User Manual for ICP DAS WISE Monitoring IoT Kit

-Microsoft Azure IoT Starter Kit-

[Version 1.0.2]

ICP DAS CO., LTD.

泓格科技股份有限公司

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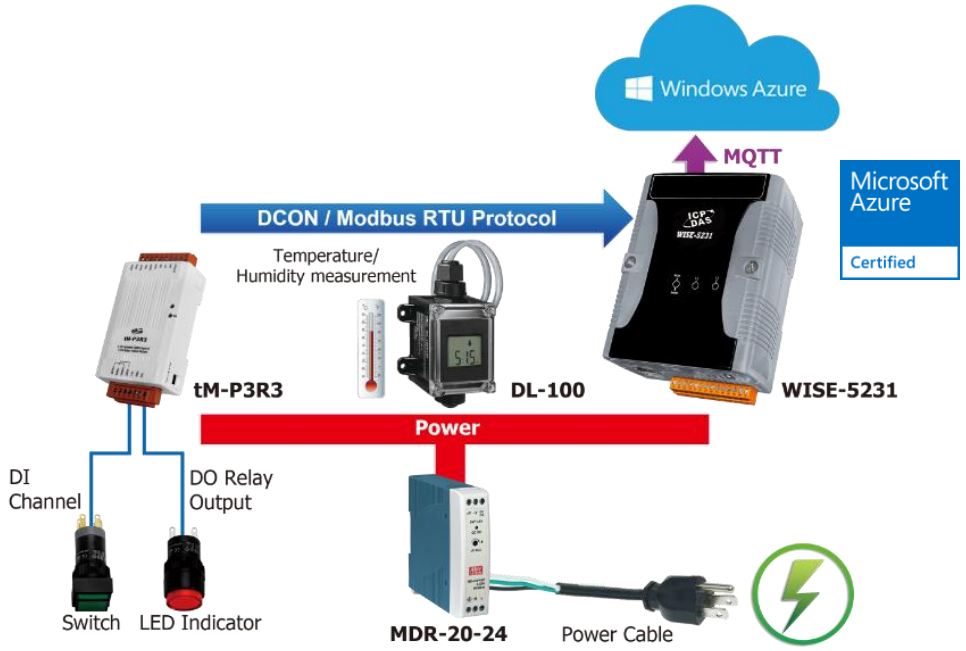
1 Introduction

Microsoft and ICP DAS have teamed up to bring you the easy way to implement the IoT (Internet of Things) Cloud system. The WISE Monitoring IoT Kit has been designed to help you seamlessly connect the Sensors and I/O modules to the cloud with the Microsoft Azure IoT. This kit includes an ICP DAS WISE-5231, a Temperature/Humidity module, an 3-channel DI/3-channel Relay Output module, and a 24W Industrial Power Supply. There are also a LED Indicator, Switch and wires to help you set up your Temperature/Humidity monitoring system. Once your WISE-5231 is connected to Microsoft Azure you can start visualizing and analyzing your data.

Microsoft Azure is a leading provider of cloud computing and Microsoft Azure IoT Hub enables secure, reliable bi-directional communications between IoT endpoints such as sensors and the cloud. Azure IoT Hub supports a broad set of operating systems (Linux, Windows, RTOS etc.), protocols and common languages, so you can configure your connections to the devices.

WISE-5231 is a product developed by ICP DAS that functions as control units for use in remote logic control and monitoring in various industrial applications. WISE offers a user-friendly and intuitive web site interface that allows users to implement IF-THEN-ELSE control logic on controllers just a few clicks away; no programming is required. WISE-5231 provides flexible integration with the Sensor and I/O module, and features various functions such as: built-in IF-THEN-ELSE logic engine, Schedule/Timer operation, data logging, CGI command sending/receiving and Email alarm notification. In addition, WISE-5231 also supports powerful Network connection ability for seamless integration with the Microsoft Azure IoT. All of these make WISE-5231 not only a Real-time automation controller of I/O modules and Sensors at the field site; it is also a Concentrator/Gateway to collect/transfer the data of the Sensors and I/O modules to the Microsoft Azure IoT Cloud platform. WISE-5231 is a cost-effective Concentrator of the Sensors and I/O modules for the Microsoft Azure IoT Cloud platform.



Features:

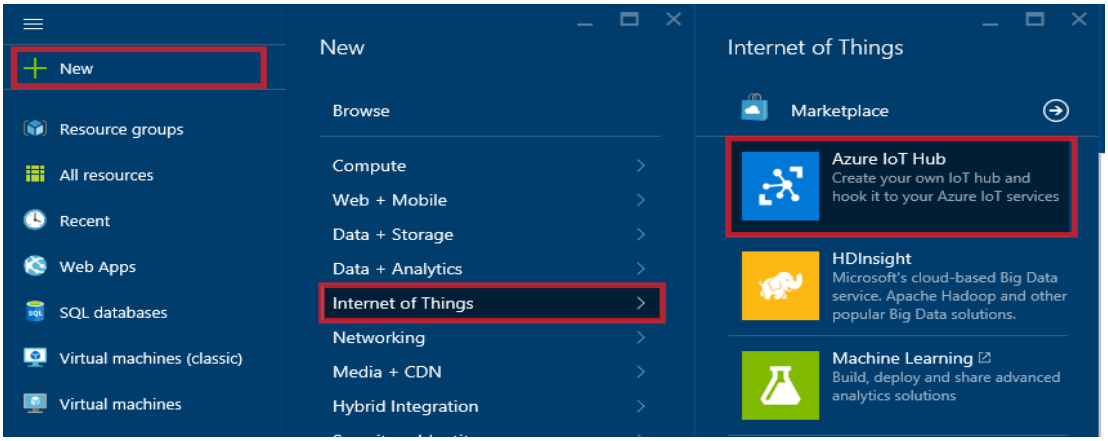
- ◆ Runs on browsers, no extra software tool is required.
- ◆ No more programming, user-friendly web pages are provided for building the IoT Cloud system.
- ◆ Ready-to-run IoT Solutions: Includes an Intelligent Sensor Concentrator, a Temperature/Humidity module, an I/O module, and Microsoft Azure service..
- ◆ Completed Application Scenario: sensor data collection and Real-time automation control can be performed at the field-site, and the data can be transferred to Microsoft Azure IoT platform for analysis.
  - ✧ Flexible integration with the Sensor and I/O module by Modbus protocol.
  - ✧ Powerful automation control, data logger and alarm notification functions at field site.
  - ✧ Seamless integration with Microsoft Azure IoT service without programming.

What's in the Box?

