

# SS Step-Servo

New

3<sup>rd</sup> Generation Step-Servo

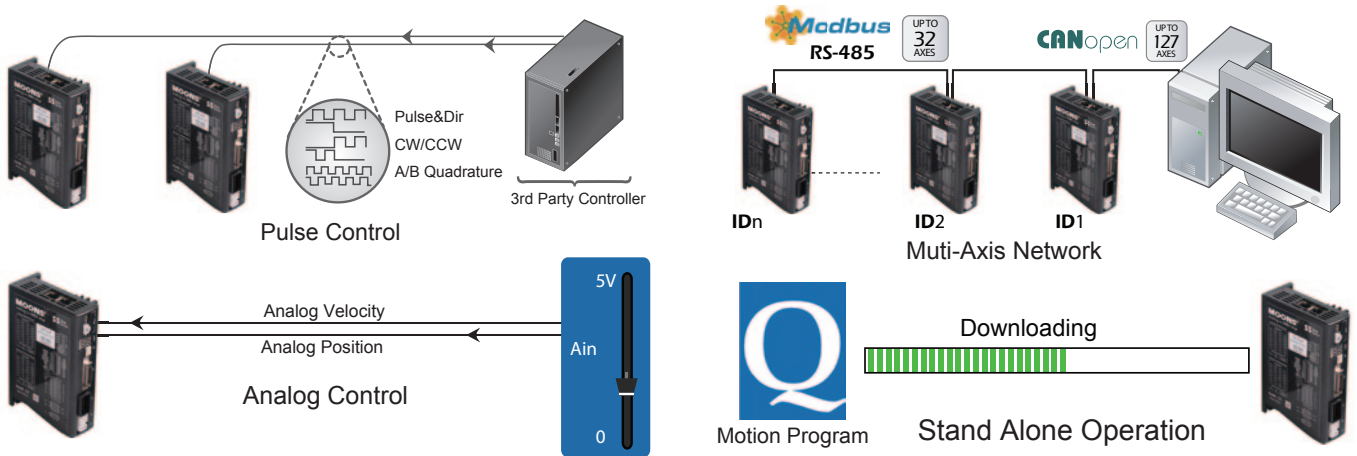
- Intelligent built-in controller
  - Multi-axis field bus control
  - Enhanced motor optimized design long life
  - Efficient smooth accurate fast
  - Low vibration low noise low heat



**MOONS'**  
*moving in better ways*

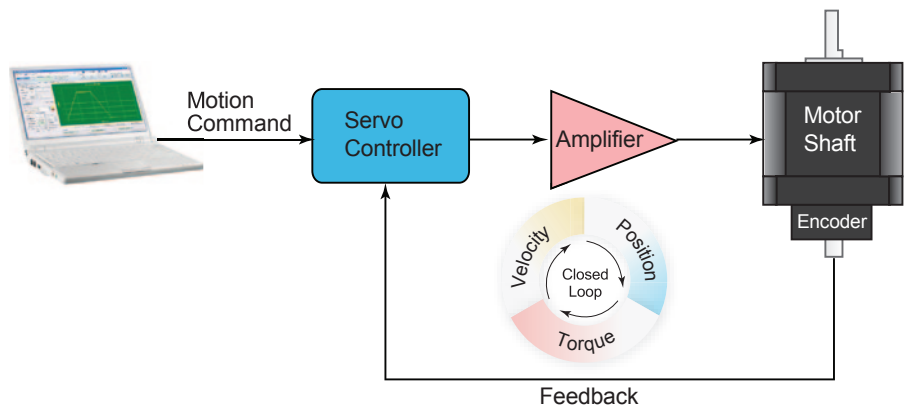
The **Step-Servo** is an innovative revolution for the world of stepper motor, it enhances the stepper motors with servo technology to create a product with exceptional feature and broad capability.

**Multi-functional Capability**

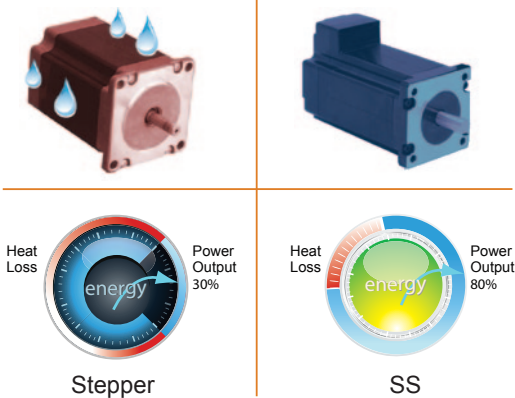


**Closed Loop**

- Very tight position and velocity control for the most demanding applications.
- Robust servo loops that tolerate wide fluctuation in load inertia and frictional loading.
- Precise positioning to within  $\pm 1$  count using high resolution(20000 counts/ rev) encoder.



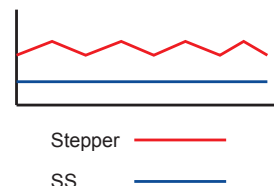
**Low Heating/High Efficiency**



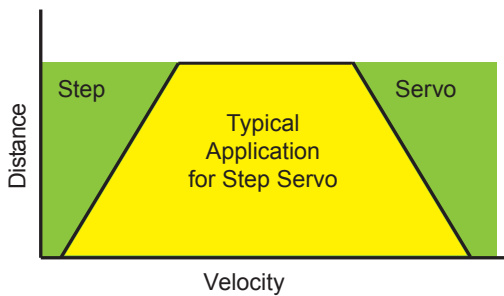
- Uses only the current required by the application, generating minimum heat output.
- When stand-still, current can reach nearly zero for extremely low heat output.
- Being able to use almost 100% of torque, allows for more efficient and compact motor usage.

**Smooth & Accurate**

- Space vector current control with 5000 line high resolution encoder, gives smooth and quiet operation, especially at low speeds. -----A feature never found with traditional stepping motors
- High stiffness due to the nature of the stepping motor combined with the highly responsive servo control -----Accurate position control both while running and static positioning



### Fast Response



- When performing fast point-to-point moves, the high torque output and advanced servo control provides a very responsive system far exceeding what can be done with a conventional stepper system.

