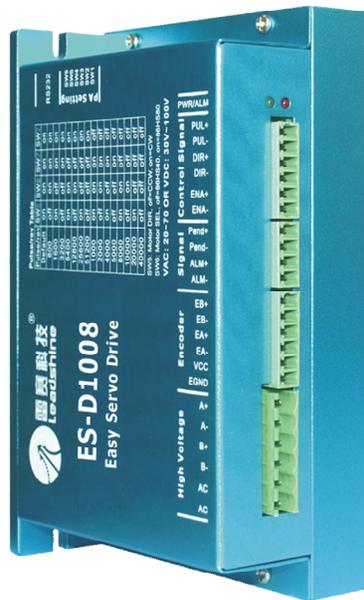




# Leadshine

## Datasheet of the Easy Servo Drive

### *ES-D1008*



**20-70 VAC or 30-100VDC, 8.2A Peak, Close-loop, No Tuning**

Version 0.1.0

<http://www.Leadshine.com>

## Features

- I Step and direction control
- I Closed position loop for no loss of movement synchronization
- I Operating voltage: 20-70 VAC or 30-100VDC
- I Load based output current of 0.5 - 8.2 A
- I High torque at starting and low speed
- I No torque reservation
- I High stiffness at standstill
- I Significantly reduced motor heating
- I Smooth motor movement and extra low motor noise
- I Quick response, no delay and zero settling time
- I No loss of steps; no hunting; no overshooting
- I Plug-and-play and no tuning

## Descriptions

ES-D1008 is one of the models in Leadshine ES-D series easy servo drives which can take 20-70 VAC or 30-100 VDC operating voltage, and output 0.5 - 8.2 A continuous load-based current. It is capable of driving NEMA 23, 24 and 34 easy servo motors (stepper motors with encoders) with the position loop closed in real time.

Based on latest DSP technology and adopting Leadshine's advanced control algorithm, ES-D1008 easy servo drive applies servo control on easy servo motors. When adopted with an easy servo motor, it combines features of both open loop steppers & brushless servo systems, and offers many unique advances features for excellent motion control system performance.

When an ES-D1008 easy servo drive is implemented with a Leadshine ES-M series easy servo motor, there is No Configuration Needed for almost all applications. The output resolution from ES-D1008 with the output resolution defaulted to output resolution of 2,000 pulses per resolution (equal to 10 microstep in 2-phase stepper systems). Via DIP switches, a user can also easily changes the output resolution to one of 15 output resolutions 800 to 51,200 (equal to 4-256 microstep in 2-phase stepper systems). With Leadshine configuration software, ProTuner, an advanced user can also set custom settings of resolution, current & position loop parameters, idle current percentage, etc.

## Applications

With many unique advanced features, Leadshine ES-D1008 easy servo systems are ideal for many industries to upgrade stepper performance or replace brushless servo systems in many applications.

Leadshine OEM clients have successfully implemented ES-D1008 driven easy servo systems in applications such as small-to-large size CNC routers, CNC mills, plasmas, large-scale laser cutters / engravers, labeling equipments, robotics, gemstone processing machines, pick & place machines, X-Y tables.

