

# SR2

## 2 Phase Stepping Motor Drive User Manual



AMP & MOONS' Automation

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## 1 Introduction

Thank you for selecting a MOONS' motor drive. We hope our dedication to performance, quality and economy will make your motion control project successful.

If there's anything we can do to improve our products or help you use them better, please call (86)21-52634688 or fax (86)21-62968682. You can also email [info@moons.com.cn](mailto:info@moons.com.cn).

### 1.1 Overview

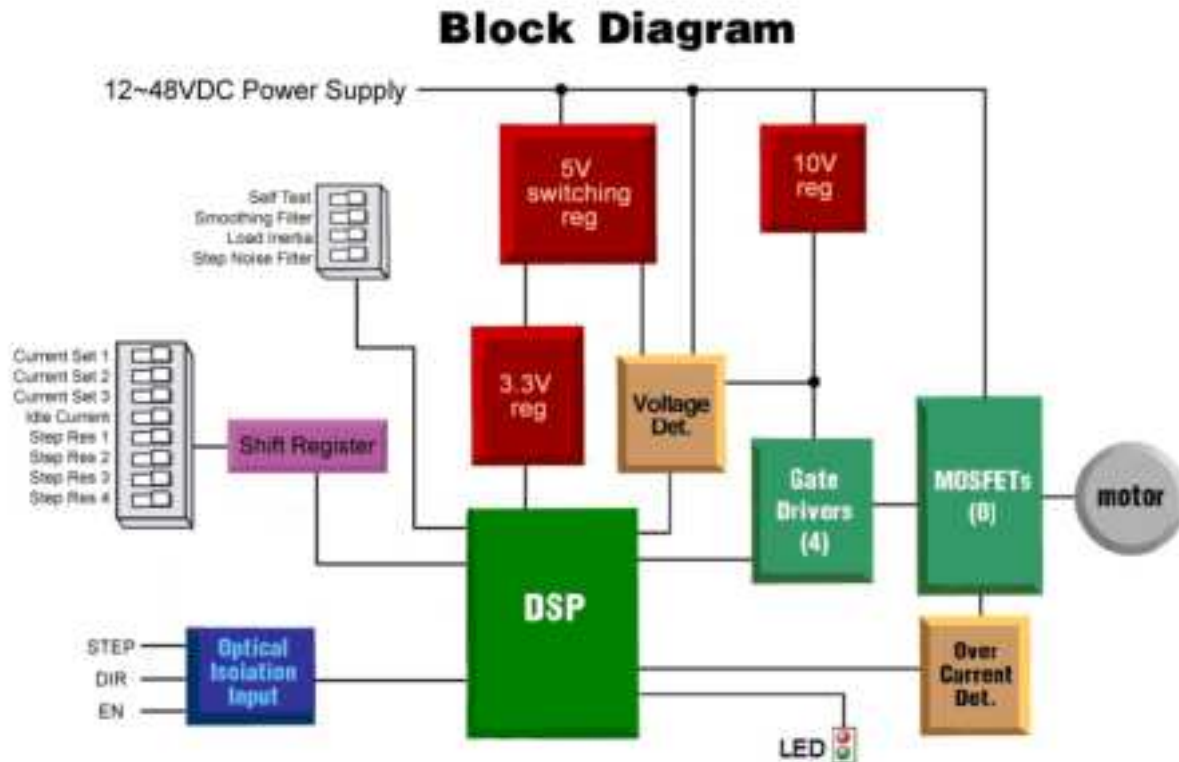
The SR2 drive is one cost-effective, high performance 2 phase stepping drive, designing based on the PID current control technology, with high torque, low noise, and low vibration. You can select the running current and microstep resolution by a piano switch. Our purpose is to have a drive which is cheaper but with better performance, especially for low cost and high quality market.