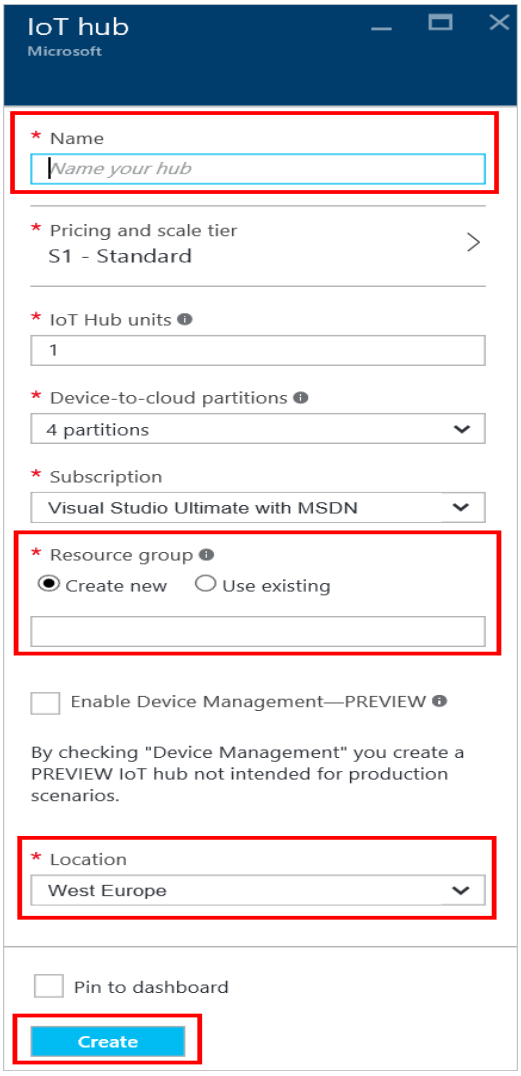
ICP DAS WISE-5231 Industrial IoT Concentrator	**ICP DAS DL-100** Temperature and Humidity Module	**ICP DAS tM-P3R3** 3-channel Digital Input and 3-channel Relay Output Module	**ICP DAS MDR-20-24** 24W Industrial Power Supply
			
LED Indicator (RED)	**Switch**	**Power cable**	
			

2 Create an IoT Hub

i. In the Azure portal, click **New** > **Internet of Things** > **IoT Hub**.

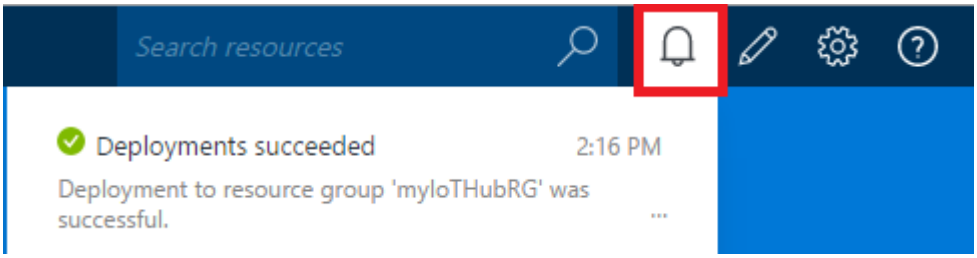


ii. In the IoT hub pane, enter the following information for your IoT hub:

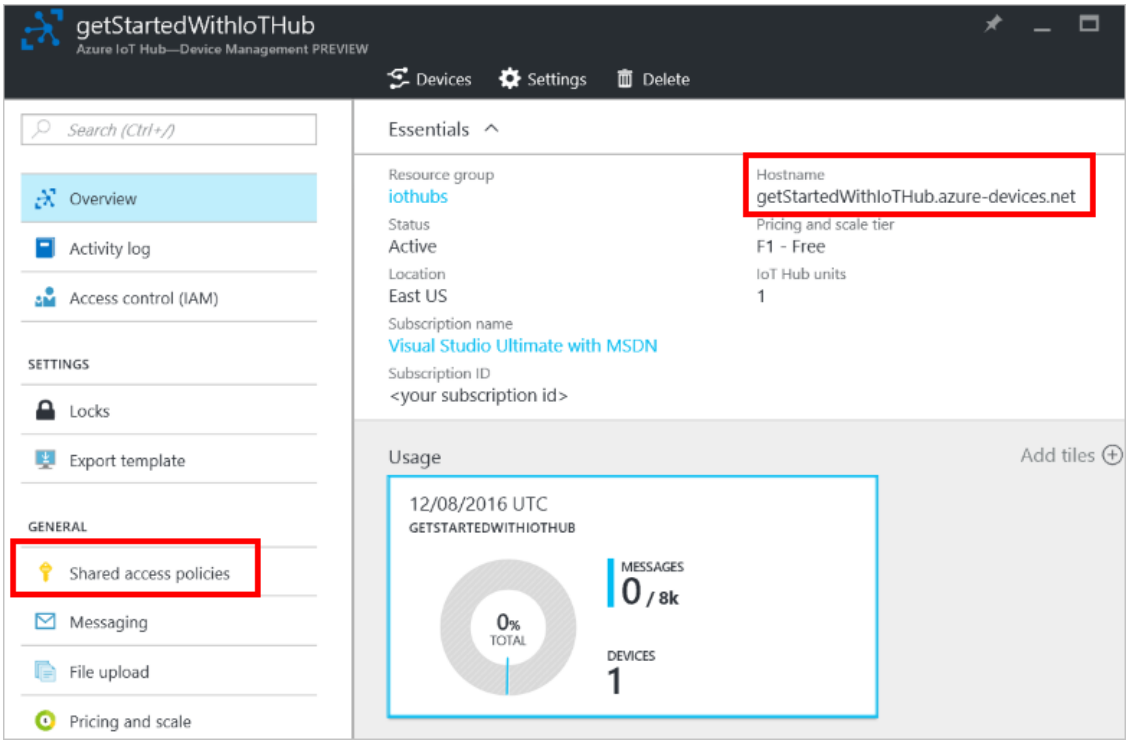


- In the **Name** box, enter a name to identify your IoT hub. When the **Name** is validated, a green check mark appears in the **Name** box.
- Change the **Pricing and scale tier** as desired. The getting started samples do not require a specific tier.
- In the **Resource group** box, create a new resource group, or select and existing one. For more information, see Using resource groups to manage your Azure resources.
- Use **Location** to specify the geographic location in which to host your IoT hub.

