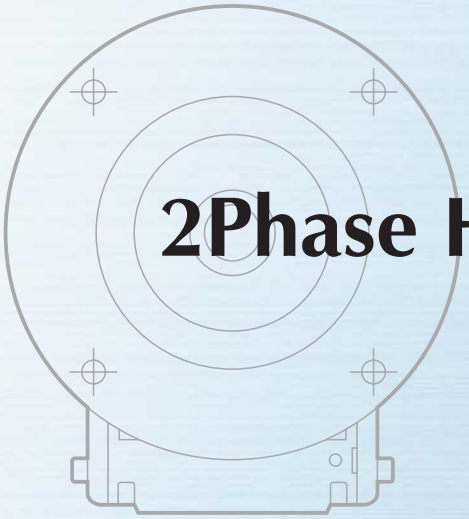
A Nidec Group Company

SERVO

All for dreams



2Phase Hybrid Stepping Motors

KA Series

A new round motor with superior balance and a compact design.

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 filed analysis. More than 30% higher holding torque was achieved and pull-out torque was also improved. (Refer to Fig. 1 and 2)

Fig. 1

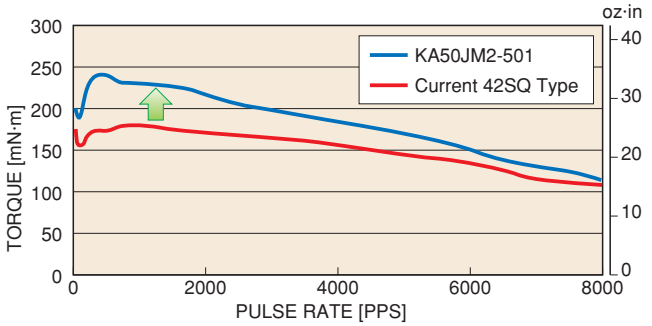
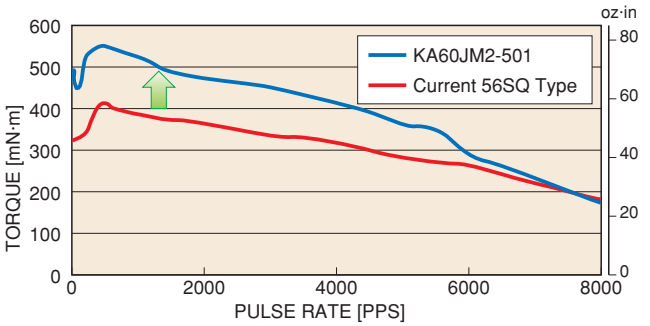
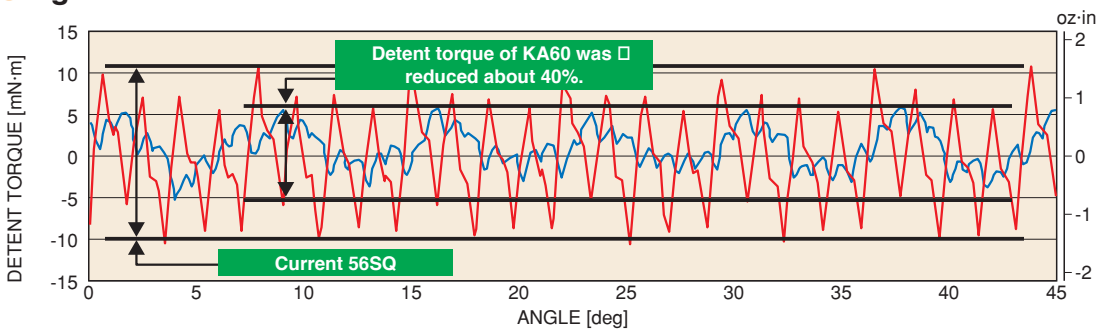


Fig. 2



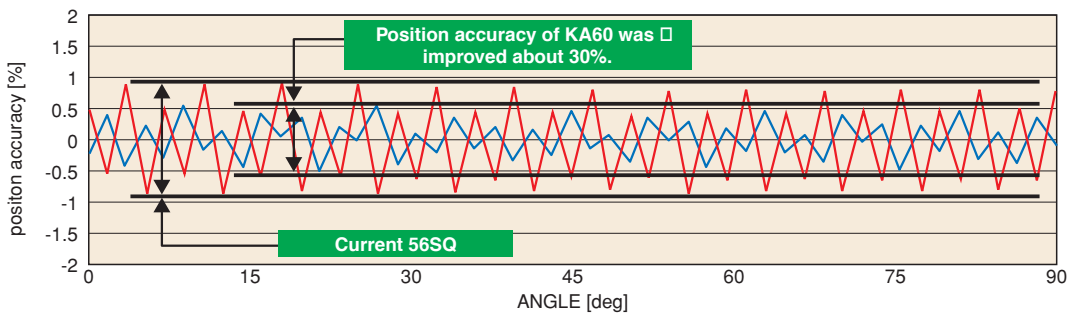
- Low vibration and low rotational fluctuation were realized by reducing the detent torque using three dimensional magnetic field analysis. Rotational fluctuation was reduced about 30%.

