Digitized Automation for a Changing World

Delta Smart Screwdriving System
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”.

Little Things Make a Big Difference
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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)

A  Single-Tool

B  Dual-Tool Alternation

C  Dual-Tool Synchronization

/  Separate tools for two workstations

+  Two different-spec tools in one workstation

&  Two tools for synchronous operation
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

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

### Smart Screwdriving Controller

<table>
<thead>
<tr>
<th>Controller</th>
<th>ASD-SD3021B-1 (Single-Tool Controller)</th>
<th>ASD-SD3041B-2 (Dual-Tool Controller)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Voltage</strong></td>
<td>100 ~ 240 V&lt;sub&gt;AC&lt;/sub&gt;</td>
<td>15 Arms</td>
</tr>
<tr>
<td><strong>DC Bus Voltage</strong></td>
<td>38 V&lt;sub&gt;DC&lt;/sub&gt;</td>
<td>38 V&lt;sub&gt;DC&lt;/sub&gt;</td>
</tr>
<tr>
<td><strong>Rated Output Current</strong></td>
<td>3.7 Arms</td>
<td>15 Arms</td>
</tr>
<tr>
<td><strong>Max. Instantaneous Output Current</strong></td>
<td>100 W / one tool</td>
<td>200 W / two tools</td>
</tr>
<tr>
<td><strong>Screen Size</strong></td>
<td>10.1” (Touchscreen)</td>
<td>10.1” (Touchscreen)</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>200 x 252 x 121 mm</td>
<td>200 x 252 x 121 mm</td>
</tr>
</tbody>
</table>
Dimensions

Smart Screwdriver

Smart Screwdriving Controller
Model Name Explanation

**ECM - SD3 - F - 12 S 0**
- **F**: Push Start & Lever Start
- Torque Ranges:
  - 12: 2.4 ~ 12 kgf-cm
  - 30: 6 ~ 30 kgf-cm
  - 50: 10 ~ 50 kgf-cm
  - 75: 15 ~ 75 kgf-cm
- **S**: Standard Model
  - 0: 6.35 mm hex head
  - 1: 5 mm hex head

**ASD - SD3 - 02 1B - 1**
- 02: 100W
- 04: 200W
- **1B**: 100 ~ 240 VAC
- 1: Single-Tool
- 2: Dual-Tool

**ASD - CA - SD FH - 03**
- **SD**: Screwdriver
- **FH**: M16 Connector + 18 AWG (Power) + 26 AWG (Signal)
- **03**: 3 m Cable
- **05**: 5 m Cable
- **07**: 7 m Cable
- **10**: 10 m Cable

Ordering Information

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