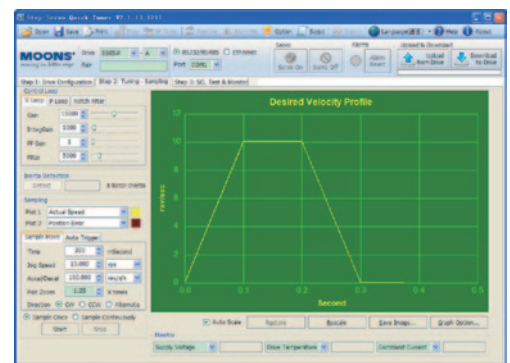
### High Torque

- Because the **Step-Servo** operates in full servo mode, all the available torque of the motor can be used.
- The motor can provide as much as 50% more torque in many applications. High torque capability often eliminates the need for gear reduction.
- Boost torque capability can provide as much as 50% more torque for short, quick moves.

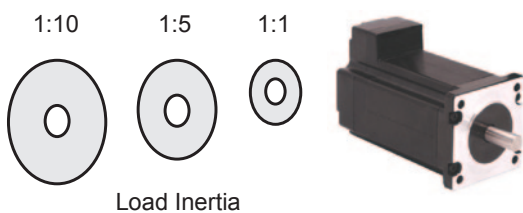


### Motion Monitoring

- For difficult control situations where performing a precise move is necessary, the **Step-Servo Quick Tuner** provide an easy to use interface for performing and monitoring the motion profile.
- Many common parameters such as Actual Speed or Position Error can be monitored to evaluate system performance.
- The monitoring is interactive with the servo tuning capability so that optimum performance can be achieved.



### Easy Tuning

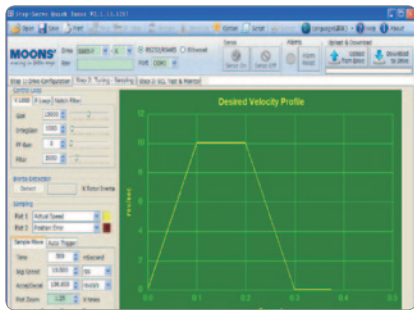


- Pre-defined tuning parameters for maximum control performance and stability.
- Easy selection list provides the level of control desired.
- In most cases NO extra manual tuning is required.

### Key Features

- Up to 8 digital inputs, 4 digital outputs and 2 analog inputs for S/Q/C type
- A/B/Z differential encoder signal output supported for P/R type
- Automatic load inertia detection
- On board daisy chain connection for field bus control(RS-485, **Modbus/RTU, CANopen**)
- Multiple homing methods for S/Q type
- Software limit for S/Q type
- Built-in position table up to 63 points for S type

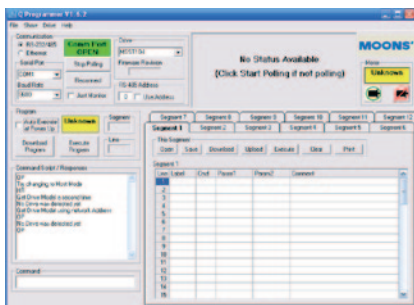
### Step-Servo Quick Tuner



#### Feature

- Friendly Interface
- Easy setup within just three steps
- Drive setup and configuration
- Servo Tuning and Sampling
- Motion testing and monitoring
- Write and save SCL command scripts
- Online help integrated

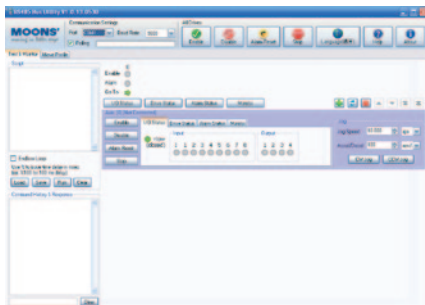
### Q Programmer



#### Feature

- Single-axis motion control
- Stored program execution
- Multi-tasking
- Conditional processing
- Math functions
- Data registers
- Motion Profile simulation
- Online help integrated

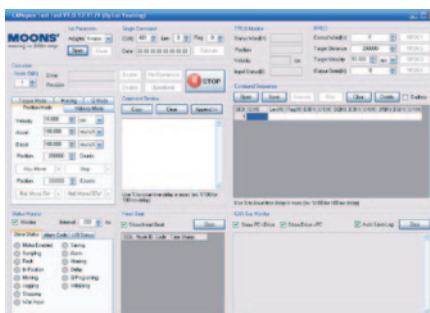
### RS485 Bus Utility



#### Feature

- Stream SCL commands from the command line
- Simple interface with powerful capability
- Easy setup with RS-485 for 32 axis network motion control
- Monitoring Status of I/O, drive, alarm and the other nine most useful motion parameters
- Write and save SCL command scripts
- Online help integrated
- Supports all RS-485 drives

### CANopen Test Tool



#### Feature

- Friendly User Interface
- Multiple operation Mode Support
- Multi-Thread, High Performance
- CAN bus monitor and log function
- Kvaser/PEAK adapter support

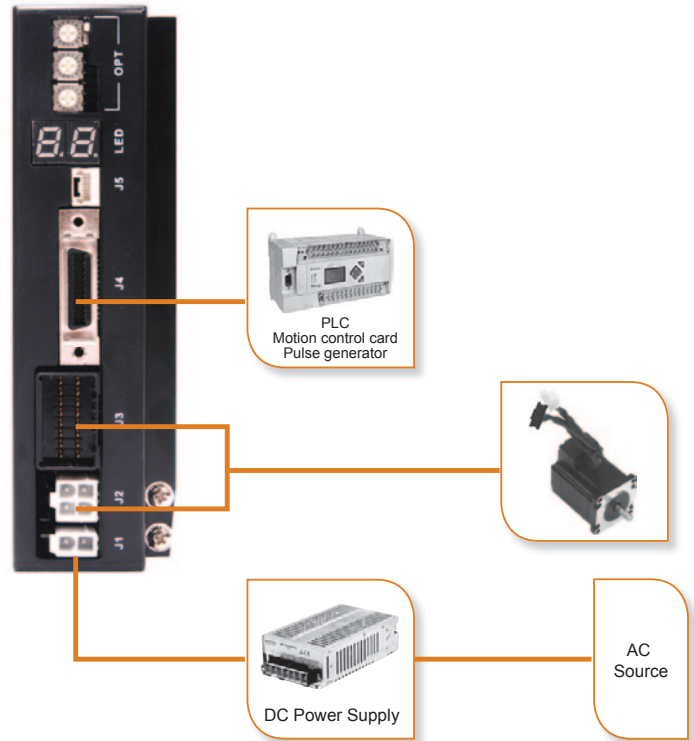
**FREE DOWNLOAD**  
 Our software and user manual can be downloaded from our website:  
[www.moonsindustries.com](http://www.moonsindustries.com)