Fig. 3



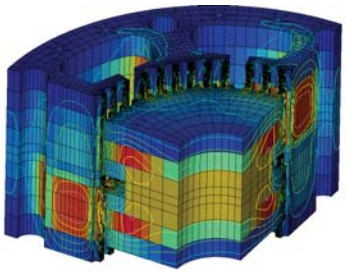
- Position accuracy was improved by minimizing the deviation of induced voltage. Position accuracy was improved about 30%. (Refer to Fig.4)

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.**

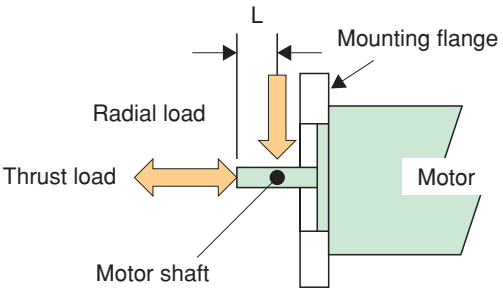
* Three dimensional magnetic field analysis: The magnetic strength is shown three dimensionally and the highest efficiency core shape is determined.
* Robust design: A design method that is not influenced by the variation in parts to eliminate product performance variation.



Max. Allowable Load / Runout for Motor Shaft

Load for Motor Shaft

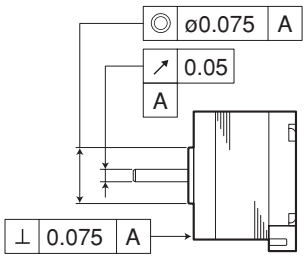
Type	Thrust load	Radial load	
		Load	L
KA50	14.7 N [1.5 kgf] [3.3 lb]	19.6 N [2.0 kgf] [4.4 lb]	10 mm
KA60	40 N [4.1 kgf] [9.0 lb]	70 N [7.1 kgf] [15.8 lb]	



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 MΩ 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 ℃ ~ +50 ℃
Storage temperature range	-20 ℃ ~ +70 ℃
Humidity range in operation and storage	5 % ~ 95 % RH (noncondensing)

KA50 Series (1.8 degree/step)

Standard Specifications

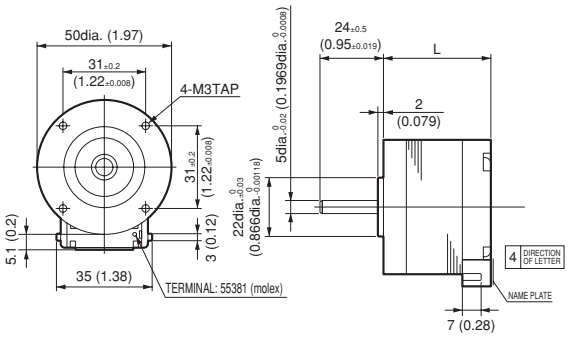
UNIPOLAR

Model	Step angle	Voltage	Current	Resistance	Inductance	Holding torque		Detent torque		Rotor inertia	
Dimension	degree/step	V/Ø	A/Ø	Ω/Ø	mH/Ø	mN·m	oz·in	mN·m	oz·in	g·cm²	oz·in²
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/Ø	A/Ø	Ω/Ø	mH/Ø	mN·m	oz·in	mN·m	oz·in	g·cm²	oz·in²
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

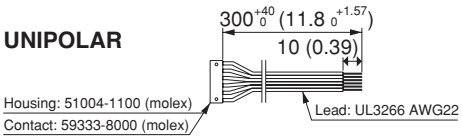
Outline unit = mm (inch)



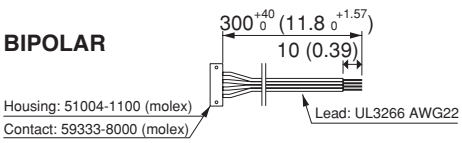
model	L[mm]	L[inch]	mass[g]	weight[lb]
KA50HM2	35	1.38	230	0.5
KA50JM2	40	1.57	300	0.7
KA50KM2	50	1.97	420	0.9

Accessories: Lead assy

UNIPOLAR



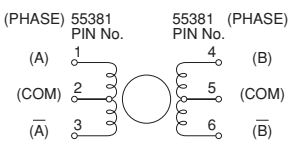
BIPOLAR



Connection Diagrams

Rotational direction

UNIPOLAR



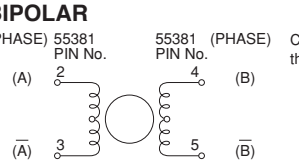
CW viewed from rotor shaft when using the following sequence diagram.

51004-1100 (PIN No.)	1	3	5	7	9	11
(PHASE)	A	A com	Ā	B	B com	B̄
COLOR OF LEAD	BLACK	RED	BROWN	YELLOW	BLUE	ORANGE

EXCITING SEQUENCE

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

BIPOLAR



CW viewed from rotor shaft when using the following sequence diagram.

