Ever ELETTRONICA

Motors & Full Digital (Servo) Drives

The clever drive

Electronics for Industrial Automation

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Stepper Motor Theory

Motors convert electrical energy into mechanical energy. A stepper motor converts electrical pulses into specific rotational movements. The movement created by each pulse is precise and repeatable,which is why stepper motors are so effective for potioning applications.

Permanent Magnet stpper motors incorporate a permanent magnet rotor, coil windings and magnetically conductive stators. Energizing a coil winding creates an electromagnetic field with a north and south pole as shown in figure. The stator carries the magnetic field. The magnetic field can be altered by sequentially energizing or "stepping "the stator coils which generates rotary motion.

Figure 1 illustrates a typical step sequence for a two phase motor. In Step 1 phase A of a two phase stator is energized. This magnetically locks the rotor in the position shown,since unlike poles attract, when phase A is turned off and phase B is turned on, the rotor rotates 90° clockwise. In step 3, phase B is turned on but with the polarty reversed from Step 1, this causes another 90°rotation. In Step 4, phase A is turned off and phase B is turned on, with polarity reversed from Step2. Repeating this sequence causes the rotor to rotate clockwise in 90° steps.

The stepping sequence illustrated in figure 1 is called "one phase on" stepping. A more common method of stepping is "two phase on" where both phases of the motor are always energized. However, only the polarty of phase is switched at a time, as shown in figure 2. With two phase on stepping the rotor aligns itself between the "average" north and "average" south magnetic poles. Since both phases are always on, this method gives 41.4% more torque than "one phase on" stepping.

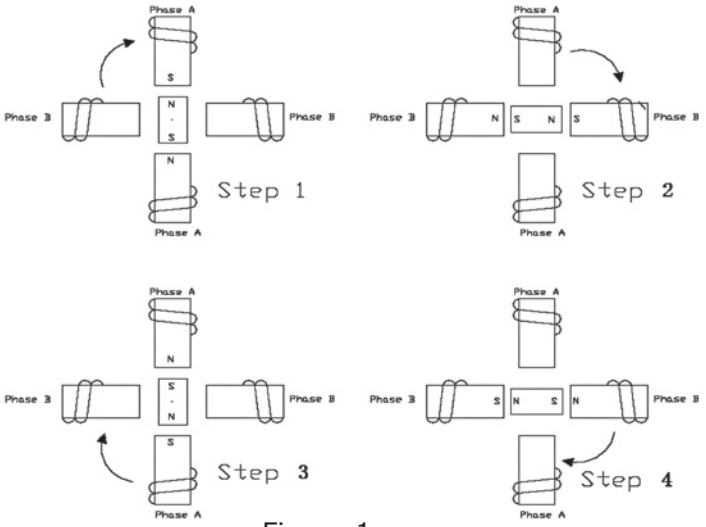

Figure 1

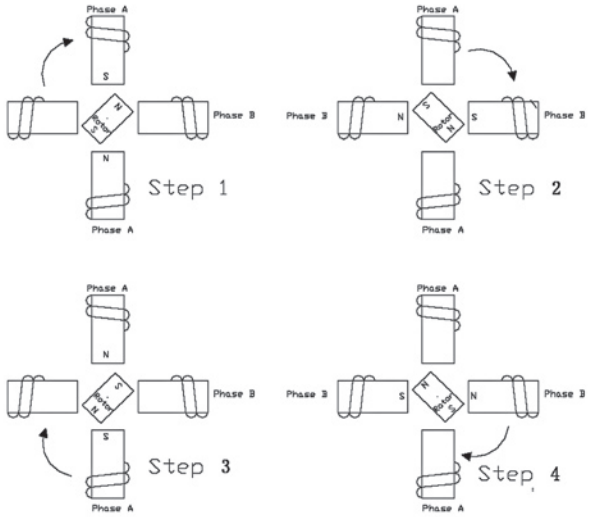

Figure 2

Half Stepping

The motor can also be "half stepped" by inserting an off state between transitioning phases. This cuts a stepper's full step angle in half. For example, a 90° stepping motor would move 45° on each half step, figure 3. However, half stepping typically results in a 15%-30% loss of torque depending on step rate when compared to the two phase on stepping sequence. Since one of the windings is not energized during each alternating half step there is less electromagnetic force exerted on the rotor resulting in a net loss of torque.

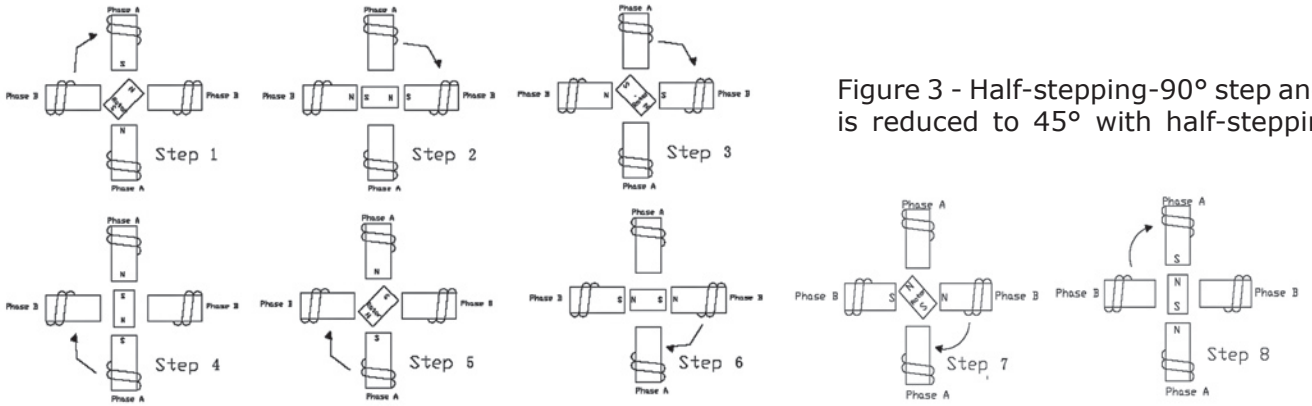

Figure 3 - Half-stepping-90° step angle is reduced to 45° with half-stepping.

DC Brush Motor

Principles of operation

The differences between a DC motor having a mechanical commutation system and a BLDC motor are mainly found in :

- the product concept
- the commutation of phase currents.

From the user's point of view, brushless DC motors follow the same equations as those with brushes: torque is proportional to current, speed depends on the voltage and the load torque.

The commutation of brushless motors

In the conventional DC motor commutation takes place mechanically through the commutator-and-brush system. In a BLDC motor, commutation is done by electronic means. In that case the instantaneous rotor position must be known in order to determine the phases to be energized.

The angular rotor position can be known by:

- using a position sensor (Hall sensor, optical encoder, resolver)
- electronically analyzing the back-EMF of a non-energised winding. This is called sensorless commutation.

Use of Hall sensors

In general, BLDC motor have three phase windings. The easiest way is to power two of them at a time, using Hall sensors to know the rotor position. A simple logic allows for optimal energizing of the phases as a function of rotor position, just like the commutator and brushes are doing in the conventional DC motor.

Use of an encoder or resolver

The rotor position may also be known by use of an encoder or resolver. Commutation may be done very simply, similar to the procedure with Hall sensors, or it may be more complex by modulating sinusoidal currents in the three phases. This is called vector control, and its advantage is to provide a torque ripple of theoretically zero, as well as a high resolution for precise positioning.

Use of Back-EMF analysis

A third option requiring no position sensor is the use of a particular electronic circuit. The motor has only three hook-up wires, the three phase windings are connected in either triangle or star. In the latter case, resistors must be used to generate a zero reference voltage. With this solution the motor includes no sensors or electronic components and it is therefore highly insensitive to hostile environments. For applications such as hand-held tools, where the cable is constantly moved, the fact of just three wires is another advantage.

The functioning of a sensorless motor is easy to understand. In all motors, the relation of back-EMF and torque versus rotor position is the same. Zero crossing of the voltage induced in the non-energised winding corresponds to the position of maximum torque generated by the two energized phases. This point of zero crossing therefore allows to determine the moment when the following commutation should take place depending on motor speed. This time interval is in fact equivalent to the time the motor takes to move from the position of the preceding commutation to the back-EMF zero crossing position. Electronic circuits designed for this commutation function allow for easy operation of sensorless motors.

As the back-EMF information is necessary to know the rotor position, sensorless commutation doesn't work with the motor at stall. The only way of starting is to pilot it at low speed like a stepper in open loop.

Remember:

- for commutation, position sensors are necessary when operating in incremental mode

-sensorless commutation is recommended only for applications running at constant speed and load.

Operating principle of BLDC motors:

It follows the same equations as the DC motor using mechanical commutation except that parameters like iron losses and losses in the drive circuit are no longer negligible in applications where efficiency is of prime importance.

Iron losses

They depend on speed and, in the torque formula, may be introduced as viscous friction. The equation for useful motor torque becomes:

$Mm = k \cdot Im - kv \cdot \omega - Mf$

With Mm= motor useful torque

k = torque constant

Im = motor current

kv = viscous coefficient for iron losses

ω = angular velocity

Mf = bearing friction

Losses in the electronics

The current and votage required by the motor and the drive circuit to operated at the desired speed and torque depend also on the drive circuit.

As an example, a driver bridge in bipolar technique will reduce the voltage available at the motor terminals by about 1.7V, and the total current must include the consumption of the circuitry.

Small Brushless DC Motor

Principles of operation

The differences between a DC motor having a mechanical commutation system and a BLDC motor are mainly found in :

- the product concept
- the commutation of phase currents.

From the user's point of view, brushless DC motors follow the same equations as those with brushes: torque is proportional to current, speed depends on the voltage and the load torque.

The commutation of brushless motors

In the conventional DC motor commutation takes place mechanically through the commutator-and-brush system. In a BLDC motor, commutation is done by electronic means. In that case the instantaneous rotor position must be known in order to determine the phases to be energized. The angular rotor position can be known by:

- using a position sensor (Hall sensor, optical encoder, resolver)
- electronically analyzing the back-EMF of a non-energised winding. This is called sensorless commutation.

Use of Hall sensors

In general, BLDC motor have three phase windings. The easiest way is to power two of them at a time, using Hall sensors to know the rotor position. A simple logic allows for optimal energizing of the phases as a function of rotor position, just like the commutator and brushes are doing in the conventional DC motor.

Use of an encoder or resolver

The rotor position may also be known by use of an encoder or resolver. Commutation may be done very simply, similar to the procedure with Hall sensors, or it may be more complex by modulating sinusoidal currents in the three phases. This is called vector control, and its advantage is to provide a torque ripple of theoretically zero, as well as a high resolution for precise positioning.

Use of Back-EMF analysis

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Operating principle of BLDC motors:

It follows the same equations as the DC motor using mechanical commutation except that parameters like iron losses and losses in the drive circuit are no longer negligible in applications where efficiency is of prime importance.

Iron losses

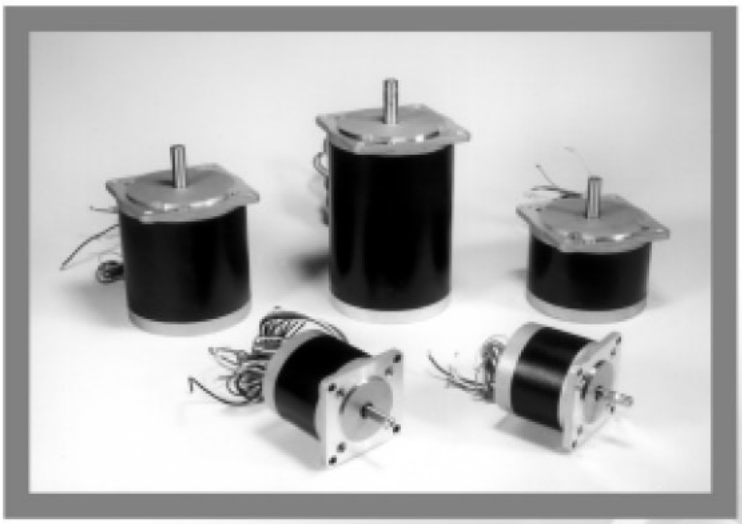
They depend on speed and, in the torque formula, may be introduced as viscous friction. The equation for useful motor torque becomes: $M_m = k \cdot I_m - k_v \cdot \omega - M_f$

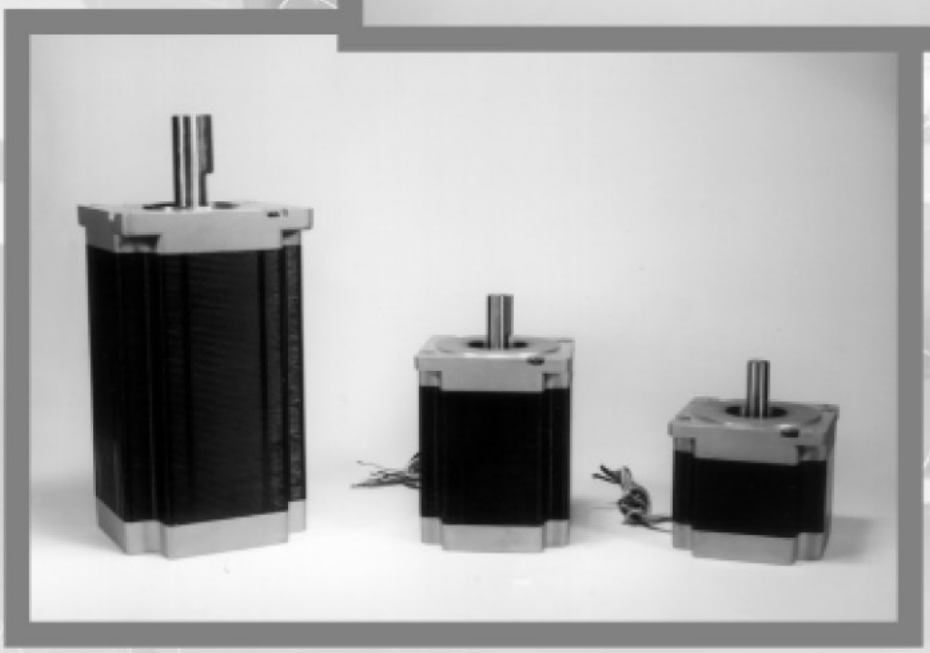
With
- M_m = motor useful torque
- k = torque constant
- I_m = motor current
- k_v = viscous coefficient for iron losses
- ω = angular velocity
- M_f = bearing friction

Losses in the electronics

The current and votage required by the motor and the drive circuit to operated at the desired speed and torque depend also on the drive circuit.

As an example, a driver bridge in bipolar technique will reduce the voltage available at the motor terminals by about 1.7V, and the total current must include the consumption of the circuitry.





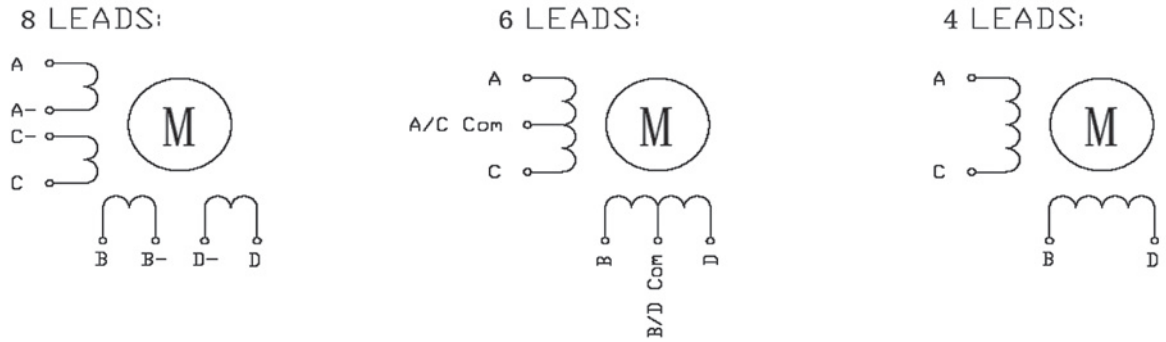
HB Stepping Motor and HB Stepping Gearmotor

- **Product Number Code For Hybrid Stepping Motor**

MT 34 FN 31 060 M 8 x x

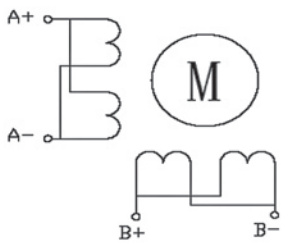
- MT — Ever Electronics motor from catalog
- 34 — Motor frame size (incs.*10)
- FN — Ever Electronics motor family
- 31 — Motor case length (incs. *10 or # of stacks code)
- 060 — Winding phase current (Amps *10)
- M — Shafts configuration (M = Single shaft) (B = Double shaft)
- 8 — Number of lead wires: 4, 6 or 8
- x x — Numbers of code for options:
  (es.: G# = gearbox)
  (es.: K# = keyset)
  (es.: T# = threaded shaft)
  (es.: ## = more customizations)

- **Wiring Diagram**

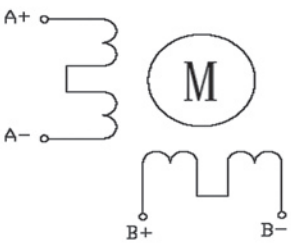


8 Leads:

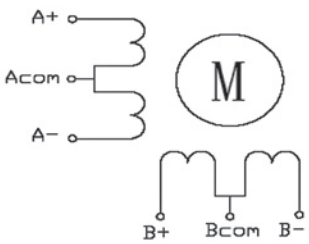
1. Bipolar (parallel) connection



2.Bipolar (series) connection



3.Unipolar conection



1.8° Size 20mm High Torque Hybrid Stepping Motor

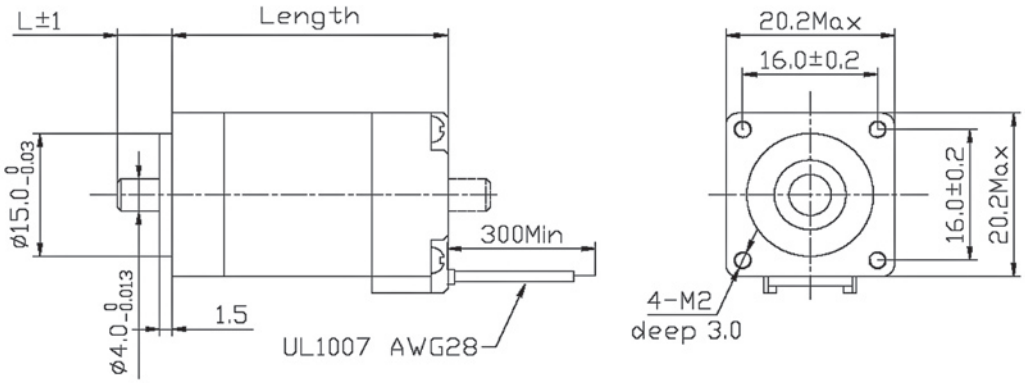
• General Specification for High Torque Hybrid Stepping Motor

Item	Specifications
Step Angle	1.8˚
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80˚C Max. (rated current, 2 phase on)
Ambient Temperature	-20˚C~+50˚C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	20N
Max. axial force	2N

• Size 20mm High Torque Hybrid Stepping Motor Specifications

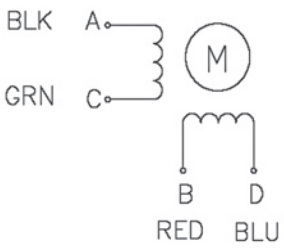
Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Length
Single Shaft	Double Shaft	V	A	Ω	mH	g.cm	#	kg-m²	kg	mm
MT08FP12006M4	MT08FP12006B4	3.9	0.6	6.5	1.7	180	4	$2.0x10^{-7}$	0.06	30
MT08FP14006M4	MT08FP14006B4	3.9	0.6	6.5	1.7	180	4	$2.0x10^{-7}$	0.06	33
MT08FP17008M4	MT08FP17008B4	4.32	0.8	5.4	1.5	300	4	$3.6x10^{-7}$	0.08	42

• Dimensions



L= 6.5, 6.5, 15

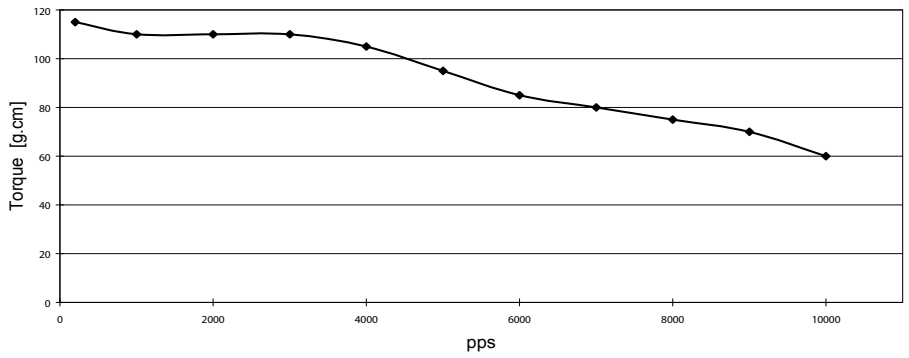
• Wiring Diagram



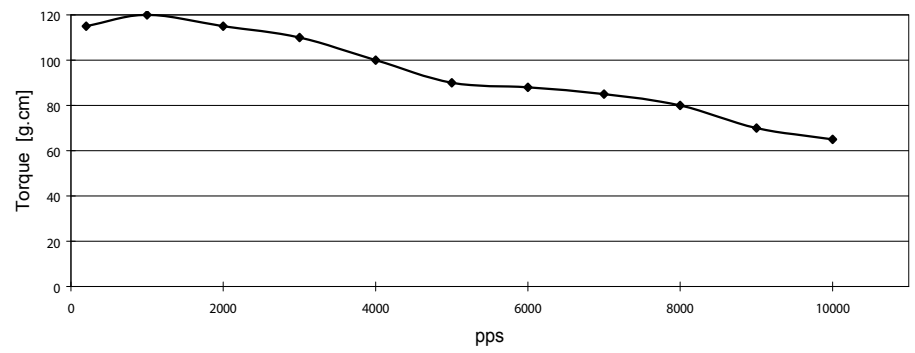
1.8° Size 20mm High Torque Hybrid Stepping Motor

- **Pull out Torque Curve**

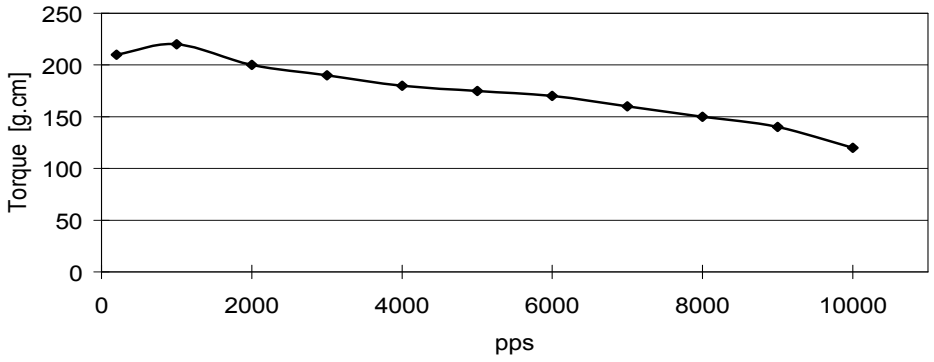
MT08FP12006M4 / MT08FP12006B4
24Vdc 0.6A/Phase Driver: full step



MT08FP14006M4 / MT08FP14006B4
24Vdc 0.6A/Phase Driver: full step



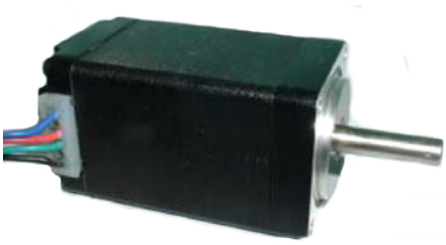
MT08FP17008M4 / MT08FP17008B4
24Vdc 0.78A/Phase Driver: full step



1.8° Size 28mm High Torque Hybrid Stepping Motor

• General Specification for High Torque Hybrid Stepping Motor

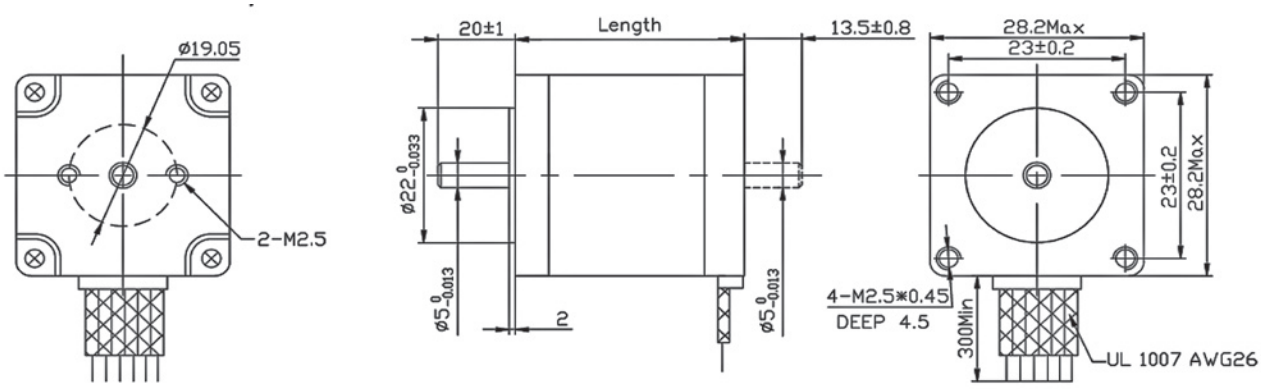
Item	Specifications
Step Angle	1.8°
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80°C Max. (rated current, 2 phase on)
Ambient Temperature	-20°C~+50°C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	28N (20mm from the flange)
Max. axial force	10N



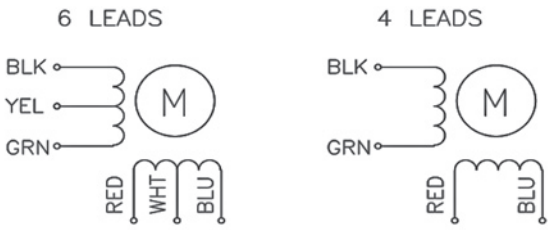
• Size 28mm High Torque Hybrid Stepping Motor Specifications

Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Length
Single Shaft	Double Shaft	V	A	Ω	mH	g.cm	#	kg-m²	kg	mm
MT12FP13009M6	MT12FP13009B6	2.66	0.95	2.8	0.8	430	6	$9.0x10^{-7}$	0.11	31.5
MT12FP13007M4	MT12FP13007B4	3.8	0.67	5.6	3.4	600	4			
MT12FP18009M6	MT12FP18009B6	3.4	0.95	3.4	1.2	750	6	$12x10^{-7}$	0.08	44.5
MT12FP18007M4	MT12FP18007B4	4.56	0.67	6.8	4.9	950	4			
MT12FP20009M6	MT12FP20009B6	4.4	0.95	4.6	1.8	900	6	$18x10^{-7}$	0.2	50.5
MT12FP20007M4	MT12FP20007B4	6.2	0.67	9.2	7.2	1200	4			

• Dimension



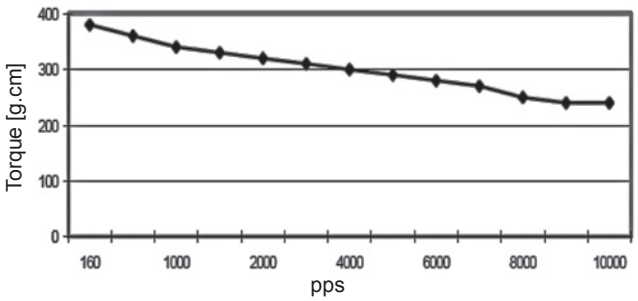
• Wiring Diagram



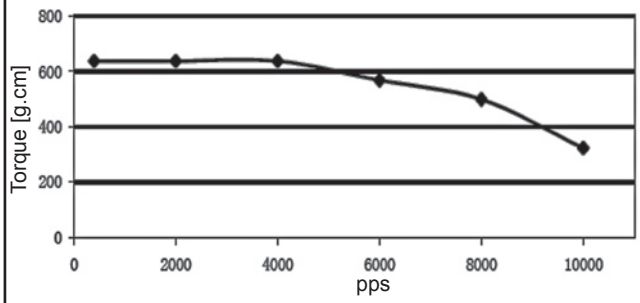
1.8° Size 28mm High Torque Hybrid Stepping Motor

- **Pull out Torque Curve**

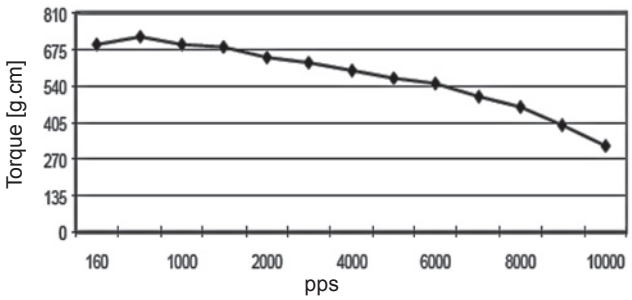
MT12FP13009M6 / MT12FP13009B6
24Vdc 0.95A/Phase Driver: half step



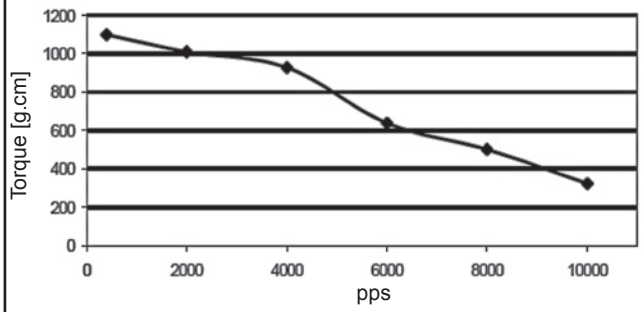
MT12FP13007M4 / MT12FP13007B4
24Vdc 0.74A/Phase Driver: half step



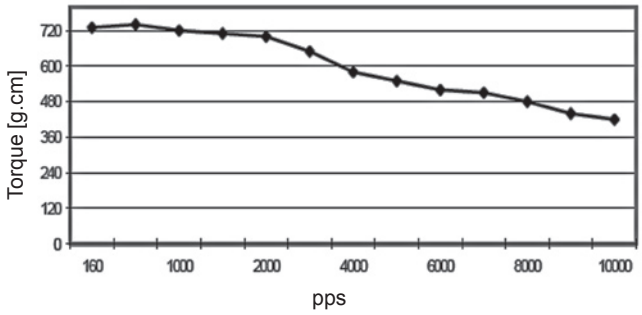
MT12FP18009M6 / MT12FP18009B6
24Vdc 0.95A/Phase Driver: half step



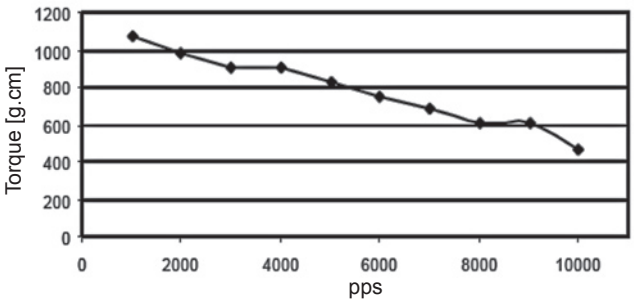
MT12FP18007M4 / MT12FP18007B4
24Vdc 0.74A/Phase Driver: half step



MT12FP20009M6 / MT12FP20009B6
24Vdc 0.95A/Phase Driver: half step



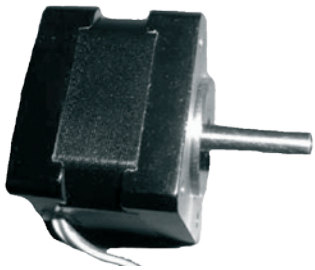
MT12FP20007M4 / MT12FP20007B4
24Vdc 0.74A/Phase Driver: half step



1.8° Size 35mm Hybrid Stepping Motor

• General Specification for Hybrid Stepping Motor

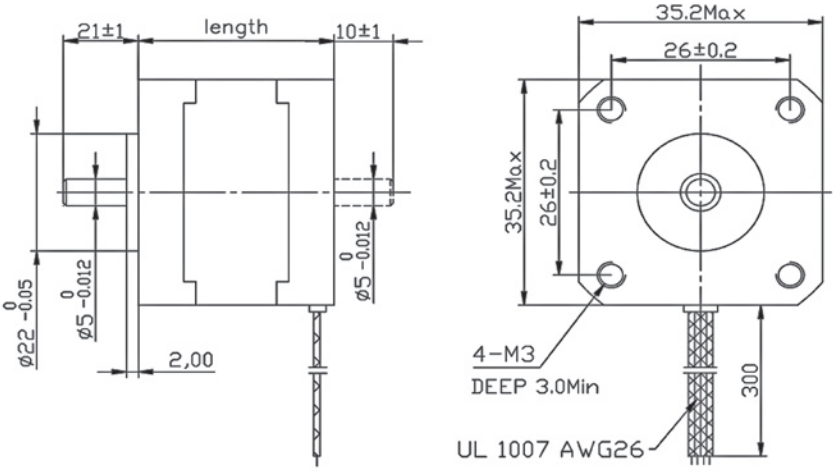
Item	Specifications
Step Angle	1.8°
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80°C Max. (rated current, 2 phase on)
Ambient Temperature	-20°C~+50°C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	28N (20mm from the flange)
Max. axial force	10N



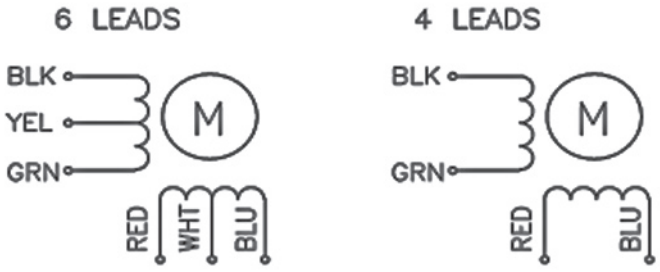
• Size 35mm Hybrid Stepping Motor Specifications

Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	V	A	Ω	mH	g.cm	#	g-cm²	kg	g-cm	mm
MT14FP10003M4	MT14FP10003B4	7.4	0.28	26	27	700	4	10	0.13	60	26
MT14FP11005M4	MT14FP11005B4	10	0.5	20	14	1000	4	11	0.14	80	28
MT14FP14010M4	MT14FP14010M4	2.7	1.0	2.7	4.3	1400	4	14	0.18	100	36

• Dimension



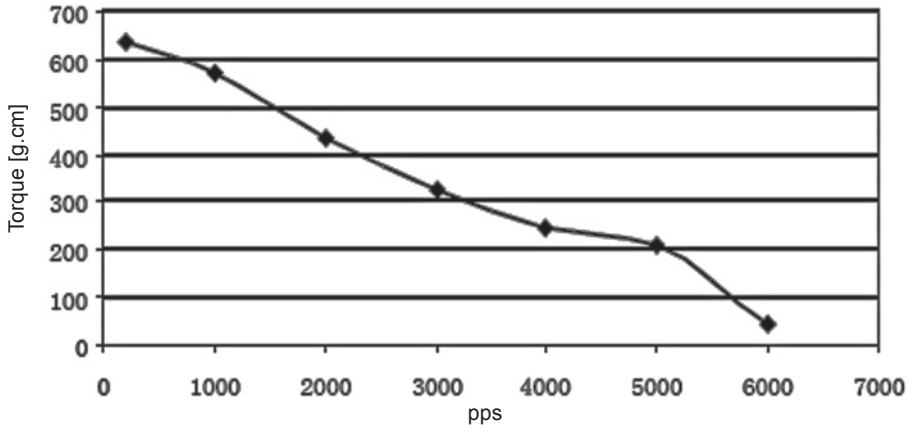
• Wiring Diagram



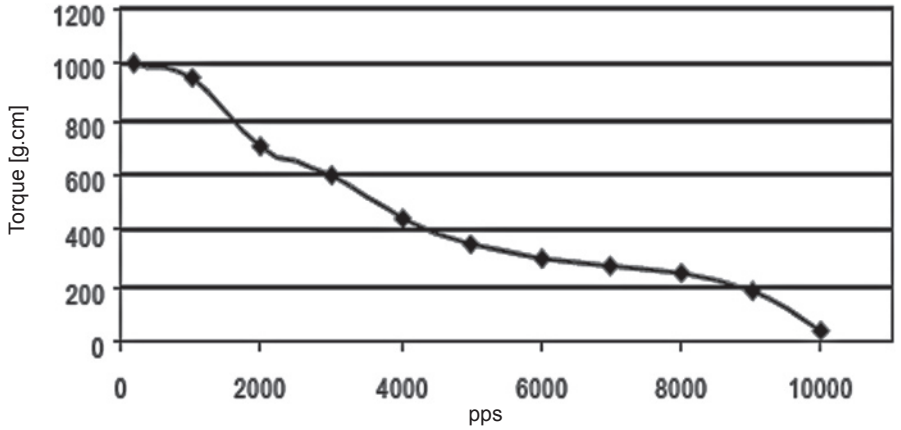
1.8° Size 35mm Hybrid Stepping Motor

- **Pull out Torque Curve**

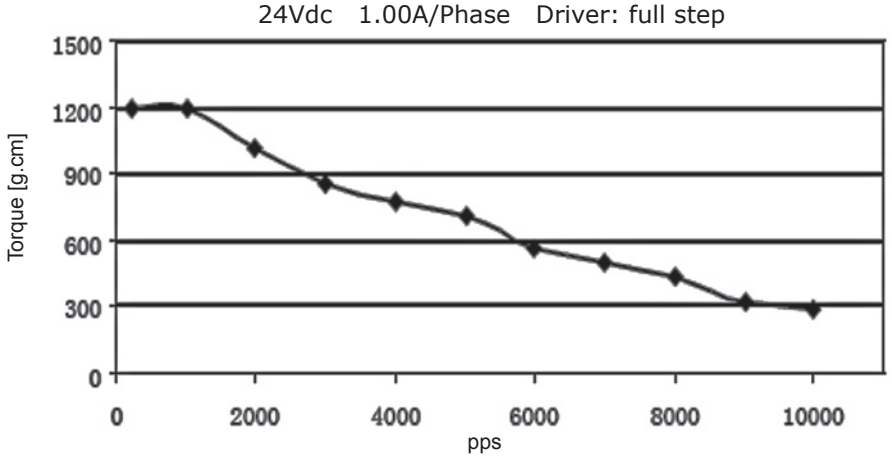
MT14FP10003M4 / MT14FP10003B4
24Vdc 0.28A/Phase Driver: full step



MT14FP11005M4 / MT14FP11005B4
24Vdc 0.5A/Phase Driver: full step



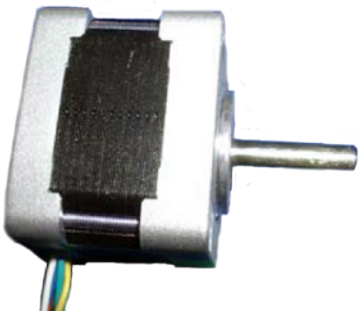
MT14FP14010M4 / MT14FP14040B4
24Vdc 1.00A/Phase Driver: full step



1.8° Size 39mm Hybrid Stepping Motor

• General Specification for Hybrid Stepping Motor

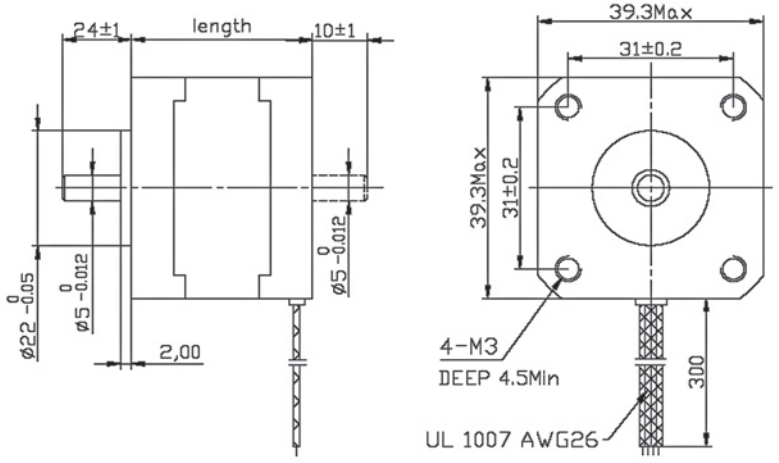
Item	Specifications
Step Angle	1.8˚
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80˚C Max. (rated current, 2 phase on)
Ambient Temperature	-20˚C~+50˚C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	28N (20mm from the flange)
Max. axial force	10N



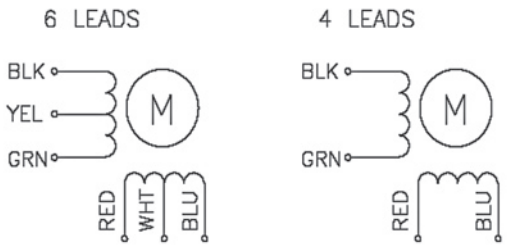
• Size 39mm Hybrid Stepping Motor Specifications

Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	V	A	Ω	mH	g.cm	#	g-cm²	kg	g-cm	mm
MT16FP08004M4	MT16FP08004B4	2.64	0.4	6.6	7.5	650	4	11	0.12	50	20
MT16FP08005M6	MT14FP08005B6	6.5	0.5	13	7.5	800	6				
MT16FP14004M4	MT16FP14004B4	12	0.4	30	32	2100	4	20	0.18	120	34
MT16FP14003M6	MT16FP14003B6	12	0.3	40	20	1300	6				
MT16FP15005M4	MT16FP15005B4	12	0.5	24	45	2900	4	24	0.2	180	38
MT16FP15008M6	MT16FP15008B6	6	0.8	7.5	6	2000	6				
MT16FP18003M4	MT16FP18003B4	12	0.3	40	100	2800	4	40	0.25	250	44

• Dimension



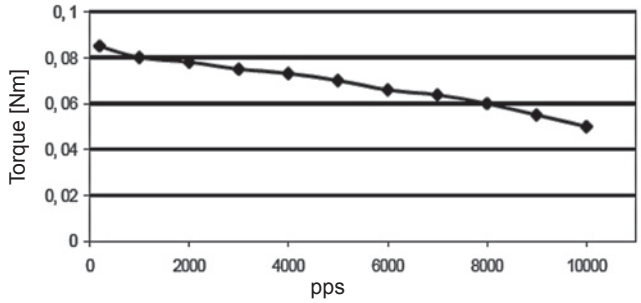
• Wiring Diagram



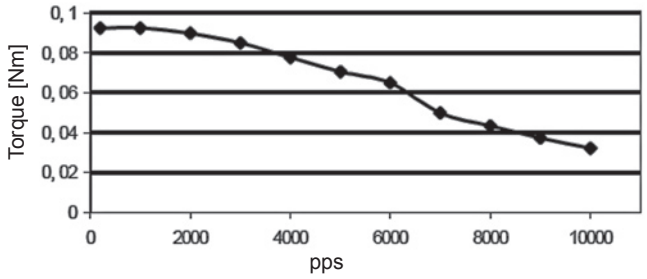
1.8° Size 39mm Hybrid Stepping Motor

- **Pull out Torque Curve**

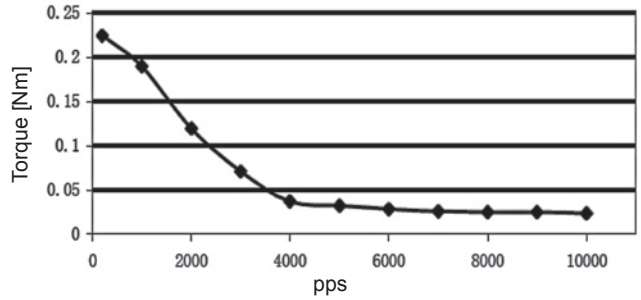
MT16FP08004M4 / MT16FP08004B4
24Vdc 0.45A/Phase Driver: half step



