

AIG-302 Series User Manual

Version 1.0, May 2024

www.moxa.com/products

MOXA[®]

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AIG-302 Series User Manual

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1. Introduction

Overview

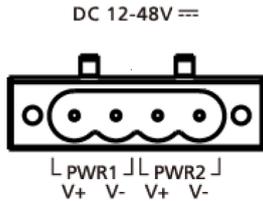
The AIG-302 Series advanced IIoT gateways are designed for Industrial IoT applications and meticulously tailored to excel in challenging operating environments commonly found in distributed and unmanned sites. This series seamlessly integrates Modbus RTU/TCP master/client protocols, streamlining the collection of data from Modbus devices. Additionally, the AIG-302 Series comes preloaded with Azure IoT Edge, Azure IoT device, and MQTT, ensuring a seamless integration process and providing a secure sensor-to-cloud connectivity solution for efficient data acquisition.

The AIG QuickON utility simplifies the device provisioning process, and the Moxa DLM Service offers a solution to further streamline operations for efficient remote device management.

2. Getting Started

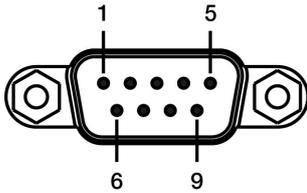
Connecting the Power

Connect the power jack (in the package) to the DC terminal block (located on the top panel), and then connect to a power line with range 12 to 48 VDC. It takes about 3 minutes for the system to boot up. Once the system is ready, the USR LED will light up. All models support dual power inputs for redundancy.



Connecting Serial Devices

The AIG device supports connecting to Modbus serial devices. The serial port uses the DB9 male connector and can be configured by software for the RS-232, RS-422, or RS-485 mode. The pin assignment of the port is shown below:



| Pin | RS-232 | RS-422 | RS-485 |
|-----|--------|---------|----------|
| 1 | - | TxD-(A) | - |
| 2 | RxD | TxD+(B) | - |
| 3 | TxD | RxD+(B) | Data+(B) |
| 4 | DTR | RxD-(A) | Data-(A) |
| 5 | GND | GND | GND |
| 6 | DSR | - | - |
| 7 | RTS | - | - |
| 8 | CTS | - | - |
| 9 | - | - | - |

Connecting to a Network

Connect one end of the Ethernet cable to the AIG's 10/100/1000M Ethernet port and the other end of the cable to the Ethernet network. The AIG will show a valid connection to the Ethernet by LAN1/LAN2 maintaining solid green/yellow color. For details on the behavior of the LEDs, refer to the *AIG-302 Series Quick Installation Guide*.

Access to the Web Console

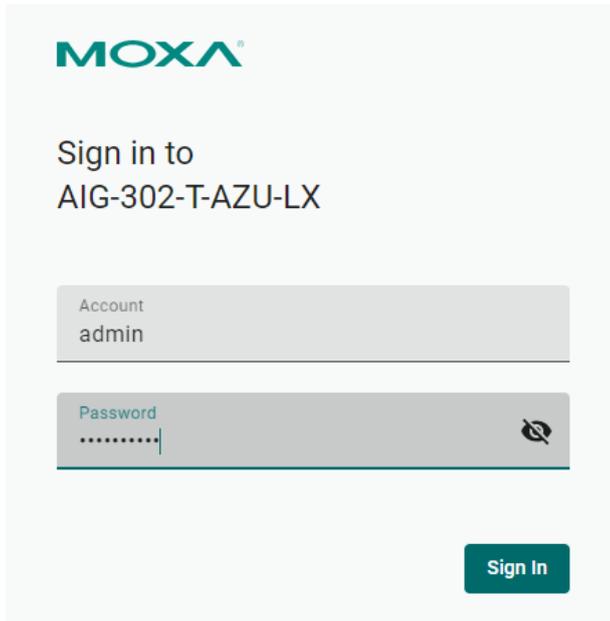
The default LAN2 IP address to access the web console of the AIG is 192.168.4.127.

When you use the default IP address to access the AIG, do the following:

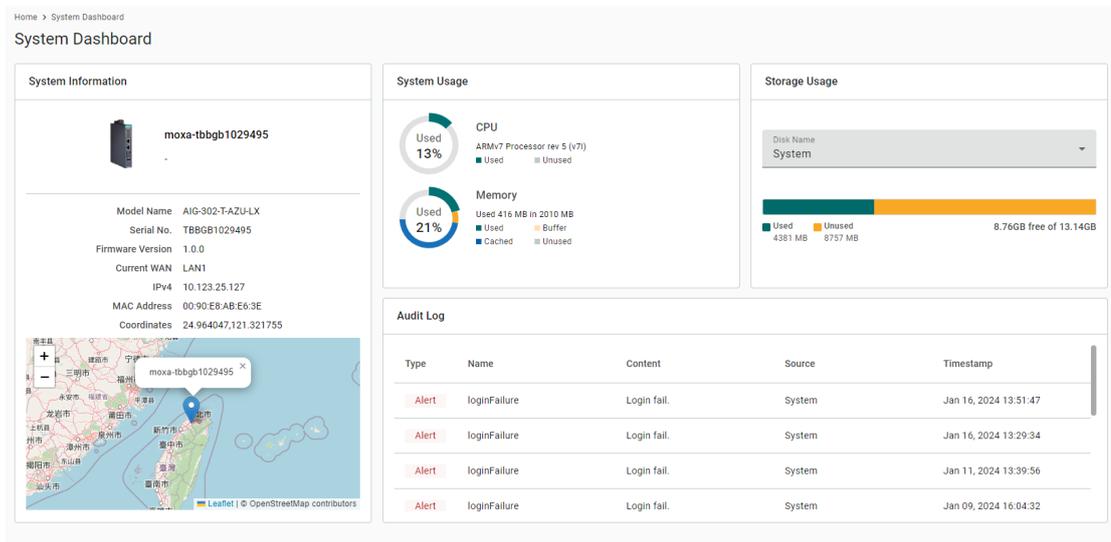
1. Ensure your host and the AIG are in the same subnet (AIG's default subnet mask is 255.255.255.0). Connect to LAN2 and enter **https://192.168.4.127:8443** in your web browser.
2. Read the system notification and click **Agree and Continue**.
3. Enter the account and password information.

Default account: **admin**

Password: **admin@123**



You will see the following homepage after logging in successfully.



Home > System Dashboard

System Dashboard

System Information

moxa-tbbgb1029495

Model Name AIG-302-T-AZU-LX
Serial No. TBBGB1029495
Firmware Version 1.0.0
Current WAN LAN1
IPv4 10.123.25.127
MAC Address 00:90:E8:AB:E6:3E
Coordinates 24.964047,121.321755



System Usage

CPU
ARMv7 Processor rev 5 (v7I)
Used 13%

Memory
Used 416 MB in 2010 MB
Used 21%
Cached 8757 MB

Storage Usage

Disk Name System

Used 4381 MB | Unused 8757 MB | 8.766GB free of 13.14GB

Audit Log

| Type | Name | Content | Source | Timestamp |
|-------|--------------|-------------|--------|-----------------------|
| Alert | loginFailure | Login fail. | System | Jan 16, 2024 13:51:47 |
| Alert | loginFailure | Login fail. | System | Jan 16, 2024 13:29:34 |
| Alert | loginFailure | Login fail. | System | Jan 11, 2024 13:39:56 |
| Alert | loginFailure | Login fail. | System | Jan 09, 2024 16:04:32 |



NOTE

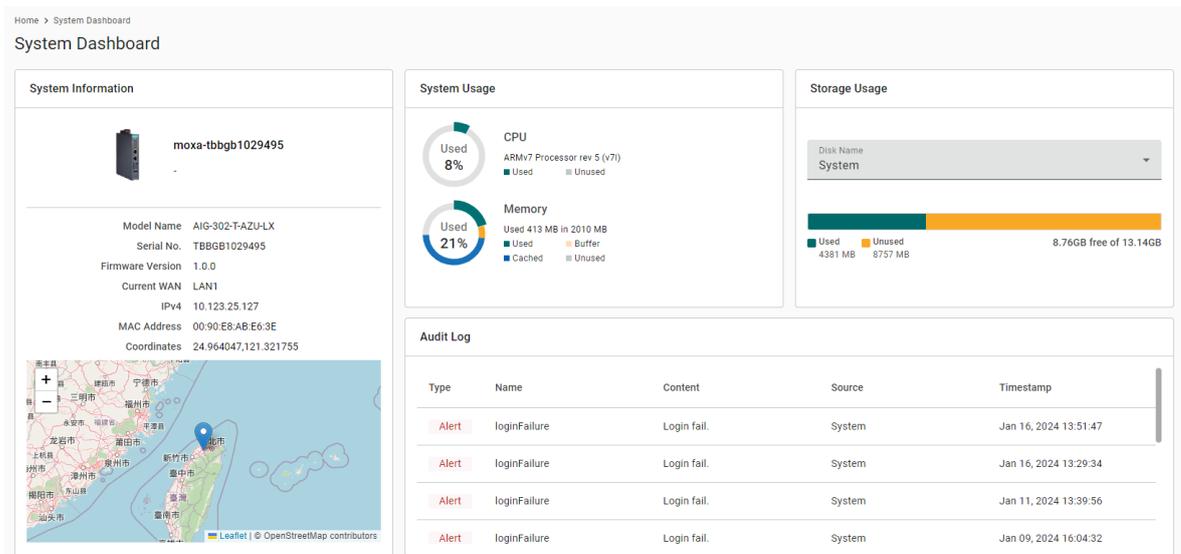
After the first login, we force a password change to comply with general security policies and practices and to increase the security of your device.

3. Web Console

Dashboard

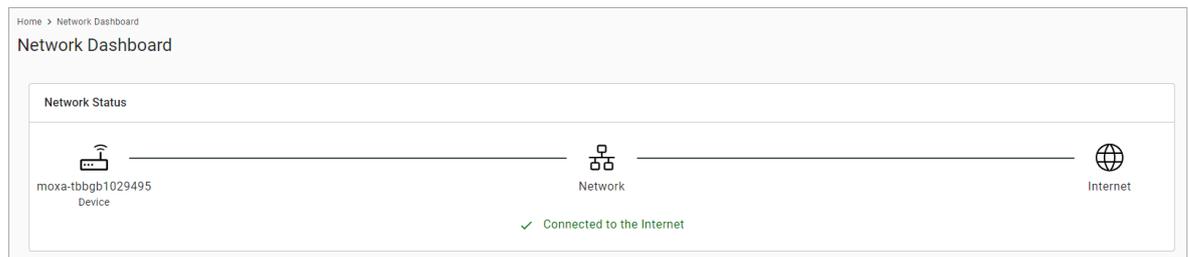
System Dashboard

This page gives you an overview of the gateway's system status. Basic system information such as model name, serial No., firmware version, system usage, storage usage, and audit log are displayed.



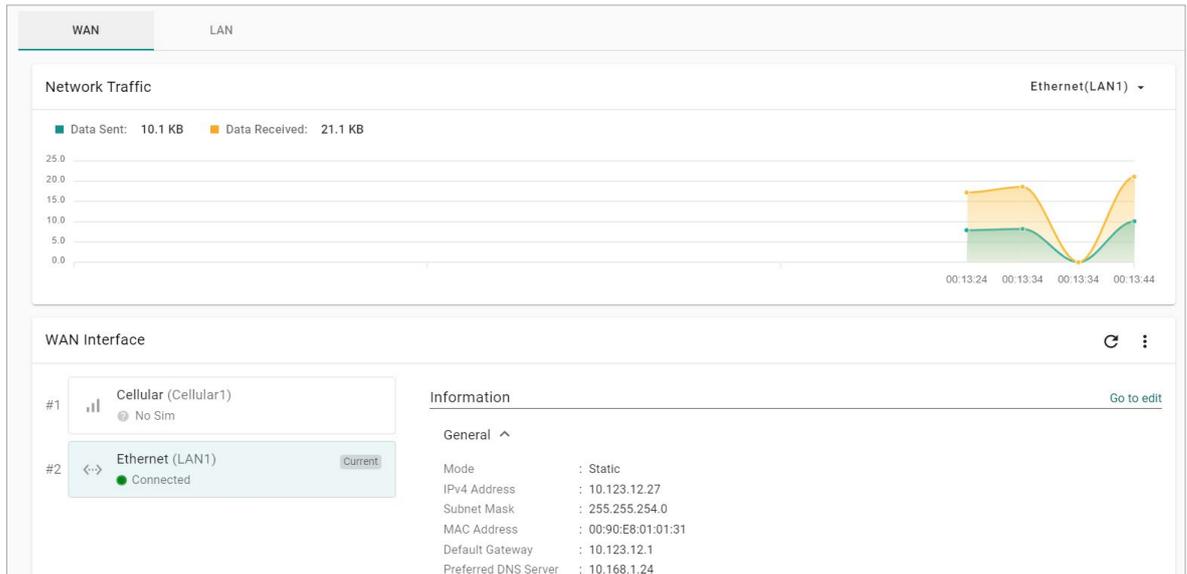
Network Dashboard

This dashboard displays information on the WAN and LAN interfaces and the network traffic passing through the interfaces. Network Status shows whether the gateway can connect to the Internet.



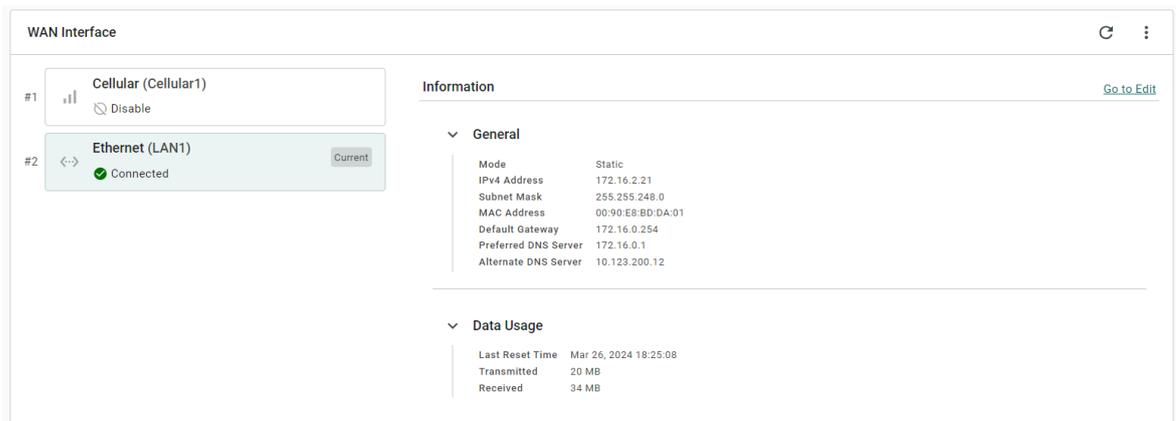
WAN

WAN displays information of the data sent and received through the WAN interfaces. You can select the interface that you want to monitor. In addition, other details on the usage of the WAN interfaces are displayed on the page. The information is refreshed every 10 seconds.



LAN

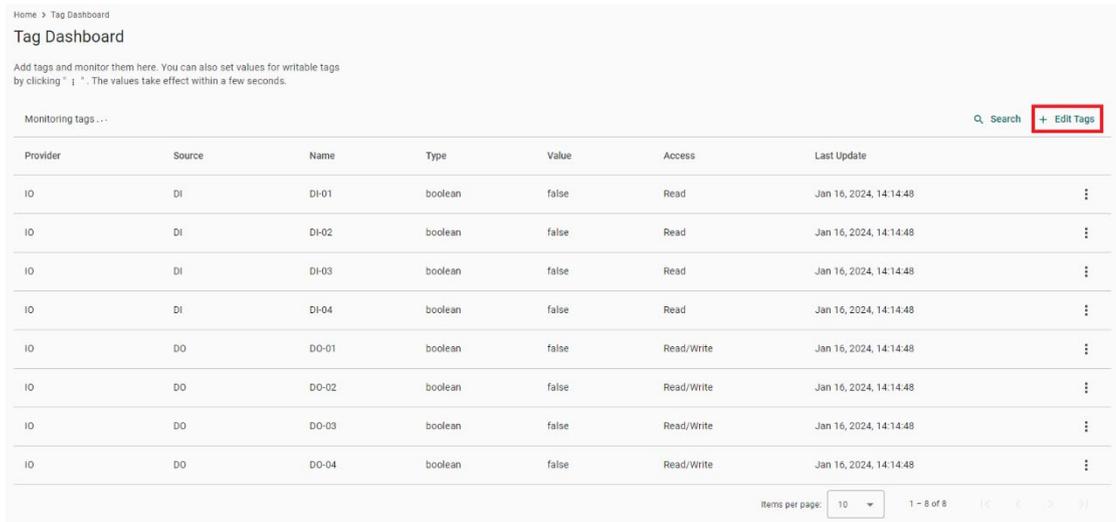
Information on the LAN interfaces is organized under the **LAN** tab and includes information on the usage of the interfaces and the traffic passing through them.



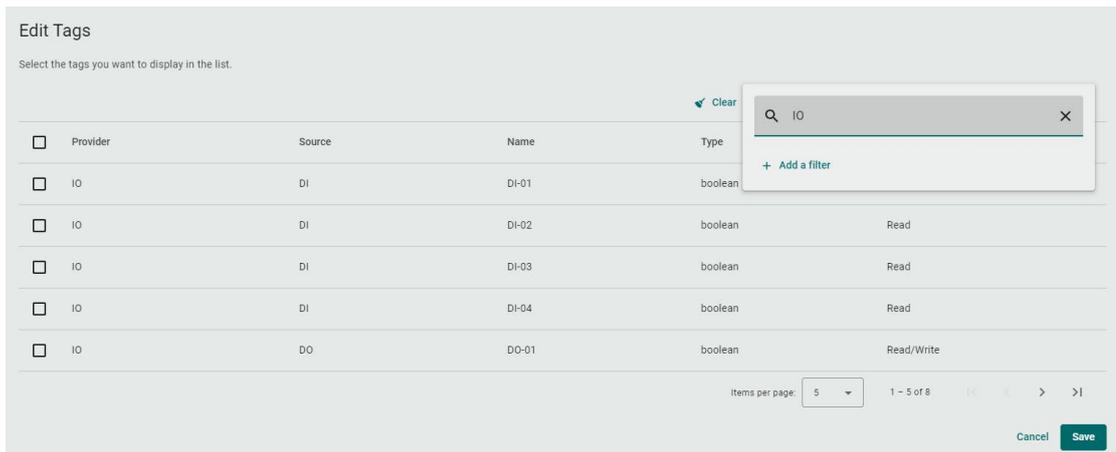
Tag Dashboard

In this page, you can create and monitor the real-time tag value for troubleshooting purposes. To see the tag's real-time value, do the following steps:

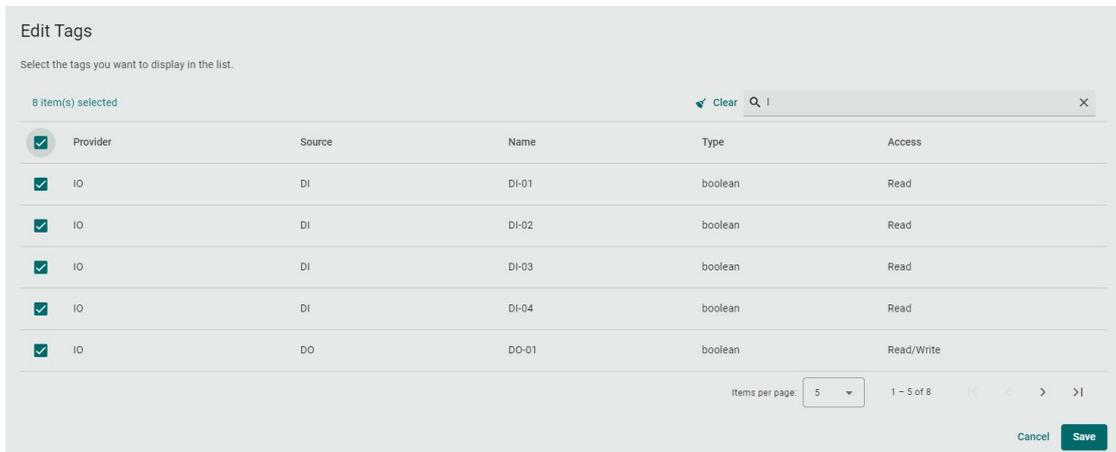
1. Click **+ Edit Tags**.



2. (Optional) use Search to find the tags quickly.



3. Select the tags to monitor in the list.



4. Click **Save**.

- (Optional) press the icon to deactivate the monitoring tags.

Home > Tag Dashboard

Tag Dashboard

Add tags and monitor them here. You can also set values for writable tags by clicking "Write value". The values take effect within a few seconds.

Monitoring tags ... Q Search + Edit Tags

| Provider | Source | Name | Type | Value | Access | Last Update | |
|----------|--------|-------|---------|-------|------------|------------------------|---|
| IO | DI | DI-01 | boolean | false | Read | Jan 16, 2024, 14:14:48 | ⋮ |
| IO | DI | DI-02 | boolean | false | Read | Jan 16, 2024, 14:14:48 | ⋮ |
| IO | DI | DI-03 | boolean | false | Read | Jan 16, 2024, 14:14:48 | ⋮ |
| IO | DI | DI-04 | boolean | false | Read | Jan 16, 2024, 14:14:48 | ⋮ |
| IO | DO | DO-01 | boolean | false | Read/Write | Jan 16, 2024, 14:14:48 | ⋮ |
| IO | DO | DO-02 | boolean | false | Read/Write | Jan 16, 2024, 14:14:48 | ⋮ |
| IO | DO | DO-03 | boolean | false | Read/Write | Jan 16, 2024, 14:14:48 | ⋮ |
| IO | DO | DO-04 | boolean | false | Read/Write | Jan 16, 2024, 14:14:48 | ⋮ |

Items per page: 10 1 - 8 of 8

- (Optional) press the icon to write value for test purposes.

Home > Tag Dashboard

Tag Dashboard

Add tags and monitor them here. You can also set values for writable tags by clicking "Write value". The values take effect within a few seconds.

Monitoring tags ... Q Search + Edit Tags

| Provider | Source | Name | Type | Value | Access | Last Update | |
|----------|--------|-------|---------|-------|------------|------------------------|---|
| IO | DI | DI-01 | boolean | false | Read | Jan 16, 2024, 14:14:48 | ⋮ |
| IO | DI | DI-02 | boolean | false | Read | Jan 16, 2024, 14:14:48 | ⋮ |
| IO | DI | DI-03 | boolean | false | Read | Jan 16, 2024, 14:14:48 | ⋮ |
| IO | DI | DI-04 | boolean | false | Read | Jan 16, 2024, 14:14:48 | ⋮ |
| IO | DO | DO-01 | boolean | false | Read/Write | Jan 16, 2024, 14:14:48 | ⋮ |
| IO | DO | DO-02 | boolean | false | Read/Write | Jan 16, 2024, 14:14:48 | ⋮ |
| IO | DO | DO-03 | boolean | false | Read/Write | Jan 16, 2024, 14:14:48 | ⋮ |
| IO | DO | DO-04 | boolean | false | Read/Write | Jan 16, 2024, 14:14:48 | ⋮ |

Items per page: 10 1 - 8 of 8

Security Dashboard

On this page, you will find a tool that checks the security status of the gateway. Clicking the Scan button initiates the process of identifying potential security risks. Subsequently, you can use the results to configure the gateway and eliminate any identified cyber security threat. Refer to the hardening guide for your product for details.

Home > Security Dashboard

Security Dashboard

 The system's security check is up to date.
Last scanned: Jan 16, 2024 17:00:47 [Generate Report](#) [Scan](#)

-  Account Setting ▼
-  Application Networking 1 issue found ▼
-  Application Resource Usage ▼
-  Product Certificate Deployment ▼

 Service Setting 4 issues found ▲

| Status | Security check | Risk |
|---|---|--------|
|  | Discovery Service should not be enabled. | High |
|  | SSH Service should not be enabled. | High |
|  | Serial Console Service should not be enabled. | High |
|  | Account Lock Service should be enabled. | High |
|  | System Use Notification should be enabled. | Medium |

| Parameter | Value | Description |
|---|-------|--------------------------------|
|  | Pass | No risks. |
|  | Info | There are low-risk failures |
|  | Warn | There are medium-risk failures |
|  | Alert | There are high-risk failures |

| Category | Security Check Criteria | Threat mitigation / handling |
|----------------------------|--|---|
| Account Setting | Password should be changed within the set time. | Go to Account Management > Accounts to change the password. |
| | An account should only have one session active. | Go to Security > Session Management to monitor and manage concurrent sessions. |
| | An account should not have abnormal connections (more than one session and with different source IPs). | |
| Application Networking | System should not have open network ports. | Go to Security > Firewall and check the allow list. |
| Application Resource Usage | IoT Edge modules should not utilize system disk's configurable space. | To ensure the IoT Edge modules are deployed in the specific path /var/run/ and /tmp/ in the system storage. |
| | IoT Edge modules should not utilize system disk's non-configurable space. | |
| | IoT Edge modules should not be directly granted privileges. | To grant permissions to the IoT Edges, go to Cloud Connectivity > Azure IoT Edge > Module Permission , and create a service account and grant the required permissions to the IoT Edge module. |

| Category | Security Check Criteria | Threat mitigation / handling |
|--------------------------------|--|--|
| Product Certificate Deployment | Production Certificate should be configured for Azure IoT Edge Downstream Certificate. | For enhanced security robustness, we recommend using your own certificate instead of the default one. Go to Cloud Connectivity > Azure IoT Edge > Downstream Certificate to upload a certificate. |
| | Azure IoT Edge should not use a connection string for provisioning. | For enhanced security robustness, we recommend using a TPM or X.509 certificate |
| | All certificates should not expire within the next three months. | Go to Security > Certificate Center to check the status of each certificate. |
| | All certificates should not have expired. | If you find that a certificate will expire soon or has already expired, go to Cloud Connectivity > Azure IoT Edge/Azure IoT Device/MQTT Client or Security > HTTPS to check and replace the certificates. |
| Service Setting | Discovery service should not be enabled. | Go to Maintenance > Service to disable the Discovery service. |
| | SSH service should not be enabled. | Go to Maintenance > Service to disable the Debug Mode. |
| | Serial Console service should not be enabled. | Go to Security > Service to disable the local console. |
| | Account Lock service should be enabled. | Go to Security > Login Lockout to enable the login failure lockout option. |
| | System Use Notification service should be enabled. | Go to Security > System Use Notification to enable the system use notification service. |
| System Status Check | Product software package should be up-to-date. | Go to Maintenance > Software Upgrade and click Check for Upgrade to retrieve the latest upgrade pack information. |
| | System backup should be performed at least once a year. | Go to Maintenance > Backup & Restore to back up the system. |

System Settings

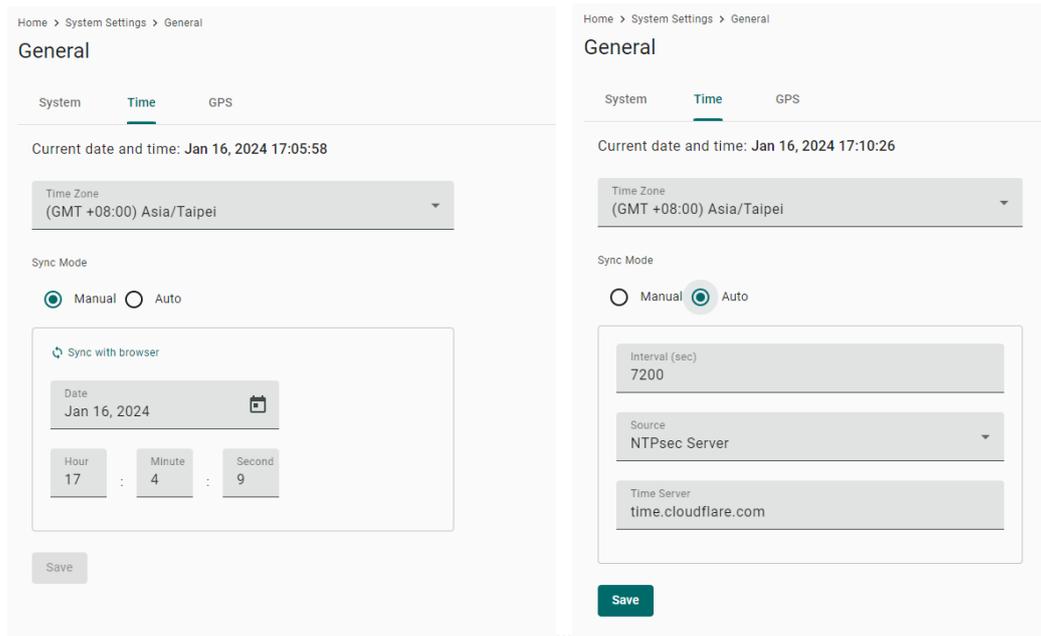
General

Go to **System Settings > General > System** to specify a new server/host name and enter a description for the device.

