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

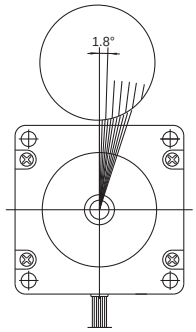
A stepper motor is an electromechanical device which converts electrical pulses into discrete mechanical movements. The shaft of a stepper motor rotates in discrete step increments when electrical command pulses are applied to it in the proper sequence.

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

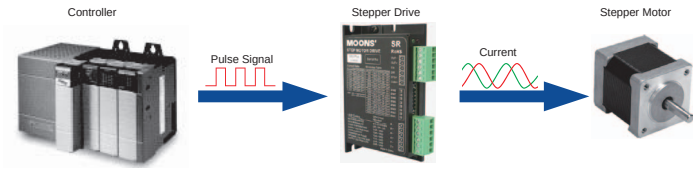
A stepper motor rotates with a fixed step angle, just like the second hand of a clock. This angle is called "basic step angle." MOONS' offers several types of "basic step angle" as standard motors: 2-phase stepping motors with a basic step angle of 0.9° and 1.8° and 3-phase stepping motors with a basic 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.

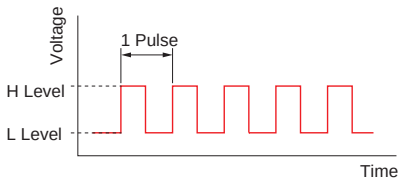


▪ What is a Pulse Signal?

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]

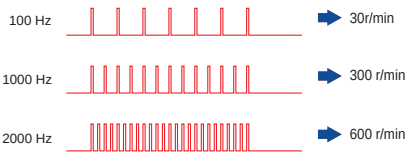
▪ The Speed is Proportional to the Pulse Frequency

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:

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

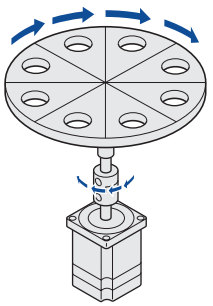
N : Speed of the motor output shaft [r/min]
θs : Step angle [deg/step]
f : Pulse frequency [Hz]
(Number of pulses input per second)



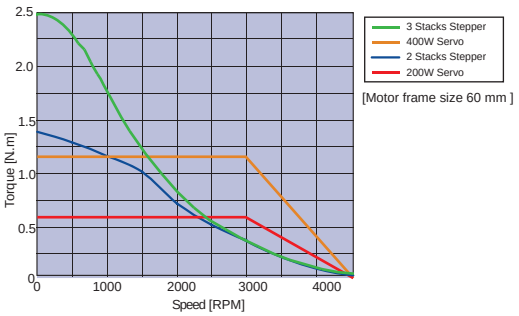
◇ Generating High Torque with a Compact Size

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

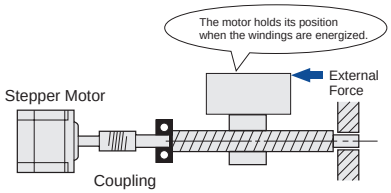


- Speed VS Torque Characteristics comparetion between servo and stepper with same motor size.



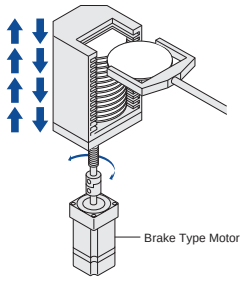
◇ The Motor Holds Itself at a Stopped Position

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.

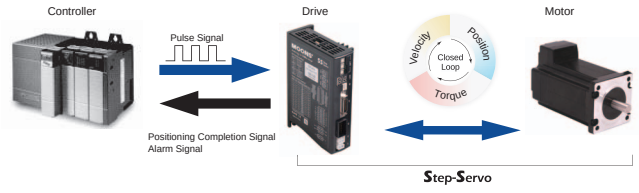


◇ Closed Loop Servo Control Stepper Motors

Step-Servo

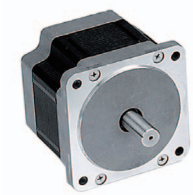
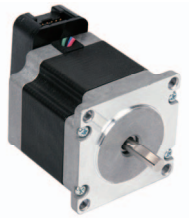
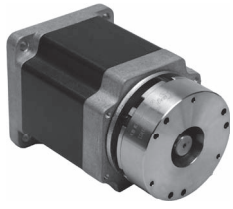
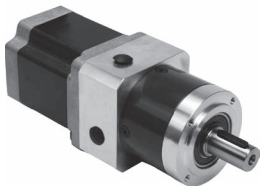
The **Step-Servo** is an innovative revolution for the world of stepping motor, it enhances the stepping motor with servo technology to create a product with exceptional feature and broad capability.

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.

