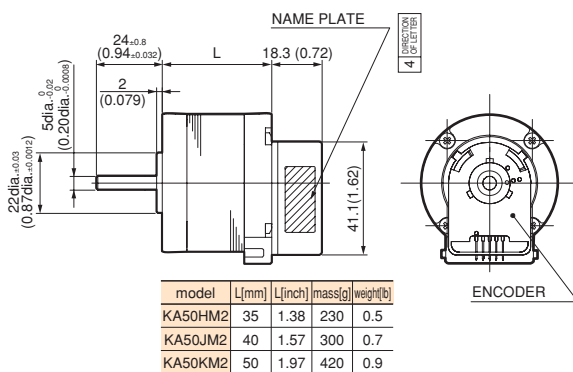
3 Channel KA50JM2E3-501



Model List

	KA50 1.8 degree/step			KA60 1.8 degree/step		
	Base motor	2 Channel	3 Channel	Base motor	2 Channel	3 Channel
UNIPOLAR	KA50HM2-501	KA50HM2E2-501	KA50HM2E3-501	KA60JM2-501	KA60JM2E2-501	KA60JM2E3-501
	KA50HM2-502	KA50HM2E2-502	KA50HM2E3-502	KA60JM2-502	KA60JM2E2-502	KA60JM2E3-502
	KA50JM2-501	KA50JM2E2-501	KA50JM2E3-501	KA60KM2-501	KA60KM2E2-501	KA60KM2E3-501
	KA50JM2-502	KA50JM2E2-502	KA50JM2E3-502	KA60KM2-502	KA60KM2E2-502	KA60KM2E3-502
	KA50KM2-501	KA50KM2E2-501	KA50KM2E3-501	KA60LM2-501	KA60LM2E2-501	KA60LM2E3-501
	KA50KM2-502	KA50KM2E2-502	KA50KM2E3-502	KA60LM2-502	KA60LM2E2-502	KA60LM2E3-502
BIPOLAR	KA50HM2-551	KA50HM2E2-551	KA50HM2E3-551	KA60JM2-551	KA60JM2E2-551	KA60JM2E3-551
	KA50HM2-552	KA50HM2E2-552	KA50HM2E3-552	KA60JM2-552	KA60JM2E2-552	KA60JM2E3-552
	KA50JM2-551	KA50JM2E2-551	KA50JM2E3-551	KA60KM2-551	KA60KM2E2-551	KA60KM2E3-551
	KA50JM2-552	KA50JM2E2-552	KA50JM2E3-552	KA60KM2-552	KA60KM2E2-552	KA60KM2E3-552
	KA50KM2-551	KA50KM2E2-551	KA50KM2E3-551	KA60LM2-551	KA60LM2E2-551	KA60LM2E3-551
	KA50KM2-552	KA50KM2E2-552	KA50KM2E3-552	KA60LM2-552	KA60LM2E2-552	KA60LM2E3-552

Outline unit = mm (inch)



Encoder specification

	KA50, KA60
Resolution [P/R]	400
Power-supply voltage	DC 5V ±0.5 V
Output aspect	2 Channel (A, B aspect) or 3 Channel (A, B, I aspect)
Output wave form	TTL

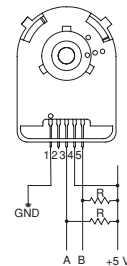
Recommended pull-up resistor value

R [Ω]	2 Channel	3 Channel
	11 k	2.7 k

The basic motor characteristics, connection diagrams, and accessories (lead connectors) conform to the standard specifications.

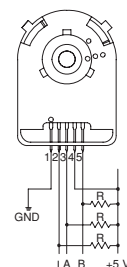
Connection diagrams

2 Channel



PIN No.	1	2	3	4	5
Connection	GND	—	A aspect	+5 V	B aspect

3 Channel



PIN No.	1	2	3	4	5
Connection	GND	I aspect	A aspect	+5 V	B aspect

2-Phase Hybrid Stepping Motor

1.8°

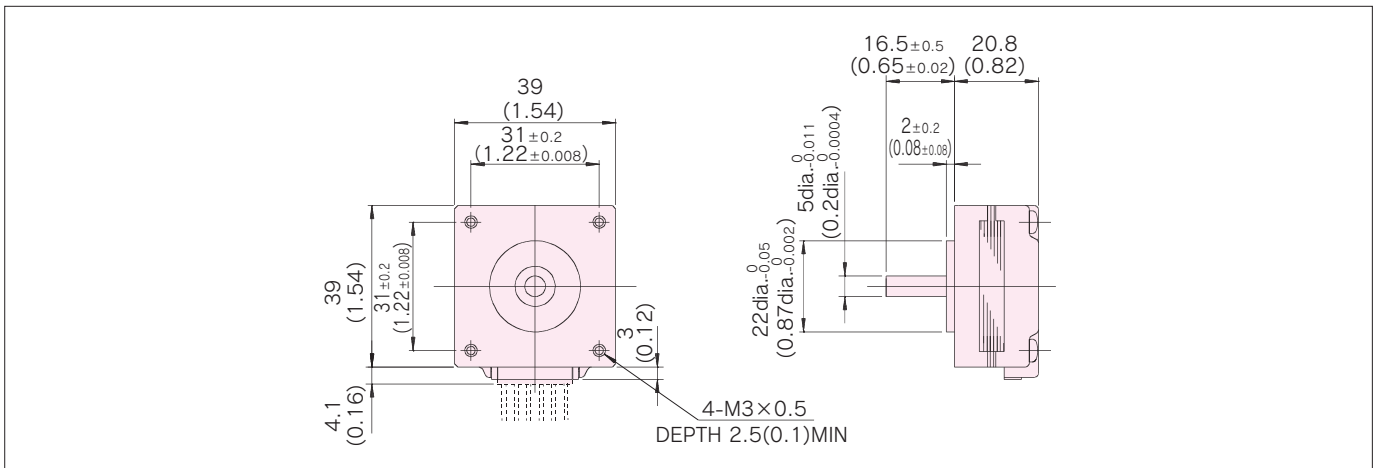
KH39 series

HIGH TORQUE, LOW VIBRATION AND LOW NOISE

STANDARD SPECIFICATIONS

MODEL	UNIT	KH39EM2	
		-801	-851
SHAFT	————	SINGLE	
DRIVE METHOD	————	UNI-POLAR	BI-POLAR
NUMBER OF PHASES	————	2	2
STEP ANGLE	deg./step	1.8	1.8
VOLTAGE	V	5.6	3.6
CURRENT	A/PHASE	0.4	0.6
RESISTANCE	Ω/PHASE	14.0	6.0
INDUCTANCE	mH/PHASE	6.4	5.5
HOLDING TORQUE	mN·m	59	78
	oz·in	8.3	11
DETENT TORQUE	mN·m	7.8	7.8
	oz·in	1.1	1.1
ROTOR INERTIA	g·cm ²	14	14
	oz·in ²	0.08	0.08
WEIGHT	g	110	110
	lb	0.24	0.24
INSULATION CLASS	————	E EQUIVALENT (120°C 248° F) (UL VALUE : CLASS B-130°C)	
INSULATION RESISTANCE	————	500VDC 100MΩmin.	
DIELECTRIC STRENGTH	————	500VAC 50HZ 1min.	
OPERATING TEMP.RANGE	°C	0 to 50	
ALLOWABLE TEMP.RISE	K	70	

DIMENSIONS unit = mm (inch)

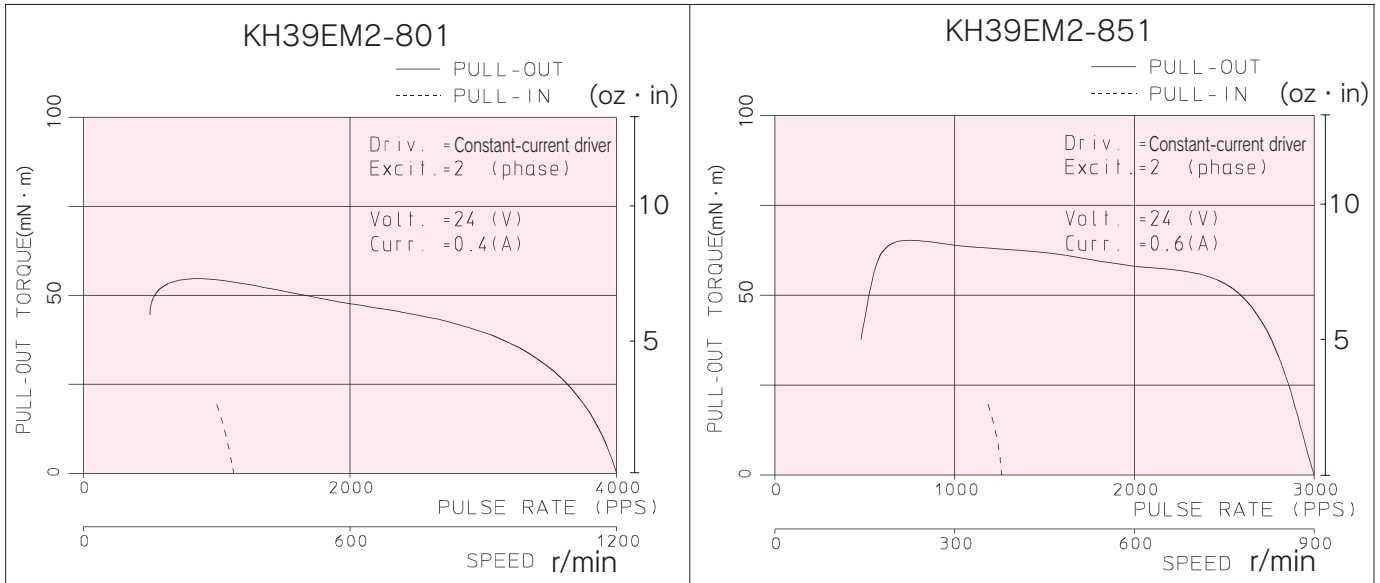




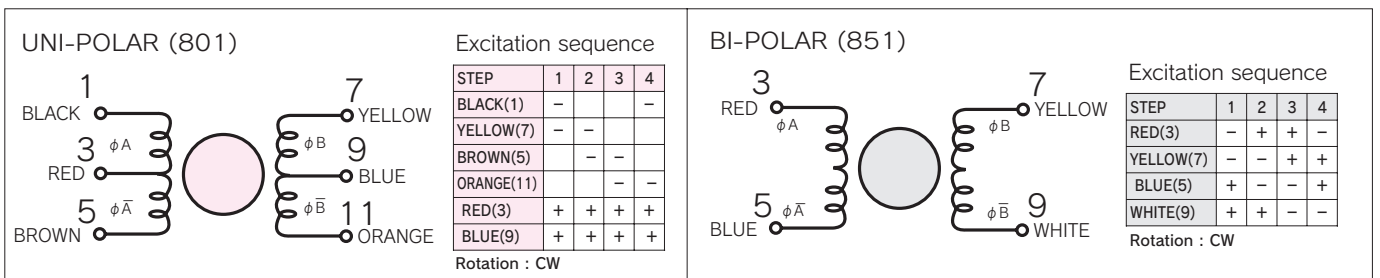
Features

1. High torque
Output is 1.3 times as high as conventional products.
2. Low noise -7dB(A) quieter than conventional products.

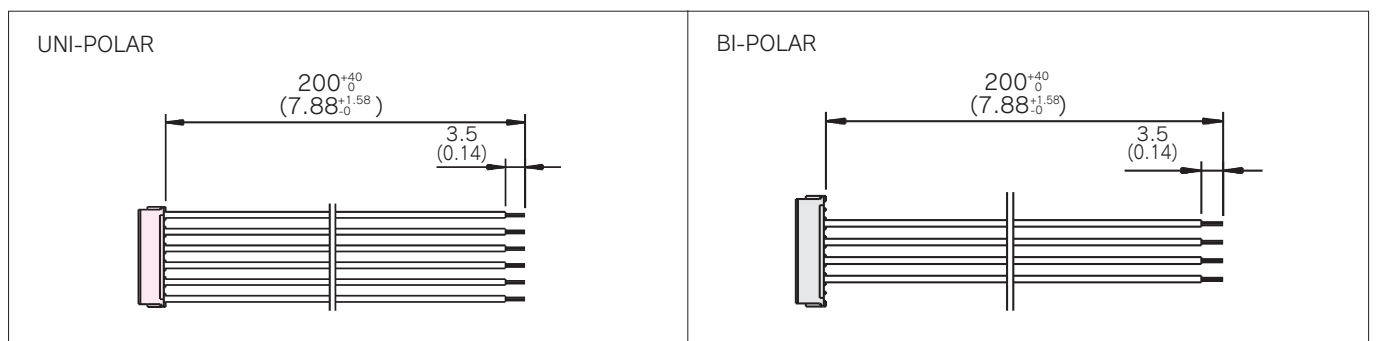
■ TORQUE CHARACTERISTICS VS PULSE RATE



■ CONNECTION DIAGRAMS



■ CONNECTION CABLE TO MOTOR unit=mm (inch)