51004-1100 (PIN No.)	3	5	7	9
(PHASE)	A	Ā	B	B̄
COLOR OF LEAD	RED	BLUE	YELLOW	WHITE

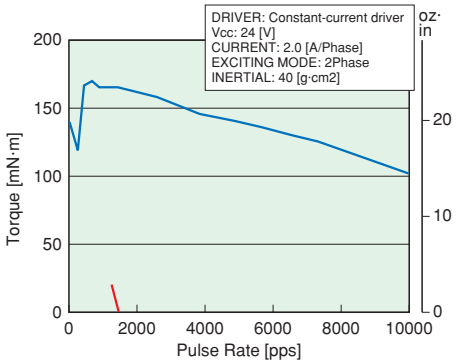
EXCITING SEQUENCE

55381 PIN No.	51004-1100 PIN No.	PHASE	1	2	3	4
2	3	A	−	+	+	−
4	7	B	−	−	+	+
3	5	Ā	+	−	−	+
5	9	B̄	+	+	−	−

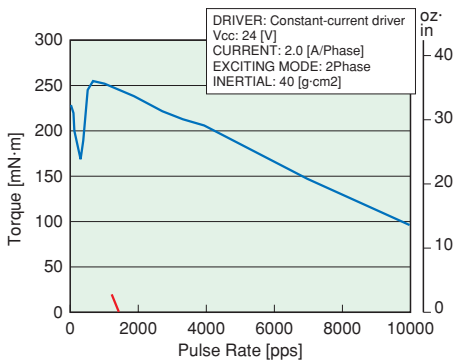
Speed-Torque Characteristics

UNIPOLAR

KA50HM2-501



KA50JM2-501



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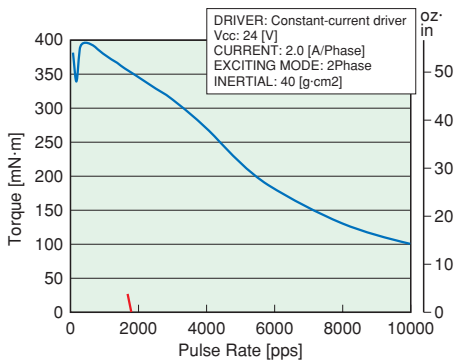

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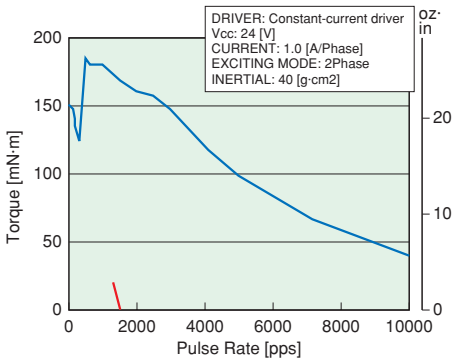

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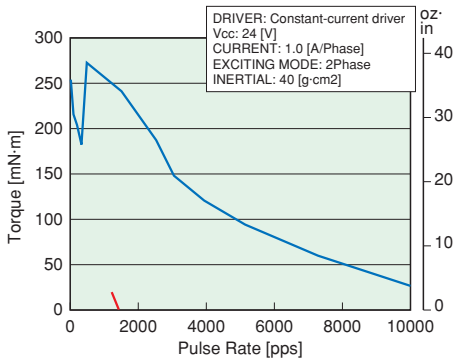

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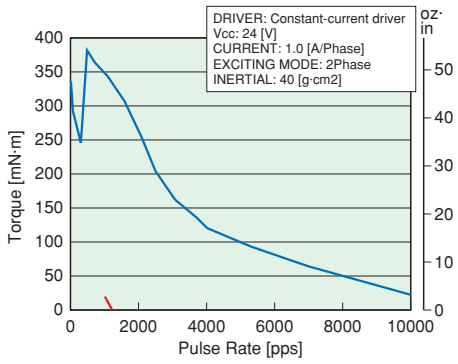
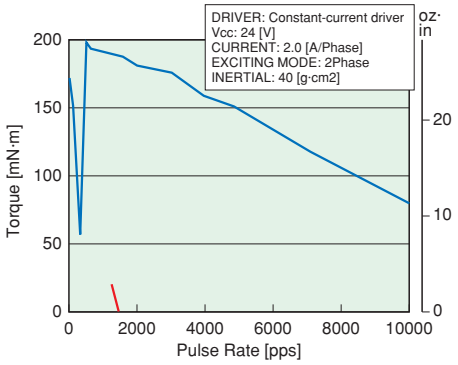


BIPOLAR

KA50HM2-551



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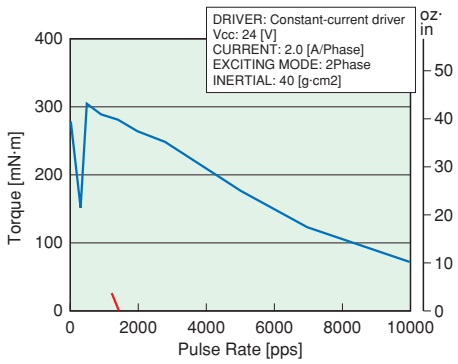

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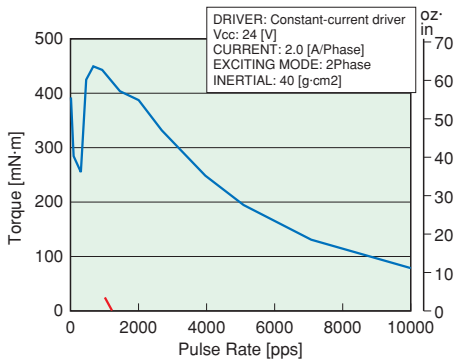

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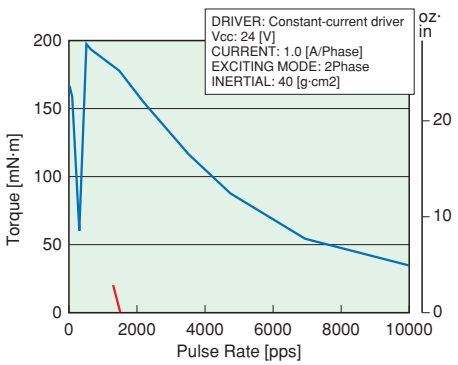

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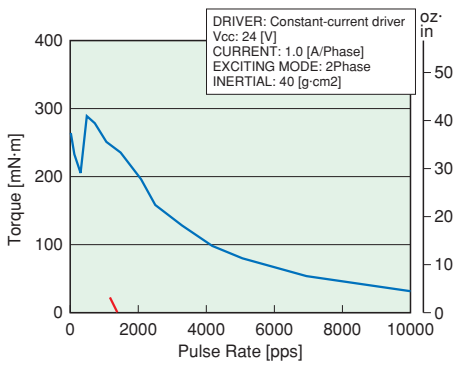

