

ECAN-240

(Modbus TCP to 2-port CAN Bus Gateway User manual)

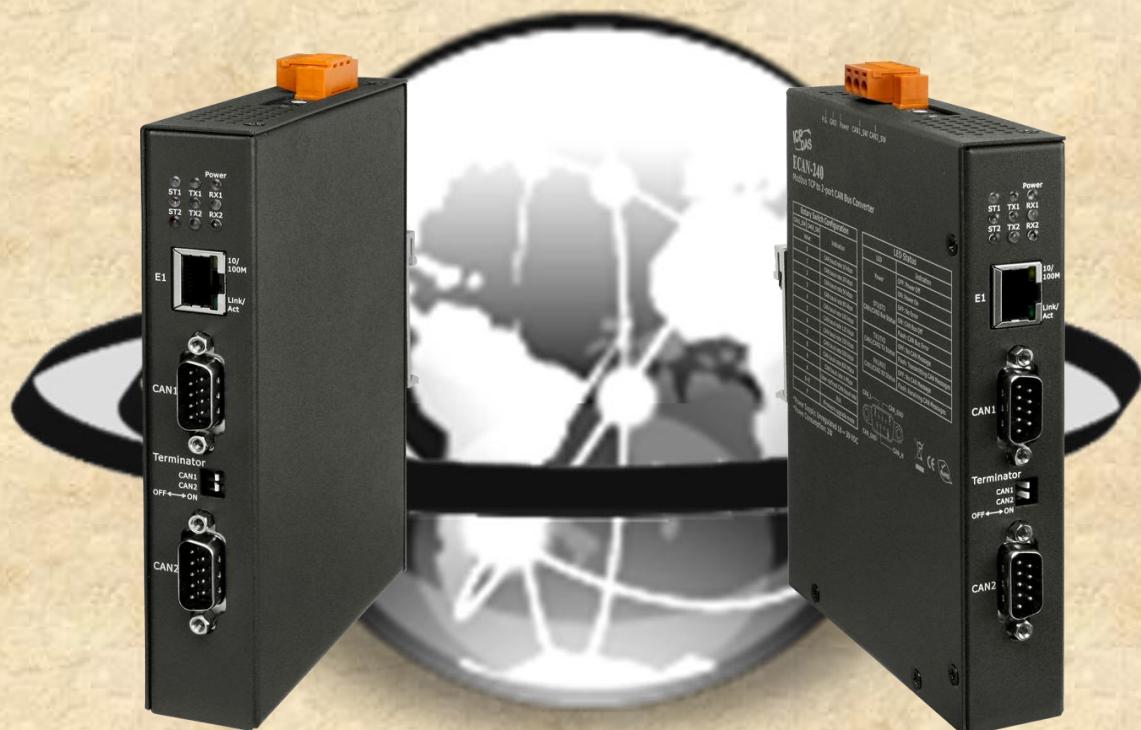


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Important Information

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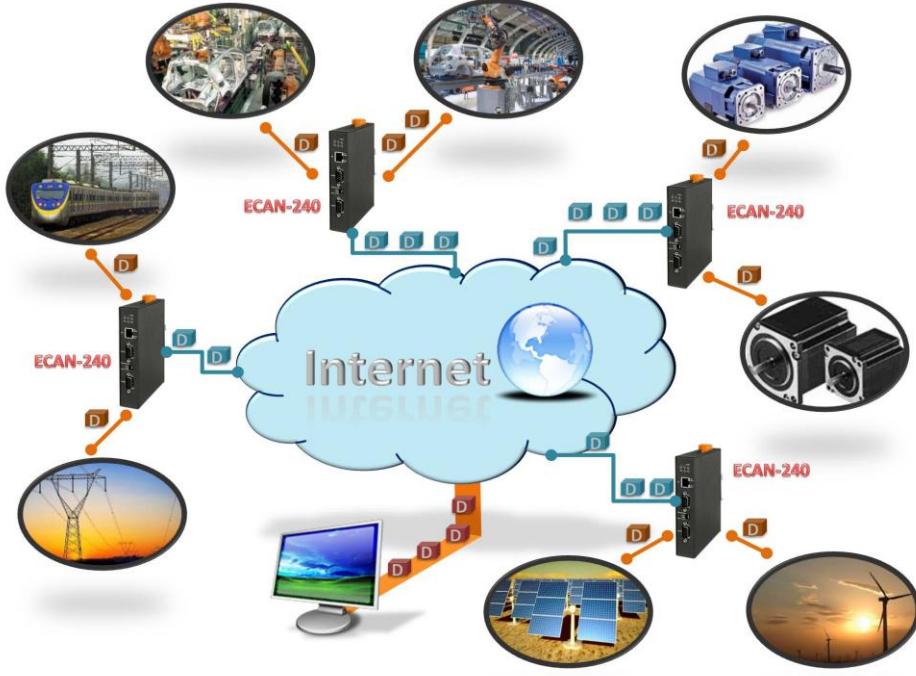
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1. Introduction



The IoT (Internet of Things) has been a much discussed topic in recent years. Using the IoT concept, it is easy to integrate the environment of heterogeneous network and let all of the things into be digitized making life more convenient. In order to provide additional access to IoT applications related to industry based on the CAN bus, ICPDAS has developed a new Ethernet product, the ECAN-240.

The ECAN-240 module is a Modbus TCP to 2-port CAN Bus Gateway. As its functionality, that provides communications via the Ethernet based on the Modbus TCP industrial protocol, meaning that the module can be easily integrated with an industrial network. The ECAN-240 module includes two CAN bus interfaces, meaning that more various CAN applications can be supported, such as a CAN bridge or a CAN message router. The CAN message router function means that the ECAN-240 module can be used to connect to four different CAN networks, ensuring they can communicate with each other. More details related to applications that can be implemented using the ECAN-240 module will be illustrated in sections 4 - 8.

The ECAN-240 module has a fine abilities including anti-jamming and a wide operating temperature meaning that it can be used in harsh environments. The ECAN-240 module provides two rotary switches that are used to select Baud Rate for the CAN bus, which supports 10 kbps to 1 Mbps. The ECAN-240 module contains seven LED indicators, one is used to indicate the status of the power and the others are used to indicate the status of the CAN bus. The ECAN-240 module uses the RJ-45 standard communication interface to perform Ethernet transmission. The status of the Ethernet connection can be determined from the built-in indicators on the RJ-45 port. The

ECAN-240 module also supports an auto-negotiation function that enables different transmission speeds via the Ethernet. The ECAN-240 module is constructed with a metal-housing that provides a fully ventilated design, meaning that there are no problems with heat radiation.

1.1. Features

■ Hardware

- ◆ Supports input voltage 10~30V_{DC}.
- ◆ Fully compatible with the ISO 11898-2 standard.
- ◆ Includes built-in DIP-switch the can be used to enable/disable the terminator resistor.
- ◆ Includes an RJ-45 Ethernet interface with auto-negotiation function.
- ◆ Includes two CAN bus interfaces with 9 pin D-sub connector.
- ◆ Includes two rotary switches for selection of CAN bus Baud Rate.
- ◆ Contains seven LED indicators, one as a power indicator and the others for monitoring CAN bus activity.
- ◆ Contains LED indicator on RJ-45 for Ethernet status.
- ◆ RoHS Design.

■ Software

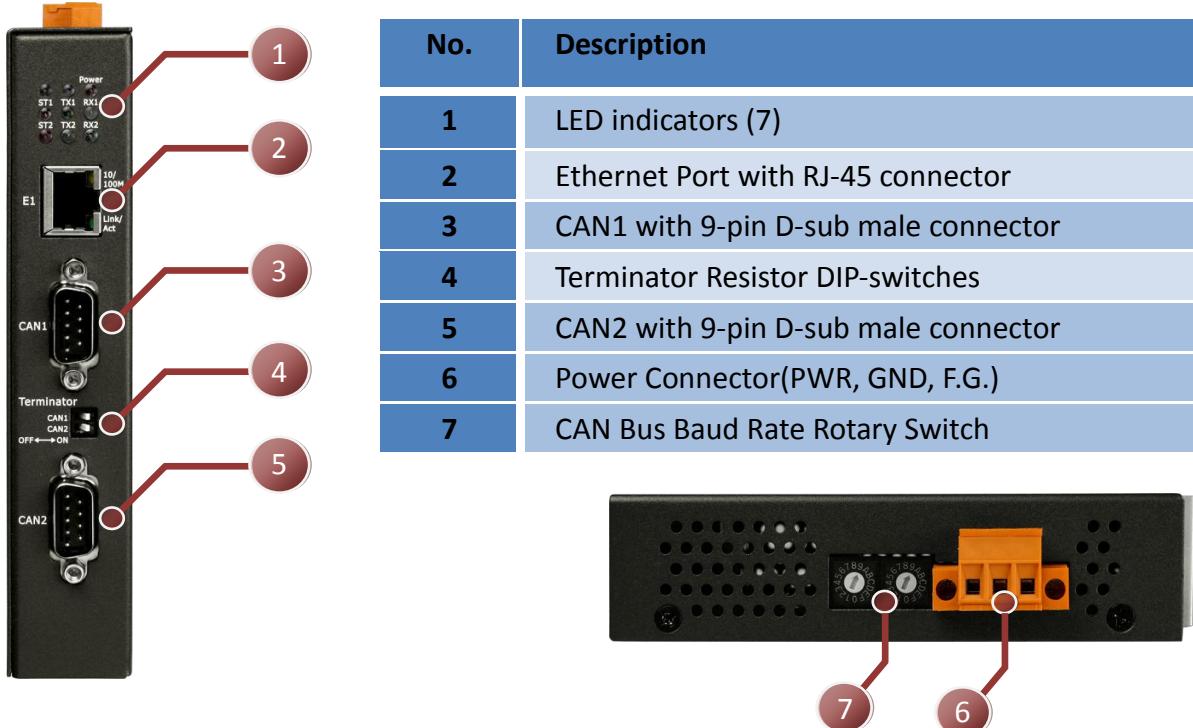
- ◆ Provides support for the CAN bus ID filter function.
- ◆ Provides support for the CAN bus bridge mode via configuration.
- ◆ Provides support for the CAN bus listen only mode via configuration.
- ◆ Provides support for a range of CAN bus Baud Rate from 10k bps to 1M bps adjustable via the rotary switch.
- ◆ Provides support for the Modbus TCP Client/Server function via configuration.
- ◆ Provides support for TCP/UDP pair connection function via configuration.
- ◆ Provides support for bootloader mode to enable firmware updates.
- ◆ Provides support for web configuration functions.

1.2. Specification

| Module | ECAN-240 |
|------------------------------|---|
| CAN Bus Interface | |
| Channels | 2 |
| Connector | 9-pin D-sub male |
| Baud Rate | 10k bps to 1M bps |
| Terminator Resistor | Built-in 120 ohm terminator resistor, enabled/disabled via DIP-Switch |
| Isolation | 3 kV VDC for DC to DC, 2500 Vrms for photo couple |
| CAN Bus Specification | ISO 11898-2 CAN 2.0A and CAN 2.0B |
| Ethernet | |
| Controller | 10/100Base-TX Ethernet Controller (Auto-negotiating, Auto_MDIx) |
| Connector | RJ-45 with Ethernet indicator |
| Protocol | Modbus TCP Client/Server, TCP, UDP, HTTP |
| Socket connections | 8 for TCP, 1 for UDP |
| LED Indicator | |
| LED (Round) | Power (1), CAN Bus Status (2), CAN Bus Tx (2), CAN Bus Rx (2) |
| Ethernet LED | Ethernet Status (RJ-45) (2) |
| Power | |
| Power Supply | Unregulated +10 ~ +30 VDC |
| Protection | Reverse polarity protection, Over-voltage brown-out protection |
| Power Consumption | (0.08) @24VDC, 2W |
| Mechanical | |
| Installation | DIN-Rail |
| Dimension (W x L x H) | 106.8mm x 146.8mm x 25.9mm |
| Environment | |
| Operating Temperature | -25 to +75°C |
| Storage Temperature | -40 to +80°C |
| Relative Humidity | 10 to 90% RH, Non-condensing |

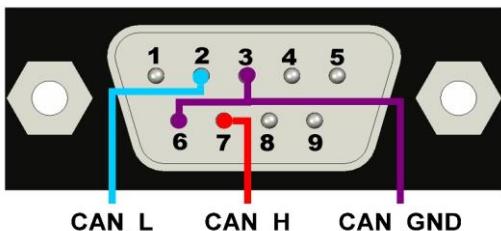
2. Getting Started

■ Appearance

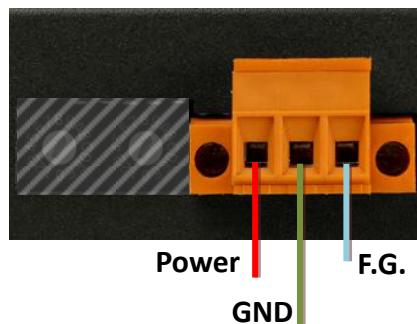


■ Wire connections and pin assignments

9-pin D-Sub male connector



| Pin | Description |
|-----|-------------|
| 1 | N/A |
| 2 | CAN Low |
| 3 | CAN Ground |
| 4 | N/A |
| 5 | N/A |
| 6 | CAN Ground |
| 7 | CAN High |
| 8 | N/A |
| 9 | N/A |



| Pin | Description |
|-------|-------------------------------|
| Power | Power, +10~+30V _{DC} |
| GND | Power Ground |
| F.G. | Frame Ground |

2.1. LED Indicator

The ECAN-240 module provides seven LED indicators, including indicators for power status and CAN Bus status. The Following is an overview of the purpose and function of each LED indicator together with a description.

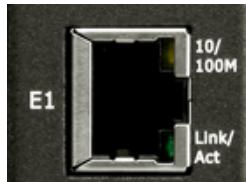


| LED Name | LED Status | LED Description |
|--------------------|------------|--|
| Power (Red) | ON | The power of the module is ON |
| ST1 (Red) | ON | CAN1 Bus is OFF (*Note) |
| | Flashing | An error has occurred on CAN 1(*Note) |
| ST2 (Red) | ON | CAN2 Bus is OFF (*Note) |
| | Flashing | An error has occurred on CAN 2(*Note) |
| TX1 (Green) | Flashing | A CAN message was successfully transmitted on CAN1 |
| TX2 (Green) | Flashing | A CAN message was successfully transmitted on CAN2 |
| RX1 (Green) | Flashing | A CAN message was successfully received on CAN1 |
| RX2 (Green) | Flashing | A CAN message was successfully received on CAN2 |

***Note:** The CAN Bus will be set to OFF if there are too many faults or if communication is interrupted. In this situation, the ECAN-240 module will automatically restore the Bus and the LED will be turned off.

