Automation for a Changing World

Delta AC Servo Drive
ASDA-A2-E Series

www.deltaww.com
**Introduction**

Delta's ASDA-A2-E, an advanced AC Servo Drive with an EtherCAT communication interface, complies with IEC61158 and IEC61800-7 and follows in the footsteps of the successful ASDA-A2 series. This advanced A2-E supports all the modes of the CoE device profile based on CiA402 and all command types of EtherCAT; features built-in Safe Torque Off (STO) function which prevents torque energy from continuing to act upon a motor and avoid accidents. In addition, A2-E offers extension digital input port for a wide range of machinery automation fields. This series cover power range from 400W to 7.5kW for 400V and 100W to 3kW for 220V.

ASDA-A2-E Series is your ideal servo drive to achieve high speed multi-axis synchronization applications.

**Features**

- Pass EtherCAT conformance test by EtherCAT Technology Group (ETG)
- Integrated Safe Torque Off (STO) safety function according to the following standards:
  - IEC EN 61508 (SIL 2)
  - IEC 62016 (SIL 2)
  - ISO 13849-1 (Cat.3 PL=d)
- Supports full closed-loop control (use output signals from sensors)
- Supports absolute type and incremental type servo motors
- Supports high speed position latch (Capture) function
  - Enabled with dedicated Digital Input (DI) on CN7 or the external encoder

**Applications**
## Specifications of ASDA-A2-E_220 V Series

<table>
<thead>
<tr>
<th>ASDA-A2-E Series</th>
<th>100 W</th>
<th>200 W</th>
<th>400 W</th>
<th>750 W</th>
<th>1 kW</th>
<th>1.5 kW</th>
<th>2 kW</th>
<th>3 kW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power Supply</strong></td>
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<tr>
<td>Phase / Voltage</td>
<td>Three-phase / Single-phase 220 V AC</td>
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</tr>
<tr>
<td><strong>Permissible Voltage Range</strong></td>
<td>Three-phase / Single-phase 200 ~ 230 V AC, -15% ~ 10%</td>
<td>Three-phase 200 ~ 230 V AC, -15% ~ 10%</td>
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</tr>
<tr>
<td><strong>Input Current (3 PH)</strong></td>
<td>Unit: Arms</td>
<td>0.39</td>
<td>1.11</td>
<td>1.86</td>
<td>3.66</td>
<td>4.68</td>
<td>5.9</td>
<td>8.76</td>
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<tr>
<td><strong>Input Current (1 PH)</strong></td>
<td>Unit: Arms</td>
<td>0.69</td>
<td>1.92</td>
<td>3.22</td>
<td>6.78</td>
<td>8.88</td>
<td>10.3</td>
<td>-</td>
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<tr>
<td><strong>Continuous Output Current</strong></td>
<td>Unit: Arms</td>
<td>0.9</td>
<td>1.55</td>
<td>2.6</td>
<td>5.1</td>
<td>7.3</td>
<td>8.3</td>
<td>13.4</td>
</tr>
</tbody>
</table>

### Cooling Method
- Natural Air Circulation
- Fan Cooling

### Encoder Resolution
- Incremental type: 20-bit
- Absolute type: 17-bit

### Control of Main Circuit
- SVPWM (Space Vector Pulse Width Modulation) Control

### Tuning Modes
- Auto / Manual

### Dynamic Brake
- no
- Built-in

### Position Control Mode (CSP)
- Command Source: DS402 object
- Electronic Gear: Electronic gear N/M multiple N: 1 ~ 32767, M: 1 : 32767 (1/50 < N/M < 25600)

### Speed Control Range
- 1:5000
- 1:3000

### Command Source External Analog Signal
- DS402 object

### Speed Control Strategy
- Low-pass and S-curve filter

### Smoothing Strategy
- Low-pass and P-curve filter

### Frequency Response Characteristic
- Maximum 1 kHz

### Speed Accuracy (at rated rotation speed)
- 0.01 % or less at 0 to 100 % load fluctuation
- 0.01 % or less at 0°C to 50°C ambient temperature fluctuation

