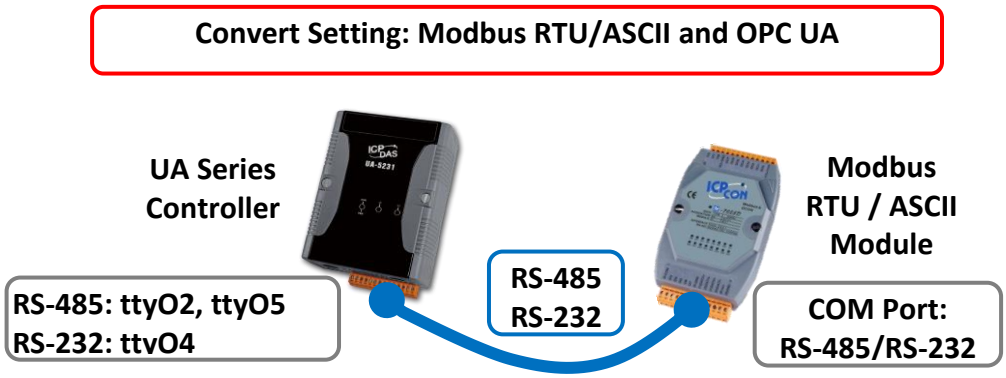
FAQ-CNV-01: UA Web UI Function Wizard – Module Communication Conversion - How to Convert Modbus RTU <=> OPC UA or Modbus ASCII <=> OPC UA ? (Use M-7055D)

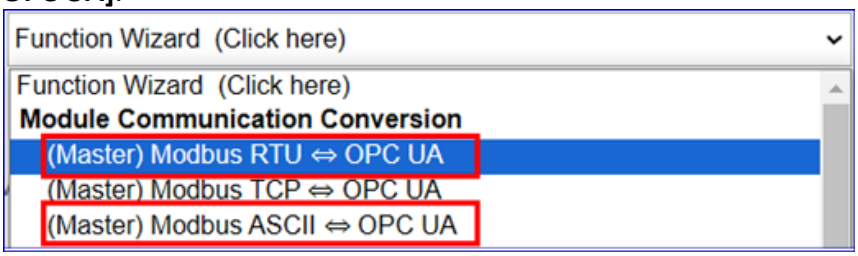
This FAQ explains the setting method of [Modbus RTU <=> OPC UA] and [Modbus ASCII <=> OPC UA], taking the connection to ICP DAS product M-7055D as an example. With the OPC UA Service function, the OPC UA Server can read and write the Modbus RTU/TCP/ASCII modules that connected to the controller. **The settings of Modbus RTU/ASCII are the same. Here will introduce them together for a setting sample.**

- **Wiring for Convert Setting: Modbus RTU/ASCII and OPC UA**



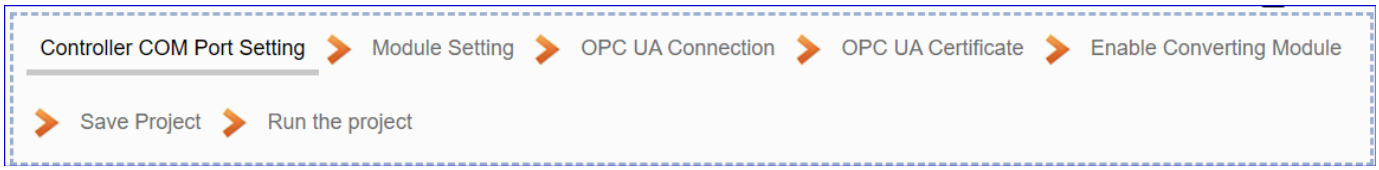
Note: The hardware/network connection methods please see the UA Manual Chapter 2.

Select the **[Function Wizard] > [Module Communication Conversion] > [Modbus RTU <=> OPC UA] or [Modbus ASCII <=> OPC UA]**.



[Step Box]:

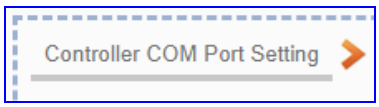
The Step Box of the [**Modbus RTU <=> OPC UA**] and [**Modbus ASCII <=> OPC UA**] has the same steps, here will introduce them together.



When enabling the Step Box, it auto-enters the first step setting page (The step with a bold underline means it is the current step.). The user just needs to follow the “Step Box” step-by-step and then can complete the project.

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Step 1. Controller COM Port Setting