***Note:** When CAN bus has some errors or CAN software buffer is overflow, the STx indicator will be flashing.

The Ethernet status indicator on ECAN-240 is part of the built-in RJ-45 connector, such as shown in the figure below.



| LED Name | LED Status | LED Description |
|-----------------|------------|-----------------------------------|
| 10/100M | ON | 100 Mbps |
| | OFF | 10 Mbps or Ethernet disconnected. |
| Link/Act | Flashing | Communicating |

2.2. Rotary Switch

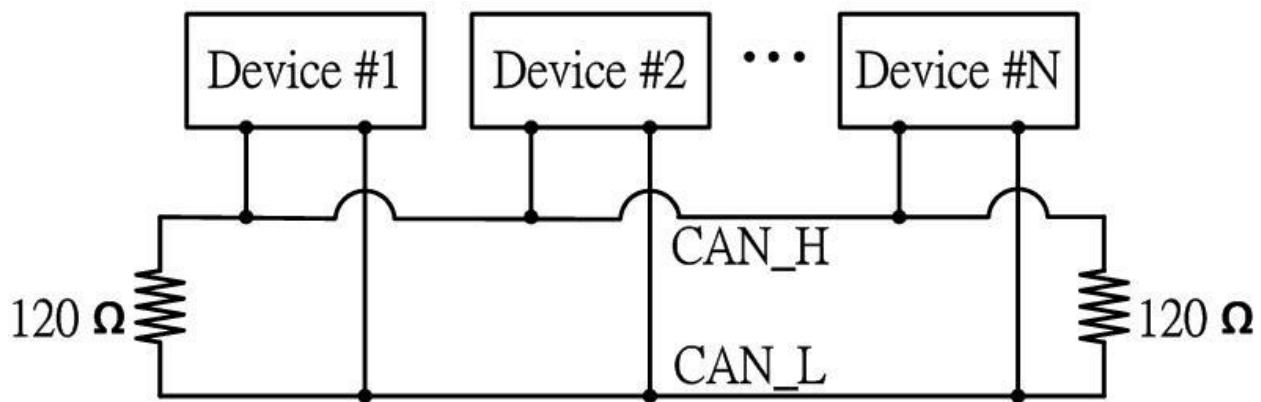
The ECAN-240 module provides two rotary switches that are used to change CAN Bus Baud Rate for using the built-in configuration functions. The following is an overview of the purpose and function of each rotary switch position together with a description.



| CAN1_SW | CAN2_SW | Description |
|---------|---------|--|
| Value | | |
| 0 | 0 | CAN Bus Baud Rate = 10 kbps. |
| 1 | 1 | CAN Bus Baud Rate = 20 kbps. |
| 2 | 2 | CAN Bus Baud Rate = 50 kbps. |
| 3 | 3 | CAN Bus Baud Rate = 80 kbps. |
| 4 | 4 | CAN Bus Baud Rate = 100 kbps. |
| 5 | 5 | CAN Bus Baud Rate = 125 kbps. |
| 6 | 6 | CAN Bus Baud Rate = 250 kbps. |
| 7 | 7 | CAN Bus Baud Rate = 500 kbps. |
| 8 | 8 | CAN Bus Baud Rate = 800 kbps. |
| 9 | 9 | CAN Bus Baud Rate = 1 Mbps. |
| A | A | User-defined CAN Bus baud rate. |
| B - E | | Reserved. |
| F | B | Load factory default IP, Mask, Gateway values and not save into EEPROM. |
| | C | Module self-testing function. Tests the two CAN Buses and the UDP broadcasting function. |
| | D | Load all factory default values and saves them to the EEPROM. |
| | E | Reserved. |
| | | F Bootloader mode. |

2.3. Terminator Resistor

In order to minimize the effects of reflection on the CAN Bus, the bus must be terminated using a terminator resistor at each end. According to the specifications given in ISO 11898-2, each terminator resistor should be 120Ω (or between 108Ω and 132Ω). The bus topology and the positions of these terminator resistors are shown below.



The ECAN-240 module includes two CAN ports and terminator resistors are provided for each CAN port. The terminator resistor can be enabled or disabled via the terminator DIP-switches as illustrated in following figure.

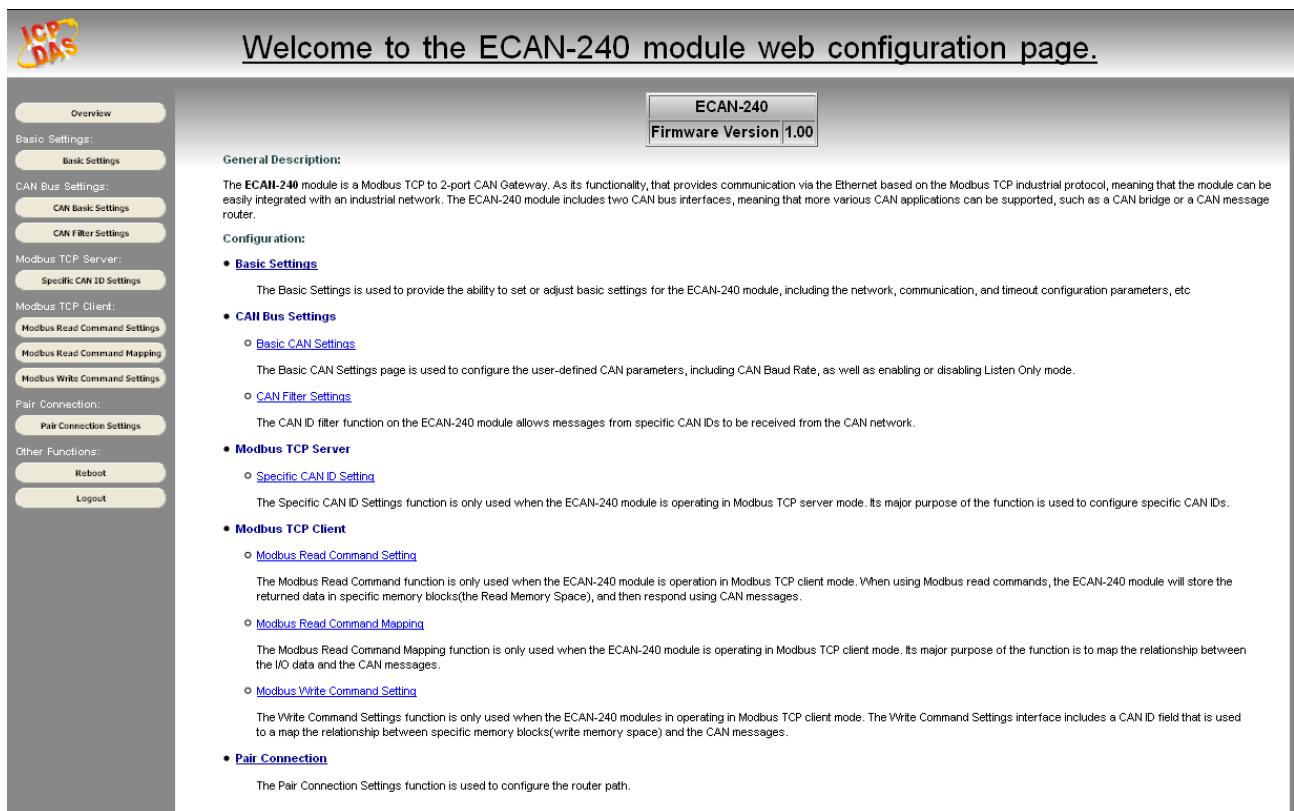


As indicated in the figure, when the DIP-switch is in the OFF position, the terminator resistor function is disabled. Similarly, when the DIP-switch is in the ON position, the terminator resistor function is enabled.

3. Web Configuration

The configuration for the module parameters or communication commands (in Modbus Client mode only) on the ECAN-240 module can be performed via a standard web browser using the embedded web configuration function. The web configuration functions are divided into several categories and includes basic configuration, CAN Bus configuration, Modbus configuration and pair connection configuration. The following is an overview of the process used to configure the ECAN-240 module via the web.

The figure below is an illustration of the main screen for web configuration. On the left are the function buttons, including Overview, Basic Settings, CAN Basic Settings, CAN Filter Settings, Specific CAN ID Settings (Modbus TCP Server), Read Command Settings (Modbus TCP Client), Read Command Mapping (Modbus TCP Client), Write Command Settings (Modbus TCP Client), Pair Connection, Reboot, and Logout.



Note:

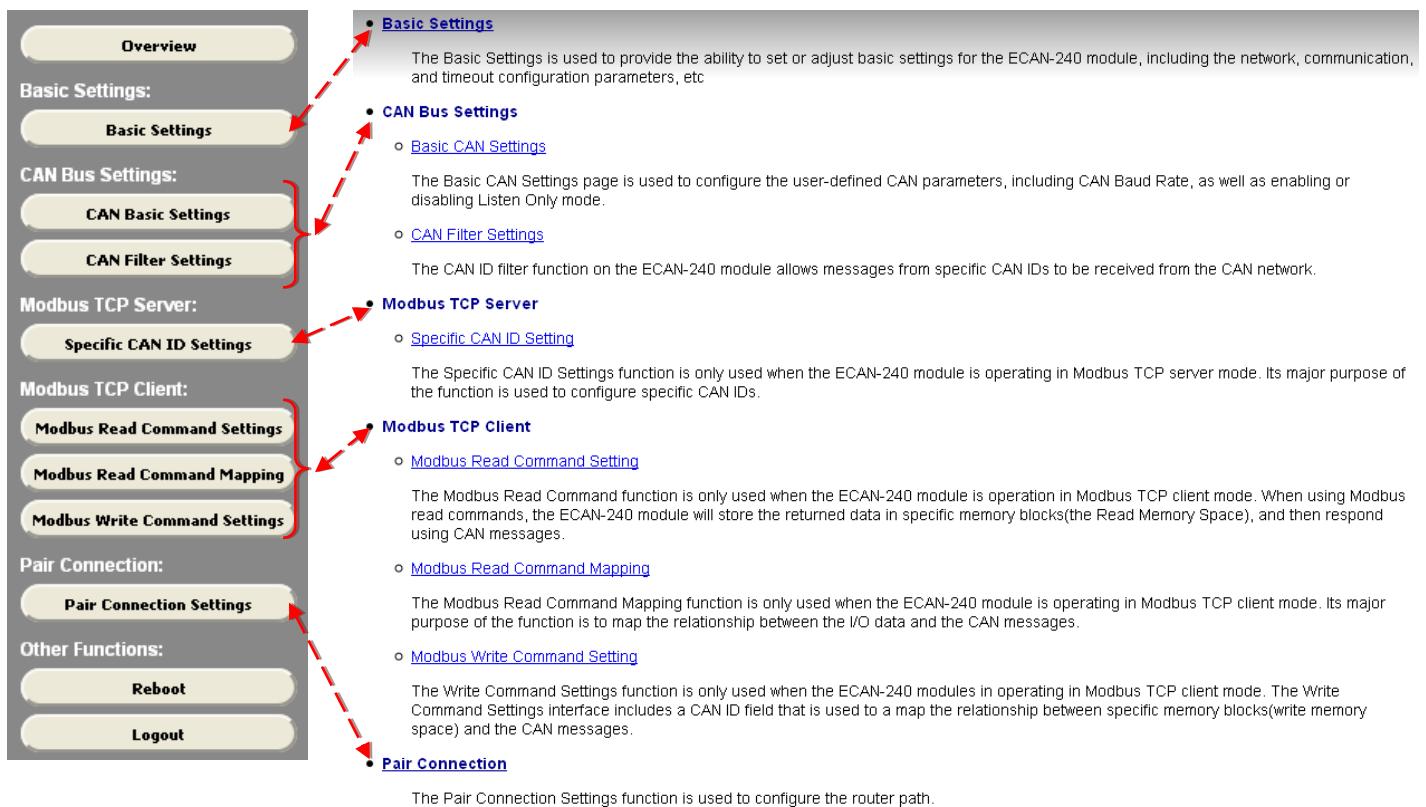
- The browsers are supported, including IE 8, Chrome, Opera, Firefox(recommended).
- The influence of Temporary Internet File on IE 8 will lead to work abnormally during using web configuration function. Thus, please change the setting to "every visit to the page"
- The IE 11 and Microsoft Edge are not supported.

3.1. Overview

The Overview page shows details of the firmware version currently in use on the ECAN-240 module, as illustrated in the figure below. The Overview page also provides a description of each configuration function. The configuration web page can be accessed using either the function button or the link on Overwrite page.



As illustrated below, each button is mapped to a link, meaning that there are two ways to access the configuration page.



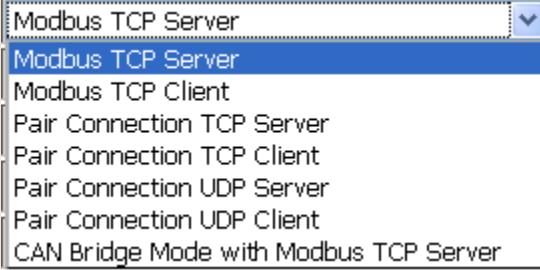
3.2. Basic Settings

The Basic Configuration section provides the ability to set or adjust basic settings for the ECAN-240 module, including the network, communication, and timeout configuration parameters, etc, as illustrated in the figure below.

| Basic Settings | | | | | | |
|------------------------------|--|-----|-----|-----|-------|----------|
| Module Alias | ECAN-240 | | | | | |
| MAC Address (Read Only) | 00 | 0D | E0 | 59 | 60 | 61 (Hex) |
| IP Address | 10 | 1 | 100 | 124 | (Dec) | |
| Mask Address | 255 | 255 | 0 | 0 | (Dec) | |
| Gateway Address | 10 | 1 | 0 | 254 | (Dec) | |
| Authentication | <input type="checkbox"/> | | | | | |
| Login ID | ICP | | | | | |
| Password | ICP | | | | | |
| Enabled DHCP | <input type="checkbox"/> | | | | | |
| Client Connection Timeout | 70000 | | | | | |
| Server Reconnect Timeout | 1000 | | | | | |
| Communication Mode | Modbus TCP Server <input type="button" value="▼"/> | | | | | |
| Remote Connection IP Address | 10 | 1 | 100 | 100 | (Dec) | |
| Modbus TCP Server | | | | | | |
| Modbus Node ID | 01 (Hex) | | | | | |
| Modbus TCP Client | | | | | | |
| Response Timeout | 600 | | | | | |
| Send CAN Interval | 12 | | | | | |
| Error Response CAN ID | 100007FF (HEX) | | | | | |
| Enabled Error Response | <input checked="" type="checkbox"/> | | | | | |
| Passively Send CAN Message | <input checked="" type="checkbox"/> | | | | | |

The following is an overview of the parameters that can be found on the Basic Configuration page together with a description of each.

