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RTU-ECAT EtherCAT Remote IO Communication Module Operation Manual

*We reserve the right to change the information in this catalogue without prior notice.

DVP-2212920-01 10/04/2020





RTU-ECAT Operation Manual

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Chapter 1 Preface

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<u>∧</u> Caution

- This manual provides an introduction to product functions, specifications, installation, basic operations and settings.
- This product is an OPEN TYPE device and therefore should be installed in an enclosure free of airborne dust, humidity, electric shock and vibration. The enclosure should prevent non-maintenance staff from operating the device (e.g. key or specific tools are required for operating the enclosure) in case that danger and damage on the device may occur.
- Be sure to read the manual carefully and follow the instructions so as to avoid injuries to personnel and damage to products.

1.1 Explanation of Symbols in This Manual

• Precautions before operation

Before operation, please read relevant safety instructions carefully so as to prevent an injury to personnel and damage to products.

| \land Danger | indicates the highly potential hazards. Severe personal injury or even death will result if you do not follow the instructions. |
|--------------|--|
| Marning | indicates the potential hazards. Minor personal injury or even death may result if you do not follow the instructions. |
| A Caution | indicates much attention should be paid. A bad accident can occur if you do not follow the instructions. |

1.2 Revision History

| Version | Revision | Release Date |
|-----------------|----------------------------------|----------------|
| 1 st | The first version was published. | April 10, 2020 |



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Chapter 2 Overview

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- 1. Thank you for choosing Delta RTU-ECAT. To ensure correct installation and operation of RTU-ECAT, please read this manual carefully before use.
- 2. This manual only provides introductory information on RTU-ECAT. For more detailed information on EtherCAT protocol, please refer to relevant references or literatures.
- 3. RTU-ECAT is defined as an EtherCAT slave and DVP-S series DI/DO modules and special modules can be connected on its right side.
- 4. Refer to **DVP-PLC Application Manual: Special Modules** for more details on how to use DVP-S series special modules.

2.1 Characteristics

- Compliant with the EtherCAT protocol, RTU-ECAT supports PDO, SDO and other services in the COE protocol.
- Supports Distributed Clock SYNC and SyncManagers SYNC.
- On its right side, RTU-ECAT connects DVP-S series right-side modules with maximum 128 digital input points and 128 digital output points as well as maximum 8 special modules such as analog modules, temperature modules, pulse modules and etc.
- Maximum 14 DVP-S series digital modules and special modules in total can be connected to the right side of RTU-ECAT.
- Users can select that the output values of right-side special modules and digital output point values of digital modules keep the same as they are before disconnection or change to zero when RTU-EtherCAT is disconnected from the master.

2.2 Specifications

Electrical specification

| Item | Specification | |
|-------------------|---------------------|--|
| Power voltage | 24 VDC (-15% ~ 20%) | |
| Consumption power | 1.8 W | |
| Isolation voltage | 500 V | |

EtherCAT specification

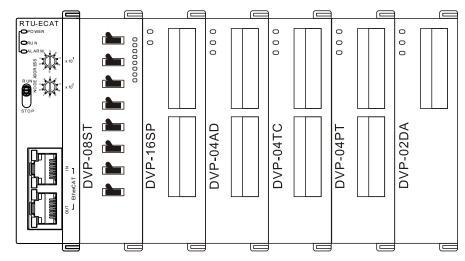
| Item | Specification | |
|------------------------|-------------------------------|--|
| Communication protocol | EtherCAT Protocol | |
| Supported service | CoE (PDO, SDO) | |
| Physical layer | 100BASE-TX | |
| Baud rate | 100Mbps | |
| Transmission medium | Cat 5 or above shielded cable | |
| Transmission distance | 100m | |
| Topology Structure | Linear topology | |



Environment

| Item | Specification | | |
|-------------------|--|--|--|
| | ESD(IEC 61131-2, IEC 61000-4-2):8KV Air Discharge, 6KV Contact | | |
| | Discharge | | |
| | EFT(IEC 61131-2, IEC 61000-4-4): Power Line: 2KV, Digital I/O: 1KV | | |
| Noise Immunity | Communication I/O: 2KV | | |
| | Damped-Oscillatory Wave: Power Line: 1KV, Digital I/O: 1KV | | |
| | RS(IEC 61131-2, IEC 61000-4-3): 80MHz ~ 1000MHz, 10V/m; 1400MHz | | |
| | ~ 6000MHz, 3V/m | | |
| Operation | 0°C ~ 55°C (temperature), 50 ~ 95% (humidity), pollution degree 2 | | |
| Storage | -25°C ~ 70°C (temperature), 5 ~ 95% (humidity) | | |
| Vibration/shock | Standard: IEC 61131-2, IEC 68-2-6 (TEST Fc)/IEC 61131-2 & IEC | | |
| resistance | 68-2-27 (TEST Ea) | | |
| Safety | Conforms to IEC 61131-2, UL 61010-1, UL 61010-2-201 | | |
| Barometric | Operating: 1080~795hPa (-1000~2000m) | | |
| pressure-altitude | Storage: 1080~660hPa (-1000~3500m) | | |
| Weight | 84g | | |

2.3 Extension Modules Connectable to RTU-ECAT



Digital modules connectable to RTU-ECAT

| Di/Do module | | Default I/O mapping data (RTU-ECAT → EtherCAT master) | |
|--------------|-----|--|--|
| DVP08SM11N | N/A | 8 bits | |
| DVP08SM10N | N/A | 8 bits | |
| DVP16SM11N | N/A | 16 bits | |



| DI/DO module (Model name) | Default I/O mapping data (EtherCAT master \rightarrow RTU-ECAT) | | |
|------------------------------|---|---------|--|
| DVP06SN11R | 8 bits | N/A | |
| DVP08SN11R/T | 8 bits | N/A | |
| DVP08SN11TS | 8 bits | N/A | |
| DVP16SN11T | 16 bits | N/A | |
| DVP16SN11TS | 16 bits | N/A | |
| DVP08SP11R/T | 8 bits | 8 bits | |
| DVP08SP11TS | 8 bits | 8 bits | |
| DVP16SP11R/T | 8 bits | 8 bits | |
| DVP16SP11TS | 8 bits | 8 bits | |
| DVP32SM11N | N/A | 32 bits | |
| DVP32SN11TN | 32 bits | N/A | |
| DVP08ST11N | N/A | 8 bits | |

Special modules connectable to RTU-ECAT

| | Default IO mapping data | | Default IO mapping data | |
|----------------|--|----------------|--|----------------|
| Special module | (EtherCAT master \rightarrow RTU-ECAT) | | (RTU-ECAT \rightarrow EtherCAT master) | |
| (Model name) | Start CR | Length (words) | Start CR | Length (words) |
| DVP02DA-S | CR10 | 2 | N/A | N/A |
| DVP04DA-S | CR6 | 4 | N/A | N/A |
| DVP04DA-S2 | CR6 | 4 | N/A | N/A |
| DVP04AD-S | N/A | N/A | CR12 | 4 |
| DVP04AD-S2 | N/A | N/A | CR12 | 4 |
| DVP06AD-S | N/A | N/A | CR12 | 6 |
| DVP04TC-S | N/A | N/A | CR14 | 4 |
| DVP04PT-S | N/A | N/A | CR18 | 4 |
| DVP06PT-S | N/A | N/A | CR18 | 6 |
| DVP06XA-S | CR10 | 2 | CR12 | 4 |
| DVP06XA-S2 | CR10 | 2 | CR12 | 4 |
| DVP01PU-S | CR42 | 4 | CR33 | 4 |
| DVP02TUL-S | CR4 | 2 | CR2 | 2 |
| DVP02TUR-S | CR4 | 2 | CR2 | 2 |
| DVP02TUN-S | CR4 | 2 | CR2 | 2 |



Note:

When special modules are connected to RTU-ECAT, the start one of CRs for data upload and download and the length of data to be uploaded and downloaded can be set up via the EtherCAT network configuration tool.



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Chapter 3 Profile and Parts

| 3.1 Profile and Dimension | |
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| 3.2 Parts | |
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| 3.4 RUN/STOP Switch | |
| 3.5 Address Switches | |
| 3.6 Extended IO Interface | |

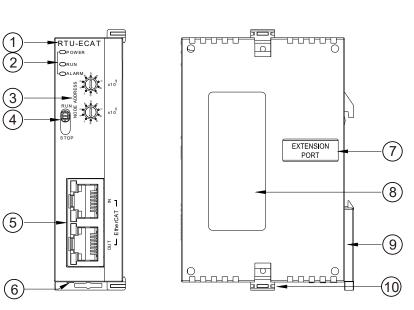


3.1 Profile and Dimension

63.4 60 25.2 RTU-ECAT ------0 0 D. 8 EXTENSION PORT 06 96 ⁼therCAT σ <u>----</u>-Ш

Unit: mm

3.2 Parts



| 1. | Model Name | 6. | 24V DC power port |
|----|------------------|-----|----------------------------------|
| 2. | State indicators | 7. | Right-side extension module port |
| 3. | Address switch | 8. | Nameplate |
| 4. | RUN/STOP switch | 9. | DIN rail clip |
| 5. | EtherCAT port | 10. | Extension module fixing clip |
| | | | |



3.3 EtherCAT Port

EtherCAT port is used for the EtherCAT communication.

See the following table for the definitions of pins.

| PIN | Signal | Description | |
|-----|----------|-------------------------------------|----------|
| 1 | Tx+ | Positive pole for transmitting data | |
| 2 | Tx- | Negative pole for transmitting data | |
| 3 | Rx+ | Positive pole for receiving data | |
| 4 | Reserved | Reserved | 87654321 |
| 5 | Reserved | Reserved | |
| 6 | Rx- | Negative pole for receiving data | EtherCAT |
| 7 | Reserved | Reserved | |
| 8 | Reserved | Reserved | |

3.4 RUN/STOP Switch

| RUN/STOP switch | Description | |
|------------------------|---|------|
| STOP \rightarrow RUN | To re-detect the number of extension modules and digital points. To read/write the data in the extension module. | RUN |
| $RUN \to STOP$ | To stop reading/writing the data in the extension module. | STOP |

3.5 Address Switches

The switches are used for setting up the node address of RTU-ECAT on EtherCAT network.

| Switch setting | Description | 8 ************************************ |
|----------------|-----------------------|--|
| 0 ~ 99 | EtherCAT node address | |

Example:

If you need to set the node address of RTU-ECAT to 26, simply switch the corresponding switch of $x10^{1}$ to 2 and the corresponding switch of $x10^{0}$ to 6.

Notes:

- ✓ Please set up the node address when the power is switched off. After the setup is completed, re-power RTU-ECAT.
- ✓ When RTU-ECAT is operating, changing the setting of the node address will be invalid.
- ✓ Use the slotted screwdriver to rotate the switch carefully in case the switch is scratched.



3.6 Extended IO Interface

The interface is used for connecting Delta DVP-S series DI/DO extension modules and special modules.



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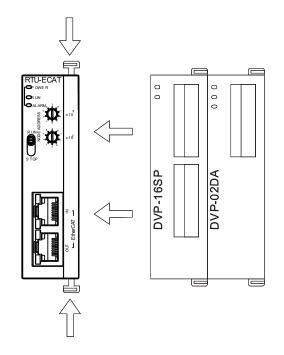
Chapter 4 Installing and Wiring

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| 4.4.2 | Ground | 4-5 |



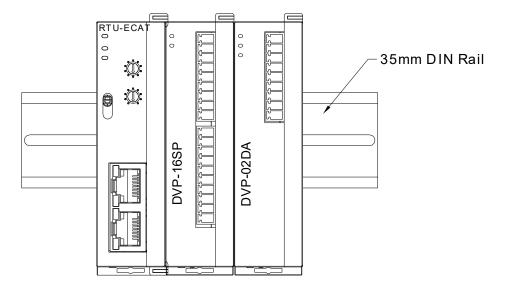
4.1 Installing RTU-ECAT and DVP-S Extension Modules

- Open the fixing clips on the top and bottom of RTU-ECAT, aim the extension module at the guiding holes and keep them met.
- Press the fixing clips on the top and bottom of RTU-ECAT to fix extension modules and ensure that the connection is fine.



4.2 Installing RTU-ECAT and DVP-S Modules on DIN Rail

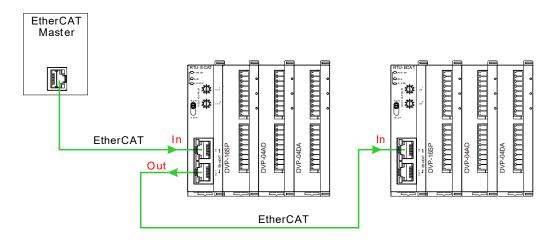
- Use the 35mm standard DIN rail.
- Open the DIN rail clips of RTU-ECAT and extension modules. Insert RTU-ECAT and extension modules into the DIN rail.
- Press the DIN rail clips of RTU-ECAT and extension modules to fix them on the DIN rail, as shown below.





4.3 Connecting to EtherCAT Port

- There is a strict network topology requirement for the EtherCAT network. The network must follow the rule that the input port of the next servo should be connected to the output port of the previous servo.
- Please use Delta cables as EtherCAT cables. For specifications of Delta cables, refer to Appendix 1.



4.4 Wiring

4.5 Power Input

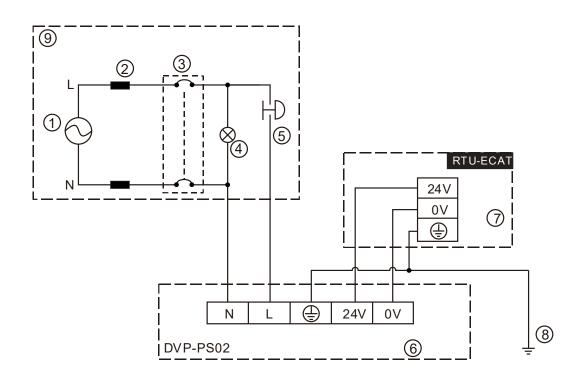
The power input of RTU-ECAT is 24V DC. Please notice the following points during use.

🕂 Warning

- Connect the supply power to the two terminals, 24V and 0V and the grounding terminal to the earth. Be cautious that the RTU-ECAT device may be damaged if the positive and negative polarities of the supply power are connected reversely.
- Please be sure to use certified power supply with SELV output or certified power supply providing double insulation evaluated by UL60950, or UL61010-1 and UL61010-2-201 standards
- The diameter of the power wire must be between 12 and 28AWG and the rated temperature should be greater than 70°C. The power terminal block plug wiring torque is 4.5 in-lbs.
- The cables of the AC power 110V, 220V and DC power 24V must be twisted and connected to the module as short as possible in length.
- Do not combine the AC 110V, 220V, and DC 24V cables with the main circuit and I/O signal cables together and please keep them away from each other. If the space permits, it's recommended to separate these lines by more than 100mm.



RTU-ECAT Safety Circuit Wiring

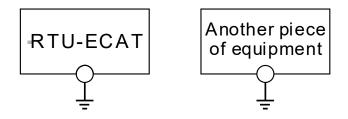


| 1 | AC power supply: 100 ~ 240VAC; 50/60Hz. |
|---|---|
| 2 | Power supply circuit protection fuse |
| 3 | System circuit isolation device: The electromagnetic contactor, relay and other switch can be used as the isolation device to prevent the system from becoming unstable when the power supply is discontinuous. |
| 4 | Power indicator |
| 5 | Emergency stop button: The button cuts off the system power supply when an accidental situation takes place. |
| 6 | Delta power module DVP-PS02/24VDC |
| Ø | RTU-ECAT device |
| 8 | Ground |
| 9 | Safety circuit |
| | |



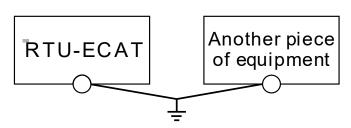
4.5.1 Ground

- The diameter of the ground should not be less than the diameters of the cables connected to the terminals L and N.
- If using multiple pieces of equipment, use a single-point ground.



