

**NOVAKON**

*HMI—Your Intelligent IIoT Gateway Solutions*

# iM-Connect Universal<sup>®</sup>

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## Protocol Conversion Software User Guide

*Version Novakon\_2.2.24.07*

1306.0037

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# 1. Log in to the Web

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When you enter the web page for the first time, the home page of the company profile (About) is shown. With the change of the operation screen, the page that a user leaves at last time would be shown in the next visit.

Open the browser and enter the URL to enter the login page.

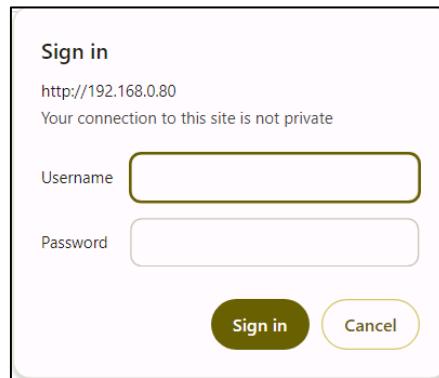
<http://hostip:8080/novakon-im-connect>

Open IEM/IED connected from remote access

Enter the specified User name and Password to enter iM-Connect Universal.

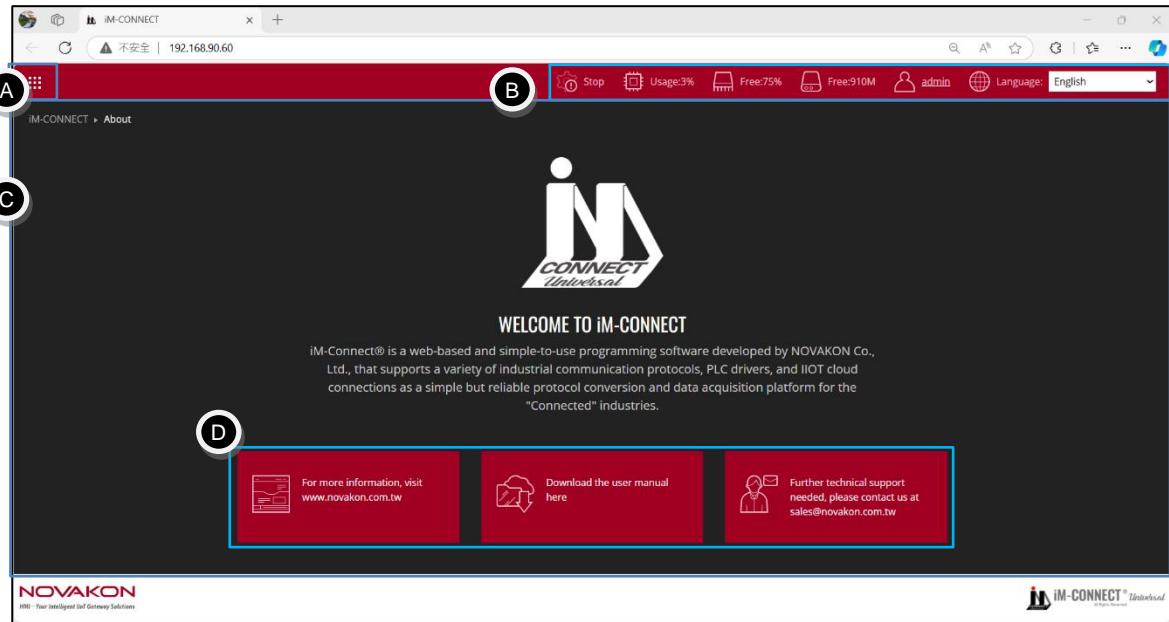
Default User name:[admin]

Default password:[5c17f1d7aa66475300]



## 2. Interface Description

After entering the URL and logging in, the following webpage is displayed.



Ⓐ IM-CONNECT UNIVERSAL Menu	Ⓑ System Status Bar
Ⓒ Operation Setting Area	Ⓓ External Links

- Ⓐ Click the button to open the [IM-CONNECT UNIVERSAL]Menu. Then, choose the action to be performed:





[IM-CONNECT UNIVERSAL]website options:

IM-CONNECT UNIVERSAL Menu	
1.	ABOUT
2.	PLC SETTING
3.	TAG SETTING
4.	DATA LOGGER
5.	ALARM
6.	MQTT
7.	MACRO EDITOR
8.	OPCUA
9.	REST API
10.	ONLINE MONTOR
11.	PROJECT SETTING
12.	SYSTEM SETTING
12.1	Date and Time
12.2	Security Setting
12.3	Service Status

(B) System Status Bar:



	Display whether the RT is running or stopped.
	Display the percentage of current CPU usage.
	Display the remaining capacity of SDRAM.

	Display the remaining capacity of Flash.
	Press to log out current user.
	The language to be displayed in the interface and on the webpage. 2 options are available at this moment, including [English], [Traditional Chinese], [Simple Chinese] and [Japanese].

④ Operation Setting Area: The selected function can be set up and performed in this area.

⑤ External Links: By clicking the buttons, you can access to Novakon official website for product introduction, document download or contact us for technical support.

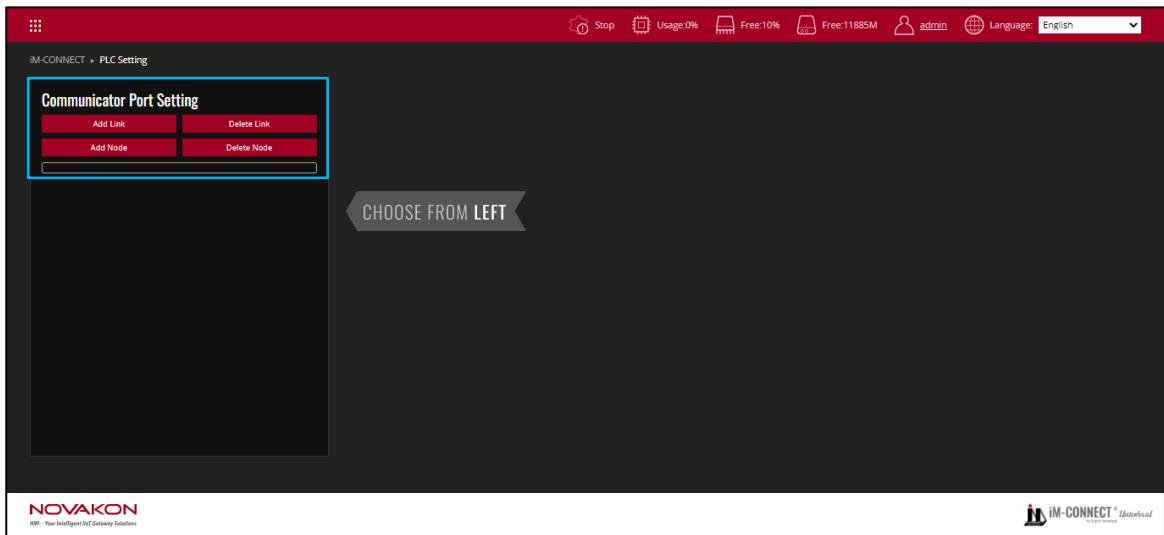
The related settings and operations of each function are introduced in the following chapters.

### 3. PLC Setting

In the industrial automation applications, control and monitoring through the connection with PLC (Programmable Logic Controller) or controllers is very common. NOVAKON provides PLC Drivers that support various industrial communication protocols and PLC models widely used in the markets.

#### Communication Port Setting

First, set the communication port and related parameter to be used.

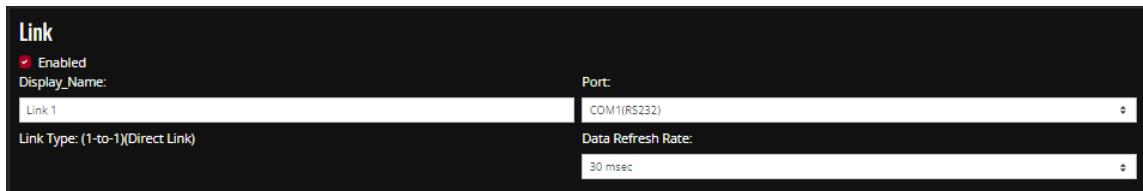


Add Link	Add a new link to be connected.
Delete Link	Check the box of the link desired to be deleted. After pressing[Delete Link], a dialog box would pop up for the user to confirm to delete a LINK.  Press [Yes] to delete the selected link. Press [No] to cancel this action.

	<div style="border: 1px solid #ccc; padding: 10px; width: fit-content; margin: auto;"> <p>Are you sure to delete this? <span style="float: right;">×</span></p> <p>1 device(s) attached to this link.</p> <p>Delete anyway?</p> <div style="text-align: center; margin-top: 10px;"> <span style="background-color: #800000; color: white; border: 1px solid black; padding: 2px 10px; border-radius: 5px;">OK</span> <span style="margin: 0 10px;"> </span> <span style="background-color: #800000; color: white; border: 1px solid black; padding: 2px 10px; border-radius: 5px;">Cancel</span> </div> </div>
Add Node	Add a node to the selected Link.
Delete Node	Delete the selected node directly in the Link.

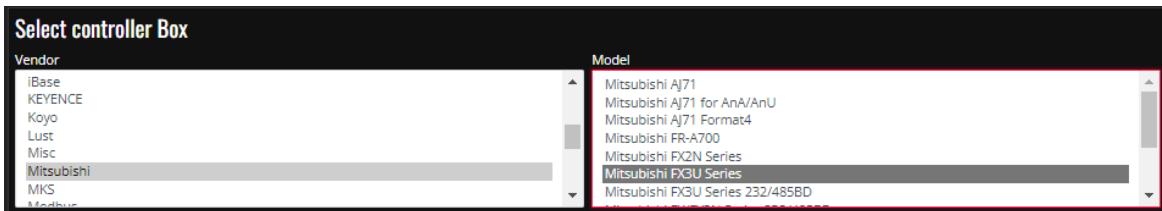
After adding a new link, the related details of the Link can be set up, such as the communication port to be used, PLC model (Protocol type), communication parameters, etc.

## Link Setting

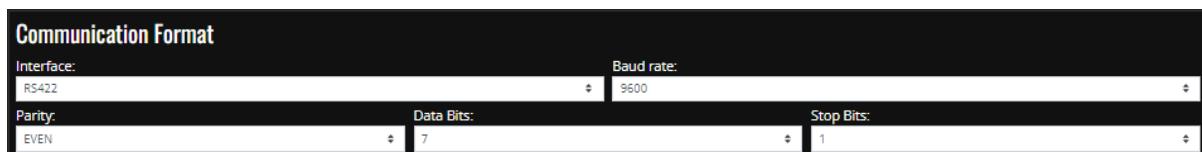


Enable	Check this box to activate the connection. The [Enable] is checked by default after the connection is established.
Display_Name	The name of the connection to be displayed. The default name is Link1.
Port	Select the communication port to be used. Based on different scenarios, one can select the corresponding communication ports, including[COM1(RS232)] 、[COM1(RS422/RS485] 、[Ethernet].
Link Type	Indicating the current connection type of the control is 1 to 1 direct

	connection (1-to-1).
Data Refresh Rate	To set the speed and frequency of receiving data from the controller.

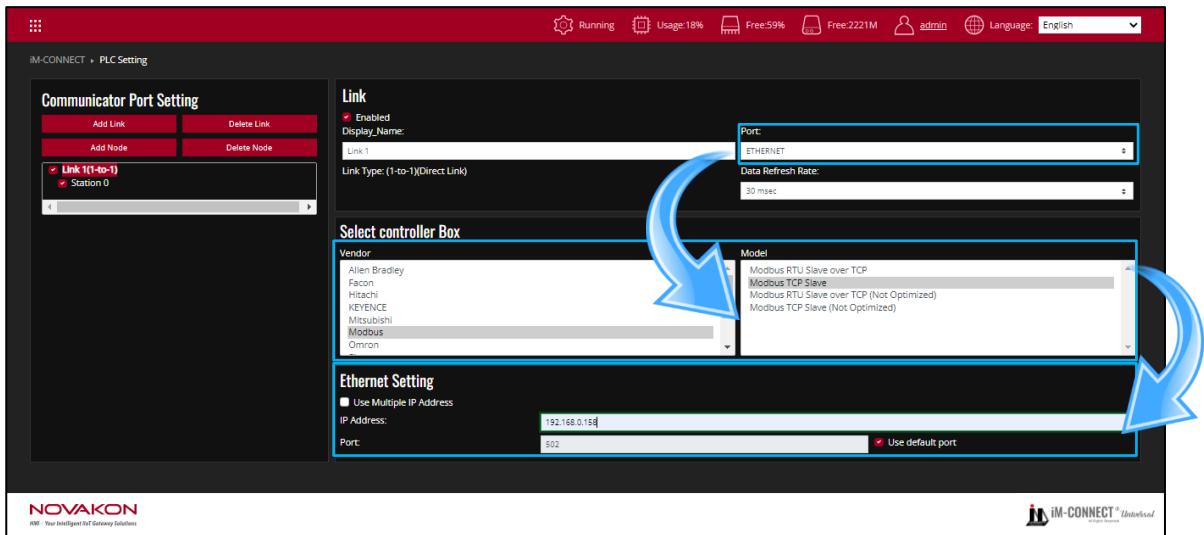


Select controller Box	Currently supported controller vendor and model. Please choose the vendor and then choose the model. For example, when COM is selected, only PLC models that support COM Port would be displayed. Likewise, when Ethernet is selected, only PLC models that support Ethernet are displayed.
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Communication Format	Set the communication format.
Interface	Select RS232, RS422, or RS485.
Baud rate	Select 4800, 9600, 19200, 38400, 57600, 115200, or 187500.
Parity	Select Even, None, or Odd.
Data Bits	Select 7 Bit or 8 Bit.
Stop Bits	Select 1 Bit or 2 Bit.

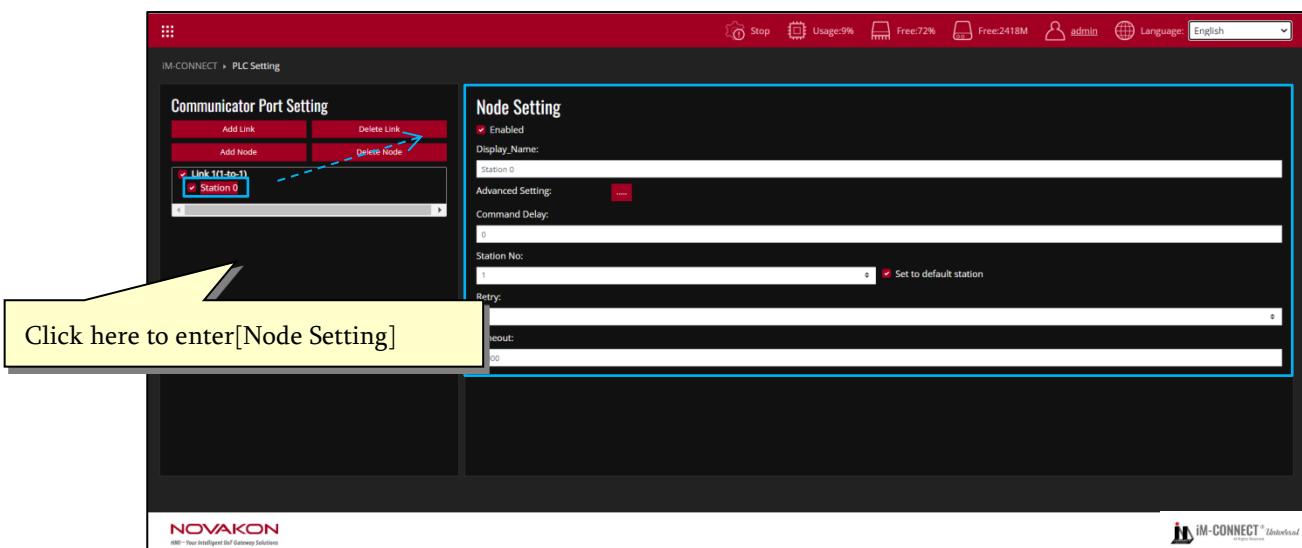
When the port is selected as Ethernet, only drivers that support Ethernet would be displayed, and the interface would be changed to the settings for Ethernet accordingly.



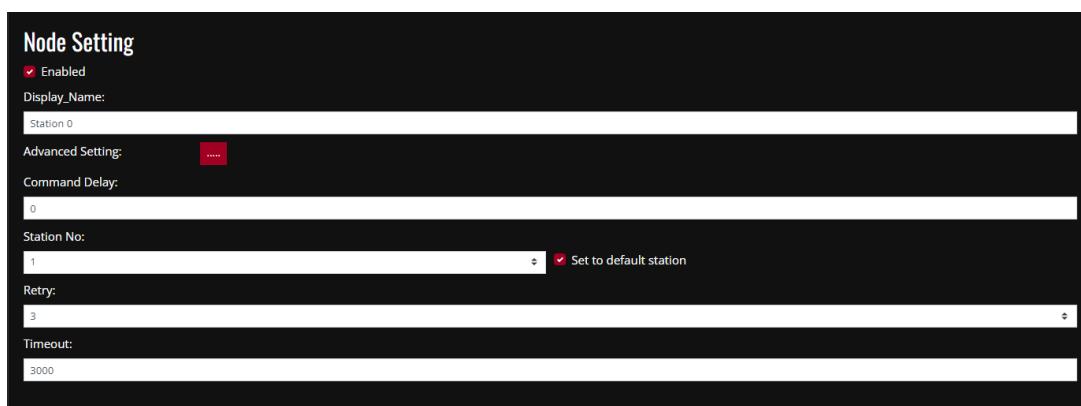
Ethernet Setting	Set Ethernet related parameters
IP Address	Set the IP address of the controller to be connected.
Port	Set the port number of the controller to be connected.
Use default port	Check to use the default port number; if you want to enter the port number yourself, uncheck it and enter it directly.

## Node Setting

Node Setting is mainly used as auxiliary settings for connections, including information such as [Command Delay], [Station No], [Retry] and [Timeout].



Double Click[Link1]to display[Station 0]. Click[Station 0]to enter Node Setting page.



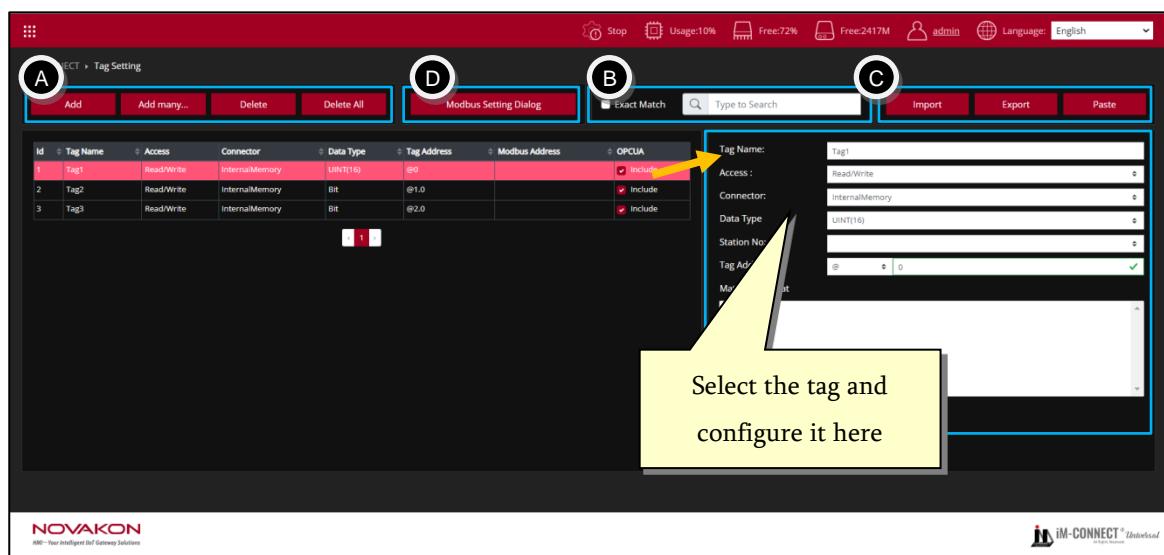
Enable	Check this box to activate the node. This [Enable] box is checked by default when a node is created.
Display_Name	Set the name of selected node. Default name is Station 0.
Advanced Setting	Set the system to show connection status when there's error.  Advanced Setting Dialog Status Tag (0: OK ; 1: Error) <input type="text"/> + <input type="text"/> Control Tag (1: Connect ; 0: Disconnect) <input type="text"/> + <input type="text"/>  Ok Cancel

	<p>[Status Tag]:Status of connection (0 means connected; 1 means disconnected) .</p> <p>[Control Tag]:The status of whether the connection is controlled. Tag value of 0 indicates disconnection, while 1 indicates connection.</p>
Command Delay	The delay time for sending and receiving of commands to the controller. The unit is milliseconds.
Station No	Link to the controller corresponding to each node. You can set this station number as the default station number to facilitate linking with tags. If the PLC station number changes, the corresponding node station number must also change accordingly. If "Set as Default Station Number" is checked, the station number of this node will automatically correspond to the default value, so there is no need to specify the station number separately in the address of the tag settings. However, if other nodes are set in the project, the station number of each individual tag used must be specified one by one.
Retry	The number of times the confirmation signal would be automatically resent when the communication is abnormal.
Timeout	The waiting time before the connection is terminated and an error occurs when the communication is abnormal. The unit is milliseconds.

## 4. Tag Setting

Tag is closely related to each service, and almost all functions need well-defined tags. The way of using a tag is different for each function; however, setting a tag is quite similar. There are many benefits of using tags. One of them is to allow users to effectively summarize and organize the registers used by the controller.

Each ID represents a tag, which can correspond to the register address of a PLC or controller. If the registration number is not set, an error message would appear when entering the registered address and compiling.

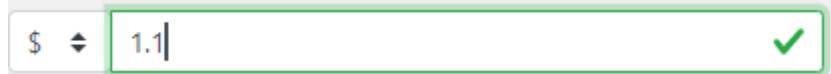


### A. Tag operation:

#### Add

One tag can be added at a time. After pressing the [Add] button, the complete content of the tag can be created in sequence.

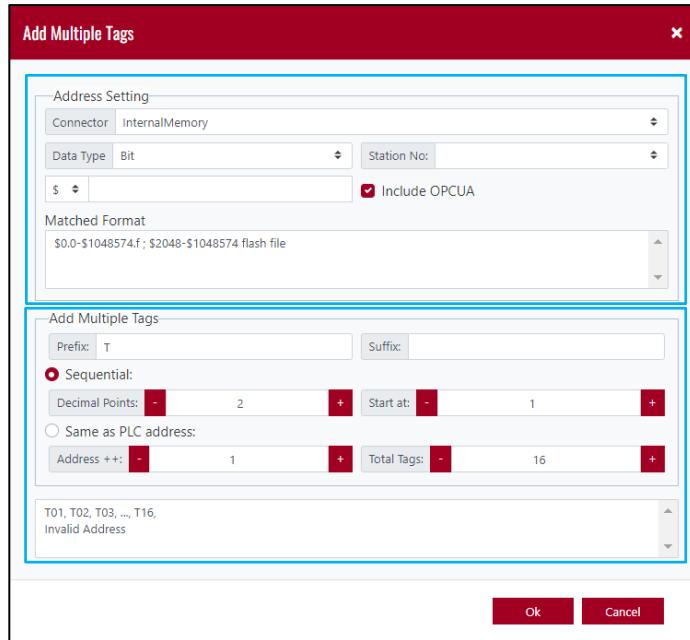
Tag_Name	Each tag can be assigned a tag name. The name supports multi-language input, and the name in English is case-sensitive (for example, Apple and
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	apple represent two different tag names). The tag name must not be duplicated.
Access	Set the tag to be[Read/Write]or[Write Only].
Connector	Select the controller or the InternalMemory of Gateway to be used.
Data Type	Select the data type, including[Bit],[INT(8)],[UINT(8)], [INT(16)],[UINT(16)],[INT(32)], [UINT(32)],[FLOAT],[Ascii], [DOUBLE],[Ascii],[INT(64)],[UINT(64)]
Station No	The station number of the controller to be used. Some controllers have different station numbers, such as thermostats that use the Modbus protocol.
Modbus Address	The value of this address can be copied to the specified Modbus address.
Tag Address	<p>The address of the register. If the format or range of the register is unknown, please refer to the prompt in the [Matched Format] window below, which display such information for the input of [Tag Address].</p> <p>The figure below shows that a green frame would appear if the entered address meets the format.</p>  <p>The figure below shows that a red frame would appear if the entered address does not meet the format.</p>  <p>If the selected connection is [InternalMemory], it means that no external controller is connected, and only the internal register provided by GATEWAY is used. There are currently two register codes that can</p>

	<p>be used:</p> <p>[\\$]: This code represents the memory retaining with power off. When GATEWAY is restarted, the original data is still saved. The range is from \$0 to \$1048574, of which \$2048 to \$1048574 are stored in Flash.</p> <p>[@]: This code represents the memory not retaining with power off. When GATEWAY is restarted, the original data is not saved. The range is from @0 ~ @65535.</p> <p>The above-mentioned two register codes can be used without actual connection to external controller as long as the setting conforms to the data type format.</p> <p>For example, when @0 (16-bit) is presented as a bit type, the expression is @0.0 ~ @0.f. It can be understood that it is a squad of the troop. The left side of the decimal (integer place) means the number of squads, and the right side of the decimal (decimal place) is the squad number in the squad.</p>
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## Add many...

Multiple consecutive tags can be added at one time.



## Address Setting

Selection of Connector, Data type, Station No, and address.

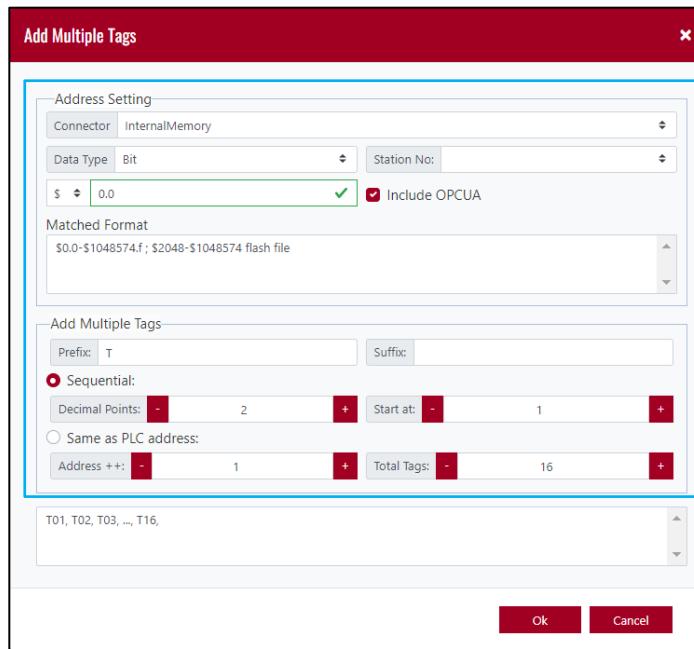
Connector	Selection of the controller to be used when adding new addresses.
Data Type	Selection of the type of data to be used when adding new addresses.
Station No	Selection of the station number of the controller to be used when adding new addresses.
Address	Enter the starting register address of the new tag.
Matched Format	This displays the format of the register address that the user can reference.

## Add Multiple Tags

Set the format of add multiple tags.

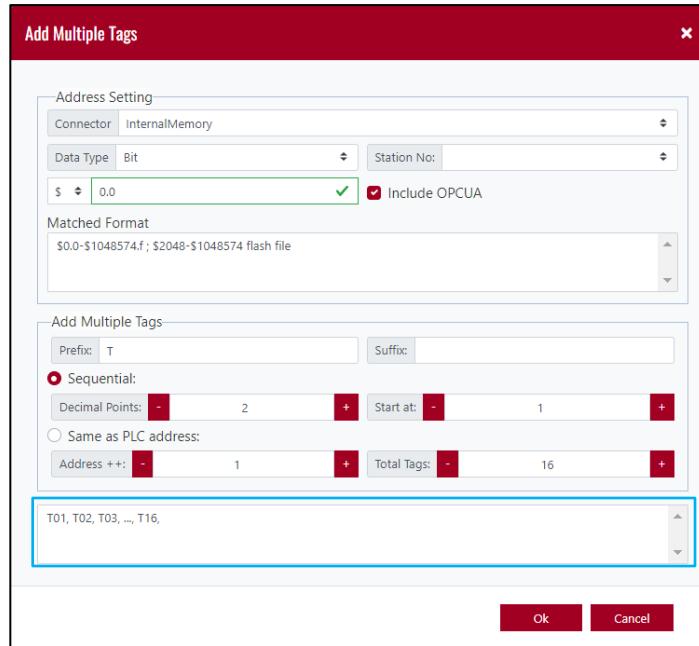
Prefix	Set the prefix of tag name.
Suffix	Set the suffix of tag name.

Sequential	The setting of custom prefixes and suffixes for the names of consecutively added multiple tags...
Decimal Points	The setting of the number of digits in the middle of the prefix and suffix.
Start at	The starting number of [Decimal Points].
Address ++	The number of increments of the register number in each step.
Total Tags	The total number of tags to be added.
Same as PLC address	Check this box, and the new tag name would be the same as the address of the PLC register.



For example, in the figure shown above, the controller is set a [InternalMemory](internal memory), and the data type is [Bit], the address is [\$0.0]. The prefix is set to [T], the suffix is not set, the number of digits is [2], and the initial value is [1], the address increment is [1], and the number of tags is [16].

