MOONS'

moving in better ways

Stepper Products

General Catalogue

Integrated Step–Servo Motor
Step–Servo Motor & Driver
Integrated Stepper Motor
Stepper Driver
Stepper Motor

Dawn of MOONS' 3A Era

1st A **Motion Products & Motion Control Products for Manufacturing Automation**

MOONS' is a leading manufacturer of the key parts, components and system level products used in manufacturing automation including: Stepper Motor and Drive, Brushless Motor and Drive, AC Servo Motor and Drive, Integrated solutions. We continue to play a major role in the manufacturing automation field with us moving forward to being a system level provider of total motion control solutions.

2nd A **Intelligent LED Driver & Control Technologies for LED Lighting Management Automation**

3rd A **Online Asset Monitoring, Fault Detection and Diagnosis Solutions for EAM Automation**

MOONS' Business Philosophies

• Customer satisfaction

MOONS' aims to enhance customer satisfaction through the provision development of innovative solutions, manufacture of high quality products, and ontime delivery and outstanding customer support.

• Employee satisfaction

MOONS' values and respects our employees input and encourages them to grow together with the company.
We have been working to develop tools and trainings to build a thriving culture of excellence internally to support the future growth of our employees and the company.

• Partnership

MOONS' strongly believes in a true integrated partnership between all partners in business including customers, distributors and all these in supply chain. As a result of our this philosophy, we endeavor to provide the best value contribution to all partners, which can help our partners improve their competiveness to achieve the win-win situation.

Worldwide service map

moving in better ways

To demostrate our commitment to our community and our customers, **MOONS'** has adopted as our official slogan: "Moving in Better Ways". These words have following meanings to **MOONS':**

- **MOONS'** is an excellent global manufacturer of control motor & control motor drive system
- **MOONS'** is a leading global supplier of intelligent LED lighting control system and drive solutions
- **MOONS'** is a well-recognized reliable provider of system solutions for the intelligent system management in large asset-intensive industrial enterprises

We provide superior motion control systems to our global customers through optimizing of product design, engineering, and manufacturing. This is done by strengthening process and quality control and constantly creating solutions using motion control products that are more energy efficient and environmental friendly.
We provide leading-edge LED lighting drivers, controls and management solutions. Our leading lighting control technology makes the drive professional, convenient to use, and more energy efficient in reducing costs and enhancing profits for global customers.
We provide management system solutions for large asset-intensive industries including power generation, petrochemical, metallurgy, coal and large scale agriculture.

- **We are an ambitious and enterprising company**

MOONS' never stops the on-going accelerated pace to improve processes and increase efficiency. Through scientific management methodologies and tools and incorporating advanced technology with senior management experience, we constantly optimize management processes that enable **MOONS'** to maintain on-going growth in competitive markets.

- **We are a cooperative and thriving group**

All members of our team are able to incorporate the concept of moving in better ways during work, they continually upgrade our collective values, and strive for excellence in the process of doing business to improve expertise and gain better opportunities.

Motion Control Products and Solutions

MOONS' provides a wide range of motion control products and solutions serving the fields of printing, intelligent stage lighting, textile machinery, consumer appliance, banking equipment, factory automation, electronics, semiconductor equipment, packaging machinery, medical equipment and measuring equipment, to name a few.

Entering into the hybrid stepper motor business in 1997, **MOONS'** has grown to where it is now one of the top 5 global manufacturers of stepper motors, and an integrated provider of related motion control products and solutions.

MOONS' has been and is concentrating on technological advancement, product design innovation and improvement for standard and customized motion control products and solutions. Cutting edge technologies, product improvement and scientifically proven management systems permit **MOONS'** to exceed customers' requirements around the world. **MOONS'** supports our growing customer base by providing exceptional quality, application engineering, rapid prototyping, regional warehousing and competitive pricing.

Introduction to Stepper Motors

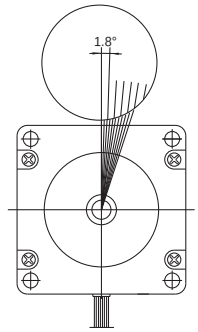
A stepper motor is an electromechanical device which converts electrical pulses into discrete mechanical movements. The shaft of a stepper motor rotates in discrete step increments when electrical command pulses are applied to it in the proper sequence.

Stepper motors are the easiest devices for precise positioning control. They are wildly being used in various application for position and speed via all kinds of control signals such as digital, analog, communication etc.

■ Features

◇ Precise Positioning Control

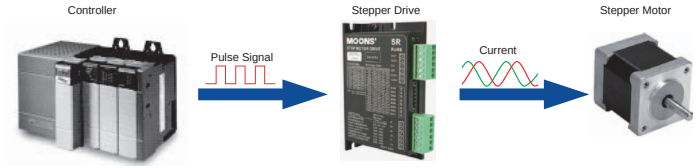
A stepper motor rotates with a fixed step angle, just like the second hand of a clock. This angle is called "basic step angle." MOONS' offers several types of "basic step angle" as standard motors: 2-phase stepping motors with a basic step angle of 0.9° and 1.8° and 3-phase stepping motors with a basic step angle of 1.2°.
Besides the standard motor, MOONS' also has stepper motors avalible with other "basic step angle." They are 0.72°, 1.5°, 3.6° and 3.75°, these motors are not listed in this catalogue, please contact MOONS' for details.



2 phase stepper motor

◇ Easy Control with Pulse Signals

A system configuration for high accuracy positioning is shown below. The rotation angle and speed of the stepping motor can be controlled accurately using pulse signals from the controller.

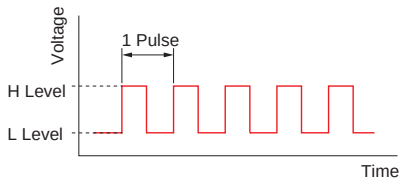


▪ What is a Pulse Signal?

A pulse signal is an electrical signal whose voltage level changes repeatedly between ON and OFF.

Each ON/OFF cycle is counted as one pulse. A command with one pulse causes the motor output shaft to turn by one step.

The signal levels corresponding to voltage ON and OFF conditions are referred to as "H" and "L," respectively.



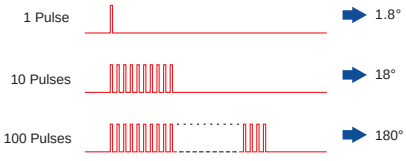
▪ The length of Rotation is Proportional to the Number of Pulses

The length of rotation of the stepping motor is proportional to the number of pulse signal (pulse number) given to the driver.

The relationship of the stepper motor's rotation (rotation angle of the motor output shaft) and pulse number is expressed as follows:

$\theta = \theta s \times A$

θ: Rotation angle of the motor output shaft [deg]
θs : Step angle [deg/step]
A : Pulse number [pulses]



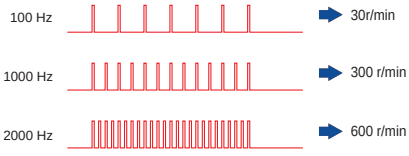
▪ The Speed is Proportional to the Pulse Frequency

The speed of the stepper motor is proportional to the frequency of pulse signals given to the driver.

The relationship of the pulse frequency [Hz] and motor speed [r/min] is expressed as follows:

$N = \frac{\theta s}{360} \times f \times 60$

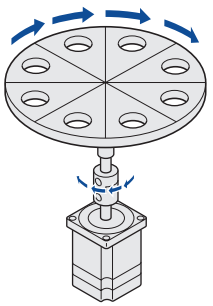
N : Speed of the motor output shaft [r/min]
θs : Step angle [deg/step]
f : Pulse frequency [Hz]
(Number of pulses input per second)



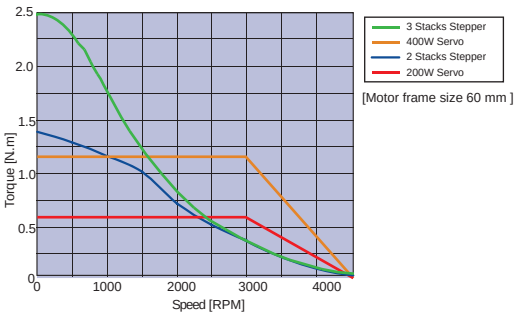
◇ Generating High Torque with a Compact Size

Stepper motors generate high torque with a compact size.
These features give them excellent acceleration and response, which in turn makes these motors well-suited for torque-demanding applications where the motor must be started and stopped frequently.
To meet the need for greater torque at low speed, MOONS' also has geared motors option.

- Frequent Starting/Stopping is Possible

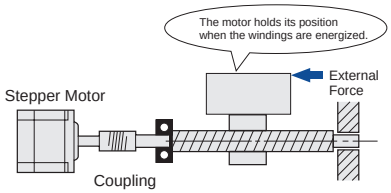


- Speed VS Torque Characteristics comparetion between servo and stepper with same motor size.



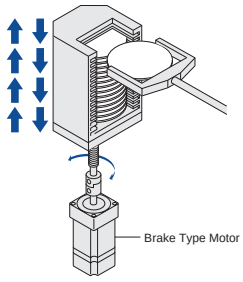
◇ The Motor Holds Itself at a Stopped Position

Stepper motor has full torque at stand-still as long as the windings are energized. This means that the motor can be held at a stopped position without using a mechanical brake.



◇ Motor with Electromagnetic Brake

Once the power is cut off, the self-holding torque of the motor is lost and the motor can no longer be held at the stopped position in vertical operations or when an external force is applied. In lift and similar applications, an electromagnetic brake type motor is required.

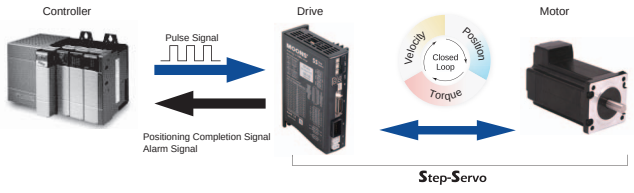


◇ Closed Loop Servo Control Stepper Motors

Step-Servo

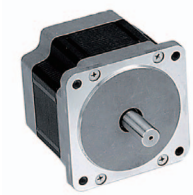
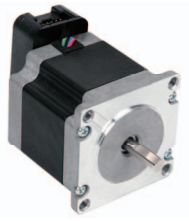
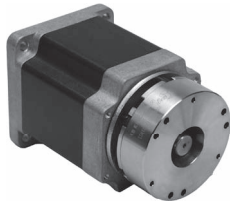
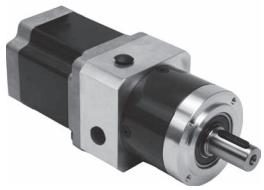
The **Step-Servo** is an innovative revolution for the world of stepping motor, it enhances the stepping motor with servo technology to create a product with exceptional feature and broad capability.

The **Step-Servo** greatly improves the performance to be much more Intelligent, Efficient, Compact, Accurate, Fast and Smooth.



■ Stepper Motor Category

Stepper motors come in different types including the basic type, encoder type, IP65 type, Integrated type with drive and controller, brake type and geared type. The availability of all options can also be combined together as the most optimize and compact motion control unit, for example, MOONS' can offer encoder and geared type, IP65 integrated with drive, controller and encoder, all combinations are avalible per request.

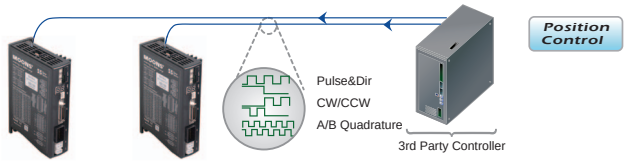
◇ Basic Type A basic model that is easy to use and designed with a balanced set of functions and characteristics.	
◇ Encoder Type Encoder type stepper gives the possiblity for closed loop control, encoder feedback signals can be used for position verification and enhanced performance as stall detection and stall prevension depending on the features of the drive.	
◇ IP65 Type IP65 type stepper motors with the feature of dust proof and resistant to low pressure water jets, are ideal for applications in wet factory environments such as the food and beverage industry or outdoor use. IP65 specifies a product that is dust tight (no ingress of dust; complete protection against contact) and protected against water jets (water projected by a nozzle from any direction shall have no harmful effects).	
◇ Integrated Type with Drive and Controller Integrated stepper motors offer a space-saving design that reduces wiring and saves on cost over separate motor and drive components. For controller type, you only need cable connection for Power and necessory communication or sensor depending on application, it also cost for host controller and make it easy for you to setup sofiscated motion control system.	
◇ Brake Type These motors incorporate a non-excitation type electromagnetic brake. When the power is accidentally cut off due to power outage or other unexpected event, the electromagnetic brake holds the load in position to prevent it from dropping or moving. Brake type steppers are wildly used in vertical axis application.	
◇ Geared Type These motors incorporate a dedicated position-control gearhead with reduced backlash to make the most of the high controllability of the motors. The gearhead ensures highly accurate, smooth operation even in applications where a large torque is received.	

■ Control Modes for Drives

With MOONS' advanced stepper drive technology, each stepper motor can be operated under various control modes as position control, velocity control or torque control. MOONS' stepper drive accepts all types of control signals including digial, analog and Industrial network communications. Built-in controller Q drive supports stand alone operation for single axis motion by stored sofiscated program execution.

◇ Pulse Control

Pulse control is a traditional way to command a stepper motor in position and velocity control.
The length of rotation is proportional to the number of pulses as well as the speed is proportional to the pulse frequency.



Pulse Control

Three most popular pulse control digital signal types are Pulse & Direction, CW/CCW Pulse and A/B Quadrature.

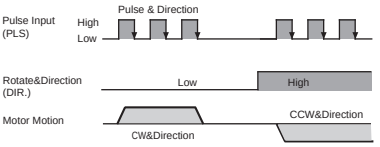
- Pulse & Direction

When the Pulse input is turned ON while the DIR input is ON, the motor will rotate by one step in one direction.

When the Pulse input is turned ON while the DIR input is OFF, the motor will rotate by one step the other direction.

*Direction definition of DIR input can be configured via MOONS' software.

The chart below shows motor configured as while the DIR input is ON, the motor will rotate by CW direction.

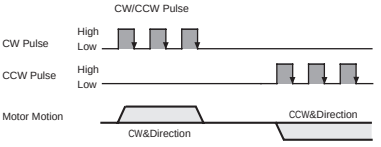


- CW/CCW Pulse

When the X1 input is turned ON, the motor will rotate by one step in One direction. When the X2 input is turned ON, the motor will rotate by one step in the other direction.

*Direction definition can be configured via MOONS' software.

The chart below shows motor configured as while the X1 input is ON, the motor will rotate by one step in CW direction.

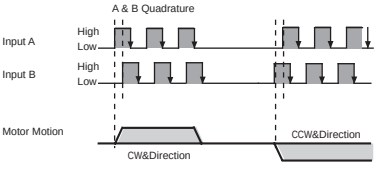


- A & B Quadrature

The motor will move according to signals that are fed to the drive from a two channel increamental master encoder.

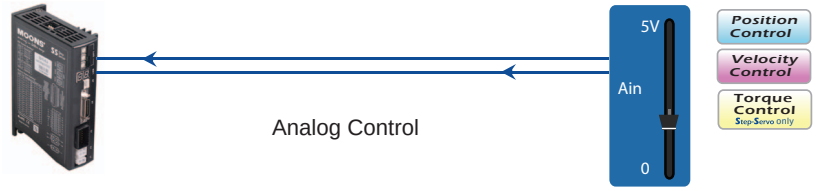
Direction definition can be configured via MOONS' software. Direction is determined via which channel leads the other.

The chart below shows motor configured as while X1 Leads X2, the motor will rotate by CW direction.



◇ Analog Control

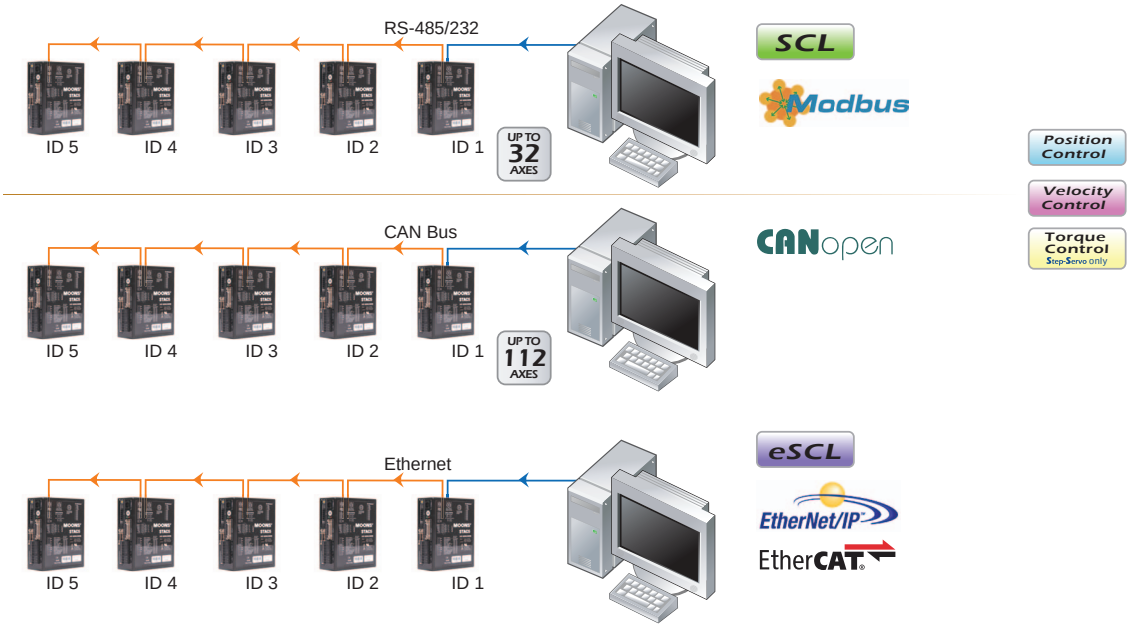
MOONS' stepper drive has the ability to accept analog signal for position and analog control, **Step-Servo** can also use analog signal for torque control.



Analog Control

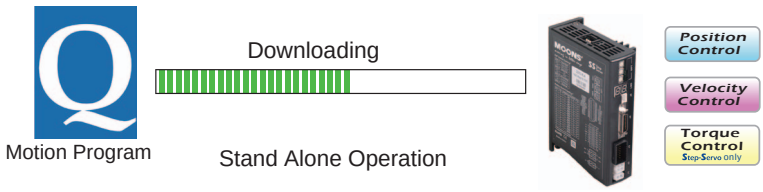
◇ Field Bus Control

MOONS' stepper drive supports all popular Industrial network communications including RS-485, Modbus, CAN , Ethernet and EtherCAT.



◇ Stand Alone Operation

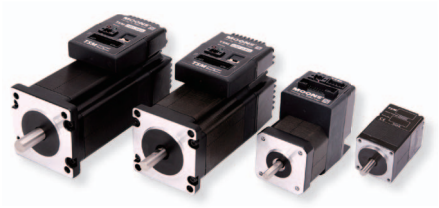
MOONS' Built-in controller Q drive supports stand alone operation for single axis motion by stored sofiscated program execution. It has the ability to run up to 744 lines of stored Q program in non-volatile memory. Q programs are created using the Q Programmer software, which provides multi-tasking, math calculations using analog and digital parameters, conditional processing, data register manipulation, and more features in a robust yet simple text-based programming language.