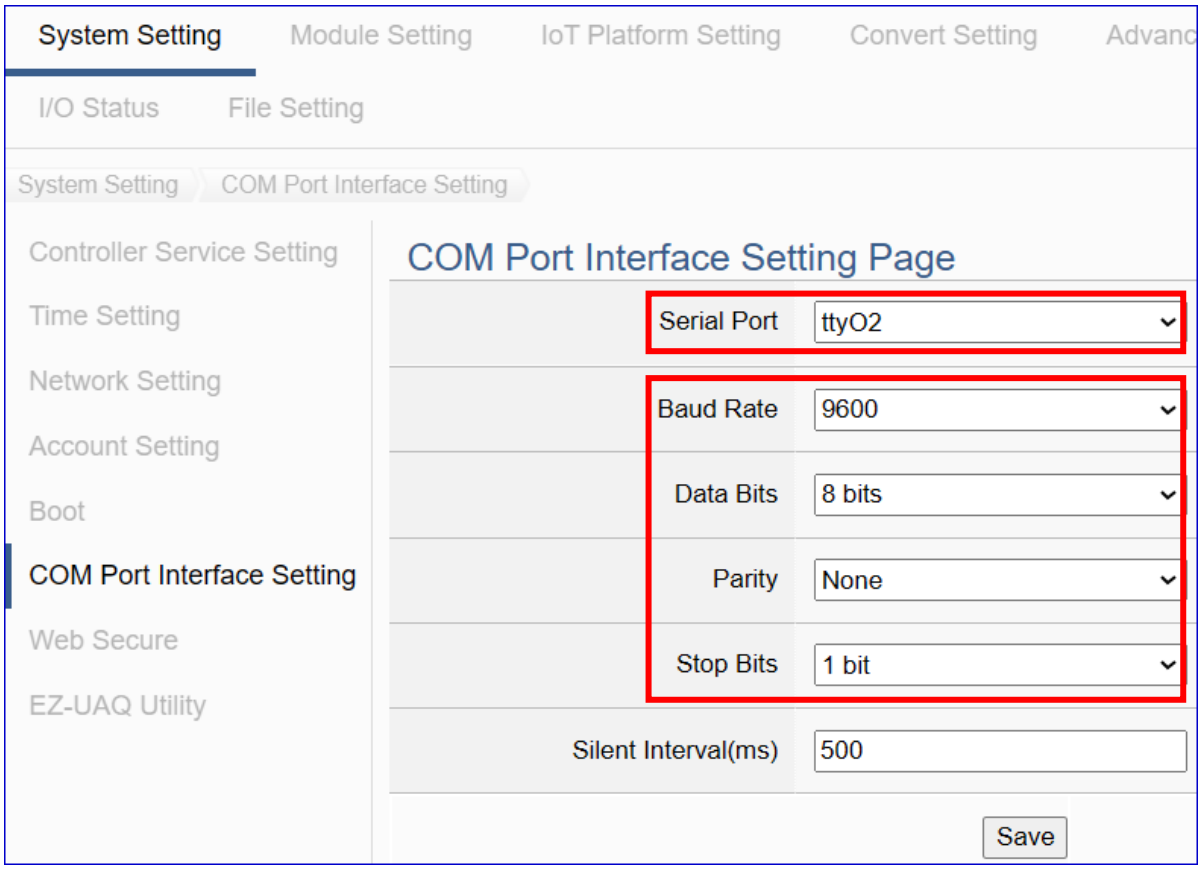
To set up the controller COM port for the serial module.

Please use ICP DAS I/O modules. The default communication values can be found in the Data Sheet, manual or I/O Module web page. Fill in the data according to the port number and module specifications of the actual connected module.

This Example: The UA communication server uses the ttyO2 serial port to connect to the M-7055D module. [UA Serial Port] ttyO2: RS-485 ; ttyO4: RS-232 ; ttyO5: RS-485

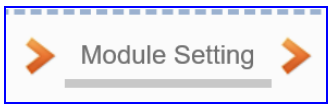
M-7055D Data Sheet > COM Port data:

COM Ports		
Ports		1 x RS-485
Baud Rate		1200 ~ 115200 bps
Data 格式		(N, 8, 1)
通訊協定	I-7000	DCON
	M-7000	Modbus RTU, DCON



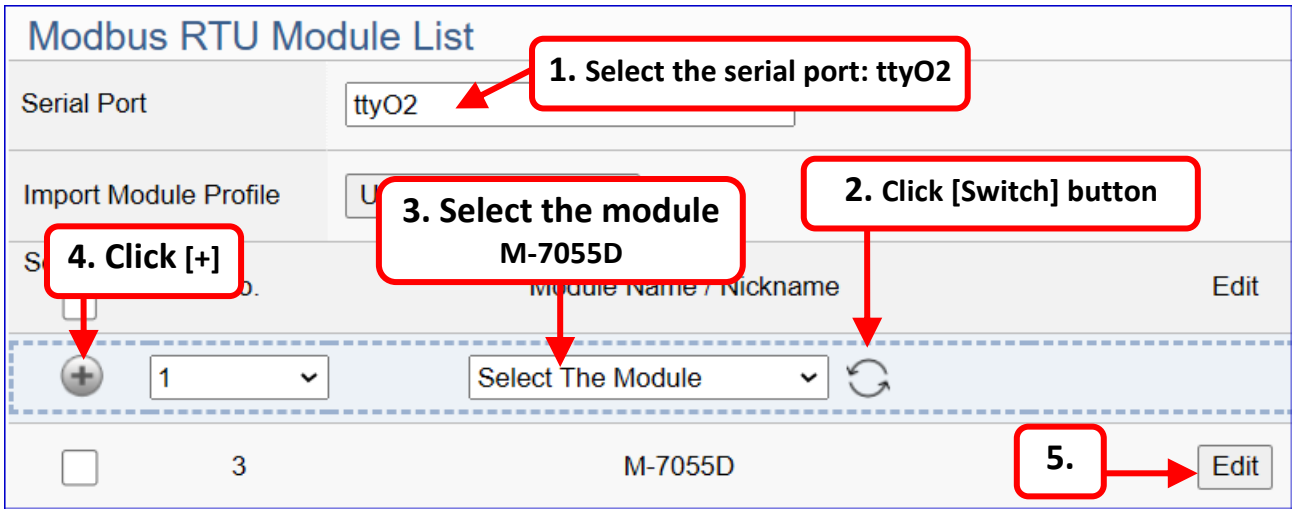
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Step 2. Module Setting

