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Note: Product appearance and technical parameters are subject to change without notice.

Leadshine

Leading Technology Shining Value

Motion Control Products 2010 - 2011

- Stepping Motors & Drives
- AC Servo Motors & Drives
- DC Servo Motors & Drives
- Motion Controllers
- Power Supplies

Company Overview

Founded in 1997, Leadshine Motion Technology Ltd. specializes in developing, manufacturing, and distributing high-quality cost-effective motion control products. Its products include motion controllers, stepping drives and motors, DC servo products, AC servo products, and power supplies. Leadshine serves various industrial and OEM customers in Asia, Europe, North/South America, Africa and Australia.

Leadshine is one of the LARGEST manufacturers of motion control products around the world. Leading by an MIT PhD graduate, Leadshine's R&D team of 80 talented engineers is capable of designing high-quality motion control products based on the latest technologies. Leadsine's manufacturing facilities are ISO-9001 certified and professionally staffed.

Leadshine is committed to provide its customers with world-class motion control products at highly competitive prices. "LEADING technology and SHINING value" is always what Leadshine intends to offer to its customers.

R&D

Leadshine is proud of its talented research & development team, which is one of the best in the motion control industry. We are capable of designing world-class products which can meet high requirements of our customers. Many innovative designs and products from Leadshine have been awarded for patents by Chinese government.

Product Quality

Leadshine has been awarded the ISO 9001 registration for quality management practices since September 2004. The certification is a testimony of Leadshine's commitment to provide its customers with high quality products and services.


Certificate

Standard: ISO 9001:2008

Certificate Holder: Leadshine Technology Co., Ltd.
3/F, Building 2, Tian'an Nan Yue Industrial Zone,
No. 20, Songkang Road, Nanshan District, Shenzhen,
Guangdong Province 518052, P. R. China

Scope: Design and Manufacture of Stepping Motor Drivers, Servo Motor Drivers, Servo Motors and Switch Power Supplies

An audit was performed, Report No. 065830. Proof has been furnished that the requirements according to ISO 9001:2008 are met.
The due date for all future audits is 29-10 (dd.mm).

Validity: The certificate is valid from 2009-11-19 until 2012-11-18.

Hong Kong, 2009-11-19

TÜVRheinland Certification and Advisory GmbH

TÜVRheinland
Precisely Right.

Technical Support

Staffed with a highly professional and experienced technical support team, Leadshine can help its customers to increase productivity, reduce design & selection risks, and minimize the product development time. We are able to support our customers through email, telephone, field support, product studying conference, and some other approaches.

You can contact Leadshine technical support by phone at 86-755-2641-8447, by fax at 86-755-2640-2718, or by email at tech@leadshine.com.

Leadshine

Quality Products Selling 1,000,000 pcs/year!

Design & Verification

Since the formation in 1997, Leadshine has been investing heavily in research and development for the newest motion technology. Leadshine owns a large number of patents and copyrights on its hardware and software of its products. Before released to its customers, all Leadshine products have been verified and tested in Leadshine's state-of-the-art laboratory.

Assembly Line

Leadshine product quality is guaranteed by an ISO-certified manufacturing system which includes rigorous supplier selection, incoming parts QC, in-process QC, final QA, and 24-hour aging test. The certification is a testimony of Leadshine's commitment to provide its customers with high quality products and services.

Quality Assurance

All Leadshine's products have to past QC and 24-hour aging test, making the usual return & repair rate is under 0.5%. And that is why Leadshine can offer **LONGER** warranty period (18 months) than most other motion control product manufacturers.

Support & Service

Leadshine's professional and experienced technical team can help customers to reduce design and selection risks, and minimize product development time through support of email, field support, exhibitions, product studying conference, and etc.

Innovative Products with High Reliability

Stepping Drives

Currently, Leadshine offers two main series of 2-phase microstepping drives, the digital DM series and analog M series. The high performance DM drives are based on powerful 32-bit DSP control technology. Their features include super-low stepping noise, anti-resonance, low-speed ripple smoothing, and low motor heating. The low-cost M drives employ precise analog current control and are characterized by superior high-speed torque, relatively low stepping noise, and low motor heating. Leadshine also supplies 3-phase digital and analog stepping drives.

DM Series Digital Stepping Drives (P5—P16)

M Series Analog Stepping Drives (P17—P28)

AC & DC Servos

Leadshine's brushless servos include ACS and ACH series DSP-based fully digital servo drives and ACM and BLM series brushless AC and DC servo motors. Because of their high performance and highly competitive price, they are ideal for replacing many popular AC servo drives available on the market.

Leadshine's brush servos include DCS series DSP-based fully digital servo drives and DCM series brush servo motors. The drives support command inputs of step and direction, analog input. Whether your application requires torque mode operation, accurate speed / velocity control or positioning, you may find the right drive to meet your requirements.

Highly Cost-effective Brushless Servos (P45—P58)

Innovative DC Servo Products (P59 —P71)

World-class Products at Highly Competitive Prices

Stepping Motors

Leadshine offers 2-phase and 3-phase stepping motors from NEMA frame size 14 to 51. Made of high quality cold roll sheet copper and anti-high temperature permanent magnet, Leadshine's stepping motors are highly reliable and generate low motor heating. Because of their nice internal damping characteristics, those stepping motors can run very smoothly and have no obvious resonance area within the whole speed ranges.

NEMA14 to NEMA51 Stepping Motors (P31—P42)

Power Supplies

Leadshine offers two series power supplies, including SPS series switching mode power supplies and PS series linear power supplies. These power supplies are specially designed to power inductive loads generated in stepping and servo systems. Features include low cost and high reliability.

SPS Series and PS Series Power Supplies (P72—P76)

Motion Controllers

Leadshine's full line of motion controllers includes single and multi-axis, bus-based and stand-alone controllers. Available interface options for international markets include PCI, USB, RS232 and Ethernet for the moment. Leadshine's controllers provide high speed performance and can handle many modes of motion such as point-to-point positioning, jogging, linear and circular interpolation, continuous interpolation and helix interpolation.

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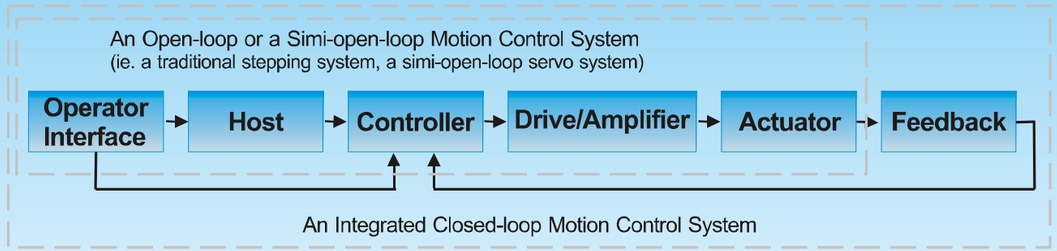
Basic Components of Motion Control System

Many different components are used in a variety of combinations to create a modern motion control system. Usually, the system will be comprised of the following basic elements: controller, drive/amplifier, actuator. And for a more integrated motion control system will be comprised of feedback, operator interface and host, besides elements mentioned above. A simplified block diagram of a motion control system would appear as shown below.



*** Operator Interface and Host**

Operator interface and host are/is present to input control logic, modify programs, or provide real time operations, such as system shut down or schedule changes.

*** Controller**

The controller acts as brain of the system by taking the desired target positions and motion profiles and creating the trajectories for the motors to follow. It will include a means of entering a set of instructions or code into its memory which are then translated into a series of electrical pulses or analog signals and output to a drive for controlling some type of actuator.

*** Drive/Amplifier**

The drive/amplifier receives the signals from the controller and generate the current required to drive or turn the actuator.

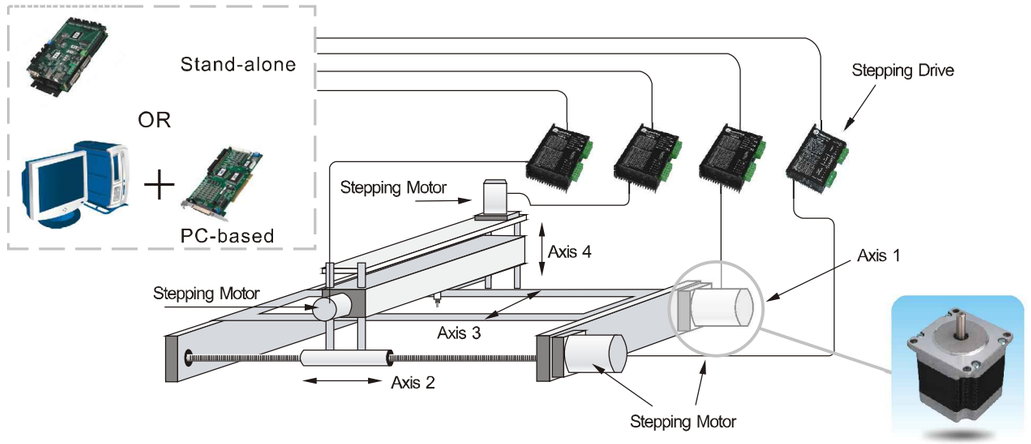
*** Actuator**

The actuator provides the actual physical motion and will be closely coupled to the design characteristics of the drive. The drive/actuator set may be any one of several different design classifications. Typically, but by no means always, they will the form of an electronic drive and an electric motor. Other common means of motion are pneumatic or hydraulic actuators.

*** Feedback Device**

There are a wide variety of feedback devices that are commonly used in motion control systems today which provide information on linear or rotary motion, such as optical encoders, magnetic encoders and resolvers.

A Typical Stepping System



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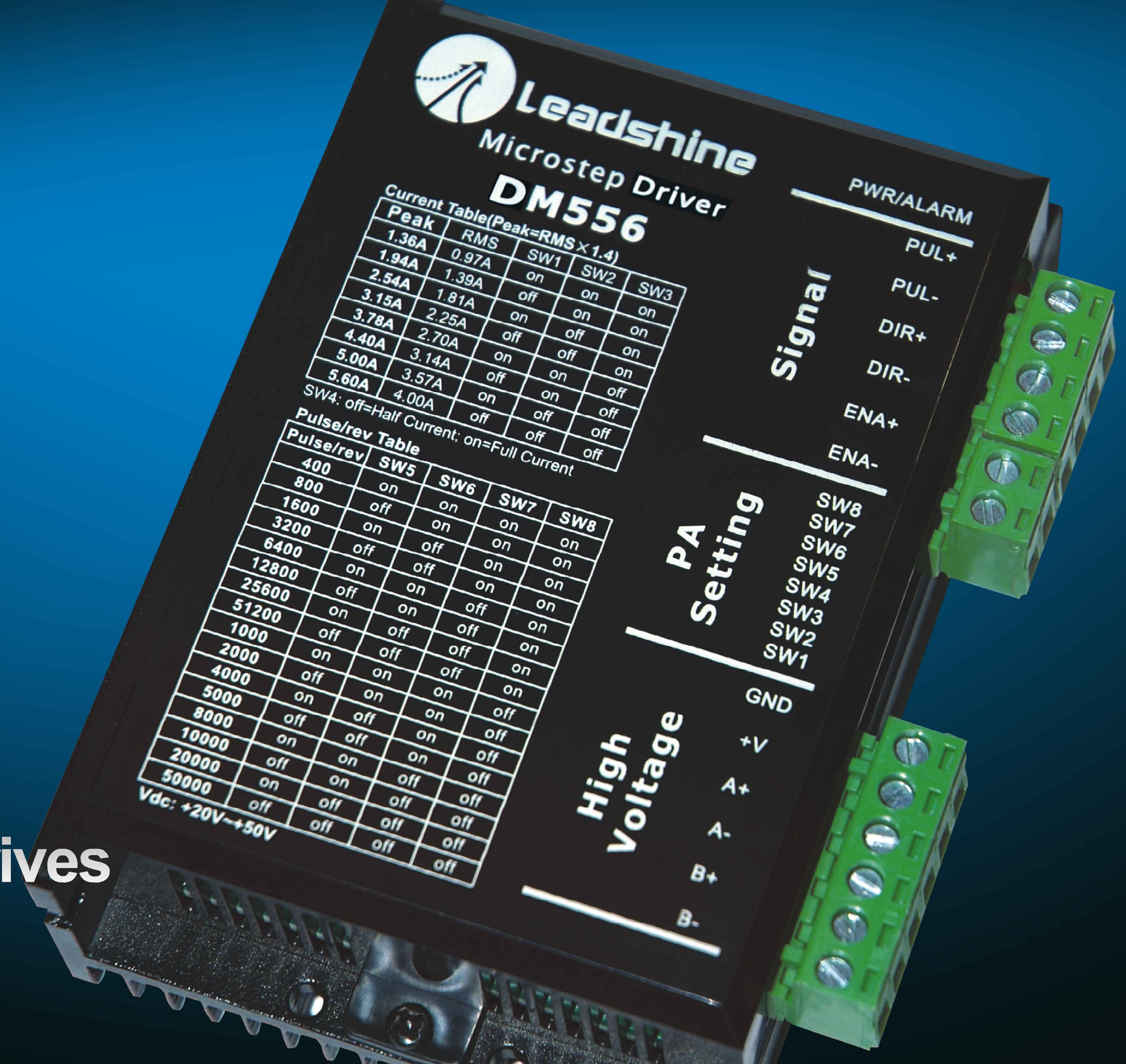
Stepping Drives



Selection Guide for Stepping Drive

A stepping motor requires an electrical sequencer and it is called a stepping drive. The stepping drive is one of the key components in a stepping system. When you select a stepping drive for the special application, you can follow the following steps. Firstly, you should choose the drive type and determine the drive operating mode. Secondly, choose right supply voltage and output current according with the application and the motor. In the end, you should consider whether the acceptable control signals of the drive are right for those of your motion controller or not. Of course, the price of the chose drive should be acceptable too.

Drive Types

The output torque and power from a stepping motor are determined by the operating current, motor size, motor heat sinking, motor winding, and the type of the drive used. You can get much different performances from a given motor by choosing different type stepping drives.

There are some commonly-used drive types, such as unipolar constant voltage drive, unipolar L/nR constant voltage drive, unipolar timed bi-level drive, unipolar constant current drive, unipolar constant current drive and bipolar constant current microstepping drive.The highest output power and motor utilization for a given motor is achieved with the bipolar constant current drive. DC-losses is kept at a minimum due to maximum utilization of the copper in the winding and no power losses from leakage inductance and snubbing circuits since every winding only consists of one part.

Bipolar constant current microstepping drive is an improved version of the basic full- and half-step bipolar constant-current drive. Here, the winding currents form a sine/cosine pair. This greatly improves low frequency performances by eliminating overshot movements, ringing, and resonances. Performances at medium and high-stepping rates are close to those of full- and half-step. This drive uses the same power stage as the bipolar constant-current drive, but extra electronics for setting the sine/cosine current levels are used. Microstepping can also increase resolution and step accuracy of the stepping systems.

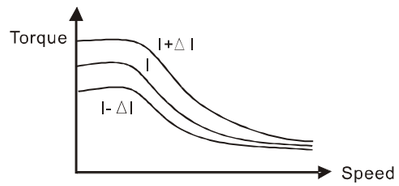
Supply Voltage and Output Current

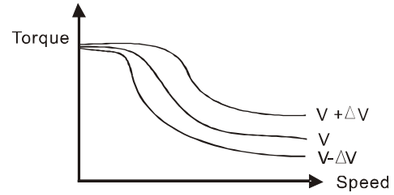
Although both regulated and unregulated power supplies can be used to power the drives, unregulated power supplies are preferred due to their ability to withstand current surge. The power supply voltage must be within the drive's allowable operating voltage range. Beyond that, the choice of voltage is dependent on the application and the motor used.

Higher supply voltage can increase motor torque at higher speeds, being helpful for avoiding losing steps. However, higher voltage may cause bigger motor vibration at lower speed, and may also cause over-voltage protection or even drive damage. Therefore, it is suggested to choose only a sufficiently high supply voltage for intended application, and use power supplies with theoretical output voltage of at least 10% below drive's maximum input voltage, leaving room for power fluctuation and back-EMF.

For a given motor, higher drive current will make the motor output more torque, but it also causes more heating in the motor and the drive. Therefore, output current is generally set to be such that the motor will not overheat for long time operation. Phase current rating supplied by motor manufacturer is important when setting a drives output current, however the setting also depends on the leads and motor connections. Since parallel and serial connections of motor coils will significantly change the resulting inductance and resistance, it is important to set drive output current based on motor's phase current and connection types.

Leadshine's stepping drives cover a broad operating voltage range, from 12VDC to 80VDC or 18VAC to 220VAC. And most of Leadshine's stepping drives have over-voltage and over-current protection functions. All of Leadshine's stepping drives use DIP switches to set motor's operating current, and all of them have automatic idle-current reduction function.





Drive Modes

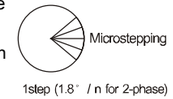
The most common drive modes are full-step, half-step and microstepping.

FULL-STEP MODE: This is the basic stepping driving mode, it offers the simplest control electronics and it is recommended for high and medium frequency operation. At these frequencies, the inertia of the motor and the load smooth out the torque, resulting in less vibration and noise compared to low-speed operation.

HALF-STEP MODE: Half-step gives smoother movement at low step rates compared to full-step and can be used to lower resonances at low speeds. Half-step doubles the system resolution. Observe that for most stepping motors, the step accuracy specification only is valid for 2-phase-on positions. The accuracy is lower and the stop-position hysteresis is larger for 1-phase-on positions.

MICROSTEPPING: The smoothest movement at low frequencies can be achieved with microstepping. If resonance-free movement at low step rates is important, the microstepping drive is the best choice. Microstepping can also be used to increase stop position accuracy beyond the normal motor limits.

Leadshine' stepping drives cover all drive modes. Both our digital stepping drives and analog stepping drives can operate in full-step, half-step and microstepping modes.



Introduction

Since releasing its first stepping drive in 1997, Leadshine has been designing stepping drives to satisfy the requirements of its customers. Today, Leadshine is one of the **LARGEST** stepping drive manufacturers in the world. Every year, over **600,000** Leadshine stepping drives are implemented in thousands of applications around the world. The applications include CNC routers, laser machines, electronic equipment, packaging equipment, textile equipment, pick-and-place device, and so on.

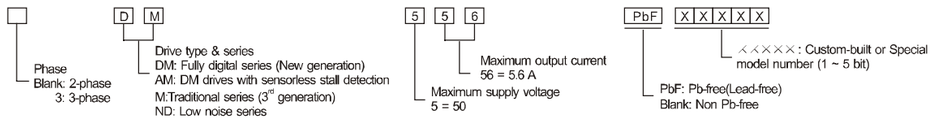
Currently, Leadshine offers two main series of 2-phase microstepping drives, the digital DM series and analog M series. The high-performance DM drives are based on powerful 32-bit DSP control technology. Their features include anti-resonance, low-speed ripple smoothing, super-low stepping noise, and low motor heating. The low-cost M drives employ precise analog current control and are characterized by superior high-speed torque, relatively low stepping noise, and low motor heating. Leadshine also supplies 3-phase digital and analog stepping drives.

Selection Table

Phase	Series	Model	Output Current (A)	Operating Voltage (V)	Microstep Resolution	Driving Motors (NEMA Size)	Weight (kg)	Size (mm)	Control Signals	
									PUL/DIR; CW/CCW	Single-ended; Differential
2	DM	DM320C	0.3 - 2.0	DC(18-30)	1-512	14, 17, 23	0.09	86*55*20	PUL/DIR; CW/CCW	Single-ended; Differential
		DM422C	0.3 - 2.2	DC(18-40)	1-512	14, 17, 23	0.115	86*55*20	PUL/DIR; CW/CCW	Single-ended; Differential
		DM442	0.5 - 4.2	DC(18-40)	1-512	14, 17, 23	0.19	116*69*26.5	PUL/DIR; CW/CCW	Single-ended; Differential
		DM556	0.5 - 5.6	DC(18-50)	1-512	14, 17, 23	0.28	118*75.5*33	PUL/DIR; CW/CCW	Single-ended; Differential
		DM870	0.5 - 7.0	DC(18-80)	1-512	17, 23, 34	0.28	118*75.5*33	PUL/DIR; CW/CCW	Single-ended; Differential
		DM1182	0.5-8.2	AC(80-150)	1-512	34, 42	1.3	202*167*63	PUL/DIR; CW/CCW	Single-ended; Differential
	M	M415B	0.21-1.5	DC(18-40)	1-64	14, 17, 23	0.115	86*55*20	PUL/DIR	Single-ended
		M550	1.2 - 5.0	DC(20-50)	2-128, 5-125	14, 17, 23	0.28	118*75.5*33	PUL/DIR; CW/CCW	Single-ended; Differential
		M760	1.45 - 6.0	DC(20-75)	2-256, 5-200	17, 23, 34	0.28	118*75.5*33	PUL/DIR; CW/CCW	Single-ended; Differential
		M860	2.4 - 7.2	DC(24-80)	2-256, 5-200	17, 23, 34	0.57	151*97*48	PUL/DIR; CW/CCW	Single-ended; Differential
		M880A	2.8 - 7.8	DC(24-80)	2-256, 5-200	17, 23, 34	0.57	151*97*48	PUL/DIR; CW/CCW	Single-ended; Differential
	ND	ND2282	0.45 - 7.8	AC(80-220)	2-50	34, 42	2.0	200*137*81	PUL/DIR; CW/CCW	Single-ended; Differential
3	DM	3DM683	2.1 - 8.3	DC(18-60)	200-10000s/r	17, 23, 34	0.38	118*75.5*33	PUL/DIR; CW/CCW	Single-ended; Differential
		3DM883	2.1 - 8.3	DC(18-80)	200-25600s/r	17, 23, 34	1.05	143*97*48	PUL/DIR; CW/CCW	Single-ended; Differential

Note: Leadshine will release its AM series digital stepping drives soon. Please visit **www.leadshine.com** for information about our latest drives.

Part Number



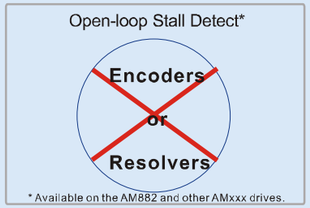
* This model has UL approved version and non-UL approved version.

DM Series Fully Digital Stepping Drives

9 Innovative Technologies

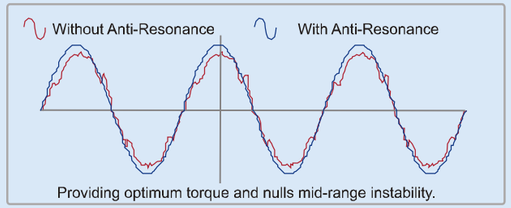
Sensorless Stall Detection

Sensorless stall detection eliminates cost of feedback device and cabling.



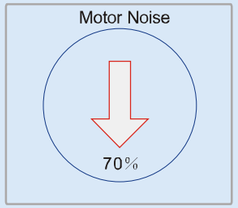
Anti-Resonance at Mid-range

Stepping systems resonate at mid-range. The DM series drives can calculate the system's natural frequency and apply damping to control algorithm for anti-resonance.



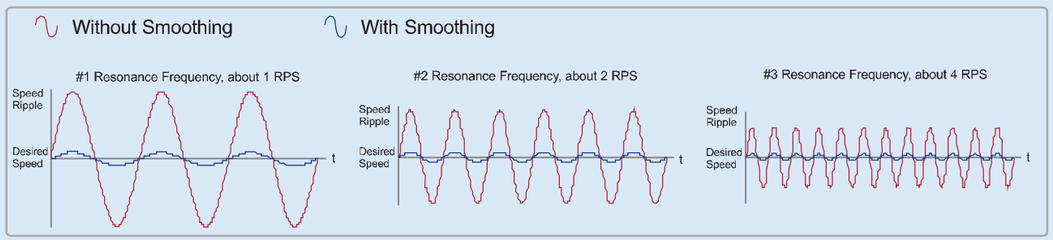
Super Low Noise

Dramatically reduces about 70% motor noise.



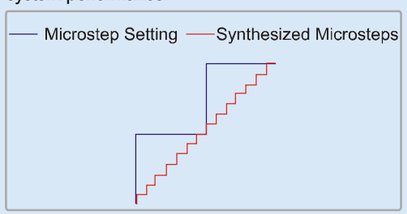
Low-speed Ripple Smoothing

Electronic damping for 3 major resonance frequency at low speed range, eliminating undesirable motor speed oscillation and making the DM series deliver unique level of smoothness.



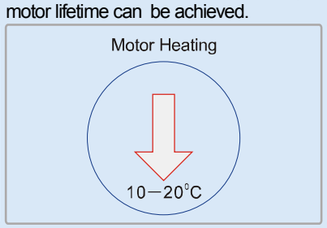
Multi-Stepping Technology

Multi-Stepping allows a low resolution step input to produce a higher microstep output for smooth system performance.



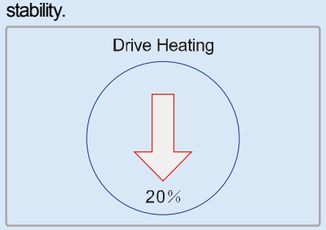
Lower Motor Heating

Motor temperature is 10°C to 20 °C lower than using a traditional drive, longer motor lifetime can be achieved.



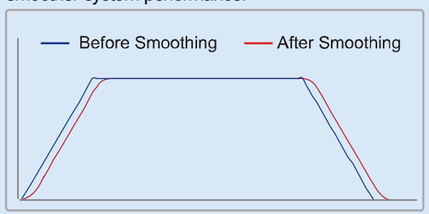
Lower Drive Heating

Drive heating is up to 20% lower than a normal driver, offering higher system stability.



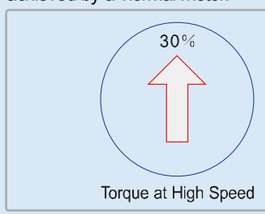
Command Signal Smoothing

Command signal smoothing can soften the effect of immediate change in velocity and direction, delivering smoother system performance.



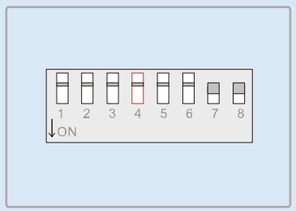
Torque Improving

Increase torque up to 30% at high speed. 3000 RPM or even higher speed can be achieved by a normal motor.



Self-test and Auto-setup

Motor self-test and parameter auto-setup technology, offers optimum responses with different motors.



Features

- **Sensorless stall detection**, eliminates cost of feedback device and cabling.*
- **Anti-Resonance**, provides optimum torque and nulls mid-range instability
- **Self-test and Auto-setup** technology, offers optimum responses with different motors
- **Multi-Stepping** allows a low resolution step input to produce a higher microstep output for smooth system performance
- Drives for 2-phase and 3-phase stepping motors are available
- Output current programmable, from 0.3 A or 0.5 A to the maximum values.
- Microstep resolutions programmable, from full-step to 51,200 steps/rev
- Opto-isolated inputs, support single-ended and differential command signals
- Support PUL/DIR and CW/CCW modes
- Built-in motion controller for self-test with trapezoidal velocity profile
- PC based and handheld configuration and tuning tools, including ProTuner and STU-DM.
- Over-current, over-voltage, phase error protections
- 10 latest errors self-record function

Introduction

Leadshine's DM series fully digital stepping drives are DSP-based innovative products adopting the latest stepping control technology. The DM series drives include the DM320C, DM422C, DM432C, DM442, DM556, DM870, 3DM683 and DM1182 for the moment. These drives deliver the same level of features and performance as global leading brands, and can significantly improve the performance of stepping systems.

Applications

Suitable for a wide range of stepping motors, from NEMA frame size 8 to 51. Can be used in various kinds of machines, such as laser cutters, laser markers, medical equipment, high precision X-Y tables, measurement devices, pneumatic markers, and so on. Their unique features make them ideal for applications desired for low noise, high smoothness, high precision and high speed performance.

Electrical Specifications

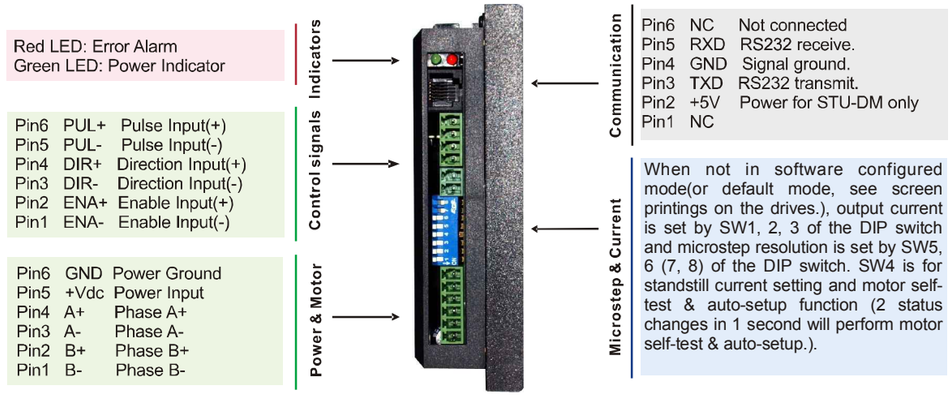
Parameters / Model	Input Voltage (VDC)			Output Current (A)		
	Min	Typical	Max	Min	Typical	Max
DM320C	+18	+24	+30	0.3	-	2.0
DM422C	+18	+24	+40	0.3	-	2.2
DM432C	+18	+24	+40	0.5	-	3.2
DM442	+18	+36	+40	0.5	-	4.2
DM556	+18	+36	+50	0.5	-	5.6
DM870	+18	+60	+80	0.5	-	7.0
3DM683	+18	+48	+60	0.5	-	8.3
DM1182	+90 (VAC)	+110 (VAC)	+150 (VAC)	0.5	-	8.2

Parameters / Model	Pulse Input Frequency (kHz)			Logic Signal Current (mA)			Isolation Resistance (MΩ)		
	Min	Typical	Max	Min	Typical	Max	Min	Typical	Max
DM Series	0	-	300**	7	10	16	500	-	-

*This function is available on the AM882 and other AMxxx stepping drives. Visit Leadshine's website for the latest information about our digital stepping drives .
** Those of the DM422C and the DM432C are 75 kHz, and that of the DM442 is 200 kHz .

Pin Assignment and Description

Similar to Leadshine's other drives, the DM series drives also have two connectors. Connector P1 for control signal connections, and connector P2 for power and motor connections. Users do not need to change wiring when upgrading stepping systems. An additional RS232 communication interface of the DM series drives is used for parameter configuration. The follow figure shows a brief description of the connectors and serial interface.

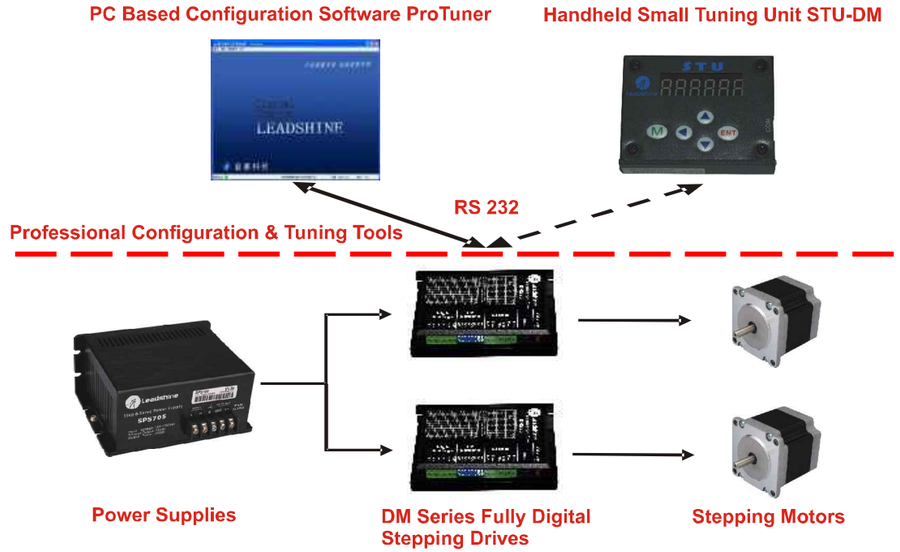


Tips:

1. Users should perform **motor self-test and auto-setup** function when powering up the system (with the motor) for first time, or changing to a new motor different from the old one.
2. The SW switches of the DIP switch should be in **DEFAULT mode** if needs the drives operate at software configured mode, including output current and microstep resolution settings. ProTuner and STU-DM can be used for these settings.
3. **ONLY ProTuner** can be use to configure advanced settings, such as anti-resonance parameter settings.
4. The number times the RED led turns on in one time periodic indicates what protection has been activated. See the relevant user manual.

PC Based and Handheld Configuration & Tuning Tools

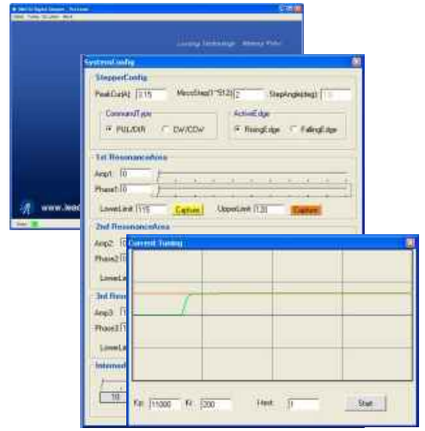
The DM series drives have a motor self-test and auto-setup function, and this function is suitable for most of applications. However, if the user wants to configure advanced settings for better performance (i.e. anti-resonance parameters), PC based and handheld configuration & tuning tools, including ProTuner and STU-DM can be supplied to meet different requirements and configuration & tuning environments.



ProTuner (Windows Based Setup Software)

- Upload and Download parameter settings
- PI parameter settings for current loop
- Output current setting
- Microstep resolution setting, from 1 to 512
- PUL/DIR or CW/CCW mode configuration
- DIR logic level setting
- Active edge of pulse signal setting
- Electronic damping coefficient setting
- Anti-resonance parameter settings for 3 resonance area
- Parameter settings for self motion test (with trapezoidal velocity profile)
- Read the latest 10 failure events and clear these events

- * 1 PC RS232 interface is necessary.
- ** Leadshine offers a cable for interfacing the drive to an RS232 port on the computer. USB-to-RS232 converter is available.