When [Continuous] is selected, the tag name is set in the sequence of T01, T02, T03,..., T16, and the corresponding address is \$0.0,\$0.1,\$0.2,...,\$0.f.



According to the new tag content set, the added tag name would be generated immediately to provide a preview at the bottom of the dialog box. If the setting is wrong, the preview window prompts the message of [Invalid Address].

Click [OK] after completion, and GATEWAY would automatically add consecutive tags.

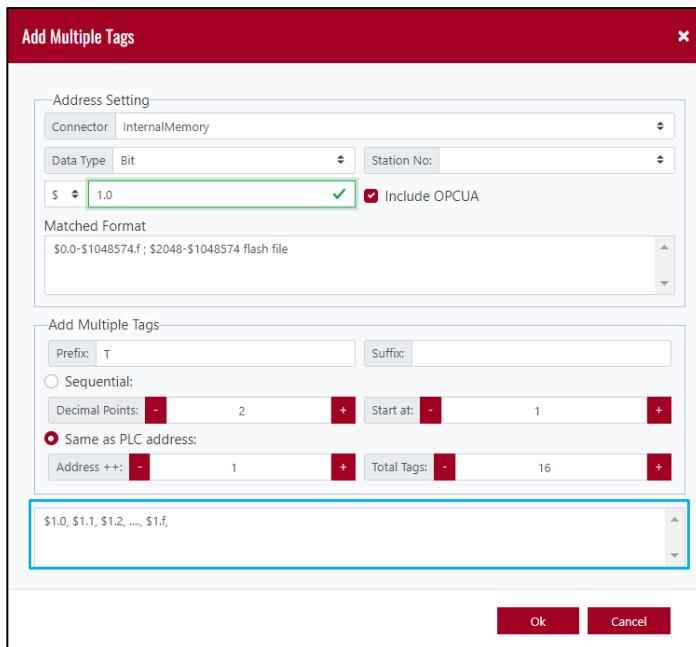
Note: All objects in the edit correspond to the tag name, not the address of the controller.

The following figure shows the content of the tag created when [Continuous] is selected.

ID	Tag Name	Connector	Data Type	Tag Address	Modbus Address	OPCUA
1	T01	InternalMemory		\$0.0		<input checked="" type="checkbox"/> Include
2	T02	InternalMemory		\$0.1		<input checked="" type="checkbox"/> Include
3	T03			\$0.2		<input checked="" type="checkbox"/> Include
4	T04	InternalMemory	Bit	\$0.3		<input checked="" type="checkbox"/> Include
5	T05	InternalMemory	Bit	\$0.4		<input checked="" type="checkbox"/> Include
6	T06	InternalMemory	Bit	\$0.5		<input checked="" type="checkbox"/> Include
7	T07	InternalMemory	Bit	\$0.6		<input checked="" type="checkbox"/> Include
8	T08	InternalMemory	Bit	\$0.7		<input checked="" type="checkbox"/> Include
9	T09	InternalMemory	Bit	\$0.8		<input checked="" type="checkbox"/> Include
10	T10	InternalMemory	Bit	\$0.9		<input checked="" type="checkbox"/> Include
11	T11	InternalMemory	Bit	\$0.a		<input checked="" type="checkbox"/> Include
12	T12	InternalMemory	Bit	\$0.b		<input checked="" type="checkbox"/> Include
13	T13	InternalMemory	Bit	\$0.c		<input checked="" type="checkbox"/> Include

If [Same as PLC address] is selected, the tag name would be the same as the PLC address, as

shown in the figure below.



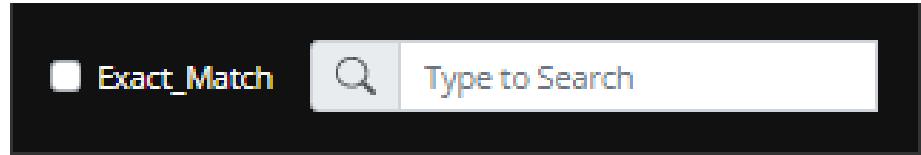
The following figure shows the created tag.

ID	Tag Name	Tag Address	Modbus Address	OPCUA
1	\$1.0	\$1.0	\$1.0	<input checked="" type="checkbox"/> Include
2	\$1.1	\$1.1	\$1.1	<input checked="" type="checkbox"/> Include
3	\$1.2	\$1.2	\$1.2	<input checked="" type="checkbox"/> Include
4	\$1.3	\$1.3	\$1.3	<input checked="" type="checkbox"/> Include
5	\$1.4	\$1.4	\$1.4	<input checked="" type="checkbox"/> Include
6	\$1.5	\$1.5	\$1.5	<input checked="" type="checkbox"/> Include
7	\$1.6	\$1.6	\$1.6	<input checked="" type="checkbox"/> Include
8	\$1.7	\$1.7	\$1.7	<input checked="" type="checkbox"/> Include
9	\$1.8	\$1.8	\$1.8	<input checked="" type="checkbox"/> Include
10	\$1.9	\$1.9	\$1.9	<input checked="" type="checkbox"/> Include
11	\$1.a	\$1.a	\$1.a	<input checked="" type="checkbox"/> Include
12	\$1.b	\$1.b	\$1.b	<input checked="" type="checkbox"/> Include
13	\$1.c	\$1.c	\$1.c	<input checked="" type="checkbox"/> Include

Delete	Click this button to delete a tag(s). Move the cursor to the leftmost serial number column, press, hold and drag the mouse's left button to select multiple tags, and click [Delete] to delete multiple tags simultaneously.
Delete All	Click this button to delete all the tags.

## B. Search

This is used for searching for tags that are the same as the keywords according to the input content, including tag name, type, address, etc.

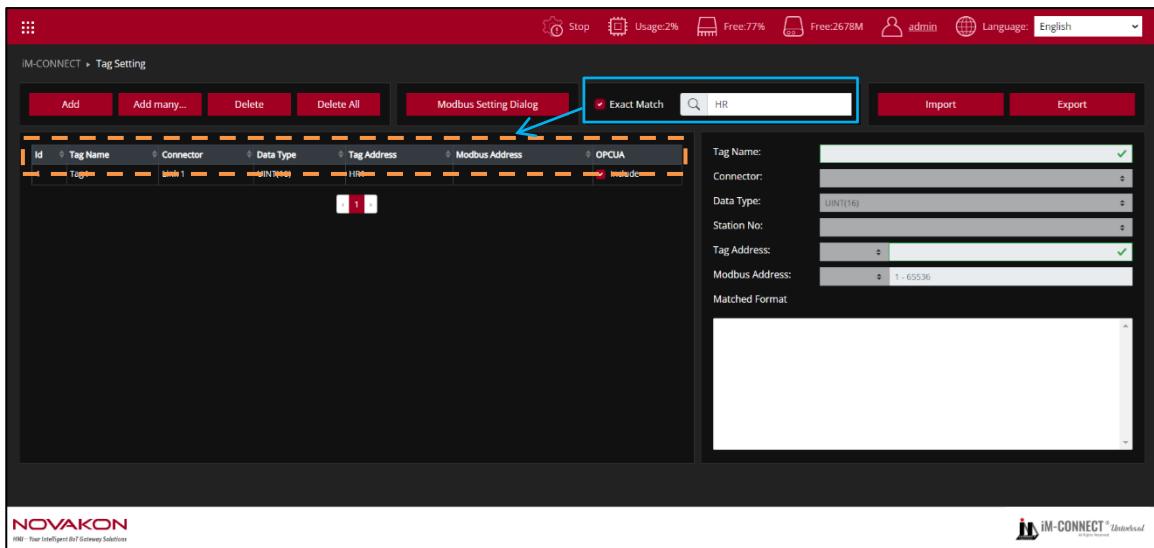


GATEWAY would automatically help us search for all matching tag content when we enter the text to be searched.

For example, after entering the search [HR] in the figure below, all tags containing [H] or [R] would be displayed, regardless of the order in which they are arranged.

A screenshot of the iM-CONNECT Tag Setting interface. The search bar at the top right contains the text "HR". A blue arrow points from the text "GATEWAY would automatically help us search for all matching tag content when we enter the text to be searched." to the search bar. On the left, there is a table with columns: Id, Tag Name, Connector, Data Type, Tag Address, Modbus Address, and OPCUA. There are two rows: one for "Tag1" and one for "Tag4". Both rows have checkboxes under "OPCUA" labeled "Include". On the right side of the interface, there is a detailed search panel with fields for Tag Name, Connector, Data Type, Station No., Tag Address, Modbus Address, and Matched Format. The "Matched Format" section is currently empty. The bottom left corner shows the NOVAKON logo, and the bottom right corner shows the iM-CONNECT logo.

But when [Exact\_Match] is checked, GATEWAY would automatically list all the tag names that meet the [HR] conditions, and the arrangement position must be correct.



## C. Import/Export

Export is to output the data content of the tag into a text file (default as fileName.TXT).

Import is to read the text file (\*.xml, \*.ninx, \*.TXT) back into the tag content.



Click the [Import] button, and a confirmation window as shown in the figure below would pop up.



Click [YES] to confirm to execute the action of importing tags, select the file you want to import, and then press [Open].

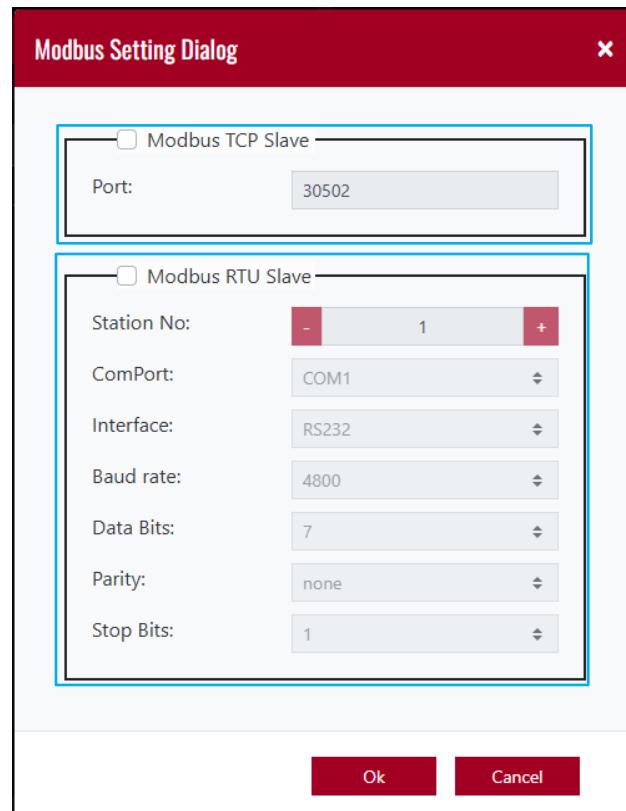
Click [NO] to exit from executing the action of importing tag.

Click the [Output] button, the system will output the data content of the tags into a text file (\*.TXT) as backup or for user to edit then import later.

## D. Modbus Setting Dialog

Set GATEWAY as Modbus slave.

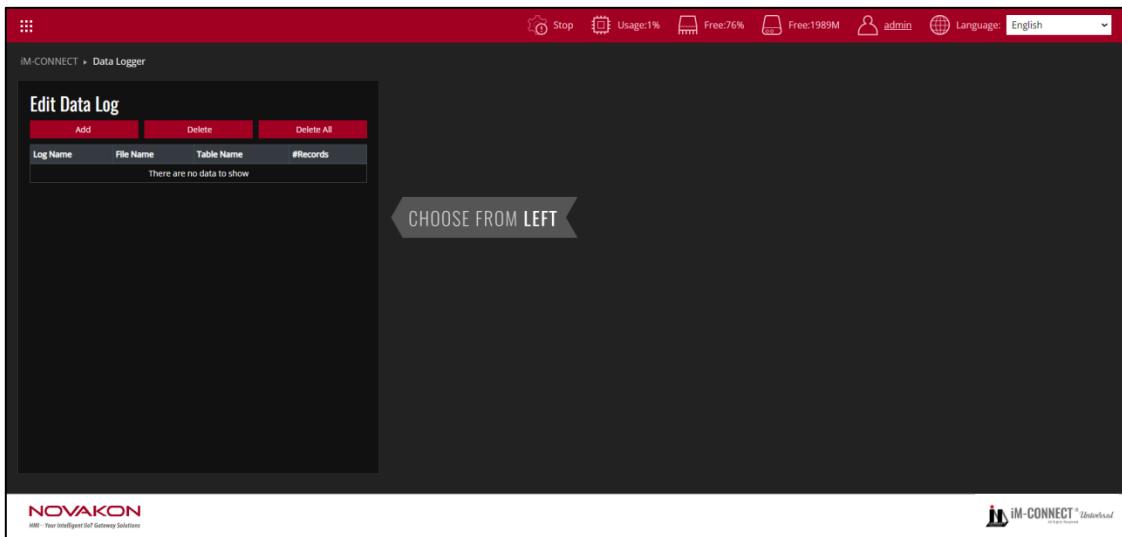
Note: When setting the Modbus slave controller in [PLC Setting], it means GATEWAY itself is Modbus Master, and the controller is Modbus slave.



Modbus TCP Slave	Check the box to activate GATEWAY as[Modbus TCP Slave].
Modbus RTU Slave	Check the box to activate GATEWAY as[Modbus RTU Slave].

## 5. Data Logger

[Data Log]:Store the historical data in flash memory and move to database at the defined timing.



### Edit data log

Set the basic parameters of the data record. A buffer is created for each data record, and historical data can be stored in the buffer.

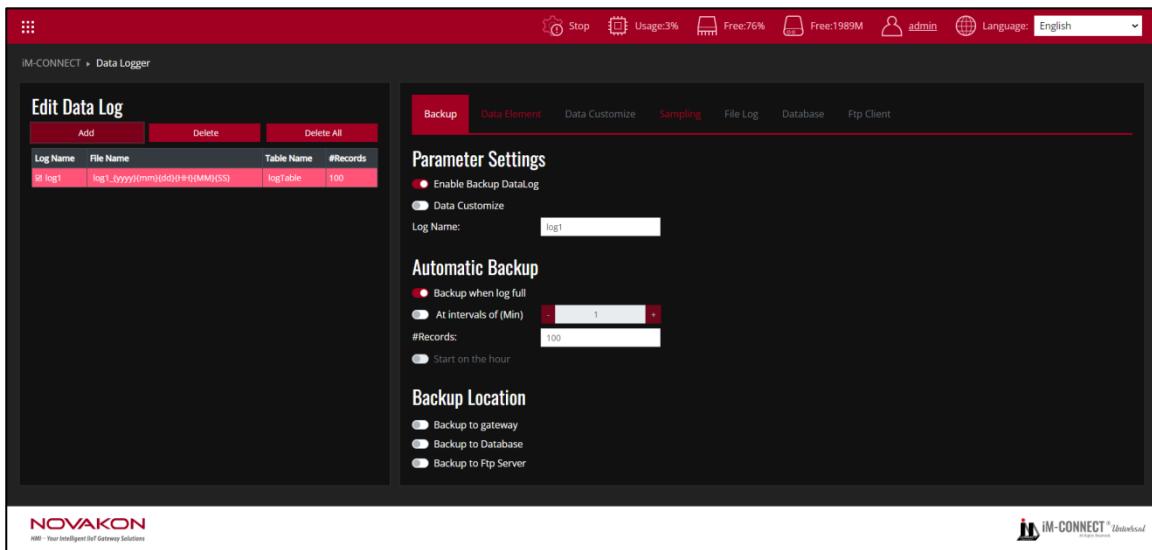
Add	Add a set of record. The records can be added up to 100 sets in maximum.
Delete	Delete the selected record name.
Delete All	Delete all the records at once.
Log Name	Display the log name. You can set the name in "Backup" -> "Parameter Settings", defaulting to "log1".
File Name	Display the name of the saved file. You can set it in "File Name", defaulting to "log1_{yyyy}{mm} {dd}{HH}{MM}{SS}" (filename_yearmonthdayhourminutesecond).
Table Name	Display the name of the database table. You can set it in "Database",

	defaulting to "logTable".
#Records	Display the number of backup entries. You can set it in "Backup" -> "Automatic Backup".

[File (table) name][#record] is located in the same location as the above-edited data record content.

When using a database, [log name] is the table name of the database.

When the file does not exist in the MSSQL, MYSQL, or FTP path, it will be automatically added and then created based on the name.

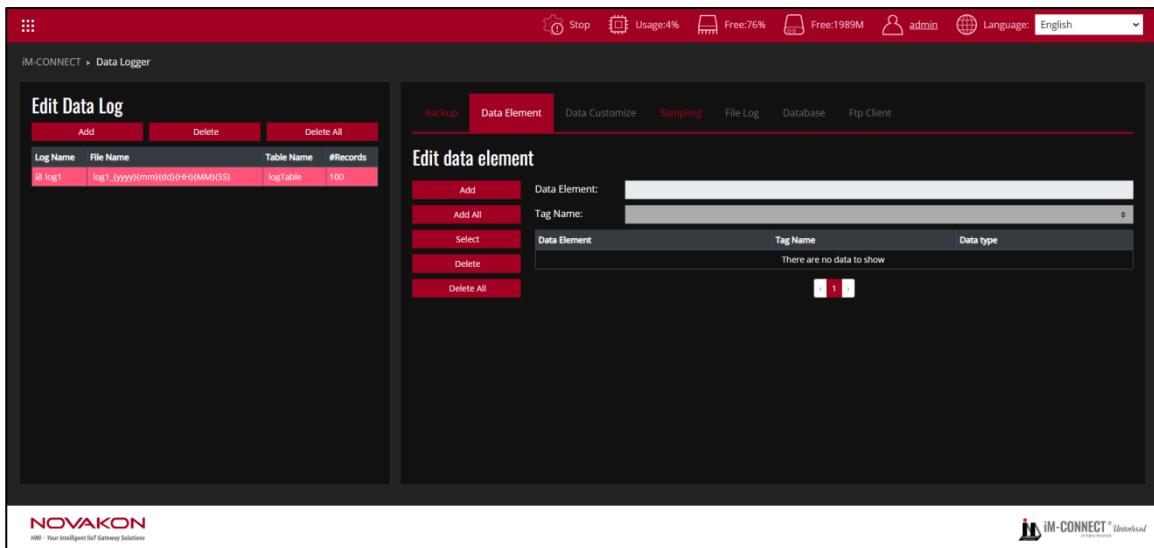


## Backup

Set the backup time and device.

Parameter Settings	Set whether to enable backup logging, Data Customize, and Log Name.
Enable Backup DataLog	Activate the data logging backup function. Once activated, you can edit the items of the data records in the [Data Element] section.
Data Customize	Activate the custom data logging backup function. Once activated, you can edit the items of the data records in the [Data Customize] section. If

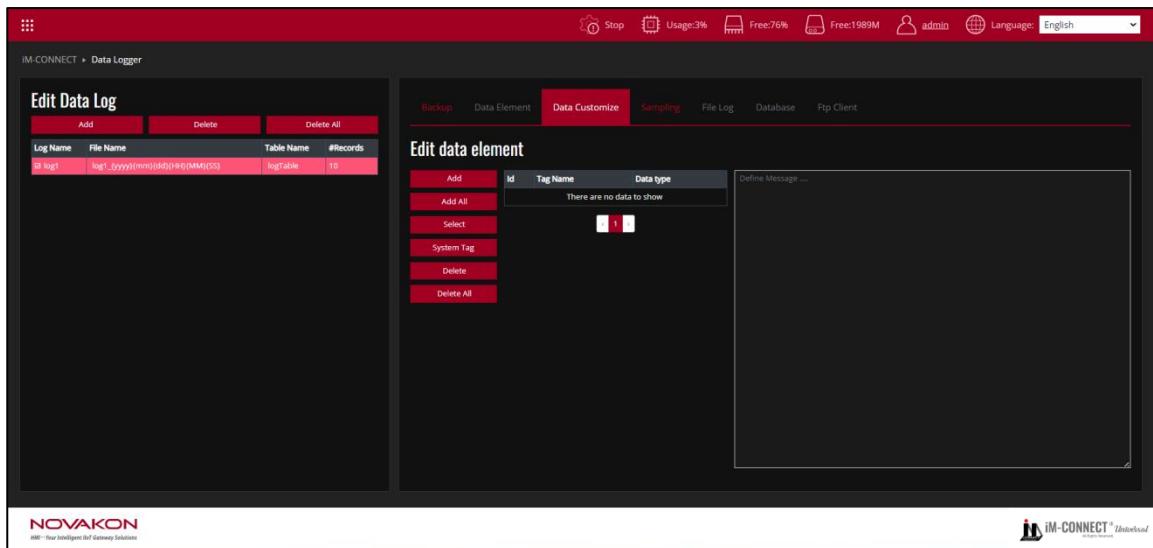
	[Backup to Database] is activated in the [Backup Location], then [Data Customize] cannot be activated, and vice versa.
Log Name	Set the name of the data logging file. This name will be displayed in the [LogName] section of [Edit Data Log].
Automatic Backup	Set the condition to trigger automatic backup.
Backup when log full	When this option is activated, the data record is backed up when it is full. And [At intervals of (Min)] and [Start on the hour] are mutually exclusive.
At intervals of(Min)	Set to backup records at fixed minute intervals. The default is every 1 minute.
#Rccords	Set the number of data backups. The maximum number is 65535. If combined with [Data Customize] to create a table, it represents the number of times the data record is repeated in the data log.
Start on the hour	When this option is activated, the backup time will be set to the top of the hour (i.e., at 0 minutes), and the time will follow the [At intervals of (Min)] setting mentioned above. However, at this time, [At intervals of (Min)] can only be set to values that are divisible by 60.
Backup Location	Set the location to store data logs. Options include "Backup to gateway," "Backup to Database," and "Backup to FTP Server."



## Data Element

Set the constituent items of the data record, including project uynname, tag, data format.

Edit data element	Set the items and conditions of data records.
Add	Add a data element. The added items can contain 32 items in maximum.
Add All	Add all tags to the data record items.
Select	Select the existing tags as the item contents.
Delete	Delete the selected item.
Delete All	Delete all item at once.
Data Element	Set the item name. The name would be displayed in the database, and it supports multiple languages editing. Nevertheless, using English for naming is suggested.
Tag Name	Set the designated tag for each item. The tag type supports all formats.
Data type	Display the data type of each tags.



## Data Customize

Customers can define the content of data record items themselves.

Edit data element	Configure the components of the data record, including item name, tags, and data format.
Add	Add a tag.
Add All	Add all tags to the data record items , excluding system tags.
Select	Select the existing tags as the item contents.
System Tag	Select system tags to be used as the content of data record items.
Delete	Delete the selected item.
Delete All	Delete all item at once.
Define Message...	You can enter the defined message text here. Use the tag from GW01 with the format #{ID}.

The screenshot shows the IM-CONNECT Data Logger interface. At the top, there are navigation links like 'IM-CONNECT > Data Logger'. On the right, there are system status indicators: Stop, Usage 4%, Free 76%, Free 1989M, admin, Language: English, and a dropdown menu. Below the header, the main content area has tabs: Backup, Data Element, Data Customize, Sampling (which is selected), File Log, Database, and Ftp Client. Under the Sampling tab, there are two sections: 'Sampling Method' (with options for 'Triggered by Bit' and 'At intervals of (Secs)') and 'Communication' (with a 'Default value (communication error)' field set to 0). On the left, there's a 'Edit Data Log' panel with a table showing a single log entry: Log Name 'log1', File Name 'log1\_(yyyy)(mm)(dd)(H)(MM)(SS)', Table Name 'logTable', and #Records '10'. The bottom of the screen features the NOVAKON logo and the IM-CONNECT Universal logo.

## Sampling

Set the sampling conditions and the corresponding action.

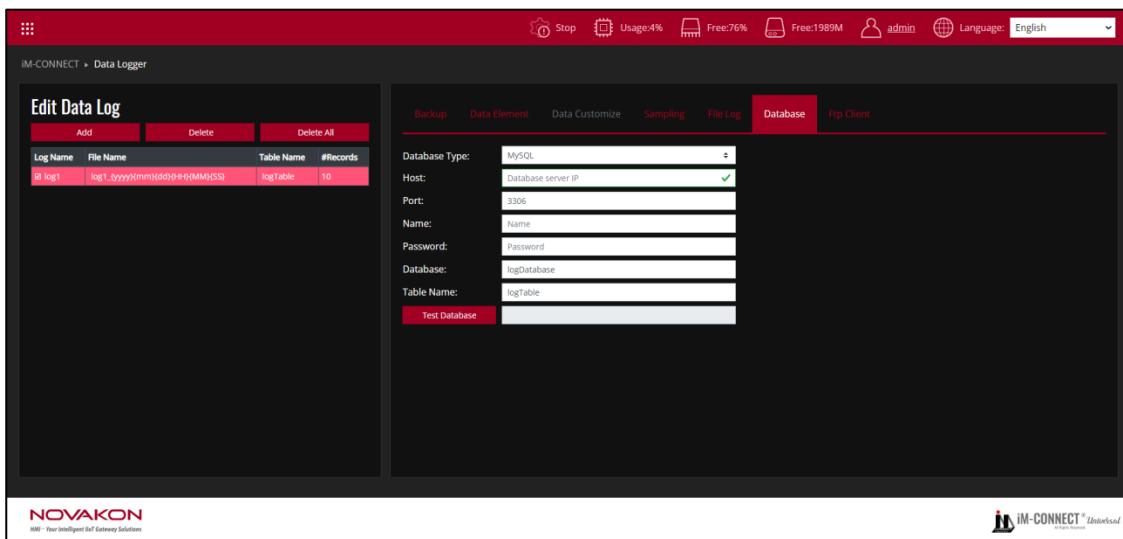
Triggered by Bit	Trigger the sampling based on Bit ON or Bit OFF.
At intervals of	Set the fixed time interval of seconds for sampling records. The default value is 1.0 seconds.
Default value (communication error)	Set the value to indicate communication error.

The screenshot shows the IM-CONNECT Data Logger interface. The layout is similar to the previous screenshot, with the 'File Log' tab selected. In the 'File Log' section, there are fields for 'File Name' (set to 'log1\_(yyyy)(mm)(dd)(H)(MM)(SS)'), 'Database Type' (set to 'Local'), and 'Subdirectory' (set to 'log1/'). The left side still shows the 'Edit Data Log' panel with the same log entry as before. The bottom of the screen features the NOVAKON logo and the IM-CONNECT Universal logo.

## File Log

Configure the information for saving files.

File Name	Set the name of the data log file for saving. This name will be displayed in [Edit Data Log] under [File Name]. The default is [log1_{yyyy}{mm}{dd}{HH}{MM}{SS}]
Database Type	Select the device type for accessing the database. Options include [Local] or [USB].
Subdirectory	Set the subdirectory for storage. The default is [log1/{yyyy}/{mm}/{dd}].

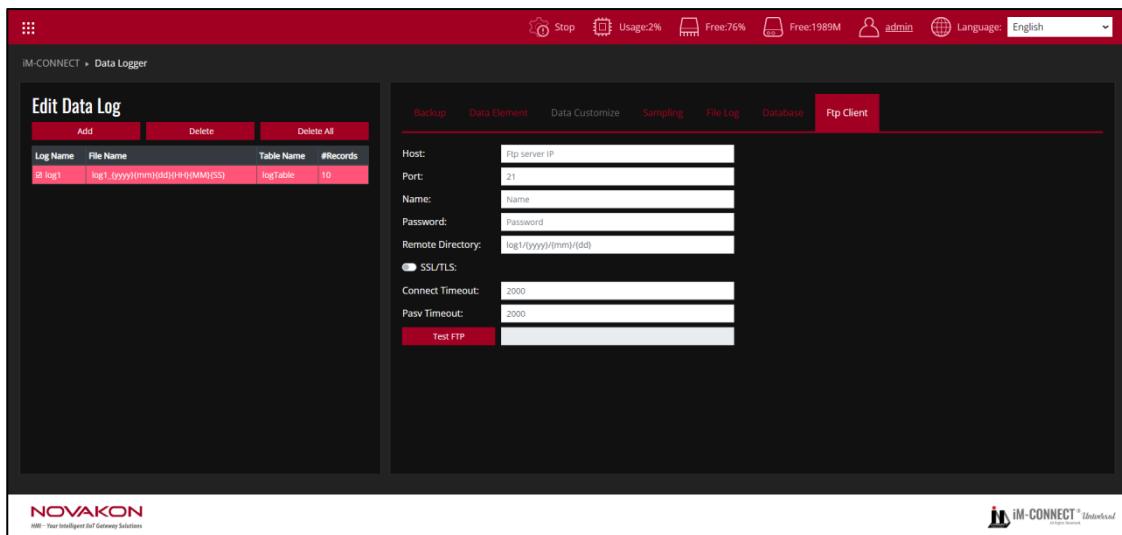


## Database

Set the uploaded database information.

Database Type	Set the database type. [MySQL] and [MS SQL] are currently available in the latest version.
Host	Set the name or IP of the server for the uploaded database.
Port	Set the Port number of the uploaded database.
Database	Set the name of the uploaded database.

Name	Enter the database username.
Password	Enter the database user password.
Database	Enter the name of the database. The default is[logDatabase]. If the database has not been created, it will be automatically created during the first data transmission.
Table Name	Enter the name of the database table. The default is[logTable]. If the database has not been created, it will be automatically created during the first data transmission.
Test Database	Test the settings of the database. You can test the connection with database here as long as the boxes of[Enable Backup Datalog]and [Enable Database Backup]are checked.



