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AX-308E
EtherCAT Motion Controller



V1.1.0

1 News

1.1 FTP-Site Link & Update

Our FTP is mainly for keeping the info of the products (datasheets, technical notes, presentations, software, etc.) which is not included in our official Download Center. Please visit our FTP site with below account info.

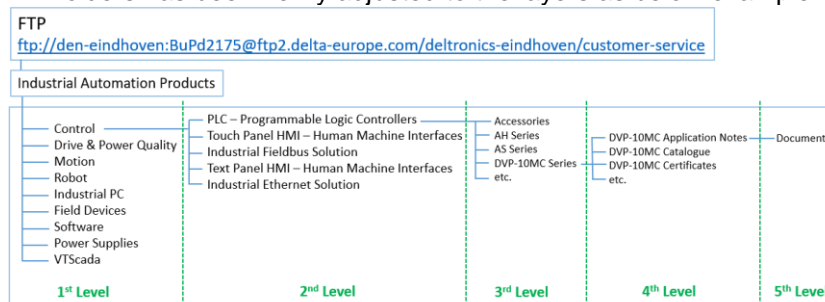
<ftp://den-eindhoven:BuPd2175@ftp2.delta-europe.com/deltronics-eindhoven/customer-service>

Name and password are included in the link.

Name: den-eindhoven

Password: BuPd2175

- **Update** To align the data categories with Delta official Download Center, the structure of the folders has been newly adjusted to the layers as below example.



- **NOTE** Due to the data migration of the server, from now on it is only possible to access our FTP via TCP port 22/23 but not others. Therefore, please use the common FTP clients such as FileZilla to access it but not using IE or other browsers with the incompatible TCP ports.

2 Product update

2.1 NEW – AX-308EA0MA1T EtherCAT Motion Controllers

AX-308EA0MA1T, the first device from the AX-3 series PLC, is a compact mid-range multi-axis motion controller based on CODESYS platform. It is also a flexible solution, which is available for a wide range of applications such as packaging, woodworking, metalworking and material handling.

The AX series comes in combination with the DIADesigner-AX, the new powerful tool that integrated with the CODESYS in DIAStudio environment.



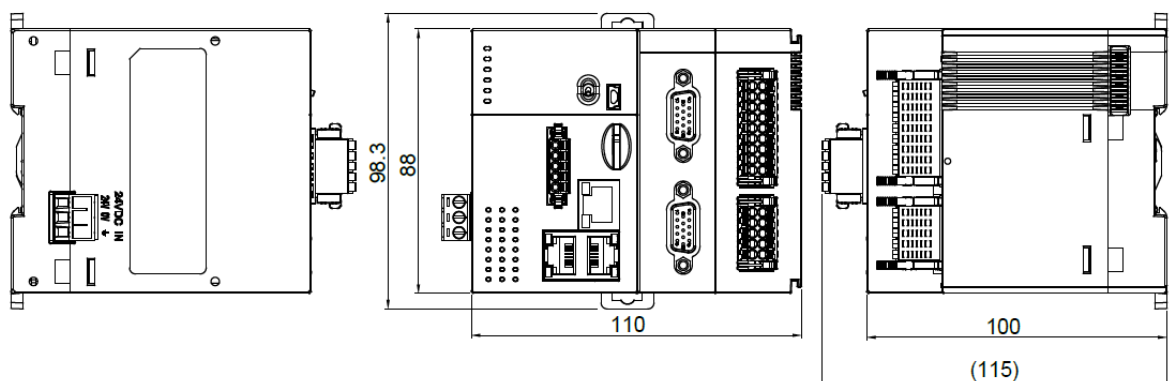
Feature

- Supports up to 8 EtherCAT servos
- Supports 3rd party EtherCAT devices
- Min. EtherCAT sync. time: 2ms@8 axes
- Min. execution time of basic instruction: 5ns
- Built-in encoder interface: Incremental x2 and SSI x1
- Built-in comm. port: EtherCAT, Ethernet, RS-232 and RS-485
- Built-in 16 DI (200KHz x4) and 8 DO (200KHz x4, supports pulse-train servo drives)
- Supports protocol: EtherCAT, OPC UA (server), EtherNet/IP, MODBUS and MODBUS TCP