### 1.2 Features

- |                         |   |
|-------------------------|---|
| ■ Power Supply          | SR2: 12 to 48 VDC   |
| ■ Out put Power         | Position Switch selectable, 8 setting. Max 2.2 Amps Peak.   |
| ■ Current Control       | Advanced digital current control provides excellent high speed torque   |
| ■ Microstep Resolution  | Position Switch selectable, 16 setting: 200, 400, 800, 1600, 3200, 6400, 12800, 25600, 1000, 2000, 4000, 5000, 8000, 10000, 20000, 25000 step/rev |
| ■ Speed Range           | Speed up to 3000rpm   |
| ■ Anti Resonance        | Raises the system-damping ratio to eliminate midrange instability and allow stable operation throughout the speed range of the motor              |
| ■ Auto Setup            | Measures motor parameters and configures motor current control and anti-resonance gain settings.  |
| ■ Microstep Emulation   | Performs high resolution stepping by synthesizing coarse steps into fine micro-steps  |
| ■ Control Modes         | Step & Direction or CW/CCW model  |
| ■ Input Digital Filters | 150KHz or 2 MHz Digital Filter for high speed inputs  |
| ■ Idle Current          | Position Switch selectable, automatic 50% or 90% idle running current after 1 s motor needn't move  |
| ■ Self Test             | Position Switch selectable, the drive will perform a 2 rev, 1RPS, CW/CCW move test  |
| ■ Load Inertia          | Position Switch selects the High or Low load inertia for smooth motion  |
| ■ Signal Smoothing      | Position Swtich selectable, Firmware configurable filtering reduces jerk and excitation of extraneous system resonances                           |

## 2 Block diagram

### 3 Specifications



#### 3.1 Electrical specification

Parameter	Min.	Typ.	Max.	Unit
Power Supply	12	-	48	VDC
output Current(Peak)	0.3	-	2.2	Amps
Input signal Average Forward Current	6	10	15	mA
Step Frequency	2	-	2M	Hz
“STEP” Pulse Width Hi and low	250	-		ns
“DIR” Pulse Width	50	-	-	us
Under Voltage Protection	-	10	-	VDC
Over Voltage Protection	-	52	-	VDC
Input signal Voltage	4.0	-	28	VDC
Driver Initialization time	-	-	2.5	S

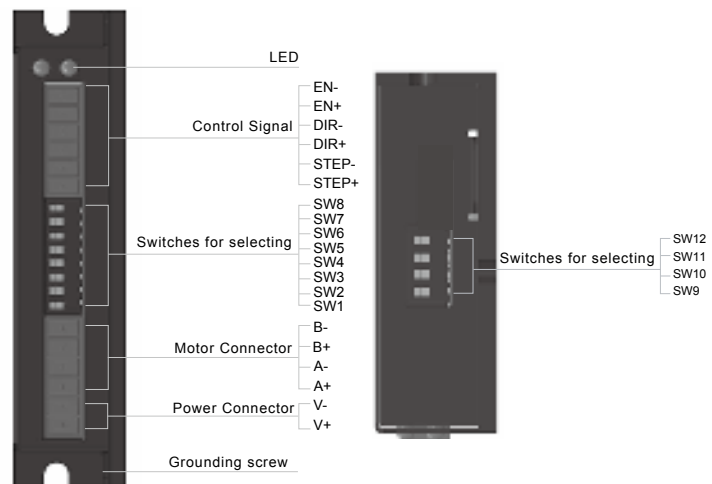
#### 3.2 Ambient specification

Heat Sinking Method		Natural Cooling or Force Cooling
Use Ambient	Use Condition	Avoid Dust, Oil fog and causticity air
	Operating Temperature	0-40°C [32 - 104°F]
	Maximum Ambient Humidity	90%RH9(No dew or bead)
	Shock	5.9m/s <sup>2</sup> max
	Storage Temperature	-10-70°C [14 - 158°F]

## 4 Connecting

To use the drive models of SR2, you should have the following:

- A power supply (12-48VDC)
- Pulse & Direction signal
- A compatible stepping motor