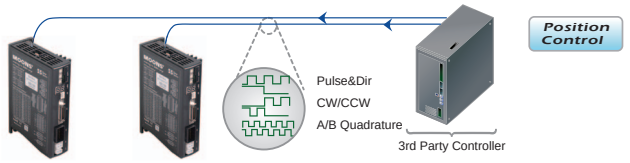
◇ Basic Type A basic model that is easy to use and designed with a balanced set of functions and characteristics.	
◇ Encoder Type Encoder type stepper gives the possiblity for closed loop control, encoder feedback signals can be used for position verification and enhanced performance as stall detection 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.

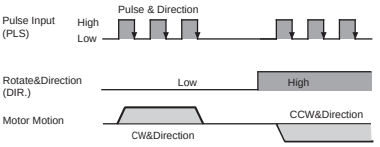
- Pulse & Direction

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.

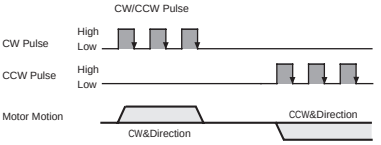


- CW/CCW Pulse

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.

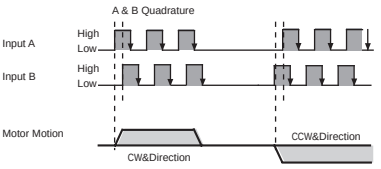


- A & B Quadrature

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

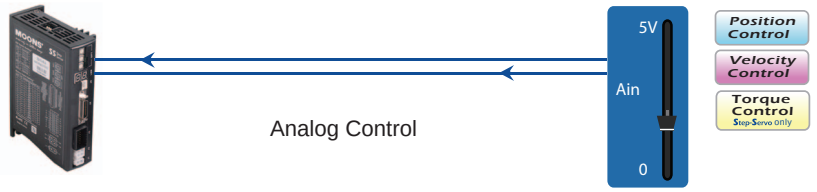
Direction definition can be configured via MOONS' software. Direction is determined via which channel leads the other.

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



◇ Analog Control

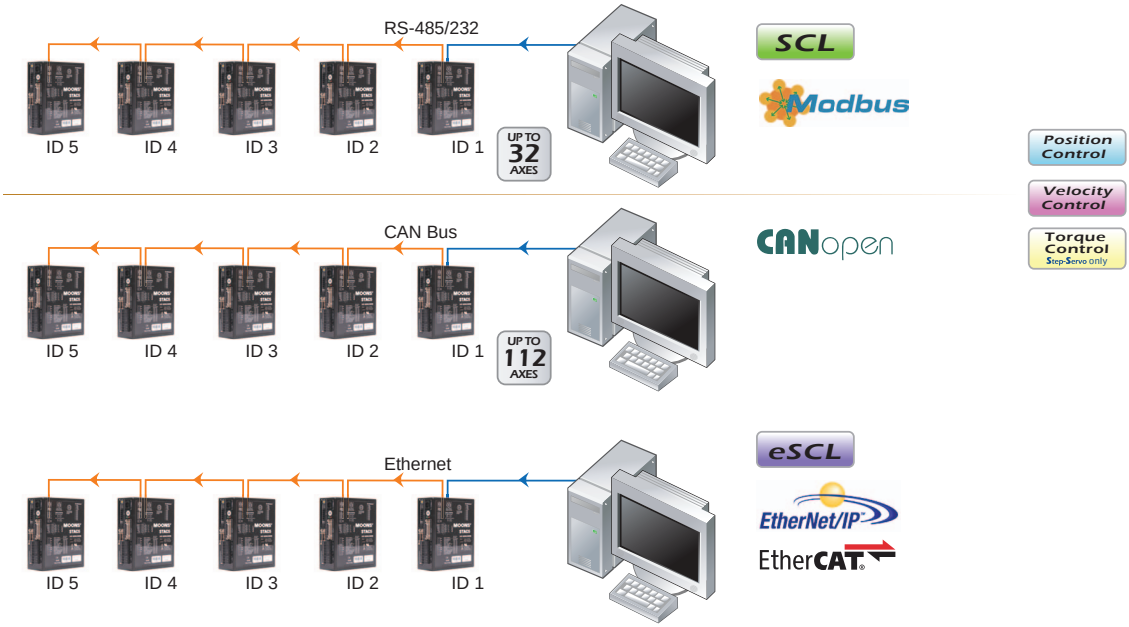
MOONS' stepper drive has the ability to accept analog signal for position and analog control, **Step-Servo** can also use analog signal for torque control.



