Digitized Automation for a Changing World

Delta Compact Modular Mid-range PLC

AS / AX-3 Series

enertronic
PROYECTOS Y
SUMINISTROS S.A.

DELTA

Flexible, Smart, Friendly - The Best Choice for a Controller of Automated Equipment

The AS Series Compact Modular Mid-range PLC is a high performance multi-purpose controller designed for all kinds of automated equipment. It features Delta's self-developed 32-bit SoC CPUs for enhanced execution speed (40k steps/ms) and supports up to 32 extension modules or up to 1,024 inputs/outputs. The AS series provides accurate positioning control for up to 8 axes via CANopen motion network and 6 axes via pulse control (200kHz). It is widely used in diverse automated equipment such as for electronics manufacturing, labeling, food packaging, and textile machines.

The AS Series Controller is equipped with CANopen and EtherNet/IP network communication for high-speed data transmission. The professional yet simple editing software DIADesigner delivers quick hardware and network configuration with built-in function blocks for different industries. It also provides multi-layer password protection for enhanced system security.

The AS Series adopts a rackless design and DIN rail clips for fast vertical module installation. The simple shape and dark gray exterior of the AS series help resist stains and dirt in harsh industrial environments.

High Efficiency Computing

Delta's self-developed AS100/200/300 Series CPU provides 32-bit high-performance computing and a real-time operation system. As the core of a high-efficiency controller, it helps increase the productivity and adaptability of demanding equipment.

Advanced CPU Performance

■ High Execution Speed

- Max. number of inputs/outputs: 1,024
- Max. extension ability: 32 modules

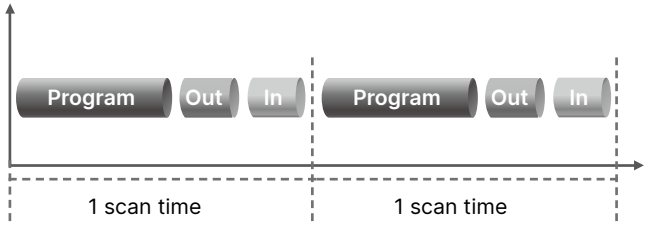
Basic instruction/Boolean operation

AS100/200/300 series CPU	25 ns
AS500 series CPU	50 ns
AX-3 series CPU	2 ~ 5 ns

Optimized Execution Efficiency

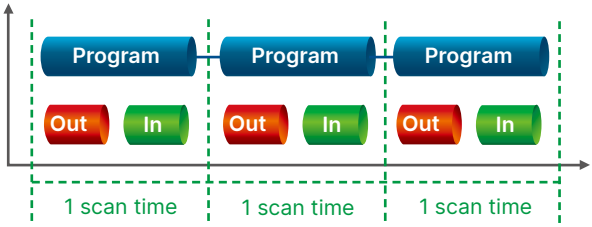
General Scanning Method

Standard simplex scanning which sequentially goes through instructions by fixed schedule operation (e.g. I/O update). It significantly affects overall execution speed.



AS Series Scanning Method

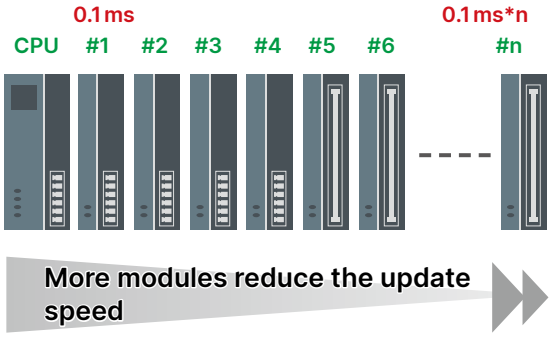
Fixed schedule operations will be automatically processed by the CPU background program when scanning starts. This significantly enhances execution speed.



Optimized I/O updates

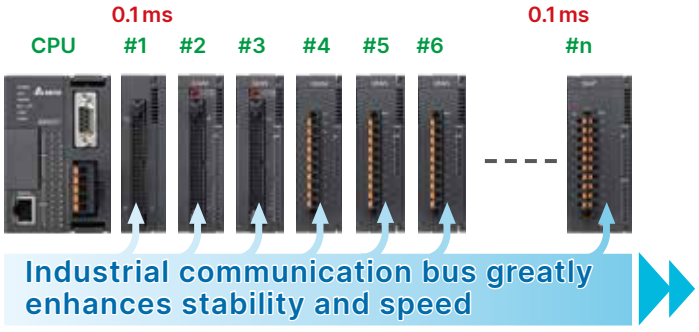
Common in the industry: PLC module bus update via serial communication

General serial communication: the signal is sequentially sent from the 1st module to the last module. The more modules the longer I/O update time it takes.



AS Series: PLC module bus update via optimized CAN protocol

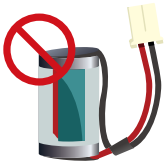
CAN protocol: The signal is sent via optimized CAN bus protocol. The I/O update time is not significantly prolonged even with more modules.



Note: The real updating performance will be different for different extension modules.

Permanent data backup, no battery required

Non-volatile memory material for data backup



	PLC power off
PLC programs	permanent backup
Latched area	permanent backup

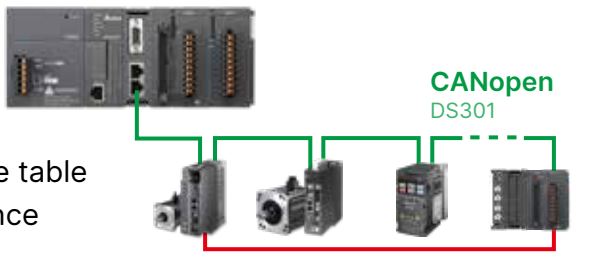
Lithium button battery for Real Time Clock (RTC) function

	PLC power off
RTC	keeps accurate time

Accurate Axis Control - Positioning Control Solution

AS100/200/300 positioning control - Delta's CANopen control

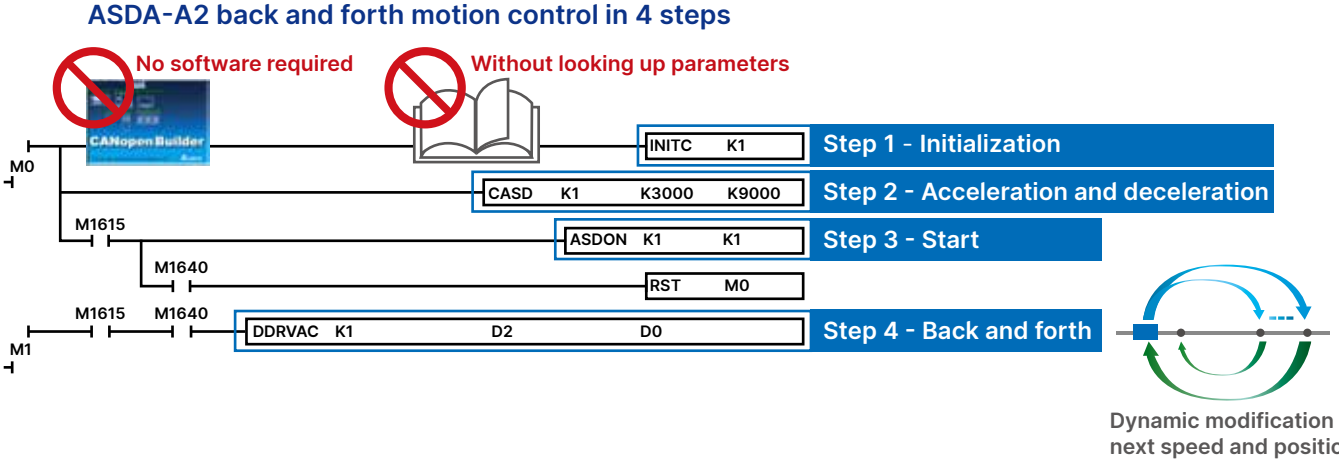
- AS100/200/300 supports up to 8 Delta servo drives and 8 AC motor drives (AS-FCOPM function card is needed for the AS300)
- Fast positioning configuration in one initialization instruction without building CANopen data exchange table
- Axis control by instructions provides easy maintenance and high PLC program readability

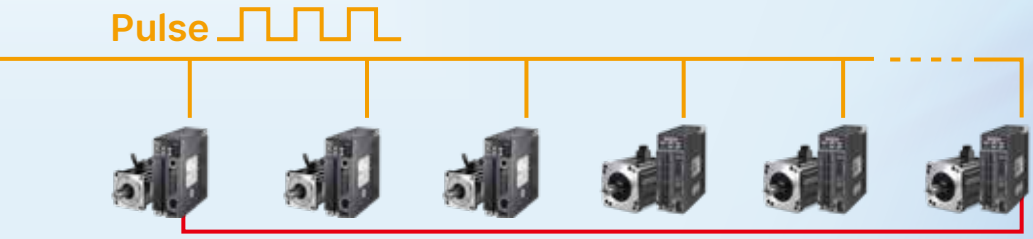


Simple control instructions for Delta drives (AS100/200/300 series CPU only)