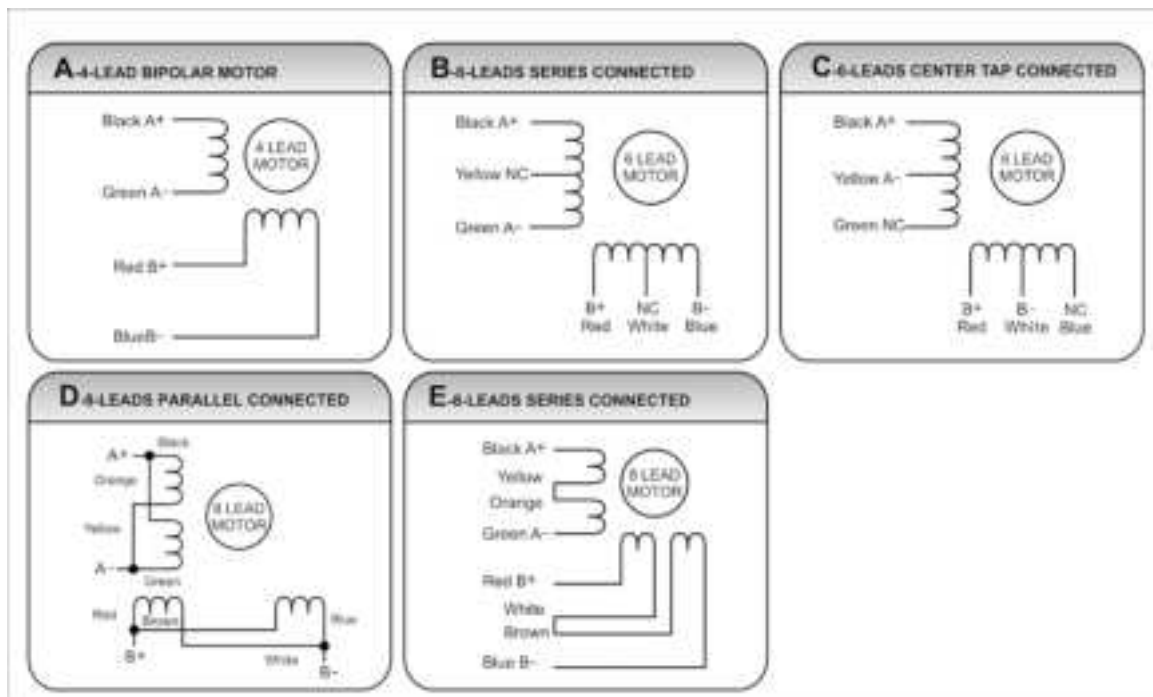
### 4.1 Connecting to Power Supply

If your power supply does not have a fuse on the output or some kind of short circuit current limiting device you need to put a fast acting fuse(Current ratings never exceed 5 Amps) between the drive and power supply. Install the fuse on the + power supply lead in series.

Connect the motor power supply "+" terminal to the drive terminal labeled "V+". Connect power supply "-" to the drive terminal labeled "V-".

**Be careful not to reverse the wires.**

### 4.2 Connecting to Motor



## 4.3 Connecting to Inputs

### 4.3.1 Pulse & Direction inputs

The SR Drive has two high speed optically isolated inputs called STEP and DIR. They accept the 5 to 24 Volts single-ended or differential signals, which up to 2MHz. The max voltage that can be applied to the input is 28V.

The motor executes one step with the falling edge of the STEP signal.

The direction of rotation is controlled by the DIR signal level. The low signal (0 level) is clockwise rotation, and the high signal (1 level) is Counterclockwise rotation

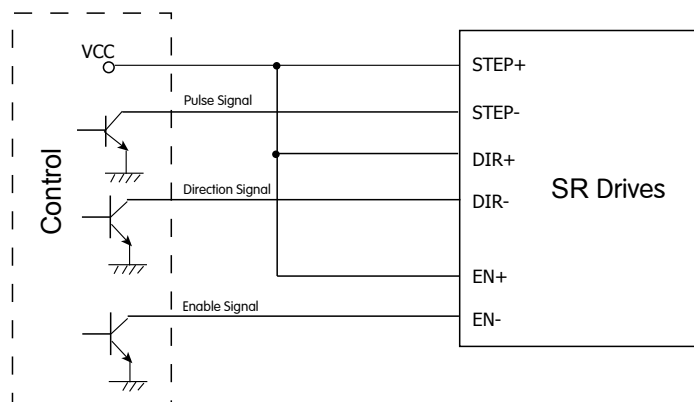
### 4.3.2 EN input

The EN input enable or disable the drive amplifier. It is an optically isolated input that accepts 5 to 24 Volts single-ended or differential signal. The max voltage that can be applied to the input is 28V.

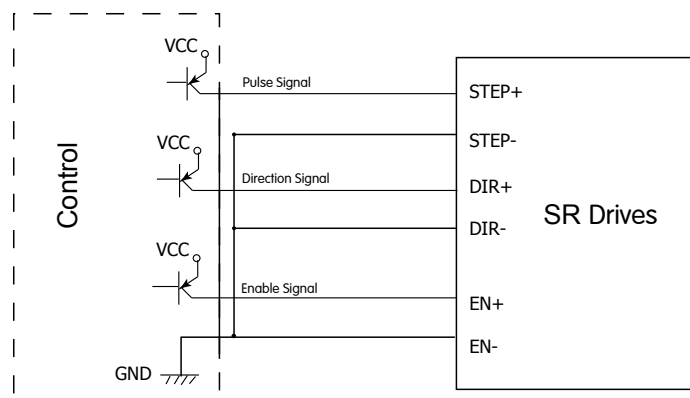
When EN input is closed, the driver amplifier is deactivated. All the MOSFETs will shutdown, and the motor is free. When EN input is open, the drive is activated.

