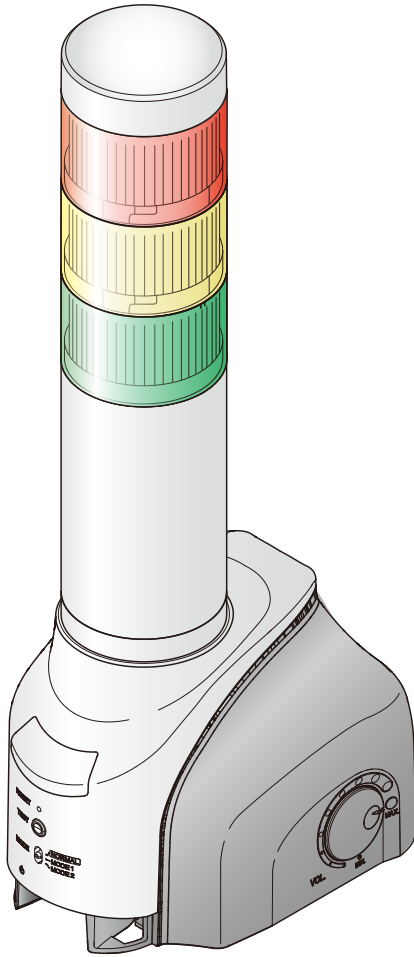


PATLITE®



Notice to Customer

Thank for your purchasing our PATLITE products. This document provides instructions for using AWS IoT Core to operate the NH-FV series. For installation and basic usage, refer to the "NH-FV Series User's Manual".

- Before using this product, read this manual and the "NH-FV Series User's Manual" thoroughly to ensure correct use.
- Amazon Web Services (AWS) is a cloud platform provided by Amazon Web Services, Inc. Operate only after confirming with personnel with a good understanding of AWS. If you have any technical questions about AWS, please contact Amazon Web Services, Inc.
- If you have any questions, please contact our service and repair desk.

Network Monitor Signal Tower with MP3
NH-FV Series

Instruction Manual Amazon Web Services (AWS) Procedure

Supported models

- **NHL-FV2**
- **NHP-FV2**
- **NHL-FV1**

Supported firmware Version 1.13 or later

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1. Before you begin







- The copyright for this document is owned by PATLITE Corporation (hereafter referred to as "our company"). Reproduction, duplication, or alteration of part or all of this document, without prior consent from PATLITE, is strictly prohibited.
- Specifications, designs, and other content in this manual are subject to change without prior notice, which may result in differences with the product that you purchased.
- This product (including software) is developed, designed and manufactured for general usage, such as office use, personal use, standard industry, and other related systems. Do not use, either directly or indirectly, in applications where a high level of safety is required or where human life is involved.

We shall not be held liable for any damages or losses, nor be held responsible for any claims by a third party, as a result of using this product for any purpose other than for general usage. When used with equipment and computer systems that require higher reliability than general usage, design safety into the system to cope with unforeseen operation of this product.

- We shall not be held liable for any damages or losses, nor be held responsible for any claims by a third party, as a result of using this product (including software).

1.1. About Safety Symbols

- The following symbols classify warnings and cautions, and describe the level of harm and damage that will occur when the corresponding instructions are ignored.

| | |
|---|--|
|  WARNING | This symbol indicates, "Failure to follow the instructions may lead to death or serious injury." |
|  CAUTION | This symbol indicates, "Failure to follow the instructions may lead to injury or property damage." |
|  Prohibited | This symbol identifies "Prohibited" operations that should never be carried out. |
|  Mandatory | This symbol identifies "Mandatory" instructions that should always be carried out. |
|  | This symbol identifies information that requires your attention at setup. |
|  | This symbol identifies supplementary information. |

