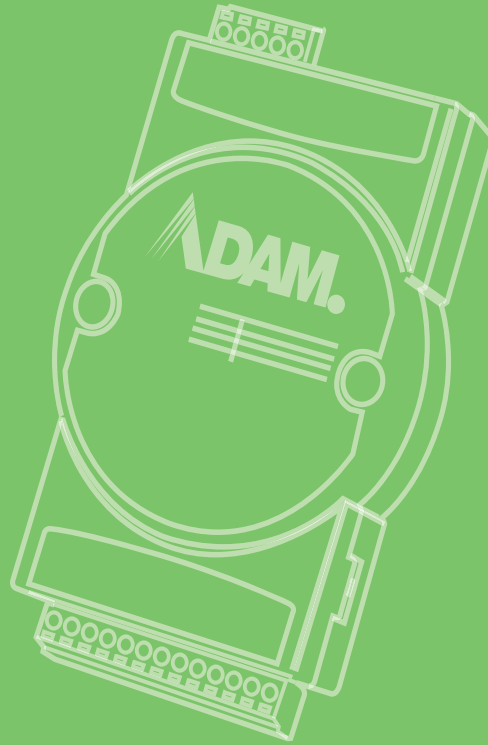


User Manual



ADAM-6700 Series

Intelligent I/O Gateway

ADVANTECH

Enabling an Intelligent Planet

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 - A complete description of the problem
 - The exact wording of any error messages

Contents

| | | |
|------------------|--|-----------|
| Chapter 1 | Product Overview | 1 |
| 1.1 | Introduction | 2 |
| 1.2 | Hardware Introduction..... | 3 |
| | Figure 1.1 ADAM-6700 Series (Front View) | 3 |
| 1.2.1 | Power Connection..... | 3 |
| | Figure 1.2 ADAM-6700 Series Power Connection | 3 |
| 1.2.2 | USB Connector | 4 |
| | Figure 1.3 ADAM-6700 Series Micro USB..... | 4 |
| | Figure 1.4 ADAM-6700 Series Type-A USB | 4 |
| 1.2.3 | Micro SD Slot..... | 5 |
| | Figure 1.5 ADAM-6700 Series Micro SD | 5 |
| 1.2.4 | RS-485 Connector | 5 |
| | Figure 1.6 ADAM-6700 Series RS-485 Connector | 5 |
| 1.2.5 | Ethernet Connector | 6 |
| | Figure 1.7 ADAM-6700 Series Ethernet Connection | 6 |
| 1.2.6 | Reset Button | 6 |
| | Figure 1.8 ADAM-6700 Series Reset Button | 6 |
| 1.3 | LED Indicator Definition | 7 |
| 1.4 | Dimensions | 7 |
| | Figure 1.9 ADAM-6700 Series Dimensions | 7 |
| Chapter 2 | Wiring and Settings | 9 |
| 2.1 | ADAM-6717 Intelligent I/O Gateway with Analog Input..... | 10 |
| 2.1.1 | Specifications..... | 10 |
| 2.1.2 | Application Wiring | 11 |
| | Figure 2.1 Current/Voltage Input Switch Setting..... | 11 |
| | Figure 2.2 ADAM-6717 Digital Output and Analog Input Wiring | 11 |
| | Figure 2.3 ADAM-6717 Digital Output with Inductive Load | 12 |
| | Figure 2.4 ADAM-6717 Wet and Dry Contact Wiring | 12 |
| 2.2 | ADAM-6750 Intelligent I/O Gateway with Digital Input/Output..... | 13 |
| 2.2.1 | Specifications..... | 13 |
| 2.2.2 | Application Wiring | 14 |
| | Figure 2.5 ADAM-6750 Digital Input and Digital Output Wiring . | 14 |
| | Figure 2.6 ADAM-6750 Digital Output with Inductive Load | 14 |
| 2.3 | ADAM-6760D Intelligent I/O Gateway with Solid-State Relay Output (for DC)..... | 15 |
| 2.3.1 | Specifications..... | 15 |
| 2.3.2 | Application Wiring | 16 |
| | Figure 2.7 ADAM-6760D Digital Input and Relay Output Wiring | 16 |
| | Figure 2.8 ADAM-6760D Digital Input and Relay Output Wiring (Side view)..... | 16 |
| Chapter 3 | System Configuration | 17 |
| | Figure 3.1 Input the LAN Port IP Address | 18 |
| | Figure 3.2 Web Portal..... | 18 |
| | Figure 3.3 Web Utility Searching Devices | 19 |
| | Figure 3.4 Web Utility Obtaining the Gateway IP Address | 19 |
| 3.1 | Web Utility Configuration..... | 19 |
| | Figure 3.5 Web Utility Login Window | 20 |
| | Figure 3.6 Web Utility Configuration Page..... | 20 |
| 3.1.1 | Information Settings | 20 |

| | | |
|-------|--|----|
| | Figure 3.7 Device Information | 20 |
| | Figure 3.8 Network Information | 21 |
| | Figure 3.9 Module Information..... | 21 |
| 3.1.2 | Configuration | 21 |
| | Figure 3.10 Configuration Information | 21 |
| | Figure 3.11 Network Information | 22 |
| | Figure 3.12 Time & Date Configuration | 22 |
| | Figure 3.13 Control Tab Page | 23 |
| | Figure 3.14 General Tab Page | 23 |
| | Figure 3.15 Firmware Tab Page | 24 |
| | Figure 3.16 Account Tab Page | 24 |
| | Figure 3.17 Change the Password | 24 |
| 3.2 | I/O Status Settings | 25 |
| 3.2.1 | Analog Input Settings..... | 25 |
| | Figure 3.18 Analog Input Status | 25 |
| | Figure 3.19 Analog Input Channel Settings..... | 26 |
| | Figure 3.20 Analog Input Common Settings..... | 26 |
| 3.2.2 | Digital Input Settings..... | 27 |
| | Figure 3.21 ADAM-6717 Digital Input Settings..... | 27 |
| | Figure 3.22 ADAM-6750 Digital Input Settings..... | 27 |
| | Figure 3.23 ADAM-6750 Digital Input Information..... | 28 |
| | Figure 3.24 Counter Mode Configuration | 28 |
| | Figure 3.25 Low-to-High Delay/High-to-Low Latch Settings..... | 29 |
| | Figure 3.26 Frequency Mode Settings | 29 |
| | Figure 3.27 ADAM-6750 Digital Input Status..... | 29 |
| 3.2.3 | Digital Output Settings..... | 30 |
| | Figure 3.28 ADAM-6717 Digital Output Settings | 30 |
| | Figure 3.29 ADAM-6750 Digital Output Settings | 30 |
| | Figure 3.30 Pulse Output Mode Settings..... | 31 |
| | Figure 3.31 Low-to-High Delay/High-to-Low Delay Settings | 31 |
| | Figure 3.32 ADAM-6750 Digital Output Status..... | 32 |
| 3.3 | Image Updates..... | 32 |
| 3.4 | Firmware Updates..... | 33 |
| | Figure 3.33 Select Firmware File..... | 33 |
| | Figure 3.34 Update Firmware..... | 33 |
| 3.5 | I/O Configuration Update | 34 |
| | Figure 3.35 Select I/O Configuration File | 34 |
| | Figure 3.36 Update I/O Configuration..... | 34 |

Chapter 4 Node-RED Program 35

| | | |
|-----|--|----|
| 4.1 | Node-RED Program..... | 36 |
| 4.2 | Starting the Node-RED Program | 36 |
| | Figure 4.1 Web Portal Utility..... | 36 |
| | Figure 4.2 Click the Node-RED Link..... | 36 |
| | Figure 4.3 Node-RED Login | 36 |
| 4.3 | Project Creation | 37 |
| | Figure 4.4 Node-RED Project Creation | 37 |
| | Figure 4.5 Sample Flow Template..... | 38 |

Chapter 5 C-Language APIs 39

| | | |
|-----|---------------------------|----|
| 5.1 | APIs for Development..... | 40 |
|-----|---------------------------|----|

Appendix A Modbus Table 41

| | | |
|-----|---|----|
| A.1 | ADAM-6717: 8AI/5DI/4DO Intelligent I/O Gateway..... | 42 |
| A.2 | ADAM-6750 12DI/12DO Intelligent I/O Gateway | 43 |

A.3 ADAM-6760D: 8SSR Relay/8 DI Intelligent I/O Gateway 47

Chapter 1

Product Overview

1.1 Introduction

The ADAM-6700 series are intelligent compact gateways aimed at edge applications. Equipped with an Arm® Cortex®-A8 32-bit 1 GHz microcontroller unit (MCU) and I/O module, the ADAM-6700 series can serve as edge platforms for data acquisition. Furthermore, the ADAM-6700 series gateways support Node-RED and C-language API programming tools to enable flexible implementation according to application demands.

1. Cloud /database access with data encryption

Every cloud/database has a unique connection mechanism that can cause problems regarding data formatting, encryption, and access. The ADAM-6700 series gateways are capable of transmitting data to the cloud via different nodes. For legacy machines that cannot transmit data to the cloud, the ADAM-6700 series can serve as a data communication gateway to enable IoT applications.

2. Open platform for flexible programming

- Graphical programming environment
Node-RED is a programming tool developed by IBM for connecting hardware devices together without complex programming. Node-RED allows users to code programs by simply dragging and dropping nodes. Nodes are programmed using JavaScript. For advanced users, the JavaScript code for nodes can be modified according to the project requirements. For more information, visit <https://flows.nodered.org/>.
- C-language API commands
For users wanting to program using a high-level language, C-language APIs are provided for easy programming.

3. Data acquisition

The ADAM-6700 series features an I/O module for collecting data from digital or analog sensors. With the inclusion of an Arm® Cortex®-A8 MCU, large amounts of data can be analyzed locally, reducing latency and potential data losses. For example, if a collected data value is outside the predefined threshold, ADAM-6700 platforms can identify this locally and directly trigger an alarm to turn off the machine, while also sending a notification to management..

4. Edge data analysis

Cloud service and storage costs are directly related to the amount of data uploaded to the cloud. Thus, instead of uploading all raw data to the cloud, ADAM-6700 platforms are capable of processing raw data into insightful information, such as average, maximum, and minimum values, before transmission to the cloud. This not only reduces costs by minimizing the amount of data uploaded, but also facilitates data visualization on digital dashboards.

1.2 Hardware Introduction

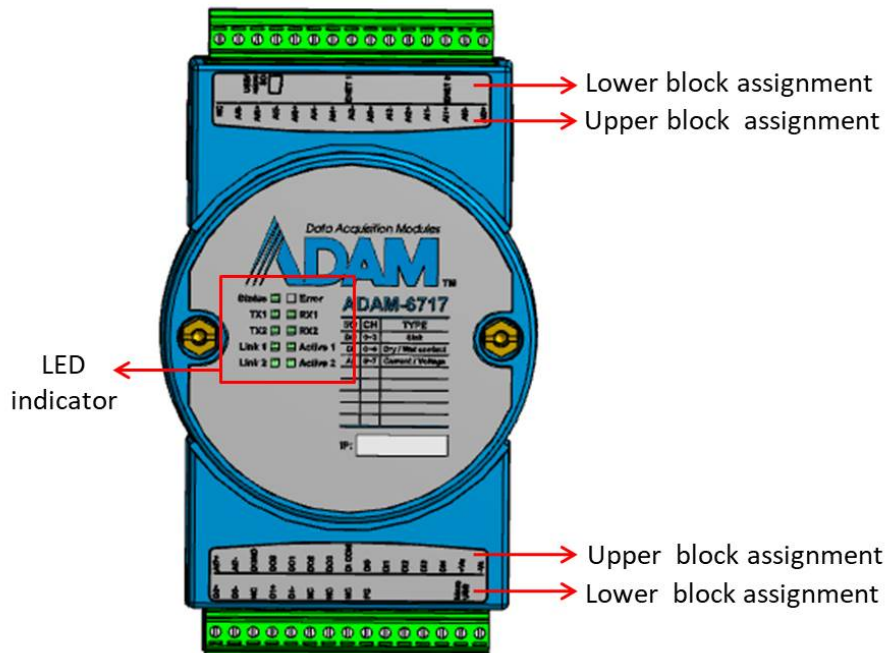


Figure 1.1 ADAM-6700 Series (Front View)

1.2.1 Power Connection



Figure 1.2 ADAM-6700 Series Power Connection

1.2.2 USB Connector

The ADAM-6700 series features a micro USB port that is used as a console port. When connect to the USB port, the device can be powered via USB.

