

# Controller

Network-Compatible Products Overview

Modbus (RTU)

EtherCAT, CC-Link, MECHATROLINK

Network Converters

Controller Overview

Controller Overview

SCX11

SCX11

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# Overview of Controllers

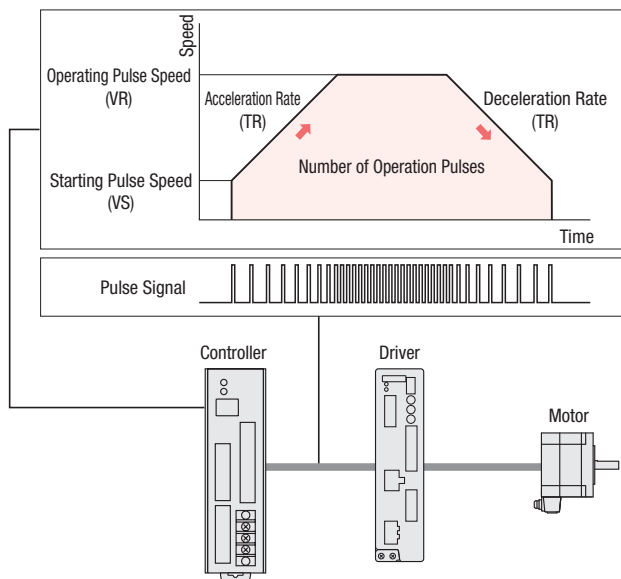
At Oriental Motor, a device that outputs the pulse signals required to operate a stepper motor or an AC servo motor is called a "controller". These products can perform various settings to control the motor and also permit connection with a programmable controller and sensors. Select a controller that best suits the system.

## Features

### Possible to Set Positioning Operation Parameters

The desired positioning operation parameters (number of operating pulses, starting pulse speed, operating pulse speed, acceleration/ deceleration rate, etc.) can be set.

#### Data Setting



#### Starting Pulse Speed (VS) [Hz]

This is the frequency at which output of pulse signals is started. The controller starts outputting pulse signals at the frequency specified by the starting pulse speed, and increases the frequency along the slope specified by the acceleration/deceleration rate.

#### Operating Pulse Speed (VR) [Hz]

This is the target pulse signal frequency. This frequency dictates the operating speed of the motor.

#### Acceleration/Deceleration Rate (TR) [ms/kHz]

This is the slope along which the pulse signal frequency is increased (acceleration) or decreased (deceleration).

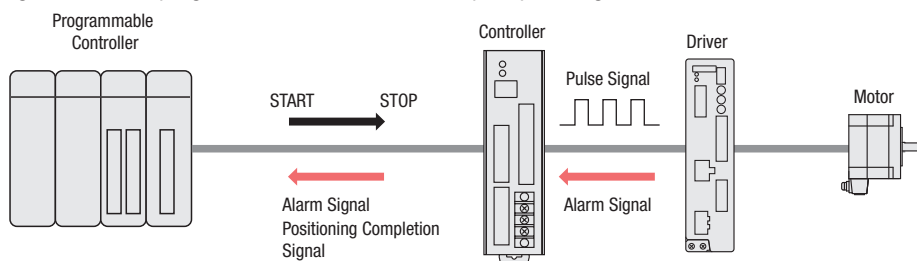
At Oriental Motor, the time needed to increase (or decrease) the frequency by 1 kHz is expressed in units of ms/kHz.

The specific method of data setting varies from one product to another depending on, for example, whether a dedicated control module is used or a computer is used. For details, refer to the page explaining each product.

### Operation System

A system configuration for controlling a positioning motor is shown below.

The controller receives signals from the programmable controller and outputs pulse signals to the driver.



The specifics vary depending on the product. For details, refer to the page explaining each product.

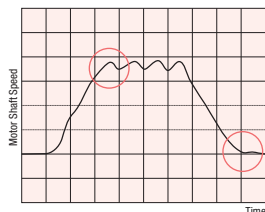
### Jerk Limiting Control Function for Suppressing Vibration of the Motor

The "jerk limiting control function" allows for the suppression of the vibration that occurs when the motor is being driven or stopped. For example, it is effective in situations such as suppressing vibration from belt pulley driving.

