



Automation for a Changing World

Delta Motion Control Solution Based on CODESYS



www.deltaww.com

 **DELTA**
Smarter. Greener. Together.



Delta Motion Control Solution Based on CODESYS

Automation and digitalization play important roles in smart manufacturing. To enhance competitiveness, machine makers around the world are seeking solutions to quickly expand equipment development and applications, and save construction time and labor.

Delta is cooperating with CODESYS® group to utilize its motion control development system to offer a brand new motion control solution based on CODESYS. The CODESYS platform is a user-friendly integration interface compliant with IEC 61131-3 standards. It provides a wide range of applications for global users with strong motion control functions, and can be easily implemented into existing equipment.

Delta's motion control solution based on CODESYS integrates the control functions of PLCs, HMIs, and motion controllers into one platform, and features a variety of new products, including the PC-based Host Motion Controller AX-864E Series and PLC-based Host Motion Controller AX-308E.

The solution also supports EtherCAT communication to simultaneously control field devices, such as the Delta AC Servo Drive ASDA-A3-E, ASDA-B3-E, ASDA-A2-E Series, High Performance Compact Drive MH300 Series, Compact Drive MS300 Series, General Vector Control Drive C2000 Plus Series and Remote Module R1-EC Series & DVP EtherCAT Remote I/O. Delta's motion control solution based on CODESYS fulfills various application demands with its complete and integrated offerings.



**PC-Based
Motion Controller
AX-864E**



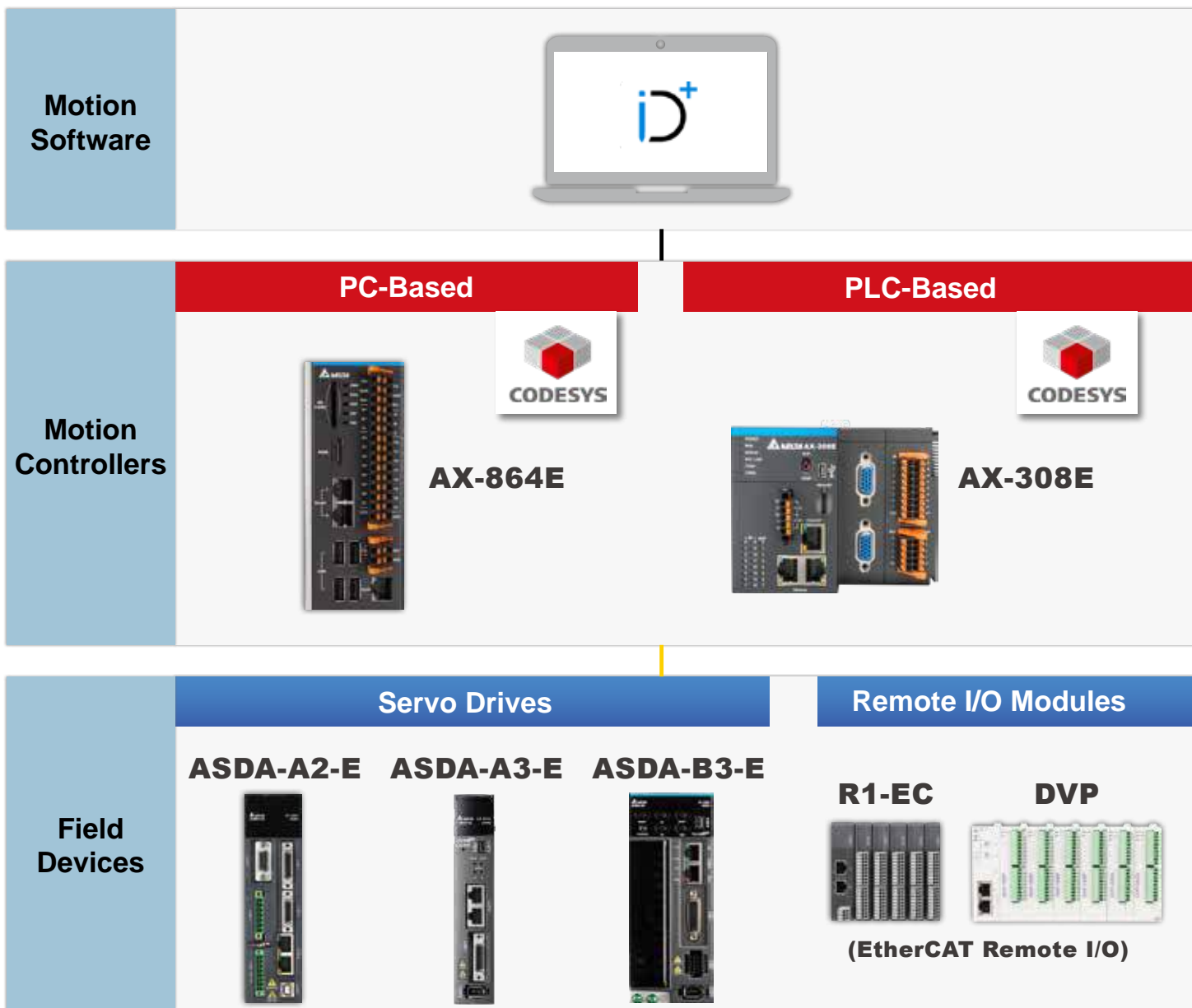
**PLC-Based
Motion Controller
AX-308E**

Content

	Page
Motion Control Solution Based on CODESYS	4
Products for Motion Control Solution Based on CODESYS	6
Motion Controllers	6
Field Devices	7
Human Machine Interface	11
Software	14
Product Information	18
Hardware Specifications	20
Model Explanation	22



Delta Motion Control Solution Based on CODESYS





Features

- ▶ **Standardized programming:**
IEC 61131-3 compliant software provides standardized programming and controller development platform
- ▶ **Unified integrated software:**
Programs all Delta's automation products in a single platform to shorten development time and cost
- ▶ **Open and modular platform:**
Allows secondary development for customized functionalities and components by users with industry know-how
- ▶ **Single PLC/Motion platform:**
CODESYS runtime supports Windows, VxWork, and Linux operating systems, and provides a unified IEC 61131-3 compliant software and editing platform with different (PC-based or PLC-based) controllers
- ▶ **Supports EtherCAT high-speed fieldbus:**
Highly efficient, precise and instant motion control enhances productivity
- ▶ **Tag sharing between HMI and controllers based on CODESYS:**
Easy and simple variable sharing saves editing time and labor
- ▶ **Various peripheral devices for applications:**
Suitable for industrial robots, woodworking, printing and packaging applications

HMI



DOP-100

Motor Drives

C2000 Plus



MH300 MS300



Products for Motion Control Solution Based on CODESYS Motion Controllers

PC-Based Motion Controller AX-864E

Supports EtherCAT communications and CODESYS-based program to provide a comprehensive and integrated motion control solution for multiple industrial applications

- Based on CODESYS SoftPLC program (compliant with the IEC 61131-3 standard) and SoftMotion
- Up to 64 servo axes control
- Fan-less and compact design
- Intel x86 CPU
- Built-in security IC system for enhanced software and hardware security
- Low-voltage detection and data duplication functions
- 8 high-speed digital local inputs / outputs
- Provides a wide range of practical accessories, meeting requirements of robot arms, woodworking, printing, packaging, and various applications



PLC-Based Motion Controller AX-308E

Provides a real-time and flexible motion solution for various applications with CODESYS-based program and EtherCAT communication

- AX-308E CPU supports up to 8 axes EtherCAT servos (Min. sync. time: 2 ms for 8 axes)
- Supports PLC AS series' power, DIO, AIO and temperature expansion modules (Max. 32 modules)
- High performance: min. execution time of basic instruction is 5ns
- Provides most popular instructions like position, velocity, torque, multi-axis interpolation, E-gear, E-Cam, and more.
- Built-in 16 DI, 8 DO, incremental encoder (×2), SSI absolute encoder, RS232/485, Ethernet and EtherCAT interfaces



AC Servo Systems

Compliant with IEC 61158 and IEC 61800-7; supports all the modes of the CoE device profile based on CiA402 and all command types of EtherCAT