When drive is in Error status and the fault is removed from system, one falling signal into EN will reset error status and activate driver amplifier again

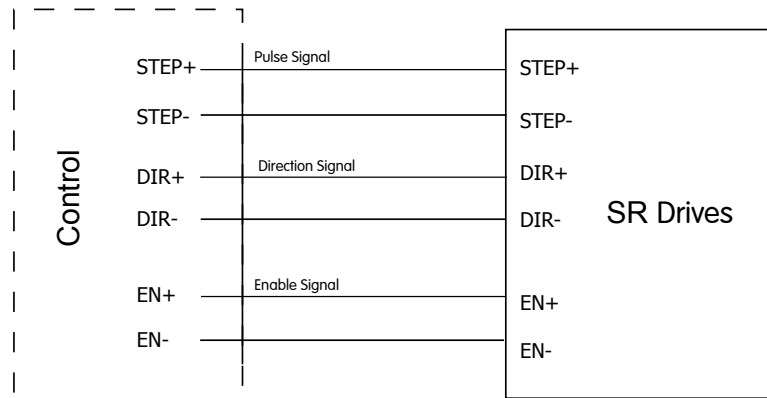
### 4.3.3 Connecting Circuit



Connecting to control with Sinking outputs



Connecting to control with Sourcing outputs



Connecting to control with Differential outputs

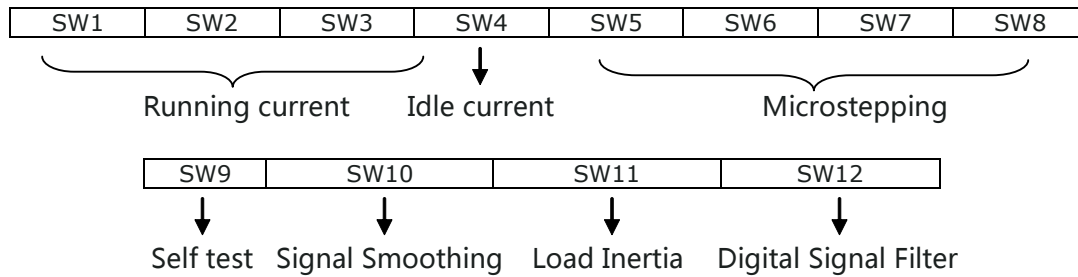
#### 4.3.4 Error Code

##### Status LED

The SR Drive include two (red/green) LEDs to indicate status. Normal status is indicated by a green LED. If the red LED flashes, an error has occurred. The errors are indicated by combinations of red and green "flashes" as follows:

●	Solid green	Motor disabled
●●	Flashing green	Motor enable
●●●●●	3 red, 1 green	Over Temperature
●●●●●●	3 red, 2 green	Internal Voltage Bad
●●●●●●●	4 red, 1 green	Over Voltage
●●●●●●●●	4 red, 2 green	Under Voltage
●●●●●●●●●	5 red, 1 green	Over current/Short circuit
●●●●●●●●●●	6 red, 1 green	Open motor winding

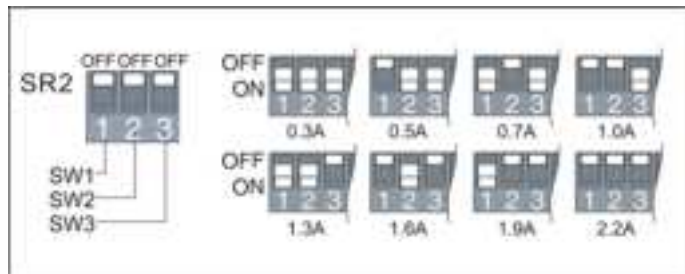
## 5 Switch Selecting



### 5.1 Running Current

SR Drive set the output current by the SW1, SW2, and SW3. There are 8 setting. The current value can be changed to meet the customers' needs.

Peak	SW1	SW2	SW3
0.3A	ON	ON	ON
0.5A	OFF	ON	ON
0.7A	ON	OFF	ON
1.0A	OFF	OFF	ON
1.3A	ON	ON	OFF
1.6A	OFF	ON	OFF
1.9A	ON	OFF	OFF
2.2A	OFF	OFF	OFF



### 5.2 Idle Current

Your drive is equipped with a feature that automatically reduces the motor running current by 50% anytime the motor needn't moving. This feature can be disabled if desired so that 90% running current is maintained when motor need not move. This is useful when a high holding torque is required. To minimize motor and drive heating we highly recommend that you enable the idle current reduction feature unless your application strictly forbids it.