■ Overview of MOONS' Stepper Products

◇ Closed Loop Step-Servo

TSM Series - Integrated Step-Servo



Frame Size: 28mm, 42mm, 56mm, 60mm, 86mm
Input Voltage(Typical): TSM11:24VDC TSM17:12-48VDC
TSM23/24:12-70VDC TSM34: 24-70VDC
Encoder: Incremental 20000 counts/rev
(only TSM11 encoder 4096 counts/rev)

Position Control
Velocity Control
Torque Control

Enhanced Intelligence:
- Automatic load inertia detection
- Extended homing and software limit

Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control, Daisy Chain
- Stand alone operation

Inputs and Outputs:
- P Type- 4 Digital Inputs, 3 Digital Outputs, Encoder Outputs
- S/Q/C/IP Type- 8 Digital Inputs, 4 Digital Outputs, 1 Analog Input

Communication:
SCL CANopen Modbus eSCL EtherNet/IP

CE RoHS Compliant

SSM Series - Integrated Step-Servo

Frame Size: 42mm, 56mm, 60mm
Input Voltage(Typical): SSM17: 12-48VDC SSM23/24: 12-70VDC
Encoder: Incremental 20000 counts/rev
Easy Wiring with Spring Connectors

Position Control
Velocity Control
Torque Control

Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control
- Stand alone operation

Inputs and Outputs:
- S/Q Type- 3 Digital Inputs, 1 Digital Output, 1 Analog Input
- C Type- 3 Digital Inputs, 1 Digital Output

Communication:
SCL CANopen eSCL EtherNet/IP Modbus

CE RoHS Compliant

TXM Series - IP65 Type Integrated Step-Servo

Frame Size: 60mm, 86mm
Input Voltage(Typical): TXM24: 12-70VDC TXM34: 24-70VDC
Encoder: Incremental 20000 counts/rev

Position Control
Velocity Control
Torque Control

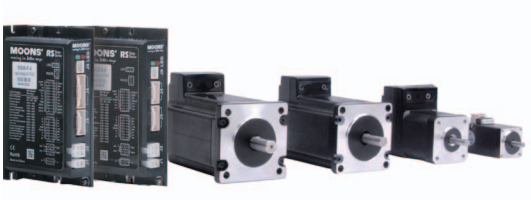
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control(Daisy Chain for RS-485 and CANopen)
- Stand alone operation

Inputs and Outputs:
- S/Q/IP Type- 3 Digital Inputs, 1 Digital Output, 1 Analog Input
- C Type- 5 Digital Inputs, 3 Digital Outputs

Communication:
SCL CANopen eSCL EtherNet/IP Modbus

CE RoHS Compliant

RS Series - Step-Servo Motor & Drive Package



Motor Frame Size: 28mm, 42mm, 56mm, 60mm, 86mm
Input Voltage(Typical): 24-70VDC
Encoder: Magnetic 4096 counts/rev
Enhanced Intelligence:
- Automatic load inertia detection and switch set stiffness
- Extended homing and software limit

Position Control
Velocity Control
Torque Control

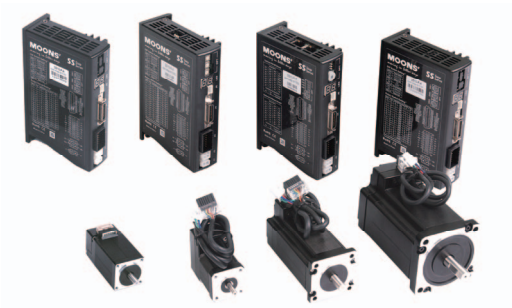
Control Modes:
- Pulse Control
- SCL Command Control
- Stand alone operation

Inputs and Outputs:
- P Type- 4 Digital Inputs, 3 Digital Outputs, Encoder Outputs
- S/Q Type- 4 Digital Inputs, 3 Digital Outputs

Communication:
SCL Modbus

CE RoHS Compliant

SS Series - Step-Servo Motor & Drive Package



Motor Frame Size: 28mm, 42mm, 56mm, 60mm, 86mm
Input Voltage(Typical): 24-70VDC
Encoder: Incremental 20000 counts/rev
(only AM11SS motor encoder 4096 counts/rev)

Position Control
Velocity Control
Torque Control

Enhanced Intelligence:
- Automatic load inertia detection and switch set stiffness
- Extended homing and software limit

Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control(Daisy Chain for RS-485, CANopen and EtherCAT)
- Stand alone operation

Inputs and Outputs:
- P/R Type- 6 Digital Inputs, 2 Digital Outputs, Encoder Outputs
- S/Q/C/EC Type- 8 Digital Inputs, 4 Digital Outputs, 2 Analog Inputs

Communication:
SCL CANopen Modbus EtherCAT

CE RoHS Compliant

◇ Integrated Stepper Motor

STM-R Series - Pluse Input Type Integrated Stepper Motor

Frame Size: 42mm, 56mm
Input Voltage(Typical): STM17R: 12-48VDC STM23R: 12-70VDC
Encoder Option: Incremental 4000 counts/rev
Microstep Resolution: Switch set, up to 25600 steps/rev
Control Modes:
- Pulse Control

Position Control

Inputs and Output:
- 3 Digital Inputs, 1 Digital Output

CE RoHS Compliant

STM Series - Controller Type Integrated Stepper Motor

Frame Size: 28mm, 42mm, 56mm, 60mm
Input Voltage(Typical):
- STM11 - 24VDC
- STM17 - 12-48VDC
- STM23/24 - 12-70VDC

Position Control
Velocity Control

Encoder Option: Incremental 4000 counts/rev
- Stall Detection
- Stall Prevension

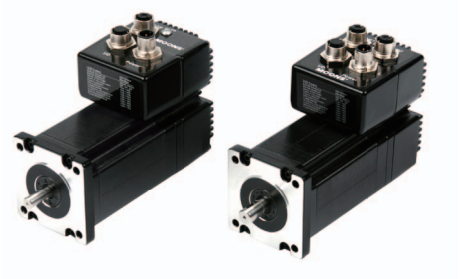
Microstep Resolution: Software set, up to 51200 steps/rev
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control
- Stand alone operation

Inputs and Outputs:
- STM11 4 digital Inputs, 2 Outputs
- SF/QF Type- 4 Configurable digital Inputs/Outputs, 1 Analog Input
- S/Q/IP Type- 3 Digital Inputs，1Digital Output，1 Analog Input
- C Type- 3 Digital Inputs, 1 Digital Output

Communication:
SCL CANopen eSCL EtherNet/IP Modbus

CE RoHS Compliant

SWM Series - IP65 Type Integrated Stepper Motor



Frame Size: 60mm
Input Voltage(Typical): 12-70VDC
Encoder Option: Incremental 4000 counts/rev
- Stall Detection
- Stall Prevension

Position Control
Velocity Control

Microstep Resolution: Software set, up to 51200 steps/rev
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control(Daisy Chain for RS-485 and CANopen)
- Stand alone operation

Inputs and Outputs:
- SF/QF Type- 4 Configurable digital Inputs/Outputs, 1 Analog Input
- S/Q/IP Type- 3 Digital Inputs, 1 Digital Output, 1 Analog Input

Communication:
SCL eSCL EtherNet/IP Modbus

CE RoHS Compliant

◇ Two Phase Stepper Drive

SRAC Series - AC Input Stepper Drive

Position Control

Input Voltage(Typical): AC120V/240V
Drive Output Current: Up to 8Amp(Peak of Sine)
Microstep Resolution: Switch set, up to 25600 steps/rev
Control Modes:
- Pulse Control

Inputs and Outputs:
- 3 Digital Inputs, 1 Digital Output

Supported Motor Frame Size: 56mm, 60mm, 86mm

CE RoHS Compliant

STAC Series - AC Input Controller Type Stepper Drive

Position Control
Velocity Control

Input Voltage(Typical): AC120V/240V
Drive Output Current: Up to 2.5Amp(Peak of Sine)
Encoder Option: Incremental
- Stall Detection
- Stall Prevension

Microstep Resolution: Software set, up to 51200 steps/rev
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control
- Stand alone operation

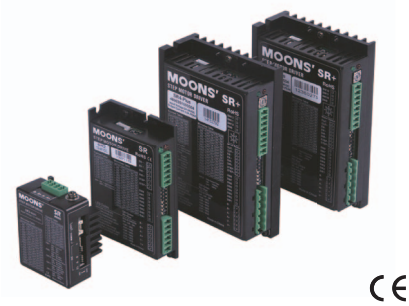
Inputs and Outputs:
- S/Q/C Type- 4 Digital Inputs, 2 Digital Outputs, 1 Analog Input
- Q-A/IP Type- 12 Digital Inputs, 6 Digital Outputs, 1 Analog Input

Communication:
SCL CANopen eSCL EtherNet/IP Modbus

Supported Motor Frame Size: 56mm, 60mm, 86mm

CE RoHS Compliant UL

SR Series - DC Input Stepper Drive



Position Control

Input Voltage(Typical):
- SR2/SR2-Plus/SR3-mini: 12- 48VDC
- SR4/SR4-Plus: 24-48VDC
- SR8/SR8-Plus: 24-80VDC

Drive Output Current: Up to 7.8Amp(Peak of Sine)
Microstep Resolution: Switch set, up to 51200 steps/rev
Control Modes:
- Pulse Control

Inputs and Outputs:
- 3 Digital Inputs, 1 Digital Output

Supported Motor Frame Size:
- 20mm, 28mm, 35mm, 42mm, 56mm, 60mm, 86mm

CE RoHS Compliant

STF Series - Intelligent field bus control Stepper Drive

Position Control
Velocity Control

Input Voltage(Typical): DC12V/24V/48V
Drive Output Current: Up to 10Amp(Peak of Sine)
Microstep Resolution: Software set, up to 51200 steps/rev
Control Modes:
- Field Bus Control
- Stand alone operation

Inputs and Outputs:
- 8 Digital Inputs, 4 Digital Outputs

Communication:
EtherCAT EtherNet/IP CANopen Modbus

Supported Motor Frame Size:
- 20mm, 28mm, 35mm, 42mm, 56mm, 60mm, 86mm

CE RoHS Compliant

ST Series - DC Input Controller Type Stepper Drive

Position Control

Velocity Control

Input Voltage(Typical): DC24V/48V

Drive Output Current: Up to 10Amp(Peak of Sine)

Encoder Option: Incremental

- Stall Detection
- Stall Prevension

Microstep Resolution: Software set, up to 51200 steps/rev

Control Modes:

- Pulse Control
- Analog Control
- Field Bus Control
- Stand alone operation

Inputs and Outputs:

- S type- 3 Digital Inputs, 1 Digital Output, 1 Analog Input
- Q/C/IP- 8 Digital Inputs, 4 Digital Outputs, 2 Analog Inputs

Communication:

SCL CANopen eSCL EtherNet/IP Modbus

Supported Motor Frame Size:

- 28mm, 35mm, 42mm, 56mm, 60mm, 86mm

◇ Three Phase Stepper Drive

AC Input Stepper Drive and DC Input Stepper Drive

Drive Input Voltage(Typical):

- AC 120V/240V
- DC 24V/48V

Control Modes:

- Pulse Control
- Analog Control
- Stand alone operation

Inputs and Outputs:

- 3 Digital Inputs, 1 Digital Output

Supported Motor Frame Size: 60mm, 86mm

◇ Stepper Motor

Standard Motors

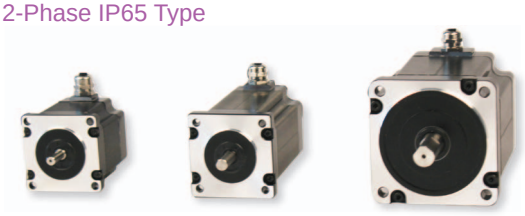
2-Phase Basic Type

20mm 28mm 35mm 42mm 56mm 60mm 86mm 110mm

2-Phase PowerPlus Series Type

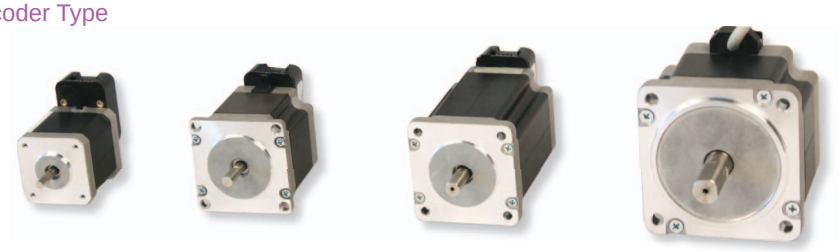
56mm

2-Phase IP65 Type



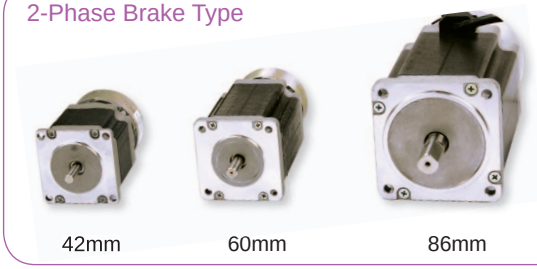
56mm 60mm 86mm

2-Phase Encoder Type



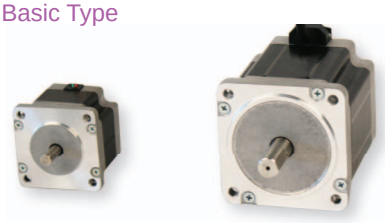
42mm 56mm 60mm 86mm

2-Phase Brake Type



42mm 60mm 86mm

3-Phase Basic Type



60mm 86mm

Planetary Reducer Motors Type

20mm 28mm 42mm 57mm(60) 86mm

Stepper General Catalogue

Step-Servo	Efficient Integrated TSM Series ·····25	Step-Servo: Efficient Integrated TSM
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Accessories	Power Supplies·····302	Accessories: Power Supplies
	Cables·····303	Accessories: Cables
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Step-Servo

Integrated **TSM**

Integrated **SSM**

IP65 Integrated **TXM**

Motor & Drive **RS**

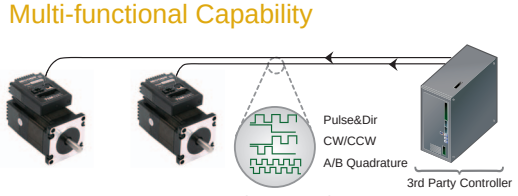
Motor & Drive **SS**

Closed Loop Step-Servo

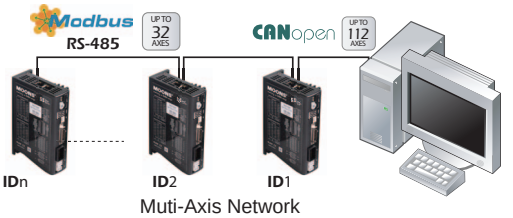
The **Step-Servo** is an innovative revolution for the world of stepper motor, it enhances the stepper motors with servo technology to create a product with exceptional feature and broad capability.

Features

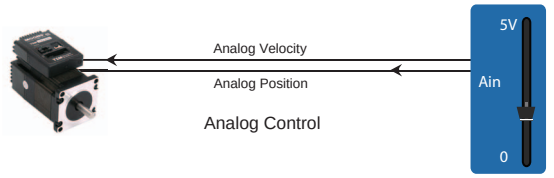
Multi-functional Capability



Pulse Control



Muti-Axis Network



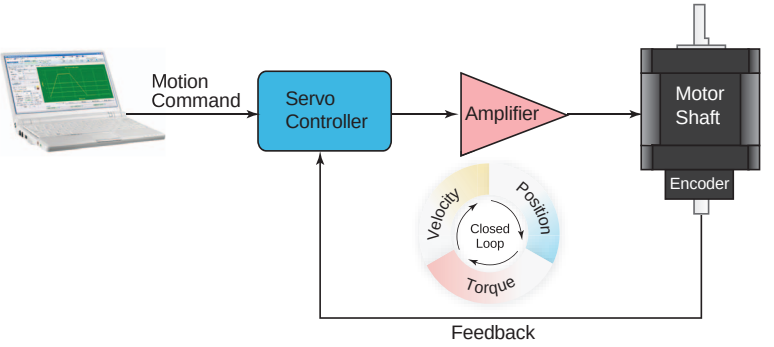
Analog Control

Motion Program

Stand Alone Operation

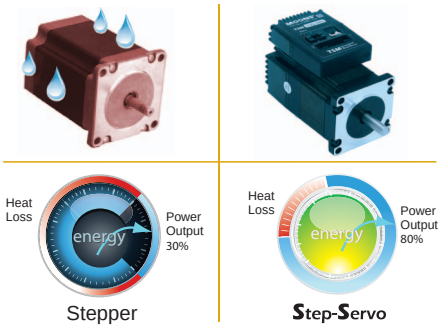
Closed Loop

- 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 (0.018°) 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.



Stepper

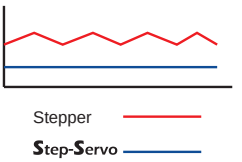
Step-Servo

Smooth & Accurate

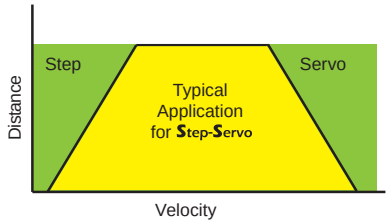
- Space vector current control with 5000 line high resolution encoder, gives smooth and quiet operation, especially at low speeds.

  ------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



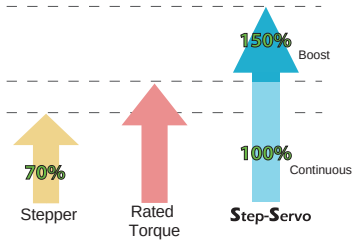
Fast Response



- 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.

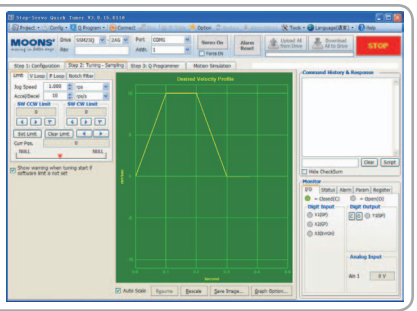
High Torque

- 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.

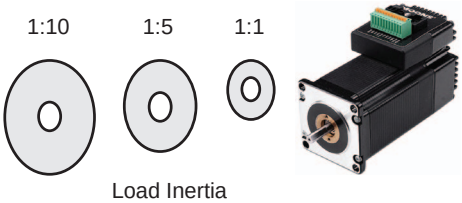


Motion Monitoring

- 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 Tunning



- 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.

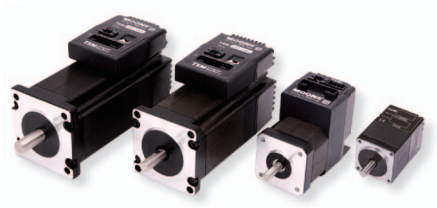
PC Based Software

MOONS' **Step-Servo** products support following software application make it easy to configure, tuning, testing and evaluation.

- **Step-Servo** Quick Tuner
- Q Programmer
- RS-485 Bus Utility
- CANopen Test Tool

■ Overview of Closed Loop Step-Servo

TSM Series - Integrated Step-Servo



Frame Size: 28mm, 42mm, 56mm, 60mm, 86mm
Input Voltage(Typical): TSM11:24VDC TSM17:12-48VDC
TSM23/24:12-70VDC TSM34: 24-70VDC
Encoder: Incremental 20000 counts/rev
(only TSM11 encoder 4096 counts/rev)

Enhanced Intelligence:
- Automatic load inertia detection
- Extended homing and software limit

Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control, Daisy Chain
- Stand alone operation

Position Control
Velocity Control
Torque Control

Inputs and Outputs:
- P Type- 4 Digital Inputs, 3 Digital Outputs, Encoder Outputs
- S/Q/C/IP Type- 8 Digital Inputs, 4 Digital Outputs, 1 Analog Input

Communication:
SCL CANopen Modbus eSCL EtherNet/IP

CE RoHS Compliant

SSM Series - Integrated Step-Servo

Frame Size: 42mm, 56mm, 60mm
Input Voltage(Typical): SSM17: 12-48VDC SSM23/24: 12-70VDC
Encoder: Incremental 20000 counts/rev
Easy Wiring with Spring Connectors
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control
- Stand alone operation

Position Control
Velocity Control
Torque Control

Inputs and Outputs:
- S/Q Type- 3 Digital Inputs, 1 Digital Output, 1 Analog Input
- C Type- 3 Digital Inputs, 1 Digital Output

Communication:
SCL CANopen eSCL EtherNet/IP Modbus

CE RoHS Compliant

TXM Series - IP65 Type Integrated Step-Servo

Frame Size: 60mm, 86mm
Input Voltage(Typical): TXM24: 12-70VDC TXM34: 24-70VDC
Encoder: Incremental 20000 counts/rev
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control(Daisy Chain for RS-485 and CANopen)
- Stand alone operation

Position Control
Velocity Control
Torque Control

Inputs and Outputs:
- S/Q/IP Type- 3 Digital Inputs, 1 Digital Output, 1 Analog Input
- C Type- 5 Digital Inputs, 3 Digital Outputs

Communication:
SCL CANopen eSCL EtherNet/IP Modbus

CE RoHS Compliant

RS Series - Step-Servo Motor & Drive Package

Motor Frame Size: 28mm, 42mm, 56mm, 60mm, 86mm
Input Voltage(Typical): 24-70VDC
Encoder: Magnetic 4096 counts/rev
Enhanced Intelligence:
- Automatic load inertia detection and switch set stiffness
- Extended homing and software limit

Control Modes:
- Pulse Control
- SCL Command Control
- Stand alone operation

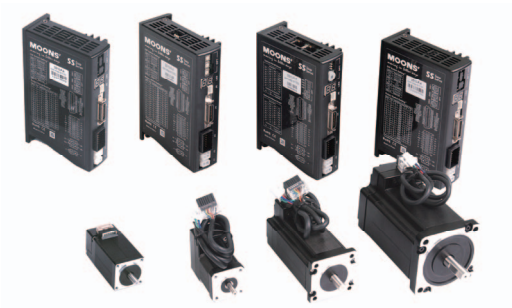
Position Control
Velocity Control
Torque Control

Inputs and Outputs:
- P Type- 4 Digital Inputs, 3 Digital Outputs, Encoder Outputs
- S/Q Type- 4 Digital Inputs, 3 Digital Outputs

Communication:
SCL Modbus

CE RoHS Compliant

SS Series - Step-Servo Motor & Drive Package



Motor Frame Size: 28mm, 42mm, 56mm, 60mm, 86mm
Input Voltage(Typical): 24-70VDC
Encoder: Incremental 20000 counts/rev
(only AM11SS motor encoder 4096 counts/rev)

Position Control
Velocity Control
Torque Control

Enhanced Intelligence:
- Automatic load inertia detection and switch set stiffness
- Extended homing and software limit

Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control(Daisy Chain for RS-485, CANopen and EtherCAT)
- Stand alone operation

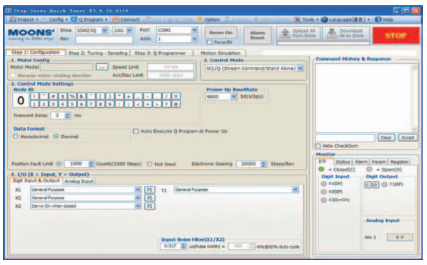
Inputs and Outputs:
- P/R Type- 6 Digital Inputs, 2 Digital Outputs, Encoder Outputs
- S/Q/C/EC Type- 8 Digital Inputs, 4 Digital Outputs, 2 Analog Inputs

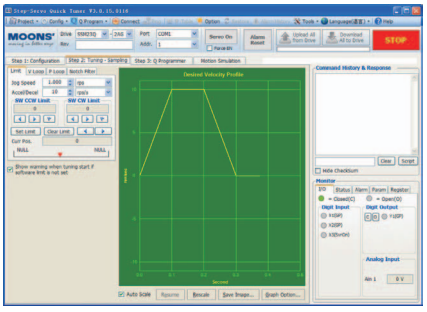
Communication:
SCL CANopen Modbus EtherCAT

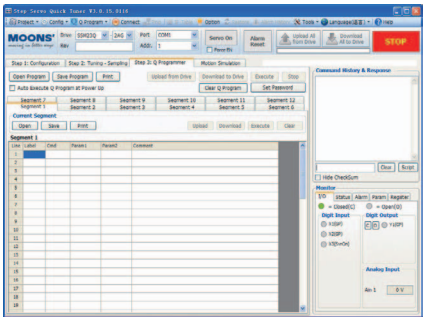
CE RoHS Compliant

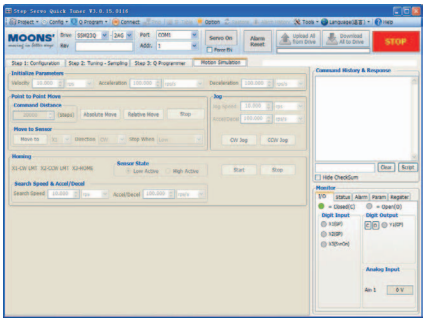
Step-Servo Quick Tuner

Software









Software Features

- Friendly Interface
- Easy setup within just three steps
- Drive setup and configuration
- Servo Tuning and Sampling
- Built-in Q Programmer to create and edit stand-alone programs for Q-compatible drivers
- Motion testing and monitoring
- Write and save SCL command scripts
- Online help integrated
- Support all **Step-Servo** products in TSM/SSM/TXM/SS/RS Series

About this software

Step-Servo Quick Tuner is the PC based software application used to configure, and perform servo tuning, drive testing and evaluation of the **Step-Servo**. System servo control gains, drive functionality, and I/O configuration are set with **Step-Servo** Quick Tuner. It also contains an oscilloscope function to help set the servo control gains. The **Step-Servo** Quick Tuner provides seamless communication with all models whether they have RS-232, RS-485, CANopen or Ethernet communications.