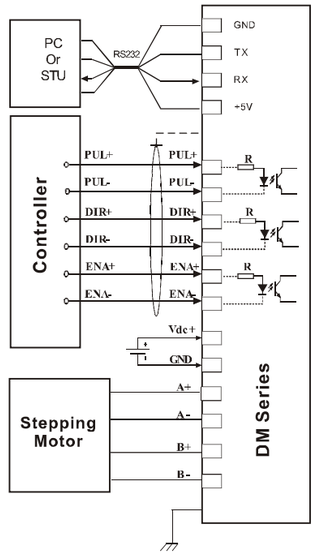


STU-DM (Handheld Configuration and Tuning Unit)

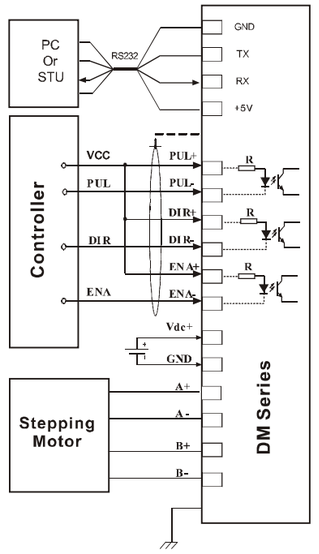
- Upload & Download parameter settings
- PI parameter settings for current loop
- Output current setting
- Microstep resolution setting, from 1 to 512
- PUL/DIR or CW/CCW mode configuration
- DIR logic level setting
- Active edge of pulse signal setting
- Read the latest failure event and clear the event

- * Leadshine offers a special cable for communication between the drive and the STU-DM handheld tuner.

Typical Connections



(a) Differential control signals



(b) Single-ended (NPN) control signals

DM320C

Introduction

The DM320C is a versatility fully digital stepping drive based on a DSP with advanced control algorithm. It brings a unique level of system smoothness, providing optimum torque and nulls mid-range instability. Motor auto-identification and parameter auto-configuration technology offers optimum response with different motors. The driven motors can run with much lower noise, lower heating, smoother movement than most stepping drives on the market.

Applications

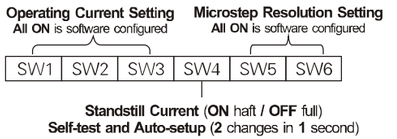
Suitable for a wide range of stepping motors, from NEMA8 to NEMA23. It can be used in various kinds of machines, such as medical machines, laser cutters, laser markers, high precision X-Y tables, labelling machines, and so on. Its unique features make the DM320C an ideal solution for applications that require low-speed smoothness.

Function Description

Function	Description
Microstep Setting	Microstep resolution is programmable. When not in software configured mode, microstep resolution is set by SW5, 6 of the DIP switch. In order to avoid losing steps, do not change the microstep resolution on the fly.
Current Setting	Output current is programmable. When not in software configured mode, operating current is set by SW1,2,3 of the DIP switch. Up to 2.0 A. Select a current setting closest to your motor's required current.
Automatic standstill current reduction;	SW4 is used for the automatic standstill current reduction, self-test and auto-setup functions. When the former active, the current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Self-test and auto-setup	If the user changes the status/position of SW4 twice in 1 second, the drive will self-test the driving motor and auto-setup control parameters, offering optimum performance with different motors..
Control Signals	PUL+ and PUL- are for the pulse command signal. DIR+ and DIR- are for the direction control signal. ENA+ and ENA- are for the enable/ disable control signal. ALM+ and ALM- are for the alarm signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with output of +18 VDC to +24 VDC, leaving room for power fluctuation and back-EMF.
Indicators	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the motor shaft will be free. Reset the drive by re-powering it to make it function properly after removing problem(s). See its manual for more information.

Parameter Settings

Microstep resolution and output current are programmable. When not in software configured mode, the drive uses a 6-bit DIP switch to set microstep resolution and motor operating current, as shown below:

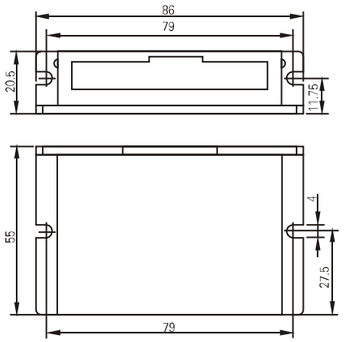


Operating Current Setting

Peak Current	RMS Current	SW1	SW2	SW3
Default (software configured, 0.3-2.0 A)		on	on	on
0.5 A	0.35 A	off	on	on
0.7 A	0.50 A	on	off	on
1.0 A	0.71 A	off	off	on
1.2 A	0.86 A	on	on	off
1.5 A	1.07 A	off	on	off
1.7 A	1.21 A	on	off	off
2.0 A	1.43 A	off	off	off

Mechanical Specifications

Units: mm 1inch = 25.4mm



Microstep Resolution Setting

Steps/rev.	SW5	SW6
Default (software configured, 1-512)	on	on
800	off	on
3200	on	off
12800	off	off

DM422C

Introduction

The DM422C is a versatility fully digital stepping drive based on a DSP with advanced control algorithm. It brings a unique level of system smoothness, providing optimum torque and nulls mid-range instability. Motor auto-identification and parameter auto-configuration technology offers optimum response with different motors. The driven motors can run with much lower noise, lower heating, smoother movement than most stepping drives on the market.

Applications

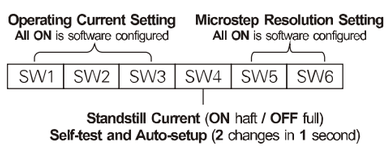
Suitable for a wide range of stepping motors, from NEMA8 to NEMA23. It can be used in various kinds of machines, such as medical machines, laser cutters, laser markers, high precision X-Y tables, labelling machines, and so on. Its unique features make the DM422C an ideal solution for applications that require low-speed smoothness.

Function Description

Function	Description
Microstep Setting	Microstep resolution is programmable. When not in software configured mode, microstep resolution is set by SW5, 6 of the DIP switch. In order to avoid losing steps, do not change the microstep resolution on the fly.
Current Setting	Output current is programmable. When not in software configured mode, operating current is set by SW1,2,3 of the DIP switch. Up to 2.2A. Select a current setting closest to your motor's required current.
Automatic standstill current reduction;	SW4 is used for the automatic standstill current reduction, self-test and auto-setup function. When the former active, the current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Self-test and auto-setup	If the user changes the status/position of SW4 twice in 1 second, the drive will self-test the driving motor and auto-setup control parameters, offering optimum performance with different motors..
Control Signals	OPTO is for the opto-coupler power supply, typically+5V. PUL is for the pulse command signal. DIR is for the direction control signal. ENA is for the enable/ disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with output of +18 VDC to +36 VDC, leaving room for power fluctuation and back-EMF.
Indicators	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the motor shaft will be free. Reset the drive by re-powering it to make it function properly after removing problem(s). See its manual for more information.

Parameter Settings

Microstep resolution and output current are programmable. When not in software configured mode, the drive uses a 6-bit DIP switch to set microstep resolution, and motor operating current, as shown below:

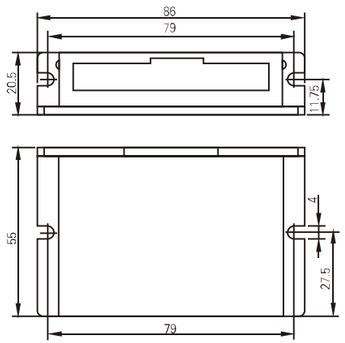


Operating Current Setting

Peak Current	RMS Current	SW1	SW2	SW3
Default (software configured, 0.3-2.2 A)		on	on	on
0.5 A	0.35 A	off	on	on
0.7 A	0.5 A	on	off	on
1.0 A	0.7 A	off	off	on
1.3 A	0.9 A	on	on	off
1.6 A	1.2 A	off	on	off
1.9 A	1.4 A	on	off	off
2.2 A	1.6 A	off	off	off

Mechanical Specifications

Units: mm 1inch = 25.4mm



Microstep Resolution Setting

Steps/rev.	SW5	SW6
Default (software configured, 1-512)	on	on
1600	off	on
3200	on	off
6400	off	off

DM432C

Introduction

The DM432C is a versatility fully digital stepping drive based on a DSP with advanced control algorithm. It brings a unique level of system smoothness, providing optimum torque and nulls mid-range instability. Motor auto-identification and parameter auto-configuration technology offers optimum response with different motors. The driven motors can run with much lower noise, lower heating, smoother movement than most stepping drives on the market.

Applications

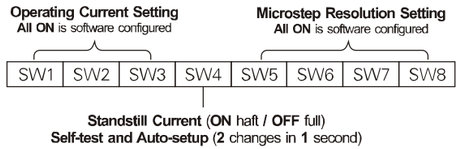
Suitable for a wide range of stepping motors, from NEMA8 to NEMA23. It can be used in various kinds of machines, such as medical machines, laser cutters, laser markers, high precision X-Y tables, labelling machines, and so on. Its unique features make the DM432C an ideal solution for applications that require low-speed smoothness.

Function Description

Function	Description
Microstep Setting	Microstep resolution is programmable. When not in software configured mode, microstep resolution is set by SW5, 6, 7, 8 of the DIP switch. In order to avoid losing steps, do not change the microstep resolution on the fly.
Current Setting	Output current is programmable. When not in software configured mode, operating current is set by SW1,2,3 of the DIP switch. Up to 3.2 A. Select a current setting closest to your motor's required current.
Automatic standstill current reduction;	SW4 is used for the automatic standstill current reduction, self-test and auto-setup function. When the former active, the current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Self-test and auto-setup	If the user changes the status/position of SW4 twice in 1 second, the drive will self-test the driving motor and auto-setup control parameters, offering optimum performance with different motors..
Control Signals	PUL+ and PUL- are for the pulse command signal. DIR+ and DIR- are for the direction control signal. ENA+ and ENA- are for the enable/disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with output of +18 VDC to +36 VDC, leaving room for power fluctuation and back-EMF.
Indicators	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the motor shaft will be free. Reset the drive by re-powering it to make it function properly after removing problem(s). See its manual for more information.

Parameter Settings

Microstep resolution and output current are programmable. When not in software configured mode, the drive uses an 8-bit DIP switch to set microstep resolution, and motor operating current, as shown below:

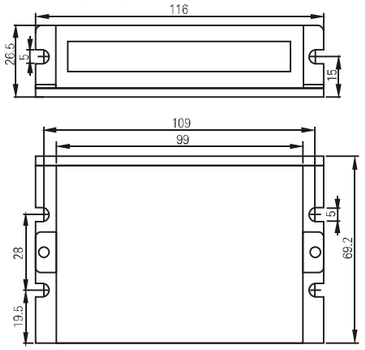


Operating Current Setting

Peak Current	RMS Current	SW1	SW2	SW3
Default (software configured, 0.5-3.2 A)		on	on	on
1.31 A	0.94 A	off	on	on
1.63 A	1.16 A	on	off	on
1.94 A	1.39 A	off	off	on
2.24 A	1.60 A	on	on	off
2.55 A	1.82 A	off	on	off
2.87 A	2.05 A	on	off	off
3.20 A	2.29 A	off	off	off

Mechanical Specifications

Units: mm 1 inch = 25.4mm



Microstep Resolution Setting

Steps/rev.	SW5	SW6	SW7	SW8
Default (software configured, 1-256)	on	on	on	on
400	off	on	on	on
800	on	off	on	on
1600	off	off	on	on
3200	on	on	off	on
6400	off	on	off	on
12800	on	off	off	on
25600	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
25000	off	off	off	off

DM442

Introduction

The DM442 is a versatility fully digital stepping drive based on a DSP with advanced control algorithm. It brings a unique level of system smoothness, providing optimum torque, nulls mid-range instability and good high speed performance. Motor auto-identification and parameter auto-configuration technology offers optimum response with different motors. The driven motors can run with much lower noise, lower heating, smoother movement than most stepping drives on the market.

Applications

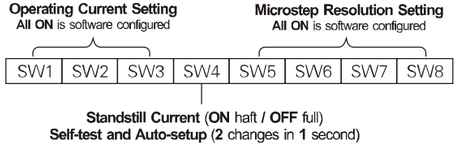
Suitable for a wide range of stepping motors, from NEMA10 to NEMA23. It can be used in various kinds of machines, such as medical machines, laser cutters, laser markers, high precision X-Y tables, labelling machines, and so on. Its unique features make the DM442 an ideal solution for applications that require low-speed smoothness and good high speed performance..

Function Description

Function	Description
Microstep Setting	Microstep resolution is programmable. When not in software configured mode, microstep resolution is set by SW5, 6, 7, 8 of the DIP switch. In order to avoid losing steps, do not change the microstep resolution on the fly.
Current Setting	Output current is programmable. When it's not in software configured mode, operating current is set by SW1,2,3 of the DIP switch. Up to 4.2 A. Select a current setting closest to your motor's required current.
Automatic standstill current reduction;	SW4 is used for the automatic standstill current reduction, self-test and auto-setup function. When the former active, the current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Self-test and auto-setup	If the user changes the status/position of SW4 twice in 1 second, the drive will self-test the driving motor and auto-setup control parameters, offering optimum performance with different motors..
Control Signals	PUL+ and PUL- are for the pulse command signal. DIR+ and DIR- are the for direction control signal. ENA+ and ENA- are for the enable/ disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with output of +18 VDC to +36 VDC, leaving room for power fluctuation and back-EMF.
Indicators	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the motor shaft will be free. Reset the drive by re-powering it to make it function properly after removing problem(s). See its manual for more information.

Parameter Settings

Microstep resolution and output current are programmable. When not in software configured mode, the drive uses an 8-bit DIP switch to set microstep resolution, and motor operating current, as shown below:

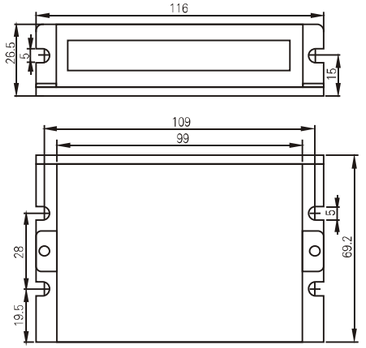


Operating Current Setting

Peak Current	RMS Current	SW1	SW2	SW3
Default (software configured, 0.5-4.2 A)		on	on	on
1.46 A	1.04 A	off	on	on
1.91 A	1.36 A	on	off	on
2.37 A	1.69 A	off	off	on
2.84 A	2.03 A	on	on	off
3.31 A	2.36 A	off	on	off
3.76 A	2.69 A	on	off	off
4.20 A	3.00 A	off	off	off

Mechanical Specifications

Units: mm 1 inch = 25.4mm



Microstep Resolution Setting

Steps/rev.	SW5	SW6	SW7	SW8
Default (software configured, 1-512)	on	on	on	on
400	off	on	on	on
800	on	off	on	on
1600	off	off	on	on
3200	on	on	off	on
6400	off	on	off	on
12800	on	off	off	on
25600	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
25000	off	off	off	off

DM556

Introduction

The DM556 is a versatility fully digital stepping drive based on a DSP with advanced control algorithm. It brings a unique level of system smoothness, providing optimum torque, nulls mid-range instability and good high speed performance. Motor auto-identification and parameter auto-configuration technology offers optimum response with different motors. The driven motors can run with much lower noise, lower heating, smoother movement than most stepping drives on the market.

Applications

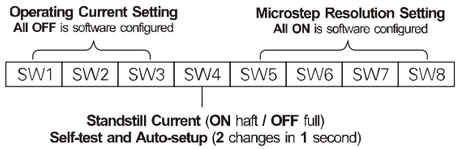
Suitable for a wide range of stepping motors, from NEMA17 to NEMA34. It can be used in various kinds of machines, such as medical machines, laser cutters, laser markers, high precision X-Y tables, labelling machines, and so on. Its unique features make the DM556 an ideal solution for applications that require low-speed smoothness and good high speed performance..

Function Description

Function	Description
Microstep Setting	Microstep resolutions is programmable. When not in software configured mode, microstep resolution is set by SW5, 6, 7, 8 of the DIP switch. In order to avoid losing steps, do not change the microstep resolution on the fly.
Current Setting	Output current is programmable. When it's not in software configured mode, operating current is set by SW1,2,3 of the DIP switch. Up to 5.6 A. Select a current setting closest to your motor's required current.
Automatic standstill current reduction;	SW4 is used for the automatic standstill current reduction, self-test and auto-setup function. When the former active, the current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Self-test and auto-setup	If the user changes the status/position of SW4 twice in 1 second, the drive will self-test the driving motor and auto-setup control parameters, offering optimum performance with different motors..
Control Signals	PUL+ and PUL- are for the pulse command signal. DIR+ and DIR- are for the direction control signal. ENA+ and ENA- are for the enable/disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with output of +20 VDC to +45 VDC, leaving room for power fluctuation and back-EMF.
Indicators	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the motor shaft will be free. Reset the drive by re-powering it to make it function properly after removing problem(s). See its manual for more information.

Parameter Settings

Microstep resolution and output current are programmable. When not in software configured mode, the drive uses an 8-bit DIP switch to set microstep resolution, and motor operating current, as shown below:

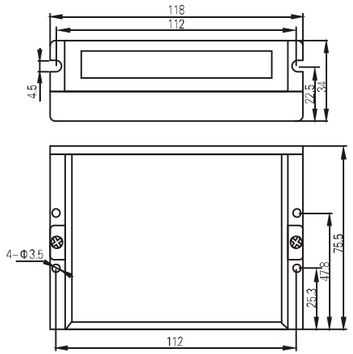


Operating Current Setting

Peak Current	RMS Current	SW1	SW2	SW3
Default (software configured, 0.5-5.6 A)		off	off	off
2.1 A	1.5 A	on	off	off
2.7 A	1.9 A	off	on	off
3.2 A	2.3 A	on	on	off
3.8 A	2.7 A	off	off	on
4.3 A	3.1 A	on	off	on
4.9 A	3.5 A	off	on	on
5.6 A	4.0 A	on	on	on

Mechanical Specifications

Units: mm 1 inch = 25.4mm



Microstep Resolution Setting

Steps/rev.	SW5	SW6	SW7	SW8
Default (software configured, 1-512)	on	on	on	on
400	off	on	on	on
800	on	off	on	on
1600	off	off	on	on
3200	on	on	off	on
6400	off	on	off	on
12800	on	off	off	on
25600	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
25000	off	off	off	off

DM856

Introduction

The DM856 is a versatility fully digital stepping drive based on a DSP with advanced control algorithm. It brings a unique level of system smoothness, providing optimum torque, nulls mid-range instability and good high speed performance. Motor auto-identification and parameter auto-configuration technology offers optimum response with different motors. The driven motors can run with much lower noise, lower heating, smoother movement than most stepping drives on the market.

Applications

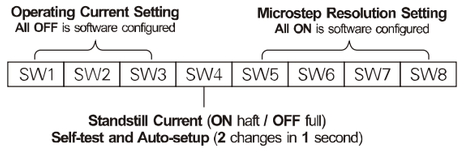
Suitable for a wide range of stepping motors, from NEMA17 to NEMA34. It can be used in various kinds of machines, such as medical machines, laser cutters, laser markers, high precision X-Y tables, labelling machines, and so on. Its unique features make the DM856 an ideal solution for applications that require low-speed smoothness and good high speed performance.

Function Description

Function	Description
Microstep Setting	Microstep resolution is programmable. When not in software configured mode, microstep resolution is set by SW5, 6, 7, 8 of the DIP switch. In order to avoid losing steps, do not change the microstep resolution on the fly.
Current Setting	Output current is programmable. When not in software configured mode, operating current is set by SW1,2,3 of the DIP switch. Up to 5.6 A. Select a current setting closest to your motor's required current.
Automatic standstill current reduction;	SW4 is used for the automatic standstill current reduction, self-test and auto-setup function. When the former active, the current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Self-test and auto-setup	If the user changes the status/position of SW4 twice in 1 second, the drive will self-test the driving motor and auto-setup control parameters, offering optimum performance with different motors..
Control Signals	PUL+ and PUL- are for the pulse command signal. DIR+ and DIR- are for the direction control signal. ENA+ and ENA- are for the enable/disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with output of +20 VDC to +68 VDC, leaving room for power fluctuation and back-EMF.
Indicators	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the motor shaft will be free. Reset the drive by re-powering it to make it function properly after removing problem(s). See its manual for more information.

Parameter Settings

Microstep resolution and output current are programmable. When not in software configured mode, the drive uses an 8-bit DIP switch to set microstep resolution, and motor operating current, as shown below:

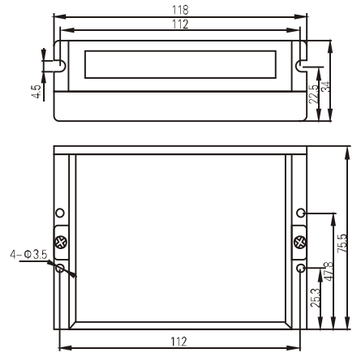


Operating Current Setting

Peak Current	RMS Current	SW1	SW2	SW3
Default (software configured, 0.5-5.6 A)		off	off	off
2.1 A	1.5 A	on	off	off
2.7 A	1.9 A	off	on	off
3.2 A	2.3 A	on	on	off
3.8 A	2.7 A	off	off	on
4.3 A	3.1 A	on	off	on
4.9 A	3.5 A	off	on	on
5.6 A	4.0 A	on	on	on

Mechanical Specifications

Units: mm 1 inch = 25.4mm



Microstep Resolution Setting

Steps/rev.	SW5	SW6	SW7	SW8
Default (software configured, 1-512)	on	on	on	on
400	off	on	on	on
800	on	off	on	on
1600	off	off	on	on
3200	on	on	off	on
6400	off	on	off	on
12800	on	off	off	on
25600	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
25000	off	off	off	off

DM870

Introduction

The DM870 is a versatility fully digital stepping drive based on a DSP with advanced control algorithm. It brings a unique level of system smoothness, providing optimum torque, nulls mid-range instability and good high speed performance. Motor auto-identification and parameter auto-configuration technology offers optimum response with different motors. The driven motors can run with much lower noise, lower heating, smoother movement than most stepping drives on the market.

Applications

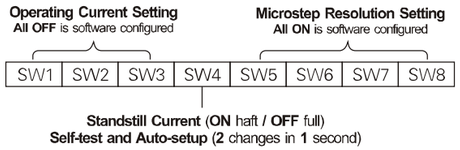
Suitable for a wide range of stepping motors, from NEMA17 to NEMA34. It can be used in various kinds of machines, such as medical machines, laser cutters, laser markers, high precision X-Y tables, labelling machines, and so on. Its unique features make the DM870 an ideal solution for applications that require low-speed smoothness and good high speed performance.

Function Description

Function	Description
Microstep Setting	Microstep resolution is programmable. When not in software configured mode, microstep resolution is set by SW5, 6, 7, 8 of the DIP switch. In order to avoid losing steps, do not change the microstep resolution on the fly.
Current Setting	Output current is programmable. When not in software configured mode, operating current is set by SW1,2,3 of the DIP switch. Up to 7.0 A. Select a current setting closest to your motor's required current.
Automatic standstill current reduction;	SW4 is used for the automatic standstill current reduction, self-test and auto-setup function. When the former active, the current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Self-test and auto-setup	If the user changes the status/position of SW4 twice in 1 second, the drive will self-test the driving motor and auto-setup control parameters, offering optimum performance with different motors..
Control Signals	PUL+ and PUL- are for the pulse command signal. DIR+ and DIR- are for the direction control signal. ENA+ and ENA- are for the enable/ disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with output of +20 VDC to +68 VDC, leaving room for power fluctuation and back-EMF.
Indicators	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the motor shaft will be free. Reset the drive by re-powering it to make it function properly after removing problem(s). See its manual for more information.

Parameter Settings

Microstep resolution and output current are programmable. When not in software configured mode, the drive uses an 8-bit DIP switch to set microstep resolution, and motor operating current, as shown below:

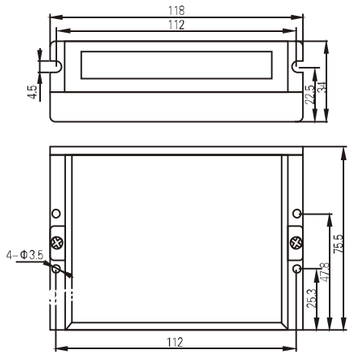


Operating Current Setting

Peak Current	RMS Current	SW1	SW2	SW3
Default (software configured, 0.5-7.0 A)		off	off	off
2.6 A	1.8 A	on	off	off
3.4 A	2.4 A	off	on	off
4.0 A	2.8 A	on	on	off
4.8 A	3.4 A	off	off	on
5.4 A	3.8 A	on	off	on
6.1 A	4.3 A	off	on	on
7.0 A	5.0 A	on	on	on

Mechanical Specifications

Units: mm 1 inch = 25.4mm



Microstep Resolution Setting

Steps/rev.	SW5	SW6	SW7	SW8
Default (software configured, 1-512)	on	on	on	on
400	off	on	on	on
800	on	off	on	on
1600	off	off	on	on
3200	on	on	off	on
6400	off	on	off	on
12800	on	off	off	on
25600	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
25000	off	off	off	off

DM SERIES
DM320C
DM422C
DM432C
DM442
DM556
DM856
DM870
3DM683
M SERIES
M550
M760
M860 V5.0
M880A
MA860
MA860H
M415B
ND2282

3DM683

Introduction

The 3DM683 is a versatility fully digital 3-phase stepping drive based on a DSP with advanced control algorithm. It brings a unique level of system smoothness, providing optimum torque, nulls mid-range instability and good high speed performance. Motor auto-identification and parameter auto-configuration technology offers optimum response with different motors. The driven motors can run with much lower noise, lower heating, smoother movement than most stepping drives on the market.

Applications

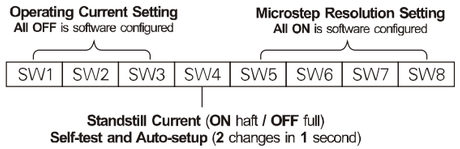
Suitable for a wide range of stepping motors, from NEMA17 to NEMA34. It can be used in various kinds of machines, such as medical machines, laser cutters, laser markers, high precision X-Y tables, labelling machines, and so on. Its unique features make the 3DM683 an ideal solution for applications that require low-speed smoothness and good high speed performance..

Function Description

Function	Description
Microstep Setting	Microstep resolution is programmable. When not in software configured mode, microstep resolution is set by SW5, 6, 7, 8 of the DIP switch. In order to avoid losing steps, do not change the microstep resolution on the fly.
Current Setting	Output current is programmable. When not in software configured mode, operating current is set by SW1,2,3 of the DIP switch. Up to 8.3 A. Select a current setting closest to your motor's required current.
Automatic standstill current reduction;	SW4 is used for the automatic standstill current reduction, self-test and auto-setup function. When the former active, the current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Self-test and auto-setup	If the user changes the status/position of SW4 twice in 1 second, the drive will self-test the driving motor and auto-setup control parameters, offering optimum performance with different motors..
Control Signals	PUL+ and PUL- are for the pulse command signal. DIR+ and DIR- are for the direction control signal. ENA+ and ENA- are for the enable/ disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	U, V, W are for motor connections. Exchanging the connection of two wires to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with output of +20 VDC to +48 VDC, leaving room for power fluctuation and back-EMF.
Indicators	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the motor shaft will be free. Reset the drive by re-powering it to make it function properly after removing problem(s). See its manual for more information.

Parameter Settings

Microstep resolution and output current are programmable. When not in software configured mode, the drive uses an 8-bit DIP switch to set microstep resolution, and motor operating current, as shown below:

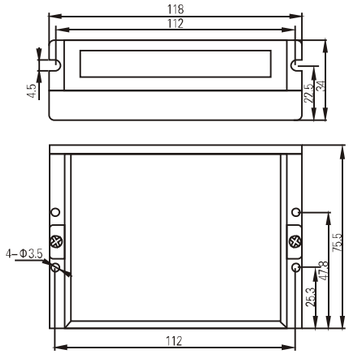


Operating Current Setting

Peak Current	RMS Current	SW1	SW2	SW3
Default (software configured, 0.5-8.3 A)		off	off	off
3.2 A	2.3 A	on	off	off
4.0 A	2.9 A	off	on	off
4.9 A	3.5 A	on	on	off
5.7 A	4.1 A	off	off	on
6.4 A	4.6 A	on	off	on
7.3 A	5.2 A	off	on	on
8.3 A	5.9 A	on	on	on

Mechanical Specifications

Units: mm 1 inch = 25.4mm



Microstep Resolution Setting

Steps/rev.	SW5	SW6	SW7	SW8
Default (software configured)	on	on	on	on
400	off	on	on	on
800	on	off	on	on
1600	off	off	on	on
3200	on	on	off	on
6400	off	on	off	on
12800	on	off	off	on
25600	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
25000	off	off	off	off

Highly Cost-effective

New M Series Analog Stepping Drives

Features

- The 3rd generation of economical high performance stepping drives
- Self-adjustment technology, providing optimal performance with different motors
- Precise current control technology with less motor heating
- 7 models, covering 20 VDC to 112VDC or 18 VAC to 80VAC operating voltage ranges
- Excellent high-speed performance
- Smoother movement at low-speed
- Lower motor noise and heating than most analog stepping drives on the market
- Replace or upgrade all old M series drives

Introduction

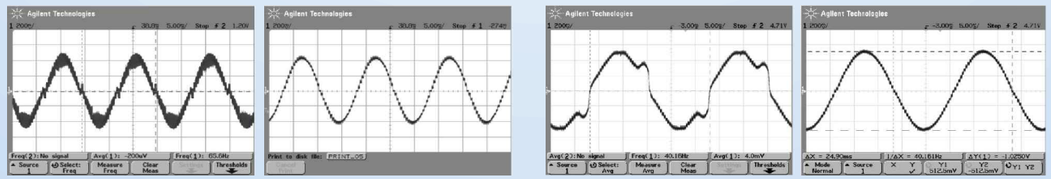
The new M series drives are the latest analog stepping drives Leadshine has developed after more than 12 years R&D experiences. These drives provide better performance and offer higher performance-price ratios. They are the most cost-effective stepping drives on the market.

The new M series stepping drives employ Leadshine's innovative patented control technologies. With the adoption of its pioneer "pure-sinusoidal current control technology" and the latest "self-adjustment technology", those drives can effectively reduce current ripples and mid-range vibration, enabling different motors to run at optimal performance and with lower heating. They can also eliminate drawbacks of difficulty of driving various motors, such as high heating with smaller inductance motors, low high-speed torque with large inductance motors, poor performance under low voltage, and high motor heating under high voltage.

The new M series stepping drives use three digital filters which greatly improve anti-interference performance, and increase the precision and stability of machines.

Application and Position

The new M series includes seven models. DC input models include the M550/M760/M860 V5.0/M880A, and AC & DC input models include the MA550/MA860/MA860H. Suitable to drive 2-phase stepping motors (form NEMA17 to 42) using in industrial and office automation applications. The AC input models cut cost by using a simpler power supply (ie. a transformer without power rectifier).



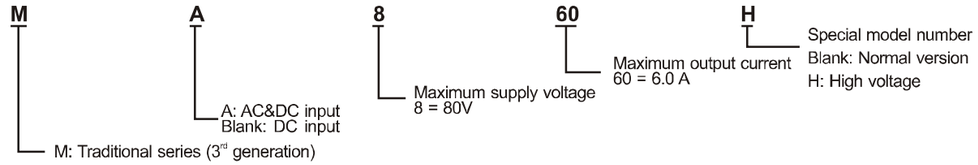
Traditional stepping drives — New M series

Much smaller current ripple means lower motor heating (10℃-20℃ lower)

Traditional stepping drives — New M series

Pure-sinusoidal current control technology means smoother movement (No creep phenomenon)

Part Number



Selection Table

Model	Models to be Replaced	Output Current (A)	Supply Voltage (V)	Size (mm) Weight (g)	Driving Motors (NEMA Size)	Control Signal	
						PUL/DIR; CW/CCW	Single-ended; Differential
M550	M535, M542, ME542	1.2 to 5.0	20 to 45VDC	118*75.5*34 271	14, 17, 23	PUL/DIR; CW/CCW	Single-ended; Differential
M760	M840, M839, ME742	1.45 to 6.0	20 to 70VDC	118*75.5*34 280	14, 17, 23, 34	PUL/DIR; CW/CCW	Single-ended; Differential
M860 V5.0	M860	2.4 to 7.2	24 to 80VDC	151*97*48 570	17, 23, 34	PUL/DIR; CW/CCW	Single-ended; Differential
MA550	MA535B	1.0 to 5.0	18 to 33VAC	132*76*45 300	14, 17, 23	PUL/DIR; CW/CCW	Single-ended; Differential
M880A	M860, M880, ME872	2.5 to 7.8	24 to 75VDC	151*97*48 565	23, 34, 42	PUL/DIR; CW/CCW	Single-ended; Differential
MA860	M860, M880, MD882	2.4 to 7.2	24 to 60VAC	151*97*48 570	23, 34	PUL/DIR; CW/CCW	Single-ended; Differential
MA860H		2.4 to 7.2	36 to 80VAC	151*97*52 590	34, 42	PUL/DIR; CW/CCW	Single-ended; Differential

Operating Environment and Other Specifications

Cooling	Natural cooling or forced cooling	
Operating Environment	Environment	Avoid dust, oil fog and corrosive gases
	Ambient Temperature	0 to +50 ℃
	Humidity	40-90% RH
	Vibration	5.9m/s² MAX
Storage Temperature	-20 to 125 ℃	

Tips

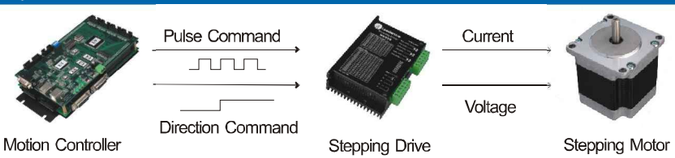
1. Working temperature for M series drives should below 70℃ (158°F); and motor working temperature should below 80℃ (176°F). Use automatic idle-current function to reduce drive and motor heating when a motor stops. Use forced cooling to cool the system if necessary.