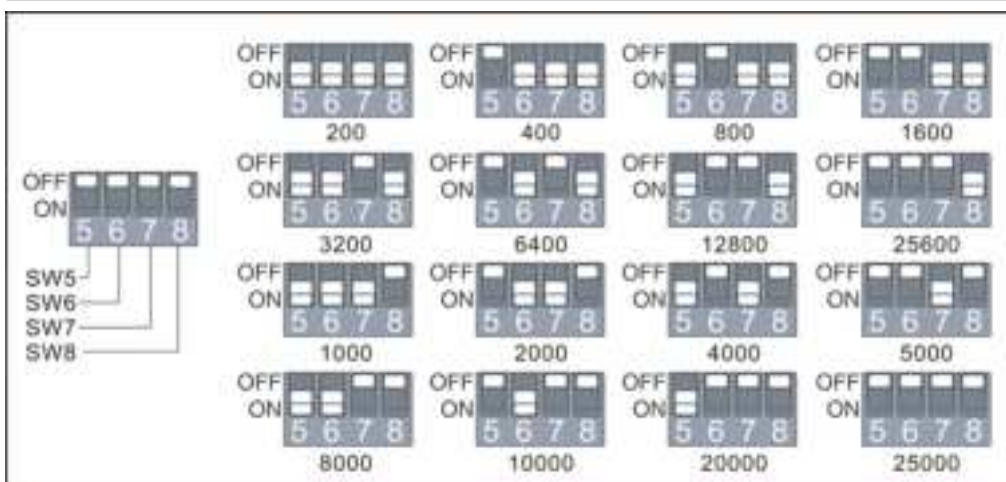
### 5.3 Microstepping

SR Drive set the Microstep resolution by the SW5, SW6, SW7 and SW8. There are 16 setting.

Microstep(step/rev)	SW5	SW6	SW7	SW8
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	OFF
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



The microstep setting can be changed to meet the customers' needs.

## 5.4 Self test

Setting the SW9 to "ON" after the drive is powered up, will cause the drive to perform a "Self Test" of 2 rev move both CW and CCW at 1rps.

## 5.5 Command Signal Smoothing

SW10 selects the function, "ON" = Enable, "OFF" = Disable.

Command signal smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components.

This function can make a little delay in following the control signal, please select that based on your application.

## 5.6 Load Inertia

SW11 selects the load inertia, "ON" = High inertia, "OFF" = Low inertia.

Different inertia selection can help SR2 drive to calculate the current control parameter, which is used in Anti-Resonance.

If the load inertia is similar as motor rotor, please select low. If the load inertia is higher than rotor, please select high.

## 5.7 Digital signal filter

SW12 selects the digital signal filter, "ON" = 150 KHz, "OFF" = 2 MHz

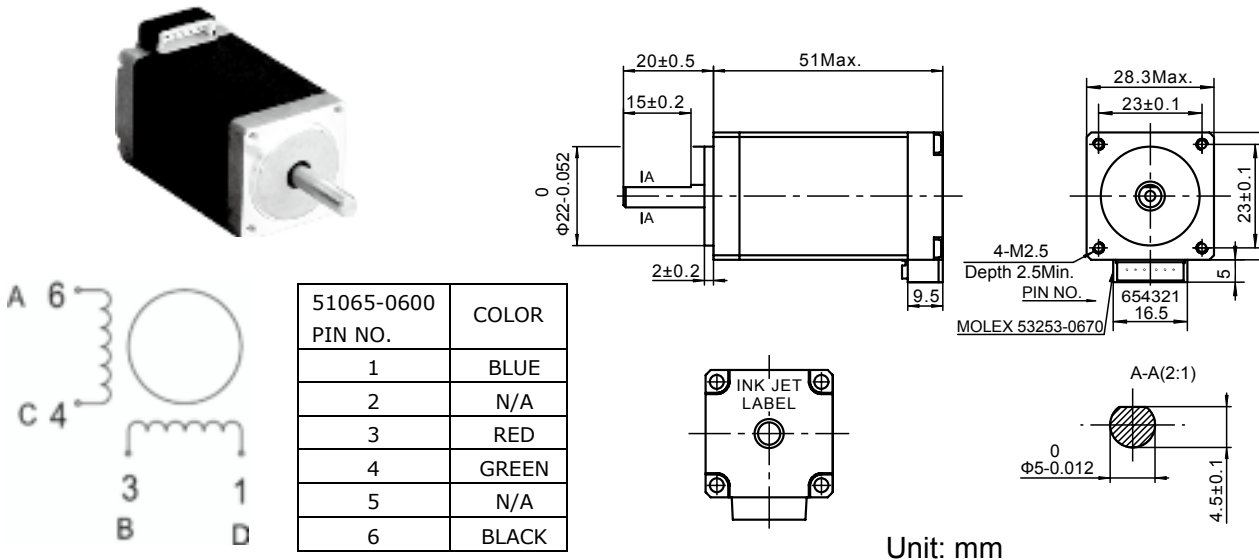
STEP and DIR signal input have built-in digital filter, this will reduce the external noise. If the system works on the low microstep, please select the 150 KHz. If the system works on the High microstep, please select the 2 MHz.