- CODESYS Certification
- Pass EtherCAT conformance test by EtherCAT Technology Group (ETG)
- Support absolute type and incremental type servo motors
- Support high speed position latch (Capture) function
- Integrated Safe Torque Off (STO) safety function according to the standard of SIL2 (IEC EN 61508 & IEC 62016) / Cat.3 PL=d (ISO 13894-1) for ASDA-A3-E and ASDA-A2-E

ASDA-A3-E

- High-end servo system
- 3.1 kHz bandwidth enhances productivity
- Flexible compensation diagnosis and vibration suppression function ensures machine stability and reduces settling time
- Compact and space-saving
- Power range: 200 V 50 W ~ 15 kW



ASDA-B3-E

- Standard servo system
- 3.1 kHz bandwidth, settling time decreased by 40 %
- Easy gantry control with high-speed inter-axis data exchange
- Compatible with the A2/B2/A3 series motors for easier replacement
- Power range: 200 V 100 W ~ 3 kW



ASDA-A2-E

- Advanced servo system
- Short cycle time, ideal for high-speed synchronous multi-axis control
- Support absolute type and incremental type ECMA Series motors
- Power range: 200 V 100 W ~ 3 kW, and 400 V 400 W ~ 7.5 kW



Products for Motion Control Solution Based on CODESYS Field Devices

High Performance/Standard Compact Drive MH300/MS300

Compact size with built-in STO function, EMC filter and integrated PLC, and supports various communications and I/O expansion modules

- Power range: 115 V 0.2 kW ~ 0.75 kW, 230 V 0.2 kW ~ 15 kW and 460 V 0.4 kW ~ 22 kW
- Supports IM and PM motors, open/closed loop control
- Max. output frequency: up to 2000 Hz/1500 Hz
- Built-in Safe Torque Off (STO) safety function according to the standard of SIL2 (IEC EN 61508 & IEC 62016) / Cat.3 PL d (ISO 13894-1)
- Integrated PLC program with 5K/2K steps capacity
- Various communications: Modbus, CANopen, EtherCAT, PROFIBUS DP, DeviceNet, Modbus TCP, EtherNet/IP



High Performance Vector Control Drive C2000 Plus

Features precise speed/torque/position control functions and built-in PLC functions, suitable for sensors/sensorless synchronous/asynchronous motors

- Power range: 230 V 0.75 kW ~ 90 kW, 460 V 0.75 kW ~ 560 kW
- Heavy duty overload capability: 150 %/60 sec, and 180 %/3 sec., suitable for constant torque applications
- Integrated PLC 10k steps program capacity
- Supports point-to-point function
- Enhanced protections and adaptation with PCB coating, compliant with 3C3 standard
- Built-in Modbus and optional communication cards: EtherCAT, PROFINET, EtherNet/IP, PROFIBUS DP, DeviceNet, Modbus TCP, CANopen



Remote I/O Module R1-EC for AX-864E

Rugged and compact gateway type E-bus slave modules for high precision and demanding industrial applications



- Power coupler: connects EtherCAT slave module with 100baseTX EtherCAT
- Digital input module: 16 ports Sink/Source DI module; provides 1 ms and 2ms response time models
- Digital output module: 16 ports DO module; output current: 0.5A/each port for sink type model and 0.25A/each port for source type model
- ADC modules: 4-channel 16-bit A/D input; DAC module: 4-channel 16-bit D/A output
- Motion module: single-axis pulse output
- MPG input module: one channel MPG input, 4/6 axis control

Remote I/O Module PLC DVP Slim RTU Solution RTU-ECAT

The best compact EtherCAT remote I/O solution for various applications



- EtherCAT coupler RTU-ECAT: built-in EtherCAT (2-port switch) and supports up to 8 DVP slim I/O modules.
 - Digital input modules: supports 8/16/32 points with NPN/PNP input
 - Digital output modules: supports 8/16/32 points with NPN/PNP/relay output
 - Digital I/O modules: supports 8 DI points and 8 DO points with different in/out type
 - Analog input modules: supports 4/6 channels with mA/V input
 - Analog output modules: supports 2/4 channels with mA/V output
 - Analog I/O modules: supports 4AI channels and 2AO channels with mA/V in/out type
 - Temperature modules: supports 2/4/6/8 channels with RTD, thermocouple and NTC input
- (Note: please refer to Delta's DVP Series PLC catalog for detail information)

Extended I/O Module PLC AS Series I/O for AX-308E

The optimized system with CAN bus protocol greatly enhances communication stability and speed; rackless DIN-rail installation for easy installation



- Digital input modules: 8~64 DI module; 1ms response time
- Digital output modules: 8~64 module; transistor (sink/source) for 1ms and relay for 10 ms response time
- Digital I/O modules: 8 DI/8 DO module; transistor (sink/source) for 1ms and relay for 10ms response time
- Analog input modules: 4 and 8 channels; 16-bit differential signal
- Analog output modules: 4 and 6 channels; 12-bit differential signal
- Load cell modules: 2 channels; 24 bit ADC resolution, selectable signal input range
- Pulse modules: 2 channels differential and 4 channels open collector; 200 kHz input / output
- High speed counter modules: 2 channels differential / open collector; 200 kHz with incremental and absolute (SSI)
- Temperature modules: 4~8 channels; 0.1 °C/0.1 °F resolution



Human Machine Interface

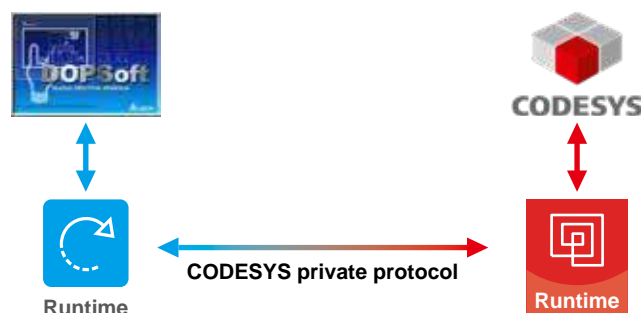
Human Machine Interface DOP-100

Tag Sharing with the CODESYS-Based Controller

Adopts the latest Cortex-A8 / Dual Core high-speed processor, multimedia functions and built-in Ethernet communication to help customers to build an IoT structure for smart machines and smart manufacturing