System Requirements

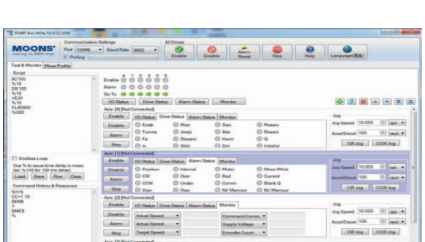
Microsoft Windows 7, Windows 8, Windows 10, 32-bit or 64-bit, Windows XP.

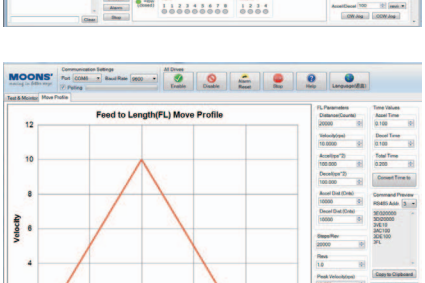
FREE DOWNLOAD
Our software and user manuals can be downloaded from our website:

www.moonsindustries.com

RS-485 Bus Utility

Software





Software Features

- 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

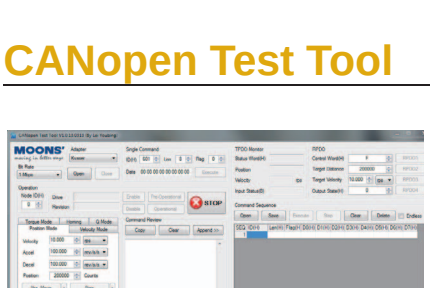
About this software

If you plan to stream serial commands to MOONS' drive using the Serial Command Language (SCL), to build an RS-485 multi-axis network, you'll need a simple terminal emulator to get familiar with and test your command strings and test the network. RS-485 Bus Utility is the ideal choice because it sends command strings as a packet, with minimal delay between characters, and properly terminated with a carriage return. Other terminal applications send each character as it's typed, making them difficult to use with SCL commands.

System Requirements

Microsoft Windows 7, Windows 8, 32-bit or 64-bit, Windows XP.

CANopen Test Tool



Software Features

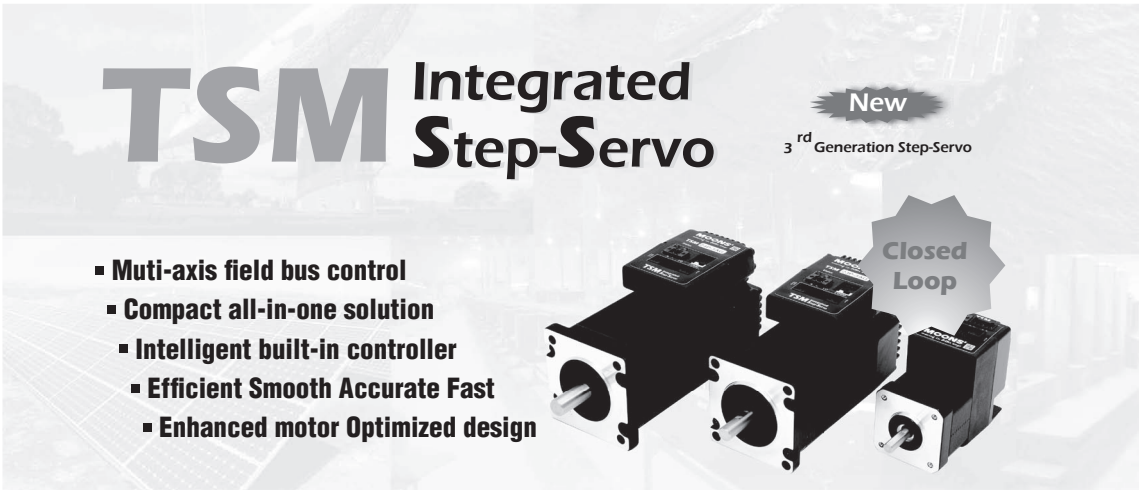
- Friendly User Interface
- Multiple operation Mode Support
- Multi-Thread, High Performance
- CAN bus monitor and log function
- Kvaser/PEAK/ZLG adapter support

System Requirements

Microsoft Windows 7, Windows 8, Windows 10, 32-bit or 64-bit, Windows XP.

FREE DOWNLOAD
Our software and user manuals can be downloaded from our website:

www.moonsindustries.com

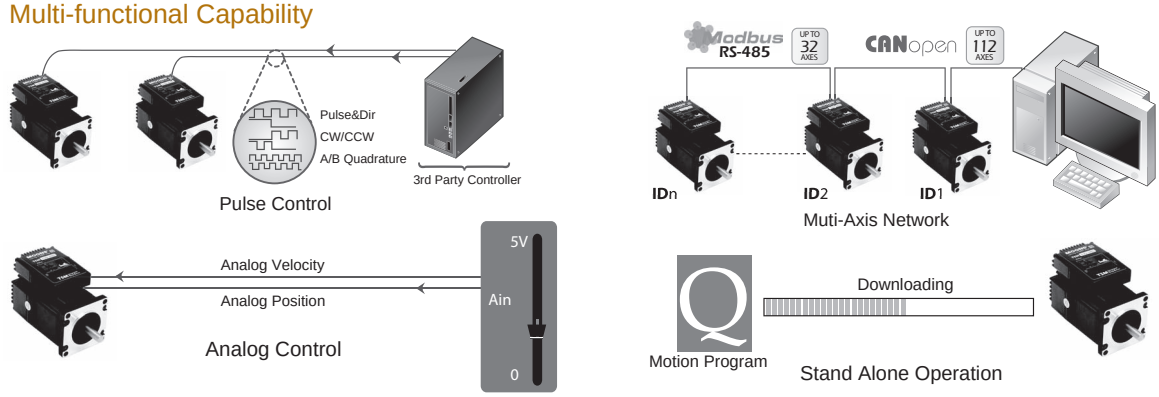


The **Step-Servo** is an innovative revolution for the world of stepper motor, it enhances the stepper motors with servo technology to create a product with exceptional feature and broad capability.

TSM is MOONS' 3rd generation integrated **Step-Servo** and compact motor+drive+encoder+controller all-in-one solution. With improved technology, TSM upgrades significant key features based on 2nd generation SSM and operates more efficient and intelligent.

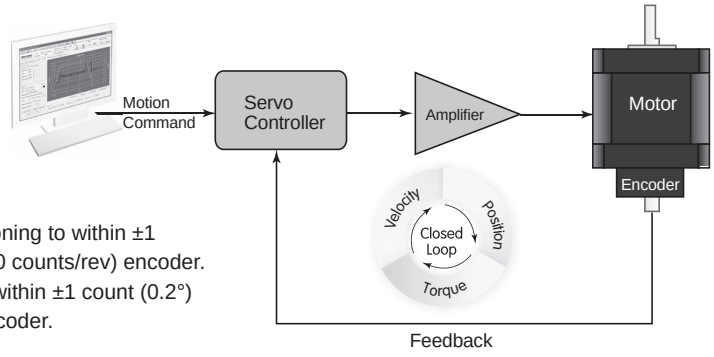
Features

Multi-functional Capability



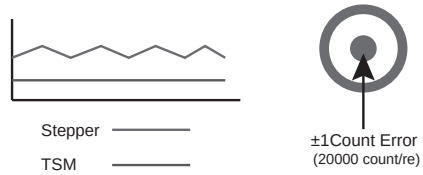
Closed Loop

- Very tight position and velocity control for the most demanding applications.
- Robust servo loops that tolerate wide fluctuations in load inertia and frictional loading.
- The TSM17/23/24/34 achieve precise positioning to within ±1 count (0.018°) using a high resolution (20000 counts/rev) encoder.
- The TSM11 achieves precise positioning to within ±1 count (0.2°) using a high resolution (4096 counts/rev) encoder.



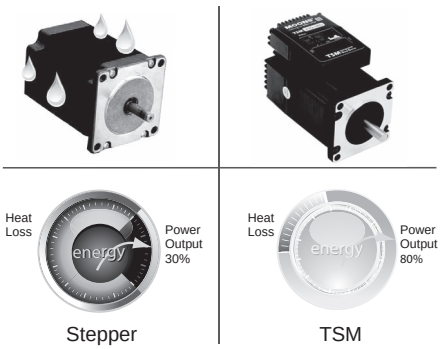
Smooth & Accurate

- 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

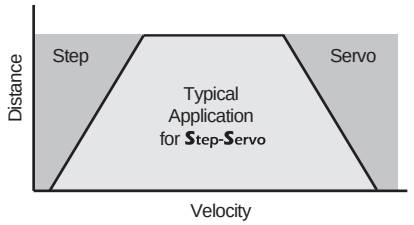


Low Heating/High Efficiency

- The TSM uses only the current required by the application, generating minimum heat output.
- When the motor is not moving, the current can be nearly zero resulting in extremely low heat output.
- Being able to use almost 100% of the available torque allows for more efficient operation and may allow a smaller motor size.



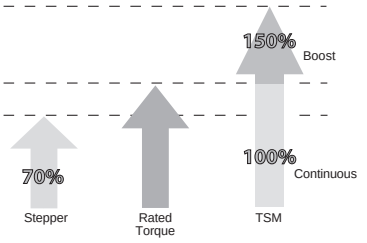
Fast Response



- 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.

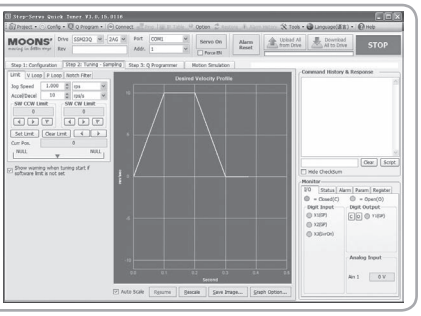
High Torque

- Because the TSM 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.

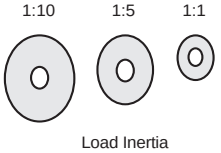


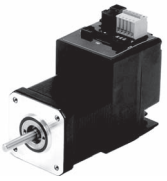
Motion Monitoring

- 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 Tunning





- 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 Enhancement based on SSM family(2nd Generation)

- Up to 8 digital inputs, 4 digital outputs and 1 analog input for S/Q/C types (TSM17/23/24/34 only)
- A/B/Z differential encoder signal output supported for P type (TSM17/23/24/34 only)
- Automatic load inertia detection
- On board daisy chain connection for field bus control (RS-485, Modbus/RTU, CANopen, TSM17/23/24/34 only)
- On board daisy chain over Ethernet on TSM34 only
- Multiple homing features for S/Q types
- Software limit for S/Q types
- Auxiliary power input for Keep Alive function (TSM34 only)

■ TSM Lineup

◇ Torque and Frame size

Model	Frame Size(mm)	Torque(N•m)	Supply Voltage(VDC)
TSM11□-1RM	28	0.065	15-30
TSM11□-2RM		0.08	
TSM11□-3RM		0.125	
TSM17□-1□G	42	0.3	12-48
TSM17□-2□G		0.5	
TSM17□-3□G		0.6	
TSM17□-4□G		0.75	
TSM23□-2□G	56	0.9	12-70
TSM23□-3□G		1.5	
TSM23□-4□G		2.5	
TSM24□-3□G	60	2.5	
TSM34□-1□G	86	2.7	24-70
TSM34□-3□G		5.2	
TSM34□-5□G		6.7	
TSM34□-6□G		8.2	

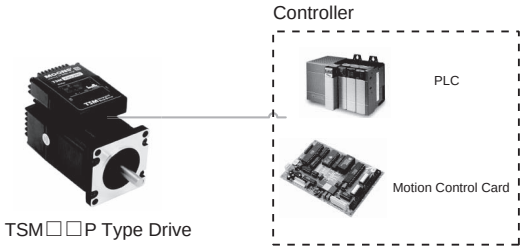
◇ Control Modes

-P Pulse Input type(Only TSM17/23/24/34)

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

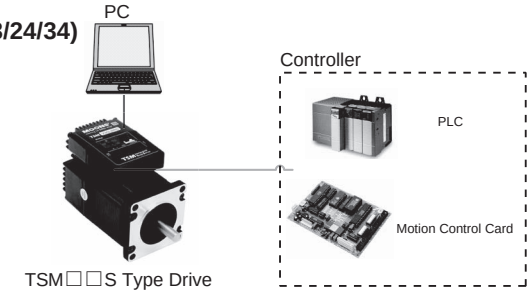


-S Basic type with serial communication(Only TSM17/23/24/34)

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

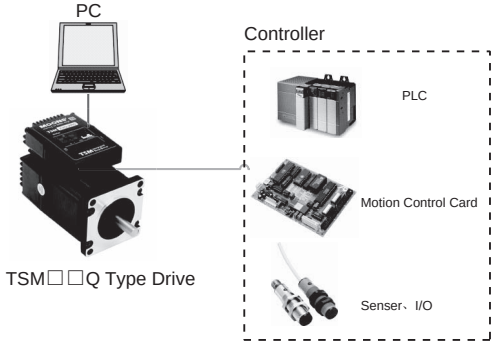


-Q Built-in programmable motion controller (Includes Modbus/RTU Type)

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
- Includes all features of S type
- Modbus/RTU network, up to 32 axes per channel
- Dual port Ethernet communication, eSCL network (TSM34 only)

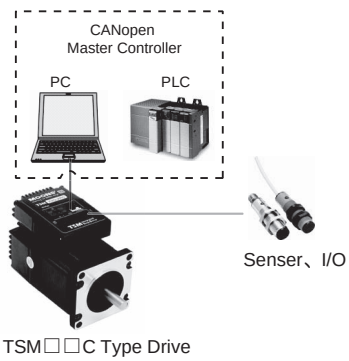


-C CANopen type

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

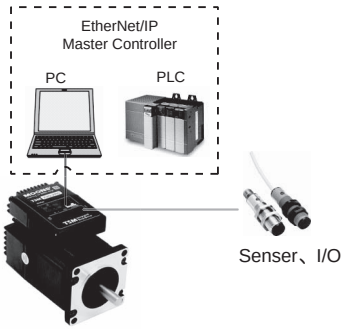


-IP EtherNet/IP type

Operates on a EtherNet/IP communication network. It supports runing stored Q programs via MOONS' specific EtherNet/IP objects.

Main Features

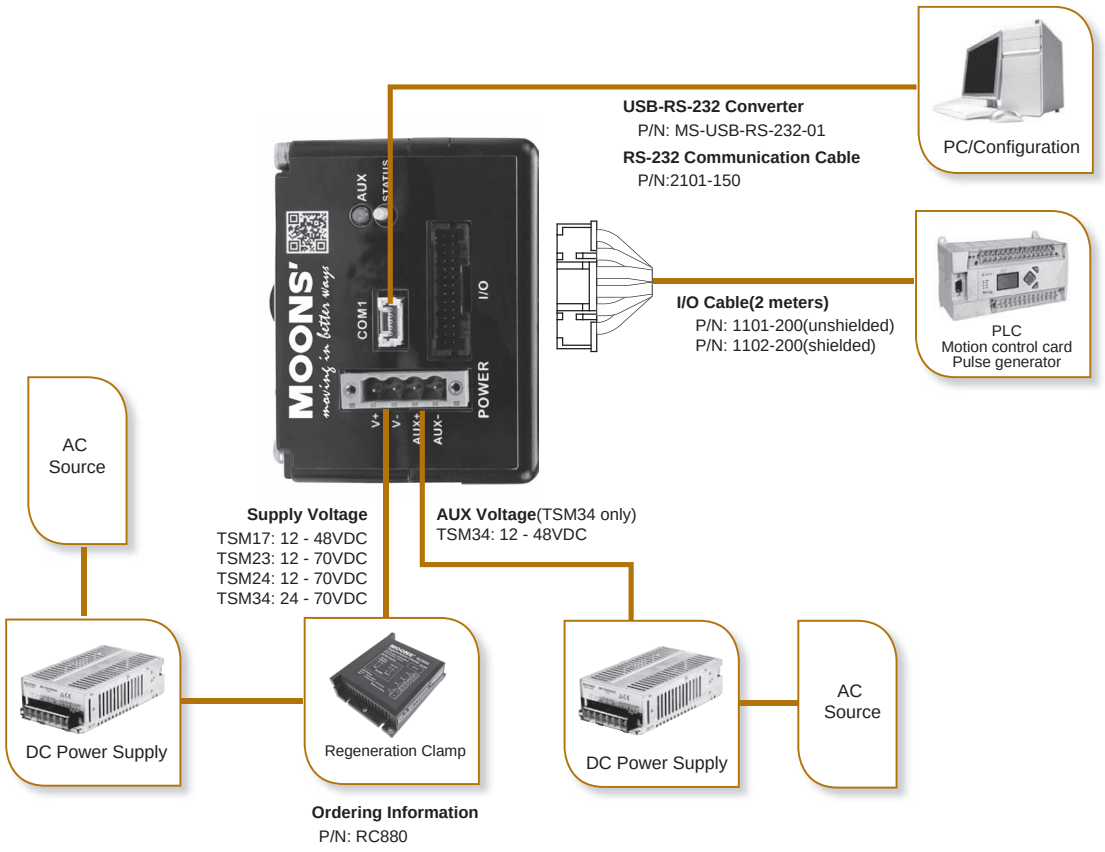
- EtherNet/IP network
- Objects for Q programming



TSM□□IP Type Drive

■ System configuration

◇ -P Pulse Input type(TSM17/23/24/34 only)