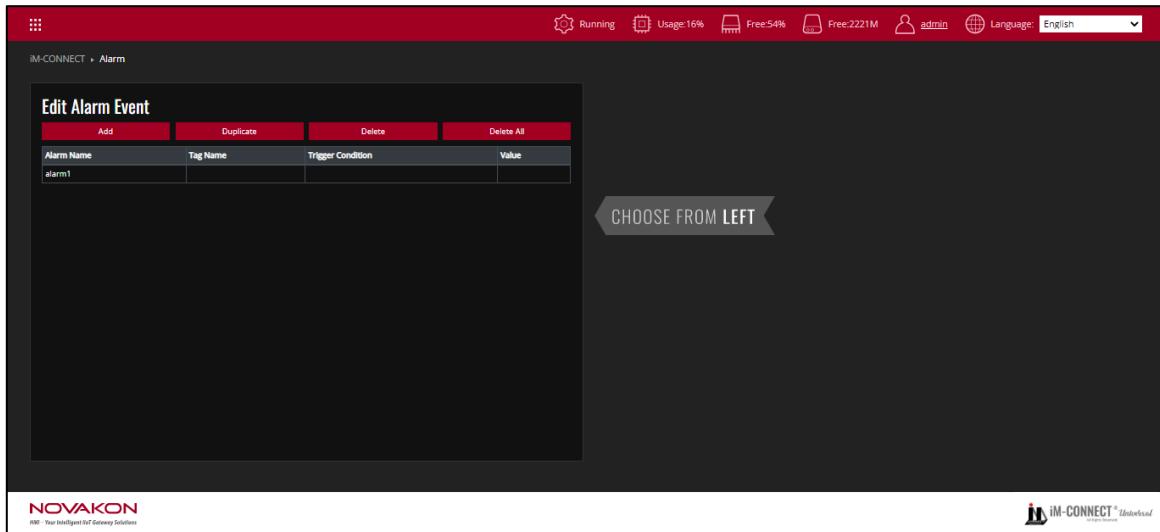
## FTP Client

Set gateway as FTP Client with the condition and related information of FTP Server, to which gateway send data through Internet.

Host	Input the server's name for connection.
Port	Input the port number of the server to connect.
Name	Input the FTP client username.
Password	Input the FTP client password.
Remote Directory	Input the remote directory of FTP server for upload.
SSL/TLS	Check to enable connection encryption.
Connect Timeout	You can set the connection timeout period. The default is 2000 milliseconds.
Pasv Timeout	You can set the passive timeout period. The default is 2000 milliseconds.
Test FTP	Click to test the connection to FTP server.

## 6. Alarm

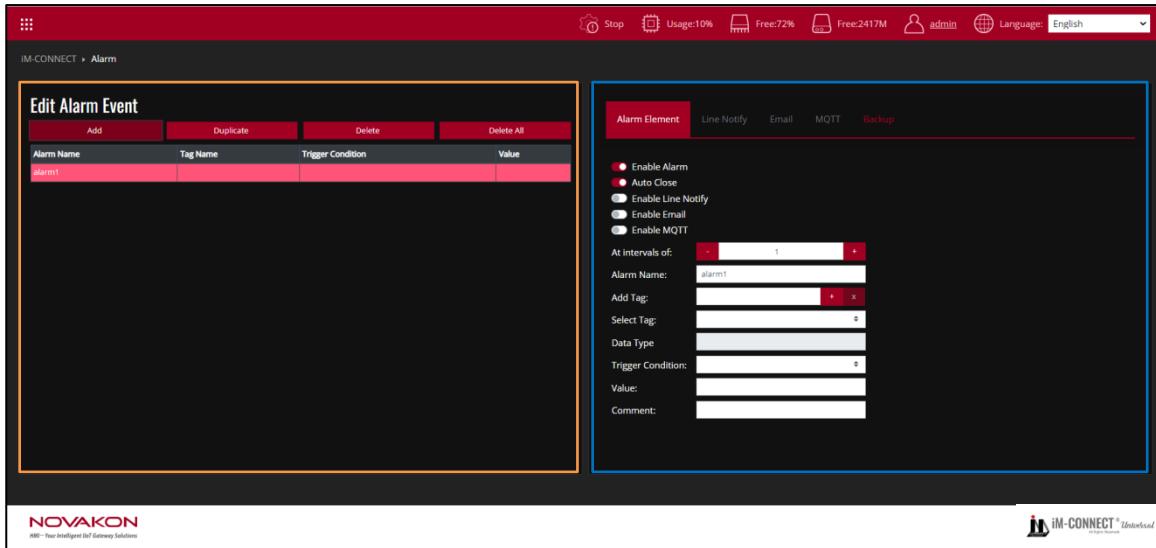
Alarm enables the set tag to send alarm messages through Line Notify, Email, or MQTT when the defined condition is met. (e.g. value falls in the predefined range, or bit turns on, etc.).



### Edit Alarm Event

Edit Alarm Event can be used to edit the content of the alarm data, including [Add], [Duplicate],[Delete], and [Delete All].

Add	Add an alarm. One alarm content can be added at a time.
Delete	Delete an alarm. Move the mouse cursor to an alarm and press [Delete] to delete the selected alarm.
Duplicate	Copy an alert. After moving the mouse cursor to an alarm, press [Duplicate] to duplicate the same alarm. The name of the duplicated alarm would be incremented by the default name (alarm). The rest of the content is the same.
Delete All	Delete all alarms at once.



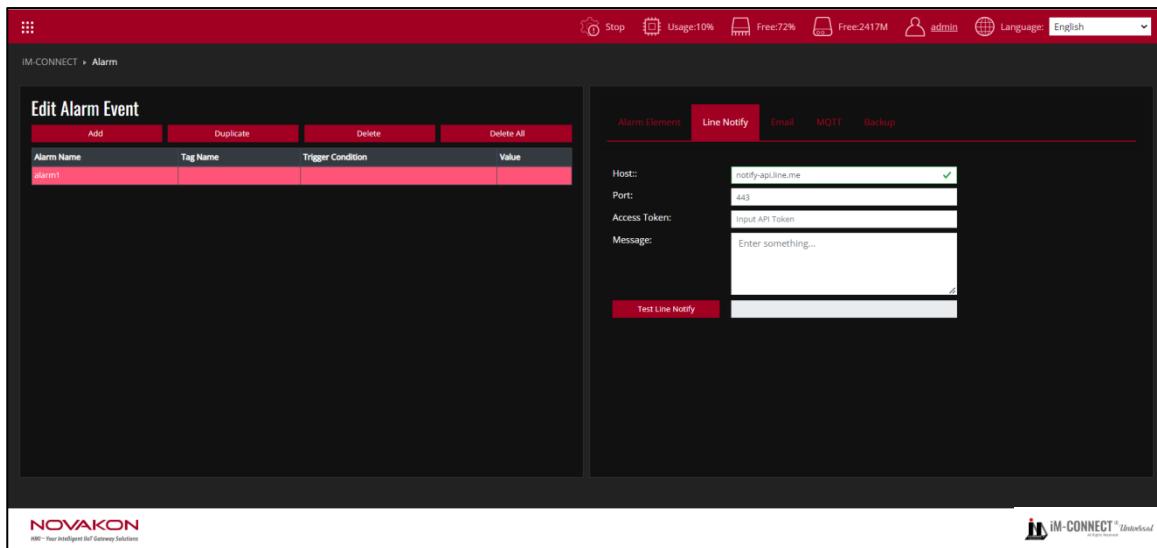
In the above figure, the orange frame on the left shows all the alarms that have been set.

Alarm Name	Set the name of the alarm, which can be used to describe the content of the alarm.
Tag Name	Set the connected tag to determine whether an alarm occurs.
Trigger Condition	Display the trigger conditions.
Value	Display the condition value of the alarm.

The blue frame on the right side of the figure above is the dialog box for the alarm setting.

Enable Alarm	Activate the alarm. If this option is not activated, the alarm content would not be displayed regardless of whether the conditions are met.
Auto Close	When the alarm is cleared (the trigger condition is not met), the alarm is automatically closed. If this option is not activated, the alarm continues to be triggered even if the alarm condition has been removed.
Enable Line Notify	Set the Line Notify Messenger APP function when the alarm is triggered.
Enable Email	Set the function of sending email to a specified mailbox when the alarm

	is triggered.
Enable MQTT	Set the function of publishing message to the designated MQTT Broker when the alarm is triggered.
At intervals of	The interval between alarm sampling. The unit is seconds.
Alarm Name	Set the name of the alarm, which can be used to describe the content of the alarm.
Add Tag	Set the tag to determine whether an alarm has occurred. If the tag has not been created, press [+] on the right to add a tag.
Select Tag	The set tag can be selected as the one to judge the alarm. In the same alarm, [Add Tag] and [Select Tag] would have the same selected tag.
Data Type	Display the specified tag type.
Trigger Condition	Display the trigger conditions. When the trigger tag type is [Bit], [Set] or [Clear] can be selected to trigger an alarm. The various types of judgment mechanisms, including [=], [!=] (not equal to), [>], [>=], [<] and [<=] are available for selection.
Value	The value of the condition that the alarm is established. When the content of the [tag] meets the [value] of the [Trigger Condition], the alarm would be triggered. If the source type is [Bit], this field does not need to be set.
Comment	Set the description of the alarm.



## Line Notify

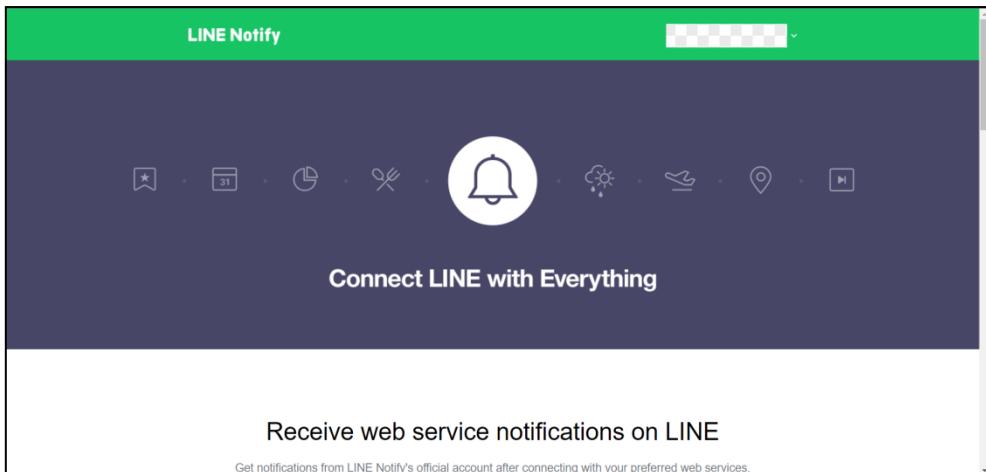
Set the line group and message to be sent when the alarm is triggered.

Host	Display the default server address of Line Messenger App.
Port	Displays the default Port of Line Messenger App.
Access Token	Enter the access token for Line. For the line access token setting method, please refer to [Appendix:LINE Push Broadcast Setting].
Message	Enter the content of the message to be pushed. Input[#{tag name}]in the Message Body if the message should contain Tag content.
Test Line Notify	Show the content of the response message after the push.

For example:

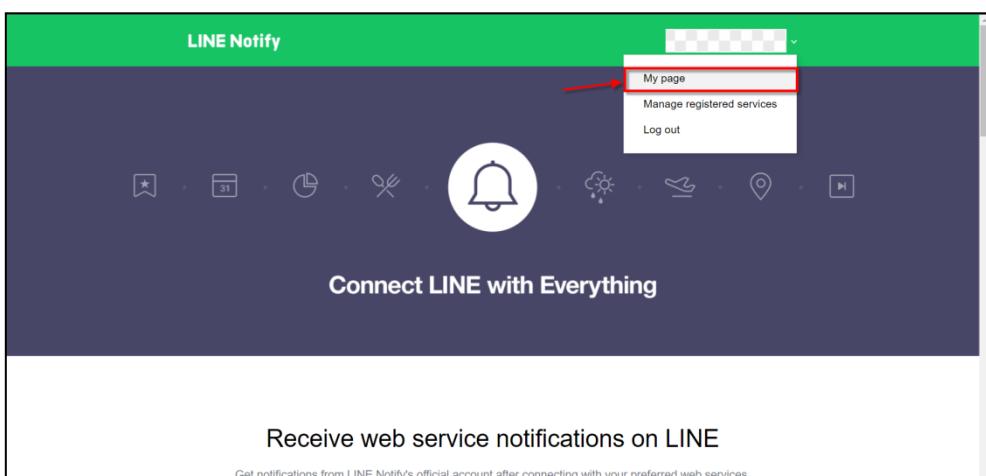
STEP1.

Connect to the Line Notify website and click on "Log in with Line account".



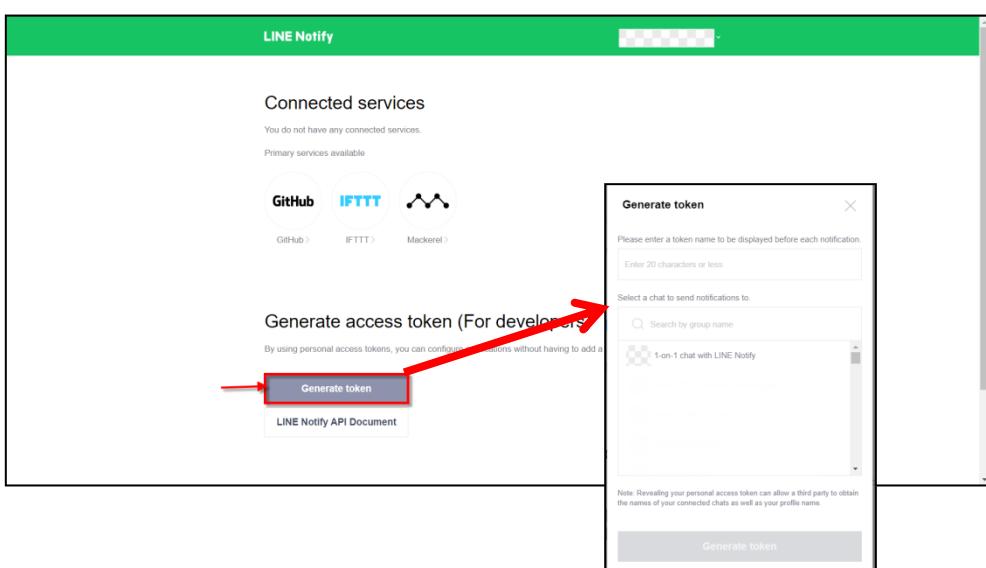
## STEP2.

Click on "My page" to enter.



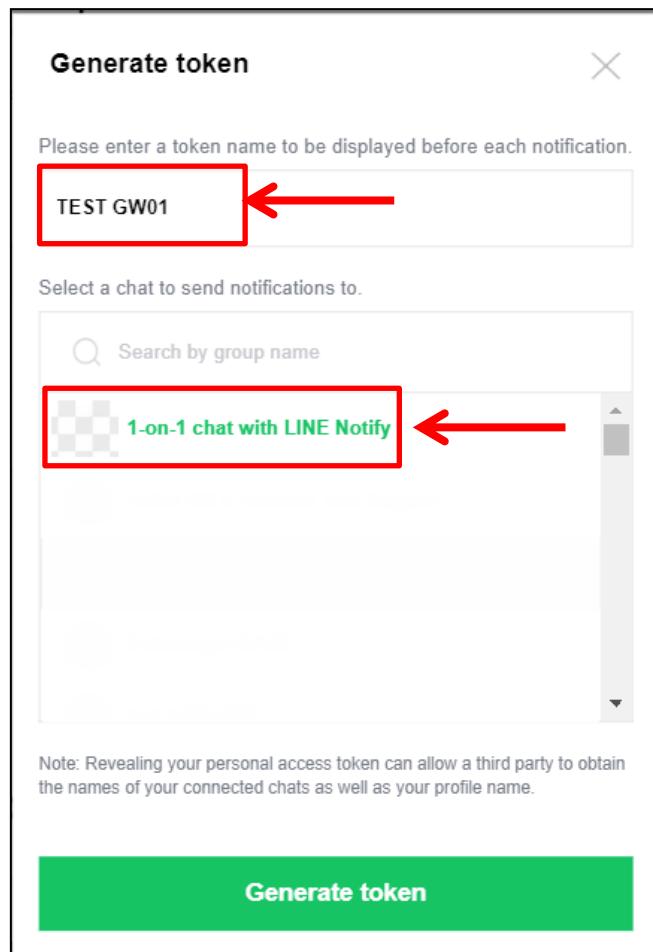
## STEP3.

Click on "Generate token" to open the settings window.



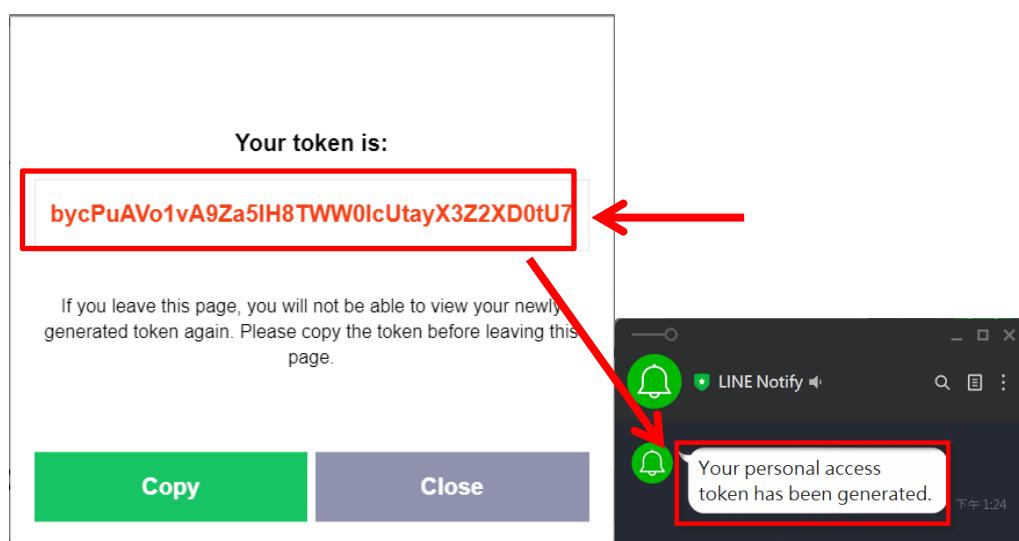
#### STEP4.

Enter a name and select the Line group to receive messages.



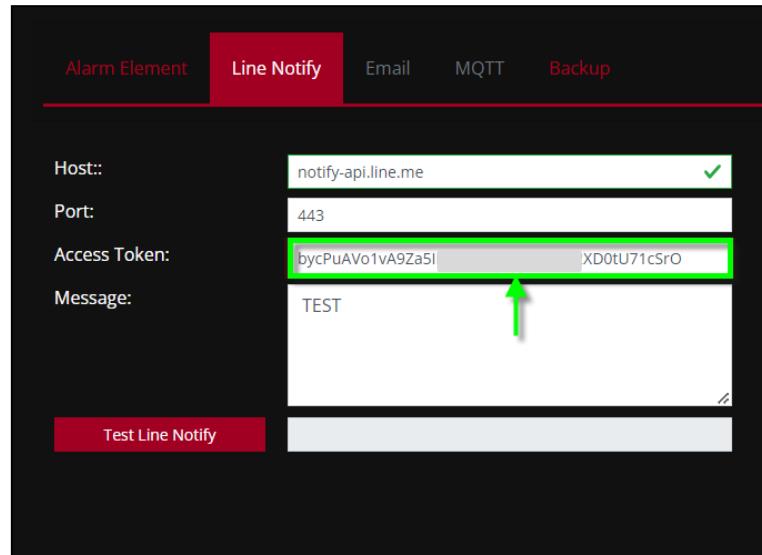
#### STEP5.

Obtain the token and copy it.



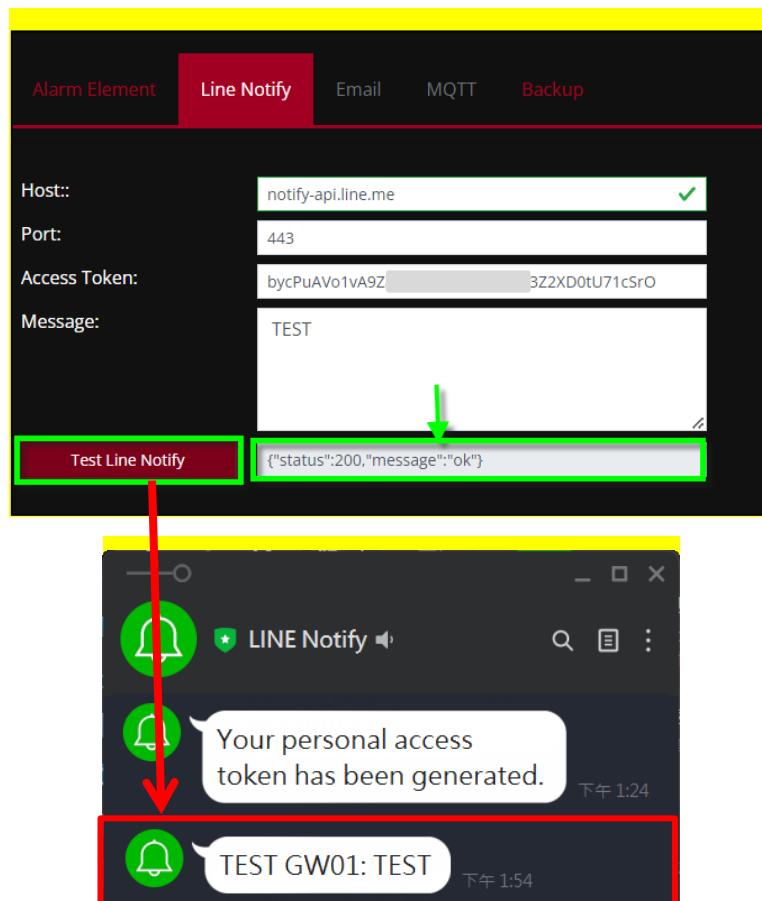
## STEP6.

Paste the copied token into "Access Token" and enter the message you want to send in "Message".



## STEP7.

Click on "Test", and you will be able to see the message sent on Line Notify.



The screenshot shows the iM-CONNECT software interface. On the left, there's a sidebar with 'IM-CONNECT' and 'Alarm'. The main area has a title 'Edit Alarm Event' with buttons for 'Add', 'Duplicate', 'Delete', and 'Delete All'. Below this is a table with columns 'Alarm Name', 'Tag Name', 'Trigger Condition', and 'Value', containing a single row 'alarm1'. On the right, there's a navigation bar with 'Alarm Element', 'Line Notify', 'Email' (which is selected and highlighted in red), 'MQTT', and 'Backup'. Under the 'Email' tab, there are several configuration fields: 'Email From' (text input), 'Email To' (text input), 'SMTP Server Name' (dropdown set to 'smtp.gmail.com'), 'Port' (text input '587'), 'Auth Mode' (radio button 'SSL'), 'Name' (text input), 'Password' (text input), 'Subject' (text input), 'Body Format' (dropdown 'Text'), and 'Message Body' (text area). A 'Test Mail Server' button is at the bottom. The footer includes the NOVAKON logo and the iM-CONNECT logo.

## Email

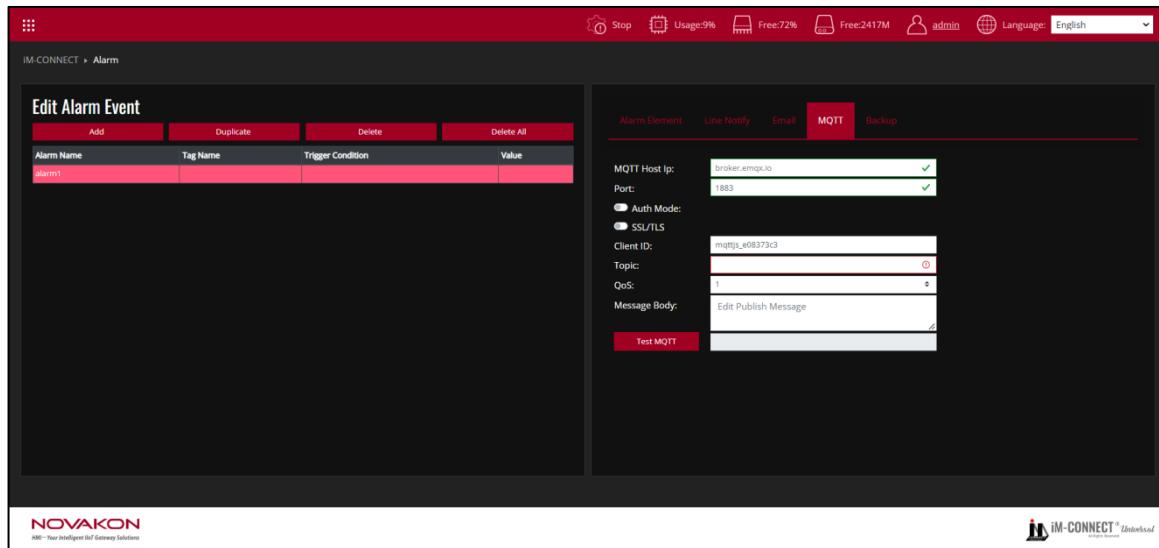
Set the email message to be sent when the alarm is triggered.

Email From	Enter the email address of the sender.
Email To	Enter the email address of the recipient. If multiple groups of emails need to be set up, please separate each group of emails with a comma.
SMTP Server Name	Enter the name of the SMTP server to be used.
Port	Display the port number to be used.
Auth Mode	Confirm whether to log in for verification.
Name	Enter the email address of the sender.
Password	Enter the sender's email password.
Subject	Enter the subject of the message.
Body Format	Enter the content body in [Text] or [Html] format of the email to be sent.
Message Body	The content of the response message to be shown after the email is sent. Input #[tag name] in the Message Body if the message should contain Tag content.

Test Mail Server	Displays the content of the response message after the email is sent.
------------------	---

Note:

Please set up the above settings in accordance with the specifications of each email server. For example of Gmail, please set the [Allow Low-Security Applications] of the Google account to be [Enabled].

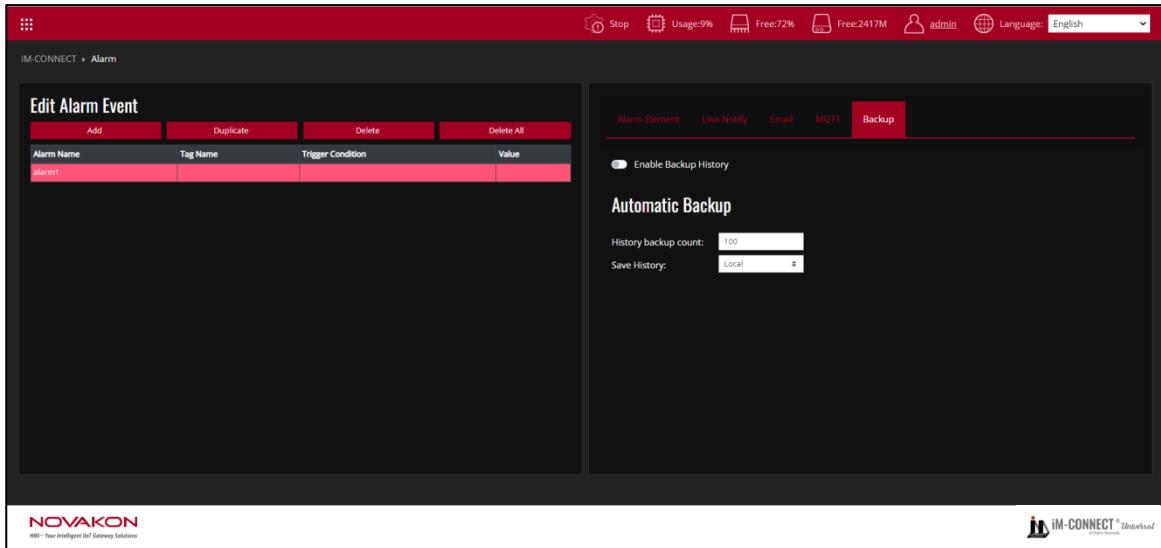


## MQTT

Set the designated MQTT client that receives the alarm message when the alarm is triggered.

MQTT Host IP	Set the MQTT Broker IP that receives the messages.
Auth Mode	Confirm whether authentication is required. If it is selected, the account name and password must be input.
SSL/TLS/Port	Set SSL/TLS port number.
Require Certificate	Confirm whether the certificate file is required or not.

Upload Cert File	Import the certificate provided by the Server.
Upload Key File	Import the key provided by the Server.
SSL Secure	After selecting it, the validity of the certificate file provided by the Server will be verified.
Client ID	Set the user's ID. Every MQTT user needs a unique ID. MQTT Broker identifies the users through the Client IDs, and records the status of the users individually, such as subscription topics and communication quality setting.
Topic	Set the topic name. The name must comply with MQTT naming principles.
QoS	<p>The quality of service is divided into three levels: 0, 1 and 2. The greater the number, the better the quality.</p> <p>0:Sent once at most (in charge of sending messages only, suitable for less critical situations).</p> <p>1:Sent once successfully at least (the data is correctly sent but message repetition may occur).</p> <p>2:Sent once properly (rigorous delivery with the feedback of “message delivered”).</p>
Message body	Input the message to be sent. If a tag is needed in the message, add [#{tag name}] in the message body.
Test MQTT	The response message sent after MQTT is published.