The screenshot shows the 'System' tab in the settings menu. Below the tabs, there are two input fields. The first field is labeled 'Server/Host Name' and contains the text 'moxa-tbbgb1029495'. The second field is labeled 'Description - optional' and contains the text 'Factory A1'.

| Parameter | Value | Description |
|------------------------|---------------------|--|
| Server/Host Name | Alphanumeric string | You can enter a name to identify the unit, such as the function, etc. |
| Description - optional | Alphanumeric string | You can enter a description to help identify the unit location such as "Cabinet A001." |

Go to **System Settings > General > Time** to select a time zone. Choose between the Manual or Auto option to update the system time.



| Parameter | Value | Description |
|----------------|---|--|
| Time Zone | User's selectable time zone | The field allows you to select a different time zone. |
| Sync Mode | Manual Auto | Manual: input the time parameters by yourself Auto: it will automatically sync with time source. NTP and GPS can be selected. NOTE: When the Auto mode is selected, in general, it takes 2 to 4 minutes. If the satellite search is slower, it could take up to 12 minutes (worst-case scenario) |
| Interval (sec) | 3600 to 86400 | The time interval to sync the time source |
| Source | NTPsec Server NTP Server GPS | The way to sync the time clock |
| Time Sever | IP or Domain address (e.g., 192.168.1.1 or time.cloudflare.com) | This field is required to specify your time server's IP or domain name if you choose the NTP server as the source |

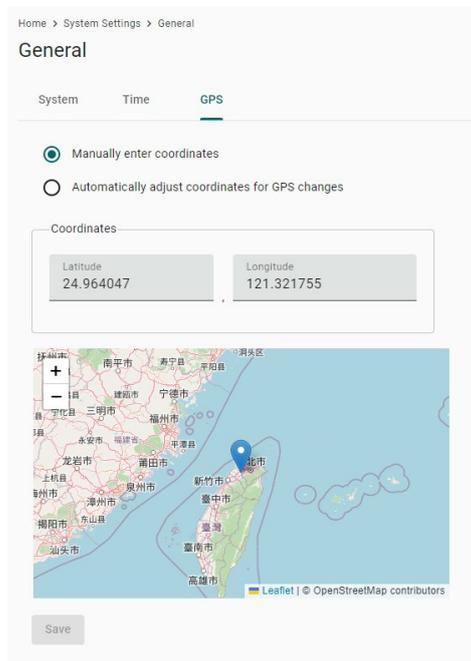


NOTE

When using GPS as a time-synchronization source, set the GPS mode to **Auto** before entering the configuration page.

Go to **System Settings > General > GPS** to view the GPS location of the device on a map. There are two options:

- Input latitude and longitude in **manual**.
- check the **Automatically adjust coordinates for GPS changes** option if you want the system to automatically update the device coordinates.

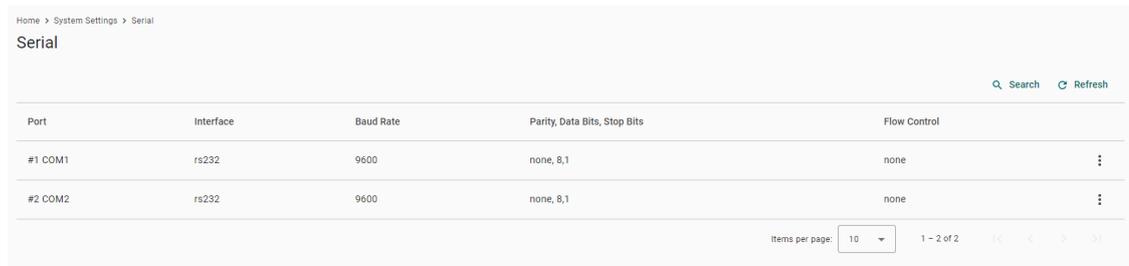


Serial

Go to **System Settings > Serial** to view and configure serial parameters.

To configure serial setting, do the following:

1. Choose the COM port to configure.



2. Set the baudrate, parity, data bits, and stop bits.



NOTE

Incorrect settings will cause communication failures.

3. Click **Save** for the settings to take effect.

Home > System Settings > Serial > Port #1

← Port#1

Serial Settings

Interface
rs232

Baud Rate
9600

Parity
none

Data Bits
 5 6 7 8

Stop Bits
 1 2

Flow Control
none

Save Clone

| Parameter | Value | Description |
|--------------|------------------------------|--|
| Interface | rs232, rs422, rs485-2w | |
| Baud Rate | 300 to 921600 | |
| Parity | none, odd, even, space, mark | |
| Data Bits | 5, 6, 7, 8 | |
| Stop Bits | 1, 2 | |
| Flow Control | None, hardware, software | Hardware: flow control by RTS/CTS signal |

External Storage

You can attach external storage to the AIG for saving logs, buffer space for Store and Forward, and creating system backups. Once you attach a storage, you will find it in the **Device List**.

External Storage

You can reduce the space occupied on the main system disk by using external storage devices.

Device List [Refresh](#)

USB_p1



NOTE

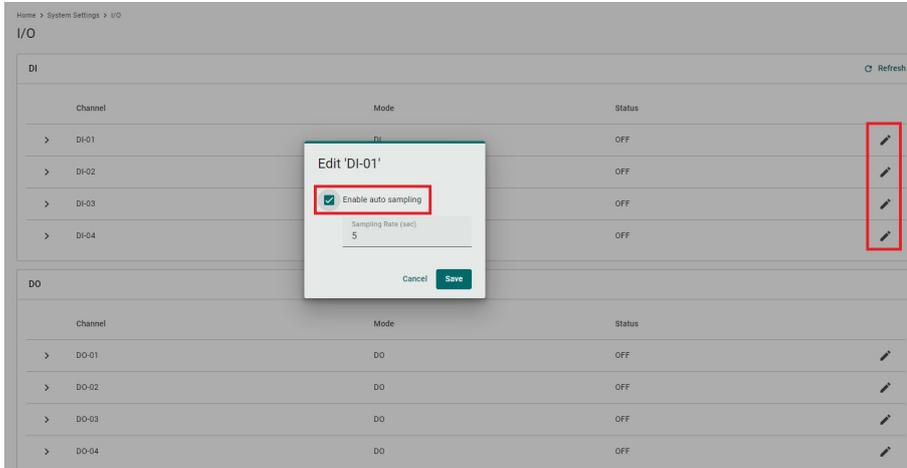
LIMITATION

- AIG does not allow the connection of multiple USB devices through a USB hub.
- The external USB format supported for AIG is FAT.

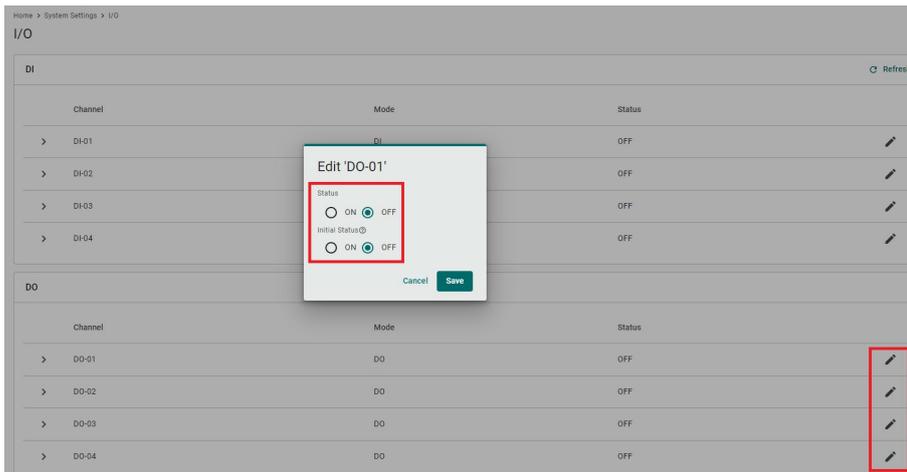
I/O

The AIG-302 comes with 4 digital inputs (DIs) and 4 digital outputs(DOs). Tags are generated for all DI/DO interfaces which can be accessed through the tag hub.

To activate a DI, click the edit icon, enable auto sampling, and input sampling rates according to your requirements.



For DOs, clicking on the edit icon allows you to configure the status and initial status settings.



| Parameter | Value | Description |
|-----------|-------|--------------|
| Status | ON | High voltage |
| | OFF | Low voltage |

Network Settings

Ethernet

Go to **Network Settings > Ethernet** to view and configure LAN1 and LAN2 network settings.

To configure the network, do the following:

1. Choose **LAN1** or **LAN2** for configuration.
2. Select the **WAN (Wide Area Networks)** or **LAN (Local Area Networks)**.
3. Select **DHCP** or **Static** mode.
4. Configure **IP address, Subnet mask, Gateway, and DNS**.

Home > Network Settings > Ethernet

Ethernet

LAN1 LAN2

WAN (Wide Area Networks) ▼

Mode

DHCP: Obtain an IP address automatically.

Static: Specify the IP address.

IPv4 Address
172 . 16 . 2 . 21

Subnet Mask
255 . 255 . 248 . 0

Gateway
172 . 16 . 0 . 254

Preferred DNS Server - optional
172 . 16 . 0 . 1

Alternate DNS Server - optional
10 . 123 . 200 . 12

| Parameter | Value | Description |
|--------------------------------|--|---|
| Types of connectivity | WAN LAN (NOTE: LAN2 does not support WAN.) | WAN: Wide Area Networks LAN: Local Area Networks |
| Mode | DHCP Static | DHCP: Gets the IP address automatically. Static: Specify the IP address |
| IPv4 Address | LAN1 default: DHCP LAN2 default: 192.168.4.127 (or other 32-bit number) | The IP (Internet Protocol) address identifies the server on the TCP/IP network |
| Subnet Mask | Default: 255.255.255.0 (or other 32-bit number) | Identifies the server as belonging to a Class A, B, or C network. |
| Gateway—optional | 0.0.0.0 (or other 32-bit number) | The IP address of the router that provides network access outside the server's LAN. |
| Preferred DNS Server—optional | 0.0.0.0 (or other 32-bit number) | The IP address of the primary domain name server. |
| Alternate DNS Server— optional | 0.0.0.0 (or other 32-bit number) | The IP address of the secondary domain name server. |

If the LAN option is selected, the AIG can be configured to operate as a DHCP server, offering the additional benefit of dynamically assigning IP addresses to devices on the network.

To configure DHCP server settings, do the following:

1. Check Enable DHCP Server.
2. Input IP Address Range parameters.
3. Specify Lease Time.
4. Click **Save**.

Enable DHCP Server
 DHCP is a network service that automatically assigns IP addresses and network settings to devices on a local network.

Start IP
 192 . 168 . 4 . 200

End IP
 192 . 168 . 4 . 250

Lease Time Mode
 Customized

Lease Time (hour)
 24



NOTE

Limitation: When AIG acts as the DHCP server, it will not allocate the DNS IP to the DHCP client.

Cellular

Go to **Network Settings > Cellular** to view the current cellular settings. You can enable or disable cellular connectivity on your device, create profiles, manage **Profile Settings**, and enable or disable the connection **Check-alive** function to optimize the cellular connection.

Home > Network Settings > Cellular

Cellular

CELLULAR1

Enable cellular data communication

Profile Settings

Create and manage profiles for a SIM with its data plan.

Connection Retry Timeout (sec)
 120

Profile List + Create

| # | Profile Name | Sim | Action |
|----|--------------|------|--------|
| #1 | Profile-1 | SIM1 | |

Check-alive

Enable check-alive

Target Host
 8.8.8.8

Ping Interval (sec)
 60

You can create customized cellular profiles in the **Profile Settings** section. A list of all the profiles in the system is displayed. **Create**, **Edit**, or **Delete** cellular profiles here.

To create a new cellular connection profile, do the following:

1. Click **+ Create**.
2. Specify a unique **Profile Name**.
3. Specify the target **SIM** card.
4. Enter the **PIN Code** if your SIM card requires it.
5. Input **APN**.



NOTE

To prevent the SIM from being locked due to three incorrect attempts, a mechanism in the AIG stops attempting to unlock the SIM when the PIN Retry count reaches 2 (only one attempt is remaining). At this point, insert the SIM into another device (e.g., cellphone) and attempt to unlock it. This way, when you reinsert the SIM card into the AIG and restart, the PIN Retry count is reset to 3.



NOTE

LIMITATION

AIG does not support hot-plugging of the SIM card; device restart is required after inserting or removing the SIM card.

Create New Profile

Profile Name

SIM2

PIN Code - optional

APN
internet

Cancel Done

6. Click **Done**.
7. On the **Cellular** setting page, click **Save**.

When you click **Save** on the Cellular section, the module restarts to apply the changes. The settings will take effect after the cellular module is successfully initialized.

The **Check-alive** function will help you maintain the connection between your device and the carrier service by pinging a specific host on the Internet at periodic intervals.

Check-alive

Enable check-alive

Target Host
8.8.8.8

Ping Interval (sec)
60

Go to **Network Dashboard > WAN** if you want to check the cellular network's connection status afterwards.

Wi-Fi Client

Go to **Network Settings > Wi-Fi** to view the Wi-Fi settings.

To configure Wi-Fi settings, check **Enable Wi-Fi** and do the following:

1. Click **+create** to manually **Create by SSID** or be **Created by Scan Results**.

Add by SSID

SSID

Security Mode
WPA/WPA2 Personal

Password

CANCEL ADD

Add by Scan Results

1 Select AP 2 View Details

Info: Please choose the Wi-Fi network that you want to add from the list. Note that only WPA and WPA2 Personal are supported.

| | | |
|-----------------------|---|---|
| SQA3_WiFi6 | 🔒 | 📶 |
| sqa-iiot-lan-50G | 🔒 | 📶 |
| SQA2-TestBed-AWK3131A | 🔒 | 📶 |
| SQA-LAB-TV | 🔒 | 📶 |
| M-Guest | 🔒 | 📶 |

CANCEL NEXT >

2. Select **DHCP** or **Static mode**.
3. Check **Check-alive** function which can be used to ensure Internet connectivity.
4. Click **Save**.

Wi-Fi Client

WIFI

Enable Wi-Fi

AP List + Create

| | | | |
|-----|-------------------------|-------------|---|
| # 1 | sqa-iiot-lan-24G-nopass | 🟢 Connected | ⋮ |
|-----|-------------------------|-------------|---|

IP Settings

Mode

DHCP: Obtain an IP address automatically

Static: Assign IP address by manual configuration

Check-alive

Enable check-alive

Target Host
8.8.8.8

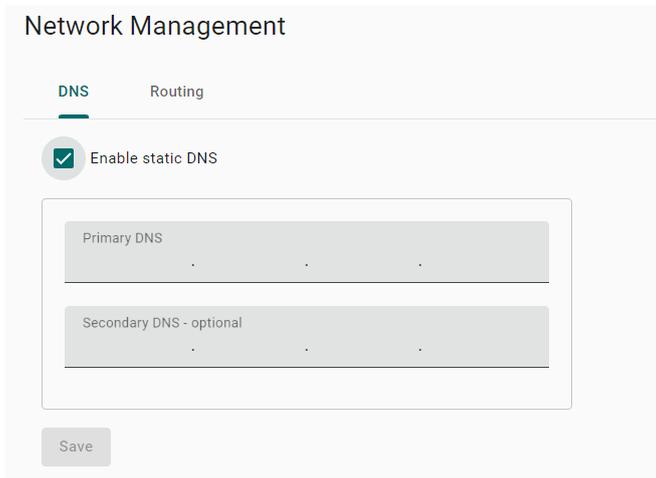
Ping Interval (sec)
60

Save

Network Management

DNS

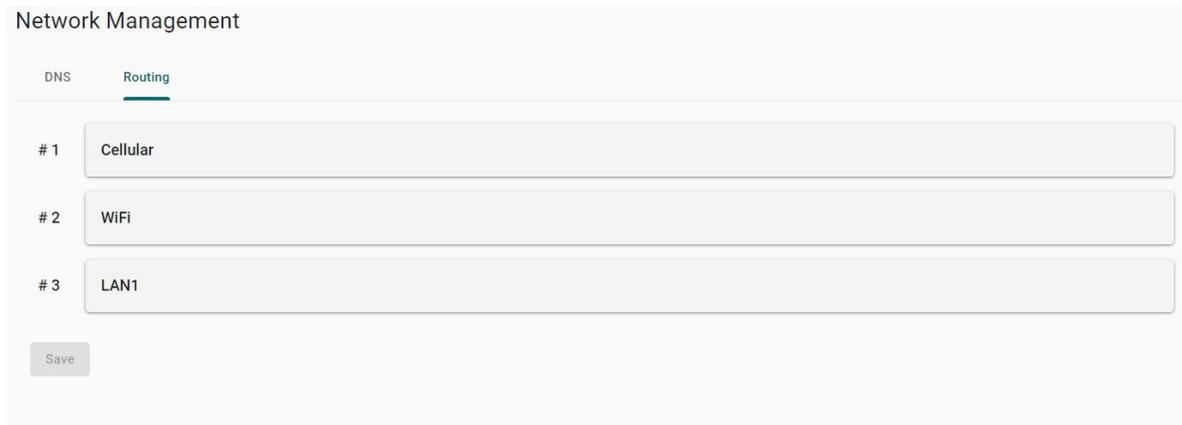
By manually configuring specific DNS server addresses, users can ensure stable and predictable internet connectivity without relying on potentially fluctuating or unreliable DNS settings provided by dynamic configurations (such as those obtained from a DHCP server). This helps to improve DNS resolution speed, enhance overall network performance, and strengthen control over network traffic and security by specifying trusted DNS servers.



The screenshot shows the 'Network Management' interface with the 'DNS' tab selected. A checkbox labeled 'Enable static DNS' is checked. Below it are two input fields: 'Primary DNS' and 'Secondary DNS - optional'. A 'Save' button is located at the bottom left of the configuration area.

Routing

The Routing priority feature allows the IIoT Gateway to prioritize different network interfaces (such as cellular, LAN, and Wi-Fi) as needed to optimize network performance.



The screenshot shows the 'Network Management' interface with the 'Routing' tab selected. It displays a list of three network interfaces with their priority levels: # 1 Cellular, # 2 WiFi, and # 3 LAN1. A 'Save' button is located at the bottom left of the configuration area.

Cloud Connectivity

Azure IoT Edge

Connect to Azure IoT Hub

To configure the Azure IoT Edge settings. You can enable/disable the Azure IoT Edge service and enroll the device via manual setting or DPS (Device Provisioning Service) here.

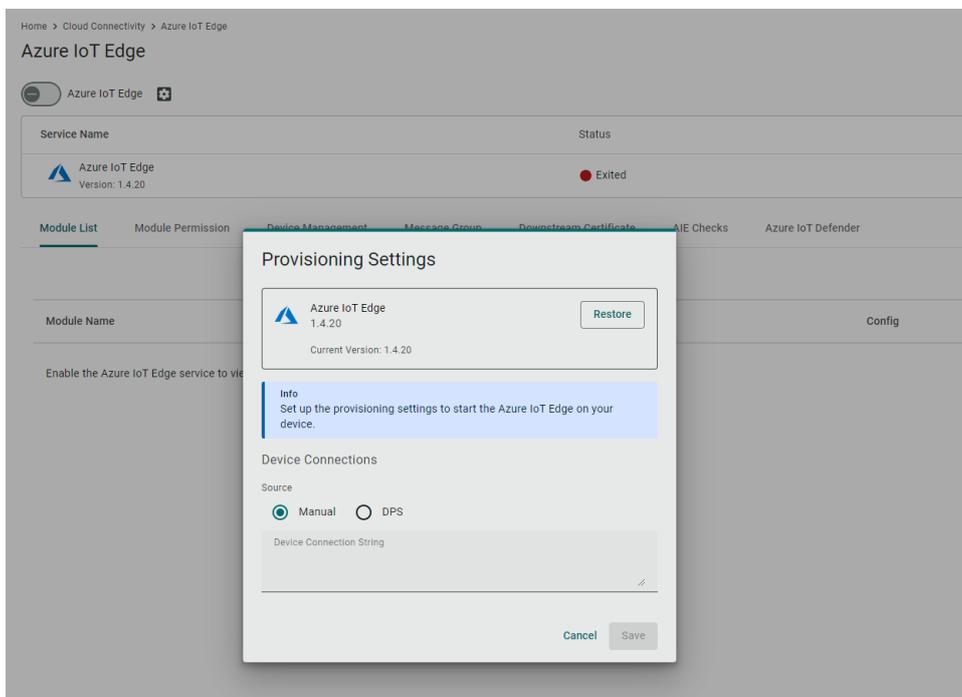


NOTE

A registered Azure account is needed to manage the Azure IoT Edge service for your IoT application.

To manually create an Azure IoT Edge connection for your device, do the following:

1. Enable the Azure IoT Edge service and click on 
2. Select **Manual**.
3. Enter the Device Connection String.
Copy and paste the string from the Azure IoT Hub.



4. Click **Save**.

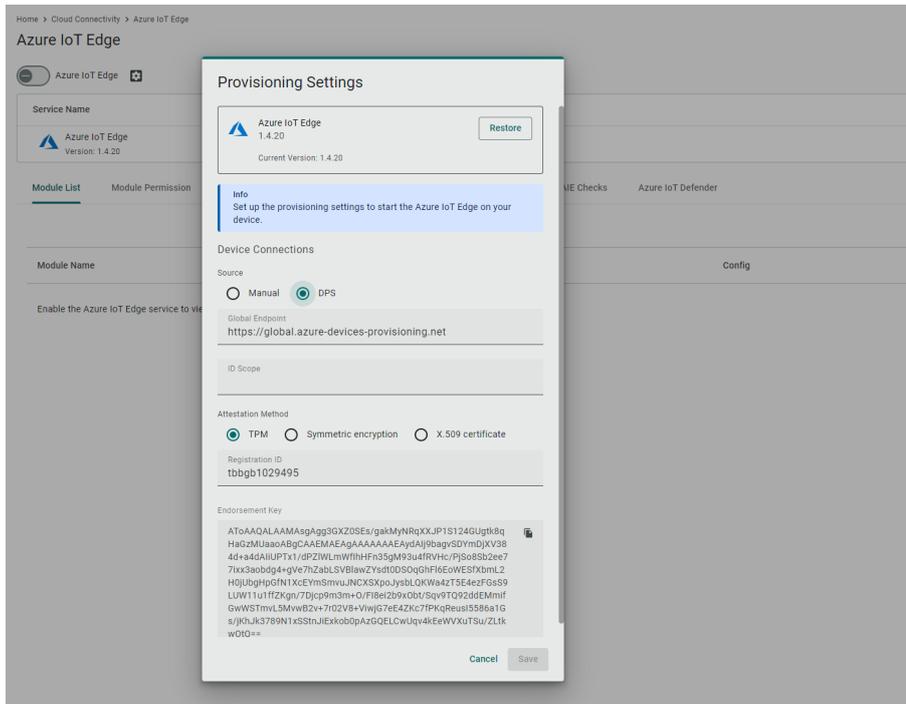
To create an Azure IoT Edge connection for your gateway via DPS, do the following:

1. Enable the Azure IoT Edge service and click on 
2. Select **DPS**.
3. Select TPM, Symmetric encryption, or X.509 certificate based on your gateway registered with the Azure IoT Hub.



NOTE

TPM attestation is only available for devices with a built-in TPM module.



For the Azure IoT Hub device provisioning service and Symmetric encryption. Enter the Registration ID, and Symmetric Key.

For X.509, upload the X.509 Certificate and Private Key.

4. Click **Save**.

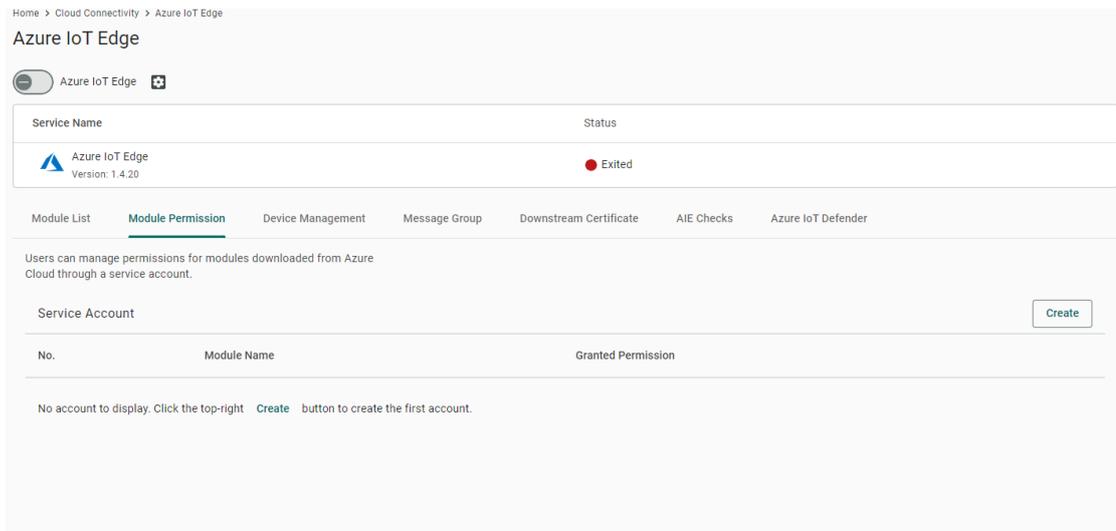
Detailed information about the Azure DPS configuration in the Azure IoT Hub is available at [Set up a DPS](#).

Module Permission

When executing an Azure IoT Edge module, for the sake of gateway security, it is necessary to generate the access key first and then import the environment variables for that module from Azure IoT Hub.

To generate the access key for a module, do the following:

1. Click the Module Permission tab and click **Create**.



- Specify a module name and grant permissions to the module. (NOTE: the module name must be the same as the one created in Azure IoT Hub).

- Click **Save**.
- Click Download Key to save the secret access key or click  to copy the key and paste it in the Azure IoT Hub.

[Home](#) > [Alfred_test](#) > [Set modules on device: Alfred_test](#) >

Add IoT Edge Module

thingspro-IoTHub-newTwin

IoT Edge module settings. [Learn more](#)

Module name *

Demo

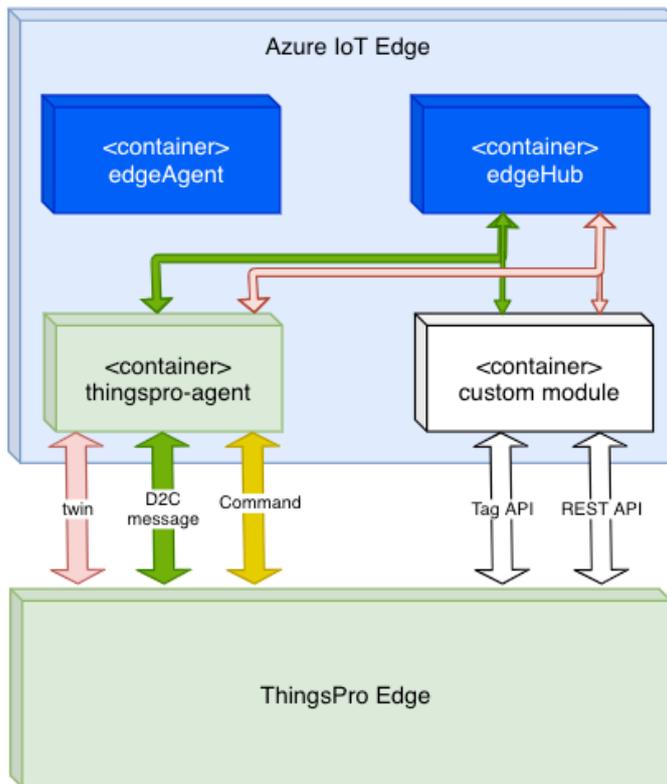
Settings **Environment Variables** Container Create Options Module Twin Settings

Environment variables provide supplemental information to a module facilitating the configuration process.

| NAME | TYPE | VALUE |
|---------------|------|--|
| SECRET_KEY | Text | eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJvc2Vzcy... |
| Variable name | Text | Variable value |

ThingsPro Agent

ThingsPro Agent is a module that runs on the Azure IoT Edge to enable the Azure Cloud services including Telemetry Message, Module Twin and Direct Method. The role of the ThingsPro Agent is shown in the diagram here.



To install the ThingsPro Agent, do the following:

1. Create an IoT Edge device.
2. Add a module from the Azure IoT Hub based on the following information

Docker Image:

```
moxa2019/thingspro-agent:3.0.1-armhf
```

Container Create Option:

```
{
  "HostConfig": {
    "Binds": [
      "/var/thingspro/data/azureiotedge:/var/thingspro/cloud/setting/",
      "/run/tpe/azureiotedge:/run/tpe/azureiotedge/",
      "/var/thingspro/data:/var/thingspro/data/"
    ]
  }
}
```

Module Twin

ThingsPro Agent exposes up-to-date configuration of connected devices via Reported Properties and allows you to re-configure devices and turn on/off services via Desired Properties. In the current version, ThingsPro Agent allows the following sections to be updated via Desired Properties.

