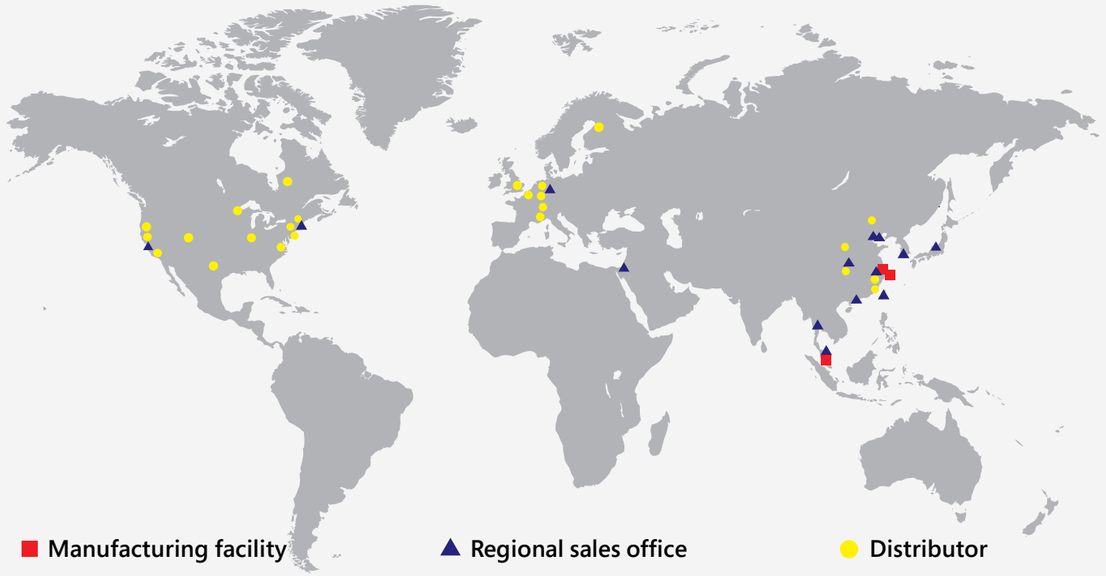
Akribis Worldwide Offices and Distribution Network



■ Manufacturing facility ▲ Regional sales office ● Distributor

Headquarters

Akribis Systems Pte Ltd
5012 Techplace II Ang Mo Kio Ave 5
#01-05 Singapore 569876
Tel: (65) 6484 3357

Manufacturing facilities

Akribis Systems (Shanghai) Co., Ltd
A2, No.6999, Chuan Sha Rd, Pudong
New Area, Shanghai, 201202, China
Tel: (86) 21 5859 5800

Akribis Systems (Nantong) Co., Ltd
Floor 2, Building 7, Boding Machinery
Industrial Park, Xingyuan Road, Tongzhou,
Nantong , Jiangsu Province, China
Tel: (86) 0513 8655 1066

Branches

Akribis Systems (Beijing) Co., Ltd
No.804, Building 7 Bao Li Da Hui,
No.156 Xinhua North Street,
Tongzhou District, Beijing, China
Tel: (86) 010 5686 5157

Akribis Systems GmbH
Am Weichselgarten 19a,
Erlangen, D-91058, Germany
Tel: (49) 9131 81179 0

Agito Akribis Systems Ltd.
6 Yad-Harutsim St., Industrial Zone,
Kfar-Saba, 4464103, Israel
Tel: (972) 5459 09589

Akribis Systems Japan Co., Ltd
Excellent TR 1F, 3-43-9,
Musashidai Fucyu-city Tokyo,
183-0042, Japan
Tel: (81) 42 359 4295

Akribis Korea Co., Ltd
4th floor, 81, Bupyeongbuk-ro,
Bupyeong-gu, Incheon, 21302,
Rep. of Korea
Tel: (82) 32 710 5033

Akribis Systems Sdn Bhd
No.1, Jalan KPB 16, Balakong Industrial
Park, 43300 Seri Kembangan, Selangor
Darul Ehsan, Malaysia
Tel: (60) 3896 4400 8

Taiwan Akribis Systems Co., Ltd
9/f, 985-8, Chunri Road,
Taoyuan District, Taoyuan,
Taiwan
Tel: (886) 3 3571868

Akribis Systems Pte Ltd
No. 56/2 Chanothai, Khlong 3,
Khlong Luang Road, Khlong Luan,
Pathum thani, 12120, Thailand
Tel: (66) 8515 10088

Akribis Systems Inc. (East)
100 Cummings Center Suite 212-D
Beverly, MA 01915, USA
Tel: (1) 508 934 7480

Akribis Systems Inc. (West)
780 Montague Expressway Suite
508 San Jose, CA 95131, USA
Tel: (1) 408 913 1300

Akribis Systems (Shanghai) Co., Ltd (Shenzhen)
1 / F, Building B, Guanlan Honglianying Industrial
Park, Longhua New Area, Shenzhen, China
Tel: (86) 0755 2377 7203

cust-service@akribis-sys.com
www.akribis-sys.com

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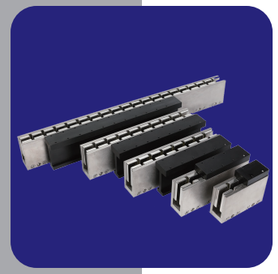
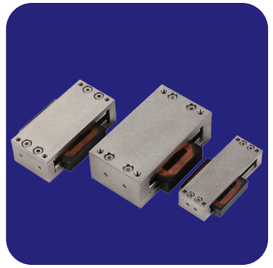
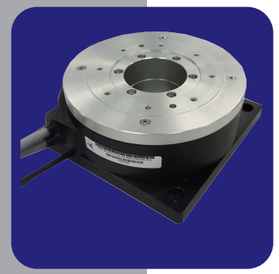
Akribis
where precision matters

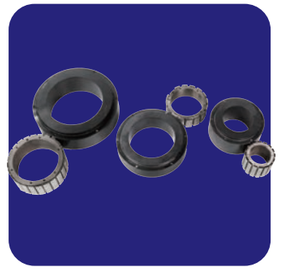
Direct Drive Motors

Linear Motors / Voice Coil Motors / Direct Drive Rotary Motors









where precision matters

Akribis is a Latinized Greek word that means “Precision”. On the Akribis logo, the letter “a” is formed by a line and a circle, representing linear and rotary motions. These are supported by a tetrahedron structure, the same structure as the diamond crystal which has many exceptional physical properties.

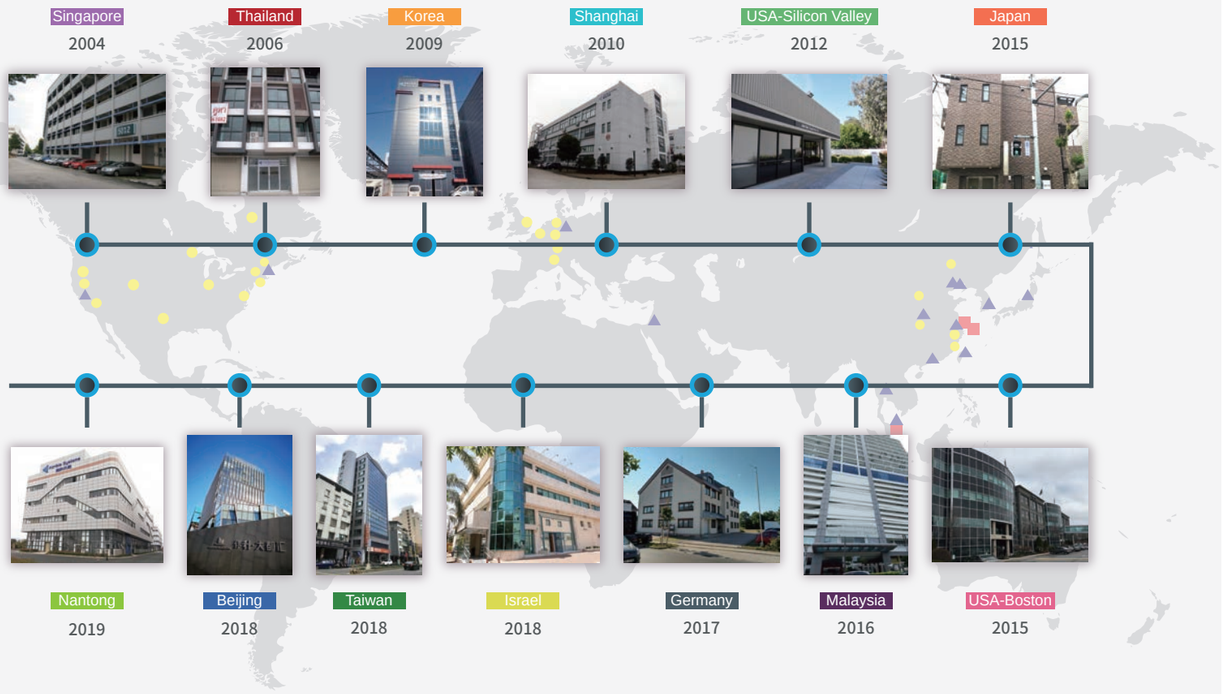
The logo signifies that Akribis Systems’ sound engineering expertise is the basis of the company’ s foundation, and this enables us to provide customers with precise, direct drive motion control solutions.

Akribis Systems Pte Ltd was founded in Aug 2004. We design and manufacture direct drive motors, stages and precision systems that are used in equipment for manufacturing, inspection and testing. Akribis Systems supports a wide range of industries including semiconductor, solar, flat panel, hard disk, LED, printed circuit board, printing, photonics and biomedical manufacturing.

From the beginning, the company has been focusing on innovation and development of new technologies and solutions in motion control, with more than 44 patents applied. Backed by a very strong and committed engineering team, the company continues to develop custom motors and systems for the most demanding applications.

The corporate headquarters of Akribis Systems is situated in Singapore. We have manufacturing facilities in Singapore and in Shanghai & Nantong, China.

Our sales network includes our sales offices in USA, South Korea, Japan, Thailand, Malaysia and Taiwan, and is reinforced by our comprehensive distribution channels in Asia, Europe and North America.



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Please refer to ***Direct Drive Stages*** for Akribis direct drive modules and stages.

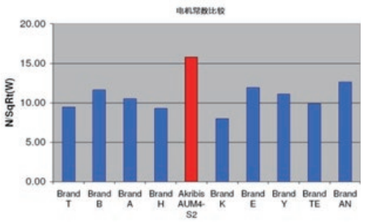
Introduction

Most complete range of linear motors

Akribis linear motors can be categorized into iron core and ironless series. Consisting of motor coils and magnet tracks, Akribis linear motors provide unparalleled advantages and features to improve system performance and efficiency: high speed, high acceleration, low velocity ripple, low operation noise, superior stability, wear & tear free, maintenance free, and long travel stroke. Akribis offers various models under each category, including: AUM, AWM, AHM, ALM and ACR series ironless linear motors; AJM, AQM, AKM series iron core linear motors for automation industry. AKMF series iron core motor with water/oil cooling options for CNC industry.

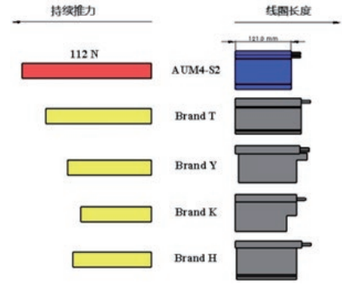
1. Highest motor constant

Using our patented design, our AUM motors produce the highest force with the smallest form factor. The motor constants for AUM series motors are the highest in its class. Motor constant is a measure of efficiency of a motor and it also determines the continuous force a motor can produce.



2. Shortest coil lengths

Even with the shortest coil lengths, our AUM motors produce the highest force.

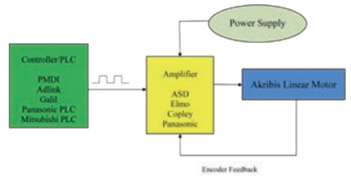


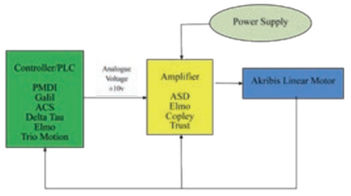
3. Custom design is possible

For applications where none of our standard linear motors fit your requirements, Akribis can offer customized designs. We design custom motors for disk drive, semiconductor front and back end, PCB and other industries. From concept design, prototyping and production, Akribis engineers have vast experience in helping our customers achieve the performance they need at affordable costs.

4. Flexible Control Modes

Akribis linear motors are compatible with all well-known motion controllers and drivers.





1. **Pulse and Direction operating mode**
2. **Analog Current / Velocity operating mode**
3. **Distributed Control (EtherCAT, CANopen, RS232, PROFINET)**

Voice Coil Motors

Voice coil motors are short stroke actuators that use permanent magnets and coil windings to generate thrust force.
It is a direct drive motor, which means that the motor drives the load directly without the need of a transmission mechanism.
Akribis offers various types of voice coil motors, including AVM series cylindrical motors， AVA series and ATA series planar motors.

1.Types of motion possible for voice coil motors

1.1 Two position control

A voice coil motor can be used as a simple two position actuator. Mounted with linear guidance bearings, the coil is typically moved while the core is kept stationary, although the reverse can also be done. A positive current cause the voice coil to move in one direction, while a negative current causes it to move in the opposite direction. At both ends, hard stops can be used to stop motion, very much like a pneumatic actuator, except that a voice coil motor is completely powered by electricity without the need for compressed air.

A two position electronic drive, EOD from Akribis can be used to drive the voice coil motor in the manner described above. The peak current, peak current duration and holding current can be adjusted to control the start of motion and the holding force of the voice coil at stationary position.

1.2 Servo control

A voice coil motor can also be used as a servo motor. Other than linear bearings, a feedback device such as a linear encoder can be used for closed loop control. In this way, the acceleration, velocity and stopping position of the voice coil can be controlled precisely.

The MGV, for example is a complete, servo controlled voice coil module, with a AVM voice coil, linear bearings and a linear encoder.

2. Advantages of using voice coil actuators

1. Low moving mass
The moving coil is typically low in mass, thus allowing very high accelerations to be achieved. Short settling times are also achievable due to the direct method of driving the load.
2. Low inductance
The inductance of a voice coil motor is typically very low. Hence, the electrical time constant is very low, enabling the voice coil motor to have very fast response.
3. Smooth motion
There is no detent force in a voice coil motor. Hence, there is no cogging force, like in most brushless motors. Hence, very smooth motion can be achieved, even at low speed.
4. Reliability
Since there is no contact between the coil and the core of a voice coil motor, there is no wear and tear, making the voice coil motor very reliable.
5. Force control
The force produced by a voice coil motor is linearly proportional to the current applied. This allows it to be employed for force control application.

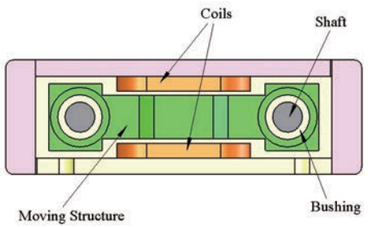
Introduction to ATA actuator

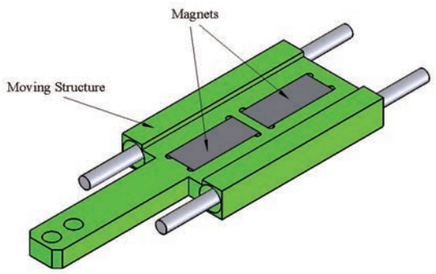
The ATA is a two position, direct drive actuator that is designed for applications that only need control of 2 positions, like pneumatic actuators. However, unlike pneumatic actuators, the ATA does not need compressed air, solenoid valves, air tubing and other components associated with pneumatic systems. Only 24 VDC is required to work with the amplifier, EOD, which drives all our ATA actuators. This makes the ATA actuators suitable even for portable devices/instruments, where compressed air is not readily available.

Design of ATA actuator

The following is the design diagram of ATA. The patent has been applied.

Patent technology



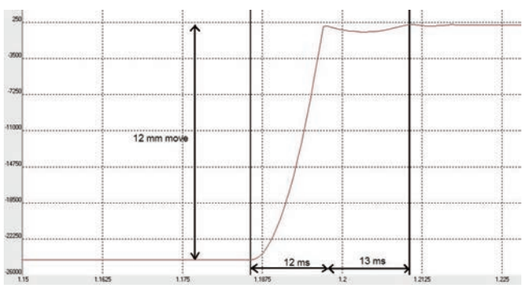


The coils are fixed to the casing, while the magnets are attached to the moving structure. The novel design does not require any magnet back iron. The magnets are held in the pockets of the moving structure, which is made from non-magnetic, low density material. This enables the actuator to have a low moving mass.

The cable that supplies current to the actuator is also fixed. Without any moving cable, the reliability of the actuator is much better than other actuators with moving cables, and high frequency cycling is possible.

Fast response

The response time for the ATA is significantly faster than traditional pneumatic actuators or other types of actuators. A 12 mm move can take only 12 ms. By controlling the peak current and peak current duration, the acceleration and motion time can be adjusted.



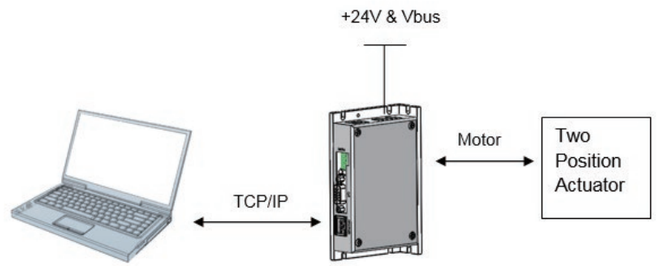
Comparison with pneumatic actuators

The table below compares ATA actuators with traditional pneumatic actuators:

Feature comparison	Pneumatic actuators	ATA actuators
Supply required	Compressed air for driving piston and 24 VDC for solenoid valve	24VDC
Components involved	Air cylinder, tubing, solenoid valve, pressure regulator etc.	ATA anf EOD
Response	Sluggish response	Fast response
Control of holding force	Passive, determined by air pressure and piston size (area of piston)	Can be adjusted on the EOD amplifier

Control Algorithm

EOD series drivers are designed to control ATA actuators for two position control.



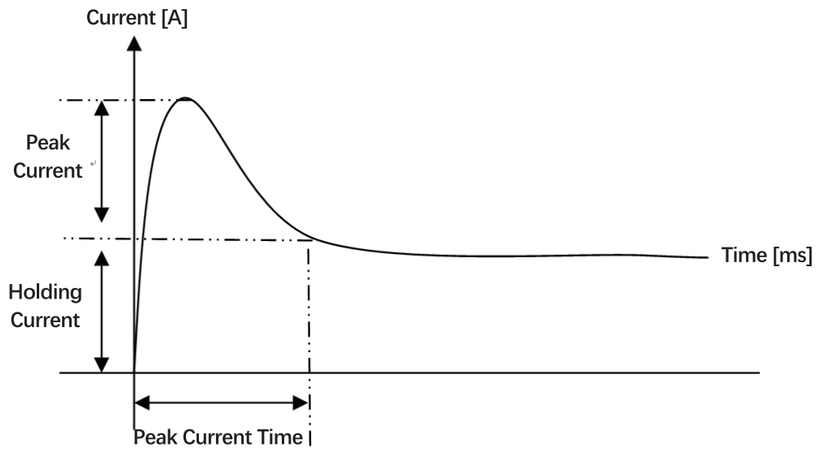
System integration setup is depicted in Figure 1.
Communication between PC and EOD can be established via TCP/IP or RS232.There are two control modes, namely Mode A, direction and move and Mode B, forward and backward. Mode selection is done by software through a GUI. In each mode, control is achieved by two I/O bit with the following truth table.

Mode A (direction and move)		
DIN 1 (Trigger bit 1)	DIN 2 (Trigger bit 2)	Function
0	0	No control
0	1	Retract
1	0	No control
1	1	Forward

Mode B (forward and retract)		
DIN 1(Trigger bit 1)	DIN 2(Trigger bit 2)	Function
0	0	No control
0	1	Forward
1	0	Retract
1	1	Retract

One unique function of EOD is user-defined current profile.

All settings, namely “Peak Current”, “Holding Current”, “Peak Current Time” “Motor Resistance”, need to be filled by user, whose relationship are described in Figure 2 and equations below,

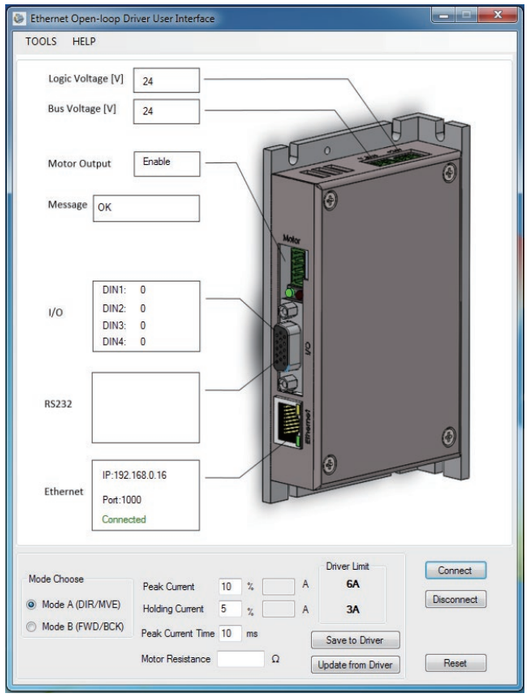


Formula for Peak Current and Holding Current:

Peak Current [A] = Bus voltage [V] / Motor Resistance [ohm] * Peak Current Percentage

Holding Current [A] = Bus voltage [V] / Motor Resistance [ohm] * Holding Current Percentage

All these parameters can be changed through the GUI.



Please refer to Hardware Manual and Software & Operation Manual of EOD for details.

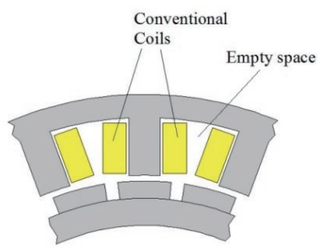
Direct Drive Rotary Motors

Direct drive rotary motors (DDR) are motors that are designed to drive loads directly without the need of any transmission mechanism, such as gears or belts. These motors are also called torque motors. They use high energy permanent magnets to generate high torque.

Akribis offers various types of DDRs, including ADR-A series, ADR-P series and ACD series. We also design many customized direct drive motors according to specific applications.

1. ADR-A Series

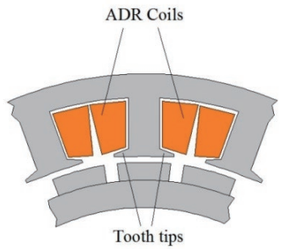
The ADR-A series motors are iron core type of brushless motors. Through our unique winding design, our ADR-A series motors produce very high torque, compared to other motors in the industry. The form factor of our ADR-A series motors is also smaller than competitor products. With low rotor inertia, these motors give better response and settling time. The maximum speed for our motors is also relatively higher than other motors.



Conventional DDR

The figures below show the windings of a conventional DDR and our ADR-A Series.

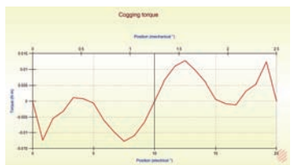
For a conventional DDR, the coils are wound and inserted into the slots, between the teeth of the stator. The coils have rectangular shapes when viewed from the top. There is inherently a large empty space in the slot, between two sets of coils. This space is a wasted, since the available magnetic flux is not used to produce any torque in this region.



ADR-A Series

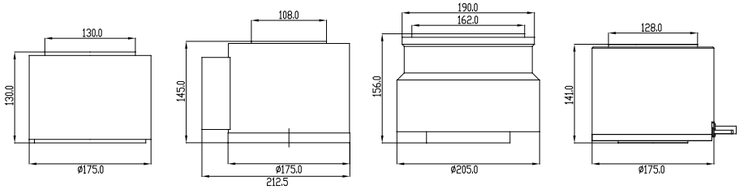
For the ADR-A Series, the coils are wound with a special technique, and up to 35% more coils can be wound, fully utilizing the space in the slots. This results in much higher torque from the motor with the same form factor.

The ADR-A Series also has tooth tips on the stator teeth. This design minimizes cogging torque significantly, without compromise on the motor performance. Akribis design engineers put in a lot of effort to optimize the performance of our motors, including reducing cogging torque to a minimum.



Below is an example that shows the cogging torque of a motor at different positions.

The illustration below shows a comparison of our ADR175-A-138, with other motors of similar diameter.



Brand/Models	Unit	Brand YA	Brand KM	Brand YG	Akribis ADR175-A-138	Our advantages
Outer Diameter	mm	175.0	175.2	190.0 (205.0)	175.0	Low height
Motor Height	mm	130.0	145.0	156.0	141.0	Low height
Peak Torque	Nm	42.0	32.8	30.0	98.6	Highest peak torque
Continuous Torque	Nm	14.0	9.8	Not published	32.9	Highest continuous torque
Max Speed (230VAC)	rpm	300	498	120	501	Highest speed
Rotor Inertia	Kgm2	0.022	0.0071	0.072	0.0076	Low rotor inertia

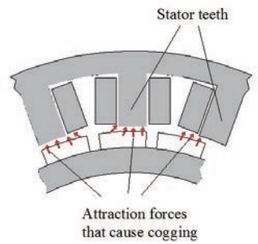
The ADR-A series motors are designed with low cogging toque. They are fully integrated with bearing and different options of encoder, optical encoder with digital output, and optical encoder with SINCOS. The motors also come with low and high speed windings (S or P).

2. ADR-P and ADR-F Series

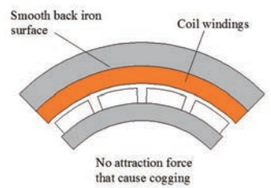
Akribis frameless torque motor ADR-P and ADR-F series consist of only rotors and stators, allowing them to be easily integrated into complex systems. ADR-P series motors are equipped with hall sensors, which easily interface with all types of servo amplifiers and controllers. ADR-F series motors are specifically designed for robot joint applications with low voltage and high speed requirements. The unique coil winding design yields one of the highest torque density in the market.

3. ACD Series

The ACD series motors are coreless type of brushless motors. These motors do not produce any cogging torque, which allows smooth motion to be achieved, with low velocity ripple. The unique winding design also gives high torque density, although the output torque is lower than the ADR-A series motors.



Conventional iron core DDR



ACD Series

These motors are also integrated with high precision bearings, which give good radial and axial runout. High resolution optical encoders with digital output and SINCOS are available as options. The motors also come with low and high speed winding connections (D or Y).

4. ACW Series

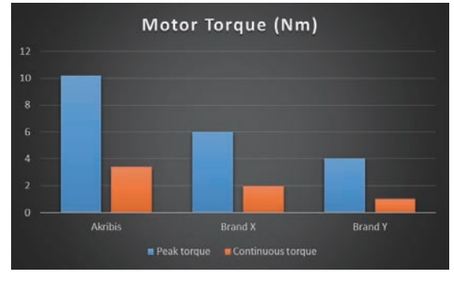
The ACW series are using coreless technology. They are designed with very low profile, and the motors do not produce any cogging torque, which allows smooth motion to be achieved with low velocity ripple.

5. AXD Series

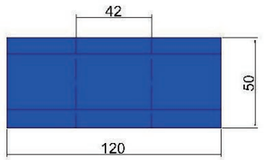
The AXD series are ironcore brushless DC motor. Being similar to ACW series, AXD series adopt flat design, featuring with large mesopore, small volume, high torque density, low moment of inertia and quality, and combine with high resolution optical encoder with high precision.

Compact size with high torque density

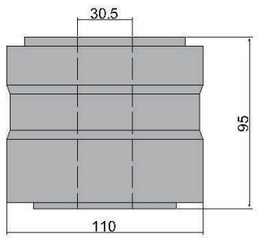
The AXD Series Direct Drive Torque motor has very high torque density. The peak torque and continuous torque are high, even though the motor form factor is relatively small. Below is a graph that shows a comparison with 2 competitor motors with similar size.



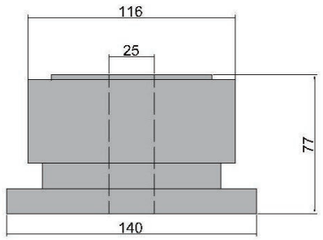
The table below shows a comparison of the key specifications of AXD with 2 competitor motors with similar size. AXD outperforms the competition in every aspect.



Akribis AXD



Brand X



Brand Y

Brand/Models	Akribis AXD 120	Brand X AX200XX	Brand Y DM1C-XXX	AXD vs Competitor
Motor height	50 mm	95 mm	77 mm	AXD is 54%~90% better
Peak torque	10.0Nm	6 Nm	4 Nm	AXD is 70%~155% better
Continuous torque	3.4 Nm	2 Nm	1 Nm	AXD is 70%~240% better
Centre hole size	42 mm	30.5 mm	25 mm	AXD is 38%~68% better
Max speed	1700 rpm	300 rpm	150 rpm	AXD is 400%~900% better
Rotor inertia	0.00102 kg·m²	0.00575 kg·m²	0.0025 kg·m²	AXD is 145%~464% better
Motor mass	2.35 Kg	4.7 kg	3 Kg	AXD is 28%~100% better
Repeatability	± 3 arc sec	± 5 arc sec	±3 arc sec	AXD is 50%~150% better

Low rotor inertia

In the torque equation T = Jα (where T is torque, J is moment of inertia, α is angular acceleration), much higher acceleration can be achieved if the moment of inertia is smaller. The moment of inertia used in the computation actually comprises 2 parts: the moment of inertia of the motor, and the moment of inertia of the load.

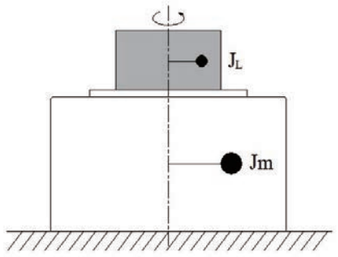


Illustration of motor inertia and load inertia

J = Jm + JL

where

Jm :Motor rotor inertia

JL :Load inertia

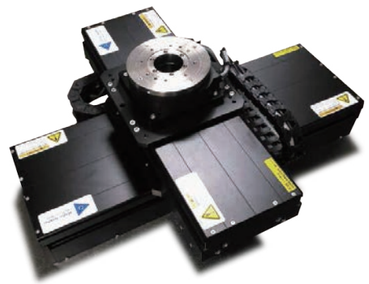
In many cases, the moment of inertia of the motor actually contributes a large percentage of the total moment of inertia. This means that the motor torque is used mainly to rotate itself. Little torque is left for the load moment of inertia.

The rotor inertia of AXD is small. This means that more torque can be used to rotate the load, resulting in more dynamic performance. Higher accelerations and shorter settling time can be achieved.

Low overall mass

The overall mass of an AXD motor is also smaller, compared to competitor motors with similar size. Newton's second law (F = ma) tells us that for higher acceleration, either the force has to be larger or the mass has to be smaller.

The trend for the automotive industry is to make cars with lower body mass. Instead of using only steel, aluminum and carbon fiber are used to reinforce the car structure, to reduce mass. This results in better performance and higher fuel efficiency.



Torque motor on a linear motor stage

Similarly, for motors used in motion control, lower motor mass is an advantage, especially when you need to mount the torque motor on a XY table. The dynamics of the XY table is affected by how much load it has to carry. Lower applied force and higher accelerations can be achieved with lower moving mass.

High resolution optical encoder

The AXD torque motor uses a high resolution optical encoder for feedback. Optical encoders provide much better accuracy, repeatability and higher resolution, compared to resolvers.

The working principle of resolvers is based on rotating transformers. Other than the signal processing errors by converters, the inconsistencies in the construction of the windings affect the accuracy of the resolver.

For optical encoders, the divisions on the disk are etched with photographic and semiconductor techniques. The gratings can be made with fine pitch, such as 4, 20, 40 or 80 microns. This results in much higher accuracy.

Resolver construction

Encoder grafting

Large center hole

AXD torque motors are designed with a large center hole. The center hole is sometimes needed for optics design, wiring or pneumatic/vacuum tubing.

Higher speed

AXD torque motors are designed for higher speeds. This means that even for indexing motions, the AXD can perform a motion in a shorter time, compared to a motor with limited maximum speed.

Stages & Systems

The Akribis precision linear motor driven stage features the patented AUM series ironless linear motor in a neat, ready to use package. Being directly driven, the linear motor stage eliminates intermediate transmission mechanism which translates directly into many benefits, including

Fast response in the form of faster accelerations (up to 25G) and settling times, which increase throughput.
High speed up to 5m/s yield lower cycle time.
High stiffness as no mechanical transmission such as gears, belt, ball-screw, etc., are required. The driving force is simply directly coupled to the load.
High Precision by using direct measurement systems. No unnecessary conversion is necessary.
Zero Backlash as a result of direct coupling of the driving force to the load.

The structural frame of the linear motor stage is extruded aluminum, offering good structural strength and cost benefits. These stages can be constructed in single piece up to 3 metres without the need for joining.

The geometrical accuracy of the stage is achieved with the use of a preloaded dual-rails-quad-runner blocks or single-rail-dual-runner blocks re-circulating linear motion ball bearing system. The runner blocks are preloaded for stiffness, and only the ball cage types are selected to deliver a smooth and low noise motion.

The displacement accuracy is achieved with the use of a direct measurement system, consisting of a linear scale (with scale linearity to +/- 3 micron/metre) and a linear encoder. The electrical resolution can be down the sub-micron region.

The wide variety of sizes, force range and travel stroke available, the linear motor modules series finds many application in,

Pick and place
Laser marking; machining; spot welding
Dispensing
Inspection
Printing

Sizing Guide

Linear Motor Sizing Guide

1. Sizing of a linear motor includes calculating the peak force and Root-Mean-Square (RMS) force requirement.

2. Peak force is determined by the moving mass and maximum acceleration required.

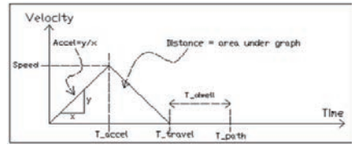
Force = mass*Acceleration+ Friction Force + External Opposing Force

For example, if moving mass is 2.5 kg (including coil assembly), and required acceleration is 30m/s^2, the motor will have to exert a force of 75N. This is assuming Friction and Opposing Forces are negligible.

3. Very often, we do not know the actual required acceleration, but we have the motion time requirement. We can calculate the required acceleration if we know the travel distance and the travel time. Usually for short travel distances, a Triangle-Shape Velocity Profile is used whereas for long travel distances, it is more efficient to use Trapezoidal-Shape Velocity Profile. In a Triangle profile, the motor does not cruise at any velocity.

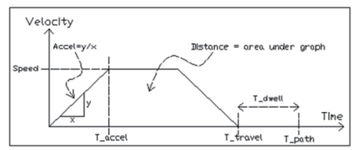
4.For Triangle Profile：

Acceleration = 4 * Distance / Travel_Time^2



5. For Trapezoidal Profile, a desired cruising speed will help to determine the required acceleration.

Acceleration = Cruise Speed / (Travel Time – Distance / Cruise Speed)



6. Similarly, compute the deceleration force required. Most likely, this is the same as acceleration force unless there is an unbalanced force (e.g. gravitational force) acting on the motor.

7. Force required by the motor during cruising (against friction and opposing forces) and dwelling (against opposing force) may also be calculated.

8 . Compute the RMS force using the formula below.

$$RMSForce=\sqrt{\frac{Fa^2*Ta+Fc^2*Tc+Fd^2*Td+Fw^2*Tw}{Ta+Tc+Td+Tw}}$$

where,

Fa = Acceleration Force Ta = Acceleration Time
Fc = Cruise Force Tc = Cruise Time
Fd = Deceleration Force Td = Deceleration Time
Fw = Dwell Force Tw = Dwell Time

9 . Select a motor according to the computed peak force and RMS force requirement. User should factor in a safety factor of at least 20-30% especially if friction and external opposing forces are assumed to be zero.

10. For example, an application requires the motor to move a 4kg load for 0.3m in 0.2s using Triangle Profile. The motor will dwell 0.15s before moving the same cycle again. Assume friction is negligible and no presence of any unbalanced force.

Acceleration = Deceleration = $4 * 0.3 / (0.2)^2 = 30 m/s^2$

Peak Force = Fa = Fd = mass * acceleration = 4 * 30 = 120N

$$RMSForce=\sqrt{\frac{(120)^2*(0.1)+(120)^2*(0.1)}{0.1+0.1+0.15}}=90.7N$$

Giving an additional 30% safety factor, a suitable motor will be AUM3-S4.

11 . Motor selection software is available to automate the calculation process. Please contact cust-service@akribis-sys.com for a copy of the software.

Voice Coil Motors

1. Peak force

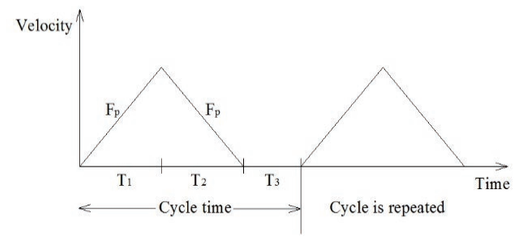
In an application, it is important to determine the peak force and RMS force required, in order to select the right voice coil motor. The peak force is calculated by Newton's second law, F = ma. With a known moving mass, and the acceleration required for the motion profile, we can calculate the peak force required.

For example, with a moving mass of 100g, and an acceleration of 40 m/s^2, the peak force required during acceleration will be 4 N.

2. RMS force

The RMS force is calculated with the equation:

$FRMS = \sqrt{\ (Fp^2 \times T1 + Fp^2 \times T2\ ) / (\ T1+T2+T3\ )}$



where

F_{RMS} is the root mean square force

F_P is the peak force

T_1 is the acceleration time

T_2 is the deceleration time

T_3 is the dwell time

Using the example described above, if the stroke is 4 mm, and if the time to complete motion is 0.02 s, then the velocity will be 400 mm/s, with an acceleration of 40 m/s^2. The peak force will be 4 N. If the dwell time is 0.05 s, then

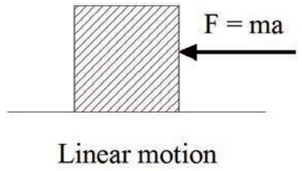
$FRMS = \sqrt{\ (Fp^2 \times T1 + Fp^2 \times T2\ ) / (\ T1+T2+T3\ )}$
$= \sqrt{\ (4^2 \times 0.01 + 4^2 \times 0.01\ ) / (\ 0.01+0.01+0.05\ )}$
$= 2.14\ N$

Hence, we can select a voice coil with a peak force that exceeds 4N, and with a continuous force that exceeds 2.14 N.

Direct Drive Rotary Motors

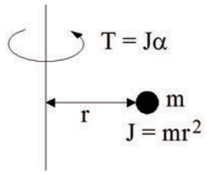
1. Peak torque and continuous torque

The torque ratings of a DDR motor must meet the torque requirements of the application. In other words, the peak torque and continuous torque of the motor must be higher than the peak torque and RMS (root mean square) torque of the application. Otherwise, the motor will not be able to accelerate as fast as needed, or the motor will over heat after some time.



Linear motion

For linear motion, by Newton's second law, F = ma, where F is the force needed to move an object in N, m is the moving mass in Kg, a is the acceleration in m/s,



Rotary motion

Similarly, for rotary motion, T = Jα, where T is the torque needed to rotate an object in Nm, J is the moment of inertia in Kgm^2, and α is the angular acceleration, in radians/ s .

For an application, we can compute the peak torque and RMS torque required:

Peak torque during acceleration/deceleration, T = Jα

$$\text{RMS Torque} = \sqrt{\frac{Ta^2 * ta + Tc^2 * tc + Td^2 * td + Tw^2 * tw}{ta + tc + td + tw}}$$

Ta = Acceleration torque ta = Acceleration Time
Tc = Cruise torque tc = Cruise Time
Td = Deceleration torque td = Deceleration Time
Tw = Dwell torque tw = Dwell Time

A motor should be selected based on the computed peak torque and RMS torque required. A safety factor of 20-30% may be used, especially if friction and external opposing torque are assumed to be zero in the calculation.

Akribis provides motor selection software, where the peak torque and RMS torque are computed automatically, and a motor is recommended, after you key in the application parameters.

Akribis DDR motors are designed with very high torque density, providing higher peak torque and continuous torque compared to conventional designs.

2. Motor inertia - the smaller the better

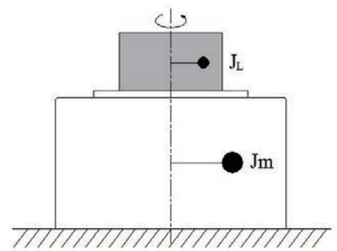


Illustration of motor inertia and load inertia

In the torque equation, , T = Jα, much higher acceleration can be achieved if the moment of inertia is smaller. The moment of inertia used in the computation actually comprises 2 parts: the moment of inertia of the motor, and the moment of inertia of the load.

In many cases, the moment of inertia of the motor actually contributes a large percentage of the total moment of inertia. This means that the motor torque is used mainly to rotate itself. Little torque is left for the load moment of inertia.

This often creates a dilemma for design engineers. The objective is to achieve a higher target performance, with higher acceleration, to reduce cycle time. Hence, higher torque is needed. In order to get higher torque, the engineer selects a bigger motor with larger torque ratings. However, the bigger motor also comes with a larger motor inertia, and this result in having higher torque requirements. The bigger motor may not meet the objective of achieving higher target performance after all.

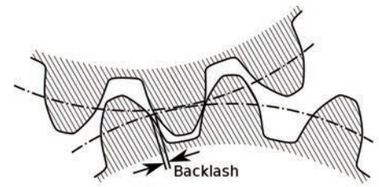
Therefore, a DDR motor with a smaller moment of inertia is an advantage. It should be noted that DDR motors using an outer rotor design will naturally have much higher motor inertia.

Akribis ADR-A series motors are designed with optimal moment of inertia. The torque density to motor inertia ratio is excellent.

3. Must the motor moment of inertia be matched to the load inertia?

When using conventional servo motors with mechanical transmission systems, it is a common practice to match the motor inertia to the load inertia. Ratios of 1:5, or up to 1:10 are used. For DDR motors, it is not necessary to match the motor inertia to the load inertia.

In conventional servo motor applications, mechanical transmissions such as belts, pulleys, rack and pinion etc introduce backlash. Hence, during very small rapid motions when reversing direction of motion, the load may be decoupled from the motor for a short period of time. This creates instability in the control system. Inertia matching is used to solve this problem, so that the controller can operate in a stable manner.

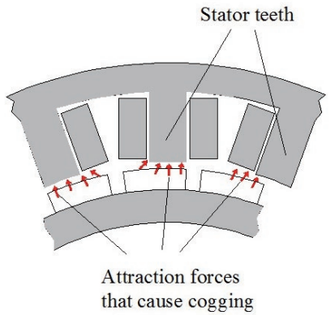


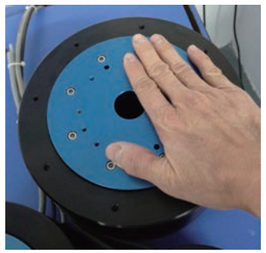
In a DDR application, the load is directly coupled to the motor without any transmission device, so there is no backlash. Consequently, there is no need for inertia matching.

4. Cogging or detent torque

DDR motors with teeth on the iron core laminations will have a cogging effect. The figure below illustrates cogging torque caused by the attraction force between the stator teeth and the magnets.

Cogging torque can be felt when you try to rotate a motor with your hand. You will feel some opposing force at certain positions.





Rotate motor by hand to feel cogging effect

The disadvantage of cogging torque is that it causes torque ripple during motion, which causes velocity ripple as well. Motion controllers can compensate the effect to a certain extent, but for slow speed applications where constant velocity is required, the effect of cogging will be detrimental.

Another disadvantage of cogging is that it affects motion settling performance, and jittering at target position.

Akribis ADR motor is designed with minimal cogging torque, due to the optimized slot/pole configuration, and the introduction of tooth tips in the stator laminations. The maximum cogging torque, peak to peak is published in our data specifications.

The ACD and ACW series motors are using coreless design, which means that they do not have any cogging torque.

5. Maximum speed

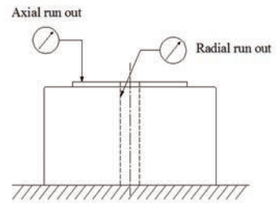
In fast indexing applications, very high peak speeds may be reached during motion. It is therefore important to consider the type of windings required for the application, and ensure that the bus voltage from the amplifier is sufficient to overcome the back EMF voltage.

To put it simply, the bus voltage should be greater than the sum of the voltage generated by the back EMF, and the peak current multiplied by the terminal resistance of the motor:
$V > (Kv * Speed + Ip * R)$
where
V is the bus voltage, the unit is VDc
Kv is the back EMF constant of the motor
Ip is the peak current, the unit is Apk
R is the terminal resistance of the motor
Akribis DDR motors typically provide 2 types of windings to cater for different speed and voltage requirements. Series winding is suitable for lower current, higher voltage type of drive electronics, while parallel winding is suitable for higher current, lower voltage type of drive electronics. Users should select the type of winding that allows the maximum speed of the application to be achieved, with matching drive electronics based on the current and voltage supply.

6. Axial and radial run out

The axial and radial run out of a DDR motor is determined by the precision of the bearing used, precision of the machined components and the assembly of the components. The axial and radial run out need to be considered for applications that require higher accuracy.

The method of measuring run out is illustrated in the diagram above.



The axial and radial run out of Akribis DDR motors are shown in the specifications sheet. For standard motors, the normal axial and radial run out is shown, with higher grade options available for selection.

7. Feedback

Akribis DDR motors typically use optical incremental encoders for feedback. However, other options are available, such as resolvers, absolute encoders and inductive encoders.

All Akribis direct drive rotary motors are equipped with optical encoders. With higher encoder resolution after interpolation, Akribis rotary motors can satisfy your need of precision in any type of demanding applications.

For example, Akribis ADR135 motors are equipped with circular optical encoder scale. With 400X interpolation digital output, the motor can achieve 1202000 counts per revolution. With SINCOS (analog) output and 4096X interpolation rate from servo drive, the motor can achieve 12308480 counts per revolution.

Stages & Systems

1. Accuracy, Repeatability and Resolution

There are many ways to define the three confusing terms for accuracy, repeatability and resolution. Professor Slocum of Massachusetts Institute of Technology in his book “Precision Machine Design” [1], defines them in a very interesting manner namely,
“Accuracy is the ability to tell the truth”
“Repeatability is the ability to tell the same story over and over again”
“Resolution is how detailed your story is”
[1] A.H. Slocum. Precision Machine Design. Prentice Hall, Englewood Cliffs, New Jersey, 1992.

Typically, a servo positioning system usually consists of the mechanics which includes the structural elements and the bearing guidance; the prime mover such as the motor and its electronics; a feedback device and the controller.
In a nut-shell
Accuracy has a dual meaning for a positioning system, namely

accuracy of the motion is contributed mainly by the bearings and it is the lateral deviation from the ideal motion path or the straight-line accuracy or running parallelism.

ability to be served to a desired position, which is the largest error between any two points in a positioning system's coverage.

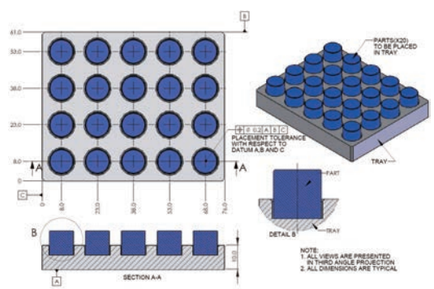
Like accuracy, repeatability has a dual meaning for a positioning system, namely

repeatability of the motion is the ability of the bearing to repeat its motion. For linear motion bearings, this is often referred to as the straight-line repeatability or running
parallelism repeatability.

ability to be servoed to the same position, which is the error between a number of successive attempts to move a workpiece or tool to the same position within the positioning system's coverage.

Resolution in a position system currently is determined by the ability of the bearing to allow for a small increment of motion. It is the smallest mechanical step that the positioning system is capable of making during point to point motion. In other words, it will be meaningless to put an encoder with nanometer encoder resolution on a positioning system with contact type bearing and hoping to achieve nanometer level mechanical resolution. For contact type of bearings, 0.1 micron is by far the best achievable results.

The three terms are best illustrated with a pick and place example below. The objective is to place the cylinder into a tray as shown in figure 1 below.
The specifications indicate that we have to place the cylinder such that the centre of the cylinder is accurate to within a diameter of 0.2 millimetre, with respect to the three datums marked A, B and C.



In order to satisfy the specification, it is important that we select a position system with adequate resolution to achieve the require repeatability. The Table below shows a typical example on deciding the positioning resolution.

Description	Value
Tolerance (+/- 3 sigma)	= 0.2 mm
Required repeatability	= 0.2 mm/6 = 0.033 mm
Required resolution	= 0.033 mm/10 = 0.003 mm

Therefore, we should use an encoder with at least 3 microns resolution.

Now, if we successive move the cylinder to the same position, we can note down the actual position of the cylinder's centre via an independent measurement system. The centre of the cylinder can be plotted as in figure 2 below.

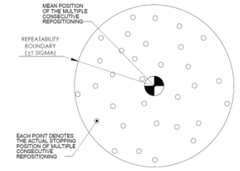


Figure 2: Actual stopping position of cylinder centre

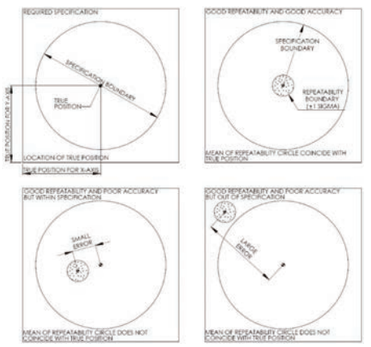


Figure 3: Specifications, Accuracy and Repeatability

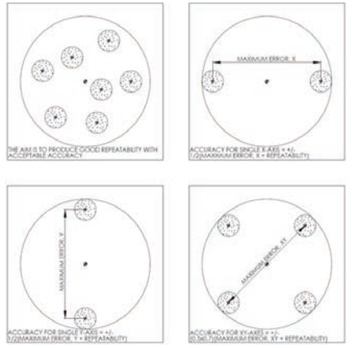


Figure 4: The aim is to produce good repeatability with acceptable accuracy

The mean position of the consecutive repositioning is marked by the centre of a circle which enclose all the points. The boundary of the big circle is the repeatability of the positioning system. Now if we superimpose the repeatability circle onto the given specifications as shown in figure 3.0, in positioning system, it is much easier to achieve good repeatability than good accuracy. In many cases, the positioning need not have to be very accurate, but only reasonably accurate, as reasonably accurate but repeatable positioning systems are capable to positioning within the required specifications given the proper positioning resolution as shown in Figure 4. It is economical to build a system which is repeatable and correct the accuracy using calibration and error compensation in the controller.

2. The relationship between force and speed.

To relate the terms force and speed, let's take a look at the 7 common terms in physics when dealing with position systems, namely

Description	Units	Symbol
Force	N	F
Load or mass	kg	m
Time	s	t
Acceleration	m/s^2	a
Velocity	m/s	v
Displacement	m	s
work	Nm	W
Power	Nm/s, Watt	P

This equation is known as the equation of motion and it gives the instantaneous value of the acceleration corresponding to the instantaneous values of the forces that are acting.

If an object starts moving from rest, that is, its initial velocity is zero, then, the relationship between velocity and acceleration is given by the equation,v = at

Likewise, the relationship between displacement, velocity and acceleration is given by equation, ∴ $s = ½at^2$

When a force is applied to an object or load and displaced (moved) it over a distance, the work done by the force during the displacement is related by the equation,W = Fs

When time comes into the equation, we have power which is the rate of doing work and it is related to velocity by the equation, ∴ P = Fv

Now, let's relate all these terms back to positioning systems. The objective of a positioning system is to position a tool (which is the load) with respect to a workpiece. We are always concerned over how fast (which is related to time) we can perform this task of moving (which is displacement) the tool to the workpiece (which is the work to be done). To do this work, we may use a motor which is available in many sizes.

The capacity of a motor is measured by the rate in which it can do work or deliver energy. The total work done or energy output is not a measure of this capacity. A motor no matter how big or small can deliver a large amount of energy if given sufficient time. On the other hand, a large and powerful motor can deliver a large amount of energy in a short period of time. In other words, if we want to travel from one point to another, we can reach that place travelling either in a small car or a big car. The only different is how long to reach the place when the same route is used. In the same light, a sport car can reach a speed of 100km/h in 5 seconds and within a very short distance. A family car can also reach 100km/h, but maybe in 12 seconds and need a longer distance. The different is in the capacity of the engine which can produce more power to accelerate the mass of the car in a very short time, thus over a very short distance.

Given the same load and travel distance, a bigger motor will be able to accelerate its load in a shorter time and at a higher velocity when compared to a smaller motor.

Motor Driver and Controller Product Recommendation

Akribis ASD100/240		AC/DC power supply Pulse, analog velocity and analog current mode
Mitsubishi MR-J4		AC power supply Pulse or SSCNET III /H network mode Power rating up to 22 KW
Panasonic A5L / A6L		AC/DC power supply pulse&direction, analog velocity/current mode, EtherCAT
Copley Xenus/Plus/Accelnet		AC/DC power supply Pulse, analog velocity and analog current mode
Trust Automation TA115 / TA310 / TA330		Linear amplifier Analog velocity and analog current mode Low current ripple
ACS CMhp/ba		AC power supply Driver and multi-axis controller integrated Abundant configuration options Excellent servo performance
ACS SPiiPlusEC		Programmable motion controller EtherCAT network control Maximum support 64 axes Special motion trajectory planning function
ACS UDMmc		Support 4 axes at most, 20A current PWM output 12V-80VDC input Support voice coil motors, brushless motors, and stepper motors Collaborate with ACS network controller
Akribis Centra-i		Ci servo motion controller, up to 8 axes of remote amplifiers and 4 I/O modules. 16kHz servo sampling rate, less than 8ns synchronization jitter.
Akribis AGD301		High performance 3-axis centralized motion servo drive , up to 90Vdc, 5.6Arms continuous current per axis. 16kHz servo sampling rate, ideal for highly coordinated applications.

Linear Encoder Product Recommendation

Akribis ABI 51 Series		Compact design Resolution from 0.1μm to 0.5μm Increased tolerance for easy installation
Renishaw RGH/ATOM/Quantic Series		Mental / glass / stainless steel encoder scales Resolution from 10μm to 1nm
SIKO LEC/MSK Series		Magnetic scale Resolution up to 0.2 μm Optional digital or analog

Please contact Akribis Sales engineers for more details （cust-service@akribis-sys.com）.

Frequently Asked Questions

Frequently Asked Questions

1. What is the maximum payload that the motor can drive?

From Newton's law F=ma, the force applied is proportional to mass and acceleration. Hence, as long as the force can overcome friction force, a heavy mass can be moved with relatively small force except that the acceleration of this mass will be small. For example, a AUM2-S2 motor with peak force of 88N can move a 10 Kg load with maximum acceleration of 8.8 m/s2 when moving horizontally.

2. How about the maximum payload in vertical orientation?

In vertical movements, the motor has to overcome gravity in addition to providing force for upward vertical motion (F = mg + ma). In this case, the maximum load is determined by the maximum force divided by 9.81 m/s2. If the vertical force has to be sustained continuously, the maximum load will be the continuous force of the motor. For example, the maximum vertical load for AUM2-S2 motor will be 2.2 Kg, since the continuous force for this motor is 22N. If the load is supported by a counterbalance (such as a spring), then the AUM2-S2 motor can move a heavier load in a vertical position.

3. What is the maximum speed of a motor or module?

There is no theoretical limit for the speed of a linear motor because there is no contact. However, the speed is typically limited by the mechanical bearings. For example, for linear guidance system using rails and runner blocks, the maximum speed is typically limited to 5 m/s. This is why in most applications, the speed for linear motors is limited to 5 m/s. An option of using ceramic ball bearings allow speeds of up to 10 m/s. Using air bearings also enable higher speeds to be possible.

4. How about the maximum acceleration?

For acceleration, as explained by Newton's law (F=ma), it is dependent on the maximum force (peak force) of the motor as well as the mass to be moved.

5. What is the maximum length of a linear motor?

There is no limit on the length for linear motors AUM and ACM. This is because the motor tracks can be joined together in sections. The linear rails can also be joined together as well. The linear scale used for encoder feedback can also come in long lengths. Hence linear motor applications can be more than 20 meters or more.

6. What happens to a linear motor when power is cut off suddenly?

When power is suddenly cut off, a linear motor may continue to move under its own inertia until it hits the end stopper or comes to a stop by friction force. This is usually not an issue but it may present a problem in some applications.

It is possible to install a brake with the linear motor which can be activated when power is cut off. In this way, the motor can stop immediately. Such a brake is typically installed on the rails of the linear bearing system.

7. Is linear motor suitable for clean room applications?

Yes, linear motors can be used in clean room environments. In fact, many front-end semiconductor applications have been using linear motors. For example, in wafer fabrication plants, high precision lithography machines use linear motors for very high precision XY position stage, with nanometer resolutions and sub-micron accuracy, in clean room class 10 facilities.

With linear motor gaining popularity in more applications, linear motors are now also used in other applications, such as semiconductor back end packaging, testing, pick and place, hard disk assembly and testing etc. Many such applications are also being applied in a clean room environment.

The advantages of linear motor over traditional ball screw drives in clean room environment are:

- No contact in the drive actuator. Hence there is no wear and tear which causes particle generation
- No lubricant needed on the linear motor. Lubricants are a source of contamination

8. What is the effect of magnetic field from linear motors?

In some applications, there is a concern of damaging sensitive components by the magnetic field from linear motors. Generally, in such applications, it is recommended to use ironless linear motors (AUM) as the magnet flux circuit is closed and there is negligible magnetic field outside the magnet track. For iron core type of linear motor (like ACM), there is some magnetic field within 50-60 mm from the magnet track. The field decays as this distance increases. This field is constant and does not generate any RFI.

9.Ferrite bead

Ferrite beads (FB) are connected to the terminals of electric motors to filter the voltage spikes from the motor driver. Voltage spikes will cause insulation failure of electric motors. When the output voltage of the driver is not stable, the ferrite bead can protect the motor from being damaged by the voltage spikes.
In addition to ferrite beads, Akribis provides high quality cables with shielding layer and motor driver with high SNR (signal-noise ratio) to guarantee the high-performance functioning of the motors.

10.Hall sensor

Hall sensors use the Hall Effect to output voltage signal indicating the position information of the motor mover. The motor driver can implement commutation of the motor based on this information. The combination of Hall sensor and high-resolution encoder can improve the accuracy of commutation. Akribis provides professional solutions of encoder commutation.

LINEAR MOTORS

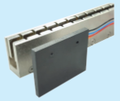
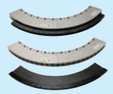
LINEAR MOTORS

Akribis systems

Overview

Akribis linear motors can be categorized into iron core and ironless series. Consisting of motor coils and magnet tracks, Akribis linear motors provide unparalleled advantages and features to improve system performance and efficiency: high speed, high acceleration, low velocity ripple, low operation noise, superior stability, wear & tear free, maintenance free, and long travel stroke.
Akribis offers various sizes and types of linear motors with force range from 3N to 16000N, as well as different cooling options like natural convection, air cooling, and water cooling.

Ironless Technology

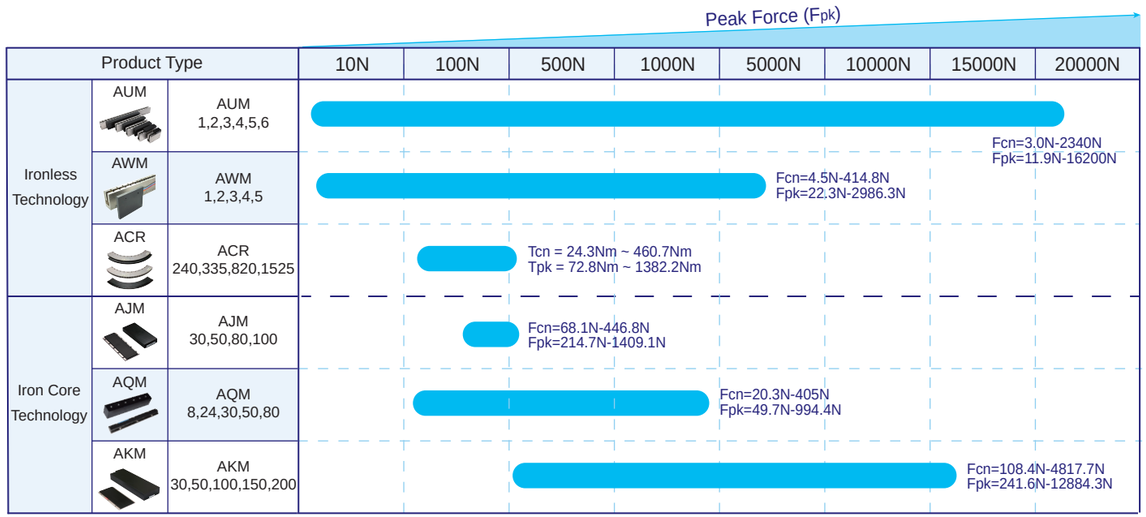
AUM Series	● High thrust force ● High motor constant ● Efficiency ● Low energy consumption	▶ Applicable to: • Point-to-point micron/ nanometer level positioning • High/low speed applications with demanding velocity ripple or motion profile requirements • Precise force control	★ Applications: Wafer/LCD/PV/battery handling,-testing, inspection and assembly Laser processing machines, metrology equipment and gene sequencing machines and other medical equipment
 AWM Series	● High thrust force ● High motor constant ● Efficiency ● Low energy consumption ● Shorter coil	▶ Applicable to: • Submicron/nanometer level positioning in vacuum environment	★ Applications: Vacuum inspection equipment in both front-end and back-end semiconductor industries
ALM Series[1]	● High thrust force ● High motor constant ● Efficiency ● Low energy consumption ● Thin T-shape motor coil	▶ Applicable to: • Point-to-point micron/ nanometer level positioning • High/low speed applications with demanding velocity ripple or motion profile requirements • Precise force control	★ Applications: Wafer inspection equipment, precision assembly & testing equipment in front-end and back-end processes
 ACR Series	● Zero cogging force ● Large center hole ● Thin and compact coil with low motor mass ● Configurable angle of rotation by attaching multiple magnet tracks	▶ Applicable to: • Point-to-point micron/ nanometer level positioning • High/low speed applications with demanding velocity ripple or motion profile requirements	★ Applications: Wafer/LCD inspection equipment, laser processing machines, and metrology equipment

[1] Please contact us for ALM series（cust-service@akribis-sys.com）.

Iron Core Technology

AJM Series	● High thrust force ● High temperature tolerance ● Low cogging force ● Max bus voltage of 600Vdc	▶ Applicable to: • Point to point micron meter level positioning • Applications with high force, speed and acceleration requirements • Higher cost-effectiveness in long stroke applications	★ Applications: Wafer/LCD/PV/battery handling, testing, dispensing and assembly Laser processing machines, packaging machines and printing equipment
AQM Series	● High thrust force ● High temperature tolerance ● Low cogging force ● Max bus voltage of 600Vdc ● Narrow width ● Cost-effective	▶ Applicable to: • Point to point micron meter level positioning • Applications with high force, speed and acceleration requirements • Higher cost-effectiveness in long stroke applications	★ Applications: Wafer/LCD/PV/battery handling, testing, dispensing and assembly Laser processing machines, packaging machines and printing equipment
AKM Series	● High thrust force ● High temperature tolerance ● Low cogging force ● Max bus voltage of 600Vdc ● Patented water-cooling design	▶ Applicable to: • Point to point micron meter level positioning • Applications with high force, speed and acceleration requirements • Higher cost-effectiveness in long stroke applications	★ Applications: Wafer/LCD/PV/battery handling, testing, dispensing and assembly Laser processing machines, packaging machines, printing equipment, and machining centers

Overview

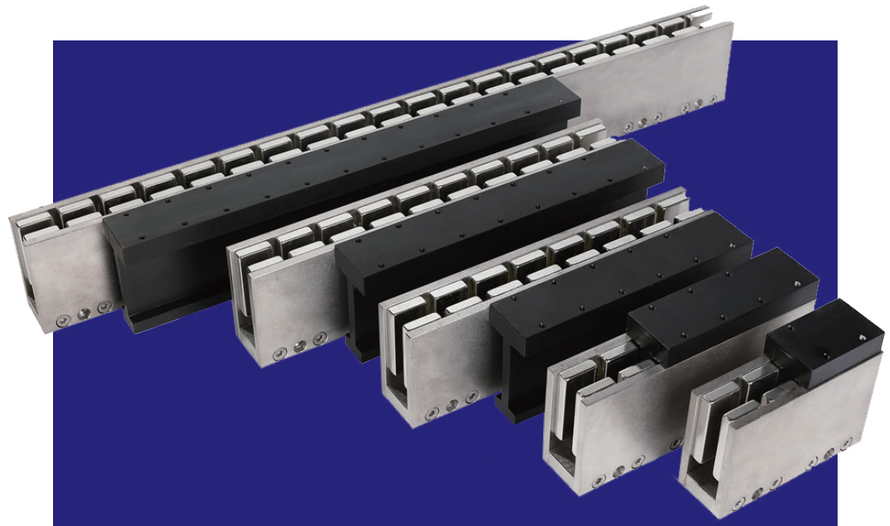


Flexible structure design contributes to excellent and simple high-precision control system:

- Multi-carriage structure
- Optional moving track design instead of moving coil, eliminating cable management and potential cable damage
- Multiple coils can be connected in series or parallel to generate higher force and faster speed while maintaining compact size

Please contact Akribis Sales engineers for more details（cust-service@akribis-sys.com）.

Applications & Industries: electronics, semiconductor, solar energy, lithium battery, PCB, FPD, HDD, LED, lathe, vehicle electronics, packaging, printing, optics, biomedical and many more.



AUM SERIES

- Ironless technology
- Zero cogging force
- Patented technology
- Small electrical and mechanical constant
- High continuous force and peak force

Introduction

AUM series Ironless DC brushless linear motors are compact in size but high in force density, achieving larger thrust force.

Fcn (Continuous force) = 3N ~ 2340N
Fpk (Peak force) = 11.9N ~ 16200N

Features

- Ironless technology and no cogging force
- High continuous and peak force
- Optional hall sensors
- High motor constant
- Wide range of forces and sizes to choose from
- Optional air cooling and water cooling configurations

Applications

Applicable to point-to-point micron/nanometer level positioning; unlimited travel stroke with top speed of 5m/s or faster; low velocity ripple during both fast and low speed scanning; precise force control with fine resolution.
Applications & Industries: high speed and precision machines for positioning, motion profile tracking, velocity controlling used in front-end & back-end wafer handling and inspection, photovoltaic and lithium battery systems, glass and LCD applications, biomedical equipment, printing machines, and laser processing machines.

	Model	Coil Length[1] (mm)	● Continuous Force (F_{cn}) / ■ PeakForce (F_{pk})[2] Unit: N 10 50 100 500 1000 1500 2000 ....
36.0 / 19.0	AUM1-S1	22	●3.0 / ■11.9
	AUM1-S2	43	●6.0 / ■23.8
	AUM1-S3	64	●8.9 / ■35.7
	AUM1-S4	85	●11.9 / ■47.6
	AUM1-S5	106	●14.9 / ■59.5
55.6 / 22.0	AUM2-S1	31	●8.8 / ■44
	AUM2-S2	61	●17.6 / ■88
	AUM2-S3	91	●26.4 / ■132
	AUM2-S4	121	●35.2 / ■176
	AUM2-S8	241	●26.4 / ■352
72.6 / 35.5	AUM3-S1	61	●28 / ■144
	AUM3-S2	121	●57 / ■289
	AUM3-S3	181	●85 / ■433
	AUM3-S4	241	●113 / ■578
	AUM3-S6	361	●170 / ■867
97.5 / 39.0	AUM4-S1	61	●55 / ■312
	AUM4-S2	121	●110 / ■624
	AUM4-S3	181	●166 / ■936
	AUM4-S4	241	●221 / ■1248
	AUM4-S5	301	●276 / ■1560
	AUM4-S6	361	●331 / ■1872
	AUM4-S8	481	●442 / ■2496
127.0 / 50.0	AUM5-S1	61	●98 / ■707
	AUM5-S2	121	●197 / ■1415
	AUM5-S3	181	●297 / ■2112
	AUM5-S4	241	●393 / ■2830
	AUM5-S5	301	●491 / ■3537
	AUM5-S6	361	●590 / ■4244
	AUM5-S8-V107	481	●786 / ■5659
	AUM5-S9-V80	757	●884 / ■6367
	AUM5-S10-V107	841	●983 / ■7078
	AUM5-S12-V107	1009	●1179 / ■8089
212.0 / 64.5	AUM6-P5-S4	337	●780 / ■5400
	AUM6-P8-S6	505	●1170 / ■8100
	AUM6-P5-S8	673	●1560 / ■10800
	AUM6-P8-S9	757	●1755 / ■12150
	AUM6-P7-S10	841	●1950 / ■13500
	AUM6-P8-S12	1009	●2340 / ■16200

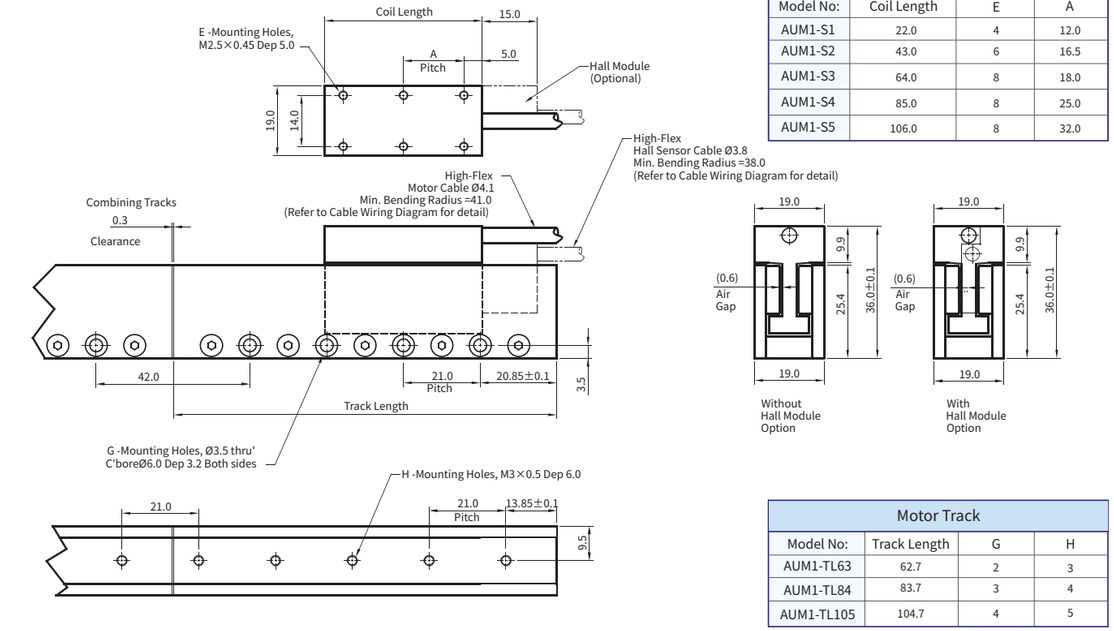
[1] No hall sensor.
[2] Continuous force is measured under the condition of self-cooling. Please refer to the detail parameters table for the continuous force under the condition of air cooling or water cooling.

AUM1

Performance Parameters	Symbol	Unit	AUM1-S1 Series	AUM1-S2 Series	AUM1-S3 Series	AUM1-S4 Series	AUM1-S5 Series
Continuous Force (NC) @100°C[1]	F_{cn}	N	3.0	6.0	8.9	11.9	14.9
Peak Force	F_{pk}	N	11.9	23.8	35.7	47.6	59.5
Force Constant ±10%	K_f	N/Arms	1.75	3.50	5.25	7.00	8.75
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	1.4	2.9	4.3	5.7	7.1
Motor Constant @25°C	K_m	N/Sqrt(W)	1.5	2.1	2.5	2.9	3.1
Resistance (L-L) 25°C ±10% [2]	R_{25}	Ω	0.92	1.92	2.92	3.92	5.32
Inductance (L-L) ±40% [3]	L	mH	0.11	0.22	0.31	0.41	0.55
Electrical Time Constant	τ_e	ms	0.12	0.11	0.11	0.10	0.10
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	1.70	1.70	1.70	1.70	1.70
Peak Current	I_{pk}	Arms	6.80	6.80	6.80	6.80	6.80
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	5.15	10.74	16.32	21.91	29.73
Max. Coil Temperature	t_{max}	°C	100	100	100	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.1	0.1	0.2	0.3	0.4
Max. Bus Voltage	U_{bus}	Vdc	330	330	330	330	330
Magnetic Period	τ_{NN}	mm	21.0	21.0	21.0	21.0	21.0
Attraction Force	F_a	kN	0	0	0	0	0
Mechanical Parameters							
Coil Mass (NC)	m_{cn}	kg	0.025	0.050	0.075	0.100	0.113
Coil Length (NC)	L_{cn}	mm	22.0	43.0	64.0	85.0	106.0
Track Mass Per Meter	m_{track}	kg/m	2.37	2.37	2.37	2.37	2.37
Other Information							
Insulation Class			Class B (130°C)				
Protection Grade			IP00				
Compliance with Global Standards			RoHS, CE				
Ambient Temperature		Operation	0°C to 40°C (non-freezing)				
		Storage	-15°C to 70°C (non-freezing)				
Ambient Humidity		Operation	10%RH to 80%RH (non-condensing)				
		Storage	10%RH to 90%RH (non-condensing)				
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.				

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling, AC-Air Cooling, WC-Water Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different. The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.
The contents of datasheet are subject to change without prior notice.