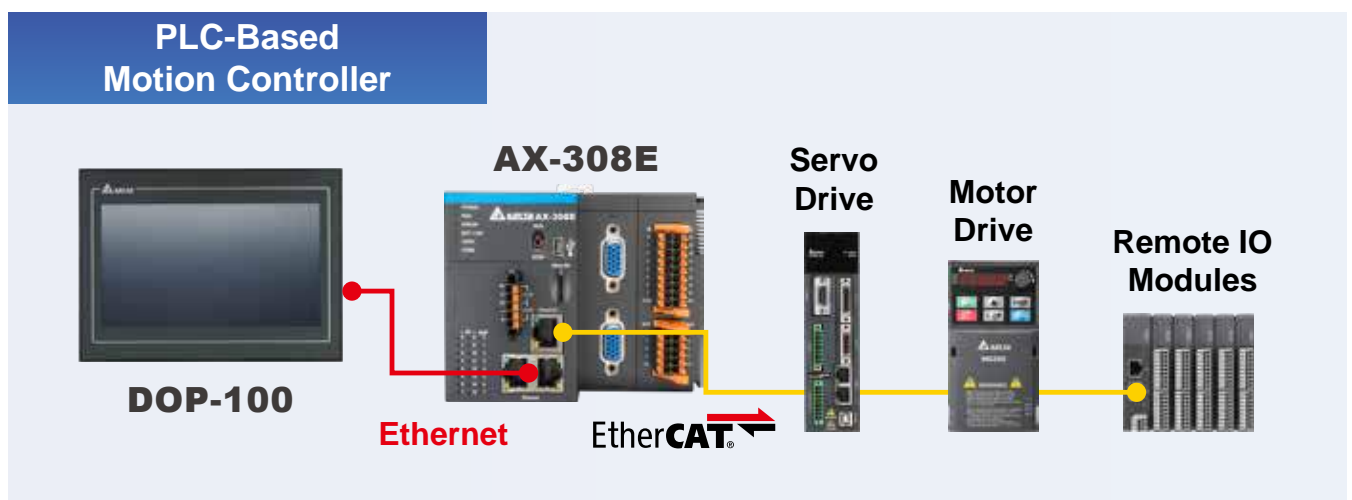
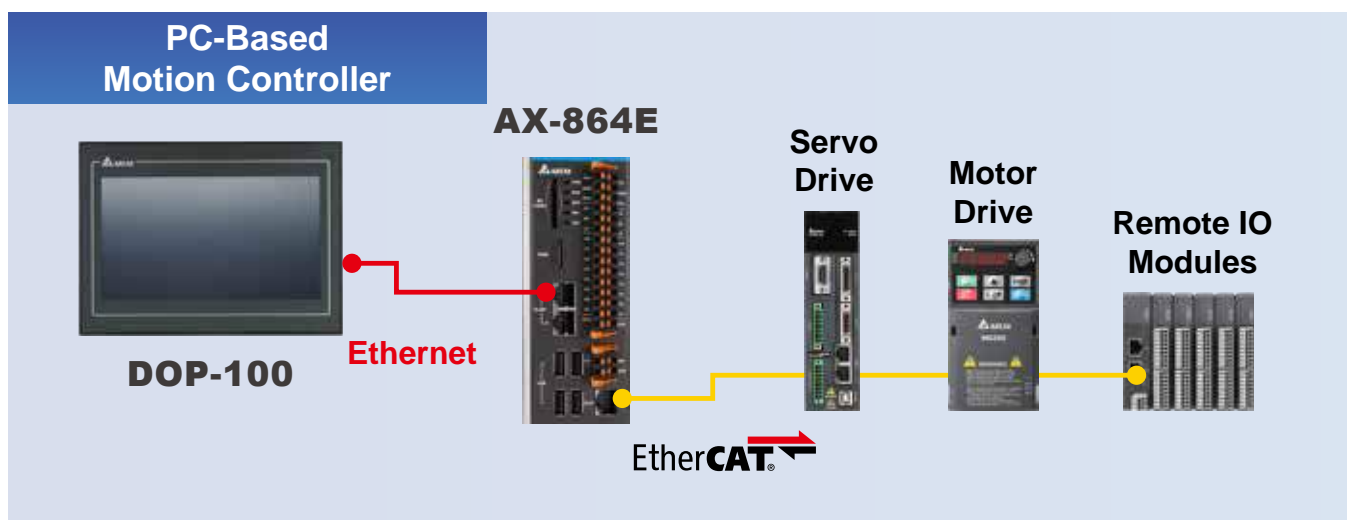
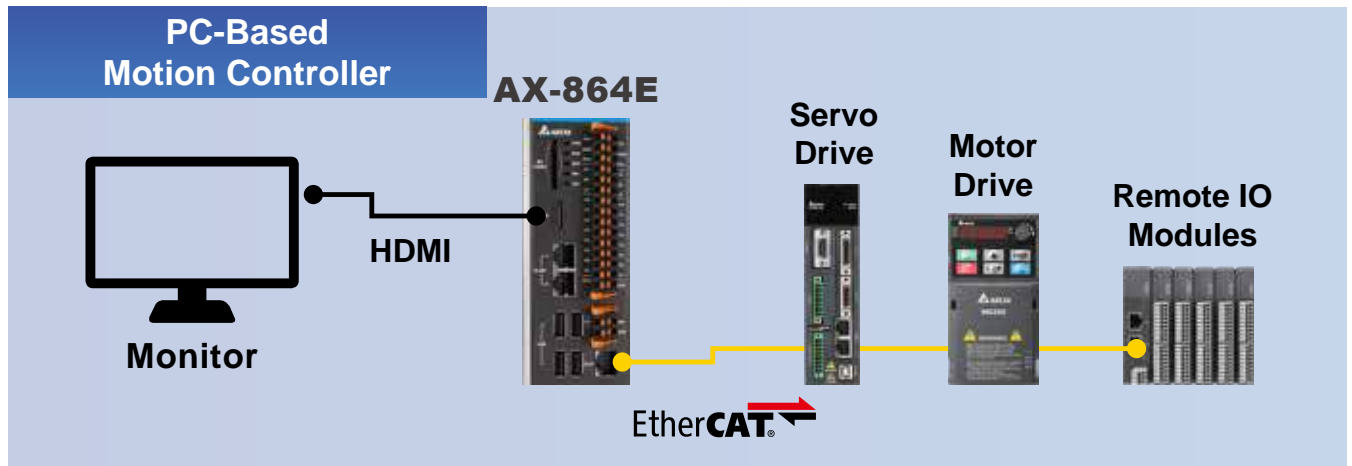


- Various display dimensions: from 4.3" to 15.1"
- Building connection with the CODESYS-based controllers
- Able to access the controllers based on CODESYS for variable value exchange
- Compact and narrow frame design to save installation space
- VNC function enables remote control via remote devices such as mobile phones and laptops
- Supports PDF documents
- Robust hardware protection: power, power board and communication isolation
- Multimedia functions: analog and IP camera connections, video play and event trigger functions
- Supports 2D and 3D recipe grouping, flexible in building recipe database
- Supports 8 levels of authorities, and allows 8 accounts (account name/password) for each level
- Supports 16 languages input to achieve localized operation for global customers



Products for Motion Control Solution Based on CODESYS Human Machine Interface

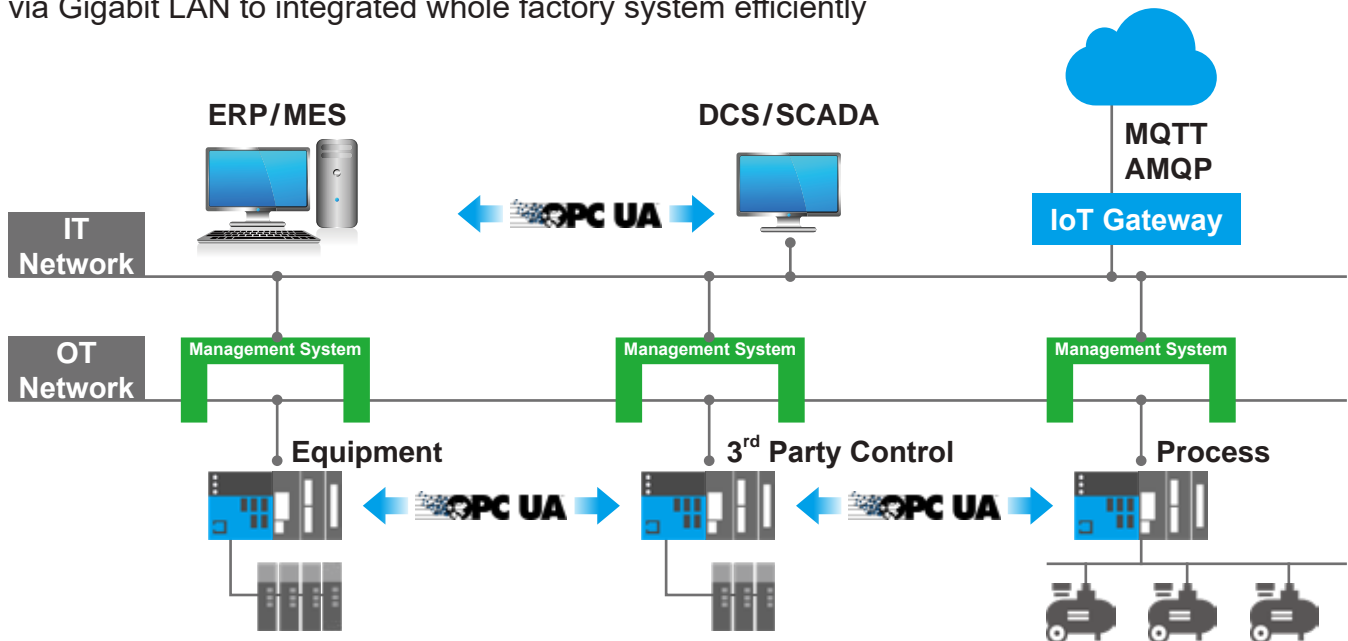
Tag Sharing between HMI and Controllers based on CODESYS