Benefits

- Supports all IEC61131-3 PLC languages (from ladder to structured text, including the support of Object Oriented Programming)
- Planning and execution of both simple and complex applications for motion control, including single-axis and multi-axis movements in accordance with PLCopen standard
- Integrated graphical interface to create electronic cams
- Integrated commissioning tools like digital oscilloscope, data monitoring, breakpoints, diagnostics and online changes.
- Simulation mode to test PLC/motion programs without physical target devices

Dimension



Unit: mm

Product Specification

| | |
|-------------------------------|--|
| Motion network | EtherCAT |
| Max real axis | 8 (+4 PTO) |
| Max total axis (real+virtual) | 16 |
| Execution speed | 5ns for basic instruction |
| Program capacity | 8MB |
| Data capacity | 16MB |
| Module expansion ability | 32 IO modules (Will support comm. modules in next stage.) |
| Max I/O points | 1,024 pts. |
| Built-in I/O points | DI: 16 pts. (Supports 200KHz x6), DO: 8 pts. (Supports 200KHz x4) |
| Built-in comm. ports | USB, EtherCAT, Ethernet, RS232, RS485 |
| Supported protocols | EtherCAT, OPC UA (Server), MODBUS, MODBUS TCP, EtherNet/IP |
| Power input | 24V _{DC} |

Electrical Specification

| | |
|-----------------------|---|
| Operating Temperature | -20 - 60°C (AX series CPU: -20 - 55°C) |
| Storage Temperature | -40 - 80°C |
| Operating Humidity | 5 – 95%, non-condensing |
| Storage Humidity | 5 – 95%, non-condensing |
| Vibration | 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 | IEC 61131-2, IEC 60068-2-27 (TEST Ea); 15g peak, 11ms duration, half-sine |
| Operating Environment | Non-corrosive gas |
| Installation | Inside of the control panel |
| Pollution Degree | 2 |
| Protection Rating | IP20 |
| Conformal Coating | Yes |

Ordering Information

| Model Name | Description | Certificates |
|---------------|---|--------------|
| AX-308EA0MA1T | AX-3 series EtherCAT motion controller, 8-axis, built-in 16DI/8DO, NPN output, CODESYS | CE, UL |

2.2 NEW – DPM-DA510 & DPM-DA530 DIN-rail Mount Power Meters

New DIN-Rail mount type power meter models, DPM-DA510 & DPM-DA530, with different function levels has been released. The 2 models are able to be basic and advanced solutions in power monitoring and energy saving applications.

Feature

- DIN-Rail mount and LCD Display
- Supports MODBUS RTU protocol
- Easy to be applied with SCADA and EMS
- Pulse Output indicates to energy accumulation
- 2 models for different application levels. DA510 for basic requirement like remote electricity data acquisition; DA530 is better for energy management because of capability of THD, TOU, demand, data record, etc.



DPM-DA510

Delta Basic DIN-Rail Mount Meter



DPM-DA530

Delta Advanced DIN-Rail Mount Meter

2.3 NEW – DVP Slim Series EtherCAT RTU Module – RTU-ECAT

New EtherCAT RTU Module, RTU-EACT, has been released. It can enhance the integration ability of Delta EtherCAT motion control system and provide complete RIO solution, and help users to build up the control system easier and faster.