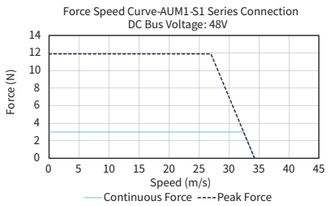
■ Dimension

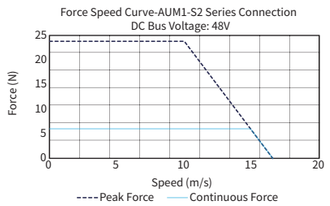


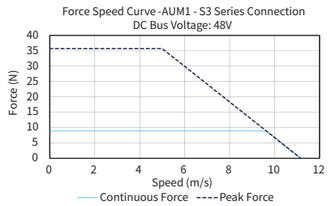
Motor Coil			
Model No:	Coil Length	E	A
AUM1-S1	22.0	4	12.0
AUM1-S2	43.0	6	16.5
AUM1-S3	64.0	8	18.0
AUM1-S4	85.0	8	25.0
AUM1-S5	106.0	8	32.0

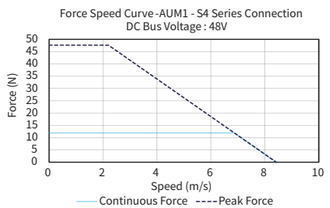
Motor Track			
Model No:	Track Length	G	H
AUM1-TL63	62.7	2	3
AUM1-TL84	83.7	3	4
AUM1-TL105	104.7	4	5

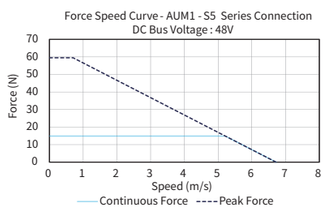
Force-Speed Curve











Part Numbering

Motor Coil

AUM1-S-S3-HF-0.5-FB

- Motor: AUM1
- Connection: S=Series
- Size: S1 / S2 / S3 / S4 / S5
- Motor Cable Options: FB[3] / NFB[4]
- Cable Length (m): 0.5 / 3.0
- Hall Cable Option: NH[1] / HF[2]

[1] NH = Without Hall Sensor cable (Standard)
[2] HF = With Built-in hall sensor & hall cable comes with flying leads
[3] FB = With ferrite bead
[4] NFB = No ferrite bead

Motor Track

AUM1-TL63

- Model: AUM1
- Track Length: TL63 / TL84 / TL105

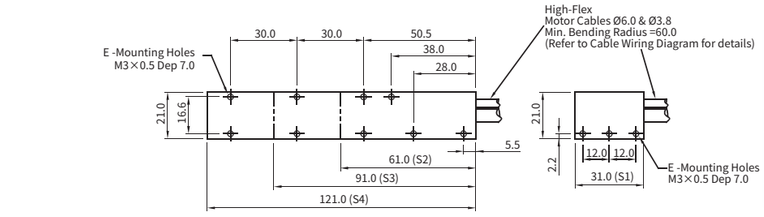
AUM2

			AUM2-S1	AUM2-S2		AUM2-S3		AUM2-S4		AUM2-S8	
Performance Parameters	**Symbol**	**Unit**	**Series**	**Series**	**Parallel**	**Series**	**Parallel**	**Series**	**Parallel**	**Series**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	8.8	17.6	17.6	26.4	26.6	35.2	35.2	70.4	70.4
Peak Force	F_{pk}	N	44.0	88.0	88.0	132.0	132.8	176.0	176.0	352.0	352.0
Force Constant ±10%	K_f	N/Arms	5.5	11.0	5.5	16.5	8.3	22.0	11.0	44.0	22.0
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	4.5	9.0	4.5	13.5	6.8	18.0	9.0	35.9	18.0
Motor Constant @25°C	K_m	N/Sqrt(W)	2.6	3.6	3.4	4.4	4.5	5.0	4.9	7.1	7.1
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	3.07	6.32	1.78	9.57	2.26	12.82	3.32	25.82	6.32
Inductance (L-L) ±40%[3]	L	mH	0.75	1.50	0.51	2.25	0.56	3.00	0.75	6.00	1.50
Electrical Time Constant	τ_e	ms	0.24	0.24	0.29	0.24	0.25	0.23	0.23	0.23	0.24
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	1.6	1.6	3.2	1.6	3.2	1.6	3.2	1.6	3.2
Peak Current	I_{pk}	Arms	8.0	8.0	16.0	8.0	16.0	8.0	16.0	8.0	16.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	15.2	31.3	35.3	47.4	44.7	63.5	65.8	127.8	125.1
Max. Coil Temperature	t_{max}	°C	100	100	100	100	100	100	100	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.2	0.4	0.5	0.6	0.6	0.8	0.9	1.7	1.7
Max. Bus Voltage	U_{bus}	Vdc	330	330	330	330	330	330	330	330	330
Magnetic Period	τ_{NN}	mm	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Attraction Force	F_a	kN	0	0	0	0	0	0	0	0	0
Mechanical Parameters											
Coil Mass (NC)	m_{cn}	kg	0.06	0.12	0.12	0.18	0.18	0.24	0.24	0.47	0.47
Coil Length (NC)	L_{cn}	mm	31.0	61.0	61.0	91.0	91.0	121	121	241	241
Track Mass Per Meter	m_{track}	kg/m	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90
Other Information											
Insulation Class			Class B (130°C)								
Protection Grade			IP00								
Compliance with Global Standards			RoHS, CE								
Ambient Temperature	Operation		0°C to 40°C (non-freezing)								
	Storage		-15°C to 70°C (non-freezing)								
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)								
	Storage		10%RH to 90%RH (non-condensing)								
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.								

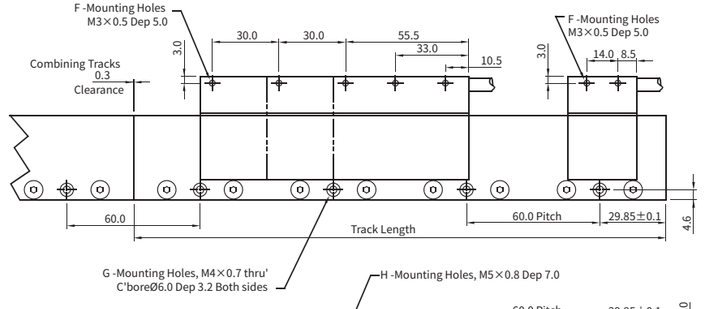
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling, AC-Air Cooling, WC-Water Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different. The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.

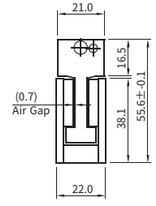
The contents of datasheet are subject to change without prior notice.

Dimension



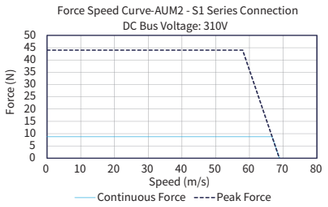
Motor Coil			
Model No:	Coil Length	E	F
AUM2-S1	31.0	3	2
AUM2-S2	61.0	5	5
AUM2-S3	91.0	7	7
AUM2-S4	121.0	9	9
AUM2-S8	241.0	17	17

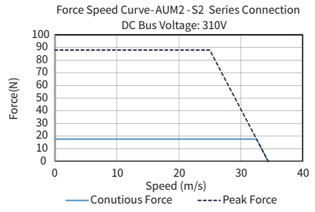


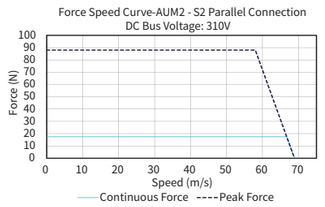


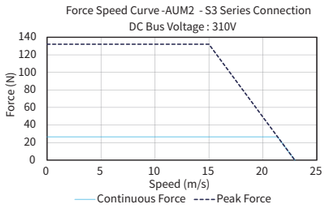
Motor Track			
Model No:	Track Length	G	H
AUM2-TL120	119.7	2	2
AUM2-TL180	179.7	3	3
AUM2-TL240	239.7	4	4
AUM2-TL300	299.7	5	5

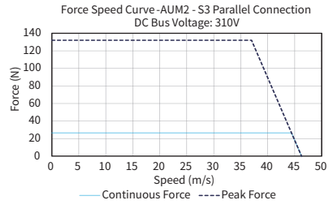
■ Force-Speed Curve

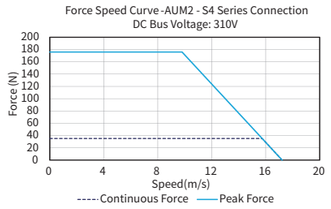


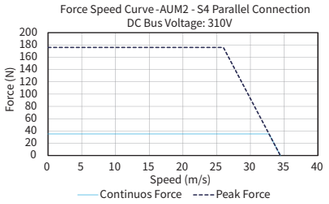


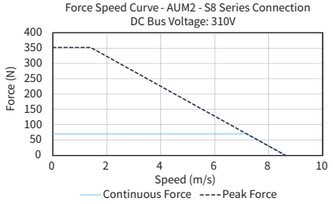


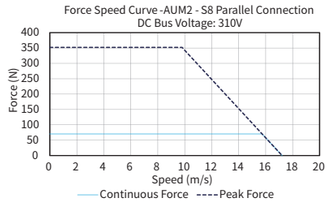












Part Numbering

Motor Coil

AUM2-S-S3-K-HF-0.5-FB

- **Motor:** AUM2
- **Connection:** S=Series / P=Parallel
- **Size:** S1 / S2 / S3 / S4 / S8
- **Motor Cable Options:** FB[3] / NFB[4]
- **Cable Length (m):** 0.5 / 3.0
- **Hall Cable Option:** NH[1] / HF[2]
- **Thermal Sensor:** J=Thermostat(standard) / K=PT100(RTD)

1. NH = Without Built-in Hall Sensor cable
2. HF = With Built-in hall sensor & hall cable comes with flying leads (Standard)
3. FB = With ferrite bead
4. NFB = No ferrite bead

Motor Track

AUM2-TL120

- **Model:** AUM2
- **Track Length:** TL120 / TL180 / TL240 / TL300

AUM3

			AUM3-S1	AUM3-S2		AUM3-S3		AUM3-S4		AUM3-S6
Performance Parameters	**Symbol**	**Unit**	**Series**	**Series**	**Parallel**	**Series**	**Parallel**	**Series**	**Parallel**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	28	57	57	85	85	113	113	170
Continuous Force (AC) @100°C[1]	F_{ca}	N	34	68	68	102	102	136	136	203
Continuous Force (WC) @100°C[1]	F_{cw}	N	37	73	73	110	110	147	147	220
Peak Force	F_{pk}	N	144	289	289	433	433	578	578	867
Force Constant ±10%	K_f	N/Arms	15.7	31.4	15.7	47.1	23.6	62.8	31.4	47.1
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	12.8	25.6	12.8	38.5	19.2	51.3	25.6	38.5
Motor Constant @25°C	K_m	N/Sqrt(W)	5.8	8.4	8.0	10.3	10.0	11.9	12.1	14.7
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	4.95	9.22	2.56	13.92	3.73	18.62	4.52	6.87
Inductance (L-L) ±40%[3]	L	mH	3.13	6.26	1.57	9.39	2.35	12.52	3.13	4.70
Electrical Time Constant	τ_e	ms	0.63	0.68	0.61	0.67	0.63	0.67	0.69	0.68
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	1.8	1.8	3.6	1.8	3.6	1.8	3.6	3.6
Continuous Current (AC) @100°C[1]	I_{ca}	Arms	2.2	2.2	4.3	2.2	4.3	2.2	4.3	4.3
Continuous Current (WC) @100°C[1]	I_{cw}	Arms	2.3	2.3	4.7	2.3	4.7	2.3	4.7	4.7
Peak Current	I_{pk}	Arms	9.2	9.2	18.4	9.2	18.4	9.2	18.4	18.4
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	31.0	57.8	64.2	87.2	93.5	116.6	113.3	172.2
Continuous Power Dissipation (AC) @100°C[1]	P_{ca}	W	44.7	83.2	92.4	125.6	134.6	168.0	163.1	247.9
Continuous Power Dissipation (WC) @100°C[1]	P_{cw}	W	52.4	97.6	108.5	147.4	158.0	197.1	191.5	291.0
Max. Coil Temperature	t_{max}	°C	100	100	100	100	100	100	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.4	0.8	0.9	1.2	1.2	1.6	1.5	2.3
Thermal Dissipation Constant (AC)[1]	K_{tha}	W/°C	0.6	1.1	1.2	1.7	1.8	2.2	2.2	3.3
Thermal Dissipation Constant (WC)[1]	K_{thw}	W/°C	0.7	1.3	1.4	2.0	2.1	2.6	2.6	3.9
Max. Bus Voltage	U_{bus}	Vdc	330	330	330	330	330	330	330	330
Magnetic Period	τ_{MN}	mm	60	60	60	60	60	60	60	60
Attraction Force	F_a	kN	0	0	0	0	0	0	0	0
Mechanical Parameters										
Coil Mass (NC)	m_{cn}	kg	0.22	0.45	0.45	0.68	0.68	0.91	0.91	1.37
Coil Length (NC)	L_{cn}	mm	61.0	121.0	121.0	181.0	181.0	241.0	241.0	361.0
Coil Length (AC)	L_{ca}	mm	61.0	121.0	121.0	181.0	181.0	241.0	241.0	361.0
Coil Length (WC)	L_{cw}	mm	61.0	121.0	121.0	181.0	181.0	241.0	241.0	361.0
Track Mass Per Meter	m_{track}	kg/m	8.33	8.33	8.33	8.33	8.33	8.33	8.33	8.33
Other Information										
Insulation Class			Class B (130°C)							
Protection Grade			IP00							
Compliance with Global Standards			RoHS, CE							
Ambient Temperature	Operation		0°C to 40°C (non-freezing)							
	Storage		-15°C to 70°C (non-freezing)							
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)							
	Storage		10%RH to 90%RH (non-condensing)							
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.							

1. Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling, AC-Air Cooling, WC-Water Cooling.
2. Resistance is measured by DC current with standard 0.5 m cable.
3. Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different. The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.

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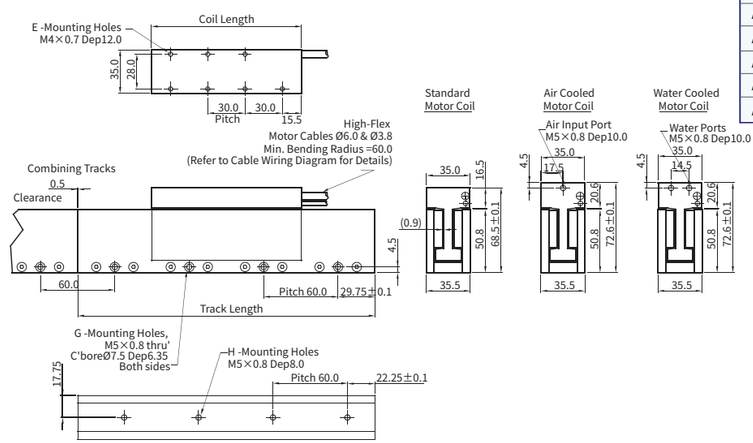
■ Dimension

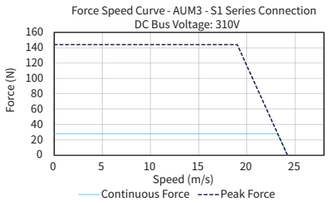


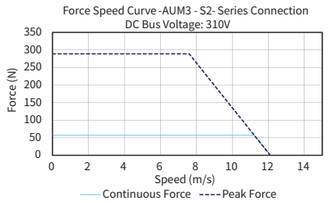
Motor Track			
Model No:	Track Length	G	H
AUM3-TL120	119.5	2	2
AUM3-TL180	179.5	3	3
AUM3-TL240	239.5	4	4
AUM3-TL300	299.5	5	5
AUM3-TL600	599.5	10	10

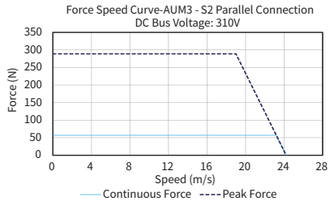
Motor Coil		
Model No:[1]	Coil Length	E
AUM3-S1	61.0	3
AUM3-S2	121.0	7
AUM3-S3	181.0	11
AUM3-S4	241.0	15
AUM3-S6	361.0	23

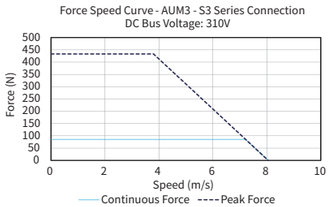
1. For air or water cooled models, Coil Length and E are the same as the standard model.

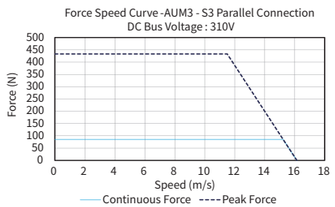
Force-Speed Curve

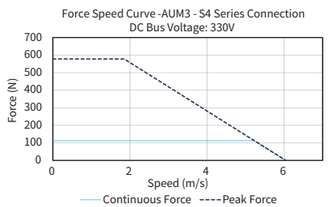


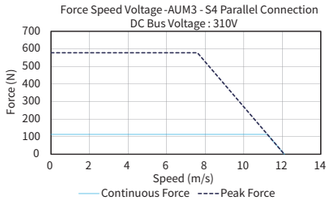


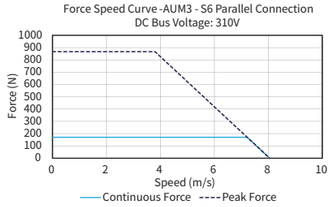












Part Numbering

Motor Coil

AUM3-[ ]-S-S3-K-HF-0.5-FB

- Motor: AUM3
- Cooling Option: (Blank)=Natural Convection; A=Air Cooled / W=Water Cooled
- Connection: S=Series / P=Parallel
- Size: S1 / S2 / S3 / S4 / S6
- Motor Cable Options: FB[2] / NFB[4]
- Cable Length (m): 0.5 / 3.0
- Hall Cable Option: NH[1] / HF[2]
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD)

[1] NH = Without Built-in Hall Sensor cable
[2] HF = With Built-in hall sensor & hall cable comes with flying leads (Standard)
[3] FB = With ferrite bead
[4] NFB = No ferrite bead

Motor Track

AUM3-TL120

- Model: AUM3
- Track Length: TL120 / TL180 / TL240 / TL300 / TL600

AUM4

			AUM4-S1	AUM4-S2		AUM4-S3		AUM4-S4		AUM4-S5	AUM4-S6	AUM4-S8
Performance Parameters	Symbol	Unit	Series	Series	Parallel	Series	Parallel	Series	Parallel	Parallel	Parallel	Parallel
Continuous Force (NC) @100°C[1]	F_{cn}	N	55	110	110	166	166	221	221	276	331	442
Continuous Force (AC) @100°C[1]	F_{ca}	N	66	132	132	199	199	265	265	331	397	530
Continuous Force (WC) @100°C[1]	F_{cw}	N	72	144	144	215	215	287	287	359	431	574
Peak Force	F_{pk}	N	312	624	624	936	936	1248	1248	1560	1872	2496
Force Constant ±10%	K_f	N/Arms	24.0	48.0	24.0	72.0	36.0	96.0	48.0	60.0	72.0	96.0
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	19.6	39.2	19.6	58.8	29.4	78.4	39.2	49.0	58.8	78.4
Motor Constant @25°C	K_m	N/Sqrt(W)	9.3	13.0	12.7	15.9	15.7	18.4	18.6	20.8	22.2	26.1
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	4.42	9.02	2.37	13.62	3.52	18.22	4.42	5.57	6.99	9.02
Inductance (L-L) ±40%[3]	L	mH	3.50	7.00	1.75	10.50	2.63	14.00	3.50	4.38	5.25	7.00
Electrical Time Constant	τ_e	ms	0.79	0.78	0.74	0.77	0.75	0.77	0.79	0.79	0.75	0.78
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	2.3	2.3	4.6	2.3	4.6	2.3	4.6	4.6	4.6	4.6
Continuous Current (AC) @100°C[1]	I_{ca}	Arms	2.8	2.8	5.5	2.8	5.5	2.8	5.5	5.5	5.5	5.5
Continuous Current (WC) @100°C[1]	I_{cw}	Arms	3.0	3.0	6.0	3.0	6.0	3.0	6.0	6.0	6.0	6.0
Peak Current	I_{pk}	Arms	13.0	13.0	26.0	13.0	26.0	13.0	26.0	26.0	26.0	26.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	45	92	97	139	144	186	181	228	286	369
Continuous Power Dissipation (AC) @100°C[1]	P_{ca}	W	65	133	140	201	207	268	260	328	412	531
Continuous Power Dissipation (WC) @100°C[1]	P_{cw}	W	76	156	164	235	243	315	306	385	483	624
Max. Coil Temperature	t_{max}	°C	100	100	100	100	100	100	100	100	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.6	1.2	1.3	1.9	1.9	2.5	2.4	3.0	3.8	4.9
Thermal Dissipation Constant (AC)[1]	K_{tha}	W/°C	0.9	1.8	1.9	2.7	2.8	3.6	3.5	4.4	5.5	7.1
Thermal Dissipation Constant (WC)[1]	K_{thw}	W/°C	1.0	2.1	2.2	3.1	3.2	4.2	4.1	5.1	6.4	8.3
Max. Bus Voltage	U_{bus}	Vdc	330	330	330	330	330	330	330	330	330	330
Magnetic Period	τ_{NN}	mm	60	60	60	60	60	60	60	60	60	60
Attraction Force	F_a	kN	0	0	0	0	0	0	0	0	0	0
Mechanical Parameters												
Coil Mass (NC)	m_{cn}	kg	0.28	0.56	0.56	0.89	0.89	1.19	1.19	1.49	1.78	2.37
Coil Length (NC)	L_{cn}	mm	61.0	121.0	121.0	181.0	181.0	241.0	241.0	301.0	361.0	481.0
Coil Length (AC)	L_{ca}	mm	61.0	121.0	121.0	181.0	181.0	241.0	241.0	301.0	361.0	481.0
Coil Length (WC)	L_{cw}	mm	61.0	121.0	121.0	181.0	181.0	241.0	241.0	301.0	361.0	481.0
Track Mass Per Meter	m_{track}	kg/m	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75
Other Information												
Insulation Class			Class B (130°C)									
Protection Grade			IP00									
Compliance with Global Standards			RoHS, CE									
Ambient Temperature		Operation	0°C to 40°C (non-freezing)									
		Storage	-15°C to 70°C (non-freezing)									
Ambient Humidity		Operation	10%RH to 80%RH (non-condensing)									
		Storage	10%RH to 90%RH (non-condensing)									
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.									

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling, AC-Air Cooling, WC-Water Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different. The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.

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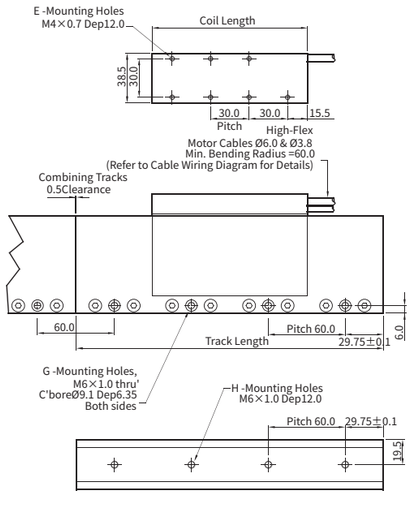
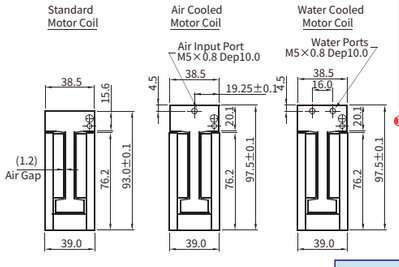
Dimension



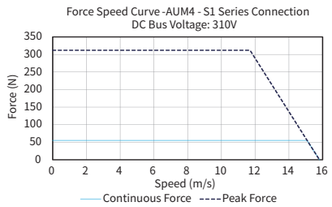


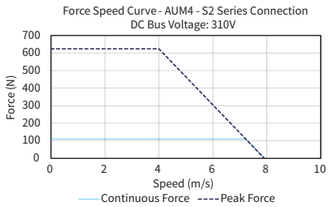
Motor Coil		
Model No:[1]	Coil Length	E
AUM4-S1	61.0	3
AUM4-S2	121.0	7
AUM4-S3	181.0	11
AUM4-S4	241.0	15
AUM4-S5	301.0	19
AUM4-S6	361.0	11
AUM4-S8	481.0	17

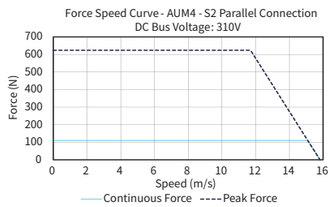
[1] For air or water cooled models, Coil Length and E are the same as the standard model. AUM4-S6 Motor Coil Series & above will use 60mm pitch for E-Mounting Holes.

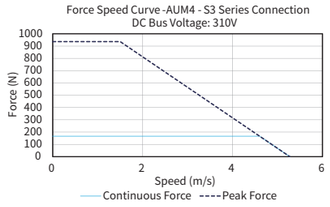
Motor Track			
Model No:	Track Length	G	H
AUM4-TL120	119.5	2	2
AUM4-TL180	179.5	3	3
AUM4-TL240	239.5	4	4
AUM4-TL300	299.5	5	5
AUM4-TL600	599.5	10	10

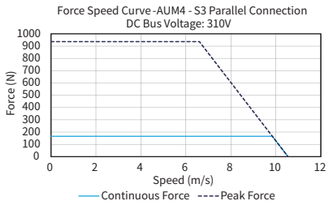
Force-Speed Curve

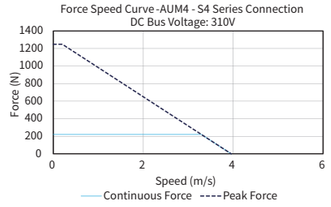


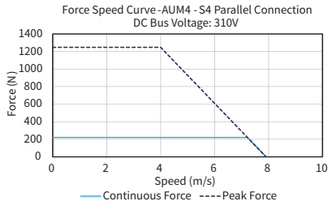


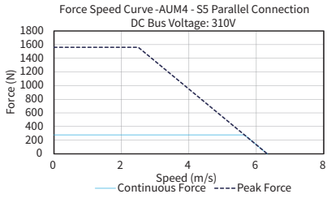


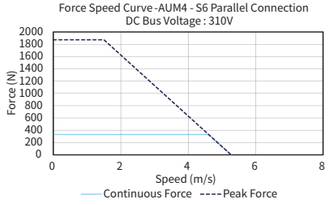


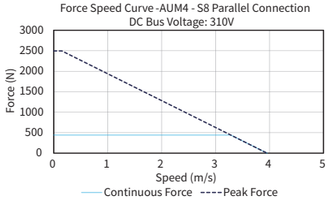












Part Numbering

Motor Coil

AUM4-[ ]-S-S3-K-HF-0.5-FB

- Motor: AUM4
- Cooling Option: (Blank)=Natural Convection; A=Air Cooled / W=Water Cooled
- Connection: S=Series / P=Parallel
- Size: S2 / S3 / S4 / S6
- Motor Cable Options: FB[3] / NFB[4]
- Cable Length (m): 0.5 / 3.0
- Hall Cable Option: NH[1] / HF[2]
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD)

1. NH = Without Built-in Hall Sensor cable
2. HF = With Built-in hall sensor & hall cable comes with flying leads (Standard)
3. FB = With ferrite bead
4. NFB = No ferrite bead

Motor Track

AUM4-TL120

- Model: AUM4
- Track Length: TL120 / TL180 / TL240 / TL300 / TL600

AUM5

			AUM5-S1	AUM5-S2		AUM5-S3		AUM5-S4		AUM5-S5	AUM5-S6	AUM5-S8 -V107	AUM5-S9 -V80	AUM5-S10 -V107	AUM5-S12 -V107
Performance Parameters	Symbol	Unit	Series	Series	Parallel	Series	Parallel	Series	Parallel	Parallel	Parallel	P5	P7	P5	P5
Continuous Force (NC) @100°C[1]	F_{cn}	N	98	197	197	295	295	393	393	491	590	786	884	983	1179
Continuous Force (AC) @100°C[1]	F_{ca}	N	118	236	236	354	354	472	472	590	707	943	1061	1180	1415
Continuous Force (WC) @100°C[1]	F_{cw}	N	128	255	255	383	383	511	511	639	766	1022	1150	1278	1533
Peak Force	F_{pk}	N	707	1415	1415	2122	2122	2830	2830	3537	4244	5659	6367	7078	8489
Force Constant ±10%	K_f	N/Arms	39.3	78.6	39.3	117.9	59.0	157.2	78.6	98.3	117.9	78.6	117.9	98.3	117.9
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	32.1	64.2	32.1	96.3	48.1	128.4	64.2	80.2	96.3	64.2	96.3	80.3	96.3
Motor Constant @25°C	K_m	N/Sqrt(W)	16.0	22.4	21.9	27.3	27.9	31.5	32.0	35.6	38.9	46.3	48.0	51.3	55.8
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	4.02	8.22	2.15	12.42	2.97	16.62	4.02	5.07	6.12	1.92	4.02	2.45	2.97
Inductance (L-L) ±40%[3]	L	mH	6.50	13.00	3.25	19.50	4.88	26.00	6.50	8.13	9.75	3.25	6.50	4.06	4.88
Electrical Time Constant	τ_e	ms	1.62	1.58	1.51	1.57	1.64	1.56	6.50	1.60	1.59	1.69	1.62	1.66	1.64
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	2.5	2.5	5.0	2.5	5.0	2.5	5.0	5.0	5.0	10.0	7.5	10.0	10.0
Continuous Current (AC) @100°C[1]	I_{ca}	Arms	3.0	3.0	6.0	3.0	6.0	3.0	6.0	6.0	6.0	12.0	9.0	12.0	12.0
Continuous Current (WC) @100°C[1]	I_{cw}	Arms	3.3	3.3	6.5	3.3	6.5	3.3	6.5	6.5	6.5	13.0	9.8	13.0	13.0
Peak Current	I_{pk}	Arms	18.0	18.0	36.0	18.0	36.0	18.0	36.0	36.0	36.0	72.0	54.0	72.0	72.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	49	99	104	150	144	201	194	245	296	372	437	474	575
Continuous Power Dissipation (AC) @100°C[1]	P_{ca}	W	70	143	150	216	207	289	280	353	426	535	630	683	827
Continuous Power Dissipation (WC) @100°C[1]	P_{cw}	W	82	168	176	254	243	339	328	414	500	628	739	801	971
Max. Coil Temperature	t_{max}	°C	100	100	100	100	100	100	100	100	100	100	100	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.6	1.3	1.4	2.0	1.9	2.7	2.6	3.3	3.9	5.0	5.8	6.3	7.7
Thermal Dissipation Constant (AC)[1]	K_{tha}	W/°C	0.9	1.9	2.0	2.9	2.8	3.9	3.7	4.7	5.7	7.1	8.4	9.1	11.0
Thermal Dissipation Constant (WC)[1]	K_{thw}	W/°C	1.1	2.2	2.3	3.4	3.2	4.5	4.4	5.5	6.7	8.4	9.9	10.7	12.9
Max. Bus Voltage	U_{bus}	Vdc	330	330	330	330	330	330	330	330	330	330	330	330	330
Magnetic Period	τ_{NN}	mm	84	84	84	84	84	84	84	84	84	84	84	84	84
Attraction Force	F_a	kN	0	0	0	0	0	0	0	0	0	0	0	0	0
Mechanical Parameters															
Coil Mass (NC)	m_{cn}	kg	0.73	1.45	1.45	2.16	2.16	2.88	2.88	3.60	4.32	5.73	6.53	7.25	8.76
Coil Length (NC)	L_{cn}	mm	61.0	121.0	121.0	181.0	181.0	241.0	241.0	301.0	361.0	481.0	757.0	841.0	1009.0
Coil Length (AC)	L_{ca}	mm	61.0	121.0	121.0	181.0	181.0	241.0	241.0	301.0	361.0	481.0	757.0	841.0	1009.0
Coil Length (WC)	L_{cw}	mm	61.0	121.0	121.0	181.0	181.0	241.0	241.0	301.0	361.0	481.0	757.0	841.0	1009.0
Track Mass Per Meter	m_{track}	kg/m	25.36	25.36	25.36	25.36	25.36	25.36	25.36	25.36	25.36	25.36	25.36	25.36	25.36
Other Information															
Insulation Class			Class B (130°C)												
Protection Grade			IP00												
Compliance with Global Standards			RoHS, CE												
Ambient Temperature	Operation		0°C to 40°C (non-freezing)												
	Storage		-15°C to 70°C (non-freezing)												
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)												
	Storage		10%RH to 90%RH (non-condensing)												
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.												

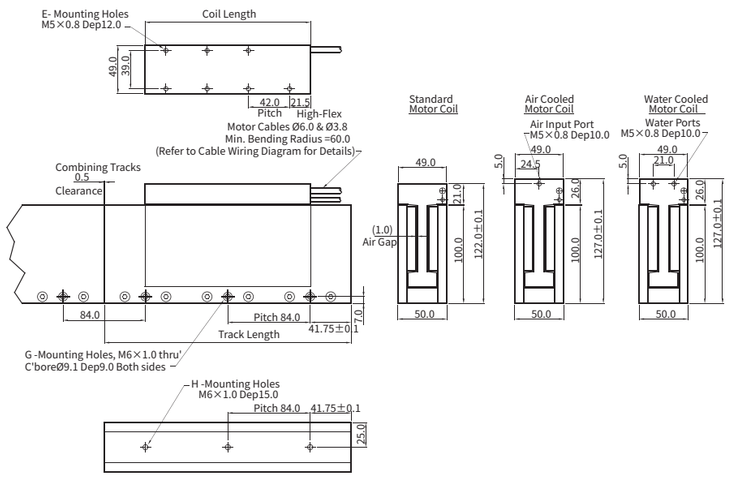
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling, AC-Air Cooling, WC-Water Cooling.

[2] Resistance is measured by DC current with standard 0.5 m cable.

[3] Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different. The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.

The contents of datasheet are subject to change without prior notice.

Dimension

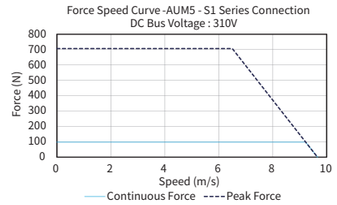


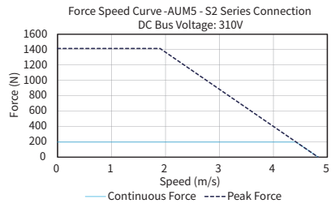
Motor Coil		
Model No:[1]	Coil Length	E
AUM5-S2	169.0	7
AUM5-S3	253.0	11
AUM5-S4	337.0	15
AUM5-S5	421.0	19
AUM5-S6	505.0	23
AUM5-P5-S8-V107	673.0	8
AUM5-P7-S9-V80	757.0	9
AUM5-P5-S10-V107	841.0	10
AUM5-P5-S12-V107	1009.0	12

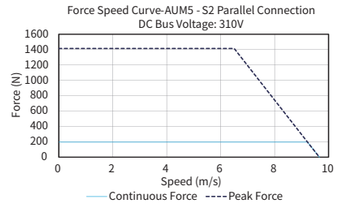
[1] For air or water cooled models, Coil Length and E are the same as the standard model.

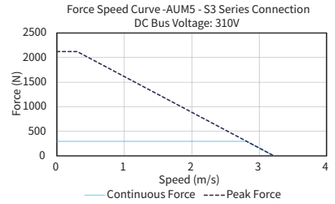
Motor Track			
Model No:	Track Length	G	H
AUM5-TL168	167.5	2	2
AUM5-TL252	251.5	3	3
AUM5-TL420	419.5	5	5

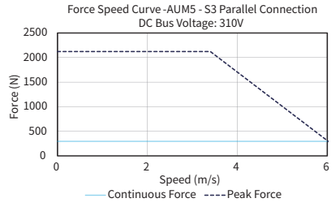
Force-Speed Curve

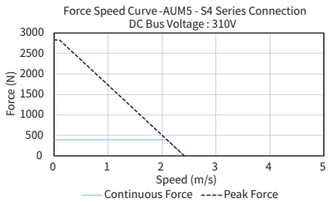


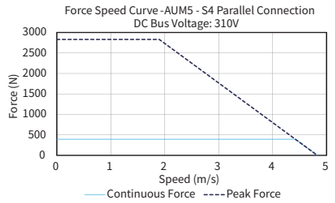


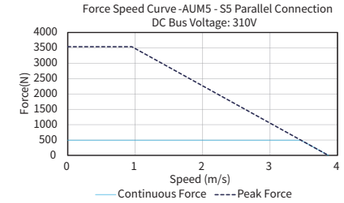


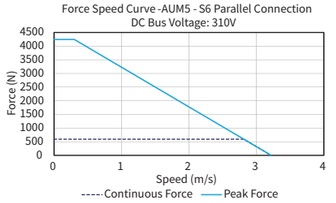


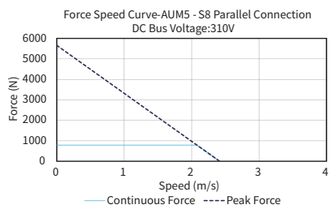


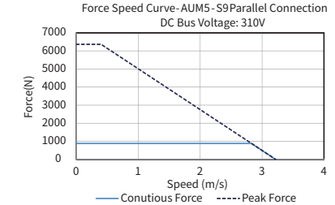


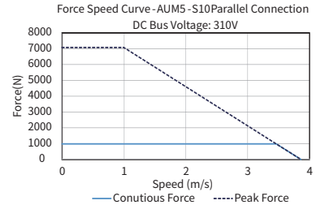


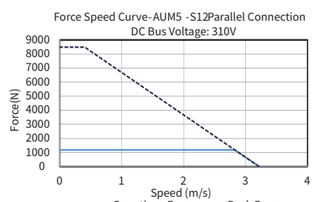












Part Numbering

Motor Coil

1 NH = Without Built-in Hall Sensor cable
2 HF = With Built-in hall sensor & hall cable comes with flying leads (Standard)
3 FB = With ferrite bead
4 NFB = No ferrite bead
5 V80 = Only for AUM5-S8 and AUM5-S9
6 V107 = Only for AUM5-S10 & AUM5-S12

Motor Track

AUM6

			AUM6-P5-S4	AUM6-P8-S6	AUM6-P5-S8	AUM6-P8-S9	AUM6-P7-S10	AUM6-P8-S12
Performance Parameters	**Symbol**	**Unit**	**P5**	**P8**	**P5**	**P8**	**P7**	**P8**
Continuous Force (NC) @100°C[1]	F_{cn}	N	780	1170	1560	1755	1950	2340
Peak Force	F_{pk}	N	5400	8100	10800	12150	13500	16200
Force Constant ±10%	K_f	N/Arms	75.0	75.0	150.0	112.5	150.0	150.0
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	61.2	61.2	122.5	91.9	122.5	122.5
Motor Constant @25°C	K_m	N/Sqrt(W)	53.3	67.5	72.9	79.9	82.2	90.7
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	1.32	0.82	2.82	1.32	2.22	1.82
Inductance (L-L) ±40%[3]	L	mH	2.65	1.77	5.30	2.65	4.24	3.53
Electrical Time Constant	τ_e	ms	2.00	2.15	1.88	2.00	1.91	1.94
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	10.4	15.6	10.4	15.6	13.0	15.6
Peak Current	I_{pk}	Arms	72.0	108.0	72.0	108.0	90.0	108.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	276	387	590	622	726	857
Max. Coil Temperature	t_{max}	°C	100	100	100	100	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	3.7	5.2	7.9	8.3	9.7	11.4
Max. Bus Voltage	U_{bus}	Vdc	330	330	330	330	330	330
Magnetic Period	τ_{NN}	mm	84	84	84	84	84	84
Attraction Force	F_a	kN	0	0	0	0	0	0
Mechanical Parameters								
Coil Mass (NC)	m_{cn}	kg	4.50	6.75	9.00	10.13	11.25	13.50
Coil Length (NC)	L_{cn}	mm	337.0	505.0	673.0	757.0	841.0	1009.0
Track Mass Per Meter	m_{track}	kg/m	66.67	66.67	66.67	66.67	66.67	66.67
Other Information								
Insulation Class			Class B (130°C)					
Protection Grade			IP00					
Compliance with Global Standards			RoHS, CE					
Ambient Temperature	Operation		0°C to 40°C (non-freezing)					
	Storage		-15°C to 70°C (non-freezing)					
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)					
	Storage		10%RH to 90%RH (non-condensing)					
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.					

1 Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling, AC-Air Cooling, WC-Water Cooling.
2 Resistance is measured by DC current with standard 0.5 m cable.
3 Inductance is measured by current frequency of 1 kHz. The variation range of AUM inductance is ±40% because three phase inductances are different. The value in the catalog is the average between the maximum and minimum values. For each phase, the variation range is ±20%.

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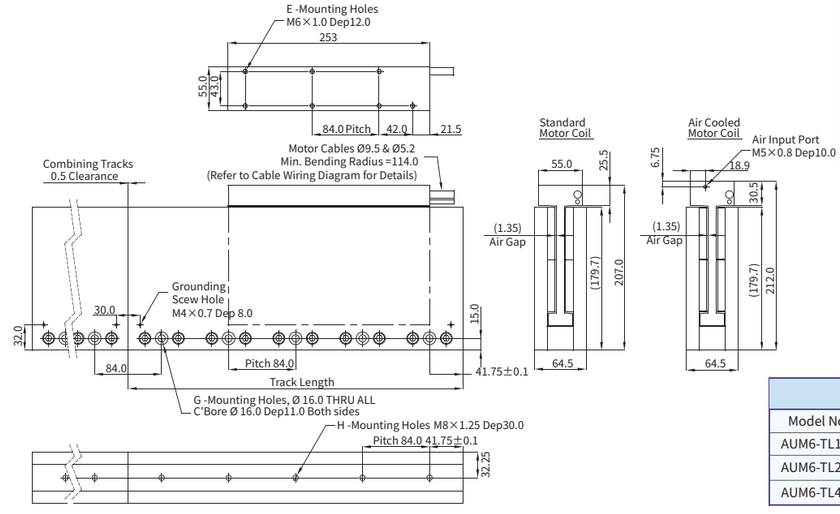
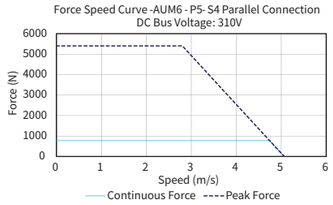
Dimension

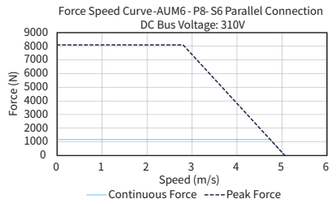


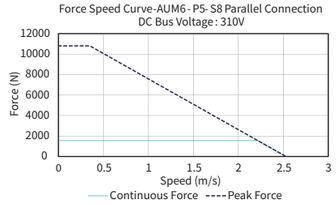
Motor Coil		
Model No:	Coil Length	E
AUM6-P5-S4	337.0	9
AUM6-P8-S6	505.0	13
AUM6-P5-S8	673.0	17
AUM6-P8-S9	757.0	19
AUM6-P7-S10	841.0	21
AUM6-P8-S12	1009.0	25

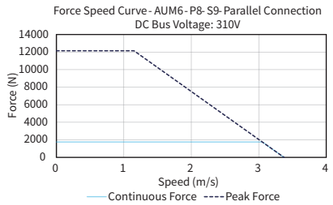
Motor Track			
Model No:	Track Length	G	H
AUM6-TL168	167.5	2	2
AUM6-TL252	251.5	3	3
AUM6-TL420	419.5	5	5

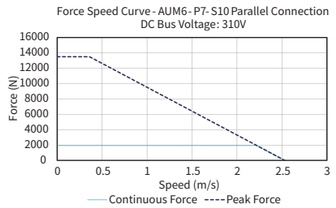
■ Force-Speed Curve

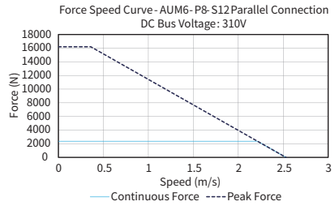












Part Numbering

Motor Coil

AUM6-P-S4-K-HF-0.5-FB

- Motor: AUM6
- Connection: P5 / P7 / P8
- Size: S1 / S2 / S3 / S4 / S8
- Motor Cable Options: FB[3] / NFB[4]
- Cable Length (m): 0.5 / 3.0
- Hall Cable Option: NH[1] / HF[2]
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD)

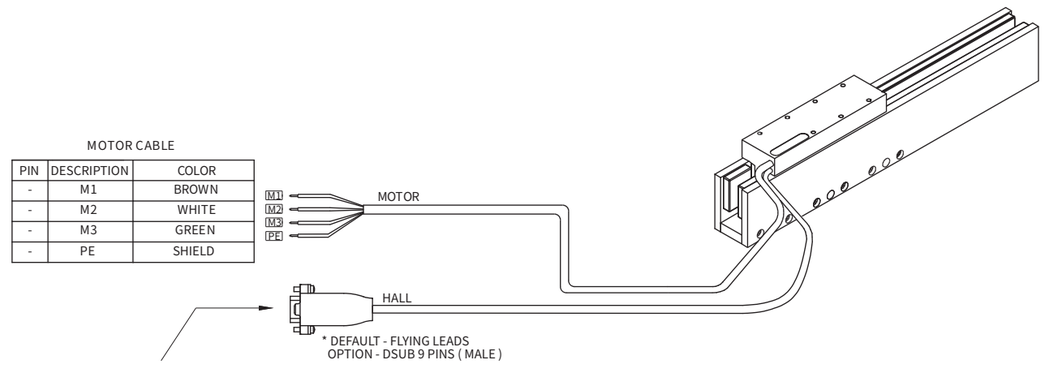
1. NH = Without Built-in Hall Sensor but with Thermal Sensor
2. HF = With Built-in hall sensor & hall cable comes with flying leads (Standard)
3. FB = With ferrite bead
4. NFB = No ferrite bead

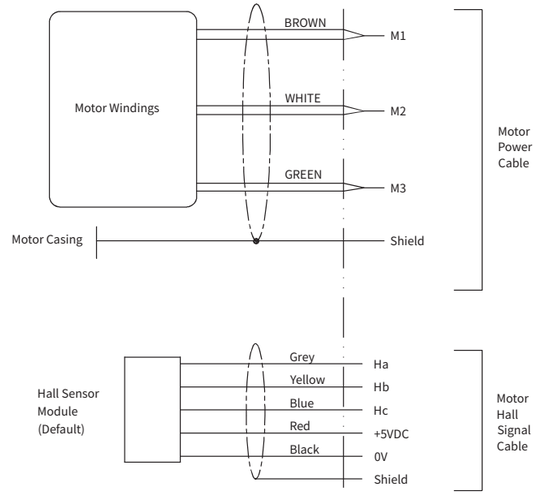
Motor Track

AUM6-TL168

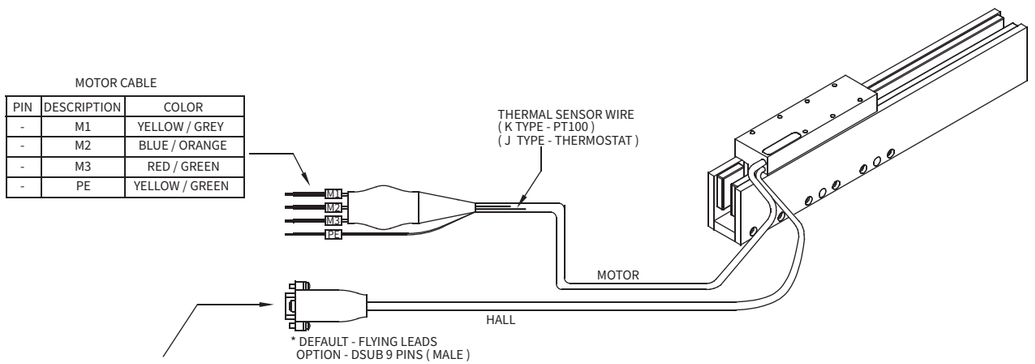
- Model: AUM6
- Track Length: TL168 / TL252 / TL420

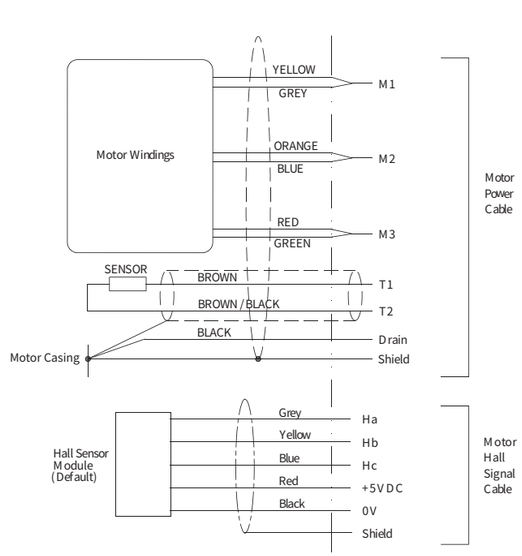
AUM1 Series Motor Cable Connection



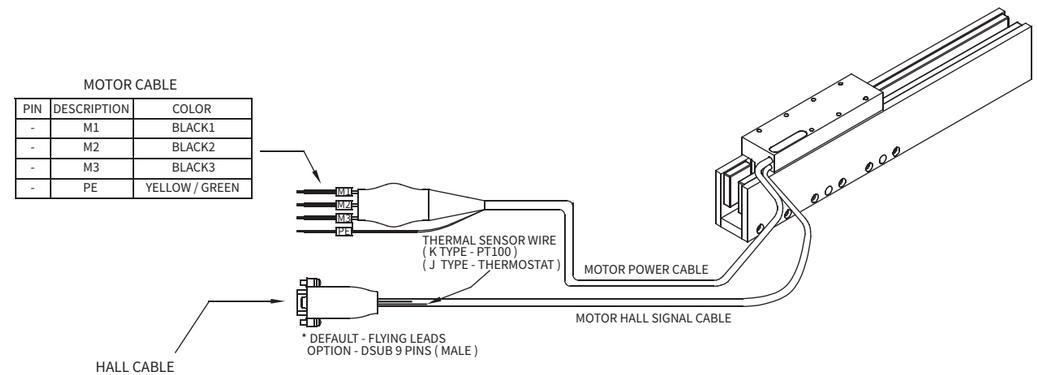


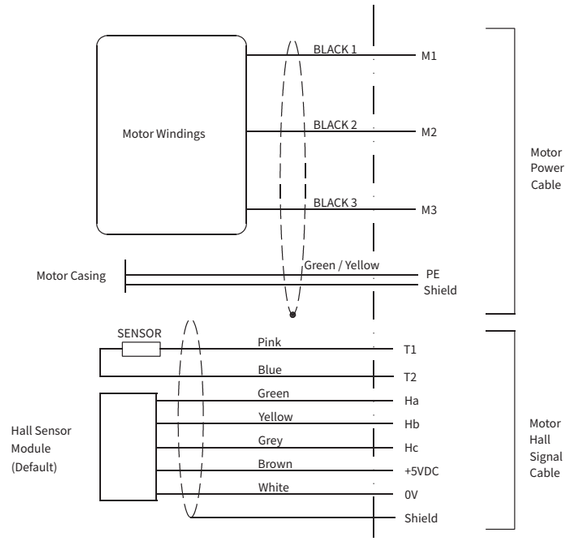
AUM2 / 3 / 4 / 5 Series Motor Cable Connection

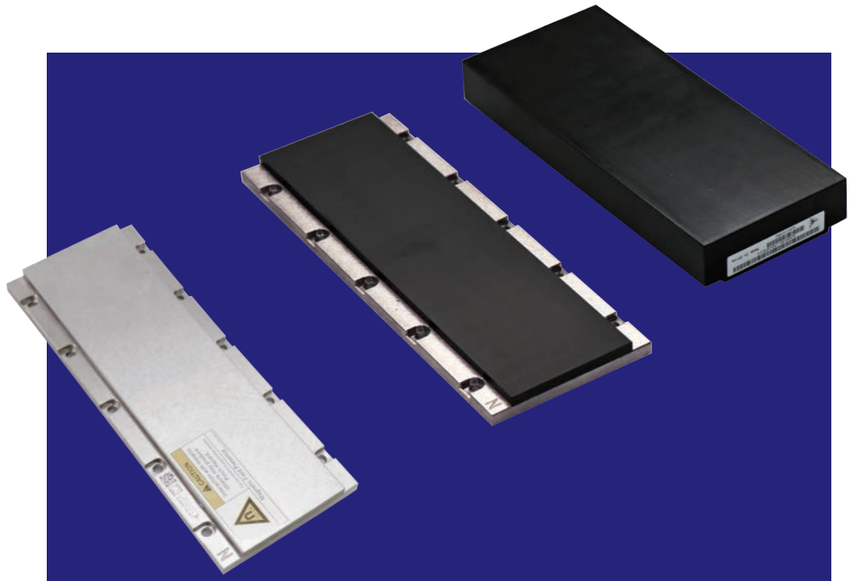




AUM6 Series Motor Cable Connection







AJM SERIES

- Ironless technology
- Low cogging force
- Integrated with hall sensors
- High force and stiffness

Introduction

Iron core AJM series linear motors provide compact size, high force density, and quick response.

Fcn (Continuous force) = 68.1N ~ 446.8N

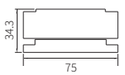
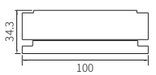
Fpk (Peak force) = 214.7N ~ 1409.1N

Features

- Iron core technology and low cogging force
- High continuous and peak force
- Optional hall sensors
- High motor constant

Applications

Best suited for point-to-point motion with micron level positioning ; unlimited travel stroke with top speed of 5m/s or faster (stroke of 100m or longer).
Applications & Industries: high speed positioning systems for product handling in semiconductor, photovoltaic and lithium battery, glass and LCD applications, as well as industrial printing machines, laser processing machines with demanding precision and motion control requirements.

	Series	Coil Length (mm)[1]	● Continuous Force (Fcn) / ■ PeakForce (Fpk) Unit: N 100 / 150 / 200 / 250 / 300 / 400 / 500 / ····
	AJM30-B2	96	●68.1 / ■214.7
	AJM30-B4	176	●136.2 / ■429.4
	AJM50-B2	96	●117.0 / ■369.0
	AJM50-B4	176	●234.0 / ■738.1
	AJM80-B2	96	●174.5 / ■550.2
	AJM80-B4	176	●348.9 / ■1100.4
	AJM100-B2	96	●223.4 / ■704.5
	AJM100-B4	176	●446.8 / ■1409.1

[1] No hall sensor.

AJM30-B2

AJM30-B2			
Performance Parameters	**Symbol**	**Unit**	**Series**
Continuous Force (NC) @100°C[1]	F_{cn}	N	68.1
Peak Force	F_{pk}	N	214.7
Force Constant ±10%	K_f	N/Arms	29.6
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	24.2
Motor Constant @25°C	K_m	N/Sqrt(W)	12.2
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	3.9
Inductance (L-L) ±30%[3]	L	mH	16.5
Electrical Time Constant	τ_e	ms	4.2
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	2.3
Peak Current	I_{pk}	Arms	9.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	40.1
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.5
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	20
Attraction Force	F_a	N	378
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	0.6
Coil Length (NC)	L_{cn}	mm	96
Track Mass Per Meter	m_{track}	kg/m	3.3
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		Chinese RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations:NC-Natural Cooling.

[2] Resistance is measured by DC current with standard 0.5 m cable.

[3] Inductance is measured by current frequency of 1 kHz.

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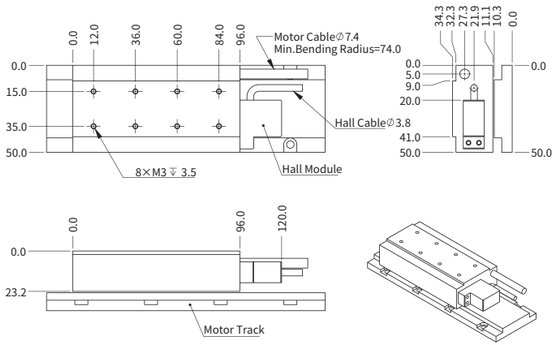
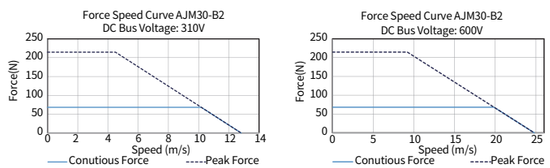
Dimension



Force-Speed Curve



AJM30-B4

AJM30-B4			
Performance Parameters	**Symbol**	**Unit**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	136.2
Peak Force	F_{pk}	N	429.4
Force Constant ±10%	K_f	N/Arms	29.6
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	24.2
Motor Constant @25°C	K_m	N/Sqrt(W)	17.0
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	2.0
Inductance (L-L) ±30%[3]	L	mH	8.2
Electrical Time Constant	τ_e	ms	4.1
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	4.6
Peak Current	I_{pk}	Arms	18.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	82.6
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	1.1
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	20
Attraction Force	F_a	N	756
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	1.1
Coil Length (NC)	L_{cn}	mm	176
Track Mass Per Meter	m_{track}	kg/m	3.3
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		Chinese RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations:NC-Natural Cooling.

[2] Resistance is measured by DC current with standard 0.5 m cable.

[3] Inductance is measured by current frequency of 1 kHz.

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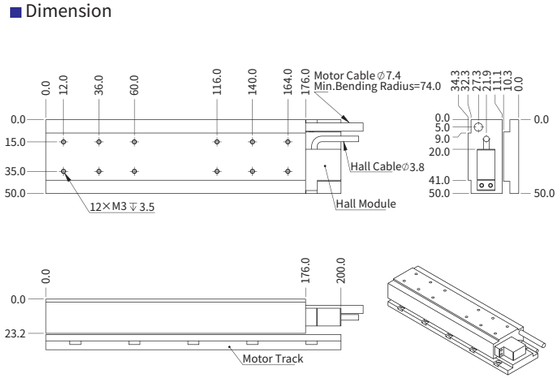
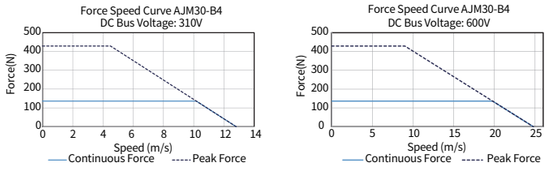
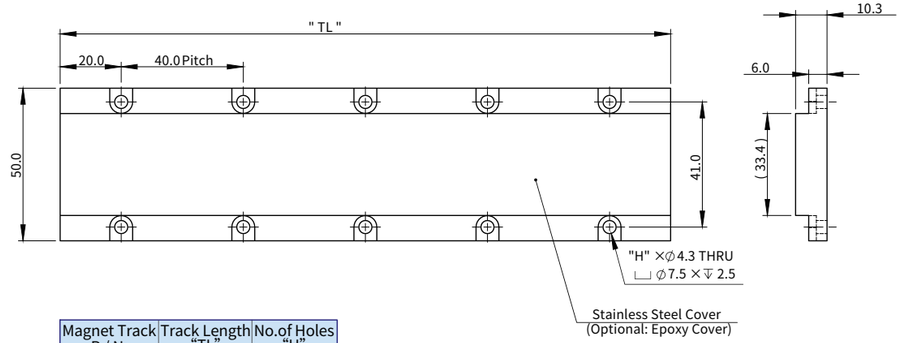
Dimension



Force-Speed Curve



AJM30 Track



Magnet Track P / N:	Track Length "TL"	No.of Holes "H"
AJM30-TL80-S	80.0	4
AJM30-TL200-S	200.0	10
AJM30-TL400-S	400.0	20

For epoxy cover option, change " -S " to " -E ". (e.g. AJM30-TL80-E)

AJM50-B2

AJM50-B2			
Performance Parameters	**Symbol**	**Unit**	**Series**
Continuous Force (NC) @100°C[1]	F_{cn}	N	117.0
Peak Force	F_{pk}	N	369.0
Force Constant ±10%	K_f	N/Arms	50.9
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	41.5
Motor Constant @25°C	K_m	N/Sqrt(W)	17.0
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	6.0
Inductance (L-L) ±30%[3]	L	mH	25.9
Electrical Time Constant	τ_e	ms	4.3
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	2.3
Peak Current	I_{pk}	Arms	9.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	61.2
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.8
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	20
Attraction Force	F_a	N	650
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	0.9
Coil Length (NC)	L_{cn}	mm	96
Track Mass Per Meter	m_{track}	kg/m	5.0
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		Chinese RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations:NC-Natural Cooling.

[2] Resistance is measured by DC current with standard 0.5 m cable.

[3] Inductance is measured by current frequency of 1 kHz.

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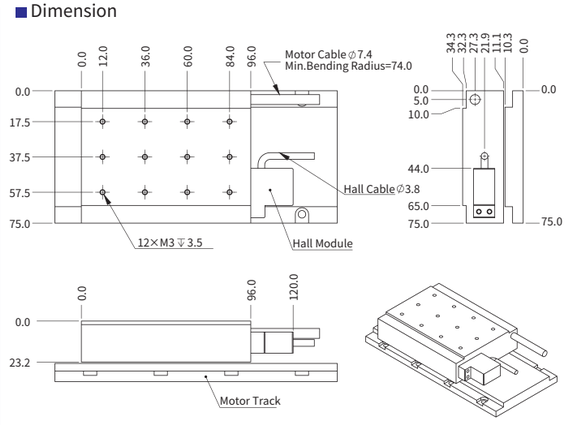
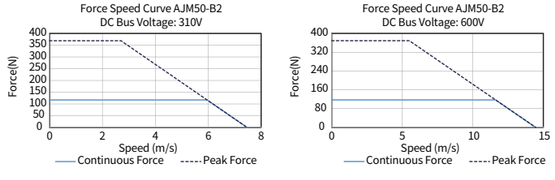
Dimension



Force-Speed Curve



AJM50-B4

AJM50-B4			
Performance Parameters	**Symbol**	**Unit**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	234.0
Peak Force	F_{pk}	N	738.1
Force Constant ±10%	K_f	N/Arms	50.9
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	41.5
Motor Constant @25°C	K_m	N/Sqrt(W)	23.8
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	3.1
Inductance (L-L) ±30%[3]	L	mH	13.0
Electrical Time Constant	τ_e	ms	4.2
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	4.6
Peak Current	I_{pk}	Arms	18.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	124.8
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	1.7
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	20
Attraction Force	F_a	N	1299
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	1.7
Coil Length (NC)	L_{cn}	mm	176
Track Mass Per Meter	m_{track}	kg/m	5.0
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		Chinese RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations:NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
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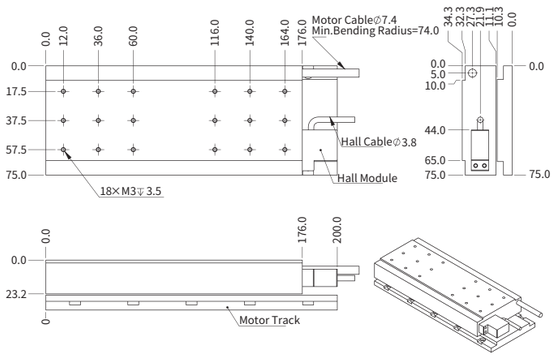
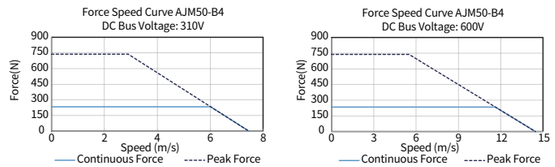
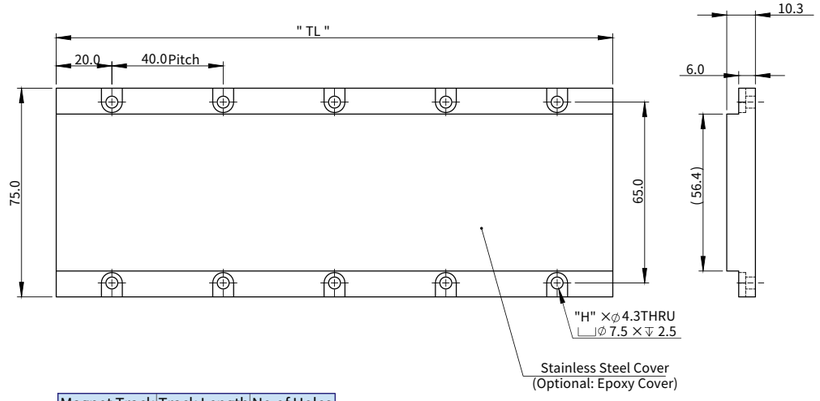
Dimension



Force-Speed Curve



AJM50 Track



Magnet Track P / N:	Track Length "TL"	No.of Holes "H"
AJM50-TL80-S	80.0	4
AJM50-TL200-S	200.0	10
AJM50-TL400-S	400.0	20

For epoxy cover option, change " -S " to " -E ". (e.g. AJM50-TL80-E)

AJM80-B2

AJM80-B2			
Performance Parameters	**Symbol**	**Unit**	**Series**
Continuous Force (NC) @100°C[1]	F_{cn}	N	174.5
Peak Force	F_{pk}	N	550.2
Force Constant ±10%	K_f	N/Arms	75.9
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	61.9
Motor Constant @25°C	K_m	N/Sqrt(W)	21.4
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	8.4
Inductance (L-L) ±30%[3]	L	mH	37.3
Electrical Time Constant	τ_e	ms	4.5
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	2.3
Peak Current	I_{pk}	Arms	9.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	85.5
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	1.1
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	20
Attraction Force	F_a	N	969
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	1.2
Coil Length (NC)	L_{cn}	mm	96
Track Mass Per Meter	m_{track}	kg/m	7.0
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		Chinese RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations:NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
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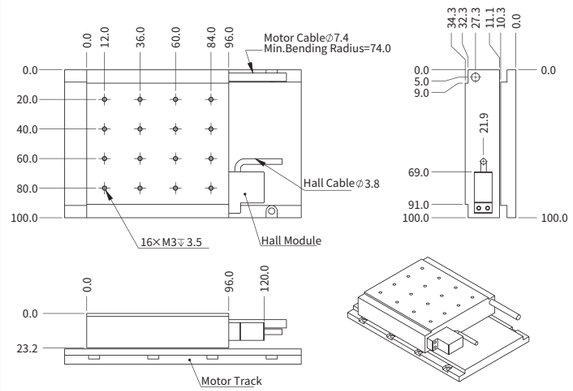
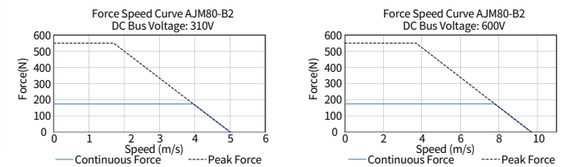
Dimension



Force-Speed Curve

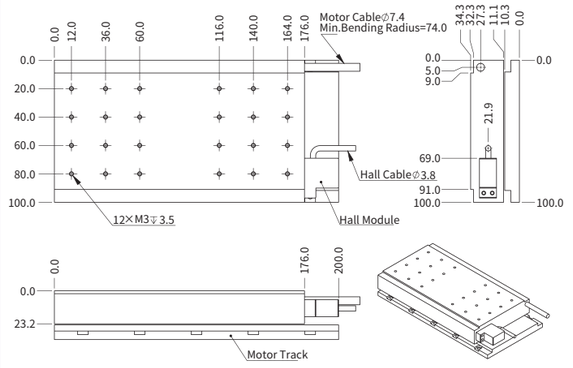


AJM80-B4

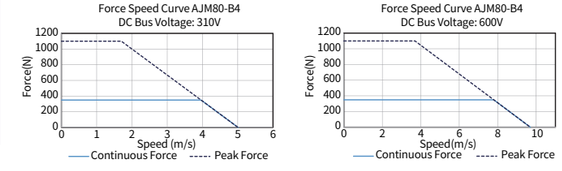
AJM80-B4			
Performance Parameters	**Symbol**	**Unit**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	348.9
Peak Force	F_{pk}	N	1100.4
Force Constant ±10%	K_f	N/Arms	75.9
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	61.9
Motor Constant @25°C	K_m	N/Sqrt(W)	30.1
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	4.2
Inductance (L-L) ±30%[3]	L	mH	18.6
Electrical Time Constant	τ_e	ms	4.4
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	4.6
Peak Current	I_{pk}	Arms	18.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	173.5
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	2.3
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	20
Attraction Force	F_a	N	1937
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	2.3
Coil Length (NC)	L_{cn}	mm	176
Track Mass Per Meter	m_{track}	kg/m	7.0
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		Chinese RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations:NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

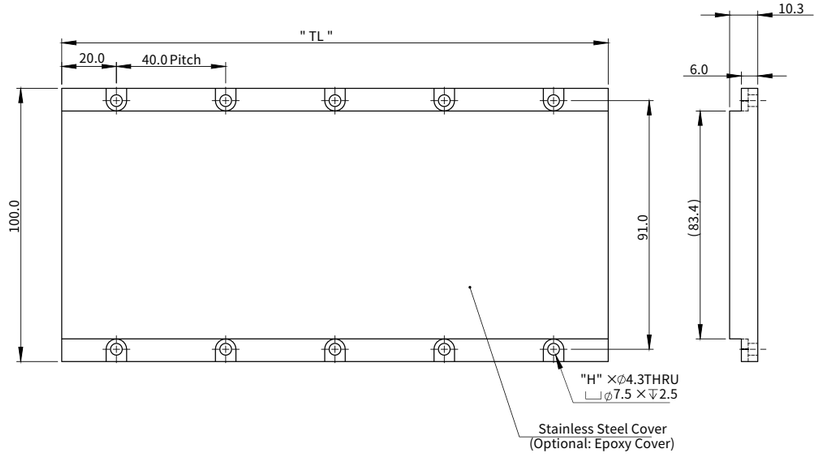
Dimension



Force-Speed Curve



AJM80 Track



Magnet Track P / N:	Track Length "TL"	No.of Holes "H"
AJM80-TL80-S	80.0	4
AJM80-TL200-S	200.0	10
AJM80-TL400-S	400.0	20

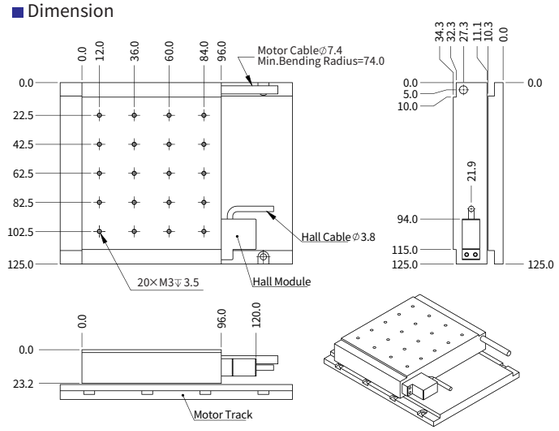
For epoxy cover option, change" -S " to " -E ". (e.g. AJM80-TL80-E)

AJM100-B2

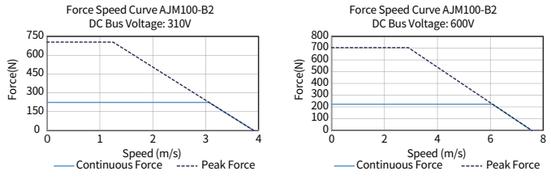
AJM100-B2			
Performance Parameters	**Symbol**	**Unit**	**Series**
Continuous Force (NC) @100°C[1]	F_{cn}	N	223.4
Peak Force	F_{pk}	N	704.5
Force Constant ±10%	K_f	N/Arms	97.1
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	79.3
Motor Constant @25°C	K_m	N/Sqrt(W)	24.7
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	10.3
Inductance (L-L) ±30%[3]	L	mH	47.2
Electrical Time Constant	τ_e	ms	4.6
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	2.3
Peak Current	I_{pk}	Arms	9.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	105.3
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	1.4
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	20
Attraction Force	F_a	N	1240
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	1.5
Coil Length (NC)	L_{cn}	mm	96
Track Mass Per Meter	m_{track}	kg/m	8.8
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		Chinese RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations:NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Dimension



Force-Speed Curve

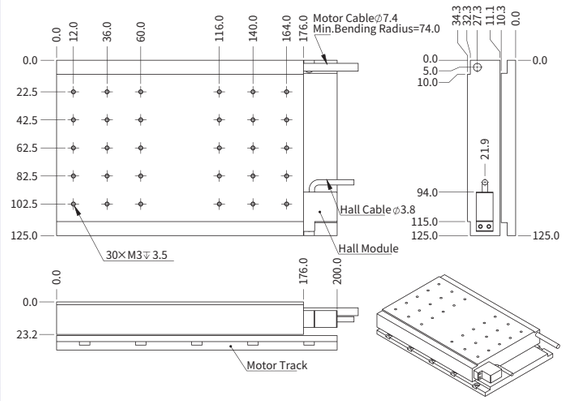


AJM100-B4

AJM100-B4			
Performance Parameters	**Symbol**	**Unit**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	446.8
Peak Force	F_{pk}	N	1409.1
Force Constant ±10%	K_f	N/Arms	97.1
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	79.3
Motor Constant @25°C	K_m	N/Sqrt(W)	34.8
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	5.2
Inductance (L-L) ±30%[3]	L	mH	23.6
Electrical Time Constant	τ_e	ms	4.5
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	4.6
Peak Current	I_{pk}	Arms	18.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	213.0
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	2.8
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	20
Attraction Force	F_a	N	2481
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	2.9
Coil Length (NC)	L_{cn}	mm	176
Track Mass Per Meter	m_{track}	kg/m	8.8
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		Chinese RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

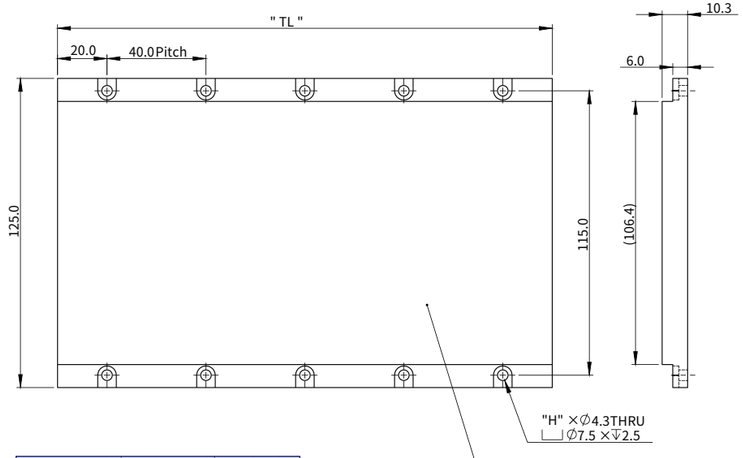
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations:NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Dimension



Force-Speed Curve

AJM100 Track



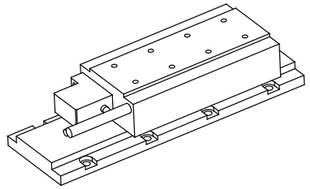
Magnet Track P / N:	Track Length "TL"	No.of Holes "H"
AJM100-TL80-S	80.0	4
AJM100-TL200-S	200.0	10
AJM100-TL400-S	400.0	20

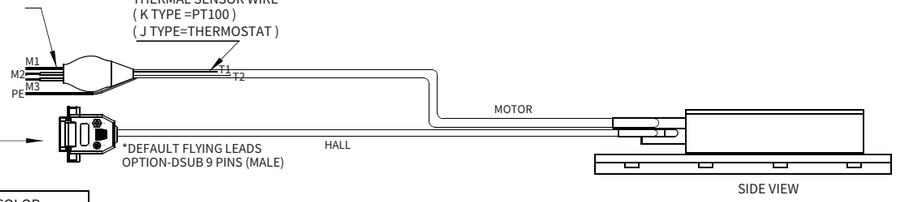
For epoxy cover option, change" -S " to " -E ". (e.g. AJM100-TL80-E)

Motor Cable Connection

MOTOR CABLE

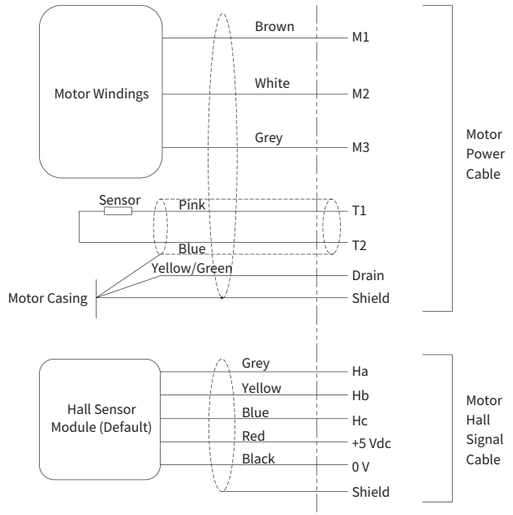
PIN	DESCRIPTION	COLOR
-	M1	BROWN
-	M2	WHITE
-	M3	GREY
-	PE	YELLOW/GREEN
-	T1	PINK
-	T2	BLUE





HALL CABLE

PIN	DESCRIPTION	COLOR
1	HA	GREY
2	HB	YELLOW
3	HC	BLUE
4	5VDC	RED
5	0VDC	BLACK



Part Numbering

Motor Coil

AJM30-B2-J-NH-0.5-NFB

- Model: AJM30 / AJM50 / AJM80 / AJM100
- Size: B2 / B4
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD) (Contact us for other thermal sensor)
- Motor Cable Option: NFB[3] / FB[4]
- Cable Length(m): 0.5 / 3.0 (Contact us for other lengths)
- Hall Cable Option: NH[1] / HF[2]

1. NH =Without Built-in Hall Sensor cable
2. HF = With Built-in hall sensor & hall cable comes with flying leads (Standard)
3. NFB = No ferrite bead
4. FB = Ferrite bead

Motor Track

AJM30-TL200-S

- Model: AJM30 / AJM50 / AJM80 / AJM100
- Track Length: TL80 / TL200 / TL400
- Cover Type: S[5] / E[6]

5. S = Stainless steel cover
6. E = Epoxy cover

AQM SERIES

- Ironless technology
- Low cogging force
- Integrated with hall sensors
- High force and stiffness

Introduction

Iron Core AQM series linear motors have a low cogging force, a competitive cost advantage, exceptionally narrow width for dimenionally constrainted applications, and are ideal for long travel strokes.