| Parameter | Description |
|------------------------------------|---|
| Module Alias | Used to specify recognizable name for the module. |
| MAC Address | Used to specify the Ethernet MAC address for the module. Note: the address is set by the manufacturer by default and cannot be modified. |
| IP Address | Used to specify the IP address for the module using the IPv4 protocol, and supports class A to E setting. Note: The IPv6 protocol is not supported on the ECAN-240 module. The default IP address is 192.168.255.1 . |
| Mask Address | Used to specify the standard subnet mask for the module. Note: The default Mask address is 255.255.0.0 . |
| Gateway Address | Used to specify the Gateway address for the module. Note: The default Gateway address is 192.168.255.2 . |
| Authentication | Used to specify whether the authentication function is enabled or disabled. If the function is enabled, users attempting to access the web configuration portal will be redirected to the authentication page. Check the checkbox to enable the function. Note: If authentication fails, the web configuration function cannot be used. |
| Login ID | Used to specify the authentication login ID. |
| Password | Used to specify the authentication password. |
| Enable DHCP | Used to enable or disable the DHCP function. Check the checkbox to enable the function. Note : when using this function, the IP, Mask, Gateway settings will be inactive. |
| Client Connection Timeout | Used to specify the Client Connection Timeout value. When the ECAN-240 module is set to act as a Server, the value will be used to calculate the timeout value if the Client either malfunctions or if its operation is terminated abnormally. If timeout, the ECAN-240 will be terminated the connection |
| Server Reconnection Timeout | Used to specify the Server Reconnection Timeout value. When the ECAN-240 module is set to act as a Client, this value will be used to calculate the timeout value and reconnect the server automatically if the Server either malfunctions or if its operation is terminated abnormally . |
| Communication Mode | Used to specify the communication mode to be used. Seven communication modes are provided on the ECAN-240 module. |

| | |
|-------------------------------------|--|
| | <p>Details related to the application of each communication mode can be found in Sections 4 to 8.</p>  |
| Remote Connection IP Address | Used to specify the IP address of a remote device which the ECAN-240 module need to connect. This parameter is used when the ECAN-240 module is acting as a Client. |
| Modbus Node ID | Used to specify the Modbus Node ID when the ECAN-240 module is acting as a Modbus TCP Server. |
| Response Timeout | Used to specify a timeout value for Modbus TCP commands. This parameter is used when the ECAN-240 module is operating in Modbus TCP Client mode. |
| Send CAN Interval | Used to specify the CAN message transmission interval. This parameter is used when the ECAN-240 module is operating in Modbus TCP Client mode. |
| Error Response CAN ID | Used to specify the CAN ID to be included in a CAN message that is transmitted when the ECAN-240 module receives an error from the Modbus TCP. This function is used when the ECAN-240 module is operating in Modbus TCP Client mode. |
| Enable Error Response | Used to enable or disable the Error Response function. This function is used in combination with the Error Response CAN ID function and is only used when the ECAN-240 module is operating in Modbus TCP Client mode. Check the checkbox to enable the function. |
| Passively Send CAN Message | Used to enable or disable the Passively Send CAN Message function. By default, CAN messages are sent actively based on the Send CAN Interval value. This function is only used when the ECAN-240 module is operating in Modbus TCP Client mode. Check the checkbox to enable the function. |
| Save Basic Configuration | Used to save the basic configuration to the EEPROM.  |

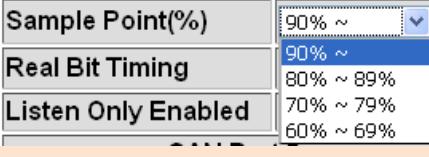
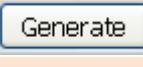
3.3. CAN Bus Settings

3.3.1. Basic CAN Settings

The Basic CAN Settings page is used to configure the user-defined CAN Bus parameters, including CAN Baud Rate, as well as enabling or disabling Listen Only mode.

| CAN Port 1 | | |
|---------------------|--------------------------|----------------------------------|
| Bit Timing | 1000000 | bits/sec |
| Sample Point(%) | 90% ~ | <input type="button" value="▼"/> |
| Real Bit Timing | 1000000 | bits/sec |
| Listen Only Enabled | <input type="checkbox"/> | |
| CAN Port 2 | | |
| Bit Timing | 1000000 | bits/sec |
| Sample Point(%) | 90% ~ | <input type="button" value="▼"/> |
| Real Bit Timing | 1000000 | bits/sec |
| Listen Only Enabled | <input type="checkbox"/> | |

The following is an overview of the parameters that can be found on the Basic CAN Settings page, together with a description of each.

| Parameter | Description |
|--------------------------------|---|
| Bit Timing Value | Used to specify the bit timing value. It is an optimum value. The ECAN-240 module will use this value to calculate a approximate (actual) bit timing. |
| Sample Point (%) | Used in the calculation of the CAN Baud Rate. The sample point is located at the specified percentage of the CAN waveform, and defines the error tolerance for the CAN message. Four selection ranges are provided:  |
| Actual Bit Timing Value | Used to specify the real bit timing value after calculating the bit timing parameters. The ECAN-240 module will use this value to communicate with other CAN devices. |
| Enable Listen Only Mode | Used to enable or disable Listen Only mode. Check the checkbox to enable the function. |
| Generate | Used to generate a actual bit timing value.  |
| Save CAN Configuration | Used to save the CAN configuration to the EEPROM.  |

3.3.2. CAN Filter Settings

The CAN ID filter function on the ECAN-240 module allows messages from specific CAN IDs to be received from the CAN network. Five fields can be configured on the CAN Filter Settings page, including the CAN Port, the CAN Specifications, Single/Group selection, and the CAN ID range.

| CAN Bus Setting -- CAN Filter Settings | | | | | |
|--|-------------------|---------------|------------------|----------------|--------|
| Filter Enabled: <input type="checkbox"/> | Add New Rule | Rule Count: 4 | | | |
| CAN Port | CAN Specification | Single/Group | CAN ID Range 1 | CAN ID Range 2 | Delete |
| CAN Port1 | 2.0A | Single | ID From 000 | to 000 | Delete |
| CAN Port2 | 2.0A | Group | ID From 001 | to 003 | Delete |
| CAN Port1 | 2.0B | Group | ID From 00000456 | to 00000789 | Delete |
| CAN Port2 | 2.0A | Single | ID From 000 | to 000 | Delete |

The following is an overview of the parameters that can be found on the CAN Filter Settings page, together with a description of each.

| Parameter | Description |
|----------------------------------|--|
| Add New Rule | Used to add a new rule to the CAN Filter table |
| CAN Port | Used to specify a CAN port where the CAN ID is to be filtered. |
| CAN Specification | Used to specify whether the ID filter is based on either the CAN 2.0A or the CAN 2.0B specification. |
| Single/Group | Used to specify whether the filter is based on either a Single or a Group ID. |
| CAN ID Range 1 CAN ID Range 2 | <p>Used to specify the range of CAN ID values to be filtered. Two fields are used to set the CAN ID value range.</p> <ul style="list-style-type: none">When the Single/Group parameter is set as Single Mode, the values specified in the two range fields will be the same, meaning that a single CAN ID will be filtered. For example, if the CAN ID Range is set as 0x000 to 0x000, it means that only messages from CAN ID 0x000 will be received from the CAN network, and all other messages will be blocked by the module.When the Single/Group parameter is set as Group Mode, the values specified in the two range fields will be the first and last values of a sequential range of CAN IDs. For example, if the CAN ID Range is set as 0x001 to 0x003, it means that only messages from CAN IDs in the range of 0x001 to 0x003 will be received from the CAN network, and all other messages will be blocked by the module. |

| | |
|-------------------------------|---|
| | module. |
| Delete | Used to delete a rule from the CAN Filter table. |
| Save CAN Configuration | Used to save the CAN filter configuration to the EEPROM. Save CAN Configuration |

3.4. Modbus TCP Server

3.4.1. Specific CAN ID Settings

The Specific CAN ID Settings function is only used when the ECAN-240 module is operating in Modbus TCP Server mode. In general, the ECAN-240 module will store the I/O data in a ring buffer when a CAN message is received, and then the Modbus address is used to retrieve the I/O data. If a specific CAN ID table is configured, the ECAN-240 module will identify the CAN ID from the specific CAN ID table and then store the IO data in the relevant buffer after finding the same CAN ID from specific CAN ID table. The CAN message in this specific buffer will be overwritten when received the same CAN ID message.

Note: About the Modbus address table, please refer to the next section.

Modbus TCP Server -- Specific CAN ID Settings

| | | | |
|-------------------|--------------------------|---------------|---------------|
| Add New ID | Rule Count: 2 | | |
| CAN Port | CAN Specification | CAN ID | Delete |
| CAN Port1 | 2.0A | 001 | Delete |
| CAN Port1 | 2.0B | 00000002 | Delete |

The following is an overview of the parameters that can be found on the Specific CAN ID Settings page, together with a description of each.

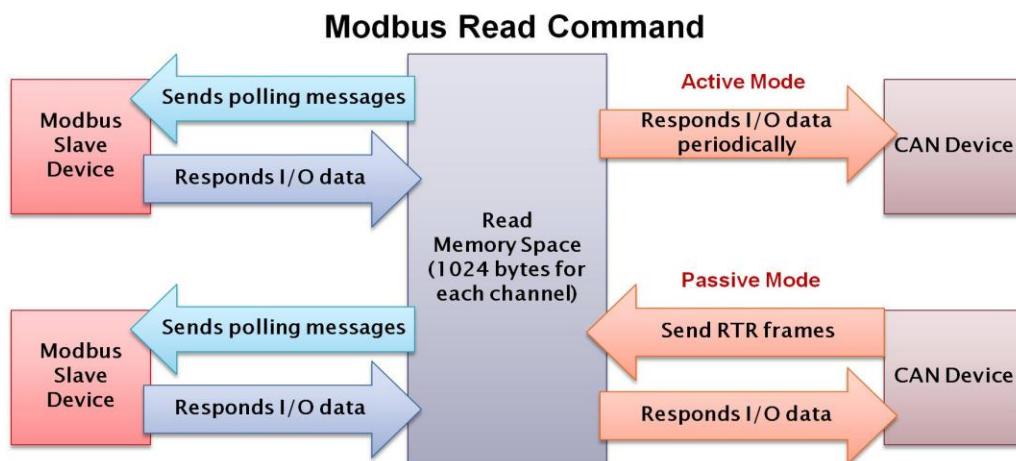
| Parameter | Description |
|-------------------------------|--|
| Add New ID | Used to add a new CAN ID to the CAN ID table. |
| CAN Port | Used to specify the CAN port that owns this specific CAN ID. |
| CAN Specification | Used to specify whether the ID settings are based on the CAN 2.0A or the CAN 2.0B specification. |
| CAN ID | Used to specify the CAN ID value. |
| Delete | Used to delete a specific CAN ID from the CAN ID table. |
| Save CAN Configuration | Used to save a specific CAN ID configuration to the EEPROM. Save CAN Configuration |

3.5. Modbus TCP Client

Three kinds of settings for the Modbus TCP Client function are available, including the Read Command Settings, Read Command Mapping, and Write Command Settings, which will be discussed in more detail in section 3.4.1 to 3.4.3 below.

3.5.1. Modbus Read Command Settings

The Modbus Read Command function is only used when the ECAN-240 module is operation in Modbus TCP Client mode. These commands support Modbus Function codes 0x01 to 0x04. When using Modbus Read Command, the ECAN-240 module will store the returned data in specific memory blocks(the Read Memory Space), and then respond using CAN messages, as illustrated in the following figure.



Modbus TCP Client -- Modbus Read Command Settings

| Add New Rule | Rule Count: 1 | | | | | | | | |
|--------------|---------------|---------------|----------------------|---------------------|-----------------------|----------------------|--------|--|--|
| CAN Port | Slave Node ID | Function Code | Start Address (High) | Start Address (Low) | Bit/Word Count (High) | Bit/Word Count (Low) | Delete | | |
| 1 (Hex) | 01 (Hex) | 01 (Hex) | 00 (Hex) | 00 (Hex) | 00 (Hex) | 00 (Hex) | Delete | | |

The following is an overview of the parameters that can be found on the Modbus Read Command Settings page, together with a description of each.

| Parameter | Description |
|---------------|--|
| Add New Rule | Used to add a new Modbus Read Command rule to the Modbus Read Command list. |
| CAN Port | Used to specify the CAN port that will be used to send the response with the return value. |
| Slave Node ID | Used to specify the node ID for the Modbus TCP device. |

| | |
|---|---|
| Function Code | Used to specify the Modbus Function Code. The ECAN-240 module supports function codes 0x01 to 0x04. |
| Start Address (High) | Used to specify the high byte of the Modbus start address. |
| Start Address (Low) | Used to specify the low byte of the Modbus start address. |
| Bit/Word Count (High) | Used to specify the high byte of the Bit/Word count. Note: The exact settings for the Bit/Word Count depends on the function code. If the function code is 0x01 or 0x02, this parameter will be set to Bit Count. If the function code is 0x03 or 0x04, it will be set to Word Count. |
| Bit/Word Count (Low) | Used to specify the low byte of the Bit/Word count. Note: The exact settings for the Bit/Word Count depends on the function code. If the function code is 0x01 or 0x02, this parameter will be set to Bit Count. If the function code is 0x03 or 0x04, it will be set to Word Count. |
| Delete | Used to delete a specific rule from the Modbus Read Command list. |
| Save Modbus TCP Client Configuration | Used to save a specific Modbus Read Command to the Flash memory. |
| Save Modbus TCP Client Configuration | |

3.5.2. Modbus Read Command Mapping

The Modbus Read Command Mapping function is only used when the ECAN-240 module is operating in Modbus TCP Client mode. Its major purpose of the function is to map the relationship between the I/O data and the CAN messages. When using the Modbus Read Command Mapping function, the ECAN-240 module will load the I/O data to the CAN data field from the read memory space and then send a CAN message.

Modbus TCP Client -- Modbus Read Command Mapping

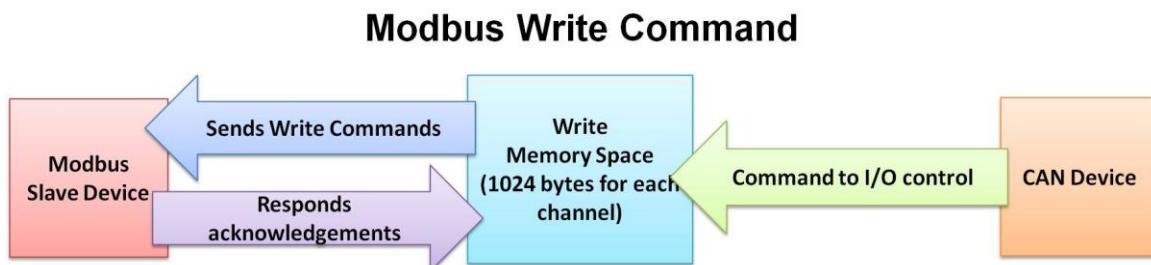
| | | | | | |
|--------------|-------------------|-----------|------------|----------------------|---------------------------------------|
| Add New Rule | Rule Count: 1 | | | | |
| CAN Port | CAN Specification | CAN ID | Byte Count | Memory Start Address | Delete |
| 1 (Hex) | 2.0A (Hex) | 000 (Hex) | 0 (Dec) | 0000 (Hex) | <input type="button" value="Delete"/> |

The following is an overview of the parameters that can be found on the Modbus Read Command Mapping page, together with a description of each.

| Parameter | Description |
|--------------------------------------|---|
| Add New Rule | Used to add a new Read Command Mapping configuration rule to the list. |
| CAN Port | Used to specify the CAN port that will be used to send the response with the return value. |
| CAN Specification | Used to specify whether the ID settings are based on the CAN 2.0A or the CAN 2.0B specification. |
| CAN ID | Used to specify the CAN ID value that will be used to send the response. |
| Byte Count (High) | Used to specify the length of the I/O data. Note: this value cannot be greater than 8 bytes, because the maximum data length for a CAN message is 8 bytes. |
| Memory Start Address | Used to specify the start address of the read memory space, and is used for I/O data and CAN message mapping. |
| Delete | Used to delete a specific rule from the Modbus Read Command Mapping configuration list. |
| Save Modbus TCP Client Configuration | Save Modbus Read Command Mapping into Flash. Used to save a specific Read Command Mapping configuration to the flash memory <input type="button" value="Save Modbus TCP Client Configuration"/> |

3.5.3. Modbus Write Command Settings

The Modbus Write Command Settings function is only used when the ECAN-240 modules are operating in Modbus TCP Client mode. These commands support Modbus Function codes 0x05, 0x06, 0x0F, and 0x10. The Modbus Write Command Settings interface includes a CAN ID field that is used to map the relationship between specific memory blocks(write memory space) and the CAN messages, as illustrated in the following figure.