Communication Structure

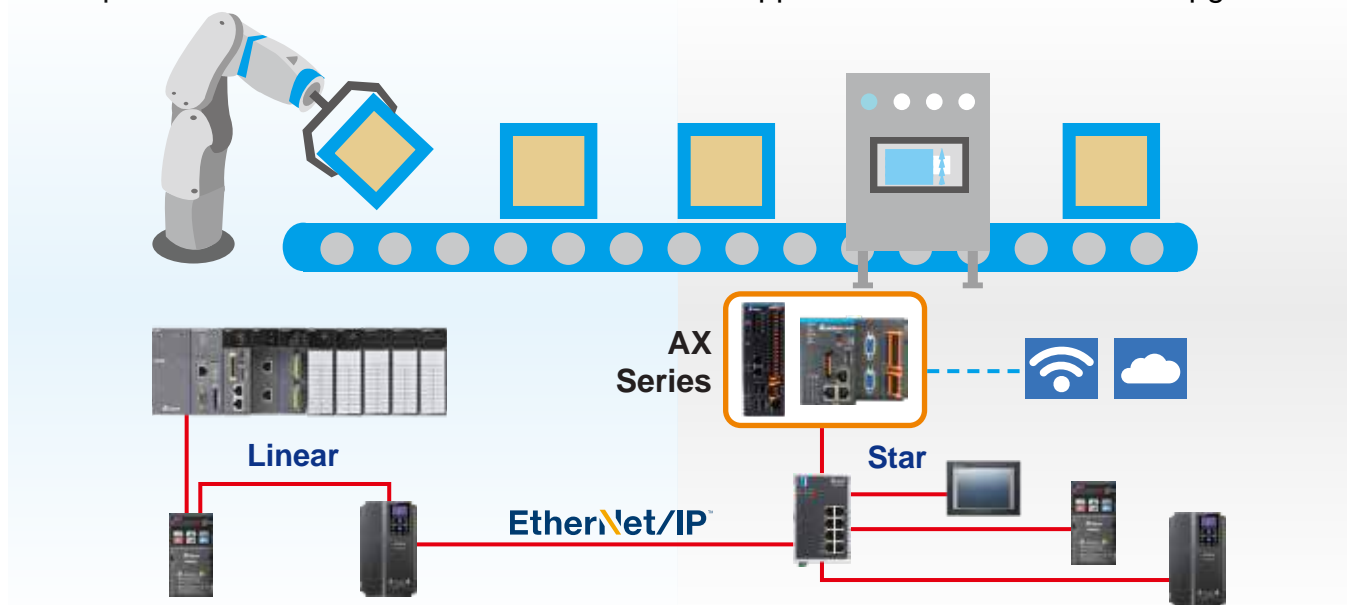
Standard OPC UA Server

Built-in OPC UA Server to connect with different system, such as MES, EPR, or PLC system via Gigabit LAN to integrated whole factory system efficiently



Flexible Network System

- Built-in EtherNet/IP to support star and linear network topology for fast expansion and management
- Compatible with IT networks for more automation applications and industrial 4.0 upgrades

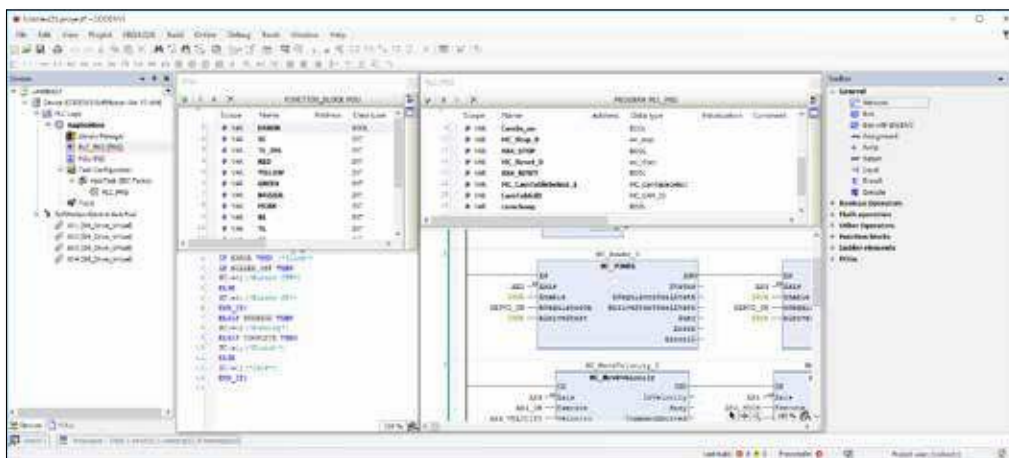


Products for Motion Control Solution Based on CODESYS Software

Comprehensive functions for configuring, programming, compiling, and debugging; seamlessly integrated for both classic and systematically supported programming

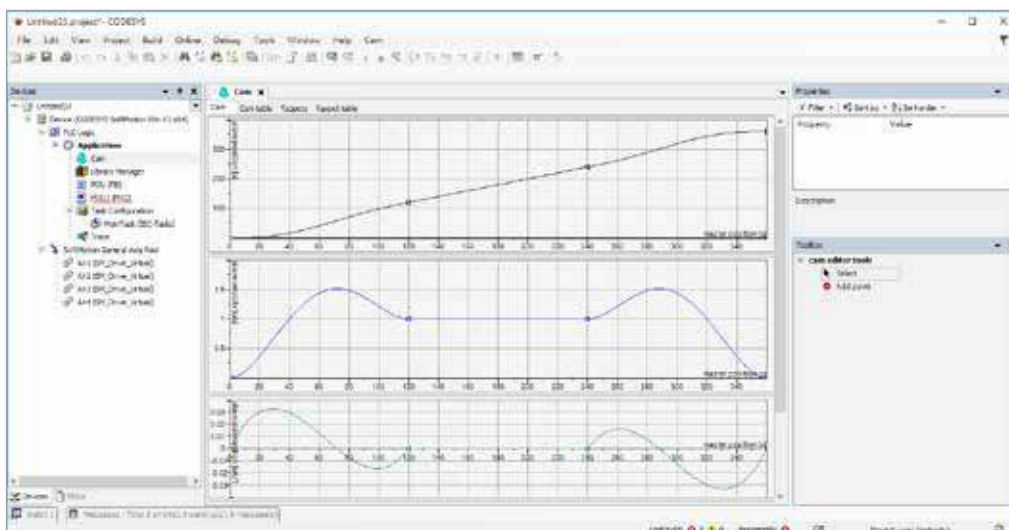
Standard IEC 61131-3 Programming

- Structured Text (ST)
- Ladder Programming (LD)
- Function Chart Programming (FBD)
- Sequential Function Chart (SFC)