#### Measurement Condition

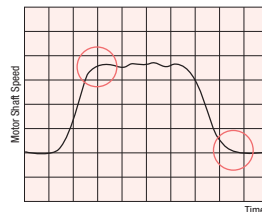
Application: Belt drive  
 Operating Mode: Positioning operation  
 Load: 10 kg (22 lb.)

Vibration that occurs when the operation mode is switched from acceleration and deceleration to constant speed manifests as vibration of the mechanism.



Linear Controlled Acceleration/Deceleration Pattern

By suppressing vibration that otherwise occurs when the operation mode is switched from acceleration and deceleration to constant speed, vibration of the mechanism is suppressed.



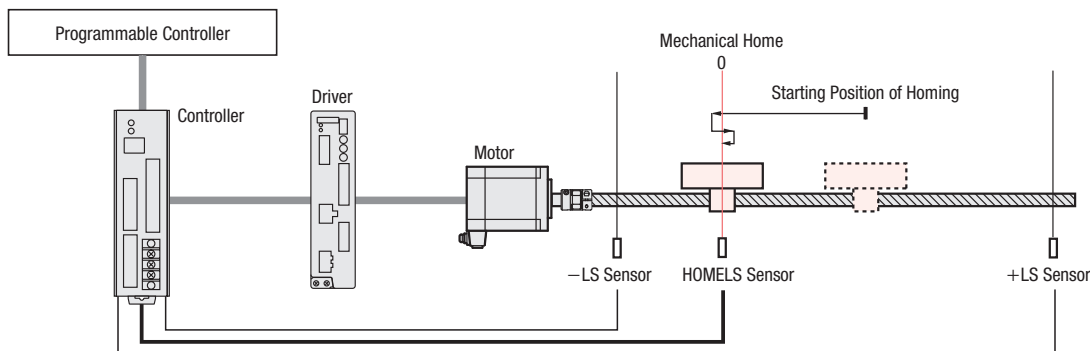
Jerk Controlled Acceleration/Deceleration Pattern

These graphs are provided only as a reference. The actual effect of this function will vary depending on the mechanism of the equipment.

● **Offering Functions to Facilitate Motor Control**

◇ **Return-to-Mechanical Home Operation Function**

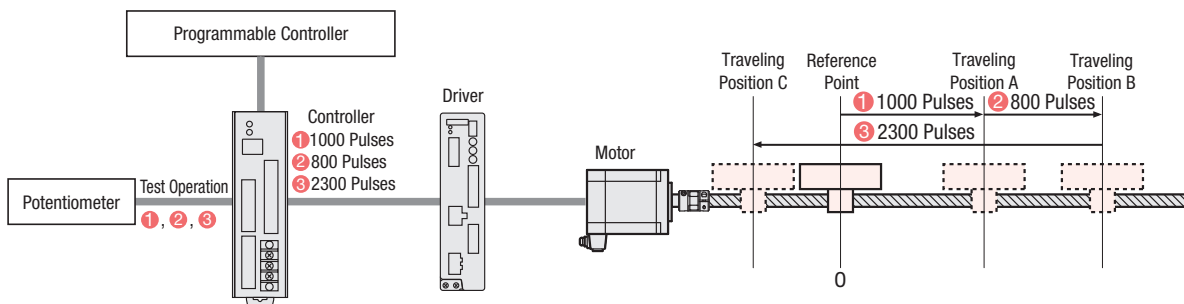
To perform accurate positioning operation, the mechanical home that defines the reference point must be determined accurately. Oriental Motor's controllers are equipped with the "automatic return-to-home operation function." All that is needed is to wire a home sensor, and the home detection function can be used right away.



◇ **Test Mode Function**

When building equipment, sometimes it is necessary to perform operation verification for just the driving part before the sequence program is completed.

Oriental Motor's controllers are equipped with a "test mode", which can be used to verify operation based on data set in the controller.



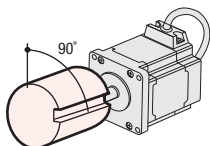
◇ **I/O Check Function**

The connection (I/Os) with the programmable controller can be checked.

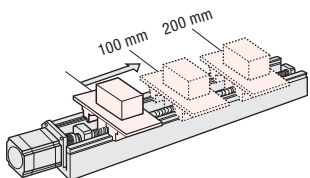
◇ **Traveling Amount Setting in Multiple Units such as mm**

The traveling amounts can be set by angle (degrees) or mm in addition to pulses.

