

Digitized Automation for a Changing World

Delta Smart Screwdriving System



www.deltaww.com

Little Things Make a Big Difference

Along with the technological innovation and booming development of electronics such as automotive electronics, quality demands in the industry are becoming higher than ever. Therefore, high precision, zero-defect management, and product traceability requirements are rising in electronics manufacturing. To reach the zero-defect goal, any detail, even the tightening results for every small screw is critical for product quality management.

Delta has leveraged its accumulated technological capabilities in motion control to integrate servo systems, reducers, torque sensors, and industrial robots to introduce a screw-driving solution featuring real-time status checks and tightening problem elimination. With precise output torque and angle control, Delta's screw-driving solution can prevent quality issues caused by screw driving, such as stripped and underdriven screws. Users can also connect the solution to an MES system to control parameters by host controllers that prevent human errors and save the tightening information for traceability and torque management.

Facing the fast-changing high-tech manufacturing industry, Delta has started with a small screw to help customers enhance product and service quality, while leveraging zero-defect goals and the vision of "Digitization for a Changing World".



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Delta Smart Screwdriving System

Integrates the key technologies of servo motors, torque detection, and software control with Delta's manufacturing experience. The screwdriving solution meets precision and quality requirements for various scenarios

Smart Screwdriving Controller



- 1 high-performance controller supports 2 screwdrivers[*1] (specific feature for dual-tool controller ASD-SD3041B-2)
- 10.1-inch display for easier examination and operation
- Large memory capacity stores up to 200,000 results and curve graphs
- Offers various tightening strategies for different scenarios



Smart Screwdriver

- Torque sensor signals are directly fed to the full closed-loop control, high-precision of ± 3%
- Low cogging torque of the DC servo motor
- Light indicator shows tightening status
- Front LED work light eliminates shading during operation
- Easy mounting on robots or machines with a flange

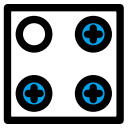
Delta Smart Screwdriving System

Product Features

Detects / Eliminates common screwdriving problems



Screw Damage



Missing Screws



Wrong Screws



Tapped Hole Problem(s)



Washer Missing

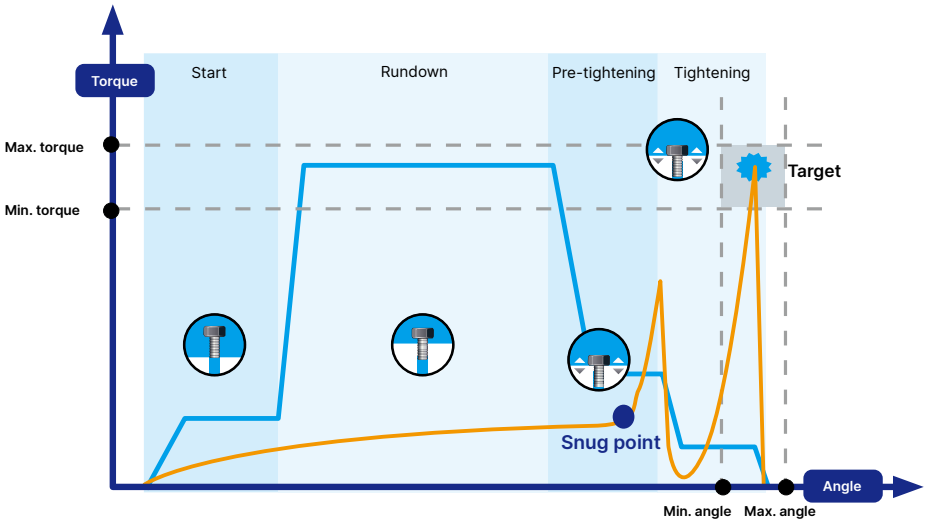


Underdriven / Stripped Screws



Overdriven Screws

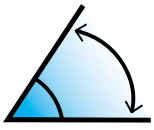
Monitors torques and angles to ensure a correct tightening process



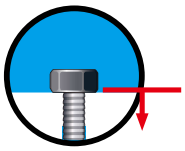
3 control modes for various screwdriving scenarios



