Trusted ePlatform Services

ADVANTECH

# ADAM-6000/6200 Series MQTT User Manual V1.0.2

# History Record:

| Revision Date | Revision | Description |
|---|---|---|
| 2024/07/09 | 1.0 | First version released |
| 2024/09/19 | 1.0.1 | Add timestamp to DIO Channel Value Topic |
| 2024/10/04 | 1.0.2 | 1. Add timestamp and IP address to all data topic<br>2. Add ”3.8 Publish Value Mode” and “3.9 AI Data Threshold” |
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# 1.Function Introduction

Our utility provides secure cloud functions to help you achieving effectively remote device management and deployment. We'll provide guidelines from this manual to setup your cloud IO devices.

## 1.1 Function list

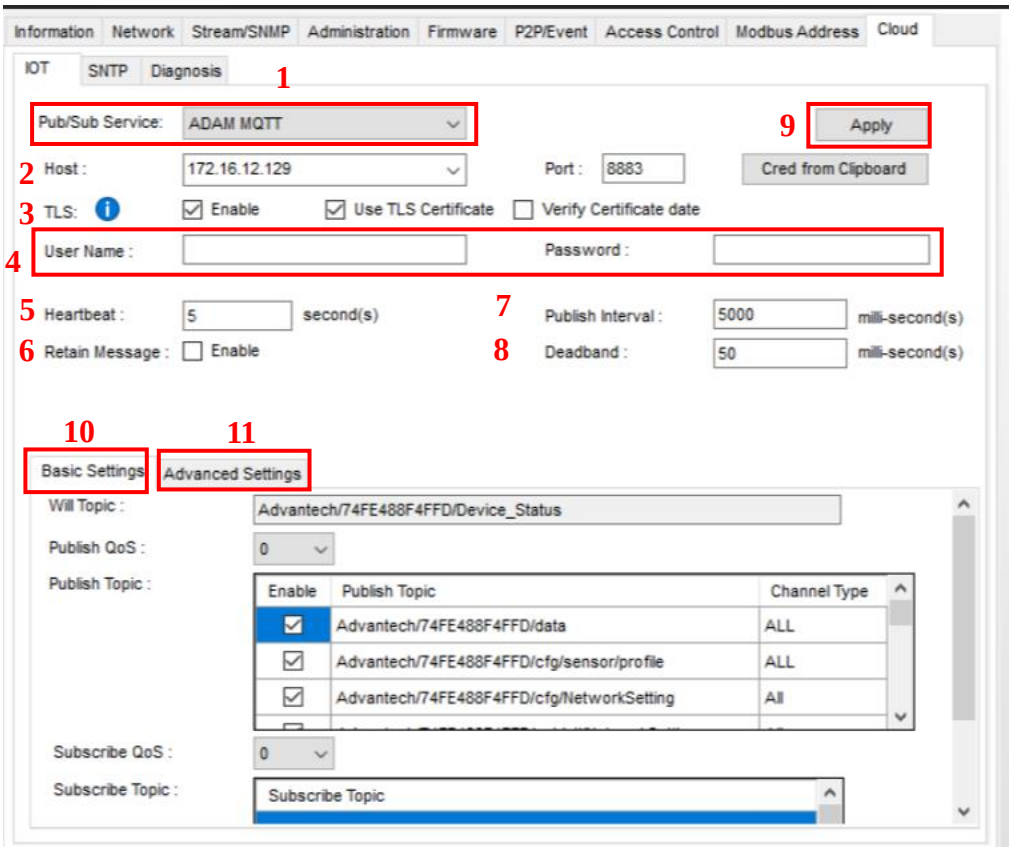



Figure 1. Utility B51 Interface

This section is for cloud I/O setup via MQTT, as below introductions are items marked from above figure.

1. Pub/Sub service

A way to integrate various Enable mode functions into drop-down options.

2. Host IP

You can set up the broker URL or IP address. ADAM modules connect to the broker via the standard MQTT protocol.

3. MQTT TLS Encryption

ADAM modules support TLS encryption during data transmissions. We can choose to use TLS certificate and verify certificate date.

4. User Name & Password

For some applications that require authorization control, the broker will constrain the subscriber's authority to the data. ADAM modules can have the username/password set using Adam/Apax .NET utility. Then, an MQTT message from an ADAM module will come with the username and password to access the broker

5. Heartbeat

The broker will regularly check the connection with the ADAM at the heartbeat interval (keep-alive) setting. The minimum interval setting is 5 s

6. Retain Message

When the retain function is enabled. The broker will store the last message of the topic. If a new subscription for the topic is made, the message will be sent to the client. The client can get the last message and does not need to wait until the next message is updated.

7. Deadband

Deadband is set to determine the minimum interval between publishing two MQTT messages. This is intended to prevent MQTT messages from being published excessively due to noise

8. Interval

Set the interval for automatically publishing all data topics.(Interval must be more than Deadband)

9. Apply

Set Utility MQTT settings (excluding Advanced Settings) to the ADAM module. After pressing Apply, the connection will be automatically disconnected to set the mqtt Settings, and then reconnect.

10. Basic Settings

Setup Publish Qos 、Publish Topic enable and Subscribe Qos

(Need to use "Apply to setup on ADAM module")

11. Advanced Settings

Let user enable "User Defined MQTT Publish/Subscribe" and customize topic name and payload message. **Advanced Settings has a separate Apply button**。

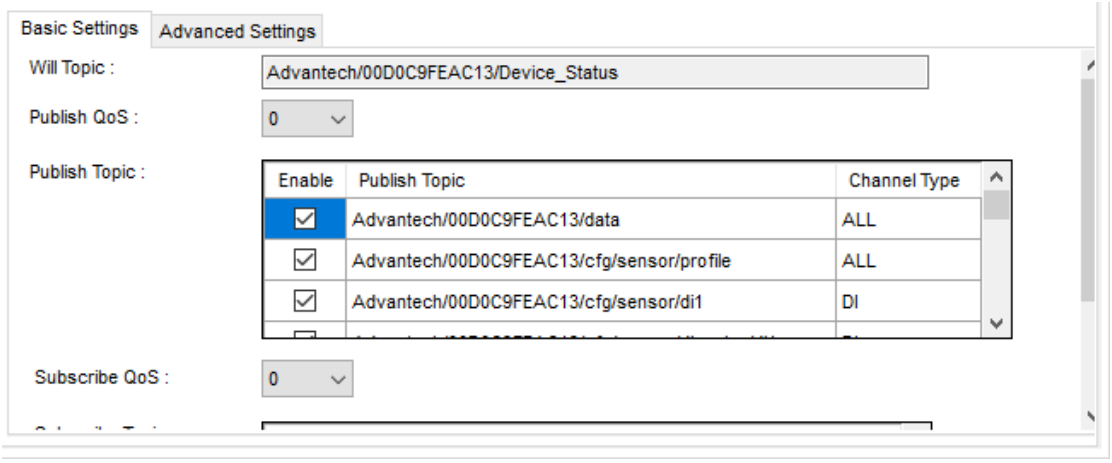



Figure 2. Basic Setting




Figure 3. Advanced Settings

## 1.2 Function support

**√:origin support X:not support v:start support**

| | ADAM DIO | ADAM-6017/6217 | ADAM-6018+ | ADAM-6024 | ADAM-6224 |
|---|---|---|---|---|---|
| **Settings** | | | | | |
| ADAM MQTT Enable | √ | √ | √ | √ | √ |
| EdgeSync 360/EdgeHub MQTT Enable | √ | v6.11B14 | v6.01B20 | v6.01B18 | v6.01B22 |
| Azure | √ | √ | v6.01B24 | v6.01B19 | v6.01B23 |
| Diagnostic | v6.11B41 | v6.11B20 | v6.01B26 | v6.01B19 | v6.01B23 |

| ADAM MQTT | | | | | |
|---|---|---|---|---|---|
| Host IP | √ | √ | √ | √ | √ |
| TLS | √ | √ | v6.01B21 | v6.01B18 | v6.01B22 |
| User name<br>Password | √ | √ | √ | √ | √ |
| Heartbeat | √ | √ | √ | √ | √ |
| Retain Message | √ | √ | √ | √ | √ |
| Deadband | v6.11B37 | v6.11B16 | v6.01B22 | v6.01B18 | v6.01B22 |
| Interval | v6.11B37 | v6.11B16 | v6.01B22 | v6.01B18 | v6.01B22 |
| WDT | v6.13B07 | X | X | X | X |
| Basic Settings | √ | √ | v6.01B24 | v6.01B19 | v6.01B23 |
| Advanced Settings | √ | √ | v6.01B24 | v6.01B19 | v6.01B23 |
| Basic Topic | √ | √ | √ | √ | √ |
| All data Topic | √ | √ | √ | √ | √ |
| CH config Topic | v6.11B30 | v6.11B14 | v6.01B20 | v6.01B18 | v6.01B22 |
| CH value Topic | v6.11B30 | v6.11B14 | v6.01B20 | v6.01B18 | v6.01B22 |
| Network Setting Topic | v6.13B08 | v6.13B00 | v6.03B00 | v6.03B00 | v6.03B00 |
| Access Control Topic | v6.13B08 | v6.13B00 | v6.03B00 | v6.03B00 | v6.03B00 |
| User-defined Modbus address Topic | v6.13B08 | v6.13B00 | v6.03B00 | v6.03B00 | v6.03B00 |
| OTA | v6.13B09 | v6.13B00 | v6.03B00 | v6.03B00 | v6.03B00 |
| **EdgeSync 360/ EdgeHub** | | | | | |
| Heartbeat | X | X | X | X | X |
| Retain Message | X | X | X | X | X |
| New Deadband | v6.11B37 | v6.11B16 | v6.01B22 | v6.01B18 | v6.01B22 |
| New Interval | v6.11B37 | v6.11B16 | v6.01B22 | v6.01B18 | v6.01B22 |
| Basic Settings | X | X | X | X | X |
| Advanced Settings | X | X | X | X | X |
| Basic Topic | √ | v6.11B14 | v6.01B20 | v6.01B18 | v6.01B22 |
| All data Topic | √ | v6.11B14 | v6.01B20 | v6.01B18 | v6.01B22 |
| CH config Topic | √ | v6.11B14 | v6.01B20 | v6.01B18 | v6.01B22 |
| CH value Topic | √ | v6.11B14 | v6.01B20 | v6.01B18 | v6.01B22 |
| OTA | v6.13B09 | v6.13B00 | v6.03B00 | v6.03B00 | v6.03B00 |

# 2. Service Setting

As below chart, * is a command that has been written in the ADAM-6000/6200 product user manual and is open to users.

## 2.1 ADAM MQTT Enable

This section helps to set ADAM MQTT enable/disable.

- When ADAM MQTT or Azure or SNMP Trap has been enabled, set EdgeSync 360/ EdgeHub enable/disable will return Error。
- When ADAM MQTT is connected to the broker, set disable will actively publish will topic (status: disconnect)。

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTTENxx* | aa: always 01<br>xx: 01 (enable),<br>00 (disable) | Return: >01<br>Error: ?01 |
| %aaGETMQTTEN* | aa: always 01 | Return: !01 (enable),<br>!00 (disable)<br>Error: ?01 |

## 2.2 EdgeSync 360/ EdgeHub MQTT Enable

Set EdgeSync 360/ EdgeHub enable/disable.

- When ADAM MQTT or Azure or SNMP Trap has been enabled, set EdgeSync 360/ EdgeHub enable/disable will return Error。
- When EdgeSync 360/ EdgeHub is connected to the broker, set disable will actively publish the will topic (status: disconnect)。

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETWMPENxx | aa: always 01<br>xx: 01 (enable), | Return: >01<br>Error: ?01 |

| | | |
|---|---|---|
| | 00 (disable) | |
| %aaGETWPMPEN | aa: always 01 | Return: !01 (enable),<br>!00 (disable)<br>Error: ?01 |

## 2.3 Azure Enable

Set Azure enable/disable.

- When ADAM MQTT or EdgeSync 360/ EdgeHub or SNMP Trap has been enabled, set Azure enable/disable will return an Error.
- When Azure connected broker，set disable proactively publish will topic (status: disconnect)。

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETAHENxx | aa: always 01<br>xx: 01 (enable),<br>00 (disable) | Return: >01<br>Error: ?01 |
| %aaGETAHEN | aa: always 01 | Return: !01 (enable),<br>!00 (disable)<br>Error: ?01 |

## 2.4 MQTT diagnosis

It's used to diagnose the MQTT connection status and receive related information during Pub/Sub.

➢ Support MQTT diagnosis starting from the following version:

| ADAM DIO | ADAM-6017/6217 | ADAM-6018+ | ADAM-6024 | ADAM-6224 |
|---|---|---|---|---|
| V6.11 B41 | V6.11 B20 | V6.01B26 | V6.01B19 | V6.01B23 |

➢ Utility start to support diagnosis function from B18 version。(Utility → Cloud → Diagnosis)

➢ Enter Diagnosis page, then Utility start Polling command。

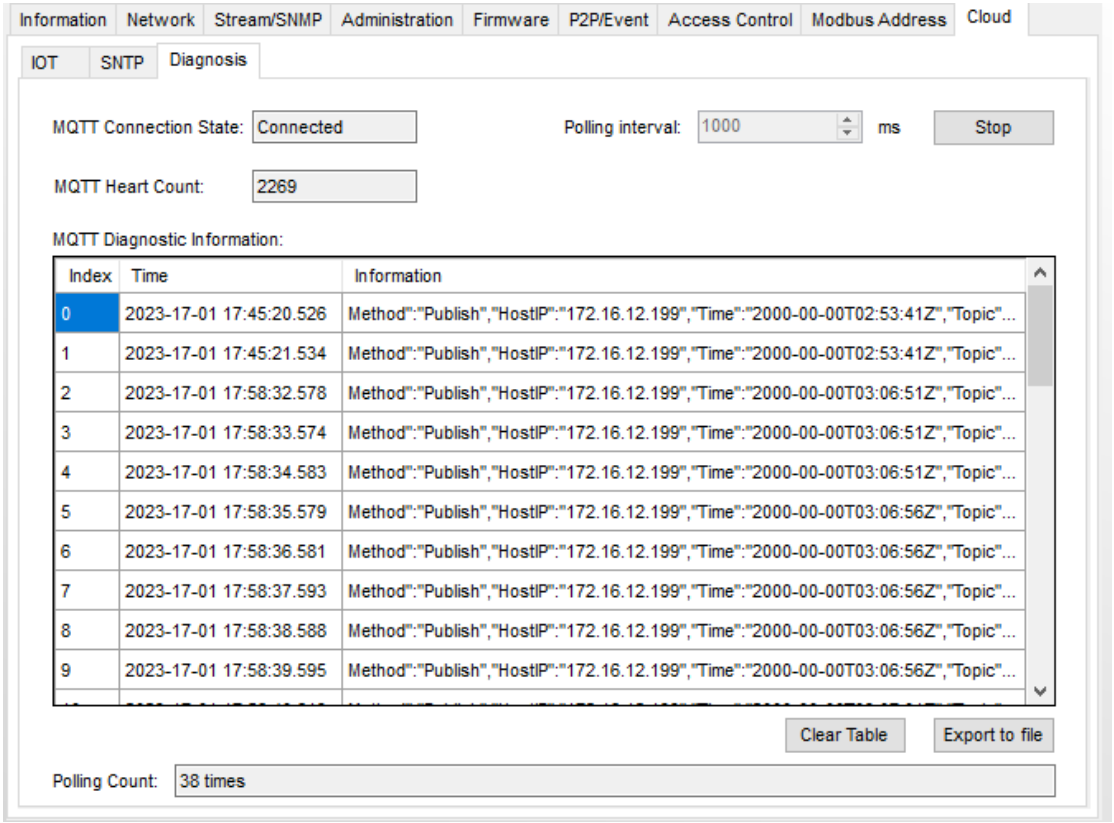



Figure 4. MQTT Diagnosis

### 2.4.1 MQTT heart counter

This function is to confirm the current connection status and continuous running heart counter.
As below is the process of connecting and reconnecting Module and broker:

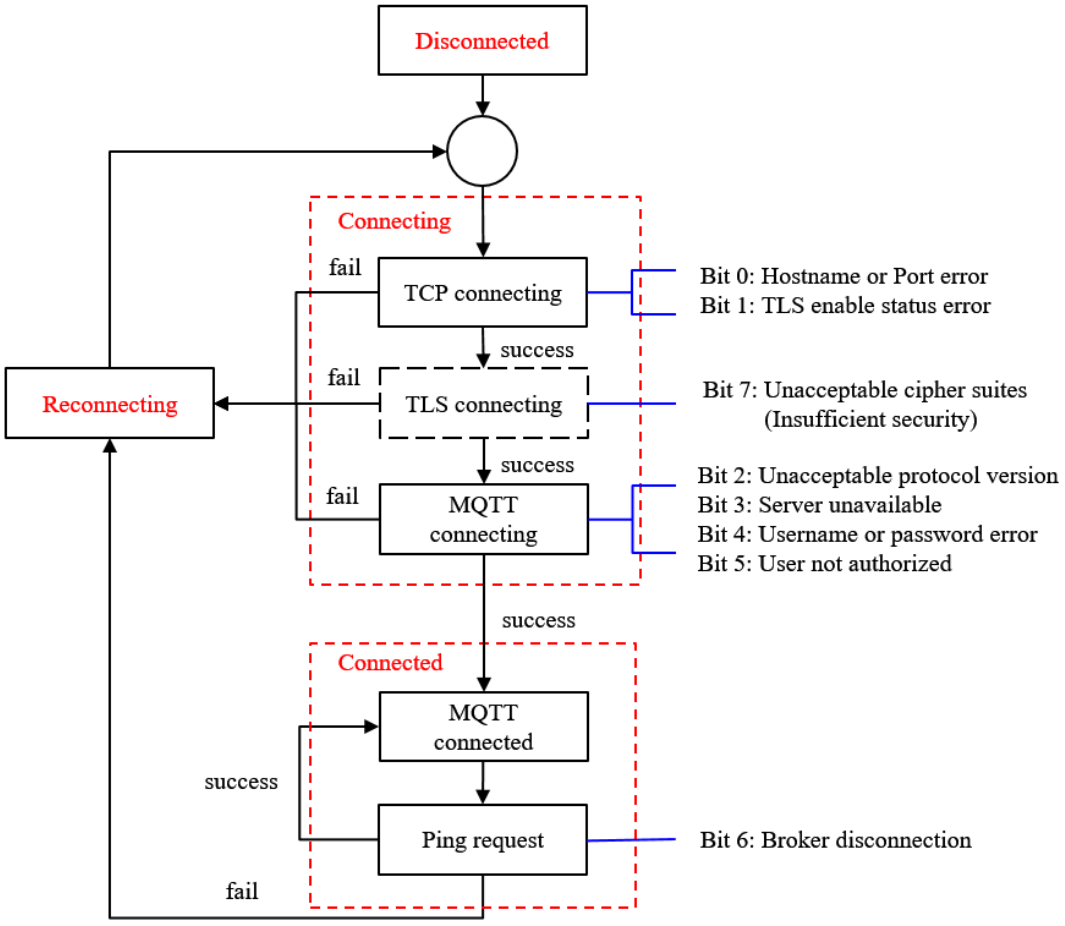



Figure 5. MQTT Heart Counter Process

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaGETMQTTHC | Gonnection error alaet<br>MQTT heart counter<br>aa: always 01 | Return: !HeartC<br>ounter<br>Error: ?01 |

➢ MQTT heart counter is an unsigned long variable. Bits 30 and 31 show the current connection status, and

the remaining bits are used to record the heart counter to know the module operation status.

➢ Heart counter will react and increase with below conditions :

1. When starting to connect for the first time
2. When trying to connect again
3. When publishing any publish information
4. When receiving any subscribe information
5. Pending requests happens according to heartbeat settings

➢ The Heart counter will return to zero when Disconnecting.

## 2.4.2 MQTT diagnostic event

According to MQTT connection status, MQTT diagnostic event includes MQTT error/alarm information。

ASCII command:

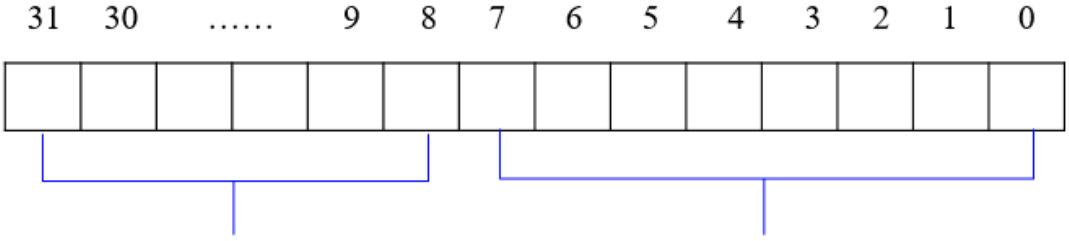
| Command | Description | Remarks |
|---|---|---|
| %aaGETMQTTDE | Get MQTT diagnostic event<br>aa: always 01 | Return: !0MQTT information<br>or !1xxxx (error alarm)<br>Error: ?01 |

➢ Connection error alarm is an unsigned long variable. The 31st bit is used to determine whether the connection is abnormal, and the 0th to 7th bits correspond to possible error causes。

| | |
|---|---|
| Bit 0 | The Broker's hostname or Port setting is incorrect. module cannot find broker |
| Bit 1 | TLS status setting error. For example, the broker does not enable TLS but the Utility enables TLS, or conversely, the broker does enable TLS but the Utility disables TLS. |
| Bit 2 | The protocol version of Mqtt is wrong. Currently, Mqtt is usually version 3.1.1. This alarm may only appear if the broker's protocol version is upgraded in the future. |
| Bit 3 | Broker server cannot be used. This alarm may occur when the host IP can be transferred but the server cannot be connected. (For example, when the EdgeSync 360/ EdgeHub server fails to connect abnormally) |

| | |
|---|---|
| Bit 4 | Username or password is incorrect. When the broker is set up with mosquitto and an account is set, this alarm will appear if the Utility's account is set incorrectly. |
| Bit 5 | User is not authorized. Ex. This alarm will appear if the account password is incorrect when connecting to EdgeSync360/ EdgeHub, or if the Connection String is connected to Azure. |
| Bit 6 | The Broker disconnected after being connected. This alarm will appear when the Broker is abnormal after there has been a correct connection. |
| Bit 7 | When Cipher Suites for TLS cannot be paired. This alarm occurs when the Cipher Suites supported by the Broker do not match the Cipher Suites supported by the module. ◦ |
| Bit 8 | This alarm occurs when the CA certificate fails to verify the Server certificate |
| Bit 9 | This alarm occurs when there is a problem with the validity date of the Server certificate or the SNTP time of the module is wrong. |
| Bit 10 | This alarm occurs when there is a problem with the expiration date of the Server certificate or the SNTP time of the module is wrong. |

(Bit 2 ~ Bit 5 alarm definition is based on MQTT v3.1.1 error definition)




| | |
|---|---|
| Bit 0 | Hostname or Port |
| Bit 1 | TLS enable status |
| Bit 2 | Protocol version |
| Bit 3 | Server unavailable |
| Bit 4 | Username or password |
| Bit 5 | User not authorized |
| Bit 6 | Broker disconnection |
| TLS | |
| Bit 7 | Cipher Suites |

Figure 6. MQTT diagnostic event table

➢ Diagnostic Information contents :

1. Publish or Subscribe
2. Host IP (Source or Destination)

3. Time (RTC time or systick)
4. Topic name

Ex:

"Method":"Publish",“HostIP":"172.16.12.223","Time":"1196779","Topic":"Advantech/00D0C9FEAC13/data"

or

"Method":"Subscribe","HostIP":"172.16.12.33",
"Time":"2000-01-01T01:26:21Z","Topic":"Advantech/00D0C9FE6050/ctl/do1"

# 3. ADAM MQTT

* command has been written in the ADAM-6000/6200 product user manual and is open to users.

## 3.1 Host IP

You can set the broker Domain name/IP Address and port which will be connected. ADAM modules will connect to the broker via standard MQTT.

➢ You don’t need to add Port when setting the host IP.
➢ Port uses 1883 by default, and 8883 is used by default when TLS is enabled.
➢ From following version (from below table), the maximum length of the host IP is modified to 199 characters (original maximum length is 50 characters), and the storage location of the flash is adjusted.

When the old version is upgraded to these versions, the host IP will be inherited, but when the new version is downgraded to the old version, the IP address will be changed to the default value (0.0.0.0)

| ADAM DIO | ADAM-6017/6217 | ADAM-6018+ | ADAM-6024 | ADAM-6224 |
|---|---|---|---|---|
| V6.11 B04 | V6.11 B04 | V6.01B24 | V6.01B19 | V6.01B23 |

Format: Domain Name、IP address、Domain Name:port、IP address:port
Example: 10.0.0.0 or iot.eclipse.org:83
default: 0.0.0.0

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTTADxx…x*<br>or | Set IP address of the broker | Return: >01<br>Error: ?01 |

| | | |
|---|---|---|
| %aaSETMQTTADxx…x:aaaa* | aa: always 01<br>xx…x: IP address/domain (1~127 character)<br>aaaa: port address<br>port range:0~65535 | |
| %aaGETMQTTAD* | Get IP address of the broker aa: always 01 | Return:<br>!IPAddress/Domain<br>or<br>!IPAddress/Domain:port<br><br>Error: ?01 |

## 3.2 TLS Enable

ADAM modules support TLS encryption during data transmissions. To enable TLS encryption, simply check the checkbox labelled “Enable” and click “Apply” to implement the setting. (Requires HOST Port to support TLS)

- When the broker is connected, changing the enable status will actively publish the will topic (status: disconnect) and reconnect.。
- Current ADAM module support TLS v1.2。

  As below are supported Cipher Suites:

  TLS_RSA_WITH_AES_256_CBC_SHA256 (0x003d)
  TLS_RSA_WITH_AES_256_CBC_SHA (0x0035)
  TLS_RSA_WITH_AES_128_GCM_SHA256 (0x009c)
  TLS_RSA_WITH_AES_128_CBC_SHA256 (0x003c)
  TLS_RSA_WITH_AES_128_CBC_SHA (0x002f)
  TLS_RSA_WITH_3DES_EDE_CBC_SHA (0x000a)
  TLS_EMPTY_RENEGOTIATION_INFO_SCSV (0x00ff)

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTTTLSxx | aa: always 01<br>xx: 01 (enable), | Return: >01<br>Error: ?01 |

| | | |
|---|---|---|
| | 00 (disable) | |
| %aaGETMQTTTLS | aa: always 01 | Return: !01 (enable),<br>!00 (disable)<br>Error: ?01 |

➢ Added ASCII command for reading Cipher Suites start from following versions.

| ADAM DIO | ADAM-6017/6217 | ADAM-6018+ | ADAM-6024 | ADAM-6224 |
|---|---|---|---|---|
| V6.13 B00 | V6.13 B00 | V6.03 B00 | V6.03 B00 | V6.03 B00 |

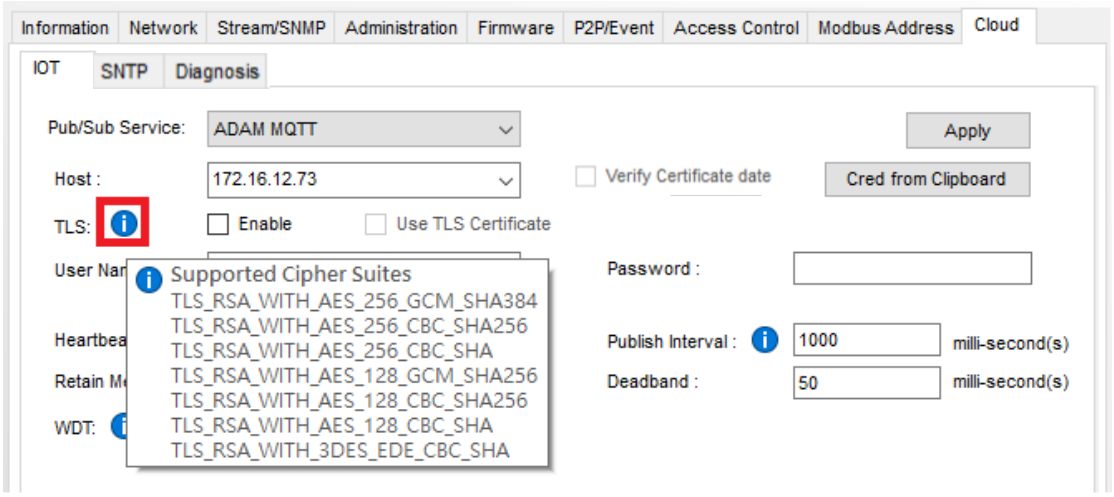



Figure 7. TLS enable page and supported Cipher Suites

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaGETTLSSUPCS | The number and types of TLS CipherSuites that received support<br>aa: always 01 | Return: !nnXXXX….<br>Error: ?01<br><br>nn: total<br>XXXX: CipherSuites types(HEX)<br><br>Ex:<br>!06003D0035009C003C002F000A |

## 3.3 User Name & Password

For some applications that require authorization control, the broker will constrain the subscriber's authority to the data. For ADAM-6000/6200 modules, the username/password can be set using

Adam/Apax .NET utility. Then the MQTT message from ADAM-6000/6200 modules will come with the username and password to access the broke

- If set null module will disable the username and password function.
- Utility changed to display user name and password in plain text in B16, and the old version is displayed with * 。
- When connected to the broker, using SET will actively publish the will topic (status: disconnect) and reconnect.
- Starting from following version, the maximum length of user name and password will be modified to 199 characters (the original maximum length was 50 characters), and the storage location of flash will be adjusted. When the old version is upgraded to this version, the user name and password will be inherited, but when the new version is downgraded to the old version, user name and password changed to default (user name: Advantech, password:00000000)

| ADAM DIO | ADAM-6017/6217 | ADAM-6018+ | ADAM-6024 | ADAM-6224 |
|---|---|---|---|---|
| V6.11 B04 | V6.11 B04 | V6.01B24 | V6.01B19 | V6.01B23 |

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTTUNxx…x* | aa: always 01<br>xx…x: user name<br>(0~199 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTTUN* | aa: always 01 | Return: !UserName<br>Error: ?01 |
| %aaSETMQTTPWxx…x* | aa: always 01<br>xx…x: password<br>(0~199 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTTPW* | aa: always 01 | Return: !Password<br>Error: ?01 |

## 3.4 Heartbeat

The broker will regularly check the connection with the ADAM at the heartbeat interval (keep-alive) setting. Default: 5 second

- EdgeSync 360/ EdgeHub don’t use this setting，fixed as 300 second。

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTTHBxxxx* | aa: always 01<br>xxxx: heartbeat interval in second (0005~FFFF) | Return: >01<br>Error: ?01 |
| %aaGETMQTTHB* | aa: always 01 | Return : !xxxx (heartbeat interval in hex format)<br>Error: ?01 |

## 3.5 Retain Message

When the retain function is enabled. The broker will store the last message of the topic. If a new subscription for the topic is made, the message will be sent to the client. The client can get the last message and does not need to wait until the next message is updated.

➢ EdgeSync 360/ EdgeHub and Azure don't use this setting，fixed as disable。

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTTPRxx* | aa: always 01<br>xx: 01 (enable),<br>00 (disable) | Return: >01<br>Error: ?01 |
| %aaGETMQTTPR* | aa: always 01 | Return: !01 (enable),<br>!00 (disable)<br>Error: ?01 |

## 3.6 Deadband

Deadband is set to determine the minimum interval between two publishing MQTT messages. It prevents MQTT messages from being excessively published due to noise interferences。

Since the new version let Deadband range be set to 32 bits, there is a new ASCII command to facilitate identification and used by Utility and customers. At the same time, because the old ASCII command is

already opened to customers, it is retained to facilitate customers to continue to use it.

After Utility B16, the new GET ASCII query modules will be used first. If the new ASCII does not respond, the old GET ASCII query modules will be used.

- Default: 50 ms
- All MQTT modes of all modules will support the setting value of this command.
- Due to the limitation of the default value of flash table in FW, the maximum value only reaches 0xfffffffe.
- During setting, it will check whether the new deadband is greater than the current interval. If it is less than the current interval, an Error will be returned.

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTTDBxxxxxxxx | aa: always 01<br>xxxxxxxx: publishing deadband in milliseconds (0x00000032~0xfffffffe) | Return: >01<br>Error: ?01 |
| %aaGETMQTTDB | aa: always 01 | Return: !xxxxxxxx (deadband in hex format)<br>Error: ?01 |

## 3.7 Interval

Set the interval for automatically publishing all data topic (Advantech/{mac}/data). Since deadband is the minimum sampling interval, interval must be larger than deadband.

Since the new version opens and sets the Interval range to 32 bits, there is new ASCII command to facilitate identification and use by Utility and customers. At the same time, because the old ASCII command is already open to customers, it is retained to facilitate customers to continue to use it.

After Utility B16, the new GET ASCII query modules will be used first. If the new ASCII does not respond, the old GET ASCII query modules will be used.。

- Default: 5000 ms
- All MQTT mods in all modules will support the setting value of this command.
- When setting, check whether the new interval is greater than the current deadband. Error will happens if interval is less than deadband.