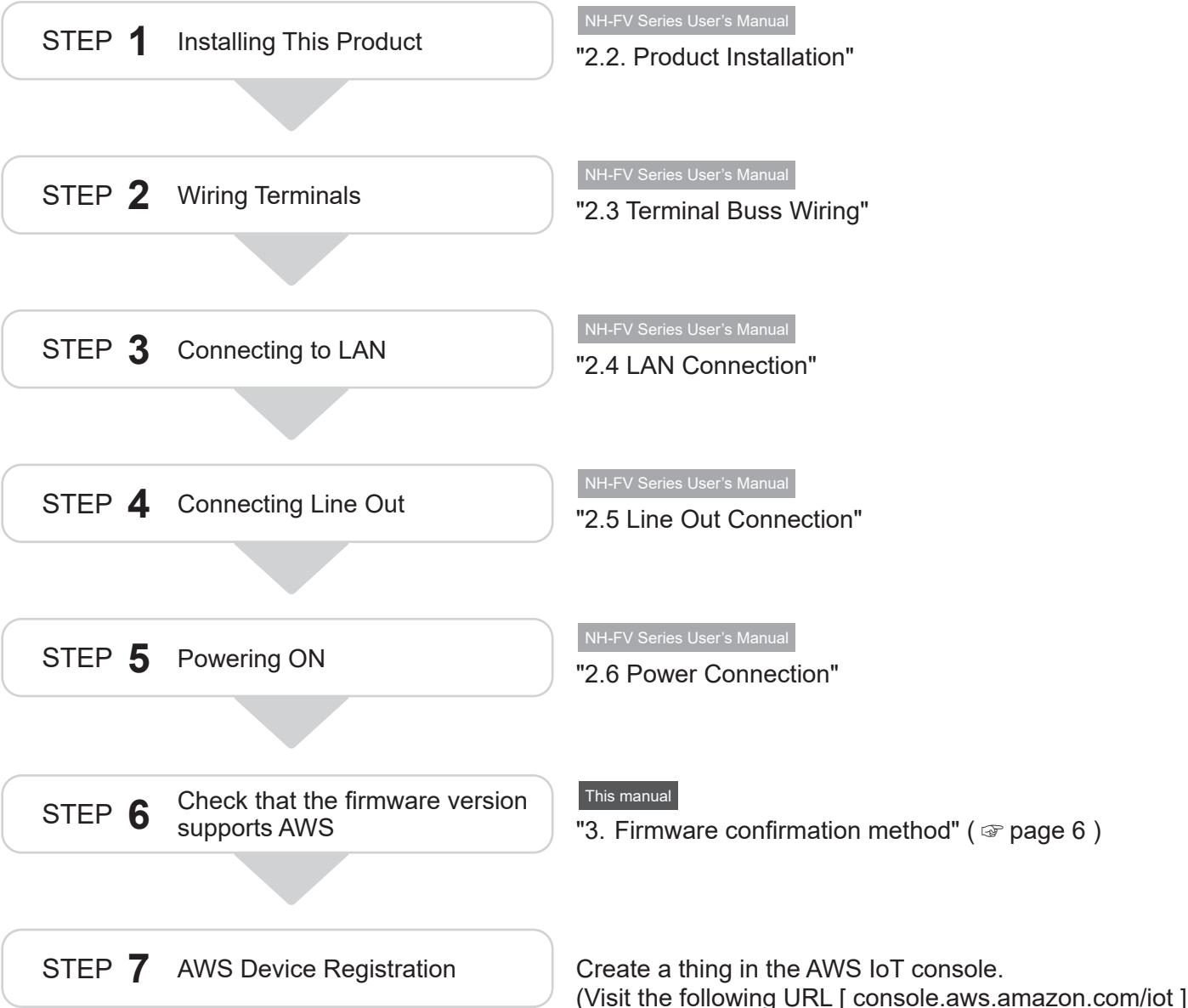
1.2. Registered Trademarks


- Amazon Web Services, the "Powered by AWS" logo, and name any other AWS Marks used in such materials are trademarks of Amazon.com, Inc. or its affiliates in the United States and/or other countries.
- Additionally, company names and product names described in this document are trademarks or registered trademarks of their respective owners.


2. Starting operations

This document describes the operation process on for using AWS IoT Core.
Operate while referring to this manual and the "NH-FV Series User's Manual".

2.1. Preparation



 ● When creating a thing, save the device certificate, private key, and root CA certificate.

● For saving, refer to "4.2. Create Thing and Certificate" ( page 10).

2.2. Settings

STEP 1 Network Settings


NH-FV Series User's Manual

"2.7 Network Setup"

"2.8 Network Setup with DHCP Function"

STEP 2 Cloud Connection Settings (AWS IoT Core)

This manual

"5. Configure NH-FV" ( page 12)



When the schedule function is enabled, it prevents connecting to the cloud.

STEP 3 Operation Settings

NH-FV Series User's Manual

"2.9 Operation Setup", "3 Functionality Details"



In the time settings, make sure you set the current time.

2.3. Operation

Using MQTT Subscribe Function

This manual

"6.1. Using MQTT Subscribe Function" ( page 15)

Using MQTT Publish Function

This manual

"6.2. Using MQTT Publish Function" ( page 16)

Using Device Shadow Function

This manual

"6.3. Using Device Shadow Function" ( page 17)

3. Firmware confirmation method

Check if the firmware version is compatible with AWS IoT Core.

If the version is incompatible, refer to "3.2. Firmware update" (👉 page 7).

3.1. Firmware version confirmation method

Caution Please change the network settings for the personal computer, so that the personal computer can communicate with this product.

1 Start a Web browser.

2 In the Web browser's address bar, enter the IP address* as set up on this product.

* The factory default IP address is 192.168.10.1.

3 Enter the password* and log in.

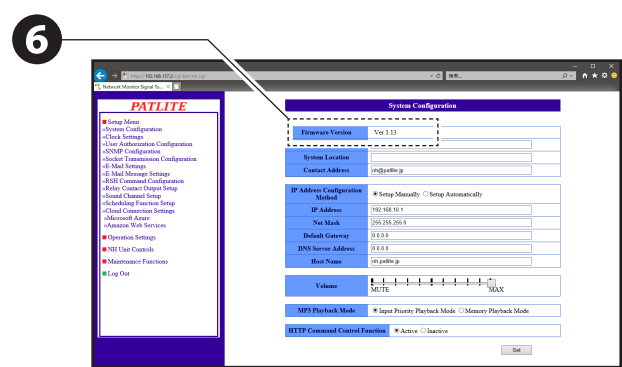
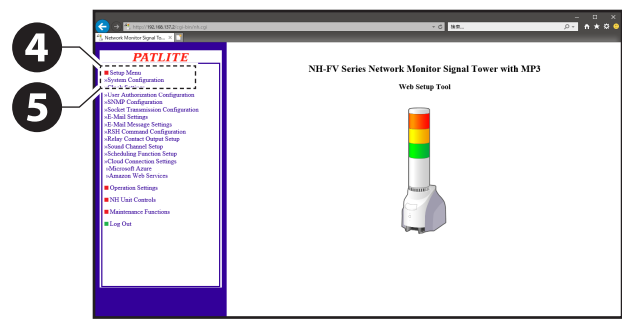
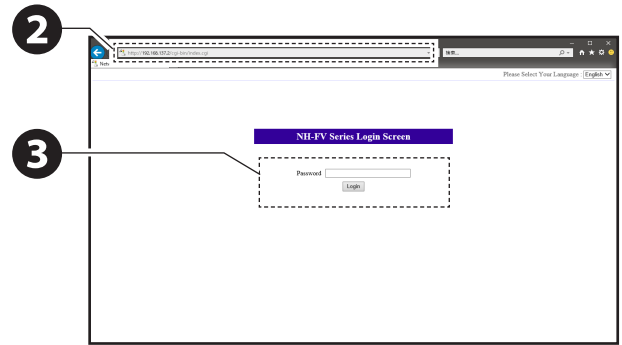
* The default password is patlite.

4 From the menu, click [Setup Menu] to expand the menu tree.

5 From the menu tree, click [System Configuration] to display the setting screen.

6 Check the version in the [Firmware Version].

* If the version is 1.12 or earlier, refer to "3.2. Firmware update" (👉 page 7).