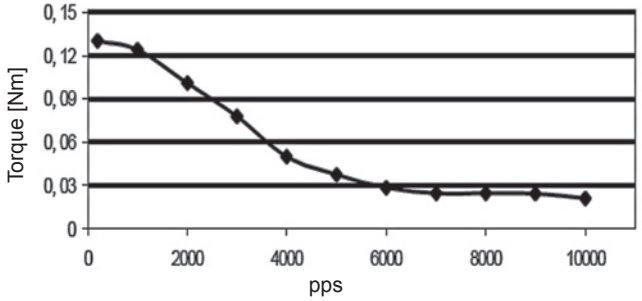
MT16FP08005M6 / MT16FP08005B6
24Vdc 0.50A/Phase Driver: half step



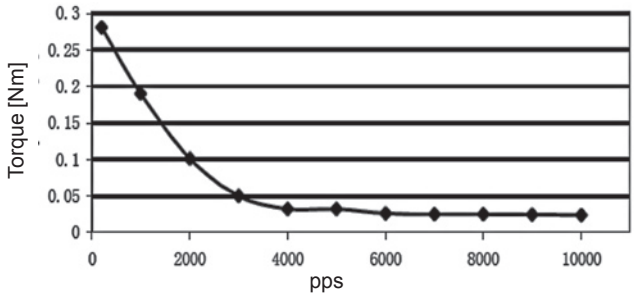
MT16FP14004M4 / MT16FP14004B4
24Vdc 0.45A/Phase Driver: half step



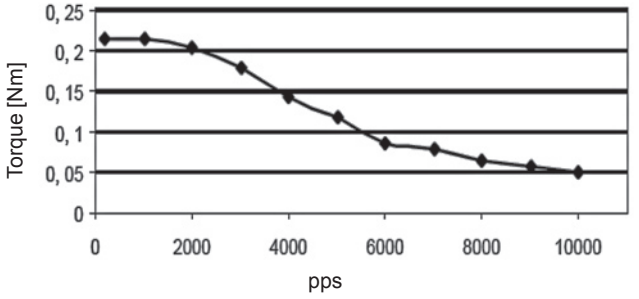
MT16FP14003M6 / MT16FP14003B6
24Vdc 0.22A/Phase Driver: half step



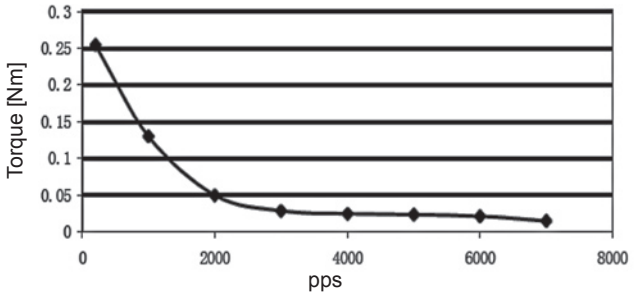
MT16FP15005M4 / MT16FP15005B4
24Vdc 0.50A/Phase Driver: half step



MT16FP15005M4 / MT16FP15005B4
24Vdc 0.50A/Phase Driver: half step



MT16FP15005M4 / MT16FP15005B4
24Vdc 0.50A/Phase Driver: half step



0.9° Size 42mm High Torque Hybrid Stepping Motor

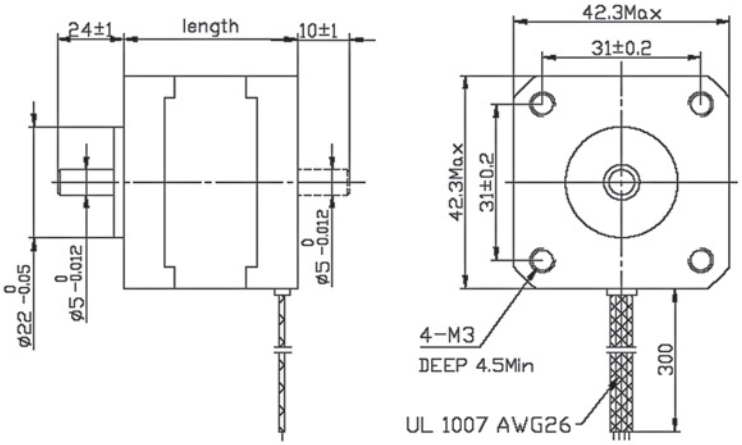
• General Specification for High Torque Hybrid Stepping Motor

Item	Specifications
Step Angle	0.9°
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80°C Max. (rated current, 2 phase on)
Ambient Temperature	-20°C~+50°C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	28N (20mm from the flange)
Max. axial force	10N

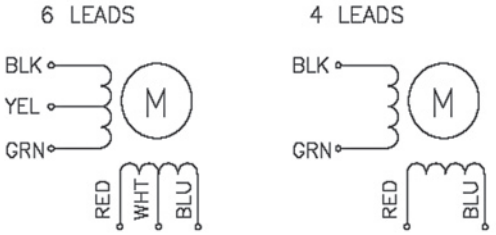
• Size 42mm High Torque Hybrid Stepping Motor Specifications

Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	V	A	Ω	mH	Kg.cm	#	g-cm²	kg	g-cm	mm
MT17FY14009M6	MT17FY14009B6	4	0.95	4.2	4	1.58	6	35	0.22	200	34
MT17FY14006M6	MT17FY14006B6	6	0.6	10	9.5	1.58	6				
MT17FY14003M6	MT17FY14003B6	12	0.31	38.5	33	1.58	6				
MT17FY14013M4	MT17FY14013B4	2.8	1.33	2.1	4.2	2.2	4				
MT17FY16012M6	MT17FY16012B6	4	1.2	3.3	3.4	2.59	6	54	0.28	220	40
MT17FY16008M6	MT17FY16008B6	6	0.8	7.5	6.7	2.59	6				
MT17FY16004M6	MT17FY16004B6	12	0.4	30	30	2.59	6				
MT17FY16017M4	MT17FY16017B4	2.8	1.68	1.65	3.2	3.3	4				
MT17FY19012M6	MT17FY19012B6	4	1.2	3.3	4	3.17	6	68	0.35	250	48
MT17FY19008M6	MT17FY19008B6	6	0.8	7.5	10	3.17	6				
MT17FY19004M6	MT17FY19004B6	12	0.4	30	38	3.17	6				
MT17FY19017M4	MT17FY19017B4	2.8	1.68	1.65	4.1	4.4	4				

• Dimension



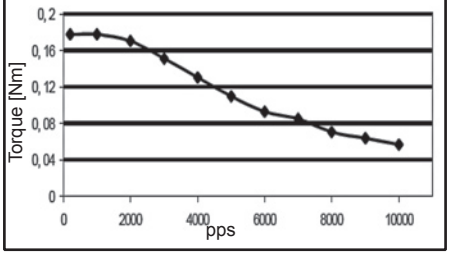
• Wiring Diagram



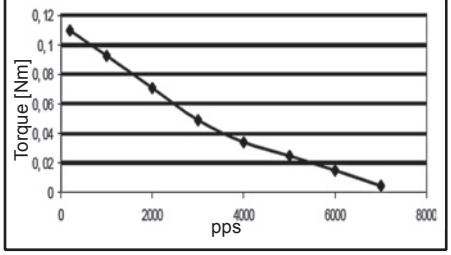
0.9° Size 42mm High Torque Hybrid Stepping Motor

- **Pull out Torque Curve**

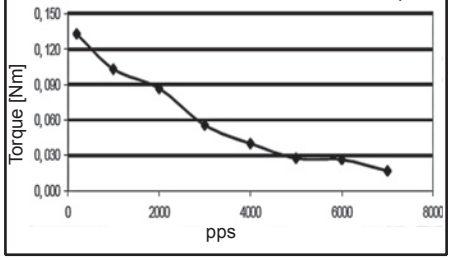
MT17FY14009M6 / MT17FY14009M6
24Vdc 1.00A/Phase Driver: full step



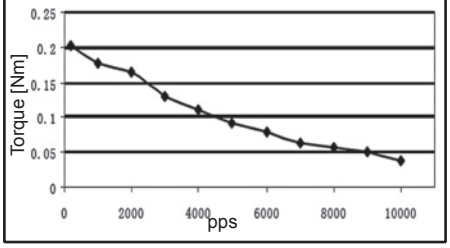
MT17FY14006M6 / MT17FY14006B6
24Vdc 0.60A/Phase Driver: full step



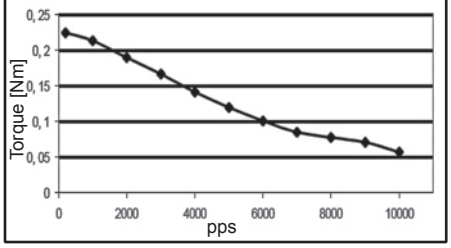
MT17FY14003M6 / MT17FY14003B6
24Vdc 0.31A/Phase Driver: full step



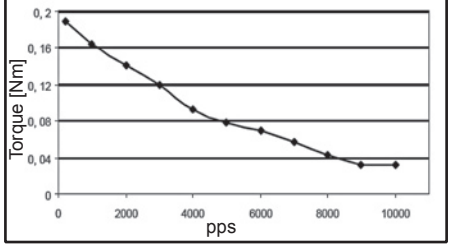
MT17FY14013M4 / MT17FY14013B4
24Vdc 1.27A/Phase Driver: full step



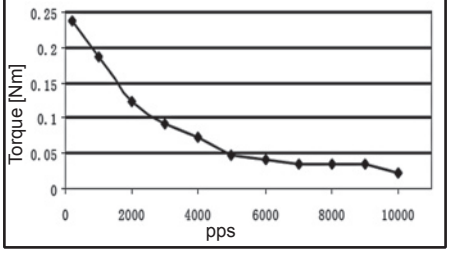
MT17FY16012M6 / MT17FY16012B6
24Vdc 1.20A/Phase Driver: full step



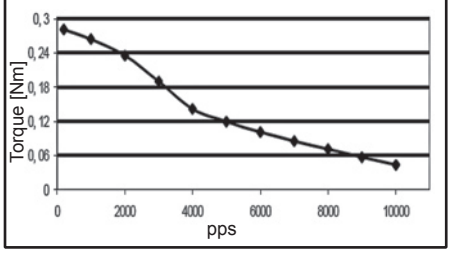
MT17FY16008M6 / MT17FY16008B6
24Vdc 0.78A/Phase Driver: full step



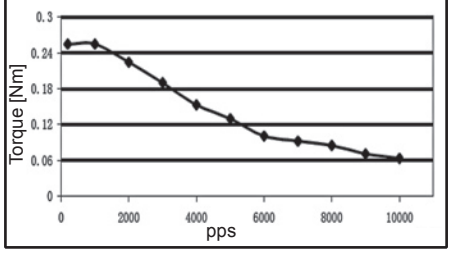
MT17FY16004M6 / MT17FY16004B6
24Vdc 0.40A/Phase Driver: full step



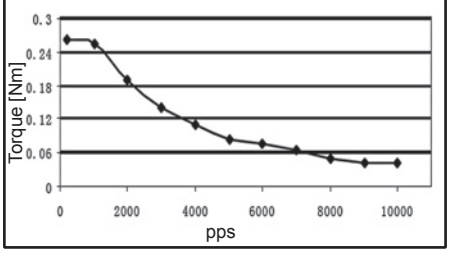
MT17FY16017M4 / MT17FY16017B4
24Vdc 1.68A/Phase Driver: full step



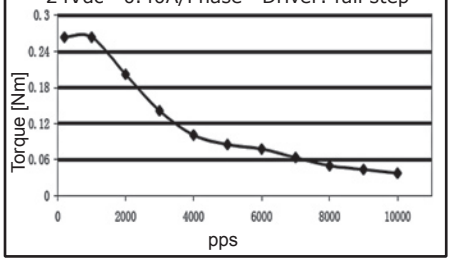
MT17FY19012M6 / MT17FY19012B6
24Vdc 1.20A/Phase Driver: full step



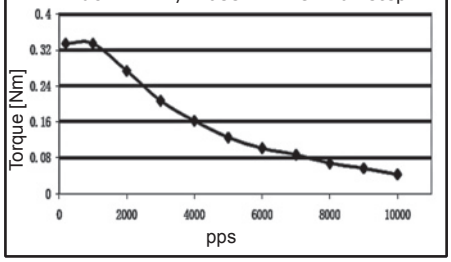
MT17FY19008M6 / MT17FY19008B6
24Vdc 0.50A/Phase Driver: full step



MT17FY19004M6 / MT17FY19004B6
24Vdc 0.40A/Phase Driver: full step



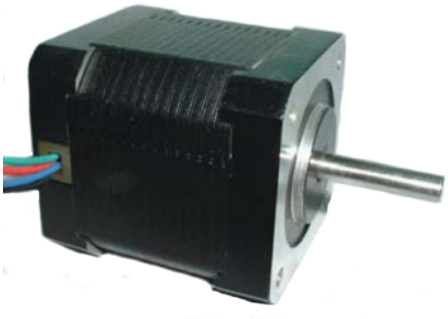
MT17FY19017M4 / MT17FY19017B4
24Vdc 1.77A/Phase Driver: full step



1.8° Size 42mm High Torque Hybrid Stepping Motor

• General Specification for High Torque Hybrid Stepping Motor

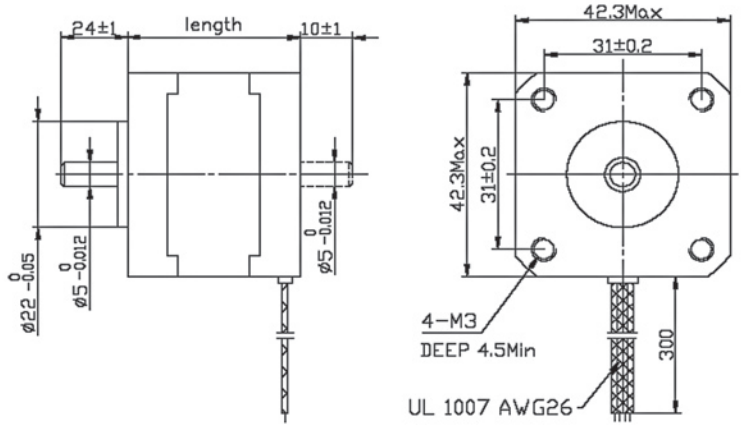
Item	Specifications
Step Angle	1.8°
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80°C Max. (rated current, 2 phase on)
Ambient Temperature	-20°C~+50°C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	28N (20mm from the flange)
Max. axial force	10N



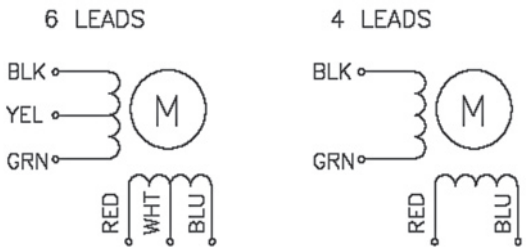
• Size 42mm High Torque Hybrid Stepping Motor Specifications

Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	V	A	Ω	mH	Kg.cm	#	g-cm²	kg	g-cm	mm
MT17FP10004M4	MT17FP10004B4	9.6	0.4	24	36	1.7	4	20	0.15	75	25
MT17FP14009M6	MT17FP14009B6	4	0.95	4.2	2.5	1.6	6	35	0.22	200	34
MT17FP14004M6	MT17FP14004B6	9.6	0.4	24	15	1.6	6				
MT17FP14003M6	MT17FP14003B6	12	0.31	38.5	21	1.6	6				
MT17FP14013M4	MT17FP14013B4	2.8	1.33	2.1	2.5	2.2	4				
MT17FP16012M6	MT17FP16012B6	4	1.2	3.3	3.2	2.6	6	54	0.28	220	40
MT17FP16008M6	MT17FP16008B6	6	0.8	7.5	6.7	2.6	6				
MT17FP16004M6	MT17FP16004B6	12	0.4	30	30	2.6	6				
MT17FP16017M4	MT17FP16017B4	2.8	1.68	1.65	3.2	3.6	4				
MT17FP19012M6	MT17FP19012B6	4	1.2	3.3	2.8	3.17	6	68	0.35	250	48
MT17FP19008M6	MT17FP19008B6	6	0.8	7.5	6.3	3.17	6				
MT17FP19004M6	MT17FP19004B6	12	0.4	30	25	3.17	6				
MT17FP19017M4	MT17FP19017B4	2.8	1.68	1.65	2.8	4.4	4				
MT17FP24012M4	MT17FP24012B4	7.2	1.2	6	7	6.5	6	102	0.5	280	60

• Dimension



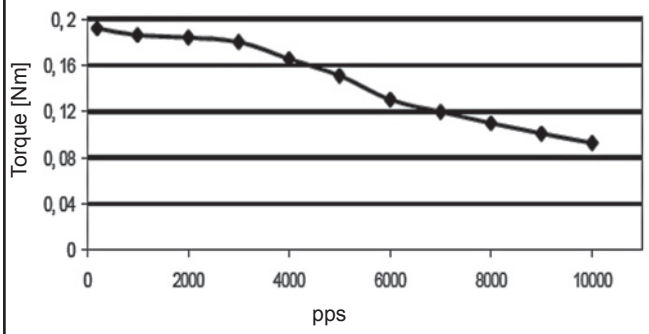
• Wiring Diagram



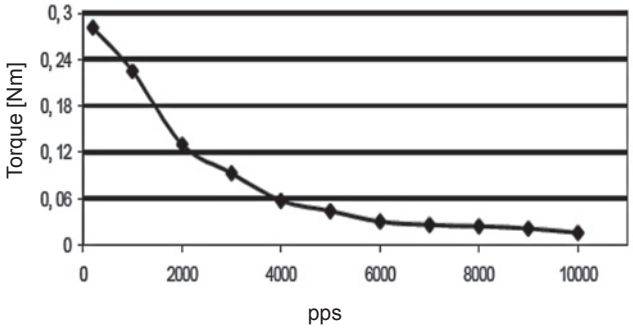
1.8° Size 42mm High Torque Hybrid Stepping Motor

- **Pull out Torque Curve**

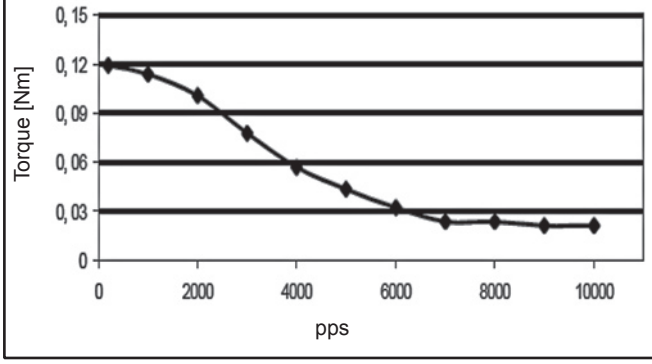
MT17FP14009M6 / MT17FP14009B6
24Vdc 1.00A/Phase Driver: half step



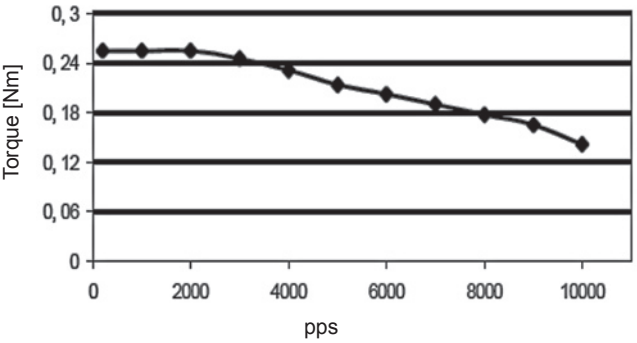
MT17FP14004M6 / MT17FP14004B6
24Vdc 0.50A/Phase Driver: half step



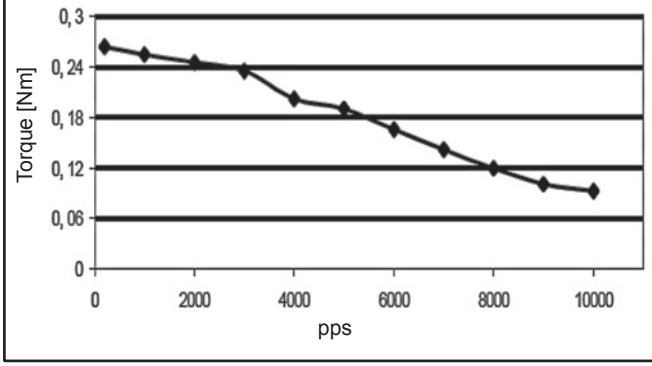
MT17FP14003M6 / MT17FP14003B6
24Vdc 0.30A/Phase Driver: half step



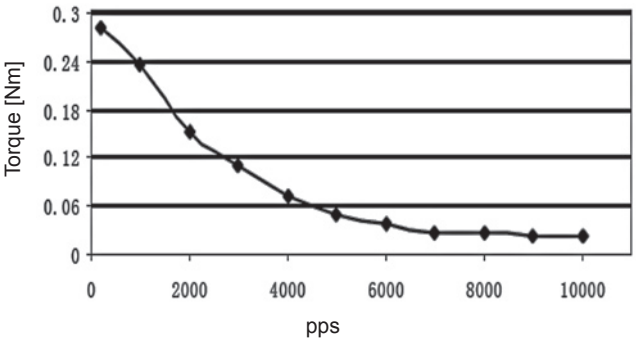
MT17FP14013M4 / MT17FP14013B4
24Vdc 1.30A/Phase Driver: half step



MT17FP16012M6 / MT17FP16012B6
24Vdc 1.20A/Phase Driver: half step



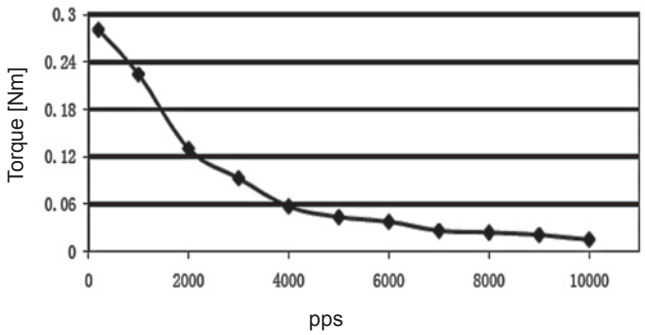
MT17FP16008M6 / MT17FP16008B6
24Vdc 0.50A/Phase Driver: half step



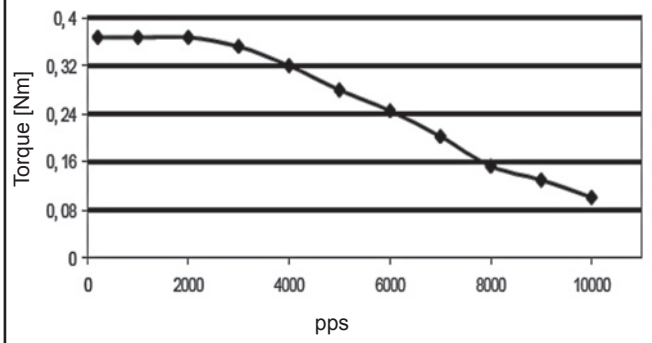
1.8° Size 42mm High Torque Hybrid Stepping Motor

- **Pull out Torque Curve**

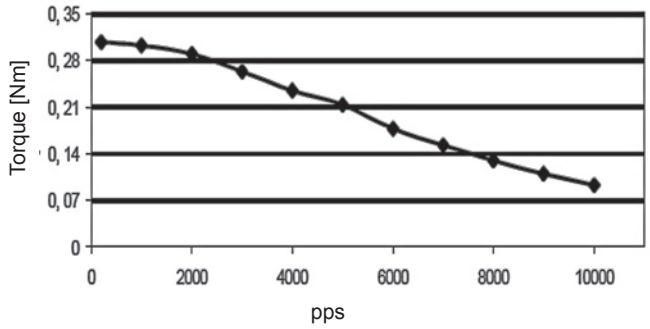
MT17FP16004M6 / MT17FP16004B6
24Vdc 0.50A/Phase Driver: half step



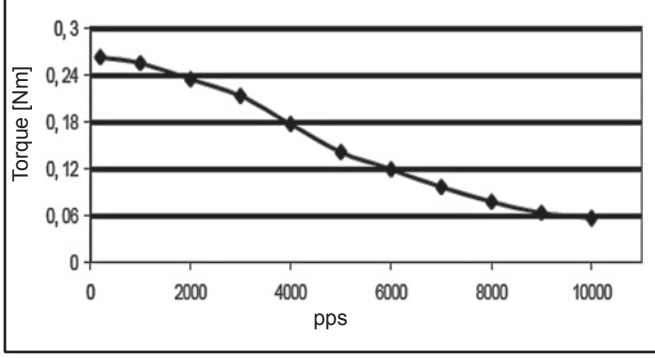
MT17FP16017M4 / MT17FP16017B4
24Vdc 1.70A/Phase Driver: half step



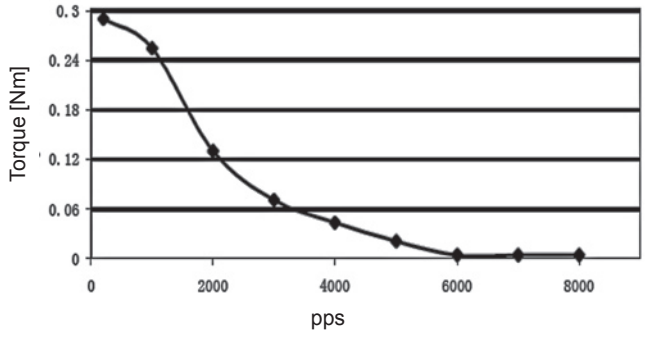
MT17FP19012M6 / MT17FP19012B6
24Vdc 1.20A/Phase Driver: half step



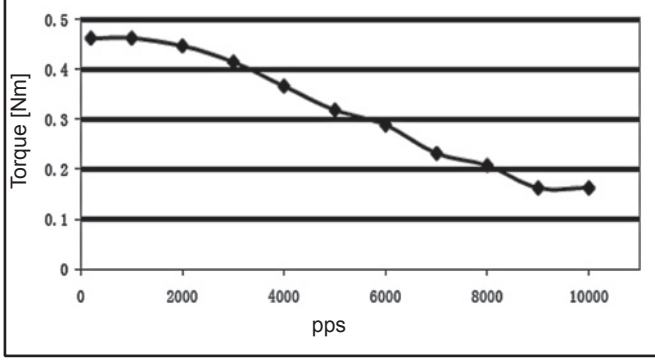
MT17FP19008M6 / MT17FP19008B6
24Vdc 0.50A/Phase Driver: half step



MT17FP19004M6 / MT17FP19004B6
24Vdc 0.50A/Phase Driver: half step



MT17FP19017M4 / MT17FP19017B4
24Vdc 0.50A/Phase Driver: half step



1.8° Size 42mm High Torque Hybrid Stepping Motor With Thread

• General Specification for High Torque Hybrid Stepping Motor With Thread

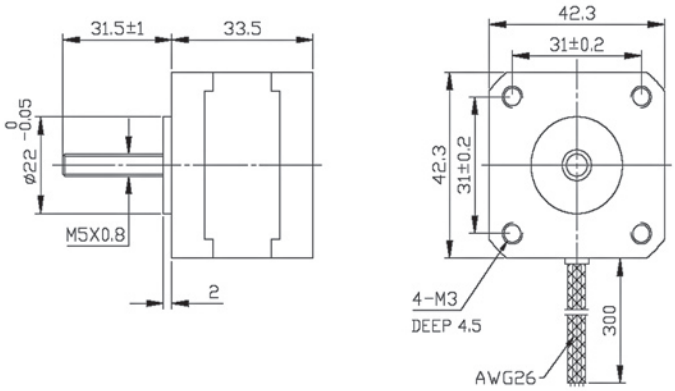
Item	Specifications
Step Angle	1.8°
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80°C Max. (rated current, 2 phase on)
Ambient Temperature	-20°C~+50°C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute
Max. radial force	28N (20mm from the flange)
Max. axial force	10N

• Size 42mm High Torque Hybrid Stepping Motor With Thread Specifications

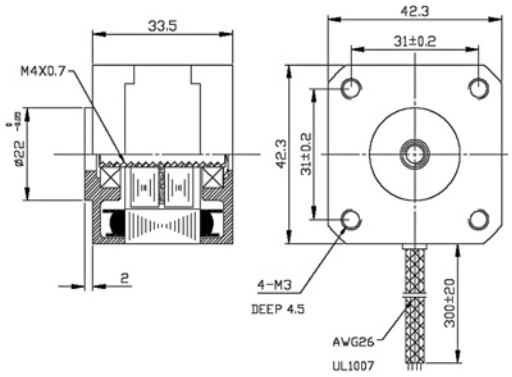
Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	V	A	Ω	mH	Kg.cm	#	g-cm²	kg	g-cm	mm
MT17FP14005M4T1	MT17FP14005B4T1	1.8	0.55	3.2	4.5	900	4	35	0.20	120	33.5
MT17FP14009M6S1	MT17FP14009B6S1	4.0	0.95	4.2	2.5	1580	6	35	0.20	120	33.5

• Dimension

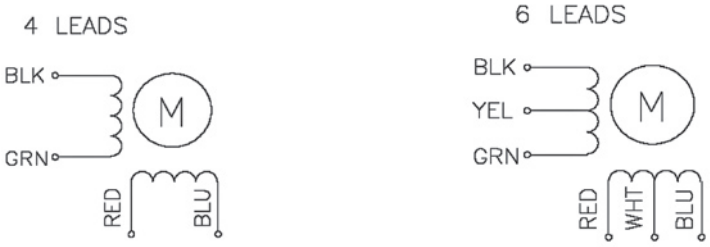
MT17FP14005M4T1



MT17FP14009M4S1



• Wiring Diagram



3.6° Size 42mm Hybrid Stepping Motor

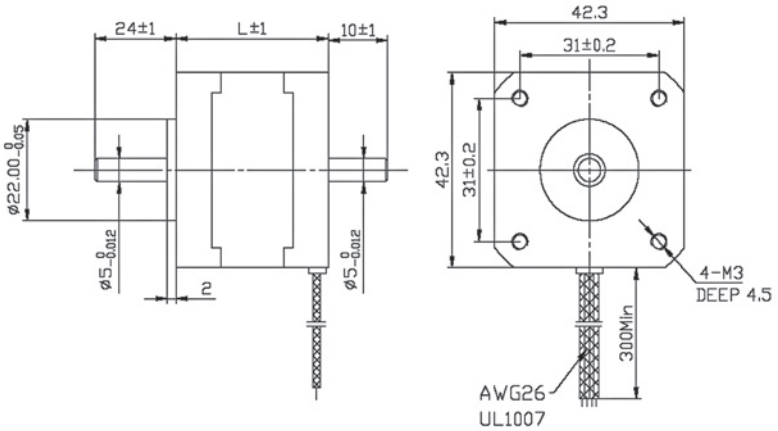
• General Specification Hybrid Stepping Motor

Item	Specifications
Step Angle	3.6˚
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80˚C Max. (rated current, 2 phase on)
Ambient Temperature	-20˚C~+50˚C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	28N (20mm from the flange)
Max. axial force	10N

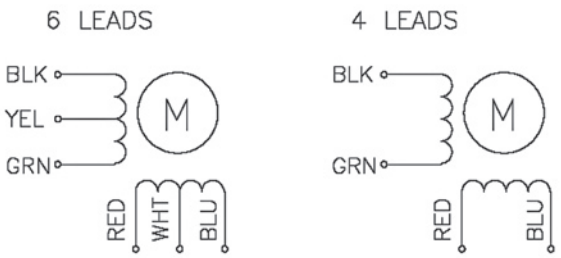
• Size 42mm Hybrid Stepping Motor Specifications

Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	V	A	Ω	mH	g.cm	#	g-cm²	kg	g-cm	mm
MT17FR14002M4	MT17FR14001B4	14	0.114	123	130	780	4	20	0.2	150	34
MT17FR14001M6	MT17FR14002B6	15	0.15	100	60	500	6	20	0.2	150	34
MT17FR14001M4	MT17FR14009M4	9.31	0.095	98	200	530	4	20	0.2	150	34
MT17FR15001M4	MT17FR15009B4	9.38	0.095	105	330	700	4	23	0.23	150	38

• Dimension



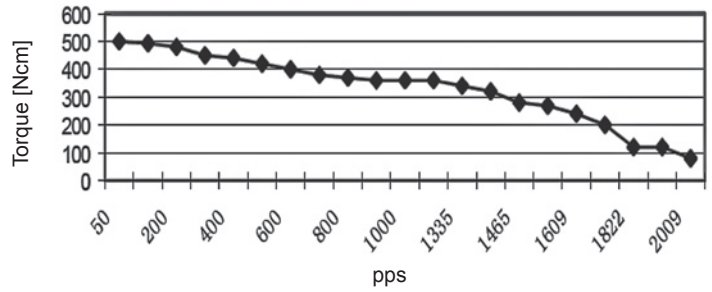
• Wiring Diagram



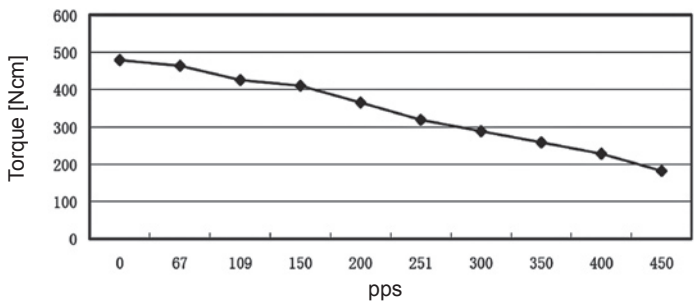
1.8° Size 35mm Hybrid Stepping Motor

- **Pull out Torque Curve**

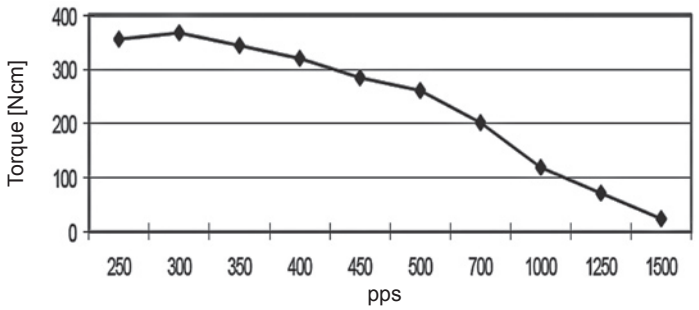
MT17FR14002M4 / MT17FR14002B4
36Vdc 0.15A/Phase Driver: full step



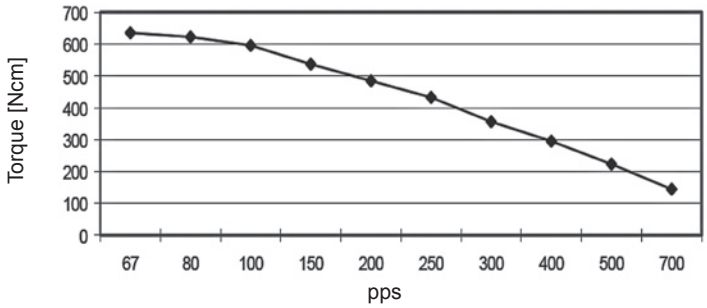
MT17FR14001M6 / MT17FR14001B6
18Vdc 0.11A/Phase Driver: full step



MT17FR14001M4 / MT17FR14001B4
18Vdc 0.09A/Phase Driver: half step



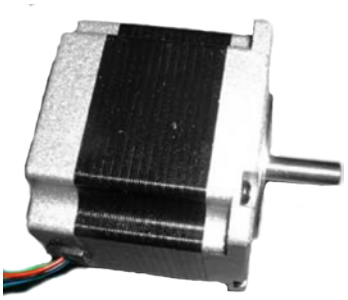
MT17FR15001M4 / MT17FR15001B4
18Vdc 0.09A/Phase Driver: half step



0.9° Size 57mm High Torque Hybrid Stepping Motor

• General Specification for High Torque Hybrid Stepping Motor

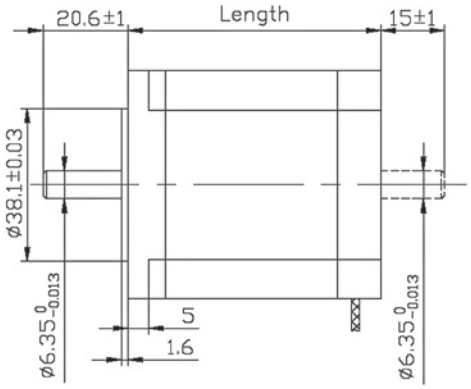
Item	Specifications
Step Angle	0.9°
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80°C Max. (rated current, 2 phase on)
Ambient Temperature	-20°C~+50°C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	75N (20mm from the flange)
Max. axial force	15N

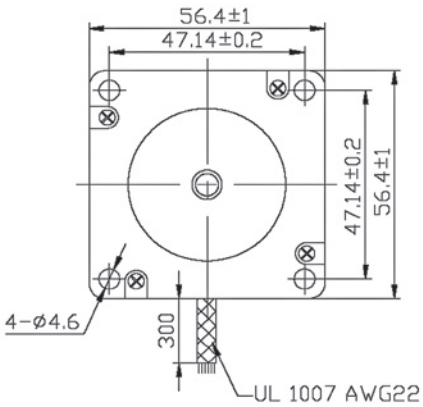


• Size 57mm High Torque Hybrid Stepping Motor Specifications

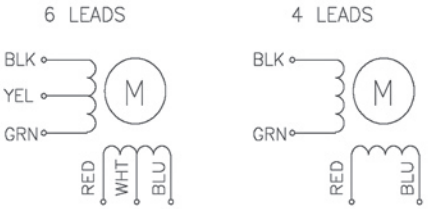
Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	V	A	Ω	mH	Kg.cm	#	g-cm²	kg	kg-cm	mm
MT23FY17010M6	MT23FY17010B6	5.7	1	5.7	8.0	3.9	6	120	0.45	0.21	41
MT23FY17020M6	MT23FY17020B6	2.8	2	1.4	2.2	3.9	6				
MT23FY17030M6	MT23FY17030B6	1.9	3	0.63	1.0	3.9	6				
MT23FY17028M4	MT23FY17028B4	2	2.8	0.7	2.2	5.5	4				
MT23FY22010M6	MT23FY22010B6	7.4	1	7.4	17.5	9.0	6	300	0.7	0.4	56
MT23FY22020M6	MT23FY22020B6	3.6	2	1.8	4.5	9.0	6				
MT23FY22030M6	MT23FY22030B6	2.3	3	0.75	1.9	9.0	6				
MT23FY22028M4	MT23FY22028B4	2.5	2.8	0.9	4.5	12.0	4				
MT23FY30010M6	MT23FY30010B6	8.6	1	8.6	23	13.5	6	480	1	0.68	76
MT23FY30020M6	MT23FY30020B6	4.5	2	2.25	5.6	13.5	6				
MT23FY30030M6	MT23FY30030B6	3	3	1	2.6	13.5	6				
MT23FY30028M4	MT23FY30028B4	3.2	2.8	1.13	5.6	18.0	4				

• Dimension





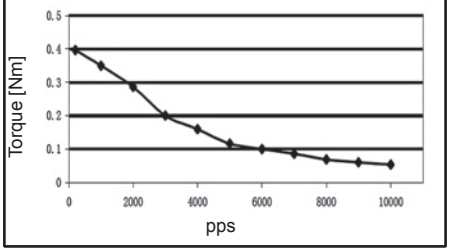
• Wiring Diagram



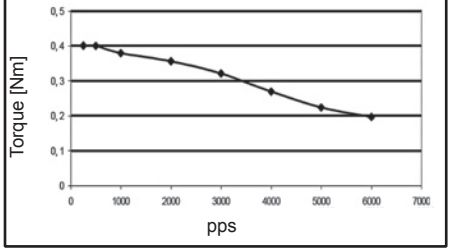
0.9° Size 57mm High Torque Hybrid Stepping Motor

- **Pull out Torque Curve**

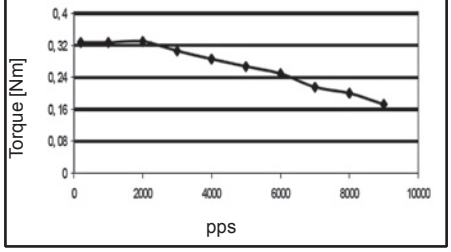
MT23FY17010M6 / MT23FY17010B6
30Vdc 1.00A/Phase Driver: full step



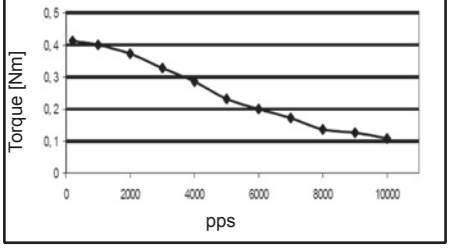
MT23FY17020M6 / MT23FY17020B6
30Vdc 2.00A/Phase Driver: full step



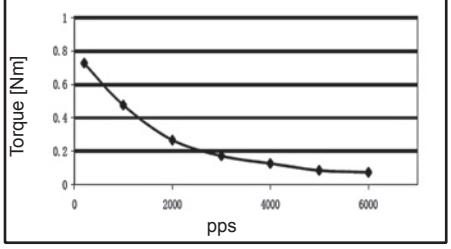
MT23FY17030M6 / MT23FY17030B6
30Vdc 2.70A/Phase Driver: full step



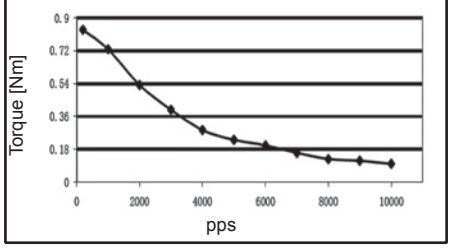
MT23FY17028M4 / MT23FY17028B4
30Vdc 2.70A/Phase Driver: full step



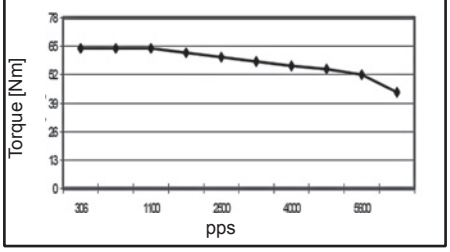
MT23FY22010M6 / MT23FY22010B6
30Vdc 1.00A/Phase Driver: full step



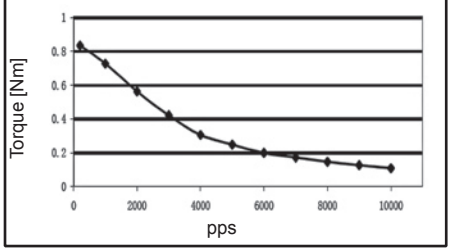
MT23FY22020M6 / MT23FY22020B6
30Vdc 2.10A/Phase Driver: full step



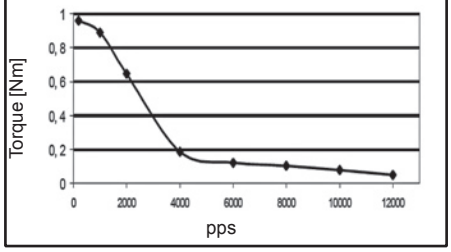
MT23FY22030M6 / MT23FY22030B6
30Vdc 3.00A/Phase Driver: full step



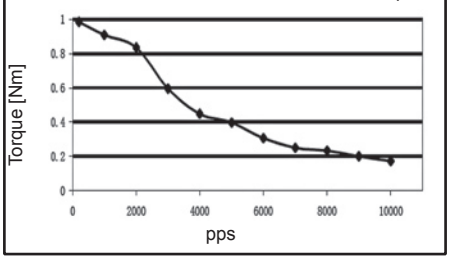
MT23FY22028M4 / MT23FY22028B4
30Vdc 2.70A/Phase Driver: full step