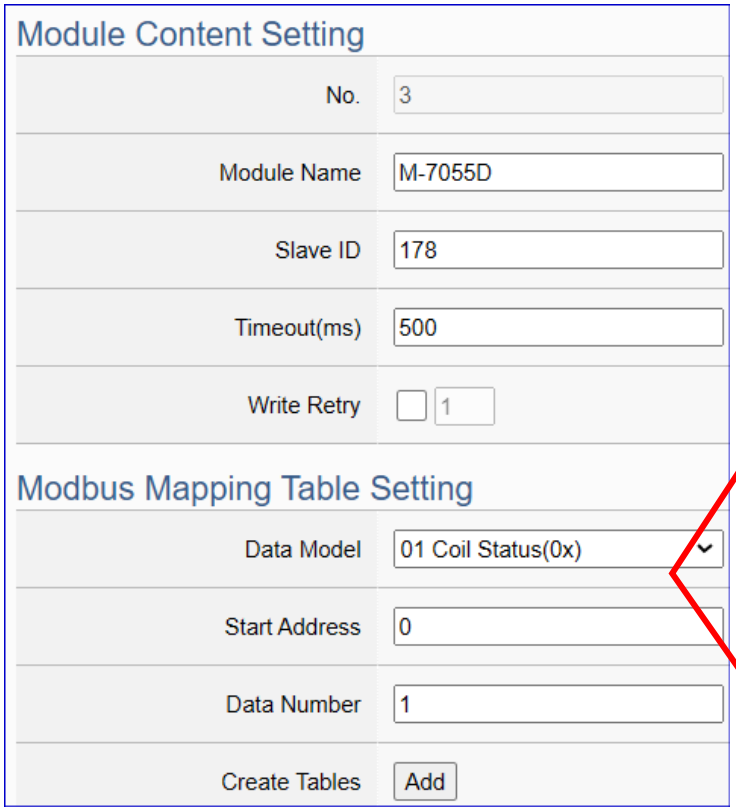


This step is to set up the Module that connected with the UA Series.

1. Select the serial port: ttyO2
2. Click the [Switch] button to change to the [Select The Module] mode.
3. Select the M-7055D module of the M-7000 Series.
4. Click the [⊕] button to add the module.



5. click [Edit] button to configure the module content and the Modbus mapping table.

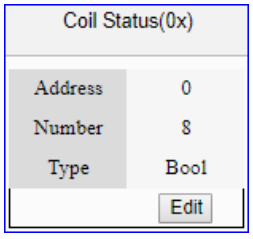


If use ICP DAS module, system will auto setup the Modbus Mapping Table; if not, user needs to check the Modbus address or I/O number from the module user manual.

> **Modbus Mapping Table Setting:**

Set module in the order of Data Model, Start Address and Data Number, then click "Add".

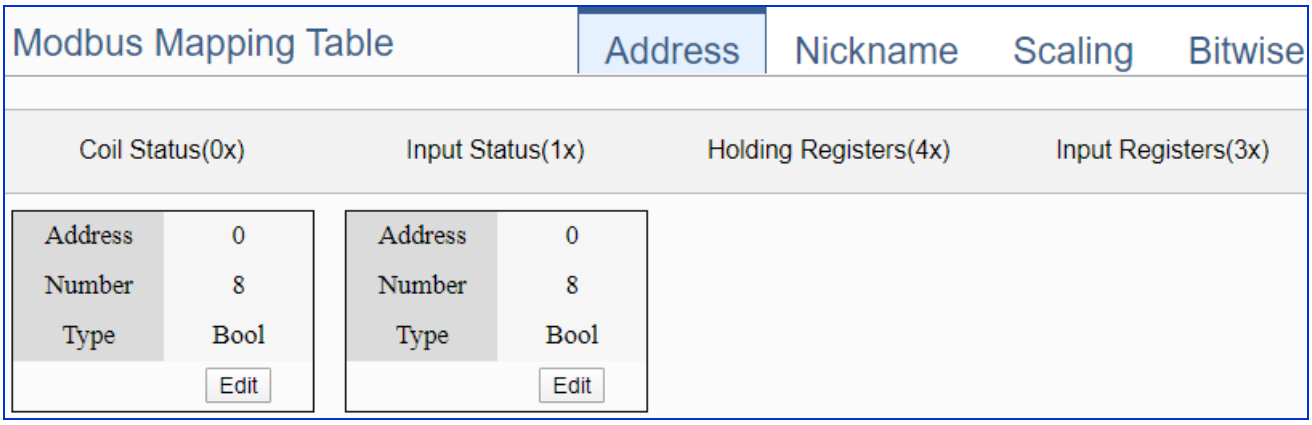
Ex: M-7055D has 8 Data Models of "01 Coil Status (0x)" (Mapping: DO), so select Model "01", Start Add. "0", Number "8", and click "Add".