2-Phase Hybrid Stepping Motor

1.8°

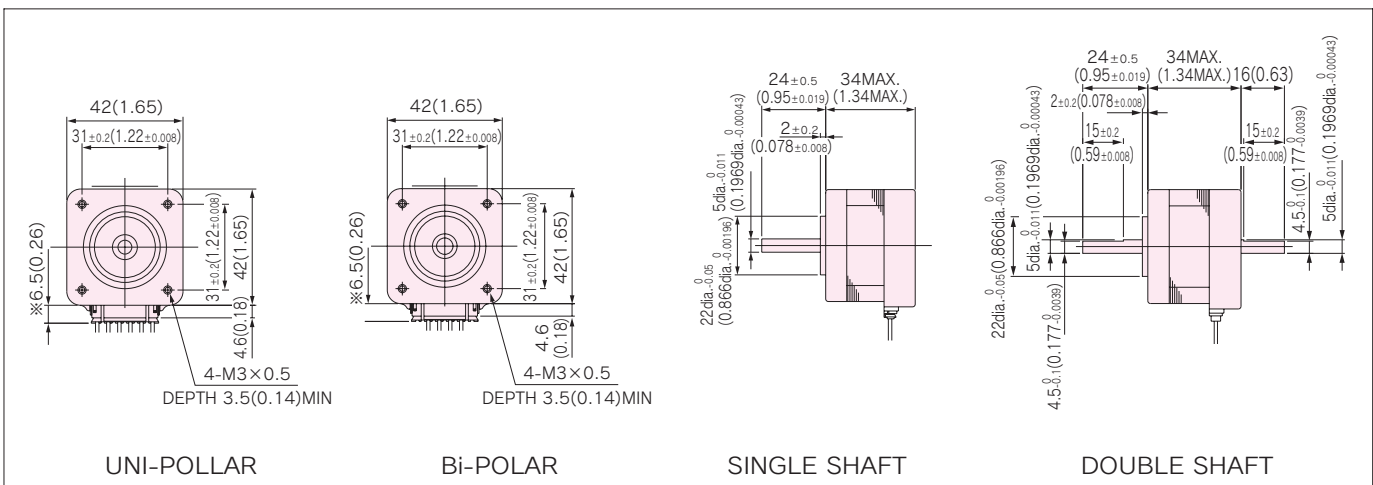
KH42 series

HIGH TORQUE, LOW VIBRATION AND LOW NOISE

STANDARD SPECIFICATIONS

MODEL	KH42HM2				
	SINGLE SHAFT	-901	-902	-903	-951
	DOUBLE SHAFT	-911	-912	-913	-961
DRIVE METHOD	————	UNI-POLAR			BI-POLAR
NUMBER OF PHASES	————	2			2
STEP ANGLE	deg./step	1.8			1.8
VOLTAGE	V	3.06	5.57	6.76	3.10
CURRENT	A/PHASE	0.9	0.58	0.46	1.0
WINDING RESISTANCE	Ω/PHASE	3.4	9.6	14.7	3.1
INDUCTANCE	mH/PHASE	2.4	6.0	9.3	4.3
HOLDING TORQUE	mN · m	140	140	140	197
	oz · in	20	20	20	20
DETENT TORQUE	mN · m	11.8	11.8	11.8	11.8
	oz · in	1.7	1.7	1.7	2.1
ROTOR INERTIA	g · cm ²	38	38	38	38
	oz · in ²	0.21	0.21	0.21	0.21
WEIGHTS	g	200	200	200	200
	lb	0.44	0.44	0.44	0.57
INSULATION CLASS	————	JIS Class E (120°C 248° F) (UL VALUE : CLASS B-130°C 266° F)			
INSULATION RESISTANCE	————	500VDC 100MΩmin.			
DIELECTRIC STRENGTH	————	500VAC 50HZ 1 min.			
OPERATING TEMP. RANGE	°C	0 to 50			
ALLOWABLE TEMP.RISE	K	70			

DIMENSIONS unit = mm (inch)





Features

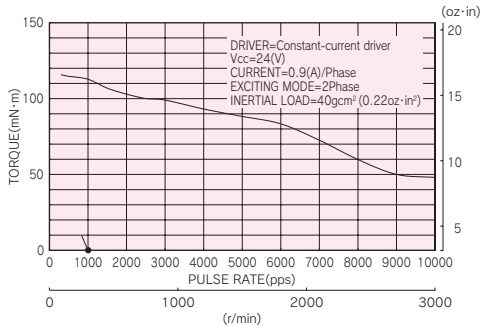
- Improved Dynamic Torque
(1.2 times torque of our previous model is generated at 300 r/min, on model : KH42JM2-901)
- Lowered Vibration & Noise Level
(by increased stiffness of body construction)
- Improved Efficiency
(1.1 times of our previous model, by high grade materials.)

■ TORQUE CHARACTERISTICS vs. PULSE RATE

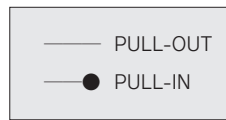
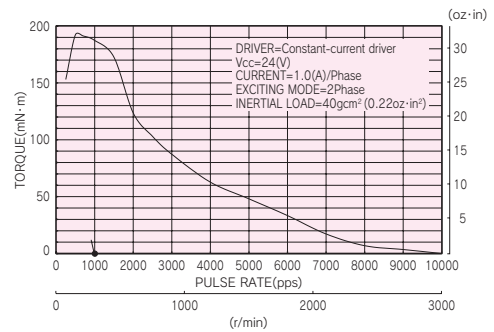
UNI-POLAR

BI-POLAR

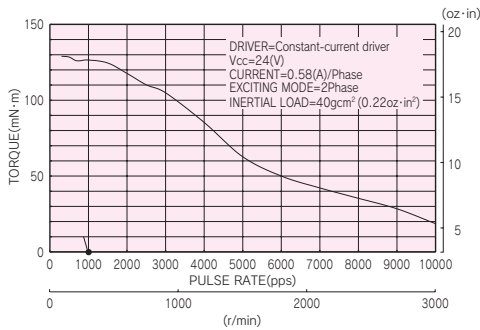
KH42HM2-901, 911



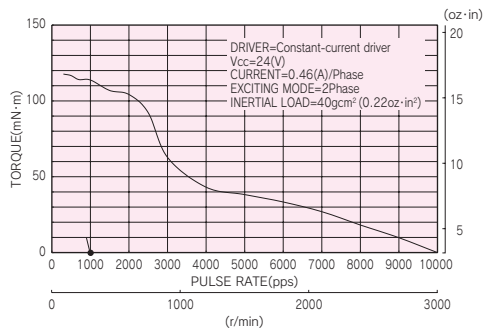
KH42HM2-951, 961



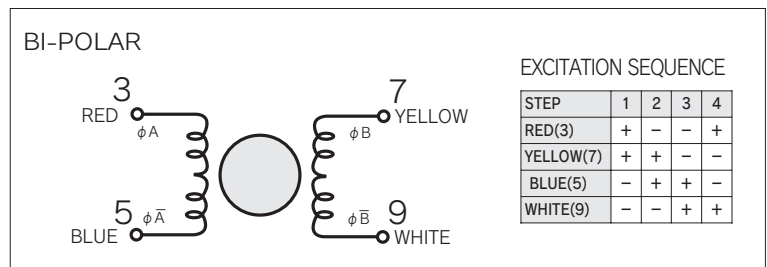
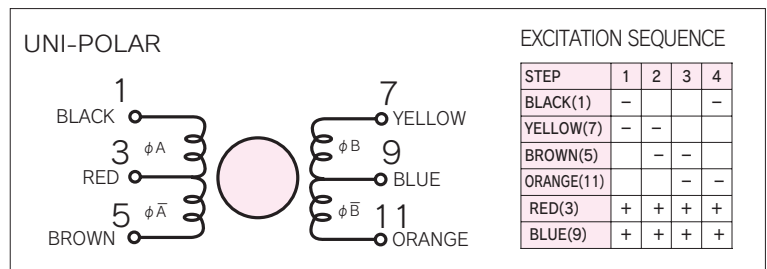
KH42HM2-902, 912



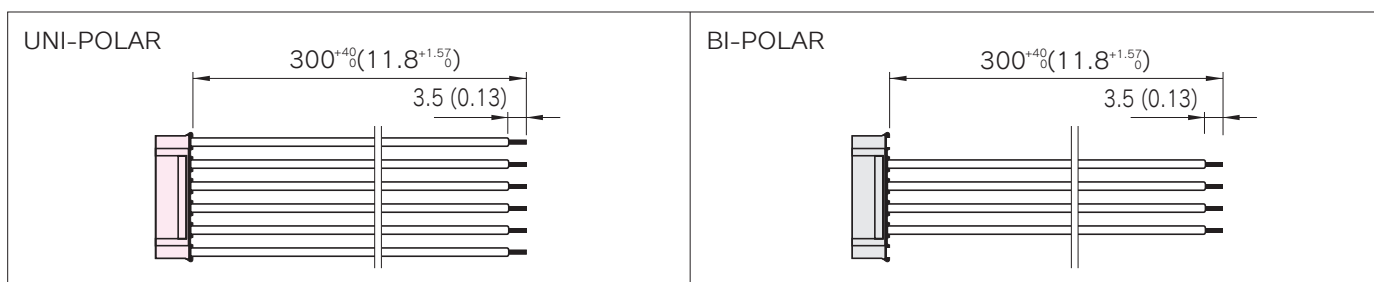
KH42HM2-903, 913



■ CONNECTION DIAGRAMS



■ CONNECTION CABLE TO MOTOR unit = mm (inch)



2-Phase Hybrid Stepping Motor

1.8°

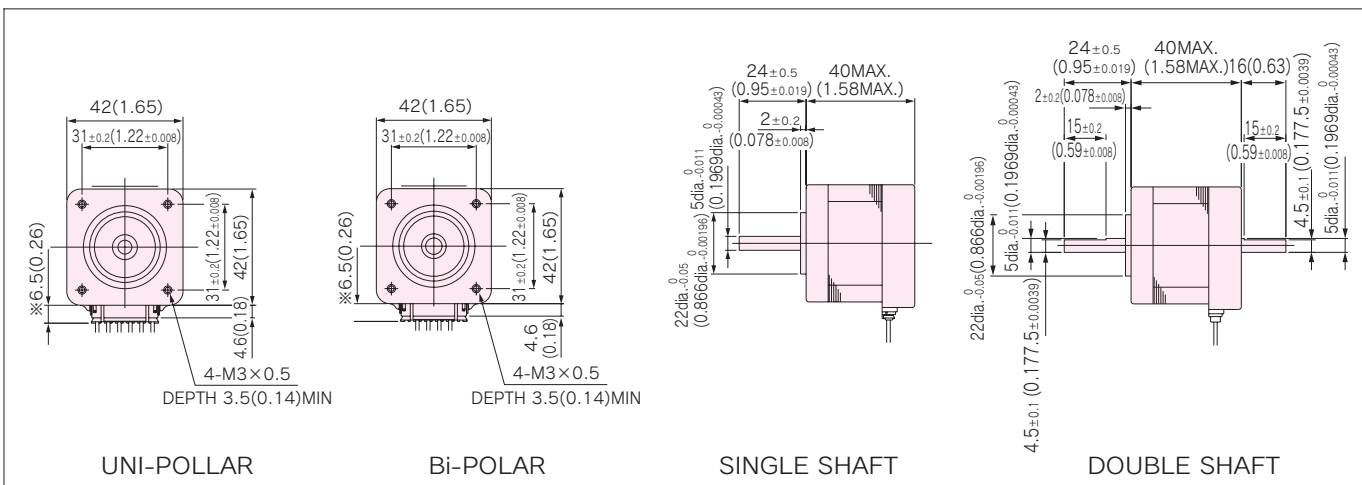
KH42 series

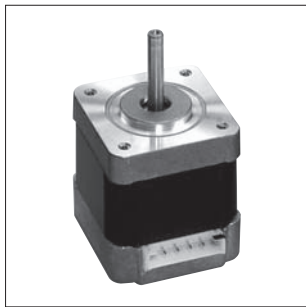
HIGH TORQUE, LOW VIBRATION AND LOW NOISE

STANDARD SPECIFICATIONS

MODEL	KH42JM2				
	SINGLE SHAFT	-901	-902	-903	-951
	DOUBLE SHAFT	-911	-912	-913	-961
DRIVE METHOD	————	UNI-POLAR			BI-POLAR
NUMBER OF PHASES	————	2			2
STEP ANGLE	deg./step	1.8			1.8
VOLTAGE	V	3.42	4.4	9.25	4.59
CURRENT	A/PHASE	1.2	0.88	0.5	0.85
WINDING RESISTANCE	Ω/PHASE	2.85	5.5	18.5	5.4
INDUCTANCE	mH/PHASE	2.5	5.1	16.3	9.3
HOLDING TORQUE	mN · m	236	236	236	314
	oz · in	33	33	33	44
DETENT TORQUE	mN · m	14.7	14.7	14.7	14.7
	oz · in	2.1	2.1	2.1	2.1
ROTOR INERTIA	g · cm ²	56	56	56	56
	oz · in ²	0.3	0.3	0.3	0.3
WEIGHTS	g	260	260	260	260
	lb	0.57	0.57	0.57	0.57
INSULATION CLASS	————	JIS Class E (120°C 248° F) (UL VALUE : CLASS B-130°C 266° F)			
INSULATION RESISTANCE	————	500VDC 100MΩmin.			
DIELECTRIC STRENGTH	————	500VAC 50HZ 1min.			
OPERATING TEMP. RANGE	°C	0 to 50			
ALLOWABLE TEMP. RISE	K	70			

DIMENSIONS unit = mm (inch)





Features

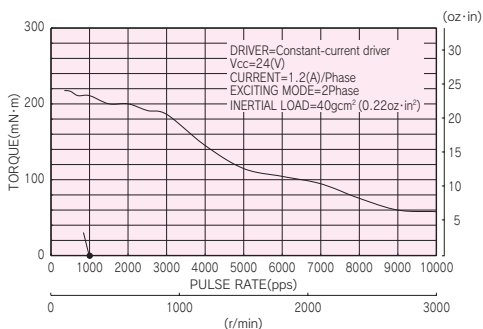
- Improved Dynamic Torque
(1.2 times torque of our previous model is generated at 300 r/min, on model : KH42JM2-901)
- Lowered Vibration & Noise Level
(by increased stiffness of body construction)
- Improved Efficiency
(1.1 times of our previous model, by high grade materials.)