Reported Properties:

| Properties | Sample |
|------------|--|
| httpserver | <pre>{ "httpserver": { "httpPort": 80, "httpsEnable": true, "httpsPort": 8443, "ipv6Enable": true, "keyFileName": "client_nopassphrase.key", "certFileName": "client.pem", "httpEnable": true } }</pre> |
| discovery | <pre>{ "discovery": { "enable": true, "schedule": { "enable": true, "disableAfterSec": 900 } } }</pre> |
| wan | <pre>{ "wan": { "displayName": "LAN1", "dns": { "0": "10.128.8.5", "arraySize": 1 }, "gateway": "10.144.51.254", "ip": "10.144.48.128", "name": "eth0", "netmask": "255.255.252.0" } }</pre> |
| route | <pre>{ "route": { "defaultRoute": "LAN1", "priorityList": { "0": "Cellular1", "1": "LAN1", "arraySize": 2 } } }</pre> |

| Properties | Sample |
|------------|---|
| serials | <pre>{ "serials": { "0": { "baudRate": 9600, "dataBits": 8, "device": "/dev/ttyM0", "displayName": "PORT 1", "flowControl": "none", "id": 1, "mode": "rs232", "parity": "none", "stopBits": 1 }, "arraySize": 1 } }</pre> |
| time | <pre>{ "time": { "lastUpdateTime": "2023-05-24T23:22:05+00:00", "ntp": { "enable": false, "interval": 7200, "server": "time.cloudflare.com", "source": "timeserver" }, "timezone": "Asia/Taipei" } }</pre> |
| ethernets | <pre>{ "ethernets": { "0": { "enable": true, "enableDhcp": false, "id": 1, "name": "enp0s31f6", "status": "connected", "displayName": "LAN1", "gateway": "10.123.12.1", "ip": "10.123.13.11", "linkSpeed": 1000, "mac": "00:90:E8:A6:61:88", "netmask": "255.255.252.0", "wan": true, "dns": { "0": "10.123.200.11", "1": "10.123.200.12", "arraySize": 2 } }, "arraySize": 1 } }</pre> |

| Properties | Sample |
|-----------------|--|
| general | <pre>{ "general": { "biosVersion": "V1.0.0S01", "firmwareVersion": "0.15.0", "serialNumber": "TBBCE1070929", "softwareVersion": "0.15.0+2045", "cpu": "Intel(R) Core(TM) i7-7600U CPU @ 2.80GHz", "description": "", "hostName": "moxa-tbbce1070929", "lastBootTime": "2023-05-24T23:06:57+00:00", "memorySize": 16635346944, "modelName": "AIG-302-T-AP-AZU-LX" } }</pre> |
| gps | <pre>{ "gps":{ "mode": "manual", "interface": "", "location": { "lat": 24.984129, "lng": 121.551753 } } }</pre> |
| SoftwareUpgrade | <pre>{ "softwareUpgrade": { "allowOverCellular": true, "allowUpdate": true, "autoScan": false, "autoScanExpression": "0 0 * * 0", "snapshotBeforeUpdate": true } }</pre> |

| | |
|-----------|--|
| Cellulars | <pre> { "cellulars": { "0": { "operatorName": "", "pinRetryRemain": 3, "profiles": { "0": { "name": "Profile-1", "pdpContext": { "apn": "internet", "auth": { "password": "", "username": "" }, "type": "ipv4" }, "pinCode": "", "simSlot": 1 }, "1": { "name": "Profile-2", "pdpContext": { "apn": "internet", "auth": { "password": "", "username": "" }, "type": "ipv4" }, "pinCode": "", "simSlot": 2 }, "arraySize": 1 }, "currentProfileName": "Profile-1", "imsi": "", "keepalive": { "enable": true, "intervalSec": 60, "targetHost": "8.8.8.8" }, "mac": "", "gateway": "", "id": 1, "name": "wwan0", "profileTimeout": 120, "cellId": "", "displayName": "Cellular1", "dns": { "arraySize": 0 }, "enable": false, "status": "sim_pin_locked", "signalStrength": 0, "capabilities": { "sim": 2 }, "iccId": "89886972203703305466", "ip": "", "mode": "unknown", "imei": "357575100284579", "lac": "" } } } </pre> |
|-----------|--|

| Properties | Sample |
|------------|---|
| | <pre> "netmask": "", "tac": "" }, "arraySize": 1 } } </pre> |

Desired Properties:

| Properties | Sample |
|------------|--|
| httpserver | <pre> { "desired": { "httpserver": { "httpEnable": true, "httpsEnable": true, "httpsPort": 8443 "ipv6Enable": true } } } </pre> |
| discovery | <pre> { "desired": { "discovery": { "enable": true, "schedule": { "enable": true, "disableAfterSec": 900 } } } } </pre> |
| serials | <pre> { "desired": { "serials": { "0": { "mode": "rs232", "stopBits": 1, "baudRate": 9600, "dataBits": 8, "parity": "none", "flowControl": "none", "id": 1 }, }, "arraySize": 1 } } } </pre> |

| Properties | Sample |
|------------|---|
| time | <pre>Update NTP Settings: { "desired": { "time": { "ntp": { "enable": true, "interval": 7200, "server": "time.cloudflare.com", "source": "timeserver" } } } } Update Time zone: { "desired": { "time": { "timezone": "Asia/Taipei" } } }</pre> |
| general | <pre>Update gateway host name: { "desired": { "general": { "hostName": "MyHost" } } } Update gateway description: { "desired": { "general": { "description": "MyDevice" } } }</pre> |
| gps | <pre>Update GPS latitude and longitude by manual mode: { "desired": { "gps": { "mode": "manual", "location": { "lat": 11, "lng": 12 } } } } Update GPS by auto mode: { "desired": { "gps": { "mode": "auto", "interface": "GPS1" } } }</pre> |

| Properties | Sample |
|-----------------|---|
| ethernets | <pre> { "ethernets": { "0": { "dns": { "0": "10.128.8.5", "arraySize": 1 }, "enable": true, "enableDhcp": false, "gateway": "10.144.51.254", "id": 1, "ip": "10.144.48.128", "netmask": "255.255.252.0", "wan": true }, "arraySize": 1 } } </pre> |
| SoftwareUpgrade | <pre> { "desired": { "softwareUpgrade": { "allowUpdate": true, "allowOverCellular": false, "snapshotBeforeUpdate": true, "autoScan": false, "autoScanExpression": "0 3 * * 1,2,3,4,5" } } } </pre> |
| cellulars | <pre> { "cellulars": { "0": { "enable": false, "keepalive": { "enable": false, "intervalSec": 120, "targetHost": "8.8.8.8" }, "profileTimeout": 140, "profiles": { "0": { "name": "SIM1", "pdpContext": { "apn": "internet", "auth": { "password": "", "username": "" }, "type": "ipv4" }, "pinCode": "0000", "simSlot": 1 } }, "arraySize": 1 }, "arraySize": 1 } } </pre> |

Direct Method:

ThingsPro Agent offers the following seven direct methods that can be invoked when the gateway is online.

| No | Method Name | Description |
|----|----------------------------------|--|
| 1 | thingspro-api-v1 | Universal direct method that invokes all Restful APIs of AIG |
| 2 | system-reboot | Restarts the gateway |
| 3 | thingspro-software-upgrade-check | Check product package is available to upgrade or up-to-date |
| 4 | thingspro-software-upgrade | Performs over-the-air (OTA) software upgrades with product package |
| 5 | message-policy-get | Retrieves the D2C message policy applied to your gateway |
| 6 | message-policy-put | Updates the D2C message policy applied to your gateway |
| 7 | upload-system-logs | Upload system logs to Azure blob storage |

Thingspro-api-v1

Method Name:

```
thingspro-api-v1
```

Request Payload: (Example to set HTTP/HTTPS configuration)

```
{
  "path": "/system/httpserver",
  "method": "PATCH",
  "headers": [],
  "requestBody": {
    "httpEnable": true,
    "httpsEnable": true
  }
}
```

| Key | Description |
|-------------|--|
| path | AIG-302 Restful API endpoint |
| method | The method associated with the API endpoint |
| headers | Required by the application/JSON payload |
| requestBody | Used to post data required by the API endpoint |

Response:

```
{
  "status": 200,
  "payload": {
    "data": {
      "httpEnable": true,
      "httpsEnable": true,
      "ipv6Enable": true,
      "httpPort": 80,
      "httpsPort": 8443,
      "certFileName": "ThingsPro Web",
      "keyFileName": "ThingsPro Web"
    }
  }
}
```



NOTE

We recommend changing the timeout parameters to 30 seconds to prevent system exceptions.

Method name * ⓘ
thingspro-api-v1

Payload ⓘ

```
{
  "path": "system/httpserver",
  "method": "PUT",
  "headers": [],
  "requestBody": {
    "httpEnable": true,
    "httpsEnable": true
  }
}
```

Response timeout ⓘ Connection timeout ⓘ
30 seconds ▾ Module must already be connected ▾

[Invoke method](#)

system-reboot

Method Name:

system--reboot

Request Payload:

{}

Response

```
{
  "status": 200,
  "payload": {
    "data": "rebooting"
  }
}
```

thingspro-software-upgrade-check

Method Name:

```
thingspro-software-upgrade-check
```

Request Payload:

```
{}
```

Response (available response):

```
{
  "status": 200,
  "payload": {
    "checktime": "2023-04-27T07:51:36Z",
    "count": 1,
    "data": [
      {
        "name": "moxa-aig-302-tpe",
        "size": 31076,
        "currentVersion": "0.11.1",
        "newVersion": "0.12.0+1533",
        "category": "software"
      }
    ]
  }
}
```

Response (up-to-date, unavailable response):

```
{
  "status": 200,
  "payload": {
    "checktime": "2023-04-27T08:08:38Z",
    "count": 0,
    "data": []
  }
}
```



NOTE

AIG-302 allows only one active software upgrade job at a time. We recommend changing the response timeout parameters to 1 minute to prevent system exceptions.

Thingspro-software-upgrade

Method Name:

thingspro-software-upgrade

Request Payload:

{}

Response:

```
{
  "status": 200,
  "payload": {
    "data": [
      "moxa-aig-302-tpe"
    ],
    "message": "Successfully trigger"
  }
}
```



NOTE

AIG-302 allows only one active software upgrade job at a time. We recommend changing the response timeout parameters to 1 minute to prevent system exceptions.

message-policy-get

Method Name:

```
message-policy-get
```

Request Payload:

```
{}
```

Response:

```
{
  "status": 200,
  "payload": {
    "data": {
      "groups": [
        {
          "id": 1,
          "description": "",
          "enable": true,
          "outputTopic": "sample",
          "format": "{ (.tagName): .dataValue, ts: .ts}"
          "properties": [ { "key": "messageType", "value": "deviceMonitor" } ],
          "tags": { "system": { "status": ["memoryUsage"] } },
          "sendOutThreshold": {
            "mode": "immediately",
            "size": 4096,
            "time": 0,
            "sizeIdleTimer": {
              "enable": true,
              "time": 60
            }
          },
          "minPublishInterval": 1,
          "samplingMode": "allValues",
          "customSamplingRate": false,
          "pollingInterval": 0,
        }
      ]
    }
  }
}
```

| Key | Description |
|--------------------|--|
| groups | Type: array Description: The message group; you can define multiple messages by demand. |
| id | Type: integer Description: The message ID. |
| description | Type: string Description: The message description. |
| enable | Type: boolean Description: Enable or disable this message policy. |
| outputTopic | Type: string Description: The output topic required by Azure IoT Edge; helps manage the message route in Azure IoT Edge. |
| format | Type: string Description: A jq script to transform a default payload to a custom payload. |
| properties | Type: string Description: Application properties of the message. This allows cloud applications to access certain messages without deserializing the JSON payload. |
| tags | Type: string Description: The tag data to send in the message. You can retrieve all available tags defined by ThingsPro Edge RESTful API. |
| sendOutThreshold | Type: object Define conditions to send out messages to Azure Edge Hub based on: mode Type: string Enum: byTime, bySize immediately size (mode: bySize) Type: integer Unit: bytes time (mode: byTime) Type: integer Unit: second value 0 almost real time sizeIdleTimer (mode: bySize, optional): Description: A fixed publish time between the two bySize mode publish. Type: object enable Type: boolean time Type: integer Unit: second |
| minPublishInterval | Type: integer Unit: second Description: A fixed interval between the two immediately mode publish |
| samplingMode | Type: string Enum: allValues, latestValues, allChangedValues, latestChangedValues |
| customSampling | Type: boolean Description: Enable will use the pollingInterval that user input. |
| pollingInterval | Type: integer Description: The interval at which to poll tag data. For example, value 10: Every 10 second value 0: when the data is pushed into the tag (almost real time) |

message-policy-put

Method Name:

message-policy-put

Request Payload:

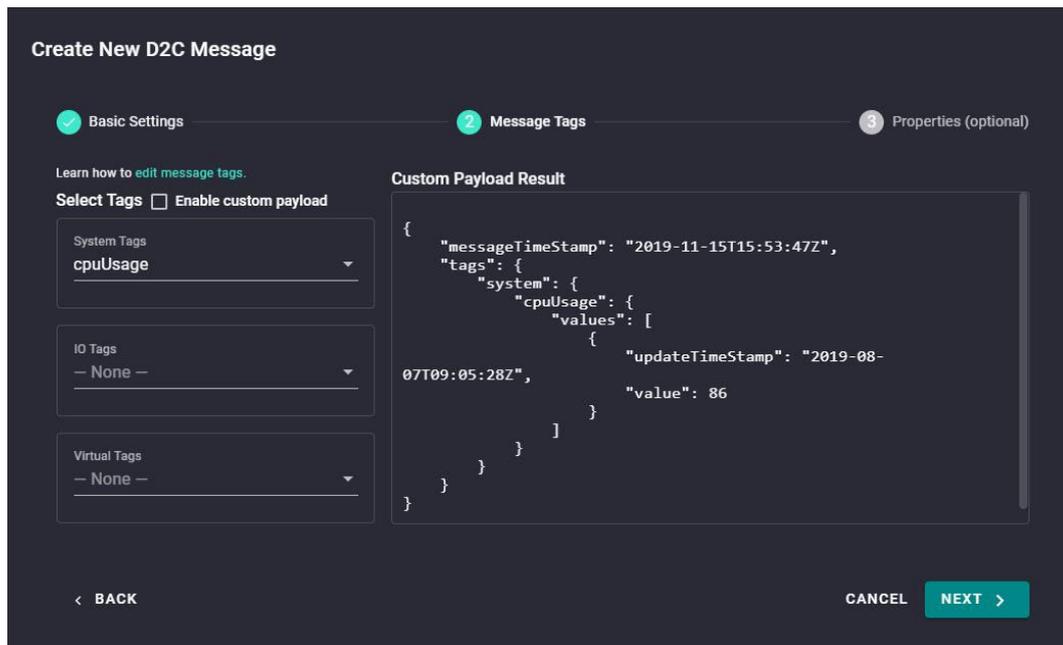
```
{
  "groups": [
    {
      "id": 1,
      "description": "",
      "enable": true,
      "outputTopic": "sample",
      "format": "{ (.tagName): .dataValue, ts: .ts}"
      "properties": [ { "key": "messageType", "value": "deviceMonitor" }],
      "tags": { "system": { "status": ["memoryUsage"]}},
      "sendOutThreshold": {
        "mode": "bySize",
        "size": 4096,
        "time": 0,
        "sizeIdleTimer": {
          "enable": true,
          "time": 60
        }
      }
    },
    "minPublishInterval": 0,
    "samplingMode": "allValues",
    "customSamplingRate": false,
    "pollingInterval": 0,
  ]
}
```

The D2C message policy allows you to transform a default payload to your desired payload schema via a **jq** filter. For additional details, refer to the jq website ([jq Manual <development version>](#)).

The AIG Web GUI offers an easy way to apply the jq filter and test the transformed result as shown in the following examples.

Default D2C message schema

Select the tags that you want using the tag-selector panel on the left. The default result for the selected tags will show in the right panel.



Create New D2C Message

1 Basic Settings | **2 Message Tags** | 3 Properties (optional)

Learn how to [edit message tags](#).

Select Tags Enable custom payload

System Tags
cpuUsage

IO Tags
— None —

Virtual Tags
— None —

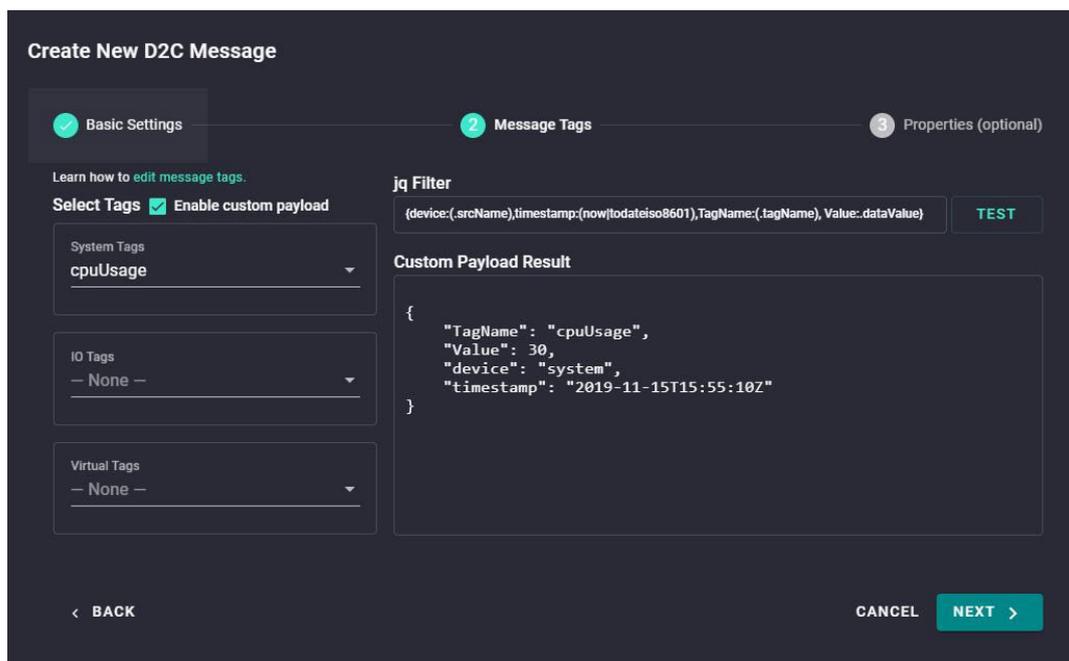
Custom Payload Result

```
{
  "messageTimeStamp": "2019-11-15T15:53:47Z",
  "tags": {
    "system": {
      "cpuUsage": {
        "values": [
          {
            "updateTimeStamp": "2019-08-07T09:05:28Z",
            "value": 86
          }
        ]
      }
    }
  }
}
```

< BACK CANCEL NEXT >

Custom payload after transforming the default payload.

Enable custom payload and input the jq Filter to display the custom payload for your selection.



Create New D2C Message

1 Basic Settings | **2 Message Tags** | 3 Properties (optional)

Learn how to [edit message tags](#).

Select Tags Enable custom payload

System Tags
cpuUsage

IO Tags
— None —

Virtual Tags
— None —

jq Filter

{device:(srcName),timestamp:(now|todateiso8601),TagName:(tagName), Value:.dataValue} TEST

Custom Payload Result

```
{
  "TagName": "cpuUsage",
  "Value": 30,
  "device": "system",
  "timestamp": "2019-11-15T15:55:10Z"
}
```

< BACK CANCEL NEXT >

| Variable | Description |
|------------|--|
| .srcName | Prints the source of the tag data |
| .tagName | Prints the tag name |
| .dataValue | Prints the tag value |
| .ts | Prints the timestamp of tag value be collected |
| .dataUnit | Prints data unit of tag value (e.g.: %) |
| .dataType | Prints data type of tag value (e.g.: int64) |

To use the above variables as the key of a JSON element, use parentheses as shown here.

```
(.tagName): .dataValue
```

Example:

```
{device:(.srcName),timestamp:(now|todateiso8601),(.tagName):.dataValue}
```

```
Custom Payload Result

{
  "cpuUsage": 52,
  "device": "system",
  "memoryUsage": 40,
  "networkUsage": 67,
  "timestamp": "2019-11-20T01:10:29Z"
}
```

When the jq Filter has been confirmed, you can include the "format" key into the D2C message policy to enable a custom payload.

```
{
  "groups": [
    {
      "enable": true,
      "outputTopic": "sample",
      "format": "",
      "properties": [
        { "key": "messageType", "value": "deviceMonitor" }
      ],
      "tags": {
        "system": {
          "status": ["cpuUsage", "memoryUsage"]
        }
      },
      "pollingInterval": 2,
      "sendOutThreshold": { "size": 4096, "time": 5 },
      "format": "{device:(.srcName),timestamp:(now|todateiso8601),TagName:(.tagName),Value:.dataValue}"
    }
  ]
}
```

Upload-audit-logs

Method Name:

upload-audit-logs

Request Payload (Set HTTP/HTTPS configuration as an example):

```
{
  "connectionString":
  "DefaultEndpointsProtocol=https;AccountName=thingsproedge;AccountKey=hgnYe/08sWqlcGK
d7VR8XNRvjydebzzSeVZxFvRCmepUqA69LTtNY13UZ5fejjZgcys+jC5B+qf3+ASStsEkNzg==;End
pointSuffix=core.windows.net",
  "containerName": "aig302"
}
```

| Variable | Description |
|------------------|--|
| connectionString | The connection string is the access key or shared access signature of the Azure blob storage |
| containerName | Upload to the container which belongs to the Azure blob storage |

Response:

```
{
  "status": 200,
  "payload": {
    "data": "upload successfully"
  }
}
```



NOTE

We recommend changing the timeout parameters to 1 minute to prevent system exceptions. In addition, take the upload speed and log size into consideration when adjusting timeouts.

Upload-system-logs

Method Name:

upload-system-logs

Request Payload (Set HTTP/HTTPS configuration as an example):

```
{
  "connectionString":
  "DefaultEndpointsProtocol=https;AccountName=thingsproedge;AccountKey=hgnYe/08sWqlcGK
d7VR8XNRvjydebzzSeVZxFvRCmepUqA69LTtNY13UZ5fejjZgcys+jC5B+qf3+ASStsEkNzg==;End
pointSuffix=core.windows.net",
  "containerName": "aig302"
}
```

| Variable | Description |
|------------------|---|
| connectionString | The connection string is the access key or shared access signature of the Azure blob storage. |
| containerName | Upload to the container which belongs to the Azure blob storage. |

Response:

```
{
  "status": 200,
  "payload": {
    "data": "upload successfully"
  }
}
```



NOTE

We recommend changing the timeout parameters to 1 minute to prevent system exceptions. (You may also consider adjusting the corresponding timeout based on the upload speed and log size.)

Device Management

Enabling this feature allows cloud service providers to manage IoT devices remotely using Device Twin and Direct Method technologies.

The screenshot shows the Azure IoT Edge configuration page. At the top, there is a breadcrumb trail: Home > Cloud Connectivity > Azure IoT Edge. Below this, the page title is "Azure IoT Edge". There is a toggle switch for "Azure IoT Edge" which is currently turned off. Below the toggle is a table with two columns: "Service Name" and "Status". The table contains one entry: "Azure IoT Edge" with version "1.4.20" and status "Exited". Below the table is a horizontal menu with tabs: "Module List", "Module Permission", "Device Management" (which is selected), "Message Group", "Downstream Certificate", "AIE Checks", and "Azure IoT Defender". Below the tabs, there is a section titled "Allow managing this device from Azure IoT Hub via a Module Twin and Direct Methods technology." with a checkbox "Allow Device Management" that is checked. A note below the checkbox says "This feature requires the ThingsProAgent module installed." At the bottom of this section is a "Save" button.

Message Group

The simplest message type for sending IoT device data to your IIoT applications is a telemetry message. To create a telemetry message, do the following:

1. Click **+ Create** to create a new message group.

The screenshot shows the Azure IoT Edge Message Group page. At the top, there is a breadcrumb trail: Home > Cloud Connectivity > Message Group. Below this, the page title is "Message Group". There is a "Last Updated" timestamp: "Jan 24, 2024 12:16:16". To the right of the timestamp are buttons for "Refresh", "Search", and "+ Create". Below this is a table with columns: "No.", "Activate", "Rule Name", "Type", "Last Activity Time", and "Status". The table is currently empty, and a message below it says "No data to display. Click the + Create button to create the first data." At the bottom right of the page, there is a pagination control showing "Items per page: 10" and "0 of 0".

2. Specify a name for the **Message Group**.

3. Select a **Publish Mode**.

For details, see Publish Mode.

The screenshot shows the 'Create Message Group' dialog box with four steps: 1. Basic Setting, 2. Tag Selecting, 3. Custom Payload Optional, and 4. Target Setting. Step 1 is active. The 'Message Group Name' field contains 'Test123'. Under 'Publish Mode', the 'By Interval' radio button is selected. The 'Publish interval (sec)' field is set to '60'. The 'Sampling Mode' dropdown is set to 'All Changed Values'. There is an unchecked checkbox for 'Custom sampling rate from acquired data' and a checked checkbox for 'Enable Message Group by default'. At the bottom right, there are 'Cancel' and 'Next >' buttons.

4. Input corresponding parameters such as publish interval, sampling mode, and publish.

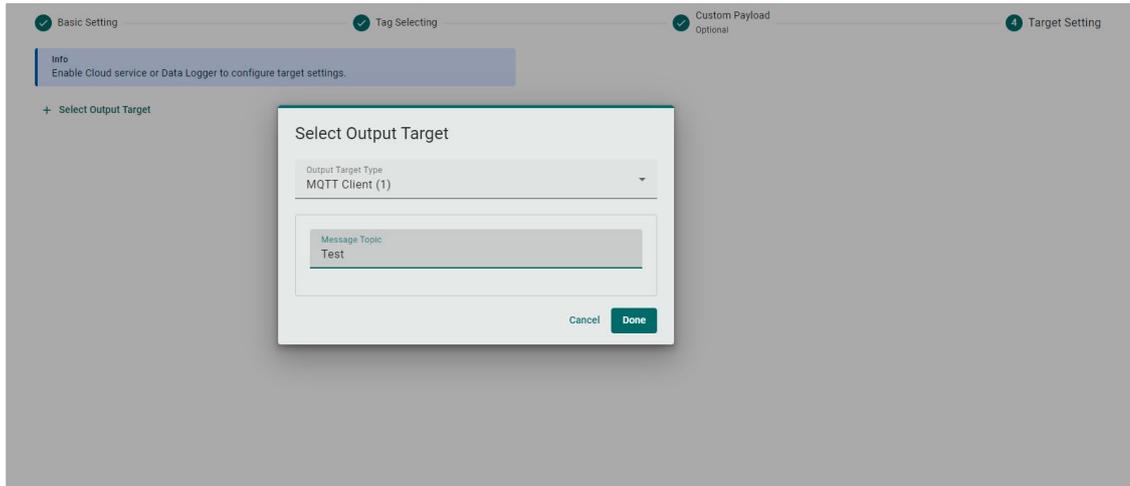
5. Click **Next**.

6. Select tags (e.g., Modbus Master).

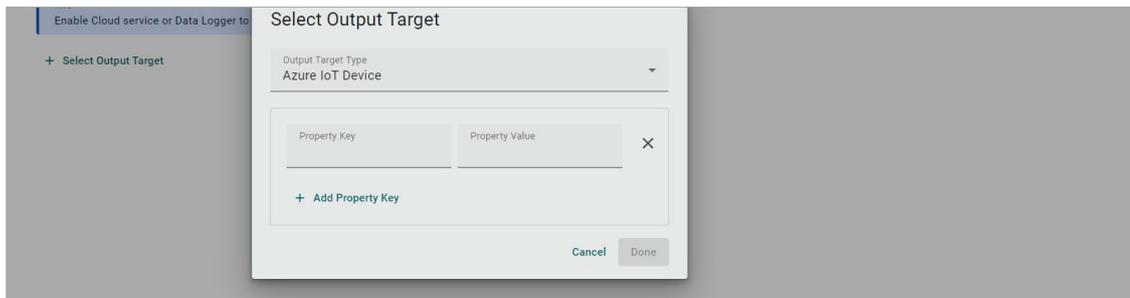
The screenshot shows the 'Create Message Group' dialog box at Step 2: Tag Selecting. Step 1 is marked as complete. The 'Select Tags' section has an info box: 'Info Select one or more tag providers and select tags to map data.' Below it, the 'Providers' dropdown is set to 'modbus_tcp_master'. A search popup is open, showing a search bar and a list of tags. The list includes a checked checkbox for '[modbus_tcp_master] SE_Meter', which is expanded to show two sub-items: 'Current' and 'status', both of which are also checked. At the bottom of the popup, it says 'Total: 2, Selected: 2' and has a 'Done' button.

- (Optional) Enable custom payload by using the **jq** filter.

The device-to-cloud (D2C) message policy allows you to transform default payload to your desired payload schema via the **jq** filter. For additional information, refer to the jq website (<https://stedolan.github.io/jq/manual/>).