3.2. Firmware update

1 Start a Web browser.

2 From [<https://www.patlite.com>], select [Products] [LAN/USB/PoE/Wireless].

3 Select [Network Products].

4 Select [NHL-3FV2 / NHP-3FV2].

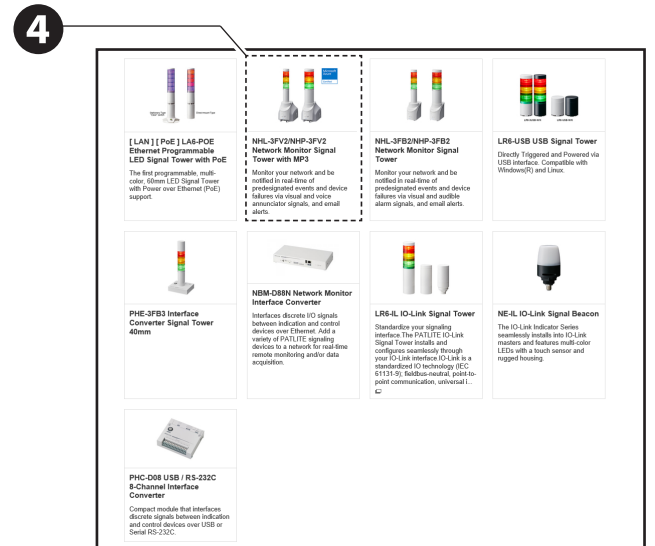
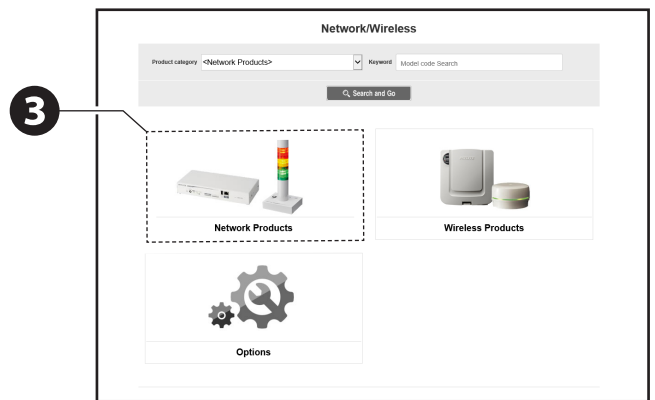
5 Select [File Downloads].

6 Download the firmware for NH-FV Series (Ver.1.13 or later).

7 Update the firmware.

NH-FV Series User's Manual

"3.24. Firmware Update Function"



4. Configure AWS IoT Core

This chapter describes the setting method on the AWS IoT Core.

Refer to the below document to set up your AWS account.

[<https://docs.aws.amazon.com/iot/latest/developerguide/setting-up.html>]

Hereinafter, the description will be described assuming that the settings of the following items have been completed.

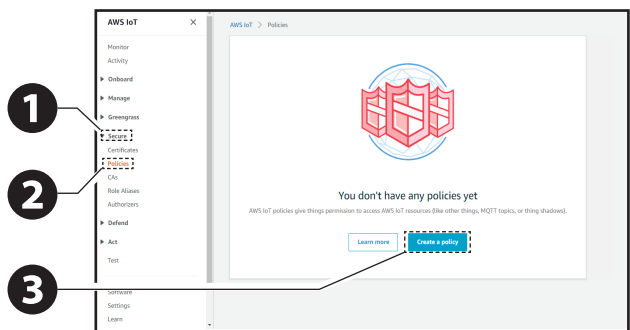


- Sign up for an AWS account
- Create a user and grant permissions
- Open the AWS IoT console

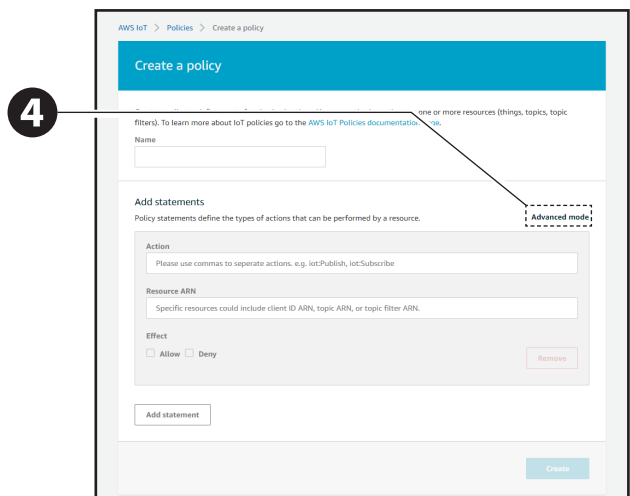
4.1. Create a Policy

Create a policy for NH-FV to connect to AWS IoT Core.

- 1 On the AWS IoT Console, click [Secure] in the navigation panel on the left.
- 2 Click [Policies].
- 3 Click [Create a policy].



- 4 Click [Advanced mode].




5 Enter the Name.

6 Enter the Policy.

An example policy is shown below.

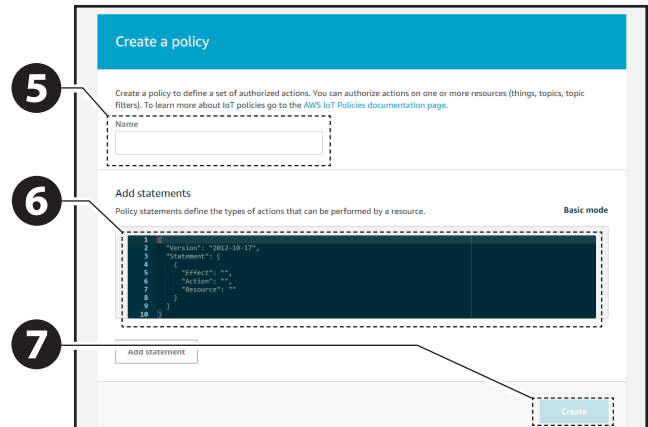
```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "iot:*",
      "Resource": "*"
    }
  ]
}
```

NOTE – All devices in your fleet must have credentials with privileges that authorize intended actions only, which include (but not limited to) AWS IoT MQTT actions such as publishing messages or subscribing to topics with specific scope and context. The specific permission policies can vary for your use cases. Identify the permission policies that best meet your business and security requirements.

 For sample policies, refer to <https://docs.aws.amazon.com/iot/latest/developerguide/example-iot-policies.html>

Also refer to <https://docs.aws.amazon.com/iot/latest/developerguide/security-best-practices.html>

7 Click [Create].



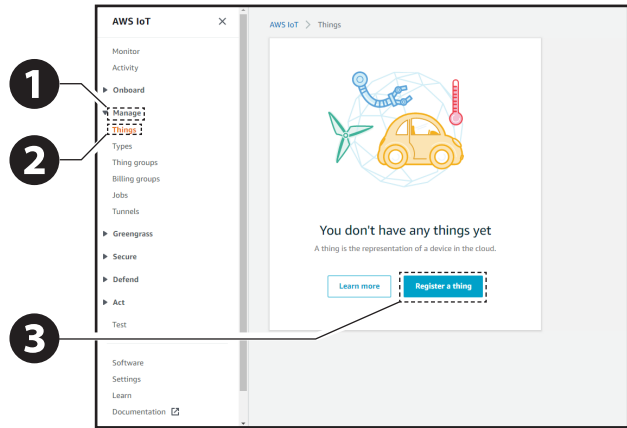
4.2. Create Thing and Certificate

When creating a thing in the AWS IoT console, follow the steps below to save the device certificate, private key, and root CA certificate.