Note! *The ADAM-6700 series can be powered by micro USB for configuration. During operation, the device should be powered with 10 ~ 30V_{DC} via the Vs+ and Vs- terminal pins.*

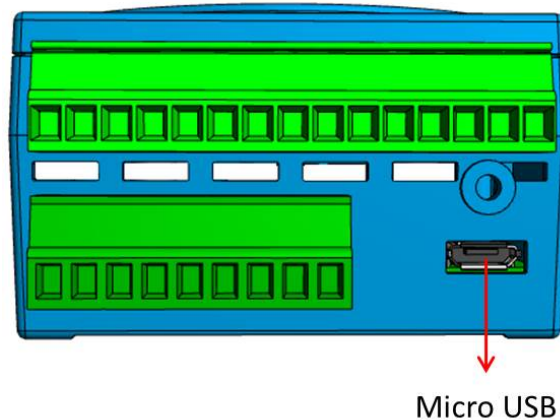


Figure 1.3 ADAM-6700 Series Micro USB

The Type-A USB port is used as a host. Users can connect a USB dongle to the ADAM-6700 device

Note! *When the Type-A USB port is in use, power must be provided via the Vs+ and Vs- terminal pins.*

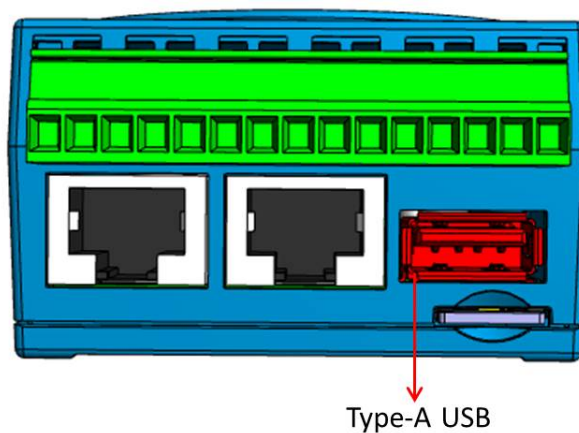


Figure 1.4 ADAM-6700 Series Type-A USB

1.2.3 Micro SD Slot

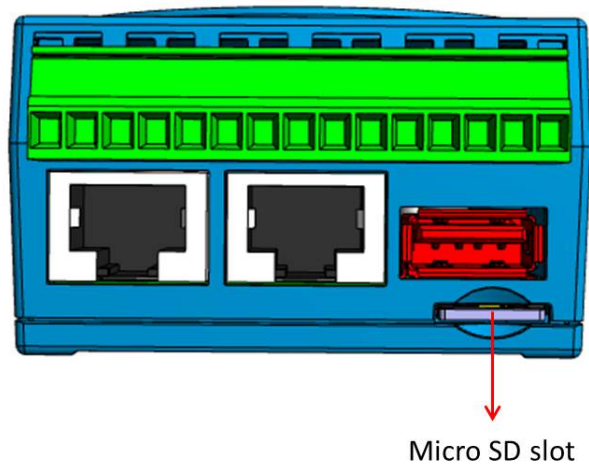


Figure 1.5 ADAM-6700 Series Micro SD

1.2.4 RS-485 Connector

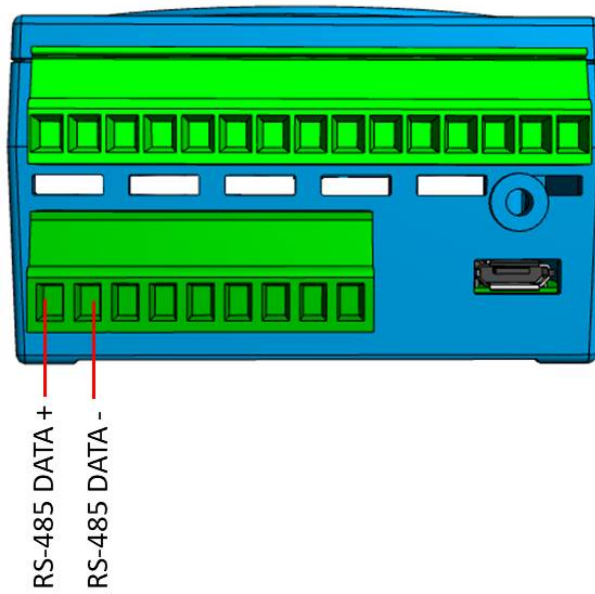


Figure 1.6 ADAM-6700 Series RS-485 Connector

1.2.5 Ethernet Connector

The ADAM-6700 series gateways have two MAC IDs that are listed on a label on the side of the device. The default IP address for these ports is 10.0.0.1 (Eth0) and 11.0.0.1 (Eth1).

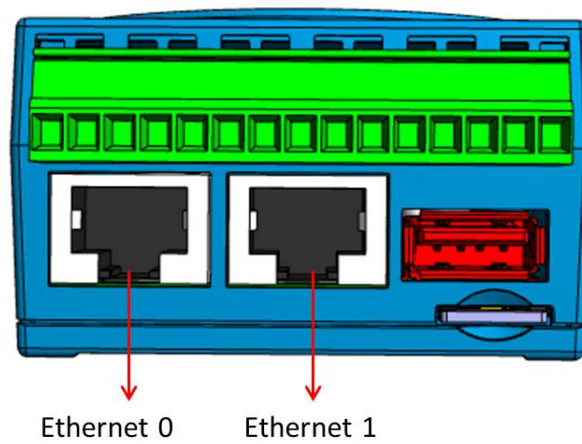


Figure 1.7 ADAM-6700 Series Ethernet Connection

1.2.6 Reset Button

User can push the Reset button to restart OS of ADAM-6700.

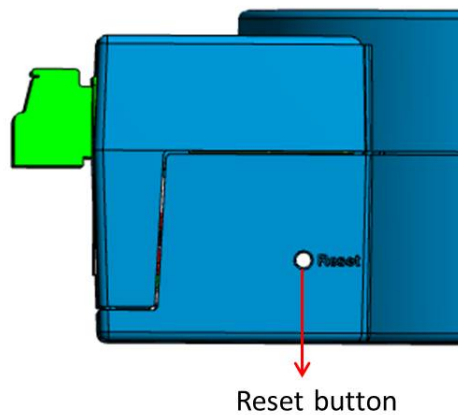


Figure 1.8 ADAM-6700 Series Reset Button

1.3 LED Indicator Definition

The ADAM-6700 series gateways are equipped with LED indicators that show the device status. The LED indicator behaviors are defined below. The indicator behavior for error events can be configured using Node-RED.

| LED | Color | Behavior | Definition |
|---------|--------|------------------|---|
| Status | Green | Stay on | Module is booting |
| | | Flash every 1s | Operating system is ready |
| | | Flash every 0.5s | Conducting image recovery processing |
| Error | Red | User defined | User defined |
| Tx0 | Yellow | Stay on | RS-485 port (D0) is transmitting data |
| Tx1 | Yellow | Stay on | RS-485 port (D1) is transmitting data |
| Rx0 | Green | Stay on | RS-485 port (D0) is receiving data |
| Rx1 | Green | Stay on | RS-485 port (D1) is receiving data |
| Link0 | Yellow | Stay on | Ethernet(Eth0) speed is 100 Mbps |
| Link1 | Yellow | Stay on | Ethernet(Eth1) speed is 100 Mbps |
| Active0 | Green | Flashing | Ethernet(Eth0) is transmitting/receiving data |
| Active1 | Green | Flashing | Ethernet(Eth1) is transmitting/receiving data |

1.4 Dimensions

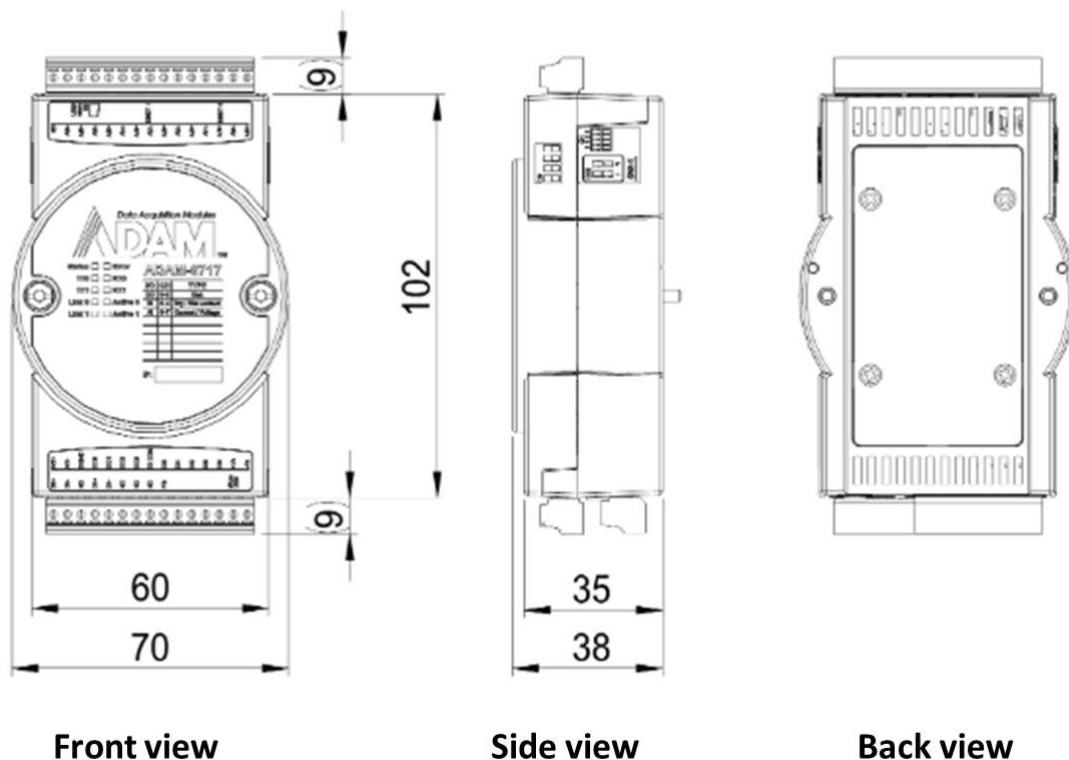


Figure 1.9 ADAM-6700 Series Dimensions

Chapter 2

Wiring and Settings

2.1 ADAM-6717 Intelligent I/O Gateway with Analog Input

2.1.1 Specifications

Analog Input

- **Channels:** 8 (differential and independent configurable)
- **Current input range:** 0 ~ 20 mA, 4 ~ 20 mA, ± 20 mA
- **Voltage input range:** 0 ~ 10V, 0 ~ 150mV, 0 ~ 1V, 0 ~ 5V, 0 ~ 10V, ± 5 V, ± 1 V, ± 500 mV, ± 150 mV, ± 10 V, 0 ~ 500mV
- **Sampling rate:** 10/100 Hz (total)
- **Accuracy@25 °C:** Voltage 0.1% FSR, current 0.2% FSR
- **Zero drift:** ± 6 uV /°C
- **Span drift:** ± 25 ppm/°C
- **High common mode:** 200 V_{DC}
- **Resolution:** 16 bit

Digital Output

- **Channels:** 4
- **Type:** sink 30 VDC, 0.1A max. per channel
- **Delay time:** Low to high: 100 us; High to low: 150 us

Digital Input

- **Channels:** 5
- **Dry contact:** Logic 0: open; Logic 1: closed to DGND
- **Wet contact:** Logic 0: 0 ~ 3 V_{DC}; Logic 1: 10 ~ 30 V_{DC}

General

- **Power input:** 10 ~ 30 V_{DC}
- **Operating temperature:** -40 ~ 70 °C (-40 ~ 158 °F)
- **Storage temperature:** -40 ~ 85 °C (-40 ~ 185 °F)
- **Operating humidity:** 40 °C @85% RH Non-condensing
- **Storage humidity:** 85 °C @95% RH Non-condensing
- **Power consumption:** 6W @ 24 V_{DC}
- **Real-time clock accuracy:** 2 seconds per day
- **LAN port:** 2 x (2 MAC ID) 10/100 Mbps
- **USB port:** 1 x micro USB, 1 x USB Type-A
- **RS-485 port:** 2
- **OS:** RT Linux V3.12
- **Memory:** NAND flash 512 MB
- **RAM:** DDR3L 512 MB
- **Program:** Node-RED, Linux C
- **External storage:** 1 x micro SD slot
- **Screw terminal block:** Accepts wire size #16-28 AWG, stripped length: 6.5 mm
- **Certification:** CE, FCC
- **Isolation:** 2500 V_{DC}

2.1.2 Application Wiring

Analog Input and Digital Output Wiring

The gateway supports the voltage and current input. Before connecting the voltage or current input, ensure that the switch and input range settings of the web utility are set to the correct value.