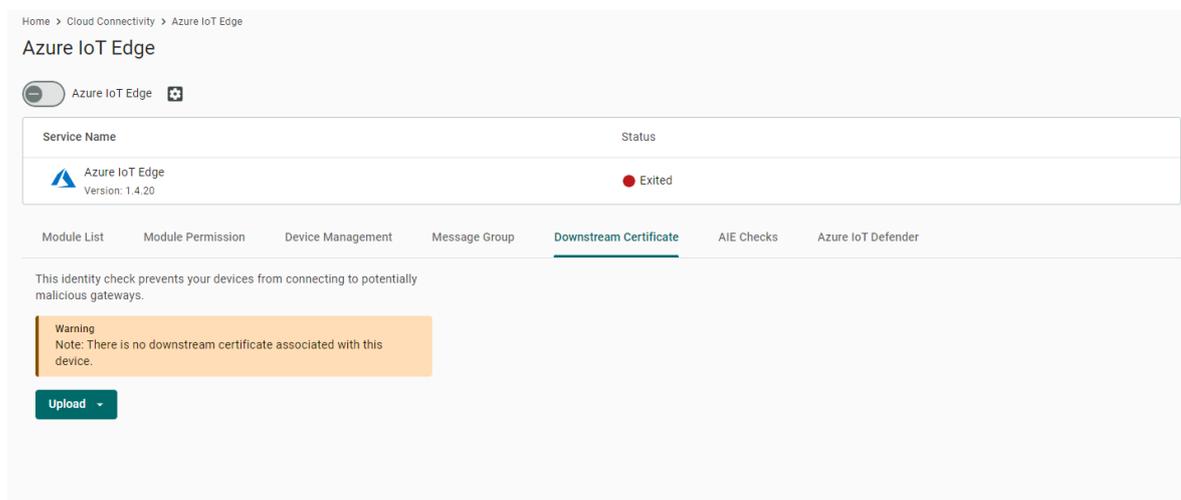
- Click **NEXT**.
- Select **Output Target Type**.
- (Optional) Enter Property Key and Value.



- Click **Done** and **Save**.

Downstream Certification

To prevent your device from connecting to potentially malicious gateways (Azure IoT Edge inside), you can upload X.509 certificate, Private Key, or Trusted CA Certificate. You can generate the certificates and the private key using ThingsPro Edge. For additional information, see Downstream Certificate.



Azure IoT Edge (AIE) Configuration Checks

If you want to check the Azure IoT Edge configuration and connectivity for common issues, go to Azure IoT Edge > AIE Checks and click **Check**. ThingsPro Edge provides a result after checking for issues. For additional information on AIE Checks, see <https://github.com/Azure/iotedge/blob/master/doc/troubleshoot-checks.md>

If an unexpected situation occurs when you upgrade/downgrade to a certain version of Azure IoT Edge, you can restore Azure IoT Edge by clicking Restore in the Provisioning Settings. Using the restore function will remove existing settings including Message Group, Device Management, and Downstream/Upstream credentials.

Azure IoT Defender

The web console is currently unavailable for configuring the Azure IoT Defender; configuration is done via a RESTful API.

Enabling the API

```
curl "http://127.0.0.1:59000/api/v1/azure-iotedge" \  
-X PATCH \  
-H "Content-Type:application/json" \  
-H "Authorization:Bearer $(cat ./token)" \  
-d '{"provisioning":{"defenderEnable":true}}'
```

Using the API to Check the Status of the Defender Service

```
curl "http://127.0.0.1:8443/api/v1/azure-iotedge/defender" \  
-X GET \  
-H "Content-Type:application/json" \  
-H "Authorization:Bearer ${token}"
```

Using the API to Restart the Defender Service

```
curl "http://127.0.0.1:59000/api/v1/azure-iotedge/defender/reload" \  
-X PUT \  
-H "Content-Type:application/json" \  
-H "Authorization:Bearer $(cat ./token)"
```

Monitoring the Log of the Defender Service

```
sudo journalctl -u defender-iot-micro-agent -f
```

Testing the Defender Service by Triggering a Baseline Violation

```
touch /tmp/DefenderForIoTOSBaselineTrigger.txt
```

Azure IoT Device

Go to **Cloud Connectivity > Azure IoT Device**. You can enable or disable the Azure IoT Device here.

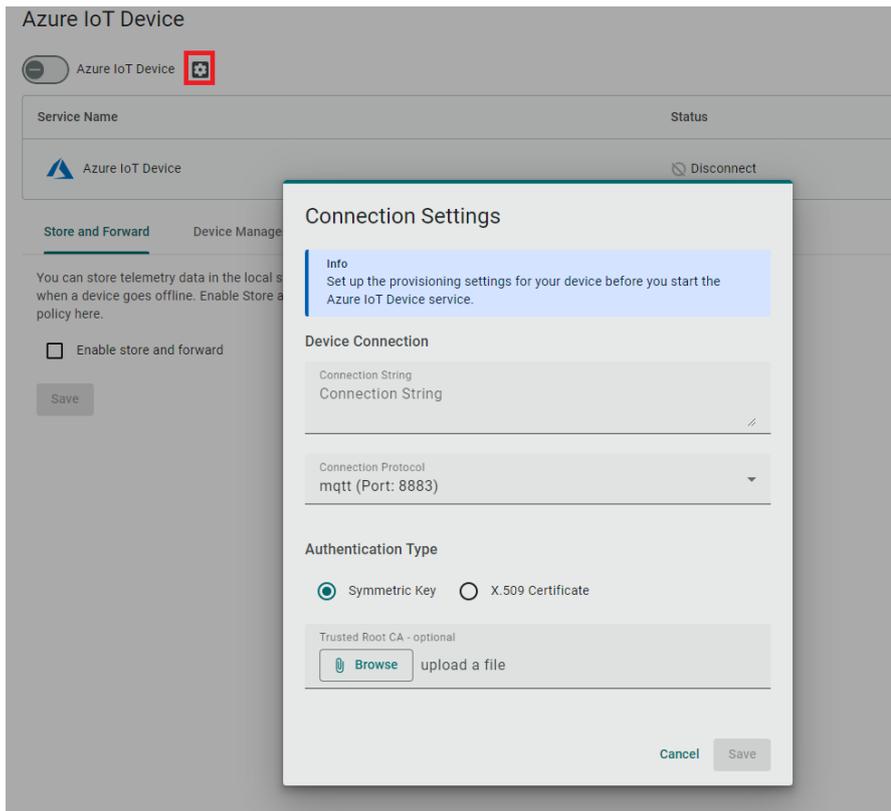


NOTE

You will need to register an Azure account to manage the Azure IoT Device service for your IIoT application.

To create the Azure IoT Device connectivity, follow the steps below:

1. Click  to set connection.

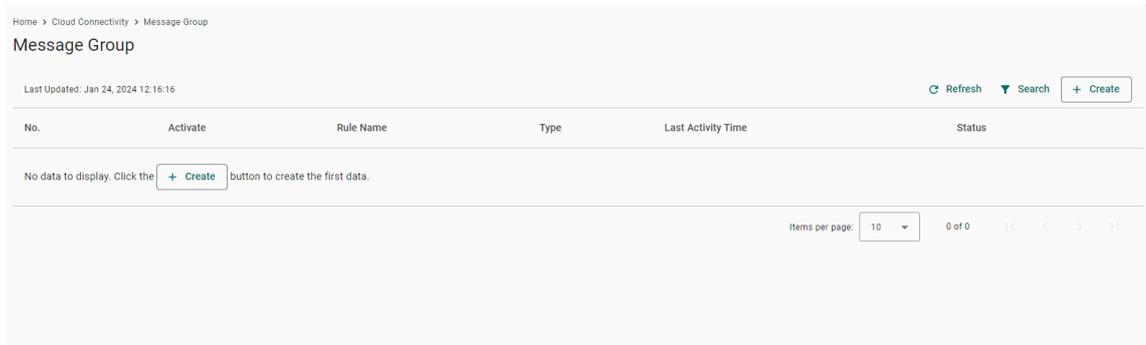


2. Enter **Connection String**.
3. Select a **Connection Protocol**.
4. Select an **Authentication Type**.
5. (Optional) Upload X.509 Certificate and Private Key.
6. Click **Save**.

Message Group

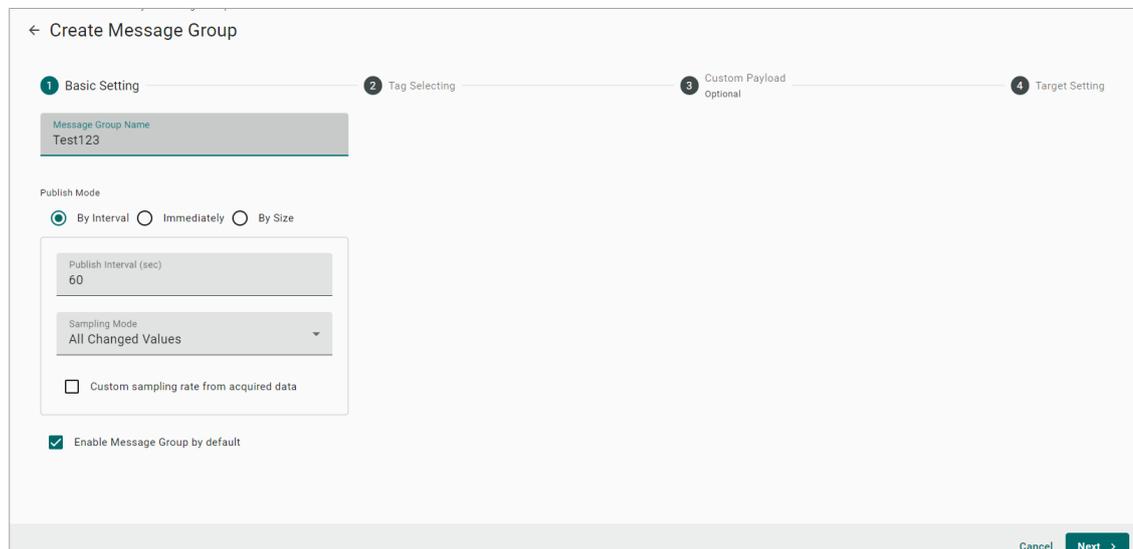
The simplest message type for sending IoT device data to your IIoT applications is a telemetry message. To create a telemetry message, do the following:

1. Click **+ Create** to create a new message group.

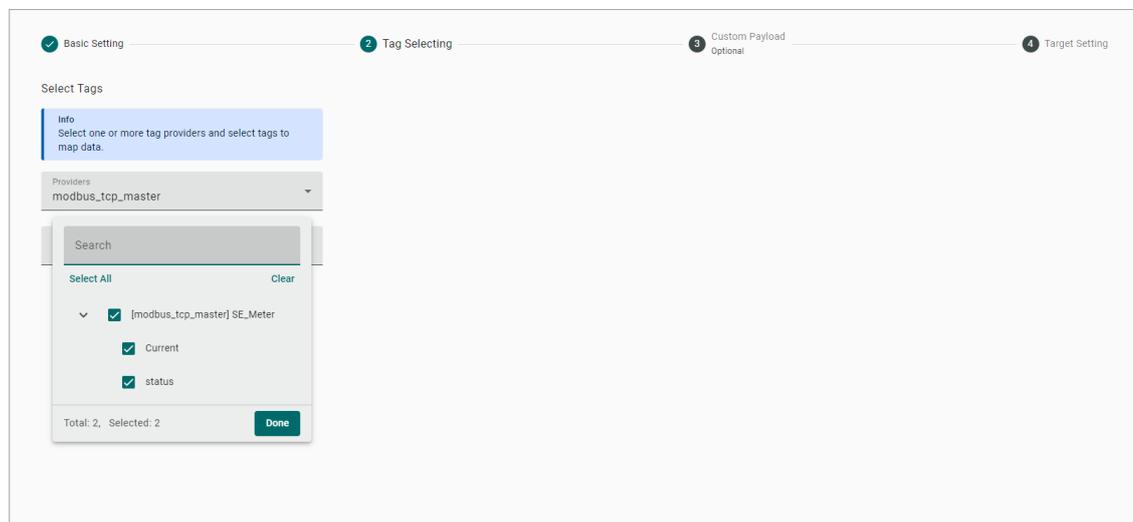


2. Specify a name for the **Message Group**.
3. Select a **Publish Mode**.

For details, see Publish Mode.

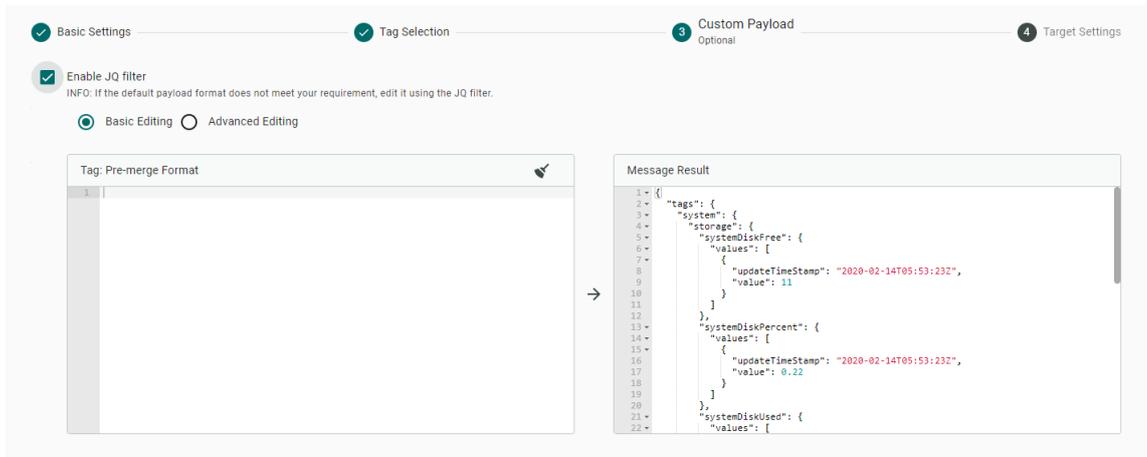


4. Input corresponding parameters such as publish interval, sampling mode, and publish.
5. Click **Next**.
6. Select tags (e.g., Modbus Master).



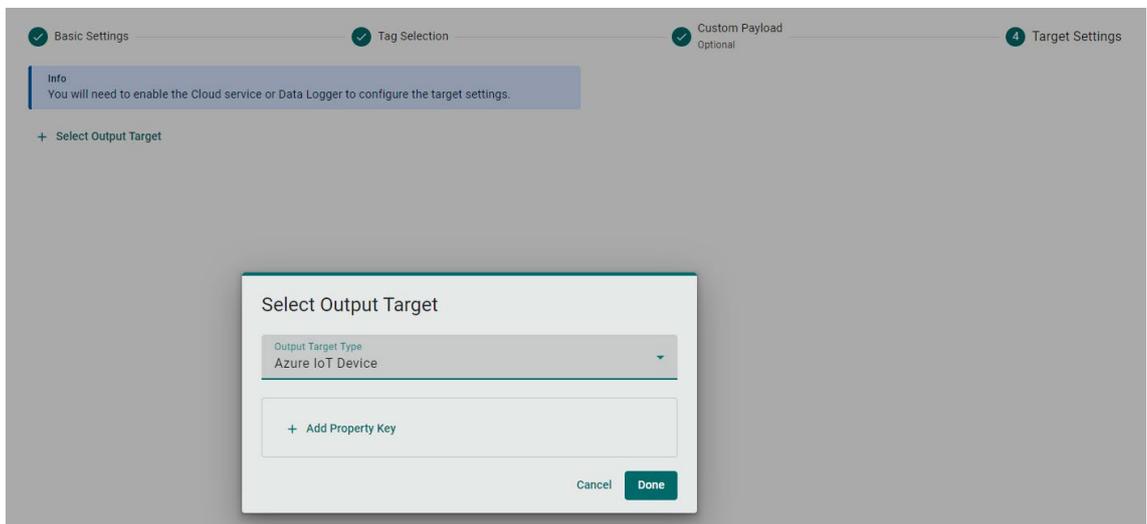
7. (Optional) Enable custom payload by using the **jq** filter.

The device-to-cloud (D2C) message policy allows you to transform default payload to your desired payload schema via the **jq** filter. For additional information, refer to the jq website (<https://stedolan.github.io/jq/manual/>).

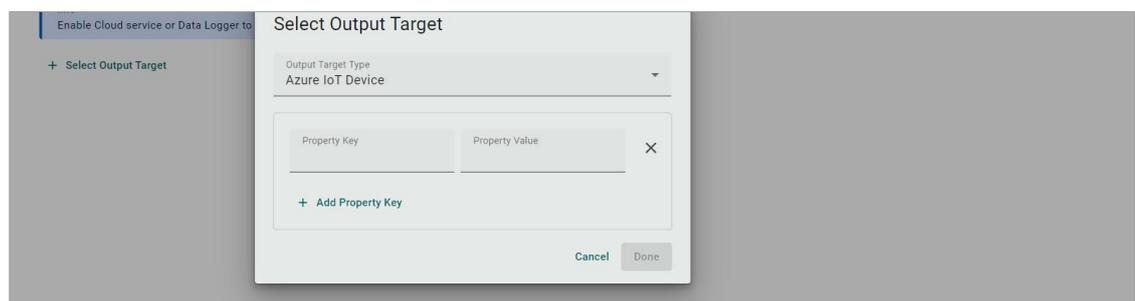


8. Click **Next**.

9. Select **Output Target Type**.



10. (Optional) Enter Property Key and Value.



11. Click **Done** and **Save**.

Store and Forward

D2C messages can be cached in a specified location and sent to the cloud later. This feature helps you keep the acquired data temporarily in a queue when the network between your IIoT Gateway and the cloud is disconnected. It will transmit the data to its destination once the network reconnects. To enable the function, click **Store and Forward** and select **Enable Store and Forward**. Select a target disk and a maximum storage cache, a retention policy, and a TTL (Time to Live) value for the messages.

Enable Store and Forward

Storage Settings

Info
You may lose part of the data stored previously if you configure a smaller Maximum Storage Cache or a shorter Time to Live.

Target Disk Status
System (24.77 GB free of 28.35 GB)

Maximum Storage Cache (MB) 
10

Storage Full Policy 
 Drop Oldest Drop Newest

Advanced Storage Limitation

Enable Time to Live
Time to live (TTL) is the time (sec) until the cached messages expire.

Time to Live (sec)
7200

Device Management

Allows this AIG to be managed from Azure IoT Hub via Device Twin and Direct Methods.

Azure IoT Device

Azure IoT Device 

| Service Name | Status |
|--|--|
|  Azure IoT Device |  Disconnect |

Store and Forward **Device Management** Message Group

Allow this device to be managed from Azure IoT Hub via Device Twin and Direct Methods.

Allow device management

Save



NOTE

if you want to use a direct method to write tags from the cloud, refer to <https://docs.moxa.online/tpe/openapi/taghub/#tag/access>

MQTT Client

Go to **Cloud Connectivity > MQTT Client**, and you can add many connections to MQTT Broker.

Note that you need to create a connection first and select D2C telemetry messages to an MQTT broker.

To create an MQTT Client, follow the steps below:

1. Click **Add Connection**.
2. Specify a **Server** (default port: 8883).

The screenshot shows a configuration form for an MQTT Client. It includes the following fields and options:

- Server**: A text input field.
- Port**: A text input field with the value 8883.
- MQTT Version**: Two radio buttons, with 3.1.1 selected and 3.1 unselected.
- Client ID**: A text input field.
- Username**: A text input field.
- Password**: A text input field with a toggle icon on the right.
- Keep Alive Time (sec)**: A text input field with the value 60.
- Clean Session**: A checked checkbox with the label "Don't persist messages on the broker when disconnected."
- Message QoS**: A dropdown menu with "At least once (1)" selected.
- Retain**: Two radio buttons, with OFF selected and ON unselected.

3. Select an **MQTT Version**.
4. (Optional) If the broker requires, enter **Client ID**, **Username**, and **Password**.
5. (Optional) Enable persistent session.
6. Select a type of **QoS** and **retain function on/off**.

- (Optional) Enable SSL/TLS, and upload Client Certificate, Client Key, Trusted Root CA.

Connect to New MQTT Broker

General **SSL/TLS** Will and Testament

SSL/TLS

Enable SSL/TLS

TLS Version

1.2 1.1 1.0

Client Certificate - optional

Client Key - optional

Trusted Root CA - optional

Ignore Server Certificate

Cancel Save

- (Optional) Enable Will flag.
- (Optional) Select type of QoS and retain function for Will flag.
- Click **Save**.

Message Group

The simplest message type for sending IoT device data to your IIoT applications is a telemetry message. To create a telemetry message, do the following:

- Click **+ Create** to create a new message group.

Home > Cloud Connectivity > Message Group

Message Group

Last Updated: Jan 24, 2024 12:16:16

Refresh Search + Create

| No. | Activate | Rule Name | Type | Last Activity Time | Status |
|--|----------|-----------|------|--------------------|--------|
| No data to display. Click the <input type="button" value="+ Create"/> button to create the first data. | | | | | |

Items per page: 10 0 of 0

- Specify a name for the **Message Group**.

3. Select a **Publish Mode**.

For details, see Publish Mode.

The screenshot shows the 'Create Message Group' dialog box with four steps: 1. Basic Setting, 2. Tag Selecting, 3. Custom Payload Optional, and 4. Target Setting. Step 1 is active. The 'Message Group Name' field contains 'Test123'. Under 'Publish Mode', the 'By Interval' radio button is selected. The 'Publish interval (sec)' field is set to '60'. The 'Sampling Mode' dropdown is set to 'All Changed Values'. There is an unchecked checkbox for 'Custom sampling rate from acquired data' and a checked checkbox for 'Enable Message Group by default'. At the bottom right, there are 'Cancel' and 'Next >' buttons.

4. Input corresponding parameters such as publish interval, sampling mode, and publish.

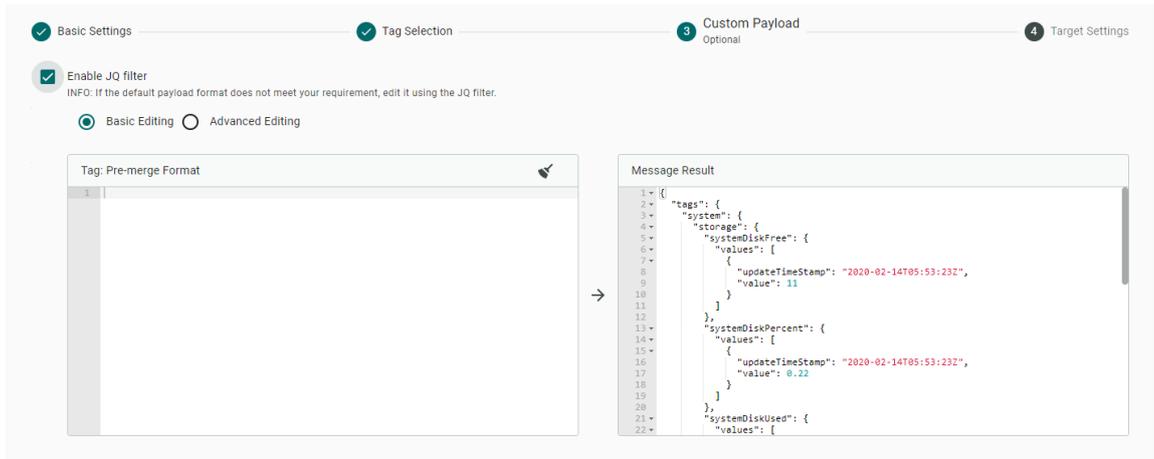
5. Click **Next**.

6. Select tags (e.g., Modbus Master).

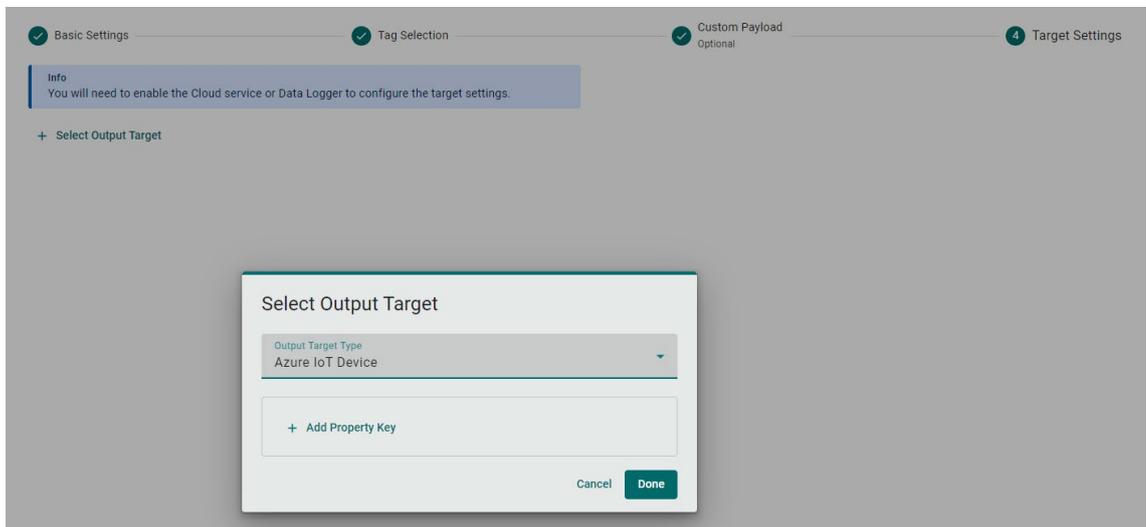
The screenshot shows the 'Create Message Group' dialog box at Step 2: Tag Selecting. Step 1 is completed. The 'Select Tags' section has an 'Info' box: 'Select one or more tag providers and select tags to map data.' The 'Providers' dropdown is set to 'modbus_tcp_master'. A search popup is open, showing a search bar and a list of tags: '[modbus_tcp_master] SE_Meter', 'Current', and 'status'. All three are checked. The popup also has 'Select All', 'Clear', and 'Done' buttons, and shows 'Total: 2, Selected: 2'. At the bottom right of the dialog, there are 'Cancel' and 'Next >' buttons.

7. (Optional) Enable custom payload by using the **jq** filter.

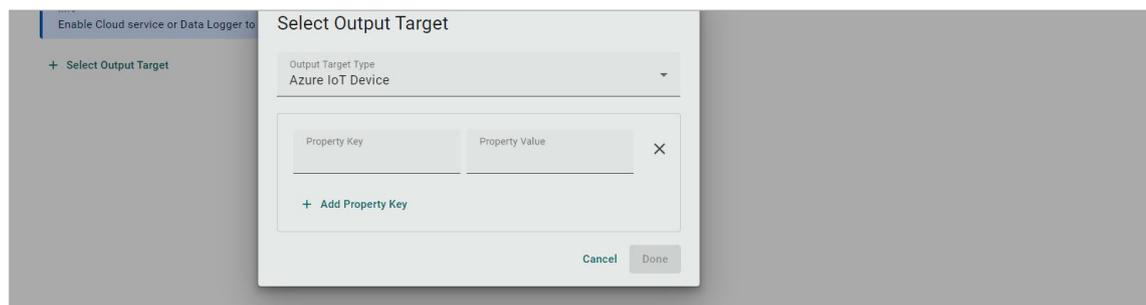
- The device-to-cloud (D2C) message policy allows you to transform default payload to your desired payload schema via the **jq** filter. For additional information, refer to the jq website (<https://stedolan.github.io/jq/manual/>).



- Click **Next**.
- Select **Output Target Type**.



- (Optional) Enter Property Key and Value.



- Click **Done** and **Save**.

Remote API Invocation

This function allows you to invoke this device's RESTful APIs from the MQTT broker and receive responses using the MQTT topics listed here.

Store and Forward **Remote API Invocation** Message Group

This function allows you to invoke almost all ThingsPro Edge restful APIs from the MQTT broker and receive responses using the MQTT topics listed here.

Enable Invoking of Device Restful APIs from MQTT Server

Input Topic to Subscribe ⓘ

Output Topic to Subscribe ⓘ

Save



NOTE

if you want to use the direct method to write tags from the cloud, refer to <https://docs.moxa.online/tpe/openapi/taghub/#tag/access>

Store and Forward

D2C messages can be cached in a specified location and sent to the cloud later. This feature helps you keep the acquired data temporarily in a queue when the network between your IIoT Gateway and the cloud is disconnected. It will transmit the data to its destination once the network reconnects. To enable the function, click **Store and Forward** and select **Enable Store and Forward**. Select a target disk and a maximum storage cache, a retention policy, and a TTL (Time to Live) value for the messages.

The screenshot displays the configuration page for the 'Store and Forward' feature. On the left, a sidebar shows a connection to 'broker.hivemq.com' which is 'Connected'. The main content area has three tabs: 'Store and Forward', 'Remote API Invocation', and 'Message Group'. The 'Store and Forward' tab is selected, showing a description: 'Stores telemetry data in the local storage to prevent data loss when device goes offline. You can enable this feature by defining policies here.' Below this is a checked checkbox for 'Enable Store and Forward'. The 'Storage Setting' section includes an 'Info' box stating that data may be lost if cache size or TTL is reduced. It features a 'Target Disk' dropdown menu currently set to 'System (26.11GB free of 28.35 GB)', a 'Maximum Storage Cache (MB)' input field with the value '10', and 'Storage Full Policy' radio buttons for 'Drop Oldest' (selected) and 'Drop Newest'. The 'Advanced Storage Limitation' section has a checked 'Enable Time to Live' checkbox and a 'Time to Live (sec)' input field with the value '7200'. A 'Save' button is located at the bottom of the configuration area.