- Initialization: INITC
- Relative positioning: DRVIC (Servo only)
- Read and write parameter: COPRW
- Acceleration and deceleration: CASD
- Constant speed control: PLSVC
- Absolute positioning: DRVAC (Servo only)
- Start/Stop: ASDON
- Homing: ZRNC (Servo only)

ASDA-A2 back and forth motion control in 4 steps



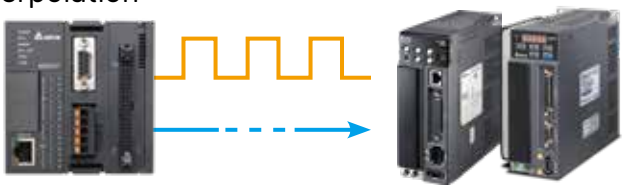


Motion control of max. 6 Delta AC Servo Drives

Positioning control - high-speed pulse

- AS332T-A / AS332P-A transistor CPU: 6 axes (or 12 channels) 200 kHz
- AS324MT-A differential CPU: 2 axes 4 MHz + 4 axes 200 kHz
- Supports positioning planning table for fast positioning planning and path simulation (AS100 / 200 / 300 series CPU only)
- Choose any given 2 axes for linear and arc interpolation

* Note: Please refer to the product specification section (P.28) for more information on CPU models



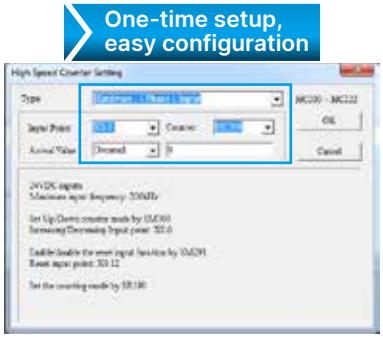
AS100 / 200 / 300 CPU

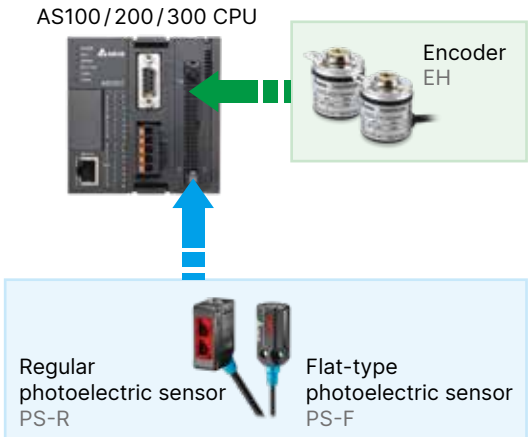
AC Servo Drive
ASDA-B3 & ASDA-B2 Series

High-speed counter

- Real-time high precision monitoring:
  AS332T-A / AS332P-A transistor CPU: 6 channels 200 kHz
  AS324MT-A differential CPU: 2 channels 4 MHz / 4 channels 200 kHz
- Up to 16 external input interrupts
- High-speed counter setting tools

* Note: Please refer to the product specification section (P.28) for more information on CPU models

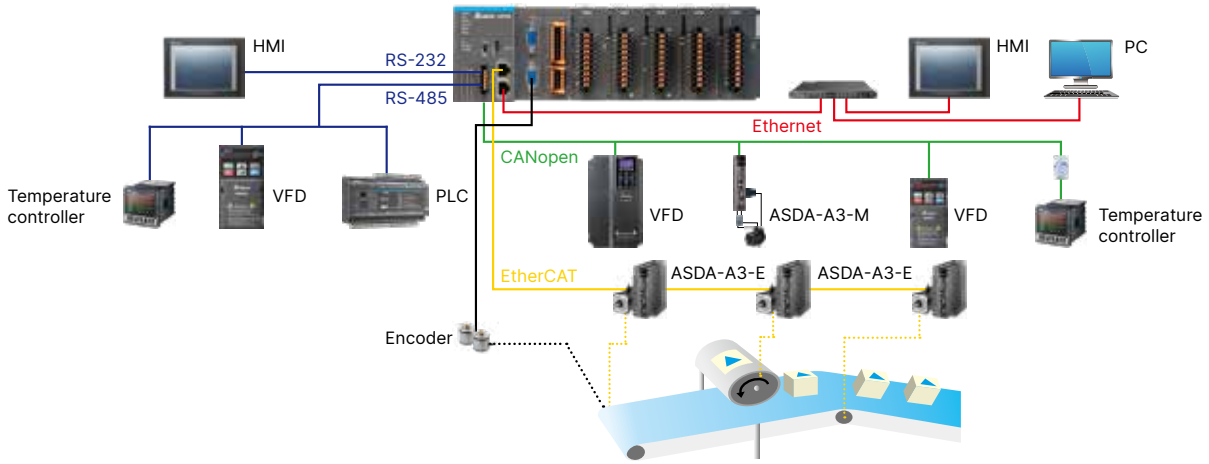




AS500 Motion Control Solution

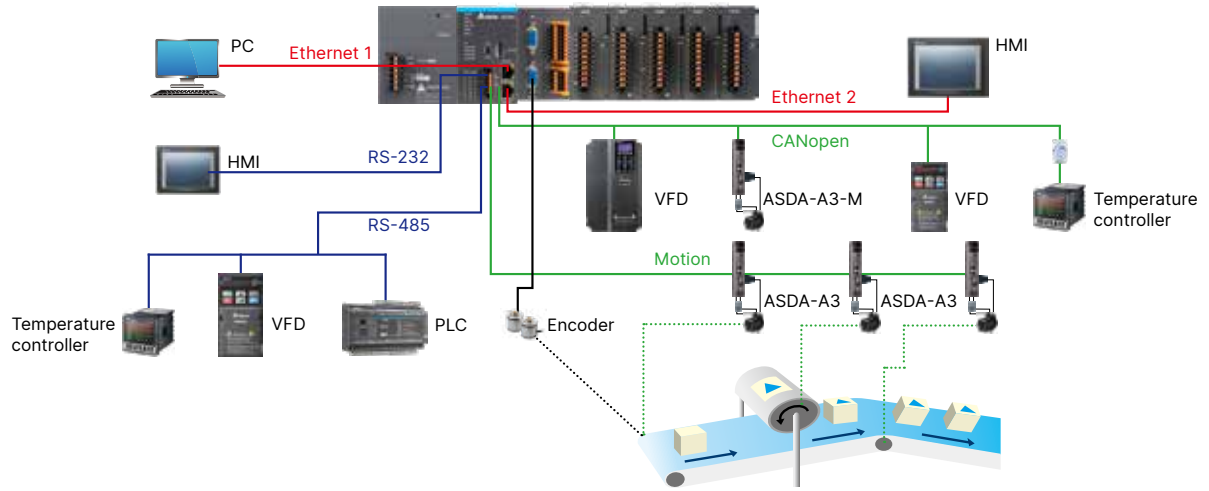
AS500 EtherCAT motion control system

- AS516E CPU supports up to 16 Delta EtherCAT servos (min. sync time: 1ms/16 axes)
- AS532ES/AS564ES CPUs support up to 32/64 Delta EtherCAT servos (Point-to-Point mode)
- Supports AS power, DIO, AIO, temperature and load cell expansion modules (max. 32 modules)
- 1GHz processor provides high operation performance
- Provides various motion commands: position, velocity, torque, multi-axis interpolation, E-gear, E-CAM, G-code, and more
- Built-in 16 DI & 8 DO, 2 incremental encoders, SSI absolute encoder, RS-232/485, Ethernet, CANopen DS301 and EtherCAT interfaces



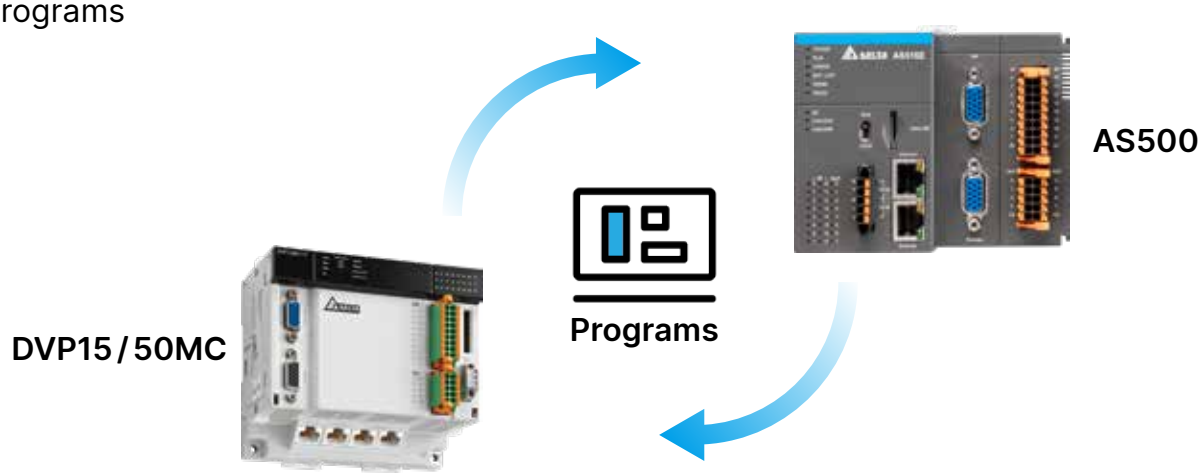
AS500 CANopen motion control system

- AS524C CPU supports up to 24 axes Delta CANopen servos (min. sync time: 2ms/4 axes)
- Supports AS power, DIO, AIO, temperature and load cell expansion modules (max. 32 modules)
- 1GHz processor provides high operation performance
- Provides various motion commands: position, velocity, torque, multi-axis interpolation, E-gear, E-CAM, G-code, and more
- Built-in 16 DI & 8 DO, 2 incremental encoders, SSI absolute encoder, RS-232/485, Ethernet (x2), CANopen DS301 and CANopen motion interfaces