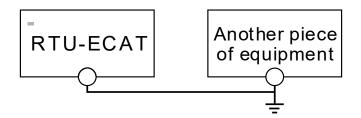
The single-point ground is better.

• If you cannot use a single-point ground, use a common-point ground.



The common-point ground is permitted.

• Do not connect equipment ground wires together as shown below.



The equipment can not be grounded in this way.



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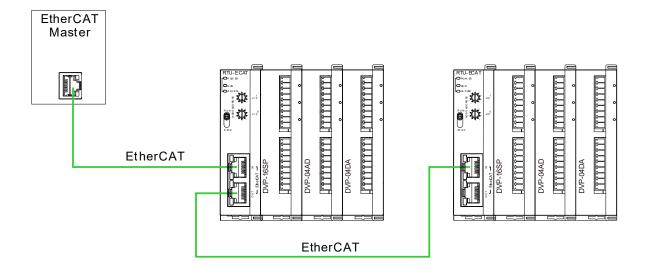
Chapter 5 Configuring RTU-ECAT

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This section describes how RTU-ECAT as an EtherCAT slave realizes the data exchange between EtherCAT master and DVP-S series extension modules.

- EtherCAT master transmits the data to extension modules.
- The input data from extension modules are transmitted back to EtherCAT master.



5.1 Terms

| No. | Name | Unit | Explanation |
|-----|--------------------------|------|--|
| 1 | Control word | Word | Sets the mode of RTU-ECAT. When the content of the control word is 8000Hex, RTU-ECAT is in STOP state. When the content of the control word is 8001Hex, RTU-ECAT is in RUN state. See section 6.3 for more details on the control word. |
| 2 | Status | Word | Status includes Error register (for error information), LV state (for voltage status), Error module number (for right-side module number) and Error list (for extension module errors) See section 6.3 for more details. |
| 3 | Digital input points | Bit | The number of digital input points is a multiple of 8. The number is regarded as 8 when it is less than 8 and as 16 when it is greater than 8 but less than 16. |
| 4 | Digital output points | Bit | The number of digital output points is a multiple of 8. The number is regarded as 8 when it is less than 8 and as 16 when it is greater than 8 but less than 16. |
| 5 | Special module number | Unit | Number of special modules connected to RTU-ECAT Range: 0~8 |
| 6 | Input data length | Word | The total length of input data of special modules on the right of RTU-ECAT |
| 7 | Output data length | Word | The total length of output data of special modules on the right of RTU-ECAT |



| No. | Name | Unit | Explanation |
|-----|------------|------|--|
| 8 | IO mapping | N/A | The IO mapping between RTU-ECAT and the special modules connected to it. |

5.2 Introduction to the Software Interfaces

This section introduces the configuration of RTU-ECAT by taking the TwinCAT3 software as an example.

5.2.1 Main Interface for RTU Configuration

Click on the RTU-ECAT symbol on the left list of the TwinCAT3 window as below. The main RTU configuration interface appears then.

| ෙ ි යි ්⊙ - ද බ ් ≠ Search Solution Explorer (Ctrl+;) ♪ - | General EtherC | AT DC Process | Data Slots St | artup C | oE - Online | Online | | |
|--|--|---|---------------|---------|-------------|--------|---------|-----------|
| Solution 'RTU-ECAT' (1 project) SVSTEM SYSTEM MOTION PLC SAFETY SAFETY C++ Device 1 (EtherCAT) Provide 1 (EtherCAT) System Device 1 (EtherCAT) Provel 1 (EtherCAT) Provel 1 (RTU-ECAT) Mappings | Name: Object Id: Type: Comment: | Box 1 (RTU-ECAT) 0x03020001 RTU-ECAT | | | | Id: 1 | nbols 🗌 | |
| | Name | Online | Туре | Size | >Add | In/Out | User | Linked to |
| | 🕫 State | | UINT | 2.0 | 1548.0 | Input | 0 | |
| | 🔊 AdsAddr | | AMSADDR | 8.0 | 1550.0 | Input | 0 | |

5.2.2 DC Interface

On the RTU configuration interface, open the DC interface with a click on **DC** tab.

| RT | U-ECAT | + X | | | | | | | | |
|----|-------------------|-----------|----|--------------|---|------|----------|--------------|--------|---|
| (| General | EtherCAT | DC | Process Data | S | lots | Startup | CoE - Online | Online | |
| | Operati | ion Mode: | | | | SM-9 | Synchron | | | ~ |
| | Advanced Settings | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

Operation Mode:

RTU-ECAT supports two operation modes, SM (Synchro Manager) and DC (Distributed Clock). Either of the two operation modes can be chosen from the pull-down box.



Advanced Settings:

When choosing DC as the operation mode, do related settings on the following "Advanced Settings" interface.

| Advanced Settings | | × |
|-------------------|-------------------------------------|--|
| Distributed Clock | Distributed Clock | |
| | Cyclic Mode | |
| | Operation Mode: | DC-Synchron \lor |
| | 🗹 Enable | Sync Unit Cycle (µs): 4000 |
| | SYNC 0 Cycle Time (μs): | Shift Time (μs): |
| | Sync Unit Cycle | x 1 \checkmark User Defined 0 |
| | ⊖ User Defined | + SYNC0 Cycle 4000 × 0 ~ 0 |
| | | Based on Input Reference |
| | ☑ Enable SYNC 0 | = 0 |
| | SYNC 1 | |
| | ⊖ Sync Unit Cycle | Cycle Time (μs): 4000 |
| | SYNC 0 Cycle | x 1 \checkmark Shift Time (µs): 0 |
| | Enable SYNC 1 | |
| | Use as potential Referen | ence Clock 确定 取消 |

5.2.3 Right-side Configuration of RTU-ECAT

Click on **Slots** tab on the configuration interface of RTU-ECAT to go to the interface for configuring right-side modules.



| lot | Module | ModuleIdent | Module | ModuleIdent | Description |
|-------------|--------|-------------|--|-------------|-------------|
| 🛕 Terminals | | | Digital Input Terminals | | |
| 🛕 Terminals | | < | DVP08SM11N | 0x01DD0001 | DVP08SM11N |
| 🛕 Terminals | | | DVP08ST11N | 0x01DD0002 | DVP08ST11N |
| 🛕 Terminals | | × | DVP16SM11N | 0x01DD0003 | DVP16SM11N |
| 🛕 Terminals | | | DVP32SM11N | 0x01DD0004 | DVP32SM11N |
| 🛕 Terminals | | | Digital Output Terminals | | |
| 🛕 Terminals | | | DVP06SN11R | 0x01DD0005 | DVP06SN11R |
| 🛕 Terminals | | | DVP08SN11R/T | 0x01DD0006 | DVP08SN11R |
| 🛕 Terminals | | | DVP08SN11TS | 0x01DD0007 | DVP08SN11T |
| 🛕 Terminals | | | DVP16SN11T | 0x01DD0008 | DVP16SN11T |
| 🛕 Terminals | | | DVP16SN11TS | 0x01DD0009 | DVP16SN11TS |
| 🛕 Terminals | | | DVP32SN11TN | 0x01DD000A | DVP32SN11T |
| 🛕 Terminals | | | Digital Input and Output Termin | nals | |
| 🛕 Terminals | | | DVP08SP11R/T | 0x01DD000B | DVP08SP11R/ |
| | | | DVP08SP11TS | 0x01DD000C | DVP08SP11TS |
| | | | DVP16SP11R/T | 0x01DD000D | DVP16SP11R/ |
| | | | DVP16SP11TS | 0x01DD000E | DVP16SP11TS |
| | | | Analog Input Terminals | | |
| | | → | 4 | | |

Select the upper "Terminals" row from the left list based on the actually configured modules on the right of

RTU-ECAT. Then select the corresponding module from the right list and click on the symbol to have the modules configured to RTU-ECAT.

Adding extension modules must start from the first "Terminals" row and no empty slot is allowed to exist between modules.

5.2.4 Data Exchange Configuration Interface of Special Modules

On the main RTU configuration interface, click on "**Process Data**" tab. The data exchange configuration interface of special modules appears then. Take the special module DVP06XA-S2 for example here.

| enera | l Ether | rCAT DC | ; P | rocess Data | Slots | Startup | CoE - Online | e Online | | | | |
|--------------|---------|-----------|-------|-------------|---------|---------|--------------|---------------|-------|------|---------|----|
| Sync N | Manage | r: | | PC | O List: | | | | | | | |
| SM | Size | Туре | Flags | 1 | ndex | Size | Name | | Flags | SM | SU | |
| 0 | 128 | Mbx | | C | x1B00 | 0.0 | Status | | | 3 | 0 | |
| 1 | 128 | MbxIn | | C | x1B01 | 0.0 | Control | | | 2 | 0 | |
| 2 | 4 | Outp | | C | x1A00 | 8.0 | DVP06XA-S2 | Input mapping | | 3 | 0 | |
| 3 | 8 | Inputs | | 0 | x1600 | 4.0 | DVP06XA-S2 | Output mappi | | 2 | 0 | |
| | | | 21.01 | | 0.0 | | | | | | | |
| | | ent (0x10 | 212): | | O Conte | ent: | | | | | | |
| ⊡0x1 ⊡0x1 | | | | | ndex | Size | Offs Nam | e | | Туре | Default | (h |



Explanation of PDO List on the configuration interface of special modules

| Item | Description |
|------------------------------|--|
| Status | The parameters related to RTU-ECAT state and the CRs with the property of Read in the special modules which have been configured can be added or deleted |
| Control | The control word in RTU-ECAT and the CRs with the property of Write in the special modules which have been configured can be added or deleted. |
| DVP06XA-S2 Input mapping | The CRs with the property of Read in DVP06XA-S2 can be added or deleted. |
| DVP06XA-S2 Output mapping | The CRs with the property of Write in DVP06XA-S2 can be added or deleted. |

How to configure the input/output mappings of special modules

Here is an example of the input mapping configuration.

Select the row where "DVP06XA-S2 Input mapping" is in the "PDO List" field and then configure input mapping parameters in the "PDO Content" field.

| | Luiei | CAT | DC | Process D | ata Sl | ots | Startup | CoE - C | Online (| Online | | | | | | |
|-----------------------|---------|---------|---------|-----------|------------------------------|---------------|---------------------------|---------------------------|----------------------------------|--------------------------|----------------|----------------------------|------------------|-------------------|---|-------------|
| Sync N | /lanage | r: | | | PDO L | .ist: | | | | | | | | | | |
| SM | Size | Туре | Fla | gs | Inde | x | Size | Name | | | | Flags | SM | SU | | |
| 0 | 128 | Mbx. | | | 0x1B | 000 | 0.0 | Status | | | | | 3 | 0 | | |
| 1 | 128 | Mbx | n | | 0x1B | 801 | 0.0 | Control | | | | | 2 | 0 | | |
| 2 | 4 | Outp | | | 0x1A | 00 | 8.0 | DVP06X | A-S2 Inp | ut mappir | ng | | 3 | 0 | | |
| 3 | 8 | Input | s | | 0x16 | 00 | 4.0 | DVP06X | A-S2 Out | tput mapp | pi | | 2 | 0 | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| PDO A | ssignm | ent (0x | (1C12): | | PDO C | Conte | nt (0x1A0 | 00): | | | | | | | | |
| √ 0x1 | B01 | ent (0x | :1C12): | | PDO (| | - | - | Name | | | | | Туре | , | Default (h. |
| √ 0x1 | B01 | ent (0x | :1C12): | | Inde | | Size | Offs | | resent val | lue o | f CH1 input | signal | Туре | • | Default (h. |
| √ 0x1 | B01 | ent (0x | :1C12): | | Inde 0x20 | x | Size 2.0 | Offs 0.0 | CR12: pr | | | f CH1 input f CH2 input | - | | • | Default (h. |
| ⊘ 0x1 | B01 | ent (0x | :1C12): | | Inde 0x20 0x20 | x 00 | Size 2.0 2.0 | Offs 0.0 2.0 | CR12: pr CR13: pr | resent val | lue o | | signal | INT | • | Defailt (h. |
| ⊘ 0x1 | B01 | ent (0x | :1C12): | | Inde 0x20 0x20 0x20 | x 00 00 | Size 2.0 2.0 2.0 | Offs 0.0 2.0 4.0 | CR12: pr CR13: pr CR14: pr | resent val resent val | lue o lue o | f CH2 input | signal signal | INT INT | ; | Default (h. |
| PDO A ☑0x1 ☑0x1 | B01 | ent (0x | :1C12): | | Inde 0x20 0x20 0x20 | x 00 00 | Size 2.0 2.0 2.0 | Offs 0.0 2.0 4.0 | CR12: pr CR13: pr CR14: pr | resent val resent val | lue o lue o | f CH2 input f CH3 input | signal signal | INT INT INT | 2 | Defau |

Select one of the rows in the red box above and right click on the selected row. Then a pull-down menu appears as below.



| Index | Size | Offs | Name | | | Туре | Default (h |
|-----------|---------|----------|-----------------|------------------|-----------|------|------------|
| 0x2000 | 2.0 | 0.0 | CR12: present v | alue of CH1 inp | INT | | |
| 0x2000 | 2.0 | 2.0 | CR13: present v | value of CH2 inp | ut signal | INT | |
| 0x2000 | 2.0 | 4.0 | CR14: pres | Insert | t signal | INT | |
| 0x2000 | 2.0 | 6.0 | CR15: pres ᆽ | Delete | t signal | INT | |
| | | 8.0 | | Edit | | | |
| | | | | Move Up | | | |
| Predefine | d PDO A | Assignme | ent: (none) | Move Down | | | |

PDO Content (0x1A00):

Explanation of the pull-down menu

| Item | Description |
|-----------|--|
| | Add or insert a CR with the property of Read in the module. |
| Insert | Selecting "Insert" in the place of an existing CR means to insert a CR row here. |
| | Selecting "Insert" in the empty place means to add a CR row in the end. |
| Delete | Delete one CR which has already been added |
| | Edit current parameter information such as Name, Index, Sub Index, Data Type and |
| Edit | etc. |
| Move Up | Move to the previous row |
| Move Down | Move to the next row |





MEMO







Chapter 6 Introduction of Parameters

| 6.1 Parameters for Right-side Special Modules | | | | | | | |
|--|-----|--|--|--|--|--|--|
| 6.2 Parameters for Connection Status of Right-Side Modules | | | | | | | |
| 6.3 Control Word and Status Indication Parameters | | | | | | | |
| 6.3.1 Control Word Parameter | 6-6 | | | | | | |
| 6.3.2 Status Indication | 6-7 | | | | | | |



6.1 Parameters for Right-side Special Modules

The index of the special module on the right of RTU-ECAT ranges from 16#2000 to 16#21A0 and the index value is determined by the position of the special module on the right of RTU-ECAT. For example, when the special module is the first one on the right of RTU-ECAT, its index is 16#2000. When the special module is the second one on the right of RTU-ECAT, its index is 16#2020. Similarly, when the special module is the 14th one on the right of RTU-ECAT, its index is 16#21A0.