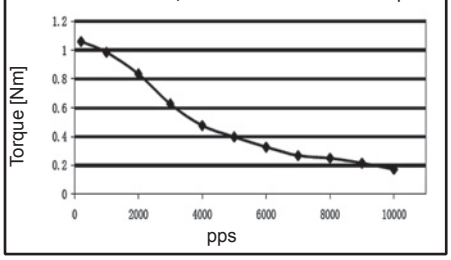
MT23FY30010M6 / MT23FY30010B6
30Vdc 1.00A/Phase Driver: full step



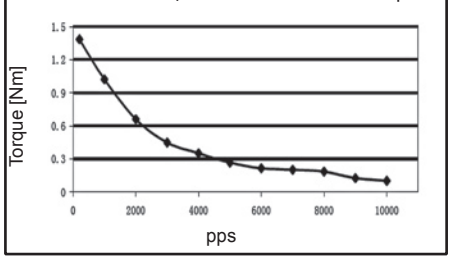
MT23FY30020M6 / MT23FY30020B6
30Vdc 2.10A/Phase Driver: full step



MT23FY30030M6 / MT23FY30030B6
30Vdc 2.70A/Phase Driver: full step



MT23FY30028M4 / MT23FY30028B4
30Vdc 2.50A/Phase Driver: full step



1.8° Size 57mm Hybrid Stepping Motor

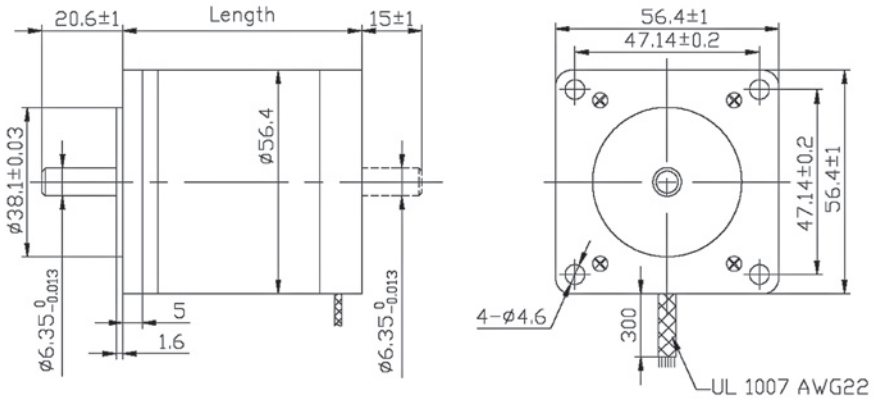
• General Specification for Hybrid Stepping Motor

Item	Specifications
Step Angle	1.8˚
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80˚C Max. (rated current, 2 phase on)
Ambient Temperature	-20˚C~+50˚C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	75N (20mm from the flange)
Max. axial force	15N

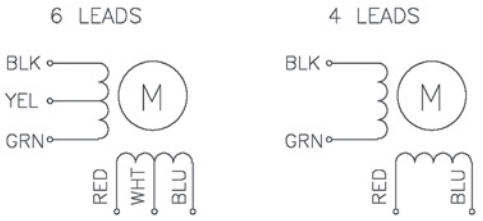
• Size 57mm Hybrid Stepping Motor Specifications

Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	V	A	Ω	mH	Kg.cm	#	g-cm²	kg	kg-cm	mm
MT23FP17011M6	MT23FP17011B6	4	1.1	3.6	3.6	2.88	6	57	0.54	0.18	41
MT23FP17004M6	MT23FP17004B6	12	0.4	30	30	2.88	6				
MT23FP17016M4	MT23FP17016B4	2.8	1.56	1.8	3.6	4.0	4				
MT23FP20009M6	MT23FP20009B6	6	0.85	7.1	9	4.97	6	110	0.60	0.35	51
MT23FP20004M6	MT23FP20004B6	12	0.42	29	36	4.97	6				
MT23FP20028M4	MT23FP20028B4	2.38	2.8	0.85	2.1	6.9	4				
MT23FP22012M6	MT23FP22012B6	6	1.2	5	8	6.05	6	135	0.65	0.42	56
MT23FP22006M6	MT23FP22006B6	12	0.6	20	32	6.05	6				
MT23FP22025M4	MT23FP22025B4	2.8	2.55	1.1	3.6	8.4	4				
MT23FP30015M6	MT23FP30015B6	5.4	1.5	3.6	6	9	6	200	0.95	0.72	76
MT23FP30007M6	MT23FP30007B6	12	0.68	17.7	30	9	6				
MT23FP30033M4	MT23FP30033B4	2.7	3.3	0.85	3	12.5	4				

• Dimension



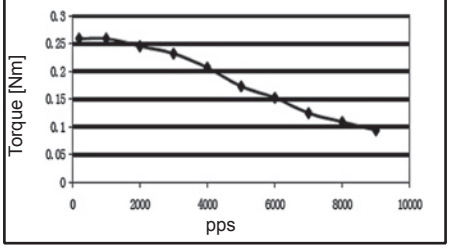
• Wiring Diagram



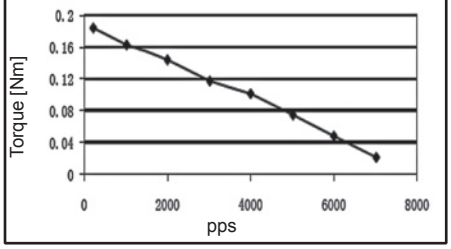
1.8° Size 57mm Hybrid Stepping Motor

- **Pull out Torque Curve**

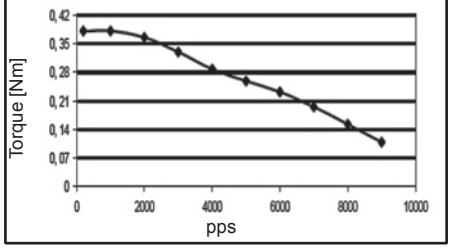
MT23FP17011M6 / MT23FP17011B6
30Vdc 1.10A/Phase Driver: half step



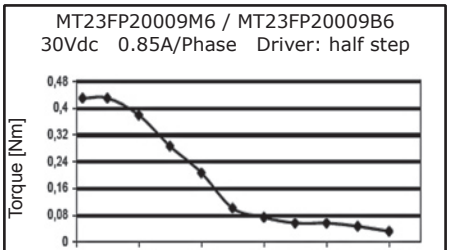
MT23FP17004M6 / MT23FP17004B6
30Vdc 0.40A/Phase Driver: half step



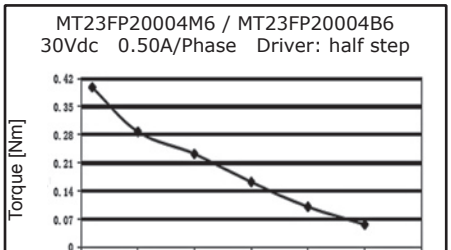
MT23FP17011M6 / MT23FP17011B6
30Vdc 1.10A/Phase Driver: half step



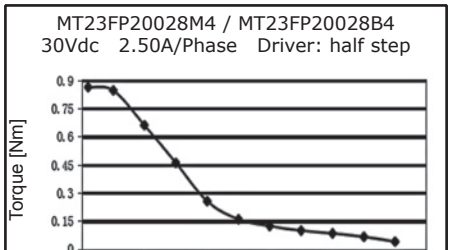
MT23FP20009M6 / MT23FP20009B6
30Vdc 0.85A/Phase Driver: half step



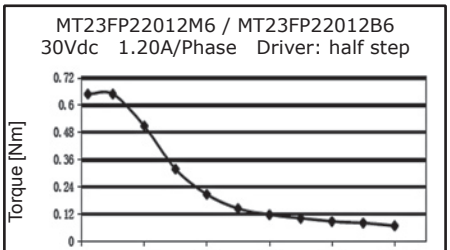
MT23FP20004M6 / MT23FP20004B6
30Vdc 0.50A/Phase Driver: half step



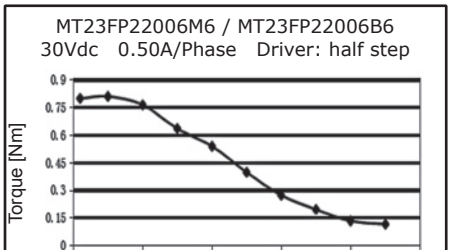
MT23FP20028M4 / MT23FP20028B4
30Vdc 2.50A/Phase Driver: half step



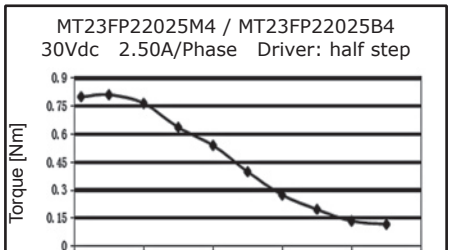
MT23FP22012M6 / MT23FP22012B6
30Vdc 1.20A/Phase Driver: half step



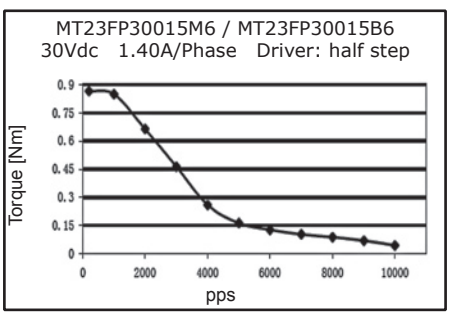
MT23FP22006M6 / MT23FP22006B6
30Vdc 0.50A/Phase Driver: half step



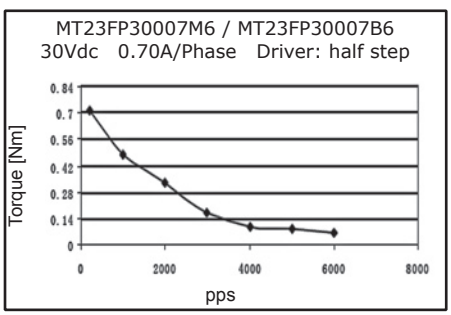
MT23FP22025M4 / MT23FP22025B4
30Vdc 2.50A/Phase Driver: half step



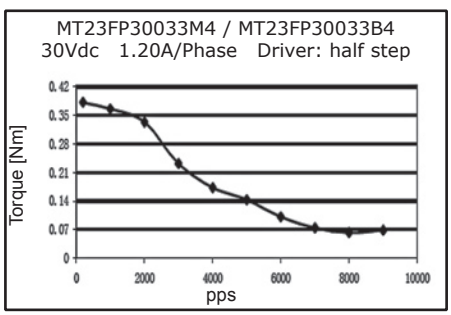
MT23FP30015M6 / MT23FP30015B6
30Vdc 1.40A/Phase Driver: half step



MT23FP30007M6 / MT23FP30007B6
30Vdc 0.70A/Phase Driver: half step



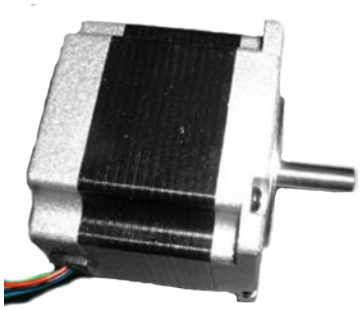
MT23FP30033M4 / MT23FP30033B4
30Vdc 1.20A/Phase Driver: half step



1.8° Size 57mm High Torque Hybrid Stepping Motor

• General Specification for High Torque Hybrid Stepping Motor

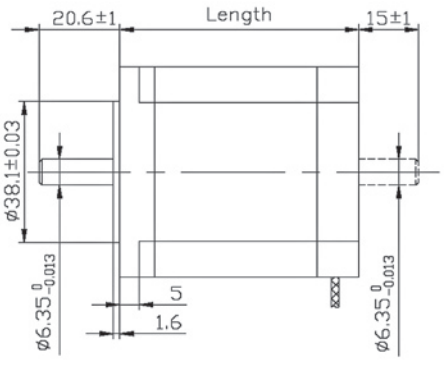
Item	Specifications
Step Angle	1.8°
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80°C Max. (rated current, 2 phase on)
Ambient Temperature	-20°C~+50°C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	75N (20mm from the flange)
Max. axial force	15N

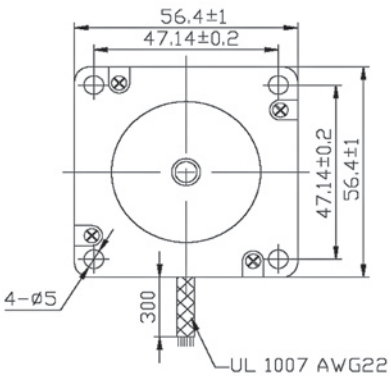


• Size 57mm High Torque Stepping Motor Specifications

Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	V	A	Ω	mH	Kg.cm	#	g-cm²	kg	kg-cm	mm
MT23FK17010M6	MT23FK17010B6	5.7	1	5.7	5.4	3.9	6	120	0.45	0.21	41
MT23FK17020M6	MT23FK17020B6	2.8	2	1.4	1.4	3.9	6				
MT23FK17030M6	MT23FK17030B6	1.9	3	0.63	0.6	3.9	6				
MT23FK17028M4	MT23FK17028B4	2	2.8	0.7	1.4	5.5	4				
MT23FK20010M6	MT23FK20010B6	6.6	1	6.6	8.2	7.2	6	275	0.65	0.36	51
MT23FK20020M6	MT23FK20020B6	3.3	2	1.65	2.2	7.2	6				
MT23FK20030M6	MT23FK20030B6	2.2	3	0.74	0.9	7.2	6				
MT23FK20028M4	MT23FK20028B4	2.3	2.8	0.83	2.2	10.1	4				
MT23FK22010M6	MT23FK22010B6	7.4	1	7.4	10	9.0	6	300	0.7	0.4	56
MT23FK22020M6	MT23FK22020B6	3.6	2	1.8	2.5	9.0	6				
MT23FK22030M6	MT23FK22030B6	2.3	3	0.75	1.1	9.0	6				
MT23FK22028M4	MT23FK22028B4	2.5	2.8	0.9	2.5	12.6	4				
MT23FK30010M6	MT23FK30010B6	8.6	1	8.6	14	13.5	6	480	1	0.68	76
MT23FK30020M6	MT23FK30020B6	4.5	2	2.25	3.6	13.5	6				
MT23FK30030M6	MT23FK30030B6	3	3	1	1.6	13.5	6				
MT23FK30028M4	MT23FK30028B4	3.2	2.8	1.13	3.6	18.9	4				

• Dimension



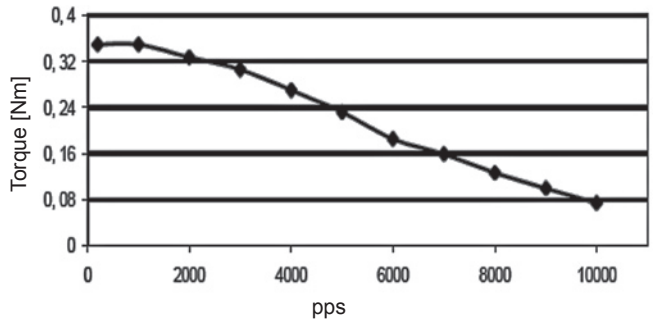


• Wiring Diagram

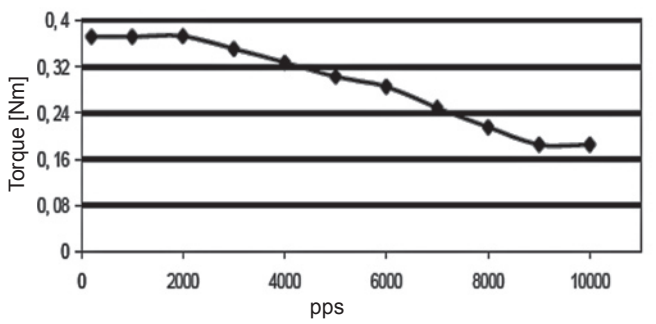
1.8° Size 57mm High Torque Hybrid Stepping Motor

- **Pull out Torque Curve**

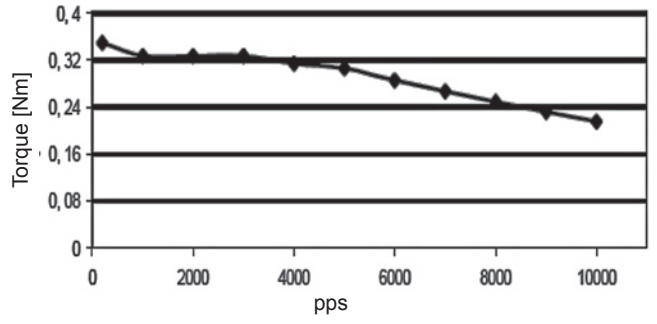
MT23FK17010M6 / MT23FK17010B6
30Vdc 1.00A/Phase Driver: half step



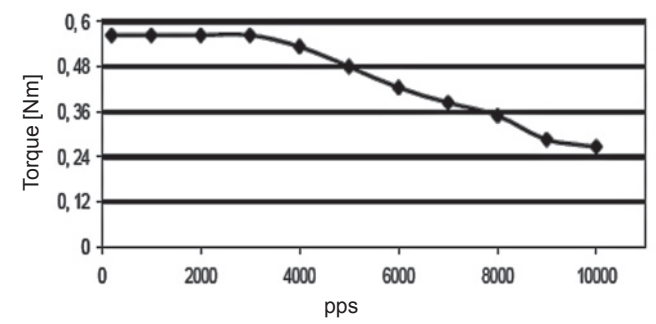
MT23FK17020M6 / MT23FK17020B6
30Vdc 2.00A/Phase Driver: half step



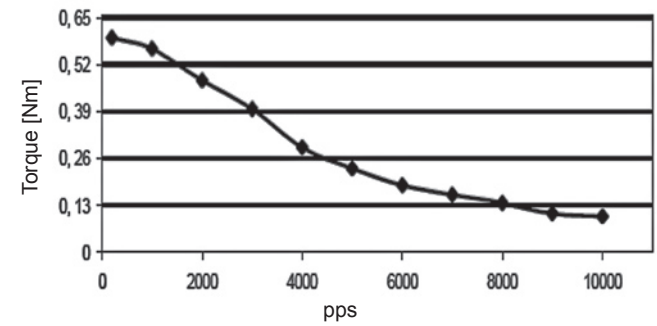
MT23FK17030M6 / MT23FK17030B6
30Vdc 3.00A/Phase Driver: half step



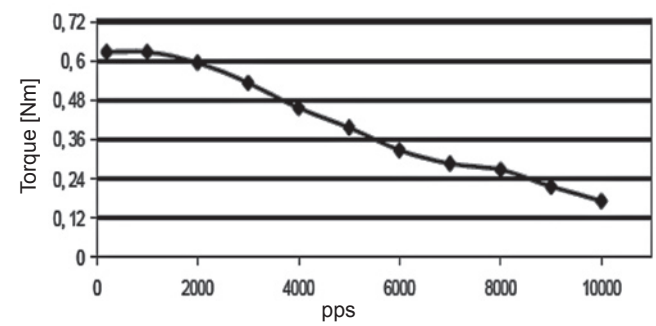
MT23FK17028M4 / MT23FK17028B4
30Vdc 2.70A/Phase Driver: half step



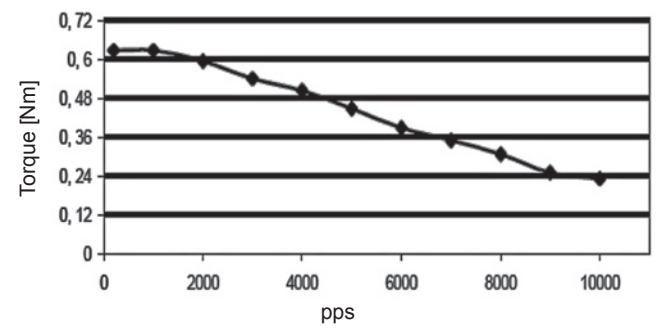
MT23FK20010M6 / MT23FK20010B6
30Vdc 1.00A/Phase Driver: half step



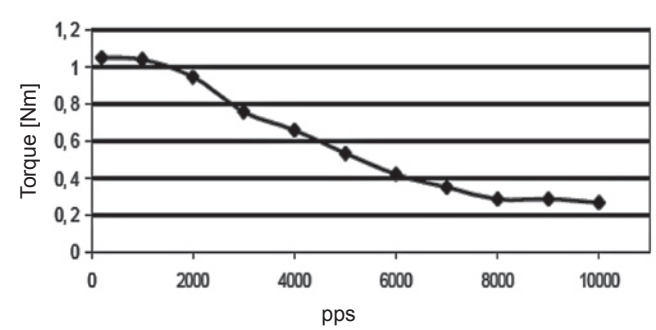
MT23FK20020M6 / MT23FK2020B6
30Vdc 2.00A/Phase Driver: half step



MT23FK20030M6 / MT23FK20030B6
30Vdc 3.00A/Phase Driver: half step



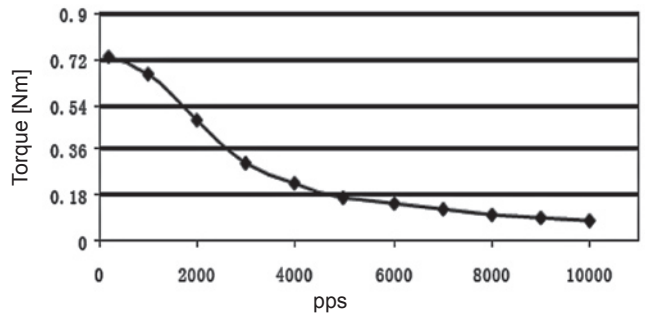
MT23FK20028M4 / MT23FK20028B4
30Vdc 2.70A/Phase Driver: half step



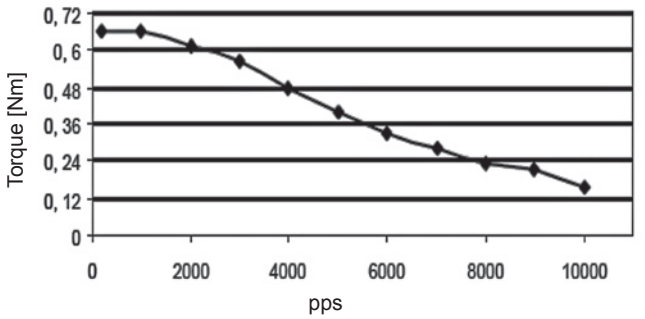
1.8° Size 57mm High Torque Hybrid Stepping Motor

- **Pull out Torque Curve**

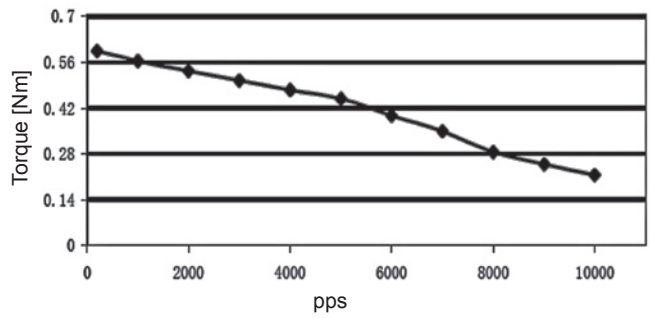
MT23FK22010M6 / MT23FK22010B6
30Vdc 1.00A/Phase Driver: half step



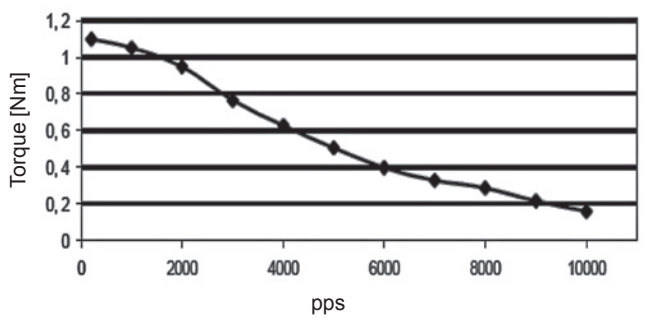
MT23FK22020M6 / MT23FK22020B6
30Vdc 2.00A/Phase Driver: half step



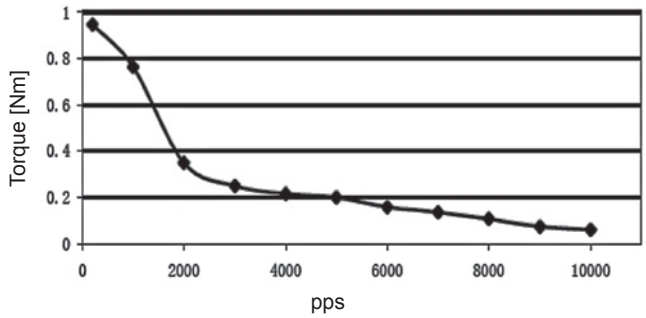
MT23FK22030M6 / MT23FK22030B6
30Vdc 3.00A/Phase Driver: half step



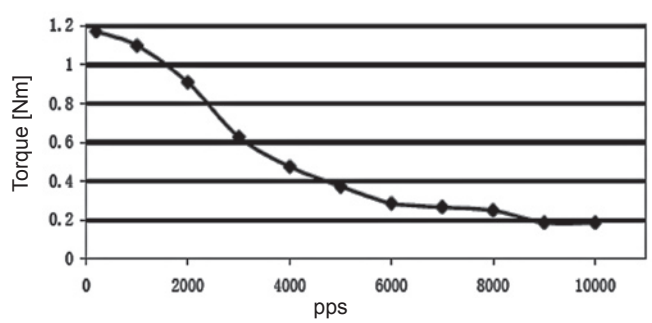
MT23FK22028M4 / MT23FK22028B4
30Vdc 2.70A/Phase Driver: half step



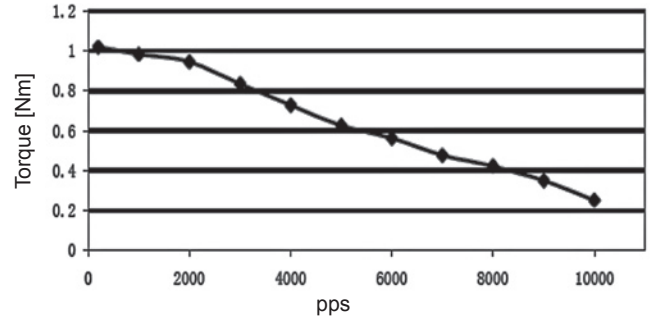
MT23FK30010M6 / MT23FK30010B6
30Vdc 1.00A/Phase Driver: half step



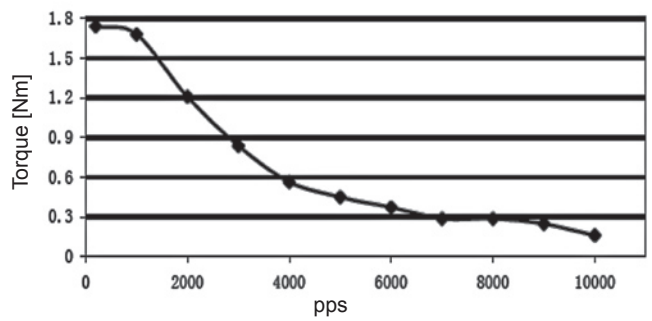
MT23FK30020M6 / MT23FK30020B6
30Vdc 2.00A/Phase Driver: half step



MT23FK30030M6 / MT23FK30030B6
30Vdc 2.70A/Phase Driver: half step



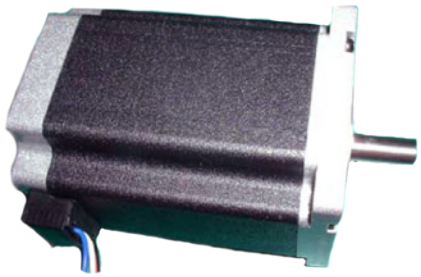
MT23FK30028M4 / MT23FK30028B4
30Vdc 2.70A/Phase Driver: half step



1.8° Size 60mm High Torque Hybrid Stepping Motor

• General Specification for High Torque Hybrid Stepping Motor

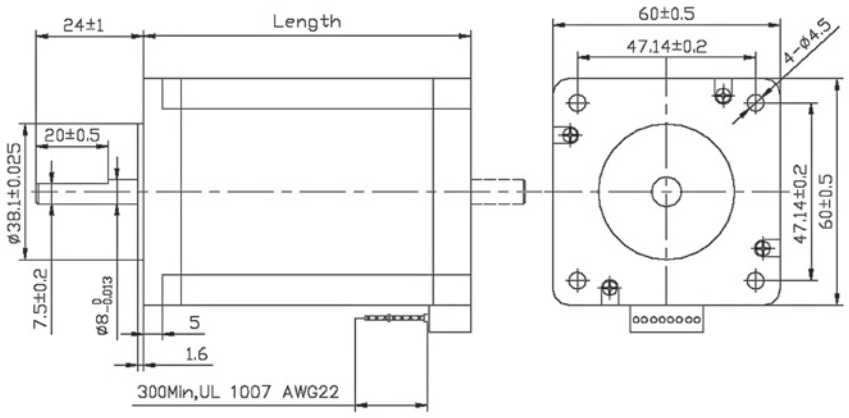
Item	Specifications
Step Angle	1.8°
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80°C Max. (rated current, 2 phase on)
Ambient Temperature	-20°C~+50°C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	75N (20mm from the flange)
Max. axial force	15N



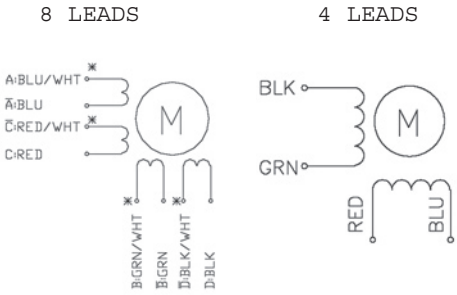
• Size 60mm High Torque Stepping Motor Specifications

Model No.			Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	Winding	V	A	Ω	mH	Kg.cm	#	g-cm²	kg	kg-cm	mm
MT24FK18020M8	MT24FK18020B8	unipolar	3	2	1.5	2	7.8	8	275	0.6	0.5	47
MT24FK18028M4	MT24FK18028B4	parallel	2.1	2.8	0.75	2	11	4				
MT24FK18014M4	MT24FK18014B4	series	4.2	1.4	3.0	8	11	4				
MT24FK22020M8	MT24FK22020B8	unipolar	3.6	2	1.8	3.6	11.7	8	300	0.77	0.7	56
MT24FK22028M4	MT24FK22028B4	parallel	2.52	2.8	0.9	3.6	16.5	4				
MT24FK22014M4	MT24FK22014B4	series	5.04	1.4	3.6	14.4	16.5	4				
MT24FK26020M8	MT24FK26020B8	unipolar	4.8	2	2.4	4.6	15	8	570	1.2	0.9	67
MT24FK26028M8	MT24FK26028B8	parallel	3.36	2.8	1.2	4.6	21	4				
MT24FK26014M4	MT24FK26014B4	series	6.72	1.4	4.8	18.4	21	4				
MT24FK35020M8	MT24FK35020B8	unipolar	6	2	3	6.8	22	8	840	1.4	1.0	88
MT24FK35028M4	MT24FK35028B4	parallel	4.17	2.8	1.5	6.8	31	4				
MT24FK35014M4	MT24FK35014B4	series	8.4	1.4	6	27.2	31	4				

• Dimension

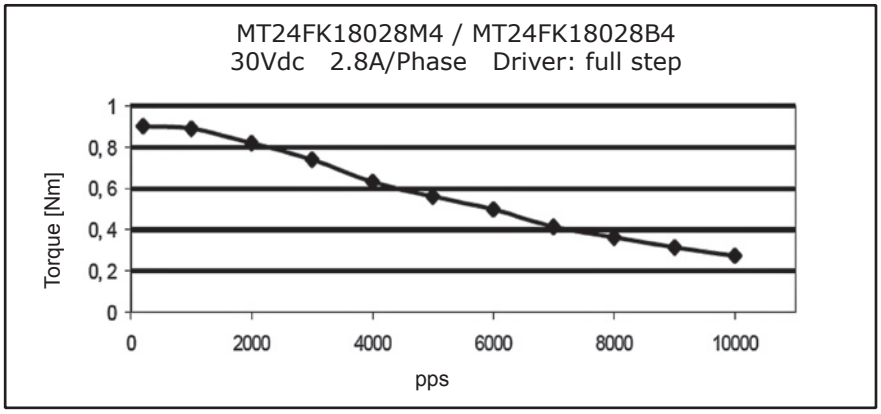


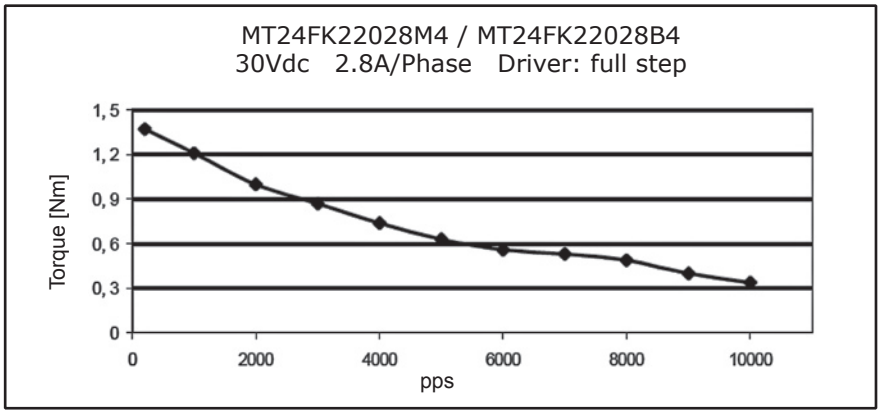
• Wiring Diagram

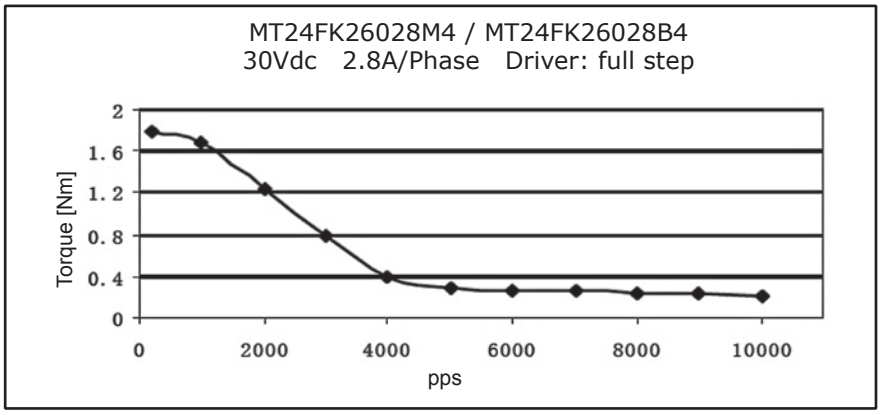


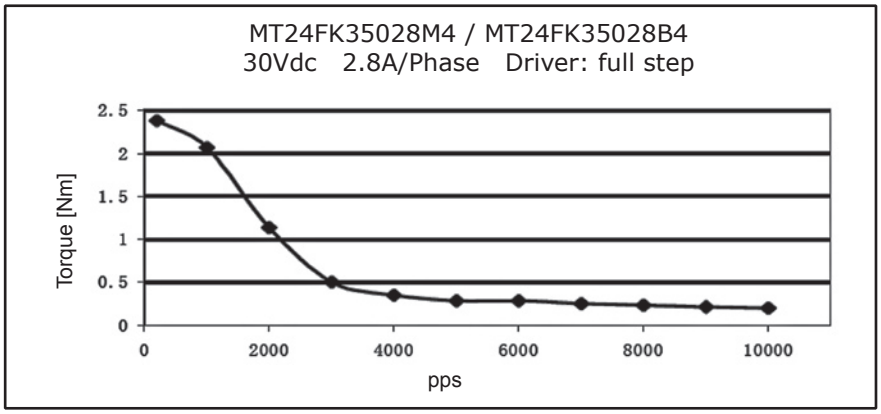
1.8° Size 60mm High Torque Hybrid Stepping Motor

- **Pull out Torque Curve**





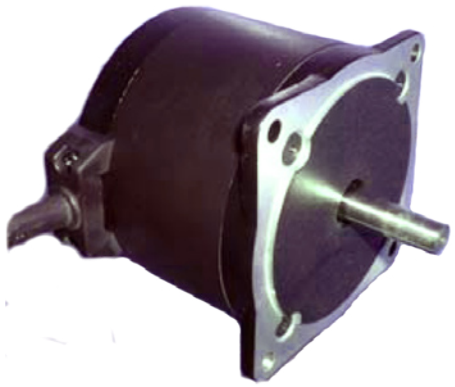




1.8° Size 86mm Round High Torque Hybrid Stepping Motor

• General Specification for Round High Torque Hybrid Stepping Motor

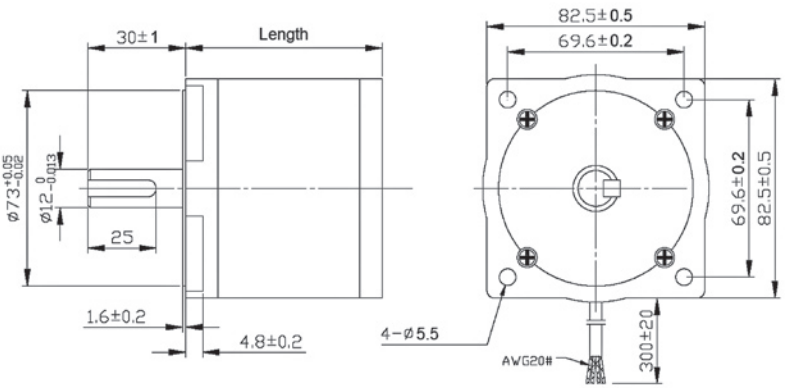
Item	Specifications
Step Angle	1.8°
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80°C Max. (rated current, 2 phase on)
Ambient Temperature	-20°C~+50°C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	820VAC, 1s, 3mA
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	220N (20mm from the flange)
Max. axial force	60N

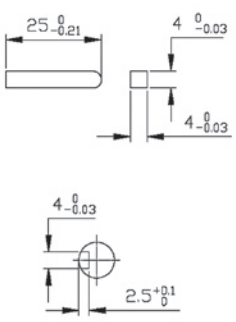


• Size 86mm Round High Torque Hybrid Stepping Motor Specifications

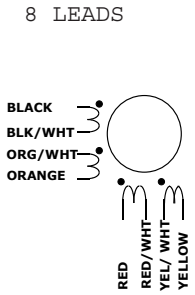
Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	V	A	Ω	mH	Kg.cm	#	g-cm²	kg	kg-cm	mm
MT34FH26028M8K	MT34FH26028B8K	3.64	2.8	1.3	5.1	28	8	660	1.6	0.85	67
MT34FH38028M8K	MT34FH38028B8K	4.76	2.8	1.7	7.7	48	8	1200	2.4	1.3	94
MT34FH50035M8K	MT34FH50035B8K	4.97	3.5	1.42	7.9	76	8	1800	3.6	2.3	125

• Dimension





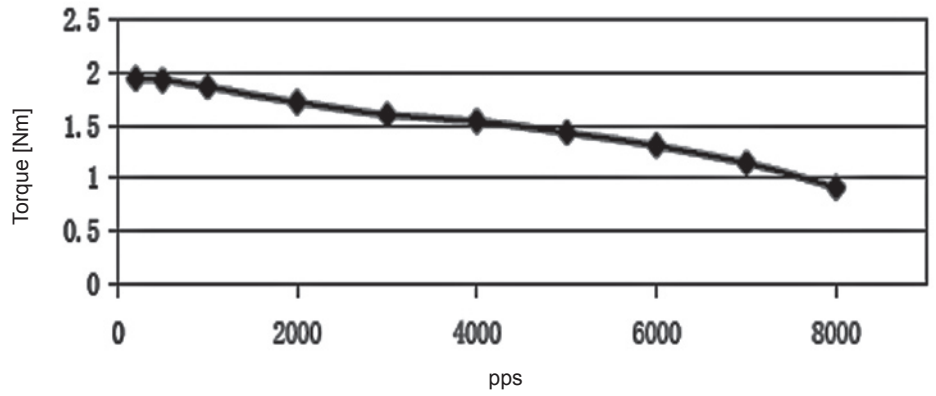
• Wiring Diagram



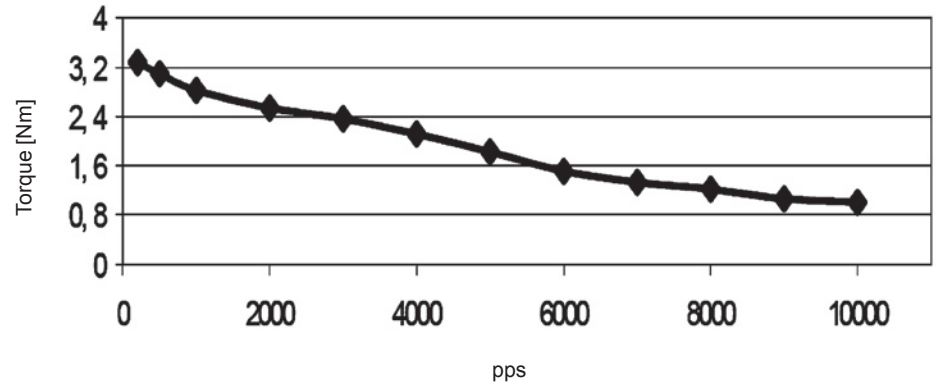
1.8° Size 86mm Roung High Torque Hybrid Stepping Motor

- **Pull out Torque Curve**

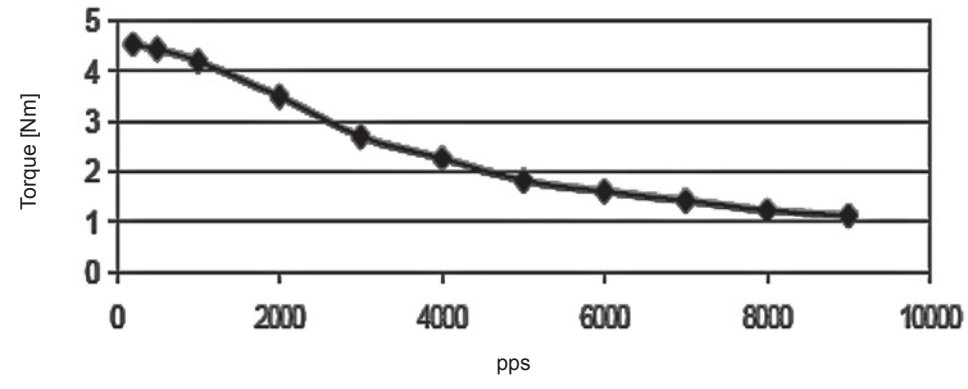
MT34FH26028M8K / MT34FH26028B8K
100Vdc 3.96A/Phase Driver: parallel connection, half step



MT34FH38028M4K / MT34FH38028B4K
100Vdc 3.96/Phase Driver: parallel connection, half step



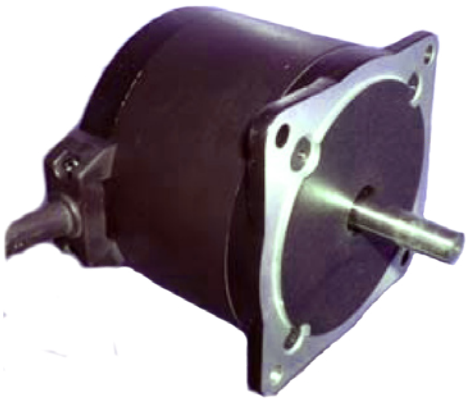
MT34FH51035M8K / MT34FH50035B8K
100Vdc 3.96A/Phase Driver: parallel connection, half step