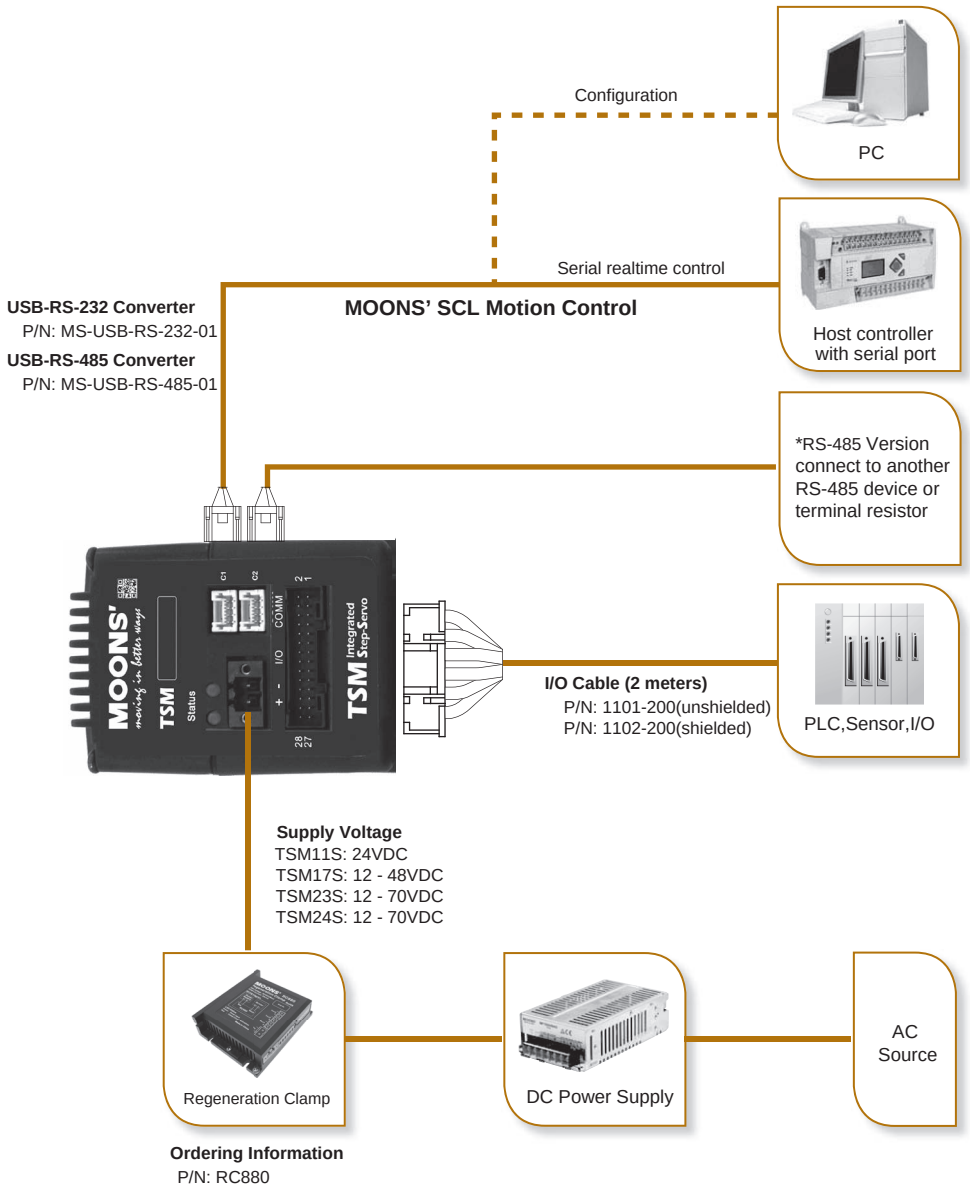


◇ Optional Accessories

P/N	Catagory	Technical Specification
RC880	Regenaration Clamp	80VDC Max. 50W
MS-USB-RS-232-01	USB Converter	USB to RS-232
MS-USB-RS-485-01	USB Converter	USB to RS-485
MS-USB-CAN-01	USB Converter	USB to CAN
1101- □□□	Cable	I/O cable, unshielded
1116- □□□	Cable	I/O cable, shielded
2101-150	Cable	RS-232 communication cable (P/Q type)
2113-150	Cable	RS-232 communication cable (C type)
2111- □□□	Cable	RS-485 Daisy Chain
2112- □□□	Cable	CANopen Daisy Chain
2012-030	Cable	CAT5e UTP 0.3m
2012-300	Cable	CAT5e UTP 3m
2013-030	Cable	CAT5e STP 0.3m
2013-300	Cable	CAT5e STP 3m

* □□□stands for length, unit:cm, ex.100 stands for 100cm

◇ -S Basic type with series communication(TSM11/17/23/24 only)

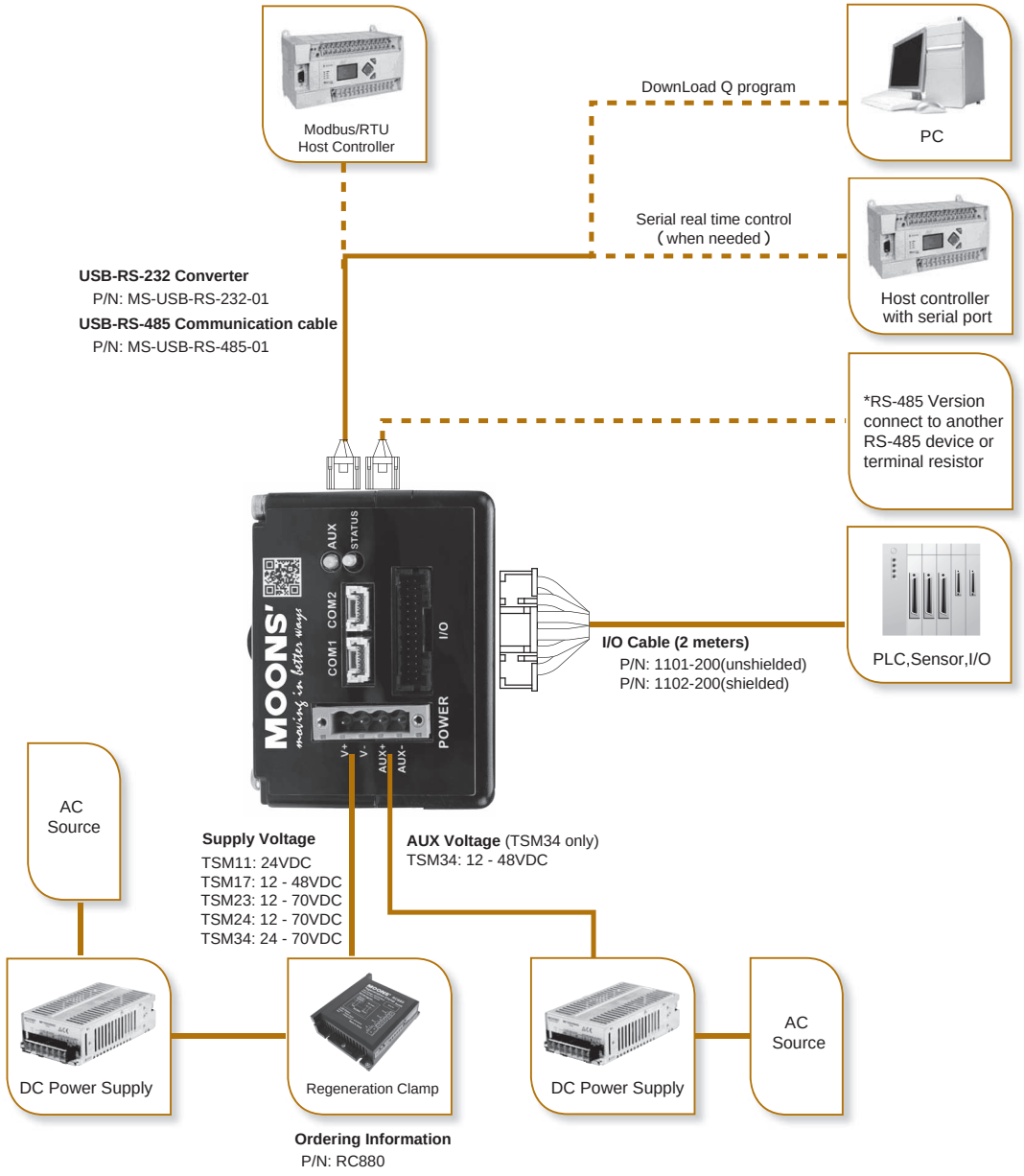


◇ Optional Accessories

P/N	Catagory	Technical Specification
RC880	Regenaration Clamp	80VDC Max. 50W
MS-USB-RS-232-01	USB Converter	USB to RS-232
MS-USB-RS-485-01	USB Converter	USB to RS-485
MS-USB-CAN-01	USB Converter	USB to CAN
1101- □□□	Cable	I/O cable, unshielded
1116- □□□	Cable	I/O cable, shielded
2101-150	Cable	RS-232 communication cable (P/Q type)
2113-150	Cable	RS-232 communication cable (C type)
2111- □□□	Cable	RS-485 Daisy Chain
2112- □□□	Cable	CANopen Daisy Chain
2012-030	Cable	CAT5e UTP 0.3m
2012-300	Cable	CAT5e UTP 3m
2013-030	Cable	CAT5e STP 0.3m
2013-300	Cable	CAT5e STP 3m

* □□□stands for length, unit:cm, ex.100 stands for 100cm

◇ -Q Built-in programmable motion controller(Includes Modbus/RTU Type)

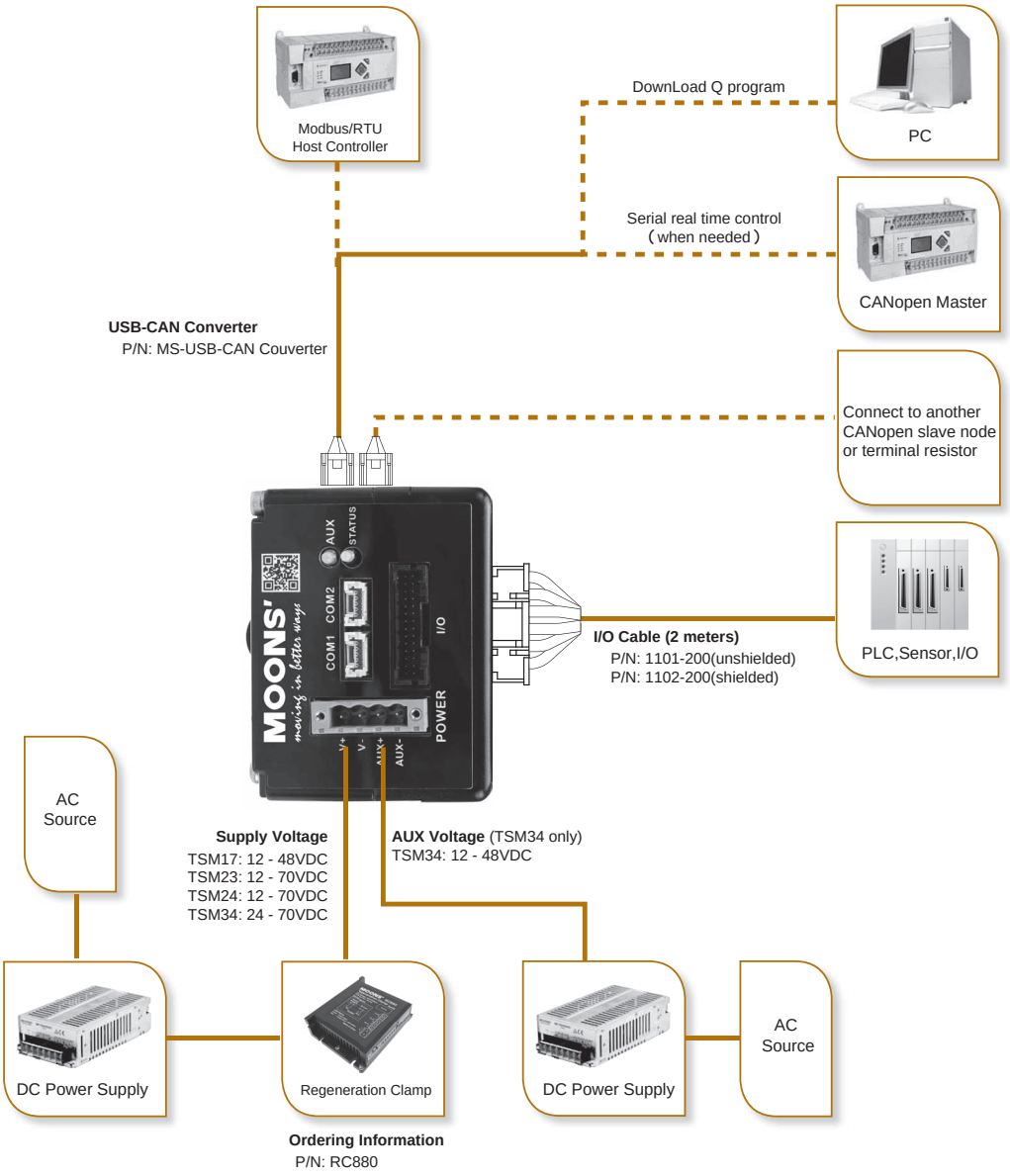


◇ Optional Accessories

P/N	Catagory	Technical Specification
RC880	Regenaration Clamp	80VDC Max. 50W
MS-USB-RS-232-01	USB Converter	USB to RS-232
MS-USB-RS-485-01	USB Converter	USB to RS-485
MS-USB-CAN-01	USB Converter	USB to CAN
1101- □□□	Cable	I/O cable, unshielded
1116- □□□	Cable	I/O cable, shielded
2101-150	Cable	RS-232 communication cable (P/Q type)
2113-150	Cable	RS-232 communication cable (C type)
2111- □□□	Cable	RS-485 Daisy Chain
2112- □□□	Cable	CANopen Daisy Chain
2012-030	Cable	CAT5e UTP 0.3m
2012-300	Cable	CAT5e UTP 3m
2013-030	Cable	CAT5e STP 0.3m
2013-300	Cable	CAT5e STP 3m

* □□□stands for length, unit:cm, ex.100 stands for 100cm

◇ -C CANopen type(TSM17/23/24/34 only)

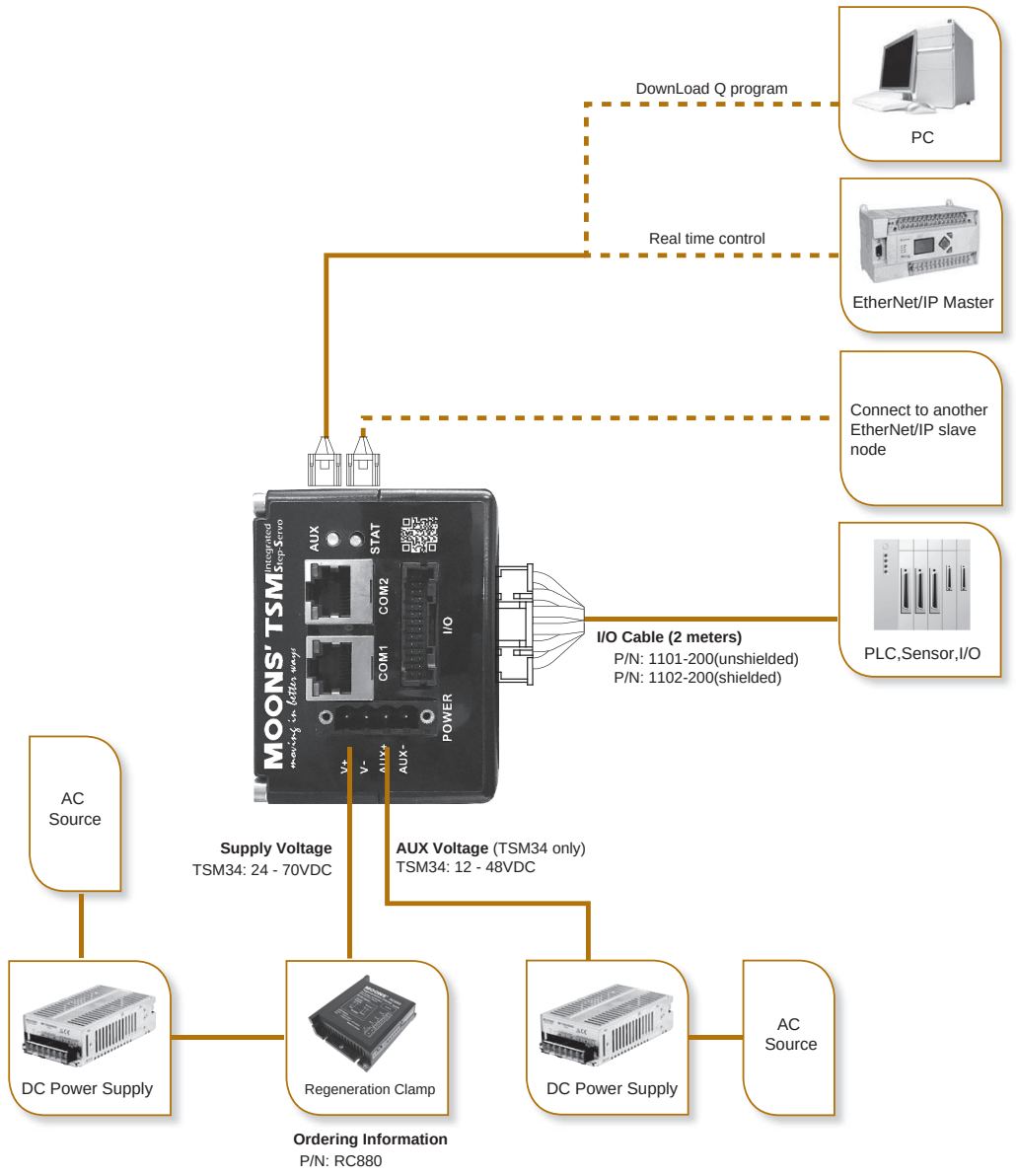


◇ Optional Accessories

P/N	Catagory	Technical Specification
RC880	Regenaration Clamp	80VDC Max. 50W
MS-USB-RS-232-01	USB Converter	USB to RS-232
MS-USB-RS-485-01	USB Converter	USB to RS-485
MS-USB-CAN-01	USB Converter	USB to CAN
1101- □□□	Cable	I/O cable, unshielded
1116- □□□	Cable	I/O cable, shielded
2101-150	Cable	RS-232 communication cable (P/Q type)
2113-150	Cable	RS-232 communication cable (C type)
2111- □□□	Cable	RS-485 Daisy Chain
2112- □□□	Cable	CANopen Daisy Chain
2012-030	Cable	CAT5e UTP 0.3m
2012-300	Cable	CAT5e UTP 3m
2013-030	Cable	CAT5e STP 0.3m
2013-300	Cable	CAT5e STP 3m

* □□□stands for length, unit:cm, ex.100 stands for 100cm

◇ -IP EtherNet/IP type(TSM34 only)



◇ Optional Accessories

P/N	Catagory	Technical Specification
RC880	Regenaration Clamp	80VDC Max. 50W
MS-USB-RS-232-01	USB Converter	USB to RS-232
MS-USB-RS-485-01	USB Converter	USB to RS-485
MS-USB-CAN-01	USB Converter	USB to CAN
1101- □□□	Cable	I/O cable, unshielded
1116- □□□	Cable	I/O cable, shielded
2101-150	Cable	RS-232 communication cable (P/Q type)
2113-150	Cable	RS-232 communication cable (C type)
2111- □□□	Cable	RS-485 Daisy Chain
2112- □□□	Cable	CANopen Daisy Chain
2012-030	Cable	CAT5e UTP 0.3m
2012-300	Cable	CAT5e UTP 3m
2013-030	Cable	CAT5e STP 0.3m
2013-300	Cable	CAT5e STP 3m

* □□□stands for length, unit:cm, ex.100 stands for 100cm

Numbering System

TSM 17 S-2 A G

- TSM Series
- Frame Size
  11, 17, 23, 24, 34
- Control Mode
  P=Pulse Type
  S=Basic Type
  Q=Q Program Type
  (Modbus/RTU Type)
  C=CANopen Type
  IP=EtherNet/IP Type
- Motor Size
  1 = 1 Stack
  2 = 2 Stack
  3 = 3 Stack
  4 = 4 Stack
  5 = 5 Stack
  6 = 6 Stack
- Communication
  A=RS-232
  R=RS-485
  C=CANopen
  D=Dual port Ethernet - 34 frame only
- Feedback
  G=5000-line encoder
  M=1024-line encoder