Analog Control

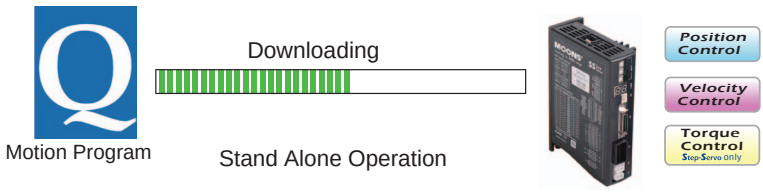
◇ Field Bus Control

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

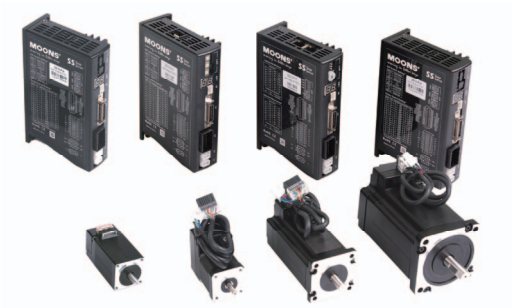
Control Modes:
- Pulse Control
- SCL Command Control
- Stand alone operation

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

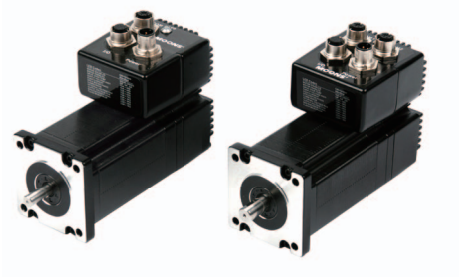
Microstep Resolution: Software set, up to 51200 steps/rev
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control
- Stand alone operation

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

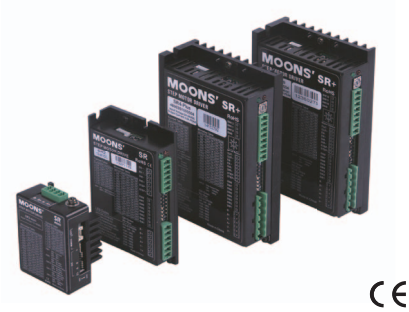
Inputs and Outputs:
- S/Q/C Type- 4 Digital Inputs, 2 Digital Outputs, 1 Analog Input
- Q-A/IP Type- 12 Digital Inputs, 6 Digital Outputs, 1 Analog Input

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

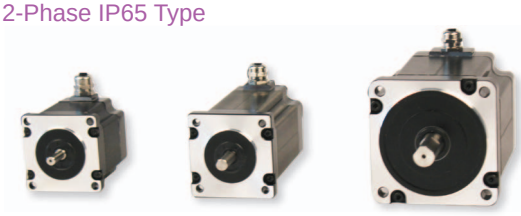
2-Phase Basic Type

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

2-Phase PowerPlus Series Type

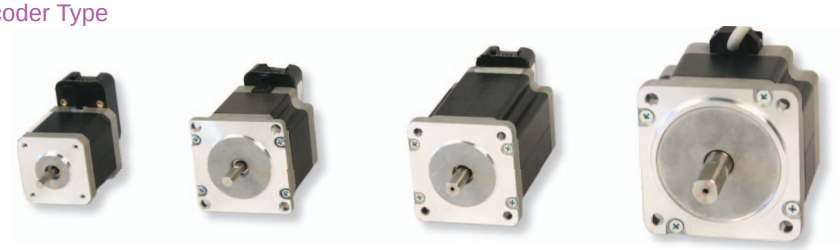
56mm

2-Phase IP65 Type



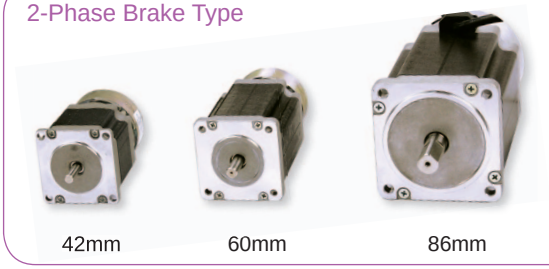
56mm 60mm 86mm

2-Phase Encoder Type



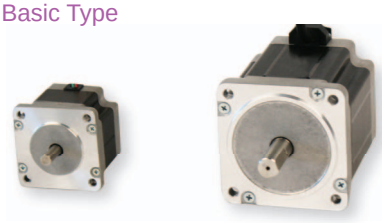
42mm 56mm 60mm 86mm

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

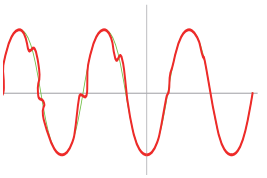
Integrated Stepper Motor

Integrated Stepper Motor

The Integrated Stepper Motor is an integrated Drive+Motor, fusing step motor and drive technologies into a single device, offering savings on space, wiring and cost over conventional motor and drive solutions.

Anti-Resonance

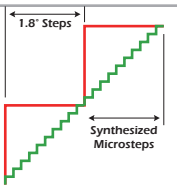
Step motor systems have a natural tendency to resonate at certain speeds. The STM integrated motors automatically calculate the system's natural frequency and apply damping to the control algorithm. This greatly improves midrange stability, allows higher speeds and greater torque utilization, and also improves settling times.



Provides better motor performance and higher speeds

Microstep Emulation

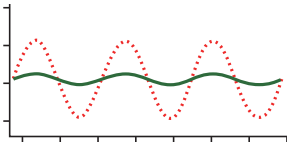
With Microstep Emulation, low resolution systems can still provide smooth motion. The drive can take low resolution step pulses and create fine resolution motion.