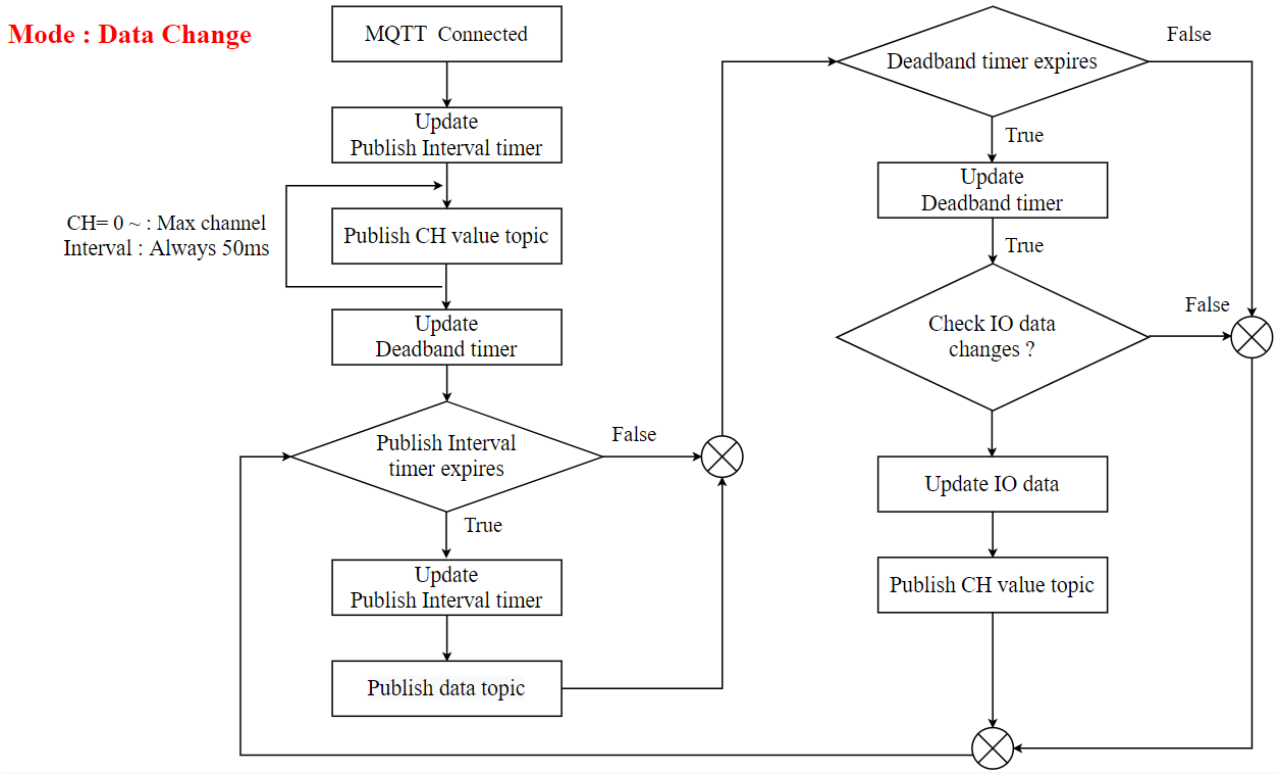
ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTTPIxxxxxxxx | aa: always 01<br>xxxxxxxx: publishing Interval in milliseconds (0x00000032~0xffffffff) | Return: >01<br>Error: ?01 |
| %aaGETMQTTPI | aa: always 01 | Return: !xxxxxxxx<br>(Interval in hex format)<br>Error: ?01 |

## 3.8 Publish value mode

User can use Channel Value Topic to publish detail I/O data from every channel. There're two topic publish timing when using **Publish value mode** : "Data Change" and " Cyclic Interval ".

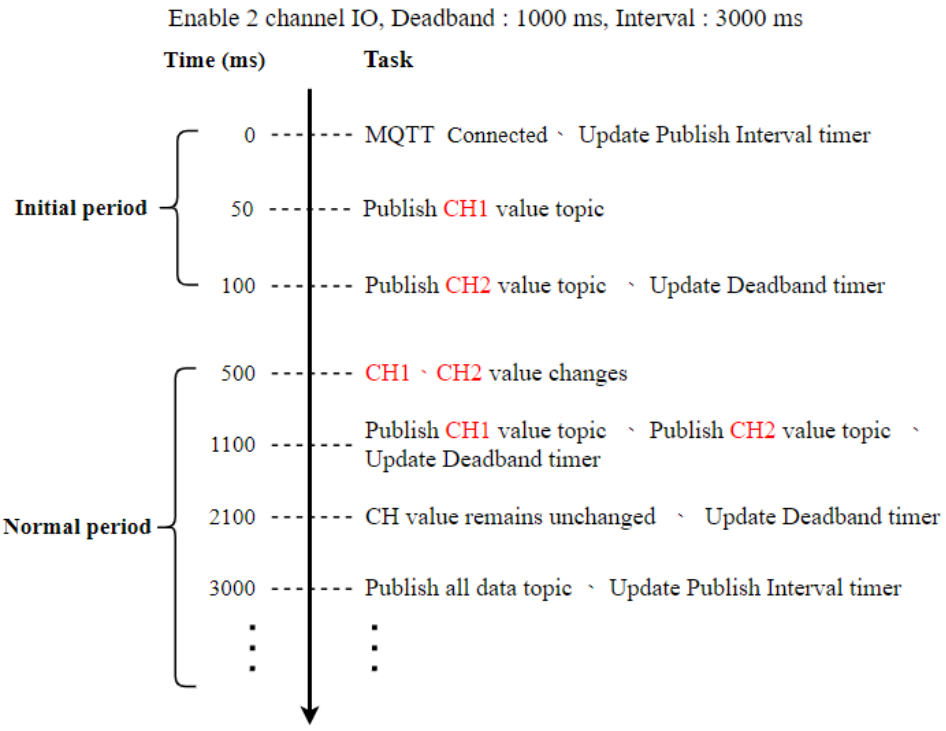
Data Change : Within deadband setting interval, every time the deadband timer expires, it will check whether there is any change in the IO data, and if there is any change, the topic will be published.



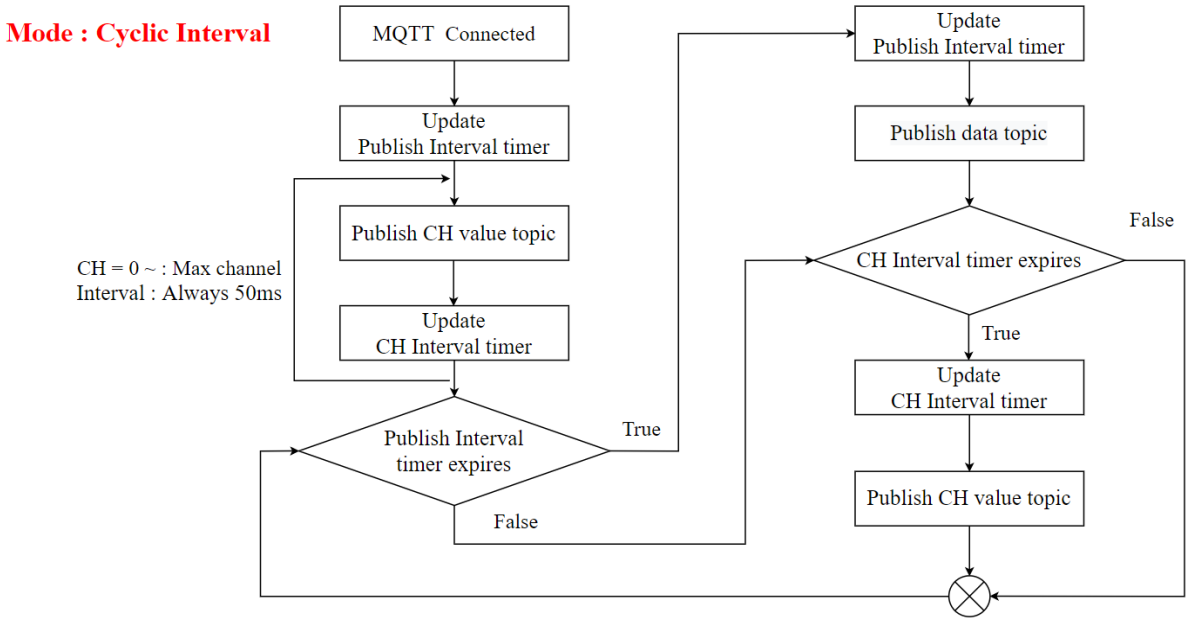

As below figure. Turn on the 2 IO channels, set **Deadband Interval** to 1000 ms, and **Interval Timer** to 3000 ms. MQTT completes the connection at the 0th second of the timeline and enters the initial state. Start timing the Publish Interval timer, and publish all **CH value topics** in one round at a fixed interval of 50 ms.

As shown in the figure, when 2 IO channels are turned on, the first round takes 100 ms in total. After all

**CH value topics** are published, the Deadband timer starts and enters the normal state. After each **Deadband Interval** ends, it will check whether there is any IO change. If there is a change, the value topic of the channel will be published. If multiple channels change, the corresponding channel value topics will be published at the same time. The **all data topic** will publish the topic at the end of each cycle according to the **interval timer** of the initial state.

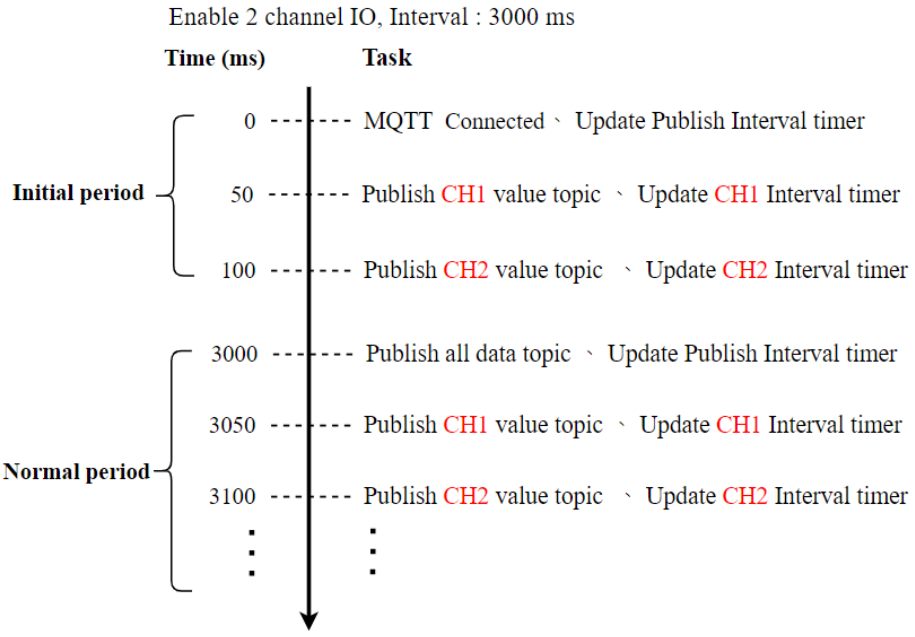



Cyclic Interval : With Interval Setting as the interval, each channel will have its own Interval timer. When the timer expires, the topic will be published.



Example as below figure, open 2 IO channels, and set the **Interval Timer** to 3000 ms.

MQTT completes the connection at the 0th second of the timeline and enters the initial state. Start timing the **Publish Interval Timer**, and publish **all CH value topics** for one round at a fixed interval of 50 ms. When the topic is published, the interval timer of the channel will be updated. When 2 IO channels are turned on as shown in the figure, the first round takes a total of 100 ms. **All CH value topics** are published and enter the normal state. The topic will be published at the end of each cycle according to the **interval timer** of the initial state.




Starts from following versions support these rules.

| ADAM DIO | ADAM-6017/6217 | ADAM-6018+ | ADAM-6024 | ADAM-6224 |
|---|---|---|---|---|
| V6.15 B03 | V6.14 B02 | V6.04 B02 | V6.04 B01 | V6.04 B01 |

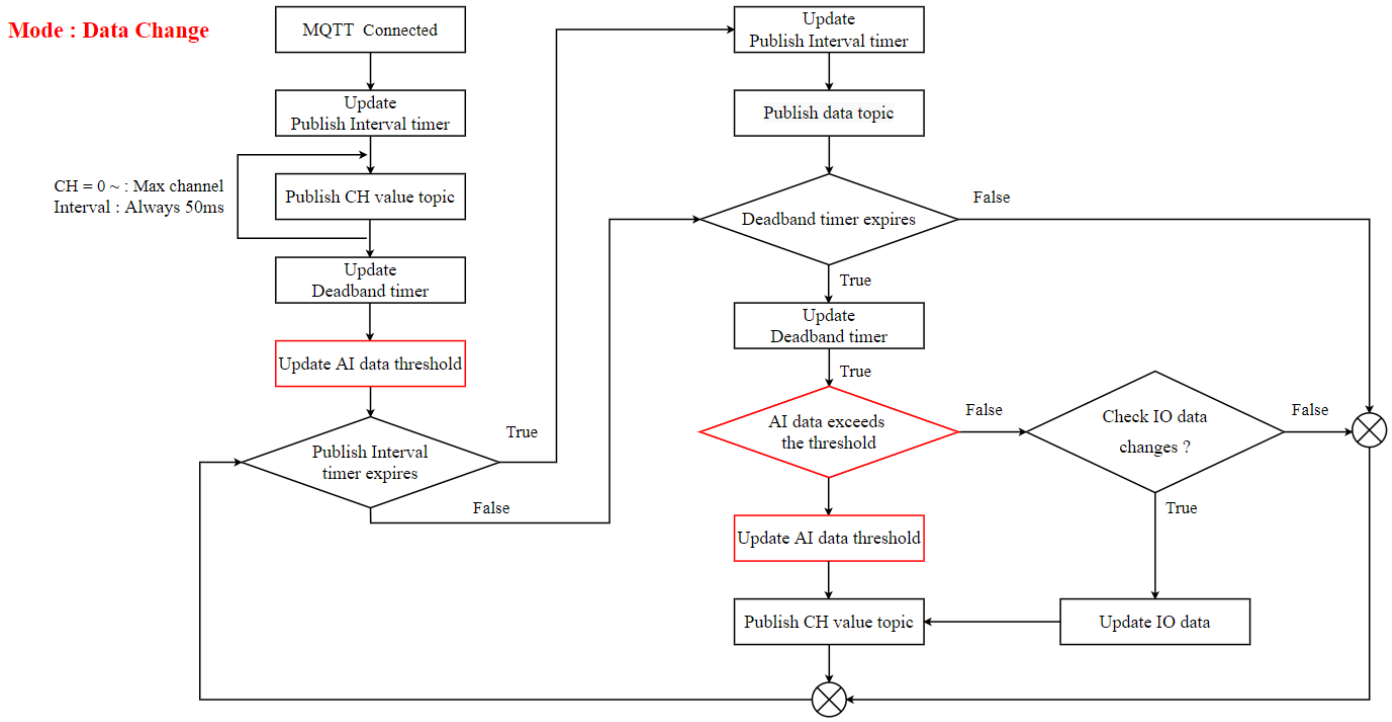
ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTTPVxx | aa: always 01<br>xx: 01 (Cyclic Interval),<br>00 (Data Change) | Return: >01<br>Error: ?01 |
| %aaGETMQTTPV | aa: always 01 | Return: !xx<br>xx: 01 (Cyclic Interval),<br>00 (Data Change)<br>Error: ?01 |

## 3.9 AI data threshold

Since AI data is a continuous input value, there will be slight fluctuations in each sampling, and AI data changes cannot be directly compared. Therefore, when the AI module is in Data change mode, it can check the change of AI data through the threshold setting. When it exceeds the threshold, it is deemed that the AI input has changed and the topic is published.

When threshold is set to 0, the AI data threshold function is deemed to be turned off. AI input changes will not be checked in Data change mode publish topic.




Starts from following versions support these rules.

| ADAM DIO | ADAM-6017/6217 | ADAM-6018+ | ADAM-6024 | ADAM-6224 |
|---|---|---|---|---|
| X | V6.14 B02 | V6.04 B02 | V6.04 B01 | X |

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTTTHxx | aa: always 01<br>xx: AI data threshold<br>Range : 0x00 ~ 0x63<br>Default : 0x00 | Return: >01<br>Error: ?01 |

| | | |
|---|---|---|
| %aaGETMQTTTH | aa: always 01 | Return: !xx<br>xx: AI data threshold<br>Range : 0x00 ~ 0x63<br>Error: ?01 |

## 3.10 WDT

The complete mechanism of MQTT triggering WDT/FSV functions has been added in the following versions.。

| ADAM DIO | ADAM-6017/6217 | ADAM-6018+ | ADAM-6024 | ADAM-6224 |
|---|---|---|---|---|
| V6.13 B07 | X | X | X | X |

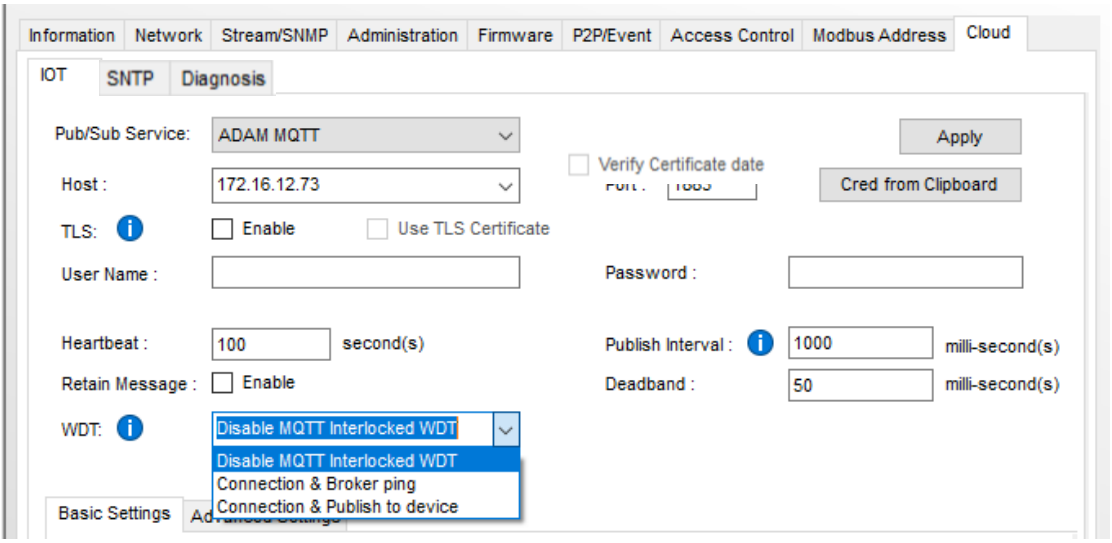



Figure 8. WDT function settings

Need to open Communication WDT in IO page, then MQTT WDT setting can be effective。

There’re 3 security levels on MQTT WDT。

**1. Disable MQTT Interlocked WDT**

**2. Connection & Broker ping**

FSV is triggered when the Broker is disconnected or the device fails to receive a ping response within the Host idle time.

So it needs Heartbeat time ≦ Host Idle time

**3. Connection & Publish to device**

FSV is triggered when the Broker is disconnected or the device fails to receive a valid Publish packet

within the Host idle time. ◦

The valid Publish packet is as follows

Set Do Status : Advantech/{mac}/ctl/don {"v":true} or {"v":false}

Set setting : Advantech/{mac}/ctl/sensor/di_config/din
or Advantech/{mac}/ctl/sensor/do_value/don

Get IO Status : Advantech/{mac}/read/data {"v":true}

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTTWDTxx | Set the level of MQTT trigger WDT/FSV<br>aa: always 01<br><br>xx:<br>00 -> disable,<br>01 -> Connection & Broker ping,<br>02 -> Connection & Publish to device | Return: >01<br>Error: ?01 |
| %aaGETMQTTWDT | Get the level of MQTT trigger WDT/FSV<br>aa: always 01 | Return: !xx<br>Error: ?01<br><br>xx:<br>00 -> disable,<br>01 -> Connection & Broker ping,<br>02 -> Connection & Publish to device |

## 3.11 Apply

After modifying various settings of MQTT in Utility, you must press Apply to finalize the setting values to the module.

## 3.12 Basic Settings

Basic Settings can setup topic Pub/Sub QoS and enable/disable Publish channel topic。

- Basic Settings can only be used in ADAM MQTT mode. In other mode, Pub/Sub QoS are fixed as 0, and Channel Publish topic fixed enabled。
- The topic list displayed in the Utility interface is written directly in the Utility's code. Therefore, when there’re more topics requirements, User need to contact Advantech to modify the displayed topics.
- Disable Channel Publish topic can impact All data topic payload。
- ADAM-6018+ newly supports enable/disable Channel Publish topic since v6.01B24。
- ADAM-6024、ADAM-6224 currently don’t support enable/disable Channel Publish topic。

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTTPQxx* | Set publishing Qos<br>aa: always 01<br>xx: publishing Qos (00~02) | Return: >01<br>Error: ?01 |
| %aaGETMQTTPQ* | Get publishing Qos<br>aa: always 01 | Return: !xx (publishing Qos in hex format)<br>Error: ?01 |
| %aaSETMQTTSQxx* | Set subscribing Qos<br>aa: always 01<br>xx: subscribing Qos (00~02) | Return: >01<br>Error: ?01 |
| %aaGETMQTTSQ* | Get subscribing Qos<br>aa: always 01 | Return: !xx (subscribing Qos in hex format)<br>Error: ?01 |
| %aaSETMQTTDICHxxxx<br>or<br>%aaSETMQTTDOCHxxxx<br>or<br>%aaSETMQTTAICHxxxx<br>or<br>%aaSETMQTTAOCHxxxx | Set enable publish channel topic flags<br>aa: always 01<br>xxxx: enable channel by bit | Return: >01<br>Error: ?01 |
| %aaGETMQTTDICH<br>or<br>%aaGETMQTTDOCH<br>or | Get enable publish channel topic flags<br>aa: always 01 | Return: !xxxx (enable channel by bit)<br>Error: ?01 |

| | | |
|---|---|---|
| %aaGETMQTTAICH<br>or<br>%aaGETMQTTAOCH | | |

## 3.13 Pub/Sub Topic

ADAM module supports topic: 1. Will Topic、2. Profile Topic、3.Channel Type Topic、4. Control Topic、5. All Data Topic、6. Channel Config Topic、7. Channel Value Topic、8. Network Setting Topic、9. Access Control Topic、10. User-defined Modbus address Topic、11. OTA for Firmware/Configuration File。

### 3.13.1 Will Topic

When the Module actively connects/disconnects with the broker, the module will publish a will topic with connect/disconnect message. Or when an accident occurs between the module and the broker and abnormal disconnection happens, the broker will publish a will topic with disconnect message.。

Will Topic name: Advantech/{mac}/Device_Status
Will message payload example:
{"status":"connect","name":"ADAM6050","macid":"00D0C9FEAC13","ipaddr":"172.16.12.36"}

### 3.13.2 Profile Topic

| | |
|---|---|
| Description | Device sends device information including the I/O module slots. |
| PUBLISH Topic | Device sends the current configurations.<br>**Advantech/{MAC}/cfg/sensor/profile** |
| Example | **Send Advantech/00D0C9CC0099/ cfg/sensor/profile**<br>{<br>"SL": 0,<br>"Id": "ADAM-6050",<br>"DIn": 8,<br>"DOn": 2,<br>"RLAn": 0,<br>"AIn": 0,<br>"UIn": 0, |

```
    "AOn": 0,
    "Cntn": 0,
    "Ch": 0,
    "RL": 0,
    "FwVer": "A2.00 B01",
    "BVer": "A1.00 B01",
    "FCS": 0,
    "IId":"00D0C9CC0099",
    "DFS": 7
}
```


➢ Resource value definitions :

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Slot Number | SL | Number | R | 0, 1 ~: Slot number. |
| Model ID | Id | String | R | Model ID.<br>For example,<br>“ADAM-6050” “ADAM-6051”<br>“ADAM-6052” “ADAM-6060”<br>“ADAM-6066” “ADAM-6250”<br>“ADAM-6251” “ADAM-6256”<br>“ADAM-6260” “ADAM-6266”<br>“ADAM-6017” “ADAM-6217”<br>“ADAM-6018+” “ADAM-6024-D”<br>“ADAM-6224” |
| Total DI Number | DIn | Number | R | 0, 1 ~: Digital input channel number. |
| Total DO Number | DOn | Number | R | 0, 1 ~: Digital output channel number. |
| Total Relay Number | RLAn | Number | R | 0, 1 ~: Relay output channel number. |
| Total AI Number | AIn | number | R | 0, 1 ~: Analog input channel number. |
| Total UI Number | UIn | number | R | 0, 1 ~: Universal input channel number. |
| Total AO Number | Aon | Number | R | 0, 1 ~: Analog output channel number. |
| Total Counter Number | Cntn | Number | R | 0, 1 ~: Counter channel number. |
| Total modbusRTU rule | RL | Number | R | 0, 1 ~: modbusRTU rule number. |
| Total MBRTU channel | MCh | Number | R | 0, 1 ~: modbusRTU channel number. |
| Firmware Version | FwVer | String | R | Version information of main firmware image.<br>"" : none |
| Bootloader Version | BVer | String | R | Version information of bootloader firmware image. |

| | | | | |
|---|---|---|---|---|
| | | | | "" : none |
| Function support | FCS | Number | R | Supported function table, bit x = 1 is supported<br>Bit: 0 — P2P; 1~15 — Reserved for future use |
| Identity | IId | String | R | iSensing asset ID |
| Device Cloud Feature support | DFS | Number | R | Features which are supported by device. Each Bit=1 represent one supported feature. Please see Feature suppor table. |
| Remarks | | | | |

## 3.13.3 Channel Type Topic

For the config topic initially supported by ADAM MQTT, the payload only contains messages of DIO/AIO type. In addition to being published when the computer is powered on and connected, it will also be published when the type changes.

- ADAM-6017 only have AI Config Topic name，don't have DO Config Topic name。
- ADAM-6024 only have AIO Config Topic name，don't have DIO Config Topic name。
- ADAM-6224 only have AO Config Topic name，don't have DI Config Topic name。
- Type message format refer to 3.11.13

Config Topic name: DIO: Advantech/{mac}/cfg/sensor/din(don)
AIO: Advantech/{mac}/cfg/sensor/ain(aon)
n (channel number) starts from 1

Config message payload example: DIO: {"typ":"counter"}
AIO: {"typ":"+-10V"} or {"typ":"J Type:0-760C"}

## 3.13.4 Control Topic

It is the control topic initially supported by ADAM MQTT. The functions that can be controlled are 1. DO High/Low, 2. AIO range type, and 3. AO value. (Cannot set DIO type through control topic)

- Type message format refer to 3.11.13
- Using DO Control Topic will clear WDT flags and reset Watch-dog timer to zero. (WDT processing will be performed regardless of whether DO changes)

Control Topic name: DO: Advantech/{mac}/ctl/don
AIO: Advantech/{mac}/set/sensor/ain(aon)
AO: Advantech/{mac}/ctl/aon
n (channel number) starts from 1
Control message payload example: DO: {"v":true}
AIO: {"typ":"0-20mA"}
AO: {"v":5.0}

### 3.13.5 All Data Topic

Publish the topic of all data messages. Interval is the only fixed topic。

- IO number to start from 1 (ex: di1, ai_st1)
- Topic name: Advantech/{mac}/data
- Message payload example:

ADAM-6050:

{"s":1,"t":"2024-10-01T05:07:56.875Z","q":192,"c":1,"ipaddr":"192.168.137.25","di1":0,"di2":true,"di3":true,"di4":true,"di5":true,"di6":true,"di7":true,"di8":true,"di9":true,"di10":true,"di11":true,"di12":true,"do1":true, "do1_timestamp":"2024-10-01T03:47:43.417Z",
"do2":false,"do3":false,"do4":false,"do5":false,"do6":false}

ADAM-6017:

{"s":1,"t":"2000-00-17T08:45:46Z","q":192,"c":1,"ai1":-0.002,"ai_st1":1,"ai2":-0.002,"ai_st2":1,"ai3":-0.002,"ai_st3":1,"ai4":-0.002,"ai_st4":1,"ai5":-0.002,"ai_st5":1,"ai6":-0.002,"ai_st6":1,"ai7":-0.002,"ai_st7":1,"ai8":-0.002,"ai_st8":1,"do1":false,"do_st1":1,"do2":false,"do_st2":1}

ADAM-6024:

{"s":1,"t":"2000-00-00T06:12:10Z","q":192,"c":1,"di1":true,"di_st1":1,"di2":true,"di_st2":1,"do1":false,"do_st1":1,"do2":false,"do_st2":1,"ai1":9999.9999,"ai_st1":0,"ai2":4.000,"ai_st2":1,"ai3":0.000,"ai_st3":1,"ai4":-0.003,"ai_st4":1,"ai5":-0.001,"ai_st5":1,"ai6":-0.002,"ai_st6":1,"ao1":4.000,"ao_st1":0,"ao2":5.001,"ao_st2":0}

ADAM-6224:

{"s":1,"t":0,"q":192,"c":1,"di1":false,"di2":false,"di3":false,"di4":false,"ao1":0.487,"ao2":-4.757,"ao3":-10.000,"ao4":0.000}

**General:**

| | |
|---|---|
| s: | Reserved for further use, default value = 1 |
| t: | Topic publish time<br>Format: YYYY-MM-DDThh:mm:ss.xxx<br>YYYY = year, MM = month, DD = date, hh = hour, mm = minute, ss = second, xxx = millisecond<br>Note: the function is not applied on ADAM-6050/6051/6052/6060/6066, t = 0 |
| q: | Reserved for further use, default value 192 |
| c: | Reserved for further use, default value 1 |
| ipaddr | Module IP address. |

**Timestamp: (ADAM-6000 series supports when using both SNTP and RTC function)**

| | |
|---|---|
| din_timestamp、<br>don_timestamp | IO changes Timestamp<br>n (channel number) starts from 1<br>Format: YYYY-MM-DDThh:mm:ss.xxxZ<br>YYYY = year, MM = month, DD = date, hh = hour, mm = minute, ss = second, xxx = millisecond<br><br>Note: Timestamps are only published when IO changes |

**di_st value(ADAM-6024 only):**

| | |
|---|---|
| 1 | Streaming, normal |
| 2 | DI change |

**do_st value(ADAM-6017、ADAM-6024 only):**

| | |
|---|---|
| 1 | Streaming, normal |
| 2 | DO change |

**ai_st value:**

| | |
|---|---|
| 0 | Channel disable |
| 1 | Streaming, normal |
| 2 | High latch |
| 3 | High momentary |
| 4 | Low latch |
| 5 | Low momentary |

➢ ADAM-6024 only 0 and 1

**ao_st value(ADAM-6024 only):**

| | |
|---|---|
| 0 | Streaming, normal |

If you want to get the data updated immediately on broker , you can use topic:

Advantech/{mac}/read/data

{"v":true}

## 3.13.6 Channel Config Topic

### 3.13.6.1 Digital input of ADAM-6000/6200 DIO

| | |
|---|---|
| Description | Retrieves information about the digital input configuration resource. |
| PUBLISH Topic | Send the current configurations.<br>**Advantech/{MAC}/cfg/sensor/di_config/din**<br><br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE Topic | Get the configurations from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/di_config/din** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/di_config/din** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/di_config/di9**<br>{<br>"Ch":9,<br>"Md":0,<br>"Inv":1,<br>"Fltr": 1,<br>"FtLo": 10000,<br>"FtHi": 10000,<br>"FqP": 0,<br>"CntKp": 0,<br>"Tag": "FrontDoor"<br>} |

**Get Advantech/00D0C9CC0099/ctl/sensor/di_config/di9**

```
{
        "cfg_id":"123",
        "Md":0,
        "Inv":1,
        "Fltr": 1,
        "FtLo": 10000,
        "FtHi": 10000,
        "FqP": 0,
        "CntKp": 0,
        "Tag": "FrontDoor"
}
```

**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/di_config/di9**

```
{
        "cfg_id":"123",
        "error":"No error
}
```

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions :

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Digital input channel number. |
| Mode | Md | Number | RW | Digital input mode. |

| | |
|---|---|
| 0 | DI |
| 1 | Counter |
| 2 | LowToHighLatch |
| 3 | HighToLowLatch |
| 4 | Frequency |

| | | | | |
|---|---|---|---|---|
| Invert Signal | Inv | Number | RW | 1 or 0: Enable or Disable invert signal function.<br>(if mode = Frequency, the function is not available) |
| Digital Filter | Fltr | Number | RW | 1 or 0: Enable or Disable digital filter function<br>(if mode = DI or Counter, the function is available) |
| Min. Low Signal Width | FtLo | Number | RW | Minimum low signal width of digit filter<br>0 -4294967295 (0.1 ms) |
| Min. High Signal Width | FtHi | Number | RW | Minimum high signal width of digit filter<br>0 -4294967295 (0.1 ms). |
| Frequency Precise 0.01Hz | FqP | Number | RW | 1 or 0: Enable / Disable Frequency Precise 0.01Hz<br>(Frequency Precise is 0.01Hz or 0.1Hz. Default Frequency Precise is 0.1Hz) |
| Keep Counter Value When Poweroff | CntKp | Number | RW | 1 or 0: Enable / Disable keep last value when power off. |
| Tag Name | Tag | String | RW | The description tag for this channel.<br>Max. 21 characters |

| | |
|---|---|
| Remarks | |

### 3.13.6.2 Common Digital output of ADAM-6000/6200 DIO

| | |
|---|---|
| Description | Retrieves information about the digital output configuration resource on specific slot. |
| PUBLISH Topic | Send the current configurations.<br>**Advantech/{MAC}/cfg/sensor/do_genconfig** |

| | |
|---|---|
| SUBSCRIBE Topic | Get the configurations from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/do_genconfig** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/do_genconfig** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/do_genconfig**<br>{<br>"WDT":0,<br>"HI":720<br>}<br>**Get Advantech/00D0C9CC0099/ctl/sensor/do_genconfig**<br>{<br>"cfg_id":"123",<br>"WDT":0,<br>"HI":720<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/do_genconfig**<br>{<br>"cfg_id":"123",<br>"error":"No error"<br>} |

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Communication WDT Enable | WDT | Number | RW | 1 / 0: Enable / Disable function of FSV watchdog timer. |

| | | | | |
|---|---|---|---|---|
| Host Idle | HI | Number | RW | TCP communication timeout and FSV watchdog timer.<br>default：720 (second)<br>range:5 - 4095 (second) |
| Remarks | | | | |

### 3.13.6.3 Digital output of ADAM-6000/6200 DIO

| | |
|---|---|
| Description | Retrieves information about the digital output configuration resource on specific slot. |
| PUBLISH Topic | Send the current configurations.<br>**Advantech/{MAC}/cfg/sensor/do_config/din**<br><br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE Topic | Get the configurations from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/do_config/din** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/do_config/din** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/do_config/di9**<br>{<br>"Ch":9,<br>"Md":0,<br>"FSV":0,<br>"PsLo":0,<br>"PsHi":0,<br>"HDT": 0,<br>"LDT": 0,<br>"Tag": "DigOut"<br>}<br>**Get Advantech/00D0C9CC0099/ctl/sensor/do_config/di9**<br>{<br>"cfg_id":"123",<br>"Md":0,<br>"FSV":0, |