Ordering Information

Model	Torque	Control	I/O(*)	RS-232	RS-485/422	Modbus/RTU	CANopen	Ethernet	EtherNet/IP
TSM11S-1RM	0.065N·m	S	4DI, 2DO		√				
TSM11S-2RM	0.08N·m				√				
TSM11S-3RM	0.125N·m				√				
TSM11Q-1RM	0.065N·m	Q			√	√			
TSM11Q-2RM	0.08N·m				√	√			
TSM11Q-3RM	0.125N·m				√	√			
TSM17P-1AG	0.3N·m	P	4DI, 3DO, EO	√					
TSM17S-1AG		S	8DI, 4DO, 1AI	√					
TSM17S-1RG					√				
TSM17Q-1AG		Q	8DI, 4DO, 1AI	√		√			
TSM17Q-1RG					√	√			
TSM17C-1CG		C	8DI, 4DO, 1AI	√			√		
TSM17P-2AG	0.5N·m	P	4DI, 3DO, EO	√					
TSM17S-2AG		S	8DI, 4DO, 1AI	√					
TSM17S-2RG					√				
TSM17Q-2AG		Q	8DI, 4DO, 1AI	√		√			
TSM17Q-2RG					√	√			
TSM17C-2CG		C	8DI, 4DO, 1AI	√			√		
TSM17P-3AG	0.6N·m	P	4DI, 3DO, EO	√					
TSM17S-3AG		S	8DI, 4DO, 1AI	√					
TSM17S-3RG					√				
TSM17Q-3AG		Q	8DI, 4DO, 1AI	√		√			
TSM17Q-3RG					√	√			
TSM17C-3CG		C	8DI, 4DO, 1AI	√			√		
TSM17P-4AG	0.75N·m	P	4DI, 3DO, EO	√					
TSM17S-4AG		S	8DI, 4DO, 1AI	√					
TSM17S-4RG					√				
TSM17Q-4AG		Q	8DI, 4DO, 1AI	√		√			
TSM17Q-4RG					√	√			
TSM17C-4CG		C	8D, 4DO, 1AI	√			√		
TSM23P-2AG	0.9N·m	P	4DI, 3DO, EO	√					
TSM23S-2AG		S	8DI, 4DO, 1AI, EO	√					
TSM23S-2RG					√				
TSM23Q-2AG		Q		√		√			
TSM23Q-2RG					√	√			
TSM23C-2CG		C		√			√		
TSM23P-3AG	1.5N·m	P	4DI, 3DO, EO	√					
TSM23S-3AG		S	8DI, 4DO, 1AI, EO	√					
TSM23S-3RG					√				
TSM23Q-3AG		Q		√		√			
TSM23Q-3RG					√	√			
TSM23C-3CG		C		√			√		

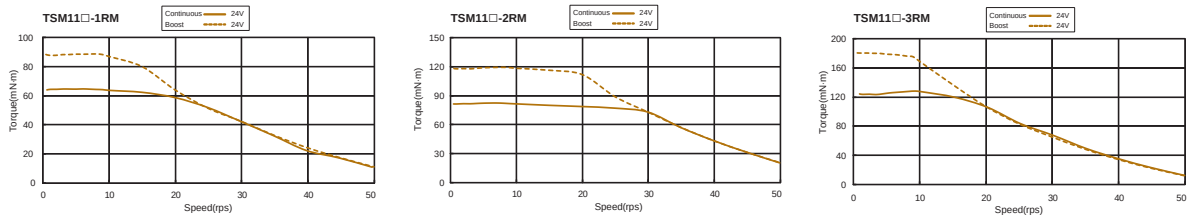
Model	Torque	Control	I/O(*)	RS-232	RS-485/422	Modbus/RTU	CANopen	Ethernet	EtherNet/IP
TSM23P-4AG	2.5N·m	P	4DI, 3DO, EO	√					
TSM23S-4AG		S	8DI, 4DO, 1AI, EO	√					
TSM23S-4RG					√				
TSM23Q-4AG		Q		√		√			
TSM23Q-4RG					√	√			
TSM23C-4CG		C		√			√		
TSM24P-3AG	2.5N·m	P	4DI, 3DO, EO	√					
TSM24S-3AG		S	8DI, 4DO, 1AI, EO	√					
TSM24S-3RG					√				
TSM24Q-3AG		Q		√		√			
TSM24Q-3RG					√	√			
TSM24C-3CG		C		√			√		
TSM34P-1AG	2.7N.m	P	4DI, 3DO, EO	√					
TSM34Q-1AG		Q	8DI, 4DO, 1AI, EO	√		√			
TSM34Q-1RG					√	√			
TSM34Q-1DG								√	
TSM34C-1CG		C		√			√		
TSM34IP-1DG		IP							√
TSM34P-3AG	5.2N.m	P	4DI, 3DO, EO	√					
TSM34Q-3AG		Q	8DI, 4DO, 1AI, EO	√		√			
TSM34Q-3RG					√	√			
TSM34Q-3DG								√	
TSM34C-3CG		C		√			√		
TSM34IP-3DG		IP							√
TSM34P-5AG	6.7N.m	P	4DI, 3DO, EO	√					
TSM34Q-5AG		Q	8DI, 4DO, 1AI, EO	√		√			
TSM34Q-5RG					√	√			
TSM34Q-5DG								√	
TSM34C-5CG		C		√			√		
TSM34IP-5DG		IP							√
TSM34P-6AG	8.2N.m	P	4DI, 3DO, EO	√					
TSM34Q-6AG		Q	8DI, 4DO, 1AI, EO	√		√			
TSM34Q-6RG					√	√			
TSM34Q-6DG								√	
TSM34C-6CG		C		√			√		
TSM34IP-6DG		IP							√

* DI: Digital Input; DO: Digital Output; EO: Encoder Output; AI: Analog Input

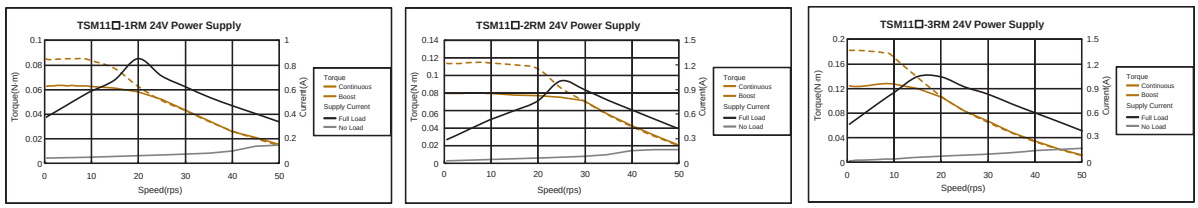
Specifications—Frame size 28mm

	Basic type	TSM11S-1RM	TSM11S-2RM	TSM11S-3RM
	Q program type(Includes **Modbus/RTU** type)	TSM11Q-1RM	TSM11Q-2RM	TSM11Q-3RM
Holding Torque	N•m	0.065	0.08	0.125
Rotor Inertia	g•cm^2	9	12	18
Supply Voltage	VDC	24		
Encoder Resolution	counts/rev	4096	4096	4096
Maximum Speed	RPM	3600	3600	3600
Mass	g	118	168	218

Torque Curves



Input Current Curves Characteristics



■ Electrical Specifications—Frame size 28mm

	Basic type TSM11S-■RM	Q program type TSM11Q-■RM
Control Command	Pulse input SCL	Pulse input SCL Q Program ***Modbus/RTU***
Pulse signal type	Pulse+Direction CW/CCW Pulse A/B Quadrature	Pulse+Direction CW/CCW Pulse A/B Quadrature
Maximum Input Pulse Frequency	2MHz, Minimum Pulse Width=250ns	2MHz, Minimum Pulse Width=250ns
Digital Input	4	4
Digital Output	2	2
Analog Input	-	-
Encoder Output	-	-
Digital Input Specification	5-24VDC	
Digital Onput Specification	30VDC/100mA	
Supply Voltage	15 - 30 VDC min/max (typical 24VDC)	
Protection	Over-voltage, under-voltage, over-temp, motor/wiring shorts (phase-to-phase, phase-to-ground)	
Communication	RS-485 four-wire	
Protocol	SCL	***Modbus/RTU*** or SCL

Enter motor length 1, 2, 3 in the box(■) within the model name

◇ RS-485 or Modbus/RTU Specifications

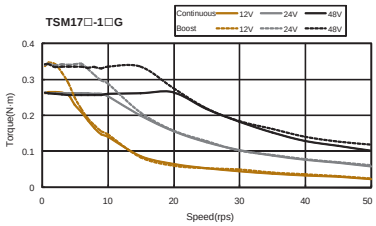
Interface	RS-485 or ***Modbus/RTU***
Baud Rate(bps)	9600/19200/38400/57600/115200
Maximum Distance	Due to transmission baud rate
Maximum Connections	32 axes per channel
Communication Cable	Twisted Shielded Cable
Address Setting	Via ***Step-Servo*** Quick Tuner

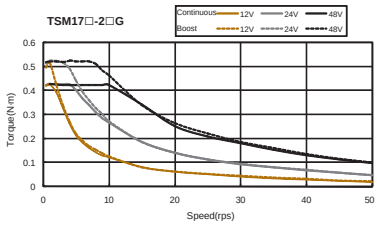
Specifications—Frame size 42mm

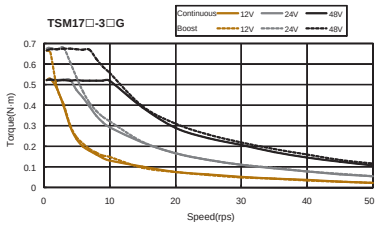
Model	Pulse input type	TSM17P-1AG	TSM17P-2AG	TSM17P-3AG	TSM17P-4AG
	Basic type	TSM17S-1□G	TSM17S-2□G	TSM17S-3□G	TSM17S-4□G
	Q program type(Includes ***Modbus/RTU*** type)	TSM17Q-1□G	TSM17Q-2□G	TSM17Q-3□G	TSM17Q-4□G
	CANopen type	TSM17C-1CG	TSM17C-2CG	TSM17C-3CG	TSM17C-4CG
Holding Torque	N•m	0.3	0.5	0.6	0.75
Rotor Inertia	g•cm^2	38	57	82	123
Supply Voltage	VDC	12-48			
Encoder Resolution	counts/rev	20000	20000	20000	20000
Maximum Speed	RPM	3600	3600	3600	3600
Mass	g	390	440	520	760

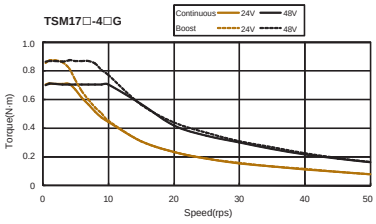
Enter A(RS-232) or R(RS-485) in the box(□) within the model name

Torque Curves

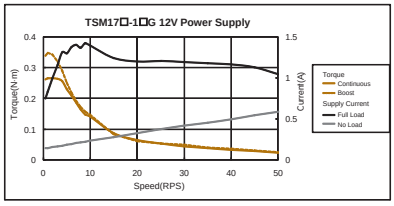


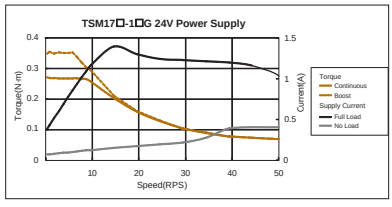


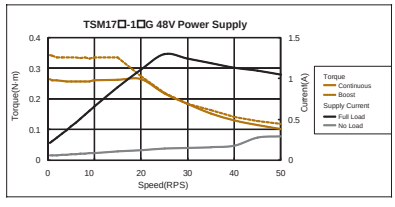


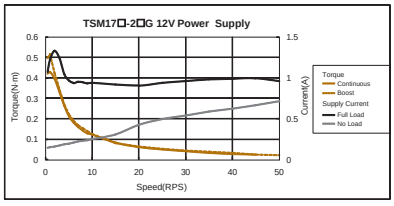


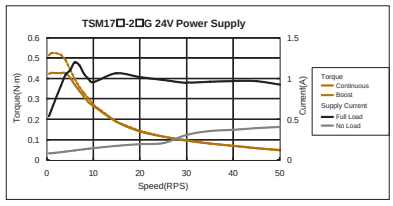
Input Current Curves Characteristics

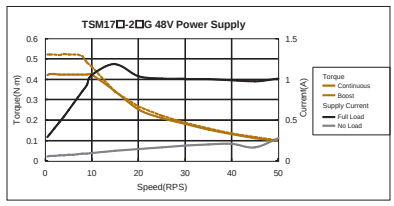


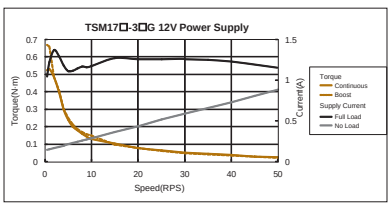


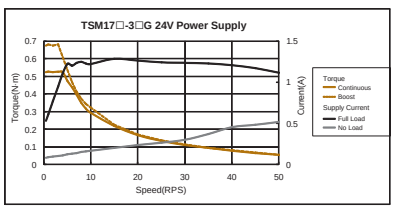


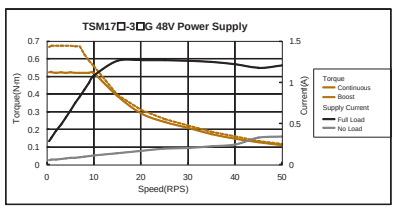












■ Electrical Specifications—Frame size 42mm

	Pulse input type TSM17P-■AG	Basic type TSM17S-■□G	Q program type TSM17Q-■□G	CANopen type TSM17C-■CG
Control Command	Pulse input	Pulse input Analog signal SCL	Pulse input Analog signal SCL Q Program **Modbus/RTU**	Q program **CANopen**
Pulse signal type	Pulse+Direction CW/CCW Pulse A/B Quadrature	Pulse+Direction CW/CCW Pulse A/B Quadrature	Pulse+Direction CW/CCW Pulse A/B Quadrature	-
Maximum Input Pulse Frequency	2MHz, Minimum Pulse Width=250ns	2MHz, Minimum Pulse Width=250ns	2MHz, Minimum Pulse Width=250ns	-
Digital Input	4	8	8	8
Digital Output	3	4	4	4
Analog Input	-	1	1	1
Encoder Output	20,000 counts/rev A/B/Z Differential	-	-	-
Digital Input Specification	Optical Isolated 5-24VDC			
Digital Onput Specification	Optical Isolated 30VDC/100mA			
Analog Input Specification	AIN referenced to GND, Range 0–5VDC, Resolution:12bits			
Supply Voltage	12-48VDC			
Protection	Over-voltage, under-voltage, over-temp, motor/wiring shorts (phase-to-phase, phase-to-ground)			
Communication	RS-232	RS-232 or RS-485	RS-232 or RS-485	RS-232&CANopen
Protocol	-	SCL	**Modbus/RTU** or SCL	**CANopen**

Enter motor length 1,2,3,4 in the box(■) within the model name
Enter A(RS-232) or R(RS-485) in the box(□) within the model name

◇ RS-485 or Modbus/RTU Specifications

Interface	RS-485 or **Modbus/RTU**
Baud Rate(bps)	9600/19200/38400/57600/115200
Maximum Distance	Due to transmission baud rate
Maximum Connections	32 axes per channel
Communication Cable	Twisted Shielded Cable
Address Setting	Via **Step-Servo** Quick Tuner

◇ CANopen Specifications

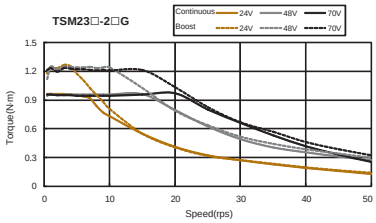
Interface	**CANopen** CiA301 CiA402
Bit Rate(bps)	1M/800K/500K/250K/125K/50K/20K/12.5K
Maximum Distance	Due to transmission bit rate
Maximum Slave Nodes	112 axes per channel
Communication Cable	Twisted Shielded Cable
Node ID Setting	On Board Rotary Switch: Lower 4 bits 0H-FH **Step-Servo** Quick Tuner: Upper 3 bits 00H-7FH

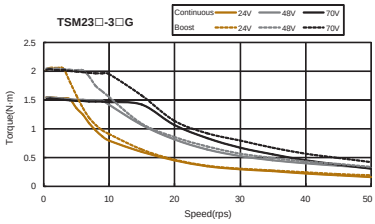
Specifications—Frame size 56mm, 60mm

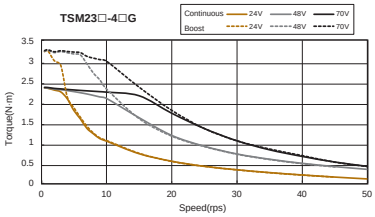
Model	Pulse input type	TSM23P-2AG	TSM23P-3AG	TSM23P-4AG	TSM24P-3AG
	Basic type	TSM23S-2□G	TSM23S-3□G	TSM23S-4□G	TSM24S-3□G
	Q program type(Includes ***Modbus/RTU*** type)	TSM23Q-2□G	TSM23Q-3□G	TSM23Q-4□G	TSM24Q-3□G
	CANopen type	TSM23C-2CG	TSM23C-3CG	TSM23C-4CG	TSM24C-3CG
Holding Torque	N•m	0.9	1.5	2.5	2.5
Rotor Inertia	g•cm^2	260	460	365	900
Supply Voltage	VDC	12-70			
Encoder Resolution	counts/rev	20000	20000	20000	20000
Maximum Speed	RPM	3600	3600	3600	3600
Mass	g	850	1250	1090	1650

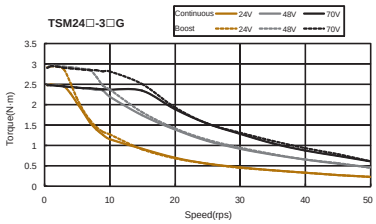
Enter A(RS-232) or R(RS-485) in the box (□) within the model name

Torque Curves

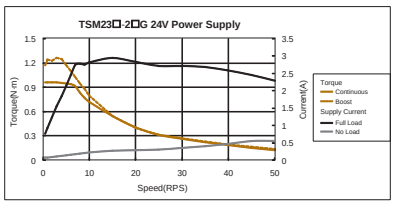


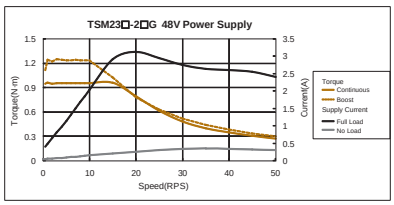


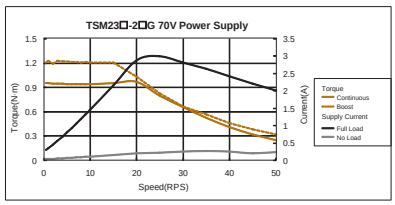


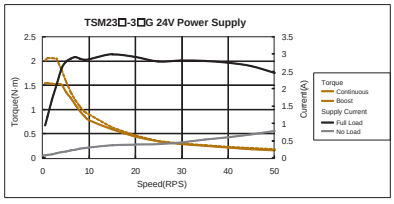


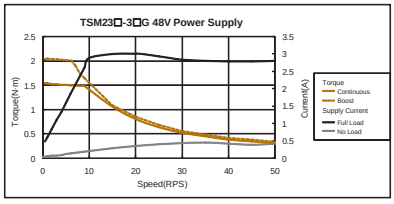
Input Current Curves Characteristics

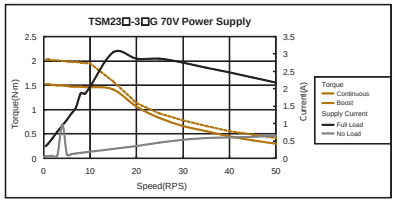


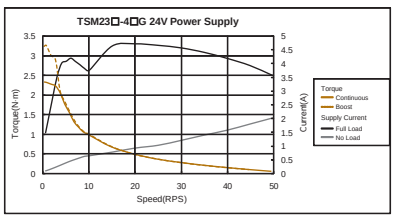


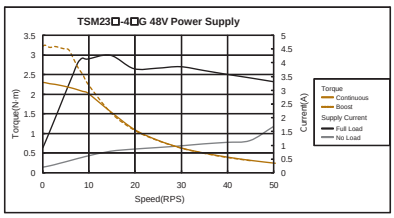


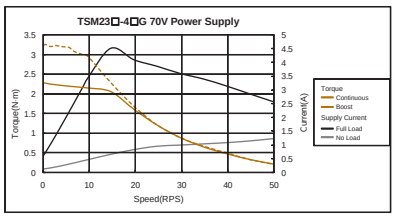


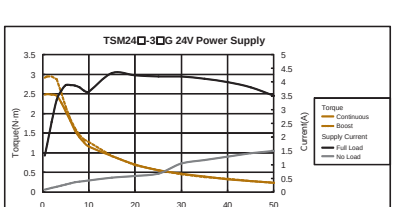


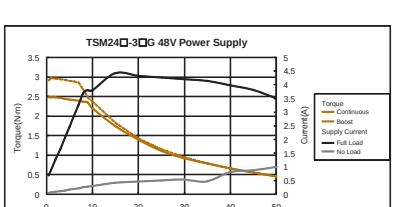


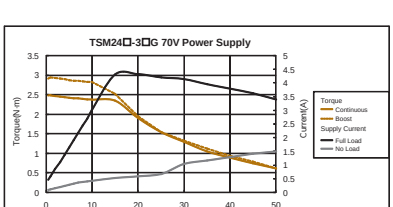












■ Electrical Specifications—Frame size 56mm, 60mm

	Pulse input type TSM2◇P-■AG	Basic type TSM2◇S-■□G	Q program type TSM2◇Q-■□G	CANopen type TSM2◇C-□CG
Control Command	Pulse input	Pulse input Analog signal SCL	Pulse input Analog signal SCL Q Program **Modbus/RTU**	Q program **CANopen**
Pulse signal type	Pulse+Direction CW/CCW Pulse A/B Quadrature	Pulse+Direction CW/CCW Pulse A/B Quadrature	Pulse+Direction CW/CCW Pulse A/B Quadrature	-
Maximum Input Pulse Frequency	2MHz, Minimum Pulse Width=250ns	2MHz, Minimum Pulse Width=250ns	2MHz, Minimum Pulse Width=250ns	2MHz, Minimum Pulse Width=250ns
Digital Input	4	8	8	8
Digital Output	3	4	4	4
Analog Input	-	1	1	1
Encoder Output	20,000 counts/rev A/B/Z Differential	20,000 counts/rev A/B/Z Differential	20,000 counts/rev A/B/Z Differential	20,000 counts/rev A/B/Z Differential
Digital Input Specification	Optical Isolated 5-24VDC			
Digital Onput Specification	Optical Isolated 30VDC/100mA			
Analog Input Specification	AIN referenced to GND, Range 0–5VDC, Resolution: 12bits			
Supply Voltage	12-70VDC			
Protection	Over-voltage, under-voltage, over-temp, motor/wiring shorts (phase-to-phase, phase-to-ground)			
Communication	RS-232	RS-232 or RS-485	RS-232 or RS-485	RS-232&CANopen
Protocol	-	SCL	**Modbus/RTU** or SCL	**CANopen**