## Backup

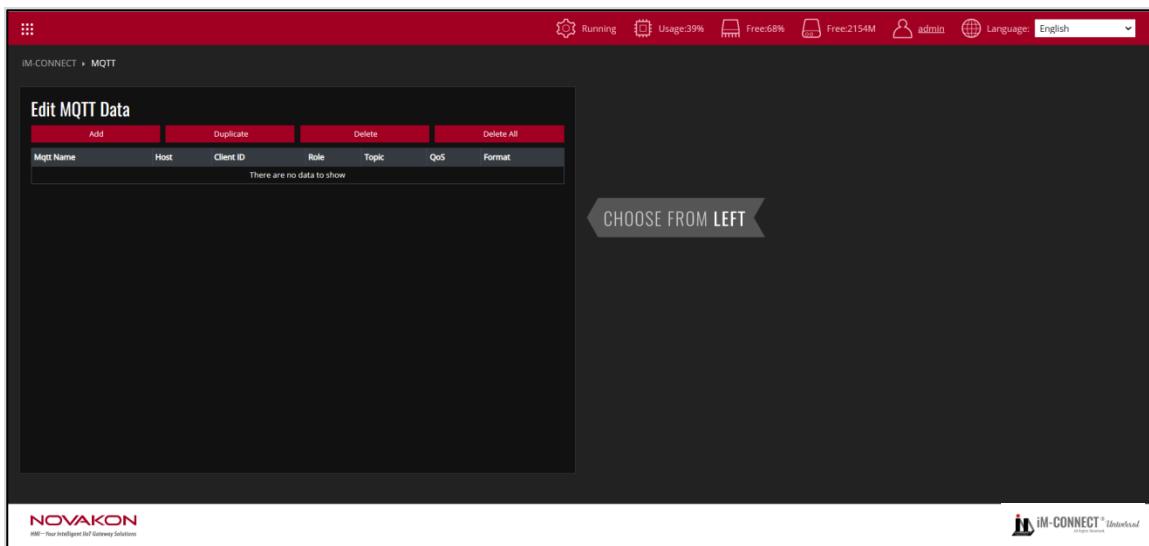
Set the number of alarm history to be backup and the destination where the log to be saved.

When [Enable Backup History] is on, the condition of Automatic Backup can be set.

History backup count	Set how many alarm history to be automatically backup to the appointed storage.
Save History	Set where to backup the history. [Local] for Gateway local storage or [USB] for external USB disk.

## 7. MQTT

MQTT is generally used as a messaging protocol in IoT (Internet of Things), with the main features of lightweight, openness, and easiness. When the program capacity is limited or the network bandwidth is limited, such advantages become more explicit. It is suitable to be used on the continuous monitoring of the data such as temperature, humidity, pressures, electricity, water level, and others.



Add	Add a set of MQTT items.
Delete	Delete the selected MQTT item.
Duplicate	Duplicate the selected set of MQTT items.
Delete All	Delete all the MQTT items.

## Client

MQTT name	Assign a MQTT name.
Client ID	Set the User's ID. Every MQTT user needs a unique ID. MQTT Broker identifies the users through the Client IDs, and records the status of the users individually, such as subscription topics and communication quality setting.
Role	<p>Set the role in MQTT. There two major roles in the MQTT protocol: Publisher and Subscriber. The Subscriber must subscribe the topics that it needs. Then, when the Publisher publishes messages to the topic, the broker sends such messages to Subscribers who subscribed to the same topic.</p> <p>Publisher: To set as a Publisher. The tag body will be published to the designated broker.</p> <p>Subscriber: To set as a Subscriber. Subscribe the designated broker and set a value to the tag when receiving the data.</p> <p>When the Role is set as the Publisher, the tag to be sent must be set up; otherwise, no tag will be sent as default.</p>

Topic	Topic name to be used.
QoS	<p>The quality of service is divided into three levels: 0, 1 and 2. The greater the number, the better the quality.</p> <p>0:Sent once at most (in charge of sending messages only, suitable for less critical situations).</p> <p>1:Sent once successfully at least (the data is correctly sent but message repetition may occur).</p> <p>2:Sent once properly (rigorous delivery with the feedback of “message delivered”).</p>
Retained	Retain the last message successfully sent.

MQTT Data

Mqtt Name	Host	Client ID	Role	Topic	QoS	Format
mqtt1	mqttjs...	mqttjs... (Client ID)	Subscriber	mqtt1_sub	0	JSON

Format: JSON

Edit data element

Add	Id	Tag Name	Data type	Address	Length
Add All					
Select					
Delete					
Delete All					

## Message

Format	Designate the MQTT format. Select [JSON](default), [Binary]or[Customize].
JSON	Through the JSON standard format, the tag content set according to the Publisher is output.

As shown in the following diagram, when the sending condition is established, the Publisher sends the content to the Subscriber(s) according to the content values of the set tags T01, T02, and T03.

The format consists of: {"Publisher\_Tag name1": Send value1,"Publisher\_Tag name2": Send value 2,"Publisher\_Tag name3": Send value 3 , and so on.}  
Thus, the input format shall be: {"T01":value,"T02": value,"T03": value }

The screenshot shows the iM-CONNECT MQTT configuration interface. On the left, there's a table titled "Edit MQTT Data" with one entry: mqtt1, connected to host mqttjs\_6c82c9046c87 as a subscriber to topic mqtt1\_sub. On the right, under the "Message" tab, the "Format" section is set to "JSON". Below it, the "Edit data element" table lists three tags: #1 Tag1 (UINT(16), \$1, 2), #2 Tag2 (UINT(16), \$2, 2), and #3 Tag3 (UINT(16), \$3, 2). The bottom right corner features the NOVAKON logo.

Binary	The tag content set according to the Publisher will be reorganized into binary format and output.
--------	---

This screenshot is identical to the one above, showing the same MQTT setup and JSON format configuration. The only difference is the "Format" dropdown in the "Edit data element" section is now set to "Binary".

Customize	The tag content is output based on the user's customized format.
-----------	--

As shown in the following diagram, when the sending condition is established, the Publisher sends the content of tags T04, T05, and T06 to the Subscriber(s) according to the

content values of the set tags T01, T02, and T03.

The format consists of: {"Subscriber\_Tag name1": Publisher\_ID1,"Subscriber\_Tag name2":

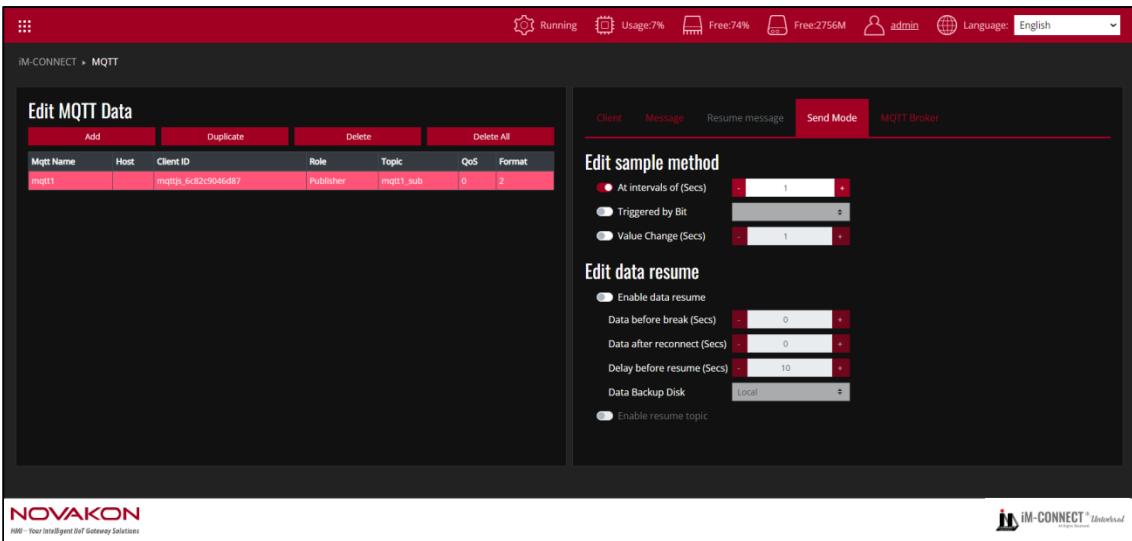
Publisher\_ID2,"Subscriber\_Tag name3": Publisher\_ID3 , and so on.}

Thus, the input format in this case shall be: {"T04":#{0}, "T05":#{1}, "T06":#{2}}.

The screenshot shows the IM-CONNECT MQTT configuration interface. On the left, the 'Edit MQTT Data' tab is active, displaying a table with one row: 'msg1' (Host: msgx.4c02-0546ca07, Client ID: msgx.4c02-0546ca07, Role: Subscriber, Topic: msg1\_sub, QoS: 0, Format: #). On the right, the 'Format' tab is active, showing a table titled 'Edit data element' with three rows: '#1 Tag1 UNI(16) \$1 2', '#2 Tag2 UNI(16) \$2 2', and '#3 Tag3 UNI(16) \$3 2'. Below the table is a text input field containing the string '1 [{"T04":#{0}, "T05":#{1}, "T06":#{2}}]'.

## Edit data element

Add	Add a MQTT item.
Add All	Add all tags to MQTT items.
Select	Select a MQTT item.
System tag	Use the system tag to obtain Gateway system time and other information.
Delete	Delete the selected MQTT item.
Delete all	Delete all the MQTT items.



## Send Mode

Set the method or condition for sending MQTT message.

### Edit sample method

At Intervals of(Secs)	Set to send MQTT message in a fixed interval in seconds. The default is 1 second.
Triggered by Bit	Set to send MQTT message when the status is triggered by bit, from OFF to ON.
Value Change(Secs)	Set to send MQTT message when the designated tag status is changed.

### Edit data resume

Enable data resume	Check this option to activate MQTT data resuming functionality.
Data before break(Secs)	Set the time period before the break for data to be transmitted upon reconnection, in seconds.
Data after	Set the time period after the break for data transmission upon

break(Secs)	reconnection, in seconds.
Data before resume(Secs)	Set the delay time for transmitting data after a break and before reconnecting, default is 10 seconds.
Data Backup Disk	Set the location for backing up data for resuming from breakpoints, selectable options are [Local] or [USB].
Enable resume topic	Check this option to activate designated resume topic content. This feature separates data during disconnection and connection periods, facilitating user differentiation.

The screenshot shows the IM-CONNECT MQTT configuration interface. At the top, there are status indicators: Running, Usage: 7%, Free: 74%, Free: 2756M, and a user account for admin. The language is set to English. Below the header, the navigation bar includes Client, Message, Resume message (which is highlighted in red), Send Mode, and MQTT Broker.

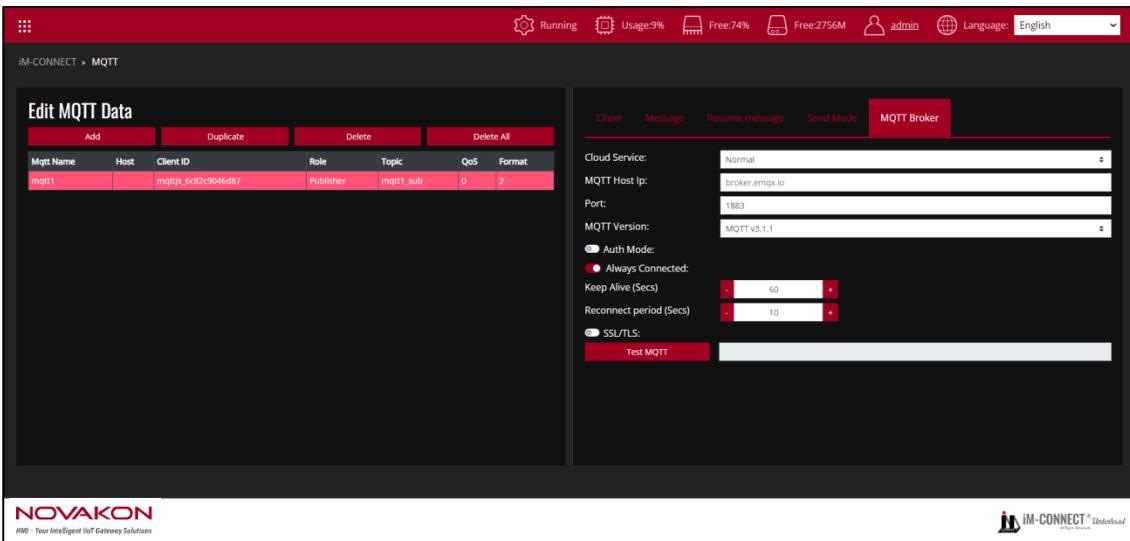
The main area is divided into two sections:

- Edit MQTT Data:** This section contains a table with columns: Mqtt Name, Host, Client ID, Role, Topic, QoS, and Format. A single row is shown: mqtt1, mqtt1, mqtt1\_6c82c9046d87, Publisher, mqtt1\_sub, 0, 2.
- Format:** This section is titled "Edit data element" and has a dropdown menu set to "JSON". It includes buttons for Add, Add All, Select, System Tag, Delete, and Delete All. A message states "There are no data to show".

At the bottom left is the NOVAKON logo with the tagline "Your Intelligent IoT Gateway Solutions". At the bottom right is the IM-CONNECT logo with the tagline "Universal".

## Resume message

This allows configuring the content of the resume message for resuming from breakpoints, utilizing the same method as described in [Message] above. This enables differentiation between data during connection and disconnection times.



## MQTT Broker

Cloud Service	Select [Normal],[AWS IoT],[Azure IoT Hub],[Google Cloud IoT] according to the requirement.
---------------	--

### Normal

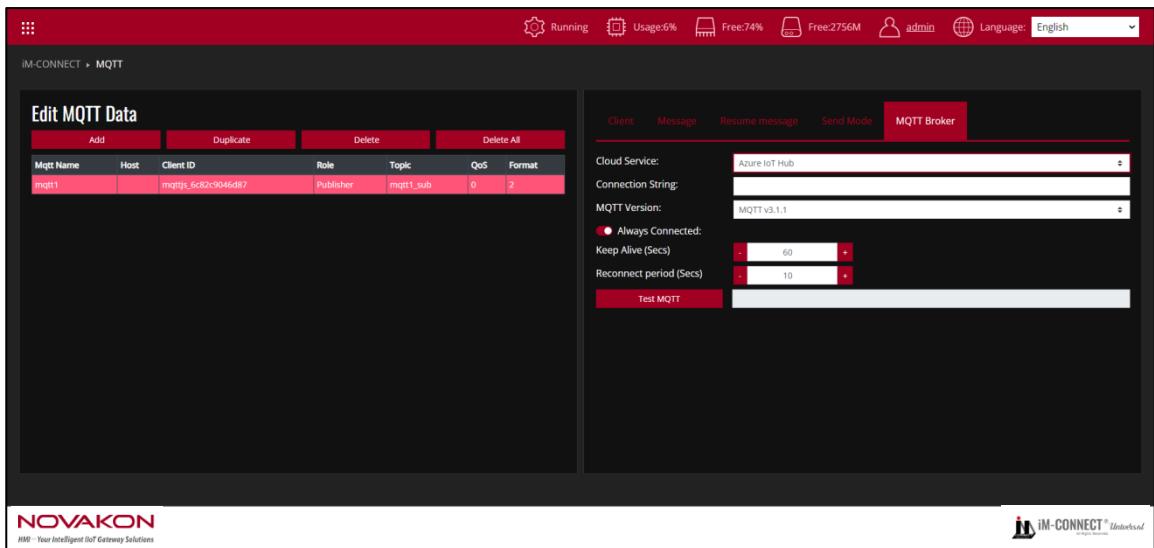
MQTT Host IP	Set the MQTT broker's IP, to receive the messages.
Port	Set the port number that allows the connection with an external device.
MQTT Version	Set the version of MQTT.
Auth Mode	Confirm whether authentication is required. If it is selected, the account name and password must be input.
SSL/TLS	Enable SSL/TLS encryption mechanism.
Require Certificate	Confirm whether the certificate file needs to be verified. Note: Enable either [SSL/TLS] or [Require Certificate] at one time according to actual use case requirement.
Upload Cert File	Import the certificate file provided by the Server.

Upload Key File	Import the key file provided by the Server.
SSL Secure	After selecting it, the validity of the certificate provided by the Server is verified.
Test MQTT	It shows the response message sent by MQTT.

## AWS IoT

Choose AWS IoT as Broker by using Thing to send message with Shadow support.

MQTT Host IP	Set the IP address of MQTT Broker in use.
MQTT Version	Set the version of MQTT Broker in use.
Always Connected	Set the MQTT to be always connected.
Thing Name	Set the name of AWS IoT Thing.
Shadow Name	Set the Shadow name that AWS IoT Thing corresponds to. Shadows can make a device's state available to apps and other services whether the device is connected to AWS IoT or not.
Upload CA File	Upload the client certificate signed by Certificate Authorities (CA) verified by Amazon.
Upload Cert File	Upload the certificate file.
Upload Key File	Upload the key file.
Test MQTT	Show the message received after MQTT publish.



## Azure IoT Hub

Set Microsoft Azure IoT Hub as Broker, input the correct connection string.

Connection String	Input the [Connection String] acquired from Microsoft Azure IoT Hub.
MQTT Version	Set the corresponding MQTT version.
Always Connected	Set the MQTT to be always connected.
Test MQTT	Show the messages received after MQTT publish.

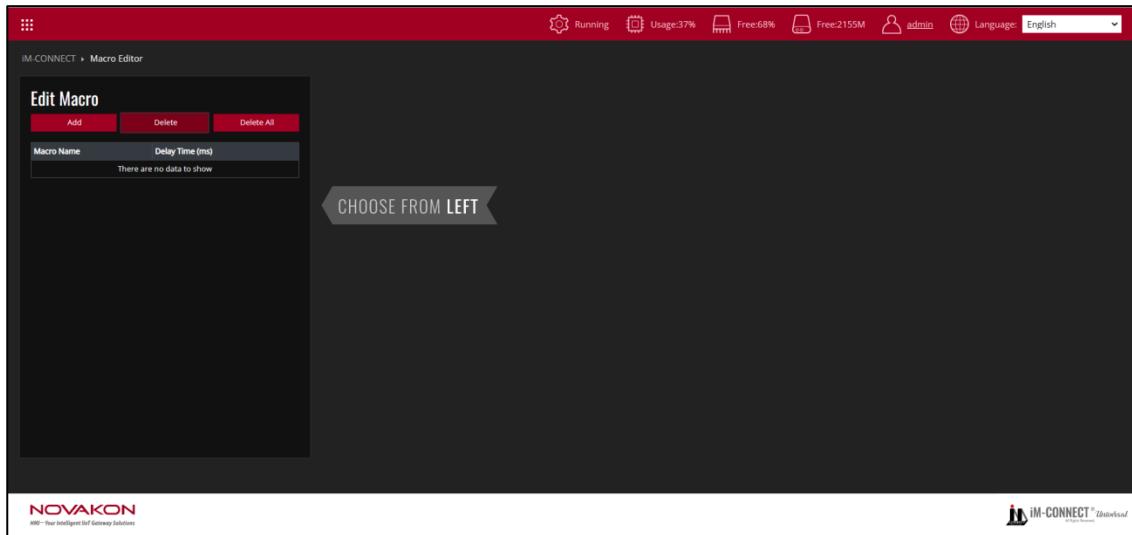
## Google Cloud IoT

Set Google Cloud IoT Core as Broker, input the required parameters and certificate for connection.

MQTT Version	Set the corresponding MQTT version.
Always Connected	Set the MQTT to be always connected.
Project ID	Input the Project ID to be used.
Region	Select the region of cloud service. Now only [us-central1],[europe-west1]and[asia-east1]are available.
Registry ID	Input the registry ID created in Google Cloud.
Device ID	Input the device ID.
Key Type	Select the key type between [RS256] and [ES256].
Upload Key File	Upload the assigned key file.
Type MQTT	Show the message received after MQTT publish.

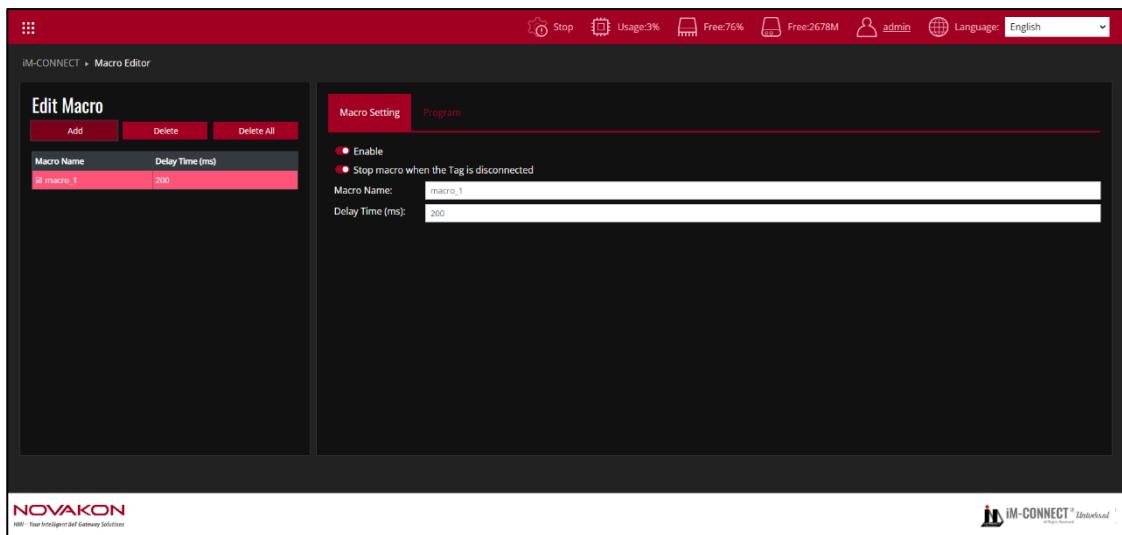
## 8. Edit Macro

Edit Macro can perform arithmetic operation, data transfer , and other actions for the Gateway's tag.



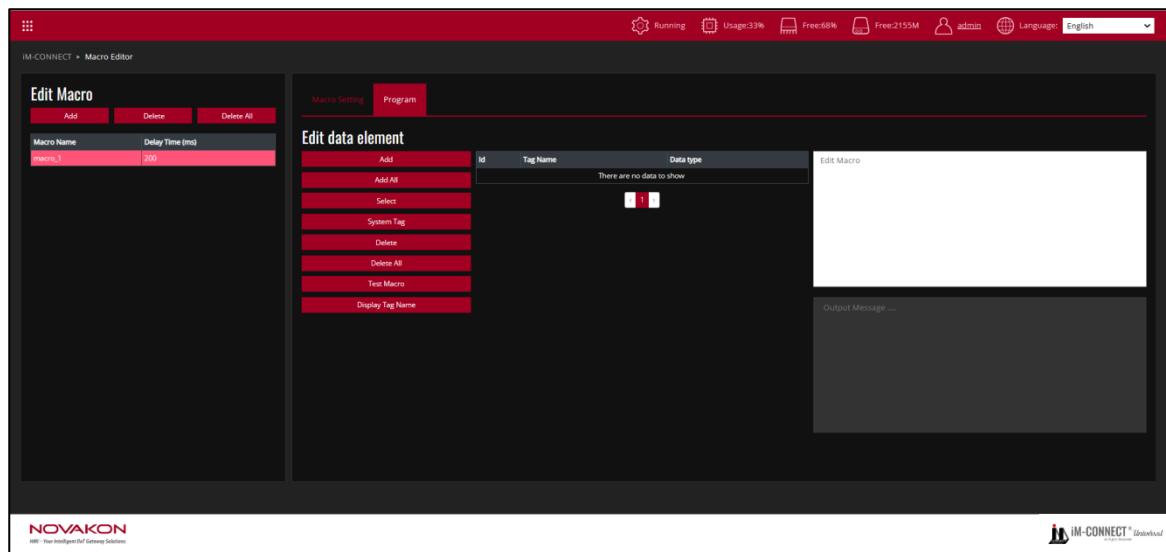
Add	Add a set of macro programming.
Delete	Delete the selected macro programming.
Delete All	Delete all the macros.

Start writing a set of macro programming after selecting[Add].

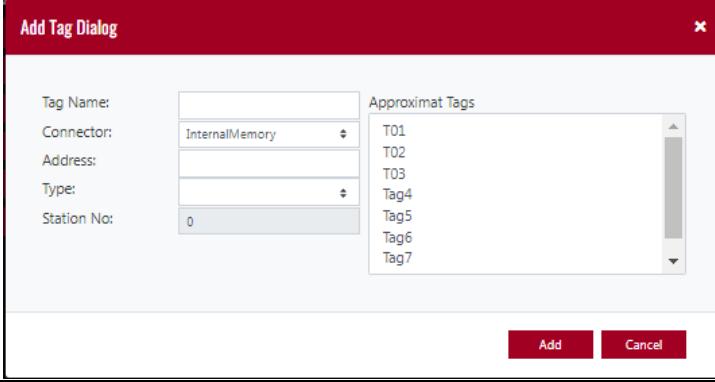


## Macro Setting

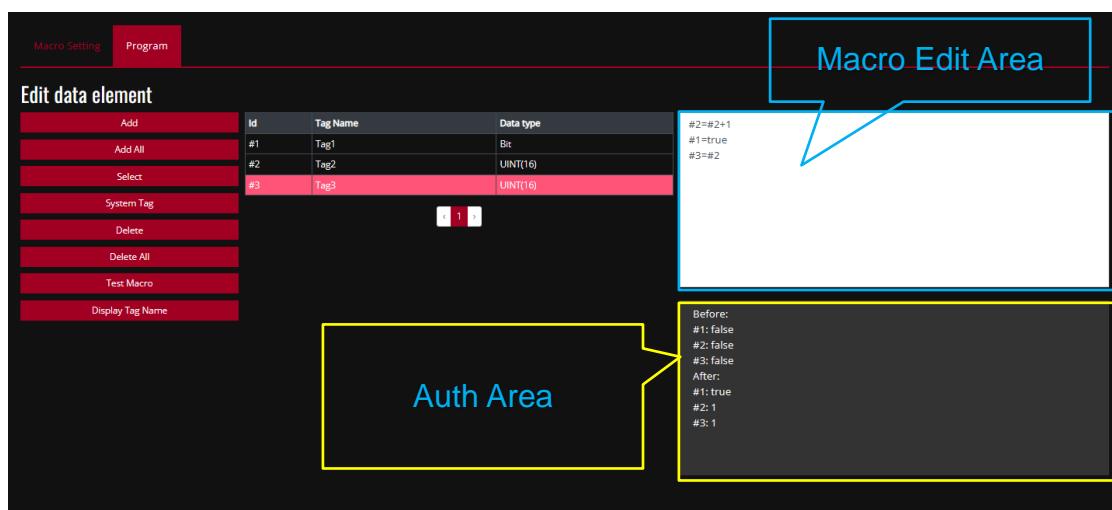
Enable	Checking this box enables the execution of the macro program.
Stop macro when the Tag is disconnected	Checking this box causes the entire macro to stop running if the tag disconnects during its execution; otherwise, the macro will continue to execute.
Macro Name	Set the name of the set of macro programming.
Time (Secs)	Set how long it delays after a regular loop of macro programming complete before starting the next loop.



## Edit data element

Add	<p>Add the tag(s) needed in the macro programming. The newly added tag(s) will also be set in the Tag Setting page.</p> 
Add All	Add all the tags existing in the project.
Select	Select the tag(s) needed in the Macro Programming from the list of tags.
System Tag	Select the system tag(s) required in the macro programming from the list of tags.

	<p><b>Select Tag Dialog</b></p> <table border="1"> <thead> <tr> <th>selected</th><th>tag name</th><th>type</th></tr> </thead> <tbody> <tr><td></td><td>timestamp</td><td>INT(32)</td></tr> <tr><td></td><td>local_time</td><td>Ascii</td></tr> <tr><td></td><td>year</td><td>INT(16)</td></tr> <tr><td></td><td>month</td><td>INT(8)</td></tr> <tr><td></td><td>date</td><td>INT(8)</td></tr> <tr><td></td><td>hour</td><td>INT(8)</td></tr> <tr><td></td><td>minute</td><td>INT(8)</td></tr> <tr><td></td><td>second</td><td>INT(8)</td></tr> </tbody> </table> <p><b>Select All</b>   <b>Unselected</b>   <b>Add</b>   <b>Cancel</b></p>	selected	tag name	type		timestamp	INT(32)		local_time	Ascii		year	INT(16)		month	INT(8)		date	INT(8)		hour	INT(8)		minute	INT(8)		second	INT(8)
selected	tag name	type																										
	timestamp	INT(32)																										
	local_time	Ascii																										
	year	INT(16)																										
	month	INT(8)																										
	date	INT(8)																										
	hour	INT(8)																										
	minute	INT(8)																										
	second	INT(8)																										
Delete	Delete the selected set of macro programming.																											
Delete all	Delete all the macro programming.																											
Test Macro	Verify the results of the macro programming performance test.																											
Display Tag Name	Change the display from ID number to Tag Name in Macro Edit Area. (Macro Edit Area becomes read only when it is changed to display Tag Name)																											



Macro Edit Area	The user can write the macro programming here.
-----------------	--

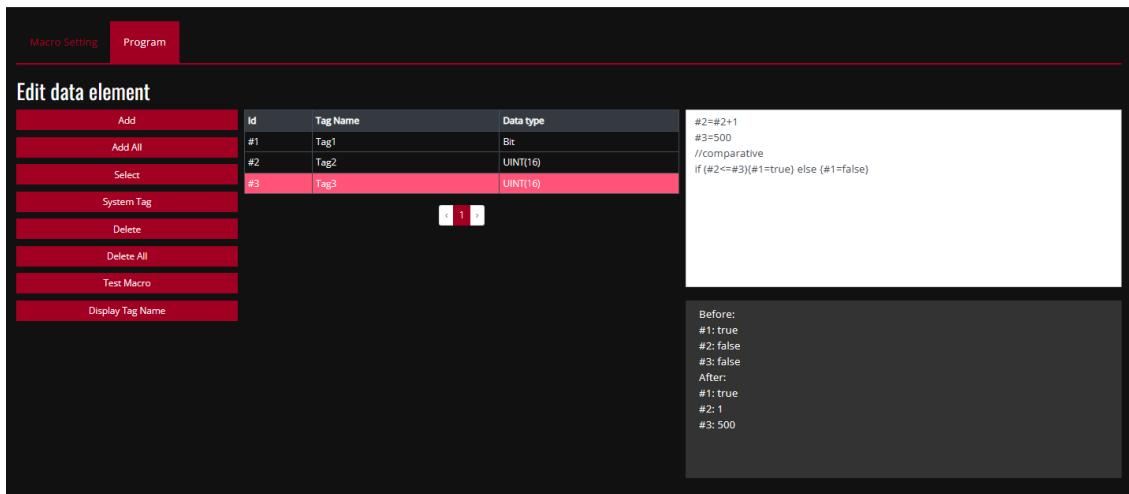
Auth Area	The results from the macro programming performance can be learned in the Auth Area after the [Test Macro] is selected.
-----------	--

For example: As shown in the diagram above, it can edit simple expressions. For the variables (tags), the corresponding ID must be input. At the same time, if the data type is Bit (Boolean), the condition must be expressed in [true](lower case) or [false](lower case).