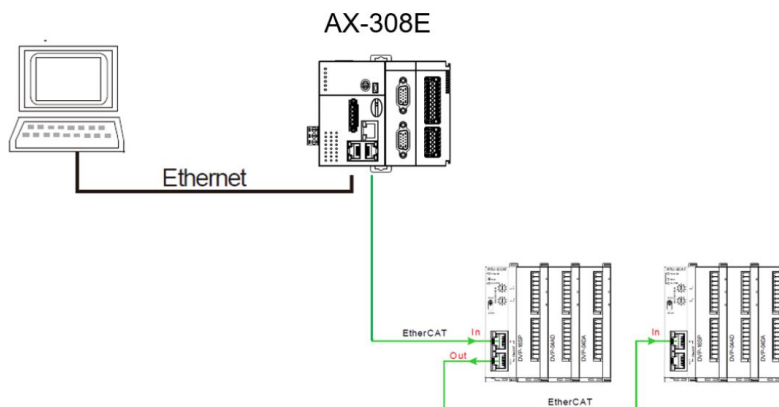
Feature

- Supports EtherCAT
- Supports up to 128DI and 128 DO points
- Supports up to 14 DVP-S I/O modules (Max quantity of modules other than DIO is 8 modules)
- Build-in ID switches
- Max baud rate is 100Mbps

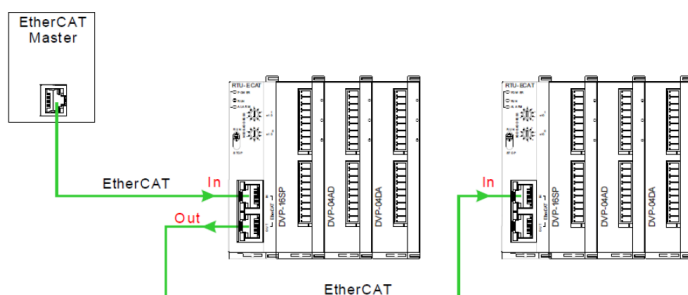


Application Structure

- AX-3 EtherCAT controller + RTU-ECAT + DVP-S I/O



- 3rd party controller + RTU-ECAT + DVP-S I/O



2.4 PHASE OUT – AH & DVP PLC Modules

Part of AH & DVP PLC modules will be phased out as listed in the table, the recommended replacements are listed for reference as well.

| | Discontinuation | | Recommended | | Last order (YYYY/MM) | Discontinuation (YYYY/MM) |
|------------------|-----------------|---|-------------|--------------------------|-------------------------|------------------------------|
| Type | Mode No. | Description | Mode No. | Description | | |
| CPU | DVP32EH00MT | DVP-EH CPU, 32 IO, transistor output | | | 2021/02 | 2021/03 |
| | DVP20PM00D-S1 | DVP-PM motion controller, transistor output | | | | |
| I/O | DVP16XM11N | 16DI | DVP16XM211N | 16DI | 2021/08 | 2021/09 |
| | DVP16XN11R | 16DO, relay output | DVP16XN211R | 16DO, relay output | | |
| | DVP24XP11R | 16DI, 8DO, relay output | DVP24XP200R | 16DI, 8DO, relay output | 2021/02 | 2021/03 |
| | DVP24XN11R | 24DO, relay output | DVP24XN200R | 24DO, relay output | | |
| | DVP32XP11R | 16DI, 16DO, relay output | DVP32XP200R | 16DI, 16DO, relay output | | |
| | DVP10RC-E2 | Resolver module | | | 2020/12 | 2020/12 |
| | AH20MC-5A | DMCNET motion control module | | | 2021/11 | 2021/12 |
| Card / Accessory | DVP-F422 | RS422 communication card | | | 2020/12 | 2020/12 |
| | TP-PCC01 | Data backup memory card (for TP) | | | 2021/02 | 2021/03 |

| Recommended | | |
|-------------|-------------|--------------------------|
| Type | Mode No. | Description |
| I/O | DVP16XM211N | 16DI |
| | DVP16XN211R | 16DO, relay output |
| | DVP24XP200R | 16DI, 8DO, relay output |
| | DVP24XN200R | 24DO, relay output |
| | DVP32XP200R | 16DI, 16DO, relay output |

For AH20MC-5A, Delta will provide 3 years, 2022~2024, repair and exchange service after discontinuation.

(Condition: User has to provide fault goods & Delta has this module in stock.)