■ TORQUE CHARACTERISTICS vs. PULSE RATE

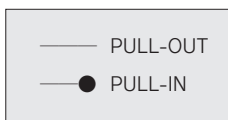
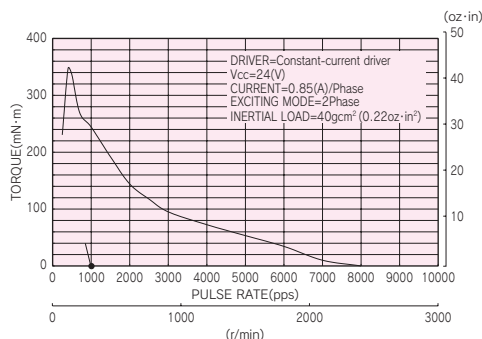
UNI-POLAR

BI-POLAR

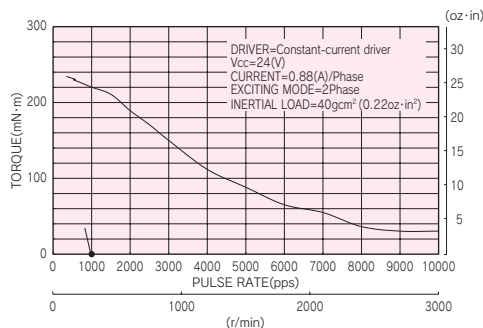
KH42JM2-901, 911



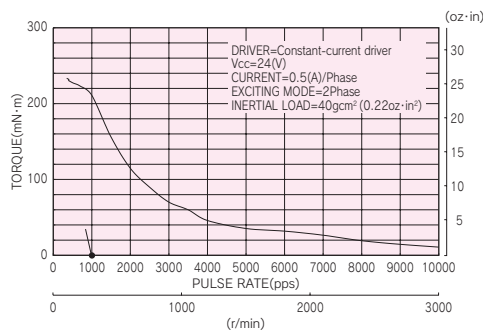
KH42JM2-951, 961



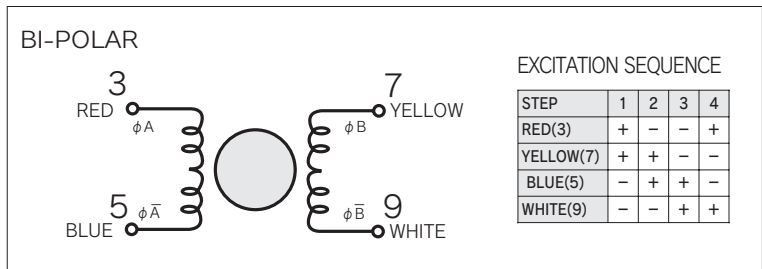
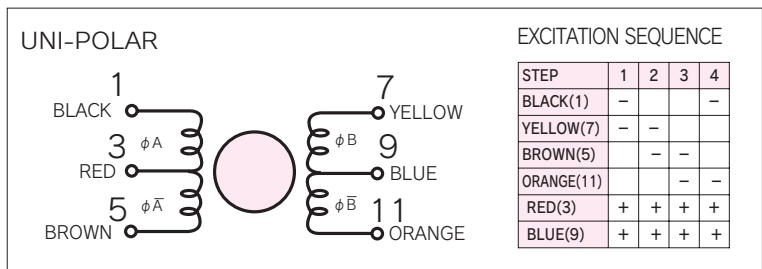
KH42JM2-902, 912



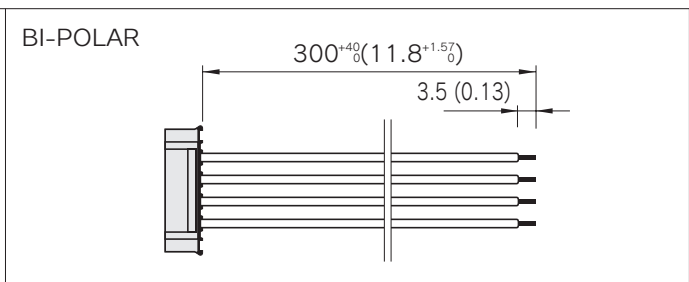
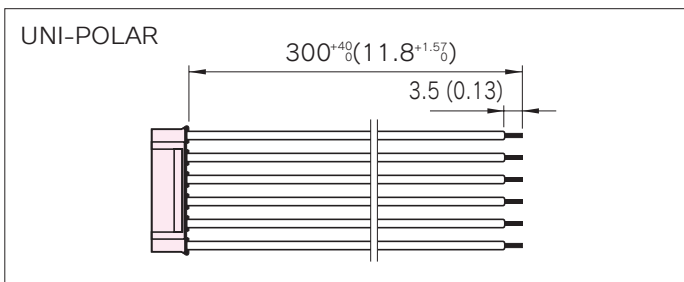
KH42JM2-903, 913



■ CONNECTION DIAGRAMS



■ CONNECTION CABLE TO MOTOR unit = mm (inch)



2-Phase Hybrid Stepping Motor

1.8°

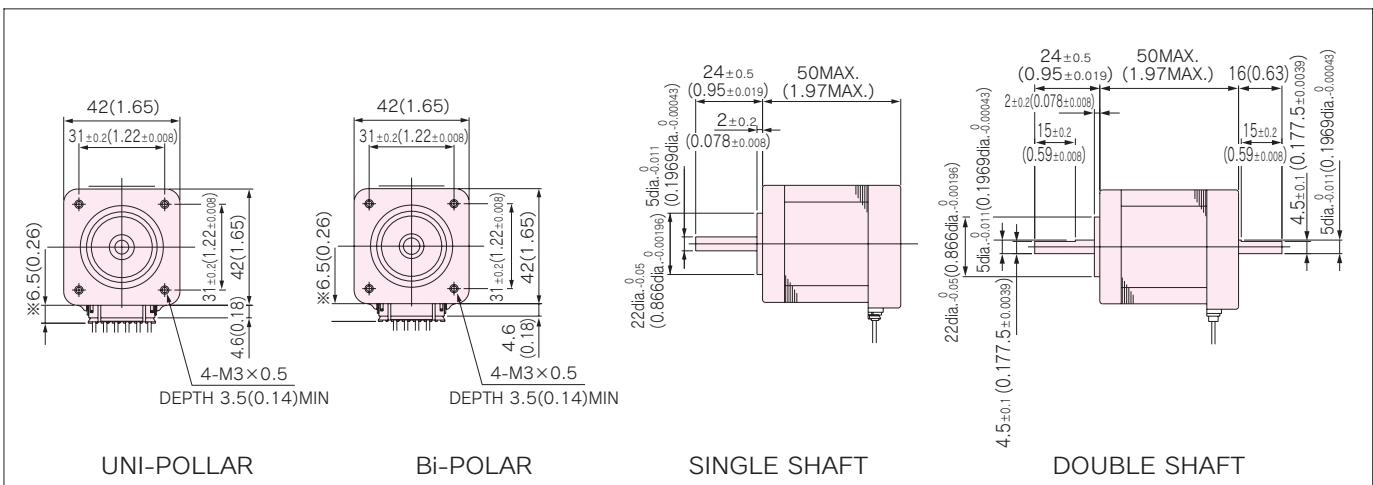
KH42 series

HIGH TORQUE, LOW VIBRATION AND LOW NOISE

STANDARD SPECIFICATIONS

MODEL	KH42KM2		
	SINGLE SHAFT	-901	-951
	DOUBLE SHAFT	-911	-961
DRIVE METHOD	————	UNI-POLAR	BI-POLAR
NUMBER OF PHASES	————	2	2
STEP ANGLE	deg./step	1.8	1.8
VOLTAGE	V	3.72	2.76
CURRENT	A/PHASE	1.2	1.2
WINDING RESISTANCE	Ω/PHASE	3.1	2.3
INDUCTANCE	mH/PHASE	3.1	4.0
HOLDING TORQUE	mN · m	340	403
	oz · in	48	57
DETENT TORQUE	mN · m	19.6	19.6
	oz · in	2.8	2.8
ROTOR INERTIA	g · cm ²	85	85
	oz · in ²	0.46	0.46
WEIGHTS	g	360	360
	lb	0.79	0.79
INSULATION CLASS	————	JIS Class E (120°C 248° F) (UL VALUE : CLASS B-130°C 266° F)	
INSULATION RESISTANCE	————	500VDC 100MΩmin.	
DIELECTRIC STRENGTH	————	500VAC 50HZ 1min.	
OPERATING TEMP. RANGE	°C	0 to 50	
ALLOWABLE TEMP. RISE	K	70	

DIMENSIONS unit = mm (inch)





Features

- Improved Dynamic Torque
(1.2 times torque of our previous model is generated at 300 r/min, on model : KH42JM2-901)
- Lowered Vibration & Noise Level
(by increased stiffness of body construction)
- Improved Efficiency
(1.1 times of our previous model, by high grade materials.)

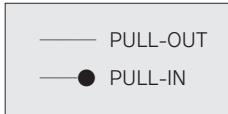
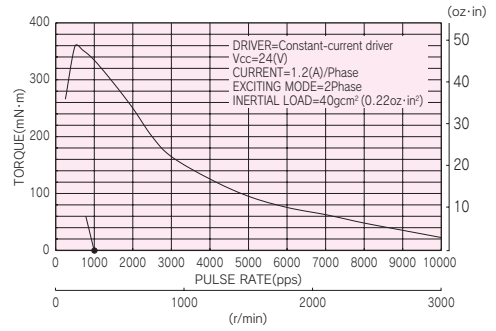
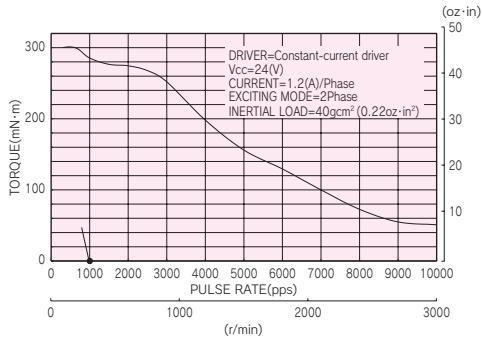
■ TORQUE CHARACTERISTICS vs. PULSE RATE

UNI-POLAR

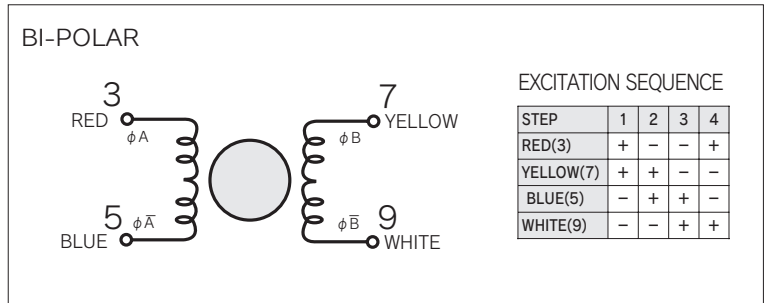
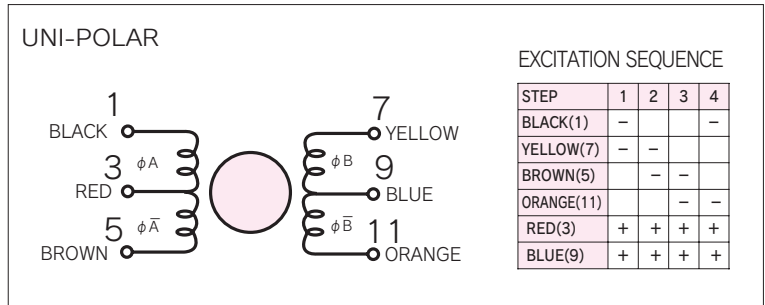
BI-POLAR

KH42KM2-901, 911

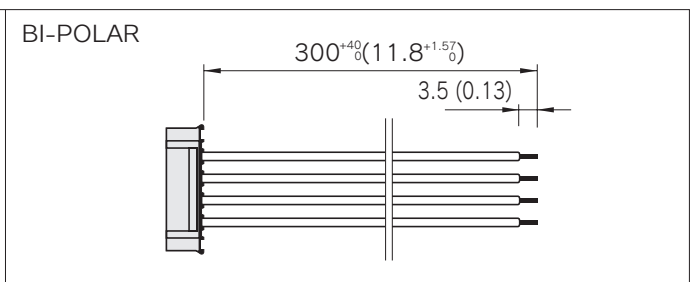
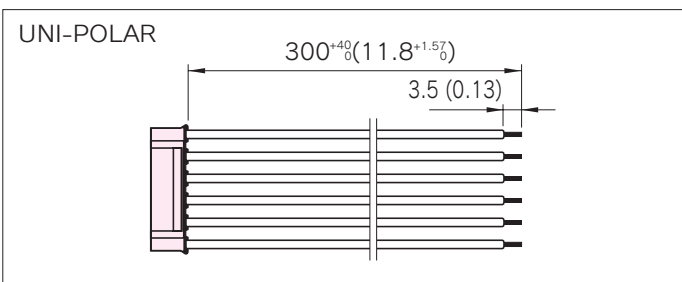
KH42KM2-951, 961



■ CONNECTION DIAGRAMS



■ CONNECTION CABLE TO MOTOR unit = mm (inch)



2-Phase Hybrid Stepping Motor

1.8°

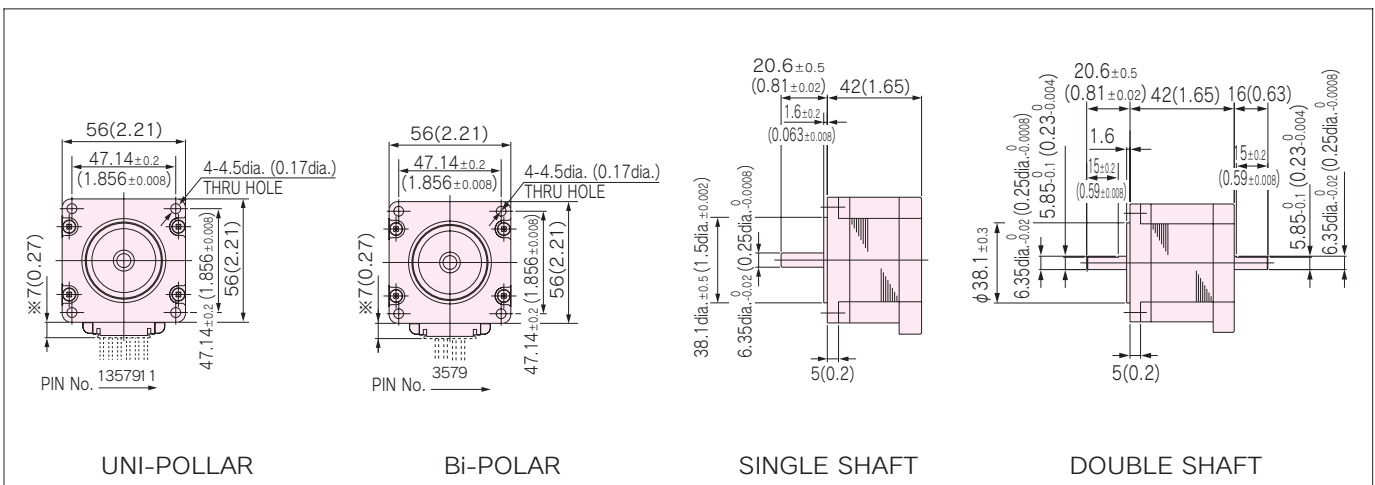
KH56 series

HIGH TORQUE, LOW VIBRATION AND LOW NOISE

STANDARD SPECIFICATIONS

MODEL		KH56JM2				
		SINGLE SHAFT	-901	-902	-903	-951
		DOUBLE SHAFT	-911	-912	-913	-961
DRIVE METHOD	————	UNI-POLAR			BI-POLAR	
NUMBER OF PHASES	————	2			2	
STEP ANGLE	deg./step	1.8			1.8	
VOLTAGE	V	1.68	2.78	4.9	1.96	
CURRENT	A/PHASE	3.0	2.0	1.0	2.0	
WINDING RESISTANCE	Ω/PHASE	0.58	1.39	4.9	0.98	
INDUCTANCE	mH/PHASE	0.61	1.8	6.68	2.27	
HOLDING TORQUE	mN · m	422	422	422	490	
	oz · in	60	60	60	69	
DETENT TORQUE	mN · m	25	25	25	25	
	oz · in	3.5	3.5	3.5	3.5	
ROTOR INERTIA	g · cm ²	115	115	115	115	
	oz · in ²	0.62	0.62	0.62	0.62	
WEIGHTS	g	400	400	400	400	
	lb	0.88	0.88	0.88	0.88	
INSULATION CLASS	————	JIS Class E (120°C 248° F) (UL VALUE : CLASS B 130°C 266° F)				
INSULATION RESISTANCE	————	500VDC 100MΩmin.				
DIELECTRIC STRENGTH	————	500VAC 50HZ 1min.				
OPERATING TEMP. RANGE	°C	0 to 50				
ALLOWABLE TEMP. RISE	K	70				