- Setting in degrees



- Setting in mm



● The specifics vary depending on the product. For details, refer to the page explaining each product.

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Stored-Program Type Controller

# SCX11 Universal Controller

<Additional Information>

- Technical reference → Page H-1
- Regulations & Standards → Page I-2



● For detailed information about regulations and standards, please see the Oriental Motor website.



View Expanded Product Information, Specifications, CAD, Accessories & more online. Visit [www.orientalmotor.com/catalog](http://www.orientalmotor.com/catalog) or use the QR code and select "SCX11 Controller".

The **SCX11** universal controller is a highly functional and sophisticated controller, equipped with program editing and execution functions. The **SCX11** is also able to control the motor via various serial ports such as USB, RS-232C and **CANopen**.

## Features

### ● 100 Sequence Programs can be Stored

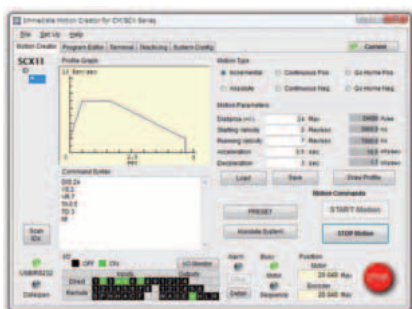
The **SCX11** can store up to 100 programs and execute various operations, from simple movements like "repeated positioning operation" to complicated controls like "operation by calculating the value based on external inputs".

### ● Easy Operation

The convenient and easy-to-use PC software, "Immediate Motion Creator for **SCX** Series", is provided with the **SCX11**. Easily start an operation with the click of a button or start key by setting the travel amount and speed. The GUI allows for easy program creation by selecting commands from the command list. Other functions available include, real time monitor for the teaching position, current position and I/O status, system parameter setting and I/O assignment.



PC software "Immediate Motion Creator for **CM/SCX** Series" (Included)



### ● USB Port as Standard Equipment

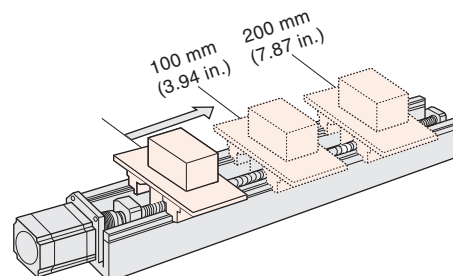
The **SCX11** has a mini USB port on the front panel which can directly connect to a PC through a commercially available mini USB cable. No special cable or converter is required.

### ● Changeover from **SCX10** is Possible

Functions like serial communication, I/O signals, commands etc. are the same as the **SCX10**, so changeover is easy.

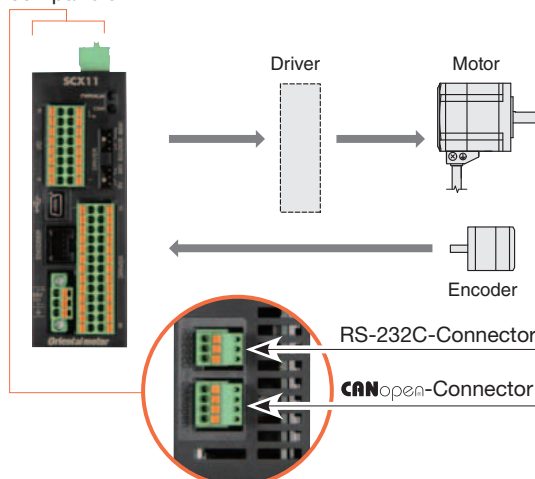
### ● Intelligent Setting

Program data for speed and travel amounts by setting the "User Unit" parameter. Data can be programmed in units such as "mm", "inch" and "revolution".

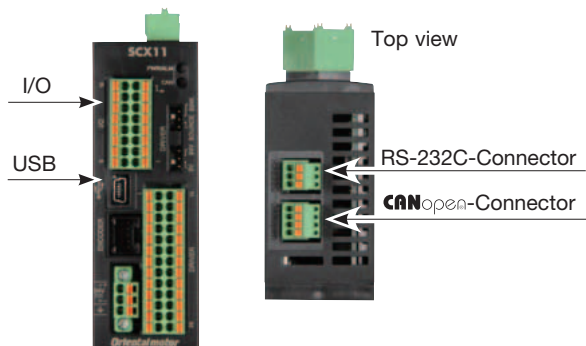


### ● External Encoder Input

The **SCX11** has a function for external encoder inputs which enables continuous monitoring of the feedback position and position error. Line driver, open collector and TTL inputs are compatible.