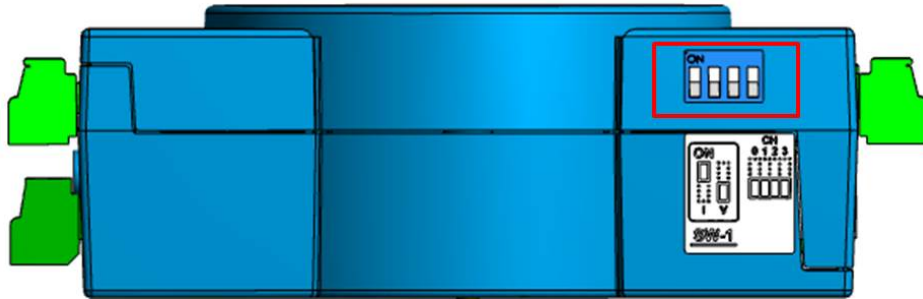


Figure 2.1 Current/Voltage Input Switch Setting

| | SW1 | | | | SW2 | | | |
|--------------|--------------------|-----|-----|-----|-----|-----|-----|-----|
| AI Channel | Ch0 | Ch1 | Ch2 | Ch3 | Ch4 | Ch5 | Ch6 | Ch7 |
| ON | Current input mode | | | | | | | |
| OFF(default) | Voltage input mode | | | | | | | |

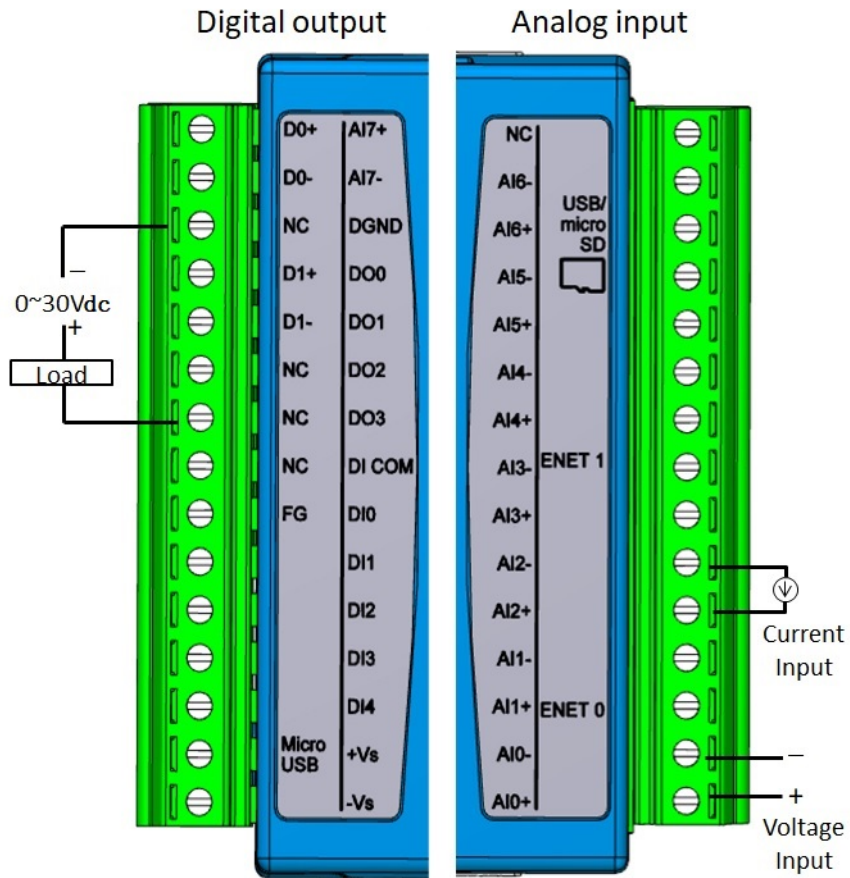


Figure 2.2 ADAM-6717 Digital Output and Analog Input Wiring

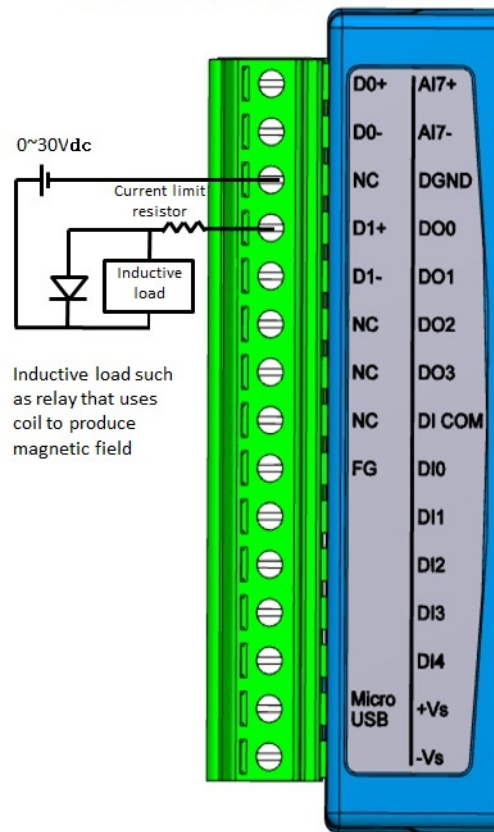


Figure 2.3 ADAM-6717 Digital Output with Inductive Load

Digital Input Wet/Dry Contact Wiring

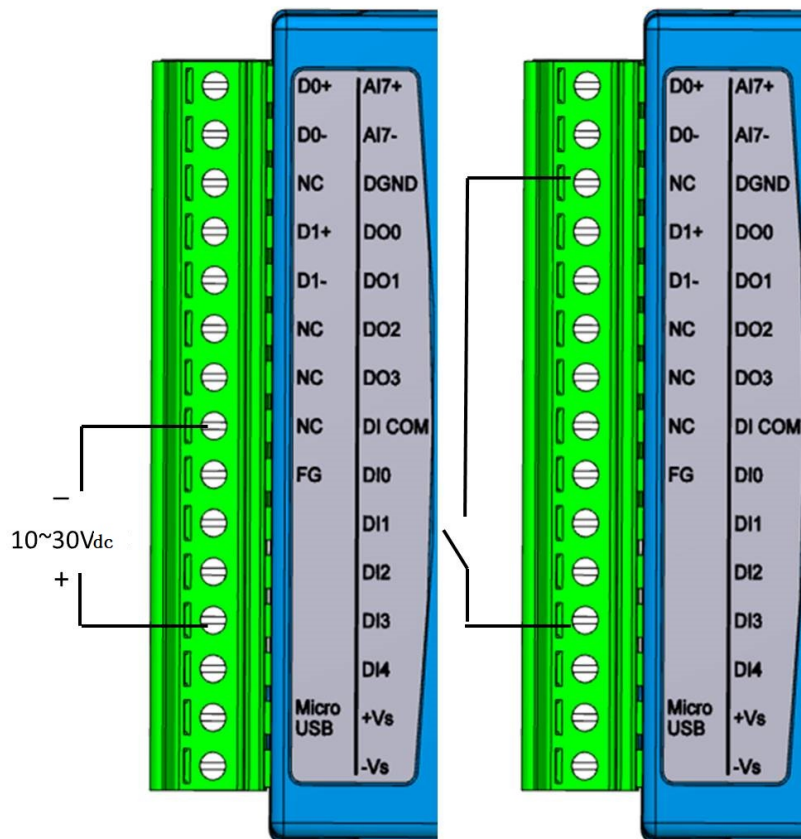


Figure 2.4 ADAM-6717 Wet and Dry Contact Wiring

2.2 ADAM-6750 Intelligent I/O Gateway with Digital Input/Output

2.2.1 Specifications

Digital Output

- **Channel:** 12
- **Type:** Sink 30 V_{DC}, 0.1A max. per channel
- **Delay time:** Low to high: 100 us; High to low: 150 us
- **Pulse output:** Up to 3 kHz

Digital Input

- **Channel:** 12
- **Dry contact:** Logic 0: open; Logic 1: closed to DGND
- **Wet contact:** Logic 0: 0 ~ 3 V_{DC}, Logic 1: 10 ~ 30 V_{DC}
- **Counter/frequency:** Up to 3 kHz

General

- **Power input:** 10 ~ 30 V_{DC}
- **Operating temperature:** -40 ~ 70 °C (-40 ~ 158 °F)
- **Storage temperature:** -40 ~ 85 °C (-40 ~ 185 °F)
- **Operating humidity:** 40 °C @85% RH non-condensing
- **Storage humidity:** 85 °C @95% RH non-condensing
- **Power consumption:** 6W @ 24 V_{DC}
- **Real-time clock accuracy:** 2 seconds per day
- **LAN port:** 2 x (2 MAC ID) 10/100 Mbps
- **USB port:** 1 x micro USB, 1 x USB Type-A
- **RS-485 port:** 2
- **OS:** RT Linux V3.12
- **Memory:** NAND flash 512 MB
- **RAM:** DDR3L 512 MB
- **Program:** Node-RED, Linux C
- **External storage:** 1 x micro SD slot
- **Screw terminal block:** Accepts wire size #16-28 AWG, stripped length: 6.5 mm
- **Certification:** CE, FCC
- **Isolation:** 2500 V_{DC}

2.2.2 Application Wiring

Digital Input and Digital Output Wiring

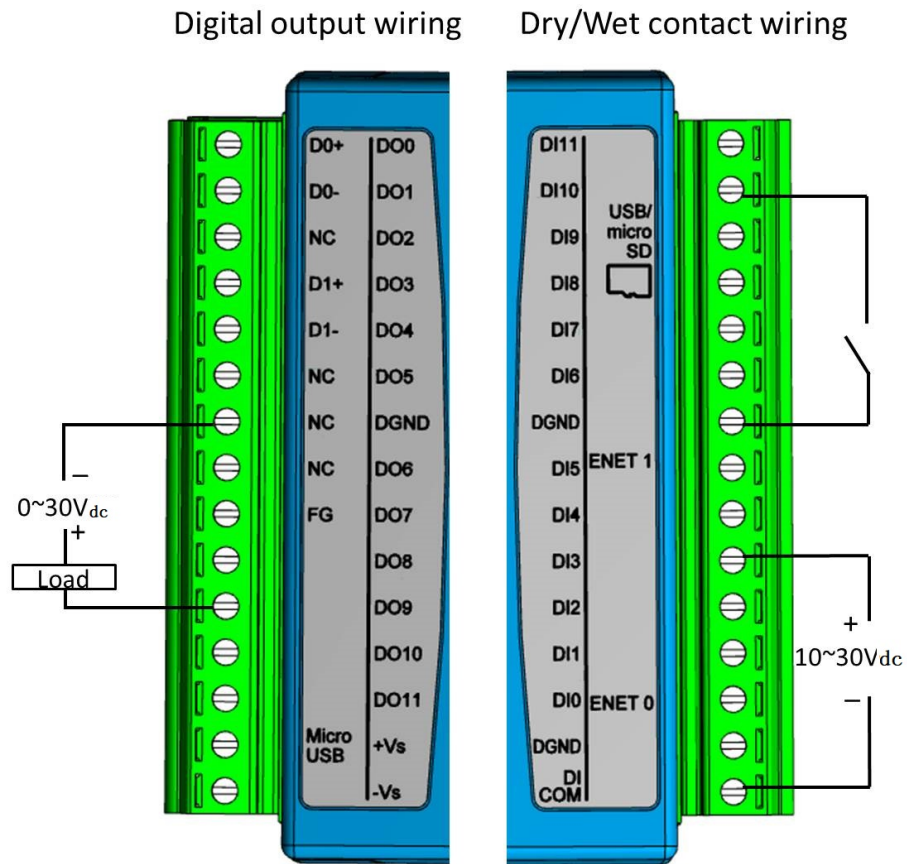


Figure 2.5 ADAM-6750 Digital Input and Digital Output Wiring

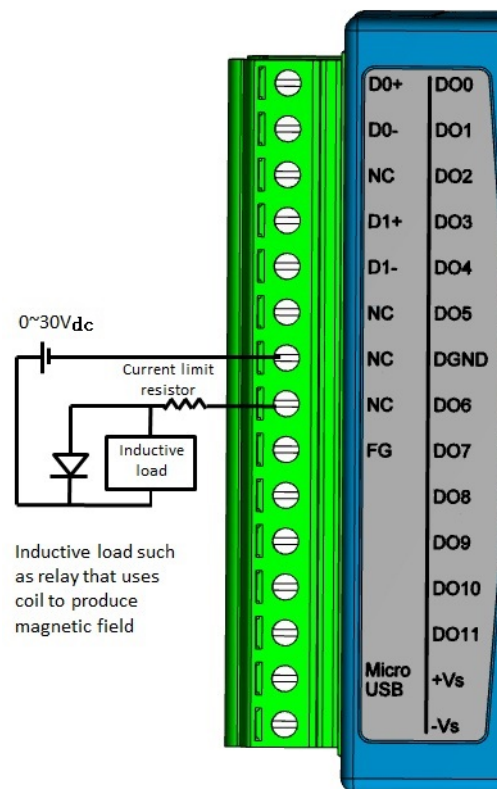


Figure 2.6 ADAM-6750 Digital Output with Inductive Load

2.3 ADAM-6760D Intelligent I/O Gateway with Solid-State Relay Output (for DC)

2.3.1 Specifications

Relay Output (PhotoMOS SPST)