Data Logger

The data logger function saves data when communication is lost. It stores data on a chosen disk with a set maximum size. Whether data is logged internally or sent to a cloud application depends on the behavior of Message Group.

The screenshot shows the 'Data Logger' configuration page. It features a checked checkbox for 'Enable data logger'. Below this is an 'Info' box with the text: 'You may lose part of the stored data if you reduce the Maximum Storage Cache value.' The 'Target Disk Status' dropdown menu is set to 'USB_p1 (7.73 GB free of 7.73 GB)'. The 'Maximum Storage Cache (MB)' input field contains the value '100'. A 'Save' button is positioned at the bottom of the configuration area.



NOTE

When the logged data reaches the configured **Maximum Storage Cache** size, the oldest data will be deleted, allowing for the storage to have up-to-date data.



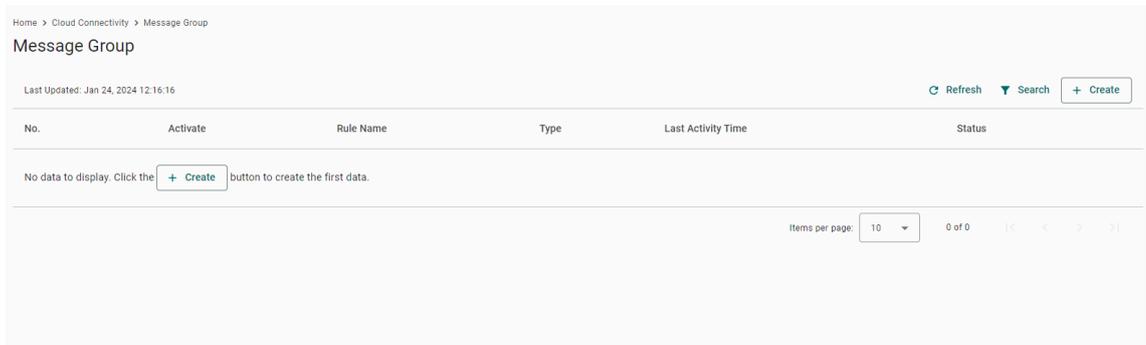
NOTE

Limitation: Hot swapping of external storage is not supported. When inserting external storage devices, it is advisable to power on/off the AIG to ensure proper functionality. Additionally, we do not endorse the use of USB hubs to simultaneously connect multiple USB devices.

Message Group

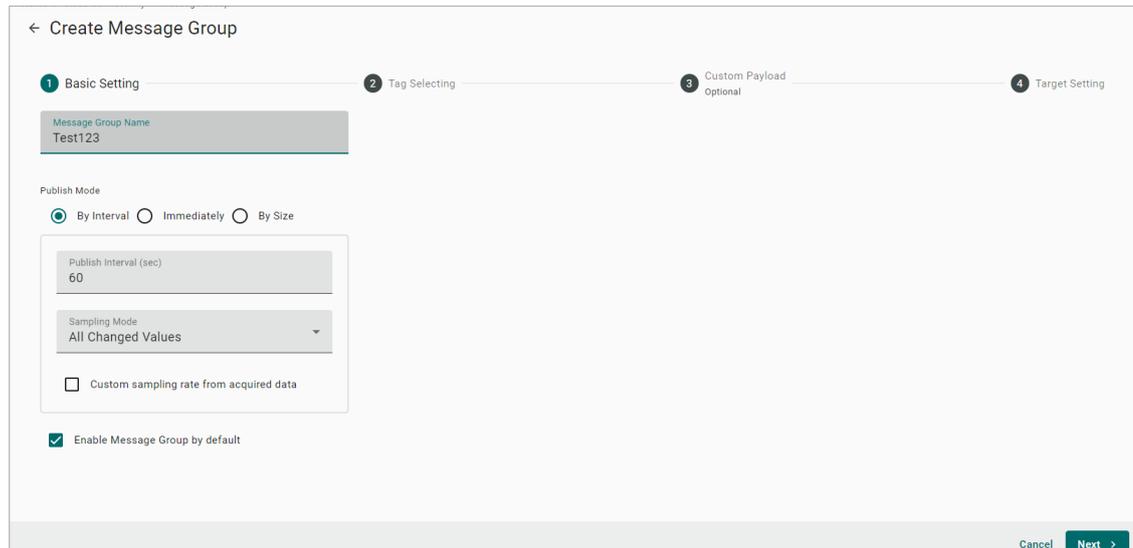
The simplest message type for sending IoT device data to your IIoT applications is a telemetry message. To create a telemetry message, do the following:

1. Click **+ Create** to create a new message group.



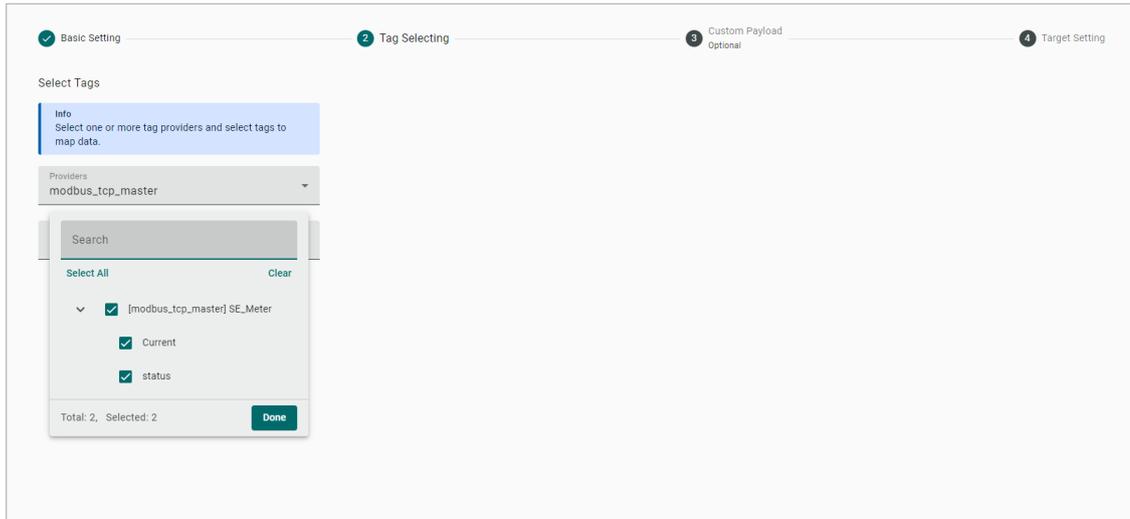
2. Specify a name for the **Message Group**.
3. Select a **Publish Mode**.

For details, see Publish Mode.



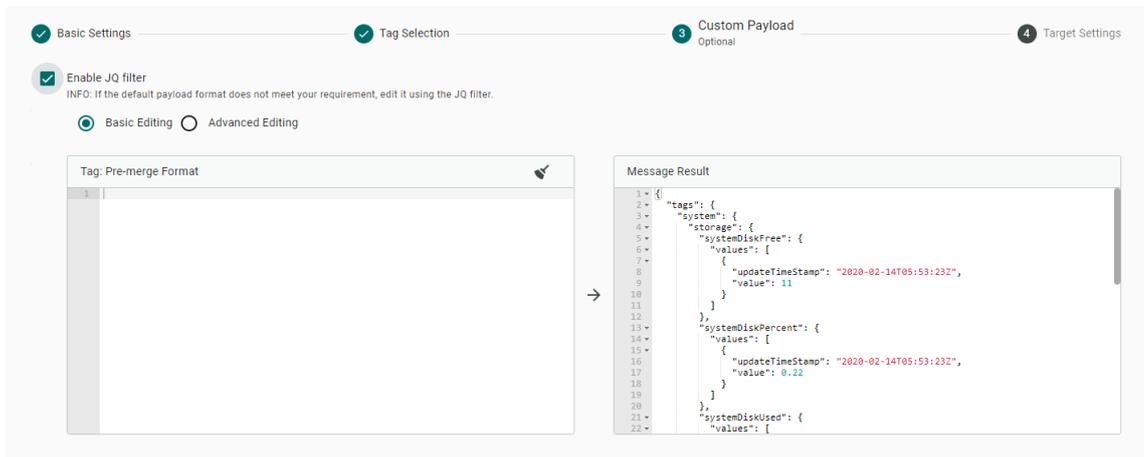
4. Input corresponding parameters such as publish interval, sampling mode, and publish.
5. Click **Next**.

6. Select tags (e.g., Modbus Master).



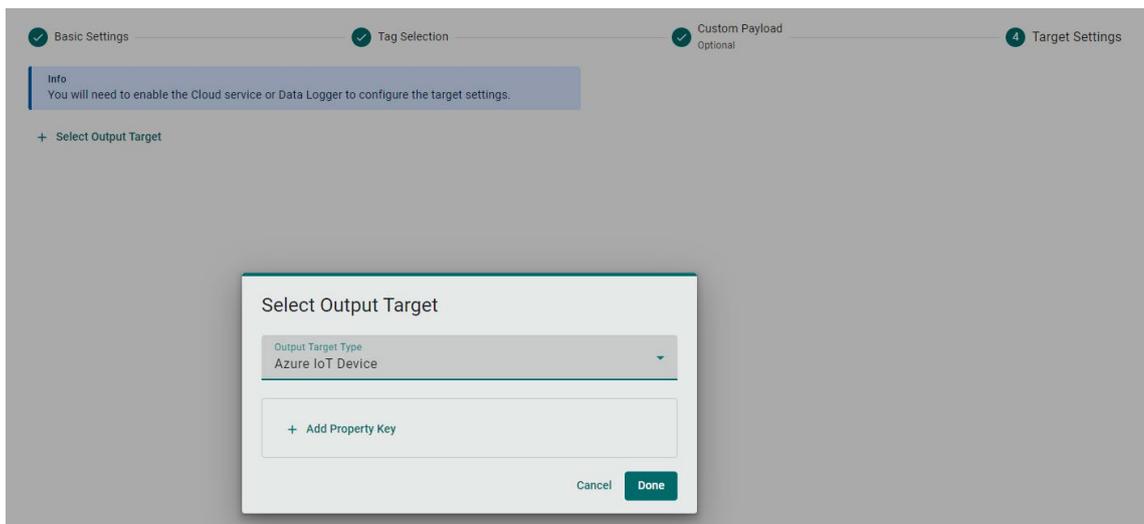
7. (Optional) Enable custom payload by using the **jq** filter.

The device-to-cloud (D2C) message policy allows you to transform default payload to your desired payload schema via the **jq** filter. For additional information, refer to the jq website (<https://stedolan.github.io/jq/manual/>).

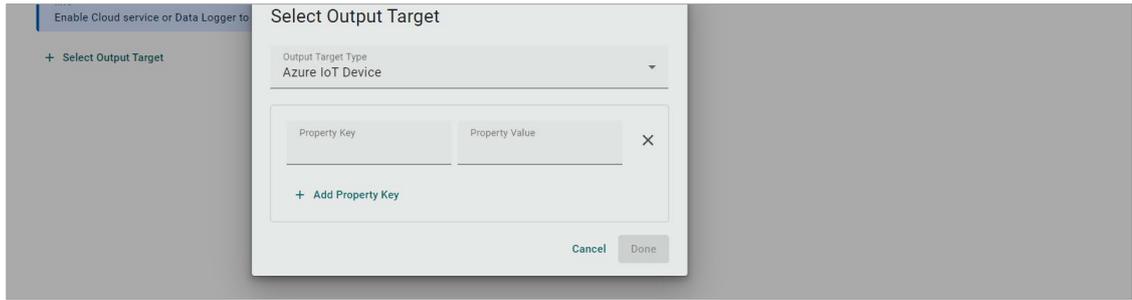


8. Click **Next**.

9. Select **Output Target Type**.



10. (Optional) Enter Property Key and Value.



11. Click **Done** and **Save**.

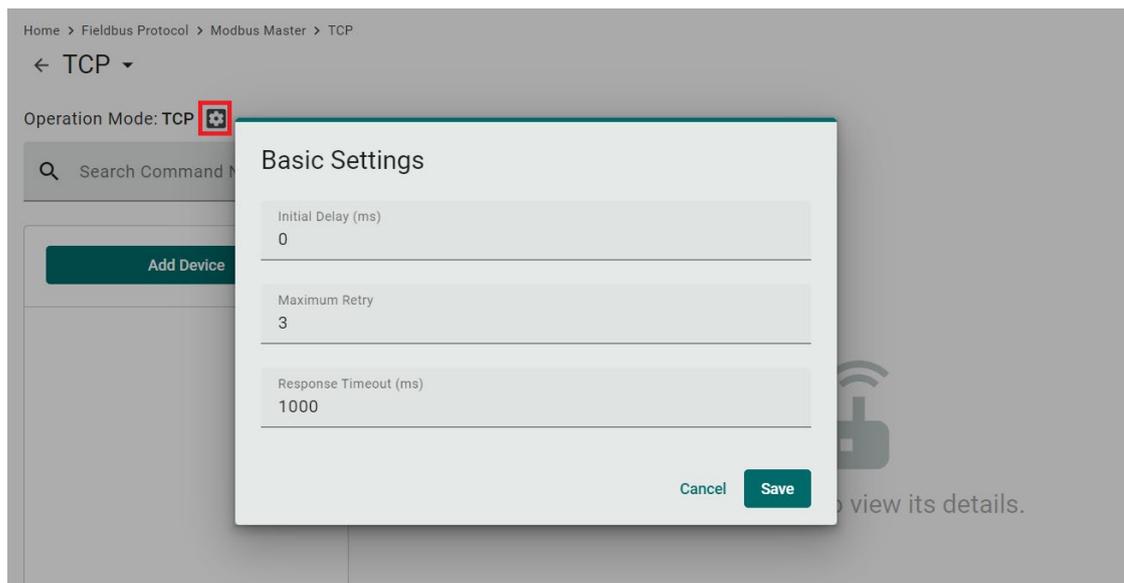
Fieldbus Protocol

Modbus Master

Modbus TCP

Basic Settings

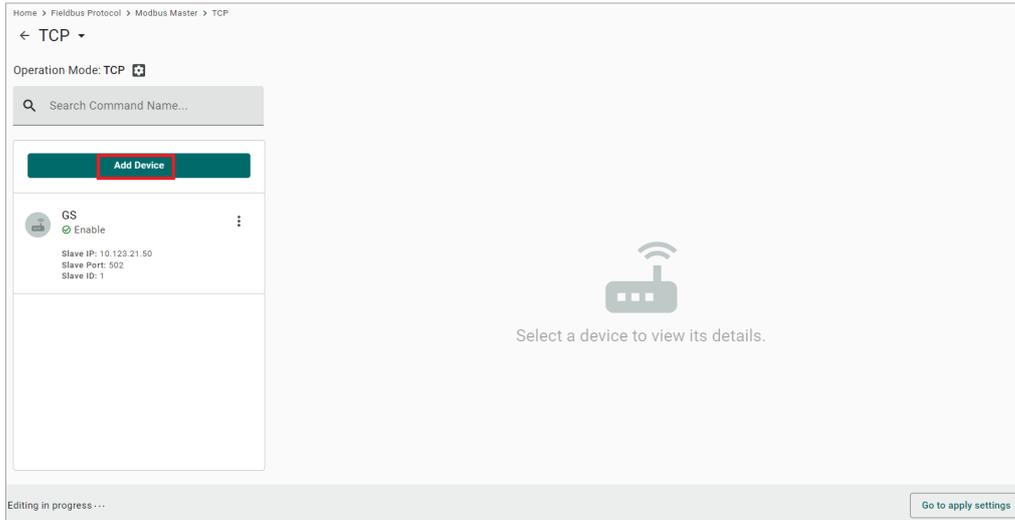
When you access the Modbus TCP setting page, you will first need to configure the basic settings.



| Parameter | Value | Default | Description |
|-----------------------|--------------|---------|---|
| Initial Delay (ms) | 0 to 30000 | 0 | Some Modbus slaves may take more time to boot up than other devices. In some environments, this may cause the entire system to suffer from repeated exceptions during the initial bootup. After booting up, you can force the AIG to wait some time before sending the first request by setting a value for this parameter. |
| Maximum Retry | 0 to 5 | 3 | This is used to configure how many times AIG will retry to communicate with the Modbus slave when the Modbus command times out. |
| Response Timeout (ms) | 10 to 120000 | 1000 | You can configure a Modbus master to wait a certain amount of time for a slave's response. If no response is received within the configured time, the AIG will disregard the request and continue operation. |

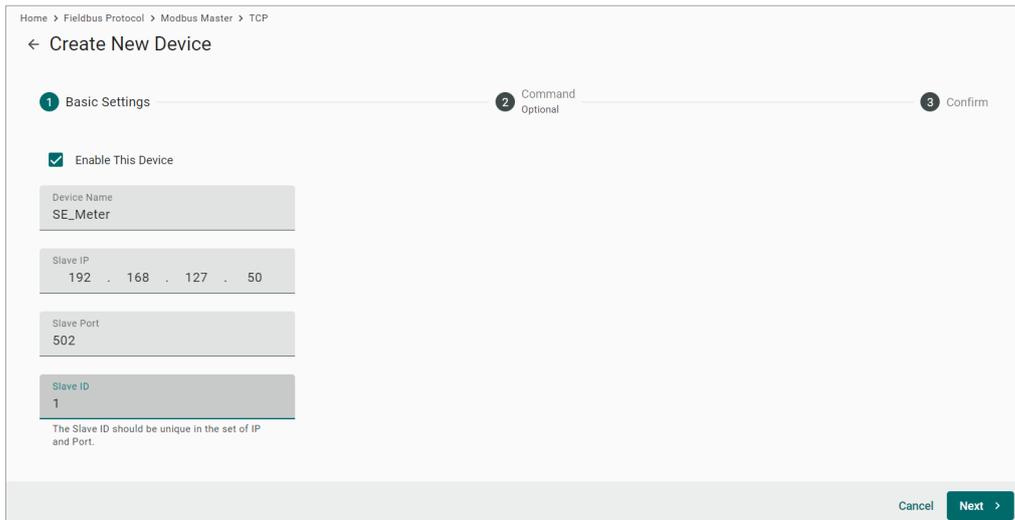
Modbus Device Settings

After configuring the basic settings, configure related parameters to retrieve data from the Modbus device. In the beginning, press **Add Device** and go to the wizard to guide you through the configuration step by step.



Step 1. Basic Settings

Enter in the basic parameters for the Modbus TCP device.



| Parameter | Value | Default | Description |
|-------------|--|---------|---|
| Device Name | Alphanumeric string and characters (~ . _ -) are allowed | - | Name your Modbus device |
| Slave IP | 0.0.0.0 to 255.255.255.255 | - | The IP address of a remote slave device. |
| Slave Port | 1 to 65535 | 502 | The TCP port number of a remote slave device. |
| Slave ID | 1 to 255 | - | The slave ID of a remote slave device. |

Step 2. Command

When you configure the device for the first time, select **Manual** mode and press **Add Command**.

The command settings will pop up.

| Parameter | Value | Default | Description |
|------------------------------|---|-----------------------------|---|
| Command Name | Alphanumeric string | - | Name the command |
| Function | 01 – Read Coils 02 – Read Discrete Inputs 03 – Read Holding Registers 04 – Read Inputs Registers 05 – Write Single Coil 06 – Write Single Register 15 – Write Multiple Coils 16 – Write Multiple Registers 23 – Read/Write Multiple Registers | 03 – Read Holding Registers | How to collect data from the Modbus device |
| Read Starting Address | 0 to 65535 | 0 | Modbus registers the address for the collected data |
| Read quantity | Read Coils: 1 to 2000 Read Discrete Inputs: 1 to 2000 Read Inputs Registers: 1 to 125 Read Holding Registers: 1 to 125 Read/Write Multiple Registers: 1 to 125 | 10 | Specifying how much data to read |
| Write start address | 0 to 65535 | 0 | Modbus registers the address for the written data |

| Parameter | Value | Default | Description |
|---------------------------|---|---------|---|
| Write quantity | Write Multiple Coils: 1 to 1968 Write Multiple Registers: 1 to 123 Read/Write Multiple Registers: 1to 123 | 1 | Specifying how much data to write. |
| Trigger | Cyclic Data Change | - | Cyclic: The command is sent cyclically at the interval specified in the Poll Interval parameter. Data change: The data area is polled for changes at the time interval defined by Poll Interval. A command is issued when a change in data is detected. |
| Poll interval (ms) | 100 to 1200000 | 1000 | Polling intervals are in milliseconds. Since the module sends all requests in turns, the actual polling interval also depends on the number of requests in the queue and their parameters. The range is from 100 to 1,200,000 ms. |
| Endian swap | None Byte Word Byte and Word | None | None: not to swap Byte: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C Word: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0C, 0x0D, 0x0A, 0x0B. Byte and Word: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0D, 0x0C, 0x0B, 0x0A. |
| Status Term | Pause Proceed - Clear data to zero Proceed - Set to User-defined value | Pause | The defined value of the Status Term will be effective when a read command encounters an error or times out. |
| Tag Type | boolean int16 int32 int64 uint16 uint32 uint64 float double string | - | The command will be generated into a meaningful tag by tag type and stored in tag hub. |

If you already have a Modbus command file, select **Import Configuration**. Importing a configuration file will help you reduce configuration time.

Home > Fieldbus Protocol > Modbus Master > TCP

← Create New Device

Basic Settings
 2 Command
Optional
 3 Confirm

Mode

Manual
 Import Configuration

Info
You can import configuration file that include command settings to replace original command settings. Click "BROWSE" button to select your configuration file.

Command Configuration

Step 3. Confirm

Review whether the information of the settings is correct.

Home > Fieldbus Protocol > Modbus Master > TCP

< Create New Device

✓ Basic Settings ✓ Command Optional 3 Confirm

Confirm the device settings and click Done to save your changes. After the device is created in the system, you can edit your device settings at any time.

Device Name SE_Meter
Slave ID 1
Slave IP 192.168.127.50
Slave Port 502
Status Enable
Number of Commands 1
Command Configuration

< Back Cancel Done

Then, you will see the setting results.

The product provides an easier way for installation and maintenance. You can **Export** all the Modbus commands into a file for backup purposes, or you can **Import** a file (golden sample) to reduce configuration time.

Home > Fieldbus Protocol > Modbus Master > TCP

< TCP

Operation Mode: TCP

Search Command Name...

Add Device

SE_Meter + Add Command Import Export

| No. | Command Name | Function | Address, Quantity | Trigger | Poll Interval (ms) | Enable |
|-----|--------------|----------|-------------------|---------|--------------------|--------|
| > 1 | Current | 3 | Read 0, 10 | Cyclic | 1000 | Enable |

Items per page: 10 1 - 1 of 1

Editing in progress... Go to apply settings

Import Command Configuration

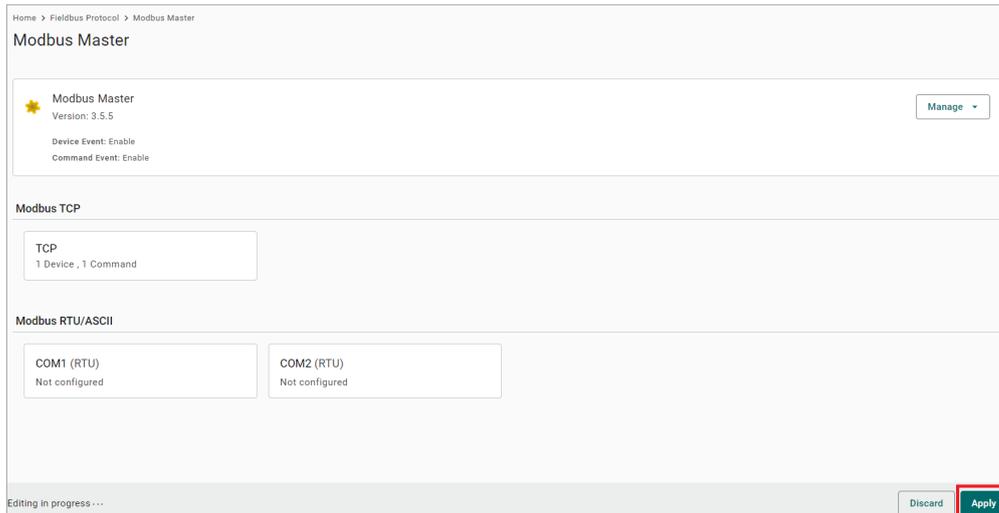
You can import configuration file that include command settings to replace original command settings. Click "BROWSE" button to select your configuration file.

Command Configuration

Browse

Cancel Done

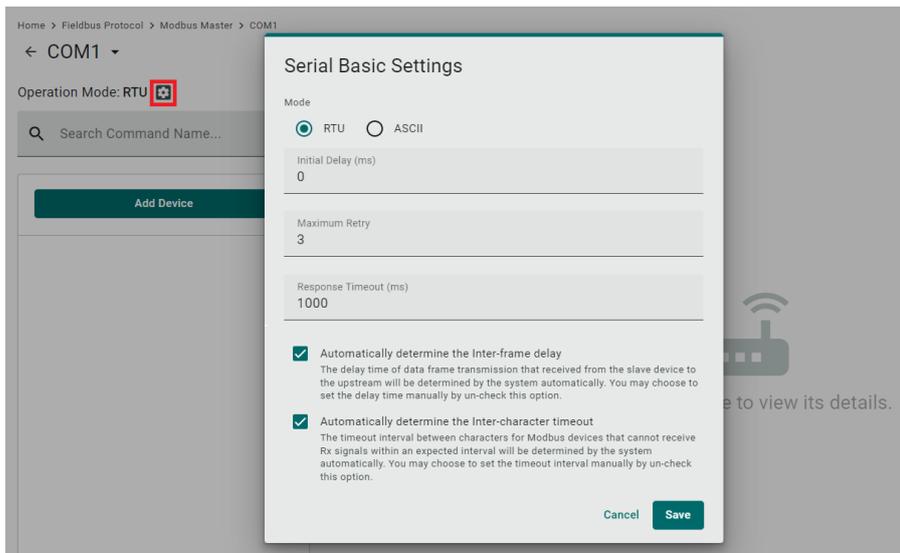
After finishing all the settings, press **Go to apply settings** and click **Apply** for the settings take effect.



Modbus RTU/ASCII

Basic Settings

When you access the Modbus RTU/ASCII settings page, you will first need to configure the basic settings.



| Parameter | Value | Default | Description |
|-----------------------|--------------|---------|---|
| Mode | RTU/ASCII | RTU | |
| Initial Delay (ms) | 0 to 30000 | 0 | Some Modbus slaves may take more time to boot up than other devices. In some environments, this may cause the entire system to suffer from repeated exceptions during the initial bootup. After booting up, you can force the AIG to wait some time before sending the first request by setting a value for this parameter. |
| Maximum Retry | 0 to 5 | 3 | Use this to configure how many times AIG will retry to communicate with the Modbus slave when the Modbus command times out. |
| Response Timeout (ms) | 10 to 120000 | 1000 | You can configure a Modbus master to wait a certain amount of time for a slave's response. If no response is received within the configured time, the AIG will disregard the request and continue operation. |

| Parameter | Value | Default | Description |
|--|----------------------------------|---------|--|
| Automatically determine the inter-frame delay (ms) | Check unchecked: 10 to 500 | check | Inter-frame delay is the time between the response and the next request. This is to ensure a legacy Modbus slave device can handle packets in a short time. Check: The AIG will automatically determine the time interval. Uncheck: You can input a time interval. |
| Automatically determines the intercharacter timeout (ms) | Check unchecked: 10 to 500 | check | Use this function to determine the timeout interval between characters for receiving Modbus responses. If AIG can't receive Rx signals within an expected time interval, all received data will be discarded. Check: The AIG will automatically determine the time out. Uncheck: You can input a specific timeout value. |

Modbus Device Settings

After basic settings, you must configure related parameters to retrieve data from the Modbus device. In the beginning, press **Add Device** and go to the wizard that guides step-by-step through the configuration process.

Step 1. Basic Settings

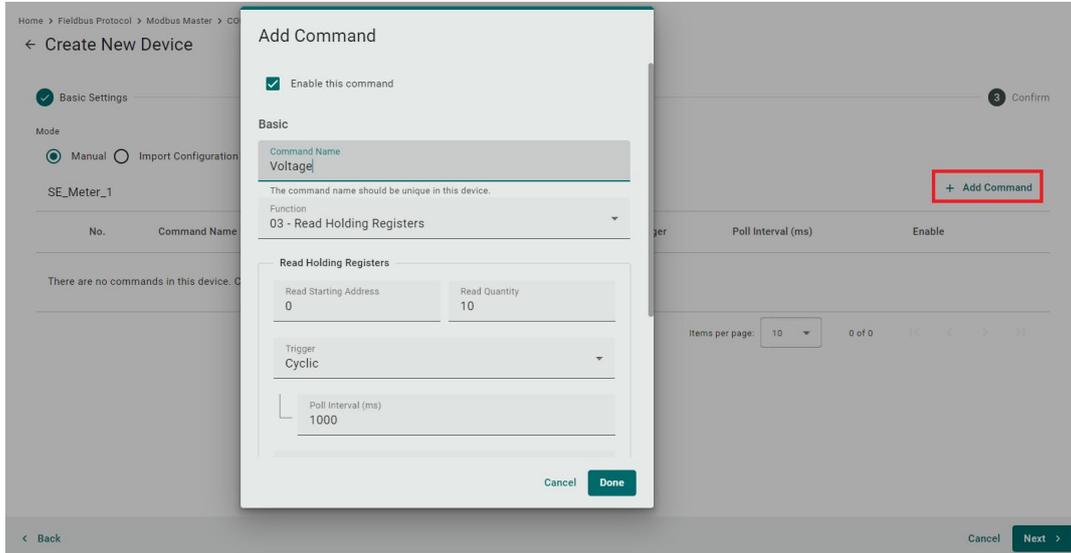
Fill in the basic parameters for the Modbus RTU/ASCII device.

| Parameter | Value | Default | Description |
|-------------|--|---------|--|
| Device Name | Alphanumeric string and characters (~ . _ -) are allowed | - | Name your Modbus device |
| Slave ID | 1 to 255 | - | The slave ID of a remote slave device. |

Step 2. Command

If you are configuring the device for the first time, select the **Manual** and press **ADD COMMAND**.