Enter frame size 3(56mm)or 4(60mm)in the box(◇) within the model name
Enter motor length 2,3 in the box(■) within the model name
Enter A(RS-232) or R(RS-485) in the box(□) within the model name

◇ RS-485 or Modbus/RTU Specifications

Interface	RS-485 or **Modbus/RTU**
Baud Rate(bps)	9600/19200/38400/57600/115200
Maximum Distance	Due to transmission baud rate
Maximum Connections	32 axes per channel
Communication Cable	Twisted Shielded Cable
Address Setting	Via **Step-Servo** Quick Tuner

◇ CANopen Specifications

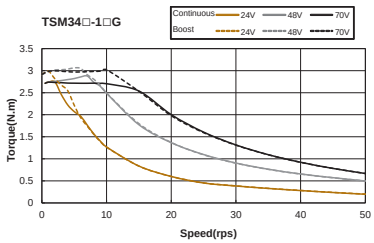
Interface	**CANopen** CiA301 CiA402
Bit Rate(bps)	1M/800K/500K/250K/125K/50K/20K/12.5K
Maximum Distance	Due to transmission bit rate
Maximum Slave Nodes	112 axes per channel
Communication Cable	Twisted Shielded Cable
Node ID Setting	On Board Rotary Switch: Lower 4 bits 0H-FH **Step-Servo** Quick Tuner: Upper 3 bits 00H-7FH

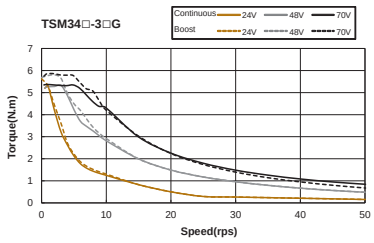
Specifications—Frame size 86mm

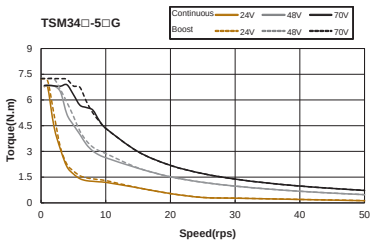
Model	Pulse input type	TSM34P-1AG	TSM34P-3AG	TSM34P-5AG	TSM34P-6AG
	Q program type (Includes Modbus/RTU, Ethernet type)	TSM34Q-1□G	TSM34Q-3□G	TSM34Q-5□G	TSM34Q-6□G
	CANopen type	TSM34C-1CG	TSM34C-3CG	TSM34C-5CG	TSM34C-6CG
	EtherNet/IP type	TSM34IP-1DG	TSM34IP-3DG	TSM34IP-5DG	TSM34IP-6DG
Holding Torque	N-m	2.7	5.2	6.7	8.2
Rotor Inertia	g-cm^2	915	1480	2200	3660
Supply Voltage	VDC	24-70			
Encoder Resolution	counts/rev	20000	20000	20000	20000
Maximum Speed	RPM	3600	3600	3600	3600
Mass	g	4600	6800	9000	11400

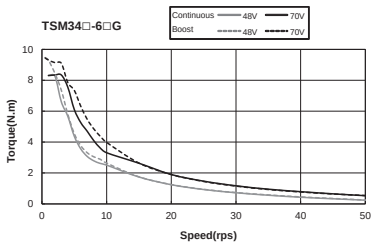
Enter A(RS-232) or R(RS-485) in the box (□) within the model name

Torque Curves

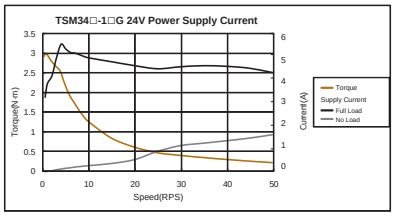


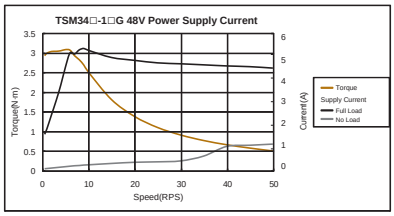


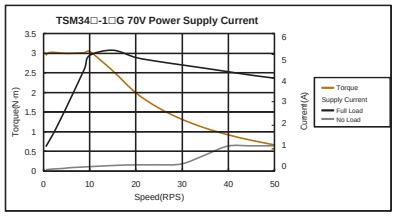


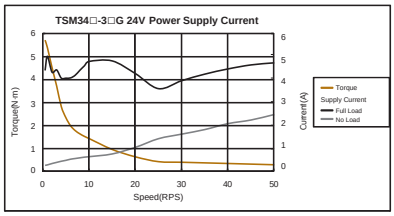


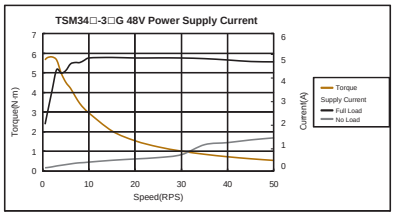
Input Current Curves Characteristics

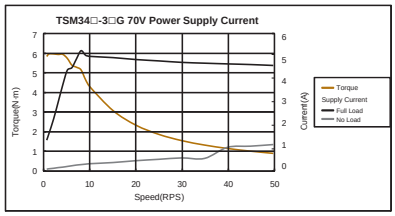


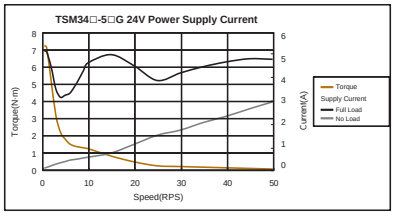


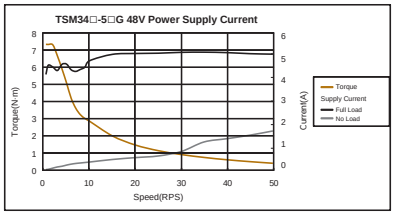


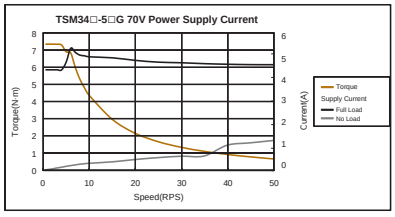


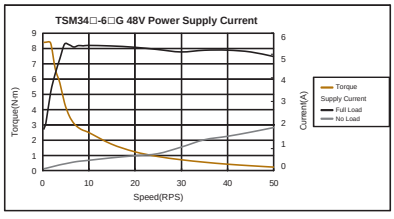


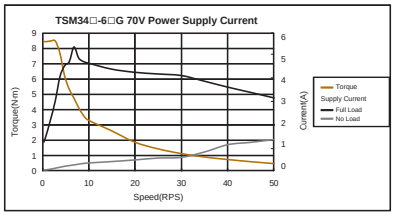












■ Electrical Specifications—Frame size 86mm

	Pulse input type TSM34P-■AG	Basic type TSM34Q-■□G	CANopen type TSM34C-■CG	EtherNet/IP type TSM34IP-■DG
Control Command	Pulse input	Pulse input Analog signal SCL or eSCL Q Program, **Modbus/RTU**	Q program **CANopen**	Q program **EtherNet/IP**
Pulse signal type	Pulse+Direction CW/CCW Pulse A/B Quadrature	Pulse+Direction CW/CCW Pulse A/B Quadrature	-	-
Maximum Input Pulse Frequency	2MHz, Minimum Pulse Width=250ns	2MHz, Minimum Pulse Width=250ns	-	-
Digital Input	4	8	8	8
Digital Output	3	4	4	4
Analog Input	-	1	1	1
Encoder Output	20,000 counts/rev A/B/Z Differential	20,000 counts/rev A/B/Z Differential	20,000 counts/rev A/B/Z Differential	20000 counts/rev A/B/Z Differential
Digital Input Specification	Optical Isolated 5-24VDC			
Digital Onput Specification	Optical Isolated 30VDC/100mA			
Analog Input Specification	AIN referenced to GND, Range 0–5VDC, Resolution: 12bits			
Supply Voltage	24-70VDC			
Protection	Over-voltage, under-voltage, over-temp, motor/wiring shorts (phase-to-phase, phase-to-ground)			
Communication	RS-232	RS-232, RS-485 or Ethernet	RS-232&CANopen	Ethernet
Protocol	-	eSCL	**CANopen**	**EtherNet/IP**

Enter motor length 1, 3, 5, 6 in the box (■) within the model name
Enter A (RS-232) or R (RS-485) or D (Dual port Ethernet) in the box (□) within the model name

◇ RS-485 or Modbus/RTU Specifications

Interface	RS-485 or **Modbus/RTU**
Baud Rate(bps)	9600/19200/38400/57600/115200
Maximum Distance	Due to transmission baud rate
Maximum Connections	32 axes per channel
Communication Cable	Twisted Shielded Cable
Address Setting	Via **Step-Servo** Quick Tuner

◇ CANopen Specifications

Interface	**CANopen** CiA301 CiA402
Bit Rate(bps)	1M/800K/500K/250K/125K/50K/20K/12.5K
Maximum Distance	Due to transmission bit rate
Maximum Slave Nodes	112 axes per channel
Communication Cable	Twisted Shielded Cable
Node ID Setting	On Board Rotary Switch: Lower 4 bits 0H-FH **Step-Servo** Quick Tuner: Upper 3 bits 00H-7FH

◇ Ethernet Specifications

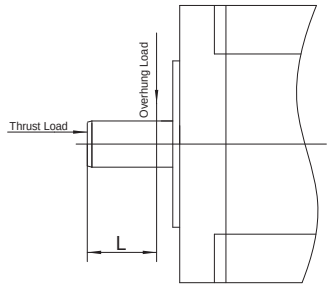
Interface	Ethernet (eSCL)
Baud Rate(bps)	100Mbps
Maximum Distance	100 meters between 2 devices
Communication Cable	Shielded twisted pair cable (CAT5e or CAT6)
Address Setting	Via Step-Servo Quick Tuner software

General Specifications

		TSM Integrated Step-Servo
Insulation Class		Class B(130°C)
Insulation Resistance		100MΩ/DC500V
Dielectric Strength		500VAC 1 minute
Operating Environment	Ambient Temperature	0~+40°C(non-freezing)
	Ambient Humidity	90% or less(non-condensing)
	Atmosphere	No corrosive gases, dust, water or oil
Degree of Protection		IP20

Permissible Overhung Load and Permissible Thrust Load(Unit:N)

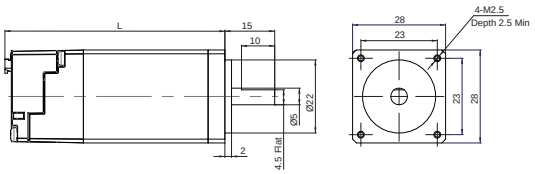
Frame Size	Model	Permissible Overhung Load Distance(L) from Shaft End(mm) 0	5	10	15	20	Permissible Thrust Load
28mm	TSM11□-1RM	20	25	34	52	-	Less than the motor mass
	TSM11□-2RM						
	TSM11□-3RM						
42mm	TSM17□-1□G	35	44	58	85	-	
	TSM17□-2□G						
	TSM17□-3□G						
	TSM17□-4□G						
56mm	TSM23□-2□G	63	75	95	130	190	
	TSM23□-3□G						
	TSM23□-4□G						
60mm	TSM24□-3□G	90	100	130	180	270	
86mm	TSM34□-1□G	260	290	340	390	480	
	TSM34□-3□G						
	TSM34□-5□G						
	TSM34□-6□G						



■ Dimensions (Unit:mm)

◇ Frame Size 28mm

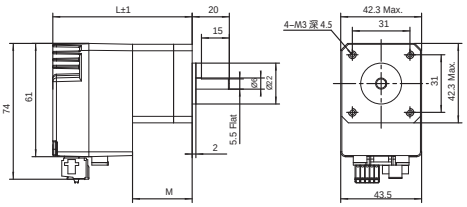
Model	Length "L"	front shaft diameter
TSM11□-1RM	45.9	5
TSM11□-2RM	55	
TSM11□-3RM	66.2	



◇ Frame Size 42mm

Model	Length "L"	Length "M"	front shaft diameter
TSM17□-1□G	69.5	26.6	6*
TSM17□-2□G	75	32.1	
TSM17□-3□G	83.5	40.6	
TSM17□-4□G	98	55	

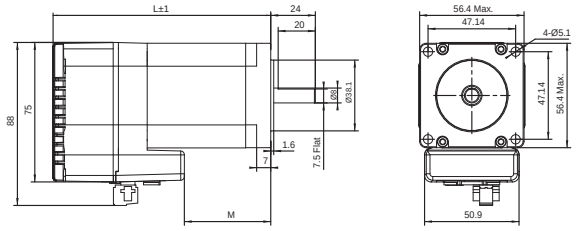
* 5 mm diameter shaft available upon request



◇ Frame Size 56mm

Model	Length "L"	Length "M"	front shaft diameter
TSM23□-2□G	95.2	24.5	8*
TSM23□-3□G	117.2	46.5	
TSM23□-4□G	120.6	49.9	

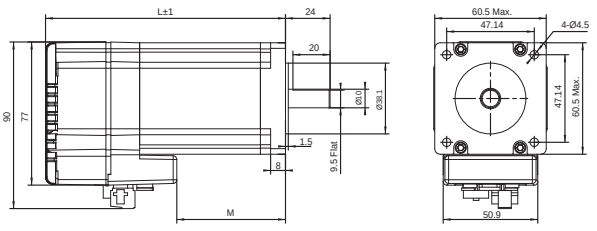
* 6.35 mm diameter shaft available upon request



◇ Frame Size 60mm

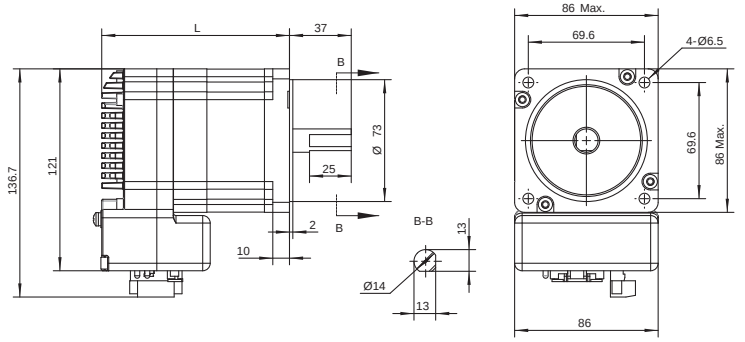
Model	"L"	"M"	front shaft diameter
TSM24□-3□G	129.15	58.5	10*

* 8 mm diameter shaft available upon request



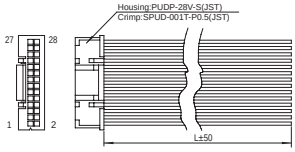
◇ Frame Size 86mm

Model	"L"	front shaft diameter
TSM34□-1□G	112.5	14
TSM34□-3□G	143	
TSM34□-5□G	172.5	
TSM34□-6□G	203	



◇ General Purpose I/O Cable(unshielded) (TSM17/23/24/34)

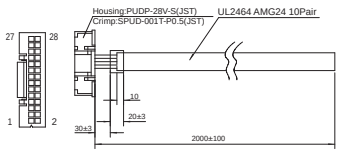
P/N	Length (L)
1101-100	1m
1101-200	2m
1101-500	5m



Pin No.	Assignment	Description	Color
1	X1+	High Speed Digital Input	BLU
2	X1-		BLU/WHT
3	X2+	High Speed Digital Input	YEL
4	X2-		YEL/WHT
5	X3	X3 Digital Input	GRN
6	X4	X4 Digital Input	ORG
7	X5	X5 Digital Input	GRY
8	X6	X6 Digital Input	PUR
9	XCOM	X Digital Input COM	WHT
10	+5V	+5V Analog Voltage	RED
11	AIN	Analog Input	BLU
12	GND	Analog Input Ground	BLK
13	X7+	X7 Digital Input	ORG
14	X7-		ORG/WHT
15	X8+	X8 Digital Input	GRN
16	X8-		GRN/WHT
17	Y1	Y1 Digital Output	BLU
18	Y2	Y2 Digital Output	YEL
19	Y3	Y3 Digital Output	BRN
20	YCOM	Y Output COM	BLK
21	Y4+	Y4 Digital Output	RED
22	Y4-		RED/WHT
23	Z+	Encoder Output Z (if applicable)	BLK
24	Z-		BLK/WHT
25	B+	Encoder Output B (if applicable)	GRN
26	B-		GRN/WHT
27	A+	Encoder Output A (if applicable)	ORG
28	A-		ORG/WHT

◇ General Purpose I/O Cable(shielded) (TSM17/23/24/34)

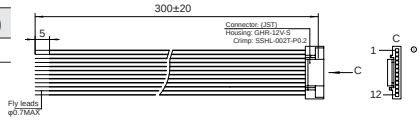
P/N	Length (L)
1116-100	1m
1116-200	2m
1116-300	3m
1116-500	5m



Pin No.	Assignment	Description	Color
1	X1+	High Speed Digital Input	BLU/WHT
2	X1-		BLU/BLK
3	X2+	High Speed Digital Input	GRN/WHT
4	X2-		GRN/BLK
5	X3	X3 Digital Input	BLU
6	X4	X4 Digital Input	PUR
7	X5	X5 Digital Input	YEL
8	X6	X6 Digital Input	GRN
9	XCOM	X Digital Input COM	ORG
10	+5V	+5V Analog Voltage	RED
11	AIN	Analog Input	WHT
12	GND	Analog Input Ground	BLK
13	X7+	X7 Digital Input	BRN/WHT
14	X7-		BRN/BLK
15	X8+	X8 Digital Input	GRY/WHT
16	X8-		GRY/BLK
17	Y1	Y1 Digital Output	BRN
18	Y2	Y2 Digital Output	GRY
19	Y3	Y3 Digital Output	PNK
20	YCOM	Y Output COM	YEL/GRN
21	Y4+	Y4 Digital Output	PUR/WHT
22	Y4-		PUR/BLK
23	Z+	Encoder Output Z (if applicable)	YEL/WHT
24	Z-		YEL/BLK
25	B+	Encoder Output B (if applicable)	ORG/WHT
26	B-		ORG/BLK
27	A+	Encoder Output A (if applicable)	RED/WHT
28	A-		RED/BLK

◇ Power + Comm + I/O Cable (Flying leadsTSM11 only)

P/N	Length (L)
1109-030	0.3m

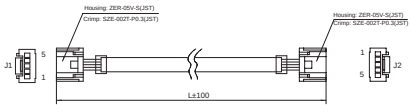


Pin No.	Assignment	Description	Color
1	Y2	Y2 Digital Output	PUR
2	Y1	Y1 Digital Output	ORN
3	X4	X4 Digital Input	WHT

Pin No.	Assignment	Description	Color
4	X3	X3 Digital Input	BRN
5	X2	High Speed Digital Input	YEL
6	X1	High Speed Digital Input	GRY
7	RXD-	RS-422/485 Data Receive-	GRN/WHT
8	RXD+	RS-422/485 Data Receive+	GRN
9	TXD-	RS-422/485 Data Transmit-	BLU/WHT
10	TXD+	RS-422/485 Data Transmit+	BLU
11	V+	Power Supply +	RED
12	V-	Power GND	BLK

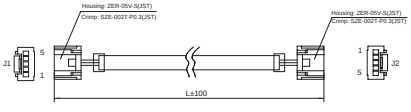
◇ RS-485 Daisy Chain Communication Cable (TSM17/23/24/34)

P/N	Length (L)
2111-025	0.25m
2111-050	0.5m
2111-100	1m
2111-300	3m



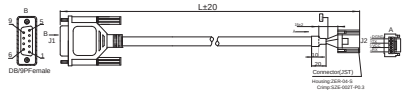
◇ CANopen Daisy Chain Communication Cable (TSM17/23/24/34)

P/N	Length (L)
2112- 025	0.25m
2112- 050	0.5m
2112-100	1m
2112-300	3m



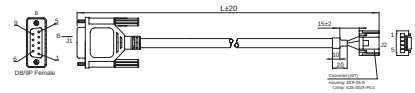
◇ RS-232 Communication Cable(P/S/Q Type) (TSM17/23/24/34)

P/N	Length (L)
2101-150	1.5m



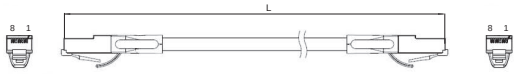
◇ RS-232 Communication Cable(C Type) (TSM17/23/24/34)

P/N	Length (L)
2113-150	1.5m



◇ Ethernet Daisy Chain Communication Cable (Q/IP Type) (TSM34 only)

Common Type	Shielded Type	Length(L)
2012-030	2013-030	0.3m
2012-300	2013-300	3m



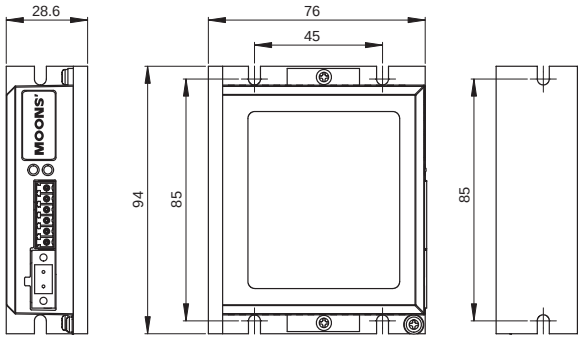
◇ Regeneration Clamp

P/N: RC880

When using regulated power supply you may encounter a problem with regeneration. The kinetic energy caused by regeneration is transferred back to the power supply. This can trip the overvoltage protection of a switching power supply, causing it to shut down.