1.8° Size 86mm Round Hybrid Stepping Motor

• General Specification for Round Hybrid Stepping Motor

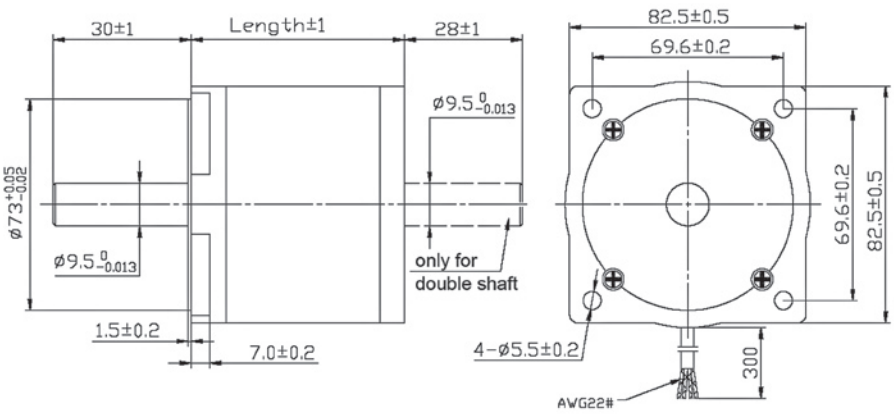
Item	Specifications
Step Angle	1.8˚
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80˚C Max. (rated current, 2 phase on)
Ambient Temperature	-20˚C~+50˚C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	1500VAC for one minute
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	220N (20mm from the flange)
Max. axial force	60N



• Size 86mm Round Hybrid Stepping Motor Specifications

Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	V	A	Ω	mH	Kg.cm	#	g-cm²	kg	kg-cm	mm
MT34FP24045M6	MT34FP24045B6	1.8	4.5	0.4	1.4	13	6	560	1.5	0.8	62
MT34FP24012M6	MT34FP24012B6	5.5	1.25	4.4	14	13	6				
MT34FP24140M6	MT34FP24140B6	0.7	14	20	60	13	6				
MT34FP24059M4	MT34FP24059B4	1.33	5.9	0.23	1.5	18	4				
MT34FP37040M6	MT34FP37040B6	3.0	4.0	0.75	4.5	26	6	1100	2.6	2.4	94
MT34FP37020M6	MT34FP37020B6	6.0	2.0	3.0	13	26	6				
MT34FP37010M6	MT34FP37010B6	12	1	12	72	26	6				
MT34FP37056M4	MT34FP37056B4	2.1	5.6	0.38	3.9	35	4				
MT34FP53067M6	MT34FP53067B6	3.0	6.7	0.45	2	36	6	1800	3.6	3.6	134
MT34FP53040M6	MT34FP37040B6	5.0	4.0	1.25	6.6	36	6				
MT34FP53018M6	MT34FP53018B6	12	1.8	6.5	41	36	6				
MT34FP53056M4	MT34FP53056B4	3.5	5.6	0.63	6.6	50	4				

• Dimension

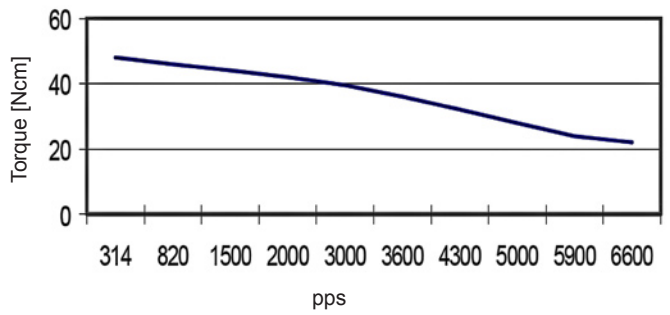


• Wiring Diagram

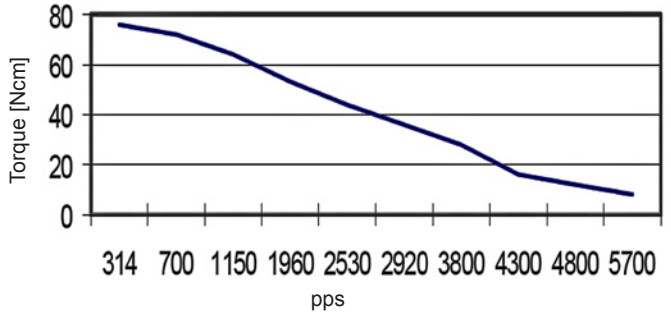
1.8° Size 86mm Round Hybrid Stepping Motor

- **Pull out Torque Curve**

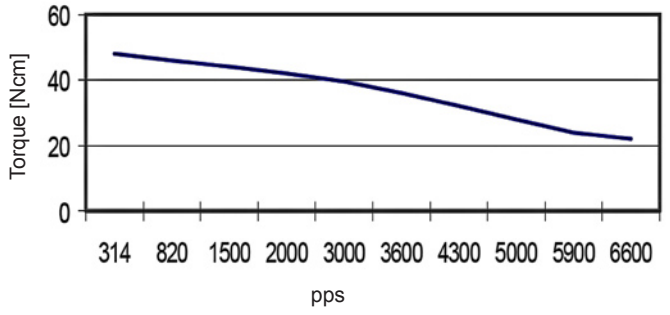
MT34FP24045M6 / MT34FP24045B6
30Vdc 3.00A/Phase Driver: half step



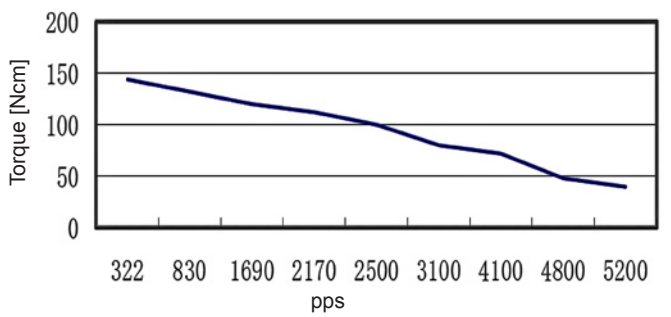
MT34FP24012M6 / MT34FP24012B6
30Vdc 1.30A/Phase Driver: half step



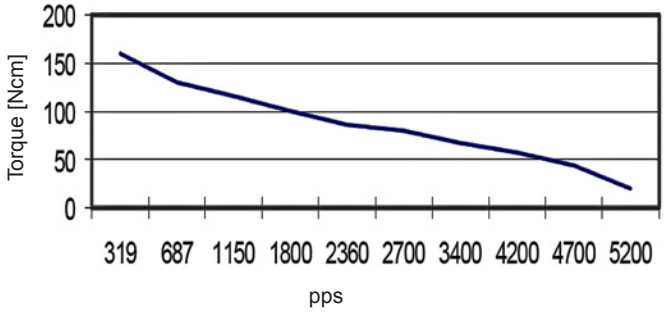
MT34FP37040M6 / MT34FP37040B6
30Vdc 3.00A/Phase Driver: half step



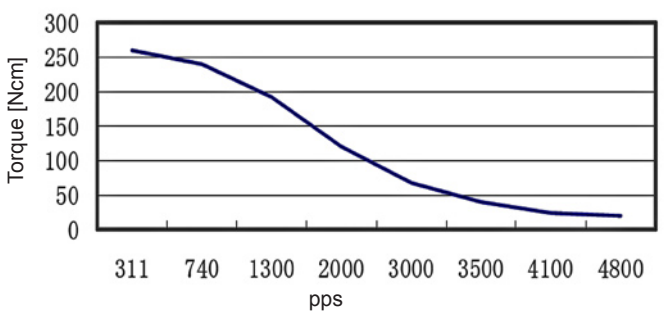
MT34FP37020M6 / MT34FP37020B6
30Vdc 2.00A/Phase Driver: half step



MT34FP37056M4 / MT34FP37056B4
30Vdc 2.00A/Phase Driver: half step



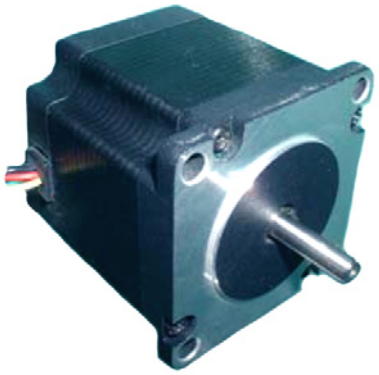
MT34FP53040M6 / MT34FP53040B6
30Vdc 3.00A/Phase Driver: half step



1.8° Size 86mm High Torque Hybrid Stepping Motor

• General Specification for High Torque Hybrid Stepping Motor

Item	Specifications
Step Angle	1.8°
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80°C Max. (rated current, 2 phase on)
Ambient Temperature	-20°C~+50°C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	820VAC, 1s, 3mA
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	220N (20mm from the flange)
Max. axial force	60N

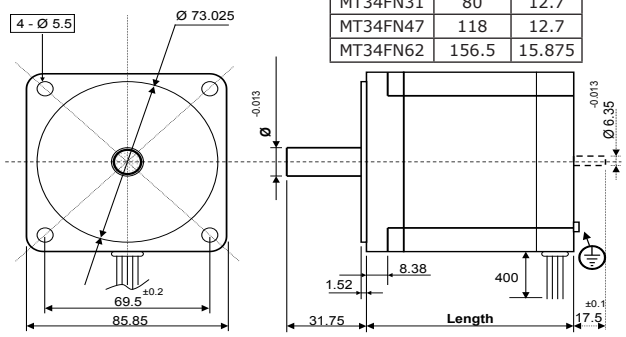


• Size 86mm High Torque Hybrid Stepping Motor Specifications

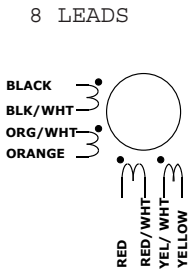
Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	V	A	Ω	mH	Kg.cm	#	g-cm²	kg	kg-cm	mm
MT34FN26028M8	MT34FN26028B8	3.64	2.8	1.3	5.1	34	8	1000	1.7	0.8	65
MT34FN26043M8	MT34FN26043B8	2.45	4.3	0.57	1.7	34	8				
MT34FN31042M8	MT34FN31042B8	3.36	4.2	0.8	4	46	8	1400	2.3	1.2	80
MT34FN31060M8	MT34FN31060B8	2.34	6	0.39	1.7	46	8				
MT34FN47035M8	MT34FN47035B8	4.45	3.5	1.3	8.3	87	8	2700	3.8	2.5	118
MT34FN47060M8	MT34FN47060B8	3.12	6	0.54	3	87	8				
MT34FN62035M8	MT34FN62035B8	6.13	3.5	1.8	12	122	8	4000	5.4	3.6	156.5
MT34FN62060M8	MT34FN62060B8	4.2	6	0.7	4.8	122	8				

• Dimension

Model	Length	Ø
MT34FN26	65	12.7
MT34FN31	80	12.7
MT34FN47	118	12.7
MT34FN62	156.5	15.875



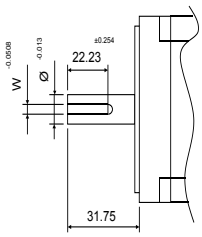
• Wiring Diagram



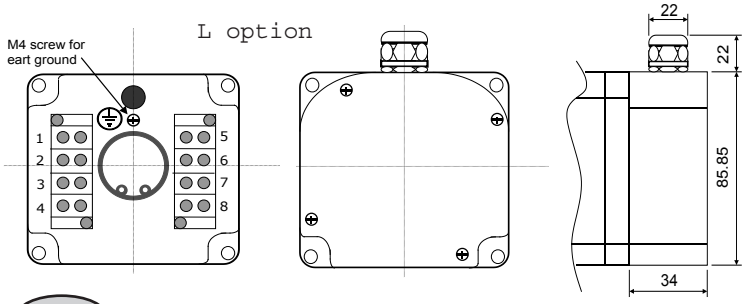
• Options

K option

Model	Ø	W
MT34FN26	12.7	3.175
MT34FN31	12.7	3.175
MT34FN47	12.7	3.175
MT34FN62	15.875	4.763



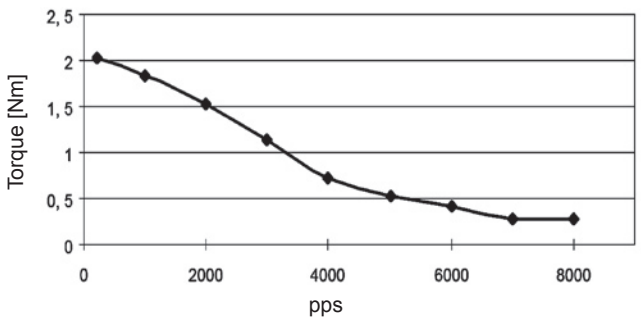
L option



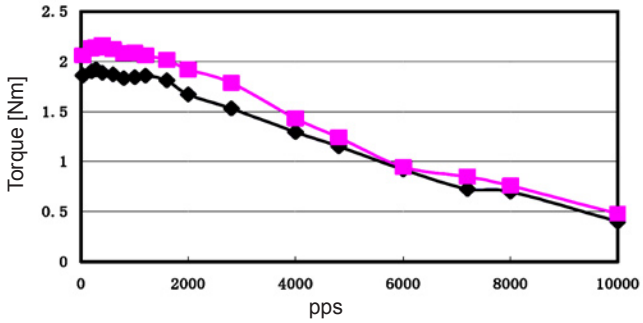
1.8° Size 86mm High Torque Hybrid Stepping Motor

- **Pull out Torque Curve**

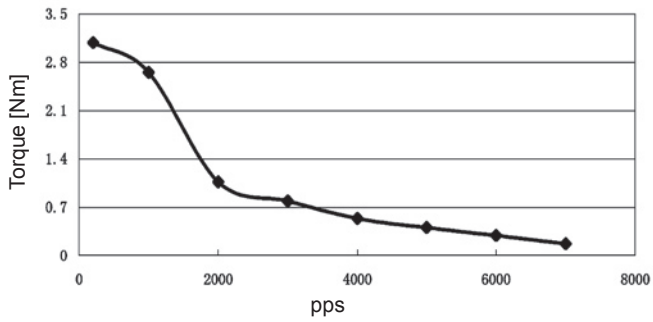
MT34FN26043M8 / MT34FN26043B8
48Vdc 6.00A/Phase Driver: full step, parallel connection



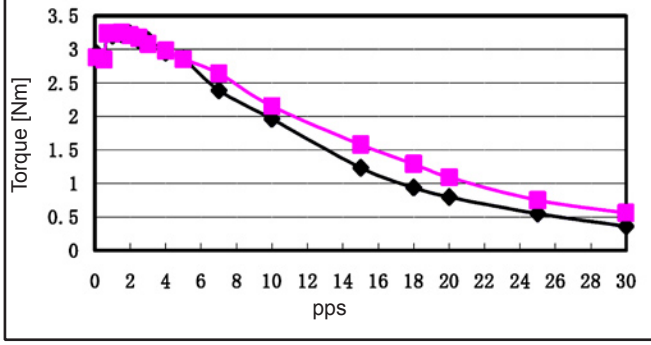
MT34N26028M8 / MT34FN26028B8
63Vdc 4.2 A / 4.9 A Driver: half step, parallel connection



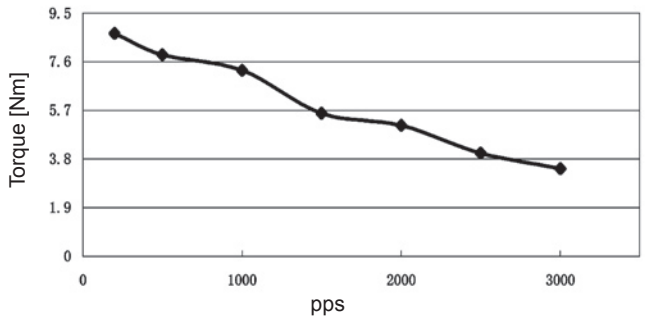
MT34FN31060M8 / MT34FN31060B8
48Vdc 4.20A/Phase Driver: full step, serial connection



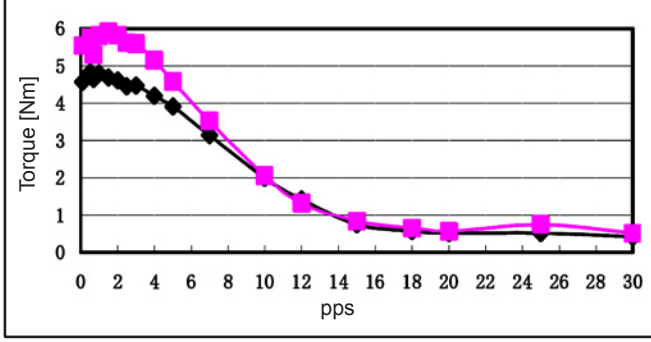
MT34FN31060M8 / MT34FN31060B8
68 Vdc / 80 Vdc 7.80A/Phase Driver: full step, parallel connection



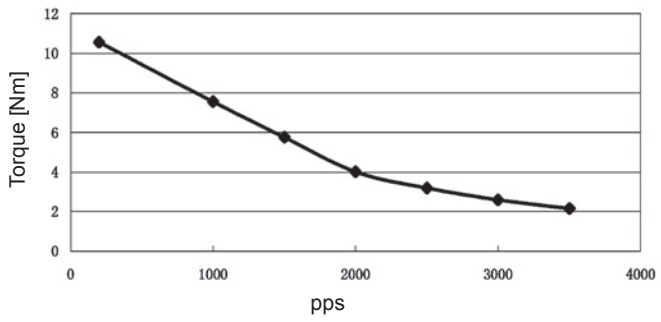
MT34FN47035M8
80Vdc 5.00A/Phase Driver: full step, parallel connection



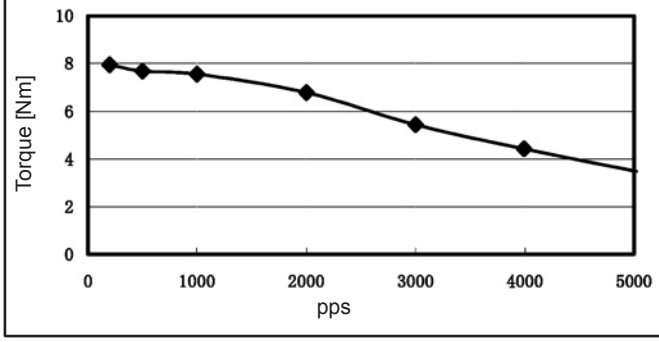
MT34FN47060M8 / MT34FN47060B8
80Vdc 5.7A / 7.8A/Phase Driver: full step, parallel connection



MT34FN62035M8 / MT34FN62035B8
80Vdc 5.00A/Phase Driver: full step, parallel connection



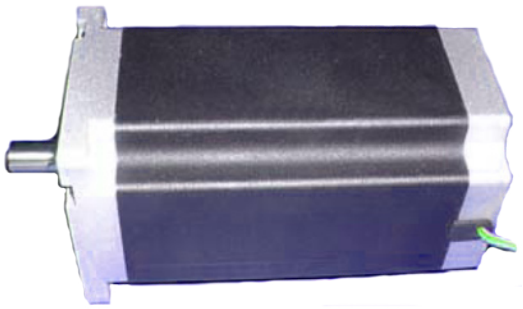
MT34FN62060M8 / MT34FN62060B8
80Vdc 4.20A/Phase Driver: full step, serial connection



1.8° Size 110mm High Torque Hybrid Stepping Motor

• General Specification for High Torque Hybrid Stepping Motor

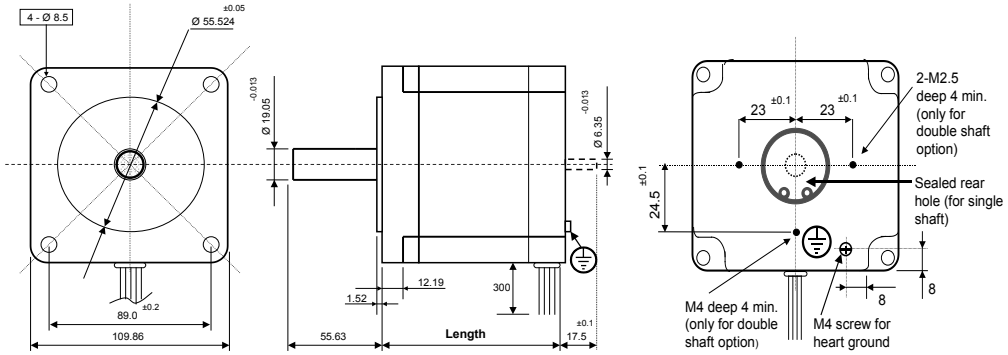
Item	Specifications
Step Angle	1.8°
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80°C Max. (rated current, 2 phase on)
Ambient Temperature	-20°C~+50°C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	1800VAC, 1s, 5mA
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	220N (20mm from the flange)
Max. axial force	60N



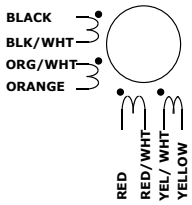
• Size 110mm High Torque Hybrid Stepping Motor Specifications

Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	V	A	Ω	mH	Kg.cm	#	g-cm²	kg	kg-cm	mm
MT42FN39075M8	MT42FN39075B8	2.7	7.5	0.36	3	113	8	5500	5	3	99
MT42FN39100M8	MT42FN39100B8	2.5	10	0.25	1.9	113	8				
MT42FN59110M8	MT42FN59110B8	3.3	11	0.3	2.9	216	8	10900	8.4	5.9	150
MT42FN79070M8	MT42FN79070B8	4.6	7	0.66	7.7	294	8	16200	11.7	7.5	201
MT42FN79110M8	MT42FN79110B8	3	11	0.28	3.2	294	8				

• Dimension

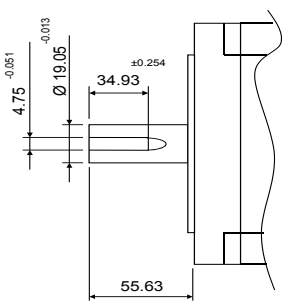


• Wiring Diagram

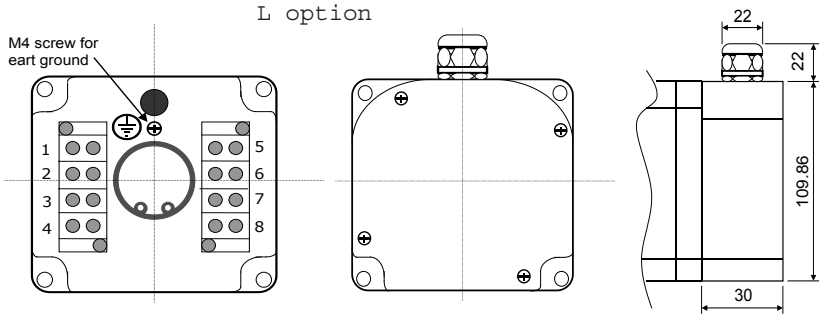


• Options

K option



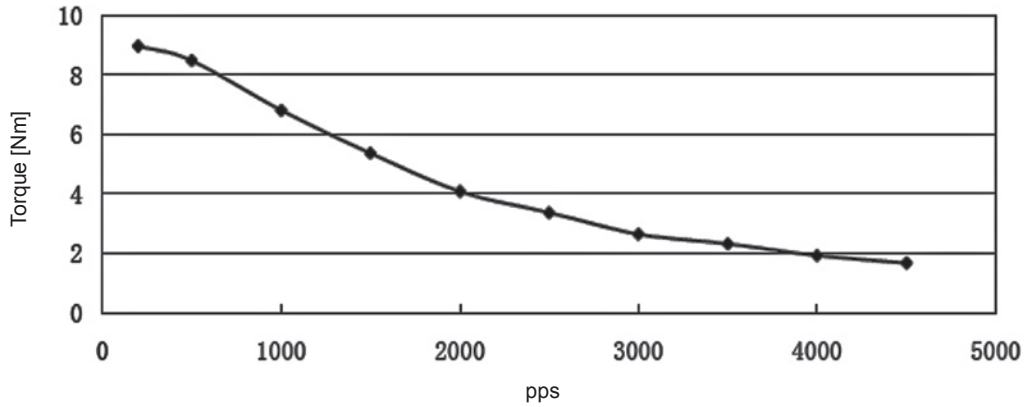
L option



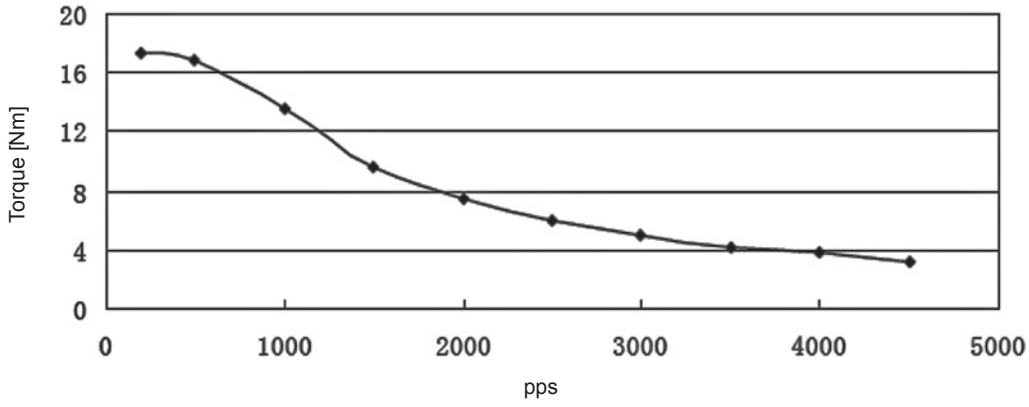
1.8° Size 110mm High Torque Hybrid Stepping Motor

- **Pull out Torque Curve**

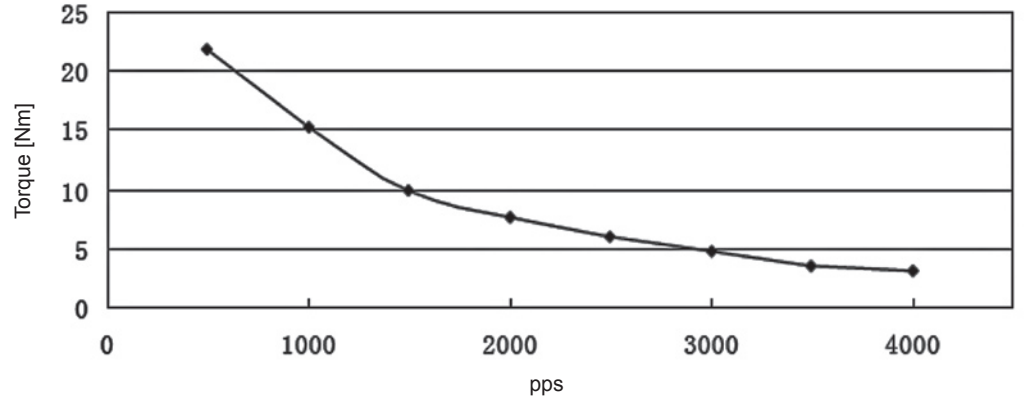
MT42FN39075M8 / MT42FN39075B8
100Vdc 7.5A/Phase Driver: full step, parallel connection



MT42FN59110M8 / MT42FN59110B8
100Vdc 7.7A/Phase Driver: full step, serial connection



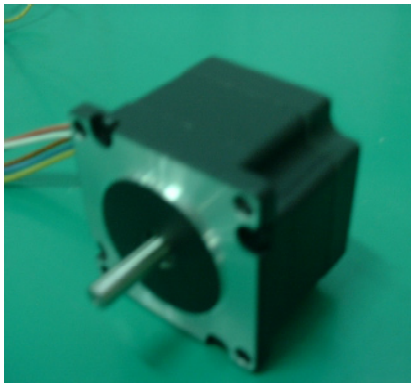
MT42FN79110M8 / MT42FN79110B8
100Vdc 7.5A/Phase Driver: full step, serial connection



1.2° Size 57mm 3-Phase Hybrid Stepping Motor

• General Specification for 3-Phases Hybrid Stepping Motor

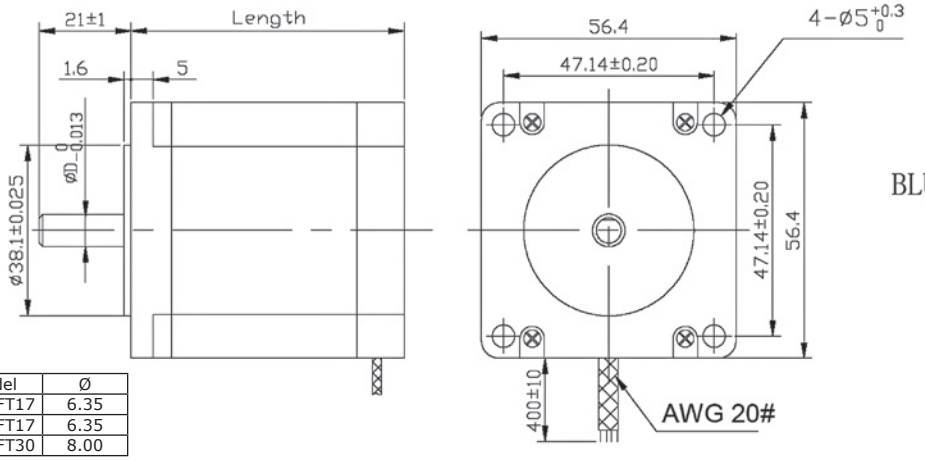
Item	Specifications
Step Angle	1.2°
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80°C Max. (rated current, 2 phase on)
Ambient Temperature	-20°C~+50°C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	75N (20mm from the flange)
Max. axial force	15N
Insulation class	F



• Size 57mm 3-Phase Hybrid Stepping Motor Specifications

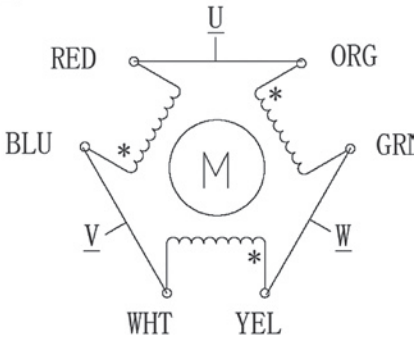
Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	V	A	Ω	mH	Kg.cm	#	g-cm²	kg	kg-cm	mm
MT23FT17052M6	MT23FT17052B6	6.76	5.2	1.3	1.4	04.5	6	110	0.45	2.1	42
MT23FT22056M6	MT23FT22056B6	4	5.6	0.7	1.7	9.0	6	300	0.75	4	56
MT23FT30058M6	MT23FT30058B6	6	5.8	1.05	2.4	15.0	6	480	1.1	6.8	79

• Dimension

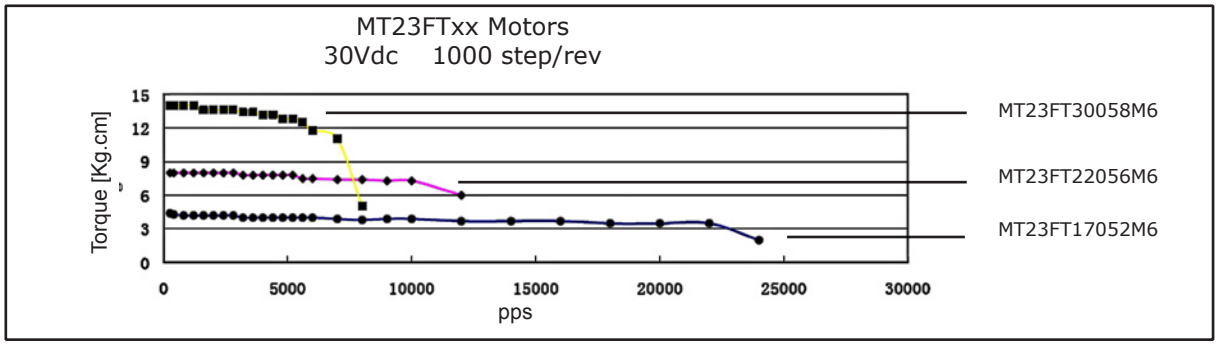


Model	Ø
MT23FT17	6.35
MT23FT17	6.35
MT23FT30	8.00

• Wiring Diagram



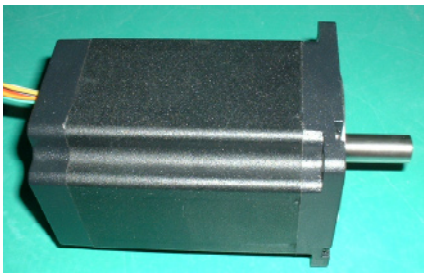
• Pull out Torque Curve



1.2° Size 86mm 3-Phase Hybrid Stepping Motor

• General Specification for 3-Phases Hybrid Stepping Motor

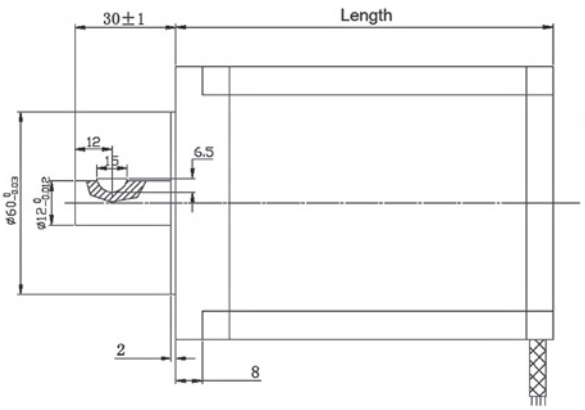
Item	Specifications
Step Angle	1.2˚
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80˚C Max. (rated current, 2 phase on)
Ambient Temperature	-20˚C~+50˚C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	1800VAC for one minute
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	220N (20mm from the flange)
Max. axial force	60N
Insulation class	F

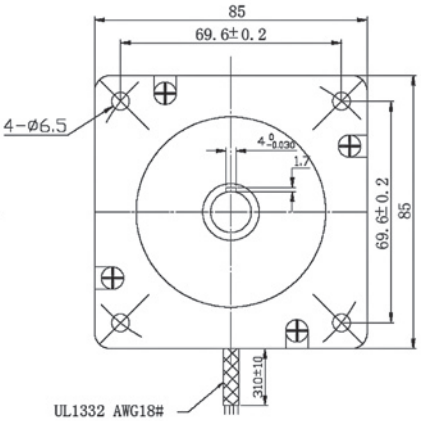


• Size 86mm 3-Phase Hybrid Stepping Motor Specifications

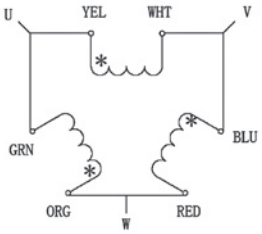
Model No.		Rated Voltage	Current /Phase	Resistance /Phase	Inductance /Phase	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	V	A	Ω	mH	Kg.cm	#	g-cm²	kg	kg-cm	mm
MT34FT26017M6	MT34FT26017B6	7.43	1.75	4.25	12.3	22.6	6	1100	1.65	nd	67
MT34FT38020M6	MT34FT38020B6	10.8	2	5.4	23	45.2	6	2320	2.7	nd	97
MT34FT38058M6	MT34FT38058B6	5.22	5.8	0.9	3.2	45.2					
MT34FT50022M6	MT34FT50022B6	20.25	2.25	9	41	67.8	6	3300	3.8	nd	127
MT34FT50052M6	MT34FT50052B6	14.3	5.2	2.75	13.7	67.8					

• Dimension



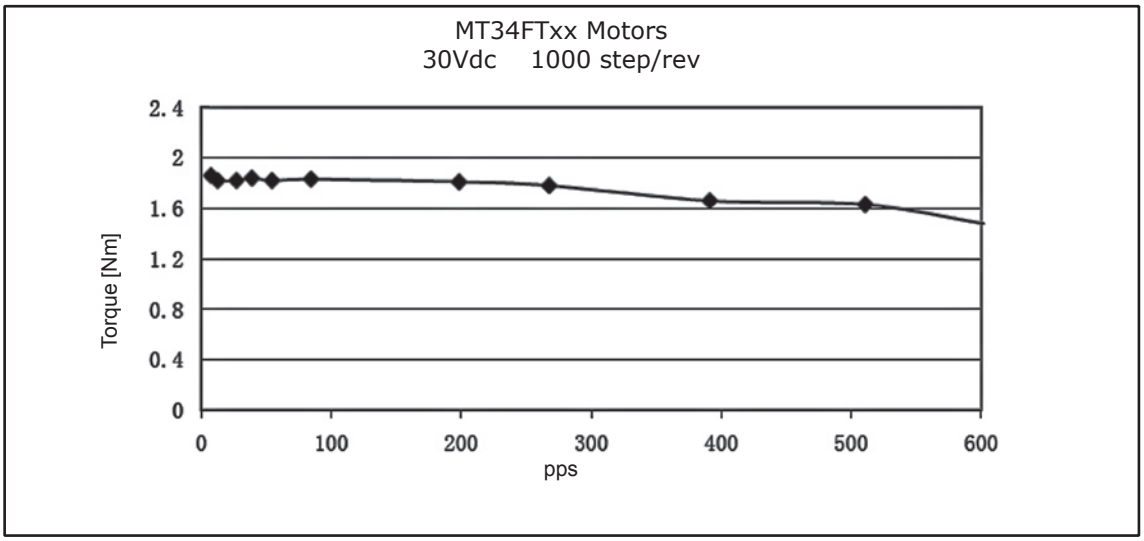


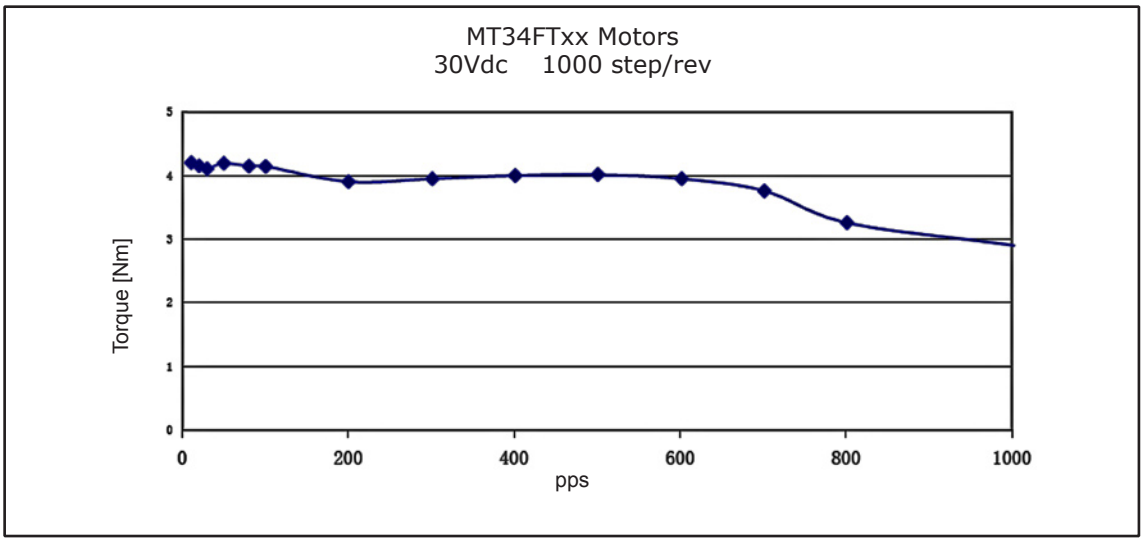
• Wiring Diagram

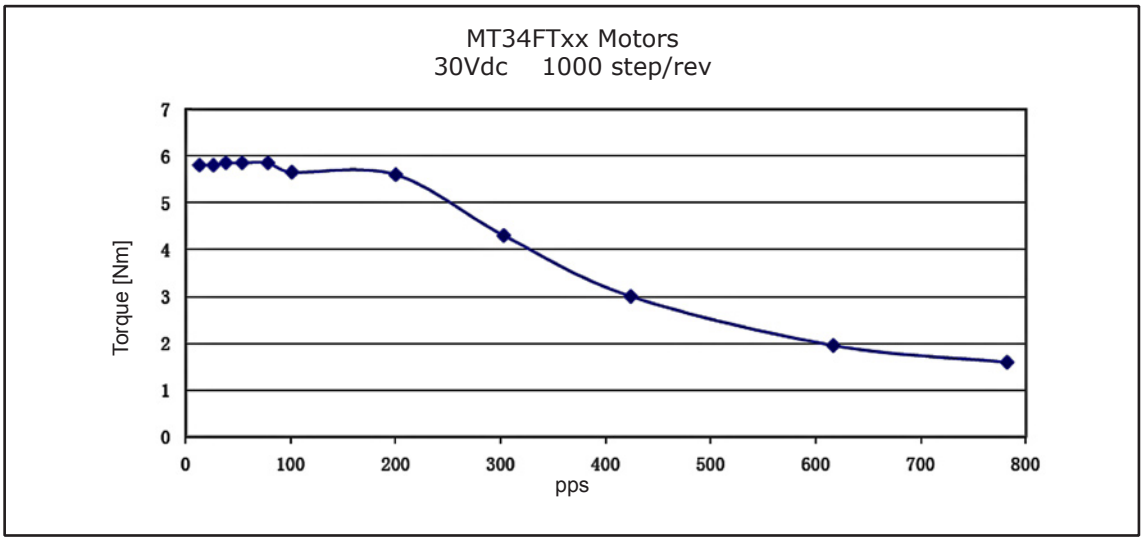


1.2° Size 86mm 3-Phase Hybrid Stepping Motor

- **General Specification for 3-Phases Hybrid Stepping Motor**



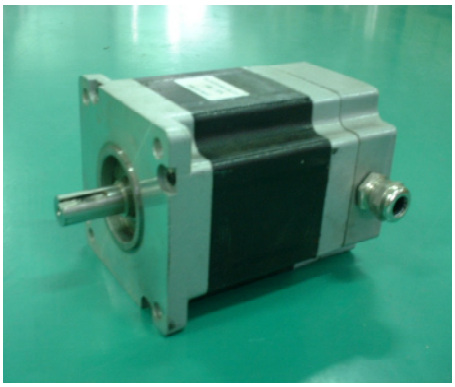




1.2° Size 110mm 3-Phase Hybrid Stepping Motor

• General Specification for 3-Phases Hybrid Stepping Motor

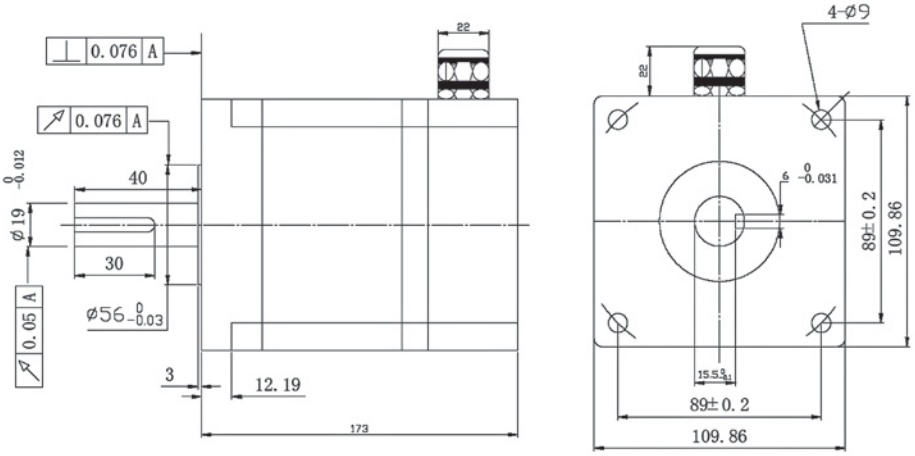
Item	Specifications
Step Angle	1.2˚
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80˚C Max. (rated current, 2 phase on)
Ambient Temperature	-20˚C~+50˚C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	1800VAC, 1s, 5mA
Shaft Radial Play	0.02Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)
Max. radial force	220N (20mm from the flange)
Max. axial force	60N
Insulation class	F



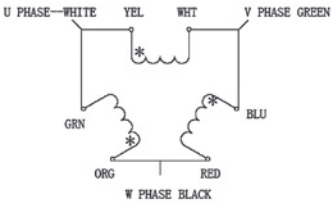
• Size 110mm 3-Phase Hybrid Stepping Motor Specifications

Model No.		Voltage /Phase	Current /Phase	Max. starting speed	Ratedng Torque	Holding Torque	Number of Leads	Rotor inertia	Weight	Detent Torque	Length
Single Shaft	Double Shaft	Vdc	A	Rpm/s	Nm	Kg.cm	#	g-cm²	kg	kg-cm	mm
MT42FT68 M6		325	4.1	4.7	12	139.2	6	10500	8	nd	173

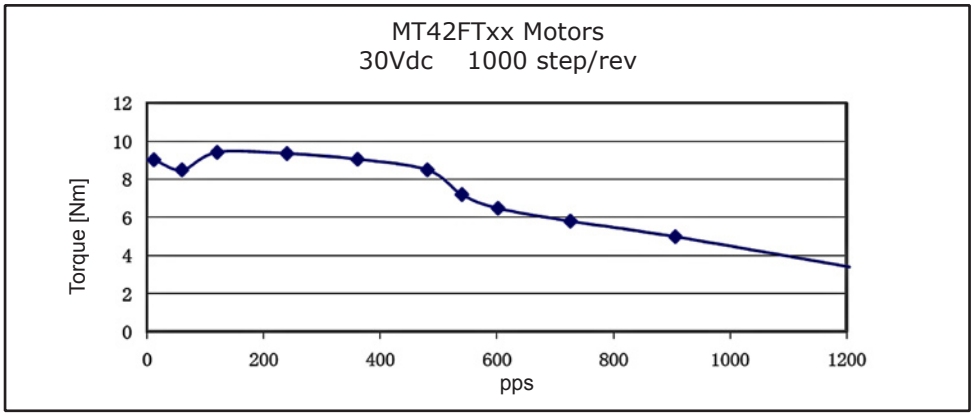
• Dimension



• Wiring Diagram



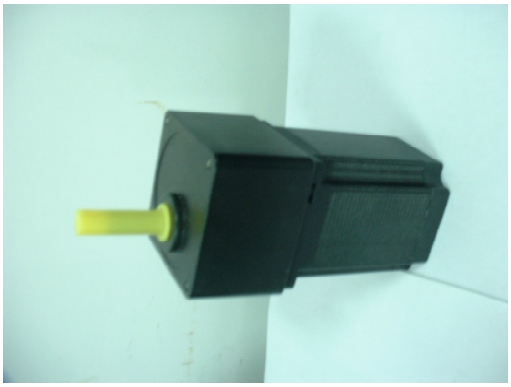
• Pull out Torque Curve



Gearbox Size 57mm High Torque Stepping Motor

• General Specification for Gearbox Size 57mm High Torque Hybrid Stepping Motor

Item	Specifications
Step Angle	1.8˚
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80˚C Max. (rated current, 2 phase on)
Ambient Temperature	-20˚C~+50˚C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute



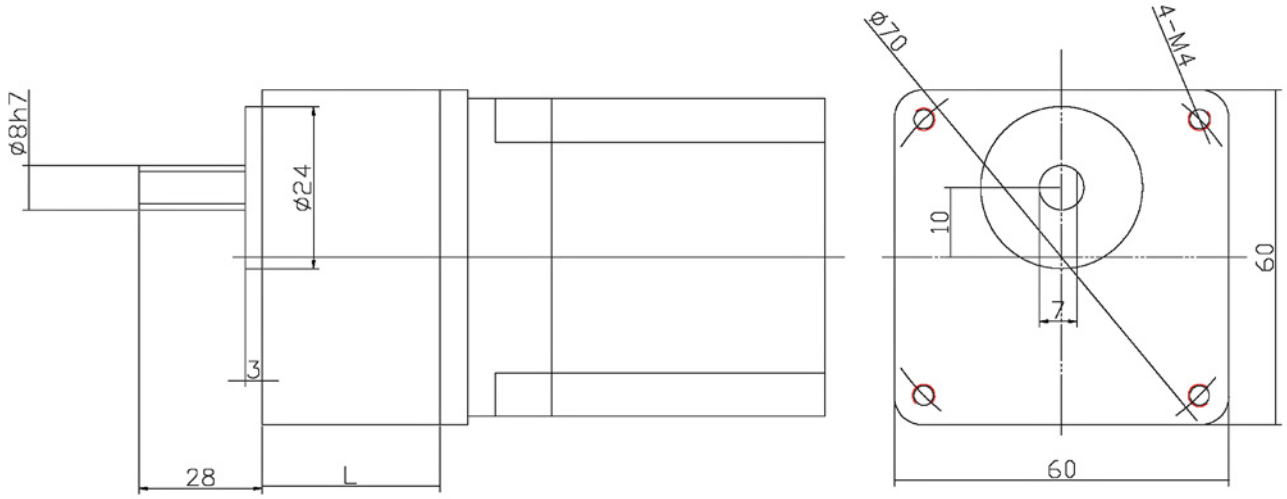
• Gearbox Size 57mm High Torque Hybrid Stepping Motor Specifications

The motor winding specifications are the same of the 1,8° Size 57mm High Torque Hybrid Stepping Motor Family (MT23FK series).