By using the CAN ID, the ECAN-240 module is able to send a Modbus Write Command containing a variety of data after it receives a CAN message.

| Modbus TCP Client -- Modbus Write Command Settings | | | | | | | | | | |
|--|-------------------|-------------|---------------|---------------|----------------------|---------------------|-----------------------|----------------------|---------------------------------------|--|
| Add New Rule | Rule Count: 1 | | | | | | | | | |
| CAN Port | CAN Specification | CAN ID | Slave Node ID | Function Code | Start Address (High) | Start Address (Low) | Bit/Word Count (High) | Bit/Word Count (Low) | Delete | |
| 1 (Hex) | 2.0A (Hex) | 00 (Hex) | 01 (Hex) | 05 (Hex) | 00 (Hex) | 00 (Hex) | 00 (Hex) | 00 (Hex) | <input type="button" value="Delete"/> | |

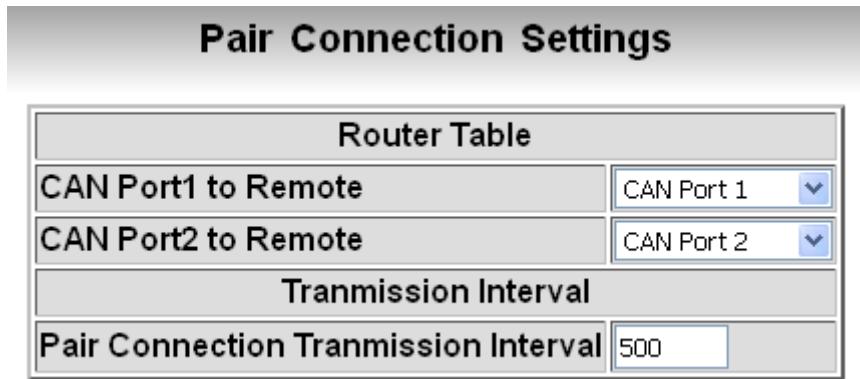
The following is an overview of the parameters that can be found on the Write Command Settings configuration page, together with a description of each.

| Parameter | Description |
|----------------------|---|
| Add New Rule | Used to add a new Modbus Write Command rule into to the Modbus Write Command list. |
| CAN Port | Used to specify the CAN port that will be used to receive the CAN data. |
| CAN Specification | Used to specify whether the ID settings are based on the CAN 2.0A or the CAN 2.0B specification. |
| CAN ID | Used to specify the CAN message ID that will be used to map the relationship. |
| Slave Node ID | Used to specify the node ID for the Modbus TCP device. |
| Function Code | Used to specify the Modbus function code. The ECAN-240 module supports function codes 0x05, 0x06, 0x0F, and 0x10. |
| Start Address (High) | Used to specify the high byte of the Modbus start address. |
| Start Address (Low) | Used to specify the low byte of the Modbus start address. |
| Bit/Word Count | Used to specify the high byte of the Bit/Word count. |

| | |
|---|---|
| (High) | Note: The exact settings for the Bit/Word Count depends on the function code. If the function code is 0x01 or 0x02, this parameter will be set to Bit Count. If the function code is 0x03 or 0x04, it will be set to Word Count. |
| Bit/Word Count (Low) | Used to specify the low byte of the Bit/Word count. Note: The exact settings for the Bit/Word Count depends on the function code. If the function code is 0x01 or 0x02, this parameter will be set to Bit Count. If the function code is 0x03 or 0x04, it will be set to Word Count. |
| Delete | Used to delete a specific rule from the Modbus Write Command list. |
| Save Modbus TCP Client Configuration | Used to save a specific Modbus Write Command to the Flash memory. Save Modbus TCP Client Configuration |

3.6. Pair Connection Settings

The Pair Connection Settings function is used to configure the router path. As the ECAN-240 module contains two CAN ports, a router table is used to connect two ECAN-240 modules located at different ends of a CAN network. A more detailed illustration of the function will be described in Section 6.



The following is an overview of the parameters that can be found on the Pair Connection Settings page, together with a description of each.

| Parameter | Description |
|--|--|
| CAN Port1 to Remote | Used to specify the remote CAN port that will be connected to CAN port1 on the ECAN-240 module. |
| CAN Port2 to Remote | Used to specify the remote CAN port that will be connected to CAN port2 on the ECAN-240 module. |
| | Note: The ECAN-240 module supports two connection methods, one-to-one and one-to-all. For example:  This means that the local CAN port 1 can be connected to either CAN port 1 on the remote device or all CAN ports. |
| Pair Connection Transmission Interval | Used to specify the transmission interval. Note: While the ECAN-240 module received messages from CAN side until 1400 bytes, and then sent via Ethernet. If not enough 1400 bytes, the ECAN-240 will wait for the transmission interval timeout and then send. |
| Save Pair Connection Configuration | Used to save the Pair Connection configuration to the EEPROM.  |

3.7. Other Functions

➤ **Reboot**

Reboot

Click the Reboot button to reboot the module. After clicking the button, close the browser or the browser tab containing the web configuration page.

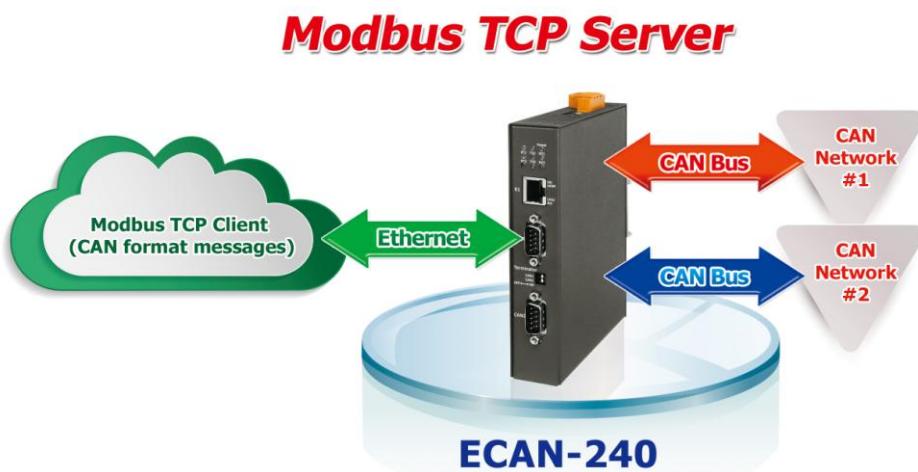
➤ **Logout**

Logout

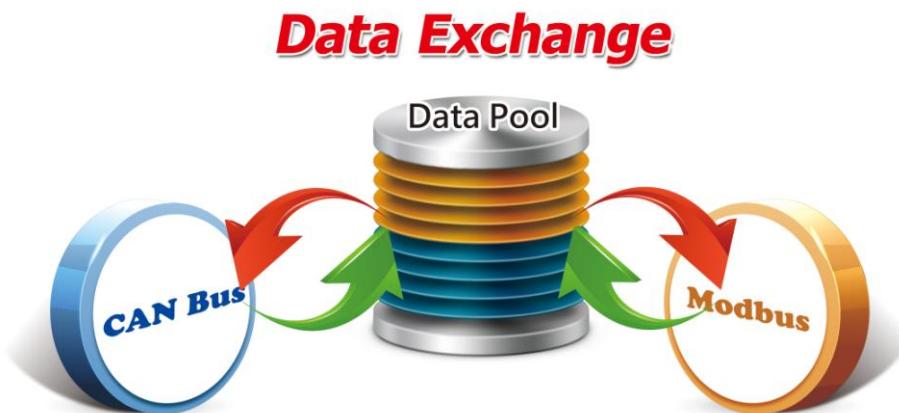
If the Authentication function is enabled, clicking this button will log the user out from the web configuration page.

4. Modbus TCP Server Applications

The Modbus TCP Server function is used to implement communications between a CAN device and a Modbus TCP Client. When the ECAN-240 module is acting as a Modbus TCP Server, the Modbus TCP Client needs to use Modbus commands based on the CAN format in order to access the ECAN-240 module. The ECAN-240 module will then translate these commands into CAN format messages and send them to the CAN networks. Similarly, when a CAN format message is received from the CAN network, the ECAN-240 translates the message into Modbus format, which can then be accessed using a Modbus command.



As illustrated below, the data pool can be considered as a ring buffer that can store up to 200 records. If this maximum is exceeded, the ECAN-240 module will overwrite the oldest record. The ECAN-240 module also provides an additional buffer that can be used to store messages based on specific CAN ID. The maximum is 100 records can be stored. The functionality of this buffer is slightly different in that. The message in this buffer will be overwritten based on the specific CAN ID.



The ECAN-240 module supports Modbus function codes 0x03, 0x04, 0x06, and 0x10, as indicated in the table below.

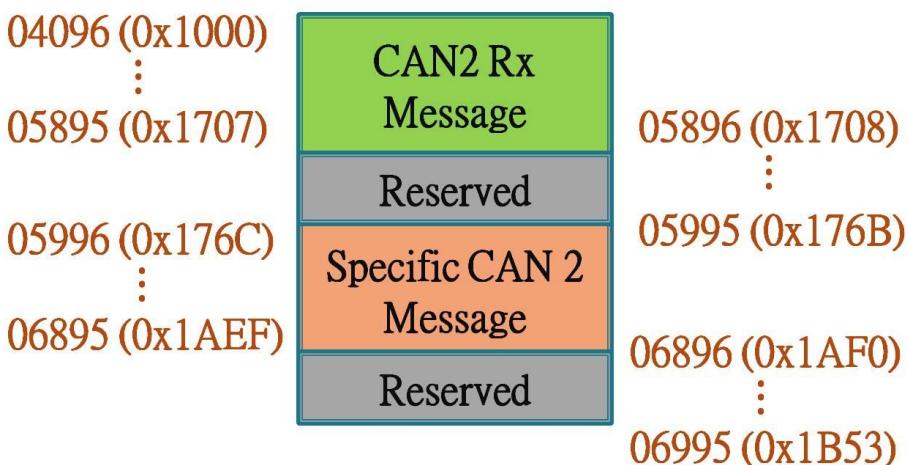
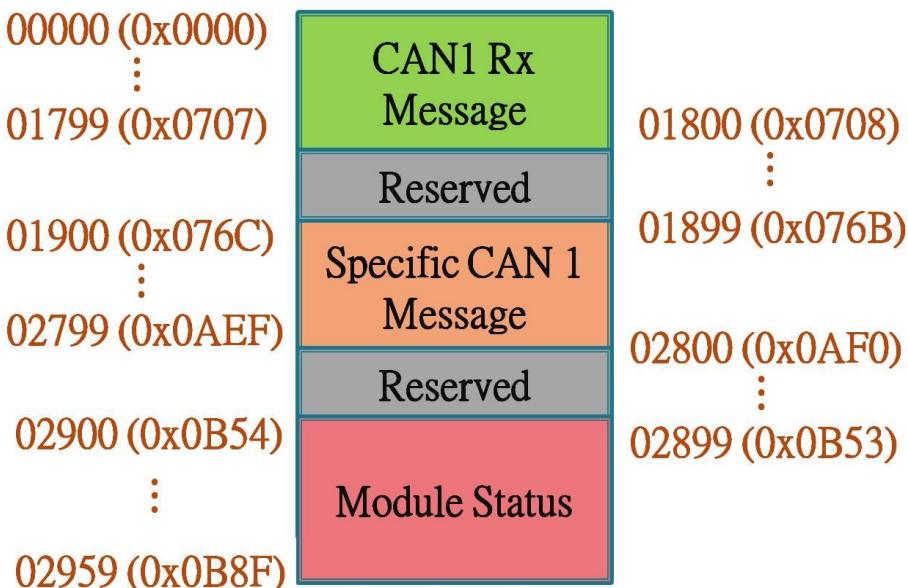
| Function Code | Function Name | Description |
|---------------|--------------------------|--|
| 3 (03 Hex) | Read Output Register | Used to read multiple output registers when sending a CAN message. |
| 4 (04 Hex) | Read Input Register | Used to read multiple input registers when receiving a CAN message |
| 6 (06 Hex) | Write Output Register | Used to write single output registers for sending a CAN message |
| 16 (10 Hex) | Write Multiple Registers | Used to write multiple registers for sending a CAN message |

4.1. Modbus Address Mapping

The memory on the ECAN-240 module is divided into two parts, depending on the purpose, and includes the Input Register and the Output Register to match the needs of Modbus TCP Server applications.

4.1.1. Input Register

The major purpose of the Input Register is used for reading CAN messages. Since the ECAN-240 contains two CAN ports, the Input Register is divided to two sections, one for each CAN port. The ECAN-240 module also provides the ability to read the status of the module using Modbus commands. The following figures provide an overview of the address allocation for the Input Register.