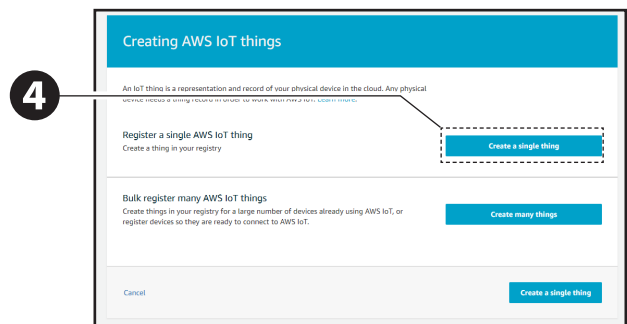
1 On the AWS IoT Console, click [Manage] in the navigation panel on the left.

2 Click [Things].

3 Click [Register a thing].

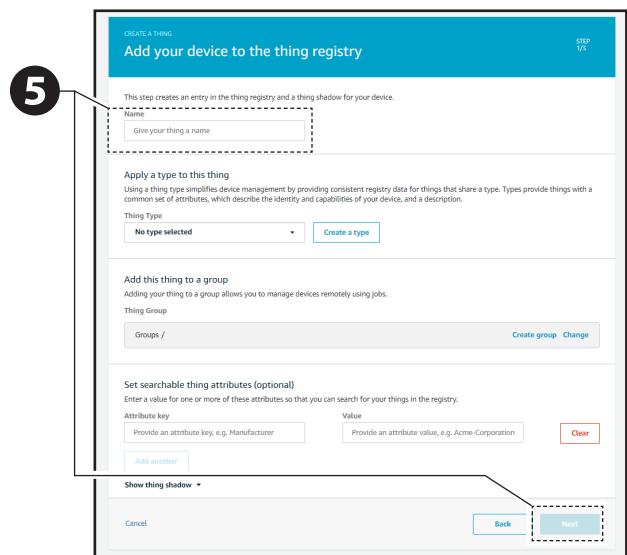


4 From the [Create AWS IoT things] screen, click [Create a single thing].



5 In the [Add your device to the thing registry] screen, enter a name and click [Next].

Caution
The input name used as Client ID. Client ID is required to use the Device Shadow Function. Refer to "7.1. Amazon Web Services (AWS) Connection Setup Screen, Names and Descriptions" (page 18).



6 In the [Add a certificate for your thing] screen, click [Create certificate].

7 For each item click [Download] to download [A certificate for this thing], [A private key], and [A root CA for AWS IoT].

MEMO

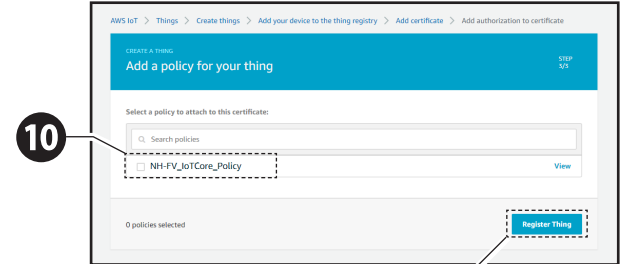
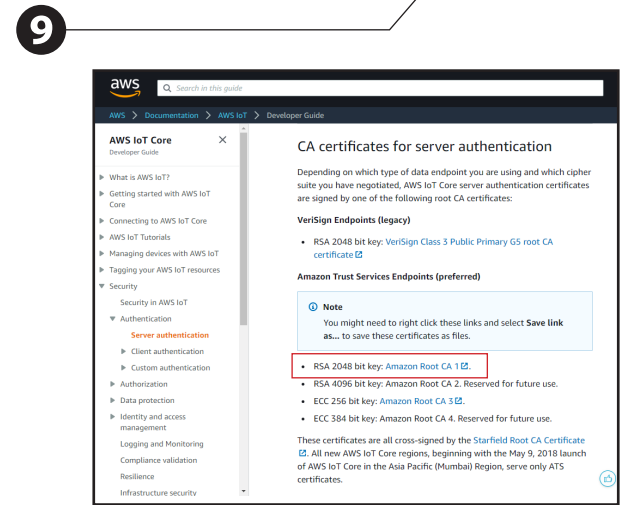
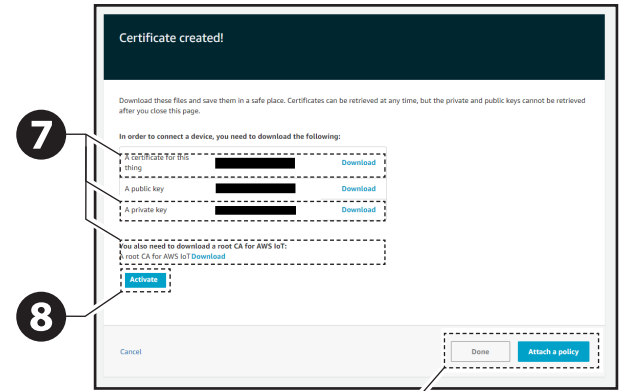
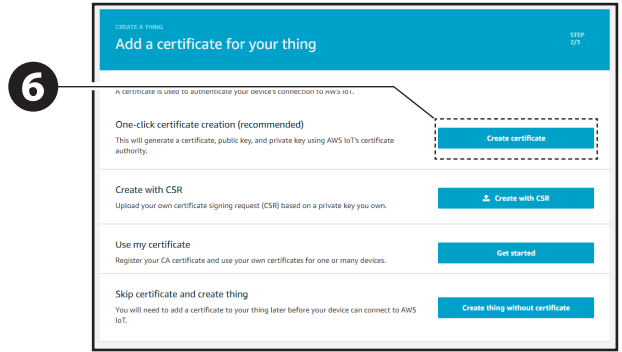
- For "Root CA," download the "RSA 2048 bit key: Amazon Root CA 1". Get from [<https://www.amazontrust.com/repository/AmazonRootCA1.pem>]
- Save [A public key] if required.

8 Click [Activate].

9 Click [Attach a policy] to attach policy to the device.

10 Select the policy.

11 Click [Register Thing].



5. Configure NH-FV

5.1. Connecting to AWS IoT Core

To connect this product to AWS IoT Core, follow the steps below.

Caution

- Please change the network settings for the personal computer, so that the personal computer can communicate with this product.
- This manual contains configuration examples when using Internet Explorer 11.
(Depending on the browser, the content displayed may differ.)

1 Start a Web browser.

2 In the Web browser's address bar, enter the IP address* as set up on this product.

* The factory default IP address is 192.168.10.1.