Torque Control



Angle Control



Snug Point Control

Large memory capacity to store operation results

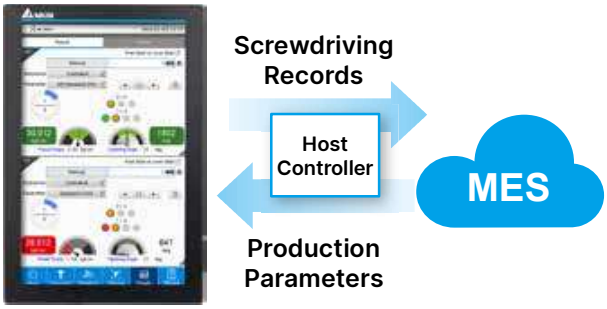


- 500 sets of parameters
- 500 sets of tightening sequences
- Up to 200,000 entries of report (incl. torques, angels, curve graphs, and more)

Delta Smart Screwdriving System

Product Features

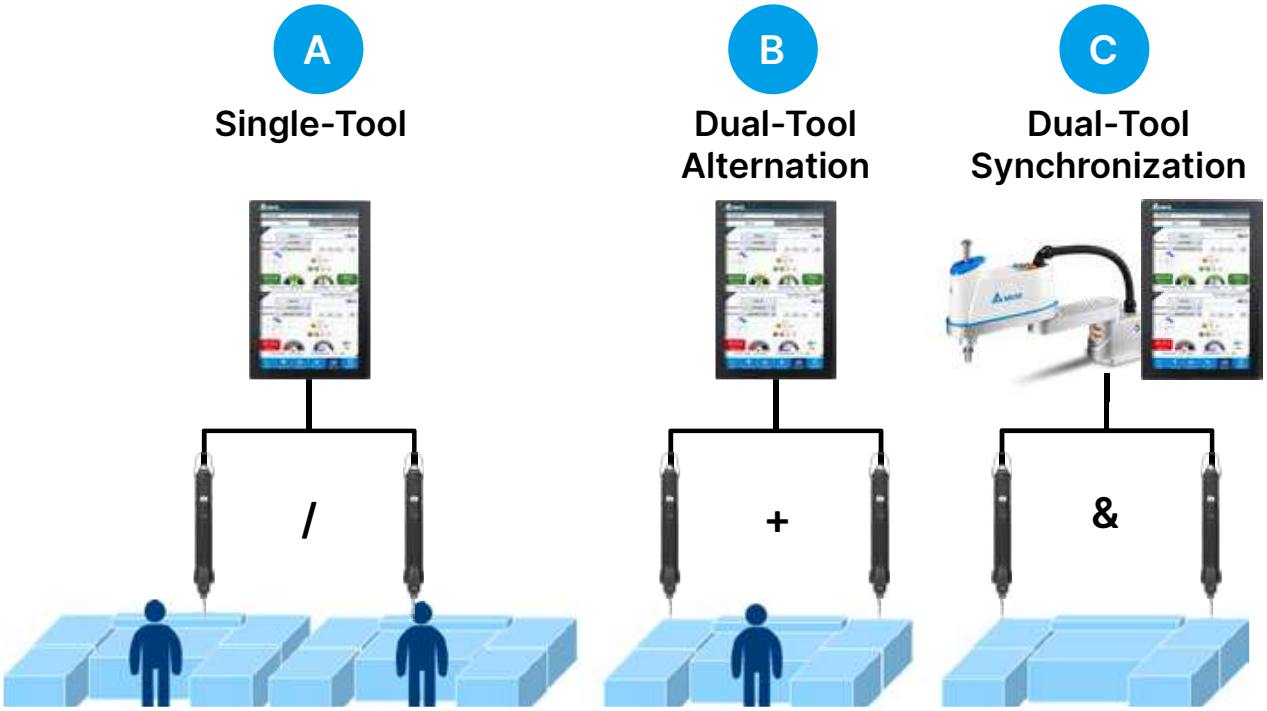
Production data can be updated to MES for real-time management