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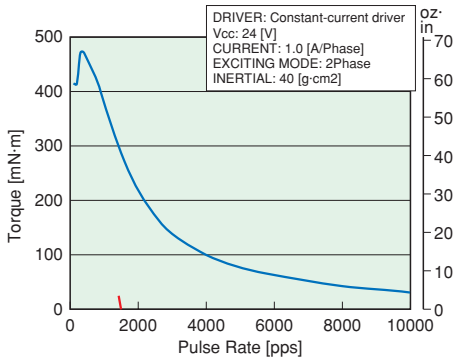


KA60 Series (1.8 degree/step)

Standard Specifications

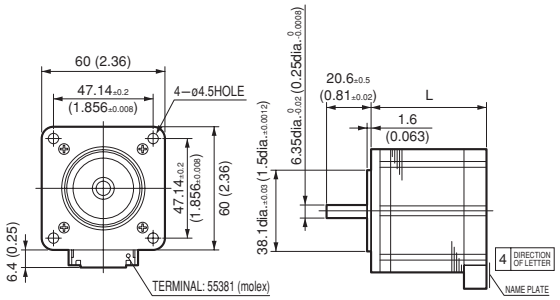
UNIPOLAR

Model	Step angle	Voltage	Current	Resistance	Inductance	Holding torque		Detent torque		Rotor inertia	
Dimension	degree/step	V/Ø	A/Ø	Ω/Ø	mH/Ø	mN·m	oz·in	mN·m	oz·in	g·cm²	oz·in²
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/Ø	A/Ø	Ω/Ø	mH/Ø	mN·m	oz·in	mN·m	oz·in	g·cm²	oz·in²
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

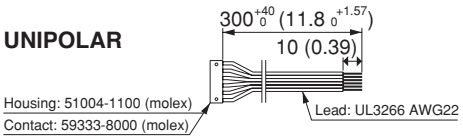
Outline unit = mm (inch)



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



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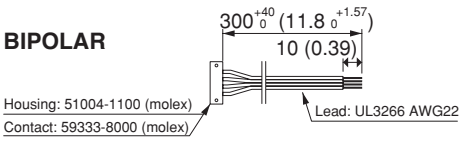
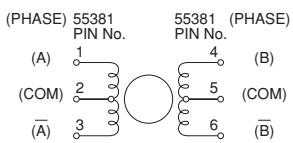


Connection Diagrams

Rotational direction

UNIPOLAR



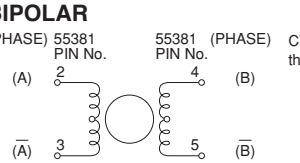
CW viewed from rotor shaft when using the following sequence diagram.

51004-1100(PIN No.)	1	3	5	7	9	11
(PHASE)	A	A com	Ā	B	B com	B̄
COLOR OF LEAD	BLACK	RED	BROWN	YELLOW	BLUE	ORANGE

EXCITING SEQUENCE

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

BIPOLAR



CW viewed from rotor shaft when using the following sequence diagram.

51004-1100(PIN No.)	3	5	7	9
(PHASE)	A	Ā	B	B̄
COLOR OF LEAD	RED	BLUE	YELLOW	WHITE

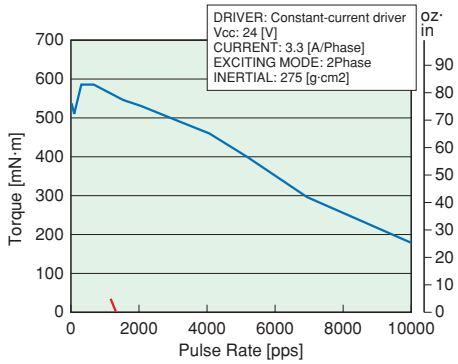
EXCITING SEQUENCE

55381 PIN No.	51004-1100 PIN No.	PHASE	1	2	3	4
2	3	A	−	+	+	−
4	7	B	−	−	+	+
3	5	Ā	+	−	−	+
5	9	B̄	+	+	−	−

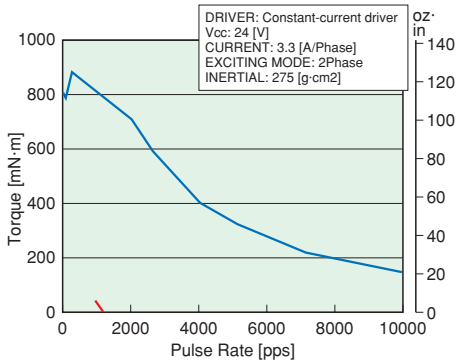
Speed-Torque Characteristics

UNIPOLAR

KA60JM2-501



KA60KM2-501



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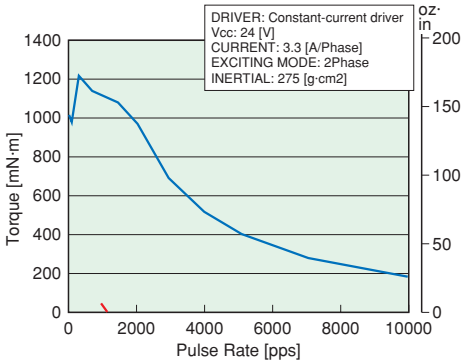

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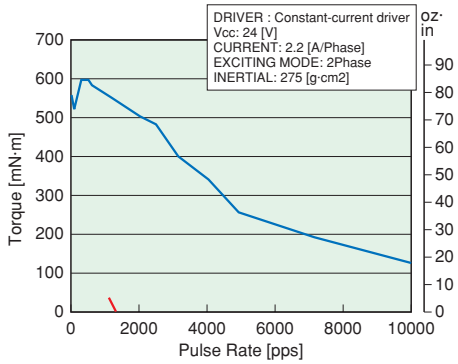