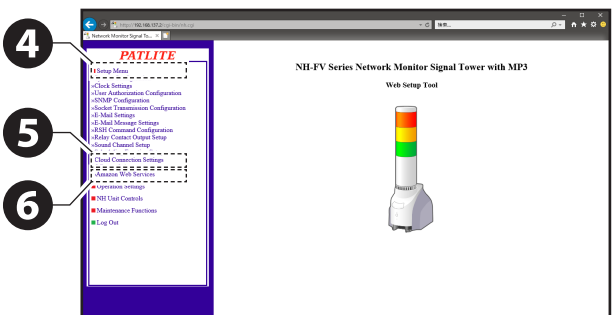
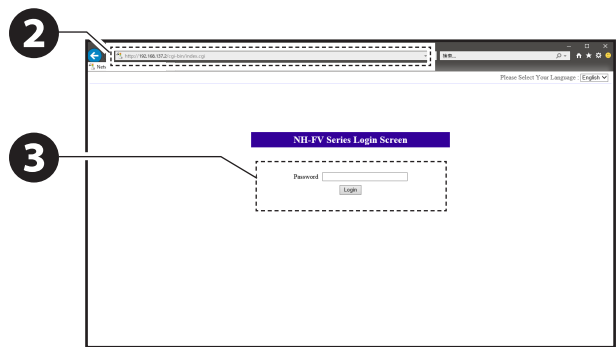
3 Enter the password* and log in.

* The default password is patlite.

4 From the menu, click [Setup Menu] to expand the menu tree.

5 From the menu tree, click [Cloud Connection Settings] to display the setting screen.

6 Click the [Amazon Web Services] sub menu, to view the set up screen.



7 Enter a value* in each field.

* Values entered in each field are as follows.

| Item | Value to enter |
|-----------------|--|
| Endpoint | Custom end point value obtained from the AWS IoT Console |
| Client ID | Thing name created in "2.1. Preparation" (page 4) |
| Subscribe Topic | Subscribe topic for this product Example, "NH-FV/SUBSCRIBE" |
| Publish Topic | Publish topic for this product Example, "NH-FV/PUBLISH" |

Go to the AWS IoT console.
[console.aws.amazon.com/iot]
MEMO In the navigation panel, choose [Settings].
The [endpoint] is listed under Custom endpoint.

8 Click [Set] to update with the defined settings.

Caution Using the Config Setting function you cannot read or write values.

9 Click [Browse] and select the certificate* to upload.

* In "4.2. Create Thing and Certificate" (page 10), certificate that was downloaded. Certificates uploaded for each item are as follows.

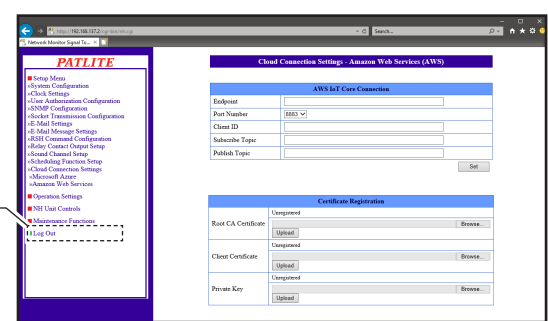
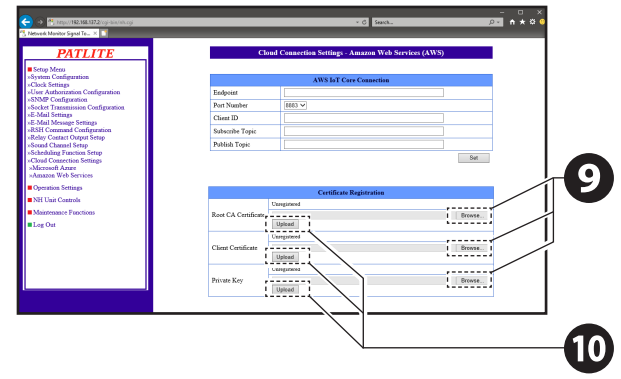
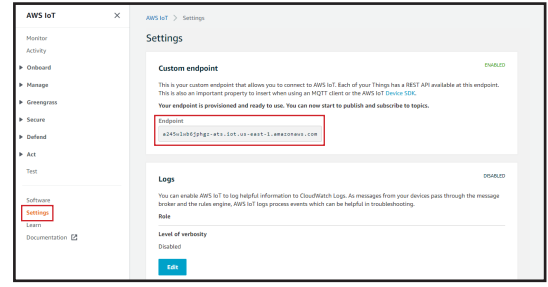
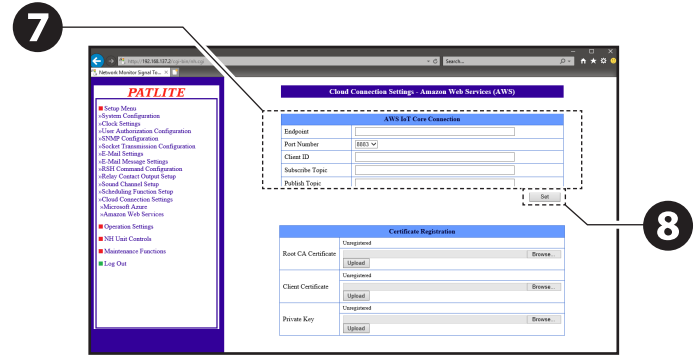
| Item | Certificate to upload |
|---------------------|-----------------------|
| Root CA Certificate | Root CA certificate |
| Client Certificate | Thing certificate |
| Private Key | Private key |

Caution Certificate file names must be 50 characters or less.
Do not contain the following characters: [<],[>],[],[&].
Do not use [.] at the beginning of a filename.

MEMO If the certificate has been uploaded, the file name of the uploaded certificate is displayed in each field.

10 Click [Upload].

11 From the menu, click [Logout] and the browser closes.



5.2. Confirm the connection with AWS IoT Core

Use the AWS "Test" function to Confirm that the NH-FV is connected.
 Follow the steps below to confirm that you can control the LED Unit.

- ① . On the AWS IoT Console, click [Test] in the navigation panel on the left.
- ② . AWS IoT > Test [MQTT client] screen is displayed.
- ③ . Enter the Subscribe Topic set in "5.1. Connecting to AWS IoT Core" (👉 page 12) in the [Publish] input field.
- ④ . Enter the control message.