Delivers smoother motion in any application

Torque Ripple Smoothing

All step motors have an inherent low speed torque ripple that can affect the motion profile of the motor. By analyzing this torque ripple the system can apply a negative harmonic to counter this effect. This gives the motor much smoother motion at low speed.



Produces smoother motion at lower speeds

Command Signal Smoothing

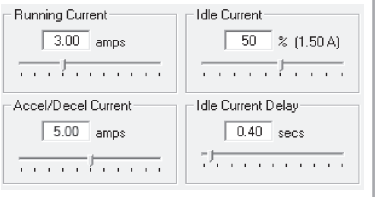
Command Signal smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components.

Improves smoother system performance

Dynamic Current Control for STM and SWM

Allows for three current settings to help the motor run cooler and reduce power consumption.

- Running Current - the current the drive will deliver for continuous motion.
- Accel Current - the current the drive will deliver when accelerating or decelerating.
- Idle Current - reduces current draw when motor is stationary.



System runs cooler

Stall Detection & Stall Prevention for STM and SWM

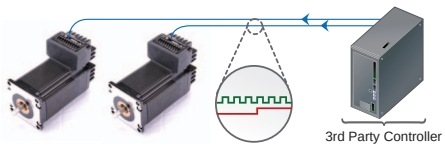
The optional encoder detects the rotor's position to provide Stall Detection and Stall Prevention functions.

Stall Detection notifies the system as soon as the required torque is too great for the motor, resulting in a loss of synchronization between the rotor and stator, also known as stalling. As soon as the motor stalls the drive triggers its fault output.

Stall Prevention automatically adjusts the excitation of the motor windings to maintain synchronization of the rotor and stator under all conditions. This means that motor position is maintained and corrected even when the required torque is too great for the motor. The stall prevention feature also performs position maintenance, which maintains the position of the motor shaft when at rest.

■ STM-R Control Options

Step & Direction

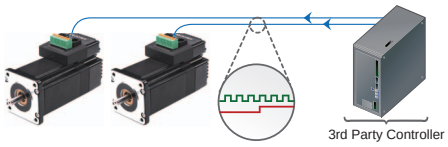


R

- Step & Direction
- CW & CCW pulse

■ STM&SWM Control Options

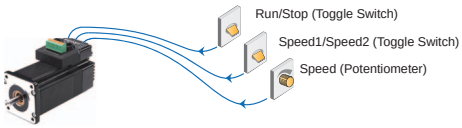
Step & Direction



S

- Step & Direction
- CW & CCW pulse
- A/B quadrature (encoder following)

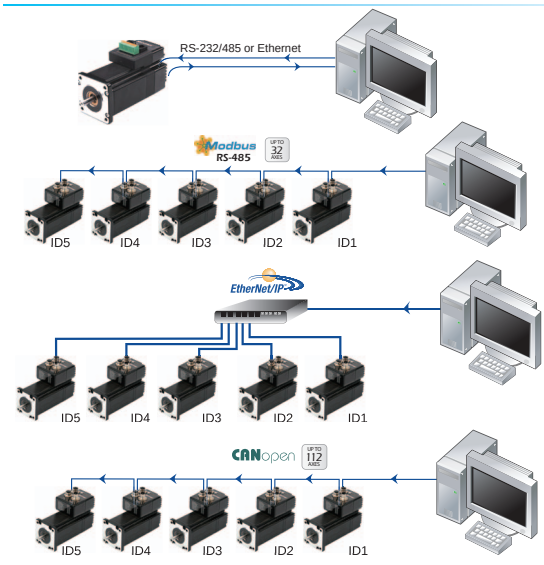
Oscillator / Run-Stop



S

- Software Configuration
- Two Speeds
- Vary speed with analog input
- Joystick compatible

Host Control



S & **Q**

RS-232

- Accepts commands from host PC or PLC

RS-485

- Accepts commands from host PC or PLC
- Multi-axis capable, up to 32 axes

Q & **IP**

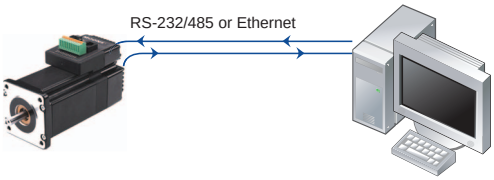
- Accepts commands from host PC or PLC
- 1000's of axes with Ethernet and EtherNet/IP

C

CANopen Model

- Connect to CANopen network
- CiA301 and CiA402 protocols
- Multi axle bus, up to 112 axis

Stand Alone Programmable



Q & **IP**

- Comprehensive text based languaged
- Download, store & execute programs
- High level features: multi-tasking, conditional programming and math functions
- Host interface while executing stored programs

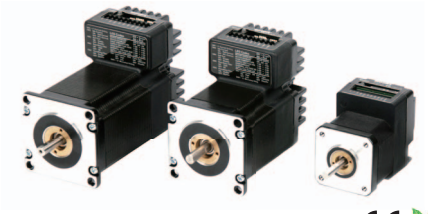
PC Based Software

MOONS' STM and SWM products support following software application make it easy to configure, testing and evaluation.