### Feed Forward Compensation
- 0.01 % or less at ±10 % power fluctuation

### Torque Control Mode (CST)
- Command Source: DS402 object

### Command Triggered
- DS402 object

### Smoothing Strategy
- Low-pass filter

### Speed Limit Operation
- Servo on ready, Servo on, At Zero speed, At Speed reached, At Positioning completed, At Torques limit, Servo alarm (Servo fault) activated, Electromagnetic brake control, Homing completed, Output overload warning, Servo warning activated, Position command overflow, Forward / Reverse software limit, Internal position command completed, Capture operation completed output., Motion control completed output., Master position of E-Cam (Electronic Cam)

### Protective Functions
- Overcurrent, Overvoltage, Undervoltage, Motor overheated, Regeneration error, Overload, Overspeed, Abnormal pulse control command, Excessive deviation, Encoder error, Adjustment error, Emergency stop activated, Reverse/Forward limit switch error, Position excessive deviation of full-close control loop, Serial communication error, Input power phase loss, Serial communication time out, short circuit protection of U, V, W, and CN1, CN2, CN3 terminals

### Communication Interface
- USB / EtherCAT

### Installation Site
- Indoor location (free from direct sunlight), no corrosive liquid and gas
  (far away from oil mist, flammable gas, dust)

### Altitude
- Altitude 1000 m or lower above sea level

### Atmospheric Pressure
- 88kPa ~ 109kPa

### Operating Temperature
- 0°C ~ 55°C (If operating temperature is above 45°C, forced cooling will be required)

### Storage Temperature
- -20°C ~ 65°C

### Humidity
- 0 ~ 90% RH (non-condensing)

### Vibration
- 9.80665 m/s² (1G) less than 20 Hz, 5.88 m/s² (0.6G) 20 to 50 Hz

### IP Rating
- IP20

### Power System
- TN System

### Approvals
- IEC/EN 61800-5-1, UL 508C, C-tick

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**Footnotes:**

1. Rated rotation speed: When full load, speed ratio is defined as the minimum speed (the motor will not pause).
2. When command is rated rotation speed, the speed fluctuation rate is defined as: (Empty load rotation speed – Full load rotation speed) / Rated rotation speed
3. TN system: A power distribution system having one point directly earthed, the exposed conductive parts of the installation being connected to that point by a protective earth conductor.
Specifications of ASDA-A2-E_400V Series