DIMENSIONS unit = mm (inch)





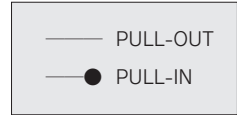
Features

- Stronger torque generated in higher speed zone (KH56KM2-901 generates 1.2 times torque of our previous model at 1200 r/min. speed)
- Lowered Vibration by increased stiffness of body construction (lowered by 10% than our previous model)
- Improved Efficiency (1.1 times of our previous model, by high grade materials)

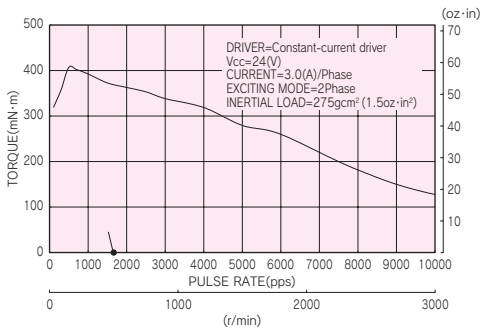
■ TORQUE CHARACTERISTICS vs. PULSE RATE

UNI-POLAR

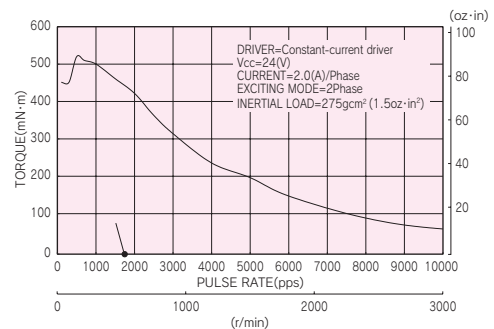
BI-POLAR



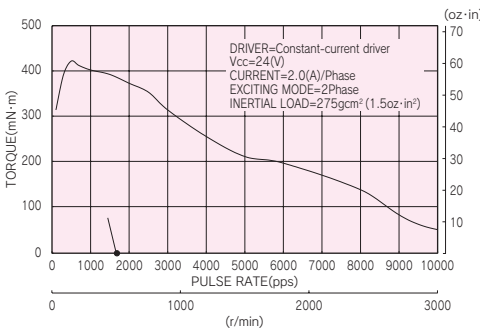
KH56JM2-901, 911



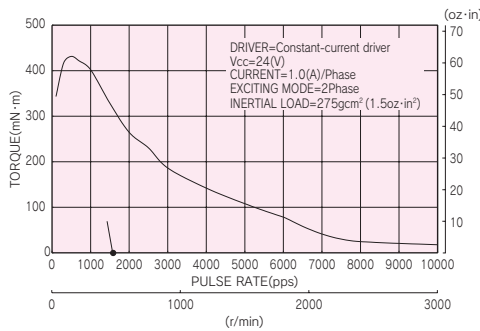
KH56JM2-951, 961



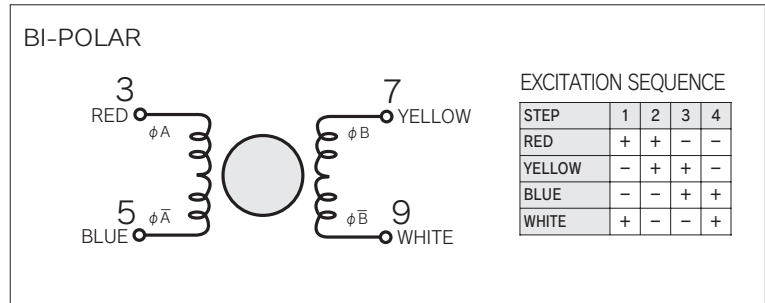
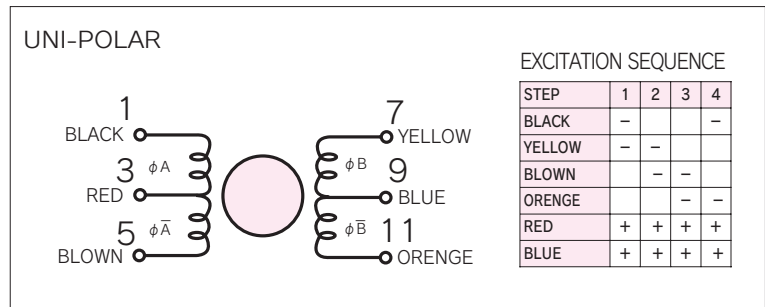
KH56JM2-902, 912



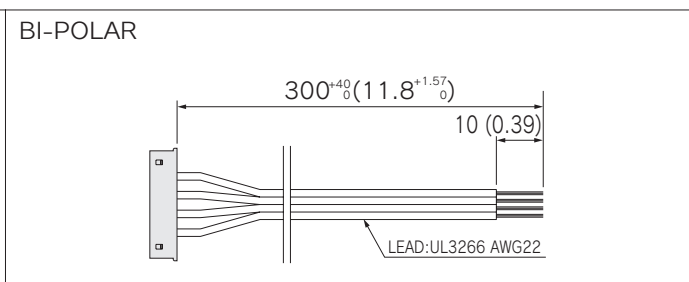
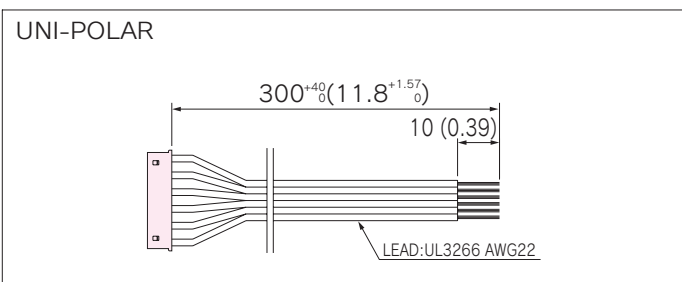
KH56JM2-903, 913



■ CONNECTION DIAGRAMS



■ CONNECTION CABLE TO MOTOR unit = mm (inch)



1.8°

2-Phase Hybrid Stepping Motor

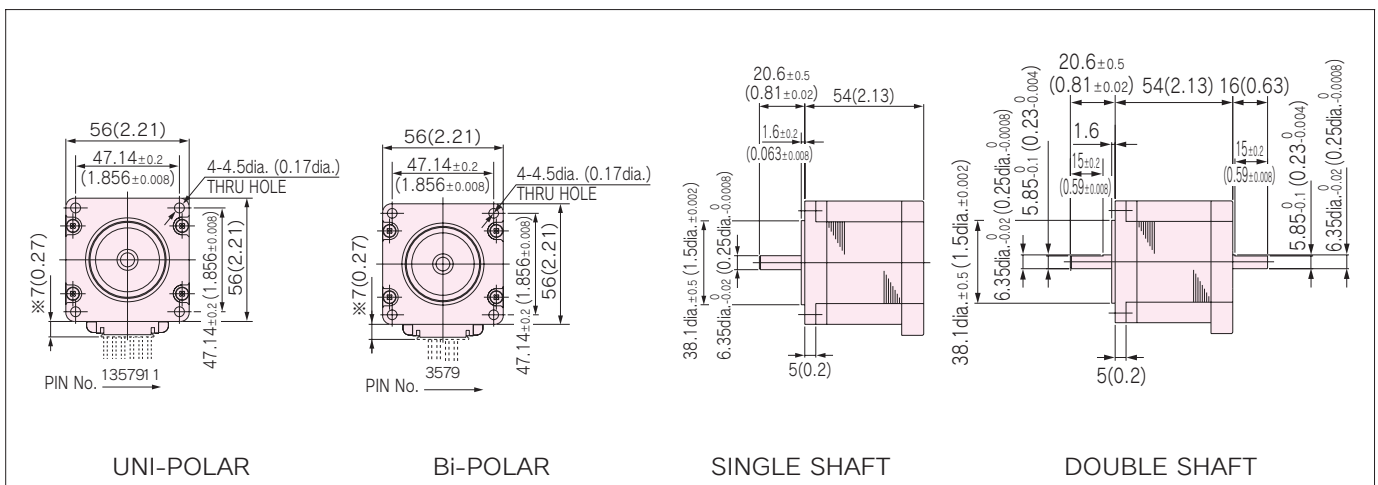
KH56 series

Rare earth magnet models	↓	Non-rare earth magnet models
KH56KM2-901	↓	KH56KM2-906
KH56KM2-902	↓	KH56KM2-907
KH56KM2-903	↓	KH56KM2-908
KH56KM2-911	↓	KH56KM2-916
KH56KM2-912	↓	KH56KM2-917
KH56KM2-913	↓	KH56KM2-918
KH56KM2-951	↓	KH56KM2-956
KH56KM2-961	↓	KH56KM2-966

STANDARD SPECIFICATIONS

MODEL	KH56KM2					
	SINGLE SHAFT	-901	-902	-903	-951	
	DOUBLE SHAFT	-911	-912	-913	-961	
DRIVE METHOD	————	UNI-POLAR			BI-POLAR	
NUMBER OF PHASES	————	2			2	
STEP ANGLE	deg./step	1.8			1.8	
VOLTAGE	V	2.3	3.6	6.71	2.4	
CURRENT	A/PHASE	3.0	2.0	1.0	2.0	
WINDING RESISTANCE	Ω/PHASE	0.77	1.79	6.71	1.32	
INDUCTANCE	mH/PHASE	1.04	3.0	9.36	3.19	
HOLDING TORQUE	mN · m	834	834	834	932	
	oz · in	118	118	118	132	
DETENT TORQUE	mN · m	37	37	37	37	
	oz · in	5.2	5.2	5.2	5.2	
ROTOR INERTIA	g · cm ²	188	188	188	188	
	oz · in ²	1.0	1.0	1.0	1.0	
WEIGHTS	g	650	650	650	650	
	lb	1.4	1.4	1.4	1.4	
INSULATION CLASS	————	JIS Class E (120°C 248° F) (UL VALUE : CLASS B 130°C 266° F)				
INSULATION RESISTANCE	————	500VDC 100MΩmin.				
DIELECTRIC STRENGTH	————	500VAC 50HZ 1min.				
OPERATING TEMP. RANGE	°C	0 to 50				
ALLOWABLE TEMP. RISE	K	70				

DIMENSIONS unit = mm (inch)





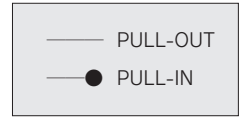
Features

- Stronger torque generated in higher speed zone (KH56KM2-901 generates 1.2 times torque of our previous model at 1200 r/min. speed)
- Lowered Vibration by increasing stiffness of body construction (lowered by 10% than our previous model)
- Improved Efficiency (1.1 times of our previous model, with high grade materials)

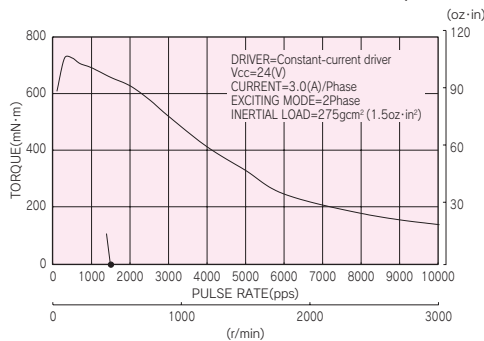
■ TORQUE CHARACTERISTICS vs. PULSE RATE

UNI-POLAR

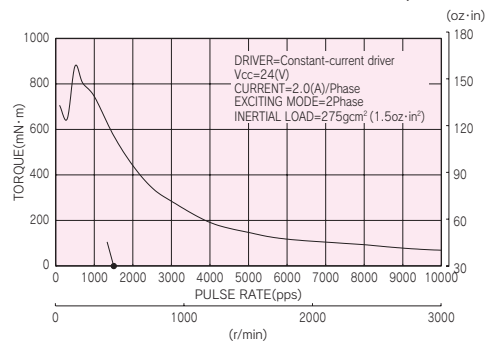
BI-POLAR



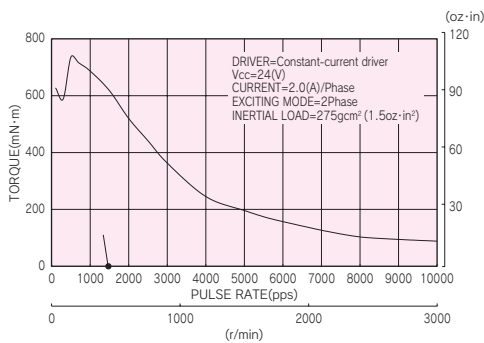
KH56KM2-901, 911



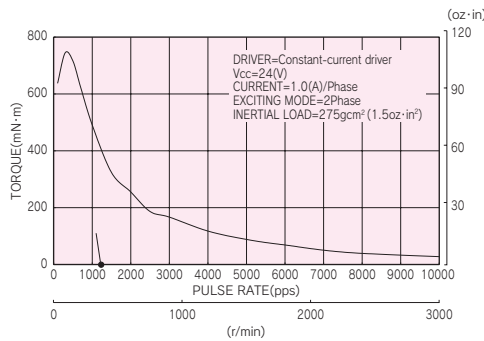
KH56KM2-951, 961



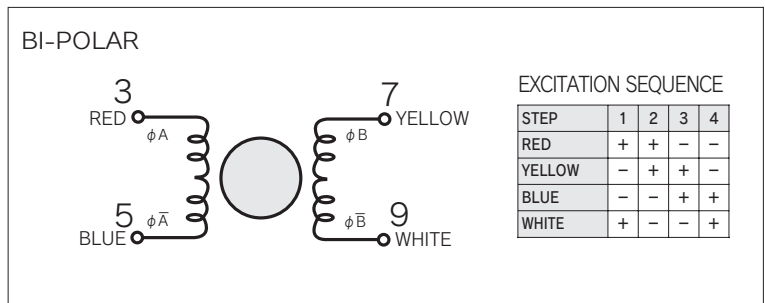
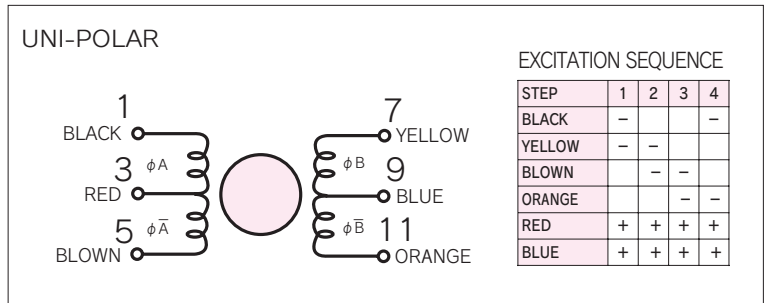
KH56KM2-902, 912