## 6 Motor select

SR2 can drive all kinds of two phase step motor, MOONS' choose several typical motors for SR2. These motor will cover most application and have better performance.

### 6.1 Recommended motors

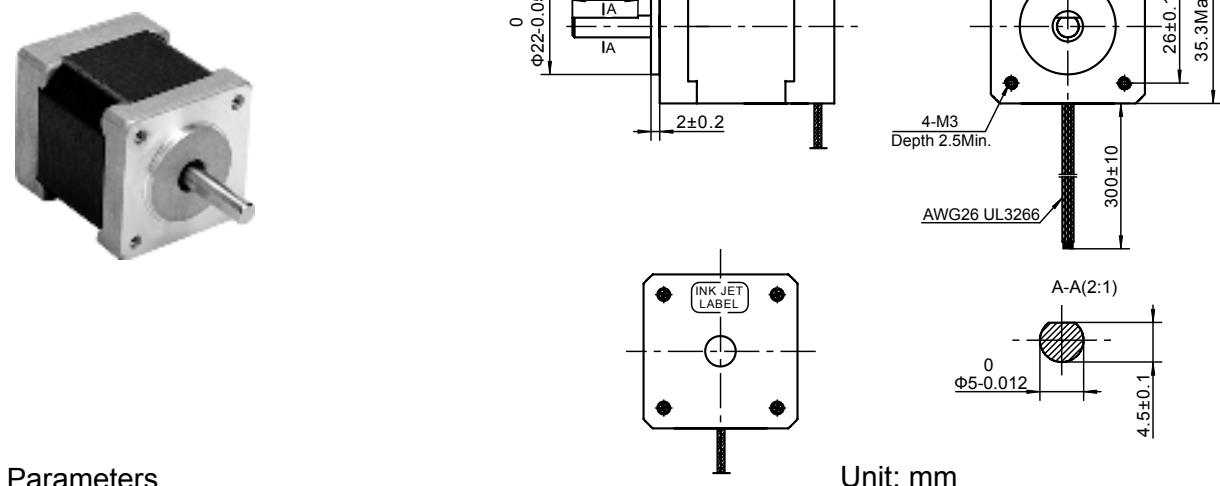
#### 11HS Series 1.8°



#### Parameters

PART#	CONNECTION	MOTOR LENGTH (mm)	MOTOR HOLDING TORQUE (mN·m)	#OF LEADS	STEP ANGLE (DEG)	AMPS	OHMS	MH	MOTOR INERTIA (g·cm <sup>2</sup> )	MOTOR WEIGHT (Kg)
11HS5008-01	bipolar	51	120	4	1.8	1	3.5	2.3	18	0.2