2. To improve anti-interference performance of the system, use twisted pair shielded cable for control signals and correctly ground the system. To prevent noise coupling on pulse/direction signals, pulse/direction signal wires, motor wires and power wires should not be tied up together. Separate them by at least 10 centimeters (4 inches) to avoid disturbing signals generated by a stepping motor, which can easily disturb pulse and direction signals and cause motor position error, system instability and other failures.

3. Don't pull and plug motor or power wires while a stepping drive is powered ON, because there is high current flowing through motor coils (even stopped). Doing that would result in extremely high voltage surge, and could damage the drive.

4. If a power supply serves multiple drives, separately connecting the drives (each in a star arrangements) is recommended instead of daisy-chain arrangement. Contact Leadshine technical support for detail by phone at 86-755-2641-8447, by fax at 86-755-2640-2718, or by email at tech@leadshine.com.

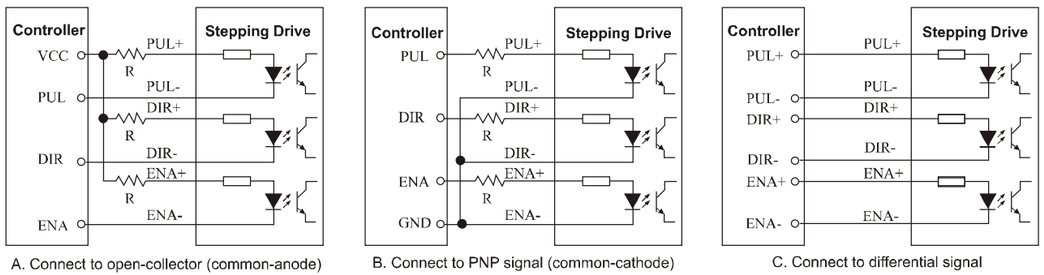
Typical Stepping System



Control Signal Interface and Timing Chart

The M series drives can accept differential and single-ended inputs, including open-collector and PNP signals. The drives have 3 optically isolated logic inputs which are located on connector P1 to accept line driver control signals. The inputs are isolated to minimize or eliminate electrical noises coupling onto the drive control signals. Use line driver control signals to increase noise immunity of a drive in interference environments. In the following figures, connections to open-collector and PNP signals are illustrated. In order to avoid some fault operations and deviations, PUL, DIR and ENA should abide by the timing rules shown in the following timing diagram. Connections and timing diagram of control signals are shown in the following figures.

Control signal connections



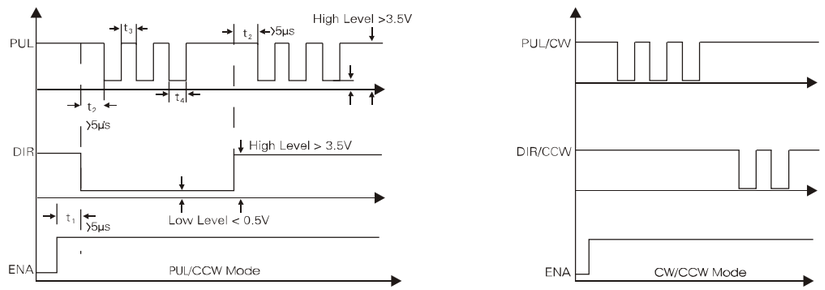
A. Connect to open-collector (common-anode)

B. Connect to PNP signal (common-cathode)

C. Connect to differential signal

Series connect resistors for current-limiting when +12V or +24V used. R=1K (>0.25W) if VCC=12V; R=2K (>0.25W) if VCC=24V. Make sure that the current through the opto-coupler is between 7 mA and 16 mA.

In order to avoid faults in operations, PUL, DIR and ENA signals should abide by the timing rules shown in this timing diagram.



Notes:

(a) t1: ENA must be ahead of DIR by at least 5 μ s. Usually, ENA+ and ENA- are NC (not connected), drive is enabled.
(b) t2: DIR must be ahead of PUL's effective edge by 5 μ s to ensure correct direction;
(c) t3: High level width not less than 1.5 μ s (New M series);
(d) t4: Low level width not less than 1.5 μ s (New M series).

Problem Symptoms and Possible Causes

Symptoms	Possible Causes
Motor is not rotating	No power
	No motion command signal
	DIP switch current or microstep resolution setting is wrong
	Fault condition exists
	The drive is disabled
	Drive failure
Motor rotates in wrong direction	Motor phases may be connected in reverse
	Direction control signal may be in reverse
	Opto-coupler for DIR inputs is broken
Drive is in fault	Over voltage protection
	Over current protection
	Something wrong with motor coil
Erratic motor motion	Control signal is too weak or interfered
	Wrong motor connection
	Something wrong with motor coil
	Current setting is too small, losing steps
Motor stalls during acceleration	Current setting is too small, not enough torque
	Motor is undersized for the application
	Acceleration is set too high
	Power supply voltage too low
Excessive motor and drive heating	Inadequate heat sinking / cooling
	Automatic current reduction function not being utilized
	Current is set too high
	Supply voltage too high

DM SERIES
DM320C
DM422C
DM432C
DM442
DM556
DM856
DM870
3DM683
M SERIES
M550
M760
M860 V5.0
M880A
MA860
MA860H
M415B
ND2282

M542 V2.0

Introduction

The M542 is a high performance microstepping drive based on pure-sinusoidal current control and self-adjustment (self-adjust current control parameters according to different motors) technologies. Driven motors can run with lower noise, lower heating, smoother movement and have better performance at higher speed than most drives on the market. It is suitable for driving 2-phase and 4-phase hybrid stepping motors from NEMA14 to NEMA34.

Applications

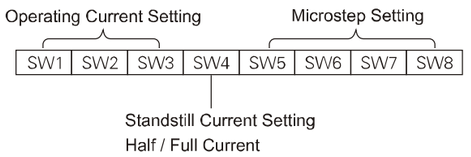
Suitable for a wide range of stepping motors from NEMA size 14 to NEMA34. Widely used in various kinds of machines, such as CNC routers, labelling machines, laser machines, X-Y tables, pick-place devices, and so on. Particularly suitable for the applications require low cost, low noise, low heating and high speed performance.

Function Description

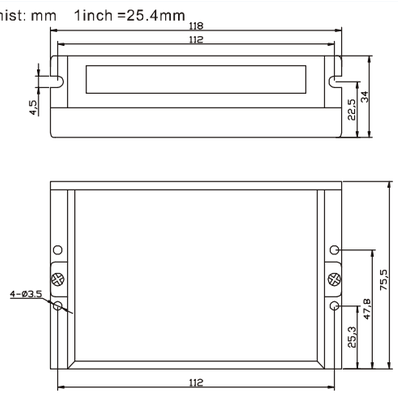
Function	Description
Microstep Setting	15 selectable microstep resolutions up to 256,00 steps/rev. Set by SW5, 6, 7, 8 of the DIP switch. In order to avoid losing steps, do not change the microstep on the fly.
Current Setting	The first three bits (SW1, 2, 3) of the DIP switch are used to set the operating current, which is up to 4.2 A. Select a current setting closest to your motor's required current.
Automatic Standstill Current Reduction	SW4 is used for the automatic standstill current reduction function. When this function is active, the current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Control Signals	PUL+ and PUL- are for the pulse command signal. DIR+ and DIR- are for the direction control signal. ENA+ and ENA- are for the enable/disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with theoretical output of +20 VDC to +45 VDC, leaving room for power fluctuation and back-EMF.
Indicators	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the motor shaft will be free. Reset the drive by re-powering it to make it function properly after removing problem(s).

Parameter Settings

This M542 uses an 8-bit DIP switch to set microstep resolution, and motor operating current, as shown below.



Mechanical Specifications



Operating Current Setting

Peak Current	RMS Current	SW1	SW2	SW3
1.00 A	0.71 A	on	on	on
1.46 A	1.04 A	off	on	on
1.91 A	1.36 A	on	off	on
2.37 A	1.69 A	off	off	on
2.84 A	2.03 A	on	on	off
3.31 A	2.36 A	off	on	off
3.76 A	2.69 A	on	off	off
4.20 A	3.00 A	off	off	off

Microstep Resolution Setting

Steps/rev.	SW5	SW6	SW7	SW8
400	off	on	on	on
800	on	off	on	on
1600	off	off	on	on
3200	on	on	off	on
6400	off	on	off	on
12800	on	off	off	on
25600	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
25000	off	off	off	off

M550

Introduction

The M550 is a high performance microstepping drive based on pure-sinusoidal current control and self-adjustment (self-adjust current control parameters according to different motors) technologies. Driven motors can run with lower noise, lower heating, smoother movement and have better performance at higher speed than most drives on the market. It is suitable for driving 2-phase and 4-phase hybrid stepping motors from NEMA14 to NEMA34.

Applications

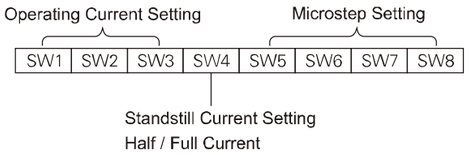
Suitable for a wide range of stepping motors from NEMA size 14 to NEMA34. Widely used in various kinds of machines, such as CNC routers, labelling machines, laser machines, X-Y tables, pick-place devices, and so on. Particularly suitable for the applications require low cost, low noise, low heating and high speed performance.

Function Description

Function	Description
Microstep Setting	15 selectable microstep resolutions up to 256,00 steps/rev. Set by SW5, 6, 7, 8 of the DIP switch. In order to avoid losing steps, do not change the microstep on the fly.
Current Setting	The first three bits (SW1, 2, 3) of the DIP switch are used to set the operating current, which is up to 5.0 A. Select a current setting closest to your motor's required current.
Automatic Standstill Current Reduction	SW4 is used for the automatic standstill current reduction function. When this function is active, the current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Control Signals	PUL+ and PUL- are for the pulse command signal. DIR+ and DIR- are for the direction control signal. ENA+ and ENA- are for the enable/ disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with theoretical output of +20 VDC to +45 VDC, leaving room for power fluctuation and back-EMF.
Indicators	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the motor shaft will be free. Reset the drive by re-powering it to make it function properly after removing problem(s).

Parameter Settings

This M550 uses an 8-bit DIP switch to set microstep resolution, and motor operating current, as shown below.

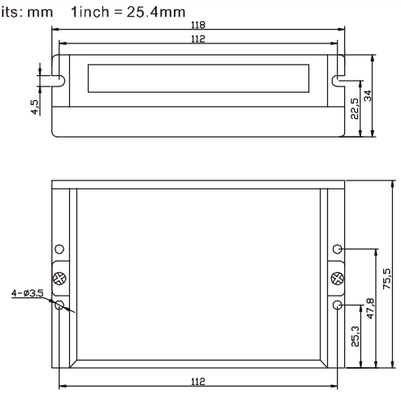


Operating Current Setting

Peak Current	RMS Current	SW1	SW2	SW3
1.20 A	0.84 A	on	on	on
1.74 A	1.24 A	off	on	on
2.27 A	1.62 A	on	off	on
2.82 A	1.99 A	off	off	on
3.42 A	2.42 A	on	on	off
3.94 A	2.81 A	off	on	off
4.47 A	3.20 A	on	off	off
5.0 A	3.57 A	off	off	off

Mechanical Specifications

Units: mm 1inch = 25.4mm



Microstep Resolution Setting

Steps/rev.	SW5	SW6	SW7	SW8
400	off	on	on	on
800	on	off	on	on
1600	off	off	on	on
3200	on	on	off	on
6400	off	on	off	on
12800	on	off	off	on
25600	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
25000	off	off	off	off

M760

Introduction

The M760 is a high performance microstepping drive based on pure-sinusoidal current control and self-adjustment (self-adjust current control parameters according to different motors) technologies. Driven motors can run with lower noise, lower heating, smoother movement and have better performance at higher speed than most drives on the market. It is suitable for driving 2-phase and 4-phase hybrid stepping motors from NEMA14 to NEMA34.

Applications

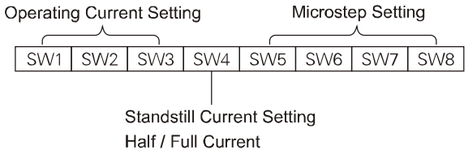
Suitable for a wide range of stepping motors from NEMA14 to NEMA34. Widely used in various kinds of machines, such as CNC routers, labelling machines, laser machines, X-Y tables, pick-place devices, and so on. Particularly suitable for the applications require low cost, low noise, low heating and high speed performance.

Function Description

Function	Description
Microstep Setting	16 selectable microstep resolutions up to 512,00 steps/rev. Set by SW5, 6, 7, 8 of the DIP switch. In order to avoid losing steps, do not change the microstep on the fly.
Current Setting	The first three bits (SW1, 2, 3) of the DIP switch are used to set the operating current, which is up to 6.0A. Select a current setting closest to your motor's required current.
Automatic Standstill Current Reduction	SW4 is used for the automatic standstill current reduction function. When this function is active, the current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Control Signals	PUL+ and PUL- are for the pulse command signal. DIR+ and DIR- are for the direction control signal. ENA+ and ENA- are for the enable/disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with theoretical output of +20 VDC to +68VDC, leaving room for power fluctuation and back-EMF.
Indicators	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the motor shaft will be free. Reset the drive by re-powering it to make it function properly after removing problem(s).

Parameter Settings

This M760 uses an 8-bit DIP switch to set microstep resolution, and motor operating current, as shown below.

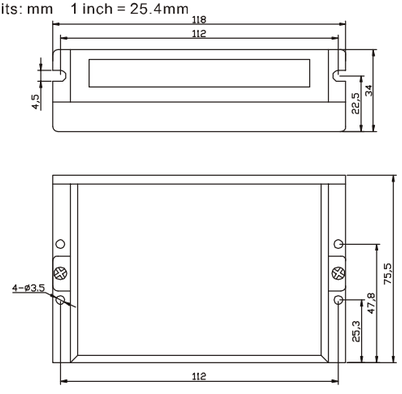


Operating Current Setting

Peak Current	RMS Current	SW1	SW2	SW3
1.45 A	1.03 A	on	on	on
2.08 A	1.47 A	off	on	on
2.72 A	1.93 A	on	off	on
3.37 A	2.38 A	off	off	on
4.05 A	2.86 A	on	on	off
4.72 A	3.34 A	off	on	off
5.35 A	3.79 A	on	off	off
6.0 A	4.24 A	off	off	off

Mechanical Specifications

Units: mm 1 inch = 25.4mm



Microstep Resolution Setting

Steps/rev.	SW5	SW6	SW7	SW8
400	on	on	on	on
800	off	on	on	on
1600	on	off	on	on
3200	off	off	on	on
6400	on	on	off	on
12800	off	on	off	on
25600	on	off	off	on
51200	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
40000	off	off	off	off

M860 V5.0

Introduction

The M860 V5.0 is a high performance microstepping drive based on pure-sinusoidal current control and self-adjustment (self-adjust current control parameters according to different motors) technologies. Driven motors can run with lower noise, lower heating, smoother movement and have better performance at higher speed than most drives on the market. It is suitable for driving 2-phase and 4-phase hybrid stepping motors from NEMA23 to NEMA42.

Applications

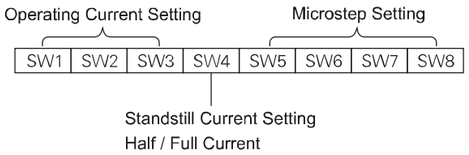
Suitable for a wide range of stepping motors from NEMA23 to NEMA42. Widely used in various kinds of machines, such as CNC routers, cutting machines, packing devices, pick-place devices, and so on. Particularly suitable for the applications require low noise and high speed performance.

Function Description

Function	Description
Microstep Setting	16 selectable microstep resolutions up to 512,00 steps/rev. Set by SW5, 6, 7, 8 of the DIP switch. In order to avoid losing steps, do not change the microstep on the fly.
Current Setting	The first three bits (SW1, 2, 3) of the DIP switch are used to set the operating current, which is up to 7.2 A.. Select a setting closest to your motor's required current.
Automatic Standstill Current Reduction	SW4 is used for the automatic standstill current reduction function. When this function is active, the current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Control Signals	PUL+ and PUL- are for the pulse command signal. DIR+ and DIR- are for the direction control signal. ENA+ and ENA- are for the enable/disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with theoretical output of +24 VDC to +68 VDC, leaving room for power fluctuation and back-EMF.
Indicators	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the motor shaft will be free. Reset the drive by re-powering it to make it function properly after removing problem(s).

Parameter Settings

This M860 V5.0 uses an 8-bit DIP switch to set microstep resolution, and motor operating current, as shown below.

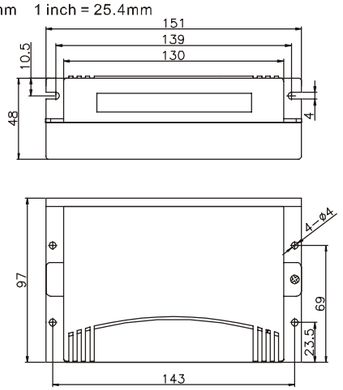


Operating Current Setting

Peak Current	RMS Current	SW1	SW2	SW3
2.40 A	1.70 A	on	on	on
3.08 A	2.18 A	off	on	on
3.77 A	2.67 A	on	off	on
4.45 A	3.15 A	off	off	on
5.14 A	3.63 A	on	on	off
5.83 A	4.12 A	off	on	off
6.52 A	4.61 A	on	off	off
7.20 A	5.09 A	off	off	off

Mechanical Specifications

Units: mm 1 inch = 25.4mm



Microstep Resolution Setting

Steps/rev.	SW5	SW6	SW7	SW8
400	on	on	on	on
800	off	on	on	on
1600	on	off	on	on
3200	off	off	on	on
6400	on	on	off	on
12800	off	on	off	on
25600	on	off	off	on
51200	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
40000	off	off	off	off

M880A

Introduction

The M880A is a high performance microstepping drive based on pure-sinusoidal current control and self-adjustment (self-adjust current control parameters according to different motors) technologies. Driven motors can run with lower noise, lower heating, smoother movement and have better performance at higher speed than most drives on the market. It is suitable for driving 2-phase and 4-phase hybrid stepping motors from NEMA23 to NEMA42.

Applications

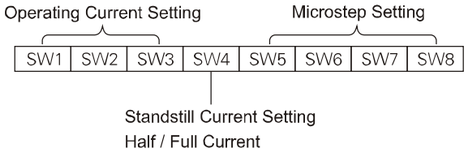
Suitable for a wide range of stepping motors from NEMA23 to NEMA42. Widely used in various kinds of machines, such as CNC routers, cutting machines, electronic manufacturing, packing, pick-place devices, and so on. Particularly suitable for the applications require low cost, low noise and high speed performance.

Function Description

Function	Description
Microstep Setting	16 selectable microstep resolutions up to 512,00 steps/rev. Set by SW5, 6, 7, 8 of the DIP switch. In order to avoid losing steps, do not change the microstep on the fly.
Current Setting	The first three bits (SW1, 2, 3) of the DIP switch are used to set the operating current, which is up to 7.8 A.. Select a setting closest to your motor's required current.
Automatic Standstill Current Reduction	SW4 is used for the automatic standstill current reduction function. When this function i active, the current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Control Signals	PUL+ and PUL- are for the pulse command signal. DIR+ and DIR- are for the direction control signal. ENA+ and ENA- are for the enable/ disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with theoretical output of +24 VDC to +68 VDC, leaving room for power fluctuation and back-EMF.
Indicators	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the motor shaft will be free. Reset the drive by re-powering it to make it function properly after removing problem(s).

Parameter Settings

This M880A uses an 8-bit DIP switch to set microstep resolution, and motor operating current, as shown below.

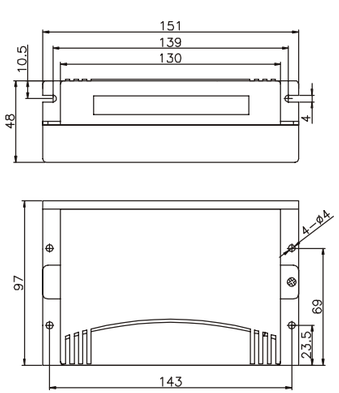


Operating Current Setting

Peak Current	RMS Current	SW1	SW2	SW3
2.80A	2.00 A	on	on	on
3.50A	2.50 A	off	on	on
4.20A	3.00 A	on	off	on
4.90A	3.50 A	off	off	on
5.70A	4.07 A	on	on	off
6.40A	4.57 A	off	on	off
7.00A	5.00 A	on	off	off
7.80A	5.57 A	off	off	off

Mechanical Specifications

Unist: mm 1 inch = 25.4mm



Microstep Resolution Setting

Steps/rev.	SW5	SW6	SW7	SW8
400	on	on	on	on
800	off	on	on	on
1600	on	off	on	on
3200	off	off	on	on
6400	on	on	off	on
12800	off	on	off	on
25600	on	off	off	on
51200	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
40000	off	off	off	off

MA860

Introduction

The MA860 is a high performance microstepping drive based on pure-sinusoidal current control and self-adjustment (self-adjust current control parameters according to different motors) technologies. Driven motors can run with lower noise, lower heating, smoother movement and have better performance at higher speed than most drives on the market. It is suitable for driving 2-phase and 4-phase hybrid stepping motors from NEMA23 to NEMA42.

Applications

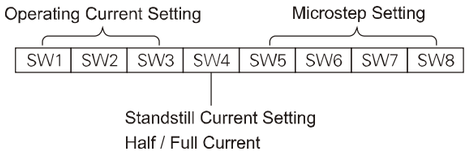
Suitable for a wide range of stepping motors from NEMA23 to NEMA42. Widely used in various kinds of machines, such as CNC routers, cutting machines, packing devices, pick-place devices, and so on. Particularly suitable for the applications require low cost, low noise, low heating and high speed performance.

Function Description

Function	Description
Microstep Setting	16 selectable microstep resolutions up to 512,00 steps/rev. Set by SW5, 6, 7, 8 of the DIP switch. In order to avoid losing steps, do not change the microstep on the fly.
Current Setting	The first three bits (SW1, 2, 3) of the DIP switch are used to set the operating current, which is up to 7.2 A.. Select a setting closest to your motor's required current.
Automatic Standstill Current Reduction	SW4 is used for the automatic standstill current reduction function. When this function is active, the current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Control Signals	PUL+ and PUL- are for the pulse command signal. DIR+ and DIR- are for the direction control signal. ENA+ and ENA- are for the enable/ disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with theoretical output of 18 to 50VAC or +20 to 68VDC, leaving room for power fluctuation and back-EMF.
Indicators	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the motor shaft will be free. Reset the drive by repowering it to make it function properly after removing problem(s).

Parameter Settings

This MA860 uses an 8-bit DIP switch to set microstep resolution, and motor operating current, as shown below.

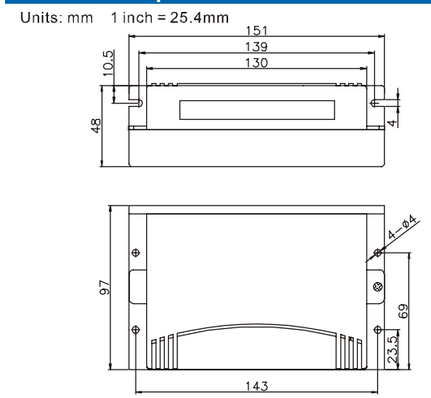


Operating Current Setting

Peak Current	M860 REF Current	SW1	SW2	SW3
2.40 A	2.00 A	on	on	on
3.08 A	2.57 A	off	on	on
3.77 A	3.14 A	on	off	on
4.45 A	3.71 A	off	off	on
5.14 A	4.28 A	on	on	off
5.83 A	4.86 A	off	on	off
6.52 A	5.43 A	on	off	off
7.20 A	6.00 A	off	off	off

Mechanical Specifications

Units: mm 1 inch = 25.4mm



Microstep Resolution Setting

Steps/rev.	SW5	SW6	SW7	SW8
400	on	on	on	on
800	off	on	on	on
1600	on	off	on	on
3200	off	off	on	on
6400	on	on	off	on
12800	off	on	off	on
25600	on	off	off	on
51200	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
40000	off	off	off	off

MA860H

Introduction

The MA860H is a high performance microstepping drive based on pure-sinusoidal current control and self-adjustment (self-adjust current control parameters according to different motors) technologies. Driven motors can run with lower noise, lower heating, smoother movement and have better performance at higher speed than most drives on the market. It is suitable for driving 2-phase and 4-phase hybrid stepping motors from NEMA34 to NEMA42.

Applications

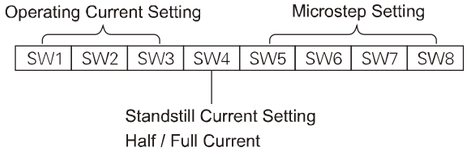
Suitable for a wide range of stepping motors from NEMA34 to NEMA42. Widely used in various kinds of machines, such as CNC routers, cutting machines, packing devices, pick-place devices, and so on. Particularly suitable for the applications require low cost, low noise, low heating and high speed performance.

Function Description

Function	Description
Microstep Setting	16 selectable microstep resolutions up to 512,00 steps/rev. Set by SW5, 6, 7, 8 of the DIP switch. In order to avoid losing steps, do not change the microstep on the fly.
Current Setting	The first three bits (SW1, 2, 3) of the DIP switch are used to set the operating current, which is up to 7.2 A.. Select a setting closest to your motor's required current.
Automatic Standstill Current Reduction	SW4 is used for the automatic standstill current reduction function. When this function is active, the current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Control Signals	PUL+ and PUL- are for the pulse command signal. DIR+ and DIR- are for the direction control signal. ENA+ and ENA- are for the enable/ disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with theoretical output of 24 to 80VAC or + 36 to 112VDC, leaving room for power fluctuation and back-EMF.
Indicators	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the motor shaft will be free. Reset the drive by repowering it to make it function properly after removing problem(s).

Parameter Settings

This MA860H uses an 8-bit DIP switch to set microstep resolution, and motor operating current, as shown below.

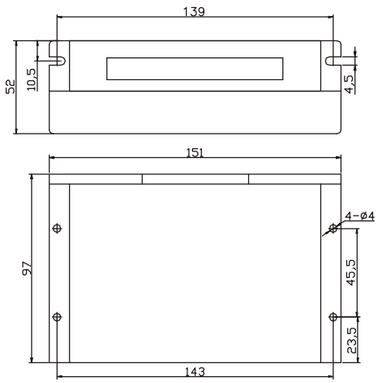


Operating Current Setting

Peak Current	M860 REF Current	SW1	SW2	SW3
2.40 A	2.00 A	on	on	on
3.08 A	2.57 A	off	on	on
3.77 A	3.14 A	on	off	on
4.45 A	3.71 A	off	off	on
5.14 A	4.28 A	on	on	off
5.83 A	4.86 A	off	on	off
6.52 A	5.43 A	on	off	off
7.20 A	6.00 A	off	off	off

Mechanical Specifications

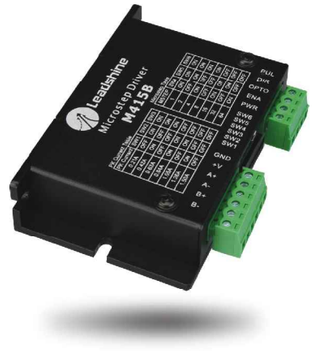
Units: mm 1 inch = 25.4mm



Microstep Resolution Setting

Steps/rev.	SW5	SW6	SW7	SW8
400	on	on	on	on
800	off	on	on	on
1600	on	off	on	on
3200	off	off	on	on
6400	on	on	off	on
12800	off	on	off	on
25600	on	off	off	on
51200	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
40000	off	off	off	off

M415B



Introduction

The M415B is a micro size high performance microstepping drive based on one of the most advanced technologies in the world today. It's suitable for driving any 2-phase and 4-phase hybrid stepping motors. By using advanced bipolar constant-current chopping technique, it can output more speed and power from the same motor, compared with traditional drives like L/R drivers.

Applications

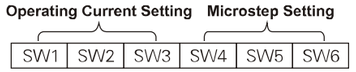
Suitable for a wide range of stepping motors from NEMA10 to NEMA23. Widely used in various kinds of machines, such as CNC routers, cutting machines, packing devices, pick-place devices, and so on. Particularly suitable for the applications require low cost, low noise, low heating.

Function Description

Function	Description
Microstep Setting	7 selectable microstep resolutions up to 12,800 steps/rev. Set by SW4, 5, 6 of the DIP switch. In order to avoid losing steps, do not change the microstep on the fly.
Current Setting	The first three bits (SW1, 2, 3) of the DIP switch are used to set the operating current, which is up to 1.5 A.. Select a setting closest to your motor's required current.
Automatic Standstill Current Reduction	The current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Control Signals	OPTO is for the opto-coupler power supply, and its typical voltage is +5V. PUL is for the pulse command signal. DIR is for direction control signal. ENA is for the enable/ disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with output of +18 to 36VDC, leaving room for power fluctuation and back-EMF.
Indicators	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the motor shaft will be free. Reset the drive by re-powering it to make it function properly after removing problem(s).

Parameter Settings

This M415B uses a 6-bit DIP switch to set microstep resolution, and motor operating current, as shown below.



Operating Current Setting

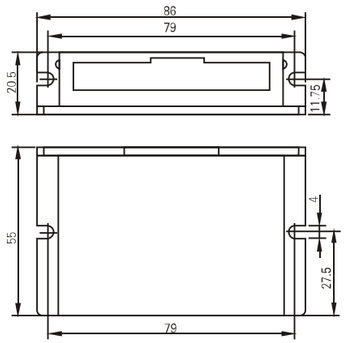
Peak Current	SW1	SW2	SW3
0.21 A	off	on	on
0.42 A	on	off	on
0.63 A	off	off	on
0.84 A	on	on	off
1.05 A	off	on	off
1.26 A	on	off	off
1.50 A	off	off	off

Microstep Resolution Setting

Steps/rev.	SW4	SW5	SW6
200	on	on	on
400	off	on	on
800	on	off	on
1600	off	off	on
3200	on	on	off
6400	off	on	off
12800	on	off	off

Mechanical Specifications

Units: mm 1 inch = 25.4mm



ND2282

Introduction

The ND2282 is a high voltage, high performance and low noise microstepping drive based on pure-sinusoidal current control technology. It's suitable for driving 2-phase and 4-phase hybrid stepping motors. Its advanced bipolar constant-current chopping and pure-sinusoidal current control technology allows coil current to be well controlled with relatively small current ripple, therefore smaller motor noise and less motor heating can be achieved. In addition, the ND2282 has a built-in EMI filter and a built-in braking resistor which can make the drive operate with higher reliability.

Applications

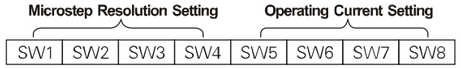
Suitable for a wide range of stepping motors, from NEMA34 to NEMA51 used in large and medium automation machines and equipment, such as engraving machines, labeling machines, cutting machines, laser phototypesetting systems, plotting instruments, pick-place devices, and so on. Particularly adapt to the applications that require low motor noise, low motor heating, high speed and high precision.

Function Description

Function	Description
Microstep Setting	16 selectable microstep resolutions up to 25,600 steps/rev. Microstep resolution is set by SW1, 2, 3, 4 of the DIP switch. In order to avoid losing steps, do not change the microstep resolution on the fly.
Current Setting	Operating current is set by SW5, 6, 7, 8 of the DIP switch. Up to 8.2 A. Select a current setting closest to your motor's required current.
Automatic standstill current reduction	The current will automatically reduced to 60% of the selected operating current 0.4 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2*R$) of the original value.
Control Signals	PUL+ and PUL- are for the pulse command signal. DIR+ and DIR- are for the direction control signal. ENA+ and ENA- are for the enable/ disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.
Motor Connector	A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.
Power Connector	Recommended to use power supplies with output of 80 VAC to 220 VAC, leaving room for power fluctuation and back-EMF.
Indicators & Alarm Signal	There are two LED indicators on the drive for power and alarm signals. When the Green LED is on means the drive is powered up, and when the Red LED is on means the drive is in fault status. When in fault status, the alarm signal output will be pulled down from High Level (4.0V-5.0V) to Low Level (0 - 0.5V), and motor shaft will be free. Reset the drive by re-powering it to make it function properly after removing problem(s).