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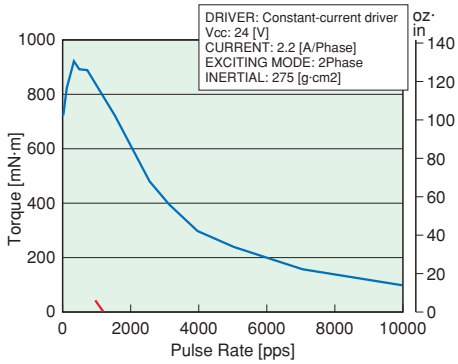

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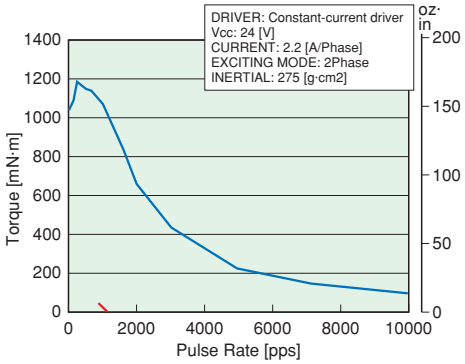
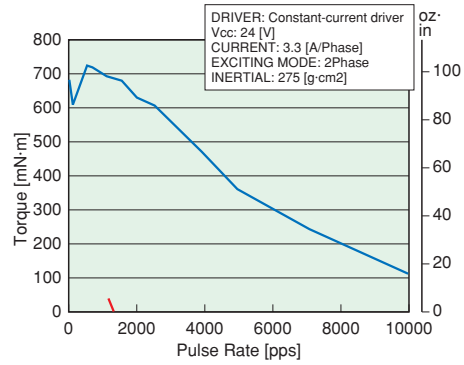
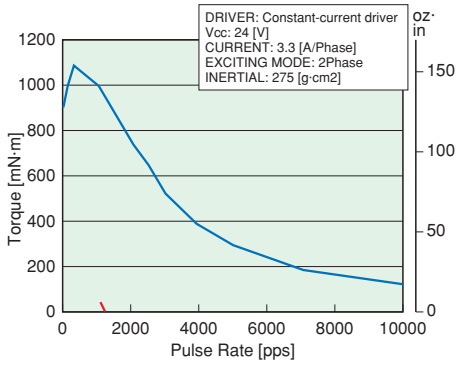


BIPOLAR

KA60JM2-551



KA60KM2-551



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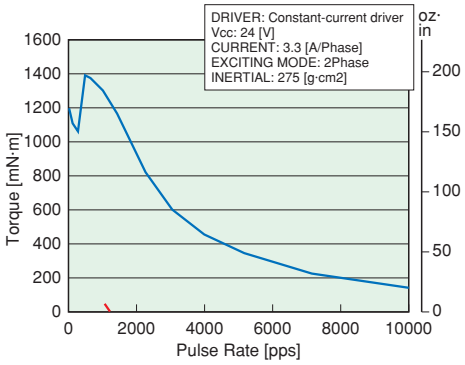

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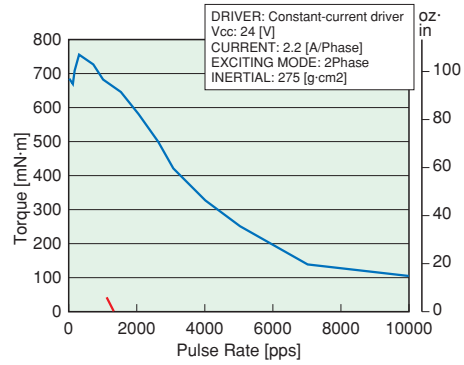

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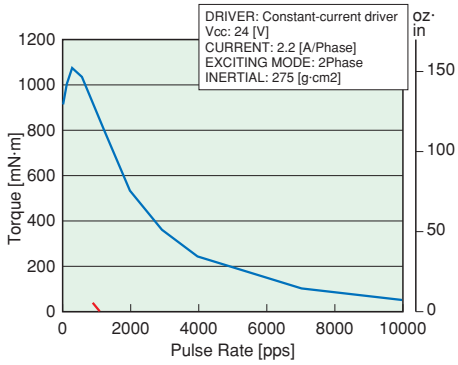

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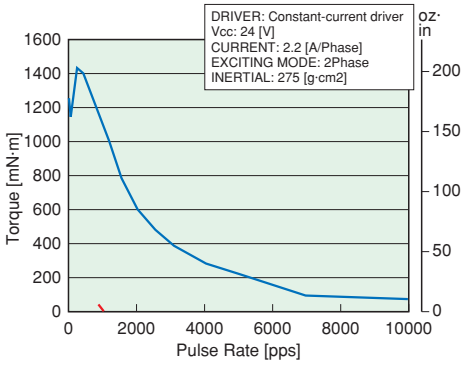


KA50 Series (0.9 degree/step)