As shown below, DVP04DA-S, DVP04AD-S, DVP16SP11T and DVP06XA-S are connected on the right of RTU-ECAT in order and then the index for DVP04DA-S is 16#2000, for DVP04AD-S is 16#2020 and for DVP06XA-S is 16#2060.

| Slot | Module | ModuleIdent |
|-------------|--------------|-------------|
| 🛕 Terminals | DVP04DA-S | 0x01DD0013 |
| 🛕 Terminals | DVP04AD-S | 0x01DD000F |
| 🛕 Terminals | DVP16SP11R/T | 0x01DD000D |
| 🛕 Terminals | DVP06XA-S | 0x01DD0015 |
| 🛕 Terminals | | |
| A = 1 1 | | |

Each subindex of a special module corresponds to one CR parameter of the special module. When the special module is located as the first one on the right of RTU-ECAT, the index 16#2000 and subindex 16#1 correspond to CR0 of the special module. When the special module is the second one on the right of RTU-ECAT, the index 16#2020 and subindex 16#7 correspond to CR6 of the special module.

For example, DVP04DA-S, DVP04AD-S, DVP16SP11T and DVP06XA-S are connected on the right of RTU-ECAT in order and the indexes and subindexes for DVP06XA-S parameters are showned below.

| <u> </u> | DVP06XA-S CR | | |
|----------|-------------------------------|------|--|
| 2060:01 | CR0: module type | RO P | |
| 2060:02 | CR1: input mode setting | RW P | |
| 2060:03 | CR2: CH1 average times | RW P | |
| 2060:04 | CR3: CH2 average times | RW P | |
| 2060:05 | CR4: CH3 average times | RW P | |
| 2060:06 | CR5: CH4 average times | RW P | |
| 2060:07 | CR6: average value of CH1 inp | RO P | |
| 2060:08 | CR7: average value of CH2 inp | RO P | |
| 2060:09 | CR8: average value of CH3 inp | RO P | |
| 2060:0A | CR9: average value of CH4 inp | RO P | |
| 2060:0B | CR10: CH5 output signal value | RW P | |
| 2060:0C | CR11: CH6 output signal value | RW P | |
| 2060:0D | CR12: present value of CH1 in | RO P | |



| Index | Subindex | Description |
|----------|----------|--|
| | 16#1 | The index and subindex that CR0 parameter corresponds to when the special module is located as the 1 st one on the right of RTU-ECAT. |
| 16#2000 | 16#2 | The index and subindex that CR1 parameter corresponds to when the special module is located as the 1 st one on the right of RTU-ECAT. |
| | | |
| 40//0000 | 16#1 | The index and subindex that CR0 parameter corresponds to when the special module is located as the 2 nd one on the right of RTU-ECAT. |
| 16#2020 | 16#2 | The index and subindex that CR1 parameter corresponds to when the special module is located as the 2 nd one on the right of RTU-ECAT. |
| | | |
| | 16#1 | The index and subindex that CR0 parameter corresponds to when the special module is located as the 3 rd one on the right of RTU-ECAT. |
| 16#2040 | 16#2 | The index and subindex that CR1 parameter corresponds to when the special module is located as the 3 rd one on the right of RTU-ECAT. |
| | | |
| | 16#1 | The index and subindex that CR0 parameter corresponds to when the special module is located as the 4 th one on the right of RTU-ECAT. |
| 16#2060 | 16#2 | The index and subindex that CR1 parameter corresponds to when the special module is located as the 4 th one on the right of RTU-ECAT. |
| | | |
| | 16#1 | The index and subindex that CR0 parameter corresponds to when the special module is located as the 5 th one on the right of RTU-ECAT. |
| 16#2080 | 16#2 | The index and subindex that CR1 parameter corresponds to when the special module is located as the 5 th one on the right of RTU-ECAT. |
| | | |
| | 16#1 | The index and subindex that CR0 parameter corresponds to when the special module is located as the 6 th one on the right of RTU-ECAT. |
| 16#20A0 | 16#2 | The index and subindex that CR1 parameter corresponds to when the special module is located as the 6 th one on the right of RTU-ECAT. |
| | <u> </u> | |
| | 16#1 | The index and subindex that CR0 parameter corresponds to when the special module is located as the 7 th one on the right of RTU-ECAT. |
| 16#20C0 | 16#2 | The index and subindex that CR1 parameter corresponds to when the special module is located as the 7 th one on the right of RTU-ECAT. |
| | | |
| 16#20E0 | 16#1 | The index and subindex that CR0 parameter corresponds to when the special module is located as the 8 th one on the right of RTU-ECAT. |
| | 16#2 | The index and subindex that CR1 parameter corresponds to when the special module is located as the 8 th one on the right of |

Explanation of paramters for special modules on the right of RTU-ECAT



6_

| Index | Subindex | Description |
|---------|----------|---|
| | | RTU-ECAT. |
| | | |
| | 16#1 | The index and subindex that CR0 parameter corresponds to when the special module is located as the 9 th one on the right of RTU-ECAT. |
| 16#2100 | 16#2 | The index and subindex that CR1 parameter corresponds to when the special module is located as the 9 th one on the right of RTU-ECAT. |
| | | |
| | 16#1 | The index and subindex that CR0 parameter corresponds to when the special module is located as the 10 th one on the right of RTU-ECAT. |
| 16#2120 | 16#2 | The index and subindex that CR1 parameter corresponds to when the special module is located as the 10 th one on the right of RTU-ECAT. |
| | | |
| | 16#1 | The index and subindex that CR0 parameter corresponds to when the special module is located as the 11 th one on the right of RTU-ECAT. |
| 16#2140 | 16#2 | The index and subindex that CR1 parameter corresponds to when the special module is located as the 11 th one on the right of RTU-ECAT. |
| | | |
| | 16#1 | The index and subindex that CR0 parameter corresponds to when the special module is located as the 12 th one on the right of RTU-ECAT. |
| 16#2160 | 16#2 | The index and subindex that CR1 parameter corresponds to when the special module is located as the 12 th one on the right of RTU-ECAT. |
| | | |
| | 16#1 | The index and subindex that CR0 parameter corresponds to when the special module is located as the 13 th one on the right of RTU-ECAT. |
| 16#2180 | 16#2 | The index and subindex that CR1 parameter corresponds to when the special module is located as the 13 th one on the right of RTU-ECAT. |
| | | |
| | 16#1 | The index and subindex that CR0 parameter corresponds to when the special module is located as the 14 th one on the right of RTU-ECAT. |
| 16#21A0 | 16#2 | The index and subindex that CR1 parameter corresponds to when the special module is located as the 14 th one on the right of RTU-ECAT. |
| | | |



6.2 Parameters for Connection Status of Right-Side Modules

| ⊟ 8200:0 | Detected information | RO | |
|-----------------|----------------------|----|--|
| 8200:01 | Digital in | RO | |
| 8200:02 | Digital out | RO | |
| 8200:03 | Anolog module number | RO | |
| 8200:04 | Anolog module ID1 | RO | |
| 8200:05 | Anolog module ID2 | RO | |
| 8200:06 | Anolog module ID3 | RO | |
| 8200:07 | Anolog module ID4 | RO | |
| 8200:08 | Anolog module ID5 | RO | |
| 8200:09 | Anolog module ID6 | RO | |
| 8200:0A | Anolog module ID7 | RO | |
| 8200:0B | Anolog module ID8 | RO | |
| | | | |

The index 16#8200 shows the actual connection state of the modules on the right of RTU-ECAT

Explanation of parameters

| Index | Subindex | Description | Data type | Access type |
|---------|----------|--|-----------|-------------|
| | 16#1 | The number of digital input points | Word | RO |
| | 16#2 | The number of digital output points | Word | RO |
| | 16#3 | The number of special modules | Word | RO |
| | 16#4 | The model code of the 1 st special module | Word | RO |
| | 16#5 | The model code of the 2 nd special module | Word | RO |
| 16#8200 | 16#6 | The model code of the 3 rd special module | Word | RO |
| | 16#7 | The model code of the 4 th special module | Word | RO |
| | 16#8 | The model code of the 5 th special module | Word | RO |
| | 16#9 | The model code of the 6 th special module | Word | RO |
| | 16#A | The model code of the 7 th special module | Word | RO |
| | 16#B | The model code of the 8 th special module | Word | RO |



6.3 Control Word and Status Indication Parameters

6.3.1 Control Word Parameter

Explanation of control word parameter

| Index | Subindex | Description | Data type | Access type |
|---------|----------|--------------|-----------|-------------|
| 16#A100 | 16#1 | Control Word | WORD | RW |

Explanation of control word parameter bits

| Bit | Value | Description |
|--------|-------|--|
| Dit 0 | 0 | RTU-ECAT is set to STOP as bit 15 of the control word parameter is 1 and bit 0 is 0. |
| Bit 0 | 1 | RTU-ECAT is set to RUN as bit 15 of the control word parameter is 1 and bit 0 is 1. |
| | 0 | The output values of right-side special modules and digital output point values of digital modules keep the same as they are before disconnection when RTU-EtherCAT is disconnected from the master. |
| Bit 1 | 1 | The output values of right-side special modules change to zero and digital output points of digital modules change to OFF when RTU-EtherCAT is disconnected from the master. |
| Bit 2 | 0/1 | Reserved |
| Bit 3 | 0/1 | Reserved |
| Bit 4 | 0/1 | Reserved |
| Bit 5 | 0/1 | Reserved |
| Bit 6 | 0/1 | Reserved |
| Bit 7 | 0/1 | Reserved |
| Bit 8 | 0/1 | Reserved |
| Bit 9 | 0/1 | Reserved |
| Bit 10 | 0/1 | Reserved |
| Bit 11 | 0/1 | Reserved |
| Bit 12 | 0/1 | Reserved |
| Bit 13 | 0/1 | Reserved |
| Bit 14 | 0/1 | Reserved |
| Bit 15 | 0 | Control word is disabled. When the bit value is 0, RTU-ECAT can not be controlled to enter RUN or STOP state via bit0 in the control word. |



| Bit | Value | Description |
|-----|-------|---|
| | 1 | Control word is enabled. When the bit value is 1, RTU-ECAT can be controlled to enter RUN or STOP state via bit0 in the control word. |

6.3.2 Status Indication

| Index | Subindex | Description | Data type | Access type |
|---------|----------|--|-----------------------|-------------|
| 16#1001 | 16#0 | Error register which contains RTU-ECAT error information | WORD | RO |
| | 16#1 | LV state which is voltage status | BYTE | RO |
| 16#A000 | 16#2 | Error module number which is the number of the module in error on the right side | BYTE | RO |
| | 16#3 | Error list which shows errors of extension modules | ARRAY [18] OF BYTE | RO |

Explanation of RTU-ECAT status indication parameters

| Status value | Description | How to correct |
|---------------|---|---|
| 0x1000 (4096) | The special modules on the right of RTU-ECAT are inconsistent with the configuration in the software. | Ensure that the special modules configured in the software match the modules actually connected. Ensure that the connection between the right-side special modules and RTU-ECAT is normal. |
| 0x1001 (4097) | The special modules and digital modules on the right of RTU-ECAT are inconsistent with the configuration data. | Ensure that the special module number and input and output point numbers of digital modules configured in the software match the modules actually connected. Ensure that the connection between the right-side modules and RTU-ECAT is normal. |

Error register (RTU-ECAT error)

| Status value | Description | How to correct |
|---------------|--|--|
| 0x1002 (4098) | An error occurs in the special modules on the right of RTU-ECAT | Ensure that the power supply to the right-side special modules is normal. Check the error information of the special modules on the right of RTU-ECAT. Configure the error status CR registers for the right-side special modules to the input data of IO data and then get to know the cause based on the values in the error status CRs. Refer to error status CRs in DVP-PLC Application Manual: Special Modules for more details on error codes of special modules. |
| 0x1004 (4100) | The modules configured in the software are inconsistent with those actually connected and meanwhile an error in extension modules on the right of RTU-ECAT occurs. | Ensure the modules configured in the software match those actually connected. Ensure the power supply to the right-side modules works normally. Check the error information of the right-side modules and then get rid of it according to the instructions in the module manual. |
| 0x1005 (4101) | The special modules configured on the right of RTU-ECAT exceeds 8 units. | Ensure that the number of special modules configured in the software is no more than 8 units. |

■ LV state (voltage status)

| Bit | Value | Description | How to correct |
|-------------|-------|-------------------------------------|---|
| | 0 | The voltage for RTU-ECAT is normal. | |
| Bit 0 | 1 | Ũ | Check if the voltage of the power supply to RTU-ECAT is normal. |
| Bit 1~bit 7 | 0/1 | Reserved | Reserved |

Error module number (The number of the right-side module in error)

| Bit | Value | Description | How to correct |
|-------|-------|---|----------------|
| Bit 0 | 0 | The 1 st special module on the right of RTU-ECAT is normal. | |



| Bit | Value | Description | How to correct |
|-------|-------|---|---|
| | 1 | The 1 st special module on the right of RTU-ECAT is alarming. | Refer to "Error list (Extension module error information)" below. |
| Bit 1 | 0 | The 2 nd special module on the right of RTU-ECAT is normal. | |
| | 1 | The 2 nd special module on the right of RTU-ECAT is alarming. | Refer to "Error list (Extension module error information)" below. |
| Bit 2 | 0 | The 3 rd special module on the right of RTU-ECAT is normal. | |
| | 1 | | Refer to "Error list (Extension module error information)" below. |
| Bit 3 | 0 | The 4 th special module on the right of RTU-ECAT is normal. | |
| Dit 3 | 1 | | Refer to "Error list (Extension module error information)" below. |
| Bit 4 | 0 | The 5 th special module on the right of RTU-ECAT is normal. | |
| Dit 4 | 1 | | Refer to "Error list (Extension module error information)" below. |
| Bit 5 | 0 | The 6 th special module on the right of RTU-ECAT is normal. | |
| DIL 5 | 1 | The 6 th special module on the right of RTU-ECAT is alarming. | Refer to "Error list (Extension module error information)" below. |
| Pit 6 | 0 | The 7 th special module on the right of RTU-ECAT is normal. | |
| Bit 6 | 1 | The 7 th special module on the right of RTU-ECAT is alarming. | Refer to "Error list (Extension module error information)" below. |
| | 0 | The 8 th special module on the right of RTU-ECAT is normal. | |
| Bit 7 | 1 | The 8 th special module on the right of RTU-ECAT is alarming. | Refer to "Error list (Extension module error information)" below. |



Error list (Extension module error information)

| Bit | Description |
|---------------|---|
| | The error code in the 1 st special module on the right of RTU-ECAT; the error code value |
| Error list[0] | is the value in the error status CR of the special module. For details, refer to error |
| | status CRs in DVP-PLC Application Manual: Special Modules. |
| | The error code in the 2 nd special module on the right of RTU-ECAT; the error code |
| Error list[1] | value is the value in the error status CR of the special module. For details, refer to error |
| | status CRs in DVP-PLC Application Manual: Special Modules. |
| | The error code in the 3 rd special module on the right of RTU-ECAT; the error code value |
| Error list[2] | is the value in the error status CR of the special module. For details, refer to error |
| | status CRs in DVP-PLC Application Manual: Special Modules. |
| | The error code in the 4 th special module on the right of RTU-ECAT; the error code value |
| Error list[3] | is the value in the error status CR of the special module. For details, refer to error |
| | status CRs in DVP-PLC Application Manual: Special Modules. |
| | The error code in the 5 th special module on the right of RTU-ECAT; the error code value |
| Error list[4] | is the value in the error status CR of the special module. For details, refer to error |
| | status CRs in DVP-PLC Application Manual: Special Modules. |
| | The error code in the 6 th special module on the right of RTU-ECAT; the error code value |
| Error list[5] | is the value in the error status CR of the special module. For details, refer to error |
| | status CRs in DVP-PLC Application Manual: Special Modules. |
| | The error code in the 7 th special module on the right of RTU-ECAT; the error code value |
| Error list[6] | is the value in the error status CR of the special module. For details, refer to error |
| | status CRs in DVP-PLC Application Manual: Special Modules. |
| | The error code in the 8 th special module on the right of RTU-ECAT; the error code value |
| Error list[7] | is the value in the error status CR of the special module. For details, refer to error |
| | status CRs in DVP-PLC Application Manual: Special Modules. |



7

Chapter 7 Application Examples

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| 7.3 Using OMRON NJ301 with RTU-ECAT | |



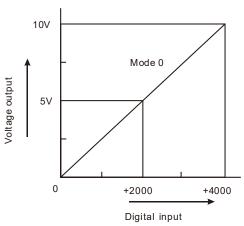
tput

This part describes how to configure RTU-ECAT module parameters through examples. Section 7.1, 7.2 and 7.3 respectively introduce the configuration methods when RTU-ECAT works together with different EtherCAT masters.