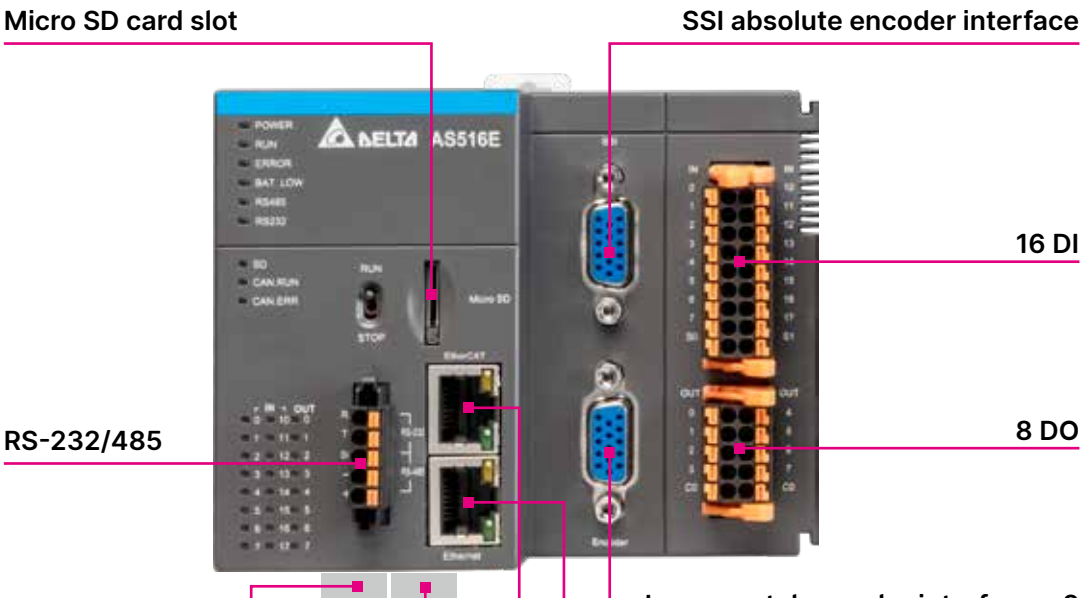
Higher scalability in DVP-MC and AS500

AS500 motion CPUs are designed with the Delta DVP-MC motion platform, which allows users to scale up/down their systems to AS/DVP systems without rewriting all programs



Highly integrated CPU design

The AS500 motion control CPUs feature various built-in I/O and communication protocols to satisfy customer needs for compact design and high performance

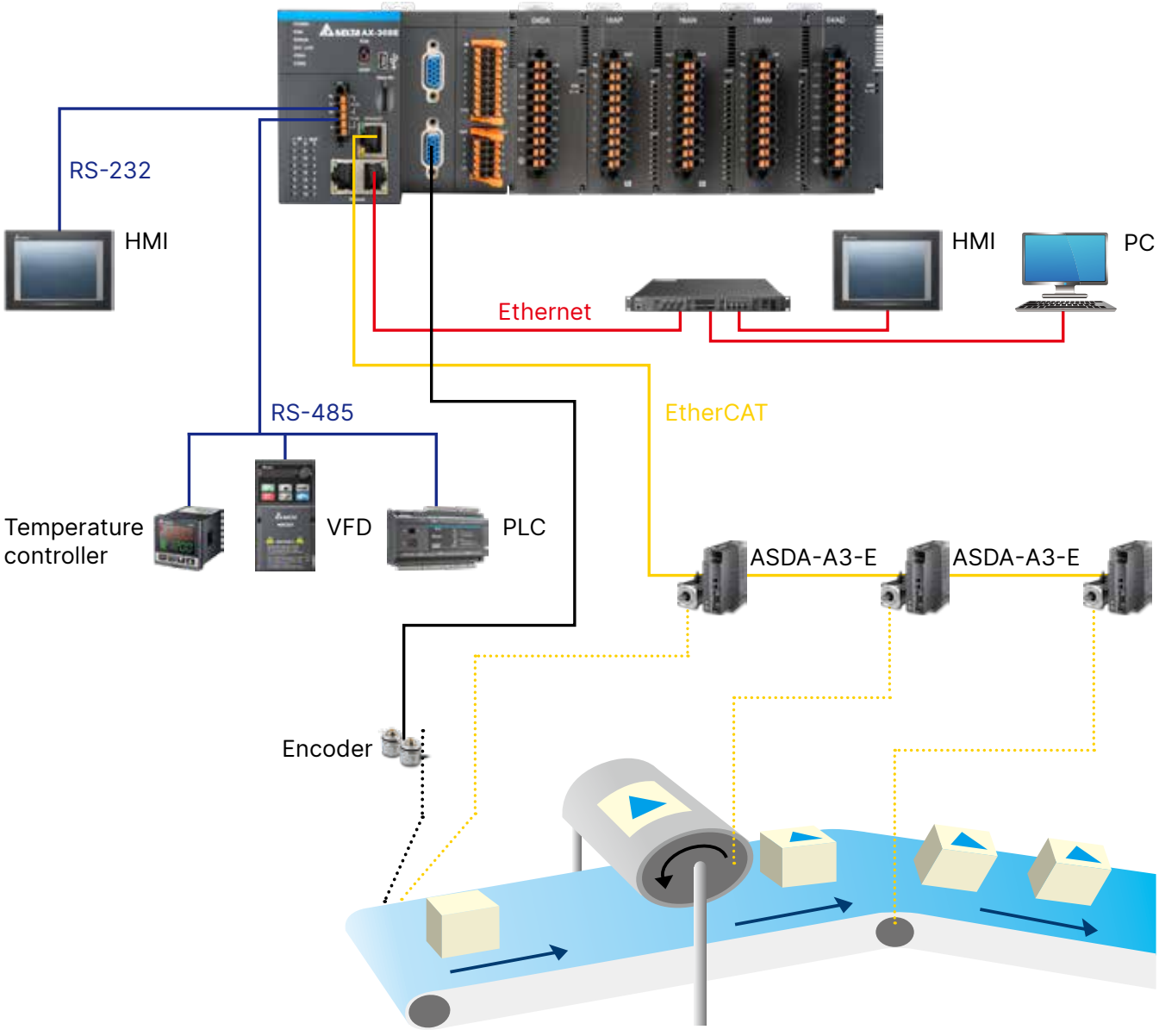


AS5xxE	CANopen (2-port)		EtherCAT
AS524C	CANopen	CAN Motion	Ethernet

AX-3 CODESYS Control Solution

AX-3 CODESYS Control System

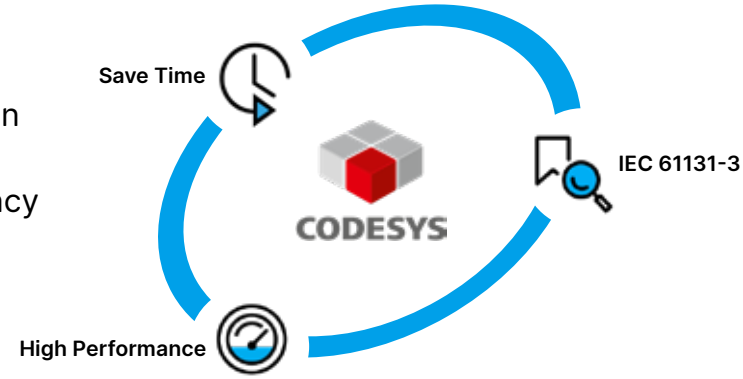
- Provides multiple controller solutions
  - EtherCAT motion controllers
    - AX-308E / AX-316E / AX-332E CPU supports up to 8 / 16 / 32 EtherCAT axes (AX-332E min. sync time: 1 ms / 32 axes)
    - AX-304EL / AX-364EL CPUs support up to 4 / 64 EtherCAT axes (Point-to-Point mode)
  - Logical controllers
    - AX-300N / AX-324N CPUs built-in 0 / 24 DIO points
- Supports AS power, DIO, AIO and temperature expansion modules (max. 32 modules)
- High performance, min. command execution time: 2 ns
- Provides various motion commands: position, velocity, torque, multi-axis interpolation, E-gear, E-CAM, and more
- Built-in 6 ~ 16 DI & 6 ~ 8 DO, incremental encoders, SSI absolute encoder, RS-232 / 422 / 485, Ethernet and EtherCAT interfaces