■ CAN1/CAN2 Rx memory addresses

| Protocol Addresses (Base 0) | PLC Addresses (Base 1) | Word Count | Description |
|--------------------------------|---------------------------|---------------|----------------------|
| Decimal rule (CAN1) | | | |
| 00000 ~ 00008 | 30001 ~ 30009 | 9 | CAN1 Rx Message #001 |
| 00009 ~ 00017 | 30010 ~ 30018 | 9 | CAN1 Rx Message #002 |
| ... | ... | ... | ... |
| 01782 ~ 01790 | 31783 ~ 31791 | 9 | CAN1 Rx Message #199 |
| 01791 ~ 01799 | 31792 ~ 31800 | 9 | CAN1 Rx Message #200 |
| Decimal rule (CAN2) | | | |
| 04096 ~ 04104 | 34094 ~ 34104 | 9 | CAN2 Rx Message #001 |
| 04105 ~ 04113 | 34105 ~ 34113 | 9 | CAN2 Rx Message #002 |
| ... | ... | ... | ... |
| 05878 ~ 05886 | 35878 ~ 35886 | 9 | CAN2 Rx Message #199 |
| 05887 ~ 05895 | 35887 ~ 35895 | 9 | CAN2 Rx Message #200 |

■ Addresses for specific CAN1/CAN2 Rx messages

| Protocol Addresses (Base 0) | PLC Addresses (Base 1) | Word Count | Description |
|--------------------------------|---------------------------|---------------|-------------------------------|
| Decimal rule (CAN1) | | | |
| 01900 ~ 01908 | 31901 ~ 31909 | 9 | CAN1 specific Rx Message #001 |
| 01909 ~ 01917 | 31910 ~ 31918 | 9 | CAN1 specific Rx Message #002 |
| ... | ... | ... | ... |
| 02781 ~ 02790 | 32782 ~ 32791 | 9 | CAN1 specific Rx Message #99 |
| 02791 ~ 02799 | 32792 ~ 32800 | 9 | CAN1 specific Rx Message #100 |
| Decimal rule (CAN2) | | | |
| 05996 ~ 06004 | 35997 ~ 36005 | 9 | CAN2 specific Rx Message #001 |
| 06005 ~ 06013 | 36006 ~ 36014 | 9 | CAN2 specific Rx Message #002 |
| ... | ... | ... | ... |
| 06877 ~ 06886 | 36878 ~ 36887 | 9 | CAN2 specific Rx Message #99 |
| 06887 ~ 06895 | 36888 ~ 36896 | 9 | CAN2 specific Rx Message #100 |

■ Module status addresses

| Protocol Addresses (Base 0) | PLC Addresses (Base 1) | Word Count | Description |
|--------------------------------|---------------------------|---------------|---|
| Decimal rule (CAN1) | | | |
| 02900 | 32901 | 1 | CAN1 Rx message count |
| 02901 | 32902 | 1 | CAN1 Baud Rate configuration |
| 02902 ~ 02903 | 32902 ~ 32903 | 2 | User-defined Baud Rate configuration for CAN1 |
| 02904 | 32905 | 1 | CAN1 status register |
| 02905 | 32906 | 1 | CAN1 error count |
| 02906 | 32907 | 1 | CAN1 overflow |
| 02907 | 32908 | 1 | CAN2 Rx message count |
| 02908 | 32909 | 1 | CAN2 Baud Rate configuration |
| 02909 ~ 02910 | 32910 ~ 32911 | 2 | User-defined Baud Rate configuration for CAN2 |
| 02911 | 32912 | 1 | CAN2 status register |
| 02912 | 32913 | 1 | CAN2 error count |
| 02913 | 32914 | 1 | CAN2 overflow |
| 02914 | 32915 | 1 | Ethernet status |
| 02915 | 32916 | 1 | Firmware version |
| 02916 ~ 02919 | 32917 ~ 32920 | 4 | Module Name |
| 02920 ~ 02922 | 32927 ~ 32923 | 3 | Manufacturer |

■ CAN status register

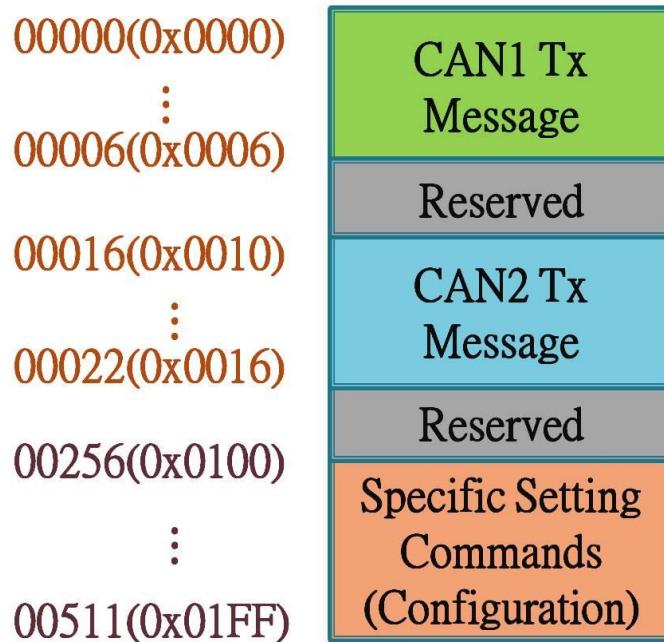
| Bit Number | Description |
|------------|--|
| 7 | Bus Status (0: Bus-On, 1: Bus-Off). |
| 6 | Error Status (0: no error, 1: error). |
| 5 | Transmit Status (0: idle, 1: transmit). |
| 4 | Receive Status (0: idle, 1: receive). |
| 3 | Transmit Complete Status (0: incomplete, 1: complete). |
| 2 | Transmit Buffer Status (0: locked, 1: released). |
| 1 | Data Overrun Status (0: absent, 1: overrun). |
| 0 | Receive Buffer Status (0: empty, 1: full). |

■ Ethernet status

| Bit Number | Description |
|------------|--|
| 15 | 100M Full Duplex (0: non-used, 1: used). |
| 14 | 100M Half Duplex (0: non-used, 1: used). |
| 13 | 10M Full Duplex (0: non-used, 1: used). |
| 12 | 10M Half Duplex (0: non-used, 1: used). |
| 6 - 11 | Reserved |
| 5 | Auto-negotiation Complete (0: incomplete, 1: complete) |
| 3 – 4 | Reserved |
| 2 | Link Status (0: Link-Off, 1: Link-On) |
| 0 - 1 | Reserved |

4.1.2. Output Register

The major purpose of the output register is for writing CAN messages. Since the ECAN-240 module contains two CAN ports, the Output Register is divided to two sections, one for each CAN port. ECAN-240 also provides the ability to control the module using Modbus commands. The following figures provide an overview of the address allocation for the Output Register.



■ CAN1/CAN2 Tx message addresses

| Protocol Addresses (Base 0) | PLC Addresses (Base 1) | Word Count | Description |
|--------------------------------|---------------------------|------------|-----------------|
| Decimal rule (CAN1) | | | |
| 00000 ~ 00006 | 40001 ~ 40007 | 7 | CAN1 Tx Message |
| Decimal rule (CAN2) | | | |
| 00016 ~ 00022 | 40017 ~ 40023 | 7 | CAN2 Tx Message |

■ Addresses for specific settings commands

| Protocol Addresses (Base 0) | PLC Addresses (Base 1) | Word Count | Description |
|--------------------------------|---------------------------|------------|--------------------------------|
| Decimal rule (CAN1) | | | |
| 00256 ~ 0257 | 40257 ~ 40258 | 2 | Modbus Command (Configuration) |

The Modbus Command (Configuration) includes the Reboot Module and Reset CAN bus functions.

- **Reboot Module**

This function is used to reboot the ECAN-240 module using Modbus command. After sending the request command, the module will respond with a message indicating that the request was successful.

Request command:

| Field Name | Size | Valid Value Range | Example |
|-------------------------|---------|-------------------|---------|
| Hexadecimal rule | | | |
| Node ID | 1 byte | 0x01 to 0xF7 | 0x01 |
| Function Code | 1 byte | 0x10 | 0x10 |
| Start Address | 2 bytes | 0x0100 | 0x0100 |
| Word Count | 2 bytes | 0x0002 | 0x0002 |
| Byte Count | 1 byte | 0x04 | 0x04 |
| Data-1 | 2 bytes | 0x0001 | 0x0001 |
| Data-2 | 2 bytes | 0x0001 | 0x0001 |

Response:

| Field Name | Size | Valid Value Range | Example |
|-------------------------|---------|-------------------|---------|
| Hexadecimal rule | | | |
| Node ID | 1 byte | 0x01 to 0xF7 | 0x01 |
| Function Code | 1 byte | 0x10 | 0x10 |
| Start Address | 2 bytes | 0x0100 | 0x0100 |
| Word Count | 2 bytes | 0x0002 | 0x0002 |

- **Reset CAN bus**

This function is used to reset the CAN bus via a Modbus command. After sending the request command, the module will respond with a message indicating that the request was successful.

Request command:

| Field Name | Size | Valid Value Range | Example |
|-------------------------|---------|-------------------|---------|
| Hexadecimal rule | | | |
| Node ID | 1 byte | 0x01~0xF7 | 0x01 |
| Function Code | 1 byte | 0x10 | 0x10 |
| Start Address | 2 bytes | 0x0100 | 0x0100 |
| Word Count | 2 bytes | 0x0002 | 0x0002 |
| Byte Count | 1 byte | 0x04 | 0x04 |
| Data-1 | 2 bytes | 0x0001 | 0x0001 |
| Data-2 | 2 bytes | 0x0002 | 0x0001 |

Response:

| Field Name | Size | Valid Value Range | Example |
|-------------------------|---------|-------------------|---------|
| Hexadecimal rule | | | |
| Node ID | 1 byte | 0x01 to 0xF7 | 0x01 |
| Function Code | 1 byte | 0x10 | 0x10 |
| Start Address | 2 bytes | 0x0100 | 0x0100 |
| Word Count | 2 bytes | 0x0002 | 0x0002 |

Note: This command will clear CAN error status and software buffer overflow status.

4.2. Structure of CAN message in Modbus commands

In order to enable data exchange between the CAN bus and Modbus, the ECAN-240 module provides CAN data format in a standard Modbus command. The CAN data format in Modbus commands is divided to two parts, Read CAN message format and Write CAN message format.

➤ Read Command Format:

| Word Number | Description |
|-------------|--|
| 1 | Bit 15: 0 = valid data, 1 = invalid data Bit 6~14: Reserved Bit 5: CAN Specification, 0 = 2.0A, 1 = 2.0B Bit 4: RTR, 0 = No, 1 = Yes Bit s 0 - 3: Data length, value = 0 - 8 |
| 2 | Most significant two bytes of the CAN identifier. (Big-endian) |
| 3 | Least significant two bytes of the CAN identifier. (Big-endian) |
| 4 | The Data 1 and Data 2 elements from the CAN data field. |
| 5 | The Data 3 and Data 4 elements from the CAN data field. |
| 6 | The Data 5 and Data 6 elements from the CAN data field. |
| 7 | The Data 7 and Data 8 elements from the CAN data field. |
| 8 | Most significant two bytes of the RX timestamp message. (Big-endian) |
| 9 | Least significant two bytes of the RX timestamp message. (Big-endian) |

➤ Write Command Format:

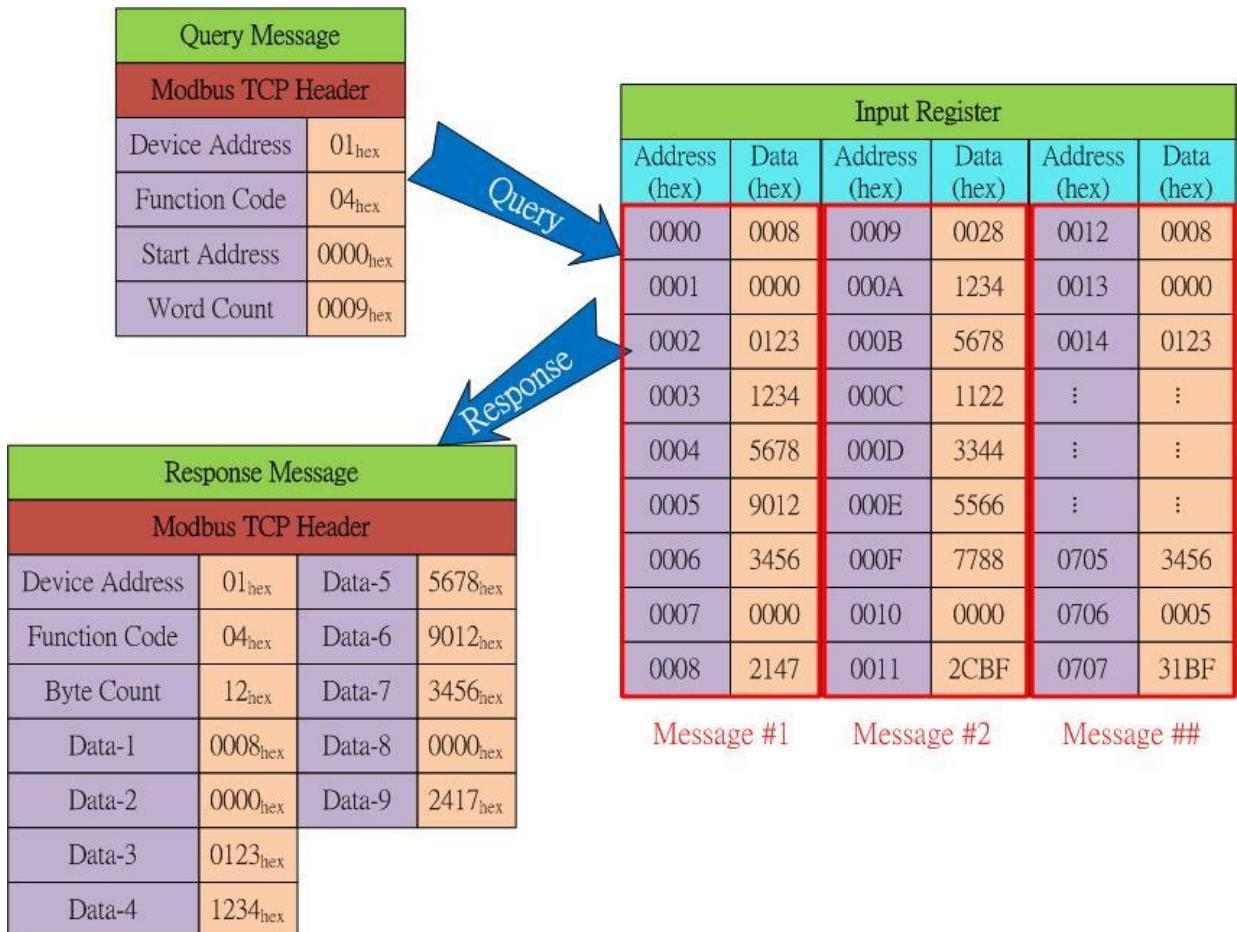
| Word Number | Description |
|-------------|--|
| 1 | Bit 6 - 15: Reserved Bit 5: CAN Specification, 0 = CAN 2.0A, 1 = CAN 2.0B Bit 4: RTR, 0 = No, 1 = Yes Bit 0 - 3: Data length, value = 0 - 8 |
| 2 | Most significant two bytes of the CAN Identifier. (Big-endian) |
| 3 | Least significant two bytes of the CAN Identifier. (Big-endian) |
| 4 | The Data 1 and Data 2 elements from the CAN data field. |
| 5 | The Data 3 and Data 4 elements from the CAN data field. |
| 6 | The Data 5 and Data 6 elements from the CAN data field. |
| 7 | The Data 7 and Data 8 elements from the CAN data field. |

4.3. Modbus Command Examples

The following is an illustration of how to use Modbus commands to read or write CAN messages and configure the ECAN-240 module.

4.3.1. Reading a CAN message via a Modbus command

Refer to the figure for details of how to use function code 0x04 to read a **single** CAN message.