## Specifications

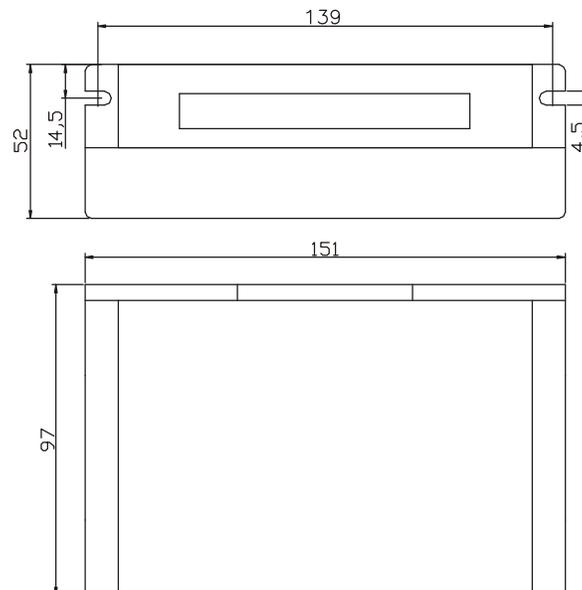
### Electrical Specifications

Parameter	Min	Typical	Max	Unit
Input Voltage	20	-	70	VAC
	30	60	100	VDC
Output Current	0.5	-	8.2(Peak)	A
Pulse Input Frequency	0	-	200	kHz
Logic Signal Current	7	10	16	mA
Isolation Resistance	500	-	-	MΩ

### Operating Environment

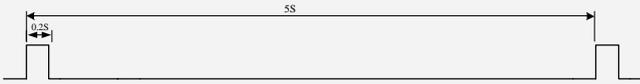
Cooling	Natural Cooling or Forced cooling	
Operating Environment	Environment	Avoid dust, oil fog and corrosive gases
	Storage Temperature	-20°C — 65°C (-4°F — 149°F)
	Ambient Temperature	0°C — 50°C (32°F — 122°F)
	Humidity	40%RH — 90%RH
	Operating Temperature (Heat Sink)	70°C (158°F) Max
Storage Temperature	-20°C — 65°C (-4°F — 149°F)	
Weight	580 g (20.5 oz)	

### Mechanical Specifications



## Protection Indications

The green indicator turns on when power-up. When drive protection is activated, the red LED blinks periodically to indicate the errors

Priority	Time(s) of Blink	Sequence wave of RED LED	Description
1st	1		Over-current protection
2nd	2		Over-voltage protection
3rd	7		Position Following Error

## Connectors and Pin Assignment

The ES-D1008 has four connectors, connector for control signals connections, connector for status signal connections, connector for encoder feedback and connector for power and motor connections.

Control Signal Connector – Screw Terminal			
Pin	Name	I/O	Description
1	PUL+	I	<b>Pulse Signal:</b> In single pulse (pulse/direction) mode, this input represents pulse signal, each rising or falling edge active (software configurable, see easy servo drive software manual for more detail); In double pulse mode (software configurable), this input represents clockwise (CW) pulse, active both at high level and low level. 4.5-24V when PUL-HIGH, 0-0.5V when PUL-LOW. For reliable response, pulse width should be longer than 2.5 $\mu$ s.
2	PUL-	I	
3	DIR+	I	<b>Direction Signal:</b> In single-pulse mode, this signal has low/high voltage levels, representing two directions of motor rotation. In double-pulse mode (software configurable), this signal is counter-clock (CCW) pulse, active both at high level and low level. For reliable motion response, DIR signal should be ahead of PUL signal by 5 $\mu$ s at least. 4.5-24V when DIR-HIGH, 0-0.5V when DIR-LOW. Please note that rotation direction is also related to motor-driver-encoder wiring match. Exchanging both the connection of two wires for a coil and an encoder channel to the driver the connection will reverse motion direction. Or you can toggle the SW5 to reverse the motion direction.
4	DIR-	I	
5	ENA+	I	<b>Enable Signal:</b> This signal is used for enabling/disabling the driver. In default, high level (NPN control signal) for enabling the driver and low level for disabling the driver. Usually left UNCONNECTED (ENABLED). Please note that PNP and Differential control signals are on the contrary, namely Low level for enabling. The active level of ENA signal is software configurable.
6	ENA-	I	