Fcn (Continuous force) = 20.3N ~ 405.0N

Fpk (Peak force) = 49.7N ~ 994.4N

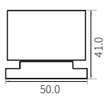
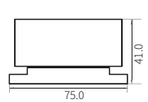
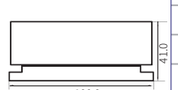
Features

- Iron core technology and low cogging force
- High continuous and peak force
- Optional hall sensors
- High motor constant
- Multiple coil lengths to select

Applications

Applicable to point-to-point micron meter level positioning; unlimited travel stroke with top speed of 5m/s or faster (stroke of 100m or longer).

Applications & Industries: high speed positioning systems for product handling in semiconductor, photovoltaic and lithium battery, glass and LCD applications, as well as industrial printing machines, laser processing machines with demanding precision and motion control requirements.

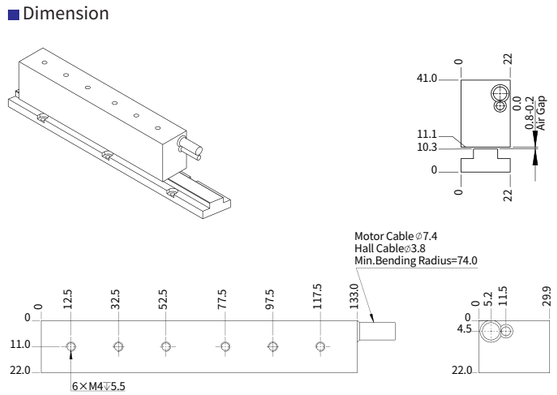
	Series	Coil Length (mm)	● Continuous Force (Fcn) / ■ PeakForce (Fpk) Unit: N 50 100 200 300 400 500 ····
	AQM8-B1	133	●20.3 / ■49.7
	AQM24-B1	133	●60.8 / ■149.2
	AQM30-B1	133	●75.9 / ■186.4
	AQM30-B2	268	●151.9 / ■372.9
	AQM50-B1	133	●126.6 / ■310.7
	AQM50-B2	268	●253.1 / ■621.5
	AQM80-B1	133	●202.5 / ■497.2
	AQM80-B2	268	●405.0 / ■994.4

AQM8-B1

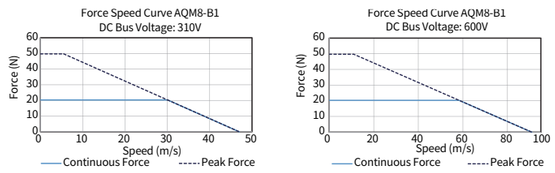
AQM8-B1			
Performance Parameters	**Symbol**	**Unit**	**Series**
Continuous Force (NC) @100°C[1]	F_{cn}	N	20.3
Peak Force	F_{pk}	N	49.7
Force Constant ±10%	K_f	N/Arms	8.1
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	6.6
Motor Constant @25°C	K_m	N/Sqrt(W)	3.8
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	3.1
Inductance (L-L) ±30%[3]	L	mH	22.7
Electrical Time Constant	τ_e	ms	7.3
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	2.5
Peak Current	I_{pk}	Arms	9.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	37.5
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.5
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{MN}	mm	30
Attraction Force	F_a	N	75
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	0.4
Coil Length (NC)	L_{cn}	mm	133
Track Mass Per Meter	m_{track}	kg/m	1.3
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations:NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

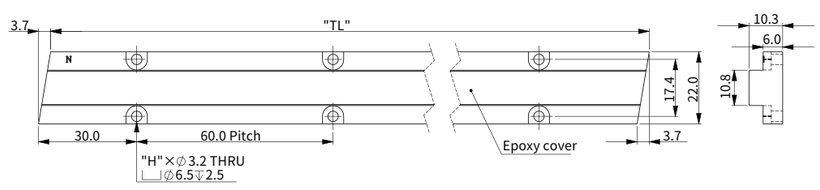
Dimension



Force-Speed Curve



AQM8 Track



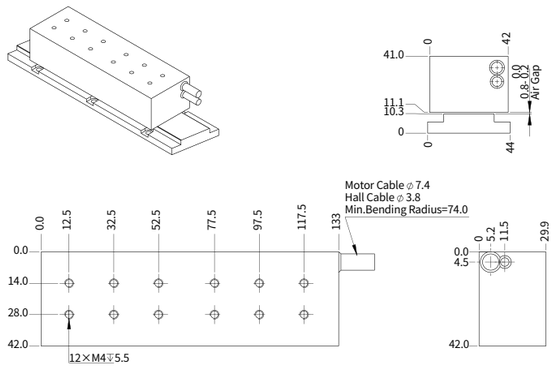
Magnet Track P / N:	Track Length "TL"	No.of Holes "H"
AQM8-TL180-E	180.0	6
AQM8-TL300-E	300.0	10
AQM8-TL420-E	420.0	14

AQM24-B1

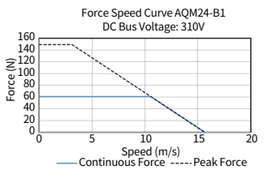
AQM24-B1			
Performance Parameters	**Symbol**	**Unit**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	60.8
Peak Force	F_{pk}	N	149.2
Force Constant ±10%	K_f	N/Arms	24.3
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	19.8
Motor Constant @25°C	K_m	N/Sqrt(W)	8.8
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	5.1
Inductance (L-L) ±30%[3]	L	mH	39.1
Electrical Time Constant	τ_e	ms	7.7
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	2.5
Peak Current	I_{pk}	Arms	9.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	61.6
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.8
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{MN}	mm	30
Attraction Force	F_a	N	224
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	0.8
Coil Length (NC)	L_{cn}	mm	133
Track Mass Per Meter	m_{track}	kg/m	2.7
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

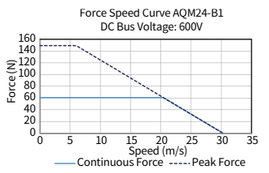
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations:NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Dimension

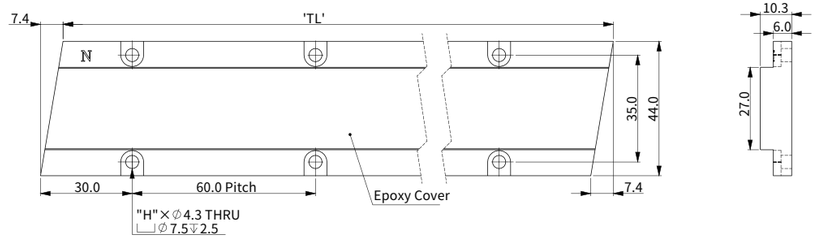


Force-Speed Curve





AQM24 Track



Magnet Track P / N:	Track Length "TL"	No.of Holes "H"
AQM24-TL180-E	180.0	6
AQM24-TL300-E	300.0	10
AQM24-TL420-E	420.0	14

AQM30-B1

AQM30-B1			
Performance Parameters	**Symbol**	**Unit**	**Series**
Continuous Force (NC) @100°C[1]	F_{cn}	N	75.9
Peak Force	F_{pk}	N	186.4
Force Constant ±10%	K_f	N/Arms	30.4
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	24.8
Motor Constant @25°C	K_m	N/Sqrt(W)	10.3
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	5.8
Inductance (L-L) ±30%[3]	L	mH	47.1
Electrical Time Constant	τ_e	ms	8.2
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	2.5
Peak Current	I_{pk}	Arms	9.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	69.6
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.9
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	30
Attraction Force	F_a	N	280
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	1.0
Coil Length (NC)	L_{cn}	mm	133
Track Mass Per Meter	m_{track}	kg/m	3.0
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

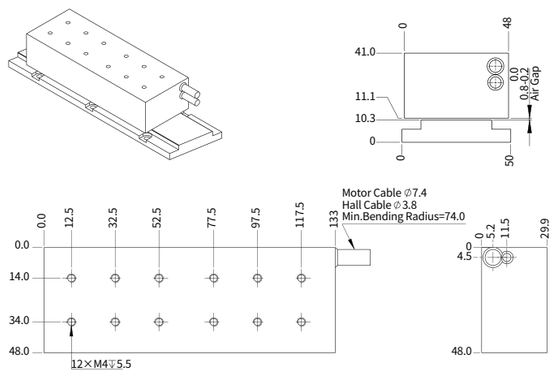
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations:NC-Natural Cooling.

[2] Resistance is measured by DC current with standard 0.5 m cable.

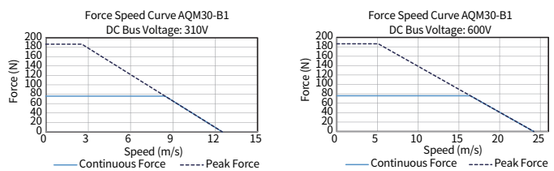
[3] Inductance is measured by current frequency of 1 kHz.

The contents of datasheet are subject to change without prior notice.

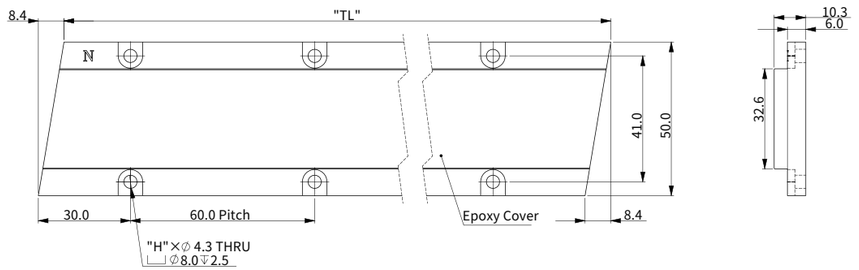
Dimension



Force-Speed Curve



AQM30 Track



Magnet Track P / N:	Track Length "TL"	No.of Holes "H"
AQM30-TL180-E	180.0	6
AQM30-TL300-E	300.0	10
AQM30-TL420-E	420.0	14

AQM30-B2

AQM30-B2			
Performance Parameters	**Symbol**	**Unit**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	151.9
Peak Force	F_{pk}	N	372.9
Force Constant ±10%	K_f	N/Arms	30.4
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	24.8
Motor Constant @25°C	K_m	N/Sqrt(W)	14.6
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	2.9
Inductance (L-L) ±30%[3]	L	mH	23.6
Electrical Time Constant	τ_e	ms	8.2
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	5.0
Peak Current	I_{pk}	Arms	18.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	139.2
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	1.9
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	30
Attraction Force	F_a	N	560
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	1.9
Coil Length (NC)	L_{cn}	mm	268
Track Mass Per Meter	m_{track}	kg/m	3.0
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

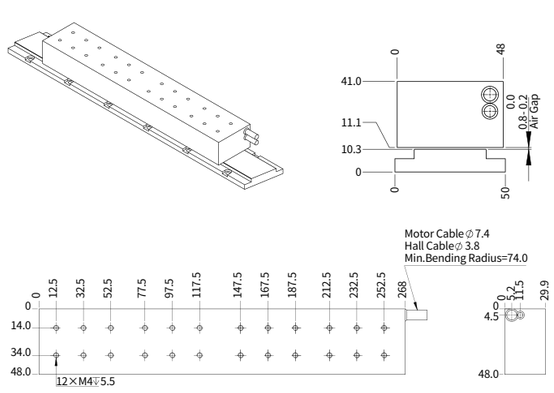
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations:NC-Natural Cooling.

[2] Resistance is measured by DC current with standard 0.5 m cable.

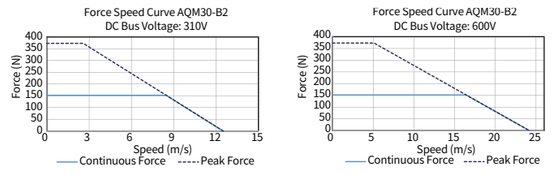
[3] Inductance is measured by current frequency of 1 kHz.

The contents of datasheet are subject to change without prior notice.

Dimension



Force-Speed Curve



AQM50-B1

AQM50-B1			
Performance Parameters	**Symbol**	**Unit**	**Series**
Continuous Force (NC) @100°C[1]	F_{cn}	N	126.6
Peak Force	F_{pk}	N	310.7
Force Constant ±10%	K_f	N/Arms	50.6
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	41.3
Motor Constant @25°C	K_m	N/Sqrt(W)	14.5
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	8.2
Inductance (L-L) ±30%[3]	L	mH	68.3
Electrical Time Constant	τ_e	ms	8.3
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	2.5
Peak Current	I_{pk}	Arms	9.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	98.8
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	1.3
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	30
Attraction Force	F_a	N	467
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	1.4
Coil Length (NC)	L_{cn}	mm	133
Track Mass Per Meter	m_{track}	kg/m	4.6
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

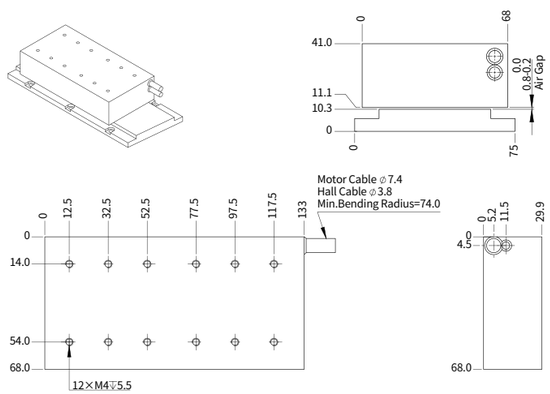
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations:NC-Natural Cooling.

[2] Resistance is measured by DC current with standard 0.5 m cable.

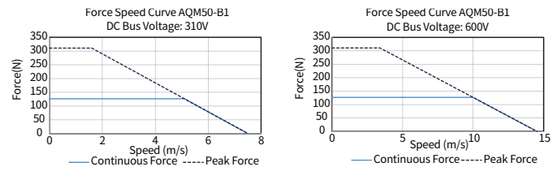
[3] Inductance is measured by current frequency of 1 kHz.

The contents of datasheet are subject to change without prior notice.

Dimension



Force-Speed Curve

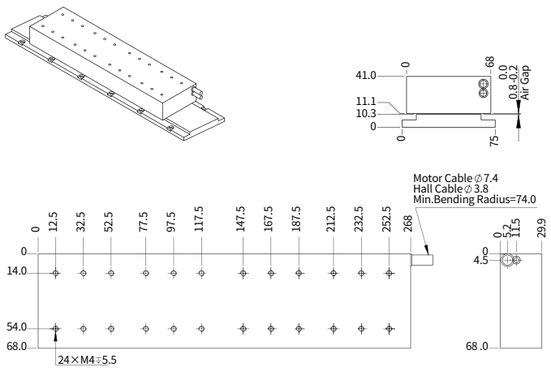


AQM50-B2

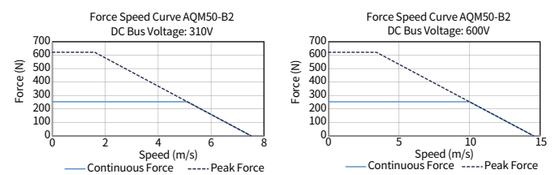
AQM50-B2			
Performance Parameters	**Symbol**	**Unit**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	253.1
Peak Force	F_{pk}	N	621.5
Force Constant ±10%	K_f	N/Arms	50.6
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	41.3
Motor Constant @25°C	K_m	N/Sqrt(W)	20.4
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	4.1
Inductance (L-L) ±30%[3]	L	mH	34.2
Electrical Time Constant	τ_e	ms	8.3
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	5.0
Peak Current	I_{pk}	Arms	18.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	197.7
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	2.6
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	30
Attraction Force	F_a	N	934
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	2.7
Coil Length (NC)	L_{cn}	mm	268
Track Mass Per Meter	m_{track}	kg/m	4.6
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations:NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

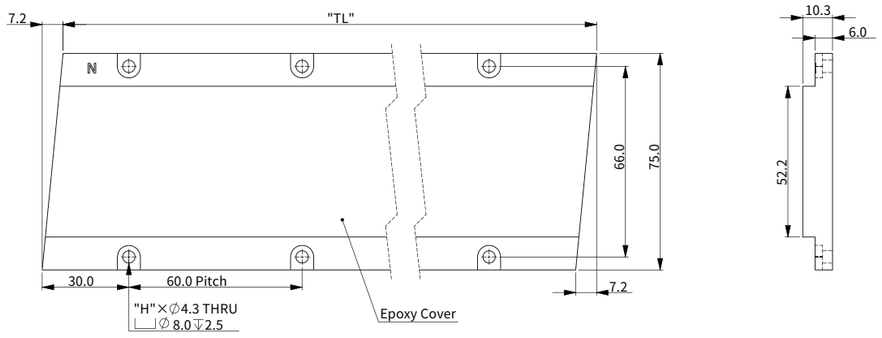
Dimension



Force-Speed Curve



AQM50 Track



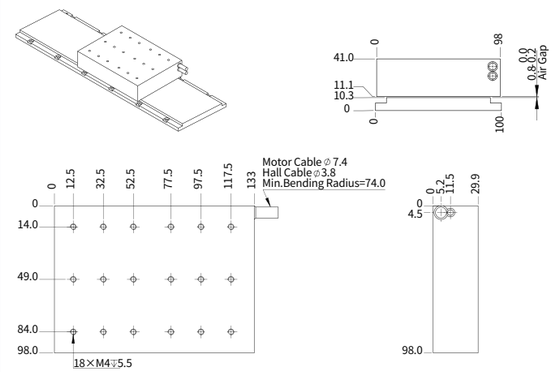
Magnet Track P / N:	Track Length "TL"	No.of Holes "H"
AQM50-TL180-E	180.0	6
AQM50-TL300-E	300.0	10
AQM50-TL420-E	420.0	14

AQM80-B1

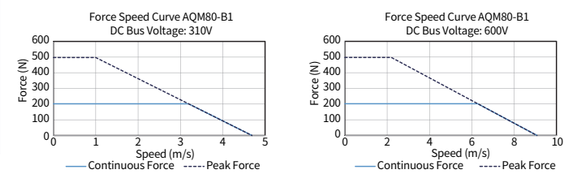
AQM80-B1			
Performance Parameters	**Symbol**	**Unit**	**Series**
Continuous Force (NC) @100°C[1]	F_{cn}	N	202.5
Peak Force	F_{pk}	N	497.2
Force Constant ±10%	K_f	N/Arms	81.0
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	66.1
Motor Constant @25°C	K_m	N/Sqrt(W)	19.5
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	11.5
Inductance (L-L) ±30%[3]	L	mH	100.0
Electrical Time Constant	τ_e	ms	8.7
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	2.5
Peak Current	I_{pk}	Arms	9.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	138.9
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	1.9
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	30
Attraction Force	F_a	N	747
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	1.9
Coil Length (NC)	L_{cn}	mm	133
Track Mass Per Meter	m_{track}	kg/m	6.1
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations:NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Dimension



Force-Speed Curve

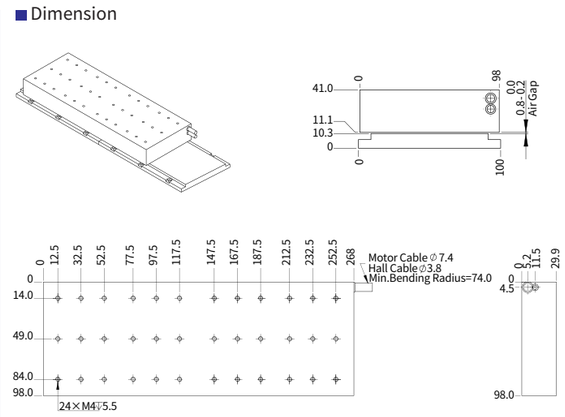


AQM80-B2

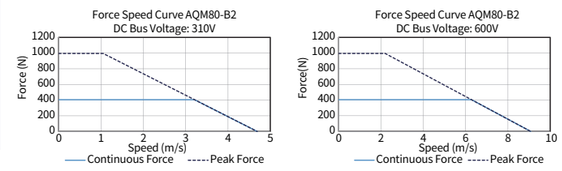
AQM80-B2			
Performance Parameters	**Symbol**	**Unit**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	405.0
Peak Force	F_{pk}	N	994.4
Force Constant ±10%	K_f	N/Arms	81.0
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	66.1
Motor Constant @25°C	K_m	N/Sqrt(W)	27.6
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	5.8
Inductance (L-L) ±30%[3]	L	mH	50.0
Electrical Time Constant	τ_e	ms	8.7
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	5.0
Peak Current	I_{pk}	Arms	18.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	277.9
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	3.7
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	30
Attraction Force	F_a	N	1494
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	3.9
Coil Length (NC)	L_{cn}	mm	268
Track Mass Per Meter	m_{track}	kg/m	6.1
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations:NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

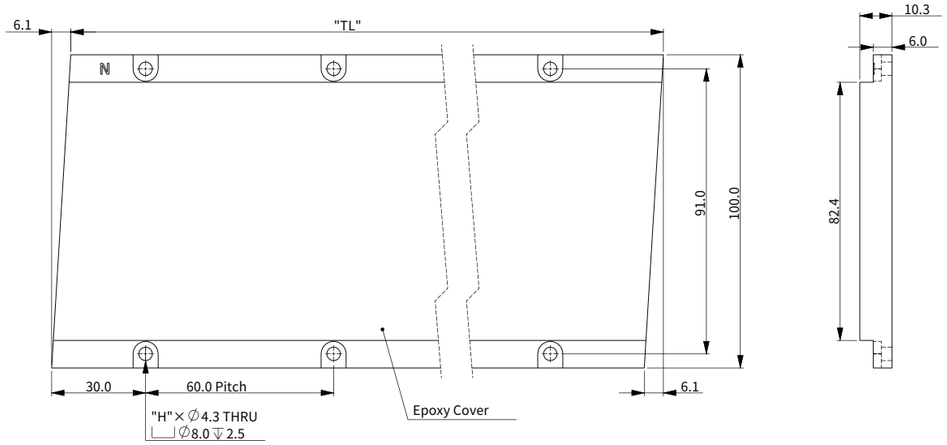
Dimension



Force-Speed Curve



AQM80 Track



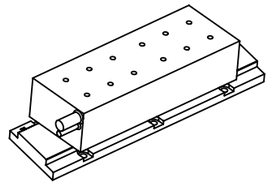
Magnet Track P / N:	Track Length "TL"	No.of Holes "H"
AQM80-TL180-E	180.0	6
AQM80-TL300-E	300.0	10
AQM80-TL420-E	420.0	14

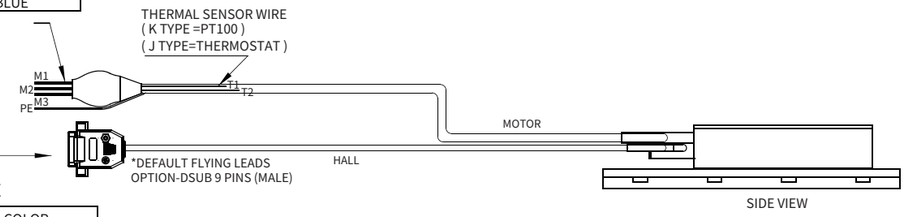
AQM Series

Motor Cable Connection

MOTOR CABLE

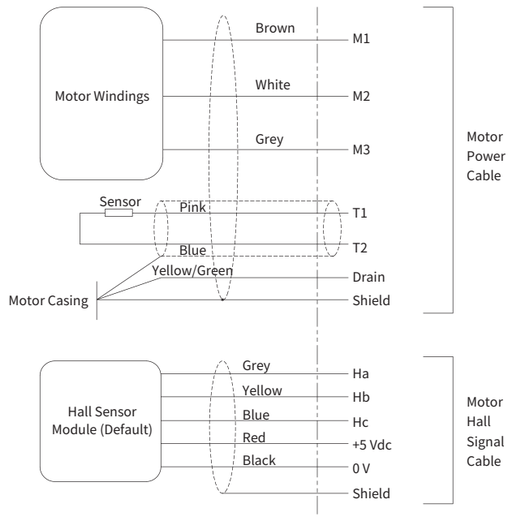
PIN	DESCRIPTION	COLOR
-	M1	BROWN
-	M2	WHITE
-	M3	GREY
-	PE	YELLOW/GREEN
-	T1	PINK
-	T2	BLUE





HALL CABLE

PIN	DESCRIPTION	COLOR
1	HA	GREY
2	HB	YELLOW
3	HC	BLUE
4	5VDC	RED
5	0VDC	BLACK



Part Numbering

Motor Coil

AQM8-B1-J-NH-0.5-NFB

- Model: AQM8
- Size: B1 / B2
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD) (Contact us for other thermal sensor)
- Motor Cable Option: NFB[2] / FB[3]
- Cable Length (m): 0.5 / 3.0 (Contact us for other lengths)
- Hall Cable Option: NH[1]

[1] NH = Without Built-in Hall Sensor but with Thermal Sensor
[2] NFB = No ferrite bead
[3] FB = Ferrite bead

AQM30-B1-J-HF-0.5-NFB

- Model: AQM24 / AQM30 / AQM50 / AQM80
- Size: B1 / B2
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD) (Contact us for other thermal sensor)
- Motor Cable Option: NFB[2] / FB[3]
- Cable Length (m): 0.5 / 3.0 (Contact us for other lengths)
- Hall Cable Option: HF[1]

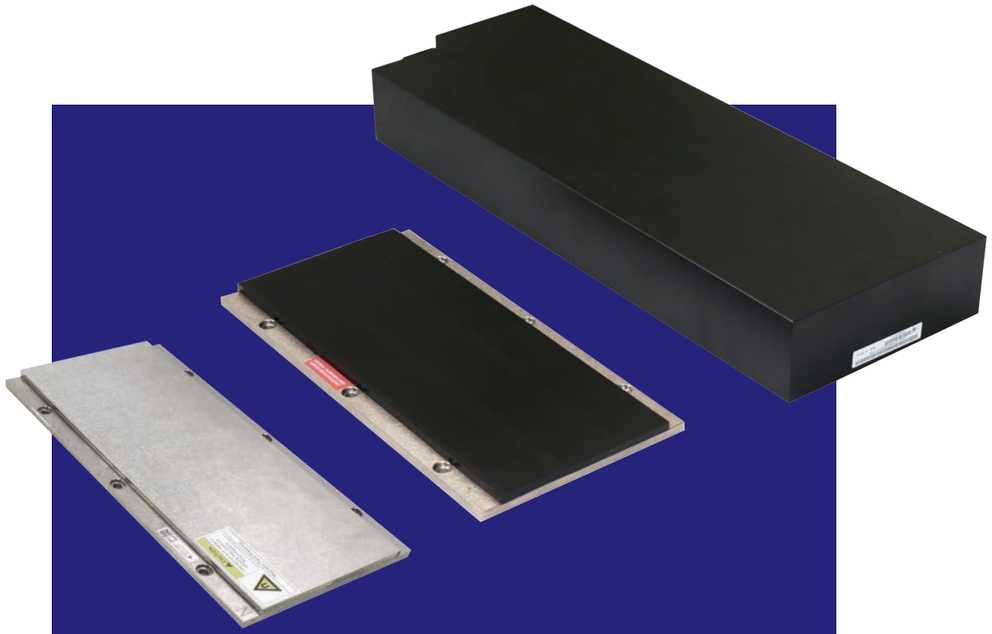
[1] HF = With Built-in hall sensor & hall cable comes with flying leads (Standard)
[2] NFB = No ferrite bead
[3] FB = Ferrite bead

Motor Track

AQM30-TL180-E

- Model: AQM8 / AQM24 / AQM30 / AQM50 / AQM80
- Track Length: TL180 / TL300 / TL420
- Cover Type: E[4]

[4] E=Epoxy cover



AKM SERIES

- Ironless technology
- Low cogging force
- Integrated with hall sensors
- High force and stiffness

Introduction

Iron Core AKM series linear motors provide the highest force for the smallest package size. This series also has a wide range of sizes and optional water-cooling configurations which are ideal for aggressive higher force and duty cycle applications.

Fcn (Continuous force) = 108.4N ~ 6190.1N

Fpk (Peak force) = 241.6N ~ 12884.3N

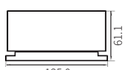
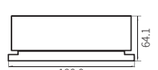
Features

- Iron core technology and low cogging force
- High continuous and peak force
- Optional hall sensors
- High motor constant
- Multiple coil lengths to select

Applications

Applicable to point-to-point micron meter level positioning; unlimited travel stroke with top speed of 5m/s or faster (stroke of 100m or longer).

Applications & Industries: high speed positioning systems for product handling in semiconductor, photovoltaic and lithium battery, glass and LCD applications, as well as machining centers, industrial printing machines, laser processing machines with demanding precision and motion control requirements.

	Series	Coil Length (mm)	● Continuous Force (F_{cn}) / ■ PeakForce (F_{pk})[1] Unit: N 200 · 500 · 1000 · 2000 · 3500 · 5500 · ····
	AKM30-B1	112	● 108.4 / ■ 241.6
	AKM30-B2	196	● 216.8 / ■ 483.2
	AKM30-B4	364	● 433.6 / ■ 966.3
	AKM50-B1	112	● 180.7 / ■ 402.6
	AKM50-B2	196	● 361.3 / ■ 805.3
	AKM50-B4	364	● 722.6 / ■ 1159.3
	AKM100-B1	112	● 361.3 / ■ 805.3
	AKM100-B2	196	● 722.6 / ■ 1159.3
	AKM100-B4	364	● 1445.3 / ■ 3221.1
	AKM150-B4	364	● 2027.0 / ■ 4831.6
	AKM150-B8	700	● 3839.1 / ■ 9663.2
	AKM200-B4	364	● 2539.6 / ■ 6442.2
	AKM200-B8	700	● 4817.7 / ■ 12884.3

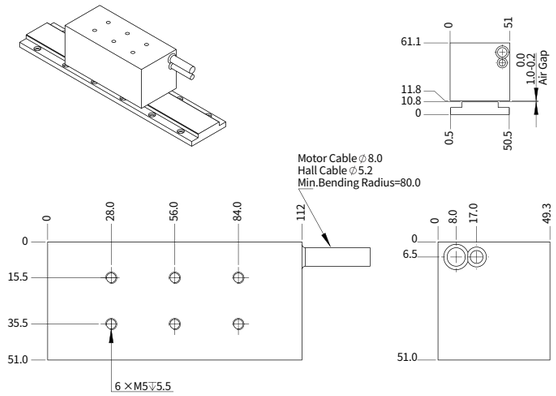
[1] Continuous force is measured under the condition of self-cooling. Please refer to the detail parameters table for the continuous force under the condition of water cooling.

AKM30-B1

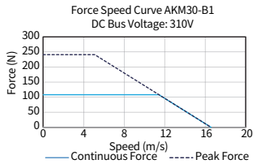
AKM30-B1			
Performance Parameters	**Symbol**	**Unit**	**Series**
Continuous Force (NC) @100°C[1]	F_{cn}	N	108.4
Peak Force	F_{pk}	N	241.6
Force Constant ±10%	K_f	N/Arms	23.0
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	18.7
Motor Constant @25°C	K_m	N/Sqrt(W)	17.7
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	1.1
Inductance (L-L) ±30%[3]	L	mH	21.0
Electrical Time Constant	τ_e	ms	18.8
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	4.8
Peak Current	I_{pk}	Arms	14.4
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	49.9
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.7
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	42
Attraction Force	F_a	kN	0.4
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	1.5
Coil Length (NC)	L_{cn}	mm	112
Track Mass Per Meter	m_{track}	kg	2.6
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

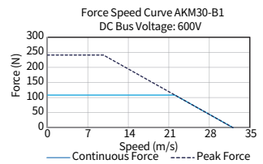
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.

■ Dimension



■ Force-Speed Curve



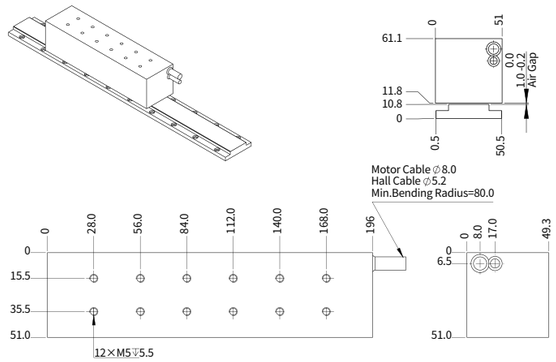


AKM30-B2

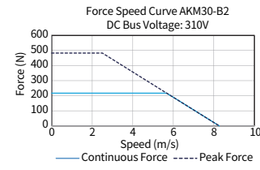
AKM30-B2			
Performance Parameters	**Symbol**	**Unit**	**Series**
Continuous Force (NC) @100°C[1]	F_{cn}	N	216.8
Peak Force	F_{pk}	N	483.2
Force Constant ±10%	K_f	N/Arms	45.9
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	37.5
Motor Constant @25°C	K_m	N/Sqrt(W)	25.0
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	2.2
Inductance (L-L) ±30%[3]	L	mH	42.0
Electrical Time Constant	τ_e	ms	18.8
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	4.8
Peak Current	I_{pk}	Arms	14.4
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	99.8
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	1.3
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	42
Attraction Force	F_a	kN	0.8
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	2.7
Coil Length (NC)	L_{cn}	mm	196
Track Mass Per Meter	m_{track}	kg	2.6
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

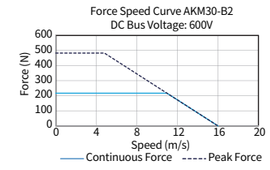
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.

■ Dimension



■ Force-Speed Curve





The contents of datasheet are subject to change without prior notice.

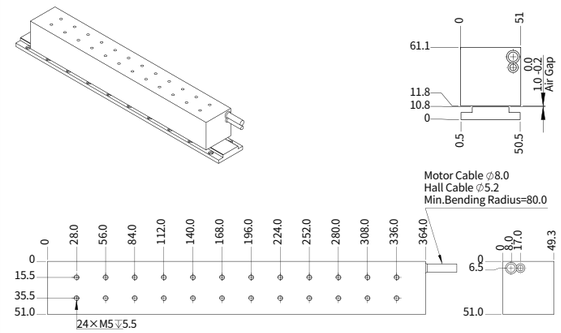
AKM Series

AKM30-B4

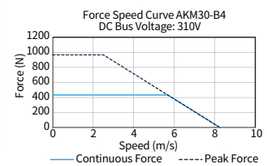
AKM30-B4			
Performance Parameters	**Symbol**	**Unit**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	433.6
Peak Force	F_{pk}	N	966.3
Force Constant ±10%	K_f	N/Arms	45.9
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	37.5
Motor Constant @25°C	K_m	N/Sqrt(W)	35.4
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	1.1
Inductance (L-L) ±30%[3]	L	mH	21.0
Electrical Time Constant	τ_e	ms	18.8
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	9.6
Peak Current	I_{pk}	Arms	28.8
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	199.5
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	2.7
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	42
Attraction Force	F_a	kN	1.6
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	5.3
Coil Length (NC)	L_{cn}	mm	364
Track Mass Per Meter	m_{track}	kg	2.6
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

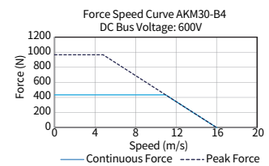
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.

■ Dimension

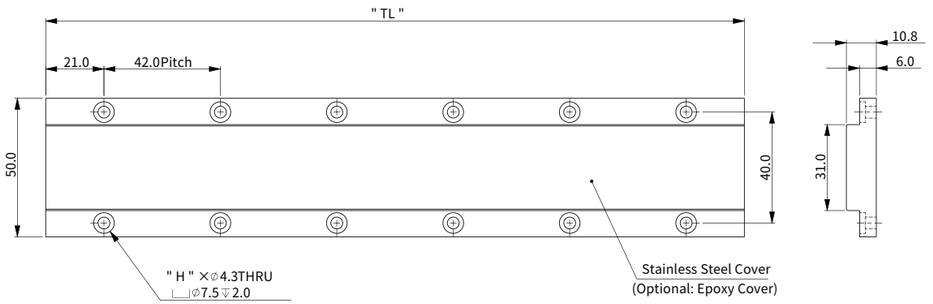


■ Force-Speed Curve





AKM30 Track



Magnet Track P / N:	Track Length "TL"	No.of Holes "H"
AKM30-TL168-S	168.0	8
AKM30-TL252-S	252.0	12
AKM30-TL420-S	420.0	20

For epoxy cover option, change "-S" to "-E". (e.g. AKM30-TL168-E)

The contents of datasheet are subject to change without prior notice.

Part Numbering

Motor Coil

AKM30-B2-J-NH-0.5-NFB

- Model: AKM30
- Size: B1 / B2 / B4
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD) (Contact us for other thermal sensor)
- Hall Cable Option: NH[1] / HF[2]
- Cable Length (m): 0.5 / 3.0 (Contact us for other lengths)
- Motor Cable Option: NFB[3] / FB[4]

1. NH = Without Built-in Hall Sensor but with Thermal Sensor
2. HF = With Built-in hall sensor & hall cable comes with flying leads (Standard)
3. NFB = No ferrite bead
4. FB = Ferrite bead

Motor Track

AKM30-TL420-S

- Model: AKM30
- Track Length: TL168 / TL252 / TL420
- Cover Type: S[5] / E[6]

5. S=Stainless steel cover
6. E=Epoxy cover

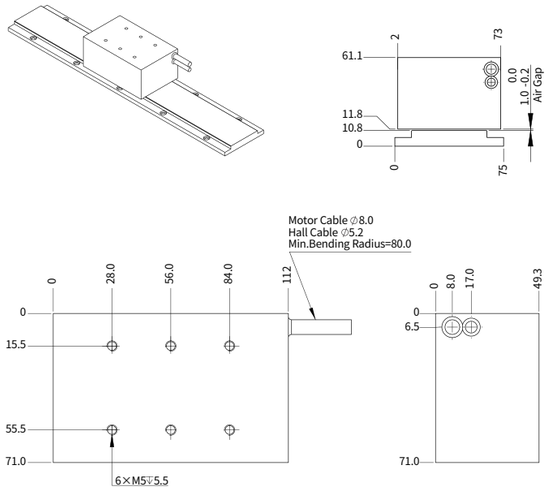
AKM50-B1

AKM50-B1			
Performance Parameters	**Symbol**	**Unit**	**Series**
Continuous Force (NC) @100°C[1]	F_{cn}	N	180.7
Continuous Force (WC) @100°C[1]	F_{cw}	N	-
Peak Force	F_{pk}	N	402.6
Force Constant ±10%	K_f	N/Arms	38.3
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	31.2
Motor Constant @25°C	K_m	N/Sqrt(W)	26.4
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	1.4
Inductance (L-L) ±30%[3]	L	mH	31.8
Electrical Time Constant	τ_e	ms	22.7
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	4.8
Continuous Current (WC) @100°C[1]	I_{cw}	Arms	-
Peak Current	I_{pk}	Arms	14.4
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	62.4
Continuous Power Dissipation (WC) @100°C[1]	P_{cw}	W	-
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.8
Thermal Dissipation Constant (WC)[1]	K_{thw}	W/°C	-
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	42.0
Attraction Force	F_a	kN	0.7
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	2.2
Coil Mass (WC)	m_{cw}	kg	-
Coil Length (NC)	L_{cn}	mm	112
Coil Length (WC)	L_{cw}	mm	-
Track Mass Per Meter	m_{track}	kg	4.8
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

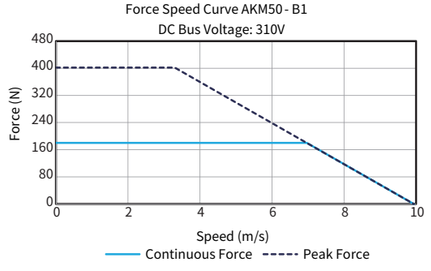
1. Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling ,WC-Water Cooling.
2. Resistance is measured by DC current with standard 0.5 m cable.
3. Inductance is measured by current frequency of 1 kHz.

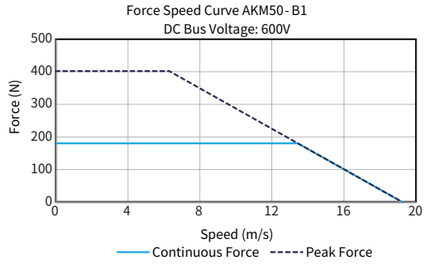
The contents of datasheet are subject to change without prior notice.

Dimension



Force-Speed Curve





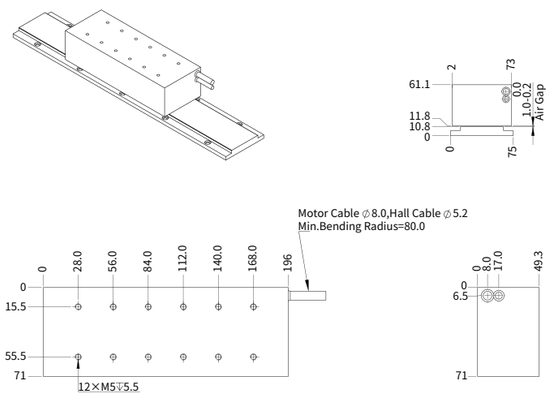
AKM50-B2

AKM50-B2			
Performance Parameters	**Symbol**	**Unit**	**Series**
Continuous Force (NC) @100°C[1]	F_{cn}	N	361.3
Continuous Force (WC) @100°C[1]	F_{cw}	N	579.6
Peak Force	F_{pk}	N	805.3
Force Constant ±10%	K_f	N/Arms	76.5
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	62.5
Motor Constant @25°C	K_m	N/Sqrt(W)	37.3
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	2.8
Inductance (L-L) ±30%[3]	L	mH	63.6
Electrical Time Constant	τ_e	ms	22.7
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	4.8
Continuous Current (WC) @100°C[1]	I_{cw}	Arms	8.2
Peak Current	I_{pk}	Arms	14.4
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	124.7
Continuous Power Dissipation (WC) @100°C[1]	P_{cw}	W	364.0
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	1.7
Thermal Dissipation Constant (WC)[1]	K_{thw}	W/°C	4.9
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	42.0
Attraction Force	F_a	kN	1.3
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	4.1
Coil Mass (WC)	m_{cw}	kg	4.9
Coil Length (NC)	L_{cn}	mm	196
Coil Length (WC)	L_{cw}	mm	234
Track Mass Per Meter	m_{track}	kg	4.8
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

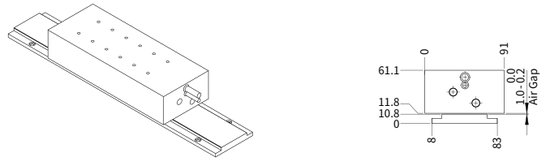
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations: NC-Natural Cooling ,WC-Water Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Dimension

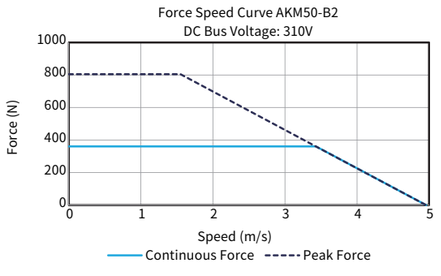
AKM50-B2

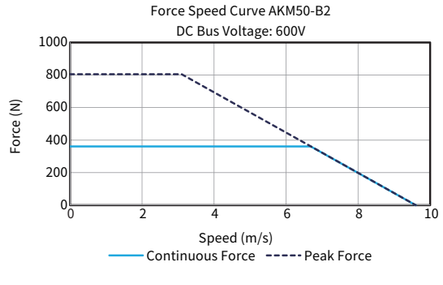


AKM50-W-B2



Force-Speed Curve





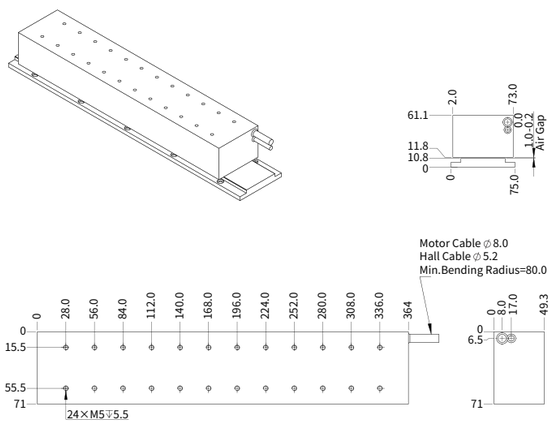
AKM50-B4

AKM50-B4			
Performance Parameters	**Symbol**	**Unit**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	722.6
Continuous Force (WC) @100°C[1]	F_{cw}	N	1159.3
Peak Force	F_{pk}	N	1610.5
Force Constant ±10%	K_f	N/Arms	76.5
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	62.5
Motor Constant @25°C	K_m	N/Sqrt(W)	52.8
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	1.4
Inductance (L-L) ±30%[3]	L	mH	31.8
Electrical Time Constant	τ_e	ms	22.7
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	9.6
Continuous Current (WC) @100°C[1]	I_{cw}	Arms	16.4
Peak Current	I_{pk}	Arms	28.8
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	249.4
Continuous Power Dissipation (WC) @100°C[1]	P_{cw}	W	727.9
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	3.3
Thermal Dissipation Constant (WC)[1]	K_{thw}	W/°C	9.7
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	42.0
Attraction Force	F_a	kN	2.7
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	7.9
Coil Mass (WC)	m_{cw}	kg	9.1
Coil Length (NC)	L_{cn}	mm	364
Coil Length (WC)	L_{cw}	mm	402
Track Mass Per Meter	m_{track}	kg	4.8
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

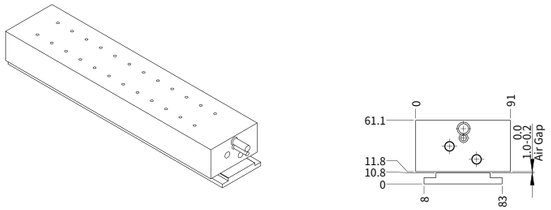
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations: NC-Natural Cooling ,WC-Water Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Dimension

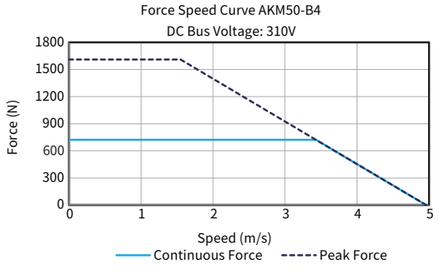
AKM50-B4

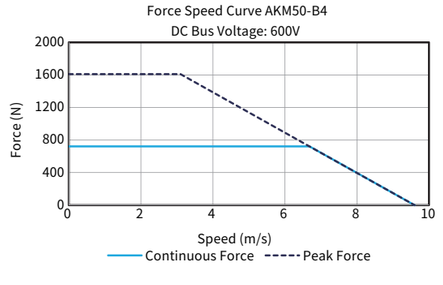


AKM50-W-B4

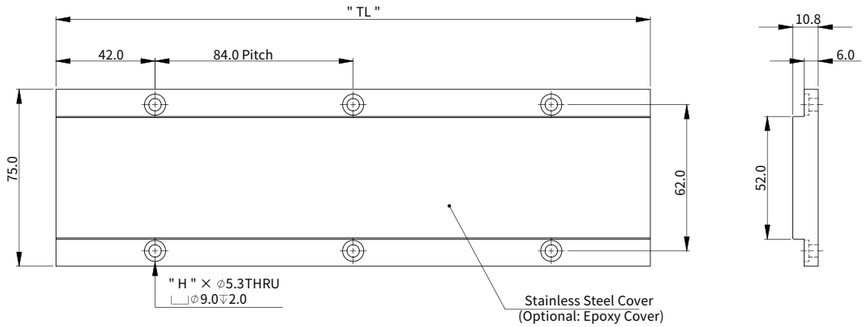


Force-Speed Curve





AKM50 Track



Magnet Track P / N:	Track Length "TL"	No.of Holes "H"
AKM50-TL168-S	168.0	4
AKM50-TL252-S	252.0	6
AKM50-TL420-S	420.0	10

For epoxy cover option, change" -S " to " -E ". (e.g. AKM50-TL168-E)

Part Numbering

Motor Coil

AKM50-W-B2-J-NH-0.5-NFB

- Model: AKM50
- Cooling Option: Blank=Natural Cooling; W=Water Cooling
- Size: B1 / B2 / B4
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD) (Contact us for other thermal sensor)
- Motor Cable Option: NFB[3] / FB[4]
- Cable Length (m): 0.5 / 3.0 (Contact us for other lengths)
- Hall Cable Option: NH[1] / HF[2]

1. NH = Without Built-in Hall Sensor but with Thermal Sensor
2. HF = With Built-in hall sensor & hall cable comes with flying leads (Standard)
3. NFB = No ferrite bead
4. FB = Ferrite bead

Motor Track

AKM50-TL420-S

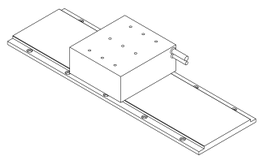
- Model: AKM50
- Track Length: TL168 / TL252 / TL420
- Cover Type: S[5] / E[6]

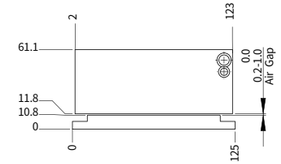
5. S=Stainless steel cover
6. E=Epoxy cover

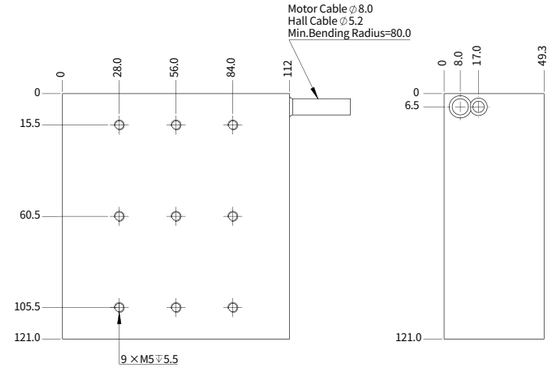
AKM100-B1

AKM100-B1				
Performance Parameters		**Symbol**	**Unit**	**Series**
Continuous Force (NC) @100°C[1]		F_{cn}	N	361.3
Continuous Force (WC) @100°C[1]		F_{cw}	N	-
Peak Force		F_{pk}	N	805.3
Force Constant ±10%		K_f	N/Arms	76.5
Back EMF Constant ±10%		K_e	Vpeak/(m/s)	62.5
Motor Constant @25°C		K_m	N/Sqrt(W)	41.2
Resistance (L-L) 25°C ±10%[2]		R_{25}	Ω	2.3
Inductance (L-L) ±30%[3]		L	mH	58.0
Electrical Time Constant		τ_e	ms	25.2
Continuous Current (NC) @100°C[1]		I_{cn}	Arms	4.8
Continuous Current (WC) @100°C[1]		I_{cw}	Arms	-
Peak Current		I_{pk}	Arms	14.4
Continuous Power Dissipation (NC) @100°C[1]		P_{cn}	W	102.4
Continuous Power Dissipation (WC) @100°C[1]		P_{cw}	W	-
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]		K_{thn}	W/°C	1.4
Thermal Dissipation Constant (WC)[1]		K_{thw}	W/°C	-
Max. Bus Voltage		U_{bus}	Vdc	600
Magnetic Period		τ_{NN}	mm	42
Attraction Force		F_a	kN	1.3
Mechanical Parameters				
Coil Mass (NC)		m_{cn}	kg	4.0
Coil Mass (WC)		m_{cw}	kg	-
Coil Length (NC)		L_{cn}	mm	112
Coil Length (WC)		L_{cw}	mm	-
Track Mass Per Meter		m_{track}	kg	8.6
Other Information				
Insulation Class			Class B (130°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension



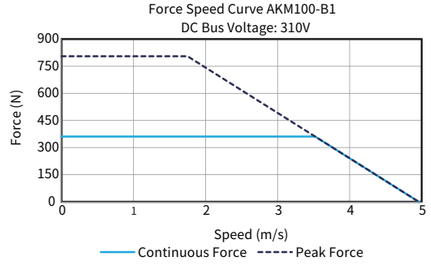


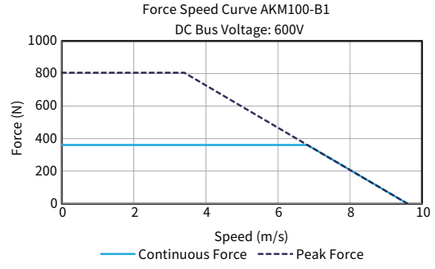


1. Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling ,WC-Water Cooling.
2. Resistance is measured by DC current with standard 0.5 m cable.
3. Inductance is measured by current frequency of 1 kHz.

The contents of datasheet are subject to change without prior notice.

■ Force-Speed Curve





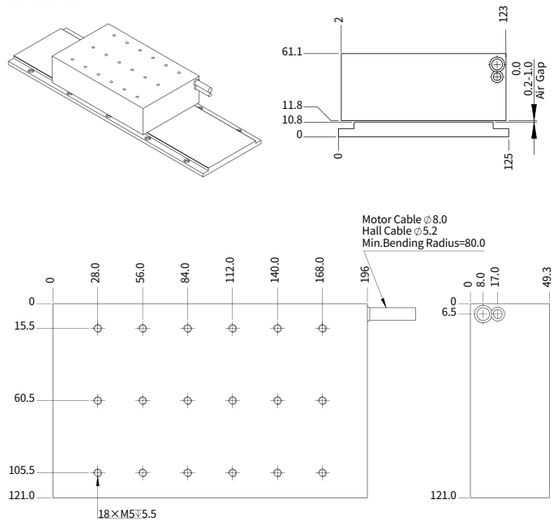
AKM100-B2

AKM100-B2			
Performance Parameters	**Symbol**	**Unit**	**Series**
Continuous Force (NC) @100°C[1]	F_{cn}	N	722.6
Continuous Force (WC) @100°C[1]	F_{cw}	N	1159.3
Peak Force	F_{pk}	N	1610.5
Force Constant ±10%	K_f	N/Arms	153.0
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	124.9
Motor Constant @25°C	K_m	N/Sqrt(W)	58.2
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	4.6
Inductance (L-L) ±30%[3]	L	mH	116.0
Electrical Time Constant	τ_e	ms	25.2
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	4.8
Continuous Current (WC) @100°C[1]	I_{cw}	Arms	8.2
Peak Current	I_{pk}	Arms	14.4
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	204.9
Continuous Power Dissipation (WC) @100°C[1]	P_{cw}	W	597.9
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	2.7
Thermal Dissipation Constant (WC)[1]	K_{thw}	W/°C	8.0
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	42
Attraction Force	F_a	kN	2.7
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	7.0
Coil Mass (WC)	m_{cw}	kg	8.5
Coil Length (NC)	L_{cn}	mm	196
Coil Length (WC)	L_{cw}	mm	236
Track Mass Per Meter	m_{track}	kg	8.6
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

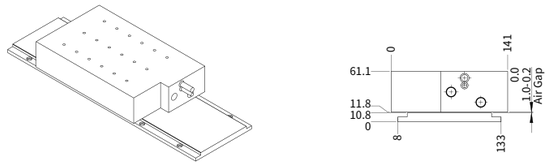
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations: NC-Natural Cooling ,WC-Water Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Dimension

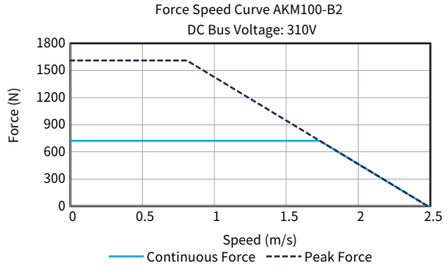
AKM100-B2

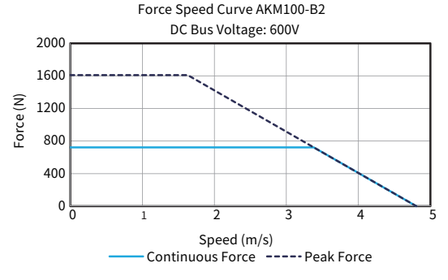


AKM100-W-B2



Force-Speed Curve





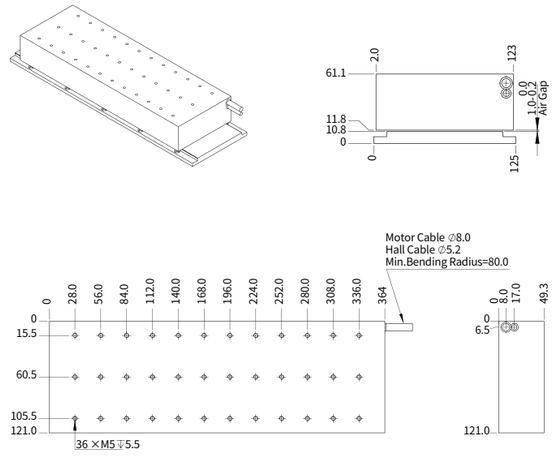
AKM100-B4

AKM100-B4			
Performance Parameters	**Symbol**	**Unit**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	1445.3
Continuous Force (WC) @100°C[1]	F_{cw}	N	1947.3
Peak Force	F_{pk}	N	3221.1
Force Constant ±10%	K_f	N/Arms	153.0
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	124.9
Motor Constant @25°C	K_m	N/Sqrt(W)	82.4
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	2.3
Inductance (L-L) ±30%[3]	L	mH	58.0
Electrical Time Constant	τ_e	ms	25.2
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	9.6
Continuous Current (WC) @100°C[1]	I_{cw}	Arms	13.4
Peak Current	I_{pk}	Arms	28.8
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	409.8
Continuous Power Dissipation (WC) @100°C[1]	P_{cw}	W	803.1
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	5.5
Thermal Dissipation Constant (WC)[1]	K_{thw}	W/°C	10.7
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	42
Attraction Force	F_a	kN	5.4
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	13.5
Coil Mass (WC)	m_{cw}	kg	15.8
Coil Length (NC)	L_{cn}	mm	364
Coil Length (WC)	L_{cw}	mm	404
Track Mass Per Meter	m_{track}	kg	8.6
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

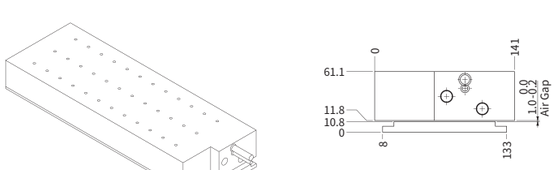
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations: NC-Natural Cooling ,WC-Water Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Dimension

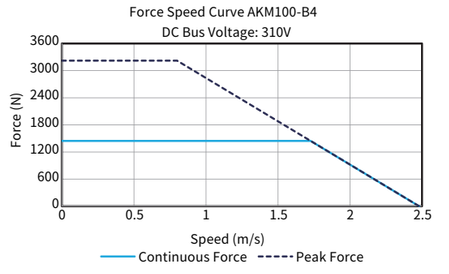
AKM100-B4

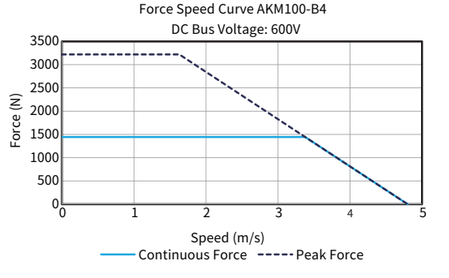


AKM100-W-B4

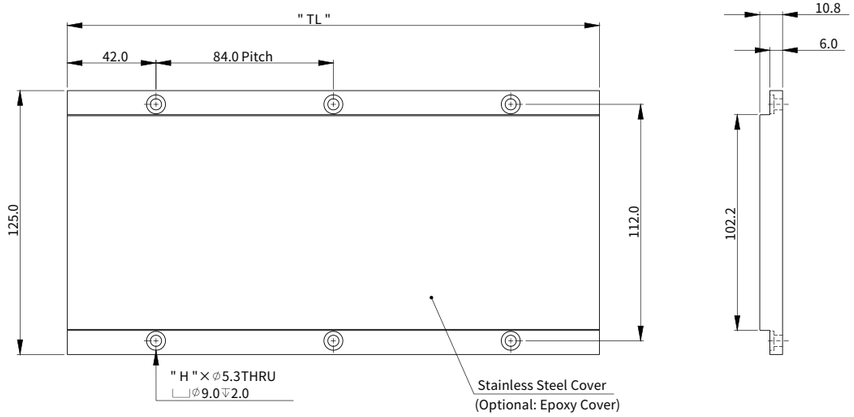


Force-Speed Curve





AKM100 Track



Magnet Track P / N:	Track Length "TL"	No.of Holes "H"
AKM100-TL168-S	168.0	4
AKM100-TL252-S	252.0	6
AKM100-TL420-S	420.0	10

For epoxy cover option, change " -S " to " -E ". (e.g. AKM100-TL168-E)

Part Numbering

Motor Coil

AKM100-W-B2-J-NH-0.5-NFB

- Model: AKM100
- Cooling Option: Blank=Natural Cooling; W=Water Cooling
- Size: B1 / B2 / B4
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD) (Contact us for other thermal sensor)
- Hall Cable Option: NH[1] / HF[2]
- Cable Length (m): 0.5 / 3.0 (Contact us for other lengths)
- Motor Cable Option: NFB[3] / FB[4]

1. NH = Without Built-in Hall Sensor but with Thermal Sensor
2. HF = With Built-in hall sensor & hall cable comes with flying leads (Standard)
3. NFB = No ferrite bead
4. FB = Ferrite bead

Motor Track

AKM100-TL420-S

- Model: AKM100
- Track Length: TL168 / TL252 / TL420
- Cover Type: S[5] / E[6]

5. S=Stainless steel cover
6. E=Epoxy cover

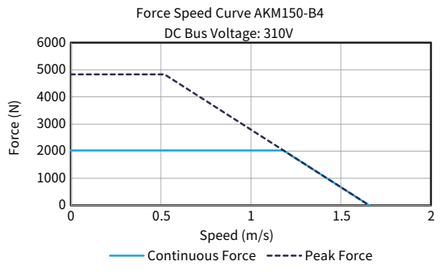
AKM150-B4

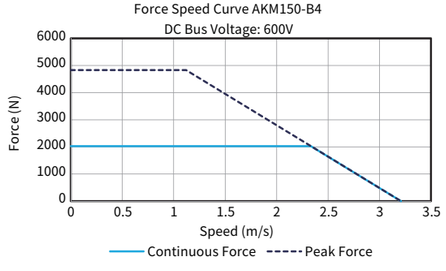
AKM150-B4			
Performance Parameters	**Symbol**	**Unit**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	2027.0
Continuous Force (WC) @100°C[1]	F_{cw}	N	2738.4
Peak Force	F_{pk}	N	4831.6
Force Constant ±10%	K_f	N/Arms	229.5
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	187.4
Motor Constant @25°C	K_m	N/Sqrt(W)	104.8
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	3.2
Inductance (L-L) ±30%[3]	L	mH	80.5
Electrical Time Constant	τ_e	ms	25.2
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	9.0
Continuous Current (WC) @100°C[1]	I_{cw}	Arms	12.6
Peak Current	I_{pk}	Arms	28.8
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	498.4
Continuous Power Dissipation (WC) @100°C[1]	P_{cw}	W	982.1
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	6.6
Thermal Dissipation Constant (WC)[1]	K_{thw}	W/°C	13.1
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	42
Attraction Force	F_a	kN	8.0
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	20.2
Coil Mass (WC)	m_{cw}	kg	22.3
Coil Length (NC)	L_{cn}	mm	364
Coil Length (WC)	L_{cw}	mm	404
Track Mass Per Meter	m_{track}	kg	15.2
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

1. Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment. Abbreviations: NC-Natural Cooling ,WC-Water Cooling.
2. Resistance is measured by DC current with standard 0.5 m cable.
3. Inductance is measured by current frequency of 1 kHz.

The contents of datasheet are subject to change without prior notice.