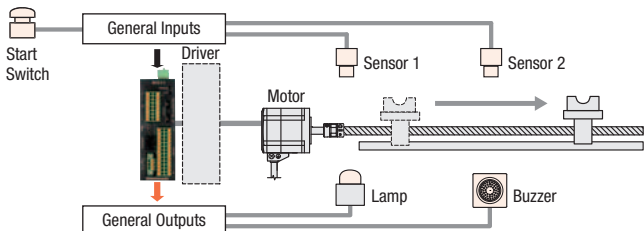


## ● Various Interfaces for Operation



### ◇ Stand-Alone Operation Using Sensors and Switches

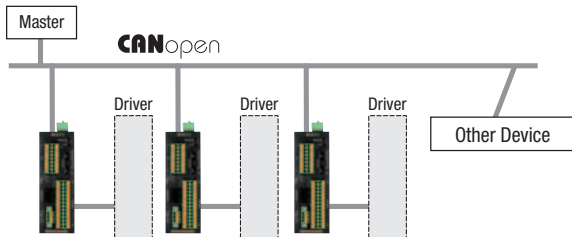
The **SCX11** can operate as a stand-alone controller, without a PC or programmable controller by utilizing 9 general inputs and 4 general outputs to select the desired sequences.



### ◇ Direct Command Operation via CANopen

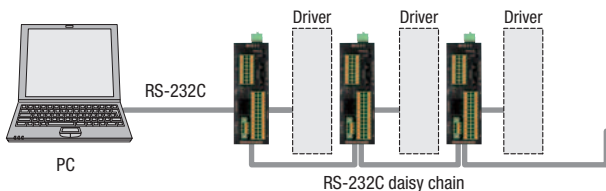
The **SCX11** has a standard built-in interface for CANopen.

\*CANopen for the **SCX11** is certified by CIA (CAN in Automation).



### ◇ Operation Using a PC

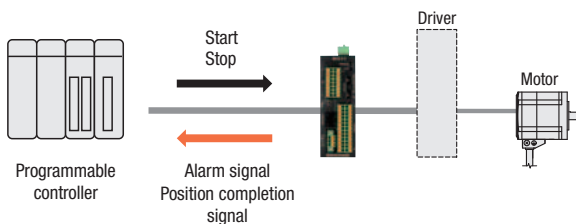
The **SCX11** can connect to a PC via RS-232C or USB\*. The **SCX11** can also be connected via an RS-232C daisy chain connection for multi-axis control with another **SCX11** or other products such as the **ASX** Series all-in-one closed loop  $\alpha$ STEP motor or **SCX10** controller.



\*Multi-axis control via USB is configured with multiple USB ports.

### ◇ Operation Using a Programmable Controller

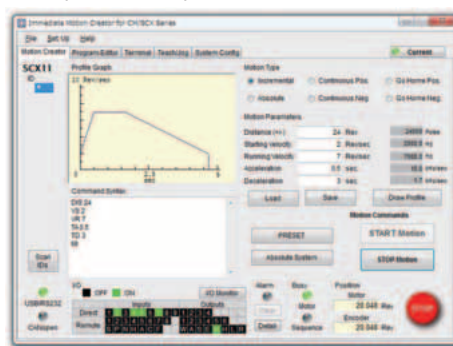
The **SCX11** can communicate a wide variety of signals via I/O to a programmable controller. Serial communications is also available, if the programmable controller has a USB or RS-232C interface built-in.



## ● Two Types of Operations

### ◇ Executing Sequence Operation [Stored Program Function]

This function is available for conditional branching using general-purpose I/O, wait processes using internal timers and other operations based on sequence control including setting the positioning and speed data. The **SCX11** can store up to 100 different programs that can be selected and executed via USB, RS-232C, CANopen and I/O port.



[ Example program ]

```
Seq 1
[1] VS 1 : Starting Velocity*
[2] VR 9 : Running Velocity*
[3] TA 1 : Acceleration Time
[4] TD 2 : Deceleration Time
[5] DIS 2 : Incremental Motion Distance*
[6] LOOP 3 : Begin Counted LOOP Block
[7] MI : Move Incremental Distance
[8] MEND : Wait for Motion End
[9] WAIT 1 : Wait for Specified Time
[10] ENDL : End of LOOP Block
[11] MA O : Move to Absolute Position
[12] MEND : Wait for Motion End
[13] END : End Sequence
```

\*Set the speed and travel amount as the unit of the actual motion such as "mm", "inch" and "revolution".