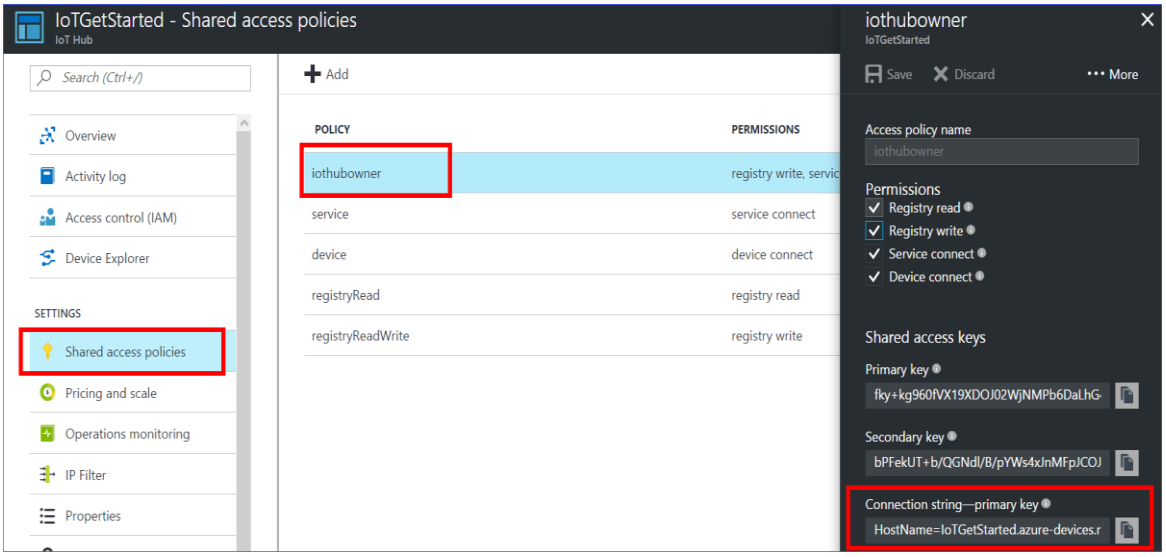
iii. Once the new IoT hub options are configured, click **Create**. It can take a few minutes for the IoT hub to be created. To check the status, you can monitor the progress on the Startboard. Or, you can monitor your progress from the Notifications section.



iv. After the IoT hub has been created successfully, open the blade of the new IoT hub, take note of the hostname URI, and click **Shared access policies**.

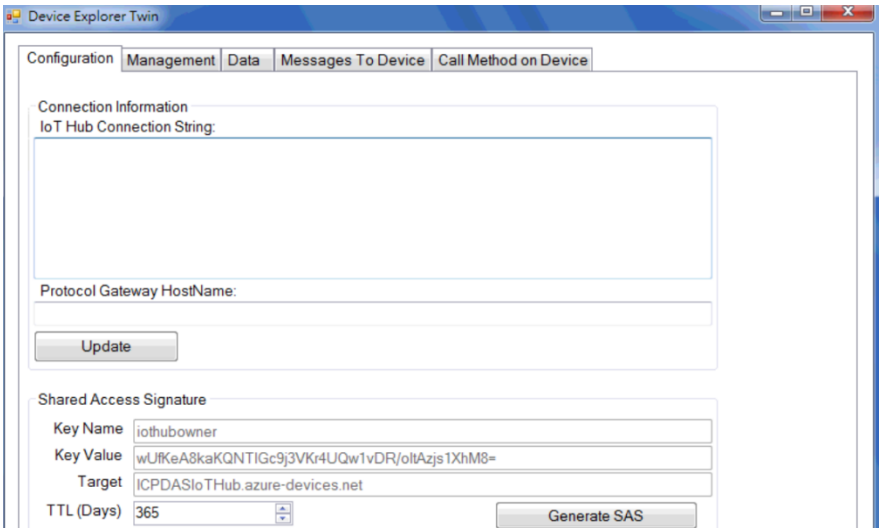


v. In the **Shared access policies** pane, click the **iothubowner** policy, and then copy and make a note of the **Connection string** of your IoT hub. For more information, see Control access to IoT Hub.

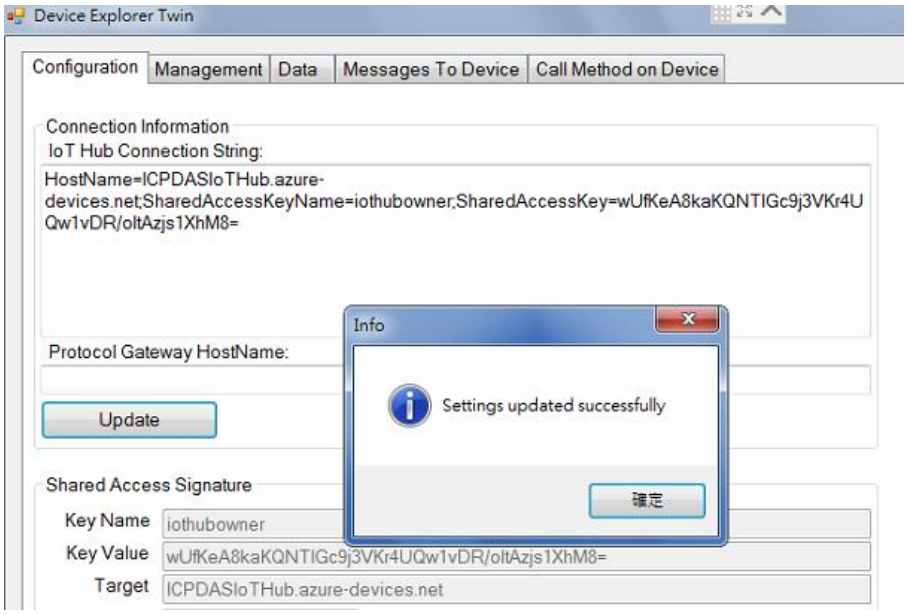

IoTGetStarted - Shared access policies
IoT Hub
Search (Ctrl+/)
Overview
Activity log
Access control (IAM)
Device Explorer
SETTINGS
Shared access policies
Pricing and scale
Operations monitoring
IP Filter
Properties
Add
POLICY
PERMISSIONS
iothubowner
registry write, servic
service
service connect
device
device connect
registryRead
registry read
registryReadWrite
registry write
iothubowner
IoTGetStarted
Save
Discard
More
Access policy name
iothubowner
Permissions
Registry read
Registry write
Service connect
Device connect
Shared access keys
Primary key
fky+kg960fVX19XDOJ02WjNMPb6DaLhG
Secondary key
bPFekUT+b/QGNdl/B/pYWs4xJnMFpJCOJ
Connection string—primary key
HostName=IoTGetStarted.azure-devices.r