Introduction of Recommended Products:

Standard PLC / Analog I/O PLC

DVP-ES2/EX2

Standard PLCs with integrated communication and highly efficient processing ability for your control systems

- ▶ 32-bit CPU for high-speed processing
- ▶ Standard PLC DVP-ES2 Series: 16/20/24/32/40/60/80 I/O points for a variety of applications
- ▶ Analog I/O PLC DVP-EX2:
 - Built-in 12-bit 4 analog inputs / 2 analog output; and 14-bit analog I/O extension module
 - Built-in PID auto tuning function for a complete analog control solution
- ▶ Built-in 1 RS-232 and 2 RS-485 ports
- ▶ Program capacity: 16k steps

- ▶ Data register: 10k words
- ▶ Max. execution speed of basic instructions: 0.35 μ s
- ▶ RTC function and file register (5k words) (hardware version 2.0 and above)
- ▶ Highly efficient processing ability: 1k steps of programs can be completed within 1ms
- ▶ Max. 100 kHz pulse control; specific motion control instructions (mark/masking and instant frequency changing) available for multi-axis applications
- ▶ Up to 4 levels of password protection secures your source programs and intellectual property

| Built-in High-Speed Counters | | | | | |
|------------------------------|--------------|------------------|-----------|------------------|------------|
| 1-phase 1 input | | 1-phase 2 inputs | | 2-phase 2 inputs | |
| Counters | Bandwidth | Counters | Bandwidth | Counters | Bandwidth |
| 2/6 | 100kHz/10kHz | 2 | 100kHz | 1/3 | 15kHz/5kHz |

Caution: The I/O terminal design is different, so users have to rewire when they change the CPU/I/O from DVP-ES to DVP-ES2.

2.5 UPDATE – DIADesigner-AX Version 1.1.0

Delta's latest DIADesigner-AX software version 1.1.0 is released, it can be installed after downloading DIAInstaller in DIAStudio V1.0 from below link.

DIAInstaller download

<https://diastudio.deltaww.com/home/downloads?sec=download#software>

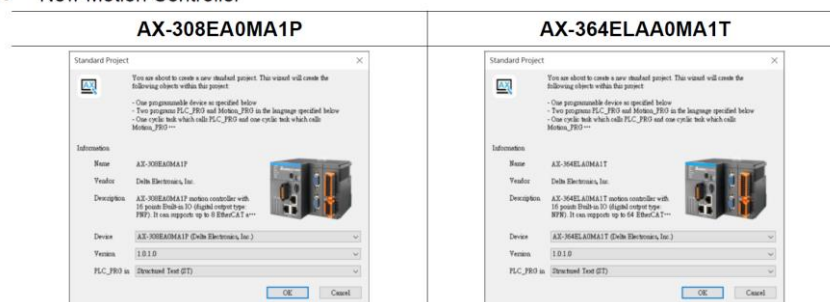


Feature

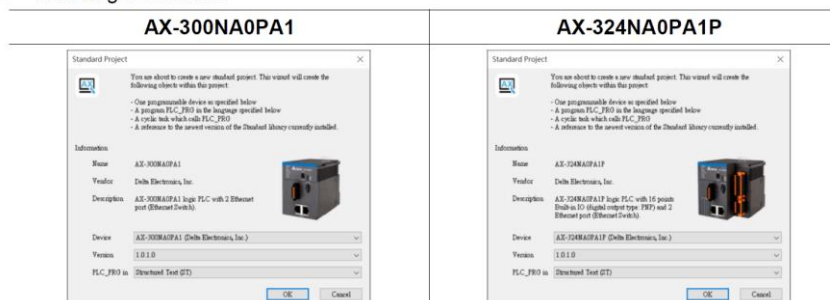
- New devices support.
The following is new device support:

| | | | |
|-------------------------------|-----------------|---------------|-----------|
| AX-3 Series Motion Controller | AX-364ELAA0MA1T | AX-308EA0MA1P | |
| AX-3 Series Logic Controller | AX-300NA0PA1 | AX-324NA0PA1P | |
| AS Series IO Module | AS02PU-A | AS04PU-A | ASS02HC-A |