### Connectors and Pin Assignment (Continued)

Status Signal Connector – Screw Terminal			
Pin	Name	I/O	Description
1	INP+	O	<u>In-position Signal</u> : OC output signal, active when the difference between the actual position and the command position is zero. This port can sink or source 20mA current at 24V. The resistance between INP+ and INP- is active at high impedance.
2	INP-	O	
3	FAULT+	O	<u>Fault Signal</u> : OC output signal, active when one of the following protection is activated: over-voltage, over current and position following error. This port can sink or source 20mA current at 24V. In default, the resistance between FAULT+ and FAULT- is low impedance in normal operation and become high when the ES-D1008 goes into error. The active level of alarm signal is software configurable.
4	FAULT-	O	

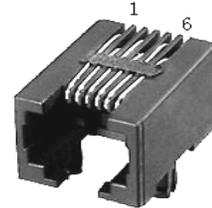
Encoder Feedback Connector – Screw Terminal			
Pin	Name	I/O	Description
1	EB+	I	Encoder channel B+ input
2	EB-	I	Encoder channel B- input
3	EA+	I	Encoder channel A+ input
4	EA-	I	Encoder channel A- input
5	VCC	O	+5V @ 100 mA max.
6	EGND	GND	Signal ground

Power and Motor Connector – Screw Terminal			
Pin	Name	I/O	Description
1	A+	O	Motor Phase A+
2	A-	O	Motor Phase A-
3	B+	O	Motor Phase B+
4	B-	O	Motor Phase B-
5	AC	I	Power Input, 20-70VAC or 30-100VDC
6	AC	I	

## RS232 Communication Port

It is used to configure the close-loop current, open-loop current, position following error limit and etc. See easy servo drive software operational manual for more information.

RS232 Communication Port			
Pin	Name	I/O	Description
1	NC	-	Not connected.
2	+5V	O	+5V power only for STU (Simple Tuning Unit).
3	TxD	O	RS232 transmit.
4	GND	GND	Ground.
5	RxD	I	RS232 receive.
6	NC	-	Not connected.



## DIP Switch Settings

### Microstep Resolution (SW1-SW4)

Steps/Revolution	SW1	SW2	SW3	SW4
Software Configured (Default 200)	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

### DIP Switch Settings (Continued)

	Function	On	Off
SW5	Default Direction <sup>Note</sup>	CW (clock-wise)	CCW (counter-clock-wise)
SW6	Self-test	Self-test is active	Self-test is close

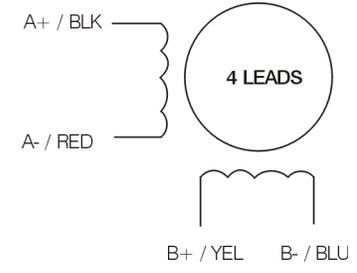
Note: The actual direction is related to the DIR level. You can toggle SW5 to change it once.

### Current Control

The motor current will be adjusted automatically regarding to the load or the stator-rotor relationship. However, the user can also configure the current in the tuning software. The configurable parameters include close-loop current, holding current, encoder resolution, micro step and etc. There are also PID parameters for the current loop, and have been tuned for Leadshine's matching motor so the user does not need to tune them.

### Easy Servo Motors

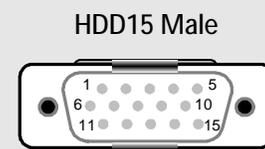
The ES-D1008 can work with the following easy servo motors from Leadshine:

	ES-M23440 ES-M23440-S1270	ES-M23480 ES-M23480-S1270	Wiring Diagram
Step Angle (Degree)	1.8	1.8	
Holding Torque (N.m)	4.0	8.0	
Phase Current (A)	5.5	6.0	
Phase Resistance (Ohm)	0.46	0.44	
Phase Inductance (mH)	4	3.73	
Inertia (g.cm <sup>2</sup> )	1500	2580	
Weight (Kg)	2.5	4.0	
Encoder (lines / Rev.)	1000	1000	