3 Register a device for WISE-5231 in the IoT Hub

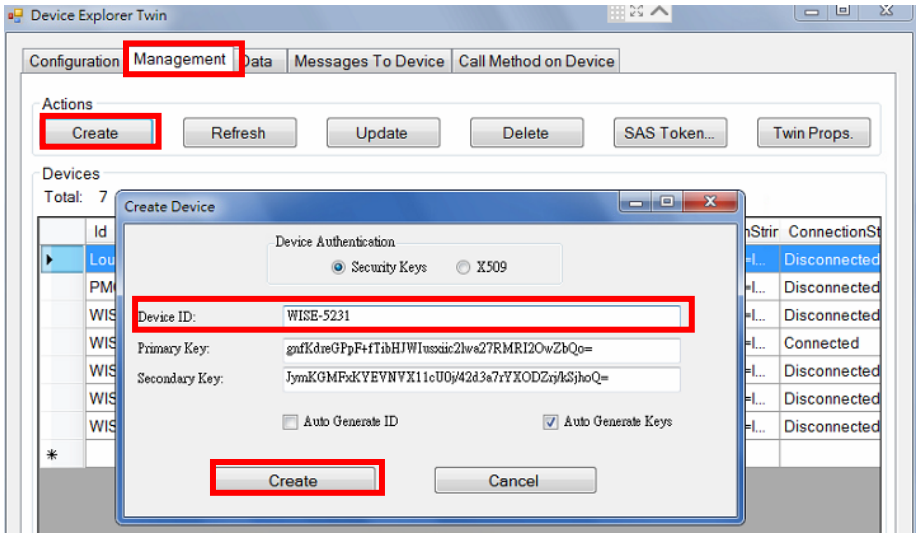
i. Download **SetupDeviceExplorer.msi** like link as below and install it.
https://github.com/Azure/azure-iot-sdks/releases



ii. Open and go to **Configuration** window, paste the **Connection String** of your IoT hub, and click the Update button, and then the Device Explorer connects to your IoT hub successfully.

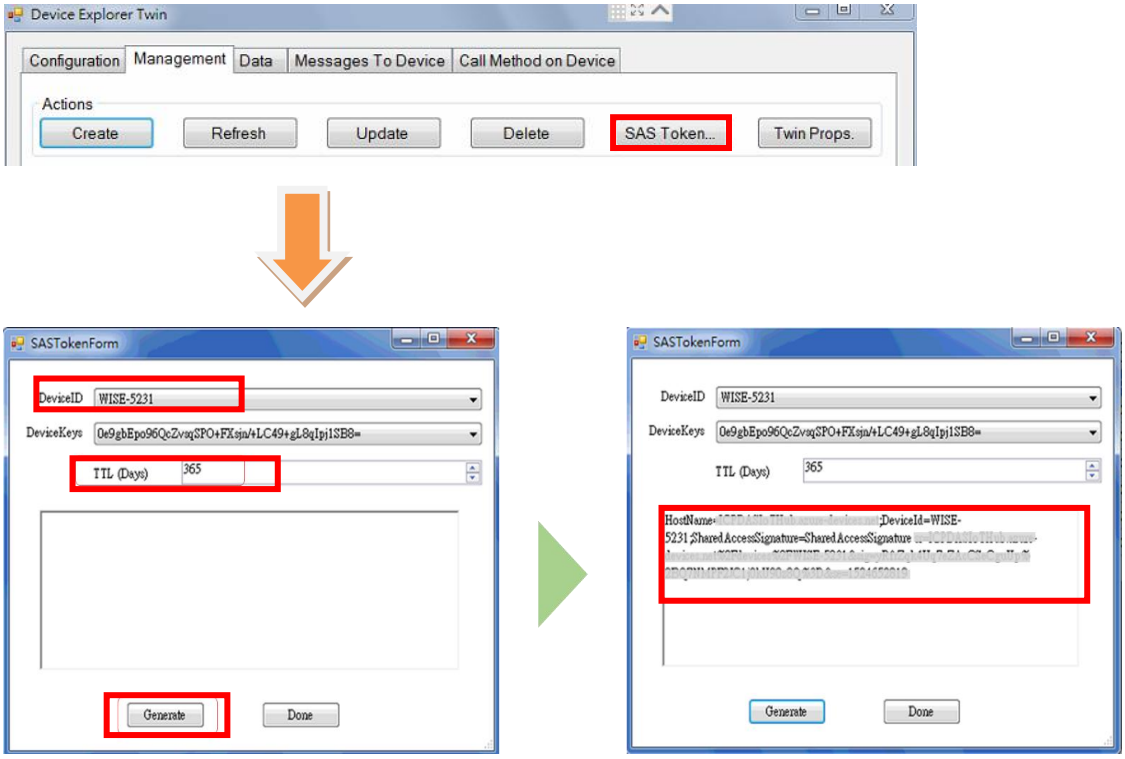


iii. Switch to the **Management** window and click the Create button to add the device. Key in the Device ID and press the Create button to create a new device in your IoT hub.



iv. Click the **SAS Taken** button to get SAS Token of the new device:

- Select the Device ID of WISE-5231.
- Set the TTL (Days) to 365. The TTL (Days) means the Time-To-Live days of this SAS Token.
- Press the **Generate** button.
- Copy and make a note of this SAS Token.

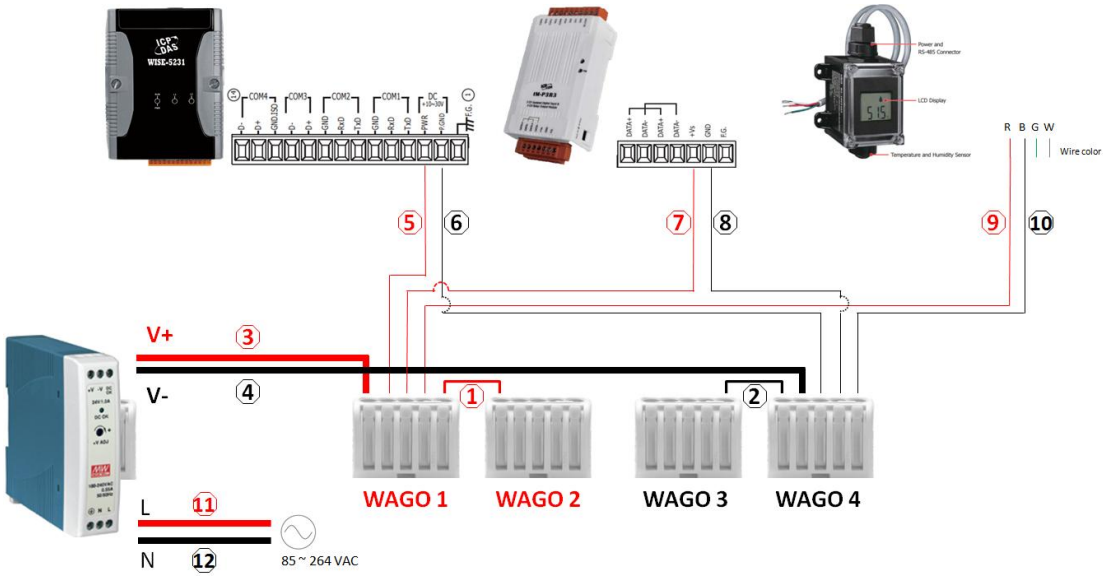


4 Setup WISE Monitoring IoT Kit

Connect the modules as bellow provided by the IoT Kit.