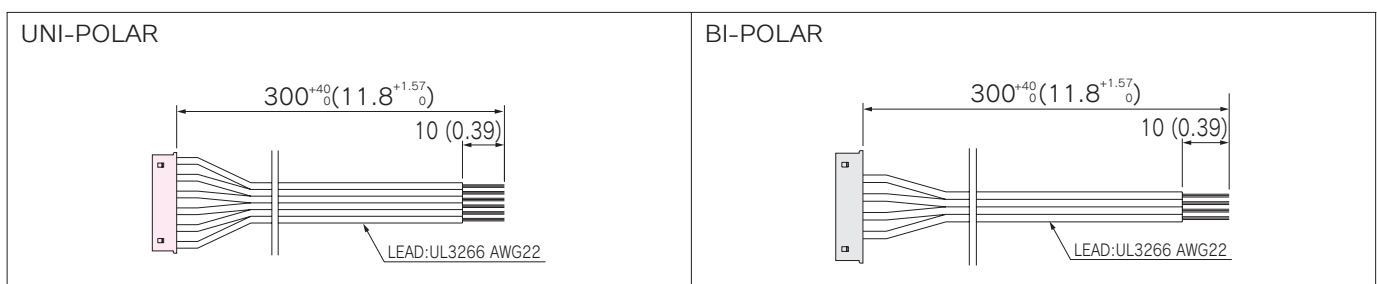
KH56KM2-903, 913



■ CONNECTION DIAGRAMS



■ CONNECTION CABLE TO MOTOR unit = mm (inch)



2-Phase Hybrid Stepping Motor

1.8°

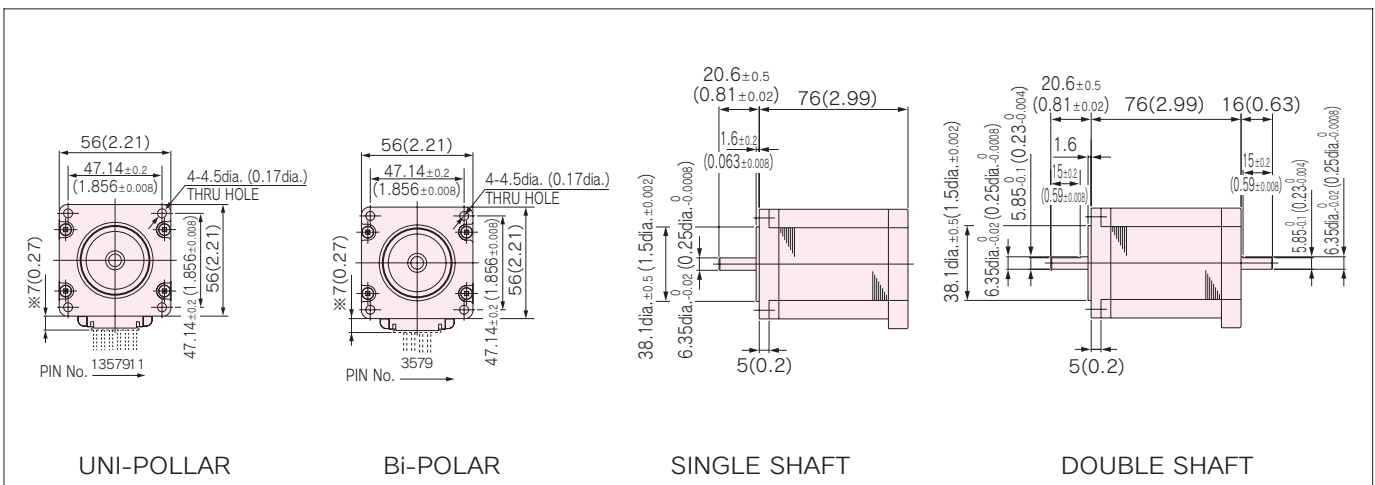
KH56 series

HIGH TORQUE, LOW VIBRATION AND LOW NOISE

STANDARD SPECIFICATIONS

MODEL		KH56QM2				
		SINGLE SHAFT	-901	-902	-903	-951
		DOUBLE SHAFT	-911	-912	-913	-961
DRIVE METHOD	—	UNI-POLAR			BI-POLAR	
NUMBER OF PHASES	—	2			2	
STEP ANGLE	deg./step	1.8			1.8	
VOLTAGE	V	3.54	5.46	9.9	4.0	
CURRENT	A/PHASE	3.0	2.0	1.0	2.0	
WINDING RESISTANCE	Ω/PHASE	1.18	2.73	9.9	2.0	
INDUCTANCE	mH/PHASE	2.4	5.4	21.6	7.35	
HOLDING TORQUE	mN · m	1324	1324	1324	1373	
	oz · in	187	187	187	194	
DETENT TORQUE	mN · m	69	69	69	69	
	oz · in	9.8	9.8	9.8	9.8	
ROTOR INERTIA	g · cm ²	269	269	269	269	
	oz · in ²	1.47	1.47	1.47	1.47	
WEIGHTS	kg	1.0	1.0	1.0	1.0	
	lb	2.2	2.2	2.2	2.2	
INSULATION CLASS	—	JIS Class E (120°C 248° F) (UL VALUE : CLASS B 130°C 266° F)				
INSULATION RESISTANCE	—	500VDC 100MΩmin.				
DIELECTRIC STRENGTH	—	500VAC 50HZ 1min.				
OPERATING TEMP. RANGE	°C	0 to 50				
ALLOWABLE TEMP. RISE	K	70				

DIMENSIONS unit = mm (inch)





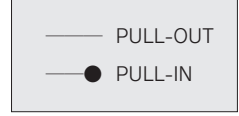
Features

- Stronger torque generated in higher speed zone (KH56KM2-901 generates 1.2 times torque of our previous model at 1200 r/min. speed)
- Lowered Vibration by increased stiffness of body construction (lowered by 10% than our previous model)
- Improved Efficiency (1.1 times of our previous model, by high grade materials)

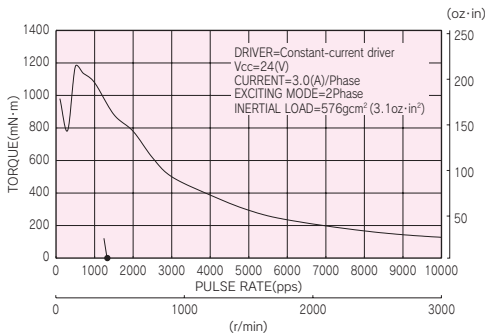
■ TORQUE CHARACTERISTICS vs. PULSE RATE

UNI-POLAR

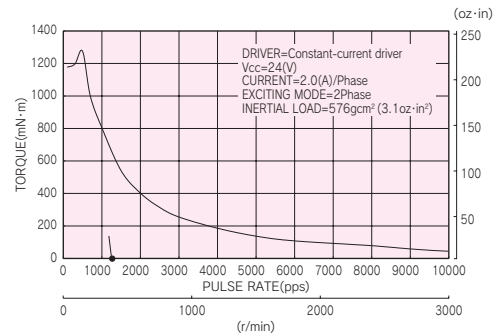
BI-POLAR



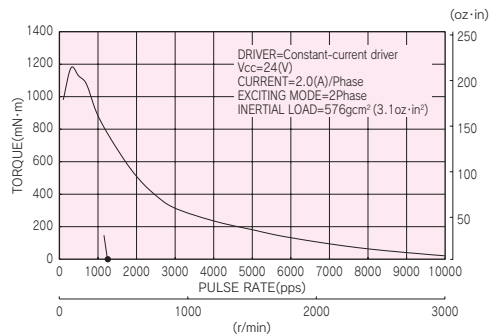
KH56QM2-901, 911



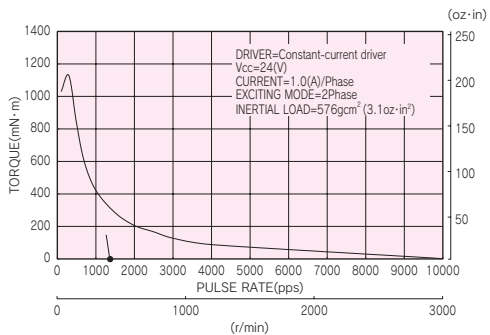
KH56QM2-951, 961



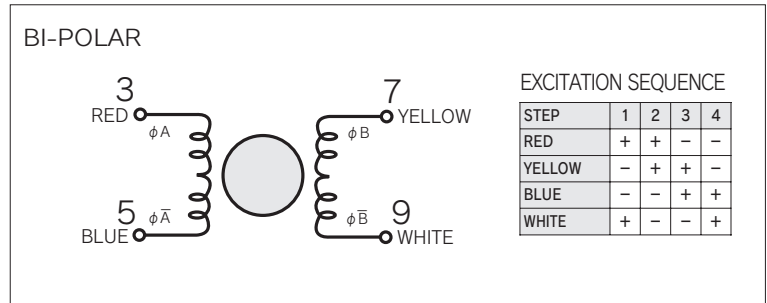
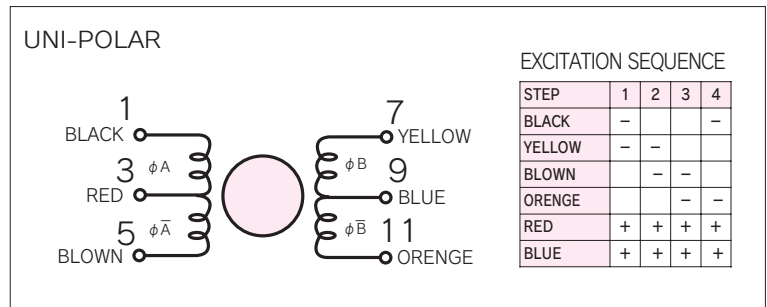
KH56QM2-902, 912



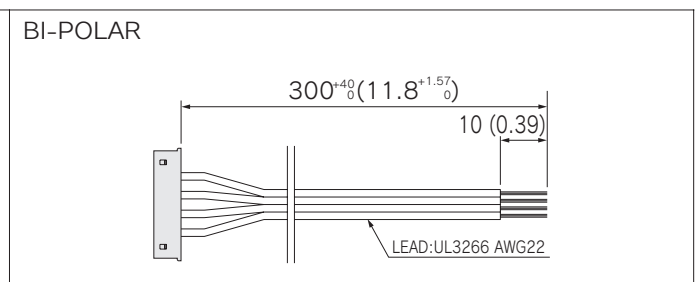
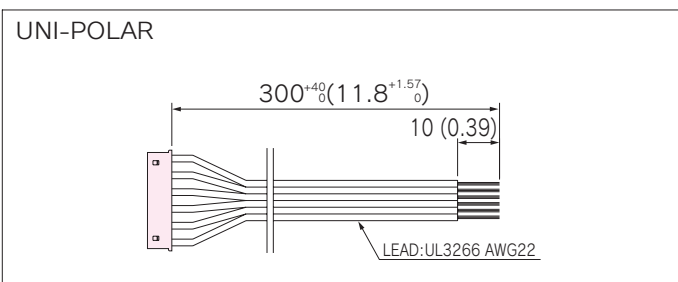
KH56QM2-903, 913



■ CONNECTION DIAGRAMS



■ CONNECTION CABLE TO MOTOR unit = mm (inch)



