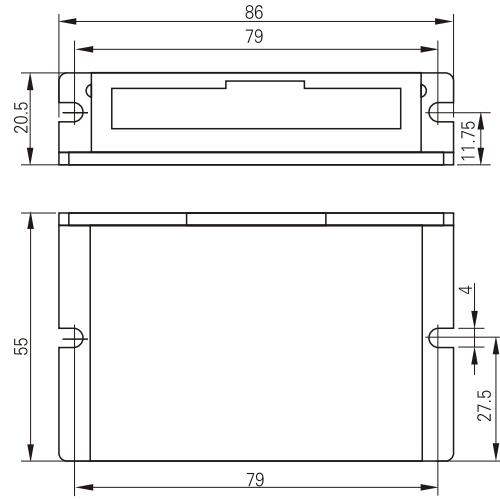
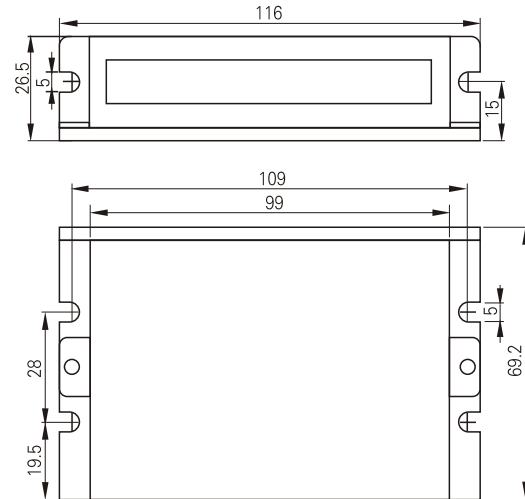


**Mechanical Specifications (Unit: mm 1 inch=25.4mm)**

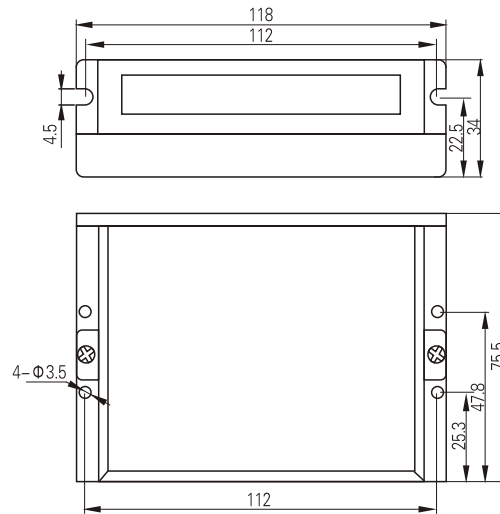
Units: mm 1 inch=25.4mm



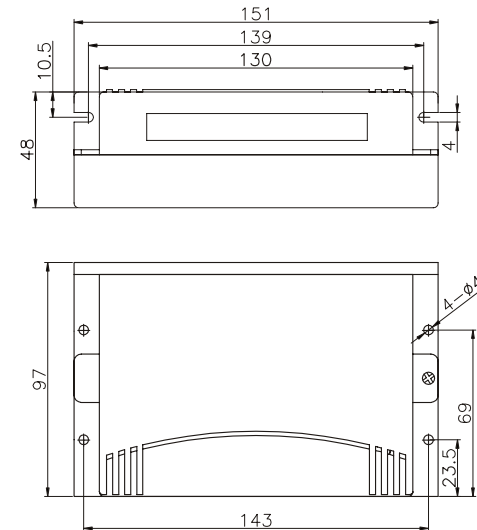
(a) Mechanical specifications of the EM415