"PsLo":0,
"PsHi":0,
"HDT": 0,
"LDT": 0,
"Tag": "DigOut"
}

**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/do_config/di9**

{
"cfg_id":"123",
"error":"No error"
}

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Digital output channel number. |
| Mode | Md | Number | RW | Digital output mode. |
| Fail Safety Value | FSV | Number | RW | 1 or 0: Enable or Disable fail safety value function. |
| Low Signal Width | PsLo | Number | RW | Low signal width of pulse<br>0 -4294967295 (0.1 ms) |
| High Signal | PsHi | Number | RW | High signal width of pulse |

| Value | Mode | Note |
|---|---|---|
| 0 | DO | |
| 1 | Pulse Output | |
| 2 | LowToHighDelay | |
| 3 | HighToLowDelay | |

| | | | | |
|---|---|---|---|---|
| Width | | | | 0 -4294967295 (0.1 ms). |
| High To Low Delay Time | HDT | Number | RW | Time for High To Low Delay<br>0 -4294967295 (0.1 ms) |
| Low To High Delay Time | LDT | Number | RW | Time for Low To High Delay<br>0 -4294967295 (0.1 ms). |
| Keep Last DO Value | LKp | Number | RW | 1 or 0: Enable / Disable keep last DO value when power off.<br><br>Note: Can only be set when DO mode |
| Tag Name | Tag | String | RW | The description tag for this channel.<br>Max. 21 characters |
| Remarks | | | | |

### 3.13.6.4 Digital output of ADAM-6017

| | |
|---|---|
| Description | Retrieves information about the digital output configuration resource on specific slot. |
| PUBLISH Topic | Send the current configurations.<br>**Advantech/{MAC}/cfg/sensor/do_config/din**<br><br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE Topic | Get the configurations from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/do_config/din** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/do_config/din** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/do_config/di9**<br>{<br>"Ch":9,<br>"En":1,<br>"ACh": 0,<br>"AMd": 0,<br>"Tag": "DigOut"<br>} |

**Get Advantech/00D0C9CC0099/ctl/sensor/do_config/di9**

```
{
        "cfg_id":"123",
        "ACh": 0,
        "AMd": 0,
        "Tag": "DigOut"
}
```

**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/do_config/di9**

```
{
        "cfg_id":"123",
        "error":"No error"
}
```

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Digital output channel number. |
| Tag Name | Tag | String | RW | The description tag for this channel. Max. 21 characters |
| The Number of AI Channel which drives the DO signal | ACh | Number | RW | 0, 1, …: Analog input channel number to drive the DO |
| The Driving Alarm Mode | AMd | Number | RW | The driving mode<br>0 No<br>1 High alarm drived<br>2 Low alarm drived |

| Remarks | |
|---|---|

### 3.13.6.5 Common Analog input of ADAM-6017/6217

| | |
|---|---|
| Description | Retrieves information about the analog input configuration resource on specific slot. |
| PUBLISH Topic | Send the current configurations.<br>**Advantech/{MAC}/cfg/sensor/ai_genconfig** |
| SUBSCRIBE Topic | Get the configurations from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/ai_genconfig** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/ai_genconfig** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/ai_genconfig**<br>{<br>"Res":16,<br>"BMd":0,<br>"AiT":0,<br>}<br>**Get Advantech/00D0C9CC0099/ctl/sensor/ai_genconfig**<br>{<br>"cfg_id":"123",<br>"BMd":0,<br>"AiT":0,<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_genconfig**<br>{<br>"cfg_id":"123",<br>"error":"No error"<br>} |

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |

| | | | | |
|---|---|---|---|---|
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions for all channels:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| AI Resolution | Res | Number | R | 1 ~ 32: Number of bits for AI value.<br>For example, the resolution of ADAM-T110 AI 12-bit. |
| Burn-out Up/Down Scale Mode | BMd | Number | RW | The burn-out value<br>0 Down scale<br>1 Up scale |
| AI Filter Mode | AiT | Number | RW | The AI filter mode<br>**ADAM-6017 support**<br>0 Auto (50/60Hz)<br>1 50 Hz<br>2 60 Hz<br>3 High Speed<br>**ADAM-6217 support**<br>0 Auto (50/60Hz)<br>1 50 Hz<br>2 60 Hz |

| | |
|---|---|
| Remarks | |

### 3.13.6.6 Analog input of ADAM-6017/6217

| | |
|---|---|
| Description | Retrieves information about the digital input configuration resource on specific slot. |
| PUBLISH Topic | Send the current configurations.<br>**Advantech/{MAC}/cfg/sensor/ai_config/ain** |

| | |
|---|---|
| | **where n = 1 ~ : the channel number** |
| SUBSCRIBE<br>Topic | Get the configurations from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/ai_config/ain** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/ai_config/ain** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/ai_config/ai2**<br>{<br>"Ch":2,<br>"En":1,<br>"Rng":328,<br>"EnLA": 1,<br>"EnHA": 1,<br>"LAMd": 0,<br>“HLAMd": 0,<br>"LoA": "2.0",<br>"HiA": "6.3",<br>"Tag": "Analog Input 0"<br>}<br>**Get Advantech/00D0C9CC0099/ctl/sensor/ai_config/ai2**<br>{<br>"cfg_id":"123",<br>"En":1,<br>"Rng":328,<br>"EnLA": 1,<br>"EnHA": 1,<br>"LAMd": 0,<br>“HAMd": 0,<br>"LoA": "2.0",<br>"HiA": "6.3",<br>"Tag": "Analog Input 0"<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_config/ai2**<br>{<br>"cfg_id":"123", |

<table>
<tr><td></td><td>"error":"No error"<br>}</td></tr>
</table>

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions by **Each Channel** :

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Analog input channel number. |
| Channel Enable | En | Number | RW | 1 / 0: Enable / Disable AI conversion |
| Input Range | Rng | Number | RW | Analog input range.<br>Notice: Average channel is read only. |

| Range code | |
|---|---|
| 328 | (0x0148) 0 – 10 V |
| 327 | (0x0147) 0 ~ 5 V |
| 325 | (0x0145) 0 ~ 1 V |
| 262 | (0x0106) 0 ~ 500 mV |
| 261 | (0x0105) 0 ~ 150 mV |
| 323 | (0x0143) +/- 10 V |
| 322 | (0x0142) +/- 5 V |
| ~~321~~ | ~~(0x0141) +/- 2.5 V~~ |
| 259 | (0x0103) +/- 150 mV |
| 320 | (0x0140) +/- 1 V |
| 260 | (0x0104) +/- 500 mV |

| | | | | |
|---|---|---|---|---|
| | | | | 384 (0x0180) 4 ~ 20 mA<br>385 (0x0181) +/- 20 mA<br>386 (0x0182) 0 ~ 20 mA |
| Enable Low Alarm | EnLA | Number | RW | 1 / 0: Enable / Disable AI low alarm function |
| Enable High Alarm | EnHA | Number | RW | 1 / 0: Enable / Disable AI high alarm function |
| Alarm Low Mode | LAMd | Number | RW | The alarm mode<br>0 Momentary<br>1 Latch |
| Alarm High Mode | HAMd | Number | RW | The alarm mode<br>0 Momentary<br>1 Latch |
| Low Alarm Value | LoA | String | RW | Set/get the low alarm limit value.<br>Data format is “±xxxx.yy”<br>Value range: -9999 ~ +9999<br>For example,<br>“+0003.250” or “3.25” |
| High Alarm Value | HiA | String | RW | Set/get the high alarm limit value.<br>Data format is “±xxxx.yy”<br>Value range: -9999 ~ +9999<br>For example,<br>“15.25” |
| Tag Name | Tag | String | RW | The description tag for this channel.<br>Max. 21 characters |

| Remarks | |
|---|---|

### 3.13.6.7 Common Analog input of ADAM-6018+

| | |
|---|---|
| Description | Retrieves information about the analog input configuration resource on specific slot. |
| PUBLISH Topic | Send the current configurations.<br>**Advantech/{MAC}/cfg/sensor/ai_genconfig** |
| SUBSCRIBE Topic | Get the configurations from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/ai_genconfig** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/ai_genconfig** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/ai_genconfig**<br>{<br>"Res":16,<br>"EnB":1,<br>"BMd":0,<br>"AiT":1,<br>}<br>**Get Advantech/00D0C9CC0099/ctl/sensor/ai_genconfig**<br>{<br>"cfg_id":"123",<br>"EnB":1,<br>"BMd":0,<br>"AiT":1,<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_genconfig**<br>{<br>"cfg_id":"123",<br>"error":"No error"<br><br>} |

➢ Message information definition:

| Field | Abbreviation | Data | Property | Description |
|---|---|---|---|---|

| | | Type | | |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions for all channels:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| AI Resolution | Res | Number | R | 1 ~ 32: Number of bits for AI value.<br>For example, the resolution of ADAM-T110 AI 12-bit. |
| Burn-out Detection Enable | EnB | Number | RW | 1 / 0: Enable / Disable AI burn-out detection function |
| Burn-out Up/Down Scale Mode | BMd | Number | RW | The burn-out value<br>0 – Down scale<br>1 – Up scale<br>Note: Can only be set when Burn-out Enable |
| AI Filter Mode | AiT | Number | RW | The AI filter mode<br>1 – 50 Hz<br>2 – 60 Hz |

| Remarks | |
|---|---|

### 3.13.6.8 Analog input of ADAM-6018+

| Description | Retrieves information about the temperature input configuration resource on specific slot. |
|---|---|
| PUBLISH Topic | Send the current configurations.<br>**Advantech/{MAC}/cfg/sensor/ai_config/ain**<br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE | Get the configurations from DeviceCloud. |

| | |
|---|---|
| Topic | **Advantech/{MAC}/ctl/sensor/ai_config/ain** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/ai_config/ain** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/ai_config/ai2**<br>{<br>"Ch":2,<br>"En":1,<br>"Rng":1024,<br>"EnLA": 1,<br>"EnHA": 1,<br>"LAMd": 0,<br>“HLAMd": 0,<br>"LoA": "50.52",<br>"HiA": "700.36",<br>"LoS": "0.00",<br>"HiS": "760.00",<br>"Tag": "Temperature Input 0"<br>}<br>**Get Advantech/00D0C9CC0099/ctl/sensor/ai_config/ai2**<br>{<br>"cfg_id":"123",<br>"En":1,<br>"Rng":1024,<br>"EnLA": 1,<br>"EnHA": 1,<br>"LAMd": 0,<br>“HLAMd": 0,<br>"LoA": "50.52",<br>"HiA": "700.36",<br>"Tag": " Temperature Input 0"<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_config/ai2**<br>{<br>"cfg_id":"123",<br>"error":"No error" |

| | |
|---|---|
| | } |

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions by **Each Channel** :

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Temperature input channel number. |
| Channel Enable | En | Number | RW | 1 / 0: Enable / Disable AI conversion<br>Notice: Average channel is read only. When channel mask of average is not 0, the value is 1. |
| Input Range | Rng | Number | RW | Analog input range. |

| Range code | |
|---|---|
| 1024 (0x400) | T/C TypeJ 0~760℃ |
| 1056 (0x420) | T/C TypeK 0~1370℃ |
| 1088 (0x440) | T/C TypeT -100~400℃ |
| 1120 (0x460) | T/C TypeE 0~1000℃ |
| 1152 (0x480) | T/C TypeR 500~1750℃ |
| 1184 (0x4A0) | T/C TypeS 500~1750℃ |

| | | | | |
|---|---|---|---|---|
| | | | | 1216 (0x4C0) T/C TypeB 500~1800℃ |
| | | | | |
| Enable Low Alarm | EnLA | Number | RW | 1 / 0: Enable / Disable temperature low alarm function |
| Enable High Alarm | EnHA | Number | RW | 1 / 0: Enable / Disable temperature high alarm function |
| Alarm Low Mode | LAMd | Number | RW | The alarm mode<br>0 Momentary<br>1 Latch |
| Alarm High Mode | HAMd | Number | RW | The alarm mode<br>0 Momentary<br>1 Latch |
| Low Alarm Value | LoA | String | RW | Set/get the low alarm limit value.<br>Data format is "±xxxx.yy"<br>Round to two decimal places<br>Value range: -9999 ~ +9999<br>For example,<br>"3.2546" "3.25" |
| High Alarm Value | HiA | String | RW | Set/get the high alarm limit value.<br>Data format is "±xxxx.yy"<br>Round to two decimal places<br>Value range: -9999~ +9999<br>For example,<br>"15.2567" "15.26" |
| Temperature Min Scaling Value | LoS | String | R | Get the scaling min value<br>Value is depended on the min. of the Input Range<br>For example,<br>If range input is "0~760℃", Min scaling value should be |

| | | | | |
|---|---|---|---|---|
| | | | | 0. |
| Temperature Max Scaling Value | HiS | String | R | Get the scaling max value<br>Value is depended on the max. of the Input Range<br>For example,<br>If range input is “0~760℃”, Max scaling value should be 760. |
| Tag Name | Tag | String | RW | The description tag for this channel.<br>Max. 21 characters |

| | |
|---|---|
| Remarks | |

### 3.13.6.9 Digital input of ADAM-6024

| | |
|---|---|
| Description | Retrieves information about the digital input configuration resource. |
| PUBLISH Topic | Send the current configurations.<br>**Advantech/{MAC}/cfg/sensor/di_config/din**<br><br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE Topic | Get the configurations from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/di_config/din** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/di_config/din** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/di_config/di2**<br>{<br>"Ch":2,<br>"Tag": "FrontDoor"<br>}<br><br>**Get Advantech/00D0C9CC0099/cfg/sensor/di_config/di2**<br>{ |

<table>
<tr><td></td><td>"cfg_id":"123",<br>"Tag": "FrontDoor"<br>}<br>Send Ack. Advantech/00D0C9CC0099/cfg/sensor/di_config/di2<br>{<br>"cfg_id":"123",<br>"error":"No error"<br>}</td></tr>
<tr><td colspan="2">➢ Message information definition:
<table>
<tr><th>Field</th><th>Abbreviation</th><th>Data Type</th><th>Property</th><th>Description</th></tr>
<tr><td>Message ID</td><td>cfg_id</td><td>String</td><td>RW</td><td>Max length: 31 bytes.</td></tr>
<tr><td>Acknowledge Description</td><td>error</td><td>String</td><td>R</td><td>See Error Table in 3.11.14</td></tr>
</table>
➢ Resource value definitions :
<table>
<tr><th>Field</th><th>Abbreviation</th><th>Data Type</th><th>Property</th><th>Description</th></tr>
<tr><td>Channel Number</td><td>Ch</td><td>Number</td><td>R</td><td>0, 1, …: Digital input channel number.</td></tr>
<tr><td>Tag Name</td><td>Tag</td><td>String</td><td>RW</td><td>The description tag for this channel.<br>Max. 21 characters</td></tr>
</table></td></tr>
<tr><td>Remarks</td><td></td></tr>
</table>

### 3.13.6.10 Digital output of ADAM-6024

| | |
|---|---|
| Description | Retrieves information about the digital output configuration resource on specific slot. |
| PUBLISH Topic | Send the current configurations.<br>**Advantech/{MAC}/cfg/sensor/do_config/din**<br><br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE Topic | Get the configurations from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/do_config/din** |

| | |
|---|---|
| | |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/do_config/din** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/do_config/di2**<br>{<br>"Ch":2,<br>"Tag": "DigOut"<br>}<br>**Get Advantech/00D0C9CC0099/ctl/sensor/do_config/di2**<br>{<br>"cfg_id":"123",<br>"Tag": "DigOut"<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/do_config/di2**<br>{<br>"cfg_id":"123",<br>"error":"No error"<br>} |

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Digital output channel number. |
| Tag Name | Tag | String | RW | The description tag for this channel.<br>Max. 21 characters |

| Remarks | |
|---|---|

### 3.13.6.11 Common Analog input of ADAM-6024

| | |
|---|---|
| Description | Retrieves information about the analog input configuration resource on specific slot. |
| PUBLISH Topic | Send the current configurations.<br>**Advantech/{MAC}/cfg/sensor/ai_genconfig** |
| SUBSCRIBE Topic | Get the configurations from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/ai_genconfig** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/ai_genconfig** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/ai_genconfig**<br>{<br>"Res":16,<br>"AiT":0,<br>}<br>**Get Advantech/00D0C9CC0099/ctl/sensor/ai_genconfig**<br>{<br>"cfg_id":"123",<br>"AiT":0,<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_genconfig**<br>{<br>"cfg_id":"123",<br>"error":"No error"<br>} |

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions for all channels:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| AI Resolution | Res | Number | R | 1 ~ 32: Number of bits for AI value.<br>For example, the resolution of ADAM-T110 AI 12-bit. |
| AI Filter Mode | AiT | Number | RW | The AI filter mode<br>0 – Auto (50/60Hz)<br>1 – 50 Hz<br>2 – 60 Hz<br>3 – High Speed |

| Remarks | |
|---|---|

### 3.13.6.12 Analog input of ADAM-6024

| | |
|---|---|
| Description | Retrieves information about the digital input configuration resource on specific slot. |
| PUBLISH Topic | Send the current configurations.<br>**Advantech/{MAC}/cfg/sensor/ai_config/ain**<br><br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE Topic | Get the configurations from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/ai_config/ain** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/ai_config/ain** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/ai_config/ai2**<br>{<br>"Ch":2,<br>"En":1,<br>"Rng":328,<br>"Tag": "Analog Input 0"<br>}<br>**Get Advantech/00D0C9CC0099//ctl/sensor/ai_config/ai2** |

```
{
        "cfg_id":"123",
        "En":1,
        "Rng":328,
        "Tag": "Analog Input 0"
}
```

**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_config/ai2**

```
{
        "cfg_id":"123",
        "error":"No error"
}
```


➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions by **Each Channel**:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Analog input channel number. |
| Channel Enable | En | Number | RW | 1 / 0: Enable / Disable AI conversion |
| Input Range | Rng | Number | RW | Analog input range.<br>Notice: Average channel is read only. |
| Tag Name | Tag | String | RW | The description tag for this channel.<br>Max. 21 characters |

| Range code | |
|---|---|
| 323 | (0x0143) +/- 10 V |
| 384 | (0x0180) 4 ~ 20 mA |
| 386 | (0x0182) 0 ~ 20 mA |

| | |
|---|---|
| | |
| Remarks | |

### 3.13.6.13 Analog output of ADAM-6024

| | |
|---|---|
| Description | Retrieves information about the digital input configuration resource on specific slot. |
| PUBLISH Topic | Send the current configurations.<br>**Advantech/{MAC}/cfg/sensor/ao_config/aon**<br><br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE Topic | Get the configurations from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/ao_config/aon** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/ao_config/aon** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/ao_config/ao2**<br>{<br>"Ch": 2,<br>"Rng": 328,<br>"AoIV": 100,<br>"Tag": "Analog Output 2"<br>}<br>**Get Advantech/00D0C9CC0099/ctl/sensor/ao_config/ao2**<br>{<br>"cfg_id":"123",<br>"Rng":328,<br>"AoIV":100,<br>"Tag":"Analog Output 2"<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ao_config/ao2**<br>{<br>"cfg_id":"123",<br>"error":"No error"<br>} |

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions by **Each Channel :**

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Analog output channel number. |
| Output Range | Rng | Number | RW | Analog output range.<br>Range code: 328 (0x0148) 0 – 10 V; 384 (0x0180) 4 ~ 20 mA; 386 (0x0182) 0 ~ 20 mA |
| Startup Value | AoIV | Number | RW | Set/get the startup value<br>Value range: 0 ~ 4095 |
| Tag Name | Tag | String | RW | The description tag for this channel.<br>Max. 21 characters |

| Remarks | |
|---|---|

### 3.13.6.14 Digital input of ADAM-6224

| Description | Retrieves information about the digital input configuration resource. |
|---|---|
| PUBLISH Topic | Send the current configurations.<br>**Advantech/{MAC}/cfg/sensor/di_config/din**<br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE Topic | Get the configurations from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/di_config/din** |

| | |
|---|---|
| | |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/di_config/din** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/di_config/di2**<br>{<br>"Ch":2,<br>"En":1,<br>"Md":0,<br>"Inv":1,<br>"Fltr": 1,<br>"FtLo": 10000,<br>"FtHi": 10000,<br>"Tag": "FrontDoor"<br>}<br><br>**Get Advantech/00D0C9CC0099/ctl/sensor/di_config/di2**<br>{<br>"cfg_id":"123",<br>"Md":0,<br>"Inv":1,<br>"Fltr": 1,<br>"FtLo": 10000,<br>"FtHi": 10000,<br>"Tag": "FrontDoor"<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/di_config/di2**<br>{<br>"cfg_id":"123",<br>"error":"No error"<br>} |

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge | error | String | R | See Error Table in 3.11.14 |

Description

➢ Resource value definitions :

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Digital input channel number. |
| Mode | Md | Number | RW | Digital input mode.<br>0 DI<br>85 HighTriggerStartup<br>90 HighTriggerSafty<br>165 LowTriggerStartup<br>170 LowTriggerSafty |
| Invert Signal | Inv | Number | RW | 1 or 0: Enable or Disable invert signal function. |
| Digital Filter | Fltr | Number | RW | 1 or 0: Enable or Disable digital filter function |
| Min. Low Signal Width | FtLo | Number | RW | Minimum low signal width of digit filter<br>0 – 4294967295 (0.1 ms) |
| Min. High Signal Width | FtHi | Number | RW | Minimum high signal width of digit filter<br>0 – 4294967295 (0.1 ms). |
| Tag Name | Tag | String | RW | The description tag for this channel.<br>Max. 21 characters |

| Remarks | |
|---|---|

### 3.13.6.15 Common Analog output of ADAM-6224

| Description | Information about the analog output configuration resource on specific slot. |
|---|---|
| PUBLISH Topic | Send the current configurations. |

| | |
|---|---|
| | **Advantech/{MAC}/cfg/sensor/ao_genconfig** |
| SUBSCRIBE Topic | Get the configurations from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/ao_genconfig** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/ao_genconfig** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/ao_genconfig**<br>{<br>"Res":2,<br>" EnSV ":0<br>}<br>**Get Advantech/00D0C9CC0099/ctl/sensor/ao_genconfig**<br>{<br>"cfg_id":"123",<br>"EnSV ":1<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ao_genconfig**<br>{<br>"cfg_id":"123",<br>"error":"No error"<br>} |

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions for all channels:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| AO Resolution | Res | Number | R | 1 ~ 32: Number of bits for AO value. |

| | | | | |
|---|---|---|---|---|
| | | | | For example, the resolution of ADAM-6224 A is 12-bit. |
| Enable Safety Value | EnSV | Number | RW | 1 or 0: Enable or Disable safety value function |
| | | | | |
| Remarks | | | | |

### 3.13.6.16 Analog output of ADAM-6224

| | |
|---|---|
| Description | Retrieves information about the digital input configuration resource on specific slot. |
| PUBLISH Topic | Send the current configurations.<br>**Advantech/{MAC}/cfg/sensor/ao_config/aon**<br><br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE Topic | Get the configurations from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/ao_config/aon** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/ao_config/aon** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/ao_config/ao2**<br>{<br>"Ch": 2,<br>"Rng": 328,<br>"AoIV": 2.0,<br>"SV": 10.0,<br>"SR": 3,<br>"Tag": "Analog Output 2"<br>}<br>**Get Advantech/00D0C9CC0099/ctl/sensor/ao_config/ao2**<br>{<br>"cfg_id":"123",<br>"Rng":328,<br>"AoIV":2.0,<br>"SV":10.0, |

"SR":3,
"Tag":"Analog Output 2"
}
**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ao_config/aon**2{
"cfg_id":"123",
"error":"No error"
}

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions by **Each Channel :**

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Analog output channel number. |
| Output Range | Rng | Number | RW | Analog output range. |

| Range code | |
|---|---|
| 328 | (0x0148) 0 – 10 V |
| 327 | (0x0147) 0 ~ 5 V |
| 323 | (0x0143) +/- 10 V |
| 322 | (0x0142) +/- 5 V |
| 384 | (0x0180) 4 ~ 20 mA |
| 386 | (0x0182) 0 ~ 20 mA |
| | |

| | | | | |
|---|---|---|---|---|
| Startup Value | AoIV | Number | RW | Set/get the startup value<br>Value range: 0 ~ 4095 |

<table>
<tr><td>Safety Value</td><td>SV</td><td>Number</td><td>RW</td><td>Set/get the safety value<br>Value range: 0 ~ 4095</td></tr>
<tr><td>Slew Rate</td><td>SR</td><td>Number</td><td>RW</td><td>Set/get the slew rate
<table>
<tr><td>Slew Rate</td><td></td></tr>
<tr><td>0</td><td>disable</td></tr>
<tr><td>1</td><td>1V/sec (or 1mA/sec)</td></tr>
<tr><td>2</td><td>2V/sec (or 2mA/sec)</td></tr>
<tr><td>3</td><td>4V/sec (or 4mA/sec)</td></tr>
<tr><td>4</td><td>8V/sec (or 8mA/sec)</td></tr>
<tr><td>5</td><td>16V/sec (or 16mA/sec)</td></tr>
<tr><td>6</td><td>32V/sec (or 32mA/sec)</td></tr>
<tr><td>7</td><td>64V/sec (or 64mA/sec)</td></tr>
<tr><td></td><td></td></tr>
</table></td></tr>
<tr><td>Tag Name</td><td>Tag</td><td>String</td><td>RW</td><td>The description tag for this channel.<br>Max. 21 characters</td></tr>
<tr><td>Remarks</td><td colspan="4"></td></tr>
</table>

## 3.13.7 Channel Value Topic

### 3.13.7.1 Digital input of ADAM-6000/6200 DIO

| | |
|---|---|
| Description | Retrieves information about the digital input value resource.<br>(ADAM-6000 series supports when using both SNTP and RTC function) |
| PUBLISH Topic | Send the current status.<br>**Advantech/{MAC}/cfg/sensor/di_value/din**<br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE Topic | Get the operation from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/di_value/din** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud |

| | |
|---|---|
| | **Advantech/{MAC}/ack/ctl/sensor/di_value/din** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/di_value/di2**<br>{<br>"Ch":2,<br>"En":1,<br>"Md":0,<br>"Stat":1,<br>"Val":1,<br>"Cnting":0,<br>"ClrCnt":0,<br>"OvLch": 0,<br>"CtFq":0,<br>"Fq":0,<br>"Lch":0,<br>"Hch":0,<br>"timestamp":"2024-09-18T05:29:18.005Z"<br>}<br><br>**Get Advantech/00D0C9CC0099/ctl/sensor/di_value/di2**<br>{<br>"cfg_id":"123",<br>"Cnting":0,<br>"ClrCnt":0,<br>"OvLch": 0,<br>"Lch":0,<br>"Hch":0,<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/di_value/di2**<br>{<br>"cfg_id":"123",<br>"error":"No error"<br>} |

➢ Message information definition:

| Field | Abbreviation | Data | Property | Description |
|---|---|---|---|---|

| | | Type | | |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Digital input channel number. |
| Channel Enable | En | Number | R | 1 : Enable function of this input channel. |
| Mode | Md | Number | R | Digital input mode.<br>0 DI<br>1 Counter<br>2 LowToHighLatch<br>3 HighToLowLatch<br>4 Frequency |
| Signal Logic Status | Stat | Number | R | 1, 0: Input signal is Logic High or Low. |
| Channel Value | Val | Number | R | DI measurement data |

| Input Mode | Value Description |
|---|---|
| DI | Logic status of DI |
| Counter | Counter value |
| LowToHighLatch | Logic status of DI |
| HighToLowLatch | Logic status of DI |
| Frequency | Frequency(unit. 0.1 Hz_ |

- Frequency is multiplied by 10 if frequency precise is 0.1Hz
- Frequency is multiplied by 100 if frequency precise is 0.01Hz

| | | | | |
|---|---|---|---|---|
| Start Counter | Cnting | Number | RW | Start/Stop counter counting<br>Read 1 : counter is counting<br>0 : not counting<br>Write 1 : start counting<br>0 : stop counting |
| Clear Counter | ClrCnt | Number | W | 1 : Clear the counter value |
| Get/Clear Counter Overflow | OvLch | Number | RW | counter overflow<br>Read 1 : overflow occurred.<br>0 : no overflow<br>Write 0 : clear the overflow |
| Counter Value | CtFq | Number | R | The counter value |
| Frequency Value | Fq | Number | R | ● Value is multiplied by 10 if frequency precise is 0.01Hz |
| Get/Clear L2H Latch Status | Lch | Number | RW | L2H latch status<br>Read 1 : L2H latch occurred.<br>0 : no L2H latch<br>Write 0 : clear the L2H latch status |
| Get/Clear H2L Latch Status | Hch | Number | RW | H2L latch status<br>Read 1 : H2L latch occurred.<br>0 : no H2L latch<br>Write 0 : clear the H2L latch status |
| Timestamp | timestamp | String | R | The time of the latest change of channel value<br>Format : yyyy-MM-dd'T'HH:MM:SS.xxxZ<br>xxx: millisecond<br>● ADAM-6000 series DIO supports when using both SNTP and RTC function |

| | |
|---|---|
| Remarks | |

### 3.13.7.2 Digital output of ADAM-6000/6200 DIO

| | |
|---|---|
| Description | Information about the digital input value resource on specific slot. |
| PUBLISH Topic | Send the current status.<br>**Advantech/{MAC}/cfg/sensor/do_value/don** |

| | |
|---|---|
| | **where n = 0 ~ : the channel number** |
| SUBSCRIBE Topic | Get the operation from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/do_value/don** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/cfg/sensor/do_value/don** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/do_value/do2**<br>{<br>"Ch":2,<br>"En":1,<br>"Md":0,<br>"Stat":1,<br>"Val":1,<br>"PsCtn":0,<br>"PsStop":0,<br>"PsIV": 0<br>"timestamp":"2024-09-18T05:29:18.005Z"<br>}<br>**Get Advantech/00D0C9CC0099/ctl/sensor/do_value/do2**<br>{<br>"cfg_id":"123",<br>"Ch":2,<br>"Val":1,<br>"PsCtn":0,<br>"PsStop":0,<br>"PsIV": 0<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/cfg/sensor/do_value/do2**<br>{<br>"cfg_id":"123",<br>"error":"No error"<br>} |

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Digital output channel number. |
| Channel Enable | En | Number | R | 1 : Enable function of this output channel. |
| Mode | Md | Number | R | Digital output mode.<br>0 DO<br>1 Pulse Output<br>2 LowToHighDelay<br>3 HighToLowDelay |
| Signal Logic Status | Stat | Number | R | 1, 0: Output signal is Logic High or Low. |
| Channel Value | Val | Number | RW | DO measurement data<br>Output Mode / Value Description:<br>DO: Get the current signal status or set its status<br>Pulse Output: Get or set the absolute pulse count value<br>LowToHighDelay: Get the current signal status or set its status<br>HighToLowDelay: Get the current signal status or set its status |
| Pulse Output Continue State | PsCtn | Number | RW | 1 / 0: Pulse outputting is continuous or not. |
| Stop Pulse Output | PsStop | Number | W | 1: Stop the pulse outputting.<br>(Continue is disabled, Absolute and incremental values are reset to zero. DO signal status is set to logic low.) |
| Incremental Pulse | PsIV | Number | RW | Incremental Pulse Output Value |

| Output Value | | | | |
|---|---|---|---|---|
| Timestamp | timestamp | String | R | The time of the latest change of channel value<br>Format : yyyy-MM-dd'T'HH:MM:SS.xxxZ<br>xxx: millisecond<br>● ADAM-6000 series DIO supports when using both SNTP and RTC function |

| Remarks | |
|---|---|

### 3.13.7.3 Digital output of ADAM-6017

| Description | Information about the digital input value resource on specific slot. |
|---|---|
| PUBLISH Topic | Send the current status.<br>**Advantech/{MAC}/cfg/sensor/do_value/don**<br><br>**where n = 0 ~ : the channel number** |
| SUBSCRIBE Topic | Get the operation from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/do_value/don** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/cfg/sensor/do_value/don** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/do_value/do2**<br>{<br>"Ch":2,<br>"Stat":1,<br>"Val":1,<br>}<br>**Get Advantech/00D0C9CC0099/ctl/sensor/do_value/do2**<br>{<br>"cfg_id":"123",<br>"Val":1,<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/cfg/sensor/do_value/do2** |

<table>
<tr><td></td><td>{<br>"cfg_id":"123",<br>"error":"No error"<br>}</td></tr>
</table>

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Digital output channel number. |
| Signal Logic Status | Stat | Number | R | 1, 0: Output signal is Logic High or Low. |
| Channel Value | Val | Number | RW | DO measurement data |

| Remarks | |
|---|---|

### 3.13.7.4 Analog input of ADAM-6017/6217

| Description | Information about the analog input value resource on specific slot. |
|---|---|
| PUBLISH Topic | Send the current status.<br>**Advantech/{MAC}/cfg/sensor/ai_value/ain**<br><br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE Topic | Get the operation from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/ai_value/ain** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/ai_value/ain** |

| | |
|---|---|
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/ai_value/ai2**<br>{<br>"Ch":2,<br>"En":1,<br>"Rng":328,<br>"Val":0,<br>"Evt":0,<br>"LoA":0,<br>"HiA":0,<br>"HVal":32768,<br>"LVal":0,<br>"EgF":5000,<br>"HEgF":5000,<br>"LEgF":0,<br>“Uni”:“Volt”<br><br>}<br>**Get Advantech/00D0C9CC0099/ctl/sensor/ai_value/ai2**<br>{<br>"cfg_id":"123",<br>"ClrH": 1,<br>"ClrL": 1<br>"En":1<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_value/ai2**<br>{<br>"cfg_id":"123",<br>"error":"No error"<br>} |