• Gearbox Specifications

Ratio	3	7.5	12.5	15	25	30	50	75	90	100	120	150
Number of gear trains	2	2	2	3	3	3	4	4	5	5	5	5
Length (L) mm	32	32	32	32	42	42	42	42	42	42	42	42
Peak torque Kg.cm	50											
Average Backlash at Noload	4 deg			3.5 deg			3 deg			2.5 deg		

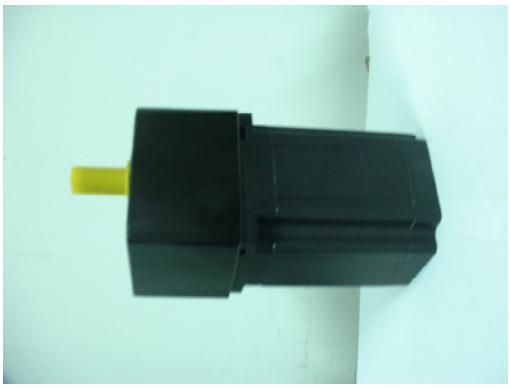
• Dimension



Gearbox Size 86mm High Torque Stepping Motor

• General Specification for Gearbox Size 86mm High Torque Hybrid Stepping Motor

Item	Specifications
Step Angle	1.8˚
Step Angle Accuracy	±5% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80˚C Max. (rated current, 2 phase on)
Ambient Temperature	-20˚C~+50˚C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute



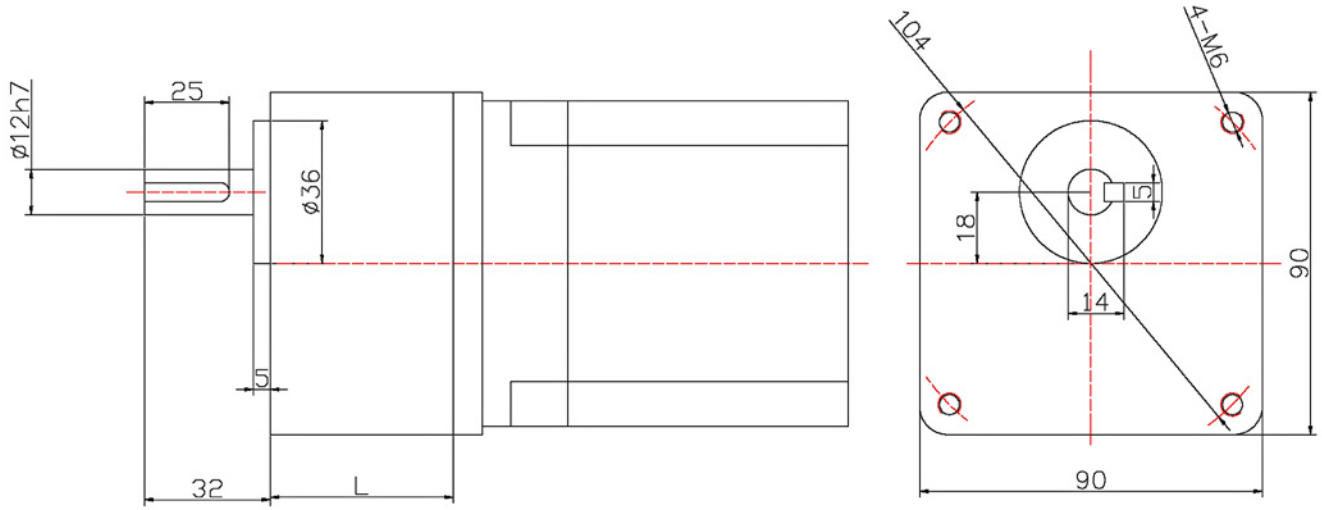
• Gearbox Size 86mm High Torque Hybrid Stepping Motor Specifications

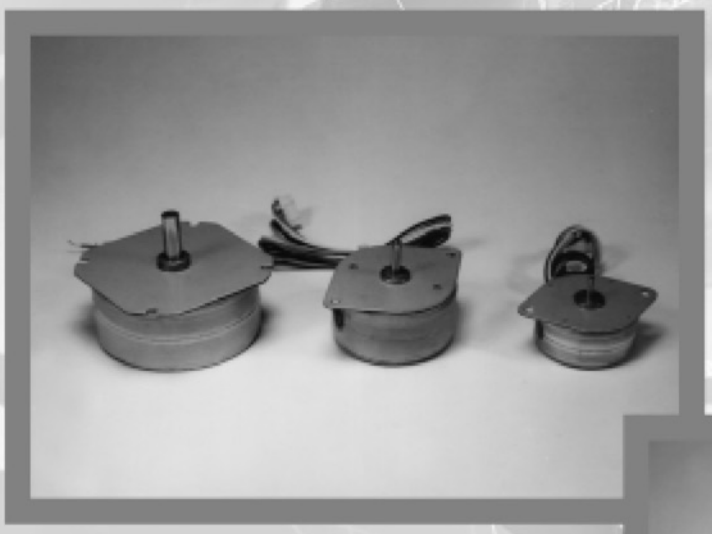
The motor winding specifications are the same of the 1,8° Size 86mm High Torque Hybrid Stepping Motor Family (MT34FN series).

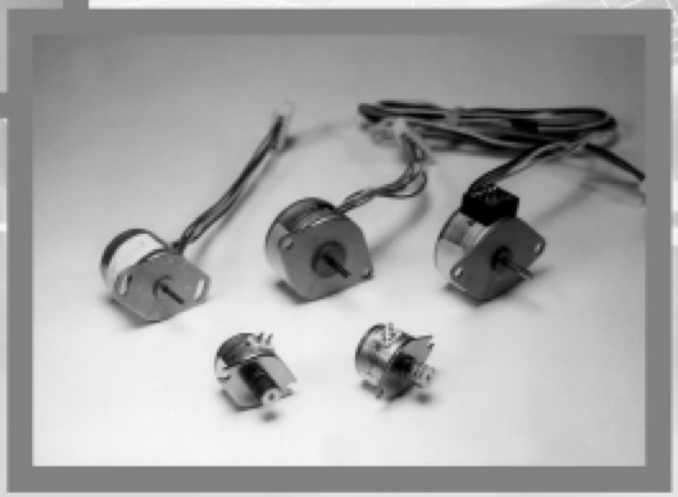
• Gearbox Specifications

Ratio	3	5	7.5	12.5	15	25	30	50	75	100	120	150
Number of gear trains	2	2	2	2	2	3	3	4	4	4	4	4
Length (L) mm	45	45	45	45	45	60	60	60	60	60	60	60
Peak torque Kg.cm	250											
Average Backlash at Noload	4 deg					3.5 deg		2.5 deg				

• Dimension

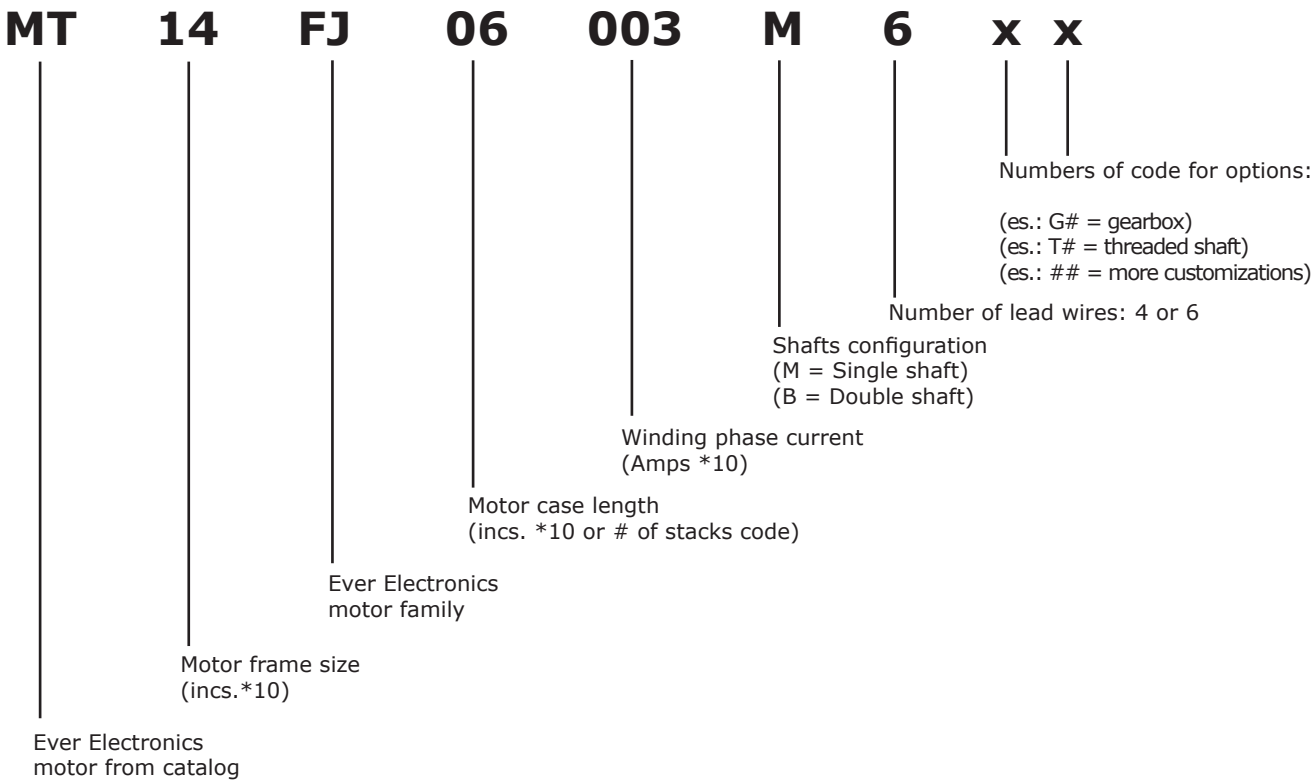






PM Stepping Motor and PM Stepping Gearmotor

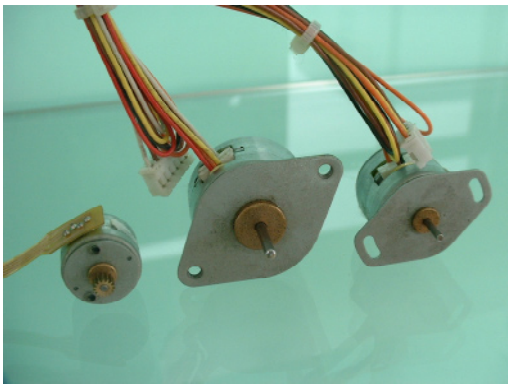
- **Product Number Code For Permanent Magnet Stepping Motor**



Permanent Magnet Stepping Motor

• General Specification for MT08FF / MT10FF / MT12FY / MT12FJ

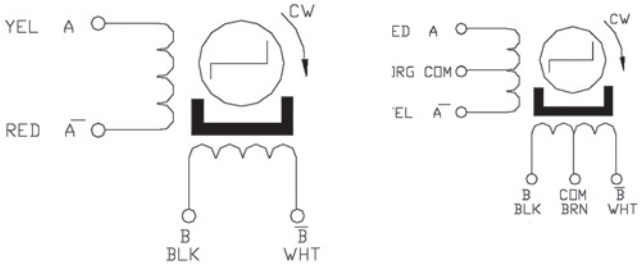
Item	Specifications
Step Angle Accuracy	±8% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80˚C Max. (rated current, 2 phase on)
Ambient Temperature	-20˚C~+50˚C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.06Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)



• Permanent Magnet Motor Specifications

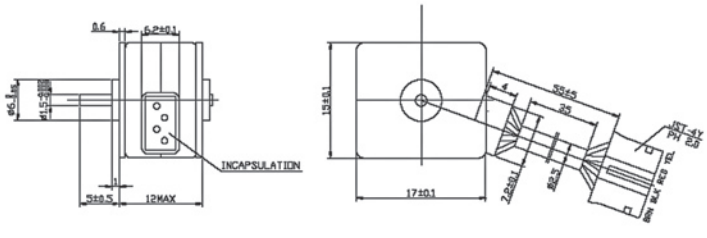
Model No.	Step Angle	Voltage /Phase	Current /Phase	Resistance /Phase	Inductance /phase	Holding Torque	Number of Leads	Rotor inertia	Detent Torque	Length
Single Shaft	Deg.	Vdc	A	Ω	mH	g.cm	#	g-cm²	g-cm	mm
MT08FF05004M4	18	12	0.04	300	-	40	4		10	12
MT08FF05005M4	18	5	0.5	10	-	27	4		6	12
MT08FF05001M4	18	12	0.065	190	-	40	4		10	12
MT10FF08002M6	18	12	0.24	50	-	80	6		25	18.5
MT10FF08005M6	18	5	0.5	10	-	60	4		20	18.5
MT12FY07005M6	15	9	0.45	20	-	140	6	<1	75	16
MT12FY07004M6	15	12	0.4	30	-	130	6		75	16
MT12FJ06002M4	7.5	12	0.24	50	-	170	4		45	15
MT12FJ06002M6	7.5	12	0.25	50	-	160	6		35	15
MT12FJ06005M6	7.5	5	0.5	10	-	120	6		45	15
MT12FJ06005M4	7.5	5	0.5	10	-	110	4		40	15

• Wiring Diagram

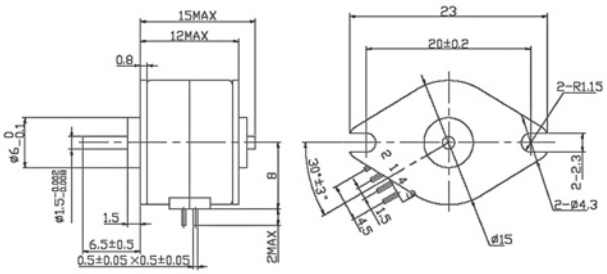


• Dimensions for MT08FF05

MT08FF05004M4



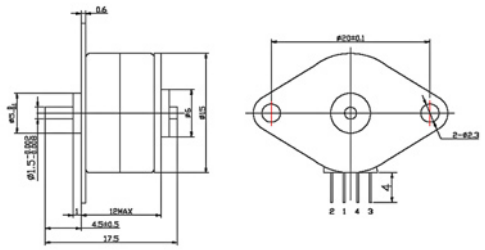
MT08FF05005M4



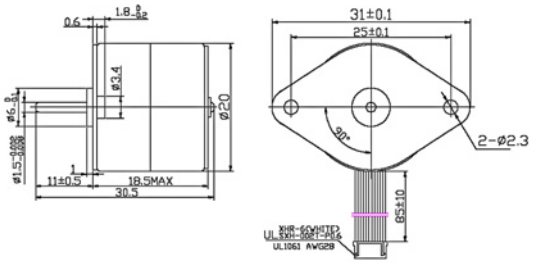
Permanent Magnet Stepping Motor

- **Dimensions for MT08FF / MT10FF / MT12FY / MT12FJ**

MT08FF05001M4



MT10FF08002M6



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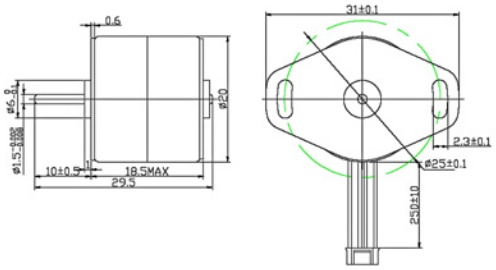

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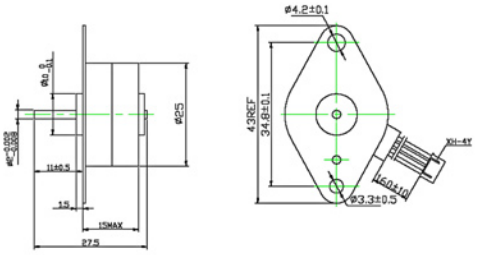

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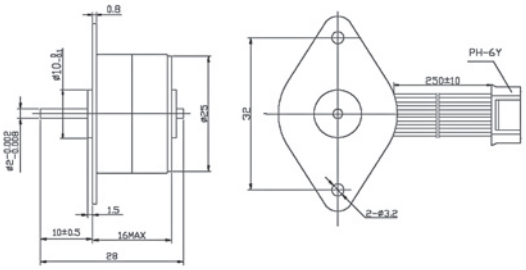

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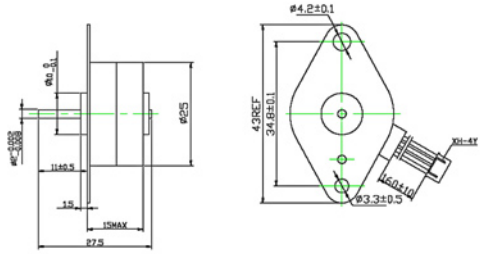

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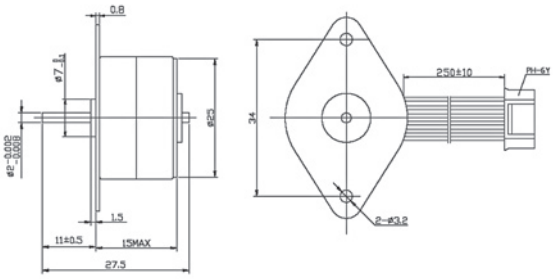

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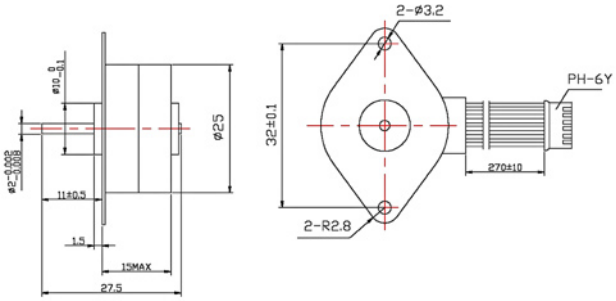

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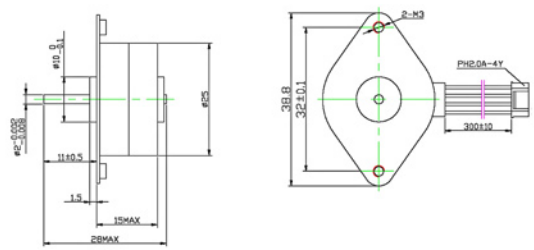
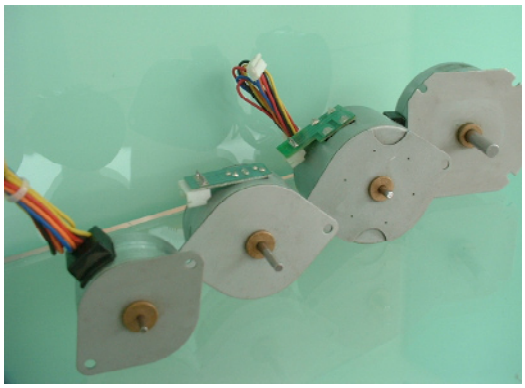


Permanent Magnet Stepping Motor

• General Specification for MT14FY / MT14FJ / MT17FJ / MT20FJ / MT23FJ

Item	Specifications
Step Angle Accuracy	±8% (full step, no load)
Resistance Accuracy	±10%
Inductance Accuracy	±20%
Temperature Rise	80°C Max. (rated current, 2 phase on)
Ambient Temperature	-20°C~+50°C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.06Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)

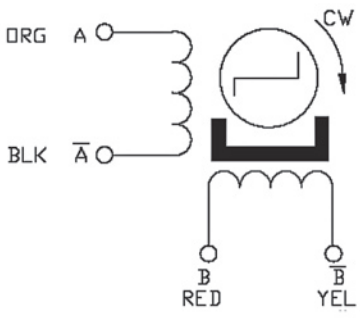


• Permanent Magnet Motor Specifications

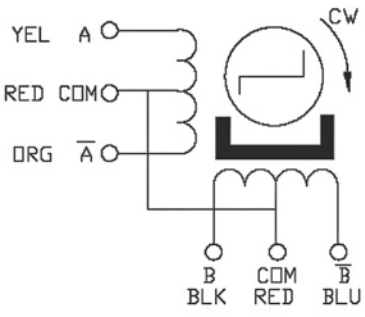
Model No.	Step Angle	Voltage /Phase	Current /Phase	Resistance /Phase	Inductance /phase	Holding Torque	Number of Leads	Rotor inertia	Detent Torque	Length
Single Shaft	Deg.	Vdc	A	Ω	mH	g.cm	#	g-cm²	g-cm	mm
MT14FY09005M4	15	5	0.46	11	-	335	4	7.5	125	22
MT14FY09005M5	15	5	0.46	11	-	300	5		125	22
MT14FJ09009M5	7.5	5	0.862	5.8	-	550	5		125	22
MT14FJ09005M4	7.5	5	0.5	10	-	550	4		125	22
MT14FJ09002M4	7.5	12	0.2	608	-	550	4		125	22
MT14FJ07003M5	7.5	12	0.255	47	-	300	5		65	16.5
MT14FJ07004M4	7.5	5	0.42	12	-	350	4		75	16.5
MT14FJ09008M5	7.5	12	0.8	15	-	800	5	9.6	210	22
MT17FJ09006M4	7.5	4.2	0.6	7	-	800	4		210	22
MT17FJ09001M4	7.5	12	0.13	95	-	550	4	7.5	100	22
MT17FJ09008M5	7.5	5	0.81	6.2	-	600	5		110	22
MT17FJ07002M5	7.5	12	0.24	50	-	600	5	9.6	90	17
MT17FJ07006M4	7.5	5	0.59	8.6	-	500	4		100	17
MT20FJ12009M4	7.5	5	0.9	5.5	-	1700	4	<14.5	350	30
MT23FJ10006M5	7.5	12	0.6	21	-	1500	5	<12.5	425	25
MT23FJ10006M4	7.5	5.6	0.625	9	-	1200	4		425	25

• Wiring Diagram

4 LEADS



5 LEADS



Permanent Magnet Stepping Motor

- **Dimensions for MT14FY / MT14FJ / MT17FJ / MT20FJ / MT23FJ**

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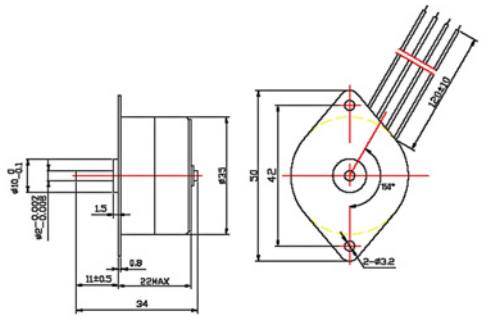

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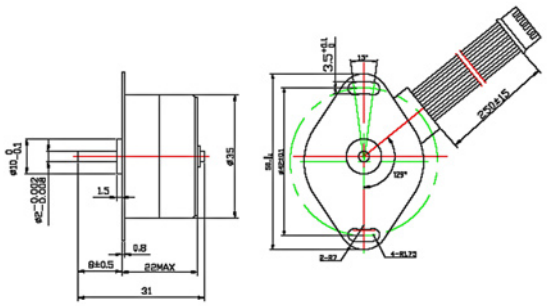

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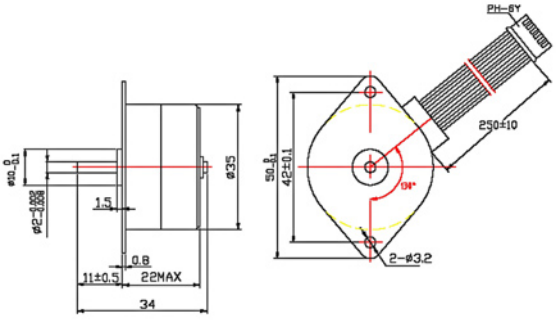

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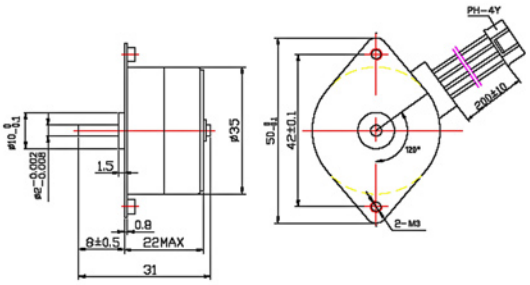

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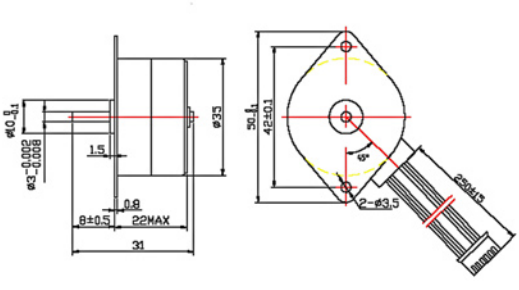

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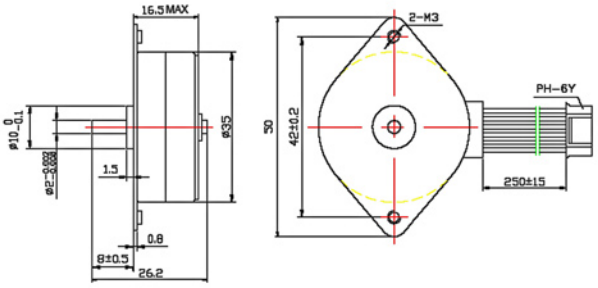

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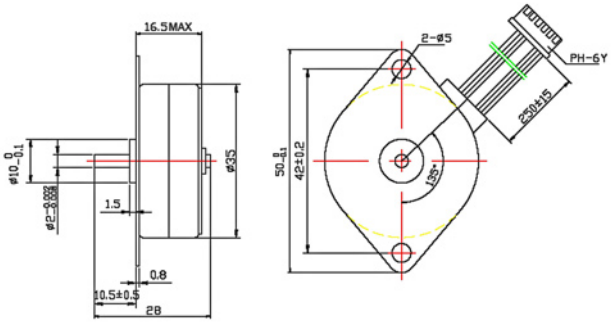

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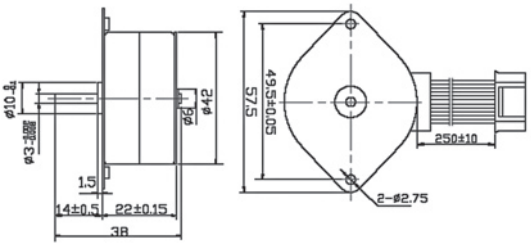

Permanent Magnet Stepping Motor

- **Dimensions for MT14FY / MT14FJ / MT17FJ / MT20FJ / MT23FJ**

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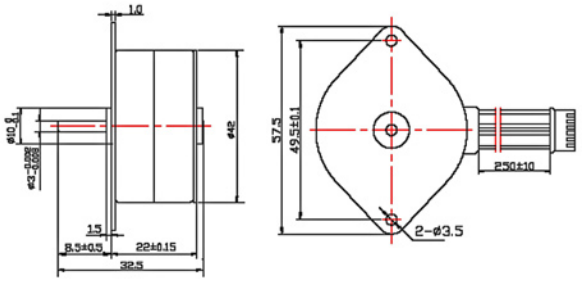

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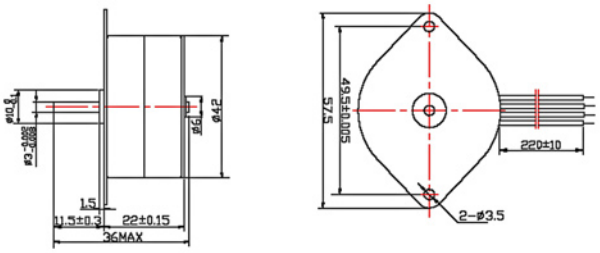

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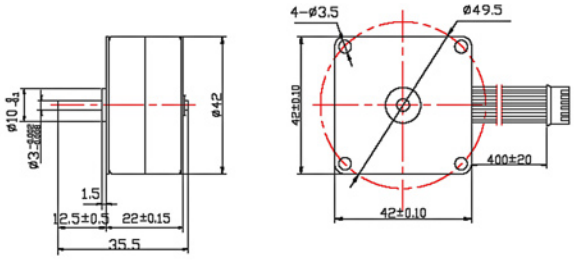

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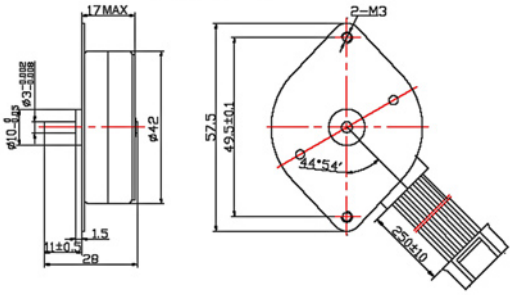

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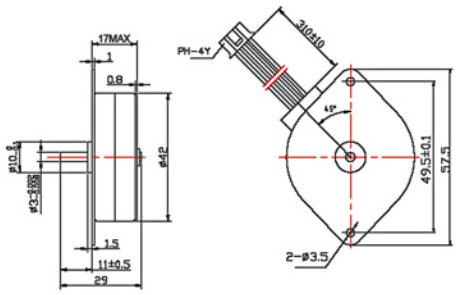

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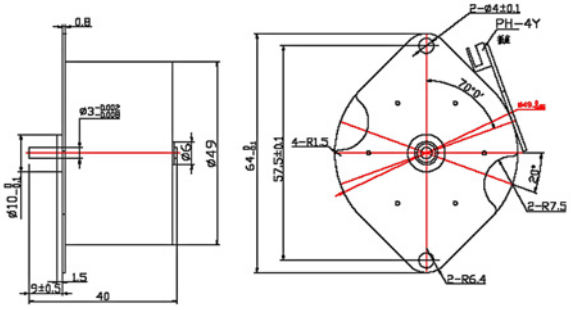

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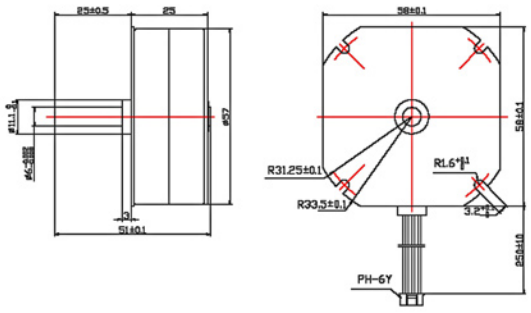

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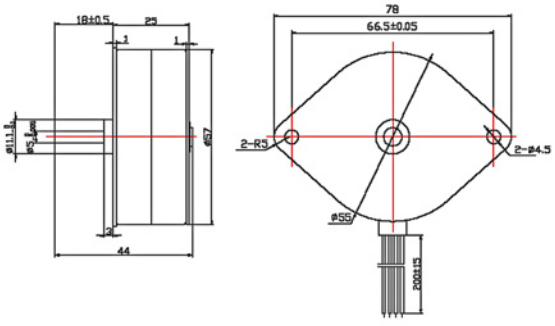
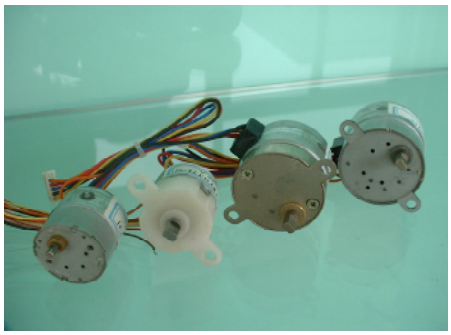


Permanent Magnet Stepping Gearmotor

• General Specification for Permanent Magnet Gearmotor

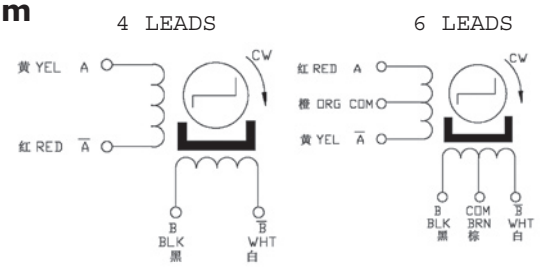
Item	Specifications
Resistance Accuracy	±7% at 25° C
Temperature Rise	60°C Max. (rated voltage, 100 pps)
Ambient Temperature	-20°C~+50°C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	600VAC for one second, leakage current 1mA
Shaft Radial Play	0.06Max. (450 g-load)
Shaft Axial Play	0.08Max. (450 g-load)



• Permanent Magnet Gearmotor Specifications

Model No.	Voltage /Phase	Resistance /Phase	Stepping Angle	Ratio	Pull-in Torque at 100 pps	Pull-in rate	Detent Torque	Number of Leads
Single Shaft	Vdc	Ω	Deg		g.cm	pps	g.cm	
MT08FJ08___M4G1								4
MT10FJ08002M4G1	5	25±10%	5.625/64	1:64	>=300	>=400	>=300	4
MT11FJ08001M4G1	12	300±10%	5.625/64	1:64	>=300	>=500	>=200	4
MT12FJ07001M4G2	12	300±10%	7.5/85.25	1:85.25	>=400	>=350	>=400	4
MT14FJ07001M6G2	12	110±10%	7.5/85.25	1:85.25	>=1000	>=500	>=800	6

• Wiring Diagram



• Dimensions

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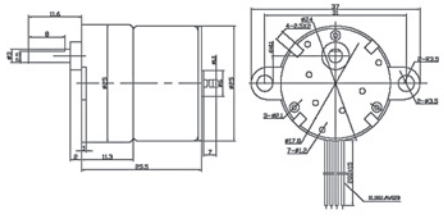

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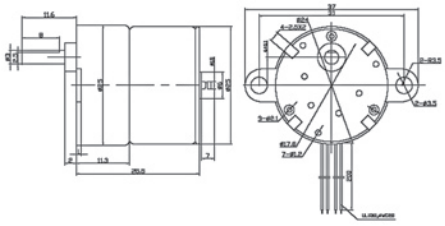

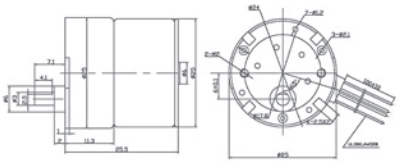

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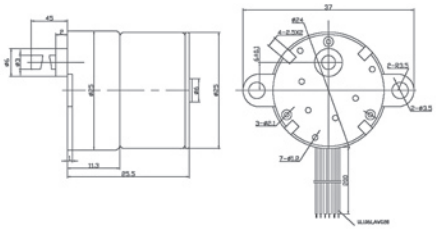

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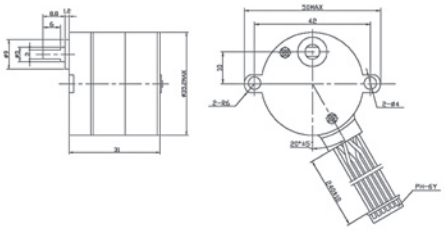

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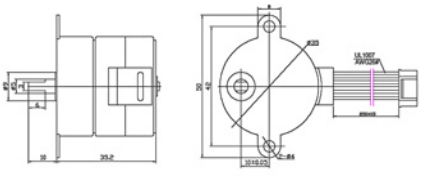
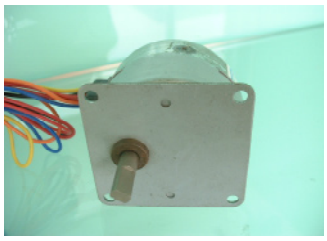


Permanent Magnet Stepping Gearmotor

• Motor Technical Data



Model No.	Stepping Angle	Voltage /Phase	Current /Phase	Resistance /Phase	No-load starting frequency	No-load operating frequency	Rated Starting Torque	Number of Leads
Single Shaft	Deg.	Vdc	A	Ω	pps	pps	g.cm/pps	#
MT17FJ22003M6Gx	7.5	6	0.3	20±10%	450	480	50/300	6
MT17FJ22004M6Gx	7.5	12	0.4	30±10%	300	350	140/300	6
MT17FJ22001M6Gx	7.5	24	0.126	200±10%	420	330	160/200	6
MT17FJ22002M6Gx	7.5	24	0.160	150±10%	500	330	180/200	6

• Permissible load of gearmotor MT17FJ22003M6Gx

x =		1	2	3	4	5	6	7	8
Reduction ratio		10	25	30	50	75	100	120	150
Number of gear trains		2	3	3	4	4	5	5	5
Rated starting torque	Kg.cm/pps	0.4/300	0.91/300	1.1/300	1.6/300	2.5/300	3.0/300	3.5/300	4.0/300
Stepping angle	deg	0.75	0.3	0.25	0.15	0.1	0.075	0.0625	0.05
Max. permissible load of gearhead	kg.cm	1.5	2	2	3	3	4	4	4

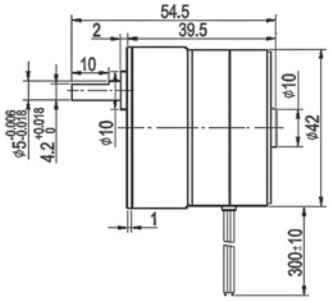
• Permissible load of gearmotor MT17FJ22004M6Gx

x =		1	2	3	4	5	6	7	8
Reduction ratio		10	25	30	50	75	100	120	150
Number of gear trains		2	3	3	4	4	5	5	5
Rated starting torque	Kg.cm/pps	1.1/300	2.5/300	3.1/300	4.0/300	4.0/300	4.0/300	4.0/300	4.0/300
Stepping angle	deg	0.75	0.3	0.25	0.15	0.1	0.075	0.0625	0.05
Max. permissible load of gearhead	kg.cm	1.5	2	2	3	3	4	4	4

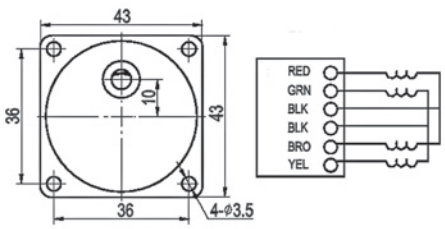
• Permissible load of gearmotor MT17FJ22001M6Gx

x =		1	2	3	4	5	6	7	8
Reduction ratio		10	25	30	50	75	100	120	150
Number of gear trains		2	3	3	4	4	5	5	5
Rated starting torque	Kg.cm/pps	1.2/300	2.8/300	3.5/300	4.0/300	4.0/300	4.0/300	4.0/300	4.0/300
Stepping angle	deg	0.75	0.3	0.25	0.15	0.1	0.075	0.0625	0.05
Max. permissible load of gearhead	kg.cm	1.5	2	2	3	3	4	4	4

• Dimensions



• Wiring Diagram



Permanent Magnet Stepping Gearmotor

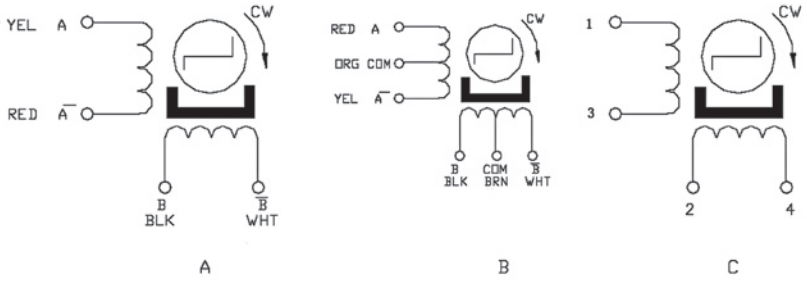
• General Specification for Permanent Magnet Gearmotor