- **Channels:** 8 (Form A)
- **Contact rating (Resistive and Inductive load):** 30 V_{DC}
 - 1 A @25°C
 - 0.7A @70°C
- **Relay-on time:** 1.3 ms
- **Relay-off time:** 0.8 ms
- **Isolation (Relay output to power):** 1500Vrms
- **Peak Load Current:** 4A (100ms (1 pulse))
- **Total Power Dissipation:** 400mW/channel
- **On-state resistance:** 0.5Ω

Digital Input

- **Channel:** 8
- **Dry contact:**
 - Logic 0: open
 - Logic 1: closed to DGND
- **Wet contact:**
 - Logic 0: 0 ~ 3 V_{DC}
 - Logic 1: 10 ~ 30 V_{DC}
- **Isolation (Digital Input to power):** 2500 V_{DC}

General

- **Power input:** 10 ~ 30 V_{DC}
- **Operating temperature:** -40 ~ 70 °C (-40 ~ 158 °F)
- **Storage temperature:** -40 ~ 85 °C (-40 ~ 185 °F)
- **Operating humidity:** 40 °C @85% RH non-condensing
- **Storage humidity:** 85 °C @95% RH non-condensing
- **Power consumption:** 6.5 W @ 24 VDC
- **Real-time clock accuracy:** 2 seconds per day
- **LAN port:** 2 x (2 MAC ID) 10/100 Mbps
- **USB port:** 1 x micro USB, 1 x USB Type-A
- **RS-485 port:** 2
- **OS:** RT Linux V3.12
- **Memory:** NAND flash 512 MB
- **RAM:** DDR3L 512 MB
- **External storage:** 1 x micro SD slot
- **Program:** Node-RED, Linux C
- **Screw terminal block:** Accepts wire size #16-28 AWG, stripped length: 6.5 mm
- **Certification:** CE, FCC
- **Isolation (RS-485 to power):** 2500 V_{DC}

2.3.2 Application Wiring

Digital Input and Digital Output Wiring

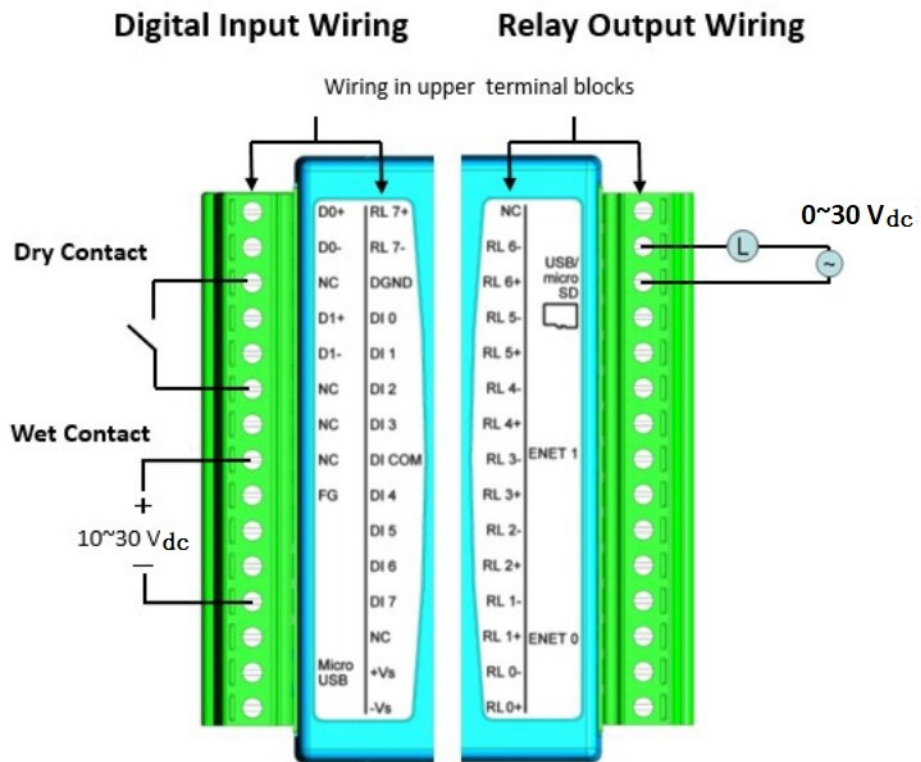


Figure 2.7 ADAM-6760D Digital Input and Relay Output Wiring

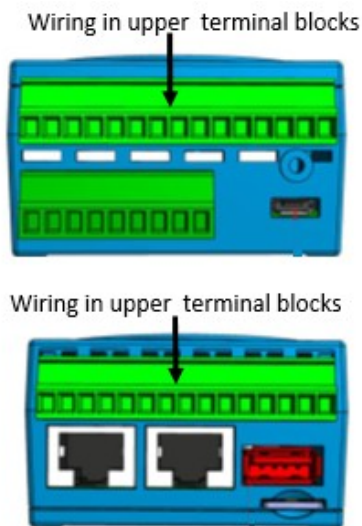


Figure 2.8 ADAM-6760D Digital Input and Relay Output Wiring (Side view)

Chapter 3

System Configuration

System Configuration

Advantech has developed a web portal for configuring the ADAM-6700 series gateways. To access the web portal, users must obtain the IP address of the assigned LAN port. Then open a browser and type the IP address of the LAN port. The default IP setup mode is “DHCP”.

1. If the IP mode is set as “DHCP” and the gateway is connected to the DHCP server, type the IP address of the assigned LAN port.
2. If the IP mode is set as “DHCP”, but the gateway is not connected to the DHCP server, the LAN port will be automatically set to (Eth0)10.0.0.1 and (Eth1) 11.0.0.1
3. If the IP mode is set as “static IP”, input the assigned static IP address.



Figure 3.1 Input the LAN Port IP Address

After inputting the LAN port IP address, the web portal interface should be displayed. Click “Link” to navigate to the web utility configuration page or Node-RED program.



Figure 3.2 Web Portal

Obtain the Gateway IP

To obtain the gateway IP address, connect the LAN port of the ADAM-6700 device to your computer. Then use the ADAM/Apax.NET Utility, version 2.05.11 B19 or later, to obtain the IP address (static or DHCP mode).

1. Enter the ADAM/Apax.NET Utility. Right-click the **Ethernet** icon and click **Search Device**.

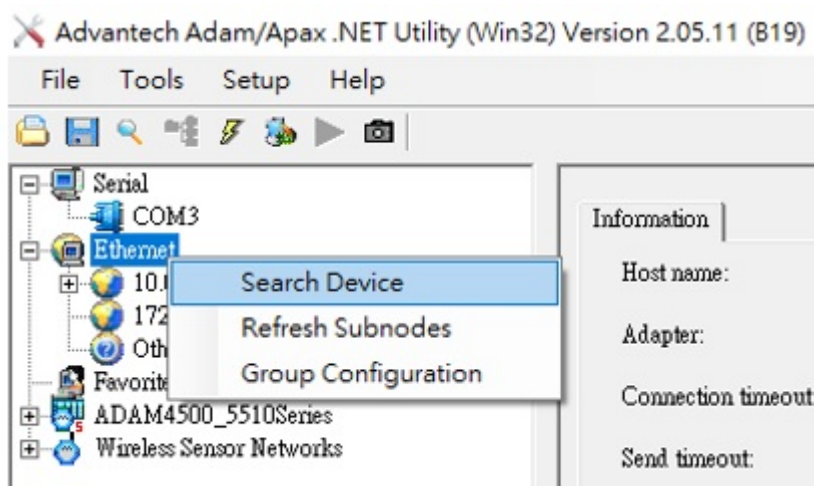


Figure 3.3 Web Utility Searching Devices

2. The ADAM/Apax.NET Utility will list the connected ADAM-6700 gateways and their IP address.

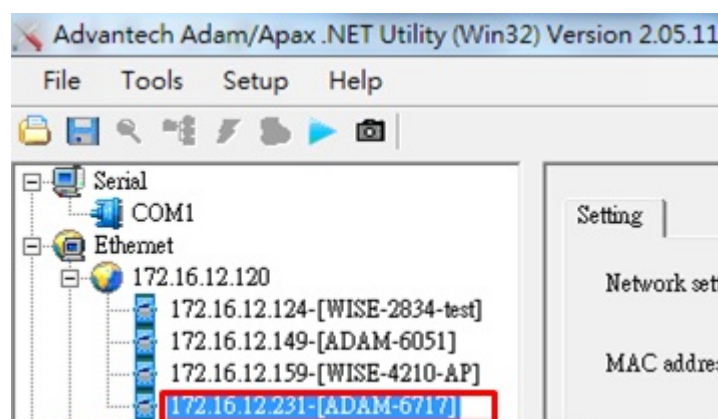


Figure 3.4 Web Utility Obtaining the Gateway IP Address

3.1 Web Utility Configuration

On the Configuration page of the web utility, click “Link”. In the popup window displayed, enter the username and password and click “Sign In”.

Default username: root

Default password: 00000000

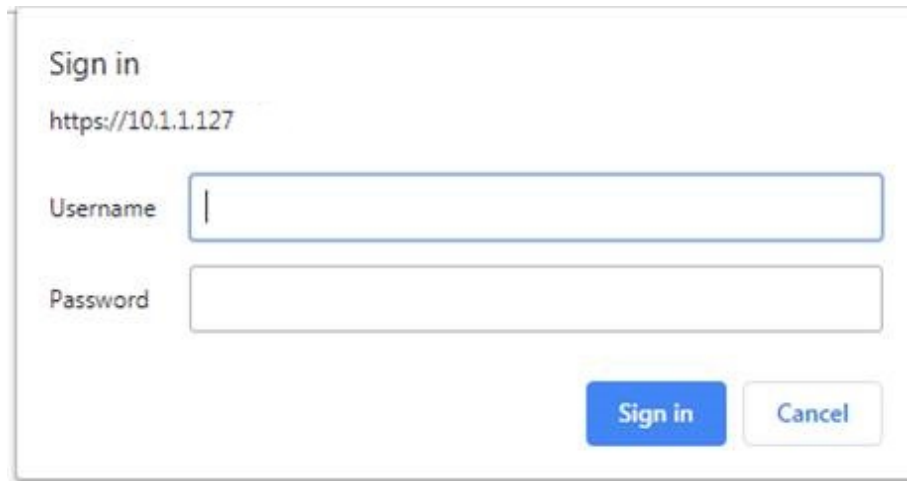


Figure 3.5 Web Utility Login Window

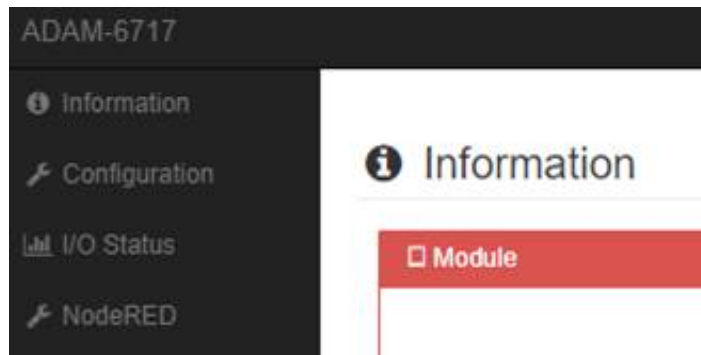


Figure 3.6 Web Utility Configuration Page

3.1.1 Information Settings

The device information, such as the model name and user-defined device name, can be found in the Information tab.

- **Device Information**



Figure 3.7 Device Information

Model Name: Shows the model name.

Customized Name: Shows the user-defined device name. The name can be modified in the configuration tab.