Parameter Settings

The drive uses an 8-bit DIP switch to set microstep resolution, and motor operating current, as shown below:



Operating Current Setting

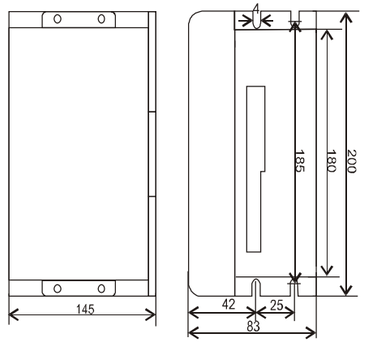
Peak Current (A)	SW5	SW6	SW7	SW8
0.7	OFF	OFF	OFF	OFF
1.2	OFF	OFF	OFF	ON
1.72	OFF	OFF	ON	OFF
2.2	OFF	OFF	ON	ON
2.75	OFF	ON	OFF	OFF

Operating Current Setting

Peak Current (A)	SW5	SW6	SW7	SW8
3.28	OFF	ON	OFF	ON
3.75	OFF	ON	ON	OFF
4.22	OFF	ON	ON	ON
4.72	ON	OFF	OFF	OFF
5.2	ON	OFF	OFF	ON
5.78	ON	OFF	ON	OFF
6.25	ON	OFF	ON	ON
6.78	ON	ON	OFF	OFF
7.31	ON	ON	OFF	ON
7.81	ON	ON	ON	OFF
8.2	ON	ON	ON	ON

Mechanical Specifications

Units: mm 1 inch = 25.4mm



Microstep Resolution Setting

Steps/rev.	SW1	SW2	SW3	SW4
200	ON	ON	ON	ON
400	OFF	ON	ON	ON
800	ON	OFF	ON	ON
1600	OFF	OFF	ON	ON
3200	ON	ON	OFF	ON
6400	OFF	ON	OFF	ON
12800	ON	OFF	OFF	ON
25600	OFF	OFF	OFF	ON
1000	ON	ON	ON	OFF
2000	OFF	ON	ON	OFF
4000	ON	OFF	ON	OFF
5000	OFF	OFF	ON	OFF
8000	ON	ON	OFF	OFF
10000	OFF	ON	OFF	OFF
20000	ON	OFF	OFF	OFF
25000	OFF	OFF	OFF	OFF

Stepping Motors

Selection Guide — — — — — 31

2-phase Stepping Motors

35HSxx — — — — — — 33

39HSxx — — — — — — 33

42HSxx — — — — — — 34

57HSxx — — — — — — 35

86HSxx — — — — — — 36

110HSxx — — — — — — 37

130HSxx — — — — — — 38

3-phase Stepping Motors

573Sxx — — — — — — 39

863Sxx — — — — — — 40

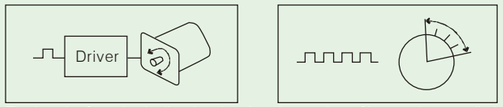
Speed-Torque Curves of 2-phase Motors 41

Speed-Torque Curves of 3-phase Motors 42

Stepping Motor Basic

A stepping motor is an electromechanical device which converts electrical pulses into discrete mechanical movements. The shaft or spindle of a stepping motor rotates in discrete step increments when electrical command pulses are applied to it in a proper sequence. The motor rotation has several direct relationships to these applied input pulses. The sequence of the applied pulses is directly related to the direction of motor shafts rotation. The speed of the motor shafts rotation is directly related to the frequency of the input pulses and the length of rotation is directly related to the number of input pulses applied.

A stepping motor can be a good choice whenever controlled movement is required. They can be used in applications where you need to control rotation angle, speed, position and synchronism. Because of the inherent advantages, stepping motors have found their places in many different applications, such as CNC routers, laser machines, and so on.



The length of rotation is directly related to the number of input pulses applied.

Stepping Motor Types

There are three basic stepping motor types. They are variable-reluctance, permanent-magnet and hybrid.

Variable-reluctance (VR)

This type of motor consists of a soft iron multi-toothed rotor and a wound stator. When the stator windings are energized with DC current the poles become magnetized. Rotation occurs when the rotor teeth are attracted to the energized stator poles.

Permanent Magnet (PM)

Often referred to as a "tin can" or "canstock" motor, the permanent magnet step motor is a low cost and low resolution type motor. PM motors as the name implies have permanent magnets added to the motor structure. The magnetized rotor poles provide an increased magnetic flux intensity and because of this the PM motor exhibits improved torque characteristics when compared with the VR type.

Hybrid (HB)

The hybrid stepping motor provides better performance with respect to step resolution, torque and speed. The hybrid stepping motor combines the best features of both the PM and VR type stepping motors. The rotor is multi-toothed like the VR motor and contains an axially magnetized concentric magnet around its shaft. This further increases the detent, holding and dynamic torque characteristics of the motor when compared with both the VR and PM types. Generally speaking, the hybrid motor may be the better choice along with reducing cost, for it offers better performance with respect to step resolution, torque and speed.

Normal Selection Steps

You can follow the following steps to choose a stepping motor.

1. Determining the Drive Mechanism Component

Determine the mechanism and required specifications. First, determine certain features of the design, such as mechanism, rough dimensions, distances moved, and positioning period.

2. Calculate the Required Resolution

Find the resolution the motor requires. From the required resolution, determine whether a motor only or a geared motor is to be used. The resolution and positioning accuracy of a stepping motor system is affected by several factors—the stepping angle, the selected drive mode (full-step, half-step or microstepping), and the gear rate.

3. Determine the Operating Pattern

Determine the operating pattern that fulfills the required specifications. Find the acceleration (deceleration) period and operating pulse speed in order to calculate the acceleration torque.

4. Calculate the Required Torque

Calculate the load torque and acceleration torque and find the required torque demanded by the motor.

5. Select the Motor

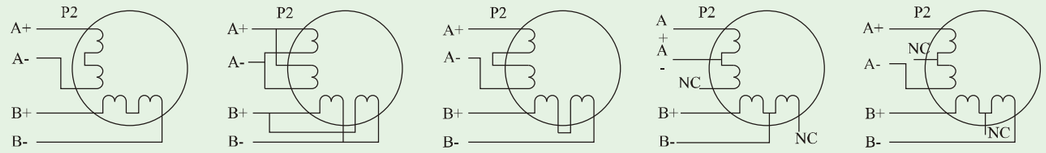
Make a provisional selection of a motor based on required torque. Determine the motor to be used from the speed-torque characteristics.

6. Check the Selected Motor

Confirm the acceleration/deceleration rate and inertia ratio.

Motor Connections

The M series drives can drive any 2-phase, 4-phase hybrid stepping motors, including 4-lead, 6-lead and 8-lead motors. Step angle of the motors can be 1.8 or 0.9 degree. For 6-lead and 8-lead stepping motors, different connections have different performance shown in the following figures.



4-lead

8-lead Parallel connection
Better high speed performance
due to smaller inductance

8-lead Series connection
Same low-speed performance as parallel
connection with smaller current

6-lead half-coil connection
Better high speed performance
due to smaller inductance

6-lead Series connection
Higher torque than half-coil at
low speed with the same current

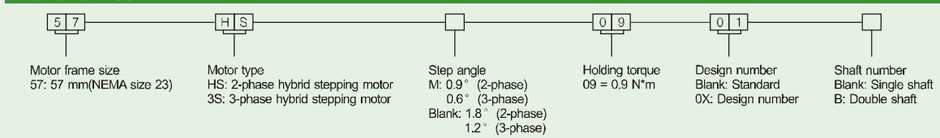
Leadshine's Stepping Motors

Leadshine offers 2-phase and 3-phase stepping motors from NEMA14 to NEMA51. Made of high quality cold roll sheet copper and anti-high temperature permanent magnet, these stepping motors are highly reliable and generate low motor heating. Because of their nice internal damping characteristics, those stepping motors can run very smoothly and have no obvious resonance area within the whole speed ranges.

Selection Table

Phase	NEMA Size	Model	Step Angle (°)	# of Leads	Connection	Current/Phase (A)	Holding Torque (Nm)	Length L (mm)	Weight (kg)	Match Drives
2	14	35HS01	1.8	4	-	0.4	0.07	26	0.15	DM320C/DM422C/DM442/M415B
	16	39HS02	1.8	4	-	0.6	0.22	34	0.2	DM320C/DM422C/DM442/M415B
	17	42HS02	1.8	4	-	0.4	0.22	40	0.24	DM320C/DM422C/DM442/M415B
		42HS03	1.8	8	Parallel	1.4	0.47	48	0.34	DM320C/DM422C/DM442/M415B
					Series	0.7	0.47			
					Unipolar	1.0	0.34			
	23	57HS04	1.8	6	Series	2.0	0.4	41	0.45	DM442/DM556/M550
					Unipolar	2.8	0.28			
		57HS09	1.8	8	Parallel	4.2	1.3	54	0.6	DM442/DM556/M550/M760
					Series	2.1	1.3			
					Unipolar	2.8	0.9			
		57HS13	1.8	8	Parallel	4.0	1.8	76	1.0	DM442/DM556/M550/M760
					Series	2.0	1.8			
					Unipolar	2.8	1.3			
		57HS22	1.8	8	Parallel	5.6	2.2	81	1.15	DM442/DM556/M550/M760
					Series	2.8	2.2			
					Unipolar	4.0	1.5			
	34	86HS35	1.8	8	Parallel	4.0	3.5	65	1.7	DM870/M760/M860/M880A
					Series	2.0	3.5			
					Unipolar	2.8	2.5			
		86HS45	1.8	8	Parallel	6.0	4.5	80	2.3	DM870/DM1182/M860/M880A
					Series	3.0	4.5			
					Unipolar	4.2	3.2			
		86HS85	1.8	8	Parallel	6.8	8.5	118	3.8	DM870/DM1182/M880A/ND2282
					Series	3.4	8.5			
					Unipolar	4.9	6.0			
	42	110HS12	1.8	4	-	5.0	12	99	5.0	DM1182/ND2282
		110HS20	1.8	4	-	6.5	20	150	8.4	DM1182/ND2282
	51	130HS27	1.8	4	-	6.0	27	227	13	DM1182/ND2282
		130HS45	1.8	4	-	7.0	45	283	19	DM1182/ND2282
3	23	573S05	1.2	6	Delta	5.2	0.45	42	0.45	3DM683/3DM883
		573S09	1.2	6	Delta	3.5	0.9	50	0.75	3DM683/3DM883
		573S15	1.2	6	Delta	5.8	1.3	76	1.1	3DM683/3DM883
	34	863S22	1.2	6	Delta	5.0	2.3	71	1.7	3DM683/3DM883
		863S42	1.2	6	Delta	5.0	4.3	103	2.9	3DM683/3DM883
		863S68H	1.2	6	Delta	2.3	6.8	135	4.0	3DM683/3DM883/3ND2283

Part Number



Motor frame size
57: 57 mm(NEMA size 23)

Motor type
HS: 2-phase hybrid stepping motor
3S: 3-phase hybrid stepping motor

Step angle
M: 0.9° (2-phase)
0.6° (3-phase)
Blank: 1.8° (2-phase)
1.2° (3-phase)

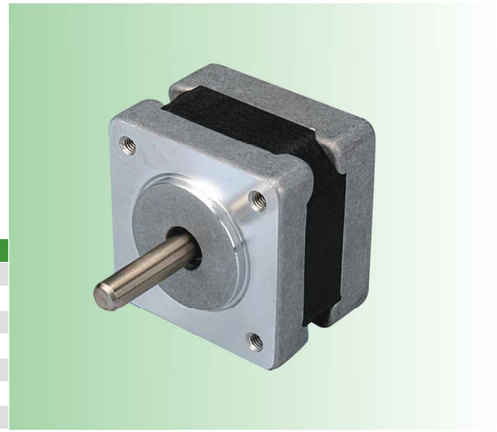
Holding torque
09 = 0.9 N*m

Design number
Blank: Standard
0X: Design number

Shaft number
Blank: Single shaft
B: Double shaft

35HSxx
39HSxx
42HSxx
57HSxx
86HSxx
110HSxx
130HSxx
573Sxx
863Sxx
ST curves
ST curves

35HSxx/39HSxx Series



General Specifications

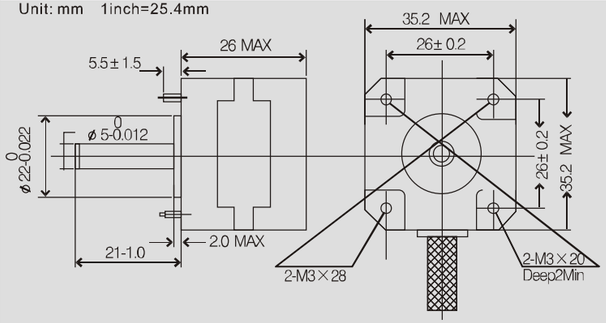
Angle Accuracy	±5%(full step, no load)
Temperature Rise	80 °C Max
Ambient Temperature	-10 °C — +50 °C
Insulation Resistance	100MΩ min. 500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.06 Max. (450g-load)
Shaft Axial Play	0.08 Max. (450g-load)

Selection Table

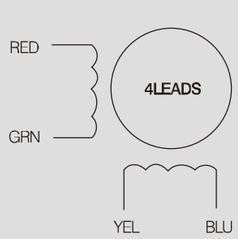
Phase	NEMA Size	Model	Step Angle (°)	# of Leads	Connection	Current/Phase (A)	Holding Torque (Nm)	Length L (mm)	Weight (kg)	Match Drives
2	14	35HS01	1.8	4	-	0.4	0.07	26	0.15	DM320C/DM422C/DM442/M415B
	16	39HS02	1.8	4	-	0.6	0.22	34	0.20	DM320C/DM422C/DM442/M415B

Mechanical Specifications of 39HSxx

Unit: mm 1inch=25.4mm

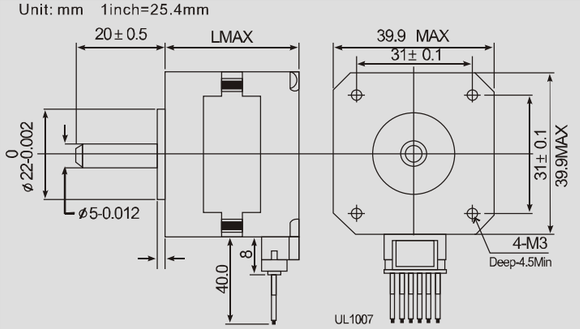


Wiring Diagram

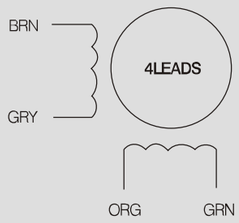


Mechanical Specifications of 39HSxx

Unit: mm 1inch=25.4mm



Wiring Diagram



Match Drives

Model	Match Drives
35HSxx / 39HSxx	M415B/DM320C/DM422C

42HSxx Series

General Specifications

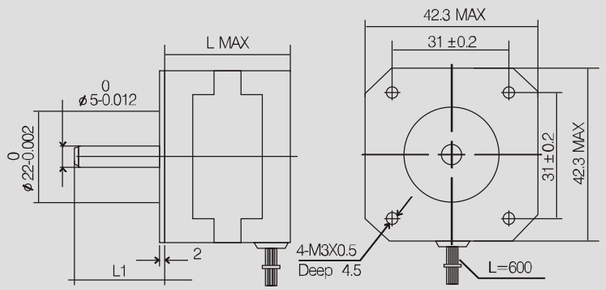
Angle Accuracy	±5%(full step, no load)
Temperature Rise	80 °C Max
Ambient Temperature	-10 °C — +50 °C
Insulation Resistance	100MΩ min. 500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.06 Max. (450g-load)
Shaft Axial Play	0.08 Max. (450g-load)

Selection Table

Phase	NEMA Size	Model	Step Angle (°)	# of Leads	Connection	Current/Phase (A)	Holding Torque (Nm)	Length L (mm)	Weight (kg)	Match Drives
2	17	42HS02	1.8	4	-	0.4	0.22	40	0.24	DM320C/DM422C/DM442/M415B
		42HS03	1.8	8	Parallel	1.4	0.47	48	0.34	DM320C/DM422C/DM442/M415B
					Series	0.7	0.47			
					Unipolar	1.0	0.34			

Mechanical Specifications of 42HSxx

Unit: mm 1inch=25.4mm



Wiring Diagram

Match Drives

Model	Match Drives
42HSxx	DM320/DM422C/DM432C/M415B

35HSxx
39HSxx
42HSxx
57HSxx
86HSxx
110HSxx
130HSxx
573Sxx
863Sxx
ST curves
ST curves

57HSxx Series

General Specifications

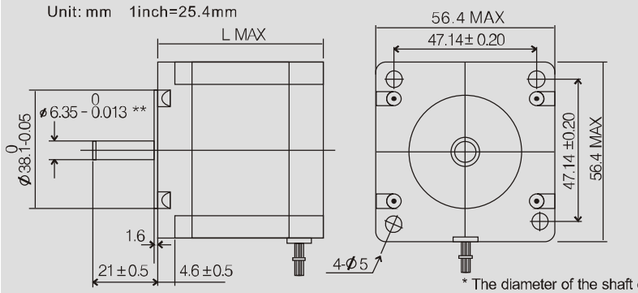
Angle Accuracy	±5%(full step, no load)
Temperature Rise	80 °C Max
Ambient Temperature	-10 °C — +50 °C
Insulation Resistance	100MΩmin. 500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.06 Max. (450g-load)
Shaft Axial Play	0.08 Max. (450g-load)

Selection Table

Phase	NEMA Size	Model	Step Angle (°)	# of Leads	Connection	Current/Phase (A)	Holding Torque (Nm)	Length L (mm)	Weight (kg)	Match Drives
2	23	57HS04	1.8	6	Series	2.0	0.4	41	0.45	DM442/DM556/M550
					Unipolar	2.8	0.28			
		57HS09	1.8	8	Parallel	4.2	1.3	54	0.6	DM442/DM556/M550/M760
					Series	2.1	1.3			
					Unipolar	2.8	0.9			
		57HS13	1.8	8	Parallel	4.0	1.8	76	1.0	DM442/DM556/M550/M760
					Series	2.0	1.8			
					Unipolar	2.8	1.3			
		57HS22*	1.8	8	Parallel	5.6	2.2	81	1.15	DM442/DM556/M550/M760
					Series	2.8	2.2			
					Unipolar	4.0	1.5			

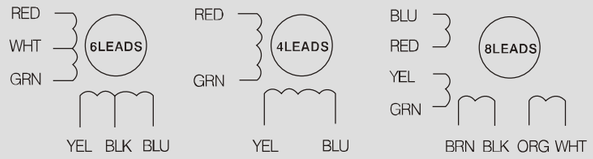
* The diameter of the shaft of the 57HS22 is 8 mm, and those of the others are 6.5 mm.

Mechanical Specifications of 57HSxx



* The diameter of the shaft of the 57HS22 is 8 mm, and those of the others are 6.5 mm.

Wiring Diagram



Match Drives

Model	Match Drives	Model	Match Drives
57HS04	DM422C/DM432C/DM556/M752/M542/M860/MA550	57HS13	DM556/DM856/M752/M542/M860/M880A
57HS09		57HS22	

86HSxx Series

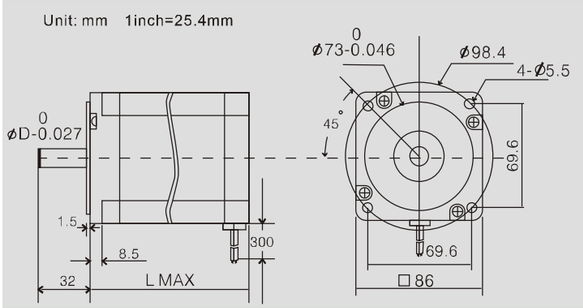
General Specifications

Angle Accuracy	±5%(full step, no load)
Temperature Rise	80 °C Max
Ambient Temperature	-10 °C — +50 °C
Insulation Resistance	100MΩmin. 500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.06 Max. (450g-load)
Shaft Axial Play	0.08 Max. (450g-load)

Selection Table

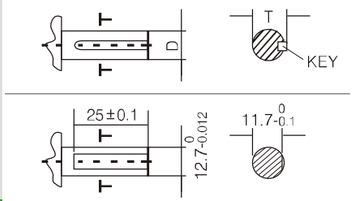
Phase	NEMA Size	Model	Step Angle (°)	# of Leads	Connection	Current/Phase (A)	Holding Torque (Nm)	Length L (mm)	Weight (kg)	Match Drives
2	34	86HS35	1.8	8	Parallel	4.0	3.5	65	1.7	DM870/M760/M860/M880A
					Series	2.0	3.5			
					Unipolar	2.8	2.5			
		86HS45	1.8	8	Parallel	6.0	4.5	80	2.3	DM870/DM1182/M860/M880A
					Series	3.0	4.5			
					Unipolar	4.2	3.2			
		86HS85	1.8	8	Parallel	6.8	8.5	118	3.8	DM870/DM1182/M880A/ND2282
					Series	3.4	8.5			
					Unipolar	4.9	6.0			

Mechanical Specifications of 86HSxx



Specifications of Motor Shafts

Model	T	KEY	D
86HS35	/	/	9.5
86HS45	/	/	12.7
86HS85	14.9	5*5*25	12.7



The Shaft of the 86HS45

* The shaft of the 86HS35 is round, no flat.

Wiring Diagram

Match Drives

Model	Match Drives
86HS35	DM556/DM856/DM870/M752/M860/M880A/MA550/MA860/H850/MA860H
86HS45	
86HS85	M860/M880A/MA860/MA860H/ND2282

110HSxx Series

General Specifications

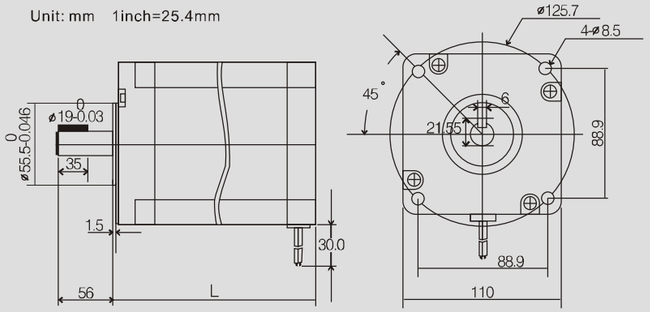
Angle Accuracy	±5%(full step, no load)
Temperature Rise	80 ℃ Max
Ambient Temperature	-10 ℃ — +50 ℃
Insulation Resistance	100MΩmin. 500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.06 Max. (450g-load)
Shaft Axial Play	0.08 Max. (450g-load)

Selection Table

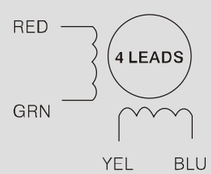
Phase	NEMA Size	Model	Step Angle (°)	# of Leads	Connection	Current/Phase (A)	Holding Torque (Nm)	Length L (mm)	Weight (kg)	Match Drives
2	42	110HS12	1.8	4	-	6.0	12	115	6.0	ND2282/DM1182
		110HS20	1.8	4	-	6.0	20	150	8.4	ND2282/DM1182
		110HS28	1.8	4	-	6.5	28	201	11.7	ND2282/DM1182

Mechanical Specifications of 110HSxx

Unit: mm 1inch=25.4mm



Wiring Diagram



Match Drives

Model	Match Drives
110HS12	ND2282/DM1182
110HS20	
110HS28	

130HSxx Series

General Specifications

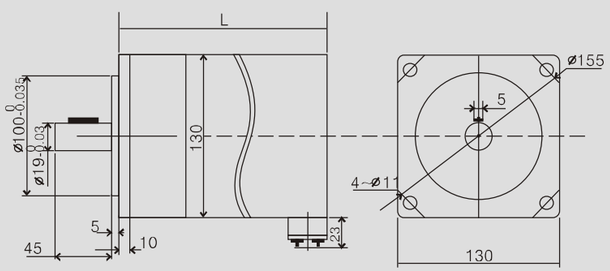
Angle Accuracy	±5%(full step, no load)
Temperature Rise	80 ℃ Max
Ambient Temperature	-10 ℃ — +50 ℃
Insulation Resistance	100MΩmin. 500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.06 Max. (450g-load)
Shaft Axial Play	0.08 Max. (450g-load)

Selection Table

Phase	NEMA Size	Model	Step Angle (°)	# of Leads	Connection	Current/Phase (A)	Holding Torque (Nm)	Length L (mm)	Weight (kg)	Match Drives
2	51	130HS27	1.8	4	-	6.0	27	227	13	ND2282/DM1182
		130HS33	1.8	4	-	6.0	33	227	13	ND2282/DM1182
		130HS40	1.8	4	-	7.0	40	283	16	ND2282/DM1182
		130HS45	1.8	4	-	7.0	45	283	19	ND2282/DM1182

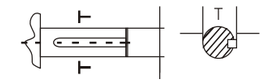
Mechanical Specifications of 86HSxx

Unit: mm 1inch=25.4mm



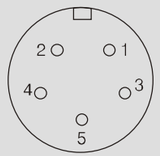
Specifications of Motor Shafts

	T	KEY	D



T=21
KEY=5 × 5 × 30

Wiring Diagram



1	2	3	4	5
A+	A-	B+	B-	NC

Match Drives

Model	Match Drives
130HSxx	ND2282/DM1182

573Sxx Series

General Specifications

Angle Accuracy	±5%(full step, no load)
Temperature Rise	80 ℃ Max
Ambient Temperature	-10 ℃ — +50 ℃
Insulation Resistance	100MΩmin. 500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.06 Max. (450g-load)
Shaft Axial Play	0.08 Max. (450g-load)

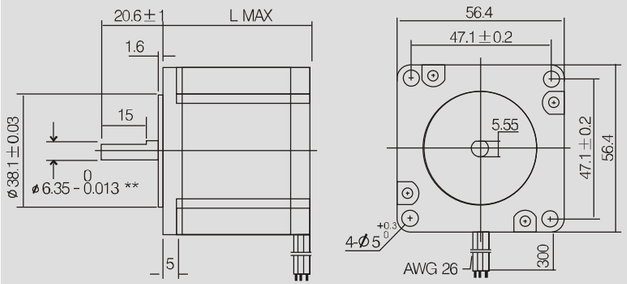
Selection Table

Phase	NEMA Size	Model	Step Angle (°)	# of Leads	Connection	Current/Phase (A)	Holding Torque (Nm)	Length L (mm)	Weight (kg)	Match Drives
3	23	573S05	1.2	6	Delta	5.2	0.45	42	0.45	3DM683/3DM883
		573S09	1.2	6	Delta	3.5	0.9	50	0.75	3DM683/3DM883
		573S15	1.2	6	Delta	5.8	1.3	76	1.1	3DM683/3DM883

* The diameter of the shaft of the 573S15 is 8 mm, and those of the others are 6.5 mm.

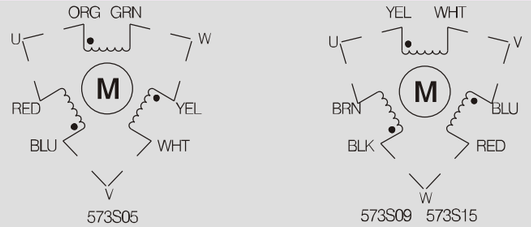
Mechanical Specifications of 573Sxx

Unit: mm 1inch=25.4mm



** The diameter of the shaft of the 573S15 is 8 mm, and those of the others are 6.5 mm.

Wiring Diagram



Match Drives

Model	Match Drives
573S05	3DM683/3DM883
573S09	3DM683/3DM883
573S15	3DM683/3DM883

863Sxx Series

General Specifications

Angle Accuracy	±5%(full step, no load)
Temperature Rise	80 ℃ Max
Ambient Temperature	-10 ℃ — +50 ℃
Insulation Resistance	100MΩmin. 500VDC
Dielectric Strength	500VAC for one minute
Shaft Radial Play	0.06 Max. (450g-load)
Shaft Axial Play	0.08 Max. (450g-load)

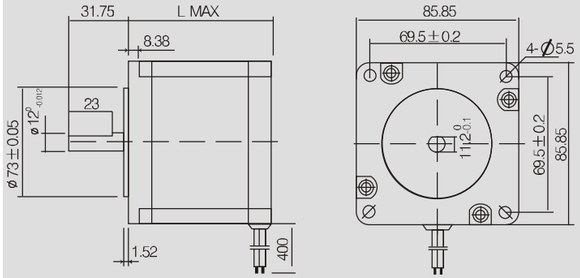
Selection Table

Phase	NEMA Size	Model	Step Angle (°)	# of Leads	Connection	Current/Phase (A)	Holding Torque (Nm)	Length L (mm)	Weight (kg)	Match Drives
3	23	863S22	1.2	6	Delta	5.0	2.3	71	1.7	3DM683/3DM883
		863S42	1.2	6	Delta	5.0	4.3	103	2.9	3DM683/3DM883
		863S68H	1.2	6	Delta	2.3	6.8	135	4.0	3DM683/3DM883

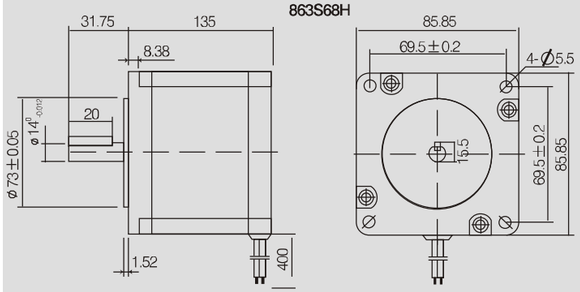
Mechanical Specifications of 863Sxx

Unit: mm 1inch=25.4mm

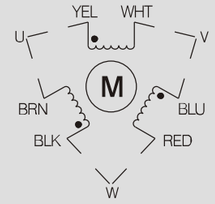
863S22, 863S42



863S68H

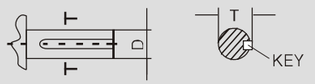


Wiring Diagram



Specifications of Motor Shafts

Model	T	KEY	D
863S68H	15.5	4*4*20	14

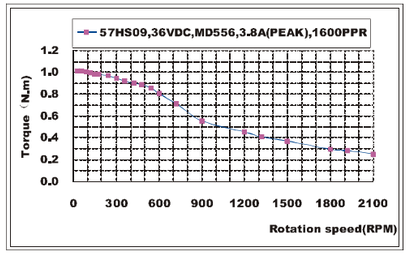


Match Drives

Model	Match Drives
863S22	3DM683/3DM883
863S42	3DM683/3DM883
863S68H	3DM683/3DM883

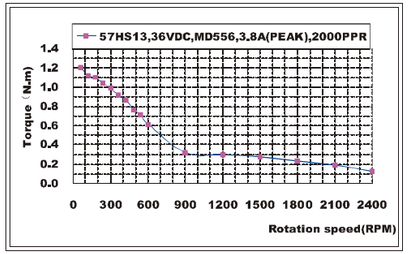
Speed-Torque Curves of 2-phase Stepping Motors

57HS09



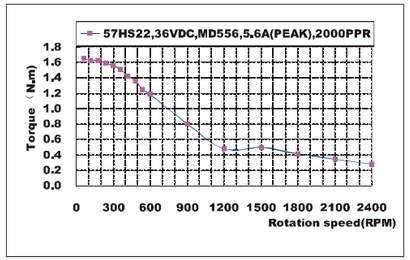
Stepping Motor: 57HS09 Output Current: 3.8 A(Peak)
Stepping Drive: MD556 Microstep: 1600 PPR
Input Voltage: 36 VDC Connection: Parallel

57HS13



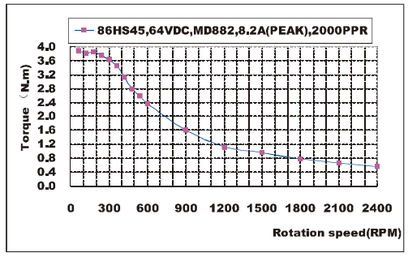
Stepping Motor: 57HS13 Output Current: 3.8 A(Peak)
Stepping Drive: MD556 Microstep: 2000 PPR
Input Voltage: 36 VDC Connection: Parallel

57HS22



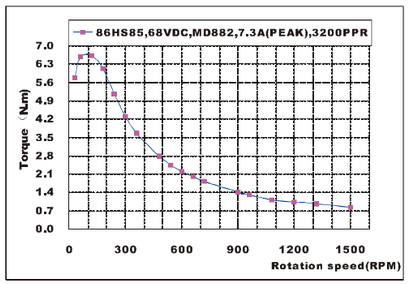
Stepping Motor: 57HS22 Output Current: 5.6 A(Peak)
Stepping Drive: MD556 Microstep: 2000 PPR
Input Voltage: 36 VDC Connection: Parallel

86HS45



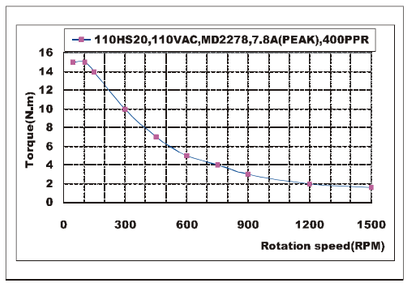
Stepping Motor: 86HS45 Output Current: 8.2 A(Peak)
Stepping Drive: MD882 Microstep: 2000 PPR
Input Voltage: 64 VDC Connection: Parallel

86HS85



Stepping Motor: 86HS85 Output Current: 7.3 A (Peak)
Stepping Drive: MD882 Microstep: 3200 PPR
Input Voltage: 68 VDC Connection: Parallel

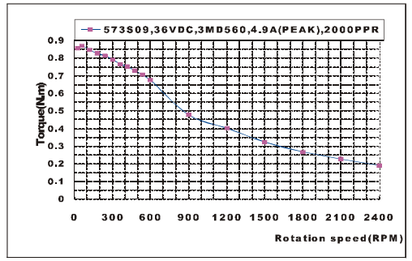
110HS20



Stepping Motor: 110HS20 Output Current: 7.8 A (Peak)
Stepping Drive: MD2278 Microstep: 400 PPR
Input Voltage: 110 VAC Connection: Parallel

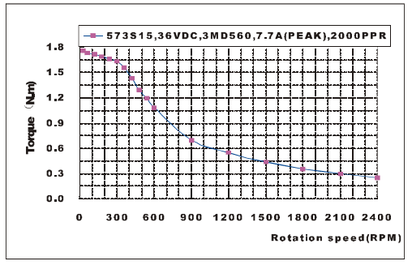
Speed-Torque Curves of 3-phase Stepping Motors

573S09



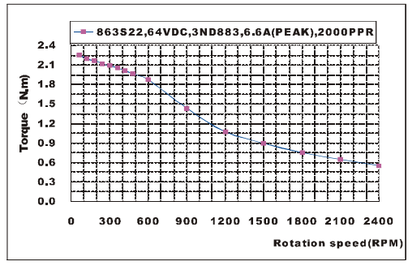
Stepping Motor: 573S09 Output Current: 4.9 A(Peak)
Stepping Drive: 3MD560 Microstep: 2000 PPR
Input Voltage: 36 VDC Connection: Delta

573S15



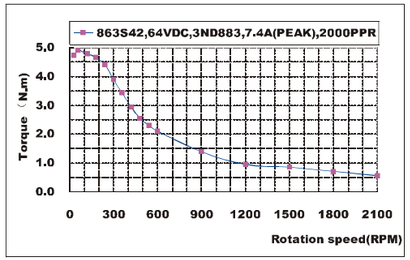
Stepping Motor: 573S15 Output Current: 7.7 A(Peak)
Stepping Drive: 3MD560 Microstep: 2000 PPR
Input Voltage: 36 VDC Connection: Delta

863S22



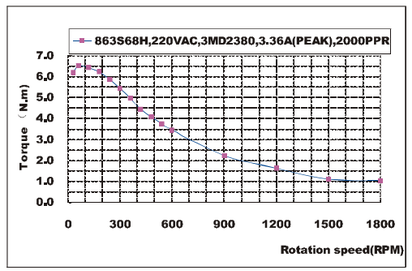
Stepping Motor: 863S22 Output Current: 6.6 A(Peak)
Stepping Drive: 3ND883 Microstep: 2000 PPR
Input Voltage: 64 VDC Connection: Delta

863S42



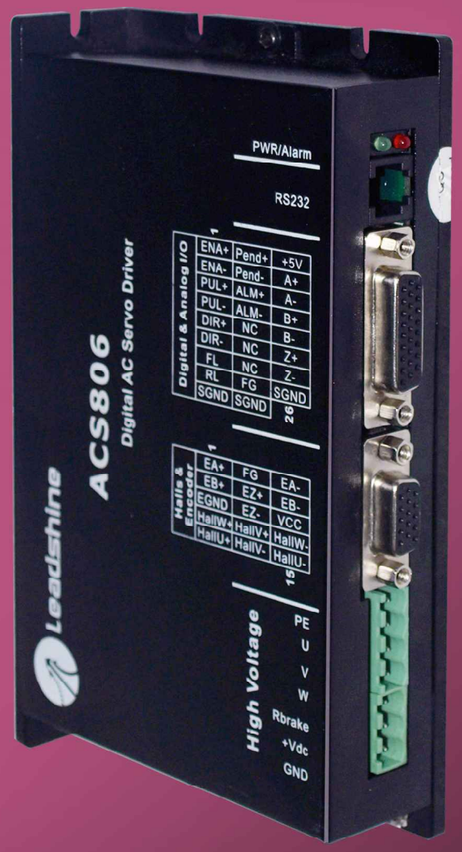
Stepping Motor: 863S42 Output Current: 7.4 A(Peak)
Stepping Drive: 3ND883 Microstep: 2000 PPR
Input Voltage: 64 VDC Connection: Delta

863S68H



Stepping Motor: 863S68H Output Current: 3.36 A(Peak)
Stepping Drive: 3MD2380 Microstep: 2000 PPR
Input Voltage: 220 VAC Connection: Delta

35HSxx
39HSxx
42HSxx
57HSxx
86HSxx
110HSxx
130HSxx
573Sxx
863Sxx
ST curves
ST curves



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DCS810S — 67
DCM Series Brush DC Servo Motors — 69

AC and DC Servos

ACS and ACH Series Cost-effective AC Servo Drives

ACS306/ACS606/ACS806/ACH400
ACH750/ACH1000/ACH1500
(Powering 25 - 1500W Servo Motors)

Features:

- Cost-effective, 32-bit DSP control technology
- Input:18 VDC to 220 VAC, Peak Cur:18A, Cont. Cur:7.5 A (Max)
- For 25 to 1500W AC & Brushless DC servo motors
- FOC-SVPWM technologies
- Opto-isolated, single-ended and differential inputs
- PUL/DIR and CW/CCW control signals supported
- Electronic gear rate from 1/255 to 255
- Self-test function with trapezoidal velocity profile
- PC-based and handheld configuration tools*
- Adjustable following error lock range
- Over-voltage, over-current, encoder error detection
- 10 last errors recorded

Power Specifications

Model	Input Voltage	Cont. Cur.	Peak Cur.	Power
ACS306	18 to 30 VDC	6 A	15 A	150 W
ACS606	18 to 60 VDC	6 A	18 A	200 W
ACS806	20 to 80 VDC	6 A	18 A	400 W
ACH400	220 VAC	2 A	3 A	400 W
ACH750	220 VAC	3.7 A	5 A	750 W
ACH1000	220 VAC	5 A	12.5 A	1000 W
ACH1500	220 VAC	7.5 A	12.5 A	1500 W

Introduction

Leadshine's fully digital ACS and ACH series servo drives are developed with 32-bit DSP control technology based on advanced control algorithm. Because of their high performance and highly competitive price, they are ideal for replacing many popular AC servo drives available on the market. The AC servo drives accept input commands of PUL/DIR signals, so they can be used to upgrade stepping drives to ACS and ACH series servo drives without modifying control systems, offering higher precision, higher speed, lower heating and lower noise performance.