MOONS' offer the RC880 “regeneration clamp” to solve this problem. If in doubt, use an RC880 for your first installation. If the “regen” LED on the RC880 never flashes, you don’t need the clamp.

Dimensions(Unit:mm)



■ USB Converter

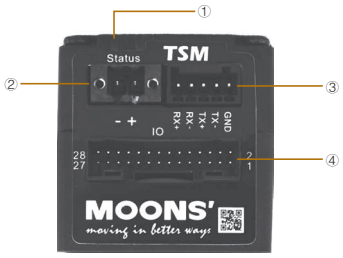
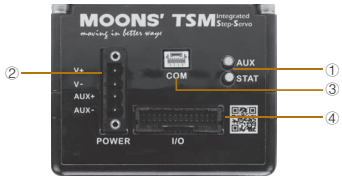
Model: MS-USB-RS-232-01
Description: USB-RS-232 converter

Model: MS-USB-RS-485-01
Description: USB-RS-485 converter

Model: MS-USB-CAN-01
Description: USB-CAN converter

■ Connection and Operation(-P Pulse Input Type)

◇ Names and Functions of Parts

TSM17P	TSM23/24P	TSM34P
		

① LED Displays

Indication	Color	Function	When Activated
Operation	Green	Power on indication	When driver is powered up
Alarm	Red	Alarm indication	Flashes when in protection
Operation	Yellow	Auxiliary Power on indication	When AUX powered up

- LED Error Codes

TSM uses red and green LEDs to indicate status. When the motor is enabled, the green LED flashes slowly. When the green LED is solid, the motor is disabled. Errors are indicated by combinations of red and green flashes as shown in Page of Alarm information.

Apart from the main power supply, TSM34 also has an auxiliary power input (AUX power) for keep alive function of the drive. When the main power supply is off, the AUX power will keep the logic power on, allowing the drive to remember its state data (motor position, etc.). This allows the motor to resume operation from its previous position without a homing routine when the main power is switched back on.

② Power Connector

TSM17/23/24

P/N: Weidmuller 1615780000

	Description
+	Power Supply +
-	Power Supply -

TSM34

P/N: Phoenix Contact 5452570

	Description
V+	Power Supply +
V-	Power Supply -
AUX+	Auxiliary Power Supply+
AUX-	Auxiliary Power Supply-

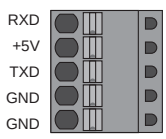
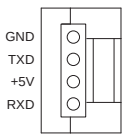
③ Communication Connector

TSM17P

P/N: Phoenix 1881354

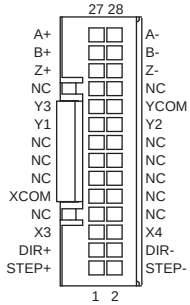
TSM23/24/34P

Housing P/N: JST ZER-04-S
Crimp P/N: JST SZE-002T-P0.3

TSM17P	TSM23/24/34P
	

Pin.	Description	Pin.	Description
RXD	Data Receive	RXD	Data Receive
+5V	+5V Power Supply	+5V	+5V Power Supply
TXD	Data Transmit	TXD	Data Transmit
GND	Ground	GND	Ground

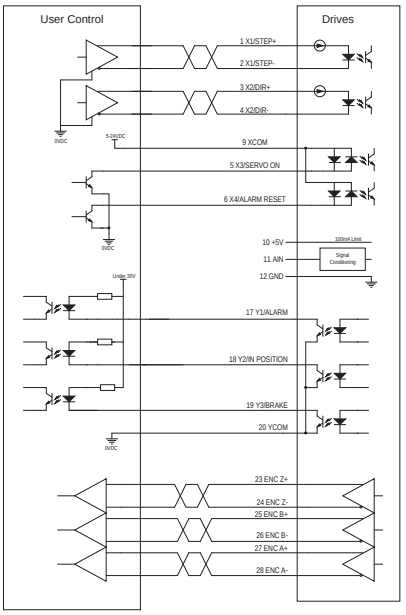
④ I/O Signal Connector



Housing P/N: JST PUDP-28V-S
Crimp P/N: JST SPUD-001T-P0.5

Pin no.	Assignment	Description
1	STEP+	High Speed Digital Input
2	STEP-	
3	DIR+	Direction Input
4	DIR-	
5	X3	X3 Digital Input
6	X4	X4 Digital Input
7	NC	N/C
8	NC	
9	XCOM	Digital Input COM
10	NC	N/C
11	NC	
12	NC	
13	NC	
14	NC	
15	NC	
16	NC	
17	Y1	Y1 Digital Output
18	Y2	Y2 Digital Output
19	Y3	Y3 Digital Output
20	YCOM	Digital Output COM
21	NC	N/C
22	NC	
23	Z+	Encoder Output Z
24	Z-	
25	B+	Encoder Output B
26	B-	
27	A+	Encoder Output A
28	A-	

◇ Wiring Diagram



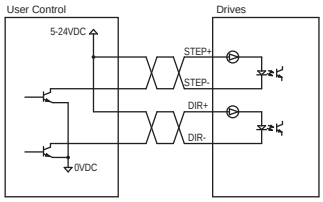
◇ Description of Input/Output Signals

Input (output) "ON" indicates that the current is sent into the photocoupler (transistor) inside the driver. Input (output) "OFF" indicates that the current is not sent into the photocoupler (transistor) inside the driver. The input/output remains "OFF" if nothing is connected.

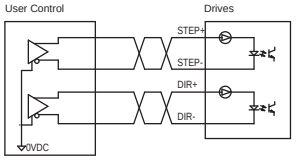
- Circuit above shows when pulse input is line driver type
- Pulse singal input range 5-24VDC
- Digital singal input range 5-24VDC
- Use a multi-core, twisted-pair shielded wire of AWG28 to 24 for the control input/output signal line, and keep wiring as short as possible
- Provide safty distance between the control I/O signal lines and power lines

● Pulse Input Circuit and Sample Connection

With Open Collector Output



With Line Driver Output



● Pulse Input Mode

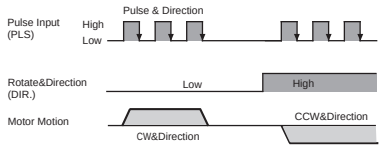
Pulse & Direction

When the Pulse input is turned ON while the DIR input is ON, the motor will rotate by one step in one direction.

When the Pulse input is turned ON while the DIR input is OFF, the motor will rotate by one step the other direction.

*Direction definition of DIR input can be configured via **Step-Servo** Quick Tuner.

The chart below shows motor configured as while the DIR input is ON, the motor will rotate by CW direction

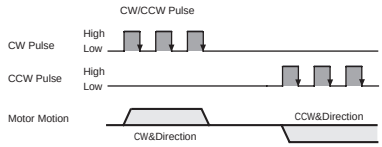


CW/CCW Pulse

When the X1 input is turned ON, the motor will rotate by one step in One direction. When the X2 input is turned ON, the motor will rotate by one step in the other direction.

*Direction definition can be configured via **Step-Servo** Quick Tuner.

The chart below shows motor configured as while the X1 input is ON, the motor will rotate by one step in CW direction

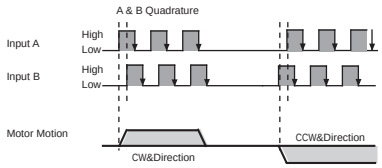


A & B Quadrature

The motor will move according to signals that are fed to the drive from a two channel increamental master encoder.

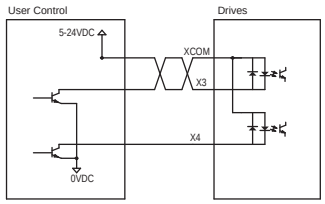
Direction definition can be configured via **Step-Servo** Quick Tuner. Direction is determined via which channel leads the other.

The chart below shows motor configured as while X1 Leads X2, the motor will rotate by CW direction.

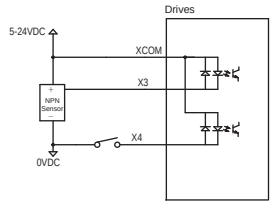


● Digital Input Circuit and Sample Connection

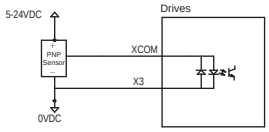
With Open Collector Output



With NPN type Sensor



With PNP type Sensor



Servo ON Input

X3 can be configured as Enable signal to excite the motor.

Alarm Reset Input

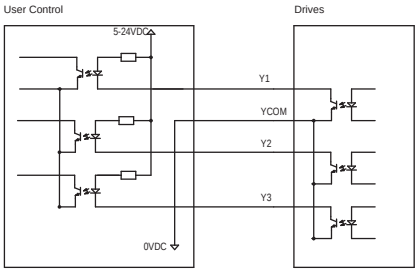
X4 can be configured as Reset signal to clear the alarm and turns to normal stutus as Servo OFF.

Caution: Please make sure there's no error in system before you clear an Alarm.

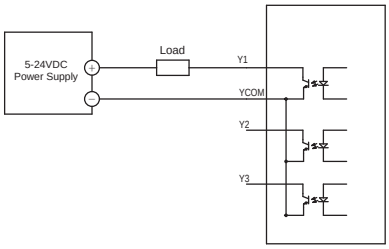
◇ Connecting using Digital Outputs

- Output Circuit and Sample Connection

Open Collector Output



Driving external load



Alarm Output

Y1 can be configured as signal output if a fault occurs, meanwhile the red LED will flash.

In Position Output

Y2 can be configured as signal output when position error less than a user-defined count value.

Moving Output

Y2 can be configured as signal output when motor is moving.

Brake Output

Y3 can be configured as signal output to release brake.

Timing Output

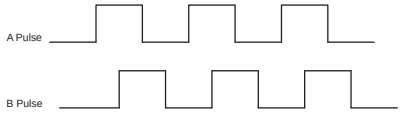
Y3 can be configured as Timing signal output, it will turn ON every time the motor output shaft rotates by 7.2°.50 pulses output with one rotation.

Tach Output

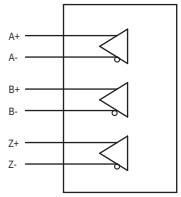
Y3 can be configured as Tach signal output, tach output produces pulses relative to the motor position with configurable resolution:100,200,400,800,1600.

- Encoder Output
  - Differential pulse output with channel A/B/Z
  - While motor rotates one revelotion, A-Phase/B Phase generate total 20,000 counts, Z-Phase generates one signal.
  - The B-Phase output has a 90° phase difference with respect to the A-Phase output. Phase A Leads B 90°while motor rotates by CW direction, phase B leads A 90°while motor rotates by CCW direction.

Pulse Output Signal Chart

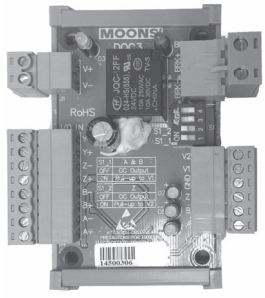


Encoder Output Circuit



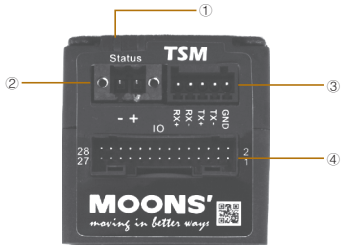
Note: If the controller cannot support differential signal input, you can choose the module that it can convert the differential signal into open-collector output.

Module part number: DOC3



■ Connection and Operation(-S/Q Controller Type)

◇ Names and Functions of Parts

TSM17S/Q	TSM23/24S/Q	TSM34Q
		

① LED Displays

Indication	Color	Function	When Activated
Operation	Green	Power on indication	When driver is powered up
Alarm	Red	Alarm indication	Flashes when in protection
Operation	Yellow	Auxiliary Power on indication	When AUX powered up

- LED Error Codes

TSM uses red and green LEDs to indicate status. When the motor is enabled, the green LED flashes slowly. When the green LED is solid, the motor is disabled. Errors are indicated by combinations of red and green flashes as shown in Page of Alarm information.

Apart from the main power supply, TSM34 also has an auxiliary power input (AUX power) for keep alive function of the drive. When the main power supply is off, the AUX power will keep the logic power on, allowing the drive to remember its state data (motor position, etc.). This allows the motor to resume operation from its previous position without a homing routine when the main power is switched back on.

② Power Connector

TSM17/23/24

P/N: Weidmuller 1615780000

	Description
+	Power Supply +
-	Power Supply -

TSM34

P/N: Phoenix Contact 5452570

	Description
V+	Power Supply +
V-	Power Supply -
AUX+	Auxiliary Power Supply+
AUX-	Auxiliary Power Supply-

③ Communication Connector

TSM17 S/Q

P/N: Phoenix 1881354

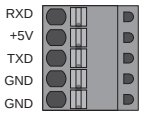
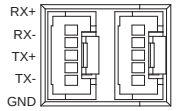
TSM23/24/34 S/Q(RS-232)

Housing P/N: JST ZER-04-S
Crimp P/N: JST SZE-002T-P0.3

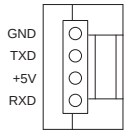
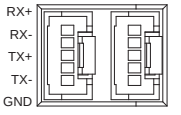
TSM23/24/34 S/Q(RS-485)

Housing P/N: JST ZER-05V-S
Crimp P/N: JST SZE-002T-P0.3

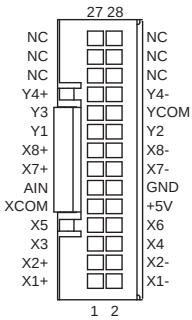
TSM17S/Q

RS-232		RS-485	
			
Pin.	**Description**	**Pin.**	**Description**
RXD	Data Receive	RX+	Data Receive +
+5V	+5V Power Supply	RX-	Data Receive -
TXD	Data Transmit	TX+	Data Transmit +
GND	Ground	TX-	Data Transmit -
GND	Ground	GND	Ground

TSM23/24/34S/Q

RS-232		RS-485	
			
Pin.	**Description**	**Pin.**	**Description**
GND	Ground	RX+	Data Receive +
TX	Data Transmit	RX-	Data Receive -
+5V	+5V Power Supply	TX+	Data Transmit +
RX	Data Receive	TX-	Data Transmit -
		GND	Ground

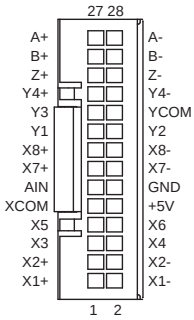
④ TSM17S/Q I/O Signal Connector



Housing P/N: JST PUDP-28V-S
Crimp P/N: JST SPUD-001T-P0.5

Pin no.	Assignment	Description
1	X1+/STEP+	High Speed Digital Input
2	X1-/STEP-	
3	X2+/DIR+	High Speed Digital Input
4	X2-/DIR-	
5	X3	X3 Digital Input
6	X4	X4 Digital Input
7	X5	X5 Digital Input
8	X6	X6 Digital Input
9	XCOM	Digital Input COM
10	+5	+5V OUT 100mA max.
11	AIN	Analog Input
12	GND	Aanlog Ground
13	X7+	X7 Digital Input
14	X7-	
15	X8+	X8 Digital Input
16	X8-	
17	Y1	Y1 Digital Output
18	Y2	Y2 Digital Output
19	Y3	Y3 Digital Output
20	YCOM	Digital Output COM
21	Y4+	Y4 Digital Output
22	Y4-	
23	NC	N/C
24	NC	
25	NC	
26	NC	
27	NC	
28	NC	

④ TSM23/24/34S/Q I/O Signal Connector



Housing P/N: JST PUDP-28V-S
Crimp P/N: JST SPUD-001T-P0.5

Pin no.	Assignment	Description
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3	X2+/DIR+	High Speed Digital Input
4	X2-/DIR-	
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6	X4	X4 Digital Input
7	X5	X5 Digital Input
8	X6	X6 Digital Input
9	XCOM	Digital Input COM
10	+5	+5V OUT 100mA max.
11	AIN	Analog Input
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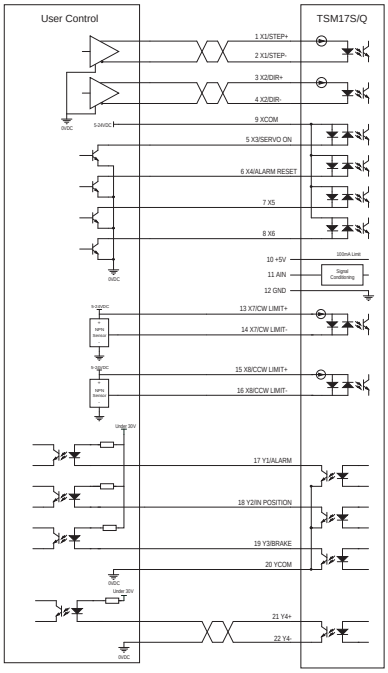
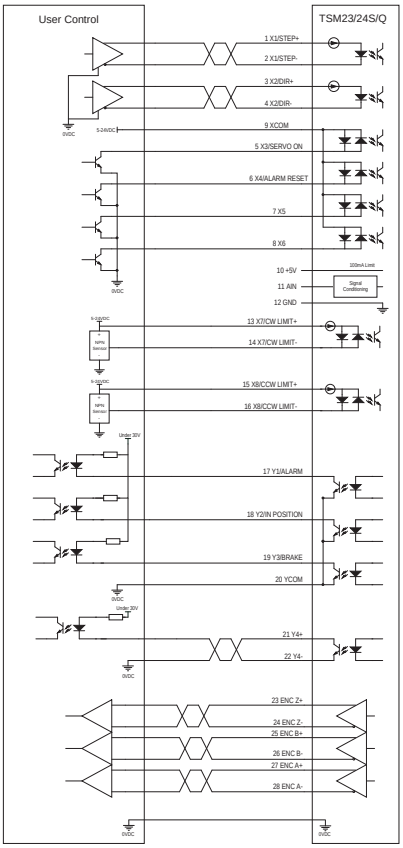
13	X7+	X7 Digital Input
14	X7-	
15	X8+	X8 Digital Input
16	X8-	
17	Y1	Y1 Digital Output
18	Y2	Y2 Digital Output
19	Y3	Y3 Digital Output
20	YCOM	Digital Output COM
21	Y4+	Y4 Digital Output
22	Y4-	
23	Z+	Encoder Output Z
24	Z-	
25	B+	Encoder Output B
26	B-	
27	A+	Encoder Output A
28	A-	

◇ Wiring Diagram

- TSM17S/Q



- TSM23/24/34S/Q



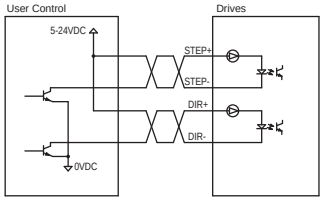
◇ Description of Input/Output Signals

Input (output) "ON" indicates that the current is sent into the photocoupler (transistor) inside the driver. Input (output) "OFF" indicates that the current is not sent into the photocoupler (transistor) inside the driver. The input/output remains "OFF" if nothing is connected.

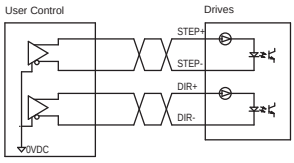
- Circuit above shows when pulse input is line driver type
- Pulse singal input range 5-24VDC
- Digital singal input range 5-24VDC
- Use a multi-core, twisted-pair shielded wire of AWG28 to 24 for the control input/output signal line, and keep wiring as short as possible
- Provide safty distance between the control I/O signal lines and power lines

- Pulse Input Circuit and Sample Connection

With Open Collector Output



With Line Driver Output



- Pulse Input Mode

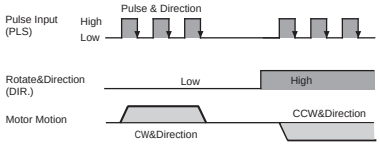
Pulse & Direction

When the Pulse input is turned ON while the DIR input is ON, the motor will rotate by one step in one direction.

