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

Pulse&Dir
CW/CCW
A/B Quadrature
3rd Party Controller

Pulse Control

Modbus RS-485 UP TO 32 AXES

CANopen UP TO 127 AXES

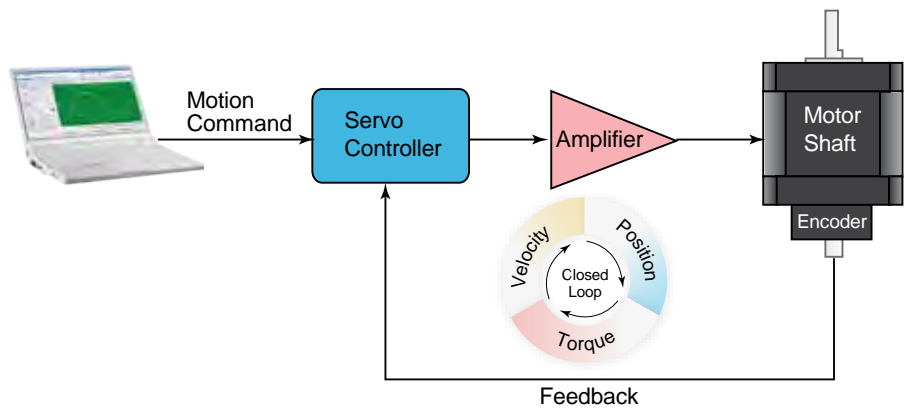**ID**n **ID**2 **ID**1

Muti-Axis Network

Analog Velocity
Analog Position

5V
Ain
0

Analog Control

Q
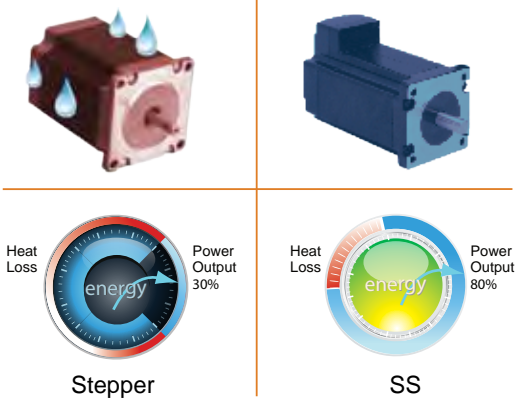Motion Program

Downloading

Stand Alone Operation

■ 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 ±1 count using high resolution encoder (20000 counts/rev for AM17/23/24/34SS motor, 4096 counts/rev for AM11SS motor).
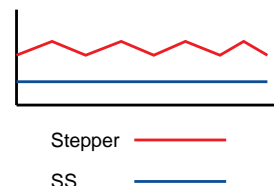
Motion Command → Servo Controller → Amplifier → Motor Shaft

Encoder

Velocity / Position / Closed Loop / Torque

Feedback

■ Low Heating/High Efficiency

Heat Loss — Power Output 30%
energy

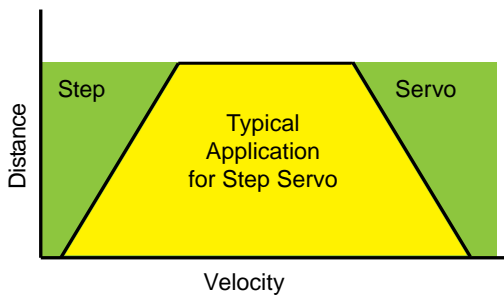**Stepper**

Heat Loss — Power Output 80%
energy

SS

- 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
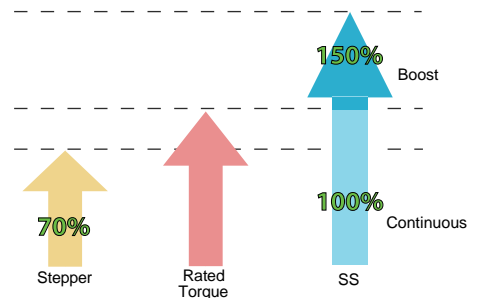 ------Accurate position control both while running and static positioning

Stepper ———
SS ———

±1 Count Error
(20000 counts/rev)

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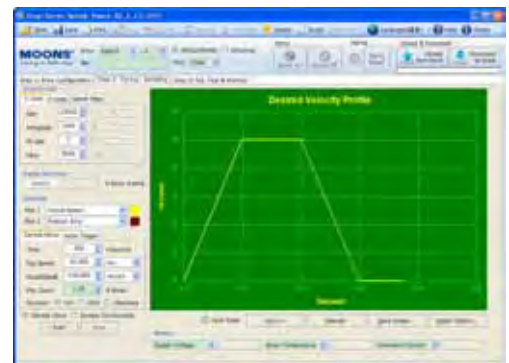
■ Easy Tuning
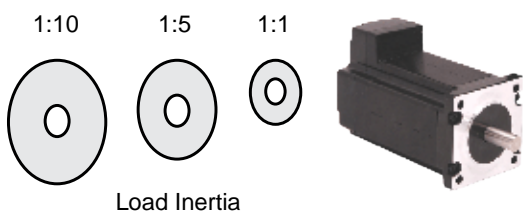
- Pre-defined tuning parameters for maximum control performance and stability.
- Easy selection list provides the level of control desired.
- In most cases NO extra manual tuning is required.

■ 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
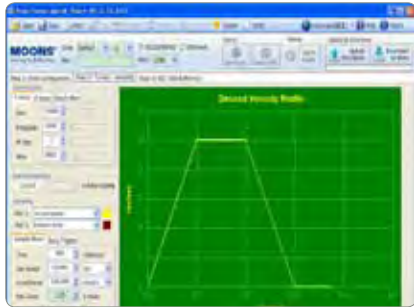
Feature

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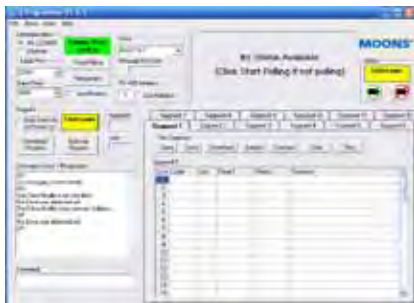- Write and save SCL command scripts
- Online help integrated

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
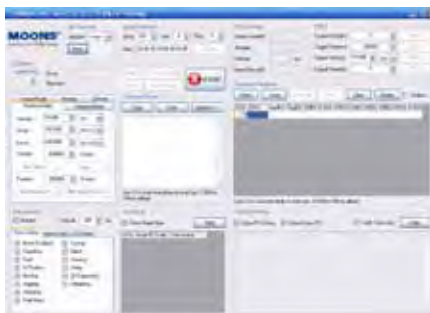
Feature

- 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

All software applications run on Window 7, Windows 8, 32-bit or 64-bit

◇ -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
- Configutaion and Tuning via switches
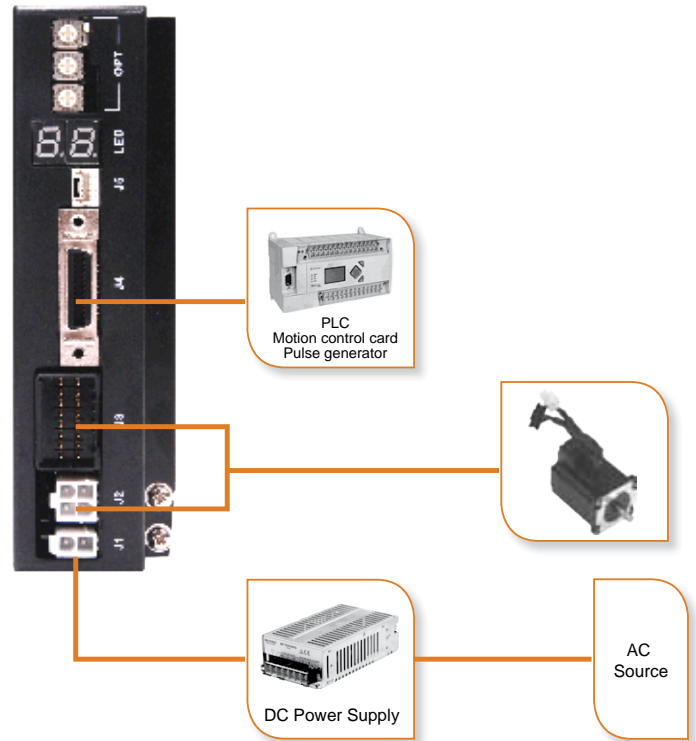
PLC
Motion control card
Pulse generator

AC Source

DC Power Supply

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

USB-RS232 Converter
P/N: MS-USB-RS232-01

RS232 Communication Cable
P/N:2101-150

PC/Configuration

PLC
Motion control card
Pulse generator

AC Source

DC Power Supply

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

◇ -S Basic Type with Serial Communication

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

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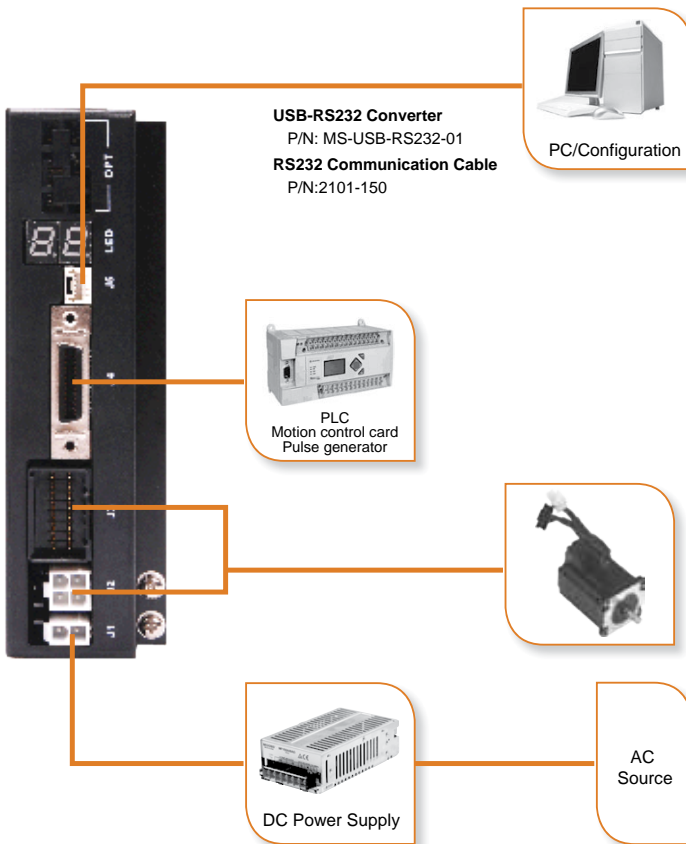
- Pulse control
- Analog control
- Host real time control using SCL via RS-232/RS-485
- Up to 32 axes per channel for RS-485
- Support Position Table(up to 63 points)