A built-in controller can be used for testing and tuning. PC-based software and handheld configuration and tuning tools can meet different tuning environments or requirements*.

Applications

Suitable for small to medium automation machinery and equipment, such as large format printers, engraving machines, electronics manufacturing equipment, pick and place machines, packing machines, and etc. Particularly suited to applications requiring high speed, high precision, high reliability and low motor noise.

Performance Specifications (with ACM Series Servo Motors)

- Position following error: +/-1 count
- Maximum acceleration speed (No Load): 100 rpm/ms
- Maximum speed: 4000 rpm
- Positioning accuracy: +/-1 count
- Velocity accuracy: (+/- 0.1%) x operating speed
- Input frequency up to 600 kHz
- Minimum speed: 0.1 rpm
- Suitable for 18 VDC to 220 VAC Brushless DC or AC servo motors

* ACHxxxx servo drives have a on-board configuration and tuning HMI.

Part Number

ACS — Low and medium voltage AC servo drive
8 — Maximum Input Voltage 8: 80 VDC
06 — Continuous Current 06: 6 A

ACH — High voltage AC servo drive (220 VAC 1φ/ 3φ)
750 — Maximum Output Power 750: 750 W

Specifications

Electrical Specifications

Parameters	ACS306	ACS606	ACS806	ACH1000
Maximum Continuous Power	150 W	200 W	400 W	1000 W
Maximum Continuous Current	6 A	6 A	6 A	5 A
Peak Current	15 A	18 A	18 A	12.5 A
Input Voltage	18 to 30 VDC	18 to 60 VDC	20 to 80 VDC	220 VAC
Logical Signal Input Current	7 to 20 mA	7 to 20 mA	7 to 20 mA	7 to 20 mA
Pulse Input Frequency	0 to 250 kHz	0 to 250 kHz	0 to 600 kHz	0 to 500 kHz
Isolation Resistance	500 MΩ	500 MΩ	500 MΩ	500 MΩ
Current Provided for Encoder	100 mA	100 mA	100 mA	100 mA

Control Specifications

Parameters	ACS306	ACS606	ACS806	ACH1000
Command Input	Step/Direction	Step/Direction	Step/Direction CW/CCW ±10 V Analog Input	Step/Direction CW/CCW ±10 V Analog Input
Enable/Disable Input	Differential	Differential	Differential	Differential
Alarm Signal Output	Isolated OC Output	No	Isolated OC Output	Isolated OC Output
End Limit Input	No	No	Positive & Negative	Positive & Negative
In Position Signal Output	No	No	Isolated OC Output	Isolated OC Output
Encoder Feedback	A, B, Z (Differential)	A, B, Z (Differential)	A, B, Z (Differential)	A, B, Z (Differential)
Hall Effect Sensor Feedback	U, V, W (Single-ended)	U, V, W (Single-ended)	U, V, W (Differential)	U, V, W (Differential)
Encoder Output	No	No	A, B, Z (Differential)	A, B, Z (Differential)
Communication Interface	RS232	RS232	RS232	RS232/RS485
Braking Resistor	No	No	Support External BR	Support External BR

Configuration and Tuning Tools

Parameters	ACS306	ACS606	ACS806	ACH1000
PC based tuning software	ProTuner	ProTuner	ProTuner	ProTuner
Handheld tuning unit	STU-ACS	STU-ACS	STU-ACS	on-board HMI

Mechanical Specifications

Parameters	ACS306	ACS606	ACS806	ACH1000
Size (mm)	116×69.2×26.5	118×75.5×34	166×97×32	225×149×75
Weight (g)	280	280	430	1900

Powering Motors

Parameters	ACS306	ACS606	ACS806	ACH1000
Powering Motors	18 - 30 VDC, 10-150 W Brushless Servo Motors: BLM57025, BLM57050	18 - 60 VDC, 10-200 W Brushless Servo Motors: BLM57090, BLM57130, BLM57180, 57BL180	20- 80 VDC, 50-400 W Brushless Servo Motors: ACM601V36, ACM602V36(A) ACM602V60(A), ACM604V60	220 VAC, 200-1000 W Brushless Servo Motors

Operating Environment

Cooling		Natural cooling or Forced cooling
Operating Environment	Environment	Avoid dust, oil fog and corrosive gases
	Ambient Temp.	0 to +50℃
	Humidity	40%RH to 90%RH
	Vibration	5.9 m/s² MAX
Storage Temperature		-20℃ to 80℃

Tips

(a) Although both regulated and unregulated power supplies can be used to power the drives, unregulated power supplies are preferred due to their ability to withstand current surge. Select a power supply with output voltage equal to or approaching the rated voltage of the chosen motor. An external electrolytic capacitor with rated voltage greater than 1.3 times the voltage of power supply should be added between the power input terminals if voltage ripples is greater than 5% of rated voltage of the power supply. Rated power of the power supply should be greater than 1.2 times the power of the servo motor. The greater the power of the power supply the better, especially in applications requiring quick acceleration.

(b) The drive's working temperature should be lower than 70℃ (158℉), and motor working temperature should be lower than 80 ℃ (176 ℉). Use forced cooling to cool the system if necessary.

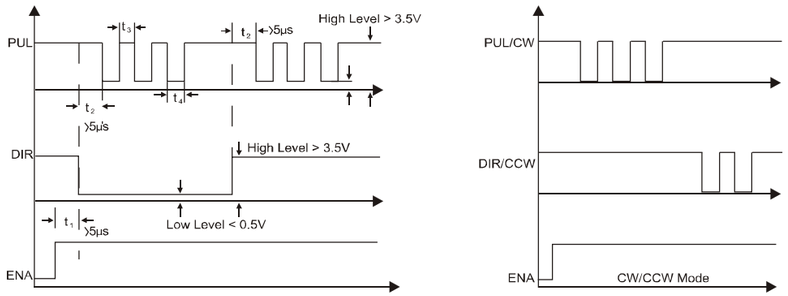
(c) To improve anti-interference performance of the system, use twisted pair shield cable for control signals and correctly ground the system. To prevent noise coupling on pulse/direction signals, pulse/direction signal wires, motor wires and power wires should not be tied up together. Separate them by at least 10 centimeters (4 inches) to avoid signals generated by the motor interfering pulse and direction signals, causing motor position error, system instability and other failures.

(d) Don't pull and plug motor or power wires while a drive is powered ON, high current flowing through motor coils (even when stopped). Pulling or plugging motor or power wires with power on will cause extremely high voltage surge, which may damage the drive.

(e) If a power supply serves several drives, connecting the drives separately (each in a star arrangement) is recommended instead of daisy-chain arrangement.

(f) A rotating motor and load has kinetic energy. When the motor and load stops rotating, the energy must either be stored or dissipated. The drive's capacitors are capable of storing a certain amount of this energy. Any energy beyond this must be dissipated by the braking/regen resistor. A 75ohm 100W regen resistor is enough for most of applications using ACM series and BLM series servo motors. A lower resistance and higher power braking should be used if more energy must be dissipated.

(g) PUL, DIR and ENA signals should meet the voltage and timing requirements as set out in the following diagrams:

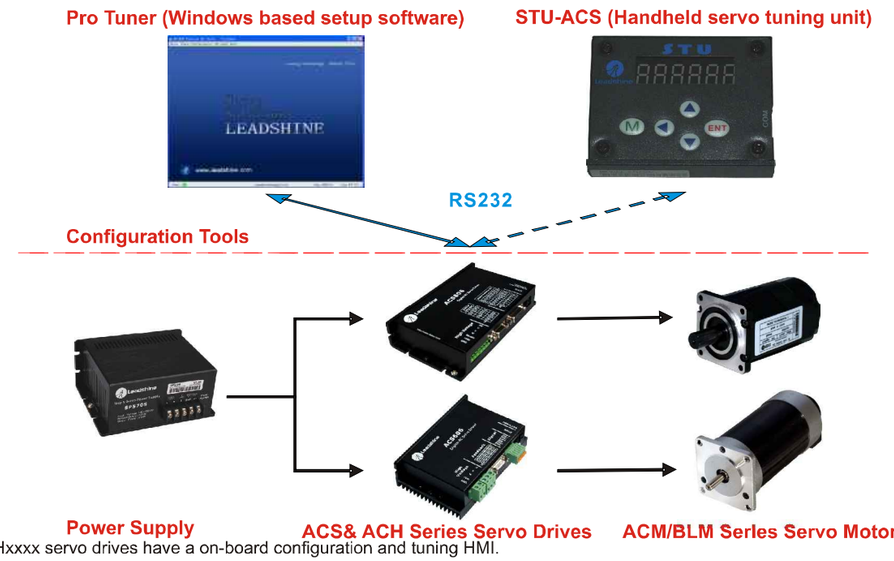


Notes:

（1）t1：ENA must be ahead of DIR by at least 5 μ s. Usually, ENA+ and ENA- are NC (not connected).
（2）t2：DIR must be ahead of PUL active edge by at least 5 μ s to ensure correct direction.
（3）t3：High Level not less than 2 μ s (ACS306, ACS606) or 0.9 μ s (ACS806) or 1.0 μ s (ACH1000).
（4）t4：Low Level not less than 2 μ s (ACS306, ACS606) or 0.9 μ s (ACS806) or 1.0 μ s (ACH1000).

PC Based and Handheld Configuration and Tuning Tools

Leadshine offers PC based and handheld configuration & tuning tools to meet different requirements and configuration and tuning environments. The user can tune the ACS series drives with two different tuning tools, including ProTuner (Windows based setup software) and STU-ACS (Handheld servo tuning unit)*.

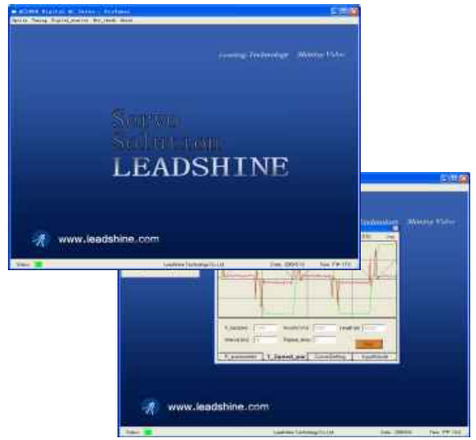


* ACHxxxx servo drives have a on-board configuration and tuning HMI.

ProTuner (Windows Based Configuration Software)

- Upload and Download parameter settings
- Digital oscilloscope for real-time current, velocity, position following error display. Measurements can be taken using the mouse pointer.
- PID parameter settings for position loop
- PI parameter settings for velocity loop
- PI parameter settings for current loop
- Motor parameter configuration
- Electronic gear rate setting from 1/255 to 255
- Position following error range setting
- Encoder resolution setting
- Parameter settings for self motion test (with trapezoidal velocity profile)
- Read the latest 10 failure events and clear the events

Notes:
1. 1 PC RS232 interface is necessary
2. Leadshine offers a cable for interfacing the drive to an RS232 port on the computer. USB-to-Serial converter also available.



STU-ACS (Handheldl Servo Tuning Unit)

- Similar to most HMI of servo drives from other manufacturers
- PID parameter settings for position loop
- Electronic gear rate setting from 1/255 to 255
- Position following error range setting
- Real-time current, velocity, position following error display.
- Parameter settings for self motion test (with trapezoidal velocity profile)
- Read the latest 10 failure events and clear the events

Notes:
1. Leadshine offers a special cable for communication between the drive and STU-ACS handheld tuner.

Order Information

Part	Model	Description
AC Servo Drives	ACS306	Digital Brushless DC&AC servo drive for 10W - 150W servo motors, input: 18 - 30 VDC, Cont. Cur: 6A, Peak Cur: 15A
	ACS606	Digital Brushless DC&AC servo drive for 25W - 200W servo motors, input: 18 - 60 VDC, Cont. Cur: 6A, Peak Cur: 18A
	ACS806	Digital Brushless DC&AC servo drive for 50W - 400W servo motors, input: 18 - 80 VDC, Cont. Cur: 6A, Peak Cur: 18A
	ACH1000	Digital Brushless DC&AC servo drive for 200W - 1000W servo motors, input: 220VAC, Cont. Cur: 5A, Peak Cur: 12.5A
Tuning Tools	ProTuner	PC based configuration & tuning software (free).
	STU-ACS	Handheld configuration & tuning unit. Each customer can get one STU-ACS for free.
	USB Cable	USB cable for connection & communication between the servo drive and PC USB interface.
	R232 Cable	RS232 cable for connection & communication between the servo drive and PC RS232 interface.
ACM Series Motors	ACM601V36	AC Servo Motor, Rated Voltage: 36 VDC, Rated Power: 100W, Shaft Diameter: 8 mm
	ACM602V36	AC Servo Motor, Rated Voltage: 36 VDC, Rated Power: 200W, Shaft Diameter: 11 mm
	ACM602V36A	AC Servo Motor, Rated Voltage: 36 VDC, Rated Power: 200W, Shaft Diameter: 14 mm
	ACM602V60	AC Servo Motor, Rated Voltage: 60 VDC, Rated Power: 200W, Shaft Diameter: 11 mm
	ACM602V60A	AC Servo Motor, Rated Voltage: 60 VDC, Rated Power: 200W, Shaft Diameter: 14 mm
	ACM604V60	AC Servo Motor, Rated Voltage: 60 VDC, Rated Power: 400W, Shaft Diameter: 14 mm
	ACM604	AC Servo Motor, Rated Voltage: 220 VDC, Rated Power: 400W, Shaft Diameter: 14 mm
	ACM602V36-01	AC Servo Motor, Rated Voltage: 36 VDC, Rated Power: 200W, Shaft Diameter: 11 mm
	ACM604V60-01	AC Servo Motor, Rated Voltage: 60 VDC, Rated Power: 400W, Shaft Diameter: 14 mm
BLM Series Motors	BLM57025	Brushless DC Servo Motor, Rated Voltage: 24 VDC, Rated Power: 25W, Shaft Diameter: 6.35 mm
	BLM57050	Brushless DC Servo Motor, Rated Voltage: 24 VDC, Rated Power: 50W, Shaft Diameter: 6.35 mm
	BLM57090	Brushless DC Servo Motor, Rated Voltage: 36 VDC, Rated Power: 90W, Shaft Diameter: 6.35 mm
	BLM57130	Brushless DC Servo Motor, Rated Voltage: 36 VDC, Rated Power: 130W, Shaft Diameter: 8 mm
	BLM57180	Brushless DC Servo Motor, Rated Voltage: 36 VDC, Rated Power: 180W, Shaft Diameter: 8 mm
	57BL180	Brushless DC Servo Motor, Rated Voltage: 36 VDC, Rated Power: 180W, Shaft Diameter: 8 mm

ACS806

Cost-effective AC Servo Drives (PVT control modes)

Features:

*Operation Modes: Position, Velocity, Current (Torque)
* PUL/DIR (Position mode) or +/ - 10 V analog Voltage (Velocity, Torque modes) Command Inputs
* Input Voltage: 20 VDC to 80 VDC
* Continuous Current 6A, Peak Current: 18A
* Powers 50 W to 400 W AC Servo Motors;
* Encoder output

Matched Motors

Power	Models
100 W	ACM601V36
200 W	ACM602V36, ACM602V36A, ACM602V60, ACM602V60A
400 W	ACM604, ACM604V60

Introduction

Leadshine's ACS806 is a highly cost-effective, fully digital AC servo drive. It has a wide input voltage covering 20 VDC to 80 VDC, and is suitable for 50 W to 400 W AC servo motors. High reliability, compact size and ease of use make the ACS806 an ideal choice for new installations and as replacement for a range of popular drives on the market.

Applications

Suitable for small to medium automation machinery and equipment, such as large format printers, engraving machines, electronics manufacturing equipment, pick and place machines, packing machines, and etc. Particularly suited to applications requiring high speed, high precision, high reliability and low motor noise.

Connections

Command and I/O Signal Connector

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	EN+	Enable signal input+	I	14	+REF	Reference signal input+	I
2	EN-	Enable signal input-	I	15	-REF	Reference signal input -	I
3	PUL+	Pulse signal input +	I	16	NC	Not connected	-
4	PUL-	Pulse signal input -	I	17	FG	Ground terminal for shield	GND
5	DIR+	Direction control signal input +	I	18	SGND	Signal ground	GND
6	DIR-	Direction control signal input -	I	19	+5V	+5V Power supply	O
7	FL	Positive limit signal input	I	20	A+	Encoder Channel A+ Output	O
8	RL	Negative limit signal input	I	21	A-	Encoder Channel A- Output	O
9	SGND	Signal ground	GND	22	B+	Encoder Channel B+ Output	O
10	Pend+	In position signal output +	O	23	B-	Encoder Channel B+ Output	O
11	Pend-	In position signal output -	O	24	Z+	Encoder Channel Z+ Output	O
12	ALM+	Alarm signal output +	O	25	Z-	Encoder Channel Z+ Output	O
13	ALM-	Alarm signal output -	O	26	SGND	Signal ground	GND

RS232 Communication Interface

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	NC	Not connected	-	4	GND	Signal ground	GND
2	+5V	Power for STU-ACS	O	5	RxD	RS232: Receive	I
3	TxD	RS232: Transmit	O	6	NC	Not connected	-

Connections

Power Connector X1

Pin.	Name	Description	I/O
1	GND	Power ground	GND
2	VDC	DC power Input (18 to 80 VDC)	I
3	Rbrake	Brake resistor connection (VDC-RBrake)	I

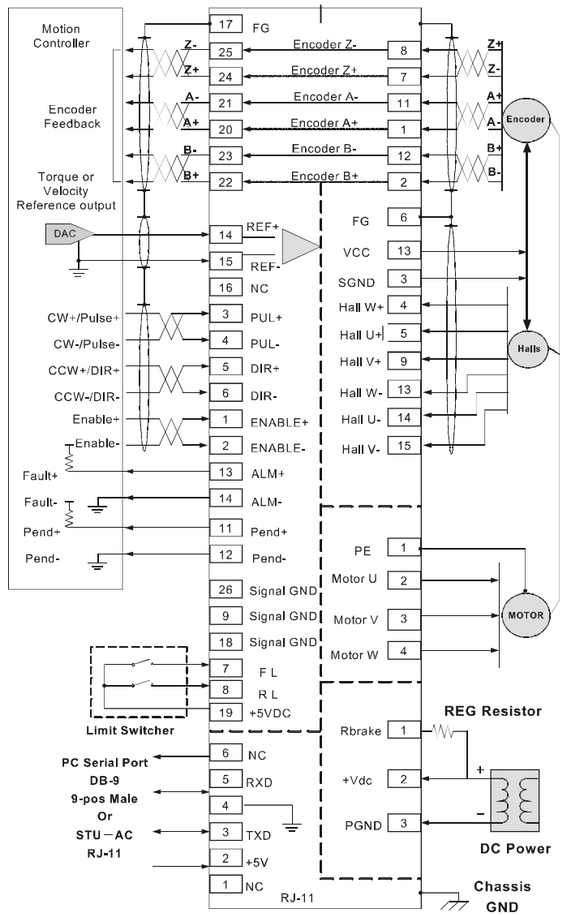
Motor Connector X2

Pin.	Name	Description	I/O
1	PE	Motor case ground	PE
2	U	Motor phase U	O
3	V	Motor phase V	O
4	W	Motor phase W	O

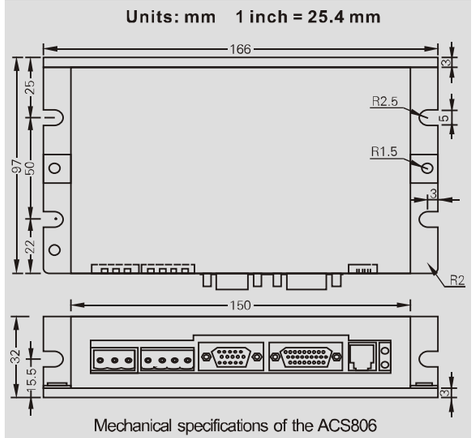
Motor Feedback Connector

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	EA+	Encoder Channel A+ Input	I	9	HallV+	Hall sensor V+ input	I
2	EB+	Encoder Channel B+ Input	I	10	HallV-	Hall sensor V- input	I
3	EGND	Signal ground	GND	11	EA-	Encoder Channel A- Input	I
4	HallW+	Hall sensor W+ input	I	12	EB-	Encoder Channel B- Input	I
5	HallU+	Hall sensor U+ input	I	13	VCC	+5V @ 100 mA max.	O
6	FG	Ground terminal for shielded	GND	14	HallW-	Hall sensor W- input	I
7	EZ+	Encoder Channel Z+ Input	I	15	HallU-	Hall sensor U- input	I
8	EZ-	Encoder Channel Z- Input	I				

Full Wiring Example



Mechanical Specifications



Mechanical specifications of the ACS806

ACS606 Simple AC and Brushless DC Servo Drive
(Operation Mode: Position)

Features:

* Position Control Mode with Opto-isolated Pulse and Direction Inputs
* PC-based and Handheld Tuning Tools Available
* Input Voltage:18 VDC to 60 VDC
* Continuous Current 6A, Peak Current: 18A
* Powering 25W to 200 W AC and Brushless DC Servo Motors

Matched Motors

Power	Models
25 W	BLM57025
50 W	BLM57050
90 W	BLM57090
130 W	BLM57130
180 W	BLM57180, 57BL180

Introduction

Leadshine's ACS606 is a simple, fully digital brushless DC/AC servo drive. It features high reliability, compact size and PUL/DIR/ENA input signals that match those used by stepping motor drives, allowing a drop-in upgrade for older systems.

The simple drive supports position control (for velocity or torque control modes, see the ACS806 or ACHxxxx drives) and tuning is accomplished with PC-based or handheld tools. It accepts a wide input voltage range (18 VDC to 60 VDC) and is suitable for driving 25 W to 200 W AC or DC brushless motors.

Applications

Suitable for small to medium automation machinery and equipment, such as large format printers, engraving machines, electronics manufacturing equipment, pick and place machines, packing machines, and etc. Particularly suited to applications requiring high speed, high precision, high reliability and low motor noise.

Connections

Command Signal Connector

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	PUL+	Pulse signal input +	I	4	DIR-	Direction control signal input -	I
2	PUL-	Pulse signal input -	I	5	EN+	Enable signal input+	I
3	DIR+	Direction control signal input +	I	6	EN-	Enable signal input-	I

Motor Feedback Connector

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	EA+	Encoder Channel A+ Input	I	9	HallV	Hall sensor V input	I
2	EB+	Encoder Channel B+ Input	I	10	NC	Not connected	-
3	EGND	Signal ground	GND	11	EA-	Encoder Channel A- Input	I
4	HallW	Hall sensor W input	I	12	EB-	Encoder Channel B- Input	I
5	HallU	Hall sensor U input	I	13	VCC	+5V @ 100 mA max.	O
6	FG	Ground terminal for shielded	GND	14	NC	Not connected	-
7	EZ+	Encoder Channel Z+ Input	I	15	NC	Not connected	-
8	EZ-	Encoder Channel Z- Input	I				

Connections

RS232 Communication Interface

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	NC	Not connected	-	4	GND	Signal ground	GND
2	+5V	Power for STU-ACS	O	5	RxD	RS232: Receive	I
3	TxD	RS232: Transmit	O	6	NC	Not connected	-

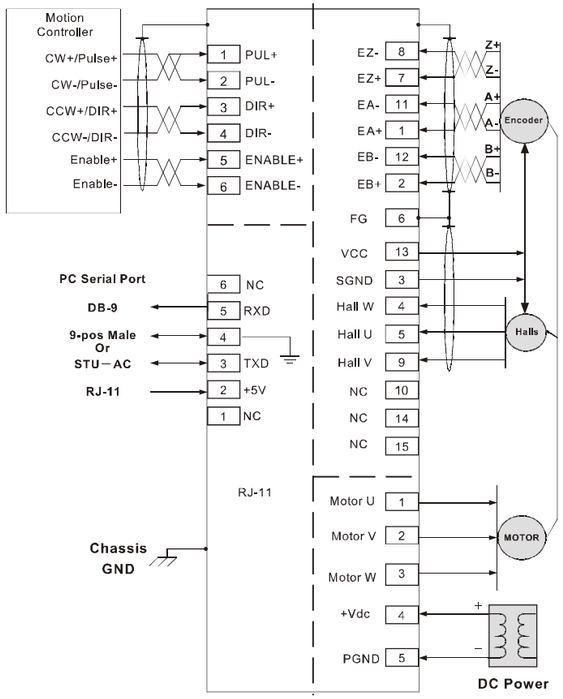
Power Connector X1

Pin.	Name	Description	I/O
1	GND	Power ground	GND
2	VDC	DC power Input (18 to 30 VDC)	I

Motor Connector X2

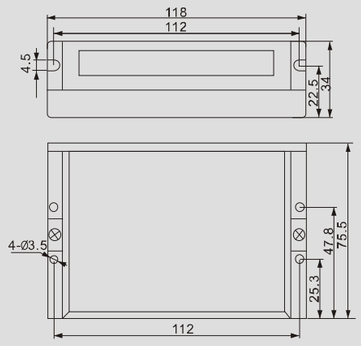
Pin.	Name	Description	I/O
1	U	Motor phase U	O
2	V	Motor phase V	O
3	W	Motor phase W	O

Full Wiring Example



Mechanical Specifications

Units: mm 1 inch = 25.4 mm



Mechanical specifications of the ACS606

ACS306 Simple AC and Brushless DC Servo Drive
(Operation Mode: Position)

Features:

* Position Control Mode with Opto-isolated Pulse and Direction Inputs
* PC-based and Handheld Tuning Tools Available
* Input Voltage:18 VDC to 30 VDC
* Continuous Current 6A, Peak Current: 18A
* Powering 25W to 150 W AC and Brushless DC Servo Motors

Matched Motors

Power	Models
25 W	BLM57025
50 W	BLM57050
90 W	BLM57090
130 W	BLM57130

Introduction

Leadshine's ACS306 is a simple, fully digital brushless DC/AC servo drive. It features high reliability, compact size and PUL/DIR/ENA input signals that match those used by stepper motor drives, allowing a drop-in upgrade for older systems.

The simple drive supports position control (for velocity or torque control modes, see the ACS806 and ACHxxxx drives) and tuning is accomplished with PC-based or handheld tools. It accepts a wide input voltage range (18 VDC to 30 VDC) and is suitable for driving 25 W to 150 W DC or AC brushless motors.

Applications

Suitable for small to medium automation machinery and equipment, such as large format printers, engraving machines, electronics manufacturing equipment, pick and place machines, packing machines, and etc. Particularly suited to applications requiring high speed, high precision, high reliability and low motor noise.

Connections

Command Signal Connector

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	PUL+	Pulse signal input +	I	5	EN+	Enable signal input+	I
2	PUL-	Pulse signal input -	I	6	EN-	Enable signal input-	I
3	DIR+	Direction control signal input +	I	7	ALM+	Alarm signal output+	O
4	DIR-	Direction control signal input -	I	8	ALM-	Alarm signal output-	O

Motor Feedback Connector

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	EA+	Encoder Channel A+ Input	I	9	HallV	Hall sensor V input	I
2	EB+	Encoder Channel B+ Input	I	10	NC	Not connected	-
3	EGND	Signal ground	GND	11	EA-	Encoder Channel A- Input	I
4	HallW	Hall sensor W input	I	12	EB-	Encoder Channel B- Input	I
5	HallU	Hall sensor U input	I	13	VCC	+5V @ 100 mA max.	O
6	FG	Ground terminal for shielded	GND	14	NC	Not connected	-
7	EZ+	Encoder Channel Z+ Input	I	15	NC	Not connected	-
8	EZ-	Encoder Channel Z- Input	I				

Connections

RS232 Communication Interface

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	NC	Not connected	-	4	GND	Signal ground	GND
2	+5V	Power for STU-ACS	O	5	RxD	RS232: Receive	I
3	TxD	RS232: Transmit	O	6	NC	Not connected	-

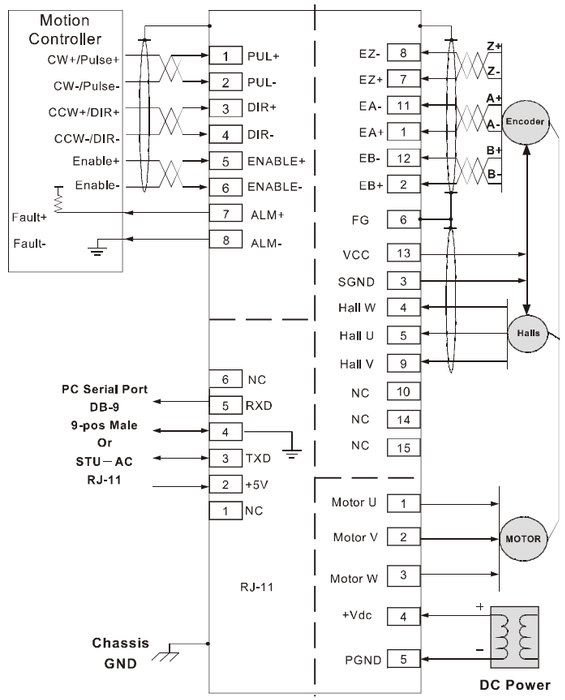
Power Connector X1

Pin.	Name	Description	I/O
1	GND	Power ground	GND
2	VDC	DC power Input (18 to 30 VDC)	I

Motor Connector X2

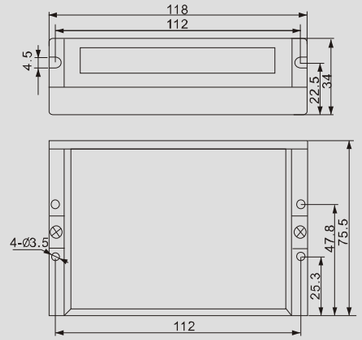
Pin.	Name	Description	I/O
1	U	Motor phase U	O
2	V	Motor phase V	O
3	W	Motor phase W	O

Full Wiring Example



Mechanical Specifications

Units: mm 1 inch = 25.4 mm



Mechanical specifications of the ACS306

ACM Series AC Servo Motors (100W/200W/400W)

Introduction

The ACM series of AC servo motors offer high performance with modes ranging from 100W to 1500W*. Mounting is compatible with Panasonic and Fuji AC servo motors. Standard models come with a standard 2500-line differential encoders with index slits (A, B, Z), and Hall Sensors (U, V, W).