When the Pulse input is turned ON while the DIR input is OFF, the motor will rotate by one step the other direction.

*Direction definition of DIR input can be configured via **Step-Servo** Quick Tuner.

The chart below shows motor configured as while the DIR input is ON, the motor will rotate by CW direction

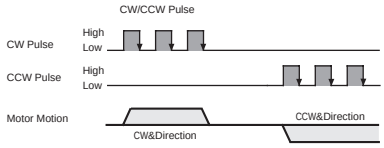


CW/CCW Pulse

When the X1 input is turned ON, the motor will rotate by one step in One direction. When the X2 input is turned ON, the motor will rotate by one step in the other direction.

*Direction definition can be configured via **Step-Servo** Quick Tuner.

The chart below shows motor configured as while the X1 input is ON, the motor will rotate by one step in CW direction

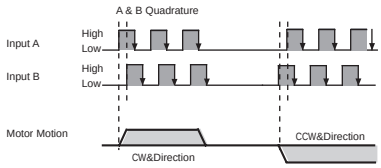


A & B Quadrature

The motor will move according to signals that are fed to the drive from a two channel increamental master encoder.

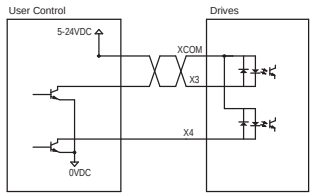
Direction definition can be configured **Step-Servo** Quick Tuner. Direction is determined via which channel leads the other.

The chart below shows motor configured as while X1 Leads X2, the motor will rotate by CW direction.

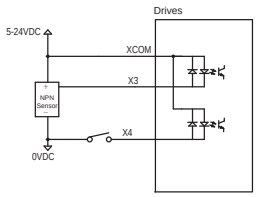


- Digital Input Circuit and Sample Connection

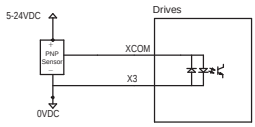
With Open Collector Output



With NPN type Sensor



With PNP type Sensor



Servo ON Input

X3 can be configured as Enable signal to excite the motor.

Alarm Reset Input

X4 can be configured as Reset signal to clear the alarm and turns to normal stutus as Servo OFF.

Caution: Please make sure there's no error in system before you clear an Alarm.

CW/CCW Limit Input

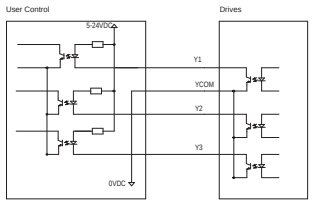
X7 can be configured as CW limit signal input, X8 can be configured as CCW limit signal input.

When either limit signal actives, motor will Servo OFF immidiately and indicate an Alarm.(Unless motors works in Homing mode and defined otherwize)

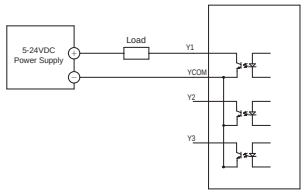
◇ Connecting using Digital Outputs

- Output Circuit and Sample Connection

Open Collector Output



Driving external load



Alarm Output

Y1 can be configured as signal output if a fault occurs, meanwhile the red LED will flash.

In Position Output

Y2 can be configured as signal output when position error less than a user-defined count value.

Moving Output

Y2 can be configured as signal output when motor is moving.

Brake Output

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Y4 can be configured as Timing signal output, it will turn ON every time the motor output shaft rotates by 7.2°.50 pulses output with one rotation.

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- Encoder Output
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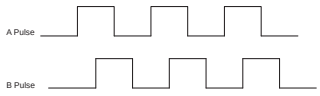
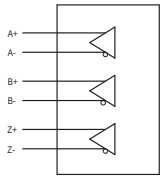
  - While motor rotates one revelotion, A-Phase/B Phase generate total 20,000 counts, Z-Phase generates one signal.
  - The B-Phase output has a 90° phase difference with respect to the A-Phase output. Phase A Leads B 90°while motor rotates by CW direction, phase B leads A 90°while motor rotates by CCW direction.

Pulse Output Signal Chart

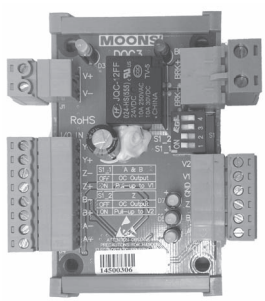


Encoder Output Circuit



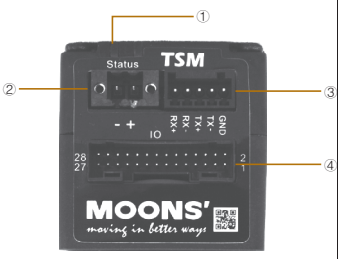
Note: If the controller cannot support differential signal input, you can choose the module that it can convert the differential signal into open-collector output.

Module part number: DOC3



■ Connection and Operation(-C CANopen Type)

◇ Names and Functions of Parts

TSM17C	TSM23/24C	TSM34C
		

① LED Displays

Indication	Color	Function	When Activated
Operation	Green	Power on indication	When driver is powered up
Alarm	Red	Alarm indication	Flashes when in protection
Operation	Yellow	Auxiliary Power on indication	When AUX powered up

- LED Error Codes

TSM uses red and green LEDs to indicate status. When the motor is enabled, the green LED flashes slowly. When the green LED is solid, the motor is disabled. Errors are indicated by combinations of red and green flashes as shown in Page of Alarm information.

Apart from the main power supply, TSM34 also has an auxiliary power input (AUX power) for keep alive function of the drive. When the main power supply is off, the AUX power will keep the logic power on, allowing the drive to remember its state data (motor position, etc.). This allows the motor to resume operation from its previous position without a homing routine when the main power is switched back on.

② Power Connector

TSM17/23/24

P/N: Weidmuller 1615780000

	Description
+	Power Supply +
-	Power Supply -

TSM34

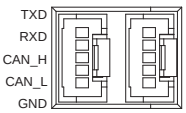
P/N: Phoenix Contact 5452570

	Description
V+	Power Supply +
V-	Power Supply -
AUX+	Auxiliary Power Supply+
AUX-	Auxiliary Power Supply-

③ Communication Connector

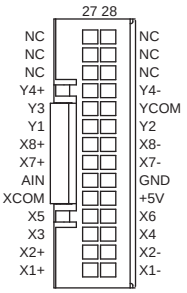
Housing P/N: JST ZER-05V-S
Crimp P/N: JST SZE-002T-PO.3

CANopen Type



Pin.	Description
TXD	RS-232 Data Transmit
RXD	RS-232 Data Receive
CAN_H	CAN+
CAN_L	CAN-
GND	Ground

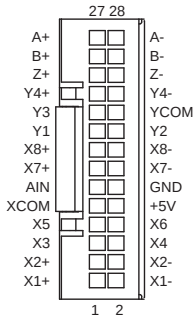
④ I/O Signal Connector(TSM17)



Housing P/N: JST PUDP-28V-S
Crimp P/N: JST SPUD-001T-P0.5

Pin no.	Assignment	Description
1	X1+	X1 Digital Input
2	X1-	
3	X2+	X2 Digital Input
4	X2-	
5	X3	X3 Digital Input
6	X4	X4 Digital Input
7	X5	X5 Digital Input
8	X6	X6 Digital Input
9	XCOM	Digital Input COM
10	+5	+5V OUT
11	AIN	Analog Input
12	GND	Aanlog Ground
13	X7+	X7 Digital Input
14	X7-	
15	X8+	X8 Digital Input
16	X8-	
17	Y1	Y1 Digital Output
18	Y2	Y2 Digital Output
19	Y3	Y3 Digital Output
20	YCOM	Digital Output COM
21	Y4+	Y4 Digital Output
22	Y4-	
23	NC	N/C
24	NC	
25	NC	
26	NC	
27	NC	
28	NC	

④ I/O Signal Connector(TSM23/24/34)



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Crimp P/N: JST SPUD-001T-P0.5

Pin no.	Assignment	Description
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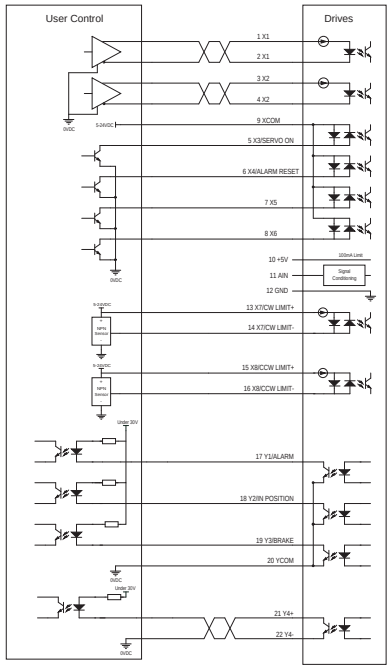
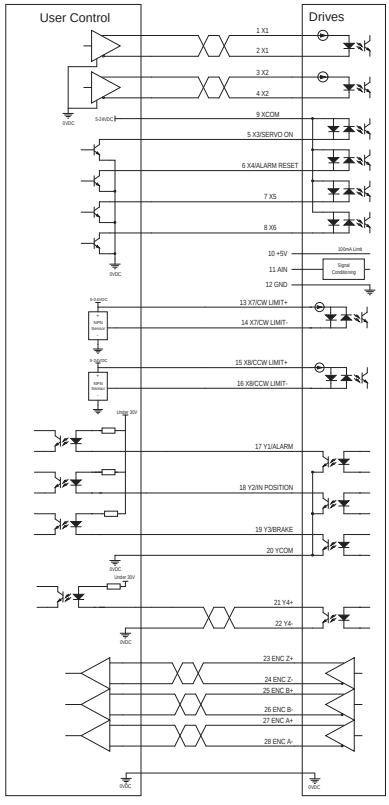
14	X7-	
15	X8+	X8 Digital Input
16	X8-	
17	Y1	Y1 Digital Output
18	Y2	Y2 Digital Output
19	Y3	Y3 Digital Output
20	YCOM	Digital Output COM
21	Y4+	Y4 Digital Output
22	Y4-	
23	Z+	Encoder Output Z
24	Z-	
25	B+	Encoder Output B
26	B-	
27	A+	Encoder Output A
28	A-	

◇ Wiring Diagram

- TSM17C



- TSM23/24/34C



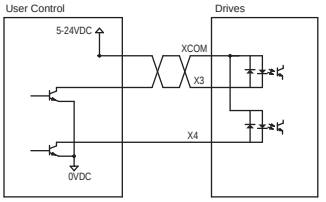
◇ Description of Input/Output Signals

Input (output) "ON" indicates that the current is sent into the photocoupler (transistor) inside the driver. Input (output) "OFF" indicates that the current is not sent into the photocoupler (transistor) inside the driver. The input/output remains "OFF" if nothing is connected.

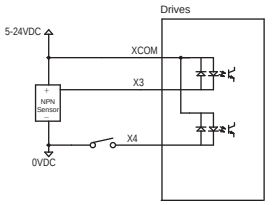
- Circuit above shows when pulse input is line driver type
- Pulse singal input range 5-24VDC
- Digital singal input range 5-24VDC
- Use a multi-core, twisted-pair shielded wire of AWG28 to 24 for the control input/output signal line, and keep wiring as short as possible
- Provide safty distance between the control I/O signal lines and power lines

● Digital Input Circuit and Sample Connection

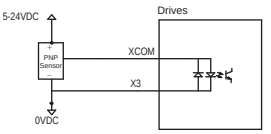
With Open Collector Output



With NPN type Sensor



With PNP type Sensor



Servo ON Input

X3 can be configured as Enable signal to excite the motor.

Alarm Reset Input

X4 can be configured as Reset signal to clear the alarm and turns to normal stutus as Servo OFF.

Caution: Please make sure there's no error in system before you clear an Alarm.

CW/CCW Limit Input

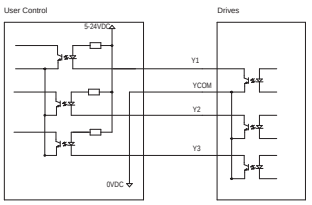
X7 can be configured as CW limit signal input, X8 can be configured as CCW limit signal input.

When either limit signal actives, motor will Servo OFF immidiately and indicate an Alarm.(Unless motors works in Homing mode and defined otherwize)

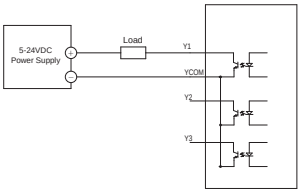
◇ Connecting using Digital Outputs

● Output Circuit and Sample Connection

Open Collector Output



Driving external load



Alarm Output

Y1 can be configured as signal output if a fault occurs, meanwhile the red LED will flash.

In Position Output

Y2 can be configured as signal output when position error less than a user-defined count value.

Moving Output

Y2 can be configured as signal output when motor is moving.

Brake Output

Y3 can be configured as signal output to release brake.

Timing Output

Y4 can be configured as Timing signal output, it will turn ON every time the motor output shaft rotates by 7.2°.50 pulses output with one rotation.

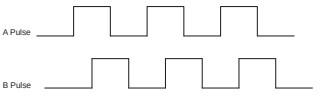
Tach Output

Y4 can be configured as Tach signal output, tach output produces pulses relative to the motor position with configurable resolution:100,200,400,800,1600.

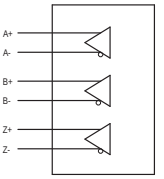
● Encoder Output

- Differential pulse output with channel A/B/Z
- While motor rotates one revelotion, A-Phase/B Phase generate total 20,000 counts, Z-Phase generates one signal.
- The B-Phase output has a 90° phase difference with respect to the A-Phase output. Phase A Leads B 90°while motor rotates by CW direction, phase B leads A 90°while motor rotates by CCW direction.

Pulse Output Signal Chart

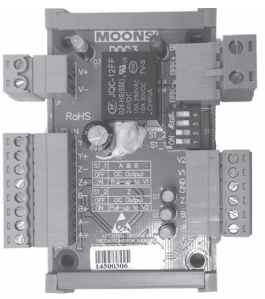


Encoder Output Circuit



Note: If the controller cannot support differential signal input, you can choose the module that it can convert the differential signal into open-collector output.

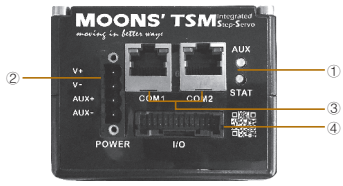
Module part number: DOC3



■ Connection and Operation(-IP EtherNet/IP Type)

◇ Names and Functions of Parts

TSM34Q/IP Ethernet version



① LED Displays

Indication	Color	Function	When Activated
Operation	Green	Power on indication	When driver is powered up
Alarm	Red	Alarm indication	Flashes when in protection
Operation	Yellow	Auxiliary Power on indication	When AUX powered up

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TSM uses red and green LEDs to indicate status. When the motor is enabled, the green LED flashes slowly. When the green LED is solid, the motor is disabled. Errors are indicated by combinations of red and green flashes as shown in Page of Alarm information.

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② Power Connector

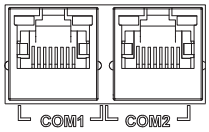
P/N: Phoenix Contact 5452570

	Description
V+	Power Supply +
V-	Power Supply -
AUX+	Auxiliary Power Supply+
AUX-	Auxiliary Power Supply-

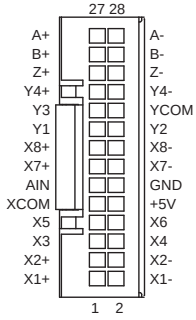
③ Communication Connector

Dual port Ethernet (RJ45 connector)

EtherNet/IP Type



④ I/O Signal Connector



Housing P/N: JST PUDP-28V-S
Crimp P/N: JST SPUD-001T-P0.5

Pin no.	Assignment	Description
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2	X1-	
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14	X7-	
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17	Y1	Y1 Digital Output
18	Y2	Y2 Digital Output
19	Y3	Y3 Digital Output
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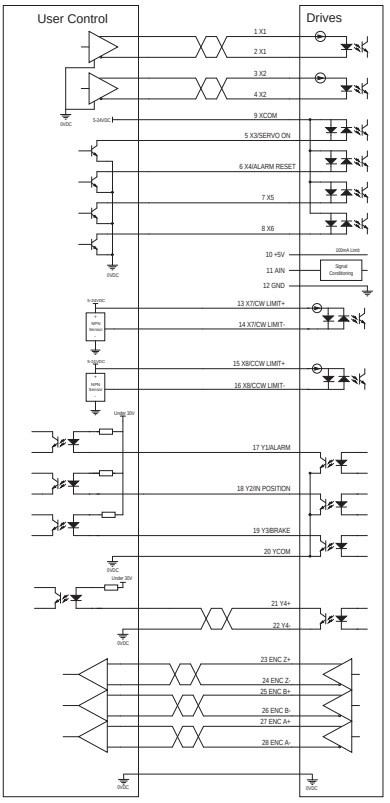
21	Y4+	Y4 Digital Output
22	Y4-	
23	Z+	Encoder Output Z
24	Z-	
25	B+	Encoder Output B
26	B-	
27	A+	Encoder Output A
28	A-	

◇ Wiring Diagram



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- Pulse singal input range 5-24VDC
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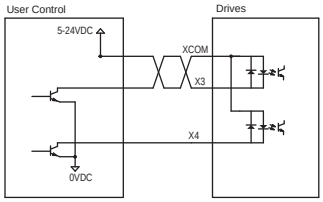
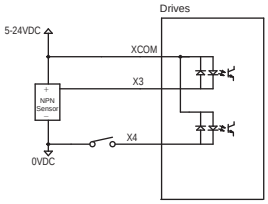
● Digital Input Circuit and Sample Connection

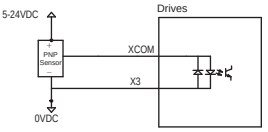
With Open Collector Output



With NPN type Sensor



With PNP type Sensor



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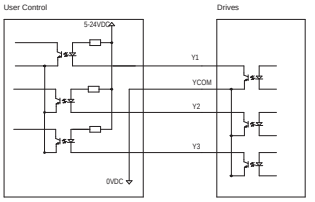
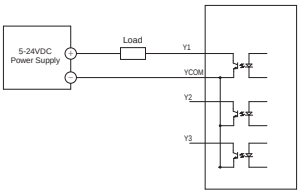
◇ Connecting using Digital Outputs

● Output Circuit and Sample Connection

Open Collector Output



Driving external load



Alarm Output

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In Position Output

Y2 can be configured as signal output when position error less than a user-defined count value.

Moving Output

Y2 can be configured as signal output when motor is moving.

Brake Output

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Timing Output

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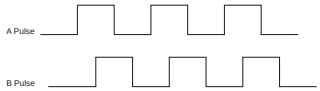
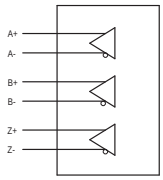
Pulse Output Signal Chart

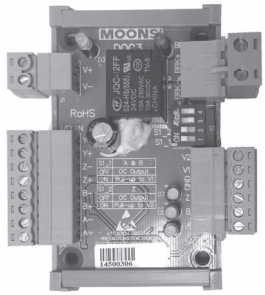


Encoder Output Circuit



Note: If the controller cannot support differential signal input, you can choose the module that it can convert the differential signal into open-collector output.

Module part number: DOC3



Alarm Information

Status Display via LEDs

TSM uses red and green LEDs to indicate status. When the motor is enabled, the green LED flashes slowly. When the green LED is solid, the motor is disabled. Errors are indicated by combinations of red and green flashes as shown below.

Code		Error
●	Solid green	No alarm, motor disabled
● ●	Flashing green	No alarm, motor enabled
● ●	1 red, 1 green	***Position limit***
● ● ●	1 red, 2 green	Move while disabled
● ● ●	2 red, 1 green	CCW limit
● ● ● ●	2 red, 2 green	CW limit
● ● ● ●	3 red, 1 green	***Drive over temperature***
● ● ● ● ●	3 red, 2 green	***Internal voltage out of range***
● ● ● ● ●	3 red, 3 green	Blank Q segment
● ● ● ● ●	4 red, 1 green	***Power supply over voltage***
● ● ● ● ●	4 red, 2 green	Power supply under voltage
● ● ● ● ● ●	4 red, 3 green	Non-volatile double error
● ● ● ● ● ●	5 red, 1 green	***Over current***
● ● ● ● ● ●	5 red, 2 green	Current foldback
● ● ● ● ● ● ●	6 red, 1 green	***Open winding***
● ● ● ● ● ● ●	6 red, 2 green	***Bad encoder***
● ● ● ● ● ● ●	7 red, 1 green	Communication error
● ● ● ● ● ● ●	7 red, 2 green	Flash memory error

● Show Red; ○ Show Green.

NOTE: Items in ***bold italic*** represent drive faults, which automatically disable the motor.

Auxiliary Power (AUX) LED (only TSM34)

If the auxiliary power is connected, this yellow LED will be solid when the power is on.