Item	Specifications
Resistance Accuracy	±7% at 25° C
Temperature Rise	60˚C Max. (rated voltage, 100 pps)
Ambient Temperature	-20˚C~+50˚C
Insulation Resistance	100MΩMin. ,500VDC
Dielectric Strength	600VAC for one second, leakage current 1mA

• Permanent Magnet Gearmotor Specifications

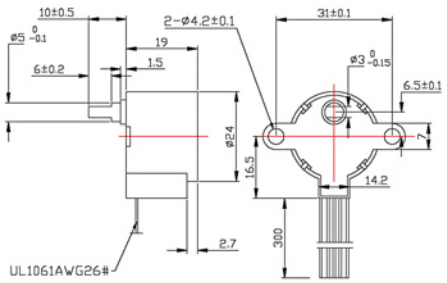
Model No.	Voltage /Phase	Resistance /Phase	Stepping Angle	Ratio	Pull-in Torque at 100 pps	Pull-in rate	Detent Torque	Wires diagram
Single Shaft	Vdc	Ω	Deg		g.cm	pps	g.cm	
MT10FJ08001M4G1	5	25 ±10%	5.625/64	1:64	>=300	>=400	>=300	A
MT11FJ08002M4G1	12	300±10%	5.625/64	1:64	>=300	>=500	>=200	C
MT12FJ07002M4G2	12	300±10%	7.5/85.25	1:85.25	>=400	>=350	>=400	C
MT14FJ07002M4G2	12	110±10%	7.5/85.25	1:85.25	>=1000	>=500	>=800	B

• Wiring Diagram



• Dimensions

MT10FJ08001M4G1



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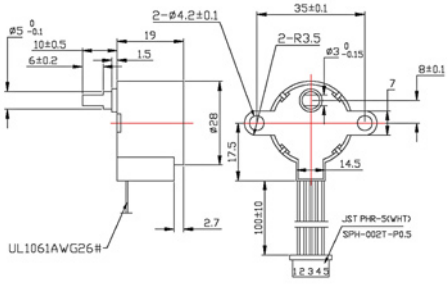

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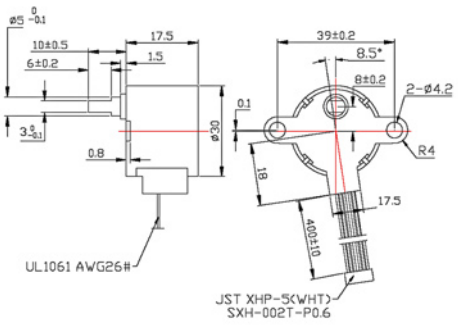
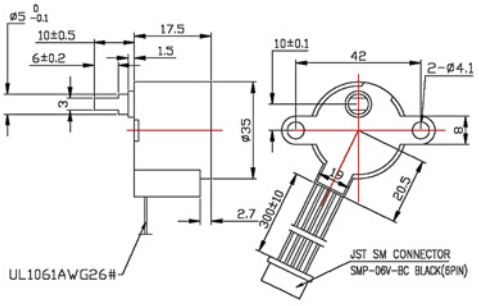


MT14FJ07001M4G2

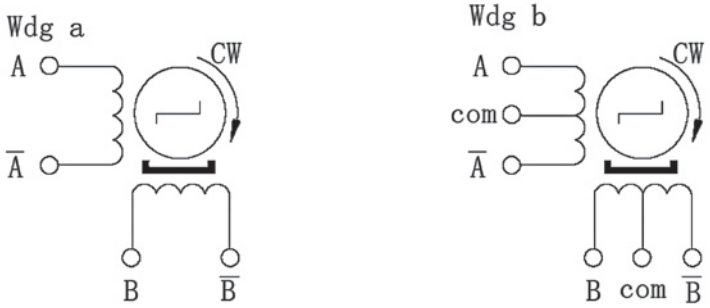


Linear Permanent Magnet Stepping Gearmotor

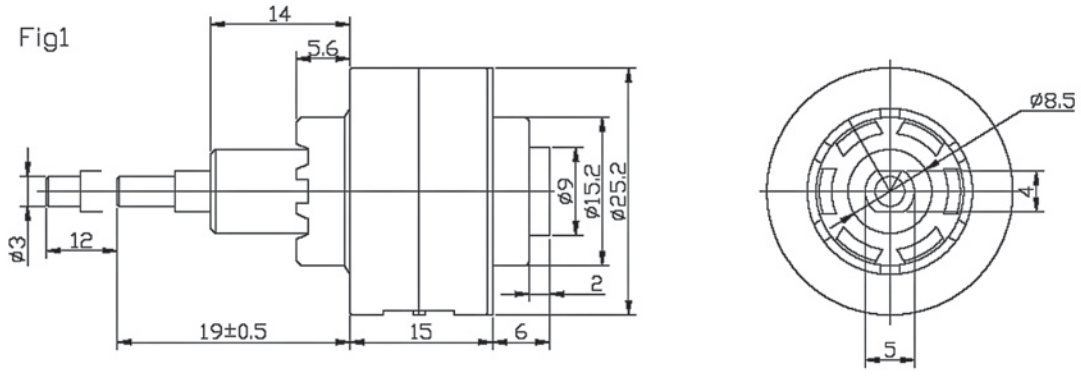
• Specification for Linear Permanent Magnet Gearmotor

Model No.	Step Angle	No. of phase	Voltage	Current	Resistance /Phase	Step Avail	Push Torque	Journey	Leads	Wiring	Fig.
Single Shaft	Deg.		V	A	Ω	mm	N	mm			
MT10FL06002M401	15	2	12	0.23	53	0.0417	25	12	AF-200 AWG28#	a	1
MT10FL06002M601	15	4	12	0.23	53	0.0417	25	12	UL1061 AWG28#	b	1
MT10FL06002M602	15	4	5	0.23	22	0.0417	7	12	UL1061 AWG28#	b	1
MT10FL06002M402	15	2	5	0.23	22	0.0417	10	12	AF-200 AWG28#	a	2
MT10FL06002M403	15	2	12	0.23	53	0.0417	25	12	AF-200 AWG28#	a	3
MT10FL06002M404	15	2	12	0.23	53	0.0417	25	40	AF-200 AWG28#	a	4
MT10FL06002M405	15	2	6	0.5	12	0.0417	7.5	40	AF-200 AWG28#	a	4
MT10FL06002M406	15	2	12	0.5	24	0.0417	30	40	AF-200 AWG28#	a	4
MT10FL06002M603	15	4	5	0.23	22	0.0417	30	40	UL1061 AWG28#	b	4

• Wiring Diagram



• Dimensions



- **Dimensions**

Fig2

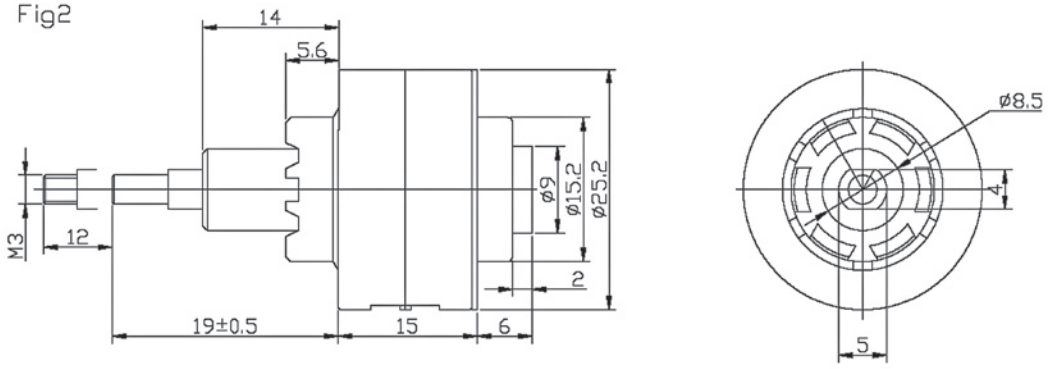


Fig3

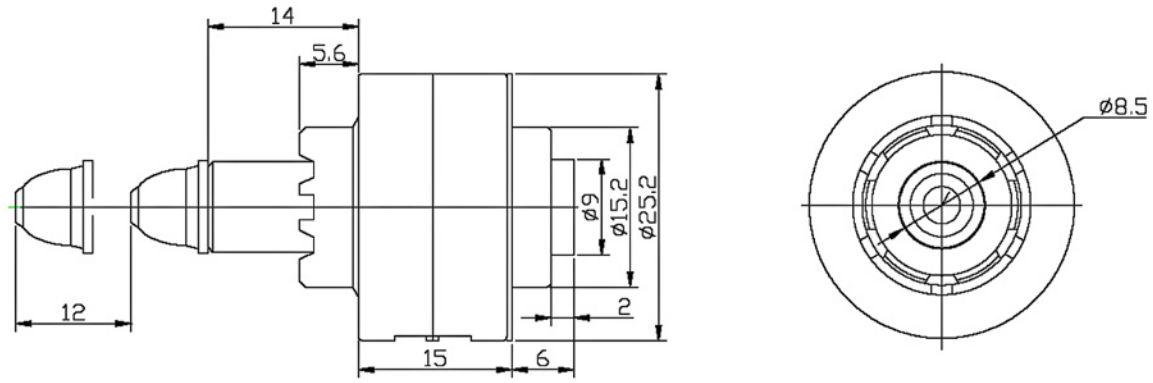
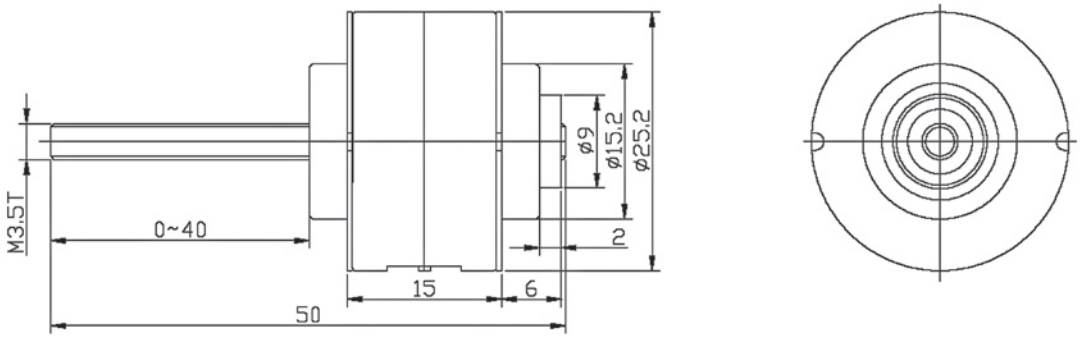


Fig4

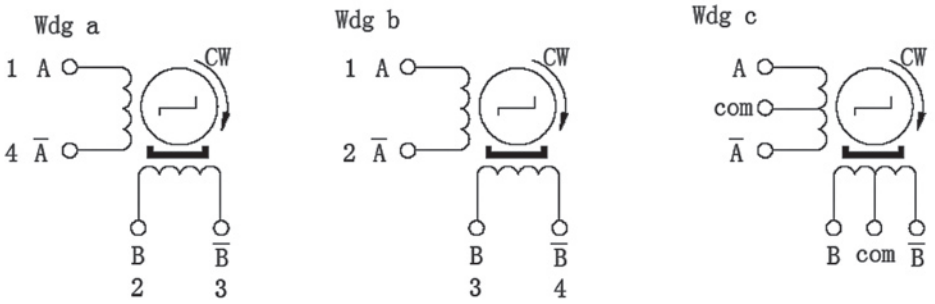


Linear Permanent Magnet Stepping Gearmotor

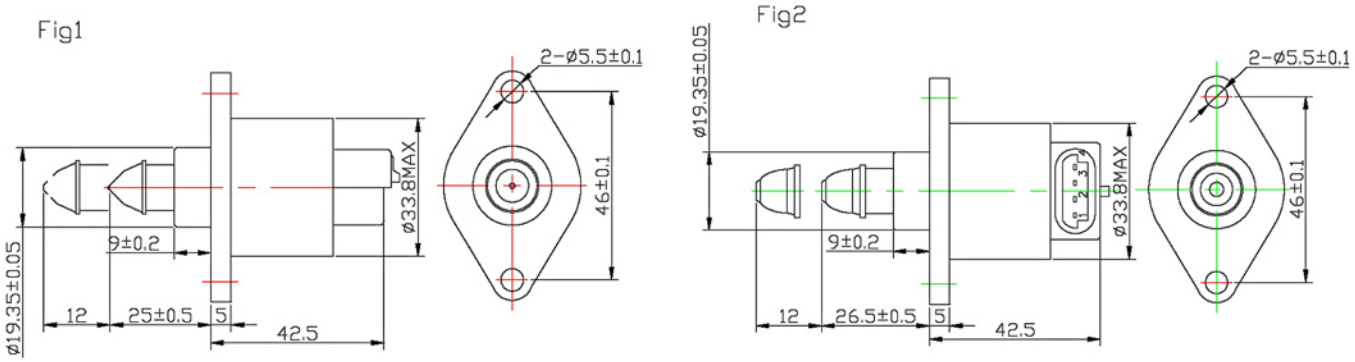
- **Specifications for Linear Permanent Magnet Gearmotor Captive Non Captive**

Model No.	Step Angle	No. of phase	Voltage	Current	Resistance /Phase	Inductance	Step Avail	Push Torque	Journey	Wiring	Fig.
Single Shaft	Deg.		V	A	Ω	mH	mm	N	mm		
MT14FL06002M401	15	2	12	0.23	53	23.4	0.0417	25	12	a	1
MT10FL06002M601	15	2	12	0.23	53	23.4	0.0417	25	12	a	2
MT10FL06002M602	15	2	12	0.23	53	23.4	0.0417	25	12	a	3
MT10FL06002M402	15	2	12	0.23	53	23.4	0.0417	25	12	a	4
MT10FL06002M403	15	2	12	0.23	53	23.4	0.0417	25	12	a	6
MT10FL06002M404	15	2	12	0.23	53	23.4	0.0417	25	12	a	7
MT10FL06002M405	15	2	12	0.23	53	23.4	0.0417	25	12	b	5
MT23FL06002M406	7.5	4	12	0.23	25	29	0.0417	31	12	c	8

- **Wiring Diagram**



- **Dimensions**



- **Dimensions**

Fig3

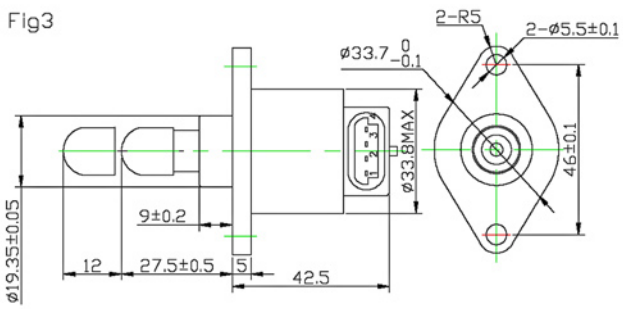


Fig4

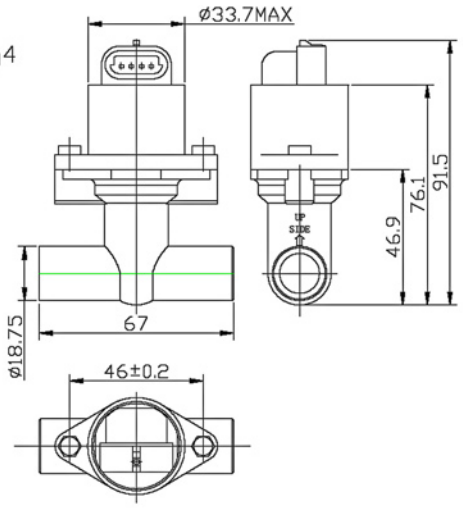


Fig5

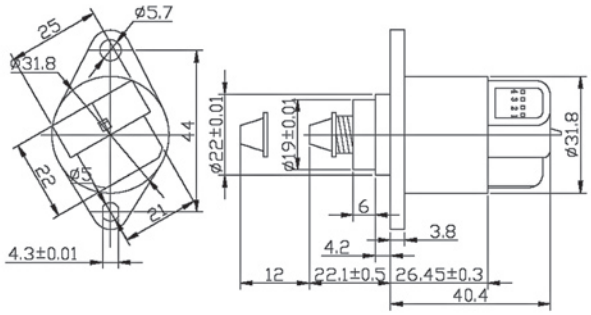


Fig6

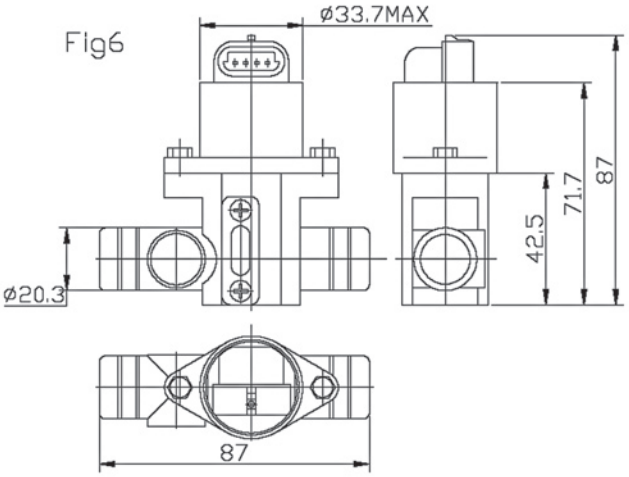


Fig7

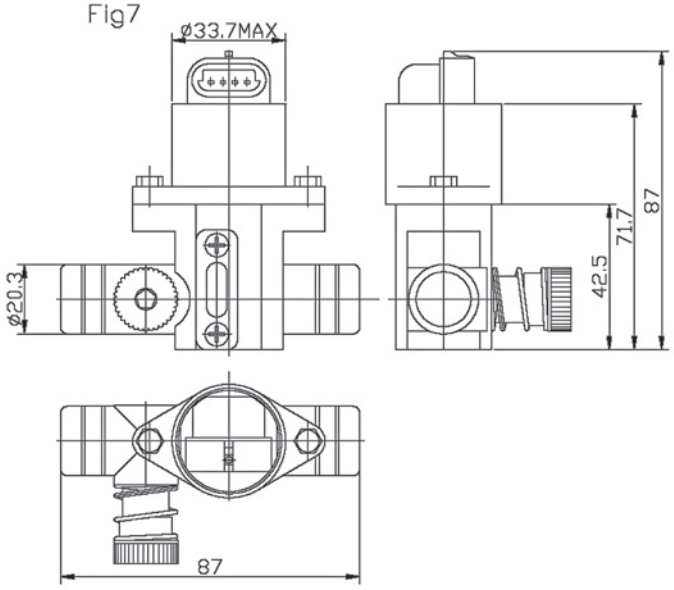
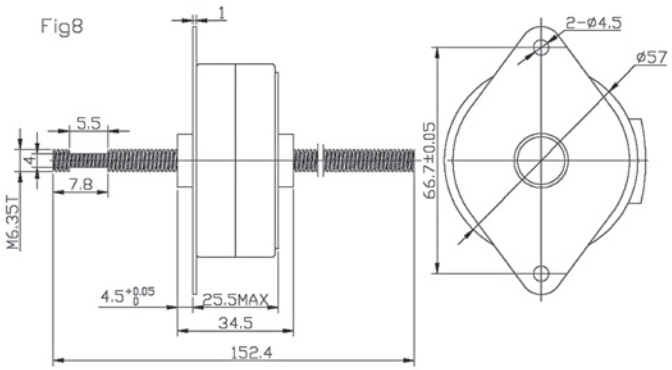
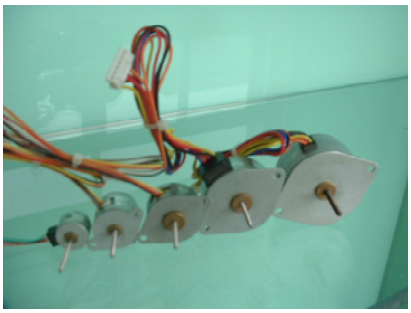


Fig8



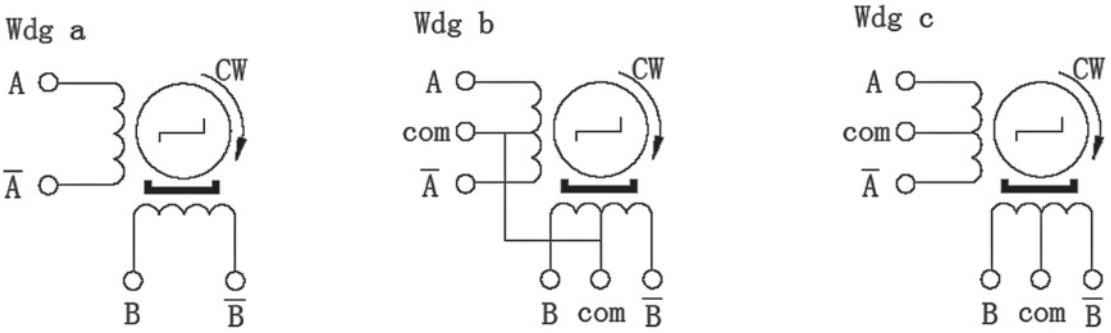
Permanent Magnet Stepping Motor with Thread on Shaft

• Specification for Permanent Magnet Stepping Motor with Thread on Shaft

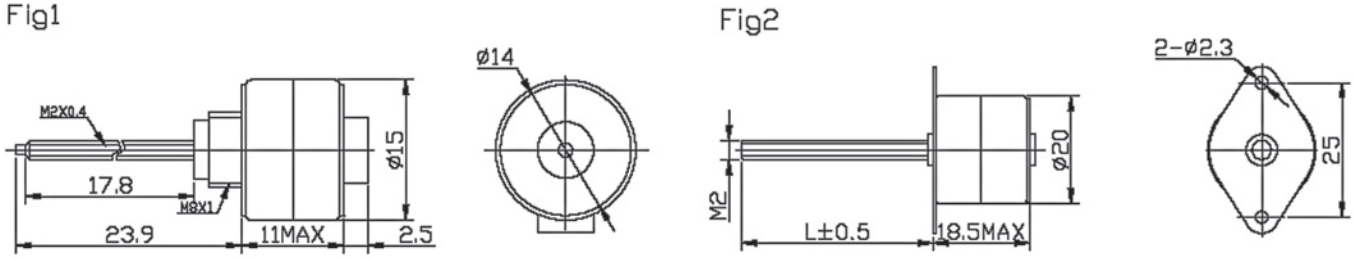


Model No.	Step Angle	No. of phase	Voltage	Current	Resistance /Phase	Holding Torque	Pull-in Torque	Detent Torque	Leads	Wiring	Fig.
Single Shaft	Deg.		V	A	Ω	g.cm	g.cm	g.cm			
MT06FL05001M4	18	2	12	0.07	170	40	5 (at 500Hz)	16	UL1571 30AWG	a	1
MT08FL08005Mx	18	2	5	0.5	10	60	10 (at 200Hz)	20		a . c	2
MT10FL07005Mx	7.5	4	5	0.5	10	120	40 (at 100Hz)	45	UL1061 28AWG	a . b	3
MT10FL09005Mx	15	4	9	0.45	20	135	20 (at 200Hz)	60	UL1061 28AWG	a . b	3
MT14FL09002M6	7.5	4	12	0.22	60	520	50 (at 200Hz)	125	UL1007 26AWG	b	4
MT14FL09003M6	15	4	24	0.28	85	450	110 (at 100Hz)	125	UL1007 26AWG	b	4
MT14FL06007M6	7.5	4	5	0.71	7	450	60 (at 200Hz)	75	UL1007 26AWG	b	5
MT17FL09002M6	7.5	4	12	0.18	70	500	60 (at 200Hz)	125	UL1007 26AWG	b	6
MT17FL06003M6	7.5	4	12	0.3	40	550	70 (at 200Hz)	100	UL1007 26AWG	b	7
MT23FL10006Mx	7.5	4	12	0.6	21	1500	320 (at 100Hz)	425	UL1007 26AWG	a . c	8

• Wiring Diagram



• Dimensions



Permanent Magnet Stepping Motor with Thread on Shaft

- **Dimensions**

Fig3

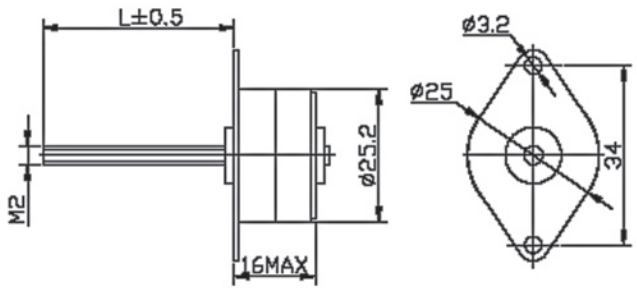


Fig4

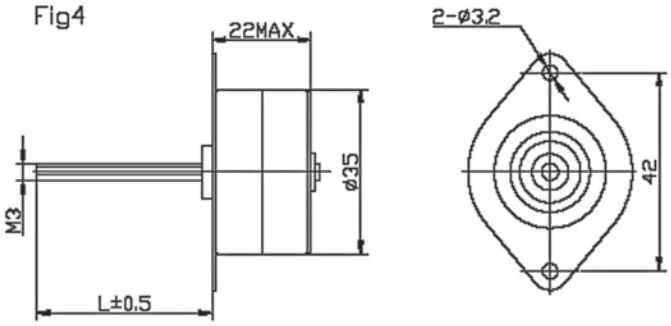


Fig5

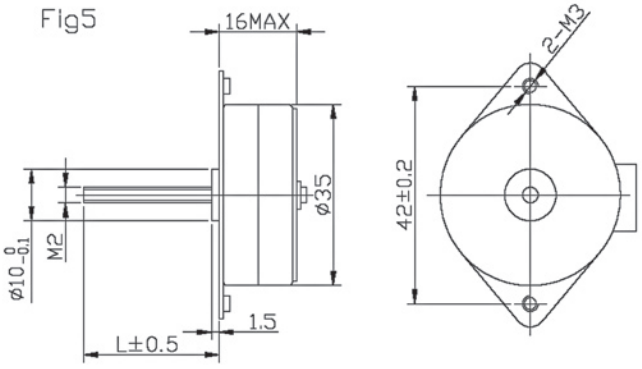


Fig6

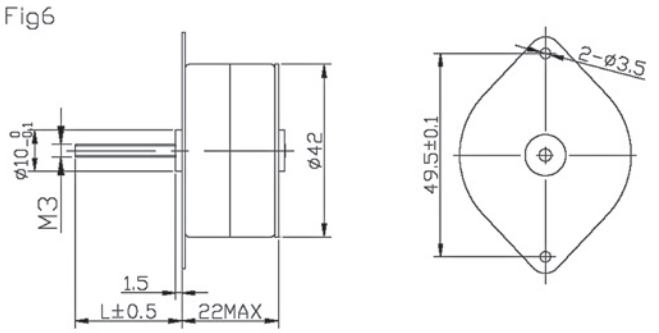


Fig7

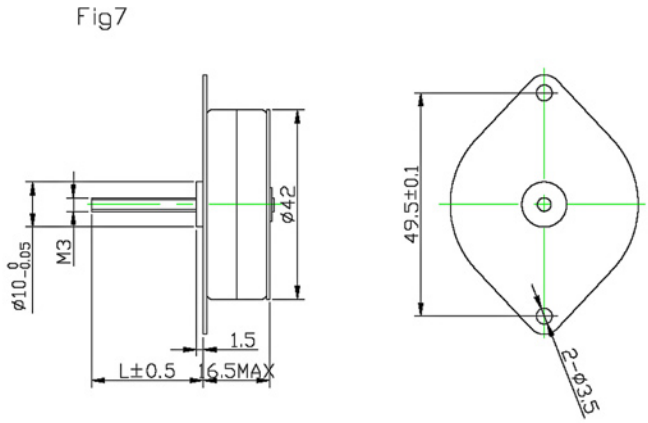
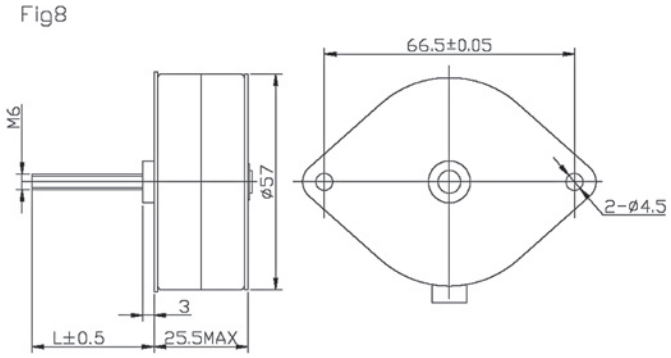
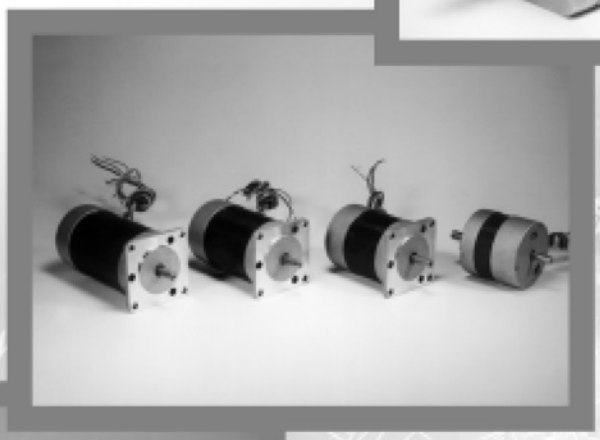
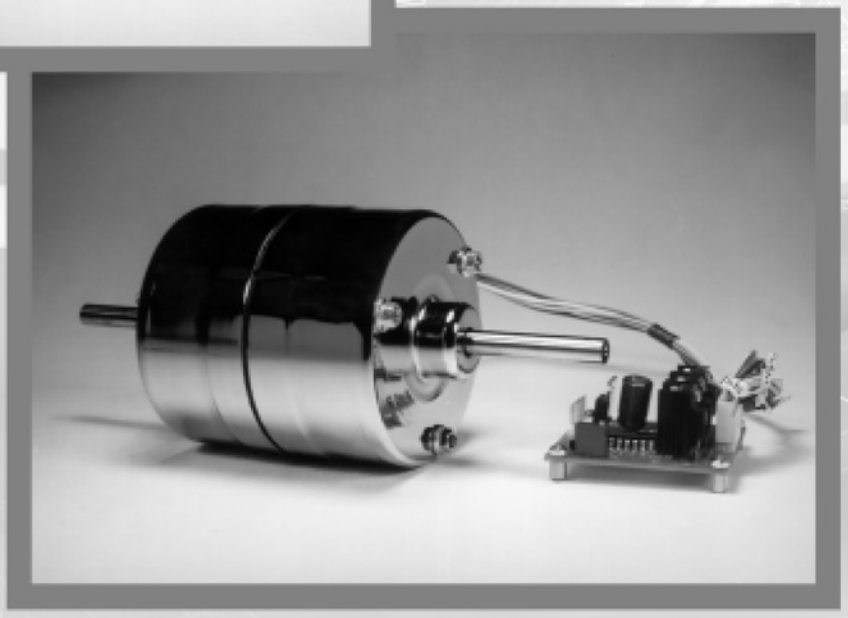


Fig8

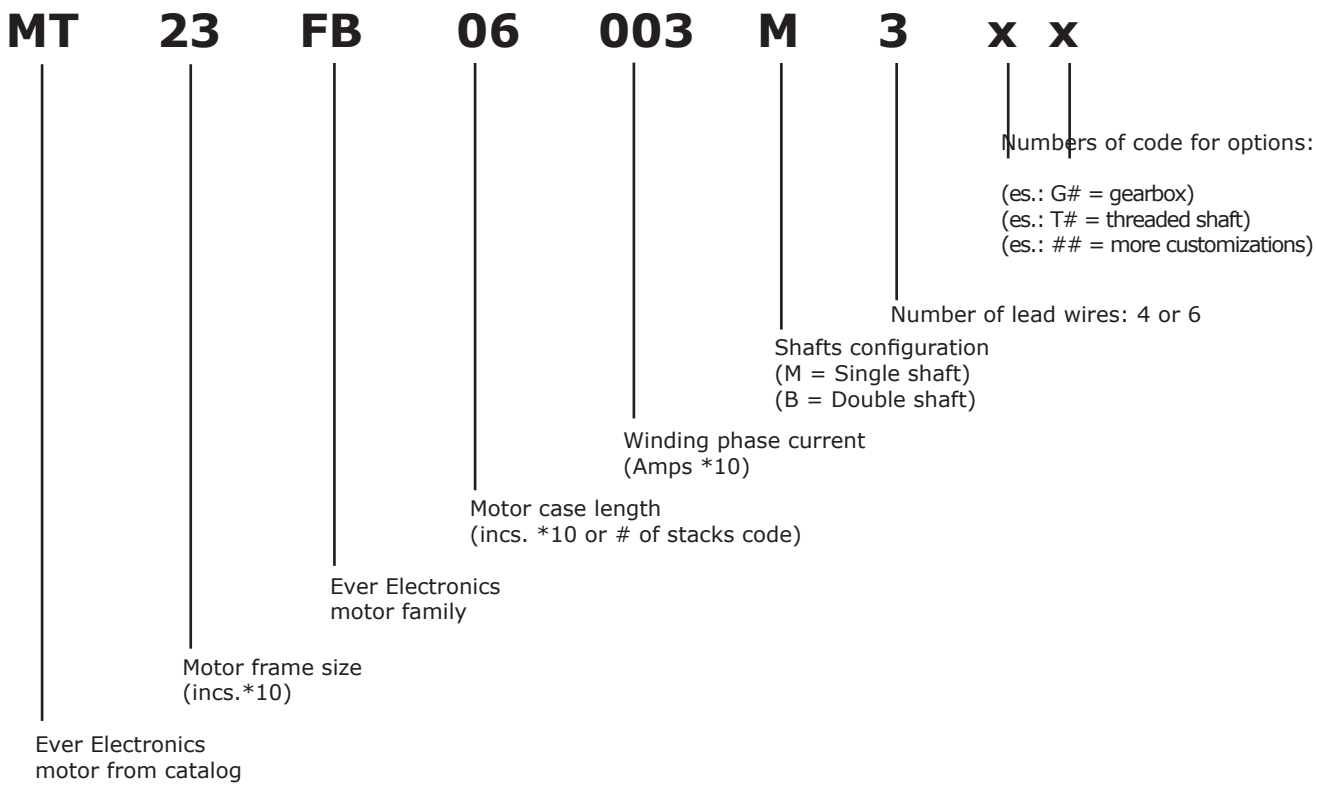






Brushless DC motor

- **Product Number Code For Brushless DC Motor**



Brushless DC Motor

• Specification for Brushless DC Motor

Item	Specifications
Winding type	Star
Hall effect angle	120 degree electrical angle
Shaft run out	0.025 mm
Radial play	0.02 mm @ 450 g
End play	0.08 mm @ 450 g
Max. radial force	15 N @ 10 mm from the flange
Max. axial force	10 N
Insulation class	Class B
Dielectric strength	500 Vdc for one minute
Insulation resistance	100MΩ Min., 500 Vdc

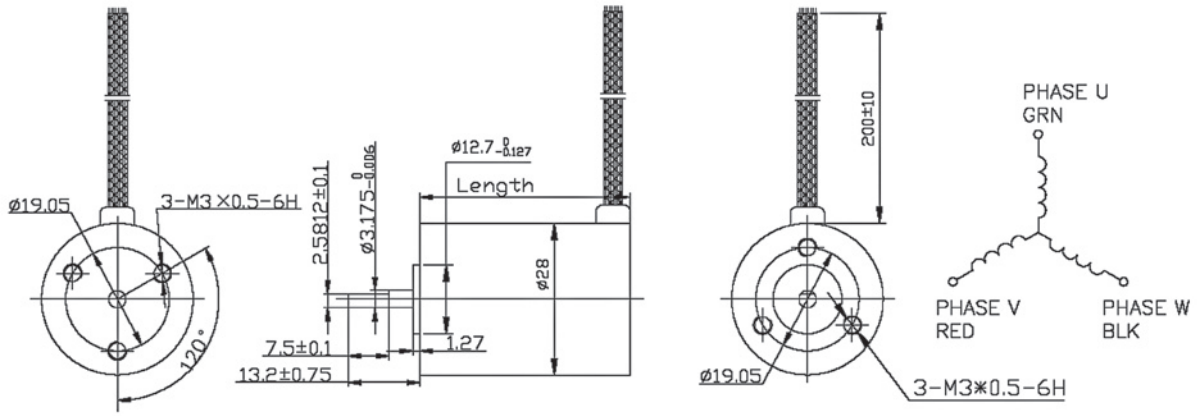
• Electrical Specifications

Model No.	No. of poles	No. of phase	Rated Voltage	Rated Speed	Continuous Stall Torque	Reted Torque	Rated Power	Peak Torque	Peak Current	Line to line resistance	Line to line inductance	Torque constant	Rotor Inertia	Body Length	Mass
			Vdc	rpm	mNm	mNm	W	mNm	A	Ω	mH	mNm/A	gcm²	mm	g
MT11FB10	4	3	15	8000	8.4	7	6	21	2.5	8	2	13.7	1.23	26	60
MT11FB15	4	3	24	10000	17	14.12	14.78	42.4	2.8	4.63	3	16	2.12	38	82
MT11FB30	4	3	24	3700	60	50	16	150	3	4.67	3.5	50	5.98	77	280

• Electric connection

Lead no.	Lead color	Lead gauge	Function	Description
1	Yellow	UL1007 26AWG	Vcc	Supply voltage for hall sensors
2	Blue		Hall A	
3	Orange		Hall B	
4	Brown		Hall C	
5	White		GND	Ground for hall sensors
6	Green		Phase U	
7	Red		Phase V	
8	Black		Phase W	

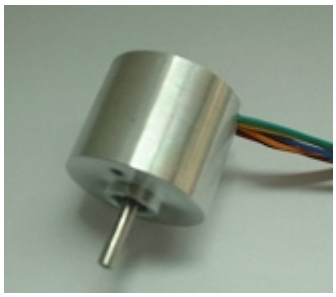
• Dimensions



Brushless DC Motor

• Specification for Brushless DC Motor

Item	Specifications
Winding type	Star
Hall effect angle	120 degree electrical angle
Shaft run out	0.025 mm
Radial play	0.02 mm @ 450 g
End play	0.08 mm @ 450 g
Max. radial force	15 N @ 10 mm from the flange
Max. axial force	10 N
Insulation class	Class B
Dielectric strength	500 Vdc for one minute
Insulation resistance	100MΩ Min., 500 Vdc



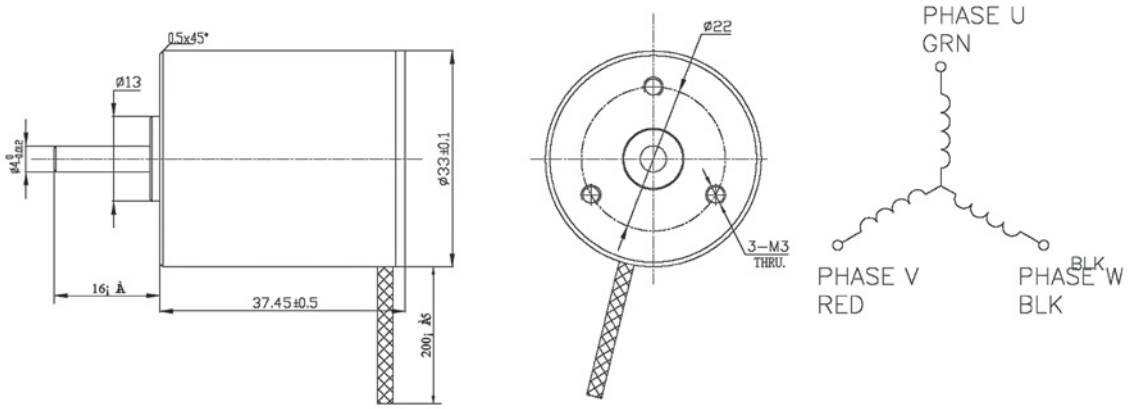
• Electrical Specifications

Model No.	No. of poles	No. of phase	Rated Voltage	Rated Speed	Continuous Stall Torque	Reted Torque	Rated Power	Peak Torque	Peak Current	Line to line resistance	Line to line inductance	Torque constant	Rotor Inertia	Body Length	Mass
			Vdc	rpm	mNm	mNm	W	mNm	A	Ω	mH	mNm/A	gcm²	mm	g
MT13FB12	4	3	36	4000	14	12	4	35	0.64	29.2	11.83	18.75	7.95	29	85

• Electric connection

Lead no.	Lead color	Lead gauge	Function	Description
1	Yellow	UL1007 26AWG	Vcc	Supply voltage for hall sensors
2	Blue		Hall A	
3	Orange		Hall B	
4	Brown		Hall C	
5	White		GND	Ground for hall sensors
6	Green		Phase U	
7	Red		Phase V	
8	Black		Phase W	

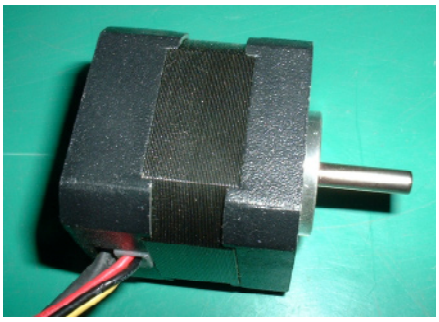
• Dimensions



Brushless DC Motor

• Specification for Brushless DC Motor

Item	Specifications
Winding type	Delta
Hall effect angle	120 degree electrical angle
Shaft run out	0.025 mm
Radial play	0.02 mm @ 450 g
End play	0.08 mm @ 450 g
Max. radial force	28 N @ 20 mm from the flange
Max. axial force	10 N
Insulation class	Class B
Dielectric strength	500 Vdc for one minute
Insulation resistance	100MΩ Min., 500 Vdc



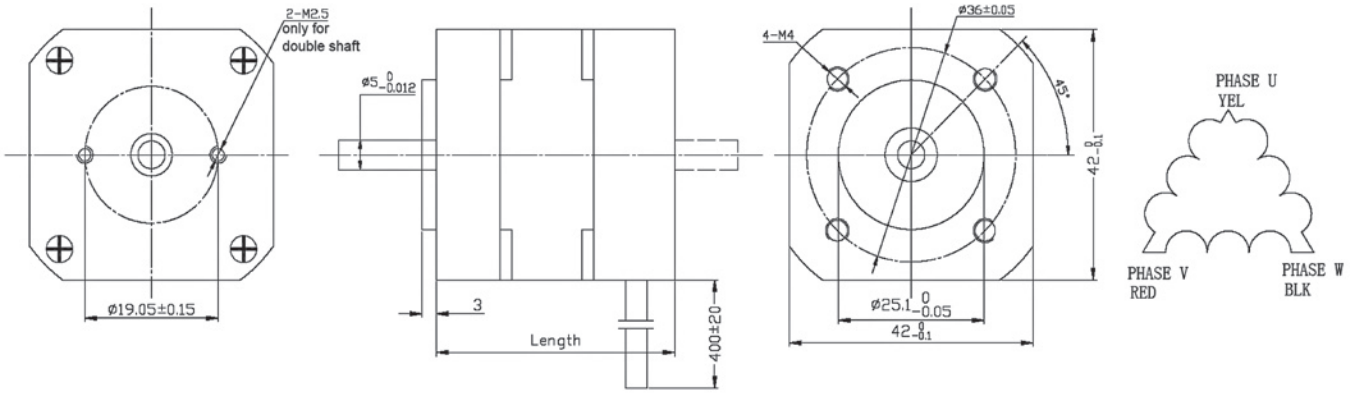
• Electrical Specifications

Model No.	No. of poles	No. of phase	Rated Voltage	Rated Speed	Continuous Stall Torque	Reted Torque	Rated Power	Peak Torque	Peak Current	Line to line resistance	Line to line inductance	Torque constant	Back E.M.F.	Rotor Inertia	Body Length	Mass
			Vdc	rpm	Nm	Nm	W	Nm	A	Ω	mH	Nm/A	V/Krpm	gcm²	mm	Kg
MT17FB17054M3	8	3	24	4000	0.075	0.0625	26	0.19	5.4	1.8	2.6	0.035	3.66	24	41	0.3
MT17FB24106M3	8	3	24	4000	0.15	0.125	52.5	0.38	10.6	0.8	1.2	0.0355	3.72	48	61	0.45
MT17FB32155M3	8	3	24	4000	0.22	0.185	77.5	0.56	15.5	0.55	0.8	0.036	3.76	72	81	0.65
MT17FB40200M3	8	3	24	4000	0.3	0.25	105	0.75	20	0.28	0.54	0.0376	3.94	96	100	0.8