When driven by Leadshine ACS series and ACH series servo drives, the ACM series motors meet application requirements from as low as 1 rpm to as high as 4000 rpm.

100W AC Servo Motors

200W AC Servo Motors

400W AC Servo Motors

*Motors rated above 400W are coming soon.

Part Number

ACM — 60 — 2 — V36 — — 2500

- ACM: AC servo motor
- 60: Flange size, 60: □ 60 mm, …
- 2: Rated power, 1: 100W, 2: 200W, 4: 400W, …
- V36: Rated voltage, Blank: 220 VAC, V36: 36 VDC, V60: 60 VDC, …
- 2500: Encoder resolution, 2500: 2500 counts/rev., 2000: 2000 counts/rev., 1000: 1000 counts/rev., …

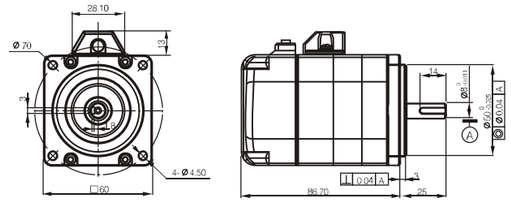
Electrical Specifications (Visit www.leadshine.com for information about other servo motors.)

Model	ACM601V36	ACM602V36(A)	ACM602V60(A)	ACM604V60	ACM604	ACM602V36-01	ACM604V60-01
Rated Voltage (V)	36	36	60	60	220	36	60
Rated Power (W)	100	200	200	400	400	200	400
Rated Torque (N.M)	0.318	0.64	0.64	1.27	1.27	0.64	1.27
Peak Torque (N.M)	0.95	1.91	1.91	3.82	3.82	1.92	3.81
Rated Speed (RPM)	3000	3000	3000	3000	3000	3000	3000
Peak Speed (RPM)	4000	4000	4000	4000	5000	4000	4000
Rated Current (A)	4	7.6	4.7	8.4	2.8	7.6	8.4
Peak Current (A)	11	22	14	25	8.5	22	25
Torque Const. (N.M/A)	0.0866	0.0918	0.15	0.161	0.49	0.084	0.151
Back EMF Const. (V/RPM)	3.03 $x10^{-3}$	3.213$x10^{-3}$	5.24$x10^{-3}$	5.54$x10^{-3}$	17$x10^{-3}$	3.2$x10^{-3}$	5.5$x10^{-3}$
Resistance (ohm)	0.38	0.16	0.38	0.19	1.42	0.39	0.28
Inductance (mH)	0.91	0.41	1.07	0.59	6	0.33	0.34
Inertia (kgm^2 x 10^{-4})	0.1032	0.176 (0.296)	0.176 (0.296)	0.3549	0.3549	0.32	0.46
Allowable radial load (N)	78.6	245	245	245	245	245	245
Allowable axial load (N)	38.2	68	68	74	74	68	74
Flange Size (mm)	60	60	60	60	60	60	60
Mounting Diameter (mm)	70	70	70	70	70	70	70
Shaft Diameter (mm)	8	11 (14)	11 (14)	14	14	11	14
Motor Length (mm)	86.7	100.7	100.7	127.8	127.8	123	143
Pole Pairs (-)	4	4	4	4	4	4	4
Encoder Res. (counts/rev.)	2500 **	2500 **	2500 **	2500 **	2500 **	2500 **	2500 **
Mass (Kg)	0.701	0.966	0.984	1.463	1.48	0.95	1.48
Ambient Temperature (℃)	0 to 40	0 to 40	0 to 40	0 to 40	0 to 40	0 to 40	0 to 40

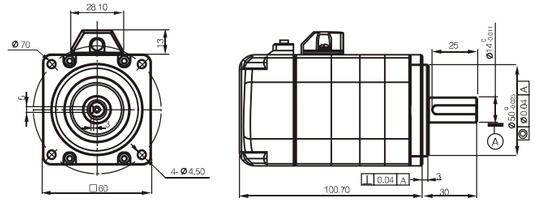
** Standard. Other configurations available, see Part Number.

Mechanical Specifications (Units: mm 1 inch = 25.4 mm)

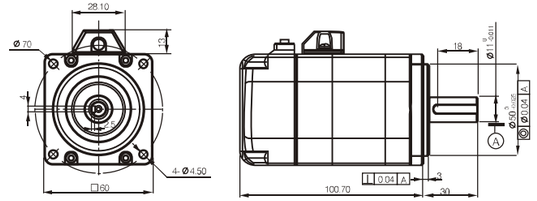
(a) Mechanical specifications of the ACM601V36 (100W)



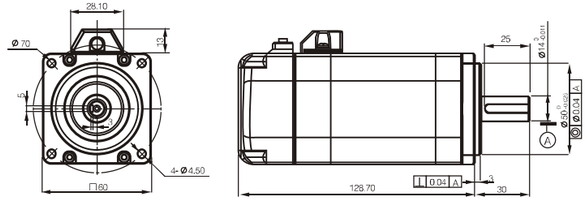
(b) Mechanical specifications of the ACM602V36A and the ACM602V60A (200W)



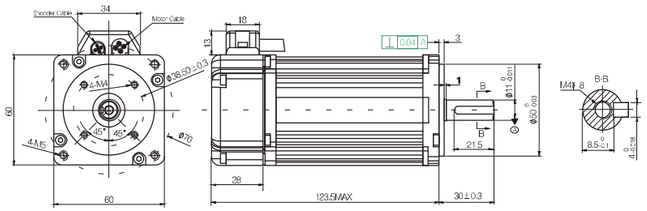
(c) Mechanical specifications of the ACM602V36 and the ACM602V60 (200W)



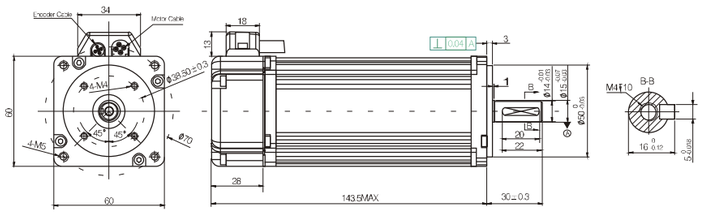
(d) Mechanical specifications of the ACM604V60 and the ACM604 (400W)



(e) Mechanical specifications of the ACM602V36-01 (200W)



(f) Mechanical specifications of the ACM604V60-01 (400W)



Matching Drives

Models	Matching Drives
100 W AC Servo Motors	ACS806
200 W AC Servo Motors	ACS806
400 W AC Servo Motors	ACS806, ACH1000

BLM Series Brushless DC Servo Motors (25W-180W)

Leadshine's BLM series of brushless DC servo motors offer high performance in costeffective packages. The series boasts rated speeds of 3000 RPM and come standard with 1000-line differential encoders (A, B) and Hall sensors (U, V, W).

When driven by Leadshine's ACS series servo motor drivers the BLM and 57BL series motors meet application requirements from as low as 1 RPM to as high as 4000 RPM. They offer AC-servo-like performance including high reliability, high speed, high precision, low motor noise and low levels of motor heating.

The BLM series is flange mount and has been designed to be compatible with NEMA23 stepping motors. The 57BL series features a compact, screw-mount body.

BLM57025 BLM57050 BLM57090 BLM57130 BLM57180 57BL180

Part Number

BLM — 57 — 025 — □

- BLM: Brushless DC servo motor
- 57: Flange size, 57: □ 57 mm, ...
- 025: Rated power, 025: 25W, 050: 50W, ..., 180: 180W
- □: Custom-built or Special Model Number, Blank: Standard, ...

* The 57BL180 is a screw mounted model and the above scheme does not apply.

General Specifications

Winding connection: △（Delta connection）
Hall Sensor: 120°
Pole Pairs (-): 2
Phase: 3
Shaft Radial Play: 0.025 mm
Shaft Axial Play: 0.025 mm@460g

Allowable radial load: 75 N@20mm from the flange
Allowable axial load: 15 N
Isolation Level: Class B
Isolation Strength: 500 VDC for one minute
Isolation Resistance: 100 M ohms

Motor Wires

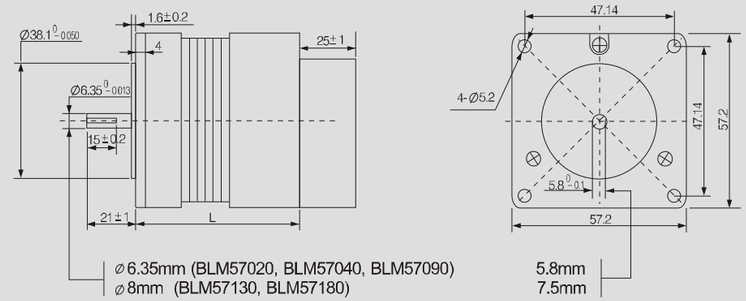
No.	Colour	Wire Size	Name	Description	No.	Colour	Wire Size	Name	Description
1	Red		Vcc	Power Input of Hall (+5V)	5	Black	UL 1007 26 AWG	GND	Power GND of Hall
2	Blue	UL 1007 26	HALL A	Hall Sensor A	6	Brown	UL 1007 20 AWG	PHASE A	Motor Coil, Phase A
3	Green	AWG	HALL B	Hall Sensor B	7	Blue		PHASE B	Motor Coil, Phase B
4	White		HALL C	Hall Sensor C	8	Black		PHASE C	Motor Coil, Phase C

Electrical Specifications

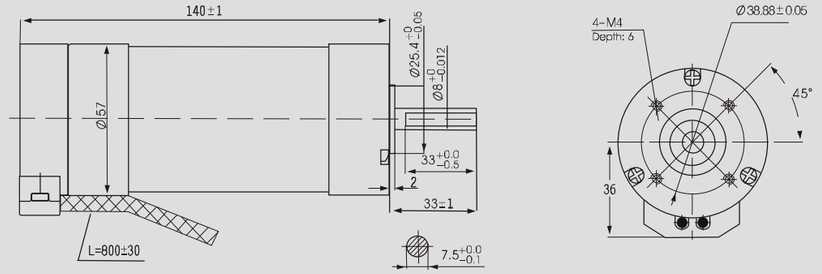
No.	Parameters	BLM57025	BLM57050	BLM57090	BLM57130	BLM57180	57BL180
1	Rated Voltage (VDC)	24	24	36	36	36	36
2	Rated Power (W)	25	50	90	130	180	180
3	Rated Torque (N.M)	0.08	0.16	0.29	0.41	0.57	0.57
4	Peak Torque (N.M)	0.24	0.48	0.87	1.23	1.71	1.71
5	Rated Speed (RPM)	3000	3000	3000	3000	3000	3000
6	Rated Current (A)	1.6	3	3.45	5.3	6.7	7
7	Peak Current (A)	4.8	9	10.35	15.9	20	20.5
8	Torque Const. (N.M/A)	0.05	0.053	0.084	0.078	0.085	0.089
9	Back EMF Const. (V/RPM)	5.2	5.55	8.8	8.2	8.9	9.3
10	Resistance (ohms)	1.73	0.88	1.35	0.63	0.9	0.53
11	Inductance (mH)	3.36	2.2	4.1	2.17	2	1.55
12	Inertia ($kgm^2 \times 10^{-5}$)	0.03	0.075	0.119	0.173	0.23	0.23
13	Motor Length (mm)	45	55	75	95	115	122
14	Mass (Kg)	0.25	0.5	0.75	1	1.25	1.25

Mechanical Specifications (Unit:mm 1 inch = 25.4 mm)

(a). Mechanical specification of the BLM57xxx series motors.



(b). Mechanical specification of the 57BL180.



Note:
The thread depth for the M4 mounting holes on the face of the 57BL180 is 6.0 mm. Do not screw more than 6.0 mm as this will cause damage to the motor.

Matching Drives

Modesl	Matching Drives
BLM57025	ACS306, ACS606
BLM57050	ACS306, ACS606
BLM57090	ACS306, ACS606
BLM57130	ACS306, ACS606
BLM57180	ACS606
57BL180	ACS606

DCS Series Brushed DC Servo Drives

Features:

*Advanced DSP control technology for smooth motion
*18 VDC to 80 VDC supply range and capable of providing 10 A continuous and 20 A peak current
*Suitable for 10 W to 400 W brushed DC servo motors
*Position control with 4 × encoder resolution accuracy
*Adjustable position following error alarm range
*Electronic gearing with adjustable ratio from 1/255 to 255
*Built-in motion controller for self-test with trapezoidal velocity profile
*Pulse and direction (PUL/DIR) inputs can alternatively be configured as clockwise and counter-clockwise pulse inputs (CW/CCW)
*Opto-isolated inputs supporting single-ended or differential signals
*PC-based and handheld configuration tools available
*Over-current, over-voltage, under-voltage, phase error, encoder error and position following error protections
*10 error history log

Power Specifications

Model	Input Voltage (VDC)	Continuous Current (A)	Peak Current (A)	Power (W)
DCS303	18 to 30	3	15	90 Max
DCS810	18 to 80	10	20	400 Max
DCS810S	18 to 80	10	20	400 Max
DCS811	18 to 80	11	20	400 Max

Introduction

The DCS series drives are fully digital brushed servo drives developed with high speed DSP and advanced algorithms for smooth motion control. Opto-isolated pulse and direction control inputs allow the drives to be drop-in replacements for stepping motor drives. In low power motion control applications DC servo motor systems perform as well as or better than AC servo motor systems with high precision, high stability and low noise at far lower costs.

The DCS series drives are very easy to use. Leadshine supplies PC-based ProTuner software for Windows. A handheld tuning and configuration tool, the STU-DCS allows configuration of the drives out in the field.

The DCS303 is a micro-size (86 × 55.5 × 20.5 mm or 3.4 × 2.2 × 0.81 inches) brushed DC servo drive. It is ideal for low power applications with limited mounting space.

The DSC810S is designed to replace the DB810-50V which was widely used in inkjet printers. It offers improved performance with the same electrical connections.

The DCS810 has differential command and encoder feedback inputs and offers better anti-interference performance.

The DCS811 features high speed response and full closed-loop control. It can drive a brushed DC motor without an encoder and use feedback signals from an encoder or linear scale attached directly to the load. Electronic damping and fast torque control technology allow the DCS811 to provide fast response with good vibration suppression. The drive is particularly suited to applications requiring high precision positioning and low cost.

Performance Specifications (with DCM Series Servo Motors)

* Position following error: adjustable down to ± 1 count
* Maximum acceleration (No Load): 80 RPM / ms
* Maximum speed: 3500 RPM
* Positioning accuracy: ± 1 count
* Velocity accuracy: ± 2 RPM
* Input frequency: up to 250 kHz (500 kHz for the DCS811)
* Low speed control: down to 1 RPM
* Suitable for 18 VDC to 80 VDC brushed DC servo motors

Applications

Widely used in large format inkjet printers, solvent printers, small and medium engraving machines, electronic manufacturing, NC machines, packing machines and production line equipment. These brushed DC servo drives are particularly suited to systems that require high precision and high speed at low cost.

Part Number

DCS	8	10	S
Brush DC Servo Drive	Maximum Input Voltage 8: 80 VDC 3: 30 VDC	Continuous Current 10: 10 A 3: 3 A	Special Model Symbol Blank: Standard S: Single-ended input

General Specifications

Electrical Specifications

Parameters	DCS303	DCS810	DCS810S	DCS811
Input Voltage	18 to 30 VDC	18 to 80 VDC	18 to 80 VDC	18 to 80 VDC
Continuous Current	3 A	10 A	10 A	10 A
Peak Current	15 A	20 A	20 A	20 A
Pulse Input Frequency	250 kHz			>500 kHz
Logical Signal Input Current	7 to 20 mA			
Current Provided for Encoder	50 mA			
Isolation Resistance	500 MΩ			

Command and I/O Signals

Parameters	DCS303	DCS810	DCS810S	DCS811
Operation Mode	Position			
Input Command	PUL/DIR Single-ended	PUL/DIR & CW/CCW Single-ended & Differential	PUL/DIR & CW/CCW Single-ended	PUL/DIR & CW/CCW Single-ended & Differential
Motor Encoder	A, B phase Single-ended	A, B phase differential	A, B phase single	None
External Encoder	None	None	None	A, B phase differential
Enable Signal	Single-ended	Differential	Differential	Differential
Alarm Signal	OC output, optical isolated	None	OC output, none-isolated	None
Communication Connector	B4B-PH	RJ-11	RJ-11	RJ-11
Communication Interface	RS232			
Protection Function	Over voltage, Under voltage, Over current, Phase error, Position following error limit, Encoder failure			
Matching Motors	18 to 30 VDC brush DC servo motors with single-ended encoder, power up to 90W	18 to 80 VDC brush DC servo motors with differential encoder, power up to 400W	18 to 80 VDC brush DC servo motors with single-ended encoder, power up to 400W	18 to 80 VDC brush DC servo motors without encoder, power up to 400W

Configuration & Tuning Tools

Parts	DCS303	DCS810	DCS810S	DCS811
PC Based Software	ProTuner	ProTuner	ProTuner	ProTuner
Handheld Servo Tuning Unit	STU-DCS	STU-DCS	STU-DCS	STU-DCS

Mechanical Specifications

Parameters	DCS303	DCS810	DCS810S	DCS811
Size (H × W × D) (mm)	86 × 55.5 × 20.5	116 × 69.2 × 26.5	116 × 69.2 × 26.5	116 × 69.2 × 26.5
Weight (g)	100	210	212	220

Operating Environment and Other Parameters

Model	DCS303	DCS810	DCS810S	DCS811
Cooling	Natural cooling or forced cooling			
Environment	Avoid dust, oil fog and corrosive gases			
Ambient Temperature	0 ℃ to 50 ℃ (32 ℉ to 122 ℉)			
Humidity	40% to 90% RH			
Vibration	5.9 m/s² Max			
Storage Temperature	-20 ℃ to +65 ℃ (-4 ℉ to 149 ℉)			

Tips

(a) Although both regulated and unregulated power supplies can be used to power the drives, unregulated power supplies are preferred due to their ability to withstand current surge. Select a power supply with output voltage equal/approach to rated voltage of the chosen motor. An external electrolytic capacitor (rated voltage > 1.3 times of the voltage of power supply) should be added between power input terminals if voltage ripples is larger than 5% of power supply rated voltage. Rated power of the power supply should be larger than 1.2 times of the power of the servo motor. The larger the power of the power supply, the better, especially in applications requiring quick acceleration.

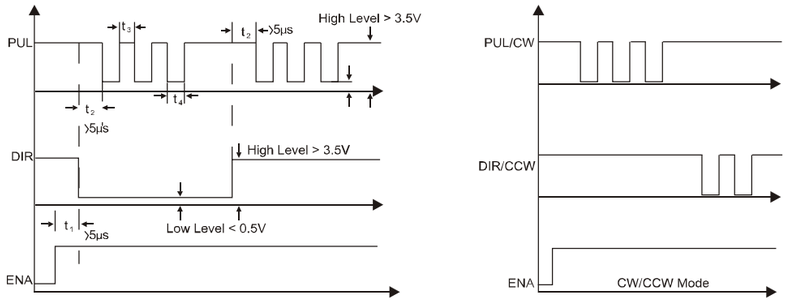
(b) Drive's working temperature should be lower than 70℃ (or 158℉), and motor working temperature should be lower than 80 ℃ (or 176 ℉). Use forced cooling to cool the system if necessary.

(c) To improve anti-interference performance of the system, use twisted pair shield cable for control signals and correctly ground the system. To prevent noise coupled on pulse/direction signal, pulse/direction signal wires, motors and power wires should not be tied up together. Separate them by at least 10 centimeters (4 inches) to avoid disturbing signals generated by motor, which will easily disturb pulse and direction signals, causing motor position error, system instability and other failures.

(d) Don't pull and plug motor & power wires while a drive is powered ON, is high current flowing through motor coils (even stopped). Pulling or plugging motor or power wires with power on will cause extremely high voltage surge, which could damage the drive.

(e) If a power supply serves several drives, connecting those drives separately is recommended instead of daisy-chaining connection.

(f) In order to avoid some fault operations and deviations, PUL, DIR and ENA signals should abide by some rules, shown as following diagrams:



Notes:

（1）t1：ENA must be ahead of DIR by at least 5 μ s. Usually, ENA+ and ENA- are NC (not connected).
（2）t2：DIR must be ahead of PUL active edge by at least 5 μ s to ensure correct direction.
（3）t3：High Level not less than 2 μ s (DCS303, DCS810, DCS810S) or 1.0 μ s (DCS811).
（4）t4：Low Level not less than 2 μ s (DCS303, DCS810, DCS810S) or 1.0 μ s (DCS811).

PC Based and Handheld Configuration and Tuning Tools

Leadshine offers PC based and handheld configuration and tuning tools to meet different requirements and configuration and tuning environments. The user can tune the DCS series drives with two different tuning tools, including Pro Tuner (Windows based setup software) and STU-DCS (Handheld servo tuning unit).

Pro Tuner (Windows based setup software)

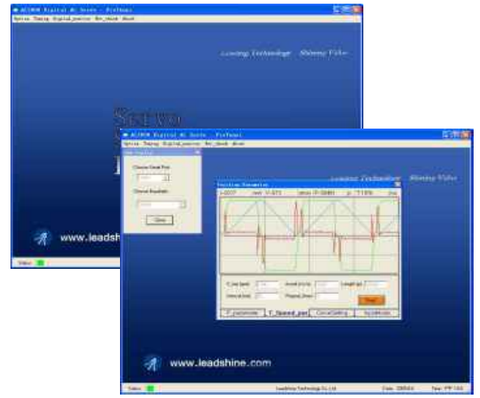
STU-DCS (Handheld servo tuning unit)

Leadshine DC Servos

ProTuner (Windows Based Setup Software)

- Upload and Download parameter settings
- Digital oscilloscope for real-time current, velocity, position following error display. Measurements can be taken using the mouse pointer.
- PID parameter settings for position loop
- PI parameter settings for current loop
- Electronic gear rate setting from 1/255 to 255
- Position following error range setting
- Encoder resolution setting
- Parameter settings for self motion test (with trapezoidal velocity profile)
- Read the latest 10 failure events and clear the events

* 1 PC RS232 interface is necessary
** Leadshine offers a cable for interfacing the drive to an RS232 port on the computer. USB-to-RS232 converter also available.



STU-DCS (Handheld Small Servo Tuning Unit)

- Similar to most HMI of servo drives from other manufacturers
- PID parameter settings for position loop
- Electronic gear rate setting from 1/255 to 255
- Position following error range setting
- Real-time current, velocity, position following error display.
- Parameter settings for self motion test (with trapezoidal velocity profile)
- Read the latest 10 failure events and clear the events

* Leadshine offers a special cable for communication between the drive and the STU-DCS handheld tuner.

Order Information

Part	Model	Description
DC Servo Drives	DCS303	Micro-size digital servo drive for 5-90W brush DC servo motors, input: 18-30 VDC, Cont. Cur: 3A, Peak Cur: 15A
	DCS810	Differential digital servo drive for 20-400W brush DC servo motors, input: 18-80 VDC, Cont. Cur: 10A, Peak Cur: 20A
	DCS810S	Single-ended digital servo drive for 20-400W brush DC servo motors, input: 18-80 VDC, Cont. Cur: 10A, Peak Cur: 20A
	DCS811	Full closed-loop digital servo drive for 20-400W brush DC servo motors, input: 18-80 VDC, Cont. Cur: 10A, Peak Cur: 20A
Tuning Tools	ProTunner	PC based configuration & tuning software (free).
	STU-DCS	Handheld configuration & tuning unit. Each customer can get one STU-DCS for free.
	USB Cable	USB cable for connection & communication between the servo drive and PC USB interface.
	R232 Cable	RS232 cable for connection & communication between the servo drive and PC RS232 interface.
DCM Series Motors	DCM50xxx-1000	Screw mounted brush DC servo motor with a 1000 line incremental encoder (A, B phase single-ended).
	DCM50xxx-500	Screw mounted brush DC servo motor with a 500 line incremental encoder (A, B phase single-ended).
	DCM50xxxD-1000	Screw mounted brush DC servo motor with a 1000 line incremental encoder (A, B phase differential).
	DCM50xxxD-500	Screw mounted brush DC servo motor with a 500 line incremental encoder (A, B phase differential).
	DCM57xxx-1000	Flange mounted brush DC servo motor with a 1000 line incremental encoder (A, B phase single-ended).
	DCM57xxx-500	Flange mounted brush DC servo motor with a 500 line incremental encoder (A, B phase single-ended).
	DCM57xxxD-1000	Flange mounted brush DC servo motor with a 1000 line incremental encoder (A, B phase differential).
	DCM57xxxD-500	Flange mounted brush DC servo motor with a 500 line incremental encoder (A, B phase differential).

Micro-size Digital Brushed DC Servo Drive DCS303

Features:

* Position control mode with opto-isolated pulse and direction inputs
* PC-based and handheld tuning tools available
* Input voltage: 18 VDC to 30 VDC
* Continuous current: 3 A , Peak current:15A ,
* Powers 5 W to 90W brushed DC servo motors.
* Adjustable position following error lock range
* Single-ended encoder feedback
* Micro-size, surface-mount technology

Model	Driving Motors
DCS303	18 VDC to 30 VDC brushed DC servo motors, power up to 90W

Introduction

The DCS303 is a micro-size brushed DC servo drive delivering power up to 90 W. It is ideal for low power applications with limited mounting space. Features include high reliability, easy-to-use, and micro-size.

Applications

Suitable for a wide range of equipment and instruments such as inkjet printers, solvent printers, cutting plotters, medical equipment, small automation machines, and etc. Particularly suited to applications requiring minimal vibration, low noise, high speed and high precision.

Connectors

Power and Motor Connector

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	Motor+	Motor positive connection	O	3	+Vdc	DC power Input (18 to 30 VDC)	I
2	Motor-	Motor negative connection	O	4	GND	Power ground	GND

Encoder Connector

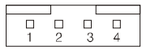
Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	EB	Encoder Channel B Input	I	3	VCC	+5V @ 50 mA max.	O
2	EA	Encoder Channel A Input	I	4	EGND	+5V power ground	-

Command and I/O Signal Connector

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	PUL	Pulse signal input	I	4	EN	Enable/Disable signal input	I
2	DIR	Direction control signal input	I	5	ERR	Alarm signal output (OC output)	O
3	OPTO	Opto-coupler power input (Normal: +5V)	I	6	EGD	Opto-coupler power ground	-

RS232 Communication Interface

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	+5V	Power for STU-DCS	O	3	GND	Signal ground	GND
2	TxD	RS232: Transmit	O	4	RxD	RS232: Receive	I



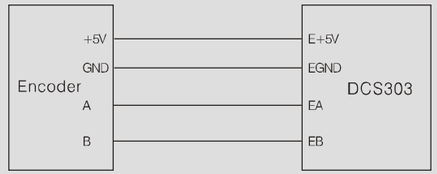
RS232 Pin assignment

Typical Connections

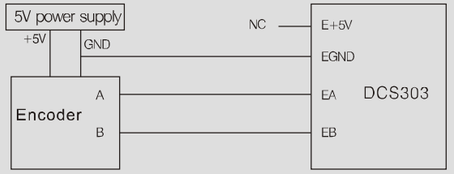
Encoder Connections

The DCS303 supports an encoder with single-ended A, B signals. If the encoder drains less than 50mA, the DCS303 can supply the encoder directly, and connect it as Figure (a). If the encoder drains more than 50mA, use an external DC supply and connect it as Figure (b). Note that twisted-pair shielded cabling provides the best immunity in electrically noisy environments.

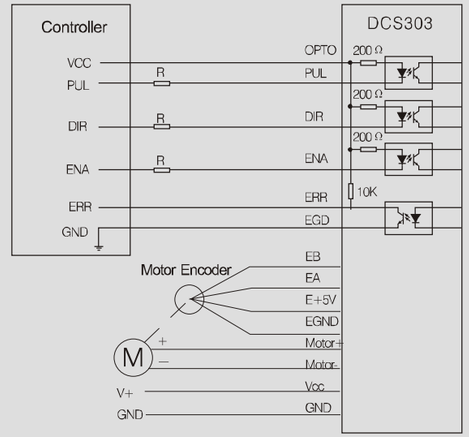
(a) Supply the encoder directly



(b) Using external power supply for the encoder

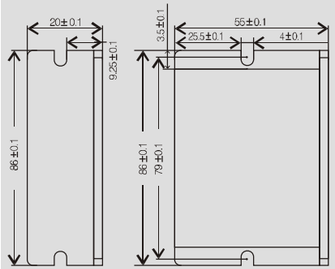


(c) Full wiring example



Mechanical Specifications (Units: mm 1 inch = 25.4 mm)

Mechanical specifications of the DCS303



DCS303: 86x55x20mm

Digital Brushed DC Servo Drive DCS810

(Differential input & feedback)

Features:

* Position control mode with opto-isolated pulse and direction inputs
* PC-based and handheld tuning tools available
* Input voltage: 18 VDC to 80 VDC
* Continuous current: 10 A , Peak current:20A ,
* Powers 20 W to 400W brushed DC servo motors.
* PUL/DIR or CW/CCW inputs
* Adjustable position following error lock range
* Differential or Single-ended encoder feedback
* Surface-mount technology

Model	Driving Motors
DCS810	18 to 80 VDC brushed DC servo motors, power up to 400W. Recommended motors DCM50xxxD-xxxx and DCM57xxxD-xxxx.

Introduction

The DCS810 is a digital brushed DC servo drive delivering power up to 400 W, features high driving and anti-interference performance. Particularly suited to electrically noisy environments with strong external interference, complicated wirings in a small room.

Applications

Suitable for a wide range of equipment and machines such as inkjet printers, solvent printers, small and medium engraving machines, electronic manufacturing, NC machines, packing equipments, and etc. Particularly suited to applications requiring minimal vibration, low noise, high speed, high precision and good anti-interference performance.

Connectors

Power and Motor Connector

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	Motor+	Motor positive connection	O	3	+Vdc	DC power Input (18 to 80 VDC)	I
2	Motor-	Motor negative connection	O	4	GND	Power ground	GND

RS232 Communication Interface

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	NC	Not connected	-	4	GND	Signal ground	GND
2	+5V	Power for STU-DCS	O	5	RxD	RS232: Receive	I
3	TxD	RS232: Transmit	O	6	NC	Not connected	-

Encoder Connector

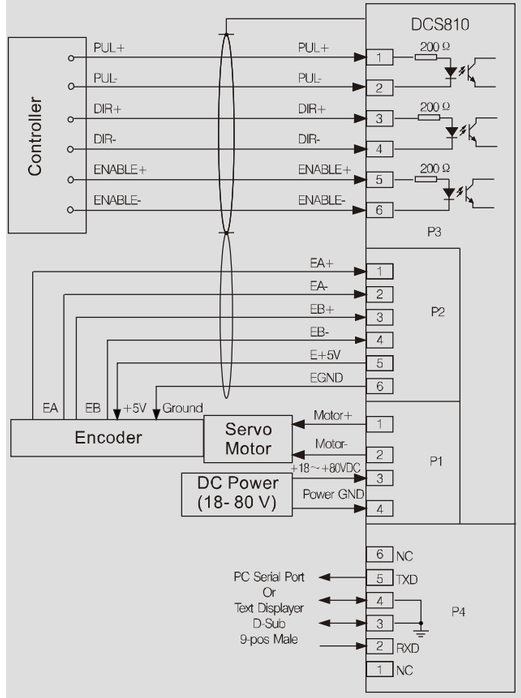
Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	EB+	Encoder Channel B Input+	I	4	EA-	Encoder Channel A Input-	I
2	EB-	Encoder Channel B Input-	I	5	VCC	+5V @ 50 mA max.	O
3	EA+	Encoder Channel A Input+	I	6	EGND	+5V power ground	-

Pin Function

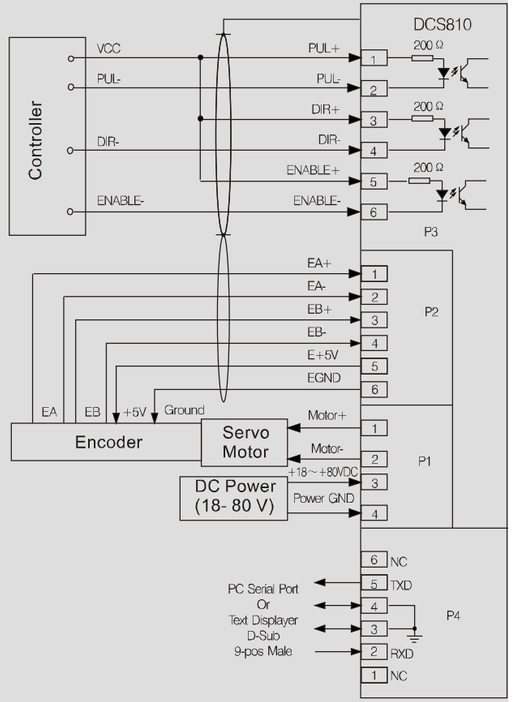
Command Signal Connector

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	PUL+	Pulse signal input +	I	5	EN+	Enable signal input+	I
2	PUL-	Pulse signal input -	I	6	EN-	Enable signal input-	I
3	DIR+	Direction control signal input +	I				
4	DIR-	Direction control signal input -	I				

Full Wiring Examples

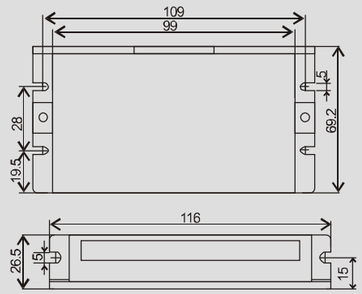


(a) Typical connections (differential controller)



(b) Typical connections (single-ended controller)

Mechanical Specifications (Units: mm 1 inch = 25.4 mm)



Mechanical specifications of the DCS810

Digital Brushed DC Servo Drive DCS810S

(Single-ended input & feedback)

Features:

* Position control mode with opto-isolated pulse and direction inputs
* PC-based and handheld tuning tools available
* Input voltage: 18 VDC to 80 VDC
* Continuous current: 10 A , Peak current:20A ,
* Powers 20 W to 400W brushed DC servo motors.
* PUL/DIR or CW/CCW inputs
* Adjustable position following error lock range
* Single-ended encoder feedback and command inputs
* Surface-mount technology

Model	Driving Motors
DCS810S	18 to 80 VDC brushed DC servo motors, power up to 400W. Recommended motors DCM50xxx-xxxx and DCM57xxx-xxxx.