USB-RS232 Converter
P/N: MS-USB-RS232-01
RS232 Communication Cable
P/N: 2101-150

PC/Configuration

PLC
Motion control card
Pulse generator

RS485
Daisy Chain
Connection

AC
Source

DC Power Supply

Ordering Information
150W P/N: MF150A24AG-V
320W P/N: MF320A48AG-V
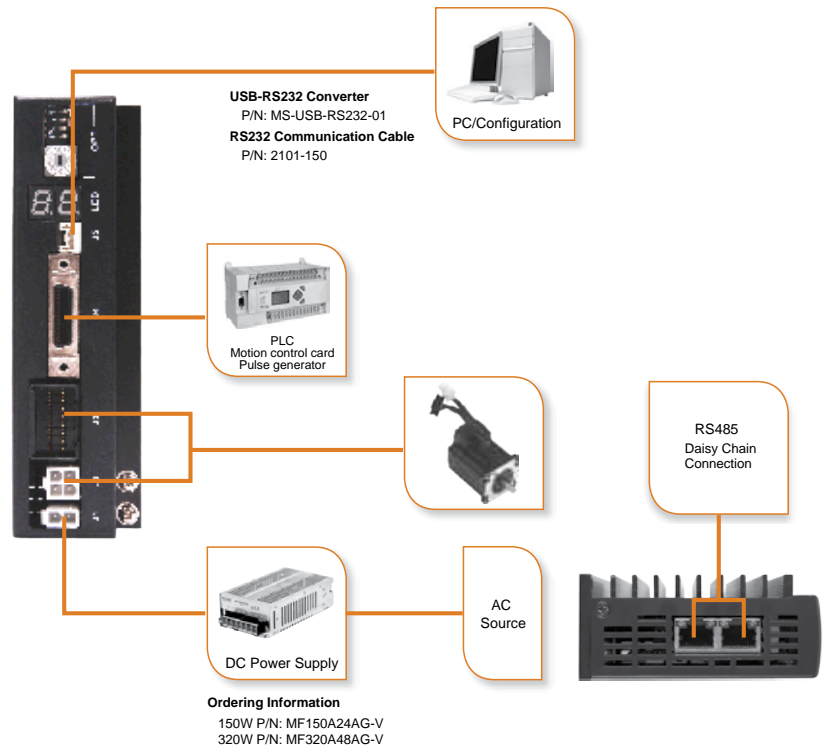
◇ -Q Built-in Programmable Motion Controller
   (Includes Modbus/RTU type)

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

USB-RS232 Converter
P/N: MS-USB-RS232-01
RS232 Communication Cable
P/N: 2101-150

PC/Configuration

PLC
Motion control card
Pulse generator

RS485 or
Modbus/RTU
Daisy Chain
Connection

AC
Source

DC Power Supply

Ordering Information
150W P/N: MF150A24AG-V
320W P/N: MF320A48AG-V
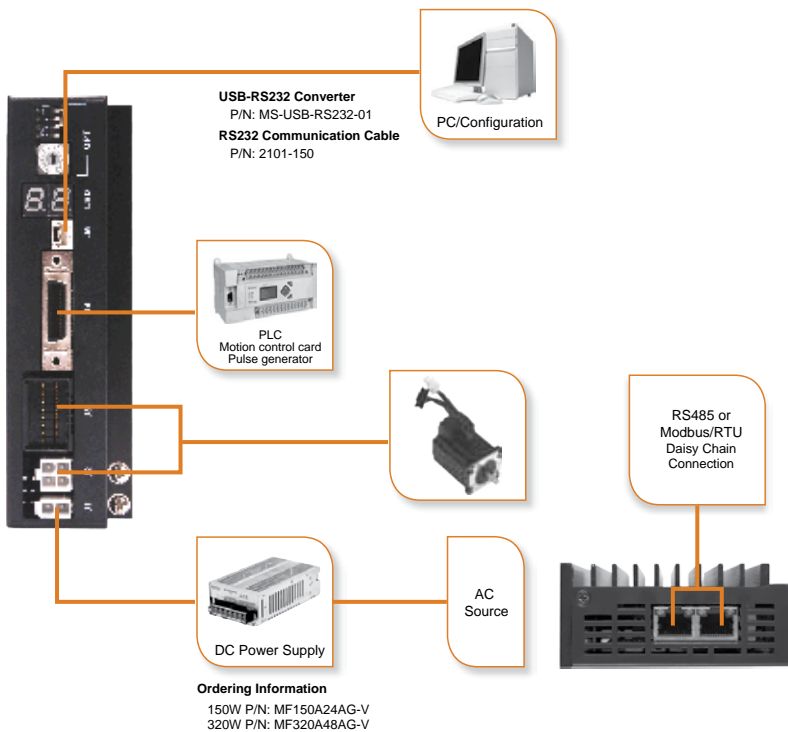
◇ -C CANopen Type

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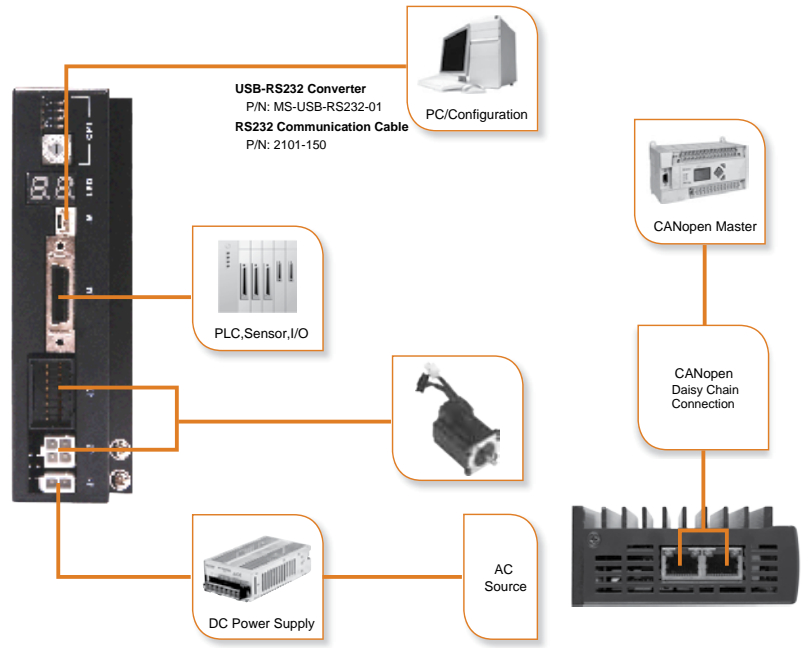
Main Features

- **CANopen** network
- Up to 112 axes per channel
- Objects for Q programming

USB-RS232 Converter
P/N: MS-USB-RS232-01
RS232 Communication Cable
P/N: 2101-150

PC/Configuration

CANopen Master

PLC,Sensor,I/O

CANopen Daisy Chain Connection

DC Power Supply

AC Source

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 Humdity	90% Max., non-condensing
Mass	Approx 0.3 Kg

■ Dimensions(Unit:mm)

🖑 Visit www.moonsindustries.com to get the 3D drawings.

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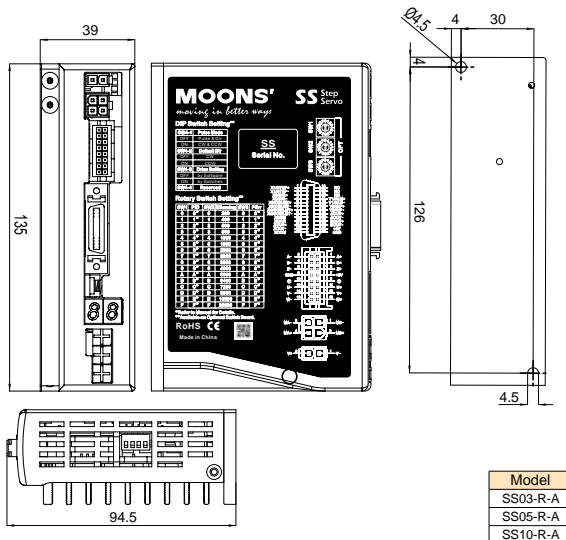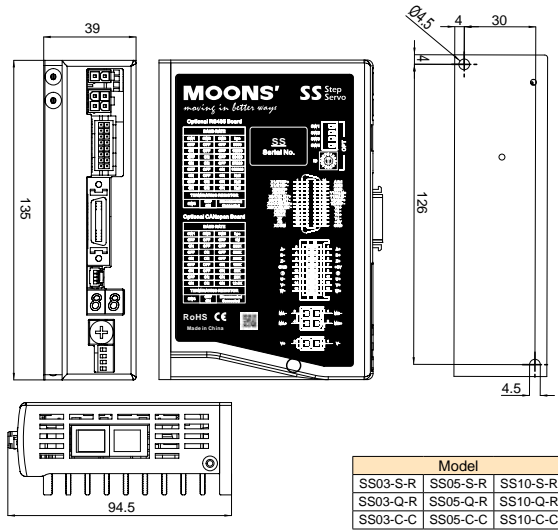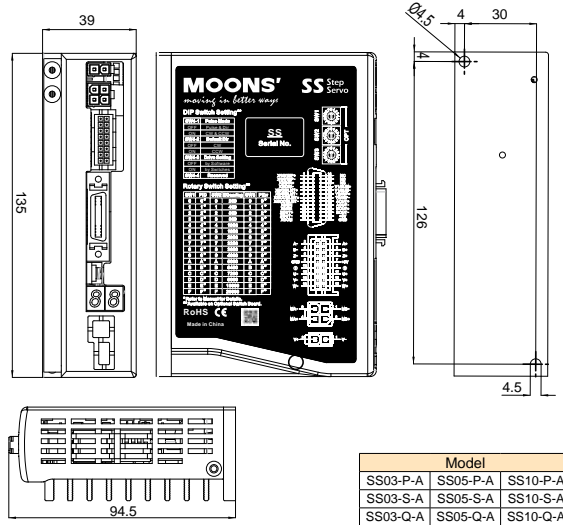
Model		
SS03-P-A	SS05-P-A	SS10-P-A
SS03-S-A	SS05-S-A	SS10-S-A
SS03-Q-A	SS05-Q-A	SS10-Q-A