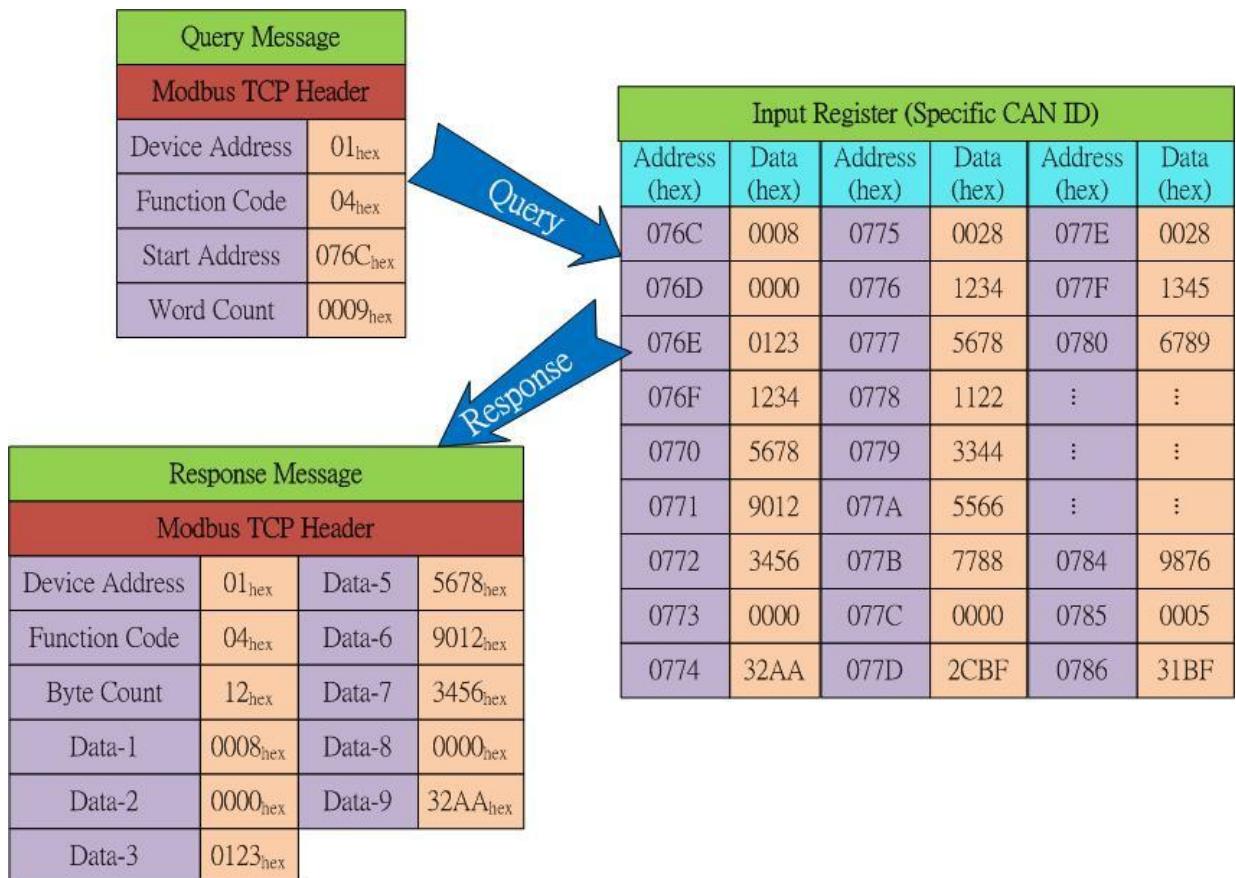


Refer to the figure for details of how to use function code 0x04 to read **two** CAN messages.



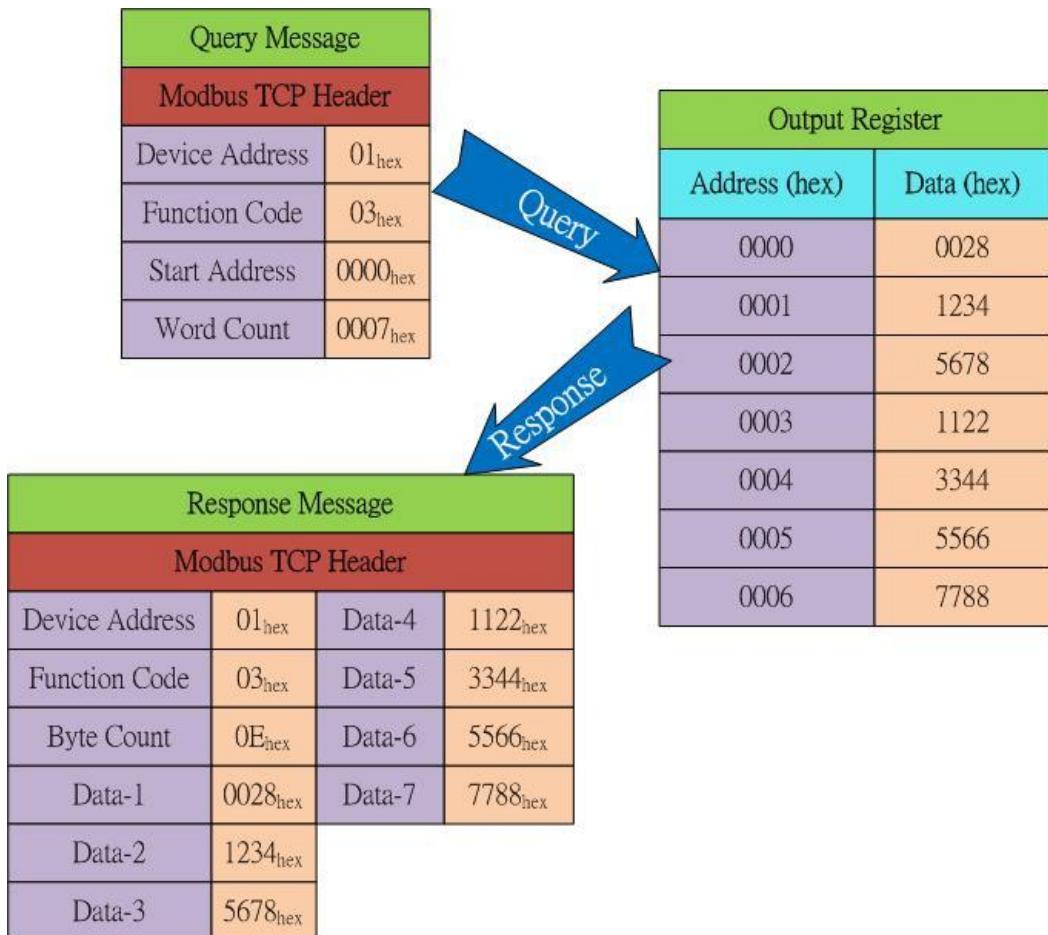
4.3.2. Reading a CAN message containing a specific CAN ID via a Modbus command

Refer to the figure for details of how to use function code 0x04 to read a single CAN message that contains a specific CAN ID.



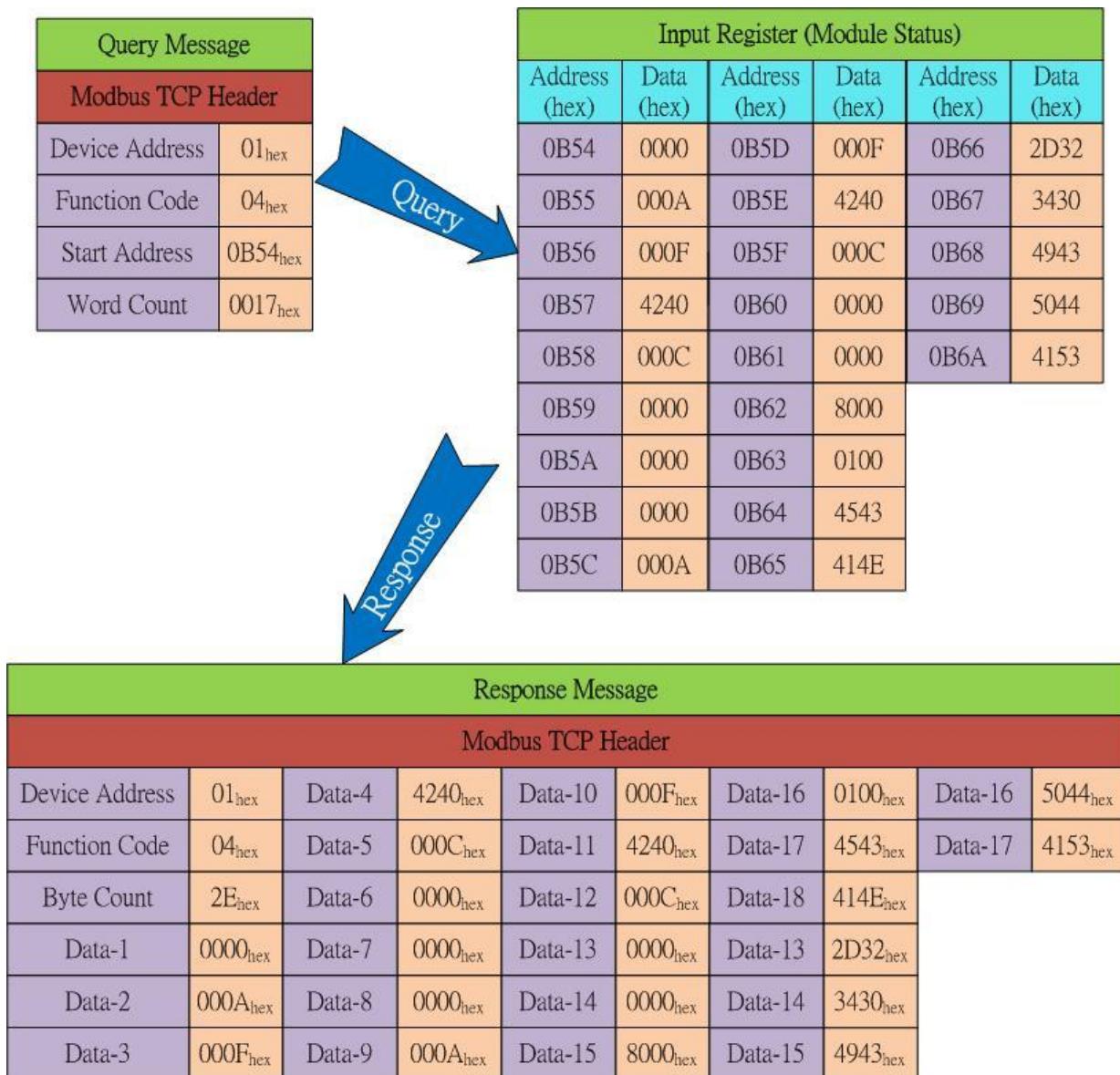
4.3.3. Reading a CAN message that has been sent via a Modbus command

Refer to the figure for details of how to use function code 0x03 to read a CAN message that has been sent via a Modbus command.



4.3.4. Reading the status of a module via a Modbus command

Refer to the figure for details of how to use function code 0x04 to read the status of a module.



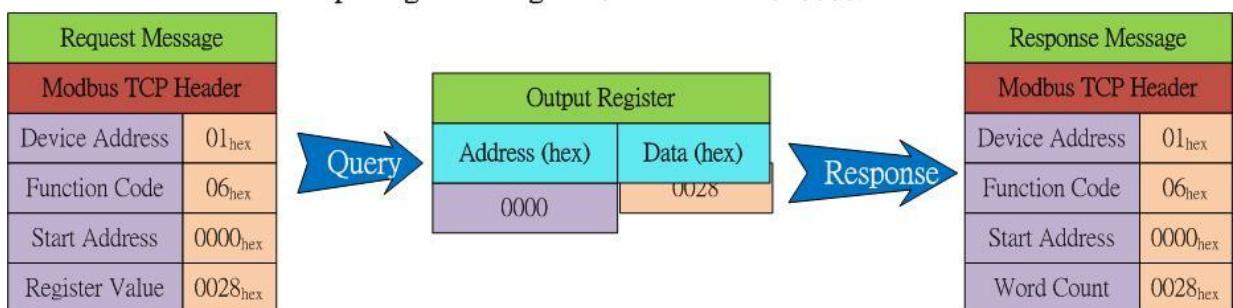
4.3.5. Writing a CAN message via a Modbus command

There are two ways to write a CAN message, including using function codes 0x06 and 0x10.

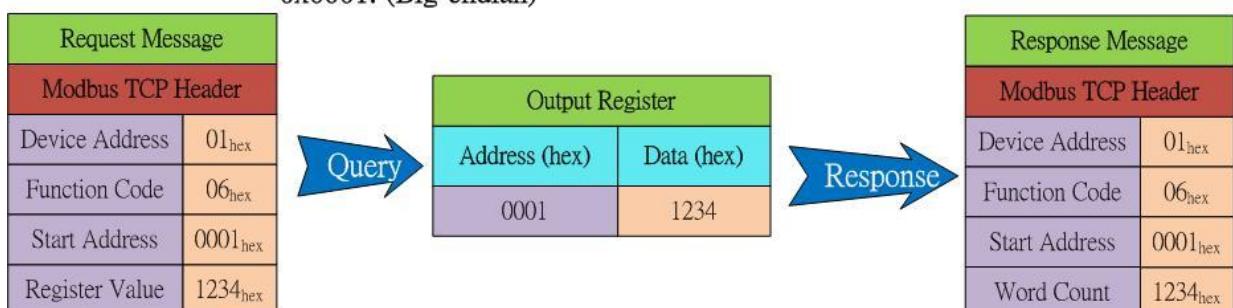
■ Using function code 0x06:

The following is a step-by-step illustration of how to send a CAN message via function code 0x06.

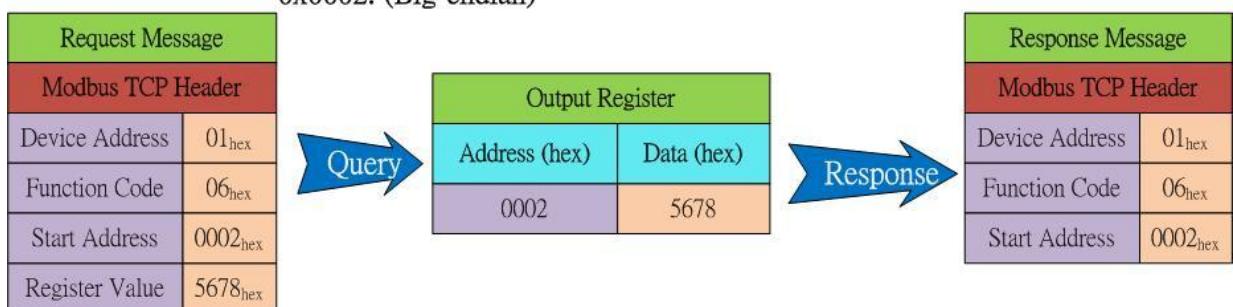
1. Write the CAN specification, RTR, Data Length values to the output register using the Start Address 0x0000.