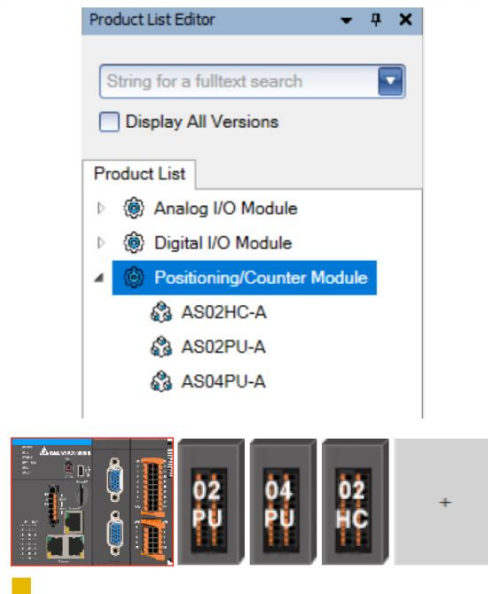
- New Motion Controller



- New Logic Controller

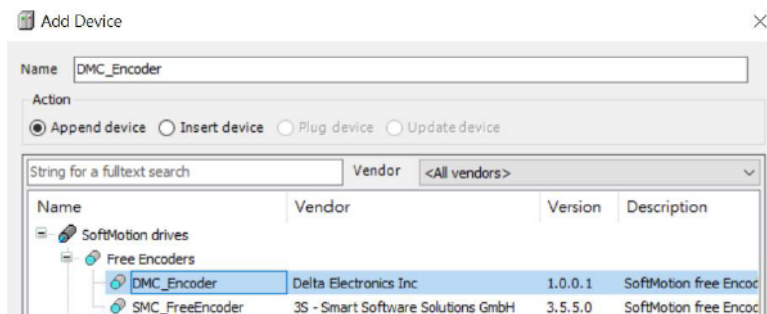


Added AX-3 Series Modules: Used in **Hardware Configuration** page

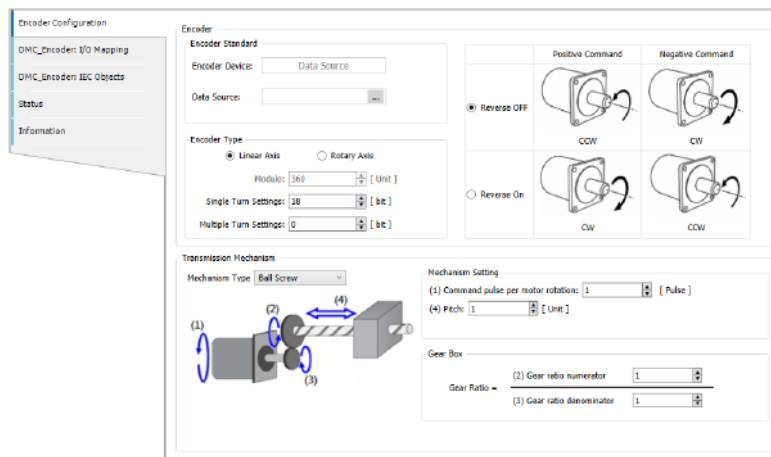


- Added Delta Encoder Configuration page
Provide intuitive pages for users to configure encoder standard, encoder type, transmission mechanism, and other parameters.

1. Select **DMC_Encoder** for **Free Encoders**



2. **Encoder Configuration** page



Supported Device: AX-3 Series and AX-8 Series Motion Controllers

- Added the IP address setting page of AX-3 Series
In **System Settings** page, users can set IP address, DNS server address, and so on. Devices with multiple Ethernet communication port will be supported in the future.

- Original IP setting interface

| | | | | | |
|----------------------------|---------------------|--------------------|--------------------|----------|--|
| GLAN1 NetworkInterface | | | | | |
| GLAN1 NetworkInterfaceMode | Enumeration of BOOL | static-IP | static-IP | Confi... | |
| GLAN1 IPAddress | ARRAY[0..3] OF BYTE | [192, 168, 0, 10] | [192, 168, 0, 10] | Confi... | |
| GLAN1 SubnetMask | ARRAY[0..3] OF BYTE | [255, 255, 255, 0] | [255, 255, 255, 0] | Confi... | |

- New IP setting interface

- Added the built-in high-speed IO setting page of AX-3 Series
Provide graphical interface, including **Timer**, **Counter**, **Pulse Output Axis**, **SSI Encoder**, **Capture**, and **Compare**.