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

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

◇ Motor
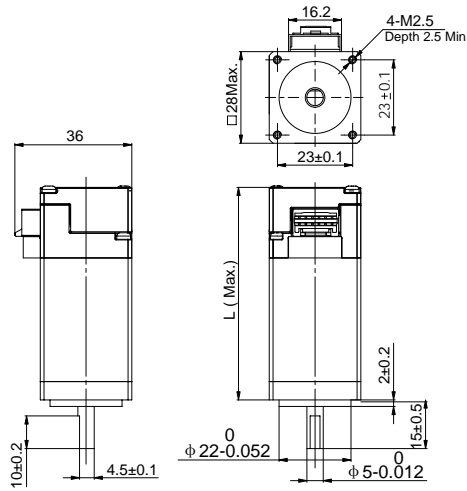
AM11SS

Model	L
AM11SS1DMA	43.8
AM11SS2DMA	52.9
AM11SS3DMA	64.1
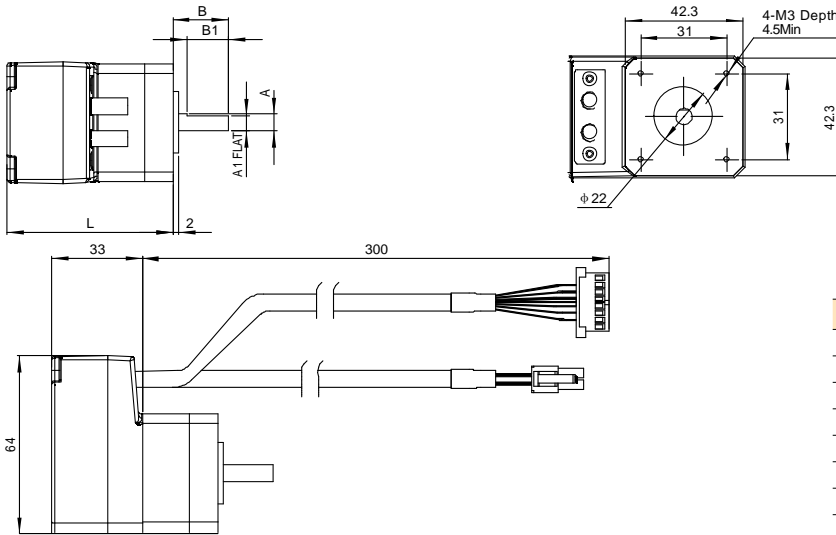
AM17SS

Model	A	A1	B	B1	L
AM17SS1DGA	φ6	5.5	20	15	59.5
AM17SS1DGB	φ5	4.5	24	15	59.5
AM17SS2DGA	φ6	5.5	20	15	65
AM17SS2DGB	φ5	4.5	24	15	65
AM17SS3DGA	φ6	5.5	20	15	73.5
AM17SS3DGB	φ5	4.5	24	15	73.5
AM17SS4DGA	φ6	5.5	20	15	89
AM17SS4DGB	φ5	4.5	24	15	89

AM23SS
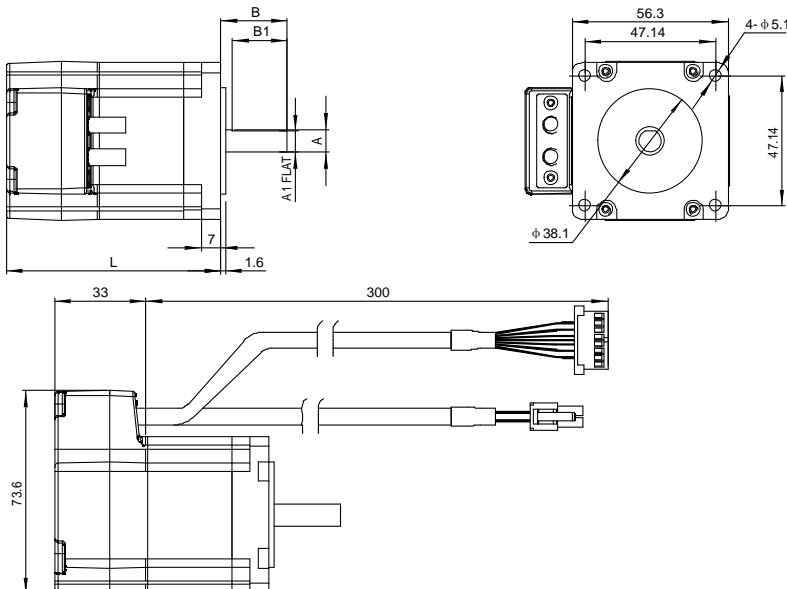
Model	A	A1	B	B1	L
AM23SS2DGA	φ8	7.5	24	20	77.5
AM23SS2DGB	φ6.35	5.85	20	15	77.5
AM23SS3DGA	φ8	7.5	24	20	99.5
AM23SS3DGB	φ6.35	5.85	20	15	99.5
AM23SS4DGA	φ8	7.5	24	20	102.5

AM24SS
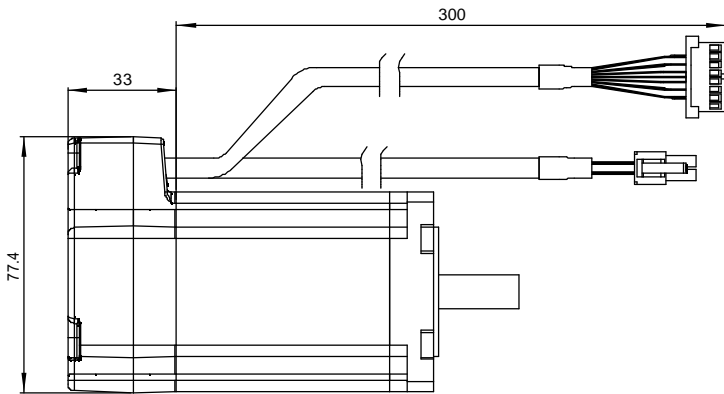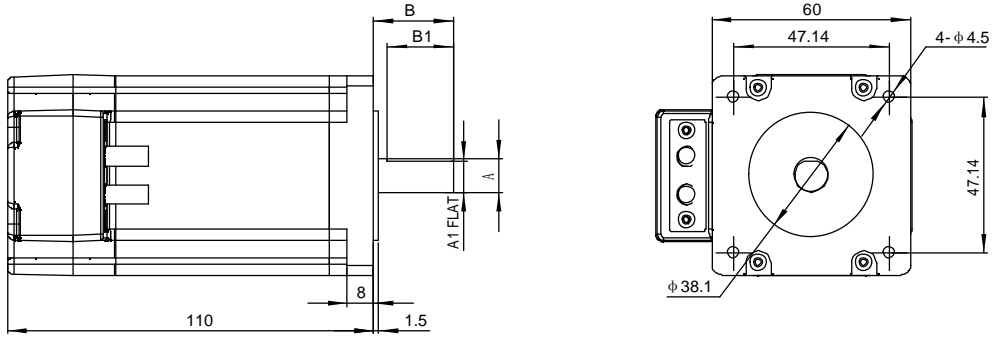
Model	A	A1	B	B1
AM24SS3DGA	φ10	9.5	24	20
AM24SS3DGB	φ8	7.5	20	15

AM34SS
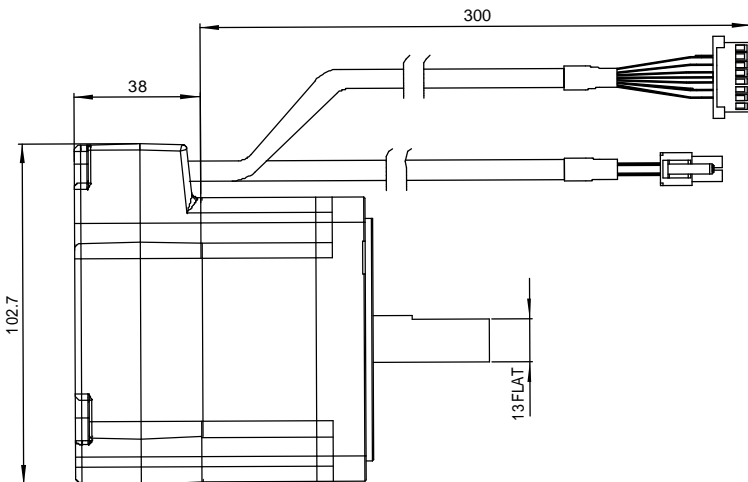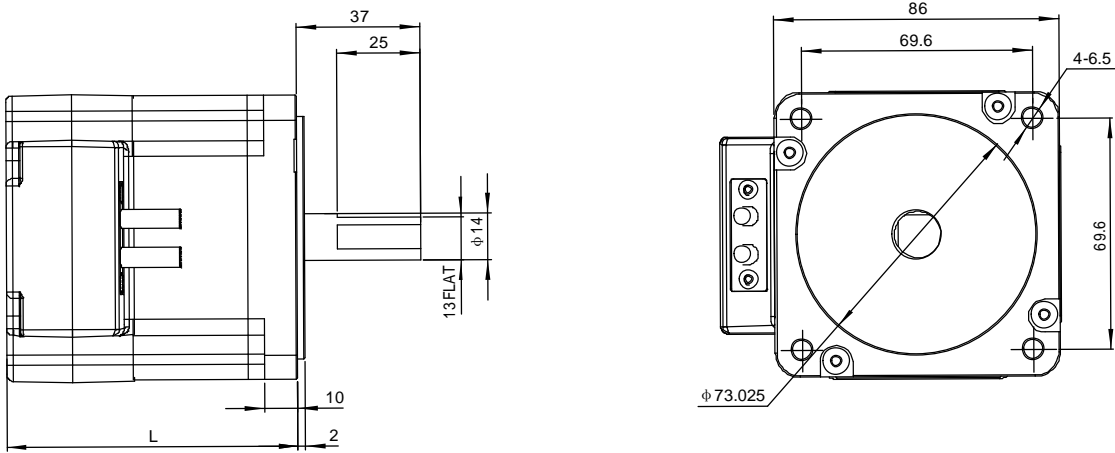
Model	L
AM34SS1DGA	88
AM34SS3DGA	117.5
AM34SS5DGA	147