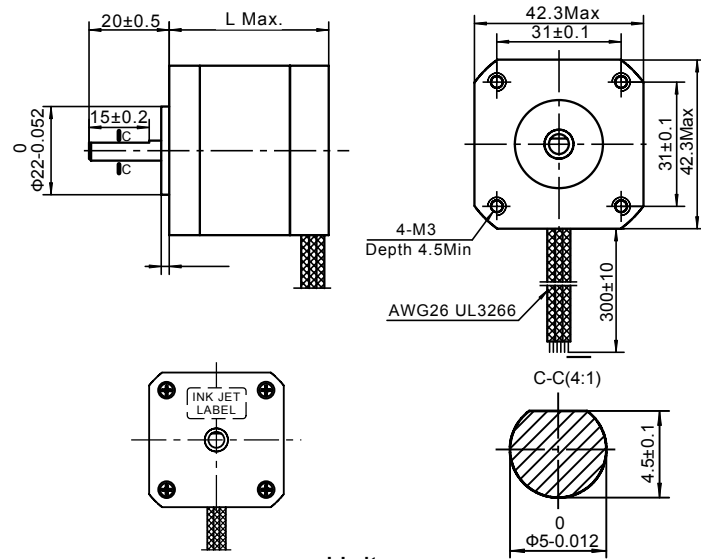
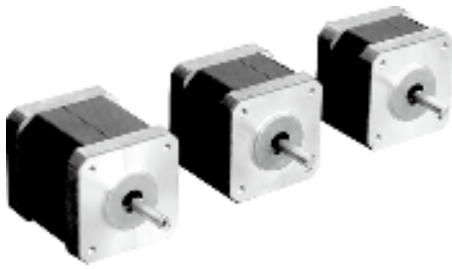
#### 11HY Series 1.8°



#### Parameters

PART#	CONNECTION	MOTOR LENGTH (mm)	MOTOR HOLDING TORQUE (mN·m)	#OF LEADS	STEP ANGLE (deg)	AMPS	OHMS	MH	MOTOR INERTIA (g·cm <sup>2</sup> )	MOTOR WEIGHT (Kg.)
14HYB401-03	bipolar	40	200	4	1.8	1	4.3	5.5	20	0.21

## 17HD Series 1.8°



Unit: mm

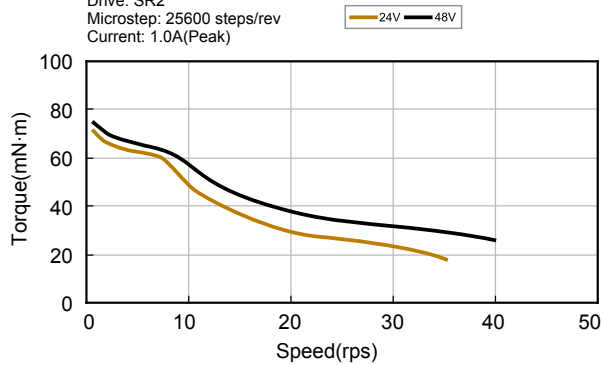
## Parameters

PART#	CONNECTION	MOTOR LENGTH (mm)	MOTOR HOLDING TORQUE (mN·m)	#OF LEADS	STEP ANGLE (deg)	AMPS	OHMS	MH	MOTOR INERTIA (g·cm <sup>2</sup> )	MOTOR WEIGHT (Kg.)
17HD2401-03N	bipolar	39.5	400	4	1.8	1.7	1.7	3.3	57	0.28
17HD4435-02N	bipolar	34.3	300	4	1.8	1.7	2	2.8	38	0.21
17HD6404-05N	bipolar	48.3	500	4	1.8	1.7	1.6	2.85	82	0.36

## 6.2 Torque Curves

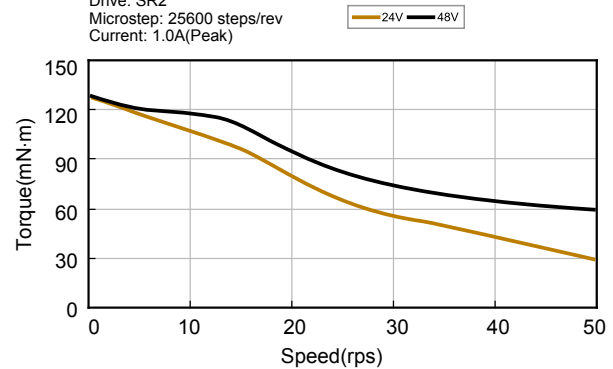
### 11HS5008-01

Drive: SR2  
Microstep: 25600 steps/rev  
Current: 1.0A(Peak)



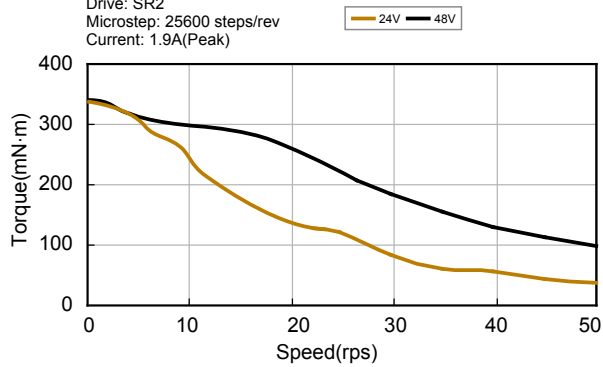
### 14HYB401-03

Drive: SR2  
Microstep: 25600 steps/rev  
Current: 1.0A(Peak)