- ST Configurator
- Q Programmer
- RS-485 Bus Utility
- CANopen Test Tool

Overview of Integrated Stepper Motor

STM-R Series - Pluse Input Type Integrated Stepper Motor



Position Control

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

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

CE RoHS Compliant

STM Series - Controller Type Integrated Stepper Motor

Position Control
Velocity Control

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

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

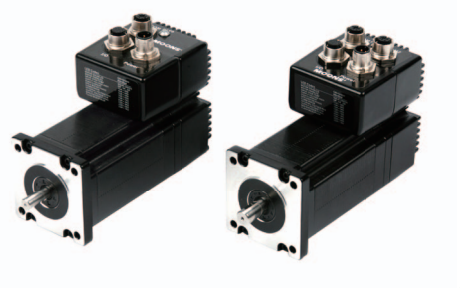
Microstep Resolution: Software set, up to 51200 steps/rev
Control Modes:
- Pulse Control
- Analog Control
- Field Bus Control
- Stand alone operation

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



Position Control
Velocity Control

Frame Size: 60mm
Input Voltage(Typical): 12-70VDC
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(Daisy Chain for RS-485 and CANopen)
- Stand alone operation

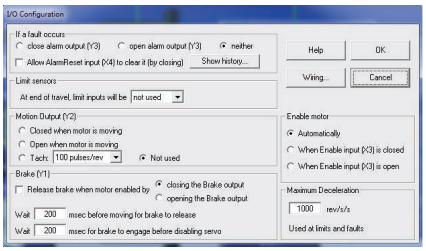
Inputs and Outputs:
- SF/QF Type- 4 Configurable digital Inputs/Outputs, 1 Analog Input
- S/Q/IP Type- 3 Digital Inputs, 1 Digital Output, 1 Analog Input

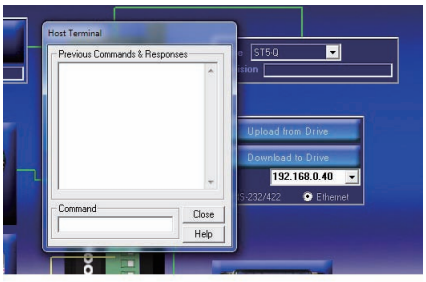
Communication:
SCL eSCL EtherNet/IP Modbus

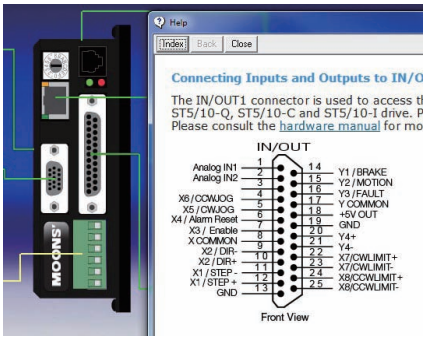
CE RoHS Compliant

ST Configurator

Software







Software Features

- Intuitive interface
- Drive status and alarm monitoring
- Self-test function to test drive/motor operation
- Built-in SCL Terminal
- Online help integrated
- Supports all STM and SWM integrated steppers

About this software

The ST Configurator software makes setting up, configuring and programming STM integrated stepper a snap. All motor, I/O, encoder and motion control parameters are available to the user through an intuitive interface. The ST Configurator provides seamless communication with all models whether they have RS-232, RS-485, CANopen or Ethernet communications. It also includes a built-in Q Programmer so you can switch context quickly and easily.

System Requirements

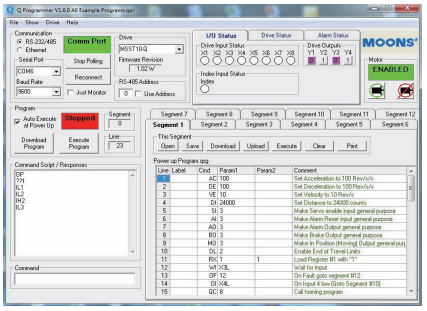
Microsoft Windows 7, Windows 8, Windows 10, 32-bit or 64-bit, Windows XP.

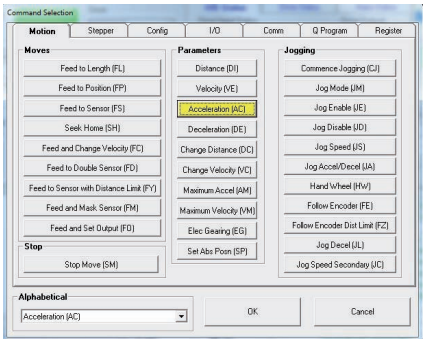
FREE DOWNLOAD
Our software and user manuals can be downloaded from our website:

www.moonsindustries.com

Q Programmer

Software





Software Features

- Single-axis motion control
- Stored program execution
- Multi-tasking
- Conditional processing
- Math functions
- Data registers
- Motion Profile simulation
- Online help integrated
- Support all Q/C/IP Types Integrated Motors in STM/SWM Series

About this software

Q Programmer is a single-axis motion control software for programmable stepper and servo drives from MOONS'. The software allows users to create sophisticated and functional programs that Q and Plus drives can run stand-alone. The commands available in the Q programming environment consist of commands for controlling motion, inputs & outputs, drive configuration and status, as well as math operations, register manipulation, and multi-tasking.