Note: Actual support functions will vary by series

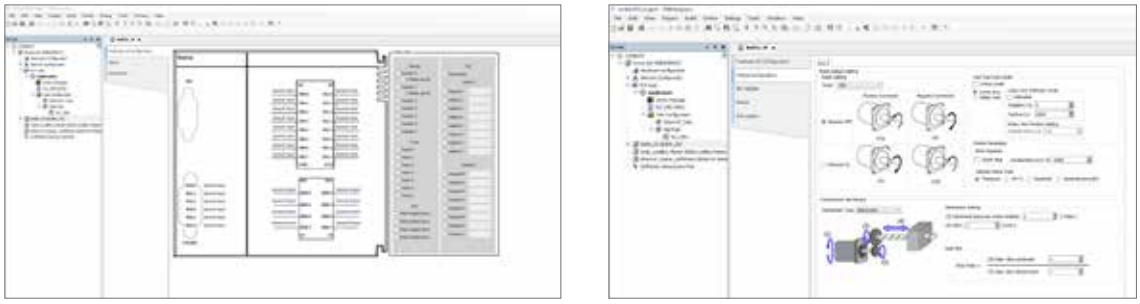
Benefits of CODESYS platform

- IEC 61131-3 standards
- High performance and stable operation system
- Enhances project development efficiency with a standardized programming and controller development platform for parameter setting, configuration and PLCopen editing



User-friendly programming software

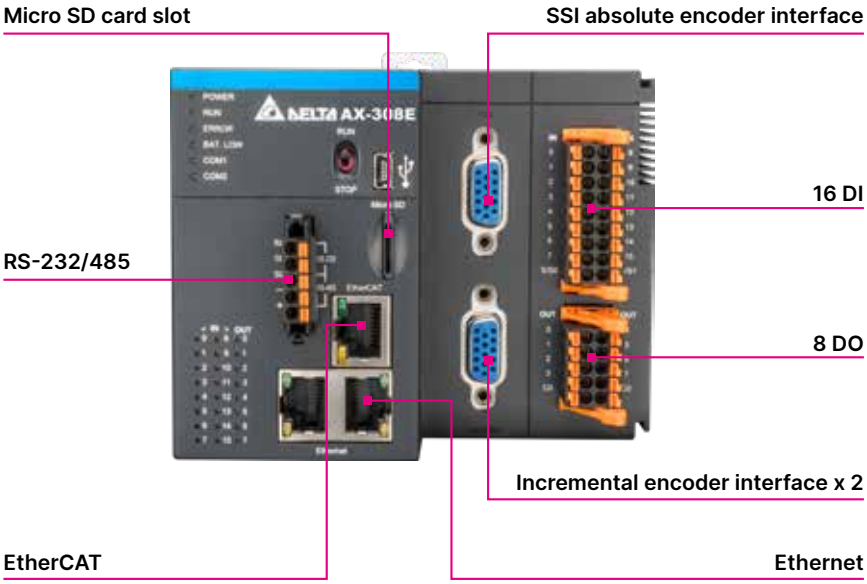
DIADesigner-AX is a new programming software for Delta AX series CPUs; it provides an optimized user-friendly programming environment and reduces programming time and effort for users



The user interface of built-in IO and axis parameter configuration

Highly integrated CPU design

The AX-3 motion control CPUs feature various built-in I/O and communication protocols to satisfy customer needs for compact design and high performance

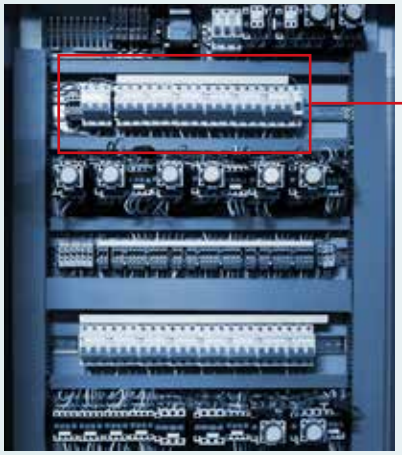


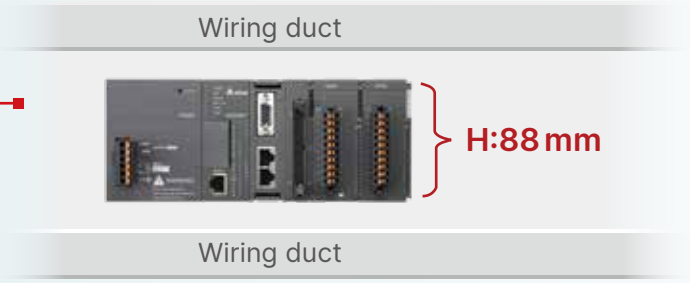
Note: Actual support functions will vary by series

Simple Installation

Easy installation

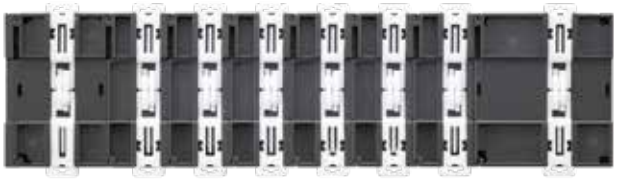
- Space-saving design, suitable for installation in control panels





Rackless DIN-rail installation

Robust slot and clip interlocking design

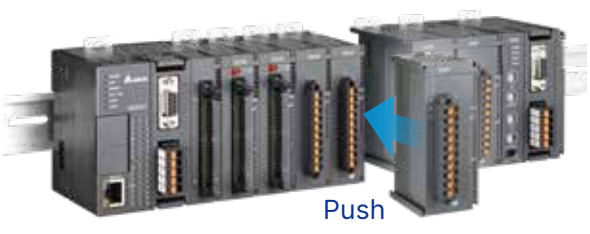


Fast disassembly

- Release the clip ring to easily take out the module from the front without moving adjacent modules

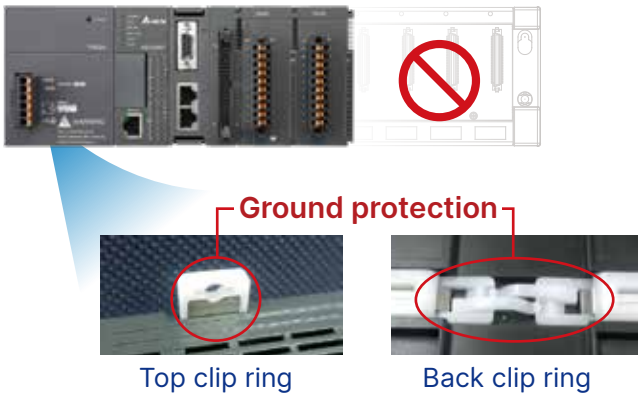
Simple installation process

- Press the clip rings and push the module to the desired position until you hear a "click" to finish installation

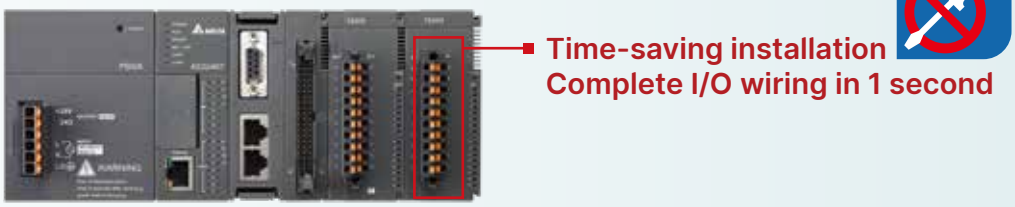


Convenient grounding protection

- DIN-rail installation: CPU module and expansion modules can be installed directly on DIN-rail without a backplane
- Installation with screws: pull out the installation clip ring and directly install it on the panel
- Both methods are equipped with ground protection

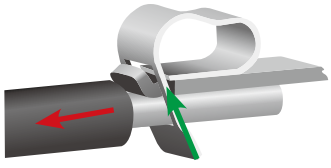


Screwless and time-saving installation



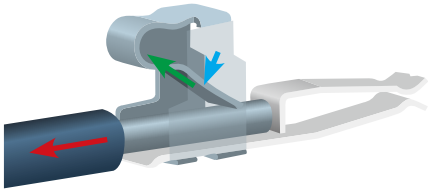
Robust loose-proof spring clamp terminal block

- In commonly used spring clamp terminal blocks, the clamping force is determined by the spring material, which decreases with the aging of the spring



The green arrow is the clamping force, and the red arrow is the pull-out force.