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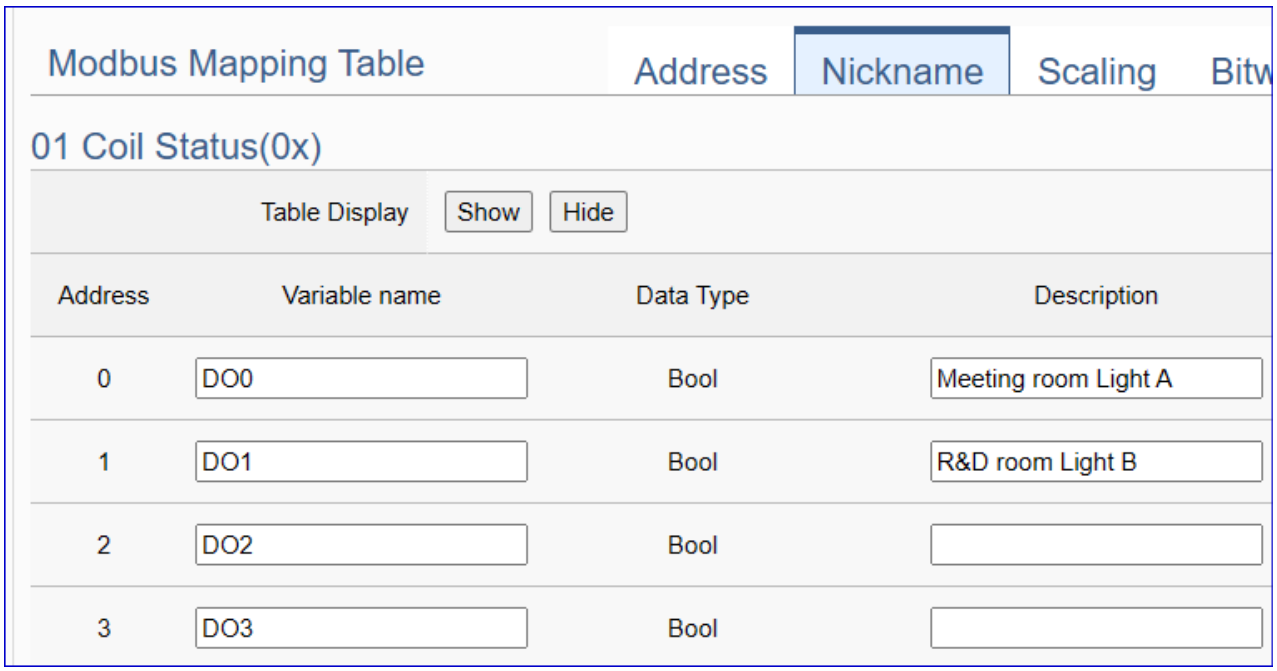
Address **Address:** Display and edit the Modbus Mapping Table.

The M-7055D system automatically sets the Modbus Address Mapping Table as follows:



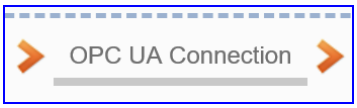
Nickname **Nickname:** Setting the variable nickname and description.

EX: Meeting room lighting control, R&D room light switch, module signal reception... as shown below.



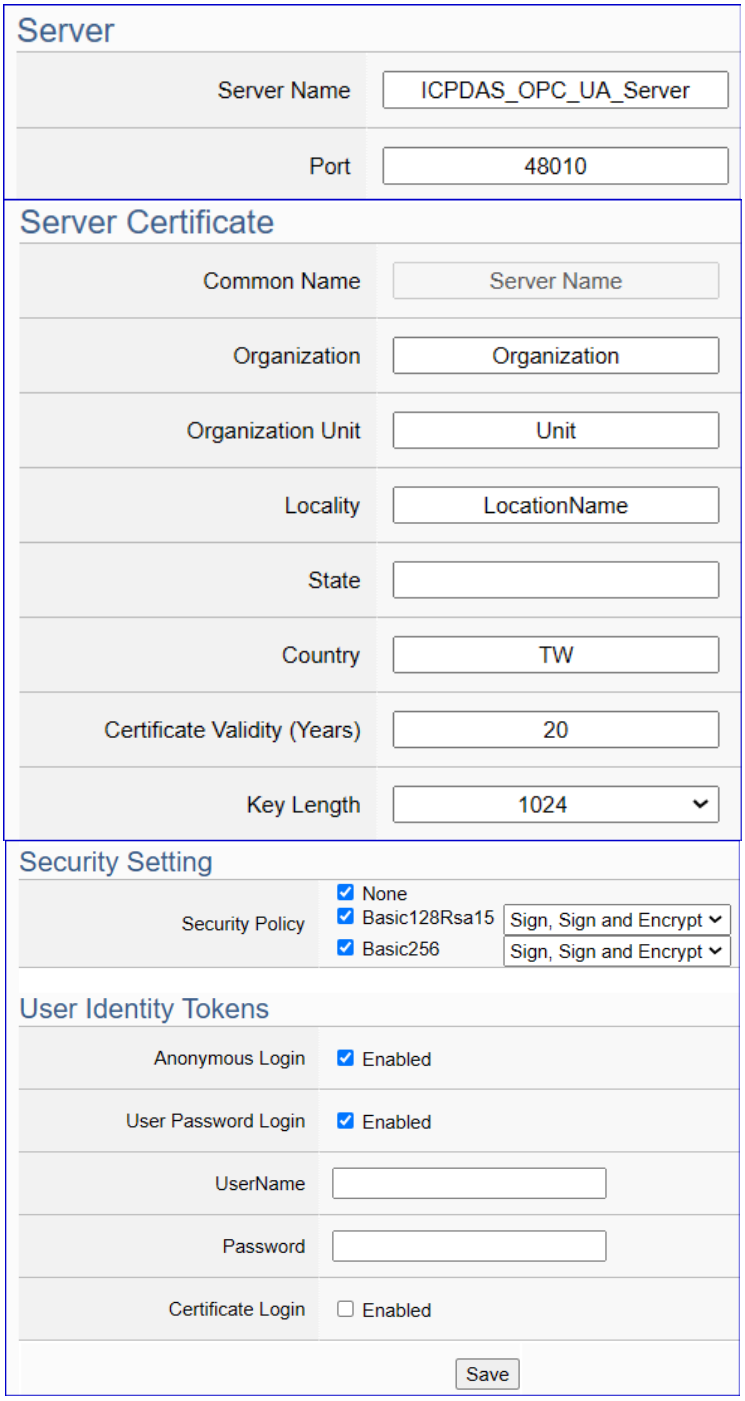
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Step 3. OPC UA Connection



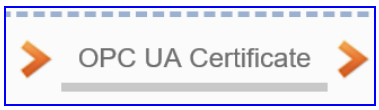
[IoT Platform Setting] > [OPC UA Connection] > [Local Server]

This step sets the OPC UA connection name, port (system default: 48010), login identity... and fill them in according to customer needs. In addition, the UA series supports security verification of certificate private keys and provides OPC UA Server certificates, which can also be set and enabled here.