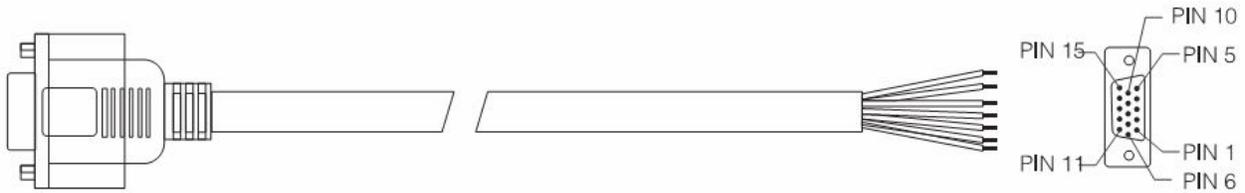
### Motor Encoder Cable Pin-Out

ES-M23440, ES-M23440-S1270, ES-M23480, ES-M23480-S1270

Pin	Name	Wire Color	I/O	Description
1	EA+	Black	O	Channel A+ output
2	VCC	Red	I	+5V power input
3	GND	White	GND	Ground
11	EB+	Yellow	O	Channel B+ output
12	EB-	Green	O	Channel B- output
13	EA-	Blue	O	Channel A- output



## Motor Encoder Extension Cable



### Pin Assignments

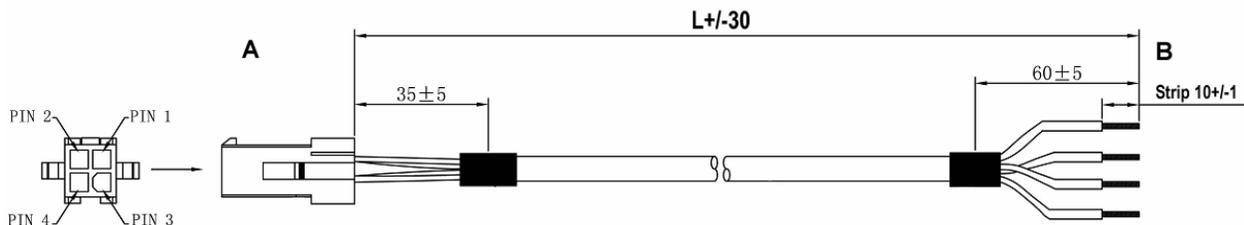
Pin	Wire Color	Name	Description	Pin	Wire Color	Name	Description
2	Red	VCC	+5V power input	12	Green	EB-	Channel B-
3	White	GND	+5V GND	1	Black	EA+	Channel A+
11	Yellow	EB+	Channel B+	13	Blue	EA-	Channel A-

### Cable Length

Part Number	L	Matching Motor
CABLEH-BM3M0	3.0m	ES-M23440, ES-M23440-S1270, ES-M23480, ES-M23480-S1270
CABLEH-BM5M5	5.5m	
CABLEH-BM8M0	8.0m	
CABLEH-BM10M0	10.0m	
CABLEH-BM13M0	13.0m	