Supported Device: AX-3 Series

2.6 UPDATE – DIAScreen Version 1.0.2

Delta's latest DIAScreen software version 1.0.2 is released, it can be installed after downloading DIAInstaller in DIAStudio V1.0 from below link, then install/perform DIAScreen Patch.

DIAScreen V1.0 download

<https://diastudio.deltaww.com/home/downloads?sec=download>

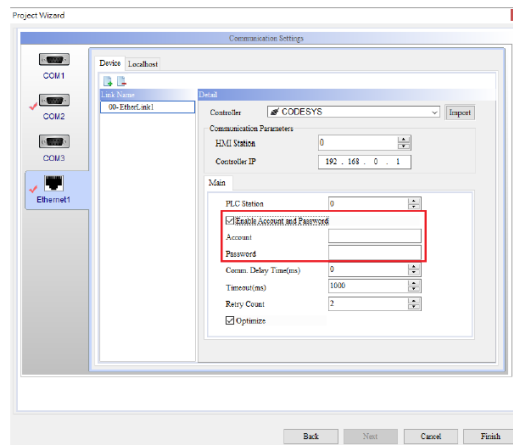


Feature

- Added the user account & password page of DOP-100 series connecting with AX-3 & AX-8 Series controller.

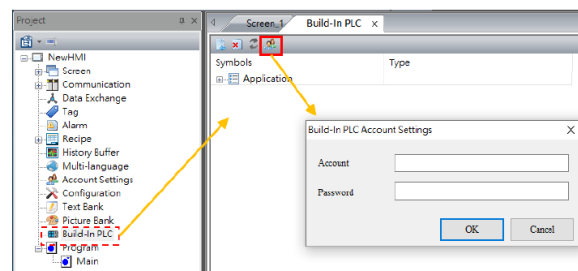
DIAScreen account and password setting:

- DOP-100 Series: On the **Communication Settings** window, select **CODESYS** as the controller, enter the controller login account & password, and then download to DOP-100 Series.



DOP-100 Series Communication Settings Window

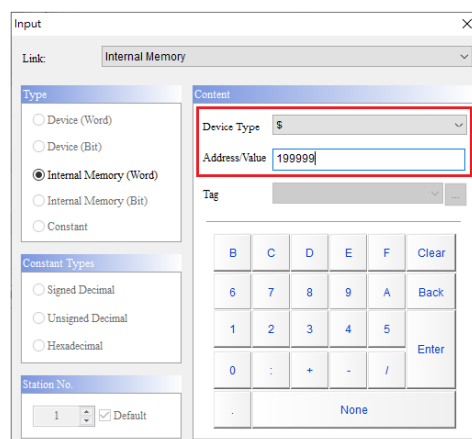
- AX-8 Series built-in HMI: Click **Account Settings** on the **Build-In PLC** tab. Enter the controller login account and password and download to the HMI.



AX-8 Series Built-In Tab

Note: The Account & Password here need to be the same as Account & Password set in the AX-3 and AX-8 Series controllers.

- Updated the internal memory \$ element range from \$0 ~ \$65,535 to \$0 ~ \$199999
Setting window of the internal memory \$ element:



2.7 UPDATE – TPEditor Version 1.98.03

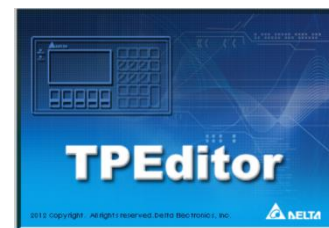
Delta's latest TPEditor software version 1.98.03 is released, it can be downloaded from Delta official Download Center.