Introduction

The DCS810S is a digital brushed DC servo drive delivering power up to 400 W. The DSC810S is designed to replace the DB810-50V which was widely used in inkjet printers. It offers improved performance with the same electrical connections. There are two DIP switches (SW1 and SW2) can be used to select 4 group servo parameters stored in EEPROM of the drive. Users can select one group of these servo parameters to optimize the performance for different applications, in which using different motors or having different load.

Applications

Suitable for a wide range of equipment and machines such as inkjet printers, solvent printers, small and medium engraving machines, electronic manufacturing, NC machines, packing machines, and etc. Particularly suited to applications requiring minimal vibration, low noise, high speed, high precision.

Connectors

Power and Motor Connector

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	Motor+	Motor positive connection	O	3	+Vdc	DC power Input (18 to 30 VDC)	I
2	Motor-	Motor negative connection	O	4	GND	Power ground	GND

RS232 Communication Interface

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	NC	Not connected	-	4	GND	Signal ground	GND
2	+5V	Power for STU-DCS	O	5	RxD	RS232: Receive	I
3	TxD	RS232: Transmit	O	6	NC	Not connected	-

Encoder Connector

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	EB	Encoder Channel B Input	I	4	EGND-	+5V power ground	-
2	EA	Encoder Channel A Input	I	5	ERR	Alarm signal output (OC output)	O
3	E +5V	+5V @ 50 mA max.	O				

Connectors

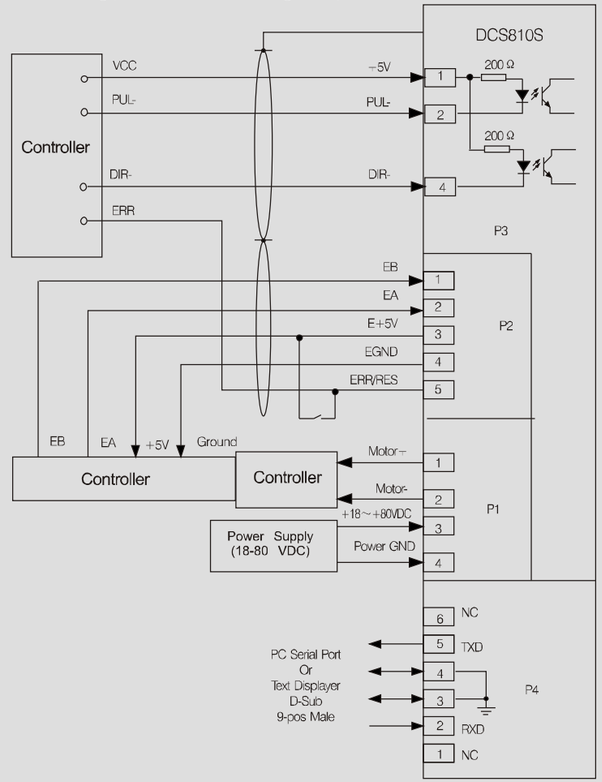
DIP Switch & Command Signal Connector

Pin.	Name	Description	I/O	Pin.	Name	Description	I/O
1	SW2	SW2 DIP switch for parameter selection	I	4	PUL	Pulse signal input	I
2	SW1	SW1 DIP switch for parameter selection	I	5	DIR	Direction signal input	I
3	+5V	Opto-coupler power input (Normal: +5V)	I	6	EGD	Signal ground	-

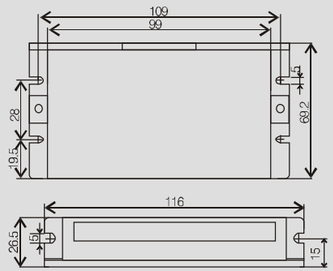
* There are two DIP switches (SW1 and SW2) can be used to select 4 groups servo parameters stored in EEPROM of the drive. The user can select one group of these servo parameters to optimize the performance for different applications, in which using different motors or having different load. For most applications, these two DIP switches should be both on OFF positions (Factory Default Status), for saving and selecting the user's own servo parameters, **NOT** other 3 groups for dedicated applications.

Full Wiring Example

The following picture shows a full wiring example of the DCS810S.



Mechanical Specifications (Units:mm 1 inch = 25.4 mm)



Mechanical specifications of the DCS810S

DCM Series Brushed DC Servo Motors

Features:

* Smooth operation, High precision, High reliability
* Extremely Low cost
* Mounting compatible with PITTMAN 14xxx motors
* Encoder resolution optional (1000 line or 500 line)
* Position error adjustable: down to one pulse
* Mounting dimensions of DCM57xxx brushed servo motors are the same as those of NEMA 23 stepping motors

Introduction

The DCM50xxx/57xxx series motors are permanent magnet brushed DC servo motors. The motors are high quality and cost-effective, making them ideal for cost sensitive applications. All of them come with an attached encoder which provides position feedback to controllers. Mounting dimensions of DCM57xxx brush servo motors are the same as those of NEMA23 stepping motors.

Applications

The DCM5xxxx series brushed DC servo motors are widely used in inkjet printers, medical equipment, measuring devices, engraving machines, electronic packing equipment, and so on. Particularly suited to the applications requiring minimal vibration, super-low noise, high precision and high speed.

Electrical Specifications

No.	Parameters	Symbol	Units	DCM50202A	DCM57202	DCM5x205	DCM5x207
1	Continuous Torque (Max)	T_C	N·m	0.15	0.15	0.25	0.35
2	Peak Torque（Stall）	T_{PK}	N·m	0.76	0.76	1.59	2.90
3	No-load Speed	S_{NL}	rpm	4600±10%	4600±10%	4000±10%	3600±10%
4	Rated Speed	S_R	rpm	3500	3500	3400	2900
5	Rotor Inertia	J_M	kg·m^2	1.62 x 10^{-5}	1.62 x 10^{-5}	3.11 x 10^{-5}	4.73 x 10^{-5}
6	Winding Temperature	θ_{MAX}	°C	155 (Max)	155 (Max)	155 (Max)	155 (Max)
7	Thermal Impedance	R_{TH}	°C/watt	9.00	9.00	7.30	4.98
8	Weight (Plus Encoder)	W_M	g	694	754	1182	1338
9	Length (Plus Encoder)	L1	mm	129±2	129±2	161±2	196±2
10	Rated Voltage	E	V	24	24	24	30.3
11	Rated Current	I	A	1.79	1.79	2.95	3.94
12	Torque Constant	K_T	N·m/A	48 x 10^{-3}	48 x 10^{-3}	52 x 10^{-3}	80 x 10^{-3}
13	Resistance	R_T	Ω	2.52	2.52	0.8	0.90
14	No-load Current	I_{NL}	A	0.45	0.45	0.5	0.45
15	Peak Current (Stall)	I_P	A	13.9	13.9	21.6	32.6
16	Encoder Resolution	-	steps/rev.	500/1000	500/1000	500/1000	500/1000

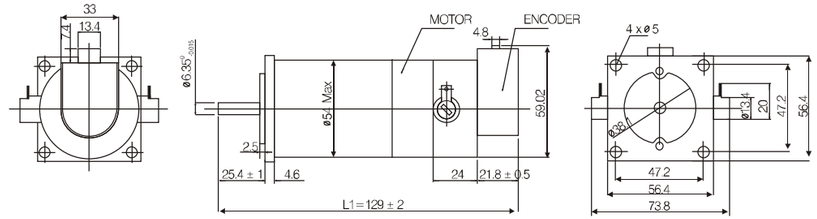
Part Number

DCM — 5 — 0 — 207 — D — — — 1000

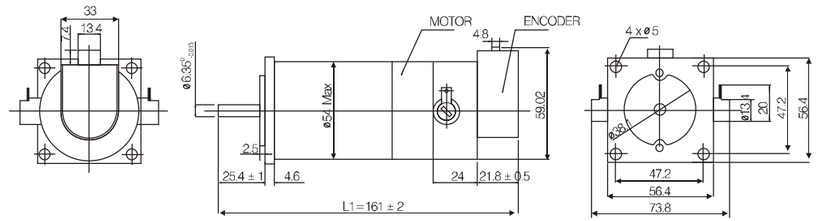
- DCM: Brush DC Servo motor
- 5: Series Symbol
- 0: Installation method; 0: Screw mounted; 7: Flange mounted
- 207: Power; 207: 120 W; 205: 80 W; 202: 50 W; 202A: 50W
- D: Encoder type; D: Differential; Blank: Single-ended
- 1000: Encoder resolution; 1000: 1000-line; 500: 500-line

Mechanical Specifications (Units: mm 1 inch = 25.4 mm)

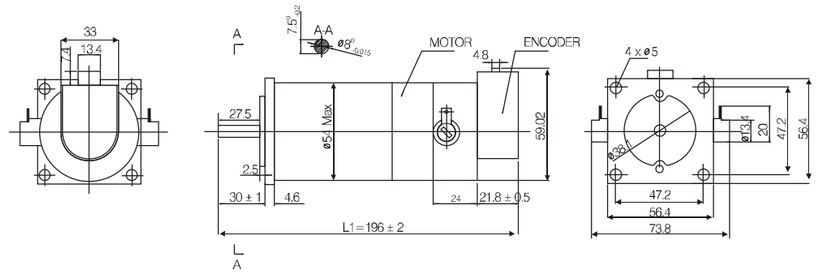
Mechanical specifications of the DCM57202 motor (plus encoder):



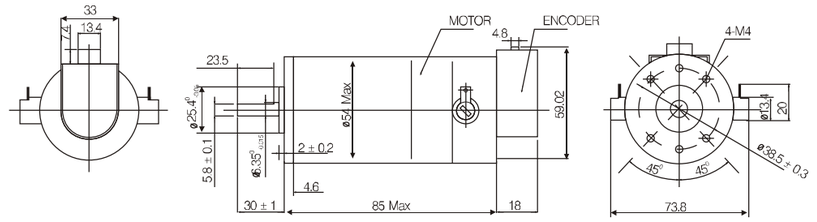
Mechanical specifications of the DCM57205 motor (plus encoder):



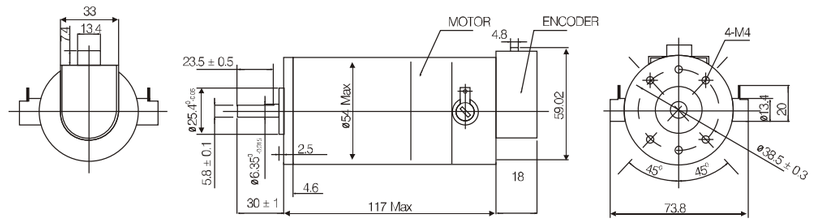
Mechanical specifications of the DCM57207 motor (plus encoder):



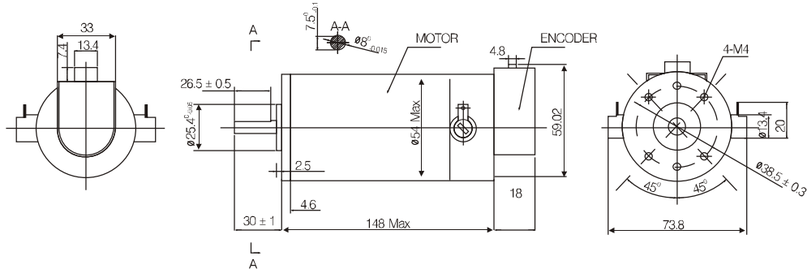
Mechanical specifications of the DCM50202A motor (plus encoder):



Mechanical specifications of the DCM50205 motor (plus encoder):



Mechanical specifications of the DCM50207 motor (plus encoder):



Encoder Connections

Connection Table for Single-ended Encoder			Connection Table for Differential Encoder		
Pin	Color	Connection (DCS303, DCS810S / DCS810)	Pin	Color	Connection (DCS810)
1	Blue	Channel B (EB / EB+)	1	Black	Channel A+ (EA+)
2	Yellow	Channel A (E A / EA+)	2	Blue	Channel A- (EA-)
3	Red	VCC (E+5V / E+5V)	3	Yellow	Channel B+ (EB+)
4	Black	Ground (EGND / EGND)	4	Green	Channel B- (EB-)
5	Green	Index / NC (NC / NC)	5	Red	VCC (E+5V)
			6	White	Ground (EGND)

Note: The DCM5xxxx-1000 motor includes an attached 1000 line encoder and the DCM5xxxx-500 motor includes an attached 500 line encoder. The Z (Index) signal is NOT offered by standard models, please contact Leadshine if an encoder with Z (Index) signal is required.

Order Information

DCM50xxx-1000 is a screw mounted motor including a 1000 line encoder (single-ended output), such as the DCM50202A-1000, DCM50205-1000, DCM50207-1000.

DCM50xxx-500 is a screw mounted motor including a single-ended 500 line encoder (single-ended output), such as the DCM50202A-500, the DCM50205-500 and the DCM50207-500.

DCM57xxx-1000 is a flange mounted motor including a single-ended 1000 line encoder, such as the DCM57202-1000, the DCM57205-1000 and the DCM57207-1000.

DCM57xxx-500 is a flange mounted motor including a single-ended 500 line encoder, such as the DCM57202-500, the DCM57205-500 and the DCM57207-500.

DCM50xxxD-1000 is a screw mounted motor including a differential 1000 line encoder, such as the DCM50202AD-1000, the DCM50205D-1000 and the DCM50207D-1000.

DCM50xxxD-500 is a screw mounted motor including a differential 500 line encoder, such as the DCM50202AD-500, the DCM50205D-500 and the DCM50207D-500.

DCM57xxxD-1000 is a flange mounted motor including a differential 1000 line encoder, such as the DCM57202D-1000 , the DCM57205D-1000 and the DCM57207D-1000.

DCM57xxxD-500 is a flange mounted motor including a differential 500 line encoder, such as the DCM57202D-500, the DCM57205D-500 and the DCM57207D-500.

SPS Series — — — — — —73
PS Series — — — — — — 75

Power Supplies

SPS Series Switching Mode Supplies

Features:

- Specifically designed to power stepping and servo drives
- High efficiency and output power up to 500W
- Input voltage 220VAC ± 10% or 110VAC ± 10% 50/60 Hz
- Short circuit, over-current, over-voltage and short-voltage protection
- Compact size, light weight

Introduction

The SPS series switching mode power supplies are specifically designed to power inductive loads generated in stepping and servo systems. The normal regulated switching power supplies popular on the market are usually working with bad reliability and low efficiency when used in stepping and servo driving, this is because that the conventional switching power supplies are designed for the constant and unvarying loads. Whereas, when the stepping or servo system running, the driving current varies extremely fast, which is belonged to inductive load, herein the drives and power supplies would be damaged easily if used normal power supplies. SPS series supplies are capable of delivering current to drives without affecting the reliability due to their unregulated specialty and bulky capacitors. By selecting appropriate model, one power supply can supply 1-3 drives, saving the average cost of per shaft.

Electrical Specifications

Model	Output Voltage（V）	Output Current（A）	Input Voltage	Size（mm）	Weight（kg）
SPS407	42	7 (RMS)	220VAC±10% or 110VAC±10% Available	132*104*60	0.638
SPS487	48	7 (RMS)			
SPS705	68	5 (RMS)			
SPS2410	24	10 (RMS)		199*110*50	0.8
SPS369	36	9.7 (RMS)		215*115*50	0.88
SPS488	48	8.3 (RMS)		261*103*65	1.14
SPS608	60	8.5 (RMS)		261*103*65	1.13

*Please point out the input supply voltage when you place an order.

Pin Assignment and Description

Pin	Description
L N	AC power input.
E	Ground terminal. Recommend connect this port to the ground for better safety.
GND	DC output negative.
V +	DC output positive.

Order Information

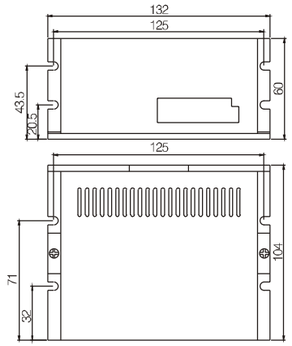
220VAC	110VAC
SPS407	SPS407-L
SPS487	SPS487-L
SPS705	SPS705-L
SPS2410	
SPS369	
SPS488	
SPS608	

Part Number

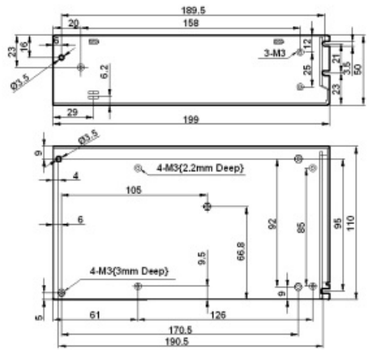
SPS 70 5 — XXXXX

- XXXXX: Special model mark (1~5 bit) Blank: Standard
- Continuous output current(Max) 5 = 5 A
- Voltage class 70 = 70 V
- Type of power supply SPS: SPS series switching mode power supplies

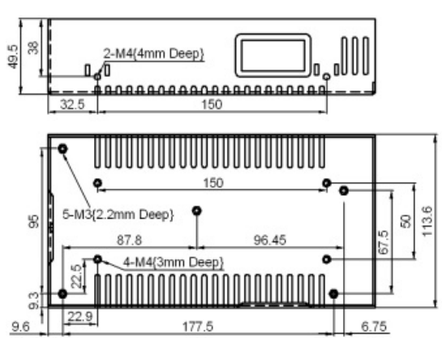
Mechanical Specifications (Units: mm 1 inch = 25.4 mm)



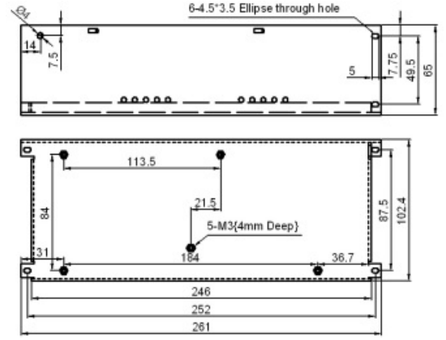
(a) Mechanical specifications of SPS407, SPS487, SPS705



(b) Mechanical specifications of SPS2410



(c) Mechanical specifications of SPS369



(d) Mechanical specifications of SPS488, SPS608

PS Series Linear Supplies

Features:

- Low cost and high reliability
- 3 main output plus 1 auxiliary output
- Short circuit and over-voltage protection
- Simple structure
- PS405 / PS408 / PS804 / PS806 are available

Introduction

The PS series linear power supplies are specially designed to power stepping and servo systems. They are unregulated power supplies and have better ability to withstand current surge than traditional switching mode power supplies.

The user may use an unregulated power supply of lower current rating than that of motor (typically 50% ~ 70% of motor current). The reason is that the drive draws current from the power supply capacitor of the unregulated supply only during the ON duration of the PWM cycle, but not during the OFF duration. Therefore, the average current withdrawn from power supply is considerably less than motor current. For example, two 3A motors can be well supplied by one unregulated power supply of 4A rating.

Electrical Specifications

Model	Main DC Output	Auxiliary DC Output	Rated Power	Size（mm）	Weight（kg）
PS405-5	DC36V/5A	DC5V/1A	200	175*110*70	1.6
PS405-12	DC36V/5A	DC12V/1A	200		
PS408-5	DC36V/8A	DC5V/1A	300		
PS408-12	DC36V/8A	DC12V/1A	300		
PS804-5	DC68V/4A	DC5V/1A	300	175*110*70	2.0
PS804-12	DC68V/4A	DC12V/1A	300		
PS806-5	DC68V/6A	DC5V/1A	500	215*130*70	3.5
PS806-12	DC68V/6A	DC12V/1A	500		

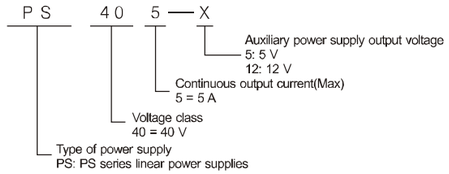
Auxiliary DC Output

Auxiliary DC Output	PS405	PS804	PS806
5V	JP1 Short-circuit	JP1 Short-circuit	R5=510Ω 1/4W
12V	JP1 Open	JP1 Open	R5=180Ω 1/4W

Pin Assignment and Description

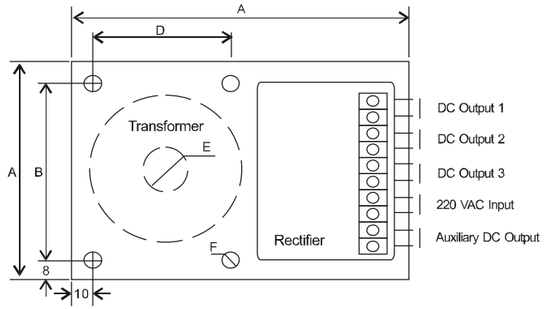
Pin	Description
L (AC) N (AC)	220 VAC power input.
VH+, VH+, VH+	Main DC output positive.
VH-, VH-, VH-	Main DC output negative.
VL +	Auxiliary DC output positive.
VL-	Auxiliary DC output negative.

Part Number



Mechanical Specifications (Units: mm 1 inch = 25.4 mm)

	A	B	C	D	E	F
PS405 / PS408	175	110	96	94	⌀6	⌀4
PS804	175	110	96	94	⌀6	⌀4
PS806	215	130	112	108	⌀6	⌀4



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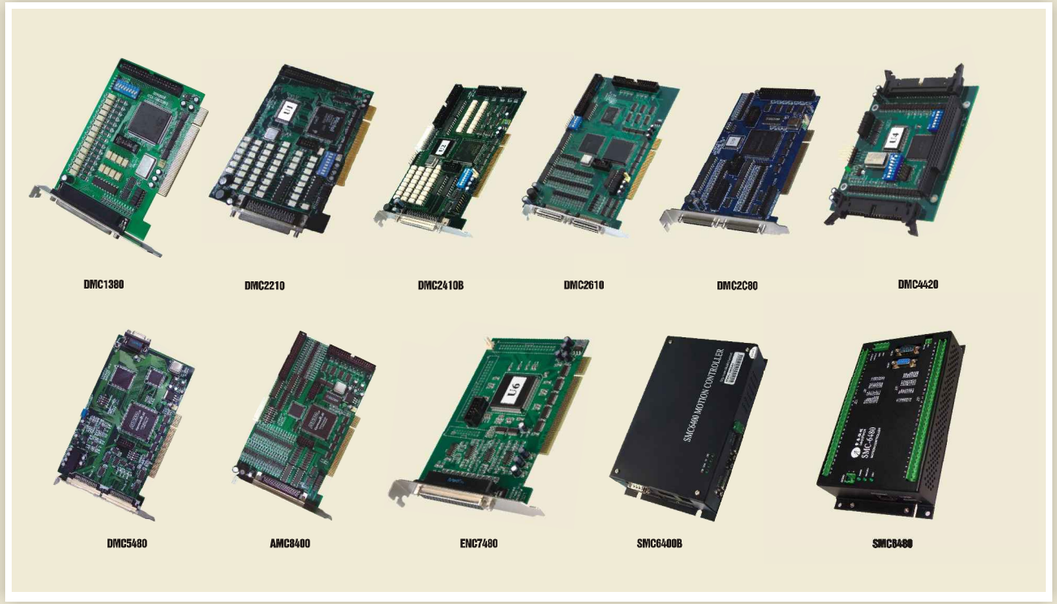
SMC6480 — — — — — — 89
SMC6400B — — — — — — 91

Motion Controllers



Selection Guide for Motion Controller

Introduction

A variety of controllers handle motion control today. Depending on the application, a bus-based, stand-alone, or network motion controller may be needed. There are three popular data communication technologies or protocols, are ued in motion control: PC bus, such as peripheral component interconnect (PCI), fieldbus and Ethernet. Each has its place in industrial control .

PCI Bus.

PCI bus architecture offers the highest data transfer rate between peripheral devices and a PC — about 20 times greater than either Ethernet or fieldbus. There are several advantages to PC-based motion control including lower system cost, flexibility, continuous improvement of PC technology, easy to make an user-friendly software and ease of integration with other PC-based components, such as PC-based machine vision or data acquisition. A single platform can synchronize each of these pieces to one another, opening up new possibilities for automated inspection.

However, the PCI architecture offers only a bus-based approach. In applications where the motion controller has to handle functions independent of a PC or in cases where the machine doesn't have PC control, PCI architecture doesn't work. However, most fieldbus or Ethernet controllers can operate as stand-alone devices. Nevertheless, the trend toward integrating vision and motion system software can increase the use of the PC-based motion controllers among applications that need high-level precision.

Fieldbus.

Originally designed as a replacement for the 4-20mA analog control method, fieldbus is a generic term that covers many different industrial network protocols. Two of the most popular protocols are DeviceNet and Profibus. Generally, fieldbus protocols originate with specific programmable logic controller (PLC) manufacturers, and their performance and hardware interfaces differ. Software is a key component in the fieldbus standard, and such equipment often required custom software to make the systems work.

Ethernet.

Ethernet offers a variety of advantages for today's motion control needs. It's usually incorporated into a motion control system through a stand-alone controller connected to the PC or network using a standard Ethernet cable.

Using Ethernet TCP/IP can help eliminate the problems inherent with PCI architecture. Ethernet devices are stand-alone and outside the PC. And another important advantage of the Ethernet protocol is its inherent scalability.

Most supervisory control and data acquisition (SCADA) networks use TCP/IP over Ethernet as the network protocol and physical layer. If a motion controller must connect to a factory network through a network interface, Ethernet motion controller is a good choice.

Typical Controller Features

Controllers generate several types of motion profiles including point-to-point, linear/circular interpolation, and contouring.

Point-to-point motion is the most basic type of controlled motion. As the name implies, an axis is made to move from one position to another. Point-to-point motion is used in applications where complex trajectories are not important such as moving a slide to a certain position or indexing a conveyor belt.

Linear interpolation extends the point-to-point approach to include coordinated motion between two or more axes. Linear interpolation specifies a target destination in two or three dimensional space. Axes move in concert plotting a direct path to the specified destination.

Circular interpolation also involves coordination of multiple axes. Circular interpolation is a hardware feature of many controllers that creates smooth circular paths without chordal error by connecting several short linear moves or chords. The combination of circular and linear interpolation enables the creation of many complex trajectories.

Some paths, however, can not be defined using simple lines and arcs. Such complex paths require controllers that support contouring. Contouring can be used for special applications like complex CNC machining, earthquake simulation.

Leadshine's Motion Controllers

Since releasing its first motion controller in 1997, Leadshine has been developing new products to meet the needs of its customers in a wide range of industries. Today, thousands of Leadshine motion controllers are deployed around the world in hundreds of industries. These applications include PCB drilling and milling machines, coordinate measuring machines (CMM), laser welding machines, vision and photo composition automation, electronic manufacturing and assembly, measurement device, biotech sampling and handing, LCD manufacturing, robotics, electronic assembly and measurement equipment, AOI machines, screen printing machines, and so on.

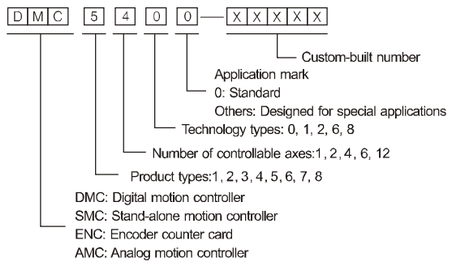
Leadshine is distinguished from others by providing motion controllers that are highly reliable, cost-effective, and easy-to-use. Leadshine's full line of motion controllers includes single and multi-axis, bus-based and stand-alone controllers. Available interface options for international markets include PCI bus, Ethernet, USB and RS232 for the moment. By using one ASIC microcomputer, Leadshine's controllers provide high speed performance and can handle many modes of motion such as point-to-point positioning, jogging, linear and circular interpolation, continuous interpolation and helix interpolation.

All of them are SMT processed with high reliability. They are suitable for stepping and digital servo control systems. Leadshine offers drivers, demo software, and documents to help the users to develop their own application software with G code or VB/VC/C++ Builder/LabVIEW in Window95/98/2000/NT/XP.

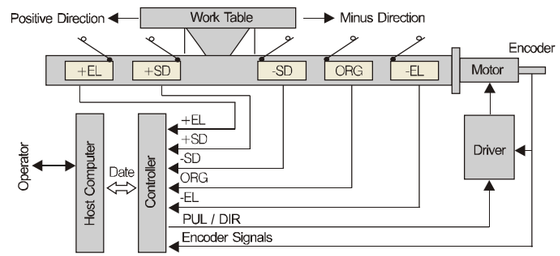
Selection Table (Visit www.leadshine.com for information about other motion controllers.)

Features \ Model	DMC1000B	DMC2410B	DMC5480	SMC6480	SMC6400B	ENC7480
Number of Controllable Axes	4	4	4	4	4	4
Interfaces	PCI	PCI	PCI	Stand-alone, USB RS232, Ethernet	Stand-alone, USB RS232	PCI
Pulse Output Frequency (Max)	1.2 MPPS	5 MPPS	8.0 MPPS	5.0 MPPS	5.0 MPPS	-
Encoder Input Frequency (Max)	-	4 MHz	6 MHz	-	-	6.5 MHz
Position Ranges	24-bit ±(8,388,608 pulses)	28-bit ±(134,217,728 pulses)	28-bit ±(134,217,728 pulses)	32-bit ±(2,147,483,648 pulses)	28-bit ±(134,217,728 pulses)	-
General purpose I/O	32 Inputs / 28 Outputs	20 Inputs / 20 Outputs	20 Inputs / 20 Outputs	32 Inputs / 24 Outputs	16 Inputs / 24 Outputs	32 Inputs / 32 Outputs
Linear Interpolation	2~4 axes	2~4 axes	2~4 axes	2~4 axes	2~4 axes	-
Circular Interpolation	Any 2 axes Software Interpolation	Any 2 axes High Speed Hardware Interpolation	Any 2 axes High Speed Hardware Interpolation	Any 2 axes High Speed Hardware Interpolation	Any 2 axes Software Interpolation	-
Continuous Interpolation	-	Yes	Yes	Yes	Yes	-
Acceleration and Deceleration	Equal	Equal or Unequal	Equal or Unequal	Equal or Unequal	Equal or Unequal	-
Encoder Counter	-	28-bit ±(134,217,728 pulses)	32-bit ±(2,147,483,647 pulses)	28-bit ±(134,217,728 pulses)	28-bit ±(134,217,728 pulses)	28-bit ±(134,217,728 pulses)
Manual Pulser Input	-	100 KHz (Max)	100 KHz (Max)	100 KHz (Max)	100 KHz (Max)	-
Index Signal Input	-	Yes	Yes	Yes	Yes	Yes

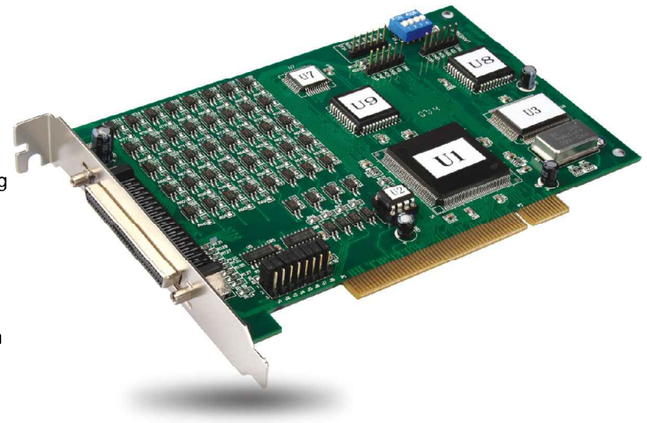
Part Number



Typical motion control system (1 axis)



DMC1000B



Features:

- 4 axes of pulse and direction signal output for controlling stepping or digital servo.
- 32-bit PCI-Bus plug and play.
- Maximum output frequency is up to 1.2 Mpps.
- 2~4 axes linear interpolation.
- Any 2 of 4 axes circular interpolation.
- Home switch, positive and negative limit and slow down switches interface provided for all axes.
- Control signal types: PUL/DIR, CW/CCW
- All I/O Isolated
- Trapezoidal and S-curve velocity profiles.
- Motion1000 demo software for verifying and testing a motion control system.
- DMC1000.DLL for API function calling in Windows 95/98/NT/2000/XP/7 systems with VB/VC/C++ Builder/LabVIEW

Introduction

The DMC1000B is an extremely cost-effective motion controller. However, it still provides a variety of motion control functions for 1 axis to 4 axes stepping or digital servo systems. Its pulse output frequency is up to 1.2 MHz with trapezoidal and S-curve velocity profiles acceleration/deceleration. In single axis operation, change position and speed on the fly are available.

It supports PUL/DIR, CW/CCW, single-ened, differential commanding signals, and offers 20 general purpose digital inputs and 16 general purpose digital outputs, making easier to build an integrated system.

Motion1000 demo software, a Microsoft Windows based software is equipped with the DMC1000 for supporting application development. It is very helpful for verifying and testing a motion control system during the design phase of a project. Besides this demo software, a Windows version function library (DLL) is included for programmers using VB/VC/C++ Builder/LabVIEW programming languages. Several sample programs are given to illustrate how to use the function library in WINDOWS XP/2000/NT/98/WIN7.

Applications

- High precision X-Y-Z table,
- PC-based CNC machining center,
- High precision rotation control device,
- Packing machines,
- Semiconductor, LCD manufacturing,
- Laboratory automation, and etc.