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Analog input channel number.<br>Note for the average channel:<br>The average channel number for a 4-ch AI module is 4. |
| Input Range | Rng | Number | R | Analog input range.<br><br>ADAM-6017-D/ ADAM-6217-B:<br>Range code: (0x0148) 0 – 10 V; 328<br>(0x0147) 0 ~ 5 V; 327<br>(0x0145) 0 ~ 1 V; 325<br>(0x0106) 0 ~ 500 mV; 262<br>(0x0105) 0 ~ 150 mV; 261<br>(0x0143) +/- 10 V; 323<br>(0x0142) +/- 5 V; 322<br>(0x0103) +/- 150 mV; 259<br>(0x0140) +/- 1 V; 320<br>(0x0104) +/- 500 mV; 260<br>(0x0180) 4 ~ 20 mA; 384<br>(0x0181) +/- 20 mA; 385<br>(0x0182) 0 ~ 20 mA; 386 |
| Channel Enable | En | Number | R | 1 / 0: Enable / Disable AI conversion<br>Notice: Average channel is read only. When channel mask of average is not 0, the value 1. |
| Channel Raw Value | Val | Number | R | 0 ~ 65535 :AI measurement data (Raw data) |
| Channel Event | Evt | Number | R | AI statuses |

| | | | | |
|---|---|---|---|---|
| Status | | | | <table><tr><th>Bit Order</th><th>Description</th></tr><tr><td>0</td><td>Reserved</td></tr><tr><td>1</td><td>Over Range</td></tr><tr><td>2</td><td>Under Range</td></tr><tr><td>3</td><td>Open Circuit (Burnout)</td></tr><tr><td>4</td><td>Reserved</td></tr><tr><td>5</td><td>Reserved</td></tr><tr><td>6</td><td>Reserved</td></tr><tr><td>7</td><td>ADC initializing/Error</td></tr><tr><td>8</td><td>Reserved</td></tr><tr><td>9</td><td>Zero/Span Calibration Error</td></tr><tr><td>10~31</td><td>Reserved</td></tr></table> |
| Low Alarm Status | LoA | Number | RW | Low alarm status<br>Read 1 : low alarm occurred.<br>0 : not occurred<br>Write 0 : clear the low alarm status |
| High Alarm Status | HiA | Number | RW | High alarm status<br>Read 1 : high alarm occurred.<br>0 : not occurred<br>Write 0 : clear the high alarm status |
| Maximum AI Raw Value | HVal | Number | R | AI max. measurement data (Raw data) |
| Minimum AI Raw Value | LVal | Number | R | AI min. measurement data (Raw data) |
| Clear Maximum AI Value | ClrH | Number | W | 1 : Clear the Maximum AI value<br>(clear would be done at the rising edge) |
| Clear Minimum AI Value | ClrL | Number | W | 1 : Clear the Minimum AI value<br>(clear would be done at the rising edge) |
| Channel Engineering data (floating type) | EgF | Number | R | AI engineering data, the value is floating type.<br>Unit:<br>mV or mA<br>For example,<br>9.120 → 9.12 mV or |

| | | | | |
|---|---|---|---|---|
| | | | | -3.220→-3.22 mA |
| Maximum AI Engineering data (floating type) | HEgF | Number | R | AI max. engineering data, the value is is floating type. Unit: mV or mA<br>For example,<br>10.200→10.2 mV<br>-5.120→-5.12 mV |
| Minimum AI Engineering data (floating type) | LEgF | Number | R | AI min. engineering data, the value is floating type. Unit: mV or mA<br>For example,<br>250.350 → 250.35 mV<br>-0.120→-0.12 mV |
| Mapping unit | Uni | String | R | Unit for mapping value(mV or mA)<br>Max. 32 characters |

| | |
|---|---|
| Remarks | |

### 3.13.7.5 Analog input of ADAM-6018+

| | |
|---|---|
| Description | Information about the analog input value resource on specific slot. |
| PUBLISH Topic | Send the current status.<br>**Advantech/{MAC}/cfg/sensor/ai_value/ain**<br><br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE Topic | Get the operation from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/ai_value/ain** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/ai_value/ain** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/ai_value/ai2**<br>{<br>"Ch":2,<br>"En":1, |

"Rng":328,
"Val":0,
"Evt":0,
"LoA":0,
"HiA":0,
"HVal":32768,
"LVal":0,
"EgF":5000,
"HEgF":5000,
"LEgF":0,
"Uni":"Volt"

}

**Get Advantech/00D0C9CC0099/ctl/sensor/ai_value/ai2**

{
"cfg_id":"123",
"ClrH": 1,
"ClrL": 1
"En":1
}

**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_value/ai2**

{
"cfg_id":"123",
"error":"No error"
}

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|

<table>
<tr><td>Channel Number</td><td>Ch</td><td>Number</td><td>R</td><td>0, 1, …: Analog input channel number.<br>Note for the average channel:<br>The average channel number for a 4-ch AI module is 4.</td></tr>
<tr><td>Input Range</td><td>Rng</td><td>Number</td><td>R</td><td>Analog input range.
<table>
<tr><td>Range code</td><td></td></tr>
<tr><td>1024 (0x400)</td><td>T/C TypeJ 0~760℃</td></tr>
<tr><td>1056 (0x420)</td><td>T/C TypeK 0~1370℃</td></tr>
<tr><td>1088 (0x440)</td><td>T/C TypeT -100~400℃</td></tr>
<tr><td>1120 (0x460)</td><td>T/C TypeE 0~1000℃</td></tr>
<tr><td>1152 (0x480)</td><td>T/C TypeR 500~1750℃</td></tr>
<tr><td>1184 (0x4A0)</td><td>T/C TypeS 500~1750℃</td></tr>
<tr><td>1216 (0x4C0)</td><td>T/C TypeB 500~1800℃</td></tr>
</table></td></tr>
<tr><td>Channel Enable</td><td>En</td><td>Number</td><td>R</td><td>1 / 0: Enable / Disable AI conversion<br>Notice: Average channel is read only. When channel mask of average is not 0, the value 1.</td></tr>
<tr><td>Channel Raw Value</td><td>Val</td><td>Number</td><td>R</td><td>0 ~ 65535 :AI measurement data (Raw data)</td></tr>
<tr><td>Channel Event Status</td><td>Evt</td><td>Number</td><td>R</td><td>AI statuses
<table>
<tr><td>Bit Order</td><td>Description</td></tr>
<tr><td>0</td><td>Reserved</td></tr>
<tr><td>1</td><td>Over Range</td></tr>
<tr><td>2</td><td>Under Range</td></tr>
<tr><td>3</td><td>Open Circuit (Burnout)</td></tr>
</table></td></tr>
</table>

| | | | | |
|---|---|---|---|---|
| | | | | 4 Reserved<br>5 Reserved<br>6 Reserved<br>7 ADC initializing/Error<br>8 Reserved<br>9 Zero/Span Calibration Error<br>10~31 Reserved |
| Low Alarm Status | LoA | Number | RW | Low alarm status<br>Read 1 : low alarm occurred.<br>0 : not occurred<br>Write 0 : clear the low alarm status |
| High Alarm Status | HiA | Number | RW | High alarm status<br>Read 1 : high alarm occurred.<br>0 : not occurred<br>Write 0 : clear the high alarm status |
| Maximum AI Raw Value | HVal | Number | R | AI max. measurement data (Raw data) |
| Minimum AI Raw Value | LVal | Number | R | AI min. measurement data (Raw data) |
| Clear Maximum AI Value | ClrH | Number | W | 1 : Clear the Maximum AI value<br>(clear would be done at the rising edge) |
| Clear Minimum AI Value | ClrL | Number | W | 1 : Clear the Minimum AI value<br>(clear would be done at the rising edge) |
| Channel Engineering data (floating type) | EgF | Number | R | AI engineering data, the value is floating type.<br>Unit: 1℃<br>For example,<br>50.12 ℃ |
| Maximum AI Engineering data (floating type) | HEgF | Number | R | AI max. engineering data, the value is is floating type. Unit: 1℃<br>For example,<br>50.12 ℃ |
| Minimum AI Engineering data | LEgF | Number | R | AI min. engineering data, the value is floating type. Unit: 1℃ |

| | | | | |
|---|---|---|---|---|
| (floating type) | | | | For example,<br>50.12 ℃ |
| Mapping unit | Uni | String | R | Unit for mapping value (1C)<br>Max. 32 characters |

| | |
|---|---|
| Remarks | |

### 3.13.7.6 Digital input of ADAM-6024

| | |
|---|---|
| Description | Retrieves information about the digital input value resource. |
| PUBLISH Topic | Send the current status.<br>**Advantech/{MAC}/cfg/sensor/di_value/din**<br>**where n = 1 ~ : the channel number** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/di_value/di2**<br>{<br>“Ch”:2,<br>“Stat”:1<br>} |

➢ Resource value definitions:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Digital input channel number. |
| Signal Logic Status | Stat | Number | R | 1, 0: Input signal is Logic High or Low. |

| | |
|---|---|
| Remarks | |

### 3.13.7.7 Digital output of ADAM-6024

| | |
|---|---|
| Description | Information about the digital input value resource on specific slot. |
| PUBLISH Topic | Send the current status.<br>**Advantech/{MAC}/cfg/sensor/do_value/don**<br><br>**where n = 0 ~ : the channel number** |
| SUBSCRIBE Topic | Get the operation from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/do_value/don** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/cfg/sensor/do_value/don** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/do_value/do2**<br>{<br>"Ch":2,<br>"Stat":1,<br>"Val":1,<br>}<br>**Get Advantech/00D0C9CC0099/ctl/sensor/do_value/do2**<br>{<br>"cfg_id":"123",<br>"Val":1,<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/cfg/sensor/do_value/do2**<br>{<br>"cfg_id":"123",<br>"error":"No error"<br>} |

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Digital output channel number. |
| Signal Logic Status | Stat | Number | R | 1, 0: Output signal is Logic High or Low. |
| Channel Value | Val | Number | RW | DO measurement data |

| Remarks | |
|---|---|

### 3.13.7.8 Analog input of ADAM-6024

| | |
|---|---|
| Description | Information about the analog input value resource on specific slot. |
| PUBLISH Topic | Send the current status.<br>**Advantech/{MAC}/cfg/sensor/ai_value/ain**<br><br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE Topic | Get the operation from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/ai_value/ain** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/ai_value/ain** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/ai_value/ai2**<br>{<br>"Ch":2,<br>"En":1,<br>"Rng":328,<br>"Val":0,<br>"Evt":0,<br>"HVal":32768,<br>"LVal":0,<br>"EgF":5000,<br>"HEgF":5000, |

"LEgF":0,
"Uni":"Volt"

}
**Get Advantech/00D0C9CC0099/cfg/sensor/ai_value/ai2**
{
"cfg_id":"123",
"ClrH": 1,
"ClrL": 1
"En":1
}
**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ai_value/ai2**
{
"cfg_id":"123",
"error":"No error"
}

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Analog input channel number. |
| Input Range | Rng | Number | R | Analog input range. |

| Range code | |
|---|---|
| 323 | (0x0143) +/- 10 V |
| 384 | (0x0180) 4 ~ 20 mA |
| 386 | (0x0182) 0 ~ 20 mA |

<table>
<tr><td>Channel Enable</td><td>En</td><td>Number</td><td>R</td><td>1 / 0: Enable / Disable AI conversion<br>Notice: Average channel is read only. When channel mask of average is not 0, the value 1.</td></tr>
<tr><td>Channel Raw Value</td><td>Val</td><td>Number</td><td>R</td><td>0 ~ 65535 :AI measurement data (Raw data)</td></tr>
<tr><td>Channel Event Status</td><td>Evt</td><td>Number</td><td>R</td><td>AI statuses
<table>
<tr><th>Bit Order</th><th>Description</th></tr>
<tr><td>0</td><td>normal</td></tr>
<tr><td>1</td><td>Over Range</td></tr>
<tr><td>2</td><td>Under Range</td></tr>
<tr><td>3</td><td>Open Circuit (Burnout)</td></tr>
<tr><td>4</td><td>Reserved</td></tr>
<tr><td>5</td><td>Reserved</td></tr>
<tr><td>6</td><td>Reserved</td></tr>
<tr><td>7</td><td>ADC initializing/Error</td></tr>
<tr><td>8</td><td>Reserved</td></tr>
<tr><td>9</td><td>Zero/Span Calibration Error</td></tr>
<tr><td>10~31</td><td>Reserved</td></tr>
</table></td></tr>
<tr><td>Maximum AI Raw Value</td><td>HVal</td><td>Number</td><td>R</td><td>AI max. measurement data (Raw data)</td></tr>
<tr><td>Minimum AI Raw Value</td><td>LVal</td><td>Number</td><td>R</td><td>AI min. measurement data (Raw data)</td></tr>
<tr><td>Clear Maximum AI Value</td><td>ClrH</td><td>Number</td><td>W</td><td>1 : Clear the Maximum AI value<br>(clear would be done at the rising edge)</td></tr>
<tr><td>Clear Minimum AI Value</td><td>ClrL</td><td>Number</td><td>W</td><td>1 : Clear the Minimum AI value<br>(clear would be done at the rising edge)</td></tr>
<tr><td>Channel Engineering data (floating type)</td><td>EgF</td><td>Number</td><td>R</td><td>AI engineering data, the value is floating type.<br>Unit: mV or mA<br>For example,<br>9.120 → 9.12 mV or</td></tr>
</table>

| | | | | |
|---|---|---|---|---|
| | | | | -3.220→-3.22 mA |
| Maximum AI Engineering data (floating type) | HEgF | Number | R | AI max. engineering data, the value is is floating type. Unit: mV or mA<br>For example,<br>10.200→10.2 mV<br>-5.120→-5.12 mV |
| Minimum AI Engineering data (floating type) | LEgF | Number | R | AI min. engineering data, the value is floating type. Unit: mV or mA<br>For example,<br>250.350 → 250.35 mV<br>-0.120→-0.12 mV |
| Mapping unit | Uni | String | R | Unit for mapping value (mV or mA)<br>Max. 32 characters |

| | |
|---|---|
| Remarks | |

### 3.13.7.9 Analog output of ADAM-6024

| | |
|---|---|
| Description | Retrieves information about the analog output value resource on specific slot. |
| PUBLISH Topic | Send the current status.<br>**Advantech/{MAC}/cfg/sensor/ao_value/aon**<br><br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE Topic | Get the operation from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/ao_value/aon** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/ao_value/aon** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/ao_value/ao2**<br>{<br>"Ch":2, |

"En":1,
"Rng":328,
"Val":4095,
"Eg":10,
"Evt":8,
"Uni":"Volt"
}

**Get Advantech/00D0C9CC0099/ctl/sensor/ao_value/ao2**

{
"cfg_id":"123",
"Val ":410,
" Eg ":1000,
}

**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ao_value/ao2**

{
"cfg_id":"123",
"error":"No error"
}

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions :

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Analog output channel number. |
| Channel Enable | En | Number | R | 1 : Enable function of this output channel. |
| Output Range | Rng | Number | R | Analog output range.<br><br>ADAM-6024-D |

| Range code | |
|---|---|
| 328 | (0x0148) 0 – 10 V |
| 384 | (0x0180) 4 ~ 20 mA |
| 386 | (0x0182) 0 ~ 20 mA |
| | |

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| Range code | |
|---|---|
| 328 | (0x0148) 0 – 10 V |
| 327 | (0x0147) 0 ~ 5 V |
| 323 | (0x0143) +/- 10 V |
| 322 | (0x0142) +/- 5 V |
| 384 | (0x0180) 4 ~ 20 mA |
| 386 | (0x0182) 0 ~ 20 mA |
| | |

| | | | | |
|---|---|---|---|---|
| Channel Engineering data | Eg | Number | RW | AO engineering data, the value is 1/1000 scale.<br>Unit: V or mA<br>For example,<br>1120 → 1.12 V (or mA)<br>-3220→-3.22 V (or mA) |
| Channel Event Status | Evt | Number | R | AO channel status |

| Bit Order | Description |
|---|---|
| 0~2 | Reserved |
| 3 | Open Circuit (Burnout) |
| 4~15 | Reserved |
| 16 | DI Triggered Safety |
| 17 | DI Triggered Startup |
| 18 | FSV Triggered Safety |
| | |

| | | | | |
|---|---|---|---|---|
| Mapping unit | Uni | String | R | Unit for mapping value(V or mA)<br>Max. 32 characters |

| | |
|---|---|
| Remarks | |

### 3.13.7.10 Digital input of ADAM-6224

| | |
|---|---|
| Description | Retrieves information about the digital input value resource. |
| PUBLISH Topic | Send the current status.<br>**Advantech/{MAC}/cfg/sensor/di_value/din**<br><br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE Topic | Get the operation from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/di_value/din** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/di_value/din** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/di_value/di2**<br>{<br>“Ch”:2,<br>“En”:1,<br>“Md”:0,<br>“TSt”:1,<br>“TSa”:1,<br>}<br><br>**Get Advantech/00D0C9CC0099/ctl/sensor/di_value/di2**<br>{<br>"cfg_id":"123",<br>“TSt”:0,<br>“TSa”:0,<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/cfg/sensor/di_value/di2** |

<table>
<tr><td></td><td>{<br>"cfg_id":"123",<br>"error":"No error"<br>}</td></tr>
</table>

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Digital input channel number. |
| Mode | Md | Number | R | Digital input mode.<br>0 DI<br>85 HighTriggerStartup<br>90 HighTriggerSafty<br>165 LowTriggerStartup<br>170 LowTriggerSafty<br>255 Invalid mode |
| Signal Logic Status | Stat | Number | R | 1, 0: Input signal is Logic High or Low. |
| Get/Clear DI triggered Startup Status | TSt | Number | RW | DI triggered startup status<br>Read 1 : startup triggered.<br>0 : startup not triggered<br>Write 0 : clear the startup triggered status |
| Get/Clear DI triggered Safty Status | TSa | Number | RW | DI triggered safty status<br>Read 1 : safty triggered.<br>0 : safty not triggered<br>Write 0 : clear the safty triggered status |

| Remarks | |
|---|---|

### 3.13.7.11 Analog output of ADAM-6224

| | |
|---|---|
| Description | Retrieves information about the analog output value resource on specific slot. |
| PUBLISH Topic | Send the current status.<br>**Advantech/{MAC}/cfg/sensor/ao_value/aon**<br><br>**where n = 1 ~ : the channel number** |
| SUBSCRIBE Topic | Get the operation from DeviceCloud.<br>**Advantech/{MAC}/ctl/sensor/ao_value/aon** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/sensor/ao_value/aon** |
| Example | **Send Advantech/00D0C9CC0099/cfg/sensor/ao_value/ao2**<br>{<br>"Ch":2,<br>"En":1,<br>"Rng":328,<br>"Val":4095,<br>"Eg":10,<br>"Evt":8,<br>“Uni”:“Volt”<br>}<br>**Get Advantech/00D0C9CC0099/ctl/sensor/ao_value/ao2**<br>{<br>"cfg_id":"123",<br>"Val ":410,<br>" Eg ":1000,<br>}<br>**Send Ack. Advantech/00D0C9CC0099/ack/ctl/sensor/ao_value/ao2**<br>{<br>"cfg_id":"123",<br>"error":"No error"<br>} |

➢ Message information definition:

| Field | Abbreviation | Data | Property | Description |
|---|---|---|---|---|

| | | Type | | |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions :

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Channel Number | Ch | Number | R | 0, 1, …: Analog output channel number. |
| Channel Enable | En | Number | R | 1 : Enable function of this output channel. |
| Output Range | Rng | Number | R | Analog output range. |

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| Range code | |
|---|---|
| 328 | (0x0148) 0 – 10 V |
| 384 | (0x0180) 4 ~ 20 mA |
| 386 | (0x0182) 0 ~ 20 mA |
| | |

ADAM-6224

| Range code | |
|---|---|
| 328 | (0x0148) 0 – 10 V |
| 327 | (0x0147) 0 ~ 5 V |
| 323 | (0x0143) +/- 10 V |
| 322 | (0x0142) +/- 5 V |
| 384 | (0x0180) 4 ~ 20 mA |
| 386 | (0x0182) 0 ~ 20 mA |
| | |

| | | | | |
|---|---|---|---|---|
| Channel | Eg | Number | RW | AO engineering data, the value is 1/1000 scale. |

<table>
<tr><td>Engineering data</td><td></td><td></td><td></td><td>Unit: V or mA<br>For example,<br>1120 → 1.12 V (or mA)<br>-3220→-3.22 V (or mA)</td></tr>
<tr><td>Channel Event Status</td><td>Evt</td><td>Number</td><td>R</td><td>AO channel status<table><tr><th>Bit Order</th><th>Description</th></tr><tr><td>0~2</td><td>Reserved</td></tr><tr><td>3</td><td>Open Circuit (Burnout)</td></tr><tr><td>4~15</td><td>Reserved</td></tr><tr><td>16</td><td>DI Triggered Safety</td></tr><tr><td>17</td><td>DI Triggered Startup</td></tr><tr><td>18</td><td>FSV Triggered Safety</td></tr><tr><td></td><td></td></tr></table></td></tr>
<tr><td>Mapping unit</td><td>Uni</td><td>String</td><td>R</td><td>Unit for mapping value(V or mA)<br>Max. 32 characters</td></tr>
</table>

| Remarks | |
|---|---|

## 3.13.8 Network Setting Topic

| Description | Retrieves information about the Network Setting resource. |
|---|---|
| PUBLISH Topic | Send the current status.<br>**Advantech/{MAC}/cfg/NetworkSetting** |
| SUBSCRIBE Topic | Get the operation from DeviceCloud.<br>**Advantech/{MAC}/ctl/NetworkSetting** |

| | |
|---|---|
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/NetworkSetting** |
| Example | **Send Advantech/00D0C9CC0099/cfg/NetworkSetting**<br>{<br>"ipMd":1,<br>"ipaddr":"172.16.12.99",<br>"subnet":"255.255.254.0",<br>"gateway":"172.16.13.254",<br>"hostIdle":720,<br>"devName":"ADAM-6250_00D0C9CC0099",<br>"devDesc":"FW_RD 123",<br>"EnLocate":0,<br>"reset2FacDef":0<br>}<br><br>**Get Advantech/00D0C9CC0099/ctl/NetworkSetting**<br>{<br>"cfg_id":"123",<br>"ipMd":1,<br>"ipaddr":"172.16.12.99",<br>"subnet":"255.255.254.0",<br>"gateway":"172.16.13.254",<br>"hostIdle":720,<br>"devName":"ADAM-6250_00D0C9CC0099",<br>"devDesc":"FW_RD 123",<br>"EnLocate":0,<br>"reset2FacDef":1<br>}<br><br>**Send Ack. Advantech/00D0C9CC0099/ack/ctl/NetworkSetting**<br>{<br>"cfg_id":"123",<br>"error":"Setting IP not supported under DHCP"<br>} |
| ➢ Message information definition: | |

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| IP Mode | ipMd | Number | RW | IP Mode:<br>0 Static IP<br>1 DHCP IP |
| IP Address | ipaddr | String | R | Note: Can only be set when Static mode |
| Subnet Address | subnet | String | R/W | Note: Can only be set when Static mode |
| Default Gateway | gateway | String | R/W | Note: Can only be set when Static mode |
| Host Idle (Timeout) | hostIdle | Number | R/W | Allowable duration for the server to remain inactive.<br><br>default：720 (second)<br>range：1 - 4095 (second) |
| Device Name | devName | String | R/W | Max length: 64 bytes. |
| Device Description | devDesc | String | R/W | Max length: 128 bytes. |
| Locate | EnLocate | Number | R/W | Help user search ADAM module with light sign. (The status LED will be constantly on for 30 seconds.)<br><br>Locate Mode:<br>0 Disable<br>1 Enable |
| Reset to Factory Defaults | reset2FacDef | Number | R/W | Set 1 to Reset to Factory Defaults<br>default：0 |

| | |
|---|---|
| | |
| Remarks | |

## 3.13.9 Access Control Topic

| | |
|---|---|
| Description | Retrieves information about the Access Control resource. |
| PUBLISH Topic | Send the current status.<br>**Advantech/{MAC}/cfg/AccessControl** |
| SUBSCRIBE Topic | Get the operation from DeviceCloud.<br>**Advantech/{MAC}/ctl/AccessControl** |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/AccessControl** |
| Example | **Send Advantech/00D0C9CC0099/cfg/AccessControl**<br>{<br>"CtlMd":1,<br>"EN0":0,<br>"IP0":"172.16.12.38",<br>"MAC0":"00D0C9FEFF06",<br>"EN1":0,<br>"IP1":"255.255.255.255",<br>"MAC1":"FFFFFFFFFFFF",<br>"EN2":0,<br>"IP2":"255.255.255.255",<br>"MAC2":"FFFFFFFFFFFF",<br>"EN3":0,<br>"IP3":"255.255.255.255",<br>"MAC3":"FFFFFFFFFFFF",<br>"EN4":0,<br>"IP4":"255.255.255.255",<br>"MAC4":"FFFFFFFFFFFF",<br>"EN5":0,<br>"IP5":"255.255.255.255", |

"MAC5":"FFFFFFFFFFFF",
"EN6":0,
"IP6":"255.255.255.255",
"MAC6":"FFFFFFFFFFFF",
"EN7":0,
"IP7":"255.255.255.255",
"MAC7":"FFFFFFFFFFFF"
}

**Get Advantech/00D0C9CC0099/ctl/AccessControl**

{
"cfg_id":"123",
"CtlMd":0,
"EN6":1,
"IP6":"172.16.12.38"
}
or
{
"cfg_id":"123",
"CtlMd":1,
"EN6":1,
"MAC6":"00D0C9FEFF06"
}

**Send Ack. Advantech/00D0C9CC0099/ack/ctl/AccessControl**

{
"cfg_id":"123",
"error":"Setting IP not supported under DHCP (IP0)"
}

➢ Message information definition:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Control Mode | CtlMd | Number | R/W | Control Mode:<br>0 IP address<br>1 MAC address |
| Enable | ENn | Number | R/W | Enable Mode:<br>0 Disable<br>1 Enable<br><br>Note : n = 0 ~ 7 |
| Security IP address | IPn | String | R/W | Security IP/MAC Setting<br>IP example: 255.255.255.255<br><br>Note1 : n = 0 ~ 7<br>Note2 : It can only be set when CtlMd is IP address |
| Security MAC address | MACn | String | R/W | Security IP/MAC Setting<br>MAC example: 00D0C9FEFF06<br><br>Note1 : n = 0 ~ 7<br>Note2 : It can only be set when CtlMd is MAC address |

| Remarks | |
|---|---|

## 3.13.10 User-defined Modbus address Topic

| | |
|---|---|
| Description | Retrieves information about the User-defined Modbus address resource. |
| PUBLISH Topic | Send the current status.<br>**Advantech/{MAC}/cfg/UserDefMBAddr** |
| SUBSCRIBE Topic | Get the operation from DeviceCloud.<br>**Advantech/{MAC}/ctl/ UserDefMBAddr** |

| | |
|---|---|
| | |
| Ack. Topic | Send the acknowledgement for the received SUBSCRIBE topic to DeviceCloud<br>**Advantech/{MAC}/ack/ctl/UserDefMBAddr** |
| Example | **Send Advantech/00D0C9CC0099/cfg/UserDefMBAddr**<br>{<br>"0x_DIStatus":"0x0001",<br>"0x_StartCnt":"0x0033",<br>"0x_ClrCnt":"0x0039",<br>"0x_ClrOverflow":"0x0045",<br>"0x_DILatch":"0x0051",<br>"4x_CntFreqVal":"4x0001",<br>"4x_ModName":"4x0211",<br>"4x_DOStatus":"4x0303"<br>}<br>**Get Advantech/00D0C9CC0099/ctl/UserDefMBAddr**<br>{<br>"cfg_id":"123",<br>"0x_DIStatus":"0x0001",<br>"0x_StartCnt":"0x0033",<br>"0x_ClrCnt":"0x0039",<br>"0x_ClrOverflow":"0x0045",<br>"0x_DILatch":"0x0051",<br>"4x_CntFreqVal":"4x0001",<br>"4x_ModName":"4x0211",<br>"4x_DOStatus":"4x0303"<br>}<br>Note: An address cannot be assigned to two Field.<br>i.e: if the DI status address is 0001 and its length is 6, no other function can be assigned to addresses 0001 to 0007.<br><br>**Send Ack. Advantech/00D0C9CC0099/ack/ctl/UserDefMBAddr**<br>{<br>"cfg_id":"123",<br>"error":"Modbus address overlap occurs (0x_DIStatus, 0x_StartCnt)"<br>} |
| ➢ Message information definition: | |

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | RW | Max length: 31 bytes. |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 |

➢ Resource value definitions:

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| | | **DIO address** | | |
| **DI status** | 0x_DIStatus | String | R/W | starting coil address of DI Status<br>default："0x0001"<br>Number of points : Total number of DIs |
| **DO status** | 0x_DOStatus | String | R/W | starting coil address of DO Status<br>default："0x0017"<br>Number of points : Total number of DOs |
| **Start Counter** | 0x_StartCnt | String | R/W | starting coil address of start/stop counter<br>length : Total number of DIs |
| **Clear counter** | 0x_ClrCnt | String | R/W | Starting coil address of clear counter<br>length : Total number of DIs |
| **Clear overflow** | 0x_ClrOverflow | String | R/W | Starting coil address of clear overflow<br>length : Total number of DIs |
| **DI latch status** | 0x_DILatch | String | R/W | Starting coil address of DI latch status<br>length : Total number of DIs |
| **Counter/Frequency Value** | 4x_CntFreqVal | String | R/W | Starting register address of Counter/Frequency value<br>default："4x0001"<br>Number of registers : Twice the total number of DIs |

| | | | | |
|---|---|---|---|---|
| **Pulse output low level width** | 4x_PulsL | String | R/W | Starting register address of Pulse output low level width<br>Number of registers : Twice the total number of DOs |
| **Pulse output high level width** | 4x_PulsH | String | R/W | Starting register address of Pulse output high level width<br>Number of registers : Twice the total number of DOs |
| **Set absolute pulse** | 4x_AbsPuls | String | R/W | Starting register address of set absolute pulse<br>Number of registers : Twice the total number of DIs |
| **Set incremental pulse** | 4x_IncPuls | String | R/W | Starting register address of Set incremental pulse<br>Number of registers : Twice the total number of DOs |
| **Registers DI status** | 4x_DIStatus | String | R/W | Starting register address of DI Status<br>default："4x0301"<br>Number of registers: 1 |
| **Registers DO status** | 4x_DOStatus | String | R/W | Starting register address of DO Status<br>default："4x0303"<br>Number of registers: 1 |
| **Registers DI event status** | 4x_DIevt | String | R/W | Starting register address of DI event status<br>default："4x0111"<br>Number of registers: Total number of DIs |
| | | **AI address** | | |
| **Registers Reset max AI value** | 0x_RstHi | String | R/W | Starting register address of Reset max AI value |

| | | | | |
|---|---|---|---|---|
| | | | | default："0x0101"<br>Number of points : Total number of AIs |
| **Registers**<br>**Reset max AI value average** | 0x_RstHiAvg | String | R/W | Starting register address of Reset max AI value average<br>default："0x0109"<br>Number of points : 1 |
| **Registers**<br>**Reset min AI value** | 0x_RstLo | String | R/W | Starting register address of Reset min AI value<br>default："0x0111"<br>Number of points : Total number of AIs |
| **Registers**<br>**Reset min AI value average** | 0x_RstLoAvg | String | R/W | Starting register address of Reset min AI value average<br>default："0x0119"<br>Number of points : 1 |
| **Registers**<br>**Burnout** | 0x_Burnout | String | R/W | Starting register address of Burnout<br>default："0x0121"<br>Number of points : Total number of AIs |
| **Registers**<br>**High alarm Status** | 0x_HiAS | String | R/W | Starting register address of High alarm Status<br>default："0x0131"<br>Number of points : Total number of AIs |
| **Registers**<br>**High alarm Status average** | 0x_HiASAvg | String | R/W | Starting register address of High alarm Status average<br>default："0x0139"<br>Number of points : 1 |
| **Registers**<br>**Low Alarm Status** | 0x_LoAS | String | R/W | Starting register address of Low Alarm Status<br>default："0x0141" |

| | | | | |
|---|---|---|---|---|
| | | | | Number of points : Total number of AIs |
| **Registers Low Alarm Status average** | 0x_LoASAvg | String | R/W | Starting register address of Low Alarm Status average<br>default："0x0149"<br>Number of points : 1 |
| **AI value** | 4x_AIVal | String | R/W | Starting register address of AI value<br>default："4x0001"<br>Number of registers : Total number of AIs |
| **AI value average** | 4x_AIValAvg | String | R/W | Starting register address of AI value average<br>default："4x0009"<br>Number of registers : 1 |
| **Maximum AI Raw Value** | 4x_HiVal | String | R/W | Starting register address of Max. AI Raw Value<br>default："4x0011"<br>Number of registers : Total number of AIs |
| **Maximum AI Raw Value average** | 4x_HiValAvg | String | R/W | Starting register address of Max. AI Raw Value average<br>default："4x0019"<br>Number of registers : 1 |
| **Minimum AI Raw Value** | 4x_LoVal | String | R/W | Starting register address of Min. AI Raw Value<br>default："4x0021"<br>Number of registers : Total number of AIs |
| **Minimum AI Raw Value average** | 4x_LoValAvg | String | R/W | Starting register address of Min. AI Raw Value average<br>default："4x0029" |

| | | | | |
|---|---|---|---|---|
| | | | | Number of registers : 1 |
| **AI Engineering data (floating type)** | 4x_AIEgF | String | R/W | Starting register address of AI max. engineering data<br>default："4x0031"<br>Number of registers : Twice the total number of AIs |
| **AI Engineering data average (floating type)** | 4x_AIEgFAvg | String | R/W | Starting register address of AI value average<br>default："4x0047"<br>Number of registers : 2 |
| **Maximum AI Engineering data (floating type)** | 4x_HiEgF | String | R/W | Starting register address of Max. AI Engineering Value<br>default："4x0051"<br>Number of registers : Twice the total number of AIs |
| **Maximum AI Engineering data average (floating type)** | 4x_HiEgFAvg | String | R/W | Starting register address of Max. AI Engineering Value average<br>default："4x0067"<br>Number of registers : 2 |
| **Minimum AI Engineering data (floating type)** | 4x_LoEgF | String | R/W | Starting register address of Min. AI Engineering Value<br>default："4x0071"<br>Number of registers : Twice the total number of AIs |
| **Minimum Minimum AI Raw Value average** | 4x_LoEgFAvg | String | R/W | Starting register address of Min. AI Engineering Value average<br>default："4x0087"<br>Number of registers : 2 |
| **AI status** | 4x_AIStatus | String | R/W | Starting register address of AI status<br>default："4x0101"<br>Number of registers : Twice the |

| | | | | |
|---|---|---|---|---|
| | | | | total number of AIs |
| **AI range** | 4x_AIRng | String | R/W | Starting register address of AI range<br>default："4x0201"<br>Number of registers : Total number of AIs |
| **AI range average** | 4x_AIRngAvg | String | R/W | Starting register address of AI range average<br>default："4x0209"<br>Number of registers : 1 |
| **AI channel enable** | 4x_AIEn | String | R/W | Starting register address of AI channel enable<br>default："4x0209"<br>Number of registers : 1 |
| | | **AO address** | | |
| **AO value** | 4x_AOVal | String | R/W | Starting register address of AO value<br>default："4x0001"<br>Number of registers : Total number of AOs |
| **AO slew rate** | 4x_SR | String | R/W | Starting register address of AO value<br>default："4x0011"<br>Number of registers : Total number of AOs |
| **AO status** | 4x_AOStatus | String | R/W | Starting register address of AO status<br>default："4x0101"<br>Number of registers : Twice the total number of AOs |
| **AO range** | 4x_AORng | String | R/W | Starting register address of AO range |

| | | | | |
|---|---|---|---|---|
| | | | | default："4x0201"<br>Number of registers : Total number of AOs |
| **AO startup value** | 4x_SupVal | String | R/W | Starting register address of AO startup value<br>default："4x0401"<br>Number of registers : Twice the total number of AOs |
| **AO safety value** | 4x_SftVal | String | R/W | Starting register address of AO safety value<br>default："4x0411"<br>Number of registers : Twice the total number of AOs |
| | | **Base address** | | |
| **Clear GCL counter** | 0x_GCL_ClrCnt | String | R/W | Starting coil address of Clear GCL counter<br>default："0x0301"<br>length : 8 |
| **Module name** | 4x_ModName | String | R/W | Starting register address of Module name<br>default："4x0211"<br>Number of registers : 2 |
| **Registers GCL flag** | 4x_GCL_Flag | String | R/W | Starting register address of GCL flag<br>default："4x0305"<br>Number of registers: 1 |
| **Registers GCL counter** | 4x_GCL_Cnt | String | R/W | Starting register address of GCL counter<br>default："4x0311"<br>Number of registers: 16 |
| Remarks | | | | |

## 3.13.11 OTA for Firmware/Configuration File

This chapter describes how to perform Firmware OTA (Over-The-Air) upgrade for Advantech devices. There are three types of OTA:

- Firmware image
- Device configuration file :

  A file exported by Utility that contains configuration settings such as device information, IO settings, network settings, Cloud settings, SNTP settings, etc.