DIASudio V1.0 download

https://downloadcenter.deltaww.com/en-US/DownloadCenter?v=1&q=TPEditor&sort_expr=cdate&sort_dir=DESC

Corrections

- Fixed an issue that projects with TP70 cannot be opened
- Fixed an issue that projects containing the object "Show Message" cannot be opened
- Fixed an issue that the system key settings are not the same as the ones in the saved file
- Fixed an issue that if switching between the editing page and starting page while editing TP02G, objects in the editing page will be lost
- Fixed a function key definition issue that occurred in TP04P. For example, the set definition for the function key is "ENT", but TP04P reads it as the setting value of "F" instead
- Fixed the security vulnerability issues.



3 Application

3.1 NEW – C2000/C2000 Plus/CH2000 Master-Follower Configuration

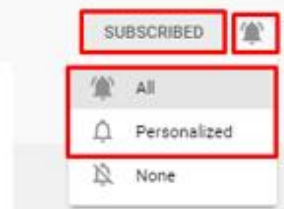
The technical note for the Master-Follower Configuration function has been shared on the FTP side;
Folder: Customer-Service\Industrial Automation Products\Drive & Power Quality\VFD-C2000 Series\Application & Technical Note\ DEN_IA_VFD-C_Master_Follower_AN_EN_20210118

3.2 NEW – More technical videos are available on YouTube Channel



There are technical videos about the below topics on YouTube Channel

<https://www.youtube.com/c/DeltaIndustrialAutomationEMEA>



Subscribe and enable notification in order to get notifications on all our new videos.

1. DRAStudio - Modbus Function

This video shows how to use DRAStudio to read/write Modbus address from Delta robot controller.
<https://youtu.be/6FdYpwGf4Fo>

2. DOP100 HMI | How to enter the system setting

This video shows you how to enter the system menu of the HMI.
<https://youtu.be/xQjYIKTkNw>

3. DIADesigner | How to connect with USB

In this video, you can see how to setup COMMGR setting for USB connection.

<https://youtu.be/Bakk9zIV63I>

4. DIADesigner | How to connect via DIACloud

In this video, you can see how to setup COMMGR setting for remote connection via DIACloud.

<https://youtu.be/jMx8TedQhKY>

5. DOP-100 - Migrating project from DOP-B

This video shows how to migrate a project from DOP-B to DOP-100

<https://youtu.be/0hLQdtCYIMU>

6. DIADesigner | How to use Simulation

In this video, you can see how to setup COMMGR setting for Ethernet connection.

<https://youtu.be/W5uqUQ-3lws>

7. DOPSoft | How to update HMI Firmware

This video shows how to update the HMI Firmware via DOPSoft.

<https://youtu.be/SU3c3NNDwqA>

8. DOP-100 - HMI OPC UA Server function Setup

This video shows how to enable the built-in OPC UA Server in Delta HMI and how to connect an OPC UA Client to the HMI.

<https://youtu.be/ryx4qsWw1rY>

9. DRASstudio - Point Management

This video shows how to manage points of Delta robot controller.

<https://youtu.be/usNadhTwPEA>

10. DRASstudio - User Digital I/O Monitor and Test

This video shows how to monitor User I/O and test output.

<https://youtu.be/UKwZgy1fSxg>

11. Automatic update of Firmware and Program in Delta HMI

This video shows how to automatically update the firmware and program of the HMI using USB stick.

<https://youtu.be/flvtqiKP9W0>

12. DIADesigner - How to connect PLC in DIADesigner

In this video, you can see how to connect Delta AS series PLC with Ethernet cable, and how to set Ethernet parameter for your devices.