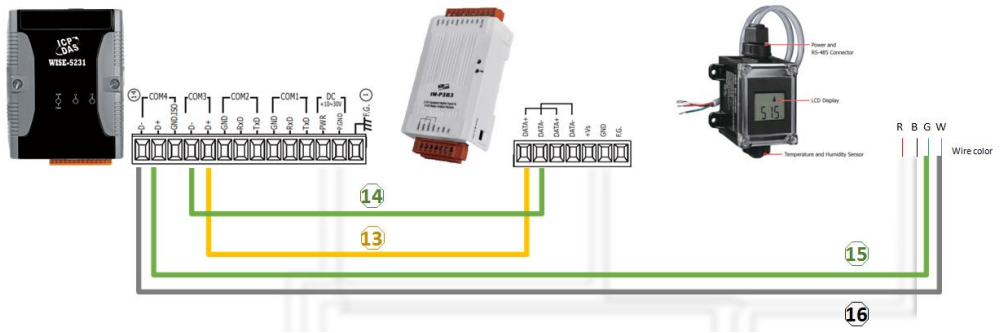
- WISE-5231
- tM-P3R3
- DL-100T485
- MDR-20-24
- LED Indicator (Red)
- Switch
- Power cable

i. Please refer to the figure as below for the wiring of power.



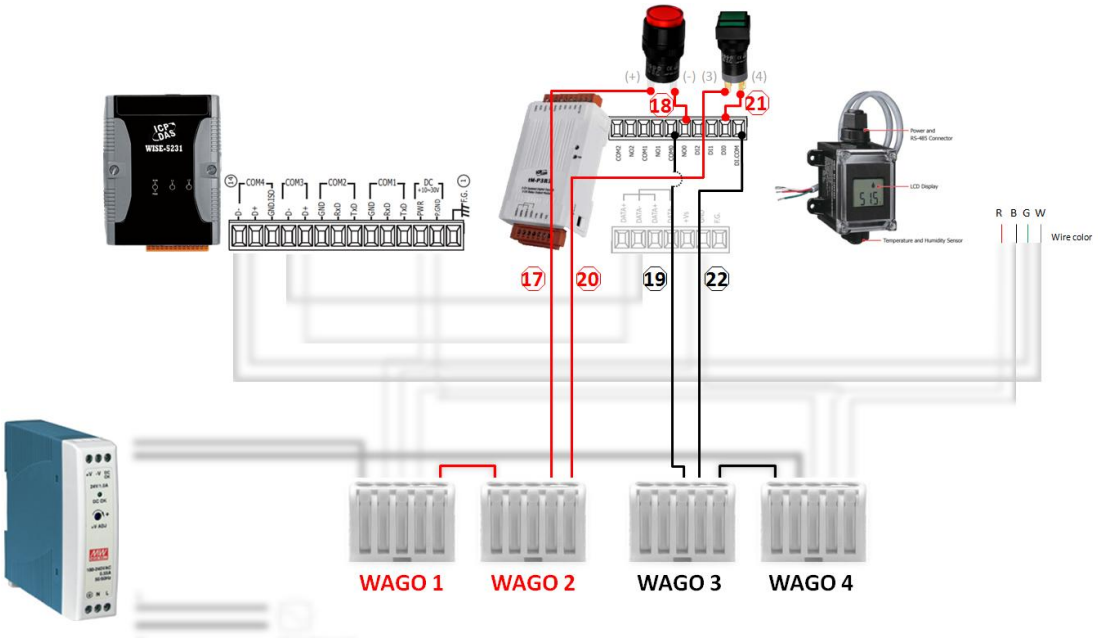
Step	Decription
1	Use the red wire(5CM) to connect two WAGOs(WAGO 1, WAGO 2)
2	Use the black wire(5CM) to connect two WAGOs(WAGO 3, WAGO 4)
3	Use the red wire(30CM) to connect MDR-20-24 DC V+ with WAGO 1
4	Use the black wire(30CM) to connect MDR-20-24 DC V- with WAGO 4
5	Use the red wire(15CM) to connect WISE-5231 PWR with WAGO 1
6	Use the black wire(15CM) to connect WISE-5231 P.GND with WAGO 4
7	Use the red wire (15CM) to connect tM-P3R3 +Vs with WAGO 1
8	Use the black wire(15CM) to connect tM-P3R3 GND with WAGO 4
9	Connect DL-100's red wire with WAGO 1
10	Connect DL-100's black wire with WAGO 4
11,12	Connect the Power Cable with MDR-20-24 AC end L,N pin

ii. Please refer to the figure as below for the wiring of RS-485 communication.



Step	Decription
13	Use the yellow wire(15CM) to connect tM-P3R3 Data+ with WISE-5231 COM3 D+
14	Use the green wire(15CM) to connect tM-P3R3 Data- with WISE-5231 COM3 D-
15	Connect DL-100's green wire with WISE-5231 COM4 D+
16	Connect DL-100's white wire with WISE-5231 COM4 D-

iii. Please refer to the figure as below for the wiring of LED and Switch.



Step	Decription
17	Connect LED Pin+ with WAGO 2
18	Connect LED Pin- with tM-P3R3 NO0
19	Use the black wire(30CM) to connect tM-P3R3 COM0 with WAGO 3
20	Connect switch Pin3 with WAGO 2
21	Connect switch Pin4 with tM-P3R3 DO0
22	Use the black wire(30CM) to connect tM-P3R3 DI COM with WAGO 3

5 Connect WISE-5231 to Azure IoT Hub

Step1: Prepare your Device

- Follow the instruction described in this Quick Start to Connect to the Web interface of WISE-5231.
- Follow the instruction described in this User Manual to set tM-P3R3 and Module parameters following table.

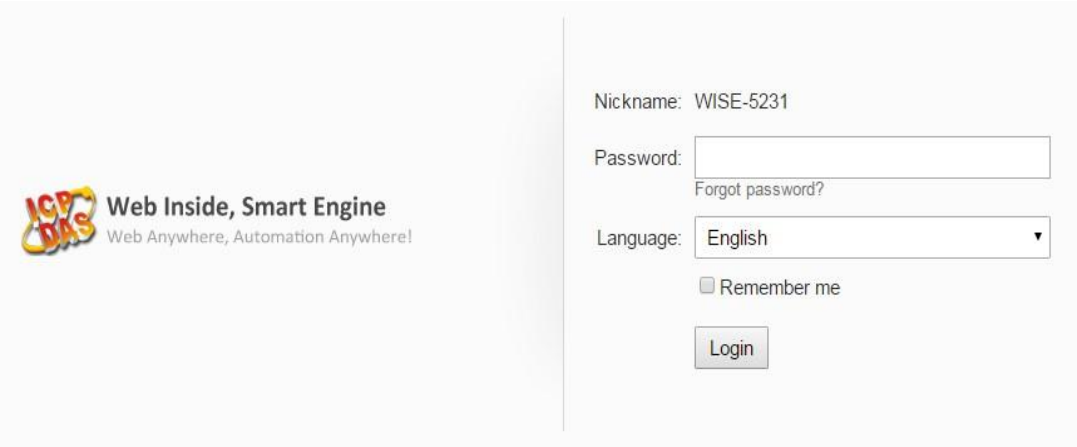
Module Name	Serial port parameters	Modbus Address
tM-P3R3	9600 N,8,1 (Default)	1 (Default, Connect to WISE-5231 COM3)

- Follow the instruction described in this Quick Start to set DL-100T485 and Module parameters following table.