To add Notes, express it with [//].

To add conditional execution, express it with [if (conditional execution body){Results executed after the conditional execution statement is set up } else {Results executed after the conditional execution statement is not set up }]

For example:



iM-Connect Universal can support elements of JavaScript, such as Number, Date, Math, etc.

The following is an example of base conversion by using JavaScript function [parseInt]:

	Id	Tag Name	Data type
Add	#2	Tag2	UINT(16)
Add All	#3	Tag3	UINT(16)
Select	#4	Tag4	UINT(16)

```
//Convert the string "123" to the value 123 (octal), and display it as 83 in decimal
#2=parseInt("123",8)
//Convert the string "0xF" to the value 0xF (hexadecimal), displayed as 15 in decimal
#3=parseInt("0xF",16)
//Convert the string "111" to the value 111 (binary), displayed as 7 in decimal
#4=parseInt("111",2)
```

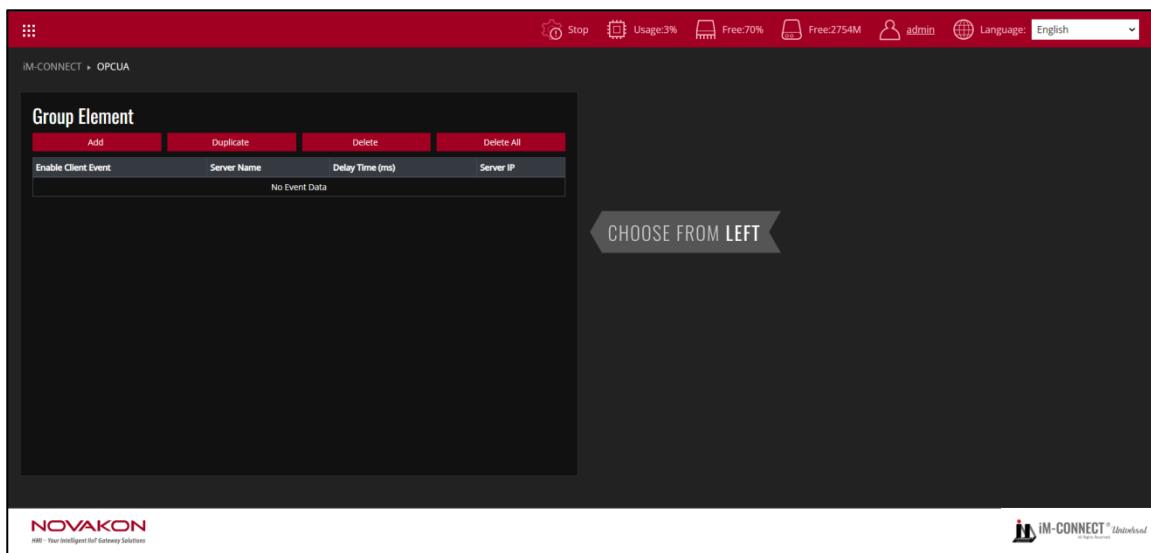
Before:  
#2: false  
#3: false  
#4: false  
After:  
#2: 83  
#3: 15  
#4: 7

- ① [Add] or [Select] the needed tag.
- ② Write the program.
- ③ Go to [Project Setting] to execute [Save & Compile] and [Enable Service].
- ④ After selecting [Test Macro], you get the correct result.
- ⑤ Enter [Online Monitor] to monitor the actual tag values. The results must be consistent with the results of Test Macro.

	Name	Value	Data Type	Status Code	Actions
2	T02	83	Uint16	Good	<button>Edit</button>
3	T03	15	Uint16	Good	<button>Edit</button>
4	T04	7	Uint16	Good	<button>Edit</button>

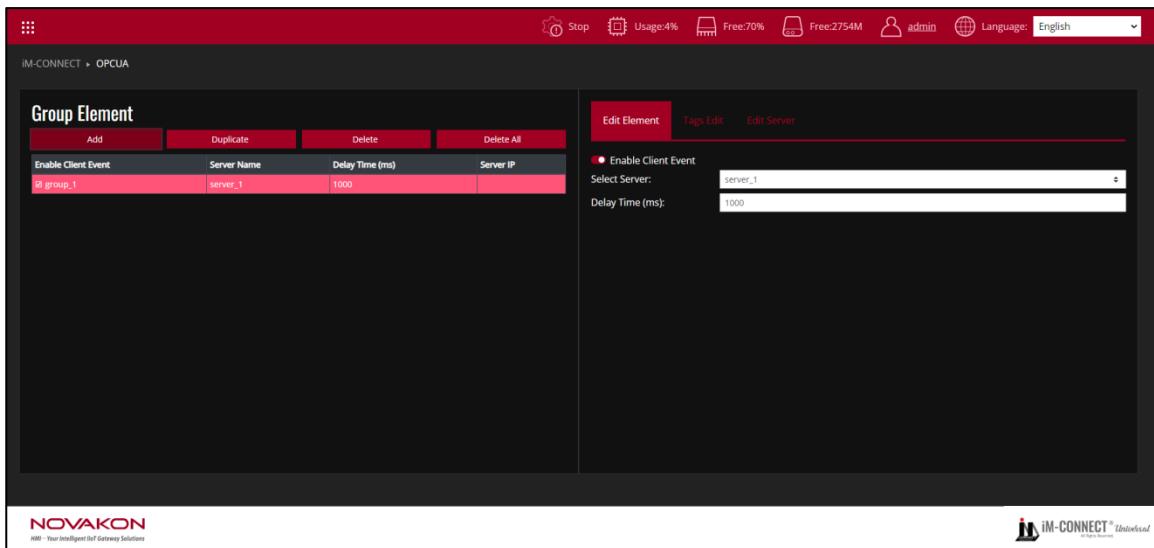
## 9. OPCUA

OPC was primarily developed to address the compatibility issues arising from manufacturers' proprietary software designs, which made monitoring difficult due to lack of compatibility. It established communication protocol standards. OPC UA, on the other hand, removes the limitations of OPC DA tied to Windows COM/DCOM technology and instead adopts a new protocol based on HTTP for further development.



Add	Add a set of OPCUA Client.
Duplicate	Duplicate the selected setting of the set of OPCUA Client.
Delete	Delete the selected setting of the set of OPCUA Client.
Delete All	Delete all the events of OPCUA Client.

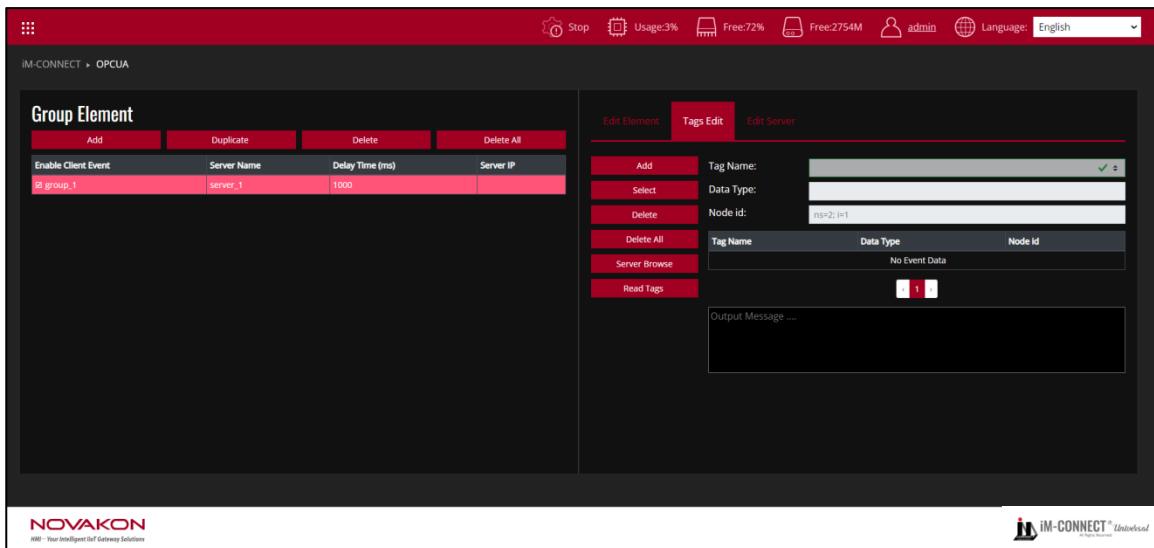
Start the OPCUA Client setting after selecting [Add].



## Edit Element

Definite a OPCUA event.

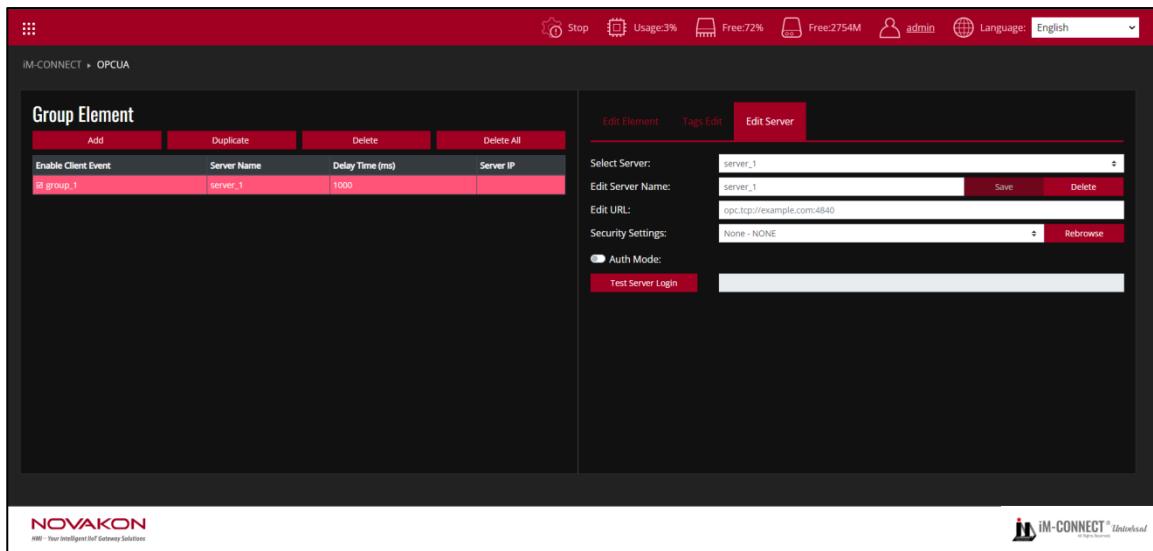
Enable Client Event	Enable a OPCUA Client item.
Select Server	Select the name of the OPCUA Server to be connected with.
Delay Time	Set OPCUA delay time.



## Tags Edit

Add	Add a tag as the monitor of OPCUA Client.
Select	Select an already established tag as the OPCUA Client.
Delete	Delete the selected tag(s).
Delete All	Delete all the tag(s) of this event.
Server Browse	Import the selected tags from OPCUA server. 
Tag name	It shows the tag name of the OPCUA Client.
Data Type	It shows the tag type of the OPCUA Client.
Node ID	Input the Node ID of the element address on the OPCUA Client. The names defined by each equipment may differ, so it shall be input based on each of the definitions.

The established Tag Name, Data Type, Node ID, Output Message, and other data are listed in sequence below.



## Edit Server

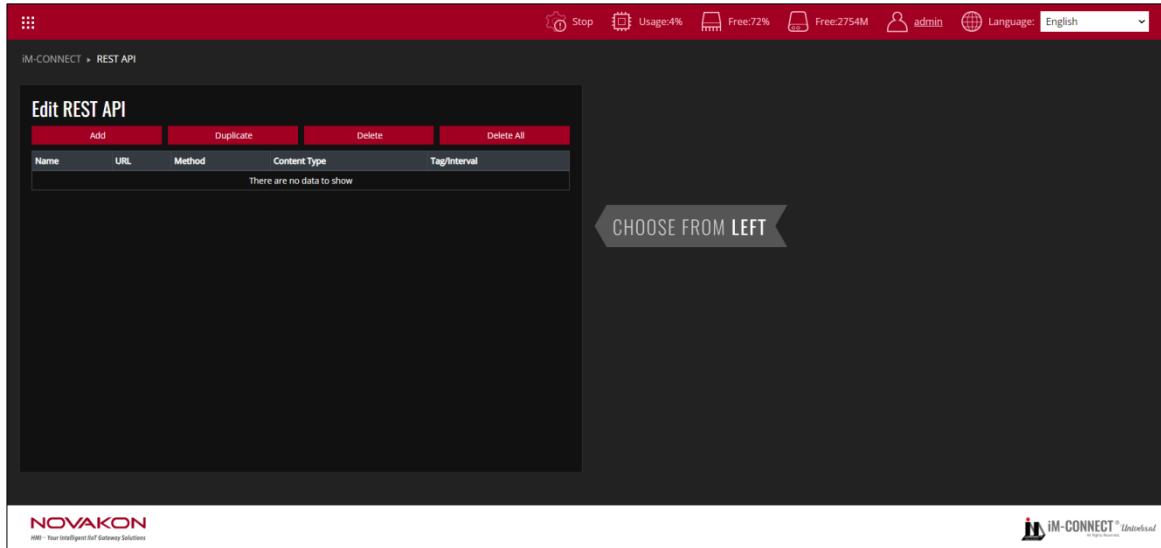
Define the relevant data of the OPCUA Server.

Select Server	Select the name of the OPCUA Server to be connected with.
Edit Server Name	Edit the name of the OPCUA Server.
Server IP	Input the IP of the OPCUA Server to be connected with.
Port	Set the port number of the OPCUA Server.
Security Settings	Set the security mode for communication according to the connected Server.
Auth Mode	Select whether the to-be-logged-in OPCUA Server needs an authentication. If it needs authentication, input the account name and password to be logged in.
Test OPC UA Server	Test connection status after selecting it.

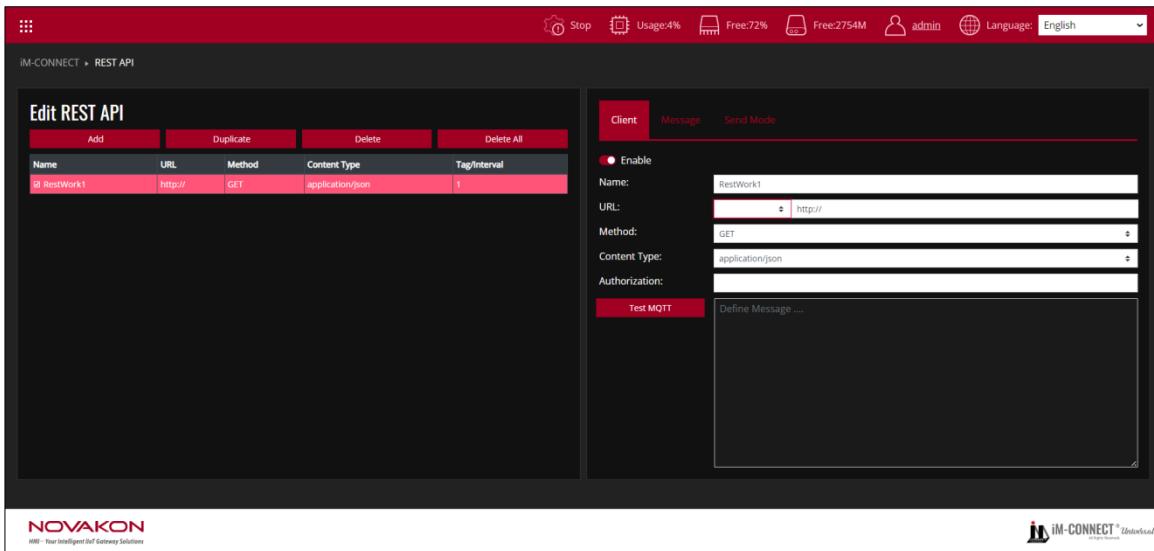
# 10. REST API

---

Rest API refers to the state transfer of information in a certain format (usually JSON format) on the network. The human-machine sends requests in JSON format through the Rest API and receives responses from the cloud to meet the needs of IoT applications.



Add	Add a new set of Rest API.
Duplicate	Copy the Rest API settings of the selected group.
Delete	Delete the selected Rest API settings.
Delete All	Delete all Rest API events.



## Client

Define a Rest API event.

Enable	Check to start this Rest API project.
Name	Set the name of Rest API.
URL	Set the URL of Rest API.
Method	Set the GET/POST/PUT/DELETE commands of Rest API.
GET	The client uses the GET method to access resources at the specified URL on the server. They can quickly make GET requests and pass parameters in RESTful API requests to instruct the server to filter data before sending it.
POST	The client uses POST to send data to the server. It contains a representation of the data in the request. A common result of sending the same POST request multiple times is to create the same resource multiple times.

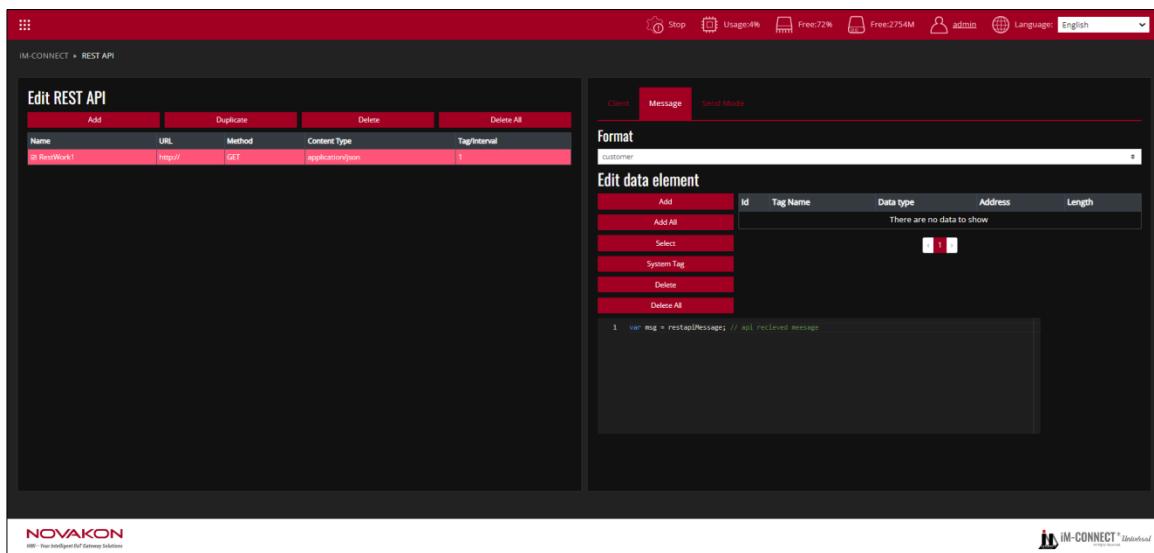
PUT	The client uses PUT to update existing resources on the server. Unlike POST, transmitting the same PUT request multiple times in a RESTful web service will produce the same result.
DELETE	The client uses DELETE to request deletion of the resource. DELETE requests a change to the server state. However, if the user does not have proper authentication, the request will fail.
Content Type	Set the type of Rest API. Can be divided into [text/plain], [application/json], [application/x-www-form-urlencoded].
text/plain	Used to indicate that the body of the request or response is plain text data.
application/json	Used to indicate that the body of the request or response is data in JSON format.
application/x-www-form-urlencoded	Usually used for HTML form submission default Content-Type, encoding form data into key-value pairs.
Authorization	Set the authorization of Rest API. Ensure that only authenticated and authorized consumers can access resources using the REST API. When using Line's REST api function, you need to add [Bearer] before authorization.

	<p><b>POST https://notify-api.line.me/api/notify</b></p> <p>Sends notifications to users or groups that are related to an access token. If this API receives a status code 401 when called, the access token will be deactivated on LINE Notify (disabled by the user in most cases). Connected services will also delete the connection information. Requests use POST method with application/x-www-form-urlencoded (Identical to the default HTML form transfer type).</p> <p><b>Expected use cases</b> When a connected service has an event that needs to send a notification to LINE</p> <p><b>Request method</b></p> <table border="1"> <thead> <tr> <th>Request methods/headers</th><th>Value</th></tr> </thead> <tbody> <tr> <td>Method</td><td>POST</td></tr> <tr> <td>Content-Type</td><td>application/x-www-form-urlencoded OR multipart/form-data</td></tr> <tr> <td>Authorization</td><td>Bearer &lt;access_token&gt;</td></tr> </tbody> </table>	Request methods/headers	Value	Method	POST	Content-Type	application/x-www-form-urlencoded OR multipart/form-data	Authorization	Bearer <access_token>
Request methods/headers	Value								
Method	POST								
Content-Type	application/x-www-form-urlencoded OR multipart/form-data								
Authorization	Bearer <access_token>								
Test API	Displays the content of the response message after the Rest API is sent.								

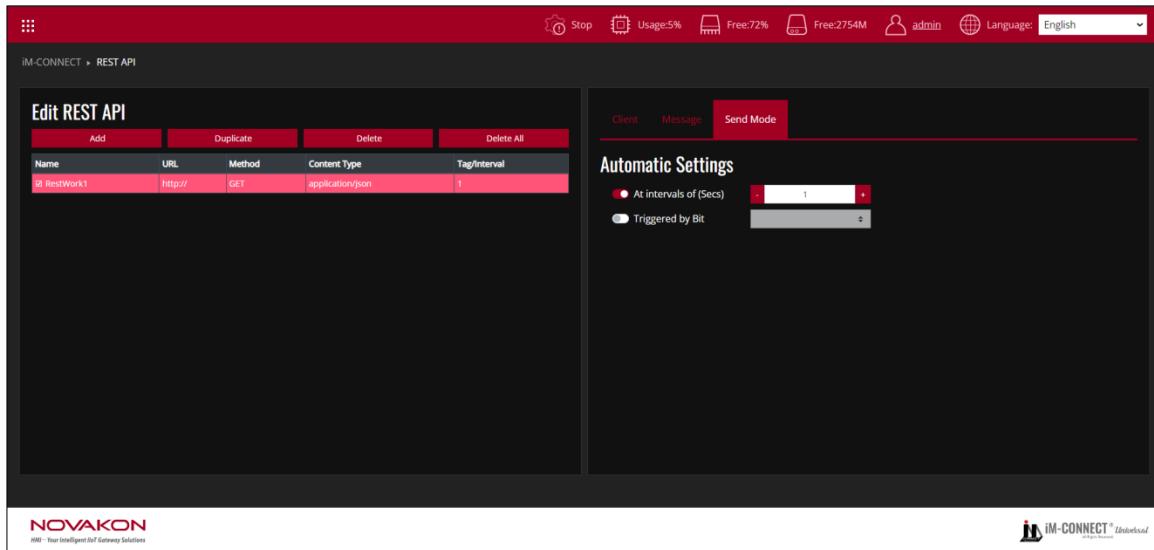
## Message

Format	You can set the [JSON]/[Customer] format. The default is [JSON].
JSON	JSON is a lightweight data exchange format that is easy for humans to read and write, and easy for machines to parse and generate. In REST APIs, JSON is the most common data format used to represent request and response bodies.
Add	Add tags used by Rest API.
Add All	Add all tags to Rest API.

Select	Select the tag used by Rest API.
System Tag	Obtain the system time and other information of the gateway through the system label.
Delete	Delete the selected tag.
Delete All	Delete all tags.



If the data format is selected as [Customer] format, the user must write the specified data into the specified tag in accordance with the RESTAPI Server definition.

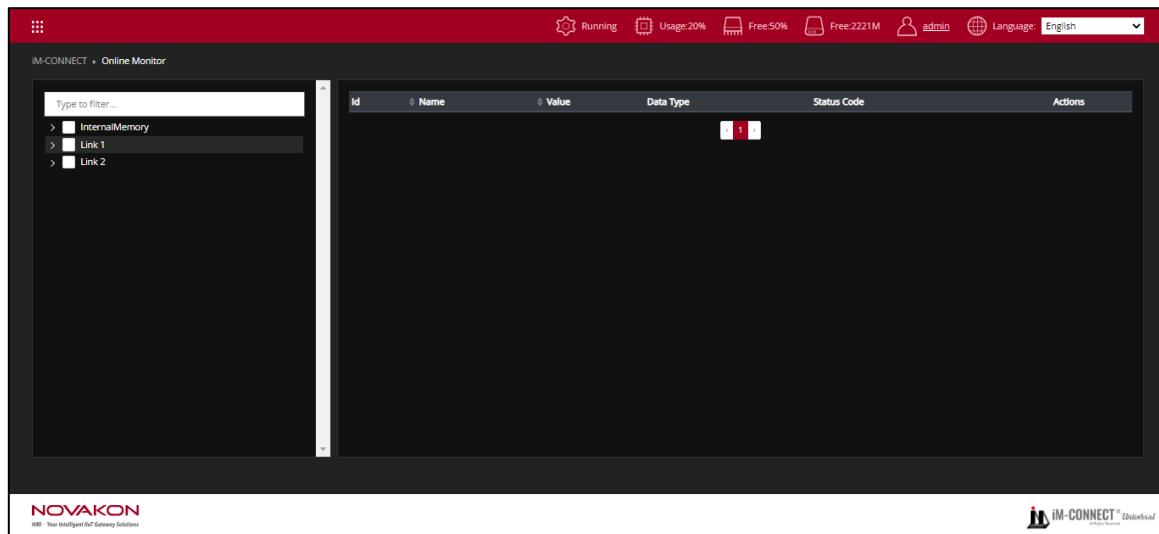


## Send Mode

At intervals of (Secs)	Set to send Rest API messages at fixed intervals of seconds. The default is 1 second.
Triggered by Bit	Set to send a Rest API message when the status of the trigger bit changes from OFF to ON.

# 11. Online Monitor

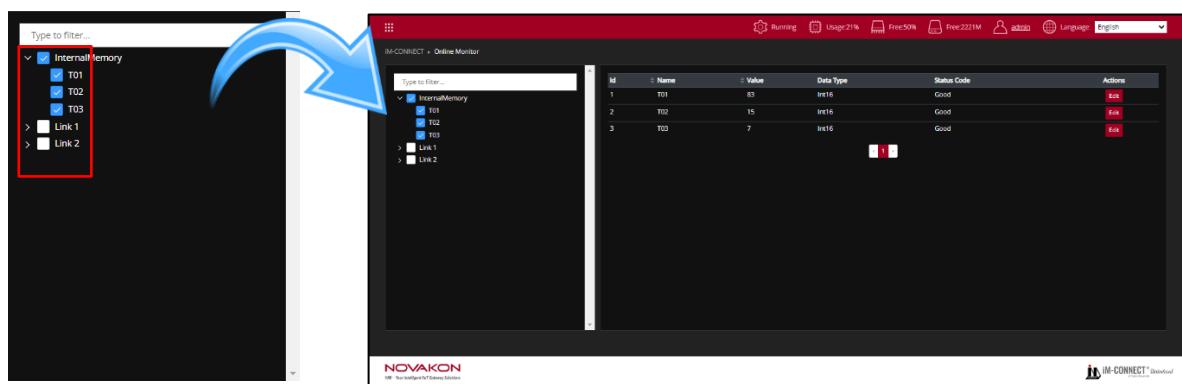
The main function of [Online Monitor] is to monitor the current tag values from the controller that connected to GATEWAY.



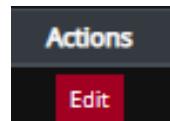
First, enter [OPCUA] from the [iM-Connect Universal Menu].

The left window displays a list of all tags of the current project.

Click [ > ] to expand or collapse the list. Next, click the box [  ] next to the tag to monitor the tag's current value in the right window.



The current tag value can be monitored in the right window. To update the GATEWAY data during the monitoring process, click [Edit] at [Actions] to modify the tag status value.



If the modified tag is [int16], after clicking [Edit] at [Actions], set the value to be modified in the box [Value]. After finishing, click [Save] to write the value to GATEWAY. To cancel writing the value to GATEWAY, click [Cancel].

After modifying the status or value of the tag, click the blank space next to it to complete the modification setting.