<table>
<thead>
<tr>
<th>ASDA-A2-E Series</th>
<th>400W</th>
<th>750W</th>
<th>1kW</th>
<th>1.5kW</th>
<th>2kW</th>
<th>3kW</th>
<th>4.5kW</th>
<th>5.5kW</th>
<th>7.5kW</th>
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<tbody>
<tr>
<td>Power Supply</td>
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<tr>
<td>Input Voltage</td>
<td>24 VDC, ±10%</td>
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<td>Input Current</td>
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<tr>
<td>Input Power</td>
<td>10.32W</td>
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<tr>
<td>Permissible Voltage Range</td>
<td>Three-phase, 380~480 VAC, ±10%</td>
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<tr>
<td>Input Current Unit Arms</td>
<td>1.40 2.35 3.02 4.24 5.65 8.01 11.9 14.1 17.27</td>
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<tr>
<td>Continuous Output Current Unit Arms</td>
<td>2.0 3.35 3.52 5.02 6.66 11.9 20 22.37 30</td>
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<tr>
<td>Cooling Method</td>
<td>Fan Cooling</td>
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<tr>
<td>Encoder Resolution (Servo Drive Resolution)</td>
<td>Incremental type: 20-bit; Absolute type: 17-bit</td>
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<tr>
<td>Control of Main Circuit</td>
<td>SVPWM (Space Vector Pulse Width Modulation) Control</td>
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<td>Tuning Modes</td>
<td>Auto / Manual</td>
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<td>Dynamic Brake</td>
<td>Built-in</td>
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<tr>
<td>Position Control Mode (CSP)</td>
<td>Command Source</td>
<td>DS402 object</td>
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<tr>
<td>Smoothing Strategy</td>
<td>Low-pass and P-curve filter</td>
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<tr>
<td>Electronic Gear</td>
<td>Electronic gear N/M multiple N: 1 ~ 32767, M: 1 : 32767 (1/50 &lt; N/M &lt; 25600)</td>
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<td>Torque Limit Operation</td>
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<tr>
<td>Speed Control Mode (CSV)</td>
<td>Speed Control Range</td>
<td>1:5000 1:3000</td>
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<td>Command Source</td>
<td>DS402 object</td>
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<tr>
<td>Smoothing Strategy</td>
<td>Low-pass and S-curve filter</td>
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<tr>
<td>Torque Limit Operation</td>
<td>Set by parameters</td>
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<tr>
<td>Frequency Response Characteristic</td>
<td>Maximum 1 kHz</td>
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<tr>
<td>Speed Accuracy (at rated rotation speed)</td>
<td>0.01 % or less at 0 to 100 % load fluctuation</td>
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<tr>
<td>Feed Forward Compensation</td>
<td>0.01 % or less at ±10 % power fluctuation</td>
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<tr>
<td>Torque Control Mode (CST)</td>
<td>Command Source</td>
<td>DS402 object</td>
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<tr>
<td>Smoothing Strategy</td>
<td>Low-pass filter</td>
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<tr>
<td>Speed Limit Operation</td>
<td>Via analog input</td>
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<tr>
<td>Outputs</td>
<td>Servo ready, servo on, At Zero speed, At Speed reached, At Positioning completed, At Torques limit, Servo alarm (Servo fault) activated, Electromagnetic brake control, Homing completed, Output overload warning, Servo warning activated, Position command overflow, Forward / Reverse software limit, Internal position command completed, Capture operation completed output., Motion control completed output., Master position of E-Cam (Electronic Cam)</td>
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<tr>
<td>Protective Functions</td>
<td>Overcurrent, Overvoltage, Undervoltage, Motor overheated, Regeneration error, Overload, O Verspeed; Abnormal pulse control command, Excessive deviation, Encoder error, Adjustment error, Emergency stop activated, Reverse/ Forward limit switch error, Position excessive deviation of full-close control loop, Serial communication error, Input power phase loss, Serial communication time out, short circuit protection of U, V, W, and CN1, CN2, CN3 terminals</td>
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<tr>
<td>Communication Interface</td>
<td>USB / EtherCAT</td>
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<tr>
<td>Environment</td>
<td>Installation Site</td>
<td>Indoor location (free from direct sunlight), no corrosive liquid and gas (far away from oil mist, flammable gas, dust)</td>
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<tr>
<td>Altitude</td>
<td>titude 1000 m or lower above sea level</td>
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<tr>
<td>Atmospheric Pressure</td>
<td>106 kPa ~ 101 kPa</td>
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<tr>
<td>Operating Temperature</td>
<td>0°C ~ 55°C (If operating temperature is above 45°C, forced cooling will be required)</td>
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<tr>
<td>Storage Temperature</td>
<td>-20°C ~ 65°C</td>
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<tr>
<td>Humidity</td>
<td>0 ~ 90% RH (non-condensing)</td>
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<tr>
<td>Vibration</td>
<td>9.8065 m/s² (1 G) less than 20 Hz, 5.88 m/s² (0.6G) 20 to 50 Hz</td>
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<tr>
<td>IP Rating</td>
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<tr>
<td>Power System</td>
<td>TN System</td>
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<tr>
<td>Approvals</td>
<td>IEC/EN 61800-5-1, UL 508C, C-tick</td>
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</tbody>
</table>

Footnote:
*1 Rated rotation speed: When full load, speed ratio is defined as the minimum speed (the motor will not pause).
*2 When command is rated rotation speed, the speed fluctuation rate is defined as: (Empty load rotation speed – Full load rotation speed) / Rated rotation speed
*3 TN system: A power distribution system having one point directly earthed, the exposed conductive parts of the installation being connected to that point by a protective earth conductor.
EtherCAT Communication Mode

Wiring for 220V

AC 200/230V
Three-phase
50/60 Hz

Wiring for 400V

AC 380/480V
Three-phase

Note:

1. For the specifications of built-in regenerative resistors, please refer to the table of “Selection of built-in Regenerative Resistors” on page 5.