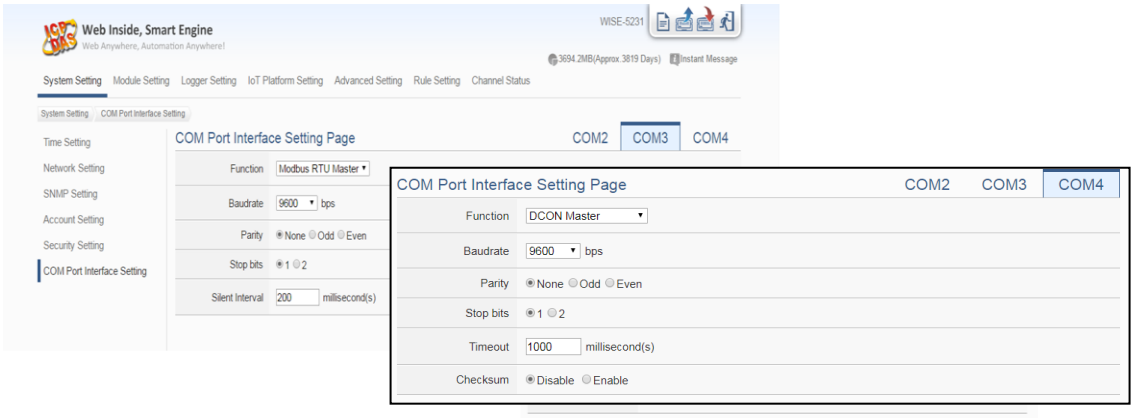
Module Name	Serial port parameters	Modbus Address
DL-100T485	9600 N,8,1 (Default)	1 (Default, Connect to WISE-5231 COM4)

Step 2: Build the sample

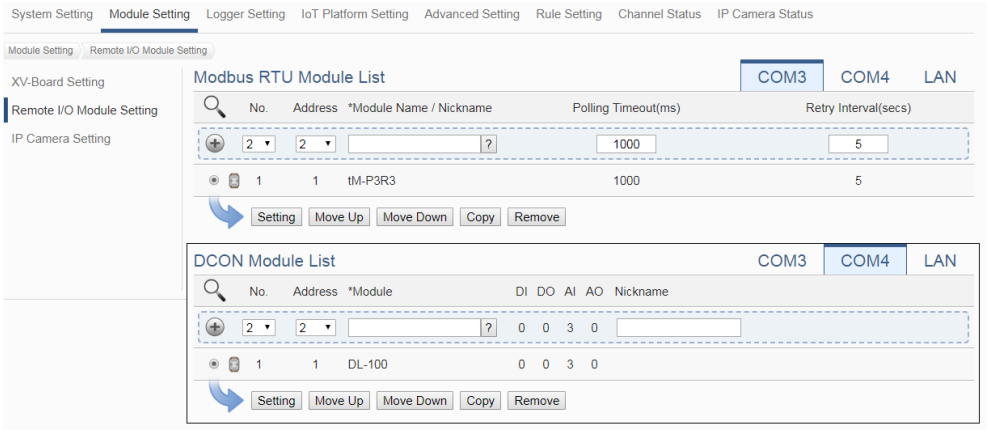
i. Connect to WISE-5231's webpage server via Web browser, login with the default password "**Admin**".



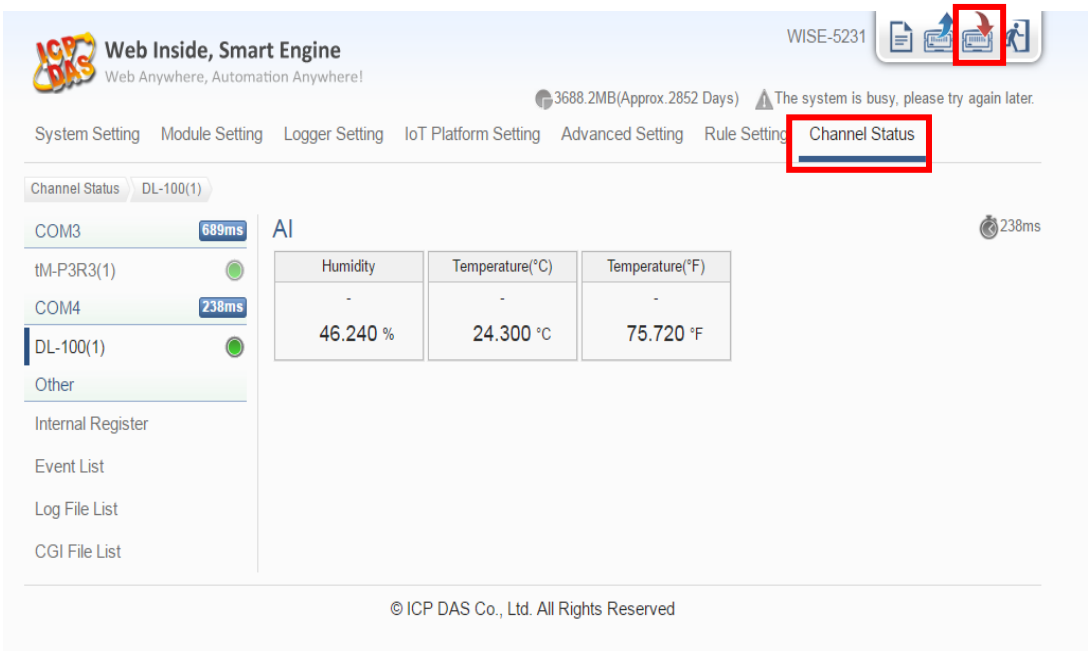
ii. Go to the "**System setting** >> **COM Port Interface Setting**" page to complete the setting of COM3(Modbus RTU Master) and COM4(DCON Master).