System Requirements

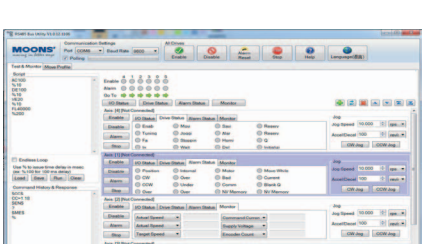
Microsoft Windows 7, Windows 8, Windows 10, 32-bit or 64-bit, Windows XP.

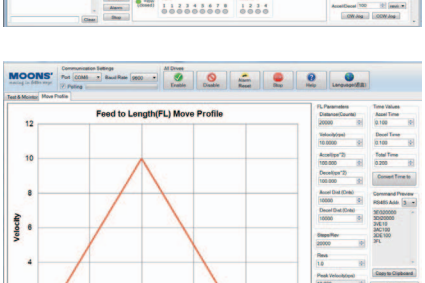
FREE DOWNLOAD
Our software and user manuals can be downloaded from our website:

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

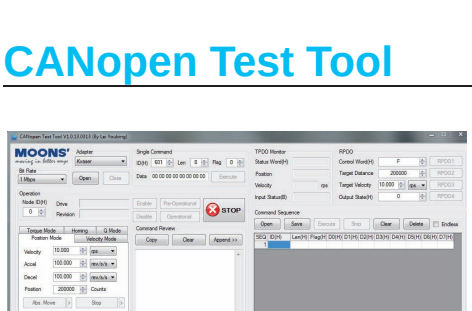
About this software

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, Windows 10, 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

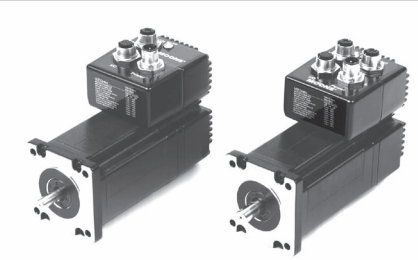
System Requirements

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

IP65 Type Integrated Stepper Motor-SWM Series



Drive + **Motor** + **Controller**

The SWM is an integrated Drive+Motor+Controller with IP65 of ingress protection against dust and water, fusing step motor and drive technologies into a single device, offering savings on space, wiring and cost over conventional motor and drive solutions.

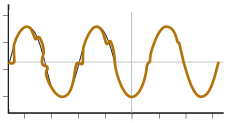
- ✓ Advanced Current Control
- ✓ Anti-Resonance
- ✓ Torque Ripple Smoothing
- ✓ Microstep Emulation
- ✓ Stall Detection and Stall Prevention

Features

Anti-Resonance

Step motor systems have a natural tendency to resonate at certain speeds. The SWM integrated motors automatically calculate the system's natural frequency and apply damping to the control algorithm. This greatly improves midrange stability, allows higher speeds and greater torque utilization, and also improves settling times.

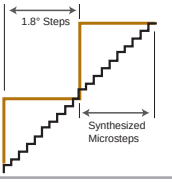
Provides better motor performance and higher speeds



Microstep Emulation

With Microstep Emulation, low resolution systems can still provide smooth motion. The drive can take low resolution step pulses and create fine resolution motion.

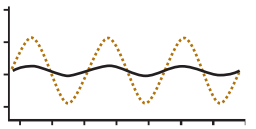
Delivers smoother motion in any application



Torque Ripple Smoothing

All step motors have an inherent low speed torque ripple that can affect the motion profile of the motor. By analyzing this torque ripple the system can apply a negative harmonic to counter this effect. This gives the motor much smoother motion at low speed.

Produces smoother motion at lower speeds



Command Signal Smoothing

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

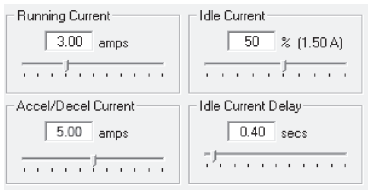
Improves smoother system performance

Dynamic Current Control

Allows for three current settings to help the motor run cooler and reduce power consumption.

- Running Current - the current the drive will deliver for continuous motion.
- Accel Current - the current the drive will deliver when accelerating or decelerating.
- Idle Current - reduces current draw when motor is stationary.

System runs cooler

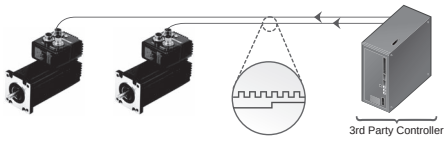


Stall Detection & Stall Prevention

The optional encoder detects the rotor's position to provide Stall Detection and Stall Prevention functions.