- The AS Series adopts a full-covered spring clamp design that enhances the clamping force. When the wire is pulled-out (red arrow) and the spring moves up (green arrow), a downward force is generated (blue arrow) to clamp the wire



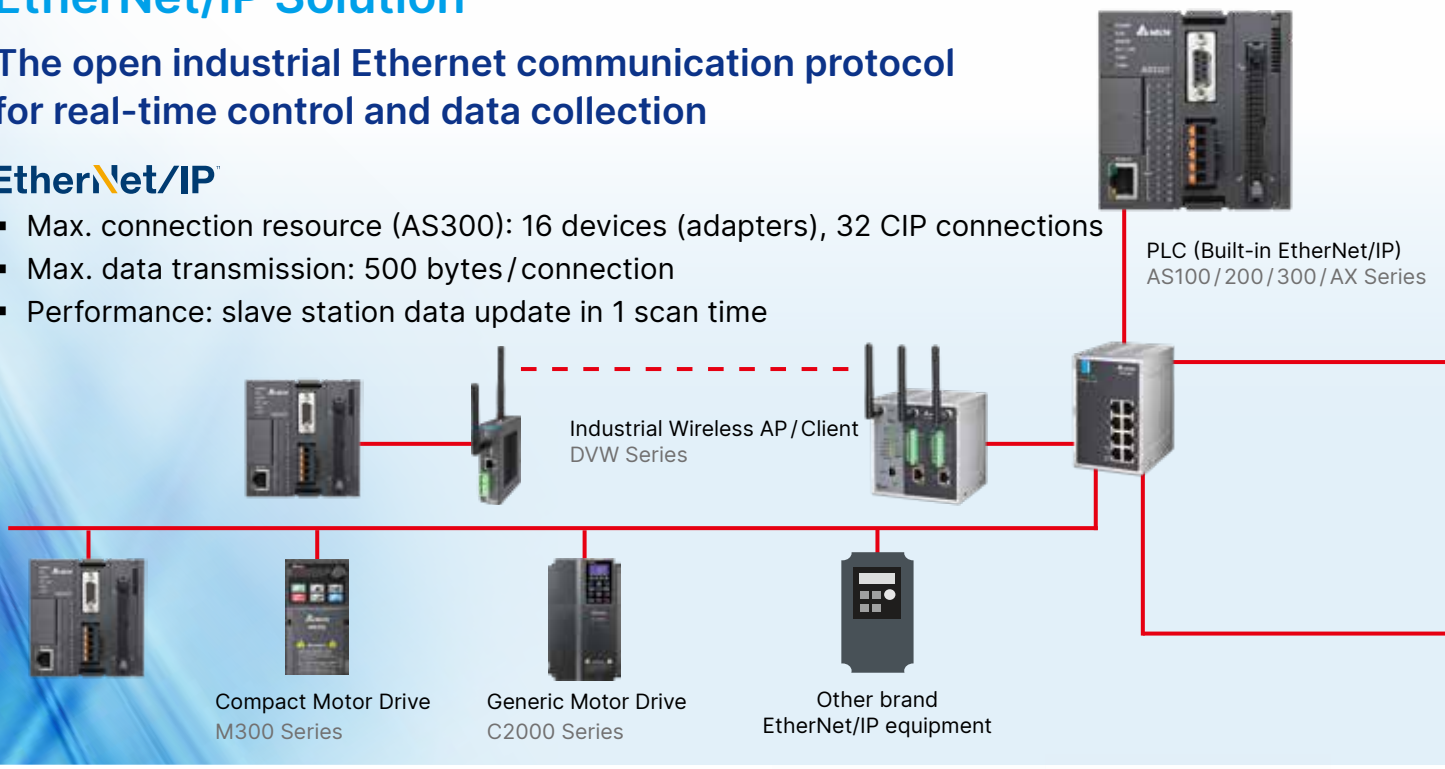
Industrial Network Solution

EtherNet/IP Solution

The open industrial Ethernet communication protocol for real-time control and data collection

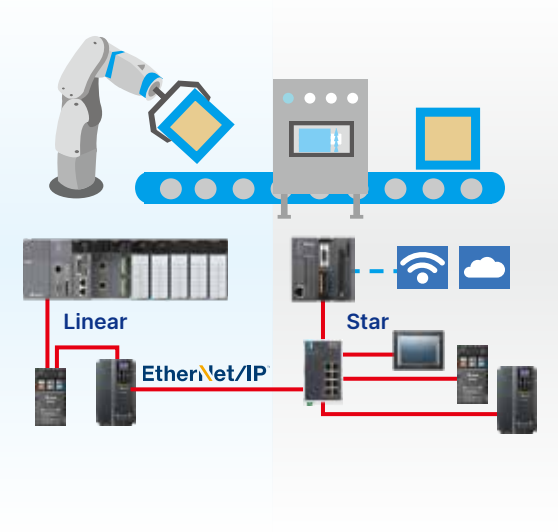
EtherNet/IP

- Max. connection resource (AS300): 16 devices (adapters), 32 CIP connections
- Max. data transmission: 500 bytes / connection
- Performance: slave station data update in 1 scan time



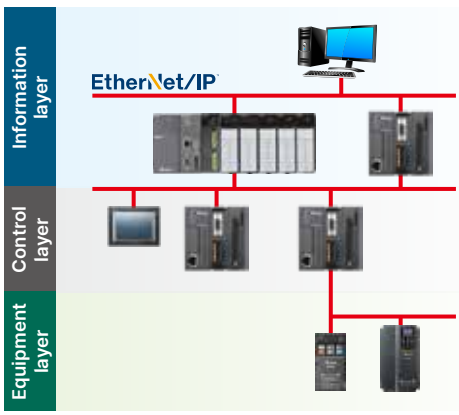
Flexible network system configuration

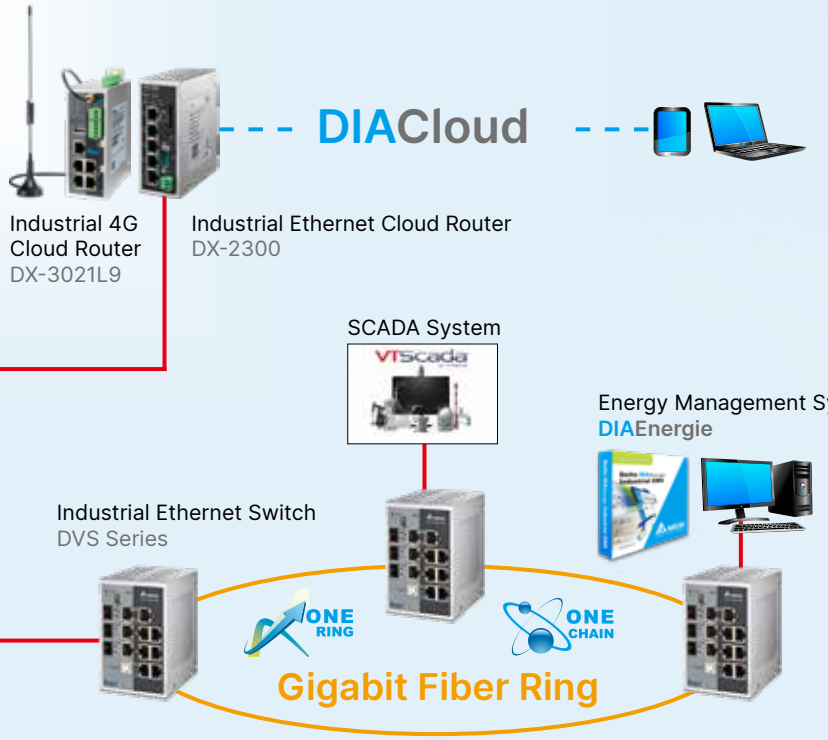
- Supports star, linear network topology for fast expansion and management on production lines
- Compatible with IT network, no independent network or IT technician required
- Combines with Delta IES solution to construct IoT for more automation applications and industrial 4.0 upgrades



One cable, one network

- Complete Delta EtherNet/IP solution connects different equipment via Ethernet cable to simplify system networking
- Replaces traditional 3-layer industrial network structure with seamless connection via 100 MB high-speed network
- Complete industrial network diagnosis to shorten debug time



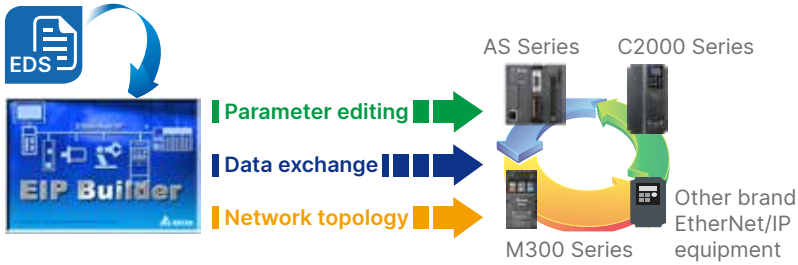


IoT & Industrial Ethernet

- DIACloud platform connection
- Redundancy ring recovery time < 20 ms
- Industrial class EMC testing

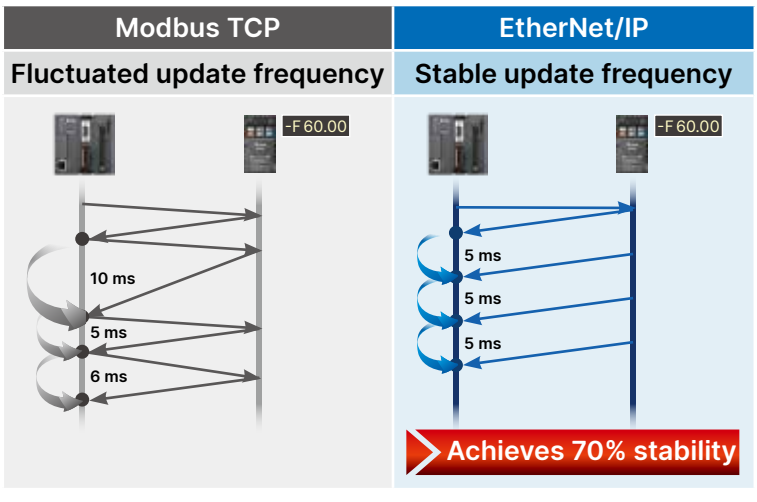
Software integration

- Consistent data exchange interface shortens learning time with fast system configuration
- Provides Delta's equipment parameter list for quick parameter matching without looking into a detailed manual
- EDS File provides quick connection with EtherNet/IP products of other brands