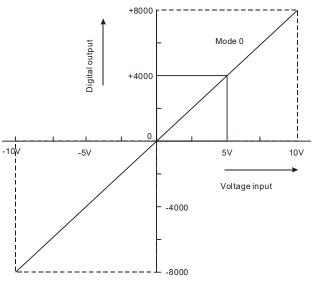
Control requirement

- DVP16SP11T is controlled to change its outputs Y0~Y7 to ON and its inputs X0~X7 are monitored via RTU-ECAT.
- 2. Channel 1 ~ channel 4 of DVP04DA-S are controlled to output the voltage of 5V via RTU-ECAT.
- The analog data conversion values of Channel 1 ~ channel 4 of DVP04AD-S are read via RTU-ECAT.

• Digital-Analog Relations for DVP04DA-S and DVP04AD-S



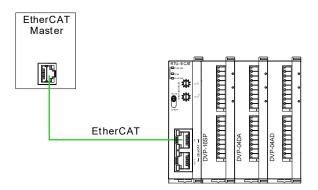
Digital input- Voltage output relation for $\ensuremath{\mathsf{DVP04DA-S}}$ in mode 0



Digital output- Voltage input relation for DVP04AD-S in mode 0



• Constructing an EtherCAT network with RTU-ECAT



• Devices used in the example:

| Device Name | Description |
|------------------|---|
| AX-832E CPU | Delta AX-8 series motion controller CPU |
| TwinCAT software | Beckhoff EtherCAT configuration software |
| NJ301 | OMRON NJ series CPU |
| RTU-ECAT module | Delta EtherCAT remote IO module |
| DVP04DA-S | Delta analog output module |
| DVP04AD-S | Delta analog input module |
| DVP16SP11T | Delta digital IO module with 8 input points and 8 output points |

Note:

- 1. Please ensure that DVP16SP11T, DVP04DA-S, DVP04AD-S and RTU-ECAT modules work normally and the whole network wiring is proper.
- 2. Refer to **DVP-PLC Application Manual: Special Modules** for more about DVP04DA-S and DVP04AD-S.

7.1 Using Delta AX8 Series CPU with RTU-ECAT

1. Download CODESYS software from Delta official website and install it. And then start the software.

| CODESYS | | - 0 | × |
|-------------------------------------|--------------------------------------|-----------------------------|----------|
| File Edit View Project | Build Online Debug Tools Window Help | , | T |
| 🎦 🛩 🔚 🎒 🗠 બ 🐰 🖿 f | 跑× 两端酷猛 貝乳乳液 隐 ‰+ ㎡ | ' 🎬 🎯 🧐 🔸 🔳 🤻 🗊 📲 📲 🎗 | Ŧ |
| r | | | |
| Devices 👻 🕂 🗙 | Start Page 🗙 | ▼ ToolBox ▼ ₽ | × |
| | CODESYS V3.5 SP15 | | |
| | | | |
| | Basic operations | Latest news | |
| | New Project | | |
| | ൙ Open Project | | |
| | Open Project from PLC | CODESYS | |
| | Recent projects | | |
| | Recent projects | | |
| | Close page after project load | CODESV | |
| Sevices POUs | Show page on startup | NT:NS: | |
| Messages - Total 0 error(s), 0 warn | ing(s), 0 message(s) | | |
| | Last build: 😳 0 🕐 0 🛛 Precompile 🗸 | Project user: (nobody) 🦸 |) |

2. A new project is created by selecting the icon in the red box and then typing a project name and storage location as below.

| 🖹 New Pr | | | | | |
|-------------|-----------------------------|-----------------------|----------------|---------------------|-----------------------|
| Categories | 5 | Templates | | | |
| | oraries ojects | Empty project | HMI project | Standard project | Standard project w |
| A project c | ontaining one device, one a | application, and an e | empty implemen | tation for PLC_ | PRG |
| Name | RTU-ECAT使用范例 | | | | |
| | RTU-ECAT使用范例 D:\范例 | | | | × |
| Name | | | | ОК | ∼ … Cancel |

Click "OK" button to complete the setting. Afterward, select "AX-8xxEP0 Series (Delta Electronics, Inc.)" in the "Device" field and then click "OK" in the pop-out window.



| Standard | l Project | | Х |
|----------|---|--|--------|
| | You are about to create a new standard project. This wizard will create the following objects within this project: - One programmable device as specified below - A program PLC_PRG in the language specified below - A cyclic task which calls PLC_PRG - A reference to the newest version of the Standard library currently installed. | | |
| | | | |
| | Device | AX-8xxEP0 Series (Delta Electronics, Inc.) | ~ |
| | Device PLC_PRG in | AX-8xxEP0 Series (Delta Electronics, Inc.) Structured Text (ST) | ~ ~ |
| | | | ~ ~ |

3. The created new project is shown as below.

| ◆ RTU-ECAT使用范例,project - CODESYS | - 0 × |
|--|---------------|
| File Edit View Project Build Online Debug Tools Window Help | ۲. |
| 🛅 📽 🖬 番目の つ & 時 வ 米 桷 築 🍓 🥸 貝 雅 雅 准 釉 獅 - 音 囲 Application (Device: PLC Logic) - 🧐 🧐 → 🔳 💐 (耳 雪 雪 雪 多 々 第 雪 ひ | |
| | |
| Devices 🗸 🕂 X | ToolBox 👻 📮 🗙 |
| ■ ···································· | |
| 🚊 🔟 Device (AX-8xx870 Series) | |
| □ 副U PLC Logc | |
| S 🕼 Application | |
| ULCHRY Manager | |
| | |
| | |
| | |
| — ④ PLC_PRG | |
| - 📆 EtherCAT_Master (AX-8xx | |
| a builth | |
| - 🖞 sultin_DIO (sultin_DI | |
| | |
| SoftWatan General Axis P | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| Devices (1) POUs | |
| Compared and the state of | |
| Last build: 📀 0 🕐 0 Precompile 🗸 👫 Project user: (n | obody) 🜍 |

Double-click on "Device" in the red box above and then click on "Scan Network" in the red box in the following window.



7

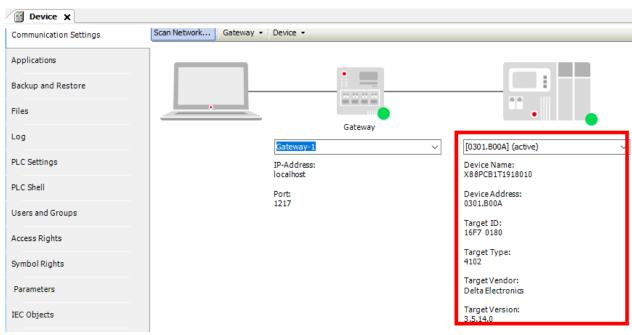
| Device X | |
|------------------------|---------------------------------|
| Communication Settings | Scan Network Gateway 👻 Device 👻 |
| Applications | |
| Backup and Restore | |
| Files | |
| Log | Gateway Gateway-1 CNWJ6ENNB009 |
| PLC Settings | IP-Address: localhost |
| PLC Shell | Port: |
| Users and Groups | 1217 |

Then the following window appears, where AX-8 series controller will be searched automatically. After the AX-8 controller shows up, select the controller and click "OK" button.

| Select Device | × |
|--|---|
| Select the network path to the controller: | Device Name: Scan Network X88PCB 1T 19 180 10 Wink Device Address: Wink 0301.B00A Block driver: UDP Encrypted Communication: TLS supported Number of channels: 8 Target ID: |
| | OK Cancel |

After the operations above are done, the connected CPU will automatically show up in the "Device" interface as below.





4. Double-click on "EtherCAT Master" in the red box below to open the "EtherCAT Master" interface.

| Devices 👻 🕂 🗙 | Device I EtherCAT_Ma | ister X | |
|--|----------------------|--|-------------------|
| ■ | General | Autoconfig Master/Slaves | Ether CAT. |
| PLC Logic | Sync Unit Assignment | EtherCAT NIC Setting | |
| Library Manager | EtherCAT I/O Mapping | Destination address (MAC) FF-FF-FF-FF-FF | Enable redundancy |
| □ PLC_PRG (PRG) □ Task Configuration | EtherCAT IEC Objects | Source address (MAC) 00-00-00-00-00 Browse Network Name ECAT | |
| EtherCAT_Tas | Status | Select network by MAC Select network by name | |
| PLC_PRG | Information | ✓ Distributed Clock | |
| BuiltIn | | Cycle time 4000 🗼 µs | |
| ···· 📆 BuiltIn_DIO (BuiltIn_DI | | Sync offset 20 🔶 % | |
| BuiltIn_Pulse_Encoder | | Sync window monitoring | |
| 🛛 🍐 SoftMotion General Axis Po | | Sync window 1 🗢 µs | |

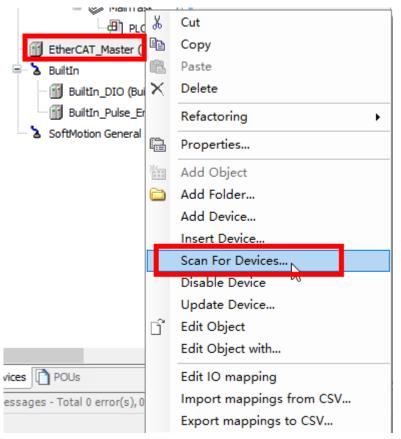
Click "Browse" button in the "EtherCAT Master" configuration area, then select the ECAT port from the pop-out "Select Network Adapter" window as below and afterwards click "OK" button.

| Select Network Adapter | | |
|------------------------|-----|---|
| MAC address N | ame | Description |
| - 00182373D26A EC. | AT | CoDeSys EtherExpress GBit PCI Ethernet Adapter |
| - 00182373D269 GL | AN2 | CoDeSys EtherExpress GBit PCI Ethernet Adapter #2 |
| 001823727777 GL | AN1 | CoDeSys EtherExpress GBit FCI Ethernet Adapter #3 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | OK Abort |
| | | |



7

5. Right-click on the "EtherCAT Master" after the above action is done and then choose "Scan For Devices..." from the context menu.

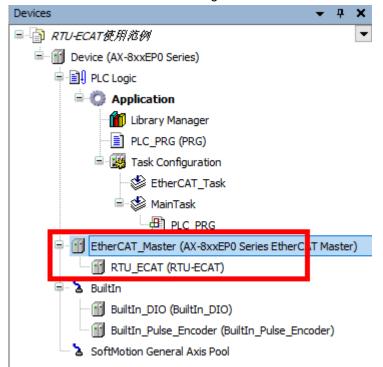


Then the following "Scan Devices" window appears with the scanned slave as follows.

| | Device type | Alias Address | | | |
|----------|-------------|---------------|---|--|--|
| RTU_ECAT | RTU-ECAT | 0 | | | |
| | | | _ | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

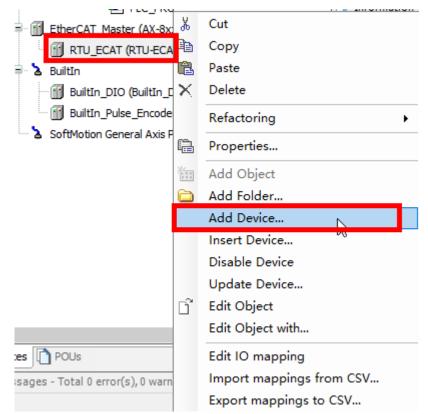
After the software scan is complete, select the scanned RTU-ECAT and then click on "Copy to project" to add





the RTU-ECAT to the EtherCAT configuration as shown below.

6. Right-click on the RTU-ECAT after it is added and select "Add Device" from the context menu to add extension modules.



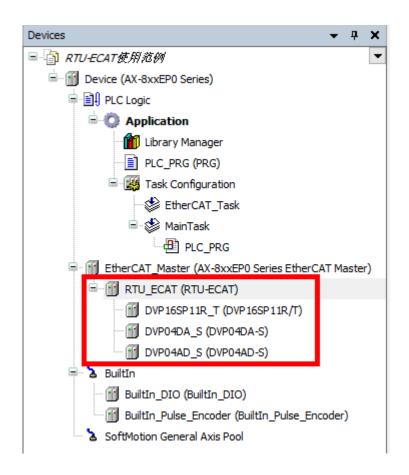
The following "Add Device" window appears for users to select extension modules.



| 7 | | | | | | |
|---|-------------|----------------|---|-----------------------|----------------------------------|-------------|
| 🕤 Add Device | | | | | | × |
| Name DVP16SP11R_T | | | | | | 1 |
| Action | | | | | | 1 |
| Append device | 🔿 Plug d | evice 🔿 U | pdate device | | | |
| | | 1 | - | | | _ |
| String for a fulltext search | | Vendor | <all td="" vendors<=""><td>></td><td></td><td>~</td></all> | > | | ~ |
| Name | Vendor | | Versio | n Description | | <u>^ </u> |
| 🖃 · 🚹 Fieldbuses | | | | | | |
| ் _{Be} ar EtherCAT | | | | | | |
| Brat Module | | | | | | |
| DVP01PU-S | Delta Ele | ctronics, Inc. | 0 | EtherCAT Module | imported from Sl | |
| DVP02DA-S | Delta Ele | ctronics, Inc. | 0 | EtherCAT Module | imported from Sl | |
| 🔟 DVP02TUL-S | Delta Ele | ctronics, Inc. | 0 | EtherCAT Module | imported from Sl | |
| - M DVP02TUN-S | Delta Ele | ctronics, Inc. | 0 | EtherCAT Module | imported from Sl | |
| ···· 🗊 DVP02TUR-S | Delta Elec | ctronics, Inc. | 0 | EtherCAT Module | imported from Sl | |
| DVP04AD-S | Delta Elec | ctronics, Inc. | 0 | EtherCAT Module | imported from Sl | |
| ···· 🔟 DVP04AD-S2 | Delta Ele | ctronics, Inc. | 0 | EtherCAT Module | imported from SI EtherCAT Mod | |
| DVP04DA-S | Delta Ele | ctronics, Inc. | 0 | EtherCAT Module | EtherCAT Wood | |
| 1 4 10 10 10 10 10 10 10 10 10 10 10 10 10 | - 111 | | | | · · · · · · | rll |
| Group by category Display all v | versions (f | or experts o | nlv) 🗌 Disr | play outdated version | | |
| | | | | | | \square |
| Name: DVP16SP11R/T | | | | ^ | | |
| Vendor: Delta Electronics, Inc. Categories: Module | | | | | | |
| Version: 0 | | | | | | |
| Order Number: DVP 16SP 11R/T | г | | | ~ | ~ | |
| | | | | | | - |
| Append selected device as last chil RTU_ECAT | d of | | | | | |
| | | | late all a sub-second | | | |
| (You can select another target no | de in the i | navigator wi | nite this wind | ow is open.) | | |
| | | | | Add Device | Close | |
| | | | | | 0.030 | |

Find out and select DVP16SP11R/T in the red box above and then click "Add Device" button to add DVP16SP11T/R to RTU-ECAT. In the same way, add DVP04DA-S and DVP04AD-S respectively to the RTU-ECAT configuration.