High-resolution Motors

Standard Specifications

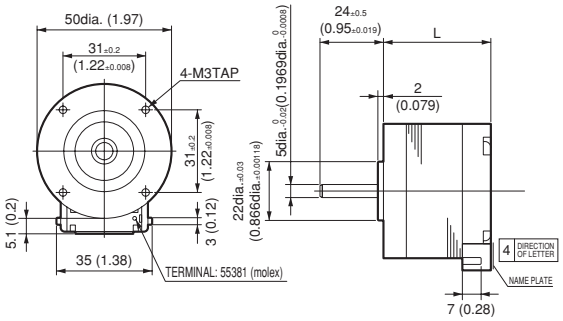
UNIPOLAR

Model	Step angle	Voltage	Current	Resistance	Inductance	Holding torque		Detent torque		Rotor inertia	
Dimension	degree/step	V/Ø	A/Ø	Ω/Ø	mH/Ø	mN·m	oz·in	mN·m	oz·in	g·cm²	oz·in²
KA50HM1-501	0.9	2.12	2.0	1.06	1.15	185	26	10	1.4	50	0.3
KA50HM1-502		4.20	1.0	4.20	4.40	185	26	10	1.4	50	0.3
KA50JM1-501		2.46	2.0	1.23	1.60	304	43	12	1.7	70	0.4
KA50JM1-502		5.00	1.0	5.00	6.90	304	43	12	1.7	70	0.4
KA50KM1-501		3.32	2.0	1.66	2.10	403	57	18	2.5	100	0.5
KA50KM1-502		6.70	1.0	6.70	8.60	403	57	18	2.5	100	0.5

BIPOLAR

Model	Step angle	Voltage	Current	Resistance	Inductance	Holding torque		Detent torque		Rotor inertia	
Dimension	degree/step	V/Ø	A/Ø	Ω/Ø	mH/Ø	mN·m	oz·in	mN·m	oz·in	g·cm²	oz·in²
KA50HM1-551	0.9	1.66	2.0	0.83	1.60	215	30	10	1.4	50	0.3
KA50HM1-552		3.20	1.0	3.20	6.60	215	30	10	1.4	50	0.3
KA50JM1-551		1.96	2.0	0.98	2.30	347	49	12	1.7	70	0.4
KA50JM1-552		3.80	1.0	3.80	9.10	347	49	12	1.7	70	0.4
KA50KM1-551		2.60	2.0	1.30	3.10	458	65	18	2.5	100	0.5
KA50KM1-552		5.10	1.0	5.10	11.00	458	65	18	2.5	100	0.5

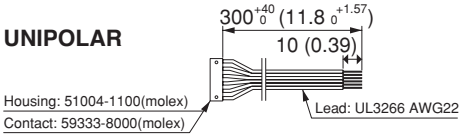
Outline unit = mm (inch)



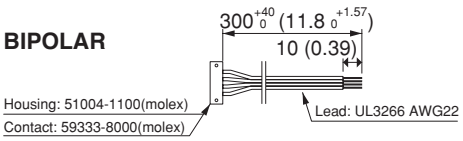
model	L[mm]	L[inch]	mass[g]	weight[lb]
KA50HM1	35	1.38	230	0.5
KA50JM1	40	1.57	300	0.7
KA50KM1	50	1.97	420	0.9

Accessories: Lead assy

UNIPOLAR



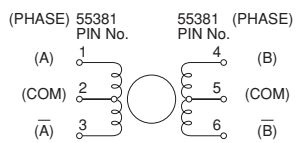
BIPOLAR



Connection Diagrams

Rotational direction

UNIPOLAR



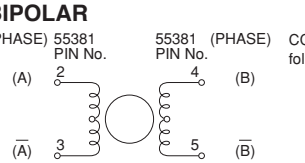
CCW viewed from rotor shaft when using the following sequence diagram.

51004-1100 (PIN No.)	1	3	5	7	9	11
(PHASE)	A	A com	Ā	B	B com	B̄
COLOR OF LEAD	BLACK	RED	BROWN	YELLOW	BLUE	ORANGE

EXCITING SEQUENCE

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

BIPOLAR



CCW viewed from rotor shaft when using the following sequence diagram.