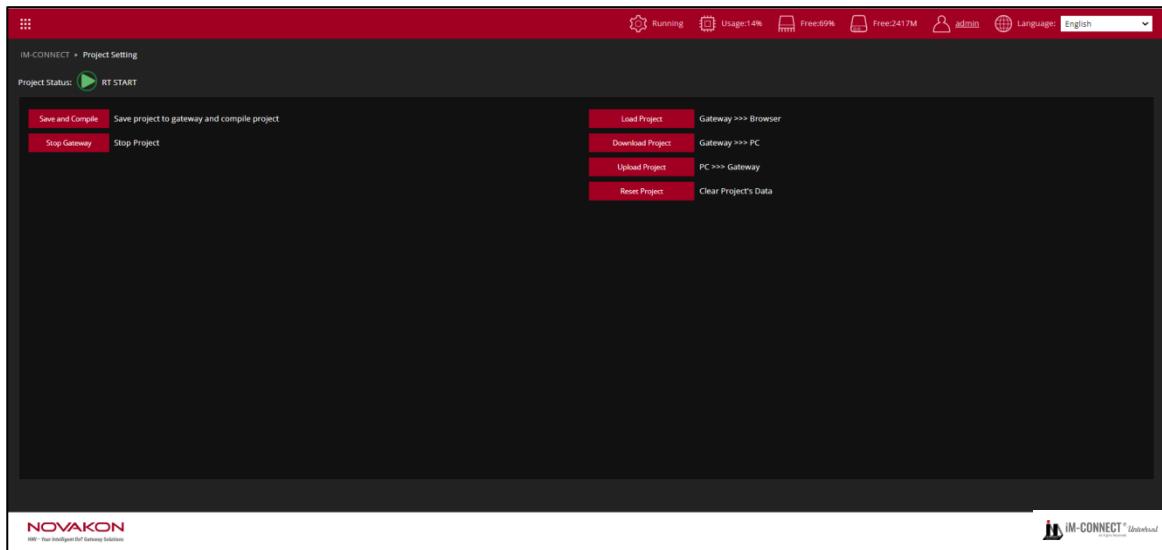
Id	Name	Value	Data Type	Status Code	Actions
1	T01	83	Int16	Good	<span data-bbox="1256 604 1287 626">Save</span> <span data-bbox="1287 604 1335 626">Cancel</span>
4	Tag4	true	Boolean	Good	<span data-bbox="1256 637 1287 660">Edit</span>

If the modified tag is [Bit], after clicking [Edit] at [Actions], the [Value] can be checked as [true] (1, ON) or unchecked as [false] (that is, Is 0, OFF). After finishing, click [Save] to write the value to GATEWAY. To cancel writing the value to GATEWAY, click [Cancel].

Id	Name	Value	Data Type	Status Code	Actions
1	T01	83	Int16	Good	<span data-bbox="1256 1008 1287 1030">Edit</span>
4	Tag4	<input checked="" type="checkbox"/> true	Boolean	Good	<span data-bbox="1208 1042 1240 1064">Save</span> <span data-bbox="1240 1042 1287 1064">Cancel</span>

## 12. Project Setting

The project setting is mainly used to perform related actions such as [Save and Compile],[Run & Stop], [Load Project] , and[Download/Upload]of the project.



Project Status	Display the current status of GATEWAY (RT) operation.
Save and Compile	Save the edited tag data to GATEWAY for verification.
Run/Stop Gateway	Run or stop the GATEWAY (RT) operation.
Load Project	Load the GATEWAY data into the web page for later tag edit, modification or add action.
Download Project	Load all current data back to the computer.
Upload Project	Return all current data to GATEWAY.
Reset Project	Clear all the settings and parameters of the project (Username, password, and IP address will not be affected).

Note: **Please remember to press [Load Project] to load the returned data to the Web page** after downloading the previous data to the computer with [Download] or after updating the originally set IP. Otherwise, the content seen on the web page would not be updated synchronously.

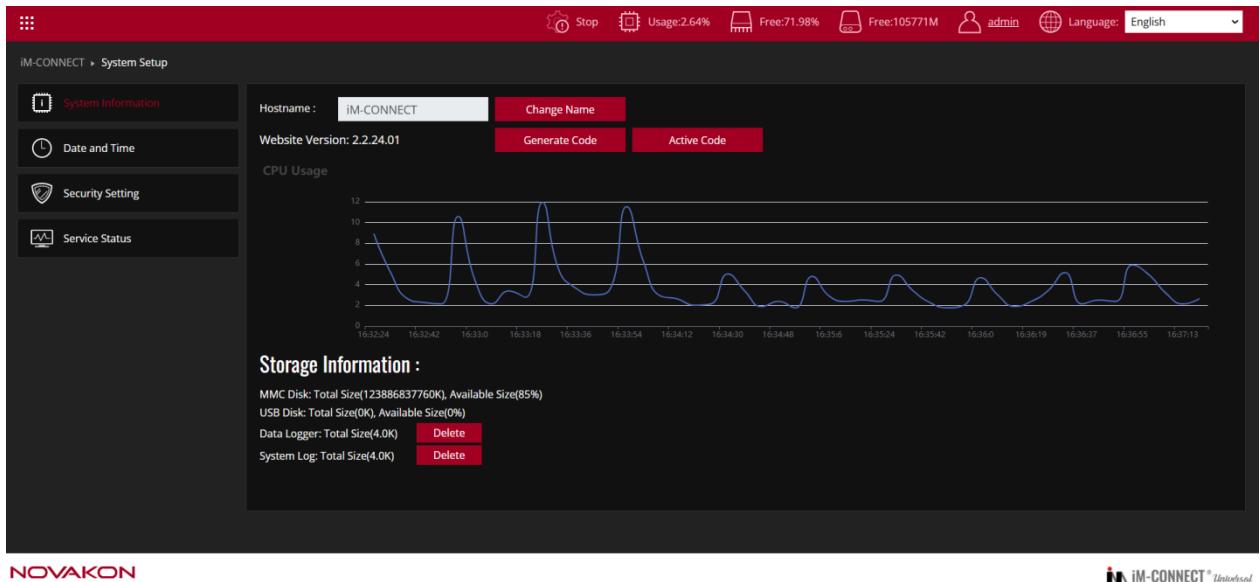
## **13. System Setting**

---

This is where to view current GATEWAY-related information and settings, including System Information, Date and Time, Security Settings, Service Status, etc.

# System Information

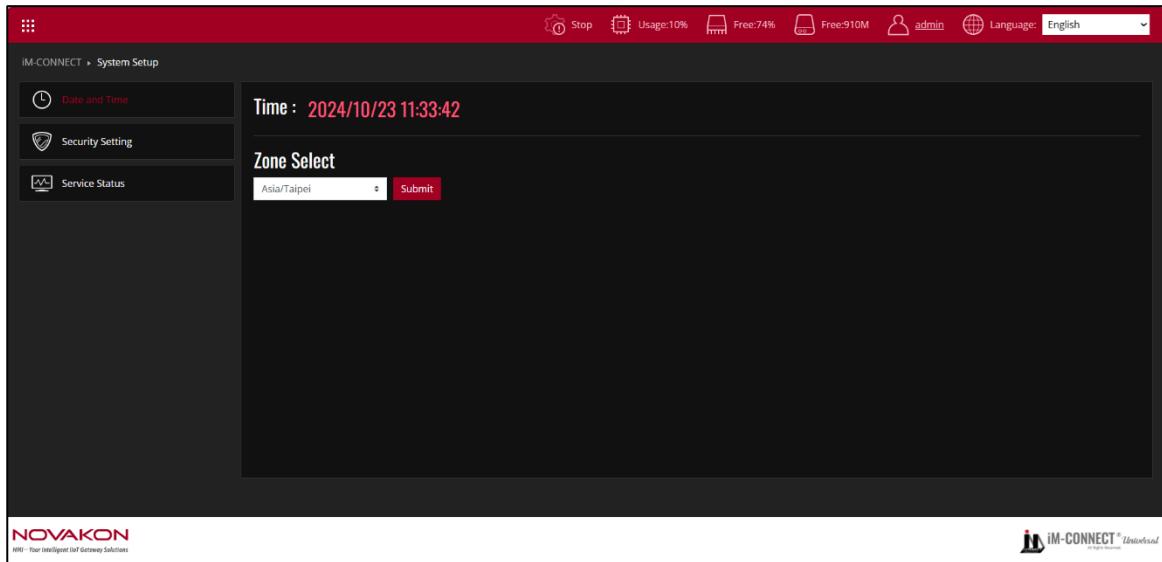
Click on each page to view information about the currently connected GATEWAY.



Hostname	Click the button of [Change Name] to modify the host name.
Generate Code	Generate the app information to get Authorized Code.
Active Code	Upload authorized Code to unlock software
CPU Usage	Display the CPU usage with trend chart.
Data Logger	Displays the current total storage capacity of recorded data, in KB. Pressing [Delete] clears the capacity.
System Log	Displays the total capacity of the current system logs, in KB. Pressing [Delete] clears its capacity.

## Date and Time

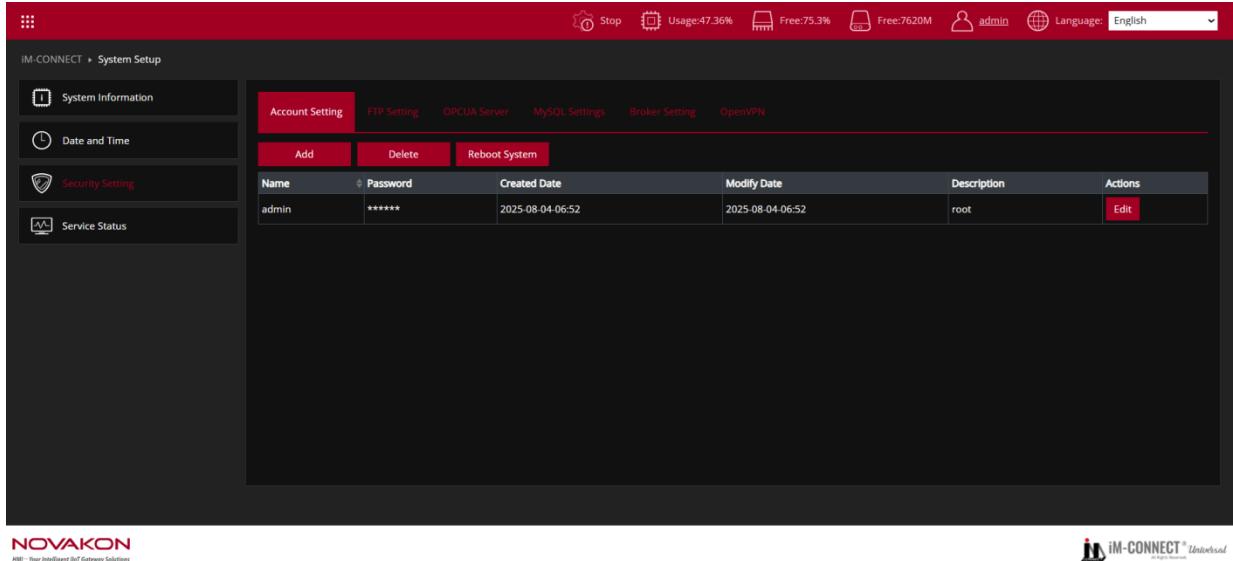
Set the date and time of the GATEWAY.



TIME	Displays current time and date of the system.
Zone Select	Choose the current location and country. After setting, press [Submit] to save the current setting.

# Security Setting

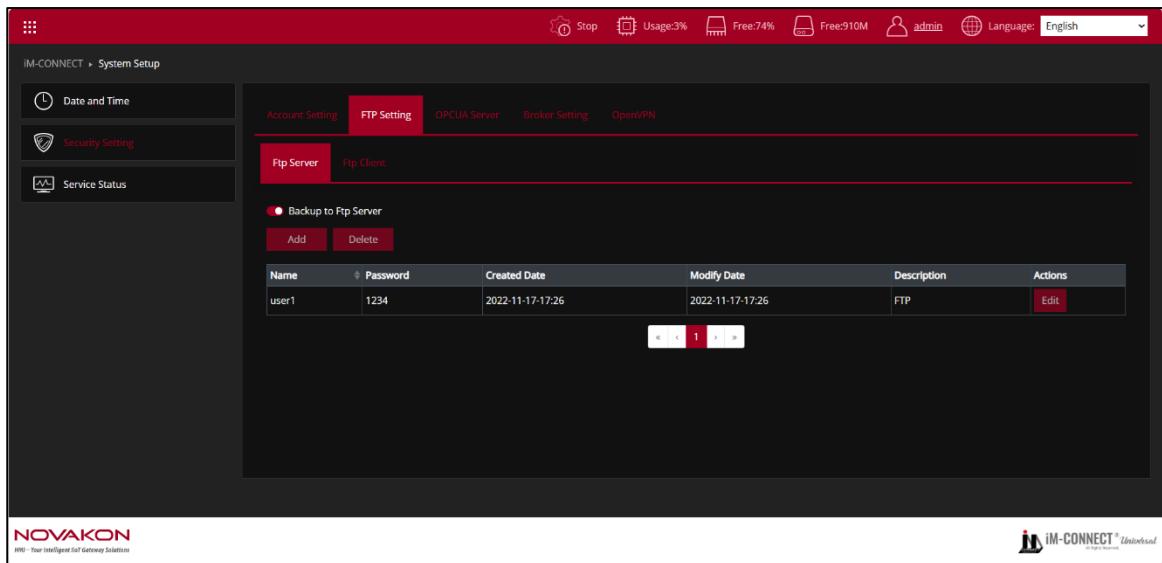
Set the login GATEWAY username and password of the account and [FTP], relevant settings of MQTT [Broker].



## Account Setting

Add or Delete usernames and passwords. Username can be set as [root] or [end-user]. Log in as [root] can access all the functions ; as [end-user] only display basic functions.

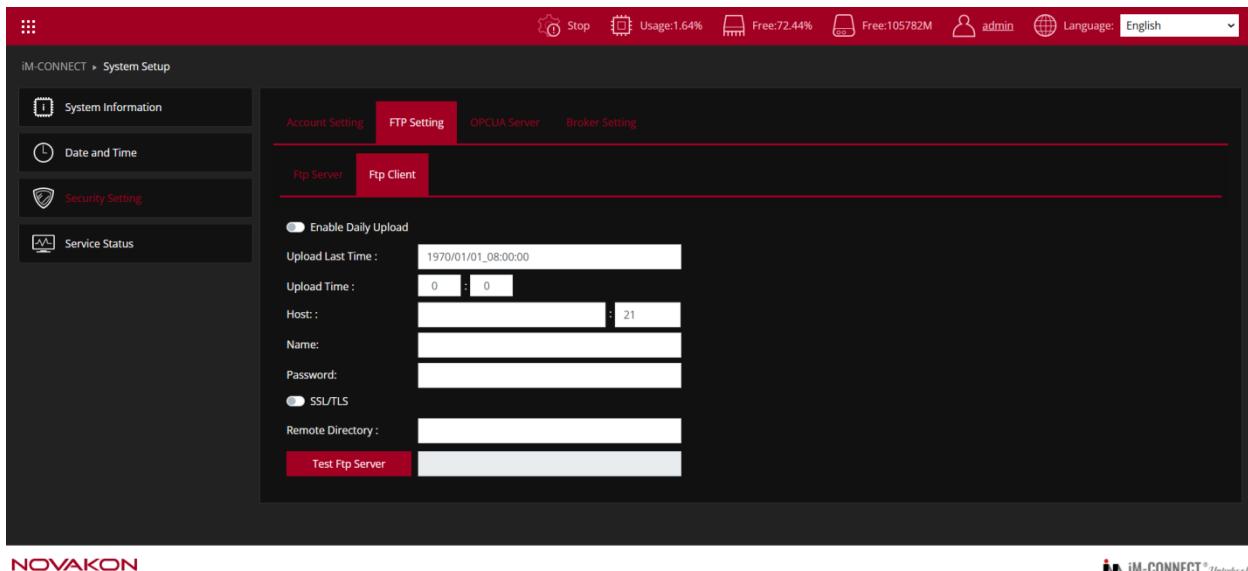
Add	Add a new set of username and password with[end-user]access.
Delete	Delete a set of username and password.
Edit	Modify username and password. Press[Save]when editing is completed. System will automatically log out for user to log in with modified username and password.



## FTP Setting

### FTP Server

Ftp Server	Check the box to enable FTP, in which data log file can be accessed. Port:30021
Add	Add a new set of FTP username and password.
Delete	Delete a set of FTP username and password.
Edit	Modify FTP username and password. Press[Save]to complete the modification.

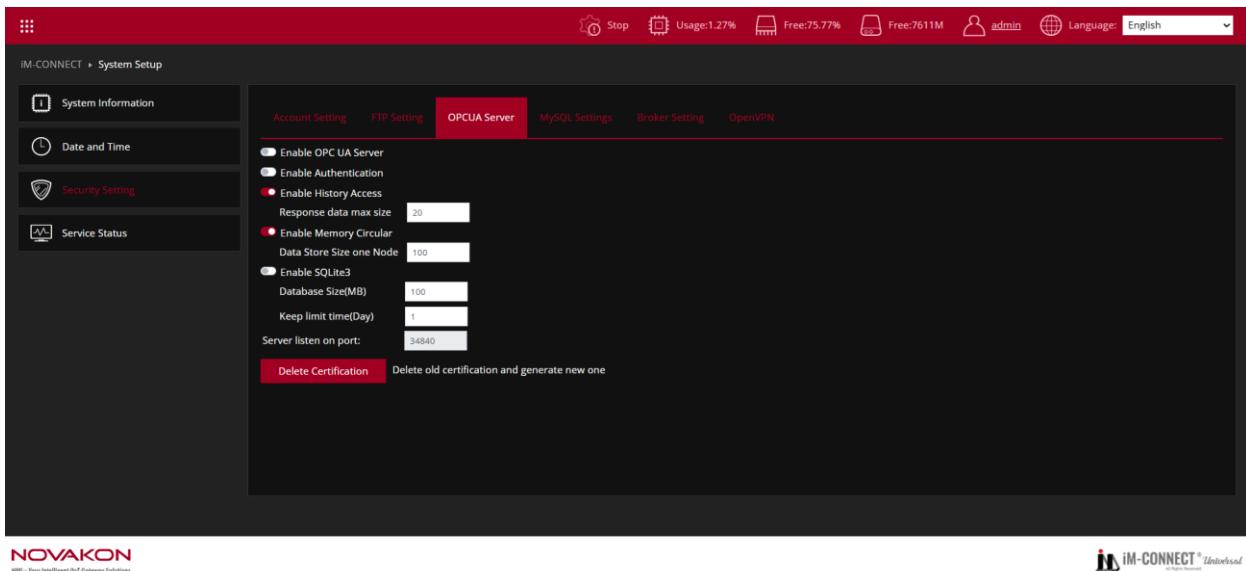


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## FTP Client

Set gateway as FTP Client with the condition and related information of FTP Server, to which gateway send data through Internet.

Enable Daily Upload	Set the time that gateway uploads data (Datalog/Alarm History) to FTP server everyday.
Upload Last Time	Displays the time when the file was last uploaded.
Upload Time	You can set the time to upload files every day.
Host	Input the server's name for connection.
Name	Input the FTP client username.
Password	Input the FTP client password.
SSL/TLS	Check to enable connection encryption.
Remote Directory	Input the remote directory of FTP server for upload.
Test Ftp Server	Click to test the connection to FTP server.



## OPCUA Server

Set GW-01 as a OPCUA Server.

Enable OPC UA Server	Enable the OPCUA Server.
Enable Authentication	Input the username and passcode when it is enabled.
Enable History Access	Client can query historical values based on specific time ranges, timestamps, or data modification times.
Enable Memory Circular	Use memory buffer Structure to save historical data and overwrites the oldest data when the buffer is full.
Enable SQLite3	Use an SQLite3 database file to store historical data for long-term retention.
Server Listen on port	Set the port on which the OPC UA Server is listening for connection requests of OPC UA Clients. The default port is[34840].
Delete Certification	Delete old certification and generate new one.

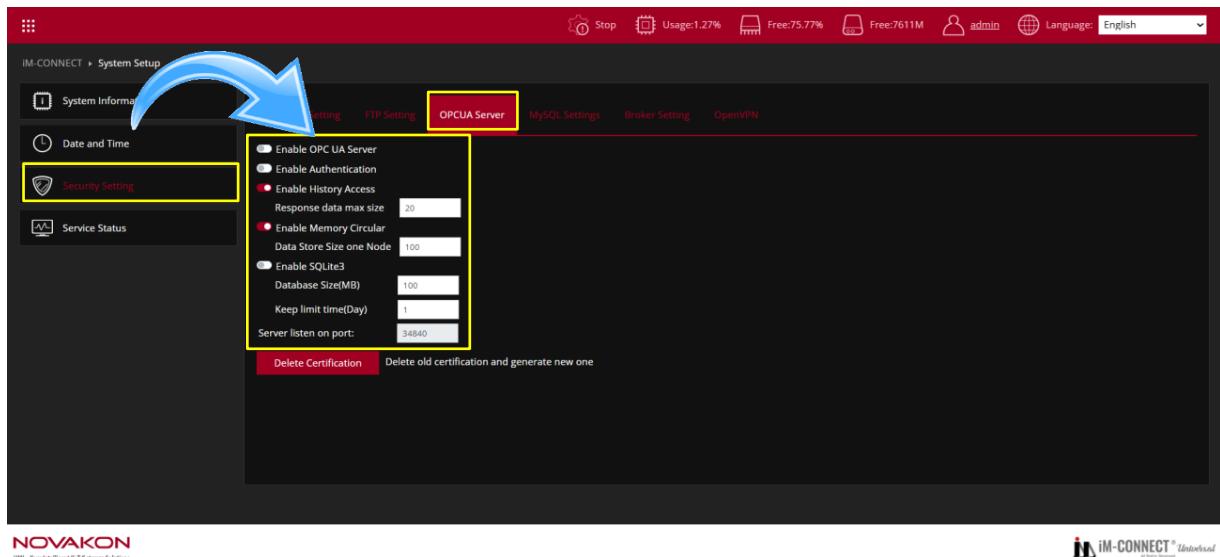
## Example

Take two GW-01, one as OPCUA Server, another one as OPCUA Client to test the connection.

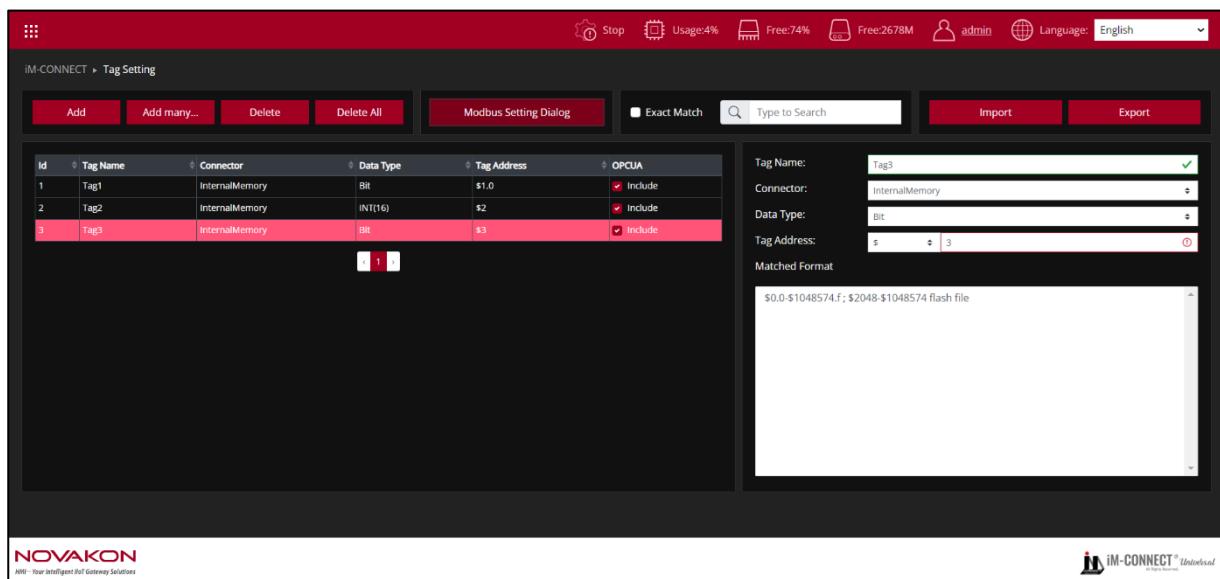
## A. OPCUA Server Settings (IP address 192.168.90.94)

- (1) Click upper left corner  to open the menu. Click[System Setup].
- (2) Click[Security Setting]→[OPCUA Server], Click [Enable OPC UA Server], Listen for connections on port to default[34840].

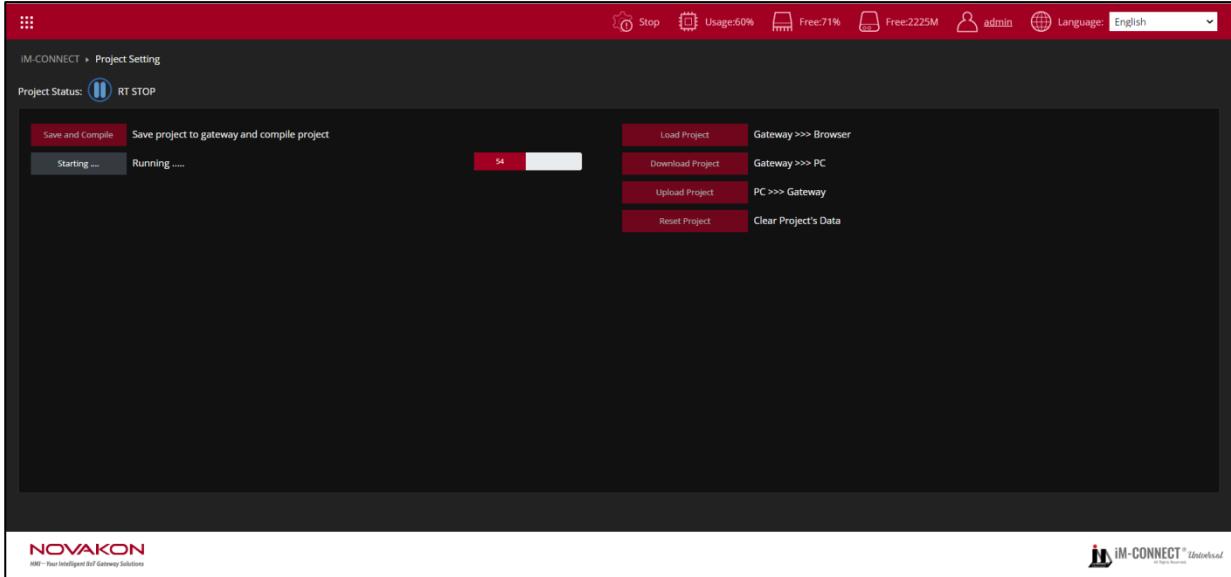
(Before changing the state of [Enable OPC UA Server], make sure the Project is stopped first.)



- (3) Click upper left corner  to open the menu. Click[Tag Setting]. Add three new tags with datatypes of Bit/INT(16)/UINT(32). For the details of Tag setting, please refer to Chapter 4[Tag Setting].

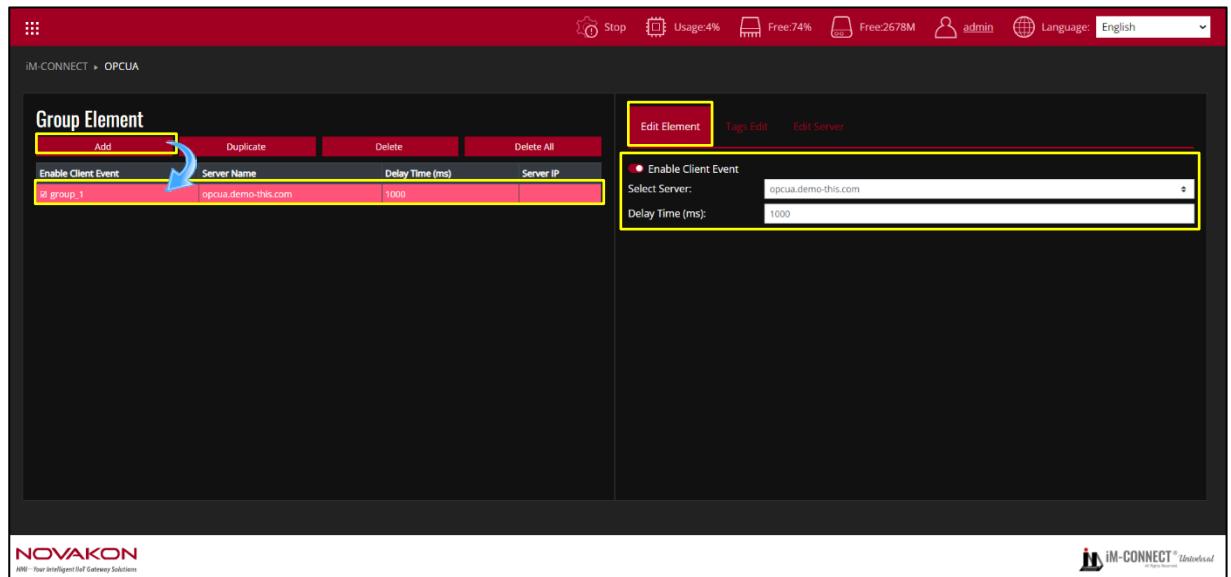


- (4) After setting, go to [Project Setting], click [Save and Compile] to GW-01 and [Start Project].