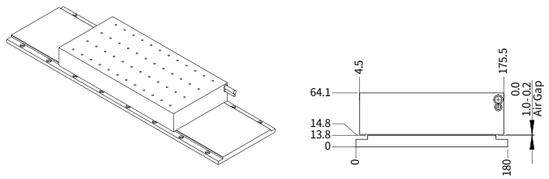
Force-Speed Curve

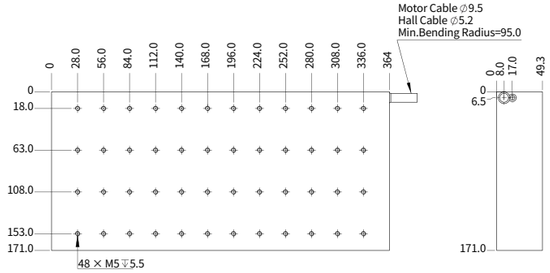




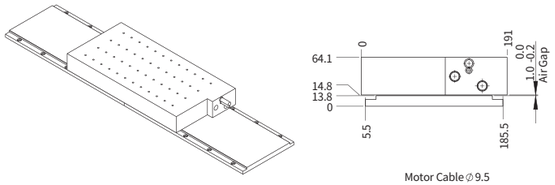
Dimension

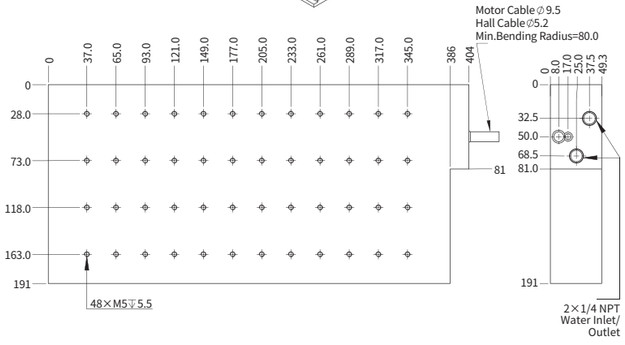
AKM150-B4





AKM150-W-B4



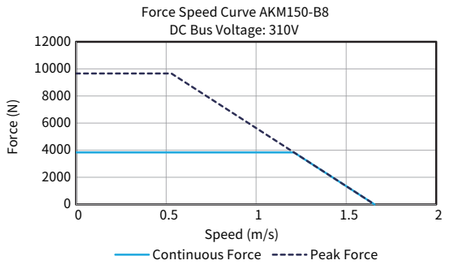


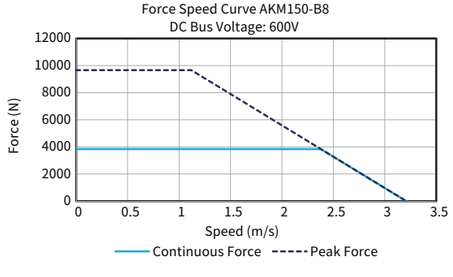
AKM150-B8

AKM150-B8			
Performance Parameters	**Symbol**	**Unit**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	3839.1
Continuous Force (WC) @100°C[1]	F_{cw}	N	5216.1
Peak Force	F_{pk}	N	9663.2
Force Constant ±10%	K_f	N/Arms	229.5
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	187.4
Motor Constant @25°C	K_m	N/Sqrt(W)	148.1
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	1.6
Inductance (L-L) ±30%[3]	L	mH	40.3
Electrical Time Constant	τ_e	ms	25.2
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	17.0
Continuous Current (WC) @100°C[1]	I_{cw}	Arms	24.0
Peak Current	I_{pk}	Arms	57.6
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	893.9
Continuous Power Dissipation (WC) @100°C[1]	P_{cw}	W	1781.6
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	11.9
Thermal Dissipation Constant (WC)[1]	K_{thw}	W/°C	23.8
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	42
Attraction Force	F_a	kN	16.0
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	39.4
Coil Mass (WC)	m_{cw}	kg	42.9
Coil Length (NC)	L_{cn}	mm	700
Coil Length (WC)	L_{cw}	mm	786
Track Mass Per Meter	m_{track}	kg	15.2
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations: NC-Natural Cooling ,WC-Water Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

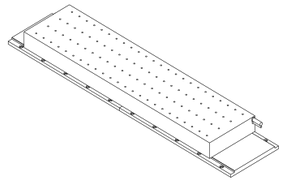
Force-Speed Curve

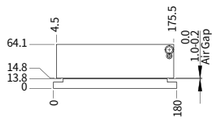


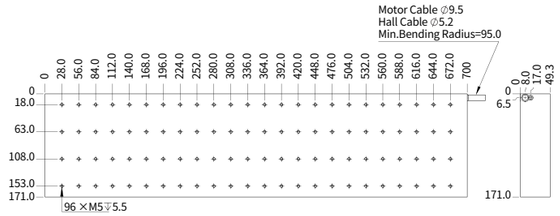


Dimension

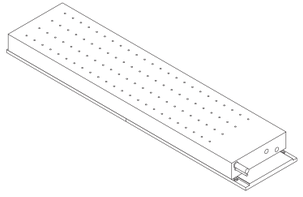
AKM150-B8

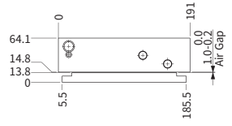


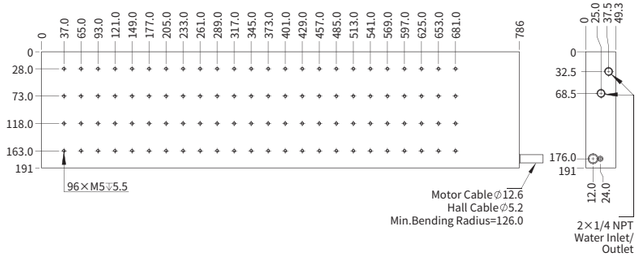




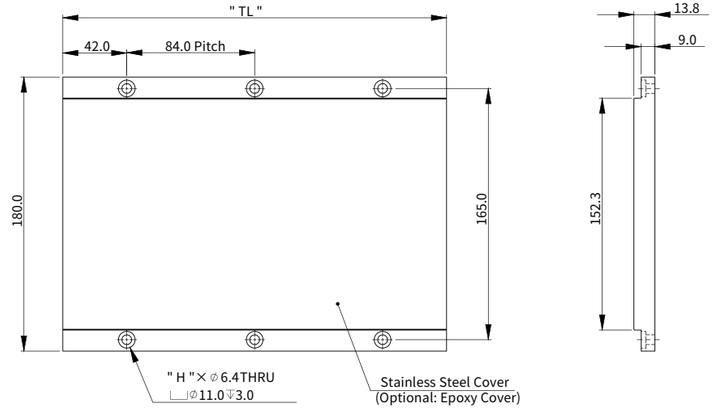
AKM150-W-B8







AKM150 Track



Magnet Track P / N:	Track Length "TL"	No.of Holes "H"
AKM150-TL168-S	168.0	4
AKM150-TL252-S	252.0	6
AKM150-TL420-S	420.0	10

For epoxy cover option, change " -S " to " -E ". (e.g. AKM150-TL168-E)

Part Numbering

Motor Coil

AKM150-W-B4-J-NH-0.5-NFB

- Model: AKM150
- Cooling Option: Blank=Natural Cooling; W=Water Cooling
- Size: B4 / B8
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD) (Contact us for other thermal sensor)
- Hall Cable Option: NH[1] / HF[2]
- Cable Length (m): 0.5 / 3.0 (Contact us for other lengths)
- Motor Cable Option: NFB[3] / FB[4]

[1] NH = Without Built-in Hall Sensor but with Thermal Sensor
[2] HF = With Built-in hall sensor & hall cable comes with flying leads (Standard)
[3] NFB = No ferrite bead
[4] FB = Ferrite bead

Motor Track

AKM150-TL420-S

- Model: AKM150
- Track Length: TL168 / TL252 / TL420
- Cover Type: S[5] / E[6]

[5] S=Stainless steel cover
[6] E=Epoxy cover

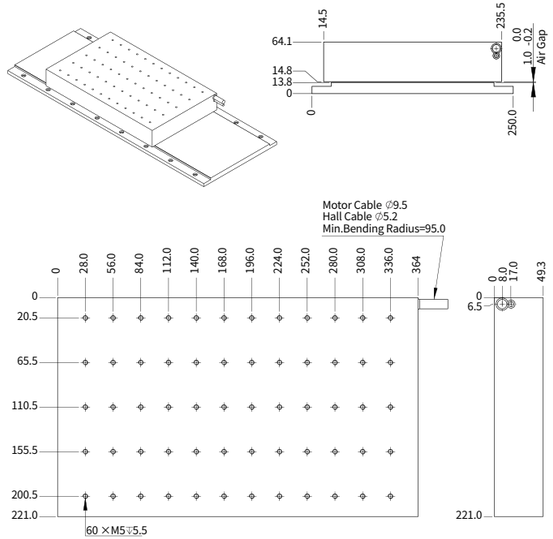
AKM200-B4

AKM200-B4			
Performance Parameters	**Symbol**	**Unit**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	2539.6
Continuous Force (WC) @100°C[1]	F_{cw}	N	3249.8
Peak Force	F_{pk}	N	6442.2
Force Constant ±10%	K_f	N/Arms	306.0
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	249.8
Motor Constant @25°C	K_m	N/Sqrt(W)	124.9
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	4.0
Inductance (L-L) ±30%[3]	L	mH	103.0
Electrical Time Constant	τ_e	ms	25.8
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	8.4
Continuous Current (WC) @100°C[1]	I_{cw}	Arms	10.8
Peak Current	I_{pk}	Arms	28.8
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	545.6
Continuous Power Dissipation (WC) @100°C[1]	P_{cw}	W	904.4
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	7.3
Thermal Dissipation Constant (WC)[1]	K_{thw}	W/°C	12.1
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	42
Attraction Force	F_a	kN	10.7
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	26.5
Coil Mass (WC)	m_{cw}	kg	29.0
Coil Length (NC)	L_{cn}	mm	364
Coil Length (WC)	L_{cw}	mm	404
Track Mass Per Meter	m_{track}	kg	22.4
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

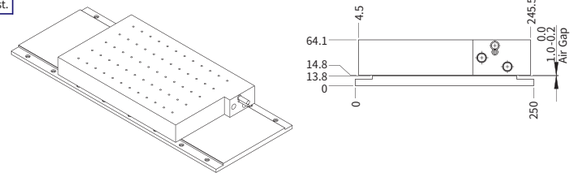
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations: NC-Natural Cooling ,WC-Water Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Dimension

AKM200-B4

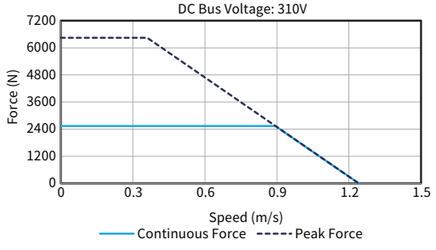


AKM200-W-B4

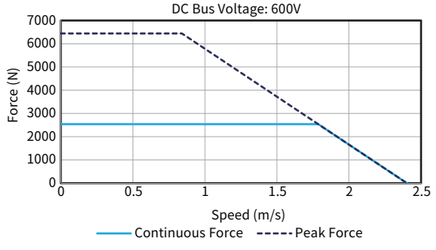


Force-Speed Curve

Force Speed Curve AKM200-B4
DC Bus Voltage: 310V



Force Speed Curve AKM200-B4
DC Bus Voltage: 600V



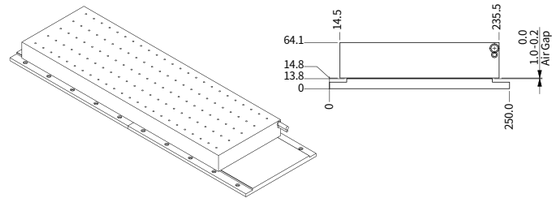
AKM200-B8

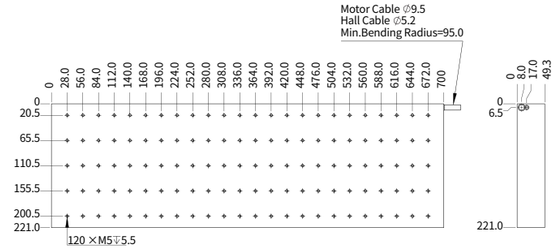
AKM200-B8			
Performance Parameters	**Symbol**	**Unit**	**Parallel**
Continuous Force (NC) @100°C[1]	F_{cn}	N	4817.7
Continuous Force (WC) @100°C[1]	F_{cw}	N	6190.1
Peak Force	F_{pk}	N	12884.3
Force Constant ±10%	K_f	N/Arms	306.0
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	249.8
Motor Constant @25°C	K_m	N/Sqrt(W)	176.7
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	2.0
Inductance (L-L) ±30%[3]	L	mH	51.5
Electrical Time Constant	τ_e	ms	25.8
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	16.0
Continuous Current (WC) @100°C[1]	I_{cw}	Arms	20.6
Peak Current	I_{pk}	Arms	57.6
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	989.8
Continuous Power Dissipation (WC) @100°C[1]	P_{cw}	W	1640.7
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	13.2
Thermal Dissipation Constant (WC)[1]	K_{thw}	W/°C	21.9
Max. Bus Voltage	U_{bus}	Vdc	600
Magnetic Period	τ_{NN}	mm	42
Attraction Force	F_a	kN	21.4
Mechanical Parameters			
Coil Mass (NC)	m_{cn}	kg	51.6
Coil Mass (WC)	m_{cw}	kg	55.8
Coil Length (NC)	L_{cn}	mm	700
Coil Length (WC)	L_{cw}	mm	786
Track Mass Per Meter	m_{track}	kg	22.4
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
Abbreviations: NC-Natural Cooling ,WC-Water Cooling.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

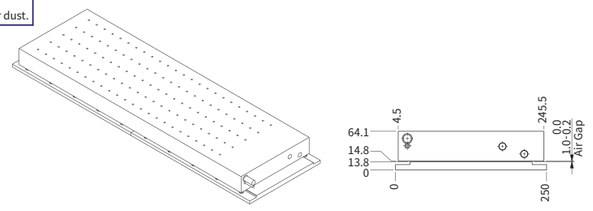
Dimension

AKM200-B8



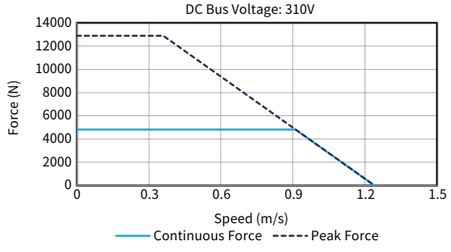


AKM200-W-B8

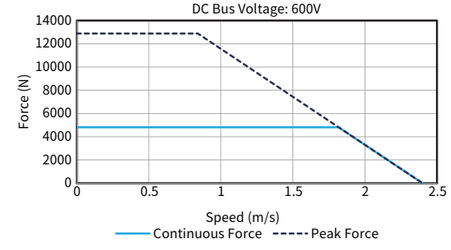


Force-Speed Curve

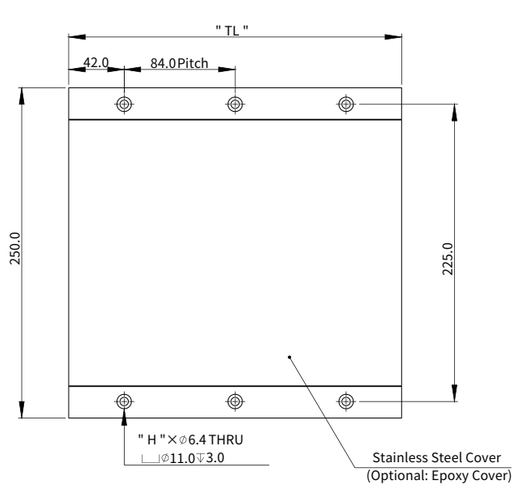
Force Speed Curve AKM200-B8
DC Bus Voltage: 310V

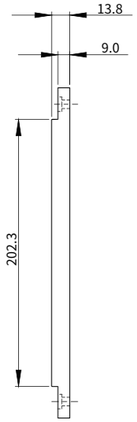


Force Speed Curve AKM200-B8
DC Bus Voltage: 600V



AKM200 Track





Magnet Track P / N:	Track Length "TL"	No.of Holes "H"
AKM200-TL168-S	168.0	4
AKM200-TL252-S	252.0	6
AKM200-TL420-S	420.0	10

For epoxy cover option, change " -S " to " -E ". (e.g. AKM200-TL168-E)

Part Numbering

Motor Coil

AKM200-W-B8-J-NH-0.5-NFB

- Model: AKM200
- Cooling Option: Blank=Natural Cooling; W=Water Cooling
- Size: B4 / B8
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD) (Contact us for other thermal sensor)
- Hall Cable Option: NH[1] / HF[2]
- Cable Length (m): 0.5 / 3.0 (Contact us for other lengths)
- Motor Cable Option: NFB[3] / FB[4]

1. NH = Without Built-in Hall Sensor but with Thermal Sensor
2. HF = With Built-in hall sensor & hall cable comes with flying leads (Standard)
3. NFB = No ferrite bead
4. FB = Ferrite bead

Motor Track

AKM200-TL420-S

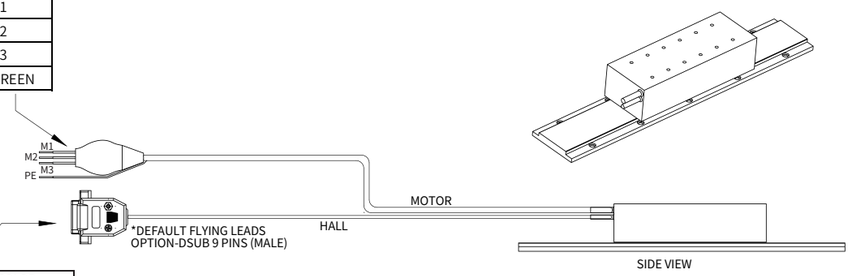
- Model: AKM200
- Track Length: TL168 / TL252 / TL420
- Cover Type: S[5] / E[6]

5. S=Stainless steel cover
6. E=Epoxy cover

Motor Cable Connection

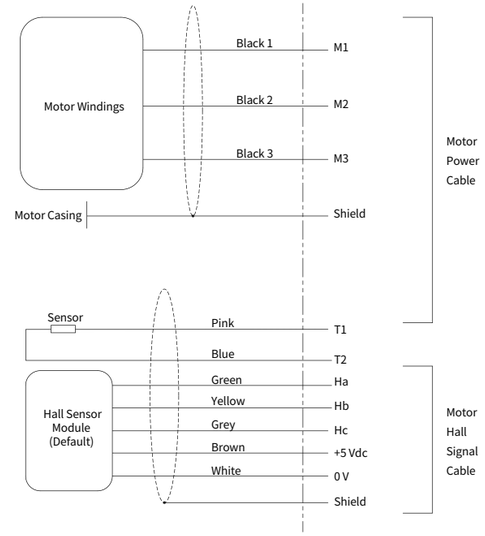
MOTOR CABLE

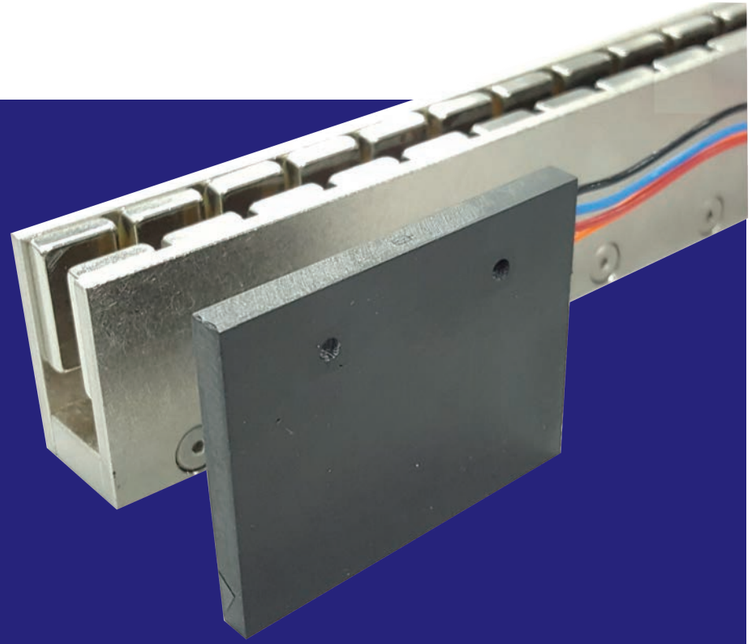
PIN	DESCRIPTION	COLOR
-	M1	BLACK 1
-	M2	BLACK 2
-	M3	BLACK 3
-	PE	YELLOW / GREEN



HALL CABLE

PIN	DESCRIPTION	COLOR
1	HA	GREEN
2	HB	YELLOW
3	HC	GREY
4	5VDC	BROWN
5	0VDC	WHITE
6	T1	PINK
7	T2	BLUE





AWM SERIES

- Ironless technology
- Vacuum Compatible (RGA tested)
- Zero cogging force
- Ironless linear motors with the highest motor constant and shortest coils lengths
- High continuous force and peak force

Introduction

AWM series linear motors are vacuum compatible ironless motors with no cogging force and high continuous/peak forces.

Fcn (Continuous force) = 4.5N ~ 414.8N

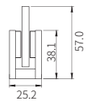
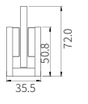
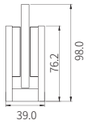
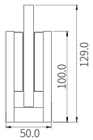
Fpk (Peak force) = 22.3N ~ 2986.3N

Features

- Vacuum compatible (RGA tested in 1×10^{-7} Torr vacuum)
- Ironless technology and no cogging force
- High continuous and peak force
- High motor constant
- Multiple coil lengths to select

Applications

Applicable to point-to-point micron/nanometer level positioning; unlimited travel stroke with top speed of 5m/s or faster; low velocity ripple during both fast and low speed scanning; precise force control with fine resolution.
Applications & Industries: front-end & back-end wafer handling and inspection, glass and LCD applications, and biomedical applications that require vacuum compatibility, high speed, precise motion and velocity control.

	Series	Coil Length (mm)	● Continuous Force (Fcn) / ■ PeakForce (Fpk) [1] Unit: N 10 / 50 / 100 / 200 / 300 / 400 / ····
	AWM1-S1	43	●4.5 / ■22.3
	AWM1-S2	85	●8.9 / ■44.7
	AWM1-S3	127	●13.4 / ■67.0
	AWM2-S1	61	●13.5 / ■67.4
	AWM2-S2	121	●27.0 / ■134.9
	AWM2-S3	181	●40.5 / ■202.3
	AWM3-S1	121	●47.0 / ■240.1
	AWM3-S2	241	●94.0 / ■480.2
	AWM3-S3	361	●140.9 / ■720.4
	AWM4-S1	121	●79.6 / ■397.9
	AWM4-S2	241	●159.2 / ■795.8
	AWM4-S3	361	●238.7 / ■1193.7
	AWM5-S1	169	●138.3 / ■995.4
	AWM5-S2	337	●276/ ■1990.9
	AWM5-S3	505	●414.8 / ■2986.3

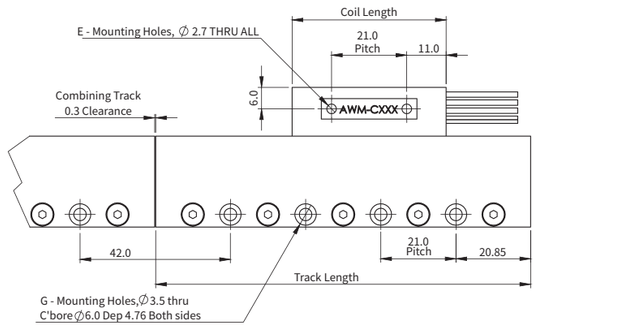
[1] Continuous force is measured under the condition of self-cooling.

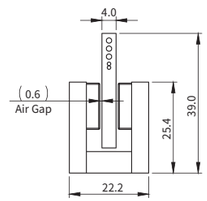
AWM1

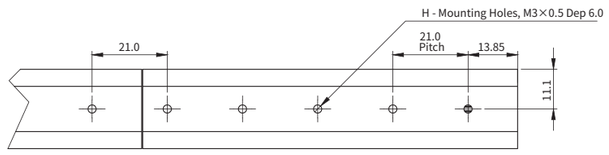
			AWM1-S1	AWM1-S2	AWM1-S3
Performance Parameters	**Symbol**	**Unit**	Series	Series	Series
Continuous Force (NC) @100°C [1]	F_{cn}	N	4.5	8.9	13.4
Peak Force	F_{pk}	N	22.3	44.7	67.0
Force Constant ±10%	K_f	N/Arms	2.6	5.3	7.9
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	2.1	4.3	6.4
Motor Constant @25°C	K_m	N/Sqrt(W)	1.9	2.7	3.3
Resistance (L-L) 25°C ±10% [2]	R_{25}	Ω	1.3	2.5	3.75
Inductance (L-L) ±30% [3]	L	mH	0.2	0.3	0.5
Electrical Time Constant	τ_e	ms	0.1	0.1	0.1
Continuous Current (NC) @100°C [1]	I_{cn}	Arms	1.7	1.7	1.7
Peak Current	I_{pk}	Arms	8.5	8.5	8.5
Continuous Power Dissipation (NC) @100°C [1]	P_{cn}	W	7.0	14.0	21.0
Max. Coil Temperature	t_{max}	°C	125.0	125.0	125.0
Thermal Dissipation Constant (NC) [1]	K_{thn}	W/°C	0.1	0.2	0.3
Max. Bus Voltage	U_{bus}	Vdc	330.0	330.0	330.0
Magnetic Period	τ_{NN}	mm	30.0	30.0	30.0
Attraction Force	F_a	kN	0.0	0.0	0.0
Mechanical Parameters					
Coil Mass (NC)	m_{cn}	kg	0.02	0.04	0.06
Coil Length (NC)	L_{cn}	mm	43.0	85.0	127.0
Track Mass Per Meter	m_{track}	kg/m	1.1	1.1	1.1
Other Information					
Insulation Class			Class B (130°C)		
Protection Grade			IP00		
Compliance with Global Standards			RoHS, CE		
Ambient Temperature	Operation		0°C to 40°C (non-freezing)		
	Storage		-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)		
	Storage		10%RH to 90%RH (non-condensing)		
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Dimension







Motor Coil		
Model No	Coil Length	E
AWM1-S1	43.0	2
AWM1-S2	85.0	4
AWM1-S3	127.0	6

Motor Track			
Model No	Track Length	G	H
AWM1-TL63	62.7	2	3
AWM1-TL84	83.7	3	4
AWM1-TL105	104.7	4	5

Part Numbering

Motor Coil

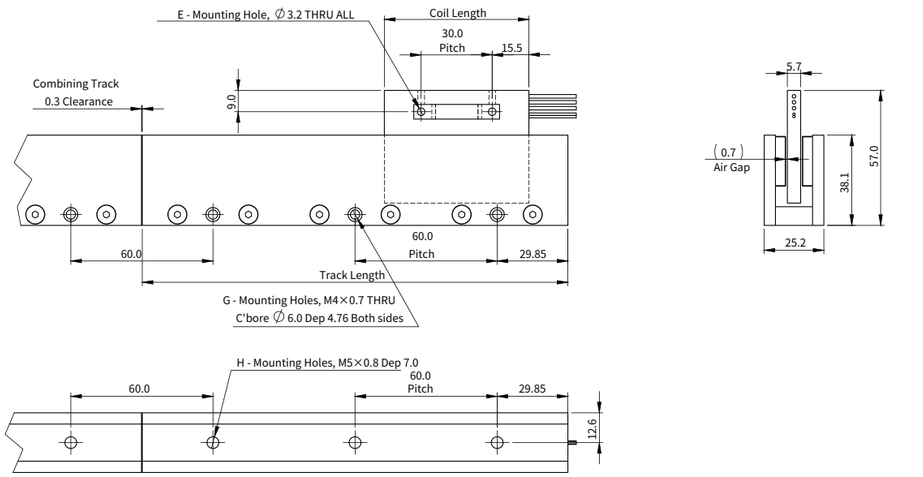
Motor Track

AWM2

			AWM2-S1	AWM2-S2		AWM2-S3	
Performance Parameters	**Symbol**	**Unit**	Series	Series	Parallel	Series	Parallel
Continuous Force (NC) @100°C ❶	F_{cn}	N	13.5	27.0	27.0	40.5	40.5
Peak Force	F_{pk}	N	67.4	134.9	134.9	202.3	202.3
Force Constant ±10%	K_f	N/Arms	8.4	16.9	8.4	25.3	8.4
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	6.9	13.8	6.9	20.6	6.9
Motor Constant @25°C	K_m	N/Sqrt(W)	3.5	4.9	4.9	6.0	6.0
Resistance (L-L) 25°C ±10% ❷	R_{25}	Ω	3.9	7.8	2.0	11.7	1.3
Inductance (L-L) ±30% ❸	L	mH	1.3	2.6	0.7	3.9	0.4
Electrical Time Constant	τ_e	ms	0.3	0.3	0.3	0.3	0.3
Continuous Current (NC) @100°C ❶	I_{cn}	Arms	1.6	1.6	3.2	1.6	4.8
Peak Current	I_{pk}	Arms	8.0	8.0	16.0	8.0	24.0
Continuous Power Dissipation (NC) @100°C ❶	P_{cn}	W	19.3	38.6	38.6	57.9	57.9
Max. Coil Temperature	t_{max}	°C	125.0	125.0	125.0	125.0	125.0
Thermal Dissipation Constant (NC) ❶	K_{thn}	W/°C	0.3	0.5	0.5	0.8	0.8
Max. Bus Voltage	U_{bus}	Vdc	330.0	330.0	330.0	330.0	330.0
Magnetic Period	τ_{NN}	mm	30.0	30.0	30.0	30.0	30.0
Attraction Force	F_a	kN	0.0	0.0	0.0	0.0	0.0
Mechanical Parameters							
Coil Mass (NC)	m_{cn}	kg	0.1	0.1	0.1	0.2	0.2
Coil Length (NC)	L_{cn}	mm	61.0	121.0	121.0	181.0	181.0
Track Mass Per Meter	m_{track}	kg/m	3.5	3.5	3.5	3.5	3.5
Other Information							
Insulation Class			Class B (130°C)				
Protection Grade			IP00				
Compliance with Global Standards			RoHS, CE				
Ambient Temperature	Operation		0°C to 40°C (non-freezing)				
	Storage		-15°C to 70°C (non-freezing)				
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)				
	Storage		10%RH to 90%RH (non-condensing)				
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.				

❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5 m cable.
❸ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

■ Dimension



Motor Coil		
Model No	Coil Length	E
AWM2-S1	61.0	2
AWM2-S2	121.0	4
AWM2-S3	181.0	6

Motor Track			
Model No	Track Length	G	H
AWM2-TL120	119.7	2	2
AWM2-TL180	179.7	3	3
AWM2-TL240	239.7	4	4
AWM2-TL300	299.7	5	5

Part Numbering

Motor Coil

AWM2-S-S1-K-0.5

- Motor: AWM2
- Winding: S = Series / P = Parallel
- Size: S1 / S2 / S3
- Thermal Sensor: K = PT100 (RTD)
- Cable Length: 0.5

Motor Track

AWM2-TL120

- Model: AWM2
- Track Length: TL120 / TL180 / TL240 / TL300

AWM3

			AWM3-S1	AWM3-S2		AWM3-S3	
Performance Parameters	**Symbol**	**Unit**	Series	Series	Parallel	Series	Parallel
Continuous Force (NC) @100°C ❶	F_{cn}	N	47.0	94.0	94.0	140.9	140.9
Peak Force	F_{pk}	N	240.1	480.2	480.2	720.4	720.4
Force Constant ±10%	K_f	N/Arms	26.1	52.2	26.1	78.3	26.1
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	21.3	42.6	21.3	63.9	21.3
Motor Constant @25°C	K_m	N/Sqrt(W)	7.7	10.9	10.9	13.3	13.3
Resistance (L-L) 25°C ±10% ❷	R_{25}	Ω	7.7	15.4	3.9	23.1	2.6
Inductance (L-L) ±30% ❸	L	mH	5.9	11.8	3.0	17.7	2.0
Electrical Time Constant	T_e	ms	0.8	0.8	0.8	0.8	0.8
Continuous Current (NC) @100°C ❶	I_{cn}	Arms	1.8	1.8	3.6	1.8	5.4
Peak Current	I_{pk}	Arms	9.2	9.2	18.4	9.2	27.6
Continuous Power Dissipation (NC) @100°C ❶	P_{cn}	W	48.2	96.5	96.5	144.7	144.7
Max. Coil Temperature	t_{max}	°C	125.0	125.0	125.0	125.0	125.0
Thermal Dissipation Constant (NC) ❶	K_{thn}	W/°C	0.6	1.3	1.3	1.9	1.9
Max. Bus Voltage	U_{bus}	Vdc	330.0	330.0	330.0	330.0	330.0
Magnetic Period	τ_{MN}	mm	60.0	60.0	60.0	60.0	60.0
Attraction Force	F_a	kN	0.0	0.0	0.0	0.0	0.0
Mechanical Parameters							
Coil Mass (NC)	m_{cn}	kg	0.2	0.5	0.5	0.7	0.7
Coil Length (NC)	L_{cn}	mm	121.0	241.0	241.0	361.0	361.0
Track Mass Per Meter	m_{track}	kg/m	10.7	10.7	10.7	10.7	10.7
Other Information							
Insulation Class			Class B (130°C)				
Protection Grade			IP00				
Compliance with Global Standards			RoHS, CE				
Ambient Temperature	Operation		0°C to 40°C (non-freezing)				
	Storage		-15°C to 70°C (non-freezing)				
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)				
	Storage		10%RH to 90%RH (non-condensing)				
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.				

❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 0.5 m cable.
❸ Inductance is measured by current frequency of 1 kHz.
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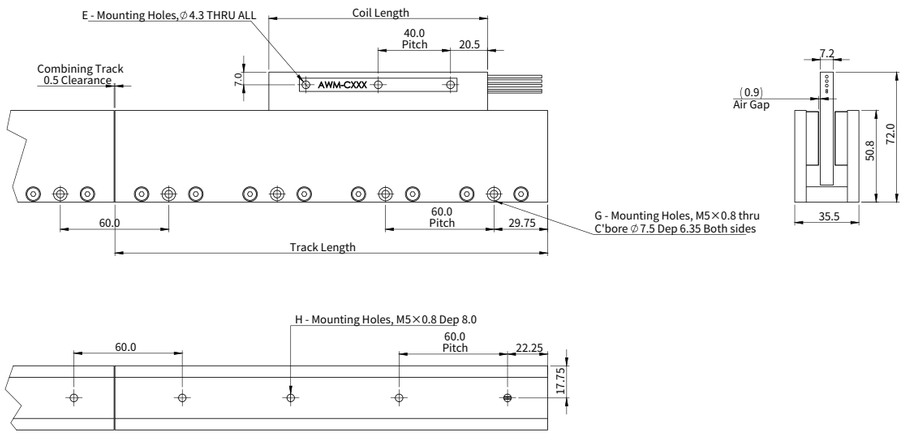
Dimension



Motor Coil		
Model No	Coil Length	E
AWM3-S1	121.0	3
AWM3-S2	241.0	6
AWM3-S3	361.0	9

Motor Track			
Model No	Track Length	G	H
AWM3-TL180	179.5	3	3
AWM3-TL240	239.5	4	4
AWM3-TL300	299.5	5	5
AWM3-TL600	599.5	10	10

Part Numbering

Motor Coil

AWM3-S-S1-K-0.5

- Motor: AWM3
- Winding: S = Series / P = Parallel
- Size: S1 / S2 / S3
- Thermal Sensor: K = PT100 (RTD)
- Cable Length: 0.5

Motor Track

AWM3-TL180

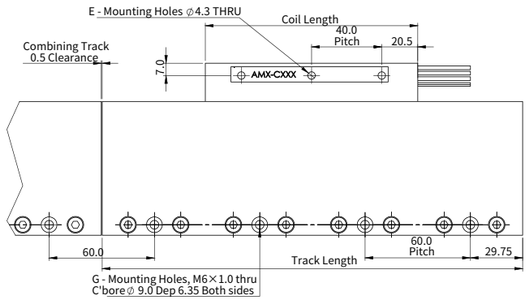
- Model: AWM3
- Track Length: TL180 / TL240 / TL300 / TL600

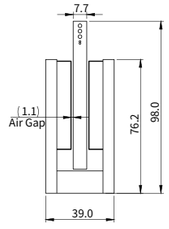
AWM4

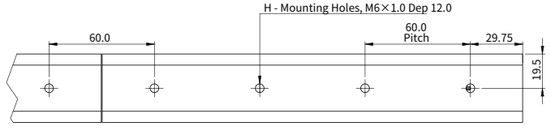
			AWM4-S1	AWM4-S2		AWM4-S3	
Performance Parameters	**Symbol**	**Unit**	Series	Series	Parallel	Series	Parallel
Continuous Force (NC) @100°C [1]	F_{cn}	N	79.6	159.2	159.2	238.7	238.7
Peak Force	F_{pk}	N	397.9	795.8	795.8	1193.7	1193.7
Force Constant ±10%	K_f	N/Arms	34.6	69.2	34.6	103.8	34.6
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	28.3	56.5	28.3	84.8	28.3
Motor Constant @25°C	K_m	N/Sqrt(W)	12.0	17.0	17.0	20.9	20.9
Resistance (L-L) 25°C ±10% [2]	R_{25}	Ω	5.5	11.0	2.8	16.5	1.8
Inductance (L-L) ±30% [3]	L	mH	5.7	11.4	2.9	17.1	1.9
Electrical Time Constant	τ_e	ms	1.0	1.0	1.0	1.0	1.0
Continuous Current (NC) @100°C [1]	I_{cn}	Arms	2.3	2.3	4.6	2.3	6.9
Peak Current	I_{pk}	Arms	11.5	11.5	23.0	11.5	34.5
Continuous Power Dissipation (NC) @100°C [1]	P_{cn}	W	56.2	112.5	112.5	168.7	168.7
Max. Coil Temperature	t_{max}	°C	125.0	125.0	125.0	125.0	125.0
Thermal Dissipation Constant (NC) [1]	K_{thn}	W/°C	0.7	1.5	1.5	2.2	2.2
Max. Bus Voltage	U_{bus}	Vdc	330.0	330.0	330.0	330.0	330.0
Magnetic Period	τ_{NN}	mm	60.0	60.0	60.0	60.0	60.0
Attraction Force	F_a	kN	0.0	0.0	0.0	0.0	0.0
Mechanical Parameters							
Coil Mass (NC)	m_{cn}	kg	0.3	0.7	0.7	1.0	1.0
Coil Length (NC)	L_{cn}	mm	121.0	241.0	241.0	361.0	361.0
Track Mass Per Meter	m_{track}	kg/m	10.7	10.7	10.7	10.7	10.7
Other Information							
Insulation Class			Class B (130°C)				
Protection Grade			IP00				
Compliance with Global Standards			RoHS, CE				
Ambient Temperature	Operation		0°C to 40°C (non-freezing)				
	Storage		-15°C to 70°C (non-freezing)				
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)				
	Storage		10%RH to 90%RH (non-condensing)				
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.				

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Dimension







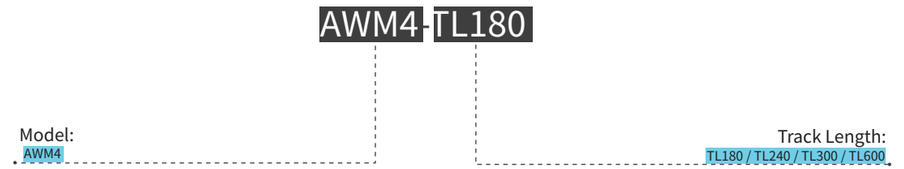
Motor Coil		
Model No	Coil Length	E
AWM4-S1	121.0	3
AWM4-S2	241.0	6
AWM4-S3	361.0	9

Motor Track			
Model No	Track Length	G	H
AWM3-TL180	179.5	3	3
AWM3-TL240	239.5	4	4
AWM3-TL300	299.5	5	5
AWM3-TL600	599.5	10	10

Part Numbering

Motor Coil

Motor Track

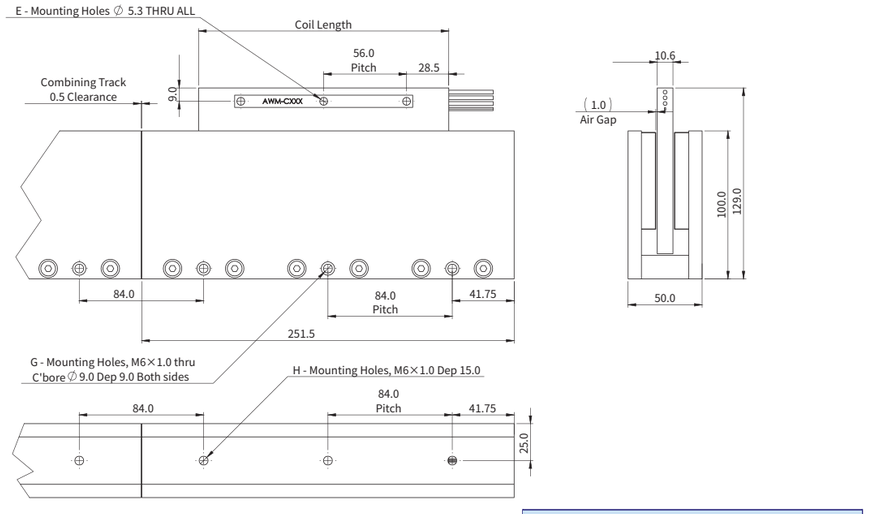


AWM5

			AWM5-S1	AWM5-S2		AWM5-S3	
Performance Parameters	**Symbol**	**Unit**	Series	Series	Parallel	Series	Parallel
Continuous Force (NC) @100°C [1]	F_{cn}	N	138.3	276.5	276.5	414.8	414.8
Peak Force	F_{pk}	N	995.4	1990.9	1990.9	2986.3	2986.3
Force Constant ±10%	K_f	N/Arms	55.3	110.6	55.3	165.9	55.3
Back EMF Constant ±10%	K_e	Vpeak/(m/s)	45.2	90.3	45.2	135.5	45.2
Motor Constant @25°C	K_m	N/Sqrt(W)	19.6	27.7	27.7	34.0	34.0
Resistance (L-L) 25°C ±10% [2]	R_{25}	Ω	5.3	10.6	2.7	15.9	1.8
Inductance (L-L) ±30% [3]	L	mH	11.1	22.3	5.6	33.4	3.7
Electrical Time Constant	τ_e	ms	2.1	2.1	2.1	2.1	2.1
Continuous Current (NC) @100°C [1]	I_{cn}	Arms	2.5	2.5	5.0	2.5	7.5
Peak Current	I_{pk}	Arms	18.0	18.0	36.0	18.0	54.0
Continuous Power Dissipation (NC) @100°C [1]	P_{cn}	W	64.0	128.1	128.1	192.1	192.1
Max. Coil Temperature	t_{max}	°C	125.0	125.0	125.0	125.0	125.0
Thermal Dissipation Constant (NC) [1]	K_{thn}	W/°C	0.9	1.7	1.7	2.6	2.6
Max. Bus Voltage	U_{bus}	Vdc	330.0	330.0	330.0	330.0	330.0
Magnetic Period	τ_{NN}	mm	84.0	84.0	84.0	84.0	84.0
Attraction Force	F_a	kN	0.0	0.0	0.0	0.0	0.0
Mechanical Parameters							
Coil Mass (NC)	m_{cn}	kg	0.9	1.8	1.8	2.6	2.6
Coil Length (NC)	L_{cn}	mm	169.0	337.0	337.0	505.0	505.0
Track Mass Per Meter	m_{track}	kg/m	25.5	25.5	25.5	25.5	25.5
Other Information							
Insulation Class			Class B (130°C)				
Protection Grade			IP00				
Compliance with Global Standards			RoHS, CE				
Ambient Temperature	Operation		0°C to 40°C (non-freezing)				
	Storage		-15°C to 70°C (non-freezing)				
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)				
	Storage		10%RH to 90%RH (non-condensing)				
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.				

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

■ Dimension

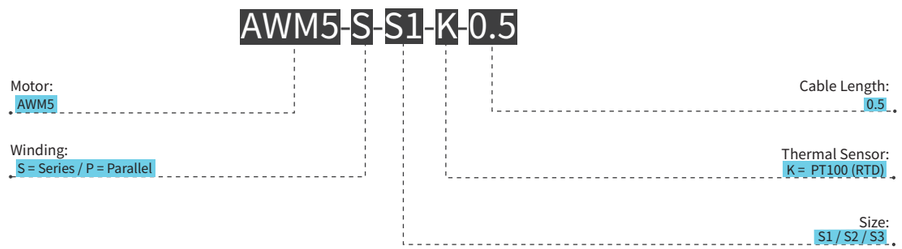


Motor Coil		
Model No	Coil Length	E
AWM5-S1	169.0	3
AWM5-S2	337.0	6
AWM5-S3	505.0	9

Motor Track			
Model No	Track Length	G	H
AWM5-TL252	251.5	3	3
AWM5-TL420	419.5	5	5
AWM5-TL588	587.5	7	7

Part Numbering

Motor Coil



Motor Track

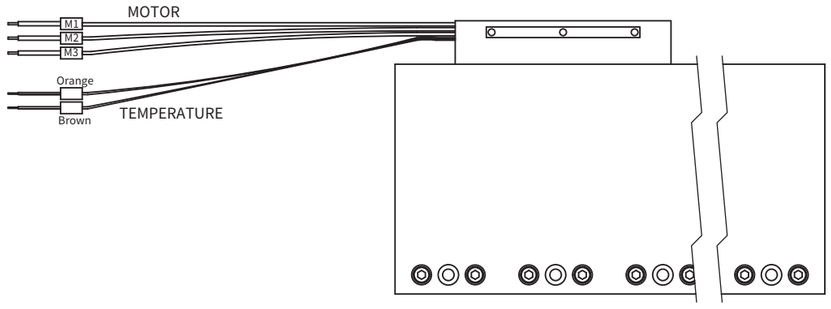
Motor Cable Connection

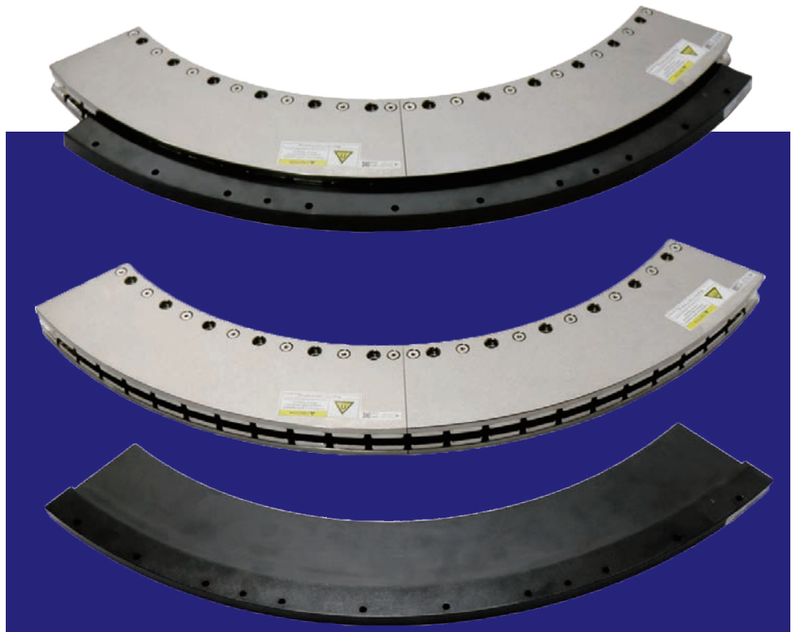
MOTOR CABLE

PIN	DESCRIPTION	COLOR
-	M1	BLACK
-	M2	BLUE
-	M3	RED

TEMPERATURE SENSOR CABLE

PIN	DESCRIPTION	COLOR
-	THERMAL	ORANGE
-	THERMAL	BROWN





ACR SERIES

- Small thickness and light weight
- Large center hole
- Integrated Hall sensor and temperature sensor
- Direct drive with high torque without cogging effect
- Limit-angle or 360-degree operation
- Multi-coil and multi-track configurations

Introduction

Ironless ACR series arc motors are specifically desinged for angular motion with constrained rotation angles less than 360 degrees. Compared with DDR motors, Akribis's ACR series arc motors feature larger center holes, lower profile form factors, and higher stiffness. When coupled with larger radius circular encoder sacles and arc bearings, ACR motors can achieve better postioning, repeatability, and accuracy.

T_{cn} (Continuous Torque) = 24.3Nm ~ 460.7Nm
T_{pk} (Peak Torque) = 72.8Nm ~ 1382.2Nm

Features

- Ironless technology and no cogging force
- Thin coil design with low mass
- High motor constant
- Big center hole
- Integrated hall sensors
- Flexible configuration with multiple coils or tracks
- Multiple coils connected in series or parallel to increase torque output
- Multiple tracks attaching together to extend angle of rotation

Applications

In applications with limited angle of rotation where direct drive rotary motors are not necessary, ACR series arc motors can effectively lower cost and save space, particularly in systems with large radius of motion. Compared with conventional direct drive rotary motors, ACR arc motors can provide larger center hole, lower profile, and great torque output with optimized electromagnetic and mechanical design. ACR arc motors enable customers to develop more compact systems and to increase competitivity in the market.
Akribis ACR series arc motors are applicable to G2.5, G4.5, G6, G8.5, G10.5 and G11 LCD, 8-inch or 12-inch wafer processing and inspection equipment, as well as biomedical devices, precision assembly and industrial printing machines.

■ Limit-angle type

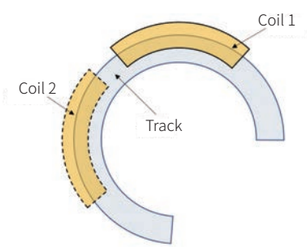
Model	Power Radius (mm)
ACR240	240
ACR335	335
ACR820	820
ACR1525	1525

■ 360° type

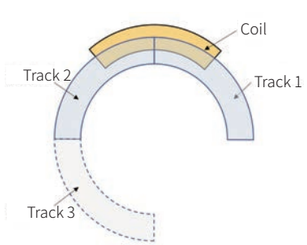
Model	Power Radius (mm)
ACR240	240
ACR335	335
ACR820	820
ACR1525	1525

Configurations

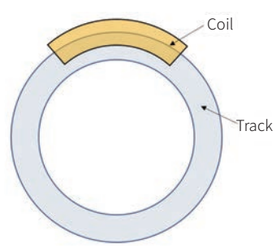
Akribis ACR series arc motors allow customers to flexibly configure systems based on their needs: multiple coils to increase torque output, or multiple tracks to increase range of motion. By attaching multiple tracks together, ACR motors can accomplish full 360° degrees of rotation.
(E.g. ACR240, ACR 335 and ACR820)



Multi-Coil Configuration



Multi-Track Configuration



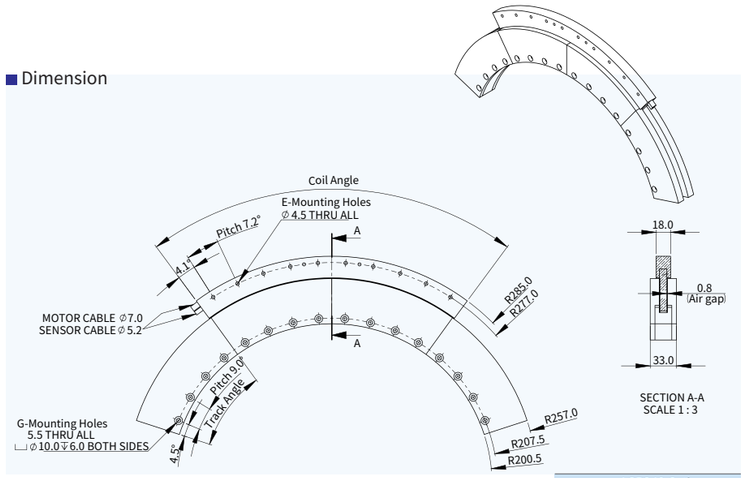
360° Configuration

ACR240-S5

Specifications

Specification	Unit	ACR240-S5
Winding Type	-	Series
Continuous Torque @100°C	Nm	24.3
Peak Torque	Nm	72.8
Torque Constant	Nm/Arms	20.2
Back EMF Constant	Vpeak/rpm	1.7
Motor Constant	Nm/Sqrt(W)	2.8
Continuous Current @100°C❶	Arms	1.2
Peak Current	Arms	3.6
Resistance (Terminal to Terminal)❷	Ω	35.2
Inductance (Terminal to Terminal)	mH	21.3
Electrical Time Constant	ms	0.6
Air Gap	mm	0.8
Magnetic Period	degree	7.2
Coil Weight	kg	1.2

Dimension



ACR240 Coil		
	Coil Angle	E
ACR240-S5	73.0°	10

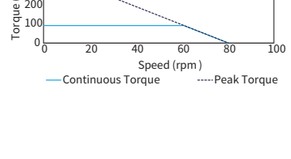
Magnet Track

Specification	Unit	ACR240-TR36
Arc Angle	degree	36°
Weight	kg	1.4
Moment of Inertia	kg·m²	0.07
G	-	4

❶In the measurement of continuous current, the coil is mounted on the testing fixture and the ambient temperature is 25 °C.

❷In the measurement of line resistance, the ambient temperature is 25 °C.

Torque-Speed Curve

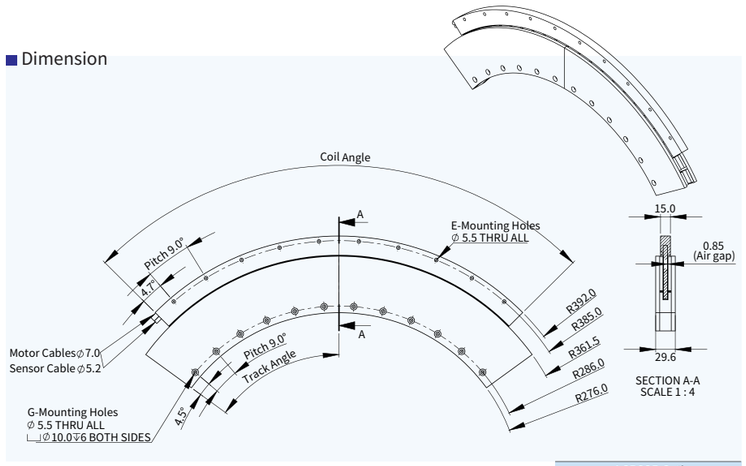


ACR335-S5

Specifications

Specification	Unit	ACR335-S5
Winding Type	-	Series
Continuous Torque @100°C	Nm	92.3
Peak Torque	Nm	276.9
Torque Constant	Nm/Arms	77.2
Back EMF Constant	Vpeak/rpm	6.6
Motor Constant	Nm/Sqrt(W)	7.7
Continuous Current @100°C❶	Arms	1.2
Peak Current	Arms	3.6
Resistance (Terminal to Terminal)❷	Ω	67.1
Inductance (Terminal to Terminal)	mH	69.8
Electrical Time Constant	ms	1.0
Air Gap	mm	0.85
Magnetic Period	degree	9.0
Coil Weight	kg	1.8

Dimension



ACR335 Coil		
	Coil Angle	E
ACR335-S5	90.4°	10

Magnet Track

Specification	Unit	ACR335-TR36	ACR335-TR54
Arc Angle	degree	36°	54°
Weight	kg	2.5	3.7
Moment of Inertia	kg·m²	0.26	0.39
G	-	4	6

❶In the measurement of continuous current, the coil is mounted on the testing fixture and the ambient temperature is 25 °C.

❷In the measurement of line resistance, the ambient temperature is 25 °C.

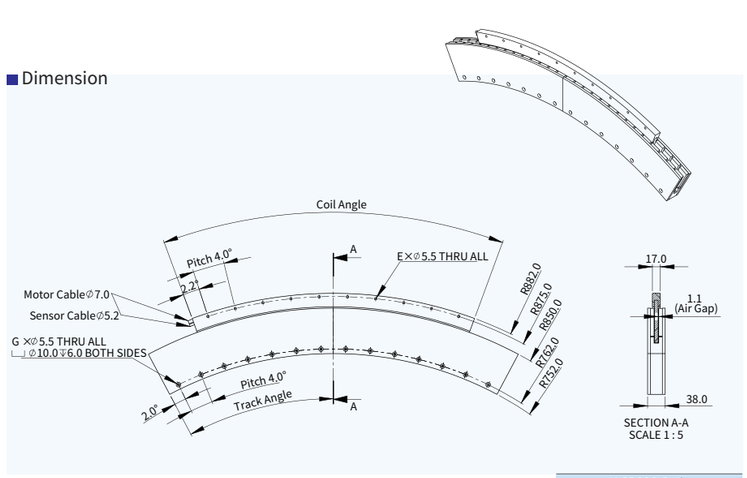
Torque-Speed Curve

ACR820-S5

Specifications

Specification	Unit	ACR820-S5
Winding Type	-	Series
Continuous Torque @100°C	Nm	331.5
Peak Torque	Nm	994.5
Torque Constant	Nm/Arms	195.0
Back EMF Constant	Vpeak/rpm	16.7
Motor Constant	Nm/Sqrt(W)	26.2
Continuous Current @100°C❶	Arms	1.7
Peak Current	Arms	5.1
Resistance (Terminal to Terminal)❷	Ω	37.0
Inductance (Terminal to Terminal)	mH	47.0
Electrical Time Constant	ms	1.3
Air Gap	mm	1.1
Magnetic Period	degree	4.0
Coil Weight	kg	2.5

Dimension



ACR820 Coil		
	Coil Angle	E
ACR820-S5	40.4°	10

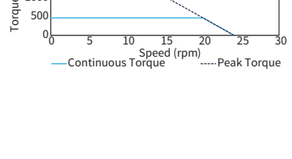
Magnet Track

Specification	Unit	ACR820-TR24	ACR820-TR28
Arc Angle	degree	24°	28°
Weight	kg	5.8	6.8
Moment of Inertia	kg·m²	3.8	4.4
G	-	6	7

❶In the measurement of continuous current, the coil is mounted on the testing fixture and the ambient temperature is 25 °C.

❷In the measurement of line resistance, the ambient temperature is 25 °C.

Torque-Speed Curve

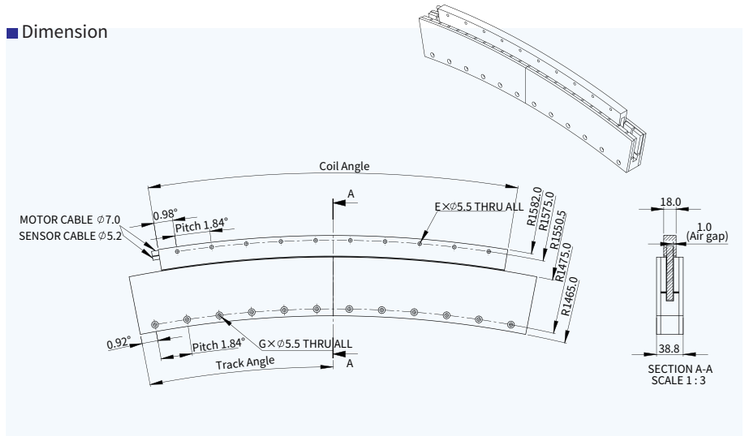


ACR1525-S5

Specifications

Specification	Unit	ACR1525-S5
Winding Type	-	Series
Continuous Torque @100°C	Nm	460.7
Peak Torque	Nm	1382.2
Torque Constant	Nm/Arms	257.3
Back EMF Constant	Vpeak/rpm	22.0
Motor Constant	Nm/Sqrt(W)	37.6
Continuous Current @100°C❶	Arms	1.8
Peak Current	Arms	5.4
Resistance (Terminal to Terminal)❷	Ω	31.2
Inductance (Terminal to Terminal)	mH	37.5
Electrical Time Constant	ms	1.2
Air Gap	mm	1.0
Magnetic Period	degree	1.84
Coil Weight	kg	2.2

Dimension



ACR1525 Coil		
	Coil Angle	E
ACR1525-S5	18.52°	10

Magnet Track

Specification	Unit	ACR1525-TR11.04
Arc Angle	degree	11.04°
Weight	kg	4.4
Moment of Inertia	kg·m²	10.0
G	-	6

❶In the measurement of continuous current, the coil is mounted on the testing fixture and the ambient temperature is 25 °C.

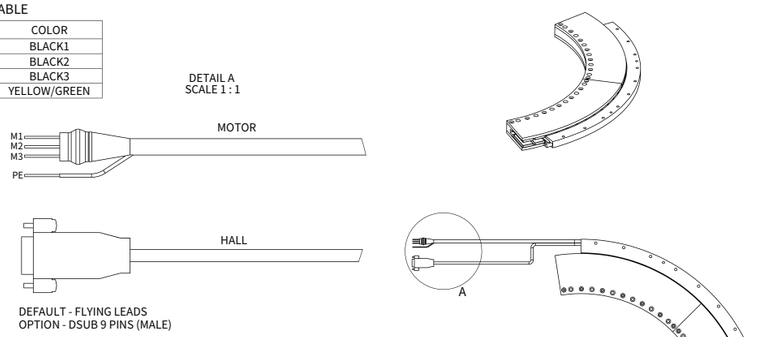
❷In the measurement of line resistance, the ambient temperature is 25 °C.

Torque-Speed Curve

Motor Cable Connection

MOTOR CABLE

PIN	DESCRIPTION	COLOR
-	M1	BLACK1
-	M2	BLACK2
-	M3	BLACK3
-	PE	YELLOW/GREEN



HALL CABLE

PIN	DESCRIPTION	COLOR
1	HA	GREEN
2	HB	YELLOW
3	HC	GREY
4	5VDC	BROWN
5	0VDC	WHITE
8	T1	PINK
9	T2	BLUE

THERMAL SENSOR WIRE
(K TYPE - PT100)

Part Numbering

Motor Coil

ACR820-S-S5-K-H9D-1.0-FB

- Model: ACR240 / ACR335 / ACR820 / ACR1525
- Connection:❶ S = Series
- Size: S5
- Thermal sensor: K=PT100 (RTD)
- Hall options: ❷HF / ❸H9D
- Cable length (m): 1.0
- Ferrite Bead Options: ❹NFB / ❺FB

❶ Please refer to the **Specifications** for the available connection types.
❷ HF = comes with built-in hall sensor & hall cable terminated in flying leads. (standard).
❸ H9D = comes with built-in hall sensor & hall cable terminated with 9-Pins D-Sub connector.
❹ NFB = motor cable terminated in flying leads without ferrite bead (standard).
❺ FB = motor cable terminated with ferrite bead.

Motor Track

ACR820-TR28

- Model: Example:ACR820
- Track angle: Example:TR28=28 degrees❻

❻ Please refer to **Dimensions** for available tracks.

Motor Cable Specifications

Motor Type	Outer Diameter (mm)	Min.Bending Radius (Flexible Use)	Min.Bending Radius (Fixed Laying)
AUM1	4.1	12×outer diameter	5×outer diameter
AUM2 / 3 / 4 /5	6.0	10×outer diameter	5×outer diameter
AUM6	9.5	12×outer diameter	6×outer diameter
AJM、AQM	7.4	10×outer diameter	5×outer diameter
AKM30-B1 / B2 / B4	8.0	10×outer diameter	5×outer diameter
AKM50-B1 / B2 / B4	8.0	10×outer diameter	5×outer diameter
AKM100-B1 / B2 / B4	8.0	10×outer diameter	5×outer diameter
AKM150-B4 / B8	9.5	10×outer diameter	5×outer diameter
AKM200-B4 / B8	9.5	10×outer diameter	5×outer diameter
ACR335	6.8	10×outer diameter	4×outer diameter
ACR820	6.8	10×outer diameter	4×outer diameter
ACR1525	6.8	10×outer diameter	4×outer diameter

Hall Cable Specifications

Motor Type	Outer Diameter (mm)	Min.Bending Radius (Flexible Use)	Min.Bending Radius (Fixed Laying)
AUM	3.8	10×outer diameter	5×outer diameter
AUM6	5.2	12×outer diameter	6×outer diameter
AJM、AQM	3.8	10×outer diameter	5×outer diameter
AKM	5.2	10×outer diameter	5×outer diameter
ACR335	5	12×outer diameter	6×outer diameter
ACR820	5	12×outer diameter	6×outer diameter
ACR1525	5	12×outer diameter	6×outer diameter

Motor Wire Specifications

Motor Type	Outer Diameter (mm)	Min.Bending Radius (Flexible Use)	Min.Bending Radius (Fixed Laying)
AWM1	1.5	10×outer diameter	5×outer diameter
AWM2	1.5	10×outer diameter	5×outer diameter
AWM3	1.5	10×outer diameter	5×outer diameter
AWM4	2.2	10×outer diameter	5×outer diameter
AWM5	2.6	10×outer diameter	5×outer diameter

VOICE COIL MOTORS

VOICE COIL MOTORS

Akribis systems

Cylindrical Voice Coil Motors

Model	Continuous Force (100°C)(N)	Peak Force (N)	Stroke (mm)	Diameter (mm)	Coil Weight (g)	Total Weight (g)	Motor Length ±Stroke/2	Max Voltage (V)
AVM12-6.4	0.91	3.53	6.4	12.7	5.0	12.3	20.4±3.2	60
AVM19-5	1.75	7.88	5	19	9.0	32.8	24±2.5	60
AVM20-10	1.56	7.60	10	20	11.0	56.1	31±5	60
AVM24-5	2.10	11.40	5	24	12.0	41.7	19.7±2.5	60
AVM24-10	2.65	14.82	10	24	16.5	61.5	30±5	60
AVM30-15	4.63	29.40	15	30	36.0	131.6	39±7.5	60
AVM40-20	9.93	58.05	20	40	67.0	293.2	49.8±10	60
AVM60-25	26.35	119.0	25	60	215.0	907.9	66.1±12.5	60
AVM90-30	89.10	315.0	30	90	820.0	2570.0	83.3±15	120
AVM35-HF-7	14.40	72.0	7	35	53.0	199.8	45.3±3.5	60
AVM40-HF-6.5	16.56	93.15	6.5	40	68.0	286.7	49.3±3.25	60
AVM50-HF-10	33.60	140.0	10	50	148.0	701.0	74.3±5	60
AVM60-HF-10	51.20	224.0	10	60	236.5	1233.5	89±5	60
AVM90-HF-10	152.67	610.68	10	90	960.0	3360.0	109.4±5	120
AVM100-HF-10	192.50	770.0	10	100	1117.0	4417.0	109.4±5	120
AVM130-HF-25	360.36	764.40	25	130	1550.0	10850.0	164.8±12.5	120
AVM250-HF-20	1111.44	4715.20	20	250	5900.0	33100.0	120±10	120
AVM14-HF-4-C19	2.44	7.33	4	14.2	7.0	20.7	25±2	60
AVM14-10-C56	0.98	2.95	10	14.2	3.0	16.6	28.8±5	60
AVM20-HF-6-C28	5.69	17.06	6	20	13.5	61.0	37.5±3	60
AVM24-HF-5-C13	5.88	31.92	5	24	21.5	103.5	42.9±2.5	60
AVM30-7-C60	5.64	24.80	7	30	15.3	101.5	28.3±3.5	60
AVM35-HF-15-C22	19.76	98.80	15	35	80.7	341.7	67.5±7.5	60
AVM35-HF-8-C35	27.43	137.16	8	35	85.2	456.6	88.5±4	60
AVM35-HF-10-C31	16.72	83.60	10	52	78.0	363.7	65±5	60
AVM40-20-C18	8.11	47.39	20	40	65.0	270.0	49.8±10	60
AVM40-HF-6.4-C11A	18.18	99.40	6.4	40	49.0	244.0	39.6±3.2	60
AVM50-HF-10-C15A	25.20	105.0	10	50	142.0	624.0	70.3±5	60
AVM50-HF-10-C34A	37.57	156.55	10	50	144.0	772.0	70.3±5	60
AVM75-HF-25-C12	124.69	572.90	25	75	710.0	2650.0	109.5±12.5	60
AVM75-38-C39	45.26	192.02	38	75	534.0	1811.0	87.05±19	60
AVM80-12-C8	33.71	192.60	12	80	124.0	1386.4	62±6	60
AVM90-30-C77	57.30	202.60	30	90	751.2	1886.3	83.3±15	120
AVM90-HF-5-C40A	62.49	220.92	5	90	427.2	1941.8	83.1±2.5	120
AVM130-HF-10-C29A	162.40	487.20	10	130	1080.0	6380.0	106.3±5	120
AVM150-HF-20-C53	585.77	1757.30	20	150	1500.0	14200.0	146±10	120

Planar Voice Coil Motors

Model	Continuous Force (100°C)(N)	Peak Force (N)	Stroke (mm)	Dimensions (L×W×H)	Coil Weight (g)	Total Weight (g)	Max Voltage (V)
AVA1-20	3.84	11.5	20	74×39×16.6	17.0	186.0	60
AVA2-20	11.69	35.1	20	83×54×26.1	45.0	496.0	60
AVM3-20	26.32	79.0	20	91×69×32.1	72.0	930.0	60

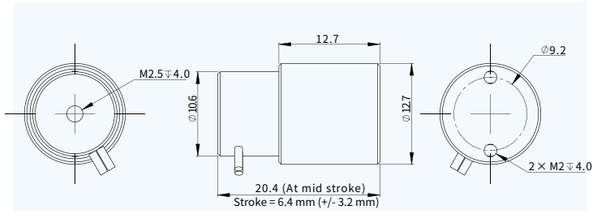
AVM SERIES

- Direct drive, zero cogging, zero backlash voice coil motors
- Low coil mass with very fast response and bandwidth
- No contact between coil and core movement (no wear and tear)
- Smooth motion at low speeds with limitless resolution (depends on feedback device)

AVM12-6.4

Performance Parameters	Symbol	Unit	AVM12-6.4
Stroke	S	mm	6.4
Continuous Force @100°C ❶❷	F_c	N	0.91
Peak Force ❷	F_{pk}	N	3.53
Force Constant ±10%❸	K_f	N/A	0.57
Back EMF Constant ±10%❷	K_e	V/(m/s)	0.57
Motor Constant @25°C❷	K_m	N/Sqrt(W)	0.53
Resistance @25°C ±10%❸	R_{25}	Ω	1.17
Inductance ±20%❹	L	mH	0.10
Electrical Time Constant	τ_e	ms	0.09
Continuous Current @100°C❶	I_c	A	1.6
Peak Current	I_{pk}	A	6.2
Continuous Power Dissipation @100°C❶	P_c	W	3.9
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant❶	K_{th}	W/°C	0.051
Max.Voltage	U_{max}	Vdc	60
Mechanical Parameters			
Coil Mass	m_{coil}	g	5
Core Mass	m_{core}	g	7.3
Running Clearance	L_{gap}	mm	0.35
Other Information			
Insulation Class		Class A (105°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

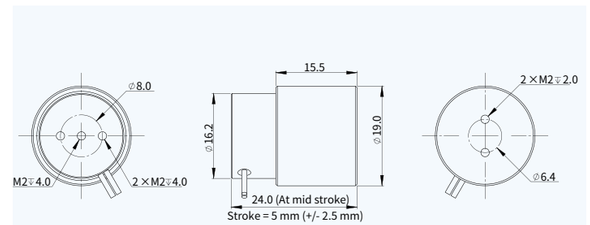


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM19-5

Performance Parameters	Symbol	Unit	AVM19-5
Stroke	S	mm	5.0
Continuous Force @100°C ❶❷	F_c	N	1.75
Peak Force ❷	F_{pk}	N	7.88
Force Constant ±10%❷	K_f	N/A	1.75
Back EMF Constant ±10%❷	K_e	V/(m/s)	1.75
Motor Constant @25°C❷	K_m	N/Sqrt(W)	1.17
Resistance @25°C ±10%❸	R_{25}	Ω	2.24
Inductance ±20%❹	L	mH	0.29
Electrical Time Constant	τ_e	ms	0.13
Continuous Current @100°C❶	I_c	A	1.0
Peak Current	I_{pk}	A	4.5
Continuous Power Dissipation @100°C❶	P_c	W	2.9
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant❶	K_{th}	W/°C	0.038
Max.Voltage	U_{max}	Vdc	60
Mechanical Parameters			
Coil Mass	m_{coil}	g	9.0
Core Mass	m_{core}	g	23.8
Running Clearance	L_{gap}	mm	0.4
Other Information			
Insulation Class		Class A (105°C)	
Protection Grade		IP00	
Compliance with Global Standards		RoHS	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

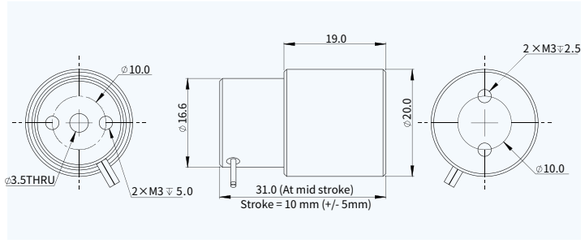


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM20-10

Performance Parameters		Symbol	Unit	AVM20-10
Stroke		S	mm	10.0
Continuous Force @100°C ❶❷		F_c	N	1.56
Peak Force ❷		F_{pk}	N	7.6
Force Constant ±10%❸		K_f	N/A	2.0
Back EMF Constant ±10%❷		K_e	V/(m/s)	2.0
Motor Constant @25°C❷		K_m	N/Sqrt(W)	1.06
Resistance @25°C ±10%❸		R_{25}	Ω	3.59
Inductance ±20%❹		L	mH	0.55
Electrical Time Constant		τ_e	ms	0.15
Continuous Current @100°C❶		I_c	A	0.78
Peak Current		I_{pk}	A	3.8
Continuous Power Dissipation @100°C❶		P_c	W	2.8
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant❶		K_{th}	W/°C	0.038
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	11
Core Mass		m_{core}	g	45.1
Running Clearance		L_{gap}	mm	0.5
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

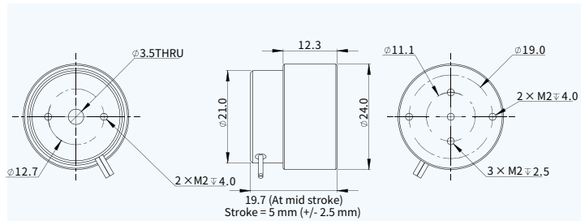


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM24-5

Performance Parameters		Symbol	Unit	AVM24-5
Stroke		S	mm	5.0
Continuous Force @100°C ❶❷		F_c	N	2.1
Peak Force ❷		F_{pk}	N	11.4
Force Constant ±10%❸		K_f	N/A	3.0
Back EMF Constant ±10%❷		K_e	V/(m/s)	3.0
Motor Constant @25°C❷		K_m	N/Sqrt(W)	1.69
Resistance @25°C ±10%❸		R_{25}	Ω	3.15
Inductance ±20%❹		L	mH	0.55
Electrical Time Constant		τ_e	ms	0.17
Continuous Current @100°C❶		I_c	A	0.7
Peak Current		I_{pk}	A	3.8
Continuous Power Dissipation @100°C❶		P_c	W	2.0
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant❶		K_{th}	W/°C	0.027
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	12
Core Mass		m_{core}	g	29.7
Running Clearance		L_{gap}	mm	0.5
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

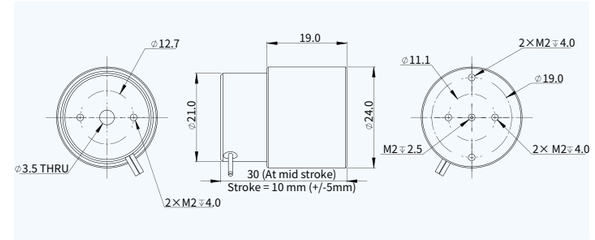


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM24-10

Performance Parameters		Symbol	Unit	AVM24-10
Stroke		S	mm	10.0
Continuous Force @100°C ❶❷		F_c	N	2.65
Peak Force ❷		F_{pk}	N	14.82
Force Constant ±10%❸		K_f	N/A	3.9
Back EMF Constant ±10%❷		K_e	V/(m/s)	3.9
Motor Constant @25°C❷		K_m	N/Sqrt(W)	1.61
Resistance @25°C ±10%❸		R_{25}	Ω	5.86
Inductance ±20%❹		L	mH	1.34
Electrical Time Constant		τ_e	ms	0.23
Continuous Current @100°C❶		I_c	A	0.68
Peak Current		I_{pk}	A	3.8
Continuous Power Dissipation @100°C❶		P_c	W	3.5
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant❶		K_{th}	W/°C	0.047
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	16.5
Core Mass		m_{core}	g	45
Running Clearance		L_{gap}	mm	0.5
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

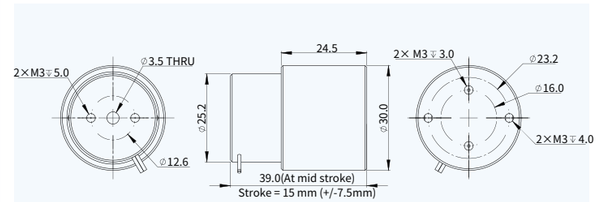


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM30-15

Performance Parameters		Symbol	Unit	AVM30-15
Stroke		S	mm	15.0
Continuous Force @100°C ❶❷		F_c	N	4.63
Peak Force ❷		F_{pk}	N	29.4
Force Constant ±10%❸		K_f	N/A	7.35
Back EMF Constant ±10%❷		K_e	V/(m/s)	7.35
Motor Constant @25°C❷		K_m	N/Sqrt(W)	2.30
Resistance @25°C ±10%❸		R_{25}	Ω	10.24
Inductance ±20%❹		L	mH	2.82
Electrical Time Constant		τ_e	ms	0.28
Continuous Current @100°C❶		I_c	A	0.63
Peak Current		I_{pk}	A	4
Continuous Power Dissipation @100°C❶		P_c	W	5.2
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant❶		K_{th}	W/°C	0.070
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	36
Core Mass		m_{core}	g	95.6
Running Clearance		L_{gap}	mm	0.6
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

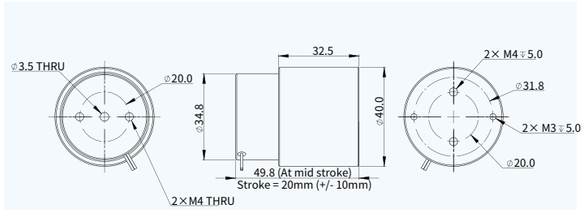


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM40-20

Performance Parameters		Symbol	Unit	AVM40-20
Stroke		S	mm	20.0
Continuous Force @100°C [1][2]		F_c	N	9.93
Peak Force [2]		F_{pk}	N	58.05
Force Constant ±10% [3]		K_f	N/A	12.9
Back EMF Constant ±10% [2]		K_e	V/(m/s)	12.9
Motor Constant @25°C [2]		K_m	N/Sqrt(W)	3.84
Resistance @25°C ±10% [3]		R_{25}	Ω	11.26
Inductance ±20% [4]		L	mH	4.77
Electrical Time Constant		τ_e	ms	0.42
Continuous Current @100°C [1]		I_c	A	0.77
Peak Current		I_{pk}	A	4.5
Continuous Power Dissipation @100°C [1]		P_c	W	8.6
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant [1]		K_{th}	W/°C	0.115
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	67.0
Core Mass		m_{core}	g	226.2
Running Clearance		L_{gap}	mm	0.6
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

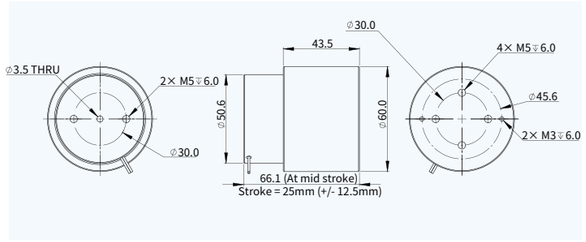


[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] The values are at mid stroke.
[3] Resistance is measured by DC current with standard 0.5 m lead wire.
[4] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM60-25

Performance Parameters		Symbol	Unit	AVM60-25
Stroke		S	mm	25.0
Continuous Force @100°C [1][2]		F_c	N	26.35
Peak Force [2]		F_{pk}	N	119
Force Constant ±10% [3]		K_f	N/A	17.0
Back EMF Constant ±10% [2]		K_e	V/(m/s)	17.0
Motor Constant @25°C [2]		K_m	N/Sqrt(W)	7.35
Resistance @25°C ±10% [3]		R_{25}	Ω	5.35
Inductance ±20% [4]		L	mH	3.82
Electrical Time Constant		τ_e	ms	0.71
Continuous Current @100°C [1]		I_c	A	1.55
Peak Current		I_{pk}	A	7
Continuous Power Dissipation @100°C [1]		P_c	W	16.6
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant [1]		K_{th}	W/°C	0.221
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	215
Core Mass		m_{core}	g	692.9
Running Clearance		L_{gap}	mm	0.7
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

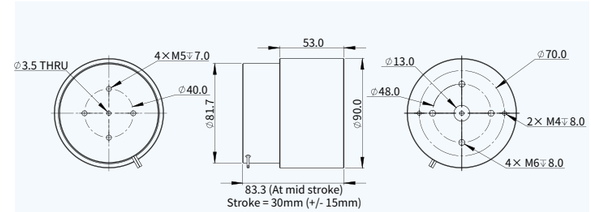


[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] The values are at mid stroke.
[3] Resistance is measured by DC current with standard 0.5 m lead wire.
[4] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM90-30

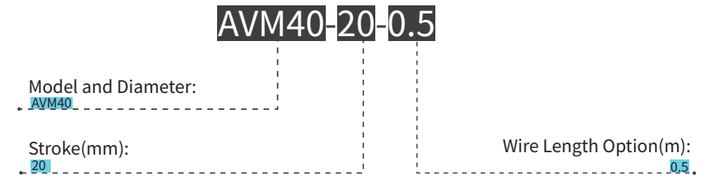
Performance Parameters		Symbol	Unit	AVM90-30
Stroke		S	mm	30.0
Continuous Force @100°C [1][2]		F_c	N	89.1
Peak Force [2]		F_{pk}	N	315
Force Constant ±10% [3]		K_f	N/A	22.5
Back EMF Constant ±10% [2]		K_e	V/(m/s)	22.5
Motor Constant @25°C [2]		K_m	N/Sqrt(W)	13.97
Resistance @25°C ±10% [3]		R_{25}	Ω	2.60
Inductance ±20% [4]		L	mH	3.26
Electrical Time Constant		τ_e	ms	1.25
Continuous Current @100°C [1]		I_c	A	3.96
Peak Current		I_{pk}	A	14.0
Continuous Power Dissipation @100°C [1]		P_c	W	52.4
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant [1]		K_{th}	W/°C	0.699
Max.Voltage		U_{max}	Vdc	120
Mechanical Parameters				
Coil Mass		m_{coil}	g	820
Core Mass		m_{core}	g	1750
Running Clearance		L_{gap}	mm	0.7
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension



[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] The values are at mid stroke.
[3] Resistance is measured by DC current with standard 0.5 m lead wire.
[4] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Part Numbering

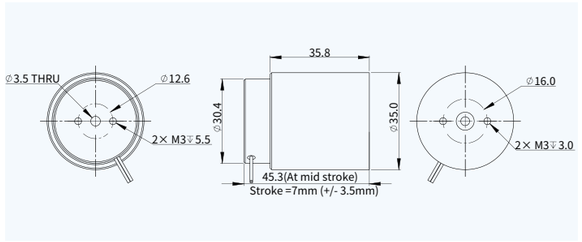


AVM High Force Series

AVM35-HF-7

Performance Parameters		Symbol	Unit	AVM35-HF-7
Stroke		S	mm	7.0
Continuous Force @100°C [1][2]		F_c	N	14.4
Peak Force [2]		F_{pk}	N	72.0
Force Constant ±10% [2]		K_f	N/A	16.0
Back EMF Constant ±10% [2]		K_e	V/(m/s)	16.0
Motor Constant @25°C [2]		K_m	N/Sqrt(W)	5.25
Resistance @25°C ±10% [3]		R_{25}	Ω	9.28
Inductance ±20% [4]		L	mH	3.55
Electrical Time Constant		τ_e	ms	0.38
Continuous Current @100°C [1]		I_c	A	0.9
Peak Current		I_{pk}	A	4.5
Continuous Power Dissipation @100°C [1]		P_c	W	9.7
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant [1]		K_{th}	W/°C	0.129
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	53.0
Core Mass		m_{core}	g	146.8
Running Clearance		L_{gap}	mm	0.5
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