7. After the above configuration setting is complete, right-click on the RTU-ECAT and select "Edit IO Mapping" from the context menu to review the IO mapping information of RTU-ECAT.

| 🚹 Device 📑 Eth | erCAT_Master | Edit IO map | ping 🗙 | | | |
|-----------------|---|-------------|--------|---|--|--|
| Find | Filter Show all | | | | | |
| Variable | Channel | Address | Туре | Description | | |
| ■- 🔐 RTU_ECAT | | | | | | |
| | | | | | | |
| 😟 - 👘 | Digital output CH1 | %QB0 | USINT | Digital output CH1 | | |
| | Digital input CH1 | %IB0 | USINT | Digital input CH1 | | |
| 🖹 🔐 DVP04DA_S | | | | | | |
| | CR6: value of CH1 output signal | %QW1 | INT | CR6: value of CH1 output signal | | |
| 😟 🍢 | CR7: value of CH2 output signal | %QW2 | INT | CR7: value of CH2 output signal | | |
| | CR8: value of CH3 output signal | %QW3 | INT | CR8: value of CH3 output signal | | |
| 😟 Kø | CR9: value of CH4 output signal | %QW4 | INT | CR9: value of CH4 output signal | | |
| 🖃 🔐 🔂 DVP04AD_S | | | | | | |
| | CR12: present value of CH1 input signal | %IW1 | INT | CR12: present value of CH1 input signal | | |
| iii ¥≱ | CR13: present value of CH2 input signal | %IW2 | INT | CR13: present value of CH2 input signal | | |
| 🚊 - 🎽 | CR14: present value of CH3 input signal | %IW3 | INT | CR14: present value of CH3 input signal | | |
| | CR15: present value of CH4 input signal | %IW4 | INT | CR15: present value of CH4 input signal | | |

Variables can be combined in the red boxes above. When module channels are not combined to variables, the I and Q devices in the "Addresss" column are valid. The values of module channels can be read through



the I and Q devices in the program.

When module channels are combined to variables, the I and Q devices in the "Addresss" column are invalid. The values of module channels can be read through variables in the program.

E.g. when module channels are not combined with variables, write 255 in %QB0 device in the program to change the Y0~Y7 output of DVP16SP11T into ON. If channel 1~ channel 4 of DVP04DA-S output 5V voltage, write 2000 to %QW1~QW4 in the program and then read the value converted from the analog data of channel 1~ channel 4 of DVP04AD-S in %IW1~%IW4.

If you need to modify the mode of channel 1~ channel 4 of DVP04DA-S, click "Startup Parameters" in the configuration interface of RTU-ECAT to open the "Startup" configuration interface and then click **Add** button as follows.

| General | ╊ Add 👔 🖉 Edit 🗙 Delete 🐨 Move Up 🗣 Move Down | | | | | |
|----------------------|---|----------------|-------------|-------|---------|--|
| Process Data | Line | Index:Subindex | Name | Value | Bit Ler | |
| | 1 | 16#8000:16#01 | module code | 113 | 8 | |
| Startup Parameters | 2 | 16#8020:16#01 | module code | 3 | 8 | |
| EtherCAT IEC Objects | 3 | 16#8040:16#01 | module code | 0 | 8 | |
| | | | | | | |
| Status | | | | | | |
| Information | | | | | | |
| | | | | | | |
| | | | | | | |

Click **Add** button and then click icon beside DVP04DA-S in the pop-out window to unfold all configurable CRs of DVP04DA-S. Then select the option "CR1: output mode setting" and enter 585 (16#249) in the "Value" field.



| nd | lex:Subindex | Name | Flags | Туре | Default | | |
|----------|--------------|--------------------------|------------|------|---------|---|--------|
| 0 | 16#10F1:16#0 | 0 Error Settings | | | | | |
| . | 16#1C32:16#0 | 0 SM output parameter | | | | | |
| ÷. | 16#1C33:16#0 | 0 SM input parameter | | | | | |
| <u>.</u> | 6#2020:16#0 | 0 DVP04DA-S CR | | | | | |
| | :16#02 | CR1: output mode set | RW | INT | 16#0000 | | |
| | :16#03 | CR2: reserved | RW | INT | 16#0000 | | |
| | :16#04 | CR3: reserved | RW | INT | 16#0000 | | |
| | :16#05 | CR4: reserved | RW | INT | 16#0000 | | |
| | :16#06 | CR5: reserved | RW | INT | 16#0000 | | |
| | :16#07 | CR6: value of CH1 ou | RW | INT | 16#0000 | | |
| | :16#08 | CR7: value of CH2 ou | RW | INT | 16#0000 | | |
| | :16#09 | CR8: value of CH3 ou | RW | INT | 16#0000 | | |
| | :16#0A | CR9: value of CH4 ou | RW | INT | 16#0000 | | |
| | :16#0B | CR 10: reserved | RW | INT | 16#0000 | | |
| Na | ame | CR1: output mode setting | - | | | | |
| In | dex: 16# | 2020 🚖 | Bit length | 16 | | ÷ | ОК |
| ~ | ıbIndex: 16# | 2 | /alue | 585 | | ÷ | Cancel |

Click "OK" button to finish the setting. The "Startup Parameters" interface is disaplayed as follows after the setting is over.

| General | - Add | Add 📝 Edit 🗙 Delete 🕆 Move Up 🖶 Move Down | | | | | | | |
|----------------------|-------|---|--------------------------|-------|------------|----------------|---------------------|-----------|-------------|
| Expert Process Data | Line | Index:Subindex | Name | Value | Bit Length | Abort on Error | Jump to Line on Err | Next Line | Comment |
| | | 16#8000:16#01 | module code | 113 | 8 | | | 0 | module code |
| Process Data | 2 | 16#8020:16#01 | module code | 3 | 8 | | | 0 | module code |
| | - 3 | 16#8040:16#01 | module code | 0 | 8 | | | 0 | module code |
| Startup Parameters | 4 | 16#2020:16#02 | CR1: output mode setting | 585 | 16 | | | 0 | |
| EtherCAT IEC Objects | | | | | | | | | |
| Status | | | | | | | | | |
| | | | | | | | | | |

Click login button and download the EtherCAT configuration data to the AX8 series CPU. Then the mode of channel 1~ channel 4 of DVP04DA-S is automatically switched to mode 1.

Refer to DVP-PLC Application Manual: Special Modules for details on CR1 in DVP04DA-S.

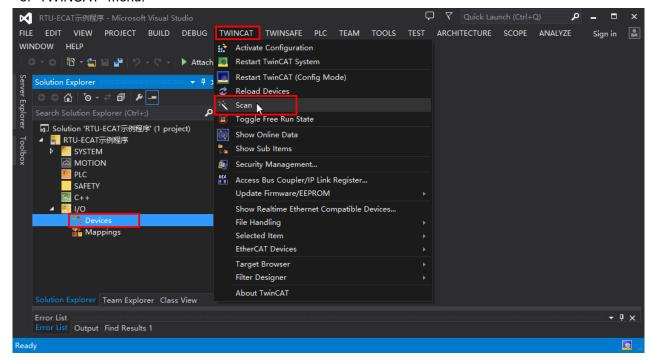
7.2 Using TwinCAT3 with RTU-ECAT

7.2.1 Configuring the Network via TwinCAT3

- Configuring RTU-ECAT
- 1. Start the TwinCAT3 software and create a TwinCAT project as below.

| NTU-ECAT示例程序 - Microsoft Visual Studio | | | ↓ ↓ Quick Lat | unch (Ctrl+Q) | - • × |
|--|----------------------|------------|-------------------|---------------|-------------|
| FILE EDIT VIEW PROJECT BUILD DEBUG | TWINCAT TWINSAFE PLC | TEAM TOOLS | TEST ARCHITECTURE | SCOPE ANALYZE | Sign in 🔒 |
| Attach | - 🔿 - Release - 🎜 🚽 | | | | |
| Solution Explorer | | | | | |
| Solution Explorer Team Explorer Class View | | | | | |
| Error List Error List Output Find Results 1 | | | | | - ₽× |
| Creating project 'RTU-ECAT示例程序' project creation suc | cessful. | | | | 1 |

2. Click on the "I/O" item on the left list of the software interface, select "Devices" and then click on "Scan" of "TWINCAT" menu.



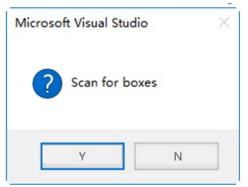
With a click on "Scan" the following dialog appears, where you click on the "OK" button.

| Microsoft Visual Studio | | × |
|--------------------------|------------------------|--------------|
| HINT: Not all types of o | levices can be found a | utomatically |
| | ОК | Cancel |

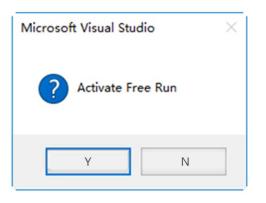
3. During the scan, the adapters information is listed as below. Select the right adapter and click on the "OK" button.

| 3 new I/O devices found | × |
|---|----------------------------|
| □ Device 1 (EtherCAT Automation Protocol) [以太网 5 (DIACom Ethernet Adapter)] □ Device 2 (EtherCAT Automation Protocol) [以太网 3 (Realtek USB FE Family Contro ☑ Device 4 (EtherCAT) [以太网 (TwinCAT-Intel PCI Ethernet Adapter (Gigabit] | OK Cancel Select All |
| | Unselect All |
| | |

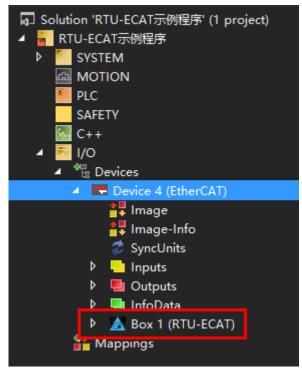
4. Click on the "Y" button in the following dialog to scan the slave modules on the network.



5. After the scan is over, the following dialog appears. Click on the "Y" button then.



6. Then the names of all node devices which have been scanned appear on the software interface as follows.



7. With a double-click on the RTU-ECAT symbol, the interface for configuring RTU-ECAT appears.



| General EtherC | AT DC Process Data Slots Startup CoE - | Online Online |
|----------------|--|----------------|
| Name: | Box 1 (RTU-ECAT) | Id: 1 |
| Object Id: | 0x03020001 | |
| Туре: | RTU-ECAT | |
| Comment: | | ^ |
| | | |
| | | |
| | | \sim |
| | Disabled | Create symbols |
| | | |

8. Click on "Slots" tab and then set the right-side module configuration of RTU-ECAT as below.

| General | EtherCAT | DC | Process Data | Slots | Startup | CoE | - Online | Online | | |
|----------|--|-----|--------------|-------|---------|-----|----------|------------------|-------------------|---------------|
| Slot | Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals | DC | | Slots | Startup | СоЕ | - Online | Online | ModuleIdent | : Description |
| | | | | | | | | | | |
| ▲ | vnload Slot(| îfg | □ (I->P) | _ | | Þ | | Create project s | specific XML File | • |

9. Click on the top "Terminals" row of the left list. Then the DVP-S series right-side extension modules which can be added appear on the right list.