3-Phase Hybrid Stepping Motor

0.6°

KT42 series TRISYN

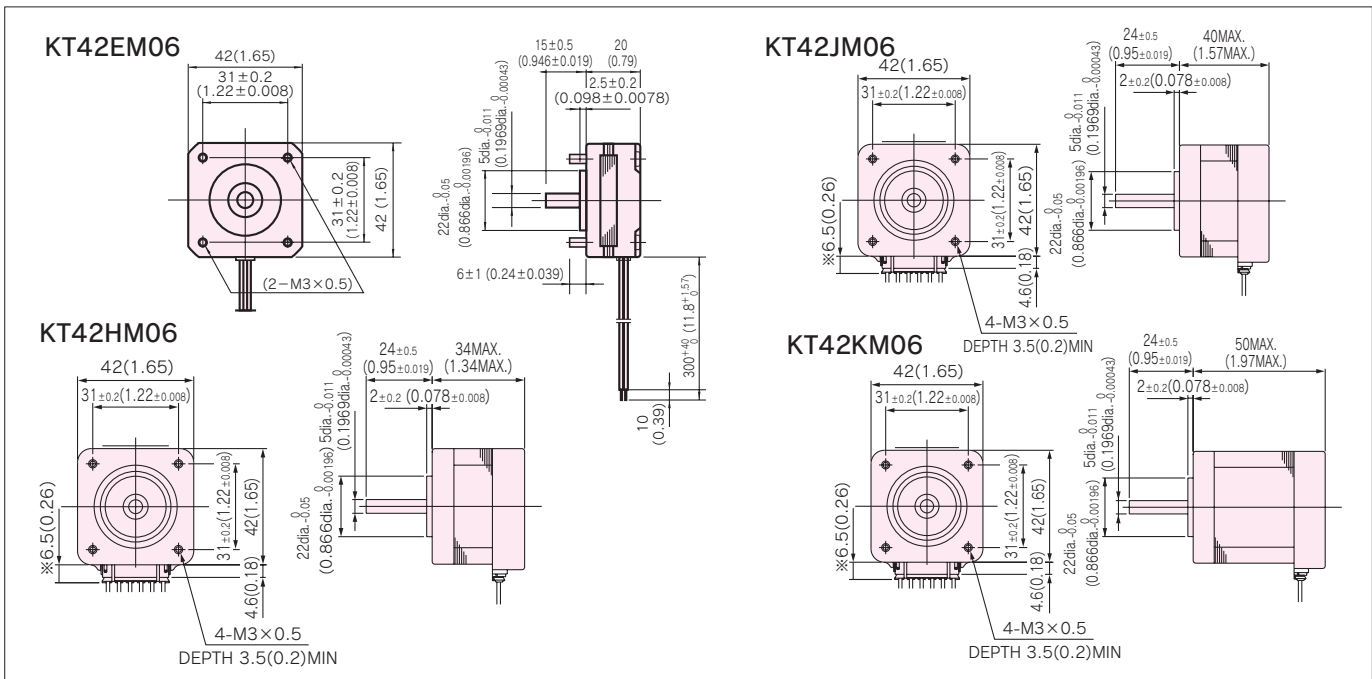
HIGH TORQUE, SILENT ROTATION

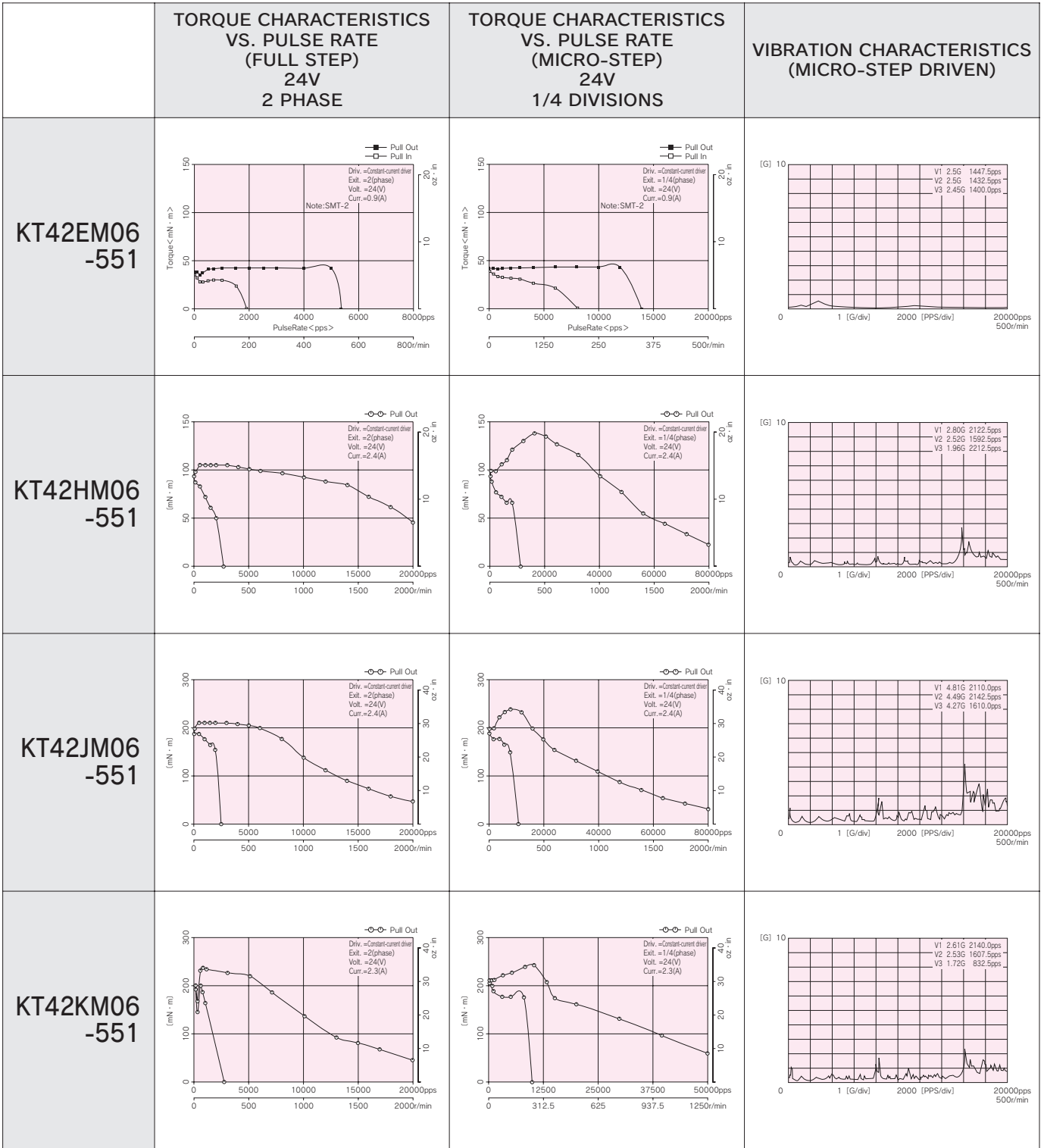
STANDARD SPECIFICATIONS

MODEL	UNIT	KT42EM06	KT42HM06	KT42JM06	KT42KM06
		-551	-551	-551	-551
DRIVE METHOD	—	BI-POLAR			
NUMBER OF PHASES	—	3			
STEP ANGLE	deg./step	0.6			
VOLTAGE	V	5.3	2.88	3.12	4.6
CURRENT	A/2-PHASE	0.9	2.4	2.4	2.3
WINDING RESISTANCE	Ω/2-PHASE	5.9	1.2	1.3	2.0
INDUCTANCE	mH/2-PHASE	3.1	0.8	1.3	1.4
HOLDING TORQUE	mN · m	45	90	180	200
	oz · in	6.4	12.7	25.5	28.3
DETENT TORQUE	mN · m	10	6	8	9
	oz · in	1.4	0.8	1.1	1.3
ROTOR INERTIA	g · cm ²	20	42	60	85
	oz · in ²	0.11	0.23	0.33	0.46
WEIGHTS	g	140	210	310	360
	lb	0.31	0.46	0.68	0.79
INSULATION CLASS	—	JIS Class E (120°C 248° F)(UL VALUE:CLASS B 130°C 266° F)			
INSULATION RESISTANCE	—	500VDC 100MΩmin.			
DIELECTRIC STRENGTH	—	500VAC 50HZ 1 min.			
OPERATING TEMP. RANGE	°C	-10 to 50			
ALLOWABLE TEMP. RISE	K	70			

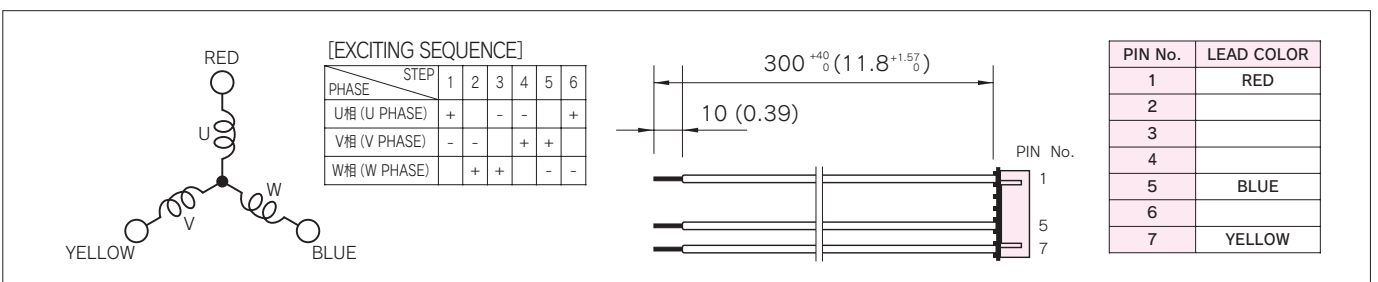


DIMENSIONS unit = mm (inch)





■ CONNECTION CABLE TO MOTOR unit = mm (inch) (Except for KT42EM06-551)