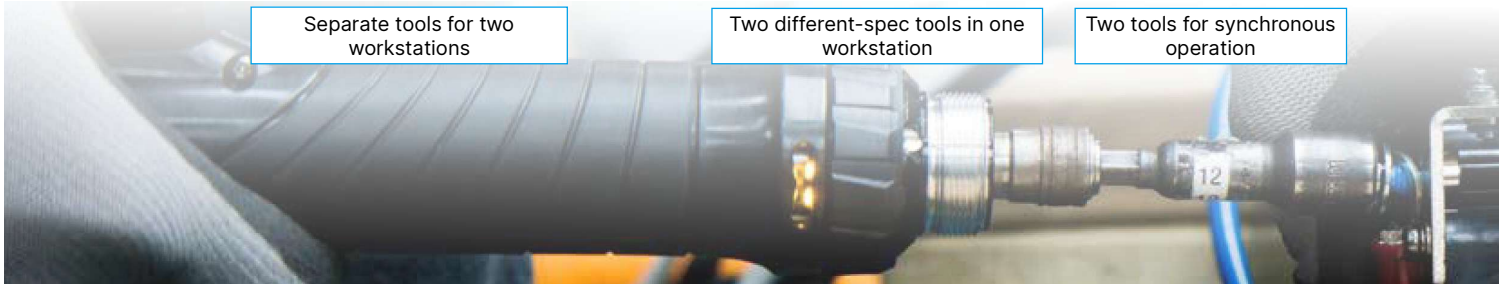


Applies corresponding parameters with a scanner to reduce human errors



One controller drives two screwdrivers for flexible production line implementation (specific feature for dual-tool controller ASD-SD3041B-2)





Functions and User Interface

Dual-tool operation with one controller

- A dual-tool controller (ASD-SD3041B-2) controls two smart screwdrivers to save space and costs
- Provides single-tool, dual-tool alternation, and dual-tool synchronization modes for flexible production line implementation

Sets and monitors key quality parameters

- Monitors angle, torque, rotation speed, time limit, quantity of screws, loosening count, and tightening sequences to ensure quality

Detects quality issues

- Detects underdriven / stripped / missing screws, torque/angle errors and others

Capable of host controller connection

- Alarm notifications
- Changes parameters based on commands from the host controller
- Stores and uploads screwdriving records

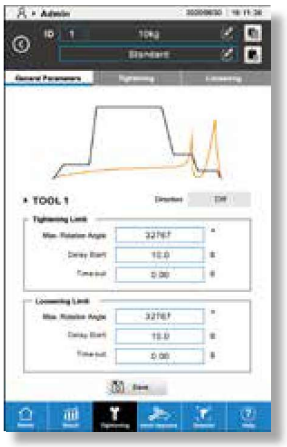
Intuitive parameter configuration

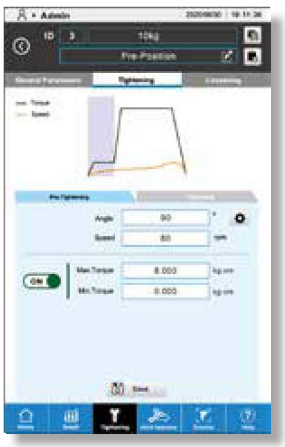
- Simple display design and large touch screen for easy operation

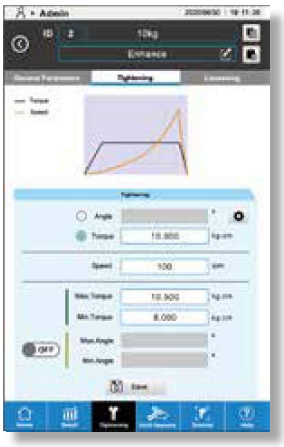


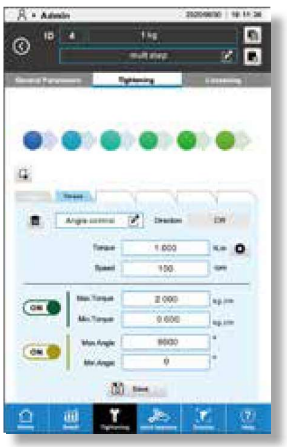
Various tightening strategies for figuring out the ideal solution