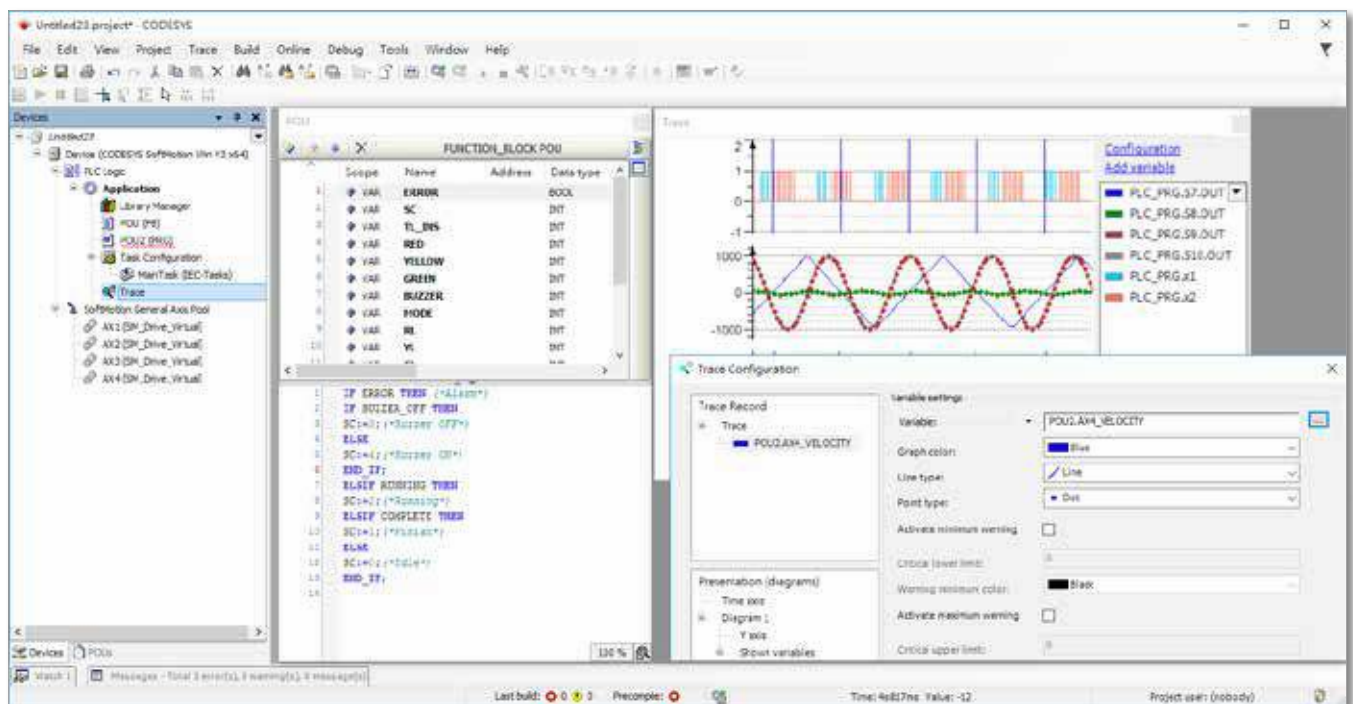
Motion Control Software Based on CODESYS - Softmotion

- Supports single-axis and coordinated multi-axis traversing motion (e.g. master/slave functions and cams) control
- Library available to use in POU's and programming of motion functions
- Graphical planning with CAM editor



Tasks and Debugger

- Display of application data at runtime in simulation mode on SoftPLC and discrete controllers
- Monitoring of specific values in watchlists
- Reading, writing, and forced setting of variable values, directly in the respective editor
- Execution of code in single step or single cycle





Products for Motion Control Solution Based on CODESYS Software

Features

- Creates structured and efficient applications from configuration to commissioning with one tool
- Optional object-oriented programming according to IEC 61131-3 (3rd edition), also blended with functional programming within the project
- Description document directly integrated into the tried and tested library for easy development

Benefits

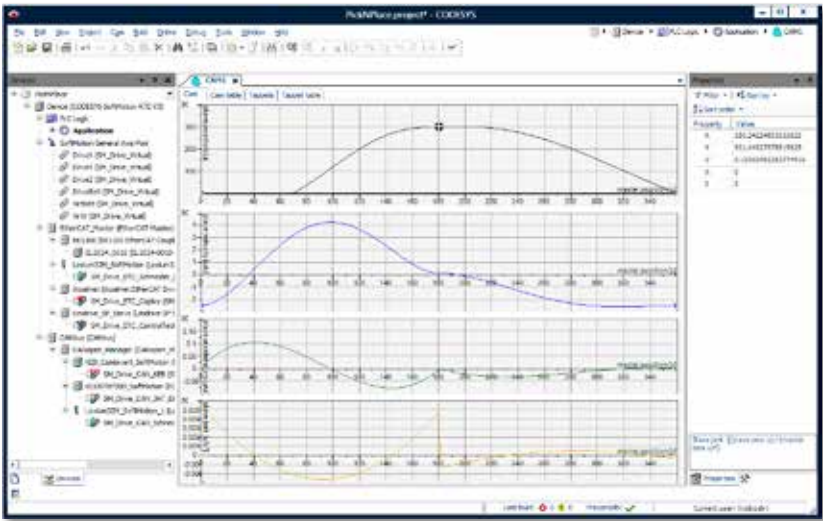
Standard PLCopen

- Single or multi-axis movements with PLCopen motion POU's



Electronic CAM

- Provides E-Cam synchronous control function
- Graphical interface for programming E-Cam curves
- Each E-Cam chart supports 65,535 points

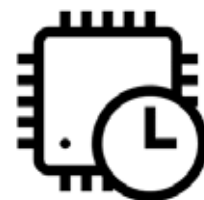




- Multi-platform development and application reusability with exchangeable target system descriptions for all CODESYS-compatible devices
- Versatile extensibility with modular design and available add-ons
- Clear user interface and user-defined windows