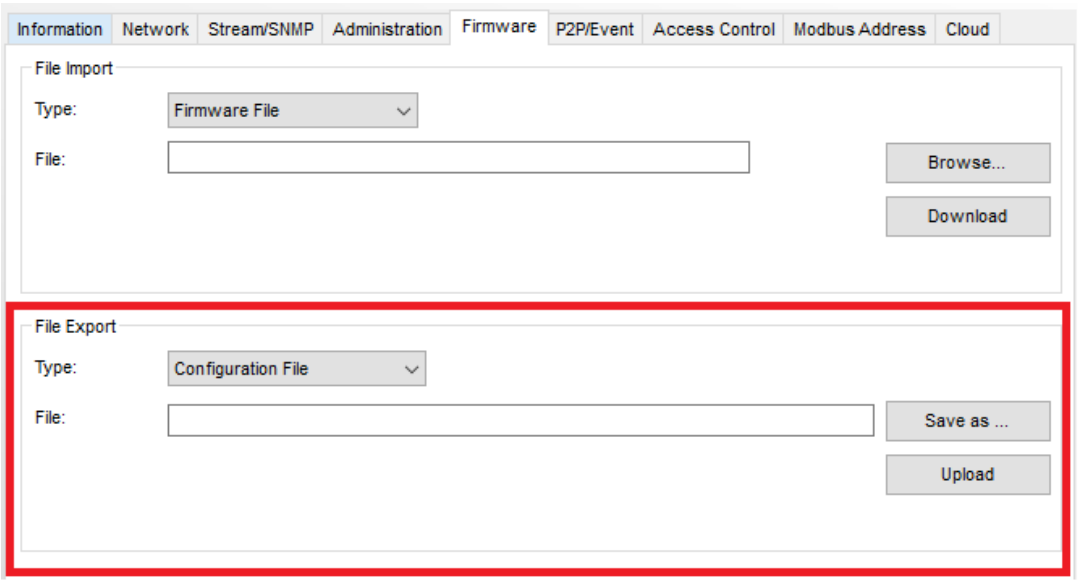



Figure 9. OTA Firmware and Configuration File upload

- CA File

  The certificate required for MQTT TLS authentication must have a public key that is an RSA key with a length of up to 4096 bits.

### OTA Operation Process:

- The file server must be set up using a web server, and the web server needs to provide a URL of the HTTP protocol.

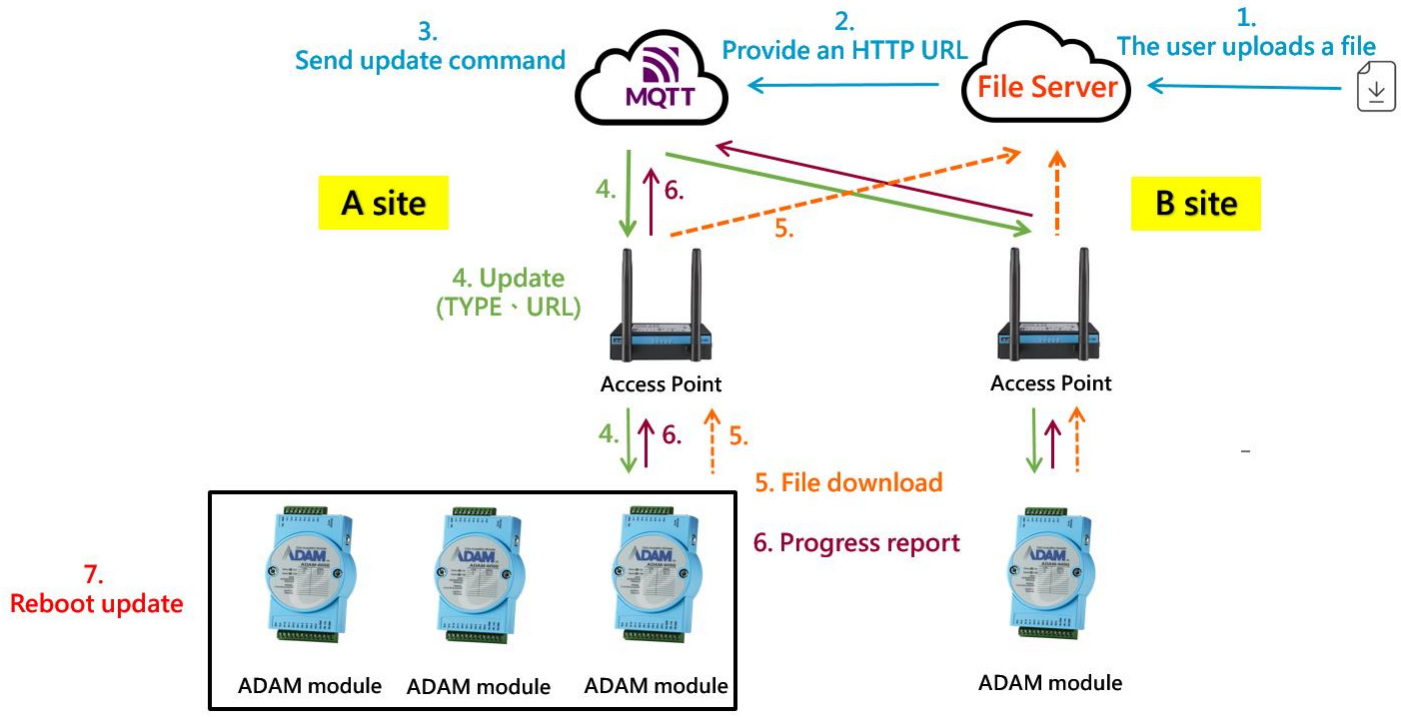



Figure 10. OTA Operation Process

## 3.11.11.1 Scenario

1. Cloud sends OTA Request to device. MQTT topic: Advantech/{MAC}/ota
2. Device Publishes MQTT message to Accept/Reject OTA request. MQTT topic: Advantech/{MAC}/ack/ota
3. Device starts to download firmware or configuration file and publish MQTT messages to notify Cloud its current download progress. Device could publish MQTT messages several times or every n seconds to notify Cloud. MQTT topic: Advantech/{MAC}/update/ota
4. Before or after perform firmware/configuration file upgrade, device publish MQTT message to report to Cloud the OTA result. MQTT topic: Advantech/{MAC}/update/ota

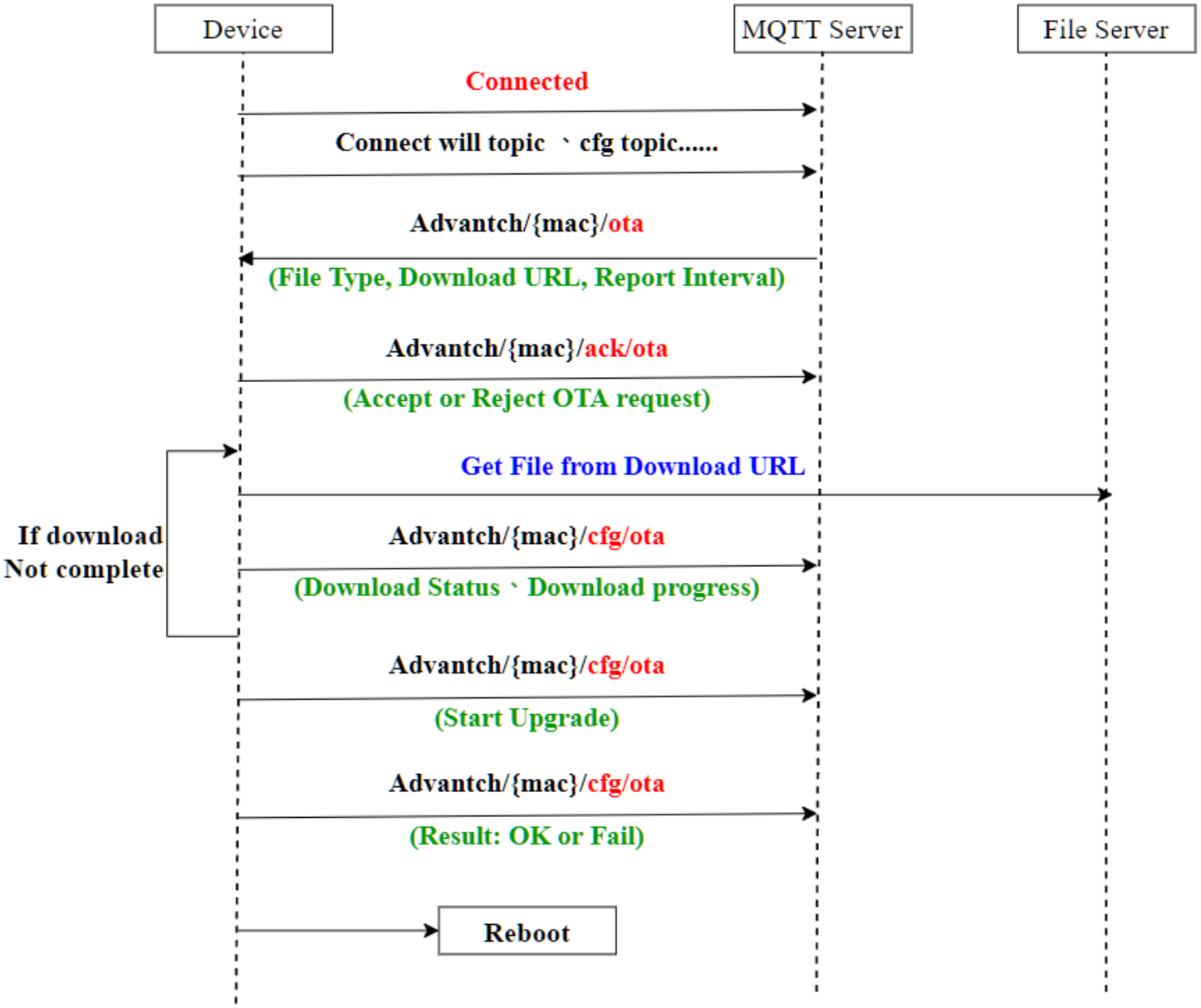



Figure 11. OTA Scenarios

## 3.11.11.2 OTA Request from Cloud

➢ **Device Subscribe MQTT topic:**

**Advantech/{MAC}/ota**

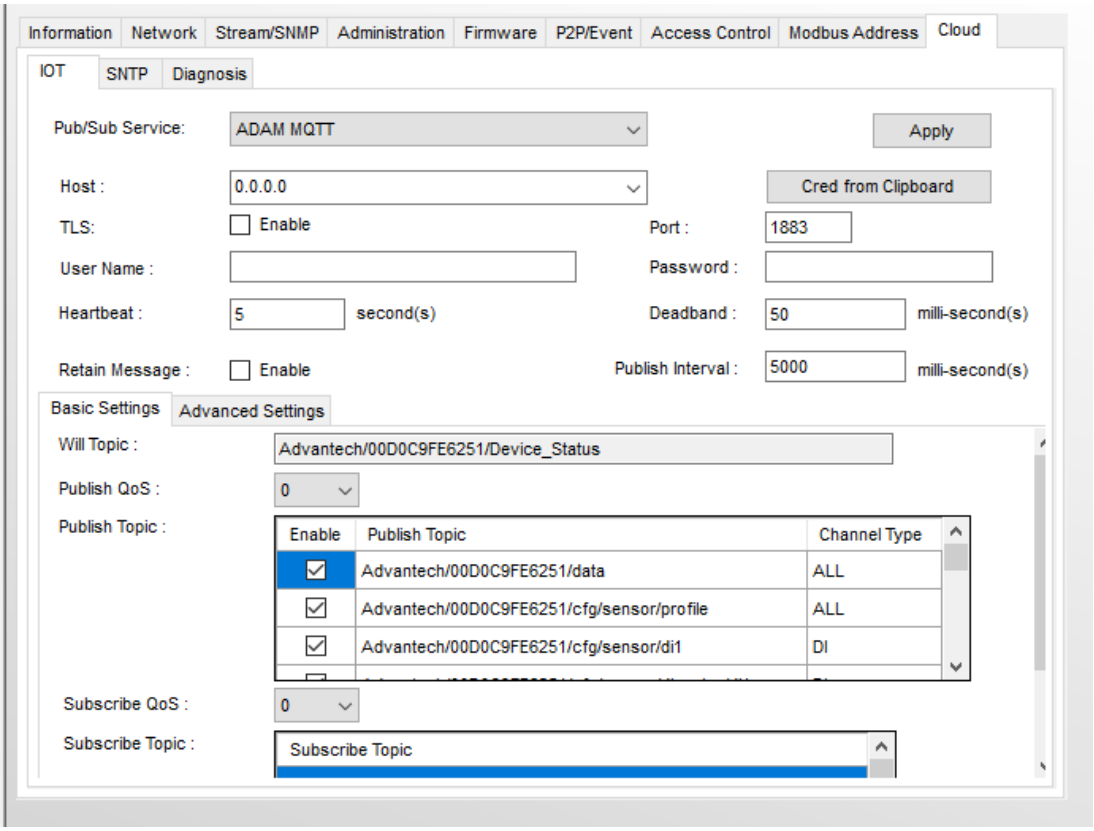
| | |
|---|---|
| Description | The cloud sets the information about OTA to the device |
| | |
| SUBSCRIBE Topic | **Advantech/{MAC}/ota** |

| | |
|---|---|
| Example | **Cloud sends Advantech/00D0C9CC0099/ota to Device**<br>{<br>"cfg_id":"5f4744bf50ac705ac8ac2dce",<br>"Url":"https://advantech.blob.windows.net/devicecloud/ADAM-6050/V6.13 B00/V6.13 B00.bin",<br>"Typ":0,<br>"Itv":10<br>} |

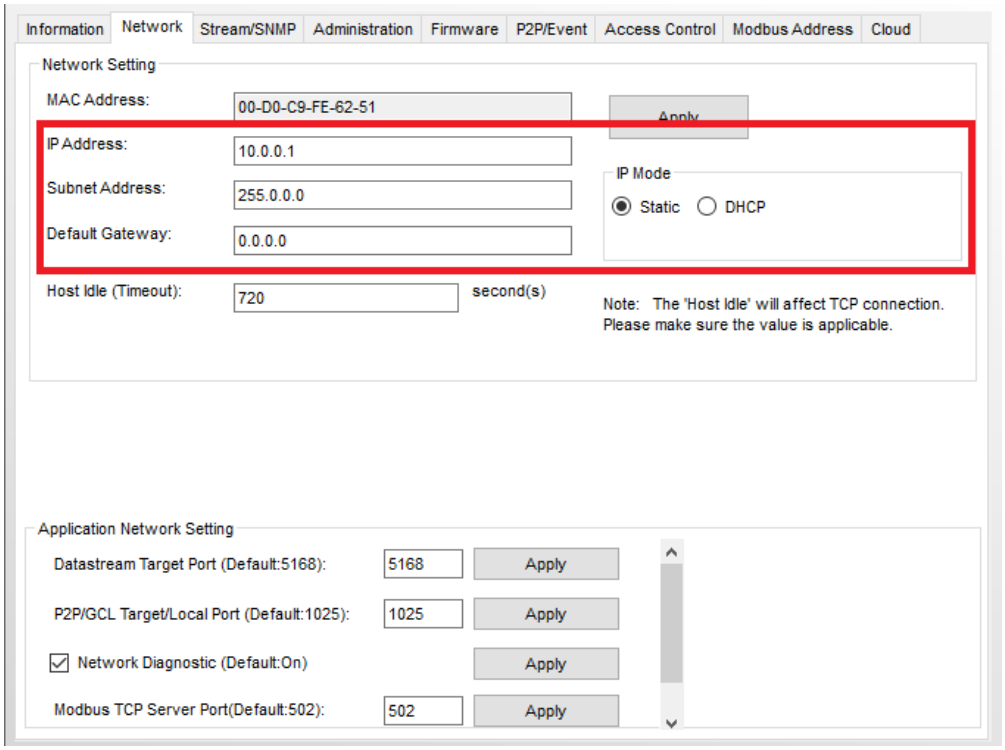
➢ Resource value definitions :

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | W | Max length: 31 bytes. |
| File Download URL | Url | String | W | File download URL<br>Max length: 256 bytes. |
| File Type | Typ | Number | W | Type: **0** — Description: Firmware<br>Type: **4** — Description: configuration File<br>Type: **18** — Description: configuration File Without Cloud Settings[1]<br>Type: **19** — Description: configuration File Without Cloud Settings and Network Settings[2] |
| Device Report Interval | Itv | Number | W | Interval of how often device reports current file download progress to Cloud.<br>Unit: second. |

| | |
|---|---|
| Remarks | 1. Cloud Settings: Utility → Cloud → IOT → All setting |




2. Network Settings: Utility → Network → IP Address、Subnet Address、Default Gateway、IP mode



# 3.11.11.3 Device ACK OTA Request

➢ **Device Publish MQTT message to ACK Cloud request:**
**Advantech/{MAC}/ack/ota**

| Description | Send the acknowledgement for the received OTA topic to Cloud |
|---|---|
| PUBLISH Topic | **Advantech/{MAC}/ack/ota** |
| Example | **Device sends Advantech/00D0C9CC0099/ack/ota to Cloud**<br>{<br>"cfg_id": "5f4744bf50ac705ac8ac2dce",<br>"Typ": 0,<br>"ackstatus":"0",<br>"cost":90,<br>"error":"No error"<br>} |

➢ Resource value definitions :

| Field | Abbreviation | Data Type | Property | Description |
|---|---|---|---|---|
| Message ID | cfg_id | String | R | Max length: 31 bytes. |
| File Type | Typ | Number | R | Type: **0** — Description: Firmware<br>Type: **4** — Description: configuration File<br>Type: **18** — Description: configuration File Without Cloud Settings<br>Type: **19** — Description: configuration File Without Cloud Settings and Network Settings |
| Acknowledge status | ackstatus | Number | R | OTA Command Code: 1 — Description: Device **accepts** OTA firmware download Request |

| | | | | | |
|---|---|---|---|---|---|
| | | | | 2 | Device **rejects** OTA firmware download Request |
| Firmware/Configuration upgrade Time | cost | Number | R | If OTA request is accepted, device reports estimate time of firmware/configuration upgrade. Unit: second.<br>If OTA request is rejected, this field is ignored. | |
| Acknowledge Description | error | String | R | See Error Table | |
| Remarks | | | | | |

## 3.11.11.4 Device Reports OTA Status

Device Publish MQTT message to report current OTA status:
**Advantech/{MAC}/cfg/ota**

| Description | The device reports the current status of OTA download and update. |
|---|---|
| PUBLISH Topic | **Advantech/{MAC}/cfg/ota** |
| Example | **Device sends Advantech/00D0C9CC0099/cfg/ota to Cloud**<br>{<br>"cfg_id": "5f4744bf50ac705ac8ac2dce",<br>"otastatus": 100,<br>"progress": 60,<br>"error":"No error"<br>} |

➢ Resource value definitions :

| Field | Abbreviation | Data Type | Property | Description | |
|---|---|---|---|---|---|
| Message ID | cfg_id | String | R | Max length: 31 bytes. | |
| OTA Status | otastatus | Number | R | OTA Status Code | Description |
| | | | | 100 | OTA download is in progress |
| | | | | 101 | OTA download is failed |

| | | | | | |
|---|---|---|---|---|---|
| | | | | 102 | OTA download is finished |
| | | | | 200 | Start upgrade |
| | | | | 300 | Upgrade is success and finished |
| | | | | 301 | Upgrade is failed and terminated |
| Firmware/Configuration File Download progress | progress | Number | R | Download progress unit is percentage and value range is 0~100. | |
| Acknowledge Description | error | String | R | See Error Table in 3.11.14 | |
| Remarks | | | | | |

## 3.13.12 Pub/Sub Topic Rules

The Pub/Sub interval of the original boot connection is controlled by Deadband, but when the Deadband is too large, it will cause too long period to boot devices. Therefore, the Pub/Sub interval of the new version is changed to be fixed at 50ms. Starts from following versions support these rules:

| ADAM DIO | ADAM-6017/6217 | ADAM-6018+ | ADAM-6024 | ADAM-6224 |
|---|---|---|---|---|
| V6.11B37 | V6.11B23 | V6.01B24 | V6.01B19 | V6.01B23 |

ADAM MQTT Sub/Pub topic mechanism is as follows:

Boot connection sequence:

1. Set Will Topic (Disconnect)
2. Subscribe
   - Advantech/{mac}/ctl/#
   - Advantech/{mac}/set/sensor/# (AIO only)
   - Advantech/{mac}/read/data
3. Publish
   - Will Topic(Connect)
   - Profile Topic

Channel Config Topic
Channel Value Topic

4. Subscribe
Channel Config Topic
Channel Value Topic

5. Publish
Channel Type Topic
All Data Topic

The following topic send intervals are subject to Deadband restrictions
Interval:
All Data Topic

When any Config changes:
Channel Config Topic

When Channel type changes:
Channel Type Topic

When any Value changes:
Channel Config Topic

DIO/AO data changes:
All Data Topic

When received Advantech/{mac}/read/data:
All Data Topic

When disconnected with broker:
Will Topic(Disconnect)

## 3.13.13 Range command format

**DI command :**
di、counter、lowToHighLatch、highToLowLatch、frequency

**DO command :**

do、pulseOutput、lowToHighDelay、highToLowDelay

**Analog Range:**

| command | range | support module |
|---|---|---|
| 0-20mA | 0~20 mA | 6017/6217/6024/6224 |
| 4-20mA | 4~20 mA | 6017/6217/6024/6224 |
| +-20mA | ±20 mA | 6017/6217 |
| 0-5V | 0~5 V | 6017/6217/6224 |
| 0-10V | 0~10 V | 6017/6217/6224 |
| 0-1V | 0~1 V | 6017/6217 |
| 0-500mV | 0~500 mV | 6017/6217 |
| 0-150mV | 0~150 mV | 6017/6217 |
| +-10V | ±10 V | 6017/6217/6024/6224 |
| +-5V | ±5 V | 6017/6217/6224 |
| +-1V | ±1 V | 6017/6217 |
| +-150mV | ±150 mV | 6017/6217 |
| +-500mV | ±500 mV | 6017/6217 |

**Thermocouple Range:**

| command | range |
|---|---|
| K Type:0-1370C | K Type 0-1370°C |
| J Type:0-760C | J Type 0-760°C |
| E Type: 0-1000C | E Type 0-1000°C |
| T Type:-100-400C | T Type -100-400°C |
| R Type:500-1750C | R Type 500-1750°C |
| S Type:500-1750C | S Type 500-1750°C |
| B Type:500-1800C | B Type 500-1800°C |

## 3.13.14 ACK Error Table

| error | Corresponding action |
|---|---|
| No error | No error |
| Invalid configuration parameter (Abbreviation of error function) | Check whether configuration parameter is correct. (Abbreviation of error function) |

| | |
|---|---|
| Modbus address overlap occurs (Abbreviation of error function) | Check whether there is overlap in Modbus table (Abbreviation of error function) |
| Invalid network setting. | Check whether IP, subnet and gateway are all correct |
| Setting IP not supported under DHCP | It is not supported to set IP under DHCP. |
| Security address not supported under current control mode (Abbreviation of error function) | Depending on current control mode, security IP(MAC) address is allowed to be referenced (Abbreviation of error function) |
| Invalid IP address (Abbreviation of error function) | Check whether IP address is correct (Abbreviation of error function) |
| Invalid MAC address (Abbreviation of error function) | Check whether MAC address is correct (Abbreviation of error function) |
| **OTA** | |
| Updating is in progress | An update is currently in progress. |
| Error in the module type of the configuration file. | Check the module type of the configuration file. |
| Failed to connect to the file server | Check if the file server is functioning properly |
| Invalid Firmware version | Check whether Firmware version is correct |
| Invalid file type | Check whether file type is correct |

## 3.14 Advanced Settings

User can do customized setting topic name and payload message。Advanced Settings have independent Apply button.(EdgeSync 360/ EdgeHub don’t support Advanced Settings)

- When the broker is connected, using the SET command will actively publish the will topic (status: disconnect) and reconnect.
- Support Advanced Settings from the following version:

| ADAM DIO | ADAM-6017/6217 | ADAM-6018+ | ADAM-6024 | ADAM-6224 |
|---|---|---|---|---|
| V6.11 B41 | V6.11 B20 | V6.01B26 | V6.01B19 | V6.01B23 |

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCENxx | Enable/Disable MQTT user define publish<br>aa: always 01<br>xx: 01 (enable),<br>00 (disable) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCEN | Get MQTT user define publish flags<br>aa: always 01 | Return: !01 (enable),<br>!00 (disable)<br>Error: ?01 |
| %aaSETMQTPCSENxx | Enable/Disable MQTT user define subscribe<br>aa: always 01<br>xx: 01 (enable),<br>00 (disable) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCSEN | Get MQTT user define subscribe flags<br>aa: always 01 | Return: !01 (enable),<br>!00 (disable)<br>Error: ?01 |

## 3.14.1 Publish Will Topic and Message

User can do customized setting will topic name and will/connect message.

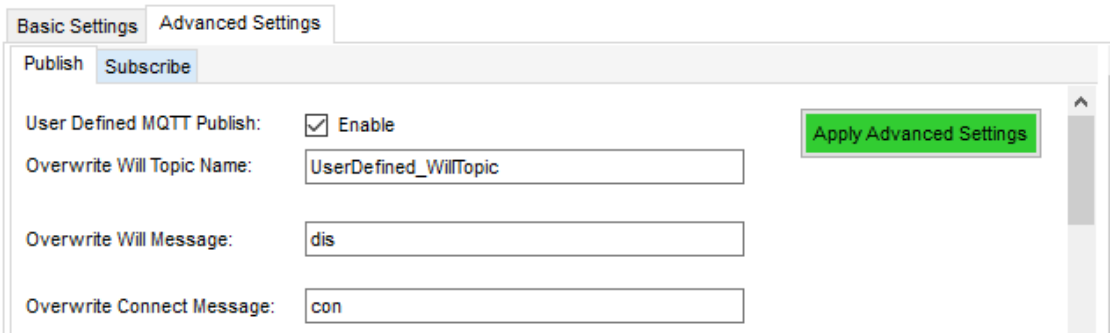



Figure 12. Advanced setting

When module is disconnected:




When module is connected:



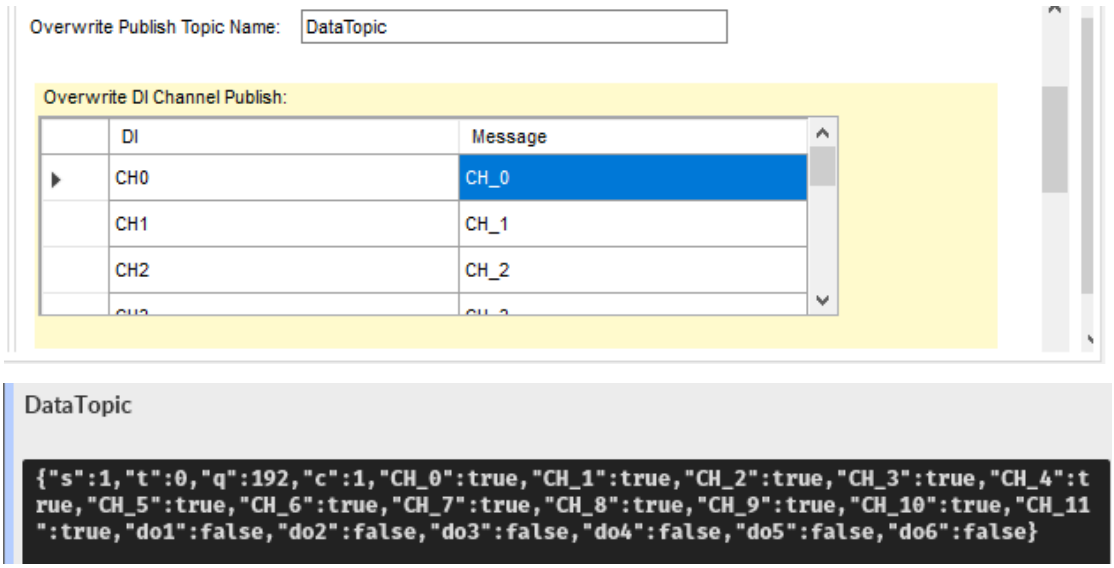

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCWTx...x | Set the will topic of user define<br>aa: always 01<br>x…x: will topic name (0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCWT | Get the will topic of user define<br>aa: always 01 | Return: !WillTopicName<br>Error: ?01 |
| %aaSETMQTPCWMx...x | Set the Will message of user define<br>aa: always 01<br>x…x: Will message (0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCWM | Get the Will message of user define<br>aa: always 01 | Return: !WillMessage<br>Error: ?01 |
| %aaSETMQTPCCMx...x | Set the Connect message of user define<br>aa: always 01<br>xx…x: Connect message (0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCCM | Set the Connect message of user define<br>aa: always 01 | Return: !ConnectMessage<br>Error: ?01 |

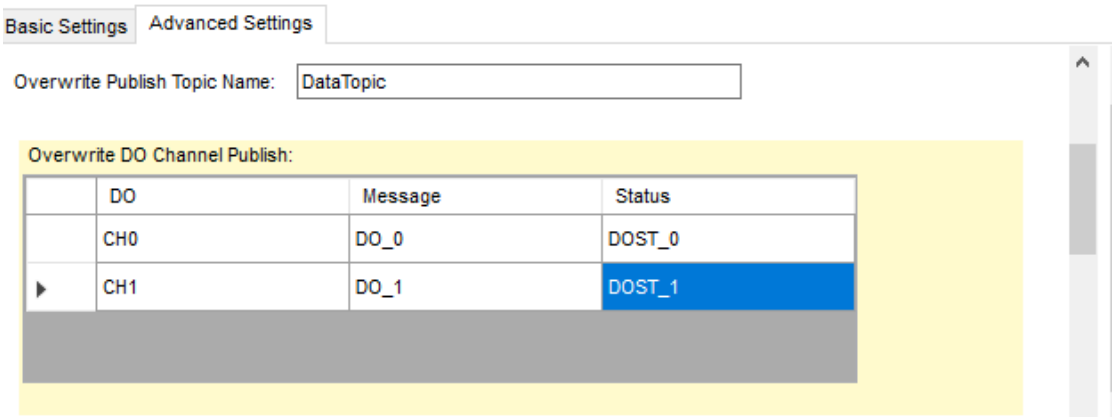
## 3.14.2 Publish All Data Topic and Message

User can define All data topic name(default:Advantech/{mac}/data) or Channel/AlarmStatus name of message(default:don or ai_stn, n starts from 1).