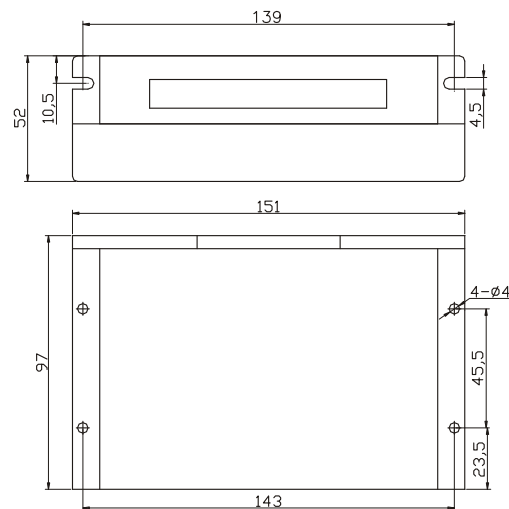
(b) Mechanical specifications of the EM430



(c) Mechanical specifications of the EM540 and the 3EM660



(d) Mechanical specifications of the EM860, 3EM860



(e) Mechanical specifications of the EM860AC, 3EM860AC

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

*Leading Technology*

*Shining Value*

# EM Series Digital Stepper Drives

*Sensorless stall detection and Super-low motor noise*



### Innovative Technologies

- Sensorless Stall Detection
- Super-low Motor Noise
- User Password Protection
- Anti-Resonance Technology
- Low-speed Ripple Smoothing
- Multi-stepping Technology
- Soft Start Technology
- Self-test and Auto-setup
- ...

### Specifications

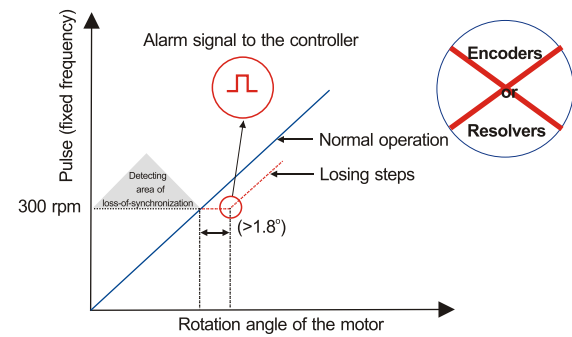
Phase	Model	Input	RMS Cur.	Matching Motors
2	EM415	18-40VDC	0.07-1.5A	NEMA14 to 23
	EM430*	18-40VDC	0.21-3.0A	NEMA17 to 23
	EM540	18-50VDC	0.35-4.0A	NEMA17 to 23
	EM860	24-80VDC	0.35-6.0A	NEMA23 to 34
3	EM860AC	20-75VAC	0.35-6.0A	NEMA23 to 42
	3EM660*	18-60VDC	0.35-6.0A	NEMA17 to 23
	3EM860*	24-80VDC	0.35-6.0A	NEMA23 to 34
	3EM860AC*	20-75VAC	0.35-6.0A	NEMA23 to 42

● Over voltage, over current, short-circuit protections besides sensorless stall detection.  
 \* Available time: to be determined.

# Innovative Products with High Reliability

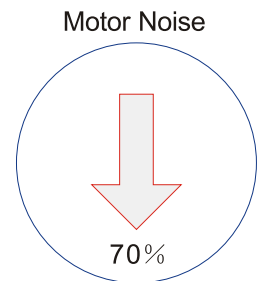
## 1 Sensorless Stall Detection

By detecting the voltage, the current, and the back-emf signal, EM series drives can detect the loss-of-synchronization of a stepper motor without additional sensor. The sensorless stall detection eliminates cost of feedback device and cabling.



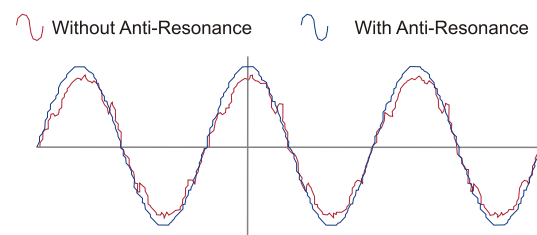
## 2 Super-low Motor Noise

Precision current control technology and multi-stepping technology can reduce about 70% motor noise, making the EM series to be an ideal solution for the applications require low motor noise.