51004-1100 (PIN No.)	3	5	7	9
(PHASE)	A	Ā	B	B̄
COLOR OF LEAD	RED	BLUE	YELLOW	WHITE

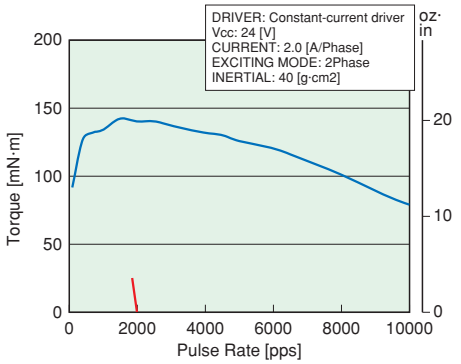
EXCITING SEQUENCE

55381 PIN No.	51004-1100 PIN No.	PHASE	1	2	3	4
2	3	A	−	+	+	−
4	7	B	−	−	+	+
3	5	Ā	+	−	−	+
5	9	B̄	+	+	−	−

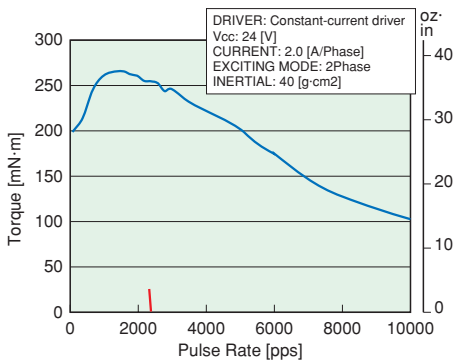
Speed-Torque Characteristics

UNIPOLAR

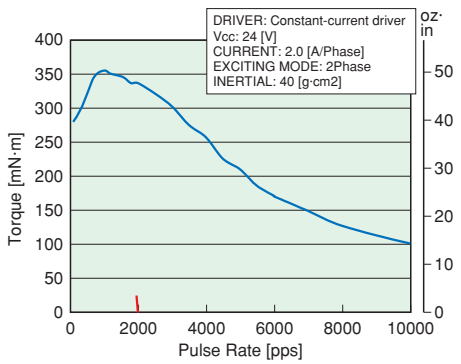
KA50HM1-501



KA50JM1-501



KA50KM1-501



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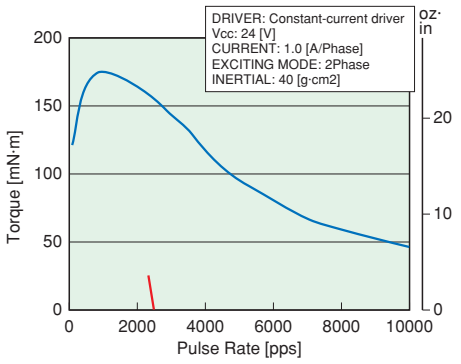
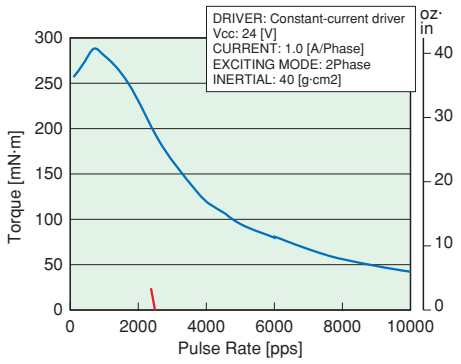
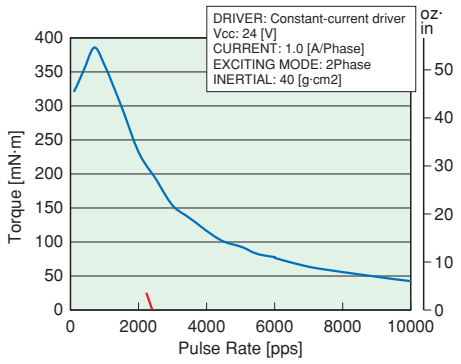


KA50JM1-502

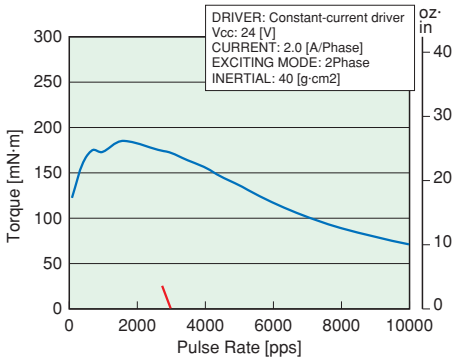


KA50KM1-502



BIPOLAR

KA50HM1-551



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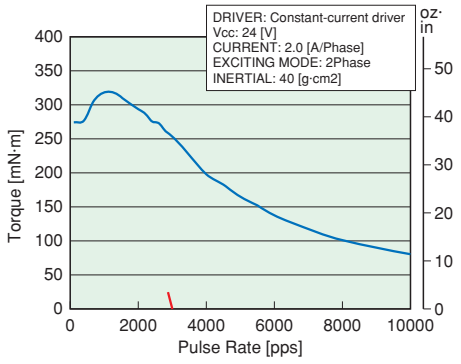

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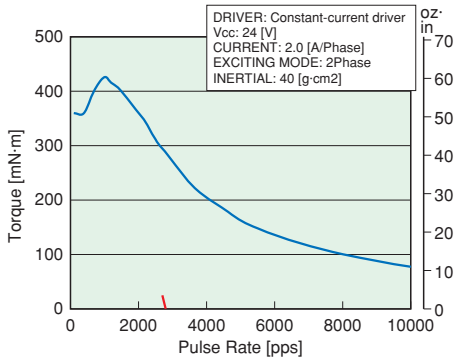
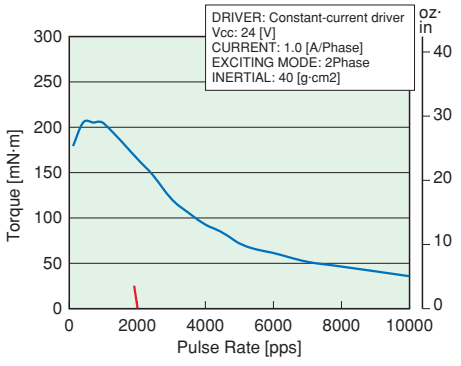
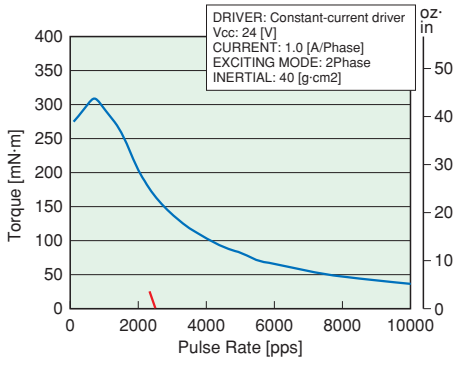


KA50HM1-552



KA50JM1-552



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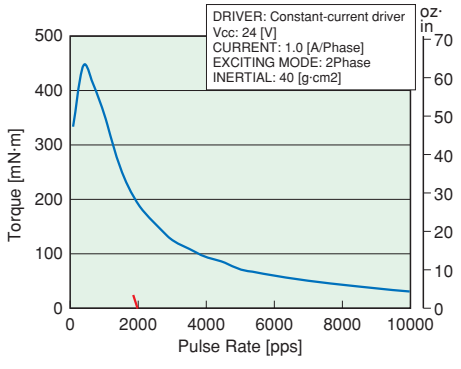


KA Series Semi-Standard

Motor with D-cut Single Shaft

(Model example)
KA50JM2-501 ⇒ KA50JM2-501**01**

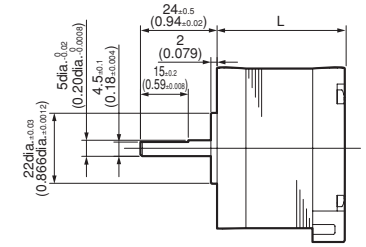
Model List

	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
	KA50KM2-50201	KA60LM2-50201	KA50KM1-50201
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
	KA50KM2-55201	KA60LM2-55201	KA50KM1-55201

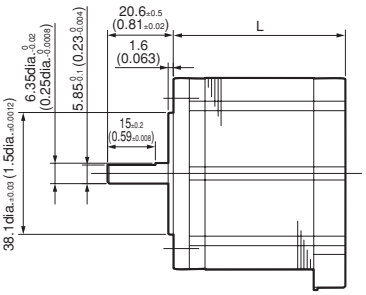
The basic motor characteristics, connection diagrams, and accessories (lead connectors) conform to the standard specifications.