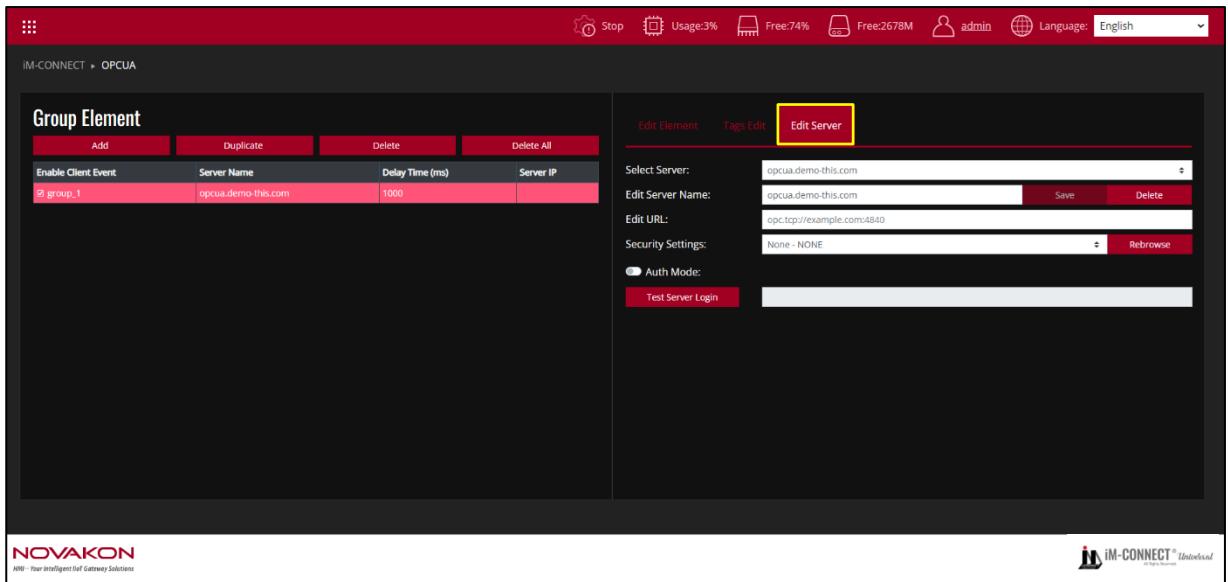
## B. OPCUA CLIENT Settings (IP address 192.168.90.118)

- (1) Click upper left corner to open the menu, Click[OPCUA].
- (2) Click[Add]to add an OPCUA item.
- (3) Go to the right column [Edit Element], click[Enable Client Event].



- (4) Click [Edit Server], set the connection to OPCUA SERVER.

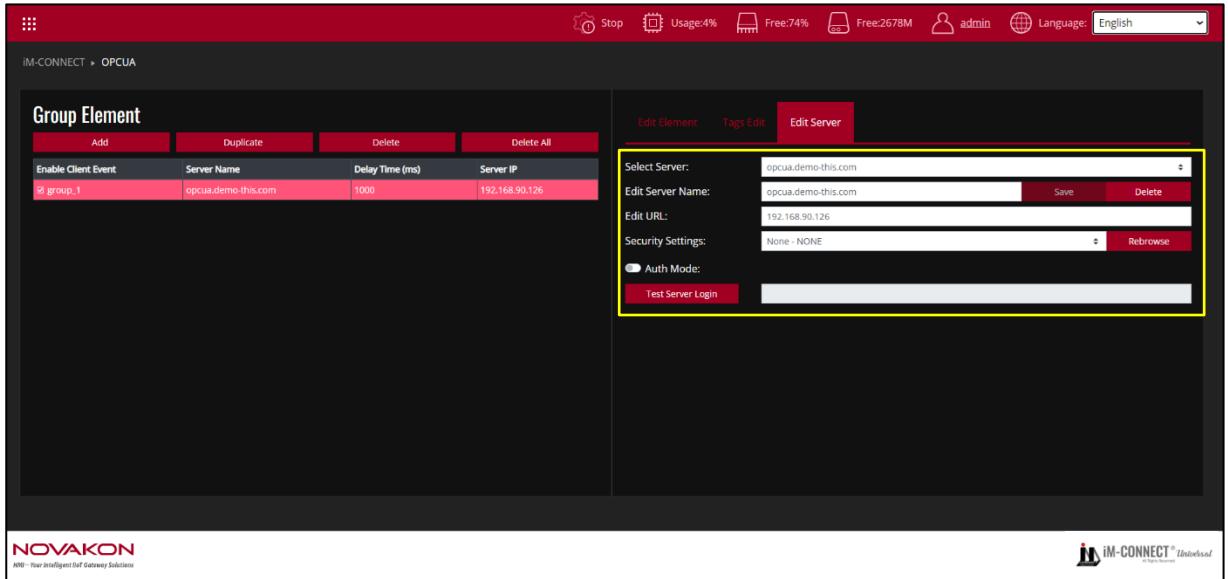
For the details of OPCUA CLIENT settings, please refer to Chapter [9.OPCUA].



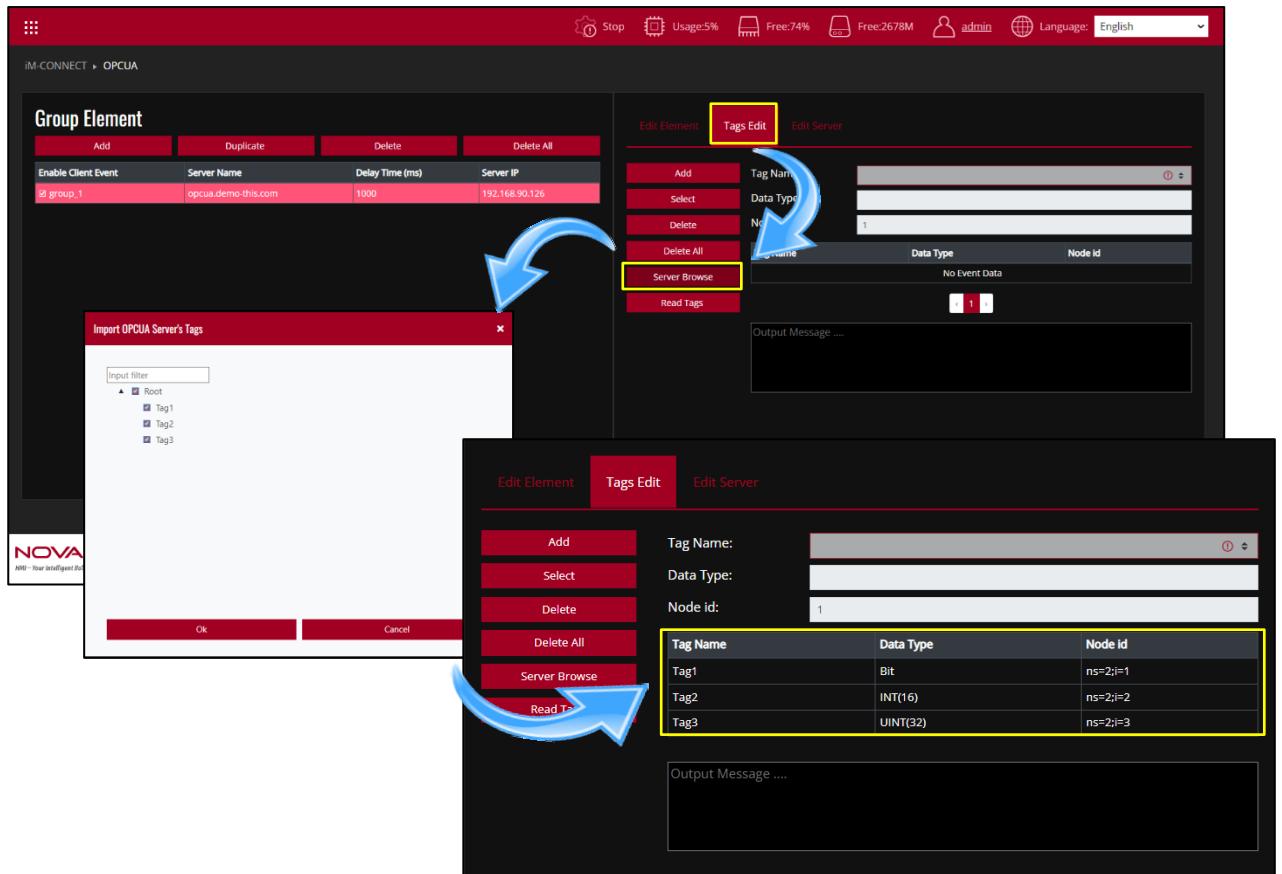
(5) Click [Edit Server], set the connection to OPCUA SERVER.

For the details of OPCUA CLIENT settings, please refer to Chapter [9.OPCUA].

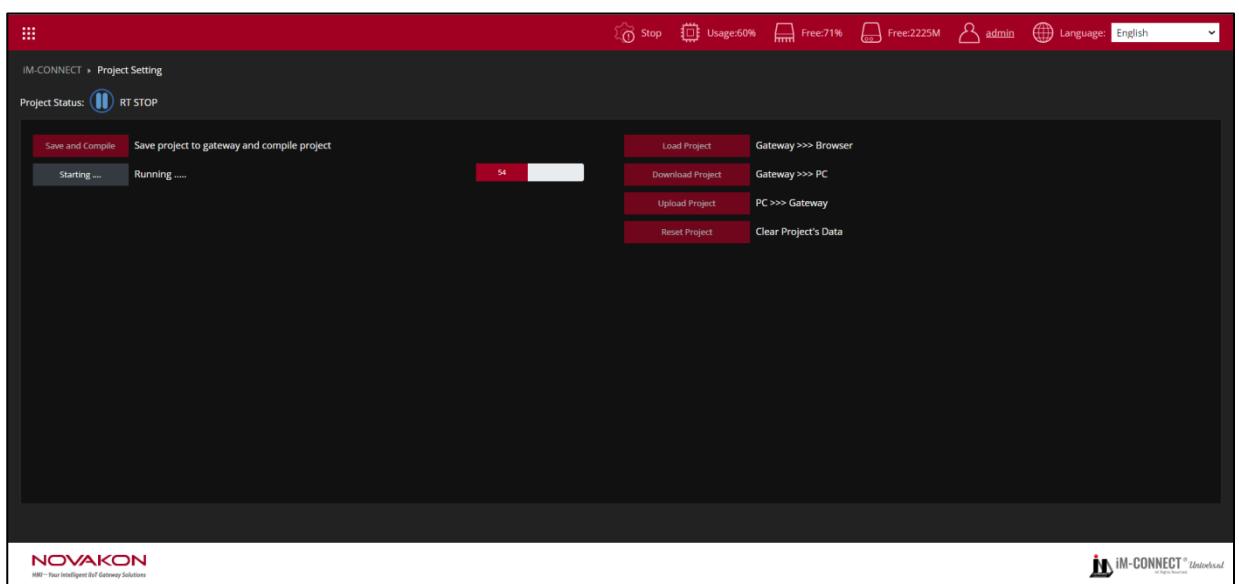
After the setting is completed, press [Test Server Login]. If the test is correct, [Server connect successfully] will be displayed.



(6) Switch to [Tags Edit]. After clicking [Server Browse], you can see the tags created in OPCUA SERVER. Check the required tags and press [OK] to automatically add the tags of OPCUA SERVER to the OPCUA CLIENT device.

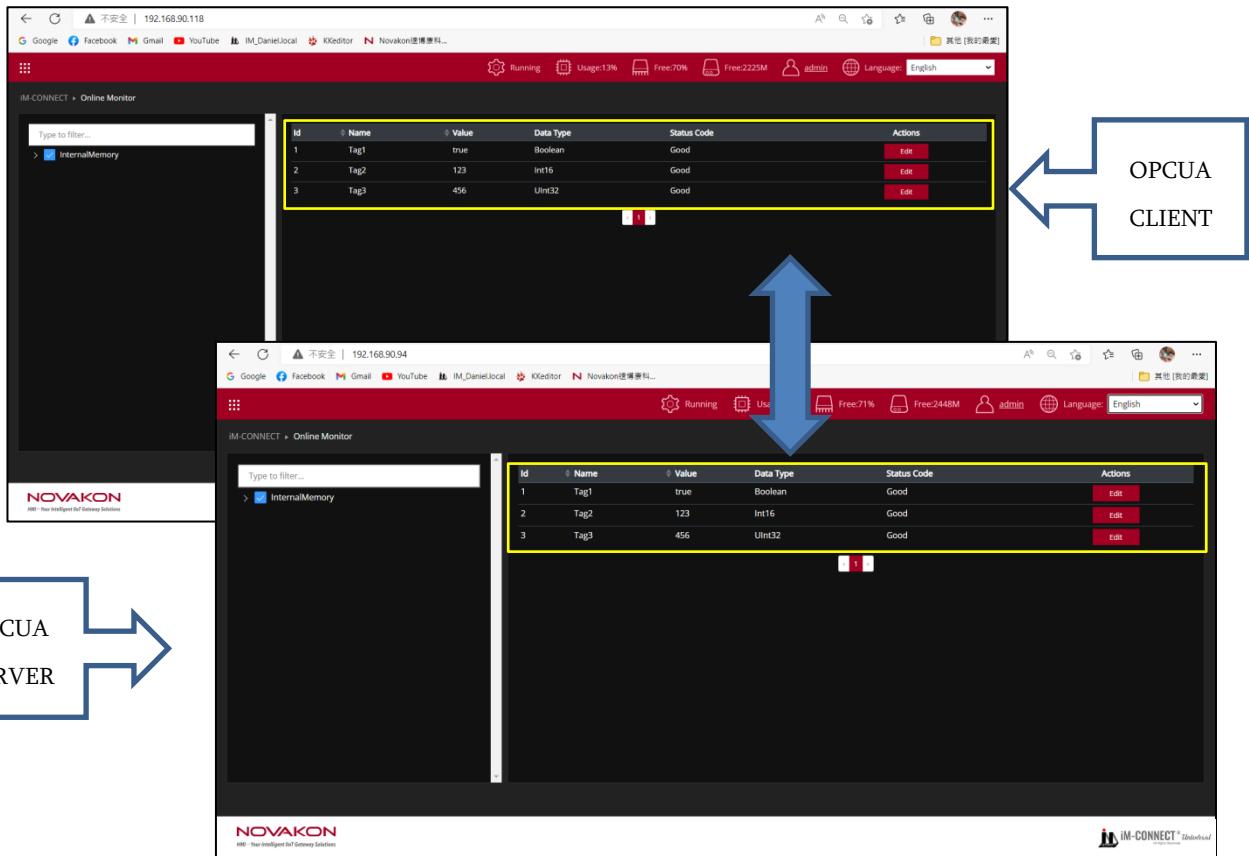


- (7) After the setting is completed, you can go to [Project Setting] to execute [Save and Compile] to GW01 and [Start Project].



## C. Connection Test

- (1) Connect two GW01 separately, click on the upper left  open the menu, and click [Online Monitor] to enter the monitoring screen.
- (2) It can be seen from the [Online Monitor] that the two devices can monitor the tag value synchronously, which means that the connection through OPCUA has been successful.



Actions	User	Password	Host
Edit	user3	*****	%
Edit	mysql.infoschema	*****	localhost
Edit	mysql.session	*****	localhost
Edit	mysql.sys	*****	localhost

Database Disk Size: 195M

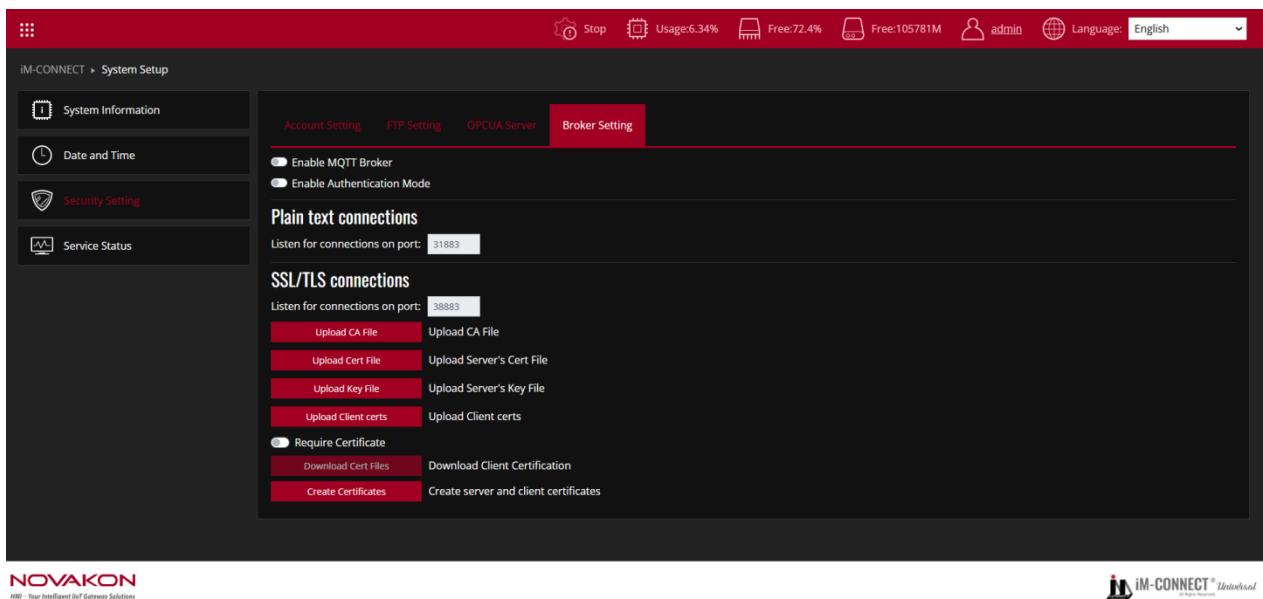
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Version 1.0.0

## MySQL Server Setting

The system uses MySQL Server 8.0 to store data logs persistently, and provides SQL access for querying historical data.

Add New User	The user is created with mysql_native_password using the IDENTIFIED WITH clause.
Delete User	To remove a user account from MySQL Server
Start MySQL	The MySQL server is started and ready to accept connections . The port is [33306].
Stop MySQL	The MySQL server was stopped manually due to maintenance.
Restart MySQL	The MySQL server is first stopped and then started again to complete a restart.



## Broker Setting

When using the MQTT protocol for data transmission, GW01 can be set as a Broker.

Enable MQTT Broker at RT Startup	Enable MQTT Broker after clicking on it.
Enable Authentication Mode	To enable the MQTT Log In Verification Mechanism, click on it and enter the account name and password for authentication.
Plain text connections	Designate the listening port with unencrypted connection. The default is[31883].
SSL/TLS connections	Designate the listening port with SSL encrypted connection. The default is[38883].
Upload CA File	Import the certificate file provided by the server.
Upload Cert File	Import the verification certificate provided by the Server.
Upload Key File	Import the key provided by the Server.

Upload Client certs	Import client certificates.
Require Certificate	Download the certificate required for the log in. Checking[Require Certificate]enables the download of client login certificates.
Download Cert Files	Download Client Certification.
Create Certificates	Create server and client certificates.

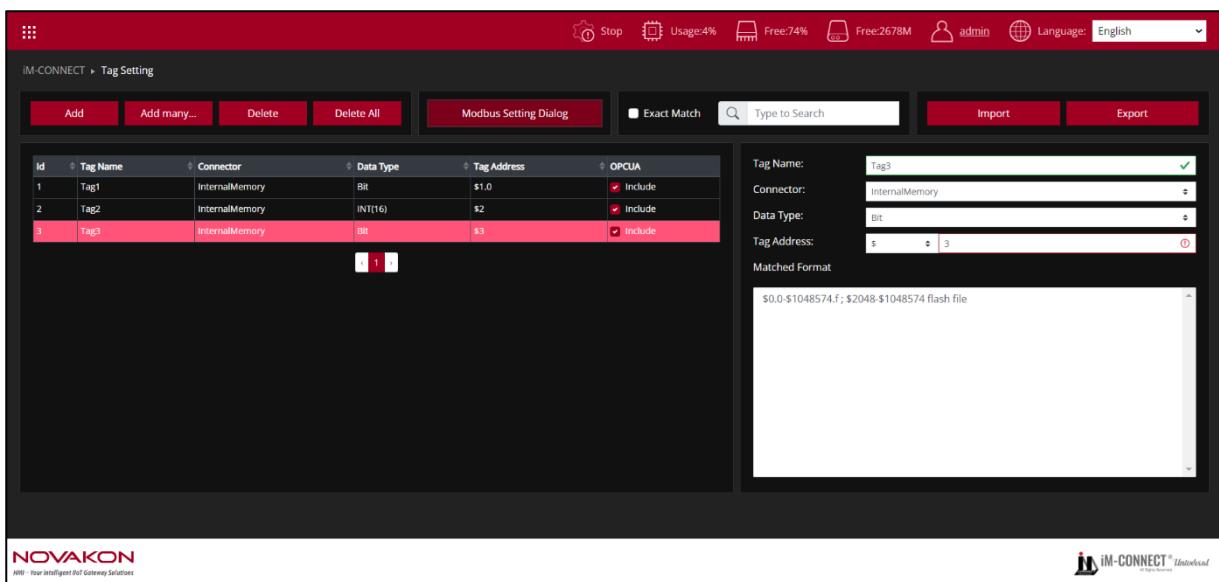
## Example

Take two GW-01 as an example, one is MQTT Subscriber and the other is MQTT Publisher.

- A. Click on the upper left  to open the menu, click [Tag Setting] to enter the setting. Add three new tags with the data types of Bit/INT(16)/UINT(32).

Both GW-01 must create these tags separately.

For instructions on tag setting, please refer to [4. Tag Setting] in this manual.

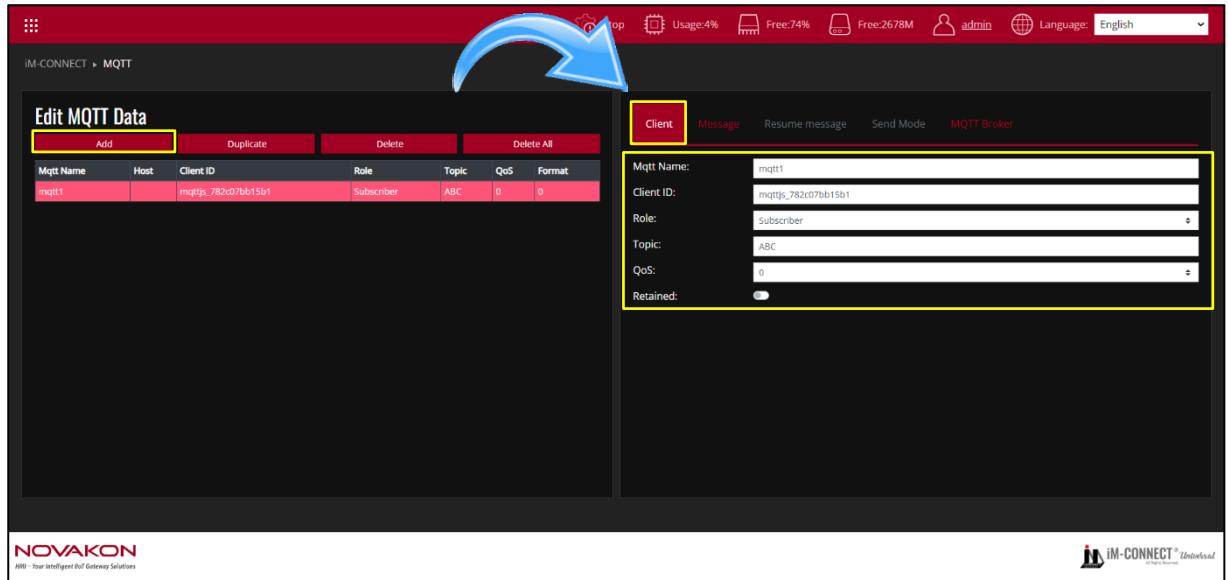


The screenshot shows the 'Tag Setting' page of the iM-CONNECT software. At the top, there are buttons for 'Add', 'Add many...', 'Delete', 'Delete All', 'Modbus Setting Dialog', 'Exact Match' (checkbox), 'Type to Search' (input field), 'Import', and 'Export'. Below this is a table with columns: Id, Tag Name, Connector, Data Type, Tag Address, and OPCUA. Three rows are listed: Tag1 (InternalMemory, Bit, \$1.0, checked), Tag2 (InternalMemory, INT(16), \$2, checked), and Tag3 (InternalMemory, Bit, \$3, checked). On the right side, there is a detailed view panel for 'Tag3' with fields: Tag Name (Tag3), Connector (InternalMemory), Data Type (Bit), and Tag Address (\$3). A note says 'Matched Format: \$0.0-\$1048574.f; \$2048-\$1048574 flash file'. The bottom left corner has the NOVAKON logo, and the bottom right corner has the iM-CONNECT logo.

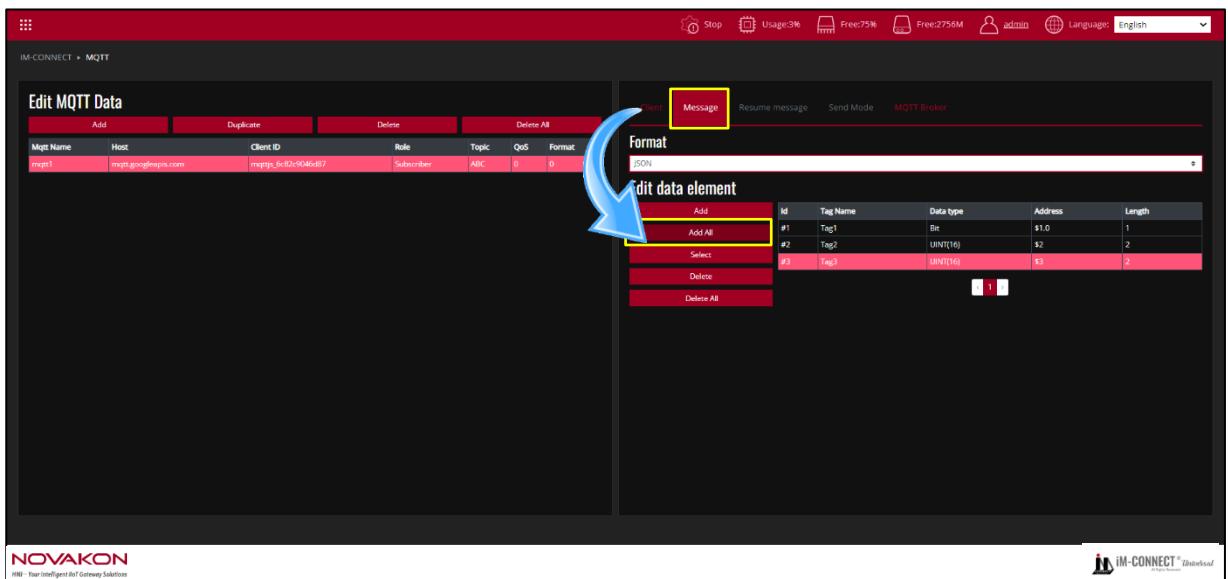
ID	Tag Name	Connector	Data Type	Tag Address	OPCUA
1	Tag1	InternalMemory	Bit	\$1.0	<input checked="" type="checkbox"/> Include
2	Tag2	InternalMemory	INT(16)	\$2	<input checked="" type="checkbox"/> Include
3	Tag3	InternalMemory	Bit	\$3	<input checked="" type="checkbox"/> Include

## B. MQTT Subscriber setting (the IP of GW01 is 192.168.90.129)

- (1) Click on the upper left  to open the menu and click [MQTT] to enter the settings.
- (2) Click [Add] and go to [Client] to set the role to [Subscriber], and the topic must be consistent with the Publisher setting. In this example, set it to [ABC].

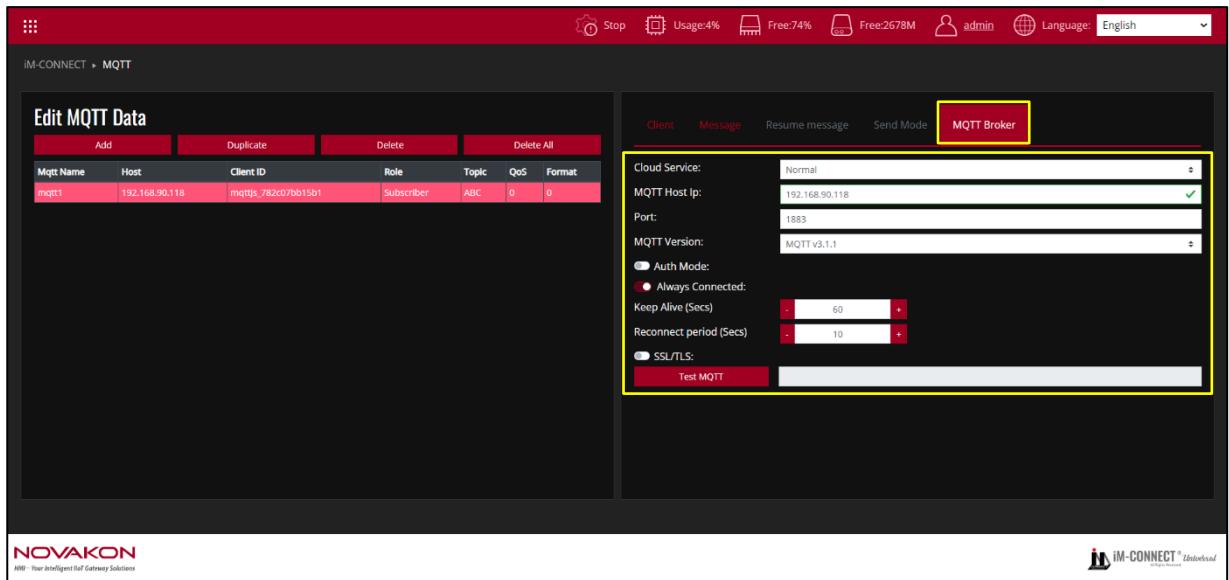


- (3) Click [Message] and press [Add All] to add all the three tags created.