◇ -R Switch Setting Pulse Input Type

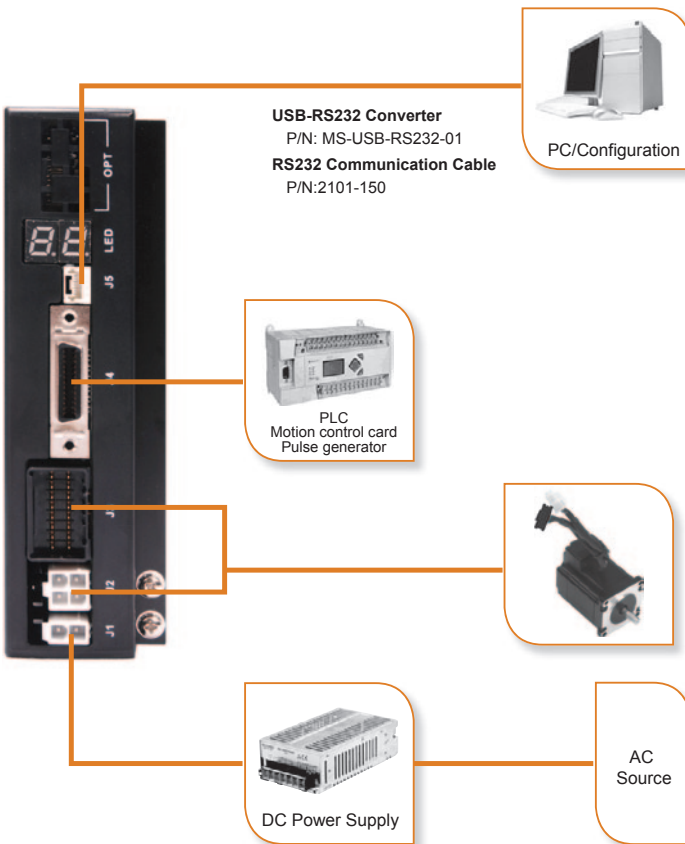
Controlled via pulse generator.

**Main Features**

- Accepts three types of pulse signal input as Pulse&Direction, CW/CCW and A/B Quadrature
- Encoder signal output, A/B/Z differential
- Configuration and Tuning via switches



**Ordering Information**  
 150W P/N: MF150A24AG-V  
 320W P/N: MF320A48AG-V



**Ordering Information**  
 150W P/N: MF150A24AG-V  
 320W P/N: MF320A48AG-V

◇ -P Software Setting Pulse Input Type

Controlled via pulse generator.

**Main Features**

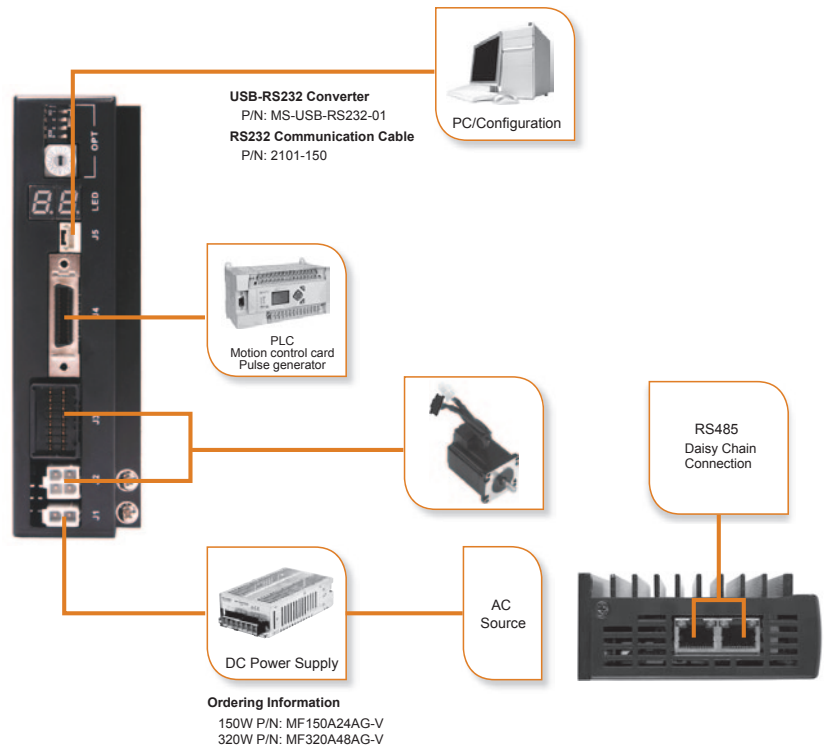
- Accepts three types of pulse signal input as Pulse&Direction, CW/CCW and A/B Quadrature
- Encoder signal output, A/B/Z differential

◇ -S Basic Type with Serial Communication

Controlled via pulse signals, analog signal or MOONS' SCL streaming series commands.

**Main Features**

- Pulse control
- Analog control
- Host real time control using SCL via RS-232/RS-485
- Up to 32 axes per channel for RS-485
- Support Position Table(up to 63 points)

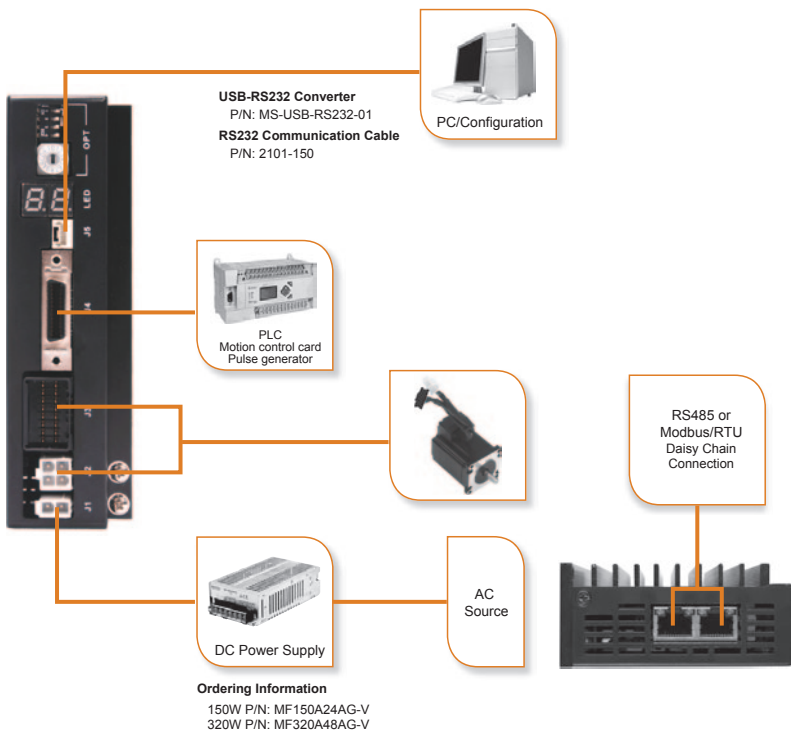


◇ -Q Built-in Programmable Motion Controller (Includes Modbus/RTU type)