- Standard Strategy: Separate tightening process into four stages to meet most scenarios
- Pre-Position Strategy: Fix screw position in the workpiece without clamping
- Enhanced Strategy: Tighten the screws or further tighten the screws with higher torque
- Self-Defined Strategy: Arrange the tightening process as needed







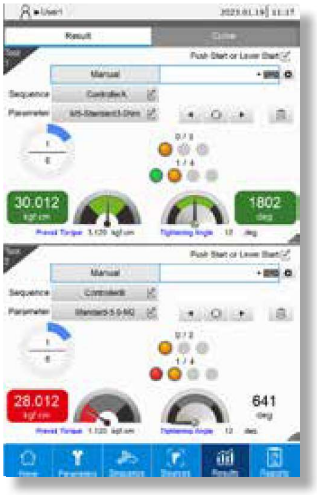


Delta Smart Screwdriving System

Functions and User Interface

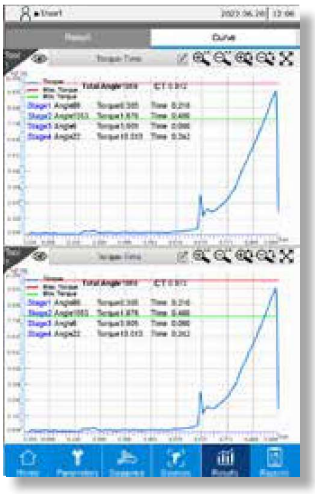
Clear display

- Hierarchic display for users to quickly know the status, torque, and quality information as well as to check the model and tightening information