Example

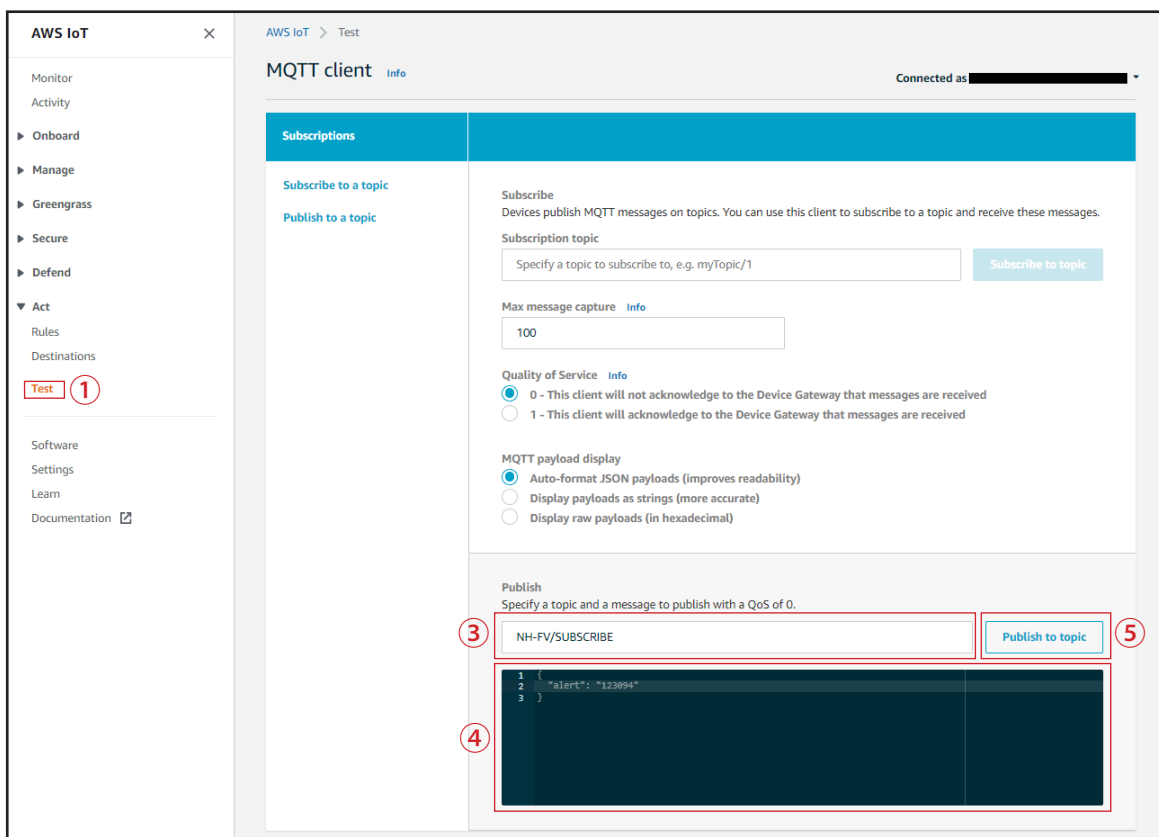
```
{
  "alert": "123094"
}
```

- ⑤ . Click [Publish to topic] to publish the message.
- ⑥ . Check the status of NH-FV.

If you send an example control message and it is controlled as follows, the connection is successful.

NH-FV state

"The red LED unit: Light on, The amber LED unit: Flashing 1, The green LED Unit: Flashing 2,
 The blue LED unit: Lights off, The white LED unit: No change, Buzzer: Pattern4"



If you can't confirm the operation, check the setting again from "4. Configure AWS IoT Core" (👉 page 8) or refer to "9. Troubleshooting" (👉 page 23)

6. Operation

6.1. Using MQTT Subscribe Function

- You can control this machine by issuing messages to the topic subscribed (Subscribe topic) by this machine. Information you can control is shown in the table below.
- For multiple instructions, separate them with a comma (,). Instructions are executed in order of priority, not in the order in which they appear.


Example

```
{
  "led_red": "1",
  "sound_pattern": "30",
  "repeat": "1"
}
```

| Item | Field name* | Priority |
|------------------------|----------------|----------|
| LED Unit and Buzzer | alert | 1 |
| LED Unit | led | 2 |
| LED Unit (red) | led_red | 2 |
| LED Unit (amber) | led_yellow | 2 |
| LED Unit (green) | led_green | 2 |
| LED Unit (blue) | led_blue | 2 |
| LED Unit (white) | led_white | 2 |
| Buzzer output | buz_pattern | 2 |
| Audio channel playback | sound_pattern | 2 |
| Digital output | digital_output | 2 |
| Repeat | repeat | 3 |
| Clear | clear | 4 |

* For information on the content of each field, refer to "8.1. MQTT Subscribe Function - Field Name List" ( page 20).



- To execute [Repeat], specify [Audio channel playback] and [Repeat].
- Do not specify [Buzzer] and [Audio channel playback] at the same time.
- If the same instruction is specified multiple times, that instruction will not execute.
- To set up Subscribe topics for this machine, refer to "7.1. Amazon Web Services (AWS) Connection Setup Screen, Names and Descriptions" ( page 18)
- When Subscribe topics are not set up, this function does not operate.

6.2. Using MQTT Publish Function

The change information for this machine is sent to the defined topic (Publish topic).
The change information you can send is as follows.

| Item | Field name* |
|------------------------|---------------------|
| LED Unit (red) | led_red |
| LED Unit (amber) | led_yellow |
| LED Unit (green) | led_green |
| LED Unit (blue) | led_blue |
| LED Unit (white) | led_white |
| Buzzer output | buz_pattern |
| Audio channel playback | sound_pattern |
| Digital output | digital_output |
| Clear | clear |
| Digital input | digital_input1 to 4 |
| Client ID | client_id |
| Publish topic | topic_name |

* For information on the content of each field, refer to "8.2. MQTT Publish Function - Field Name List" (☞ page 21).



- To set up Publish topics for this machine, refer to "7.1. Amazon Web Services (AWS) Connection Setup Screen, Names and Descriptions" (☞ page 18).
- When Publish topics are not set up, this function does not operate.
- Sends the current status of only changed items.

6.3. Using Device Shadow Function

Using the Device Shadow function, you can get the control and current status of this machine. The control and status information you can get is shown in the table below.

| Item | Field name* |
|------------------------|----------------|
| LED Unit (red) | led_red |
| LED Unit (amber) | led_yellow |
| LED Unit (green) | led_green |
| LED Unit (blue) | led_blue |
| LED Unit (white) | led_white |
| Buzzer output | buz_pattern |
| Audio channel playback | sound_pattern |
| Digital output | digital_output |

* For information on the content of each field, refer to "8.3. Device Shadow Function - Field Name List" (☞ page 22).