◇ Motor（With Brake） **New**

AM17SS	AM23SS	AM24SS	AM34SS
AM17SS3DGA-BR01	AM23SS2DGA-BR01	AM24SS3DGA-BR01	AM34SS3DGA-BR01
AM17SS3DGB-BR01	AM23SS2DGB-BR01	AM24SS3DGB-BR01	AM34SS5DGA-BR01
	AM23SS3DGA-BR01		
	AM23SS3DGB-BR01		
	AM23SS4DGA-BR01		

AM17SS（With Brake）

Model	A	A1	B
AM17SS3DGA-BR01	φ6	5.5	20
AM17SS3DGB-BR01	φ5	4.5	24

AM23SS（With Brake）

Model	A	A1	B	B1	L
AM23SS2DGA-BR01	φ8	7.5	24	20	77.5
AM23SS2DGB-BR01	φ6.35	5.85	20	15	77.5
AM23SS3DGA-BR01	φ8	7.5	24	20	99.5
AM23SS3DGB-BR01	φ6.35	5.85	20	15	99.5
AM23SS4DGA-BR01	φ8	7.5	24	20	102.5

AM24SS（With Brake）

Model	A	A1	B	B1
AM24SS3DGA-BR01	φ10	9.5	24	20
AM24SS3DGB-BR01	φ8	7.5	20.6	15

AM34SS（With Brake）

Model	L
AM34SS3DGA-BR01	117.5
AM34SS5DGA-BR01	147

SS Step Servo

■ Motor Specifications

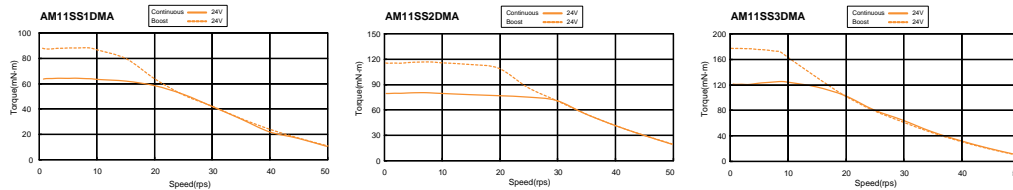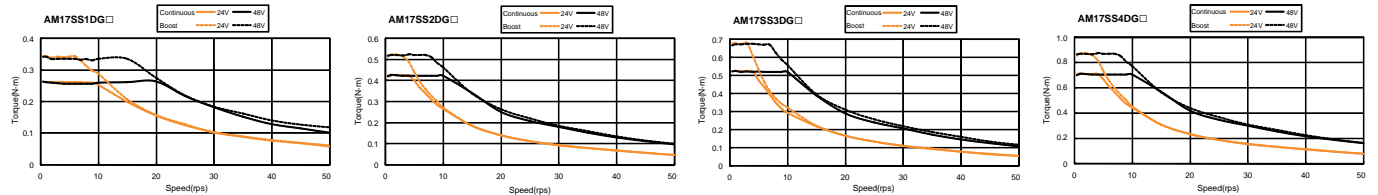| Motor P/N | Drive P/N | Holding Torque | Rotor Inertia | Encoder Resolution | Maximum Speed | Mass | Frame Size | Permissible Overhung Load（N） | | | | | Permissible Thrust Load |
| | | | | | | | | Distance(L) from Shaft End(mm) | | | | | |
		N•m	g•cm²	counts/rev	RPM	g		0	5	10	15	20	
AM11SS1DMA		0.05	9			118							
AM11SS2DMA	SS03-■-◇	0.07	12	4096		168	28mm	20	2 5	34	52	-	
AM11SS3DMA		0.09	18			218							
AM17SS1DG□		0.3	38			390							
AM17SS2DG□	SS03-■-◇or	0.5	57			440							
AM17SS3DG□	SS05-■-◇	0.6	82			520	42mm	35	44	58	85	-	
AM17SS4DG□		0.75	123		3600	760							Less than the motor mass
AM23SS2DG□		0.9	260			850							
AM23SS3DG□	SS05-■-◇	1.5	460	20000		1250	56mm	63	75	95	130	190	
AM23SS4DGA		2.5	365			840							
AM24SS3DG□		2.5	900			1650	60mm	90	100	130	180	270	
AM34SS1DGA		3.5	915			2000							
AM34SS3DGA	SS10-■-◇	6.0	1480			3100	80mm	260	290	340	390	480	
AM34SS5DGA		8.0	2200			4200							
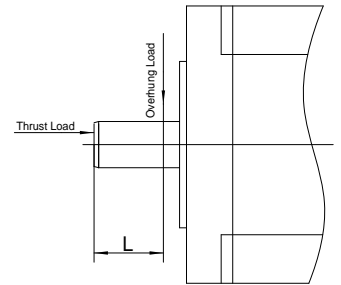
□：A or B, refer to motor part numbering system; ■：R, P, S, Q, or C, refer to driver part numbering system; ◇：A, R or C, refer to driver part numbering system
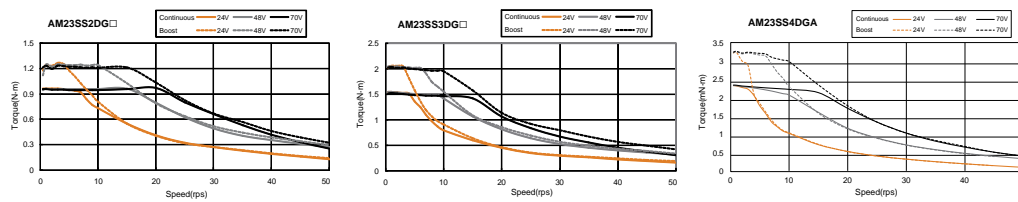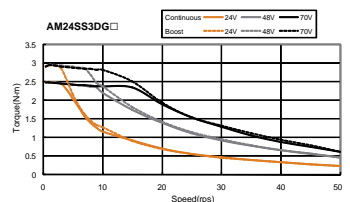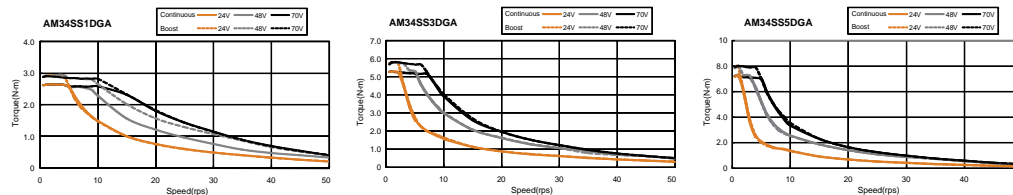
◇ Torque Curves

AM11SS Series

AM17SS Series

AM23SS Series

AM24SS Series

AM34SS Series

Numbering System

```
AM11  SS  1  D  G  A
```

Frame Size — 11,17,23,24,34

Step Servo

Motor Size
1 = 1Stack
2 = 2Stack
3 = 3Stack
4 = 4Stack
5 = 5Stack

D=DC Input

Encoder
G=5000-Line
M=1024-Line

Mechanical Option
A=Output shaft size
11: φ5
17: φ6
23: φ8
24: φ10
34: φ14
B=Output shaft size
17: φ5
23: φ6.35
24: φ8

```
SS  03  -  P  -  A
```

Step Servo

Output Current
03-3A
05-5A
10-10A

R=Switch Setting Type
P=Pulse Input Type
S=Basic Type
Q=Q Type(Modbus/RTU Type)
C=CANopen Type

A=RS-232
R=RS-485
C=CANopen

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
	SS05-R-A	AM23SS2DG □	0.9N·m		SS05-P-A	AM23SS2DG □	0.9N·m
		AM23SS3DG □	1.5N·m			AM23SS3DG □	1.5N·m
	SS10-R-A	AM24SS3DG □	2.5N·m		SS10-P-A	AM24SS3DG □	2.5N·m
		AM34SS1DGA	3.5N·m			AM34SS1DGA	3.5N·m
		AM34SS3DGA	6.0N·m			AM34SS3DGA	6.0N·m
		AM34SS5DGA	8.0N·m			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
	SS05-S-A	AM23SS2DG □	0.9N·m		SS05-S-R	AM23SS2DG □	0.9N·m
		AM23SS3DG □	1.5N·m			AM23SS3DG □	1.5N·m
	SS10-S-A	AM24SS3DG □	2.5N·m		SS10-S-R	AM24SS3DG □	2.5N·m
		AM34SS1DGA	3.5N·m			AM34SS1DGA	3.5N·m
		AM34SS3DGA	6.0N·m			AM34SS3DGA	6.0N·m
		AM34SS5DGA	8.0N·m			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
	SS05-Q-A	AM23SS2DG □	0.9N·m		SS05-Q-R	AM23SS2DG □	0.9N·m
		AM23SS3DG □	1.5N·m			AM23SS3DG □	1.5N·m
	SS10-Q-A	AM24SS3DG □	2.5N·m		SS10-Q-R	AM24SS3DG □	2.5N·m
		AM34SS1DGA	3.5N·m			AM34SS1DGA	3.5N·m
		AM34SS3DGA	6.0N·m			AM34SS3DGA	6.0N·m
		AM34SS5DGA	8.0N·m			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
	SS05-C-C	AM23SS2DG □	0.9N·m
		AM23SS3DG □	1.5N·m
	SS10-C-C	AM24SS3DG □	2.5N·m
		AM34SS1DGA	3.5N·m
		AM34SS3DGA	6.0N·m
		AM34SS5DGA	8.0N·m

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

■ Standard Accessories

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

■ Optional Accessories (Sold separately)