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Step 4. OPC UA Certificate

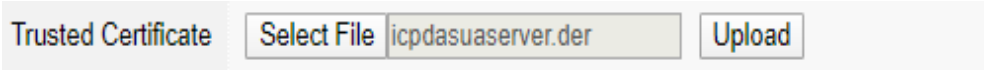


Set the OPC UA Certificate for the security and encryption.

This step is for the connected Server/Client to add credentials to each other to enhance the security and encryption of communication. You can skip it if it is not needed for the project:

1. Upload:

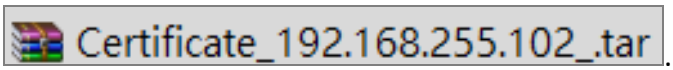
Obtain the **OPC UA Client** trust certificate file of the device from the connected party, save it to the PC. In this step, select this file and upload it to the UA controller.
File format must be **DER**. Extension name must be "**der / cer / crt**".



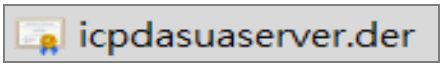
2. Download:

The device of the other side needs the UA certificate also. In this step, download the **OPC UA Server** certificate file (**Certicate_IPAddress_.tar**) to the other party, so that they can decompress the file (**icpdasuaserver.der**) and upload to their device.

File format: **DER**. File name: **Certicate_IP-address_.tar**

e.g. 

.

Before using, decompress to **icpdasuaserver.der**, as below. 



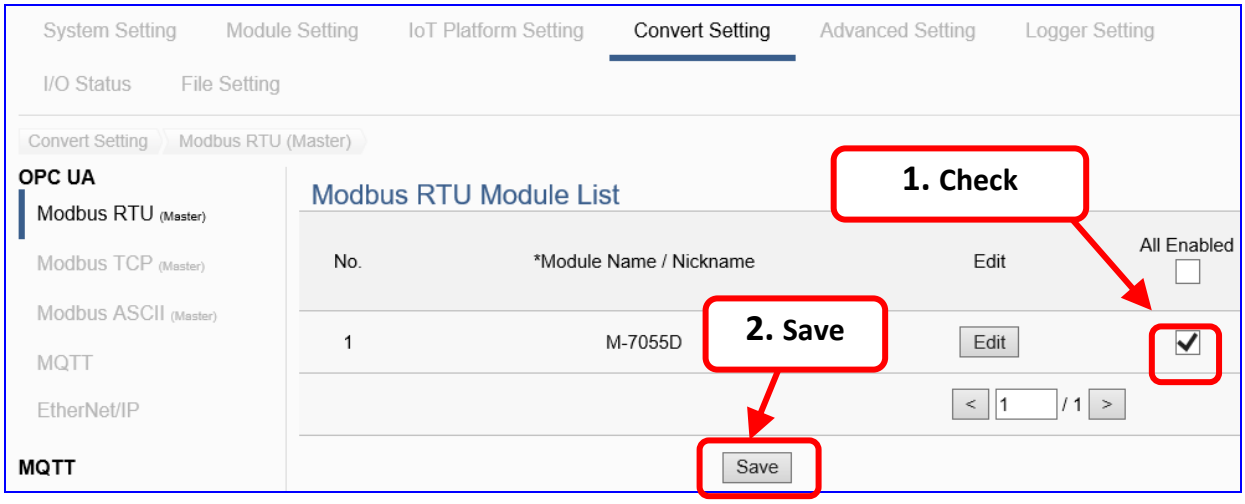
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Step 5. Enable Converting Module



This step is for enabling the Modbus RTU / OPC UA conversion.

In this step, user just need check the enabled box of the module. If user want to enable some I/O only, please click “Edit” to check the I/O one by one.



Step 6. Save Project



The setting of this example is finished now. Click the next step **[Save Project],** the Step Box will show an animation as below picture, that means the project is saving. When the animation vanished, the project is saved completely.



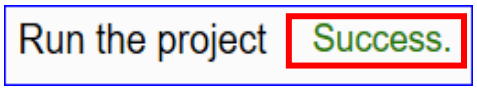
Step 7. Run the Project



This step executes the project.

This step can also via the [**System Setting** > **Controller Service Setting** > **Run Project**] to Stop and Run the project.