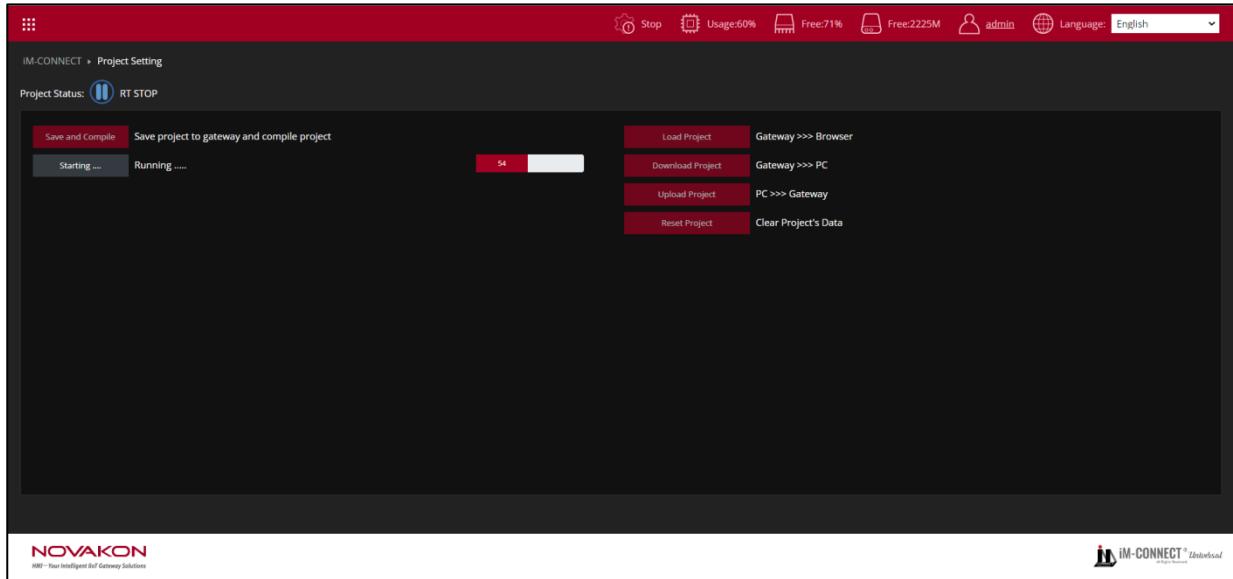


- (4) Click [MQTT Broker] and set [Cloud Service] (this example is set to [Normal]) / [MQTT Host ip] (in this example the command is sent by the Publisher, so Host ip

must be set to the IP address of the Publisher [192.168.90.118] /[Port](in this example, the default is [31883]).



- (5) After the setting is completed, you can go to [Project Setting] to execute [Save and Compile] to GW01 and then [Start Project].



## C. MQTT Publisher settings (the ip of GW01 is 192.168.90.118)

- (1) Click on the upper left to open the menu, and click [MQTT] to enter the settings.
- (2) [Client] set the role to [Publisher], and the topic should be consistent with the Subscriber setting. In this example, it is set to [ABC]

The screenshot shows the IM-CONNECT MQTT configuration interface. On the left, the 'Edit MQTT Data' tab is active, displaying a table with one row: 'mqt1' (Host: mqtts\_6c82c9046d87, Client ID: mqtts\_6c82c9046d87, Role: Publisher, Topic: ABC, QoS: 0, Format: JSON). A yellow box highlights the 'Add' button. On the right, the 'Message' tab is active, showing fields for Client Name (mqt1), Client ID (mqtts\_6c82c9046d87), Role (Publisher), Topic (ABC), QoS (0), and Retained (checkbox). A yellow box highlights the entire message configuration area.

- (3) Click [Message] and press [Add All] to add all the three tags created.

The screenshot shows the IM-CONNECT MQTT configuration interface. On the left, the 'Edit MQTT Data' tab is active. On the right, the 'Message' tab is active, showing the 'Format' section with 'JSON' selected. Below it, the 'Edit data element' table has a yellow box around its header row (Id, Tag Name, Data type, Address, Length). The 'Add All' button at the bottom of the table is also highlighted with a yellow box. A blue arrow points from the 'Edit data element' table towards the 'Add All' button in the 'Edit data element' table.

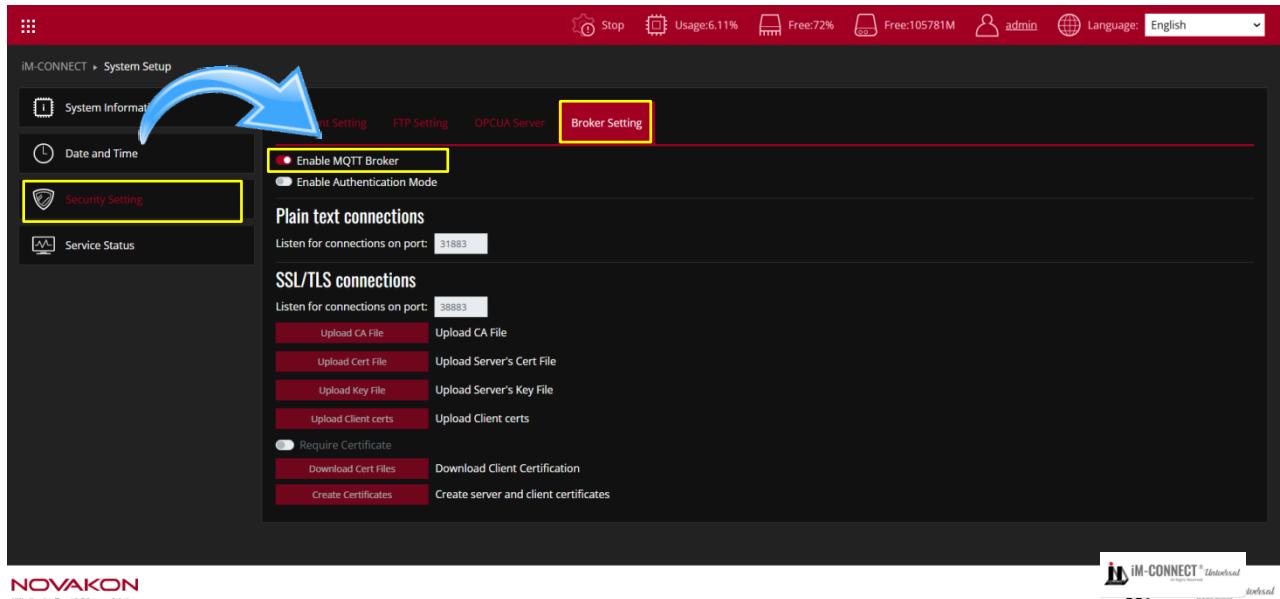
Add	Duplicate	Delete	Delete All		
mqt1	mqtts_6c82c9046d87	Publisher	ABC	0	0

Format																																		
JSON																																		
<table border="1"> <thead> <tr> <th>Add</th> <th>Message</th> <th>Resume message</th> <th>Send Mode</th> <th>MQTT Broker</th> </tr> </thead> <tbody> <tr> <td><b>Add All</b></td> <td>#1 Tag1</td> <td>Bit</td> <td>\$1.0</td> <td>1</td> </tr> <tr> <td>Select</td> <td>#2 Tag2</td> <td>UINT(16)</td> <td>\$2</td> <td>2</td> </tr> <tr> <td>System Tag</td> <td>#3 Tag3</td> <td>UINT(16)</td> <td>\$3</td> <td>2</td> </tr> <tr> <td>Delete</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Delete All</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>					Add	Message	Resume message	Send Mode	MQTT Broker	<b>Add All</b>	#1 Tag1	Bit	\$1.0	1	Select	#2 Tag2	UINT(16)	\$2	2	System Tag	#3 Tag3	UINT(16)	\$3	2	Delete					Delete All				
Add	Message	Resume message	Send Mode	MQTT Broker																														
<b>Add All</b>	#1 Tag1	Bit	\$1.0	1																														
Select	#2 Tag2	UINT(16)	\$2	2																														
System Tag	#3 Tag3	UINT(16)	\$3	2																														
Delete																																		
Delete All																																		

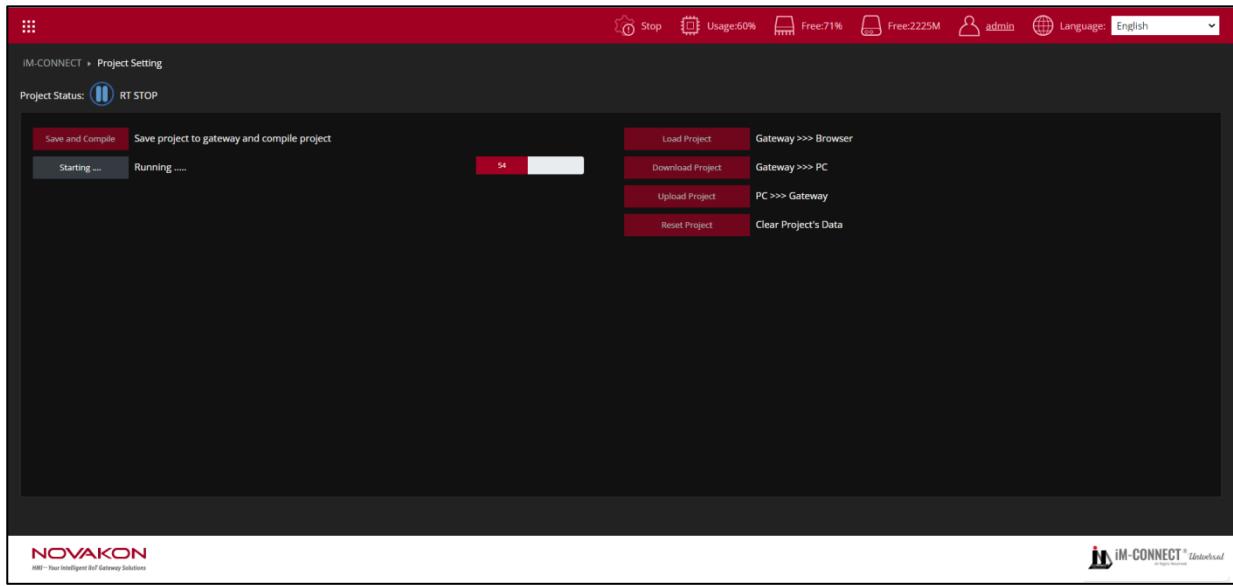
- (4) Click [Send Mode], and set the conditions for transmitting data according to actual needs (in this example, set [At intervals of (Secs)] to transmit once per second).

- (5) Click [MQTT Broker] and set [Cloud Service] (this example is set to [Normal]) / [MQTT Host Ip] (because this gateway is the Publisher, so enter the IP of this gateway [192.168.90.118] here) /[Port](in this example, the default is [31883]).

- (6) Click on the upper left to open the menu, and click [System Setup] to enter the settings.
- (7) Click [Security Setting] → [Broker Setting]. Press [Enable MQTT Broker] and specify it as MQTT Broker.

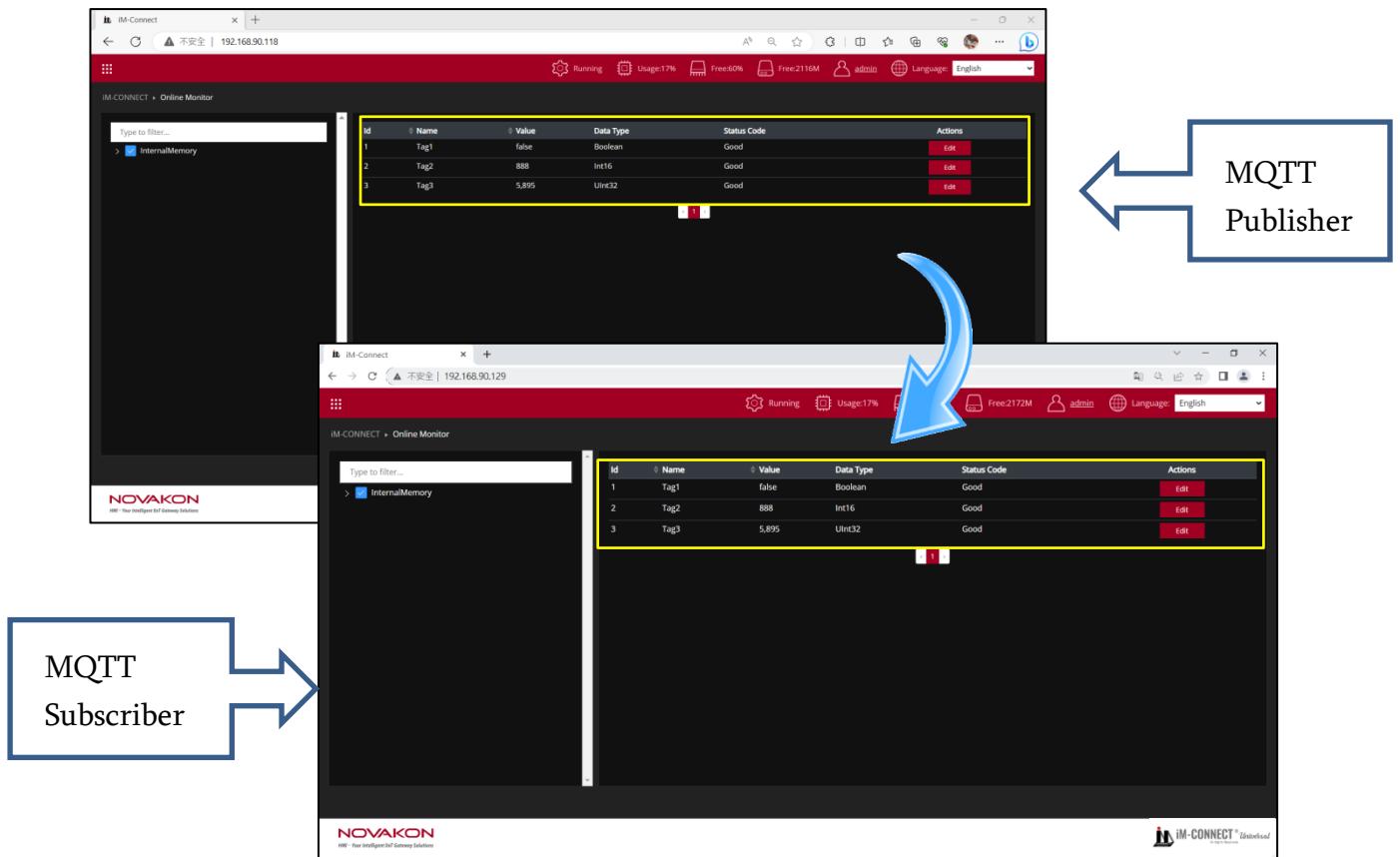


- (8) After the setting is completed, you can go to [Project Setting] to execute [Save and Compile] to GW01 and [Start Project]



## D. Connection Test

- (1) Connect two GW01 respectively, click on the upper left  to open the menu, and click [Online Monitor] to enter the monitoring screen.
- (2) It can be seen from the webpage that when the Publisher modifies the tag value, it will be sent to the Subscriber after one second, which means that the connection through MQTT has been successful.



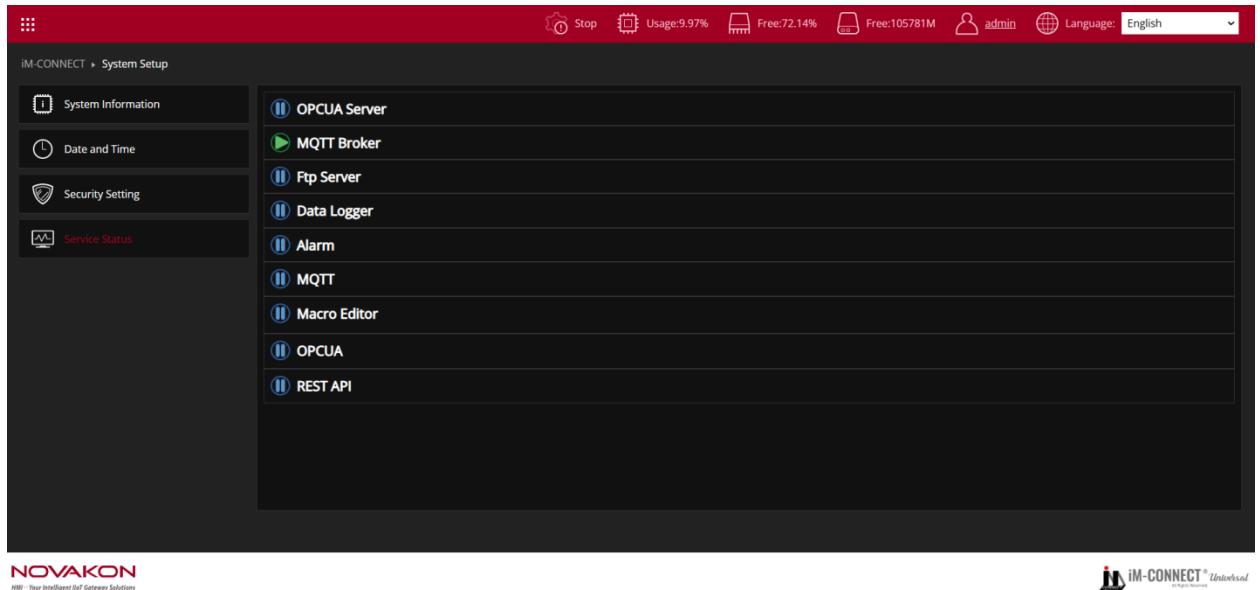
Remark:

- (1) The MQTT server host URL of [Subscriber] should be consistent with [Publisher], so that the data can be sent from [Publisher] to [Subscriber] smoothly.
- (2) The MQTT Broker used in this example is built inside the same GW01 as the [Publisher], so you should go to [System Setup] → [Security Setting] → [Broker Setting], and press [Enable MQTT Broker], to specify it as an MQTT Broker.
- (3) After the setting is complete, you can enter the [MQTT Broker] tab and press [Test MQTT] to check whether it is correct.

MQTT is a one-way data transmission method, that is, [Publisher] sends data to [Subscriber].

# Service Status

Display current status of each services in the project.



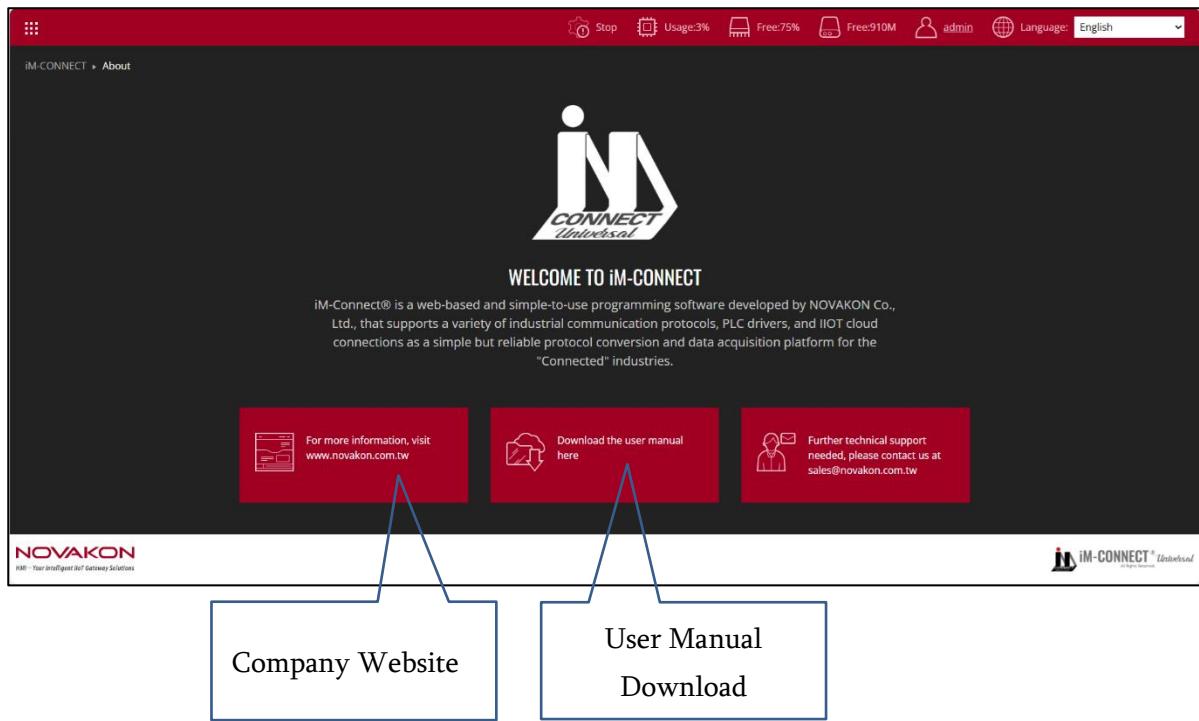
▶ indicates the service is started; ⏺ shows the service is stopped.

When there is an error in the service, 🔴 will be displayed, and when the red [Error Message] button is pressed, a drop-down window will be displayed to show error-related messages.

## 14. About

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[About]displays company and product related information. Users can access to NOVAKON official website for resources, including download the user manual.



## 15. Connection Setup Example

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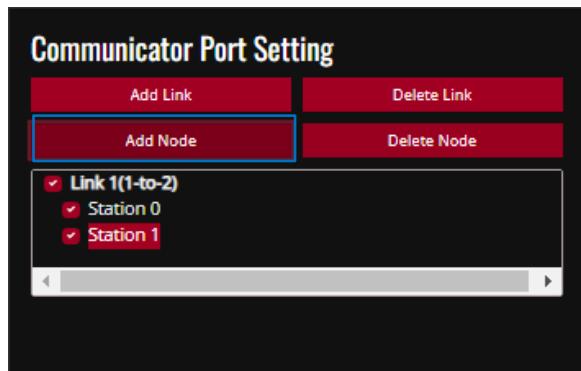
### Add Station and Link

#### 15.1.1 Add Station

If same devices are using the same IP, press [Add Note] to add a Station; otherwise, press [Delete Note] to delete a Station.

Each Station can be assigned a different [Station No], which means it is already connected to other devices. Likewise, each tag can be assigned to a specified Station No.

- A. Click Link 1 (1-to-1) and add [Station 1] by clicking [Add Node].



- B. Edit the content of [Station 1], set [Station No] to 2, meaning pairing to Device Id: 2.  
Repeat the same steps to increase the number of [Station No].



- C. Edit the tag, open [Tag Setting], and press [Add] to add a new Tag. Add tags in sequence by following the same procedure shown above.
- D. Specify the paring Device Id by selecting the corresponding [Station No] with the same number.

ID	Tag Name	Connector	Data Type	Tag Address	Modbus Address	OPCUA
1	Tag1	Link 1	UINT(16)	HR1		<input checked="" type="checkbox"/> Include
2	Tag2	Link 1	UINT(16)	2-HR1		<input checked="" type="checkbox"/> Include

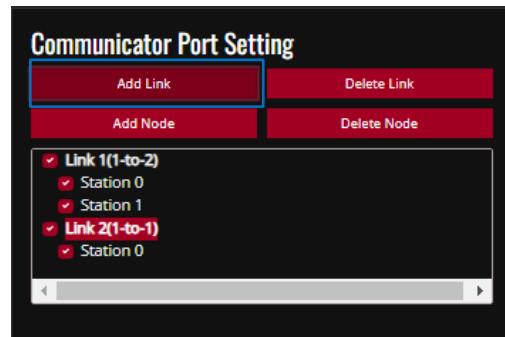
Tag Name: Tag2  
 Connector: Link 1  
 Data Type: UINT(16)  
 Station No: 2  
 Tag Address: 1  
 Modbus Address: 2

Matched Format:  
Holding Registers (read/write, HR1-HR65536)

### 15.1.2 Add LINK

If a different IP (including the Port number) or COM Port is used, a LINK must be added to establish a different connection. The process is shown as follows:

- A. Go back to [IM-CONNECT UNIVERSAL Menu] and enter the [PLC Setting] page → click [Add Link] to add a new set of connections.



B. Please refer to the above section [8.1] for the method of choosing a PLC Driver.

Follow the aforementioned process to add tags to be used in sequence.

ID	Tag Name	Connector	Data Type	Tag Address	Modbus Address	OPCUA
1	Tag1	Link 1	UINT(16)	HR1		<input checked="" type="checkbox"/> Include
2	Tag2	Link 1	UINT(16)	2-HR1		<input checked="" type="checkbox"/> Include
3	Tag3	InternalMemory	Bit			<input checked="" type="checkbox"/> Include

C. Select Link2 in the drop-down list of [Connector].

A screenshot of a configuration dialog box. On the left, there are several input fields: "Tag Name:" (set to "Tag3"), "Connector:" (dropdown menu showing "InternalMemory" and "Link 2" with "Link 2" selected), "Data Type:" (dropdown menu showing "InternalMemory", "Link 1", and "Link 2" with "Link 2" selected), "Tag Address:" (dropdown menu showing "\$" and "1 - 65536" with "\$" selected), and "Modbus Address:" (dropdown menu showing "1 - 65536"). On the right, there is a "Matched Format" section containing the text "\$0.0-\$1048574.f; \$2048-\$1048574 flash file".

D. The setting is complete. Tag3 is now changed as Link2.

The screenshot shows the iM-CONNECT Tag Setting interface. At the top, there are buttons for Add, Add many..., Delete, Delete All, Modbus Setting Dialog, Exact Match, Type to Search, Import, and Export. The main area displays a table of tags:

ID	Tag Name	Connector	Data Type	Tag Address	OPCUA
1	Tag1	Link 1	UINT(16)	HR1	<input checked="" type="checkbox"/> Include
2	Tag2	Link 1	UINT(16)	2-HR1	<input checked="" type="checkbox"/> Include
3	Tag3	Link 2	UINT(16)	2-D6	<input checked="" type="checkbox"/> Include

Below the table is a search bar with the placeholder "Type to Search". To the right, there are "Import" and "Export" buttons. On the far right, there is a "Language: English" dropdown.

The right side of the interface contains a configuration dialog for "Tag3":

- Tag Name: Tag3
- Connector: Link 2
- Data Type: UINT(16)
- Station No:
- Tag Address: D 0

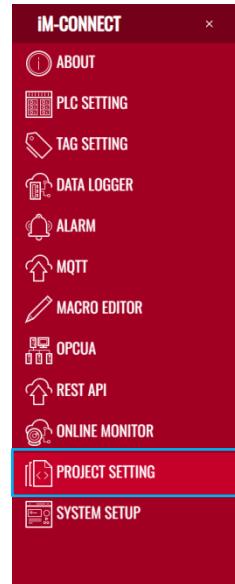
A "Matched Format" section lists:  
Data Registers(D0-D7999)  
Special Data Registers(D8000-D8511)

At the bottom left is the NOVAKON logo: NOVAKON HWI - Your Intelligent I/O Gateway Solutions. At the bottom right is the iM-CONNECT logo: iM-CONNECT Universal.

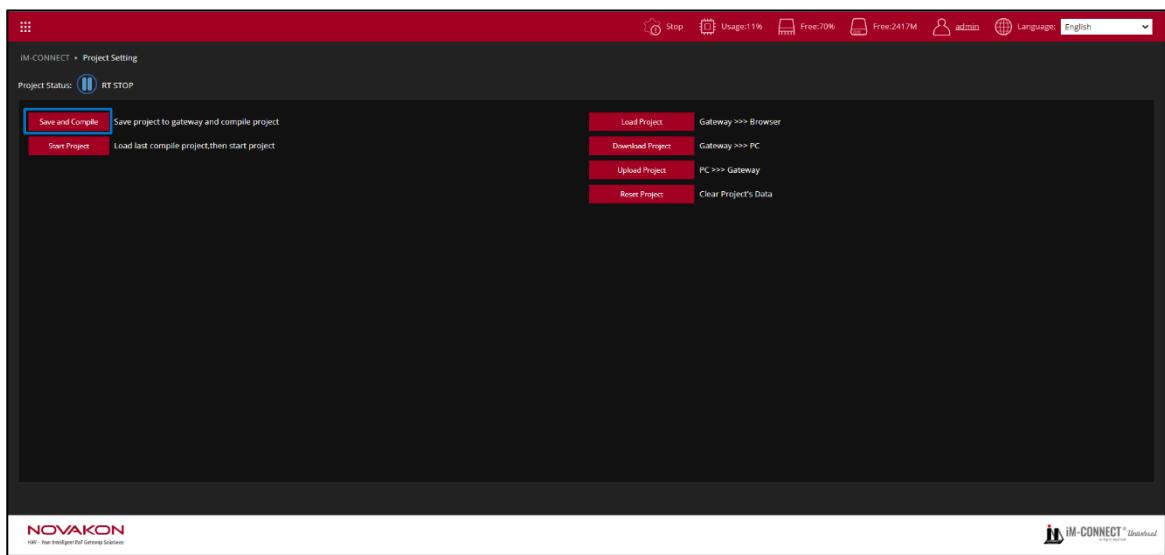
## Compile PLC and Tag data, load and start service

After the tag is set, the project is ready to be uploaded to GATEWAY.

- A. Go back to [IM-CONNECT UNIVERSAL Menu] and click [Project Setting].



- B. Enter [Save and Compile] to save the previously set content to GATEWAY for compilation.



- C. Click [Start Project] button to stop the current service, load the new successfully compiled data, and restart the Gateway.