Control Options

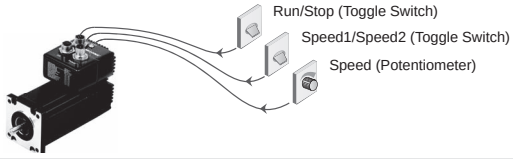
Step & Direction



S

- Step & Direction
- CW & CCW pulse
- A/B quadrature (master encoder)

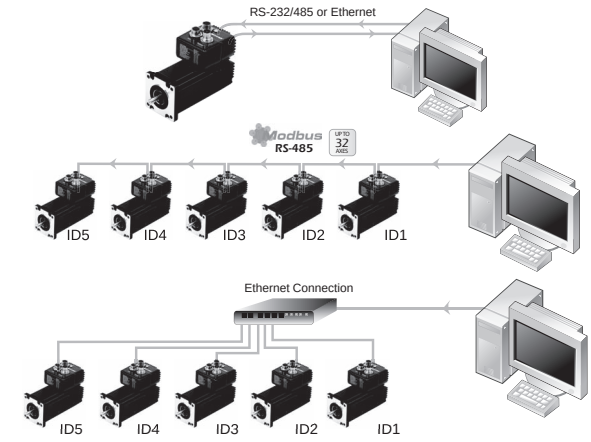
Oscillator / Run-Stop



S

- Software Configuration
- Two Speeds
- Vary speed with analog input
- Joystick compatible

Host Control



S & Q

RS-232

- Accepts commands from host PC or PLC

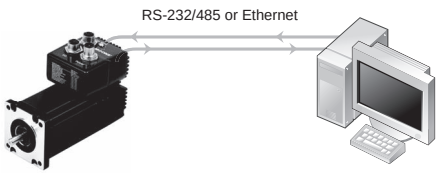
RS-485 or Modbus/RTU network

- Accepts commands from host PC or PLC
- Multi-axis capable, up to 32 axes

Q & IP

- Accepts commands from host PC or PLC
- 1000's of axes with Ethernet and Ethernet/IP

Stand Alone Programmable



Q & IP

- Comprehensive text based languaged
- Download, store & execute programs
- High level features: multi-tasking, conditional programming and math functions
- Host interface while executing stored programs

SWM24 - IP65 controller type integrated stepper motor

Specifications

Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 20 KHz
Output Torque	SWM24□-3□□: Up to 2.4N•m
Power Supply	External 12 - 70 volt power supply required
Protection	Over-voltage, under-voltage, over-temp, internal motor shorts (phase-to-phase, phase-to-ground)

Controller	
Microstep Resolution	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
Encoder Feedback	Optional 4000 counts/rev encoder feedback
Speed Range	Speeds up to 3000 rpm
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
Modes of Operation	SWM24S/SF: Step & direction, CW/CCW pulse, A/B quadrature pulse, velocity (oscillator, joystick), streaming commands(SCL) SWM24Q/QF: All SWM24S/SF modes of operation with stored Q program execution SWM24IP: All SWM24Q modes of operation with EtherNet/IP industrial network communications
Digital Input SF and QF models	Adjustable bandwidth digital noise rejection filter on all I/O points configured as inputs **IN1+/-:** optically isolated, 5-24 volts, minimum pulse width 250 ns., maximum pulse frequency 2 MHz Function: Step, CW step, A quadrature (encoder following), CW jog, start/stop (oscillator mode), Enable or general purpose input **IN2+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: Direction, CCW step, B quadrature (encoder following), CCW jog, direction (oscillator mode), alarm/fault reset or general purpose input **IN3+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: CW limit, Enable, speed 1/speed 2 (oscillator mode) or general purpose input **IN4+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: CCW limit, alarm/fault reset or general purpose input
Digital Output SF/QF models	**OUT1+/-:** Optically isolated, 30V/100 mA max. Functions: Fault, brake, motion, tach, and general purpose programmable **OUT2+/-:** Optically isolated, 30V/100 mA max. Functions: Fault, brake, motion, tach, and general purpose programmable **OUT3+/-:** Optically isolated, 30V/100 mA max. Functions: Fault, brake, motion, tach, and general purpose programmable **OUT4+/-:** Optically isolated, 30V/100 mA max. Functions: Fault, brake, motion, tach, and general purpose programmable
Digital Input S/Q Ethernet models	Adjustable bandwidth digital noise rejection filter on all inputs **STEP+/-:** optically isolated, 5-24 volts, minimum pulse width 250 ns., maximum pulse frequency 2 MHz Function: Step, CW step, A quadrature (encoder following), CW limit, CW jog, start/stop (oscillator mode), or general purpose input **DIR+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 250 ns, Maximum pulse frequency = 2 MHz Function: Direction, CCW step, B quadrature (encoder following), CCW limit, CCW jog, direction (oscillator mode), or general purpose input **EN+/-:** Optically isolated, 5-24 volt. Minimum pulse width = 100 µs, Maximum pulse frequency = 10 KHz Function: Enable, alarm/fault reset, speed 1/speed 2 (oscillator mode), or general purpose input
Digital Input S/Q Ethernet models	**OUT+/-:** Optically isolated, 30V/100 mA max. Functions: Fault, brake, motion, tach, and general purpose programmable
Analog Input	AIN referenced to GND. Range = 0 to 5 VDC. Resolution = 12 bits
Communication	SF/QF Type: RS-232, RS-485 or Modbus/RTU S/Q Type: Ethernet TCP or UDP IP Type: EtherNet/IP
Physical	
Ambient Temperature	0 - 40°C (32 - 104°F) when mounted to a suitable heat sink
Humidity	90% non-condensing
Mass	SWM24□-3□□: 1800 g
Rotor Inertia	SWM24□-3□□: 900 g•cm^2