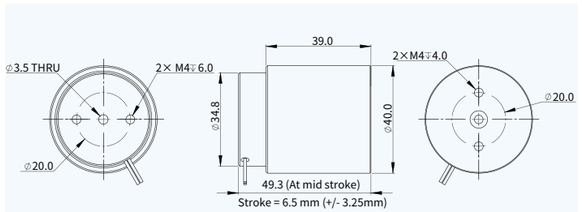


[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] The values are at mid stroke.
[3] Resistance is measured by DC current with standard 0.5 m lead wire.
[4] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM40-HF-6.5

Performance Parameters		Symbol	Unit	AVM40-HF-6.5
Stroke		S	mm	6.5
Continuous Force @100°C [1][2]		F_c	N	16.6
Peak Force [2]		F_{pk}	N	93.2
Force Constant ±10% [2]		K_f	N/A	20.7
Back EMF Constant ±10% [2]		K_e	V/(m/s)	20.7
Motor Constant @25°C [2]		K_m	N/Sqrt(W)	6.39
Resistance @25°C ±10% [3]		R_{25}	Ω	10.51
Inductance ±20% [4]		L	mH	4.2
Electrical Time Constant		τ_e	ms	0.40
Continuous Current @100°C [1]		I_c	A	0.8
Peak Current		I_{pk}	A	4.5
Continuous Power Dissipation @100°C [1]		P_c	W	8.7
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant [1]		K_{th}	W/°C	0.116
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	68.0
Core Mass		m_{core}	g	218.7
Running Clearance		L_{gap}	mm	0.6
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

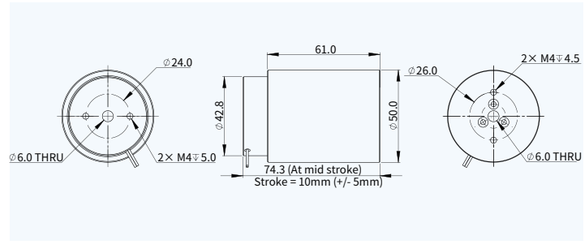


[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] The values are at mid stroke.
[3] Resistance is measured by DC current with standard 0.5 m lead wire.
[4] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM50-HF-10

Performance Parameters		Symbol	Unit	AVM50-HF-10
Stroke		S	mm	10.0
Continuous Force @100°C [1][2]		F_c	N	33.6
Peak Force [2]		F_{pk}	N	140.0
Force Constant ±10% [2]		K_f	N/A	28.0
Back EMF Constant ±10% [2]		K_e	V/(m/s)	28.0
Motor Constant @25°C [2]		K_m	N/Sqrt(W)	9.6
Resistance @25°C ±10% [3]		R_{25}	Ω	8.5
Inductance ±20% [4]		L	mH	5.20
Electrical Time Constant		τ_e	ms	0.61
Continuous Current @100°C [1]		I_c	A	1.2
Peak Current		I_{pk}	A	5.0
Continuous Power Dissipation @100°C [1]		P_c	W	15.8
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant [1]		K_{th}	W/°C	0.210
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	148
Core Mass		m_{core}	g	553
Running Clearance		L_{gap}	mm	0.6
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

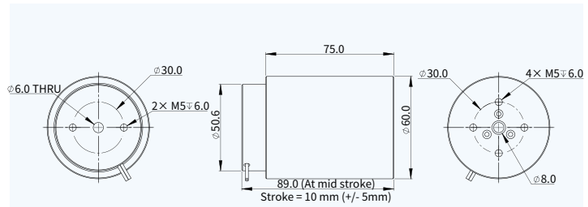


[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] The values are at mid stroke.
[3] Resistance is measured by DC current with standard 0.5 m lead wire.
[4] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM60-HF-10

Performance Parameters		Symbol	Unit	AVM60-HF-10
Stroke		S	mm	10.0
Continuous Force @100°C [1][2]		F_c	N	51.2
Peak Force [2]		F_{pk}	N	224
Force Constant ±10% [2]		K_f	N/A	32.0
Back EMF Constant ±10% [2]		K_e	V/(m/s)	32.0
Motor Constant @25°C [2]		K_m	N/Sqrt(W)	13.56
Resistance @25°C ±10% [3]		R_{25}	Ω	5.57
Inductance ±20% [4]		L	mH	3.83
Electrical Time Constant		τ_e	ms	0.69
Continuous Current @100°C [1]		I_c	A	1.6
Peak Current		I_{pk}	A	7
Continuous Power Dissipation @100°C [1]		P_c	W	18.4
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant [1]		K_{th}	W/°C	0.245
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	236.5
Core Mass		m_{core}	g	997
Running Clearance		L_{gap}	mm	0.7
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension



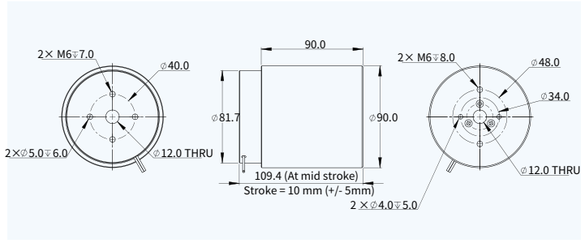
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] The values are at mid stroke.
[3] Resistance is measured by DC current with standard 0.5 m lead wire.
[4] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM High Force Series

AVM90-HF-10

Performance Parameters		Symbol	Unit	AVM90-HF-10
Stroke		S	mm	10.0
Continuous Force @100°C ❶❷		F_c	N	152.7
Peak Force ❷		F_{pk}	N	610.7
Force Constant ±10%❸		K_f	N/A	43.6
Back EMF Constant ±10%❷		K_e	V/(m/s)	43.6
Motor Constant @25°C❷		K_m	N/Sqrt(W)	25.27
Resistance @25°C ±10%❸		R_{25}	Ω	2.98
Inductance ±20%❹		L	mH	4.02
Electrical Time Constant		τ_e	ms	1.35
Continuous Current @100°C❶		I_c	A	3.5
Peak Current		I_{pk}	A	14.0
Continuous Power Dissipation @100°C❶		P_c	W	47.0
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant❶		K_{th}	W/°C	0.627
Max.Voltage		U_{max}	Vdc	120
Mechanical Parameters				
Coil Mass		m_{coil}	g	960
Core Mass		m_{core}	g	2400
Running Clearance		L_{gap}	mm	0.65
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

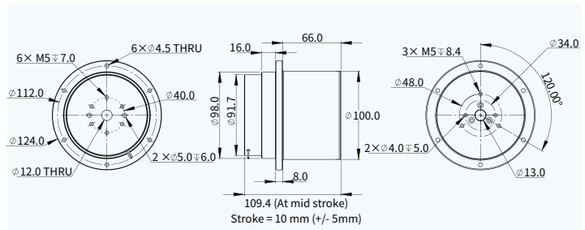


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM100-HF-10

Performance Parameters		Symbol	Unit	AVM100-HF-10
Stroke		S	mm	10.0
Continuous Force @100°C ❶❷		F_c	N	192.5
Peak Force ❷		F_{pk}	N	770
Force Constant ±10%❷		K_f	N/A	55.0
Back EMF Constant ±10%❷		K_e	V/(m/s)	55.0
Motor Constant @25°C❷		K_m	N/Sqrt(W)	29.85
Resistance @25°C ±10%❸		R_{25}	Ω	3.40
Inductance ±20%❹		L	mH	4.43
Electrical Time Constant		τ_e	ms	1.30
Continuous Current @100°C❶		I_c	A	3.5
Peak Current		I_{pk}	A	14
Continuous Power Dissipation @100°C❶		P_c	W	53.6
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant❶		K_{th}	W/°C	0.715
Max.Voltage		U_{max}	Vdc	120
Mechanical Parameters				
Coil Mass		m_{coil}	g	1117
Core Mass		m_{core}	g	3300
Running Clearance		L_{gap}	mm	0.65
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

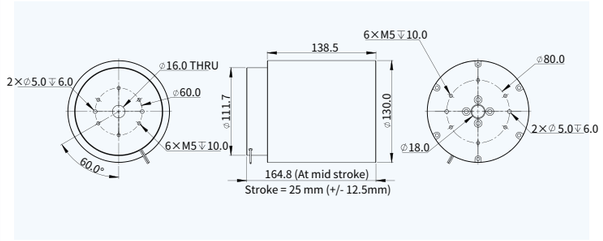


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM130-HF-25

Performance Parameters		Symbol	Unit	AVM130-HF-25
Stroke		S	mm	25.0
Continuous Force @100°C ❶❷		F_c	N	360.4
Peak Force ❷		F_{pk}	N	764.4
Force Constant ±10%❸		K_f	N/A	54.6
Back EMF Constant ±10%❷		K_e	V/(m/s)	54.6
Motor Constant @25°C❷		K_m	N/Sqrt(W)	48.17
Resistance @25°C ±10%❸		R_{25}	Ω	1.29
Inductance ±20%❹		L	mH	1.59
Electrical Time Constant		τ_e	ms	1.24
Continuous Current @100°C❶		I_c	A	6.6
Peak Current		I_{pk}	A	14
Continuous Power Dissipation @100°C❶		P_c	W	72.1
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant❶		K_{th}	W/°C	0.962
Max.Voltage		U_{max}	Vdc	120
Mechanical Parameters				
Coil Mass		m_{coil}	g	1550
Core Mass		m_{core}	g	9300
Running Clearance		L_{gap}	mm	0.55
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

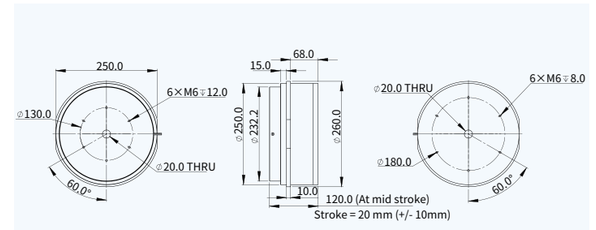


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM250-HF-20

Performance Parameters		Symbol	Unit	AVM250-HF-20
Stroke		S	mm	20.0
Continuous Force @100°C ❶❷		F_c	N	1111.4
Peak Force ❷		F_{pk}	N	4715.2
Force Constant ±10%❸		K_f	N/Arms	168.4
Back EMF Constant ±10%❷		K_e	Vpeak/(m/s)	168.4
Motor Constant @25°C❷		K_m	N/Sqrt(W)	87.55
Resistance @25°C ±10%❸		R_{25}	Ω	3.7
Inductance ±20%❹		L	mH	5
Electrical Time Constant		τ_e	ms	1.35
Continuous Current @100°C❶		I_c	Arms	6.6
Peak Current		I_{pk}	Arms	28
Continuous Power Dissipation @100°C❶		P_c	W	207.7
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant❶		K_{th}	W/°C	2.769
Max.Voltage		U_{max}	Vdc	120
Mechanical Parameters				
Coil Mass		m_{coil}	g	5900
Core Mass		m_{core}	g	27200
Running Clearance		L_{gap}	mm	0.9
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension



❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Part Numbering

AVM60-HF-10-0.5

Model and Diameter: AVM60

High Force Option: HF[1]

Wire Length Option(m): 0.5

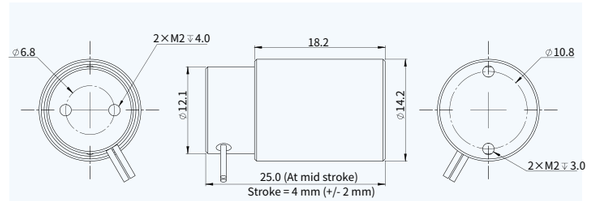
Stroke (mm): 10

[1] HF= High force series

AVM14-HF-4-C19

Performance Parameters		Symbol	Unit	AVM14-HF-4-C19
Stroke		S	mm	4.0
Continuous Force @100°C [1][2]		F_c	N	2.44
Peak Force [2]		F_{pk}	N	7.33
Force Constant ±10% [2]		K_f	N/A	1.88
Back EMF Constant ±10% [2]		K_e	V/(m/s)	1.88
Motor Constant @25°C [2]		K_m	N/Sqrt(W)	1.35
Resistance @25°C ±10% [3]		R_{25}	Ω	1.93
Inductance ±20% [4]		L	mH	0.14
Electrical Time Constant		τ_e	ms	0.073
Continuous Current @100°C [1]		I_c	A	1.3
Peak Current		I_{pk}	A	3.9
Continuous Power Dissipation @100°C [1]		P_c	W	4.2
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant [1]		K_{th}	W/°C	0.06
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	7.0
Core Mass		m_{core}	g	13.7
Running Clearance		L_{gap}	mm	0.35
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

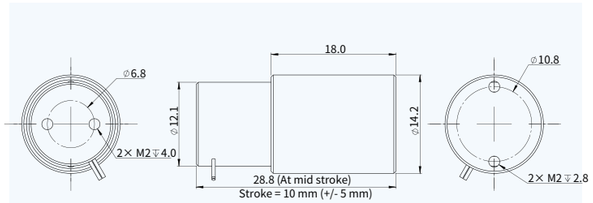


[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] The values are at mid stroke.
[3] Resistance is measured by DC current with standard 0.5 m lead wire.
[4] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM14-10-C56

Performance Parameters		Symbol	Unit	AVM14-10-C56
Stroke		S	mm	10.0
Continuous Force @100°C [1][2]		F_c	N	0.98
Peak Force [2]		F_{pk}	N	2.95
Force Constant ±10% [2]		K_f	N/A	0.82
Back EMF Constant ±10% [2]		K_e	V/(m/s)	0.82
Motor Constant @25°C [2]		K_m	N/Sqrt(W)	0.55
Resistance @25°C ±10% [3]		R_{25}	Ω	2.22
Inductance ±20% [4]		L	mH	0.24
Electrical Time Constant		τ_e	ms	0.108
Continuous Current @100°C [1]		I_c	A	1.20
Peak Current		I_{pk}	A	3.60
Continuous Power Dissipation @100°C [1]		P_c	W	4.11
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant [1]		K_{th}	W/°C	0.05
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	3.0
Core Mass		m_{core}	g	13.6
Running Clearance		L_{gap}	mm	0.35
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension



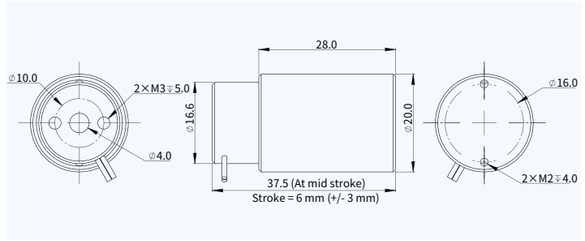
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] The values are at mid stroke.
[3] Resistance is measured by DC current with standard 0.5 m lead wire.
[4] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM Customized Series

AVM20-HF-6-C28

Performance Parameters		Symbol	Unit	AVM20-HF-6-C28
Stroke		S	mm	6
Continuous Force @100°C ❶❷		F_c	N	5.69
Peak Force ❷		F_{pk}	N	17.06
Force Constant ±10%❸		K_f	N/A	4.74
Back EMF Constant ±10%❷		K_e	V/(m/s)	4.74
Motor Constant @25°C❷		K_m	N/Sqrt(W)	2.16
Resistance @25°C ±10%❸		R_{25}	Ω	4.84
Inductance ±20%❹		L	mH	0.60
Electrical Time Constant		τ_e	ms	0.124
Continuous Current @100°C❶		I_c	A	1.20
Peak Current		I_{pk}	A	3.60
Continuous Power Dissipation @100°C❶		P_c	W	8.98
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant❶		K_{th}	W/°C	0.12
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	13.5
Core Mass		m_{core}	g	47.5
Running Clearance		L_{gap}	mm	0.5
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

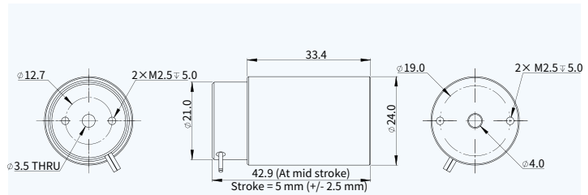


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM24-HF-5-C13

Performance Parameters		Symbol	Unit	AVM24-HF-5-C13
Stroke		S	mm	5
Continuous Force @100°C ❶❷		F_c	N	5.88
Peak Force ❷		F_{pk}	N	31.92
Force Constant ±10%❸		K_f	N/A	8.40
Back EMF Constant ±10%❷		K_e	V/(m/s)	8.40
Motor Constant @25°C❷		K_m	N/Sqrt(W)	2.91
Resistance @25°C ±10%❸		R_{25}	Ω	8.35
Inductance ±20%❹		L	mH	1.68
Electrical Time Constant		τ_e	ms	0.201
Continuous Current @100°C❶		I_c	A	0.70
Peak Current		I_{pk}	A	3.80
Continuous Power Dissipation @100°C❶		P_c	W	5.27
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant❶		K_{th}	W/°C	0.07
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	21.5
Core Mass		m_{core}	g	82.0
Running Clearance		L_{gap}	mm	0.5
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

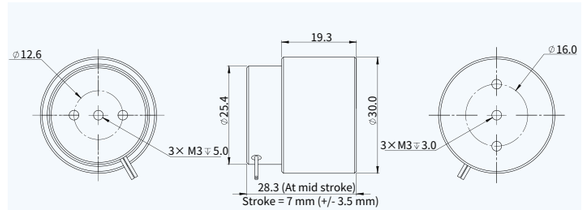


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM30-7-C60

Performance Parameters		Symbol	Unit	AVM30-7-C60
Stroke		S	mm	7
Continuous Force @100°C ❶❷		F_c	N	5.64
Peak Force ❷		F_{pk}	N	24.80
Force Constant ±10%❸		K_f	N/A	6.20
Back EMF Constant ±10%❷		K_e	V/(m/s)	6.20
Motor Constant @25°C❷		K_m	N/Sqrt(W)	2.49
Resistance @25°C ±10%❸		R_{25}	Ω	6.21
Inductance ±20%❹		L	mH	1.41
Electrical Time Constant		τ_e	ms	0.226
Continuous Current @100°C❶		I_c	A	0.91
Peak Current		I_{pk}	A	4.00
Continuous Power Dissipation @100°C❶		P_c	W	6.62
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant❶		K_{th}	W/°C	0.09
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	15.3
Core Mass		m_{core}	g	86.2
Running Clearance		L_{gap}	mm	0.6
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

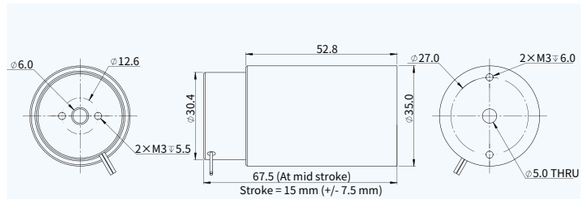


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM35-HF-15-C22

Performance Parameters		Symbol	Unit	AVM35-HF-15-C22
Stroke		S	mm	15
Continuous Force @100°C ❶❷		F_c	N	19.76
Peak Force ❷		F_{pk}	N	98.80
Force Constant ±10%❸		K_f	N/A	24.70
Back EMF Constant ±10%❷		K_e	V/(m/s)	24.70
Motor Constant @25°C❷		K_m	N/Sqrt(W)	6.24
Resistance @25°C ±10%❸		R_{25}	Ω	15.66
Inductance ±20%❹		L	mH	7.0
Electrical Time Constant		τ_e	ms	0.447
Continuous Current @100°C❶		I_c	A	0.80
Peak Current		I_{pk}	A	4.00
Continuous Power Dissipation @100°C❶		P_c	W	12.91
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant❶		K_{th}	W/°C	0.17
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	80.7
Core Mass		m_{core}	g	261.0
Running Clearance		L_{gap}	mm	0.5
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

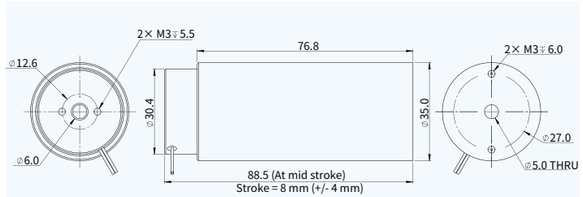


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM35-HF-8-C35

Performance Parameters		Symbol	Unit	AVM35-HF-8-C35
Stroke		S	mm	8
Continuous Force @100°C [1][2]		F_c	N	27.43
Peak Force [2]		F_{pk}	N	137.16
Force Constant ±10% [2]		K_f	N/A	34.29
Back EMF Constant ±10% [2]		K_e	V/(m/s)	34.29
Motor Constant @25°C [2]		K_m	N/Sqrt(W)	8.32
Resistance @25°C ±10% [3]		R_{25}	Ω	16.98
Inductance ±20% [4]		L	mH	7.15
Electrical Time Constant		τ_e	ms	0.421
Continuous Current @100°C [1]		I_c	A	0.80
Peak Current		I_{pk}	A	4.00
Continuous Power Dissipation @100°C [1]		P_c	W	14.01
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant [1]		K_{th}	W/°C	0.19
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	85.2
Core Mass		m_{core}	g	371.4
Running Clearance		L_{gap}	mm	0.5
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

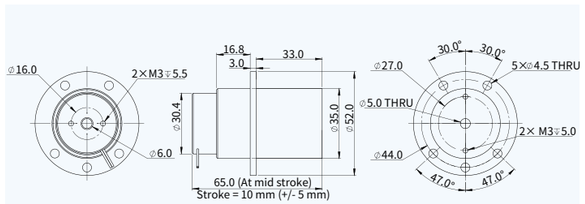


[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] The values are at mid stroke.
[3] Resistance is measured by DC current with standard 0.5 m lead wire.
[4] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM35-HF-10-C31

Performance Parameters		Symbol	Unit	AVM35-HF-10-C31
Stroke		S	mm	10
Continuous Force @100°C [1][2]		F_c	N	16.72
Peak Force [2]		F_{pk}	N	83.60
Force Constant ±10% [2]		K_f	N/A	20.90
Back EMF Constant ±10% [2]		K_e	V/(m/s)	20.90
Motor Constant @25°C [2]		K_m	N/Sqrt(W)	5.98
Resistance @25°C ±10% [3]		R_{25}	Ω	12.23
Inductance ±20% [4]		L	mH	5.22
Electrical Time Constant		τ_e	ms	0.427
Continuous Current @100°C [1]		I_c	A	0.80
Peak Current		I_{pk}	A	4.00
Continuous Power Dissipation @100°C [1]		P_c	W	10.09
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant [1]		K_{th}	W/°C	0.13
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	78.0
Core Mass		m_{core}	g	285.7
Running Clearance		L_{gap}	mm	0.5
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

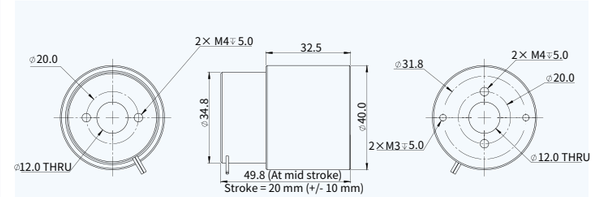


[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] The values are at mid stroke.
[3] Resistance is measured by DC current with standard 0.5 m lead wire.
[4] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM40-20-C18

Performance Parameters		Symbol	Unit	AVM40-20-C18
Stroke		S	mm	20
Continuous Force @100°C [1][2]		F_c	N	8.11
Peak Force [2]		F_{pk}	N	47.39
Force Constant ±10% [2]		K_f	N/A	10.53
Back EMF Constant ±10% [2]		K_e	V/(m/s)	10.53
Motor Constant @25°C [2]		K_m	N/Sqrt(W)	3.06
Resistance @25°C ±10% [3]		R_{25}	Ω	11.82
Inductance ±20% [4]		L	mH	5.41
Electrical Time Constant		τ_e	ms	0.458
Continuous Current @100°C [1]		I_c	A	0.77
Peak Current		I_{pk}	A	4.50
Continuous Power Dissipation @100°C [1]		P_c	W	9.03
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant [1]		K_{th}	W/°C	0.12
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	65.0
Core Mass		m_{core}	g	205.0
Running Clearance		L_{gap}	mm	0.6
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension

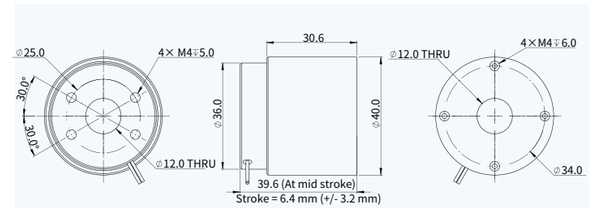


[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] The values are at mid stroke.
[3] Resistance is measured by DC current with standard 0.5 m lead wire.
[4] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM40-HF-6.4-C11A

Performance Parameters		Symbol	Unit	AVM40-HF-6.4-C11A
Stroke		S	mm	6.4
Continuous Force @100°C [1][2]		F_c	N	18.18
Peak Force [2]		F_{pk}	N	99.40
Force Constant ±10% [2]		K_f	N/A	14.20
Back EMF Constant ±10% [2]		K_e	V/(m/s)	14.20
Motor Constant @25°C [2]		K_m	N/Sqrt(W)	5.91
Resistance @25°C ±10% [3]		R_{25}	Ω	5.77
Inductance ±20% [4]		L	mH	1.44
Electrical Time Constant		τ_e	ms	0.249
Continuous Current @100°C [1]		I_c	A	1.28
Peak Current		I_{pk}	A	7.00
Continuous Power Dissipation @100°C [1]		P_c	W	12.18
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant [1]		K_{th}	W/°C	0.16
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	49.0
Core Mass		m_{core}	g	195.0
Running Clearance		L_{gap}	mm	0.5
Other Information				
Insulation Class			Class A (105°C)	
Protection Grade			IP00	
Compliance with Global Standards			RoHS	
Ambient Temperature	Operation		0°C to 40°C (non-freezing)	
	Storage		-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)	
	Storage		10%RH to 90%RH (non-condensing)	
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension



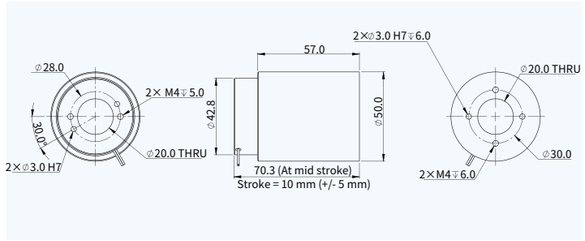
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] The values are at mid stroke.
[3] Resistance is measured by DC current with standard 0.5 m lead wire.
[4] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM Customized Series

AVM50-HF-10-C15A

Performance Parameters		Symbol	Unit	AVM50-HF-10-C15A
Stroke		S	mm	10.0
Continuous Force @100°C ❶❷		F_c	N	25.20
Peak Force ❷		F_{pk}	N	105.00
Force Constant ±10%❸		K_f	N/A	21.00
Back EMF Constant ±10%❷		K_e	V/(m/s)	21.00
Motor Constant @25°C❷		K_m	N/Sqrt(W)	7.10
Resistance @25°C ±10%❸		R_{25}	Ω	8.75
Inductance ±20%❹		L	mH	4.93
Electrical Time Constant		τ_e	ms	0.563
Continuous Current @100°C❶		I_c	A	1.20
Peak Current		I_{pk}	A	5.00
Continuous Power Dissipation @100°C❶		P_c	W	16.24
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant❶		K_{th}	W/°C	0.22
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	142
Core Mass		m_{core}	g	482
Running Clearance		L_{gap}	mm	0.6
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

■ Dimension

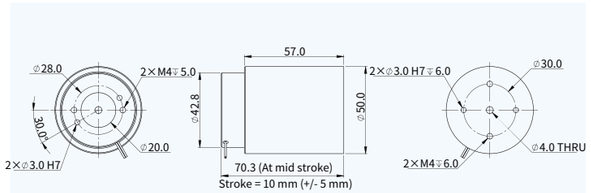


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM50-HF-10-C34A

Performance Parameters		Symbol	Unit	AVM50-HF-10-C34A
Stroke		S	mm	10.0
Continuous Force @100°C ❶❷		F_c	N	37.57
Peak Force ❷		F_{pk}	N	156.55
Force Constant ±10%❸		K_f	N/A	31.31
Back EMF Constant ±10%❷		K_e	V/(m/s)	31.31
Motor Constant @25°C❷		K_m	N/Sqrt(W)	11.21
Resistance @25°C ±10%❸		R_{25}	Ω	7.80
Inductance ±20%❹		L	mH	5.30
Electrical Time Constant		τ_e	ms	0.679
Continuous Current @100°C❶		I_c	A	1.20
Peak Current		I_{pk}	A	5.00
Continuous Power Dissipation @100°C❶		P_c	W	14.48
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant❶		K_{th}	W/°C	0.19
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	144
Core Mass		m_{core}	g	628
Running Clearance		L_{gap}	mm	0.6
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

■ Dimension

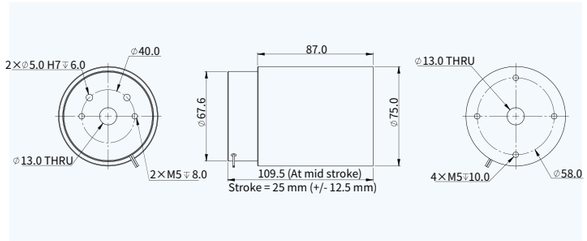


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM75-HF-25-C12

Performance Parameters		Symbol	Unit	AVM75-HF-25-C12
Stroke		S	mm	25.0
Continuous Force @100°C ❶❷		F_c	N	124.69
Peak Force ❷		F_{pk}	N	572.90
Force Constant ±10%❸		K_f	N/A	33.70
Back EMF Constant ±10%❷		K_e	V/(m/s)	33.70
Motor Constant @25°C❷		K_m	N/Sqrt(W)	20.05
Resistance @25°C ±10%❸		R_{25}	Ω	2.83
Inductance ±20%❹		L	mH	2.76
Electrical Time Constant		τ_e	ms	0.977
Continuous Current @100°C❶		I_c	A	3.70
Peak Current		I_{pk}	A	17.00
Continuous Power Dissipation @100°C❶		P_c	W	49.84
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant❶		K_{th}	W/°C	0.66
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	710
Core Mass		m_{core}	g	1940
Running Clearance		L_{gap}	mm	0.5
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

■ Dimension

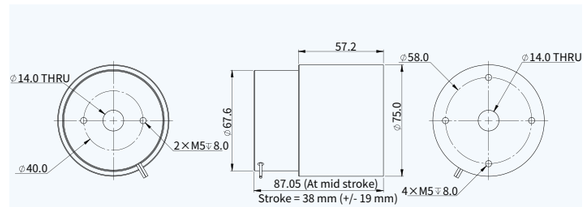


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM75-38-C39

Performance Parameters		Symbol	Unit	AVM75-38-C39
Stroke		S	mm	38.0
Continuous Force @100°C ❶❷		F_c	N	45.26
Peak Force ❷		F_{pk}	N	192.02
Force Constant ±10%❸		K_f	N/A	13.72
Back EMF Constant ±10%❷		K_e	V/(m/s)	13.72
Motor Constant @25°C❷		K_m	N/Sqrt(W)	9.66
Resistance @25°C ±10%❸		R_{25}	Ω	2.02
Inductance ±20%❹		L	mH	1.82
Electrical Time Constant		τ_e	ms	0.903
Continuous Current @100°C❶		I_c	A	3.30
Peak Current		I_{pk}	A	14.00
Continuous Power Dissipation @100°C❶		P_c	W	28.28
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant❶		K_{th}	W/°C	0.38
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	534
Core Mass		m_{core}	g	1277
Running Clearance		L_{gap}	mm	0.5
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

■ Dimension

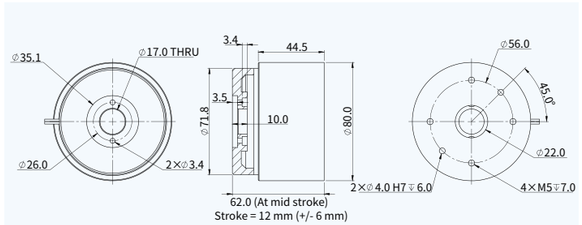


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM80-12-C8

Performance Parameters	Symbol	Unit	AVM80-12-C8
Stroke	S	mm	12
Continuous Force @100°C ❶❷	F_c	N	33.71
Peak Force ❷	F_{pk}	N	192.60
Force Constant ±10%❸	K_f	N/A	21.34
Back EMF Constant ±10%❷	K_e	V/(m/s)	21.34
Motor Constant @25°C❷	K_m	N/Sqrt(W)	8.37
Resistance @25°C ±10%❸	R_{25}	Ω	6.50
Inductance ±20%❹	L	mH	1.70
Electrical Time Constant	τ_e	ms	0.262
Continuous Current @100°C❶	I_c	A	1.58
Peak Current	I_{pk}	A	9.00
Continuous Power Dissipation @100°C❶	P_c	W	20.91
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant❶	K_{th}	W/°C	0.28
Max.Voltage	U_{max}	Vdc	60
Mechanical Parameters			
Coil Mass	m_{coil}	g	124
Core Mass	m_{core}	g	1262.4
Running Clearance	L_{gap}	mm	0.6
Other Information			
Insulation Class			Class A (105°C)
Protection Grade			IP00
Compliance with Global Standards			RoHS
Ambient Temperature	Operation		0°C to 40°C (non-freezing)
	Storage		-15°C to 70°C (non-freezing)
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)
	Storage		10%RH to 90%RH (non-condensing)
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.

■ Dimension

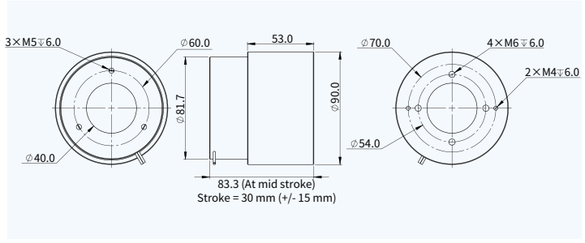


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM90-30-C77

Performance Parameters	Symbol	Unit	AVM90-30-C77
Stroke	S	mm	30
Continuous Force @100°C ❶❷	F_c	N	57.30
Peak Force ❷	F_{pk}	N	202.60
Force Constant ±10%❸	K_f	N/A	14.33
Back EMF Constant ±10%❷	K_e	V/(m/s)	14.33
Motor Constant @25°C❷	K_m	N/Sqrt(W)	8.67
Resistance @25°C ±10%❸	R_{25}	Ω	2.73
Inductance ±20%❹	L	mH	3.80
Electrical Time Constant	τ_e	ms	1.392
Continuous Current @100°C❶	I_c	A	4.00
Peak Current	I_{pk}	A	14.00
Continuous Power Dissipation @100°C❶	P_c	W	56.29
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant❶	K_{th}	W/°C	0.75
Max.Voltage	U_{max}	Vdc	120
Mechanical Parameters			
Coil Mass	m_{coil}	g	751.2
Core Mass	m_{core}	g	1135.1
Running Clearance	L_{gap}	mm	0.65
Other Information			
Insulation Class			Class A (105°C)
Protection Grade			IP00
Compliance with Global Standards			RoHS
Ambient Temperature	Operation		0°C to 40°C (non-freezing)
	Storage		-15°C to 70°C (non-freezing)
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)
	Storage		10%RH to 90%RH (non-condensing)
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.

■ Dimension

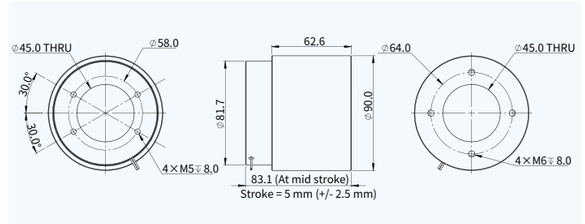


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM90-HF-5-C40A

Performance Parameters	Symbol	Unit	AVM90-HF-5-C40A
Stroke	S	mm	5
Continuous Force @100°C ❶❷	F_c	N	62.49
Peak Force ❷	F_{pk}	N	220.92
Force Constant ±10%❸	K_f	N/A	15.78
Back EMF Constant ±10%❷	K_e	V/(m/s)	15.78
Motor Constant @25°C❷	K_m	N/Sqrt(W)	14.44
Resistance @25°C ±10%❸	R_{25}	Ω	1.20
Inductance ±20%❹	L	mH	0.75
Electrical Time Constant	τ_e	ms	0.628
Continuous Current @100°C❶	I_c	A	3.96
Peak Current	I_{pk}	A	14.00
Continuous Power Dissipation @100°C❶	P_c	W	24.15
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant❶	K_{th}	W/°C	0.32
Max.Voltage	U_{max}	Vdc	120
Mechanical Parameters			
Coil Mass	m_{coil}	g	427.2
Core Mass	m_{core}	g	1514.6
Running Clearance	L_{gap}	mm	0.65
Other Information			
Insulation Class			Class A (105°C)
Protection Grade			IP00
Compliance with Global Standards			RoHS
Ambient Temperature	Operation		0°C to 40°C (non-freezing)
	Storage		-15°C to 70°C (non-freezing)
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)
	Storage		10%RH to 90%RH (non-condensing)
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.

■ Dimension

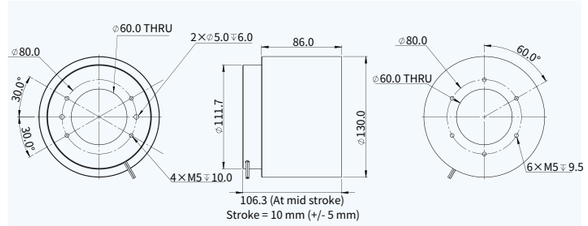


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM130-HF-10-C29A

Performance Parameters	Symbol	Unit	AVM130-HF-10-C29A
Stroke	S	mm	10
Continuous Force @100°C ❶❷	F_c	N	162.40
Peak Force ❷	F_{pk}	N	487.20
Force Constant ±10%❸	K_f	N/A	46.40
Back EMF Constant ±10%❷	K_e	V/(m/s)	46.40
Motor Constant @25°C❷	K_m	N/Sqrt(W)	53.58
Resistance @25°C ±10%❸	R_{25}	Ω	0.75
Inductance ±20%❹	L	mH	0.75
Electrical Time Constant	τ_e	ms	1.0
Continuous Current @100°C❶	I_c	A	3.50
Peak Current	I_{pk}	A	10.50
Continuous Power Dissipation @100°C❶	P_c	W	11.84
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant❶	K_{th}	W/°C	0.16
Max.Voltage	U_{max}	Vdc	120
Mechanical Parameters			
Coil Mass	m_{coil}	g	1080
Core Mass	m_{core}	g	5300
Running Clearance	L_{gap}	mm	0.55
Other Information			
Insulation Class			Class A (105°C)
Protection Grade			IP00
Compliance with Global Standards			RoHS
Ambient Temperature	Operation		0°C to 40°C (non-freezing)
	Storage		-15°C to 70°C (non-freezing)
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)
	Storage		10%RH to 90%RH (non-condensing)
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.

■ Dimension

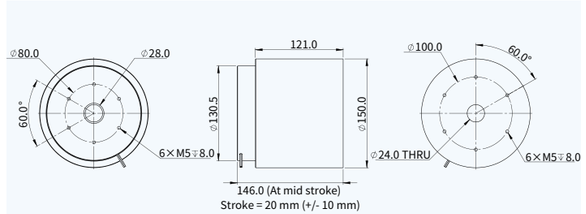


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVM150-HF-20-C53

Performance Parameters		Symbol	Unit	AVM150-HF-20-C53
Stroke		S	mm	20.0
Continuous Force @100°C [1][2]		F_c	N	585.77
Peak Force [2]		F_{pk}	N	1757.30
Force Constant ±10% [3]		K_f	N/A	97.63
Back EMF Constant ±10% [2]		K_e	V/(m/s)	97.63
Motor Constant @25°C [2]		K_m	N/Sqrt(W)	46.54
Resistance @25°C ±10% [3]		R_{25}	Ω	4.40
Inductance ±20% [4]		L	mH	2.60
Electrical Time Constant		τ_e	ms	0.591
Continuous Current @100°C [1]		I_c	A	6.00
Peak Current		I_{pk}	A	18.00
Continuous Power Dissipation @100°C [1]		P_c	W	204.14
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant [1]		K_{th}	W/°C	2.72
Max.Voltage		U_{max}	Vdc	120
Mechanical Parameters				
Coil Mass		m_{coil}	g	1500
Core Mass		m_{core}	g	12700
Running Clearance		L_{gap}	mm	0.75
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

■ Dimension



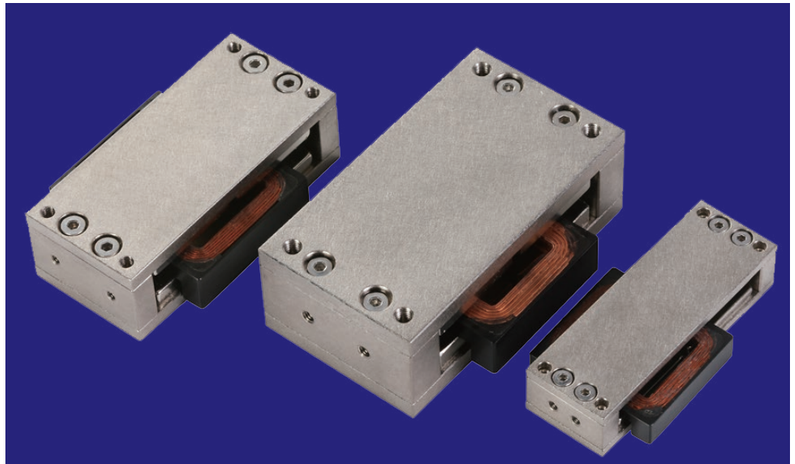
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] The values are at mid stroke.
[3] Resistance is measured by DC current with standard 0.5 m lead wire.
[4] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Part Numbering

AVM90-HF-5-0.5-C40A

- Model and Diameter: Example: AVM90
- High Force Option: HF [1] / (blank) [2]
- Stroke (mm): 5
- Wire Length Option(m): 0.5
- Customization Number: Example: C40A [2]

[1] HF= High force series
[2] (blank)= Non high force series



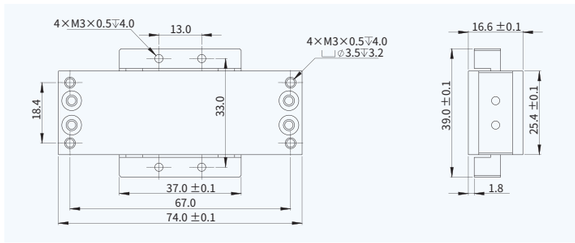
AVA SERIES

- Direct drive, zero cogging, zero backlash voice coil motors
- Low coil mass with very fast response and bandwidth
- No contact between coil and core movement (no wear and tear)
- Smooth motion at low speeds with limitless resolution (depends on feedback device)

AVA1-20

Performance Parameters		Symbol	Unit	AVA1-20
Stroke		S	mm	20
Continuous Force @100°C ❶❷		F_c	N	3.84
Peak Force ❷		F_{pk}	N	11.5
Force Constant ±10% ❷		K_f	N/A	1.92
Back EMF Constant ±10% ❷		K_e	V/(m/s)	1.92
Motor Constant @25°C ❷		K_m	N/Sqrt(W)	1.62
Resistance @25°C ±10% ❸		R_{25}	Ω	1.40
Inductance ±20% ❹		L	mH	0.27
Electrical Time Constant		τ_e	ms	0.19
Continuous Current @100°C ❶		I_c	A	2.0
Peak Current		I_{pk}	A	6.0
Continuous Power Dissipation @100°C ❶		P_c	W	7.2
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant ❶		K_{th}	W/°C	0.096
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	17
Core Mass		m_{core}	g	186
Running Clearance		L_{gap}	mm	0.6
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP20		
Compliance with Global Standards		RoHS		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

■ Dimension

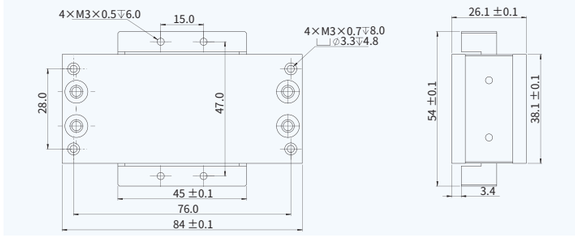


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVA2-20

Performance Parameters		Symbol	Unit	AVA2-20
Stroke		S	mm	20
Continuous Force @100°C ❶❷		F_c	N	11.69
Peak Force ❷		F_{pk}	N	35.1
Force Constant ±10% ❷		K_f	N/A	8.35
Back EMF Constant ±10% ❷		K_e	V/(m/s)	8.35
Motor Constant @25°C ❷		K_m	N/Sqrt(W)	4.34
Resistance @25°C ±10% ❸		R_{25}	Ω	3.7
Inductance ±20% ❹		L	mH	1.24
Electrical Time Constant		τ_e	ms	0.34
Continuous Current @100°C ❶		I_c	A	1.4
Peak Current		I_{pk}	A	4.2
Continuous Power Dissipation @100°C ❶		P_c	W	9.3
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant ❶		K_{th}	W/°C	0.125
Max.Voltage		U_{max}	Vdc	60
Mechanical Parameters				
Coil Mass		m_{coil}	g	45
Core Mass		m_{core}	g	496
Running Clearance		L_{gap}	mm	0.6
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP20		
Compliance with Global Standards		RoHS		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

■ Dimension

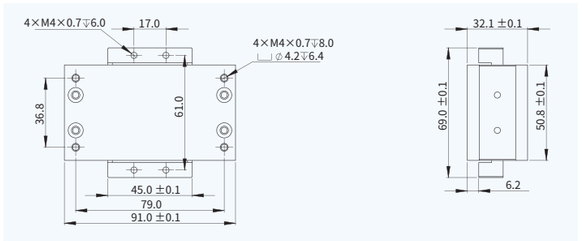


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ The values are at mid stroke.
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

AVA3-20

Performance Parameters	Symbol	Unit	AVA3-20
Stroke	S	mm	20
Continuous Force @100°C ❶❷	F_c	N	26.32
Peak Force ❷	F_{pk}	N	79.0
Force Constant ±10% ❸	K_f	N/A	9.40
Back EMF Constant ±10% ❷	K_e	V/(m/s)	9.40
Motor Constant @25°C ❷	K_m	N/Sqrt(W)	7.43
Resistance @25°C ±10% ❸	R_{25}	Ω	1.6
Inductance ±20% ❹	L	mH	0.7
Electrical Time Constant	τ_e	ms	0.44
Continuous Current @100°C ❶	I_c	A	2.8
Peak Current	I_{pk}	A	8.4
Continuous Power Dissipation @100°C ❶	P_c	W	16.2
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant ❶	K_{th}	W/°C	0.216
Max.Voltage	U_{max}	Vdc	60
Mechanical Parameters			
Coil Mass	m_{coil}	g	72
Core Mass	m_{core}	g	930
Running Clearance	L_{gap}	mm	0.6
Other Information			
Insulation Class		Class A (105°C)	
Protection Grade		IP20	
Compliance with Global Standards		RoHS	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Dimension



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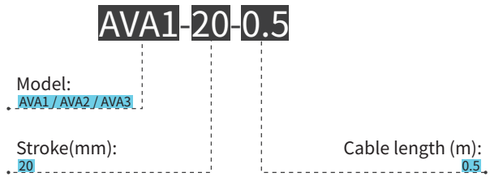
❸ Resistance is measured by DC current with standard 0.5 m lead wire.
❹ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subject to change without prior notice.

Part Numbering

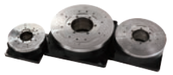


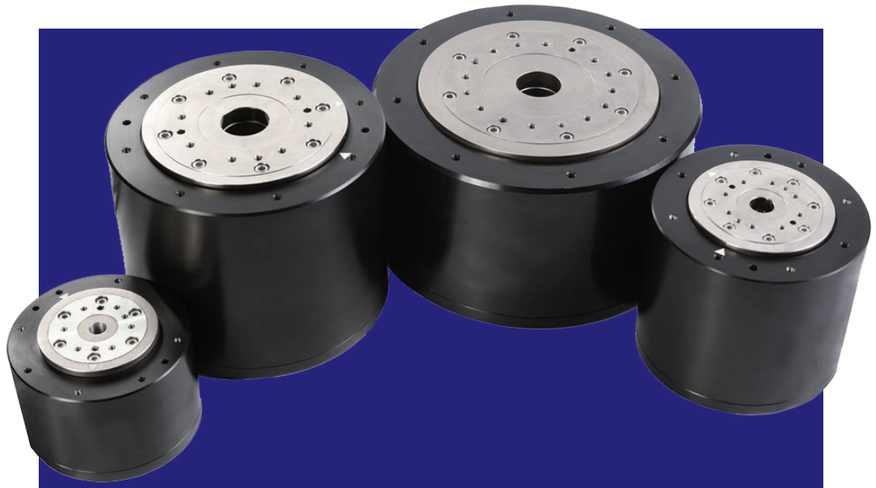
DIRECT DRIVE ROTARY MOTORS

DIRECT DRIVE ROTARY MOTORS

Akribis systems

Overview

DDR Motors	Model	● Continuous Torque(T_{cn}) / ■ Peak Torque(T_{pk}) Unit: Nm													Repeatability (arc sec)
		2.5	5	10	30	50	100	150	200	250	300	500	1000	1500	
ADR-A Series	ADR110-A75	●1.9 / ■5.8													+ / -2.7
	ADR110-A98		●4.2 / ■12.6												+ / -2.7
	ADR135-A90		●5.2 / ■15.5												+ / -2.7
	ADR135-A115			●11 / ■32.9											+ / -2.7
	ADR175-A102			●15.7 / ■47.1											+ / -2
	ADR175-A138				●32.9 / ■98.6										+ / -2
	ADR220-A120					●46.0 / ■137.9									+ / -2
	ADR220-A165						●94.9 / ■284.6								+ / -2
	ADR360-A150								●184.8 / ■554.5						+ / -2
	ADR360-A215											●377.9 / ■1133.8			+ / -2
ADR-B Series	ADR110-B113	●1.9 / ■5.8													+ / -2.7
	ADR110-B136		●4.2 / ■12.6												+ / -2.7
	ADR135-B121		●5.2 / ■15.5												+ / -2
	ADR135-B148			●11 / ■32.9											+ / -2
	ADR175-B143			●15.7 / ■47.1											+ / -2
	ADR175-B180				●32.9 / ■98.6										+ / -2
	ADR220-B167					●46.0 / ■137.9									+ / -2
	ADR220-B217						●94.9 / ■284.6								+ / -2
ADR-P Series	ADR110-P-22	●1.9 / ■5.8													-
	ADR110-P-45		●4.2 / ■12.6												-
	ADR135-P-27		●4.5 / ■13.6												-
	ADR135-P-54			●10.3 / ■31											-
	ADR175-P-36			●14.3 / ■42.9											-
	ADR175-P-72				●31.5 / ■94.4										-
	ADR220-P-50					●43 / ■129.1									-
	ADR220-P-100						●91.9 / ■275.8								-
	ADR360-P-70								●171 / ■513						-
	ADR360-P140											●358 / ■1074			-
		● Continuous Torque(T_{cn}) / ■ Peak Torque(T_{pk}) Unit: Nm													
		0.1	0.2	0.3	0.4	0.5	0.75	1	1.5	2	2.5	3	4	5	7.5	10	12.5	15	
ADR-F Series	ADR45-F-5	●0.05 / ■0.15																	-
	ADR45-F-10		●0.1 / ■0.3																-
	ADR60-F-10			●0.33 / ■0.95															-
	ADR60-F-20					●0.65 / ■1.9													-
	ADR75-F-15							●0.8 / ■2.41											-
	ADR75-F-30									●1.61 / ■4.82									-
	ADR90-F-20									●1.88 / ■5.61									-
	ADR90-F-40													●3.75 / ■11.22					-
		● Continuous Torque(T_{cn}) / ■ Peak Torque(T_{pk}) Unit: Nm																	
		0.1	0.2	0.3	0.4	0.5	0.75	2	2.5	5	7.5	10	12.5	15	17.5	20	22.5	25	
ACD Series	ACD62-60	●0.115 / ■0.4																	+ / -3
	ACD62-84			●0.341 / ■1.19															+ / -3
	ACD120-80						●1.85 / ■6.46												+ / -3
	ACD120-175											●9.22 / ■32.25							+ / -3
		● Continuous Torque(T_{cn}) / ■ Peak Torque(T_{pk}) Unit: Nm																	
		2.5	5	7.5	10	20	30	50	75	100	150	200	250	300	350	400	450	500	
ACW Series	ACW120-37	●0.6 / ■2.1																	+ / -4
	ACW170-37		●2.8 / ■11.9																+ / -3
	ACW220-42			●7.4 / ■35.9															+ / -3
 AXD Series	AXD80-50	●0.9 / ■2.6																	+ / -6
	AXD120-50		●3.4 / ■10																+ / -3
	AXD160-55				●9.4 / ■27														+ / -2.5
	AXD200-65					●18.8 / ■54.3													+ / -2
	AXD280-90							●51.1 / ■150.3											+ / -2
	AXD400-155													●250.6 / ■648.9					+ / -2
		Unit: Nm																	
		0.1	0.2	0.3	0.4	0.5	0.75	1	1.5	2	2.5	3	4	5	7.5	10	12.5	15	
AXM Series	AXM40-43	●0.11 / ■0.3																	+ / -10
	AXM60-50							●0.71 / ■2											+ / -10



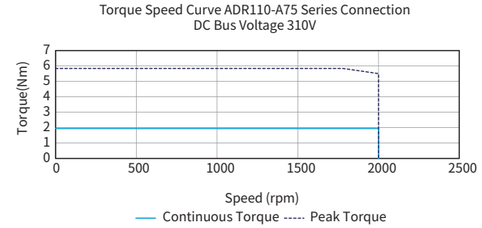
ADR-A SERIES

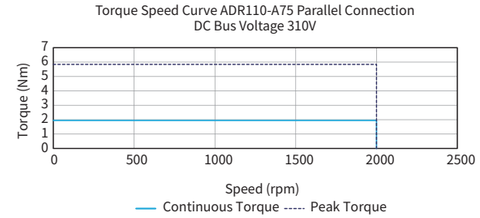
- Direct drive brushless motor
- Fully integrated with encoder and bearing
- Low cogging torque
- Precise homing through index pulse
- Low speed and high speed windings

ADR110-A75

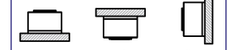
ADR110-A75				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]	T_{cn}	Nm	1.9	1.9
Peak Torque	T_{pk}	Nm	5.8	5.8
Torque Constant ±10%	K_t	Nm/Arms	0.65	0.32
Back EMF constant ±10%	K_e	Vpeak/rpm	0.055	0.028
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.30	0.30
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	3.20	0.80
Inductance (L-L) ±20%[3]	L	mH	17.15	4.29
Electrical time constant	τ_e	ms	5.36	5.36
Continuous Current @100°C[4]	I_{cn}	Arms	3.0	6.0
Peak Current	I_{pk}	Arms	9.0	18.0
Continuous Power Dissipation @100°C[1]	P_{cn}	W	55.7	55.7
Max. Coil Temperature	T_{max}	°C	100.0	100.0
Thermal Dissipation Constant[1]	K_{thn}	W/°C	0.7	0.7
Max. Bus Voltage	U_{bus}	Vdc	600.0	600.0
Pole Number	p	-	16	16
Rec. Max Speed @230V AC[6]	Ω_{max}	rpm	1700	2000
Mechanical Parameters				
Overall Mass	m_n	kg	3.20	3.20
Rotor Inertia	J_r	kg·m²	3.086E-04	3.086E-04
Axial Runout[5]	-	µm	15 (10,5)	15 (10,5)
Radial Runout[5]	-	µm	15 (10,5)	15 (10,5)
Max Axial Load (Upright Mounting)[6]	-	N	700	700
Max Axial Load (Inverted / Wall mounting)	-	N	150	150
Max Moment Load (Upright Mounting)	-	Nm	20	20
Max Moment Load (Inverted / Wall Mounting)	-	Nm	2.2	2.2
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	3005	3005
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev	240400	240400
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev	480800	480800
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev	1202000	1202000
Accuracy with Error Mapping[7]	-	arc sec	+/-5.4	+/-5.4
Repeatability[7]	-	arc sec	+/-2.7	+/-2.7
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE, UL (option)		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

■ Torque-Speed Curve



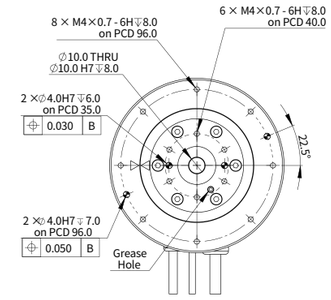


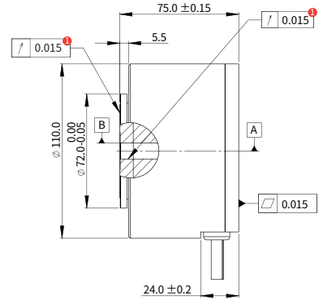
Mounting Illustration

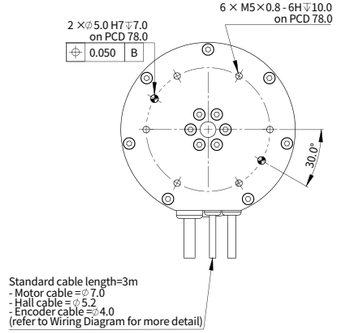


[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

■ Dimension





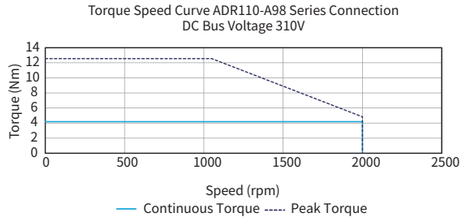


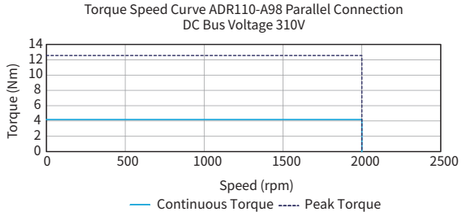
[1] Standard axial/ radial run-out = 0.015

ADR110-A98

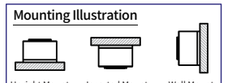
ADR110-A98					
Performance Parameters	**Symbol**	**Unit**		**Series**	**Parallel**
Continuous Torque @100°C[1]	T_{cn}	Nm		4.2	4.2
Peak Torque	T_{pk}	Nm		12.6	12.6
Torque Constant ±10%	K_t	Nm/Arms		1.40	0.70
Back EMF constant ±10%	K_e	Vpeak/rpm		0.119	0.060
Motor Constant @25°C	K_m	Nm/Sqrt(W)		0.51	0.52
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω		4.90	1.21
Inductance (L-L) ±20%[3]	L	mH		26.26	6.49
Electrical time constant	τ_e	ms		5.36	5.36
Continuous Current @100°C[1]	I_{cn}	Arms		3.0	6.0
Peak Current	I_{pk}	Arms		9.0	18.0
Continuous Power Dissipation @100°C[1]	P_{cn}	W		85.3	84.2
Max. Coil Temperature	T_{max}	°C		100.0	100.0
Thermal Dissipation Constant[1]	K_{thn}	W/°C		1.1	1.1
Max. Bus Voltage	U_{bus}	Vdc		600.0	600.0
Pole Number	p	-		16	16
Rec. Max Speed @230V AC[4]	Ω_{max}	rpm		1000	2000
Mechanical Parameters					
Overall Mass	m_n	kg		4.60	4.60
Rotor Inertia	J_r	kg·m²		4.419E-04	4.419E-04
Axial Runout[5]	-	μm		15 (10,5)	15 (10,5)
Radial Runout[5]	-	μm		15 (10,5)	15 (10,5)
Max Axial Load (Upright Mounting)[6]	-	N		700	700
Max Axial Load (Inverted / Wall mounting)	-	N		150	150
Max Moment Load (Upright Mounting)	-	Nm		20	20
Max Moment Load (Inverted / Wall Mounting)	-	Nm		2.2	2.2
Encoder Parameters					
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev		3005	3005
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev		240400	240400
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev		480800	480800
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev		1202000	1202000
Accuracy with Error Mapping[7]	-	arc sec		+/-5.4	+/-5.4
Repeatability[7]	-	arc sec		+/-2.7	+/-2.7
Other Information					
Insulation Class	Class B (130°C)				
Protection Grade	IP40				
Compliance with Global Standards	RoHS, CE, UL (option)				
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience	Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.				

■ Torque-Speed Curve



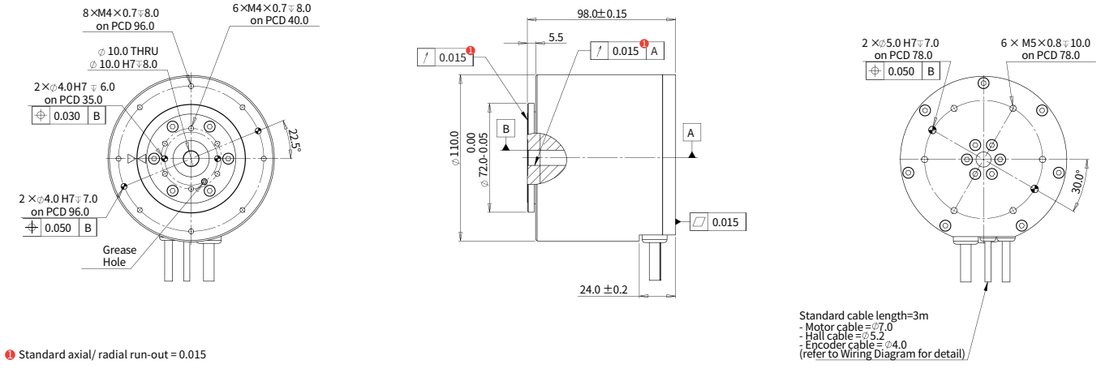


Mounting Illustration



[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

■ Dimension

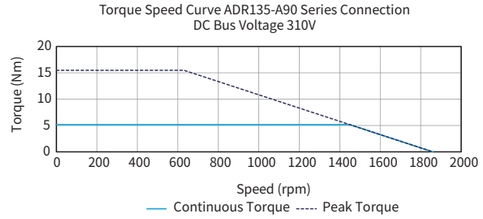


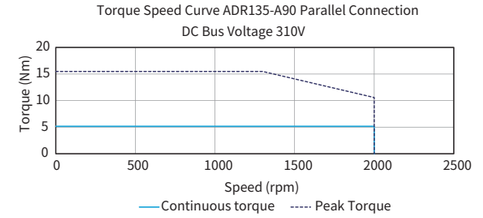
[1] Standard axial/ radial run-out = 0.015

ADR135-A90

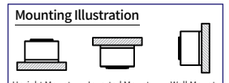
ADR135-A90					
Performance Parameters	**Symbol**	**Unit**		**Series**	**Parallel**
Continuous Torque @100°C[1]	T_{cn}	Nm		5.2	5.2
Peak Torque	T_{pk}	Nm		15.5	15.5
Torque Constant ±10%	K_t	Nm/Arms		1.72	0.86
Back EMF constant ±10%	K_e	Vpeak/rpm		0.147	0.074
Motor Constant @25°C	K_m	Nm/Sqrt(W)		0.55	0.55
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω		6.60	1.65
Inductance (L-L) ±20%[3]	L	mH		45.30	11.20
Electrical time constant	τ_e	ms		6.86	6.79
Continuous Current @100°C[1]	I_{cn}	Arms		3.0	6.0
Peak Current	I_{pk}	Arms		9.0	18.0
Continuous Power Dissipation @100°C[1]	P_{cn}	W		114.9	114.9
Max. Coil Temperature	T_{max}	°C		100.0	100.0
Thermal Dissipation Constant[1]	K_{thn}	W/°C		1.5	1.5
Max. Bus Voltage	U_{bus}	Vdc		600.0	600.0
Pole Number	p	-		16	16
Rec. Max Speed @230V AC[4]	Ω_{max}	rpm		630	1350
Mechanical Parameters					
Overall Mass	m_n	kg		4.80	4.80
Rotor Inertia	J_r	kg·m²		9.916E-04	9.916E-04
Axial Runout[5]	-	μm		15 (10,5)	15 (10,5)
Radial Runout[5]	-	μm		15 (10,5)	15 (10,5)
Max Axial Load (Upright Mounting)[6]	-	N		1050	1050
Max Axial Load (Inverted / Wall mounting)	-	N		180	180
Max Moment Load (Upright Mounting)	-	Nm		35	35
Max Moment Load (Inverted / Wall Mounting)	-	Nm		3.9	3.9
Encoder Parameters					
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev		3005	3005
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev		240400	240400
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev		480800	480800
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev		1202000	1202000
Accuracy with Error Mapping[7]	-	arc sec		+/-5.4	+/-5.4
Repeatability[7]	-	arc sec		+/-2.7	+/-2.7
Other Information					
Insulation Class	Class B (130°C)				
Protection Grade	IP40				
Compliance with Global Standards	RoHS, CE, UL (option)				
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience	Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.				

■ Torque-Speed Curve



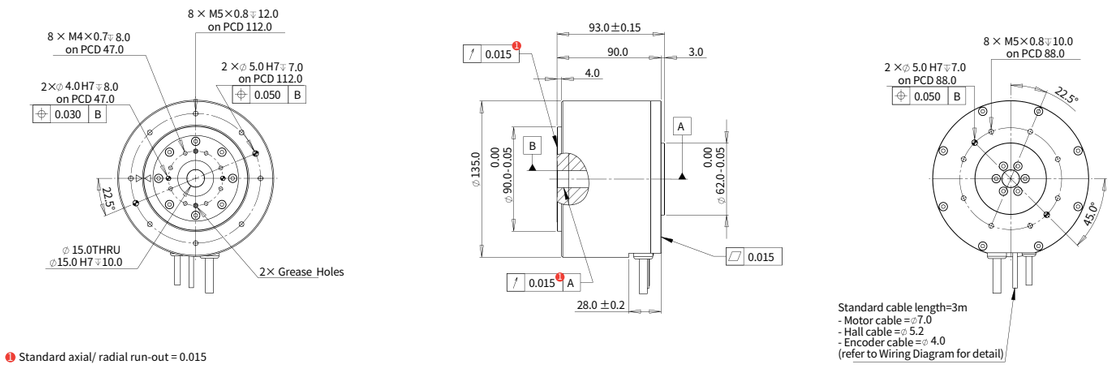


Mounting Illustration



[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

■ Dimension

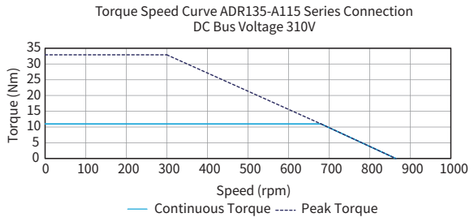


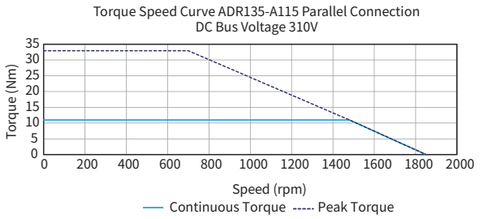
[1] Standard axial/ radial run-out = 0.015

ADR135-A115

ADR135-A115				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]	T_{cn}	Nm	11.0	11.0
Peak Torque	T_{pk}	Nm	32.9	32.9
Torque Constant ±10%	K_t	Nm/Arms	3.66	1.83
Back EMF constant ±10%	K_e	Vpeak/rpm	0.313	0.156
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.91	0.91
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	10.70	2.70
Inductance (L-L) ±20%[3]	L	mH	72.76	18.63
Electrical time constant	τ_e	ms	6.80	6.90
Continuous Current @100°C[1]	I_{cn}	Arms	3.0	6.0
Peak Current	I_{pk}	Arms	9.0	18.0
Continuous Power Dissipation @100°C[1]	P_{cn}	W	186.2	187.9
Max. Coil Temperature	T_{max}	°C	100.0	100.0
Thermal Dissipation Constant[1]	K_{thn}	W/°C	2.5	2.5
Max. Bus Voltage	U_{bus}	Vdc	600.0	600.0
Pole Number	p	-	16	16
Rec. Max Speed @230V AC[4]	Ω_{max}	rpm	330	745
Mechanical Parameters				
Overall Mass	m_n	kg	4.90	4.90
Rotor Inertia	J_r	kg·m²	1.332E-03	1.332E-03
Axial Runout[5]	-	μm	15 (10,5)	15 (10,5)
Radial Runout[5]	-	μm	15 (10,5)	15 (10,5)
Max Axial Load (Upright Mounting)[6]	-	N	1050	1050
Max Axial Load (Inverted / Wall mounting)	-	N	180	180
Max Moment Load (Upright Mounting)	-	Nm	35	35
Max Moment Load (Inverted / Wall Mounting)	-	Nm	3.9	3.9
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	3005	3005
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev	240400	240400
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev	480800	480800
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev	1202000	1202000
Accuracy with Error Mapping[7]	-	arc sec	+/-5.4	+/-5.4
Repeatability[7]	-	arc sec	+/-2.7	+/-2.7
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE, UL (option)		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

Torque-Speed Curve

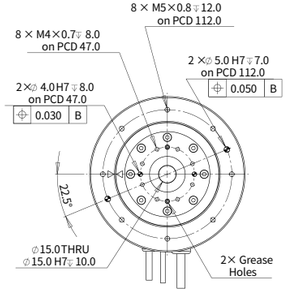


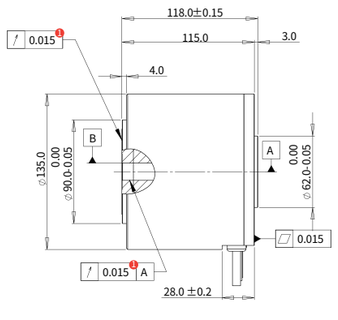


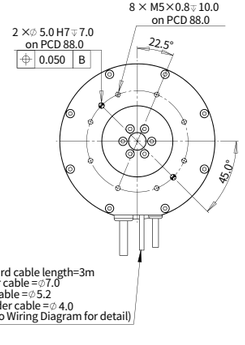
Mounting Illustration

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

Dimension





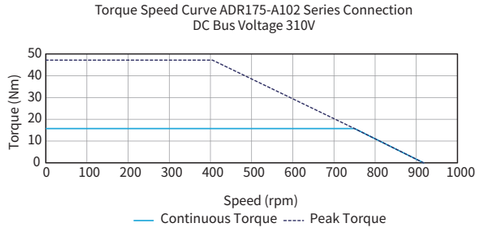


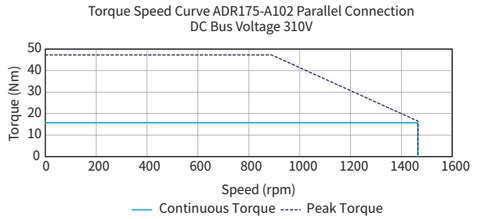
[1] Standard axial/ radial run-out = 0.015

ADR175-A102

ADR175-A102				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]	T_{cn}	Nm	15.7	15.7
Peak Torque	T_{pk}	Nm	47.2	47.2
Torque Constant ±10%	K_t	Nm/Arms	3.93	1.97
Back EMF constant ±10%	K_e	Vpeak/rpm	0.336	0.168
Motor Constant @25°C	K_m	Nm/Sqrt(W)	1.40	1.41
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	5.27	1.30
Inductance (L-L) ±20%[3]	L	mH	45.72	11.27
Electrical time constant	τ_e	ms	8.67	8.67
Continuous Current @100°C[1]	I_{cn}	Arms	4.0	8.0
Peak Current	I_{pk}	Arms	12.0	24.0
Continuous Power Dissipation @100°C[1]	P_{cn}	W	163.1	160.9
Max. Coil Temperature	T_{max}	°C	100.0	100.0
Thermal Dissipation Constant[1]	K_{thn}	W/°C	2.2	2.1
Max. Bus Voltage	U_{bus}	Vdc	600.0	600.0
Pole Number	p	-	16	16
Rec. Max Speed @230V AC[4]	Ω_{max}	rpm	400	880
Mechanical Parameters				
Overall Mass	m_n	kg	8.5	8.5
Rotor Inertia	J_r	kg·m²	5.422E-03	5.422E-03
Axial Runout[5]	-	μm	20 (15,10)	20 (15,10)
Radial Runout[5]	-	μm	20 (15,10)	20 (15,10)
Max Axial Load (Upright Mounting)[6]	-	N	2310	2310
Max Axial Load (Inverted / Wall mounting)	-	N	240	240
Max Moment Load (Upright Mounting)	-	Nm	53	53
Max Moment Load (Inverted / Wall Mounting)	-	Nm	5.8	5.8
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	4103	4103
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev	328240	328240
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev	656480	656480
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev	1641200	1641200
Accuracy with Error Mapping[7]	-	arc sec	+/-4	+/-4
Repeatability[7]	-	arc sec	+/-2	+/-2
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE, UL (option)		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

Torque-Speed Curve

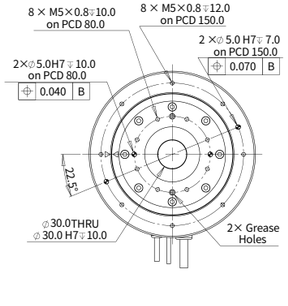


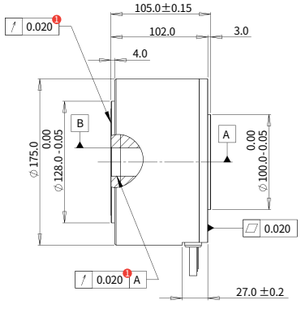


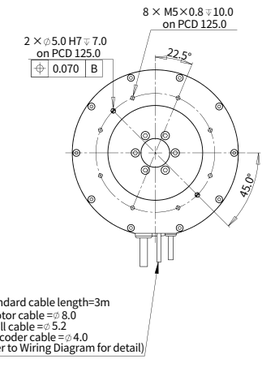
Mounting Illustration

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

Dimension





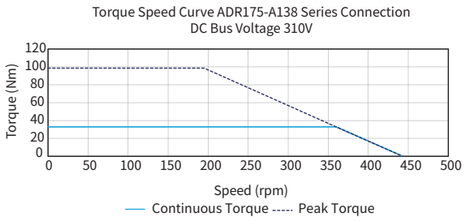


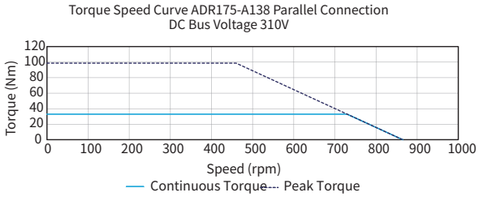
[1] Standard axial/ radial run-out = 0.020

ADR175-A138

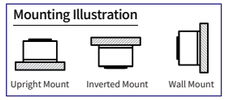
ADR175-A138					
Performance Parameters	**Symbol**	**Unit**		**Series**	**Parallel**
Continuous Torque @100°C[1]	T_{cn}	Nm		32.9	32.9
Peak Torque	T_{pk}	Nm		98.6	98.6
Torque Constant ±10%	K_t	Nm/Arms		8.22	4.11
Back EMF constant ±10%	K_e	Vpeak/rpm		0.703	0.351
Motor Constant @25°C	K_m	Nm/Sqrt(W)		2.33	2.30
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω		8.30	2.13
Inductance (L-L) ±20%[3]	L	mH		72.00	18.51
Electrical time constant	τ_e	ms		8.67	8.67
Continuous Current @100°C[1]	I_{cn}	Arms		4.0	8.0
Peak Current	I_{pk}	Arms		12.0	24.0
Continuous Power Dissipation @100°C[1]	P_{cn}	W		256.8	264.2
Max. Coil Temperature	T_{max}	°C		100.0	100.0
Thermal Dissipation Constant[1]	K_{thn}	W/°C		3.4	3.5
Max. Bus Voltage	U_{bus}	Vdc		600.0	600.0
Pole Number	p	-		16	16
Rec. Max Speed @230V AC[4]	Ω_{max}	rpm		195	470
Mechanical Parameters					
Overall Mass	m_n	kg		12.7	12.7
Rotor Inertia	J_r	kg·m²		7.621E-03	7.621E-03
Axial Runout[5]	-	μm		20 (15,10)	20 (15,10)
Radial Runout[5]	-	μm		20 (15,10)	20 (15,10)
Max Axial Load (Upright Mounting)[6]	-	N		2310	2310
Max Axial Load (Inverted / Wall mounting)	-	N		240	240
Max Moment Load (Upright Mounting)	-	Nm		53	53
Max Moment Load (Inverted / Wall Mounting)	-	Nm		5.8	5.8
Encoder Parameters					
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev		4103	4103
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev		328240	328240
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev		656480	656480
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev		1641200	1641200
Accuracy with Error Mapping[7]	-	arc sec		+/-4	+/-4
Repeatability[7]	-	arc sec		+/-2	+/-2
Other Information					
Insulation Class	Class B (130°C)				
Protection Grade	IP40				
Compliance with Global Standards	RoHS, CE, UL (option)				
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience	Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.				