Run stand-alone with sophisticated and functional programs. Commands for controlling motion, inputs & outputs, drive configuration and status, as well as math operations, register manipulation, and multi-tasking.

**Main Features**

- Stand-alone operation plus Serial host control
- Math operations
- Register manipulation
- Multi-tasking
- With all features in S type
- **Modbus/RTU** network, up to 32 axes per channel

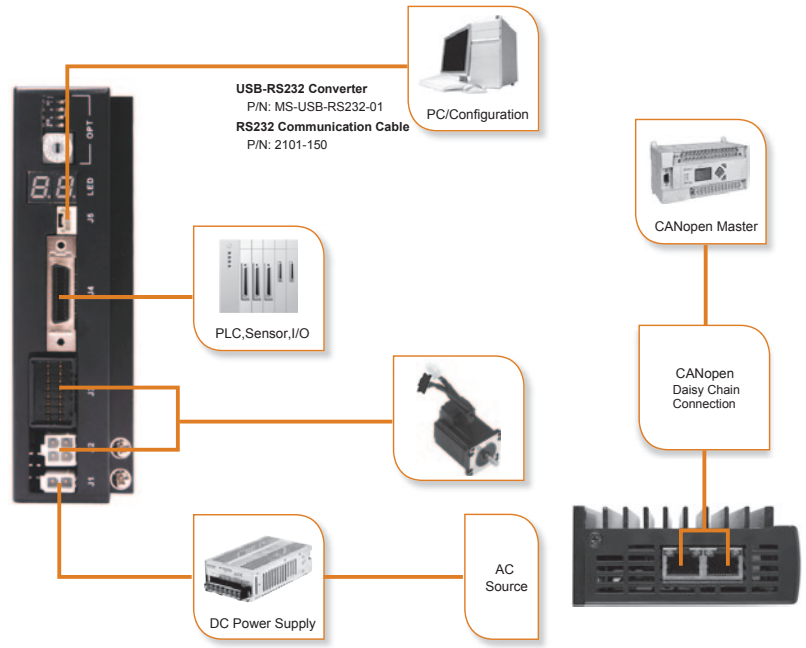


◇ -CANopen Type

Operates on a **CANopen** communication network and conforms to CiA301 and CiA402. It supports running stored Q programs via MOONS'-specific **CANopen** objects.

**Main Features**

- **CANopen** network
- Up to 127 axes per channel
- Objects for Q programming



**Ordering Information**  
 150W P/N: MF150A24AG-V  
 320W P/N: MF320A48AG-V

■ Specifications

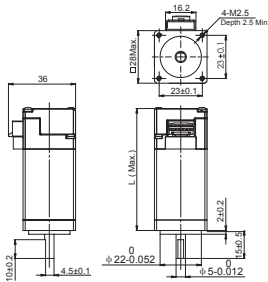
Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 20 KHz
Output Current	SS03: Continuous Current 3A max, Boost Current 4.5A max (1.5s), current limitation auto set-up by attached motor SS05: Continuous Current 5A max, Boost Current 7.5A max (1.5s), current limitation auto set-up by attached motor SS10: Continuous Current 10A max, Boost Current 15A max (1.5s), current limitation auto set-up by attached motor
Power Supply	External nominal 24 - 75 volt DC power supply required, Absolute maximum input voltage range 18 - 80 VDC
Protection	Over-voltage, under-voltage, over-temp, motor/winding shorts (phase-to-phase, phase-to-ground)
Controller	
Electronic Gearing	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
Filters	Digital input noise filter, Analog input noise filter, Smoothing filter, PID filter, Notch filter
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
Modes of Operation	R/P type: Position Mode(Pulse & Direction, CW & CCW Pulse, A/B Quadrature) S type: Position Mode(Pulse & Direction, CW & CCW Pulse, A/B Quadrature); Torque Mode, Velocity Mode, SCL Mode Q type: Position Mode(Pulse & Direction, CW & CCW Pulse, A/B Quadrature); Torque Mode, Velocity Mode, SCL Mode, Q Programming, Modbus/RTU C type: CANopen, CiA301, CiA402, Q Programming
Position Table(S type only)	Built-in Position Table, up to 63 positions
Digital Inputs	R/P type: X1/STEP, X2/DIR, X3/CW Limit, X4/CCW Limit; Optically isolated, differential, 5-24VDC; Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz; X5/Enable, X6/Alarm Reset; Optically isolated, single-ended, 5-24VDC S/Q/C type: X1/STEP, X2/DIR, X3/CW Limit, X4/CCW Limit; Optically isolated, differential, 5-24VDC; Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz; X5/Enable, X6/Alarm Reset, X7, X8; Optically isolated, single-ended, 5-24VDC
Digital Outputs	R/P type: Y1/Alarm, Y2/In Position; Optically isolated, 30V/100 mA max S/Q/C type: Y1/Alarm, Y2/In Position, Y3, Y4; Optically isolated, 30V/100 mA max
Analog Inputs (S/Q/C type only)	Two analog inputs Each input can accept a signal range of 0 to 5 VDC, ±5 VDC, 0 to 10 VDC or ±10 VDC
Encoder Outputs (R/P type only)	Differential encoder outputs (A±, B±, Z±), 26C31 line driver, 20 mA sink or source max
+5V Output	4.8~5V, 100 mA max
Communication	RS-232, RS-485(optional), Modbus/RTU(optional), CANopen(optional)
Physical	
Ambient Temperature	0 to 40°C (32 to 104°F) when mounted to a suitable heatsink
Ambient Humidity	90% Max., non-condensing
Mass	Approx 0.3 Kg

**Dimensions(Unit:mm)**

Visit [www.moonsindustries.com](http://www.moonsindustries.com) to get the 3D drawings.