Outline unit = mm (inch)

Single shaft specification



model	L[mm]	L[inch]	mass[g]	weight[lb]
KA50HM	35	1.38	230	0.5
KA50JM	40	1.57	300	0.7
KA50KM	50	1.97	420	0.9



model	L[mm]	L[inch]	mass[g]	weight[lb]
KA60JM	44	1.73	500	1.1
KA60KM	54	2.13	700	1.5
KA60LM	65	2.56	850	1.9

Motor with D-cut Double Shaft

(Model example)
UNIPOLAR KA50JM2-501 ⇒ KA50JM2-5**1**1
BIPOLAR KA50JM2-551 ⇒ KA50JM2-5**6**1

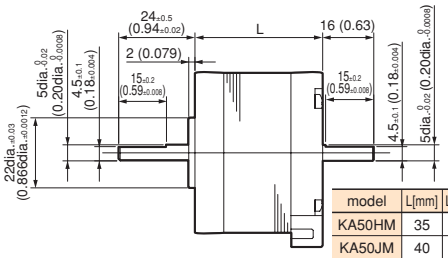
Model List

	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
	KA50KM2-512	KA60LM2-512	KA50KM1-512
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
	KA50KM2-562	KA60LM2-562	KA50KM1-562

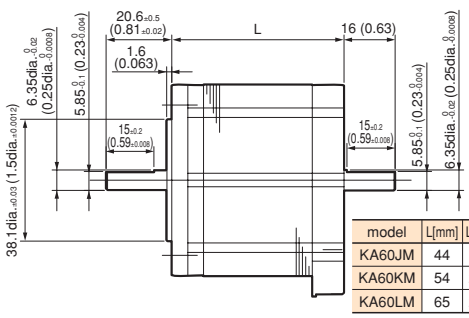
The basic motor characteristics, connection diagrams, and accessories (lead connectors) conform to the standard specifications.

Outline unit = mm (inch)

Double shaft specification



model	L[mm]	L[inch]	mass[g]	weight[lb]
KA50HM	35	1.38	230	0.5
KA50JM	40	1.57	300	0.7
KA50KM	50	1.97	420	0.9



model	L[mm]	L[inch]	mass[g]	weight[lb]
KA60JM	44	1.73	500	1.1
KA60KM	54	2.13	700	1.5
KA60LM	65	2.56	850	1.9

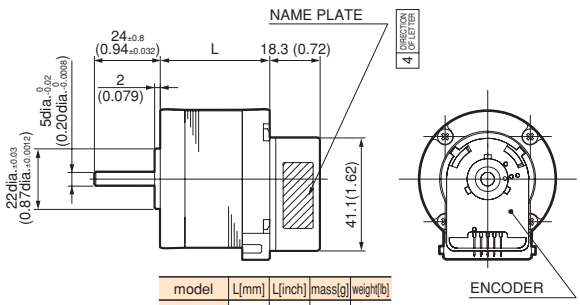
Motor with Encoder

(Model example)
KA50JM2-501 ⇒ 2 Channel KA50JM2**E2**-501
3 Channel KA50JM2**E3**-501

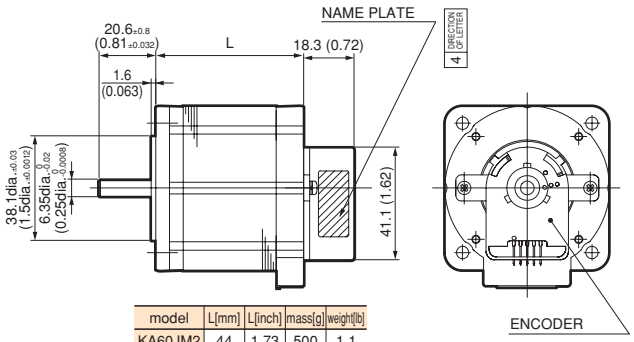
Model List

	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)



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



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

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

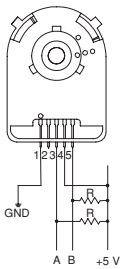
Recommended pull-up resistor value

	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.

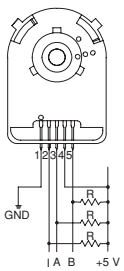
Connection diagrams

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

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Nidec Taiwan Corporation.
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WARNING

- Please do not exceed the specifications noted in this catalogue, otherwise there is a chance of electric shock, injury, or other damage.
- Any modifications made to this motor are beyond the limits of our guarantee NIDEC SERVO cannot take responsibility for any customer modifications.
- Please ensure that a thorough evaluation has been done before using this motor in medical equipment or other devices related to human lives.
- Please ensure that a thorough evaluation has been done before using this motor in applications that have a serious effect on the public.

NOTE

- Figures in this catalogue are average measured values. Please request the product delivery specification when preparing a purchase specification.
- The dimensions, specifications, and components contained in this catalogue are subject to change without prior notice due to further product improvements.

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