Torque-Speed Curve



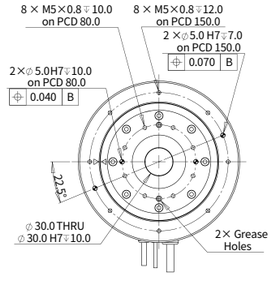


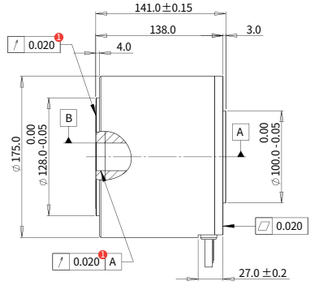
Mounting Illustration

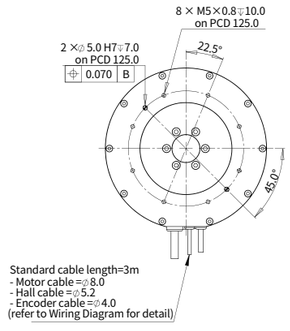


[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

Dimension





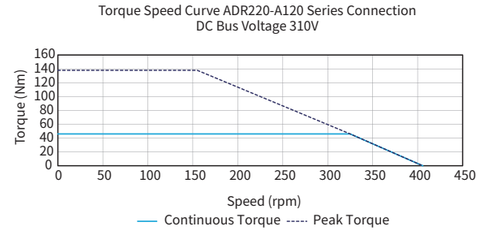


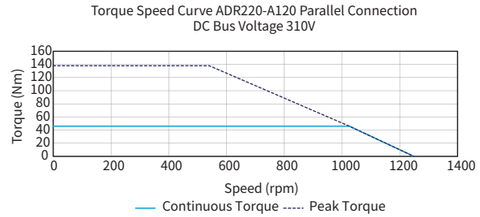
[1] Standard axial/ radial run-out = 0.020

ADR220-A120

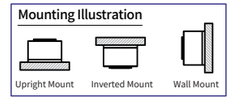
ADR220-A120					
Performance Parameters	**Symbol**	**Unit**		**Series**	**Parallel**
Continuous Torque @100°C[1]	T_{cn}	Nm		46.0	46.0
Peak Torque	T_{pk}	Nm		137.9	137.9
Torque Constant ±10%	K_t	Nm/Arms		8.51	2.84
Back EMF constant ±10%	K_e	Vpeak/rpm		0.727	0.242
Motor Constant @25°C	K_m	Nm/Sqrt(W)		2.87	2.69
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω		5.87	0.74
Inductance (L-L) ±20%[3]	L	mH		53.60	6.30
Electrical time constant	τ_e	ms		9.13	8.51
Continuous Current @100°C[1]	I_{cn}	Arms		5.4	16.2
Peak Current	I_{pk}	Arms		16.2	48.6
Continuous Power Dissipation @100°C[1]	P_{cn}	W		331.0	375.5
Max. Coil Temperature	T_{max}	°C		100.0	100.0
Thermal Dissipation Constant[1]	K_{thn}	W/°C		4.4	5.0
Max. Bus Voltage	U_{bus}	Vdc		600.0	600.0
Pole Number	p	-		24	24
Rec. Max Speed @230V AC[4]	Ω_{max}	rpm		150	540
Mechanical Parameters					
Overall Mass	m_n	kg		18.3	18.3
Rotor Inertia	J_r	kg·m²		1.786E-02	1.786E-02
Axial Runout[5]	-	μm		25 (10)	25 (10)
Radial Runout[5]	-	μm		25 (10)	25 (10)
Max Axial Load (Upright Mounting)[6]	-	N		2800	2800
Max Axial Load (Inverted / Wall mounting)	-	N		300	300
Max Moment Load (Upright Mounting)	-	Nm		72	72
Max Moment Load (Inverted / Wall Mounting)	-	Nm		7.9	7.9
Encoder Parameters					
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev		4103	4103
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev		328240	328240
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev		656480	656480
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev		1641200	1641200
Accuracy with Error Mapping[7]	-	arc sec		+/-4	+/-4
Repeatability[7]	-	arc sec		+/-2	+/-2
Other Information					
Insulation Class	Class B (130°C)				
Protection Grade	IP40				
Compliance with Global Standards	RoHS, CE, UL (option)				
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience	Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.				

Torque-Speed Curve



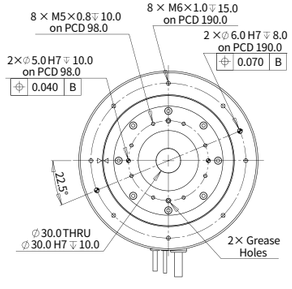


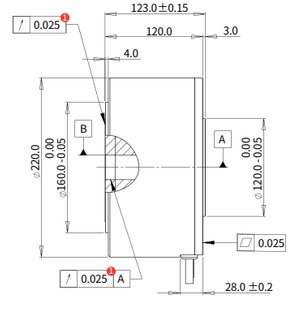
Mounting Illustration

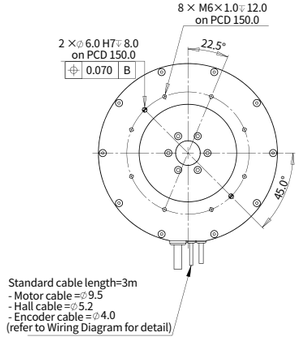


[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

Dimension





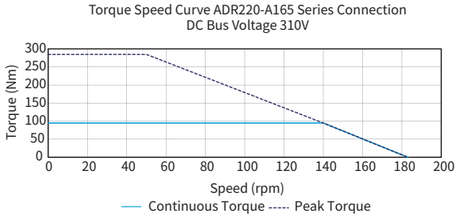


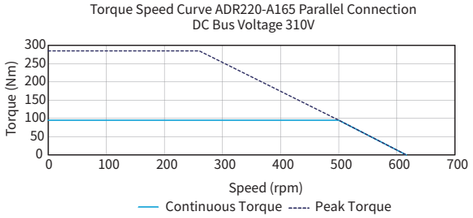
[1] Standard axial/ radial run-out = 0.025

ADR220-A165

ADR220-A165				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]	T_{cn}	Nm	94.9	94.9
Peak Torque	T_{pk}	Nm	284.6	284.6
Torque Constant ±10%	K_t	Nm/Arms	17.57	5.86
Back EMF constant ±10%	K_e	Vpeak/rpm	1.502	0.501
Motor Constant @25°C	K_m	Nm/Sqrt(W)	4.47	4.37
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	10.32	1.20
Inductance (L-L) ±20%[3]	L	mH	106.70	11.90
Electrical time constant	τ_e	ms	10.34	9.92
Continuous Current @100°C[1]	I_{cn}	Arms	5.4	16.2
Peak Current	I_{pk}	Arms	16.2	48.6
Continuous Power Dissipation @100°C[1]	P_{cn}	W	581.9	608.9
Max. Coil Temperature	T_{max}	°C	100.0	100.0
Thermal Dissipation Constant[1]	K_{thn}	W/°C	7.8	8.1
Max. Bus Voltage	U_{bus}	Vdc	600.0	600.0
Pole Number	p	-	24	24
Rec. Max Speed @230V AC[4]	Ω_{max}	rpm	50	260
Mechanical Parameters				
Overall Mass	m_n	kg	24.1	24.1
Rotor Inertia	J_r	kg·m²	2.522E-02	2.522E-02
Axial Runout[5]	-	μm	25 (10)	25 (10)
Radial Runout[5]	-	μm	25 (10)	25 (10)
Max Axial Load (Upright Mounting)[6]	-	N	2800	2800
Max Axial Load (Inverted / Wall mounting)	-	N	300	300
Max Moment Load (Upright Mounting)	-	Nm	72	72
Max Moment Load (Inverted / Wall Mounting)	-	Nm	7.9	7.9
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	4103	4103
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev	328240	328240
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev	656480	656480
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev	1641200	1641200
Accuracy with Error Mapping[7]	-	arc sec	+/-4	+/-4
Repeatability[7]	-	arc sec	+/-2	+/-2
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE, UL (option)		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

Torque-Speed Curve

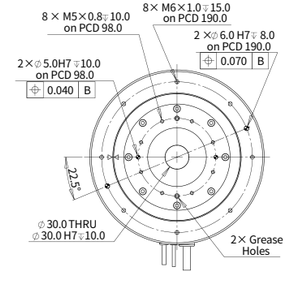


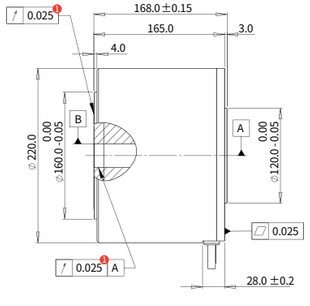


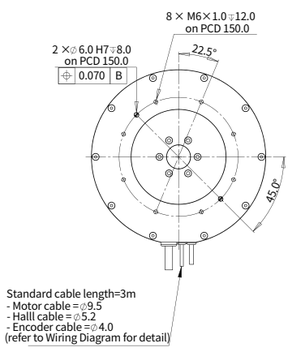
Mounting Illustration

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

Dimension





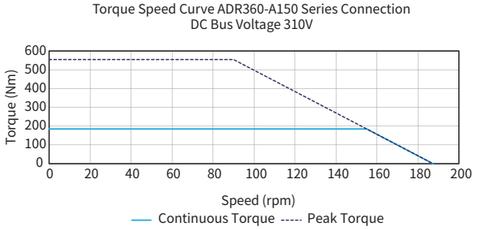


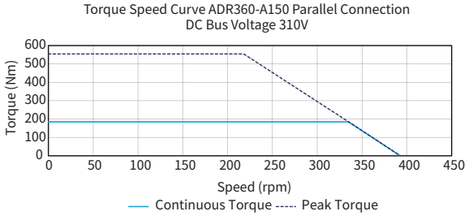
[1] Standard axial/ radial run-out = 0.025

ADR360-A150

ADR360-A150				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]	T_{cn}	Nm	184.8	184.8
Peak Torque	T_{pk}	Nm	554.5	554.5
Torque Constant ±10%	K_t	Nm/Arms	18.48	9.24
Back EMF constant ±10%	K_e	Vpeak/rpm	1.580	0.790
Motor Constant @25°C	K_m	Nm/Sqrt(W)	8.64	8.64
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	3.05	0.76
Inductance (L-L) ±20%[3]	L	mH	31.70	7.92
Electrical time constant	τ_e	ms	10.40	10.40
Continuous Current @100°C[1]	I_{cn}	Arms	10.0	20.0
Peak Current	I_{pk}	Arms	30.0	60.0
Continuous Power Dissipation @100°C[1]	P_{cn}	W	589.3	589.3
Max. Coil Temperature	T_{max}	°C	100.0	100.0
Thermal Dissipation Constant[1]	K_{thn}	W/°C	7.9	7.9
Max. Bus Voltage	U_{bus}	Vdc	600.0	600.0
Pole Number	p	-	32	32
Rec. Max Speed @230V AC[4]	Ω_{max}	rpm	90	220
Mechanical Parameters				
Overall Mass	m_n	kg	56.0	56.0
Rotor Inertia	J_r	kg·m²	2.046E-01	2.046E-01
Axial Runout[5]	-	μm	40 (15)	40 (15)
Radial Runout[5]	-	μm	40 (15)	40 (15)
Max Axial Load (Upright Mounting)[6]	-	N	11200	11200
Max Axial Load (Inverted / Wall mounting)	-	N	350	350
Max Moment Load (Upright Mounting)	-	Nm	245	245
Max Moment Load (Inverted / Wall Mounting)	-	Nm	27.0	27.0
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	7500	7500
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev	600000	600000
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev	1200000	1200000
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev	3000000	3000000
Accuracy with Error Mapping[7]	-	arc sec	+/-4	+/-4
Repeatability[7]	-	arc sec	+/-2	+/-2
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE, UL (option)		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

Torque-Speed Curve

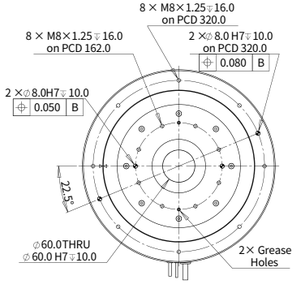


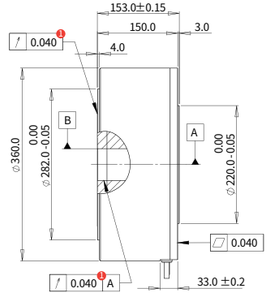


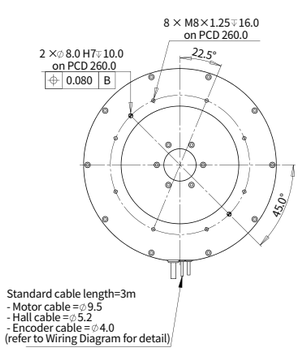
Mounting Illustration

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

Dimension





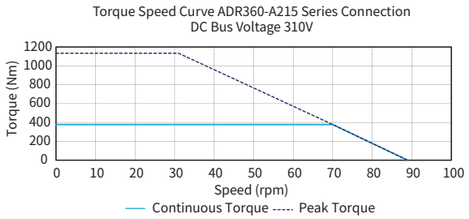


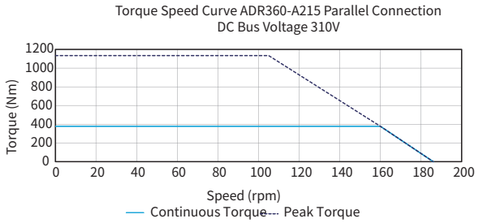
[1] Standard axial/ radial run-out = 0.040

ADR360-A215

ADR360-A215				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C [1]	T_{cn}	Nm	377.9	377.9
Peak Torque	T_{pk}	Nm	1133.8	1133.8
Torque Constant ±10%	K_t	Nm/Arms	37.79	18.90
Back EMF constant ±10%	K_e	Vpeak/rpm	3.230	1.615
Motor Constant @25°C	K_m	Nm/Sqrt(W)	13.45	13.80
Resistance (L-L) @25°C ±10% [2]	R_{25}	Ω	5.26	1.25
Inductance (L-L) ±20% [3]	L	mH	54.74	13.00
Electrical time constant	τ_e	ms	10.40	10.40
Continuous Current @100°C [1]	I_{cn}	Arms	10.0	20.0
Peak Current	I_{pk}	Arms	30.0	60.0
Continuous Power Dissipation @100°C [1]	P_{cn}	W	1017.8	966.8
Max. Coil Temperature	T_{max}	°C	100.0	100.0
Thermal Dissipation Constant [1]	K_{thn}	W/°C	13.6	12.9
Max. Bus Voltage	U_{bus}	Vdc	600.0	600.0
Pole Number	p	-	32	32
Rec. Max Speed @230V AC [4]	Ω_{max}	rpm	30	105
Mechanical Parameters				
Overall Mass	m_n	kg	71.0	71.0
Rotor Inertia	J_r	kg·m²	3.223E-01	3.223E-01
Axial Runout [5]	-	µm	40 (15)	40 (15)
Radial Runout [5]	-	µm	40 (15)	40 (15)
Max Axial Load (Upright Mounting) [6]	-	N	11200	11200
Max Axial Load (Inverted / Wall mounting)	-	N	350	350
Max Moment Load (Upright Mounting)	-	Nm	245	245
Max Moment Load (Inverted / Wall Mounting)	-	Nm	27.0	27.0
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	7500	7500
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev	600000	600000
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev	1200000	1200000
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev	3000000	3000000
Accuracy with Error Mapping [7]	-	arc sec	+/-4	+/-4
Repeatability [7]	-	arc sec	+/-2	+/-2
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE, UL (option)		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

■ Torque-Speed Curve

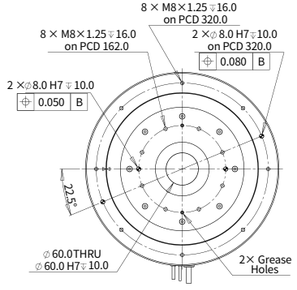


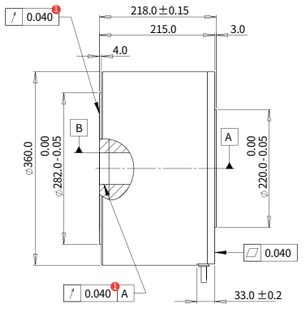


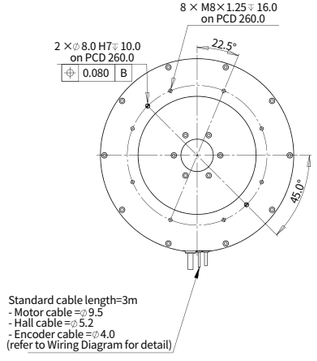
Mounting Illustration

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

■ Dimension

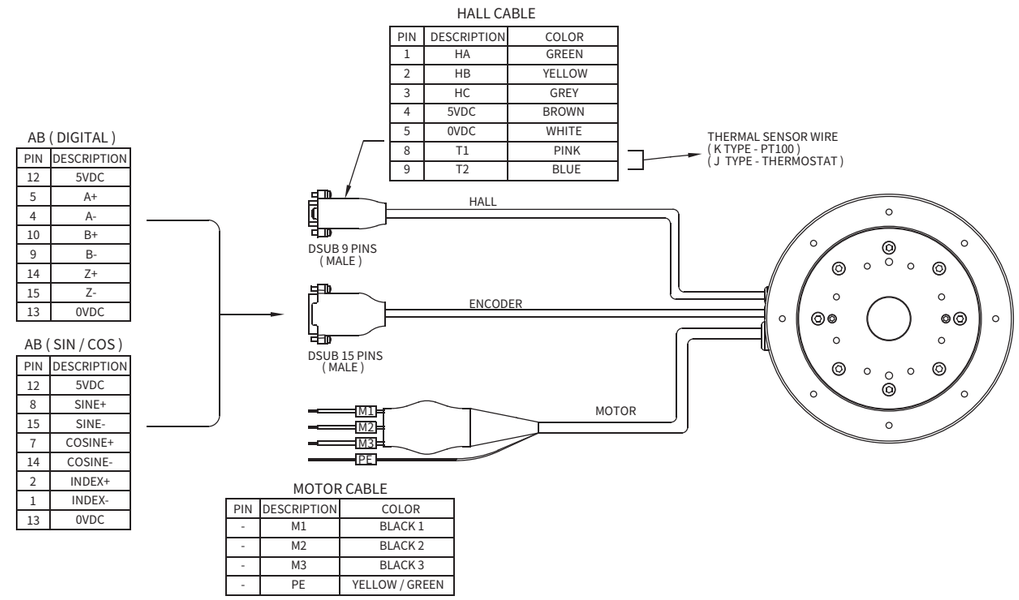






[1] Standard axial/ radial run-out = 0.040

Motor Cable Connection



Part Numbering

ADR110-A98 -S-J-H9D-3.0-FB-AB-3005-SINCOS-P15

- Motor: ADR110 / ADR135
- Model: ADR110-A75 / A98; ADR135-A90 /A115
- UL Compliance: U [1] / (blank) [2]
- Winding: S=Series / P=Parallel
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD)
- Hall Cable Options: H9D [3] / NH [4]
- Runout: [6] P5 / P10 / P15
- Interpolation Options: SINCOS 80X / 160X / 400X
- Encoder Options: AB-3005
- Motor Cable Options: FB [5]
- Cable Length (m): 3.0

[1] U=UL-complied version (and CE-complied)
[2] (blank)= standard, only CE-complied
[3] H9D= With Built-in hall sensor, comes with 9-Pins D-Sub Connector
[4] NH= Without Built-in Hall Sensor but with Thermal Sensor
[5] FB = With ferrite bead
[6] P5 = Axial Runout 5um, Radial Runout is 5um.
P10 = Axial Runout 10um, Radial Runout is 10um
P15=Axial Runout 15um, Radial Runout is 15um.

ADR-A Series

ADR175-A138[ ]-S-J-H9D-3.0-FB-AB-4103-80X-P10

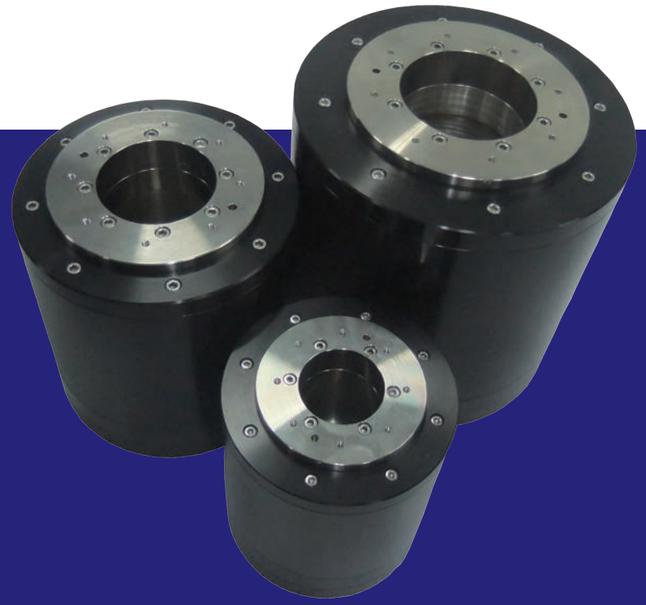
- Motor: ADR175 / ADR220
- Model: ADR175-A102 / A138, ADR220-A120/A165
- UL Compliance: U[1] /(blank)[2]
- Winding: S=Series / P=Parallel
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD)
- Hall Cable Options: H9D[3] / NH[4]
- Runout:[6] P10, P15, P20, P25
- Interpolation Options: SINCOS, 80X / 160X / 400X
- Encoder Options: AB-4103
- Motor Cable Options: FB[5]
- Cable Length (m): 3.0

1. U=UL-complied version (and CE-complied)
2. (blank)= standard, only CE-complied
3. H9D= With Built-in hall sensor, comes with 9-Pins D-Sub Connector
4. NH= Without Built-in Hall Sensor but with Thermal Sensor
5. FB = With ferrite bead
6. ADR175 / ADR220 : P10 = Axial Runout 10um, Radial Runout is 10um
   ADR175 : P15=Axial Runout 15um, Radial Runout is 15um.
   ADR175 : P20 = Axial Runout 20um, Radial Runout is 20um.
   ADR220 : P25 = Axial Runout 25um, Radial Runout is 25um.

ADR360-A150[ ]-S-J-H9D-3.0-FB-AB-7500-400X-P15

- Motor: ADR360
- Model: A150 / A215
- UL Compliance: U[1] /(blank)[2]
- Winding: S=Series / P=Parallel
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD)
- Hall Cable Options: H9D[3] / NH[4]
- Runout:[6] P15 / P40
- Interpolation Options: SINCOS, 80X / 160X / 400X
- Encoder Options: AB-7500
- Motor Cable Options: FB[5]
- Cable Length (m): 3.0

1. U=UL-complied version (and CE-complied)
2. (blank)= standard, only CE-complied
3. H9D= With Built-in hall sensor, comes with 9-Pins D-Sub Connector
4. NH= Without Built-in Hall Sensor but with Thermal Sensor
5. FB = With ferrite bead
6. P15=Axial Runout 15um, Radial Runout is 15um.
   P40=Axial Runout 40um, Radial Runout is 40um.



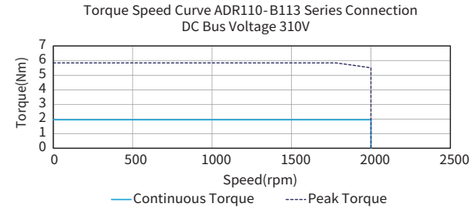
ADR-B SERIES

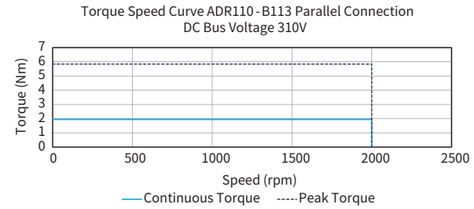
- Direct drive brushless motor
- Fully integrated with encoder and bearing
- Low cogging torque
- Precise homing through index pulse
- Low speed and high speed windings

ADR110-B113

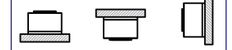
ADR110-B113				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]	T_{cn}	Nm	1.9	1.9
Peak Torque	T_{pk}	Nm	5.8	5.8
Torque Constant ±10%	K_t	Nm/Arms	0.65	0.32
Back EMF constant ±10%	K_e	Vpeak/rpm	0.055	0.028
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.30	0.30
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	3.20	0.80
Inductance (L-L) ±20%[3]	L	mH	17.15	4.29
Electrical time constant	τ_e	ms	5.36	5.36
Continuous Current @100°C[1]	I_{cn}	Arms	3.0	6.0
Peak Current	I_{pk}	Arms	9.0	18.0
Continuous Power Dissipation @100°C[1]	P_{cn}	W	55.7	55.7
Max. Coil Temperature	T_{max}	°C	100.0	100.0
Thermal Dissipation Constant[1]	K_{thn}	W/°C	0.7	0.7
Max. Bus Voltage	U_{bus}	Vdc	600.0	600.0
Pole Number	p	-	16	16
Rec. Max Speed @230V AC[4]	Ω_{max}	rpm	1700	2000
Mechanical Parameters				
Overall Mass	m_n	kg	3.20	3.20
Rotor Inertia	J_r	kg·m²	3.086E-04	3.086E-04
Axial Runout[5]	-	μm	15	15
Radial Runout[5]	-	μm	15	15
Max Axial Load (Upright Mounting)[6]	-	N	439	439
Max Axial Load (Inverted / Wall mounting)	-	N	35	35
Max Moment Load (Upright Mounting)	-	Nm	25	25
Max Moment Load (Inverted / Wall Mounting)	-	Nm	2.8	2.8
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	3005	3005
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev	240400	240400
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev	480800	480800
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev	1202000	1202000
Accuracy with Error Mapping[7]	-	arc sec	+/-5.4	+/-5.4
Repeatability[7]	-	arc sec	+/-2.7	+/-2.7
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE, UL (option)		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

■ Torque-Speed Curve



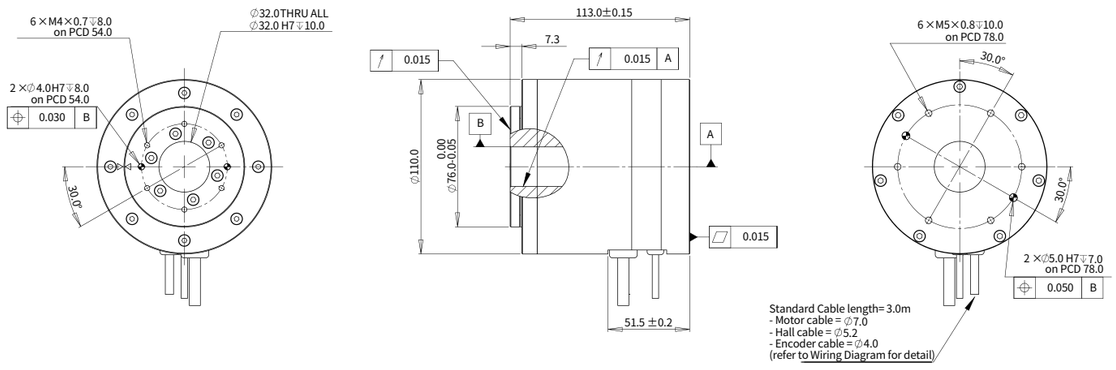


Mounting Illustration



[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

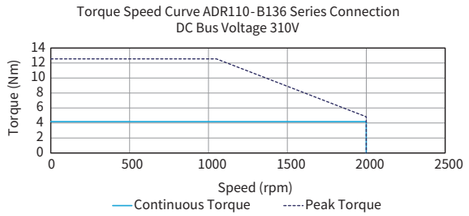
■ Dimension

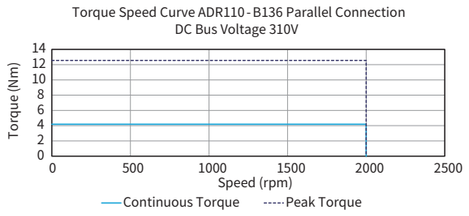


ADR110-B136

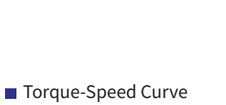
ADR110-B136					
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**	
Continuous Torque @100°C [1]	T_{cn}	Nm	4.2	4.2	
Peak Torque	T_{pk}	Nm	12.6	12.6	
Torque Constant ±10%	K_t	Nm/Arms	1.40	0.70	
Back EMF constant ±10%	K_e	Vpeak/rpm	0.119	0.060	
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.51	0.52	
Resistance (L-L) @25°C ±10% [2]	R_{25}	Ω	4.90	1.21	
Inductance (L-L) ±20% [3]	L	mH	26.26	6.49	
Electrical time constant	τ_e	ms	5.36	5.36	
Continuous Current @100°C [1]	I_{cn}	Arms	3.0	6.0	
Peak Current	I_{pk}	Arms	9.0	18.0	
Continuous Power Dissipation @100°C [1]	P_{cn}	W	85.3	84.2	
Max. Coil Temperature	T_{max}	°C	100.0	100.0	
Thermal Dissipation Constant [1]	K_{thn}	W/°C	1.1	1.1	
Max. Bus Voltage	U_{bus}	Vdc	600.0	600.0	
Pole Number	p	-	16	16	
Rec. Max Speed @230V AC [4]	Ω_{max}	rpm	1000	2000	
Mechanical Parameters					
Overall Mass	m_n	kg	4.60	4.60	
Rotor Inertia	J_r	kg·m²	4.419E-04	4.419E-04	
Axial Runout [5]	-	μm	15	15	
Radial Runout [5]	-	μm	15	15	
Max Axial Load (Upright Mounting) [6]	-	N	439	439	
Max Axial Load (Inverted / Wall mounting)	-	N	35	35	
Max Moment Load (Upright Mounting)	-	Nm	25	25	
Max Moment Load (Inverted / Wall Mounting)	-	Nm	2.8	2.8	
Encoder Parameters					
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	3005	3005	
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev	240400	240400	
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev	480800	480800	
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev	1202000	1202000	
Accuracy with Error Mapping [7]	-	arc sec	+/-5.4	+/-5.4	
Repeatability [7]	-	arc sec	+/-2.7	+/-2.7	
Other Information					
Insulation Class		Class B (130°C)			
Protection Grade		IP40			
Compliance with Global Standards		RoHS, CE, UL (option)			
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.			

Torque-Speed Curve



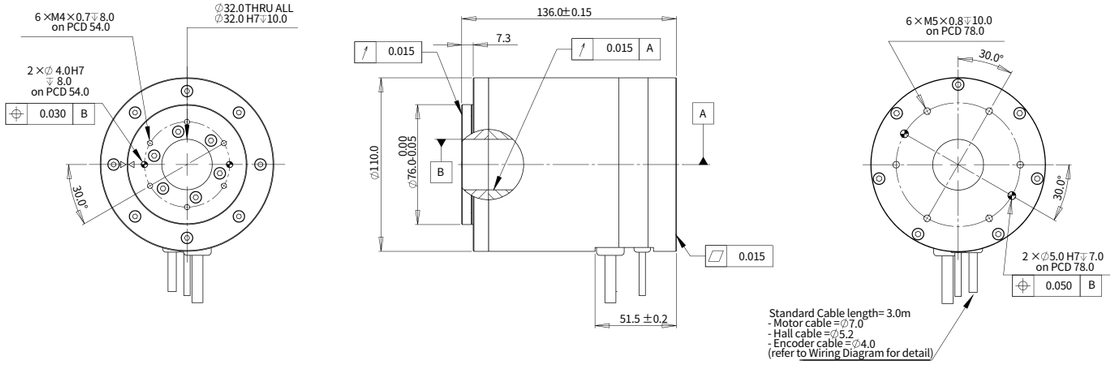


Mounting Illustration



[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

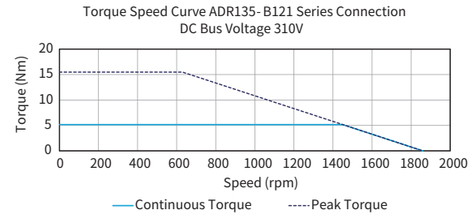
Dimension

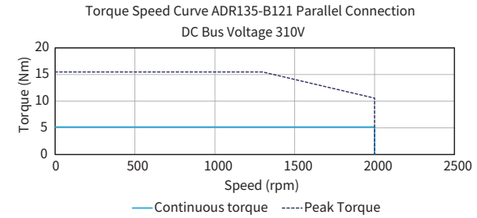


ADR135-B121

ADR135-B121					
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**	
Continuous Torque @100°C [1]	T_{cn}	Nm	5.2	5.2	
Peak Torque	T_{pk}	Nm	15.5	15.5	
Torque Constant ±10%	K_t	Nm/Arms	1.72	0.86	
Back EMF constant ±10%	K_e	Vpeak/rpm	0.147	0.074	
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.55	0.55	
Resistance (L-L) @25°C ±10% [2]	R_{25}	Ω	6.60	1.65	
Inductance (L-L) ±20% [3]	L	mH	45.30	11.20	
Electrical time constant	τ_e	ms	6.86	6.79	
Continuous Current @100°C [1]	I_{cn}	Arms	3.0	6.0	
Peak Current	I_{pk}	Arms	9.0	18.0	
Continuous Power Dissipation @100°C [1]	P_{cn}	W	114.9	114.9	
Max. Coil Temperature	T_{max}	°C	100.0	100.0	
Thermal Dissipation Constant [1]	K_{thn}	W/°C	1.5	1.5	
Max. Bus Voltage	U_{bus}	Vdc	600.0	600.0	
Pole Number	p	-	16	16	
Rec. Max Speed @230V AC [4]	Ω_{max}	rpm	630	1350	
Mechanical Parameters					
Overall Mass	m_n	kg	3.90	3.90	
Rotor Inertia	J_r	kg·m²	9.916E-04	9.916E-04	
Axial Runout [5]	-	μm	15	15	
Radial Runout [5]	-	μm	15	15	
Max Axial Load (Upright Mounting) [6]	-	N	604	604	
Max Axial Load (Inverted / Wall mounting)	-	N	56	56	
Max Moment Load (Upright Mounting)	-	Nm	45	45	
Max Moment Load (Inverted / Wall Mounting)	-	Nm	5.0	5.0	
Encoder Parameters					
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	4103	4103	
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev	328240	328240	
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev	656480	656480	
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev	1641200	1641200	
Accuracy with Error Mapping [7]	-	arc sec	+/-4	+/-4	
Repeatability [7]	-	arc sec	+/-2	+/-2	
Other Information					
Insulation Class		Class B (130°C)			
Protection Grade		IP40			
Compliance with Global Standards		RoHS, CE, UL (option)			
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.			

Torque-Speed Curve

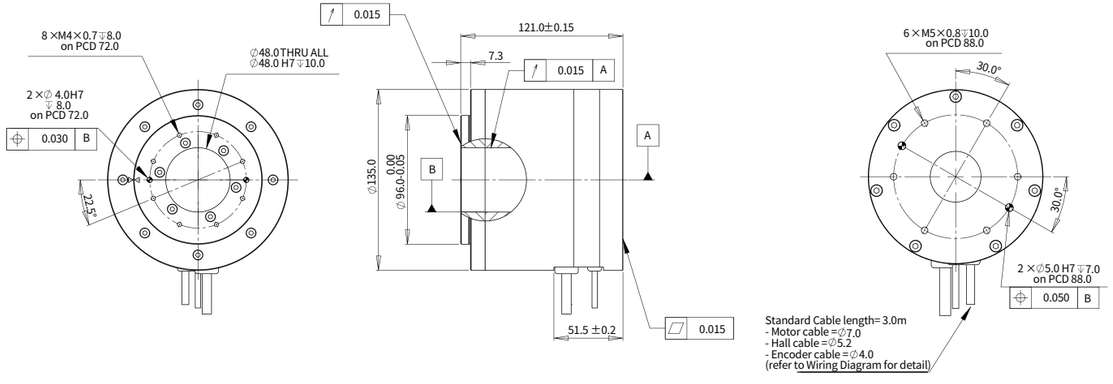




Mounting Illustration

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

Dimension

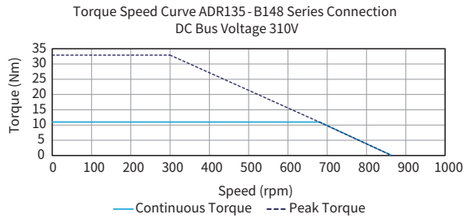


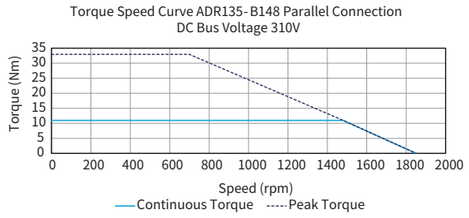
ADR-B Series

ADR135-B148

ADR135-B148				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]	T_{cn}	Nm	11.0	11.0
Peak Torque	T_{pk}	Nm	32.9	32.9
Torque Constant ±10%	K_t	Nm/Arms	3.66	1.83
Back EMF constant ±10%	K_e	Vpeak/rpm	0.313	0.156
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.91	0.91
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	10.70	2.70
Inductance (L-L) ±20%[3]	L	mH	72.76	18.63
Electrical time constant	τ_e	ms	6.80	6.90
Continuous Current @100°C[1]	I_{cn}	Arms	3.0	6.0
Peak Current	I_{pk}	Arms	9.0	18.0
Continuous Power Dissipation @100°C[1]	P_{cn}	W	186.2	187.9
Max. Coil Temperature	T_{max}	°C	100.0	100.0
Thermal Dissipation Constant[1]	K_{thn}	W/°C	2.5	2.5
Max. Bus Voltage	U_{bus}	Vdc	600.0	600.0
Pole Number	p	-	16	16
Rec. Max Speed @230V AC[4]	Ω_{max}	rpm	330	745
Mechanical Parameters				
Overall Mass	m_n	kg	5.70	5.70
Rotor Inertia	J_r	kg·m²	1.332E-03	1.332E-03
Axial Runout[5]	-	μm	15	15
Radial Runout[5]	-	μm	15	15
Max Axial Load (Upright Mounting)[6]	-	N	604	604
Max Axial Load (Inverted / Wall mounting)	-	N	56	56
Max Moment Load (Upright Mounting)	-	Nm	45	45
Max Moment Load (Inverted / Wall Mounting)	-	Nm	5.0	5.0
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	4103	4103
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev	328240	328240
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev	656480	656480
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev	1641200	1641200
Accuracy with Error Mapping[7]	-	arc sec	+/-4	+/-4
Repeatability[7]	-	arc sec	+/-2	+/-2
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE, UL (option)		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

■ Torque-Speed Curve

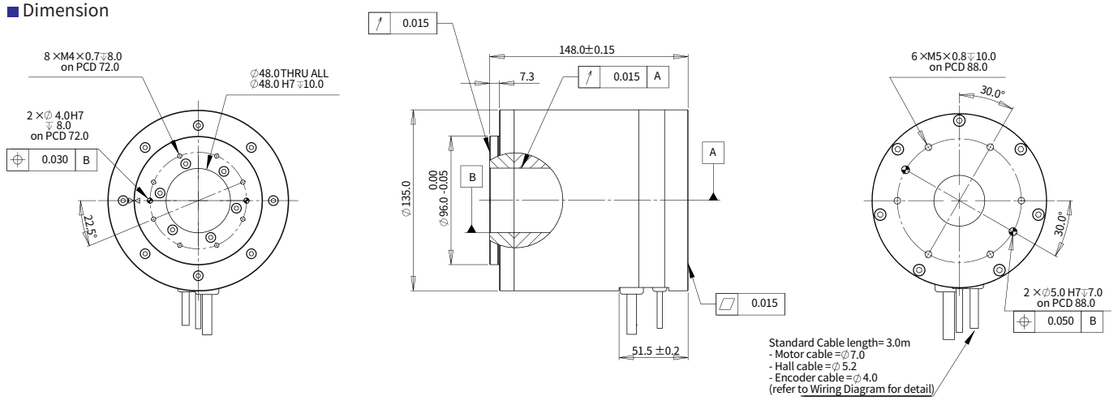




Mounting Illustration

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

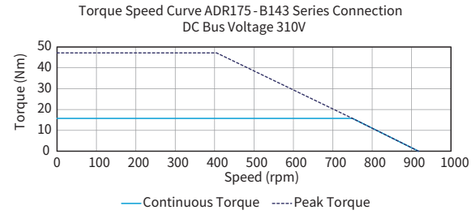
■ Dimension

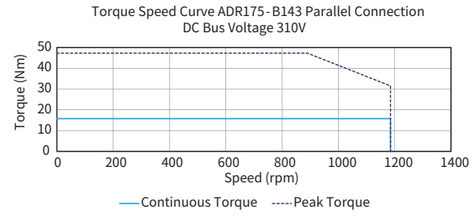


ADR175-B143

ADR175-B143				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]	T_{cn}	Nm	15.7	15.7
Peak Torque	T_{pk}	Nm	47.2	47.2
Torque Constant ±10%	K_t	Nm/Arms	3.93	1.97
Back EMF constant ±10%	K_e	Vpeak/rpm	0.336	0.168
Motor Constant @25°C	K_m	Nm/Sqrt(W)	1.40	1.41
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	5.27	1.30
Inductance (L-L) ±20%[3]	L	mH	45.72	11.27
Electrical time constant	τ_e	ms	8.67	8.67
Continuous Current @100°C[1]	I_{cn}	Arms	4.0	8.0
Peak Current	I_{pk}	Arms	12.0	24.0
Continuous Power Dissipation @100°C[1]	P_{cn}	W	163.1	160.9
Max. Coil Temperature	T_{max}	°C	100.0	100.0
Thermal Dissipation Constant[1]	K_{thn}	W/°C	2.2	2.1
Max. Bus Voltage	U_{bus}	Vdc	600.0	600.0
Pole Number	p	-	16	16
Rec. Max Speed @230V AC[4]	Ω_{max}	rpm	400	880
Mechanical Parameters				
Overall Mass	m_n	kg	10.0	10.0
Rotor Inertia	J_r	kg·m²	5.422E-03	5.422E-03
Axial Runout[5]	-	μm	20	20
Radial Runout[5]	-	μm	20	20
Max Axial Load (Upright Mounting)[6]	-	N	1256	1256
Max Axial Load (Inverted / Wall mounting)	-	N	84	84
Max Moment Load (Upright Mounting)	-	Nm	65	65
Max Moment Load (Inverted / Wall Mounting)	-	Nm	7.2	7.2
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	5071	5071
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev	405680	405680
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev	811360	811360
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev	2028400	2028400
Accuracy with Error Mapping[7]	-	arc sec	+/-4	+/-4
Repeatability[7]	-	arc sec	+/-2	+/-2
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE, UL (option)		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

■ Torque-Speed Curve

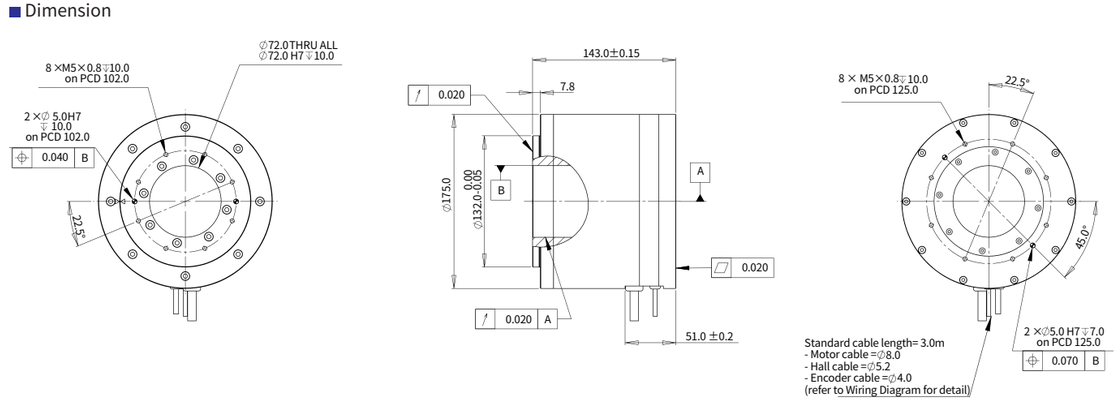




Mounting Illustration

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

■ Dimension



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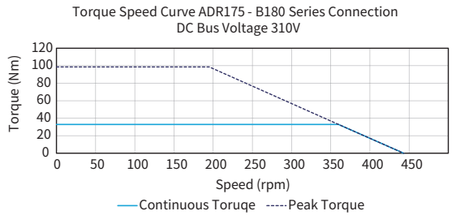
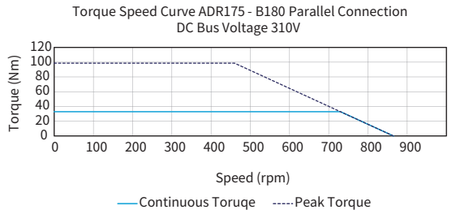
ADR175-B180

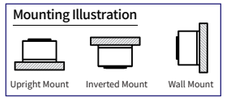
ADR175-B180					
Performance Parameters	**Symbol**	**Unit**		**Series**	**Parallel**
Continuous Torque @100°C [1]	T_{cn}	Nm		32.9	32.9
Peak Torque	T_{pk}	Nm		98.6	98.6
Torque Constant ±10%	K_t	Nm/Arms		8.22	4.11
Back EMF constant ±10%	K_e	Vpeak/rpm		0.703	0.351
Motor Constant @25°C	K_m	Nm/Sqrt(W)		2.33	2.30
Resistance (L-L) @25°C ±10% [2]	R_{25}	Ω		8.30	2.13
Inductance (L-L) ±20% [3]	L	mH		72.00	18.51
Electrical time constant	τ_e	ms		8.67	8.67
Continuous Current @100°C [1]	I_{cn}	Arms		4.0	8.0
Peak Current	I_{pk}	Arms		12.0	24.0
Continuous Power Dissipation @100°C [1]	P_{cn}	W		256.8	264.2
Max. Coil Temperature	T_{max}	°C		100.0	100.0
Thermal Dissipation Constant [1]	K_{thn}	W/°C		3.4	3.5
Max. Bus Voltage	U_{bus}	Vdc		600.0	600.0
Pole Number	p	-		16	16
Rec. Max Speed @230V AC [4]	Ω_{max}	rpm		195	470
Mechanical Parameters					
Overall Mass	m_n	kg		11.6	11.6
Rotor Inertia	J_r	kg·m²		7.621E-03	7.621E-03
Axial Runout [5]	-	µm		20	20
Radial Runout [5]	-	µm		20	20
Max Axial Load (Upright Mounting) [6]	-	N		1256	1256
Max Axial Load (Inverted / Wall mounting)	-	N		84	84
Max Moment Load (Upright Mounting)	-	Nm		65	65
Max Moment Load (Inverted / Wall Mounting)	-	Nm		7.2	7.2
Encoder Parameters					
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev		5071	5071
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev		405680	405680
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev		811360	811360
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev		2028400	2028400
Accuracy with Error Mapping [7]	-	arc sec		+/-4	+/-4
Repeatability [7]	-	arc sec		+/-2	+/-2
Other Information					
Insulation Class	Class B (130°C)				
Protection Grade	IP40				
Compliance with Global Standards	RoHS, CE, UL (option)				
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience	Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.				

■ Torque-Speed Curve



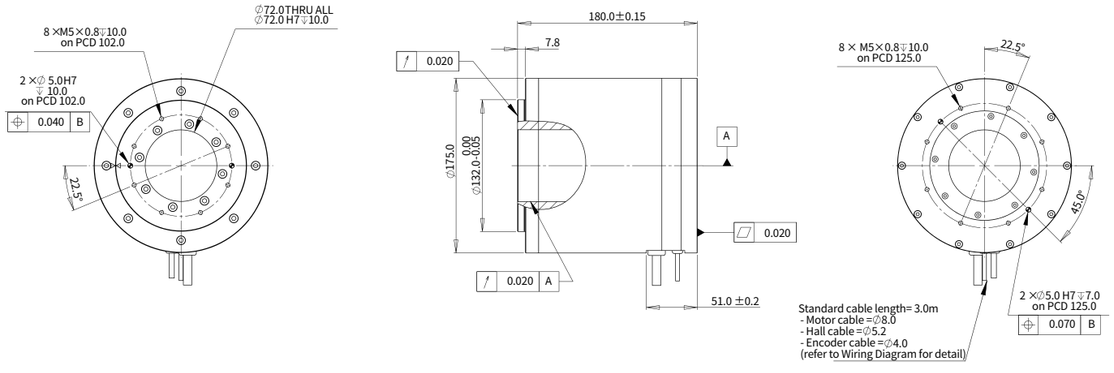


■ Mounting Illustration



[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

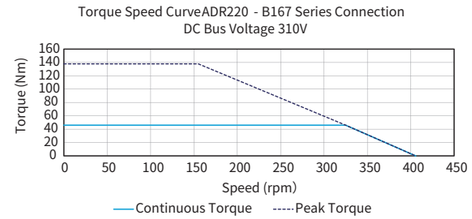
■ Dimension

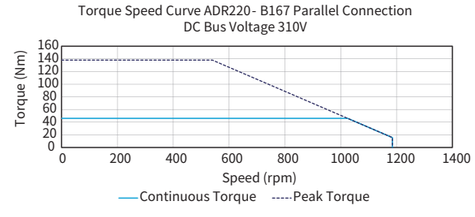


ADR220-B167

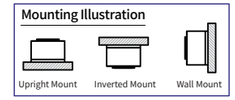
ADR220-B167					
Performance Parameters	**Symbol**	**Unit**		**Series**	**Parallel**
Continuous Torque @100°C [1]	T_{cn}	Nm		46.0	46.0
Peak Torque	T_{pk}	Nm		137.9	137.9
Torque Constant ±10%	K_t	Nm/Arms		8.51	2.84
Back EMF constant ±10%	K_e	Vpeak/rpm		0.727	0.242
Motor Constant @25°C	K_m	Nm/Sqrt(W)		2.87	2.69
Resistance (L-L) @25°C ±10% [2]	R_{25}	Ω		5.87	0.74
Inductance (L-L) ±20% [3]	L	mH		53.60	6.30
Electrical time constant	τ_e	ms		9.13	8.51
Continuous Current @100°C [1]	I_{cn}	Arms		5.40	16.20
Peak Current	I_{pk}	Arms		16.2	48.6
Continuous Power Dissipation @100°C [1]	P_{cn}	W		331.0	375.5
Max. Coil Temperature	T_{max}	°C		100.0	100.0
Thermal Dissipation Constant [1]	K_{thn}	W/°C		4.4	5.0
Max. Bus Voltage	U_{bus}	Vdc		600.0	600.0
Pole Number	p	-		24	24
Rec. Max Speed @230V AC [4]	Ω_{max}	rpm		150	540
Mechanical Parameters					
Overall Mass	m_n	kg		15.6	15.6
Rotor Inertia	J_r	kg·m²		1.786E-02	1.786E-02
Axial Runout [5]	-	µm		25	25
Radial Runout [5]	-	µm		25	25
Max Axial Load (Upright Mounting) [6]	-	N		1669	1669
Max Axial Load (Inverted / Wall mounting)	-	N		105	105
Max Moment Load (Upright Mounting)	-	Nm		85	85
Max Moment Load (Inverted / Wall Mounting)	-	Nm		9.4	9.4
Encoder Parameters					
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev		5071	5071
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev		405680	405680
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev		811360	811360
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev		2028400	2028400
Accuracy with Error Mapping [7]	-	arc sec		+/-4	+/-4
Repeatability [7]	-	arc sec		+/-2	+/-2
Other Information					
Insulation Class	Class B (130°C)				
Protection Grade	IP40				
Compliance with Global Standards	RoHS, CE, UL (option)				
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience	Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.				

■ Torque-Speed Curve



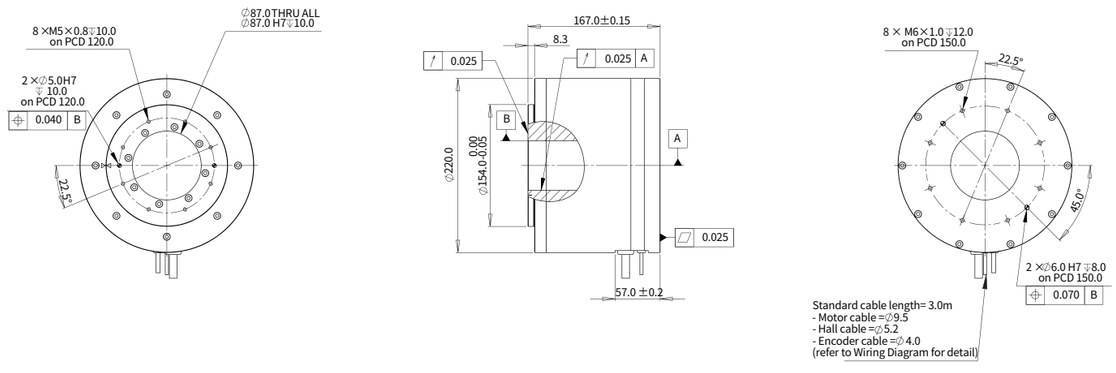


■ Mounting Illustration



[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

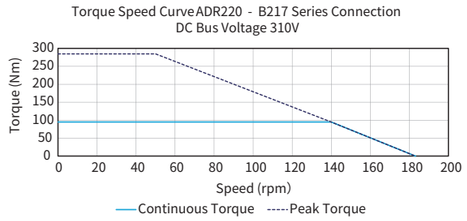
■ Dimension

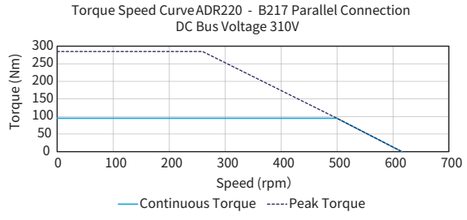


ADR220-B217

ADR220-B217				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C [1]	T_{cn}	Nm	94.9	94.9
Peak Torque	T_{pk}	Nm	284.6	284.6
Torque Constant ±10%	K_t	Nm/Arms	17.57	5.86
Back EMF constant ±10%	K_e	Vpeak/rpm	1.502	0.501
Motor Constant @25°C	K_m	Nm/Sqrt(W)	4.47	4.37
Resistance (L-L) @25°C ±10% [2]	R_{25}	Ω	10.32	1.20
Inductance (L-L) ±20% [3]	L	mH	106.70	11.90
Electrical time constant	τ_e	ms	10.34	9.92
Continuous Current @100°C [1]	I_{cn}	Arms	5.40	16.20
Peak Current	I_{pk}	Arms	16.2	48.6
Continuous Power Dissipation @100°C [1]	P_{cn}	W	581.9	608.9
Max. Coil Temperature	T_{max}	°C	100.0	100.0
Thermal Dissipation Constant [1]	K_{thn}	W/°C	7.8	8.1
Max. Bus Voltage	U_{bus}	Vdc	600.0	600.0
Pole Number	p	-	24	24
Rec. Max Speed @230V AC [4]	Ω_{max}	rpm	50	260
Mechanical Parameters				
Overall Mass	m_n	kg	23.4	23.4
Rotor Inertia	J_r	kg·m²	2.522E-02	2.522E-02
Axial Runout [5]	-	µm	25	25
Radial Runout [5]	-	µm	25	25
Max Axial Load (Upright Mounting) [6]	-	N	1669	1669
Max Axial Load (Inverted / Wall mounting)	-	N	105	105
Max Moment Load (Upright Mounting)	-	Nm	85	85
Max Moment Load (Inverted / Wall Mounting)	-	Nm	9.4	9.4
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	5071	5071
ABI Optical Incremental Encoder Digital Resolution (80x)	-	counts / rev	405680	405680
ABI Optical Incremental Encoder Digital Resolution (160x)	-	counts / rev	811360	811360
ABI Optical Incremental Encoder Digital Resolution (400x)	-	counts / rev	2028400	2028400
Accuracy with Error Mapping [7]	-	arc sec	+/-4	+/-4
Repeatability [7]	-	arc sec	+/-2	+/-2
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE, UL (option)		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

■ Torque-Speed Curve

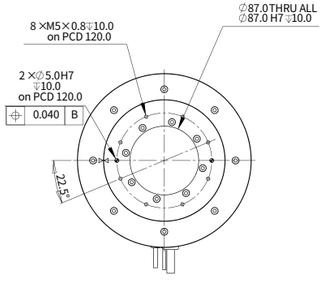


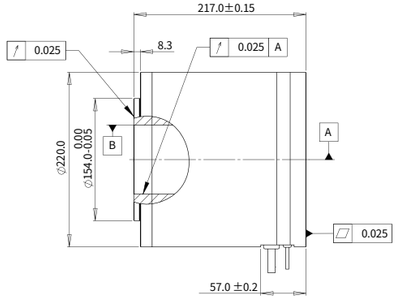


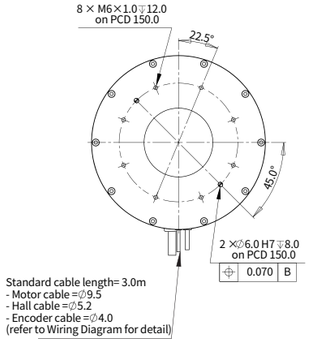
Mounting Illustration

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under maximum bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change.

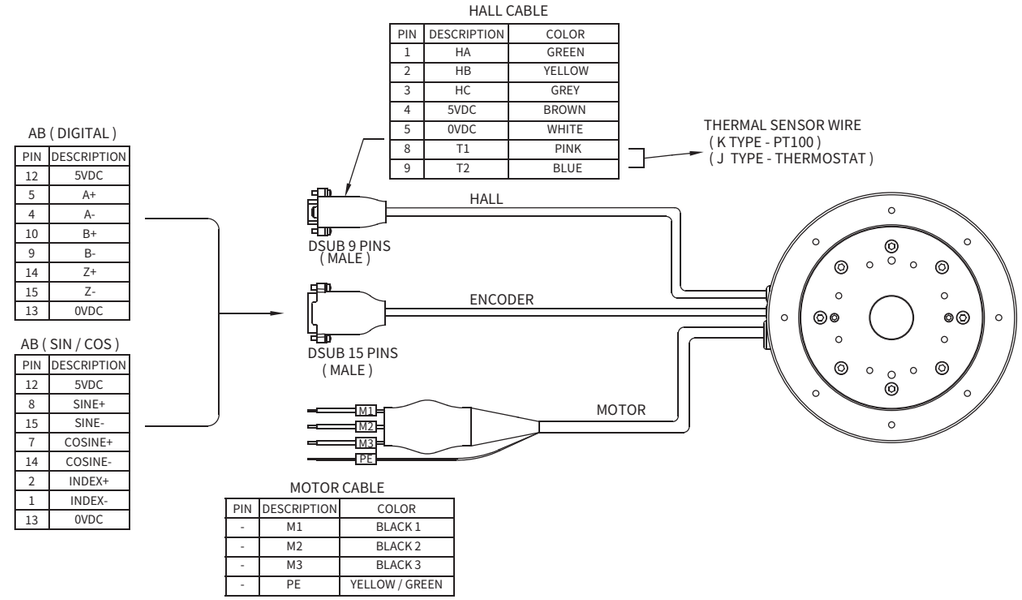
■ Dimension







Motor Cable Connection



Part Numbering

ADR110-B136-S-J-H9D-3.0-FB-AB-3005-SINCOS-P15

- Motor: ADR110
- Model: B113 / B136
- Winding: S=Series / P=Parallel
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD)
- Hall Cable Options: H9D[1] / NH[2]
- Cable Length (m): 3.0
- Motor Cable Options: FB[3]
- Encoder Options: AB-3005
- Interpolation Options: SINCOS 80X / 160X / 400X
- Runout: P15[4]

[1] H9D = With Built-in hall sensor, comes with 9-Pins D-Sub Connector.
[2] NH = Without Built-in Hall Sensor but with Thermal Sensor.
[3] FB = With ferrite bead.
[4] P15 = Axial Runout 15um, Radial Runout is 15um.

ADR-B Series

ADR135-B121-S-J-H9D-3.0-FB-AB-4103-SINCOS-P15

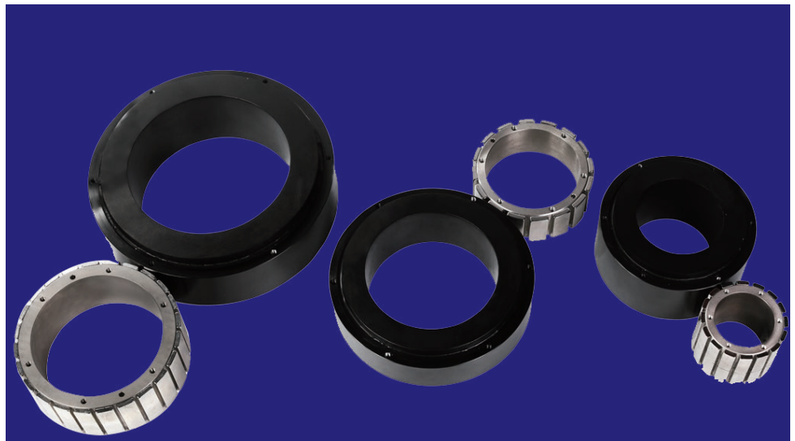
- Motor: ADR135
- Model: B121 / B148
- Winding: S=Series / P=Parallel
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD)
- Hall Cable Options: H9D[1] / NH[2]
- Cable Length (m): 3.0
- Motor Cable Options: FB[3]
- Encoder Options: AB-4103
- Interpolation Options: SINCOS 80X / 160X / 400X
- Runout:[4] P15

❶ H9D = With Built-in hall sensor, comes with 9-Pins D-Sub Connector.
❷ NH = Without Built-in Hall Sensor but with Thermal Sensor.
❸ FB = With ferrite bead.
❹ P15 = Axial Runout 15um, Radial Runout is 15um.

ADR175-B180-P-J-NH-3.0-FB-AB-5071-SINCOS-P20

- Motor: ADR175 / ADR220
- Model: ADR175-B143 / B180 ADR220-B167 / B217
- Winding: S=Series / P=Parallel
- Thermal Sensor: J=Thermostat(standard) / K=PT100(RTD)
- Hall Cable Options: H9D[1] / NH[2]
- Cable Length (m): 3.0
- Motor Cable Options: FB[3]
- Encoder Options: AB-5071
- Interpolation Options: SINCOS 80X / 160X / 400X
- Runout:[4] P20 P25

❶ H9D = With Built-in hall sensor, comes with 9-Pins D-Sub Connector.
❷ NH = Without Built-in Hall Sensor but with Thermal Sensor.
❸ FB = With ferrite bead.
❹ ADR175 : P20 = Axial Runout 20um, Radial Runout is 20um.
ADR220 : P25 = Axial Runout 25um, Radial Runout is 25um.



ADR-P SERIES

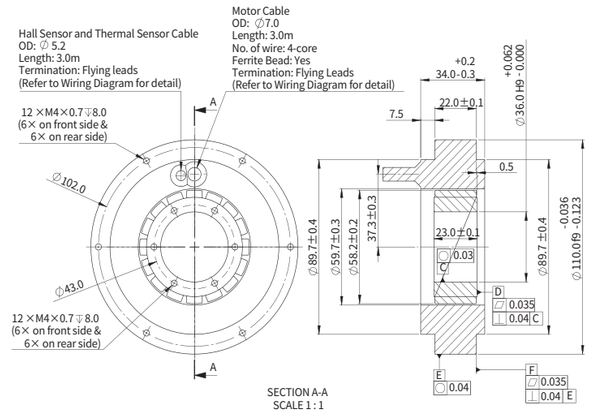
- Direct drive brushless motor
- Low cogging torque
- Low speed and high speed windings

ADR110-P-22

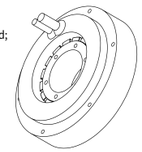
ADR110-P-22					
Performance Parameters		**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]		T_{cn}	Nm	1.9	1.9
Peak Torque		T_{pk}	Nm	5.8	5.8
Torque Constant ±10%		K_t	Nm/Arms	0.65	0.32
Back EMF Constant ±10%		K_e	Vpeak/rpm	0.055	0.028
Motor Constant @25°C		K_m	Nm/Sqrt(W)	0.30	0.30
Resistance (L-L) @25°C ±10%[2]		R_{25}	Ω	3.20	0.80
Inductance (L-L) ±20%[3]		L	mH	17.15	4.29
Electrical Time Constant		τ_e	ms	5.36	5.36
Continuous Current @100°C[1]		I_{cn}	Arms	3.0	6.0
Peak Current		I_{pk}	Arms	9.0	18.0
Continuous Power Dissipation @100°C[1]		P_{cn}	W	55.7	55.7
Max. Coil Temperature		t_{max}	°C	100	100
Thermal Dissipation Constant[1]		K_{th}	W/°C	0.742	0.742
Max. Bus Voltage		U_{bus}	Vdc	600.0	600.0
Pole Number		2P	-	16	16
Mechanical Parameters					
Rotor Mass		m	kg	0.25	0.25
Stator Mass		m	kg	0.88	0.88
Rotor Inertia		J_r	kg m²	1.463E-04	1.463E-04
Other Information					
Insulation Class			Class B (130°C)		
Protection Grade			IP00		
Compliance with Global Standards			RoHS, CE		
Ambient Temperature	Operation		0°C to 40°C (non-freezing)		
	Storage		-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)		
	Storage		10%RH to 90%RH (non-condensing)		
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subjected to change without prior notice.

■ Dimension



Note:
[1] User to ensure the concentricity of stator and rotor to be within 0.15mm when mounted;
[2] User to ensure flatness of mounting surface within 0.015/300mm;
[3] User to ensure perpendicularity of rotor inner bore relative to datum E within 0.1mm when mounted;
[4] The cable diameter tolerance +0.3, and cable length tolerance +60.0

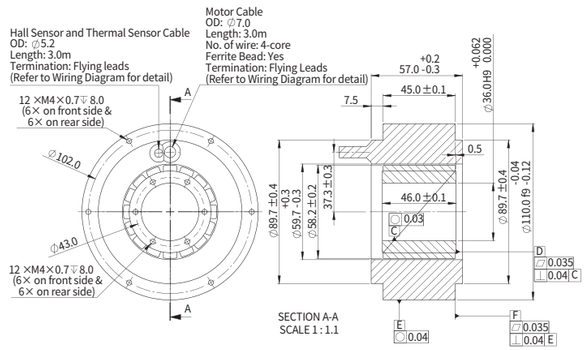


ADR110-P-45

ADR110-P-45					
Performance Parameters		**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]		T_{cn}	Nm	4.2	4.2
Peak Torque		T_{pk}	Nm	12.6	12.6
Torque Constant ±10%		K_t	Nm/Arms	1.40	0.70
Back EMF Constant ±10%		K_e	Vpeak/rpm	0.119	0.060
Motor Constant @25°C		K_m	Nm/Sqrt(W)	0.51	0.52
Resistance (L-L) @25°C ±10%[2]		R_{25}	Ω	4.90	1.21
Inductance (L-L) ±20%[3]		L	mH	26.26	6.49
Electrical Time Constant		τ_e	ms	5.36	5.36
Continuous Current @100°C[1]		I_{cn}	Arms	3.0	6.0
Peak Current		I_{pk}	Arms	9.0	18.0
Continuous Power Dissipation @100°C[1]		P_{cn}	W	85.3	84.2
Max. Coil Temperature		t_{max}	°C	100	100
Thermal Dissipation Constant[1]		K_{th}	W/°C	1.137	1.123
Max. Bus Voltage		U_{bus}	Vdc	600.0	600.0
Pole Number		2P	-	16	16
Mechanical Parameters					
Rotor Mass		m	kg	0.40	0.40
Stator Mass		m	kg	1.80	1.80
Rotor Inertia		J_r	kg m²	2.990E-04	2.990E-04
Other Information					
Insulation Class			Class B (130°C)		
Protection Grade			IP00		
Compliance with Global Standards			RoHS, CE		
Ambient Temperature	Operation		0°C to 40°C (non-freezing)		
	Storage		-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation		10%RH to 80%RH (non-condensing)		
	Storage		10%RH to 90%RH (non-condensing)		
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subjected to change without prior notice.

■ Dimension



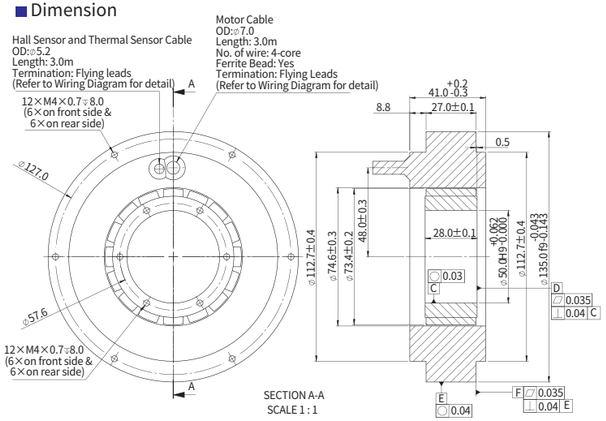
Note:
[1] User to ensure the concentricity of stator and rotor to be within 0.15mm when mounted;
[2] User to ensure flatness of mounting surface within 0.015/300mm;
[3] User to ensure perpendicularity of rotor inner bore relative to datum E within 0.1mm when mounted;
[4] The cable diameter tolerance +0.3, and cable length tolerance +60.0

ADR135-P-27

ADR135-P-27					
Performance Parameters		**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]		T_{cn}	Nm	4.5	4.5
Peak Torque		T_{pk}	Nm	13.6	13.6
Torque Constant ±10%		K_t	Nm/Arms	1.51	0.76
Back EMF Constant ±10%		K_e	Vpeak/rpm	0.129	0.065
Motor Constant @25°C		K_m	Nm/Sqrt(W)	0.51	0.51
Resistance (L-L) @25°C ±10%[2]		R_{25}	Ω	5.81	1.45
Inductance (L-L) ±20%[3]		L	mH	39.51	9.88
Electrical Time Constant		τ_e	ms	6.80	6.80
Continuous Current @100°C[1]		I_{cn}	Arms	3.0	6.0
Peak Current		I_{pk}	Arms	9.0	18.0
Continuous Power Dissipation @100°C[1]		P_{cn}	W	101.1	101.1
Max. Coil Temperature		t_{max}	°C	100	100
Thermal Dissipation Constant[1]		K_{th}	W/°C	1.348	1.348
Max. Bus Voltage		U_{bus}	Vdc	600.0	600.0
Pole Number		2P	-	16	16
Mechanical Parameters					
Rotor Mass		m	kg	0.45	0.45
Stator Mass		m	kg	1.45	1.45
Rotor Inertia		J_r	kg m²	4.243E-04	4.243E-04
Other Information					
Insulation Class		Class B (130°C)			
Protection Grade		IP00			
Compliance with Global Standards		RoHS, CE			
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.			

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subjected to change without prior notice.

■ Dimension



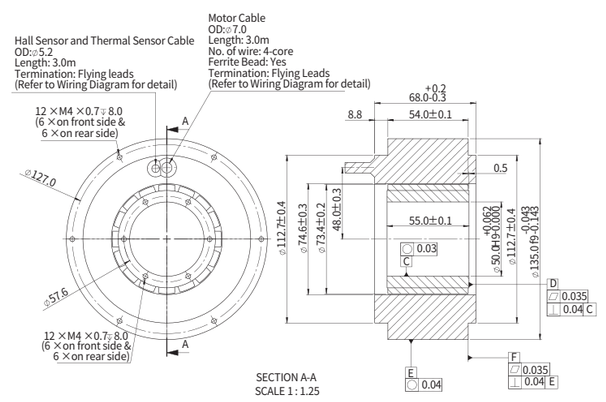
Note:
[1] User to ensure the concentricity of stator and rotor to be within 0.15mm when mounted;
[2] User to ensure flatness of mounting surface within 0.015/300mm;
[3] User to ensure perpendicularity of rotor inner bore relative to datum E within 0.1mm when mounted;
[4] The cable diameter tolerance +0.3, and cable length tolerance +60.0

ADR135-P-54

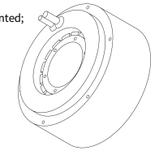
ADR135-P-54					
Performance Parameters		**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]		T_{cn}	Nm	10.3	10.3
Peak Torque		T_{pk}	Nm	31.0	31.0
Torque Constant ±10%		K_t	Nm/Arms	3.44	1.72
Back EMF Constant ±10%		K_e	Vpeak/rpm	0.294	0.147
Motor Constant @25°C		K_m	Nm/Sqrt(W)	0.92	0.92
Resistance (L-L) @25°C ±10%[2]		R_{25}	Ω	9.31	2.33
Inductance (L-L) ±20%[3]		L	mH	63.31	15.83
Electrical Time Constant		τ_e	ms	6.80	6.80
Continuous Current @100°C[1]		I_{cn}	Arms	3.0	6.0
Peak Current		I_{pk}	Arms	9.0	18.0
Continuous Power Dissipation @100°C[1]		P_{cn}	W	162.0	162.0
Max. Coil Temperature		t_{max}	°C	100	100
Thermal Dissipation Constant[1]		K_{th}	W/°C	2.160	2.160
Max. Bus Voltage		U_{bus}	Vdc	600.0	600.0
Pole Number		2P	-	16	16
Mechanical Parameters					
Rotor Mass		m	kg	0.90	0.90
Stator Mass		m	kg	3.00	3.00
Rotor Inertia		J_r	kg m²	8.463E-04	8.463E-04
Other Information					
Insulation Class		Class B (130°C)			
Protection Grade		IP00			
Compliance with Global Standards		RoHS, CE			
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.			