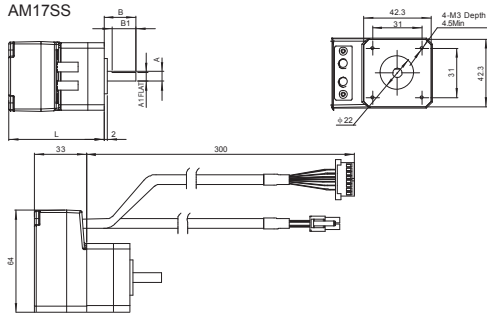
Motor

AM11SS



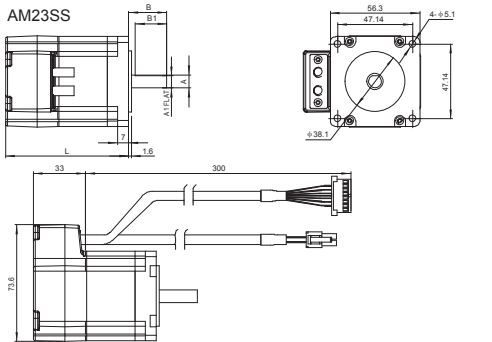
Model	L
AM11SS1DMA	43.8
AM11SS2DMA	52.9
AM11SS3DMA	64.1

AM17SS



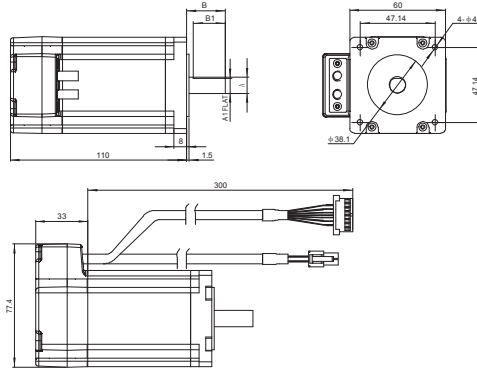
Model	A	A1	B	B1	L
AM17SS1DGA	φ 6	5.5	20	15	59.5
AM17SS1DGB	φ 5	4.5	24	15	59.5
AM17SS2DGA	φ 6	5.5	20	15	65
AM17SS2DGB	φ 5	4.5	24	15	65
AM17SS3DGA	φ 6	5.5	20	15	73.5
AM17SS3DGB	φ 5	4.5	24	15	73.5
AM17SS4DGA	φ 6	5.5	20	15	89
AM17SS4DGB	φ 5	4.5	24	15	89

AM23SS



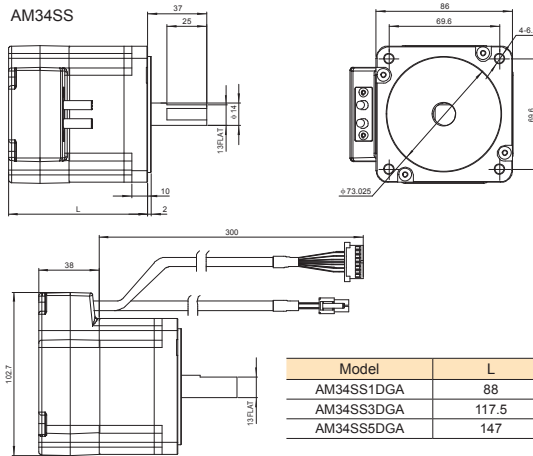
Model	A	A1	B	B1	L
AM23SS2DGA	φ 8	7.5	24	20	77.5
AM23SS2DGB	φ 6.35	5.85	20	15	77.5
AM23SS3DGA	φ 8	7.5	24	20	99.5
AM23SS3DGB	φ 6.35	5.85	20	15	99.5

AM24SS



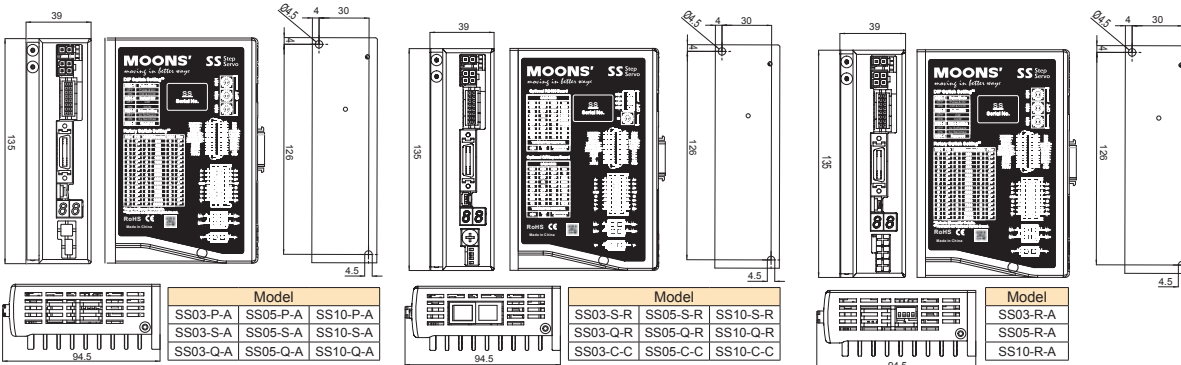
Model	A	A1	B	B1
AM24SS3DGA	φ 10	9.5	24	20
AM24SS3DGB	φ 8	7.5	20	15

AM34SS



Model	L
AM34SS1DGA	88
AM34SS3DGA	117.5
AM34SS5DGA	147

Drive



Model
SS03-P-A
SS03-S-A
SS03-Q-A
SS05-P-A
SS05-S-A
SS05-Q-A
SS10-P-A
SS10-S-A
SS10-Q-A

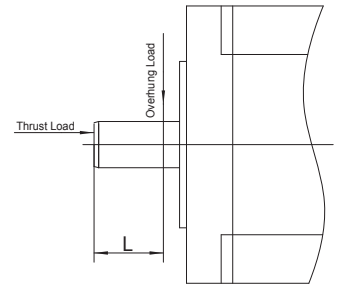
Model
SS03-S-R
SS03-Q-R
SS03-C-C
SS05-S-R
SS05-Q-R
SS05-C-C
SS10-S-R
SS10-Q-R
SS10-C-C