| Slot | Module | | | Module | ModuleIdent | Des |
|---|---|----------|-----------------------------|---|---|---|
| Taminala N | | | | Digital Input Terminals | | |
| A Terminals | | | < | DVP08SM11N | 0x01DD0001 | DVF |
| A Terminals | | | | DVP08ST11N | 0x01DD0002 | DVF |
| A Terminals | | | × | DVP16SM11N | 0x01DD0003 | DVF |
| A Terminals | | | | DVP32SM11N | 0x01DD0004 | DVF |
| A Terminals | | | | Digital Output Terminals | 0,01000001 | |
| A Terminals | | | | DVP06SN11R | 0x01DD0005 | DVF |
| A Terminals | | | | DVP08SN11R/T | 0x01DD0006 | DVF |
| A Terminals | | | | DVP08SN11TS | 0x01DD0007 | DVF |
| A Terminals | | | | DVP16SN11T | 0x01DD0008 | DVF |
| A Terminals | | | | DVP16SN11TS | 0x01DD0009 | DVF |
| A Terminals | | | | DVP32SN11TN | 0x01DD000A | DVF |
| A Terminals | | | | Digital Input and Output Tern | | |
| A Terminals | | | | DVP08SP11R/T | 0x01DD000B | DVF |
| | | | | DVP08SP11TS | 0x01DD000C | DVF |
| | | | | DVP16SP11R/T | 0x01DD000D | DVF |
| | | | | DVP16SP11TS | 0x01DD000E | DVF |
| | | | | Analog Input Terminals | | |
| Download SlotCfg |](I->P) T from the righ | t list a | nd click or | Create project specific XML Fi | | |
| _ • - | T from the righ | t list a | nd click or | < | | |
| Select DVP16SP11R/ | T from the righ | | nd click on CoE - Online | to add DVP16SP | | |
| Select DVP16SP11R/ | T from the righ U-ECAT. | | | to add DVP16SP | | t De |
| Select DVP16SP11R/ configuration list of RT eneral EtherCAT DC P Slot & Terminals | T from the righ U-ECAT. rocess Data Slots | Startup | CoE - Online | to add DVP16SP | 11R/T to the | t De |
| Select DVP16SP11R/ configuration list of RT eneral EtherCAT DC P | T from the righ U-ECAT. rocess Data Slots Module | Startup | | to add DVP16SP Online Module | 11R/T to the | |
| Select DVP16SP11R/ configuration list of RT eneral EtherCAT DC P Slot & Terminals & Terminals & Terminals | T from the righ U-ECAT. rocess Data Slots Module | Startup | CoE - Online | to add DVP16SP Online Module Digital Input Terminals | 11R/T to the ModuleIdent | D |
| Select DVP16SP11R/ configuration list of RT eneral EtherCAT DC P Slot & Terminals & Terminals | T from the righ U-ECAT. rocess Data Slots Module | Startup | CoE - Online | to add DVP16SP Online Module Digital Input Terminals DVP08SM11N | 11R/T to the ModuleIdent 0x01DD0001 | ים ים |
| Select DVP16SP11R/ configuration list of RT eneral EtherCAT DC P Slot & Terminals & Terminals & Terminals | T from the righ U-ECAT. rocess Data Slots Module | Startup | CoE - Online | to add DVP16SP Online Module Digital Input Terminals DVP08SM11N DVP08ST11N | ModuleIdent 0x01DD0001 0x01DD0002 | רם ים ים |
| Select DVP16SP11R/ configuration list of RT eneral EtherCAT DC P Slot & Terminals & Terminals & Terminals & Terminals | T from the righ U-ECAT. rocess Data Slots Module | Startup | CoE - Online | to add DVP16SP Online Module Digital Input Terminals DVP08SM11N DVP08ST11N DVP16SM11N | ModuleIdent 0x01DD0001 0x01DD0002 0x01DD0003 | רם ים ים |
| Select DVP16SP11R/ configuration list of RT eneral EtherCAT DC P Slot & Terminals & Terminals & Terminals & Terminals & Terminals & Terminals | T from the righ U-ECAT. rocess Data Slots Module | Startup | CoE - Online | to add DVP16SP Online Module Digital Input Terminals DVP08SM11N DVP08ST11N DVP08ST11N DVP16SM11N DVP32SM11N | ModuleIdent 0x01DD0001 0x01DD0002 0x01DD0003 | ים ים ים |
| Select DVP16SP11R/ configuration list of RT eneral EtherCAT DC P Slot & Terminals & Terminals & Terminals & Terminals & Terminals & Terminals & Terminals & Terminals | T from the righ U-ECAT. rocess Data Slots Module | Startup | CoE - Online | to add DVP16SP Online Module Digital Input Terminals DVP08SM11N DVP08ST11N DVP16SM11N DVP16SM11N DVP32SM11N Digital Output Terminals | 11R/T to the ModuleIdent 0x01DD0001 0x01DD0002 0x01DD0003 0x01DD0004 | ים יים יים יים |
| Select DVP16SP11R/ configuration list of RT eneral EtherCAT DC P Slot Terminals Terminals Terminals Terminals Terminals Terminals Terminals | T from the righ U-ECAT. rocess Data Slots Module | Startup | CoE - Online | to add DVP16SP Online Digital Input Terminals DVP08SM11N DVP08ST11N DVP16SM11N DVP16SM11N DVP32SM11N Digital Output Terminals DVP06SN11R | 11R/T to the ModuleIdent 0x01DD0001 0x01DD0002 0x01DD0003 0x01DD0004 0x01DD0005 | ים ים ים ים |
| Select DVP16SP11R/ configuration list of RT eneral EtherCAT DC P Slot Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals | T from the righ U-ECAT. rocess Data Slots Module | Startup | CoE - Online | to add DVP16SP Online Digital Input Terminals DVP08SM11N DVP08ST11N DVP16SM11N DVP16SM11N DVP16SM11N DVP32SM11N Digital Output Terminals DVP06SN11R DVP08SN11R/T | 11R/T to the ModuleIdent 0x01DD0001 0x01DD0002 0x01DD0003 0x01DD0004 0x01DD0005 0x01DD0005 | ים יים יים יים יים |
| Select DVP16SP11R/ configuration list of RT eneral EtherCAT DC P Slot Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals | T from the righ U-ECAT. rocess Data Slots Module | Startup | CoE - Online | to add DVP16SP Online Digital Input Terminals DVP08SM11N DVP08ST11N DVP16SM11N DVP16SM11N DVP16SM11N DVP08SN11R DVP08SN11R/T DVP08SN11TS | 11R/T to the ModuleIdent 0x01DD0001 0x01DD0002 0x01DD0003 0x01DD0004 0x01DD0005 0x01DD0005 0x01DD0005 | |
| Select DVP16SP11R/ configuration list of RT eneral EtherCAT DC P Slot Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals | T from the righ U-ECAT. rocess Data Slots Module | Startup | CoE - Online | to add DVP16SP Online Module Digital Input Terminals DVP08SM11N DVP08ST11N DVP16SM11N DVP16SM11N DVP16SM11N DVP06SN11R DVP06SN11R/T DVP08SN11TS DVP16SN11T | 11R/T to the ModuleIdent 0x01DD0001 0x01DD0002 0x01DD0003 0x01DD0004 0x01DD0005 0x01DD0005 0x01DD0006 0x01DD0007 0x01DD0008 | יים יים יים יים יים יים |
| Select DVP16SP11R/ configuration list of RT eneral EtherCAT DC P Slot Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals Terminals | T from the righ U-ECAT. rocess Data Slots Module | Startup | CoE - Online | to add DVP16SP Online Digital Input Terminals DVP08SM11N DVP08ST11N DVP16SM11N DVP16SM11N DVP16SM11N DVP06SN11R DVP06SN11R DVP06SN11R/T DVP08SN11TS DVP16SN11T DVP16SN11TS | 11R/T to the Module1dent 0x01DD0001 0x01DD0002 0x01DD0003 0x01DD0004 0x01DD0005 0x01DD0006 0x01DD0006 0x01DD0006 0x01DD0008 0x01DD0008 0x01DD0008 | יים יים יים יים יים יים |
| Select DVP16SP11R/ configuration list of RT eneral EtherCAT DC P Slot & Terminals & Terminals | T from the righ U-ECAT. rocess Data Slots Module | Startup | CoE - Online | to add DVP16SP Online Digital Input Terminals DVP08SM11N DVP08ST11N DVP16SM11N DVP16SM11N DVP06SN11R DVP06SN11R/T DVP08SN11R/T DVP08SN11TS DVP16SN11T DVP16SN11TS DVP16SN11TS DVP16SN11TS DVP16SN11TS DVP16SN11TS | 11R/T to the Module1dent 0x01DD0001 0x01DD0002 0x01DD0003 0x01DD0004 0x01DD0005 0x01DD0006 0x01DD0006 0x01DD0006 0x01DD0008 0x01DD0008 0x01DD0008 | יים יים יים יים יים יים |
| Select DVP16SP11R/ configuration list of RT eneral EtherCAT DC P Slot & Terminals & Terminals | T from the righ U-ECAT. rocess Data Slots Module | Startup | CoE - Online | to add DVP16SP Online Module Digital Input Terminals DVP08SM11N DVP08SM11N DVP16SM11N DVP16SM11N DVP16SM11N DVP06SN11R DVP08SN11R/T DVP08SN11TS DVP16SN11TS DVP16SN11TS DVP16SN11TS DVP16SN11TN DVP16SN11TN DVP16SN11TN DVP16SN11TN DVP16SN11TN DVP16SN11TN DVP16SN11TN | 11R/T to the ModuleIdent 0x01DD0001 0x01DD0002 0x01DD0003 0x01DD0004 0x01DD0005 0x01DD0006 0x01DD0006 0x01DD0007 0x01DD0008 0x01DD0008 0x01DD0008 | יים יים יים יים יים יים |
| Select DVP16SP11R/ configuration list of RT eneral EtherCAT DC P Slot & Terminals & Terminals | T from the righ U-ECAT. rocess Data Slots Module | Startup | CoE - Online | to add DVP16SP Online Digital Input Terminals DVP08SM11N DVP08ST11N DVP16SM11N DVP16SM11N DVP16SM11N DVP06SN11R DVP06SN11R/T DVP08SN11R/T DVP16SN11TS DVP16SN11TS DVP16SN11TS DVP16SN11TS DVP16SN11TS DVP16SN11TS DVP16SN11TS DVP16SN11TS DVP16SN11TN DVP16SN11TS DVP16SN11TS DVP16SN11TN DVP16SN11TN DVP16SN11TN DVP16SN11TN DVP16SN11TN DVP08SP11R/T | 11R/T to the ModuleIdent 0x01DD0001 0x01DD0002 0x01DD0003 0x01DD0004 0x01DD0005 0x01DD0006 0x01DD0006 0x01DD0008 0x01DD0008 0x01DD0008 | יים יים יים יים יים יים יים |

11. Following the steps above, add DVP04DA and DVP04AD under DVP16SP as below.



| General | EtherCAT | DC | Process Data | Slots | Startup | CoE - Online | Online | | |
|---------|-----------|----|--------------|---------|---------|--------------|--|-------------|-------|
| Slot | | | 1 | Module | | | Module | ModuleIdent | Descr |
| | Terminals | | | OVP16SP | P11R/T | | DVP16SP11R/T | 0x01DD000D | DVP1 |
| | Terminals | | (| OVP04D | A-S | < | DVP16SP11TS | 0x01DD000E | DVP1 |
| | Terminals | | 1 | OVP04A | D-S | | Analog Input Terminals | | |
| | Terminals | | | | | × | DVP04AD-S | 0x01DD000F | DVP0- |
| | Terminals | | | | | | DVP04AD-S2 | 0x01DD0010 | DVP0- |
| | Terminals | | | | | | DVP06AD-S | 0x01DD0011 | DVP0 |
| | Terminals | | | | | | Analog Output Terminals | | |
| | Terminals | | | | | | DVP02DA-S | 0x01DD0012 | DVP0: |
| | Terminals | | | | | | DVP04DA-S | 0x01DD0013 | DVP0- |
| | Terminals | | | | | | DVP04DA-S2 | 0x01DD0014 | DVP0- |
| | Terminals | | | | | | Analog Input and Output Te | rminals | |
| | Terminals | | | | | | DVP06XA-S | 0x01DD0015 | DVP0 |
| | Terminals | | | | | | DVP06XA-S2 | 0x01DD0016 | DVP0 |
| | Terminals | | | | | | Temperatrue Terminals | | |
| | | | | | | | DVP04PT-S | 0x01DD0018 | DVP0- |
| | | | | | | | DVP06PT-S | 0x01DD0019 | DVP0 |
| | | | | | | | DVP04TC-S | 0x01DD001A | DVP0- |
| | | | | | | | DVP02TUN-S | 0x01DD001B | DVP0 |
| ◀ | | | | | | • | • | | • |

12. After the configuration is completed, click the "Process Data" tab to enter the data exchange configuration interface.

| vnc I | Manage | r: | | PDO List: | | | | | | | |
|------------|--------------|----------------|-------|---------------------------|---------------------------|--------------------|--|----------------------|-------------------|---------|-------|
| SM | Size | Туре | Flags | Index | Size | Name | | Flags | SM | SU | |
| | 128 | Mbx | riags | | | | | riags | | | |
| 0 1 | 128 | MbxIn | | 0x1B00 0x1B01 | 0.0 0.0 | Status Control | 1 | | 3 | 0 | |
| | 9 | | | 0x1A00 | 1.0 | | | | 2 | 0 | |
| 2 3 | 9 | Outp Inputs | | 0x1600 | 1.0 | | SP11R/T Input mapp SP11R/T Output ma | | 2 | 0 | |
| э | 9 | inputs | | 0x1600 | 8.0 | | | | 2 | 0 | |
| | | | | 0x1A20 | 8.0 | | DA-S Output mapping AD-S Input mapping | | 2 | 0 | |
| | | | | | | | | | | | |
| DO | Assianm | ent (0x10 | 12): | PDO Contr | -nt (0x16 | 10): | | | | | |
| | | ent (0x1C | :12): | PDO Conte | • | - | Name | | Type | Default | + (h. |
| Z0x Z0x | 1B01 1600 | ient (0x1C | :12): | Index | Size | Offs | Name | utout si | Туре | Default | t (h |
| Z0x Z0x | 1B01 | ient (0x1C | :12): | Index 0x2020 | Size 2.0 | Offs 0.0 | CR6: value of CH1 o | | INT | Default | t (h |
| Z0x Z0x | 1B01 1600 | ent (0x1C | :12): | Index 0x2020 0x2020 | Size 2.0 2.0 | Offs 0.0 2.0 | CR6: value of CH1 o CR7: value of CH2 o | utput si | INT INT | Default | t (h |
| Z0x Z0x | 1B01 1600 | nent (0x1C | :12): | Index 0x2020 | Size 2.0 2.0 2.0 | Offs 0.0 | CR6: value of CH1 o | utput si utput si | INT INT INT | Default | t (h |

Add or delete a special module CR which need be read or written to in the "PDO Content" box as below.



| Index | Size | Offs | Name | Туре | Default (h |
|--------|------|------|------------------------|------------|------------|
| 0x2020 | 2.0 | 0.0 | CR6: value of CH1 outp | out si INT | |
| 0x2020 | 2.0 | 2.0 | CR7: value of CH2 | Insert | |
| 0x2020 | 2.0 | 4.0 | CR8: value of CH3 | | |
| 0x2020 | 2.0 | 6.0 | CR9: value of CH4 🔀 | Delete | |
| | | 8.0 | | Edit | |
| | | | | Move Up | |
| | | | | Move Down | |

PDO Content (0x1610):

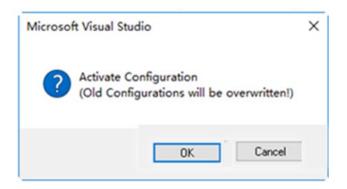
Explanation of the pull-down menu:

| Item | Description |
|-----------|--|
| Insert | Add or insert a special module CR. |
| Delete | Delete a special module CR which has been added. |
| Edit | Edit the selected parameter |
| Move Up | Move to the previous row |
| Move Down | Move to the next row |

13. After the above setting is over, click on the "Activate Configuration" option on "TwinCAT" menu to make the current configuration effective.

| FILE | EDIT | VIEW | PROJECT | BUILD | DEBUG | TWIN | CAT TWIN | SAFE | PLC | TEAM | TOOLS | TEST | ARCHI | TECTURE | SCOPE | ANALYZE | WIND | woo | HELP |
|-----------------|-------------------|------------------------|---------------------------------------|------------------|-----------------------|------------|---|-----------------|---------|------------|---------|--------------------|---------------|---|------------|------------------------------|------|------------------|-------------|
| | | 18 - 省 | 8 8 7 | | Attach | | ctivate Confi estart TwinC | | - A | | | | | | | | | | |
| Server Explorer | | ⊡`o` | ・ ご | 4 +;) | د ب - م | ■ R 2 R | estart Twinc estart TwinC eload Device can | AT (Co | | ode) | | | rtup C | CoE - Online | e Online | | | | |
| er Toolbox | ▲ <mark> </mark> | ution 'RTL RTU-ECAT | M | 郢序' (1 pro | ject) | 🔯 s | oggle Free F how Online I how Sub Iter | ata | te | | | | | ame atus | | Flags | ; | SM 3 | SU 0 |
| 6 | | PLC SAFETN | | | | S € | ecurity Mana ccess Bus Co pdate Firmw | gemer upler/ | 1P Link | Register. | | | D\ D\ | ntrol /P16SP11R/ /P16SP11R/ /P04DA-S C | T Output r | ma | | 2 3 2 2 | 0 0 0 |
| | - | * | Device 4 (Etl 📮 Image | | | S Fi | how Realtim le Handling elected Item | | | mpatible I | Devices | | | PO4DA-S Ir | | 1 9 | | 3 | 0 |
| | | ▶ ₹ | 🖡 Image-In 🏂 SyncUnits 🚺 Inputs | | | | therCAT Dev arget Brows | | | | | | ×1610): Of | | e | | Тур | e | Default (h |
| | | ♪ | Outputs InfoData | | | Fi | lter Designe bout TwinCA | | | | | | 0.0 | | | H1 output si H2 output si | | | |
| | | A | Box 1 (R ⁻ Lostatus | | | | | | | | |)20 2.0)20 2.0 | 4.0 6.0 | | | H3 output si H4 output si | | | |

With a click on "Activate Configuration", the following reminder dialog appears, where you click "OK" button.