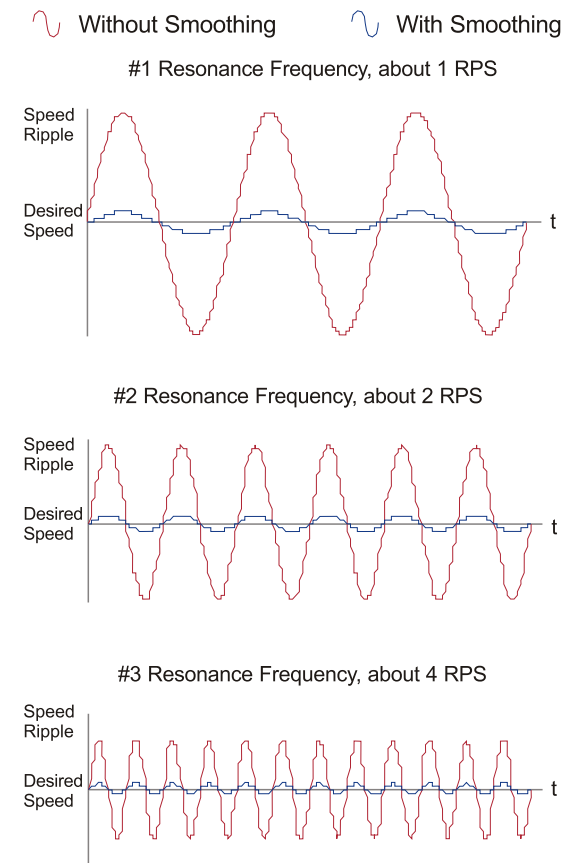
## 4 Anti-Resonance at Mid-range

Stepper systems resonate at mid-range. The EM series drives can calculate the system's natural frequency and apply damping to control algorithm for anti-resonance. Providing optimum torque and nulls mid-range instability.



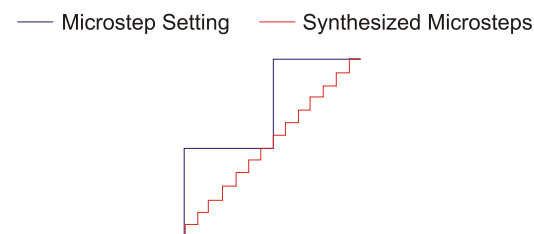
## 3 Low-speed Ripple Smoothing

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



## 5 Multi-stepping Technology

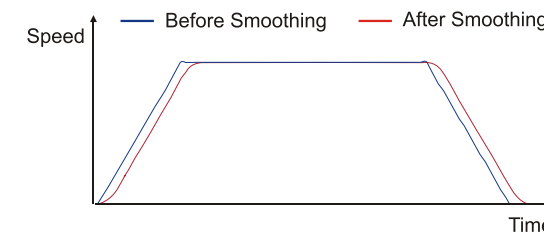
Multi-stepping allows a low resolution step input to produce a higher microstep output for smooth system performance. This function can improve performance of the stepper drive system without upgrading to a faster motion controller.



# World-class Products at Highly Competitive Prices

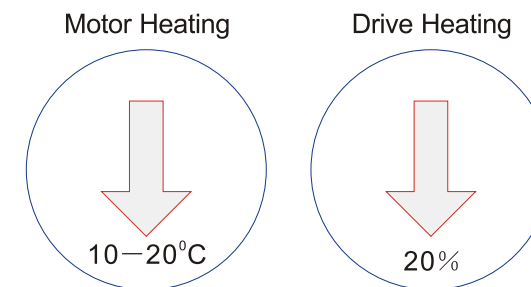
## 6 Command Signal Smoothing

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



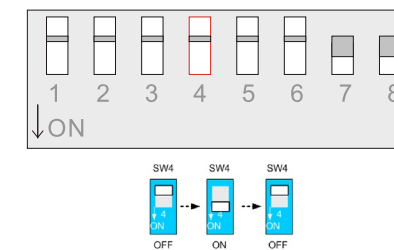
## 8 Lower Heating Technology

Motor temperature is 10–20 °C lower than using a traditional drive. Longer motor lifetime can be achieved, reducing maintenance cost. Drive heating is up to 20% lower than that of a traditional drive, offering higher system stability and higher power transfer efficiency.