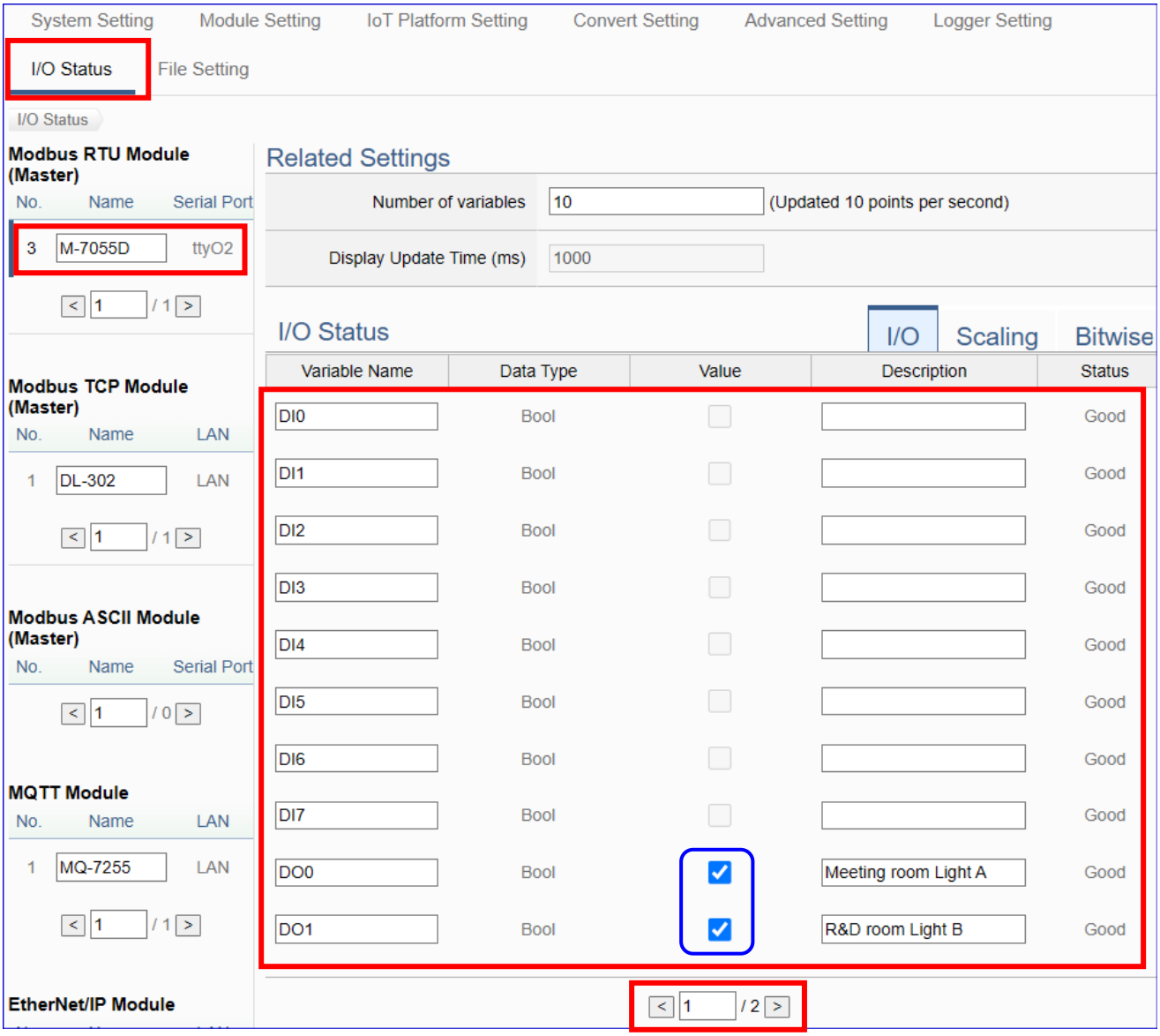


When the words “**Please wait**” disappears, the new words “**Success**” appears, that means the UA controller is running new project successfully. Then the Step Box will disappear automatically now, and back to the first screen view of the Web UI.

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- **View real-time I/O status**

Click the menu [**I/O Status**] > [Modbus RTU Module] on the left > **M-7055D** to view the real-time status of each I/O of the module.



As long as the line wiring and network connection are good and the project executes successfully, the I/O status will display "Good" status. Check the value box of the DO channel (as shown in the blue box in the figure), and the corresponding indicator light of the physical module will also turn on.

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Verify if the OPC UA Conversion is Correct

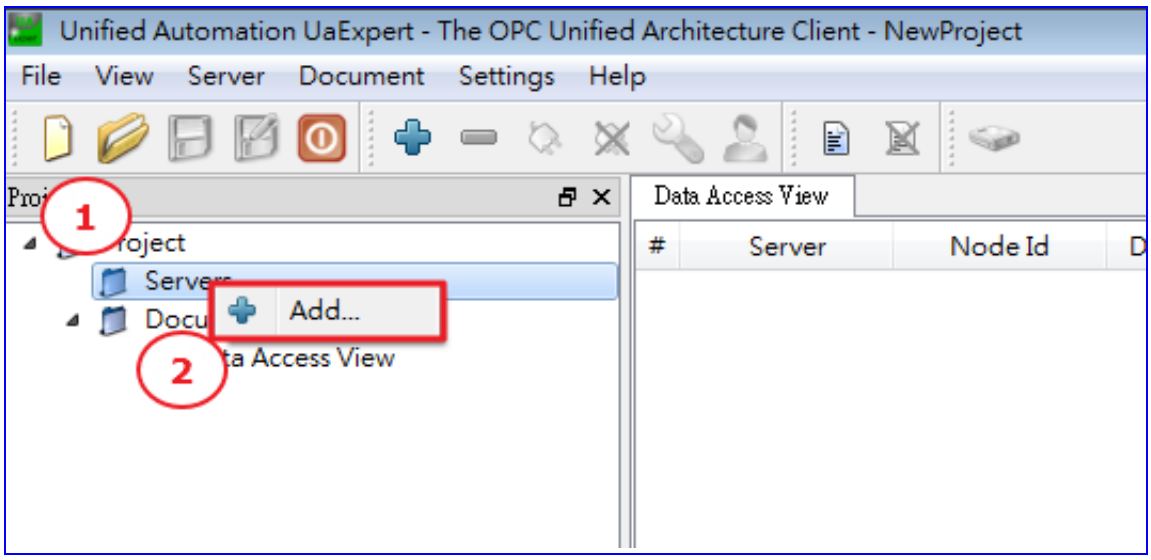
The UA series has finished setting the OPC UA function and viewing the I/O data in the "I/O Status" menu.