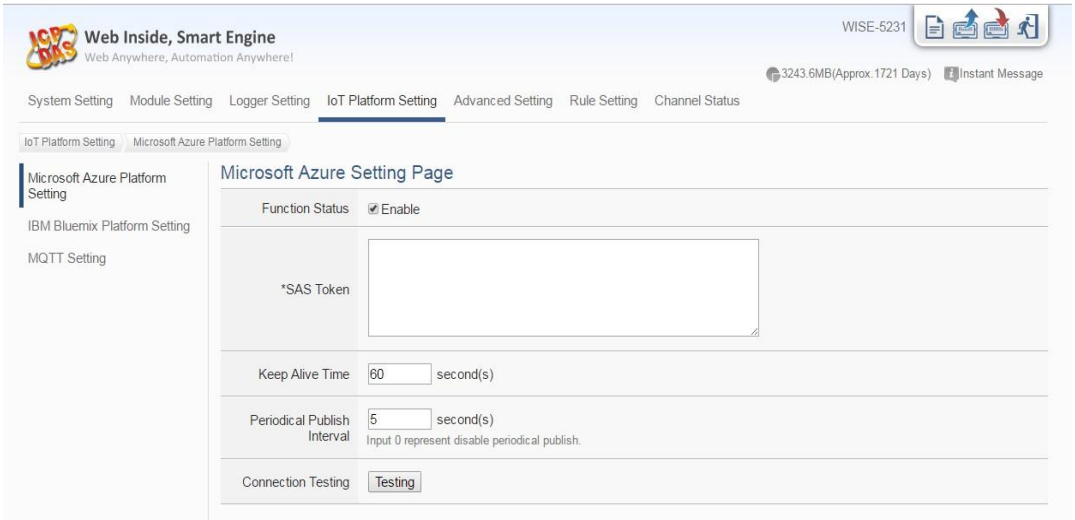
iii. Go to the "**Module Setting** >> **Remote I/O Module Setting** " page to add tM-P3R3 in COM3, and add DL-100 in COM4.



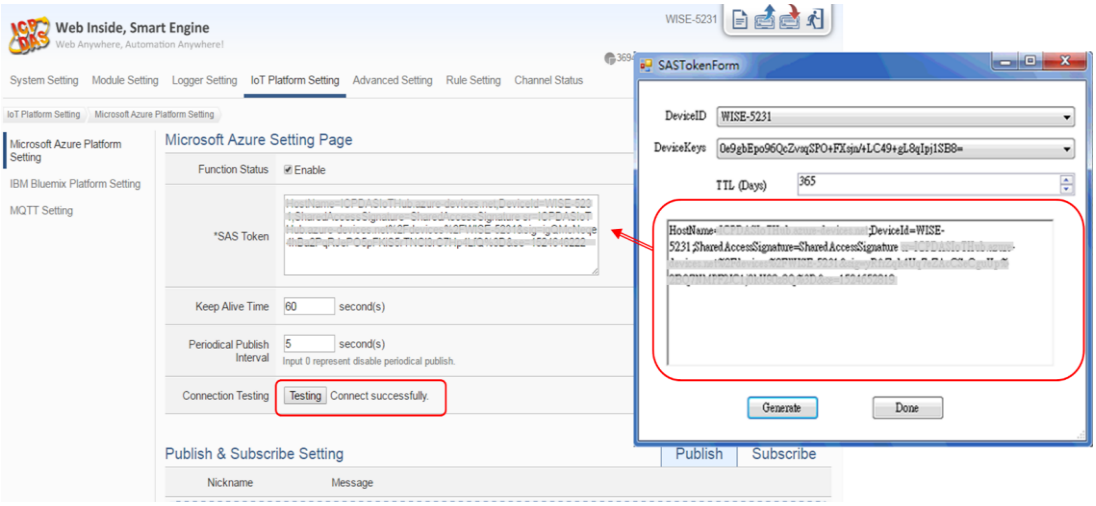
iv. Complete the setting and download the setting to WISE-5231, and then go to the "**Channel Status**" page to check the module communication status.



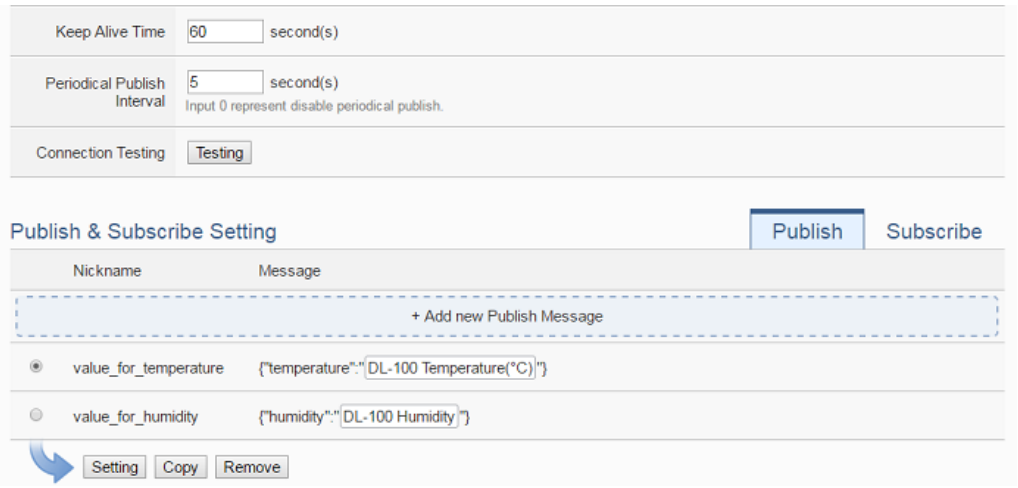
v. Go to the "**Microsoft Azure Platform Setting**" page.



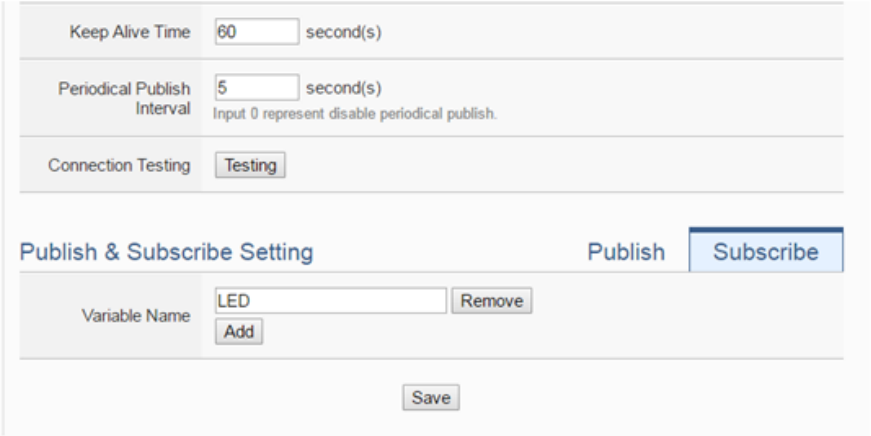
vi. Input the SAS Token generated by Device Explorer. (please refer previous section)