## 10 Self-test and Auto-setup

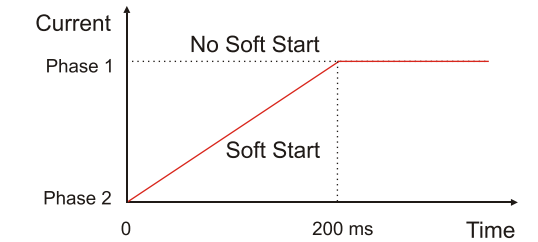
Motor self-test and parameter auto-setup technology offer optimum responses with different motors. It makes the user easier to configure different axes with different load or to build different machines.



2 status changes in 1 second will finish motor self-test & auto-setup .

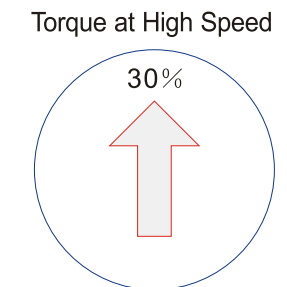
## 7 Soft Start Technology

The soft start technology allows the motor to start-up while slowly applying the shaft torque to the load to avoid "torque shock". This function is realized by software, so no additional device or cost is needed.



## 9 Torque Improving

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



## 11 User Password Protection

User password protection sets up a wall to prevent others copying your motion control solution, helping you get your deserved return.







**Features**

- **Sensorless stall detection**, eliminates cost of feedback device and cabling
- **Super-low motor noise**, offers a better work environment to you or your customer
- **User password protection**, prevents others copying your motion control solution
- **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 stepper motors are available
- Output current programmable, from 0.07A or 0.35A to the maximum values.
- Microstep resolutions programmable, from full-step to 51,200 steps/rev
- Support PUL/DIR and CW/CCW modes
- Over-current, over-voltage, short-circuit protections besides sensorless stall detection

**Introduction**

Leadshine's EM series DSP-based stepper drives employ today's latest stepper control technologies, delivering global leading performance. The EM series drives include the EM415, EM430, EM540, EM860, EM860AC, 3EM660, 3EM860 and 3EM860AC, covering a broad supply voltage and output current ranges. Unique level of system smoothness, excellent high speed performance and sensorless stall detection function make them deliver servo-like performance at the cost of stepper drives and avoid additional loss such as material wasting or rejects without any sensor.

**Part Number**

3	EM	8	60	AC
Phase	Series	Maximum Input	Maximum RMS Current	Type of Supported Input
Blank: 2-phase 3: 3-phase	EM: EM series	4: 40 V 5: 50 V 8: 80 V ...	15: 1.5 A 40: 4.0 A 60: 6.0 A ...	Blank: DC power AC: Both DC and AC power