DIO module:




AIO module:



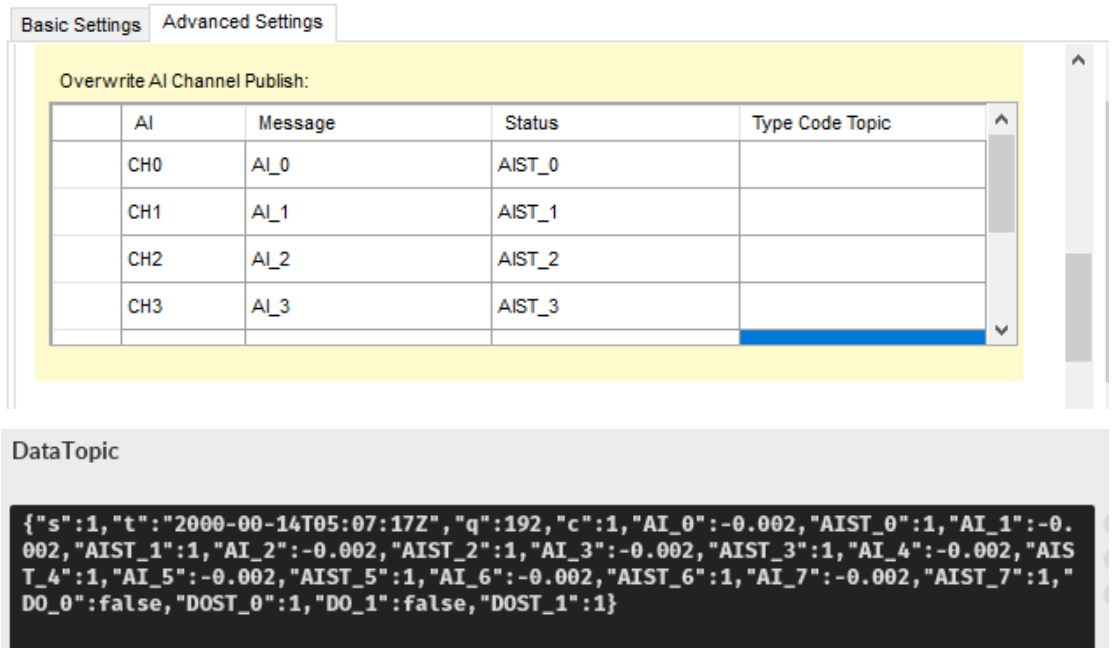



Figure 13. Publish DIO/AIO Data Topic and Message

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCPTDx...x | Set the Publish data topic of user define<br>aa: always 01<br>x…x: data topic name (0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCPTD | Get the Publish data topic of user define<br>aa: always 01 | Return: !DataTopicName<br>Error: ?01 |
| %aaSETMQTPCPMDIccx...x<br>or<br>%aaSETMQTPCPMDOccx...x<br>or<br>%aaSETMQTPCPMAIccx...x<br>or<br>%aaSETMQTPCPMAOccx...x | Set the Publish channel message of data of user define<br>aa: always 01<br>cc: channel(hex format)<br>x…x: channel message (0~63 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCPMDIcc<br>or<br>%aaGETMQTPCPMDOcc<br>or<br>%aaGETMQTPCPMAIcc | Get the Publish channel message of data of user define<br>aa: always 01<br>cc: channel(hex format) | Return: !ChannelMessage<br>Error: ?01 |

| | | |
|---|---|---|
| or<br>%aaGETMQTPCPMAOcc | | |
| %aaSETMQTPCPMSTDIccx...x<br>or<br>%aaSETMQTPCPMSTDOccx...x<br>or<br>%aaSETMQTPCPMSTAIccx...x<br>or<br>%aaSETMQTPCPMSTAOccx...x | Set the Publish channel alarm status message of user define<br>aa: always 01<br>cc: channel (hex format)<br>x…x: channel message (0~63 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCPMSTDIcc<br>or<br>%aaGETMQTPCPMSTDOcc<br>or<br>%aaGETMQTPCPMSTAIcc<br>or<br>%aaGETMQTPCPMSTAOcc | Get the Publish channel alarm status message of user define<br>aa: always 01<br>cc: channel (hex format) | Return: !AlarmStatusMessage<br>Error: ?01 |

### 3.14.3 Publish AI Type Topic and Message

User can do customized setting AI Type Topic name and AI type message name.

AI Type Topic Default: Advantech/{mac}/cfg/sensor/ain

AI Type Topic User defined example: **Advantech/AIType_0**

- n (channel number) starts from 1
- Type message format refer to 3.11.13

AI Type message

Default example: {"typ":"0-20mA"} or {"typ":"J Type:0-760C"}

User defined example: {"AIType":"0-20mA"} or {"AIType":"J Type:0-760C"}

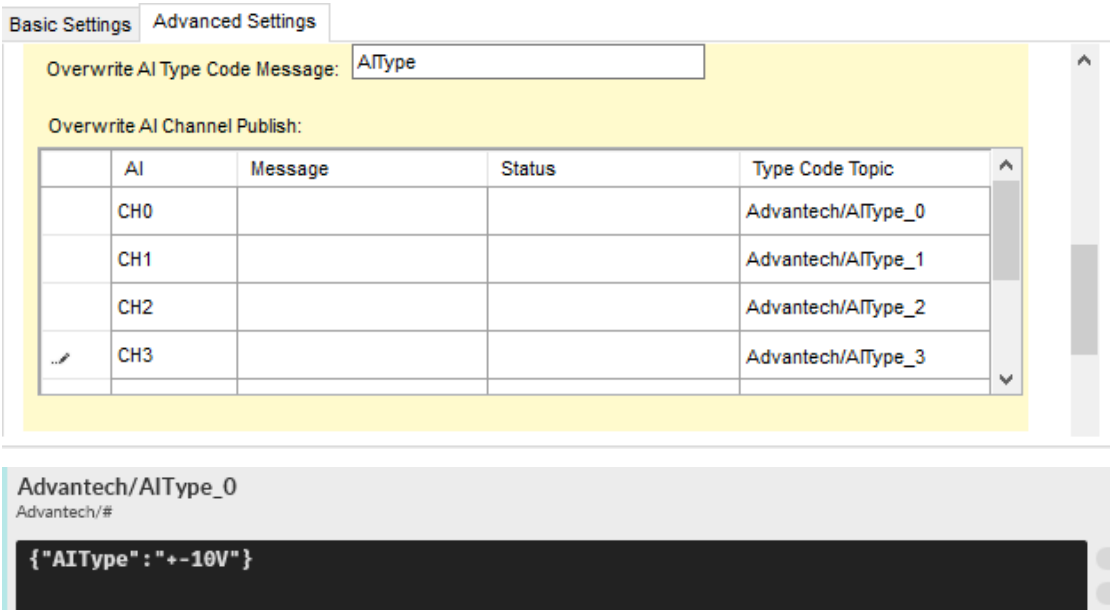



Figure 14. Publish AI Type Topic and Message

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCPMTx...x | Set the Publish AI channel type message of user define<br>aa: always 01<br>x…x: AI type message<br>(0~63 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCPMT | Get the Publish AI channel type message of user define<br>aa: always 01 | Return: !AITypeMessage<br>Error: ?01 |
| %aaSETMQTPCPTTccx...x | Set the Publish AI channel type topic of user define<br>aa: always 01<br>cc: channel (hex format)<br>x…x: channel message | Return: >01<br>Error: ?01 |

| | | |
|---|---|---|
| | (0~127 character) | |
| %aaGETMQTPCPTTcc | Get the Publish AI channel type topic of user define<br>aa: always 01<br>cc: channel(hex format) | Return: !ChannelTypeTopic<br>Error: ?01 |

## 3.14.4 Publish AO Type Topic and Message

User can do customized setting AO Type Topic name and AO type message name.

AO Type Topic Default: Advantech/{mac}/cfg/sensor/ain

AOType Topic User defined example: **Advantech/AOType_0**

- n (channel number) starts from 1
- Type message format refer to 3.11.13

AO Type message

Default example: {"typ":"0-20mA"}

User defined example: {"AOType":"0-20mA"}

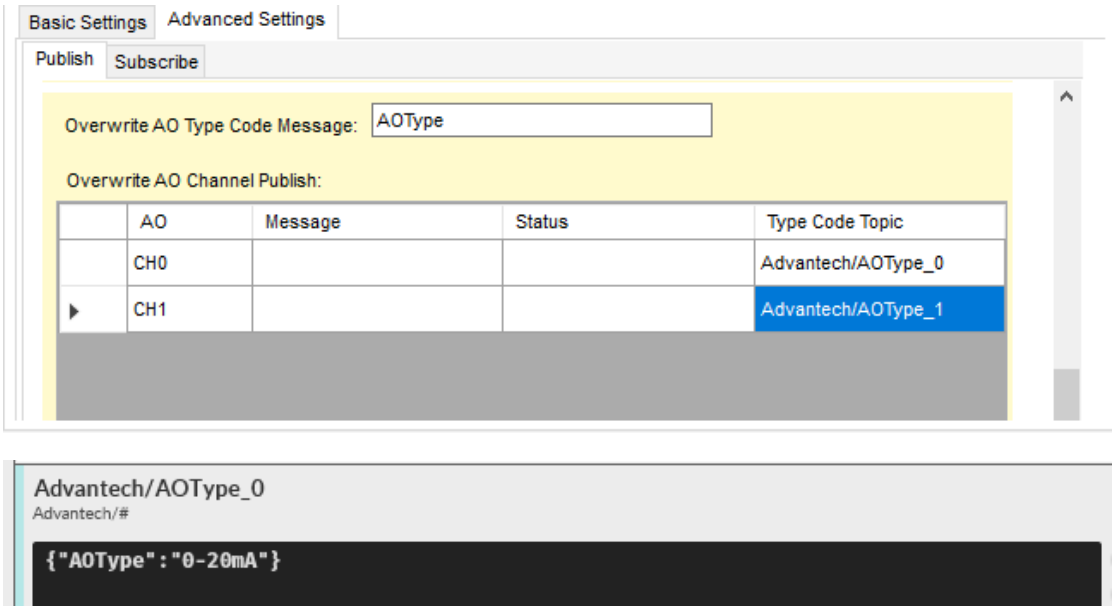



Figure 15. Publish AO Type Topic and Message

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCPAOMTx...x | Set the Publish AO channel type message of | Return: >01<br>Error: ?01 |

| | | |
|---|---|---|
| | user define<br>aa: always 01<br>x…x: AI type message<br>(0~63 character) | |
| %aaGETMQTPCPAOMT | Get the Publish AO channel type message of user define<br>aa: always 01 | Return: !AITypeMessage<br>Error: ?01 |
| %aaSETMQTPCPAOTTccx...x | Set the Publish AO channel type topic of user define<br>aa: always 01<br>cc: channel (hex format)<br>x…x: channel message<br>(0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCPAOTTcc | Get the Publish AO channel type topic of user define<br>aa: always 01<br>cc: channel(hex format) | Return: !ChannelTypeTopic<br>Error: ?01 |

### 3.14.5 Subscribe DO Control Topic and Message

User can do customized setting DO control Topic name and DO control message name.

DO control Topic Default: Advantech/{mac}/ctl/don

DO control Topic User defined example: **Topic_DO0**

➢ n (channel number) starts from 1

DO control message

Default example: {"v":true}

User defined example: {"data": true}

DIO module:

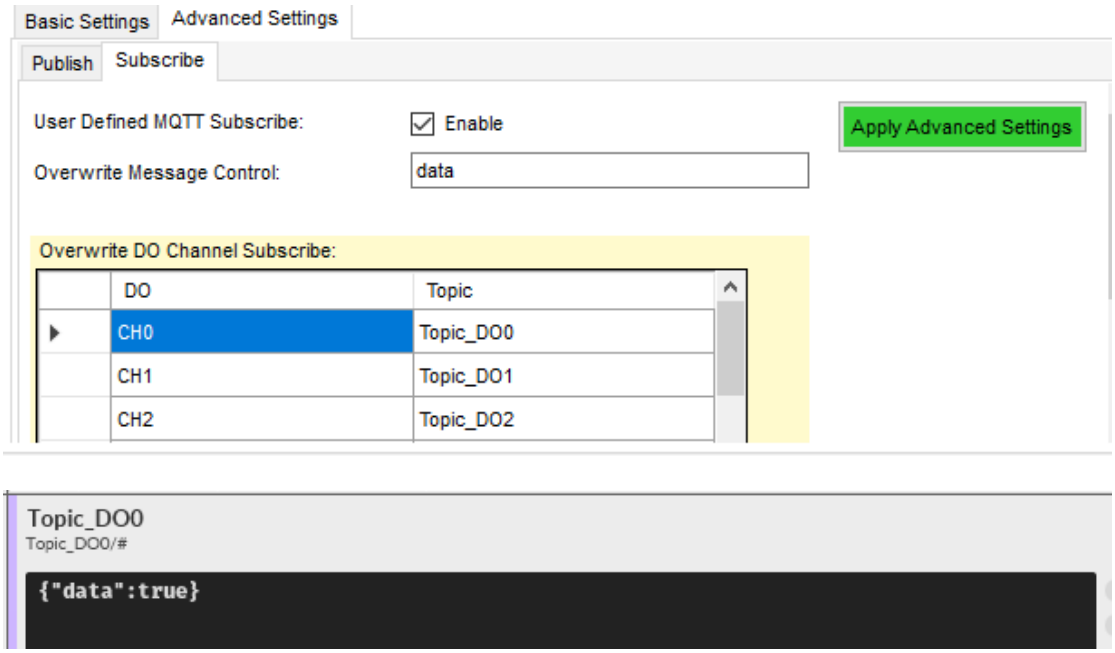



Figure 16. Publish DO Type Topic and Message

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCSMCTLx...x | Set the subscribe DO control message of user define<br>aa: always 01<br>x…x: DO message (0~63 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCSMCTL | Get the subscribe DO control message of user define<br>aa: always 01 | Return: !DOControlMessage<br>Error: ?01 |
| %aaSETMQTPCSTCTLccx...x | Set the subscribe DO control topic of user define<br>aa: always 01<br>cc: channel (hex format)<br>x…x: channel message (0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCSTCTLcc | Get the subscribe DO control topic of user define | Return: !DOControlTopic<br>Error: ?01 |

| | | |
|---|---|---|
| | aa: always 01<br>cc: channel(hex format) | |

## 3.14.6 Subscribe AI Type Topic and Message

User can do customized setting AI Type Topic name and AI Type message name.

AI Type Topic Default: Advantech/{mac}/set/sensor/ain

AI Type Topic User defined example: **AIType_topic/AI0**

- n (channel number) starts from 1
- Type message format refer to 3.11.13

AI Type message

Default example: {"typ":"0-20mA"} or {"typ":"J Type:0-760C"}

User defined example: {"AIType":"0-20mA"} or {"AIType":"J Type:0-760C"}

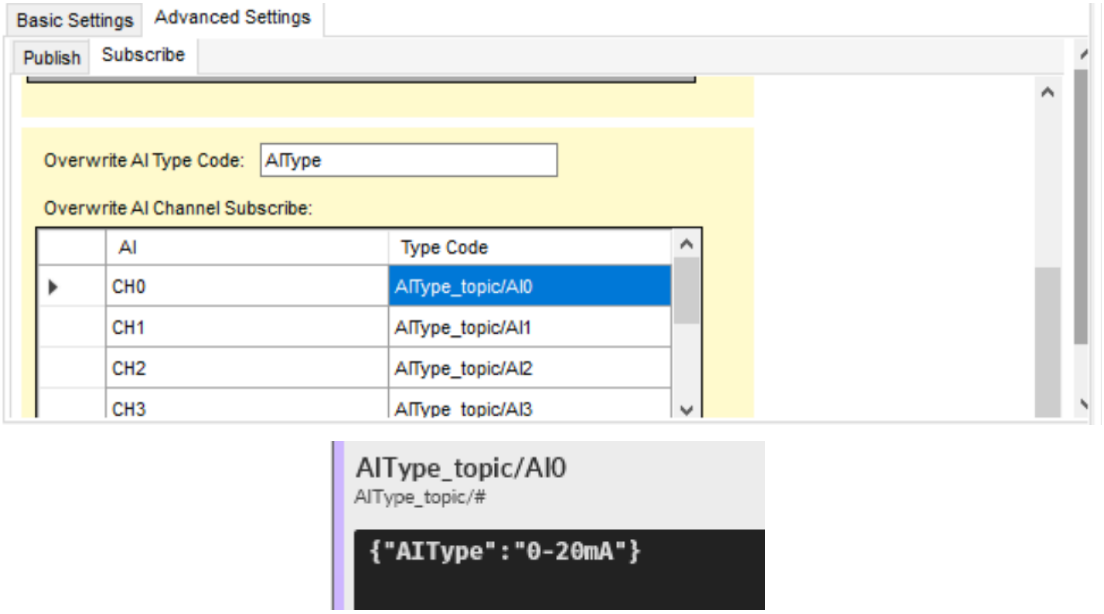



Figure 17. Subscribe AI Type Topic and Message

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCSMCFGx...x | Set the subscribe AI type message of user define<br>aa: always 01<br>x…x: DO message (0~63 character) | Return: >01<br>Error: ?01 |

| | | |
|---|---|---|
| %aaGETMQTPCSMCFG | Get the subscribe AI type message of user define<br>aa: always 01 | Return: !AITypeMessage<br>Error: ?01 |
| %aaSETMQTPCSTCFGccx...x | Set the subscribe AI type topic of user define<br>aa: always 01<br>cc: channel (hex format)<br>x…x: channel message (0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCSTCFGcc | Get the subscribe AI type topic of user define<br>aa: always 01<br>cc: channel(hex format) | Return: !AITypeTopic<br>Error: ?01 |

## 3.14.7 Subscribe AO Control Topic and Message

User can do customized setting AO control Topic name and AO control message name.

AO control Topic Default: Advantech/{mac}/ctl/aon

AO control Topic User defined example: **Topic_AOctl_0**

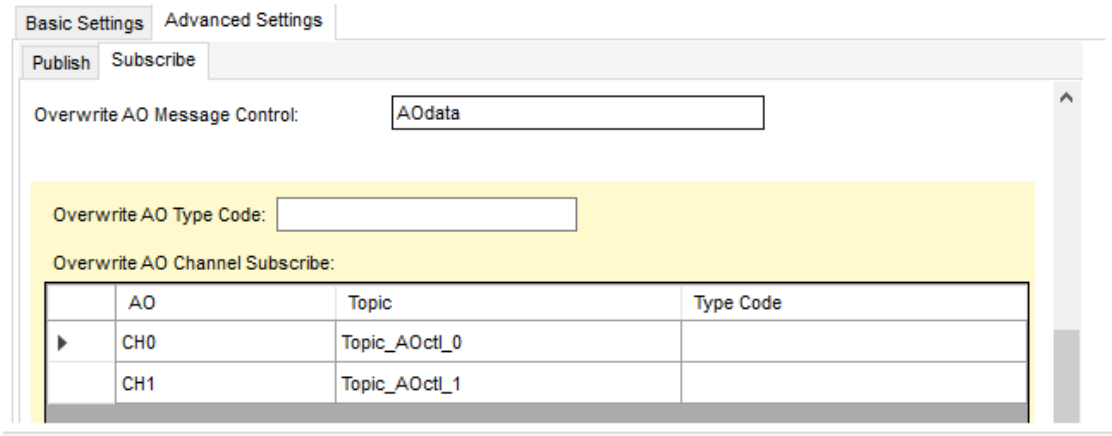
➢ n (channel number) starts from 1

AO control message

Default example: {"v":1.0}

User defined example: {"AOdata":1.0}

AO module:



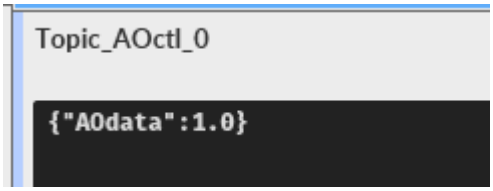



Figure 18. Subscribe AO Control Topic and Message

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCSMAOCTLx...x | Set the subscribe AO control message of user define<br>aa: always 01<br>x…x: AO message (0~63 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCSMAOCTL | Get the subscribe AO control message of user define<br>aa: always 01 | Return: !AOControlMessage<br>Error: ?01 |
| %aaSETMQTPCSTAOCTLccx...x | Set the subscribe AO control topic of user define<br>aa: always 01<br>cc: channel (hex format)<br>x…x: channel message (0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCSTAOCTLcc | Get the subscribe AO control topic of user define<br>aa: always 01<br>cc: channel(hex format) | Return: !AOControlTopic<br>Error: ?01 |

## 3.14.8 Subscribe AO Type Topic and Message

User can do customize settings AO Type Topic name and AO Type message name.

AO Type Topic Default: Advantech/{mac}/set/sensor/aon

AO Type Topic User defined example: **AOType_topic/AO0**

➢ n (channel number) starts from 1

➢ Type message format refer to 3.11.13

AO Type message
Default example: {"typ":"0-20mA"}
User defined example: {"AOType":"0-20mA"}

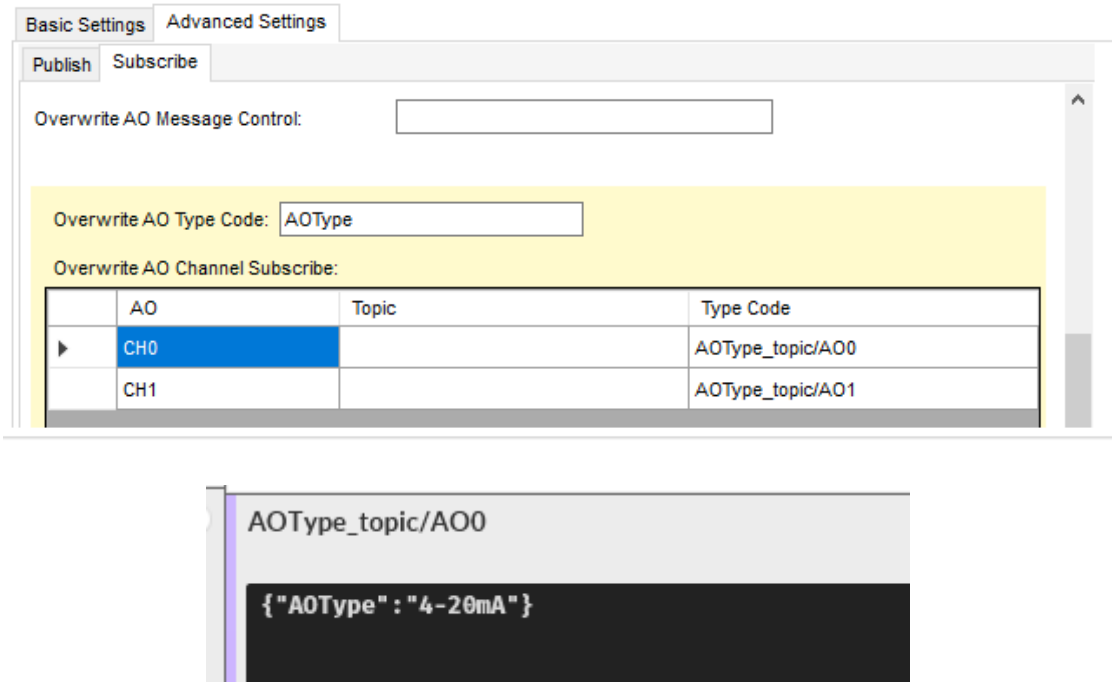



Figure 19. Subscribe AO Type Topic and Message

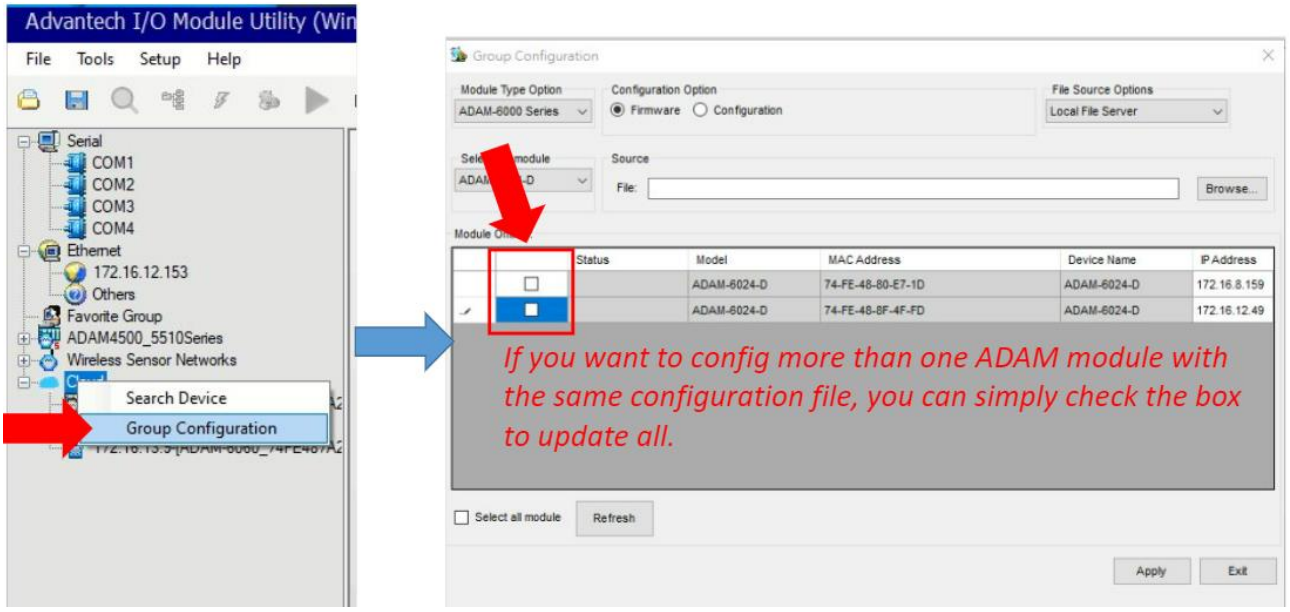
ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCSMAOCFGx...x | Set the subscribe AO type message of user define<br>aa: always 01<br>x…x: DO message (0~63 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCSMAOCFG | Get the subscribe AO type message of user define<br>aa: always 01 | Return: !AITypeMessage<br>Error: ?01 |
| %aaSETMQTPCSTAOCFGccx...x | Set the subscribe AO type topic of user define<br>aa: always 01<br>cc: channel (hex format) | Return: >01<br>Error: ?01 |

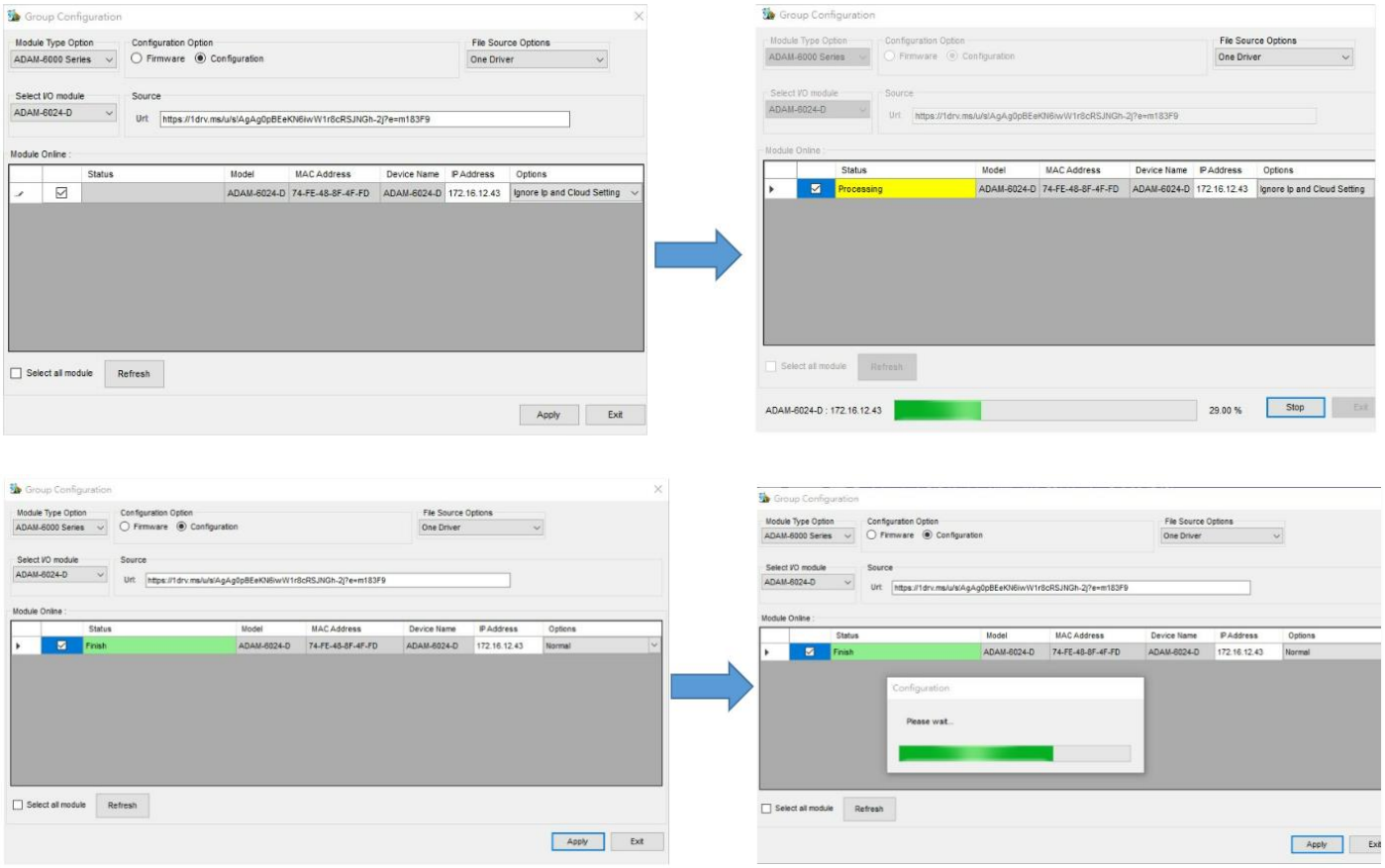
| | | |
|---|---|---|
| | x…x: channel message (0~127 character) | |
| %aaGETMQTPCSTAOCFGcc | Get the subscribe AO type topic of user define<br>aa: always 01<br>cc: channel(hex format) | Return: !AITypeTopic<br>Error: ?01 |

## 3.15 Group configuration

If users would like to implement Firmware or Configuration for multiple devices, there's also "Group Configuration" function in "Cloud". Firstly, please right click "Cloud" then select "Group Configuration".




Then select devices you want (or you can select all) to apply the firmware or configuration you want. The devices will be one-by-one in processing and finish implement in batch.




# 4 EdgeSync 360/ EdgeHub

## 4.1 What is EdgeSync 360/EdgeHub

EdgeSync 360/ EdgeHub is an Advantech IoT Core Service. Users can combine ADAM-6000/6200 series and Advantech EdgeSync 360/ EdgeHub to enable internet/intranet IO rapid development, management, and scaling of IoT projects. The product goal is to provide an out-of-the-box IoT cloud or on-premises solution that will enable server-side infrastructure for IoT applications. Customers can gain the benefits of scalability, agility, and cost-efficiency offered by the cloud, while maintaining control over sensitive data and meeting regulatory requirements.

Please refer to below links for more EdgeSync 360/ EdgeHub details.