Model
SS03-R-A
SS05-R-A
SS10-R-A



**Motor Specifications**

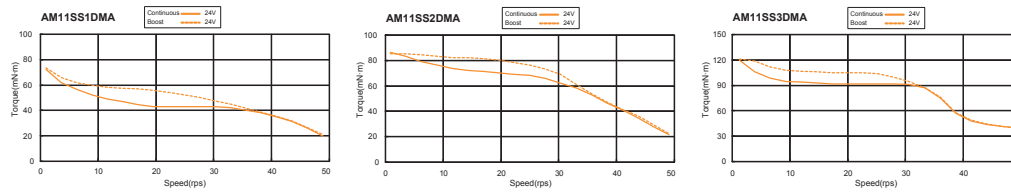
Motor P/N	Drive P/N	Holding Torque N·m	Rotor Inertia g·cm <sup>2</sup>	Encoder Resolution counts/rev	Maximum Speed RPM	Mass g	Frame Size	Permissible Overhung Load (N) Distance(L) from Shaft End(mm)					Permissible Thrust Load	
								0	5	10	15	20		
AM11SS1DMA	SS03-■-◇	0.05	9	4096	3600	118	28mm	20	2	5	34	52	-	Less than the motor mass
AM11SS2DMA		0.07	12			168								
AM11SS3DMA		0.09	18			218								
AM17SS1DG □	SS03-■-◇ or SS05-■-◇	0.3	38	20000	3600	390	42mm	35	44	58	85	-		
AM17SS2DG □		0.5	57			440								
AM17SS3DG □		0.6	82			520								
AM17SS4DG □	SS05-■-◇	0.75	123	20000	3600	760	56mm	63	75	95	130	190		
AM23SS2DG □		0.9	260			850								
AM23SS3DG □		1.5	460			1250								
AM24SS3DG □	SS10-■-◇	2.5	900	20000	3600	1650	60mm	90	100	130	180	270		
AM34SS1DGA		3.5	915			2000								
AM34SS3DGA		6.0	1480			3100								
AM34SS5DGA	SS10-■-◇	8.0	2200	20000	3600	4200	80mm	260	290	340	390	480		



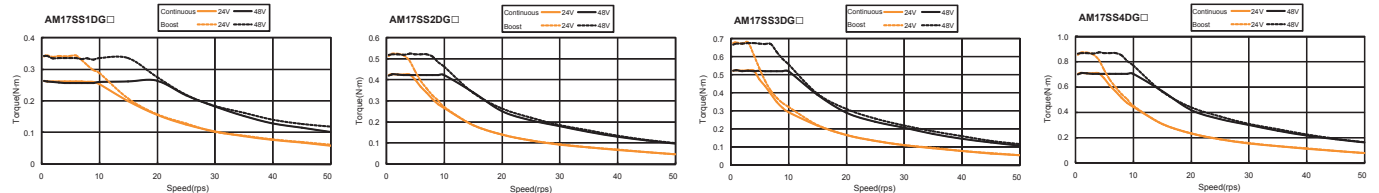
□: A or B, refer to motor part numbering system; ■: R, P, S, Q, or C, refer to driver part numbering system; ◇: A, R or C, refer to driver part numbering system