**Electrical Specifications**

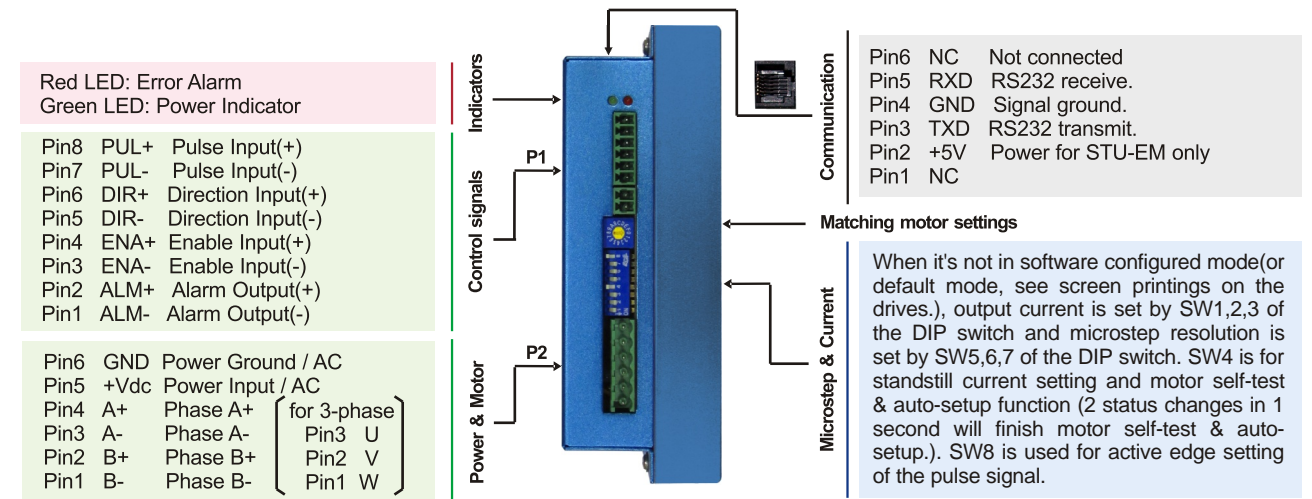
Parameters	Input Voltage (VDC)			RMS Current (A)					
	Min	Typical	Max	Min	Typical	Max			
Model									
EM415	+18	+24	+40	0.07	-	1.5			
EM430	+18	+24	+40	0.21	-	3.0			
EM540	+18	+36	+50	0.35	-	4.0			
EM860	+24	+68	+80	0.35	-	6.0			
EM860AC	20 VAC	48 VAC	75 VAC	0.35	-	6.0			
3EM660	+18	+48	+60	0.35	-	6.0			
3EM860	+24	+68	+80	0.35	-	6.0			
3EM860AC	20 VAC	48 VAC	75 VAC	0.35	-	6.0			
Parameters	Pulse Input Frequency (kHz)			Logic Signal Current (mA)			Isolation Resistance (MΩ)		
Model	Min	Typical	Max	Min	Typical	Max	Min	Typical	Max
EM Series	0	-	300	7	10	16	500	-	-

**Applications**

Suitable for a wide range of stepper motors, from NEMA frame size 14 to 34. Can be used in various kinds of machines, such as high-ended CNC routers, laser cutters, laser markers, medical equipment, high precision X-Y tables, measurement devices, etc. Their unique features make them ideal for applications desired for low noise, high smoothness, high precision with high reliability and excellent high speed performance.

**Pin Assignment and Description**

The EM series drives have two connectors. Connector P1 for control signal connections, and connector P2 for power and motor connections. An additional RS232 communication interface of the EM series drives is used for parameter configuration or setting. The follow figure shows a brief description of these connectors and interface.