- **Network Information**

Network Information

| | | | |
|-----------|-------------------|---------|--|
| Interface | eth0 | | |
| Mac | 3C:A3:08:60:1A:E7 | | |
| IP | 172.16.12.154 | Subnet | 255.255.254.0 |
| Gateway | 172.16.13.254 | IP Mode | <input type="radio"/> Static <input checked="" type="radio"/> DHCP |
| Interface | eth1 | | |
| Mac | 3C:A3:08:60:1A:E9 | | |
| IP | *** | Subnet | *** |
| Gateway | *** | IP Mode | <input type="radio"/> Static <input checked="" type="radio"/> DHCP |

[Go to Configuration](#)

Figure 3.8 Network Information

Interface: Shows the device LAN port.

Mac: Shows the Mac ID of the LAN port.

Gateway: Shows the gateway IP address.

Subnet: Shows the subnet address.

IP Mode: This item allows users to set the IP Mode as “Static” or “DHCP”.

■ Module Information

| Module Name | Module Description | Firmware Description |
|-------------|-------------------------------------|--|
| ADAM-6717 | 5-ch DI, 4-ch DO and 8-ch AI module | Fw:A1.01 B008, OS:3.12.10-rt15-ti2013.12.01 #48 1.4.4 rev 9324 PREEMPT RT Thu Jan 10 16:10:54 CST 2019 |

Figure 3.9 Module Information

Module Name: Shows the module name.

Module description: Shows the module description.

Firmware Description: Shows the firmware version and system information.

3.1.2 Configuration

■ Information

Configuration

Information | Network | Time & Date | Control | General | Firmware | Account

Information

Module Information

| | | | |
|------------|-----------|-----------------|-----------|
| Model Name | ADAM-6717 | Customized Name | ADAM-6717 |
|------------|-----------|-----------------|-----------|

Figure 3.10 Configuration Information

Customized Name: Define the name in the column and click “submit” to implement the change.

Submit: Click for the changes to take effect.

■ Network

Information Network Time & Date Control General Firmware Account

Network

Interface eth0

Mac FC:69:47:9A:1A:39

IP 172.16.12.231 Subnet 255.255.254.0

Gateway 172.16.13.254 IP Mode Static DHCP

Interface eth1

Mac FC:69:47:9A:1A:3B

IP *** Subnet ***

Gateway *** IP Mode Static DHCP

Submit

Figure 3.11 Network Information

Interface: Shows the network LAN port.

Mac: Shows the Mac ID of the LAN port.

IP: Shows the IP address.

Gateway: Shows the gateway address.

Subnet: Shows the subnet address.

IP Mode: This item allows users to set the IP Mode as “Static” or “DHCP”.

■ Time & Date

Information Network Time & Date Control General Firmware Account

Local Time

Current Time 2019-01-22 13:30:15 +0800

Time Zone (GMT+08:00) Taipei

Time Calibration Click Me...

Figure 3.12 Time & Date Configuration

Current Time: Shows the current time.

Time Zone: Shows the time zone.

Time Calibration: This item allows users to adjust the time and date.

■ Control

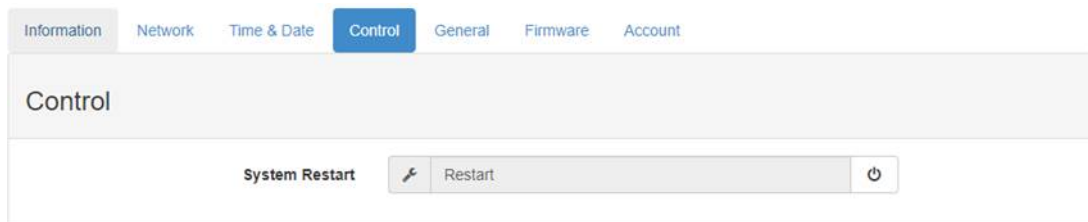


Figure 3.13 Control Tab Page

System Restart: This item allows users to reboot the system.

■ General

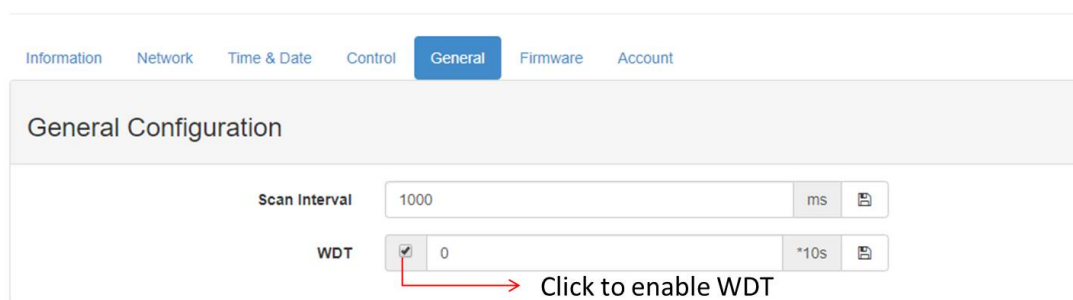
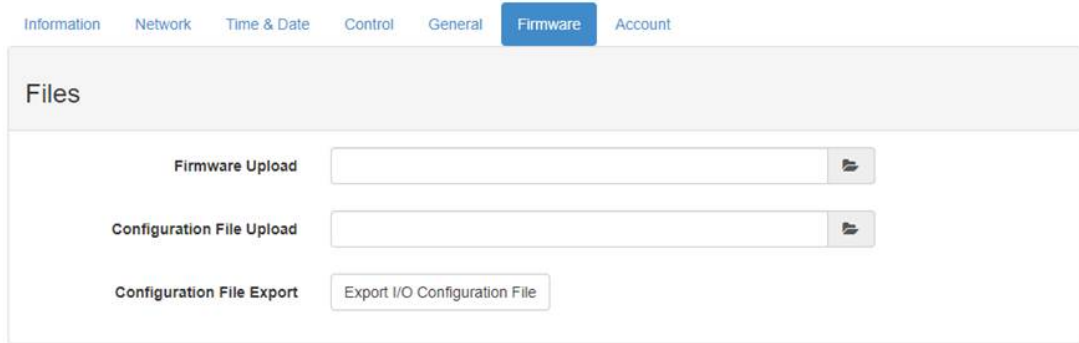


Figure 3.14 General Tab Page

Scan interval: This item allows users to set the time interval for refreshing I/O data

WDT: The system watchdog conducts system checks at regular intervals to ensure normal operation. If the watchdog detects that the system is not running, the device will be automatically rebooted. Click to enable the watchdog (a tick will appear when successfully enabled). Next, set the watchdog timer intervals as multiples of 10 seconds.

■ Firmware



Information Network Time & Date Control General **Firmware** Account

Files

Firmware Upload

Configuration File Upload

Configuration File Export

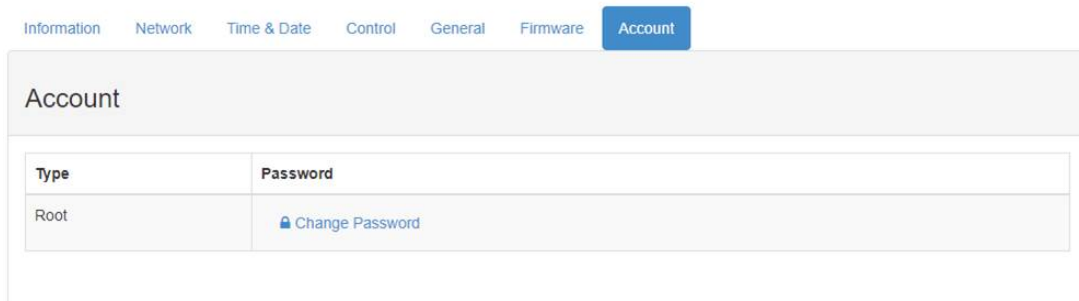
Figure 3.15 Firmware Tab Page

Firmware Upload: Follow the onscreen instructions to update the firmware.

Configuration File Upload: Use this item to import the I/O configuration settings.

Configuration File Export: Use this item to export the I/O configuration settings.

■ Account



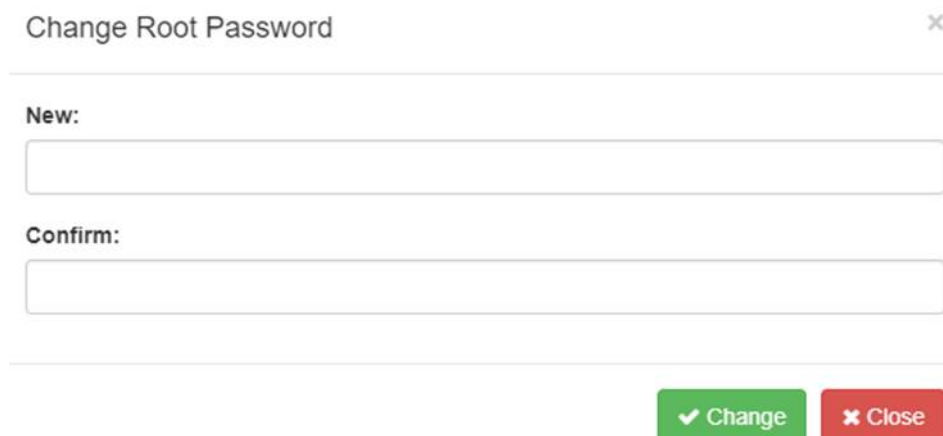
Information Network Time & Date Control General Firmware **Account**

Account

| Type | Password |
|------|---------------------------------|
| Root | Change Password |

Figure 3.16 Account Tab Page

The default password is “00000000”. To change the password, click “Change Password”. The system will display a popup window.



Change Root Password ×

New:

Confirm:

Figure 3.17 Change the Password

Input a new password and click “change”. Wait 30 seconds before logging in again using the new password (the Node-RED program will reboot when the password is changed).

3.2 I/O Status Settings

3.2.1 Analog Input Settings

Status

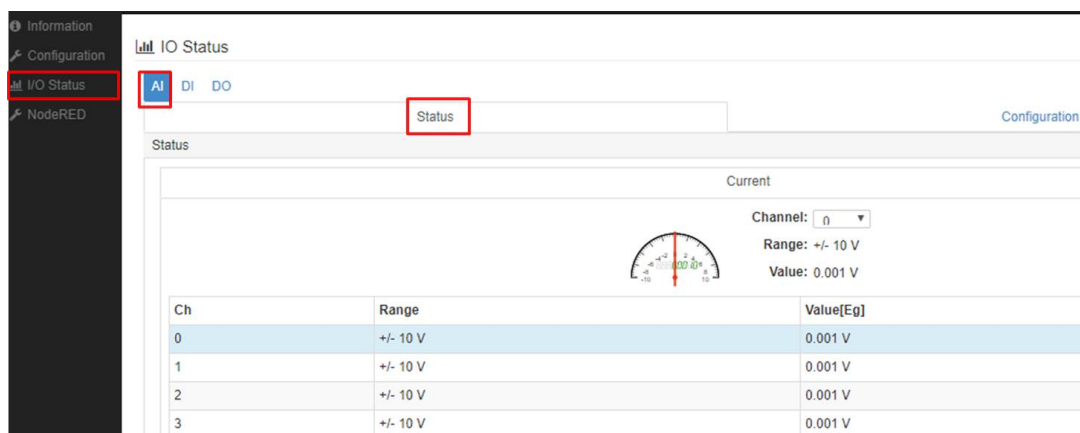


Figure 3.18 Analog Input Status

The Status tab shows the analog input settings, including the input range and values.

Note! *Ensure that the current and voltage input range settings are consistent with the switch settings.*



Channel Settings

| Channel | Range | Parameter |
|---------|----------|-----------|
| 0 | +/- 10 V | En = 1 |
| 1 | +/- 10 V | En = 1 |

Figure 3.19 Analog Input Channel Settings

Channel: Use this item to select the channel for configuration. The “All” option can be used to configure all channels simultaneously.

Range: Use this item to set the analog input range.

Channel Mask: Use this item to enable/disable channel masking (a tick will appear when successfully enabled).

Refresh: Use this item to refresh the channel information.

Submit: Click to make the changes take effect.

Parameter: When the channel is enabled En = 1 and when the channel is disabled En = 0.

Common Settings

| Channel | Enable/Disable |
|---------|-------------------------------------|
| 0 | <input checked="" type="checkbox"/> |
| 1 | <input type="checkbox"/> |

Figure 3.20 Analog Input Common Settings

Filter Mode: Use this item to change the sampling rate. The default mode is 50/60 Hz. Low-speed mode is 10 Hz (total). High speed mode is 100 Hz (total). User-defined mode is not available.

Filter Rate of FSR: Use this item to set the noise filter function. If the value is more than the percentage of the input range, the value will be considered noise + filter.

Software Filter: Use this item to enable/disable the noise filter function.