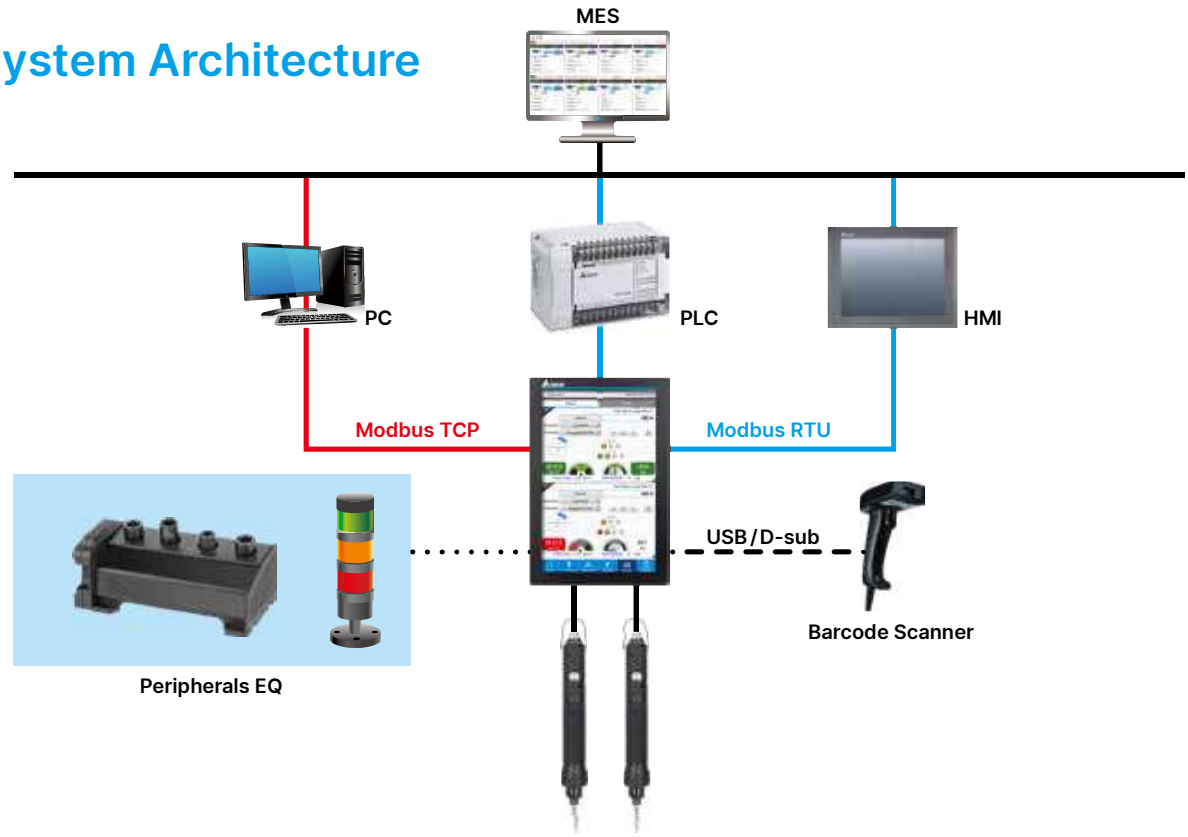


Complete results and reports

- Records complete process with torques, angles, and tightening strategies for each screwdriving for traceability and analysis



System Architecture



Specifications

Smart Screwdriver

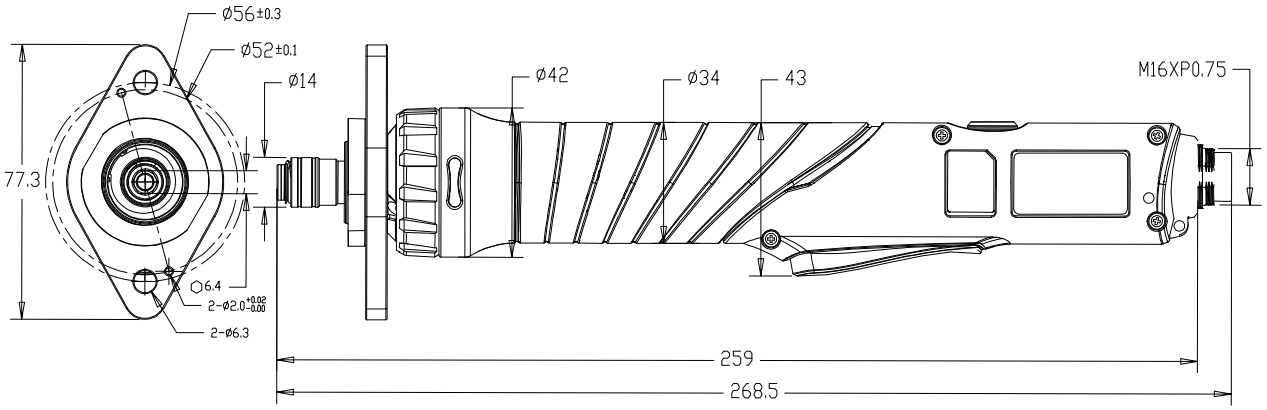
Model	ECM-SD3-F12S0 ECM-SD3-F12S1	ECM-SD3-F30S0 ECM-SD3-F30S1	ECM-SD3-F50S0 ECM-SD3-F50S1	ECM-SD3-F75S0 ECM-SD3-F75S1
Input Voltage	38 V_{DC}			
Torque Range (kgf-cm)	2.4 ~ 12	6 ~ 30	10 ~ 50	15 ~ 75
Precision	±3%			
Max. Rotation Speed	2000 rpm	1100 rpm	700 rpm	500 rpm
Tool Length	268.5 mm			
Weight	560 g			
Handheld Diameter	34 mm			
Bit Specification	6.35 mm hex head for the model name that ends with 0 5 mm hex head for the model name that ends with 1			
Operating Temperature	0°C (32°F) to 40°C (104°F)			
Storage Temperature	0°C (32°F) to 60°C (140°F)			
Humidity	0 ~ 90 % RH (non-condensing)			
IP Rating	IP40			