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subjected to change without prior notice.

■ Dimension



Note:
[1] User to ensure the concentricity of stator and rotor to be within 0.15mm when mounted;
[2] User to ensure flatness of mounting surface within 0.015/300mm;
[3] User to ensure perpendicularity of rotor inner bore relative to datum E within 0.1mm when mounted;
[4] The cable diameter tolerance +0.3, and cable length tolerance +60.0

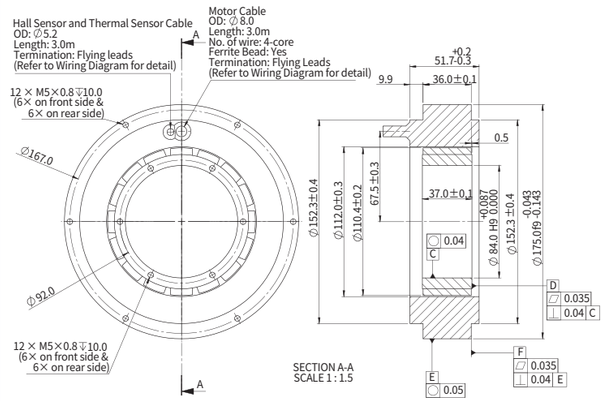


ADR175-P-36

ADR175-P-36					
Performance Parameters		**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]		T_{cn}	Nm	14.3	14.3
Peak Torque		T_{pk}	Nm	42.9	42.9
Torque Constant ±10%		K_t	Nm/Arms	3.58	1.79
Back EMF Constant ±10%		K_e	Vpeak/rpm	0.306	0.153
Motor Constant @25°C		K_m	Nm/Sqrt(W)	1.32	1.32
Resistance (L-L) @25°C ±10%[2]		R_{25}	Ω	4.91	1.23
Inductance (L-L) ±20%[3]		L	mH	42.57	10.64
Electrical Time Constant		τ_e	ms	8.67	8.67
Continuous Current @100°C[1]		I_{cn}	Arms	4.0	8.0
Peak Current		I_{pk}	Arms	12.0	24.0
Continuous Power Dissipation @100°C[1]		P_{cn}	W	151.9	151.9
Max. Coil Temperature		t_{max}	°C	100	100
Thermal Dissipation Constant[1]		K_{th}	W/°C	2.025	2.025
Max. Bus Voltage		U_{bus}	Vdc	600.0	600.0
Pole Number		2P	-	16	16
Mechanical Parameters					
Rotor Mass		m	kg	1.10	1.10
Stator Mass		m	kg	3.50	3.50
Rotor Inertia		J_r	kg m²	2.453E-03	2.453E-03
Other Information					
Insulation Class		Class B (130°C)			
Protection Grade		IP00			
Compliance with Global Standards		RoHS, CE			
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.			

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subjected to change without prior notice.

■ Dimension



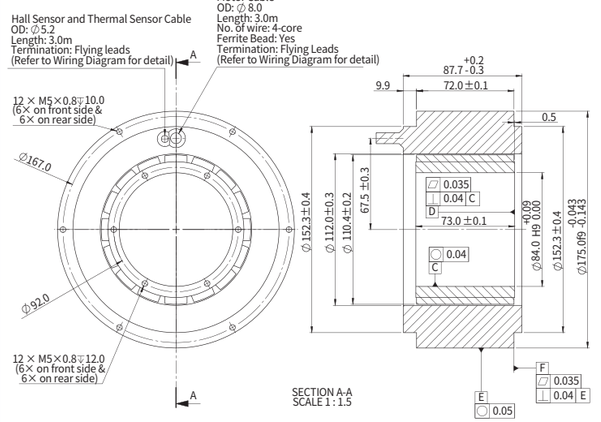
Note:
[1] User to ensure the concentricity of stator and rotor to be within 0.15mm when mounted;
[2] User to ensure flatness of mounting surface within 0.015/300mm;
[3] User to ensure perpendicularity of rotor inner bore relative to datum E within 0.1mm when mounted;
[4] The cable diameter tolerance +0.3, and cable length tolerance +60.0

ADR175-P-72

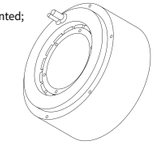
ADR175-P-72					
Performance Parameters		**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]		T_{cn}	Nm	31.5	31.5
Peak Torque		T_{pk}	Nm	94.4	94.4
Torque Constant ±10%		K_t	Nm/Arms	7.87	3.93
Back EMF Constant ±10%		K_e	Vpeak/rpm	0.672	0.336
Motor Constant @25°C		K_m	Nm/Sqrt(W)	2.25	2.25
Resistance (L-L) @25°C ±10%[2]		R_{25}	Ω	8.18	2.05
Inductance (L-L) ±20%[3]		L	mH	70.92	17.73
Electrical Time Constant		τ_e	ms	8.67	8.67
Continuous Current @100°C[1]		I_{cn}	Arms	4.0	8.0
Peak Current		I_{pk}	Arms	12.0	24.0
Continuous Power Dissipation @100°C[1]		P_{cn}	W	253.1	253.1
Max. Coil Temperature		t_{max}	°C	100	100
Thermal Dissipation Constant[1]		K_{th}	W/°C	3.374	3.374
Max. Bus Voltage		U_{bus}	Vdc	600.0	600.0
Pole Number		2P	-	16	16
Mechanical Parameters					
Rotor Mass		m	kg	2.10	2.10
Stator Mass		m	kg	5.90	5.90
Rotor Inertia		J_r	kg m²	4.892E-03	4.892E-03
Other Information					
Insulation Class		Class B (130°C)			
Protection Grade		IP00			
Compliance with Global Standards		RoHS, CE			
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.			

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subjected to change without prior notice.

■ Dimension



Note:
[1] User to ensure the concentricity of stator and rotor to be within 0.15mm when mounted;
[2] User to ensure flatness of mounting surface within 0.015/300mm;
[3] User to ensure perpendicularity of rotor inner bore relative to datum E within 0.1mm when mounted;
[4] The cable diameter tolerance +0.3, and cable length tolerance +60.0

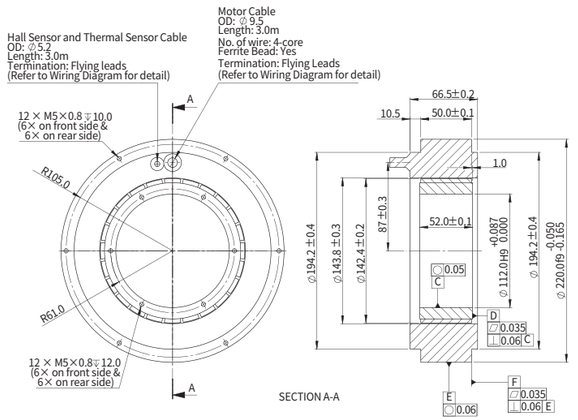


ADR220-P-50

ADR220-P-50					
Performance Parameters		**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]		T_{cn}	Nm	43.0	43.0
Peak Torque		T_{pk}	Nm	129.1	129.1
Torque Constant ±10%		K_t	Nm/Arms	7.97	2.66
Back EMF Constant ±10%		K_e	Vpeak/rpm	0.681	0.227
Motor Constant @25°C		K_m	Nm/Sqrt(W)	2.70	2.70
Resistance (L-L) @25°C ±10%[2]		R_{25}	Ω	5.81	0.65
Inductance (L-L) ±20%[3]		L	mH	57.62	6.40
Electrical Time Constant		τ_e	ms	9.92	9.92
Continuous Current @100°C[1]		I_{cn}	Arms	5.4	16.2
Peak Current		I_{pk}	Arms	16.2	48.6
Continuous Power Dissipation @100°C[1]		P_{cn}	W	327.6	327.6
Max. Coil Temperature		t_{max}	°C	100	100
Thermal Dissipation Constant[1]		K_{th}	W/°C	4.368	4.368
Max. Bus Voltage		U_{bus}	Vdc	600.0	600.0
Pole Number		2P	-	24	24
Mechanical Parameters					
Rotor Mass		m	kg	2.30	2.30
Stator Mass		m	kg	7.50	7.50
Rotor Inertia		J_r	kg·m²	9.249E-03	9.249E-03
Other Information					
Insulation Class		Class B (130°C)			
Protection Grade		IP00			
Compliance with Global Standards		RoHS, CE			
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.			

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subjected to change without prior notice.

Dimension



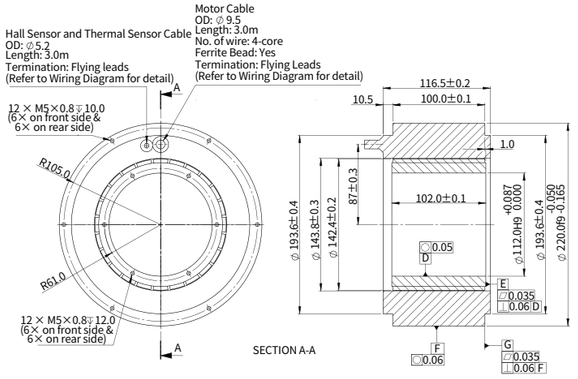
Note:
[1] User to ensure the concentricity of stator and rotor to be within 0.15mm when mounted;
[2] User to ensure flatness of mounting surface within 0.015/300mm;
[3] User to ensure perpendicularity of rotor inner bore relative to datum E within 0.1mm when mounted;
[4] The cable diameter tolerance +0.3, and cable length tolerance +60.0

ADR220-P-100

ADR220-P-100					
Performance Parameters		**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]		T_{cn}	Nm	91.9	91.9
Peak Torque		T_{pk}	Nm	275.8	275.8
Torque Constant ±10%		K_t	Nm/Arms	17.02	5.67
Back EMF Constant ±10%		K_e	Vpeak/rpm	1.456	0.485
Motor Constant @25°C		K_m	Nm/Sqrt(W)	4.43	4.43
Resistance (L-L) @25°C ±10%[2]		R_{25}	Ω	9.83	1.09
Inductance (L-L) ±20%[3]		L	mH	97.48	10.83
Electrical Time Constant		τ_e	ms	9.92	9.92
Continuous Current @100°C[1]		I_{cn}	Arms	5.4	16.2
Peak Current		I_{pk}	Arms	16.2	48.6
Continuous Power Dissipation @100°C[1]		P_{cn}	W	554.2	554.2
Max. Coil Temperature		t_{max}	°C	100	100
Thermal Dissipation Constant[1]		K_{th}	W/°C	7.390	7.390
Max. Bus Voltage		U_{bus}	Vdc	600.0	600.0
Pole Number		2P	-	24	24
Mechanical Parameters					
Rotor Mass		m	kg	4.50	4.50
Stator Mass		m	kg	15.00	15.00
Rotor Inertia		J_r	kg·m²	1.831E-02	1.831E-02
Other Information					
Insulation Class		Class B (130°C)			
Protection Grade		IP00			
Compliance with Global Standards		RoHS, CE			
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.			

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subjected to change without prior notice.

Dimension



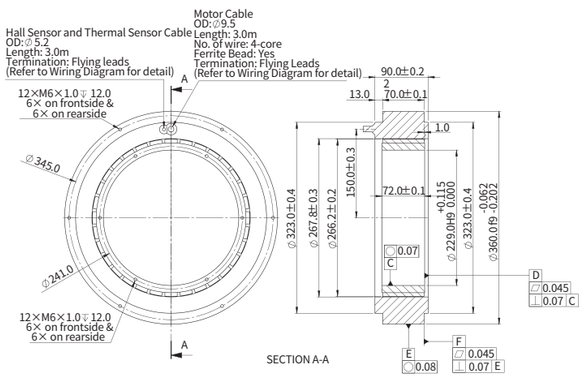
Note:
[1] User to ensure the concentricity of stator and rotor to be within 0.15mm when mounted;
[2] User to ensure flatness of mounting surface within 0.015/300mm;
[3] User to ensure perpendicularity of rotor inner bore relative to datum E within 0.1mm when mounted;
[4] The cable diameter tolerance +0.3, and cable length tolerance +60.0

ADR360-P-70

ADR360-P-70					
Performance Parameters		**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]		T_{cn}	Nm	171.0	171.0
Peak Torque		T_{pk}	Nm	513.0	513.0
Torque Constant ±10%		K_t	Nm/Arms	17.10	8.55
Back EMF Constant ±10%		K_e	Vpeak/rpm	1.462	0.731
Motor Constant @25°C		K_m	Nm/Sqrt(W)	8.17	8.17
Resistance (L-L) @25°C ±10%[2]		R_{25}	Ω	2.92	0.73
Inductance (L-L) ±20%[3]		L	mH	30.37	7.59
Electrical Time Constant		τ_e	ms	10.40	10.40
Continuous Current @100°C[1]		I_{cn}	Arms	10.0	20.0
Peak Current		I_{pk}	Arms	30.0	60.0
Continuous Power Dissipation @100°C[1]		P_{cn}	W	564.6	564.6
Max. Coil Temperature		t_{max}	°C	100	100
Thermal Dissipation Constant[1]		K_{th}	W/°C	7.528	7.528
Max. Bus Voltage		U_{bus}	Vdc	600.0	600.0
Pole Number		2P	-	32	32
Mechanical Parameters					
Rotor Mass		m	kg	7.30	7.30
Stator Mass		m	kg	17.50	17.50
Rotor Inertia		J_r	kg·m²	1.145E-01	1.145E-01
Other Information					
Insulation Class		Class B (130°C)			
Protection Grade		IP00			
Compliance with Global Standards		RoHS, CE			
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.			

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subjected to change without prior notice.

Dimension



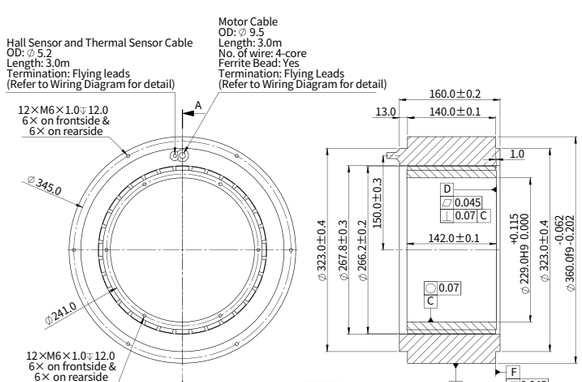
Note:
[1] User to ensure the concentricity of stator and rotor to be within 0.15mm when mounted;
[2] User to ensure flatness of mounting surface within 0.015/300mm;
[3] User to ensure perpendicularity of rotor inner bore relative to datum E within 0.1mm when mounted;
[4] The cable diameter tolerance +0.3, and cable length tolerance +60.0

ADR360-P-140

ADR360-P-140					
Performance Parameters		**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque @100°C[1]		T_{cn}	Nm	358.0	358.0
Peak Torque		T_{pk}	Nm	1074.0	1074.0
Torque Constant ±10%		K_t	Nm/Arms	35.80	17.90
Back EMF Constant ±10%		K_e	Vpeak/rpm	3.061	1.530
Motor Constant @25°C		K_m	Nm/Sqrt(W)	12.89	12.89
Resistance (L-L) @25°C ±10%[2]		R_{25}	Ω	5.14	1.29
Inductance (L-L) ±20%[3]		L	mH	53.46	13.36
Electrical Time Constant		τ_e	ms	10.40	10.40
Continuous Current @100°C[1]		I_{cn}	Arms	10.0	20.0
Peak Current		I_{pk}	Arms	30.0	60.0
Continuous Power Dissipation @100°C[1]		P_{cn}	W	993.8	993.8
Max. Coil Temperature		t_{max}	°C	100	100
Thermal Dissipation Constant[1]		K_{th}	W/°C	13.251	13.251
Max. Bus Voltage		U_{bus}	Vdc	600.0	600.0
Pole Number		2P	-	32	32
Mechanical Parameters					
Rotor Mass		m	kg	13.80	13.80
Stator Mass		m	kg	33.00	33.00
Rotor Inertia		J_r	kg·m²	2.272E-01	2.272E-01
Other Information					
Insulation Class		Class B (130°C)			
Protection Grade		IP00			
Compliance with Global Standards		RoHS, CE			
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.			

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subjected to change without prior notice.

Dimension

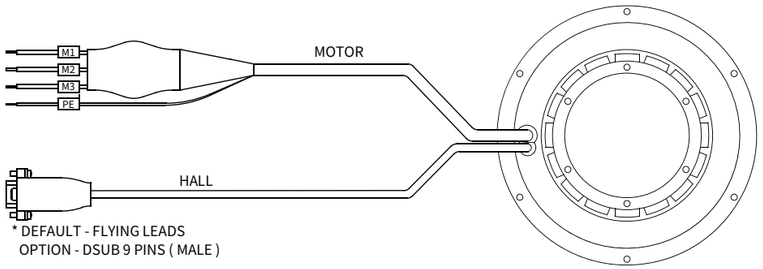


Note:
[1] User to ensure the concentricity of stator and rotor to be within 0.15mm when mounted;
[2] User to ensure flatness of mounting surface within 0.015/300mm;
[3] User to ensure perpendicularity of rotor inner bore relative to datum E within 0.1mm when mounted;
[4] The cable diameter tolerance +0.3, and cable length tolerance +60.0

Motor Cable Connection

MOTOR CABLE

PIN	DESCRIPTION	COLOR
-	M1	BLACK 1
-	M2	BLACK 2
-	M3	BLACK 3
-	PE	YELLOW / GREEN



HALL CABLE

PIN	DESCRIPTION	COLOR
1	HA	GREEN
2	HB	YELLOW
3	HC	GREY
4	5VDC	BROWN
5	0VDC	WHITE
8	T1	PINK
9	T2	BLUE

THERMAL SENSOR WIRE
(K TYPE - PT100)
(J TYPE - THERMOSTAT)

Part Numbering

ADR175-P-36-S-J-HF-3.0-FB

Motor Model:
ADR110-P-22 / ADR110-P-45
ADR135-P-27 / ADR135-P-54
ADR175-P-36 / ADR175-P-72
ADR 220-P-50 / ADR220-P-100
ADR 360-P-70 / ADR360-P-140

Winding:
S = Series / P = Parallel

Thermal Sensor Options:
J- Thermostat (Standard)
K-PT100(RTD)

Motor Cable Options:
FB[3]

Cable Length(m):
3.0

Hall Cable Options:
HF[1] / NH[2]

[1] HF= With Built-in hall sensor & hall cable comes with flying leads.
[2] NH = Without Built-in Hall Sensor but with Thermal Sensor.
[3] FB = With ferrite bead.

ADR-F SERIES

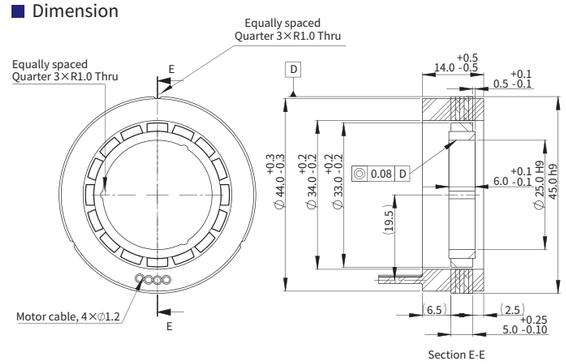
- Small volume and compact design
- Direct drive and brushless motor
- High torque density
- Low cogging torque
- Optional for low speed and high speed windings

ADR45-F-5

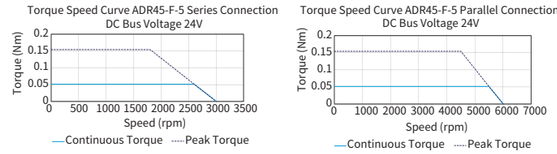
ADR45-F-5					
Performance Parameters	**Symbol**		**Unit**	**Series**	**Parallel**
Continuous Torque (NC) @100°C[1]	T_{cn}		Nm	0.05	0.05
Peak Torque	T_{pk}		Nm	0.15	0.15
Torque Constant ±10%	K_t		Nm/Arms	0.09	0.04
Back EMF Constant ±10%	K_e		Vpeak/rpm	7.32E-03	3.66E-03
Motor Constant @25°C	K_m		Nm/Sqrt(W)	0.04	0.04
Resistance (L-L) 25°C ±10%[2]	R_{25}		Ω	3.65	0.91
Inductance (L-L) ±20%[3]	L		mH	0.79	0.20
Electrical Time Constant	τ_e		ms	0.22	0.22
Continuous Current (NC) @100°C[1]	I_{cn}		Arms	0.6	1.2
Peak Current	I_{pk}		Arms	2.0	4.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}		W	2.6	2.6
Max. Coil Temperature	t_{max}		°C	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}		W/°C	0.03	0.03
Max. Bus Voltage	U_{bus}		Vdc	48	48
Pole Number	2_P		-	16	16
Max.Speed[4]	Ω_{max}		rpm	1500	3000
Mechanical Parameters					
Overall Mass (NC)	m_n		kg	0.08	0.08
Rotor Inertia	J_r		$kg \cdot m^2$	2.60E-06	2.60E-06
Other Information					
Insulation Class			Class A (105°C)		
Protection Grade			IP00		
Compliance with Global Standards			RoHS, CE		
Ambient Temperature		Operation	0°C to 40°C (non-freezing)		
		Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity		Operation	10%RH to 80%RH (non-condensing)		
		Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
The contents of datasheet are subject to change without prior notice.

Dimension



Torque-Speed Curve

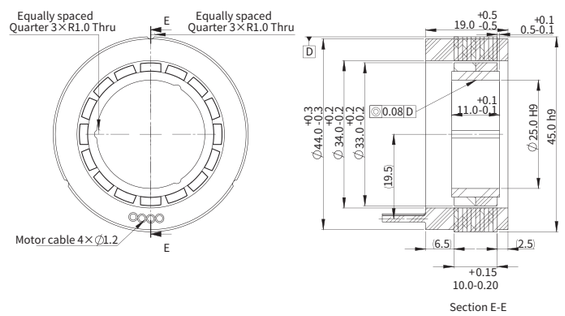


ADR45-F-10

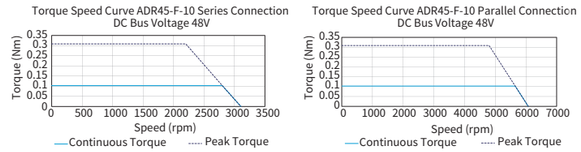
ADR45-F-10					
Performance Parameters	**Symbol**		**Unit**	**Series**	**Parallel**
Continuous Torque (NC) @100°C[1]	T_{cn}		Nm	0.10	0.10
Peak Torque	T_{pk}		Nm	0.30	0.30
Torque Constant ±10%	K_t		Nm/Arms	0.17	0.09
Back EMF Constant ±10%	K_e		Vpeak/rpm	1.46E-02	7.32E-03
Motor Constant @25°C	K_m		Nm/Sqrt(W)	0.06	0.06
Resistance (L-L) 25°C ±10%[2]	R_{25}		Ω	5.40	1.35
Inductance (L-L) ±20%[3]	L		mH	1.30	0.33
Electrical Time Constant	τ_e		ms	0.24	0.24
Continuous Current (NC) @100°C[1]	I_{cn}		Arms	0.6	1.2
Peak Current	I_{pk}		Arms	2.0	4.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}		W	3.8	3.8
Max. Coil Temperature	t_{max}		°C	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}		W/°C	0.05	0.05
Max. Bus Voltage	U_{bus}		Vdc	48	48
Pole Number	2_P		-	16	16
Max.Speed[4]	Ω_{max}		rpm	1500	3000
Mechanical Parameters					
Overall Mass (NC)	m_n		kg	0.11	0.11
Rotor Inertia	J_r		$kg \cdot m^2$	5.20E-06	5.20E-06
Other Information					
Insulation Class			Class A (105°C)		
Protection Grade			IP00		
Compliance with Global Standards			RoHS, CE		
Ambient Temperature		Operation	0°C to 40°C (non-freezing)		
		Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity		Operation	10%RH to 80%RH (non-condensing)		
		Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience			Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
The contents of datasheet are subject to change without prior notice.

Dimension



Torque-Speed Curve

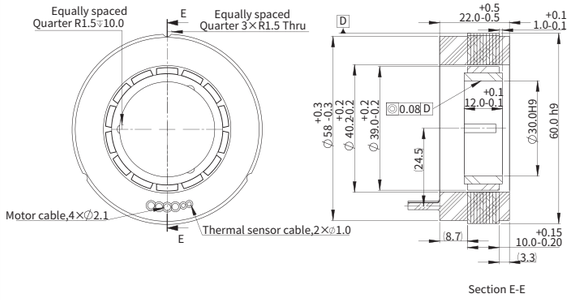


ADR60-F-10

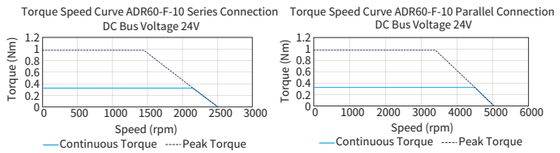
ADR60-F-10				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque (NC) @100°C[1]	T_{cn}	Nm	0.33	0.33
Peak Torque	T_{pk}	Nm	0.95	0.95
Torque Constant ±10%	K_t	Nm/Arms	0.11	0.05
Back EMF Constant ±10%	K_e	Vpeak/rpm	8.97E-03	4.49E-03
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.11	0.11
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	0.65	0.16
Inductance (L-L) ±20%[3]	L	mH	0.47	0.12
Electrical Time Constant	τ_e	ms	0.72	0.72
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	3.1	6.2
Peak Current	I_{pk}	Arms	10.9	21.7
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	12.1	12.1
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.16	0.16
Max. Bus Voltage	U_{bus}	Vdc	48	48
Pole Number	2_P	-	14	14
Max.Speed[4]	Ω_{max}	rpm	1500	3000
Mechanical Parameters				
Overall Mass (NC)	m_n	kg	0.22	0.22
Rotor Inertia	J_r	kg·m²	1.02E-05	1.02E-05
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.

Dimension



Torque-Speed Curve

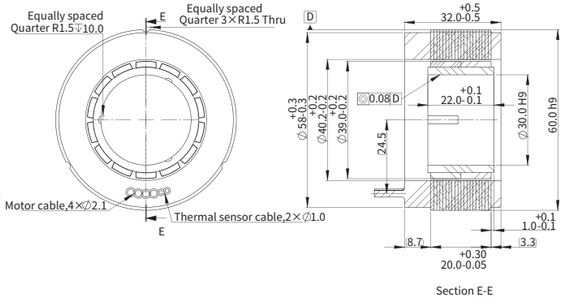


ADR60-F-20

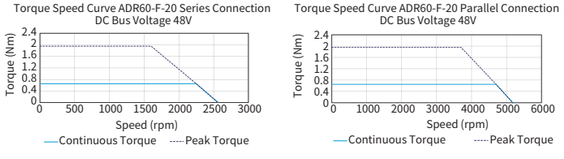
ADR60-F-20				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque (NC) @100°C[1]	T_{cn}	Nm	0.65	0.65
Peak Torque	T_{pk}	Nm	1.90	1.90
Torque Constant ±10%	K_t	Nm/Arms	0.21	0.11
Back EMF Constant ±10%	K_e	Vpeak/rpm	1.79E-02	8.97E-03
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.16	0.16
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	1.10	0.28
Inductance (L-L) ±20%[3]	L	mH	0.81	0.20
Electrical Time Constant	τ_e	ms	0.74	0.74
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	3.1	6.2
Peak Current	I_{pk}	Arms	10.9	21.8
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	20.5	20.5
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.27	0.27
Max. Bus Voltage	U_{bus}	Vdc	48	48
Pole Number	2_P	-	14	14
Max.Speed[4]	Ω_{max}	rpm	1500	3000
Mechanical Parameters				
Overall Mass (NC)	m_n	kg	0.35	0.35
Rotor Inertia	J_r	kg·m²	2.03E-05	2.03E-05
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.

Dimension



Torque-Speed Curve



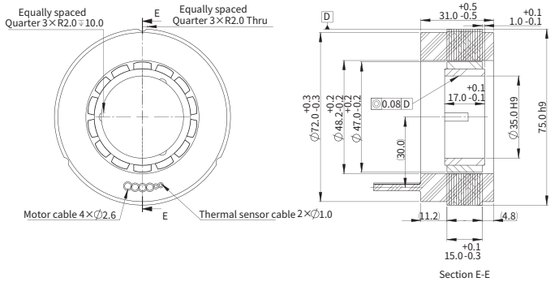
The contents of datasheet are subject to change without prior notice.

ADR75-F-15

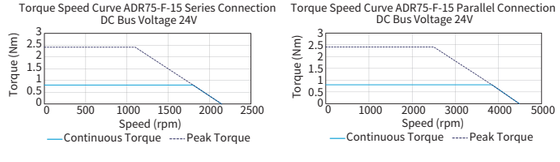
ADR75-F-15				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque (NC) @100°C[1]	T_{cn}	Nm	0.80	0.80
Peak Torque	T_{pk}	Nm	2.41	2.41
Torque Constant ±10%	K_t	Nm/Arms	0.12	0.06
Back EMF Constant ±10%	K_e	Vpeak/rpm	1.03E-02	5.13E-03
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.20	0.20
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	0.25	0.06
Inductance (L-L) ±20%[3]	L	mH	0.40	0.10
Electrical Time Constant	τ_e	ms	1.60	1.60
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	6.7	13.4
Peak Current	I_{pk}	Arms	20.1	40.2
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	21.8	21.8
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.29	0.29
Max. Bus Voltage	U_{bus}	Vdc	48	48
Pole Number	2_P	-	14	14
Max.Speed[4]	Ω_{max}	rpm	1500	3000
Mechanical Parameters				
Overall Mass (NC)	m_n	kg	0.46	0.46
Rotor Inertia	J_r	kg·m²	3.25E-05	3.25E-05
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.

Dimension



Torque-Speed Curve

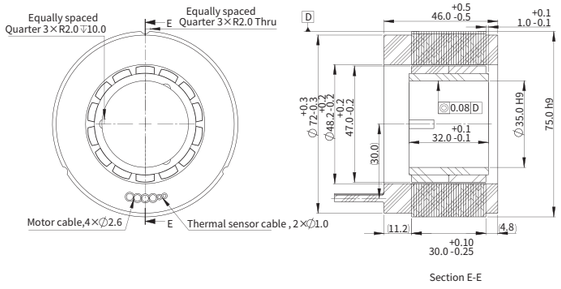


ADR75-F-30

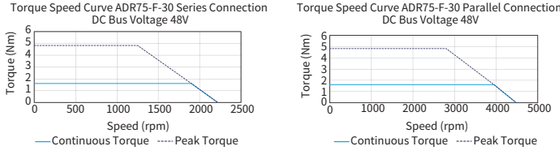
ADR75-F-30				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque (NC) @100°C[1]	T_{cn}	Nm	1.61	1.61
Peak Torque	T_{pk}	Nm	4.82	4.82
Torque Constant ±10%	K_t	Nm/Arms	0.24	0.12
Back EMF Constant ±10%	K_e	Vpeak/rpm	2.05E-02	1.03E-02
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.32	0.32
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	0.38	0.10
Inductance (L-L) ±20%[3]	L	mH	0.70	0.18
Electrical Time Constant	τ_e	ms	1.84	1.84
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	6.7	13.4
Peak Current	I_{pk}	Arms	20.1	40.2
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	33.1	33.1
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.44	0.44
Max. Bus Voltage	U_{bus}	Vdc	48	48
Pole Number	2_P	-	14	14
Max.Speed[4]	Ω_{max}	rpm	1500	3000
Mechanical Parameters				
Overall Mass (NC)	m_n	kg	0.80	0.80
Rotor Inertia	J_r	kg·m²	6.47E-05	6.47E-05
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.

Dimension



Torque-Speed Curve



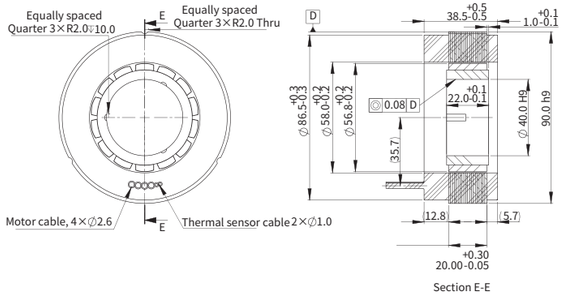
The contents of datasheet are subject to change without prior notice.

ADR90-F-20

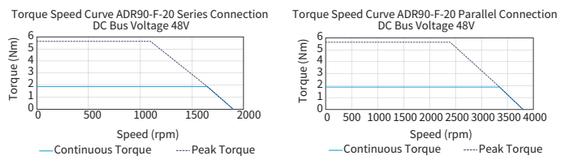
ADR90-F-20				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque (NC) @100°C[1]	T_{cn}	Nm	1.88	1.88
Peak Torque	T_{pk}	Nm	5.61	5.61
Torque Constant ±10%	K_t	Nm/Arms	0.28	0.14
Back EMF Constant ±10%	K_e	Vpeak/rpm	2.39E-02	1.20E-02
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.38	0.38
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	0.37	0.09
Inductance (L-L) ±20%[3]	L	mH	0.80	0.20
Electrical Time Constant	τ_e	ms	2.16	2.16
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	6.7	13.4
Peak Current	I_{pk}	Arms	22.5	45.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	32.2	32.2
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.43	0.43
Max. Bus Voltage	U_{bus}	Vdc	48	48
Pole Number	2_P	-	14	14
Max.Speed[4]	Ω_{max}	rpm	1500	3000
Mechanical Parameters				
Overall Mass (NC)	m_n	kg	0.85	0.85
Rotor Inertia	J_r	kg·m²	1.03E-04	1.03E-04
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.

Dimension



Torque-Speed Curve

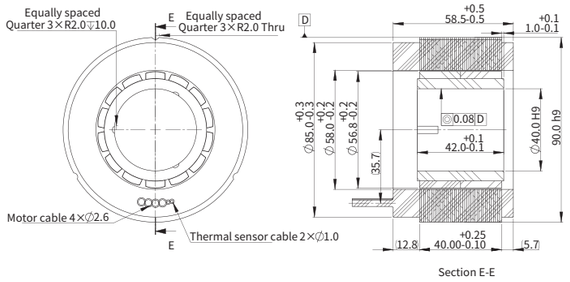


ADR90-F-40

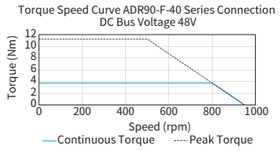
ADR90-F-40				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque (NC) @100°C[1]	T_{cn}	Nm	3.75	3.75
Peak Torque	T_{pk}	Nm	11.22	11.22
Torque Constant ±10%	K_t	Nm/Arms	0.56	0.28
Back EMF Constant ±10%	K_e	Vpeak/rpm	4.79E-02	2.39E-02
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.61	0.61
Resistance (L-L) 25°C ±10%[2]	R_{25}	Ω	0.57	0.14
Inductance (L-L) ±20%[3]	L	mH	1.45	0.36
Electrical Time Constant	τ_e	ms	2.54	2.54
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	6.7	13.4
Peak Current	I_{pk}	Arms	22.5	45.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	49.7	49.7
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.66	0.66
Max. Bus Voltage	U_{bus}	Vdc	48	48
Pole Number	2_P	-	14	14
Max.Speed[4]	Ω_{max}	rpm	750	1500
Mechanical Parameters				
Overall Mass (NC)	m_n	kg	1.49	1.49
Rotor Inertia	J_r	kg·m²	2.04E-04	2.04E-04
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

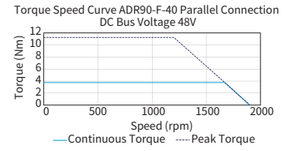
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 0.5 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.

Dimension



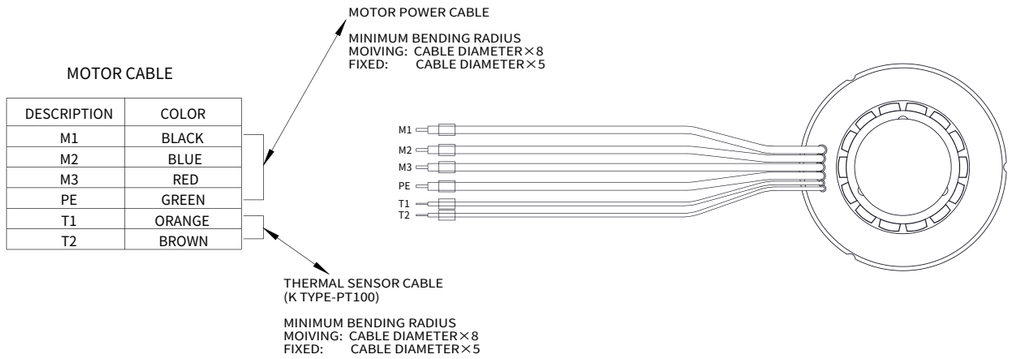
Torque-Speed Curve



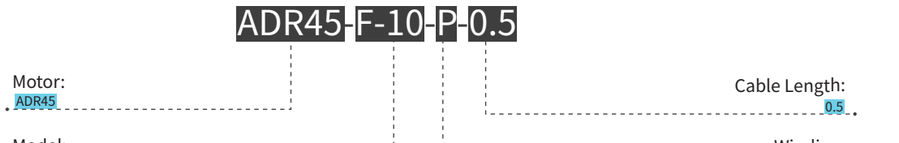


The contents of datasheet are subject to change without prior notice.

Motor Cable Connection



Part Numbering



ACD SERIES

- Direct drive zero cogging coreless motor
- Precise homing through index pulse
- No cogging torque
- Smooth motion even at low speeds (low velocity ripple)

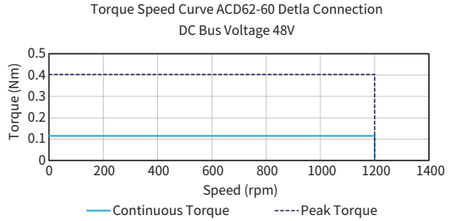
Note:Frameless ACD-P series motors are available, consisting of only rotors and stators.

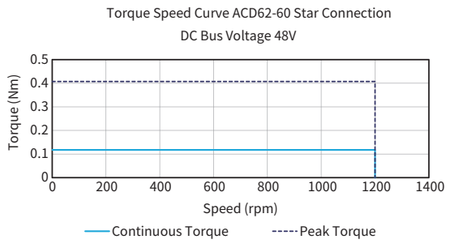
ACD62-60

ACD62-60				
Performance Parameters	**Symbol**	**Unit**	**D**	**Y**
Continuous Torque @100°C[1]	T_{cn}	Nm	0.115	0.115
Peak Torque	T_{pk}	Nm	0.40	0.40
Torque Constant ±10%	K_t	Nm/Arms	0.024	0.042
Back EMF Constant ±10%	K_e	Vpeak/rpm	0.002	0.004
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.023	0.028
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	0.73	1.51
Inductance (L-L) ±20%[3]	L	mH	0.073	0.195
Electrical Time Constant	τ_e	ms	0.10	0.13
Continuous Current @100°C[1]	I_{cn}	Arms	4.8	2.8
Peak Current	I_{pk}	Arms	16.8	9.7
Continuous Power Dissipation @100°C[1]	P_{cn}	W	32.6	22.4
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant[1]	K_{thn}	W/°C	0.435	0.298
Max. Bus Voltage	U_{bus}	Vdc	48.0	48.0
Pole Number	2P	-	8	8
Rec. Max. Speed @48 VDC (Digital / SINCOS)[4]	Ω_{max}	rpm	1200	1200
Mechanical Parameters				
Overall Mass	m_n	kg	0.50	0.50
Rotor Inertia	J_r	kg·m²	2.157E-05	2.157E-05
Axial Runout[5]	-	μm	12	12
Radial Runout[5]	-	μm	10	10
Max. Axial Load (Upright Mounting)[6]	-	N	50	50
Max. Axial Load (Inverted / Wall Mounting)	-	N	5	5
Max. Moment Load (Upright Mounting)	-	Nm	0.3	0.3
Max. Moment Load (Inverted / Wall Mounting)	-	Nm	0.05	0.05
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	1620	1620
ABI Optical Incremental Encoder (80x)	-	counts / rev	129600	129600
ABI Optical Incremental Encoder (160x)	-	counts / rev	259200	259200
ABI Optical Incremental Encoder (400x)	-	counts / rev	648000	648000
Accuracy after Error Mapping[7]	-	arc sec	+/-6	+/-6
Repeatability[7]	-	arc sec	+/-3	+/-3
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

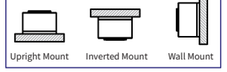
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change without prior notice.

■ Torque-Speed Curve

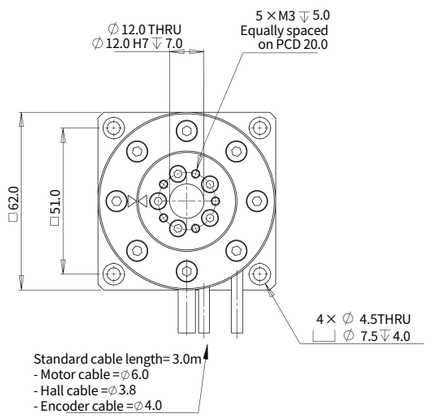


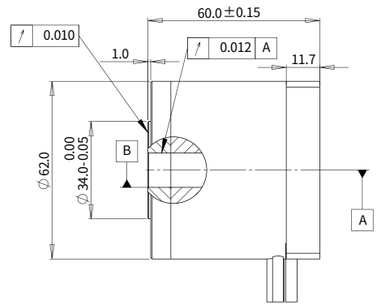


Mounting Illustration



■ Dimension



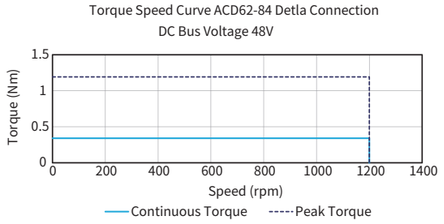


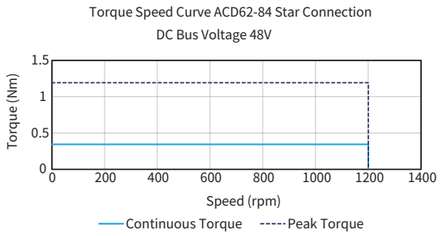
ACD62-84

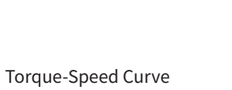
ACD62-84				
Performance Parameters	**Symbol**	**Unit**	**D**	**Y**
Continuous Torque @100°C[1]	T_{cn}	Nm	0.341	0.341
Peak Torque	T_{pk}	Nm	1.19	1.19
Torque Constant ±10%	K_t	Nm/Arms	0.071	0.123
Back EMF Constant ±10%	K_e	Vpeak/rpm	0.006	0.011
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.058	0.068
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	1.01	2.21
Inductance (L-L) ±20%[3]	L	mH	0.144	0.316
Electrical Time Constant	τ_e	ms	0.14	0.14
Continuous Current @100°C[1]	I_{cn}	Arms	4.8	2.8
Peak Current	I_{pk}	Arms	16.8	9.7
Continuous Power Dissipation @100°C [1]	P_{cn}	W	44.8	32.7
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant[1]	K_{thn}	W/°C	0.597	0.436
Max. Bus Voltage	U_{bus}	Vdc	48.0	48.0
Pole Number	2P	-	8	8
Rec. Max. Speed @48 VDC (Digital / SINCOS)[4]	Ω_{max}	rpm	1200	1200
Mechanical Parameters				
Overall Mass	m_n	kg	0.80	0.80
Rotor Inertia	J_r	kg·m²	3.944E-05	3.944E-05
Axial Runout[5]	-	μm	12	12
Radial Runout[5]	-	μm	10	10
Max. Axial Load (Upright Mounting)[6]	-	N	50	50
Max. Axial Load (Inverted / Wall Mounting)	-	N	5	5
Max. Moment Load (Upright Mounting)	-	Nm	0.3	0.3
Max. Moment Load (Inverted / Wall Mounting)	-	Nm	0.05	0.05
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	1620	1620
ABI Optical Incremental Encoder (80x)	-	counts / rev	129600	129600
ABI Optical Incremental Encoder (160x)	-	counts / rev	259200	259200
ABI Optical Incremental Encoder (400x)	-	counts / rev	648000	648000
Accuracy after Error Mapping[7]	-	arc sec	+/-6	+/-6
Repeatability[7]	-	arc sec	+/-3	+/-3
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change without prior notice.

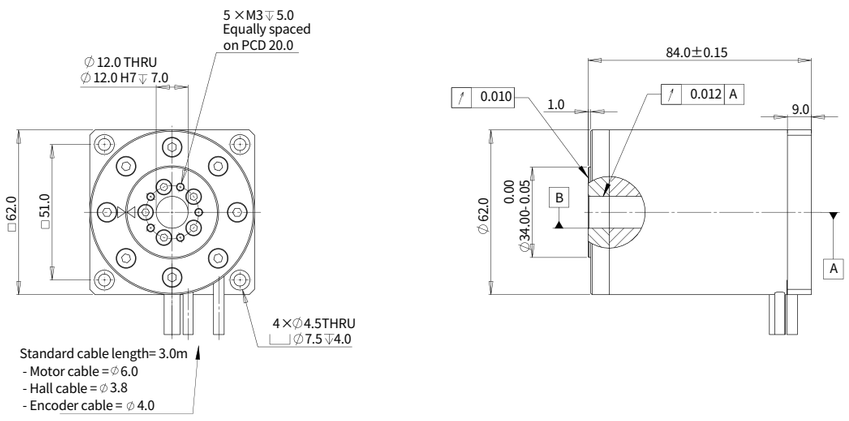
Torque-Speed Curve







Dimension

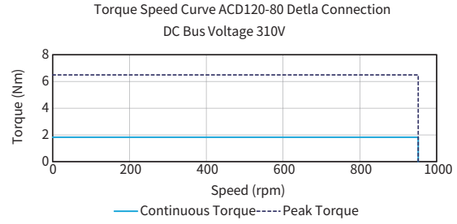


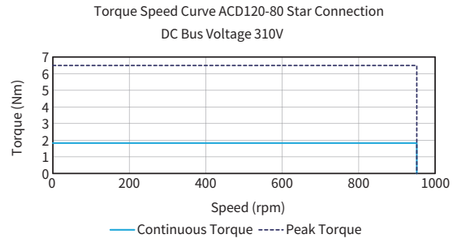
ACD120-80

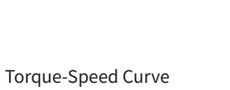
ACD120-80				
Performance Parameters	**Symbol**	**Unit**	**D**	**Y**
Continuous Torque @100°C[1]	T_{cn}	Nm	1.85	1.85
Peak Torque	T_{pk}	Nm	6.46	6.46
Torque Constant ±10%	K_t	Nm/Arms	0.36	0.63
Back EMF Constant ±10%	K_e	Vpeak/rpm	0.031	0.054
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.220	0.238
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	1.80	4.64
Inductance (L-L) ±20%[3]	L	mH	0.628	1.900
Electrical Time Constant	τ_e	ms	0.35	0.41
Continuous Current @100°C[1]	I_{cn}	Arms	5.1	2.9
Peak Current	I_{pk}	Arms	17.9	10.3
Continuous Power Dissipation @100°C[1]	P_{cn}	W	90.4	77.7
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant[1]	K_{thn}	W/°C	1.205	1.036
Max. Bus Voltage	U_{bus}	Vdc	330.0	330.0
Pole Number	2P	-	12	12
Rec. Max. Speed @230 VAC (Digital / SINCOS)[4]	Ω_{max}	rpm	952	952
Mechanical Parameters				
Overall Mass	m_n	kg	3.2	3.2
Rotor Inertia	J_r	kg·m²	1.08E-03	1.08E-03
Axial Runout[5]	-	μm	15	15
Radial Runout[5]	-	μm	10	10
Max. Axial Load (Upright Mounting)[6]	-	N	150	150
Max. Axial Load (Inverted / Wall Mounting)	-	N	15	15
Max. Moment Load (Upright Mounting)	-	Nm	10	10
Max. Moment Load (Inverted / Wall Mounting)	-	Nm	1.0	1.0
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	2868	2868
ABI Optical Incremental Encoder (80x)	-	counts / rev	229440	229440
ABI Optical Incremental Encoder (160x)	-	counts / rev	458880	458880
ABI Optical Incremental Encoder (400x)	-	counts / rev	1147200	1147200
Accuracy after Error Mapping[7]	-	arc sec	+/-6	+/-6
Repeatability[7]	-	arc sec	+/-3	+/-3
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change without prior notice.

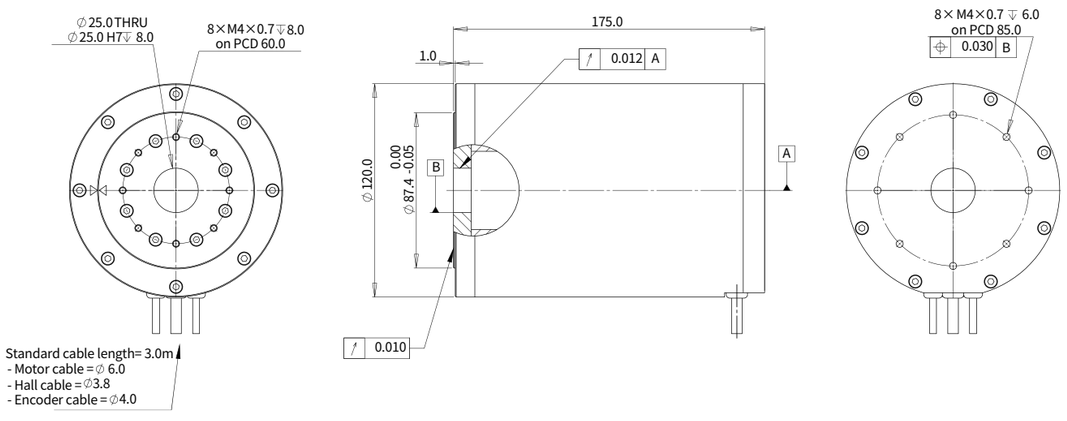
Torque-Speed Curve







Dimension

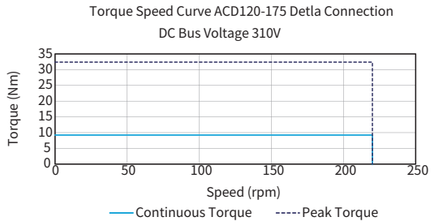


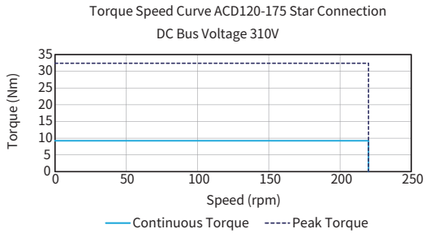
ACD120-175

ACD120-175					
Performance Parameters		**Symbol**	**Unit**	**D**	**Y**
Continuous Torque @100°C[1]		T_{cn}	Nm	9.22	9.22
Peak Torque		T_{pk}	Nm	32.25	32.25
Torque Constant ±10%		K_t	Nm/Arms	1.81	3.13
Back EMF Constant ±10%		K_e	Vpeak/rpm	0.154	0.268
Motor Constant @25°C		K_m	Nm/Sqrt(W)	0.736	0.736
Resistance (L-L) @25°C ±10%[2]		R_{25}	Ω	4.02	12.07
Inductance (L-L) ±20%[3]		L	mH	1.873	5.619
Electrical Time Constant		τ_e	ms	0.47	0.47
Continuous Current @100°C[1]		I_{cn}	Arms	5.1	2.9
Peak Current		I_{pk}	Arms	17.9	10.3
Continuous Power Dissipation @100°C[1]		P_{cn}	W	202.4	202.1
Max. Coil Temperature		t_{max}	°C	100	100
Thermal Dissipation Constant[1]		K_{thn}	W/°C	2.698	2.695
Max. Bus Voltage		U_{bus}	Vdc	330.0	330.0
Pole Number		2P	-	12	12
Rec. Max. Speed @230 VAC (Digital / SINCOS)[4]		Ω_{max}	rpm	220	220
Mechanical Parameters					
Overall Mass		m_n	kg	7.0	7.0
Rotor Inertia		J_r	kg·m²	3.21E-03	3.21E-03
Axial Runout[5]		-	µm	15	15
Radial Runout[5]		-	µm	10	10
Max. Axial Load (Upright Mounting)[6]		-	N	150	150
Max. Axial Load (Inverted / Wall Mounting)		-	N	15	15
Max. Moment Load (Upright Mounting)		-	Nm	10	10
Max. Moment Load (Inverted / Wall Mounting)		-	Nm	1.0	1.0
Encoder Parameters					
ABI Optical Incremental Encoder (SIN/COS)		-	lines / rev	2868	2868
ABI Optical Incremental Encoder (80x)		-	counts / rev	229440	229440
ABI Optical Incremental Encoder (160x)		-	counts / rev	458880	458880
ABI Optical Incremental Encoder (400x)		-	counts / rev	1147200	1147200
Accuracy after Error Mapping[7]		-	arc sec	+/-6	+/-6
Repeatability[7]		-	arc sec	+/-3	+/-3
Other Information					
Insulation Class		Class B (130°C)			
Protection Grade		IP40			
Compliance with Global Standards		RoHS, CE			
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.			

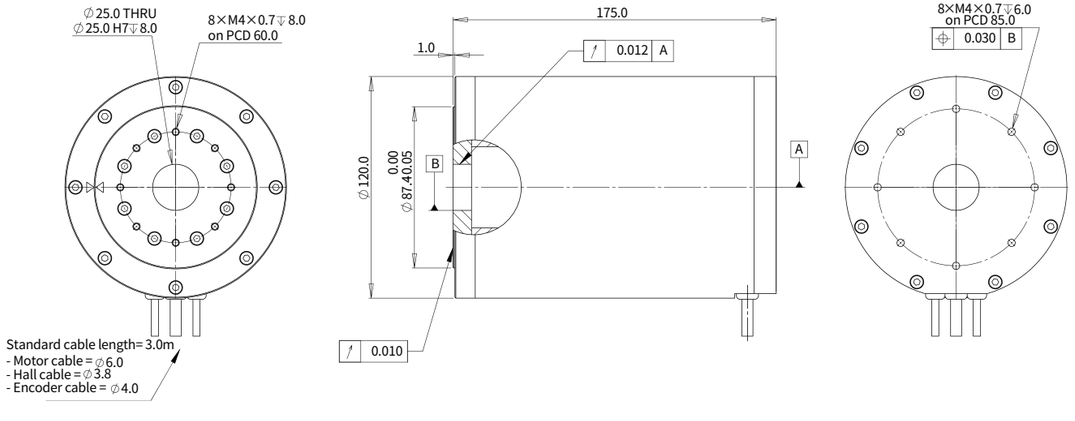
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change without prior notice.

■ Torque-Speed Curve





■ Dimension



Part Numbering

ACD62-84-D-K-NH-3.0-FB-AB-1620-160X

- Motor Model: ACD62-60 / 84
- Connection: D = Delta/Y = Wye
- Thermal Sensor: K= PT100 (RTD)
- Hall Cable Option: NH[1] / H9D[2]
- Interpolation Option: SINCOS / 80X / 160X / 400X
- Encoder Option: AB-1620
- Motor Cable Option: FB[3]
- Cable length (m): 3.0

ACD120-80-Y-J-H9D-3.0-FB-AB-2868-SINCOS

- Motor Model: ACD120-80 / 175
- Connection: D = Delta/Y = Wye
- Thermal Sensor: J = Thermostat (Standard) / K= PT100 (RTD)
- Hall Cable Option: NH[1] / H9D[2]
- Interpolation Option: SINCOS / 80X / 160X / 400X
- Encoder Option: AB-2868
- Motor Cable Option: FB[3]
- Cable length (m): 3.0

[1] NH = Without Built-in Hall Sensor but with Thermal Sensor.
[2] H9D = With Built-in hall sensor, comes with 9-Pins D-Sub Connector.
[3] FB = With ferrite bead.

Motor Cable Connection

MOTOR CABLE

PIN	DESCRIPTION	COLOR
-	M1	YELLOW / GREY
-	M2	BLUE / ORANGE
-	M3	RED / GREEN
-	PE	YELLOW / GREEN

HALL CABLE

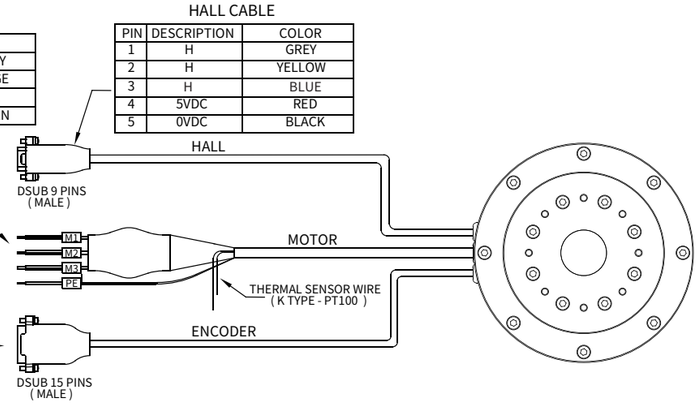
PIN	DESCRIPTION	COLOR
1	H	GREY
2	H	YELLOW
3	H	BLUE
4	5VDC	RED
5	0VDC	BLACK

AB (DIGITAL)

PIN	DESCRIPTION
12	5VDC
5	A+
4	A-
10	B+
9	B-
14	Z+
15	Z-
13	0VDC

AB (SIN / COS)

PI	DESCRIPTION
12	5VDC
8	SINE+
15	SINE-
7	COSINE+
14	COSINE-
2	INDEX+
1	INDEX-
13	0VDC

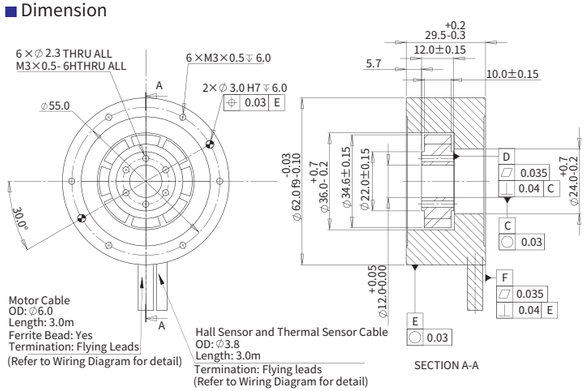


ACD62-P-10

ACD62-P-10				
Performance Parameters	**Symbol**	**Unit**	**D**	**Y**
Continuous Torque @100°C❶	T_{cn}	Nm	0.115	0.115
Peak Torque	T_{pk}	Nm	0.40	0.40
Torque Constant ±10%	K_t	Nm/Arms	0.024	0.042
Back EMF Constant ±10%	K_e	Vpeak/rpm	0.002	0.004
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.023	0.028
Resistance (L-L) @25°C ±10%❷	R_{25}	Ω	0.73	1.51
Inductance (L-L) ±20%❸	L	mH	0.073	0.195
Electrical Time Constant	τ_e	ms	0.10	0.13
Continuous Current @100°C❶	I_{cn}	Arms	4.8	2.8
Peak Current	I_{pk}	Arms	16.8	9.7
Continuous Power Dissipation @100°C❶	P_{cn}	W	32.6	22.4
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant❶	K_{thn}	W/°C	0.435	0.298
Max. Bus Voltage	U_{bus}	Vdc	48.0	48.0
Pole Number	$2p$	-	8	8
Mechanical Parameters				
Overall Mass	m_n	kg	0.5	0.5
Rotor Inertia	J_r	kg·m²	9.714E-06	9.714E-06
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

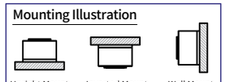
❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 3 m cable.
❸ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subjected to change without prior notice.

■ Dimension



Note:
❶ User to ensure the concentricity of stator and rotor to be within 0.15mm when mounted;
❷ User to ensure flatness of mounting surface within 0.015/300mm;
❸ User to ensure perpendicularity of rotor inner bore relative to datum E within 0.1mm when mounted;
❹ The cable diameter tolerance +0.3, and cable length tolerance +60.0

Mounting Illustration

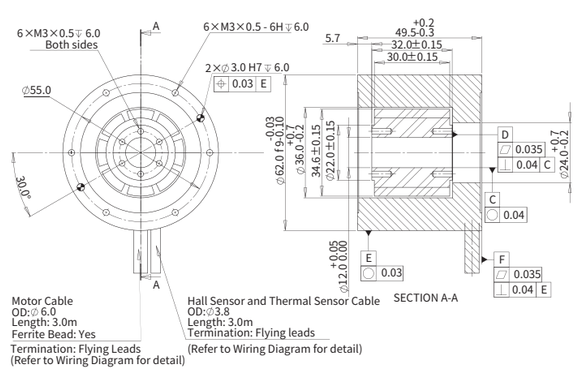


ACD62-P-30

ACD62-P-30				
Performance Parameters	**Symbol**	**Unit**	**D**	**Y**
Continuous Torque @100°C❶	T_{cn}	Nm	0.341	0.341
Peak Torque	T_{pk}	Nm	1.19	1.19
Torque Constant ±10%	K_t	Nm/Arms	0.071	0.123
Back EMF Constant ±10%	K_e	Vpeak/rpm	0.006	0.011
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.058	0.068
Resistance (L-L) @25°C ±10%❷	R_{25}	Ω	1.01	2.21
Inductance (L-L) ±20%❸	L	mH	0.144	0.316
Electrical Time Constant	τ_e	ms	0.14	0.14
Continuous Current @100°C❶	I_{cn}	Arms	4.8	2.8
Peak Current	I_{pk}	Arms	16.8	9.7
Continuous Power Dissipation @100°C❶	P_{cn}	W	44.8	32.7
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant❶	K_{thn}	W/°C	0.597	0.436
Max. Bus Voltage	U_{bus}	Vdc	48.0	48.0
Pole Number	$2p$	-	8	8
Mechanical Parameters				
Overall Mass	m_n	kg	0.8	0.8
Rotor Inertia	J_r	kg·m²	2.883E-05	2.883E-05
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

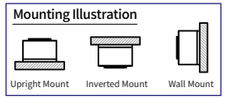
❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 3 m cable.
❸ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subjected to change without prior notice.

■ Dimension



Note:
❶ User to ensure the concentricity of stator and rotor to be within 0.15mm when mounted;
❷ User to ensure flatness of mounting surface within 0.015/300mm;
❸ User to ensure perpendicularity of rotor inner bore relative to datum E within 0.1mm when mounted;
❹ The cable diameter tolerance +0.3, and cable length tolerance +60.0

Mounting Illustration

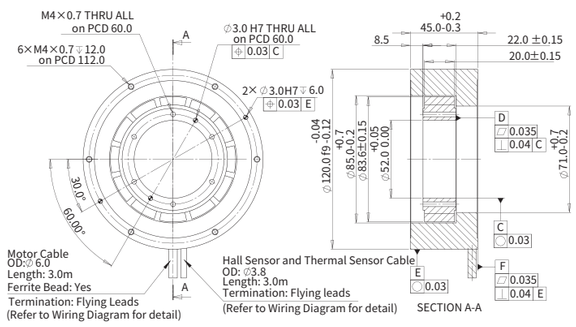


ACD120-P-20

ACD120-P-20				
Performance Parameters	**Symbol**	**Unit**	**D**	**Y**
Continuous Torque @100°C❶	T_{cn}	Nm	1.85	1.85
Peak Torque	T_{pk}	Nm	6.46	6.46
Torque Constant ±10%	K_t	Nm/Arms	0.36	0.63
Back EMF Constant ±10%	K_e	Vpeak/rpm	0.031	0.054
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.220	0.238
Resistance (L-L) @25°C ±10%❷	R_{25}	Ω	1.80	4.64
Inductance (L-L) ±20%❸	L	mH	0.628	1.900
Electrical Time Constant	τ_e	ms	0.35	0.41
Continuous Current @100°C❶	I_{cn}	Arms	5.1	2.9
Peak Current	I_{pk}	Arms	17.9	10.3
Continuous Power Dissipation @100°C❶	P_{cn}	W	90.4	77.7
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant❶	K_{thn}	W/°C	1.205	1.036
Max. Bus Voltage	U_{bus}	Vdc	330.0	330.0
Pole Number	$2p$	-	12	12
Mechanical Parameters				
Overall Mass	m_n	kg	3.2	3.2
Rotor Inertia	J_r	kg·m²	5.950E-04	5.950E-04
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP00		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

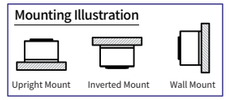
❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 3 m cable.
❸ Inductance is measured by current frequency of 1 kHz.
The contents of datasheet are subjected to change without prior notice.

■ Dimension



Note:
❶ User to ensure the concentricity of stator and rotor to be within 0.15mm when mounted;
❷ User to ensure flatness of mounting surface within 0.015/300mm;
❸ User to ensure perpendicularity of rotor inner bore relative to datum E within 0.1mm when mounted;
❹ The cable diameter tolerance +0.3, and cable length tolerance +60.0

Mounting Illustration



Part Numbering

ACD62-P-10-D-K-NH-3.0-FB

- Motor Model: ACD62-P-10/ACD62-P-30
- Connection: D = Delta/Y = Wye
- Thermal Sensor: K= PT100 (RTD)
- Hall Cable Option: HF[1] / NH[2]
- Cable length (m): 3.0
- Motor Cable Option: FB[3]

ACD120-P-20-Y-J-HF-3.0-FB

- Motor Model: ACD120-P-20
- Connection: D = Delta/Y = Wye
- Thermal Sensor: J = Thermostat (Standard) / K= PT100 (RTD)
- Hall Cable Option: HF[1] / NH[2]
- Cable length (m): 3.0
- Motor Cable Option: FB[3]

[1] HF= With Built-in hall sensor & hall cable comes with flying leads.
[2] NH = Without Built-in Hall Sensor but with Thermal Sensor.
[3] FB = With ferrite bead.

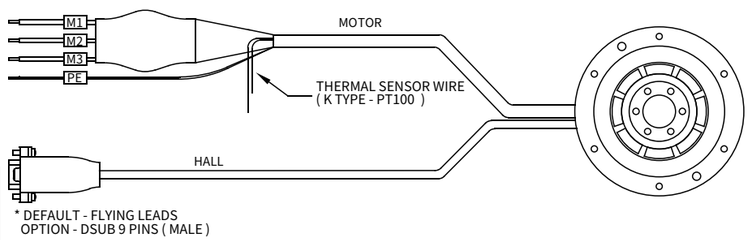
Motor Cable Connection

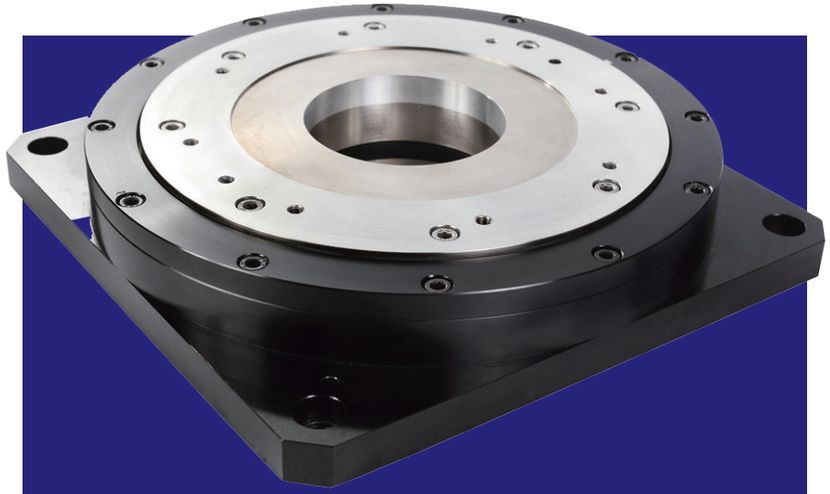
MOTOR CABLE

PIN	DESCRIPTION	COLOR
-	M1	YELLOW / GREY
-	M2	BLUE / ORANGE
-	M3	RED / GREEN
-	PE	YELLOW / GREEN

HALL CABLE

PIN	DESCRIPTION	COLOR
1	HA	GREY
2	HB	YELLOW
3	HC	BLUE
4	5VDC	RED
5	0VDC	BLACK





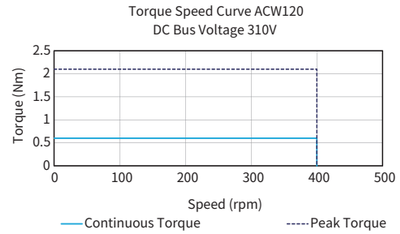
ACW SERIES

- Direct drive brushless motor
- Fully integrated with encoder and bearing
- No cogging torque
- Precise homing through index pulse
- Large centre hole
- Low profile

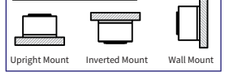
ACW120

ACW120			
Performance Parameters	**Symbol**	**Unit**	**Parallel**
Continuous Torque @100°C[1]	T_{cn}	Nm	0.6
Peak Torque	T_{pk}	Nm	2.1
Torque Constant ±10%	K_t	Nm/Arms	0.14
Back EMF Constant ±10%	K_e	Vpeak/rpm	0.012
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.10
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	1.43
Inductance (L-L) ±20%[3]	L	mH	0.47
Electrical Time Constant	τ_e	ms	0.33
Continuous Current @100°C[1]	I_{cn}	Arms	4.6
Peak Current	I_{pk}	Arms	16.1
Continuous Power Dissipation @100°C[1]	P_{cn}	W	58.5
Max. Coil Temperature	t_{max}	°C	100
Thermal Dissipation Constant[1]	K_{thn}	W/°C	0.78
Max. Bus Voltage	U_{bus}	Vdc	330.0
Pole Number	2P	-	16
Max. Speed For Standard Axial/Radial Runout @230V AC[4]	Ω_{max}	rpm	400
Max. Speed For Optional Axial/Radial Runout (P10, P5) @230V AC[4]	Ω_{max}	rpm	120
Mechanical Parameters			
Overall Mass	m_n	kg	2.0
Rotor Inertia	J_r	kg.m²	6.584E-04
Axial Runout[5]	-	μm	15 (10,5)
Radial Runout[5]	-	μm	15 (10,5)
Max. Axial Load (Upright Mounting)[6]	-	N	150.0
Max. Axial Load (Inverted / Wall Mounting)	-	N	15.0
Max. Moment Load (Upright Mounting)	-	Nm	14.7
Max. Moment Load (Inverted / Wall Mounting)	-	Nm	1.47
Encoder Parameters			
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	3934
ABI Optical Incremental Encoder (80x)	-	counts / rev	314720
ABI Optical Incremental Encoder (160x)	-	counts / rev	629,440
ABI Optical Incremental Encoder (400x)	-	counts / rev	1,573,600
Accuracy after Error Mapping[7]	-	arc sec	+/-8
Repeatability[7]	-	arc sec	+/-4
Other Information			
Insulation Class		Class B (130°C)	
Protection Grade		IP40	
Compliance with Global Standards		RoHS, CE	
Ambient Temperature	Operation	0°C to 40°C (non-freezing)	
	Storage	-15°C to 70°C (non-freezing)	
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)	
	Storage	10%RH to 90%RH (non-condensing)	
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.	

■ Torque-Speed Curve

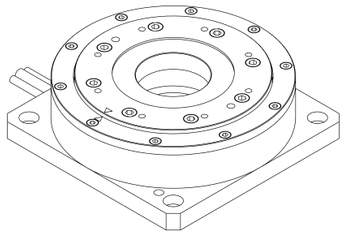


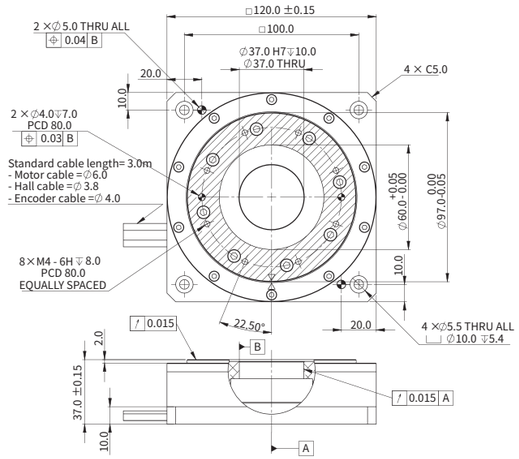
Mounting Illustration



[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with P5 runout.
The contents of datasheet are subjected to change without prior notice.