◇ Torque Curves

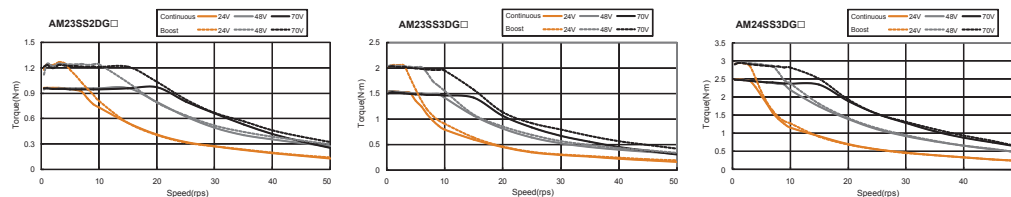
AM11SS Series



AM17SS Series

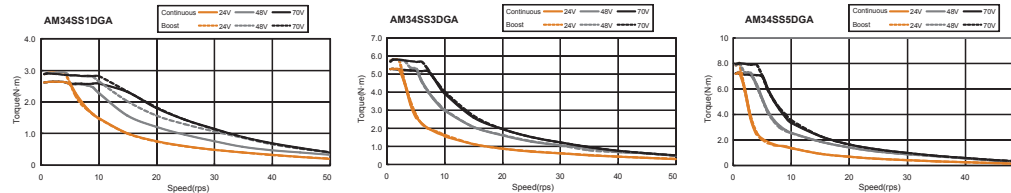


AM23SS Series

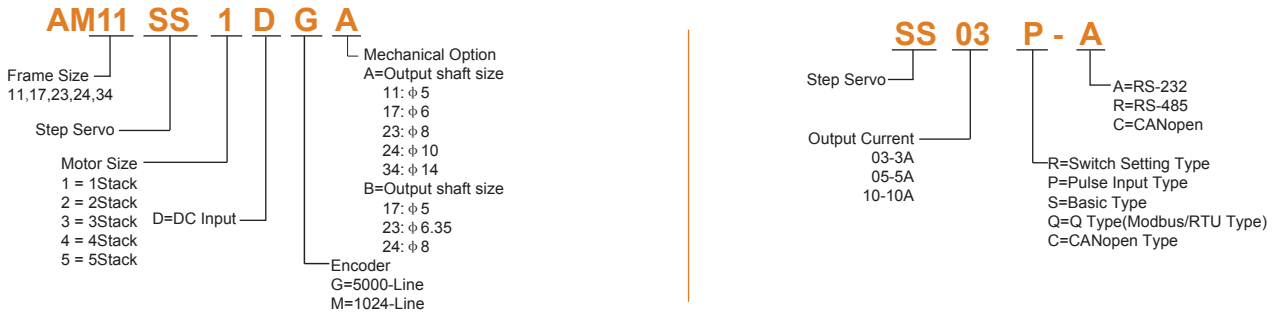


AM24SS Series

AM34SS Series



■ **Numbering System**



■ **Ordering Information**

Control	Drive Type	Motor Type	Torque	Control	Drive Type	Motor Type	Torque
R Type Pulse Input Type Selectable Switch & RS232 Software 6 Digital Inputs 2 Digital Outputs Encoder Output	SS03-R-A	AM11SS1DMA	0.05N·m	P Type Pulse Input Type RS232 Software 6 Digital Inputs 2 Digital Outputs Encoder Output	SS03-P-A	AM11SS1DMA	0.05N·m
		AM11SS2DMA	0.07N·m			AM11SS2DMA	0.07N·m
		AM11SS3DMA	0.09N·m			AM11SS3DMA	0.09N·m
	SS03-R-A / SS05-R-A	AM17SS1DG □	0.3N·m		SS03-P-A / SS05-P-A	AM17SS1DG □	0.3N·m
		AM17SS2DG □	0.5N·m			AM17SS2DG □	0.5N·m
		AM17SS3DG □	0.6N·m			AM17SS3DG □	0.6N·m
		AM17SS4DG □	0.75N·m			AM17SS4DG □	0.75N·m
		AM23SS2DG □	0.9N·m			AM23SS2DG □	0.9N·m
		AM23SS3DG □	1.5N·m			AM23SS3DG □	1.5N·m
	SS05-R-A	AM24SS3DG □	2.5N·m		SS05-P-A	AM24SS3DG □	2.5N·m
		AM34SS1DGA	3.5N·m			AM34SS1DGA	3.5N·m
		AM34SS3DGA	6.0N·m			AM34SS3DGA	6.0N·m
SS10-R-A	AM34SS5DGA	8.0N·m	SS10-P-A	AM34SS5DGA	8.0N·m		

Control	Drive Type	Motor Type	Torque	Control	Drive Type	Motor Type	Torque
S Type Basic Type RS232 Communication 8 Digital Inputs 4 Digital Outputs 2 Analog Inputs	SS03-S-A	AM11SS1DMA	0.05N·m	S Type Basic Type RS485 Communication 8 Digital Inputs 4 Digital Outputs 2 Analog Inputs	SS03-S-R	AM11SS1DMA	0.05N·m
		AM11SS2DMA	0.07N·m			AM11SS2DMA	0.07N·m
		AM11SS3DMA	0.09N·m			AM11SS3DMA	0.09N·m
	SS03-S-A / SS05-S-A	AM17SS1DG □	0.3N·m		SS03-S-R / SS05-S-R	AM17SS1DG □	0.3N·m
		AM17SS2DG □	0.5N·m			AM17SS2DG □	0.5N·m
		AM17SS3DG □	0.6N·m			AM17SS3DG □	0.6N·m
		AM17SS4DG □	0.75N·m			AM17SS4DG □	0.75N·m
		AM23SS2DG □	0.9N·m			AM23SS2DG □	0.9N·m
		AM23SS3DG □	1.5N·m			AM23SS3DG □	1.5N·m
	SS05-S-A	AM24SS3DG □	2.5N·m		SS05-S-R	AM24SS3DG □	2.5N·m
		AM34SS1DGA	3.5N·m			AM34SS1DGA	3.5N·m
		AM34SS3DGA	6.0N·m			AM34SS3DGA	6.0N·m
SS10-S-A	AM34SS5DGA	8.0N·m	SS10-S-R	AM34SS5DGA	8.0N·m		

Control	Drive Type	Motor Type	Torque	Control	Drive Type	Motor Type	Torque
Q Type Programm Type RS232 Communication Modbus/RTU 8 Digital Inputs 4 Digital Outputs 2 Analog Inputs	SS03-Q-A	AM11SS1DMA	0.05N·m	Q Type Programm Type RS485 Communication Modbus/RTU 8 Digital Inputs 4 Digital Outputs 2 Analog Inputs	SS03-Q-R	AM11SS1DMA	0.05N·m
		AM11SS2DMA	0.07N·m			AM11SS2DMA	0.07N·m
		AM11SS3DMA	0.09N·m			AM11SS3DMA	0.09N·m
	SS03-Q-A / SS05-Q-A	AM17SS1DG □	0.3N·m		SS03-Q-R / SS05-Q-R	AM17SS1DG □	0.3N·m
		AM17SS2DG □	0.5N·m			AM17SS2DG □	0.5N·m
		AM17SS3DG □	0.6N·m			AM17SS3DG □	0.6N·m
		AM17SS4DG □	0.75N·m			AM17SS4DG □	0.75N·m
		AM23SS2DG □	0.9N·m			AM23SS2DG □	0.9N·m
		AM23SS3DG □	1.5N·m			AM23SS3DG □	1.5N·m
	SS05-Q-A	AM24SS3DG □	2.5N·m		SS05-Q-R	AM24SS3DG □	2.5N·m
		AM34SS1DGA	3.5N·m			AM34SS1DGA	3.5N·m
		AM34SS3DGA	6.0N·m			AM34SS3DGA	6.0N·m
SS10-Q-A	AM34SS5DGA	8.0N·m	SS10-Q-R	AM34SS5DGA	8.0N·m		

Control	Drive Type	Motor Type	Torque
C Type CANopen 8 Digital Inputs 4 Digital Outputs 2 Analog Inputs	SS03-C-C	AM11SS1DMA	0.05N·m
		AM11SS2DMA	0.07N·m
		AM11SS3DMA	0.09N·m
	SS03-C-C / SS05-C-C	AM17SS1DG □	0.3N·m
		AM17SS2DG □	0.5N·m
		AM17SS3DG □	0.6N·m
		AM17SS4DG □	0.75N·m
		AM23SS2DG □	0.9N·m
		AM23SS3DG □	1.5N·m
	SS05-C-C	AM24SS3DG □	2.5N·m
		AM34SS1DGA	3.5N·m
		AM34SS3DGA	6.0N·m
SS10-C-C	AM34SS5DGA	8.0N·m	

□ : Enter A(Enhanced Shaft) or B(Standard) in the box( □ ) within the model name

■ **Standard Accessories**

P/N	Category	Technical Specification
1103-200	Cable	Power Supply Cable
2101-150	Cable	RS232 Communication Cable