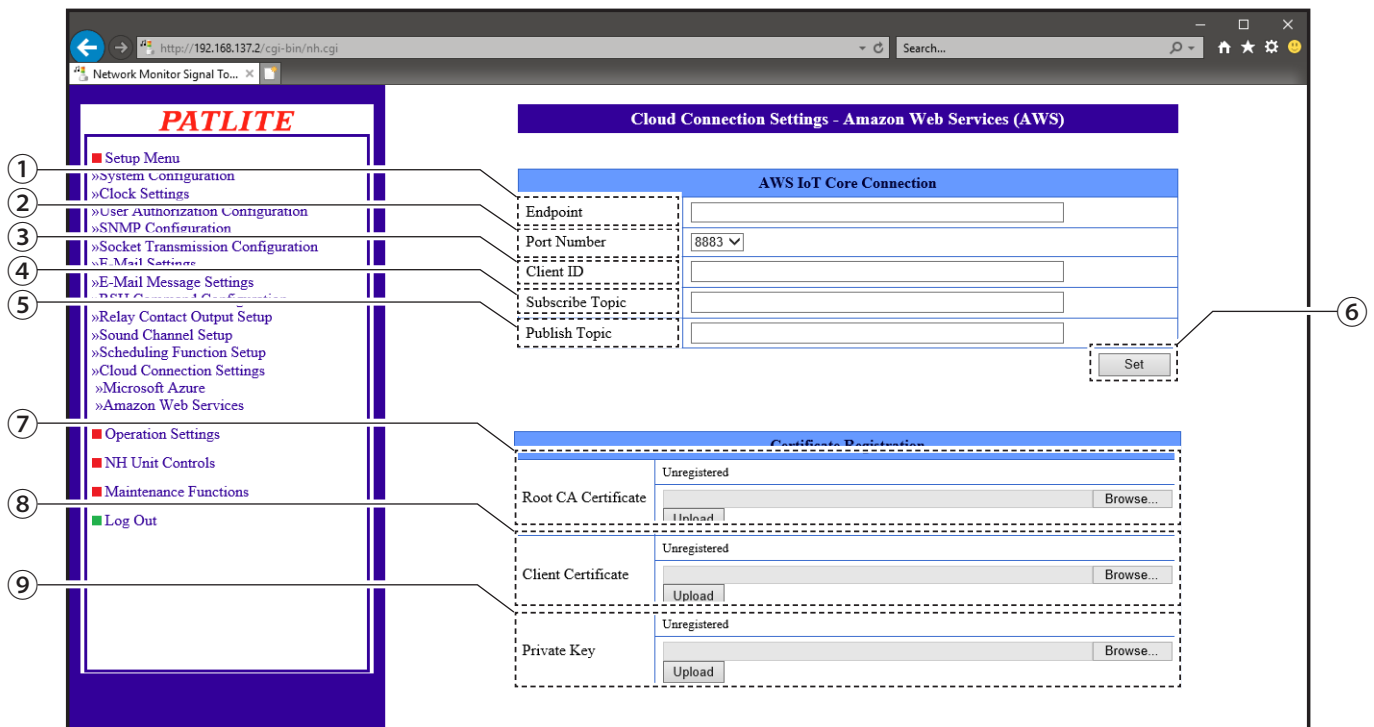
- Do not control the buzzer output and audio channel at the same time.
- If the same instruction is specified multiple times, that instruction will not execute.
- When Client ID are not set up, this function does not operate.

7. Functions

This chapter describes functions related to this product. For functions that are not described in this manual, refer to "3. Functionality Details" and "4. Function Setup" in the "NH-FV Series User's Manual".

7.1. Amazon Web Services (AWS) Connection Setup Screen, Names and Descriptions

Caution This manual contains configuration examples when using Internet Explorer 11.
(Depending on the browser, the content displayed may differ.)



| No. | Item | Description | Input range |
|-----|---------------------|--|--------------------------------|
| ① | Endpoint | Enter the AWS IoT Core custom end point | Up to 511 characters |
| ② | Port Number | Select the port number used to communicate with AWS IoT Core | 443 or 8883 |
| ③ | Client ID | Enter the name of the thing created in the AWS IoT console | Up to 127 characters |
| ④ | Subscribe Topic | Enter the user defined subscribe topic for this machine. | Up to 255 characters |
| ⑤ | Publish Topic | Enter the user defined publish topic for this machine | Up to 255 characters |
| ⑥ | Set button | Buttons for settings ① to ⑤ | - |
| ⑦ | Root CA Certificate | Uploads the root CA certificate | File name up to 50 characters* |
| ⑧ | Client Certificate | Uploads the client certificate | |
| ⑨ | Private Key | Uploads the client private key | |

* Do not contain [<], [>], [()], [&].
* Do not use [.] at the beginning of a filename.

7.2. About the Event Log Function

The machine's event log screen displays the following Amazon Web Services (AWS) event names.

| Event name | Event content | Event description |
|------------|---------------|--|
| AWS | CONNECT | Record when connecting to AWS. |
| | CONN_FAILED | Recorded when AWS connection fails. |
| | DISCONNECT | Record when closing the connection to AWS. |
| | CONTROL | Record when AWS operation is run. |

7.3. About Initialization Functions

At initialization, the values of each Amazon Web Services (AWS) setting are as follows.

| Item | Execution method | | | | |
|---------------------|---|---|--|---------------------------------|-------------------------|
| | WEB Setup Tool | | | Mode Switch Functions | |
| | Network also reinitializes check box selected | Playlist data also initialized check box selected | Either Network or Playlist check box cleared | Initialize network setting only | Initialization mode |
| Endpoint | Default value (empty) | | | Save set value | Default value (empty) |
| Port Number | Default value (8883) | | | Save set value | Default value (8883) |
| Client ID | Default value (empty) | | | Save set value | Default value (empty) |
| Subscribe Topic | Default value (empty) | | | Save set value | Default value (empty) |
| Publish Topic | Default value (empty) | | | Save set value | Default value (empty) |
| Root CA Certificate | Default value (empty) * | | | Save set value | Default value (empty) * |
| Client Certificate | Default value (empty) * | | | Save set value | Default value (empty) * |
| Private Key | Default value (empty) * | | | Save set value | Default value (empty) * |

* Certificates are erased from the machine when initializing.