3.2.2 Digital Input Settings

ADAM-6717



| Channel | Mode | Status |
|---------|------|--------------------------------------|
| 0 | DI | ■ |
| 1 | DI | ■ |
| 2 | DI | ■ |
| 3 | DI | ■ |
| 4 | DI | ■ |

Figure 3.21 ADAM-6717 Digital Input Settings

Status: Shows the status of the digital inputs; green = on, grey = off.

ADAM-6750/6760D

DI Mode Configuration

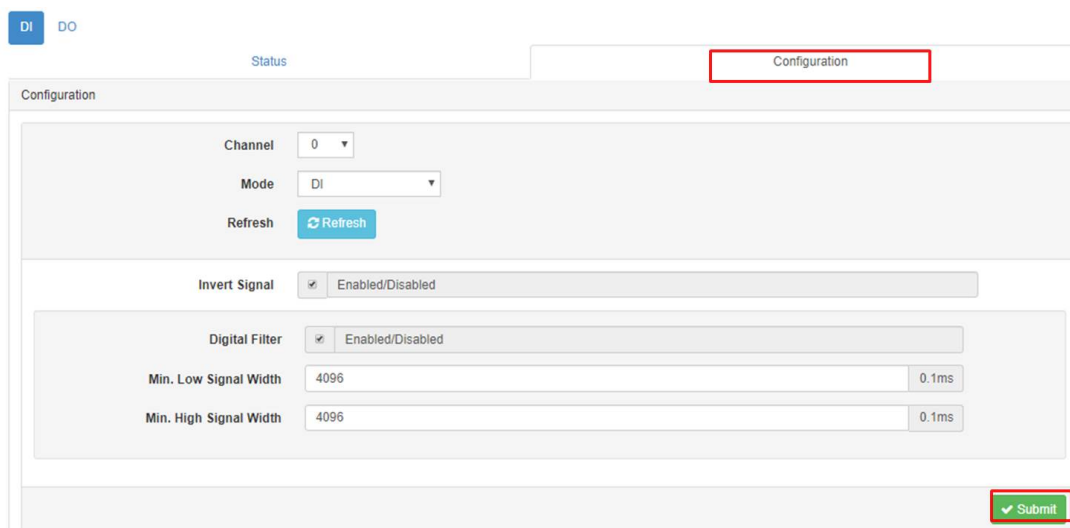


Figure 3.22 ADAM-6750 Digital Input Settings

Channel: Select the channel for configuration

Mode: Use this item to set the digital input mode as “DI”, “counter”, “low-to-high latch”, “high-to-low latch”, or “frequency”.

Refresh: Use this item to refresh the current settings.

Invert Signal: Use this item to enable/disable inversion of DI signals (a tick will appear when enabled).

Digital Filter: Use this item to enable/disable the digital filter (a tick will appear when enabled).

Min. Low Signal Width: Use this item to set the low signal width of the filter as multiples of 0.1 ms.

Min. High Signal Width: Use this item to set the high signal width of the filter as multiples of 0.1ms.

| Channel | Mode | Parameter |
|---------|-------------------|--|
| 0 | Counter | Inv = 0, Fltr = 0, FtHi = 1, FtLo = 1, CntKp = 0 |
| 1 | Frequency | Inv = 0 |
| 2 | DI | Inv = 1, Fltr = 1, FtHi = 4096, FtLo = 4096 |
| 3 | High to Low Latch | Inv = 0 |

Figure 3.23 ADAM-6750 Digital Input Information

Parameter: Shows the channel settings: 1 = enable, 0 = disable, Inv = invert signal, Fltr = filter, FtHi = high signal width, FtLo = low signal width, CntKp = keep last value.

Counter Mode Configuration

The screenshot shows the 'Configuration' page for the Counter mode. The 'Channel' is set to 0, and the 'Mode' is 'Counter'. The 'Refresh' button is highlighted. The 'Invert Signal', 'Digital Filter', and 'Keep Last Value' options are all disabled. The 'Min. Low Signal Width' and 'Min. High Signal Width' are both set to 1, with a 0.1ms multiplier. A green 'Submit' button is at the bottom right.

Figure 3.24 Counter Mode Configuration

Channel: Select the channel for configuration.

Invert Signal: Use this item to enable/disable inversion of DI signals (a tick will appear when enabled).

Digital Filter: Use this item to enable/disable the digital filter (a tick will appear when enabled).

Min. Low Signal Width: Use this item to set the low signal width of the filter as multiples of 0.1 ms.

Min. High Signal Width: Use this item to set the high signal width of the filter as multiples of 0.1 ms.

Keep Last Value: Use this item to enable/disable the keep last value function (a tick will appear when enabled).

Submit: Click to make the changes take effect.

Low-to-High Delay/High-to-Low Latch Configuration

Figure 3.25 Low-to-High Delay/High-to-Low Latch Settings

Invert Signal: Use this item to enable/disable inversion of DI signals (a tick will appear when enabled).

Frequency Mode Configuration

Figure 3.26 Frequency Mode Settings

Invert Signal: Use this item to enable/disable inversion of DI signals (a tick will appear when enabled).

Status

IO Status

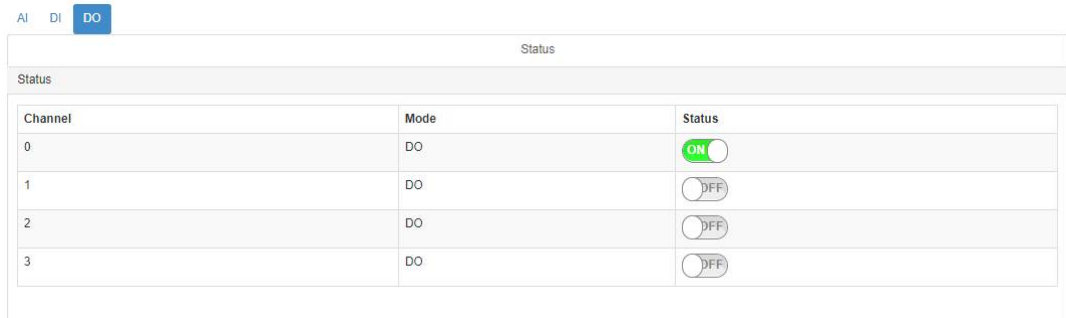
| Channel | Mode | Status |
|---------|-------------------|--|
| 0 | Counter | 8888888888 Start Reset |
| 1 | DI | |
| 2 | DI | |
| 3 | High to Low Latch | Clear |

Figure 3.27 ADAM-6750 Digital Input Status

Mode: Use this item to view and change the channel mode.

3.2.3 Digital Output Settings

ADAM-6717



The screenshot shows a web interface for the ADAM-6717. At the top, there are tabs for 'AI', 'DI', and 'DO', with 'DO' selected. Below the tabs is a 'Status' section containing a table with three columns: 'Channel', 'Mode', and 'Status'. The table lists four channels (0, 1, 2, 3), all with 'DO' mode. Channel 0 is shown as 'ON' with a green indicator, while channels 1, 2, and 3 are shown as 'OFF' with grey indicators.

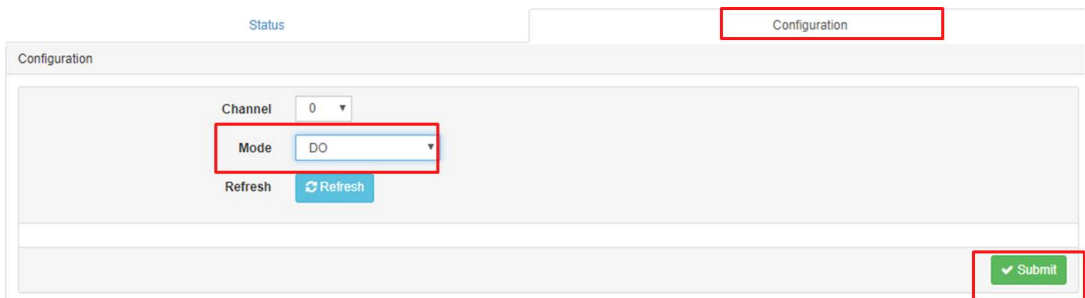
| Channel | Mode | Status |
|---------|------|--------|
| 0 | DO | ON |
| 1 | DO | OFF |
| 2 | DO | OFF |
| 3 | DO | OFF |

Figure 3.28 ADAM-6717 Digital Output Settings

Status: Shows the status of the digital outputs; green = on, grey = off

ADAM-6750/6760D

DO Mode Configuration



The screenshot shows a web interface for the ADAM-6750. At the top, there are tabs for 'Status' and 'Configuration', with 'Configuration' selected. Below the tabs is a 'Configuration' section containing a form with three main elements: a 'Channel' dropdown menu set to '0', a 'Mode' dropdown menu set to 'DO', and a 'Refresh' button. A 'Submit' button is located at the bottom right of the form area.

Figure 3.29 ADAM-6750 Digital Output Settings

Channel: Use this item to select the channel for configuration.

Submit: Click to make the changes take effect.

Pulse Output Mode Configuration

DI DO

Status Configuration

Configuration

Channel 0

Mode Pulse Output

Refresh Refresh

Low Signal Width 1 0.1ms

High Signal Width 1 0.1ms

Output frequency 5000 HZ

Duty cycle 50 %

Submit

Figure 3.30 Pulse Output Mode Settings

Channel: Use this item to select the channel for configuration.

Low Pulse Width: Use this item to set the low pulse width of the filter as multiples of 0.1 ms.

High Pulse Width: Use this item to set the high pulse width of the filter as multiples of 0.1 ms.

Output Frequency: Use this item to set the pulse output frequency:
ADAM-6750: up to 3 kHz

Duty Cycle: Use this item to set the duty cycle.

Submit: Click to make the changes take effect.

Low-to-High Delay/High-to-Low Delay Configuration

DI DO

Status Configuration

Configuration

Channel 3

Mode Low to High Delay

Refresh Refresh

Delay Time 1 0.1ms

Submit

Figure 3.31 Low-to-High Delay/High-to-Low Delay Settings

Channel: Use this item to select the channel for configuration.

Delay Time: Use this item to set the delay time as multiples of 0.1 ms.

Submit: Click to make the changes take effect.

Status

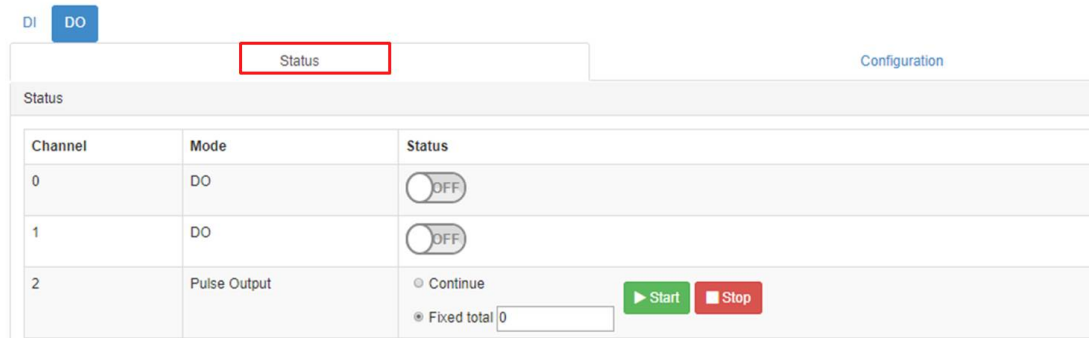


Figure 3.32 ADAM-6750 Digital Output Status

Status: Shows the status of the digital outputs; green = on, grey = off.

Pulse Output: Fixed total => Click “start” to output a specific number of pulses.

Continue => Click “start” to continue to output pulses until the user clicks “stop”.

3.3 Image Updates

The device image contains the operating system files and should be updated to support new functions. The latest image can be downloaded from www.advantech.com. Follow the steps outlined below to update the image.

1. Ensure that the device is turned off. Copy the image file onto a micro SD card and insert the card into the ADAM-6700 micro SD slot.
2. Turn on the device. The Status LED will flash every 0.5 seconds until the image update is complete. At this point, the status LED will flash every 1 second.
3. Turn off the device and remove the micro SD card. The device is now installed with the new image and ready for use.

Note! *After the image update process is complete, a new update.log file will be created on the micro SD card and the advupdate.txt file will be deleted. This is to prevent the system from updating the image again if the micro SD card is left in the slot. To update the image again, first delete the image file on the micro SD card. Then follow the standard steps to update the image, as outlined in Section 3.2.*



3.4 Firmware Updates

The device firmware can be updated using the web utility.