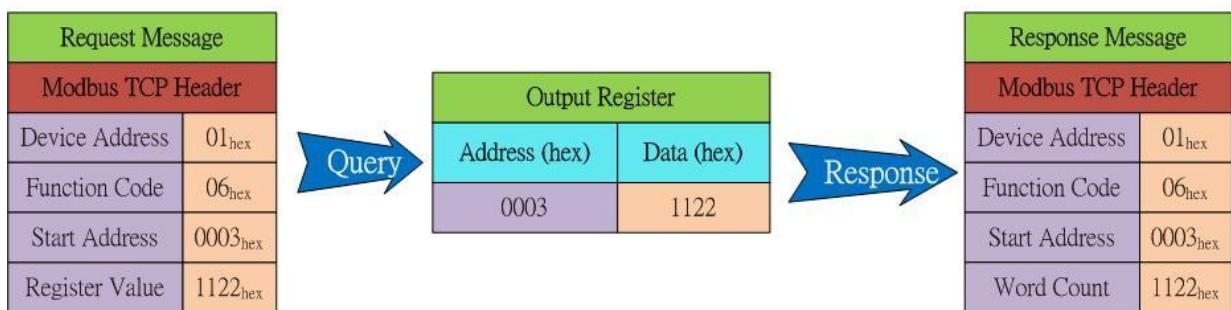
2. Write the most significant two bytes of the CAN identifier to the output register using the Start Address 0x0001. (Big-endian)



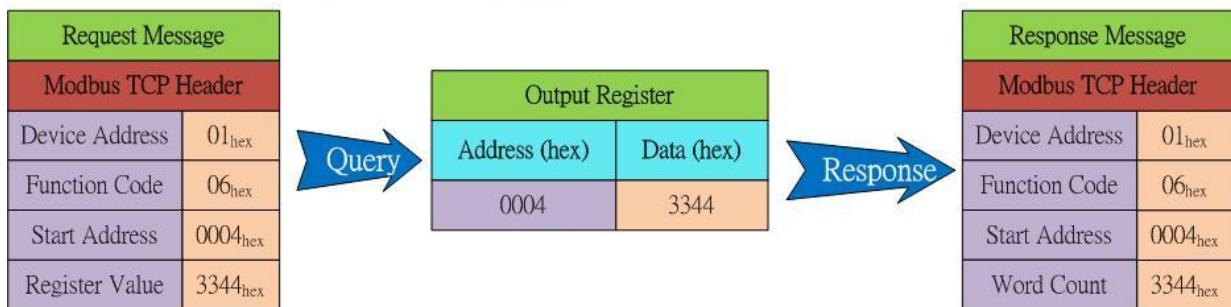
3. Write the least significant two bytes of the CAN identifier to the output register using the Start Address 0x0002. (Big-endian)



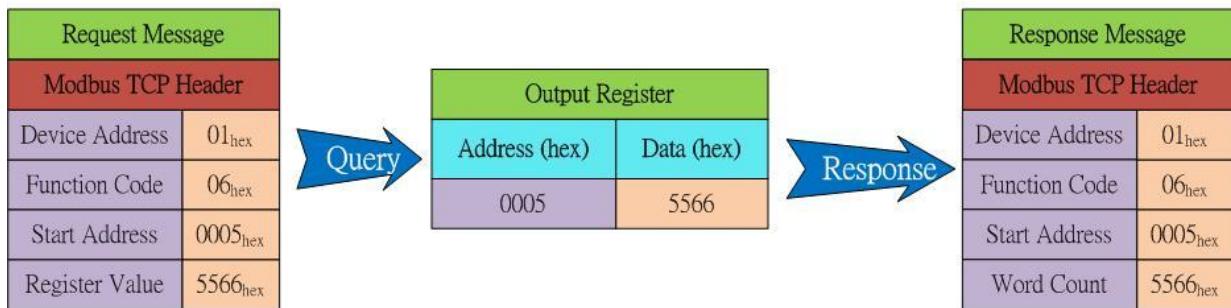
4. Write CAN data1 and data2 to the output register using the Start Address 0x0003.



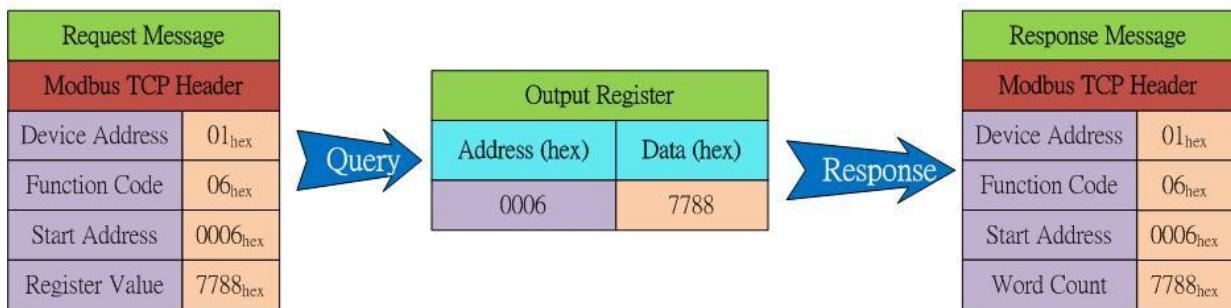
5. Write CAN data3 and data4 to the output register using the Start Address 0x0004.



6. Write CAN data5 and data6 to the output register using the Start Address 0x0005.



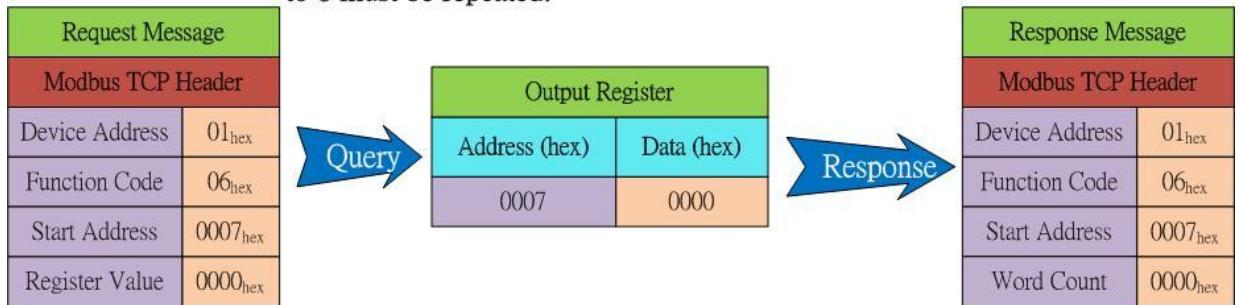
7. Write CAN data7 and data8 to the output register using the Start Address 0x0006.



8. Write the register value To the output register using the Start Address 0x0007. The CAN message will then be transmitted.

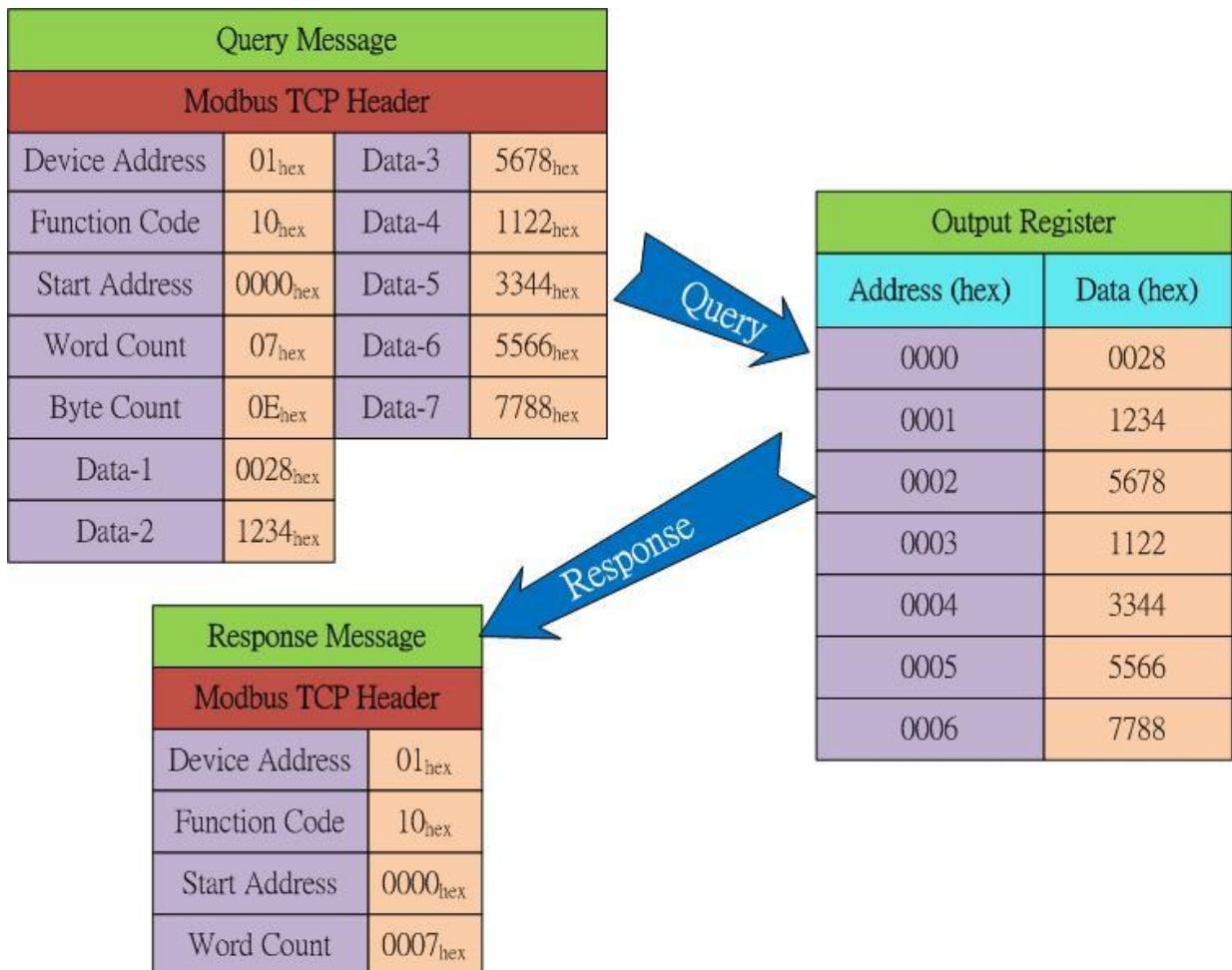
If the same CAN message needs to be transmitted, simply use a different value to replace the original one.

If a different CAN message needs to be transmitted, steps 1 to 8 must be repeated.



■ Using function code 0x10:

Refer to figure for details of how to use function code 0x10 to write a CAN message.



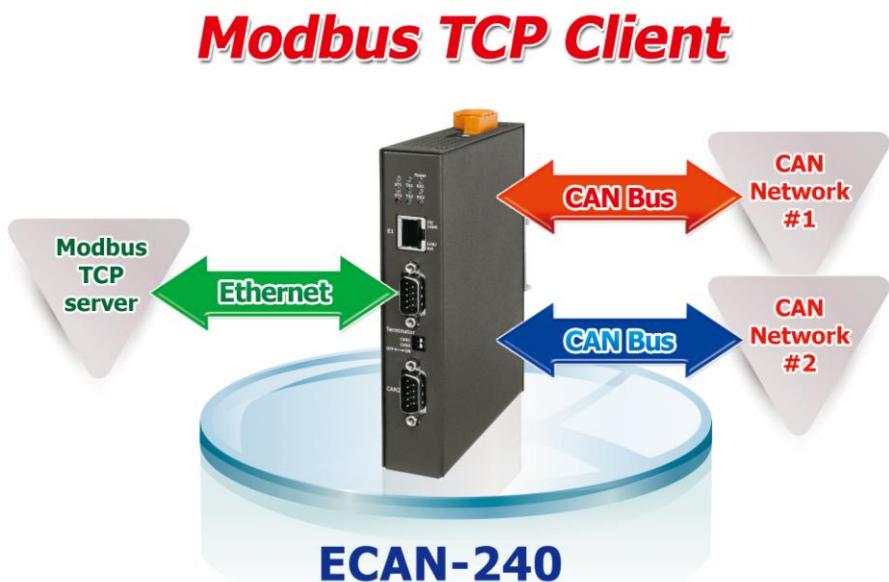
4.4. Modbus Exception Codes

The following is an overview of the Modbus Exception codes that are supported by the ECAN-240 module.

| Code | Description | Possible causes & solutions |
|------|----------------------|--|
| 1 | Illegal function | The function code is not supported by the ECAN-240 module. |
| 2 | Illegal Data Address | The data address does not exist on the ECAN-240 module. |
| 3 | Illegal Data Value | The number of registers or the byte count value is not valid, or no CAN message details are stored in the “Normal CAN Message” field on the ECAN-240 module. |
| 6 | Slave Device Busy | A transmission buffer overrun has occurred. The message should be retransmitted at a later time once the status of the module has returned to normal. |

5. Modbus TCP Client Applications

The Modbus TCP Client function is used to implement communications between a CAN Bus and a Modbus TCP Server. When the ECAN-240 module is acting as a Modbus TCP Client, it can access the Modbus TCP Server via the command configuration. When the ECAN-240 module receives I/O data, it will forward it to the remote CAN devices for analysis, control, or other operations. Once configured, the ECAN-240 module is also able to access the Modbus TCP Server via a CAN message.



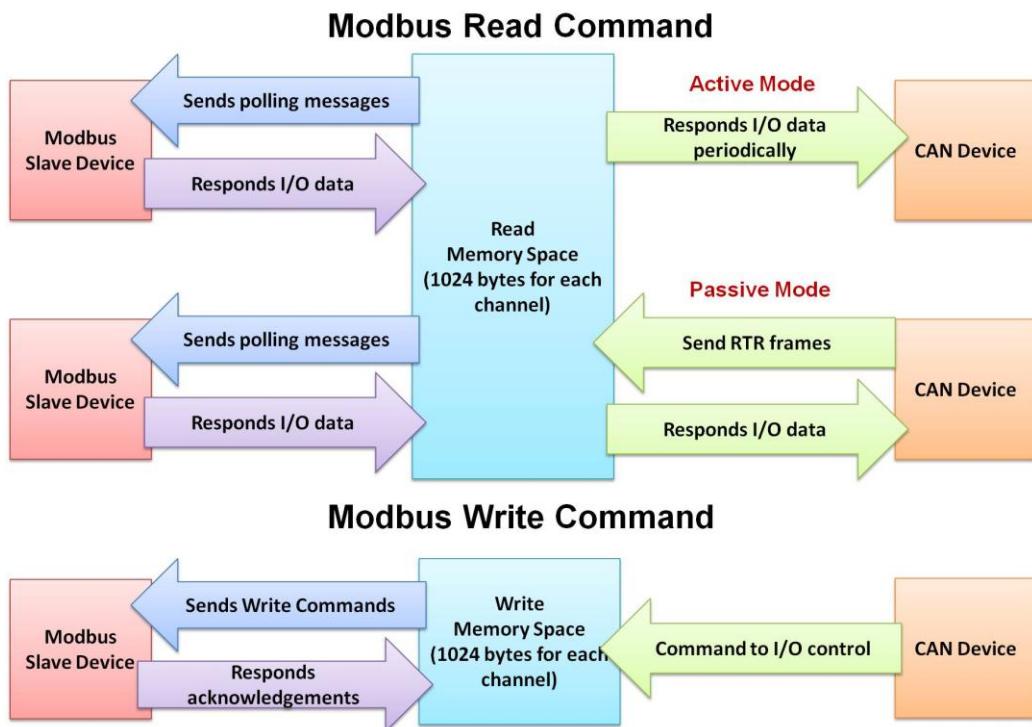
5.1. Supported Modbus Function Codes

The Modbus TCP Client function supports Modbus function codes 0x01, 0x02, 0x03, 0x04, 0x05, 0x06, 0x0F, and 0x10, as indicated in the table below.

| Modbus Command | Function Code | Function Name | Description |
|----------------------|---------------|--------------------------|--|
| Modbus Read Command | 1 (01 Hex) | Read Coil Status | Used to read the status of a coil from a Modbus TCP Server device. |
| | 2 (02 Hex) | Read Input Status | Used to read the status of the input from a Modbus TCP Server device. |
| | 3 (03 Hex) | Read Holding Registers | Used to read Holding Registers from a Modbus TCP Server device. |
| | 4 (04 Hex) | Read Input Registers | Used to read the registers of the input from a Modbus TCP Server device. |
| Modbus Write Command | 5 (05 Hex) | Write Single Coil | Used to write to a single coil on a Modbus TCP Server device. |
| | 6 (06 Hex) | Write Signal Register | Used to write to a single register on a Modbus TCP Server device. |
| | 15 (0F Hex) | Write Multiple Coil | Used to write to multiple coils on a Modbus TCP Server device. |
| | 16 (10 Hex) | Write Multiple Registers | Used to write to multiple registers on a Modbus TCP Server device. |

5.2. I/O Memory Size

The ECAN-240 module provides a memory block that can be used for data exchange via Modbus TCP Client function. Each CAN port provides a total of 2048 bytes of memory space for transmission and reception, where the available space is 1024 bytes for each. For more information related to the operation of the transmission and reception memory blocks, refer to Sections 3.5.