Smart Screwdriving Controller

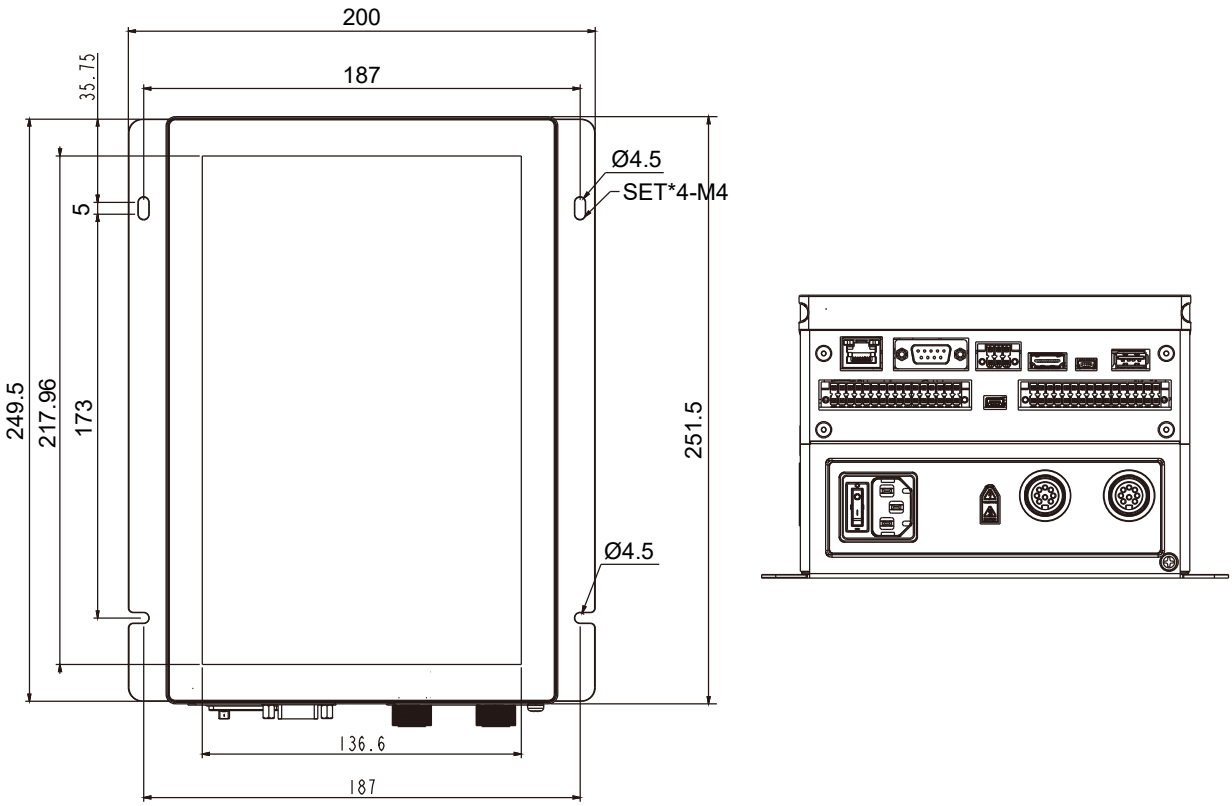
Controller	ASD-SD3021B-1 (Single-Tool Controller)	ASD-SD3041B-2 (Dual-Tool Controller)
Input Voltage	100 ~ 240 V_{AC}	
DC Bus Voltage	38 V_{DC}	
Rated Output Current	3.7 Arms	
Max. Instantaneous Output Current	15 Arms	
Rated Power Output	100 W / one tool	200 W / two tools
Screen Size	10.1" (Touchscreen)	
Dimensions	200 x 252 x 121 mm	