■ **Optional Accessories (Sold separately)**

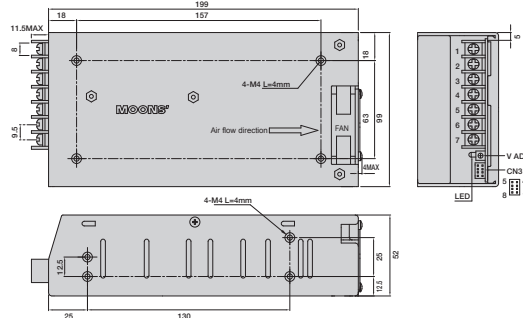
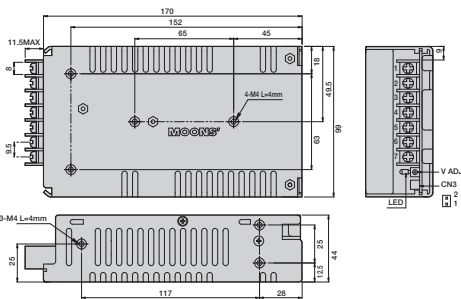
P/N	Category	Technical Specification
MF150A24AG-V	Switching Power Supply	150W, 24V
MF320A48AG-V	Switching Power Supply	320W, 48V
2103-□□□	Cable	Motor Extension Cable for AM17/23/24/34SS motor
2109-□□□	Cable	Motor Extension Cable for AM11SS motor
2104-□□□	Cable	Encoder Extension Cable for AM17/23/24/34SS motor
2108-□□□	Cable	Encoder Extension Cable for AM11SS motor

◇ **Switching Power Supplies**

**MOONS' recommend to use following switching power supplies**

**P/N:MF150A24AG-V 150W,24VDC**

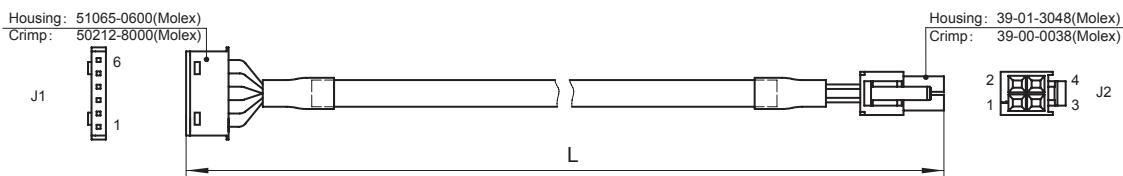
**P/N:MF320A48AG-V 320W,48VDC**



◇ **Motor Extended Cable for AM11SS motor**

P/N	Length
2109-100	1M
2109-300	3M
2109-500	5M
2109-1000	10M

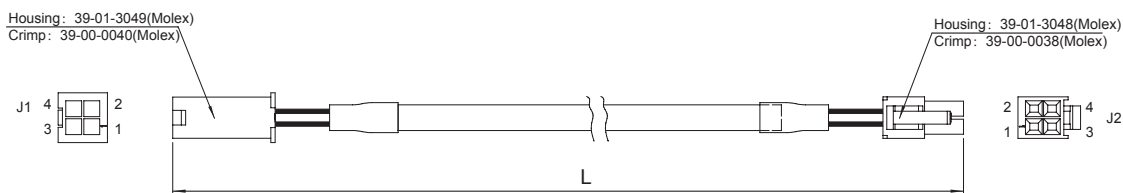
Wiring Diagram		
PIN ( J1 )	Colour(Signal)	PIN ( J2 )
1	Blue ( B- )	1
3	Red ( B+ )	2
4	Green ( A- )	3
6	Black ( A+ )	4



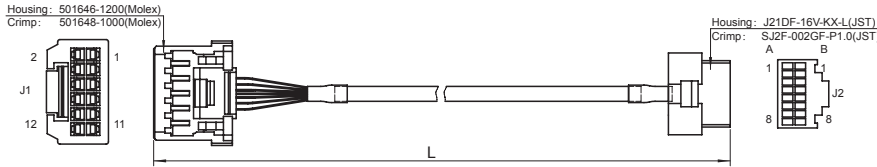
◇ **Motor Extended Cable for AM17/23/24/34SS motor**

P/N	Length
2103-100	1M
2103-300	3M
2103-500	5M
2103-1000	10M

Wiring Diagram		
PIN ( J1 )	Colour(Signal)	PIN ( J2 )
1	Blue ( B- )	1
2	Red ( B+ )	2
3	Green ( A- )	3
4	Black ( A+ )	4



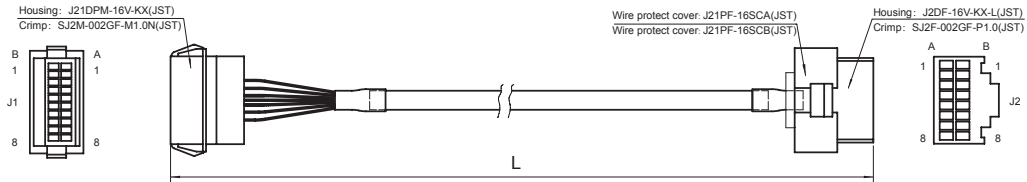
◇ Encoder Extended Cable for AM11SS motor



P/N	Length
2108-100	1M
2108-300	3M
2108-500	5M
2108-1000	10M

Wiring Diagram					
PIN ( J1 )	Colour(Signal)	PIN ( J2 )	PIN ( J1 )	Colour(Signal)	PIN ( J2 )
10	Blue ( A+ )	A8		Brown ( U+ )	A3
9	Blue/Black ( A- )	B8		Brown/Black ( U- )	B3
8	Green ( B+ )	A7		Gray ( V+ )	A2
7	Green/Black ( B- )	B7		Gray/Black ( V- )	B2
6	Yellow ( Z+ )	A6	1	White ( W+ )	A1
5	Yellow/Black ( Z- )	B6	2	White/Black ( W- )	B1
3	Red ( +5V )	A5	12	Shield	B4
4	Black ( GND )	B5			

◇ Encoder Extended Cable for AM17/23/24/34SS motor



P/N	Length
2104-100	1M
2104-300	3M
2104-500	5M
2104-1000	10M

Wiring Diagram					
PIN ( J1 )	Colour(Signal)	PIN ( J2 )	PIN ( J1 )	Colour(Signal)	PIN ( J2 )
A8	Blue ( A+ )	A8	A3	Brown ( U+ )	A3
B8	Blue/Black ( A- )	B8	B3	Brown/Black ( U- )	B3
A7	Green ( B+ )	A7	A2	Gray ( V+ )	A2
B7	Green/Black ( B- )	B7	B2	Gray/Black ( V- )	B2
A6	Yellow ( Z+ )	A6	A1	White ( W+ )	A1
B6	Yellow/Black ( Z- )	B6	B1	White/Black ( W- )	B1
A5	Red ( +5V )	A5	B4	Shield	B4
B5	Black ( GND )	B5			



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