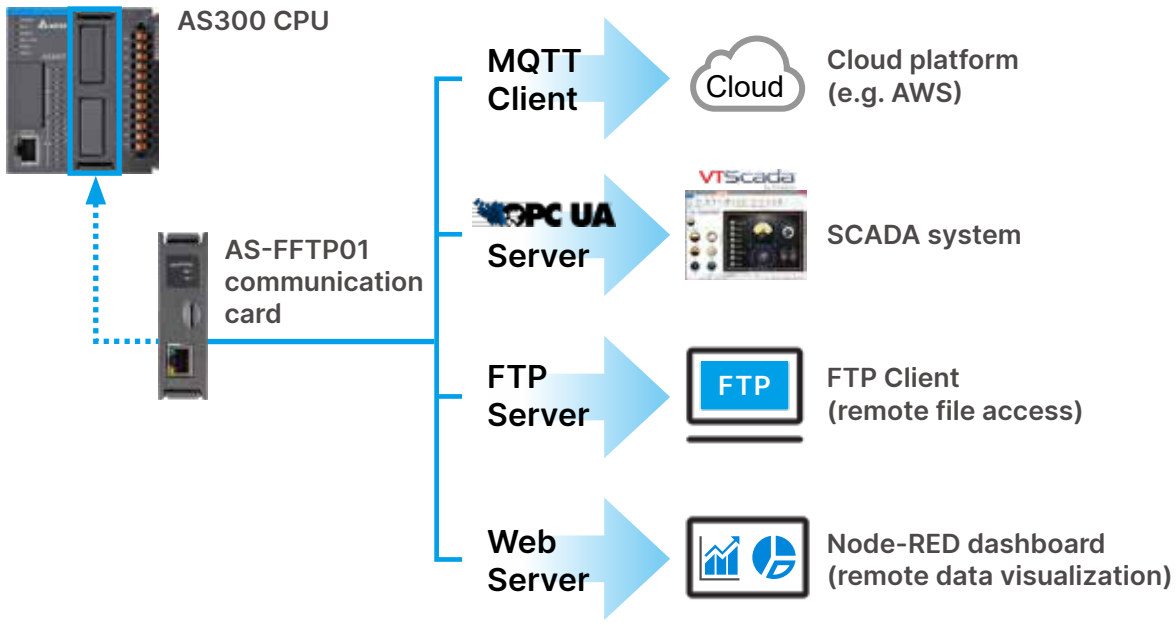
Accurate data update

- Provides real-time cyclic and acyclic data transmission and defines data priority between equipment
- Establishes multiple CIP links and defines different register priorities with one piece of equipment
- Executes data update based on user RPI. Updates all slave station data in one scan time
- Enhances stability by 70% compared to traditional Modbus TCP



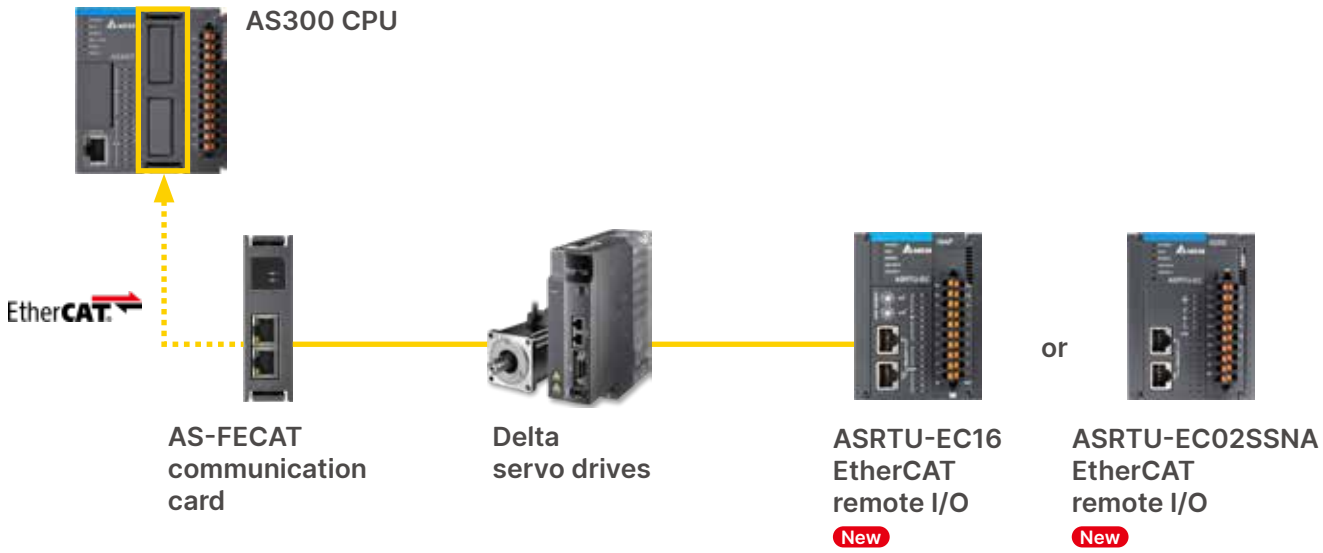
Industrial Internet of Things (IIoT) Applications

AS-FFTP01 communication card realizes various IIoT applications required by a smart machine: remote data access / visualization, connectivity to SCADA via OPC-UA, and connectivity to cloud via MQTT

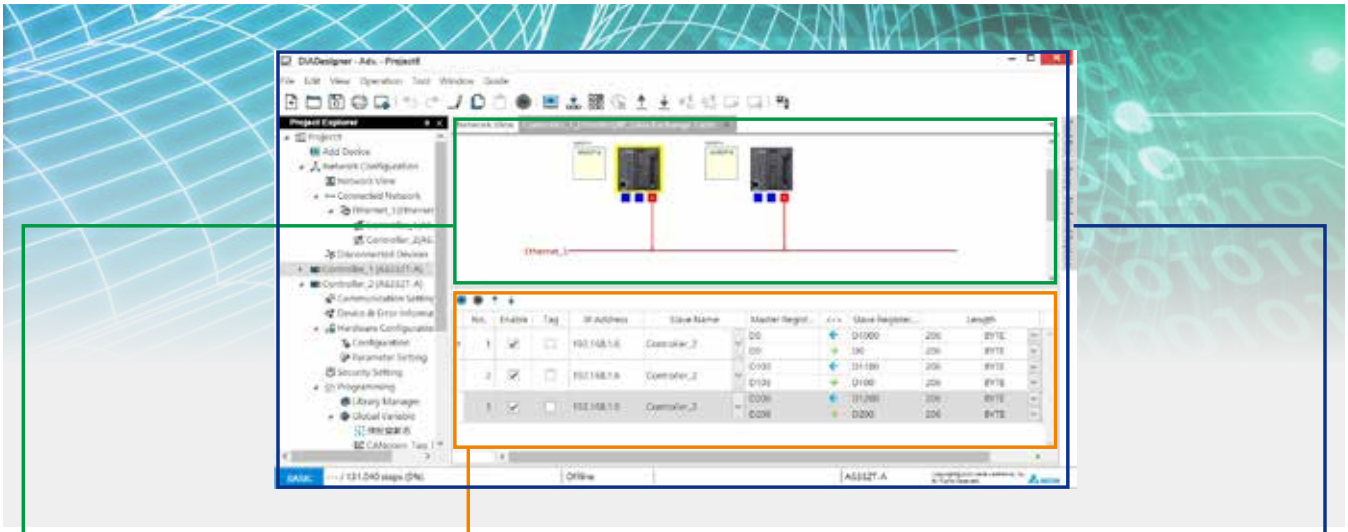


EtherCAT Point-to-Point Positioning Solution

AS-FECAT communication card provides up to 16 axes point-to-point positioning to construct EtherCAT network with Delta drives and remote I/Os



DIADesigner: EtherNet/IP



Visualized Network Mapping

- Direct network planning

Network Mapping Diagnosis

- Real-time network status and device indicators display

Parameter List

- Built-in parameter list of Delta's products

Data Exchange Table

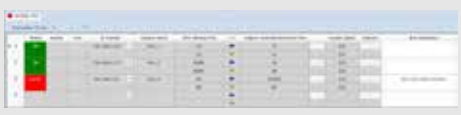
- Data exchange via table blanks filling. PLC programing is not required

Data Input / Output Corresponding Table

- Preset data exchange on corresponding parameters
- Connecting equipment editing on corresponding parameters