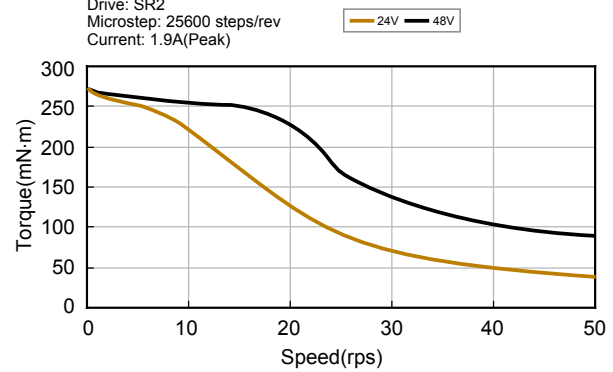
### 17HD2401-03N

Drive: SR2  
Microstep: 25600 steps/rev  
Current: 1.9A(Peak)



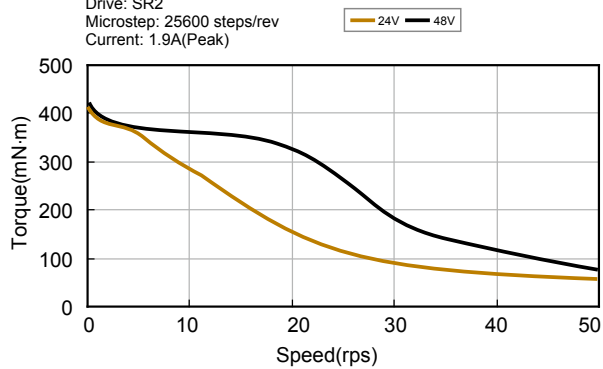
### 17HD4435-02N

Drive: SR2  
Microstep: 25600 steps/rev  
Current: 1.9A(Peak)



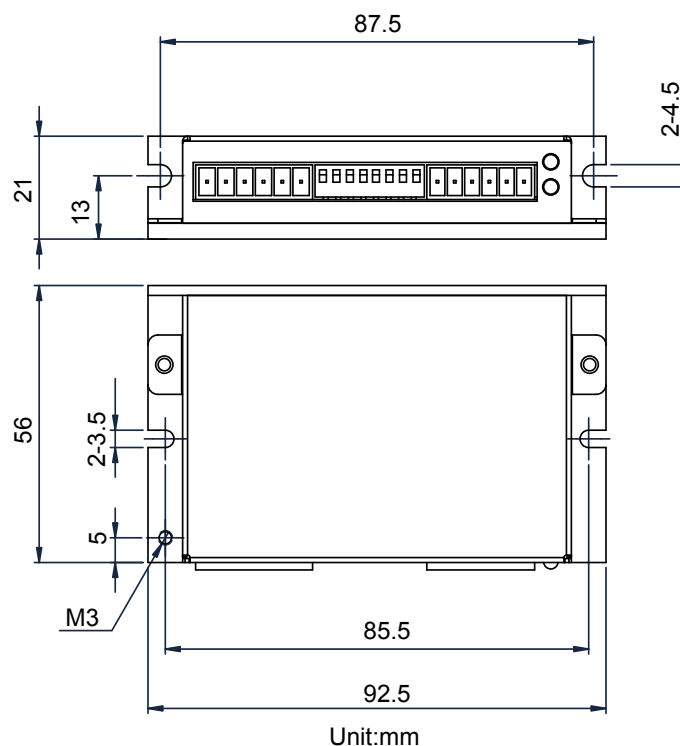
### 17HD6404-05N

Drive: SR2  
Microstep: 25600 steps/rev  
Current: 1.9A(Peak)



## 7 Drive Mounting

### 7.1 Mechanical Outline



### 7.2 Mounting the Drive

You can mount your drive on the wide or the narrow side of the chassis. If you mount the drive on the wide side, use M3 screws through the four corner holes. For narrow side mounting applications, you can use M3 screws in the two side holes.

The amplifiers in the drive generate heat. To operate the drive continuously at maximum power you should take compulsory air-cooled method.

Never use your drive in a space where there is no air flow or where other devices cause the surrounding air to be more than 40 °C. Never put the drive where it can get wet or where metal particles can get on it.

## 8 Contacting MOONS'

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