P/N	Catagory	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
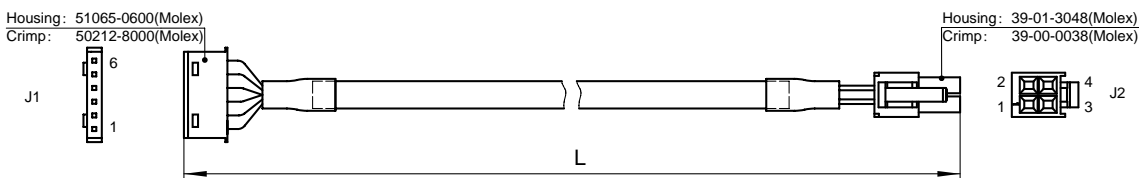
P/N:MF150A24AG-V 150W,24VDC   **P/N:MF320A48AG-V** 320W,48VDC
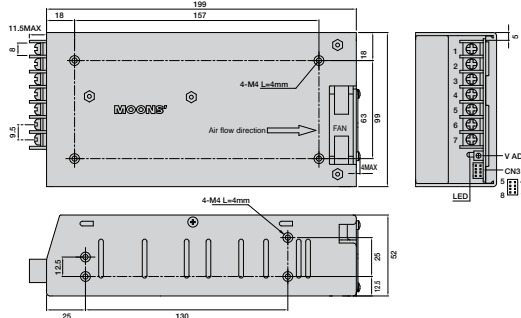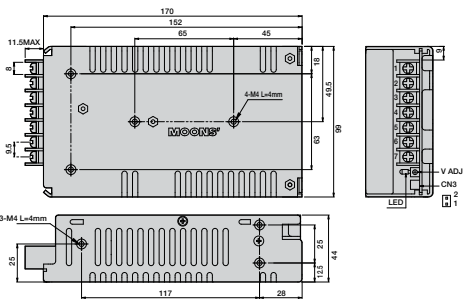
◇ Motor Extension Cable for AM11SS motor

P/N	Length(L)
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 Extension Cable for AM17/23/24/34SS motor

P/N	Length(L)
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 Extension Cable for AM11SS motor
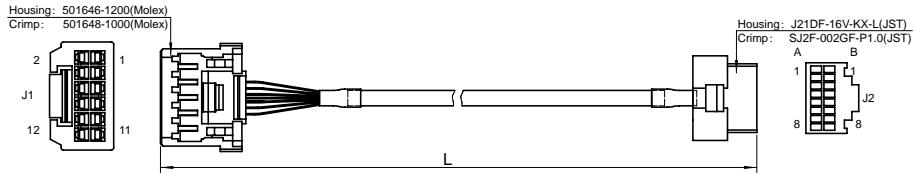
Housing：501646-1200(Molex)
Crimp：501648-1000(Molex)

Housing：J21DF-16V-KX-L(JST)
Crimp：SJ2F-002GF-P1.0(JST)

P/N	Length(L)	Wiring Diagram					
		PIN（J1）	Colour(Signal)	PIN（J2）	PIN（J1）	Colour(Signal)	PIN（J2）
2108-100	1M	10	Blue（A+）	A8		Brown（U+）	A3
2108-300	3M	9	Blue/Black（A-）	B8		Brown/Black（U-）	B3
2108-500	5M	8	Green（B+）	A7		Gray（V+）	A2
2108-1000	10M	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 Extension Cable for AM17/23/24/34SS motor
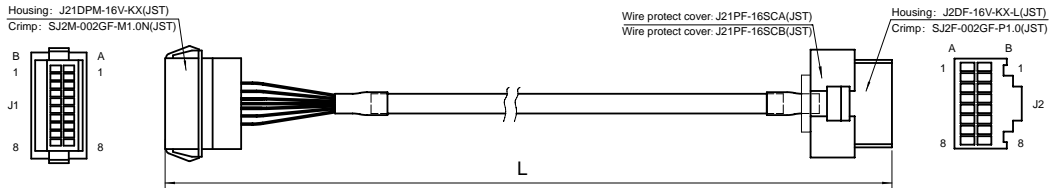
Housing：J21DPM-16V-KX(JST)
Crimp：SJ2M-002GF-M1.0N(JST)

Wire protect cover: J21PF-16SCA(JST)
Wire protect cover: J21PF-16SCB(JST)

Housing：J2DF-16V-KX-L(JST)
Crimp：SJ2F-002GF-P1.0(JST)

P/N	Length(L)	Wiring Diagram					
		PIN（J1）	Colour(Signal)	PIN（J2）	PIN（J1）	Colour(Signal)	PIN（J2）
2104-100	1M	A8	Blue（A+）	A8	A3	Brown（U+）	A3
2104-300	3M	B8	Blue/Black（A-）	B8	B3	Brown/Black（U-）	B3
2104-500	5M	A7	Green（B+）	A7	A2	Gray（V+）	A2
2104-1000	10M	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			

SS-EC *S*tep-*S*ervo

- ■ Intelligent built-in controller
  - ■ Enhanced motor optimized design long life
    - ■ Efficient smooth accurate fast
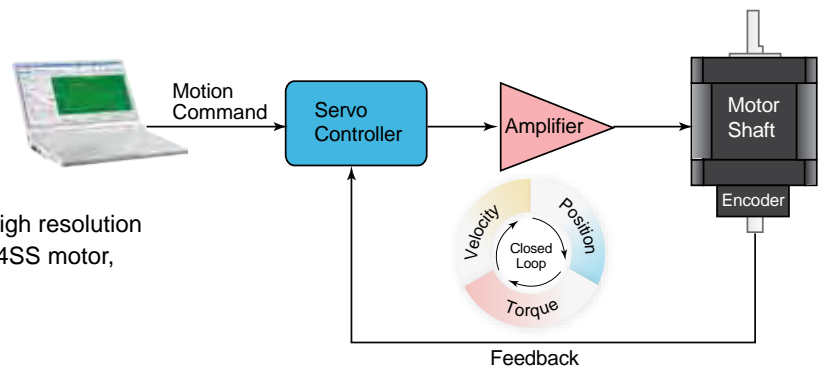   - ■ Low vibration low noise low heat

EtherCAT®

MOONS'
moving in better ways

The SS-EC is a member of Step-Servo family equipped with built-in EtherCAT communication interface. This drive can operate as a standard EtherCAT slave using CANopen over EtherCAT (CoE). This drive can be combined with various associated step servo motors.

- Programmable, digital step-servo drive and motor package
- Operates from a 24 to 70 volt DC power supply
- CANopen over EtherCAT (CoE) with full support of CiA402. Based on the widely used 100BASE-TX cabling system and with a baud rate of 100Mbps full-duplex, EtherCAT enables high speed and high reliable communication
- Dual port EtherCAT communication
- USB port for configuration
- Encoder resolution: 20000 counts/rev for AM17/23/24/34SS motor, 4096 counts/rev for AM11SS motor
- SS03-EC output current: continuous 3A, boost 4.5A
- SS05-EC output current: continuous 5A, boost 7.5A
- SS10-EC output current: continuous 10A, boost 15A
- 8 optically isolated digital inputs, 5-24VDC high level voltage
- 4 optically isolated digital outputs, max 30V/100mA sink or source current
- 2 analog inputs, can be configured to 0-5V, 0-10V, ±5V or ±10V signal ranges.
- Differential encoder signal output (AOUT ±, BOUT ±, ZOUT ±)
  26C31 line driver, 20mA sink or source current
- Auxiliary power supply for keep alive operation
- 4 keys and 5 digital LED display for parameters setting
- STO function (Safe Torque Off)

■ 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 ±1 count using high resolution encoder (20000 counts/rev for AM17/23/24/34SS motor, 4096 counts/rev for AM11SS motor).
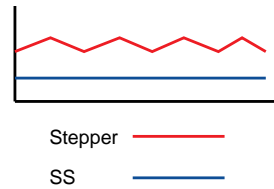

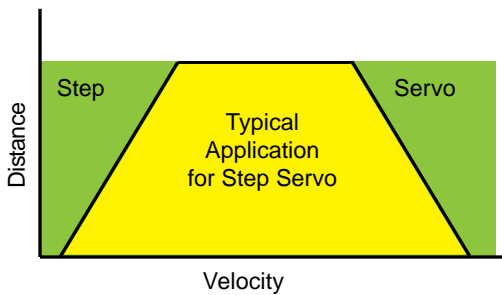## ■ Low Heating/High Efficiency

Stepper   SS

- 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
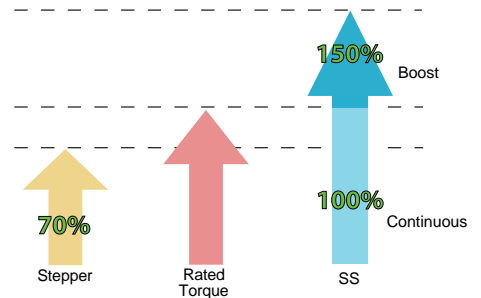 ------Accurate position control both while running and static positioning

Stepper ——

SS ——

±1 Count Error
(20000 counts/rev)

Fast Response

Distance

Step   Servo

Typical
Application
for Step Servo

Velocity

- 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.
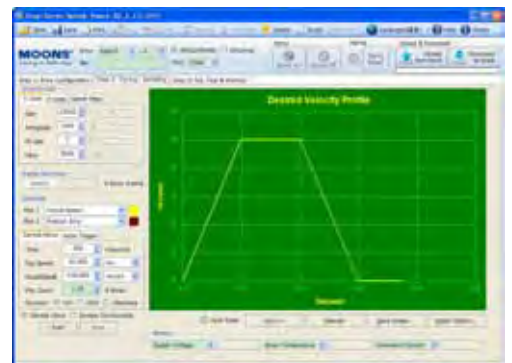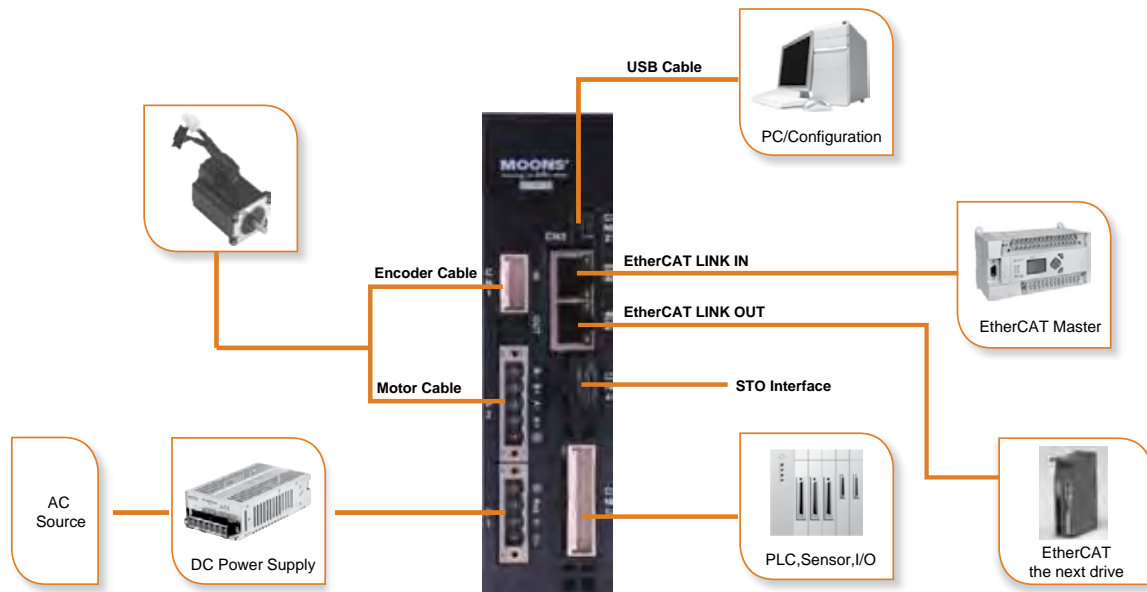
High Torque

- Because the **S**tep-**S**ervo 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.