Data Exchange Diagnosis

- Data exchange status and error codes



Visualized Product List

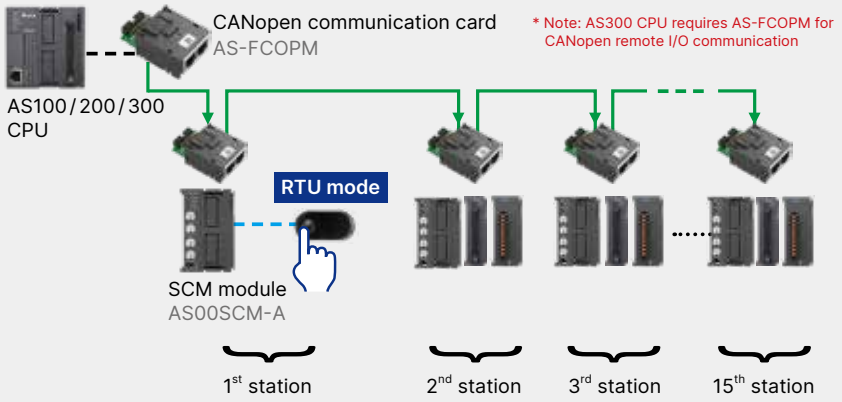
- Visualized equipment selection

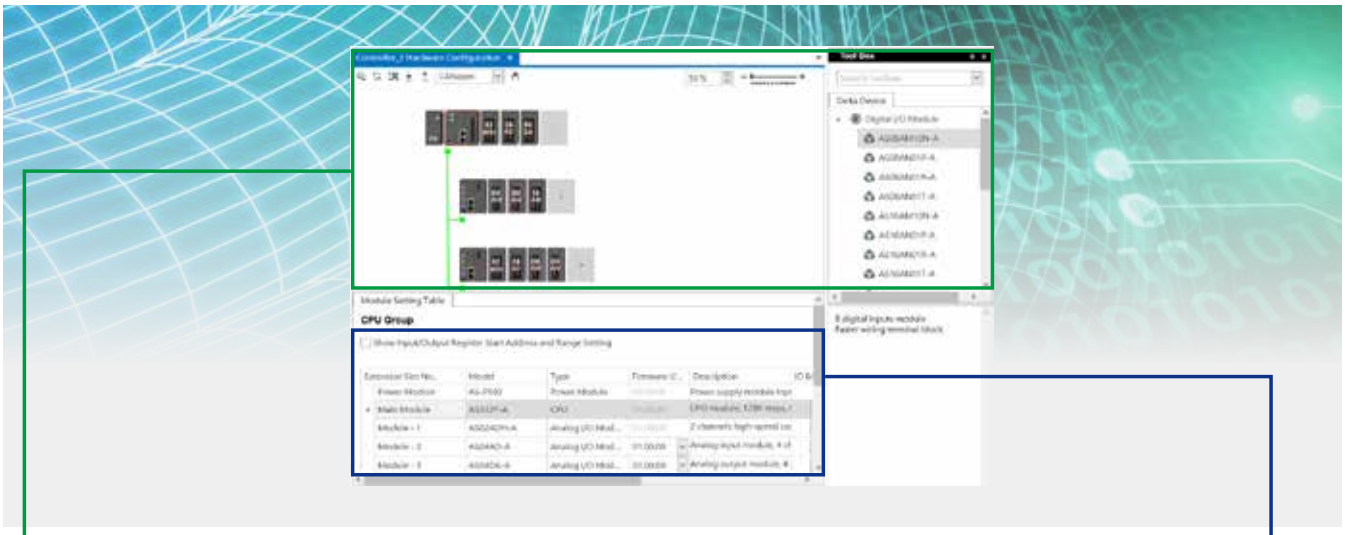
Equipment Description Management Function

AS100 / 200 / 300 Remote I/O Solution

CANopen Remote I/O

- Max quantity of RIO stations: 15 stations
- Max quantity of IO modules (CPU right side + RIO (SCM) right side): 32 modules
  - Max DIO points: 1,024 points
  - Max quantity of AIO modules: 16 modules
  - Max quantity of communication modules: 4 modules (Only installed on CPU right side)
  - Max quantity of IO modules installed on RIO (SCM) right side: 8 modules
- AS-FCOPM can only be installed in slot 2 of the CPU and SCM
  - When an AS-FCOPM is installed in slot 2, slot 1 can be used to install another function card of identical size except AS-FCOPM
  - When SCM is working in RIO (RTU) mode, then slot 1 is disabled





Hardware Configuration

- Hardware parameter complete planning

Visualized I/O Structure

- Direct I/O planning

I/O Product List

- Product description and specification

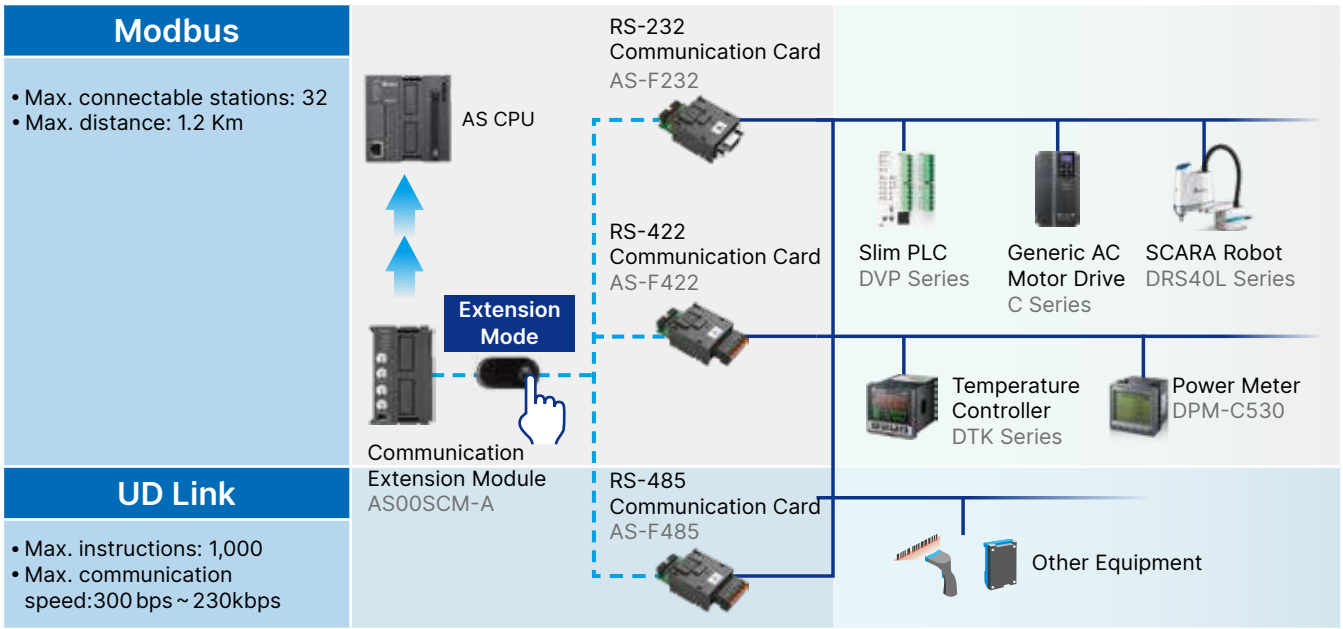
I/O without Planning

- Auto-mapping with I/O addresses in CPU (X,Y, and D)