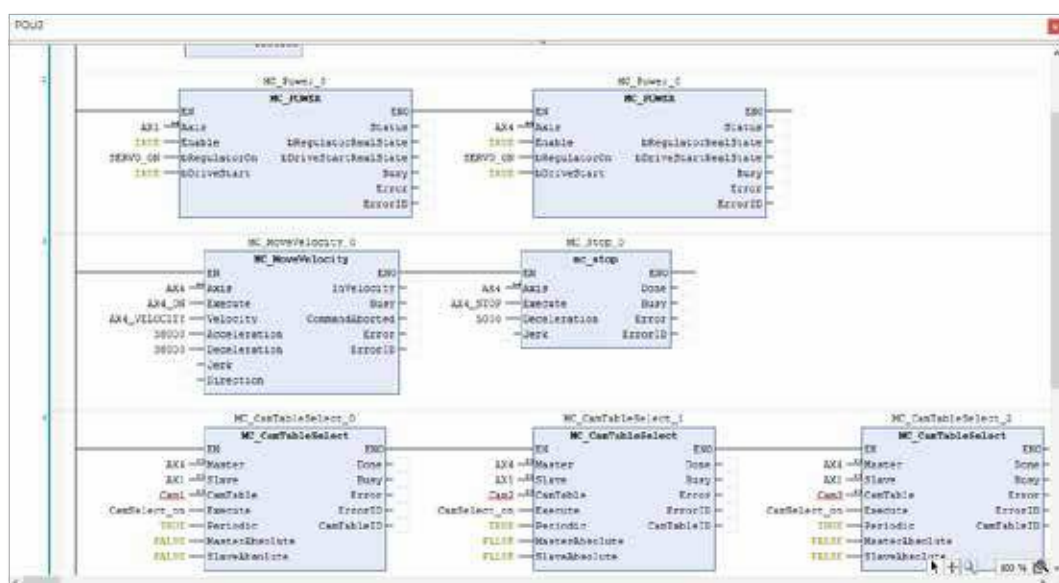
Real-Time System

- 1 ms synchronous cycle to control a total of 64 real and virtual axes



Multi-Axis Function Block

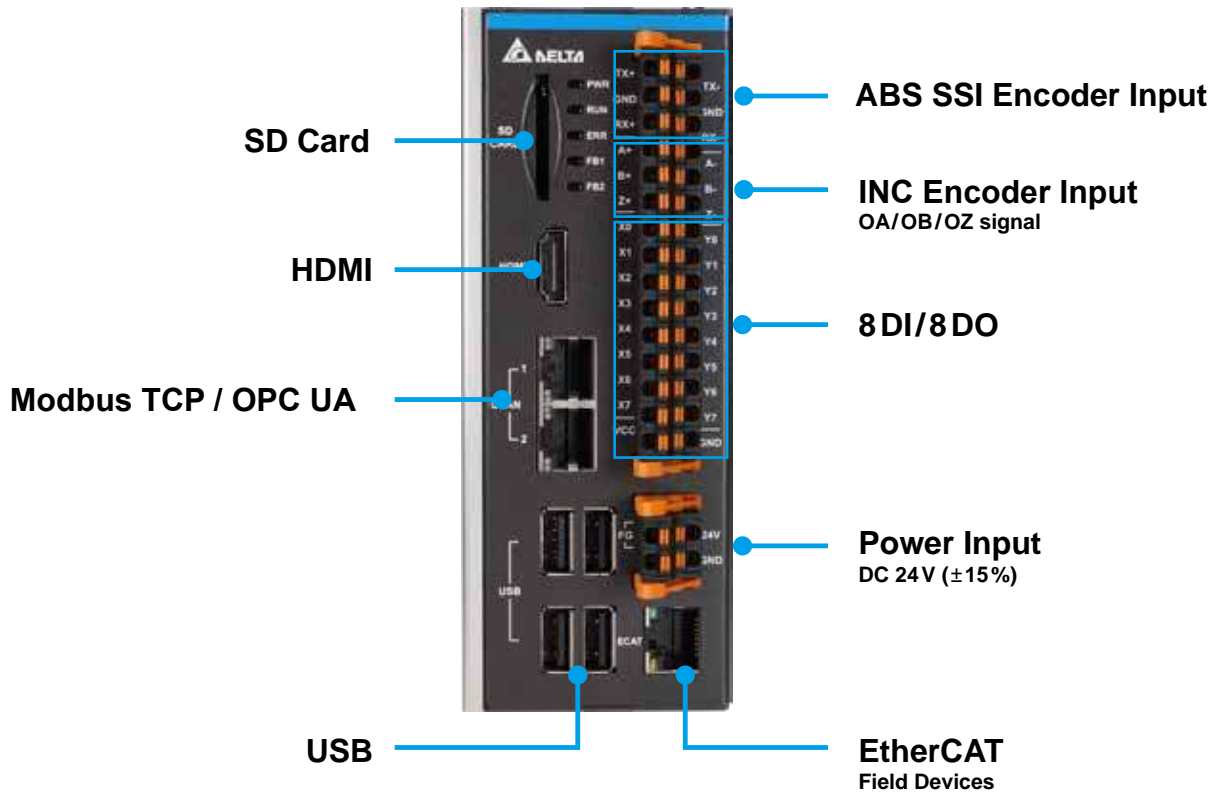
- Motion control using IEC 61131-3 function blocks