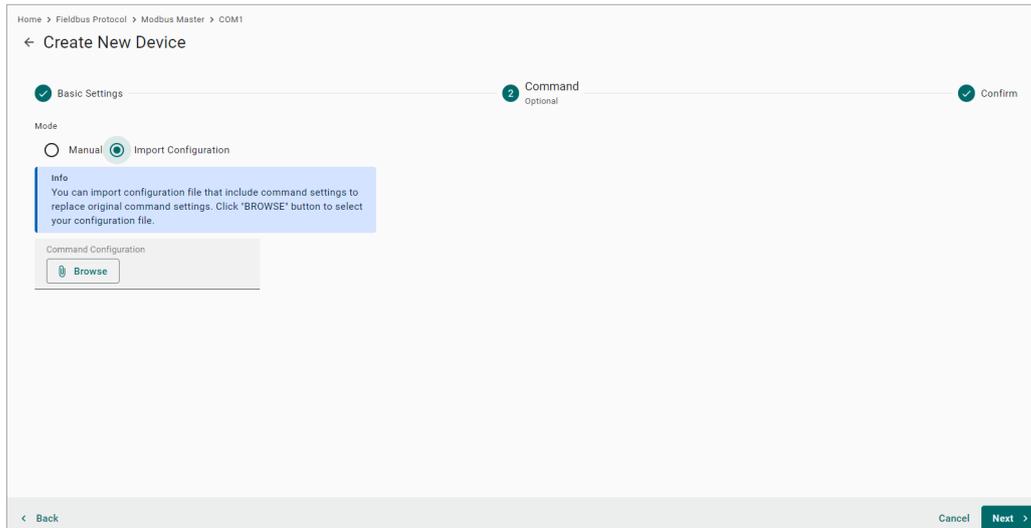
The command settings will pop up.



| Parameter | Value | Default | Description |
|-----------------------|---|-----------------------------|---|
| Command Name | Alphanumeric string and characters (~ . _ -) are allowed | - | Name the command |
| Function | 01 – Read Coils 02 – Read Discrete Inputs 03 – Read Holding Registers 04 – Read Inputs Registers 05 – Write Single Coil 06 – Write Single Register 15 – Write Multiple Coils 16 – Write Multiple Registers 23 – Read/Write Multiple Registers | 03 – Read Holding Registers | How to collect data from the Modbus device |
| Read Starting Address | 0 to 65535 | 0 | Modbus registers the address for the collected data |

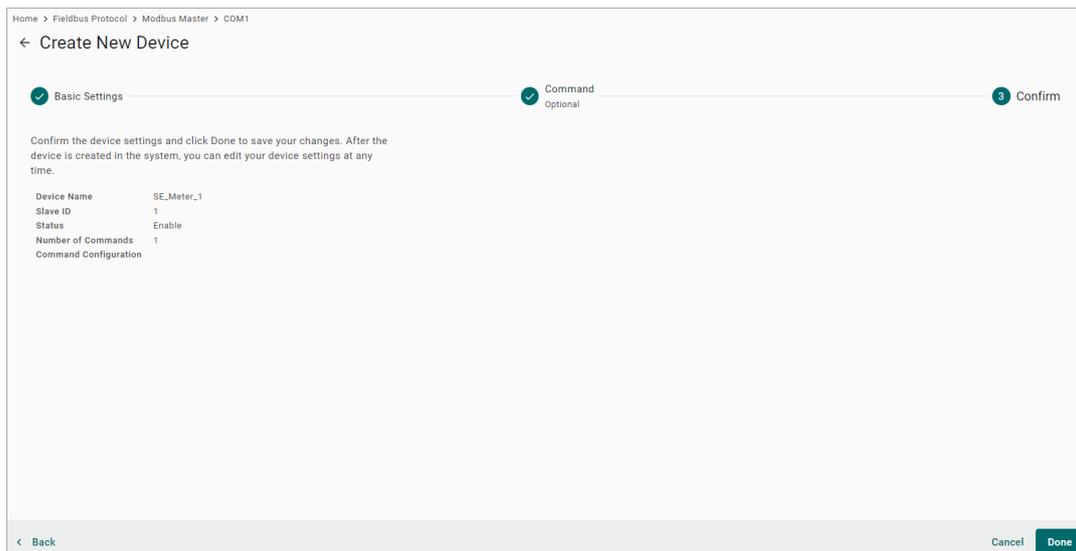
| Parameter | Value | Default | Description |
|------------------------|--|---------|---|
| Read quantity | Read Coils: 1 to 2000 Read Discrete Inputs: 1 to 2000 Read Inputs Registers: 1 to 125 Read Holding Registers: 1 to 125 Read/Write Multiple Registers: 1 to 125 | 10 | Specifying how much data to read |
| Write starting address | 0 to 65535 | 0 | Modbus registers the address for the written data |
| Write quantity | Write Multiple Coils: 1 to 1968 Write Multiple Registers: 1 to 123 Read/Write Multiple Registers: 1 to 123 | 1 | Specifying how much data to write. |
| Trigger | Cyclic Data Change | – | Cyclic: The command is sent cyclically at the interval specified in the Poll Interval parameter. Data change: The data area is polled for changes at the time interval defined by Poll Interval. A command is issued when a change in data is detected. |
| Poll interval (ms) | 100 to 1200000 | 1000 | Polling intervals are in milliseconds. Since the module sends requests in turns, the actual polling interval also depends on the number of requests in the queue and their parameters. The range is from 100 to 1,200,000 ms. |
| Endian swap | None Byte Word Byte and Word | None | None: not to swap Byte: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0B, 0x0A, 0x0D, 0x0C Word: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0C, 0x0D, 0x0A, 0x0B. Byte and Word: 0x0A, 0x0B, 0x0C, 0x0D becomes 0x0D, 0x0C, 0x0B, 0x0A. |
| Status Term | Pause Proceed - Clear data to zero Proceed - Set to User-defined value | Pause | The defined value of the Status Term will be effective when the read command encounters an error or times out. |
| Tag Type | boolean int16 int32 int64 uint16 uint32 uint64 float double string | – | The command will be generated into a meaningful tag by tag type and stored in the tag hub. |

If you already have a Modbus command file on hand, select the **Import Configuration** mode. Importing a configuration file will help you reduce configuration time.



Step 3. Confirm

Review whether the information of the settings is correct.



Then, you will see the setting results.

Moreover, the product provides an easier way for installation and maintenance. You can **Export** all the Modbus commands into a file for backup purposes; or you can **Import** a file (golden sample) to reduce configuration time.

Home > Fieldbus Protocol > Modbus Master > COM2

← COM2 ▾

Operation Mode: RTU 🛠

🔍 Search Command Name...

Add Device

SE_Meter_1

SE_Meter_1
🟢 Enable
Slave ID: 1

+ Add Command **Import** **Export**

| No. | Command Name | Function | Address, Quantity | Trigger | Poll Interval (ms) | Enable |
|-----|--------------|----------|-------------------|---------|--------------------|--------|
| > 1 | Voltage | 3 | Read 0, 10 | Cyclic | 1000 | Enable |

Items per page: 10 ▾ 1 - 1 of 1 |< < > >|

After finishing all the settings, press **Go to apply settings** and click **Apply** for the settings to take effect.

Home > Fieldbus Protocol > Modbus Master

Modbus Master

🌟 Modbus Master
Version: 3.5.5
Device Event: Enable
Command Event: Enable Manage ▾

Modbus TCP

TCP
1 Device, 1 Command

Modbus RTU/ASCII

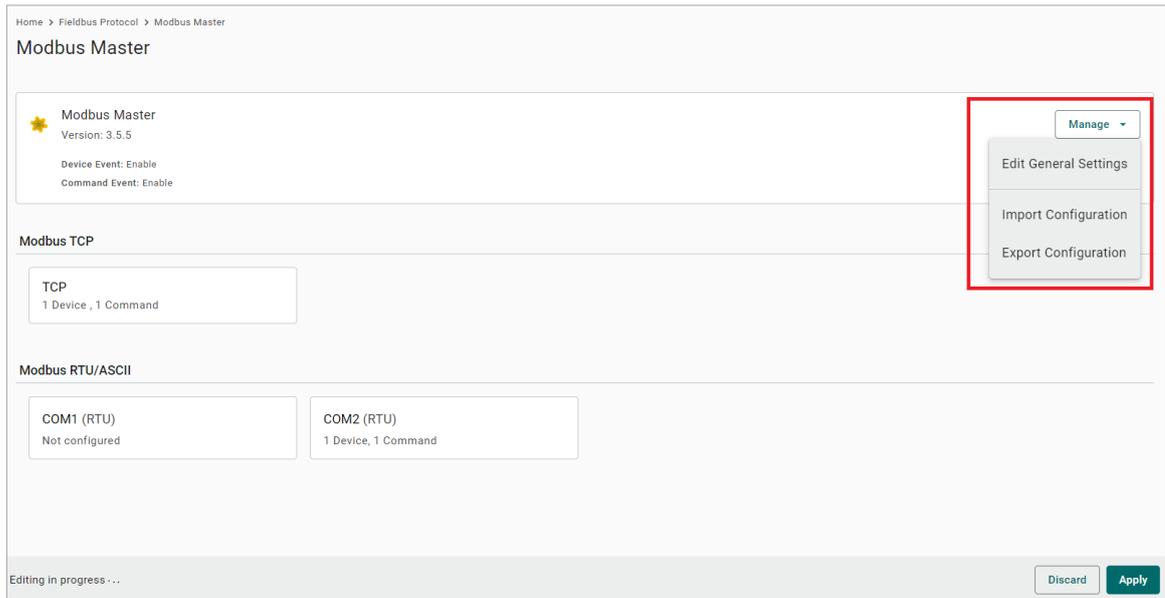
COM1 (RTU)
Not configured

COM2 (RTU)
1 Device, 1 Command

Editing in progress ... Discard **Apply**

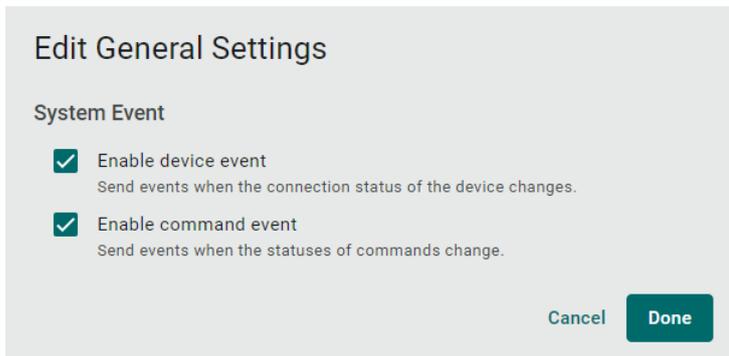
Manage

The AIG provides advanced features that help you save installation time and maintenance effort.



Edit General Settings

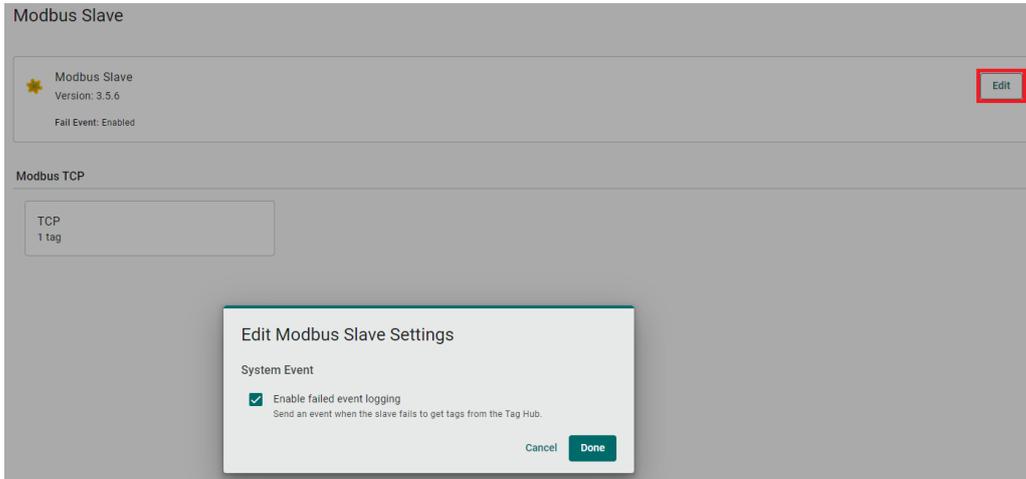
Once your northbound main system wants to monitor the Modbus communication status, you can enable this function.



| Parameter | Value | Default | Description |
|-----------------------------|------------------|---------|---|
| Enable device event | Check uncheck | Check | Check: If the Modbus communication fails, e.g., Modbus exception code is received The Modbus response timeout and the value of the status tag in the tag hub will change to 1. Uncheck: Disable the function |
| Enable command event | Check uncheck | Check | Check: If the Modbus command fails, e.g., Modbus exception code is received or Modbus response times out, the value of the status tag in the tag hub will change to 1. Uncheck: Disable the function. |

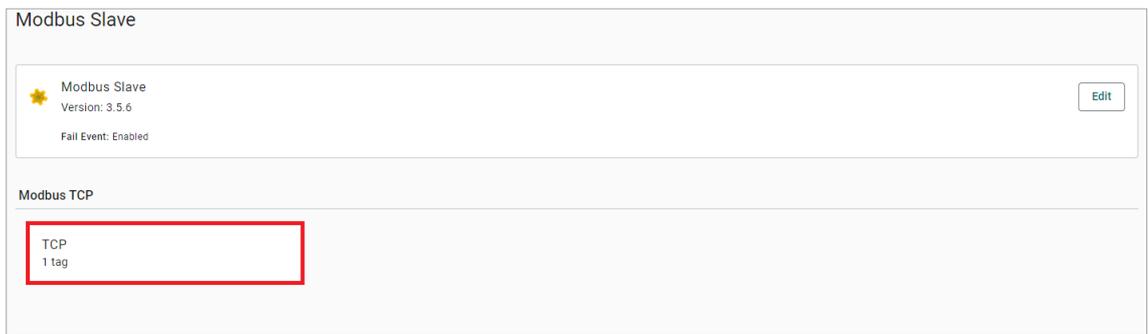
Modbus Slave

Click **Edit** for Modbus Slave advanced settings. If you want to create an event under the event log for when the Modbus TCP connection might get disconnected, you can enable the fail event function.

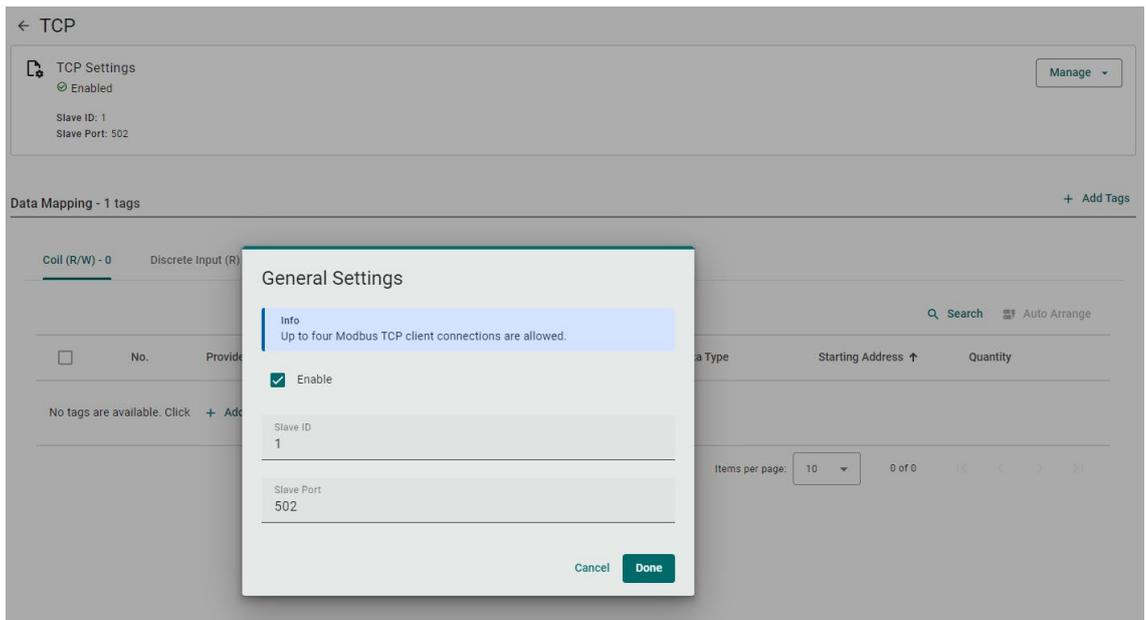


To create a Modbus TCP server (slave), following the steps below:

1. Click **TCP** under Modbus TCP.



2. Click **Manage > General Settings**.



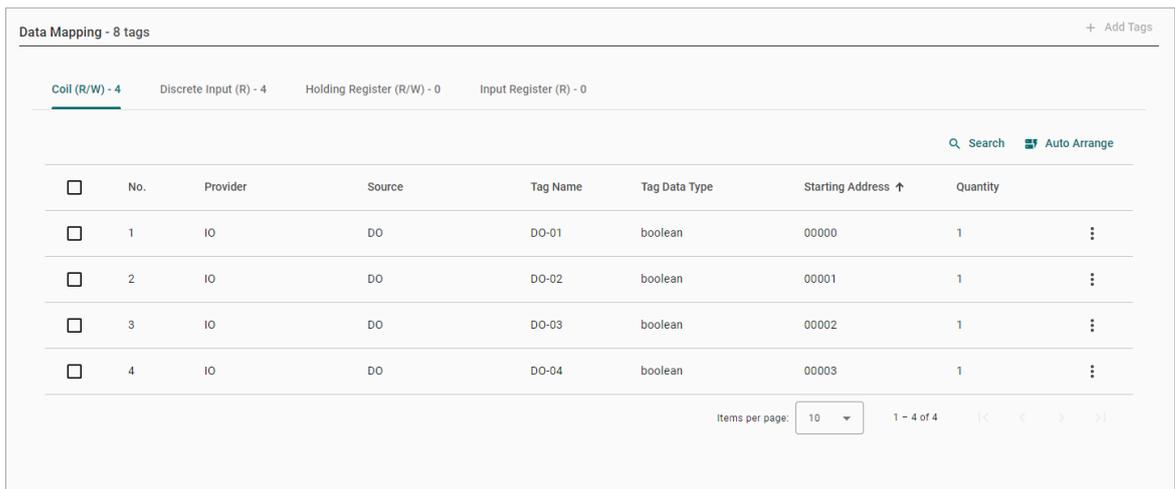
3. Check **Enable this slave**, input **Slave ID** and **Slave Port**, then click **Done**.
4. Click **+Add Tags** to select tags (e.g., Modbus Master).



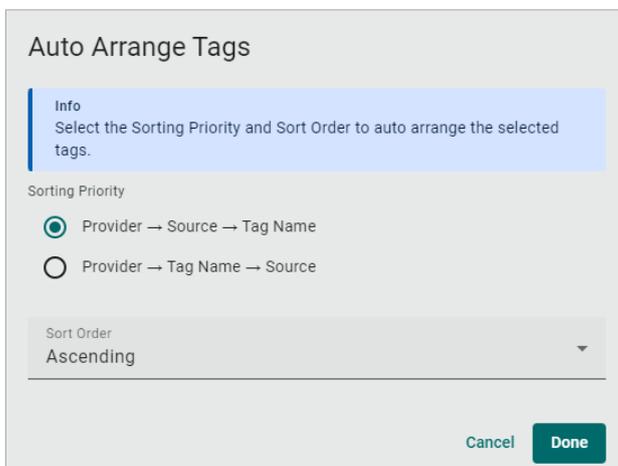
5. Click **Done** to finish settings.

Under Data Mapping, you can view all the selected tags, which will be divided into Coil, Discrete Input, Holding Register, and Input Register. The rule is based on the tag's attribute stored in the tab hub. For example, if the tag type is Boolean and Tag Access permissions are Read, the tag will be mapped to Discrete Input in Modbus TCP server (slave).

| | Tag Type | Tag Access Permissions |
|------------------|-------------|------------------------|
| Coil | Boolean | Read/Write |
| Discrete Input | Boolean | Read |
| Holding Register | Non-boolean | Read/Write |
| Input Register | Non-boolean | Read |



If you want to rearrange the Modbus table, click **Auto Arrange**. You can select different sorting priorities and sort order types.



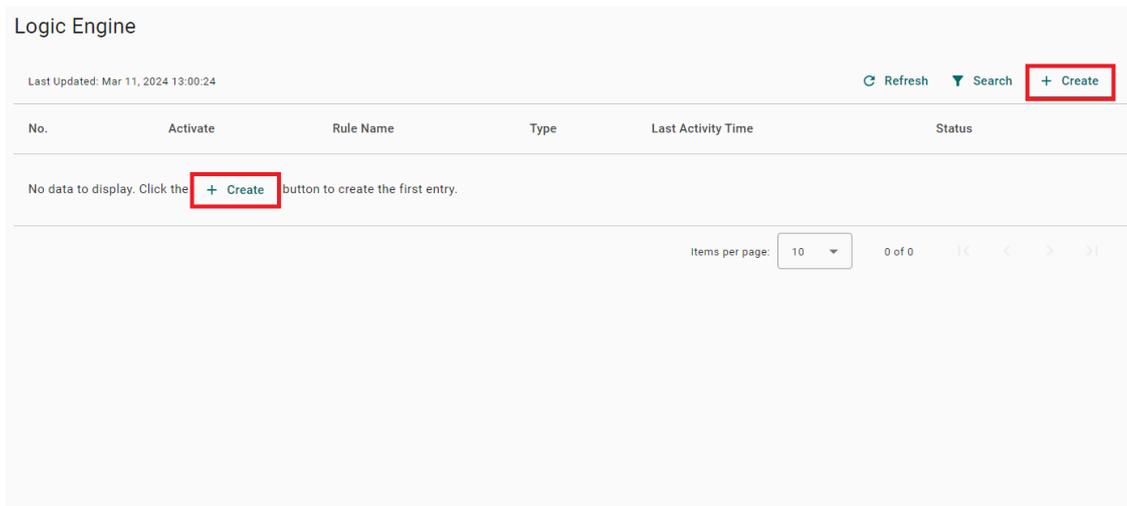
Edge Computing

Logic Engine

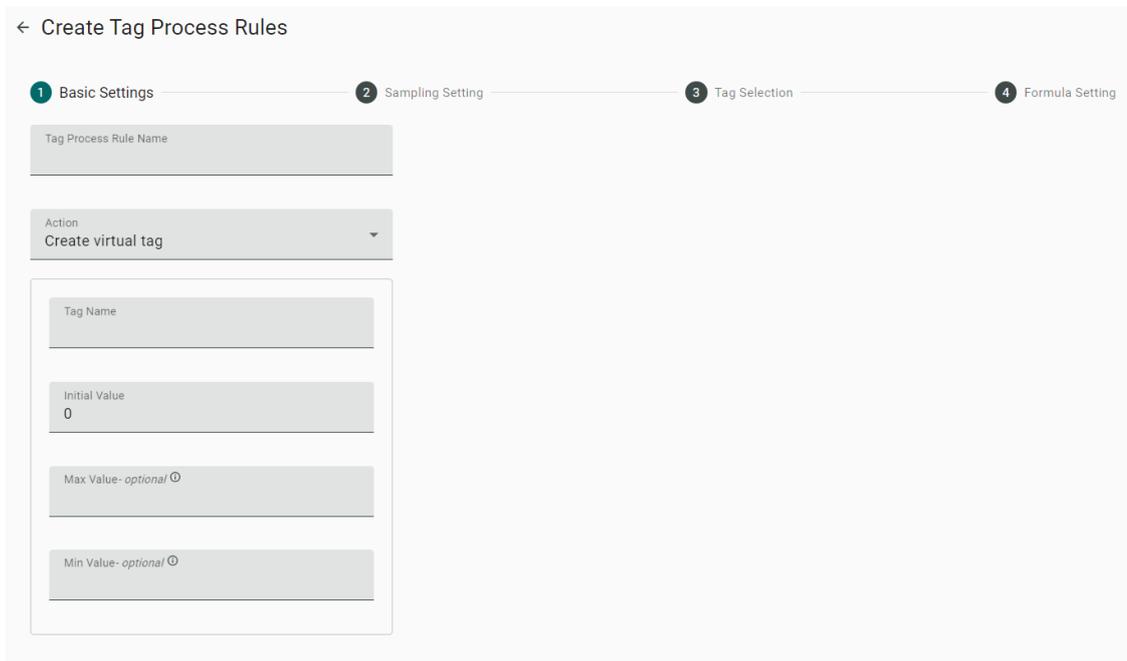
The device has a built-in intuitive no-code solution that can help write rules for processing data and calculate values or create simple logic control to fulfill specific scenarios, which can then be used to trigger some actions. This feature helps eliminate the programming effort in data processing.

To process data and calculate data values, do the following:

1. Click **+ Create**.



2. Specify **Rule Name**, select **Create virtual tag** under **Action** and configure **Tag Name** and following parameters, then click **Next**.



3. Select a sampling setting and click **Next**.

← Create Tag Process Rules

✓ Basic Settings 2 Sampling Setting ✓ Tag Selection 4 Formula Setting

Sampling Mode
Sample Rate

Interval (sec)
10

< Back Cancel Next >

4. Select the tags from system or Modbus that you want to process and click **Next**.

← Create Tag Process Rules

✓ Basic Settings ✓ Sampling Setting 3 Tag Selection 4 Formula Setting

Select a max of 8 parameters (tags) along with the assigned code (A, B, C, ...). You can edit the formula using the code in the next step.

| | | |
|--------------|---|-------------|
| system (3) | A | IO/DI/DI-01 |
| network (13) | B | IO/DI/DI-02 |
| storage (6) | C | IO/DI/DI-03 |
| status (11) | D | IO/DI/DI-04 |
| IO (2) | E | -- |
| DI (4) | F | -- |
| DI-01 | G | -- |
| DI-02 | H | -- |
| DI-03 | | |
| DI-04 | | |
| DO (4) | | |

< Back Cancel Next >

5. Drag and drop the formula and tags from **Math** and **Tag** and click **Save**.

← Create Tag Process Rules

Basic Settings Sampling Setting Tag Selection **4** Formula Setting

Logic
Math
Lists
Tag

Data_Calculation = A * 'value' + B * 'value'

| | |
|---|-------------|
| A | IO/DI/DI-01 |
| B | IO/DI/DI-02 |
| C | IO/DI/DI-03 |
| D | IO/DI/DI-04 |
| E | -- |
| F | -- |
| G | -- |
| H | -- |

Back Cancel Save

6. After the rule is created successfully, you can find the virtual tag on the **Tag Dashboard**.

Logic Engine

Last Updated: Mar 11, 2024 13:23:31 Refresh Search Create

| No. | Activate | Rule Name | Type | Last Activity Time | Status |
|-----|----------|--------------------|------------------|-----------------------|---------|
| 1 | Enable | Calculate the Data | Tag Process Rule | Jan 01, 0001 08:06:00 | Success |

Items per page: 10 1 - 1 of 1



NOTE

The **Status** column indicates if the rule contains any errors or not.

Edit Tags

Select the tags you want to display in the list.