5.3. Error Response

The ECAN-240 Module allows error response messages over CAN Bus via error response settings. The Error Response CAN ID is used to specify the CAN ID of the error response messages. Once the error response function is enabled, a CAN message will be returned when the ECAN-240 encounters a Modbus error.

| | |
|---|-------------------------------------|
| Error Response Enable (Modbus TCP Client) | <input checked="" type="checkbox"/> |
| Error Response CAN ID (Modbus TCP Client) | 000007FF (HEX) |

The following describes the format and definition of the CAN error response message.

◆ **CAN Error Response Message Format**

| CAN ID | Length | Byte 0 | Bytes 1 - 3 | Bytes 4 - 6 | Byte7 |
|-----------------------|--------|-----------------|-------------|------------------|----------|
| Error Response CAN ID | 8 | Identifier Code | Reserved | Modbus Exception | Reserved |

◆ **The “Identifier Code” in Data Byte0 is divided into four types**

| Identifier Code | Description |
|-----------------|---|
| 0x00 | Reserved |
| 0x01 | This code indicates that the current Modbus command has been completely transmitted, but the ECAN-240 module has received the wrong Node ID command. |
| 0x02 | This code indicates that the current Modbus command has been completely transmitted, but the ECAN-240 module has not received any response command. |
| 0x03 | This code indicates that the current Modbus command has been completely transmitted, but the ECAN-240 module has received a “Modbus Exception” command. |

Data Bytes 4 to 7 indicate the “Modbus Exception” message, which includes the Slave Node ID, the Exception Function Code, and the Exception Code. If the Identifier code is 0x03, this message will be shown in the CAN error response message. Otherwise, these data value will be 0x00.

◆ Modbus Exceptions

| Byte4 | Byte5 | Byte6 | Byte7 |
|---------------|-------------------------|----------------|----------|
| Slave Node ID | Exception Function Code | Exception Code | Reserved |

◆ Relationship between the Function Code and Exception Function Code

| Function Code (Hex) | Exception Function Code (Hex) |
|---------------------|-------------------------------|
| 0x01 | 0x81 |
| 0x02 | 0x82 |
| 0x03 | 0x83 |
| 0x04 | 0x84 |
| 0x05 | 0x85 |
| 0x06 | 0x86 |
| 0x0F | 0x8F |
| 0x10 | 0x90 |

◆ Modbus Exception Code

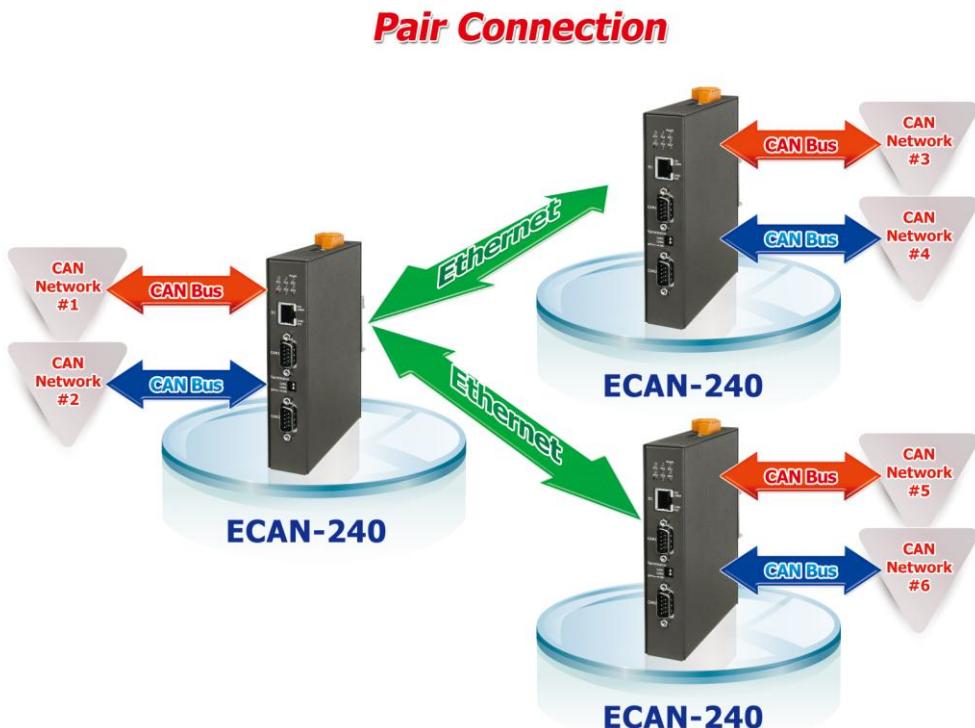
For more information related to Modbus Exception Code, refer to the Modbus protocol specifications.

6. Pair Connection Applications

The pair connection function is used to implement communication between two ends of CAN network. CAN Network #1 can communicate with CAN Network #3 or CAN Network #4 using pair connection configuration (for details of the router table, refer to Section 3.6). Similarly, CAN Network #2 can also communicate with CAN Network #3 or CAN Network #4 in the same manner. The pair connection function on the ECAN-240 module is implemented via either the TCP or the UDP protocol. When using the **TCP protocol**, the application architecture will be one-to-one, as illustrated in the application diagram below.

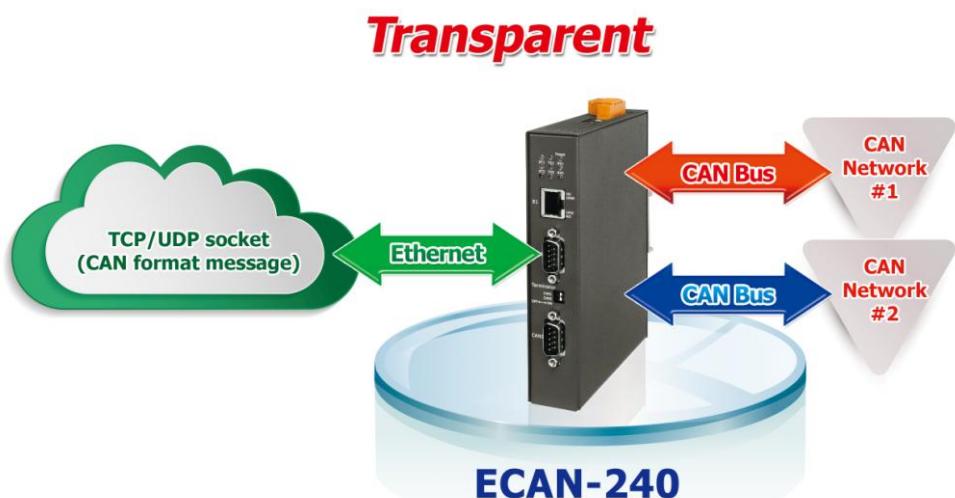
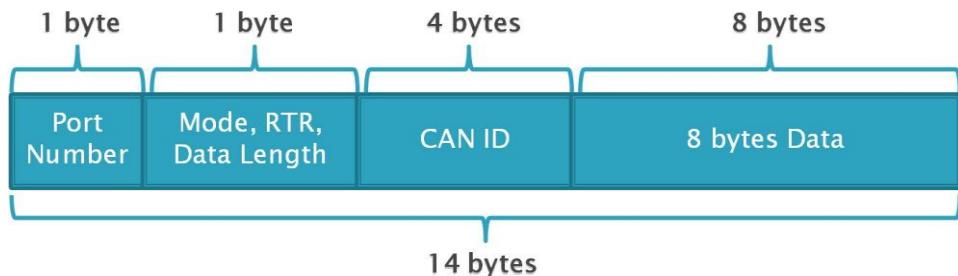


When using the **UDP protocol**, the application architecture will be either one-to-one or one-to-many (UDP broadcast), as illustrated in the application diagram below.



Note: When using **UPD protocol**, be aware that some routers will block the transmission of UDP packets to the Internet.

The Transparent option is to see as a half-pair connections. The TCP/UDP packet is in CAN format and contains the CAN ID. TCP uses port **10003** and UDP uses port **57540**. This is useful because it allows custom TCP/UDP programs to be developed that can directly access the ECAN-240 module for specific applications.



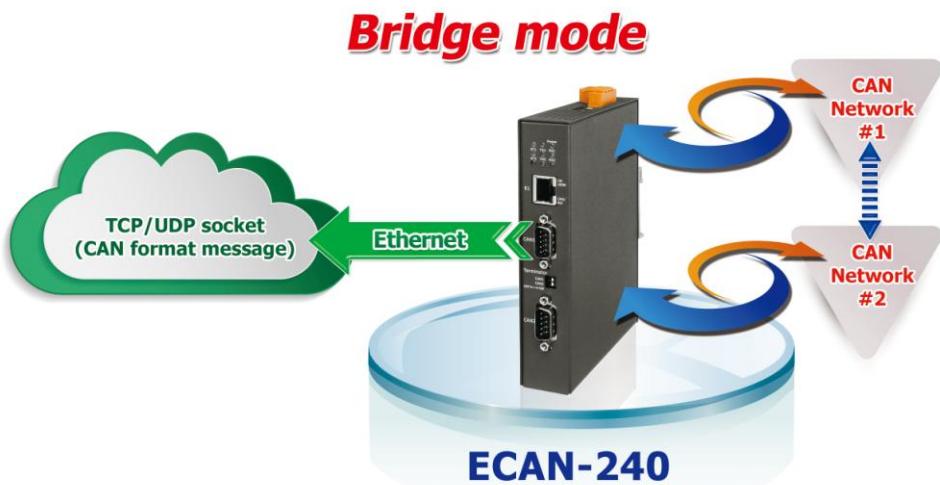
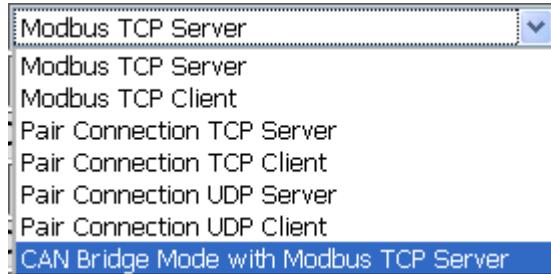
7. Listen Only Application

The “Listen Only” function is used for listening to CAN Bus communications between two CAN networks. After enabling the “Listen Only” function and rebooting the module, the CAN Bus on the ECAN-240 module will be set to “Listen Only” mode, meaning that the ECAN-240 module will not be able to send any messages to the CAN Bus. On the Ethernet side of the connection, the ECAN-240 module acts as a Modbus TCP Server and can be accessed using Modbus TCP commands.



8. Bridge Mode Applications

Bridge Mode is a special function that allows two CAN networks to communicate with each other via the ECAN-240 protocols. At this time, the ECAN-240 module acts as a Modbus TCP Server and CAN messages can be transmitted between two CAN modules using Modbus TCP commands.



Appendix A Firmware Update

The firmware on the ECAN-240 module can be updated via CAN devices produced by ICP DAS. The latest firmware file ("*.fw") and the latest version of the Firmware Update utility, FW_Update_CAN_vX.XX.exe (where X denotes the utility version), are available from the FTP link below. A notification will not be sent when a new version is released.

ftp://ftp.icpdas.com/pub/cd/fieldbus_cd/can/gateway/ECAN-240/firmware

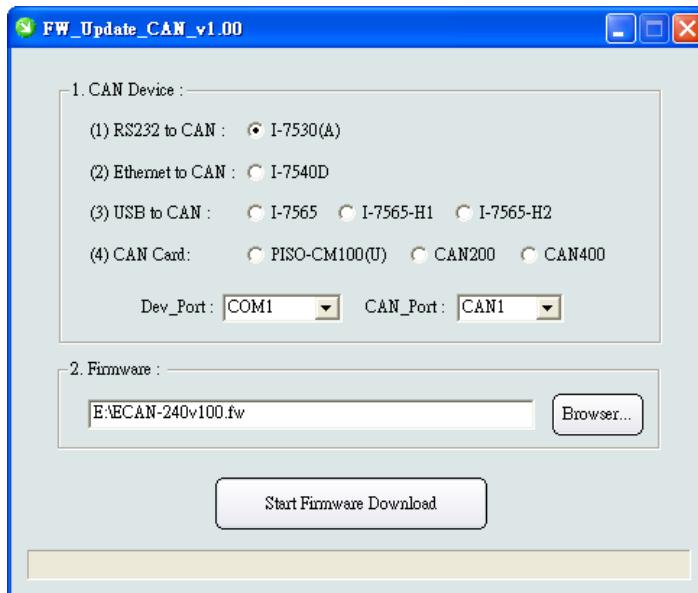
ftp://ftp.icpdas.com/pub/cd/fieldbus_cd/can/gateway/ECAN-240/software/update_tool

Follow the process described below to update the firmware for the ECAN-240 module using the ICP DAS Firmware Update utility.

Step 1: Move the two rotary switches to the 0xF position (Bootloader mode) and reboot the module.

Once the ECAN-240 module has rebooted, all the LEDs on the module will be flashing.

Step 2: Run the Firmware Update utility, FW_Update_CAN_vX.XX.exe (where X denotes the utility version).



[1] CAN devices:

The firmware on the ECAN-240 module can be updated by using ICP DAS CAN products indicated below and Firmware Update utility.

- (1) RS232 to CAN : I-7530(A).
- (2) Ethernet to CAN: I-7540D.
- (3) USB to CAN: I-7565, I-7565-H1, and I-7565-H2.
- (4) CAN Card: PISO-CM100(U), PISO-/PCM-/PEX-CAN200 and CAN400.

Before updating the firmware, the following parameters needs to be set on the utility.

- (1) Select the CAN hardware device.
- (2) Set the Dev_Port or Board_ID (for CAN cards only).
- (3) Set the CAN_Port number.
- (4) Connect to CAN Port 1 of the ECAN-240 module.

[2] Download the Firmware:

- (1) Click the “**Browser...**” button to select the location of the firmware file. The name of the firmware file will be ECAN-240_vXXX.fw (where X denotes the firmware version).
- (2) Click the “**Start Firmware Download**” button to begin the firmware update process.
While the firmware is being updated, a progress bar will be displayed in the utility to indicate the status of the update process. Once the firmware has been successfully updated, a notification will be displayed.