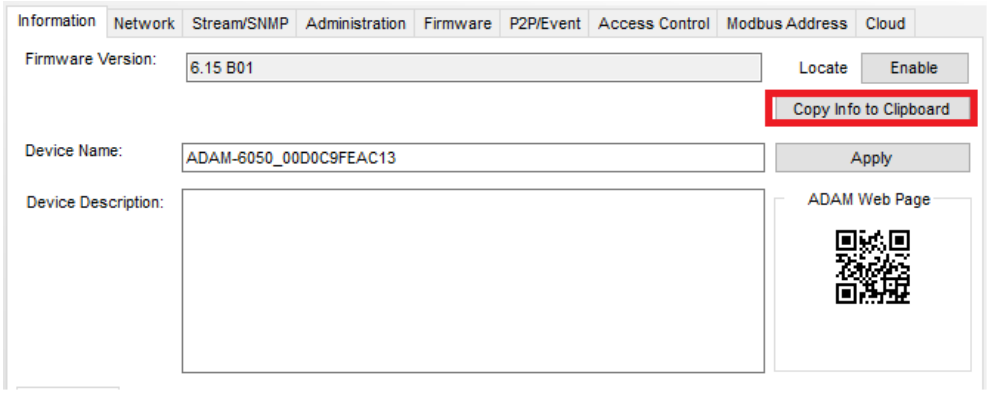
(https://docs.wise-paas.advantech.com/en/Guides_and_API_References/16769566461525087777/16770462063775138 84/16770517153499117 68/v1.0.1)

(https://www.advantech.com/zh-tw/products/edgesync-360-edgehub/sub_a3e4d4db-6fb1-4809-b621-56f6968ca6bd)

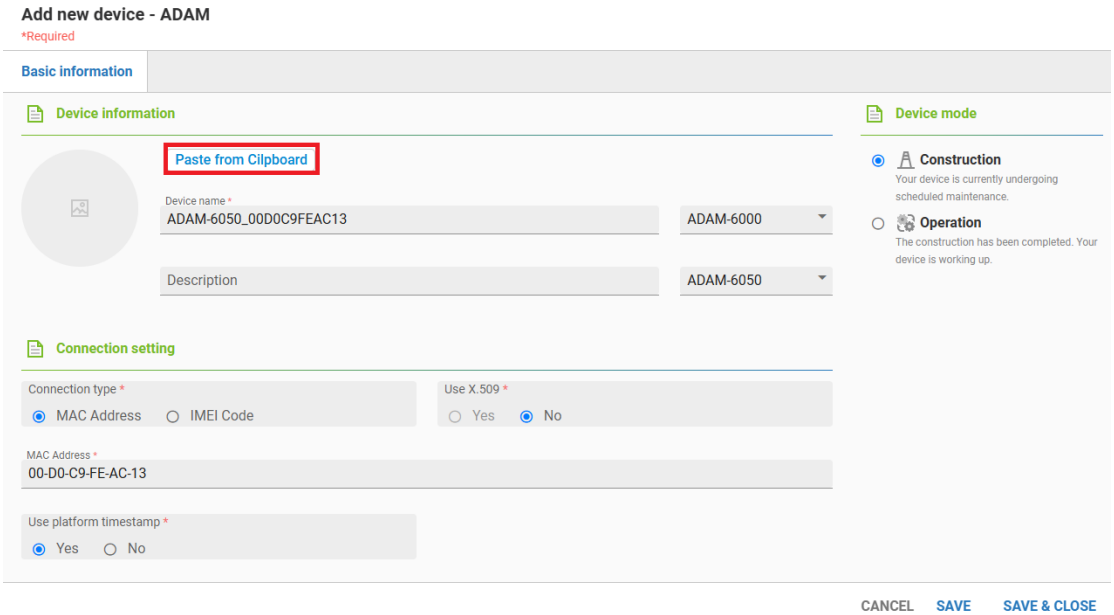
## 4.2 EdgeSync 360/ Edgehub creates ADAM module

- ADAM-6000/6200 modules can be created in EdgeSync 360/Edgehub.
- ADAM-6000/6200 series can help connecting to EdgeSync 360/ Edgehub via utility

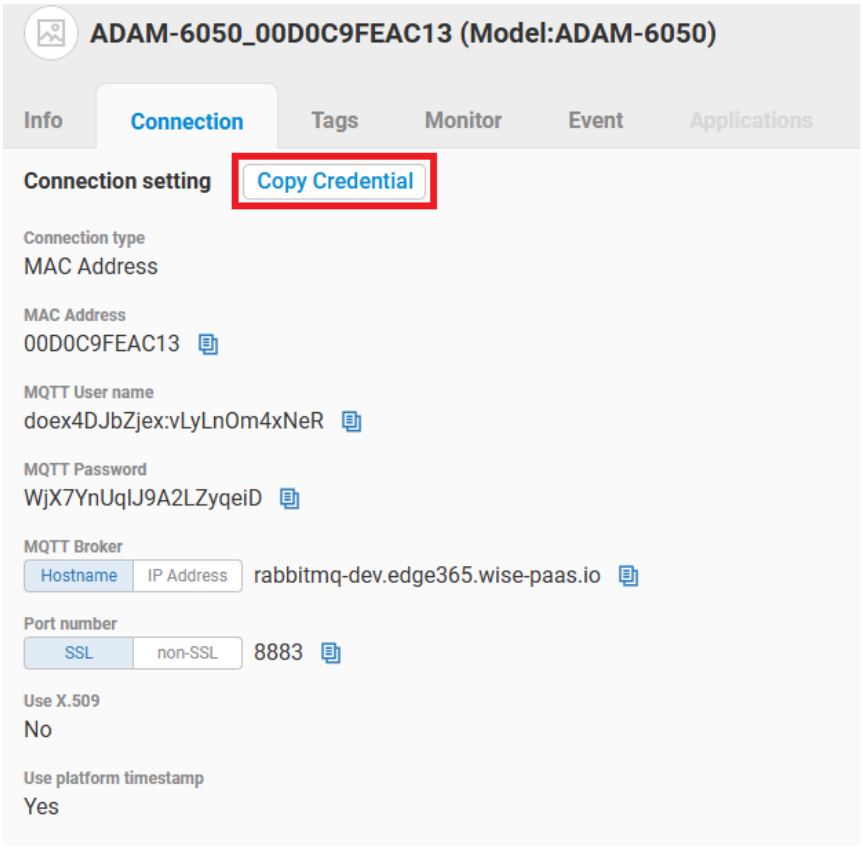
Step 1: Copy module information (Device Name, mac, etc.) in Utility




Step 2: Fill in "DPM Device information" and create the device

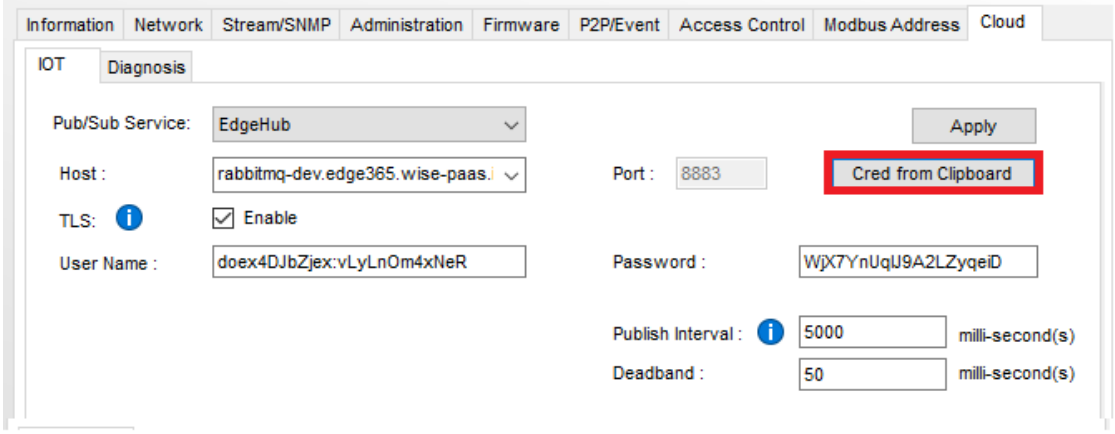



Step 3: Copy DPM connection information




Step 3: Fill in Utility and establish a connection

(Publish interval reference ch3.7、Deadband reference ch3.6)



# 5. Azure

➢ Support Advanced Settings from the following version:

| ADAM DIO | ADAM-6017/6217 | ADAM-6018+ | ADAM-6024 | ADAM-6224 |
|---|---|---|---|---|
| V6.11 B00 | V6.11 B00 | V6.01 B24 | V6.01 B19 | V6.01B23 |

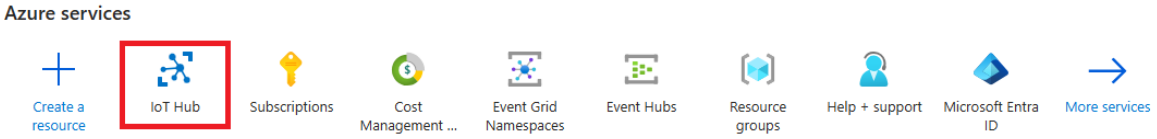
## 5.1 Azure Connected

➢ Tool:

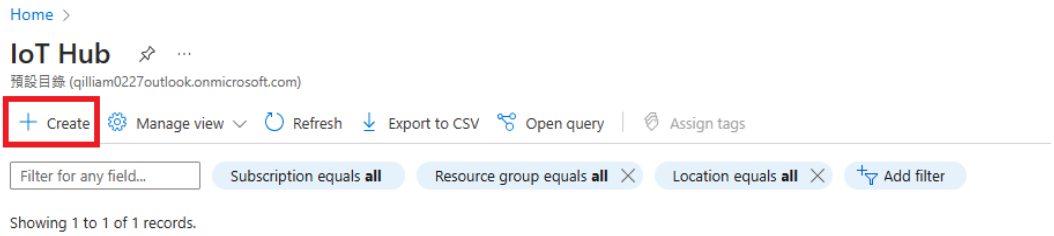
1. Utility
2. Azure cloud: https://azure.microsoft.com/
3. Device explore: Download URL: There are 12 files in total. After downloading, click on setupdeviceexplorer.msi to start the installation. After installation, you can use device explorer.
   https://github.com/Azure/azure-iot-sdk-csharp/releases/tag/2019-1-4

### 5.1.1 Setup Azure cloud

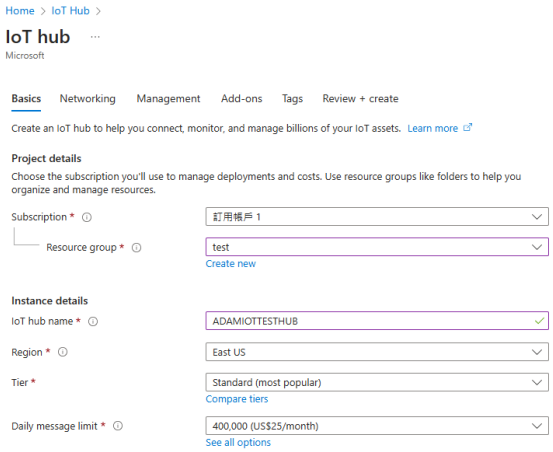
1. Enter: https://azure.microsoft.com/zh-tw/
2. Log in
3. Entrance website
4. Click IoT Hub



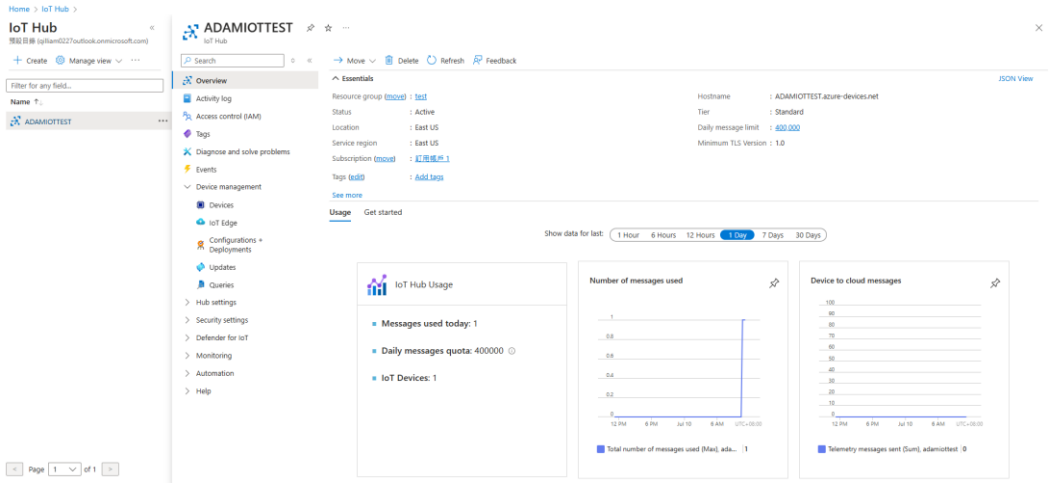

5. Setup new IoT hub -> Create



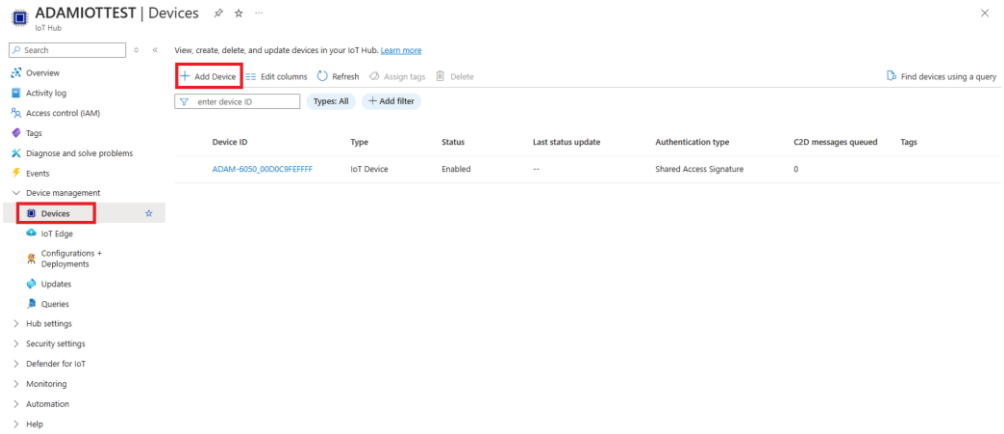

6. Complete the form and create it. It will take a while (about 10 minutes) before you can start using the newly created IoT hub.




7. Click on the created IoT hub to enter the IoT hub interface.




8. Click Devices → Add Device

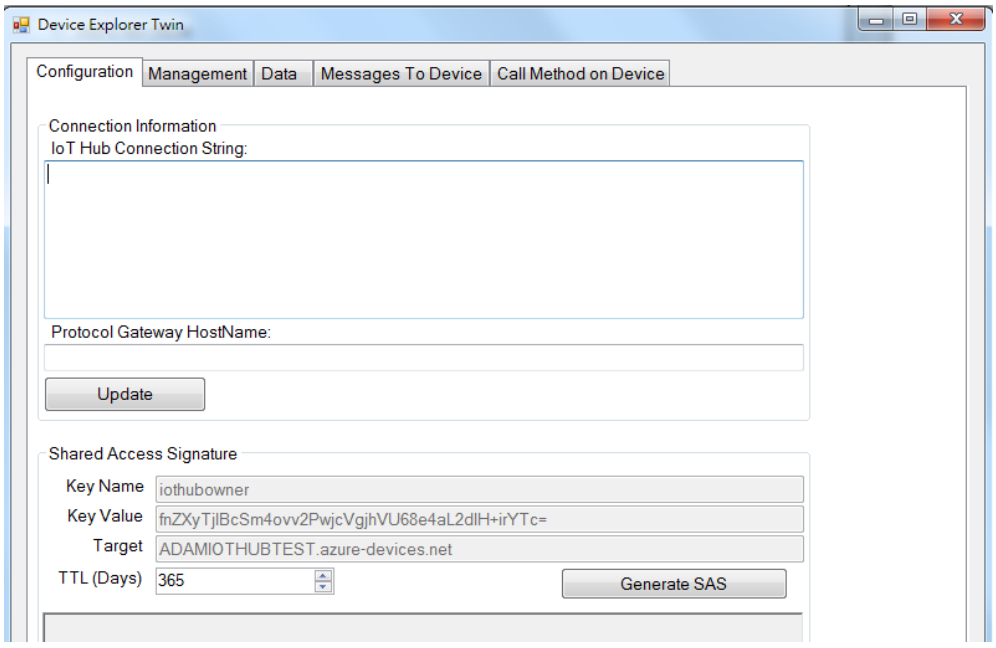



9. Set the device identification code and click Save to complete the addition. This identification code is the DeviceID used when setting the publish topic and using User defined.。

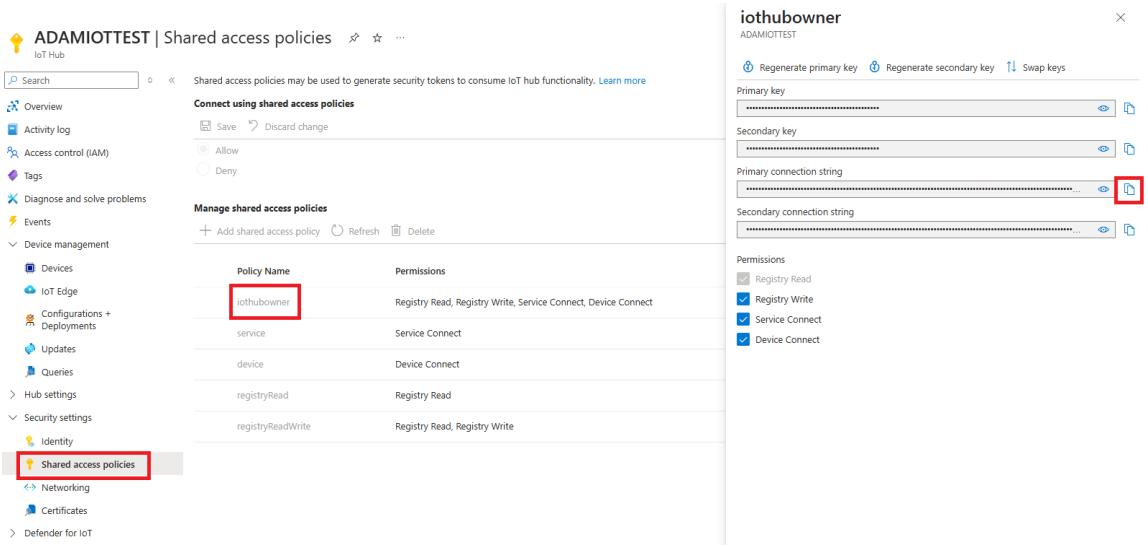



## 5.1.2 Setup device explore and connect Azure

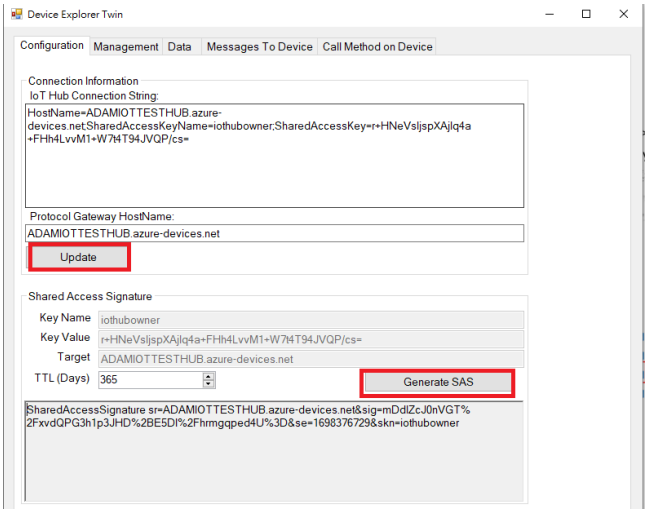
1. Open device explore (After downloading, there is no shortcut on the desktop or start, you can use windows search to find it.)




2. Input IoT hub connection string
   (Get location: Azure cloud → Shared access policies →iot hub policy name → primary connection string

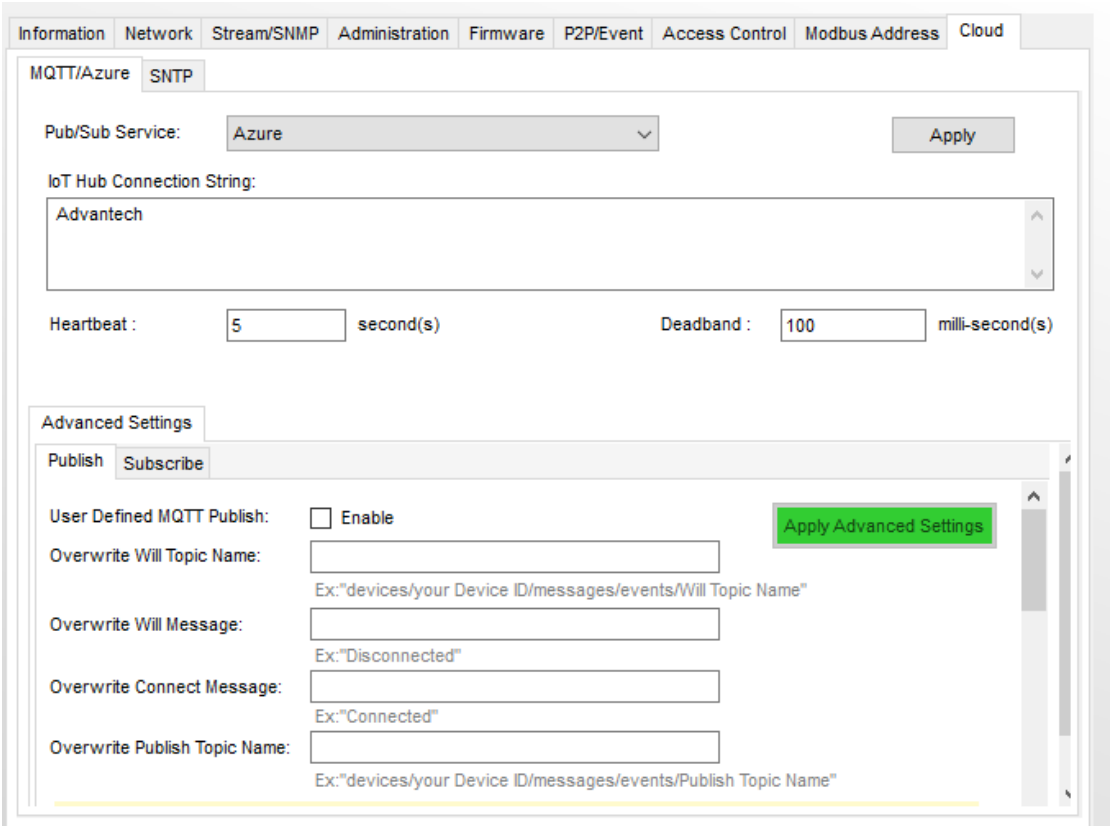



3. Click device explorer ”update” then pick “generate SAS”, then finished azure connection



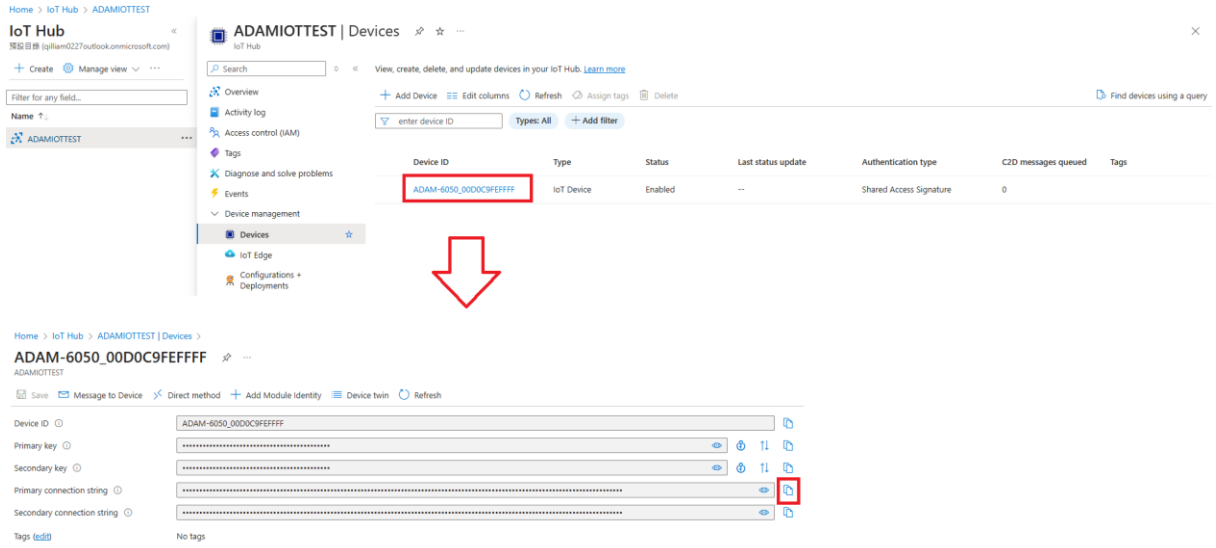

## 5.1.3 Setup ADAM module and connect Azure (Utility)

1. Module connect PC and open utility
2. Utility Ethernet> refresh subnodes> search device> enter ADAM module page> Cloud> Azure




3. Input IoT hub connection string

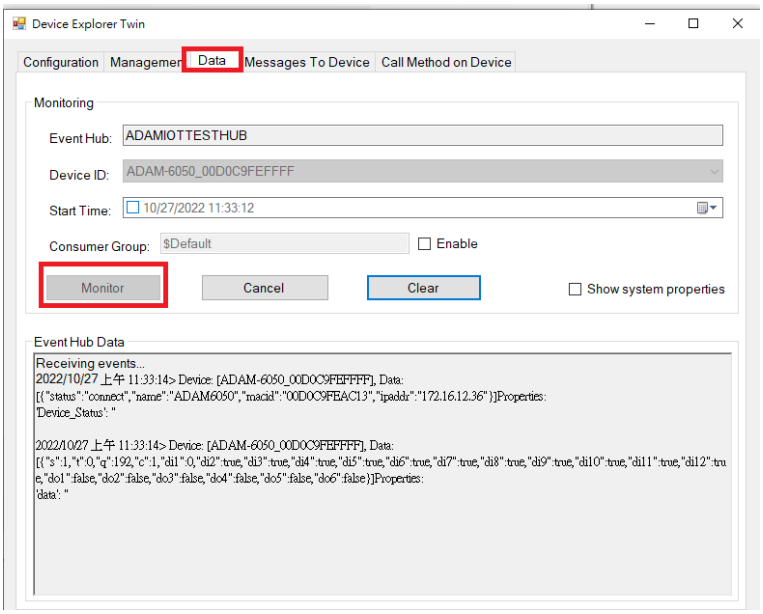
(Get location: Azure cloud name → Devices → Device ID → Primary connection string)



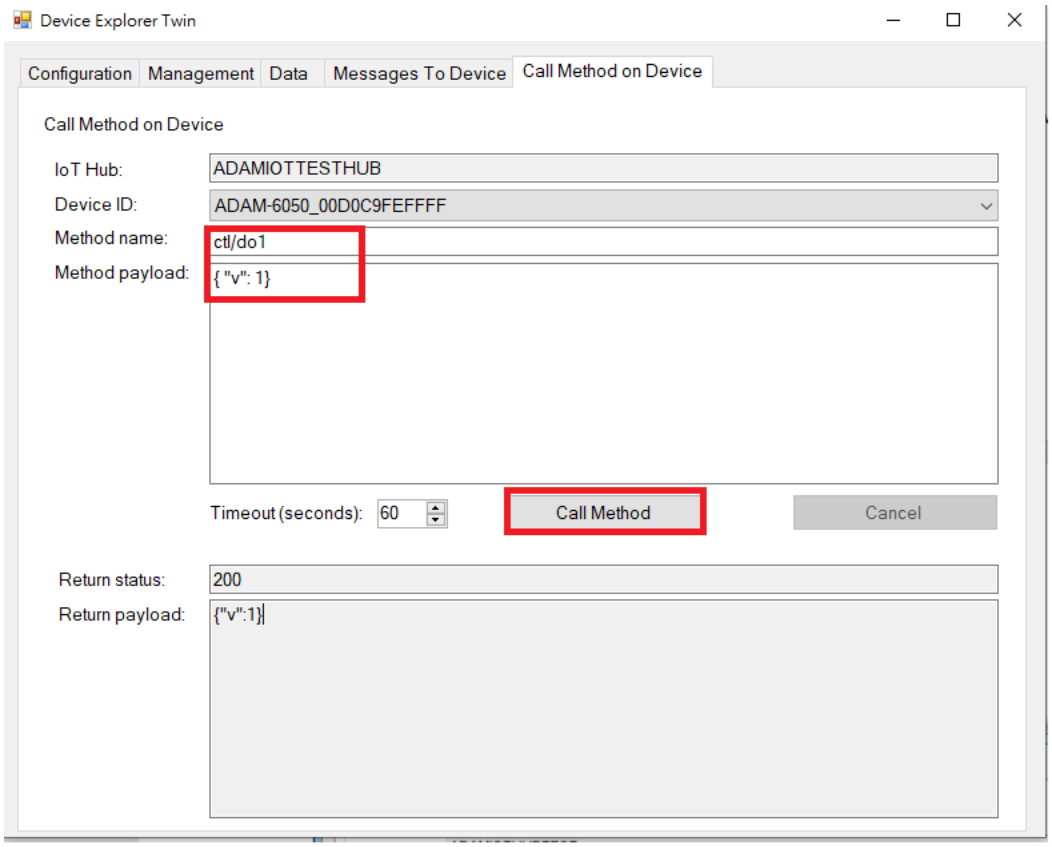

4. Click Apply，Utility will automatically parse 1.Host ID and Port 2. Password 3. DeviceID from the main connection string and set it to the module.

## 5.1.4 Device Explore Operation

1. Read topic and message




2. Setup Control topic (Return status fixed as 200)



## 5.2 IoT Connection String

Set the main connection string for the Azure device. After pressing Apply, Utility will automatically parse 1.Host ID and Port 2. Password 3. DeviceID from the main connection string and set it to the module.

- Before ADAM DIO **v6.11B23** and ADAM-6017/6217 **v6.11B18**, the azure DeviceID cannot be customized, so when Azure creates the device identification code, it must be the same as the ADAM module ID (module_mac, ex:ADAM6017_00D0C9123456)。
- Utility will automatically set DeviceID (%aaSETAHIDx…x) to ADAM-6017/6217 after version B16.

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETAHCSx…x | Set azure connection string<br>aa: always 01<br>x…x: IP address/domain<br>(0~255 character) | Return: >01<br>Error: ?01 |
| %aaGETAHCS | Get azure connection string<br>aa: always 01 | Return:<br>!ConnectionString<br>Error: ?01 |
| %aaSETAHADx…x:aaaa | Set azure domain name<br>aa: always 01<br>x…x: domain name<br>(1~126 character)<br>aaaa: port address(0~65535) | Return: >01<br>Error: ?01 |
| %aaGETAHAD | Get IP address of the broker<br>aa: always 01 | Return: !Domain:port<br>Error: ?01 |
| %aaSETAHPWx…x | Set azure password<br>aa: always 01<br>x…x: password<br>(0~254 character) | Return: >01<br>Error: ?01 |
| %aaGETAHPW | Get azure password<br>aa: always 01 | Return: !Password<br>Error: ?01 |
| %aaSETAHIDx…x | Set azure DeviceID<br>aa: always 01<br>x…x: Azure DeviceID<br>(0~254 character) | Return: >01<br>Error: ?01 |

| | | |
|---|---|---|
| %aaGETAHID | Get azure DeviceID<br>aa: always 01 | Return: !AzureDeviceID<br>Error: ?01 |

## 5.3 TLS

In Azure mode, TLS fixed as enable。

Current ADAM modules support **TLS v1.2** and below Cipher Suites:
TLS_RSA_WITH_AES_256_CBC_SHA256 (0x003d)
TLS_RSA_WITH_AES_256_CBC_SHA (0x0035)
TLS_RSA_WITH_AES_128_GCM_SHA256 (0x009c)
TLS_RSA_WITH_AES_128_CBC_SHA256 (0x003c)
TLS_RSA_WITH_AES_128_CBC_SHA (0x002f)
TLS_RSA_WITH_3DES_EDE_CBC_SHA (0x000a)
TLS_EMPTY_RENEGOTIATION_INFO_SCSV (0x00ff)

## 5.4 Heartbeat & Deadband & Interval

In Azure mode, Heartbeat、Deadband、Interval all use ADAM MQTT same command, function and usage are same as ADAM MQTT.

## 5.5 Retain Message

Retain Message cannot be set in Azure mode and is fixed to disable. Retain Message will not be displayed in Utility B16 version.

## 5.6 Basic Settings

Basic Settings can’t be setup in Azure mode, Pub/Sub Qos sixed as 0, Channel Publish topic fixed as enable. Utility B16 version not show Basic Settings。

## 5.7 Pub/Sub Topic

Azure mode supports topic: 1. Will Topic; 2.Channel Type Topic; 3. Control Topic; 4. All Data Topic. (Azure mode currently don't support Profile Topic, Channel Config Topic and Channel Value Topic)

### 5.7.1 Will Topic

When the Module actively connects/disconnects with the broker, the module will publish a will topic with connect/disconnect message. Or when an accident occurs between the module and the broker and there is an abnormal disconnection, the broker will publish a will topic with disconnect message.

Will Topic name: devices/{DeviceID}/messages/events/Device_Status

Will message payload example:

```
2022/10/27 上午 10:16:31> Device: [ADAM6017_00D0C9E4FC6C], Data:
[{"status":"disconnect","name":"ADAM6017","macid":"00D0C9E4FC6C","ipaddr":"172.16.12.188"}]Properties:
'mqtt-retain': 'true'
'iothub-MessageType': 'Will'
'Device_Status': ''
```

### 5.7.2 Channel Type Topic

For Azure's config topic, the payload only has a message of AIO range type. In addition to being published when the connection is started, it will also be published when the range type changes.

- Only support AIO Channel Type Topic in AIO module, no Channel Type Topic from DIO module.
- Type message format refer to 3.11.13

Config Topic name: AIO: devices/{mac}/messages/events/cfgain(cfgaon)
n (channel number) starts from 1

Config message payload example:

```
2022/10/27 上午 10:16:36> Device: [ADAM6017_00D0C9E4FC6C], Data:[{"typ":"0-20mA"}]Properties:
'cfgai1': ''
```

### 5.7.3 Control Topic

As Azure Control topic, Functions that can be set: 1. DO High/Low; 2. AI range type.

- Type message format refer to 3.11.13

➢ Using DO Control Topic will clear WDT flags and reset Watch-dog time to zero.r

Control Topic name:

DO: iothub/methods/POST/**ctl/don**

AIO: iothub/methods/POST/**set/sensor/ain(aon)**

AIO: iothub/methods/POST/**ctl/aon**

n (channel number) starts from 1

Control message payload example:

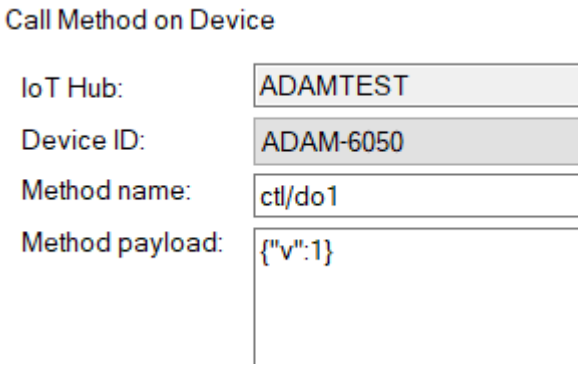
DO : {"v":1}

AIO: {"typ":"0-20mA"} or

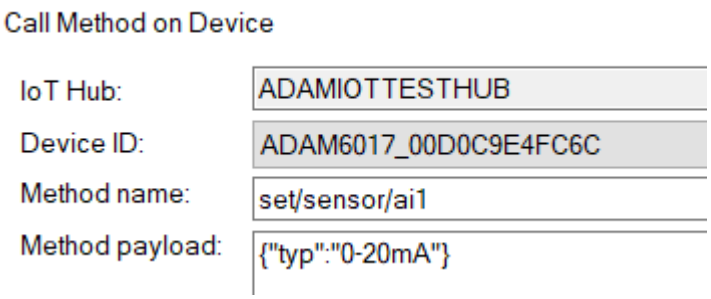
{"typ":"J Type:0-760C"}

AO: {"v":1.0}

DI :




AI type:




## 5.7.4 All Data Topic

Publish all data message topic。What Intervalonly send topic。

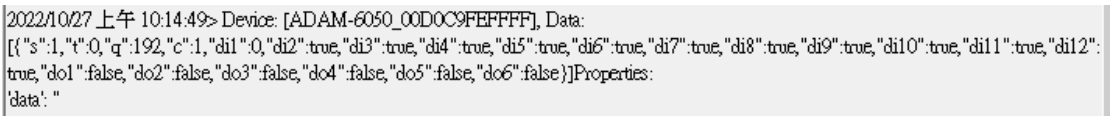
➢ IO number to start from 1 (ex: di1, ai_st1)

➢ Topic name: devices/{DeviceID}/messages/events/data

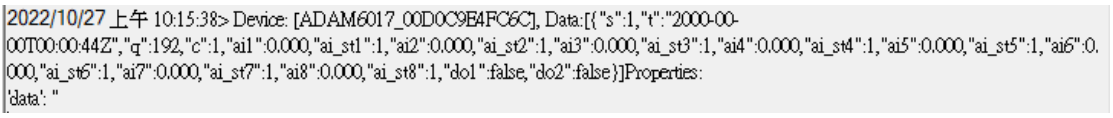
➢ Message payload refer to 3.13.5

Message payload example:

ADAM-6050:




ADAM-6017:




## 5.7.5 Pub/Sub Topic Rules

The Pub/Sub interval of the original boot connection is controlled by Deadband, but when the Deadband is too large, it will take too much time to cause the boot. Therefore, the Pub/Sub interval of the new version of the connection is changed to be fixed at 50ms. Product supports rules starting from below versions:

| ADAM DIO | ADAM-6017/6217 | ADAM-6018+ | ADAM-6024 | ADAM-6224 |
|---|---|---|---|---|
| V6.11B37 | V6.11B23 | V6.01B24 | V6.01B19 | V6.01B23 |

➢ Azuer mode Sub/Pub topic mechanism is as follows:

Boot connection sequence:

1. Set Will Topic (Disconnect)
2. Subscribe
   iothub/methods/POST/#
3. Publish
   Will Topic(Connect)
   Channel Type Topic
   All Data Topic

➢ Below topic send interval are limited by Deadband

Interval:

All Data Topic

When AI Channel type changes:
Channel Type Topic

DIO/AO data changes:
All Data Topic

When disconnected with broker:
Will Topic(Disconnect)

## 5.8 Advanced Settings

User can do customize setting topic name and payload message.