1. In the Firmware tab, click the Firmware Upload icon and select the firmware file xxxx.bin

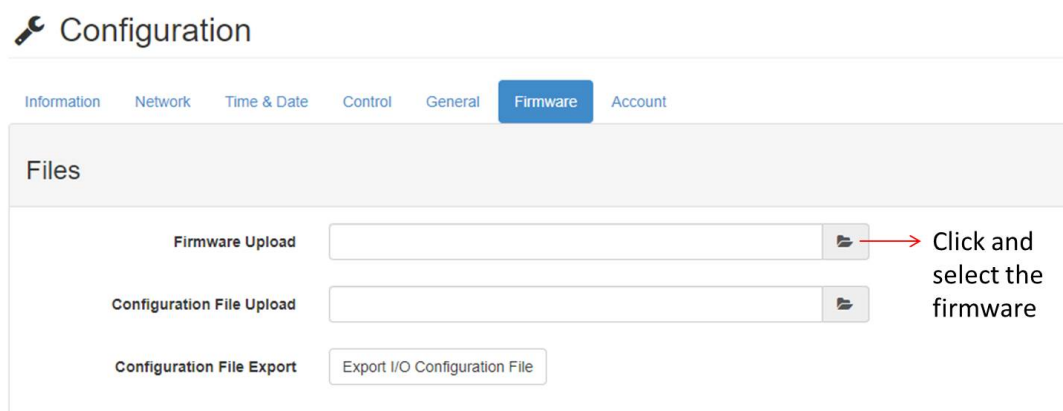


Figure 3.33 Select Firmware File

2. Click the Update icon to start the update, or click the Cancel icon to cancel the process.

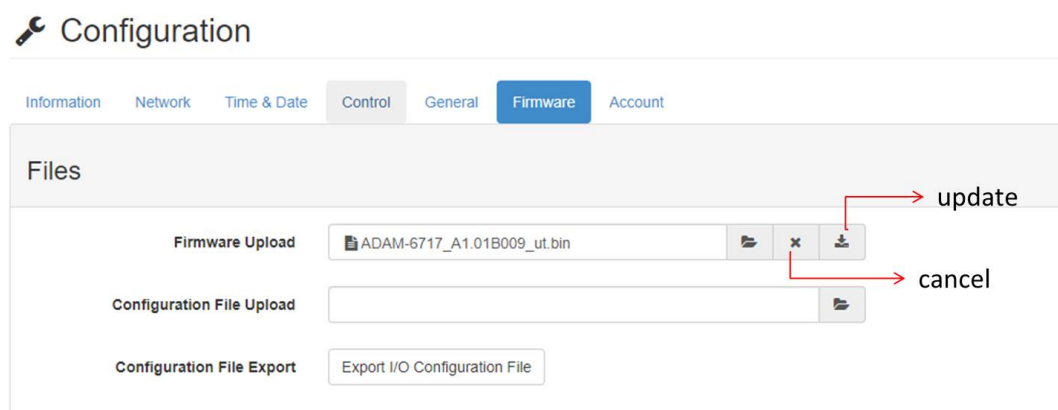


Figure 3.34 Update Firmware

3. Reboot the device to implement the firmware update.

3.5 I/O Configuration Update

To save time when configuring the I/O, the I/O configuration settings can be exported and imported to the device.

1. In the Firmware tab, click the Configuration Upload icon and select the configuration file xxxx.cfg

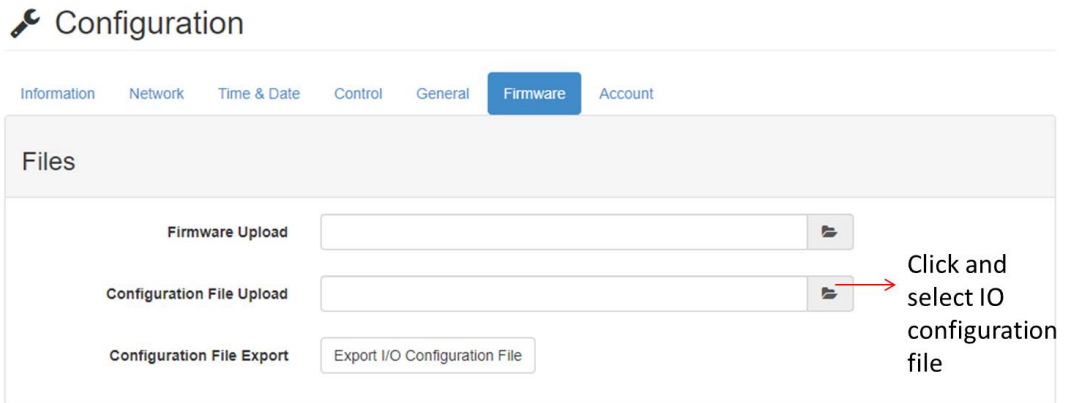


Figure 3.35 Select I/O Configuration File

2. Click the Update icon to start the update, or click the Cancel icon to cancel the process.

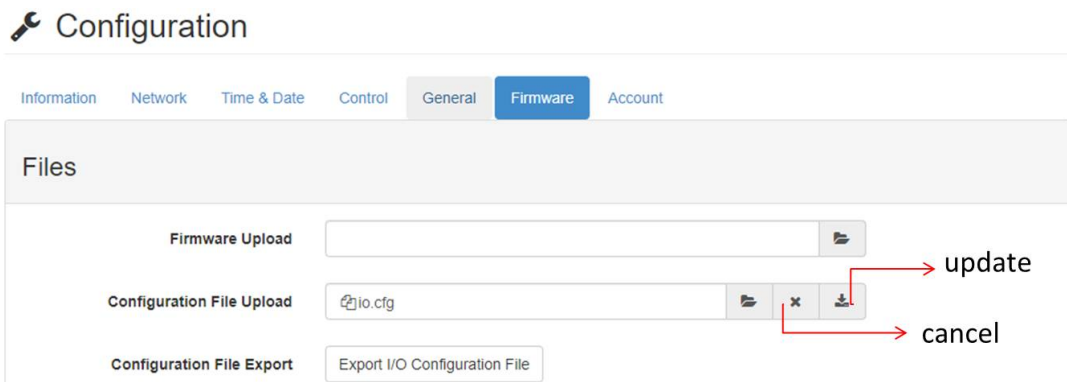


Figure 3.36 Update I/O Configuration

Chapter 4

Node-RED Program

4.1 Node-RED Program

The ADAM-6700 series devices are built in Node-RED, which is a graphical programming environment that allows users to code programs by simply dragging and dropping nodes. User can quickly and easily code programs without needing to know complex high-level programming languages.

Moreover, diverse node resources are available online to suit any application. For more information, visit <https://flows.nodered.org/>.

Note! To achieve the optimum performance of the Node-RED program, close the web utility when using Node-RED.



4.2 Starting the Node-RED Program

Connect the ADAM-6700 series device to your computer. Open a web browser and in the search bar enter the IP address of the LAN port. The web portal interface should be displayed. Click “Link” to navigate to the Node-RED program.



Figure 4.1 Web Portal Utility



Figure 4.2 Click the Node-RED Link

Enter the username and password to login (the username and password will be the same as that for the web portal).

Default username: root

Default password: 00000000



Figure 4.3 Node-RED Login

4.3 Project Creation

After logging into the Node-RED program on the ADAM-6700 series device, users can begin creating projects and coding programs. To connect hardware devices together simply drag nodes from the left-side palette and drop them into the edit area. The node information is shown in the sidebar on the right of the interface. Define the data and flow process by using wires to connect the endpoint of each node. When the flow is finished, click “Deploy” to execute the flow.

Note!



1. When downloading or updating nodes, confirm whether the nodes support Node.js v6.3.1. If the nodes are not compatible with Node.js v6.3.1, Node-RED may crash when the nodes are in operation.
2. If Node-RED crashes due to downloading or updating nodes that are not compatible with Node.js v6.3.1, users will need to clean the flow. Refer to the FAQs on Advantech’s website for instructions on how to clean the flow.

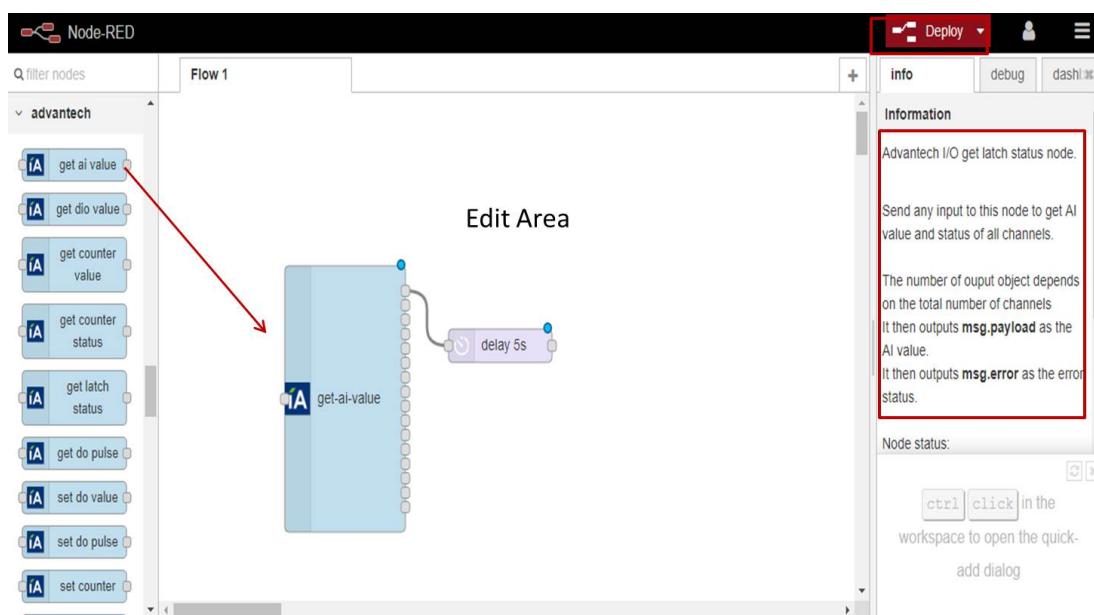


Figure 4.4 Node-RED Project Creation

Users can import sample flows from the library to reduce development time.

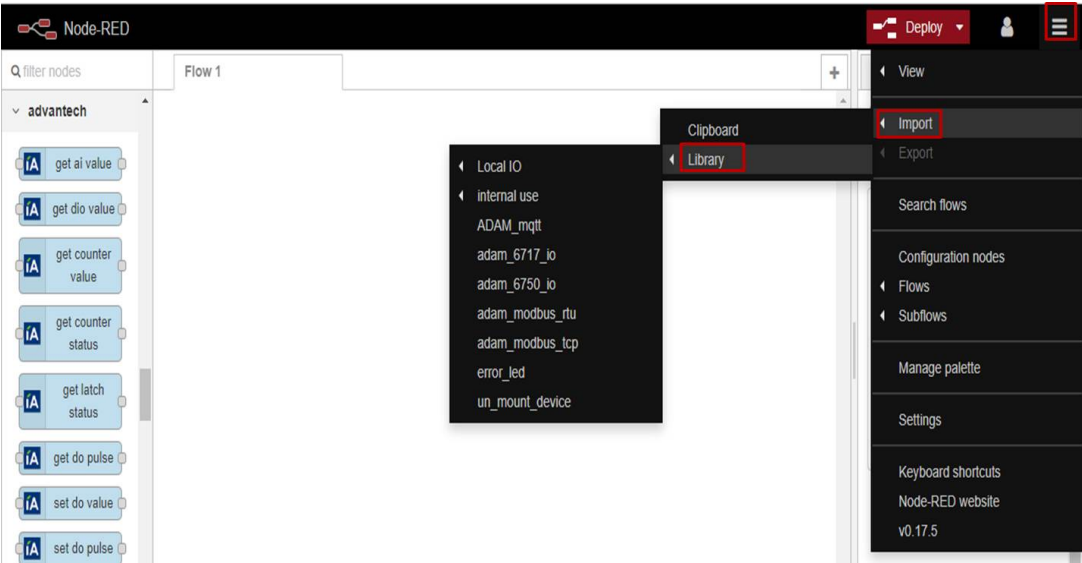


Figure 4.5 Sample Flow Template

Chapter 5

C-Language APIs

5.1 APIs for Development

The ADAM-6700 series gateways offer C-language APIs for easy programming and development. Relevant instructions and software documentation are provided on the Advantech support website at <https://support.advantech.com/support>.

To find the API instructions, simply visit the above link and in the support portal search bar, input the specific ADAM-6700 model (e.g., ADAM-6717, ADAM-6750).