■ Dimension



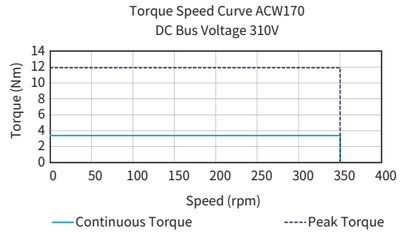


Note:
[1] 37mm diameter through hole
[2] Shaded area, mounting surface

ACW170

ACW170				
Performance Parameters		**Symbol**	**Unit**	**Parallel**
Continuous Torque @100°C[1]		T_{cn}	Nm	2.8
Peak Torque		T_{pk}	Nm	11.9
Torque Constant ±10%		K_t	Nm/Arms	0.66
Back EMF Constant ±10%		K_e	Vpeak/rpm	0.056
Motor Constant @25°C		K_m	Nm/Sqrt(W)	0.32
Resistance (L-L) @25°C ±10%[2]		R_{25}	Ω	2.76
Inductance (L-L) ±20%[3]		L	mH	1.65
Electrical Time Constant		τ_e	ms	0.60
Continuous Current @100°C[1]		I_{cn}	Arms	4.2
Peak Current		I_{pk}	Arms	14.7
Continuous Power Dissipation @100°C[1]		P_{cn}	W	94.1
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant[1]		K_{thn}	W/°C	1.26
Max. Bus Voltage		U_{bus}	Vdc	330.0
Pole Number		2P	-	16
Max. Speed For Standard Axial/Radial Runout @230V AC[4]		Ω_{max}	rpm	250
Max. Speed For Optional Axial/Radial Runout (P10, P5) @230V AC[4]		Ω_{max}	rpm	120
Mechanical Parameters				
Overall Mass		m_n	kg	3.7
Rotor Inertia		J_r	kg.m²	2.020E-03
Axial Runout[5]		-	µm	18 (10,5)
Radial Runout[5]		-	µm	18 (10,5)
Max. Axial Load (Upright Mounting)[6]		-	N	230.0
Max. Axial Load (Inverted / Wall Mounting)		-	N	23.0
Max. Moment Load (Upright Mounting)		-	Nm	31.7
Max. Moment Load (Inverted / Wall Mounting)		-	Nm	3.17
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)		-	lines / rev	5560
ABI Optical Incremental Encoder (80x)		-	counts / rev	444800
ABI Optical Incremental Encoder (160x)		-	counts / rev	889,600
ABI Optical Incremental Encoder (400x)		-	counts / rev	2,224,000
Accuracy after Error Mapping[7]		-	arc sec	+/-6
Repeatability[7]		-	arc sec	+/-3
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

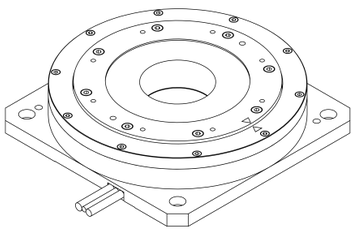
■ Torque-Speed Curve

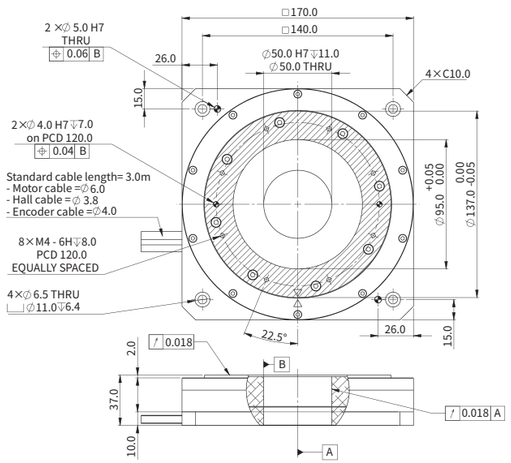


Mounting Illustration

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with P5 runout.
The contents of datasheet are subjected to change without prior notice.

■ Dimension



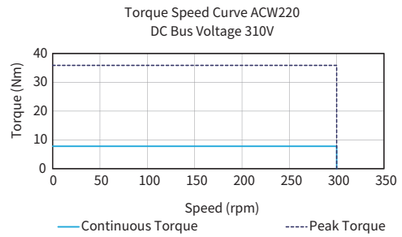


Note:
[1] 50mm diameter through hole
[2] Shaded area, mounting surface

ACW220

ACW220				
Performance Parameters		**Symbol**	**Unit**	**Parallel**
Continuous Torque @100°C[1]		T_{cn}	Nm	7.4
Peak Torque		T_{pk}	Nm	35.9
Torque Constant ±10%		K_t	Nm/Arms	1.95
Back EMF Constant ±10%		K_e	Vpeak/rpm	0.167
Motor Constant @25°C		K_m	Nm/Sqrt(W)	0.71
Resistance (L-L) @25°C ±10%[2]		R_{25}	Ω	5.06
Inductance (L-L) ±20%[3]		L	mH	4.72
Electrical Time Constant		τ_e	ms	0.93
Continuous Current @100°C[1]		I_{cn}	Arms	3.8
Peak Current		I_{pk}	Arms	13.3
Continuous Power Dissipation @100°C[1]		P_{cn}	W	141.3
Max. Coil Temperature		t_{max}	°C	100
Thermal Dissipation Constant[1]		K_{thn}	W/°C	1.88
Max. Bus Voltage		U_{bus}	Vdc	330.0
Pole Number		2P	-	16
Max. Speed For Standard Axial/Radial Runout @230V AC[4]		Ω_{max}	rpm	190
Max. Speed For Optional Axial/Radial Runout (P10, P5) @230V AC[4]		Ω_{max}	rpm	120
Mechanical Parameters				
Overall Mass		m_n	kg	7.0
Rotor Inertia		J_r	kg.m²	8.354E-03
Axial Runout[5]		-	µm	18 (10,5)
Radial Runout[5]		-	µm	18 (10,5)
Max. Axial Load (Upright Mounting)[6]		-	N	300.0
Max. Axial Load (Inverted / Wall Mounting)		-	N	30.0
Max. Moment Load (Upright Mounting)		-	Nm	55.2
Max. Moment Load (Inverted / Wall Mounting)		-	Nm	5.52
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)		-	lines / rev	7500
ABI Optical Incremental Encoder (80x)		-	counts / rev	600000
ABI Optical Incremental Encoder (160x)		-	counts / rev	1,200,000
ABI Optical Incremental Encoder (400x)		-	counts / rev	3,000,000
Accuracy after Error Mapping[7]		-	arc sec	+/-6
Repeatability[7]		-	arc sec	+/-3
Other Information				
Insulation Class		Class B (130°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

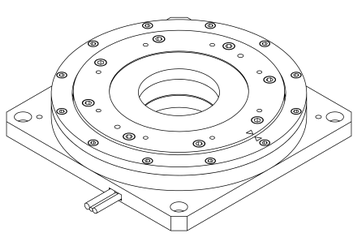
■ Torque-Speed Curve

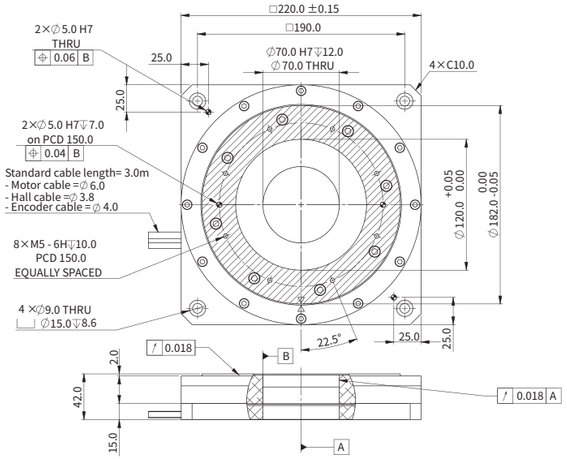


Mounting Illustration

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with P5 runout.
The contents of datasheet are subjected to change without prior notice.

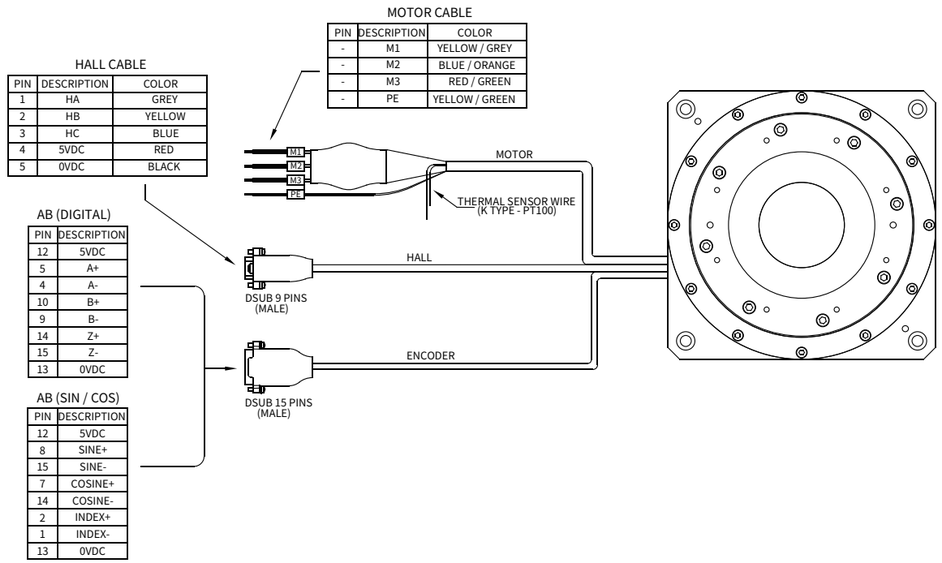
■ Dimension





Note:
[1] 70mm diameter through hole
[2] Shaded area, mounting surface

Motor Cable Connection Diagram

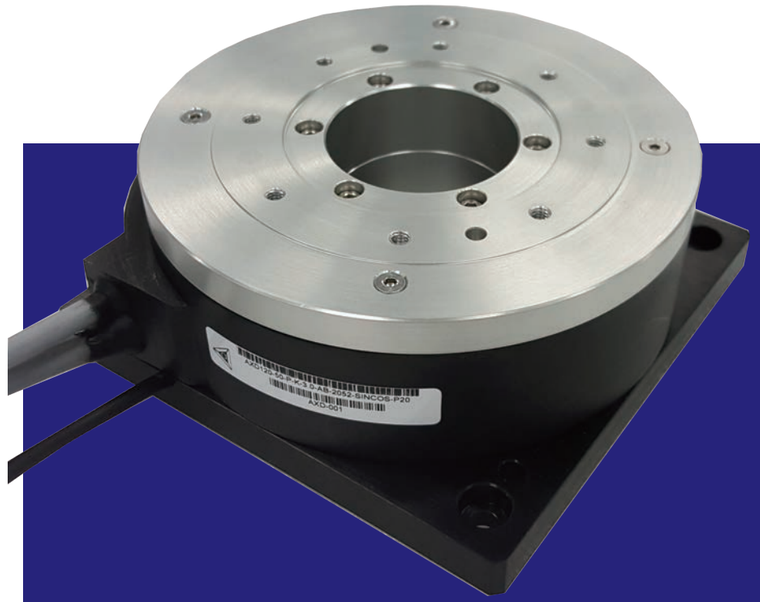


Part Numbering

ACW170-37-P-K-H9D-3.0-FB-AB-5560-SINCOS-P18

- Motor Model: ACW120-37 / ACW170-37 / ACW220-42
- Winding: P=Parallel
- Thermal Sensor Options: K = PT100 (RTD)
- Hall Cable Options: H9D[1] / NH[2]
- Cable Length (m): 3.0
- Motor Cable Options: FB[3]
- Encoder: ACW120:AB-3934 / ACW170:AB-5560 / ACW220:AB-7500
- Interpolation Options: SINCOS / 80X / 160X / 400X
- Runout:[4] P5 / P10 / P15 / P18

[1] H9D=With Built-in hall sensor, comes with 9-Pins D-Sub Connector
[2] NH=Without Built-in Hall Sensor but with Thermal Sensor
[3] FB=With ferrite bead
[4] ACW120 / ACW170 / AXW220:P5= Axial Runout 5um, Radial Runout is 5um
ACW120 / ACW170 / AXW220:P10= Axial Runout 10um, Radial Runout is 10um
ACW120:P15= Axial Runout 15um, Radial Runout is 15um
ACW170 / AXW220:P18= Axial Runout 18um, Radial Runout is 18um



AXD SERIES

- Direct drive and brushless motor
- Fully integrated with encoder and bearing
- Low cogging torque
- Precise homing through index pulse
- Optional for low speed and high speed windings
- High torque density
- Low profile with large centre hole
- Flat design

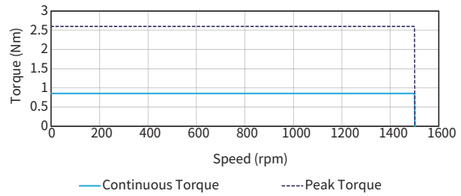
AXD80-50

AXD80-50				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque (NC) @100°C[1]	T_{cn}	Nm	0.9	0.9
Peak Torque	T_{pk}	Nm	2.6	2.6
Torque Constant ±10%	K_t	Nm/Arms	0.91	0.46
Back EMF Constant ±10%	K_e	Vpeak/rpm	0.078	0.039
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.25	0.25
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	9.1	2.3
Inductance (L-L) ±20%[3]	L	mH	28.1	7.0
Electrical Time Constant	τ_e	ms	3.1	3.1
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	0.9	1.9
Peak Current	I_{pk}	Arms	3.4	6.8
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	15.6	15.6
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.2	0.2
Max. Bus Voltage	U_{bus}	Vdc	330	330
Pole Number	2P	-	14	14
Max Speed[4]	Ω_{max}	rpm	1500	3000
Mechanical Parameters				
Overall Mass (NC)	m_n	kg	1.35	1.35
Rotor Inertia	J_r	kg·m²	1.82E-04	1.82E-04
Axial Runout[5]	-	μm	15	15
Radial Runout[5]	-	μm	15	15
Max Axial Load (Upright Mounting)[6]	-	N	350	350
Max Axial Load (Inverted / Wall Mounting)	-	N	100	100
Max Moment Load (Upright Mounting)	-	Nm	10	10
Max Moment Load (Inverted / Wall Mounting)	-	Nm	3	3
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	1062	1062
ABI Optical Incremental Encoder (64x)	-	counts / rev	67968	67968
ABI Optical Incremental Encoder (80x)	-	counts / rev	84960	84960
ABI Optical Incremental Encoder (160x)	-	counts / rev	169920	169920
ABI Optical Incremental Encoder (400x)	-	counts / rev	424800	424800
Accuracy after Error Mapping[7]	-	arc sec	+/-12	+/-12
Repeatability[7]	-	arc sec	+/-6	+/-6
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

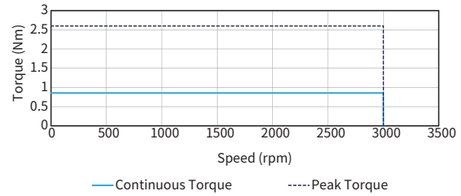
[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change without prior notice.

Torque-Speed Curve

Torque Speed Curve AXD80-50 Series Connection
DC Bus Voltage 310V

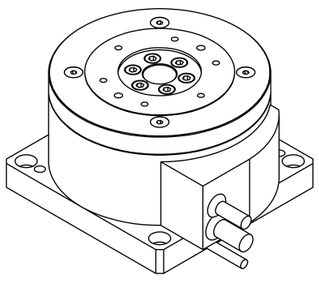


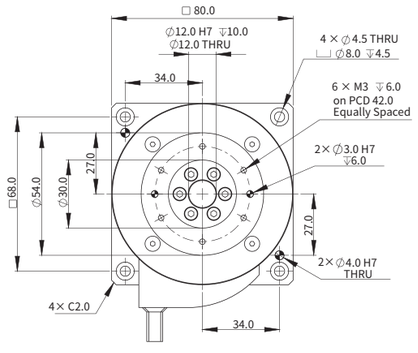
Torque Speed Curve AXD80-50 Parallel Connection
DC Bus Voltage 310V

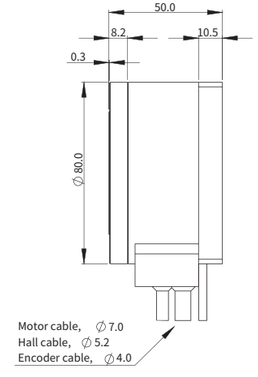


Mounting Illustration

Dimension



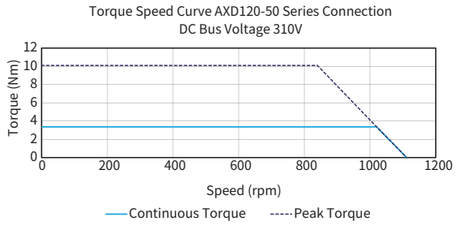


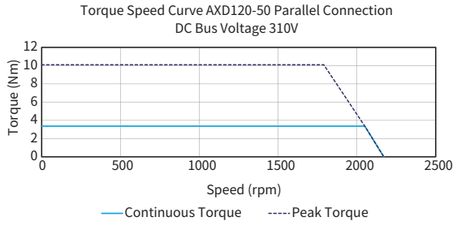


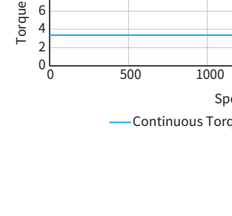
AXD120-50

AXD120-50				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque (NC) @100°C[1]	T_{cn}	Nm	3.4	3.4
Peak Torque	T_{pk}	Nm	10.0	10.0
Torque Constant ±10%	K_t	Nm/Arms	3.04	1.52
Back EMF Constant ±10%	K_e	Vpeak/rpm	0.26	0.13
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.64	0.64
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	15.2	3.8
Inductance (L-L) ±20%[3]	L	mH	47.7	11.9
Electrical Time Constant	τ_e	ms	3.1	3.1
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	1.1	2.2
Peak Current	I_{pk}	Arms	3.9	7.8
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	36.4	36.4
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.5	0.5
Max. Bus Voltage	U_{bus}	Vdc	330	330
Pole Number	2P	-	14	14
Max Speed[4]	Ω_{max}	rpm	800	1700
Mechanical Parameters				
Overall Mass (NC)	m_n	kg	2.6	2.6
Rotor Inertia	J_r	kg·m²	1.02E-03	1.02E-03
Axial Runout[5]	-	μm	20	20
Radial Runout[5]	-	μm	20	20
Max Axial Load (Upright Mounting)[6]	-	N	500	500
Max Axial Load (Inverted / Wall Mounting)	-	N	150	150
Max Moment Load (Upright Mounting)	-	Nm	30	30
Max Moment Load (Inverted / Wall Mounting)	-	Nm	10	10
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	2052	2052
ABI Optical Incremental Encoder (64x)	-	counts / rev	131328	131328
ABI Optical Incremental Encoder (80x)	-	counts / rev	164160	164160
ABI Optical Incremental Encoder (160x)	-	counts / rev	328320	328320
ABI Optical Incremental Encoder (400x)	-	counts / rev	820800	820800
Accuracy after Error Mapping[7]	-	arc sec	+/-6	+/-6
Repeatability[7]	-	arc sec	+/-3	+/-3
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

Torque-Speed Curve

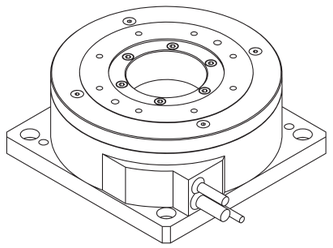


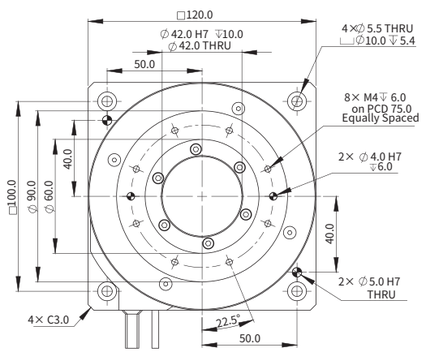


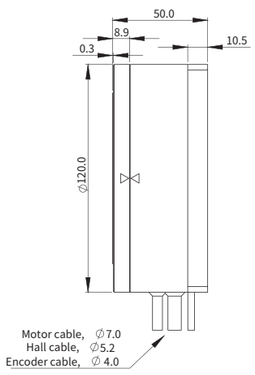


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 3 m cable.
❸ Inductance is measured by current frequency of 1 kHz.
❹ The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
❺ The runout value in parenthesis is optional.
❻ Please refer to the illustration for different mountings.
❼ Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change without prior notice.

Dimension



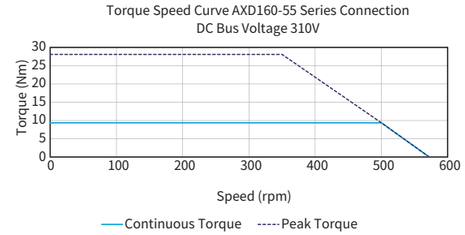


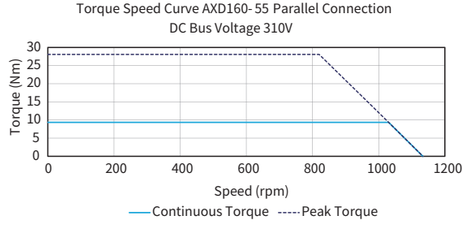


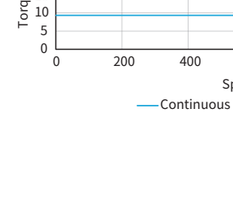
AXD160-55

AXD160-55				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque (NC) @100°C[1]	T_{cn}	Nm	9.4	9.4
Peak Torque	T_{pk}	Nm	27.0	27.0
Torque Constant ±10%	K_t	Nm/Arms	5.85	2.93
Back EMF Constant ±10%	K_e	Vpeak/rpm	0.50	0.25
Motor Constant @25°C	K_m	Nm/Sqrt(W)	1.24	1.24
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	14.9	3.7
Inductance (L-L) ±20%[3]	L	mH	92.1	23.0
Electrical Time Constant	τ_e	ms	6.2	6.2
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	1.6	3.2
Peak Current	I_{pk}	Arms	5.8	11.5
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	74.0	74.0
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	1.0	1.0
Max. Bus Voltage	U_{bus}	Vdc	330	330
Pole Number	2P	-	14	14
Max Speed[4]	Ω_{max}	rpm	330	800
Mechanical Parameters				
Overall Mass (NC)	m_n	kg	5.1	5.1
Rotor Inertia	J_r	kg·m²	3.72E-03	3.72E-03
Axial Runout[5]	-	μm	30	30
Radial Runout[5]	-	μm	30	30
Max Axial Load (Upright Mounting)[6]	-	N	750	750
Max Axial Load (Inverted / Wall Mounting)	-	N	225	225
Max Moment Load (Upright Mounting)	-	Nm	40	40
Max Moment Load (Inverted / Wall Mounting)	-	Nm	12	12
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	2868	2868
ABI Optical Incremental Encoder (64x)	-	counts / rev	183552	183552
ABI Optical Incremental Encoder (80x)	-	counts / rev	229440	229440
ABI Optical Incremental Encoder (160x)	-	counts / rev	458880	458880
ABI Optical Incremental Encoder (400x)	-	counts / rev	1147200	1147200
Accuracy after Error Mapping[7]	-	arc sec	+/-5	+/-5
Repeatability[7]	-	arc sec	+/-2.5	+/-2.5
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

Torque-Speed Curve

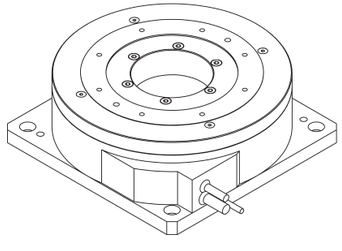


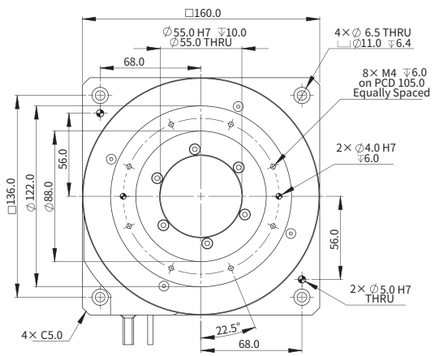


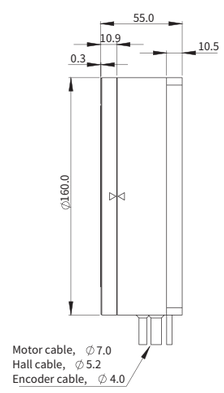


❶ Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
❷ Resistance is measured by DC current with standard 3 m cable.
❸ Inductance is measured by current frequency of 1 kHz.
❹ The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
❺ The runout value in parenthesis is optional.
❻ Please refer to the illustration for different mountings.
❼ Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change without prior notice.

Dimension



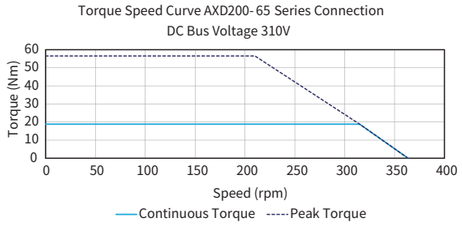


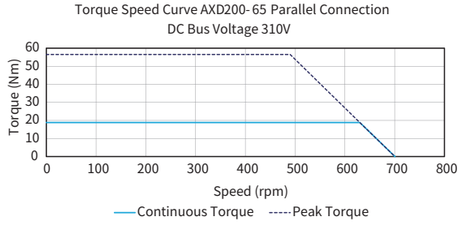


AXD200-65

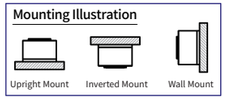
AXD200-65					
Performance Parameters		**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque (NC) @100°C[1]		T_{cn}	Nm	18.8	18.8
Peak Torque		T_{pk}	Nm	54.3	54.3
Torque Constant ±10%		K_t	Nm/Arms	9.42	4.71
Back EMF Constant ±10%		K_e	Vpeak/rpm	0.81	0.40
Motor Constant @25°C		K_m	Nm/Sqrt(W)	2.13	2.13
Resistance (L-L) @25°C ±10%[2]		R_{25}	Ω	13.0	3.3
Inductance (L-L) ±20%[3]		L	mH	121.0	30.3
Electrical Time Constant		τ_e	ms	9.3	9.3
Continuous Current (NC) @100°C[1]		I_{cn}	Arms	2.0	4.0
Peak Current		I_{pk}	Arms	7.2	14.4
Continuous Power Dissipation (NC) @100°C[1]		P_{cn}	W	100.9	100.9
Max. Coil Temperature		t_{max}	°C	100	100
Thermal Dissipation Constant (NC)[1]		K_{thn}	W/°C	1.3	1.3
Max. Bus Voltage		U_{bus}	Vdc	330	330
Pole Number		2P	-	14	14
Max Speed[4]		Ω_{max}	rpm	200	490
Mechanical Parameters					
Overall Mass (NC)		m_n	kg	8.3	8.3
Rotor Inertia		J_r	kg·m²	1.00E-02	1.00E-02
Axial Runout[5]		-	μm	40	40
Radial Runout[5]		-	μm	40	40
Max Axial Load (Upright Mounting)[6]		-	N	1000	1000
Max Axial Load (Inverted / Wall Mounting)		-	N	300	300
Max Moment Load (Upright Mounting)		-	Nm	50	50
Max Moment Load (Inverted / Wall Mounting)		-	Nm	15	15
Encoder Parameters					
ABI Optical Incremental Encoder (SIN/COS)		-	lines / rev	3934	3934
ABI Optical Incremental Encoder (64x)		-	counts / rev	251776	251776
ABI Optical Incremental Encoder (80x)		-	counts / rev	314720	314720
ABI Optical Incremental Encoder (160x)		-	counts / rev	629440	629440
ABI Optical Incremental Encoder (400x)		-	counts / rev	1573600	1573600
Accuracy after Error Mapping[7]		-	arc sec	+/-4	+/-4
Repeatability[7]		-	arc sec	+/-2	+/-2
Other Information					
Insulation Class		Class A (105°C)			
Protection Grade		IP40			
Compliance with Global Standards		RoHS, CE			
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.			

■ Torque-Speed Curve



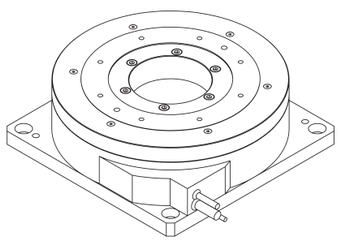


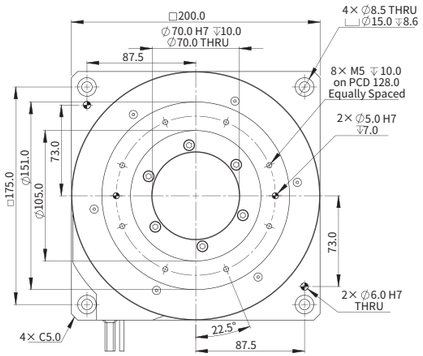
Mounting Illustration

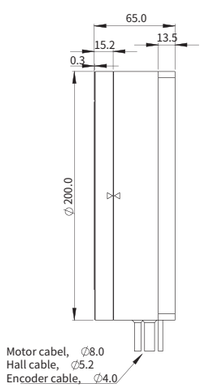


[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change without prior notice.

■ Dimension



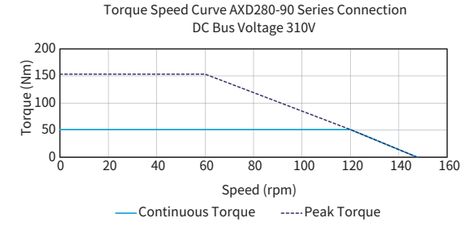


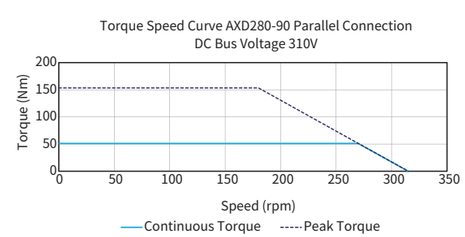


AXD280-90

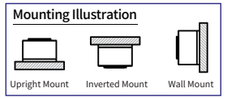
AXD280-90					
Performance Parameters		**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque (NC) @100°C[1]		T_{cn}	Nm	51.1	51.1
Peak Torque		T_{pk}	Nm	150.3	150.3
Torque Constant ±10%		K_t	Nm/Arms	22.23	11.12
Back EMF Constant ±10%		K_e	Vpeak/rpm	1.90	0.95
Motor Constant @25°C		K_m	Nm/Sqrt(W)	4.34	4.34
Resistance (L-L) @25°C ±10%[2]		R_{25}	Ω	17.5	4.4
Inductance (L-L) ±20%[3]		L	mH	194.0	48.5
Electrical Time Constant		τ_e	ms	11.1	11.1
Continuous Current (NC) @100°C[1]		I_{cn}	Arms	2.3	4.6
Peak Current		I_{pk}	Arms	8.0	16.0
Continuous Power Dissipation (NC) @100°C[1]		P_{cn}	W	179.7	179.7
Max. Coil Temperature		t_{max}	°C	100	100
Thermal Dissipation Constant (NC)[1]		K_{thn}	W/°C	2.4	2.4
Max. Bus Voltage		U_{bus}	Vdc	330	330
Pole Number		2P	-	28	28
Max Speed[4]		Ω_{max}	rpm	60	180
Mechanical Parameters					
Overall Mass (NC)		m_n	kg	21.0	21.0
Rotor Inertia		J_r	kg·m²	6.00E-02	6.00E-02
Axial Runout[5]		-	μm	50	50
Radial Runout[5]		-	μm	50	50
Max Axial Load (Upright Mounting)[6]		-	N	1800	1800
Max Axial Load (Inverted / Wall Mounting)		-	N	500	500
Max Moment Load (Upright Mounting)		-	Nm	75	75
Max Moment Load (Inverted / Wall Mounting)		-	Nm	23	23
Encoder Parameters					
ABI Optical Incremental Encoder (SIN/COS)		-	lines / rev	5560	5560
ABI Optical Incremental Encoder (64x)		-	counts / rev	355840	355840
ABI Optical Incremental Encoder (80x)		-	counts / rev	444800	444800
ABI Optical Incremental Encoder (160x)		-	counts / rev	889600	889600
ABI Optical Incremental Encoder (400x)		-	counts / rev	2224000	2224000
Accuracy after Error Mapping[7]		-	arc sec	+/-4	+/-4
Repeatability[7]		-	arc sec	+/-2	+/-2
Other Information					
Insulation Class		Class A (105°C)			
Protection Grade		IP40			
Compliance with Global Standards		RoHS, CE			
Ambient Temperature	Operation	0°C to 40°C (non-freezing)			
	Storage	-15°C to 70°C (non-freezing)			
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)			
	Storage	10%RH to 90%RH (non-condensing)			
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.			

■ Torque-Speed Curve



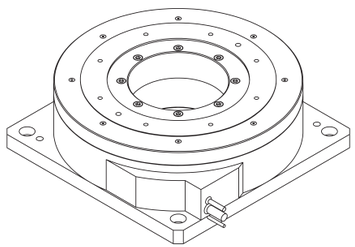


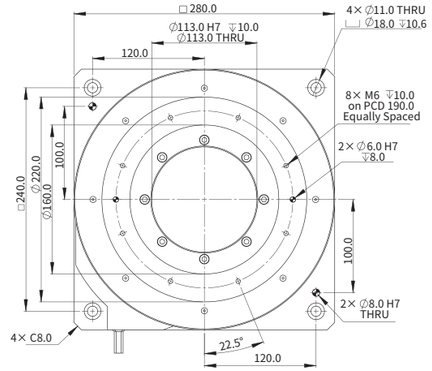
Mounting Illustration

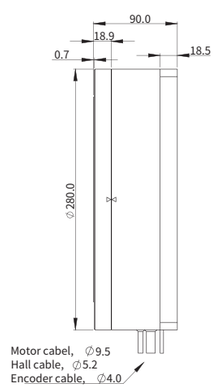


[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change without prior notice.

■ Dimension





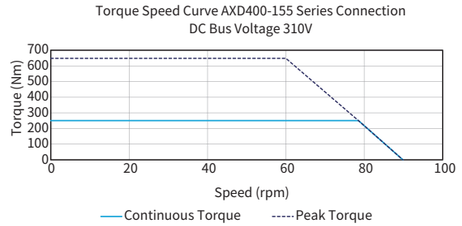


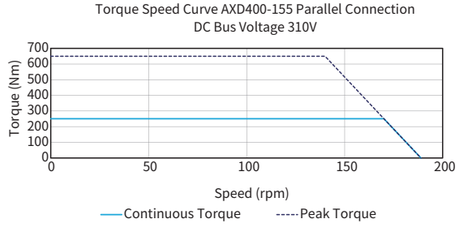
AXD400-155

AXD400-155				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque (NC) @100°C[1]	T_{cn}	Nm	250.6	250.6
Peak Torque	T_{pk}	Nm	648.9	648.9
Torque Constant ±10%	K_t	Nm/Arms	35.80	17.90
Back EMF Constant ±10%	K_e	Vpeak/rpm	3.06	1.53
Motor Constant @25°C	K_m	Nm/Sqrt(W)	15.62	15.62
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	3.5	0.875
Inductance (L-L) ±20%[3]	L	mH	74.0	18.5
Electrical Time Constant	τ_e	ms	21.1	21.1
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	7.0	14.0
Peak Current	I_{pk}	Arms	25.0	50.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	332.9	332.9
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	4.4	4.4
Max. Bus Voltage	U_{bus}	Vdc	330	330
Pole Number	2P	-	28	28
Max Speed[4]	Ω_{max}	rpm	60	140
Mechanical Parameters				
Overall Mass (NC)	m_n	kg	80.0	80.0
Rotor Inertia	J_r	kg·m²	5.12E-01	5.12E-01
Axial Runout[5]	-	μm	70	70
Radial Runout[5]	-	μm	70	70
Max Axial Load (Upright Mounting)[6]	-	N	8000	8000
Max Axial Load (Inverted / Wall Mounting)	-	N	1500	1500
Max Moment Load (Upright Mounting)	-	Nm	100	100
Max Moment Load (Inverted / Wall Mounting)	-	Nm	30	30
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	7500	7500
ABI Optical Incremental Encoder (64x)	-	counts / rev	480000	480000
ABI Optical Incremental Encoder (80x)	-	counts / rev	600000	600000
ABI Optical Incremental Encoder (160x)	-	counts / rev	1200000	1200000
ABI Optical Incremental Encoder (400x)	-	counts / rev	3000000	3000000
Accuracy after Error Mapping[7]	-	arc sec	+/-4	+/-4
Repeatability[7]	-	arc sec	+/-2	+/-2
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP40		
Compliance with Global Standards		RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 3 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change without prior notice.

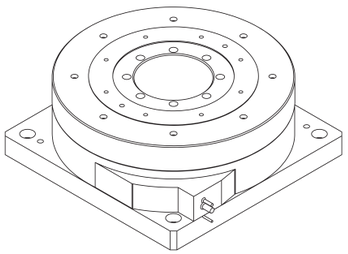
■ Torque-Speed Curve

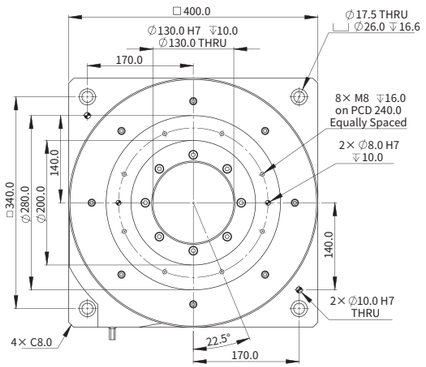


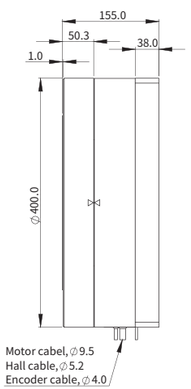


Mounting Illustration

■ Dimension







Motor Cable Connection

MOTOR CABLE

PIN	DESCRIPTION	COLOR
-	M1	BLACK 1
-	M2	BLACK 2
-	M3	BLACK 3
-	PE	YELLOW / GREEN

HALL CABLE

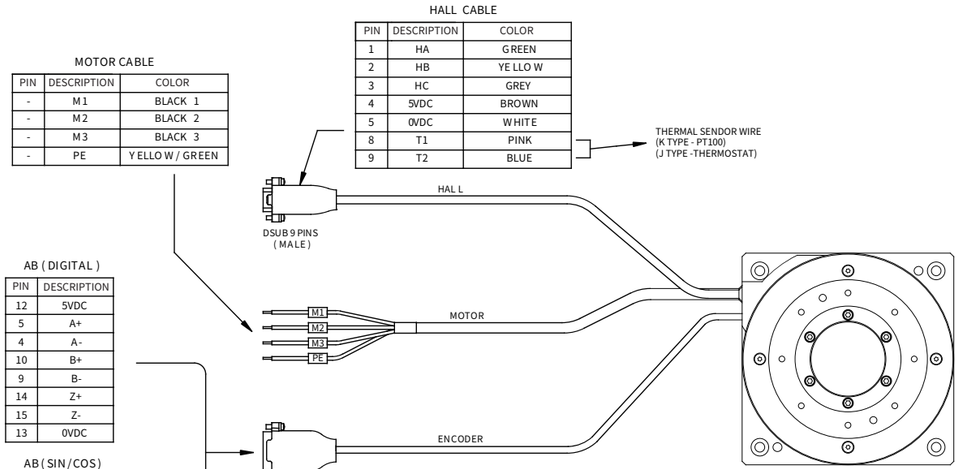
PIN	DESCRIPTION	COLOR
1	HA	GREEN
2	HB	YELLOW
3	HC	GREY
4	5VDC	BROWN
5	0VDC	WHITE
8	T1	PINK
9	T2	BLUE

AB (DIGITAL)

PIN	DESCRIPTION
12	5VDC
5	A+
4	A-
10	B+
9	B-
14	Z+
15	Z-
13	0VDC

AB (SIN / COS)

PIN	DESCRIPTION
12	5VDC
8	SINE+
15	SINE-
7	COSINE+
14	COSINE-
2	INDEX+
1	INDEX-
13	0VDC



Part Numbering

AXD160-55-P-J-H9D-3.0-NFB-AB-2868-400X-P30

Motor Model:
AXD80-50 / AXD120-50
AXD160-55 / AXD200-65
AXD280-90 / AXD400-155

Winding:
S = Series / P = Parallel

Thermal Sensor Options:
J-Thermostat (standard)
K-PT100(RTD)

Hall Cable Option:
NH[1] / H9D[2]

Cable length (m):
3.0

Runout:[4]
P15 / P20 / P30
P40 / P50 / P70

Interpolation Option:
64X / 80X / 160X / 400X / SINCOS

Encoder Option:
AXD80-50: AB-1062
AXD120-50: AB-2052
AXD160-55: AB-2868
AXD200-65: AB-3934
AXD280-90: AB-5560
AXD400-155: AB-7500

Motor Cable Option:
NFB[3]

[1] NH = Without Built-in Hall Sensor but with Thermal Sensor.
[2] H9D = With Built-in hall sensor, comes with 9-Pins D-Sub Connector.
[3] NFB = Without ferrite bead.
[4] AXD80:P15 = Axial Runout 15um, Radial Runout is 15um
AXD120:P20 = Axial Runout 20um, Radial Runout is 20um
AXD160:P30 = Axial Runout 30um, Radial Runout is 30um
AXD200:P40 = Axial Runout 40um, Radial Runout is 40um
AXD280:P50 = Axial Runout 50um, Radial Runout is 50um
AXD400:P70 = Axial Runout 70um, Radial Runout is 70um

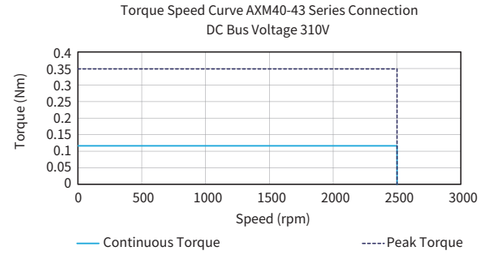
AXM SERIES

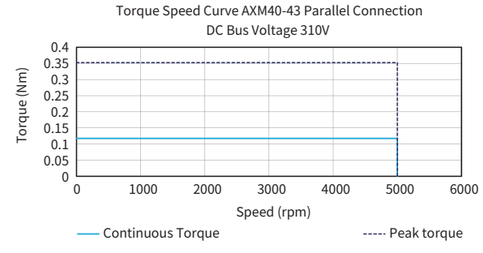
- Direct drive and brushless motor
- Fully integrated with encoder and bearing
- Low cogging torque
- Optional for low speed and high speed windings
- High torque density
- Built-in high precision grating scale

AXM40-43

AXM40-43				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque (NC) @100°C[1]	T_{cn}	Nm	0.11	0.11
Peak Torque	T_{pk}	Nm	0.30	0.30
Torque Constant ±10%	K_t	Nm/Arms	0.09	0.05
Back EMF Constant ±10%	K_e	Vpeak/rpm	0.008	0.004
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.03	0.03
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	8.4	2.1
Inductance (L-L) ±20%[3]	L	mH	6.8	1.7
Electrical Time Constant	τ_e	ms	0.8	0.8
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	1.2	2.4
Peak Current	I_{pk}	Arms	4.9	9.8
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	24.3	24.3
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.32	0.32
Max. Bus Voltage	U_{bus}	Vdc	330	330
Pole Number	2P	-	10	10
Max Speed[4]	Ω_{max}	rpm	2500	5000
Mechanical Parameters				
Overall Mass (NC)	m_n	kg	0.24	0.24
Rotor Inertia	J_r	kg·m²	1.18E-05	1.18E-05
Axial Runout[5]	-	μm	25	25
Radial Runout[5]	-	μm	25	25
Max Axial Load (Upright Mounting)[6]	-	N	20	20
Max Axial Load (Inverted / Wall Mounting)	-	N	6	6
Max Moment Load (Upright Mounting)	-	Nm	0.3	0.3
Max Moment Load (Inverted / Wall Mounting)	-	Nm	0.1	0.1
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	650	650
ABI Optical Incremental Encoder (80x)	-	counts / rev	52000	52000
ABI Optical Incremental Encoder (160x)	-	counts / rev	104000	104000
ABI Optical Incremental Encoder (400x)	-	counts / rev	260000	260000
Accuracy after Error Mapping[4]	-	arc sec	+/-20	+/-20
Repeatability[7]	-	arc sec	+/-10	+/-10
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP40		
Compliance with Global Standards		Chinese RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

■ Torque-Speed Curve

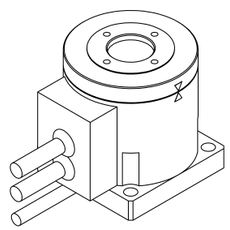


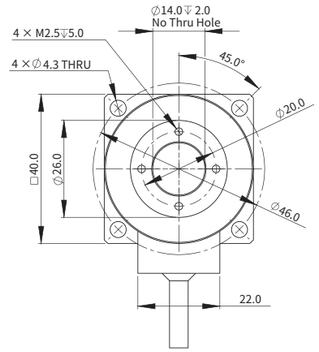


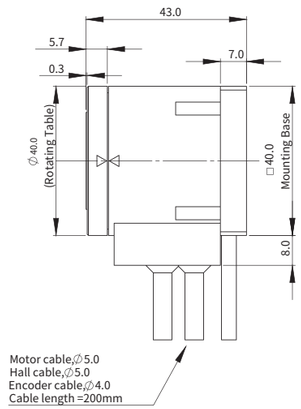
Mounting Illustration

1 Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
2 Resistance is measured by DC current with standard 0.2 m cable.
3 Inductance is measured by current frequency of 1 kHz.
4 The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
5 The runout value in parenthesis is optional.
6 Please refer to the illustration for different mountings.
7 Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change without prior notice.

■ Dimension





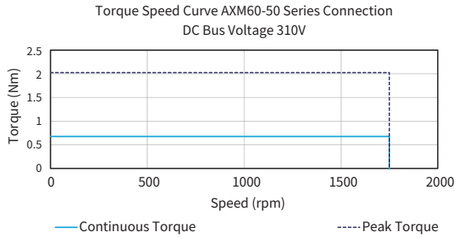


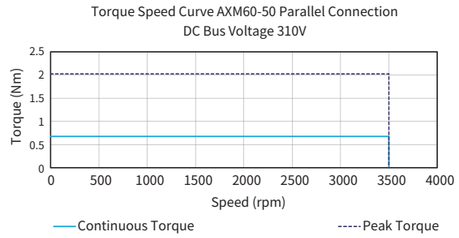
Note:
1 No centre through hole.
2 No temperature sensor.
3 Standard cable length=200mm
4 ABI Analog Encoder

AXM60-50

AXM60-50				
Performance Parameters	**Symbol**	**Unit**	**Series**	**Parallel**
Continuous Torque (NC) @100°C[1]	T_{cn}	Nm	0.71	0.71
Peak Torque	T_{pk}	Nm	2.00	2.00
Torque Constant ±10%	K_t	Nm/Arms	0.47	0.24
Back EMF Constant ±10%	K_e	Vpeak/rpm	0.040	0.020
Motor Constant @25°C	K_m	Nm/Sqrt(W)	0.11	0.11
Resistance (L-L) @25°C ±10%[2]	R_{25}	Ω	12.8	3.2
Inductance (L-L) ±20%[3]	L	mH	28	7
Electrical Time Constant	τ_e	ms	2.2	2.2
Continuous Current (NC) @100°C[1]	I_{cn}	Arms	1.5	3.0
Peak Current	I_{pk}	Arms	6.0	12.0
Continuous Power Dissipation (NC) @100°C[1]	P_{cn}	W	55.9	55.9
Max. Coil Temperature	t_{max}	°C	100	100
Thermal Dissipation Constant (NC)[1]	K_{thn}	W/°C	0.75	0.75
Max. Bus Voltage	U_{bus}	Vdc	330	330
Pole Number	2P	-	10	10
Max Speed[4]	Ω_{max}	rpm	1750	3500
Mechanical Parameters				
Overall Mass (NC)	m_n	kg	0.64	0.64
Rotor Inertia	J_r	kg.m²	7.38E-0.5	7.38E-0.5
Axial Runout[5]	-	µm	25	25
Radial Runout[5]	-	µm	25	25
Max Axial Load (Upright Mounting)[6]	-	N	50	50
Max Axial Load (Inverted / Wall Mounting)	-	N	15	15
Max Moment Load (Upright Mounting)	-	Nm	0.7	0.7
Max Moment Load (Inverted / Wall Mounting)	-	Nm	0.2	0.2
Encoder Parameters				
ABI Optical Incremental Encoder (SIN/COS)	-	lines / rev	650	650
ABI Optical Incremental Encoder (80x)	-	counts / rev	52000	52000
ABI Optical Incremental Encoder (160x)	-	counts / rev	104000	104000
ABI Optical Incremental Encoder (400x)	-	counts / rev	260000	260000
Accuracy after Error Mapping[4]	-	arc sec	+/-20	+/-20
Repeatability[7]	-	arc sec	+/-10	+/-10
Other Information				
Insulation Class		Class A (105°C)		
Protection Grade		IP40		
Compliance with Global Standards		Chinese RoHS, CE		
Ambient Temperature	Operation	0°C to 40°C (non-freezing)		
	Storage	-15°C to 70°C (non-freezing)		
Ambient Humidity	Operation	10%RH to 80%RH (non-condensing)		
	Storage	10%RH to 90%RH (non-condensing)		
Recommended Ambience		Indoor (no direct sunlight); No corrosive gas, inflammable gas, oil mist or dust.		

■ Torque-Speed Curve

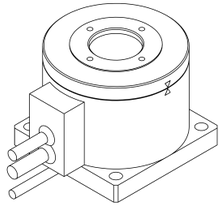


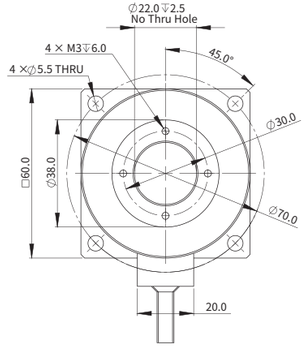


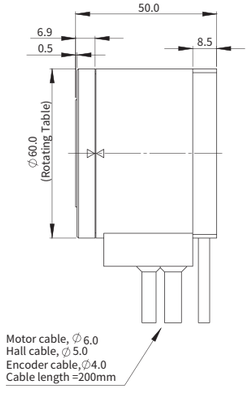
Mounting Illustration

[1] Measurement is taken at ambient temperature 25°C. Value depends on the thermal environment.
[2] Resistance is measured by DC current with standard 0.2 m cable.
[3] Inductance is measured by current frequency of 1 kHz.
[4] The value is based on ABI optical SIN/COS encoder (4096x interpolation) under max. bus voltage.
[5] The runout value in parenthesis is optional.
[6] Please refer to the illustration for different mountings.
[7] Based on ABI optical SIN/COS encoder (4096x interpolation) with standard runout.
The contents of datasheet are subjected to change without prior notice.

■ Dimension







Note:
[1] No centre through hole.
[2] No temperature sensor.
[3] Standard cable length=200mm
[4] ABI Analog Encoder

Motor Cable Connection

HALL CABLE

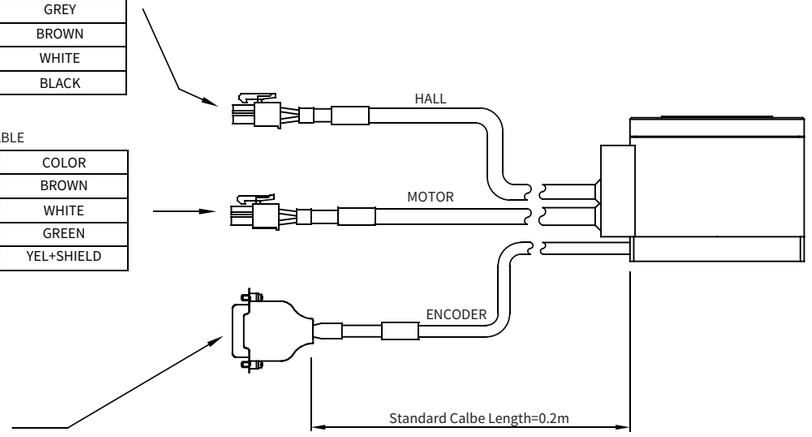
PIN	DESCRIPTION	COLOR
1	HA	GREEN
2	HB	YELLOW
3	HC	GREY
4	5VDC	BROWN
5	0VDC	WHITE
6	SHIELD	BLACK

MOTOR CABLE

PIN	DESCRIPTION	COLOR
1	M1	BROWN
2	M2	WHITE
3	M3	GREEN
4	PE	YEL+SHIELD

AB (SIN / COS)

PIN	DESCRIPTION
12	5VDC
8	SINE+
15	SINE-
7	COSINE+
14	COSINE-
2	INDEX+
1	INDEX-
13	0VDC



Part Numbering

AXM60-50-P-0.2-AB-650-SINCOS-P25

- Motor Model: AXM40-43 / AXM60-50
- Winding: S=Series / P=Parallel
- Cable Length (m): 0.2
- Encoder: AB-650
- Interpolation Options: SINCOS / 80X / 160X / 400X
- Runout:[1] P25

[1] P25=Axial Runout 25um, Radial Runout is 25um

Motor & Encoder & Hall Cable Specifications

Motor Cable Specifications

Motor Type	Outer Diameter (mm)	Min.Bending Radius (Flexible Use)	Min.Bending Radius (Fixed Laying)
ADR45	1.2	8×outer diameter[1]	5×outer diameter[1]
ADR60	2.1	8×outer diameter[1]	5×outer diameter[1]
ADR75	2.6	8×outer diameter[1]	5×outer diameter[1]
ADR90	2.6	8×outer diameter[1]	5×outer diameter[1]
AXM	5.0	12×outer diameter	6×outer diameter
ACD / ACD-P	6.0	10×outer diameter	5×outer diameter
ACW	6.0	10×outer diameter	5×outer diameter
AXD80	7.0	12×outer diameter	6×outer diameter
ADR110	7.0	12×outer diameter	6×outer diameter
ADR135	7.0	12×outer diameter	6×outer diameter
AXD120	7.0	12×outer diameter	6×outer diameter
AXD160	7.0	12×outer diameter	6×outer diameter
ADR175	8.0	12×outer diameter	6×outer diameter
AXD200	8.0	12×outer diameter	6×outer diameter
ADR220	9.5	12×outer diameter	6×outer diameter
AXD280	9.5	12×outer diameter	6×outer diameter
ADR360	9.5	12×outer diameter	6×outer diameter
AXD400	9.5	12×outer diameter	6×outer diameter

[1]Robot specific cable, small bending radius

Hall Cable Specifications

Motor Type	Outer Diameter (mm)	Min.Bending Radius (Flexible Use)	Min.Bending Radius (Fixed Laying)
ADR-F	1.0	8×outer diameter[1]	5×outer diameter[1]
ACD	3.8	10×outer diameter	5×outer diameter
ACD-P	3.8	12×outer diameter	6×outer diameter
ACW	3.8	10×outer diameter	5×outer diameter
AXM	5.0	12×outer diameter	6×outer diameter
ADR	5.2	12×outer diameter	6×outer diameter
AXD	5.2	12×outer diameter	6×outer diameter

[1]Robot specific cable, small bending radius

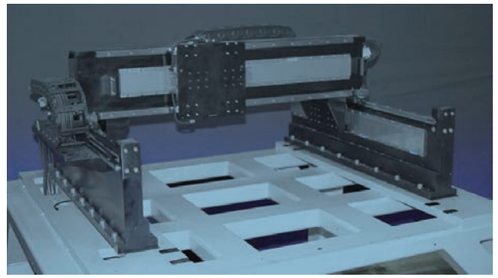
Encoder Cable Specifications

Motor Type	Outer Diameter (mm)	Min.Bending Radius (Flexible Use)	Min.Bending Radius (Fixed Laying)
ACD	4.0	12×outer diameter	6×outer diameter
ACW	4.0	12×outer diameter	6×outer diameter
ADR	4.0	12×outer diameter	6×outer diameter
AXM	4.0	12×outer diameter	6×outer diameter
AXD	4.0	12×outer diameter	6×outer diameter

Motion Control of Gantry Stages

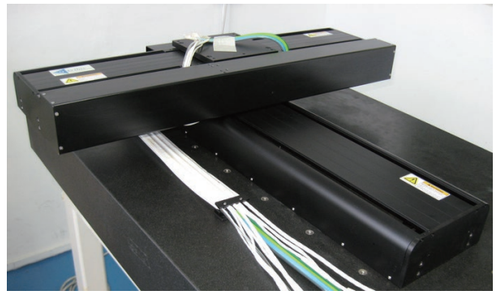
A gantry stage is basically an XY table where the top axis is supported at the 2 ends by the bottom axis. The top axis and its payload is supported by 2 parallel linear bearings at the 2 sides of the stage.

See picture below. This configuration allows the top axis to carry an end effector (like pick and place mechanism, camera, etc.) to access the work piece at any XY positions from the top.



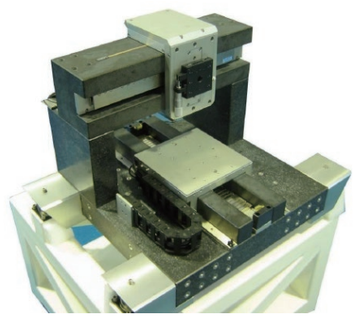
A standard stacked XY table will usually have to move the work piece while the end effector is fixed on top. This is usually not recommended if the work piece is very big and heavy, or if the top axis stroke is very long.

Since the top axis is only supported at the middle, it would deflect downwards at the 2 ends (more significant as the top axis length increases), resulting in poor flatness specifications.



A nice hybrid configuration is to separate the X and Y where the top axis is mounted on a stationary bridge.

In this case, the bottom axis carries the work piece in one direction and the top axis carries the end effector to move in the orthogonal direction.



In motion control, we are more concerned on the bottom axis of the first type of configuration (moving bridge). The load is supported at the 2 sides, it can easily create yaw error if the driving force is not in line with the CG (center of gravity) of the moving load.

In motion control, we call the bottom axis of such configuration as gantry axis.

1.Types of gantry axis configuration

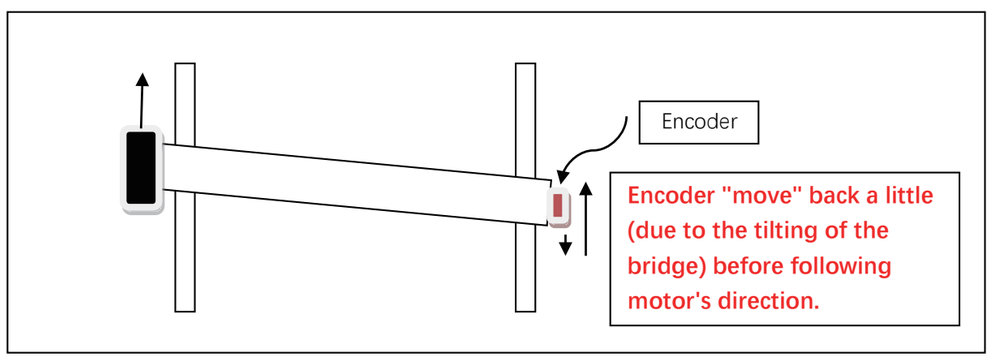
T-drive

T-drive means the bottom axis is driven by one motor at the side, the other side is supported and guided by a linear bearing. This configuration requires only one driver and one encoder. It is the most cost effective gantry configuration. Ideally, the encoder should be mounted at the center of the gantry but this is usually impossible. Most designs will have the encoder mounted at one side.

The main disadvantage of this configuration is the unbalanced driving force. It is almost impossible to drive in line with the CG of load. This will result in high yaw error. The side without motor is always being dragged behind by the motor at the other side. When the motor changes direction, there will be big yaw error which result in high reversal error. In other words, the side without motor will remain stationary until the motor side has moved enough to drag it along.

To improve repeatability of this configuration, it is recommended to approach the critical position always in same direction. This could mean over travelling in one direction then move back in the required direction. This would produce similar yaw error every time so that this yaw error doesn't contribute to the repeatability error of the gantry axis.

One important consideration in a T-drive configuration is the location of encoder with respect to the motor driving force. If it is opposite to the motor driving force, the encoder may register an opposite direction motion before it starts to follow the motor direction (see illustration below). This is, in a way, like a positive feedback situation that could affect servo performance. So, it is recommended to have the encoder at the same side of the motor.



H-drive

H-drive means the gantry is driven by 2 motors, one at each side of the gantry. This would provide a more balanced driving force and minimize the problems experienced in T-drive configuration.

2.Encoder configurations

For H-drive configuration, there are options to use 1 or 2 encoders.

Single encoder

In single encoder configuration (again, usually mounted at one side of the gantry), both motors would receive the same feedback signal and have the same position error all the time. Essentially, both motors will output the same force all the time. However, this doesn't guarantee that there will be no yaw error because the load inertia and friction experienced at the 2 sides will not be the same. But generally, having motors driving at both sides would reduce the reversal error significantly as compared to T-drive configuration.

In this configuration, it is possible to use only one driver if the driver's current rating can drive the 2 motors connected in parallel. However, there will be only one hall sensors port in the driver, so the 2 motors must be aligned exactly to their respective magnetic tracks to ensure accurate commutation.

Dual encoders - one on each side of gantry

Having encoders at both sides of the gantry would provide actual position difference between the 2 motors. However, this would require 2 separate position loops to control the 2 motors, it would require 2 drivers.

With 2 encoders, the stopping position can be controlled to the accuracy and repeatability of the encoders.

3.Rigid vs Flexible link between the bridge and the gantry axis

In single encoder system, either T-drive or H-drive configuration, the bridge should be rigidly mounted on the gantry axis to minimize yaw error.

However, there are important factors for consideration in rigid link design.

Bridge length is fixed and fully constrained when rigidly mounted at the 2 ends

If the environment temperature changes, the top axis bridge will expand or contract. More importantly, the moving axis mounted on the bridge will generate heat and dissipate through the bridge. As the bridge length changes (it will be more significant if the bridge is long), the stress on the 2 linear bearings will increase, resulting in higher friction on the gantry axis. The bridge itself may also bend and twist which will affect the top axis as well.

Mechanical alignment of the 2 linear bearings

If the 2 bearings are not parallel or their straightness and/or flatness are not controlled, it would result in uneven friction across the full stroke of the gantry axis. Some part of the stroke will have higher friction than other part. This could affect servo performance and require higher driving force from the motors than the calculated force requirement.

It can be very costly to machine the base support of the gantry stage to the required accuracy if the gantry is big (sometimes may not be possible at all).

On the other hand, most rigidly mounted bearings will still have some small degree of compliance to allow some displacement in the orthogonal directions. So the performance (or if it is functional at all) depends on the machining accuracy, bearings clearance, gantry size, etc.

Rigid link with dual encoders

With 2 encoders, it will provide the Yaw error (position difference between the 2 motors) to the controller. However, the assembly error of the 2 encoder scales and the scales' error itself could result in similar effect as misaligned bearings. In this case, the controller will try to servo the 2 motors to the commanded position. So if there is encoder scale error and bridge length is fully constrained, the controller will output very high current to the motors trying to stretch, bend or twist the bridge in order minimize their respective position errors. The 2 motors will be fighting each other and result in instability and higher continuous force.

One way to handle the difference in encoder scale error (including assembly alignment tolerance) is to map the differential error in one of the driver to match the encoder reading of the other. In this case, the bridge will be at their naturally "relax" orientation (no fighting between the gantry motors). But this doesn't mean that the yaw error is zero. In fact, it is impossible to achieve zero yaw error all the time in rigid gantry unless the mechanical setup (parallelism, straightness, flatness, etc.) is perfect.

Flexible link

Flexible link means allowing some freedom in yaw direction at one side (usually called the gantry master), and on the other side, allow translational freedom in the top axis direction and yaw rotation (to allow expansion/contraction of bridge and rotation due to straightness error in gantry bearings and encoder scale error).

It requires 2 encoders and 2 controller axes (2 drivers) in order to control the yaw direction.
This is more costly in terms of the number of control components, but allows higher tolerance in the mechanical parts fabrication and assembly.

4.Controller configuration

In single driver configuration, the controller will see the gantry as one motor and everything behave like a conventional axis. It is more important to size the driver and power supply based on the combined motor current and back EMF.

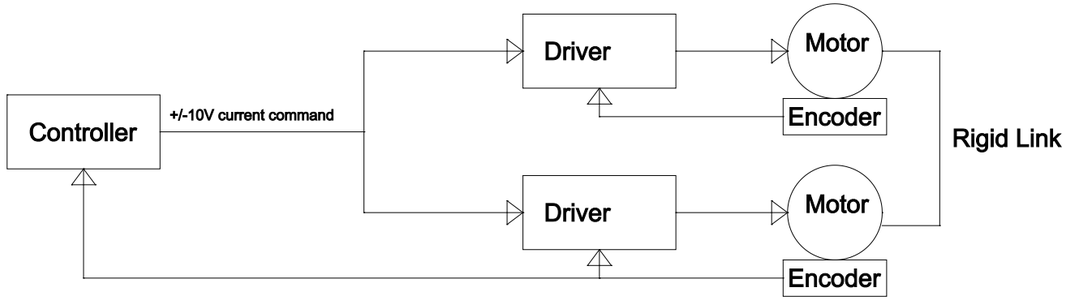
In dual-driver configuration, there are a few options.

Shared current command

This is similar to connecting the 2 gantry motors in parallel to a single driver with 1 encoder feedback. In the case when the driver's current or voltage rating could not support the 2 motors in parallel connection, it will be necessary to drive the motor separately with 2 drivers.

The controller treats the gantry as a single motor with only 1 position loop. The encoder feedback is used to compute current command and converted to a +/-10V analog signal, which is connected in parallel to the 2 drivers. Both motors should output the same force if their commutation alignment is the same.

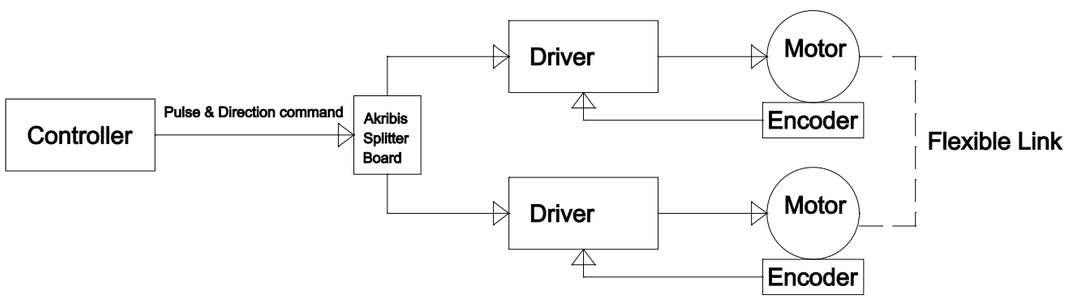
In the case when it is not easy to ensure good commutation alignment by mechanical design, it is possible to use separate encoders connected to their respective drivers for commutation purpose. Only one of the encoders will be connected to the controller since there is only 1 position loop.



Shared position command

Similar to shared current command, in this case, the 2 drivers are operating in position mode. The position command can be sent in pulse & direction or other equivalent formats. To ensure strong pulse signals are received at the 2 drivers, it is recommended to use a splitter circuit board from Akribis to split the signals.

Again, the controller treats this as a single motor and generate one motion path profile. Position control is done in the drivers, so it is possible to apply encoder error compensation separately in each driver to avoid fighting between the 2 motors.

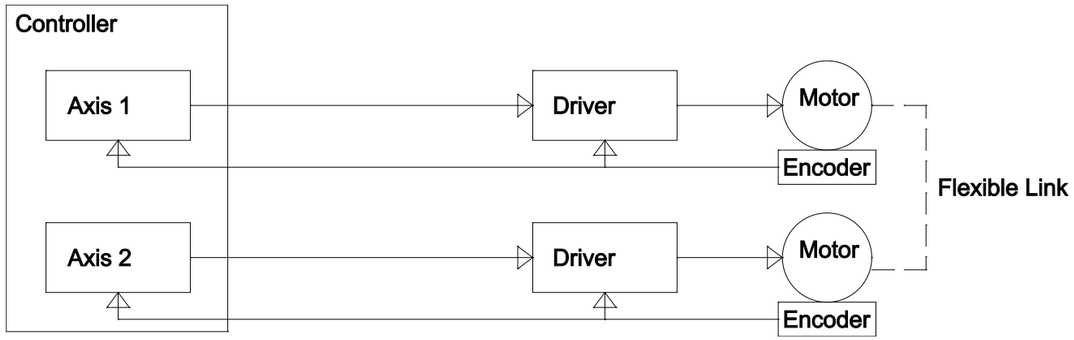


Vector mode or Gear mode with 1:1 ratio

When the 2 drivers are connected to separate axes in the controller (this will take up 2 controller axes), it is possible to control the 2 motors separately. This may be necessary if the application requires some movement in the yaw axis (not always orthogonal to the main gantry axis). Of course, this would require a flexible link gantry design.

When moving in the main gantry direction, it is advisable to group the 2 axes in vector mode or gear mode because most controller has special error handling in such mode to decelerate and stop both motors together even if only one of the motors encountered an error condition.

If there isn't such protection in place, when one motor encountered error and stopped, the other may continue to move and could cause damage to the gantry mechanism.

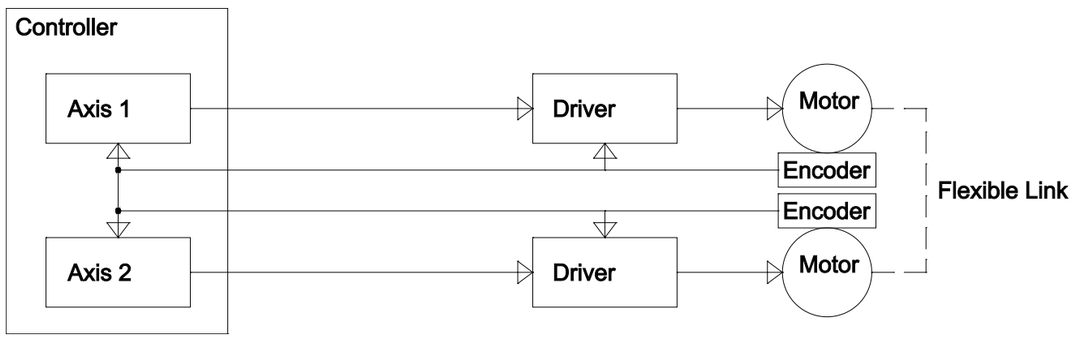


Active yaw control

With 2 complete set of motor, encoder, driver and controller axis, it would be better to share both encoder signals among the 2 position loops so that each motor is aware of the actual position of the other motor.

For example, when one motor is slowed down by high friction, the other motor can also slow down to reduce the yaw error. The controller is actively trying to correct the yaw error at all time, hence the name "active yaw control".

Most advanced controllers like Elmo, ACS and Polaris support active yaw control, refer to next section for more description.

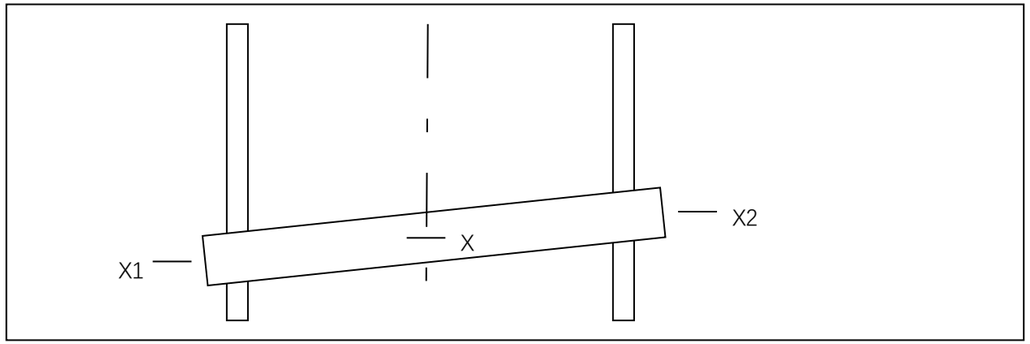


5.Active yaw control

Active yaw control requires 2 set of motor, encoder, driver and controller axis.

The controller transforms the 2 physical gantry axes (X1 and X2) into gantry main axis (X-axis) and a Yaw-axis based on the following equations.

X = (X1 + X2) / 2
Yaw = X1 - X2



The controller generates motion profile to X axis (which is effectively the desired position at the mid-point of the bridge) while the yaw command should always be zero (that means the bridge is orthogonal to X-axis).

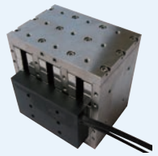
After transforming the X1 and X2 encoder values into X and Yaw's feedback values, the position and velocity control loops (PID, PIP or any other control structure) are processed to output the required current command to X and Yaw axis. These current commands will be transformed back to X1 and X2 axis and send to the current loop of their respective driver.

In this way, X1 and X2 motor will output different force to correct any yaw error while moving the gantry according to the required X-axis profile.

In case of rigid gantry (or less flexible gantry link), it is recommended to set a weak yaw controller by reducing the control gains for Yaw-axis or limit the current command to Yaw-axis. It will be useless (or even harmful) to output strong yaw control to a rigid gantry as the motors will not be able to correct the yaw error due to the rigidity of the gantry.

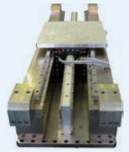
Special Motors

AHM series



ALM series

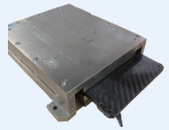
ACM-D series



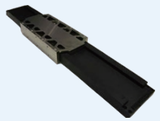
ATA series

ADR-H series

Motor with carbon fibre coil plate

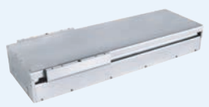


Water cooled moving magnet linear motor

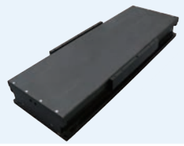


Standard Stages

DGL series



DGE series

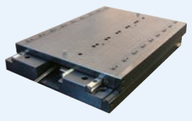


DGC series

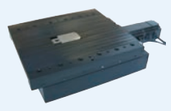
SGL series

VPL series

XRL series



XRB250 series

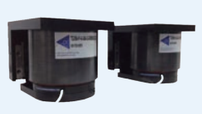


XMGV series

XRV series

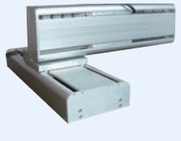
DGV series

TGV series



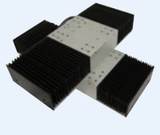
APK series

DGL XY series



DGL XY series

DGL XY series

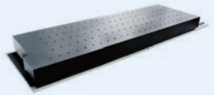


VRG series

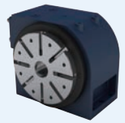
Other Direct Drive Products

CNC Specialized Direct Drive Products

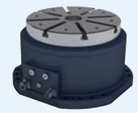
AKMF series linear motor



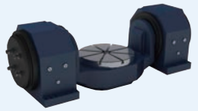
ARH series horizontal CNC turntable



ARV series vertical CNC turntable



ATRT series Dual-axis CNC turntable

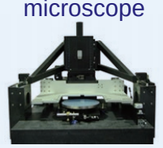


AMH series Dual-axis machining head

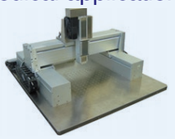
Precision Stages for Industries

5-axis XYZT for 3D measurement

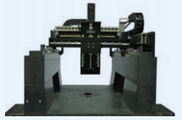
XYZ stage for wafer microscope



XYZ stage for medical application

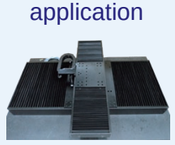


XYZ stage for epoxy dispensing

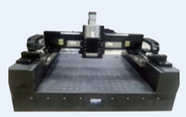


XYZ stage for optical system assembly

XYZ stage for laser application

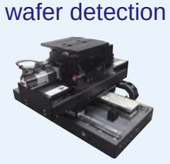


H-drive gantry stage



Hollow XY stage for wafer detection

XYZ stage for wafer detection

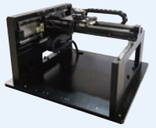


14-axis FPD stage for G6 laser packing

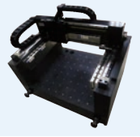
6-axis mini stage with a Roll-pitch-z module

XYZ stage for fiber optic alignment

TGB stage for epoxy dispensing

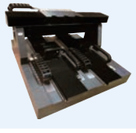


H-drive gantry stage for assembly and testing

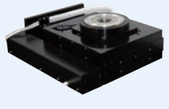


XYT stage for glass laser cutting

XYZ stage for PCB exposure



XYZ stage for wafer testing



H-drive gantry stage for testing and laser application

LX1030Z gantry machining center