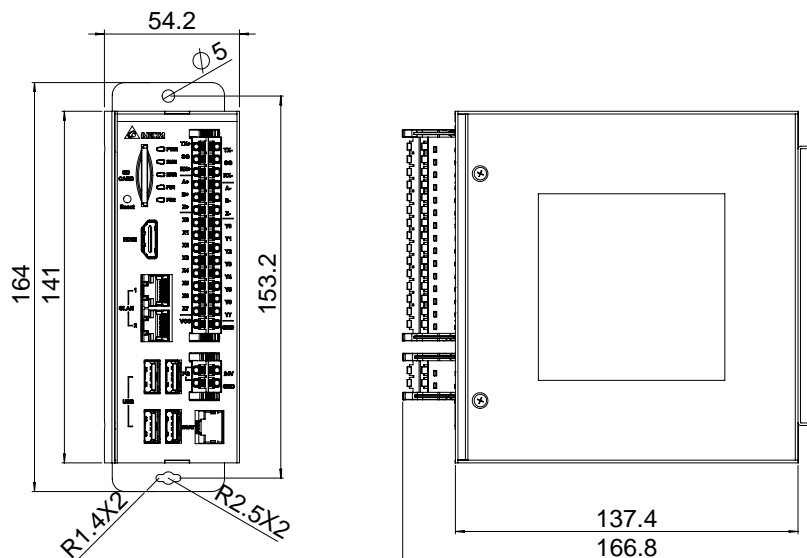
Product Information

PC-Based Motion Controller AX-864E

Product Parts

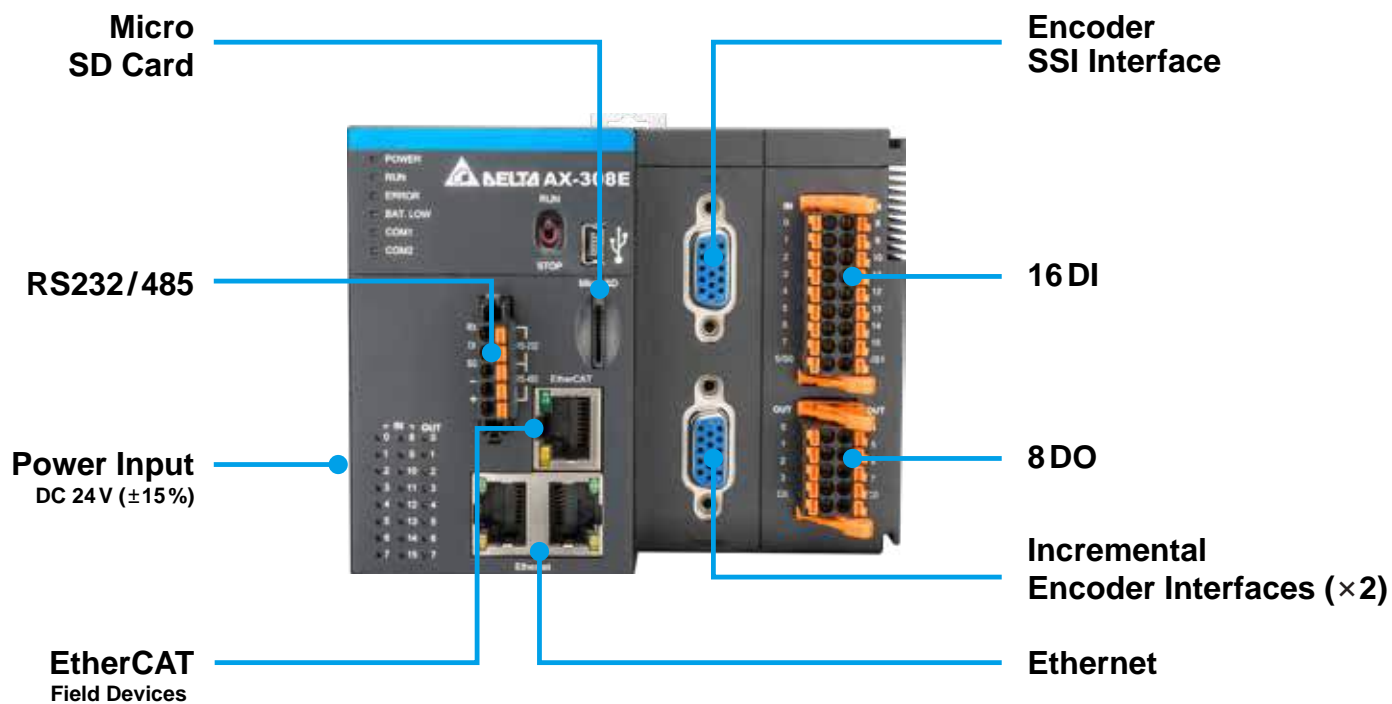


Dimensions Unit: mm

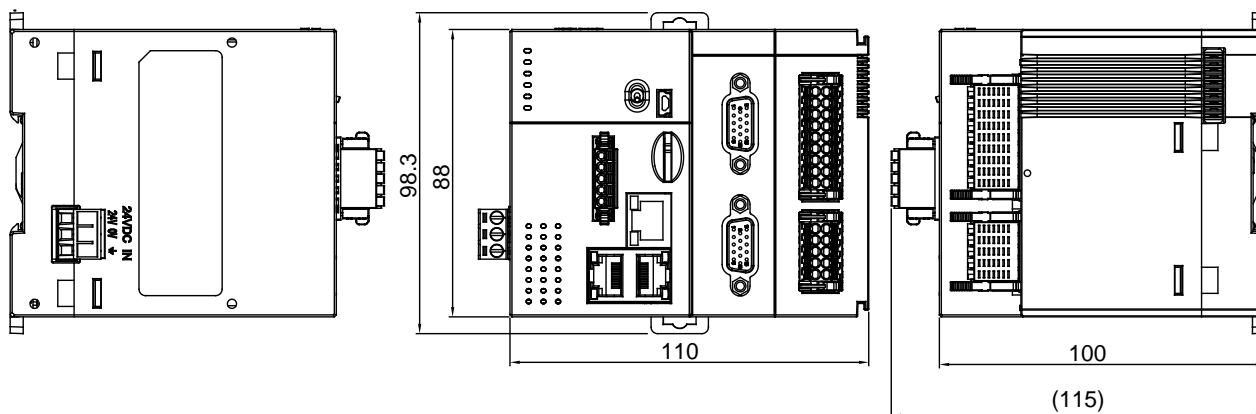


PLC-Based Motion Controller AX-308E

Product Parts



Dimensions Unit: mm

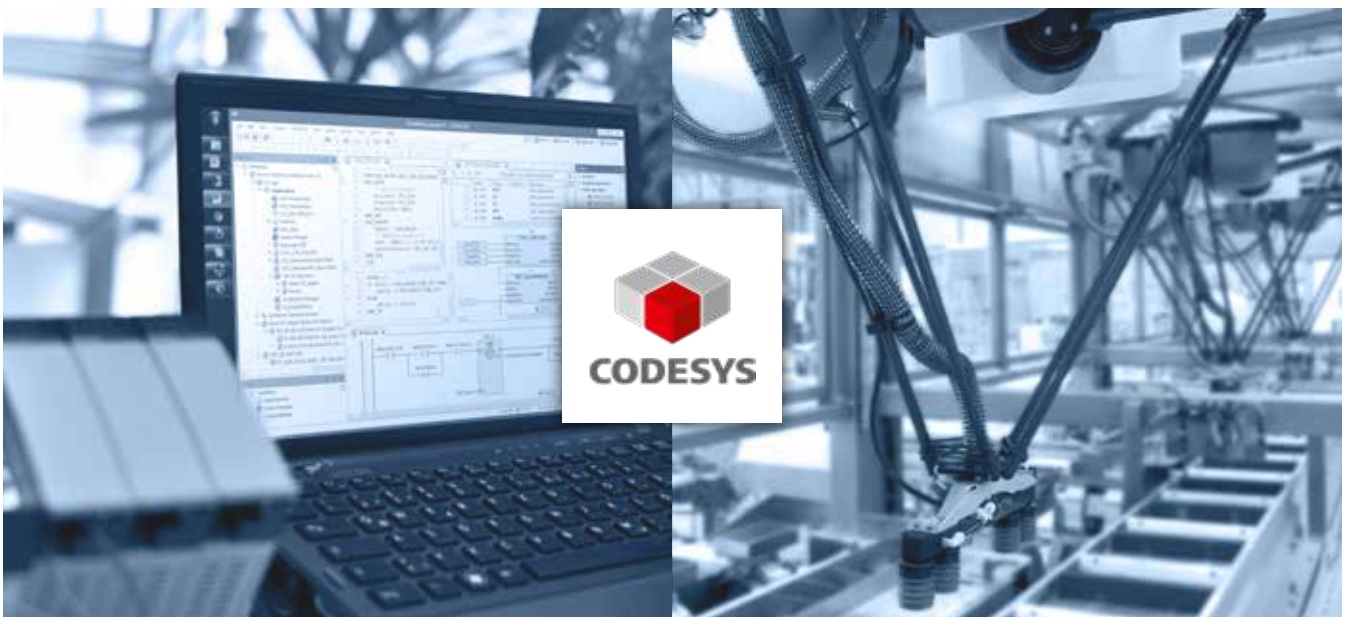
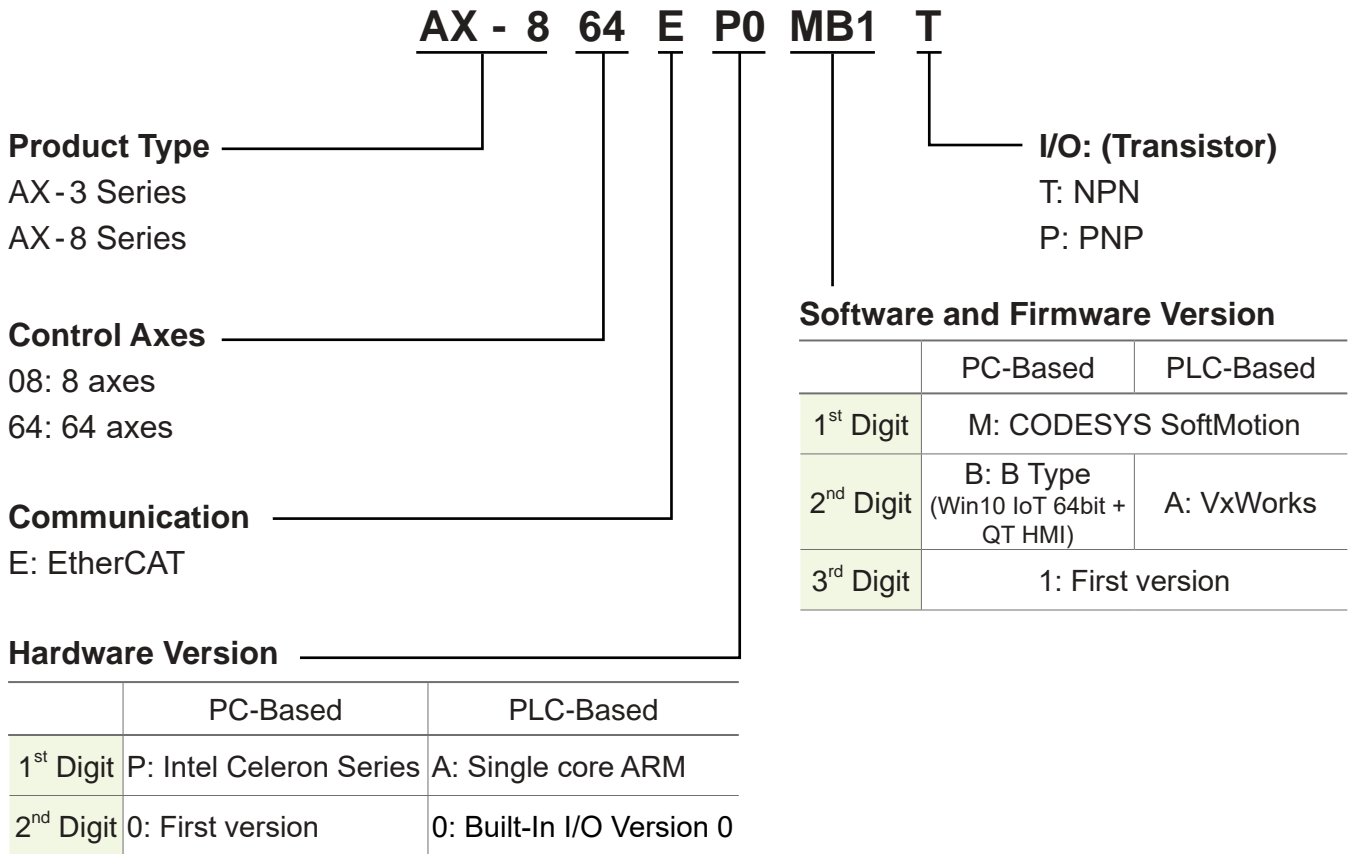


Hardware Specifications

Model		AX-864E
Processor	CPU	Intel® Celeron J1900 2.0 GHz Quad. Core
	BIOS	AMI BIOS
	Memory	Built-in DDR3L-1333 4 GB
	Non-Volatile Memory	96 KB
Display	Type	HDMI 1.4a × 1
Input / Output Port	DI / DO	8 DI / 8 DO
	Transistor	PNP; NPN
Encoder Input	Input Pulse	A± / B± / Z±
	Communication Type	SSI × 1
Execution Cycle	Floating-point Number	30 ns
Storage	SSD	M.2 module × 1 (Built-in SSD 32G)
	USB	USB 2.0 × 4
	SD Card	SD card slot × 1
	Program Capacity	1 G
	Temp. Data Storage (I/Q/M)	128 KB / 128 KB / 5 MB
Power	Input Voltage	24 V _{DC} , -15 % / +20 %
	Rated Power	48 W
	Max. curr. consumption	2 A
RTC Backup Battery		BIOS 3V CR2032 lithium battery × 1
Dimensions (W) × (H) × (D) mm / Weight		54.2 × 141 × 137.5 / 700 g
Cooling System		Natural
Axes of Control (1 ms)		64 Axes / 96 Stations
Communication	Network Port	Ethernet × 2
	Serial Port	RS422/485: 115.2 kbps
Environment	Ambient Temperature	0 ~ 50 °C
	Storage Temperature	-30 ~ 85 °C
	Humidity	10 ~ 90 % RH (non-condensing)
	Vibration Resistance	5 ~ 8.3 Hz 3.5 mm, 8.3 ~ 150 Hz 1 G IEC61131-2
	Shock Resistance	75G IEC 60068-2-27, half sine, 11 ms duration
	Protection Rating	IP20
	Certifications	CE