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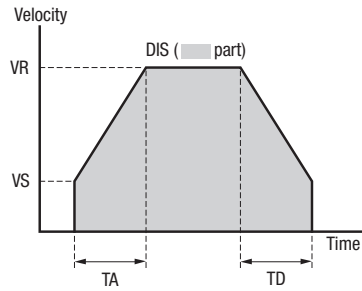
Controller Overview

SCX11

◇ Direct Command Operation

Operate a motor directly by sending commands via the serial port (USB, RS-232C, CANopen) from a PC or programmable controller. This function is suitable for applications where positioning data is updated frequently or managed all at once by the PC or programmable controller.

```
>DIS=60
DIS=60 mm
>VR=5
VR=5 mm/sec.
>VS=1
VS=1 mm/sec.
>TA=0.5
TA=0.5
>TD=0.5
TD=0.5
>MI
>
```



[ Example Commands ]

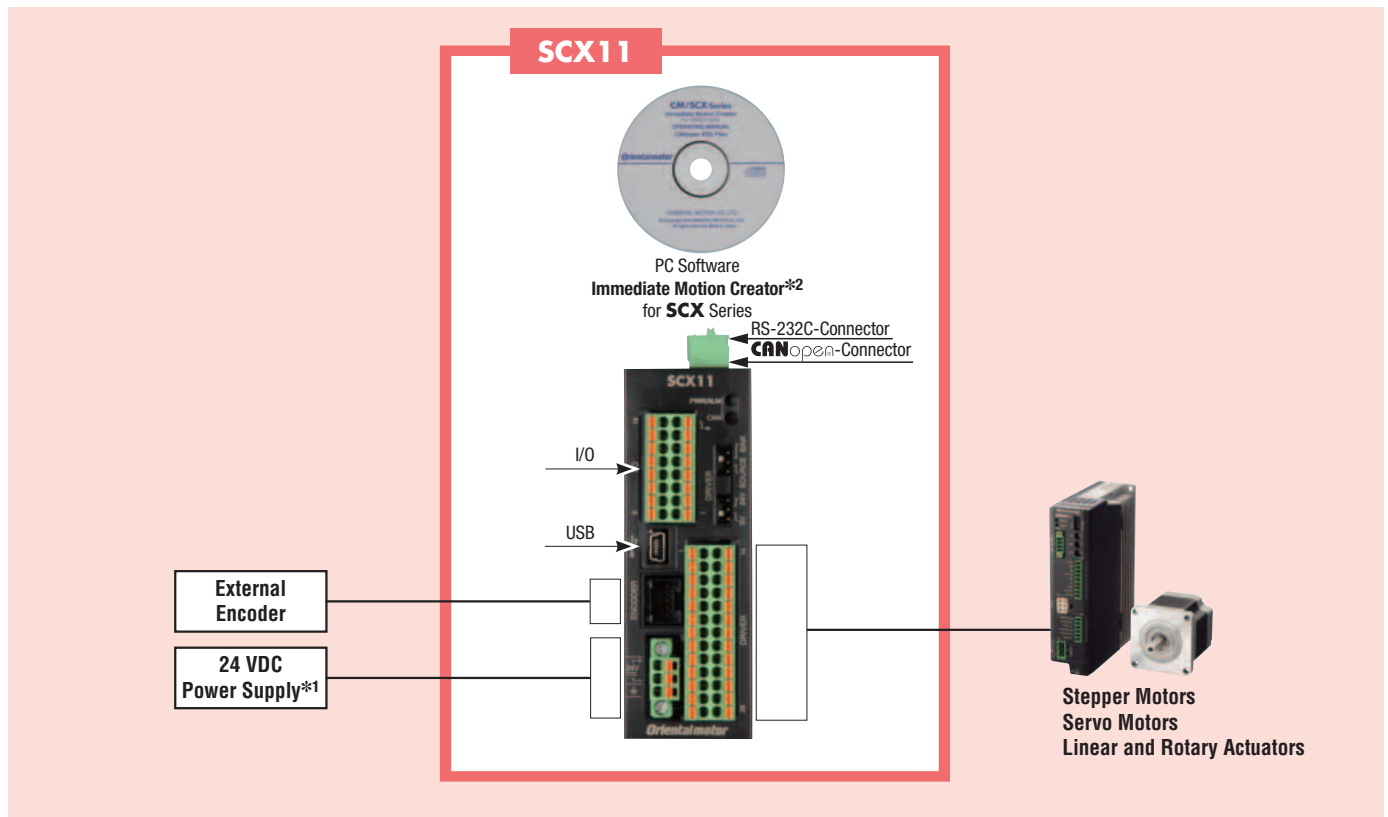
- D I S : Incremental Motion Distance
- V R : Running Velocity
- V S : Starting Velocity
- T A : Acceleration Time
- T D : Deceleration Time
- M I : Move Incremental Distance
- M A : Move to Absolute Position
- M C P : Move Continuously, Positive
- M C N : Move Continuously, Negative
- M G H P : Seek Mechanical Home Position
- A L M C L R : Clear Alarm Condition