## Motor Power Extension Cable

### CABLEH-RZXMX



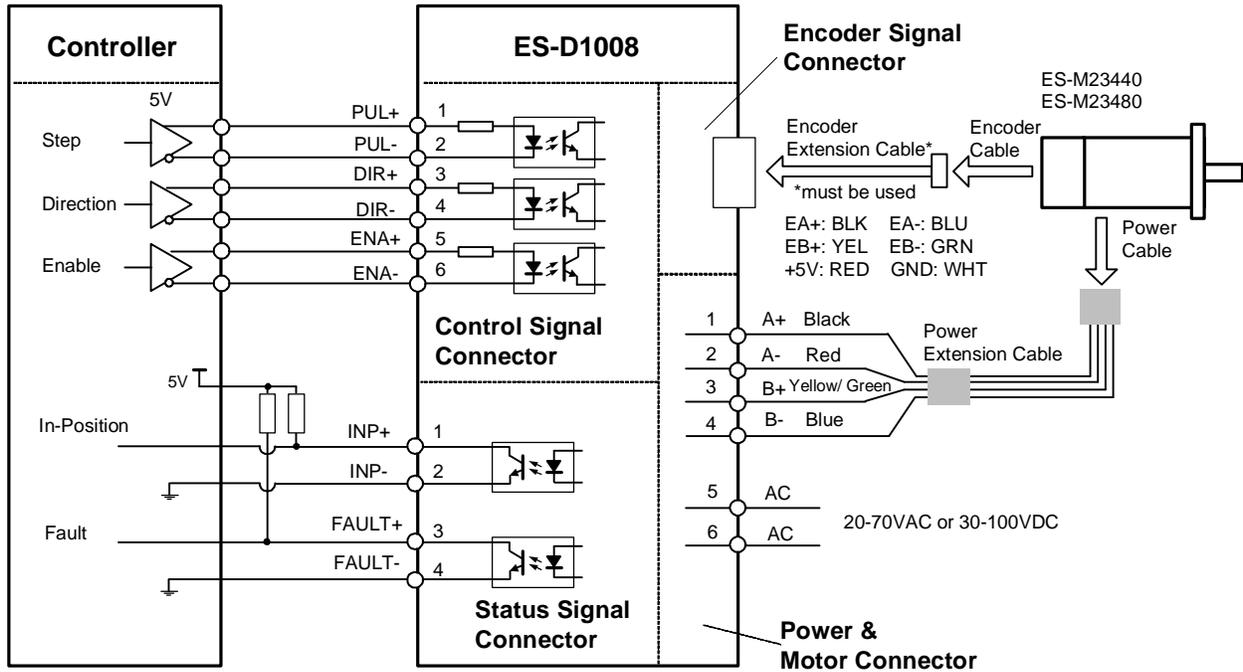
### Pin Assignments

A	B	Name	Description
Pin	Wire Color		
1	Blue	B-	Motor Phase B-
2	Red	A-	Motor Phase A-
3	Black	A+	Motor Phase A+
4	Yellow / Green	B+	Motor Phase B+