• Electric connection

Lead no.	Lead color	Lead gauge	Function	Description
1	Red	UL1007 26AWG	Vcc	Supply voltage for hall sensors
2	Blue		Hall A	
3	Green		Hall B	
4	White		Hall C	
5	Black		GND	Ground for hall sensors
6	Yellow	UL1007 20AWG	Phase U	
7	Red		Phase V	
8	Black		Phase W	

• Dimensions



Brushless DC Motor

• Specification for Brushless DC Motor

Item	Specifications
Winding type	Delta
Hall effect angle	120 degree electrical angle
Shaft run out	0.025 mm
Radial play	0.025 mm @ 460 g
End play	0.025 mm @ 4000 g
Max. radial force	75 N @ 20 mm from the flange
Max. axial force	15 N
Insulation class	Class B
Dielectric strength	500 Vdc for one minute
Insulation resistance	100MΩ Min., 500 Vdc

• Electrical Specifications

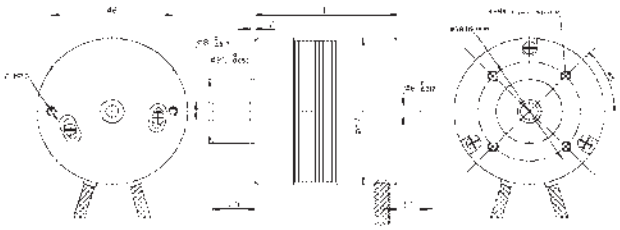
Model No.	No. of poles	No. of phase	Rated Voltage	Rated Speed	Reted Torque	Rated Power	Peak Torque	Peak Current	Line to line resistance	Line to line inductance	Torque constant	Back E.M.F.	Rotor Inertia	Body Length	Mass
			Vdc	rpm	Nm	W	Nm	A	Ω	mH	Nm/A	V/Krpm	gcm²	mm	Kg
MT23FB18035M3(S)	4	3	36	4000	0.055	23	0.16	3.5	4.1	10	0.053	5.55	30	45	0.25
MT23FB22068M3(S)	4	3	36	4000	0.11	46	0.39	6.8	1.5	4.2	0.063	6.6	75	55	0.5
MT23FB30115M3(S)	4	3	36	4000	0.22	92	0.7	11.5	0.7	2.16	0.063	6.6	119	75	0.75
MT23FB38165M3(S)	4	3	36	4000	0.32	133	1	16.5	0.45	1.4	0.063	6.6	173	95	1
MT23FB46205M3(S)	4	3	36	4000	0.43	180	1.27	20.5	0.35	1	0.063	6.6	230	115	1.25

• Electric connection

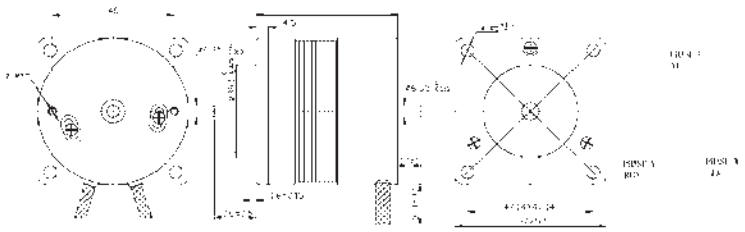
Lead no.	Lead color	Lead gauge	Function	Description
1	Red	UL1007 26AWG	Vcc	Supply voltage for hall sensors
2	Blue		Hall A	
3	Green		Hall B	
4	White		Hall C	
5	Black		GND	Ground for hall sensors
6	Yellow	UL1007 20AWG	Phase U	
7	Red		Phase V	
8	Black		Phase W	

• Dimensions

MT23FBxxxxxM3



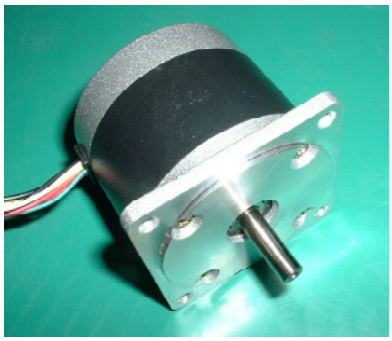
MT23FBxxxxxM3S



Brushless DC Motor

• Specification for Brushless DC Motor

Item	Specifications
Winding type	Delta
Hall effect angle	120 degree electrical angle
Shaft run out	0.025 mm
Radial play	0.025 mm @ 460 g
End play	0.025 mm @ 4000 g
Max. radial force	75 N @ 20 mm from the flange
Max. axial force	15 N
Insulation class	Class B
Dielectric strength	500 Vdc for one minute
Insulation resistance	100MΩ Min., 500 Vdc



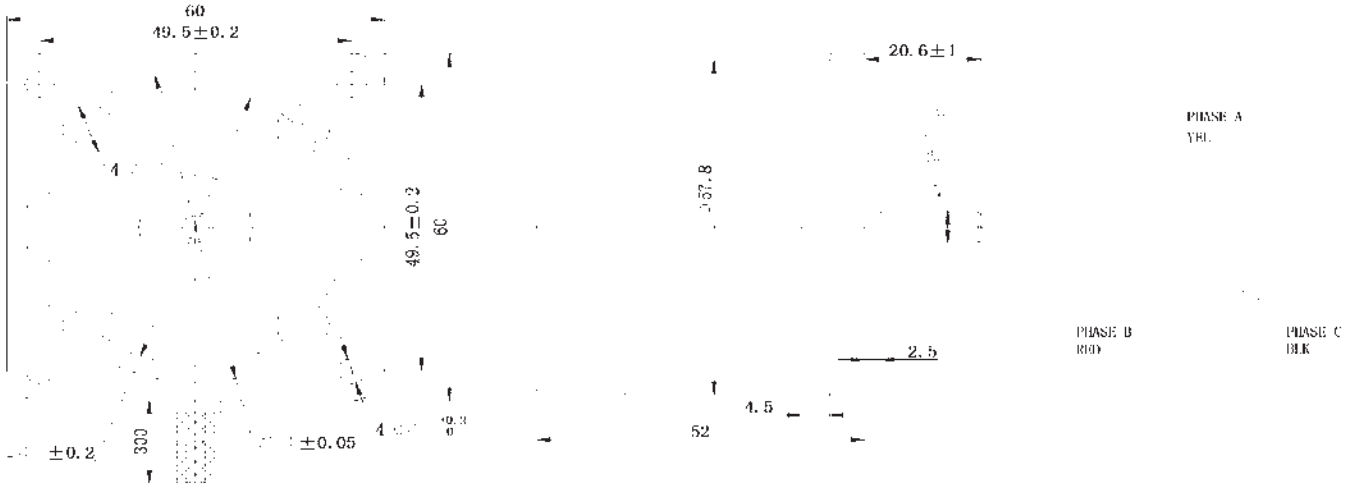
• Electrical Specifications

Model No.	No. of poles	No. of phase	Rated Voltage	Rated Speed	Reted Torque	Rated Power	Peak Torque	Peak Current	Line to line resistance	Line to line inductance	Torque constant	Back E.M.F.	Rotor Inertia	Body Length	Mass
			Vdc	rpm	Nm	W	Nm	A	Ω	mH	Nm/A	V/Krpm	gcm²	mm	Kg
MT23FB20115M3SH	4	3	24	2300	0.24	58	0.55	11.5	1.5	1.8	0.05	5.2	200	52	0.65

• Electric connection

Lead no.	Lead color	Lead gauge	Function	Description
1	Red	UL1007 26AWG	Vcc	Supply voltage for hall sensors
2	Blue		Hall A	
3	Green		Hall B	
4	White		Hall C	
5	Black		GND	Ground for hall sensors
6	Yellow	UL1007 20AWG	Phase U	
7	Red		Phase V	
8	Black		Phase W	

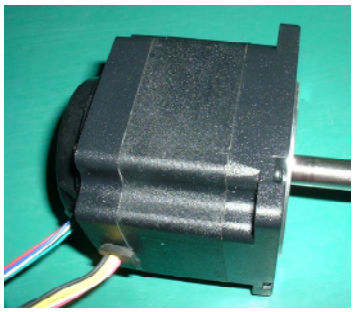
• Dimensions



Brushless DC Motor

• Specification for Brushless DC Motor

Item	Specifications
Winding type	Delta
Hall effect angle	120 degree electrical angle
Shaft run out	0.05 mm
Radial play	0.02 mm @ 450 g
End play	0.02 mm @ 450 g
Max. radial force	220 N @ 20 mm from the flange
Max. axial force	60 N
Insulation class	Class B
Dielectric strength	500 Vdc for one minute
Insulation resistance	100MΩ Min., 500 Vdc



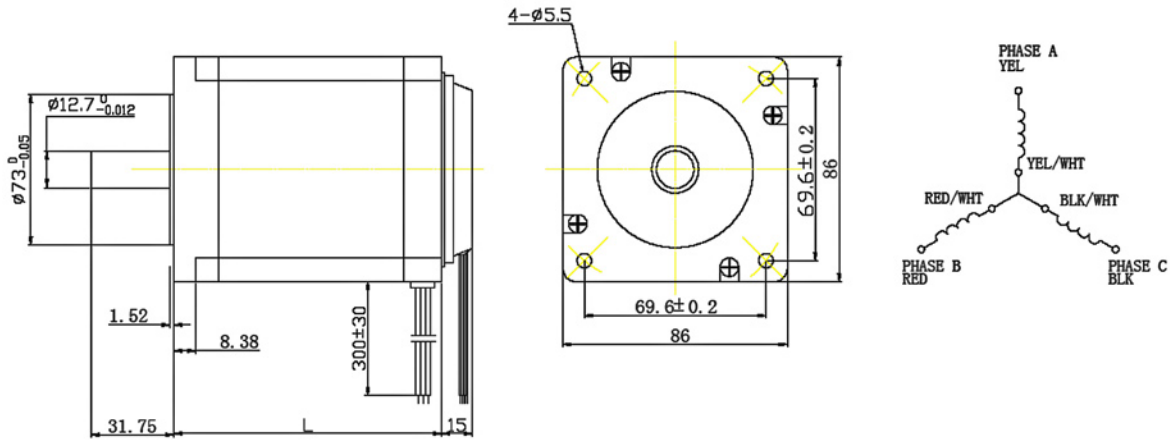
• Electrical Specifications

Model No.	No. of poles	No. of phase	Rated Voltage	Rated Speed	Reted Torque	Rated Power	Peak Torque	Peak Current	Line to line resistance	Line to line inductance	Torque constant	Back E.M.F.	Rotor Inertia	Body Length	Mass
			Vdc	rpm	Nm	W	Nm	A	Ω	mH	Nm/A	V/Krpm	gcm²	mm	Kg
MT34FB23110M3	8	3	48	3000	0.35	110	1.05	11	1.05	2.2	0.10	10.5	400	58	1.5
MT34FB28190M3	8	3	48	3000	0.7	220	2.1	19	0.36	1.05	0.11	11.5	800	71	1.85
MT34FB39330M3	8	3	48	3000	1.4	440	4.2	33	0.2	0.48	0.13	13.5	1600	98	2.6
MT34FB50550M3	8	3	48	3000	2.1	660	6.3	55	0.16	0.3	0.11	11.5	2400	125	4.0

• Electric connection

Lead no.	Lead color	Lead gauge	Function	Description
1	Red	UL1007 26AWG	Vcc	Supply voltage for hall sensors
2	Blue		Hall A	
3	Green		Hall B	
4	White		Hall C	
5	Black		GND	Ground for hall sensors
6	Yellow	UL3266 20AWG	Phase U	
7	Red		Phase V	
8	Black		Phase W	

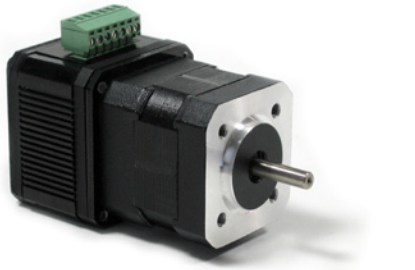
• Dimensions



Brushless DC Motor with integrated electronics

• Specification for Brushless DC Motor with integrate electronics

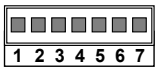
Item	Specifications
Winding type	Delta
Hall effect angle	120 degree electrical angle
Shaft run out	0.025 mm
Radial play	0.02 mm @ 450 g
End play	0.08 mm @ 450 g
Max. radial force	28 N @ 20 mm from the flange
Max. axial force	10 N
Insulation class	Class B
Dielectric strength	500 Vdc for one minute
Insulation resistance	100MΩ Min., 500 Vdc



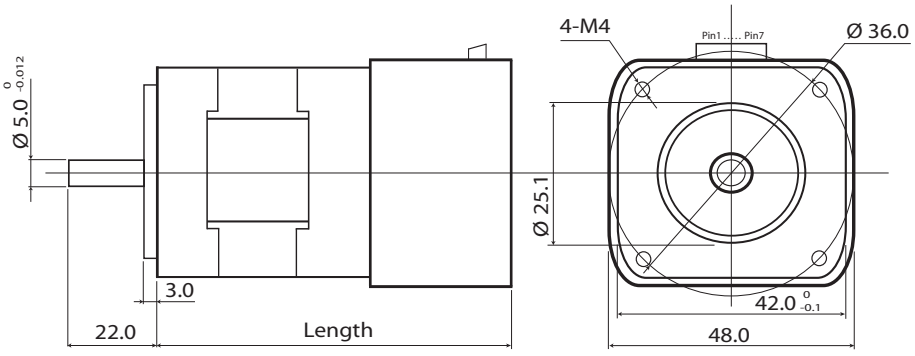
• Electrical Specifications

Model No.	No. of poles	No. of phase	Rated Voltage	Rated Speed	Reted Torque	Rated Power	Peak Torque	Peak Current	Line to line resistance	Line to line inductance	Torque constant	Back E.M.F.	Rotor Inertia	Body Length	Mass
			Vdc	rpm	Nm	W	Nm	A	Ω	mH	Nm/A	V/Krpm	gcm²	mm	Kg
MT42BL01-IE	8	3	24	4000	0.0625	26	0.19	5.4	1.75	2.10	0.034	2.78	24	77	0.90
MT42BL02-IE	8	3	24	4000	0.125	52	0.38	10.6	0.80	1.20	0.0355	2.90	48	97	1.05
MT42BL03-IE	8	3	24	4000	0.185	78	-	-	0.46	0.70	0.038	3.10	72	137	1.25
MT42BL04-IE	8	3	24	4000	0.250	104	-	-	0.28	0.54	0.0376	3.07	96	157	1.40

• Electric connection

Pin no.	Connector	Signal	Description
1		+ 5 V	5 Volt output
2		F / R	Rotating direction (Hi=CW)
3		SV	Speed voltage 0 ÷ 5 Vdc
4		PG	Speed pulse output (TTL), 24 pulse/rev
5		GND	Common ground of system
6		GND	Common ground of system
7		+ Vp	DC power input +24 Vdc

• Dimensions



Brushless DC Motor with integrated electronics

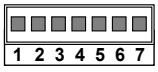
• Specification for Brushless DC Motor with integrate electronics

Item	Specifications
Winding type	Delta
Hall effect angle	120 degree electrical angle
Shaft run out	0.025 mm
Radial play	0.025 mm @ 450 g
End play	0.025 mm @ 450 g
Max. radial force	75 N @ 20 mm from the flange
Max. axial force	15 N
Insulation class	Class B
Dielectric strength	500 Vdc for one minute
Insulation resistance	100MΩ Min., 500 Vdc

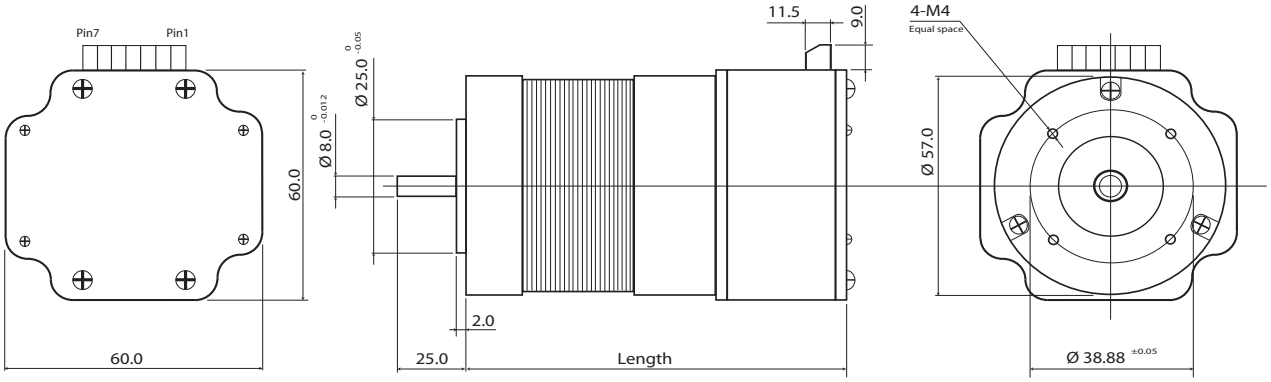
• Electrical Specifications

Model No.	No. of poles	No. of phase	Rated Voltage	Rated Speed	Reted Torque	Rated Power	Peak Torque	Peak Current	Line to line resistance	Line to line inductance	Torque constant	Back E.M.F.	Rotor Inertia	Body Length	Mass
			Vdc	rpm	Nm	W	Nm	A	Ω	mH	Nm/A	V/Krpm	gcm²	mm	Kg
MT57BL01-IE	4	3	36	4000	0.110	46	0.16	5.4	1.50	4.50	0.063	5.10	30	102	1.00
MT57BL02-IE	4	3	36	4000	0.220	92	0.39	10.6	0.60	2.10	0.063	5.10	75	122	1.25
MT57BL03-IE	4	3	36	4000	0.320	134	0.55	9.0	0.45	1.65	0.061	4.90	119	162	1.50
MT57BL04-IE	4	3	36	4000	0.440	184	-	-	0.38	1.00	0.063	5.10	230	182	2.00

• Electric connection

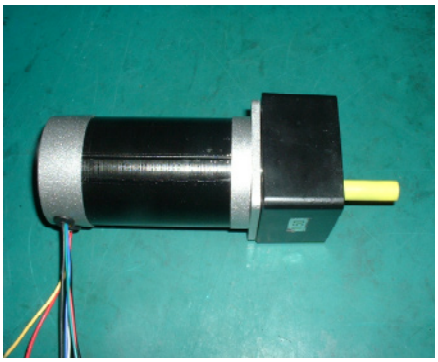
Pin no.	Connector	Signal	Description
1		+ 5 V	5 Volt output
2		F / R	Rotating direction (Hi=CW)
3		SV	Speed voltage 0 ÷ 5 Vdc
4		PG	Speed pulse output (TTL), 24 pulse/rev
5		GND	Common ground of system
6		GND	Common ground of system
7		+ Vp	DC power input +36 Vdc

• Dimensions



Gearbox Size 57mm Brushless DC Motor

- **General Specification for Gearbox Size 57mm Brushless DC Motor**



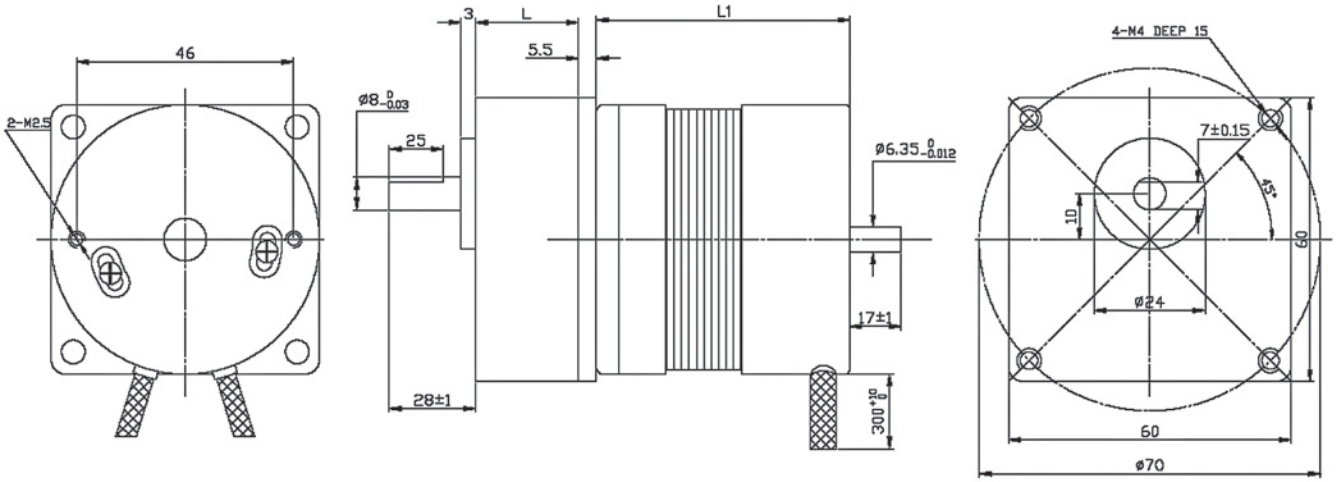
- **Gearbox Size 57mm Brushless DC Motor Specifications**

The motor winding specifications are the same of the Brushless DC Motor Family (MT23FB series).

- **Gearbox Specifications**

Ratio	3	7.5	12.5	15	25	30	50	75	90	100	120	150
Number of gear trains	2	2	2	3	3	3	4	4	5	5	5	5
Length (L) mm	32	32	32	32	42	42	42	42	42	42	42	42
Peak torque Kg.cm	50											
Average Backlash at Noload	4 deg			3.5 deg			3 deg			2.5 deg		

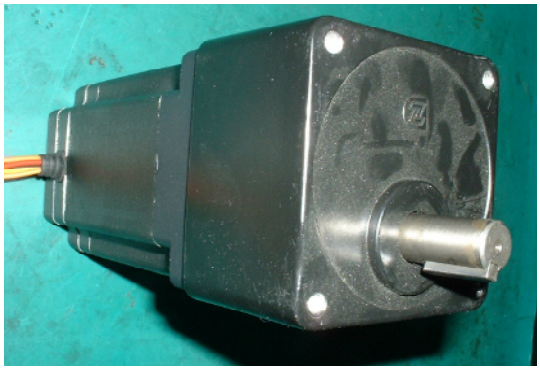
- **Dimension**



L1 can be 45mm, 55mm, 95mm and 115mm

Gearbox Size 86mm Brushless DC Motor

- **General Specification for Gearbox Size 86mm Brushless DC Motor**



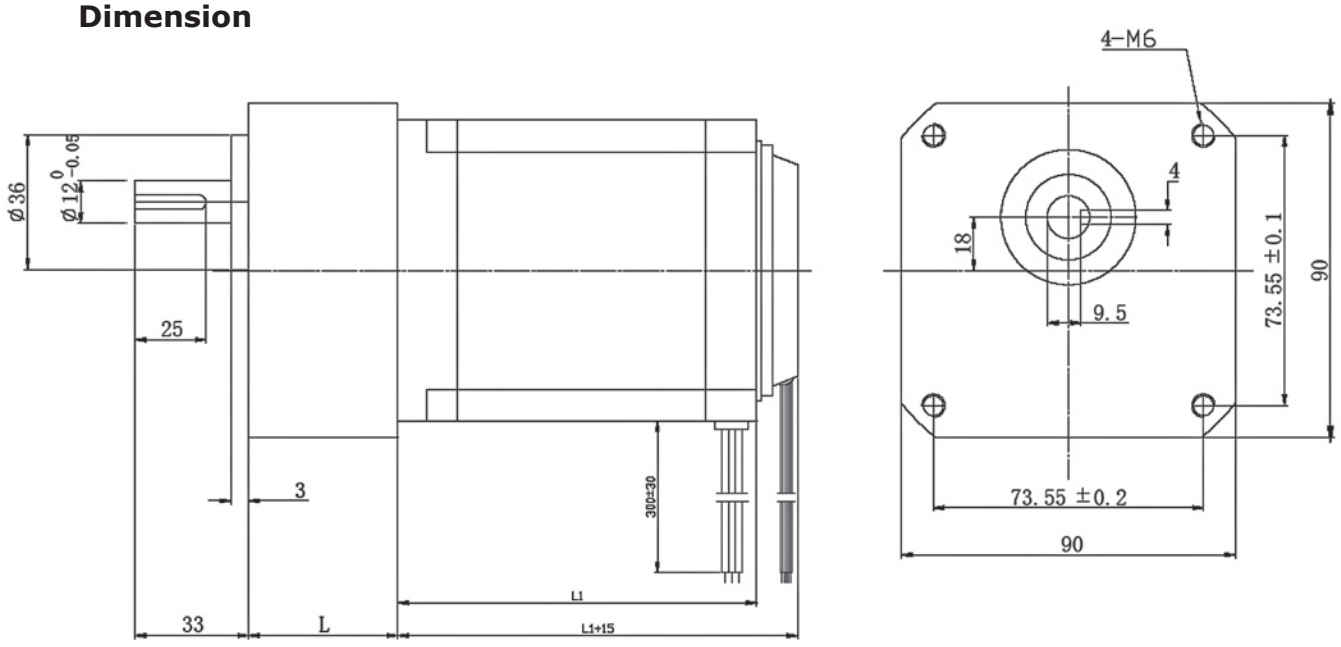
- **Gearbox Size 86mm Brushless DC Motor Specifications**

The motor winding specifications are the same of the Brushless DC Motor Family (MT34FB series).

- **Gearbox Specifications**

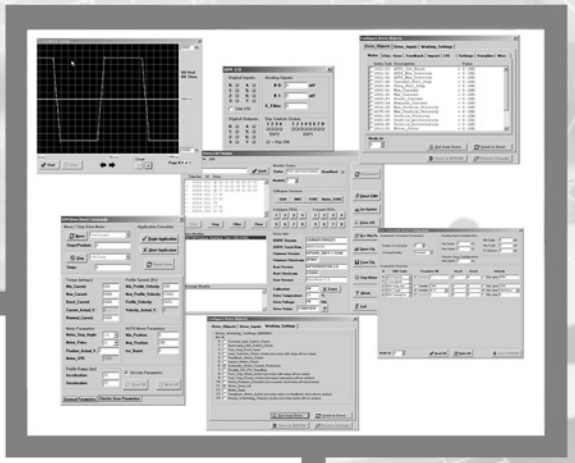
Ratio	3	5	7.5	12.5	15	25	30	50	75	100	120	150
Number of gear trains	2	2	2	2	2	3	3	4	4	4	4	4
Length (L) mm	45	45	45	45	45	60	60	60	60	60	60	60
Peak torque Kg.cm	250											
Average Backlash at Noload	4 deg					3.5 deg		2.5 deg				

- **Dimension**



L1 can be 56mm, 69mm, 96mm and 123mm

Slim Line



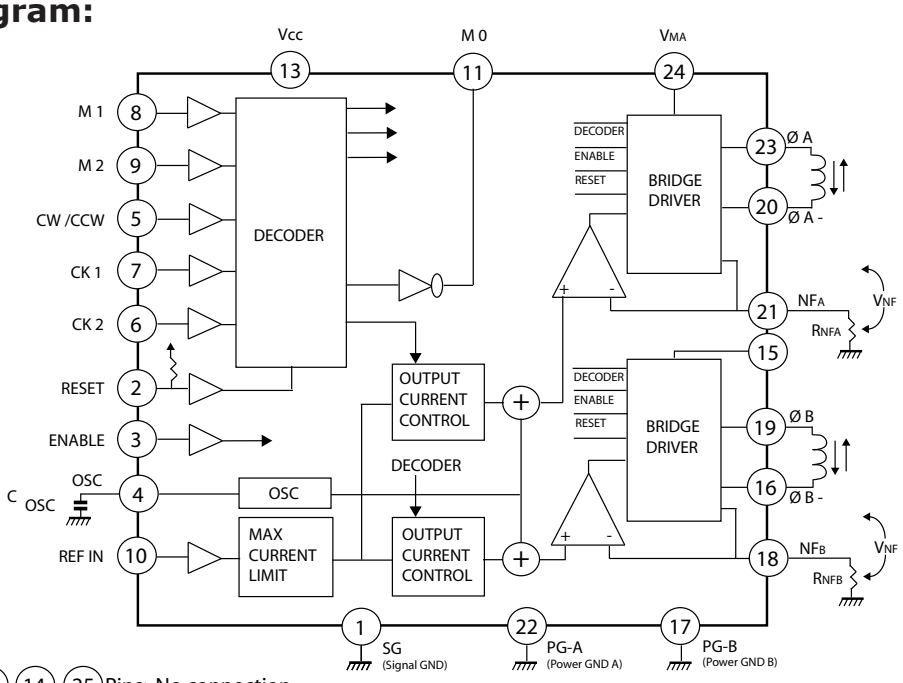
ATOMIC
by

• SDI-C403 IC drive

Main features and specifications:

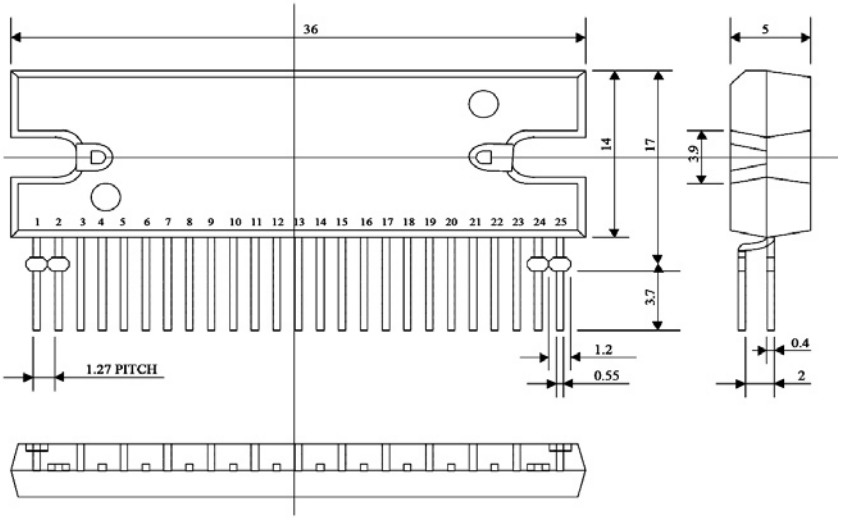
- Bipolar PWM chopper drive;
- Chopper frequency 20 to 40 kHz;
- Phase current 1.5 Arms (2.5 Apeak);
- Maximum Output Voltage 40 Vdc;
- Step angle: full step, 1/2 step, 1/4 step, 1/8 step;
- Inputs: step, direction, drive enable, current reduction (CMOS type with integrated 40 Kohm pull-up resistors);
- Output: drive status monitor (±2 mA max.);
- Package: CPP - 25 pins (25 W);
- Power supply: PWM 24 Vdc (40 Vdc max); logic 5 Vdc ±10%;
- Operating temperature : - 40° ÷ + 85° C.

Block diagram:



12 14 25 Pins: No connection.

Mechanical drawing and dimensions:

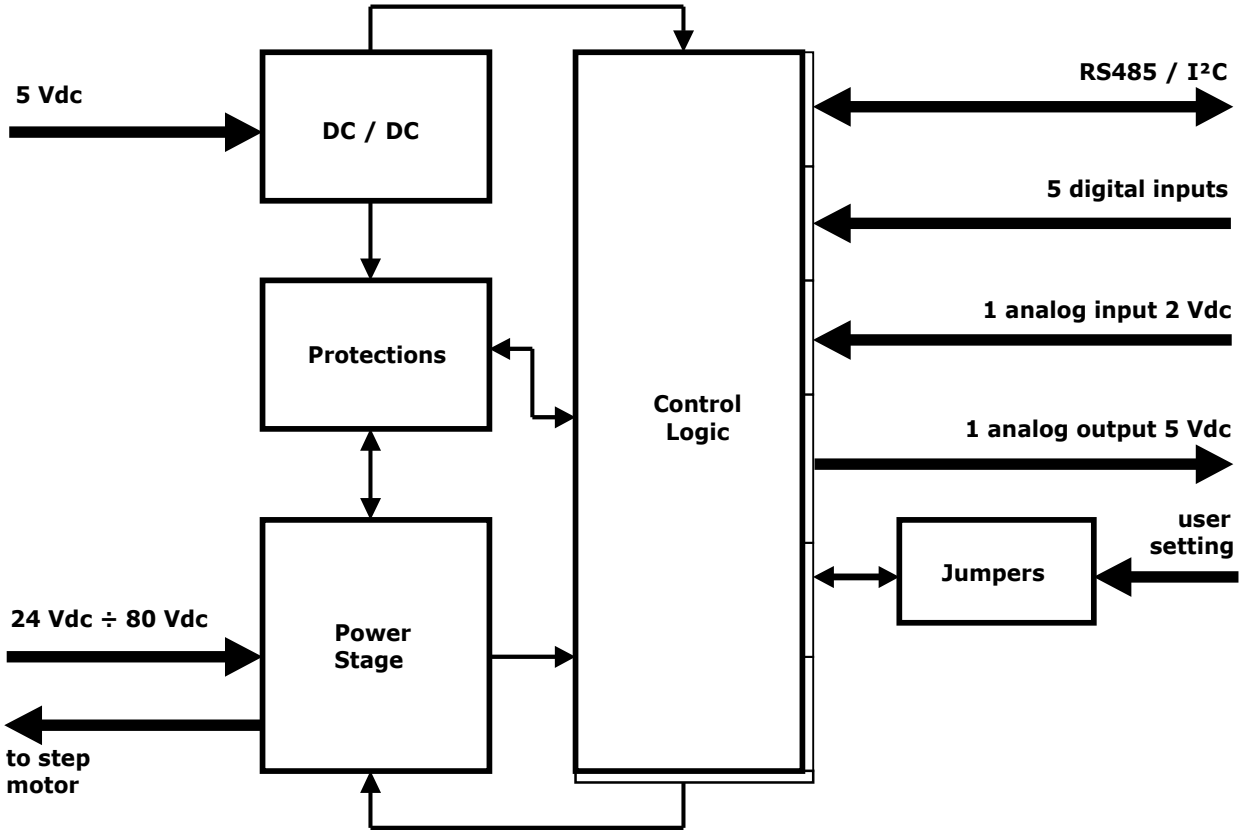


• M5A stepper drive

Main features and specifications:

- motor movement control by step /dir operation or internal clock;
- 24 to 80 Vdc power stage;
- 5 Vdc logical stage;
- step angle: full step, ½ step, 1/4 step,1/8 step with sinusoidal envelopes;
- phase current: 6.0 Apeak;
- protection against over- and under-voltage, over-current and overtemperature;
- 5 digital inputs, 1 analogue input and 1 analogue output;
- serial asynchronous RS485 or synchronousI I2C bus interface;
- jumpers to select between internal/external step control and RS485/I2C bus.

Block diagram:



SlimLine Series Drivers

• LW1 Series

Product number code for SlimLine series driver

L W 1 D 3 050 N 0 8 1 - 00

- L = Hardware controlled driver
- W = Wall mounting
- 1 = Ever Electronics code for driver tipology
- A = AC power input
  D = DC power input
- Voltage range code:
  2 = 24 ÷ 36 Vdc
  3 = 24 ÷ 80 Vdc
  4 = 48 ÷ 140 Vdc or 36 ÷ 100 Vac
  6 = 115 ÷ 230 Vac
- RMS max current in Amps *10:
  042 = 4.2 Arms
  050 = 5.5 Arms
  060 = 6.0 Arms
  080 = 8.0 Arms
- Fieldbus code:
  N = no fieldbus
- # of serial interfaces:
  0 = no serial interface
- I/O configuration code:
  8 = 3 digital inputs and 1 digital output
- # Axes
- Housing characteristics code

Main features:

The LW drives are mastered by means of hardware settings (dip-switches), step & direction, analogue speed reference or start/stop inputs.
All models performs:

- On Board Safety provisions: √ fully tested for direct installation unit
  √ fault monitoring and handling
- Other features:
  √ low motor vibration
  √ low mechanical noise
  √ no resonance
  √ exellent EMC proprety
  √ safe protections
  √ high speed and torque output
  √ compact sizes
  √ low heat generation
  √ high reliability
  √ easy setup
  √ DC/AC Power Supply
  √ wide range of power

SlimLine Series Drives

• LW1 Series

Models specifications:

LW1D2042N081-00

- supply voltage 24 ÷ 36 Vdc;
- step angle till 1/256 and 1/250 with sinusoidal envelopes;
- output phase current controllable from 1.5 to 4.2 Arms;
- 3 300kHz, 5V PNP or NPN or line-driver optoisolated inputs for clock, direction and enable;
- 1 24Vdc-500mA fault protected output;
- automatic reduction of the idle current;
- dimensions 100.0 x 74.0 x 37.0 mm.

LW1D3050N081-00

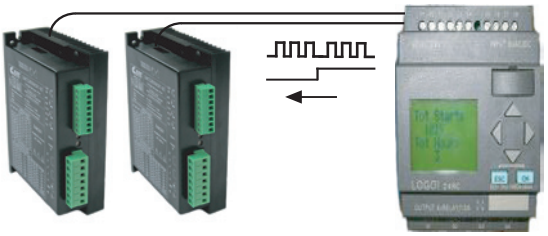
- supply voltage from 24 to 80 Vdc;
- step angle till 1/256 and 1/250 with sinusoidal envelopes;
- output phase current controllable from 1.0 to 5.5 Arms;
- 3 300kHz, 5V PNP or NPN or line-driver optoisolated inputs for clock, direction and enable;
- 1 24Vdc-500mA fault protected output;
- automatic reduction of the idle current;
- dimensions 120.0 x 97.5 x 45.5 mm.

LW1A9060N081-00

- supply voltage from 115 to 230 Vac;
- step angle till 1/256 and 1/250 with sinusoidal envelopes;
- output phase current controllable from 1.0 to 6.0 Arms;
- 3 300kHz, 5V PNP or NPN or line-driver optoisolated inputs for clock, direction and enable;
- 1 24Vdc-500mA fault protected output;
- automatic reduction of the idle current.
- dimensions 120 x 97.5 x 45.5 mm

Control modes:

- Step & Direction Mode



• SW1 Series

Product number code for SlimLine series drives

S W 1 A 4 080 C 0 6 1 - 00 c0300

- **S** = Software controlled drives
- **W** = Wall mounting
- **1** = Ever Electronics code for driver tipology
- **A** = AC power input; **D** = DC power input
- **4** = Voltage range code:
  2 = 24 ÷ 40 Vdc
  4 = 48 ÷ 140 Vdc or 36 ÷ 100 Vac
  9 = 115 ÷ 230 Vac
- **080** = RMS max current in Amps *10:
  042 = 4.2 Arms
  060 = 6.0 Arms
  080 = 8.0 Arms
- **C** = Fieldbus code:
  C = CANbus (CANopen)
  N = Serial RS232/RS422 (Modbus)
- **0** = # of serial interfaces:
  0 = no serial interface
  3 = 1 Serial RS232/RS422 (Modbus)
- **6** = I/O configuration code:
  6 = 4 digital inputs, 2 digital outputs and 2 analog inputs
  B = 16 digital inputs, 10 digital outputs and 2 analog inputs
  C = 16 digital inputs, 10 digital outputs, 2 analog inputs and 2 analog outputs
- **1** = # Axes
- **00** = Housing characteristics code
- **c0300** = Firmware configuration:
  0300 = CANopen mode
  0400 = Modbus mode
  0490 = eePLC programmable mode

Main features:

The SW drives communicate through serial interfaces and/or fieldbus and are configured by means of software interfaces for Microsoft Windows OS.
All models performs:

- Multiform Control Modes
- On Board Safety provisions:
  - √ fully tested for direct installation unit
  - √ built in watch dog functionality
  - √ fault monitoring and handling
  - √ on field working errors buffering
- Other features:
  - √ low motor vibration
  - √ low mech. noise
  - √ no resonance
  - √ safe protections
  - √ DC/AC Power Supply
  - √ compact sizes
  - √ low heat generation
  - √ high reliability
  - √ high speed and torque output
  - √ wide range of power

SlimLine Series Drives

• SW1 Series

Models specifications:

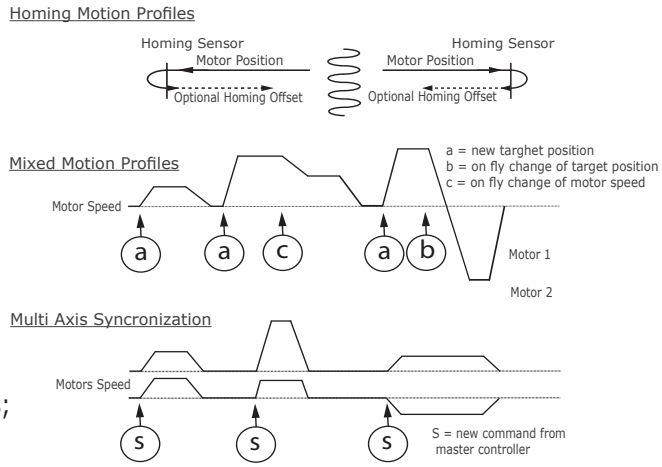
SW1D2042C061-00 / SW1D2042N361-00
- supply voltage 24 ÷ 40 Vdc;
- phase current from 0.2 to 4.2 Arms (0.3 to 6.0 Apeak);
- step angle: from full step to 1/128 with sinusoidal envelopes;
- CANBus (Canopen) or serial interface RS232/RS422 (Modbus);
- 4 digital optoisolated inputs and 2 digital optoisolated outputs;
- 2 analog inputs ±10V;
- dimensions 142.0 x 74.0 x 37.0 mm

SW1D4080C061-00 / SW1A4080C061-00
SW1D4080N361-00 / SW1A4080N361-00
SW1D4080N3B1-00 / SW1A4080N3B1-00
- supply voltage from 48 to 140 Vdc or 36 ÷ 100 Vac, separated for logic and power;
- phase current from 1.0 to 8.0 Arms (1.40 to 11.28 Apeak);
- step angle: from full step to 1/128 with sinusoidal envelopes;
- CANBus (Canopen) or serial interface RS232/RS422 (Modbus);
- 4 digital optoisolated inputs and 2 digitla optoisolated outputs or 16 digital optoisolated inputs and 10 digital optoisolated outputs;
- 2 analog inputs ±10V;
- dimensions 165.0 x 97.5 x 62.3 (54.3 for SW1D4080__61-00) mm

SW1A9060C061-00 / SW1A9060N361-00
SW1A9060N3C1-00
- supply voltage from 115 to 230 Vac;
- phase current from 1.0 to 6.0 Arms (1.40 to 8.46 Apeak);
- step angle: from full step to 1/128 with sinusoidal envelopes;
- CANBus (Canopen) or serial interface RS232/RS422 (Modbus);
- 4 digital optoisolated inputs and 4 digital optoisolated outputs or 16 digital optoisolated inputs and 10 digital optoisolated outputs;
- 2 analog inputs ±10V;
- 2 analog outputs (SW1A9060N3C1-00 only)
- dimensions 235.0 x 151.5 x 62.5 mm

Motion module:

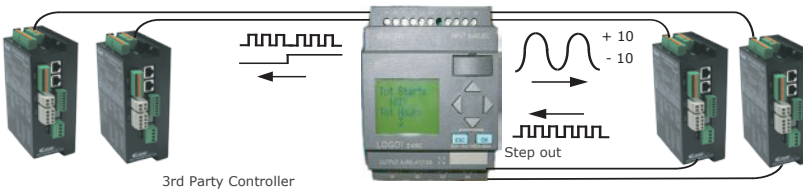
- Step & Direction control mode;
- Analog speed ref. control mode (by potentiometer or ±10Vdc);
- Velocity control mode;
- Wide range of positioning control modes (homing, relative, absolute, target);
- CAM mode: cam profile can be programmed;
- Electric Gear with programmable gear ratio to track external master reference (from fieldbus or incremental encoder) of motor's speed and position;
- High speed I/O triggered motor's start & stop to event syncronizing for fast response demanding application: labeling, nick_finder, on fly cut., etc ...;
- Multi Axis movements syncronization capability;
- On fly change among any motion module's control modes;
- On fly electric gear enable/disable capability;
- Motor stall detection & target position tracking through encoder feedback.