Model		AX-308E
Instruction Processing Speed	Boolean Operation	5 ns
	Elementary Arithmetic for Integer	5 ns
	Elementary Arithmetic for Floating Point	33 ns
Program Capacity		8 MB
Data Capacity		16 MB
Max. Extension Modules		32 modules (max. 16 analog modules)
Max. Number of Inputs / Outputs		1,024 points (input & output)
CPU Built-in Inputs / Outputs		16 DI / 8 DO
CPU Built-in Differential Inputs / Outputs		Incremental ×2 / SSI absolute ×1
I/O Devices	X (Input)	8,192 bytes
	Y (Output)	8,192 bytes
Bit Devices	M (Memory)	512k bytes
Pulse Output		Open collector: 4 axes, 200 kHz
High-Speed Counter		General: 5 CHs, 200 kHz
DO Type		NPN
Built-in Communication Port		USB, Ethernet (Switch), RS232, RS485, EtherCAT
Data Backup (w/o battery)	Program	Flash ROM, rewritable up to 100,000 times
	Latched Area	MRAM, no rewriting limit
RTC Backup Battery		CR1620 lithium battery ×1
Power	Input Voltage	24V _{DC} (±10%)
	Internal Power Consumption	150 mA
Dimensions (W) × (H) × (D) mm / Weight		110×88×100 / 420 g
Environment	Operating Temperature	-20 ~ 55 °C
	Storage Temperature	-40 ~ 80 °C
	Humidity	5 ~ 95 % RH (non-condensing)
	Vibration Resistance	IEC 61131-2, IEC 60068-2-6 (TEST Fc); 5 Hz ≤ f ≤ 8.4 Hz, constant amplitude 3.5 mm; 8.4 Hz ≤ f ≤ 150 Hz, constant acceleration 1g
	Shock Resistance	IEC 61131-2, IEC 60068-2-27 (TEST Ea); 15g peak, 11 ms duration, half-sine
	Operating Environment	Non-corrosive gas
	Installation	Inside of the control panel
	Pollution Degree	2
	Protection Rating	IP20
	Certifications	CE, UL

Model Explanation





Smarter. Greener. Together.

Industrial Automation Headquarters

Delta Electronics, Inc.

Taoyuan Technology Center
No.18, Xinglong Rd., Taoyuan District,
Taoyuan City 33068, Taiwan
TEL: 886-3-362-6301 / FAX: 886-3-371-6301

Asia

Delta Electronics (Shanghai) Co., Ltd.

No.182 Minyu Rd., Pudong Shanghai, P.R.C.
Post code : 201209
TEL: 86-21-6872-3988 / FAX: 86-21-6872-3996
Customer Service: 400-820-9595

Delta Electronics (Japan), Inc.

Tokyo Office
Industrial Automation Sales Department
2-1-14 Shibadaimon, Minato-ku
Tokyo, Japan 105-0012
TEL: 81-3-5733-1155 / FAX: 81-3-5733-1255

Delta Electronics (Korea), Inc.

Seoul Office
1511, 219, Gasan Digital 1-Ro., Geumcheon-gu,
Seoul, 08501 South Korea
TEL: 82-2-515-5305 / FAX: 82-2-515-5302

Delta Energy Systems (Singapore) Pte Ltd.

4 Kaki Bukit Avenue 1, #05-04, Singapore 417939
TEL: 65-6747-5155 / FAX: 65-6744-9228

Delta Electronics (India) Pvt. Ltd.

Plot No.43, Sector 35, HSIIDC Gurgaon,
PIN 122001, Haryana, India
TEL: 91-124-4874900 / FAX : 91-124-4874945

Delta Electronics (Thailand) PCL.

909 Soi 9, Moo 4, Bangpoo Industrial Estate (E.P.Z),
Pattana 1 Rd., T.Phraksa, A.Muang,
Samutprakarn 10280, Thailand
TEL: 66-2709-2800 / FAX : 662-709-2827

Delta Electronics (Australia) Pty Ltd.

Unit 20-21/45 Normanby Rd., Notting Hill Vic 3168, Australia
TEL: 61-3-9543-3720

Americas

Delta Electronics (Americas) Ltd.

Raleigh Office
P.O. Box 12173, 5101 Davis Drive,
Research Triangle Park, NC 27709, U.S.A.
TEL: 1-919-767-3813 / FAX: 1-919-767-3969

Delta Greentech (Brasil) S/A

São Paulo Office
Rua Itapeva, 26 – 3º Andar - Bela Vista
CEP: 01332-000 – São Paulo – SP - Brasil
TEL: 55-11-3530-8643 / 55-11-3530-8640

Delta Electronics International Mexico S.A. de C.V.

Mexico Office
Gustavo Baz No. 309 Edificio E PB 103
Colonia La Loma, CP 54060
Tlalnepantla, Estado de México
TEL: 52-55-3603-9200

EMEA

Headquarters: Delta Electronics (Netherlands) B.V.

Sales: Sales.IA.EMEA@deltaww.com
Marketing: Marketing.IA.EMEA@deltaww.com
Technical Support: iatechnicalsupport@deltaww.com
Customer Support: Customer-Support@deltaww.com
Service: Service.IA.emea@deltaww.com
TEL: +31(0)40 800 3900

BENELUX: Delta Electronics (Netherlands) B.V.

De Witbogt 20, 5652 AG Eindhoven, The Netherlands
Mail: Sales.IA.Benelux@deltaww.com
TEL: +31(0)40 800 3900

DACH: Delta Electronics (Netherlands) B.V.

Coesterweg 45, D-59494 Soest, Germany
Mail: Sales.IA.DACH@deltaww.com
TEL: +49(0)2921 987 0

France: Delta Electronics (France) S.A.

ZI du bois Challand 2, 15 rue des Pyrénées,
Lisses, 91090 Evry Cedex, France
Mail: Sales.IA.FR@deltaww.com
TEL: +33(0)1 69 77 82 60

Iberia: Delta Electronics Solutions (Spain) S.L.U

Ctra. De Villaverde a Vallecas, 265 1º Dcha Ed.
Hormigueras – P.I. de Vallecas 28031 Madrid
TEL: +34(0)91 223 74 20

Carrer Llacuna 166, 08018 Barcelona, Spain

Mail: Sales.IA.Iberia@deltaww.com

Italy: Delta Electronics (Italy) S.r.l.

Via Meda 2-22060 Novedrate(CO)
Piazza Grazioli 18 00186 Roma Italy
Mail: Sales.IA.Italy@deltaww.com
TEL: +39 039 8900365

Russia: Delta Energy System LLC

Vereyskaya Plaza II, office 112 Vereyskaya str.
17 121357 Moscow Russia
Mail: Sales.IA.RU@deltaww.com
TEL: +7 495 644 3240

Turkey: Delta Greentech Elektronik San. Ltd. Sti. (Turkey)

Şerifali Mah. Hendem Cad. Kule Sok. No:16-A
34775 Ümraniye – İstanbul
Mail: Sales.IA.Turkey@deltaww.com
TEL: + 90 216 499 9910

GCC: Delta Energy Systems AG (Dubai BR)

P.O. Box 185668, Gate 7, 3rd Floor, Hamarain Centre
Dubai, United Arab Emirates
Mail: Sales.IA.MEA@deltaww.com
TEL: +971(0)4 2690148

Egypt + North Africa: Delta Electronics

Unit 318, 3rd Floor, Trivium Business Complex, North 90 street,
New Cairo, Cairo, Egypt
Mail: Sales.IA.MEA@deltaww.com