■ Connection interface

Power Port		
	Pin.	Description
	1	Power Supply+
	2	Power Supply-
	3	Power Supply+
	4	Power Supply-

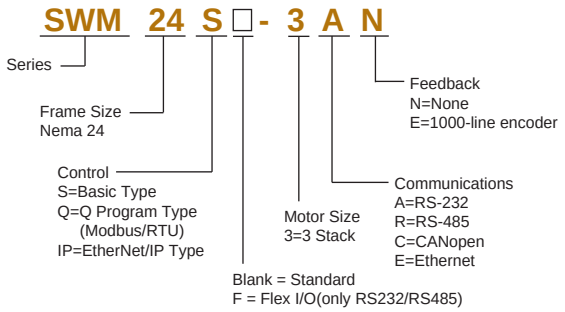
RS-232 Communication Port		
	Pin.	Description
	1	Data Receive RX
	2	+5V 50mA
	3	Data Transmit TX
	4	GND
	5	NC

RS-485 or Modbus Communication Port		
	Pin.	Description
	1	Data Receive RX+
	2	Data Receive RX-
	3	Data Transmit TX+
	4	Data Transmit TX-
	5	GND

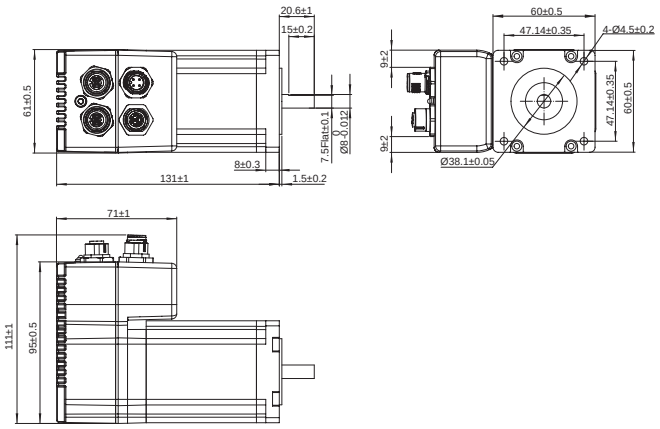
Ethernet Communication Port		
	Pin.	Description
	1	Data Transmit TX+
	2	Data Receive RX+
	3	Data Transmit TX-
	4	Data Receive RX-

I/O Port			
			
SF&QF Type		**S/Q Ethernet Type**	
Pin.	Description	Pin.	Description
1	I/O1+	1	STEP+
3	I/O1-	3	STEP -
5	I/O2+	5	DIR+
8	I/O2-	8	DIR-
6	I/O3+	6	EN+
4	I/O3-	4	EN-
11	I/O4+	11	OUT +
12	I/O4-	12	OUT-
9	+5V 50mA	9	+5V 50mA
2	N/C	2	N/C
10	AIN	10	AIN
7	GND	7	GND

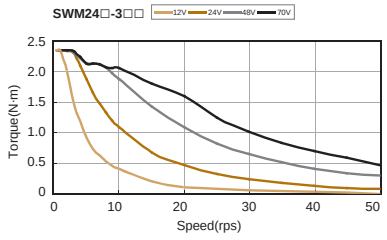
Numbering System



Dimensions(Unit:mm)



Torque Curves



Ordering Information

Model	Torque	Control	Encoder	RS-232	RS-485	Modbus/RTU	Ethernet	EtherNet/IP	Daisy Chain
SWM24SF-3AN	2.4N·m	S		✓					
SWM24SF-3AE			✓	✓					
SWM24SF-3RN					✓				✓
SWM24SF-3RE			✓		✓				✓
SWM24S-3EN							✓		
SWM24S-3EE			✓				✓		
SWM24QF-3AN		Q		✓					
SWM24QF-3AE			✓	✓					
SWM24QF-3RN					✓	✓			✓
SWM24QF-3RE			✓		✓	✓			✓
SWM24Q-3EN							✓		
SWM24Q-3EE			✓				✓		
SWM24IP-3EN		IP						✓	
SWM24IP-3EE			✓					✓	