150%
Boost

70%

100%
Continuous

Stepper   Rated Torque   SS

Motion Monitoring

- For difficult control situations where performing a precise move is necessary, the **S**tep-**S**ervo 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.

■ Specifications

Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 20 KHz
Output Current	SS03 Maximum continuous current 3A, boost current 4.5A (for 1.5s) Drive auto-set the current limitation according to the attached motor
	SS05 Maximum continuous current 5A, boost current 7.5A (for 1.5s) Drive auto-set the current limitation according to the attached motor
	SS10 Maximum continuous current 10A, boost current 15A (for 1.5s) Drive auto-set the current limitation according to the attached motor
Power Supply	External nominal 24 - 70 volt DC power supply required Absolute maximum input voltage range 18 - 75 VDC
Protection	Over-voltage, under-voltage, over-temp, over-current
Controller	
Microstep Resolution	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
Encoder Resolution	20000 counts/rev for AM17/23/24/34SS motor; 4096 counts/rev for AM11SS motor
Speed Range	Speeds up to 3600 rpm
Filters	Programmable hardware digital noise filter, software noise filter, smoothing filter, PID filter, notch filter
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
Digital Inputs	X1, X2, X3, X4: Optical isolated, differential, 5-24VDC, minimum pulse width 250ns, maximum pulse frequency 2MHz X5, X6, X7, X8: Optical isolated, single-ended input, 5 - 24 volts
Digital Output	Y1, Y2, Y3, Y4 Optical isolated, Open Collector, 30 volts, 100 mA max, maximum pulse frequency 10 KHz
Analog Input	AIN1, AIN2 Input resolution 12-bit, software configured as 0-5 volts, 0-10 volts, ±5 volts or ±10 volts (AIN referenced to GND)
+5V Supply Output	+4.8 - 5 volts @ 100mA maximum
Communication	EtherCAT and mini USB
Environment	
Ambient Temperature	0 - 40°C (32 - 104°F) when mounted to a suitable heatsink
Humidity	90% non-condensing

■ Dimensions(Unit:mm)

🖑 Visit www.moonsindustries.com to get the 3D drawings.

◇ Motor

AM11SS
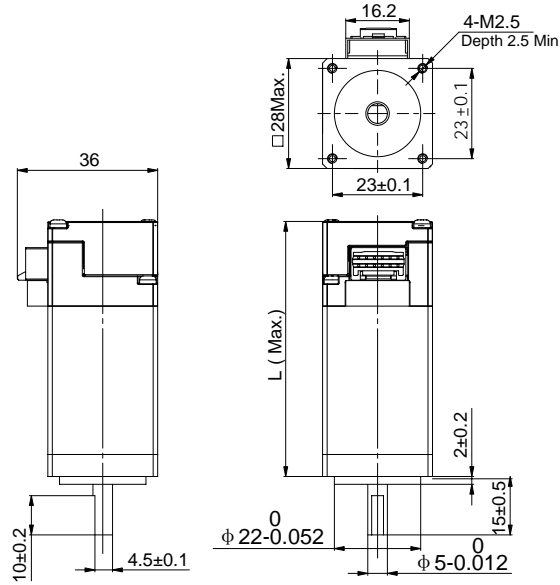
Model	L
AM11SS1DMA	43.8
AM11SS2DMA	52.9
AM11SS3DMA	64.1
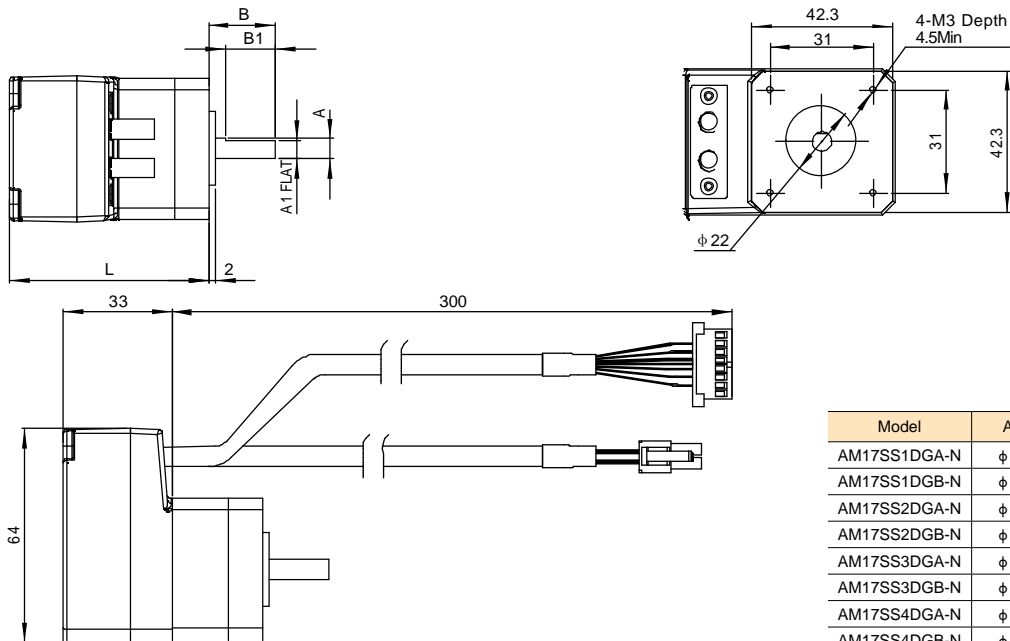
AM17SS

Model	A	A1	B	B1	L
AM17SS1DGA-N	φ6	5.5	20	15	59.5
AM17SS1DGB-N	φ5	4.5	24	15	59.5
AM17SS2DGA-N	φ6	5.5	20	15	65
AM17SS2DGB-N	φ5	4.5	24	15	65
AM17SS3DGA-N	φ6	5.5	20	15	73.5
AM17SS3DGB-N	φ5	4.5	24	15	73.5
AM17SS4DGA-N	φ6	5.5	20	15	89
AM17SS4DGB-N	φ5	4.5	24	15	89

AM23SS
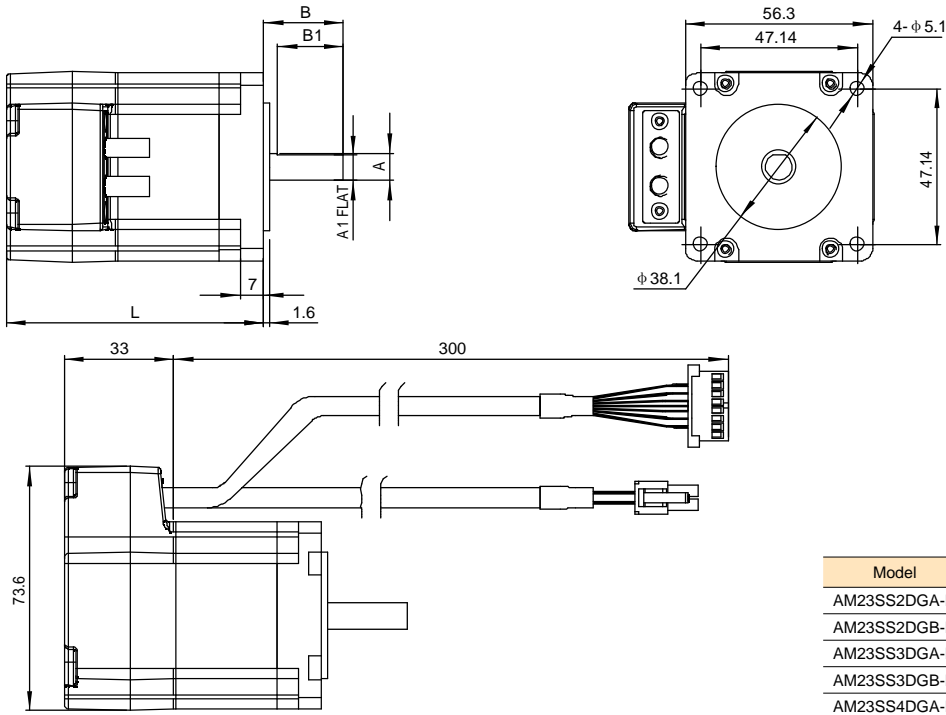
Model	A	A1	B	B1	L
AM23SS2DGA-N	φ8	7.5	24	20	77.5
AM23SS2DGB-N	φ6.35	5.85	20	15	77.5
AM23SS3DGA-N	φ8	7.5	24	20	99.5
AM23SS3DGB-N	φ6.35	5.85	20	15	99.5
AM23SS4DGA-N	φ8	7.5	24	20	102.5