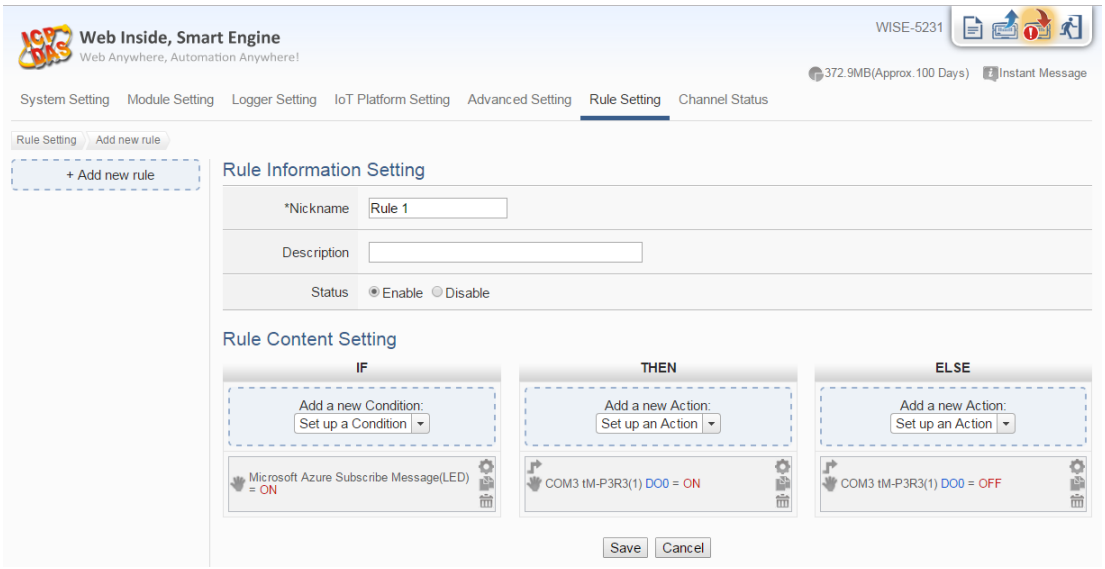
vii. Complete the Publish Message editing.



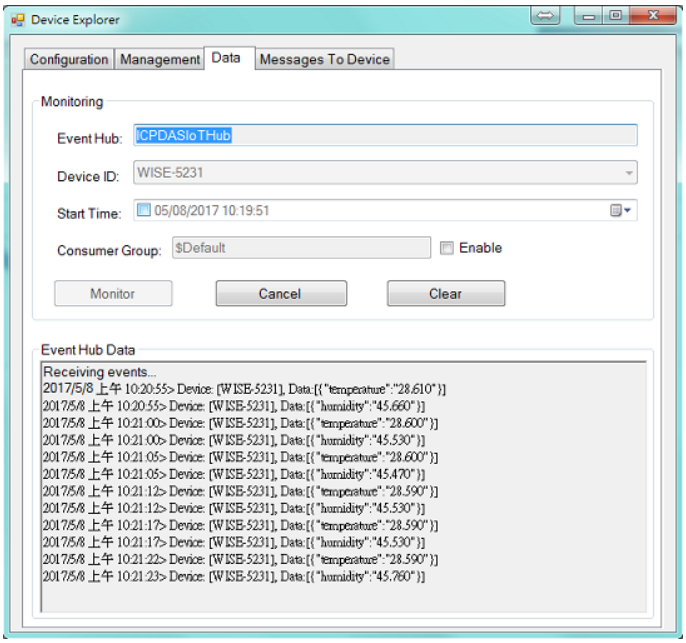
viii. Complete the Subscribe Message editing and click the "**Save**" button to save the settings.



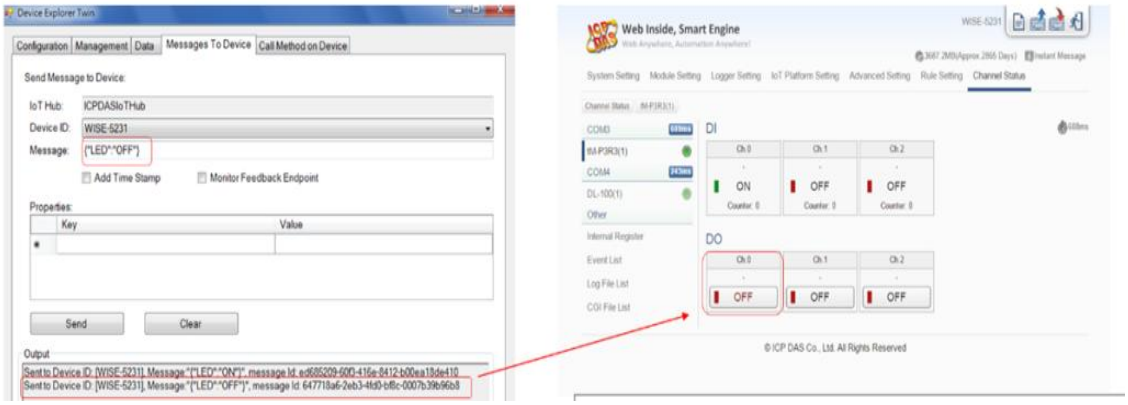
ix. Go to the "**Rule Setting**" page to add a rule to turn the relay on when receive the message from Azure, then remember to download the setting to WISE-5231.

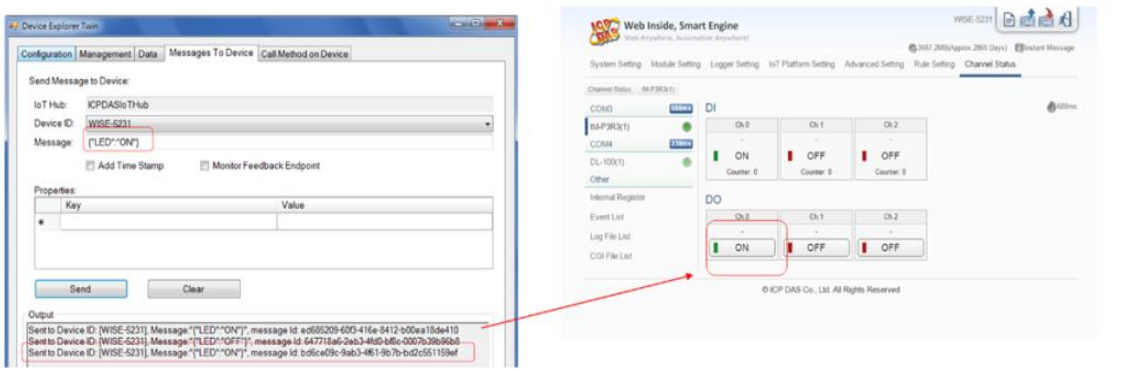


x. Use the Device Explorer utility to verify if the IoT Hub receives the messages from WISE-5231. Go to the "**Data**" window, select the Device ID of WISE-5231 and press the "**Monitor**" button. And then Device Explorer would receive the messages send by WISE-5231.



xi. Go to the "**Channel Status**" page to observe that the LED status changes when WISE-5231 gets the message send by Device Explorer. Go to the "Messages To Device" window of Device Explorer, select the Device ID of WISE-5231, and input the Messages ***{"LED":"ON"}*** or ***{"LED":"OFF"}*** in the "**Message**" field and then press the "**Send**" button to change the status of the LED indicator.





6 Resource

- ICP DAS WISE Monitoring IoT Kit URL: http://wise.icpdas.com/products/WISE_IoTKit_01.html
- Microsoft Azure IoT Starter Kits URL: http://aka.ms/iotstarterkitss