Appendix **A**

Modbus Table

A.1 ADAM-6717: 8AI/5DI/4DO Intelligent I/O Gateway

Address (0X):

| Address 0X | Channel | Description | Attribute |
|------------|---------|-----------------------------|-----------|
| 00001 | 0 | | |
| 00002 | 1 | | |
| 00003 | 2 | DI Value | Read |
| 00004 | 3 | | |
| 00005 | 4 | | |
| 00017 | 0 | | |
| 00018 | 1 | DO Value | R/W |
| 00019 | 2 | | |
| 00020 | 3 | | |
| 00121 | 0 | | |
| 00122 | 1 | | |
| 00123 | 2 | | |
| 00124 | 3 | Open-Circuit Flag (Burnout) | Read |
| 00125 | 4 | | |
| 00126 | 5 | | |
| 00127 | 6 | | |
| 00128 | 7 | | |

Address (4X):

| Address 4X | Ch | Description | Attribute |
|-------------|---------|-----------------------------|-----------|
| 40031~40032 | 0 | | |
| 40033~40034 | 1 | | |
| 40035~40036 | 2 | | |
| 40037~40038 | 3 | | |
| 40039~40040 | 4 | AI Floating Value (IEEE754) | Read |
| 40041~40042 | 5 | | |
| 40043~40044 | 6 | | |
| 40045~40046 | 7 | | |
| 40047~40048 | reserve | | |
| 40201 | 0 | | |
| 40202 | 1 | | |
| 40203 | 2 | | |
| 40204 | 3 | | |
| 40205 | 4 | Type Code | R/W |
| 40206 | 5 | | |
| 40207 | 6 | | |
| 40208 | 7 | | |
| 40209 | reserve | | Read |

| | | | |
|-------|-----|-------------------|------|
| 40211 | | Module Name 1 | Read |
| 40212 | | Module Name 2 | |
| 40221 | All | AI Channel Enable | R/W |

A.2 ADAM-6750 12DI/12DO Intelligent I/O Gateway

| Address (0X): | | | |
|---------------|---------|----------------------------|-----------|
| Address (0x) | Channel | Description | Attribute |
| 0x0001 | 0 | | |
| 0x0002 | 1 | | |
| 0x0003 | 2 | | |
| 0x0004 | 3 | | |
| 0x0005 | 4 | | |
| 0x0006 | 5 | DI Value | Read |
| 0x0007 | 6 | | |
| 0x0008 | 7 | | |
| 0x0009 | 8 | | |
| 0x0010 | 9 | | |
| 0x0011 | 10 | | |
| 0x0012 | 11 | | |
| 0x0017 | 0 | | |
| 0x0018 | 1 | | |
| 0x0019 | 2 | | |
| 0x0020 | 3 | | |
| 0x0021 | 4 | | |
| 0x0022 | 5 | DO Value | R/W |
| 0x0023 | 6 | | |
| 0x0024 | 7 | | |
| 0x0025 | 8 | | |
| 0x0026 | 9 | | |
| 0x0027 | 10 | | |
| 0x0028 | 11 | | |
| 0x0033 | | Counter start (1)/stop (0) | R/W |
| 0x0034 | 0 | Clear Counter (1) | Write |
| 0x0035 | | reserve | R/W |
| 0x0036 | | DI latch status | R/W |
| 0x0037 | | Counter start (1)/stop (0) | R/W |
| 0x0038 | 1 | Clear Counter (1) | Write |
| 0x0039 | | reserve | R/W |
| 0x0040 | | DI latch status | R/W |

| | | | |
|--------|----|----------------------------|-------|
| 0x0041 | | Counter start (1)/stop (0) | R/W |
| 0x0042 | 2 | Clear Counter (1) | Write |
| 0x0043 | | reserve | R/W |
| 0x0044 | | DI latch status | R/W |
| 0x0045 | | Counter start (1)/stop (0) | R/W |
| 0x0046 | 3 | Clear Counter (1) | Write |
| 0x0047 | | reserve | R/W |
| 0x0048 | | DI latch status | R/W |
| 0x0049 | | Counter start (1)/stop (0) | R/W |
| 0x0050 | 4 | Clear Counter (1) | Write |
| 0x0051 | | reserve | R/W |
| 0x0052 | | DI latch status | R/W |
| 0x0053 | | Counter start (1)/stop (0) | R/W |
| 0x0054 | 5 | Clear Counter (1) | Write |
| 0x0055 | | reserve | R/W |
| 0x0056 | | DI latch status | R/W |
| 0x0057 | | Counter start (1)/stop (0) | R/W |
| 0x0058 | 6 | Clear Counter (1) | Write |
| 0x0059 | | reserve | R/W |
| 0x0060 | | DI latch status | R/W |
| 0x0061 | | Counter start (1)/stop (0) | R/W |
| 0x0062 | 7 | Clear Counter (1) | Write |
| 0x0063 | | reserve | R/W |
| 0x0064 | | DI latch status | R/W |
| 0x0065 | | Counter start (1)/stop (0) | R/W |
| 0x0066 | 8 | Clear Counter (1) | Write |
| 0x0067 | | reserve | R/W |
| 0x0068 | | DI latch status4 | R/W |
| 0x0069 | | Counter start (1)/stop (0) | R/W |
| 0x0070 | 9 | Clear Counter (1) | Write |
| 0x0071 | | reserve | R/W |
| 0x0072 | | DI latch status | R/W |
| 0x0073 | | Counter start (1)/stop (0) | R/W |
| 0x0074 | 10 | Clear Counter (1) | Write |
| 0x0075 | | reserve | R/W |
| 0x0076 | | DI latch status | R/W |
| 0x0077 | | Counter start (1)/stop (0) | R/W |
| 0x0078 | 11 | Clear Counter (1) | Write |
| 0x0079 | | reserve | R/W |
| 0x0080 | | DI latch status | R/W |

| Address (4X): | | | |
|----------------------|----------------|------------------------------|------------------|
| Address (4x) | Channel | Description | Attribute |
| 4x0001 4x0002 | 0 | | |
| 4x0003 4x0004 | 1 | | |
| 4x0005 4x0006 | 2 | | |
| 4x0007 4x0008 | 3 | | |
| 4x0009 4x0010 | 4 | | |
| 4x0011 4x0012 | 5 | Counter/Frequency Value | Read |
| 4x0013 4x0014 | 6 | | |
| 4x0015 4x0016 | 7 | | |
| 4x0017 4x0018 | 8 | | |
| 4x0019 4x0020 | 9 | | |
| 4x0021 4x0022 | 10 | | |
| 4x0023 4x0024 | 11 | | |
| 4x0025 4x0026 | 0 | | |
| 4x0027 4x0028 | 1 | | |
| 4x0029 4x0030 | 2 | | |
| 4x0031 4x0032 | 3 | | |
| 4x0033 4x0034 | 4 | | |
| 4x0035 4x0036 | 5 | Pulse output Low-level width | Read |
| 4x0037 4x0038 | 6 | | |
| 4x0039 4x0040 | 7 | | |
| 4x0041 4x0042 | 8 | | |
| 4x0043 4x0044 | 9 | | |
| 4x0045 4x0046 | 10 | | |
| 4x0047 4x0048 | 11 | | |

| | | | |
|--------|-----|-------------------------------|------|
| 4x0049 | 0 | | |
| 4x0050 | | | |
| 4x0051 | 1 | | |
| 4x0052 | | | |
| 4x0053 | 2 | | |
| 4x0054 | | | |
| 4x0055 | 3 | | |
| 4x0056 | | | |
| 4x0057 | 4 | | |
| 4x0058 | | | |
| 4x0059 | 5 | | |
| 4x0060 | | Pulse output High-level width | Read |
| 4x0061 | 6 | | |
| 4x0062 | | | |
| 4x0063 | 7 | | |
| 4x0064 | | | |
| 4x0065 | 8 | | |
| 4x0066 | | | |
| 4x0067 | 9 | | |
| 4x0068 | | | |
| 4x0069 | 10 | | |
| 4x0070 | | | |
| 4x0071 | 11 | | |
| 4x0072 | | | |
| 4x0211 | All | Module name 1 | Read |
| 4x0212 | All | Module name 2 | |
| 4x0301 | All | DI Value | Read |
| 4x0303 | All | DO Value | R/W |

A.3 ADAM-6760D: 8SSR Relay/8 DI Intelligent I/O Gateway

| Address (0X): | | | |
|---------------|---------|----------------------------|-----------|
| Address (0x) | Channel | Description | Attribute |
| 0x0001 | 0 | | |
| 0x0002 | 1 | | |
| 0x0003 | 2 | | |
| 0x0004 | 3 | | |
| 0x0005 | 4 | DI Value | Read |
| 0x0006 | 5 | | |
| 0x0007 | 6 | | |
| 0x0008 | 7 | | |
| | | | |
| 0x0017 | 0 | | |
| 0x0018 | 1 | | |
| 0x0019 | 2 | | |
| 0x0020 | 3 | | |
| 0x0021 | 4 | SSR Value | R/W |
| 0x0022 | 5 | | |
| 0x0023 | 6 | | |
| 0x0024 | 7 | | |
| | | | |
| 0x0033 | | Counter start (1)/stop (0) | R/W |
| 0x0034 | 0 | Clear Counter (1) | Write |
| 0x0035 | | reserve | R/W |
| 0x0036 | | DI latch status | R/W |
| 0x0037 | | Counter start (1)/stop (0) | R/W |
| 0x0038 | 1 | Clear Counter (1) | Write |
| 0x0039 | | reserve | R/W |
| 0x0040 | | DI latch status | R/W |
| 0x0041 | | Counter start (1)/stop (0) | R/W |
| 0x0042 | 2 | Clear Counter (1) | Write |
| 0x0043 | | reserve | R/W |
| 0x0044 | | DI latch status | R/W |
| 0x0045 | | Counter start (1)/stop (0) | R/W |
| 0x0046 | 3 | Clear Counter (1) | Write |
| 0x0047 | | reserve | R/W |
| 0x0048 | | DI latch status | R/W |
| 0x0049 | | Counter start (1)/stop (0) | R/W |
| 0x0050 | 4 | Clear Counter (1) | Write |
| 0x0051 | | reserve | R/W |
| 0x0052 | | DI latch status | R/W |

| | | | |
|--------|---|----------------------------|-------|
| 0x0053 | | Counter start (1)/stop (0) | R/W |
| 0x0054 | 5 | Clear Counter (1) | Write |
| 0x0055 | | reserve | R/W |
| 0x0056 | | DI latch status | R/W |
| 0x0057 | | Counter start (1)/stop (0) | R/W |
| 0x0058 | 6 | Clear Counter (1) | Write |
| 0x0059 | | reserve | R/W |
| 0x0060 | | DI latch status | R/W |
| 0x0061 | | Counter start (1)/stop (0) | R/W |
| 0x0062 | 7 | Clear Counter (1) | Write |
| 0x0063 | | reserve | R/W |
| 0x0064 | | DI latch status | R/W |

Address (4X):

| Address (4x) | channel | Description | Attribute |
|--------------|---------|------------------------------|-----------|
| 4x0001 | 0 | | |
| 4x0002 | | | |
| 4x0003 | 1 | | |
| 4x0004 | | | |
| 4x0005 | 2 | | |
| 4x0006 | | | |
| 4x0007 | 3 | | |
| 4x0008 | | Counter/Frequency Value | Read |
| 4x0009 | 4 | | |
| 4x0010 | | | |
| 4x0011 | 5 | | |
| 4x0012 | | | |
| 4x0013 | 6 | | |
| 4x0014 | | | |
| 4x0015 | 7 | | |
| 4x0016 | | | |
| 4x0025 | 0 | | |
| 4x0026 | | | |
| 4x0027 | 1 | | |
| 4x0028 | | | |
| 4x0029 | 2 | | |
| 4x0030 | | | |
| 4x0031 | 3 | | |
| 4x0032 | | Pulse output Low-level width | Read |
| 4x0033 | 4 | | |
| 4x0034 | | | |
| 4x0035 | 5 | | |
| 4x0036 | | | |
| 4x0037 | 6 | | |
| 4x0038 | | | |
| 4x0039 | 7 | | |
| 4x0040 | | | |

| | | | |
|--------|-----|-------------------------------|------|
| 4x0049 | 0 | | |
| 4x0050 | | | |
| 4x0051 | 1 | | |
| 4x0052 | | | |
| 4x0053 | 2 | | |
| 4x0054 | | | |
| 4x0055 | 3 | | |
| 4x0056 | | Pulse output High-level width | Read |
| 4x0057 | 4 | | |
| 4x0058 | | | |
| 4x0059 | 5 | | |
| 4x0060 | | | |
| 4x0061 | 6 | | |
| 4x0062 | | | |
| 4x0063 | 7 | | |
| 4x0064 | | | |
| 4x0211 | All | Module name 1 | Read |
| 4x0212 | All | Module name 2 | |
| 4x0301 | All | DI Value | Read |
| 4x0303 | All | DO Value | R/W |

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