• SW1 Series

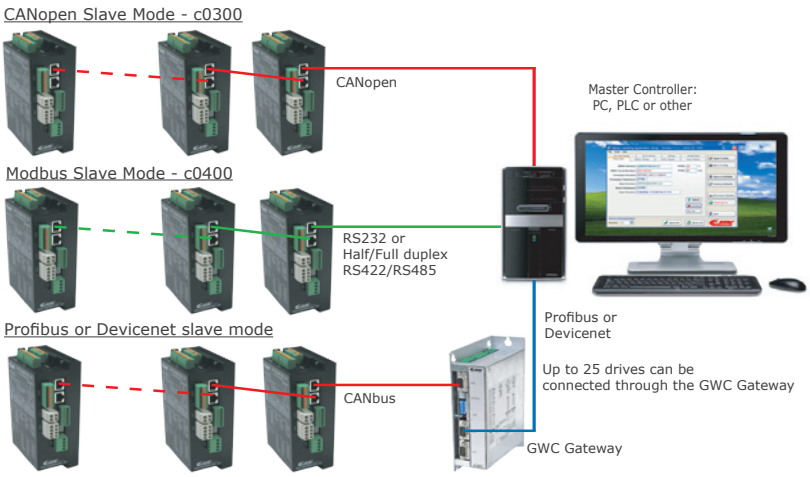
Control modes:

- Step & Direction or Analog



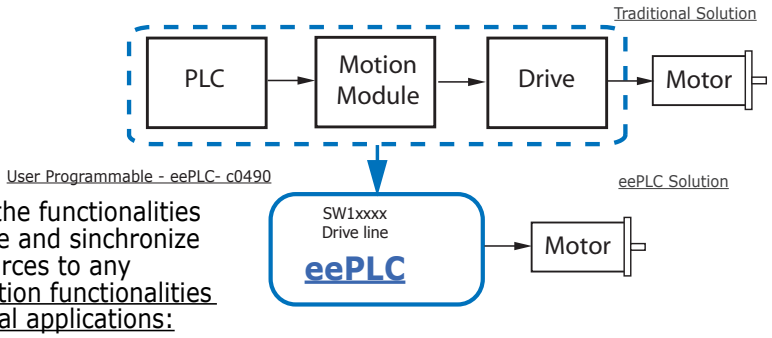
- Multi Axes Systems

Drives' control through commands by master controller. Suitable for multi axes systems (up to 127 drives). Built in powerfull motion module functionality assures Perfect sinchronyzation among axes and reduces master controller workload.



- Stand Alone Mode

eePLC integrates PLC, Motion Module, Process Module and drive in One Device. eePLC Studio PC interface is available to friendly, fast and easy custom to machine or process device's programmig.



Atomic handler permits user to access all the functionalities and resources of the device and to manage and sinchronize the motion module and other drive's resources to any process' events. Access to all powerful motion functionalities built in process realtime modules for special applications:

- Labeling
- CAM
- Wire Processing
- User Custom Process

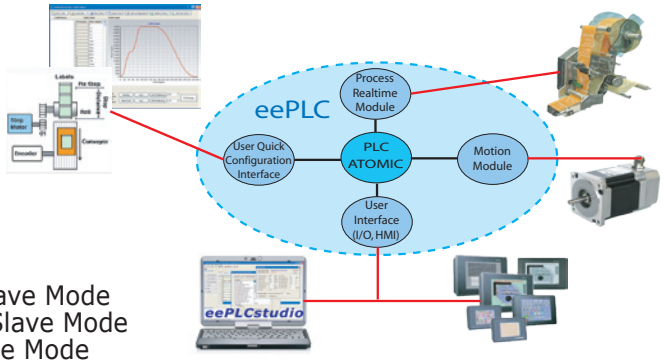
Software:

Special Quick Configuration Windows for Process Realtime Modules.

Accepts parameter setting from optional controller through serial RS232, RS422, RS485 in Modbus RTU protocol (HMI, PLC, PC, other).

Ever co. proprietary PC Software Tools for easy and quick development, configuration and supervision of each system.

Realtime process special software modules availables:
- Labeling - CAM - Wire Processing - User Custom -

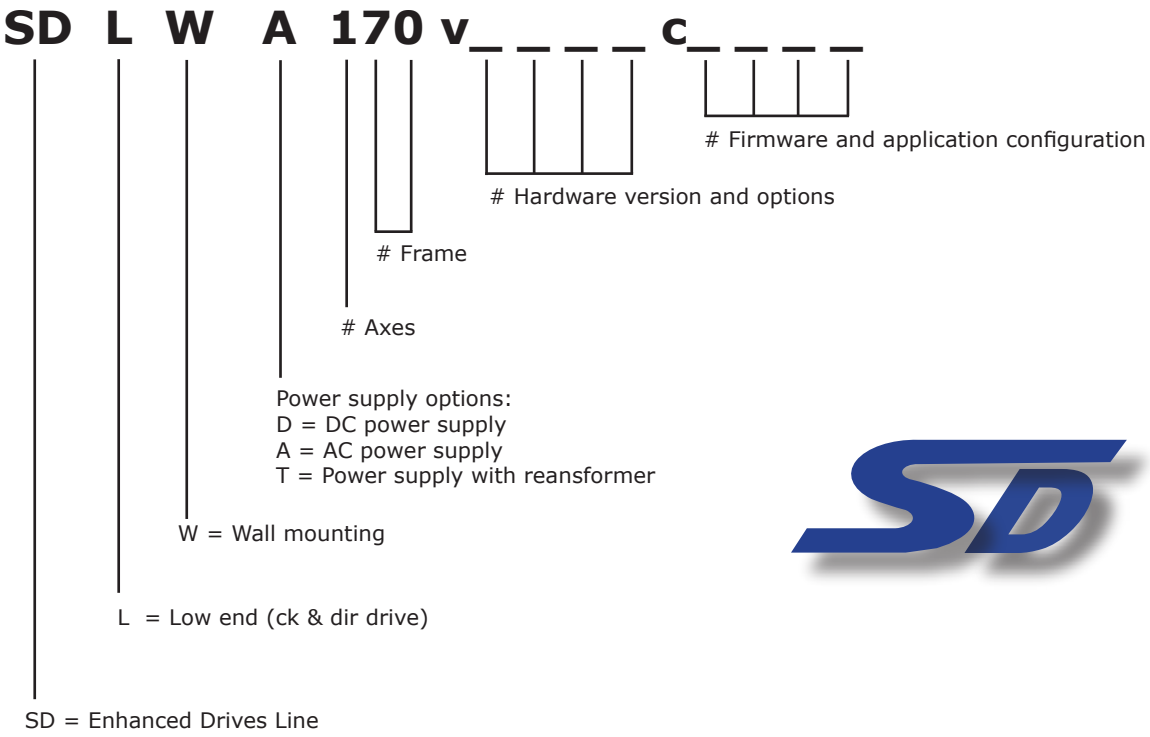


PC Software Tools available:
SL_Modbus for Modbus Slave Mode
SL_CAN for CANopen Slave Mode
SL_eePLC for Stand Alone Mode

SD Enhanced Series Drives

• SDL Series

Product Number Code for SD Enhanced Line Drives



Main features:

The SDLWx170 / 180 is a step motor 'clock & direction' driver implemented through a new generation of DSPC. The unit integrates a microstep drive able to move the motor according to the input digital signals issued by an external master controller. Dip-switches are available to user settings. The unit is powered through one AC or DC bus and can drive the stepper motor in open velocity & position loops, according to internal or external acceleration and decelleration ramps, while running a real time checking of the critical working parameters as temperature rise, voltages and currents.
All model features:

- On Board Safety provisions:
  - √ fully tested for direct installation unit
  - √ fault monitoring and handling
  - √ on field working errors buffering
- Other features:
  - √ low motor vibration
  - √ low mech. noise
  - √ no resonance
  - √ safe protections
  - √ DC/AC Power Supply
  - √ compact sizes
  - √ low heat generation
  - √ high reliability
  - √ high speed and torque output
  - √ wide range of power

SD Enhanced Series Drives

• SDL Series

Models specifications:

SDLWD170 / SDLWA170

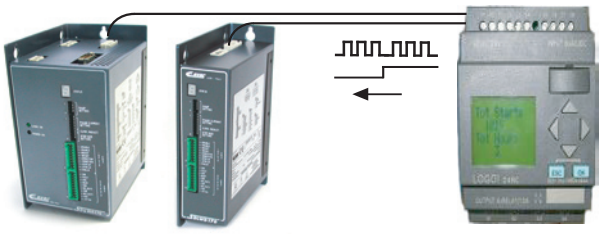
- supply voltage from 24 to 130 Vdc (SDLWD170) or from 24 to 90 Vac (SDLWA170);
- phase current from 1.0 to 8.0 Arms;
- step angle from full step to 1/256 with sinusoidal envelopes;
- 4 200kHz, 5V line-driver or 24Vdc PNP or NPN optoisolated inputs for clock, direction, enable and current boosting;
- 1 24Vdc-500mA fault and busy protected output;
- automatic reduction of the idle current;
- dimensions 100.0 x 74.0 x 37.0 mm.

SDLWD180 / SDLWA180 / SDLWT180

- supply voltage from 24 to 70 Vdc (SDLWD180) or from 24 to 48 Vac (SDLWA180) or 115/220 Vac (SDLWT180);
- phase current from 0.5 to 5.0 Arms;
- step angle: full step to 1/256 sinusoidal envelopes;
- 4 200kHz, 5V line-driver or 24Vdc PNP or NPN optoisolated inputs for clock, direction, enable and current boosting;
- 1 24Vdc-500mA fault and busy protected output;
- automatic reduction of the idle current;
- dimensions 123.3 x 175.0 x 47.7 (88.3 for SDLWA170) mm.

Control modes:

- Step & Direction Mode



3rd Party Controller

SD Enhanced Series Drives

• SDM Series

Product Number Code for SD Enhanced Line Drives

SD M W A 170 v_ _ _ _ c_ _ _ _

- SD = Enhanced Drives Line
- M = High end motion controller (Atomic programmable & firmware availability)
- W = Wall mounting
- Power supply options:
  A = AC power supply
  D = DC power supply
  T = Power supply with reansformer
- # Axes
- # Frame
- # Hardware version and options
- # Firmware and application configuration

Main features:

The SDMWx170 / SDMWx180 / SDMWA130 module are a compact step motor drive that integrates a microstep drives and a logic able to move the motor following commands mastered by a PLC through a CANbus or a RS232/485 link. These units can work also in stand alone modality with customized firmware for general common applications or programmed with ATOMIC software. These units are powered through one AC or DC bus and can drive the stepper motor in open or closed velocity & position loops, according to internal or external acceleration and decelleration ramps, while running a real time checking of the critical working parameters as temperature rise, voltages and currents. All models features:

- Multiform Control Modes
- On Board Safety provisions:
  - √ fully tested for direct installation unit
  - √ built in watch dog functionality
  - √ fault monitoring and handling
  - √ on field working errors buffering
- Other features:
  - √ low motor vibration
  - √ low mech. noise
  - √ no resonance
  - √ safe protections
  - √ DC/AC Power Supply
  - √ compact sizes
  - √ low heat generation
  - √ high reliability
  - √ high speed and torque output
  - √ wide range of power

SD Enhanced Series Drives

• SDM Series

Specifications

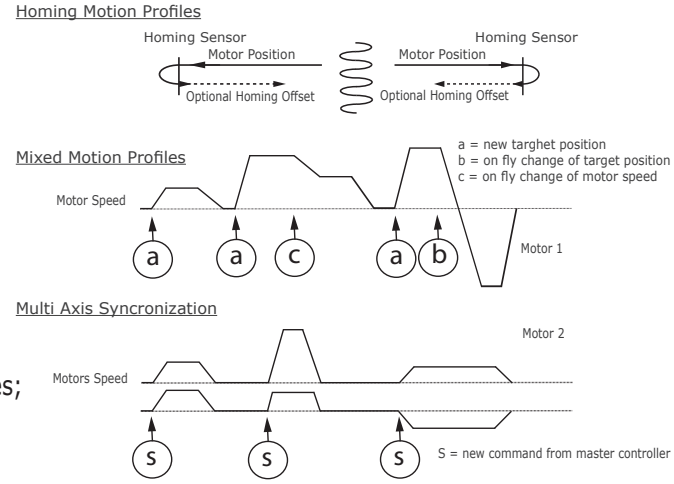
SDMWD170 / SDMWA170
- supply voltage from 24 to 130 Vdc (SDMWD170) or from 24 to 90 Vac (SDMWA170);
- phase current from 1.0 to 8.0 Arms;
- step angle from full step to 1/256 with sinusoidal envelopes;
- 4 200kHz, 5V line-driver or 24Vdc PNP or NPN optoisolated inputs
- 1 ±10Vdc analog input;
- 4 24Vdc-500mA optocoupled and protected outputs;
- CANbus (Canopen) or serial RS232/RS485 (Modbus) interface;
- 7 segment led display monitoring of the working status;
- dimensions 123.3 x 175.0 x 47.7 (88.3 for SDMWA170) mm.

SDMWD180 / SDLWA180 / SDMWT180 / SDMWA130
- supply voltage from 24 to 70 Vdc (SDMWD180) or from 24 to 48 Vac (SDMWA180/SDMWA130) or 115/220 Vac (SDMWT180);
- phase current from 0.5 to 5.0 Arms;
- step angle from full step to 1/256 with sinusoidal envelopes;
- 4 200kHz, 5V line-driver or 24Vdc PNP or NPN optoisolated inputs
- 2 ±10Vdc analog inputs;
- 3 24Vdc-500mA optocoupled and protected outputs;
- CANbus (Canopen) or serial RS232/RS485 (Modbus) interface;
- 7 segment led display monitoring of the working status
- dimensions 123.3 x 175.0 x 47.7 (118.6 for SDMWT180) mm.

SDMWA130
- supply voltage from 24 to 70 Vdc (SDMWD180) or from 24 to 48 Vac (SDMWA180/SDMWA130) or 115/220 Vac (SDMWT180);
- phase current from 0.5 to 5.0 Arms;
- step angle: full step to 1/256 with sinusoidal envelopes;
- 4 200kHz, 5V line-driver or 24Vdc PNP or NPN optoisolated inputs;
- 2 ±10Vdc analog inputs;
- 3 24Vdc-500mA optocoupled and protected outputs;
- CANbus (Canopen) or serial RS232/RS485 (Modbus) interface;
- dimensions 86.0 x 165.0 x 45.0 mm.

Motion module:

- Step & Direction control mode;
- Analog speed ref. control mode (by potentiometer or ±10Vdc);
- Velocity control mode;
- Wide range of positioning control modes (homing, relative, absolute, target);
- CAM mode: cam profile can be programmed;
- Electric Gear with programmable gear ratio to track external master reference (from fieldbus or incremental encoder) of motor's speed and position;
- High speed I/O triggered motor's start & stop to event syncronizing for fast response demanding application: labeling, nick_finder, on fly cut., etc ...;
- Multi Axis movements syncronization capability;
- On fly change among any motion module's control modes;
- On fly electric gear enable/disable capability;
- Motor stall detection & target position tracking through encoder feedback.

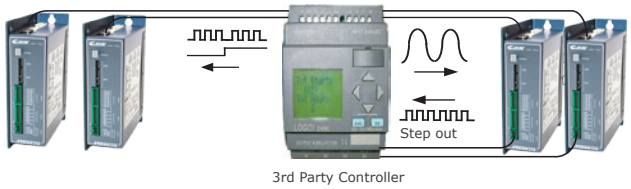


SD Enhanced Series Drives

• SDM Series

Control modes:

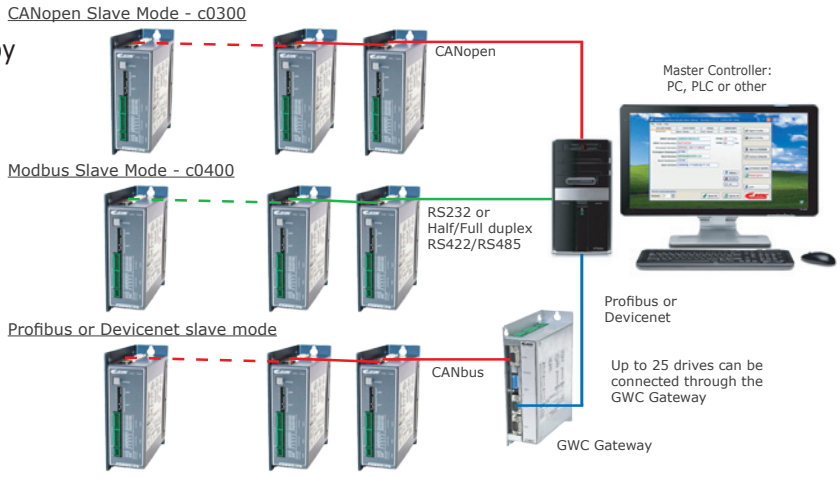
- Step & Direction or Analog



- Multi Axes Systems

Drives' control through commands by Master Controller. Suitable for multi axes systems (up to 127 drives).

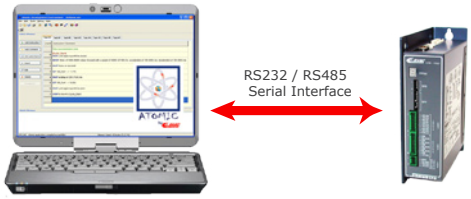
Built in Powerfull Motion Module functionality assures Perfect sinchronyzation among axes and reduces Master Controller workload.



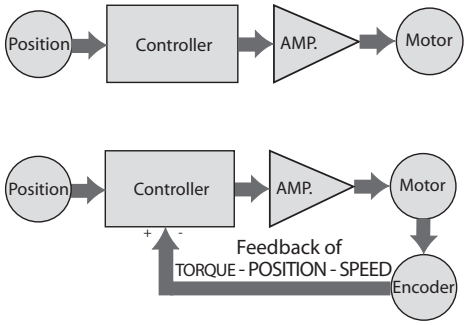
- Stand Alone Mode

The drive can be programmed and configured also for stand alone operations.

Please see the firmware/software applications available for this function.



Open loop / Closed loop



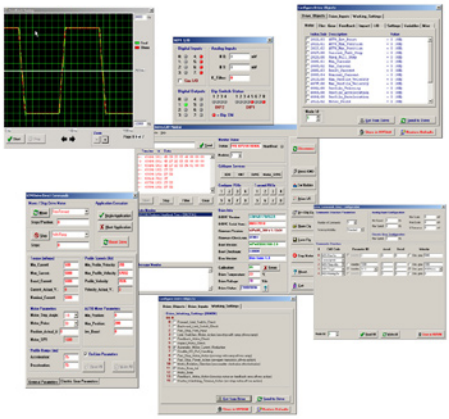
Advantages of Closed Loop Control:

- *with regard to an open loop stepper solution:*
  - Reliable positioning without synchronism loss;
  - Keeps the original position stable and recovers it automatically in case of positioning errors caused by external factors such as mechanical vibrations;
  - 100% use of the motor torque;
  - Capacity to operate at high velocity related to the current control, which is adjusted depending on the load variations, where the normal systems in open loop use a constant current control at all velocities without considering the load variations.
- *compared with a brushless servo controlled solution:*
  - no need to adjust the power (automatic current regulation depending on the load changes);
  - Keeping the position stable without fluctuations after completing the positioning;
  - Quick positioning favoured by the independent control of the integrated DSP;
  - Allows the continuous and fast execution of short stroke movements thanks to the short positioning time.

SD Enhanced Series Drives

• SDM Series

Softwares:



Ever Elettronica PC Software tools to develop, configure and monitor every system in an easy and fast way.:

SDM_CAN = to configure the drive for CANbus use.

SDM_MOD = to configure the drive for Modbus use.

SDM_LBL = to configure the drive for the management of a labelling head.

SDM_TRK = to configure the drive for a 'Digital Tracker' function.

ATOMIC = environment for the simple and fast programming of customized cycles.

Accepts configuration parameters of optional controllers by means of CANbus connections with Canopen protocol or Serial RS232, RS422, RS485 with MODbus RTU protocols (HMI, PLC, PC, other…).

- **CANBus std applications:** *generic application for motor operation via CANopen control commands (c0300).*
  This firmware application is supplied as standard on all SDM drives with CANbus interface to enable the drive to execute motion control commands mastered by a control unit according to CanOpen protocol. The CANbus interface offers numerous advantages: reliability, easy-to-wire and low costs as well as being programmer-friendly and with highly efficient communication.

- **ModBus std applications:** *generic application for motor operation via Modbus control commands (c0400).*
  Implemented on all SDM drives provided with a serial RS232/485 interface, this firmware application allows the drive control by a master unit according to the Modbus RTU protocol.

- **Labelling control:** *'stand alone' application for high performance labelling control (c0404 / c0450).*
  The labelling machine control firmware is available in two versions, 'Silver' and 'Gold XP', running on all SDM with serial RS232/RS485 interface. High performance, easy set-up and maintenance and user-friendly automatic labels format changeover functions are just a few of the main characteristics of the 'Silver' version. Further important functions that have been introduced in the 'Gold XP' versions for an even more comprehensive, high performance and clever functionality of the labelling machine are for instance:
  - missing label handling: detecting the label missing in the roll the machine can recover the right labels line positioning before the arrival of the next item to label;
  - multi-label: the same item can be labelled in several precise and distinct positions;
  - closed loop: this mode can be enabled by installing a feedback shaft encoder on the motor driving the labels roll for a further improvement of labels positioning speed and precision.

- **Digital Tracker:** *motor operation with step-direction-drive enable or analog voltage controls (c0420).*
  This application firmware allows SDM drives to receive movement commands via the traditional digital signals of step, direction, drive enable and current reduction or boosting or via analog reference voltages of torque, speed and position. The drive will automatically calculate the resulting motion profile and the relevant acceleration and deceleration ramps in accordance with the movement parameters set in open or closed loop featuring all the performance advantages provided by Ever Elettronica's f^4d^2 technology.

- **Thread winding:** *'stand alone' application for accurate thread winding (c0370).*
  This firmware can be implemented on all drives with a CANbus or serial interface to manage the winding of a thread reel according to the most common winding methods: 'wild' crossing, 'precision' crossing, 'precision step' crossing. Furthermode, this firmware permits an accurate control of the reel 'tapering' and 'borders hiding' through dedicated regulating parameters set-up, whereas for any type of thread winding it is possible to define the winding ratio, the threads crossing mode, etc. The drive can receive synchronisation commands from a master PLC and calculate the motion profiles of the step motor controlled in closed loop to obtain very fast winding performances.

- **ATOMIC:** *the software environment to program SDM drives (c0499).*
  Atomic is a micro programming language designed for the 'full digital' SDM family drives. The scope of this language is to give the user the freedom to create his own simple application without having to switch to more complex and more expensive drives. Atomic's philosophy is to have few but powerful instructions. The Atomic software development environment is a Microsoft Windows(tm) application that enables to build the user application by means of wizards and dialog boxes so it will not be necessary to write a single line of instruction. This means that the user doesn't have to learn the syntax of the Atomic instructions that are completely handled by the Personal Computer software.

Integrated Servomotors

• SM2A Series

Product number code for SlimLine integrated servomotors

SM 2 A 6 60P C0 4 3 B 4 0 c0300

- SM = Servo Motor
- Internal code
- A = AC single/three phase power supply
  D = Direct current power supply
- 5 = Separated power supply input for power and logic
  6 = Single power supply input
- 60P = 6.0 Amps parallel connection to the motor
- C0 = CANBus in/out connection
  N2 = RS485 in/out connection
  N3 = RS232/RS485 connection
- 4 = 4 digital input and 2 digital output
- 3 = 3.4' flange motor (86 mm)
- A = 1/2 stack motor
  B = 1 stack motor
  C = 2 stack motor
  D = 3 stack motor
  E = 4 stack motor
- N = no encoder (open loop)
  4 = 400 ppr incremental encoder (closed loop)
- 0 = option number
- # Firmware and application configuration

Main features:

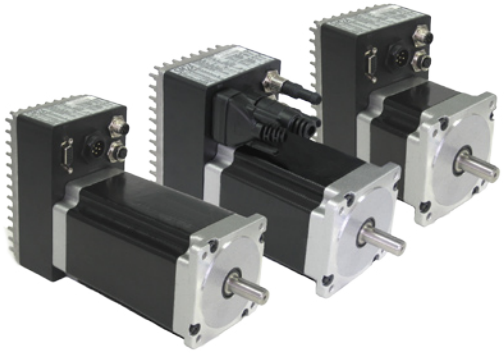
The SM2A series with a flange size of 86 mm have IP65 protection degree, high reliability connectors, AC power supply, protection against over-and under-voltage, over-current, open phase and overheating of the drive, fieldbus and I/O's. The motors, made of Low Power Loss materials, feature a holding torque from 3.4 to 12.5 Nm and a feedback encoder for the closed loop control of torque, velocity and position.
All models performs:

- Multiform Control Modes
- On Board Safety provisions:
  - √ fully tested for direct installation unit
  - √ built in watch dog functionality
  - √ fault monitoring and handling
  - √ on field working errors buffering
  - √ separated power supply for logic and power
- Servomotors main features:
  - √ low motor vibration
  - √ low mechanical noise
  - √ low heat production
  - √ AC power supply
  - √ protection class IP65
  - √ no resonance
  - √ high reliability
  - √ wide range of power
  - √ closed loop of torque,velocity and position

Integrated Servomotors

• SM2A Series

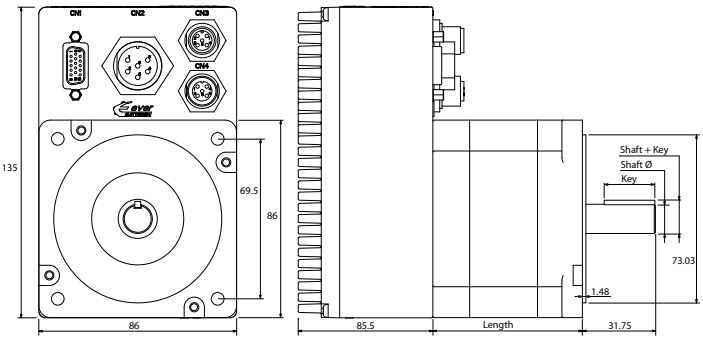
Specifications:



Code		Holding Torque
SM2A	A	3.40 Nm ±10%
SM2A	B	4.50 Nm ±10%
SM2A	C	7.00 Nm ±10%
SM2A	D	8.50 Nm ±10%
SM2A	E	12.00 Nm ±10%

- separated power supply 24 VDC (logic) and 24÷100 VAC (power) for SM2A5 models and single single 24÷100 VAC for SM2A6 models;
- output phase current up to 8.0 ARMS (11.0 APEAK);
- H-bridge bipolar chopper of 40 KHz power stage
- RS232 / RS422 / RS485 or CANbus optoisolated control interfaces;
- 4 digital optocoupled inputs and 2 digital optocoupled outputs (100 mA);
- 2 analog inputs (potentiometer or ±10Vdc);
- step resolution from full step to 128 microstep (open loop) or StepLess technology (closed loop);
- Over/Under-voltage, Over Current, Over Temperature, Open Windings, Closed Windings Phase/Phase Phase/Ground safety protections;
- IP65 protection class;
- dimensions:

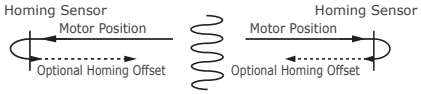
Models	Dimensions (mm)			
	Length	Shaft Ø	Key	Shaft + Key
SM2A_ _ _ _ _ _A_ _	65.0	9.525	(3.000x3.000) 22.00	10.725
SM2A_ _ _ _ _ _B_ _	80.0	12.70	(3.175x3.175) 22.23	14.097
SM2A_ _ _ _ _ _C_ _	94.0	12.70	(3.175x3.175) 22.23	14.097
SM2A_ _ _ _ _ _D_ _	118.0	12.70	(3.175x3.175) 22.23	14.097
SM2A_ _ _ _ _ _E_ _	156.5	15.87	(4.763x4,763) 22.23	17.907



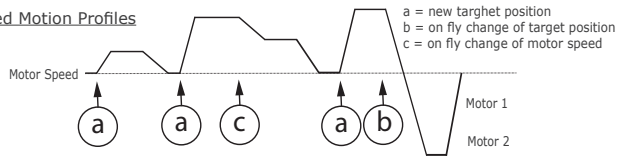
Motion module:

- Step & Direction control mode;
- Analog speed ref. control mode (by potentiometer or ±10Vdc);
- Velocity control mode;
- Wide range of positioning control modes (homing, relative, absolute, target);
- CAM mode: cam profile can be programmed;
- Electric Gear with programmable gear ratio to track external master reference (from fieldbus or incremental encoder) of motor's speed and position;
- High speed I/O triggered motor's start & stop to event syncronizing for fast response demanding application: labeling, nick_finder, on fly cut., etc ...;
- Multi Axis movements syncronization capability;
- On fly change among any motion module's control modes;
- On fly electric gear enable/disable capability;
- Motor stall detection & target position tracking through encoder feedback.

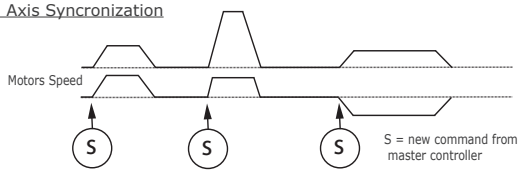
Homing Motion Profiles



Mixed Motion Profiles



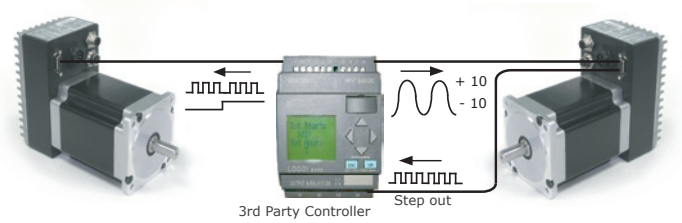
Multi Axis Syncronization



• SM2A Series

Control modes:

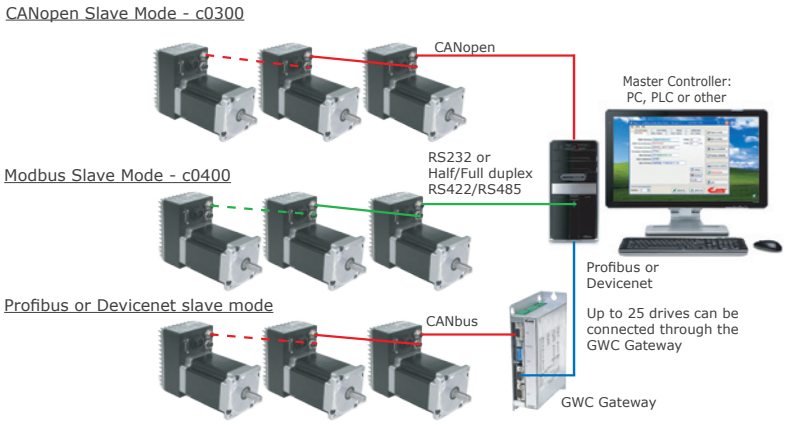
- Step & Direction or Analog



- Multi Axes Systems

Servomotor control through commands by Master Controller. Suitable for multi axes systems (up to 127 drives).

Built in Powerfull Motion Module functionality assures Perfect sinchronyzation among axes and reduces Master Controller workload.

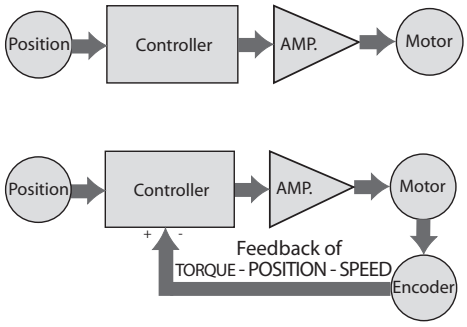


- Stand Alone Mode

The servomotor can be programmed and configured also for stand alone operations.

Please see the firmware/software applications available for this function.

Open loop / Closed loop



Advantages of Closed Loop Control:

- *with regard to an open loop stepper solution:*
  - Reliable positioning without synchronism loss;
  - Keeps the original position stable and recovers it automatically in case of positioning errors caused by external factors such as mechanical vibrations;
  - 100% use of the motor torque;
  - Capacity to operate at high velocity related to the current control, which is adjusted depending on the load variations, where the normal systems in open loop use a constant current control at all velocities without considering the load variations.
- *compared with a brushless servo controlled solution:*
  - no need to adjust the power (automatic current regulation depending on the load changes);
  - Keeping the position stable without fluctuations after completing the positioning;
  - Quick positioning favoured by the independent control of the integrated DSP;
  - Allows the continuous and fast execution of short stroke movements thanks to the short positioning time.

Softwares:

Quick configuration with process-oriented MS Windows Tools.
Accepts configuration parameters of optional controllers by means of CANbus connections with Canopen protocol or Serial RS232, RS422, RS485 with MODbus RTU protocols (HMI, PLC, PC, other…).

The Atomic environment also allows the user to access all functionalities and resources of the device, and to manage and synchronize the Motion Module and the resources of other drives with every process event.

Special Real-time Software Modules available for:
- Labelling
- CAM Management
- Wire Processing
- Plates Orientation
- Control Printing Registers.
- Customization

Ever Elettronica PC Software tools to develop, configure and monitor every system in an easy and fast way:

ATOMIC = environment for the simple and fast programming of customized cycles.
SDM_CAN/SDM_MOD = to configure the drive for CANbus or Serial use.
SDM_LBL = to configure the drive for the management of a labelling head.
SDM_TRK = to configure the drive for a 'Digital Tracker' function.

- **CANBus std applications:** *generic application for motor operation via CANopen control commands (c0300).*
  This firmware application is supplied as standard on all SM2A integrated drives with CANbus interface to enable the drive to execute motion control commands mastered by a control unit according to CanOpen protocol. The CANbus interface offers numerous advantages: reliability, easy-to-wire and low costs as well as being programmer-friendly and with highly efficient communication.

- **ModBus std applications:** *generic application for motor operation via Modbus control commands (c0400).*
  Implemented on all SM2A integrated drives provided with a serial RS232/485 interface, this firmware application allows the drive control by a master unit according to the Modbus RTU protocol.

- **Labelling control:** *'stand alone' application for high performance labelling control (c0404 / c0450).*
  The labelling machine control firmware is available in two versions, 'Silver' and 'Gold XP', running on all SDM with serial RS232/RS485 interface. High performance, easy set-up and maintenance and user-friendly automatic labels format changeover functions are just a few of the main characteristics of the 'Silver' version. Further important functions that have been introduced in the 'Gold XP' versions for an even more comprehensive, high performance and clever functionality of the labelling machine are for instance:
  - missing label handling: detecting the label missing in the roll the machine can recover the right labels line positioning before the arrival of the next item to label;
  - multi-label: the same item can be labelled in several precise and distinct positions;
  - closed loop: this mode can be enabled by installing a feedback shaft encoder on the motor driving the labels roll for a further improvement of labels positioning speed and precision.

- **Digital Tracker:** *motor operation with step-direction-drive enable or analog voltage controls (c0420).*
  This application firmware allows SDM drives to receive movement commands via the traditional digital signals of step, direction, drive enable and current reduction or boosting or via analog reference voltages of torque, speed and position. The drive will automatically calculate the resulting motion profile and the relevant acceleration and deceleration ramps in accordance with the movement parameters set in open or closed loop featuring all the performance advantages provided by Ever Elettronica's f^4d^2 technology.

- **ATOMIC:** *the software environment to program SDM drives (c0499)*.
  Atomic is a micro programming language designed for the 'Full Digital' drives. The scope of this language is to give the user the freedom to create his own simple application without having to switch to more complex and more expensive drives. Atomic's philosophy is to have few but powerful instructions. The Atomic software development environment is a Microsoft Windows(tm) application that enables to build the user application by means of wizards and dialog boxes so it will not be necessary to write a single line of instruction. This means that the user doesn't have to learn the syntax of the Atomic instructions that are completely handled by the Personal Computer software.

• GWC Motion Controller, Gateway & PLC

Main features:

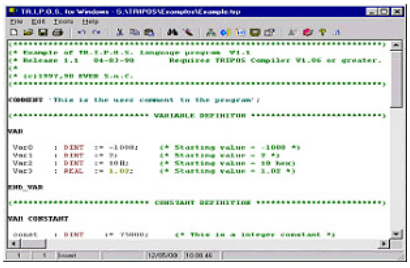
The GWC unit provides three main functionalities: motion controller, gateway and programmable logic controller (PLC). As PLC and motion controller it permits the user to locally controll a process through fieldbus, serial links and I/Os and executing an user defined program. Working as bus gateway it allows the data exchanging among different automation field busses: CANBus (CANOpen), DeviceNet, ProfiBus, ModeBus working. The three functionalities, built in the same unit, allow an easy solution to a spread range of industry automation processes.

Specifications

GWCB211

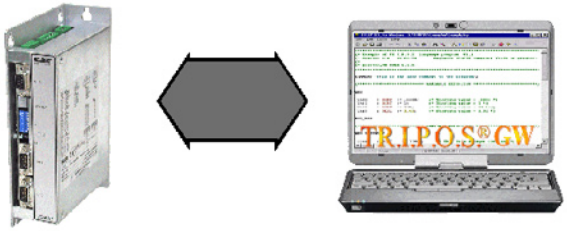
- power supply 24 Vdc - 800 mA max;
- CPU 16 bit 40 Mhz CISC;
- user program memory 1 Mb flash and 512 Kb high speed ram;
- CanOpen interfaces electrically isolated, 1Mbit/s;
- CanOpen or DeviceNet electrically isolated, 1Mbis/s;
- profibus-DP interface electrically isolated;
- 2 serial interfaces RS232/RS485 electrically isolated;
- 8 electrically isolated 5 ÷ 24Vdc - 200 kHz inputs;
- 8 electrically isolated 24V - 0.5A- 1kHz outputs;
- 8 dip-switches for user functions setting;
- 7 segment leds display of the unit status;
- dimensions 194.0 x 120.0 x 45.0 mm.

The software environment to program the GWC controller



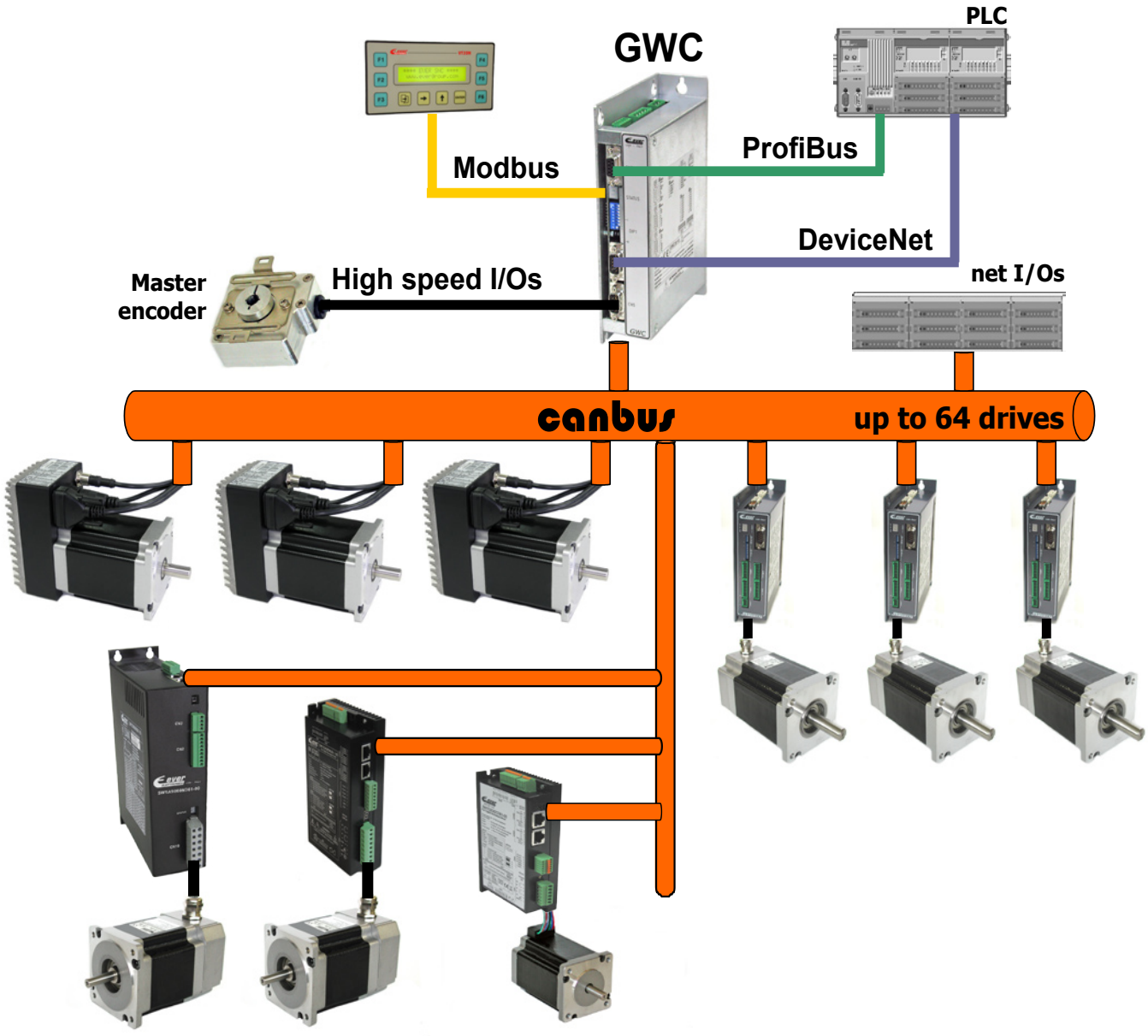
The programming environment T.R.I.P.O.S. GW allows the userto create its own cycle by means of a structured language inaccordance with the IEC1131-E(ST) standards. TR.I.P.O.S. GW allows a wide access to hardware resources through the GWC device and is open to the extensions of the user functions with protection.

T.R.I.P.O.S.GW environment permits the full editing of the program and of all its functions, which can be easily personalized to adapt to every type of machine.
Allows to personalize the cam to memorize into the GWC unit or to import other cams realized with other motion control devices



- **GWC Motion Controller, Gateway & PLC**

  Application scheme



Ever Elettronica Group

Via del Commercio, 2/4 - 9/11
26900 - L o d i (LO) - ITALY
Tel: ++39 0371 412318
Fax:++39 0371 412367
e-mail: infoever@everelettronica.it
sito internet www.everelettronica.it