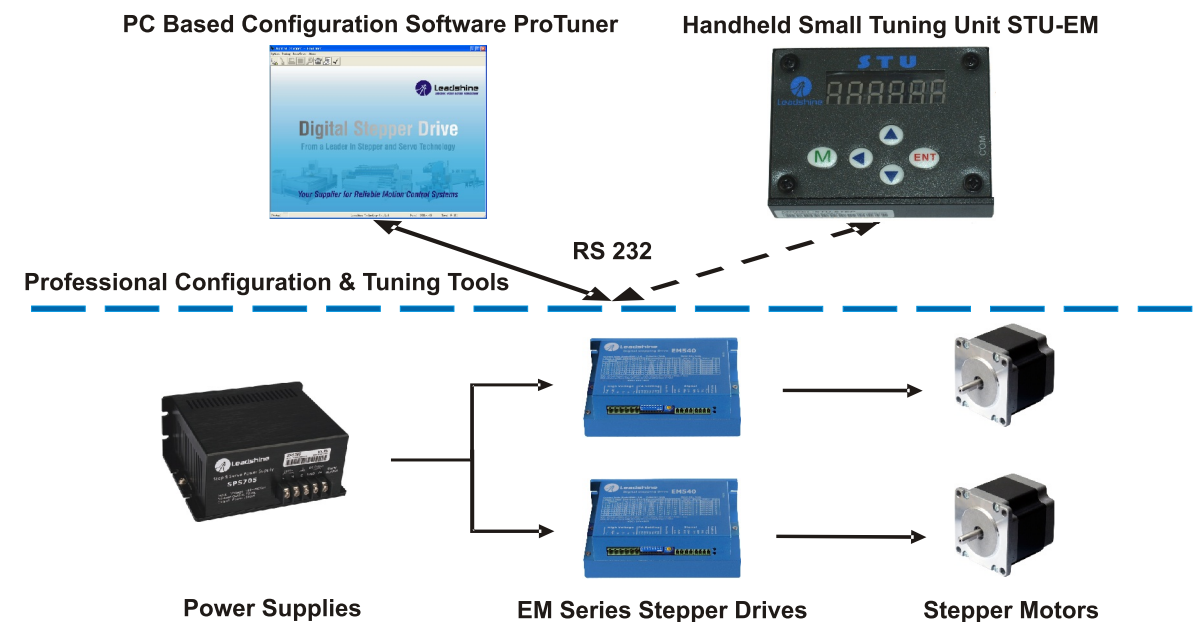


**Tips:**

1. Users should use motor **self-test and auto-setup** function when powering up the system (with the motor) for first time or changing 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 settings. ProTuner and STU-EM can be used for these settings.
3. **ONLY ProTuner** can be used to configure advanced settings, i.e. anti-resonance parameter settings.
4. How many times the RED led turns on in one periodic time indicates what protection has been activated. See their user's manuals.

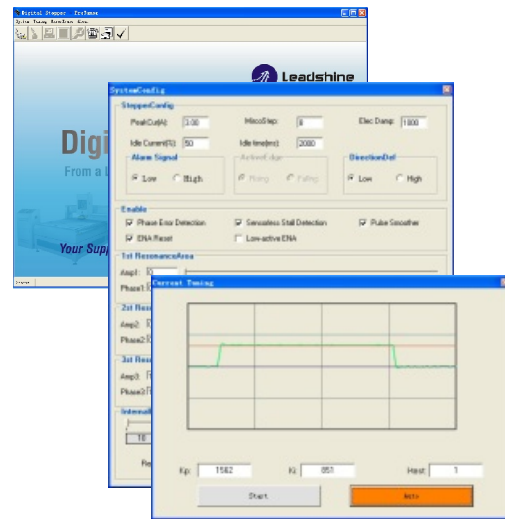
**PC Based and Handheld Configuration & Tuning Tools**

The EM series drives have motor self-test and auto-setup function, and this function can manage most of applications. However, if the user wants to configure advanced settings for better performance, i.e. anti-resonance parameters and advanced current loop tuning, PC based and handheld configuration & tuning tools, including ProTuner and STU-EM can meet different requirements or configuration/tuning environments.



**ProTuner (Windows Based Setup Software)**

- User password setting
- Upload and Download parameter settings
- PI parameter settings for current loop
- Microstep resolution and output current setting
- Electronic damping coefficient setting
- Anti-resonance parameter settings for 3 resonance area
- PUL/DIR or CW/CCW mode configuration
- DIR and ALM logic level setting
- Enable and disable sensorless stall detection, ENA reset function and command signal smoothing
- Parameter settings for self motion test
- Save, open, upload and download a configuration file
- Read the latest 10 failure events and clear these events



\* 1 PC RS232 interface is necessary.  
 \*\* Leadshine offers special cable for communication between ProTuner and the drive.