- Advanced Settings have independent Apply button.
- ADAM MQTT commonly use all Advanced Settings ASCII command.
- Azure has a format for defining topics, so User defined topics must conform to the format. (https://learn.microsoft.com/en-us/azure/iot-hub/iot-hub-mqtt-support)
- When connected to broker, please use command SET and then proactively publish will topic (status: disconnect) then do re-connection.

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCENxx | Enable/Disable MQTT user define publish<br>aa: always 01<br>xx: 01 (enable),<br>00 (disable) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCEN | Get MQTT user define publish flags<br>aa: always 01 | Return: !01 (enable),<br>!00 (disable)<br>Error: ?01 |
| %aaSETMQTPCSENxx | Enable/Disable MQTT user define subscribe<br>aa: always 01<br>xx: 01 (enable),<br>00 (disable) | Return: >01<br>Error: ?01 |

| | | |
|---|---|---|
| %aaGETMQTPCSEN | Get MQTT user define subscribe flags<br>aa: always 01 | Return: !01 (enable),<br>!00 (disable)<br>Error: ?01 |

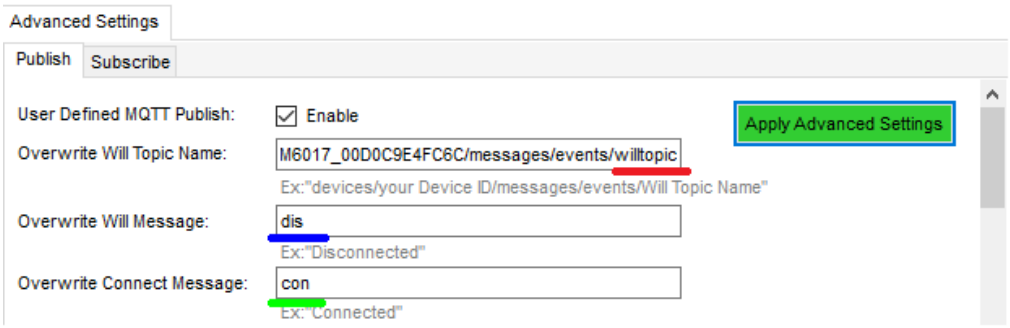
## 5.8.1 Publish Will Topic and Message

User can do customized setting will topic name and will/connect message.

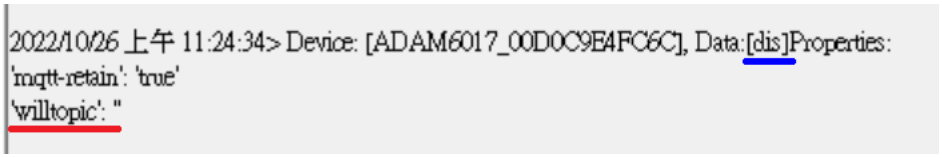
Will Topic Default: devices/{DeviceID}/messages/events/Device_Status

Will Topic User defined: devices/{DeviceID}/messages/events/**{property bag}**

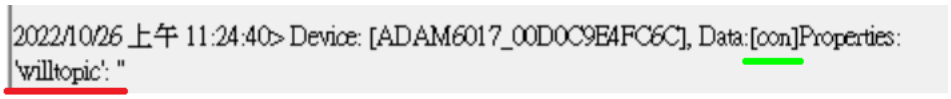
- Device ID is gotten from device connect string
- property bag need to use url-encoded format, when setting with Utility, special characters will be automatically converted to url-encoded.




When module is disconnected:




When module is connected:




ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCWTx...x | Set the will topic of user define<br>aa: always 01<br>x…x: will topic name (0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCWT | Get the will topic of user | Return: !WillTopicName |

| | | |
|---|---|---|
| | define<br>aa: always 01 | Error: ?01 |
| %aaSETMQTPCWMx...x | Set the Will message of user define<br>aa: always 01<br>x…x: Will message (0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCWM | Get the Will message of user define<br>aa: always 01 | Return: !WillMessage<br>Error: ?01 |
| %aaSETMQTPCCMx...x | Set the Connect message of user define<br>aa: always 01<br>xx…x: Connect message (0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCCM | Set the Connect message of user define<br>aa: always 01 | Return: !ConnectMessage<br>Error: ?01 |

## 5.8.2 Publish All Data Topic and Message

User can do customized setting All Data topic name and Channel/AlarmStatus message name.

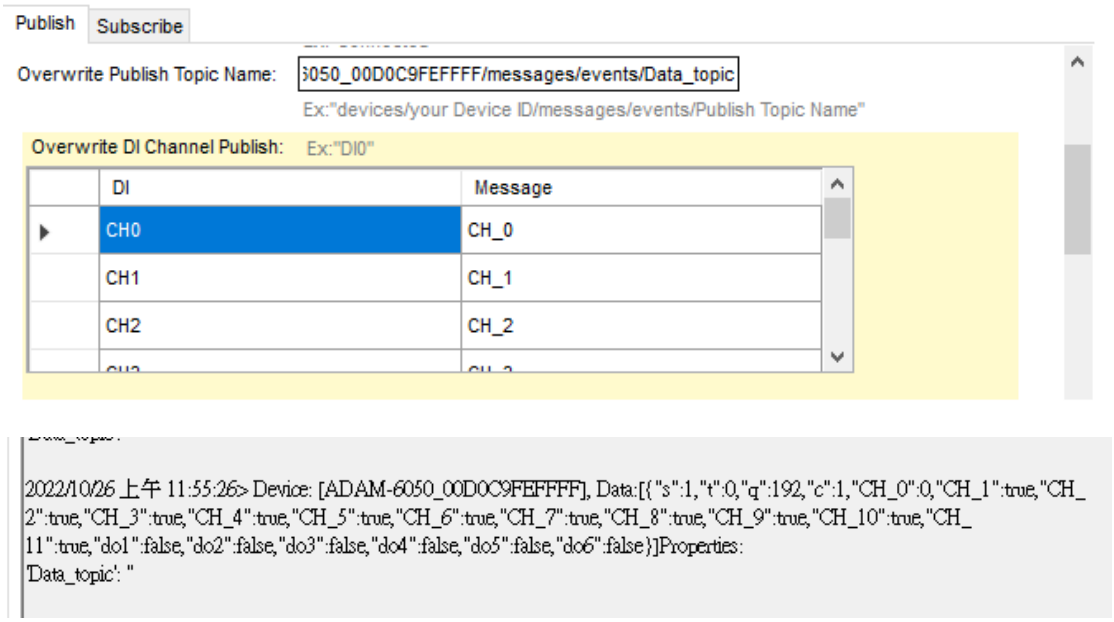
All Data Topic Default: devices/{DeviceID}/messages/events/**data**

All Data Topic User defined: devices/{DeviceID}/messages/events/**{property bag}**

- Device ID is gotten from device connect string
- property bag need to use url-encoded format, when setting with Utility, special characters will be automatically converted to url-encoded.

Channel/AlarmStatus message

Default: don or ai_stn, n (channel number) starts from 1




AI module:

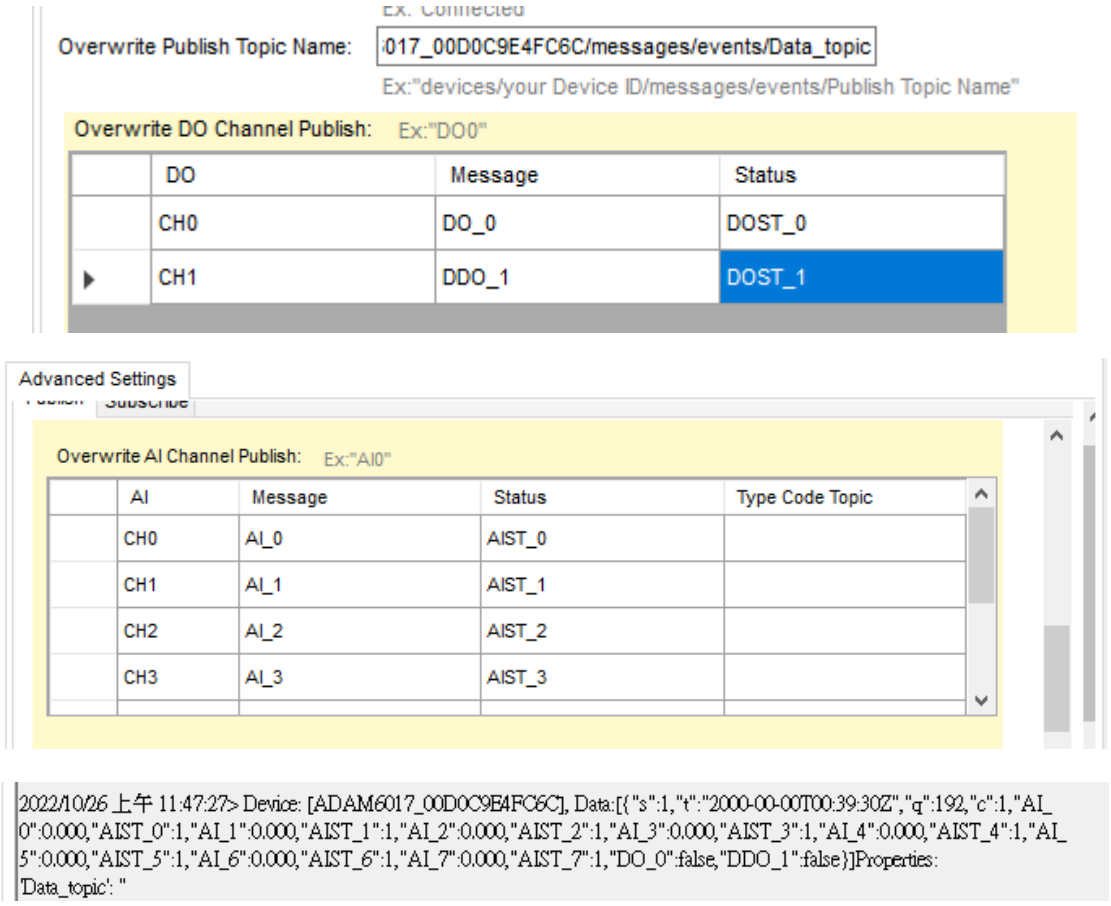



Figure 20. Publish All Data Topic and Message Setting

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCPTDx...x | Set the Publish data topic of user define<br>aa: always 01<br>x…x: data topic name (0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCPTD | Get the Publish data topic of user define<br>aa: always 01 | Return: !DataTopicName<br>Error: ?01 |
| %aaSETMQTPCPMDIccx...x<br>or<br>%aaSETMQTPCPMDOccx...x<br>or<br>%aaSETMQTPCPMAIccx...x<br>or<br>%aaSETMQTPCPMAOccx...x | Set the Publish channel message of data of user define<br>aa: always 01<br>cc: channel(hex format)<br>x…x: channel message (0~63 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCPMDIcc<br>or<br>%aaGETMQTPCPMDOcc<br>or<br>%aaGETMQTPCPMAIcc<br>or<br>%aaGETMQTPCPMAOcc | Get the Publish channel message of data of user define<br>aa: always 01<br>cc: channel(hex format) | Return: !ChannelMessage<br>Error: ?01 |
| %aaSETMQTPCPMSTDIccx...x<br>or<br>%aaSETMQTPCPMSTDOccx...x<br>or | Set the Publish channel alarm status message of user define<br>aa: always 01 | Return: >01<br>Error: ?01 |

| | | |
|---|---|---|
| %aaSETMQTPCPMSTAIccx...x<br>or<br>%aaSETMQTPCPMSTAOccx...x | cc: channel (hex format)<br>x…x: channel message (0~63 character) | |
| %aaGETMQTPCPMSTDIcc<br>or<br>%aaGETMQTPCPMSTDOcc<br>or<br>%aaGETMQTPCPMSTAIcc<br>or<br>%aaGETMQTPCPMSTAOcc | Get the Publish channel alarm status message of user define<br>aa: always 01<br>cc: channel (hex format) | Return: !AlarmStatusMessage<br>Error: ?01 |

## 5.8.3 Publish AI Type Topic and Message

User can do customize setting AI Type Topic name 和 AI Type message name。

AI Type Topic Default: devices/{DeviceID}/messages/events/**cfgain**

AI Type Topic User defined: devices/{DeviceID}/messages/events/**{property bag}**

- Device ID is get from device connect string
- Property bag need to use url-encoded format，When setting with Utility, special characters will be automatically converted to url-encoded.。
- n (channel number) starts from 1
- Type message format refer to 3.11.13

AI Type message

Default example: {"typ":"0-20mA"} or {"typ":"J Type:0-760C"}

User defined example: {"AIType":"0-20mA"} or {"AIType":"J Type:0-760C"}

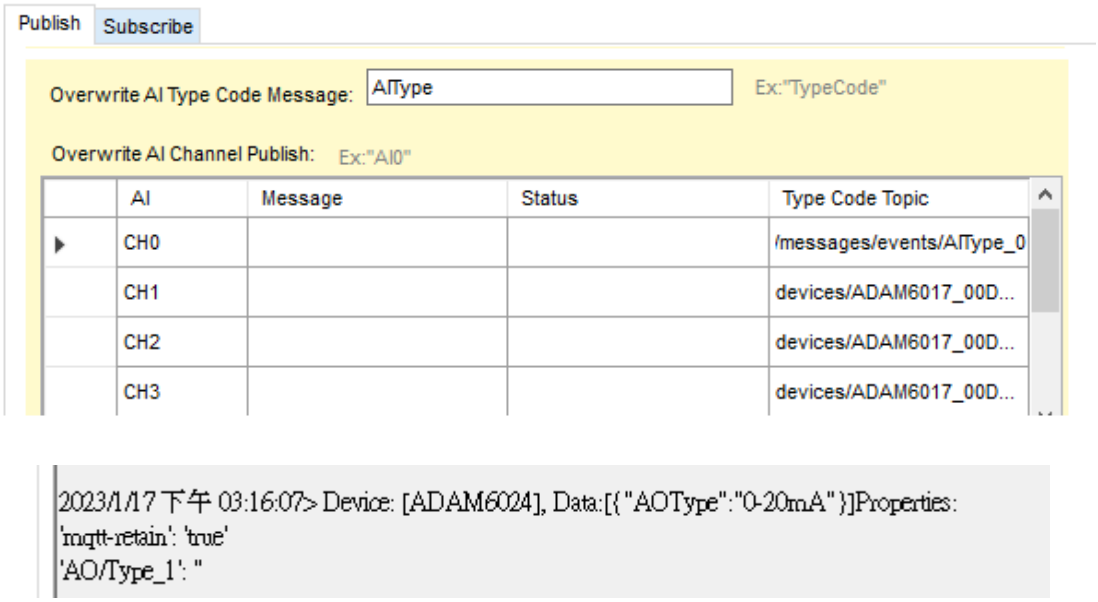



Figure 21. Publish AI Data Topic and Message

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCPMTx...x | Set the Publish AI channel type message of user define<br>aa: always 01<br>x…x: AI type message (0~63 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCPMT | Get the Publish AI channel type message of user define<br>aa: always 01 | Return: !AITypeMessage<br>Error: ?01 |
| %aaSETMQTPCPTTccx...x | Set the Publish AI channel type topic of user define<br>aa: always 01<br>cc: channel (hex format)<br>x…x: channel message (0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCPTTcc | Get the Publish AI channel type topic of user define<br>aa: always 01 | Return: !ChannelTypeTopic<br>Error: ?01 |

| | | |
|---|---|---|
| | cc: channel(hex format) | |

## 5.8.4 Publish AO Type Topic and Message

User can do customized setting AO Type Topic name and AO type message name.

AO Type Topic Default: devices/{DeviceID}/messages/events/**cfgaon**

AO Type Topic User defined: devices/{DeviceID}/messages/events/**{property bag}**

- Device ID is get from device connect string
- Property bag need to use url-encoded format, when setting with Utility, special characters will be automatically converted to url-encoded.
- n (channel number) starts from 1
- Type message format refer to 3.11.13

AO Type message

Default example: {"typ":"0-20mA"}

User defined example: {"AOType":"0-20mA"}

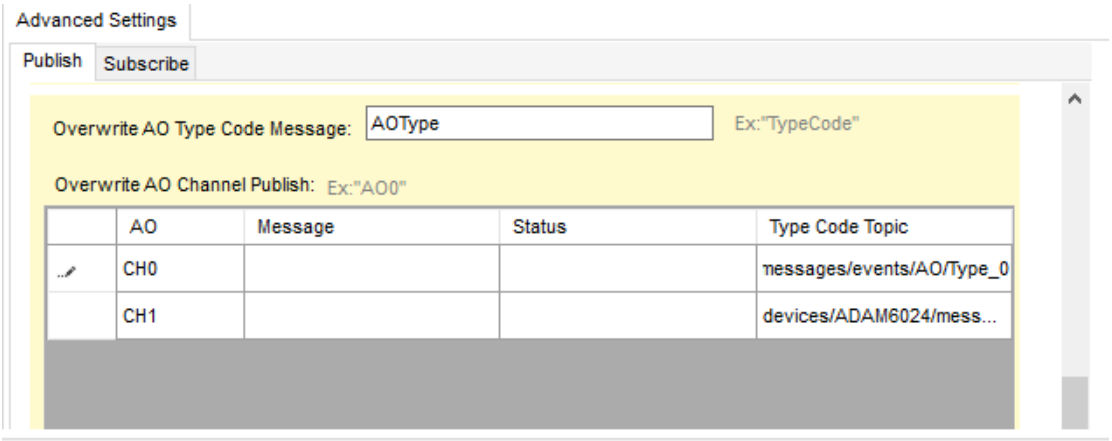



Figure 22. Publish AO Data Topic and Message

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCPAOMTx...x | Set the Publish AO channel type message of user define<br>aa: always 01<br>x…x: AI type message (0~63 character) | Return: >01<br>Error: ?01 |

| | | |
|---|---|---|
| %aaGETMQTPCPAOMT | Get the Publish AO channel type message of user define<br>aa: always 01 | Return: !AITypeMessage<br>Error: ?01 |
| %aaSETMQTPCPAOTTccx...x | Set the Publish AO channel type topic of user define<br>aa: always 01<br>cc: channel (hex format)<br>x…x: channel message (0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCPAOTTcc | Get the Publish AO channel type topic of user define<br>aa: always 01<br>cc: channel(hex format) | Return: !ChannelTypeTopic<br>Error: ?01 |

## 5.8.5 Subscribe DO Control Topic and Message

User can do customized setting DO control Topic name and DO control message name.

DO control Topic Default: $iothub/methods/POST/**ctl/don**

DO control Topic User defined: $iothub/methods/POST/**{property bag}**

- Device ID is get from device connect string
- Property bag need to use url-encoded format, when setting with Utility, special characters will be automatically converted to url-encoded.
- n (channel number) starts from 1

DO control message

Default example: {"v":1}

User defined example: {"data":1}

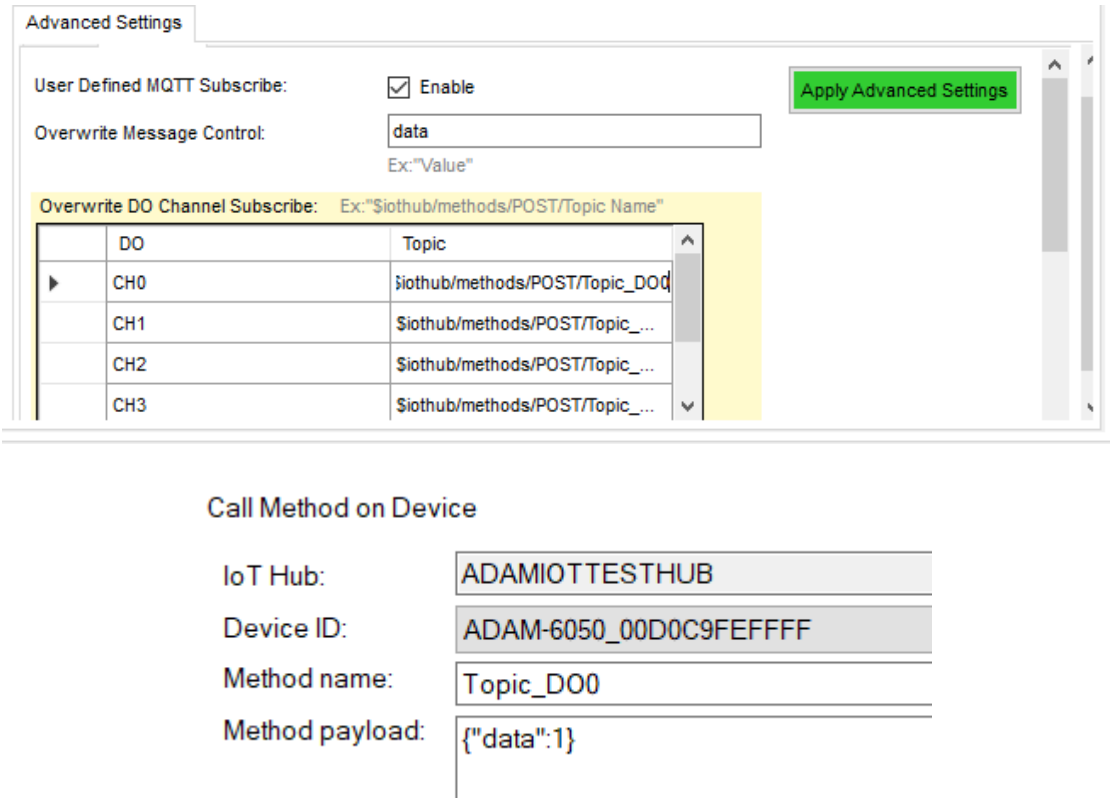



Figure 23. Publish DO Control Data Topic and Message

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCSMCTLx...x | Set the subscribe DO control message of user define<br>aa: always 01<br>x…x: DO message (0~63 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCSMCTL | Get the subscribe DO control message of user define<br>aa: always 01 | Return: !DOControlMessage<br>Error: ?01 |
| %aaSETMQTPCSTCTLccx...x | Set the subscribe DO control topic of user define<br>aa: always 01<br>cc: channel (hex format)<br>x…x: channel message (0~127 character) | Return: >01<br>Error: ?01 |

| | | |
|---|---|---|
| %aaGETMQTPCSTCTLcc | Get the subscribe DO control topic of user define<br>aa: always 01<br>cc: channel(hex format) | Return: ! DOControlTopic<br>Error: ?01 |

## 5.8.6 Subscribe AI Type Topic and Message

User can do customized setting AI Type Topic name and AI Type message name.

AI Type Topic Default: $iothub/methods/POST/**set/sensor/ain**

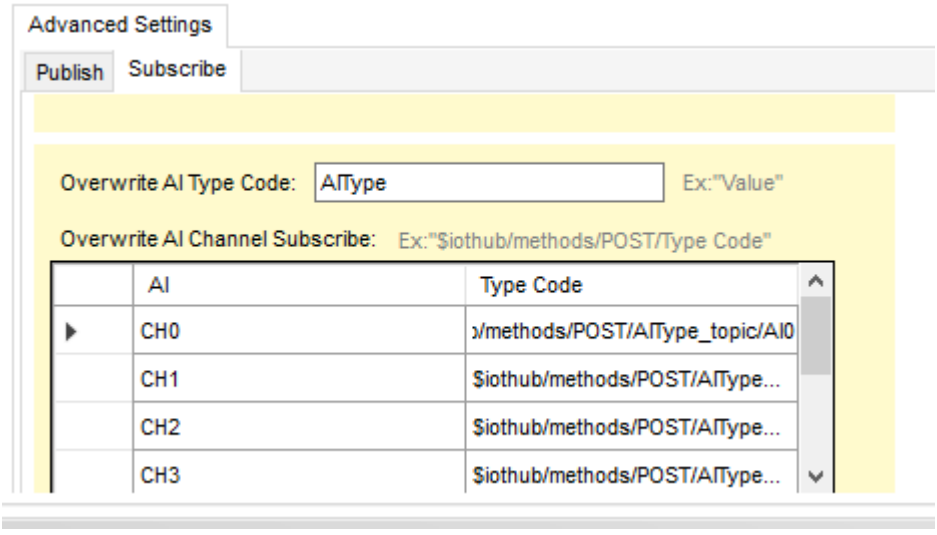
AI Type Topic User defined: $iothub/methods/POST/**{property bag}**

- n (channel number) starts from 1
- Type message format refer to 3.11.13

AI Type message

Default example: {"typ":"0-20mA"} or {"typ":"J Type:0-760C"}

User defined example: {"AIType":"0-20mA"} or {" AIType ":"J Type:0-760C"}



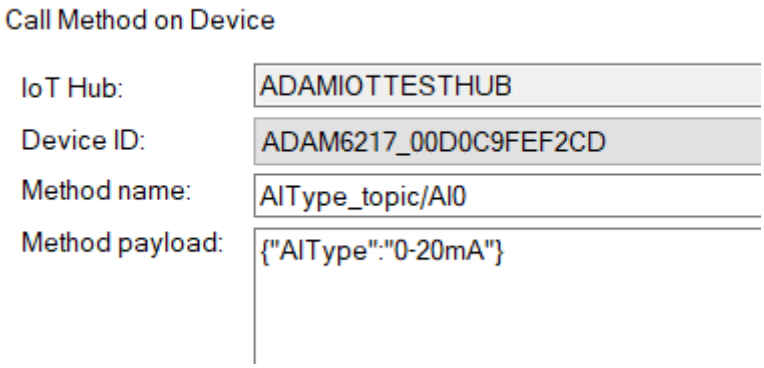



Figure 24. Subscribe AI Type Data Topic and Message

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCSMCFGx...x | Set the subscribe AI type message of user define<br>aa: always 01<br>x…x: DO message<br>(0~63 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCSMCFG | Get the subscribe AI type message of user define<br>aa: always 01 | Return: !AITypeMessage<br>Error: ?01 |
| %aaSETMQTPCSTCFGccx...x | Set the subscribe AI type topic of user define<br>aa: always 01<br>cc: channel (hex format)<br>x…x: channel message<br>(0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCSTCFGcc | Get the subscribe AI type topic of user define<br>aa: always 01<br>cc: channel(hex format) | Return: !AITypeTopic<br>Error: ?01 |

## 5.8.7 Subscribe AO Control Topic and Message

User can do customized setting AO control Topic name and AO control message name.

AO control Topic Default: $iothub/methods/POST/**ctl/aon**

DO control Topic User defined: $iothub/methods/POST/**{property bag}**

➢ Device ID is get from device connect string

➢ property bag need to use url-encoded format，When setting with Utility, special characters will be

automatically converted to url-encoded。

➢ n (channel number) starts from 1

AO control message
Default example: {"v":1.0}
User defined example: {"data":1.0}

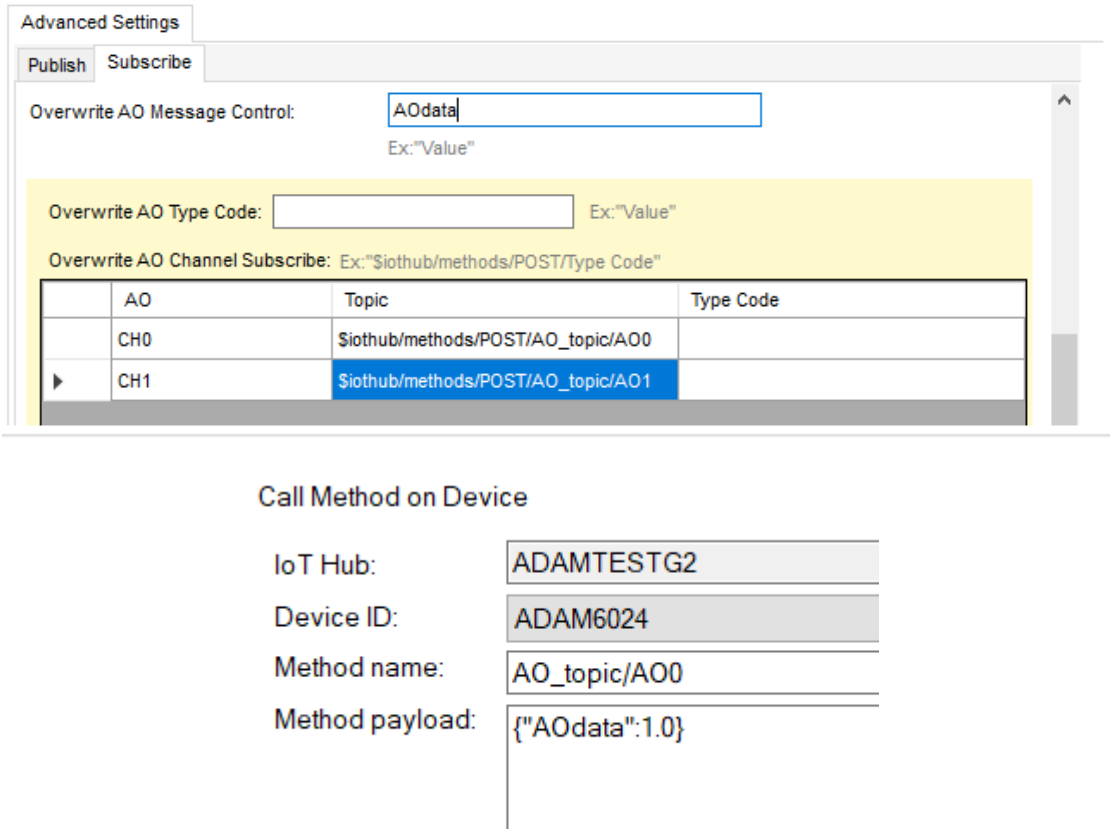



Figure 25. Subscribe AO Control Data Topic and Message

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCSMAOCTLx...x | Set the subscribe AO control message of user define<br>aa: always 01<br>x…x: AO message (0~63 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCSMAOCTL | Get the subscribe AO control message of user define | Return: !AOControlMessage<br>Error: ?01 |

| | | |
|---|---|---|
| | aa: always 01 | |
| %aaSETMQTPCSTAOCTLccx...x | Set the subscribe AO control topic of user define<br>aa: always 01<br>cc: channel (hex format)<br>x…x: channel message (0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCSTAOCTLcc | Get the subscribe DO control topic of user define<br>aa: always 01<br>cc: channel(hex format) | Return: !AOControlTopic<br>Error: ?01 |

## 5.8.8 Subscribe AO Type Topic and Message

User can do customized setting AO Type Topic name and AO Type message name.

AO Type Topic Default: $iothub/methods/POST/**set/sensor/aon**

AO Type Topic User defined: $iothub/methods/POST/**{property bag}**

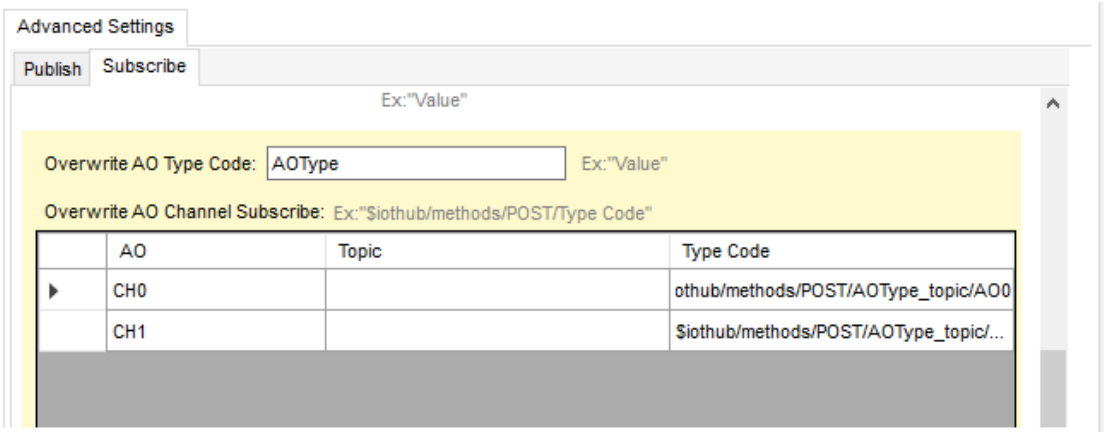
n (channel number) starts from 1

➢ Type message format refer to 3.11.13

AO Type message

Default example: {"typ":"0-20mA"}

User defined example: {"AOType":"0-20mA"}



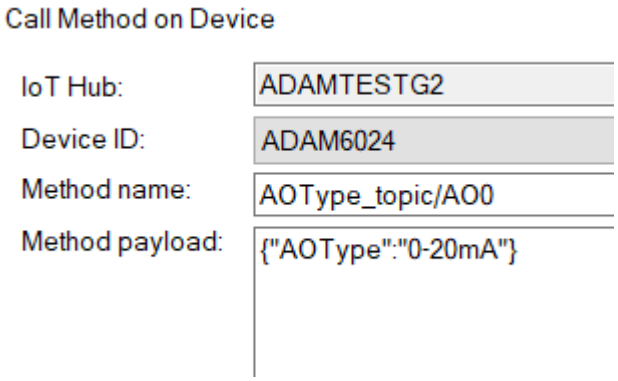



Figure 26. Subscribe AO Type Data Topic and Message

ASCII command:

| Command | Description | Remarks |
|---|---|---|
| %aaSETMQTPCSMAOCFGx...x | Set the subscribe AO type message of user define<br>aa: always 01<br>x…x: DO message (0~63 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCSMAOCFG | Get the subscribe AO type message of user define<br>aa: always 01 | Return: !AITypeMessage<br>Error: ?01 |
| %aaSETMQTPCSTAOCFGccx...x | Set the subscribe AO type topic of user define<br>aa: always 01<br>cc: channel (hex format)<br>x…x: channel message (0~127 character) | Return: >01<br>Error: ?01 |
| %aaGETMQTPCSTAOCFGcc | Get the subscribe AO type topic of user define<br>aa: always 01<br>cc: channel(hex format) | Return: !AITypeTopic<br>Error: ?01 |