14. If the mode of channel 1~ channel 4 of DVP04DA-S need be modified, e.g. the mode of channel 1~ channel 4 is to be changed to mode 1, click "Startup" tab in the configuration interface of RTU-ECAT and then press "New..." button as shown in the red box below.

| ransiti | Protocol | Index | Data | Comment | |
|-----------|----------|-----------|---------------------|----------------------|--|
| <ps></ps> | CoE | 0x1C12:00 | 0x00 (0) | clear sm pdos (0x1C1 | |
| <ps></ps> | CoE | 0x1C13:00 | 0x00 (0) | clear sm pdos (0x1C1 | |
| <ps></ps> | CoE | 0x1B00:00 | 0x00 (0) | clear pdo 0x1B00 ent | |
| <ps></ps> | CoE | 0x1B01:00 | 0x00 (0) | clear pdo 0x1B01 ent | |
| <ps></ps> | CoE | 0x1A00:00 | 0x00 (0) | clear pdo 0x1A00 ent | |
| <ps></ps> | CoE | 0x1A00:01 | 0x60000108 (1610613 | download pdo 0x1A0 | |
| <ps></ps> | CoE | 0x1A00:00 | 0x01 (1) | download pdo 0x1A0 | |
| <ps></ps> | CoE | 0x1600:00 | 0x00 (0) | clear pdo 0x1600 ent | |
| <ps></ps> | CoE | 0x1600:01 | 0x70000108 (1879048 | download pdo 0x160 | |
| <ps></ps> | CoE | 0x1600:00 | 0x01 (1) | download pdo 0x160 | |
| <ps></ps> | CoE | 0x1610:00 | 0x00 (0) | clear pdo 0x1610 ent | |
| <ps></ps> | CoE | 0x1610:01 | 0x20200710 (5389698 | download pdo 0x161 | |
| <ps></ps> | CoE | 0x1610:02 | 0x20200810 (5389701 | download pdo 0x161 | |
| <ps></ps> | CoE | 0x1610:03 | 0x20200910 (5389703 | download pdo 0x161 | |
| <ps></ps> | CoE | 0x1610:04 | 0x20200A10 (5389706 | download pdo 0x161 | |
| <ps></ps> | CoE | 0x1610:00 | 0x04 (4) | download pdo 0x161 | |
| <ps></ps> | CoE | 0x1A20:00 | 0x00 (0) | clear pdo 0x1A20 ent | |
| <ps></ps> | CoE | 0x1A20:01 | 0x20400D10 (541068 | download pdo 0x1A2 | |
| 00 | 0.5 | 0 1400 00 | 0.00400510 (5410500 | | |

After pressing above "New.." button, click to unfold configurable CRs of DVP04DA-S in the following window.



| Edit CANopen | Startup Entry | | | × |
|--|---|------------|--------|--------------|
| Transition □ I -> P \bigvee P -> S □ S -> 0 | Index (hex): □ S -> P Sub-Index (dec): | 2020 | | OK Cancel |
| <u> </u> | 0 -> S Validate | Complete / | Access | |
| Data (hexbin): | 00 00 | | | Hex Edit |
| Validate Mask: | | | | |
| Comment: | CR1: output mode setting | | | Edit Entry |
| | | | | |
| Index | Name | Flags | Value | ^ |
| 😟 - 10F1:0 | Error Settings | | >2< | |
| | SM output parameter | RO | > 32 < | |
| 😟 1C33:0 | SM input parameter | RO | > 32 < | |
| EI 2020:0 | DVP04DA-S CR | | | |
| | CR0: module type | RO P | | |
| - 2020:02 | | RW P | | |
| 2020:03 | CR2: reserved | RW | | |
| 2020:04 | CR3: reserved | BW | | |
| 2020:05 | CR4: reserved | RW | | |
| 2020:06 | CR5: reserved | RW | | |
| 2020:07 | CR6: value of CH1 output signal | RW P | | |
| 2020:08 | CR7: value of CH2 output signal | RW P | | |
| 2020:09 | CR8: value of CH3 output signal | BW P | | ¥ |
| < | | | | > |

Double-click "CR1: output mode setting" in the red box above. Then set the value for CR1 in the following new window.

| Set Value D | ialog | × |
|-------------|------------------|----------|
| Dec: | 585 | OK |
| Hex: | 0x0249 | Cancel |
| Float: | | |
| | | |
| Bool: | 0 1 | Hex Edit |
| Binary: | 49 02 | 2 |
| Bit Size: | ○1 ○8 ●16 ○32 ○6 | 4 () ? |

Click "OK" to close current window. After the setting is over, the CR1 parameter of DVP04DA-S which has been added can be seen in the "Startup" tab page.



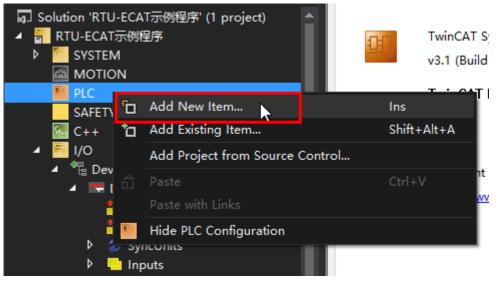
| Transiti | Protocol | Index | Data | Comment | |
|-------------|----------|-----------|---------------------|----------------------|--|
| C <ps></ps> | CoE | 0x1A20:00 | 0x00 (0) | clear pdo 0x1A20 ent | |
| C <ps></ps> | CoE | 0x1A20:01 | 0x20400D10 (541068 | download pdo 0x1A2 | |
| C <ps></ps> | CoE | 0x1A20:02 | 0x20400E10 (5410688 | download pdo 0x1A2 | |
| C <ps></ps> | CoE | 0x1A20:03 | 0x20400F10 (5410690 | download pdo 0x1A2 | |
| C <ps></ps> | CoE | 0x1A20:04 | 0x20401010 (5410693 | download pdo 0x1A2 | |
| C <ps></ps> | CoE | 0x1A20:00 | 0x04 (4) | download pdo 0x1A2 | |
| C <ps></ps> | CoE | 0x1C12:01 | 0x1B01 (6913) | download pdo 0x1C1 | |
| C <ps></ps> | CoE | 0x1C12:02 | 0x1600 (5632) | download pdo 0x1C1 | |
| C <ps></ps> | CoE | 0x1C12:03 | 0x1610 (5648) | download pdo 0x1C1 | |
| C <ps></ps> | CoE | 0x1C12:00 | 0x03 (3) | download pdo 0x1C1 | |
| C <ps></ps> | CoE | 0x1C13:01 | 0x1B00 (6912) | download pdo 0x1C1 | |
| C <ps></ps> | CoE | 0x1C13:02 | 0x1A00 (6656) | download pdo 0x1C1 | |
| C <ps></ps> | CoE | 0x1C13:03 | 0x1A20 (6688) | download pdo 0x1C1 | |
| C <ps></ps> | CoE | 0x1C13:00 | 0x03 (3) | download pdo 0x1C1 | |
| C PS | CoE | 0x8000:01 | 0x71 (113) | module code | |
| C PS | CoE | 0x8020:01 | 0x03 (3) | module code | |
| C PS | CoE | 0x8040:01 | 0x00 (0) | module code | |
| C PS | CoE | 0x2020:02 | 585 | CR1: output mode set | |

Click "TwinCAT" menu > "Activate Configuration" option to make current configuration effective. Refer to **DVP-PLC Application Manual: Special Modules** for details on CR1 in DVP04DA-S.

7

7.2.2 Controlling RTU-ECAT's Right-side Modules via PLC

- After the configuration of the entire network is finished by following the steps above, create the PLC program to control the modules on the right of RTU-ECAT.
- 1. Select "PLC" on the left list of the TwinCAT software, right click on "PLC" and select "Add New Item" to add a PLC project.

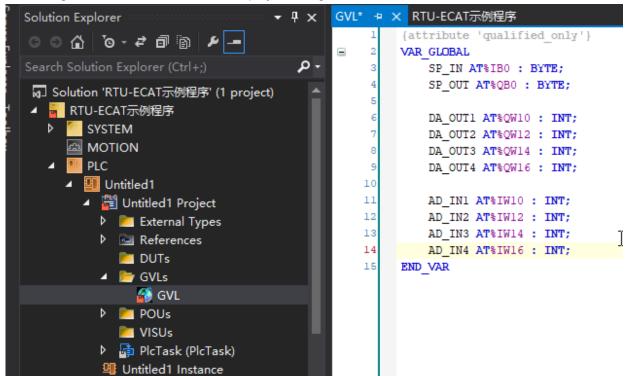


2. Select "Standard PLC Project" from the new PLC project list, enter a name for the project and then click on the "Add" button.

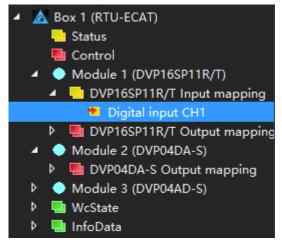
| Add New Item - RTU | J-ECAT示例程序 | | | | | | ? | Х |
|--------------------|---------------|----------------------|---------------------------|-------------------------|---------------|--|------------|----|
| ▲ Installed | | Sort by: | Default - | ₩ 🗉 | | Search Installed Template | s (Ctrl+E) | .م |
| Plc Templates | | Standard PLC Project | | | Plc Templates | | | |
| | | | Empty PLC Project | | Plc Templates | Creates a new TwinCAT F containing a task and a p | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | <u>Click here to go o</u> | nline and find template | | | | |
| Name: | Untitled1 | | | | | | | |
| Location: | F:\测试\RTU-ECA | T\测试稽 | 官令、TwinCAT程序、RTU-ECAT示 | 例程序\RTU-ECAT示例和 | \$\$\ ▼ | Browse | | |
| | | | | | | Add | Cano | el |



3. Create a global variable table in the PLC project and global variables as follows.



- 4. Click on "Build Solution" of "BUILD" menu to compile current project after global variables are created.
- 5. After the compiling is over, unfold the mapping list of RTU-ECAT's right-side module with a click on it as below.



6. With a click on "Digital input CH1" above, the following window shows up, where you click on the "Linked to" button.



RTU-ECAT Operation Manual

| v · · · · | -1 | | | |
|-----------|-------|-------------------------------|--------------------|----------|
| Variable | Flags | Online | | |
| | | | | |
| Name: | | Digital input CH1 | | |
| | | | | |
| Type: | | USINT | | |
| | | | | |
| Group: | | DVP16SP11R/T Input mappi | Size: | 1.0 |
| | | | | - |
| Address | | 39 (0x27) | User ID: | 0 |
| | | | | |
| Linked t | to | | | |
| | | | | |
| Comme | nt: | | | A. |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | • |
| | | | | |
| ADS Info | o: | Port: 11, IGrp: 0x3040030, IO | ffs: 0x80000027, I | Len: 1 |

With a click on "Linked to", the following interface pops out, where you select desirable varaibles and then click on the "OK" button.

| Attach Variable Digital input CH1 (Input) | × |
|---|--|
| Search: X PLC Unitited1 Instance SVL.SP_IN > IB 128000.0, BYTE [1.0] | Show Variables Unused Used and unused Exclude disabled Exclude other Devices Exclude same Image Show Tooltips Show Tooltips Show Variable Groups Show Variable Groups Show Variable Types Matching Type Matching Size All Types All Types Array Mode Offsets Continuous Show Dialog Variable Name / Comment / Hand over / Take over |



Following the instructions of step 5 and step 6, make the connection between other global variables and the channels of DVP16SP11T, DVP04DA and DVP04AD.

The relations between global variables and RTU-ECAT 's right-side modules:

| Input: | | | | |
|---------|----------|----------|----------|---|
| SP_IN | ÷ | | + | Read the state of input points of DVP16SP11T |
| AD_IN1 | ÷ | | ÷ | Read current value of channel1 of DVP04AD |
| AD_IN2 | ÷ | RTU-ECAT | ÷ | Read current value of channel2 of DVP04AD |
| AD_IN3 | ÷ | | ÷ | Read current value of channel3 of DVP04AD |
| AD_IN4 | ÷ | | ÷ | Read current value of channel4 of DVP04AD |
| Output: | | | | |
| SP_OUT | ↑ | | → | Control the output of output points of DVP16SP11T |
| DA_OUT1 | → | | → | Control the output of channel1 of DVP04DA |
| DA_OUT2 | → | RTU-ECAT | → | Control the output of channel2 of DVP04DA |
| DA_OUT3 | → | | → | Control the output of channel3 of DVP04DA |
| DA_OUT4 | → | | → | Control the output of channel4 of DVP04DA |

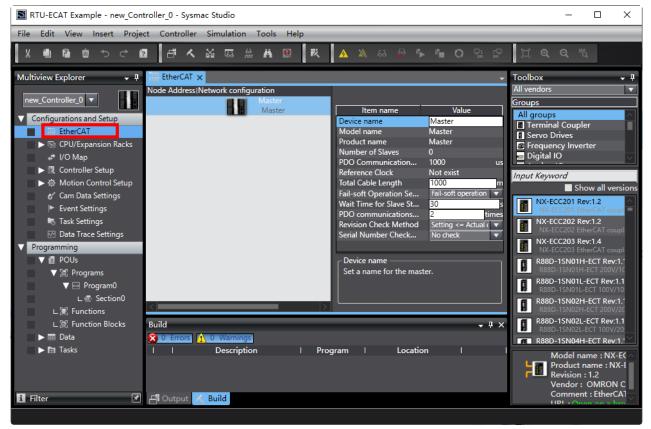
7. After the variables and channels are connected, the values of channels of RTU-ECAT's right-side modules can be read through the variables in the program. Setting the value of SP_OUT to 255, Y0~Y7 outputs of DVP16SP11T all change into ON. Setting the values of DA_OUT1~DA_OUT4 to 2000, channel 1~ channel 4 of DVP04DA-S can be controlled to output 5V voltage.

7.3 Using OMRON NJ301 with RTU-ECAT

1. Start the OMRON Sysmac Studio software and create a new project as below.

| RTU-ECAT Example - new_Co | ontroller_0 - Sysmac Studio | - 🗆 X |
|---------------------------|--|-------|
| File Edit View Insert Pro | oject Controller Simulation Tools Help | |
| | 2 | a, ™ |
| Multiview Explorer | Toolbox Search> | |
| 🖬 Filter D | Build The second | |

2. Double-click "EtherCAT" under "Configurations and Setup" in the red box below to open the EtherCAT configuration interface.

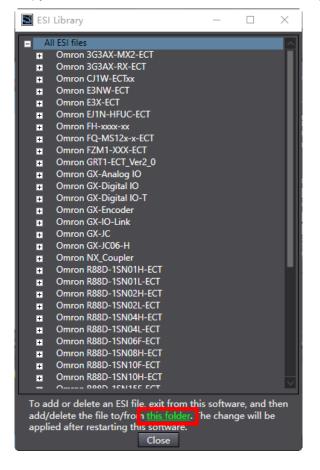


3. Right-click on "Master" and then select "Display ESI Library" from the context menu.



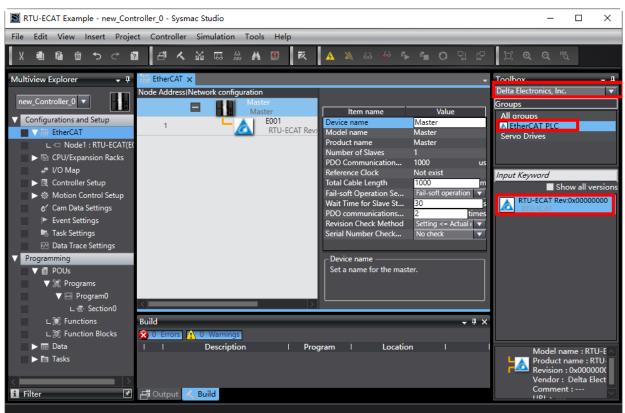
| RTU-ECAT Example - new_Controller_0 - Sysmac Studio | - 0 | × |
|--|---|--------------|
| File Edit View Insert Project Controller Simulatio | n Tools Help | |
| 「「「「」」」 「「」」 「」」 「」」 「」」 「」」 「」」 「」」 「 | ## 😃 🗮 🛕 🔌 & 🍦 🐂 🔿 및 🖓 🍳 Q 🔍 | |
| Multiview Explorer 🗸 🕂 🚟 EtherCAT 🗙 | - Toolbox | • I |
| new_Controller_0 Image: Section 2000 Configurations and Setup EtherCAT Controller Setup Controller Setup Motion Control Setup Cam Data Settings Event Settings Task Settings Data Trace Settings Programming Image: Programs Image: Program 0 L Image: Function Blocks L Image: Tasks Image: Tasks | figuration All vendors Groups Groups Cut All groups Copy Paste Delete Undo Undo Frequency Inverter Digital IO Digital IO Undo Imput Keyword Expand All Imput Keyword Calculate Transmission Delay Time of the Master INX-ECC201 Rev:1.2 Import Slave Settings NX-ECC203 EtherCAT cou Write Slave Node Address NX-ECC203 EtherCAT cou Compare and Merge with Actual Network Configuration R88D-1SN011-ECT Rev:1 Mixed Statistics Information R88D-1SN011-ECT Rev:1 Display Diagnosis/Statistics Information R88D-1SN021-ECT Rev:1 Display Production Information R88D-1SN021-ECT Rev:1 | sions |
| 🚹 Filter 📝 🗗 Output 📈 Build | Output to ENS File Comment : EtherC Export All Couplers' I/O Allocations | A1 ~ |

Click "this folder" in the red box in the ESI Library window to open the folder where ESI file is to be stored. Copy the ESI file of RTU-ECAT to this folder to complete the installation of RTU-ECAT device file.