Specifications

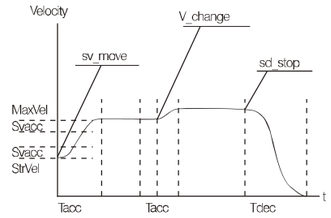
Number of controllable axes:	4 axes
Maximum pulse output frequency:	1.2MHz
Position setting range:	-8,388,608 to +8,388,608 pulses
Number of general purpose I/O:	32 DI / 28 DO
Operating temperature:	0 ℃ to 50 ℃
Storage temperature:	-20 ℃ to 80 ℃
Humidity:	5%RH to 85%RH
Power Consumption	—
PCI slot (input):	±5VDC±5%，@ 900mA (Max)
External power supply (input):	±12 to 24VDC±5%，@ 500mA (Max)
Dimension:	146.5 mm(W) x 106.5 mm(H)

Build Intended Programs

Its DLL offers up to 40 API functions, and the user can build an intended program with VB/VC/C++ Builder/ LabView in a short time.

Code Example：

```
#Include<dmc1000.h>
void main(void)
{
  int card=d1000_board_init();
  d1000_set_command_pos(0,0);
  d1000_start_sa_move (0,3000,100,2000,0.1);   // Move Axis0 to the position 3000
  while(d1000_get_command_pos (0) >1000);   // Chang speed of Axis 0 to 2200
  d1000_change_speed(0,2200);                  // after it reaches the position 1000
  while(d1000_check_done(0)==1);  // Wait until Axis0 stops
}
```



Connector

The DMC1000B uses a 68pin SCSI-II connector, and it contains the following signals.

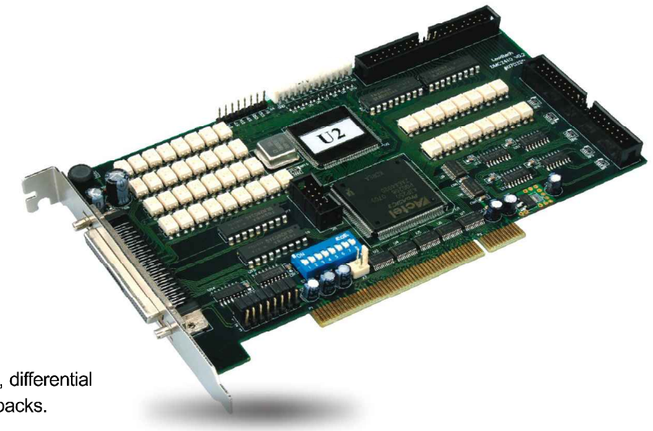
GND	1	35	PUL2+		
PUL0+	2	36	PUL2-		
PUL0-	3	37	DIR2+		
DIR0+	4	38	DIR2-		
DIR0-	5	39	PUL3+		
PUL1+	6	40	PUL3-		
PUL1-	7	41	DIR3+		
DIR1+	8	42	DIR3-		
DIR1-	9	43	OUT1		
EL0+	10	44	OUT2		
EL0-	11	45	OUT3		
SD0+	12	46	OUT4		
SD0-	13	47	OUT5		
ORG0	14	48	OUT6		
EL1+	15	49	OUT7		
EL1-	16	50	OUT8		
SD1+	17	51	OUT9		
SD1-	18	52	OUT10		
ORG1	19	53	OUT11		
EL2+	20	54	OUT12		
EL2-	21	55	IN5		
SD2+	22	56	IN6		
SD2-	23	57	IN7		
ORG2	24	58	IN8		
EL3+	25	59	IN9		
EL3-	26	60	IN10		
SD3+	27	61	IN11		
SD3-	28	62	IN12		
ORG3	29	63	IN13		
IN1	30	64	IN14		
IN2	31	65	IN15		
IN3	32	66	EXGND		
IN4	33	67	VDD		
EXGND	34	68	IN16		

Order Information

- **PCI-bus motion controller:** DMC1000B
- **Signal Cable:** CABLE68
- **Terminal Board:** TB68
- **Demo software and user's manual for DMC1000B**

DMC1000B
DMC2410B
DMC5480
ENC7480
SMC6480
SMC6400B

DMC2410B



Features:

- 4 axes of pulse and direction signal output for controlling stepping or digital servo.
- 32-bit PCI-Bus plug and play.
- Maximum output frequency is up to 5 Mpps.
- 2~4 axes linear interpolation.
- Any 2 of 4 axes circular interpolation.
- Trapezoidal and S-curve velocity profiles.
- Control signal types: PUL/DIR, CW/CCW; single-ened, differential
- 28-bit up/down counters for incremental encoder feedbacks.
- Number of general purpose DI/DO: 20/20
- Software supports up to 8 pieces DMC2410 operation in one computer.
- Motion2410 demo software for verifying and testing a motion control system.
- DMC2410.DLL for API function calling in Windows 95/98/NT/2000/XP/7 systems with VB/VC/C++ Builder/LabVIEW

Introduction

Highly Cost-effective Motion Controller

The DMC2410B is a highly cost-effective PCI-bus motion controller. It offers 1 axis to 4 axes motion control for stepping systems or digital servo systems to accomplish various operations. Compare to the DMC1000B, it provides better performance in pulse output frequency and interpolation. What's more, it offers incremental encoder interface on all four axes.

Linear and Circular Interpolation

In multi-axis operation, the DMC2410B provides linear interpolation by any 2, any 3, or even all-4 axes. Any 2 axes can perform circular interpolation. And all the interpolation are done by hardware, so it offers much better interpolation performance than the controllers using software interpolations.

Continuous Interpolation

The DMC2410B supports continuous interpolation with velocity continuity in multi-axes operation.

Change Position and Speed on The Fly

In single axis operation, change position and speed on the fly are available, making a much complicated velocity profile can be achieved.

Position Latching and Comparing

With the help of on board FIFO, the DMC2410 can also perform precise and extremely fast position latching, position compare and trigger functions without consuming CPU resource.

Simultaneous Start and Stop

Multiple DMC2410B controllers can be used in one computer. If there are two or more DMC2410B controllers, simultaneous start/stop control on all concerned axes is possible.

Applications

- Vision and photo composition automation
- Electronic manufacturing and assembly
- Measurement device
- Biotech sampling and handing
- Laser processing
- CNC machines

DMC1000B
DMC2410B
DMC5480
ENC7480
SMC6480
SMC6400B

Performance

Number of controllable axes:	4
Number of controllers operate in 1 computer:	8
Maximum pulse output frequency:	5 MHz
Control signal types:	6
Position setting range:	-134217728 to +134217728 pulses
Number of supported encoders:	4
Encoder counter counting range:	28 bit
Maximum encoder input frequency:	4MHz（X4）

I/O Signals

Incremental encoder signals input pins:	EA, EB
Encoder index signal input pin:	EZ
Position latch input pin:	LTC
Position compare output pin:	CMP
Mechanical limit/slow down/switch signal input pins:	EL, SD, ORG
Servo motor interface I/O pins:	INP, ALM, ERC, SVON, RD
Simultaneous start/stop/slow-down signal I/O pins:	STA, STP, CSD
Manual pulser signal input pins:	PA, PB

General Purpose I/O

Digital inputs:	20 (14 Opto-isolated)
Digital outputs:	20 (1 OC output)

32 Inputs /28 outputs including special purpose DI/DO.

Dimensions

178mm x 106.5 mm

Connectors

X1 Connector

PUL1+	1	35	PUL3+		
PUL1-	2	36	PUL3-		
DIR1+	3	37	DIR3+		
DIR1-	4	38	DIR3-		
PUL2+	5	39	PUL4+		
PUL2-	6	40	PUL4-		
DIR2+	7	41	DIR4+		
DIR2-	8	42	DIR4-		
OUT1	9	43	OUT3		
OUT2	10	44	OUT4		
SEVON1	11	45	SEVON3		
SEVON2	12	46	SEVON4		
ERC1	13	47	ERC3		
ERC2	14	48	ERC4		
CMP1	15	49	CMP3		
CMP2	16	50	CMP4		
IN1	17	51	IN3		
IN2	18	52	IN4		
ALM1	19	53	ALM3		
INP1	20	54	INP3		
RDY1	21	55	RDY3		
EL1+	22	56	EL3+		
EL1-	23	57	EL3-		
SD1\PCS1	24	58	SD3/PCS3		
ORG1	25	59	ORG3		
ALM2	26	60	ALM4		
INP2	27	61	INP4		
RDY2	28	62	RDY4		
EL2+	29	63	EL4+		
EL2-	30	64	EL4-		
SD2/PCS2	31	65	SD4/PCS4		
ORG2	32	66	ORG4		
VDD	33	67	GND		
EGND	34	68	EMG		

Motion Command Signals
(68-pin SCSI)

X2 Connector

5V	1	20	GND
GND	2	21	EA2+
EA1+	3	22	EA2-
EA1-	4	23	EB2+
EB1+	5	24	EB2-
EB1-	6	25	EZ2+
EZ1+	7	26	EZ2-
EZ1-	8	27	LTC2+
LTC1-	9	28	LTC2-
5V	10	29	GND
GND	11	30	EA4+
EA3+	12	31	EA4-
EA3-	13	32	EB4+
EB3+	14	33	EB4-
EB3-	15	34	LTC1+
EZ3+	16	35	EZ4-
EZ3-	17	36	BUF
EZ4+	18	37	LED
5V	19		

Encoder Signals
(37-pin D-sub)

X3 Connector

IN5	1	20	LTC3-
IN6	2	21	OUT5
IN7	3	22	OUT6
IN8	4	23	OUT7
IN9	5	24	OUT8
IN10	6	25	OUT9
IN11	7	26	OUT10
IN12	8	27	OUT11
IN13	9	28	OUT12
IN14	10	29	OUT13
IN15	11	30	OUT14
IN16	12	31	OUT15
IN17	13	32	OUT16
IN18	14	33	OUT17
IN19	15	34	OUT18
IN20	16	35	OUT19
LTC4+	17	36	OUT20
LTC4-	18	37	GND
LTC3+	19		

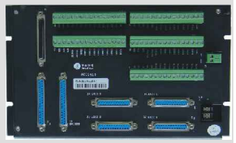
I/O Signals
(37-pin D-sub)

Order Information

- **DMC2410** Highly Cost-effective motion controller
- **CABLE68-2.0** Cable for X1 connector and TB68 (2m)
- **TB68** Terminal board for X1 connector
- **EB37** 40-pin IDE to 37-pin MCR connector with bracket
- **CABLE37-2.0** Cable for EB37 (X2, X3 connectors) and TB37 (2m)
- **TB37** Terminal board for X2, X3 connectors

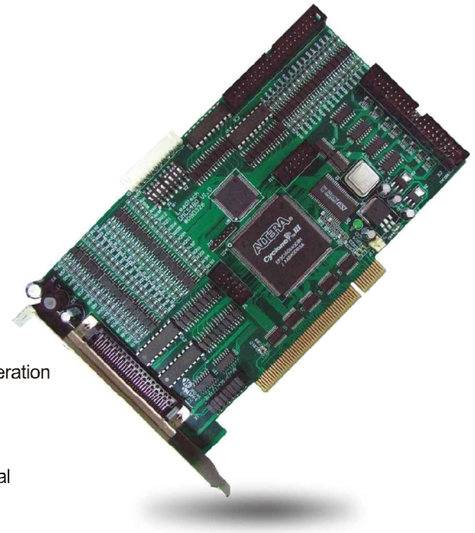
ACC2410 Terminal Board

Upgrade TB68 and TB37, offering better anti-interference performance. 4 D-sub connectors, and each D-sub connector includes all signals for one axis, easier for wiring and connecting.



DMC1000B
DMC2410B
DMC5480
ENC7480
SMC6480
SMC6400B

DMC5480



Features:

- 4 axes of pulse and direction signal output for controlling stepping or digital servo.
- 32-bit PCI-Bus plug and play.
- Maximum output frequency is up to 8 Mpps.
- Continuous interpolation with velocity continuity in multi-axes operation
- 2~4 axes linear interpolation.
- Any 2 of 4 axes circular interpolation.
- Trapezoidal and S-curve velocity profiles.
- Control signal types: PUL/DIR, CW/CCW; single-ened, differential
- 28-bit up/down counters for incremental encoder feedbacks.
- Number of general purpose DI/DO: 20/20
- Software supports up to 8 pieces DMC5400 operation in one computer.
- Motion5480 demo software for verifying and testing a motion control system.
- DMC5480.DLL for API function calling in Windows 95/98/NT/2000/XP/7 systems with VB/VC/C++ Builder/LabVIEW

Introduction

The DMC5480 is a high performance PCI-bus motion controller. It can generate pulse control signals (up to 8 MHz) to control 4 axes stepping or digital servo systems.

As a motion controller, it provides trapezoidal and S-curve velocity profiles acceleration/deceleration, circular interpolation between any two axes, linear interpolation between 2~4 axes, continuous interpolation with velocity continuity in multi-axes operation. In single axis operation, change position and speed on the fly are available. It offers13 home return modes. Since these functions needing complex computations are done internally on the ASIC, the computer's CPU is free to supervise and perform other tasks.

Multiple DMC5480 controllers can be used in one computer. Incremental encoder interface on all four axes provide the ability to correct positioning errors generated by inaccurate mechanical transmissions. With the help of on board FIFO, the DMC5480 can also perform precise and extremely fast position compare and trigger function without consuming CPU resource. In addition, mechanical sensor interface, servo motor interface and general-purpose I/O signals are provided for system integration.

Motion5480 demo software, a Microsoft Windows based software is equipped with the DMC5480 card for supporting application development. It is very helpful for verifying and testing a motion control system during the design phase of a project. Besides this demo software, a Windows version function library (DLL) is included for programmers using VB/VC/C++ Builder/LabVIEW programming languages. Several sample programs are given to illustrate how to use the function library in WINDOWS XP/2000/NT/98/WIN7.

Applications

- Electronic manufacturing and assembly,
- Vision and photo composition automation
- Measurement device
- Biotech sampling and handing
- Laser processing
- Robotics
- CNC machines
- Laboratory automation

Performance

Number of controllable axes:	4
Number of controllers operate in 1 computer:	8
Maximum pulse output frequency:	8 MHz
Control signal types:	6
Position setting range:	-2,147,483,647 to +2,147,483,647 pulses
Number of supported encoders:	4
Encoder counter counting range:	32 bit
Maximum encoder input frequency:	6MHz（X4）

I/O Signals

Incremental encoder signals input pins:	EA, EB
Encoder index signal input pin:	EZ
Position latch input pin:	LTC
Position compare output pin:	CMP
Mechanical limit/slow down/switch signal input pins:	EL, SD, ORG
Servo motor interface I/O pins:	INP, ALM, ERC, SVON, RD
Simultaneous start/stop/slow-down signal I/O pins:	STA, STP, CSD
Manual pulser signal input pins:	PA, PB

General Purpose I/O

Digital inputs:	20 (14 Opto-isolated)
Digital outputs:	20 (1 OC output)

32 Inputs /28 outputs including special purpose DI/DO.

Dimensions

178mm x 106.5 mm

Connectors

X1 Connector

PUL1+	1	35	PUL3+		
PUL1-	2	36	PUL3-		
DIR1+	3	37	DIR3+		
DIR1-	4	38	DIR3-		
PUL2+	5	39	PUL4+		
PUL2-	6	40	PUL4-		
DIR2+	7	41	DIR4+		
DIR2-	8	42	DIR4-		
OUT1	9	43	OUT3		
OUT2	10	44	OUT4		
SEVON1/OUT25	11	45	SEVON3/OUT27		
SEVON2/OUT26	12	46	SEVON4/OUT28		
ERC1/OUT29	13	47	ERC3/OUT31		
ERC2/OUT30	14	48	ERC4/OUT32		
CMP1/OUT21	15	49	CMP3/OUT23		
CMP2/OUT22	16	50	CMP4/OUT24		
IN1	17	51	IN3		
IN2	18	52	IN4		
ALM1/IN33	19	53	ALM3/IN35		
INP1/IN29	20	54	INP3/IN31		
In21	21	55	In23		
EL1+	22	56	EL3+		
EL1-	23	57	EL3-		
SD1/IN25	24	58	SD3/IN27		
ORG1	25	59	ORG3		
ALM2/IN34	26	60	ALM4/IN36		
INP2/IN30	27	61	INP4/IN32		
In2	28	62	In24		
EL2+	29	63	EL4+		
EL2-	30	64	EL4-		
SD2/IN26	31	65	SD4/IN28		
ORG2	32	66	ORG4		
VDD	33	67	GND		
EGND	34	68	EMG		

X2 Connector

EA1+	1	20	EA2+		
EA1-	2	21	EA2-		
EB1+	3	22	EB2+		
EB1-	4	23	EB2-		
EZ1+	5	24	EZ2+		
EZ1-	6	25	EZ2-		
LTC1+	7	26	LTC2+		
LTC1-	8	27	LTC2-		
EA3+	9	28	EA4+		
EA3-	10	29	EA4-		
EB3+	11	30	EB4+		
EB3-	12	31	EB4-		
EZ3+	13	32	EZ4+		
EZ3-	14	33	EZ4-		
LTC3+	15	34	LTC4+		
LTC3-	16	35	LTC4-		
5V	17	36	5V		
GND	18	37	GND		
GND	19				

X3 Connector

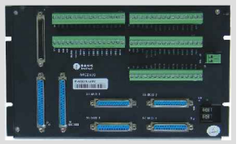
IN5	1	20	OUT5		
IN6	2	21	OUT6		
IN7	3	22	OUT7		
IN8	4	23	OUT8		
IN9	5	24	OUT9		
IN10	6	25	OUT10		
IN11	7	26	OUT11		
IN12	8	27	OUT12		
IN13	9	28	OUT13		
IN14	10	29	OUT14		
IN15	11	30	OUT15		
IN16	12	31	OUT16		
IN17	13	32	OUT17		
IN18	14	33	OUT18		
IN19	15	34	OUT19		
IN20	16	35	OUT20		
NC	17	36	NC		
GND	18	37	GND		
GND	19				

Order Information

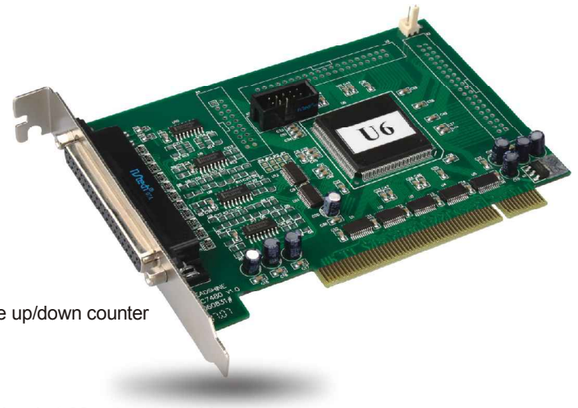
- **DMC5480** High performance motion controller
- **CABLE68-2.0** Cable for X1 connector and TB68 (2m)
- **TB68** Terminal board for X1 connector
- **EB37** 40-pin IDE to 37-pin MCR connector with bracket
- **CABLE37-2.0** Cable for EB37 (X2, X3 connectors)and TB37 (2m)
- **TB37** Terminal board for X2, X3 connectors

ACC2410 Terminal Board

Upgrade TB68 and TB37, offering better anti-interference performance. 4 D-sub connectors, and each D-sub connector includes all signals for one axis, easier for wiring and connecting.



ENC7480



Features:

- 32-bit PCI Bus, plug and play
- 4-axis 28-bit counters, up to 5 MHz (X4 is 20 MHz)
- Counters for quadrature AB phase encoder or general purpose up/down counter
- Supports differential and single-ended inputs
- Latches 4 axes' positions by 2 triggers with interrupt function
- Auxiliary +5V encoder supply
- 32 DI and 32 DO, 32 of 51 inputs with interrupt function, initial level of 32 outputs settable.
- LED and buzzer outputs, which are synchronous with trigger signals
- One 37-pin rugged connector for encoder signals, two 40-pin header connectors for I/O

Introduction

Designed to interface industry standard rotary shaft encoders and linear encoders to PC compatible computers, the ENC7480 incremental encoder interface makes it possible to measure position, velocity and acceleration in such wide ranging applications as co-ordinate measuring machines, robotics and CNC machine tools.

Based on a custom designed ASIC quadrature counter, the ENC7480 interface card provides four independent encoder channels each with a 28-bit position counter with a maximum count rate of 4MHz. The ENC7480 contains a powerful event system which allows events generated by a trigger signal to latch encoder positions. Further more, 64 digital I/O are provided.

A comprehensive software support package includes libraries and examples for modern rapid application development tools such as Visual Basic, Visual C. Plug and Play software support for Windows 98/2000/ME/XP and NT enables simple installation and automatic configuration of up to 5 interfaces supporting a total of 20 encoders.

The ENC7480 enables both OEMs and end users to create powerful and highly flexible PC based measurement systems.

Applications

- Manual CMM machines position measurement, Measurement systems
- Automation & process control
- Control system diagnostics
- Metrology

Encoder Counter Specifications

Number of channels	4
Counter resolution	28-bit
Counter types	A, B phase; PUL/DIR
Maximum counting rate	4 MHz (X4, 20 MHz)
Auxiliary power supply for per encoder	5V ± 5%, @ 100mA (Max.)

General Purpose Digital I/O

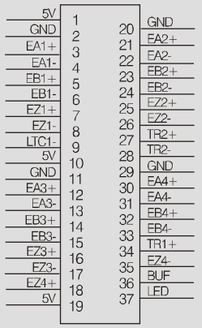
Number of general purpose DI	32
Number of general purpose DO	32
Digital I/O type	LV TTL

Operating Environment

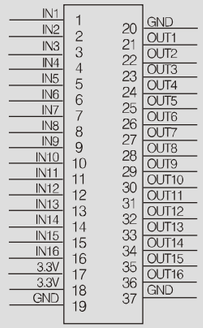
Ambient Temperature	0℃ to 50℃
Storage Temperature	-20℃ to 80℃
Humidity	5%RH to 85%RH

Connectors

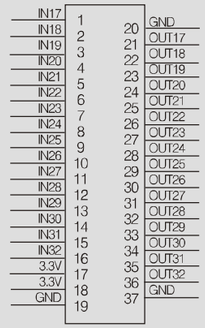
37-pin D-sub connector X_1 (Encoders)



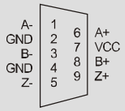
40-pin IDE to 37-pin D-sub connector X_2 (I/O)



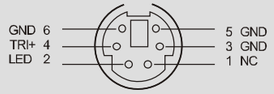
40-pin IDE to 37-pin D-sub connector X_3 (I/O)



CABLE37-0.15-5B Breakout Cable



DB9 connector for encoders (female)



Mini DIN 6-pin connector for probe (female)

Mini DIN 6-pin connector for pedal (female)

Order Information

ENC7480	4-channel quadrature encoder interface card without I/O ports
ENC7480-IO	4-channel quadrature encoder interface card with I/O ports
CABLE37-2.0	Cable with DB37 female connectors (2 meters long)
ACC37-74ENC	Termination Board with DB37 male connector
EB37	Extension bracket with DB37 male connector
CABLE37-0.15-5B	DB37 breakout cable: one end is DB37 female connector; another end includes 3 encoders' connectors, a probe's connector and a pedal's connector

Notes:

For most applications, please choose CABLE37 and ACC37-74ENC for wiring. If the application need I/O extension, the user will need 1 or 2 set of EB37, CABLE37 and ACC37-74ENC additionally.

For manual CMM machines, usually the CABLE37-015-5B breakout cable is a more convenient choice.

Please contact Leadshine if the user want to custom a breakout cable.

SMC6480 Ethernet Motion Controller

Features:

- Ethernet supports multiple masters and slaves.
- TCP/IP protocol for long-range control
- Pulse output rate up to 5 MHz
- 2~4 axes linear interpolation
- 2 axes circular interpolation
- Multi-axis continuous interpolation
- Good contouring performance with the advanced path planning software
- Support BASIC and G code in stand-alone mode
- 2 D/A and 2 PWM outputs for custom use
- Support touch screen and USB flash disk, easy-to-use

Introduction

The SMC6480 is a high performance, Ethernet motion controller, which based on a 32-bit RISC CPU and a FPGA. It offers 1 axis to 4 axes motion control for stepping motors or servo motors to accomplish various operations. The SMC6480 can operate stand-alone or interface to a PC and USB flash disk over Ethernet and USB interface.

In multi-axis operation, the SMC6480 provides linear interpolation by any 2, any 3, or even all-4 axes. Any 2 axes can perform circular interpolation. And the SMC6480 supports the continuous interpolation function. All interpolations are realized by hardware, so faster interpolation speed, better interpolation accuracy and higher stability.

The SMC6480 can work in stand-alone mode, and supports standard ISO G code programming. The user can edit G code program with text monitor, touch screen or on a PC before downloading the program to the controller over Ethernet or USB interface or USB flash disk.

The SMC6480 supports master-slave control mode. The user can realize real-time control by using a computer as a master controller. The application software developed with VB/VC/C++ Build/LabView on master computer can control or communicate with the SMC6480 over Ethernet.

Operation Modes

1. Master-slave Control Mode

The SMC6480 supports master-slave control mode. The user can realize real-time control by using a computer as a master controller. The application software developed with VB/VC/C++ Build/LabView on master computer can control or communicate with the SMC6480 over Ethernet.

2. Stand-alone Mode

Then SMC6480 can work in stand-alone mode, and the user can make an application program with G code.

Applications

- Electronic assembly and measurement equipment
- Semiconductor and LCD manufacturing & measurement equipment
- Laser cutting/engraving/marking equipment
- Biotech sampling and handing device
- Robotics
- Special CNC machines

Motion Control Specifications

Number of controllable axes:	4
Maximum pulse output frequency	5 MHz
Pulse output frequency accuracy	± 0.1 Hz
2 to 4 axes linear interpolation	± 1 pulse
Any 2 axes circular interpolation	± 1 pulse
Position range:	-2,147,483,647 to +2,147,483,648 pulses (32-bit)
6 pulse/dir output modes:	Pulse /DIR, CW/CCW, etc.

DA Outputs

DA outputs	2 DA outputs (8-bit)，0.07 to 4.45 V

I/O Signals

General purpose digital inputs:	32 DI (16 DI are opto-isolated, and 16 DI are non-isolated.)
General purpose digital outputs::	24 DO (8 DO are opto-isolated, and 16 DO are non-isolated.)
	All DI including special purpose digital inputs have RC low-pass filter.

PWM Outputs

PWM outputs	2 PWM outputs，Maximum frequcncy is 1MHz，duty ratio 0 to 100% adjustable

Power Supplies

Power supply for the controller:	+12 to 24VDC±5%, 1100mA(Max)

Dimension

208 mm(L) x 116 mm(W) x 40 mm(H)	1 inch = 25.4 mm

Connectors

Motion Connector J21

Pin	Name
1	PUL1+
2	PUL1-
3	DIR1+
4	DIR1-
5	PUL2+
6	PUL2-
7	DIR2+
8	DIR2-
9	PUL3+
10	PUL3-
11	DIR3+
12	DIR3-
13	PUL4+
14	PUL4-
15	DIR4+
16	DIR4-
17	+5V
18	ELx+
19	ELx-
20	Ely+
21	Ely-
22	ELz+
23	ELz-
24	Elu+
25	Elu-
26	ORGx
27	ORGy
28	ORGz
29	ORGu
30	EXGND
31	EXGND
32	EXGND

I/O Connector J11

Pin	Name
1	IN1
2	IN2
3	IN3
4	IN4
5	IN5
6	IN6
7	IN7
8	IN8
9	IN9
10	IN10
11	IN11
12	IN12
13	IN13/INP1
14	IN14/INP2
15	IN15/INP3
16	IN16/INP4
17	OUT1
18	OUT2
19	OUT3
20	OUT4
21	OUT5
22	OUT6
23	OUT7
24	OUT8
25	PWM2
26	PWM1
27	VDD
28	EXGND
29	EXGND
30	EXGND
31	EXGND
32	EXGND

I/O Connector JPI01

Pin	Name
1	VCC3.3
2	GND
3	IN24/ALM4
4	OUT16
5	IN23/ALM3
6	OUT15
7	IN22/ALM2
8	OUT14
9	IN21/ALM1
10	OUT13
11	IN20
12	OUT12
13	IN19
14	OUT11
15	IN18
16	OUT10
17	IN17
18	OUT9
19	VDD
20	EXGND

COM1 Connector J3

Pin	Name
1	RXD0
2	TXD0
3	EXGND

Digital Output Initial Setting S1

Pin	Name
1	SEL3
2	SEL2
3	SEL1
4	SEL0

I/O Connector JPI02

Pin	Name
1	VCC3.3
2	GND
3	IN32
4	OUT24
5	IN31
6	OUT23
7	IN30
8	OUT22
9	IN29
10	OUT21
11	IN28
12	OUT20
13	IN27
14	OUT19
15	IN26
16	OUT18
17	IN25
18	OUT17
19	VDD
20	EXGND

COM2 Connector J4

Pin	Name
1	TXD1
2	RXD1
3	EXGND

D/A Output Connector J2

Pin	Name
Analog_A	DA Output A
Analog_B	DA Output B
AGND	DA Ground
AGND	DA Ground

Order Information

- **SMC6480:** High performance Ethernet motion controller (4-axis).
- **ACC37-7480-V1.0:** Terminal board for I/O expansion connectors JPI01 and JPI02.
- **CABLE37-DP-08:** Cable for the ACC37-7480-V1.0 and I/O expansion connectors JPI01 and JPI02.
- **CABLE09-DP-10:** Communication cable for the touch screen and the controller.
- **Touch screen:** MT6056iV or MT6070 (optional).

SMC6400B

Features:

- Operates stand-alone or interfaces to a PC or USB flash disk with USB interface
- Supports G code/VB/VC programming
- Pulse output rate up to 5 MHz
- 6 pulse/dir output modes: Pulse /DIR, CW/CCW etc.
- 2~4 axes linear interpolation
- 2 axes circular interpolation
- Multi-axis continuous interpolation
- Teach and playback
- 2 home return modes
- Trapezoidal and S-curve velocity profiles programmable
- Multi-axis, simultaneous start/stop
- Position limit and return home signals for each axis
- Standard servo motor control signal for each axis
- 16 digital inputs, 24 digital outputs
- Touch screen and text monitor optional

Introduction

High performance stand-alone 4-axis motion controller

The SMC6400B is a high performance, stand-alone motion controller, which based on a 32-bit RISC CPU. It offers 1 to 4 axes motion control for stepping motors or servo motors to accomplish various operations. The SMC6400 can operate stand-alone or interface to a PC and USB flash disk with USB interface.

G code programming

The SMC6400 supports standard ISO G code programming. The user can edit G code program with text monitor, touch screen or on a PC before downloading the program to the controller through USB interface or USB flash disk.

Teaching-playback function

The controller supports teaching-playback function. The user can generate simple program by using text monitor or touch screen when the controller in teach-in mode, so the user does not need to learn any program language.

Communication Interfaces

The user can download user program and configure the controller through PC's USB interface, in addition, user program can be changed while the SMC6400 operating under stand-alone condition when start-up with an USB flash disk which has stored user program.

Program memory

User program memory capacity up to 32M flash and each user program can be up to 5000 rows G code, 128 kByte.

Linear, circular interpolation and continuous contouring

In multi-axis operation, the SMC6400 provides linear interpolation by any 2, any 3, or even all-4 axes. Any 2 axes can perform circular interpolation. And the SMC6400 supports the continuous interpolation function.

Supports master-slave control mode

The SMC6400 supports master-slave control mode. The user can realize real-time control by using PC as a master controller.

Applications

- Electronic assembly and measurement equipment
- Semiconductor and LCD manufacturing & measurement equipment
- Laser cutting/engraving/marking equipment
- Biotech sampling and handing device
- Robotics
- Special CNC machines

Motion Control Specifications

Number of controllable axes:	4
Maximum pulse output frequency	5 MHz
6 pulse/dir output modes:	Pulse /DIR, CW/CCW, etc.
Position range:	-134,217,728 to +134,217,728 pulses (28-bit)

I/O Signals

Mechanical limit switch signal input pins:	± EL, SD and ORG (Optically Isolated)
Standard servo motor control signal	INP, ALM, ERC, SVON, RDY
Manual pulser signal input	PA, PB
General purpose digital inputs:	16 DI with opto-isolated
General purpose digital outputs::	24 DO

Communication Interfaces

USB interface:	USB1.1
U flash disk interface	USB1.1
Serial interface:	RS－232

User Program Capacity

User program memory capacity:	32M flash
Each user program:	5000 rows G code, 128kByte

Power Supplies

Power supply for the controller:	+12 to 24VDC±5%, 500mA(Max)

Dimension

180 mm(L) x 110 mm(W) x 25 mm(H)	1 inch = 25.4 mm

Connectors

15-pin D-sub connectors (X, Y, Z, U) X8 for general purpose I/O | X9 for general purpose I/O | X10 for general purpose I/O

Pin	Name	Pin	Name	Pin	Name	Pin	Name	Pin	Name	Pin	Name	Pin	Name	Pin	Name
1	VCC	9	PUL1+	1	E5V	11	OUT1	1	E5V	11	OUT16	1	OUT24	6	OUT19
2	PUL1-	10	DIR1+	2	EGND	12	OUT2	2	EGND	12	OUT15	2	OUT23	7	OUT18
3	DIR1-	11	OUT25	3	INPUT8	13	OUT3	3	INPUT9	13	OUT14	3	OUT22	8	OUT17
4	ERC1	12	INP1 /INPUT19	4	INPUT7	14	OUT4	4	INPUT10	14	OUT13	4	OUT21	9	EGND
5	INPUT17	13	ALM1	5	INPUT6	15	OUT5	5	INPUT11	15	OUT12	5	OUT20	10	
6	ORG1	14	SD1 /INPUT18	6	INPUT5	16	OUT6	6	INPUT12	16	OUT11				
7	EL1-	15	EI1+	7	INPUT4	17	OUT7	7	INPUT13	17	OUT10				
8	EGND			8	INPUT3	18	OUT8	8	INPUT14	18	OUT9				
				9	INPUT2	19	COM	9	INPUT15	19	COM				
				10	INPUT1	20	EGND	10	INPUT16	20	EGND				

Order Information

- SMC6400: High performance stand-alone motion controller (4-axis)
- ACC6400: Terminal board for the SMC6400
- 9PIN cable for RS232 communication
- Touch screen: MT6056iV or MT6070 (optional)