<https://youtu.be/re36pDDIjz4>

4 FAQ

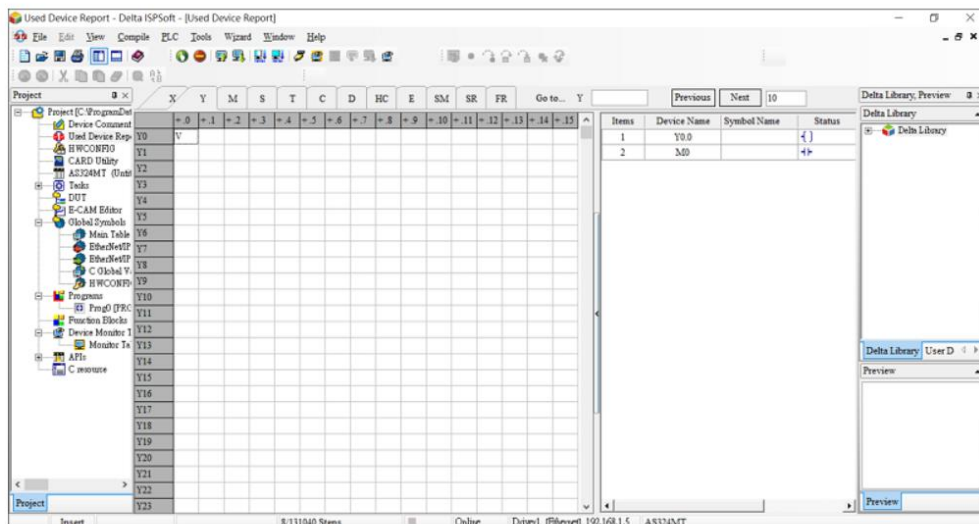
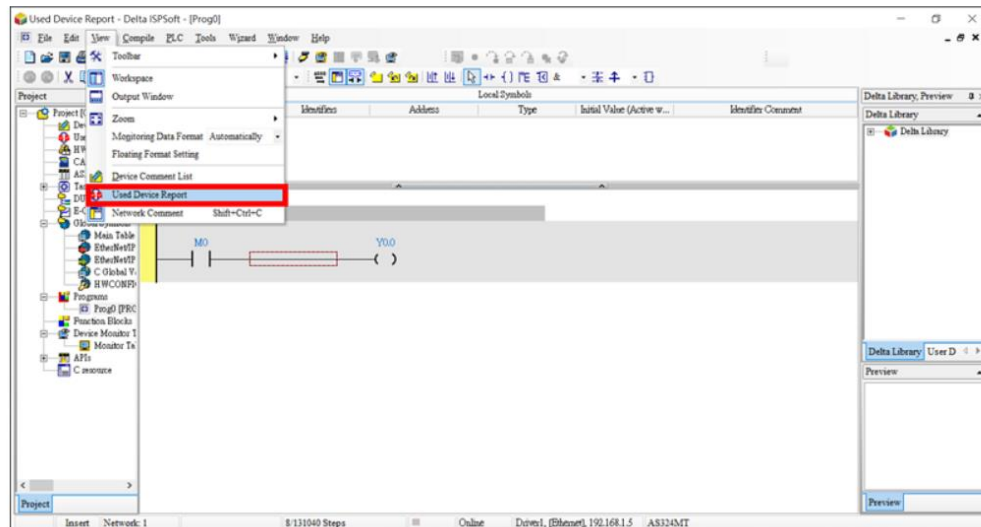
4.1 Software

ISPSoft

Q How do I check whether the registers of a programmable logical controller are used or not in the ISPSoft?

A Follow the steps down below.

Run ISPSOFT and click **View > Used Device Report** to see if the registers are used.



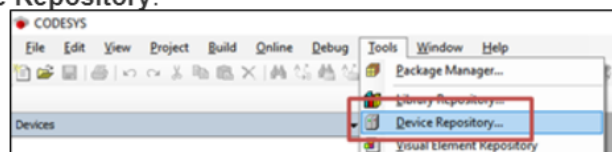
4.2 Motion Controllers

AX-8 Series

Q How do I connect other manufacturers' devices to the PC-based Motion Controller AX-8 Series?

A If you connect another manufacturer's device to the AX-8 Series via EtherCAT, please install an *.ESI or *.EDS file from the device you'd like to connect to the AX-8 Series via Codesys.

Step 1. Run Codesys. Click **Tools > Device Repository**.



Step 2. Click **Install** and select a desired *.ESI or *.EDS file.