1 Item(s) selected Clear Ca X

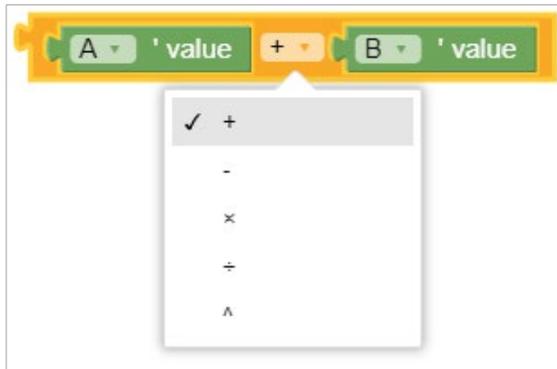
| <input type="checkbox"/> | Provider | Source | Name | Type | Access |
|-------------------------------------|----------|--------|------------------|--------|--------|
| <input type="checkbox"/> | system | status | memoryCached | uint64 | Read |
| <input checked="" type="checkbox"/> | virtual | logic | Data_Calculation | double | Read |

Items per page: 5 1 - 2 of 2

Cancel Save

The following Math formulas are supported:

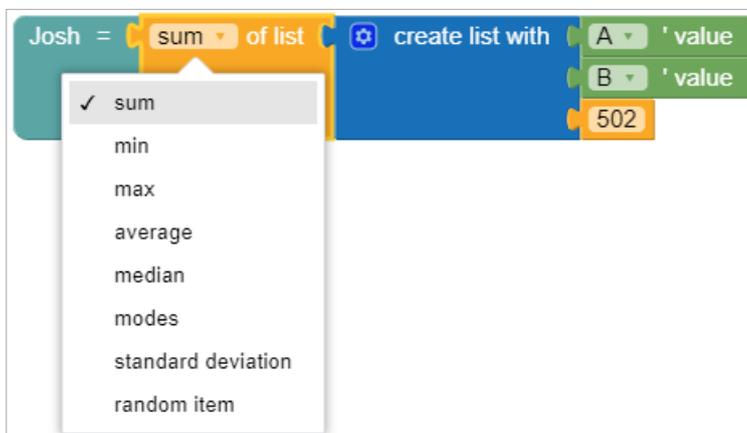
- **addition(+), subtraction(-), multiplication(x), division(/), and power(^)**



- **round, round up, round down**



- **sum, minimum, maximum, average, median, modes, standard deviation, random items**



To create a logic control rule, do the following:

1. Click **+ Create**.

Logic Engine

Last Updated: Mar 11, 2024 13:00:24

Refresh Search **+ Create**

| No. | Activate | Rule Name | Type | Last Activity Time | Status |
|---|----------|-----------|------|--------------------|--------|
| No data to display. Click the + Create button to create the first entry. | | | | | |

Items per page: 10 0 of 0

2. Input the **Rule Name**, configure **Overwrite Tag** under **Action**, and select the **Overwrite Target**, then click **Next**.

← Create Tag Process Rules

1 Basic Settings 2 Sampling Setting 3 Tag Selection 4 Formula Setting

Tag Process Rule Name
Logic Control

Action
Overwrite tag

Overwrite Target
IO/DO/DO-01

Cancel **Next >**

- Configure the **Sampling Mode** and click **Next**.

← Create Tag Process Rules

Basic Settings
 2 Sampling Setting
 3 Tag Selection
 4 Formula Setting

Sampling Mode
Sample Rate

Interval (sec)
10

[← Back](#)

[Cancel](#)
[Next >](#)

- Select the tags from system or Modbus that you want to process, then click **Next**.

Home > Edge Computing > Logic Engine

← Create Tag Process Rules

Basic Settings
 Sampling Setting
 3 Tag Selection
 4 Formula Setting

Select a max of 8 parameters (tags) along with the assigned code (A, B, C, ...). You can edit the formula using the code in the next step.

> system (3)

▼ IO (2)

 ▼ DI (4)

DI-01

DI-02

DI-03

DI-04

 ▼ DO (4)

DO-01

DO-02

DO-03

DO-04

| | |
|---|-------------|
| A | IO/DI/DI-01 |
| B | -- |
| C | -- |
| D | -- |
| E | -- |
| F | -- |
| G | -- |
| H | -- |

[← Back](#)

[Cancel](#)
[Next >](#)

5. Drag and drop the formula and tags from **Logic, Math, and Tag**, then click **Save**.

← Create Tag Process Rules

Basic Settings Sampling Setting Tag Selection **4** Formula Setting

Info
The tag has been changed; remember to check the formula.

Logic
Math
Lists
Tag

if A value = true
do IO/DO/DO-01 = 1

| | |
|---|-------------|
| A | IO/DO/DO-01 |
| B | -- |
| C | -- |
| D | -- |
| E | -- |
| F | -- |
| G | -- |
| H | -- |

← Back Cancel Save

6. You will see the rule has been created successfully.

Logic Engine

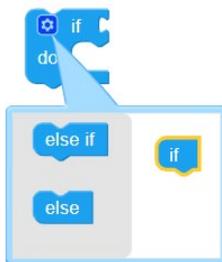
Last Updated: Mar 11, 2024 14:13:37 Refresh Search + Create

| No. | Activate | Rule Name | Type | Last Activity Time | Status |
|-----|----------|---------------|------------------|-----------------------|---------|
| 1 | Enable | Logic Control | Tag Process Rule | Jan 01, 0001 08:06:00 | Success |

Items per page: 10 1 - 1 of 1

The following logic sets are supported:

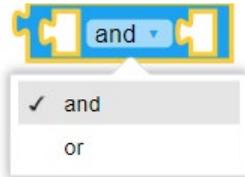
- **If, else if, else**



- **Equal (=), not equal to (≠), greater than (>), greater than or equal to (≥), less than (<), less than or equal to (≤)**



- **And, Or**



- **True, False**



Limitations

When a Tag Type is boolean, the following restrictions apply:

1. When used as a condition, it needs to be evaluated using True (1) or False (0).
2. When used in execution, it needs to be operated with numerical values 1 or 0.

Correct Usage Example:

Tag "A" indicates DO-01(boolean)



correct usage scenario

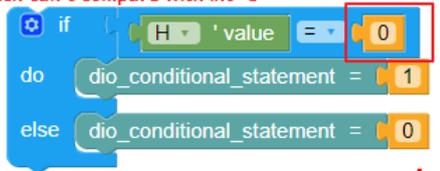
Incorrect Usage Example:

Tag "G" indicates Overwrite DO tags or modbus write tag



The number written into the write tag must be 0 or 1. Using "true" or "false" to write value will cause error.

Tag "H" is a boolean(DI-01), which can't compare with int "0"



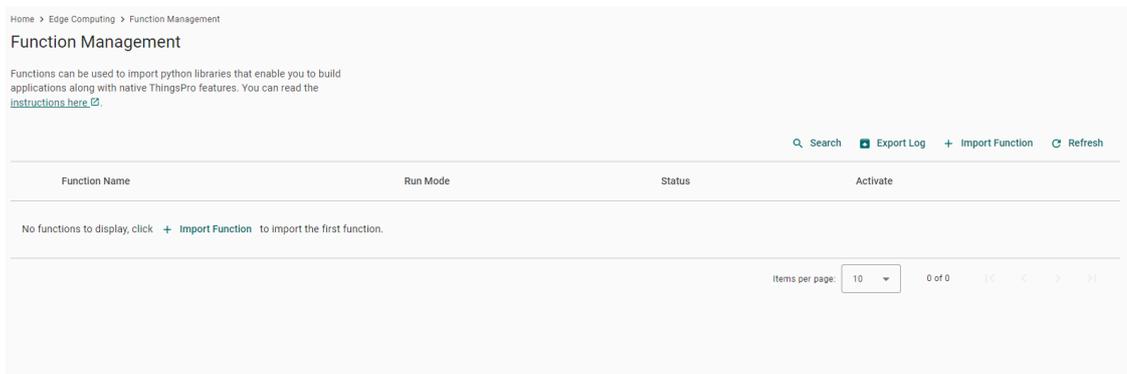
Function Management

AIG-302 Series provides a functionality to trigger actions based on specific data or time frame. For example, you can create a function that implements a defined action such as a device reboot or a **cron** job triggered by a specified change in a tag value or newly generated tags/events.

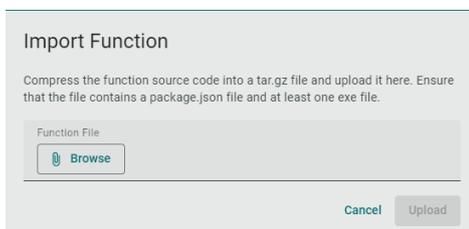
Go to **Edge Computing > Function Management** to import and manage functions. For additional information, see [build your own functions](#).

To import functions, do the following:

1. Click **Import Function**.



2. Click **Browse** to select the application/file (*.tar.gz file) and click **Upload**.



The function is displayed in the list along with the run mode and status of the function. You can click the function to check the **package.json** file.

Function Management
Home > Edge Computing > Function Management

Functions can be used to import python libraries that enable you to build applications along with native ThingsPro features. You can read the [instructions here](#).

SEARCH EXPORT LOG IMPORT FUNCTION

| Function Name | Run Mode | Status |
|---------------|--|---------|
| onChangeTag | Boot Last uptime: May 20, 2022 20:42:15 | Running |

```

id: 1
name: "onChangeTag"
enabled: true
trigger:
  driven: "dataDriven"
  dataDriven:
    tags:
      system:
        status:
          0: "cpuUsage"
  events:
  timeDriven:
    mode: "boot"
  
```

| | Run Mode |
|---|----------|
| 1 | Boot |
| 2 | Cron job |

| Status | Description |
|----------|--|
| Running | The function is running |
| Retrying | Retrying a failed function every 5 seconds (unlimited tries) |
| Failure | The function failed during a retry. The correspondent error message will be displayed in the table. You can click Export Log to check the logs. |
| Inactive | The function is disabled. |

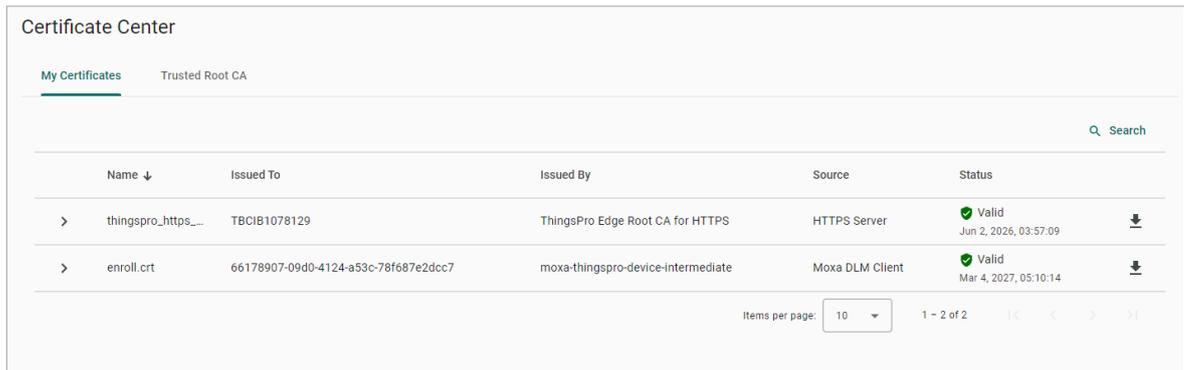
Security

Certificate Center

To check what certificates have been used on the devices, go to **Security > Certificate Center** to view all of them. On this page, you can search, view the status, and download the certificate for backup purpose.

The **ThingsPro Edge Root CA for HTTPS** certificate is used to sign the HTTP SSL X.509 certificate, default.crt. You can download this root CA and import it to your client devices to trust the HTTPS connection between clients and AIG. To import to Google Chrome, you can refer to the below link:

https://docs.moxa.online/tpe/users-manual/security/certificate_center/#import-rootcacer-to-google-chrome



The screenshot shows the 'Certificate Center' interface with two tabs: 'My Certificates' (active) and 'Trusted Root CA'. A search bar is located in the top right. Below is a table with columns: Name, Issued To, Issued By, Source, and Status. Two certificates are listed:

| Name ↓ | Issued To | Issued By | Source | Status |
|-----------------------|--------------------------------------|------------------------------------|-----------------|--------------------------------|
| > thingspro_https_... | TBCIB1078129 | ThingsPro Edge Root CA for HTTPS | HTTPS Server | Valid Jun 2, 2026, 03:57:09 |
| > enroll.crt | 66178907-09d0-4124-a53c-78f687e2dcc7 | moxa-thingspro-device-intermediate | Moxa DLM Client | Valid Mar 4, 2027, 05:10:14 |

At the bottom right, there is a pagination control showing 'Items per page: 10' and '1 - 2 of 2'.

Firewall

AIG provides a firewall that allows you to create rules for inbound Internet network traffic to protect your IIoT gateway.

Inbound

System Default

AIG reserves ports for certain services and purposes as indicated in the table below.

| No. | Service/purpose | Port |
|-----|-----------------------|------|
| 1 | HTTP service | 80 |
| 2 | HTTPS service | 8443 |
| 3 | SSH server | 22 |
| 4 | Discovery service | 5353 |
| 5 | Modbus TCP slave port | 502 |



NOTE

The AIG disables all ports by default excluding the reserved ports mentioned above. To enhance the security of your device, we recommend configuring a rule that includes the source IP and source port, thereby granting access only to specific individuals.

Home > Security > Firewall

Firewall

Inbound Rules NAT Service

System Default

Search

| Rule Name | Gateway Port ↑ | Protocol | Source IP | Source Port | |
|-----------------------|----------------|----------|-----------|-------------|--|
| ssh server | 22 | TCP | Any | Any | |
| http service | 80 | TCP | Any | Any | |
| modbus tcp slave port | 502 | TCP | Any | Any | |
| discovery service | 5353 | UDP | Any | Any | |
| https service | 8443 | TCP | Any | Any | |

Items per page: 10 1 - 5 of 5

Allowed List

AIG provides an allowed list for creating firewall rules. You can create, edit, and delete firewall rules here.

To create firewall rules, do the following:

1. Click **+ Create Rule**.
2. Specify the protocol, gateway port, and rule name.
3. Specify a source IP or a subnet.
4. Specify a source port or a range of ports.
5. Click **Save**.

Allowed List

Search Create Rule

Rule Name

No data to display. Click [Create Rule](#)

Port Forward

Rule Name Gateway Port

No data to display. Click [Create Rule](#)

Destination IP Destination Port

Items per page: 10 0 of 0

Items per page: 10 0 of 0

Create Rule

Protocol

TCP

UDP

Gateway Port

Rule Name

Port_

5 / 32

Source IP

Any

Source Port

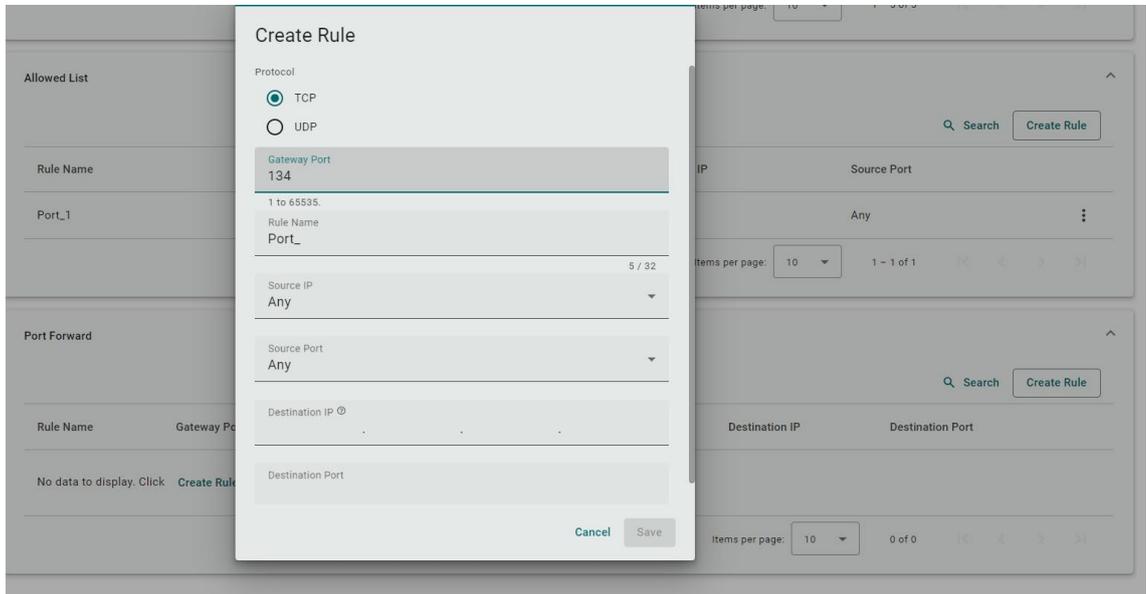
Any

Cancel Save

Port Forward

AIG provides port forwarding function. You can create, edit, and delete firewall rules here. To create firewall rules, do the following:

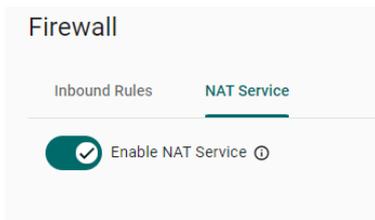
1. Click **+ Create Rule**.
2. Specify the protocol, gateway port, and rule name.
3. Specify a source IP.
4. Specify a destination IP and port.



5. Click **Save**.

NAT Service

Enable the NAT service to allow child devices to connect to external networks.



HTTPS

To ensure the securely access web console of the device, HTTPS has been enabled by default.

To use the HTTPS console without a certificate warning appearing, you need to import a trusted certificate issued by a third-party certificate authority. If there are no imported certificates, the AIG Series can generate the "ThingsPro Edge Root CA for HTTPS" certificate instead.

Home > Security > HTTPS

HTTPS

HTTP Service

Redirect HTTP to HTTPS

HTTPS Service

Port Number
8443

Import TLS/SSL Certificate

Certificate
 thingspro_https_default.crt

Private Key
 thingspro_https_default.key

Login Lockout

To avoid hackers repeatedly logging into the account to crack the passwords, you may choose to enable the login failure lockout and configure related settings.

Login Lockout

To avoid hackers from repeatedly logging in into the account to crack passwords, you can enable the Login Failure Lockout setting and configure related settings.

Enable login failure lockout

Max Failed Retries (times)
10

Failure Counter Reset Period (min) ⓘ
15

Lockout Period (min)
10

| Parameter | Value | Description |
|------------------------------------|-----------|---|
| Max Failure Retry (times) | 3 to 32 | You can specify the maximum number of failures retries, if exceed the retry times, AIG will lock out for that account login |
| Failure Counter Reset Period (min) | 1 to 60 | The login failure counter will be recalculated after the reset period that you have set. |
| Lockout Time (min) | 5 to 1440 | When the number of login failures exceeds the Max Failure Retry, the AIG will lock out for a period. |

Session Management

You can review session statuses for all accounts and manage sessions for individual accounts.

Session Management

You can check the session statuses for all accounts and also perform session management for individual accounts.

Last Updated Jan 24, 2024, 22:15:13 🔍 Search 🔄 Refresh

| <input type="checkbox"/> | No. | Account | Source IP | Created Time | Last Activity Time ↓ | |
|--------------------------|-----|---------|---------------------------|------------------------|------------------------|----|
| <input type="checkbox"/> | 1 | admin | 10.160.122.195 (your web) | Jan 24, 2024, 22:17:42 | Jan 24, 2024, 22:15:11 | 🗑️ |

Items per page: 10 1 - 1 of 1 < >

In the event of detecting unusual connections, you can enhance the security of your device by deleting the respective session.

Session Management

Home > Security > Session Management

You can check the session statuses for all accounts and also perform session management for individual accounts.

Jan 17, 2024, 07:15:45 Last Updated 🔍 SEARCH 🔄 REFRESH

| <input type="checkbox"/> | No. | Account | Source IP | Created Time | Last Activity Time ↓ | |
|--------------------------|-----|---------|-----------|--------------|------------------------|----|
| <input type="checkbox"/> | 1 | admin | | | Jan 17, 2024, 07:02:06 | 🗑️ |

Items per page: 10 1 - 1 of 1 < >

Delete Session

Attention: This could be your account session!

This session will be permanently deleted, and the client's next call will receive an "unauthorized" response. Are you sure you want to proceed?

CANCEL
DELETE

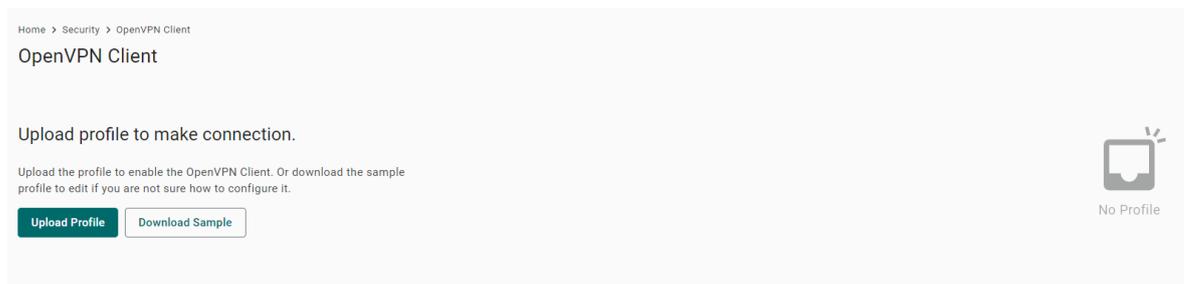
OpenVPN Client

OpenVPN allows you to create secure connections over the internet. It provides encryption and authentication to ensure confidentiality and integrity of your data. OpenVPN uses a client-server architecture where the server acts as the VPN endpoint and the client connects to the server to establish a secure connection.

To enable the function, go to **Security > OpenVPN Client** and do the following:

1. Download the OpenVPN profile template.
2. Revise the profile by inputting the necessary information provided by your VPN service provider.
This information includes:
 - a. Remote server IP: This is the address of the VPN server you want to connect to.
 - b. Port number: The port through which the VPN connection will be established. The default is usually 1194.
 - c. Protocol: The protocol to be used for the VPN connection, such as UDP or TCP.
 - d. Authentication method: The method used to authenticate your connection.
 - e. Encryption settings: The encryption algorithm to be used for securing the VPN connection.
3. Import the OpenVPN profile.
You should see it listed in the OpenVPN client.
4. Click the button to enable OpenVPN client to connect.

If the connection is successful, you will be connected to the VPN network, and your internet traffic will be encrypted and routed through the VPN server.



Home > Security > OpenVPN Client

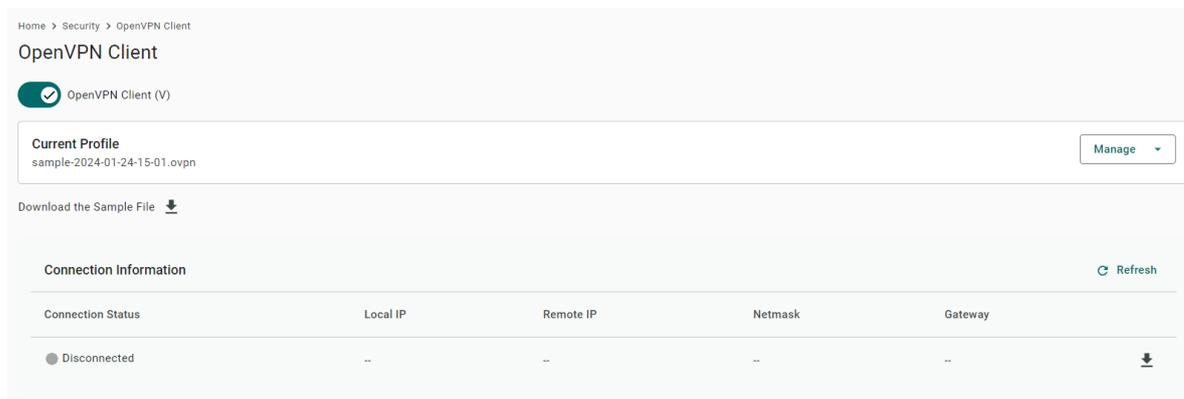
OpenVPN Client

Upload profile to make connection.

Upload the profile to enable the OpenVPN Client. Or download the sample profile to edit if you are not sure how to configure it.

[Upload Profile](#) [Download Sample](#)

No Profile



Home > Security > OpenVPN Client

OpenVPN Client

OpenVPN Client (V)

Current Profile
sample-2024-01-24-15-01.ovpn [Manage](#)

Download the Sample File [Download](#)

Connection Information [Refresh](#)

| Connection Status | Local IP | Remote IP | Netmask | Gateway | |
|-------------------|----------|-----------|---------|---------|--------------------------|
| ● Disconnected | -- | -- | -- | -- | Download |



NOTE

OpenVPN cannot be used when the Moxa DLM Service is running.

System Use Notification

The System Use Notification feature is designed to provide users with essential information prior to accessing the main functionalities of the system. These notifications are displayed on the login screen to ensure users are aware of important details before logging in.

System Use Notification

The following text will be displayed before the login page. It can be turned off if not necessary.

Enable system use notification

Mode
Default

Text Content
This gateway system is for the use of authorized users only.

Individuals using this gateway system without authority, or in excess of their authority, are subject to having all of their activities on this system monitored and recorded by system personnel.

In the course of monitoring individuals improperly using this system, or in the course of system maintenance, the activities of authorized users may also be monitored.

Save

Account Management

You can maintain user accounts and assign a role with specific permissions to each account. These functions allow you to track and control who accesses this device.

Accounts

You can **View**, **Create**, **Edit**, **Deactivate**, and **Delete** user accounts. In the main menu, go to **Account Management > Accounts** to manage user accounts.

Home > Account Management > Accounts

Accounts

Search Create

| Account Name | Role | Status | Creation Date | |
|--------------|---------------|--------|---------------|---|
| admin (you) | Administrator | Active | 22 Jan, 2024 | ⋮ |
| user1 | operator | Active | 23 Jan, 2024 | ⋮ |

Items per page: 10 1 - 2 of 2

Creating a New User Account

Click on **+ Create** to create a new user account. In the dialogue box that is displayed, fill up the fields and click **SAVE**.



NOTE

To comply with security policy and best practices, specify a strong password that is at least eight characters long, consisting of at least one number and at least one special character.

| Password Policy | Valid Password |
|-----------------|----------------|
| | |

Managing Existing User Accounts

To manage an account, click on the pop-up menu icon for the account.

Home > Account Management > Accounts

Accounts Search

| Account Name | Role | Status | Creation Date | |
|--------------|---------------|--------|---------------|---|
| admin (you) | Administrator | Active | 22 Jan, 2024 | ⋮ |
| user1 | operator | Active | 23 Jan, 2024 | ⋮ |
| Josh | operator | Active | 24 Jan, 2024 | ⋮ |

Items per page: 10 1 - 3 of 3

- Edit
- Change Password
- Deactivate
- Delete

| Function | Description |
|------------|--|
| Edit | Change the role, email, or password of an existing account. |
| Deactivate | Does not allow the user to log in to this device. |
| Delete | Delete the user account. (NOTE: This operation is irreversible.) |

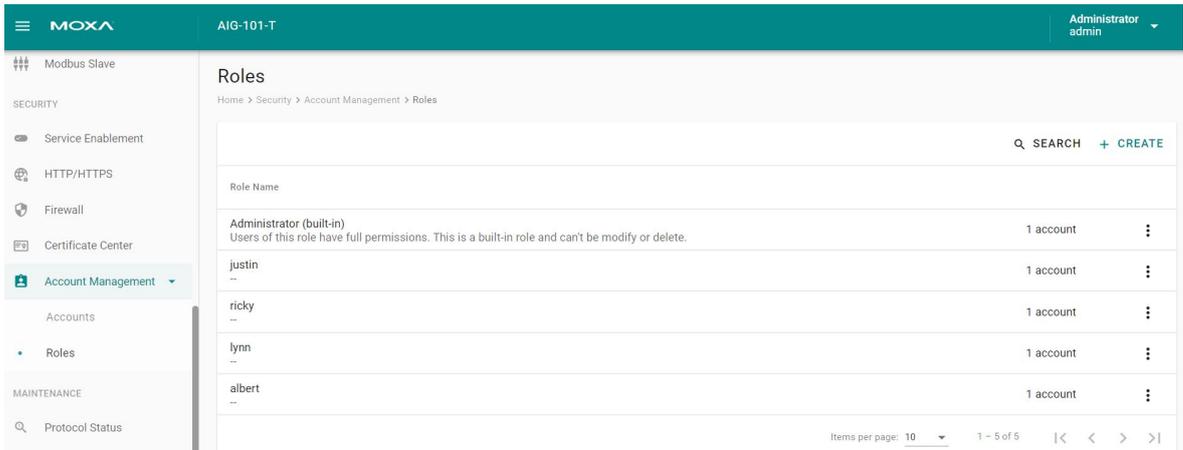


NOTE

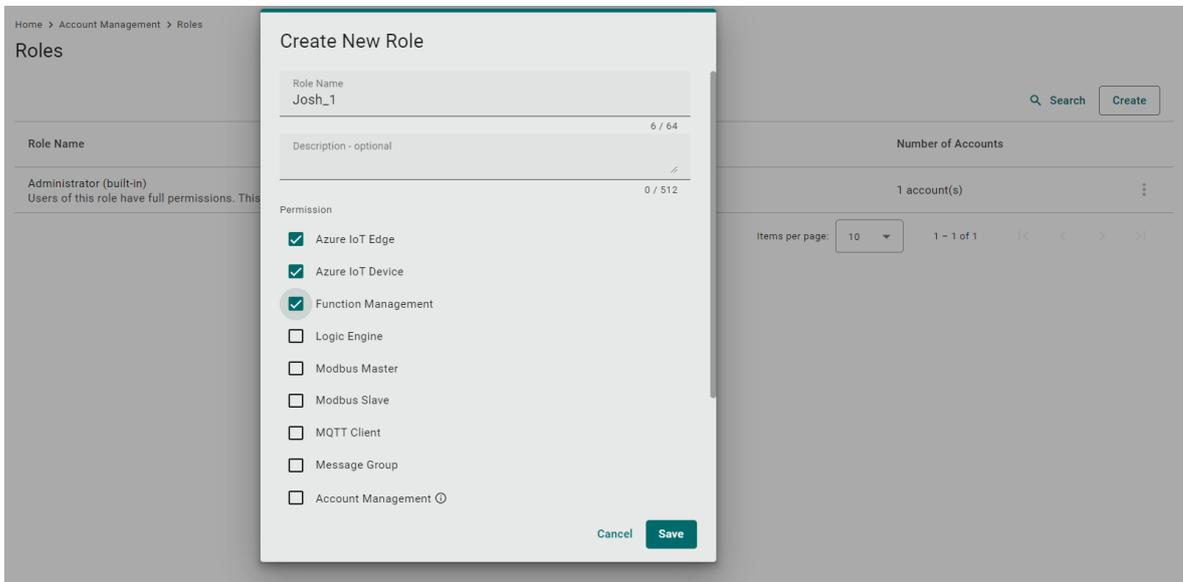
You cannot **Deactivate** or **Delete** the last remaining account with an Administrator role. This is to prevent an unauthorized account from fully managing this system. When the system detects only one active account when the Administrator role is selected, all items in the pop-up menu will be grayed out.