If the user wants to verify whether the OPC UA conversion is correct, he can use the OPC UA client software "**UaExpert**". Please download the "UaExpert" software from the official website: https://www.unified-automation.com/products/development-tools/uaexpert.html

Operation instructions of the UaExpert software:

1. After setting UA-5231, run the **UaExpert**

   Mouse right-click on **Server** at the top left of the screen, then click **Add.**



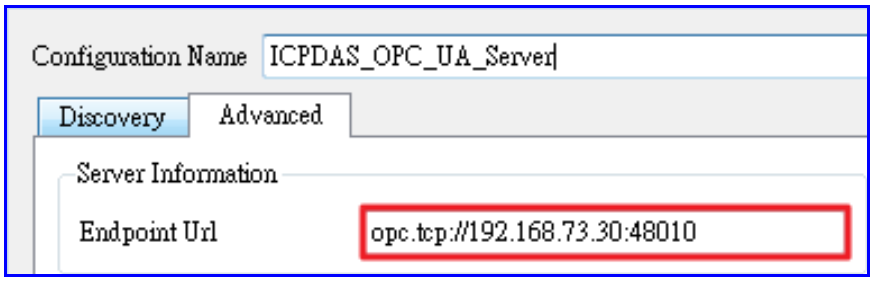
2. When the following window appears, click **Advanced**



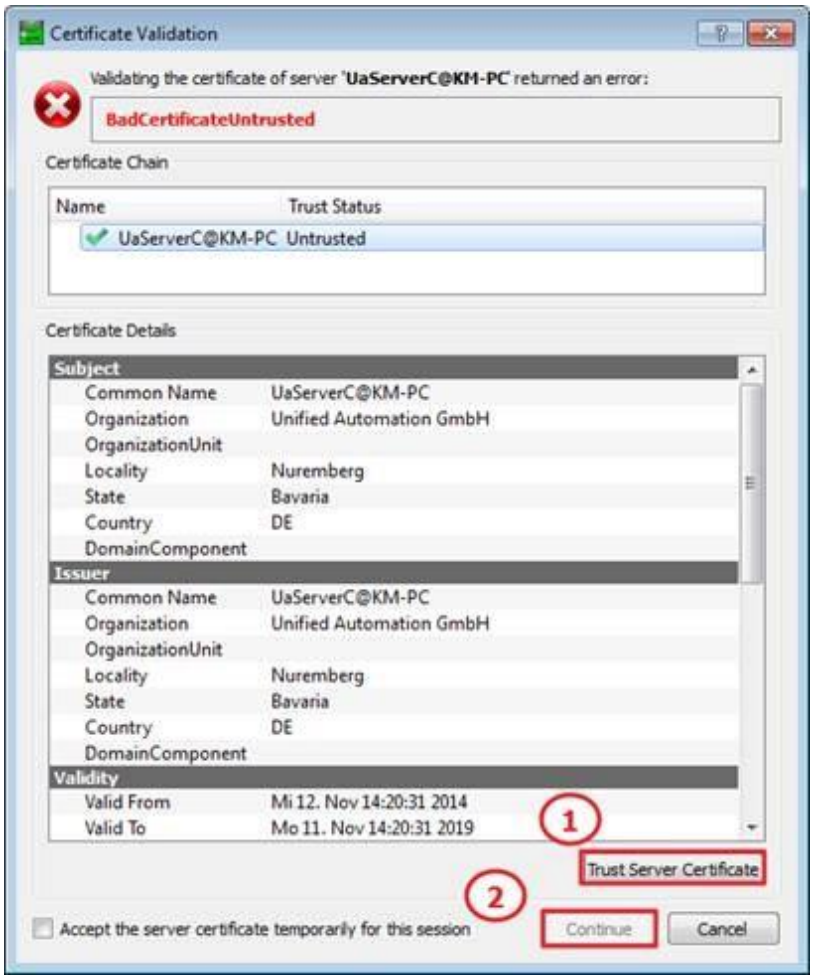
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3. In the field **Endpoint Url**, specify the OPC UA Server to be connected

The **format is opc.tcp://192.168.73.30:48010**
opc.tcp:// is the fixed beginning format of OPC UA connection;
Next is the **IP** of OPC UA Server, which is the IP of UA-5231;
The last is the **port**, UA-5231 is **48010** by default.
Click OK after setting.



Note:
After clicking OK, if the **"BadCertificateUntrusted"** message is displayed,
click **"Trust Server Certificate"** at the bottom right, and then click the **"Continue"** button.