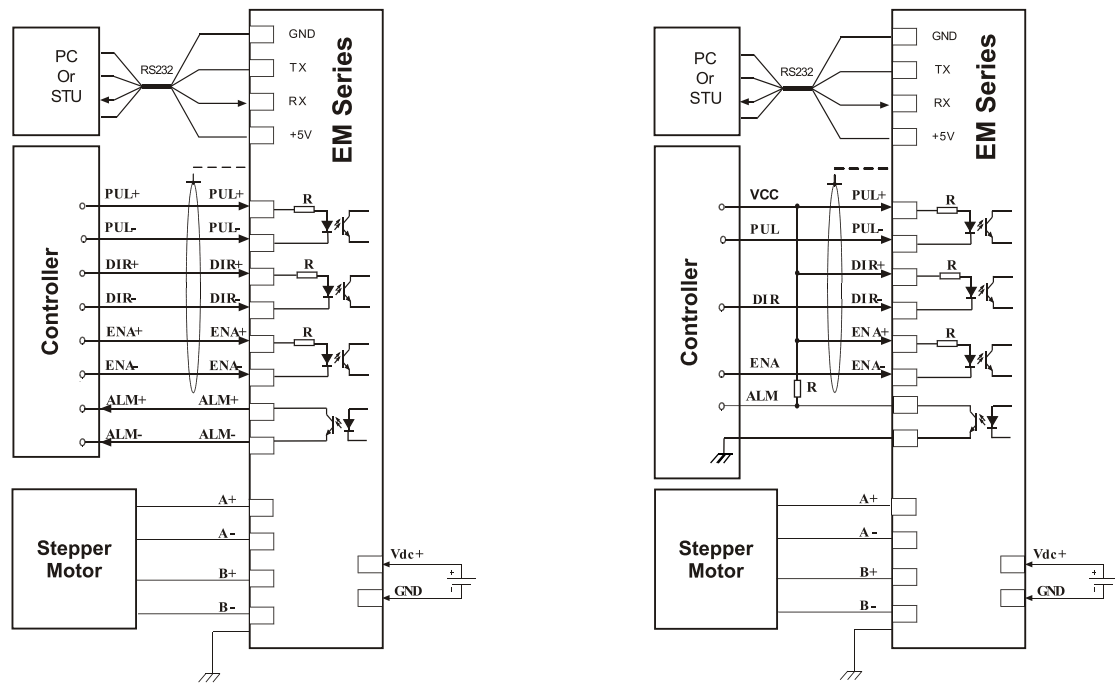
**STU-EM (Handheld Configuration and Tuning Unit)**

- Upload and Download parameter settings
- PI parameter settings for current loop
- Microstep resolution and output current setting
- Electronic damping coefficient setting
- PUL/DIR or CW/CCW mode configuration
- DIR and ALM logic level setting
- Enable and disable sensorless stall detection, ENA reset function and command signal smoothing
- Parameter settings for self motion test
- Upload and download a configuration file



\* Leadshine offers special cable for communication between the STU-EM and the drive.