Roles

You can **View**, **Create**, **Edit**, and **Delete** user roles on your AIG device.



Click **+ Create** to set up a new user role. Specify a unique name for the role and assign the appropriate permissions. When you are done, click **Save** to create the role in the system.



You can **edit** the settings or **delete** an existing role by clicking on the pop-up menu icon next to the role.



When the Role has been setup, it is available for selection under the Account.

Password Policy

Home > Account Management > Password Policy

Password Policy

Info
This setting will be applied to the password of new accounts or to future password changes. Existing passwords will not be affected.

To enhance the higher security level of your password, you may choose to set the minimum password length and the password strength policy.

Min. Password Length
8

Password Strength Policy

- At least one digit (0-9)
- Mixed upper and lower case letters (A-Z, a-z)
- At least one special character (~!@#\$%^&*()_+={}|~\:"';<>?,./)

The system will reminder password changes when an account reaches the reminder threshold upon logging in.

- Enable password change reminders

Reminder Threshold (day)
180

Save

| Parameter | Value | Description |
|---------------------------|----------------|---|
| Min. Password Length | 8 to 256 | The minimum password length. |
| Password Strength Policy | | To define how the AIG checks the password's strength. |
| Password Change Reminders | 10 to 360 days | Notify user to change the password. |

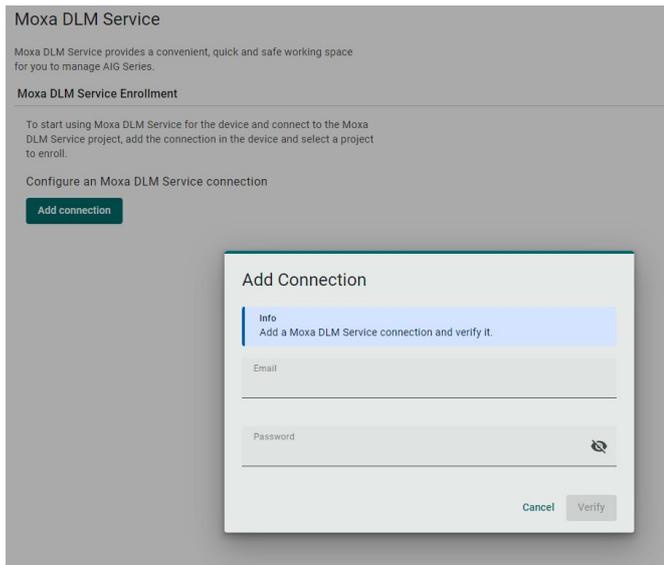
Maintenance

Moxa DLM Service

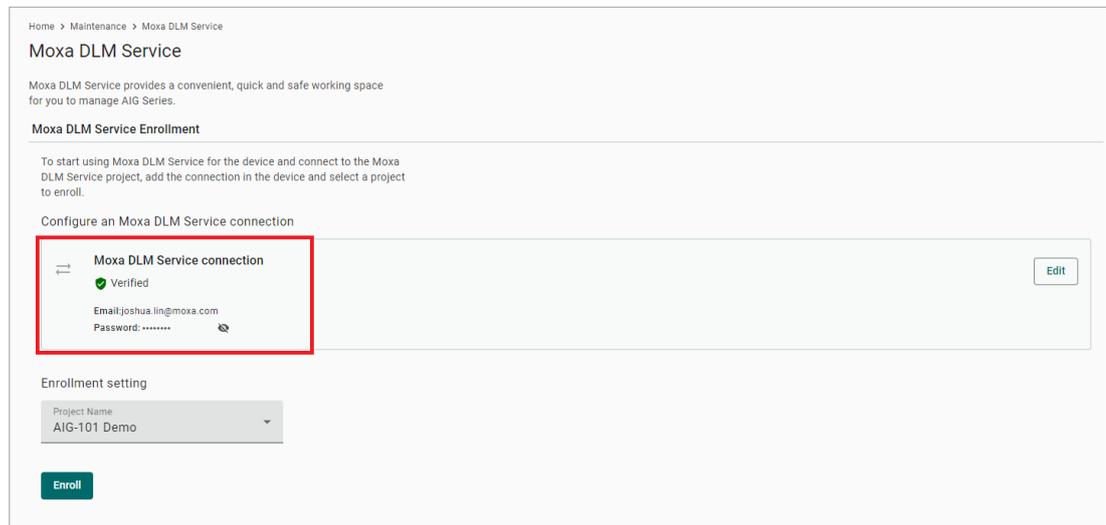
Moxa DLM (device lifecycle management) service is used for managing the AIG devices. Imagine sitting in your office and using this service to remotely manage numerous devices distributed around the world. You can monitor the device's health status, upgrade firmware, import/export configuration, and remotely log into the device's web console. If you want to apply for this service, contact the product manager, Joshua Lin, at joshua.lin@moxa.com.

Once you have access to the service, go the **Moxa DLM Service** to register the product online as follows.

1. Input DLM **email** and **password**, and press **Verify**.



2. If the input information is correct, you will see the connection has been verified.



3. Choose the **Project** and click **Enroll**.

Home > Maintenance > Moxa DLM Service

Moxa DLM Service

Moxa DLM Service provides a convenient, quick and safe working space for you to manage AIG Series.

Moxa DLM Service Enrollment

To start using Moxa DLM Service for the device and connect to the Moxa DLM Service project, add the connection in the device and select a project to enroll.

Configure an Moxa DLM Service connection

Moxa DLM Service connection Edit

✓ Verified

Email: joshua.lin@moxa.com

Password: 🔒

Enrollment setting

Project Name
AIG-101 Demo

Enroll

4. Once the enrollment is successful, you will see the following information:



NOTE

Ensure the Moxa DLM service is enabled at the top left corner.

✓ Moxa DLM Service +

| Project Name | Status |
|-----------------------------|---|
| 📁 AIG-101 Demo | ✓ Connected Connect on Mar 04, 2024, 17:20:40 |

Moxa DLM Service Certificate

Moxa DLM Service certificate is a leaf X.509 certificate which issued by Moxa DLM Service and allow device to connect with.

📄 **enroll.crt**
✓ Verified

Issued By: moxa-thingspro-device-intermediate
Expires: Mar 4, 2027 09:10:14
Organization: Moxa Inc.
Model Name: AIG-302-T-AP-AZU-LX
MAC Address: 0090E8BDDA01
Serial Number: TBCIB1078129

5. Log in to the Moxa DLM Service.
You will see your AIG device online and you can manage it.

All Devices

Home > Projects > All Devices

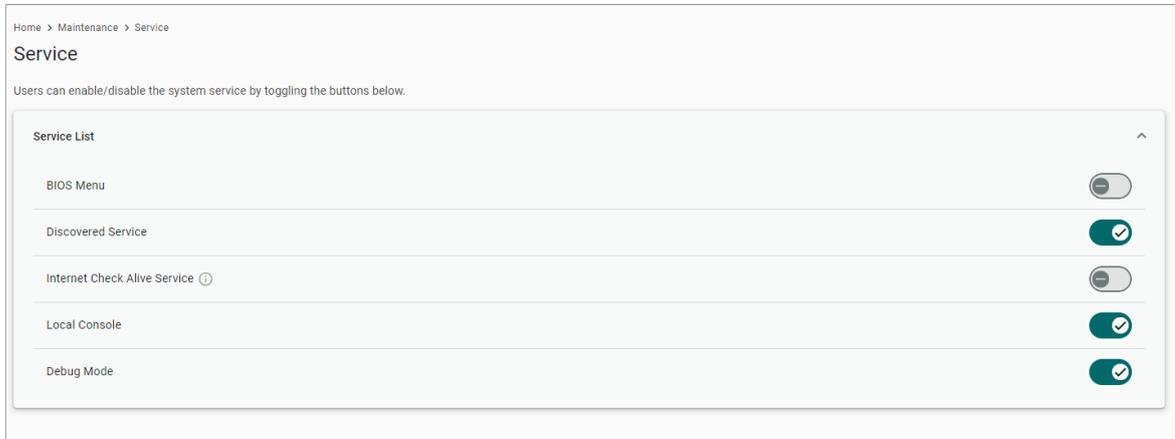
🔍 SEARCH 🔄 REFRESH

| <input type="checkbox"/> | Serial Number | Model Name | Host Name | Connection Status | Labels |
|--------------------------|---------------|---------------------|-------------------|---|--------|
| <input type="checkbox"/> | TBCIB1078129 | AIG-302-T-AP-AZU-LX | moxa-tbcib1078129 | ● Online Connected on Mar 04, 2024 17:10:26 | - |

Items per page: 10 1 - 1 of 1 |< < > >|

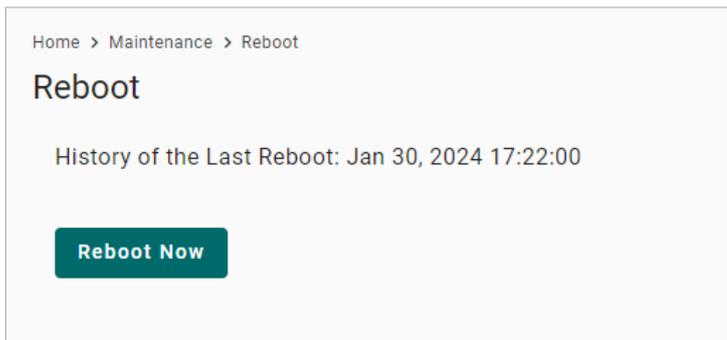
Service

For security reasons, disable all unused services. Go to **Maintenance > Service** to disable or enable the system services by just toggling the buttons.



Reboot

If you want to reboot the device, go to **Maintenance > Reboot** and click **Reboot Now**.



Config. Import/Export

Go to **Maintenance > Config. Import/Export**, where you can import or export the gateway configuration file. The exported configuration file will be compressed to the **tar.gz** format and downloaded on your computer.

Home > Maintenance > Config. Import/Export

Config. Import/Export

Export

Click "Export" to save your current system log file and export the file.

Export

Import

Click "Browse" to select a previously exported configuration file to upload the file.

Configuration File

Browse

Upload

Backup & Restore

The backup function backs up the data on AIG device to a file (only one back up file can be created at a time). Backup files are encrypted and stored in a designated location on the device. You can restore the data from the backups when needed.

Backup & Restore

The backup function backs up the data (excluding Audit Log and System Log, which can be manually exported from the relevant page) on AIG devices to a file. Backup files are encrypted and stored in a designated location on the device. You can restore the data from the backups when needed.

| File Name | Status | Last Backup | File Size |
|-----------------|--------|-----------------|---------------|
| AIG Backup File | None | Last Backup: -- | File Size: -- |

Manage ▾

- Backup
- Restore
- Delete

Software Upgrade

There are two approaches to upgrading an AIG: Over the-air and Upload package.

1. Over-the-air

You can press Check for Upgrade to get the latest upgrade information, then select the patches to install. (Patches leverage the Debian APT mechanism, ensuring compatibility and identity. Additionally, all available patches are signed by Moxa, and the communication between AIG-302 and the repository is encrypted for system security.)

The screenshot displays the 'Software Upgrades' window. At the top, there are three tabs: 'Available Upgrades' (selected), 'Upgrade Settings', and 'Upgrade History'. Below the tabs, there is a toggle for 'Allow software upgrade' which is checked. A dropdown menu is open, showing 'Over the Air' (selected) and 'Package Upload'. The status 'Last checked on Mar 04, 2024 17:50:14' is shown. There are two filter buttons: 'Product Package' and 'Patches' (selected). A search bar with a magnifying glass icon and a 'Check for upgrades' button are also present. The main area contains a table of available updates. At the bottom right, there is a pagination control showing 'Items per page: 10' and '1 - 10 of 19'.

| <input type="checkbox"/> | Name ↑ | Current Version | New Version | Size | |
|--------------------------|-----------------|---------------------|---------------------|-----------|--|
| <input type="checkbox"/> | base-files | 11.1+deb11u8 | 11.1+deb11u9 | 70.22 KB | |
| <input type="checkbox"/> | libc-bin | 2.31-13+deb11u7 | 2.31-13+deb11u8 | 717.47 KB | |
| <input type="checkbox"/> | libc-l10n | 2.31-13+deb11u7 | 2.31-13+deb11u8 | 864.01 KB | |
| <input type="checkbox"/> | libc6 | 2.31-13+deb11u7 | 2.31-13+deb11u8 | 2.33 MB | |
| <input type="checkbox"/> | libcurl3-gnutls | 7.74.0-1.3+deb11u10 | 7.74.0-1.3+deb11u11 | 311.3 KB | |
| <input type="checkbox"/> | libglb2.0-0 | 2.66.8-1 | 2.66.8-1+deb11u1 | 1.21 MB | |
| <input type="checkbox"/> | libnftables1 | 0.9.8-3.1+deb11u1 | 0.9.8-3.1+deb11u2 | 232.4 KB | |
| <input type="checkbox"/> | libnghttp2-14 | 1.43.0-1 | 1.43.0-1+deb11u1 | 66.72 KB | |
| <input type="checkbox"/> | libperl5.32 | 5.32.1-4+deb11u2 | 5.32.1-4+deb11u3 | 3.42 MB | |
| <input type="checkbox"/> | locales | 2.31-13+deb11u7 | 2.31-13+deb11u8 | 4.08 MB | |

2. Upload Package

A pack that integrates all patches between two versions (e.g., from version 1.0 to version 1.1.) This scenario is applicable when the AIG cannot access the Internet. The upgrade pack can also be downloaded from the Moxa SRS: <https://moxa-srs.thingsprocloud.com/home>

The screenshot shows the 'Software Upgrade' page with the 'Available Upgrades' tab selected. A toggle switch for 'Allow software upgrade' is turned on. Below it, there are two buttons: 'Over-the-air' and 'Upload package', with 'Upload package' being the active selection. A text instruction states: 'You may upload the product package file or patch file from your local drive.' Underneath, there is a 'Local File' section with a 'Browse' button. At the bottom, there is an 'Upload' button.

Upgrade Settings

The screenshot shows the 'Software Upgrade' page with the 'Upgrade Settings' tab selected. It features three checkboxes: 'Software upgrade over cellular' (checked), 'Disk Snapshot before upgrade' (checked), and 'Check for upgrades automatically (Repeat every 1 week)' (unchecked). A 'SAVE' button is located at the bottom of this section. Below this, the 'Check for upgrades automatically (Repeat every 1 week)' checkbox is checked, and a configuration box is shown. This box contains a row of day buttons: Sun., Mon. (checked), Tue., Wed., Thur., Fri., and Sat. Below the day buttons is a 'Time' dropdown menu set to '23:00'. At the bottom of the configuration box, it displays 'Occurs every Mon. 23:00'.

| Parameter | Default | Description |
|--|-----------|---|
| Software upgrade over cellular | Checked | Allows upgrading the system via cellular. If you have a budget data plan for the cellular network, you may uncheck this option to save on data costs. |
| Disk Snapshot before upgrade | Checked | Takes a snapshot to record the system status before upgrading. We strongly recommend checking this option in case of unexpected situations. |
| Check for upgrades automatically (repeat every 1 week) | Unchecked | Specify a regular time to check for upgrades every week. |

Upgrade History

The installed patches are listed here.

Home > Maintenance > Software Upgrade

Software Upgrade

Available Upgrades Upgrade Settings Upgrade History

This page shows the latest upgrade record.

Latest History

| Type | Name | Version | Status | Last Update |
|-----------|------------------|------------|-----------|------------------------|
| > Package | moxa-aig-302-tpe | 1.0.0+5820 | ● Success | Jan 30, 2024, 17:01:33 |
| Success | | | | |

Items per page: 10 1 - 1 of 1

Reset to Default

There are two methods for resetting to default settings:

1. If you only wish to reset the configuration settings, use the **Reset** under **Configuration Reset**.
2. If you want to reset both the configuration settings and revert to the factory default firmware simultaneously, use the **Reset** under **Factory Reset**.

Home > Maintenance > Reset to Default

Reset to Default

Configuration Reset

If you wish to revert all configurations to their default settings, please utilize the "configuration default" option. It's important to note that the DLM connection will remain active (excludes **EULA agreement**).

> Show details on storage location of log files

Reserve network settings

Reset

Factory Reset

If you want to reset the device back to the factory default use the **Factory Reset** function. It's important to note that the DLM connection will remain active.

Reset

Device Retirement

Utilize this function when the device is being retired and you wish to securely delete all files and logs for security purposes to ensure the data cannot be recovered. Due to the low-level formatting of the memory that is required to erase data, it may take approximately 1.5 hours.

Device Retirement

You can initiate a process to securely erase a device, including all software, settings, and data on its internal disk. With this, the device will be restored to the factory default settings and all log files cleared, thereby preventing any potential data recovery from the device.

Retire

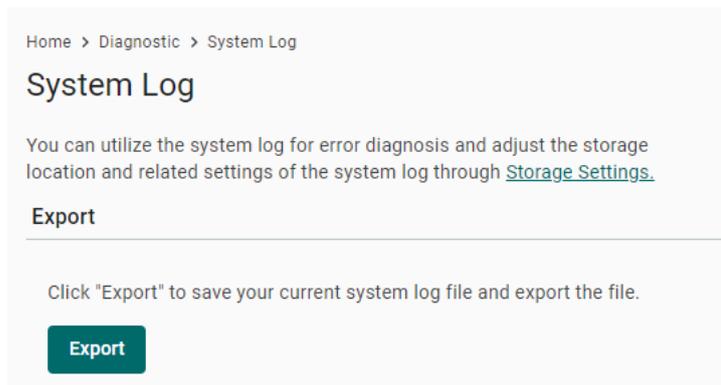
Diagnostics

System Log

The main purpose of system log is to help Moxa engineers with troubleshooting. When you encounter an issue that you are not able to solve by yourself, export the log file and send it to Moxa TS for analysis.

Go to **Diagnostic > System Log** to export the system log file and specify the location to save the system logs.

Click **Storage Settings** to specify the location to store the event logs. To optimize the use of storage space on your AIG, you can check the Enable **Time to Live** option and specify the maximum storage space for the system logs. Click **Save** to confirm your settings.



Audit Log

When you face issues, you can go to **Diagnostic > Audit Log** check historical events that help you to narrow down the problems. If there are plenty of event logs, you can export the log to read easily.

The audit logs can be exported and downloaded onto your computer.

Home > Diagnostic > Audit Log

Audit Log

Log View | Log Settings

Search [] Export []

| Type | Name | Content | Source | Timestamp ↓ |
|----------|---------------------|-------------------------------|--------|------------------------|
| > Notice | loginSuccess | Account admin login success. | System | Feb 01, 2024, 14:51:02 |
| > Notice | loginSuccess | Account admin login success. | System | Feb 01, 2024, 14:41:42 |
| > Notice | loginSuccess | Account admin login success. | System | Feb 01, 2024, 14:05:48 |
| > Notice | configurationExport | Configuration export success. | admin | Feb 01, 2024, 13:49:14 |
| > Notice | configurationExport | Configuration export success. | admin | Feb 01, 2024, 13:48:49 |
| > Notice | loginSuccess | Account admin login success. | System | Feb 01, 2024, 13:44:07 |
| > Notice | loginSuccess | Account admin login success. | System | Feb 01, 2024, 13:40:18 |
| > Alert | loginFailure | Login fail. | System | Feb 01, 2024, 13:39:13 |
| > Notice | loginSuccess | Account admin login success. | System | Feb 01, 2024, 13:36:45 |
| > Notice | loginSuccess | Account admin login success. | System | Feb 01, 2024, 13:26:53 |

Items per page: 10 | 1 - 10 of 4531 | < >

In the **Log Settings**, you can specify the storage size to store the logs and notification threshold. Also, you also can enable time to live for maximum stored days.

Home > Diagnostic > Audit Log

Audit Log

Log View | **Log Settings**

Reserved Storage Size (MB) ⓘ
100

Notification Threshold (%) ⓘ
80

Enable time to live

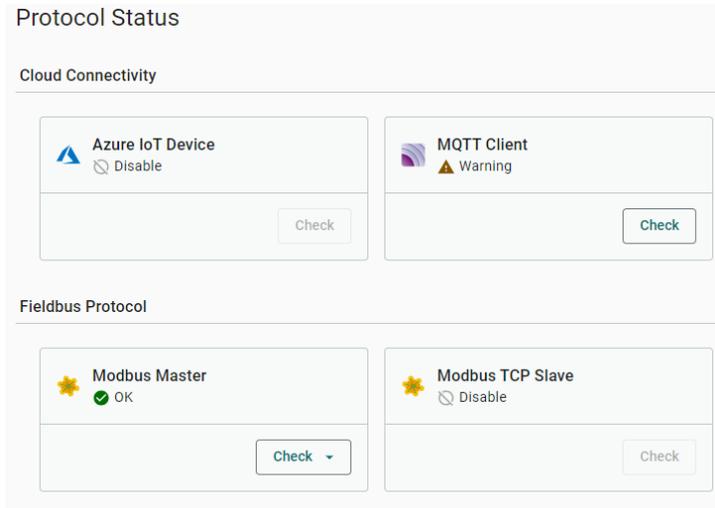
Save

Protocol Status

In case of A communication issue, go to **Diagnostic > Protocol Status**. The device provides comprehensive troubleshooting tools to help you identify the issue easily. When you access the page, you can see an overview of the status for Cloud Connectivity and Fieldbus Protocol.

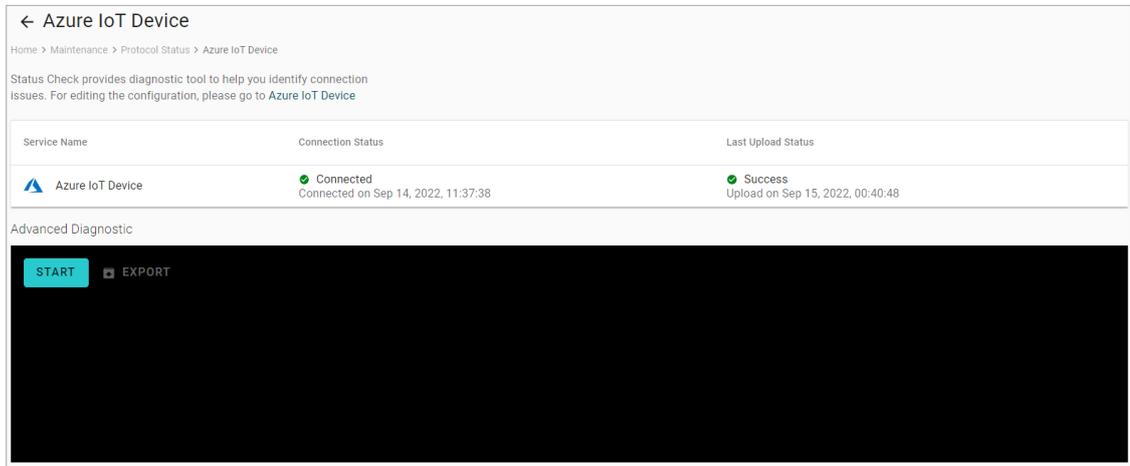
For troubleshooting issues related to Azure and MQTT Client, do the following:

1. Click **Check**.

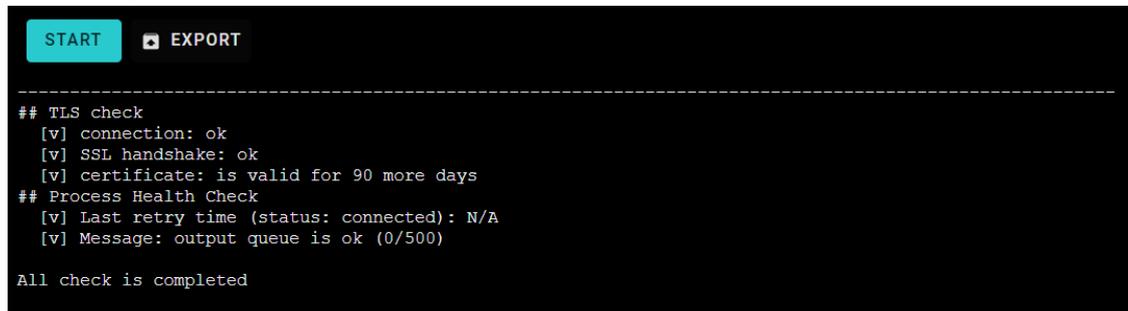


2. Click **Start**.

The example below selects Azure IoT Device. The steps may vary depending on the protocol you choose.



3. View the logs to identify the issue.



4. (Optional) **Export** the logs.

A. Appendix A

Publish Mode

| Publish Mode | Parameters | Value | Description |
|--------------|---|--|---|
| By Interval | Publish Intervals (sec) | 1 to 86400 | The frequency of data uploads to the cloud. |
| | Sampling Mode | All Values Latest Values All Changed Values Latest Changed Values | All Values: All values recorded within a specified interval will be sent to the cloud. Latest Values: Only the most recent value will be sent to the cloud. All Changed Values: All values that have changed within the configured interval will be sent to the cloud. Latest Changed Values: Only the most recent value that has changed will be sent to the cloud. |
| | Custom Sampling Rate From Acquired Data (sec) | 0 to 86400 | The frequency to synchronize the tag value with tag hub. |
| Immediately | Sampling Mode | Enable/disable | Enable: Only publish the changed values to the cloud immediately. Disable: Publish all data to the cloud immediately when one of data item changes in the topic. |
| | Minimal Publish Interval (sec) | 0 to 60 | To avoid transmitting a large amount of data to the cloud in a short period, it is possible to set a time interval that ensures a delay between each data transmission. |
| By Size | Publish Size (bytes) | 1 to 262144 | Once the data size reaches the specified threshold, the data will be transmitted to the cloud. |
| | Sampling Mode | All Values All Changed Values | All Values: All values recorded within the specified size will be sent to the cloud. All Changed Values: All values that have changed within the configured size will be sent to the cloud. |
| | Custom Sampling Rate From Acquired Data (sec) | 0 to 86400 | The frequency to synchronize the tag values with the tag hub. |
| | Idle Timer (sec) | 1 to 86400 | To avoid situations where the data takes a long time to reach the desired size, a threshold value can be set to ensure that the data is sent out as soon as it reaches the specified timer setting. |

Useful Links and Upgrade Information

You can access all the reference information at: <https://github.com/TPE-TIGER>

Information on all device APIs is available at: <https://tpe-tiger.github.io/>

There are a couple of methods to upgrade the software on your AIG device. Some of the most common methods are listed below:

Method 1. Upgrade from downloaded packages (web console)

Download all the upgrade packs from <https://moxa-srs.thingsprocloud.com/home> to your local drive and upgrade your device from the local drive.

Method 2. Upgrade over the air (web console)

The device can receive the most recent upgrade information and then choose which patches to install. For further details, see **Software Upgrade**.

Method 3. Upgrade from the Moxa DLM tool

If you are interested in using the Moxa DLM tool on a trial basis, get in touch with a Moxa sales representative to set up a trial account.

C. Appendix C



NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance 20 cm between the radiator & your body.

This device and its antenna must not be co located or operating in conjunction with any other antenna or transmitter.

The radiated output power of the Wireless Device is below the Innovation, Science and Economic Development Canada (ISED) radio frequency exposure limits. This wireless device should be used in a manner such that the potential for human contact during normal operation is minimized.

This device has also been evaluated and shown to be compliant with the ISED RF Exposure limits under mobile exposure conditions (antennas must be at > 20 cm distance from a person's body).

La puissance de sortie rayonnée du dispositif sans fil est inférieure aux limites d'exposition aux radiofréquences d'Innovation, Sciences et Développement économique Canada (ISED). Le dispositif sans fil doit être utilisé de manière à minimiser le potentiel de contact humain pendant le fonctionnement normal.

Cet appareil a également été évalué et montré conforme aux limites d'exposition RF ISED dans des conditions d'exposition mobiles. (Les antennes sont à plus de 20 cm du corps d'une personne).