8. Fields and descriptions

8.1. MQTT Subscribe Function - Field Name List

| No. | Field name | Data type | Value | Description |
|-----|----------------|-----------|---|--|
| 1 | alert | string | Set patterns in order: R (red) → Y (amber) → G (green) → B (blue) → C (white) → Z (buzzer). [RYGBC] 0: light off, 1: light on, 2: flashing 1, 3: flashing 2, 9: State maintained (no change) [Z] 0: Mute, 1: Buzzer pattern 1, 2: Buzzer pattern 2, 3: Buzzer pattern 3, 4: Buzzer pattern 4, 9: State maintained (no change) | Signal Light and Buzzer are controlled using a 6 character string. Example, "alert": "123094" "The red LED unit: light on, The amber LED unit: flashing 1, The green LED Unit: flashing 2, The blue LED unit: lights off, The white LED unit: no change, Buzzer: pattern4" |
| 2 | led | | Set patterns in order: R (red) → Y (amber) → G (green) → B (blue) → C (white). [RYGBC] 0: light off, 1: light on, 2: flashing 1, 3: flashing 2, 9: State maintained (no change) | Signal Light is controlled using a 5 character string. Example, "led": "10013" "The red LED unit: light on, The amber LED unit: lights off, The green LED Unit: lights off, The blue LED unit: light on, The white LED unit: flashing 2" |
| 3 | led_red | | 0: Light off 1: Light on 2: Flashing 1 3: Flashing 2 9: State maintained (no change) | Control the red LED unit. |
| 4 | led_yellow | | | Control the amber LED unit. |
| 5 | led_green | | | Control the green LED unit. |
| 6 | led_blue | | | Control the blue LED unit. |
| 7 | led_white | | | Control the white LED unit. |
| 8 | buz_pattern | | 0: Stop 1: Pattern 1 2: Pattern 2 3: Pattern 3 4: Pattern 4 9: State maintained (no change) | Control the buzzer. |
| 9 | sound_pattern | | 0: Stop, 1 to 70: Channel number | Play the specified audio channel. |
| 10 | repeat * | | 0 to 255: Number of times to repeat | Specify the number of times to repeat the audio. |
| 11 | digital_output | | 0: OFF, 1:ON, 9: State maintained (no change) | Control digital output. |
| 12 | clear | | 1: Execute clear | Turn off all the Signal Lights and stop playing the channel. |

* Set a value of 255 for endless playback.



- This will not run if an invalid value is specified.
- Do not control the buzzer and audio channel at the same time.

Example

- Turn red LED unit on and play audio channel 30 two times

```
{
  "led_red": "1",
  "sound_pattern": "30",
  "repeat": "1"
}
```

8.2. MQTT Publish Function - Field Name List

| No. | Field name | Data type | Value | Description |
|-----|----------------|-----------|---|--|
| 1 | client_id * | string | Setup Value | <ul style="list-style-type: none"> • Notification of client ID value. • Notification of the value as set in the Amazon Web Services (AWS) Connection Setup Screen. |
| 2 | topic_name * | | Setup Value | <ul style="list-style-type: none"> • Notification of Publish topic value. • Notification of the value as set in the Amazon Web Services (AWS) Connection Setup Screen. |
| 3 | led_red | | 0: Light off 1: Light on 2: Flashing 1 3: Flashing 2 | Notification of the red LED unit status. |
| 4 | led_yellow | | | Notification of the amber LED unit status. |
| 5 | led_green | | | Notification of the green LED unit status. |
| 6 | led_blue | | | Notification of the blue LED unit status. |
| 7 | led_white | | | Notification of the white LED unit status. |
| 8 | buz_pattern | | 0: Stop 1: Pattern 1 2: Pattern 2 3: Pattern 3 4: Pattern 4 | Notification of the buzzer status. |
| 9 | sound_pattern | | 0: Stop, 1 to 70: Channel number | Notification of the audio channel status. |
| 10 | digital_output | | 0: OFF 1: ON | Notification of the digital output status. |
| 11 | digital_input1 | | | Notification of the digital input status. |
| 12 | digital_input2 | | | |
| 13 | digital_input3 | | | |
| 14 | digital_input4 | | | |
| 15 | clear | | 1: Press clear switch | Notification that clear switch was pressed. |

* "client_id" and "topic_name" are always included at the start of the message.


Example

•Amber LED unit is on and buzzer pattern 1 is sounding

```
{
  "client_id": "NH",
  "topic_name": "NH/Publish",
  "led_yellow": "1",
  "buzzer_pattern": "1"
}
```

8.3. Device Shadow Function - Field Name List

| No. | Field name | Data type | Value | Description |
|-----|----------------|-----------|--|------------------|
| 1 | led_red | integer | 0: Light off 1: Light on 2: Flashing 1 3: Flashing 2 9: State maintained (no change) | LED Unit (red) |
| 2 | led_yellow | | | LED Unit (amber) |
| 3 | led_green | | | LED Unit (green) |
| 4 | led_blue | | | LED Unit (blue) |
| 5 | led_white | | | LED Unit (white) |
| 6 | buz_pattern | | 0: Stop 1: Pattern 1 2: Pattern 2 3: Pattern 3 4: Pattern 4 9: State maintained (no change) | Buzzer control |
| 7 | sound_pattern | | 0: Stop, 1 to 70: Channel number | Audio channel |
| 8 | digital_output | | 0: OFF 1: ON 9: State maintained (no change) | Digital output |

 This will not run if an invalid value is specified.

Example

- Notification that green LED unit is on and audio channel 50 is playing

```
"state": {
  "reported": {
    "led_red": 0,
    "led_yellow": 0,
    "led_green": 1,
    "led_blue": 0,
    "led_white": 0,
    "buz_pattern": 0,
    "sound_pattern": 50,
    "digital_output": 0
  }
}
```

- Control to stop playing audio channel and turn ON digital output

```
"state": {
  "desired": {
    "sound_pattern": 0,
    "digital_output": 1
  }
}
```

9. Troubleshooting

Use in combination with "8. Troubleshooting" in the "NH-FV Series User's Manual".

| Problem | Check content |
|--|---|
| LED unit does not run as expected | Confirm the Amazon Web Services (AWS) Connection Setup is correct. |
| | Confirm field names and values are specified correctly. |
| | Confirm the Client ID and topic names do not conflict with other NH-FV. |
| AWS IoT Core cannot be connected | Confirm the Endpoint and Client ID are set up correctly in the Amazon Web Services Setup Screen. |
| | Confirm the Amazon Web Services Setup Screen's root CA certificate, Client Certificate, and Private key are uploaded properly. |
| | Confirm the certificate and policy are attached to the thing created in the AWS IoT console. |
| | Make sure the product's time setting is correct. |
| MQTT Publish function does not notify changes in digital input | Check the signal definition in the digital input settings. Notify when there are changes according to the specified definition. |
| Certificate cannot be uploaded | Certificate file name is too long. Shorten the file name and try uploading again. |

10. License agreement

10.1.APACHE LICENSE, VERSION 2.0

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