3-Phase Hybrid Stepping Motor

1.2°

KT42 series TRISYN

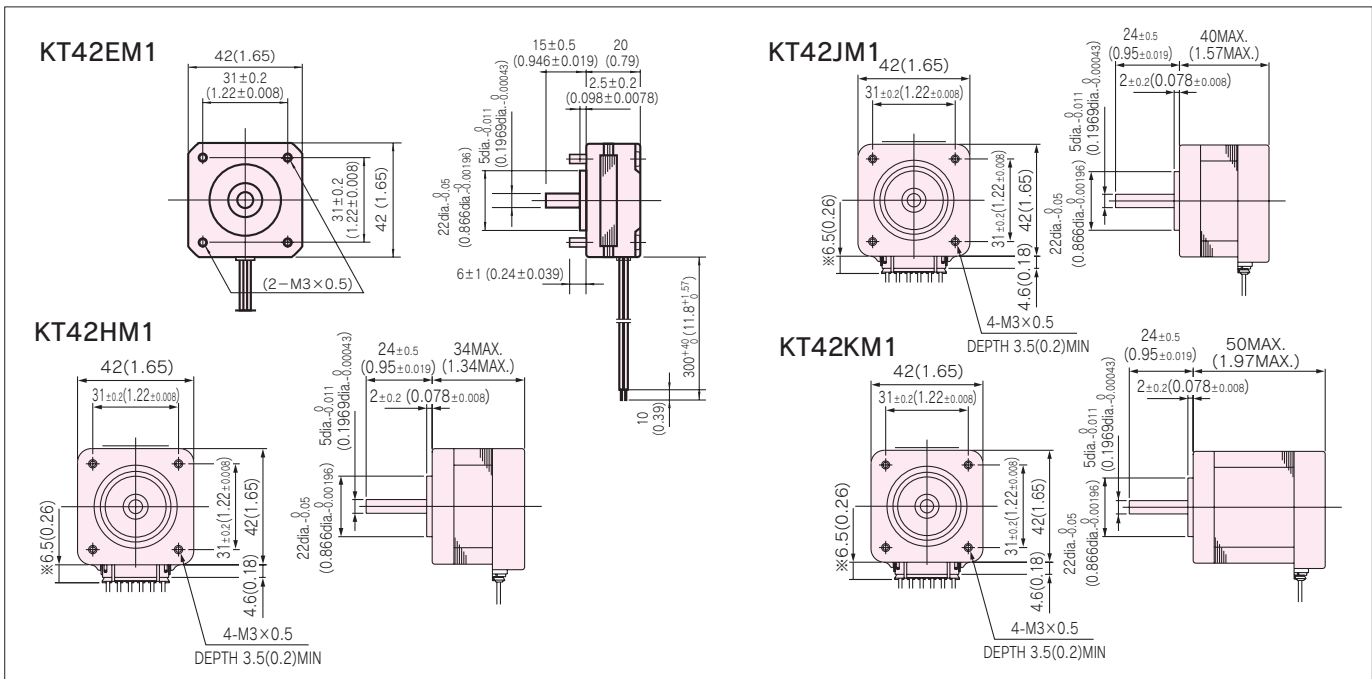
HIGH TORQUE, SILENT ROTATION

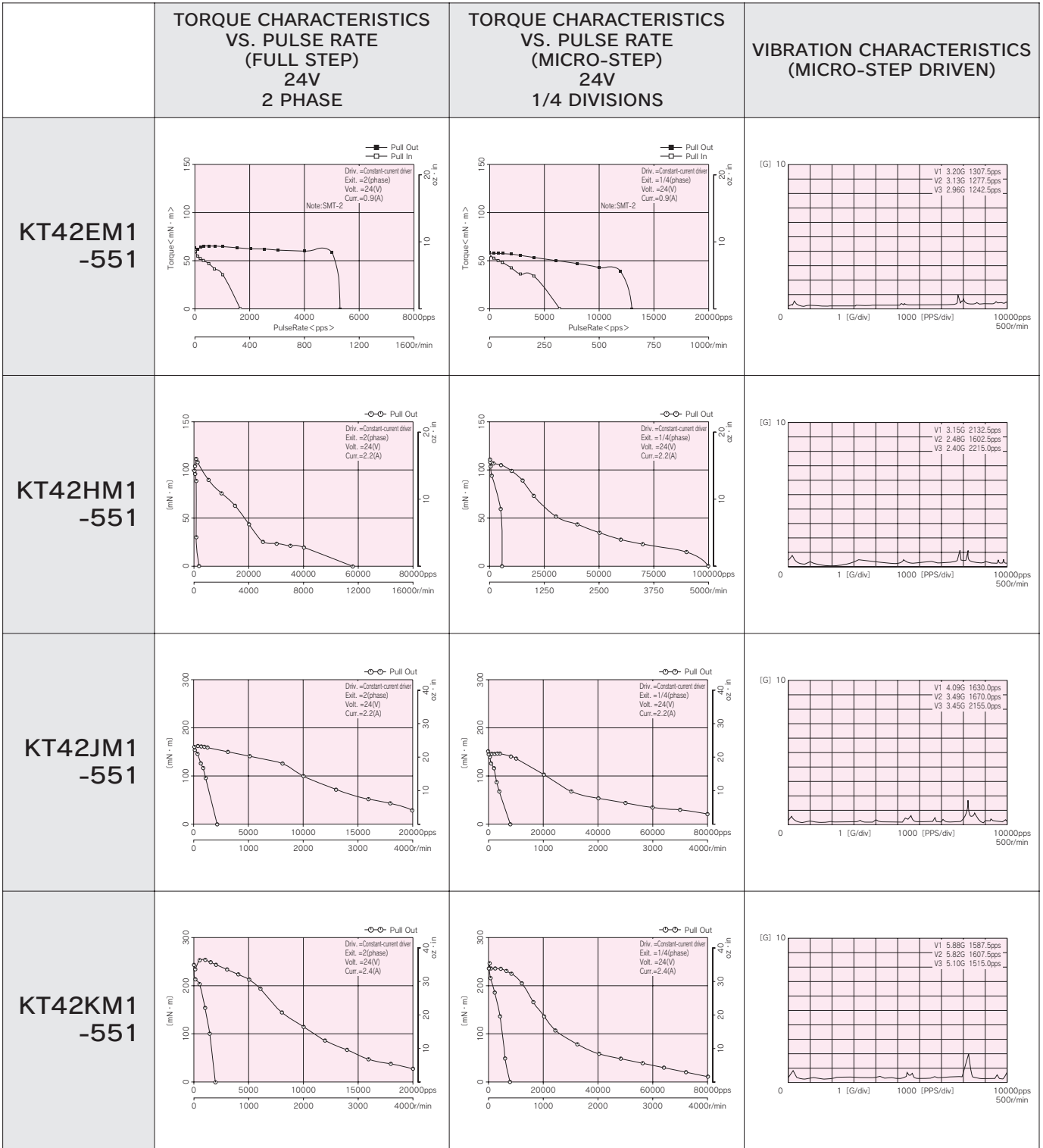
STANDARD SPECIFICATIONS

MODEL	UNIT	KT42EM1	KT42HM1	KT42JM1	KT42KM1
		-551	-551	-551	-551
DRIVE METHOD	————	BI-POLAR			
NUMBER OF PHASES	————	3			
STEP ANGLE	deg./step	1.2			
VOLTAGE	V	5.3	2.64	2.88	3.6
CURRENT	A/2-PHASE	0.9	2.4	2.4	2.4
WINDING RESISTANCE	Ω/2-PHASE	5.9	1.1	1.2	1.5
INDUCTANCE	mH/2-PHASE	2.6	0.5	0.8	1.0
HOLDING TORQUE	mN · m	70	140	210	280
	oz · in	9.9	19.8	29.7	39.6
DETENT TORQUE	mN · m	10	10	12	16
	oz · in	1.4	1.4	1.7	2.3
ROTOR INERTIA	g · cm ²	20	42	60	85
	oz · in ²	0.11	0.23	0.33	0.46
WEIGHTS	g	140	210	310	360
	lb	0.31	0.46	0.68	0.79
INSULATION CLASS	————	JIS Class E (120°C 248° F)(UL VALUE:CLASS B 130°C 266° F)			
INSULATION RESISTANCE	————	500VDC 100MΩmin.			
DIELECTRIC STRENGTH	————	500VAC 50HZ 1 min.			
OPERATING TEMP. RANGE	°C	-10 to 50			
ALLOWABLE TEMP. RISE	K	70			

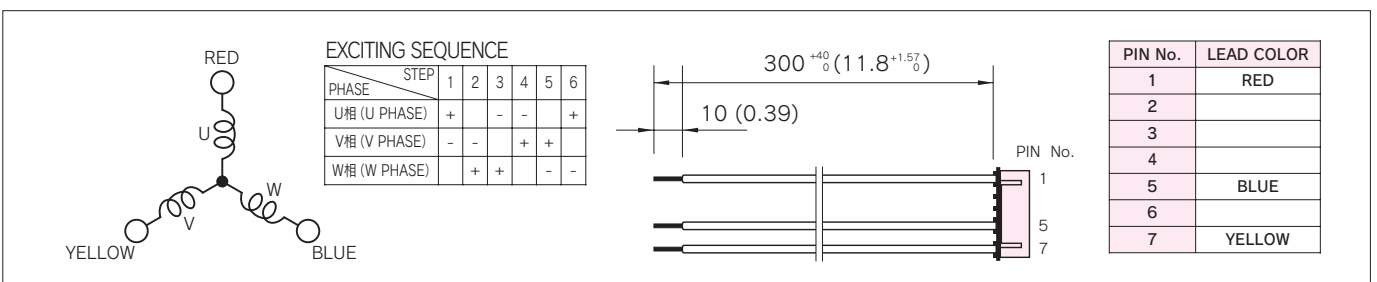


DIMENSIONS unit = mm (inch)





CONNECTION CABLE TO MOTOR unit = mm (inch) (Except for KT42EM1-551)



3-Phase Hybrid Stepping Motor

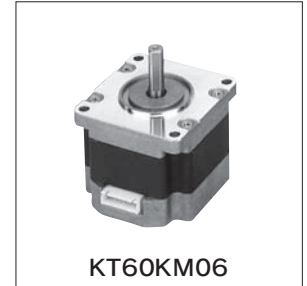
0.6°

KT60 series *TRISYN*

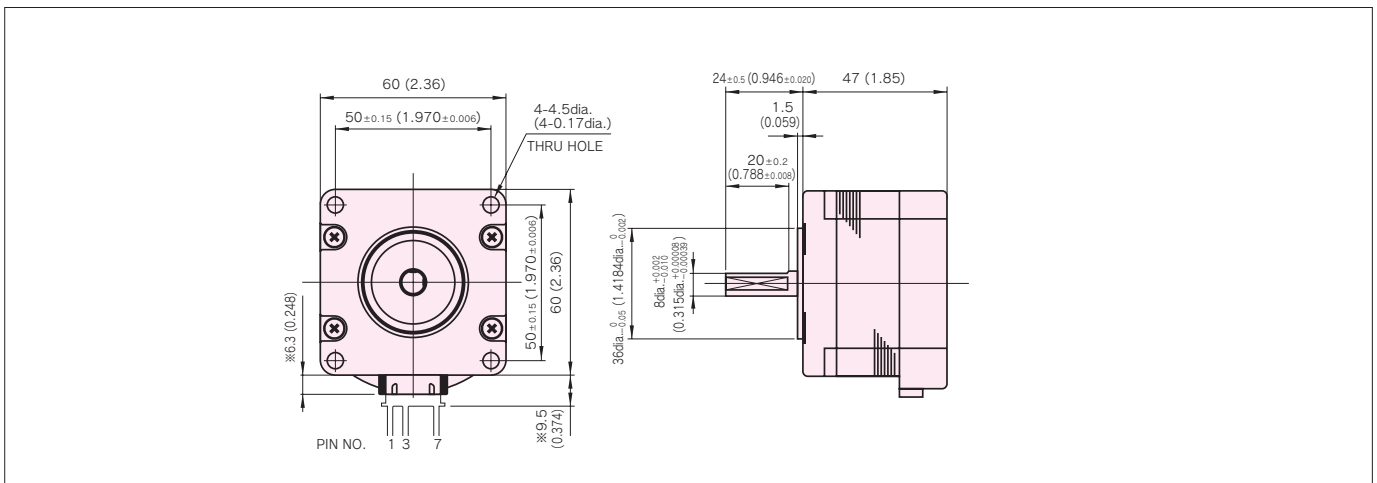
HIGH TORQUE, SILENT ROTATION

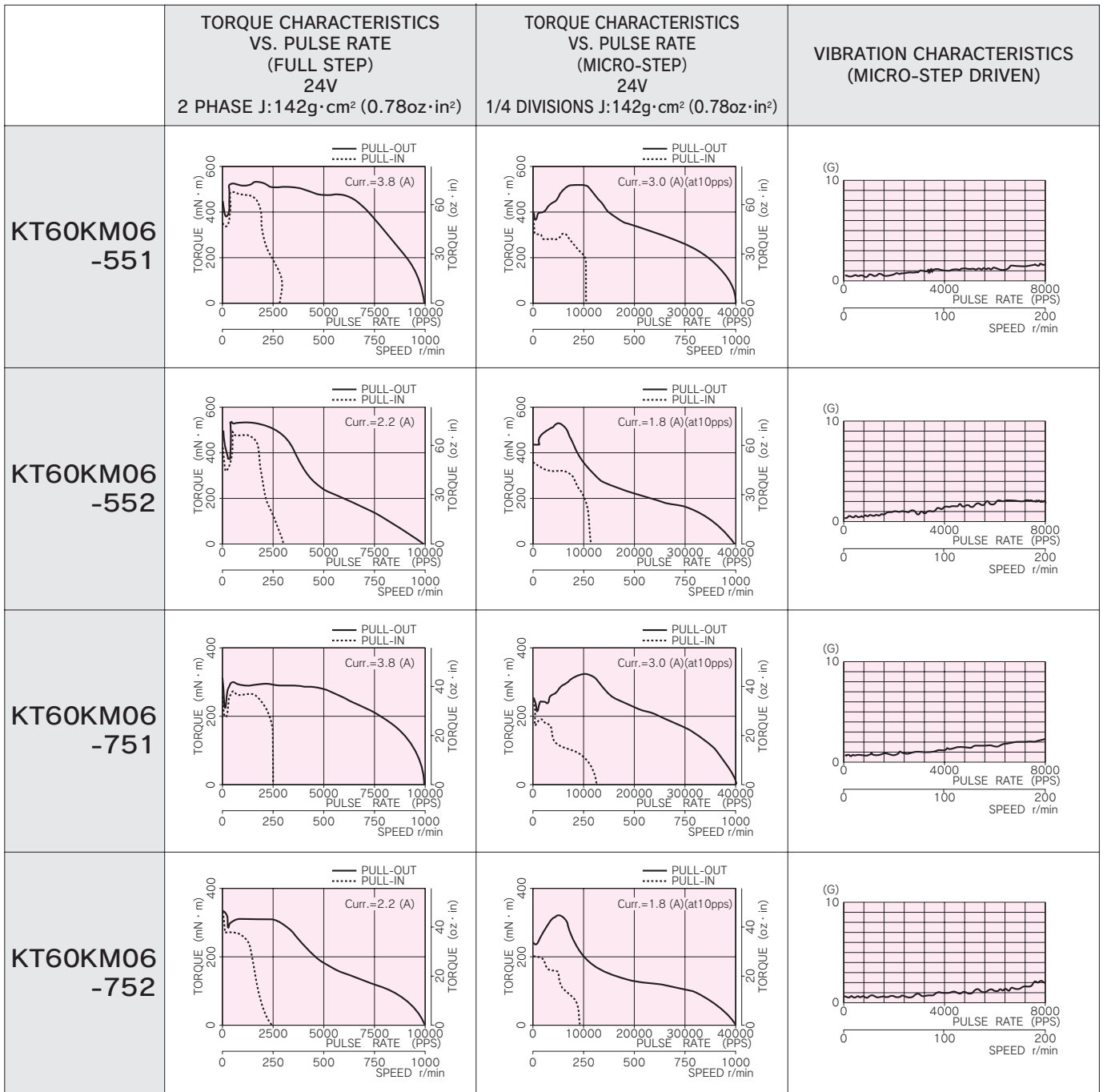
STANDARD SPECIFICATIONS

MODEL	UNIT	KT60KM06			
		-551	-552	-751	-752
DRIVE METHOD	————	BI-POLAR			
NUMBER OF PHASES	————	3			
STEP ANGLE	deg./step	0.6			
VOLTAGE	V	2.09	3.52	2.09	3.52
CURRENT	A/2-PHASE	3.8	2.2	3.8	2.2
WINDING RESISTANCE	Ω/2-PHASE	0.55	1.6	0.55	1.6
INDUCTANCE	mH/2-PHASE	1.0	3.0	1.0	3.1
HOLDING TORQUE	mN · m	442	442	246	246
	oz · in	62	62	35	35
DETENT TORQUE	mN · m	20	20	10	10
	oz · in	2.8	2.8	1.4	1.4
ROTOR INERTIA	g · cm ²	170	170	170	170
	oz · in ²	0.93	0.93	0.93	0.93
WEIGHTS	g	550	550	550	550
	lb	1.2	1.2	1.2	1.2
INSULATION CLASS	————	JIS Class E (120°C 248° F)(UL VALUE:CLASS B 130°C 266° F)			
INSULATION RESISTANCE	————	500VDC 100MΩmin.			
DIELECTRIC STRENGTH	————	500VAC 50HZ 1min.			
OPERATING TEMP. RANGE	°C	0 to 50			
ALLOWABLE TEMP. RISE	K	70			

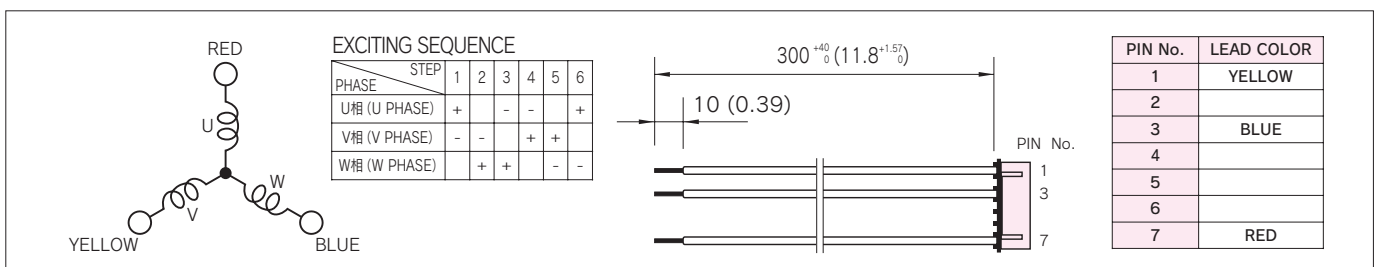


DIMENSIONS unit = mm (inch)





■ CONNECTION CABLE TO MOTOR unit = mm (inch)