2. The brake coil has no polarity.

3. For wiring diagrams of other control modes, please refer to the user manual of Delta’s ASDA-A2-E.
Communication Specifications

<table>
<thead>
<tr>
<th>Physical Layer</th>
<th>IEEE802.3u (100 BASE-TX)</th>
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</thead>
<tbody>
<tr>
<td>Data Link Layer</td>
<td>APRD, FPRD, BRD, LRD, APWR, FPWR, BWR, LWR, ARMW, FRMW, APRW, FPRW, BRW, LRW</td>
</tr>
<tr>
<td>Device Profile (CiA402)</td>
<td>Horning Mode, Profile Position Mode, Profile Velocity Mode, Profile Torque Mode, Interpolated Position Mode, Cyclic Syn. Position Mode, Cyclic Syn. Velocity Mode, Cyclic Syn. Torque Mode, Touch Probe Function, Torque Limit Function</td>
</tr>
<tr>
<td>Process Data Size</td>
<td>Tx: 8 Object (32 byte, Max.); Rx: 8 Object (32 byte, Max.) Dynamic Mapping supported.</td>
</tr>
<tr>
<td>Bus Clock</td>
<td>DC cycle with min. 250 us*</td>
</tr>
<tr>
<td>LED Indicator</td>
<td>EtherCAT Link/Activity Indicator (L/A) x 2, EtherCAT RUN Indicator (RUN) x 1, EtherCAT ERROR Indicator (ERR) x 1</td>
</tr>
</tbody>
</table>

* This function will be available in a new version soon to come.

Selection of Built-in Regenerative Resistors

<table>
<thead>
<tr>
<th>220 V Series</th>
<th>Servo Drive (kW)</th>
<th>100W</th>
<th>200W</th>
<th>400W</th>
<th>750W</th>
<th>1.0kW</th>
<th>1.5kW</th>
<th>2.0kW</th>
<th>3.0kW</th>
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</thead>
<tbody>
<tr>
<td>Specification of Built-in Regenerative Resistor</td>
<td>NA</td>
<td>NA</td>
<td>40W</td>
<td>40W</td>
<td>40W</td>
<td>60W</td>
<td>60W</td>
<td>60W</td>
<td>100W</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>40 ohm</td>
<td>40 ohm</td>
<td>40 ohm</td>
<td>40 ohm</td>
<td>40 ohm</td>
<td>20 ohm</td>
<td>20 ohm</td>
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<table>
<thead>
<tr>
<th>400 V Series</th>
<th>Servo Drive (kW)</th>
<th>400W</th>
<th>750W</th>
<th>1.0kW</th>
<th>1.5kW</th>
<th>2.0kW</th>
<th>3.0kW</th>
<th>4.5kW</th>
<th>5.5kW</th>
<th>7.5kW</th>
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<tbody>
<tr>
<td>Specification of Built-in Regenerative Resistor</td>
<td>40W</td>
<td>40W</td>
<td>40W</td>
<td>40W</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td></td>
<td>80 ohm</td>
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</table>

Part Names and Functions

Accessories for ASDA-A2-E

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASD-CNFS0808</td>
<td>Pack of connectors used for STO wiring, 8 pcs of connectors in one pack</td>
</tr>
</tbody>
</table>

Note:
For other accessories, please refer to Delta's ASDA-A2 product catalogue.
Dimensions

▲ 220 V Series
100 W / 200 W / 400 W

- Weight: 1.5 (3.3)

▲ 400 V Series
400 W / 750 W / 1 kW / 1.5 kW

- Weight: 2.0 (4.4)

750 W / 1 kW / 1.5 kW

- Weight: 2.0 (4.4)

2 kW / 3 kW / 4.5 kW / 5.5 kW

- Weight: 4.6 (10.1)

2 kW / 3 kW

- Weight: 2.89 (6.36)

7.5 kW

- Weight: 5.5 (12.1)

Footnote:
1. Dimensions are in millimeters (inches); Weights are in kilograms (kg) and pounds (lbs)
2. Dimensions and weights of the servo drive may be revised without prior notice.
Industrial Automation Headquarters
Delta Electronics, Inc.
Taoyuan Technology Center
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