AM24SS
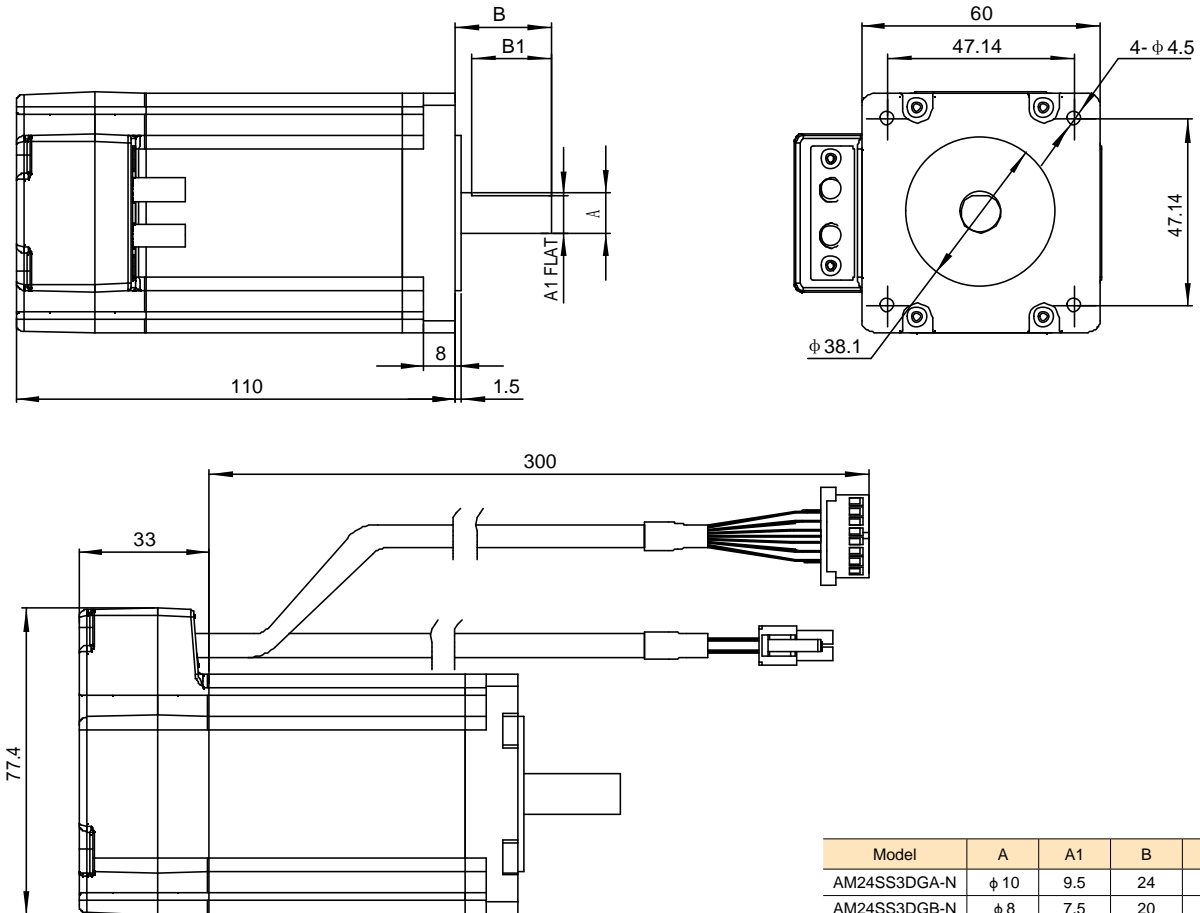
Model	A	A1	B	B1
AM24SS3DGA-N	φ10	9.5	24	20
AM24SS3DGB-N	φ8	7.5	20	15

AM34SS
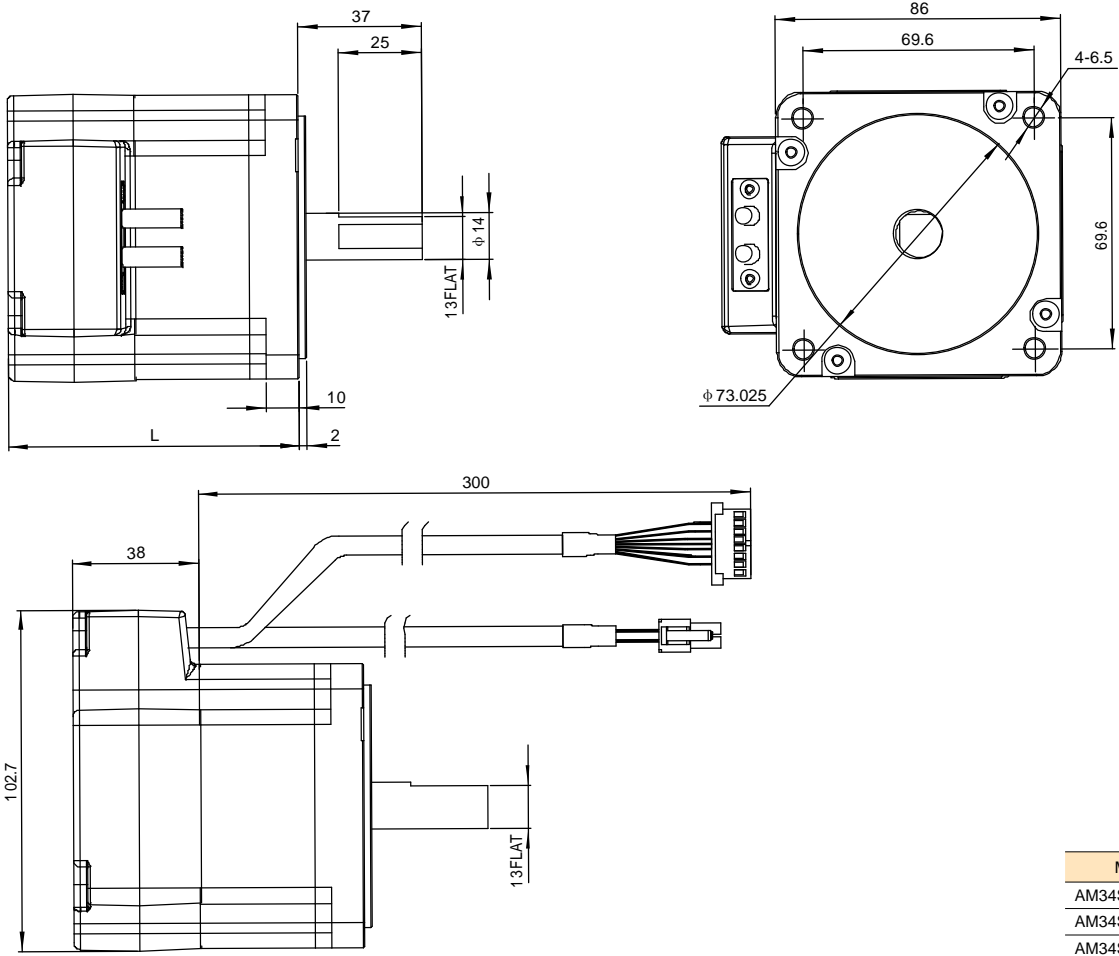
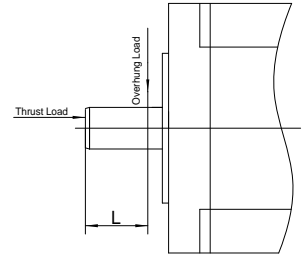| Model	L
AM34SS1DGA-N	88
AM34SS3DGA-N	117.5
AM34SS5DGA-N	147

◇ Drive
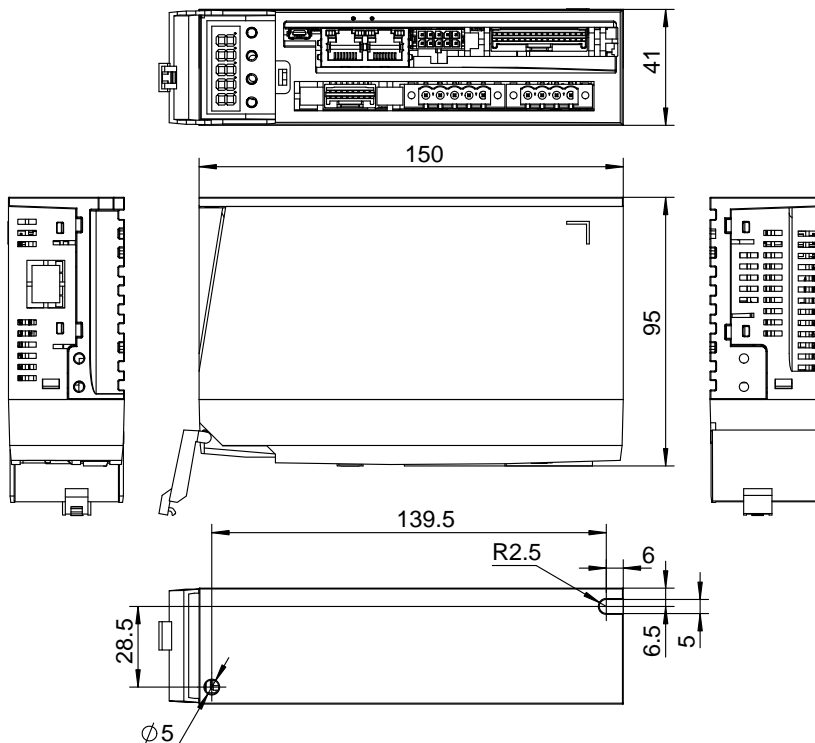
Motor Specifications

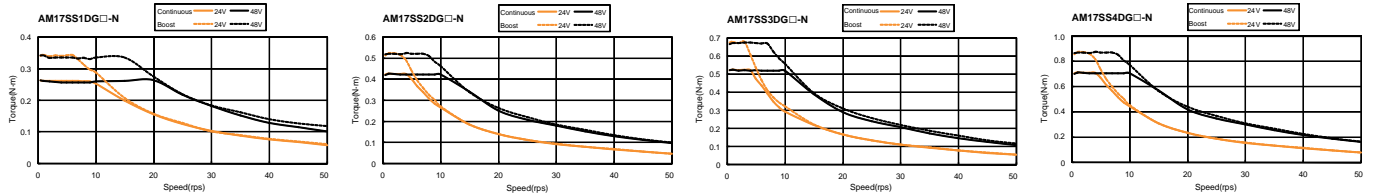| Motor Part Number	Matching Drive	Holding Torque (N·m)	Rotor Inertia (g·cm²)	Encoder Resolution (counts/rev)	Maximum Speed (RPM)	Mass (g)	Frame Size	Permissible Overhung Load(N) Distance(L) from Shaft End(mm)					Permissible Thrust Load
								0	5	10	15	20	
AM11SS1DMA	SS03-EC-D	0.065	9	4096		118	28mm	20	25	34	52	-	Less than the motor mass
AM11SS2DMA		0.08	12			168							
AM11SS3DMA		0.125	18			218							
AM17SS1DG□-N	SS03-EC-D or SS05-EC-D	0.3	38			390	42mm	35	44	58	85	-	
AM17SS2DG□-N		0.5	57			440							
AM17SS3DG□-N		0.6	82			520							
AM17SS4DG□-N		0.75	123			760							
AM23SS2DG□-N	SS05-EC-D	0.9	260		3600	850	56mm	63	75	95	130	190	
AM23SS3DG□-N		1.5	460	20000		1250							
AM23SS4DGA-N		2.5	365			840							
AM24SS3DG□-N		2.5	900			1650	60mm	90	100	130	180	270	
AM34SS1DGA-N	SS10-EC-D	3.5	915			2000	80mm	260	290	340	390	480	
AM34SS3DGA-N		6.0	1480			3100							
AM34SS5DGA-N		8.0	2200			4200							