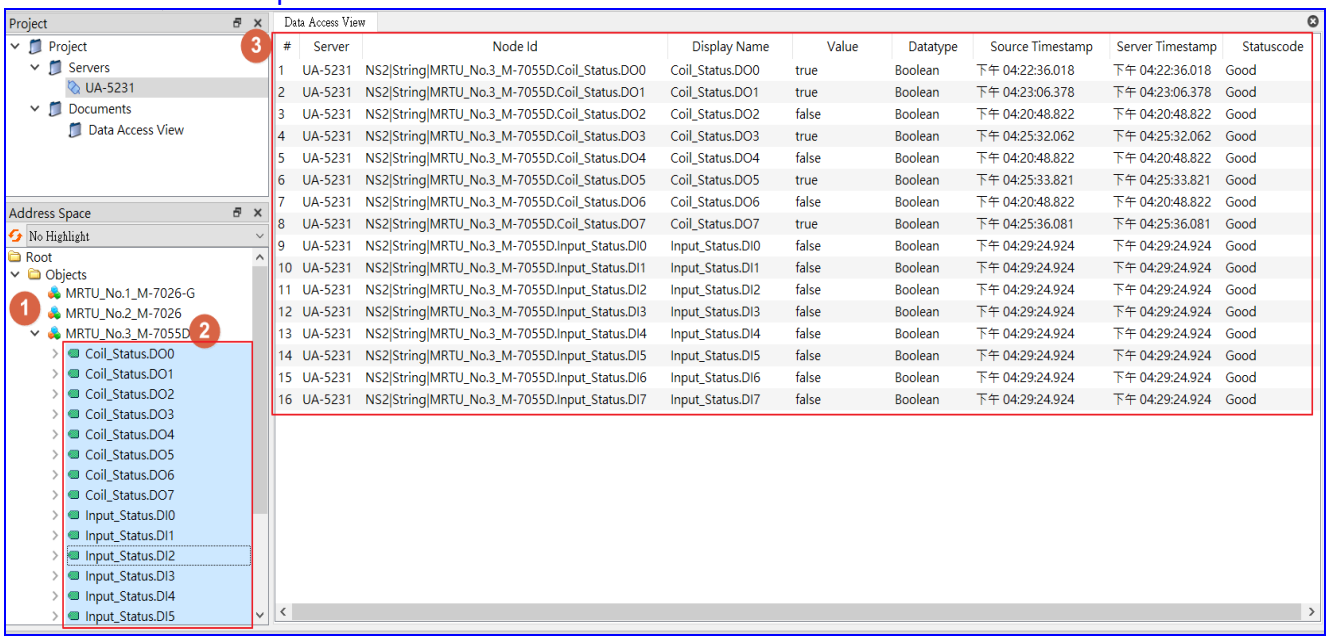


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4. Specify the module connected with UA Server in the lower-left corner of the screen to view its status

   First click the arrow on the left of the module name, as shown as **Circle 1** in the figure below. All the tags of the module will be displayed. Select all tags and mouse drag them to the right window **Data Access View** to see all the tag status. **Note that whether the column of "Statuscode" shows Good.** If not, please check whether the UA-5231 setting is wrong.

- Modbus RTU Example



#	Server	Node Id	Display Name	Value	Datatype	Source Timestamp	Server Timestamp	Statuscode
1	UA-5231	NS2|String|MRTU_No.3_M-7055D.Coil_Status.DO0	Coil_Status.DO0	true	Boolean	下午 04:22:36.018	下午 04:22:36.018	Good
2	UA-5231	NS2|String|MRTU_No.3_M-7055D.Coil_Status.DO1	Coil_Status.DO1	true	Boolean	下午 04:23:06.378	下午 04:23:06.378	Good
3	UA-5231	NS2|String|MRTU_No.3_M-7055D.Coil_Status.DO2	Coil_Status.DO2	false	Boolean	下午 04:20:48.822	下午 04:20:48.822	Good
4	UA-5231	NS2|String|MRTU_No.3_M-7055D.Coil_Status.DO3	Coil_Status.DO3	true	Boolean	下午 04:25:32.062	下午 04:25:32.062	Good
5	UA-5231	NS2|String|MRTU_No.3_M-7055D.Coil_Status.DO4	Coil_Status.DO4	false	Boolean	下午 04:20:48.822	下午 04:20:48.822	Good
6	UA-5231	NS2|String|MRTU_No.3_M-7055D.Coil_Status.DO5	Coil_Status.DO5	true	Boolean	下午 04:25:33.821	下午 04:25:33.821	Good
7	UA-5231	NS2|String|MRTU_No.3_M-7055D.Coil_Status.DO6	Coil_Status.DO6	false	Boolean	下午 04:20:48.822	下午 04:20:48.822	Good
8	UA-5231	NS2|String|MRTU_No.3_M-7055D.Coil_Status.DO7	Coil_Status.DO7	true	Boolean	下午 04:25:36.081	下午 04:25:36.081	Good
9	UA-5231	NS2|String|MRTU_No.3_M-7055D.Input_Status.DI0	Input_Status.DI0	false	Boolean	下午 04:29:24.924	下午 04:29:24.924	Good
10	UA-5231	NS2|String|MRTU_No.3_M-7055D.Input_Status.DI1	Input_Status.DI1	false	Boolean	下午 04:29:24.924	下午 04:29:24.924	Good
11	UA-5231	NS2|String|MRTU_No.3_M-7055D.Input_Status.DI2	Input_Status.DI2	false	Boolean	下午 04:29:24.924	下午 04:29:24.924	Good
12	UA-5231	NS2|String|MRTU_No.3_M-7055D.Input_Status.DI3	Input_Status.DI3	false	Boolean	下午 04:29:24.924	下午 04:29:24.924	Good
13	UA-5231	NS2|String|MRTU_No.3_M-7055D.Input_Status.DI4	Input_Status.DI4	false	Boolean	下午 04:29:24.924	下午 04:29:24.924	Good
14	UA-5231	NS2|String|MRTU_No.3_M-7055D.Input_Status.DI5	Input_Status.DI5	false	Boolean	下午 04:29:24.924	下午 04:29:24.924	Good
15	UA-5231	NS2|String|MRTU_No.3_M-7055D.Input_Status.DI6	Input_Status.DI6	false	Boolean	下午 04:29:24.924	下午 04:29:24.924	Good
16	UA-5231	NS2|String|MRTU_No.3_M-7055D.Input_Status.DI7	Input_Status.DI7	false	Boolean	下午 04:29:24.924	下午 04:29:24.924	Good

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