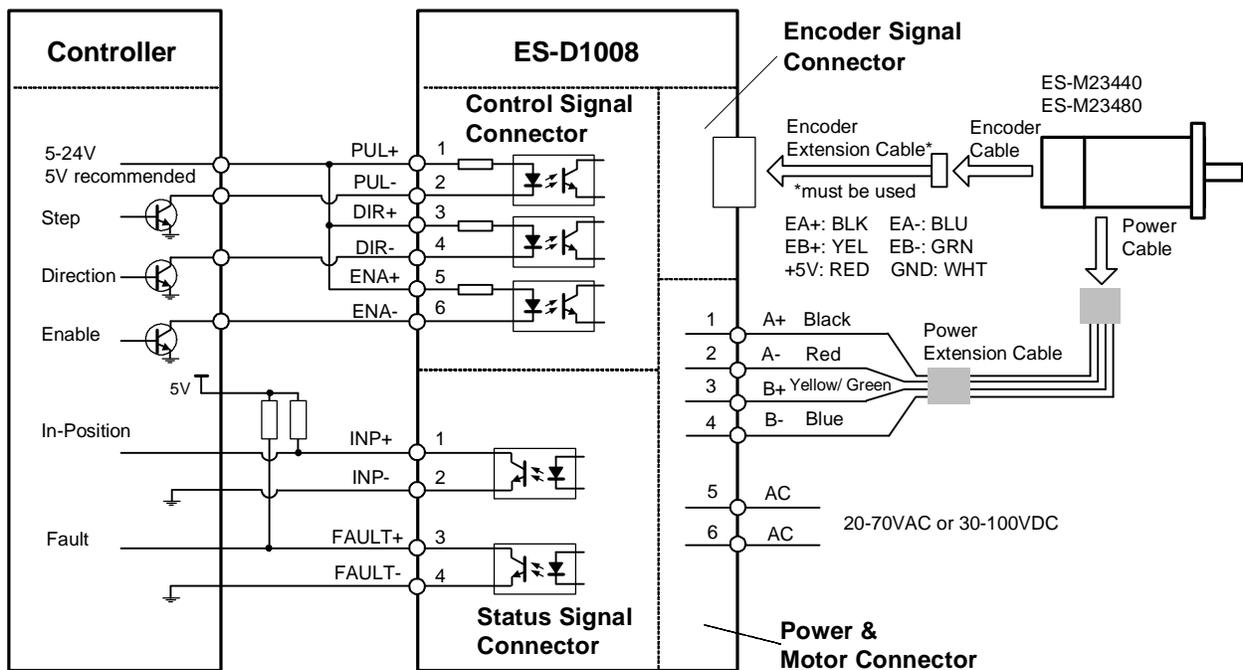
### Cable Length

Part Number	L	Matching Motor
CABLEH-RZ3M0	3.0m	ES-M23440, ES-M23440-S1270, ES-M23480, ES-M23480-S1270
CABLEH-RZ5M0	5.0m	
CABLEH-RZ10M0	10.0m	

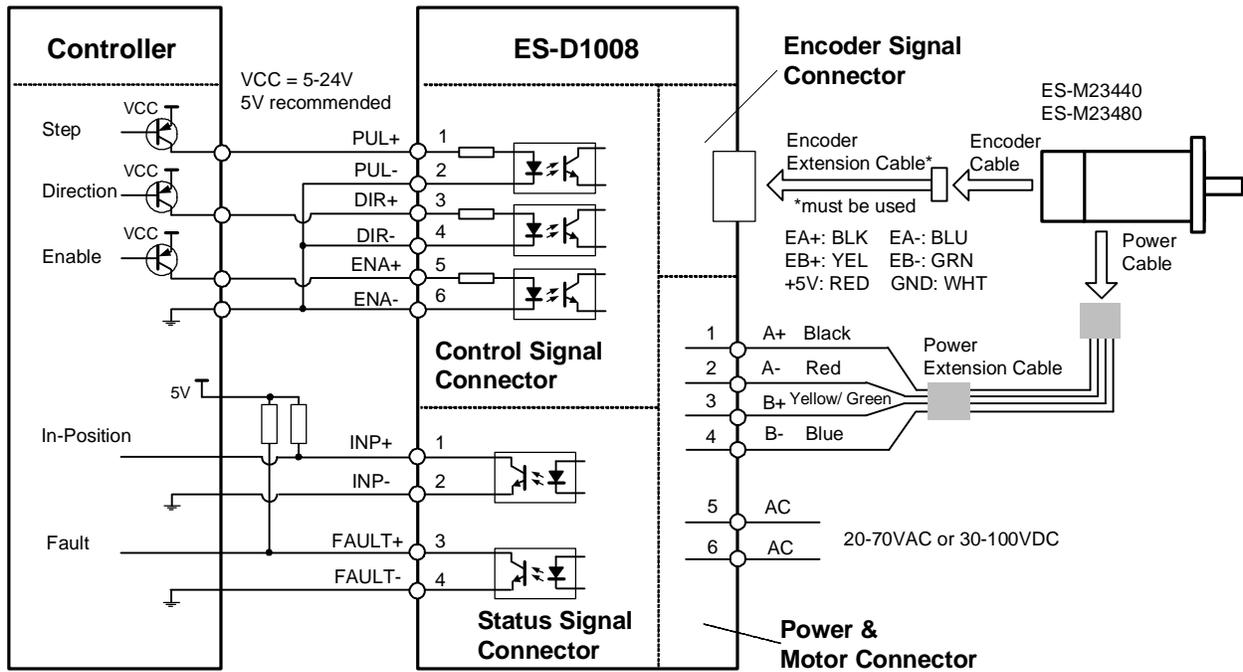
### Typical Connections



Connections to controller of differential output



Connections to controller of sinking output

**Typical Connections (Continued)**


Connections to controller of sourcing output