□：A or B, refer to motor part numbering system

◇ Torque Curves

AM11SS Series

AM11SS1DMA

AM11SS2DMA

AM11SS3DMA

AM17SS Series

AM17SS1DG□-N

AM17SS2DG□-N

AM17SS3DG□-N

AM17SS4DG□-N

AM23SS Series

AM23SS2DG□-N

AM23SS3DG□-N

AM23SS4DGA-N

AM24SS Series

AM24SS3DG□-N

AM34SS Series

AM34SS1DGA-N

AM34SS3DGA-N

AM34SS5DGA-N

SS Step Servo

■ Numbering System

AM17 SS 1 D G A-N

Frame Size
11,17,23,24,34

Step Servo

Motor Size
1 = 1Stack
2 = 2Stack
3 = 3Stack
4 = 4Stack
5 = 5Stack

D=DC Input

Encoder
G=5000-Line
M=1024-Line

Mechanical Option
A=Output shaft size
11: φ5
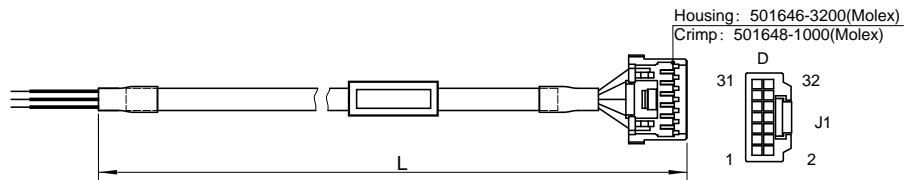17: φ6
23: φ8
24: φ10
34: φ14
B=Output shaft size
17: φ5
23: φ6.35
24: φ8
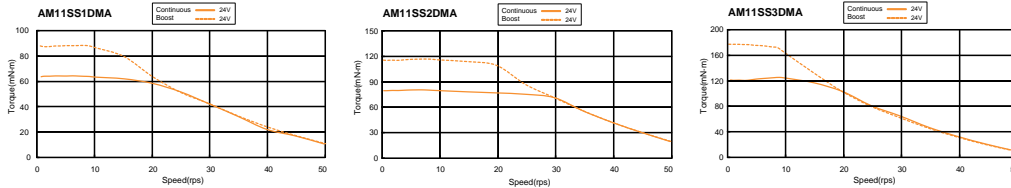
Note: AM17/23/24/34SS motors matching with SS-EC drive have -N suffix
AM11SS motors matching with SS-EC drive DO NOT have -N suffix

SS 05 - EC - D

Step Servo

Output Current
03 - 3A
05 - 5A
10 - 10A

EC=EtherCAT

D=Dual-port Ethernet

SS Step Servo

■ Optional Accessories (Sold separately)

◇ I/O Cable
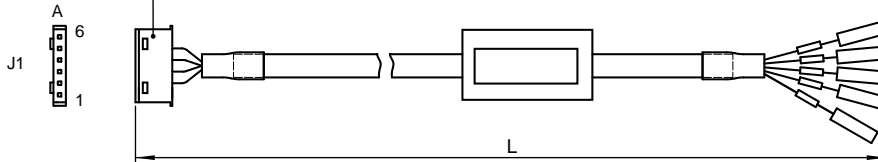
Housing：501646-3200(Molex)
Crimp：501648-1000(Molex)

P/N	Length(L)
1117-200	2M

◇ Motor Extension Cable between SS-EC drive and AM11SS motor

Housing: 51065-0600(Molex)
Crimp: 50212-8000(Molex)

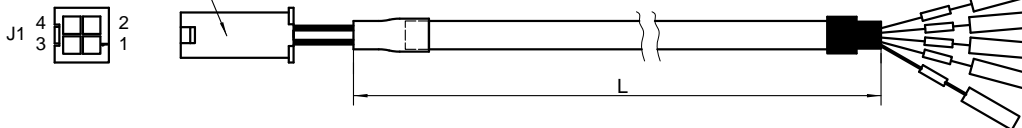| P/N	Length(L)	Wiring Diagram	
1127-100	1M	PIN(J1)	Colour(Signal)
1127-300	3M	1	Blue(B-)
1127-500	5M	3	Red(B+)
1127-1000	10M	4	Green(A-)
		6	Black(A+)

◇ Motor Extension Cable between SS-EC drive and AM17/23/24/34SS-N motor

Housing：39-01-3049(Molex)
Crimp：39-00-0040(Molex)

P/N	Length(L)	Wiring Diagram	
1114-100	1M	PIN(J1)	Colour(Signal)
1114-300	3M	1	Blue(B-)
1114-500	5M	2	Red(B+)
1114-1000	10M	3	Green(A-)
		4	Black(A+)

◇ Encoder Extension Cable between SS-EC drive and AM11SS Motor
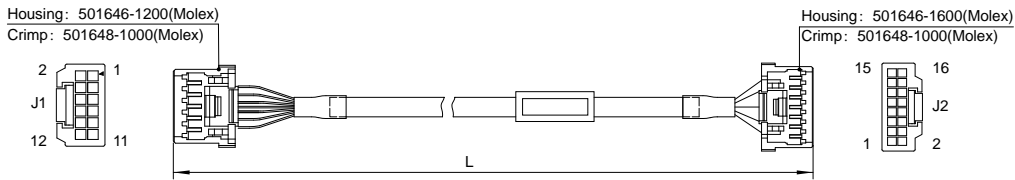
Housing：501646-1200(Molex)
Crimp：501648-1000(Molex)

Housing：501646-1600(Molex)
Crimp：501648-1000(Molex)

P/N	Length(L)	Wiring Diagram					
2118-100	1M	PIN(J1)	Colour(Signal)	PIN(J2)	PIN(J1)	Colour(Signal)	PIN(J2)
2118-300	3M	10	Blue(A+)	1		Brown(U+)	
2118-500	5M	9	Blue/Black(A-)	2		Brown/Black(U-)	
2118-1000	10M	8	Green(B+)	3		Gray(V+)	
		7	Green/Black(B-)	4		Gray/Black(V-)	
		6	Yellow(Z+)	5	1	White(W+)	15
		5	Yellow/Black(Z-)	6	2	White/Black(W-)	16
		3	Red(+5V)	7	12	Shield	10
		4	Black(GND)	8			

◇ Encoder Extension Cable between SS-EC drive and AM17/23/24/34SS-N Motor
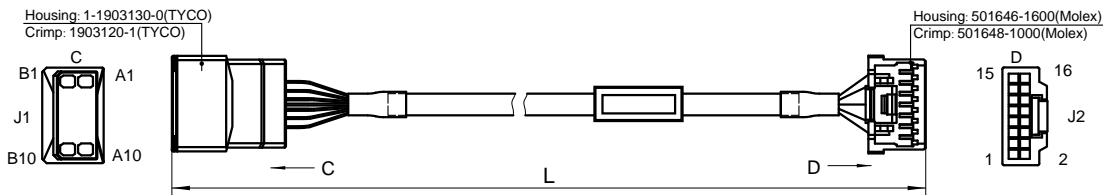
Housing: 1-1903130-0(TYCO)
Crimp: 1903120-1(TYCO)

Housing: 501646-1600(Molex)
Crimp: 501648-1000(Molex)

P/N	Length(L)	Wiring Diagram					
2117-100	1M	PIN(J1)	Colour(Signal)	PIN(J2)	PIN(J1)	Colour(Signal)	PIN(J2)
2117-300	3M	A9	Blue(A+)	1	B5	Shield	10
2117-500	5M	B9	Blue/Black(A-)	2	A4	Brown(U+)	11
2117-1000	10M	A8	Green(B+)	3	B4	Brown/Black(U-)	12
		B8	Green/Black(B-)	4	A3	Gray(V+)	13
		A7	Yellow(Z+)	5	B3	Gray/Black(V-)	14
		B7	Yellow/Black(Z-)	6	A2	White(W+)	15
		A6	Red(+5V)	7	B2	White(W+)	16
		B6	Black(GND)	8			

◇ USB Cable

P/N	Length(L)
2620-150	1.5M
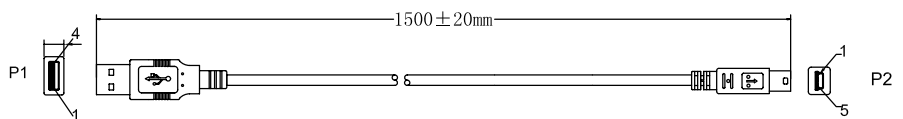
◇ Network Cable

Common Type	Shielded Type	Length(L)
2012-030 *	2013-030	0.3M
2012-300	2013-300	3M
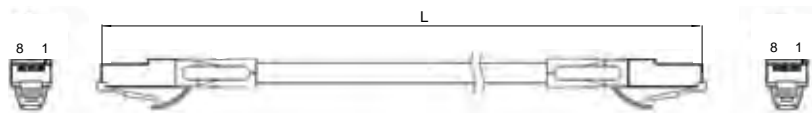
* 2012-030 is included in the drive package.

http://www.moonsindustries.com
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