■ System Configuration

An example of a system configuration with the **SCX11** controller.

\*1 Not supplied

\*2 Available for download. See website for details.



● The system configuration shown above is an example. Other combinations are available.

## Product Line

Product Name	List Price
<b>SCX11</b>	\$349.00

## Specifications

Product Name		<b>SCX11</b>
Operation Mode		Immediate command/stored program
Sequence Programs	Number of Sequence Programs	Max.100
	Program Size	6 kB maximum for total compiled sequences, 6 kB maximum for 1 sequence (text data)
	Programming Method	Immediate Motion Creator for <b>CM/SCX</b> Series [supplied software] or general terminal software
	Function Example	Subroutines, math/logical operators, user variables
Control	Number of Control Axis	Single axis
	Control Modes	Positioning operation (INDEX operation) Return to mechanical home operation (HOME operation) Continuous operation (SCAN operation) 1-pulse operation (JOG operation)
	Operating Mode	Incremental/absolute
	Starting Velocity	0~1.24 MHz (1 Hz increments)
	Speed Range	1 Hz~1.24 MHz (1 Hz increments)
	Acceleration Time	0.001~500 sec (0.001 sec increments)
	Position Range	-2,147,483,648~+2,147,483,647 pulses maximum
	Mode for Mechanical Home Seeking	3 sensor mode, 2 sensor mode, 1 sensor mode (+LS, -LS, home, sensor, timing)
	Features	User unit, teaching positions, linked motion, multi axis operation, external encoder input, protective functions
	Driver Interface	Pulse Output
Input		5 signals photo-coupler input Input voltage 4.25-26.4 VDC, input resistance 3 kΩ Built-in 5/24 VDC power supply sink logic/source logic compatible
Output		8 signals photo-coupler open-collector outputs 30 VDC 20 mA or less Built-in 5/24 VDC power supply sink logic/source logic compatible
Encoder Input		A-phase, B-phase, Index max. frequency 1 MHz
External Encoder Input		A-phase, B-phase, Index max. frequency 1 MHz Line-driver, open collector and TTL compatible Built-in 5 VDC power supply
I/O	Input	9 signals (configurable) photo-coupler inputs, input voltage 4.25-26.4 VDC, input resistance 5.4 kΩ
	Output	4 signals (configurable) photo-coupler open-collector outputs 30 VDC 20 mA or less
Serial Communications	USB	USB2.0 compatible (virtual COM port) mini USB terminal 9600, 19200, 38400, 57600, 115200 bps (9600 is default.)
	RS-232C	Start-stop synchronous method, NRZ (non-return zero), full-duplex 8 bits, 1 stop bit, no parity 9600, 19200, 38400, 57600, 115200 bps (9600 is default.) daisy-chain compatible (up to 36 axis)
	CANopen	CIA 301 ver4.02 compliant 10 kbps, 20 kbps, 50 kbps, 125 kbps, 250 kbps, 500 kbps, 800 kbps, 1 Mbps
Power Input	Voltage	24 VDC±10%
	Current	0.26 A
Mass		0.18 kg (0.40 lb.)
Environmental Condition	Ambient Temperature	0~50°C (+32~+122°F) (non-freezing)
	Ambient Humidity	20~85% (non-condensing)

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## Dimensions Unit = mm (in.)