3-Phase Hybrid Stepping Motor

0.6°

KT60 series *TRISYN*

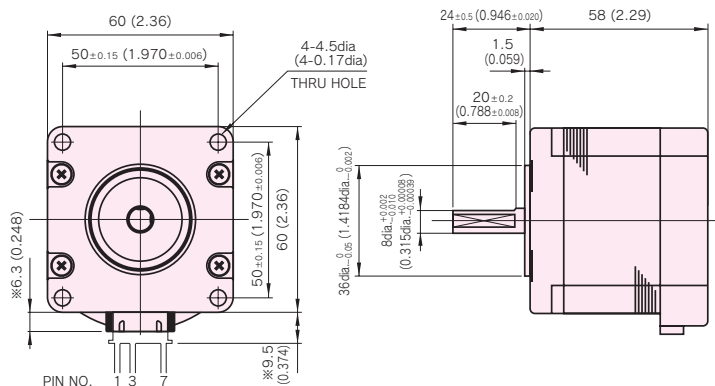
HIGH TORQUE, SILENT ROTATION

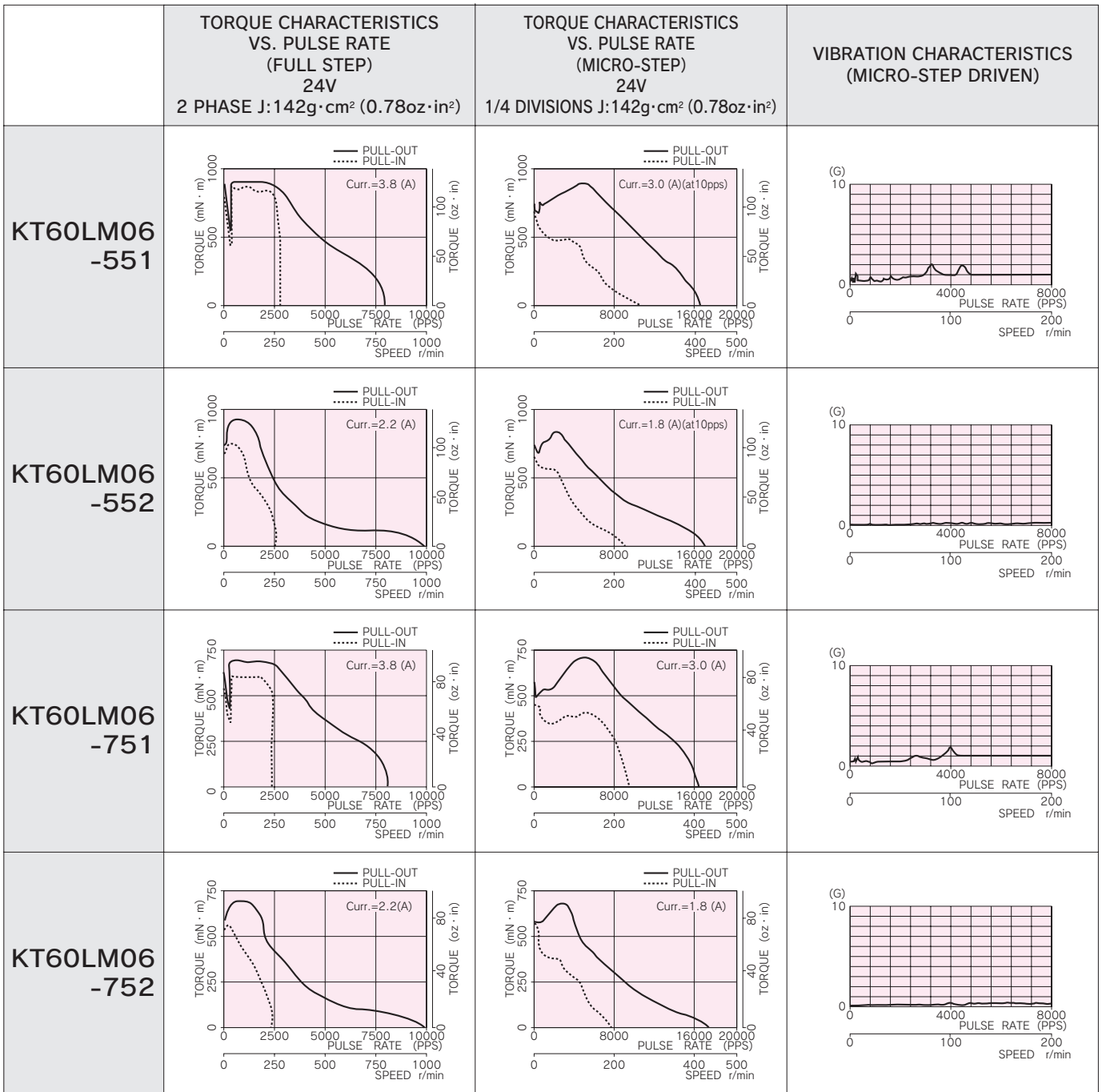
STANDARD SPECIFICATIONS

MODEL	UNIT	KT60LM06			
		-551	-552	-751	-752
DRIVE METHOD	————	BI-POLAR			
NUMBER OF PHASES	————	3			
STEP ANGLE	deg./step	0.6			
VOLTAGE	V	2.77	4.84	2.77	4.84
CURRENT	A/2-PHASE	3.8	2.2	3.8	2.2
WINDING RESISTANCE	Ω/2-PHASE	0.73	2.2	0.73	2.2
INDUCTANCE	mH/2-PHASE	1.7	5.6	1.8	5.7
HOLDING TORQUE	mN · m	785	785	589	589
	oz · in	111	111	83	83
DETENT TORQUE	mN · m	25	25	15	15
	oz · in	3.5	3.5	2.1	2.1
ROTOR INERTIA	g · cm ²	265	265	265	265
	oz · in ²	1.45	1.45	1.45	1.45
WEIGHTS	g	720	720	720	720
	lb	1.6	1.6	1.6	1.6
INSULATION CLASS	————	JIS Class E (120°C 248° F)(UL VALUE:CLASS B 130°C 266° F)			
INSULATION RESISTANCE	————	500VDC 100MΩmin.			
DIELECTRIC STRENGTH	————	500VAC 50HZ 1min.			
OPERATING TEMP. RANGE	°C	0 to 50			
ALLOWABLE TEMP. RISE	K	70			

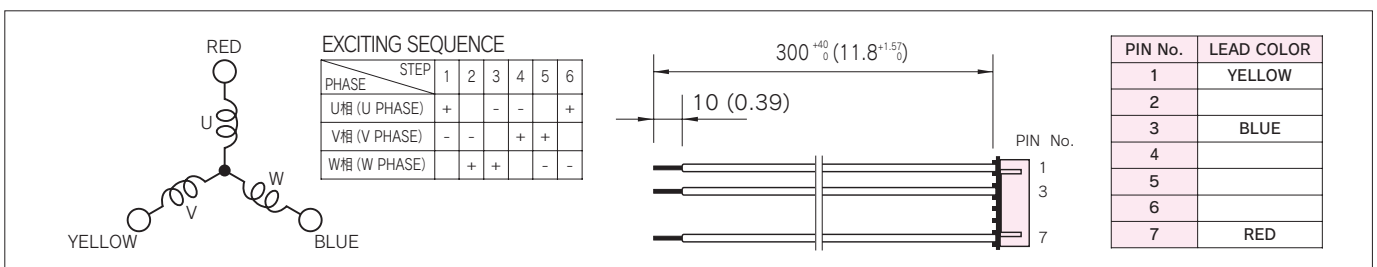


DIMENSIONS unit = mm (inch)





■ CONNECTION CABLE TO MOTOR unit = mm (inch)



3-Phase Hybrid Stepping Motor

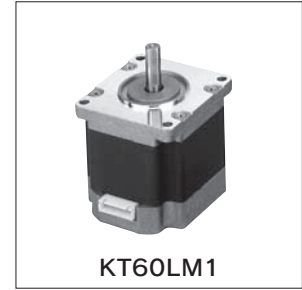
1.2°

KT60 series TRISYN

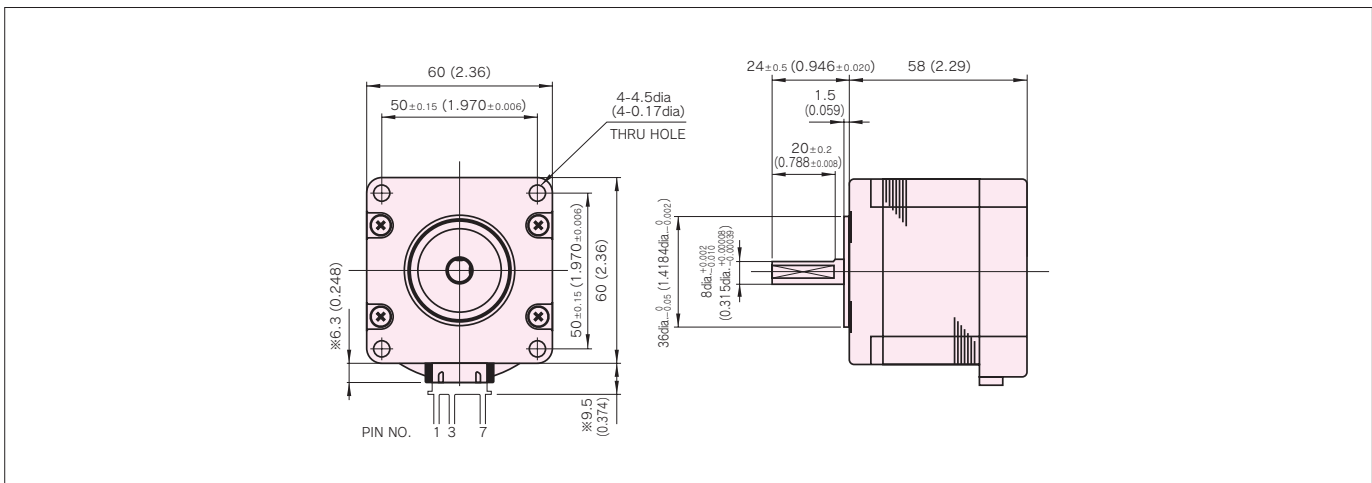
HIGH TORQUE, SILENT ROTATION

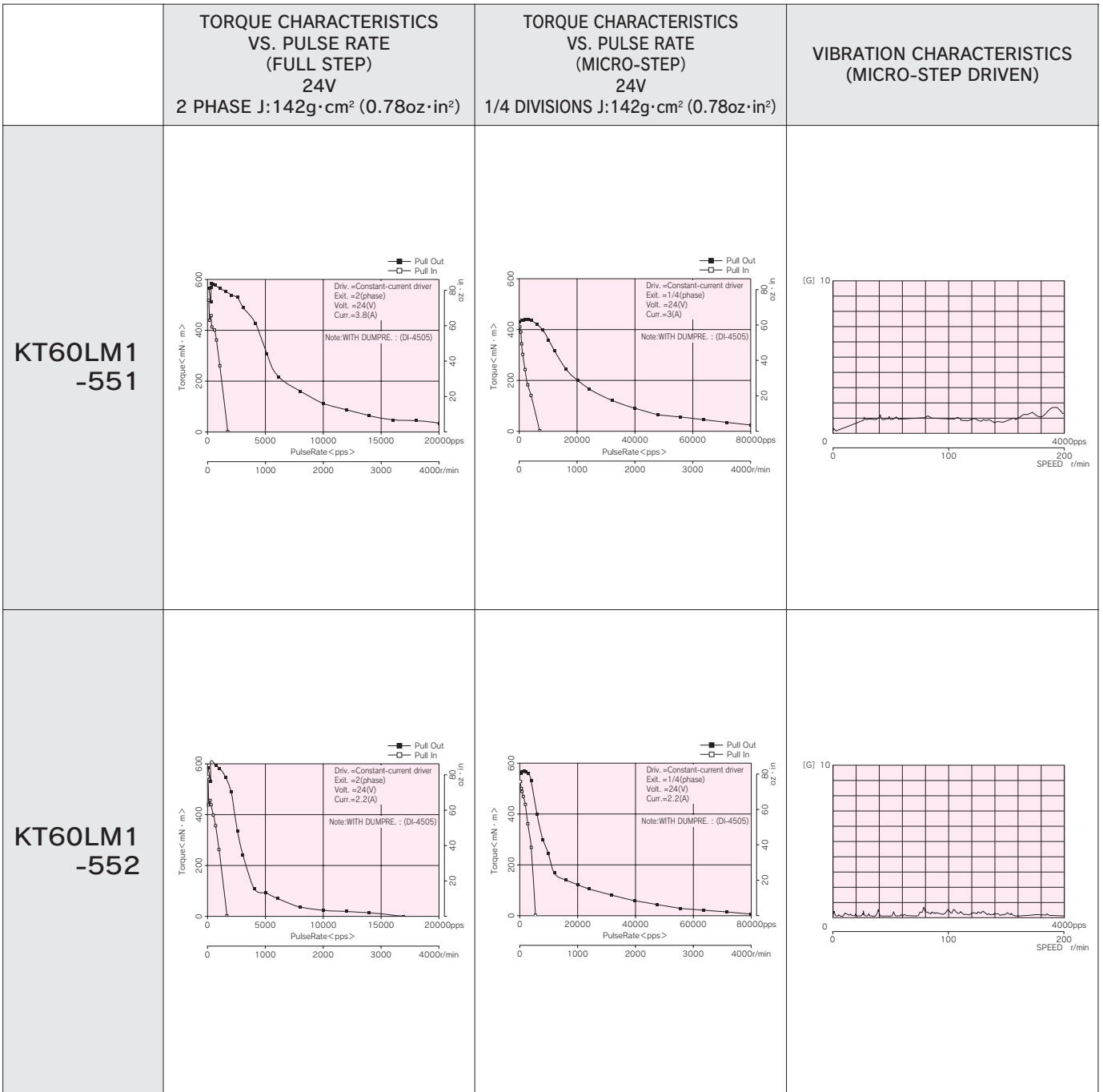
STANDARD SPECIFICATIONS

MODEL	UNIT	KT60LM1	
		-551	-552
DRIVE METHOD	————	BI-POLAR	
NUMBER OF PHASES	————	3	
STEP ANGLE	deg./step	1.2	
VOLTAGE	V	2.77	4.84
CURRENT	A/2-PHASE	3.8	2.2
WINDING RESISTANCE	Ω/2-PHASE	0.73	2.2
INDUCTANCE	mH/2-PHASE	1.0	3.3
HOLDING TORQUE	mN · m	600	600
	oz · in	85	85
DETENT TORQUE	mN · m	35	35
	oz · in	5	5
ROTOR INERTIA	g · cm ²	265	265
	oz · in ²	1.45	1.45
WEIGHTS	g	720	720
	lb	1.6	1.6
INSULATION CLASS	————	JIS Class E (120°C 248° F)(UL VALUE:CLASS B 130°C 266° F)	
INSULATION RESISTANCE	————	500VDC 100MΩmin.	
DIELECTRIC STRENGTH	————	500VAC 50HZ 1min.	
OPERATING TEMP. RANGE	°C	0 to 50	
ALLOWABLE TEMP. RISE	K	70	



DIMENSIONS unit = mm (inch)





■ CONNECTION CABLE TO MOTOR unit = mm (inch)