DIO

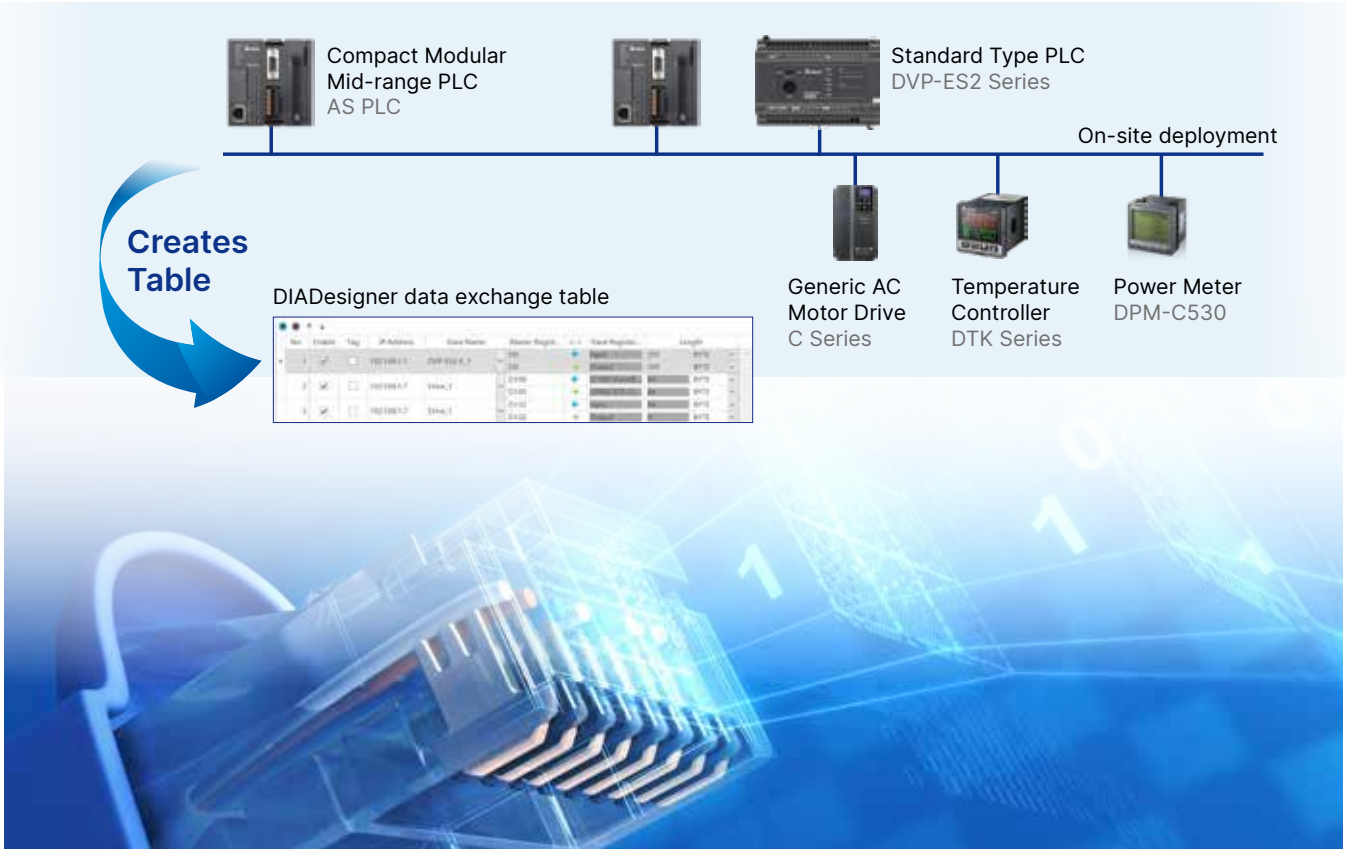
AIO

Serial Communication Solution



■ Modbus Mode

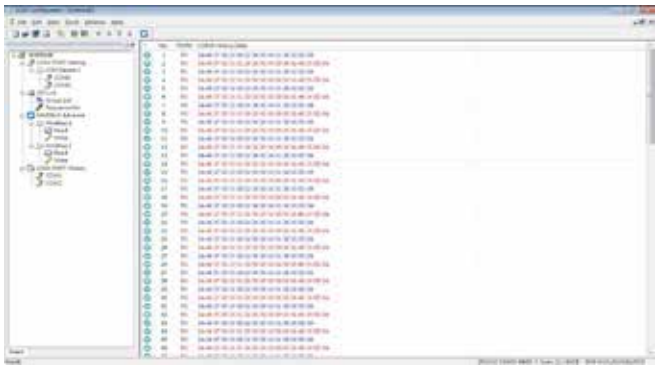
- Easy data exchange configuration



Serial Communication Solution

Real-time history log diagnosis

- AS00SCM stores 2k bytes history log; SCMSoft directly displays the log for real-time communication status monitoring with no additional monitoring software required

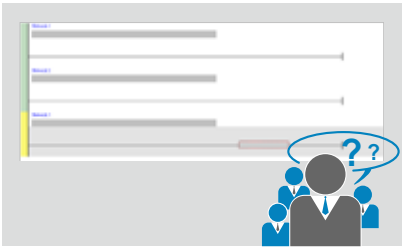


UD Link Mode (User-defined)

- Easy connection to end equipment via special communication protocols

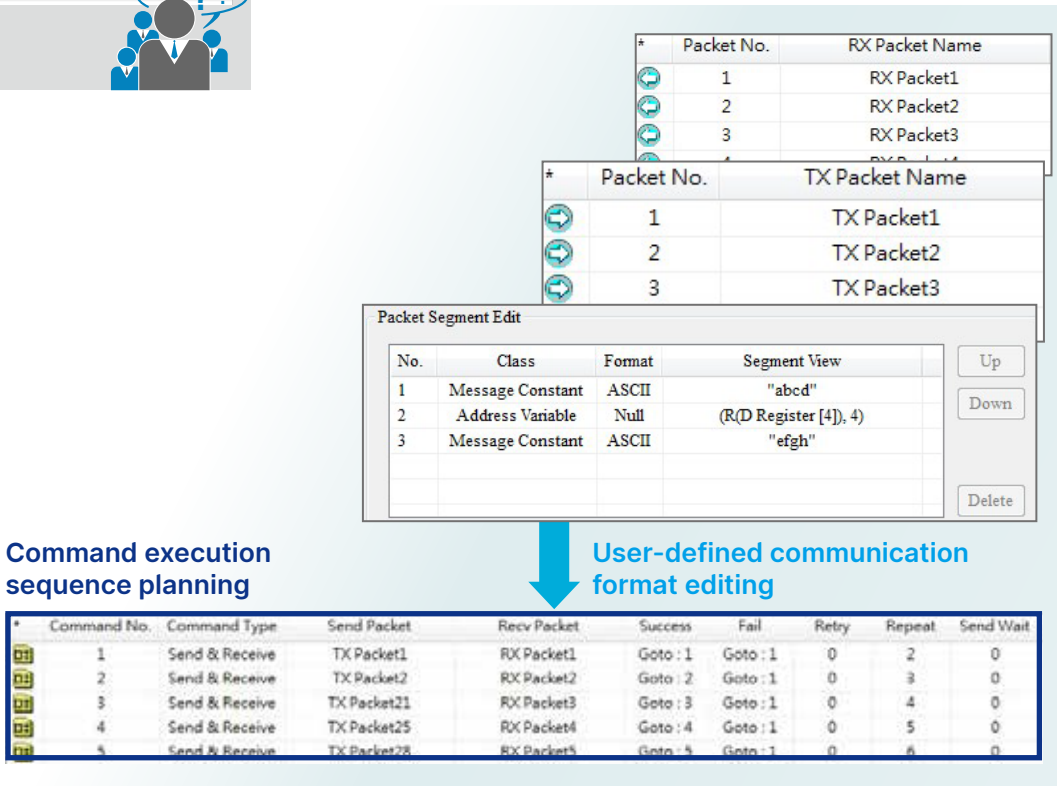
Traditional programming structure

Instruction receiving, accessing, editing, transmitting, sequence control



Connection to end equipment via special communication protocols

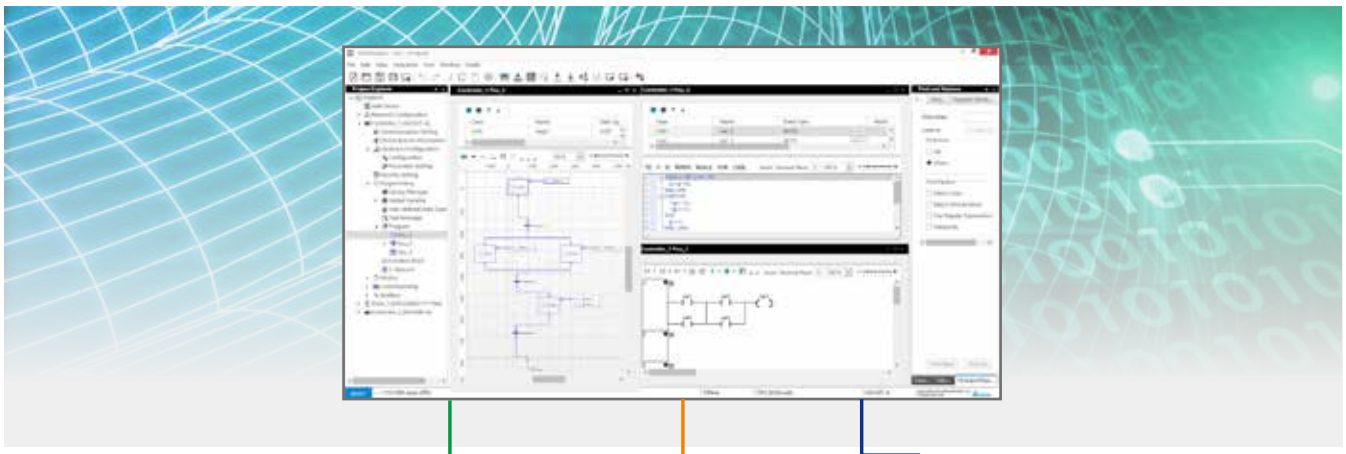
- Edits the transmitting/receiving packets via SCMSoft; format exchange and checksum calculation via AS00SCM
- Packet content auto-combination for logic control in PLC, reducing PLC program complexity
- Max. 1,000 transmitting/receiving packets



Programming & Diagnosis

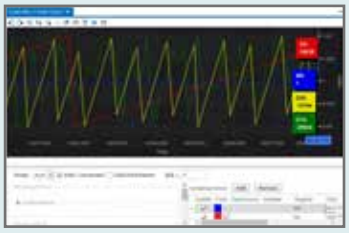
DIADesigner IEC Programming Software

Easy operation greatly enhances efficiency



Data Tracer / Logger

- Data log and time-sequential analysis

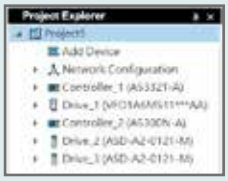


Positioning Planning Tool

- Table-structured position planning

Projects for Multiple Devices

- Integrates multiple Delta products in one project



COMMGR

- Communication interface manager

AS200 / 300 CPU

Hardware Configuration

- Hardware configuration and parameter setting

Network Configuration

- Integrates fieldbus systems in one view, including EtherNet/IP, CANopen and Modbus