Dimensions

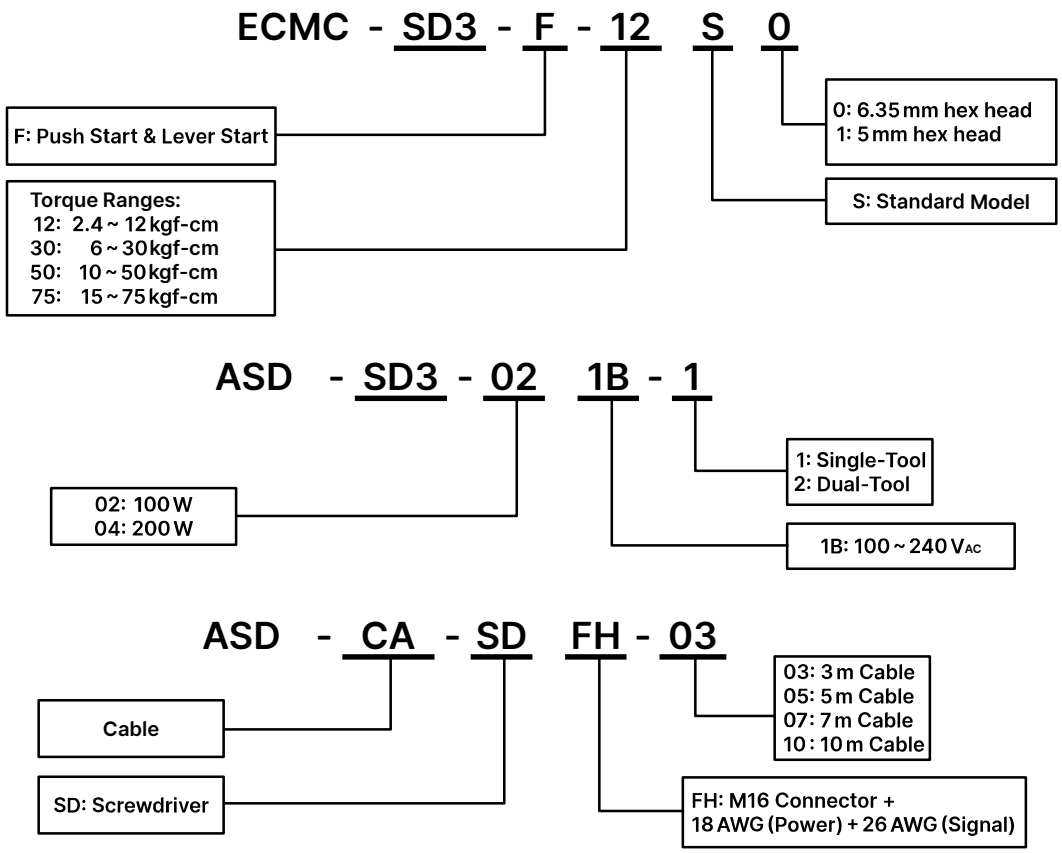
Smart Screwdriver



Smart Screwdriving Controller



Model Name Explanation



Ordering Information

Smart Screwdriving System Models	Specifications
ECM-SD3-F12S0	2.4 ~ 12 kgf-cm, 6.35 mm Hex head
ECM-SD3-F30S0	6 ~ 30 kgf-cm, 6.35 mm Hex head
ECM-SD3-F50S0	10 ~ 50 kgf-cm, 6.35 mm Hex head
ECM-SD3-F75S0	15 ~ 75 kgf-cm, 6.35 mm Hex head
ECM-SD3-F12S1	2.4 ~ 12 kgf-cm, 5 mm Hex head
ECM-SD3-F30S1	6 ~ 30 kgf-cm, 5 mm Hex head
ECM-SD3-F50S1	10 ~ 50 kgf-cm, 5 mm Hex head
ECM-SD3-F75S1	15 ~ 75 kgf-cm, 5 mm Hex head
ASD-SD3021B-1	100 ~ 240 VAC, 100 W, Single-Tool
ASD-SD3041B-2	100 ~ 240 VAC, 200 W, Dual-Tool
ECM-SD3-ACSSR	Flange module for fixing the smart screwdriver to a machine
ACS3-CASDFH03	Cable between screwdriver and controller - 3 m
ACS3-CASDFH05	Cable between screwdriver and controller - 5 m
ACS3-CASDFH07	Cable between screwdriver and controller - 7 m
ACS3-CASDFH10	Cable between screwdriver and controller - 10 m
ACS3-CAPW311A	US-standard power cable with 3-pin plug
ACS3-CAPW311C	CN-standard power cable with 3-pin plug