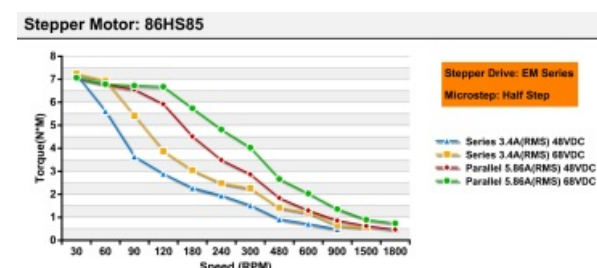
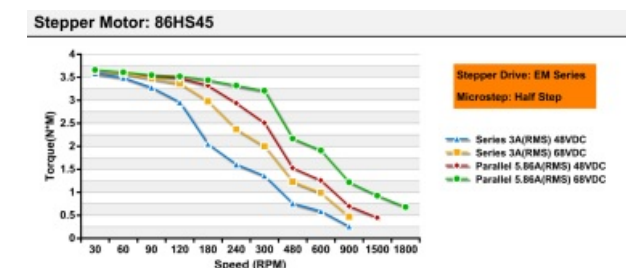
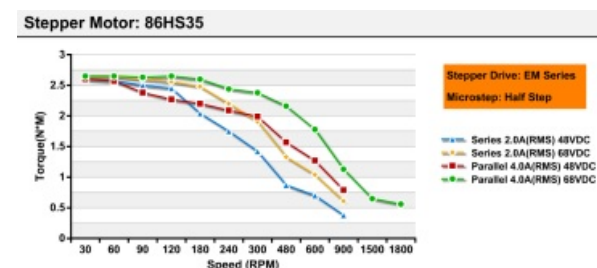
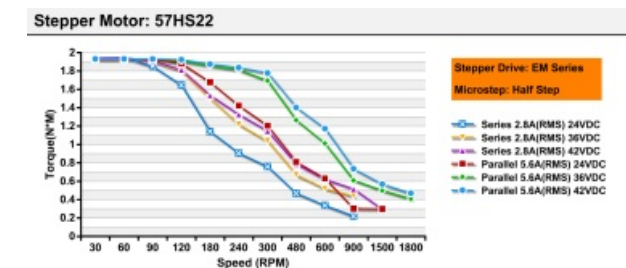
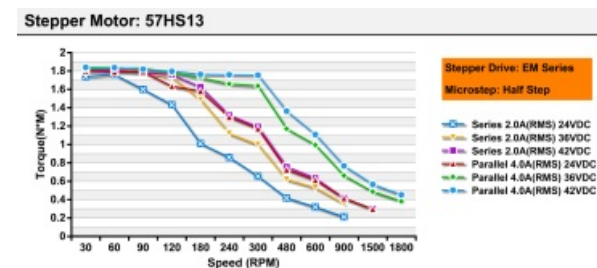
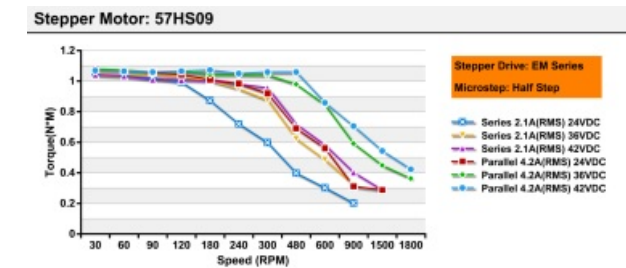
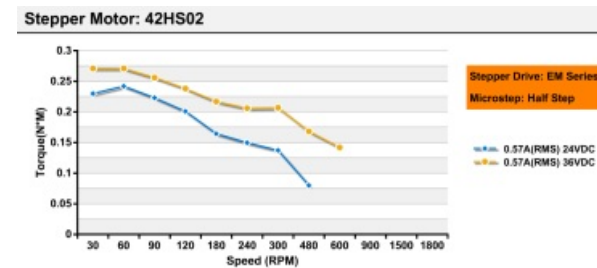
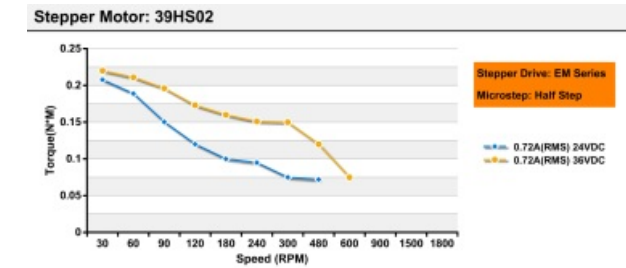
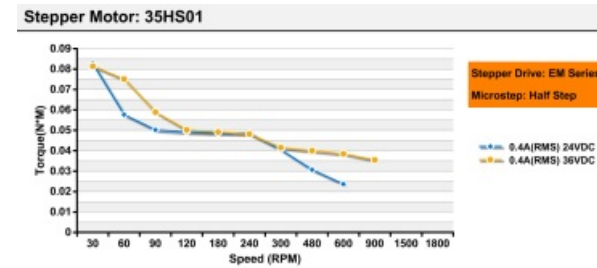
**Typical Connections**



(a) Differential control signals

(b) Single-ended (NPN) control signals

**Speed-Torque Curves of Pre-set Matching Motors\***



\* Other curves will be released soon.