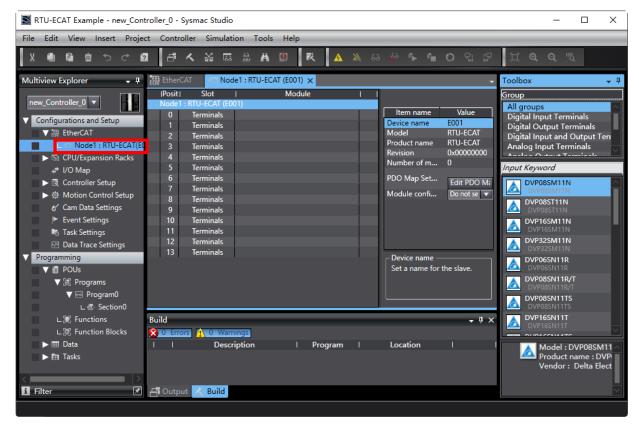




4. Select "Delta Electronics, Inc." from the Toolbox pulldown list and then choose "EtherCAT PLC" as well as double-click on RTU-ECAT to add RTU-ECAT to the EtherCAT network.

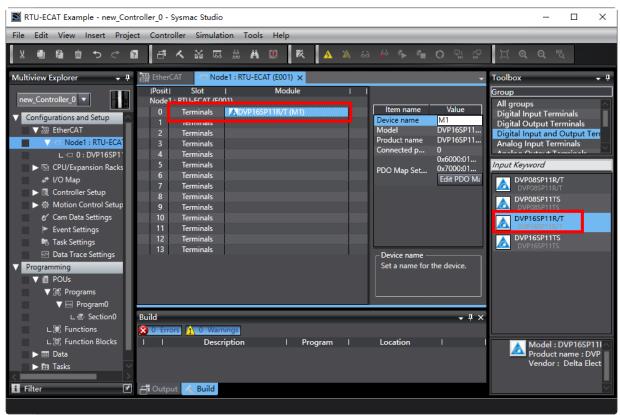


5. Double-click on "Node1: RTU-ECAT(E001)" to open the configuration interface after RTU-ECAT is added to the EtherCAT network.



7-30

6. Add DVP16SP11T to the node configuration as below by selecting the top slot and then finding out and double-clicking on DVP16SP11R/T from the Toolbox area on the right side of the software.



7. Add DVP04DA-S and DVP04AD-S to the second and third slots respectively in the method of step 6.

7

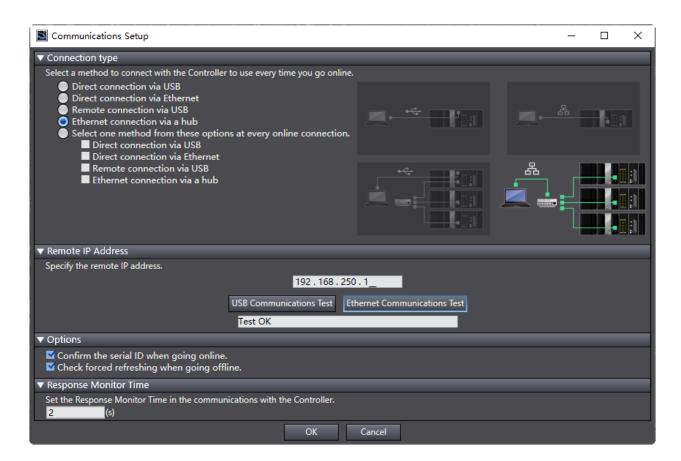
| RTU-ECAT Example - new_Cont | troller_0 - Sysmac Studio | – 🗆 X |
|--|---|--|
| File Edit View Insert Project | ct Controller Simulation Tools Help | |
| | ▋ Ê ヘ ぬ ╔ ӝ # 0 ҟ ▲ Ҳ & ҂ ݨ 0 な ? | [] @ Q [™] 2 |
| Multiview Explorer 🚽 🕂 | EtherCAT ONde1:RTU-ECAT (E001) × | Toolbox 🝷 🖡 |
| new_Controller_0 ▼ ▼ Configurations and Setup ▼ B EtherCAT ▼ Node1 : RTU-ECA L = 0 : DVP16SP1 ⁺ L = 0 : DVP04DA-1 L = 2 : DVP04AD-1 ► COULExpansion Racks * I/O Map ► Controller Setup € Motion Control Setup €' Cam Data Settings ► Task Settings ► Data Trace Settings ▼ Data Trace Settings ▼ Programming ▼ POUs | IPositi Slot I Module I Nodel : RTU-ECAT (E001) Item name Value Image: Terminals : ADVP04DA-S (M2) Item name Model DVP04AD-S 1 Terminals : ADVP04AD-S (M2) Model DVP04AD-S 2 Terminals : ADVP04AD-S (M3) Model DVP04AD-S 3 Ierminals : ADVP04AD-S (M3) Model DVP04AD-S 5 Terminals : ADVP04AD-S (M3) : ADVP04AD-S Ox2000:0E 6 Terminals : ADVP04AD-S : ADVP04AD-S Ox2000:0E : Ox2000:0E 6 Terminals : ADVP04AD-S : ADVP04AD-S : Ox2000:0E : Ox2000:0E 6 Terminals : ADVP04AD-S : Device name : Ox2000:0E : Ox2000:0E 7 Terminals : ID : IDO Map Set : Device name : Edit PDO M: 10 Terminals : ID : IDO Map Set : Edit PDO M: : Edit PDO M: 11 Terminals : ID : ID : ID : ID : ID : ID : ID | Group Digital Input and Output Tern Analog Input Terminals Analog Input and Output Ter Position Control Terminals Totel Strategy Input Keyword DVP04AD-S DVP04AD-S2 DVP04AD-S2 DVP06AD-S DVP06AD-S DVP06AD-S |
| ▼ 🗐 Programs ▼ 🔤 Program0 | Build - T X | |
| L 중· Section0 上宮 Functions 上宮 Function Blocks > < | I I Description I Program I Location I I | Model : DVP04AD-S Product name : DVPi Vendor : Delta Elect |

8. Double-click on "I/O Map" in the red box below and then type variables for mapping of module channels in the "Variable" column of the "IO Map" interface.

| RTU-ECAT Example - new_Controller_0 - Sysmac Studio | | - 🗆 X |
|---|---|-------------------------|
| File Edit View Insert Project Controller Simulation Tools Help | | |
| メ 巻 隆 竜 つ ご 超 「書 人 盗 辱 魚 甚 ③ 茂 🔺 🛽 | 🔉 🕹 🆗 🍾 🛍 🔿 🖫 | ₽ 0, 0, % |
| Multiview Explorer 🗸 📮 🛗 EtherCAT 🖃 Node1 : RTU-ECAT (E001) 🚅 I/O Mag | рх | → Toolbox → |
| Multiview Explorer ↓ ↓ Port Description new_Controller_0 Port Description ✓ Configurations and Setup T Network Configuration ✓ EtherCAT //P16SP11R/T Port Description ✓ Node1 : RTU-ECAT //P16SP11R/T PifSP11R/T PifSP11R/T └ 0 : DVP16SP1 //P04DA-S Po4DA-S Output mapping_CR6: PifSP11R/T └ 1 : DVP04DA- 'P04DA-S Output mapping_CR7: Po4DA-S Output mapping_CR12: PifSP11R/T Image: Controller Setup 'P04DA-S Output mapping_CR12: 'P04DA-S Input mapping_CR12: 'P04DA-S Input mapping_CR12: ✓ Controller Setup 'P04DA-S Input mapping_CR12: 'P04AD-S Input mapping_CR12: 'P04AD-S Input mapping_CR12: ✓ Task Settings 'P04AD-S Input mapping_CR15: 'P04AD-S Input mapping_CR15: 'P04AD-S Input mapping_CR15: ✓ Porgramming 'Mid 'P04AD-S Input mapping_CR15: 'P04AD-S Input mapping_CR15: ✓ Porgramming 'Mid 'Mid 'Mid 'Mid | R/W Data Type Variable R USINT SP_IN W USINT SP_OUT W INT DA_OUT1 W INT DA_OUT2 W INT DA_OUT3 W INT DA_OUT4 R INT AD_IN1 R INT AD_IN2 R INT AD_IN3 R INT AD_IN4 | <pre> Ioolbox</pre> |
| V M Program0 20 Errors 1 0 Warnings | · · | |
| L 🗟 Section0 Description Program | I Location I | |
| L 訳 Functions L 認 Function Blocks マ | | |
| | | |
| 🚹 Filter 🕜 🗗 Output 🔀 Build | | |
| | | |

9. Click menu "Controller" > "Communications Setup..." to set up the connection type between the NJ CPU and computer as follows.





10. After the communication setup is complete, click "OK" button in the window above and then select "Online" from the "Controller" menu in the window below.

| e Edit View Insert Project X 🗐 🖻 前 🕤 C 🔞 | Controller Simulation Communications Setup. Change Device | | A × | 63 | <i>₽</i> ₽ | େ ତ ୍ରା | r | | ર ™્ |
|---|---|--------------|-----------|-----|------------|------------------|----------|-------------------|-------------|
| ultiview Explorer 🛛 🗸 🖡 👔 | Online N | Ctrl+W | 🧈 I/O Map | × | | | - 1 | Foolbox | |
| | Offline | Ctrl+Shift+W | tion | R/W | Data Type | Variable | | <search></search> | ▼ 2 |
| new_Controller_0 🔻 | Synchronize | Ctrl+M | | | | | | | |
| Configurations and Setup | Transfer | , | | | | | | | |
| ▼ | Mode | | | R | USINT | SP_IN | | | |
| ▼ -□ Node1 : RTU-ECA' — | | • | | w | USINT | SP_OUT | | | |
| ∟-□ 0:DVP16SP1 | Monitor | | | | | - | t II | | |
| L -□ 1 : DVP04DA-: | Stop Monitoring | | | w | INT | DA_OUT1 | TH | | |
| ∟-□ 2 : DVP04AD-: | Set/Reset | , | | w | INT | DA_OUT2 | | | |
| 📄 🕨 🔄 CPU/Expansion Racks | Forced Refreshing | , | | w | INT | DA_OUT3 | | | |
| 📕 🛷 I/O Map | MC Test Run | • | | w | INT | DA_OUT4 | ы. | | |
| Controller Setup | MC Monitor Table | , | | R | INT | AD IN1 | | | |
| ▶ ∯ Motion Control Setup | | | | R | INT | AD_IN1 AD_IN2 | ┼┨ | | |
| Cam Data Settings | SD Memory Card | | | R | INT | AD_IN3 | | | |
| Event Settings | Controller Clock | | | R | INT | AD_IN4 | | | |
| Task Settings — | Release Access Right | | | | | | | | |
| 🖂 Data Trace Settings — | Update CPU Unit Name. | | | | | | | | |
| Programming ▼ | Security | , | | _ | _ | | > | | |
| V III POUS VIII Programs B | Clear All Memory | | | | | . 4 | | | |
| V i Programs B V i Program0 5 | Reset Controller | | | | | - 4 | <u> </u> | | |
| L 🗟 Section0 | Description | | Program | 1 | Location | | - | | |
| | Description | | | | Location | | _ | | |
| L 🗟 Function Blocks 🗸 | | | | | | | | | |
| E B Function blocks | | | | | | | | | |



11. When going online is successful, click menu "Controller" > "Transfer..." > "To Controller..." to download the EtherCAT configuration and program to the controller. After the download is done, the channels of the right-side modules of RTU-ECAT can be read and written to via the variables set in the I/O Map interface.

Setting the value of SP_OUT to 255, Y0~Y7 outputs of DVP16SP11T all change into ON. Setting the values of DA_OUT1~DA_OUT4 to 2000, channel 1~ channel 4 of DVP04DA-S can be controlled to output 5V voltage.





Chapter 8 Error Diagnosis and Trouble-shooting

Table of Contents

| 8.1 LED Indicator Diagnosis | 8-2 |
|---------------------------------|-----|
| 8.2 Status Indication Diagnosis | 8-3 |



RTU-ECAT provides two diagnostic methods, LED indicator diagnosis and status indication diagnosis.

8.1 LED Indicator Diagnosis

POWER LED

| LED status | Indication | How to correct |
|----------------|--------------------|-------------------------------------|
| Off | Power is abnormal. | Make sure that RTU-ECAT is powered. |
| Green light on | Power is normal. | |

ALARM LED

| LED status | Indication | How to correct |
|-----------------------|---|--|
| Off | RTU-ECAT works normally or lacks the work power. | |
| Red light blinking | Possible causes: 1. The configuration data of RTU-ECAT are invalid; 2. The extension modules on the right of RTU-ECAT are in error or are offline. | Check if the modules on the right of RTU-ECAT are consistent with those configured in the software. Check out the error information of the modules on the right of RTU-ECAT and then deal with the errors by following related module manual instructions. Check if the power supply and wiring of the modules on the right of RTU-ECAT are fine. Make sure that the wiring of EtherCAT cables is proper. |
| Red light on | RTU-ECAT is under voltage | Check if the power supply for RTU-ECAT is normal. |

RUN LED

| LED status | Indication | How to correct |
|----------------|-----------------------|--|
| Off | RTU-ECAT in STOP mode | Ensure that the power supply for RTU-ECAT and the connection are fine. Check if the RUN/STOP switch of RTU-ECAT has been switched to RUN. Check if the control word of RTU-ECAT is effective and controlling RTU-ECAT in STOP state. |
| Green light on | RTU-ECAT in RUN mode | |



| LED | LED status | Indication | How to correct |
|-----------------|------------|---|---|
| Green light | ON | The EtherCAT port has been connected to the EtherCAT network. | |
| | OFF | The EtherCAT port has not yet been connected to the EtherCAT network. | Ensure that the hardware connection to the EtherCAT port is proper. |
| Yellow light | Blinking | Data are being transmitted or received via the EtherCAT port | |
| | ON | No data are being transmitted or received via EtherCAT port. | Add RTU-ECAT to the master. |
| | OFF | There is no hardware connection to the EtherCAT port. | Ensure that the hardware connection to the EtherCAT port is proper. |

EtherCAT LED

8.2 Status Indication Diagnosis

The status indication parameters of RTU-ECAT are used to display the operating states of special modules and DI/DO modules. See section 6.3.2 for details on related status indication parameters.



2

MEMO





Appendix A List of Accessories

Table of Contents

| A.1 | Accessories | for | EtherCAT | Communication | A- 2 | 2 |
|------|-------------|-----|----------|---------------|-----------------|---|
| A. 1 | Accessories | 101 | LUICICAI | communication | ~ ' | - |



A.1 Accessories for EtherCAT Communication

• Cables

| Figure | Model | Length | Diameter(AWG) |
|--------|---------------|--------|---------------|
| | UC-EMC003-02A | 0.3M | 4#22 PVC |
| | UC-EMC005-02A | 0.5M | 4#22 PVC |
| | UC-EMC010-02A | 1.0M | 4#22 PVC |
| 12 | UC-EMC020-02A | 2.0M | 4#22 PVC |
| 03 | UC-EMC050-02A | 5.0M | 4#22 PVC |
| ~ | UC-EMC100-02A | 10.0M | 4#22 PVC |
| | UC-EMC200-02A | 20.0M | 4#22 PVC |

